

>SPBIB_v1_10001|ID:27161763| protein of unknown function [Uncultured spirochete bib]
VVDIRPVYHHLDDRIRAHVLCFIAMVLRVAERTLSMSWRDIAYTLTDIRVGHTKGPDG
ELWLTSPLEMQRTLFTMLKVKHPPKVWDFKKSCKAPIGV*

>SPBIB_v1_10002|ID:27161764| transposase [Uncultured spirochete bib]
MGKVTKAEVSAILQGMQDRELYEKLLGLKEPWSVENVTLDLPSATVTVAISHPKGAKFPC
PVCGTERPIYDHQKRRWRHLDTGFTTILEAEVPRIQCPEHGVKQVNVWPWGEPGSRFTAL
FEAIAISLLKVASFSDVARHLRISWDAASGIMERA VRRGLARREAQPLRRIGIDETSFOK
RHEYVTVVFQDQERSCVVDVLDGRKKETLKTWLAANQNALTALESVSMMDMWDAYIGAVREA
HPDGEQKICFDRFVAQYFNKAVDKVRAEEHREFKTRGEQSPLTRTKHAWLRKGGAPDAAF
SSLARSNLKTARAWRIKEAAELLRTKSHEEAARDWRKLLSWMMRSRLGPVVKVAAMIRQ
YLWGILNAARLGATNAKNEAVNATIQLKVRACGFRNRSRFRKVMVILSHLGLSLLPEVMT
*

>SPBIB_v1_10003|ID:27161765|chpA| toxin of the ChpA-ChpR toxin-antitoxin system, endoribonuclease [Uncultured spirochete bib]
MVKPKKYVPERGDIVWLDNFNPQLGHEQKGRPALVISFKEYNEKIGLALFCPITSKVKGY
PFETEYKGIINGCVLSDQVKNLDWTVRNVEFIEKIEDEKLNIDIIDNILLIEK*

>SPBIB_v1_10004|ID:27161766| Transcriptional regulator/antitoxin, MazE [Uncultured spirochete bib]
MQTVVQKWGNSLGIRIPSVYAKEFNKLGNSVEIVKEGGKIIIPPKKTLEEMLSKVTKD
NIHAPIETGSSLGNEEW*

>SPBIB_v1_10005|ID:27161767| PilT protein domain protein [Uncultured spirochete bib]
MLNSILIDTGPLIALFDKDDTYHNKVKDFIKNAKYRFITTA VITEVSHMLDFNINAQID
FFEWIMKEGVILQEISQKDISRIIELTKEYSDRPMDFADATLVIAAEKTGIKKIISIDSD
FDIYRLPGKVKIENVFHK*

>SPBIB_v1_10006|ID:27161768| CopG-like domain-containing protein DNA-binding [Uncultured spirochete bib]
MTTVRLPIEIEQRLEILARKKHKSCTDLIREALEKLFIEESEKDSYELGEEYFGKYGSG
DGTLSVITYKDKLKDKINAKLNSH*

>SPBIB_v1_10007|ID:27161769| Phospholipid diacylglycerol acyltransferase protein [Uncultured spirochete bib]
MPISKSTNWGRKEKMITYTESLRGVSHYSLDGFCEGWQQLTPLQLRSILKHSTYRILAM
DTEHTRIVGIITALSDKIHWAFIPYLEVIPAYQKQGIGKRLMELMIEKTKGIVCIDLTCD
TEMQAFYEQFGMVASHGMILRRYMDEK*

>SPBIB_v1_10008|ID:27161770| conserved protein of unknown function [Uncultured spirochete bib]
LANFKIAETETFEKKIQSSQYKFLYKKIQHYIYPLLRENPFYFGPNIKKLKGEYKEIYRFR
IGDYRLFYTISEETVIIFILDENRKDAYK*

>SPBIB_v1_10009|ID:27161771| conserved protein of unknown function [Uncultured spirochete bib]
MAKTITVRVEDTTYDIFKKA AEGQKRTISNYLEFAALNYTVNETVDDSEMKEILAFEND
IKKGLADISAGRYKVIG*

>SPBIB_v1_10010|ID:27161772| Ribbon-helix-helix protein, CopG family [Uncultured spirochete bib]
MKKTNTITLRVPEELKERIENMATLQGVSMNQFALYAFTKELSELENSQYFKKYLGKGGK
EEIIGFDDVFSKVKPRNVDQWDTL*

>SPBIB_v1_10011|ID:27161773| Toxin-antitoxin system toxin component, PIN family [Uncultured spirochete bib]
MKVVLDTSVLFQALYSSTGASHAILKLIREGALQLPISIPVFEEYREVLLRQSSLDL FEL
STNDVQKIIDFIALIGVKTDIRFLLRPNLRDENDNIFIELAFASGAHYVITKNVNDFKYD
ADLRFNEITATPAEFMKIWRNTYEK*

>SPBIB_v1_10012|ID:27161774| Plasmid stabilization system protein [Uncultured spirochete bib]
MSAKYTIVFSRYAEDDLSEIHKYAEKNSQYALKLLDTLETRVQELREL PARGRIVPELA
QQNILEYRELIEGNYRIIYVIQDSMVVIHAILDSRRNLEELLMQKLMRFYS*

>SPBIB_v1_10013|ID:27161775| Prevent-host-death family protein [Uncultured spirochete bib]
MNVNLKDTIKPISYIKTNAADMMKFINDNKSSIIITQNGEAKA VLVDIDSYQEMRDAFSL
LKIIKLSEKDIAAGNYKESDAVFSNLR TSLSK*

>SPBIB_v1_10014|ID:27161776| conserved protein of unknown function [Uncultured spirochete bib]
MNKKVFIDSDVILDLLSKRQPFYPA AAEIFTFGDYGLDLYTSSLVFSNVFYILRKS VGN
EKAKELLRKLRLIRIPIVEKNIDMALNSTFTDLEDAIQYYSSCSFGIDVIVTRNTSDY
KNSEELLIQSPEEFINIISIEKE*

>SPBIB_v1_10015|ID:27161777| conserved protein of unknown function [Uncultured spirochete bib]
METKLTCLKDQAIQRAKQYAEHNRSVSKLVEDYFRNLIVNRKDKTHYSPLVEELSGVI
TPDDINNSDYTSYLEAKYE*

>SPBIB_v1_10016|ID:27161778| Kinase domain protein [Uncultured spirochete bib]
MENDVIKQIRKDYTFIRNIGRGATGAAILLKDELIDQLFVCKKYQPAMGIEPAEYYSKF
VNEIKMMYLLNNRNVRRIYNYLYPKQYTGILMEYIDGNSIGDYISKNPKEKIDIFIQT
VNGFYELQENGILHRDIRDSNIMVSSEGIVKIIDFGFGKIEFSDYDKSISLNWQCQP
NEFNDGRYDFKTEIYFVGKLFKLLLDNGLSNFKYSDQLKKMIAPDPENRISSFKEIFSE
AILKNDMENIFEDEIEIYRSFANGLSAIYAKIENSAKYEKDVELIISKMEECYKKNMLE
QEIIDSNDLAKIFVQGA YTYKKRTIYLSCLKNFLQLLKGASSEKRRRIIMLNENRLDAI
EHYRKPEDNFTDDIPF*

>SPBIB_v1_10017|ID:27161779| protein of unknown function [Uncultured spirochete bib]
LAYELDYVIFHFTLTREKSI*

>SPBIB_v1_10018|ID:27161780| membrane protein of unknown function [Uncultured spirochete bib]
MAIKEKKQRYFEYFTYLKTSINLAYRPSKLLDYSLKHSFTTLLFNSITLISIFSLTIVIV
LALFNSEYSIENQIKISFAMFLISLLYLPGLVTSILFKNKILKTALKASFFICINIIVFY
LSIPIFSLIIFKSEIYFFYYAYLFLCIIFFIYIILPILYSKGNHRINILLSIVIA
LSFNISVSFIKNQNNNIAESIDPIFYELRSNNLLERSRYDYLDQDTGNIINSVNKYLN
DNIKYLEELGLEEKPLLLLKESLLELEKKIHFRTNKQLITTSIEAADILRNISQTSRIT
ELSDLPQSIQKGIAYINDGKELIEKNQKIVNEDMTKINTILDKINHLKDITTEYNQM
LKESTKLNNDIININLDIKKIDALLKNADAELETTDQYIEYLNKKNSVIKEITILIEEYE
KNINDRIKAVKKIEQIYKLKNVYFFP*

>SPBIB_v1_10019|ID:27161781| protein of unknown function [Uncultured spirochete bib]
MIDIYDLEKVLVSKISFKNLIDLRTKKYLM DINYPSLYVFWFNNDGAIKNLKRNFVIKK
PGKFENNL*

>SPBIB_v1_10020|ID:27161782| protein of unknown function [Uncultured spirochete bib]
VMIVASFLGFAWGWLFLFVKMPGEKTPSEISEIDEEKTKKARISILFFQKVR*

>SPBIB_v1_10021|ID:27161783| IstB domain protein ATP-binding protein [Uncultured spirochete bib]
MIRTPQERERTRITIASMSRKLMLSSRVVELCESEATPRQEEFLKVLSEEIDRRERGKK
ARLLNRAGFPVFKSFEDYDFSEIRFPPALSKEELLRADFIPEKKNLVLYGGVGTGKTHMA
IALGIAACEKGLSVRFLTVTELVLKLEAYKAGTLERLIRDLKQLDLLILDEWGYVPVDR
EGSQLLFRIIADSYESKSLILTTNLEFSKWGGIFTDEQMAAAMIDRLVHHGHLLEFEAKS
YRMTHALMRQPGPTAKPKTTVEAGSRLGEGGA*

>SPBIB_v1_10022|ID:27161784| Integrase catalytic region [Uncultured spirochete bib]
VINMPQIQGIREQYREGSSVAELARIYGVDPKTVRKYLKQDDFSPKPPEKMTKESILDPY
KPLIDSWLLEDQGRWHKQRHTAKRIHDRLISEVAGYACSYNTVQRYVKRVLQEQRVTRAS
MELVWHPGESQADFGADFLERGTMRVKKYLTLSFPYSNDSFTQIFGGETAECVCQGLKD
IFAYIGGVPPLVVF DNATGVGRRIGEIIHEAELFSRMRAHYGFSVRFCNPESGHEKGNVE
AKIGYTRRNLFVPEPAFDDIEDYNRTLLSLHASKAQESHYKLLPIKDLFEEDTRALLPL
PRTAFDPVRYDYLDKADGYGKVRIDSRHYSTSPYAGQEVLVAIRAHSIDILDDHKRLVV
RHSRVYGERRSDSSDYRTSLAVLMNPNPAGWKNSGIRELIPDPLKSLMDRQQRTQLHATLK
TMHTLSSEYGF EIAVQALEEGVQRSRTSFHDAAILAARIAGYGLNMAPERGQDLHVYDEF
LEGVQV*

>SPBIB_v1_10023|ID:27161785| conserved protein of unknown function [Uncultured spirochete bib]
MNKKVFIDSVDLLSKRQPFYPAAAEIFTFGDYGLDLYTSSLVFSNVFYILRKS VGN
EKAKELLRKLRLIRIPIVEKNIDMALNSTFTDLEDAIQYSSCSFGIDVIVTRNTSDY
KNSEELLIQSPEEFINIISIEKE*

>SPBIB_v1_10024|ID:27161786| conserved protein of unknown function [Uncultured spirochete bib]
METKLTCLKDQAIQRAKQYAEHNRSVSKLVEDYFRNLIVNRKDKTHYSPLVEELSGVI
TPDDINNSDYTSYLEAKYE*

>SPBIB_v1_10025|ID:27161787| protein of unknown function [Uncultured spirochete bib]
MIYGILVFLWCIIGYIFSLITEIPLGYVGPIAILLGIISMNIIRKKMK*

>SPBIB_v1_10026|ID:27161788| protein of unknown function [Uncultured spirochete bib]
MKSIIISHNKLFTICLHNMLNYLVKDNKNIIDNFVLIVIDATSIDSNILQKLLKYSDS

IYRILLIHDHVDDLTEKIVYNSRVVAVYNPRASNSTKFGHLLQHVLDGGVMLSKEKLFEL
RHTESIHTKIVFTKREEEINQLLHNGDSIKVISSKLHISQNTVKVYISRIYKKLGIHSRA
EYYINYDVLSGNMEVKA*

>SPBIB_v1_10027|ID:27161789| exported protein of unknown function [Uncultured spirochete bib]
MKKIFACVLIVLLVVSVPAPAFARPTARENADFVVDIIGISLGIVKRAGTALAVVYTAADF
ITYAVTGKTIGGYANDGFEEKSKIIYADDNKPYRGWMGLGMQ*

>SPBIB_v1_10028|ID:27161790| Integron integrase [Uncultured spirochete bib]
MGSIIFDKAAAFMNYLMAKCNFSAKGTEWACIWVEKFLRFYDPDWSNREKAIAGFSEALSR
RKPANIVNLALRSVQLFIAFIDFELGERPLARSTQSGEDATGSRSKTCSISASSEENPGE
SKDREWQEFASRAMKQVRELIRLKHRSRTEKTYLGWTRRFLDFIRVRRLANFVDGAPKI
TADHLRAYLSYLAVDVRSASMQEALNALLVLFMRVLHIEIEGLSSVLRKAKRRLPMV
LSREEVSALLAQLRQPYRLMASLMYGCGLRLEECLSLRVKDINFENETIEVRAGKGGKDR
LTMLPGVLKRVLHEHLRELRALWEEMRRRDLPGIFLPEALDRKYPGLSKEWSWFWLFPK
SPCANVRTGEIAFWHVHPSVIQKKIRLAIQAAGIQKLASAHTLRHSFATNLIEDGYDIRT
IQELLGHSNVQTTMIYTHVAMRNKRGVRSPLNL*

>SPBIB_v1_10029|ID:27161791| protein of unknown function [Uncultured spirochete bib]
MSQCGTRGACAVLWRICEQGSRLRHSNLFSDSDGESGRNRFTFQQIAFYHILLKSIVN
RSEEVVNLILEKELEAK*

>SPBIB_v1_10030|ID:27161792| Anion transporter [Uncultured spirochete bib]
MNKNSAARKLAAIGIAAILFAVLAFLPLPDSVRRAGDALLDPKGQRAIAVLAGALVIWVL
EALPFHITGLLAMVMLALVGAGDFATIVKSGFGDDVVLFFIGVLALAAIVRSGLGKRV
LLVLSITGNSTRRIIFGFLAAGAFLSMWVTAIASSAIIMPLALAILTEEGAKPGESRFR
ALMLAVAWGALIGAVGTPAGSGSNPLVVKFMGSLAHVDISFVRWMTIGLPIVALLLPSAW
GVLVLFSPPEMTHLQKSRDDIKHEFSNQSRMSHDEKATLIVFAITVLIWVASPLFQSF
WHIKIPISMGA VAAVLLFVPGMTSFKWKDLQKEIDWSGIILIAAGISLGMTLYQTGAAAWL
SVVLLGGIGNLPLFVRLVLIVLAVLTVKIAFSSNTLTGTIIVPLVLALGPLLGTGAAGLA
LAAGFTANLAILVTTSPVNIIPYTTGYFSIKDMAIAGLILTPLAALIALVFSILGPAM
GIL*

>SPBIB_v1_10031|ID:27161793|sucD| succinyl-CoA synthetase, NAD(P)-binding, alpha subunit [Uncultured spirochete bib]

MSILVDQSTRTIVMGATGSEGTFWTEHVMVNLGTHIAAVTPGKEGEHVGDIPVYHSHVHRA
LDASALGSRSAAGAPADTYAPADAAMLFPVPHFTKDAVFECLDAGIKLIVIVADGIPLHD
ALQIRAASRTEGALVVGNTSGIISPGKAMLMGMPYWIERYKPGRIGVMTRSGSLTNEV
TAMVVRAGFGVSTLVGVGGDPVPGTRFAEILARFQEDSETDAVVMIGELGGTMEEEAEM
IASGAFSKPLIAFIGGRHAPKDKRMGHAGAIISGGKGSALDKMRALEEAGALTAERASQV
GILLAETLKSARGAVTSAKSARSPLSADSAPGASTRGSHNE*

>SPBIB_v1_10032|ID:27161794|sucC| Succinyl-CoA ligase [ADP-forming] subunit beta [Uncultured spirochete bib]

MKLHEYQAKALFREFGIPAPQGEADTVEAAVNSAEHLGWPAALKAQVLRGGRGKAGLVK
IVQTPEEACTAAQAIFASDWKVRKILVEQAIAHERELYVSFSADSRTGAHLLLASAEGGV
EIEDLARTAPEKILKEHIDSIRGILPYQARTAAYDLGFAPSLAKGFASIIKLYRLYVQK
DCELAENPLFVTLEGNFIAADAKISIDNLFHPEFEQDPADFDSDIAREAAAEGIPY
LQFDGDISLMCAGAGLTTAVYDLVDFGGTVANYLEFGGPNYRKSVRAMKLCIKNNPKVI
LIVTFGTIARADIMAEGIVEAIRCLRPDCPIVTCIRGTGEDKARETLLSAGLEPLTDEE
AVKKAVELAHARSTATERPTPAAASKQGGQP*

>SPBIB_v1_10033|ID:27161795|sauS| Sulfoacetaldehyde dehydrogenase (acylating) [Uncultured spirochete bib]

MNGQSILSEQASSEQASAGQTSSAPKTDSADGQAFIAEIVARARAAQKIAATWSQERVD
EVCVAVGWSVYNDENIRKLAELAVAETGMGRVEDKITKHKNKVMGVLRDIRGVRTVGLME
EDPARGLRKYAKPVGVGALAPVTNPTATPASNGLSILKGANAVIFAPHPKAKKSTTLAC
TFMREALRKVGAPEDLVQVIEEPSIELTQELMRQVDLIVATGGSAMVKAAYSSGKPAYGV
GPGNAVQLLEDADPEDAAKKIATSKSFDNATSCSSENSAVVHRAVWDRFLAGLQKEGGW
LCTAEQKKALRHYLWVTGKNGQENLNPAIIAQDADKIARGAGFDVTKGTRFLIVQGEQPI
ESDRFFWEKISPLTVLPCDSFEEGLRFVERITDLCGTGHSSGIFTFREDYIDRMGLYMR
SSRIMVRQPMVSGNGGTFFNGMPSTVTLGCGTWGNNITTENIHWKHFINTWLAMPIELN
RPKDEDIFGDYWKRFK*

>SPBIB_v1_10034|ID:27161796|rpiB| Ribose-5-phosphate isomerase B [Uncultured spirochete bib]
MPEKIVIAIASDLSGFPLKREIVKHLRENHPELEVLDGIESEDAPKPYIQAQKVAKAI
QDGRAQKGIACGTGQGMIVCNKHKGIYACVADDIFSGERGRIINNANVLTMGGWITAP
FLGCQIVDAWLSVAFTQKMEFKKDFLTNAFNNVQKIEEENFK*

>SPBIB_v1_10035|ID:27161797| putative transketolase C-terminal section [Uncultured spirochete bib]
MSDQKEMRAVYAETLISLVEEGKDIVVLEADLMRATGTTAFACKYPDRAVNVGVAEANLV
GIASGLSAAAGKVPFAATFACFASRRAYDQFFLSANYAQLNVKLGITDPGVTAAFNGGTHM
PFEDLTLMRVIPRLTIAEPSDPISLAAITRLGANLKGsfymRLQRKPAPVIYRENEFSI
GKAKVLRGGDVTLVALGTMVNEALKAADMLAQEGIKATIIDALWLSPLDEETILAHSG
CGCIVTCENHRVTGGLGSAVAEVIAEKAPGVRLARIGVAADLFGVGTLDWLAERFALTA
PHIADAARTLIQQK*

>SPBIB_v1_10036|ID:27161798| putative transketolase N-terminal section [Uncultured spirochete bib]
MNTHEIQALERKAREIRGLTIEEIGYLGVGHHGGALSIVDLLVLLYHKHMNINPKEPGWP
ERDMLVLSKGHAGPALYATLADKGYFPLDWLLTLNKGGTNLP SHCDRTKTPGIDMTTGS
GQGLSAAAGLALGRAMDRKPGFVYCIIGDGESNEGQVWEAAMFAAHRKLSNLIAFADWNG
MQIDGLTKEIIDMDDIVAKWTAFGWHARMVDGHDFAAMDKAIEEAKRRAAPGIERPSMIV
LRTIKGKGASFCGQVTNHNMSYGIPQTKREALAALGVPARLIPELVHGA*

>SPBIB_v1_10037|ID:27161799| protein of unknown function [Uncultured spirochete bib]
MSKERAMGRMRVRVKRAAGMARLFTRALVMGLAMWVVTGCSPPAIESAVLGDIRPPMVKN
ARLESGYEFIEFDEPVRVPKDSFSAEPKRLAAQAESSENVSVLFEPPQSPGCVVTLG
TVQDMCGNSTRVQVQFKGYNDRPAGLVITEIQTAKNTSKKAPHRDYIEFLVKKAGNLGGI
YVQWASSTKTMRFDFPACEVRAGEVIVLHLAPEGVAEEKNETGSELGLSGGIDATAQGRD
FWS DAGGLPDASGAI VHEREGALPIDGIFYADSSKSGKLES AKLIALARELADAGLWKL
DVPPLWENALLWKPSTSRPLVRTSTSPYGASAWGIGESGSQSPGIVN*

>SPBIB_v1_10038|ID:27161800|trxA| Thioredoxin-1 [Uncultured spirochete bib]
MSAEVTLTSENFKKEVLESKIPVLVDFWAEWCMPCKMIAPSV AQIAESYKDRIKVGKLVN
DEQSDLASQYGIISPTLIVFKDQVARQKVGAMPRHEIEKLFDLI*

>SPBIB_v1_10039|ID:27161801| MATE efflux family protein [Uncultured spirochete bib]
MIGKQTEKMPNTTASPFARSLSLGPFWFYREALALAI PVMQLSLITGLVSLVDNFMVA
GLGDAKMAGVNIANQVNFVFMVIINVVTIAGGIFLSQHRGAKNQEGMIQAFRFLVMGTG
LSTAYFLVCVLAPEALLSLMVSNNAQGAVIVAEGARYMRAVSFSFIPIALS GAIGSSFRD
IGEPKVPLL VSTAAA IANTIGNWFLIYGNFGAPRLEV VGAATATVIARGLEITAFIVMLK
ARKPAFAFRLKTIFRINGKFFADVLSRSAMMFFSETAWV VSETIITALYNRRGGPETVAG
MAAGWSVANLFFLVFP AIHTATNVIVGSTLGAGKLEDEGRAKARWIMAGSVFFGLAAGLFA
ALSTAVVPLVFGNLS DQARIVTRSIIFVIAIYLPLWCLLNAQFGVSRAGGDTLMGLFVDV
GVTYVLFIPAAFVIARYTSWGPVALFGIAKLS DIPKALVAGWWLAKERWVRNLTVASVFK
AVL*

>SPBIB_v1_10040|ID:27161802| Beta-mannosidase [Uncultured spirochete bib]
VEIINLAGQWRLVRLADGSARPMEVPGDIYSALIQSGELKDPYYGESELKAQWPGREDWK
IERSFTIPEHFLQLETIRLQADVIDTISEVYINGSLAGTSNNMFRSFEANPKPLLHPGEN
FIAVIIRSPEQAAIREAARLHYPASLYPVSSPHRNLIRKAQCMAGWDWGPCLMTGGIY
DSIKLIATDGPVIK YVQTRMKALGPFPA TEEEPASGPDFSLDIFADIEVPEEMDIETEFF
LVGRHVSHDCHLVSNYHLAAGTHRISATMLVKKPDLW WPNGHGKPALYDLYLKTGSDPLS
EISAEVHKKIGFREL RVVSEEDDIGRSFKFV VNGKEIFAKGANWIPADALPSRWTRARIA
GLLDSAVEAHMNCLRVWGGGRYESDDFYELCDER GIMI WQDCMFSCALYPSSPEFLSNVE
AEITHQVKRLSDHPSIALWCGNNEALGAITWY EESKKNPARYIVDYDRLTEGVLGRVIRA
LDPDRCFWPSSPSAGPNDFSDNWHSDER GDMHFWSVWHEGKPFSEYLT VQPRFCSEFGFQ
AFPSMRTIESFAPSDERNISAPALEAHQKHPRGNSLILDTMLRYFRLPKGFWELVYLSQV
QQAMAIRTA VEYWR SAMPRCMGTLYWQLNDVWPAVSWSSLNYDGTWKLHLYEARRFYAPV
ILALFIKDGI AQAHIVSEIPGEHTATITLQLLDFHGEPRGVLCTNSSTITNLT SQIVWHM
PVSEL PYKPEEA YIEAALDVPDLGISTAILFLTEPKRCKLADPGLDVT LATNEKGQIEA
TVHASEAPAFYVALELEGLPGQFEDAGFYCKKGARKK VAFISEETATTRKHASIATQRAH
AEASAISMANASLQARLRV FHLQNSFEH*

>SPBIB_v1_10041|ID:27161803| ROK family protein [Uncultured spirochete bib]

VSSRSDQWTRTATRIFRTIWRPNPNSRVDLAKKLGLDKSTVTKQVADLLENGLIEEKEEG
EASARGGRKPIYLAVNKEYGRFIGIELQLGFFEAVVVDLAGDILETARGEVRITQENFAA
TVADIVDTMQKRFCSDSLLLGVGVGTAGLVDSKKGRIKYSVPLGIQKTLDFAKAIAGKLK
APAFIENDANCCAWGELAFNRDEELKDFLFALVEYRQDETSLIRYGGIGVGFVVLGGRV
HTGAHGYSGEFRSAFCDPGELQFSLSREELMCLRGDKNLLHRTVDELARNMAMLINTMD
FQHVIYIGGDIEALDIDLPAILRHRLEENWMPSPKDVEIRYSSLGDKAVAFGAAGMVFER
LMAERSMPGLAVELKNLDQQIGA*

>SPBIB_v1_10042|ID:27161804| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]
MKKGLFVFLALIALGSVMAQEKVTLNVLNYQQADQAGYQEDVAIWKRQFQELNPDITLNM
EVLNFNEPYHQKLQAYAAAGTLPDVFYVWPTARSAVIHEKKLAKDLSKLLGPDFLKDFSGA
ATDPNNQLGKYMAMLPQSFTYTSVMYVNNKLLADNGFDLPKTYDDLKMMVPKLLKAGGINV
IMLPDKDGMWPMQSCFLSTVLGRMAGNSFVDAILAGKAKFTDKPFVDSLKVIDNLYKDGII
AREDNQVGYGEAPGLFVSGKATIIYIDGWRVGA YITDKASGKALIPPAQESDFALLPFP
AIPGEVNPGLVLSAIAAGTGWASASIPAGSAKEKAAVRLIKYLYSDEVQAIRYSTGAYVPT
RKNVKANVEPLVAKVPLFYAANPKTCYVFDGMFDPAVYNVNDGLIAIGLGTSTPEKVAA
DVQKAYETWKASQK*

>SPBIB_v1_10043|ID:27161805| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]
MVHLNRVHLEEKRAYWAMVMPAFALYLLVMAFPIILSIMLSVSNYSGGKMFGEKWFAG
FSAYARVFTDPWFNALKNNLYIVLISVFGQLPLGFIFAYFIYSKIVRAPSFWQGVLYVP
NIISVIVVGLLWQVIFSPHGPAAEIVNSIHASSFQQLKAIFDGAGGFSLSDDVIKKILH
LAGPSGQAMFSDPPELRLDASYNQPISEIYTALSNLFVQKWSPAFLTKTDIAMPLPV
FVILWMYTGMYLILFLANMQKIDAQIESARIDGANEGQVMRYIILPALS GTIVNSAILA
ISGSLSSFALIFAMTGGGSPRVTEILSIYMYNNAFLGRPNFPLANAISLIMVLISVVLIV
LTKAVEKRYGGKEE*

>SPBIB_v1_10044|ID:27161806| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]
MSEMIKETKLQKALAAVGRGAVYIVMSL FALMTLYPIFWLIMNSFKTTREFQVSQ LAFPR
APTLQNYVEAWKMGDFGLLPNSVLYTLGATAGIIFLSLMAGFAFAKLKSRATKLIYNSF
VIGILLTQTLMIPFLFVNLLGLYNTRLAVLLVYIGAGLPIGIYLATEYIKAIPSAVVE
SARIDGAGFFTIFLKIIVPMSVPVATTLAMLNITGLWNEFALINILVSKTELKSLPLGIY
KFSGSLSTDYGGKQFAALTIGMVPMLVFYMI FRKQITKGVAAGAIKG*

>SPBIB_v1_10045|ID:27161807|bglA| Beta-glucosidase [Uncultured spirochete bib]
MKRQDGFPEDFVWGCSTSSYQIEGAASEDGRGPSIWDTFSSHTPGKVVQGHGTGDIACDSYH
RWREDVALLKELNAGAYRFSVSWTRIQPDGKGKPNQKGLDYYSRLVDGLREAGIEPWLEL
FHWDLPQALEDAGGWRNRDTAFRFEYARIMYKAIGDRVEHWTSMNPEWCA AFLGHLTGE
HAPGLRDREKTSRAVHLLLAHGLAARA YREGGFKGEYGLVINA AKPRPATLRPEDVEAS
ERASIERTSLWDPVFGRGYP ELMQHFSGMQMPIEPGDMDIIA APIDFIGVNYYNEDAVR
AALLSEENPYGFYVPTWQRKTEMGWDIEAQGLRRILMHIARNWPAKVLVY TENGAAFAD
APSPDGVIRDYDRIEYLREHLAACRQVI ADEVPLKGYFVWSLMDNF EWSFGYTRKFGLVS
IDHITKARRPKLSFYYYRDAIAGFGL*

>SPBIB_v1_10046|ID:27161808| Beta-N-acetylhexosaminidase [Uncultured spirochete bib]
MGCDLVPIPVLC EAKEGVFELGPGMSVQVSAGLEKEAALLAEWLSGIEGVGQVGISRAPV
ANAATSISLSLDPGMQRAEEYELGIAPQGIRIAAKDAAGIVRGASSLYQLALSQSRALRS
LRIQDWPRFAWRGFMLDCARNFFRVEFIEKLLDLAALHKLNVFHWHLTDDQAWRLEIASK
PELTGRGAFRQDMRYEIEWEKGGFYTRADV ARVVEYAAARHIMV VPEIETPGHSTALLAS
HPEFSCRGASDPSVLFKPEDHYGIFEDILCAGNDRVLA FIDEVLEEVCAMFPGEYVHMG
DEAPKARWLSCPACRSRMDVLGMRKGGGQYEPERLQAWFMGRMAEMLTRCGKRMIGWDEV
LEGGIQKDTLIMSWRGAEPGVRAASLG YDVMCPQTKACYLDHKQFDVPEEPGHLGVCT
KDSYNFDPVPDGLRKEEA AHILGGQANLWSELVYFGRQAEYMLFPRLCALSEVFWSPREN
RDFNDFSTRLATHTQRLDMLDVLYCRGKYF*

>SPBIB_v1_10047|ID:27161809| putative Transcriptional regulator, MarR family protein [Uncultured spirochete bib]
MSEHSELENALKAWISQIMRLSMRGFITFATEIGLSMPQIAVLFRLNGDKRCAVTELGDE
LGVSGAAASQMVDKLVQLGLVDRLEDPHDRRVRLLLLTQK GKTIERSIEARQE WIGHFC
SSLSEEKAKEAAGLFNQFAQIAEQLETALHTPSSH*

>SPBIB_v1_10048|ID:27161810| Xenobiotic-transporting ATPase [Uncultured spirochete bib]

MRTLFRYLKPYWLSIVLVIALLFIQANADLSLPDYLSKIVNIGIQGGIEPDLQPVRIS
SFEALGRLLQAEGAGEKFAALQKVYTHVTPGSDQAKTLSKKWPLANSEPVMSLDLSDKAA
VDAARQVFLAEYPKLVVMSQLPNAAMGGAGALGGAVPSAGPSAGTLPSAGAVPGAAAPN
MPAPSGQVPSGQASGAPAALSPQAILSQIDSLDPLAKSQLVVRGLQKEFEALGVDTVVLO
TGYILSIGAIMLIITLISVASTIMVGFLGSRVAAGTARDLRRVFTKVEDFSLAEFDSFS
TASLITRSTNDVTQVQMMIMMGTRMLFYAPIIGIGGVIRALGKASGMWWIIAAAVGVVIG
IIGLVFALVVRFRVTVQKLVDRNLVVRENLSGMMVIRAFNRQDHEVQRFDKANRDLTST
MLYVTRVMVVLMPIMTVIMNVVSVSIIWVGSHEVSAGSIRVGDMMAFMQYSMQIFFAFLM
MSMMFIMLPRASVSADRIAEVVNTPVSIKDPEAPKLLPKPTRGEIEFRNVRFRYPGAQED
VLHDSFTA KPGTTTAIIGTTGSGKSTLVSLIPRLYDVTEGAVLLDGTDIRTLALSRLG
AIGFVPQKSMLFSGSIADNVRYGKDSAAEEEVKEALELSQIWSLVEESPEGLERQISQGG
MNVSGGQRQLAIARALVRRAPVYIFDESFSALDYRTERAIRAALKTYAKDSTVFLVSQR
VAPIRHAEQIIVLDDGHIVGIGKHEELMKTCDVYRDIALS QLKQEELA*

>SPBIB_v1_10049|ID:27161811| conserved membrane protein of unknown function [Uncultured spirochete bib]
MNGTQKPENIQKSASPAQTSHANS GM E P A K G G A P S S A P S S T Q G T A K I R P G A M M G R G G P G A
LMPGEKSKDFKGTMKKLIAYLGPYRWAILAVMILATIATILGIMGPKVLGTATTTLFDGV
VKKLSRTGDIDFAKIGSILLTVLGLYLSSAILQYIQGWVVS G I A I K I T Y N L R K D I L A K I N
RMPFRAFDNTNHGEILSRMTNDVDTVNQTL S Q S L S Q M I T S V M T L I G A L V M M L T I S W Q M T L
VAMVMIPSLVLVRFIVKRSQKYFKTQQEYLGHLNGHIEENFGAHTVVKAYGGESRAIKT
FDSLNSTLYQSAWKSQFLSSIMMPLMNFVGNLGYVAVAVSGGYLA AKKMVTVGDIQAFLO
YVRSFTQPITQVANISNVLQQTAAA A E R I F E F L A R E E E S P D S E A S A T L V P A R I E G K V E F R
HVHFGYVPGEPHIKDFSATVLPGQKVAIVGPTGAGKTTLVKLLMRFYEPDSGEILVDGIP
IQDLPRSVRSWFGMVLQDTWLFSGTVKENIAYGKHDA A E E E L V E S A K A A H V D H F V R A F P
EGYNLVLNEETTNISQGGKQLLTIARAMLAHPPMLILDEATSNVDTHTELLIQKAMNTLM
QGRTSFVIAHRLSTIRDADLILVMDHGDIVEQGTHEELLA K C G F Y A E L Y N S Q F D E T G E A Q
VACS*

>SPBIB_v1_10050|ID:27161812|groL| Cpn60 chaperonin GroEL, large subunit of GroESL [Uncultured spirochete bib]
MAKQLLFSE D A R R K L L V G V E T I S K A V K V T L G P K G R N V L L D K K F G A P T V T K D G V S V A K E V E
LEDPYENMGAQLLKEVATKTNDIAGDGT T T A T V L A Y S I V K E G L K S V A A G I D P M A L K R G I D
QAVTIAVEEIRKNSKEIKEKEEIAHVASVSANNDIEIGNQIADAMEKVGKDG VITVEESK
TMDTTIEYVEGMQFDRGYTSPYFVTNRDSMTTVFENPLILIHDKKISNMKDLLPVLEKIA
QTGKPLIIAEDVEGEALATLIVNHLRGT L N V C A V K A P G F G D R R K A M L E D I A I L T G G E V I
SDELGLKLENTSLNQLGTAKTVKVDKDN T T I N G G G K Q K D I Q D R I A Q I K K Q I E E T T S D Y D
REKLQERLAKLAGGVAVINVGAATEVEMKEKKHRVEDALSATRAAIEGIVSGGGIALIQ
AALALDKADISKLS D D E K V G Y K I V K R A L E E P I R Q I A E N A G I D G S I I A D K A K H E K K G I G F D
AAKMEWVDMMKAGIIDPAKVTR S A L Q N A A S V A A L L T T E C A I T D L P E K E K P M A N P G G G M G
GMGGMDY*

>SPBIB_v1_10051|ID:27161813| RluA family pseudouridine synthase [Uncultured spirochete bib]
VKAQFPILYLDDSIIDKPA G V L A I P D H W D P E V P V A Q Q M L A K E Y G T L L P V H R I D K D T T G
VLLYARTQDAHRALNERFSTRQVEKVYLAI V S G E P E H D E W E I D A P L R A D G D R M H R T I I D M
SKGKPALTRFEVVERFRGFALVRALPETGRTHQIRVHLAASRLPILADALYGD A E P L M L S
KLKRRWKGDAFEEKPVIARSALHASKVTFLHPTSGMRLEIEAPLPRDFRAALNQLRKLRA
I*

>SPBIB_v1_10052|ID:27161814| protein of unknown function [Uncultured spirochete bib]
MQSMHSRDSGGERMEK G E R S A F S M G E R D I Q A Q K V P F G L L M F D I D H F K K V N D T Y G H L A G D I
VLKMOVAGTISGALRLLDTAARFGGEEFAVLVPNCNEEYLF L Q G G S F *

>SPBIB_v1_10053|ID:27161815| Aminotransferase class I and II [Uncultured spirochete bib]
MPLQISDLSDAVLHTHYAVRGPIVARAQELEHLGREIICYNIGNPQALGQKPLTYVRDVL
ALCEQPALLERAPHAFPDDVMETARTILGQSKYGLGAYSESKGMRFVRKAIADFI A A R D S
TGGVMQTSNPEHIYLTDGASKGVQAALRLLIASHKDGILIPQYPLYSATITLYGGRQI
GYYLDEDSGWSLNEQM L E E A M H E A I K E G I R A R A I V V I N P G N P T G A V L T E E N I E M V I R F A K
RHNLAILADEVYQENIYKPGARFLSFAHVMTKLSEHEVSLFSFHSTSKGFFGECGQRGGY
MEVRNVPEEVIAQITKLQSVALCANLPQVMTYLMVNPPKPADPSYKRYVEERSHILSEL
AQRAKILEEGLNRIPGIHCQPIQGAMYAYPSISLPAGKTDEEYCMALLEQTGVCVVPGTG

FGQKPGTAHFRTTILPPTTRQIEAVIDAVDAFQRQWG*

>SPBIB_v1_10054|ID:27161816|hflX| GTPase HflX [Uncultured spirochete bib]
MTSNTAQKNQNESVERAFLVGMATDKIRKAEARELLDELHGLARTLGLDIAGEMLIQLRD
PTPSLLVGSGKADEIAAAAEAAHADSIIFDHILSPVQQRNWEKLSKKVYDRAELIIF
ASRALTKEASLQVELAQLQYALPRLAHSYDDLMRQRGGRYGTKSGEQKIELDRREIERR
IHEIQSELEAVRKERAVQRRRERASVPRAAIVGYTNAGKSSLLNALTAAASVRAEDKLFA
TLDPTTRRLMLTRGQTLTLLTDTVGFIRNLPHGLVEAFHSTLEEASQADILIHVADASDR
VDAHIATTIQVLSEIGAQDVPRILVLNKIDLAEPDVVQSFLARYPGSLAVSAKTGEGDLA
LIEAIQESLTKDMKTCTLRIPHADYWIVSLVMREGTVLEERSDDAYTWLRCRVPQRMESK
ILQYIAAEDPEVGKARESEGE*

>SPBIB_v1_10055|ID:27161817| 2-dehydropantoate 2-reductase [Uncultured spirochete bib]
MDRISSVIVGAGAIGASVAAMLSDSGHAEVQVCASGERQERYRKEGFVNGTRYFFPLA
GKDTSRKADLVILAVKNYSLDEAIDEMKPFVGNNTIILSLLNGITAVPRLRDEFGADKVP
FAMILGIDAHRHANEVQFTSKGQIFFGFEKERIAAGESKLRVLGDFLGVCNVPYRIPEDI
VKEVWFKFMMNVAVNQWSALLRASYSLFHRSRHARALLEQTMAEVVNLSKKFGTGLSDDD
IVRMLSILDGLPSFGRTSMLQDVEAGRTEVEAFAGTMVRLSKEAGIRCPYNEMLYQAIC
ALEESYAS*

>SPBIB_v1_10056|ID:27161818| putative Biotin--[acetyl-CoA-carboxylase] ligase [Uncultured spirochete bib]
MFSLPVVSSTMDEARRIAEEGFPGAALVRADTQSAGRGRLAGRQWVDAPGSSLLVTMLMP
SDFRTVEALPLRAGLGILRALES DTGKSLLKWPNDVLAPPRWGKLCGILCENSKGRVLI
GFGINIKKSAHARANPSFPAASIEELCGFVPSAFSDLAAAQRVARSIMKALQDSGWHEA
YESCLWARGSSVQFDAGHPDAPKRIEGILEGVDDEGKLILRVAGQRKTFASGELSHLRSI
*

>SPBIB_v1_10057|ID:27161819|glmS| Glutamine--fructose-6-phosphate aminotransferase [isomerizing] [Uncultured spirochete bib]

MNEKARALQAAYTVTNLAYAVPDSFCSAPLAANPLYDTIELQSCKNCIERKERSMCGIIG
YTGPRKTAKILLEGLRRLEYRGYDSAGIAVGRENAEPRLEIIKSVGKIVELAKKMPEDID
GSWGIGHTRWATHGGVTEANAHPHTDMSGKIVVVHNGIENHKT LR TMLEKKG VVFKSET
DTEVIPHLIASYYEGDLLKAVLAALQHLEGTYGIACIHANEPGRIVGARNGSPLIVGVGN
DEMFLASDITAMVA YTNRVIYLNDGEVVDITRDSY TITDRHSNMLDKQVDEITWELGAI
KSGFMHYMEKEIFEQPDSIARAMSGRIDEENATAKLGGLNLSRRQLADVHRVRIIAAGTS
WHAGMTGSYLLEQAARIPAQAELASELRYPVENDSLWVVSQSGETADSLYAMREVQ
RKGATVLGICNVVGSTIARES DGGVYVHSGPEIAVASTKAFTSQLTAFYLF TLLMARMRD
MSREEGQKFTRSLLA VPD MVRNALAQRDHIQAI AKKYCRAKDFLYLGRGILYPIALEGAL
KLKEISYIHAEGYSAGEMKHGPIALISPEVPSVFLVSDDYLHEKTISNIREIKARGGPII
AVGVEGDTEAMALADDFIAPKADPRFYFPSMVVPLQLFAYFCALELGRDVDQPRNLAKS
VTVE*

>SPBIB_v1_10058|ID:27161820| conserved exported protein of unknown function [Uncultured spirochete bib]
MKNPAWRMLPIVVFAVAMIGALAFNIALVSRSRALASTILRN PATVRTARFHIAAIIPD
AVDPFYGHLVEGLREEADRQNAALQVFYYSASAIGEGSNPSEEVWRWF EIALRSKTDGII
LFQSKGMETS RFAAEAE SAAMPFVPLAMDAPAQWTRSGVSGDSFSQGKEASSLVLGLLGS
AARIGIILSADTSQGYAQAEFPYRGV VEMIKNRPGA AIVAAVREESILGGEDACARML
SSHDPINAILCIDAKATIGAAQVIIDRGIVGQVVIIGSDENSEVNRLIEKGVVHASIVRD
AAAMGRSAVALAVGQRIGIRKPERISVGYHV KPERGTTP*

>SPBIB_v1_10059|ID:27161821| Signal transduction histidine kinase, LytS [Uncultured spirochete bib]
MIDLVSLARPWKPRRQGLRNRIIVNSIILLVLVIATS YTAFAFDLARSVELLFRNSI
SMEELRATLRETQESLTGYLSAKNSESLKDFIRTSTSLSNMKLRLNKENKVDDVFLLEKD
LAFLVDSYLVSAEGAVQAKRGRNVTQYVSLYEEARRTASLIEFLSAKMDTIHLGQSLKGF
SSYRANISLALVSNVLLLA AFLLSIALIARYSYTITEPLARLSVAAEAVGRGEYDHPLP
PYENEDEIRTLHDAFVNMQDSVQKAF AELTRKAELERSLMEERMRLVLT YQHRLKDAELLA
LQTQINPHFLYNTLSAGWQLALAE GNEKTAEFLEKLA AFIRYALKPSTRFVLVSEEIECV
RQYIWLLKLRFGERYRFRIEVQDEALGNETPALVLQPLVENAIAHGLRDIEEGGDVIVSA
RIEGETIRLSVSDSGKGM AKDDIARALSAADPEDTTPQRGIGLHNVRRVALATGGLGKV
EIESEPHGTRITIVLPV GKPI*

>SPBIB_v1_10060|ID:27161822| Two component transcriptional regulator, AraC family [Uncultured spirochete bib]
MKRVLVVDDEMPIVNGLLLLFKRYFQTEYTVVGVAQSGREAIEKAKELAPDIILMDVQMP
GITGLDAIRELSRQKSATAFILVTAYERFDIAREALSMGVCDYLLKPVSRERLEIALRVA
SDYLDRSRLFDKRELEFRDRQQLVPLIRTAFFCSVRWQELKKNLGLVKEMLKINEDAG
VLGIASFSPMDGNAGALYERFCSLIQYKTVALVGPLEDNRYCAWFLPMKKAALSESIAA
SEISAFILGILRGAFSSELATGEIVLAHGQPEILENLSWSAAVQVFAGSTLIPKKGSDI
AGISAAVGSIVQPQVNLEIQLSEWEKNHASCALDAQFSEEIMEGQYAMAGQSLEKMLMQ
IDCSHTAARDSLFRIIAALSFAALKLAGGGILSEQVYREFMDFSDIEQLWNQAACHLFAA
KVRERFASLQKYAVAAGSHSPFVVRVRAIQYIENHYQEPITLESAAEAIGISAGHLTRLMSD
ELKKGFARTLIDYRLQKAKEMLKKNVSVRDVSRLCGYSDANYFARLFRRMTGVSPSKYS
ARKSGGEESDA*

>SPBIB_v1_10061|ID:27161823|xylF| D-xylose transporter subunit ; periplasmic-binding component of ABC superfamily [Uncultured spirochete bib]
MHNAKHMLQHGPKHVHQFGNFYFSLILFAASLSLNLVSCSKARKPIGDRAPIVGFSLD
SLVVERWRRDVSFTKAAHDLGAEVVLRVANQDANTQISQVKELLNQGIDALVIIPNDAE
KLTEVCREAKRRGVPVMSYDRLVHNADVLDYISFDNEKVGSLQAQAASEAVPSGTYYIIVN
GAITDNNAFMINKGFHTVLDPLIQSGRIRLAGEIWPWDWISDEVTRTFETLLQPGQKIDA
VLCGNDMLAETVISVLSENRMVGTIVTGQDAELAACQRIAEQSQFATYKPIDALALKA
AGFAVMMARGEKVRVYDNKIDDGHYKVPYIALEPILVTAKTLGSTVIKDGTFHTREDVYRNV
KR*

>SPBIB_v1_10062|ID:27161824| Periplasmic sugar-binding protein [Uncultured spirochete bib]
MKRTLFIALLFTVVAGFVFADTQVGIVLPTKDEPRWIQDQTRFLDALKSAGFSKVLFSQ
GDSAKEKANVEALISEKIKVLIICPDGTAADLAHKAAGVVKVISYDRLIRDTTSDY
YVTFDSFMVGKAWGDYLSKVPAGSKGNNLYLYAGAASDNNAFIFEGAWSALQPKIADG
TYIVRNSDKAVALKNKAKLTRDEEAQIIGQVTTNWNFNDAKNKAEANLTAAPKEAKGTVY
ICAPNDGTARAIADAFADKDVKTYITGQDAEIASIQYIIDGKQSMTVLKDVRTLVNDA
INAAVAYMKGQTPPVTSYYNNGKKDVPKPTAIVTVTKDNVKEIVDSGYWPADKFTGLK
*

>SPBIB_v1_10063|ID:27161825|xylG| fused D-xylose transporter subunits of ABC superfamily: ATP-binding components [Uncultured spirochete bib]
MSDNILEMRHITKTFPGVRALNDVNFVRRGEIHCLVGENGAGKSTLMKVLVSGVYPHTEF
EGEILNGKKVAFSGIHDSEKAGIGIYQELALVPEMMVYENLMLGHEIRRGITIDTPEM
IRKAEELLKRVRLSVNPSAKIKDLGIGKQQLVEIAKALSARNVSLILDEPTAALNEDDCD
NLLDILRLLKSQGVTCIMISHKLKEVLEIAETITVLRDGTICTLDRQKDEVNEQVLIKH
MVGRSINIYPPRTTKPSDEILLEVHNWSAFDVNLGRQVLHNVNFHVRKGEVVGLSGLVG
SGRTELARSLFGNPDGYITTGEMIFKGGKQVFRHPRHAIRAGLAYATEDRKRNGLVLIQS
IQHNISLANLQGVSKNGIVNEELDKQNAVNFVRSLSIKTPGIHQVMNLSGGNQQKVSVA
KWLFGVGPDLIFDEPTRGIDVGAKYEIYTIINDLVAKGMSILMISSELPEILGMSDRIYV
VANGTITGELDAKTATQEAVMRLATQY*

>SPBIB_v1_10064|ID:27161826|xylH| Xylose transport system permease protein XylH [Uncultured spirochete bib]
MNELLTVLKKNVREYGMIALAVIMAVFTILSKGLFISSRNIANLLNQTGYIAVLAVGMT
LVIVIRHIDLSVGFLSGFLGAVAAIALTQWNWPVWL TILLVLLGTIAGLVTAFPVAQLG
IPAFVASLAGWLIYRGALMLVTAATGTIIVPNESFNAIGNGYIPDLFASASFLPNVHKTT
LLGAVAVLFIIGQISDRRKLQYNFEVLSTGLFTAKLLFISVVLGFITWILAGYNGMS
WTVVIMVAVVLVYYFITQRTVIGRHIYAVGGNPEAAELSGIDVKRITMAVFASMGFLAAL
SGILFTARLKSATPQAGQLFEMDAIAASYIGGVSAAGGIGSVTGSLVGALVYMSLMNGMN
LLGTDISLQYIIRGLVLLFAVIFDVMTRKRKS*

>SPBIB_v1_10065|ID:27161827| Major facilitator superfamily MFS_1 [Uncultured spirochete bib]
MKEKTKEIAVKGARSTFWIMFCMMLLHQADKLLIGPLTTQIMDTFKISRTQMGAVTTGAL
IVGAIFYPIWGWLYDKFSRPKLIALASFLWGASTWLNIAIPTYPIFLATRAAGTGIDDSSY
PGLYSLISDYPPKRGKIYGFLQVAQPPGYLVGMILALAFGAVYGVWRNVFYLTGSLGIV
VSFIIFLVKDRPRGSTEPELSSVEHLERFKFSWKTVGGLFRKKSLILFVQGFIVFPW
NVITYWFFDYKTERGYSDTQTLTMVPAVLILAAGYPLGGALGDRLFKKTPKGRVIVGA
AGVAIGAVLLWITMNIPLAAHLPGFIMLCATALFIPFASPNVLSFYDVTEPEIRSTTNA

VQNFIEAAGSALAPLMAGIADKSTLGNAILLICTVAWAACFAFFIFAGRFIPKDIADLK
EKLAARAAAGSV*

>SPBIB_v1_20001|ID:27161828| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]
MKKNLAIVAVLMLCGAMLFAAPAKKITVLGVWGGQELDVFNAMCKAFTDKTGTGIQVDFEGT
RDLDAVITTRVEAGNPPDVAGLTGPGKMIELANKGKLADLSKILDMNAFSKNYAQGWKDL
GSVNGKLYGIFMKA AVKGLVWYNPKAMKAAGLEPKNGWTWDDMLAASAKIQAMGKTPWA
VGIESGSASGWVGTDWIENIFLRQNGPQMYKDWYEGKVSWSPEIKKAWQTFGQIVADPK
MAYGGAAYINSTNFGNAAAPLFQEPQAYFHMQASFIQSFIMNQFPNAKPVTDNFVGF
SINTKYSKAMEVAADLFVAFRSTPEVKEFMNYIASAEAQAFWAAGTGGLGTNRNVALTFY
PDALTKRAASLLNDTEIVVFDASDMMKPEMNAFWSAVVSYV NKPSDLD SILANLEKVRK
DAYKN*

>SPBIB_v1_20002|ID:27161829|ag|F| Alpha-glucoside transport system permease protein AglF [Uncultured spirochete
bib]

MNSQTILMLAVVVLGVPLLLVGYITLSERLLGSAAHKRSSSVRAIFWIAPAVVLLVVFLV
YPIITTIILSLKDAASRGYVGLANYKYVFTDRNMLLVLRRNNLLWLVFLTLVTLTFGLLIA
LLADRVKYEAVAKSIVFLPMAISFVAAGIIWKFMDFQAPAGAPQIGTVNAVFS AVIPGYQ
PQAWLFNTATNNIALIVVGIWMWTGFAMVILSAGIKGIPTDVLEAARIDGANEFQIFRFV
TMPLLAAPTITVVATTLIIDVLKIFDIVYVMTNGNLNTEVIANRMYKEMFNHNYGRASAI
AVILLVAIIPVMIMNIKRFRQGGANA*

>SPBIB_v1_20003|ID:27161830| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]

MHKHTSSKRPLSRFILHLILVICAGWL VPSLGLLVSSFRPRNLISTTGWWTALLPPFKF
TLSNYAYVLTRGHMGISFINSLI AIPSTVMPILIAFAAYAFAWMRFPFKETIFLVIIG
LLVVPLQLTLIPVLKLFNALGMTGSFVAIWLAHTGYGLPFAIYLLRNFMQDLPGSVLESA
YLDGATHPQIFFRLIIPMSVPAIASLAIFQFMVWVNDLLIALIYLGQTQSVAPMTVTMSN
MVNSYGGGWEYLTA AAFISMLLPMLVFFTLQKYFVRGILAGSVKG*

>SPBIB_v1_20004|ID:27161831| Transcriptional regulator, LacI family [Uncultured spirochete bib]

MGNRKRKSISQEEIARIAGVSR TTVSFVLNNTRGKSISEETRQRVIVA AAKEFGYMPDMSA
VETATSRDGSICLIVCHSESAFSDAYIMRLIEGMSRPIHKERYDLRVLHFRVSRHDYLET
ARKGSFDGAILLNTHADDPGIAELEASNLPFVIIGALPDKGLIQIDIDNSEAAAGVARYL
LSLGHNRNIGVIAHAPETFFAVRARLAGFCGEMRRNGVEMCDSNIRFANFTEESGYEAARD
LLSSKQPLTAIFGTNDVVAYGIMRAVEDAGLAIPDDISVVGFDYDLYSLYTNPPLTTVTL
PAEGIGRTAAETLLRLIRGAPVHRGLRLLPTNL TIRQSCRKV*

>SPBIB_v1_20005|ID:27161832| Beta-phosphoglucomutase [Uncultured spirochete bib]

MARCIAQTSFDPARAALYESLFMVGNGHFGIRGSDEERRHSVYRGTFINGFFEKKPIQYG
EWAYGYARNHQ TILNVIDAASIELEVDGSPLDFSSGLKTYERCLDLDAGKLVRRLEWESP
SGVLIRVNSERLASFEKAEIAAMRYE VSPDAACSIKLVSFLDGSVRNRP AEAGDPRVGS
IDANPILWCKVEARDGALLAGTTVRSGLGLAVVRHVVSFSGSSILRAEHSAGGETLFS
SYCADCAGGERFRLDKFVAVVNGSADA IAKRLADEARAAAEDAANRGYDEIAALQADYLRT
FWAGADIQIQGDPKMEEGLRFNIFHLLQSAGRDGRTSIAAKGLSGEGYEGHYFWDTEIYA
LPFFDYEA PAIARSLVRYRIGILGKARERARELSLPGVLPWRTIDGEETSAYYPAGTAQ
FHIDADIA YALMRYVEATGERGILLEGGAELLFETARLWMGLGFFNPRKEKKKFCIPCVTG
PDEY TALVDNNAYTNLMAEFNLRHAWKVATELQDQHPEEFSALAERIGLSPSEIGEWKKA
ADMMYLPFDKETGIVPQDDQFMDRPAWNL AETPREQFPLLLHYHPLMIYRRQVLKQPDTV
LAMFLRHERFSLAEKMRNFRFYEPLTTGDSSLSHC IQSVAAAECGETGKAYEYFAKTARM
DLDDVHGNSRDGVHIAAMAGSWISV VYGFAGMREGRDCLSRPMLPPAWKRLAFSIGWRG
SRIACEYTAETSTYSLVWGTEIDIEHEGKRYHLASGAPVCIDERPKPLVWIFDLDGVIAD
TAVLHTRAWMRLADELGIPFRPETGELVKGVS RMASLCIVLGDHAAEYDAESLAELADRK
NCYYRELVEHVGPSDILPGMADLLASLKN DGRMLVLASASRNAPAIKQLGLEGTFDGIV
DAAA VSMPKPDPEIFIRAAEMAGARLKDCVAFEDAQAGIDAIRAAGIFS VGIGTKLVGAD
IRFDSTSLVDRKAIEDAFYKRG*

>SPBIB_v1_20006|ID:27161833| conserved protein of unknown function [Uncultured spirochete bib]

VVKSVVSTVHFDVMDL PFSRRGSWLAISWIKASDPTRHVPEGLYLRTVDRGDYQQLFRI
DLPADGGREIRAEASPSIMHLFP GGTKSERSGVVDVCIPTTSSVRFRRGRGTLRLSSIPG
PELSYAI PRGEGSWIVNMLGAGLRLMLT PLRGLKHVDAPWQAQGSQPMRFEMHPDIAGEF

DIVIEEFAQALTPKRLHPPFEDEAAAVEADFLAFAARHGEGPFSETADIARYILWSCIV
NPEGAITRPTVLATKDRLTGIWSWDHCFTALALCPGDPALAWNQIMTIFDHQDEFGLPD
AVFDRRVVQNFTKPPVHGWAIGRMLKLGCLDRAMKEEA YLHLARWTDFFWFSYRDYDGDGV
PQYDHGNDSGWDNASPFIFRPPLEAPDLATFLILQMDTLAVLADELERSKEAIAWREKST
AFLRLATSHLTRRGRMGFVASGTHEEIPNESLLPYLQLLLGNRLTESTRTSLLKSLEEEG
YITQWGIATESTLSQNYSSDG YWLGPWAPSTFLMVDALFRSGENLAKEIGSRFLDLVE
TSGFAENFDAITGAPLRDRAFAWTASTYLILARDISARP*

>SPBIB_v1_20007|ID:27161834| Basic membrane lipoprotein [Uncultured spirochete bib]
MRNISRFFLLMLIAIVAGSAAFAQSAPPAAGPNLTIGLVMVGPYNDHGWSQANYDGVQYV
LAKVPGTKLVYIDKANSADRPGTTVSQLGESLVAQGAQLVIFSSDDMTDEAIKFAQDHKD
IFVILTSGSQWKEGKDYKPLPNMINIMGRMEYMKMVAGVAAAMTTKTGKIGFLGPLIND
ETRRLAASAYLGARYAWVNYLKKDKPAKLTFKVTWIGFWFNIPGVTSDPTQVADDFNSGF
DVVISGIDTTEAVAEAAKYTAQGGKQVWAIPYDYSKAIDEGKGVSLGVPYFNWGPAYANAA
KAAMNGTWKNHFENWNGPDWKNINNPDTSAVGFNKGTLSEASAAIDKFIDELGKGLNLWT
GPLNYQDGSVFLKKGEKATDQIQIYLPQLLQGMEGQSVSK*

>SPBIB_v1_20008|ID:27161835| conserved protein of unknown function [Uncultured spirochete bib]
MERGRKKVAMHIELRGITKCFGALRANDNISFAVPPSSIHGILGENGAGKSTLMKILSGF
YSPDSGDILLDGKKVRIASPADAIRHGIGMLHQDPLDFPPLKVIDDFILGSKGNLIPNHK
SATREFRELAARFGFSIDPESYVDTLTVGERQQLEILRLLWLGARALILDEPTTGISLPQ
KEKLFATLKKLASEGMTILFVSHKLEDVEALCNKVS VLRQGLVGSVDPPFATGALVEMM
FGKEIALEPKAQLRFGSNVLHIKHVDLEGIRIQIKGLDLQVRAGEVIGLAGMEGSGQTLF
LGACAGLAQPVGGSFCLDEDEKDMTGRTYHEFRKHGVAYLPAARLEQALVPGLTLTEHFI
LSEGMKGLFIDRKKAEALAKSRIQVFNIKGRPDSTVESLSGGNQQRALLALMRDPLKLIL
VEHPTRGLDIESTIYIWNKLKERCARGTSIIFISADLDEILKYSDRVLVFFAGRVSPPLE
ASTLSVERLGRLLIGGKDWETLETEAHA*

>SPBIB_v1_20009|ID:27161836| ABC-type uncharacterized transport system, permease component [Uncultured spirochete bib]
MRDSRATRLLFKVGAILFALIVTTGVLFLAKAQPFAYKYITL GALGSWDVVTNVFVSWV
PLLLATSGLLVTFTVGLWNIGIEGQITLGAIFTTWAMRLLHSGWNPTLILMLAVLAGML
GGALWAMLGALKTFGGVNEIFGGLGLNFVATALNIWLIFGPWKRPGVASMSGTIPFDRS
LWMPAQGSSRLTPATLVMAIVGILVVYAMIEGTYFGLRLKAVGKNARSAHILGIPTWQY
MMSSFAVCGIFAGVAGAVQVTVAVYHRLIPSISG YGYLGLMVAMLVGYRASLAAPVALFF
AALNVGSIQLPIVLKLDSSLAGVLQGTLLVLFVVLGQGVRSRILKKT KVKS*

>SPBIB_v1_20010|ID:27161837| Inner-membrane translocator [Uncultured spirochete bib]
MNNSALFVSLGGVLSAAPVLFVAVIGETISERAGVLNLSMNGMILLSAMGSFAVALSTGS
VVLGFLAGALIGALVSLVVVFASLTLLQSQVAVGFVLALLCRDLSYFLGSPIMGQVGPRI
SQLPIPGLEQIPVLGTILFRQDMMTYLSFILVILAWFFIFKTRPGLTLRGIGERPAAAFV
RGANVNRLRYLYAVLGGAIAGLAGPIYSLSVKAGWKGTISGLDGIGWIVLSITIFGGWKP
FRAAFGAYLFAFLQWLGLVLQPSLPSVPSQVLQVAPFLMILTLLFVNIGNAEWVERS LA
RLPENVRRIA KVL RAMNATPPAALGV PFEKE*

>SPBIB_v1_20011|ID:27161838| Branched-chain amino acid ABC transporter, amino acid-binding protein (TC 3.A.1.4.1) [Uncultured spirochete bib]
MKKLLFAALAIALVLAGCSSGGKSDVIKVGWLGALTGDQAVWGENELNTVKMLFEEYNAA
GGIDVGGK KYKLEVIGYDNKGDPQEA VNVTKRLTGQDKVVAIIGPNSGNAIPMAPILEK
AKVPDIATVATNPKVTVQDGKVKPYNFRVCFIDPYQGA VAAGFAYDRLGART AALLYDVG
DDYSQGLREFFKLNFEKKGKIVADESFNSGDVDFRPQLSKIKAA NP DVIFMPYFFKEVA
LSANQARDLG I KQVLMGGDGWPSDQLISMGGKAVEGSYFVNHLDYADPAVQDFKTRYKAK
YGKETELNGFLAHDAVLLLVEGLKKAGKVNGEALAKAFEGIDVQGITGRIHISPETHNPE
GKDAAIKIVDGQYVFQEKYAAQ*

>SPBIB_v1_20012|ID:27161839| High-affinity branched-chain amino acid transport system permease protein LivH (TC 3.A.1.4.1) [Uncultured spirochete bib]
MVQFLQQLINGLSIGSVYALMAVGYSLVYSIMNFSNFAHGGVIMLGAYFGFFSLTLLKLP
FVVAFLASVGTLAVAIIVERIAYKPLRERKAPFLYFIISAMGASILLENIVIA TIGPTF
RTYPEVFSKVPITLGPLAIGRLDLIIFAISAVCLTLLILFIEKTKIGKAIQAASYNVKAC

ALMGVNTDRVILTVFGLGGFLAGVAGVFFGMKYTVYPQIGNITTKSFIAAVFGGLGSLPG
AVLGSVILGTIETFVAGYLSSQFRDLIAFVILIAVLVLRPTGIMGKVTEDKA*

>SPBIB_v1_20013|ID:27161840| Inner-membrane translocator [Uncultured spirochete bib]
MSWTYIQGILMLAGINMIAVLGLSLLTGFTGLFSFGHAGFMAIGAYVGAWISASPASTPA
GLGLPFILAIVGGGAAAGIVSYFIGRISLNLKGDYFCIATLGFGEAIRLIFNNVNRFGGA
RGWPGVPRSTFLVILIADVIAILFLANLVKSRHGRNMIAVREEELAAQIAGINVFRYKM
ISLIISAVYAGVAGVFFAHYMTFIQPKMFSLTKSTELTIIVIFGGLGSISGSVLGALVLT
ALPELLRAFEIWRLVFYGA AVILIMVSRPKGLMGMELTPSGIRKVL AERNALREAKTKL
LADAQSGEED*

>SPBIB_v1_20014|ID:27161841|livG| leucine/isoleucine/valine transporter subunit ; ATP-binding component of ABC
superfamily [Uncultured spirochete bib]

MAPILSIRNLTKKFGGLTAVGDVDFDVPESIVGLIGPNGAGKTTIFNLITGVYKPTSGT
IEFREKSILGLEPYRIADMGITRTFQNI RLFKNLTVFENVLTACHMNASY SFAEAILRLP
RFRTQEKALVAKAENLLEIMGLMGYRDLVANNLPYGLQRRLEIVRALALNPVLLLLDEPA
AGMNPDETEQLMRLIGRIRNDFSLSVL VIEHHMDLIMGVCEHIVLNFGEKIAEGTADDEV
SRSPQVIEAYLGTSLEAADA*

>SPBIB_v1_20015|ID:27161842|livF| leucine/isoleucine/valine transporter subunit ; ATP-binding component of ABC
superfamily [Uncultured spirochete bib]

MLEVQNLHVAYGGIRALKGVSLSVQKGEIVTIIGANGAGKSTLLNTISGFLKPVRGSVLY
NGSALPRRPDLIVKSGICHVPEGR LIFANLSVQDNMLGAYLRNDKKAIQADLEKVF AIF
PRLKEREEQRAGT LSGGEQQMLAMGRALMTNGEFILMDEPSLGLAPLLVQTVFEIIFR
SMGKTILLVEQNAFKALQVADRAYILEQ GKIVKEGSARELARDPAVKEAYLGSRSRGGG*

>SPBIB_v1_20016|ID:27161843| Peptidase M20 [Uncultured spirochete bib]

MNIAEKLSQLVKFRTVSSFDPEEEDDGPFAALIAALPELPLAHARLERICIGSRGIVYR
WQGTDP SLKPAIFCAHFDVVPASETDAWDEPPFSGAIRNGYVWGRGTQDIKVQLACILES
AEQLAANGFQPQRTL YFAFGGDEEVGGTRGAGAIKWFSEQHIHASWVIDEGSPVGQGLV
GFVRKPLALIGIAEKGYADIIIEAQGGGHASMPPRHTALGA VAHALAAIEDNPF PARLT
KTTDGF LAALAPHAIAPYKQIFALRRILSPFILKA FSAMPSTNAMVVRTTCAATMAQASPK
ENVLPTLAQAAVNVRMIPGMSSAEVVEHFNLLASPGAKAYIKFPEHMVEASEESSTSSE
GWIAIAKAVSEAFPEAVPAPFLFTASTDTKHYRALTDDIYRFTPLIQTQEDIAAVHNVNE
KVSIENTLERCVRFYRSLMQGC*

>SPBIB_v1_20017|ID:27161844| exported protein of unknown function [Uncultured spirochete bib]

MNSTRFTNPAAVILAAGRSSRMGATKPLMLIDDMPMLMYAANAFRAAGIDYIIIVVTGFDA
ERVAALAREGALHPVHNSNFDKGMFTSVCAGIEAVPDEFDSAFVLPVDIPFVSPETLKR L
QTSANREHGASAKERGAPSAGGIDGMPAAARSRPVIVPRHTGKPGHPPLIHR SIFGQLRG
WRGPHGLGGFLKAQSSLVAYLDVEDPFILRDIDTPDDMQKIISDRNLHGVAMPHS*

>SPBIB_v1_20018|ID:27161845| putative XshC-Cox1-family protein [Uncultured spirochete bib]

MSELRKWIAARLRRGETV VLA AVTRVSGSTSRGTDALLAMDSTGAMNGTVGGGFTEGQTI
EAARRMLGLGGSQAGAQT TTAQPPGASQDLDFDLTPETNQTQMICGGRLRIHLEKLEPQS
AAARALLACIDSVENGRPGAFVVVKTHCAQYSFALDNRGNDAVIPAPLLASLRANMPGF
EGAAEFEIEDPSNAVHETAHVFWLGLLPDPVVYIFGAGHVGKAVCDFASLAGFRVIVTDD
RPEMLTTERFPHASDLRLIHSFEDALTDASGAPAVSIGPQDCALVLRKPDIDKAMLAQV
LHTNAGYIGLIGSKSKRDGVFAALKAEGFADTDIARVHAPIGLAIGARTPEEIAVSILAE
IIAVRAGIPATASISPHSGAQAPASTKVASR*

>SPBIB_v1_20019|ID:27161846| Aldehyde oxidase and xanthine dehydrogenase molybdopterin binding protein
[Uncultured spirochete bib]

MRDYHTSTPPASTKELDATQKFNVVAHNISKVDGEGLVLRPAYTDDLAPQNALYVKLVR
SPHAFARILSIDASEALKMPGVACVLTWKDCPRIPITRAGQGNPEPSPHDRFILDEYVRY
VGDEVA VVA AENEATAEKAASLIKVDYQVLEPILDFEKALDNPIIIHPEPEIHEMFPIGF
EPKRNIAAA YHMEIGDVEKELATSPVTVETT VHTQAQQHVALEPHTAFSYLDIQGRLVIV
TSTQNPWHTRRLGLAFQMPLRQIRIVKPRIGGGFGGKQHIHIEPYVAMVTMKTGKPARL
ALTRREVF EATFTRHEMRVKVRLGADPDGALRAIDMQVLSNTGAYGEHALTTFMVAGSKT
LPLYNKVKA VRFGGHVYTNKVSAGAYRGYGAIQGLTGLESAMDELAHKLGMDPVELRRK
NMLHEGETSEVFRIMGEGTEGVAMIIESCKLEECIRRGKELIGWDPHTLVQEVA PSK VRA

KGMAIAMQGSIGPLVDMGSARIELQDGGFFKLHV GATDLGTGSDTILAQIAAEELGVDMK
DIVIHSSDTHDTPFDVGAYASSTTYVSGSAVLRAARSLKQKLEAVSLKFGVRPQDLTFE
DKVVRTIDGSKELSLNDFS YDTLYHDGAKMKTIEATESFSGDKSPPPYLA AFVEIELDKE
TGKVDVVNYVAVADVGT PINPNLAKIQIEGGLLQGIGMALYEDVRYSKGHMLSHNMMTY
AIPSRVDVGRITVELVDSYEPSGPF GAKSAGEIGIDTPPAAIANAIRNATGVRLTQYPFT
PERVLMAIRQA EKGGKQT*

>SPBIB_v1_20020|ID:27161847|xdhC| Xanthine dehydrogenase iron-sulfur-binding subunit [Uncultured spirochete bib]

MIITLYINGK KESVECQPGEML TEVLRRAGYVEVKKGC DTGNCGVCTV LLEGKPVLS CSY
LAIRADGKQITTIQGA AKEAEFAHFLTAEGADQCGFCAPGFALT VLAMKKELPNPSEGE
IRHYLAGNLCRCSGYEGQIRAIKKYLEAEHA*

>SPBIB_v1_20021|ID:27161848| Molybdopter in dehydrogenase FAD-binding protein [Uncultured spirochete bib]

MEILEFASPRTLDEALHLVRDRHGTAIGGAAWLRMNTKTMPLGVLDSELGLDYIREANGS
IEIGAMTTYRELETSPLLEARFGALFRNTVSHIVGIQLRNITVGGTLAGRYGFSDLNTT
LCALGAKVVFYPGKIADVASF IQDGE EWPF LIEKVLLPVSARASYQQMRITANDFP IINA
AAAWTGSSWRIA VGSRPAASRLCKKAMVLLGN EPYPSDEKIGQA AVAAAEELQFGSDIRA
SAEYRREILPALMRALMEVRG*

>SPBIB_v1_20022|ID:27161849|dnaE| DNA polymerase III subunit alpha [Uncultured spirochete bib]

MLLAEVKNHLLPVFRIIAQVSKMGKLG YTGIMAEFVHLHNHTDYSLLDGAAPVQKLIKKA
KEFGMPALAITDHGNMFGVMAFQDECRKAGIKPIIGCEFVYVAGGSRLEKTGTENGNKYWH
LILIAENQTGYHNLLKLT SRSFTEGFYKPRIDDELLAAHSEGLIASTAC LAGEIPSLIL
AGKIEQA AKKIGYYKEIFGPDHFYLELQDHGLDEQRIVN KELIRLSKLLDAPL VATNDLH
YVEREDAVAQDILLCIGTNRKRNDPSRMRFPNDQFYLKSPDEMAALFSEVPEALANTLKI
NEMAQLEIEFFGPLL PDYQVPESFSDPDDYLRHIAREGLAKRYPNPSPEATARLEYELDV
ITKMGTGYFLIVWDFIHWAKEHGIPVGPGRGSGAGSIVAYAMRITDIDPLKYDLLFERF
LNPERVSMPDFD VDFDFERRGEVIEYVAQKYGQNRVAQIITFGTLKAKAVIKDVARALDI
PFEEANQIAKLVPDDPKMTLAKAFKMEPKLAALAE NPSYAELFSIAARLENLHRHSSLHA
AGIVISKSELTDYVPLYKDPKTGLVATQYTM EYLENCGLVKMDFLGLKTLTLIRNTLDIL
RRRGIDIDE EKIPDNDPKTFKMLSE GKSTSIFQFESQGMQSILKRAK PSSIEDLIALNAL
YRPGPMDFIDQFINSKNGKMAIEYPHPSLEKYLKGT YGVIVYQEQVMQVAREVAGYSLGR
ADLLRRAMGKKKPEILQKEEGPFIEG AISRGYSREDAKRIFEILTPFAGYGFNKSHAAAY
SVVAYRTAYL KANYPAEFMAANLTNEISNTDKL TEYISEARAMGLSVLPPDINRSDANFS
VDHGQIIYGFLGIKGVGEGIAKAIQLEREQNGRFSDFIDFLSRMSPAGLNRKTLES LILA
GCFDSMKHKRREL VQNLERAIEYVEGKRAFEASRQGS LFELEDMPYPAFQFEP ADEFSN
QEMLQAEKELLGFFFS AHPMDEYRTI WERSSTLDLGR LDQASANREYTVIGLLKEFRHTT
TQNGKRMAFGKLEDYHGSIDIVFPDMLEKNEQAFIKDRVLCVSGMYDNSRRAPSLKIQA
ILDPESLRKASWRELHIRLANSVRATGQAGFTDRAEPSQASAI FDETSLYQLRDAIYSLH
GQCKVLFHVPLIKGGEAVIEAGPHTTCSANDSDLEFLKGQPAVAEVWRS*

>SPBIB_v1_20023|ID:27161850| putative Ribonuclease Z [Uncultured spirochete bib]

MKIRILNGGGFYNEGLPYNAIAIDGHVLIETPPDILQSLNHSDMRPSQIDTVFISHIHGD
HCFGFPFFFNWLYAGEADSHYEKGSMLAIIGPAGLREHLLALLRLAIPPEHQYIRDFSE
RAKLVEVDEGDIIAVKGNIWFSFMRTKHSLPTLSLIAGATAGPPSPKRALKEALFAYSS
DTAMFEGIH TLLES GAKLILCDTNGEKESDVHMSPAQLIAAARVHGLAGNSGRLLLGTHM
SRRIVSQENLRFAQDGEEFSVI*

>SPBIB_v1_20024|ID:27161851| putative hydrolase of the HAD superfamily [Uncultured spirochete bib]

LYIFLMQQRVRFRAV VFDVDGTLYPASALYLR CIDIFVRHPRLVEGFSVVRKELRTLQMR
SDYTPRDAEELHQLQASLLAQRMHIPQDQVRKLMEFFFYATLPERFASIRPFSGVRNAIE
TIRRSGLI AVALSDLPTEKIEALGLSDLLEHALCAEEFGVLKPHPWVFAALIERLGYAP
SEILYVGNPNVYDIQGAKNAGMAAARCGRPTALADFSFTKWK NLADWVLTNRA*

>SPBIB_v1_20025|ID:27161852|hndD| NADP-reducing hydrogenase subunit HndC [Uncultured spirochete bib]

MEEQLIEITIDGQNV RVDPSANIVEACAHAGVKIPTLCY LKGISQNASCGVCVVEVEGAK
SLVRSCVQKPVPGMKIRTSSPRVIRARKTAV ELLANHPDDCLSCIRSDTCELHTIANIL
EVRADRFPGYKKYMPD TTSEGIVRDDS KCILCGRCVAVCEETQGVHAI AFSGRGARTRV
STFLDRGLAQ SACVQCQC SVVCPTGAITEKDESREVFSAIEDPRLTVVVQTAPAIRASL

GEALGLPAGSLVTGQMVAALRRLLGFNRVFDTQFTADLTIMEEGSELLERLSKGGTLP MIT
SCSPGWINFIEGFYPDLLSHLSTCKSPQQMFGSVAKTYAKKAGLTPDHMRVVSIMPCTA
KKYEARRKEMDGAWGWWKEQDPGKVPARPFVDVWALTTRELARMIKLAGIDISRLPEEE
FDDPLGQSTGAGTIFGTTGGVMEALRTVYELVEKKPLENIEFTKVRGF EAIKTAEVVVG
GSPVRVAVAHGLANARVLLDEIRAGKSPYHFIEIMSCPGGC VGGGGQPVLADLEKKLARS
QALYEEDRKLAIKSHENPAVRALYQEFGLKPLGHL SHELLHTSYKARVF*

>SPBIB_v1_20026|ID:27161853| NADH-quinone oxidoreductase subunit F 2 [Uncultured spirochete bib]
MKNASDLGFLAQTGLARIHGDKPWISVGMGTGIGSGADKVWEILNQKAKASEILVRRVG
CFGFCAAEPVMTWMPGKPVLFFTDVDEQKTRRILGGLENSASYDKIAKLAEAKIEEWF
RTSKIEFGHGYAQLPAWKDLNFFKGQEKIVLRDAGLIDPESIEDYI AVGGYGS LVRALTS
MPPEIIIEVRKSGLRGRGGAGFPTWKKWSIMRQSLDNPGEYIICNADEGDPGAYMNR
NEIESDPHMLLEGMILGAYAMGATRGVVYVRAEYPLAVYRLTKAIEDAREHGLLGINILG
TKFSFDIDIVTGAGAFVCGEETALIASIEGNAGRPRPRPPFPVQKGLYGRPTSINNVETW
CNIPVIIARGGEWFAGFGTPTSTGTKVFSFVGKVRNTGLVELQLGSTLESVIYGICGGMG
PKKKIKAVQCGGPSGGCVPASLFKTPIDYEH LAELGAIMGSGGMVMDQDNMVDVARYF
TGFVVGESCGKCTPCREGTSQMLHILQKVS DGEATESDLDTLQDLALTVKDS SLCGLGQT
SANPVLTTLR YFRDEYIQHIK GKRCPAGVCENLYIALCESSCPLHMNIPGYLQLLKENRI
EDAFELTLRENPLPGTIGRICHFHCRMRCRRDMLDEPVSQGEIHRYLADTMYKMGREKQI
YANIIKEKFPSTGKRIAIIGAGPAGLTAASYLVRLGHEVTVYEASDEPGGVLRWGIPAYR
LPKDVLLKKEVSFIEKLGVRVYNTRIAEPEQWRRLSDSNDAIIVAAGASAELELGIPGED
AQGVYKACNFLGMLAKKEKVHTGGEVVVIGGGNSAIDAARSALRLGATVTVVYRRSKIDM
PANEEELKGALEEGIDLICMASPVEIVTKQKEGKKT VKA VRIQRMKAGPVDSSGRPTPIP
TDKIDEISCSTLIVAIGE KVEIPGIESLGVERLKNGR IKADPFLVTSNPKVYAIGDATL
GPATAAEAMGQAKTVAEIIDQALTGKKRFDQLFR RFDYRMEIPLKISKEKMTRAGMLPVN
ARKSNFMEINLGYTGEQARIEANRCLRCDVREHRREPRGTLVRE*

>SPBIB_v1_20027|ID:27161854| NADH:ubiquinone oxidoreductase 24 kD subunit [Uncultured spirochete bib]
MTKTASNTKMPDIDSIVDSCKEKP GSLLSALEQAQQNDPRKYLSEATLRRISAKLGVPLS
KVYSVATFY SFFSLKPQGEHVIVVCRGTACHTRGSLALLNESLSRLGIKEFK EEEENSAT
SSDSFATIRTVACFGQCALAPVIMVDGKVLSRMTVGKLVSLIEKMKKGGEK*

>SPBIB_v1_20028|ID:27161855| protein of unknown function [Uncultured spirochete bib]
MVPPFRNRRMVRPLIILLHVAVFVKKKLSIKLYQAIFI*

>SPBIB_v1_20029|ID:27161856| conserved protein of unknown function [Uncultured spirochete bib]
MASFEWDTPGKPCSRPRWPSRFSHASVDIVARKLKKVFDQ NANTGYFSCAEIRDYSYYEN
LLIQGLDGIDRKMTSGLLVPVDLSEYPKIIRADRGKIRACIYIGSFDPFQLTHLTVAVRF
LASEMSTSDFVIVVPEGSPDPAKPLKTEYAFRLSIARMQVEGILDPFIKVL DLGMQADTI
EIVRRFIGMHSGLSLELTHLIGSDVLPAAKYISEDMRIWKKEAQESGVDWRHCIHVVQR
DEESAARPYLEKIEAENVCAMLDPHIVATPSSTDFRTKQAF TIVLPTASIRDKMEIIFRY
RMHKSWSDDQE*

>SPBIB_v1_20030|ID:27161857| adk| adenylate kinase [Uncultured spirochete bib]
MKLVFLGPPGAGKGTISR MVSERLGIPQISTGDIFRTAVKEKTELGLKVQAILAAGGLVP
DEL TIAIVKDRLSWPDAQRSYILDGFPR TIAQAEALAGFSSLDAAVDFEVKDELILFRLT
GRRVCKVCGAIYHVVTKPPKVEGICDLCSGELYIRNDDKEETVKARLNAYHEETEPLIGW
YGNRSLLLTIDGSPDAETVYN AFISEIGRFLRK*

>SPBIB_v1_20031|ID:27161858| exported protein of unknown function [Uncultured spirochete bib]
MIPKSSLAIRFLTIFLFLAAGAGGAVCAQMSSASQISPVPIAEIPAPEIPASETPVA AVP
SFEAPAAQADTSAKIAPGTWAGKLILQP VQTGQSGNYSFDFVIRILSAGRMLVDIPEQG
MFSYPVDRYSLNADSLSLVLDATGAE EELAFSGSYSGT FAPQGS AKKGGIVGTVRGRSWK
GSFYVQKQEAQLKPGEMPFEVPAEGGLLPATITFPVHAAAELNPAAFASFPLVILVAGAG
KTRNNGNNFEVPGKTD TLLQLAEGLRARNVGSFRYDRRGAAEAYMLEKSGHMTSFAQHVK
DLAAVIRAAAALPREGR LILAGMNEGAWMALAALNQLGQDADLVDGLIMLDSSGQSPMEA
LAGSLEDQDEEIRNTAMEAAQTLIKTGALIPVPEILADFFSPSRKEWLASWLA FDPVKEL
KKVPVPVLLVYGENDMQVSREAF AKLADAKPSAAIKIVPGMNYVLKEVHGEDENYAAFTD
PLFKVPAILVDLIAAFKAQAPQGLLPWSSH*

>SPBIB_v1_20032|ID:27161859| protein of unknown function [Uncultured spirochete bib]

MMTFDSRNQHNQQDGEERSAEQRKYRIFALLFALTAFLVFSSCMSVPRDVAVSGLFDHF
ERTPQVLARAESAFLRDMAASFDDSTIQALISMTSENPDNGQKPINRDRLDKTLARAEAA
GIGISWNSKESPSIEAVFAGNFPSLFTSLSFSLDGNWKRIEGGYASKSGKLYVRDPYAGK
LHFTTWAPEQLNNSISAASSIAERSGLLASASDLAIYLDAKSALVSQLPILDGVTLPFDG
ILLTAERDRTSPKGANPHARYTAIFKIQMKDEQTARTYRPIRMVMWALVSGKLTALGIPV
SPETSIEQQGSLFATTPISMSAREIVNVFLALSNMNGGKAASGLVAAPRQ*

>SPBIB_v1_20033|ID:27161860| conserved protein of unknown function [Uncultured spirochete bib]
MILRMNREFHYVVCYLARKAGFPPEHAETIALSSQMVDDSKLPWKIEGEQNSGHPHTLP
ADQSASFMTVEVTQNYLFWDPKIARDVYLPFHFIQGDQPQLAAMKRKDRKLHPLAVTADSON
ARALLVDALRSGNLFRIALHSYADTWAHQNFQTADPFNELEARNILPAVGHQAGTT
PDQPQALWRDMRLAASYEDISNSARFLEAARMYRFLSTAQHKKFEDEAFVTGPLEELWL
NRRTSKNDSLAAASDYVIYFDVPPYDPDKWFRSLEARQFDTRELLKAISAEGFGTEWLGA
FSGQSMVVRTISISNYSDSMFAQWNAASAHRDAFMKLMHTKGIQVL*

>SPBIB_v1_20034|ID:27161861|ndk| Nucleoside diphosphate kinase [Uncultured spirochete bib]
MAIERTFAMLKPGVLSRRIAGEIISRIERKGFDIIGLKIMRITRELAEKHYAEHIGKPPF
NELVA YITSSPVVAMVLEGDQAIKILRMMCGSTKPEEANPGTIRGDYAMHTNINIIHASD
SPEAAAREISLFFKPEELMDWS DGNQHWI*

>SPBIB_v1_20035|ID:27161862| Oligoendopeptidase, pepF/M3 family [Uncultured spirochete bib]
MAETLNVPTWNLDDVFPGFSEKEYREAKVRIKAMLEKAKNYLVESSPPVGDAAFADWLWA
LLAELDQIEVLADTLA YVYARFSTETKNPVVIAELNKIEELLVPATTVLVQFRNMLAQH
EKQLKAAIASDARFAPYAFVLEEALFFQKHQMAPELEDLAADLGRSGADAWSRLQESILA
NTSAVWDEATGERKTMVELRNLA YDPDRAVREKAYRLELGIWKS VEMPVAAALNGVKGTV
STLNKRRGWESALEASLAQARISRATLDALIGAMEVSLPMWRRYLKAKARLLGLERVAFY
DLFGPVERQGAMLPTFQWNEARDFIVRQFGTFDPDMAAFAAHAFEHFWIDAKPREGKSGG
AYCTHFPAARQPRVFCNFDGSSFSLGTIAHELGHAWHYETIKDLPMLLSQYPMTLAETAS
IFSETLVSNAAMAELDQSARLPLIEMHLQDACQVIVDILSRFYFEKAVFEERANGEITAD
RLCALMLDAQNRTYGDAMEPELKHPYMWAVKGYHYIPSLSFYNFPYAFGQLFGVGLYQIY
KEQGSSFARRYRELLRATGSLPAVEVARKAGFDIETPDFWLRAMSTFEEDVRFLEDEAQK
SARE*

>SPBIB_v1_20036|ID:27161863|lysS| Lysine--tRNA ligase [Uncultured spirochete bib]
MEQKKAHWA DQTAEKIIQTWGEQERYTCASGITPSGTVHVGNFREMISVELVVRALRRL
GKNVRFIYSWDDYDVFRK VPLNMPNPEMLEKYLRFPITMVPDPWGRDESYARHHEVDVET
ILPEVGIYPEFIYQANRYRAGTYAEGMRRALEMREHLKTILDKYRDEDHKKIQGEWWPVAV
FCSNCNRDTTEIDGWDGDWGLTYHCESCGHKETGDLRRTLKGAKLVWRVDWPMRWAYEKVD
FEPAGKDHHSQGGSFDTSKHVVEDVYGRKPPVTFRYDFIGIKGSPGKMSSSKGKVVDLPD
LLRVYQPEIVRYL FAGTRPNTEFVISFDL DVIKIYEDYDRTERIYWGTEKAKNEEIEALE
RRIYELSQVESVPEEMPYQIPFRHL CNMLQIHQGNIDSVIALLPDLKPSQEARVRRRAQC
AWYWITECAPEDFRFFLRKPGKAELSELEAAVCRLRDEVVAKLDQFAQENEVAEAIYA
VAQASGIEPKQLFRASYQALIGKDQGPRLAGFLKAIGKEKVL SILEQY*

>SPBIB_v1_20037|ID:27161864| conserved protein of unknown function [Uncultured spirochete bib]
MMPASMNIEKISLEEAARIALAECIELKKQENVLIANPDTEQSEIAKAFFEQAEEMGAS
PRLLFQPVKTQADYAEDEVIAIEA APPVILSISTEKL GKDRKRLSSPLKAPDGRSFDHI
FHYLLHGISAIRAIWTPGITKDMFIRTVPVDY LKMRAAADRLSALLTQASVVMVKSPGGT
DISFSIQGRKAMRDDGDFRSAGKGGNLPAGEVFISPAIKSAEGTIVFDGSSISDIEGDIVI
QKPIACTVRGGYVMGIEGGEEADRLEKALMRGLN MASRLVHQQGMAPETALS YGTNARHI
GEFGIGLNPAARIGGNMLEDEKVLGTIHF AIGSNYDEDAPALIHLDGLV KLPTVVLLMPT
GEEITIMEHGALSMVAALTE*

>SPBIB_v1_20038|ID:27161865|gcp| O-sialoglycoprotein endopeptidase [Uncultured spirochete bib]
MRILGIETSCDECAAAVVEDGRHILSNVVM TQIPLHERYQGVVPEIASRAHIEWILGAVR
RALAEAQLDIDDIDGVAATAK PGLIGSLAVGLSFAKAFAWARGLPFGKINHMLAHL YAPQ
LEETIEYPFLGLLVSGGHTVICRADD FDSIAVLGTTIDDAAGEAFDKVAKYYGFGYPPGGL
AIDQLAERGDENAFKFLPSLHKGEHRYDVS YSGLKTA VIHHLHSYL RPGASISPENIAA
SFRKTAIDTLLSRLYRAVRDTGIRTIVAGGGVA ANAYLRRELASKKDLRVFFPPLSLCGD
NGAMVAGIAWHYFCRGEADGWDLAPSSRVMDFKWRQNHP*

>SPBIB_v1_20039|ID:27161866| Divergent polysaccharide deacetylase family [Uncultured spirochete bib]
MNGARRGTIHSVGTQKRHTQKYSLVIAACAFAVFALFALINACTPKDSSKKQAQSSRYG
TPEYVIELPPGYEDLKVIPESQKEPLTQPPANPESLSGSQPGAPGAGASVARLARPEGTV
PSGAPVLIIVDDVGYNNGELKPFLELPFITFAVLPLQLPHSADSALSIQKAGKEMILHQ
PMEALGGNDPGPHAVYLSMDEATIAKTVAENIDSPFYQPKGMNNHMGSAVTRDRNAMTPV
LKLVKERGMYYLDSLTPGTASELCRELGTPLYMERNVFLDNKSDRESILAAIEEGKRIA
RKRGAAVMIGHVWSTNLAATLMEIYPELVEQGYSLSTISQYMQLQAEENSGHADSWN*
>SPBIB_v1_20040|ID:27161867| RNA polymerase sigma factor [Uncultured spirochete bib]
MTITDNDESLSLYFDSIRKIPLVTRQEESILASRIARGDKNALKKLIEGNLRLVVRIAKS
MWMPPHSLMDLIQEGNIGLVKAAERYDASKNVKFSTYAVWWIRQAISRSLVNTGRQIRIP
HRKEDALRRLNAIQMRKSLEISRAPTEKELADELGCSEAEVSNIMHLGDQPIALEQSGDE
ELSILDIYEDWRYNPEREIERASISWQTAWLLSNLPSREREVLSRRYGFTEGRTESLKA
GAVVGCSAETVRHIESRALKSLWHTAARVGLTA*
>SPBIB_v1_20041|ID:27161868| protein of unknown function [Uncultured spirochete bib]
MNLQIQTDDAILEAEDILHKPLVSVMSGENFVVTTPAAPRYRSNKERPHYVPQNVPTS
PKARAKNRIDFRTLFRLEKKNHAPRSGKPKQRNNNAGAINRFSVQPAMFPRTIVDVPSEL
GTGVPGADKHRPFELGLVRRRPVARSTMRTLLQGKMLHAFKIRARWIILALVLAAGT
GFLAASIINSHPHISLPNENSAQDALIAMLEPEPSAVQNSDTALPPLPSLLVERS
YTVR
RGDTLQTIARQFGLREDTIISANSLNSKTQLQVGTKLIPNMNGVYHTVKRNE
SLSTISR
AYGIEMVRIVDANNIASSALRAGDRLFIPNAKLDSSVLRNFYGDFTFIWPV
RGPISPPFGY
RTNPFSGERTYHAAIDIVVNRGTSVKATREGKVADTGYNAVFGNYVIIRHTD
GYQSLYAH
LDAILARKGARVNQGEVIGRSGNTGQSTGPHLHFSIFRNGQAVDPRKYVK*
>SPBIB_v1_20042|ID:27161869| putative Signal peptidase I [Uncultured spirochete bib]
MWKRPPASAKSFDSTLITIVLVVIVAILLRFFVADAAIVQGKSMPLPHYRNGEV
VVFIFKAA
YGIRLPSGRYIVRWGRPVRGEVVAALRPGTNEIVIKRIGEIREQQPMPVYFLIG
DNGIES
IDSRDFGLVTFDAFVGKVIPQR*
>SPBIB_v1_20043|ID:27161870| Peptidoglycan glycosyltransferase [Uncultured spirochete bib]
MENHAQARFNRLRLIFVLFTFAAAVLVRYAVLAIIEGPKTEKSTNTVTERGRIL
DRNG
NVLAFDIPKFNIAIRKNEIDPFRIHEDLRIVASALNTSADALEQKIRDSSQNFV
YLAKRL
DIDTVKPLLSQADKQLAGFLIEISGRIYPEGRLASHLIGFTGEGNRGLEGVEYK
YDTE
LSGAGSENVRGSDIYLTIDAHLQYALEQTARKAFNENHAESFLMAMDVNTGEV
LAYVQM
PDFDPNNFNGAFKEAEREDRMSVYSYEPGSVFKIFSMASVLDAGLITPKTQFN
CDGAYRKT
LPSGEQIIKDLHSYGMLDLAGILAKSSNAGAGYASDRMSEAEFYSRLINFGFT
QKTGIG
SPGENPGSLREPAKWSARTKPTVAIGQEIRVTALQMITAASAVANGGILLKPE
TIQRIEQ
ADGKILYNHKPVALRKVIAPETSRAIITAMESAASLEGTGWRAKVPDVRMAV
KTGTAQMI
DPKTRAYSETDFIASTLILPADNPKVAIYVAIVKPKGDSYLGQIAAPVLR
EAAESAIS
ILGLPRGKSQNAMHDGLVTIQEPAPAVIGAKMPDLGGFSKRQLPLLLRS
DITVIINGDG
YVVSQDPPPGTAEAGARIVLRLQ*
>SPBIB_v1_20044|ID:27161871| Metal dependent phosphohydrolase [Uncultured spirochete bib]
MTRDQAVALWRQWNNDESLWRHALSVESVMRHFAHRYGENEEYWGLVGLLH
DIDYQKYPE
EHLRHAREILAPAGFDEAFIRAVESHGWGICSDVEPAHVMEKVL
FATDELTFIAACAYV
RPSRSVLDMEVKS
VKKKWGSAAFAAGVRRSVIEQGAQMLDMPLEELIGETIVALRSVAAD
IGLKGNL*
>SPBIB_v1_20045|ID:27161872|ffh| Signal recognition particle protein [Uncultured spirochete bib]
MLEKISETFSDVVRTISGKASISEKNVEDALDRIKIALLEADVNVRRVRRFING
ALEEAK
GEKVLRSVTPGQQFIKIVFDRMVALLGDERQDLALKGTDTSVILLGLQGS
GKTTTAAK
LANMLKNKGRKVLLAACDLVRPAAVEQLAVLAGQVGV
DIHREDSND
AVQVARNALARARR
EGHDV
IIVDTAGRLQIDEPLMQELVRIRDAMSPVESLLVADAMT
GQAAVDIAKAFDEKIG
VTGVILTKFDS
TRGGAALSLSITGKAIKFIGV
SERIEGLEPFY
PDRIANRILGMGDIV
SLVEKAQEVYDQ
KEALDLERKMSQETFTLEDYLDQIHKMKMG
SVKSMLEMIPGLAGQID
EDRIDLQEMK
WEEAILLSMTKKERQNH
LIIGPSRRSRIAKGSGTSVAE
VNRLKKFEKSR
SMMKKMVKNKGAMAKMFGGGNP*
>SPBIB_v1_30001|ID:27161873| conserved protein of unknown function [Uncultured spirochete bib]
VHWF AFCPNPCPYHHEAPASWAYAIGWYATKAFGKVRFRCTRCGKSFSTQTFSTHY

LKRIVSYRDVLYXX

>SPBIB_v1_30002|ID:27161874| conserved protein of unknown function [Uncultured spirochete bib]
MPAIGHDAQYRCVCEKKA AFEGGFFFCRTVDTELQPHALNADKIKNECVQKGIPMNRGKH
IILALVVIVVLISIFPITVEAVEPVPYRLFPALYKKENFSRIDQTMSLVNYQAGGGFLWD
RVPLIANNTIVAYYGSPLSDRMGILGRFPKEKIAQMVKETAQQYDEVNGKDGVIPAFYII
YGTCWPGGEIGYLDEKVLDDYIKYAQSEGMLVFVDHQIGKYSVREAMDRILPFLRYPNVH
LAIDPEWRTL VPMKEIGSITAKELNDAQDYMDAYIRENNIPGIRMLVVHQFADKMIQSRQ
EVQAHRDRVILIHTSDGFGVPQVKKATYQRNANAANMPVKGFKLFFKSDFPLAGFDMPLM
SPAEMQLDPRPSLILYQ*

>SPBIB_v1_30003|ID:27161875| exported protein of unknown function [Uncultured spirochete bib]
MNRARKANIAILLCAALSTVSA YDPPKGASLLGRIYSSWSMGGGMSLTEQGS AWAF
NPASTAFEELPGLEFSYTG IADMSTGSPQGWGSAQAADFALPKAYGVWVGAVRLFSTPGA
MTSMPLGTFVTVGGGFSK KISGRMSVGASAWLAMGDNGSFGWGWADLGVIQELGDVGF
KNARLGFVVSGLGKEFN YQTPVGIAPGSLAATGFPQAFTPGIGFSADLLNEYDLRMRVS
VDLRAPSFSDIEAETSLALSFRNIVSLRLAMATSLYDIQQKSGRSVWPSLTLSGRIPLGK
KSANNAGVSSVAPAFGLMPL YDSLDAFSLGTRLSFGQADKSPKVK AQLPVSTSGLPAA
ISPADGAQDWLEIPITVSDDQRTVAGGVFKIEDRSSGKVVRTITEQASPPETIKSFADL
KEGFGFSRHNAFIPDALRWDGKDDQGNLVPEGTYIVSFHAWDDLGN TNMDYDSCMNVVVD
RTPPSVNAWVLGDEQLYQGT DQLIFSPDGDNSKDTISFRTQGS IENNWKEYILDANDKAV
RTKEIRERSAPRDFVWDG TDDAGKRVPDGYRFRLSAADPAGNVGSKTIGVAPDKSDWIV
VDSRPAVRVAADRKA FSPIKEGKAGTIDVSFSLESLKNL VSWKEFIQDQSGKTLWSSG
DSSNPPLTSFAFNGLDPSGKPFADGQYKAGIEMKYRNGYSPVVYS DPFILDATPPSAQIV
LDDVRAIFSPDGDGSRDALAFKFAGSKEDLWNLSIRNEQGEVVYSQEYRDGLANRFVWNG
LDTTGRRVDDGRYFLHLESKDIAENAFSTEYGP IVDTRTPRASFA LSRDAFSPNDGVA
DVLKVGIMLESIEGLRAWKLDVASSAAQIAEKNA AISTLLSGDGSNPPATWQFDGKTD
RGQLPEGAYR FELTIEYDNGWKTTVSSPEFVLDNTAPKAQVSR SRPYFNPRGSALQSQVI
ISQLGSKENLWTGELRDAQ GALKRKWEFKNSEPGEILWDGRTADGALLPDGLYSYRLFCV
DAAGNSFASEPIHIGIDTAAKQSSLSANYMAISPNGDGIQDAMAL AISVTSPESVQNWRL
AILKGQETVMEWKGAGNVPQSITWDG TSLTRLPVPDGSYTAFFHADY PNGDATEASLGPL
VVDRIAPQAEVKIARAIFSPNGDGVNDTLPIQQSSVPGDVWQGSILDVDGKVVRSWTDWG
TVQSVEWDGRDNAGNVAADGKYRYKLESKDAAGNAFSYISP AFEIETEKKAVRLTVSDKA
FSPNNDGIKDVQVLSAAIVAPEKVKEFVLQIVAQDGPAA LSAVRTWKGETPLSRYEWRGE
TDAQIPAPDGHYAASMRVVYRNGDEAESATGTFL LDRQYPQIDVKVQGSIFSPDGDGRSD
TITIAQSSMPGDDWKG TMKDSAGNVVRSWAWQAQASDFVWDGRNTNGSVVSDGFYTYTVE
SEDAAGNRTMAGPFRIQVETGKRAVQLRLSDKAFSPNGDGIKDELVINVEADARDRIKQY
SLIIRGKDGTAVRIWTGSAGLAREYRWNGTNDAGAA VPDGEYSVGIEVLYLNDAFAKDG
IPVTVDRIPQASVRLSRIFSPNGDGRADTLEIAQSSVY GDRWNGQIISEVGKIVRTWE
WYPMIADIVWDGKDQNGKIVPDGAYYELR SIDEAGNSFILPRQRIIVDAAQKNVSRVE
PSAFSPNDNGVKDITYINISAPK PETLLSYAVSIFSGTKAVQGGQAPVRSWKGSTDIKTQY
VWDGLTDAGLKVPDGNYSVYLMLEYANGDLFNIGPVPV VVDTVPPKISISADPMLFSPNG
DGIKDYVTITQNSDPGDDWTGRIRSASGAVVRSYTWKGQAKTFNWDGTDANGRLVPNGAY
SYEVVSVDAAGNSASASIKGLTVDSTKPKVYVTASDTGISPNGDGIRDDVSFSLTVENRE
GVESWRFLIDSKGVERSFFGGSGSDVPTRLVWDGRDLQ GQVIEDTYTGKLVVRYLKGDV
AEASSAKIIVKIAPPKVDVTVKPEYFSPDGDGVDDTLTFGIATEKNAGITEWKLEILETA
VVESASMQEAKPTRSFKIWTGKGNPPAQITWNGKSDKGELVESATDYPFEFTCWDALGNQ
TKVKGIIAVDVLVIRGDRLKIKVPSIVFRANHADFIGLDAETVARNQRVVARIAQILNK
FPDYRIRIEGHGNNV GKMLGYSASRIQQEEINELIPLSTERAEVVRKMLVDNGVDSRRLT
VNGLGSSEPVPFTDVENRWKNRRVEFVLIKNQ*

>SPBIB_v1_30004|ID:27161876| membrane protein of unknown function [Uncultured spirochete bib]
MHTIHDPAGVFVALLAALLFSAWLSDLLPMHIAAILPVLG IILGPEVLGIIEGGTVLQIL
GSIGVMYIFFSAGLSANIASRTARRSIVPTS VILKQVFIWTIMPSMAGIAVGLAAGASFI
RACAIGLFFASAGARSALKLNKAKFQE QASYGMPAFVPIFSALCLLVLDTLMSGADARSF
MLVLAFSFIGGGLVWIVFPRLAALFLRHVKIKGSIEVWLLFLVFGAAYAGTFFSIPAWF
TAFMTGVALSAAAAPSADSELN RIPVRDDIFIPAALLFMGVSARISGILPTGNWILVAVI

FVIGGLAARILIVFLSKRFALVTEPLIGLAVPFASFSLAISWILYGSGLFDSVLFLSALA
LAISSIIISGISMKGSSGAEAPSAAGGDKSRLAIPNRILIALSKPSSIAQLVELSGILH
GTANSSPIFPLVVRMPEETASQQSADSETLLATAVMQLSQMQKSALPLQIEALNAGLGII
DSAIQKNADTIIIGWKNPPRLSHAFFGNVIDQVVSGTSQMVLVARAQFPWKQIKKIYVVA
PVLVNRHPGFAAALQCIERLAEATYAHIHFIVAEENAEVQKIGKSLASFNSAQTSHFHS
WRDIPSLIQVSSGSHAMIALISARPGEASWNPAPERLPHVLAEKNSAANVLMMLYMPAFLP
EEAQASEYQQPLPEPLAESSAEALLAEA VRAGRIRVDMQTSADGIYELMFAALPHTEK
NVLQSVADHFIEMVQRQPIEIEPGVLLHDRIENISYPIVCFGAHKKGFRLSTLDVPVQV
IVIIIVPHNQGAEEHLRFLAEIAALFHSIDLRLERLIAANMPENLLSQH*

>SPBIB_v1_30005|ID:27161877|murB| UDP-N-acetylenolpyruvoylglucosamine reductase [Uncultured spirochete bib]
METLWQIAQKINTEQCSVTFDEPMSAHTTFRIGGPADLFLKPRSVEALASVLTLLRSARI
PVFLLGGGANILVADQGIRGAVIDTCLLSSVRSASNSNIYAECGASVSTLCTEALVQG
LSGLENFYGMPGSIGGAIYMNARCYEDDISLHINEITAISPTGELVSLSARTMQWSYKRS
PFMRKGAFAGYIVAAGRFSLEPGEPLQIAAHMRSRMRMMDRMHKHHFDYPSAGSMFKNNRNF
GKPTGKILHELGLRGYRIGNAAISPWHANIFINLGGATARDMRALILHAQAVVLAATGWK
LEPEVLFVGEF*

>SPBIB_v1_30006|ID:27161878|cysS| Cysteine--tRNA ligase [Uncultured spirochete bib]
MHDMYLFNTMGRSLQRFEPLHDHKVGFYGCPTVYNFAHIGNLRTYIFEDILVRTLRRF
YDVTHVMNITDVGHLTGDDDTGEDKMVRSARERGSVLEIAQFYTDAFFVDTQRLNINRP
TIVCKATDHIQDMIDLQRIEANGYTYFAGGNLYFDVSKFEHYGELAGLQLDQLKAGARI
EIDPNKRNPFDVFLWFTKSKFENQALLWDSPWGRGYPGWHEICSAMSMKYLGEQFDIHAG
GVDHIAVHHTNEIAQSEAATGHKWVNYWMHAEFLVLDKKGKMSKSSGSFLTQTLVDKGYD
PLDYRYFCLGGHYRSQLSFSWEGLDQARAARLALVDRVVALKEAAGQPAHSLARPEQIGA
AAKAYLQAFDDALSDDLAMPRALAQVWTMLKDTEIPPADALACILDMDRVLGLSLDAAEK
REASVDAETVRWIEDMIRRAAAKARDYAAADAIRNELKAKGIQLEDRPDGTSWKLTN*

>SPBIB_v1_30007|ID:27161879| RNA polymerase sigma-24 factor [Uncultured spirochete bib]
LFQRKDDSLSSDFRIFAQNIIDLLRIA VRITNDWESAEDVVQDAFGKVLEKRLQFPSDE
DARYWLIRVVKNGAINWSKRKLREFKAYEHWWKAETTQAKSSSSAASNGEEQNQDAGTEQ
SAHELLMKESAEEVREALAKLPENLRVVLILKEYEGMNYKEIAKVLGISEGNVKVRAFR
ARQALLSLLSEGGTHVP*

>SPBIB_v1_30008|ID:27161880| conserved protein of unknown function [Uncultured spirochete bib]
MCPDEILLTAFVDNEVPSPWKERIELHLEQCERCRTVETYRELRVRLRSADSIDALQLA
HAVQRIRLSLEETEKAAASMKGARRLVARYPILSALSSRRVSVPLPLLVASALLIVFFAGL
AFGIFGAGRYANQALALSTRLPATTNANIESLVSTLSQTDPSQVVTIRAPGTMLAPLSSA
APVYVIYNIGEQQKPTVMAVPAQGEAK*

>SPBIB_v1_30009|ID:27161881| exported protein of unknown function [Uncultured spirochete bib]
MRIRTLVVI AFLLAGAGCLFAQAPSAQPAQGTGIAPSQNPGASLPLPVFQFRLRAAFML
TPVMVA AIQSA AIHSQNSKVNNAQPLDKDAVPAWDEPILRDVSLTSPGIIKIQQDQLIAM
IVFMPVELVKKDLTMLVQNQIWAKSPDNSIQMNTSVHTIRVPLGALFYYPPLGGDNKQGA
PVAIEILVNQK*

>SPBIB_v1_30010|ID:27161882| exported protein of unknown function [Uncultured spirochete bib]
MKRRAIIIIVCMFVLMMLAAGAIIFYVSRPVLIAIDPVSSKPNEVVSFLFRNFGEQPGHVL
FDAAPLPSPAVLYWSPQLSIRMPHGVDTAIVRIQTRFGLSNPLMLADASKIPEISKSAP
IPSIHPVISSMQPTTNAQIGKPLIVSGDHFDPGEEGSAVFFTRIASVSTLALDDPANFIE
VNSVDKLVVWWTENKITVRVPDGAENGFVIRTKRGTSNVYPVVSISRAGRTWKGETAKY
SIEQRIAIHVAASLPEGQLSLFLAKPPNQANQNAQIEVKSGAEYLVA DENNWQEFRLGQA
DASKGKIEIVRGLQVDVSEM RADLASSSLQGIDSPWPAFLASSLAADTLVPSDDPTIQAA
ALAIQKKEKNPFRQIVLVSQWVSSNVKLN DKSQGLSDEALVALKHKAGGTRALALLNCAM
LRALGIPAVPVAGFLATGDNRLIPHFWGEYYLTGMGWIPFDPLLASGYVPQQFSGGFSR
LIYYRGIDNRHIAMSRGYRLLPAVSREVQKKKQKVSWSFFEYDELSLGLSYSSTWDIAMIS
WNANP*

>SPBIB_v1_30011|ID:27161883|glyA| serine hydroxymethyltransferase [Uncultured spirochete bib]
MSYIQSVDPHELHAAMLAEMDRQKNKLELIASENYTSRAVLEAAGSVLTNKYAEGYPGKRY
YGGCEFVDIAENLARDRAKKLFGADHANVQPHSGSQANMGVLF AALNPGDTIMGMSLAHG

GHLTHGAPVSFSGKLYKVVSYGVNPDPTETIDYDQVAYLAREHKPKLIAGASAYSRIIDF
DAFRRVADEVGAYLMVDMAHIAGIVAVGRHPSPIPVADFTTTTTTHKTLRGPRGGMILVGR
DKENNRGIMTPKGDALRKWSEVIDSMIMPGIQGGPLMHIIAGKAVALKEALEPSFAEYID
RVLLNAKAMAKALSAGGARIVSGGTDNHLMLVDLTPLEITGRDAEKWLDEANITVNKNGI
PFDKKS PFVTS GIRVGT PAITTRGMGPAEMERIAGFIMDVLKSKGDAQVITRVKQEV LAL
TKRFPLP*

>SPBIB_v1_30012|ID:27161884| protein of unknown function [Uncultured spirochete bib]
MVLEGGVGRWYAEALLRSAASQHFFSFALRKEEWVRVFRVQGVAE EEGGAHVDEGAPES
GAQKSQNAPDSGSASQNSENLWARYQLDSAGAMLVVALRYAPDVEPESDEERAVRGLPPL
PIAKEGRPAAAVGRFARANWYRETIARLADCVK SISDEARARGLPVFAPREWHRFSNSRF
PEKALAVAAGLGTIGRNGLLIAQRTGNAEASDSGCAETSSWPLWSSAVVLGLMLLPFDIG
KEAGTLHDEPIMPLALCGTCQRCIDACPTGALALAE LPRYERARCIQNYTSGAGPLPEDI
EAAWGNQLYGC DICLEACPYFKP NSEACTALGRIGGAFDAAFIAAMSEAE LRAVFKGSAL
DQKWIAPEALRRNVAIVASLFIGKSSDVPSRLL*

>SPBIB_v1_30013|ID:27161885| conserved protein of unknown function [Uncultured spirochete bib]
MYTLIYTASYEEKVRRFLK KHPEIEKQYIKTLKLELNPFHPSLRLHHFKTSNFE GYSIS
INLMYRISLEFIMNGKEILLIDIGDHKAIYGKE*

>SPBIB_v1_30014|ID:27161886| Prevent-host-death family protein [Uncultured spirochete bib]
MAILVSANDLKVKGIRAI EENSNDREVIITVRGKEKYVILPIETYNQLREYELDAAILE
AQKDYAEGRYHTGTIEEHLQRVH*

>SPBIB_v1_30015|ID:27161887| protein of unknown function [Uncultured spirochete bib]
MAESWKC ANVQIQILYLQ QKHFSIFVSEIDTKGLFCTCIRYIVLRVIRKEHSTKAKTVGE
KLFFADPAFY PALGGDLGTSREAI VAFFLEQAGWNVEALADEQAGDFAISRTGPDTRTER
YTLEVGGRSKKPKQAD FVIRDDIDYPAGNAIPLWLAGFMF*

>SPBIB_v1_30016|ID:27161888| Lysine--tRNA ligase [Uncultured spirochete bib]
MEVSILQARSRMVTATRDFFLSRGYLETDTPALAPSLIPESC LEVFATEYVHPTKGRRPL
YLIPSPEIWMKKVIAETGRSVFQLCKSWRNAESVSR IHNPEFTMLEYYGVGLSSSDNIRL
TEELFAALATDETPPQARPPFRVMSMKEAWHEFAHTDL DALAEPEAMREACRERGLLVPQ
DAPWEDAFNILFLSFVEPALPQDQPLVLNEY PAGIECLAMDIPGTTYKERWELYVSGIEI
ANCFTEMASSDAVRAYFASQSEKKRQALVPHHIDDSYASIFEHFPPCSGVA VGFDRLLMV
LLGKRSLAEVMLFPFESFPETE QASLETLRNAAMHDSW*

>SPBIB_v1_30017|ID:27161889|efp| Elongation factor P [Uncultured spirochete bib]
MVRGGEIGIGTCLLINGTPHIVVEREFVSPGKGS AFARVRAK NLKNGNVITQTIKTADFV
EDAQVDLVDCQYQYNDGEFFHFMNNETFDQFEVPVAAHEDRGPYLKEGETYTIVMWE GEP
IDIKIPYKMVFTVVESENYVRGDTVSGATKPVTTETGLVVRVPLFIKQGEKILVNTESNE
YVERVNE*

>SPBIB_v1_30018|ID:27161890| conserved protein of unknown function [Uncultured spirochete bib]
VLDAGCGTGVIGISLAASCPDMEVVMRDRDFRAVAF AARNASRNLAVKLQGLGGTELAQ
CAKRPFKIKVQRNAALIAAPGLLCEPDPNAPYEAVVANLP AKAGPALLSQYFVAVGRE
LLREGGTFAFVIVAPLAEQARAWCMEAGFEIQR TVATKNH MVCIARTGERRAGENA VKEA
LAELGRGKADQWFKAYVRSHVKKSIAGASLVWDGIQGLPEFDEPSFATLCALALGRQVFP
GSLVRRALVIEPGVGIVPLWCKGVLSSEITL KSHDVLALAA SGWNLRRAGFDNSVRILE
PAFAKKENSAGEPVLDSAERGMEVLAPFSIDAA ILFPEDIPKFDSASYWPLLSRALKRG
AVAVIASSATYIGRFVRQKPSGFSKLPQGEHRKGWEAVAFRRE*

>SPBIB_v1_30019|ID:27161891| conserved protein of unknown function [Uncultured spirochete bib]
MKKSEKLIIESATPDEYVTNSLKSRLKPAEKARLARMWMERTGYTRDDIIRARNRNAYWR
KRKMEGAAERTKRRMQEHDYSEGTAIEWTRERIEEFITLNRKDAYGRYIHRDWELAQHFG
TSIPSIQYMRRKY NKIRKMLGPGAKRDKVIDYMSCSELVLQHGGPKSRKRSR*

>SPBIB_v1_30020|ID:27161892|recG| ATP-dependent DNA helicase RecG [Uncultured spirochete bib]
VFLRELTQDVRILKGAGPATMRALANLGIHTVADLLLHLPRDYEDKTKIVPLSRFADAKV
FTTARVIRHEWFGFGRMRTLKILIEDESSEAA LLCFNRPFLEQMAPVGS MIQVYVGKFKQFK
YGEIQSSSFEIKRIDGELAAEKALSPVYPLTEHLNQ MAMRKMVTLALNKFASHIEDELPA
YLLDRRQFLRKTDAIRAIHFSSWEDAKRAHDALAYEELFYFQLGIALRIRARRAKTIER
KQSPGVLARRLRERLSYSLTDDQQA V LQEI VDDMHKPYPMARLLQGDVGC GKTIVALLAA

LYAVERGGQVAIMAPTELLARQHATIAAHLVEPLGVRLAFVTGSSVNAARPPLLSALKNG
DIDIAIGTHALFSEDVAFKNLELVIIDEQQRFGVLQRIALYKKGHVPDLLMMTATPIPRS
LALTFFGDLQVSTIKNLPPGRRPVVTHLAREDRCDRVYEFARKKLKEGRQAYFVYYPVISE
SDRLGLRDAESMAAHLAKEVFPEFKVGLLHSRLGDDAKMEAMNQFAAGHIQVLVATTVVE
VGVDVPNATIMVIEHAERFGLSALHQLRGRIGRGTYYQGYCFLIYSKELTEEGRMRLKALY
DTNDGFAIAEEDLKIRGPGDLLGIEQAGELNLRADMRDFTDLLKEARKDAFAVIEKDWL
LAGPEHEAIRQVLTRANPLRER*

>SPBIB_v1_30021|ID:27161893| Thermostable carboxypeptidase 1 [Uncultured spirochete bib]
MHKETARLLELDREHSLVMHIGAILGWDQETYMPKAIERSSQLALLEGLAHQKAVNPE
IGELLAALEAKSDLSEDEKAYVRVVRDYDRETKLPEAFVTEYAKEASLSQAAWADAKKN
NDFAAFKPHLSRMVELNKKRAHYLNPNAKPYDVLLDLFEPGSTQESVAAVFAKMKSYLVE
ILTRIRERPQIEDKCSGRRVDKHTQERISQYFMKVLGYERDRGRLDVSAHPFTTTLGADD
VRITTRYVEDYFSSSLFSTIHESGHALYEMGIDPNPDYRGTKLAEAVSMAVHESQSRLWE
NIVGRSPAFWERHFPALSALLGEVGEGLDLESFVKSINRVSPSLIRTEADEVTYGLHVIA
RFELESALFDGSLNVEEVPEAWRAKYRELLGIEAPDDRQGLQDVHWSMGAFGYFPSYAL
GNLYGAQFWAALKKEIPDVEARISGGDTSAVLAWLRKNVHVQGSRYTPGELVKKVTGQAL
DPVWFEKYLREKYSKIYGF*

>SPBIB_v1_30022|ID:27161894|hisD| Histidinol dehydrogenase [Uncultured spirochete bib]
MEKYTLKRITIEEPEPSMRLFDPEVDAVAIKAIEAVRSGGEVALRRWAQEFDGLAKGAP
LVIAREEMKAAAYDSLPEETAALLGRAKGRVAAFAAAQRACLAPLDVPALGGRHGHEFVPV
ARAGCYVPGGAFPLPSSALMTVIPAKAAGVPEVWCAGPKPTRETLAAAWLAGADGFLQCC
GAHAIAALAFGIAVPRCDVIIIGPGGKYVAAAKRLLYGIVGTEAPAGPSELLVIADESADP
DIVAADLLAQAEHSPDAMPALIAHSHIADQIDRILRAQLAALPEPNRSIAQRSLQNGFC
CIEPDPARIADGANHCAPEHLEIATSEPRALAKRIKNAGAIFLGSGSAEVFGDYGAGPNH
TLPTGGASRFAAGLSVLHFLRARTWLAIDDPAGLADDTAAFARLEGLEAHARAALIRTRR
SSSTSLAGTSRTRPGPAPAR*

>SPBIB_v1_30023|ID:27161895| conserved protein of unknown function [Uncultured spirochete bib]
MIVPSIDIMNGRAVQLRGGKQPPLDAGNPLELAERYSRVGEFAVVDLDAAMGKGSNRELV
LSMCKRWPVRVGGGIRTQKLALAYLNAGARYIMLGTAATPEFCAQLPRERLIAALDSRND
TIMVEGWTKPREGSVEEAIQKLAPYVAGFLVTFIETEGDQCIGIDIERAKRLVKLAPDRKF
TFAGGAAGGERGLADITALDAIGADIQAGTSLVLGDLSLADAFAPLHTDRPDGLWPTLV
CDESGKVLGLVYSNRESLKHAIESGKGAYHSRSLGLWVKGESSGNGQTLIRADLDCDRDT
IRFTVRQEGVGFCHLKRNCFDGYLEKLNRTISKRMKDAPQGSYTRRLFSDEALLASK
LREEAQELAQSKTKDEAVAEAADVMYFALVKTISMGGSLSDIEAELERRSLRVTRRGNA
KPEFEGSEGKNEWKSIH*

>SPBIB_v1_30024|ID:27161896|hisF| imidazole glycerol phosphate synthase, catalytic subunit with HisH [Uncultured spirochete bib]
MSGLAVRIIPCLDFKDGRVVKGVRFENLVDSGDPLERALLYEAQGADELAFDISATVEG
RKTMAKEVARIRKAIAIPITVGGGIASMEDAARLLD SGADRVSVNSAAVREPAIIEAIAR
RFGVQCAVVAIDATKSPAMPSGYEVKIAAGAVATGLDAIEWASEAAQRGAGEILLTSIDR
DGTNLGYECNLIHLVSRAVPIPVVASGGASKPEHFLEGYRNGALALLAAGIFHRSEVSIS
EIKQYLSAHNVEVRL*

>SPBIB_v1_30025|ID:27161897|hisH| Imidazole glycerol phosphate synthase subunit HisH [Uncultured spirochete bib]
MSQIRTPSLVIIETGVANLASVRALAERLGLQPIVTS DPEEVVRAPFVLLPGVGAFGPAM
HKLREGLDAAIRSVAEGRPIAGICLGMQLFFEASEESEGVQGLRLLPGKVKRLSGGLP
LPQLGWNRIEPEPGSRLLAGWVYFANSYGVGIEQKFN DGTADTSKAAFPRFDSISIATT
TYGSAFISAIEAWRDDRPVLLLCQFHPELSGSFGKNL FARWLELASERRRV*

>SPBIB_v1_30026|ID:27161898|hisB| Imidazole glycerol-phosphate dehydratase [Uncultured spirochete bib]
MSEQSIQNEKGGQSQIARLRRTTRETDVTIALSFLPGAIDIKTGIGFFDHMLTQLAFHAG
WSLELSCKGDLVDVDDHHSVEDCAIALGKAFKLA PSGAGRQRFYAYAPMDEALARAVID
ISGRSYCVLSGTFTSPSIGNALSTSNIAHFFQSFAANANL TLHLDILRGENDHHKAEALFK
AAALALKSALEPRAQAPSASTKGETTFSTPEEGK*

>SPBIB_v1_30027|ID:27161899| putative Histidinol-phosphate aminotransferase [Uncultured spirochete bib]
MLRLDANEGRCLLSEEDLKEILSPEIARRYPVRSLL EEP LAEMLGLPVSCVLATAGADDA

IDRTVRSLAGPGGLVMSTSPGFVEFLEAAKRSSAMFESIPKDPLGAFPVAEICEAVKSRS
PQLLILASPDNPSGCVLAKSELEAVANACREAGTILIFDATYSDFSLRTAKPVDAIAFPN
VLVSGSFSKSRGLAGFRIGYIAGGEEAAPLIARLADAGPPFSLSSAAIEAGRRALSDSS
TVQAFVDEVREVALLTAQLRGLGFVSDSEANFVLLKSSASARVAEMLRREGILVRTWK
GKTAYEGLVRITVPGEKSEFEKLANAIHTLARFKEAAE*

>SPBIB_v1_30028|ID:27161900|hisG| ATP phosphoribosyltransferase [Uncultured spirochete bib]
MREKKNERTELRIGLPKGRMQAKVIELFNDAGIPVSVDEREYRPRVGNKPKQALISKGIA
YEAKLLKPQNIVEMLATGSRDIGFAGADWIRELGVDLVELLDTALDPVTIVAAPEAVAE
AYGKCKGNIEVVKKVCGRTPIVASEYEGLAKEWIAKNLPGAFAFVRSYGATEVFPEDADI
IIDNCATGTTLRANKLSIIDTLMSSSTRFYASKEAMQDPVKREAADSLILLFRSVLEARR
RVMLEVNISAELLDQLVAILPCLRAPTVSPLGKGDAFAVKVAAPRDTLASLIPEIKRRGG
TDIVVTQMSQLVP*

>SPBIB_v1_30029|ID:27161901| protein of unknown function [Uncultured spirochete bib]
MTDTRHPGFLTPERHQGEDAASIIYPVVSRRARGLSLGINLFPDSKHCTYNPCYCEVQP
FSNPHARLSEGMIEAALREFFDKDWPAYAKSFALEDISISGNGEPTCSPFLEEALYAAAK
VLSEQVSLDAKLFHVPIVLITNSTGFLSPQICELLHRFSQEARFEIWAKLDGGSSELHSI
LSRSNYAFDRIVGDIAHFAAITPVKIQTMICRDACSGRVLFDAERYCGALMSLIGQGARI
NAIQLYTTARPPAEPWIASIDDIEMAMLASIVRRCLPSEIRLECFGRSGELSIPNSGQEQ
WPK*

>SPBIB_v1_30030|ID:27161902| PHP domain protein [Uncultured spirochete bib]
MAQVDLHHTSSASDGELSPSELMALAHKGLSTIALTDHDTVAGLAEAAQAAHAHGIECI
PGIEIEIDFEPGEFHLLGYGIDPQSAPLLDATQRLGNARHERNEAILELFANAGFQLDTI
KISELSRESYIGRPHLADLLVKARCVTRQEAFFDRYLKGRPFYIKKSCLPLEEALSVIK
AAGGVVVAHPYSLFVSKSMLGTLFSRWKDMGIEGLEAYHPTAKFGQCVILERMARERGM
FVTAGSDFHGKARPECGLGRTAGNMAIDSCYRDALVSALSHPAQK*

>SPBIB_v1_30031|ID:27161903| conserved membrane protein of unknown function [Uncultured spirochete bib]
MVVLIYPEITKTIISTMKTLPNRKIAFLFFLLFLLVARLFYFPFLTVILWSGLLYVFL
EPLHKKLSGSVRVNGRKSFGSHLSALVLSVLGVLLVPMFLAVAVTRQLADLLKSAVH
FFETNMDKLRIDPQSQLGATIQSFLGDSFDIRTLDPIRELQSLAAGANQALRLSSSLIK
NVFRFVIAILFIMFTLYYLLMDGNSLGETFVSMMPIDPEHTRLFMRKLRETGRQLVKGYP
LVALFQGLMMFILSLIFGFRNNLVLAVLTAIASFVPMVGTSLVWFPMGIFIAASGNIGLA
LVFLITAGILVSTLDNFIRPVVLGGQLKVHPLFLFFSIAGGLVVFNGIILGPLVLMLF
IAAGDLYRSISVEEDEGAKKSTELTSAPPDEKAR*

>SPBIB_v1_30032|ID:27161904|rsmI| Ribosomal RNA small subunit methyltransferase I [Uncultured spirochete bib]
MQYKTVSTLYMVATPIGNLGDITLRGLETLKAVDVVACEDTRHTLKLSSHFDIHKPLVSC
HANDEQRGAERVAALLDEGKNVAYCSDAGTPGLSDPGAVLVREARSRGHVIVPIGPSPA
ATLISAAGISGRTFLFDGFLSPKPGKRRARLKELLARGESFVLYESPFRVGLKLLDDIASI
EPERCICIGRELTKIHEEIVRGTASELAPRFPADSAKGEFCLIVEGRGSEQPDSKRGKDS
*

>SPBIB_v1_30033|ID:27161905| tRNA/rRNA methyltransferase (SpoU) [Uncultured spirochete bib]
MMDLAHLLNLHGRARVRKTVLILERIEHESTESIHAFFLLYLRELAVMLKESPEPDSL
QAAGSFLQAIDREQLSSEGRDNDSTRSMLRALNQFRHALMRISGQTPADWDFVNAPRSS
GFAQRKAGMRVYLEDVRSFPNIGSIFRTAEALGFEEIILSPECADPMHPRARRSAMGTIE
RMAWRRAPVSSLAEMEGVFALEVGGSSALGEYTFPLPGVMVLGSEELGISSDALQYCTAGR
VEIPLVGAKASLVATAFGIAAFAWFS*

>SPBIB_v1_40001|ID:27161906|ycjV| putative sugar transporter subunit: ATP-binding component of ABC superfamily
transporter [Uncultured spirochete bib]
MAKVELKGMGKVYEGNVRAVTNANITINDKEFVVVFGPSGCGKTTTLRMIAGLEDITEGE
LYIDGKLVNDVPPKDRDIAMVFQNYALYPHMTVYENMAFGLKIRKLPKDEIDARVKEAAR
ILDIEKLLDRKPKQLSGGQRQVAVGRAIVRKPKVFLFDEPLSNLDAKLRVQMRAELIEL
HDRLQATMIYVTHDQVEAMTMGDKIVVMKDGLVQQIGSPLYLYNNPINKFVAGFIGSPPM
NFMTVNVVEEGGQIFIDEGSFRAPDEKQAGLLKPYVGKSVYFGIRPEDLPVADAAHRGQ
KFDAKVTVVEPLGAEIHLQATTPTQVMVARIPPHLYKHGDTITFAPVMAKAIYFDKETE
KSILPVKWNEQEE*

>SPBIB_v1_40002|ID:27161907| Major facilitator superfamily MFS_1 [Uncultured spirochete bib]
MDRKKKGFPGPYLGITFLIGFGFFTMGLMDPLYDTYVPIFLSKYIGSMSLVGFIMTIDNILA
IFLIPIVSAWSDRTNTRIGRRMPYILVLLPLTAIFFGAIPYAAGASLAALIAILLNVT
KQSVRGPVVALMPDTIPADYRSEANGVINTMGGIASIVGTIGLARLMDLDTKPLLLGNTK
DRLPFPLAGLFVVLAIILLFAFIREKKPDQTETSEQKIPMIESFRNVAAQKDKSALYILI
SLFLWFLGYQGVLPFIGKYSVDVLKTSSGTAALAAGMVGIAAIFALPSGYVAHRVGRKK
TIRASLLVISILTALFAHPWLTAAMPGLSLKASFWAIMFLFGIFWVSIITNSFPMLWQM
AEWGTIGIYTGLYYTASQAAAILAPILTGLIIDVFGYSGIFLFCCTVCMLAARFVMGKVTK
GPAESPAAEA*

>SPBIB_v1_40003|ID:27161908| conserved protein of unknown function [Uncultured spirochete bib]
MISQKIPHIRRADLSVTAQKNLDARLRLVSRLPGSIPGKMTGSQAELHYFSSPGRTELG
GNHTDHNHGCVLAASVDLMDLAVARARADRIVTVTSEGYDPIIVDFSDSAARMHEQGTPA
AIIRGLAAWLERSTPLRRGFDIAIDSEVPAGSGLSSSAFELLIAAIFDDDFGGLGLSPV
EWAIAGQFAENEYFGKPCGLMDQIACAVGGIVSIDFAEPAQPLISSIAYDFASRNALALAI
VDTGSNHEDLTREYAAIPNEMKEVAAIFGKQTMREVEKADLVARAAKIRAQCGDRAFLRA
WHFVHETARPALMQDALERNDLASYLSLVRESGRSSWMYLQNIHAGDPRQQSLAVALALS
EDLLGSEGAWRVHGGGFAGTIQVYVPEPEFFAFSGRMEAVFGRGCVRRLNIRPFGMCRII
ED*

>SPBIB_v1_40004|ID:27161909| conserved protein of unknown function [Uncultured spirochete bib]
MSKEYLANIHKTPNTEKAAAYISPHAVIRGAVTLGQDVSVWHGAVLRGDMAPIEVGARSNI
QDGAVLHVAENMPCIVGEEVTIGHGAIHACTVGNRCLVGMGAIVLNGTVVGDECIIGAG
TVIPGGKNIPPRSMVLGNPGKVTRAITDEEAIHLREQAYTYIALARETAIEERKGS*

>SPBIB_v1_40005|ID:27161910| protein of unknown function [Uncultured spirochete bib]
MMRXXSLYLLGHNYLKPFRIRAXKXGHPRXHAEAAGIPXXLVQHFVQALXGXIXAFLSRCX
LSETMXRTWEKRWKTGPKTKAEYIPKYALA*

>SPBIB_v1_40006|ID:27161911| exported protein of unknown function [Uncultured spirochete bib]
VLHKXXRNPRCLSMXTRMXSFXCANTKGLEVVVAKEVQAXAHHAVCDIAVETDCFPVVVR
EVFAQLPVDVVGRKKGIAEX

>SPBIB_v1_50001|ID:27161912| conserved exported protein of unknown function [Uncultured spirochete bib]
MKKILLAVALIAVSGIAFAQVDLSKVKDG VYFAQDNGFSSSGWKEQVILEVSKGKIVRA
VWNGVSNLPGATDKKTYAASGKYGMKASKIKA EWDTQAKTVEDYL VKTQDINFSKFDK
GHTDAISGATLTVKGFELAQEALKSSPVEKGSYKDGWYYAEDLNFDKSGWKN SVLVTVV
NGTIVDVVWNGISKDPQAKSKYVQSQLGTYKMNAKNGEWYVQADRVAQAIVKAGDPAKIP
VKADGKTDAVSGVSITVQGITLAEALKA*

>SPBIB_v1_50002|ID:27161913| Aminotransferase class I and II [Uncultured spirochete bib]
MNQLADELNALLSGTVADRLLSDMGRRMYFPKGILSQGAEASERAYRFNATIGMAYEHGQ
PMMLNALRKELPGLTPTEAVAYASTGGVQKLRSVWKDSL YKKNPSLAGKRISLPVVVPGL
TAAVSYICDLFVEPGDTVIVPDLHWPNYRLIVEERKTAAGITYPLFSGEGYNVEALLDGV
RQAGQRRGKAIILNFPNPTGYSLTLEEADRLAQGLLEIAQSGTDILAITDDAYFGLQY
EPNLLRESMFARLTDLHPNILAVKADGPTKEDYVWGFRI GFVTFGGCGLSDEQYDALFKK
LAGIIRSSVSSSSLSQNL LKALQDSGYDAQKEVYRATLERRYRAMKNKLSTMQLPEGL
VPMPFNSGYFMSFHCQGFSAEALRKLLDEYGIGTVSLLDRYLRVAFSSVEETDVDELCE
AIAKAAASLISKG*

>SPBIB_v1_50003|ID:27161914| exported protein of unknown function [Uncultured spirochete bib]
MKCKAIPRFALAAGAALFLWLSCQSACAQSAHAESIPQAPPQAALRVATWNVHDCSASNK
KTGQTFLLHAQIARTLHELKIDIILQEIQVEGRKGADIQLLQNALEHEGWPM SYAAWAK
SPQADDLAILSRFPIAQNVVLEPSKAPWPRPVLEAHINVAGRELVLYNAHFKAFFDDAKS
LAARRAQASALASLLRAQYGDRIKGAAILAGDFNTIMPEDMAPNTGTLDMLQLRDNEP
SDDFLSASLKWRYPEPTFISARYSSITDHLIISPALAAHAGKNDIAIVDAPDSGYGFPLS
DHKILISLLISDLPLLSR*

>SPBIB_v1_50004|ID:27161915| Orn/DAP/Arg decarboxylase 2 [Uncultured spirochete bib]
VKTAYSFPLENFMSREKFERIKEFAKDKETPCLIIDLDVIRKKNYENLQTYLPWATIYYAV
KANPDDAVVSLLRDLGSNFDVASRYELDQLRLGVSPDRMSFGNTIKKEKDIA YFYEKGV
RLFVTDSIADIDKLSRAAPGSKVFFRLLEGLGADWPLSKKFGSHPDLARQLMKTAMRFG

LEPYGISFHPGSQQRDVGVQSSALAIVAQLFNWARHDLKVDLKMINGGGFPANYLEPTD
SLEQYAQDIKRFLDNSFGLVWPEKIVIEPGRSMAGDAGVIVSEIINIAKKS VHERYPWVF
LDIGKFGGLIETLDESIKYPIYFEGQGSVEEVILAGPTCDSMDILYERTPYFMPSSAKIG
DRVYILTGTGAYTQSYSSVYFNGFPPLKSYILPPA*

>SPBIB_v1_50005|ID:27161916| conserved membrane protein of unknown function [Uncultured spirochete bib]
MIGFFIKKSFDDGWDNL YLLAALNGIFLLVLLFFAVPVALGAPMWLIIIAVACAIAVLS
IWDVAVSNAMEYAIADGKSVHFADIKAAIPRS AKLGLVMGGINIYGVALTVALPFYLSQK
AMWGVFAGGVLFWTMILAMLILQYVPAIFARDGGTLRQIFRTSLYLFVDNPGFSIFLLW
RIVTLAISALTMLLAPGPAGSALASAVAVRLRMKKYRYIKDNPGADRRRIPWNELLLEEK
ELVGKRTLKGMIFPWKD*

>SPBIB_v1_50006|ID:27161917| conserved protein of unknown function [Uncultured spirochete bib]
MIEKSRREPGMKPPARGKGHAAALNPQKKVRS AEHGENSSTRPLLEAFEERKKLALSSIVF
IRFDGKAAQSHIPEGIDPSIPYVQLQAPMVKLN PASITPESLLTGMLRVLA WDPDNANG
ATYRAYVRAVRPELFEELIAAGVQKAESKEWLVAEEIFFAASGLDPERPEPFINLALMHE
EHAKQLSDAGDEAQA EKEDELAKHYQHL LAAKQAFPPAYYHAAFFFLRKHNYDRTVSL
TSYIGMNDDEERTNKAKSILEKLSSMGYLDTLFKEAYDFIQMGEEQKGLERAKQFVDFKFP
SVWNGWFLVGVWAHRR LGNWSEGAQAFATALEKGAEGADVFNELAICQMEMGDLEAARSNL
ERALRLEPENVKIIVNLGALS YRQGRYKEAEGFFRAALEFPEDRIAKEWLKRFDSAGGS
AESTGEQNQ*

>SPBIB_v1_50007|ID:27161918| putative Calcineurin-like phosphoesterase [Uncultured spirochete bib]
MDHDEESSNGTLPASQELEKALEAVLAAAGTIPSSIRPRAPKGSYPGGLIQLPSDKPCVL
VPDVHARPDFVESLLLSVFPGIEGTLDAALGKGLATLVFLGDIPHAEGELAARRWNRA YE
RIVREHDAHAILCP EMDEEMGLSLAALLEVIDLQCRYPSSVFCLKGNHDMTNAADHGDL
PFYKYADEGRMGALWLEMRYGEKIARLMRRYELSLPVVACSKNFCASHAEPAPPLDKERV
ISFREHSEVVQALIWTANDEAKPGSVAKSLEALLDSMEKAQHSVWFSGHRPVRDNFAIRA
NGQLVQIHNPD LWHIVFLSGNAKQADFYAVQRSGGEAAHVCSLILDPERRR K*

>SPBIB_v1_50008|ID:27161920| conserved exported protein of unknown function [Uncultured spirochete bib]
MAVRKKKRTSAKTGCLLWAVAFLLVLLVFLVKFNDIRSAVQKTGFLDALNHAVSKPASQE
KPVQPSAPASPPSAVTQPPGSQPAITQGLPKDAEKPGQTPPQSAPQPEQKPEAQTSPSP
AEPGQQIQKTRSAVL YFVHIGEDGTISSERVKRVLPLTDSPIQDTLETLLKGPTSELR
NLISLIPSGAKLRGISM RGSTVLVDFSDGFTYNRYGKEGYLAQLKQVVFTL TEFQNTDV
QFLIEGKMRPFISEGVPLDKPYSRAS F*

>SPBIB_v1_50009|ID:27161919| protein of unknown function [Uncultured spirochete bib]
MFVLPVSVQAEERSEEVS AQVFPHLSVALELLQAVNPVAESQQMAAKLVRTAVLVFPERQ
VSKQRDSMHPENRFSVPRSEYH*

>SPBIB_v1_50010|ID:27161921|gcvT| Aminomethyltransferase [Uncultured spirochete bib]
MAPFAGYDMPITYPTGAIEEHLVTRRSVGLFDIDHMGQLEISGAGADAFVSRMVTAKVSD
LVPPMARYSLLLDEKGGVIDDLFIYRLPQSWWIVVNASNRAKDFEFWKAHAPEDVA VVDR
SDDTYMIAVQGPRAIELIDKVANMAVSSIQRFNWGNISIDGVPVLFGRGTGYTGEDGGELF
FPAAEAQHVVWELL LAKGEALS IETRPIGLAARDLSRFEAGMPLHGHEISTEINPIEAGFK
WACDFEKEFIGKEALLAIDKGVSRKLVGIEVFGGVPREGYEVTSPDGKDIGHCVAGMFC
PTVKKYAANAFVLPDYAKVGTEASV VIRGQPRKAVVVKRPLYLPAYRR*

>SPBIB_v1_50011|ID:27161922|gcvH| glycine cleavage complex lipoylprotein [Uncultured spirochete bib]
MAIDKNARYLESHEYAKPEGGNFVIGISDHAQ AELGDVVVELPAVGKTIK GATFGTIE
SVKAASDLYMPVSGTVVEVNEAVKNDPALVNKDCFGAGWLIKVAPSNPAEFD SLLDASAY
GKAIGEE*

>SPBIB_v1_50012|ID:27161923|gcvPA| putative glycine dehydrogenase (decarboxylating) subunit 1 [Uncultured spirochete bib]

VPFIPNTDAERTEMLNTIGVESVEELFSDIP AHLRIQKLDLPDGVSEMEALAALDALAER
NAQTTKMDWVFGAGAYNSYIPSLVPALASRGEFLTA YTPYQPEVSQGT LQAI FEYQSM AA
KLLGMPVVNASHYDGATALAEAVLMAWKAKEGRNRILLPADLHPEYAKVIATYLT SFDIE
LAR YDGDPERASLDERTAAVVVA YPGFSGEVYPVEKAAARAHAAGALCIVQADPVMCAIF
KSPGEQGADIVTAEGQSLGNPLNFGG P YLGMLGTTEALLRRMPGRIAGETKDKEGRRGFV
LTLSTREQHIRREKA VSNICSNQGLSMLQTCIYLAALGKQGLRHVAKQSYDKAHYAAELI

GRIPGFRVATKQFFREFLVQTPKPAADIARALAKKGIVPGLPVSRYFPDKPNELLVCVTE
MNSRPQIERLAIALKEASK*

>SPBIB_v1_50013|ID:27161924|gcvPB| putative glycine dehydrogenase (decarboxylating) subunit 2 [Uncultured
spirochete bib]

MNTMNMNRDEPLVYELSRPGRIGCTLPRSDVPEYALPEGLVRTDLDLPELDELTVVRHFTR
LSQKNFSIDTEFYPLGSCMTKYNPKANAAAAHSGWKNLHPLVEPEHAQGALELLWRLQE
ALQKIGGFAAASLQPAAGAHGEFSGVLMIIHAALKDRGELGRKKMLIPDSAHTNPASCTM
AGFVTQTIPSGPDGNIDIAALRAALDDTVAGIMITNPNTLGLFETNIEEICRLVHEAGGY
VYGDGANMNALTGVFKPGSSGIDVMHFNHKTFTSTPHGGGGPGAGMIAANEALAPYLPGP
VAVKRGESYRLEMPAKSIGQVKAFYGNFGVLVRAITYLLMTGGNGLRRVAENAVLNANYL
KALVEGVYPVPYKRHCMHEFVAKGTIVPGVHTLDIAKRLIDYGFHPPTIYFPLIVQEALM
IEPTETESKETLDQYADAMLKIAKEAAEQPELLHDAPHNAPVARLDEVMAARCPILCYRG
*

>SPBIB_v1_50014|ID:27161925| putative undecaprenyl-phosphate N-acetylglucosaminyl 1-phosphate transferase
[Uncultured spirochete bib]

MLWLSLATAVVLSSVLMPLIIQFCHRHQLYDRLNDRKVHSDSKMPRLGGIGIALAFILSI
VIIRIFQIDEFHQLYDGYRLWPIIAGASIIFLTGLLDDLDLTAWQKLTLSAAAIMVML
AGYRFKFLVVPFGSGVWNFGLFSYPLTFLWIVGITNAINLIDGIDGLAGGISGLAALAF
LFFMFTSNVLPAEICLALVGSIIIGFLIYNLPPAKIFMGDSGSLFLGYVLAIPLLSQYKG
FQGTDIGVLSAATVLSIPIFDLTMAMYRRFRAHKSFFSADRKHLHHQLLDRGFHTSEILL
ILYSLTVVLAMVSLSMLFIPLSWSFVLNVAMFGAMLLYFLRFSRPDREKNMHGPL*

>SPBIB_v1_50015|ID:27161926| protein of unknown function [Uncultured spirochete bib]

MLIIVRSHQILQCSLNILLKKPRAQRFRVSPNLKQSGQSRATFYVRRERMSAIITHRRL
LQVFLRLAILGLVLASMAACAIEAPKSQGTLRICILPGEFTHYAAKGIPKGGAPESA
SSAALRLIGPQSGWQIASYRLTCTSPERGEIITKTLGRASGDITLVGGWNILAEGLAADG
SIIVENQTQIDVSAGRTINLPISHLAKGKGSVQITFSTTQTPNASWKYSLSLEFLGLPG
DATAEGPPAYTAEFAATEQSFNAADLPSGYYRLTVQLKDNTQATLAGSVETILVLPGRIS
AGNCDIVLADPSIDISLSPLELSAKAAIGVDRFLNKNKKMLVPLAVAEENANLIDWF
ANGEAVGGGLETGNQILTGYRLHFGTIDAPGAFSFLKMDALLTDPDTKLAQVVTQKSTNV
SPPLSAHAEWIQSMDYRAALTKALHDNGDPANQGTGVPSDAKWVTA
STNGFIAIAGLDKS
SAVHLFFSTAGQEATDSNGIPVVLPAESGWIRLWRDKVVIEKSERSPDRVSLANGLLLA
AGSSSNWLRVYVLDTAGAIVAKKDIVSGKNGAPAFANIKALKFSPDTKKLFLVLTNSPEK
ILVFNVENLTAGEPVLAEFLFASCENPPSSSLGMEIDLALLSDGWIAACSSNIARIFLV
HYSNDQFSSATTYASGANGESLGDPKSIVFDEQNTLMYVLGYSKKLHVFSKIDGYTGYQP
VSTISLTNEFDKARSLALARIYSSSFLVAGGGQSMGIIALDAAGQPIAQSSLASVDANY
AGIASIMNIAALGDTIVAAAGTSGLASVFNIF*

>SPBIB_v1_50016|ID:27161927|glgA| Glycogen synthase [Uncultured spirochete bib]

VKILFVSSEVTPFAKSGGLGDAVSSLATALSRAGHDVRILLPRYYFISKNTLRRTNGLLE
IETAREHYHAFLYTTAMPNSQVKIYFLDCEPLYGRNGIYGYSSAQEFDPNPARFSVLSKA
AFAACRSLGWIPDIMHANDWPTSLVPVYLNTEKNTFSDTAGVLTIHNLGYQGIYSRDH
FPELGLGWEYFYGAGFEYYGNVNLKAGIVSAECITTVSPTYAREIQTPNGGFGLDGLLR
QRSRDLVGILNGIDVDIWNPAADPYIPAHYSYKDMGKAACKAALQKELGLPSDPNVPI
GMVTRLVEQKGISEVFGRTYGCMRKILETIHVQVAVLGSQDAWAEAIMNYSAYPQFKG
VVGYNERLAHLIEAGADFFLMPSRYEPCGLNQMYSLVYGTLPVHRTGGLADTVVNYNQE
LGEGTGFMFDDLTPQAVYDTVGWAMWAWYNKLQHIQNMVRAMQQDFSWARSADEYVRLY
EHAISLRKAR*

>SPBIB_v1_50017|ID:27161928| conserved membrane protein of unknown function [Uncultured spirochete bib]

MSEKTLTDYNKNEVRERLLRTFQSGTKEWAAADLARATGLPLAQINAEMPAIADEYRGRL
KVSQKGDILYSFPNGLKSRYRGGFPMRKLGRALGRGAAEAGKALFKIWILVTLFGYFFL
FIALALVAFFGSIAVQGGGSRDRGDRRGGGGLGGLWLTTSLFDSMIRLWFYSELKSSSE
ARYRDSFARRERHPLHKA VFSHVFGDGNADWDTVLKKAFAVAFVQTHKGVITLPEFMAI
SGLKPQEAEDRITRFLVEFEGSPEVTEGALYFFFPSLLAKAGNVSAAAASTFPLKKLKS
FSSNNKKMDRTRWVNVNLLFGSYYAWNAMNIGTDVIVRTSQGLSLRGGLTFLYSYTVY
LASQLGAAKPAVVIGWLLGAAPLAFSVLFFAIPLIRSWRLKRENEMLKRENMRKMLYSGV

LSSPQGFDRHRAVALPTEEVPRANPKSVVEEIQHLAAWSSAEIRADGKWWFKDVEFVQKEV
EHVRAKESDYAADRTIFDTNAPV*

>SPBIB_v1_50018|ID:27161929| protein of unknown function [Uncultured spirochete bib]
MRNIMLFQAMQKIGARNTSIISTIEPVFTNVFMMMLLGEILTGQRIVGGVLLILAGVIVLD
RLGYSPDSTISATSSIGRSSPISKSPGTDEGKS*

>SPBIB_v1_50019|ID:27161930| UvrD/REP helicase [Uncultured spirochete bib]
MMADRIDPYLQGLNPEQLEAVRFDGTRLLILAGAGTGKTRVITTKIAYLVREKGIPEESI
LAVTFTNKAANEMRERAMAIEPACERAIIRTFHSFGAWFMRRNAQAFGLRSEFTIYDADD
SAELVHSVFPFASRRDCSDYAFLIAKAKDYCLAPDSPTLGFISQHPEFRRIYAA YEERLR
ATGNVDFGDLILLPALLEKDEIIRNRTRQFRVILVDEYQDSNVAQFRLLQQLASPEGM
LCVVGDDDDQSIYRFRGAEVNINLNFQTIFFPETKIIKLERNYRSHQRILDLAHSIVVRNMS
RLGKLLATRPGGTPKLAAILDDQDQIEFCASIIRQHVQNGGHWKDIAILYRTNAQSLG
FERLFPKFDIPYRIVGALRFYEREEIKDMLAFLALLANPRDEIAFKRIINKPSRGIGASA
ISAIVEYAMQKQIDLLEASDRQAQAHGKKEGLKYFVGLMDSARSMLMSGQLQDENHPKD
LGALISDLAQRSGLIEFYRSKDRIAGTQKEENIEELVNAASEFPLSEEGLEFLDTIMLD
QSQQNGDSNADSVTLITMHNTKGLEFPVIVVTGLEQGLFPRNDEEGDDLEEQRRLFYVAV
TRAKEHLYLSACRWRRLHGRLFETMPSRFLTEIDPEL YELWGASRRFAGAQRQPDLP
SAGSETGRRGYGQSMYVQSAANEYRSQEPAPKPEKPEWEPGMSVYHDEYGS GTIIKVTPSQA
GLLVIVRFDGSKIAQFFPKYTKKLEKVEH*

>SPBIB_v1_50020|ID:27161931|rimO| Ribosomal protein S12 methyltransferase RimO [Uncultured spirochete bib]
MPAFFIDQHGCANQVDGEEIASRLVDAGFVAVDSPENAEVIVNTCGFIEDAKKESIQ
AIEAKRQWPEKVVVAGCLSQRYPDALFQDLVDADGIVGNADLSLIPDSIQKVEGERVL
VCPQQASLPSAYYPRKALDFPGTAHIKITEGCSNHCTYCAIPLIRGELRSRTIEDIVH
EARTLLERGFELV LIGQDLGNFGRDLKGRCLLPDLLEALARLEGNFRVRILYIHPDHP
ETILPIREDRRFAPYFDLPFHASEPVLRRMNRKGSATAYLELLASIRESLPDAMIRST
FLVGFPGETEDDFEELLQFQKKAQLDWLGAFEYSREENTPA YTMKNRVPKSIKKR
KALIEEVQTAITGAKLQRFIGSNDTFVVEEVDFDHDLCIARGWMQAPDVGVTLIHSRQ
NPGSAVHARIISVNGVDFNAILDYTAEP*

>SPBIB_v1_50021|ID:27161932| protein of unknown function [Uncultured spirochete bib]
VVMGKVGNI FRDTRLGKGLTLDQVADETNIKRFLQGIENDNFDGFPGEVYIIGFIRNYA
EFLGLNPAETVARFKAAEPEPEPPS QDKSPEKPSSETPEAIEPIAKSPDTQTS
AETKPARKEPEVPLLFTEESEEA EAKASTLSSEHAKSGKMPRTSKKQAVAKHPSEPEK
APPAAGPASVTESEAPLAKAQPSLTDSQKEKIALSHQPFFPARKNQKVHAAP
IQLGHFLLYALAILIII VGVVSMPLRKLPSRASRTPADYRAEGLPFEQRLYPQDR
VYLPLGNDFISVTLKSVKDKV VLDTPYGEFTLGLNEETVINPTADKDR
LIVSIIDYAPNEPQNGALAHFDVKEALSQQETS SDITIPASAAAPAASKAEP
APIVLFKSASGPHPFYVNVSFVSPVMFRYEADRKEWVEKYY RKGESITVNAS
NSITFWTANAQAVKVSVFQ SAGKSTELMMGGPGEISVQRLSWSNSQGGW
ALVAAPLD*

>SPBIB_v1_50022|ID:27161933| Outer membrane lipoprotein carrier protein LolA [Uncultured spirochete bib]
VKRKHFFVLMFIVGFYMA LSNIGAQTLLTADQFFSKLADRYASVTDYQADVQITAGRQPM
TGKLIKFSPTLLRIDFSQPADQVIVFDGKTLLVYLPQYRAVLRQDASDQGISLGAATLAS
KEGLSLLRRNYTIGWERSPNEEPLDPGSTEQVYRLMLSRKSVSEGYKNIRLSVSGDTMLI
RRLEGWTVSNDKITFD FQNVLLNQGIRDDRFVYDAPASANVYNNFLFQ*

>SPBIB_v1_50023|ID:27161934| Pyrophosphate-dependent phosphofructokinase [Uncultured spirochete bib]
MLERSPLHTARYAYTPKVPEIFLEPLPHIKALPSEVIEPKDKKELLSIFPNSFGKPAVK
FVKGEGVPSEKAFTVGVILSGGPAAGGHNVIAGLFDGIKKANPKSKLIGFKGGPSGLIDG
KYLEINADMLEQYRNTGGFDIIGSGRTKIETPQQLKSFENAIKGLDALVVIGGDDSNT
NAALLSEYFIQKGA PVTVVGVPKTIDGDLKNEWIEISFGFDTATKVYSELIGNICRDASS
GRKYWHFIKLMGRSASHIALECAFQTRPNIALISEEIEAKQMSLAQIVATIADAIAARAA
KGENFGVIIPEGLIEFIPEIKALIAQINEIIAAAGSEYESLPRGEAQRSFILSKLPAET
AALFSQLPESIQ TQLCWRDPHGNVQVSRIETEKLLVEMVSRRLKEMSAEGTYTGTFDYQ
THFFGYEGRCAPSNFDADYCYSLGYSACLLILHGLTG YIAAIRNLAAPPKEWIPGGIPI
VSMMNIERRHGKEKPVIKKALVDLEGKPKFAFAQVRDKWALSSDYRIPGSIQYFGPPSIT
DVPAILQLEQNS*

>SPBIB_v1_50024|ID:27161935| putative LysM domain/M23/M37 peptidase domain protein [Uncultured spirochete bib]

MARRAVVIAISLLSLFFMPLGLCGAEQEYHVIQSGETLYSIAKSYSVPYEMLASINGITD
PSKIRPGTVLLIPLVHVVAKGETFFGIKKYDVSIQELKTANSLSDSYVLRVGDVLPD
KGVAAATPSQAAPAQPAPVAASPADTAPPSSAKPTSATPAASIPAAPPSAPAAASPADTA
PPSSNSNSKNASAAASRTPDALSIWPVEGKQYMSGKLEGIMFQTTTRGAPVKAVASGTVV
SAGPSRGGFDVVFIQSKSGFVYVYGGNESILVKTGENVEPGKTIGRVGIDAKDGTAIAYF
FVFRNGQPIDPSLAPRD*

>SPBIB_v1_50025|ID:27161936| RNA polymerase sigma factor [Uncultured spirochete bib]
MSDLENCNTGSSSERPTRKNEDSMADLDPLSLYLRQISKYPLLDASREKEIGAHLADLGA
QLTQIDLAIKPDNAELERERNRIAADIRATRELLITSNLRLVVSIAKGYQMRGVNLLD
LIDEGNIGLIEAVSRFDYKRGYRFSTYASWWIRQAIKCLVDQSRVIRLPIHMLNTIRRC
YASAKQLVQELGRDPNMLELAEKMGIPQNKVESAMQLAAGTSSLDAGLDEERNGSIGDSV
KDEKAPDPFNQAFATIRELLRYVMCSLSEREQIVLQLRYGLNGEGPKTLEETGHALGIT
RERVRQIQEQALEKIKQRQELSDCRT*

>SPBIB_v1_50026|ID:27161937| putative ankyrin [Uncultured spirochete bib]
MQKHTLRPTRLGFMILALLIAGCATSPASNKEVTLSDLVIKGDIEGIRKIFYANQEQLN
KADSQGLYPLHYAISRGDAQIAEILIVLGAKPDNKDLSGKTALRYAVDRYPTEPAKQKEI
IKMLVDRGADPFLPDVAGTSPAQVALKSDINILDAMFNKNINNTAADGRTVLHYAADAL
MTKEVELLSKGVSVQIKDKADRTALDLVLLYDPKLEAAQIAEKLILKGANPSFPEFVWF
AQTVRAPDYNAVRFANGNSPLHEAISRYQYGFASLLLKADPNKNLNKNGDAPHLAVKA
GYVEGAKLLSMNANQDILDANHNTPLLLPIPAARRLEMIKLLLNFKANPALADNQGNTF
LHKAIVIQSYAPEIVETLIQAGAPVNAQNANGDTPLILCVRSGRYEYAKPLIEAKADIFKM
NQAGENALKLAISKGYQAVDSIVLSANVNQSDDNSNSVLMTAVSLKAPTDVLLKILAKGA
DPNARNKALDSALHIAVRQNYAEQGIVLLDANADIFQYNSKQENPLFLALTAKPAPLEWF
FRPNVIAARDANGDSVVHHAARKNLPDGIAYLVKKGADINVLNNAEETPLHTAAKYDAVD
AIAYLARAGSSLEAADIKGDIPLQSAVLAGAARATQALLVAGSPIDNQNYSGETALHQAA
KNNISAIVILLAANGAQTEILDSRGTPLAAAAANGAFESANELLKAKAQVDTRDNGST
PLFQAVSGEHIATARLLLANGADMHALNARGLSPFKLSLMKNAQVTAEFFAPWLINKPDS
NGDAILHMLAGSSAGPDLIEAALKNGANPNARNARGDTPLMVALKKNDIVTAAQLINAGS
SVFASNADNISALSMIFGMDSGSRTKLLSAILSSIKAPKTDFAGESLLHYAVRANNKEAV
ADLLALRADKSIRNRKGEAPLDIAQSKGFQDIVSLLTNN*

>SPBIB_v1_50027|ID:27161938| D-isomer specific 2-hydroxyacid dehydrogenase NAD-binding protein [Uncultured spirochete bib]

MKIGSFMPLNSVWGPAIKQLRDEFPQHAWLEGLKPESSEIGSLDAMIAGRIPLEVFERAH
SLKTLFQPFVTGNHLPASLLERNVEVYNVHSNAFDVAERALAMTLAFYGRLLIEYHNDLR
NEIWHGFVWNRGAEDNWDSIYGKTCAILGTGAIGVALAKLLKAFDCTVYGWRKSSSTATVP
EHFDAIFPTMREIDA AEIVFIALPATAETEGLSKEILAGMKGKFLVNVGRGSIVNEEG
LYEALKNLILKGA AIDTWYTPKTGVIGAPSRYPHITLSNVILSPHVGGSTNQATRAVD
DTLKNIRAFRLRTGKGIWRADLSRMY*

>SPBIB_v1_50028|ID:27161939| protein of unknown function [Uncultured spirochete bib]
MKLLFVQLPSQMPDWSSAPANVPLAAGYLAAYAESKILARREWSILEPEIANYGSDSSI
VASIAAREPDIVSFTLYSWNLERSLFIARLASLLPHARLVAGGPEVVEHMPVTVRTPFH
SLVFGEGEEAFVDLLRDVQQHRPLAPSYSANALADLEKVPNPYLAGTLRFDPSTQVHLET
MRGCSAKCAYCYYGKNYNTLRRFPKHVLDVIRAASEAGVPEIYIMDPNFQTPDFAGRL
RDIA YANHARTAIHTELRLLEGITEEIAAGLLKEAGIASVEAGLQSTNPKALEAVHRTFDRK
AFERGAELLQKQKILVKTGLILGLPFDGYEQVIETFDLGMQGLGQEAELYPLSLLPGTE
IRERADEYGMSAMEIPPYLVTSTHWISYDDMVDAIAAFEESEFDVEWAMPAPHFQFLKEG
FVSFIDTRRPENIDWMRLNPEKLSNSMTLLVDSDDPEILVRIVRAARDLRKDNPFPLYQV
VLTSETRIPSEKLVERVREAFLEHPEHYELANSFSPDPQTSYQTRMFFATKNFALAYRAL
EEAQDMETMVVLNAKGGYNAERLAELLPYVVFQKQTLPFDRLYELISYADFPHMLIEAP
EGLF*

>SPBIB_v1_50029|ID:27161940|aat| Leucyl/phenylalanyl-tRNA--protein transferase [Uncultured spirochete bib]
MRWITMPAYLDEAEYRFPASGASRNGVVCYGGNLSPGVLLSAYRQGIFPWPSTPDTLR

WCSPDPRFVIPRGFLYITESARKALKKALRRGSPYTLTDKAFIDVISNCAAIPRPSQPG
TWIFPNLVNAYTELHGRGYAHSVEVWKNALVGGLYGVSIGAAFFGESMFSTESNASKIG
FLALAITLFEQGFDFIDCQVYTPYLELMGGIDVPRELYLEMLQGALQKPTIKGDWSRYFQ
NFPEVNLIIAAKRNIETITHNA*

>SPBIB_v1_50030|ID:27161941|clpA| ATPase and specificity subunit of ClpA-ClpP ATP-dependent serine protease, chaperone activity [Uncultured spirochete bib]

MKVSPEVQAIFNAAYNEAKLRNHEYLMPEHILFASLSFEKVRNILENCADADLEQMRHSIE
AYFEQKMPIVRNAEPIQSAGFQAVIERAVMQSQSAGKEEVQISDLVVSLEYDEERTYAGYL
MRKLGIKRLQLLEVLSHGMSDEIDIEAESLTEEETEEHPEEGGKERRAARPGTLERFATDL
TALAAAGKLEPVI GREAEIERTIQVLCRRLKNNPIHVGDAGVGKTAITEGLAQRIAAGKV
PPKLQGYTIWSLDMGALLAGTKFRGDFEERVKKVIDLLLKKEKSILFIDEIHTIIGAGAV
TGSTLDASNLLKPALTSGLRCIGSTTYDEYNKIFEKDRALSRRFQKIDIVEPTIPETVE
ILKGLRPKYEEYHDVRYSDETLEIAAKLAAQFITERKLPDKAIDVIDEAGALARIQAYKQ
NQDAQVKTIELTPHDIEVVIKARIPERTVTSSEKDKLATLESTLKLEVFGQDQAI EAV
VRAVKRSRAGFRAPDKPIANFLVVGPTGVGKTELARQLAKHLAISLHRFDMSEYQEKHTV
SRLIGSPPGYVGYEEGGLTDAIRKTPNAVLLDEIEKAHPDIYNILLQIMDYATLTDNQ
GRKADFRNVILIMTSNAGARDIGKPLIGFGDQAVSVSALDEAVERAFSPEFRNRLDAVVH
FNNLPMDIIRIVRKAIDEFRVQLAEKNVTLEVDDEVVHFLAERGYSREFGARNINRLIE
DQIKTVFVDEVLF GKLEHGGTAVAHIEGDKIAFDITPHVS*

>SPBIB_v1_50031|ID:27161942| ATP-dependent Clp protease adapter protein ClpS (modular protein) [Uncultured spirochete bib]

MGTRVTNATGTQELTQHDLETNEPEEYRVYLINDDFTTMEFVISILMTIFHKSLAEATKL
TLEVHRKGRGMAGVFPYDIATTKIQQVHAMARQGRGFLRCIMEKA*

>SPBIB_v1_50032|ID:27161943|thrS| Threonine--tRNA ligase [Uncultured spirochete bib]

MSADIDRIRHSLAHVMAEAVLHLHPGVQFGIGPAIQDGFYDFLFPQSIANEDLPAIEKE
MRRIIAQNTFVREEVSKAQAREIFRDQPFKLELIDGLEEGTISIYRQGFVDLCRGPVH
ESTKELRPDAFKLKTIA GAYWRGDETRPMLTRIYAYAFATKAELEAYLRMLEEAERRDHR
KLGKELDLFSTHEEAGPLIYWHPKGGRVRVELEKWWREEHYKNGYEILFTPHIGKSWLW
ETSGHLGFYKANMYAPMTIDEDDYIKPMNCPFHIMIYKTTSHSYRDLPLRWAE LGTVYR
YERSGVLHGLMRVRGFTQDDAHICTPEQIEDEILEVLRFSLSMWKTLGFSKIKAYLATR
PADSVGDPERWDQALVSLKKAIEKEGLPYEMDEGGGAFYGP KIDLKIQDAIGREWQMTTI
QFDFNLPERFDMTYVDKDG RQKQPYMVHRALLGSIERFFGVFVEHYAGAFPVWLM PDQVA
VIPVAPTFDEYAKEVTAFLRGKGVRAKAMLSEERMNAKIRDAQNQKIPYMVILGQREKDE
RTVSLRLRTGSQENGIPLTFASRVLGKIEAKALDL*

>SPBIB_v1_50033|ID:27161944| putative dihydropyrimidine dehydrogenase [NADP+], similar to dihydroorotate dehydrogenase [Uncultured spirochete bib]

MADLGTWLMGLRLRNPIIVGASGLTSLPDGVEKAAHSGAGAI VLKSLFEEQILAVLGQEI
AGLDIDSYPDAAFISRTAWEESTDEYLKLIDESKKRTSGVPIIASINCVGPGN WASF
RIEEAGADALELNIA YVPFSPHISGQIEHKV LSTVKEARLATKLPIMVKLGNNY TSLPH
TVHGLSKEGANAVVLFNRFFRDFNLD TMRLTGVQPLSSETEYHESLRW TAILYKRA GVE
IVSSTGIHTADA AVKCILGGASAVEVCSIIYQKGWKAITAILEEMDSIVESMGYSSLD AI
QGKLSAANAERPEEYLR LQYIKAL TG VY*

>SPBIB_v1_50034|ID:27161945|ytsJ| putative NAD-dependent malic enzyme 4 [Uncultured spirochete bib]

MKLNRLDNLSEAFPDDLTPDQRARAQTLFLKALSEKAHRFYEGKIQVVPKAGLYGFNWF
NVWYTPGVSKISTAIRDNNDQSFALSNRGNLVA VVSDSTRVLGDGDCTPPGGLGVM EGKS
FLMKYLGGVDAIALCINSRGKDGKPDADKIIDFVKMLEPSVGAVNLEDISQPNCFKVLDE
LREACDIPVWHDDAQGTACVTLAGLLNALELAGKKLSDAKIVLLGAGASNTTIARLIMAD
GGKGENMIIFDSKGLHRNRKDIEQDTRYR KWELCQATNPQCIETEAEALKGADVLIAL
STPGPDTV KREWVRSMAPKSIVFACANPVPEIWPYAAKEEGAYIVATGRGDFPNQVNSI
CFPGLLKGALLVRARKITDNMAIRCAHSIADFAKSRGINTENIIATMEETE VFAREAADV
AMAAIEEGVARVTD TWENVYKKAKEDILES RSLTKDLMDRGHIAPIPEEMLKEAFDYAVA
EVRKK*

>SPBIB_v1_50035|ID:27161946| putative amidohydrolase [Uncultured spirochete bib]

MKIALAQFRPEFGESDRNIERLLRLCKENPADLYILPELAYTGYQFVSQEEVHALADSVH

SRRIEAFRNAAKELDACLIFGFPELAGAVIYNSALAVLSDGREYLYRKTHLFYKETLYFS
PGDTGFPVFEYRGARIGMAICFDWFFPESFRTLALKGADIIAHCNSLVLPYCQTADFAAA
VQNRVFIATVNRVGAEQREDEQLAFTGESVLVSPKGEYLLRGPIEDEAVLVAEIDPEAAR
NKSINPYNEVFKMRRPGMYTLQ*

>SPBIB_v1_50036|ID:27161947| membrane protein of unknown function [Uncultured spirochete bib]
MRLFPRPQNGWLKRALILLGAMAFLSVFATIDTSEHFRTWRTARMWTSEQKVTAQAEDAA
AMFAIASASVIFNTAIVAFSAVGALALGISVALDNRKWLVSWSAIGLCASACGILYSFTV
IYKIRIGERHILKGPFDYNLALQPPVIAIVGYILVFILWIALMRSARANQAGQGGQ*

>SPBIB_v1_50037|ID:27161948| protein of unknown function [Uncultured spirochete bib]
MNEEKGTQMADIQKKKPHHLKRPVLTACMATIFALTIAVLTDASHFRNRSSDILFIEAIA
LVIGAWASYLKSRLSFLVMHPFRRKNLAESWIDRVPEKFGVSAQEMDAEARSLQIQRSR
EFRDLAIASGILLATGLIVQYI*

>SPBIB_v1_50038|ID:27161949|aliB| Oligopeptide-binding protein AliB [Uncultured spirochete bib]
MYKKIALALVALVLLSAATLGAATPKSKDYVYVFSTDPRSFNLYLNDQRATNTQHITNFVD
ALLEHTRYGILRPALAESWKTNDDFTVWTFNIRKGVKVVADLEPYADVKAQDWVDALKY
MLDNKSTLTYLIDGFVKNAGAYLQGGKITDFSQVGVKAKGDYVLEYTLEKPTPYFDTMLTY
NAYYPVNGEFLKTKGKDFGKVDKNGILYNGAYILSNYTSKSVIEYDANPTYWDKGNVSIQ
HVKFVYFDGKDPDSLNNFDAGVYVAAPVYTDNEALFARAQAKYKDYIFRARQDSTTFVY
AFNYDRNAFASPADPTKKGKSPKSKAKEDTKKAILNRNFRKAIFFGIDRPTILAQRNGDV
NKLAAAIRNSYTAPELSFDIAGKDYVKYVEDALKSRNPADFPASFKLDDAQPYYNPTKAK
AYMAKAKAELTKQGVKFPIELDVAADVSYTKGMKMDQSLKAGLEALFGTDTIKVNVVEMD
SDNYDASTYYAETGAQSNYDIGNTTGWGPDYGDYPTFLQTLEPVVGALLTPIGLDPVDEG
SDKAAATAIGLYEYAKKVEAGNAEYKDYSKRFKLFADAEAQLLDDAAILPYMSFGGAFQV
SRVIPYTAPRAAYGADEYKFKGVIVSDKVVSLAEREKYRQEWKQRQAEYKKNLAKG*

>SPBIB_v1_50039|ID:27161950| ABC transporter, permease protein [Uncultured spirochete bib]
MRGFMKGYVLKRILQSLVSVFLVSTLTVFLVFSCIPRQLVFKGDQMLQKLANRPDEYQDY
KFRTWESLGYLDYITMKEYAQSIYGNDSQVSTALQSGSSFYERFRAELQAKRYTVEAQP
VTGYLYAYKDIPTMTRVLRWYANLVQVDHPWRVKDPNPNLKRGGYYFTKDWSGMPALAAS
GTLKYQIWIWIDGSPFLHQNIHLYMGRSYPTYDGIPVLEVIGMGQGRARREVTTKVGG
QEVTFYTSIDEHTLKYKPDLDRLDKNKFEDNYADGNNIYQDPSMLGISFRIGIMSLISL
GIGLTIGVVAAMRKDKMFDKVTMGYIVFISSIPTLLYIALFARFGMKILGLPDKFPFLGA
QNFLSYILPTLSLSLGGIAGEALWIRRYMVDQMNADYVVKFARSKGLTQGEVFFRHIVRNA
LPIVHSIPMAVIGTLAGALITESFYAVPGMGKMFSSISDYNAMIIALTFIFTFVSVF
AIFLGDILVTIVDPRISLAARKEAR*

>SPBIB_v1_50040|ID:27161951|amiD| Oligopeptide transport system permease protein AmiD [Uncultured spirochete bib]

MTDKTAEKFTYATFDILQSEHIAGPKYSYWKSVFQTFKFKKWSVFWLVLLVMTLMAFIQ
PLLSGYDPAIAPNINKPETWYLKPSAQHWFGTDDRGNMWNVWVWAGTRMSLSIALIAAAI
NIGVGILVGAIWGYSKRIDPILLGIYNVVSNPVILRSMMLMYIFGRGFVQIVLAMTITG
WLGVAFFIRTQVMIIRDREYNLASRCLGTPLKRMVTRNLPYMVSVIATLIYQEIPGLIN
TETVLSYLGIGLPTTYPVSLGRMIDTYWSFVDYTPHMIVFPGIVLGLITISFYIVGQLFAD
ASDPRTHR*

>SPBIB_v1_50041|ID:27161952|oppD| oligopeptide transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]

MDTPNIILSAKDLVVKFRVRNKELTAIRHISLDFEGETLAIVGESGSGKTVLTKTFTGM
LENGRIDNGSIIFEGQELTKLKTQKQWETIRGAKISTVFQDPMTSLNPLKRIGIQITEV
IEKHQKLPSAEAKKIALNLMERVGKNAEQRFDTYPFQYSGGMRQRIVIAIALACKPRIL
ICDEPTTALDVTIQAQILDLIRNLQREYGFYIYTHDLGVVANVADRVAVMYAGQIVEY
GTVREIFYDPKHPYTWALISSLPTLAEKDKPLYAIPGTPPTLFSDIKGDAPRNRALK
IDFEEPPFYQVSPTHFAKTWLLDPRAPQAEPDAVKIMRERGRKNTKQTSEAQQ*

>SPBIB_v1_50042|ID:27161953|oppF| oligopeptide transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]

MNAAVNAAANARNNEPLLSVKNLEVTFKNGNTSFTA VRDVSFDIMEGESFALVGESGSGK
TTIGRTIIRINPASKGEIYFKGKRISGIIDKETDSWVIRNIQMIFQDPMASLNERATIDY

IVSEGLYNFNLFSSSEERREKAFRALRDVGLLEEHAERYPHEFSGGQRQRICIARVLVME
PNFIIADEPISALDVSIRAQVLNLLKDLKKERGLSYLFAHDLTVVRYFADRIAVIHQGE
LKELARTEELFSRPLHPYTRSLLSAVPLPDPDLEKNKLLVYDPATMHDYSKGLPSWREI
FPGHFVLANDKEAEEYQEMYR*

>SPBIB_v1_50043|ID:27161954| AAA ATPase [Uncultured spirochete bib]
MDTVSVNVDGYGEVAVPAGTSAELVLEQANIEAASRPKKNAPPLAVLINNELAPLSAPI
GAPCSIKPVYPPDSPMGTEVYRRSLCFILALAAAREIVPSRRLTVSMAIGNGYHYHFDNEP
VSAQLLEALSRRMRELVLSDLPIRIVTRAWEAELEYFKTSNQSDTLALMEYINDPFIQMN
ECNGFRDFHIAPLVPRTGLLSVWELVPYRRGMLLRFPHTKTPYEMDPFSDVPVLYDIAEE
YEHKARILNAESVGALNRINQSGNIQDFILVAEALQNKKLALIADRIAEEKSDKTKVVLIA
GPSSSGKTTTAKKLAIQKVLGFRPIHIELDNYFVDRSRTPLDKDGKPDFECLEALDIEY
LNQQLDLDFDGKEVELPLYDFKSGTRKASGRKISLSNNEILILEGIHGLNDRLTPHIPAE
NKLKIYVSALTQLNIDDHNRVRTTDYRLLRRMVRDYNFRGHSQAATLGMWSSVQRGERLY
IFPFQGSADIAFNSALDYELGVLKVFAEPLLQAVKPDHDEYPDARRIQAFISRISPISPO
YVPSDSILREFIGGSVFKY*

>SPBIB_v1_50044|ID:27161955| Transcriptional regulator, LacI family [Uncultured spirochete bib]
MSKVTIKDIAQRAGVSKTAVSFALNYPGRISKKTYEKIMAIVEELGYVPNPFARTLTTKR
LGAIGLLLQKIGDIFGNPHMAQIISGIGEECERREFSLAILPLIRGKIIEAARKSYVDA
LITIGVGPDHEVVDLLKKNHIPFVTIDGEESENTINIGIDHKNAAKEIMLHVLQQHRDI
AILALEADTKPIESTHTSIVLQRRFQGFQEALEEFSSISLAEPSVQILNCKSSMQAGHESV
QILLSNAKRPTAIVAMSDIAAIGALVAIKENGLRVPGDIAVAGFDDIPESLSPALTTI
FQPGRQKGTEAARMVLNMLDGAQGTHIKLPYKLIVRESTLRA*

>SPBIB_v1_50045|ID:27161956|yjbG| Oligoendopeptidase F homolog [Uncultured spirochete bib]
MAKAIPARSEVPAEHKWNLSLFFKDDAAWEEGLAALGAMLQDAEACKKAGIGHSAEAFLA
ALSAYEQYLILEERLGYSHLRVTEDEGNSTARGMFARFVGVSSQGQAAWSWFSPAIVL
DDAFLQACLADPKFAGYRVFLEKLRRFKPHVLSEAEERLLALQAEPAQTAQEAQSVLTVN
DLNFGTIDTPEGPKPLTQSTFASFMRMPDRSIRKTAYLQFYTFESHQNTLGSLYAGSVK
LDKYQAQVRKYPSARAMALFPDNPESVYDNLIATLGKNLPSLHRYKLRKKILGLDEL
HYDVYVPLVRESRATHSYEEAVDIVTEALKPLGEDYISVLRKGLTSGWVDRYENKGGKRS
AFSAGTYTGEPYILLNYKDDVLHDLFTIAHEGGHSMHSWYSSRSNPFMCYNYTIFEAEVA
STFNEQLVFSYLYQHSTDAMQKAFLIANRIDDTLATLFRQTMFAEFEMRAHEIVEAGQAL
TVDVLRKEYRALLEKYFGPELVFESVSDLEGLRIPHFYNAFYVYKYATGLSASIALSERV
MKGGKEERDAYLGLKSGGSKFPIEALKLAGVDMSTPQPIEAACRFADDVNELARLLSI
SLD*

>SPBIB_v1_50046|ID:27161957| putative Ribosomal RNA small subunit methyltransferase E 1 [Uncultured spirochete bib]
MNLCLDSGDEFQALPVSDRRAQHILRVLEKRKGDRIAGTSDGRLGYAIIAIGNDEIT
LHFFPESLAPPLRPLTVLLGTVRPIQGARIVKDLATLGVASIVFFPTALGEKSYTQSNFY
KRKEYIQHALDGAEQAGNPRLPEISIAWSLKKALEAIEHAEGTKLVCHPDIAALPLSQIQ
VEQTPVILAIGTERGWTQDELALFERANFSLCALGDRILKTETAIAIAAVSVILSKLNL*

>SPBIB_v1_50047|ID:27161958| putative reductase TDE_0597 [Uncultured spirochete bib]
MILKPMVRNNICINAHPPQGCRAEVRAQVERAKAFRDRLAGFGKNGSNVTKPFHVLVIGCS
SGYGLASRIVAAMAYGADTVGFSYKAPSALKPATPGWYFNNEFDRLAAQAGLFARTFSD
VDAFSYEAKTKAIEVARERNFRYDLVIYSLASPVRTDPTGELYRSVIKPIGRQYAGRSL
DVFTGKISEATVQPATDEEIAQTVMGGEDWQLWIDALNKANVLPAGAITLAYSIGPS
FSWPIYHDGTIGQAKLHLEKTAHALTSCYQENGLRAFVSINKAVVTRASA VIPVIPLYV
ATLFKVMKERNIHEDCVDQMLRFLSERLYRKDAAQIPTDQEKRIRIDDLEMGSSVQSEVS
ARISRIDESNL YLLADPEGFKSDFLRAHGFVPGVDYDQEVSSFE*

>SPBIB_v1_50048|ID:27161959|fabZ| 3-hydroxyacyl-[acyl-carrier-protein] dehydratase FabZ [Uncultured spirochete bib]
VNHIETYLPHRPPFLFVDDAHIEGETIIATHTFHDDDWFFKGHFPSFPIVPGVLLVESMA
QAGGVGAKLMGIYPKSLFMFAKIKEARFKRPVRPGDTLKMELNVRASSVFLHQKGVGKV
GDEIAVEAEWISSSGVPE*

>SPBIB_v1_50049|ID:27161960|fabF| 3-oxoacyl-[acyl-carrier-protein] synthase II [Uncultured spirochete bib]

MKEEVAVTGLGIISPIGNSIEEFWKNCVNGVSGIGPITHFDASNVESKIAAEVKNFDASL
WIDRKEARKMALFSQYAVAAAQAWNDAGLPATMDSQSAEKSASIDPYRIAIVIGNGIGG
LEVFTESHAKMLQDGPDRIPPMTIPLMIANEAAANIAMRFGIHGPALTQVTACASGTDAL
GQALDLIRSGRADIVIAGGTEAAITEFAIGAFCRLKALSTSYNDRPELASRPFDRDRDGF
VMGEGAGILVLERMESAKARQAPIHAVFAGYGATCDAYHLTAPQPEGLFGAKAIEIALKD
AALAPEDIGYYNAHGTGTELNDQMETRMLKTAFGPLAQSLQISSTKSMTGHCVAAGAIE
AIVCIQALKTGILPPTIHLNDNPDLENGCDLDYIPNSARTHKINAAMSASLGFGGHNGVVI
FAQP*

>SPBIB_v1_50050|ID:27161961|fabH| 3-oxoacyl-[acyl-carrier-protein] synthase 3 [Uncultured spirochete bib]
MSVLIRAISAYVPPIRISNEELASRIDTTDEWIRSHGTGIGARHIAPDGVQTSDMAVSAAK
SALEKAKISIEHIDYIIVATATPDYFGFPATACIVQDKLGAYGASAFDVTAGCTGFIYAL
NIASSMLETSHGRNALVIGAEGLSRITDWNDRSTAVLFGDGAGAAVLSRIDETGRGCLSF
ILGADGSGAKDLVLVQPERAKAFERQPLVPVISMNGKKVYDFAVKSITVVIERLLHKTA
YRLEDFAWIIPHQANARIVQAAAKRFSIPMDKIFLNIEEYANTSAAIPLALSEMDEKGL
LKPNDLIMLVGFGAGLTYGAAVIRW*

>SPBIB_v1_50051|ID:27161962|ftsH| ATP-dependent zinc metalloprotease FtsH [Uncultured spirochete bib]
MPSKGNKNSWSPNQNKPKDNQGDPNKKPGMPEGFKFRFSLGYVLIALIAVSFFNYFLFRS
DNTVVPYSTFKDKIRTGEIKRVEIDINYTYGTDARSSEPASPLPATAKPGVVYKTVPV
DPEFTALMDQKGVVYSASPREGSAILLLLLNWVLPFAIMFFLWRTVMSRFMGSNSNVLAF
GQNRATVVAEGDIKTRFTDVAGVDEAKAELVEVVDLKNPQKYTEIGGKIPKGVLLVGPP
GTGKTLARAVAGEANVPFFKMSGAEFVEMFVGVGAARVRDLFKQAREKAPCIIFIDEID
ALGKSRMSGMIGGNDEREQTLNQLLVEMDGFSTSGLILVAATNRPDVLDPALLRPGFRD
RQVLVDRPDMIGREEILKIHTKTIKMDPSVDLSKIARSTPGFVGADLANVVNEAALLAVR
AGRKKVKEEDFQNAIEKVVAGLEKKNRMINPKEKQIVAVHETGHAITAFTPGADPVRKI
SIVPRGFGALGYTLQMPLEDRYLVTKEELLGQIDVLLGGRAAEELVFHSISTGAANDIAR
STDIARRMITDYGMSEKFRNVALTKRGGSSIPGMPQIADPYATKEYSEDTRQYIDEEIASI
VDERYKHVQNLLIQKKDMLDRISALLLEKEVIEETEFAALTAELTSPSAAAASSKA*

>SPBIB_v1_50052|ID:27161963|groS| 10 kDa chaperonin [Uncultured spirochete bib]
MTVKPLGDRVLVKIKESETKTAGGIIPQTAQEKQTGTGVVAVGTDSVIVKVGDEVMY
DKYAGTQIKIDGAEHLIVKMSDILAILE*

>SPBIB_v1_50053|ID:27161964| putative PTS IIA-like nitrogen-regulatory protein PtsN [Uncultured spirochete bib]
MDLKNLLKPELVSLDLKGNKEAIIRELVELAFRSGKVLKKEAIRSVFEREDRMSTGMK
HGIAIPHGKTTAVRELVACIGISPEEIDFDALDRKGCRIFIMTLSPIDKTGPHLQFLAEV
GMLFRSEEKRQALLAAKTPEEVVSILVGNNS*

>SPBIB_v1_50054|ID:27161965| putative transporter [Uncultured spirochete bib]
MLLGTMKLWLKYAFGIAMGAILYALPPSMVRGTAAITFISEISLKIGGYALVFMLASGI
PVSFVRLSEAHRFWKIFSQSFLLVGLSIVAAGLGLAVALIFKSAPLPLITDSGLTPTID
PAEMVVRSTFPFISFSTFAGSGTWLLPLLVFGFAFLAVAHDPVMARPLIPVLDVISRTAY
LINTFISEILGILLIAVSLNLFVLRNTGLPVEYRGILFSAGVAAVVVLFVGFPLAYRIL
GGKANPYVLLYGMLGPLLAAAGSGSIFSSGSAIRHLSESLGVKRDTNATIFPLALMTGR
AGSAFVVASAFIAMFLYSRNGPGLAQLLLLLVLPFSVFVASAGIRSDISVMLSLVCML
FGQGFQNGASLLVPVAFPLSILAAILDSAWMMFAVALIGDRQGERTTKRARNFI*

>SPBIB_v1_50055|ID:27161966| protein of unknown function [Uncultured spirochete bib]
MKDFYAEKRGKVYYIRFKDPLTGKILSARSSGQRNRDLAIKWAALYEKMKSQAGMPTGK
FGDWANLFFKEGCPHITRLLNQGKSYAESTRRDNRRYVDMFLKDPISRMKLGEIGRDI
IDLQDRIVKAYGRTRSAQRIYQAFHILNEAVIRGKLSANPSNGIAKISYQPKVRKPLTK
AELDRFLDPKHWPNRTHWLMTMMARYTGLRAGEIRALYWEHLNPEEGSIMVLQNLPKNVS
LEALRPPKWGKTRKAVYPKQLQVLEKERKPTGLVFQEKDGSVDYWLWHDSVKHARKAS
NITHAGIHALRHSLDTILAENGINQEVKAIFGWTNAKTEQIYNHPEMYDVGKLSKKIQR
VLKSGNSTNGELSKAGSD*

>SPBIB_v1_50056|ID:27161967| conserved protein of unknown function [Uncultured spirochete bib]
MNACIRFGTCSWNYPVSWVGLVYSEPQRRAAAYLREYSQKYDTVEIDSWFYKIPNPREVAD
YLAQVPPSFRFTCKVPQELTLTHLRGKAGAAIGVVNPSFLSPELFEQFLEVIEPMLPKID
AIMFEFEYLNRDKMPSLEAFLKKLDDFLAAMGERGKHLPLAIESRNKNYLTAAYFSFLRE

RHLPIFSEKLYLPHIYDLYRQYKDSIDTDVVIRLLGGDRTEIENKTNKQWNTIVEPKPD
KEAIVTMARDITHRGHMVTINVNNHYEGSAPLTIKAMQKMLH*
>SPBIB_v1_50057|ID:27161968| conserved exported protein of unknown function [Uncultured spirochete bib]
MKKLTVIGIVVALVFGGCTLFPTVTFDDAKGEWDFPDTTFNNSTITSIHLSVMGENQAAC
RIDLSWNNFNFFYYGDGTMNGNVFTGEYNVGGNSSDTTYSITVTFSLSGSTLKAVFNGQ
GPLNGLILEHG VKAAT*
>SPBIB_v1_50058|ID:27161969| exported protein of unknown function [Uncultured spirochete bib]
MWKRRRLGCGFLFLFRLRQPSALPSDWRQLDTKDLLQEAAALAIERLQALNETLTQQAASE
KQSKELAAQLETLTKEKEKLLNDIERLQAALATLQADWTESERMKALEHTLTSLQASLQ
SCREEAKKTRRAGIVGLAVGVGVGMMIGIVSRR*
>SPBIB_v1_50059|ID:27161970| protein of unknown function [Uncultured spirochete bib]
MKQPSIFQEQDGAFSMRRTLALLYALSSNGCLWLATLSGSMAGVWAGLAALVAVLILTGY
TTIEGLKGLAAAIKGTCEGKED*
>SPBIB_v1_50060|ID:27161971| conserved protein of unknown function [Uncultured spirochete bib]
MRQGIQTLFAELGEAGCLALCICELGKPGISEGEAVGLILEGIARGFILYDENDRQNPNN
FFVQDRDGFMALVTGQKGWSSTKESGYPKPGERIIECWKWDETLAGNVVSHQHFRPLA
WDPIKEARTVRYGQLESYRVFRKAA*
>SPBIB_v1_50061|ID:27161972| protein of unknown function [Uncultured spirochete bib]
MQSIVDKLLDAAAGIAAAAITGTLWLNLRWLFSSKRSMEKVLSEVVGMRSIAVLYTLQG
PILLGMKASLEALRDGTCNGNVDEALRLIAEKKKFFDEHLLSAITGDTEERAK*
>SPBIB_v1_50062|ID:27161973| putative Phage related protein [Uncultured spirochete bib]
MTMNVPSLRILTNTLELVADLDRYAELYYTRSLSEPGDFAFSLPIEADSEGAVAEGNLLL
IGNDGRRIGIIEEVERKALDKGSEWLIARGHEAKAIFARRIILPPAGAARIDMDAPAETV
MKALVESQCGPSAETRRRFPALKIAADLGRGCRYLSSGYASLLSELCSIAKASGLGFSL
SFDPGGQKLIFELIEGIDRSAGQKENPRALFASEYDTLSEARLIQGYGRHASILYVLGAK
LAEGRPVALAFDGTPEGFGRFERTLDAPSFDTLERLFAYGQARLSAYPTTFFLEAVLPE
GSSLVPDRDFALGDLCTVHAYGQWYTVPIHSIEEHWTKDGQIRLGFGRPSPGAFSASLH
VTNELLEAFRAR*
>SPBIB_v1_50063|ID:27161974| protein of unknown function [Uncultured spirochete bib]
MSEESGFFTSVAGDRKYTAQFMNEKLHEAMQRAEGVVRHADGELMVSTDGSLSDVAAGV
ALKGGVYYKNPAGLHLALAAPTGLTQRWDRLAVRIDRMRRTMQAVVIQGSESDPVVPA
NPSDDIPLAKVLVNRVEDPPVTVADEREFRPLFLTDRNSLDDLGEDEVYGRVLKEKAEA
LNAGQAGLSFRQFGFVSRPWSAAQIECALLPLGSGTLFVGRSDTTKLSYSTDSGISWADV
AGITIDNKIMSIVFTGSSYLAAGGSPARIFRGSPMGTWSKVFEDTTQEFVSALVVLSPQ
ILAACGDKIYASTNGGSSWSQRGTLPGSYLMTAMANLGNVLLAAGFSTDKIWRSTDSGA
TWTAVKTTDCYEKRPFGFIQVGNVLLGYNDGGLLYRSTDWGLTWDSGRQVAEGGLFTG
ILADGEMLYLPQGKALYESADFGQSWSLKYPCANYDSIVALGKSDGNIITLGYQSHLYW
GYPVAA*
>SPBIB_v1_50064|ID:27161975| putative Phage-related tail protein [Uncultured spirochete bib]
VTLITYISAEDNELAIGTGRLTLLSAEGLDAPPVHLSIAKGGPGVDGAIAAHLQLEPRRIT
LEALLDLEGLDEAGMAEERAGICTTMCPAKEGGSLRVTRGTRTRSIEAVPAAAPAFAKKR
WNEAWQTFRLEFVCLKPSFKSTEPVISSVRYASLTFEGEIEFGEEGFECSSIEHSGE
RTTTIVNDGTAPAPVRIRFTGPMVNPFFIRNRTTGEIIRITQMIRAGEYLEIDTEPGRRQI
RLWKAGTEQNGMHYLDLASSFFQLAPGENIEELGDESAGEGSEAFFECYGHYLEA*
>SPBIB_v1_50065|ID:27161976| protein of unknown function [Uncultured spirochete bib]
MSEESLQGANRRDDVEQILSVDEEELPGLLEEKRRREELSRQIAFGEG*
>SPBIB_v1_50066|ID:27161977| protein of unknown function [Uncultured spirochete bib]
MSEGARIAALLDADEELSALLGPGTHILQGSALAAQPPYPLPLVLSANENIPLLENEDGV
VAEGCRCTIGILAEGGLEALESRTKEVMEEAGYRCEMRKRLPAGRPEWHCCAMSFSGARL
RI*
>SPBIB_v1_50067|ID:27161978| protein of unknown function [Uncultured spirochete bib]
MKRRQIVKLFKRGLTLDGNFALSASWEDGGSFEASLWPARKTGQREGQRYLLVAKAGIGL
EPYDRIETAQGLFRVLWVRIFPKHTEALVEKEVV*
>SPBIB_v1_50068|ID:27161979| conserved protein of unknown function [Uncultured spirochete bib]

MIIEDGTGLSGATSYIGLEEADGYHGERGNGRWTEAGEAEKSAALVRACDWLERAYGRLW
DGTKRVATQRLSFPREEMDGVGEGEIPWWLKEAQCEAALELSEPGVLAFDASEGGGLQR
EREGERFFAPGPGSVRKFPEIYRLVAGHLRSPAQVIGIGRA*

>SPBIB_v1_50069|ID:27161980| protein of unknown function [Uncultured spirochete bib]
MGRRAKGISVGPPAAGLAMAVHG*

>SPBIB_v1_50070|ID:27161981| protein of unknown function [Uncultured spirochete bib]
VAFDSEKAGILDRLSPDGQKALLGQELLRLGQEASLQALVALGAAVSGLETAVGSLEA
ALARRQRFFARTGVLQAALAGTRVAILSESELGAGEKAYPLGFFLALGGEVAWSGGTGR
LYLADSGTDLVYRFASVEARVLAAPGNFIGVGAEGVALEAEFGLGLGGRAGKGIDIVADGN
FAEGSDLAVTVYGYIG*

>SPBIB_v1_50071|ID:27161982| protein of unknown function [Uncultured spirochete bib]
VAMGVGVGRAVALDVGKRAVTLLLG*

>SPBIB_v1_50072|ID:27161983| P22 coat protein [Uncultured spirochete bib]
MANLFTALAPILFSAAQEVS AEDTGALQAITLNFDDKQVAKDDIVAVPIASGGTPVDFVP
GNVSPQGDSDTASTVDVTRITASKKRSWHLTGEQRRSLENAGTDKEWLRLKLMQEMRSLRN
AAEADCVA AIVQGASRATGTAGTTPFSSSLDELIAVRRILKDNGCPMADAQFVCD SAAET
NLLKLSAIQQA YAAGSDEERRSGVIK RQGF EIRTS AQITQH QKGTGTNYLT NATTPMAK
GDTATTL SGASGSGTILEGDILSFE GPDNLYVSHAGISAAQQVLRIGRPGVRQAIGTSTP
ISIGNSYTPCLGFDRGAVV GIMRPPVMPENPTMQQALISDMRGLTYLLEIAQY GQITWE
LHLAWGFKVVMHEHVALLLG*

>SPBIB_v1_50073|ID:27161984| protein of unknown function [Uncultured spirochete bib]
MTSLNDIISHLKFELGKEGPLSKETILPLVEKIEPLAARDWARIKKLERKVEAFSGKSPE
ELETSMKELETLKAELESTKLLGEKDELLKTLTKERAEKEAALAKSLSEEKAAVARLLL
DAGLTAELSKANVKPSLLGAAKALIREKGILDVDGEGEVRTAVARIRRDGVEQTMSLADW
VREFVASDEGKEFIAAKENAGSGAGEHRASASTASANSIPAERFWSLPAKDRSAFILKGG
TVTED*

>SPBIB_v1_50074|ID:27161985| protein of unknown function [Uncultured spirochete bib]
LGSDPWGFTHCPCMIYYTLVGVRADRTTRTGGVTPARALLS*

>SPBIB_v1_50075|ID:27161986| conserved protein of unknown function [Uncultured spirochete bib]
MVDYLLHIYRKGS RPFQTLSDLP EAMALQIMEQLYIEGAVFWERFKEPRSYQSFRKQVEQ
TMRAAFKNKGGKPKINKHPIYLIVGRPKWMDIVSDEKTLQTTEILRVPLSMIKRESVSFA Y
PDSMVSALMAAEQNPDY YEPEYHGKVFTFDEIMDIIEKKGLPGEGWETRM PKHYAHYIEA
QVWDRSILESIG*

>SPBIB_v1_50076|ID:27161987| conserved protein of unknown function [Uncultured spirochete bib]
MEQDIRGALPKSQGKRKRILILEDSEVDADLIIRILKKNLDFEFLRIENEA EFLRQMD
AFAPDLILSDINLPGFSGFKALEIVKQAYPELPIFVSGMVGEDLAIKMFNEGAVDCINK
SSLSRLPGSVVRALEDSSQKKRRLAELALEKNLRMTHEILIASIKALATAMEMRDPYTA
GHQRRVADLAVQIAKRRGFSEDKIEGVSLAAAVHDIGKIYVPAEILMRPTRLTSAEYELI
QVHSSAGYEILKDIEFPWPIAKAVYQHHERLDGSGCPRGLKNEEIIVEARIIMVADVVEA
MASHRPYR PALGLAAALEIRK DAGTRFD PDIVEACASLFADGYQFPQRTS*

>SPBIB_v1_50077|ID:27161988| Response regulator receiver protein [Uncultured spirochete bib]
MLEHEQINLLLIEDNPDDADLALRALRKRHLLNTIKVLSDGEEAIHYLLRRGPYEGTELP
SSIKLILLDLKLPKLN GFV LHAIRNDERTKRIPVVILTSSQEDPDIQKAYALGANSYVV
KPVDFDNFSKCVSDLGMYWFLNKP PSHG*

>SPBIB_v1_50078|ID:27161989| putative Histidine kinase [Uncultured spirochete bib]
MKKEARMQDVAERYLSIAAEVILSLDAHGNITMLNESGHRLLG YAQGELIRKNWFDECVP
VDVRNKLKTVFAKLMAGEGSDVSTYENQVITKSGETLDLLWHNTVLRDPDGHITGLSSA
EDITQRKKMEEELRNSEEQYRMLFTGMDIGVFFFKPGGTISYANPAALDILGVTEEEITS
LVPTDSRWKNIQEDGSEYPDDL PSTLAMHTGQAVRDKVIGIYNGREKRYRWVIGSAIPR
FHTGEKAPSLVYVTMMDITERKMLEKEVAHMASFPAQNPSVLEVGTDGAVRFANA AVMA
TLERLGLPPDARQFLPGTPEELALLRSQCEQSHQVRELRLGGATFLEIISAPEQHSLRVY
ITDITEQKKA EELQKSLFLQVQEEKERLDLLIASMSDEVWFADTAGHFTLENPAACKAFG
LEKPGDIDIQSFAQSLEVFRPDGSPRPVEEAPPLRALRGQTTIEQEEIVRLPKSGQLRYR
LVTSNPVRDFEGNITGCISVVHDITDKKQAE LRIEREKAFFDHLIEMAPEGIAITDKTGI

VAGGAVSDLWDRNRHVIQAFQIPKGWYIDRSFDWGSSKPFSLGWWAESDGSPAILPNGQQ
KTWPKGTLFRIA EWYGWNGKPNEGCKLEDTAIGKRMREMEVAMRETLGIEGVNAGPADGM
IFEAQPGKPSIAQGI EDGYGRKDLFYPADKRPGSRIKRLAIFRRMLAASEHEPLEEPGIF
FFDSCVYGAIRTIPTLPRDPRNPEDIDTRAEDHAWDDIGYRLTTVRPIAKSIQIEAA*
>SPBIB_v1_50087|ID:27161998| conserved protein of unknown function [Uncultured spirochete bib]
MTNKGQFKKGVSGNPKGRPKTGEAITELFKEYLEGIDETTKLERKRLLEELYARAMGKK
TISKRGKQIQLPGSDELLKYIVNRLDGMPKQAVDLEAFVDGEETLTVFIERPSGAPASRA
DERREGTKDAEDQPA*
>SPBIB_v1_50088|ID:27161999| putative Tyrosine recombinase XerC [Uncultured spirochete bib]
MTNEENKYQWYAAMLDEL RARKYSTSTRKRYLAICLQIAQAYPDRDLRSLKKGESFLA
AMERGGASASTINQAISAATFLWRNVFELPFPIKVRPLKDRQLPTVITRYQVMQLIAAAN
TSKTRLALALAYSAGLRVSEIASLQIGDINRE RGVHIRAGKGRKDRVVP LSQLVSDMLD
KYLAQHPTKRWIFRGT TGGSHVNV RSLQNA MA AARAKAGLSSDVTMHTLRHSFATHLVER
GENLVVVKELLGHSSLSTVQQYVHIAKTGILATKSPLDSPPLY*
>SPBIB_v1_50089|ID:27162000| protein of unknown function [Uncultured spirochete bib]
MARRMRHGLDYFPLDTSWDL SMRLKAKYGLEGLGTVIQLMQMIYREGYYIEWSSETRQL
FCAENQIDEPKLNAILFCLGHGLFNQDLFKQYSVLTSQAIQRQWIKICLYSKHKNLGD
ARLNLCPENSDAYGQKREYLDSTSGKNAQNSESLRDNFNGDFPDNDGDFPDNCGKFPQNPR
NMQEIGTEIKEKENKEKSTLAEFCAQPVENKREIQALIKALAQKKSAPNGPPASK*
>SPBIB_v1_50090|ID:27162001| protein of unknown function [Uncultured spirochete bib]
MSAIDKCLCMVPEQEAFLQFHYPNIYELKALANKDRARGEKSLDIQKLLARIHDP
ERLRQERTDAAILCHYRALLESDFCLWKMFRSGG*
>SPBIB_v1_50091|ID:27162002| protein of unknown function [Uncultured spirochete bib]
MKILHTADLHARRESSREFFISYDSIRSAAMRHDVAMIAIAGDIWHGPVQNSAGSLFPDF
IEAIRSLGDIAPVAMIYGTPSHDVEGSLEIFETQEC SHGIKILRPGTAYVLKKGKIEELN
GGNEEEAELLISGIPEPSKRWIISAASEPGSRDADLAANEAFRMLCMATGCMRERYPRLP
SLVLAHGQVEGATTGHGRMLGTGDGLHFTKDNL KSLKAEYIALGDIHQPHIEGTRAWYA
GSA YPLDFGETHRAGCWIVDIHEPGKPV DVVRENFPHTNRHLISHASCAMEIPTMHNQK
VWYEVQGTQELAPLDADIILSRLLAHGA AKGSKVTFDITDSDPVRASEIRTKKSLEEK
STWAQVSGETL TESIEKARSLERETAARNAAAGNARYRIDRLILRGATGLWAKSRKDEI
DLDLSSRGPVIALIGANGAGKTTILENLHPWPRLLTREGPLRDHFRLADSFRLDLYLTDE
ATCKYRCLIRM RADIPSGTTEYWLFRDAGQGYVPLPGINGRLEPYQEWIERLFGSLALY
QRTAFTAQNSKSCPDLSAATKGERKELFSEL CGIDWLEAYREAAKEKEDALSESLSKLE
AKHSILAGSQARCAALQKEIEHAAYADEKSREEKEIVRKLEEAKDELAKIEKMNQERTR
LIREREEARMRMLELTKKENECMGSIESLRASRLKPEMQSIINRAREIENRREALAAEK
AAHDARQKQEMKDYLLAMTSYTTQRNDLVAAMNKIKVEIATLKERAH TIEERLAMPLGEN
CPACGQKLPPEQLARQKELRIADEASLESYAKLIDMLASKKETE QKLQNLVLPSYPAQM
EYPGTEELKSLSKFAAIDLVRAYDIVQRAEIAEGTIAHLRIELKKLEEEIGKVNRIDED
SKAKLDRMPPKHEEEKLMEAI STLAEELTNTKLDIARAQTRREEAEKQLAEAKRNLEEYE
RLGEQLKALTQEICEWALLGRATGKDG IQALELDALAPSISAIASRLLAASGNEGSIAIQ
TLRLAGKGSRQHAIEDFEIMYISARGDEQEISTLSGGEAVVWRKAIYDAFELIRAQNTGI
QFRTVILDEADGALDHESRLRYLRMIDAAHRESGRYQTIIVTHSLELQEMADMSIAIADL
KPHADRQNAKDIAIPA*
>SPBIB_v1_50092|ID:27162003| protein of unknown function [Uncultured spirochete bib]
MTKSQALEI IKRYPDAKNYIKQSHLEQLSPLVEVAIEAITCKKEDFHCLPGNTYMPRKET
IDRFAMAAGISFNPLEESTRKENDCYIGRSQAMVMGPDGKYCYGDVCEYEYDVTIRHEEE
MLIDRNSRTPRLHAGAKPVEDRARLAYLTLRKTARQ RANTGARSRAILSILGMQTGFKDL
FPPDAPPTAEKTF LFSRIIVNTKNEMVLHRMLDSL TAPAKALYGS DARNLEAQPLHLALP
EQPEPEEDPDPATDEHEEAIASIQESLDSGLLGPRATLAARDALLNHQSDDAYLADIAAR
LKAAIENRKHTQQNNQ*
>SPBIB_v1_50093|ID:27162005| protein of unknown function [Uncultured spirochete bib]
LLDVVLGVGVALDDLKRLAFGHFLSLLCYWQGMALGAVLFLQGRLLVLLFDPGVEVCDAEE
DAGADAHVGD SA VTGFPVDVGF*
>SPBIB_v1_50094|ID:27162004| protein of unknown function [Uncultured spirochete bib]

MESKIPVNNPMPFRRERILISVNEAAQMLNLSKSYIYRETRNRTIPHVRIGSRILFRVT
DLNAWIEQQNQPALQEQDCA*

>SPBIB_v1_50095|ID:27162006| protein of unknown function [Uncultured spirochete bib]
MKNSLLKRLALTILKIKIYGGYYYSLWHTHEYPIGEDKRGRRNRFLVAIAFFLCFQKKW
*

>SPBIB_v1_50096|ID:27162007| protein of unknown function [Uncultured spirochete bib]
MDSNRYYLTTYGIDGNPLVEVDFSIIDQIKKSMNILAIIRTIIEQYDIVVGNYKELLKEI
FEVTIDNNLYSPSDIIFLHEFSRKINIRLLNFLNSAKMYQDHLHASLLKIDNTKGRSYIQ
RVGQLKKQNISICILEALRNHIQHYGIPTFTSEGTKRITRNTEDIIVHYLLIIIEVEYFK
KDKKVRDTIPKEILSQNIELNSHIKEYFSYLSNEIEEVRQLFIEEYSSSTILIDRMIEMY
SKVYPEIMEKWQKILCIIRNEENSVMVEFNRRNIDLIEKLRSRNKKGINLINRFFTDFTD
LALNRL*

>SPBIB_v1_50097|ID:27162008| TPR repeat-containing protein (fragment) [Uncultured spirochete bib]
MKRKIRVFFASPSDLVDEHKIFGEAITQLNVGFGDGANVEFEPFGWEYSLASTGRRAQSV
MNDKIDICDVFILALYRRWGDAPDASPYSSYTEEEFYRALDRWERTSAPEIFVFFKRVD
AESEADPGPQLRKVLDFRKHLEETHQVLKYFDSQPQSFIDLVDCHLRAFAKDELPKPDKR
RDVVILPMSILQQVEKAKEIALQKTEEAKKAKDAEQRHQLEALQLEIADDASQFSKEG
KIEFAREKLTKLVTETTNLHILYLGFDFFYRTGDLDSAIVLKKWLSLSGDENKTEVTAM
AFEMLGILYQTRGELDRAEMYQKALAIIEALGLKEGMAADYXX

>SPBIB_v1_60001|ID:27162009| Methyltransferase [Uncultured spirochete bib]
MENYKSIYLTADFEIDDGTLKIVNDYLAKQPEPRPFVKPNSLGYVFYFHTLDVSLRRNI
EALQSLDLFSGNGSNSSKAGEILRIIYDEVSKIGSYGVKSGKRQYVDFNLERKVQNRKD
KEKNRSQYYYAQNNSFSETNNPLPENLTNKIICGDSLEILRVIPDNSIDLIFTSPYPNFG
LEYDSQDDAHKWELYFEKLFADFECIRVLKFSGRIVVNIQPLFSDYIPSHHISNFFIN
RRMIWKGEILWEKNNYNCKYTAWGSWKSPPNYLKYTWEFVEIFAKGTLKKSGBPQNA
TPDEFKEWVVAKWSIAPERKMKFEFGHPAMFPEKLAERVIKLSFVGDVLDPFNGVGT
TAVAQKLGRKFGIDISQEYCDVAQKRVKSMLL*

>SPBIB_v1_60002|ID:27162010|ddeIR| Type-2 restriction enzyme DdeI [Uncultured spirochete bib]
MPYNIGEIQKAYNILVGGIDDKANAENDEGSRAYGGVRSKAGILVEGIAKNLVEIAWNE
LGGHPSRSLSFQKETIRIPLKPEYLKRVPAEVAEYIKAHIQQYFYGHKTDVHVSIDGQFV
MGIECKAYTENAMLKRILVDFTLKQVVPNLKCVLLQLESQLTGDYSQPLKPIIYGSPSS
HTLLSYFNVDLNIIVTLLEGERKVDEPIHKKPYFKPMTEQALIKAVETLKKLLSEFVVRK*

>SPBIB_v1_60003|ID:27162011| Integrase domain protein (fragment) [Uncultured spirochete bib]
VEQKNSQYVRQFVGYARYDTTEEFALREVYRVLCPNLFYFSTKLIKHXRENATIHKT
YDTPQTPFSRVLASPFVSLTAKEQLSALKAGYDPVVLRYNLDTALDKLHHAHSNKT
LIEVLYEKE*

>SPBIB_v1_60004|ID:27162012| Integrase domain protein (fragment) [Uncultured spirochete bib]
MGLSMKERHRVIAETAGRYRAASKKEKSRILNELTALTCYNRLYAMHLLTWWGKT
VQRVIGGTRLKIVIGSPRVRKRRNGKKKYSEALYESLKRIVATFDCMCGKRLAVSIRE
NLAFALHEEYAITDAVRAELAAISPATIDRLLAKEKQTXWXXKRHSTTSEANHYKTKI
PIRTYYSSEEQRPGYLEIDTVFHSGVTVHDEFCCCTLDATDTMTGWVELRALPNRAQR
WVKEALVDIKETLPFRLIAIDSDNGSEFLRQAGL*

>SPBIB_v1_60005|ID:27162013| protein of unknown function [Uncultured spirochete bib]
MDSVNRALDTIIVERFWRSLKYEDIYIKDYRTLAEKLGVSRYIRFYNSAHCL
IENLSETIPMPHHKI*

>SPBIB_v1_60006|ID:27162014| protein of unknown function [Uncultured spirochete bib]
VALEALKGEKTLQELATIYAVHPNMIALWKKQLVERASMIFEKEGKDKEAEAAERTQ
DELFRQIGQLQVENEFLKKLQTAVWERTEAIEPEHPELSIGRQCELLGVS
RSTFYRPEEAIRYGVPGIFNTVKGVSSPLMRFSQSWKPMEYRSVWIV*

>SPBIB_v1_60007|ID:27162015| conserved protein of unknown function [Uncultured spirochete bib]
LNNEEVVGHTPSNRMNPEVDAAYLRDTKKWQEELAKLRTIVLDCHLTEELK
WGVPCYMFQDRNIVLIHTFKDYCALLFFKGALLKDDKILIQQTGNVQAGRQIRFT
NVREIVEMEPILKAYINEAIEAEKAGLKVPFKTAEFIPEEFQKKLDEIPAL
KTAFDALTPGRQRAYILYFSA PKQSKTRALRVEKCIQQILNGKGLNEGE*

>SPBIB_v1_60008|ID:27162016| AAA ATPase [Uncultured spirochete bib]
MAAYNKYMFKREYEPLDQYLSPNKVLVIYGPRRVGKTTLLQNYLKQTPLKYKLDSDGNIR
TQQLSSQDFAQILSYVEGYELLAIDEAQNIPNIGMGLKIIVDQIPGIKVIVTGSSSFEL
TGQIGEPLTGRKTTLNLYAMAQSELLSVYNRFELREKLEDFLIFGTYPVQLQAPNQRTRI
DILTEIANAYLLKDILALDRIKNSRTLLDLLKLLAFQIGSEVALTELATQLSVDVKTVKR
YLDLLEKAFVIHRLNGFSRNLQRQEVNTKSKYYFLDNGIRNAVIAQFNSLDQRNDQOGLWE
NFMLVERLKYRTYYSLYANMYFWRNYRQQEIDLIEHSGNLFQYEFKWSHNKAVRPPATW
TENYPDATFTVIHPANYLEFILP*

>SPBIB_v1_60009|ID:27162017| protein of unknown function [Uncultured spirochete bib]
LNMYLLYAAMGYLSNAGNMADYFDVKY*

>SPBIB_v1_60010|ID:27162018| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]
MKRIALAFMVLMAATAAFGAGKLTLMQNKPEIDAQIKAYAAEWGKKNNVTTVIKSIGGTS
GGMGPQLKADYAAGDMPDIFAFDGLSEYKEWEGVILDLSKEPWVSKTSVAFKYNGKVYGF
PVAVEGWGMAYNADLLAKAGIDPKTLTNYDAYKKAFEKLDKSMKKELGINSVVSMAASVEM
GWVTAHNFNSLLSNGLPYGDLVVDNLLAGKVDMLQRLQEYADWVELLFKYADKTVLLTG
NYDAQVGAFATGKAVFLHQGNWVDPNLKAANATFKMAFAPHGSMKKTDDGIFVAAPSFYA
INKDSKNVALAKKFLNDLVTTPPEGHTYMKDAGMIPAFSGINLNPEGQLSKSVQQWSAAG
KVYSWNQYYFSGDFRDKVLTPIYNQFAAGSITKAQFVDLMAKAFKDNAKK*

>SPBIB_v1_60011|ID:27162019| amyD| putative starch degradation products transport system permease protein AmyD
[Uncultured spirochete bib]
MTKKTESSLVFWVFLAPVLFAFIMVMVIPFFLGSYYAFTNWSSARVDGGLRFVGLQNFA
ESFRDPAFLYSFGITFAYTILNMIANVVAFALALLVTGELRLKNVYRVGFFVPLNIGGL
ILGYIWQFIFNNAIPSLGRIIPVLGFLANPGNMLSKNTSALAAMIVVGTWQYAGYIMMI
YVAAIENIPQELLEAAKIDGATPWIRLKSITIPLCAQAFVTMFLTLVNSFKQFDVNVSL
TSGGPSTMLMGQPILGTELLALNIYNTAFISNKLSVAQARAFVFFVLAIIISIIQVYVVK
KREIEL*

>SPBIB_v1_60012|ID:27162020| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]
MKQLRSRKPGMIVAEIVTALLFILFLFPFVLVLLNSAKTSFEVTQYPLAWPSRWGNIIDN
VVKIWTSESVRYPSSLLTSTIVTVVSLVLINLFSAQAGWVLVRTKSRISIIFFIFVASM
VIPFQIVMFPLLSWFRTVTVATGIRLLRTYQGIILAYIGFGAPLSIFMFHGFIKSIPLEL
EEAATIDGCKKYQIFRYIIFPILTPIQATVVLNNGIWIWVNDYLLPLLVLGKGNNDIMTIPL
AVSNFAGAFVKQWDLILTALMAMVPVHIFFLFAQKYIVKGMVAGAIK*

>SPBIB_v1_60013|ID:27162021| putative integral membrane protein [Uncultured spirochete bib]
MRPMKVLQPKHKIEHATPAFIFLSVIYATLLIISNITVVKLVKVGPFLLTAAFFTYPAVY
VISDIMTEIYGYRLSMKAIWANFAAQALMSAVLAFATWLSGTDNAINDAMKTLFSSTWRI
VIGSLAAWVGDWMNSAILSKMKVAQKQKWFLLRAMGSSLPAHFVDTTLFNIVAFGLVWT
TGDIVRNALSESSLATVYELALFPVTFVLVVKLWKRIEGIDVFDEGISYAPF*

>SPBIB_v1_60014|ID:27162022| exported protein of unknown function [Uncultured spirochete bib]
MPGRLRRFFESLGPAAASSAISAKNAAAMGQYAAVYNQAASDAETCLAFFKKISPDEL
EAEKSAHACMDQIRLLATTLNELDGLVASMPLRELEKDRAAIEAKKRTAPPALAADYDKS
ISEIDAQRQAHQSLLEKESLEIKLHSMNSQFRQLSLDLASAHAVDAQTKLDSQHAALAT
LSKRAEEIRASIEDLRTGSDDWLSMEIEKLSQNGA*

>SPBIB_v1_60015|ID:27162023| protein of unknown function [Uncultured spirochete bib]
MSGEEIRLCAIMHAEIAKPDALLALGKEEAGAAFAQFRETIRAAAEKSGRFLESSHGGGA
VVAFDTSAAASALLIQQNLKPQIKAKIGINVDVLTSSGGAIGSAADIAEELVRVLP
AGGICVSAAAWHASPSVDARTIHVQLELPSGKTLDAYRIETGENSLQKCPDA*

>SPBIB_v1_60016|ID:27162024| putative enzyme [Uncultured spirochete bib]
MLAETKYITSVPAKQCILWSTIVYRHFPDYKQVMLPINSLVMYKGRPAIVVAADLDRISI
RTIDAEKRVPRPKDVAMAHTGPISRFPENRAPDEVMEALELLQTEHPEGIPLISWKDFAE
LAWSDPKPEHIVIAWHELNNPAVETLDEGIRIRSEEEQHKIRDKLQKKKEAAEAKAFL
VAFRAAWKKKDSSPIEGNSAFQPFLEELSRVARGLADDSPIARELGIKLAPQAVHEALLS
SGYWNLANPWPENGCIMSEPEAPSALEERKELRIDRLDLRALPSYIDNAWSKDPDDA
ISVEGENVWIHADPASIVGPFRLDAEAMERGSTLYLPEKIIPMLPDALVQKMGLGLSA
ESKALSFRITLRGDGKIADISILPSMVAVQRLTYEQADTMLEDNPVLQKLSKIASVRAEL

RRRQNAVVIDFPEVAVHVVDGLPTFLPVPQTRSARIVQELMILAGEAAARWAFEKGIPIFP
FATQDPPVSENLAGCGAGPSSSLAENFMRRRSMRAALVSSTCSAHAGLGLSFYSQVTSPL
RRYQDLLAHYQIHAVLAAANKLDRNNAPSEPDLLISADTMNERLFRYSNQAAKNRQAERD
SRAHWTLVYLSMNPDRGEGIVLDAEAETGQIFIPQFGYEFQTRIPRGIHVDSRVSLALR
RVSVPDLFASFDILPQGT*

>SPBIB_v1_60017|ID:27162025| conserved protein of unknown function [Uncultured spirochete bib]
MTALLVGIGLIISVLMVLPGLVGGWVNDVLAFLRGAIPVFAVLIGALAVFIGIADIKDKI
EEKKEEEKSKNAENEQETKEEKD*

>SPBIB_v1_60018|ID:27162026|rpIM| 50S ribosomal subunit protein L13 [Uncultured spirochete bib]
MKTVFVTAATAERKWIIDAAGKPLGRVAVKVASILRGKNKPTFTPSQETGDYVIVINAD
KVAVTGRKRQNKMYHHHTGFPGLKDYSFDELIDRNPVSPMEIAIRGMLPKGPLGRKLFK
NVKVYAGPNHPHAAQMPIAIDL*

>SPBIB_v1_60019|ID:27162027|rpsI| 30S ribosomal subunit protein S9 [Uncultured spirochete bib]
MRKGNEMVKNINLGIGTGRRKCAIARVFLREGTGKIINQKELKEYFPIEDLVAKVRKPF
LVTDSENKFDAFITVVGPGPTGQAGACAHGLARALAQIDPANHVSLKSNGLLTRDPRMVE
RKKYGQRGARRRFQFSKR*

>SPBIB_v1_60020|ID:27162028| protein of unknown function [Uncultured spirochete bib]
MALRIESVREKASGTLELALSGLLFHFSTDVRLCGMRFDSSSRMLITDDGSRLEFAPE
AEVENEMLVSLRRLDQLHAARKVALGLVARAEQASIQLEYKLAKKGFTKETARIAVQWMC
ENGYVDDRRYVRLLLQSHLVRGQGERLKAIAWPRIGLFENPRIIFAEAFSSIEEENLL
EAMRRSTENLLKRGKIPAGYRRTILDDENAENPAAPLSRSRKLAFRLSWFRQEGFPNYAI
DRFLESWEIENKDES*

>SPBIB_v1_60021|ID:27162029| putative PTS IIA-like nitrogen-regulatory protein PtsN [Uncultured spirochete bib]
MDDDILTIEEVAKYLRVSERTVYDWAQKGEIPSGKIGTVWRFKKSEIERWVNERLSSNRP
VALISSVRIQNIISPDRILFLNYPKRDALMALAENLASAPQIKNKQELISEILRREELM
STAIGKGIAPHVRLNSVTDLVVSIGISRCDIQDFQTLDDVPVRLFMIAAAYNQHAYYL
QTLSSFFSARLKVVELRDGLLSCKSAQEAYDLLIRQDE*

>SPBIB_v1_60022|ID:27162030|smc| Chromosome partition protein Smc [Uncultured spirochete bib]
MASLRVLFILQERNDFVFLKSLEIFGFKSFADRVRIEFSPGISALLGPNCGCKSNIVDAI
KWVVGESAKSLRAESMEDIIFNGTENRRPLSVAEVAITLANDGEVLPDVPDVEIEIKRRL
YRSGENEYFINGKQARLKEVRELFWDGTGKSAYSVLEQGRIDQILSSKPEDRRYLFEEA
AGITKHKVRAREAEQKLAKTEENMRQIESIVAEVKRSYENLKSQADKTIKYRLLKEKIFE
TELDLYLVRLRQHVRERDRNSALFDQKKEREELVQRIERMSEAMSQGLDLVNELEAKLV
EMQKLLYGLAVEKNGKEKQKILLAEVRELKAKIEQLEGRDRAIASKIESLRDEEKEA
EYAGYRARVREVDANIHTFDENINAAALSVKANEETIRQNASAEIAQKTSQLRQELDA
ITERIAELVDERLRQSESQIEARQNLEAQIHRAILEISASTAARAQRLEDLAKTLPAMNA
QERAQQIDTISADLRALSLLSKSLEQDFTRYIAIAPTFLNELVAPEGVMTQKRRIDAAIL
AHAVRLKEIEAENQALSSRNGDLSRKIETYRKTLEEARLEKAKIQAQMEAAQEALSVLRR
EIAGQEA YRHEIASELAGEQKRQQLQEEIESLEELAEIEQGRRLSEEMAELEASISQ
RTSDLAERRKESSELEQKMQALQELLENLHMAVAQSETEIRNLKDTFTELYSRDLSFES
RMYEIRKPISEIREELTSIKATLAALGSVNLMAPEEFEEVKQRYDFLSGQYEDLVHARTD
LVRLTDEIRTESAQLFIDTYNRIKKNFHNMFRLFGGGRALRLDTHVLESIEIYAQ
PPGKKLENISLLSGGERSLTAIALLFATYMKPSPFCFLDEIDAALDEGNIIRFVNLLRE
FGTASQFIVITHNKKT VAGADTLLGVTMEESGVTKAIAIRVQNDNGVVRPVYLPDEPFQE
EEVEYEDGRQLDDQAKSANAPA*

>SPBIB_v1_60023|ID:27162031| putative Threonyl/alanyl tRNA synthetase SAD [Uncultured spirochete bib]
MNVHALSERLFYQNPWLQEADAVIKAEYAGPDVSADASAAKSGVETLRVLLDITVFYPE
GGGQPPDTGFIDDLRVIDVQEIDGHIWHFVELPGNPSSPLKPHDPLKPGDRVHLRIDWQR
RLDHMQHTGQHLLSAVLEQEYGIHTLSFHLGTEYSTIDVSAKNPEELPLPDIEAKIEDW
IGHDVSVLVHYCPPEDIAAFKLRKKPPANEAVIRVVEIEGYDWSPCGGTHVERTGQLRAI
KILSLERYKGNVRVYFAAGARAVRLLSATYEETKKTASALGVGIGGISARVFDILGKIAA
LERALKQSTQTWAAAEAKLAASQAAPHEVLEFRLDEEGADSAEELAKAAAEELGRAAIAIS
LSDKTIIQVPQVAGFLSLAGMLKPKLAIEFGGKGGGGPAFFRASFSSESELARFAEEAKQ
ALAALSD*

>SPBIB_v1_60024|ID:27162032| Thymidine kinase [Uncultured spirochete bib]
MQPNDETGEFLKSLGFPQLNIHSMRHHDFESAGKRVLVIGPMGSGKTEFSARIWRDSRV
ALKKKGAAAQLTSSGVVDRRDIFVVRSALDKSRFPDYPDDALAYRGGYERCGDRIGAAHD
SFSLEMLIAENPQVGTWIIDEAAFFDERIAYLMKDEAESRGLSFILPTLVLNFRREIFNQ
TARLLETATDIPLTAYCEHEECLKDSLTYTRYLIDGEECPALYFDPLIIIGDRTKH
DGKEPNYCTRCDEHHYLPGKEYTFFTLKPFGELAARGNIAPLLAELNALVGNIEESRLYA
SISSRCVEGPGREVQMNALRVPCIAERALVYLYAEQNLLSEEQMRYFIDELNLDREYLSQ
RLADNRRPLAL*

>SPBIB_v1_60025|ID:27162033| ABC-type transporter, periplasmic subunit [Uncultured spirochete bib]
MNSRLALAVFAIAALLAPIGAQETEFVTVYGAQLPQLDPQRALFSNEAQIHTALYEGFLT
YDPQTLEPVRALAQSWRSIDGKVYRFSIRENAQWSDGTAITAEDFVRSWLRMLDLNAEY
ATFFDIIAGAREYRLGTDVADHVGKAIKIDPMTLEVTLVRPAAFYFTRLLCHQSFALIHPS
MIGVKDWRAAIPYPVNGPYRPISTMTDSELVLEKNEKYWDAASVEIPTLRMMFTDDDNLAT
SLFNTGHVHWLDGPGNYEQVLLQTAIQVFPIYSTHYWFFNCFAPWNDQVRRALALLP
WDTIRSSDTYRLPAKTLVLPLPGYSKTKGIEKADKEEAKKLLADAGYPNGQGLPEIVIAF
ADYKQPRAIATTFKTEWEKALDLHVTLPKMAPSSYYDSITNRADTTSFTLAHETWIGDFA
DPEAFLQMWTGAPLNVAGYEDKEFMDYMNQSYAANDDTRMQLLSKAETELLQGAACLPI
YHNFAASIIDAIEYVQGWYQNALDIHPYKYLHFGTPSVSPNVADANMPAKARPVSAALQ*

>SPBIB_v1_60026|ID:27162034| GTP-binding protein [Uncultured spirochete bib]
MGLEKAFVPERLVVGVLSDEAAENAALAEMIERYGQLCFHSAKELFLWTRYCPEMGDT
ILRSYWAFEQLVDPMLAAIKRQTNAIELKLARNKRTVNLDPGMLGSARFCLATTKDHS
HRIPLSDGIYAELTLMFEHGEFRALPWTPDWASQPVRQMLSELRTALLADLKRLTSALN
LV*

>SPBIB_v1_60027|ID:27162035| protein of unknown function [Uncultured spirochete bib]
MGGGSSAFRPADTVGLXVVVPHKVGPEAQHAVCDIAVEADTLTMVVRQVLSELAIGVVR
KEX

>SPBIB_v1_70001|ID:27162036| putative Histidine kinase [Uncultured spirochete bib]
MTNLGSSVRKRSGRIFAVSAIALAVAALLCFFIAKNYNPAVGVITLAIFAIFLFAFTFRS
IVSMYQMPLDAISQQADEIAKNLQSRTOEVAELTTKLQSIFDTTEEAIIVIRAPNELLSA
NTSAYRLFGLSPGAGYTTESFFFSPAILGLIETCLKEGKASIEQFSMLKDKNEIILSAR
AQRFAVSQSDAAVIVISDITSSKRTELTKKNFVANVSHEL RTPVQIVRGYAEMLNADIP
EENKSWAEIILHQLRMERIVSDDLMLAKLEHDPASWIVRERFPIKPILEEAAQTVKLQY
PEISRISIDCPDELEIEASPLIEQA AFNLISNAAQHSGSHDKIIVGAMQENEDFVLRVR
DYGAGIPPKDLAHIFERFYRADKSRSSQSSGKSGSSGSSGLGLAIVKHIAFAHGGTVHAES
WAGEGALFEFRIPARGSEYCSQPCVKT*

>SPBIB_v1_70002|ID:27162037| Two component transcriptional regulator, winged helix family [Uncultured spirochete bib]
MDTILLVEDDRDIAQMISTSLGRAGYRVIVMPDAEHAHAFLKDGAVSAILLDLMLPGMDG
FAFIRKLKKNPALSAPVIITSAKDDDDTDVVAGLELGAEDYIVKPFSLKVLEARLRAVLR
RSDASYINEGTSRRVQKSGILLDSARHEVRCQDIPVDLSATEFAILEVLLKNPGMVFSRD
RMISEIRGGDVAVTERSIDVHILSIRKLGEGSLIETVRGVGYRFRDE*

>SPBIB_v1_70003|ID:27162038| Phosphate-specific transport system accessory protein PhoU [Uncultured spirochete bib]
MPREAFERSIEEINKRIISMGAASVEALQKAMHAFRERELDAAKKIKKADADIDAQQLQI
EDLVATTMATQQPVATDLRLLCSIKMAAELERSADYAAHLAKATKFFAGEPQWRQTEMI
EQMVQIGATMITGTVQAFISRSALQARQVALMDDQIDHIHKSNIKEMVMMLLGSRPEDA
EAKVAKFIQVSGYLERLGDHMTNACESIIMVEGIHMELNL*

>SPBIB_v1_70004|ID:27162039|pstB| phosphate transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]
MPEETKSPDSFIIETKDLSTITYGDGHEAVKHVSLGFPERNVTAIIGPSGCGKSTLLRALN
RMNELIPNTRTSGEVIYRAQNIYNSSIDPVIIRRQIGMVFQKPNPFPKSVYQNIWA
AAKVHGYAGDMDDLVEMSLRKAALWEEVKDKLKNALALSGGQQQLCIARAIALQPEVILMDE
PTSALDPIASSYIEDLISELRKDYTIVIVTHNMQQAGRISDYAFMLMGDLVEVGPTRKL
FISPSDERTERYLTGRFG*

>SPBIB_v1_70005|ID:27162040|pyrD| Dihydroorotate dehydrogenase B (NAD(+)), catalytic subunit [Uncultured spirochete bib]

MKNPEQEQQSKKNEILAGPPPSVLNLGYDLNLSVRIGSLIMPNPVGVASGTFGYGEEYDEL
VHIDALGALYTKAVTLEPREGNPPRLVETPMGLINSIGLANPGVEKFLREKLPSLRLRL
CPIIVNVAGSTEDDYIQVIERIEAHLASTDSGRPGIDGYEINVSCP NVQKGGMSFGIDPR
LVERLTHSLRQKTSRPLI IKLSPNVT DIAE IARAAEAGGADAISCINTV VGMVIDTEKKK
PAIAMGTGGLSGPAIRPIGVAATYKVGKAVRIPVIGLGGITNASDAIQYLLAGALAVQVG
TALFSDPRAPLKVLDGIIW MKRHSVHSVSDIRFMLR*

>SPBIB_v1_70006|ID:27162041| putative Dihydroorotate dehydrogenase B (NAD(+)), electron transfer subunit [Uncultured spirochete bib]

MRQFNATVAINRAIAPDWMHMAFEWPSDLPAPKPGQFF TALPPVVELRAGTILRRPF AFA
GFEEAQIEKDSSMLSRPAYAHSIYQVRGPGTRALASM QPGSSLDI IAPLGNAFPYPERGE
RAIIAGGGIGIGPMLFLAEQLGAGTYASSAILVLGFRSALLIPFSGSFSAAGLPSWKLL
EKAFFSTDDGSAGTPGTVRDALEALWLQASDLKGS GTKNLAQKKWHL YGCGPGPMLASLA
QFAAQNHMHAHFSAEQWMACGVGACHGCVLPAASGGFLRVCADGPVFDARTINWEANVQ*

>SPBIB_v1_70007|ID:27162042| conserved membrane protein of unknown function [Uncultured spirochete bib]

MLRMIQILVLLAFLFGGALAASIRLAPKPRVVEVSITAALWLLFSM GFRIGNNPELVHS
IGTIGLLGFASAVFTIAGSCIAVVLVSHFAPAVG SVRKIGTAAQKENG FSAASSGPADSE
FVVGASYSVLARLKPPAILLSVVVAGFIAGIALPRLAFDPGLITEWTLNALLFLIGMQFR
QSQVPLASMLRSPAVVALPLATAVGSMAAGLLLVPFFSLRVGKALALASGFGWYSLSGVL
ISNLGDPVLGSSAFLANMIRESLGLILIPVLGQTRVPTMAISVAGATSMDVSLPLIEQTL
GPEAVPLSFISGAFLSALVPVLVPLFMKL*

>SPBIB_v1_70008|ID:27162043| conserved protein of unknown function [Uncultured spirochete bib]

MNQDRVHEILEAIEPAPAPFTLVFSGRTNKKVNGLYKPAKAEIILHNRNFDS DNQLIYTA
IHEYAHLIFVRHGGLPMRPHQTQEFWALFHELLEKAEQKGFYTSVFDSVPEFASLTMEI
KNRCLAGNGSLLELGRLLVQAEELCRIHKARFEDYVERVLGLPKRTASTAIQAQTLNLD
PSLGWDGLALVASIRDPEARSKAAEALSNGATPLIAKR VAMPPQDDSGDPVETLLAEHKK
LERSIASMTERLQRIEDKLRTMGISEDEISS*

>SPBIB_v1_70009|ID:27162044| transposase [Uncultured spirochete bib]

MFVQTLFEKKTGRTLLFYYTARRVKGKIVKTKVKRIGYLDEF LDAYPDPLTHFRQEAKRL
TQEAQLKTLTVTFMDEHFSFGAGFAATEDAAVEKADRTFHYGVLPLLQLYRELKIDAF
RIKAQYTKVDFNHNHLFQMLVFGRILFPESKLATWRDRTRILQHSDFSDDAVYRALPFFA
QIKDALVQHLHEQVQRQYHRDTLLYYDVTNYYWEVDREDEL RKRGVSKHRPEPIVQLG
LCMDNSGLPVTYGLFPGNTNDVATMRPMMQH LAESLGTKHLIYVADKGMGMGMNIAQIL
EHNGYVISSSVRKADAELRRYILDHEGYTELAGGSFKYKSRLVPCTLYVDTPDGRKKQIR
INERQVVFWSEDYWKARHDRDMAIAKAMARAGY GENTVLNNHAGNRFIKKEIFDPDTRK
EVDHPEFSFALDQELLDSEEELDGYLIRS NVVGVREGDAPFNQPYRWHAKDNL FELNRP
VVDLDIIDMYRGLWRIEESFKITKSQ LKARPAFVHRQDSIEAHFLSCFVALLLLRLEKR
TGEKIPVATIVESLRKAQLVQLEDETYVNACCDNVIEAIGQALELDLTKKYYTKGELKAL
RGKTAKS*

>SPBIB_v1_80001|ID:27162045| conserved protein of unknown function [Uncultured spirochete bib]

VHWF AFCPNPCPYHYEAPASSWAYAIGWYATKAFGKVRRFRCTR CGKSFSTQTYSTHY
LKRIVS YRDVLYXX

>SPBIB_v1_80002|ID:27162046| Uncharacterized glutaredoxin-like 8.6 kDa protein in rubredoxin operon [Uncultured spirochete bib]

MSVAIYTTPSCGYCRMAKDWFRQNGIPFTEYNVAADMRRAEEMVRKSGQMGPVIDVNGR
IIVGFNKPEIERALHR*

>SPBIB_v1_80003|ID:27162048| protein of unknown function [Uncultured spirochete bib]

MKNNIYKVVQRDIERQKMKQASNCLRLVNVGIKEYCLISAWVVAFTCGSGCLGLGGRISL
SASTSSTRTYFQYELSPA FQIQAAIPLAIRNEVLTQSVFAESAFAAKGKIAGAEFAAGKL
AINDAAGFLAKADAISNRGSSTLSVSSPGSVNDPWGLSVGAGKWALFAAKGPLYSDAAFQ
YVLADRPGRLAVAAGFLMDAQQEIGTALRHASPWIAISAGYFHHSSILARIQMLPNFQS
ARQIQADLDWAKGAAARLDFSRKGNSSVEGFAYAEAGDFISASGDVAA YDALIYSHYDA
VFPGPSPIIKSVSLRAGIYSKQGAVSPKTGSLPAWGQYDPDLLRYWPKADINFKINTE

RRFNIFNSPGVLDSAFSAGISIEPSDWRARLQMDLHTRHAGKTYPQYGINLAIQGSFALP
EDKANAASEPENAVENAEENAADGNFYEYPEQQGRAISYLDRFLGRMQISLSFLFEKFSS
RLAVAIPMNAEESRTYSCKIQIGLKTEPLHLEGLTLEYNPEAMIISLPYARVFASFAL*
>SPBIB_v1_80004|ID:27162047| protein of unknown function [Uncultured spirochete bib]
VRVLLVEALSEILPPRPRHPEPHVNATTHAEIKQYSLIPTFTRRKQLLACFIFWRSIS*
>SPBIB_v1_80005|ID:27162049|pncA| Pyrazinamidase/nicotinamidase [Uncultured spirochete bib]
VESALIVVDIQNDFCPGGVLAVPDGDAAIIPAANSLAAYPISVLTQDWHPLNHCSFASAK
SLPPFSLDTSAEPPNVLWPDHCVAGTKGADFPALQSWKARFIIRKGRKELDSYSAFFE
NDGVTPTGLSGLSSLGIRVLCGLATDYCVKATALDARRVGFKVVIVEDAIKIDANP
GDIDKAKTQMRDAGCVFAKTHELLAKI*
>SPBIB_v1_80006|ID:27162050| Nicotinate phosphoribosyltransferase [Uncultured spirochete bib]
MNCLYQSALFTDFYELTMAQGYWKRRTMPVVFDFYFFRRHPFGGGYSVFAGLATLIEALE
DFAFSREDLDYLATLGLFEKEFLEYLSSFRFKGTIYAAREGEIVFPQEPLLRVEADLITA
QIVEGLVLNVLNFQSLIATKAARVWNASRRGAIMEFGLRRAQGADGALSASRAAFIGGAV
GTSNTLAGKEYGIPVLGTMAHSWVMSYASELEAFNAYADIYPKNTVFLIDTYSNLESGIV
NAIEAGKKLKEKGLSFGVRLDSGDIDYLSRMIRSRLDEAGLQDVKIVVSNELNEEIIESL
VDDKAPIDVWVGVTNLVTGGDEAAFTGVYKLSAIDPEGEKRPVMKFSNDPEKSTNPGVKN
LWRMYDEKGSARLDLISCSEEEIQEGTEYIVHPSADWRQLKIVPARIEPLLFKVMDHGV
RVLDLPIKECQAFMKERIKSFDSTYLRLLNPHIYKVSITDRLYDLKVSLLINAFKQKLS
KS*
>SPBIB_v1_80007|ID:27162051| conserved exported protein of unknown function [Uncultured spirochete bib]
MSKNLSGTDMSHTAPRSRKLKICVFCGSSMGNSPVYADTAARLGRTIAGQGM TLVYGGG
NVGLMGIVAESAMKTGGKVIGIIPERLFALVEQQELTELLVVKDMHERKALMQKKADAFI
SLPGGIGTMEELFEVWSWRYIGYHQKPVALLNIEHYDQLLSLLRHMVNEGFLHKEIYDD
LIVD TDM DRLIESLVAKIGKGA AVPFKKPERS*
>SPBIB_v1_80008|ID:27162052|aroE| Shikimate dehydrogenase [Uncultured spirochete bib]
MPNRNYKAELGVFGYPVAENPTVMMEEA AFRALGLNWRYLTIEVKPDNLADAIRGLVAF
GMRGINLTIPHKIEVMKYLDEIAGDARLIGAVNTVVAENGRRLRGENTDGKGFRLSLKEQG
STRIAGSRVFLGAGGAARSAVELALAGAGHIVVANRTRTRGEDLVRTLNEATQCHADF
LLWDRQLAIPEDTDILVNATSIGLFPDIEAVPDIDYRTIRPDLVVC DVIPNPPHTAFLKK
AEARGAKTIDGLGMLVNQGVIGFKLWTGLEAPREVMMEALSKEFAG*
>SPBIB_v1_80009|ID:27162053| Carbohydrate kinase FGGY family protein [Uncultured spirochete bib]
MQHYFLGIDNGGTVAKAALFDETGAEIAIASETVPFSA PKPGFAERDMLELWQANCR IIR
EVLQKSRIPSKLIAGVACTGHGKGLYLWGKNERPAYPGIVSTDTRAWEYPLRWEKDGT AQ
TVYAKTFQKILACQPVSLVAWLKDHASEVIERTKWVFEAKDYVRFMLTGEAYAEITDYSG
SGLLNIRDRSFD SALLEAYGLGDLYDKLPPLVHSTDLCGKISASAAQATGLVEGTPVAGG
MFDIDACAVASGVIDEQYFCVVAGTWSINEYLSRRPVT DGNIMMNSLFCMPEYYLIEESS
PTSAGNYEWFNFFLDKEKNEAAEAGLSIFEFAERMARHIAPEDCDLVFLPFLFGSNYNP
EARACFAGFSARHTRAHMIRAVLEGIVFSHKTHIDKLLATRTPPLAVRLTGGAARSREWV
QMFADVIGLPVETVLASEPGALGCAMSA AVASGTYRDLREAAAHMVKLGSRFEPDSAKAG
MYLK KYKLYKDIADSLDHSWKG FSPQTPSTELPS*
>SPBIB_v1_80010|ID:27162054|ulaE| L-ribulose-5-phosphate 3-epimerase UlaE [Uncultured spirochete bib]
MKHESSRNQYSLGIYEKAMPSSLILSEKLLAAARHGYDFMELSIDESDEKLARLEASAQW
KRELVNAAQDAGIRILTMCLSGHRKYPIGSADPKTRARGMEIMEGAILLAADLGIRIIQI
AGYDAYYEPSTETTQALFAENLAKSVAFARYGVCLAFETMETPFMNTVEKALRFVRKID
SPFLQIYPDVGNVTNAFEGDITRISQDILGGAGHLVAVHLKETQPGIFREIPYKKGHVNF
DTCVEA AFSAGARIFTSEFWYQKGADWELDIGRAHAFLRKKLDRISSGE*
>SPBIB_v1_80011|ID:27162055| conserved protein of unknown function [Uncultured spirochete bib]
MMHTAADVERIAYFGRNSVLLSNEKVRAIVDDLGGMMPEFSLKKGKGA VNAHWIPDFRGN
SGLPWSSHEHGQYWKANILYILAGDFPCSPNFGPDCTVDGVGLPAHGWTANERWNLASSG
AIQDGNAA YAKFTLESPDVRMPLSYTKYDVVQAGKPA YYSAMTIENHGDAPVSINLARHN
TLGSPFLQAGCRIYVSAERCMTAPKGT EFD D TGR LAQGA EFDSLLKAPGRD GKPVDLSIV
PGMIGY TDFVTGAIPAHKALGWSCV VNPVLKLA YVTF FPGPRGLPNDEIALGFNDLWMQY
GGRNFTPWALHEGGADRTFCLGTENAVGAFANGLAYSRAHPELLGTPTMVTIPAKSARTL

NYGTALVELEDALAAEAITDIEAEGDMLVLKTARTYQRVSLDASFSGLRELVSRLK*
 >SPBIB_v1_80012|ID:27162056| conserved protein of unknown function [Uncultured spirochete bib]
 MAHEKQLVEKALNEGNGVFRLEPAWVPRSFCIPGRRLKLHPNDYYAYGANRGGIDERWFA
 STTKADNGPLTTPFEGLSFIWVDEKQHVLLKDAIELAGREILGDAVMKKHGGWRAYSKFF
 DNQEPLPHHVHTDKMAANIGQMKGKPYFPKQLNNHGGWFPYTFGLNPGTTREQIKQ
 CLADWEKKDNNILALSRAYLLQPGTGWDVPPGILHAPGSLTYEPQRASDVFAMFQNIWV
 NSYTPKELLQKDIPEDKKDDLDYYVELLDWELNTDPLFYEHFRFMPPKPAKPLEDMRAEGY
 EEHDIVYKSEYFSAKELTILPGRSALIKDKGPYGAIVIQGHGKFGSLDIESPAMIRFGQM
 THDELFTERAAREGVLITNTSDTDDLVMLKHFGPEA*

>SPBIB_v1_80013|ID:27162057| putative HTH-type transcriptional regulator DegA [Uncultured spirochete bib]
 MPCLKDVARLAGVSTSTVSRAINGTIPVSEETRLRVEKAVRDMGYKPNLVAQSLRIKSTR
 LLGLVVPQMHEFISFIRFTEEAEEAKGYNLIIGSTNSDPDREERFIENLIRRNIDGII
 FSRVSDKSHVLKILDRTKIPVVIDRTLREDDIPSVMMDNYESGKLVAEHLSSLGHRAFA
 CITGPLDIANRDLRAGFRDVLGGGTLEDKCIYEGNFKFESGKKGIAYLLDTGARFTA
 LWAQNDYMAVGVNLLSDRGIAVPGEISVAGLDNIQSSWMMRPSLTTVAQPFREMCTHAV
 DIIIDRAGREDDNREKIRVMLKPELIVRETTARPEGSFAAERKEVERK*

>SPBIB_v1_80014|ID:27162058| rbsB| D-ribose-binding protein [Uncultured spirochete bib]
 MKKVILVALVVIALVPVSVFAQKQIVIGMTVPGLQFPFFVTMKQEAEEAAAKLGVKINFI
 DAQNASDKQMAAIETFISQKVDGILISPMTEDSLVAIEAAVKAGIPVATVDRKANTDKV
 LIHVGADNVEGGRAAARFIEKLGKGTVIELEGTPGSSAAIDRKKGFDEVMKASNKIL
 VSQTADFTRSKAQSVMENLMQVYPKFDAVFGANDEMIIGAIEAMLAAGIKPATKVTIGFD
 ATTAFTYMKEGKLNATIDQFPGKQAAMALEALVNKIKNNVNPQKVVVISPLPVTK*

>SPBIB_v1_80015|ID:27162059| rbsA| fused D-ribose transporter subunits of ABC superfamily: ATP-binding
 components [Uncultured spirochete bib]
 MDDIVLSMKGISKSFPQVQALKSVDFDLKKGEVHALVGENGAGKSTLMKILSGLYRADEG
 EIWLKGGKITTRGIKAMINAGVSVIYQELNLRQLSVAENIFIGREPMLPGGFIDWKKMY
 SDVHTLLKPFNVNINPRTKVYMLSPAQQVVEIAKALSLSKSDILVMDEPTAPLTGNEVDK
 LFEIHNLLKSEVSIYISHRLEEIPKVAERVITLDRDGEKILTKPLAELTTAEIHKHMVG
 RTLTEQYPKISIPIGEEVLRIEGLSKKGYCTDVSFSVRKGEIVGFTGLVGAGRTEIMQTI
 YGRMKKDAGRIYIDGKEEHIRGVCDVVRKIGLPEERKHQGLVLGLSVQDNATMTILDK
 ESVFGFLKQKLSALVGKMIETMNIKTPSARQLVRYLSGGNQQKVILAKWFLHNCKVYIF
 DEPTRGIDVGAKVEIYKLMQNLAKDAGVVMVSELPEVLNMSDRIEVVFGGRIVKEFRR
 DEADSETVMEYALGLRENASQQTPEAGAES*

>SPBIB_v1_80016|ID:27162060| rbsC| D-ribose transporter subunit ; membrane component of ABC superfamily
 [Uncultured spirochete bib]
 MKVKFVETLKNYGIIAFAFIILVVLISFSPVFLTVNNINVIQTSIYGIMAVGMTFVIL
 TGGIDLSVGSVLGVSGAICAGMLKAGNPILVIIATLGVGIACGFASGIFITKARITPFV
 VTLGMMSIARGLTLIYTKGYPISGFSPAFRLIGGGYVLGLPIPIIFLVIVIIAYIVLTQ
 TKLGRYTYAIGGNEETVRLSGINSNFYKTLVYVISGATAGFSALILTSRLNSAEPVAGTG
 YELDVIAAVVIGGASLNGGRGSVWGTFIGSLLIGVINNGMNLGISPYPFQQVVKGLIIG
 AVWLDQLRAKED*

>SPBIB_v1_80017|ID:27162061| conserved protein of unknown function [Uncultured spirochete bib]
 MKTEALWYLGERSIELRKMEIPEPKAHEVLVEMEICGMCSWDVLAFAAGKFGKFPYPPFAA
 GHEGVGRVIKVGDNVASIKVGQRVACHEVPIGTPGGALMARHAIRTEDKATVIPENPIPL
 KYWVVEPVVCIVNLVYAGIQPGDSVALVGAGYMGLIFAQGLAKTLAREVVAFDVDEKRL
 SLAREFGVTRTVKIEGDAIPEDYRKHFVDIIETAGKPSSMQLALAVAKTGAIENFAWHH
 HMHEFDLDAWHINAWRILNIQPGVNSHFSDFLQRTIDLMIAGTFSNEKLITHWAPVEQAK
 EIFTTALERRDGYMKGAILFS*

>SPBIB_v1_80018|ID:27162062| protein of unknown function [Uncultured spirochete bib]
 MVLSIMGVHWFRPVRVCAAGGVATLLKVAKPLSANNGAFALAA*

>SPBIB_v1_80019|ID:27162063| mnmA| tRNA-specific 2-thiouridylase MnmA [Uncultured spirochete bib]
 MEAMEAMKAINTAIVAVGLSGGVDSLAAYLLKEQGYAVIGLTMKIWKGA YKIQEDLKHA
 CFGPGEEDIAACERLCARLDIPYHVIDLSEEYERFVIEYFRKEYLVGRTPNPCICNRE
 IKFGFLIERAHQAGLEFDYFATGHYVRKATIDGITYLKTARDAGKDQSYFLYGLDSERLS

HIMFPLGEMTKEQTRAAARTHGLEVAEKPE SQDFVGGGDYAPLFENDKPEAGDIVDIKGN
VLGRHRGLPFYTIQRRGLGISIGTEPLYVLALDAKLN RVIVGHGKGLFSSGLISNSFRL
QNPCDLGKSFACRVKIRQNHKPAPATV L VQSNGEARIEFEIPQRAVAPGQSAVLYSDDGL
VLGGGIIDEAIPDEDIEE*

>SPBIB_v1_80020|ID:27162064|gcdB| Glutaconyl-CoA decarboxylase subunit beta [Uncultured spirochete bib]
MAAVEYIQSMQDVFIFGTSITWKMLVMY GIGGLLIWLAIKKQYEPMLLLPIGFGSILVNL
PLAIAWEHEGVPGFLHILYDAGIANELFPLLIFIAVGAMIDFGPLFRNPLMIFFGAAAQF
GIFATMIIATLLGFDLKTAA SIGIIGAADGPTAIYVANKFARDYLAPISVAAYSYMSLVP
IIQPPVIRLLTTKQERGIHMALHEKPAPHWLRILFPIVVTMTAGIVAPISVPLVGSMLFG
NLIRESGVLERLSQFAQNELAYLV TLLLGITIGGSMSAEKFLNWQTL LILAMGLVAFVFD
TAGGVLFKAFVNLFLPHERKINPMIGACGISAFPMSARVIQKMANDEERGNIILMQAIGA
NVSGQLGSIAGGLVLALVPLLVK*

>SPBIB_v1_80021|ID:27162065| protein of unknown function [Uncultured spirochete bib]
MENLIETLKNASPAVQAIGVSAGGLIGVFATIAFFVFLIVAADRFGKR*

>SPBIB_v1_80022|ID:27162066| Beta-lactamase domain protein [Uncultured spirochete bib]
MKVHSITPRIYAIHADIRSDDLFEGIWPIPYGVSLNSYLVKGEKIALIDLVRDWVVGAPGE
LAGQLAAARTSLSDIDYLILNHLEPDHTGWLGEFLEINKKAILATAKGIELVNNFYFEH
ERVRAVKNGETLDL GAGQVLQFFETPNVHWPETMMTWALDGGVLFSCDGFSGFGALGDRV
FDDEFSAEEHEFFEAESLRYANIVASFGLFVKRAVDKLSNLQIKVVAPSHGIIWREHPE
MIERYLRYADYLEGSREKEIAIVWGS MYGNTENGLQHVIEGIEEEQVPYTIHRVPNDNV
SWVLADAYKSEGIVIAMPTYEYKMFPPMAYVLDIFERKHVWYRKALRIGSFGWVGAKKE
YEAKIAQLK WDSLEPVWAGAPDEETAELLRERGRELARLVKGA*

>SPBIB_v1_80023|ID:27162067| conserved exported protein of unknown function [Uncultured spirochete bib]
MTKRFIAIAGIVLFLSMAVQFVSAQEGGTDLDSLFGEEVVPENPAGQTAQPDQTGQGGG
AIAANPLQGLLKTEAVRIGGSITGTVGISGTWNDPWTKGFDITAPDAQQLSPALSSLVYF
DARPDEEFRVYGSVKTA WPFSSKYSVLNSATLVNSTLSTTSTSTITVPDVSIFELFSDFQ
LGDKAYFRFGKATVKWGVGYFFSPADIINLEQINLFDPTAQREGPLQFRVLM PFGPSQNT
VSFYTIFDTSNPDFSTTALAGKAEFVLGRYELGVSGYYRDDTAERAALTLTGPLGKFDVF
AEGVISRGS PKTFYSFSTSAPYYSTSASKDHR TTYPSATAGFLYNDQNNNITAI AQYYY
NGEGYADSERSSSISALNALLSMPLPDATKTALTGLSKLFAYGSGRHYGAASISFSEIGG
SDFSASLLGLANFSDLSGLVQPSVSWQVADRLKLTGSALFFFGASDTEYGILRPNNPMTL
SLSLSAGTGNF*

>SPBIB_v1_80024|ID:27162068| conserved exported protein of unknown function [Uncultured spirochete bib]
MNVFFRKRNPKFVKAASLAVMMLAGLLAAVPTVFAQAKPDPVALLKELDQLSDFSGKDFS
AVFTIVTQKPGEKDSVTQARIFRRDTKKQFLILILLPEVNKGQGYLREEDNVWFYDPTSR
KFSSHSSVKENLQNTKAKNSDFTLSSFADDYA V TSMTEGTLGKFPVWILDLKAKTNEVSYE
RVVLYIRKDR TMLLKREDYSVNGRLMRTTAYPKYIELDGKLLSTQILILDEINKGEKSQI
TMAEQSVAPLPDKVFTKAFLEQVSR*

>SPBIB_v1_80025|ID:27162069| putative ABC transporter, permease protein [Uncultured spirochete bib]
MNMVLPRIAARNLLRQKKRTILLAGAIAFGIMIVTLINGFAGSFIQNVSENFAYLMGGHV
FVSGSEYTPSGKRISVIRDDSVIMKALED SGQKWASIAKTSQATASLIFEGKSVSQNLTG
IDITHSKMLKERLVLV KGSWEDASQPDAIIISQSVANKLNVLP GDKIVAQLQTVTGQNNV
GEFRVA AISVDSSIIGSRMTYVQLEYLNNLIGL GKGEYMSLGIMLDRLDLS DGFATSLYT
SMKGNIGIQLFDRNAKQESTSTPFQAMISEQNSETWSGTYR VYTIDDVLSQARQIVVAL
DTASVAILIVLFAIVMIGISNTFRMSMYERIREIGTMRAVGVQRGEIRAMFLYEALFLAL
AGAIAGIVLALVIMGILGLFSFDPQSAIFLILKRGHLSFYLPPLRAIGNIAIIAVLTLVA
VYAPANAAK LAPAEALRTVK*

>SPBIB_v1_80026|ID:27162070| conserved membrane protein of unknown function [Uncultured spirochete bib]
MAVILRMAFRNIREHKS KSLIIGILLALGALILVVGTA FIDASQAGIRSTFSDVYTGDI
ISGISSEGPVSLFGVSSPGGLAATPIIPNYEKVLSIVKSTPHIAGHSSLATGFAQLTRED
STPQQANALKSTIQS QDRFLFLFGVDAASYWNLFNQVEIVQGERLQPGQPGLMISESRQ
KFSDWLGKPLSIGDTLLIQGFSSAGMRLRELPIVGIFQLKEQGASPEQLAYIDIESLRVM
SGMTVGANEP IQLKPEETSMLSTDNADSLFGEDVTVTQGSSTGIDVNAIAAQIAQESA
AK PLQADEGAWQFIVAKADSPRN VQRTIAALNASFAKEGIPV VAGDWQKAAGPYGQSIDVVR

IVFAAIIILSIVAIIIIMNTFVISVIERTSEIGTMRAIGAGKGFVRGLFTAETALALV
SSVVGAGLGIAVTSILRALHIEATNQFFLILFGGKYMNPVIVSAGNMITAIVVMVVVGFIA
HLYPVSLALKIQPVRAMQEE*

>SPBIB_v1_80027|ID:27162071| ABC transporter, ATP-binding protein [Uncultured spirochete bib]
MQIIELRNAKKDYLLGKVTVPAIKGVSFAIERGDFVSIAGPSGSGKTTILNMIGLIDIPT
SGEVIIDGKNTSGLSDQELTRFRHEVLGFIFQSFNLIPVLNVWENIEFPLLLGRTRVPKN
EWKDWIDFLIGEVLGDWRDHKPNELSGGQRQRVAIARALVTKPSIVLADEPTANLDSAT
GEQIIDLMKKINREIQTTFFIFSTHDATIVSIADHVIRLRDGTIENRRNGEDINGSGA VG
APVED*

>SPBIB_v1_80028|ID:27162072| putative enzyme [Uncultured spirochete bib]
MQDFSKYLSANANNMKKSVIRELLKLTNQPDIIISFAGGLPAPETFPVEELREASDRVFRK
YGDKILQYGTTEGDNDLKAQLVAYESAQGIKLGPENLLITSASQQALDMLPKLFLDPGDY
VIAGRPTYVGAIQAIQSYQGNVGLGIPFSTADDGDFMVELEKRYERASAKKRIKIYIYVIP
DFQNPSGICWSLEKRKALLEFAYREGLFIVEDAPYREIRFMGEPVPSIYQLDQQMQNRGI
VINLKTFSKILAPGTRIGWIIAREDLIQKMVIKQAMDLCSTVLTQKMIAEFMATGKDKD
IVARTCGIYRNKRNFMLEMFEKYMPCRFDLAWTKPEGGLFLWLSLPRYIDTDKMFYKAVE
KKVAVVVGSAFYFDEPETNSMRINFSYSSFEQIEEGTKRLANVISEEIEAHEAGPRGQTS
PEDI*

>SPBIB_v1_80029|ID:27162073|ychF| putative GTP-binding protein [Uncultured spirochete bib]
MPLNCGIVGLPNVVKSTIFSALTSAKAEAANYPFCTIDPNVGVPLPDKRLDRLCEIFKP
RRKVPVAVVEFVDIAGLVRGASKGEGGLGNQFLSHIREVGMIAHVVRFCDDPDIHVAGKVD
PADDIDVIHTELALADLDSIDRRLDKLNRQLKVQDPNLKDKTEKEIAVLQKVRPALQEGK
PAFTVDLEPEEIEFARRSFLMTMKKELFVCNVDESQVHGNKYVDIVKEIAEKQGSEAVVI
CGKFEAELADIEDPAERAFLAGIGLEAPGLASLAHAAYRLLGLRFTFTAGEDECRAWTI
LAGDKAPAAAGVIHTDFEKGFIKAEVYHYDDLIQYGSEAAVRAAGKMRQEGREYVVQDGD
IMFFKFNV*

>SPBIB_v1_80030|ID:27162074| conserved protein of unknown function [Uncultured spirochete bib]
MSEPLEKGEVVGQGSIEQGFSPAGDESAPRLALGSFSPSIRSKEKGEYYGHPRNHFWPIL
AAFAMERGIVLPPGSLDNYSAKIALASSLGLLIWDMVQSCRRQTSADGELEIVALNDIRD
LLGQYPSIKWVGLNGALAASLFMRHVSPENRLLARKALRMAGGRISIEIGQMRSIMYL
PSTSPVPSRNRSTIDKQHIWFEFLGA*

>SPBIB_v1_80031|ID:27162075|uvrA| ATPase and DNA damage recognition protein of nucleotide excision repair
excinuclease UvrABC [Uncultured spirochete bib]
MDKLIKGAAREHNLKNIDLELPRNKLIVISGLSGSKSSLAFDTIFAEGQRRYVESLSAY
ARQFLGRMDKPDVDYIEGLSPAISIEQKTTTRNPRSTVGTVTEIYDYLRLLFARIGVPHC
PSCGREIREQSVDQILDVILSWPSETKLQILAPVIRAQKGEHRKVLEDALKQGFLRARVD
GQFIELEVPPALEKQKKHTIELVVDRI RLSEESRRRV AEA VETALGIADGIVTVIREGSG
AQEGQLKEEFFSQQGACPVCGISLPEMEPRLFSFNAPQGACACAGLGMNMEFDPDLIIP
DKLSLNFEGGCIPYNPTSAWNRSRFEALAHYHFSLDTPFESLPEKVMHAILYGSDEDIH
VRYDNRDRTGHFEYQSKFPGILADLRRRYMESTSDEIKDWLESFMIEKECEVCHGKRLRP
EALAVTIGGKNIYDITCMPVGEAVQFFESLKLTPTEAQISKLILKEIVARLGFLRNVGLD
YLTLERKAATLSGGEAQRIRLATQIGSSLVGVLYILDEPSIGLHQQRDNQRLIDTLTYLRD
LGNTLIVVEHDEQTLRTADYLDLGPAGEHGGYVVAQGTVPVIAHPDSLGTGQYLAGTL
RIDVPKVRQNGAYITVKGASEHNLKHIDVKIPLGKFCITGVSGSGKSTLLSDVLYPA
ISNRIMRSSHREGAFEAIHGLEHIDKIINIDQSPIGRTPRSNPATYVGVFTPIRELFASL
PESRARGWKPGRFSFNKGGRCCEHCQGDGTIKIEMNFLPDVYITCEVCHGKRFNADTLDV
RFKGNADVLNMTVEEASGFFAHIPSIAHRLKTMLDVGLGYIRLGQSALTLGGEAQRV
KLSLELAKRATGRTLYFLDEPTTGLHFADVRQLLEVIHRLVDSGNTVVMIEHNLDIHKQA
DWVIDLGPEGDRGGMIVAEGTPEDIARCKQSYTGQYLGPMLEISGPR*

>SPBIB_v1_80032|ID:27162076| exported protein of unknown function [Uncultured spirochete bib]
MRRILCIFGLLFIILFLPAQEAVNQSSPAEESTAQQTDTQSIPTAISASPVPEDFARKT
LRFRIAAAATYELRDIAAEYGLSADGTADELRLRFAHFGEPIPKVKGDVSMTIEKAGN
VQYFTIENGTKAIRVNGPLEIRFADSQGTIHRISAQYLVFNRDTNEVQAAGNVEYTRET
TRTDIYKQSQIAVNLDDESSGVFVDGGSFNMEPTGAESRTLIVHFGTLISKSEEVVSLANGS

LTACDAIDPHYILRAKKIWLFGSGDWA VVNATLYVGSIPVLWLPFFYYPKASVFHPVVG
FRSRQGGFVQTTTYVAGTQGAEARQSSAFSLQQGATGSFGTYVSRQTTEQSDTSSLAV
LVDAYSSLGAFAGLRGKSASRLPVNLSWL VGVGLSRSVFLESTGYYSYDWAGNYKSVWN
DWKFGSIALPVRVTSFEASSRRNASGLSWKVSLPFYSDPFIDQDFLDRKESYDFFSIFG
GASSTVSERTSFVQKASLSWSWRAKNTQKPLTFNLSNLSSLSWKSXYASTSGMTAAQLR
LNAVNPQRHFFYPENARVVDTTFSASGIIARSNAASLGWTTSNAMYIEDRFYSFAWQKPQ
DIDFKSWYWLLGSRNNASLNSQLSVEKAALDFQFSSGVSGQVQYRPYLYDERVSPTTVHP
FKLADYGYNTASWNAGTSIIWSPLRNIDMLAASKLQYSLSGKIAMVSYEGLDGGSGVNPANP
VYKLNWLSWDDTMIRDHSILAELA KIGSTSERLSFKIALPPLENYTFSLSAAGIASF
GAAYIISRQSSLADLKSTSLAGNVSLQPLKQLRFAANA AWFDFANAPLSVSADITAWSFN
ARFTAQKANGYTFKSGSWIQDGTQYFRPSTVSLSWKPVLMKPPQDISDKLVWYFEFGSA
LSLSQNLIQYTNAIFGSDFRISLKNSSGGLSLDLSVSSINKSFWRY YAGLLPVAGDLDPEI
YKRNFFNDLLDSLSIWD SARLQRTLFLKQLSLTLAVDAHDWDLAGSIAAGPTLITPDTG
RPYYQMDVSFSIAVTWKDISAIKSSINYSEGA FRE*

>SPBIB_v1_80033|ID:27162077|ybeZ| putative enzyme with nucleoside triphosphate hydrolase domain [Uncultured spirochete bib]

LSPSHIVLEDTRLLAELCGANDYNLSVLSLLGARVLSRGNELFIESENDEVVGLFSQLV
SAIGTSIEDGVPATPELIIALHAELTPEGKQPDDRGDQSAPEENESGISKFLDTCIQIPN
GFGKVFPRSSGQSLYLQGIAMHDLVFAIGPAGTGKTYLAMAYALRELLAKTRRKLILTRP
VVEAGESLGYLPGDLEQKINPYLRPLYDAMEALVPYETIRRLEESRAIEVAPLAYMRGRS
LTNCIVILDEGQNTTKEQM KMFLTRLGDHTKAIVTGDITQIDLPKKNESGLVHAVTLEH
IDEV FVSRLDARDVVRSP LVRKII EAYEKE*

>SPBIB_v1_80034|ID:27162078| putative 7TM receptor with intracellular metal dependent phosphohydrolase [Uncultured spirochete bib]

MKKNNDELFFSSLLRQLASMAPSMWYFLAAIVIAAVGLVFLGPSALGSRNSLRSIQPGKV
ADSDVYAGKDTVYVDKEATQRKILAEERLVLAVFVLDDKITS AVREKAEAFASYRQLAG
EPGGVDALSLLRSRFPDLFQPELYTVLVRAKLNAQAFVYVSDIVESMLGKGVVSLPDGV
FDQFNPNYYELVRTLGTRQESEQLPVNGMITLANLGNRLDDEMDARHVPESMKQYVRLLG
KALLRENVFFDQGLSEKRIAAARARVEPVTRFVSRNEILVRKGELVTPELYQQIKTIRSA
ILVSDVGVLMTGLGLLLVASLLGFLARVKDLSDFPSDRSSLLFLLSLLILLYWILVIQ
NVIDSKSLSRGALFVPASLFAGLVSLLYGPRTGIFFSLISFFLTGAATNLNAQFMIGILL
AGISATLTMRTARTRIMLARA AIFQAIQALLAIILLLNQKPNA AELIQSMGLGALNGFA
GGSFILLLLPLFERLLDRATQFRLMELADINAPILKEMLSNAPGT YAHSIQVAHLAEAAA
KDIGANPLLARIGAYYHDIGKIEHPEYFTENQKGVNRHDDINPSLSASIIRRHVKDGV
GREIGLPKEVIEIIGQH HGNSVMEAIISKVKDSVSEADVQSFSYQGEHPKSKEAAIVMLA
DTVEAASRSLKNPSSAKLEQFVHQLILHKLNTGQLEDSEL TMRDIRITEEAFSRILQSQM
HTRIEYPGQEQ*

>SPBIB_v1_80035|ID:27162079|ybeY| Endoribonuclease YbeY [Uncultured spirochete bib]
MNGNEVFYSVIGTDEPAWAQRAANYALS VLDALKKQNWQISLTFCDATMQLNRD YRNI
DAPTDVLSFTLGELEHVNDGEDVFIAGDVVISVPALYRNAEDFGVSADEELRRLIIHGIL
HLSGMNHEDNEPDQPMHLQEQLLGGQSGNSIL*

>SPBIB_v1_80036|ID:27162080| conserved protein of unknown function [Uncultured spirochete bib]
MSLLSQIFKPRAKTELSSNESVEEQREMI EGVEHLPEKIVKDVMPRTD TVCVDNTTSID
EILAILVESGHSRIPVYSDTIDNIVGILYAKDVLAALVKKEPELEKRLIRPPYFVPETKR
IDSLLEKFKRRHVHIAIAVDEYGGTAGIVCLEDIIEEIVGEIQDEFDEETE QVIK VSENT
WRCDARIRLEDLNEAIGAQLPIGEYDSL AGYVFDL FERIPATGEQVTAGDLQFTVEAMEG
HRLTIVRIDRILVS*

>SPBIB_v1_80037|ID:27162081|gdhA| glutamate dehydrogenase, NADP-specific [Uncultured spirochete bib]
MNSYIKEVLDGLRARYPWESEFLQATEEVLESITPLIEAEPKYRQQKILERIVEPERVVM
FRVPWVDDKGEYHVNRGYRVQFN SAIGPYKGGIRFHPKVTLSTLKFLAFEQIFKNSLTGL
PMGGGKGGSDFDPNGKSDNEIMRFCQSFVTE LFRHIGPDTDVPAGDIGVGGREVG YMFGQ
YKRLANQFSGVFTGKGLSFGGSLIRPEATGFGAVYFAEEM LKLRGETLEGKTVSVSGFGN
VAWGACIKASQLGAKVV TISGPDGYVYDPDGVGTQEKWDYLEEMLIIDRNKVET YVKKFP
KAVFYKGGKPWEQKVDIAMPCA IQNELNGEDAKMLIANGVKTVVEVSNMGCTPEAWKLF I

EKEIPFGPGKAANAGGVATSGLEMSQNSMRLAWSAEVDHRLHEIMTNIHKSCVETA AKY
GFEGNYIVGANIAGFKKVADAMIAQGLV*

>SPBIB_v1_80038|ID:27162082| RNA-directed DNA polymerase and maturase, group II intron origin (fragment) [Uncultured spirochete bib]
VTRTEETNPETTKLIERLVERGTMREAYARVVGNGKAAGVDKMTVEALKPWLQAHWVEVK
GRLLRGTYRPEVVVRGVEIPKPNGGKRQLGIPTVVDRFIQQALHQILSPIFEPEFSANSYG
FRPGRGAHDAIRKAKEYQLAGKRWVVDIDLAKFFDEVNHDLLMARIKKVRDKKVLRLIR
RYLQAGIMKDGVVWDRDKGTPQGGPLSPLLSNIMLDALDKELEKRGLSFCRYADDCNIYV
GSERAGMRVMESITRFIEGTLKLVNREKSAVARPWERKYLGYSTNERKVRIQVSASSI
ERFKEKVKALFRGAHGRNLGRFIRETINPFVRGWIQYYSLADTKQFAEELDGWLRRKLRC
NLWRQWKRPWTRLKRLMERGLPEETA VRSAPL TSAARGGT LAPST*

>SPBIB_v1_80039|ID:27162083| protein of unknown function [Uncultured spirochete bib]
LDSVLQSRRYKAVCGRAGWMA PQETTVQPLAAVEETVDAPETADGAWLARRNGSPFRAF N
QRGPWWNSGAQH MNYAFP KKYFDSMGLVSMIDRLCLSR*

>SPBIB_v1_80040|ID:27162084|aroA| 3-phosphoshikimate 1-carboxyvinyltransferase [Uncultured spirochete bib]
MENRIVYSSKVG GTIRAPASKSALQRAIACAVLAQGKSRIIGDPLCDDAQAALHIAEGLG
ATVHVSDGAIEIEGSEQFLQEDGTGTT SLEQQEPLMLSCGESGLCMRMFAPVAALLDRPV
QMEAEGSLRKRPMAMVESALHAFGADCAAQEGLPPLFVRGPLQPKLATLDAKGSSQLVTG
LLISLPVLHG DSELGVENLVSAGYLDLTLEICSQFGVHIDKVS SDGRTARFLIKGNQSYR
PASLRVEGDW SGA AFLAVAAAIAGKPEGLRIQGLKNDSLQPDRAIVDVLALAGARVQFDG
SDVIVQPGDCLPFEFDATDCPDLFPPLAVLASVAKGISSIQGVHRLSVKESNRALALQDM
LANIGIHSKIVDDALQISGGHFSGGRVESHNDHRIAMAAAIAGLAAANPVAIEGAECVAK
SWPGFFEDLQSISSAPNLVPELK*

>SPBIB_v1_90001|ID:27162085| putative membrane protein [Uncultured spirochete bib]
MTGTKQDAKVSQKSAIKIGKKAFLLSAGIILV LMLVSGILTIVLPSGEYQRVIQDGKTLV
VNGTYHEVPKPNYP AWRWLTAPVEILFAQDNVALITIIIFIFCVGGSISILEGAGIMEEL
VKTLVQRFSKRKYLLIAVIIFFFMAISSFIGVYEGMVP MIIIFIVPLAIFLGWDSL TGLGL
SLLPLAFGFASA VTNPFTIAVAQRIADLPLFSGSWLRIIFFIIVYGIVTTFMIRHAKKVE
RNPASSLTFKEDEAIRASLAAGEAEAAHNTAAPNGGKHTDTASSRAKTKGLIWFASCVGA
AMAIVLVTARMPGLSDLAFPVMALLFLIGGIGGLLAKVRPGNIGATFIRGAGNLLPGIV
LILMAYSVKHIIISGKIMDTILHGAATLISQAPPLSAAFLVYL TTLVMNFFIGSASAKAF
LMMPLLTPLADLVGITRQTAVLAFDFGDGFSNMIFPTNALLLIALSFTVVSYP RWMRWTW
KLQAILVVT SIFLAI AVGIRFGPF*

>SPBIB_v1_90002|ID:27162086| Prephenate dehydrogenase [Uncultured spirochete bib]
MRIA ILGAGRMGAWL TEELCWHHDVMVHDTDLLKMKYFIKVHRALSIEEFAEFEP ELPFIN
CVPLGYTLEAFDKTLPYLPKTCIISDIASVKTGFKEYYEQSGRAFVSSH PMFGPTLANIR
DLHEESAIISSESSKEGA AFRNFYAGLKIRIFEYSFEEHDKTVAYS LATPFAS TMVFAA
CMKKQDAPGTNFKRHL SIAKGLLED RLLTEIMFN PYTIRQLELINSKLAYLTHIIRQR
DYEEMKKFLDSLRRNIGE*

>SPBIB_v1_90003|ID:27162087| Prephenate dehydratase [Uncultured spirochete bib]
MNLDDIRTDIDRVD AKILSLLNERMEKAILARRFKTSTLDTAREQAILDKVRRSSQCLLD
PAFSVKMYEQIMAESRRIQEAGLQTVAFQGEHGAYSEVALRVLMPNAATIPCREFS DVFE
GVEKGIYDYGIVPVENTLGGIVGPVNSILYITSLKIVAAIDMPIRHCLL TLPGADHRELR
TVWSHTQALAQCRNFLYRNHLDPEPY YDTAGAAKALAESRPGIAAVASKFAADLYGLEI
IKEDVQDTPHNRT RFFVISTKESDAEGDKCSAVFTAGNKAGSLFAVLRVFADEKINLTRI
ESVPDTPGKYAIFIDFEGALLSAAVQKAISKVSALAE GFKILGCYKEMRVEE*

>SPBIB_v1_90004|ID:27162088|aroC| Chorismate synthase [Uncultured spirochete bib]
MNTGGTIFRVS LYGESHGPAVGVIIDGCPAGISLSENDFAADLGRRKSGAEGTTPRVESD
APLLSGVFRGRTTGAPIHIEFRNENTQSEDYADFMHIPRPGHADYSAMMKYAGWHDPRG
SGHFSGRITIGLVAAGVIAKKILAHCAPI SFDTRIIAAGGSEQIAETIRAAKEAGDSVGA
LVEIRIAGVPAGWGEPFFDAAESVIAHFIFAVPAVRGIEFGDGFAAAAMK GSEHNDFPID
QNGKTARNGAGGINGGITNGNELVIRVAVKPASSIAKQRTLD FSRNEPTELEIKGRHDA
CIALRSVVLEAAAACALADLALVARARKSWESNIPWRKS*

>SPBIB_v1_90005|ID:27162089| 3-dehydroquininate synthase (modular protein) [Uncultured spirochete bib]

MQTDRTILFGPFSSLM EIVPLDKAIFITSRALRQRAEALLASSNATHAAASLKDMPHAA
QKESGLRWIEVPDGEPCCKTFPVLESVYHALLNLDANRDTVLVAIGGGSVSDLAGFVAHTW
MRGIRLVLAPTTLLAMIDASIGGKNAIDVGYAKNIVGSFHMPHILCDVAWLHSLSPQDL
ASGMAEAIKHALLDSEDHVEFLERIAMSGKALPELEAGAFKELVQRSQQVKLRVYVQADFL
DAHARHVLNYGHTFGHAIELLTGLPHGFAVSAGMTAANRFAVQRGALSLAAAERIERLLA
RFGLP TSMQA AFNLADRPIDKKALFELMRADKKRRSDIVDFVMPHAIGDLRIEEVTL PQL
EAALEWLTKSASEDSTTRSAL*

>SPBIB_v1_90006|ID:27162090|aroF| 3-deoxy-7-phosphoheptulonate synthase [Uncultured spirochete bib]
VIKNIKLAARKPGQKTTIIDVNGIRVGEGLVIIAGPCSVETERQTIETAIKVKNAGAHML
RGGAFKPRTPSYAFQQLGLKGLKILDKARKETGLPVVTEVVDTRDVSWSVGEYADV LQIGA
RNMQNFSLLREAGKSGKPILLKRGMYSTLEEWLNCAEYILAEGNPNVILCERGIRTFETY
TRNTLDLSMIPAVKRESHLPIIIDPSHG TGILSFIEPMSLAAVAAGANGLEIEVHIDPAS
ALSDKDQQLTVPMFESLMNKLRLRAFMDPEMSSALQENMDTPAGKSAVQENNAQNAAP
PLPGAFSEAVD*

>SPBIB_v1_90007|ID:27162091| conserved protein of unknown function [Uncultured spirochete bib]
MYFNELVSA YDRQRRE RNIYHDLMRDRVREVLLVGSLYDSFVVEDGVLTEQIYGEYFKL
NLNTIPRVTCAYTEESALDLFREGRFDLVIIMASLD FDMPLRLAALMRSIWPDIPLLLMV
TNNSSLAMLDMERPELSAFNRIFVWNGYSKLVGMIK YIEDWRNVEADTRACEVRVILLI
EDSVRYYSRYLPVLYKVVLRQTQALVEEEHITETYKLMSIRARPKILLASTYEEALRIFE
TYKPYLLTVITDIRFN R GACDENAGFDVRF AKQELPDL PVLVQSSEPNVREKAF AIGA
SFIDKNSESELEMELASFLQTNLGFNGFIFRLPDGREITRARNMSEFVQKLNEIPESLLY
HAEHNHFSAWLMARGEIHVAKILRPYKITDFSSPVQLRQFIVR MIDQIRSTRSRGMVPYF
DPEMVEYQRYLCKIADG SVGGKGRGLIFIHSLLENLDFSQYIQGVRVSM PNTV FV GIDEF
ERFLELNLG L WAWAYYGDSASEVRKVFVEKSLTLQLQDRLRQFLAVSTKPLAVRSSGLFED
MLMVPFSGVYD TYILPNNHPDPEVRLKQLCDAIKLIYASLFSKEARAYFEAANYNLEER
MAVVIQELV GSPHGGYFYPHAAGVAQSYNYYPVSYVKPEDGLCIAALGLGTYVVGGSAY
RFCPKYPKLDV LSPDHALESTQRYFHALSLEDEAPDLLKGEMASLSELPVSAAEKDRYFP
MLASTWDSADQRFVPGVQAKGSRVIDFANMLKYDAYPFAKAIEVVLDVASKSMGTPVEIE
YAFNFDAGKEEPVLYLLQLKPLIHIEDRIEIDPASILPEVCFILSRNCMGNR DVSIRNI
IWVDPRTFDRSETLEIAAEIDELDAIARQESFN YLLIGPGRWGTRDRWLGIPVSFSQISH
AKAIVEADLPGFAVESSQGSFFFHNLTTMRIK YIKVTQSSADNFVDWEWLYQMPTRIRTK
HCALTELEAPMDLRFDGRSGIGAVIKSAGLSNNGSSR*

>SPBIB_v1_90008|ID:27162092|pheS| Phenylalanine--tRNA ligase alpha subunit [Uncultured spirochete bib]
MIDQSAARALHPLEVKILLAFKVGDTIDSALVREKLG FREGDQQQAFSWLMAKGVLEEAD
RQTEVFYELTPLGQEWLEKGTPIRRIFSLMKEIGPMSLPDIAQALGFDQKTVGS AFGSLS
KEGVCAMDEARRAILTKSALPQLLDIEALLKAAAANAGSLPEKSLTQQQKALMAQIAKK
RGAQDAPFRIAERAKVLFRLTSLAEDYRQAVTALGMTGEEFGAITPDMLEKGTWKLGTFR
PYNVQIPPARVIPGRRNPYVEFLDSVKDKLVSLGFEEFDGNMVETEFWNSDALFMPQFHS
ARDIHDVYYIDEPTHAKFIEPHLSRVAAAHENGGNTGSRGWQYQFDRDFTRRLILRSQG
TVLSARQLPKAKVPGKYFGIVRCFRYDRVDATHLSDFYQTEGIVLGEDVNLRTLLGFLEM
FAVEVAGAKEVKYVPGYFPFTEPSIEVHIKHPVLGWFE LGGSGIFRPEVTRSLGIDVPVL
AWGIGIDRMALMALGLNDLRELFSPDLESVRMRRS QYKIQ*

>SPBIB_v1_90009|ID:27162093|pheT| Phenylalanine--tRNA ligase beta subunit [Uncultured spirochete bib]
MPKIEVNEELFFRLAGKTWS DKEAFEQDLTVAKAELDEWDTSLPADSERTIKIELNDTNR
PDLWSTAGLARQLRIYRTNIPSYPFFASQKKKIAAPYRVVVERS VKEVRPWL A GFVAKG
PAISDALLRDMIQTQEKLAWNFGRKRKGV SIGIYRISLIEWPVRYFGVDPHKVSFVPLQE
TRRMTLNQILEEHPK GIEYASILK GKPIHPLLTDSKGRVLSY PPIINSADLGA VQVGDTE
VFIEVTGSDYPSVALSSSIMACDLADMGF EIKNVQVDY EYDTPFGSSIVFPYFQGEISV
SIEEANKLLGSLDVAQAIDALTRMGLCAYSEDGRTIRVAPPEYRNDFLHPVDIVEDIMI
GHGLENFPPERPRDFTIGRLTPIERFSRKAKSIMVGLGYQEMIYNYLGS GKDYAEKMQIP
ASALVKIANPMTENYEYVRNSPLPGLLQTESVSSKASYPHRTFEVGKVALKDVDANYGIV
TRQYIGFLTSHAQADYNEIASHVAALMYFLGKEYTVREASDPRFV PGRQVEVLAGGKRAG
VFGEVHPAVLEAFGIMMPCAASELDLDM LIEE*

>SPBIB_v1_90010|ID:27162094| conserved protein of unknown function [Uncultured spirochete bib]

MEIYAHEPLGFDGFLVRVEADIRNGIPA VEIVGLASTSVREARERARIAVRNAGFEFPQD
RILVNLSPADLPKEGSAYDFPIALKILSQSGQIADVPPVFLAMGELTLEGEIQPVRGILP
AARAAVEKGIGTCIVPIENASEAMVVSSMQVWPISHLSQARQILIALREGEKPGMFLDGI
LLGHGFGHDLQADSAPDSMPDASHMNYSPGAWHEHEQSLDFRDFKGDKEKFIKALVVAAGGH
NMFLAGPPGAGKTMAANRFPSSLPLDLEATEALDTASLYSLWGQKQARFTKRPPFRAPHHS
ASLEGILGGSKPLRPGEVSLAHHGVFLFLDECPEFRRDVLQALREPVERGYVDIVRAGRVI
RFPSDFQLIMAANPCPCGNLGPVKTCCTPEEIRRYWKKLGGPLDRIDMRVAVVPPGP
SRLLRASISHSDLQKKVLNARIQQRERLQRADARNARTNARIPPGHISELCKVTGNAEK
LFLSGVSSYGFSARAGHSILKVARTIADLDGRQEIGESEIEEAIEYRQLGDGDAIWPG*

>SPBIB_v1_90011|ID:27162095| Oxidoreductase domain protein [Uncultured spirochete bib]
MNKKLRFGLIGYGKVAALHARALAAAPHCELVSVSUGHNKEKRDAFASQWKLASRDGVHEM
VQKDGVEAVLITTPHPRHYFDAMDAFSAGCHVLVEKPLSLSVSEAEEMMRQAQATGRFLS
VISQRRWYPACIRIREAIDQGLLGSPLLGQLTILGWRDEEYRSDPWRGSWEHEGGGVIV
NQAPHQFDLLCWYMGEVAEYVGAWANVNHPYIEVDDSAVATVRFKSGGLSSVFISNSQKP
GIYAKVHIHGSSGASAGVQTDGGAMFIAGRSVLEPPYNDLWTVPGQEALREQWHKEDKA
FFAGIDATWYFFSLQEEDFARAILEGRTPAVSGRDGLQVARIIEGIYRSNKEGKPVRY*

>SPBIB_v1_90012|ID:27162096| Alcohol dehydrogenase GroES domain protein [Uncultured spirochete bib]
MKALVLEDYMRLEVRDIPQPTISAPDDVLIQIKAAAICGSDVHGIDGSTGRRRPPLVMGH
EAAGVVAACGSGVAHFVPGDRVTFDSTVWCCECYFCRRGEVNLCDRRVLGVSCEEYKRD
GTFAEYVVPERILYHLPNSVSFEEAALTEPISVAMHAFHITNMQPGERAAVVGTLIGL
LLIQIIRAYSPHLILAFDTPDRRAAALQSGADIALDPADPLSTSMVLKATDGRGVDRAF
EAVGASASIATAISVARKGGSVTLIGNISPKVEIPLQSVVTREISLLGSCAISGEYPASL
ELIASRKINPRSVISAVAPLEEGPVWFERLYKREKRLKVVLP*

>SPBIB_v1_90013|ID:27162097| PfkB domain protein [Uncultured spirochete bib]
MSALQIMPAEKAELDFLSVGGVLRMDPGVVPFAFADRYDVHVSNGEYNVAANLARCFCGK
QTAIASAMVDYPLGEKVEASVRSMGVRGIYKRFKYDGVVGNIALVWSDRGQGVVPPVVF
YNRANEAALLKPGDFDFRSIFEKGVRFHSGGIFSALSATPELVIEGMKAARAHGSIV
SFDLNYRAKLWAAADTGKKPSDILERVEHVDVLLGNEEDLQMGLGLPGPDIHSASKLDP
ASFLGTIEQVHAKWPNVKVVATTLREVKSTNRHLWSAVLWIESQHWLAPTMELDVYDRVG
GGDGFAAGLIYGMLEGLDPEECLRLGWALHAGALITTPGDTTMATLEQVKTAKGGSARIQ
R*

>SPBIB_v1_90014|ID:27162098|gnd| gluconate-6-phosphate dehydrogenase, decarboxylating [Uncultured spirochete bib]
MKADIGLVGLAVMGENLVNLMESHGFTIAVYNRTVEKVDAFTSGRGAGKHHIIGAHSPKEL
VAVLKKPRIVMIMVRAGSAVDDTIAQIAPLLEPGDIIVDGGNSNYQDTMRRLAELEGKGL
LYVGTGVSGGEEGALNGPSLMPGGSEAAWPHIKPIFQIAIAAKVDDGSPCCDWVPGGAGH
FVKMVHNGIEYGDMQLIAEVYHMMRDQLGMTPDEMADVFEAWNKGELDSYLVAITRDILR
FKDEDGLPIVDKILDAAGQKGTGKWTGITALDFSVPVTLIVEAVFARCLSAMKDERVRAV
KILGKPSGARFKGSRGAFIEDLGKALYAAKIISYAQGFMLLREAAAEYGWKLNYGSIALM
WRGGCIIRSRLGRIKEAFDAEPSLSNLVFAPFFAAQVLENESALRNVVGEAVASGIPVP
ALSSALEWFDGLRTERLPANLLQAQRDYFGAHTYERIDKPRGEFFHTNWTGHGGSTAAS
YVV*

>SPBIB_v1_90015|ID:27162099| Transcriptional regulator, RpiR family [Uncultured spirochete bib]
MEKPKSSNCLYLIHSLMEDFSDRERRIADYILANPAKAVHPSIEELSESIGVSVSTLVRF
VKKLGFKGYQQFRISLASEALAPEAKIYETIVDRNDPQIAFSSAQKALELTSSMIDRS
ALAALASRIIEAGCVHLFGLGSAIVAKDAVHKLIRTGIHCVNAEDYHLQLMIASQLGEK
DTAIVISHTGVNKDTRLIAEIAKNAGAFLCVITTYPRSPPLARMSDRLFISASSGSQMISE
AFSARIAQLAMIDSLYIAIMEQLGECGIQKVEKMRAAIAKRRM*

>SPBIB_v1_90016|ID:27162100| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]
MKSKLMLVILVVLTVLSVGAQQKEIRVLLANHPYGDLLKAAIPEYEKATGVKVNVESSLQE
SQLTTKLTTEFATRSSTVDVFMTRPLQEAKMFYKNGWYEPLADYDFSDYPKNALDVATFG
NKAYLVPLVTEWEVLYYRVDLFKKAGLSVPTNFTELEMAAKKLNSADIAGFASRGKGA
VTQLSSYVYNYGGTYLDKKGKAVFNSKEALDAIRFYGKMLANYGPAGITNMSWENIMPLFQ
AGKVAMWTDASVFGYQIVDPTKSQIPAENVGIANFPAGPKGNTPIYVVSWSGMAIAKQSKN

KALAADFIKWATSKELAKRGM LANITMARN SAWKDSEVRAKIH PGLIATQEYAAKNGIPY
DRPYMSAVGEARDLIGEVIIESINTGGSSAKLESLARDKVAAVNSLLEDTGEYGVY*

>SPBIB_v1_90017|ID:27162101| Permease component of ABC-type sugar transporter [Uncultured spirochete bib]

MAIKRPKGSFLEKNLHIFPLPAVVFVIVMMLFPVLYTLFLSFTNWNLTSGMPLSIVFLK
SYQKVLREPRFIAALGRFSFTALAVAVETILGMIVALILNREFRKGFTKLIMLLPLVS
TPVAIGIVNLFYDPTIGLANFVLRTRFGLPRQAWTGSAA TVIPSLAIVDIWQWTPMIALI
LLSGLASLSSEPYESARVDGASEWQIFWRITLPMVTP TLLTALILRTIDALKTFDIYAM
TGGGPGYASET LNVMFAKYSFEYFRMGQASVILVFLFMLVLFMSLLIVRMRKSLEL*

>SPBIB_v1_90018|ID:27162102| Binding-protein-dependent transport systems inner membrane component
[Uncultured spirochete bib]

MRTALIRKILFFLVILAIVVPVLPFLWMLTSSFKTQVDIVAWPPRLVFSPTLQNYERVF
REQNFLKYFTNSSIIGISAVSLSLLMGLPAAYSIARYKQKRLSMFILARLMPGISFLMP
WYIIFSRLLKLMDSYIALILSHMLITLPIIVWIMSSYFETIPIEMEE SAMVDGATRQRAFL
SVVLP IAGPGIVTSVTLAFIFSWNNFMFSQVLSMERTRTLPIAIYNFVSYAEVDWGAVMA
AAVAIMAPAILTMIFQKYVVKGLTMGAVKG*

>SPBIB_v1_90019|ID:27162103|trpB| Tryptophan synthase beta chain 2 [Uncultured spirochete bib]

MRIKATLSDELPRQWYNLAADLPETPNPLAPDGSSLRPEQLSALFPEPLIEQEVSSDR
WIDIPEEVLEILARWRPTPLVRARNLEKALGTPARIYKKNESLSPAGSHKPNTAVPQAYY
NKITGTKRLTTETGAGQWGSALAFASAQFGLECQVFMVRSSYEKKPYRKVMMQW GASCT
PSPSQLTRAGRAVLAEHSDSPGSLGIAISEAVEAALEDRTGKTHYALGSVLNHVMLHQTV
IGLEAKRQLALFGEKAPDTIACVGGGSNFAGLSFPFVKDKIDGANIDIVPEPASCPSM
TKGLFAYDYGD TAGMTPLLAMYTLGHDFMPSPSHAGGLRYHGMAPLVSHAARHGLLRPVS
VPQLECFSAAVL FARTEGIIVAPETSHAVAQVIREAIQAREEQKEKVILFGLSGHGLLDL
QGYEEYFAGELGDLSLSEEELARSLASLPKAGPAK*

>SPBIB_v1_90020|ID:27162104| Cation diffusion facilitator family transporter [Uncultured spirochete bib]

MQESFRKLG YAEGIASAIINTILFGLKIWVGIKASSIAMTADAWHTLSDTLTSLVVILGF
WISGRPKDEEHPFGHGRAEVIAAVVIATLLAVVGASFFRDSIRQLIERKNAAFSTLSLII
FSISVLVKEALARFSLWAGKKTQSQSLVADGW HHRSDALASLMIVVGA VVGKYVWWIDGV
LGIGVSALILYAA YDIAKSAFHALMGESAGAFLSGEIRRIAAETSPQLKDIHHIHVHRYG
DHLEITLHARMNGETNIQDAHNLSSSLERELKKELNADTTVHIEPEKHA*

>SPBIB_v1_90023|ID:27162107| putative DegT/DnrJ/EryC1/StrS aminotransferase family protein [Uncultured
spirochete bib]

MIRVFSSYITRKDMDLVLSRMVEDAVGPGDFNSRFAKAIKDQFGFEYAVALRSPYTAMQR
AFKICGLGQGSKVAISALAPSWHLAAVEDAGYVPIVLDVEEETLHPSKEAIESANPSTVL
LFDALGKMPPSSLLQSLGFPVIEDISQVSGNIAESTSSNTFA YFAVWGLENDSP IATGGG
ALLCARGKRDGQILRSMEE SLPSEL RMTDYNAA LGVSQLKSVSQMVERRKAIQEILSRQL
ARTRHAGLKIAESEATPIYAFAVFAEGSSKEIIEYAKKHGVQAE LAFSSSPAIMGDDAAA
CFPVARSIARCVLFPMHKLSNQQVDQIGKIVATLP*

>SPBIB_v1_90024|ID:27162108|ppnK| putative inorganic polyphosphate/ATP-NAD kinase [Uncultured spirochete
bib]

MQESKSALIFANLNKDDASNAALVIKKGLLERGWQADILGFRSSIGERPDFSRYALLVSL
GGDGTLLYAASFAAPLGLPILPINLGT LGFIAANKIDTWAATFDGWCSGSIEVSKRLMLR
VRAYRENELLYNGIALNDIVVSSEGNARMIRMCLYVNNDRFGHYRADGLIVSTPTGSTAY
NLAAGGPAVHPEISAIINPICPFTLASRPLVIPGKLPVEIVIDETRKSGALLTVDGHDM
TPLKKGDVAKIEKYEKHALLVPPGNAFFSALR TKLGWSGDNDA*

>SPBIB_v1_90025|ID:27162109|recN| DNA repair protein RecN [Uncultured spirochete bib]

MLEQLSVQNFAIIEQVDIDL SHGMTVFSGETGAGKSLIVDALGFLLGAKADNSIIREGAA
DCTVSGLFSIRDNPEVQRWLEERGISESESSILIRRTLKQNGRSLAWIQNRQVSRAELV
EFTQFLVDIHGQHEHQRLIDPATHIEMLDAYASLDQDLKAYQKIYQEW RDSVKTYQSLLE
EKAKRAQEMDYLEFVIKDIASAKPRAGEDIELAAEEKILSQHEKLF AAISEASSMAAGD
STDALHLLKRARADLETARAIDARLGPFADRLAAAYYELEDISESIAEYRSGLRFD PARL
EAIQNRLAELQRLKRKYGPELADVLRFRDRARSTLDTLAHADENALELEKRTKALKEKVL
SAAAEISEKRMAAAAATLSSSMEAIVRRLGMPDARCIVRVARIVDDRGSYRPGPF GFDEVE
FYIAPNPGEPDRPLSRIASGGELSRFALALKA VLA AHDVVDTLVFDEIDTGIGGQVGVAV

GEYLKQLSEYRQVLCVTHLATIAARADQQCKVMKYISEGRTSTEIRYLSDEREAEIARM
LSGSAESDVSRSHAAELLSKAQIQQ*

>SPBIB_v1_90026|ID:27162110|cdd| Cytidine deaminase [Uncultured spirochete bib]
MQPEYSSLFDLAEACEHSYAPYSKFRVGAALLCEDGSVITGVNVENRSYGLTICAERNA
IAAAITAGKKKFKALVIATPDADYPVSPCGACRQVISEFMPPSAPVVFGNSQNSYMTSSV
GELLPHDALHELSELD*

>SPBIB_v1_90027|ID:27162111| exported protein of unknown function [Uncultured spirochete bib]
MHHRNEMKKRRFHIFAFIVAAVLFVLLSVRGTKKQEISEAIFLFPSSALDPASISRQNP
SPSLISFLGDGYLYGIDSANNQLYAAQFSDRAAIDSSGWISYDRLATALQAFSLGSKPST
IAGYGYPWFKSSRRFLIRADQMGAEMHADGSIVWEIEFPMPITAIDATPTTLGIGFLDG
SIRFLGKKAENLYSEPHDSQQDSQHIRTVYGIALSGDGRSAAVLRGMSPQKIESYRRAGT
GFVKSSERELPSGAPLQATMCYAEDGSHVIAQGEQLIYNTKKNYVRKLANGAALGNVA
SGAFVQHFLVGLPTGGNTIAVLQVQSQNPTTKVLILKHGIIEREPEGAVSASAGK GALII
VFRDGV EIVKGWQQ*

>SPBIB_v1_90028|ID:27162112| exported protein of unknown function [Uncultured spirochete bib]
MKSTKLIACFLFSVAFLGPLGAIDFQVPAATDIAGFGTILATQGSSNAKELQTKPGFV
PRSDIALKTEYPEIKAPSSGTVIYSQRESPVASVFSFPLGGAVAILHPESYISLVSGLAL
DTVIFNQAGRQENSVKKGTSMGQAIGSGIYPERYFGLRFLDLKNSLWINPLFLASWLQD
RTAPVIQNVWLNENMRGNTPIELKTTAPKGYIECQQATYEVSVAAIDSIIPGSRFSFA
PYKIVIMLDGKTSIDTSFIAATCKSEGLSFLGNPAPSSKAILENGAYRVGRIPLQRGQHE
IEVQVSDYAGNQSILKASLMVN*

>SPBIB_v1_90029|ID:27162113| Pyridoxal phosphate enzyme, YggS family [Uncultured spirochete bib]
MPMNDSQIADNIARIQERILRAAERAGRAPQSIALMAVTKFHPAEAILDAYHAGIRLFG
NRVQEAQTKYPPLRDSL VGSR LHMIGTLQKNKINKALGIFDALEGIDSVEVLEAILARLS
SRTEPIELFFELHTGEESKAGFP SLD ELLRACDLLASFAAENREEGR LVVLRGLMTMAPF
TDERAIRHSF SMLAAAKAEVAQR FDFVHFTELSMGMSNDFEIAIEEGSTLVRIGTALFG
ERA*

>SPBIB_v1_90030|ID:27162114| membrane protein of unknown function [Uncultured spirochete bib]
MRWPLLRCIAFLVIVFFVGSFAFSAQDMQEVLPEDQTNPTQETIPQTEDTTGAF PQTEGG
QAEQTQAKPPAVTLPSFSYKTTKESMAGRALILSIGVFPFSYFYTGFLVDVTRFVSNNFD
TAYAPWPFKTQNSVALTNSEMWLKLGISAGLSIGFGILSAILK*

>SPBIB_v1_90031|ID:27162115|apt| Adenine phosphoribosyltransferase [Uncultured spirochete bib]
MANDSAIHEEDEGFNLDDAIRKVSDFPKPGILFYDITSILANPDAFQYCVDSMLKLYKDM
EIDAVAAIESRGFVFAAPFCYKRGIPLLLVRKKGKLPGKTISCSYELEYGSAILEMHVED
IQPGARFLIVDDLIATGGTINATCDMITRSGAVPVRAFSVVGLPFLNYGEKIKDIGVDTL
IEYFGE*

>SPBIB_v1_90032|ID:27162116|gpmI| putative 2,3-bisphosphoglycerate-independent phosphoglycerate mutase
[Uncultured spirochete bib]

MVAALKKNPQWKGRRGPLVLVIMDGVGYGEYKEGDAVQAADMLHFRKLEASCPVTKLKAH
GTA VGLP SDDDMGNSEVGHNAIGCGRVFAQGARLVNLSIETGAMFQGRVWRELVANVKNS
RGALHFIGLFS DGNVHSHIEHLKAMLIQAQKEGVQRARIHILLDGRDVGSQSALDYVIPF
EAFLAELRTKGV DYRIASGGGRQYITMDRYGANWKQVKRGWDCHVLGLGRRFSSAEAEIT
TYRKEIPGVIDQDVPEFVIADEKGPVGTIEDGDSVIFNFNRGDRAIEITA AFEQDNFDKF
DRVRRPKVYYAGMMQYDGLMVPKNYLVSPPAIDRTVGEYIAATGLKTLA ISETQKFGHV
TYFFNGNRSGKFSDELEDYVEIKSDRVPFEQRPWMKCAEIADYVLD AIGSGKYSFIRLNF
PNGDMVGHTGVFQAVVCGLEGMDLQIGRIKEAVEKAGGILILTADHGNSDDMF EHDKKTG
KVTL DANGE PKVKTSHSLNPVPCVIYDPEYKGEYKAALRSGLGISSLAATCIELLYEPP
ADYDPSVLEM*

>SPBIB_v1_90033|ID:27162117| putative Adenylyl cyclase CyaB [Uncultured spirochete bib]
MDQPDRAHMVEIELKARIADRKA VEAQLASFMRFAGDIDKRDEYWEVSGWNPLAPAAFRF
RVRAEPARTTITFKEKTFDGDIEINRESEFSVDNEAVFRKFMEKLEARFVYTKRKIGTRW
ESA EGLVAE VVEVEPLGLFLEVECVCEQLDSEALDEAKCRLYEVIDRCGIPRVNLEPRPY
SQMLGY*

>SPBIB_v1_90034|ID:27162118| exported protein of unknown function [Uncultured spirochete bib]

MIPFAKKLISSFKFRIFLFLVLAAIMPAFLLSFLQLHYERNRELSEMRYTTHQIVELIAQQ
ESDVFQDTRQLEAIVAAMPEIRNAAYKEIAIYLRKLASAFHRYRNFLLDAKGTILANAF
PADDAKTDDKIPALAEIAASKSPVMSGFHIDPDDHSPSVYFGYPLIDRSGYVSGALAAVI
DLSYLNVEQAIRSKLQPEAVLTKIDREGIVLIREPDPEAYIGKKYQEQAVLMQIGTQQD
GVLLQTDQGGQKSVFAFSRMPSKIYASDIYVIVSIPEHSFAFAGINQRFYRELLILGIGMI
LISLLTMLS LDPFLMHDVQELIAAAKKMQKGLTARARHFKYSSIELQQLVRAFNTMADS
MQKSQQQLLDSYEATLEGWVRILDIRDNETS GHSKRVTDLALQFAREAHVKEDEMPNIRR
GALSRS AVQIRQRP*

>SPBIB_v1_90035|ID:27162119| protein of unknown function [Uncultured spirochete bib]
LKLEMSFFAKGIIIVSRASEPDYTICESNYKESLVSDYQIKPKGALNDSRRKKTEVLQMYD
PYYKEGLGTPIDAPAFPRKCVRVSSCGTLQVKKRAGGTCAR*

>SPBIB_v1_90036|ID:27162120| conserved protein of unknown function [Uncultured spirochete bib]
VGLVYSEPPQRRAAAYLREYSRKYDTVEIDSWFYKISGPEEVADYLAQVPPAFRFTCKVPQ
ELTLTHLRGNAGASMGVNPNSL*

>SPBIB_v1_90037|ID:27162121| exported protein of unknown function [Uncultured spirochete bib]
MRKAFFLILAVLLIFSSCNLINPVKKPSDIDTVAEINSSDIQSSGATNVPTTESEIVAI
SGIGSNASSDQVIQDLGNSFAEKLSAAKILKAAKSLSSSFQQQIDKIQQDFDNFPTTKK
IDETISLSGENIGTYFALTGTGEAAFSLNAVTTDGNPIDMQGASNLSSLAGEGTLKIAINP
TSALSSLQADASAIKDFKFRNLNAGGSASISTKAGAGMERIPDKITLDYAESMAIAFSARV
DTNGGKFSFKIDSKYSGTIDYSNIQSATDPEEVLNNTLVPSITITVKVYDDSGNVTFNKTY
TSIEAFVAAFTPAT*

>SPBIB_v1_90038|ID:27162122| exported protein of unknown function [Uncultured spirochete bib]
MKKYALVALFAVAVFGMAFAATTQSGPASISGLAAEVFSLTVPGTYMGTIANGSTAETWN
LGIITVNSNVRNWQLSVSSANSGLVNTADNTEKIAYTITVAYLDITDWSLSRVAVSPPQ
PRTSKTGNIPVQLKFGPSADYYQAGTYGDTLTVTISHN*

>SPBIB_v1_90039|ID:27162123| conserved protein of unknown function [Uncultured spirochete bib]
MRTNIVIDSLMNKAKSISGYKTKKQTIIEALKLLIAQKEQSEIRKLRGKLNWEGNLEEM
RLDR*

>SPBIB_v1_90040|ID:27162124|vapC| Ribonuclease VapC [Uncultured spirochete bib]
MIIVDTSVWIDYVRGIDTPQTDLLDYELLHDRVATGDLIIVEFLQGFREEKDIIKIAKQIM
DRLEYYDFLGKEMAIISAENYRKLKRGHVTVRKIDVIIGTFCLEKGFELLHNDRDFDPM
EQYLGLKVKR*

>SPBIB_v1_90041|ID:27162125| protein of unknown function [Uncultured spirochete bib]
LKDEKAPEQAPS NR MNPKVDAFLRNAKNWQEELAKLRTIVLDCGLTEGSIVITSNRPPED
WFSIFPDQIVGGAIMDRLVSGAVKLIVTSGRSFRKEGTLRNQISEPAA*

>SPBIB_v1_90042|ID:27162126| exported protein of unknown function [Uncultured spirochete bib]
MITYKTKRIVSLLILTAIFLITFGCSEPIVYRTILLYLTSNYGLFSTGEKTD AKIYSISD
GYITTLKPGDMANYTTYVGDRIIAIYSKKVNNTWVDVSKTMIVGEDSSVFYLD*

>SPBIB_v1_90043|ID:27162127| transposase (fragment) [Uncultured spirochete bib]
MYFKKDRAIHLVAGMTDMRKQINGLAQIANEKKADRMFSGDYFVFLGKTRKVMKVLYWDR
TGFLWHKRLEEETYAAPVKVGLNFPVLV*

>SPBIB_v1_90044|ID:27162128| protein of unknown function [Uncultured spirochete bib]
MKYRKAERGSMKYPLELKQKVLKDYFEGKDGIRGLERTYGIQHQLILSWIKTCQQPSYRM
RQKVPKEAALHLNEPPVFNDPRKELEYLRAENAYLREMLMLSGVRKNGRKKKALPPSND
SAHEATP*

>SPBIB_v1_90045|ID:27162129| transposase [Uncultured spirochete bib]
VKLLCSIAQVSRSGYYRYLLITQKPNKDARLAEKVREVQEA VCYSYGAKRMAHVLSESEQ
VPINHKRIARIMQKYL LGARILRRHPEYWYRQRHKVRLSDRQCAPNILNRDFLAPCPLK
KLVTDTVWISCADGTYLSAVMDL FNRQIISYTL SRRNTTATALSPILELVGSYNLQGT
VHSDRGPAYRSEYQALLRKHGIVTSYSRAGNCWDNALMECFHGMKCELGFVTGSQKKQ
RVAQVSQKIHEYL VFYNKTRIQKNL GWVSPMGYKMLYTSSIESNNVST*

>SPBIB_v1_90046|ID:27162130| protein of unknown function [Uncultured spirochete bib]
MGLVQTKTGKLSPTVTVDRLAHHGHILLFEGENYCMKHALMRQKDQIKLPMA*

>SPBIB_v1_90047|ID:27162131| protein of unknown function [Uncultured spirochete bib]

MPRRIAMIELREIILQLRRGCGIKHIRTGHHRTVIRALKAI AEAKDWLNPQKPPPDEA
AVHAAWEATITSKKPHQLDGIQDQLLRSHHEGISFVVMHRLIAGQVSCSESTLRRYIQKM
CPPTQ*

>SPBIB_v1_90048|ID:27162132| transposase [Uncultured spirochete bib]
VIDRLYIPGDCMDVDFWLLGLVDDEQDGRMRKAWVFSARLRSRKA YRTIVFSQHQDSFL
ACHIEAFEWFGGVPATVVLNKLKAGIVKASWEDPLVTRAYHALAEQYGFTISACRPSTPK
HKGGVENDMHYLRKRSFWPEIRAREAQKGHAVPRLAKVVAYLSEWNATVSEVRLVAKVGKT
VTALFAEEKPYLQPLPSTRWEPERWAFATVQADWQIQFDKAFYSVPYRFIGQRLVQATR
TTVRIFHESDEIAVHERAEHHWQHRVVVDHGGPPQAAEYLATSTKGLLMAAETIGPATGRF
AKAIYADRAVDSIRPLWALVHLSERYPCDAIEQQAERLLAYGLASYTSLKNELKFAKEKA
TRFSPSFRFARDPAYRDAAGVCHG*

>SPBIB_v1_90049|ID:27162133| conserved protein of unknown function [Uncultured spirochete bib]
MADLAVLKPKLTRLKLSGMLDSLQQRFD EAVAQKWSFSDFLEHLLQDEVERRDSKQLAYR
LTKSGLDPHKT FESFDFSNPKICEPAIREIASCQFLNDKENVFFVGPSGVGKSHLAQAI
GHEAVRRGHEVLFRRRTAPLFRWIAAGHGDGYSRRLKSVIAVPLLIFDDFGLQTLSD EQQ
NDLYEVL CERYESASTIITSNRDFGEWPSVFSNPLMSSAAMDRLVHHAVK FVIEGKSYRV
ESFSSRQRLTAGN*

>SPBIB_v1_90050|ID:27162134| protein of unknown function [Uncultured spirochete bib]
MNSSILFLSFIIIIIVFVILLLVKNRNRKKQYVIPSSNISHTREAEDLQLDPASSYSAS
TKTIVKQDIPELIEIKNSPSPVDSQMIDESSINDNKT MENLVNPRLESSIYFTSIYFIRN
DSQKTRKHTLEPIKRGGRPRDPNRDPKYL SLRQTLNYIAKPEIVCWEK GSEWKVGVEIPD
EILANQDISILQNGIYLDRDSNIDNCWNLA AISGEIIIQWSNNEINN KIVITNENTYLIF
RLVGEDQKRGYLVSNPSMGSYLIIAPEIWEYSNISTVNRIALPEPSSLVGYLAHFCEFKA
DKENSVAFKTS ENKIITIKPVKPKFELVGN SLEDSS ENIGPLFGDSMPQIKAITKNTWND
ISVIII GEEGRAKKRWRKEFIPDLSQNPQYIPDSFYEK GSGWYYVRIYNKENELVESMNF
RYIELLKKINIPKHLHPAQNDGYQTAKIELIHSPGFVIKSANRRDNIQIEQESSEKTIK
IPADPDYDNSHWLVEIDNNKFIPLTISLKRIWWALGEENKTPLEWIDKAILLQRSDFTAL
SNKALWIRCPQDFKSKSISISMGENSRDRHYKISDSLAMIPIREFSDVTEMLQNNLEIF
ASLPQDNIRIKICEVLRKLQCKFCDFTS LNEQDIIAHAIANHL DQMFIPLN YDELKANDP
NLPHRIYQCIYCGFYVTSDDIENPTSKIIHHINNDCKKAPRNDGPPRTDFKIISNVDEIR
ENIIAELPNIEKCYFCGKTFERATDNKKKTHLKECHMSLLYKLL*

>SPBIB_v1_90051|ID:27162135| IstB domain protein ATP-binding protein [Uncultured spirochete bib]
MRRPRTNRTLLREEISQLLKKMAFSQTA VQLCEE EGTAPMEQFLNLVLQSEMASREQARR
ARFLREAAFPVYKTLEGDFDFTSVSLPPALS RDELLSMQFVAEKKNLV MYGPVGTGKTHLA
TALGVEACNRSMRTKFFTAELVVRLSEAHKEGMLDKLLKAVLRADLLIIDEWGYVPVDH
QGAQLLFRVIADSYEQRS LILTTNLEFSK WGSIFTDDQMAAAMIDRLAHHGHILLFEGES
YRMKHALMRQKDQIKLPMA*

>SPBIB_v1_90052|ID:27162136| Integrase catalytic region [Uncultured spirochete bib]
MNQIDQIKELQRQGYGPGEIASRLRIDRKT VRTYMKREDFNESLEAHTTWPSKLD RWKPL
IDEWLAEDQRMRFKQRHTAKRIHQRLC GEHAGEYDCSYPLVQR YVKAKKVAQRQMDGFLE
LVWAPGEAQADFGAEVMEAGVRKTIKYL TLSFPYSNAGFTQVFEGETAECVAQGLQDIF
GYLGGVPRRIVFDNATGVGRKIQQHVALNQLFLRFKCHYGFVSFCNP NAGHEKGNVENK
IGYTRRNFFVPLPVVDRLVDLNMQLFKKALQDHARKHYKKGQTIAALFAEEQTALSPLPA
RPFNVERYERLRTDGYGKFCLDGKHWYSSAPEYASGEVTVGIKAREIVVYGP DGEVRGEH
RRIYGEERSDSIDWHTSIAALMHKPSAWQNSHFRAATSPSVRQALDALPRDRLRDVLKGL
VQSSERFGFEVALASLEEAVSVARLDSYSVHAVAARHVYDGLYGIPAAGPDLGVYDRAFI
GEKEHTP*

>SPBIB_v1_90053|ID:27162137| protein of unknown function [Uncultured spirochete bib]
VLADIPLPDEILYGKSYMALMDRIQ*

>SPBIB_v1_90054|ID:27162138| protein of unknown function [Uncultured spirochete bib]
VLA YDGSSMKRIDAAGILGMAMSGTTATLLARRWESALLVNVDNDTLRRLMSNEEAMRAL
MGIVSVNFTPLGKNRKRKFHTV GQKSV*

>SPBIB_v1_90055|ID:27162139| transposase [Uncultured spirochete bib]
METALSELPDDVESLKKLVVEKARRAHELEATSKQLKEENAALQLKLEVTDKYETLQQK

FFGSSSEKRRKKEDDNPQALLFNEAETYAEAPPKPEKSIPVKSHERKVRGRKPLPANLER
REFVYELSEAERTCPCSGAVRPEIGQEVREELEFIPARFVVNAHILKKYGPCQCASCSDP
IVQAEKPAKLIPGSSFSNTTIAFFLTSKFVDSQPFYRMEGILSRWGIDTSRASLCKVAVS
AGRAIGELLDELRKDLAASPVLQMDVTVVQVLHEKNRSAQAKSYMWVARGYAEGKPVVFF
HYHPSRAKEIVQKFLHGYHGFVQTDGYAGYNEVGFSPGITHVGCLAHVRRKFFAEQQGS
TEASAFLERIAELYHAEKLVRRKFEEGVLTTEEFLAARTKEQGPRLSEMKAWLIKQGGQ
PPSLSFGKAVHYALGQWDRIEKYLQHELLTPDNNAVENAIRPFVIGRKNWLFSTPLGAH
ASAGIYSMIETAKANGHEPYKYLCYLFNALPKARSLEEKRALLPYKLAPNSY*
>SPBIB_v1_90056|ID:27162140| conserved protein of unknown function [Uncultured spirochete bib]
MYFKKDRAIHLVAGVTDMRKQINGLAQIANEKKSDRVFSGDYFIFLGKTHKVMKVLYWDR
TGFCLWVKRLEEETFPWTRKQKGIITLKREKLKLLKIDIFREHTEKRYVSVL*
>SPBIB_v1_90057|ID:27162141| transposase [Uncultured spirochete bib]
METALSELPDDVESLKKLVVEKARRAHELEATSKQLKEENAALQLKLEVTDKYETLQQK
FFGSSSEKRRKKEDDNPQALLFNEAETYAEAPPKPEKSIPVKSHERKVRGRKPLPANLER
REFVYELSEAERTCPCSGAVRPEIGQEVREELEFIPARFVVNAHILKKYGPCQCASCSDP
IVQAEKPAKLIPGSSFSNTTIAFFLTSKFVDSQPFYRMEGILSRWGIDTSRASLCKVAVS
AGRAIGELLDELRKDLAASPVLQMDVTVVQVLHEKNRSAQAKSYMWVARGYAEGKPVVFF
HYHPSRAKEIVQKFLHGYHGFVQTDGYAGYNEVGFSPGITHVGCLAHVRRKFFAEQQGS
TEASAFLERIAELYHAEKLVRRKFEEGVLTTEEFLAARTKEQGPRLSEMKAWLIKQGGQ
PPSLSFGKAVHYALGQWDRIEKYLQHELLTPDNNAVENAIRPFVIGRKNWLFSTPLGAH
ASAGIYSMIETAKANGHEPYKYLCYLFNALPKARSLEEKRALLPYKLAPNSY*
>SPBIB_v1_90058|ID:27162142| conserved protein of unknown function [Uncultured spirochete bib]
MYFKKDRAIHLVAGVTDMRKQINGLAQIANEKKSDRVFSGDYFIFLGKTHKVMKVLYWDR
TGFCLWVKRLEEETFPWTRKQKGIITLKREKLKLLKIDIFREHTEKRYVSVL*
>SPBIB_v1_90059|ID:27162143| protein of unknown function [Uncultured spirochete bib]
LRLGIEGFRSLNQDIETIINKFEAVKCLKREANDRQLAKEEKLVLSEEEKEYKSKRKQI
QEKLIKFAIRIPAFMYLTDYRERPLKDVITQLELGLFKKVTGLTVKDFELLVSLGFFNNV
SRSV*
>SPBIB_v1_90060|ID:27162144| protein of unknown function [Uncultured spirochete bib]
VPDATLRKLTGHLTPAMTDHYDHTTIDDLRLLAKAQDEKLLGTIEATKEE*
>SPBIB_v1_90061|ID:27162145| IstB domain protein ATP-binding protein [Uncultured spirochete bib]
MIRTPQERERTRITIASMSRKLMLSSRVVELCESEATPRQEEFLLKVLSEEIDRRERGKK
ARLLNRAGFPVFKSFEDYDFSEIRFPPALSKEELLRADFIPEKKNLVLYGGVGTGKTHMA
IALGIAACEKGLSVRFLTVTELVLKLTEAYKAGTLERLIRDLDLQDLILLDEWGYVPVDR
EGSQLLFRIIADSYESKSLILTTNLEFSKWGGIFTDEQMAAAMIDRLVHHGHLLEFEAKS
YRMTHALMRQPGPGTAKPKTTVEAGSRLGEGGA*
>SPBIB_v1_90062|ID:27162146| Integrase catalytic region [Uncultured spirochete bib]
VINMPQIQGIREQYREGSSVAELARIYGVDPKTVRKYLKQDDFSPKPEKMTKESILDPY
KPLIDSWLLEDQGRWHKQRHTAKRIHDLISEVAGYACSYNTVQRYVKRVLQEQRVTRAS
MELVWHPGESQADFGADFLERGTMRVKKYLTLSFPYSNDSFTQIFGGETAECVCQGLKD
IFAYIGGVPLVDFDNATGVGRRIGEIIHEAELFSRMRAHYGFSVRFNPNESGHEKGNVE
AKIGYTRRNLFVPEPAFDDIEDYNRTLSSLHASKAQESXYKLLPIKDLFEEDTRALLPL
PRTAFDPVRYDYLDKADGYGKVRIDSRHYSTSPYAGQEVLVAIRAHSIDILDDHKRLVV
RHSRVYGERSDSSDYRTSLAVLMNPNPAGWKNNGIRELIPDPLKSLMDRQQRMQLHATLK
TMHTLSSEYGFIAVQALEEGVQSRSTSFHDAAILAARIAGYGLNMAPERGQDLHVYDEF
LEGVQV*
>SPBIB_v1_90063|ID:27162147| protein of unknown function [Uncultured spirochete bib]
VLELGASNPHGSEGFLIYGANPGARLDRAAIERAFDKALIKPSLEGRYDTSSKEEKESVF
NIS*
>SPBIB_v1_90064|ID:27162148| protein of unknown function [Uncultured spirochete bib]
MKRQKQEKIDFRVFSRTVWGTKKKYIRFLFCGKAFLTRATDAPTAAGAGIAAKIMATED
LEAVAKAKEQKKVIKLDEIDRLAELPVIEFLRFLWNPSRSPYLQDMAAAGRPLSGSYIRD
NARNANTYWAIAPLDSLPMQDLKLDKHSRIRSMRQKGSRYTISAAIDCIRTPCSWLLS
RGVMEKIDFSAIVLPKAAVKERGILTNEELDRIVHLEVVGWQDSNLKTHISVRPRNRM

GGEKNEGMAPVGWREKLIILLLAYTGARVGEARALMWKNVDLEKGLIRIEINYTDTDGLK
EPKAKSRRTVPIAATLEPFLLEARRVAQEIGTANPDGFVLLNAADPIRPIAMTTVKRAWE
RVLRAIGISYEEQKARNLVIHGLRHL YATRLVDAGLTPIEAAKLTGHRVIATLGRYSHT
QPETLKKSSREILDGIKN*

>SPBIB_v1_90065|ID:27162149| putative Adenosine kinase [Uncultured spirochete bib]
VKAESRGFLFGIGHAMCDVSARLDDEGWAAFEKVFVGFSAASCRPHHIDIEAALKALAFIEK
LAGEGHADLVYSAGGSALNAVRAASMLGAKASFAGCIGADALGDIIVNDIEARGVRSLE
RREGHTGVFCTVRHGDSEDSKPEAPPIILASPAGARKIREMPLASFIPEGSGVVHAEG
LLADREGLLEEYVFSKAKGLAVSIDLVSAEMARRYRAPILNLIERFVDYVFCTKAEFEA
LGADIARMRRDIAWIVKADKEGVDCYFQGGSVHEEAPRGPVVDLGGAGDAFAGAFLYGRT
LGWPLEACIKLGSAAAACALRAKGSVPDAVCMRSLQA*

>SPBIB_v1_90066|ID:27162150| protein of unknown function [Uncultured spirochete bib]
MLNRFCVYMAWHNYAKPFRIKANRKARMTHAEAAGIPREL V ATGRAWMFRERAFSLRSL
DLLDQKLWKRAFSTPLKTSAEYLPRYALA*

>SPBIB_v1_90067|ID:27162151| protein of unknown function [Uncultured spirochete bib]
MGHTRLSVRFDPGLCVVVPGHVDAEPIEHIGDIAGKAXX

>SPBIB_v1_100001|ID:27162152| putative Radical SAM domain protein [Uncultured spirochete bib]
MMHEGKIVTAAVAADMANPIFELASAKILIVRLSPFRDIEVSYSHL VLFDEARRALPDAF
IDFAFLPTAPDRLLNAKCGAWFFGRASGRSPSEFDIILVSCSFTLELVNLPWLFAQSGI
PTSRAERLRNNTIPFVFLGGSSAVTSGALLQIREGLPVDSLVD AIFFGEGEGRIAEIVRT
ASEGQKQNAAKQVILSEIAAQVKGFWPCSPWKTTERSICEDRPAVLTSPLVLNGEYAGHA
KLAITAGCTGHCSFCLEGWDRRPFREKPFLELSNAASALKKTTGASDVELFSYNFMHHE
ILNIVPVMGRYFMHVSLMSQRIDLLARIPHLLAAEFAAGKRSFTLGIEGISARMRQYYHK
GISDEQIADAISAILEGNARELKLFFILSGYEKPSDFDELHTLFD AIGRFKEQTRASTRI
IISAGYLVRLPFTPLQFAPLACDRDRLERISATIESLCNERKLEFRLAASFEDYWTDQLL
SIAGPQAHDWLCACAESGFVYDTHISRQAAASLDAFLRRKKEFSALLDEKTS DYRPCFSF
LESDAHWNLLRAHYERAASYLEFSHAPKNQPKLGKRRTQSALQSTSTHSALSIAAEKTQA
VSTIAALMEAKSHFQPLVVR IREDPALAFATLAYESSWLIRAISTLVPNAERALFECRQI
VPGNAWDKVFSTRAGIEYGLSGEKWFALYGPDIRTLQKIVDAASRKIKASLQSGQSTAALP
SAYLLDIEPQDPEITPEECVLSFSLPQEYNSFVGRIIEIWLEKQDIHFTGKKIENGYEYL
VAHSSLNKRILLNAEYHTSSSGSFVTMRIGKRADMLLLSDYLHKEASDH E LIFNIEYWE*

>SPBIB_v1_100002|ID:27162153| putative DEAD/DEAH box helicase domain protein [Uncultured spirochete bib]
MEAFISLGVDIRLTKALDAFGFVAPSEVQKRAIPVLAKGQDLIMQSETGTGKTFAYLLPI
FSRILGSAARLSGLDWPSALIICPTQELAVQVARQAALLAQSASVPIKSLALLGGTHFSH
QKEDLKAHPHIITGTPGRLADLVRMRFFDISCIEFLVDEADRLFSKEYIEPVEYLLSKT
PASCVRALASATIPEKTRKKAYPWMHNPVVVDLSGEGILTDAIEHWVFYAEHRKKIDLLK
RIIAAVRPQRCLIFASD TYRVQRATERLQASGLKCHSILSRMEKQSRHSAIDQFRQGIIP
FLVTTDLGARGLDISDISHVISLDLPEDSNAYVHRAGRTGRAGKKGISILVADGLELERA
SRAAVKYGFVFRTKWLESGQVIEPEVEEFFERVQTMEDERSRRLKS*

>SPBIB_v1_100003|ID:27162154|rnz| Ribonuclease Z [Uncultured spirochete bib]
MNLEAFVLGSGGMMPLPYRQLTSM LVRREGELFLFDAGEGTQVSIRRLNLRWKKITAI
SHMHADHVTGLPGILMLSSQVDREPLYIFGPPRLAEYIEQNRRLDMYINYDIVVREIS
DREVWQGEDYSIRAFPLKHTKMCFGYALEESPRPGIFYPDKAMSQGVPRGPLWSELQSG
KTVTLSDGREVRPSEVMGEP RSGRKFYSYVTDLSYFPEIAKEVSNSDLFICEGMFEHGLVD
SAIEKRHMTARQAAQIAQDAGNVKQLGLIHYSRYADRELKVLLEEAREVFPNTVLTKDR
MRFPID*

>SPBIB_v1_100004|ID:27162155| exported protein of unknown function [Uncultured spirochete bib]
MKQIFRIILFVATLVLIAASVMYVAMKIGEIRLNGEQSASAEY TILRNAVAPITSEQELG
DQFIRDRLKSLYNASAHLLAVQVLDNRNGLVLWKMPDESAYFGSPATTPGSVFRAPGLSTV
IYMTPLPDGMKMMALYSILSQRDIANTLLLPIALAVWIVLLVILQFVLKEKPAAYAALA
AAPPVAEPQAQSEAPPEGETESASQAEMPAPPSEIAQPDEEIIAENEEIPATKEKPSQEE
APHYPEPEEQGVSEEA E VPEMMPEPELQPEPEEPIRPRIAVQEPEYDLEHAEFVSPPP
SQQEEKILHDFPSIASGALERALESQLQTRQDEEISLMLIHCVLAGEGDPSALALGVT
IREYFASDTLVFELAKGCHAAILPGVDTGSCLKLAVDLDDVLT TTTASLYKDLSAEPFFYF

GISARYGRTVSPARLYKEAYAALQKARESESRLAFKPVNQE*

>SPBIB_v1_100005|ID:27162156| conserved protein of unknown function [Uncultured spirochete bib]
MSVGMKIRKRLLPAGWYPENADEIRSLVAEWTKLQKSLSAYAAVAPHAGWYFSGDLAARA
VWSLRECDTVVVLGGHLGYGDPVLYASEDSFDCTVRIARNDTVLLDAVKKELIDVGINEF
ALDAGMDNSVEIILPLASLRFPEAKIVWLRVPPDFKARELGSALARAASSCGRSLSVIAS
TDLTHYGPNYGFMPHGVGESACDWVRNENDRGLINAALSMDAERVLSHARERFSACSAGA
VAAAISYSLDSGAKRGILIGHKLSYDVHPDRSFVGYAGIAYVK*

>SPBIB_v1_100006|ID:27162157|murD| UDP-N-acetylmuramoylalanine--D-glutamate ligase [Uncultured spirochete bib]

MSITEDITEFRSKKVTIMGLGLHGGSISSARFFARAGAHVTVTDLRDQNTLAPAIEQLQG
LDIRFVLGAHREQDFSDADIVIKNPAVRRDSPYLKVAKRIETDISIFLRYQSPLIAVTG
SKGKSTVASAIWHVLSQAGKTALLGGNITVSPLDFDKTAPDVPVLELSSWQLGDLRGM
GLLKPQIAVLTTLIPDHLNYYGSMDAYVADKRVIIYQAQDETCYTICNADQNWGRSFAQET
RATVLWYSEKPLEEAIGAGARGGWLALDILSQTKEKNAEAGAPHSGHVLDPKEHPELYAG
YGTFTGTDYSHELLVPQHIVVPLGHQKKNLLAAAVALCAFGLSAKEIAPALGSFPGVPHRL
EYVAEIDGVRWYNDSTATIPDAAIAAINSFSFCPVVLIAGGSDKSSDFSFAFAEKARSLKDI
ILLAGSGTDRIIALLEKEKISYKGPYNSMRDAVDSAAQSAARSDVVLLSPGCASFGLFLH
EFERGDLFKKEVFEISARAHSARLSPAQEQSEQSK*

>SPBIB_v1_100007|ID:27162158| Pyruvate/2-oxoglutarate dehydrogenase complex, dihydrolipoamide dehydrogenase component [Uncultured spirochete bib]

MNRIENHPILQSRKDRRQIRFYFDGDEIAGFEQEPVASALIASGHHVFSHHHKDGAPQGL
FCANGQCSQCTMLIDGIPKKSCMTPLSEGMDVRTLYGLPHLPAEDEPLVQAERRSVRTDI
FIIGAGPAGLAAATELGRMGYQVLVADDKAQAGGKLVLQTHKFFGSEADCYAGTRGIDIA
HILEDEAKRHPSVTILTNPVVGIIYKDRKAGIYLNYESYLLVEFTALVVAAGAREKALHF
PGWDLPGVIGAGAFQTLVNRDLVKA YRKILIGSGNVGLIAAYHALQAGITVAGIIEVAG
RVNGYQVHADKIRRMGVPISLNSTILKAERDKVERAIVAAVDEKQPVAGTARAYEVDA
VLIAAGLSPCNEFLEQARRYGIMAVAAGDAAEIAEASSAMYGGKTAAMD LASMLGKKIIV
NPEWETTRKVLASRPGDSYERSPVVPGSEWRPVFFCSEEIPCNPATVCPVGAIQLRPMH
GNIMDLPYFEGNRCTGCGSCVAVCPGLAITLVRRIPGEKALADKASGDKASGDRAQVVLP
WEFNADFDIGTELVDLVDQKGFVERAPVVSRRVSSRNTWLLTFHV DIAHASKIAGIRVQ
PQEASAFQSAEIPADGAADTVLCRCERVTLGEIVEFIRNNKVRDINQLKSLRVGMGACGG
KTCSQLVGKAFRLAGTDPAEVEPATQRPLFMEMPMGA AVNEGLHKLGGKEAGARGAP*

>SPBIB_v1_100008|ID:27162159| putative oxidoreductase [Uncultured spirochete bib]

MKHFDVVIVGAGSVGVPLAWQLAARGLKVAVIDQEASWGRGQNRAAIGGVRATHSDPAKI
RICLESIEIFSSLKSKYGLDVEWQPGGYLYVAYDEATEMQFRSLLKKQKTAGLEIDWISP
EKIARLAPGIRTEGLLGGTFSPYDGYASPLMAATAFHKLALDAGVLEFFNRRVESIRKAD
NTIISLTAGQEEFSAEFFVNAAGAEAADIAKIAGFDIPVFPDCHEAGVTEPVERFMQPMI
VDIRSDAESGNYYFYQARTGQVVFCTIPRPQIWRDKDSTSTFLPICVRRMIELYPRLRN
LRVRRRTWRGMYPMPDGLPIIGYPDMAINFLQAVGMCGQGFMMGPGLGHILAQTIMAGGS
HANPAGATEYNFIFDEFINSRFDHAELLK*

>SPBIB_v1_100009|ID:27162160| Rrf2 family protein [Uncultured spirochete bib]

MFQVPTKTQYAIRALVHLVHAGSASVATIAEAEHIPAKYLEAILSQKLSAGLVISDRGRS
GGYRLARAASIIQMSEVVQATEGEIRPVECVDNATICVVSEGCLPRRFWLGLKKTVDEYL
ASVTLAEIAEPGLSDSLSAFRKRPPAPARMNRSN*

>SPBIB_v1_100010|ID:27162161|iscS| cysteine desulfurase (tRNA sulfurtransferase), PLP-dependent [Uncultured spirochete bib]

MNARYVYMDYNATTPLRPEVRDLMVRTLDVYGNASSMHELGRVARAEIEEARAHAHVAALIG
AQNPSRVYFTSGGSESNTVFNTMFLIGNQKRRKIITTSIEHPCVLNSAAHLRDEGFPV
VFLPVD RDGRVMDAYCAELSPDVLLVSVMAANNEIGTIEDIKTIKLAKEQGALVHTDA
TQAAGKIPVSVEDWGV DYLTLSCHKIYGPKGIGALYVRERAPIEPLIRGGHQEDGVRAGT
YNNLGIMGFGEAARLARAELAEYGQNVSRRLRAMLRGLILRVPNVRINGHPTEVLPNTLN
VSFPGAEGESILLSLDLEGIEVSTGSACASGSLDPSHVLM AIGLGP ELAHG SIRFSLGKY
TTEDDVRYVADKLPIIARLRMSTVPAEEIIGEIRTEGAHPEGAK*

>SPBIB_v1_100011|ID:27162162| IscU protein [Uncultured spirochete bib]

MDAFQWLYSDIVKDHFTNPRNVFDPDKDKDFKPD AEGMVGNIKCGDQMMFMLKIQNIIA
DVRWKTYGCASAIASSTMLSETIRGMNIRDAYHIKPADIASRLGGLPENKIHCSVLGDKA
LRAAIDVYLEQHGRAGEFKGEDAQIICKCLNITDKDIEEA VRQGAHDWHSLQEATKIGTV
CGSCKTKAEELLHEFVHIYS*

>SPBIB_v1_100012|ID:27162163| Endonuclease III family protein [Uncultured spirochete bib]
MNLSTAEDIAGARTFILEKGREHYRDL PWRKTSSP WAILVSEVMLQQTQVPRVSKIFP
LWMERFPVPSALAAVPLSEVLRAW SGLGYNRRALNLQKAARILALEYKDAVPPSEEALRS
LPGVGVYTARAVLAFANIASVFLETNIRT VFIRHFSAGLSRET DGTVSDRDLEKIGQRL
LDRQNPRAWYSALMDYGAWLKQNEGNFGKQAKKYRPQPPFN GSMRQIRGAILKSLETS
LPVDIVAERLLTDPERIYSCALQLAQEGFLEIQTTESAEGPESARWPESAAADSILLNLP

*

>SPBIB_v1_100013|ID:27162164| TRAP dicarboxylate transporter, DctP subunit [Uncultured spirochete bib]
MKRTVYTVLALMLLLVPSAVFGQITLKL AHLNPQQPYDVASAAMA AVFKSEVESKSNQI
KVELYPNGVLGKEAETLVQVKSGVVQSFIS SSGMAQFYPLIDVTNMPFAFSSYNVGYKV
YDGDGFKELAADIEKKAGFHVLF GFGESGGFFAITNSKKPIKSPADMKGIKLRTMALPLHQ
AIVKALGASPTTIAWAEVYTSLQTG VVDGQMNPIIIAMAKLQEVQKYITLTNHL YAPYV
WVINPKFYNSLSDELKNVDDAARTAI VAGRGLSRIIDSTEKGLPTLAEKLQVYVPTKAE
MKLFRDATVPAAREFMLSQYKDEGKI WVDKFFDAIDKAEKELGY*

>SPBIB_v1_100014|ID:27162165| membrane protein of unknown function [Uncultured spirochete bib]
MENEKPVSRSVRRISALIDKIVSFLCAI VFGAMTIDVLLGVFFRYVLNSPLNFTEELARY
LMIWGASLAISLGV SAGEHVGLTVILDSMKKPNARKALAMLVNFFVFAFLVFM SVYSAGA
TIEAKSQMTQALGISMVLPKLA VPLAMILATIQQIILVSIMILADPNGR LTTSTTG YIDI*

>SPBIB_v1_100015|ID:27162166| TRAP dicarboxylate transporter, DctM subunit [Uncultured spirochete bib]
MIVSVLIVFFAMLVIGVPIGFTLGIAGV VGLLLMGSGVGLLSMAPLQFFTGLDMFTLMAM
PFFILAGELMNKAGITRRLVHFANVL VGHWRGGLAHANILASVFFAGMTGAAVSDTAAIG
TMLIPAMVEDGYD VDFSAAVTAASSIIGPTIPPSNMMVIY GSLMNVSIAGLFAAGFMPGF
LLAALLMVMSAYLSFKRGYPKGPKTTFKEKLIATKDAIIPLLMPIIILGGILSGLFTPTE
AASVAVFYALIIGFFVLKSIKLRDIAPML VKTARVTGTVFLIIGTASILSWVLAINQVPQ
AIAAFLISTTRDPKLVMLLILLMLVVG MFMDIAAALIILGPILHPIAVSLGYQPIHFGI
IMVLSLNIALMTPPVGACLFVAC SISKISLAKLSKAIFPFIIMEVIALFIVAYIPEISLF
LPRLLG FVK*

>SPBIB_v1_100016|ID:27162167| D-alanyl-D-alanine carboxypeptidase [Uncultured spirochete bib]
MKYFRSKRLDGVRKFRQFIAFLFFFELFA IANASALSLEYSQFGVEIARPPSLNARSAI
LIDAATGTVLYEKNADIALPPASLTKLV TLHLAMEEIKAGRLSPDEMVEIDARDCSPYIP
YGSSLMYLRPGMKVSIRDMLGA AVVSGNDAAYALARRIAGSNERFAEMMNKAVAEMGFD
RMTFVPSGLSEKNLVTARQFALFSKRY IELHPEALKELHSVKSIFRPEHATTEYHPD
GIIIQYNRNPLIFS YDGADGLKTGYIIEVGYNMAATAQRNGTRFIAVLLGGSSTPYANGT
AVRTKDTKALLDWAFSNFSTARPGYIAPKPLR VWFVKTIQLLPEPNGEAAITVPSSLKDR
VWARIELPKTVRAPIQKGQKIGRIVYEIDKKEIGSVDL VAPTEIQRGGFFRILIDTVLRF
FAFILGKV*

>SPBIB_v1_100017|ID:27162168|asnS| asparaginyl tRNA synthetase [Uncultured spirochete bib]
MTLLPTIKQLLAMEPIGQEVTIRGWVRT KRETKQSTFIEVNDG SCLSNIQC VVESALLEN
EALKSMLARIATGASVEIAGKLVPSAKGQKAEV SVIRVKLIGEAPADRYPLQKKAHSLE
FLRELAHLRVRTNTFGAVARVRNRMAFAIH QFFQEHGFYVHTPIITASDAEGAGAMFQV
TTLDLDALAKSGGPVDYDKDFFGKRAYLTV SGOQLNVETCYQALS RVYTFGPTRFRAENSNT
TRHLAEFWMIPEMAFAELSDNIALATEFIQYLVA VALKDCAEDIAFFDERIQPGLRESL
EKVAQTPFAHMTYTD AVRELESANTQFEFKPYWGCDLQSEHEKYLTEKVVGGPVVVTDYP
KEIKAFYMKQNEGDGKTVAAMDVLVPRFGEIIGG SEREWRDLVLEKRIEELGLSKEVYSWY
LDLRRFGSTPHSGFGLGFERLLLYVTGMTNIRDVIPFPRAPRQAEF*

>SPBIB_v1_100018|ID:27162169| TM2 domain protein [Uncultured spirochete bib]
VRYSLSTAYLLWFISGFGALGFHRFYLGKTGT GLLWLLTGGLGGVGCYDLFTLPNQVRE
ANIAAAREALGYDAYGAGSGFIARVRPAETPERVILRIAKANNMVTAGEVAIEANISI
EEAQKQLDSLAKKGIAQVRVRSSGVLVYFFPEFSKENADFID*

>SPBIB_v1_100019|ID:27162170| putative Peptidase C14 caspase catalytic subunit p20 [Uncultured spirochete bib]

MYFESGKALEQHRLKPVREK GALT MQRLRAKRHLSGIGSLVPLL VLSVILMLTGCELPK
SASSSPGVKYAII VGINDIYI LPYGRNNDLSYCVADANS MKTMLEEAGWTVKLITAESNE
STNRFATKSAIESALNNVPSDAESFMFYYS GHGSGGFDPGEAYIIPSDWDPRAFNFTRM
ISTSEFASLLEKVP AKNKIVILDSCYSGGFVNPAESSDAVPGNVSSQ QISSSIDMFLKFG
ELLALNAQYRSADASLAPLTISAAGWDEESWEQGSPIYHGLFTY YLLKAAEVNVEGRMPG
DADGDNVLSCLEAYNYAKKALEKTNYRYLPHISGGLRDFALIDNRGN*

>SPBIB_v1_100020|ID:27162171| exported protein of unknown function [Uncultured spirochete bib]
MQRFMGKTRKAGLVAAFIILLFYANAMNAEAQPTLEAQFLYANA WTWTSATAFSRHTGYA
FSLDAQWLFPLRLSSSAQEENRGISLMFAAGVHAQHVNMGASVWLADGSRYRAWNALGFG
PEVGVGIQFAGLSVGRKQIFALSAGPIANFANYTSTTLYNAYWSGYL KLSWEAEIDRHW
LDVSLPVEIGSRSDGTSVIAALGAGVQYVF*

>SPBIB_v1_100021|ID:27162172| exported protein of unknown function [Uncultured spirochete bib]
VKKIAAILSLIFASSLLAGMAACKPRIRLPEDGSITGSAKWLVISSLYCQMKAEPASAS
LDKGILRKGTVLKIEESRFSTAENEQGTLWFKVQNAGQSGWVSIRDAHTYPTETQARNA
RRME*

>SPBIB_v1_100022|ID:27162173| protein of unknown function [Uncultured spirochete bib]
MDFIRSWIIPPLIGAIIGYFTNWLAIKMLFRPYKEIRIGGIKVPFTPGILPRERERLAES
LGDTVAQELLTPKVITDRIHSPQIQKTA AKAVSIAIKGFLDQDAERLFLMRHSEQISS
AEAALDSAAGSSLAHQIIESLRRLVASADIQTAIQHIFAEFITRLGRLKFQSLVSKQQF
VAGIMKAAGSIGSQSVSDIVHVQSTDS ENESGY SRLRPILAALLQLPPDATIRVATDSL
VPPAYALFLPELKQFLRSKEFRSRLEVEGRSFVKRALDRLGPVQRLFVSLAGYETRISQS
MPETIEDLIKTIELLLDDPEVPERLAEACATIVSRRAKTGPASTAASMQRENIASAIGQ
SLKESDELKLRAERVYDDIADLSLEELAGGRMNAEDISGFVLSAFVRAIDSEKEISSST
IGTLFIDVLKESAKGKTIAEFFGIQE QDIEQISYTLANALLQLIETRMPLLVEAMDIRGM
VAERIDSLDMKEVERIVLQVVSHELAWITWLG GILGAMIGFIQSLIALL*

>SPBIB_v1_100023|ID:27162174| FolC bifunctional protein [Uncultured spirochete bib]
VNQLHFKSIDEVYDFVLGYVNVEKGQATEFKLDRMNW MASQLGDPHLGRMTIHVAGSKGK
GSVATFIASALERSGIPTGLYTSPII SWKERITRAGKELPDNIILRAADEVFELVEGKT
ADNFFGGELPTYFELTTLIAFCAFRMAGFQAQVIEVGLGGRLDSTNIVSPDVCVITPIEL
EHTQFLGSTIRLIAGEKAGIIKKKVPVCTIQPKAEALEVIEAKAAAMEAPCLV VGRDIHV
SRVEVDTEGTHCVLEADQNAPSAVHNFLGGRPCPVQTQLV GSIYAGNMALAGLALSQLPV
SIHSEHMQEGFAKASMLARFEIASRNPFI VLDGAHTPESVRTILSTFLELAPSPRILLFG
CAYDKRHDDEMADLLAPSFEDIIITRPGSFKQSTPEIVFESFHKRKTDSVIIEDTALAII
AVRRTQEKGGSLVTGSFYLCAEYKKLLSKS*

>SPBIB_v1_100024|ID:27162175| protein of unknown function [Uncultured spirochete bib]
VRIIHA AEIGPSAKPSGRRNRGTAFSQKPPSQA EESVRVDQPLHLHDKQIIVIESEGA
VFDIHYWHETAYLPSFIGCFGGNVDP SLSGEVWRTVALKSSLRGEPPLVILLAALRVLN
TLSPSMQRAVVIKTLEKYSLSSESSTEDLLRLDEKHPVEMMVIDWLSMAEGLIQETGRVPH
FSTAEFLRSVSYIAPQSQVLVYSTLAESSAMRMWQSSGLGECFFRIAGKERGKPGEYLR
AAMSAGFERSSIVAIGASAAMFRAAQLAGIRFFPIVPEQEEESWKILAEQWFPAYLRGEA
WKIDMQAERFYEQMCHEFNVRETAE EIGRKFGLQQSKPKFV*

>SPBIB_v1_100025|ID:27162176| AAA ATPase central domain protein [Uncultured spirochete bib]
VAGQPNMPSHPLFSPGAVAHSPESGEPLASRMRPRTLDEFV GQEHIVGEGRLLRRAIQK
DQLSSVIFAGPPGTGKTTLARIANTTKSHFITLNAVLSGVADLREAI EQAKTYRDMYGR
KTILFIDEVHRWNKSQQDALLPWIENGTAILIGATTENPFFEVNRALLSRSRVFLKQLT
RDDLFRVAQMTLGDKERGYGLYTVEFE EGALEHLVDTADGDARSLNLELA VETSTPQW
PPPEGSKIFVSMASAEESIQRRAVL YDKDGDYHFDTISAFIKSVRGSDPDASLYWLARMV
YAGEDPDFILRLLILASEDIGLADPQAINVVSACALAFDRVGLPEGQFH LAQATLYCAL
APKSNSTLGYFDALQAVQSEQAEPDHLKDANRDKA AFGHGEGYQYPHAYRDHWVAQQYL
PASLAGKLFYFSPQIGFEGTRRAEVLVRREAQLAVLPSDIENESSQSLVWSKEGESRTR
WRIRSEFSATERLLAIRKAVFDFVLPAPVDNITDPRLGFYAMEAIRRSSEGKVFAVLN
DESARMQLENLSKAITEILQPEILLYDECNNGSEGPKKISAFLEEAQP AFILVCEVERIP
LSVIETLAFQAKQAASKTARFFAFDIDASRSSMLSGALS AVANLGKEETKFLERLREFEL
ERQGGPTYAAKPHTQQNRSNWRDVLPHPFPEAILESITLNGAFTRPIDDEELA QWLDPGT

AYGKVFERSIFNQKDIKMMEGIVQRYNRSPSWPIFVSLYELRL*

>SPBIB_v1_100026|ID:27162177| protein of unknown function [Uncultured spirochete bib]
MNIYGYSIKLTKLATGRAKQKNAALSRKGSDIAGLYAALALTLLVLFAGCDNSFSIFKS
ISQETKQVGVDFLKNVTVRAMANDAANYALLGQVVWRPIDGSASWNVLSVNGSTDYFAA
GLASDGAKVYVAKANSNNVLVDVYKTIDSGATWTAMNAAASIGSSAAVDWLKCANGTLFV
AFHASGTYSLYYYDGAAFKSAGIANISRPLIDIVWDGSEYWAISDSAAYHGSAGAMTEDT
APALAQGLIGLATDSAGRVLISRSDGLVYSLQSGAWTQITIKASTKLGPLFLTQPAATK
TIMVVGKIATYGYEYDETGTSGLKENGSNYISTSSSVYLSTMLSKHVIGFWQPSNDANI
LYVMLAAGGTDSYALYKNIFDPTANAGAGAWSGWTAE*

>SPBIB_v1_100027|ID:27162178| exported protein of unknown function [Uncultured spirochete bib]
MKKKLVAAAIVLLVLCIGMVWAQDSADPFAANRKKGSQSIEISPGGFLPLFVLDNSNFAMI
STPNMSPGAAFSVLRYRMLGKNLGVGGSIAGSFVTTVGGRTLFLAPVCVSSTWVFGTDPM
EFDISAEIGMNMVRLSGNGIISPIAKLGGGISRYISESWSIGGKLMWWFVPELHLGSYAN
LNSYASFLEFSIGAQYLF*

>SPBIB_v1_100028|ID:27162179| protein of unknown function [Uncultured spirochete bib]
MLLVRPHGNLIQQIRALKRLAMNWETDPLPMALPEGFICGWFDSQLSQARAINETFSEE
GYPGAGSKASNEQFFQQALVQHAQEICAALPDVFRFESVVQRGGEIILEFSRDIDSGKLQ
EAMHQFAHDAGLVCRESAGTYNGIWLGSGSLPELQSPLSFKKYELVLYLAELPESPLNG
YYFKTIARVHRKMPSHARSRKE*

>SPBIB_v1_100029|ID:27162180| conserved protein of unknown function [Uncultured spirochete bib]
MKRKTEELAAFLDITISRWGVDICVLDLRSQNDDELDPHYALVFDVYRRGVPSAEKREQ
LFKNPGAFESAPGGMKDRFFLDEIPIRVEYKHIPVVQDMVERPLHHIKLLKNTGTYPYLR
LLKFPLVFSRSDWIDRMRAQLNSFPPEEAWKGLFDSFSAKMEHYLSDFGAAAVSENQFFRL
MSRAGFLRFAGASIFMFNHAFEP SHAEYEAQLKDLTNLPANLASLWDAISGERNDLTEFR
KFELARLLAREIFELQ*

>SPBIB_v1_100030|ID:27162181| exported protein of unknown function [Uncultured spirochete bib]
MSIPVEAHRSTSFALFAALFFVLAMIAGCKSGEVKSFALWDEKGLRLSFRSTAPYAESAG
SFTKQGEKQRYILSRSAIPDGFARLKLAAQSSSVDFQVSYGDEKKGKNASVLCMPQTG
QVAFILPFEQLKNLQWLEIKLQKFDQAQKTSIAEKQPASQNGPSTLLQLQEIRLVPQMRGF
RKDADILEISPOFSFQAGKSANRYEIRQPFSSGSEAEKLNQARLEVVLEGDAGLATLFW
GEQKIIYRHSAGASQLVIPFALFGYDPAKVSLEIPVSMQAKVFCADVYPKDNSLFLSLDPG
LLLYHAPLTEQNYFLARWDLMPDVLFLFKDYATQDRYLKRLAFFVEKIGFVGR LAPDSE
IVNLHGWNAHDYRPEDIARFFDA AASQNFPLAAEEIELRELLKQGILIKSGSMYLPQGG
AIVSITQESPSYLQSKFLVHELHALFFTDNR YRDLALS LYQNLNDEEKWFLIQYFRWMR
YNIDSAYLMANEMQAYLVQQPTRDLEKYFSVTLGERLAQEHPELQKNIESYMQNH LAALV
RAANQLNSYLHTAYGFEAGMLFRVR*

>SPBIB_v1_100031|ID:27162182| protein of unknown function [Uncultured spirochete bib]
MEKDKNKSPSANYSDDVPEGLFISPLDDSESFRKMEAEAEAKILSPPRAIPANSNTSDEFA
PSAARNNVEQEDATHLPPPKSAEATPEQLIFRFAGELKSIKQDLSIKQHFEALKKPQPA
AALQPATLQAPAAQQA AAVTQPAAGQADPDTIALLNDVKLLLYLDRLLLES LPEEKIEE
FANSEYFSLYRNIFEHLGLS*

>SPBIB_v1_100032|ID:27162183| exported protein of unknown function [Uncultured spirochete bib]
MRLPRINIRKGVVLTSLAYGFFSLLIAYCCVSAIAGKAGVLAYQDILLIQKQEIQAIDY
LQAQNLQKSRAIEDLKNNSVVAEAGAAVLGYVRQGEMLIVLPDSWRASVKDGEGELRLPV
VMGDSTGLPDAIIRFMAAITGLFALLAIQLFHFNPEAKERKHISLEKQE*

>SPBIB_v1_100033|ID:27162184| Penicillin-binding protein, 1A family [Uncultured spirochete bib]
MRSHKVRVYIFIAVILMFTAILGAGLGLALS GTANAI RTENFTEFESALPTKIYDINGR
LITEFFAEQRI PVFIKDLPNYLVEAFITREDQAFYSHRGFSLRSILRAAIGQILGKNLG
GGSTITQQLAGDLYADRKVISLQRKLELWWALQIERRFTKEEILEMYLNRTIMGPAVYG
VEAASRYFFGHPAKDCTPAEAAILAIQLSSPSRYNPFRNPMLARDRSKEILDQMVARHVI
SRAEADESFDAYWASFDYSRVAVSAFYNREDKAPWFSEYVRRQLEDLFYGSIDIYSDGLS
VYTTLDLQKAAADLYMKRGIETANASF KATNSQRLTEAENTYVPIVELLGLAFDLPTLY
APQSRSETDSQKYFLNVINPVL DATSLLLNIASLKP YVGAASAKIKTELEKTTVEGALVT
IDNSTGYILALVGGSNYSQANQLIRATQAKLMPGSTFKPLYSSAAIDSKKITEGTYIVDE

PTTFYNEDGTPYSPQNFKGEWKGSVLAWQALANSMNVPSVKVLQTVGFDAAISRAAALLD
ITDPIEIRKTFPRYYPLALGVIGVTPLQMARAFSVLANGGKAVTPIAIRYIEDRYGNVIA
EPEKDALQALRQKSPQVVSPQNSAIMIDMLKR VVSAGTLGATQSGSIFKQTS PDGKQYV
IPIIGKTGTTQNWADAWTVGSSPYTTAIWLGFD RPNLSLGVVSQTGATVAAPVWANYMRD
IHLGLPYKNFSKPESGLVSVTVCAKSGQLPTEYCTDGT VNLMYLEGTQPTTEVCTLHGPSV
APEPVSPPGPSIARPEESPIFQNR*

>SPBIB_v1_100034|ID:27162185|gapA| glyceraldehyde-3-phosphate dehydrogenase A [Uncultured spirochete bib]
MKVAINGFGRIGRLVFQSIVDQNLGK GKDKIDVVA VVDIVTDASYFAYQLKYDSVQGKM
KAEITSKKS DPKAEDDILV VNGHEIACIMAEKELKNLPWGKLGVEYVIESTGLFTDEKS
WGHLEAGAKKVIITAPAKSKAEDKKIPILLMGV NQDKYNPAKDHVVSNASCTTNCLAPLV
YVLLKEGIGIETGLMTTIHSYTATQKVVDGVS KKDWRGGRAAAINIIPSTTGAAKAVGEV
LPEIKGKLTGMSFRVPTPTGSVVDLTFRSVKETS IQEIDALMKKASETYLKGILGVTDEE
LVSTDFIHDNRSSIYDSLATLQNNLPGEKRFFK VVSWYDNEWGYSNRVVDLLRYMASKDN
F*

>SPBIB_v1_100035|ID:27162186|pgk| phosphoglycerate kinase [Uncultured spirochete bib]
MIKTVRDISLAGKRIIMRVDFNVPMKDGKV QDDTRIVASLPTIKYILDQKPRSLVLM SHL
GDPDKDAAKAKEKAEKEGKPF DLEAYLSAKHRM KPVAEYLAKLLGKNV VFLPSCFGQKAA
IDALPNGAVAMLENTFRHKEETA KDPAAQEVLARELASYGDIYV NDAFGTAHRAHASTAT
IAKFMNFRVGGFLMEKEVANLEPMLHNPPKPMVA IIGGAKVSSKIAVLENLLKNASSLVI
GGGMAYTFLKAQGIAVGKSMVEDDFLD TARQLLDHAKAQGVEV VLPVDHIAADHFAPDAV
PVAVNAQAVPDALMGLDVGPKTLELYAKVLAGAKSVL WNGPVG VFEFDAFAKGT EKVAQL
VAEATARGALTVVGGGDSVA AVNKFGLASKMSHVSTGGGASLEYLEGKELSGIACLEQK*

>SPBIB_v1_100036|ID:27162187| protein of unknown function [Uncultured spirochete bib]
MREKGRPKGRPF SFDVRVFCMRATVRKGDATGANGTQAPGKDVAYRAKFCDFIL*

>SPBIB_v1_100037|ID:27162188|cysK| cysteine synthase A, O-acetylserine sulfhydrylase A subunit [Uncultured spirochete bib]

LRIYNSILD LIGNTPMVYLNKLAASLLARIA VKLEFQNP GHSVKDRAALSMILEAERTGL
LQPGMTIVEPTSGNTGISLAMIAAARGYRCIIV MPESMSLERRTIMKAYGAELLLTPKSK
GMAGAIEEARALLSKDPAHYFMPMQFENPANPQA HRLGTAQEILSDTEGQVDIFVAGVGT
GGTLTG VGEALKTQKPSVRIVAVEPSASPVLSGGKAGPHGIQIGAGFVPSILNTKIYDE
IIAISVDV DAYAMARRAAKEEGLLVGISSGAVIHA AVQLASRPENKGLIV AIAASSGERY
LSTPLFADLQDK*

>SPBIB_v1_100038|ID:27162189|cysE| Serine acetyltransferase [Uncultured spirochete bib]
MHMEKREKNNTPKERASAGPLSLFKSDIEAILQRDPAARTKIEAVLVYPGLHAVWLHRLA
HHLWNHGSKLTARLISNISRRLTGIEIHPAARIGQGLFIDHGMGVVIGETAIVGNNVTLY
HGVTLGGTSLDKKRHPTVGDRTIGAGAKILGDIHIGADSRIGANAVVVKVPPNSVVV
GIPGQVVHRHIPHTASDEPDLHHEKIPDVLGQRVHEL SARVAALEEVIARMRAGCEDGTR
SDAAL*

>SPBIB_v1_100039|ID:27162190|tpiA| Triosephosphate isomerase [Uncultured spirochete bib]
MKRYFIAGNWKMHK TIAEVALASELKDKLADCKEKLMIAPPFTALQAVSKIVEG SNILL
GAQNMGPEESGAHTGEISV LMLKDLGVRV VILGHSERRHTYGENDELINKK VRLALSHKL
EVILCVGETLEEREHGMLENVIRRQLSEGLKGVELSALKDVTIAYEPVWAIGTGKTATPE
DADAVHAFCRQVIAEMYGKDAAKAIVIQYGGSVKADNAAALMSKENIDGALVGGASLKAE
AFVPIAKFR*

>SPBIB_v1_100040|ID:27162191| Preprotein translocase, SecG subunit [Uncultured spirochete bib]
MGFFGVLLL VV FVIVCLLLIFLVIIQDEDS DSIGGIFASGSQS AFGSRSSNVVIRITYVL
GTLFFITAFALAVVNKSSTGNVEKVVEQNSAQ TATSEWWNNQTQTDQTSQTQPATEGQTP
QTGQPAAPASK*

>SPBIB_v1_100041|ID:27162192| protein of unknown function [Uncultured spirochete bib]
MVRRSFAEMGHEAAIVSDSPYGLSAYDFLV FITEPKSMFGGIASSLPQTLAKSEGLIGKR
CLALVRKSGFRSGNTLRKFMEALEHEGLVV VQGEIVSDASSAAA VARGTPLNRR*

>SPBIB_v1_100042|ID:27162193| putative Chaperone protein DnaJ [Uncultured spirochete bib]
MKNYYEILGVHPDSSPQDIKSAFRKQAKRLHPDMHYS AENARPRESSATLRESAMRLILE
AYKILSDAEKRRAYDRELRRRERDNKGFDYHEFLQQRSDDPESQAKLIVYDLLHDLDEEA

LAIYERSKTFADFRLERWLERGEAMDAEYCIAEEYEKRGKYIKAYQIYKLLIRMELEKPW
FRYYFEVVALKFRFLILQKMPGRVDEEDYLDRLDEAIELKIAPRETAQYLRKKVEILLHR
GEAEAAEEALNQISLIYPKLAGFAALRSRVQRAVDQPLAQNKIS*

>SPBIB_v1_100043|ID:27162194| putative PpiC-type peptidyl-prolyl cis-trans isomerase [Uncultured spirochete bib]
MKRIASWLILFVFAAFPLIAQTSIDKPAATFKLTKQEVISVRQLRADVDRLNATGAKLT
VEQRKDVLDARINSMLFLQFCEREKISVSDAQVNSALAQLKAQLGANATDADLEKSLRAS
GVFVDPKVYVVKQRLLEAYVQTKRLDDMKANLKPPTADEILKAYDLAKASLVRPDTIRLS
VIYTDTRGKSDADIKTKDLMNSISAALKANPSKFDEYVLRAGDAAGYKAIPSLYLEKTQ
QSKSIFGAEFFDAAFQAKVGEITSVIQTPYGFRIVRVNEFIPQKQLTSLDTPVPGNQNLTV
QEFLAMQLASEKEQAFFNKVEAEVIDSLRKEATIKIYTENLSW*

>SPBIB_v1_100044|ID:27162195|nusB| N utilization substance protein B homolog [Uncultured spirochete bib]
VASRRKARILAVQALYAWDLAGHSLPELLSFAWLDEEKKLHYDAEILDFSRLMITGTIEE
IDRIDAIKKHLEHWAFERLRKVDLAILRVGCYSLLYQKDIPAGISIDEAIEIAKEYGSD
DSYRFINGVLDGIQKEIVGGLHDSNKE*

>SPBIB_v1_100045|ID:27162196|map| Methionine aminopeptidase [Uncultured spirochete bib]
MIRIKNKKQIEGIRASCQMLSALYDALKPLVQPGATPKDLDRFAYDFIVKNGGKPAFLGY
EGYPATLCISVNDVVIHGIPGSRPLEEGDIVGIDSGIDLGGFFSDAAFTLPVGKITTEAQ
KLLDVTKECLDLAIAQIKPHSRISDISRAVFSHATKNGFKVVRQYCGHGVGLEIHEDPQI
PNYVSAGPNPRIMGMVLAVEPMINVTSDVRVLDLDDWTVVTMDGSLSAHFEHTVLVTDS
GCEVLTRW*

>SPBIB_v1_100046|ID:27162197| Protease Do [Uncultured spirochete bib]
MSFGKCLYSKNFFIANLVILGIVIGFALAFMFRANPSASSTALPIVKAETPPMVAGSDTE
AAISQAEAVQEAFRNIAKTVLPVVELDVVEGAQKNQPPQQTPQFPDFGGPDTSPDQ
FPPQEGLGSGVIVRRSGKTVYVLTNHHVAGNATKITVKLSGDREYEGKLVGTDERKDVAL
VKFETDDSDIVIAKLGDSKLVGDWAIALGSPFGYVSSVTTGIISALGRRGGPDGNIND
FIQTDAANKGNSGGALVNIRGEVIGINTWIASPTGGSVGLGFAIPINNIKSAIDDFIVH
GTVKYGWLGVSLSNITQDKASAKELGLDGKKGAFIGHVFMNGPADKAGLLPGDFVTAVDG
KSVASTDDLVRMIGDIKAGTAAKLDIIRRGSMQTLAKIELRDATVASNNANIFPGVTVI
SLKSDSVDQKQVPAGLRGALVVDVLAKSPAATMGLRTGDVITKINGKNVSDLKQFYETLA
KEGRNKL VFTINRDGQTVETLAYVGK*

>SPBIB_v1_100047|ID:27162198| Phosphoribosyl transferase domain protein [Uncultured spirochete bib]
MHKEFVPYDMIRNNAIKLAYRIYKDGFIQDVIYVSLRGGAYMGNVISEYFKFVKGNRPV
FYAAVVARSYSGFDQENIKIDGWTYNPDFLRHGDKVLLVDDVFD SGR TINHLAKVIMDR
GLPRSDVKIAVHDYK VREYLPQHLPTPDYWCRKIEVKSKEDELWIHYMSHEL VGLTEAE
VAQHYNDDPDLAEAMRLVTSRN*

>SPBIB_v1_100048|ID:27162199|glgC| Glucose-1-phosphate adenyltransferase [Uncultured spirochete bib]
MTEILSIVLGGGKGRFLPFTKERSKPAVPFGGKYRIVDIPISNCINSFGFKKIYILTQFN
SASLHLHISRSYNFDHFSKGFVEILAAEQTPAHSGWYEGTADAVRKNLIHFRPHKPSHYL
IVSGDQLYRMDLADMFRKHTEACRLTIAGTLVSREAASSLGIKIRPDGCIDSFLEKPG
PTKDIRDFAVPEELKPKDADPNKPYLASMGYIFDAPLIEDALQMDANDFGKEIIPAIVA
KEKVNTYVFGGYWEDIGTIRSFYEANIELTDINPQFNFYDEQMPIYTHARNLPASKLNYC
TLNQALASDGCITNASITRSIVGIRTVIESGASLDGVVCMGADYETEAEKAENRRKHI
PNIGIGGSIIRHAIIDKNGRIGSNCRIGIDPLPREDGEYKTHYIVDGIIVIPKNQIIPD
GTVI*

>SPBIB_v1_100049|ID:27162200|yprA| Uncharacterized ATP-dependent helicase YprA [Uncultured spirochete bib]
MNSETANAICDELASWLSERSEIAWSTKLPARAPDFVPLPQDLHDVLSLSESLAARGIHALY
RHQKRSYELARAKRDFIVVTPTASGKTLCYNLPVMQTLLEEPEGRALYLFPTKALSQDQQ
SALGEIMLAGSIGMAINTYDGDTPTEIRAKARTSGRIIISNPDMLHSGILPNHAKWVKFF
SNLKYVVDELHAYRGVFGSHVASVLRRLIRIAKFGSEPVFIFSSATIANPQELAERYI
EREVALIEESGAGSGEKVLFVNPPLVDPVQGIRRSSALEAESVMLWLLKKGVRTILFSR
SRLQVELLSSYLNKKLENAYNRNFGLVVKPYRSGLLPSEERREIEKGLRDGRIHG VVSTNA
LELGIDIGGLDAAVITGYPGSIASFWQQAGRAGRLGVSLAVYISSSAPLDQYFAAHPEY
FLSRAPEHAHIDAYNPYIFTDHLKCAAFELPFAESEPFSPDPSNQKAAELTKEALDYLEE
EGIVRHTAGRYFWSAEGYPGEKISLRSATTENVVIVDATNGRHVDVIGEMDRPSAKELLFD

KAVYIHLGTQYQVKSLEKRVCLVERSDVDYWTDSIVKRDIEVLTIDSQAEHSECTMML
GDILVRSQVEKYKCLRNFNTHENIGYGEIWLPPDEMQRSLIITIAQESSESGKLLGALVPE
KADAVLSGVARLMRQLAPASVLCVDHIGVASRRDLFFKNPALYFYDMYPGGTGIAEAL
YANVQEIFAALERLGNCSCKAGCPCIGVESADKDSKAISLQFLKLLQGACAK*

>SPBIB_v1_100050|ID:27162201| protein of unknown function [Uncultured spirochete bib]
MNLKERLALIKNEKTKLKPSAPRKRFIPEGWQEIAPLVWAREVSRPFRQVPETLSPSIMR
PLVPAYDEAMHVEPGSVAGYIAFFDLETTGLSGGAGTIAFLCTTATFEGSSLFLKQIYL
EDYPGEPEFLKKVIENTLSAAKWIASYNGTAFDIPLLQVRCVLNRIAMPQLRHIDLLHDCR
RFWGRSVQSCALQSMFAFLGKERESDIPGALVPKVWLDLVKSELPSSEEQKALMVLVWKH
NLEDVVSLEAELFLAEMAYRDPVSGVARYAIDPAAIASRLLKTGRTEEARKLLLMVRDQN
SALDCQGEKRMRALRVLASLARREKNHRLFAETILAMDNSAYGCVAKAKLFEHVYKDPQA
ALEWAKSAREILASQKELSKELWEGQEPRQLPYLTIESLQHRIARLERKAAKQKGL*

>SPBIB_v1_100051|ID:27162202|rlmN| putative dual-specificity RNA methyltransferase RlmN [Uncultured spirochete bib]

MSGPALSNHMKVYPSGLSLAETAALLPDQPPYRARQVYEWFSKGIASFAMTNLPQSLRE
RLSGLYGGQVRSSIEKELIDEDGSLKLQIRLRDGAAVECVLLEDIEGRKTACLSSQVGC
PMGCAFCCKTGTGLGFLRNLPDEIIEQFHFLRDRRGFISNVVFMGMGEPLLNLENVRKAI
VLSSEPIGMSLRKITISTSGIIPGILDIAQSGPKIRLAISLTSAPENLRTRLMPVNKTW
PLDELKSALLQFQATRDRITLEVVLIGNMNASETDAEALAAWITPLKAQVNLIAWNPIQ
GMPFEQPSRQMRIFSEILERKGVITVQRMSRGRGVMGACGQLGDTLQTTNPPSA*

>SPBIB_v1_100052|ID:27162203| Tetratricopeptide TPR_2 repeat-containing protein [Uncultured spirochete bib]

MSDMPSLPYNDDFFEVPEEIQSENTEIAETSKKGYQLKENRFDEAVECFIQILEKDKEN
NYALVGMGDSARKQGRFKEAADYYRCLVFHPGNSYALFGLADCYKALNQFQKAIEIWEQ
YLLHDNTNITVLTRVADAYRKVHDFRKSIAIYHRVLELNPNDHYALIGLGHLYDFKEYK
EALS YWQRMVELEGNVDIRVLT AIGNCYRKLKHFDPKIPYFEKALEKEPENFYALFGIA
DCYRGVKGQNMSLVYWNKILEKDPKNK VILTRAGDAYRNMGDYDKAVEYYQNALNIEFDI
YAVLGLAVIARQQGKYEEAIASLRSLLQNDPKNYRIYIELAQT YLMNNQRQQAIDVLTEF
QHMGIKNPIIQEALAKLTGKA*

>SPBIB_v1_100053|ID:27162204| putative Methyltransferase [Uncultured spirochete bib]

MRITGGLYSGRIVKMPEGDLKIRPAMDRMRESVFAVLGDLTGFSFCDLFSGSGIIGLEAA
SRGAKPVVICIEKDRKKFPVLLQNATIAEPPLFCRAMPAETFIMRNKTAFDIVFLDPPFDY
KFKLQLLERLDCSASLHEGSLVLIHFPHEDRLEPQVGALKSIDTRIFGRSTVRFYRKGPA

*

>SPBIB_v1_100054|ID:27162205|smpB| SsrA-binding protein [Uncultured spirochete bib]

MRSQVPIKIIAQNRARFDYEIEENIECGIALQGSEVKSIEGRVSFGDSFAEIKGEEVW
LNNLHIAEYAQASMFSDPDRPKLLHRQEIKRIDRRVREKGYTLVPLSIYKHLVVL
ELGLCRGKKEFDKRAIDKARDIDREIRRDFRLKDW*

>SPBIB_v1_100055|ID:27162206| putative PEGA domain protein [Uncultured spirochete bib]

MKDADKITEQEIQAQAVTLKPVLGVRPRVYVPVLYSAILVVLFFLLVNPGLSHPGARLQ
FSGHPDAAA VYIDGAYAGNTQDGAHAKPGPHQIEIRKQGFSSKVLQTTVPNRIFATLIFP
PAVHLGYALEPQSQEAIMLPFAFKDFASWALSGKPSAIYQLPMTLSEASRD LASIQNIDRA
ALSDALLAAGISLSMNAASLRDTVYASTAIAAPAGSPLGVLCTARNLAGMLASSKNSAAM
VMETIPDKASDAIRNAAAALKQETAALRINPLQANGLRSVGPHSFIMFKGGLLDLVSSTP
EGSKTLFQSTLPEFGLASTEVTQREFARFLAENPDWKPENKAVLIEKGLADSSYLKDFDL
AAADNR PITGVS WYAANA YCQWLNRQAPAGYEVLPTEAMWEAAAAVSSRSISL GIFKN
HASTGPLVGSAGTDSL SFSDFGNVWEWTS DGFRPYAWIQKDSSAFDELIG AISQKTVK
GGSWANSPDQISIDSRGPVPAAHGSEFLGFRPALRKK*

>SPBIB_v1_100056|ID:27162207| Signal peptidase I [Uncultured spirochete bib]

MKKTDFFDRLVAFSEFLTRRKQKSLRAKMKQKRHPVVDWIYAILWAACVVLVINQYLF
QAYRIPSGSMEKTLVGMIFVDKLSYGPPELLPGVLKTPGVSKPERGKVIIFENPSYLSR
GPLYTIFQQLYMTFTLVDIDREPTGEPRVHYLIKRAIGVGGDTIHVVNGEVYIKPRGS
SEFMSEKSLMQGLGLAVKTQRLVSQSEYAEITNVGIASAYSELNLAFPASLGTSPVQSAN
KDAFH YDMSRVTTLRDANPSEARNAQIAQRYENGWYIADSRVFPMDNRDNRDARYFGP
VAEKKVLGHALFIYFPFSRMGSIR*

>SPBIB_v1_100057|ID:27162208| protein of unknown function [Uncultured spirochete bib]
MFARRPVRYAEKVERKKNRLRAIWFVVFIILSSFIRGVVIQSWQIRDQTMNPSLVVGDV
VLAVPFWSIFSSAPFSFSGPLHQDGLVLIDDGASEVTPPALLTADAVLRFFTLQRFSILE
AQYGRNFGVPEVMRIKSIIRENRENKRVLTYLEYDARRMSADAPADKEVQASRIRAKLV
FRIWPIRRVGPLT*

>SPBIB_v1_100058|ID:27162209| putative Oxygen-independent coproporphyrinogen-III oxidase-like protein YggW
[Uncultured spirochete bib]

MSAEHFTDKKPFPTSLYVHIPFCAGRCAYCDFFSVPRGSCSPSTLASVSAVLEQAAEW
TKIFEAGEFATIYIGGGTPTVLGTELLGTLVRGLEPYAANECEWTIEANPESLDEEAQVM
LAETKVSRLSLGVQTLSONQWPILGRVGSVEDSLRAIELLGSSRFEVSVDLLAGIPYRAS
DPAGAPEYIEAQLQLSLSALSGKVPHISMYDLTIEEGTVLQRRIVDGELVLPDSDLARA
RESADGLLAAHGYYRVEVSNYALPGHECRHNLA YWNMDPYLGLGSGAVSTLAYPADAHQR
MLGSMVRLNGTKNLKHFARPAEIPPEVEIIDKPTAAFEVLMMGFRTARGVDATRFSALF
GIPILELIPSSLERWGGEIQKDNHIAIHPRNFDILNRFLVECFEEMDENRAMLKT*

>SPBIB_v1_100059|ID:27162210| conserved protein of unknown function [Uncultured spirochete bib]
MTLFQYAVVASILHDEKQKQELLSKFEQALIEAGGELQSVGTHTLCPRNTNLPLFIFVLT
GGTEAEAMQLIQEKEMIEQGTVPVLLAHPFQNSLPAAMEILAKVKQDSGKGLILQADASG
VFDAALGNIIAVSQSMRTLQASRIGVVGKPSDWLIASSQHPDIAKKA WGLTLIDIPFAE
LMHDIEAIRAKPERAPDMPGLRAKAEFFSEADEADMRKSAEILQALKGIVARYRLTALTL
RCFDLVLQDSSTGCLALSALADEGIDAGCEGDIPSIIALHWMRTLGMTGWMANPSRISI
DKEKGTAAQALIAHCTAPRSILSSYGLRSHFESGLGVA VAGITPEGPVTLVRIGGKNLERV
WFSNASVIGSPRQEGLCRTQALLELPEARAEELLTNPLGNHLMIRGDWIKRIEAFIRLW
QS*

>SPBIB_v1_100060|ID:27162211| Metallo-beta-lactamase domain protein [Uncultured spirochete bib]

MKIYQHYSIFGFSNSYMIGNEKLGKAIADVPAELTPTMIEKIEQNHFDLCAIFITHNHTH
HIRGLSTIMKIYSPHIYASNAKILEFQCKKVRDGESFEEAGFSVRAIAVPGHSQDSIVYL
VDESFLFTGDVLAHAGLIGKTSSTFNTNALAARIQKQLFSLPQETVIFPGHGPPSTIFSET
RANISYQEGFAEHIKSNYDFFV*

>SPBIB_v1_100061|ID:27162212| putative Pentapeptide repeat protein [Uncultured spirochete bib]

MFKVVPCSVEGCHRPSFSLETLCFDHLKND AERMRSLEELRSQTLIMNRVFDDATIMGM
DFSRYRFVGC SFRNVKMHAMFTGASFHLSFLDGSEFISCDFSGTDIDFC SFGSSNFLDC
SFENSELIQTNFNGSHFSDCTFSGSNLYNSRFMLCDLDTVNFDNCFKRAFYPAKESNV
TFVGSNIAEAVRDLEHLYL*

>SPBIB_v1_100062|ID:27162213| putative Glutamate racemase [Uncultured spirochete bib]

MQSNNDALHVCVFDSGIGGLPFLKAIHQEW RGVVTISYVADDAGFPYGTKSPEAIRDILFE
RVRRIRARLDPDILVISCVTAVQIGLKDLQAAHRPMKIIGAIPPIAQAARETQSHRIAVL
TTARAAEDAFLDDMIARDAPEIDVFRIPAQDLVDYVEQHL PFAEQESAEEAVEPYIAYAL
EKGADRLVLASSHFV FLEEAI RHVITARGMDDVHCLDSREHVL SALRRFLFSEPAEEAAN
EGGFYLTGDRKPCPSYIAWANRFGTAVPELL*

>SPBIB_v1_100063|ID:27162214|rsgA| putative ribosome biogenesis GTPase RsgA [Uncultured spirochete bib]

VGTSMLGIVLSFSNHYARVRCEDNTVRLCTIKGKRIRSLDGWYNALAAGDRVSVQIISDG
EGVIEKLLPRRVFGRFNEKGGADQAFANIDMVVCVTSANSPPFRPRFIDRVSVITEQC
GVPLLILFNKIDLGSDEHAEARLSVFESLGYKVLRC SALLQOGLNALRESILGKTAVFVG
QSGTGKSSIINVLMPGIDRKVA AISEKYNRGKHTTTLAELFFSPEGDIAVIDTPGFRRLA
MRNIEPDDLSAYFPDMMPFIGKCAFGASCSTHESGCAIMDAVQNGIIHYDRYESYLIR
SELESRQWKKEETGKFRKTPKFRLEDEEGW*

>SPBIB_v1_100064|ID:27162215|mutS| Endonuclease MutS2 [Uncultured spirochete bib]

MVMHEHSLARLDFRRLRERLEGYCLSYEGRALMRNTLPCSNPESVRR LKRDLYLLSEGLR
EREIPALPFPDL DVVVQKAKKEGLALDVELFALGIWATS YEQIVGLVRSILEASDRAKR
AHQPEENVPM TAFDSSADTEEWAMLGIETA VFSAPSLALLRERIFAILTPEGEIRDLPRI
RALKRAIHTA QLENQRLVSQYLSDPDLQDALQSNAATERDNRTVLAIKANFKGRVKGIVH
EFSSTGQTVFIEPLELIERNRLLLELETRLNEEIRAILRETTEAIRPLVPSFERARQHLA
AIDARLARAIQLRREDLVNATLLDEGLHLYQARHPLL GKKAVPIDVDVDPDGTRVLIITGP
NTGGKTVSLKTIGLLALLNQY GAGIPALSTSGFAVFDTVFADIGDEQSIDQSLSTFSGHM

RVISDIVRAATGRSLVLLDELGAGTDPEEGCAIAMALLDFFLERKSLTIATTHHGILKNY
GYTKPGCLNASMEFDAQSLSPTYRMCMPGIPGESRALEIARQTGLSDEIVATATSYLDDER
TDYSALMRS LG EKQRELDRL EQEK RKQLKGAQESRRNADLQNLKVRQRELELRRQGVAEL
NRLLESRRTFENLVREIRESGRKVEEASSAREFLNELSEEAKRENDEL SRFEAETKTLA
RSLSDGNAPSRRIDPASASVGEKVL YAGREAIIVRKLDEKRVLIQAGSLRIPVAMEDLSI
PPLHKKPDSETKLVYQVELSSPGE GSSKPLPEIDVRGMRLAQALET LAHQIDAASLGGLG
VFSVIHGTGEGILGKGIHEWLKTQPSVADYYFARPEDGGFGKTWVHLKP*

>SPBIB_v1_100065|ID:27162216|yebC| conserved hypothetical protein [Uncultured spirochete bib]
MGTSETIKDLQLTPIYAAWYRYAAFLSAKGVFMSGH SKWATIKHKKGALDAKRGQLFTKL
IKEISIAARMGGGDPEGNRLRTAVLKARAANMPKDNIDRAIKKGTGELEGTIYEELFYE
AYAPGGGAMLIEVLTDNKNRAAAEIRNIVTRSGANLGTAGSVAYLFRKRGVLT YDGEKYT
EDQILEAALDAGADDV V NEDGSIVVFTDPASFEDVLNAMNAKGFETLGAEISMV P DTYIS
VDAETA AKIQRLIDKLEENEDVQNVYHNIEMPEIEE*

>SPBIB_v1_100066|ID:27162217|ruvC| Crossover junction endodeoxyribonuclease RuvC [Uncultured spirochete bib]
MAARRAIVAIGIDPGIAAVGFGVVRTREGSLELIAHGCIQTESSVPMGKRLAHIFNEIKR
LLQQYAPDVGGIEELYFFRNVS SA FPVAEARGVIRLAFEEANIELMQHTPNAIKKSVTGS
ARADKLQVQEMVRILLGMKEIPKPDHAADALAAICTLHSIGPAGYTL*

>SPBIB_v1_100067|ID:27162218|ruvA| Holliday junction ATP-dependent DNA helicase RuvA [Uncultured spirochete bib]
MFNRIRGILNGHADDALHVATGAIWEIFVPVRDPAFFSRV GEEIELYTWLHHYEDGMRL
YGFISAPERQLFLDLQKVEGIGPRQAFKILQGIAPRALATMLDTS DLVSLQKIPGIGPKT
AQKMMLALKGKLI ALEGEVGPAPAVQGRFRDVIRAL IEMGFDRREVERVVAQLGADVQQ
GPESEKELFRKALLELSTGAGA*

>SPBIB_v1_100068|ID:27162219|ruvB| ATP-dependent DNA helicase, component of RuvABC resolvasome [Uncultured spirochete bib]

MNSEIPDDESIIHSPMNPGYDPSEDEKEATLRPRYLSEFQGQERIKDNLLIFIRAARERA
EALDHLFLMGPPGLGKTTLALVVASEMGVDFKPTSAPAIEKPKDLAGILT NLRPNAVLF I
DEIHLKPAIEEMLYIAMEDFELDWVIGQGPAARTVRIPLPPFTLVGATTKAGMVSAPLS
SRFGISLRFDYSAEELERVVRRSSRILDIKIDEDAVKLLAGTSRGT PRIANRLLRRMRD
FAQVKGAGVITKDIVIDGLARLEVDFLGLERLDREILKAIILRFGGGPVGAETLAVSVSE
SVESLEDY YEPYLIQIGMLARTPRGRIVTPAA YRHLGLEQMNENG*

>SPBIB_v1_100069|ID:27162220|queA| S-adenosylmethionine:tRNA ribosyltransferase-isomerase [Uncultured spirochete bib]

MKTDDFN FELPERLIAQYPPEHRGESRLMVLDRATEKTFDAMVADIASFIEPGTLMIFND
SRVRKARLYGICEQTGSHVEFVFLSPADEAEFDEQQFRGSDHAAQALNMPGSDKPVV PKH
KLPSSQRWL VVCSKAKRQKIGRKYLFPGELAGTIISDRVDEKIIEFSAPIGDEYFDRYG
HVPLPPYIKREDTKADEQRYQTVYAKRTGSAASPTAGLHFTPEILSSLRDRGIEIAHVTL
HVGLGTFLPVRTENIEDHRMHEEWFEISPEIANRVNAAKKEGRAILAVGTTSLRALES AW
YDGALHSGSYSTRIFIYPGF EFHVVDQLFTNFHTPKSTLLMLVSAFAGRERILEAYRS AI
EKQYRFFSYGDAMLIR*

>SPBIB_v1_100070|ID:27162221|tmk| Thymidylate kinase [Uncultured spirochete bib]

MHSINTDELK KRFIVIEGIDGAGTTTQMNL LAGSLRARGLS CVTTAEPTTSPIGMLIRSV
LSGKNEAAPSTVAHLFAADRNEHLYGKEGIAQKVEEGALVISDRYV LSSLA YQGVTCGPE
IPWQLNSRFPAPGLTLLFEVDPEVCIKRIDTRSNKEIYETLEFQKRVDHMYAVMADRLEQ
QGWHIERINADGDIETVRQRIEAVVFAFLGVPSCGITGSASRLHS*

>SPBIB_v1_100071|ID:27162222| exported protein of unknown function [Uncultured spirochete bib]

MRTKRPAIAIALISLLFAIYSTIVIVNLLRLEVQQA VGRSLDSVQSVVDQATGLSLDYDY
LSIDAVNRFTMHGIRLV RKDAPDVSPVQVRSVSLRISY WALITGRSTEV LKEVSASDLQV
DLVLPEDFIVQKLYKILFEGPLIVLPRFQLNIEPVHVHLKQNEPLADGTI HIESFQLST
LGGFPEIVAPSISADLGGFFGLPKDLSSKIGIDGSLAADFSTFD FSVNISAGAPSVLLLP
QQFVVSKRGSRIEARRRGKGLELVGWYEKGRWGLQGDMLGYRVSGDMEGKGEVWEVVKGV
RGDGHIEAWGEGKVLGGYRVDVKGA VDEGVRWGKYALGGLAVVLKGE GDSAGYRGVVEGV
HAGYGVRYEGEVGYASWAVKGSYTVSGAGVRV RGTVEGSGDRY GVEVAEGNVRGLVLGEG
AGQVKLTGEGYEVGYRGGV GAGRVSGEGSIGKDG GFEGVVEVEKVDVASVVAATGLKLQG

VEGVVSGRVYGLVRGGKVSALNGGEYEGRVQGVGVKVGLEGVGDEAGYTLKRAQGVVGG
IAVGLEGKGMVYRGEVFRGQVTVGGIGYGVQVGVKEGEVGTITVGDTAEGKVVFGGSRIEQ
VRLKGFVGVGGGVVWLKGGARGWYEKDAWGLELTVNGVRYEYEGEVYPQLEVSGTVDAKG
AKLTIDYFEYNARKLKGELTITYASIESIIRDFDASYTLSSIDYERAKIEGTIKSKDGII
DAAITANALPIEQFIPSSLKIAGDLQLKGGKASASLNGDKFSLANFSLLEVQFKMQKGEIN
GLPFSASGTADLKDSVLSIKDGSFAYLNHKIDAISANYDIKSGSAHFQAQVRSVIAEKL
TAYFNGDGKIAQDNPNWDLQFSGQIAKAIYNSRNIDDIGYVAAFKNGNIDLNLNANGSN
AHASITSMSEFEVSLNFFKLTGTAKGSVKENAVEADVSLNKFDLAALQMFIPENYIKDM
SGSASCSLKISGDLNDPAIDGNIALKAVSFSSNIYLLKVGPFADMKVSEGIIELGPAI
IKVGTESISLAATASLSRWEIGDIKAFISTQETAALRFKGTIAGLTAKDIRAKTDLTATL
SQSGLEIKGNIFLDNGTLEVNPAAGFVVSPEAKATVPLSLNIALTLGKNVELYLPQDFP
LVSGMSSPNSALNILYDQASGAFSVTGKVELRSGYVLYLLRNFFIKQCTIEFSENQTKFN
PLINAVAEARESSKDGMIIVTSLADQTPFENFKPKLSSIPPKSEIELLALLGGGLALSET
SDNNPLTIREAMIASSEFLTQNSLFRSFEQRVQKALGLDVLVYVRSSFIQKWLLDITGQST
KGLANYLSGTELVFGKYITDSAFAHFILRMAQNPLEETGVLQLDSELGLEFQSPFGLLEW
GLSFGKEGTPLNNQKISLSWRINY*

>SPBIB_v1_100072|ID:27162223| Outer membrane protein assembly complex, YaeT protein [Uncultured spirochete bib]

MRLHRALFAALILFFAFQTTMAQDTPDEWFWNKPIAGFQWEGLHYANRNDLDSMLRSYID
VAFTDTVWTDIQAALYALDWFDSEIPVALPAGDSKDKVIVKFIIVTEKPSISSIRIIGNSA
LRTSELLDAASSKNGAIFNADKAKSDTVAMQKLYLEKGYPDAKVEFETAPSPQDASRIIL
TFKVEEGTAVIVRKILFSGNSVVSQAQTLKSQVTLKEAGLFQKGAQFQESKLAESRSAIEDY
YSSKGYVDAKVVDILRTYTKKEKTSKNYLDITFVISEGKQWVFSGVSFDFGNTIFSTERLS
SFISLKPGDPLNLKRLSDKQKIDDLYESGYIFNSISMSQTRDEQAGSISFKISIIERD
RAHIGSISFKGNTKTKDYVIAREIPLEVGEVFSKTKIIDGLRNLNLQYFSSIDPEIHQ
SVENLMDLVINVEEMSTAQIQFGLTLTGLGQSNTFPISGFVKWNDSNLGGTGKNLQVNMT
LSPDEQSLDTSFGQNWLLNKRISQSLSFTIKHAMSQTAQDSIAPFSSDIPDPYTALGS
GANEWNGLLSSVPDNYLMKYDDYTFSLGYSYLYVYKIPRGDIGLSGGVSSGLGMSSYDAS
KYRPEKEMRDYNGQWILKNSIFGRVYLNRLDYWYNPVGKGYFLSQRFTYTGFSLNERQFY
IRSDTKAELYATLFSIPFSPSWVFSPPVGLHSGVQTLAQPWTPSVTKDWVYLDGTFSV
RGWKSLYGSKGTLVWENWLELHLPVQVVS LDGFLDAGAMQTQNGWVNMALDSPAEGE
WNLQWKHFVAFSTGLGVRVIAQFPFRFYFAKRFVFDGSAVTWKTAAGSDFVLSITQPLY

*

>SPBIB_v1_100073|ID:27162224|mutS| DNA mismatch repair protein MutS [Uncultured spirochete bib]

MPESSMTLEQYRRIKSQHRGEILFFRLGDFYEMFNEDAQEASSILDLTLTKRQGQPMCGI
PYHAAKTYIARLLKAGKKVAICEQKTIQGRRLMDRDVVEVITPGTVVEDDFLEQSANNY
LADICLLHGRLCFAYLDVSTGEFRAHSLPFDDRSKEVLRAELYRLSPRELLVQQSLDQA
NFLQVIRESAAMIEPQPDWYDVFHSAFMLKRRFGVASLKGFGFEDNDPALAAAGNLLEY
VQEMVHQSCPHIRAILRFEQKDYVLLDEATKRNLVKNLSDSSRRDTLIEILDKTKTAG
GARMLRQWLFQPLRNKARIEARHEAVSFLYHNQILLGDARKILASVLDVERLISRLAMDK
AHAKDLRALRDSVEAGLALFQLIEAEHPPMALIPRVS AEDKAECNQVIATIDSAIQDDPS
VLLTEGGIIRDGYNSELDELRLNLHNAQAVLESYLEEEKQHTGIQNLRIYNRVIGYYLE
VTKGKLSNVPSHFIRQSLVGGERYTTDRLAELESKINGAQERIIIELEKRLFLEVRENK
GNVAALLECAHAISEIDCLASLAQAATENGYTRPVMCEEPVIDIVNGRHPVEMCLPYGD
FVPNSISLSRDNQWFALITGPNMAGKSTILRQTALIVLLAHMGSFVPAEAARIGLVKIF
CRVGAQDNLARGESTFLVEMHEAAFILNTATANSLVIMDEVGRGTGLDGVSIWAVSEY
LVERVGCRTLFATHYHELTTMGLSGLRNMRMAVIEHDGTVSFPKRLEDGASSGSYGIHVA
RLAGLPDGVISRASEIEQHFHQLERGLGQEQQVEENDA VPGRIPAYSFSPKPSKEAYIP
DAESKKEKRAQMRRTGELFSPEDLVSELRSINPNEITPLGALQILSELVEKLLKQ*

>SPBIB_v1_100074|ID:27162225| conserved protein of unknown function [Uncultured spirochete bib]

MGMRFHFCVADCVD AIFPVRVLCGSLVSKSPWWPAPLCTSC EKTLECIGGLRCERCGRP
LISEQGLCAQCKNEQYILMHILPVFAYKGNAA RL VQCYKIEERASLAKYFSLRLAEMVPL
FAETSSDIAIVPVRPEKIWAGKFDQV GILANYLSRYGYRIWKGLVRRKGGAEQKTLAR
ADRLKNA YQSYMLRAGSMDIPEKALLLDDVCTTGSTLDACAEILAGKGTTLGAVLAAD

*

>SPBIB_v1_100075|ID:27162226| putative Ribosome maturation factor RimP [Uncultured spirochete bib]
MVEMNGKELEKEIDDLLRAAGLDLLEFSVTRHRGKTHVRAVIYSREGTGTDECAKAHRLI
LPRVQMRLGDQEPYIEVFSPGIDRIIRTEREWQAFTGSIYIMILTSVPEWRKGRLLVNFVK
GVVQIEMNETVVDIPIASIQKAKLDSSEHEGKTHGI*

>SPBIB_v1_100076|ID:27162227|nusA| Transcription termination/antitermination protein NusA [Uncultured spirochete bib]

MASEMAEAIKQLISEKGIPEELIKTLEDSILAAAYKKKFGTSENAIIRFKENYEGIEIYA
KKTIVSDDDFEDEVLEIPLEEARLAEAEIGDILEIPVDPSEDFQSVMLAKQTARQSL
RDISRDTLYAEFKSKVGEIIIIGYYQRRNGTIFVDLKGVEGIFPRKYQSPRESYHVGDR
KALIVEVEKTKTGFQVLSRTHAEFVRKLLLEIPEIYDKTIEIFKIVREPGYRTKVAVY
TKRTDIDPVGACVGPKGMRSQLISQELEGEKIDFIRYDINPKEFIRNALAPAQIKEVYIV
DDARHMALAVVEEHLSIAIGKSGQNVKLANRLCDWNIDVMTEEQYLQDSRNVELKKAAD
SLFSAEEEEQGEELLLKDLPGMKPEWILALESAGIQSIEQFLEAESEMPQRTSIAAEDLA
RIREIIEENVEIVQEEAEEEEETEAYSCPECGAPITMDMDHCPSCGVALSFEVDEGRDE*

>SPBIB_v1_100077|ID:27162228|infB| translation initiation factor IF-2 [Uncultured spirochete bib]
MTDSTDKDPKKVHLIKQAKQASQEQPIEPVAAPQPDQGTEKKKVVVVVKKKVVTAKKVQA
KVISPAGSAQGGAEETNKEPAASASAQVEAHAKLEIARPTPESSAHIAHSHKQEPGVS
GAVASLATQESSGKSEESSAEKKAETKPDAPRSPAHTSPSQSHRPDSSYNPQRRYSSD
GRAGNLAQGRPAPTSRYNQDRNESRPPAGTYPTRTSYGQQPSRSYPSTQTRPGQGPSAY
NRGPRPSGGSQYPGSSQYPGAPGGANRGYPSARSGQKPGSRPGGYAGSRPSGAGGYGGS
PGGSGGYGARPAPAPAGENRPTSTRRQPAKKKGTGFKREEEIELEKQIQLKKKAEAKLAAV
PKSVDIMENISISDLAKKMNLPADLISKLMSLGVMATINQKIDADTAAILAAEYGCVR
VVSLYDETVIEKAADKPEELKPRPIVTVMGHVDHGKTKLLDAIRKTDVVSQEFGGITQH
IGAYMVDTPRGKISFLDTPGHAFTKMRARGANLTDIVILVVSAREGVMPTKEAIDHAK
AADVPIIVAINKIDLPEANPDRVKTQLSELGLIPEEWGGTTQFVEVSALQKKGIPELFA
ILLQAEMLDLKANFDRLAEGKVIESRIDQGRGIVSSIMIQNGTLRIGDPFVAGIYPGKVR
ALFDDKQQRVEEATPAMPVEVLGFEGMPEAGDPFEAVEDEKFAHQISAKRQELKKYEEGR
NVKKVTLNLYETISQGEIKELKVIKGDVHGSVEALKGMLEKLTSEVHLNVIRAAAGA
ITEDDVMMASASNAIIIGFNVNRPPTSAKQLAEREKVDVRKYNIYRAQEEIKLAMEGLLA
PELKEQEVGKAEVRSIFRVPKVGIVAGCQVTEGIVKRNCQVRVIRDNIEIFQGSLSLKR
FKDDVKEVAAGYECGIGIENCNDLQEGDILEFYETVEVARTLESNNNGSDTKASS*

>SPBIB_v1_100078|ID:27162229|rbfA| Ribosome-binding factor A [Uncultured spirochete bib]
MDQIRRRRLEELIREEISRMITFGEIKDPRVNSFLSVTRVEAAQDGSHAKVWVSSLEDEE
SRLDEAITGLSHAAGFIQALLAKRVRLRLTPVLTFFPDRGIKEGFEISEKLDLLK*

>SPBIB_v1_100079|ID:27162230| tRNA pseudouridine synthase B (fragment) [Uncultured spirochete bib]
MSCSGFFLVDPKAGPTSNRVLQEIKRAFASKAYPTLNVKFGHAGTLDSEFASGLLIVLTGKC
TRLTPWFMHQTKYEAVFRFGEETDLDPLGRIIGHAELPSKDMLEQAIPRFQGDILQIP
PSYSAVHIGGKRSYKIARDGETPDLAPRPVMIEALRMHSYDGEAAHFSIRCSSGTIYRAL
ARDIAQACGSRAVFKSLRRTRIGPFAVDAALRPDMCSAKTMMHFTSEVAISLGLGAGLLN
PAYFDRFLHGSDDLPLSAIESRGKALDLFAGRSLADSPLALFSQSDAFLGIVQKSESGWAV
KVMAADEAKE*

>SPBIB_v1_100080|ID:27162231| putative riboflavin biosynthesis protein [Uncultured spirochete bib]
MKVLTWQDFLENVPHARIAATVGVFDGLHLGHQALIETVRKEAPQLKPCVITFRENPKKI
LHPASYRGSLLTTEQKLSAIEASGIEYCVLIDFSGKFATLSGREFLAALYVANVRFVAVG
ENFQFGHRLDTNAVKLEVLSEEIGLRPAIVKNVMYRGHPVSSSRIRHAVQEGRLEEADM
LGRPYQIIVQRGAEPGVMVAEDDLLLPPDGEYEGIANDGGAMQYCRVEIDHRNLKFLGLRM
QSEVVRFAFVDTATQEKENLVWL*

>SPBIB_v1_100081|ID:27162232|rpsO| 30S ribosomal subunit protein S15 [Uncultured spirochete bib]
MALSKEDKAQVVLEYGKDPKNTGAIETQIALISSRISYLTEHFKTHKKDTNSRRGLLKL
GQRRKLLKYLQRTNLESYREIVEKLQIRK*

>SPBIB_v1_100082|ID:27162233|pnp| polynucleotide phosphorylase/polyadenylase [Uncultured spirochete bib]
MINKLECQIGNETLVFETGRMAKQANGAVFATYGGSAIATACCSSTPTEGLDFVPLTVE
YSEKYYAAGKIPGGFIKRETRPKDREILVSRIIDRPMRPLFHKEFGREIQVVPTCISADQ

INPPDVIAANAASAAVHISDIPFEGPIGCVRVVALVDGKYIVNPTYEQIEHAKLEIVVAGT
AKGITMVEGGSHEASEEEMIEAIETAKEPIARICATIEELKHLAGKEKLPLAPLQVELNN
KEEIRAYAHHELLSKALFTKVKQERAKAVAQAIAAVKDKFKDALTDIQAQKLFKLMDDLQ
YEILRSSILDKQLRVDGRGLEDIRPITCEVGVLPRTGHS AIFTRGETQVLA VTTLGTVFD
EQIFDDIEGDRRERFMLHYNFPFVSVEVGRGTGRREIGHGDLARRAIEPMLPPKDKFP
YTVRVVAEVLNNGSSSMATVCSSSMSLMHAGVPVAKPVAGIAMGLITDETRYAVLSDIL
GDEDHLGDMDFKVAGTKEGITGFQMDIKISSVSTEILRKALEQARRGRLHILSIMEKTIS
APQSEISPFAPQVISARIDPEKIGLVIGPSGKNIKALSEKYDVQINIEEDGSVTVYGKDQ
KSAFNARDAILGMVEEPEVGKIYIGTVKRIMDFGAFIEIIPGREGLCHISRLAKGHVEKV
SDILKEGDTIQVKLMEIDHLGRLNLAIDSLENGEARERPARSDSRSSDRPRDSRPSRR
DFHRDR*

>SPBIB_v1_100083|ID:27162234| putative Peptidase, M16 family [Uncultured spirochete bib]
MPLLLKSAAGTMLAADSMPNASSVSIGLWLPYGSRNEKPQNRGFFHFIEHMFVKGTISK
AQALARTFERTGGFVNAFTERSTTCFHCTIPAKWKYACTTLLEMAFLSIFPEDEFEKEK
IVILSEILQTEDDPEELAHHEFFRLFWKDQPIGLPIAGELADIQTISREKLFSFYLEQFK
PEISFISIAGAIDENEAARFVEAELTRITSLRQKLFGTIGLAAENCEIIPVSAVPHIFS
AYEKNHASLSYVIQCMQVPPPQNVRRYLLNALMNEIIGGSTISRLFQSLREKEGLCYTVF
SSFETETLEALWIIHLQTGGKQLTRALDVLDDDEVKLSKGYPSAMEFEDARSRVAGLLQL
ASEDTDFRQRRMARSYFAHGTTEGIEQELALVQSIYDEVCSAASDFGSLNRARFVFGTA
KEKELLKRGYLEHE*

>SPBIB_v1_100084|ID:27162235|dut| Deoxyuridine 5'-triphosphate nucleotidohydrolase [Uncultured spirochete bib]
MSDSFAKQIEVSISLSGNAQMPNYATAQSAGADLCASLSEPVVIQPFARALIPTGVRIAL
PEGYEAQVRPRSGLAFKHGVSLNTPGTIDADYRGEIQVLLINLGDKPFTVTNGDRIAQL
VIAPCSRARFSQVAHLDETGRGTGGFGSTGL*

>SPBIB_v1_100085|ID:27162236| putative Permease YjgP/YjgQ family protein [Uncultured spirochete bib]
MKEKPPLTFWRMMFSEMMLSFLAFFFFFFIVFLINQVLLFAEDILSRGADLVSVAKLLFY
SLPTIIAIVPFSVLAATLMTSSRQHADNEFLASSTLGIPLWIYIPFLIVGLGIAVGSF
YANDWFIPRAANGFKTVYAELIRKSAKVELSPYTISKYGDKLLVTGASNAALIQNLLIVD
QKQGADANVVTADDVSIQSDSMDAILKMNNITEEKKLPGGEPGDFSMTTARQGDRIQ
IREQIPSYSSSTAPSEMSIASLARQIREKESRLASRLREKESQKATALDRLRLSYAQSSAA
SSALASFKSLASQKTEDTSLQIYRLEYQKKFVIPSACFFFAFLAFLPLGIGSRRAGRTAGF
GLALLLAVIYWALLFAGQTFGYRQGFDPALSMWMPNFVMFAAACLIWISRKI FTGHFL*

>SPBIB_v1_100086|ID:27162237| conserved membrane protein of unknown function [Uncultured spirochete bib]
MNEELVKSRFASLDLSQGPQKPFLLWKELTSKVLLWTAGGTLFSLVISLAELFSMLWKF
LARNASFIDILKWIGFGIPKHIVDAAPVAFLFAIVFILSEWHANNELEAVFSAGISLQRF
VLPLLVSVLLCATEYFVTDQIAIPFLRERSTLQSGILRESDSRYAVPALMADKGGKVVY
YRFYDEKKGRIYDISVIERDDSGALLRKISAKYASFENELWVFSDAIYKKS RDVWEFAE
APRFSDFAFDEPPASFMRPTMDVRFMNAELNGHIAFLKSAGLPAEDAEVEQQRRISFAF
TPLVVVGLAAAFAGRFRKSIFLLSLLSSSATLYYVAQMLASLA AKARMSSAGLAIWSV
MLLFAAASTVSYFKART*

>SPBIB_v1_100087|ID:27162238|tgt| Queuine tRNA-ribosyltransferase [Uncultured spirochete bib]
MANSIFIEKHRDPSCRARTGTLFLPHGEVETPTFMPVGTNATVKA VEPADLDAMGFNIIL
ANTYHLFLRPGPDIIAKAGGLHGFSGWKKNFLTDSGGFQVFSLSQFRKILQEGVHFKSHI
DGSSHVLTPEKVVDVQVAFNSDIQMALDICAPWGETEKKAFFRAAMLTYDWAKRAKSQWIM
HRENGYQGNLFGIVQGNFYEELRKL SAEQISELDLPGIAIGGLSIGEPKEAYIEYLELTS
ALLPLDKPHYLMGIGTPDYIIEAVRNGIDIFDCVYPTRTARNGLLFTSKGQITIKKAIKF
EDFSPIDPECSCHVCKTYSRAYLHHLFRNNEILYSMLASQHNHFTAD FVGKIRRAIEQD
RFEAFARAFMSGYSEAAAAAE*

>SPBIB_v1_100088|ID:27162239| Transcription elongation factor [Uncultured spirochete bib]
MAESPLNEKLQMLNEEKWTRTLMANYSVASLKELDRLVEDAVQQGVTDIIKTCTDHLS
QTKNSVIALYVAGILNIMRQPADES YLVQLMDL FADSKKT NIVEYICNRMLDYGENRIAL
MRLAECYAEDEKIEQRYAVWERLVRIDTEEAELAQLIAEWKEKNGRTEE AIDFYKKALIR
YINKSLFANIKDIWLKLDLSPEDLDFLHAQKKIAKQISPEKAAMLLMDLYAWYKKNEK
WETALDILKLSIEYDERNPALRKEFLDCYTAIYSGHSMFDECVRLSNLTQTYRSLHEAIA

DFEKRIAFDKGNFVFHRTWSIGRISNVTNDEIVIDFSKSRNHHMSLKMFGDSLTTLSKDH
IWVLKATWPKEKLRDKVKADPAWAIKVIKSFNDRADMKRIKAELVPSILSTSEWNSWSS
RAKEILKTDPMFGNASDDISTFIVRDRPLSFEEKIYAQFKAENFFARAQYFRDYIEMSD
IDSDYFEDMLS YFV SFLKIGQVNEYVVGSYLLKELSTRYPRLQQHVTIRFPDLFAQIKD
SIVPIYLGLKDTTELKNQFIQNIKTLPNWPDIYIQLLPYARSNKMLEALENADQEEKLKR
LAMYIVENYKDMREAFIWLAKDLKDKPWLKELGIVREKILTLHILDITFKEIDSHKDT
TENRKINKLVQNILFKEKDLEEFLEDAPQQVTERVYSMLADIKEVDP AIKLNKIKKIGER
FPDIKFYDGNERTVSHGLMVTASKYEEKKRLLSHIMEIDVPANQKEIAFALSLGDLREN
AEYKAAKEKQDELNSKVGKLNELDRAQIIGPEHVDTTISFGTKVTLKNLASGQEELFT
ILGPWESDPEKQVISYLSPLGKHELLNHKVGETLNFTINERKFSYKVLKITKAEF*

>SPBIB_v1_100089|ID:27162240| Tetratricopeptide TPR_2 repeat-containing protein [Uncultured spirochete bib]
MAIQPQIKNASAASDLLIAYESLKNADIQSADFLERALKTDFEHPEVLFAMKCMQFWKE
QLLNMPDTKNLLDRGDFLCASWKKFMVFLGHIGESFETTRYAFKRIFIGLALDQYLALPD
EQKESLGAIDLRLGRSRKATGDIETAIVHLERAAQSQRNDAAILSELADAYAMAGEARL
SKALFREAFFIDPQAVEIDFLESEFILKIIENVRNLGYSNDIAEWIPVYAEIWGVFNLK
RELSTAEYNRISASARQIEIELRESPQRSSLLPRLNRYFWMADYLKAQGDEAGWHSVS
LKIKILDQSIHALYVG*

>SPBIB_v1_100090|ID:27162241|rpe| Ribulose-phosphate 3-epimerase [Uncultured spirochete bib]
VKIGLAKAADLHYSVDCMKMPIIAPSILSADFLEIGA AVESIESSGAEWLHLDVMDGHFV
PPITFGNKMVSDIRKRTGLFLDTHLMIEEPERHIHAFLDAGSDAITFHAEACIHSRLLQ
TIRHSGKKAGISIVPSTPVSQILPLLQAVDQVLVMTVNPYGGQKLLPFCLSKVDEL RDI
RKKEGLDFLIAVDGGTNLSTISQVAIHEPDILVIGSAFFAAQDKQAFACSIRSAWNE*

>SPBIB_v1_100091|ID:27162242| exported protein of unknown function [Uncultured spirochete bib]
MKKYILGLLLLLAGISLSLHAQGNDEIFAKFSSAFDLFKKENFQKAGSEFALLYETWSES
SLASDSCFMAAQSYFNAGDYPTSYLYCVQFIQNYSDHPNIPDMKFQLGRIFFKTGRFKDA
IIAFDDFLKAYPGSPLFASALFWKAESYYQLGDIARSFPLFNLKEKWPDSKASL VSWR
LNVMGLEAREAKFSRLMAYETEKAAQMEIGGMQKEALQEQQYIRVYYLLKTLRVRNELPG
SSKLPYVQYTPQNAPEVDSNLKSRLNKLNVLLEAKKRILELLAKIDAYMREISP*

>SPBIB_v1_100092|ID:27162243| exported protein of unknown function [Uncultured spirochete bib]
MKRSFALLAVIFCFTSAATALDLRSGLVRIATDDLTLRPLYRLVDIAGKKKYEPIWYSD
DPRTSFIVINVDGRIYRMGSSQEYQTSQKQIANGIEIEYRSIINRVTQRIQFASLAGSRV
ANGFLVEIEVENFTSRDMKIMLKEVC DTWLGEKSGNHIALASNPKVIDEMYLTPDSQEPY
IVSPGEYASVALLFDSEPRPDAVVIANWKRLSDSMFAYDSSLMRGFTLSPYSINDSALGL
YWNERIVPAKGVIKVSSRWLTGGPGNEFLAWLADNYPPKAEQQTTEAQQNSTEQMSLPAL
DVEAIRSLLARIDSAIQNV DVLSD EDLQILSELDSLEQGVANPIPQN*

>SPBIB_v1_100093|ID:27162244|dtd| D-tyrosyl-tRNA(Tyr) deacylase [Uncultured spirochete bib]
MRAVIQRVSEASVTMQPEDNSGERLCGRISNGILVYLG VGVDDTDEDASYLAEKIAHLRI
FMDQQQKMNL SVLDLGYEALVISQFTLYADSRKGRRPSYSQAAEPARARYLYELFCKKLR
NQGLHVQTMGFQEIMRVRYTNEG PVTILLDTKN*

>SPBIB_v1_100094|ID:27162245|ppdK| Pyruvate, phosphate dikinase [Uncultured spirochete bib]
MPKKKFVYSFGAGVAEGDGMKELLGGKGAGLHEMTKIGLPVPAGFTITTEVCDLFFKSG
KKWPEGLEKEVQKHLKQLEKTTGKTLGDPRDPLLVSVRSGAPVSMPGMMETILNLGLTDA
SVEGLAAKTGNRRFALDAYRRFIMMYGSTAMGIEREEFDKAFDEIKAKRTRARLGIPADQ
KVNDTDVNEEELDELKMFKKIYREHIKVDFFQDPWEQLKG AIDAVFNSWMADKAVTYRK
VEKLVGIKGTAVNVVQMVFGNKGETSGTGVCFTDRPNSENVFYGDYLVNAQGEDVVAGI
RTPIRLAELDKRDPKVYKQLVDIRRKLEKHYRDMQDLEFTVEEGKLYMLQCRTGKRSPIA
AFRIAVDMVKEGLISKEEAILRIKASDIEGIFYPMIDKSKPEELKKAFLVQGIDAVPGAA
TGKVVFNADAEWAAGKEKVILVRKETSPELVGGMHAAQGILTATGGKTSHAAVVARGW
GKTCIVGCEKLDIDYEKGIFAVGETVIKEGDYITLDGGTGNVYKQQLKLVKPEPPKAYTT
LMSWVDKIRTLKVRTNADTPYDAEKARQLGAEGIGLCRTEHMFDFSEERILAIREMIAD
DLESRKKALAKLLPFQTKDFEGIFKAMDGLPVTIRLIDPPLHEFVPHDEEGQRALAKAVG
VSFEKVVQRVEQLHEANPMLGHRGCRLAITYPEILDMQVTAIITAACNMTKKGIKVLPEI
MIPLVIDDKELKILETRTREVADAIKSGIKLSYMGVTMIEVPRAALLADRIATVAEFF
SFGTNDLTQMTLGLSRDDAGKFLPDYVDEK KAGVFKADPFQSLDQDGVGMLIRMGIEKGR

SVRPKLKVGICGEHGGDPASVKFCHRVMNYVSSSPFRVPISRLAAAQAVVEETASAKKP
GKNRGRPAKKASAVAPKKTSTRGRKPASAVRAVSASSAASAAPKRRGRPLGSKNKNK*
>SPBIB_v1_100095|ID:27162246| exported protein of unknown function [Uncultured spirochete bib]
MSRIPGVAKAFLFAAVISIMLASCIGIEAATKMDAKGSGTLSMEYQISNEFAQIGALET
PSLPLPLSREDIEKSLQRIEGVHLKSYSQNSRANNIISFTLLFDSPSHLAYYLDPAGKF
VQYSQEDGISHLKLTLGDAIQPLDKQMKDALYEKVKPYNFKFTFEASQAAPPEISMQNADF
FKTATSGKKVTLESSMADLLTSVEPPRIDISWR*
>SPBIB_v1_100096|ID:27162247| conserved protein of unknown function [Uncultured spirochete bib]
MLRMVLRLEASTIKDKRRVVLAIKEKLQHRYKLSCAEVDLLDSVMFAEIGAALVSNPQ
HGETVLRDAVTFVEDHYPVELYDVQTHYEIFG*
>SPBIB_v1_100097|ID:27162248|metG| Methionine--tRNA ligase [Uncultured spirochete bib]
MKRRLITSALPYVNNVPHLGNLIQVLSADVFAFCRLRGYETLYVCGTDEYGTATETKAL
EENLSPRELCDFHALHRDIYSWFEIAFDTFGRSTSPDHTEVTQSFIFLDLDRNGYITSQS
IEQLYCDSCRFLADRYVRGTCPCYCYEGARGDQCEMCGKLLDPMELINPKCATCGATPK
PRTTTHLYIDLPAILPKLEAWMKEASIKGFWANNAIQMTQAWIRDGLHPRAITRDLKWGI
PVPKKGYEDKVFYVWFDAPIGYISMTVSLAKEKNFDWKSWWQNPDKVELFQFIGKDNIPF
HTVIFPSSLLGSGKPWTMLHHMSSTEYLNYEAGKFSKSKGIGVFGTDAMETGISADVWRF
YIFWNRPETS DYTFTWADFQEKVNGELIGNLGNLVNRTLTFVSRYYNGVIPEGEPDAAFW
KEVLKLEENVAEHLERAELRDAFRSIFAISDLANKRFQDEAPWKARVEEPAKAASLMRDL
CYVLKDLAIMTYPYMPKAAENLAGFLGLSFGAQGLSWRELGPAGLPGTVRKPEMLFQKLE
DDLISALRERYSGSQKERQERDAQENAEGPGVQGPAAPPSAPPSEPPEQRFFKLVDLRVA
KIVKIERHPKADKLYIETLDDGSGKERTIVSGLVPFYKEDELLGKNIVLVNMLKPAKLRG
VESAGMLLAASVSAPDGTESVEVLAAPNASPGDRVILEKTEGEPASSEIPSAIIDVDAFF
SIPIVAKDGS AWVGTKRLVNGEPIALRRVLNGEIG*
>SPBIB_v1_100098|ID:27162249| Methicillin resistance protein [Uncultured spirochete bib]
MNVLPHVAFPTISSASDCIPEFEYSSFLQSKFWGLFKARTGWQAYSCSYDFEDDGPHGNL
LVLRRIA KFLSFLYVPHGGGELSRLPDRWNALSMLGRALSES MGKSDAFVRFDLPWERM
LDEKTEFELTS GPTGSKRLILHKGTDVQVADTVVLDLAKSTEELLSGMKPKWRYNIRLSE
KKGIVTKHKGKEGLPLFMKLYEETAKRDKIAIHPESSYYATLFDTVLEVSDLMKEQGIPQQ
DRPILSLYIAHHESDALAGIIVLKHGPVATYMYGASSNLKRNMPAYALQWHAIQESKEQ
GARMYDFFGIPPQGDASHAMSGLYLFTKTFGGKIIHRYGAWDVPIHPWLYAIFRSAEKM
RAFWHKKVKK SIRKISPTASAAHPSAGERDDSEKTNPSNP*
>SPBIB_v1_100099|ID:27162250| conserved protein of unknown function [Uncultured spirochete bib]
MKFSIDIDDQKALLKYARKVIQA ALEHEPEPEPPELSTTLRCGAFVTLREDASLRGCIGR
MQSNDPLARTIAEMALAAAFEDPRFTSVAAEELPRLEIEITLLSPLKPILPEQVVVGKHG
LLISALGRSGVLLPQVPTEY GWDRETFLEQLCRKAGLAAGTWKSSLAQLYGFEGFVFS
SLSPAEG*
>SPBIB_v1_100100|ID:27162251| putative MEMO1 family protein Asulf_00361 [Uncultured spirochete bib]
MHTDKLIRSALLPGIFYPADPEQLKSEVRMLAMQTEQMPHSGCAIISPHGSFRYSGLLAA
KAWGSLVGANPSIILAGPAHLPYEEGVFLPESSQFDIPGAVLNVDVSFAEYLLARIPEL
KKNDLVHLEEHSIEMQLPFAEHFFPGVPILPFIVSGRDEKTVATVEQLFEEIRVCVENQG
VLILSSDLAVSNTPEECDKLSNEFIAALSCGSTASFS AHDVSRHSFCGEPAIRAFRHAYP
ESKSRLAYANSAPFREGSDEL VVGYGAISSFR*
>SPBIB_v1_100101|ID:27162252| conserved protein of unknown function [Uncultured spirochete bib]
MRISRILIWYRMESVIQALLYEEKMLHNRLQRLNECASRPKGS IILKRRFHMVYAYLQW
REGEKVVSRYLGKSDSWKCRSMQAKIERRKYE QEMREVQNKLKKIHHLLLEEAKKLG*
>SPBIB_v1_100102|ID:27162253| putative galactokinase (Galactose kinase) [Uncultured spirochete bib]
MNSMKDIFAIHLSEYETAPDCTVAAPAIVKILGEHTDFTDGLVLA AALSFEV RVAVSFRK
DNSLRFYAGDFNERKRANIATLKYKREDRWANHIKSICDYFLRVFELEPKGLNVTIQSSV
PLGLGLGISSSLNMAAAFIFKTIYNLDIKPDELA AHACKAQSVFFEKDFPITNYLAITAP
AGRSFSVVDLRTRKRRGIQFLPEPWEMVLTDSKVPRLSVEAELEQRTSDCNA CLSVLTPR
GNRSIRDIAPRELDELLGIVPERKRRRCLHVLEEVRVSEAEDALARQDYAGFARIVNKS
HASLRSLYEISCP EIDWLAKRALELDGVLC SRLVGQGFGGSTLTILNNDVKEAYRHRLEE
YERIFGFRPVVYEVSPGSGLRILEH*

>SPBIB_v1_100103|ID:27162254|surE| 5'-nucleotidase SurE [Uncultured spirochete bib]
MRILLTNDGDIQSDGLFALVDSLGLSKNDRGEQLHEIWVVAPEHERSGVSHAMTLKKPTK
LRKLGEHRYSCSGTPADCVIVAGLGLVHEAPDVVISGINKGPNLGTDIISGTCTCGAARQA
ALEGIPAIAVSCASFGDNLEYGGLTSFVASNLEKLIALWKPDSFININGPSTSTCTDLCAV
WANPGKNRYLDNLKCFDGADGYTYCFLAEGRQERTPDIYSDHHA VSQGFIALSLVEIHPR
ALHDTALNGTSVFEAPNLHSGSEVKH*

>SPBIB_v1_100104|ID:27162255| conserved exported protein of unknown function [Uncultured spirochete bib]
MEQMMKMPNLRKIMQFSLLSIGLLVMAFSILMVVAPFRRAPAEVKIKNGATLSSVSRDLR
AANVIPSSKIFALYMRLAGAERAIKPGTYRFEPSPPYEVARKLIRGDTIALKVMPIEGR
TARQIAQILESQKIVDASAFLAAVNDPVLTEKLGIPAKSSEGYLEPDTYFLEPGSDAEQI
VVQMVANFRAAMKKIAGEMQDTLNAQALYEKVLASMIEREYRVPEDAPLIASVFNRLS
KNMPLQSCATVVYVLTTEHLGRPHPSIVYYNDLRVKDPYNTYLNRLGLPPGPISNPGEVSLK
AALFPSKTDFLYFRLDDSSSGKHRFSRTLQEHNEAGIIPKGL*

>SPBIB_v1_100105|ID:27162256| DNA primase [Uncultured spirochete bib]
MARIPPQTRQEILDKTDYLSIYQEHVRLQRKGASYWGLCPFHSEKTPSFSVSADTGLFYC
FGCHKGGSVIQFLMDIDKLSYTEAMEELAQRAGVTVHFESEKAGEAERERQALLELYDR
LSRTFHWFMLQHPGHRALEILQKRGIPDDLIERFSLGYAPASRSWLFSFLKAKGYSDNF
LKRSGLFSRNDVAWPLFADRMFPISDAKGRIIAFGGRAMDQDGPKYINSPETALFRKQD
TLFAFAQALESIKKTDEAIVCEGYMDVLSFHAAGLTNAVAPLGTAFSTYQAMALRRKASK
VVLCFDTDEAGLRAAERACSIATAVGLETSVLLLEGGKDASEILERQGAGELTRMAKNTI
NSGLFLLTRASQLFDISTMEGKAKAVAFLPFLDAMDSDVRRQEYMKEIARTLGVSAHAV
EMDYAKAKASGSYHQRDSANPSVPMGSSGSARTADLVFIAAVILSNNPFLPSVLQLDSED
IEDARAKDLIAALKEAEKEGIRDIEGILSFCPDDAAVRFVHEIDASGELSEGLEKIIDG
LARKRKKALEKERSRLVASLQAKCAEDRMQEKSILEKIMRIDEELKKTGGDLDE*

>SPBIB_v1_100106|ID:27162257|rpoD| RNA polymerase sigma factor RpoD [Uncultured spirochete bib]
MSDLELDPAILKLEYAKEKKTISFDELSDMLPEQILNSDKMEAIINLLVSSNVKIEEEV
QIEEEPLPKIVAIPSKNKMVANDKEIASDDPVRLYLRDIGRENLLTAEQEVELSRTMEQG
ENIIKNTLRKSGMLIPEFYQIIVKATRKEPKDLSLQKENTEKIAERRRLNQFYKDLIDS
CAADLKAVIDLKKWVIAKGGDVFEFAQLKEIRERLYPIINEADIHPEEITAFSEKFIAAA
KKIIRNRKEQDRIEGILQVSSAKDLRALGRNLTIKEKREEIEQRLGLSAEEIKDRIRQLQ
VNEKKLKDIENNFETPIDRIISMAREVNRGRKMMKSAKDKLIKANLRLVVSIAKKYTNRG
MQFFDLVQEGNIGLIKAVEKFEYRKGKGFSTYATWWIRQAITRSISDQARTIRVPVHMIE
QINKVVRESRQLMQKLGREPTDEEVAEQLGWEIDRVKAVKNVAREPVS�DTPIGEDSDSL
LQDFIEDKEVENPAVRTDYNLLQEQLRMVLATLPKREQEVLRMRFGLEDEGYSLTLEEVL
YFNVTRERIRQIEAKALKKLRQFKRSQKLRDYIDH*

>SPBIB_v1_100107|ID:27162258| conserved protein of unknown function [Uncultured spirochete bib]
MPMRMDEVFETLRKYQELLSQRVELESQLEAMPKTIDIQNQMLSRRERKSWAEAKEQYEIS
ESNLRELRLQEELEEAEMKRENAEKQMDGITTQREYDAVNKEIREASEKEQELRRRIQEEER
RFAEIDDRLHRIEISVSTLEAIEAQKRTEIEAKTKIVLDEAEKIKSEETSLTSELDEDLK
FKFERIIRSKSGMGIVPIHGVVCTGCHMILPANFVNEVRQADKIVFCPYCSRILYFEEAE
TDESIEEILAGSLVDLNDEEAEESESESNDESEETVSKAKRPSSRKKKNQSEPLIDNDF
IIDNMDE*

>SPBIB_v1_100108|ID:27162259| putative Tetratricopeptide repeat domain protein [Uncultured spirochete bib]
MFNAFFRKISTRFRPLWIAAIVFVLIGCISTGLFFILKNSDAKGVISHREIAKLWNEG
NIEKTIAESRKATEAFPDEYYLSMRGISAYYSALDAQDEETRQQLLEESVISLRKALVI
GVPSGMKAQIFYVLAKAYYQKGEPWFDLAERYFLLARNSGSKEKDLPPQYLAVVYAGKKDY
EHAIEWFELSLKGDTSILLSAAISYKNIGKNDKARELLASLETHATDAKIRLKAKLLL
AQDSYESGDFSTALQRYEELKEDPLNADAWYGLGLVYAKKNDQLGARA AFRKVVQIDPN
HADARKRLAEKL*

>SPBIB_v1_100109|ID:27162260|mreB| cell wall structural complex MreBCD, actin-like component MreB
[Uncultured spirochete bib]
VGILDMFSPDIGIDLGTCNTLIYVKGKGIVLNEPSVVAVERGTNRIVAVGTEAKNMLSRT
PTDIIAKRPLRDGVIADPDTTEKMIKYFIQRVFPKNLFFKPRVVVGVPCTCITKVEENAVI
DSTYKAGARQVKVIAESLAAAIGAGIPITEPAGHMICDIGGGTTEISVISLKGMMVVTSIAI

RIGGDEFDDAIKHIRNIHNLIGDQTAERLKIEIGNASPERTIEKMEIKGTDAITGLPR
RFEVDSVEIREALMDSVNIIVEEIKKTLGKTPPELAADIVERGIVLSGGGALLKGLPKLI
AKETGVPVILA EKPMECVAIGAGKYFEIMQRNIGSSSVYESLNL*

>SPBIB_v1_100110|ID:27162261| putative Cell shape-determining protein MreC [Uncultured spirochete bib]
MKNNGFHRPSRTVHRKAALFILLSLSILFVSTSTVFRVPDLFHGYVIGNIQKAFAAVSSF
VSRTVGAVSELRNKKDYEALLAKMQEYELKEREFTSLIEENKRLKDLLGLTSFPDAKKI
AAHIIARDPGNTYSSSFVIDKGYNEGIRKYPVIAFQDQVEGLVGKIIDVKASTSTLQPLY
DQRFFAAARLAKTRA EGLANGRGRDAPMTLLYIPKTEM DTLKQGDIVVTSGLDQVFPQD
IIIGRVGSYQLNEFSSSLVIEVQPAIDLSRVEYVFAIENQGALTPYAGGKQ*

>SPBIB_v1_100111|ID:27162262| putative Rod shape-determining protein MreD [Uncultured spirochete bib]
MRS LFISLSASILMLFIQSTWLSHGIVFGIIPDLAMSIVLFSSFINKDGGQGIIVAFIAGL
IADMLSAAPLGYAFLYVSCAYLATLLSYVAEKDIFIIPFLLGTGAAIARGILTRFVSWI
FAANINTYQIFSAEFGIELLADGFFT VLVFFILTFQPLENSPRKALP*

>SPBIB_v1_100112|ID:27162263| Penicillin-binding protein 2 [Uncultured spirochete bib]
MAVLKKKITNRILRALV VVLLAIYALNLFMQILRKQLFTSEAERISLQSTRIPAPRG
EIYDRTGRVVLAGNIEAYS VYITPSELPA TKRESVILLSSKLLNISAEDIESKLPTGRLT
SYGRVAVAKNASLSAISEIAAHIDEFFGVS WTSQPLRDYADLRSLSN TIGYVGSITRDEY
KLFYNKGYTLEDLTGKAGIELIYEDLLKGKDGWIAKAVDVHVGKDISRNKARIEAPEPGKR
LILSIDSNIQKIAEDALGKRQGSVVVLKPATGEILAMATYPY YDSRVFMSDNAGQEYLKL
LNDPQKPMLNRAYQSSYPPASTFKTVLSTAILEEGFISPDKTIYCSGEINYGGRSWSCWI
KKPGHGAVDLKNALAQSCDIYYWTVGRDYIGVENIVSYAQDYGYGKLTGIDLPGENPGLL
PTPTWKEEKYNDSWTPGDTMNL SIGQGYMLASPLQVANMMAMIVNGGVIYKPHVLKEIRD
PGTGALINEVQPEVLQKSSISEKTFETMRSLLRGVIVYGTARAPISTKAVQIAGKTGTGE
IGLKDRWHSWFASFGPYDAPAKDQIVVVTMIEASNPEWVWGPYAANVIYQAIYAGQDAKT
AAATVGVKLDGIAVGGRE*

>SPBIB_v1_100113|ID:27162264|mrdB| Rod shape-determining protein RodA [Uncultured spirochete bib]
MNLQSLRRLFGNIDYLLIATILLCAIGIAAIYSSGVDAEGRLVSNEYVKQLVWFVIGFF
LLAGAALFDFSRFKDTSWIFFAIAIALLVLTRVAGR VVNGARAWIGIGGFGIQPAEFAKI
ATVLMMLGRYLD SA EYDSSFKKL VMTGLILSLPLMLLILIQPDFGSALVFFPAALIMLTLAD
VDFRYILFGVISILGIFLFLSLPLYA ANHYSQDNILNVIIAKTDILVLIFVILFIAVIA
GVGWLKFKKRYYYWLSYAFAILAFS IAGAFAAHKLLKPYQIERLLVFIDPSIDPRGSGWN
ILQSITAIGSGGFWGKGYLQGSHSHARYIPQQSTDFIFSIIAE EFGFFGCLVLFALY AII
FIRCFVLIETSKDRFSQYIVGGILGIFAFHFMINVGMAMGIMPVTGIPLYFISYGGSAMW
SSLISIGILTGISARRYSA*

>SPBIB_v1_100114|ID:27162265| Radical SAM domain protein [Uncultured spirochete bib]
MRKSFIDPLRDFGDALFHIQKPARYVGGECDAVPAIDQDDQRLRIAICFPDLYEIGMSNN
AIRILYSMLNEKRSSLICERVFAPAPDFENLLREKNIPLYTLESGIPLSECDILAFSIGY
ELLATNVLTVMERGGVPIESIERSDKDPIVLAGGPAVTNPLPFERFFDAVWIGEA EAGFV
ELMDQVAELKKSQAQRTDILRHISRHPSVWMSSASCKALGIEKKRVVRAIYPDFPKTAY
QPSFPYPVLNPNVHSHGTVEIMRGCPNGCRFCHAGY YRPQRSKYPGIIQKEVEDLVMQKG
YREITLSSLSSGDYPGIVELFETLNSKWSAKKISFQLPSLKVDSFTLPLEKISEVRKSG
LTFAVETPLDEWQCSINKRVPLEKIELILREAKAKGFRSAKFYFMIGLPVSGRGMNEAEA
IVEYIKKIAAVERIAIHVNVGTFIPKAHTPYEREEQLSEEEALECINYIRRNFRYMRNID
VTYHPPFLSVLEGIISRGDEAVGDLIIDAYRSGARLDAWEEFMNRDVWRAALKKFNETRG
EGAWQAYLHKRSLREELPWHTISLKV SQWLKHEKEKAENGIIT AACNEICTNPCGICDK
YINIVSNSILVEPIFDNIEFVGSSNKKIRKIDFEWAKAKEDNRIRMKLVFTWSKRD L AVL
YPMHEVANAFSRAFQILGIPMQYTEGFNPQPKLELSPPLPLGVESERDILGVFISVDKDA
QQLRFREISESSLAVLQSINENLPKGLAVDSIRLAQ GKHTIGSLFSAAEWKYAFIDQESY
SIACAALCSNSADFISWKSFDDSRELFVLENFEPASGKIKNFYKTLKTFSESSKGKEIKF
RACRTKCFAKDEAGNLLPLEEAL*

>SPBIB_v1_100115|ID:27162266| exported protein of unknown function [Uncultured spirochete bib]
MRGRKKYFFDNPRIVAAGAKRKS YIFRALLFASAAISSFLMFSCGTPSAEYL YHPIDFTS
ETGILRLLPNPSNIDDSYVAALFKGYEIIYHVFD TNDAAALNSLSLLQSLSSYDPSYFMSI
ATSSTYNYYP LLHRFDYLIDPHRPLIVVSN TTNNTYLEFDLNMEINKSWSITS GTDIIVD

SVVRNLANNTSADFFVSAYYNSKDQDYTGSDSPKTVYIVFFAVSYGISEASLGNALYSEP
VIIDAPVEYTPNS*

>SPBIB_v1_100116|ID:27162267| conserved protein of unknown function [Uncultured spirochete bib]
VNQQEKQPRKDMNVLNKNEKKAFFSDKLADDFISANRILFIGIAIGIVVAIAAVGIYTAVSE
NVATASSRAMELAEQKLQQWSQETDEQKKADSEKALLVDLDTIAKKWPHTIAAQRALLRK
AAILNQQKEYADAECTALDALARNKNSYAAPIALELAAVSAEEAGNKDAAIAHYTQLAKD
YLKDNVPAPHALFNLGRLQEEKSDYKAAMASYNQLVSAFGGSDWALLAKNRIIYLKAKGL
AE*

>SPBIB_v1_100117|ID:27162268| Transcriptional regulator, NifA subfamily, Fis Family [Uncultured spirochete bib]
MTAMVSAIDPDKFRTLIDINARLNSSYTNFRSLLKAIVESAARLVGAEEASLALFDAATE
TLRFEIALGPRGLELQKKSIPATEGIAGWVYQNSKSIIVNDAAHQRFSPSTISKEIAYST
NSILAVPLKVKDKTEGVIELINKTSHGLFMADDLEWVEIFAVQAGIAFENAKQFERTEHE
LTYLQQKVQEEQGWHPLVFSSKVMQERLDLVKRVAPSDASVLILGESGVGKELIAEQLHL
LSRRAEKPFVRVNCALPENLLESELFGHVKGAFDTAISNRAGRFEAADGGTIFLDEIAE
LPLRLQAKLLRVIQKTFERVGSSETIKVDVRIIAATNRDIEKLVQNQEFRSDLYRNLV
LPIHIPPLRERLDDIPPLAEHFLKYARETNRGIMHFSDSA VQCMMGYSWPGNIRELENA
IERAVLIAKGNLITADDLMIGNKAEPSYKQFEGKDLKEAIIKFRHYIQASLEQNRWNQT
ETARHLQIQRTYLSRLIKELNILQNKE*

>SPBIB_v1_100118|ID:27162269| 30S ribosomal protein S1 [Uncultured spirochete bib]
MAENKEVEMDVTEPSRDDIQTQLQEYQLKSLEGLEEGDLIDGKVVQVAGDTVFDVGYKS
EGKLSLEEFQDNPPKAGDIVK VILIRKETHSGDIVISKKKADEKLFWKSIAAFKDHLPV
EGTITKEVKGGFEVNLGHGLTGFLPLSKADIQRLEKGSSELVGTQAKFYLERLYSDKKINI
ILNRRKLMEEEEIEQHRASFFQNTQIGDTVKGIVKSFTSFGAFIDLGGFDGLLHINDMSWG
HVTRPKDFVRKQGIEELKVIRLDPEEKRINLSLKHFTPDWNSFEEKYHVGDVVKGVTK
LTDYGAFFIEIEEGIEGLAHISEFSWVKKVRKPEDMLKAGDIVDCMILGYDIPAGKVSLGL
KQVQPNPWTIDERYPAGTRLKRKIVKVTNAGAFVELEEGIDGFLHIDDYSWTQKIKNPS
SVLHEGDEIEVIVLESNAEDRNVRLGVKQLSEDPWRSFAKTYKFGAIVEGTVSSVTDGFGV
FVKVPGEIEGLIKKQDLVSDRSESYDDALKKYQPGMQVKA VVIDLNPDRQKLGKLSVKDLI
QKQQREEISRFIQEDEGEAGYTLGDLLKAKDKEND*

>SPBIB_v1_100119|ID:27162270|cmk| Cytidylate kinase [Uncultured spirochete bib]
MKVAIDGPAGCGKSTIARMIADNLGFLYINSGNLYRAVAYLALREGVSWQDQALTALMR
QHRFDYKPDGSLVDGERLLAELRTPQVDAIVAQVSAIPSIRVEVNAIIRAISEGKDVIS
EGRDITTVVFPDAEVKFDYLDASSQVRAERRFRERQEARSHAFSQPDSQQAPRDMIAQTIP
APQSAPAIEEIRKNIEMRDQIDTQKSVGALKIAKDAEYLDTSDLTIQQVYEKVYNKIISA
RKAHGRK*

>SPBIB_v1_100120|ID:27162271| Pseudouridine synthase [Uncultured spirochete bib]
MSDLQAKPIRLHAFLAAAGIASRRACEELIKQGRVEVDGQPASIGQKVYGTEDIRVNGQP
IPVLSQKRFRYILLNKPKGYLSSIKDPQGRPCAIDLIAPSIPDRLYNIGRLDQWSSGLL
FTNDGNFAAQLMHPSSSEIDKEYFVQTDQPIPPGFAASFMRGIILEGVRYRAHAVRVVAPD
KAHIVLIEGKNREIRR VLEHFGLRAKILERIRIGPLSIGELSPGQWRDLTEQEIYALKAY
MSSRPSNKGPRK*

>SPBIB_v1_100121|ID:27162272| Segregation and condensation protein B [Uncultured spirochete bib]
MNEQLDAEAAALVGAILFLENPVSEERLAKISGLTDEQISLALQRLCAEYELPVHGFAPT
QSAGGWILAPKLSLWEQLKDHYGKKNEMKLSRAAMETLAIAYSQPITRAEIEAIRGVNV
DGMIRLLLSRNLAIEIGKRDAPGKPMQYGTQDFLKYFKLNSIADLPKLDEIENARFSKP
ETPEG*

>SPBIB_v1_100122|ID:27162273| ScpA/B protein [Uncultured spirochete bib]
MMQDFDNDANGEPISVSSTGRTFHLSDFEGPLDLLLYLIKKNEMNIYDIHISSITEQFLQ
CLNSDPSASLDELSDFYQMAATLLYIKSRMLLPNSQDELDEIDPRRMLIDQLIEYHRYK
KLSELMEQREMEVEWFVERSSSQRTLFPADNPDEPWIPADSWDLLRFTFASMIRHFDSER
IIDLYEEVSINEKIALIHELLDKKGNFRFDDLISRHSSALDLACAFLAVLDSTKNRIISI
RQHRLFGDILIPYSSPEAPHERTA*

>SPBIB_v1_100123|ID:27162274|folK| 2-amino-4-hydroxy-6-hydroxymethylidihydropteridine pyrophosphokinase
[Uncultured spirochete bib]

MEKVWLGLGSNMGDSAQILELAVQDLSKMLSDMHVSGLWRSRARYEYEEQEDFYNMVVCGM
TELNPRQLLDSIHDIACYGRNRSREIKKGPRTLDDIDILLYGGKIITEPDLIIPHPGLAE
RKFALLPALLEIDPSLIHPVLGVPLKMLAASLPPQGIYPASESQYDEPYE*

>SPBIB_v1_100124|ID:27162275|recA| DNA strand exchange and recombination protein with protease and nuclease activity [Uncultured spirochete bib]

MAKRQIRAAEETVSEREAKFSQESNAASKQDSGIDPEIQRERDQKLKALEAAKLQIEKQF
GQGSLMKLGAHVIAQGIEVVSSGSILLDEALGIGGYPRGRIIEIYGPESGKTTLALHAI
AEAQKKGGAIAFIDAEHALDPVYARNLGVDINELYISQPDNGEQALDITESLIRSGAVDI
IVIDSVAALTPQAEIEGEMGDAHVGLQARLMSQALRKLKLAGTLSKSKTILIFINQIRMKIG
VMFGNPETTTGGNALKFYASVRLEVRKIETIERGQDEEAIGNKVRVKVVKVKNKVAPPFRKA
ELEIIFGKGISWSASLLDAAVKCNVIEKKGAWYTWGAEKIGQGRENAKAYLEQFTEEAKK
IESQVREILFHPEKASNANPDQGASSEAFIAVSADELPSADTASDTGRIRAEDLF*

>SPBIB_v1_100125|ID:27162276| conserved membrane protein of unknown function [Uncultured spirochete bib]

MHQVKNPNIRPLTFVGLRLLFGRPANEQYNDLYRARHSVFWGAVLGIGISLVPLYIVLVFV
SNGMIQGITDRYLETKTSHLQMSLPFSFDATQRNALTQDVSRMPGIISTSFEDVDGIGLAA
SQNGSTSAQIRGLDGA VLQDKGFNRFSVDEGQMYPNRQNEVVLGRYLARKLEVKTGDSV
TLITLRSNDSTNYLPKLA VFRVAGIISGYRELDANWFIIQSDAALRLLNSATAYAFMGI
KISKPYGSDLRIASEVSRAGQKYGLTSEQGARVRTWREIEKSLFQSFSTRSVLVLIMV
IAIIVAALNLASALTTFVIEHRAEIAIIRSFGVSRTQAALIFLLGGTATGAIGCIAGSLA
GIAISIFINQIISGMQAILGFASRLLSADRQTIQLLNPDYYLEHIPITMDWRFVVLILLS
GIALSAIASILPAMKSTSIAPAELIRHE*

>SPBIB_v1_100126|ID:27162277|lolD| outer membrane-specific lipoprotein transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]

VSEPIIFCENLTKTFSSSAEVLRLDNADFVLEKKGACTILGPSGSGKSTFLAILGSLER
FDSGTVKIAGYDLGQAQEKMLHIFRREVIGFVVFQFHLLNDFTALENVAIPAYMAGVPRA
ESWDRAKLLDLVGLNLRATHFPSQLSGGERQRVAIARALINQPSVVLADEPTGNLDPAS
ASAVKELLKSLPEIARTTLVLVTHDPELAGIGDSSYLLKGGHFECIR*

>SPBIB_v1_100127|ID:27162278| conserved membrane protein of unknown function [Uncultured spirochete bib]

MAANEHGTFEPLQTRKRAGFMALFRIARWTTITGRKTSHRSTSFLFSVIGIAAGIVALIVV
MSVMNGFQRQYIDSLETSSFHVRIMPESDPSILAQSLRENSLVRSVTPFIETNLLAEG
AEGRQNVVRAMWISPDLDGADKGFNCALHISERAAEDGIRQIGIMIGTETARLLGMYNGQN
LVLRGAVVNPDEGVQQYEIALPVGGLFKSGYYEIDAGLVILPMASASKLKTLPASLVLGI
KLKNPEKVDQFIASLAHTPGIGRTESWRDYNRSFFSALRTEKVVMFILVSIIFAVVAINI
HYAMRRNIARKSRELAAILAIGTDRRSIGSIFMLEGLMAGILGALGGIGIGIPLAKNIDH
VINFAVGIAEAVVSFLYRVGIAKSVPDLSLFSPTIFYIESIPSRVYASDIGFIAFFAILF
PALAVYAAAYRRFRNASPLEVLRSE*

>SPBIB_v1_100128|ID:27162279|ftsY| Signal recognition particle receptor FtsY [Uncultured spirochete bib]

MKFAEKIKALFRRNKLSEETFEDLADLLIEGDMGAALAFEIVDSLKAACKKEGISDPDAA
KAKLKELLRPYIKTATFELDPGKLNIVLILGVNGVGKTTSCAKLAQWAGRQYPGNNVILA
AGDTFRAAAIDQLKIHGERLGIRVVAQQHGSDPGAVLWDAIDAAAAGAQLVIADTAGRM
HTRSDLVKELAKLDRVVSQRADQANYRKLVLVDATTGQNAMRQAETFHEAVKVDGVIMTK
YDSTSKGGMIIAVSRQFGLPTLFLGTGEKYENLQPFNIDAYLEDFVGE*

>SPBIB_v1_100129|ID:27162280| membrane protein of unknown function [Uncultured spirochete bib]

MKTFKGSALLAALVFLFLTSNVFCQTPANIALAFPVRIEMSALNHLIAENSSEWDI WAS
VRQGLASNQTLNNGSPLPEAGSFVRLKESFQTRIETRISAVLDDLAMKVLGEKSNSTLL
EAGELKGAQFFVCTVYAVEGSAFRFGMALLEKSGKSTYFSDPVDVFSISKAVQAATESM
ILRGTFSAKTVIAPSMANASANLPKTEPWILKSRYEKANNTFKFAIGGVSSISLSAAFLSA
GLWQTYQEAAIRNSAFNSAVTISGIAAGASIAATAVFLTAIWNNAVITLQTTR*

>SPBIB_v1_100130|ID:27162281|prfB| Peptide chain release factor 2 [Uncultured spirochete bib]

VLAEIKTLKERLESWKKLHDDILGLEEMYELVRDEGHQDMEGELLANLNDIRNRFDKALI
LELLSGEADRND AFLTIHAGSGGTEACDWASMLYRMYTRWAERHDFK VETLDFLEAEGGI
KSVTIQISGEYAYGYLKGETGVHRLVRISPFDANARRHTSFASVSVMPVLDDSIIDIRP
EDIRIDTYRAGGAGGQKVNKTDSAVRITHLATGIVVTCQNERSQYKKNKDVAMSILKSRLY
EYYKAERDKETAKFAGEKKEIAWGSQIRSYVFQPYTMVKDHRNKFSVGNVQAVMDGDIDP

FLDAYLHWQWKGGTIVEGEDEDI*

>SPBIB_v1_100131|ID:27162282|mro| Aldose 1-epimerase [Uncultured spirochete bib]
MGIEKKHFGTLASGEDVSLYVLKAGDFLAAFTDYGATWVSFIMPDAHGSFDDILLGFSTL
SGYAGKHPYFGSTVGRFANRIGGARFELDGKEYKLWANNNRNHLHGGRRGFDKYLWNGEL
SSISGDPALMLTRESPDGEEGYPGTLAVELTVSLSPSGSLRLRYQAKTDDKTLVSLTNHA
YFNLAGEGNGTILDHELLMHSSMYLPVDSSELIPTGAIASVDGTPLDFRTMKPIGKEIRNA
NDGDFDFCFIIDKEYSPLKPF AEIREPKSGRIMTAATTLPAVQFYTGNNLNGIAGKRGSVY
DRHS AFCLETEMYPDSPHHPNFPSAFLLPGEKWEHETIYNFSVMK*

>SPBIB_v1_100132|ID:27162283| Short chain dehydrogenase/reductase family oxidoreductase [Uncultured spirochete bib]
MEKSDDRPVALVTGATSGLGLAIAQSFIDAGFIVFGAGRQNPENLPAGLIYVRTDVTSN
DSVEECRNYILSNAGRIDVLCGAGSGISGSIEDTPISEAQAQLDVNFFGVVVRTVQAFLP
AMRQQKSGKIIVIGSIAGRIGMPFQAFYSASKFALEGFVESLRHEIRAFNIQACIVEPGD
FRTGFTSARRKLVPRGSAYTSQFEKAIGVQEHDELHGALPALAGKRIVQLASARSLPVRV
TIGPLFERFAVWVRRILPDSWFEAFYKIYYKL*

>SPBIB_v1_100133|ID:27162284|cmk| Cytidylate kinase [Uncultured spirochete bib]
MGIIAISGKSGCGNTTVSRMVADRLGYTPVNYTFRMTAAEMGMPLLEELFRKAQESLEYDR
KLDEHQTMLARKGNTVIGSRLAMWMVPEADLKVYLKASPSVRVSRIFAREGGDRKEIERF
TLERDARDRQRYLALYNIDIDVSV AHLVIDTERWSASQVADIIDAYNISLYGEQHGKI
R*

>SPBIB_v1_100134|ID:27162285| conserved protein of unknown function [Uncultured spirochete bib]
MKSMTGFAHRTISAKGFLGSITLKSNNRFFDLSLSIPASASGIEPNIREFLGSRISRK
IECTLRLLKKTEATLDDITMNFQSAKTLTEQLRNLALACGLNDTPSLDVLTRFPGVIELNT
DIDSELWQILFPTMEETWREFEESRIREGLATQQNITNQMNRFSTKLDEIEQNAGQLEQ
LVHDQITARFKELLGDNYDESRLQELAVQLVRLTINEEIQRLKAHISAFKAIAAEPSCG
KKLDFLCQEMNREVENTIGSKNMLVAVSLAVVEMKDALENIREQLRNVE*

>SPBIB_v1_100135|ID:27162286|murC| UDP-N-acetylmuramate--L-alanine ligase [Uncultured spirochete bib]
MELKQFPSNLYGLQIHLVGAKGTGMTALAEILHSRGALLTGSDVPDVFYTD SILRALNVK
LFENFD AKHIPDACDLVIYSAAYSRDANPELKA AAAHNIPIYSYPEVLGALS LHSTSAGI
AGVHGKTTTALTGILMEALSMPATVLAGSAISNFNRCTLIQGDYFIAETCEYRKHFL
NFKPSWIVLTSVESDHQDYFPTYESIRDAFVEYVLSLPSGGTLIFCADEKGATEVADIAL
QQRKDINFVEYGFSAQGWKIRSLRTL AGTNTFITGNYPVDISLHVPGQHLVLDAVAALA
LADSIFKAETS RDIEPHEWKMMANALSSFRGSKRRSEVVGEYGGILIIDDYGHHTAIAA
TIEGIKKFWPHRRLVVD FMSHTYTRTIALQDAFVAALDQADAVVMHKIYASAREQPIQDF
DGQKLFQKLCERRKDLLVPDDSHLAATSIGHGESTLRARTGFALYTEEPLDALPMLEK
KLKPGDIFLTMGAGDNWKLGRALAELENKKA IKHGPERKHTE*

>SPBIB_v1_100136|ID:27162287| putative 4-alpha-glucanotransferase [Uncultured spirochete bib]
MQSFRVVLGMYNSLPYNASDTLYEQAYQGAWRPFLSGLYKFPSIKAVIHFPGNIFAWIEQ
NHPEYL YLLIEMVRKGGQIELLGGGFYSPLAPL VSTQDMTGQVEALS AFIRKTIGKRPSGA
WLYEYSWTSSLPAILQNSKIQYTFLPAAQFKEIAPENLSCQP VASEDHRKMVLIYPAFES
HSDDSAFVPYEATLLKLQQDNPQISAFVIMADGNAISSTWERSGLES PDVLFERSFAWFQ
KNCLEYDTITASQLYKSSKAARTIYFAQCYSRRFRDYCERIIQKADIPRFECVQISKQSV
VDHPLVHLLYQKLN FVSAMTNLFRGDKSRKKA SLDDIWRAQSGELFWVSPTGGILRSEAR
LGAYASLIEAEKTIRQNRFHFMAYDDLDFDGIKEVLYQSSVYNCYLKS DSAVAELDSL
RTGRNYACGWNAEHFSTGCFKDEIRAAGTFETRLFPDYEA WNLVENAKESLNATFYREFH
GKIDNLGAFFGCRKSYQFENDYFSIN YELTNKGSNPFPIRFACTISEIIALPSLKDHKVQT
LAHRQSRQLPADQSFAADAIDGVEIGDVLGA EKMIIRSDNPFSLDGVPNFAESP KDGRI
TEKEAQDARIFEGFTLTIGWDFSLPPEGTVLFSVSVHIEH*

>SPBIB_v1_100137|ID:27162288| Acid phosphatase/vanadium-dependent haloperoxidase related protein (modular protein) [Uncultured spirochete bib]
MHFRLDMRGLFPHTFSVEASSHNLP SLLANPIFVSGALSIFLAQVLKAILAFLKRHKLKA
KEIAFIMLWKTGGMPSSHSALV VSLSAIAAFVEGFDSL FVLSFFLGLIVIRDALGVRRSA
GLQSKALNILGKQMSERFNIAFTPVKEIHGHRWQEVVVGAVLGM AVSILVCWNYIFHAVS
SSLQ*

>SPBIB_v1_100138|ID:27162289| Pseudouridine synthase, RluA family [Uncultured spirochete bib]
MLKAPETKIGFARRDGRLCDDASTLKVCGKSPRMSSLKCIADCLRIDLKSLWHYVNVNHE
VKKFSLGADDDGRRADRIVRKILKNIPLSLIYRLFREGKIKKNGLTAEASERVHSGDFME
IIGLDDTAFKKNPPRNKEFSARSIDEQPSVIWQNEHLIAMHKPRGMLTHDGEASLDAFVY
SLLKDNLSPSVSFLPGPLHRLDRNTSGIIIFSKTRLGAEKFSSAIRRREVQKLYLALVEG
TMDGPLRLQDTIERNRKAHVSVLNQGDKGGR LAVMDAIPLFARERYTLVLVDLHTGITHQ
IRAQLATHGFPLAGDTKYGGSPLPLQTGYFLHAYSLRMEHPVFEDMPNSIIAPLPELFGK
TVASIFELDYHDLYKTMQRLTEDI*

>SPBIB_v1_100139|ID:27162290|hflK| Protein HflK [Uncultured spirochete bib]
MANSTIFKKPPNITIRWPLVLIVLIAIGVIIFLSTSFIIVDQTEKAVITTFGKYTKTLGA
GLHYKLPFGIQKAYMVKTQVIQTETFGFRTIKPGIVTQYSDKKYPEESTMLTGDLNIVDV
EWIIQYRIANPEAWLFAVTDREKTIRDTSQTVLNMLIGDRAILGVIGPDRQTIQDSAVVM
MNELFTKYGLGIVVTQVQLQNIVPPEGVQA AFEDVNKAIQDMNRFINEGREAYNAEIPKV
QGQADQILEVAQGYAAERVNVAKGDVARFNAVYDEYRKAPDITRKRLYEMMEEIFKDQK
NIDLIDKSLQNILPIKNLTQTTQPQEATK*

>SPBIB_v1_100140|ID:27162291|hflC| Protein HflC [Uncultured spirochete bib]
MKKIPIIIAIVA VLAVLFIVIFGPLFVLNEGEQAVVVRFGKIVAVHTEAGLKWRSPFVDT
VMKYPKKLMSWDGEPQRIPTKENQFIYVDTTARWKIVDPVKFYETVGSIDVAYGKLDDVI
DSAVRTIISNYLREAVRSSDEILNATKIETFQTGEVENSSTLQQLAITPTQYEKIEKGR
RLLADEMRRLLVSNIVPTFGIEVVDILPRQIKYSDELTESVYQRMKERNQIAQAFRAFGE
GKKAEWLGKLENEKRSLSSAYAKGEIIGKADAEASKIYADSFSDPSFFFEFWKAIESY
RKTMPAFSKTLSTGMDYFKYLYSPTGR*

>SPBIB_v1_100141|ID:27162292| putative Metallophosphoesterase [Uncultured spirochete bib]
MSTLAIADIHGEIEVLEKILEEHPNAQYILIAGDLTNFGREKEAKKVLAAALERRFPQS
NLYFVAGNCDTV SARNVFSRHPGYIEGKCAQILEGRAIASNASNPLYVIGCGGGLVHTGL
TPFERKDEEMASSLQAGFLQCNFSNPSAEQKEGGPKPLIVLTHTPPNGTYADMRHMRHV
SSSFISFLYEYKPLLWICGHIHEGRSQAEDETLVINPGPAAHGSAALISFEQREGSYHA
VAELRGI*

>SPBIB_v1_100142|ID:27162293| conserved protein of unknown function [Uncultured spirochete bib]
MSKKAWQIDRALRLTAIPLDRRVHTSNWYTSETIFPTGDDLIQLFWDSKVPGSGAPEIPY
VEMVQAMGNKGYDVSAAEELLPEGIELARKGERADLRVLTARLLHAIHTAPVDP AHTYWT
YRHPERWDDVRAAMPAHADDDKPR TIPRDIEEKILEGWTGQLAGGAFGT AIEGYHTDQIEK
VYGRIDS YVTEPETVND DVVYELVFLDVFEQRGRALSSRDIGLEWVRQIPFGWSAEWIAL
HNMADGILPPESGSWHNPYSNWIGAQM RGMVCGLVAPSWPMEAAARLAHIDGLVSHAENG
YGEMYAAAL TSLAFAMDNPRELVEQAAGFVPAKSEYAAVLEKCLRIVKEHKSADA AWRVL
DDHFQKYNWIHA YPNIAAVIVALWYGQGDFTESFRILAHAGLDVDCNAGLVGT VLGVMRG
VPSKWADPLGGILETYIAGKEKLSIRELAARTARLAQRRA*

>SPBIB_v1_100143|ID:27162294| putative ABC transporter permease protein [Uncultured spirochete bib]
MNVLIGLITGMISGATPILLAALGGTFTFYAGVFNIAMEGMMMLMAAFFAVLGSFFFHSWV
IGLAFGVLGSLTLALIFILFSVKLETDEFVTGIALNLFALGITT YFLRQIFKVKGVFTSK
SIVPVPQLHIPFIEKIPFVGPVLSGRNLIVYIAVIATVFCYYLIFKTRFGLRLRAAGYNA
DSL DSSGVRTSRIRMQALLLCALFCGLGGAFLSLGYVTLFAENMTAGRGWISLAAILVD
GHPYGIAAISLLFGFFDGLGLFLQNYGVASQFTAMIPYIATL FALYVYAQRREKRRKRV
*

>SPBIB_v1_100144|ID:27162295| putative ABC transporter permease protein [Uncultured spirochete bib]
MKRRLWSGLVGVVVALAVGALIMLAQGYKPLSTYVALFQFSLGGIGPFTTTLKNSVPLVL
TGLSAAVAFASGPVNLGQPGQFVFGAL AATLGGLYIRLPVLEIPLLLLLAIAGGALWSS
IAAFLRRAFEMSEFIVTLMLNMIADFFTA WVIAFPLMDRKAFSPMTPQIAKSGWMPDLGL
LSSSTLVM LGAVVLVWFV FHRWRAGYEWRTGQNSVFARLGGCDIHRNFLAVMLVTGALA
GLAGGLVVMAGPHRFIKGLGANYAWDGIMIAIMANNSIVGTLVYGVFIAAIQTGALGMEL
ITNVPSEIAQVLQAVLVLIIVATREYTNVLLDRLSARRQAKERAA*

>SPBIB_v1_100145|ID:27162296|tsgD| Glucose import ATP-binding protein TsgD13 [Uncultured spirochete bib]
MNDLIALHNIVKVYPPNVLA VDDVSVSFCCKGEIHSIVGENGAGKSTLMKLLYGLVPFDSG
RIEFGGVNVRFRKPGDAIAMGIGMVHQEIVLIPQYSVWENVVLGAEPVRTLGRIDSRTAI

DAVRSKIEEFQFNLDPLAIVDDISVAARQKVEILKLLFRNVSVLILDEPTAVLTPQEIPQ
LFAELKRLRDRGHTILFISHRLDEVLELSDRITMRKGRKVATVEASETNKESLATMMVG
RQVIFTSKRTPHQRGELVFEAQHVDWERGDGLKLLDDVSFSVHAGEIVGIAGVEGNGQFE
LVNSIMGLEQPTRGSFLVKGKDITSLILERRKLISFVPQDRGKMGASLSASILDNAIMT
HHRLEKRFSRWHGLVLDYRKARDFVDMLKERFSVQMASRQSDFRSLSGGNQQKVILAREL
LLATPFFLMDQPTRGLDVGSIEYVHGEILAMREADRAVLLISADLEELFLVADRILVMHR
GCIVADLMTEKTIEEVGAYMLGGRASA*

>SPBIB_v1_100146|ID:27162297| putative basic membrane lipoprotein [Uncultured spirochete bib]
MKGRKYVLLGALFLLGAALTAYSQTPKINTNRVVYLINGALGDNAFYDSGEAGIKNIGR
TYKVETRTIECNFDAGKFQPALDAAVQYADIIFVISYGFEDQLKAIADKYPNKIFVNIDT
VVENPKKTITSVFFLAEQSSYLAGMTAALLTTTTSLKGVNKDKIIGVIGGDTDPVSAFV
FGFQNGARAVDPGVKVLTKSLGGAWDDSAK GKQAALQLYDQKADVVIYQVAAAAGIGVLQA
AAERGLYAIGVDTNQNDLEPGHVVASAVKNVGATIEKVFKTIKDGTYKPGQVINSGLADG
GVDLDFATAKQQVLPKSIIDKVMQARQQIIDGKLTVKLYNGENVVWQ*

>SPBIB_v1_100147|ID:27162298| protein of unknown function [Uncultured spirochete bib]
VGSFAFQNTSQMRAILKGYRKIRGKGNPGWAIRNASSSGIIGRSMLTARE*

>SPBIB_v1_100148|ID:27162299|deoD| Purine nucleoside phosphorylase DeoD-type [Uncultured spirochete bib]
MHEKEIHEKNLANYRNGTPHNAAKAGEIAPVVLMPGDPLRAKRIAETMLS DVHQFNAIN
MFGYTGM YQGKRISVMGSGMGAPSMGIYSYELYSFYEVQAIIRIGTCGGLAPDVEVGDLV
IAMSASTDSNYAHQYELNGTFSPCCSYELLEPAVQLARARNMRFHVGNV FSSDV FSLYSA
LPPERGWQKWGRMGCKATDMECYALYCNAAWTNKQAL TLLTCSDSNITHKEMTPPEARQNS
LDAMIQIALDIA*

>SPBIB_v1_100149|ID:27162300|tyrS| Tyrosine--tRNA ligase [Uncultured spirochete bib]
MNRALVQLQERGFVQQCTDFEGLSRLMDEGPVTFYIGVDPTGPSLHIGHMVPFFALRHLR
DAGHVGIALLGGGTARIGDPSGKTEMRKLISYEEIDENTRRFIKQLDRFVGFVGHVHAFTA
NNKDWLADLNYIEFLREIGRHFSVNRMLSFEAYKQRMEAGLSFIEFN YQLLQSYDFLQLY
RRHNCRLQIGGDDQWGNIVAGIELIRRVEGAECYGLTFPLVTTSDGKKMGKTEKGALFLD
PNMTSPYDFFQYFRDVS DSDVERFLLMFTFLPSEECRRLGSLKDAELNQA KERLAWEVTA
LIHGKEEADKALAAARA AFRGDGAAQLPTIAIKRARLEAGIGVLDL FVEAGLVPSKNEA
RRLVQQGGASVNGQKVENEKQVFTIAALQDGAMMLRAGKKRVARVISKDN*

>SPBIB_v1_100150|ID:27162301| DNA-binding protein HRL18 [Uncultured spirochete bib]
MPSTGKPLTKVEIINALAKKTGFTKKDVGLVLDELAKLSYSEVKKSKKFTLPGIAIMKVV
KRKAKVGRNPATGQQITIPARDVIKISVAKPCKDAVLGK*

>SPBIB_v1_100151|ID:27162302|glyQS| Glycine--tRNA ligase [Uncultured spirochete bib]
MADTTVTMDKIVSLAKRRGFVFQSSEIYGGLSGAWDYGPQGIELKNRIARFVWKEMTQLH
DNIVGIDAAILMHPRVWEASGHVENFTDPLVDCKKCKTRFRADQIPPENLAARKCPEC GG
ELTETRKFNL MFKTTLGPVEDESGLVYLRPETAQGIYVNFKNVQQSNRMKIPFGIAIQIGK
AFRNEIVTKNFIFRTCEFEQMEMQFFVKPGTDEEWF EYWRDQRWNYRKL GIDMKNLRWH
RHGPDELAHYAKDAYDIEFEFPMGFKELEGVHNRSNYDL SRHQQYSGKDLQYIDQDNGNE
RYIPFIIETSAGLTRQLLMLLCDAYEEQKVADKGNEDDWRTV LHFHPDIAPITAAVLPLM
KKDGLAELAQDIRAELKEDFVTDYDQAGAIGRRYRRQDEIGTPFCVTIDYQSKEDGTVTV
RDRDTMLQERVSRSHLSEYIRAKIKSYKRAERIS*

>SPBIB_v1_100152|ID:27162303|glnS| glutamyl-tRNA synthetase [Uncultured spirochete bib]
MPEVNEKTEYMDFIREAVAEDLRTGRFKEVHTRFPPEPNGWLHIGHAKALFVDFGVAQDF
GGKCNLRMDDTNPEKEDMEYVEAIQRDIKWLGFWDWEDRLFFASDYETLYELACKLIRKG
LAYVDDLDEEQIKEYRGTNVPDKNNITYTPPGKNSPWRDRSIEENLDL FARMRAGEFPDG
SKTLRAKIDMAHPNLLMRDPVMYRIRRM PHYRTGNTWC IYPMYDFAHPLSDAIEGITHSL
CSLEYEIHRLPYDWFVSNCEVFPSRQIEFARLNITHTVLSKRWLLQLVREKKVSGWDDPR
MPTIAGMRRRGYSAAGIRDFLGRIGIAKTDSMVDIQLLEHCIREDLNASAQRYMAVLNPV
KLV IENWPQGRVEWLD AVNNPENPQAGMRKIPFSGTLYIERDDFRENPPPKYRLYPGNQ
VRLRYGYIITCTGFDKDPATGEVTEIRCTYDPATKGGDAPDNRKVKG TIHWVSADHAVPF
EARLYDYLF EAERPMEVSEGKTFIDNLS DHSLTVEKRAVAEPALRELA VGQTVQFERLGY
FCKDPDSTNERAVFNRTVTLKDSWTKLEKLLANG*

>SPBIB_v1_100153|ID:27162304|glxX| Glutamate--tRNA ligase [Uncultured spirochete bib]

MSVRVRYAPSPTGNQHIGGVRTALINYLFKAKSQQGGSFILRLEDTRTRYSEEVVQNLVYDT
FKWLGIFYWDEGPDIGGPVGPYVQSERLDLYKKYAEDLVRMGKAYYCFCDSERLEKIRQEQ
IAAKKDEIGYDRHCRYLPKEELERNIAEGKPYVVRKIPLEGVTVFHDRLGRTIEWKNED
ISPDVLLKSDGFPTYHLANVIDDHLMGITHVMRAQEWIPSAPLHKIMYDAFGWEMPELC
HLPMLVGGQDGHKLSKRHGATAVNEFRKAGYLPQALINYIALLGCSYEDGRDIYSLDELVS
LFKIERLNKSPA VFDYQKLEWFNGQYIRQTSDSLALVVRPYLVDAGLRKAQDPMDRLE
LAAMPLVKERLKFLSDAPVIMSILYKRELPVETFLPKKADAKETAGFLEESKLLSEY
GLDDIPA VEEKFRSRAAEIGRKLGDLLMPLRVAITYTRVSPPLFESMKILGLKECIERID
EAIRYLRGY*

>SPBIB_v1_100154|ID:27162305| membrane protein of unknown function [Uncultured spirochete bib]
MKGESGKTEKSLFTKIQKFAEILIFAVWILAIVLLILDGSEFFRLSMEILSIALLGVGLF
NVCMMVGFSAAKRSHFQFGLFFIRIAYILLSAASLAISLFVAGIRIR*

>SPBIB_v1_100155|ID:27162306| Histidine triad (HIT) protein [Uncultured spirochete bib]
MEYLFNFNKIAYLKGKRPQGCILCLIRDGSQDVENLVVYQTERFMVSLNLYPYNPGHLLV
FPKRHIVDIRQYTEGEKAELDALVPACLDVLDAFGNPSAYNIGYNMGLSAGASIEHLHLH
IIPRYPREIGIVELIGGSRLVQDPKDTYAKLKELFNISAGGRN*

>SPBIB_v1_100156|ID:27162307| Thiamine diphosphokinase [Uncultured spirochete bib]
MKALIITGGGCPSSGIIRSLSQGAGLVIAADSGLPCLSDLDPDYVIGDFDSVETALLA
KIPEERIMQYPEDKDYTDTELAIDLARKKAGDRIVLAGGGAGRLDHLAVRALFERTEPI
HEWHTGAESAFLPAGEKLFSSSIGTVVSVFPLSKGAEGMSSEGLKWPLDGLRWDCGNF
GVSNKTIAPNAAISSGRNPILVILPLGIQALISSAS*

>SPBIB_v1_100157|ID:27162308| Polynucleotide adenylyltransferase/metal dependent phosphohydrolase [Uncultured spirochete bib]

MLRYTPLAGMRIPRIDPELRIADSLRAGKKA YLVGGAVRDTFLNRQVTFDIDATNAT
PEECMQIFPRAIPTGIRHGTITVIPRSRRFKVEITFRTEGSYSDGRRPDSVAFIDDIAM
DLSRRDFTINAMAFDLSNNHFVDPYGGKDLAAKVIRAVGNPSEFAEDGLRTLRAIRFA
AQLGFAIEPATLKAIEECHEKLSVSRERIRDEFKSIICAPKPCGIRLLVDTLILDL
PEILSCKSVPPKNNHHLDVFEHLLATVDAVNPDLSEERLLVRLAALLHDIGKPCNLN
ISEDDTISFYRHEIESEAIARKTLQDLKYPNEIIDRVCHLVRHMFNYEPGWTDAAVRRF
VARVGQHAIPDLFALRLADTIATTGEPVSWPLSEFQTRIDRILEEKQAISLRDLAVNGE
DLASIGIPRNREMGALLSELLEAVLEDQSLNTRAKLLEIAKAKYFNVAR*

>SPBIB_v1_100158|ID:27162309| rnc| Ribonuclease 3 [Uncultured spirochete bib]
VAGGVKRSKSGSTHTATSTSRLLSLDSFQRRLGISFQNPPELLDIALTHSSFSNEIHINE
PNNERLEFLGDSVLGLCVAHILYERFPNRQEGDLARMKSVLVSEASLGIAQALGLAEYL
LLGKGEEISGGRQKQAILADAMEALLGAYYLDSDFFENVKSFIQQLMAPKIEELS VTSGKD
YKSIIQEYAQKQGMNLPKYELVKTEGPEHARRFFVTCTLAGEIFGPCEGLTKKAAEQNAA
QYTFEKLHARGGELARMLDVIAAPLPQSTSLH*

>SPBIB_v1_100159|ID:27162310| acpP| acyl carrier protein (ACP) [Uncultured spirochete bib]
MDELFEKIKKIIAEKLEVDESKITMDASFRQDLGADSLDITYELVYGIEEELGIQIPDEKA
NEFETVKDAYEFIKTQVK*

>SPBIB_v1_100160|ID:27162311| coaD| Phosphopantetheine adenylyltransferase [Uncultured spirochete bib]
MLLLTIAFAYSKVCHMSTAVFAGSFDPTAGHLVDVIEGALGIFDTLYVVVAMNPEKDGMF
TVEERVAMLKAVNTYGDRMKIVTWKGLVTDFAREHNCSVLVRGIRNAAELPYESTMAYMN
RRLDPSIKTVFFLYDAKHVDISSLVRDLVSHGRLPDGIVPDGVA AVLKDILHARGQPLS
*

>SPBIB_v1_100161|ID:27162312| Int| Apolipoprotein N-acyltransferase [Uncultured spirochete bib]
VRLAFIVYSNYMREQMNTSNTYLSEIERGPSAGFSQRILWVAAA VLSALSQPNELFLYG
NWLAGLVCLVPLYFALTNTKSGEASVLGAVFGALHHALTSYWLFFYKDFAFWTLGTTTI
AYAVVYGAAIMYGWFMLQHSGSMKPIVFALAWAAFEYAKSTGFLGYPWGLLPYSFTA VPI
MLQTADIWGVYGISAFALSSAACAEMISSLQVRQSRGNRWWAVAVGYGLVLLAYGAW
AVAHPWPVRSVRLLLAQQNTDPWISGENAALESNIELARKALDLNRQSGGRKPDLMVFS
ETSLRRPFTEFRSWFEKNPPTSPLIPFLQQEDIPLLTGLPVVKDWNTYEASNSVGLISPN
GVLETYAKMHPVPFAEAIPFWEFKWFRSFVQNVIGLESGWVMGDKPVLFKLTLQNRGSV
CTDIHVLPVSVQFASPICFEDAFAGLSRDVIIRGADLLINLTNDSWSRTKSAQIQHYAVAR

FRAIESRKTLVRSTNSGVTCVVGADGKNIAELEQFKADSIIVDVPIYAVPMTFYIRFGDW
FALLSASFALVFIWGIRTEKLKRRIL*

>SPBIB_v1_100162|ID:27162313| conserved protein of unknown function [Uncultured spirochete bib]
LSISNYVSADFFETLEEAGNIVKYREHPAFDAVPFLGSIKKHPYDQEKCLVLLLQPQKRM
PWFKGGEEIHLKTRDVQALDELPSAIDLGTGTAISVFRIWVKRGAIAVRFEPFEVTDEEYR
PFDTDSISRLLAQRD*

>SPBIB_v1_100163|ID:27162314| Radical SAM domain protein (fragment) [Uncultured spirochete bib]
MSASEIARYWRKMPQKKIQCFCLSHACIIEDGASGHCSARLNDRDGEMSLPFYGWISLAI
DPVEKKPLRRFMPGTWTYSVGFWHCTMNCPCFQNWIEAHPLRIVQEIISPEKLIELAVES
GCPSISFTYSEPTLHIEYVIEAMQRAHARGLKTILVTNGNVLDQPAHEILAHTDATNVDF
KTADAGIYKNILGGDIKVVQNFIHVAYELCHVEVTSLAVPGILDSASQIHSIAQTLAAIS
DEIPLHITHYRPAWKYHKPPLPSEMIQSMMAEAARKHLKHVYAYI*

>SPBIB_v1_100164|ID:27162315| protein of unknown function [Uncultured spirochete bib]
LTDFADFGIVSIADCTVGVAVQVVECQTVDLVVVGSIPITHSPSPSLGTEPERVRSSA
G*

>SPBIB_v1_100165|ID:27162316| protein of unknown function [Uncultured spirochete bib]
MGNFSNGPLAQLAEQQTLNLRVEGSNPSRLISVKALKMLQALTKRRCSATMRHA*

>SPBIB_v1_100166|ID:27162317|tig| Trigger factor [Uncultured spirochete bib]
MEITEKKIEDLEQSRVRMTLTIPSRDVRAEYDAMMNEYAKNARIDGFRKGVHPVFLERK
FGDSLKTEAMGRVIEKAVEEGLKDATRQPLTYEPPAVEGEPQFNLDSDFTFSVTYDAYPA
FELPSLEGIEIEVPAVSVSEDIARELEEIRQRNAIVVEKDGAETGDIVTADFAEIAED
GTEIPGTARKDFAFELGKQLNIYKFDDEIVGLKAGDEKTFKTFPADFEYSEYAGKTVTI
KVKVTKVKRQDLPELDDELAQDVSEKYKTLEDLKA AVRNLNEALEARLRSTKENAIVDE
LLKRTSVSIPRSMALAEAMRWESLKQQMGVDNDERLEMLLRISGKSRDQLLQDWAPLAE
KALASRILLDKLVEAGSYTATDEDVDAEIAKEAAHTMSPAIEKAEYEKRGRTLEYLKDDI
KVRKLFDAILASAQVKEGTA VSYLDFMKENQ*

>SPBIB_v1_100167|ID:27162318|clpP| proteolytic subunit of ClpA-ClpP and ClpX-ClpP ATP-dependent serine
proteases [Uncultured spirochete bib]
MSEHMSSLVPIVIEQTGLGERSYDIYSRLLKDRIVFIDGEINDLTADLVIAQLLFLESQD
PSRDISIYINSPGGMVTAGLALYDTIQYIKPEVQTICIGQASSMAALLACGTKGKRSAL
PSSRILIHQPWGGVSGQASDISLQAREIIRLKKLTIDYFAQHSGQALEKVAQDMERDFYM
SSQEALEYGIIDTIMEPRKHGKK*

>SPBIB_v1_100168|ID:27162319|clpX| ATPase and specificity subunit of ClpX-ClpP ATP-dependent serine protease
[Uncultured spirochete bib]
MAKNKQFDLEQETYCSFCGKSSSYVRKMIAGPGVNICDDCVRICSQILDEEEQKVTAEFL
TEVPKPREIKEFLDQYVVGQEQYAKRVLVAVYNHYKRLHLKVSATAPDVEIEKSNVLLIG
PTGTGKTLARTLARKLKVPFAMADATTLTEAGYVGEDVENILLKLIQNAGGNIQAERG
IVYIDEIDKISRKSENPSITRDVSGEGVQQALLKIIEGTIANVPPQGGRKHPNQEYLRID
TTNILFCGGAFVGLDKIIESRVSSHMPMGFGADVRAKHEKNLSQLFAELQPDDLIFGLI
PEFVGRLLPIKVALDDLSKEELKRIIEPRNALLKQYKASMKLDNAELEFEFEAIDAIAEK
AIAQKTGARGLRRAIVEKIMIDIMYSLPSDSNVKKVILTRDAVEGNGSCIIYRQKTA*

>SPBIB_v1_100169|ID:27162320|thiB| Thiamine-binding periplasmic protein [Uncultured spirochete bib]
MMRRKPLIAIFLGVGAIFFASMSLWGQTQPSAGAGAPELVVWYDSFVSEWGPAAQIAEG
FQKQSGAKVRFVSKGDGGALFSSLLDIAKKPNADIVIGLDDRQLEKALTSDFAPLKLVN
LADIQKDLLDPSNRLVPFDGQFAFIWDSSESNIEPPRSLEDLTKPIYRKKVIIMDPRTS
TPGLGLAWTQAVYKAGWRDYWKRLSPSILAMTPSWDTGYGLFTKGEAPLVLSYSTSPAY
HKAYENTERYKALKFSDGHPQQIEFAGVLSTSQNKLLAQKFVDYLLSQECQSFLPETQWM
FPANRSKLPASFSVSKYPSVNAKVQDIDRDPDAANILISSH*

>SPBIB_v1_100170|ID:27162321| putative ABC-type transporter, integral membrane subunit [Uncultured spirochete
bib]
MQSGNGSFEQRLGKTEIILSIALIAILSFSLAPLVAFKNAIVGAGHASLLASLGSISVP
VIVRSLQFTLLQAFASTALAIIGLPGAWLAAFRFPGRALLALAAVPCFPPIVILA
FILYYGKEGYFSAFLALVMGQKNEYRGLLYSFWGLVLVHAFYNFPIAVHQISALWMRIPE
SQKEAAKTLGANRIMAFRTGTLPWLLPGIAQAAGLIFLYCFFSFTTVLVFVGGRTGSTLEV

SIYQALRYQANAGLALLFSVIETGFALLGIWFITGMTQKKQHALRDFGRRRELSSPKGSQ
RVLLAIYGILLIFFIGPLVSIVVEAFRVPASLGGASHFGFGNFERLLKGFQAPLLKAIR
ATLTLSGSAALLATIAGVIAGISVFIGKKAGKLHFTNRIVEALQWLPLAVSPA VFAYGWL
FLSPDR TISAALIAAQA VIA WPFV SRAVSASLQSLDPRMREAGRTL GASPLRAFLTIDLR
VIAPSVAAAAFAFSITAGDVNVPLMLGMSEIETLPLLLFRLTAA YRFNEACAAGLVLGL
MTGIVFFLKEKAIDVA*

>SPBIB_v1_100171|ID:27162322| putative Fe(3+)-transporting ATPase [Uncultured spirochete bib]
MSLEVRNLEVVRDGFVLKADFALQDNKVLVLLGPSGCGKTLLRAIAGLEPIKQGEILLK
GKRIDALPTEKRHIGFVFQDLALFEQMKVRDNIA YSLQIRRENKAHIKERIDYLAMRFRI
DHLLERYPSELSSGERQRVALARALASDPSLILLDEPLSALDAPLRREMRRFMRVQLTQG
YLTAIHVTHDVEEAIDLADEIIVMRNGNMIARGTISDLENSPGSGWLARFMNFGLTLHVD
AVSRKKGANL VMAHCKAGDILCSAHDTAQSAQIESGASYCVYVPFSSLSALDSKKVLARA
PGGILHATIVRCIGILSSTMKLLLSLGENEQFFEMTLAMGGGILVPKEGSEIELEVDPA
KCRLLPEEPRLPKA*

>SPBIB_v1_100172|ID:27162323|aroK| Shikimate kinase [Uncultured spirochete bib]
MKIALIGMMGSGKTKIGQLLAAHYGIDFLDLDHIIQRVGLSISEIFAQKGETEFRKIEE
STLAEVVGLGKPLVLACGGGVVLMPSNRELLESECITVWLDVPLRELARRLAGEKDSRPL
LASSNWQETLKEIYDARHMLYKETASIRYVWKENC SIDTSIQRIAQLIDSKKA E FQRTS*

>SPBIB_v1_100173|ID:27162324| Membrane dipeptidase [Uncultured spirochete bib]
MTEQSEDFVVIDAHCDTLMALNGRSMNKKETDPRDFADNPDAHIDLPKLLRGNVRCQVM
AIFLEDNQLANAPEETMHMIDIFDEVCKKSN GAVCLATNAAEVRRRAINEKKLSALLSIEG
AEALGSSLDMLDTYYGRGVRAIGITWNRNRAFRGRGLRGE GEGGLTPLGKQLVEKMQLVLM
LIDVAHLSEEGFWEVADIAGPFIA SHANARAVLDHPRNL TDAQIRAIADHGGAIGCVFV
PSFIAKDPNDSNLEAFLHVDQVVKAGGIESCAIGSDFDGFPIDASVIRNTSEFPLLYE
GLRKRGYSHGDAAKILGENWLRVFDEVLS*

>SPBIB_v1_100174|ID:27162325|uvrB| excinulease of nucleotide excision repair, DNA damage recognition component [Uncultured spirochete bib]

VKPFKVVAPYGPAGDQGQAIESIVNALQNGERYVTLKGV TGS GKTFTMAKVIEAIQK PAL
VISHNKTLSAQLYREFKGFPPENAVEYFVSYYDYQPEAYVPSKDLYIEKDSDINEEIDR
MRLAATAALMERRDVVIVATVSCIYGLGSPDLYRDMRLYMDKGSTVDLDEIKRTLVS LQY
ERNDMVLERGRFRIRGDVLEVFPAYLEEAYRIELDFDTVVRIRRLNPVTGEAHDELEEAV
IYPAKHVMPENMVQRAVERIKAELEERHRFFLEHGKYLEAERIKARTEYDIEMLEEMGY
CTGIENYSAPLSGRKPGERPGVLLDYFPKDFITFIDESHVTL P QIGAMYAGDRSRKLSLV
EYGFRLPCALDNRPLTIAEFESIVPQTVYVSATPGEIEFKRSKTVAEQIIRPTGLVDPEI
QVRPTEGQMEDIYARVRERAQIGERSLIITLTKKMAEELSEYLSGLGLRVRYIHSEIETI
ERVEILTQLRAGEFDVLVGINLLREGIDLPEVSFIAILDADKIGFLRSATSLIQIIGRAA
RNAAGLVVMYADTMSDAMRKAIAETERRRAMQTQYNKEHGITPQTIHKKVQDILERHREE
KIEASQDELALLKRTHNIFVPEQRKAMIREMEKLMFEHAKNLEFEQAALIRDEIAKLG N
RDV*

>SPBIB_v1_100175|ID:27162326| Peptidase S1 and S6 chymotrypsin/Hap [Uncultured spirochete bib]

MKLYSRTQIIIAVIVSVAITSLSIAGIVLLLNQPSRPKVSSSSSAAGAINMPAAQQGAA
QNGTASGLTAISPVPASAEAKSANLTQYLSGYSPEETENISYIYKYNESVVNITTEVLG
INWFLEPVPQSGSGSGSIIDERGYVL TNNHVVEKAYKLYVSLSDGSRYEAKLVGADPES
DLAVIKFTPEPGKCLKPVPFGSAKNLKV GQKVLAI GNPFGLERTLTTGIVSGLGRPIQKD
ETLILQNMIQTDA SINPGNSGGPLFNTKGEMIGINTMIYSPSGG SVGIGFAIPVDTAVRI
VPQLIKDGKVRRGWIDMQAIQLFPSLVDY LKQSGKGAPVESGLLVSTVTQGGNADRAGLK
GGNMAVRYGSTVFYIGGDIVVSDGKPVTSIAQLYSALEDSSPGQVVVEFYRGTKKMST
TITLSERKK*

>SPBIB_v1_100176|ID:27162327|yvcqK| Cob(I)yrinic acid a,c-diamide adenosyltransferase [Uncultured spirochete bib]

MSIVTKTGDDGSTGLWSGERIGKDSL RVEAYGTIDELSSALGMARHLCFQDNVLYAIEYI
QRLFRVAGELASLGTSFDRPITEEDEKTIEAKTSEIEARIPLRGFVVPGMTQGSAA LDI
ARTIARRAERRVVALSRTDEISPVLLR TLNRLSDFIYMLAREEEAAQ GK LTFV*

>SPBIB_v1_100177|ID:27162328| putative Arginyltransferase [Uncultured spirochete bib]

MYNEFKAGIRYASRCKPKTKAYKETSMLSSRQSPIQFQTR SICQYLPDHRPSLSDHMIFA

PSVDPALYGSLISHGWRRYGRELYRMACPGCNICIPLRINA EKIRLSSSLKILRLNSDL
QIVVKPPSFNAEHFELWKSYSKLGKHFSGPGDLTEEVYCYGLFEPWSLILEYREMAAQNRLV
AVSHLDPLPDGISSVYFSFAPEAKDRSLGFFSIMAEAYIATSAHLLNGKLVSIETA AVV
SYYSNRENTKNSGWY YLGFVWPGSPKMEYKARIAPFEIALPEWHEFGSRLEALEYL RDV
RMPGLGPFLQI*

>SPBIB_v1_100178|ID:27162329| putative PpiC-type peptidyl-prolyl cis-trans isomerase [Uncultured spirochete bib]
MASSENKKQTTNNGKSPIEKKAENKKTESLKRNFNPFVYIGTIVILVLTIIAFVLIPG
VSTGTSSGGQAPSGFTWNGKRIEYSSDSYFADQVSQINDYLKQQGMDQSQSQLYAYQVWR
LAFQNTVVRTALLDSAKRAGMKVSEQTIDEEDIAKDVQFQVDGKFSLEKYNKTPLATRLSI
RNRLRDDMLIQNYGDLMAVAPSTAEIEFVSSMAKPQRSIQYVDISYANFPEDKTIEWAK
ANESLFRSIGLSKITITSSQKDAEKVLSQIKANSLSFEDA AKSHSKDSYADKGGDMGTRI
FYDLKNEFQNEKDADAVMALKKGEISPVYKISNNAWAIYRVNSESSAPDFSKQSVLDEVK
SYLFDREKSVMESWALAKADEFAAEAPKSSFAQA AKKTGLEAKTAGPFILNYGKPSFYFY
GQQVGLFQEPYRSLDNDLVGAENETFLTTLFSTPKGAIKPVVLDASVVVMTVTGDTEG
TEQETS YTKFA YPYFFQTALESQIRNTILSSKKLKDEFNTTFARLFTPAAK*

>SPBIB_v1_100179|ID:27162330|lepA| GTP-binding membrane protein [Uncultured spirochete bib]
MIEPSRIRNFCIIAHIDHGKSTLADRFEIKAHLVDLRKFQDQMLDNMDIERERGITIKSQ
AVSLPYTAKDGQTYMLNLVDTPGHVDFS YEVSRAIAACEGAILVIDATQGVEAQTLSNMY
MALEHNLEIIPAINKIDMPAADVEGVRRQIEKDLGLDGDSALAVSAKLGIGIDELFEAIV
ERIPAPEGKPEDSLQALIFDSHYDPYRGAVVHLRLKQGTIKKGMHIRFMSNGIVHEVEEV
GHFIITATPSEMLIAGEVGYCIAGIKTVKEVHVGDTLTDDHEPCA HPLPGFREV KPVVFS
SIYPIDSADYEELRDSLEKLVNDASLIFEKDHSLALGFGFRCGFLGLLHLEV VQERLER
EYNQSIHMTAPSVRYKILLKNGTTVYIDNPSEYDPARIESA EEPYIRAQIITPVDYVGN
VISLCLSKRGTQQSFTHLDEKRVELVFEMPLAEVLFDFYDKLKSTSRGYASFYDITGYK
PTELAKLDFLINGEPLDALAMLVYKQSA YERARLICERLRNNIPRQQFKVPIQGAIGGQI
IARETVNPVRKDV LAKCYGGDITRKRKLEKQKEGKKLKRIGNVELGQDVFLSVLRASE
EEER*

>SPBIB_v1_100180|ID:27162331| Glutaredoxin [Uncultured spirochete bib]
MNLQNLPPVAKDGSRADHEIMVYALSTCGFCKRALAFLDAHQFA YRYLYVDLIPIDTKNA
IKQELKQRFKENVAFPFAVIDDKKYLIGFIEADWKMTLGV*

>SPBIB_v1_100181|ID:27162332| Ferredoxin thioredoxin reductase beta chain [Uncultured spirochete bib]
MANQKTREQTIIFTQMVAKKQGWVLPD TAFYNSLVDGLTQNYNRYGYHHCPCRDSEGSR
ELDAPAICPCVWSKEDILQYGH CYCALYLSKEFAASGKEPQAIPDRRFKK*

>SPBIB_v1_100182|ID:27162333| Aminotransferase class V [Uncultured spirochete bib]
MTQPVYLDWAATTPADPELMRRALELSLAAYGNPSSSHWAGKQANSILEESRTRLLGALG
MKQGS LIFTASGTEADHIPMLALLKHFNRVASQGKKIHIIISGIEHA AIDCQARMLQKTG
IEISWVAPD TYGHIVPEAVASHIRKETALISVMAVNNETGAIQDIRAVSTLIDDAARTLK
IKKPWFHVDAVQMLSKLPVAEYCMGADSI ALSAHKIRGPKGVGALWLGRPLESFVCGGGQ
EKGIRPGTENLFGALAFSLAGEKAQQLLET YVAHAQSLELRLLEGVARIKGAVVPERKP
KDNGFVPSIVSLSPFGVGETMVRALS DRGIAISTGSACSSRHKEKGRRILKAMGVPEDI
SFSSIRVSTGILTSEHEIDIFLEQAEDLYRTLKT*

>SPBIB_v1_100183|ID:27162334|thiI| putative tRNA sulfurtransferase [Uncultured spirochete bib]
MRTFFLIKPGEIELKLG NRREFVHRLKEQIQKRLHGIHFDLEEY PGRFFLSVEEKDT DFA
LFVLQHCPGVNGIAQAIKSEK RTERILKAAIEIASKEAARGARRFKVETRRSDKSFPLDS
YGM SAAAGDAVTQALSSLSVDVHNPDFIIAIEIRERAYIYASTSPGPRGLPVGSQGGV L
LLSGGIDSPVAGYMMARRGLAIESVYFHTY PFTSEE AQKKVEQLARRIAIWTGSMHAWIV
SFTEVQLKIKKGGREEANTLMLRMAMMKAADV IASRIKARAIVTGESLGQVASQTAENLR
LSQSM TSLPVL RPLIGIDKEETIATARRIGTYTISILPYEDCCVLFSPKHPVLKPDFEDL
RAYFSSLELESEILKAVDKAEKFFSFGDALREYGLDAYAEFWNAGGPRA*

>SPBIB_v1_100184|ID:27162335| RelA/SpoT domain protein [Uncultured spirochete bib]
MSDIENSIPDKAALAEIYANNRANYEEALARA VHDISKLLQRRGIHPTIKSRIKDFESLF
AKKIRLLKTA WDEHRDPLPNDV LAMRIICPFLRDLDEVENALAEHYEIIIEIERKGGQDRS
FREFGYESIHVLVHIPPELQPLCKGLERDVIEIQLRTILQEAWAEVEHEL VYKAEFTPFD
EPLKRKLAALNATLTLSDIIFQEILDYQK KLNDA LKRRREAFYGKIEQASAKVFGIEEEL

SSTIPRPVRLKKTSGKAIPEARSNQDRWASLDDITLLLSALDAHNASDFDA AISIYTEIL
SRKPEATIAAVVYKHRGMAFFAQSDYPDALSDFTS CIMLDPECYKAFYYRGVVKSIQGEL
QQAIDDFNKALEIHPYHFFSRYRRALCWWQLGDYVQAHADCEIALRIKPENKLAQELQKK
IGEHLARDEI*

>SPBIB_v1_100185|ID:27162336| protein of unknown function [Uncultured spirochete bib]
MSTDSTRRHAERYVIAALILGAVIFILLRGPILQFNGMRLYFPDEKQNLKLEMRHIPI
GSLEEKASDVIRELLGLPLTRNLQPLVHSDISLLRVVAGKNSIYLD FSTVSLEEISASYK
LFKEAIEKSLHETIPGNYHVYIYINSILTR*

>SPBIB_v1_100186|ID:27162337| Cell wall hydrolase/autolysin [Uncultured spirochete bib]
MIVARRRLKGRGLWQTRRALVVLILSVTWFNPAFAAEPAEKDITLSSLAQSLNAMLEY
DPLTRSGTLEKNGKTARFALDTPYVLFWDWTALKTLPPPVEDQDSIRVKKEFDIALRQFFD
TKQAPLSKYSVKAIVIDPGHGGKDPGAIGEFENFKIQEKDVNLAIAHRLAELLRIRYPER
TIQLTRTDDTYP SLEERVDMANKIKLAETEAIYISIHANASFNKNTHGFEVWYLNPSYR
RTVVDEQTAKEKEDIAPINTMLEEEFTTESILAQKVYQRMGKMIGDQSPARGIRAE
WVVRNAKMP SILIEVGFVTNKNEATLLSQAGYLRIADAIYNGVCFIEHFEY*

>SPBIB_v1_100187|ID:27162338|nrkJ| Vitamin B12-dependent ribonucleotide reductase [Uncultured spirochete bib]
MKIKRLFTKAGRGPYEGIEWEKRRSEIRNPNGTSVFSMDSVIVPSFWSPIASDIIAQKYF
RKAGVPKDKALDWTKFVPSSQTTLSEADVGDSEHDARQVFHRLAYTWCLWGRQANYFDT
DEDEKAFYDEICYMLAHQIAAPNSPQWFNTGLHAVYGIEGPAQGHYYVDPATNQVVKSES
AYQRPQPHACFILDVQDDL VNEGGIMDLVTREARLFKYGSGTGSNFSRLRGANEKLSGGG
VSSGLLSFLKIADRSAGAIKSGGTTRRAAKMVILDADHPDVSEFVRWKTEEEYKVA CLAA
GSAMLNHYADEMVAIEDMGADDENS YLLDRNILLRKVVKQALDAGVPSSWIHQVLT FYS
QTGKTPRLPL YNTAWESEAYNTVSGQSSNSIRVSNAFMQAVIDDLDWDLIARTTGSPFR
KVKARELWNEIAEAAWLCADPGLQFH TTVNEWHTCIADGEIRGSNPCSEYMFLDDTACNL
ASLNLISFYDEKTNTFDDAA YRHAIRLWTIVLEISVAMAQFPSKEIARKSYDYRTLGLGY
ANIGSLMVMGLPYDSKGR TVAAALSAILTGESYAQSARMAKEFGPFARYNPNKDHMLR
VIRNHRRAAYNAAPQEYESLSVLPKGIEAHLCPENLVKAARQSWDEALELGEKYGFRNAQ
VTAIAPTGTIGLLMDCDTTGIEPDFALVKFKKLAGGGYFKIINTS VPPALRSLGYSEDKI
GDIIAYALGRGTLEGAPGISRESLLEK GIPESALLKA EKALQNSISLEGCFSPYVIGYDV
LEKLGISKEEADVPGFSLARLGYSENDIEAAELYACGTMGLEGAPHLAEKDLAVFDTAT
PSGKRGRTRISWQAHIAMMAAVQPFITGGISKTINMPNNVSIDDVKGAYMLAWRSM LKSI
ALYRDGSKLSQPLAALAPGSDLIAD SIVALQTNQLSESAASQAADNTAGSTIPARLQTAP
EPELPGMPFAPRGIRRALPNRRKGYTQKAKIGGHSIFLRTGEYEDGALGEIFLDMHKEGA
AFRSILNSFAIAVSLGLQYGV PLEEVDAFTFRFEPNGMVNGHDY LKMATSVLDFIFRD
LAISYLHRYDLGQVKPEDLISTSTQSILDKGSQAFESGKKQTPAKSENVVSEPRPKKPSA
AAPAPAKDQTVLLIRAARQKGYEGDPCPVCGNLTLVRNGTCLKCETCGSTTGCS*

>SPBIB_v1_100188|ID:27162339| Arginine deiminase [Uncultured spirochete bib]
MESVRIDSEIGKLRRVIIHNP GSEIEAMTPREAERDLYNDIPLFAVQREYAKLRDFLHK
VTKTYELADLLAECLANENDKLEFLKEYSHINPIAHIVDQLALLPAQQLAQSLLAGIIP
KESLAQHLNPHSFIANPLPNAYFMRDSVAIIGNQVISA AFTFDVRMAEAYITRFIFK KHP
AFRNGLLDIDGPAERNRLFTIEGGDIHVLSSDVLAIGISERTTAF AIDRIAQRIARAEAR
PMTIFAIDLPKERATIHLDMVFTMIDRNAALAYKPVMLGAGRAQVYKLDVQANGSVRYSE
EKSLFEGLRGV GIDLEPILCGNGHSVFQEREQWLSGANSFAFGPGKILMYSCNAYTLEAL
NAKGFAILPAQDFLDGKANPDDYARLAVAFDGIELARGGGGARCMTLPVERDSL*

>SPBIB_v1_100189|ID:27162340| conserved protein of unknown function [Uncultured spirochete bib]
MKKRKIIIIGAAGRDFHNFNTRFRNDESVEVIAFTA AQIPNIDGRKYP AELAGPLYPKGI
PIFAESDLPNLIK NYEVDECVFSYSVDPYSHVMKLSAIVNAAGASFTLLGPKDTQIKSSK
PVIAICAVRTGSGKSQTSRKIVQMLMKRGLKVVAIRHPMPYGD LVKQKVQRFATIEDLAR
HNCTIEEMEEYEPHIARGNVYIYAGVDYEA ILREAEKEADVILWDGGNND FSFYVPDLMIT
VADPLRAGNEVSFYPGEVSLRTADVVIINKIDSASPEQIQIVRENIARTNPAALVIDAAS
PISVDHPELIRGKRVLCVEDGPTLTHGMMKYGAGIVAARKFQAAQIIDPRPYISGELIKT
FQTYPEIGTLLPAMGYSTTQTRDLEQTIDRTDCDA VIIATPIDLNRVVKIRKPTVRVGYD
LQEIGKPD LNEVLDDFCARHKL V*

>SPBIB_v1_100190|ID:27162341| conserved protein of unknown function [Uncultured spirochete bib]

MAQQQFCSNKEGAMHIEFSFPVKS DIKPRAILSLKDAGDMTYKPKSESPSRLAFFDRFGI
EPTRIAGIELKHSRNVAFVESIQELSHACAANRDGFDGIITNPWL VPSITVADCMPIWL
FCKECGAFGLHSGWKG TGILKTAVDGMTNRYRCNPNDISVIFGPAIGSCCYLVDEKRAR
AFKNEFGSQAVDEHMRNGTRVFYLDLLAANLAI AEKIGIGSFFASG SCTSCDGRFGSYRR
EGASSFTRMIALCIFGNAEAENRQRSM*

>SPBIB_v1_100191|ID:27162342| protein of unknown function [Uncultured spirochete bib]
MPFSEQKEPSIITIAHGAI AVFKPAGWHSV FQGVELKSPRALNERSAADFEDMVS WLSSH
ADLLPASELKDAKAWQARFAGLQAQVQPKAADRFLSELGMLYRLDRETSGIMLFALDRA
TMESMRAAQNAFMLKKRYILMSEASDIELAGSLPRSRSAEREVLLSALYEGNTMPIVSYF
RSYGPRGGLVSCIEPSFRLKAKKKITKDRYQTDLSAAKPMQWPAAGAICIEAEIRKGFRRH
QIRAHCAWLGLPIIGDLQYGGGSSKRLWLEAFSVSLMDGRQCVAEWKLHDGPTAILQQ*

>SPBIB_v1_100192|ID:27162343| ABC-type multidrug/protein/lipid transport system, ATPase component [Uncultured spirochete bib]

VAEFFDAEPVTKGYDSQITRILAYLKPYRLFALIVLITLSVSTAGELLSPTLIRQAVDE
ALVREWYGLDPSAASRFRSKNGSREIVINNRIYVRTSQLAGITEKERTAMEKQGLLDASP
SYIFPLEPDREKKEALALRYSQITISGVWGIVPYSLTSLSPDDAYLLRSQDSPVLGHYA
LLLLLVL SIVLLSTFAMTWYTNHIGTLIMKDMRLQYRHHVIEQSLAYLSRQPVGRLVTRL
TSDIEVISQFFTDVLSAFIKDATIMLGLSVLFLVFNWKLGLVVFATVPLIFVAAA IARVK
ARDAFRNQRYWTSKVNSFLSEHISGIDIVKLFVQEKR VSEKFGENNRNLLKANIAEMYVY
ATFRPFVDFMSTIASALAIFFGAILFLRLDISIGTLIAFINLISMFYSPIKDLSEKYILL
QSAMASGERVFGLLDSDDRLEQLPVLADKEAPS VIRGHIELSNVWFAYKNEEWVLKNIS
FTVNPGEKIAIVGYTGAGKSTIANLLARFWDIQKGAILIDGVPIGQYPLKRIRKFIQVPV
QDVFLFQGSIRENIALGLDLSQEQLETA AKAVYAHEFIMALPKGYDTLLSEGGLNLSLQ
RQLISFARVLAHEPSIILDEATSSIDTETEKLLQK GIEGLLKDHTSIVIAHRLSTIRDA
DRIIVLGQGHVVETGTHSELIERRGLYWNLYRLQNREME*

>SPBIB_v1_100193|ID:27162344| ABC transporter related protein [Uncultured spirochete bib]

MFKEYATLLPHLKQYRFRYIAGILCLIAVDASQVLIPRYMKT AIDTIVSGSFQLREIVQP
LLIMIALAVLISVGRFFWRYFINV ASRRIEAEMRDRLFAHILNMSGGFFRTNTTGDLMAR
ATNDISTIRQATGMGFVALVDGVFMTAMILVAMFANNARVAAWIILPLPLITALILLFGR
IVGKLFKKIQDIYGRLSNIAQESISGIRVVKSFVKEDYFFGRFAQANSEYKNAIMDLVKT
SGFFFPFITFLAGLSTVLLVLFGGNASIRNKMTPGSIIAMLSYLEMLVWPMMSAGFTVNI
VQRGAASLKRINEILNTKPEIPESKNLVN GEPLGDIEIRLSYAYPGSSRMALENVSVHI
PHASMLGILGKVGSGKSTLLKMLPRMLDPGEGHIFIGGTDIC SFKLDTLRAAFGMVPQES
FLFSDSIRANILFAAPGLDSARFEEITRIAGLDRDVS LFPHGWDTIVGERGITLSGGQKQ
RIALARALANPSILLDDALSAVDGETEERILSALLEERAGKTTLV VSHRISTLRNADQ
IIVLDGGRITQKGTHEELLEDSEGFYAKIAALQQL EQESCASC GDAGSGEALGEEAAGG*

>SPBIB_v1_100194|ID:27162345| rnhA| Ribonuclease H [Uncultured spirochete bib]

MQEKSIVVYTDGGCKGNP GPGGWAYIMRFGERYREAWGGELQTTNNRMELTAVIRALSFL
KERID AARASCIRRYIPLPAWISTPIHIFTDSMYVKN GISGWIHDWKKRGWKTA AKKPV
NRDLWETLDILCAELNPQFEWVEGHAGNPDNEHCDTLV GQAVEELLQHVAPAVYHESEKE
EDLATDAPL*

>SPBIB_v1_100195|ID:27162346| conserved exported protein of unknown function [Uncultured spirochete bib]

MKKITFAGALVVALIVSSCASTPSIPEWVSQKPAPDARYTYFV GSSSAPDSATAANDATA
SLIAGIMQYMGVSVSVSSSAEARASLDDYQAQITQTVKTESKGR LAGFEVVEKYIQKDPK
TGQYTVHVLARYETKELQKEKARIEAIFQEERDAVAIPEKKGDQA ATEGRLMDAIRSYAE
AMSAAGGSNLEN AKIKLERNAKKASELAASLKL TIVSESSLVALGSKLPASKVALISNS
GGMKQRVAGAPLLV TYPKKLASGRVGTGMQVFTDTNGVT AFEVPPIDIAGNYRVAIQLD
FSSISDLLSSLPSWALPYSDAVENELSGIVAYLNYKVISTAKNVPMAVAAYLKDTESARN
ADPAVFLSGLKETLLKEGFSLSDAKLPSGYQTPIDLSVLRAIAPADAQR FALASLDV KSI
TKDGSYFIATAEGSLGVFELASGRTLYSATKSAQGMGLSESEAVSNALKTLG SQAFGKDL
LSALP*

>SPBIB_v1_100196|ID:27162347| conserved protein of unknown function [Uncultured spirochete bib]

MRVGKFLALMAVVLVISC GTKPLRKGEVLIEDKGTAYGIKTPK WVELAIIGGYRDIEK
LPDYKDKVVFIAQFEAQNLSAQLLAERMQADTEIARYLSTRVKDAFKGANVADADSKNF

GAYGERFVASVGEAKFSGYRMEADWVVKVQTYTPENKPKDKQIYRVIQLWAIEKGMLQKQF
DILFSQLAGTAQPTPEQKRAIDLQNTVTKDFFGENK*

>SPBIB_v1_100197|ID:27162348| conserved exported protein of unknown function [Uncultured spirochete bib]
MSDNTNVMKKKKYFALVLAAYAIAALLIGCASKPASPAVSAESQQAQKNIVQSTSTPDMPA
TPPAPSPSAQDPSAAAKSVVGSQPMGQAQAPGAVPGTPQAGTASYEALTPDESHFLQNY
LGRLSYL VYYNEASGLDPQLAKAAVSQANRYLIEKLGLSVIDFDQIQKNKKDQMSAYQAE
TGGSIDIIITYIAQKLNADVVEIDAKTSYSGGPGNWSGSAQGS MKIFDASTAALLGSISF
MSPQTFSPVSADAAMMNAIAGIVWQSMPKVTEQSKALMSASVSRGVRYELVLQNTPDAKA
ISQFEKNLSKKVREIERLSYAPGETRFALYAFMPASRIQEAIYDAAAAAGYPCYLLYMR
GRSYTFNTGL*

>SPBIB_v1_100198|ID:27162349| conserved membrane protein of unknown function [Uncultured spirochete bib]
MRRQKTSYIIVAGIILFSFHAAPFVSPQNASRPEMQGTFTETGCNHCDSFLYIQKPRLE
ETYGIHIALETHDILSTKGYELCVEMLEQRGLKFTVFPVLFIGSNVYRGSNAIEENMPKE
IEYFLSHGSYMPTIRQTDQSALAAKNSNAFAASALPTIFAGLLDGINPCAFSTMLFFLS
FMALKRKDQRSLLWVGLAFIVSVFIA YFLIGLGLL GALRKYLSENRF SIYINIFISAIAA
IFAVLNVRDAIAASRGRAFDSVLQMPFFKQLNHRFIRYFNQLPL YILGAAISGFLVSFI
ELACTGQIYLP TLA YMNQSMRSSKSILLLLMYNLA FILPLSLVFV LFFFGLRHEKIRHWY
GSHLALVRLLSAVFFVALAVLVWAS*

>SPBIB_v1_100199|ID:27162350| putative Maf-like protein TDE_2348 [Uncultured spirochete bib]
MYGDPILLASESPRRASILESLHIPFITVVPRIDEQIFDHLDPGERVVALAATKARRGKE
RWIEGKKLYSDPLPEPMEKPAEPRFALGADTLVAFRTPEGWHTIGKPIDEQDAYAMLTME
AGNRQYVFSGLCLDMENDVPHVALSVSEVQFSPMSAADI AWYINLGEWKGAAGAYRIQG
AGSYFIEDIKGSFSGVMGLPIRELYGILRQSGYLSSEEIQG*

>SPBIB_v1_100200|ID:27162351|rpsB| 30S ribosomal protein S2 [Uncultured spirochete bib]
VAVVTMKNLLESGVHFGHQVKRWDP RMKKYIFAERNGIHIIDLQKTIQAIKEAYDAVQKV
VSSGKTVLFGTKKQAQSAIQKEAERCEQFYVNSRWLGGMLTNFSTIRKSIQRLKKIERM
EVDGTFSSLTKKEIASLLKEKTKLEKNLGGIKEMTSLPGILFVVDTRKEAIAVAEAQRLG
IPIVAIVDTNCNPEGITYPIPGNDDAIRSISLFTQIIANA VIEAGASEGLKIIETLPAEE
EQELAPPAKTEEDEVEIDLETYSNVPIAQEKEPEEPAEVEAPIIDEDRLYEEN*

>SPBIB_v1_100201|ID:27162352|tsf| Elongation factor Ts [Uncultured spirochete bib]
VEIKASDVKALRERTGAGMMDCKKALTESNGNFEEAEKLLREWGMAGVEKRAGRATNEGR
IFVAQNESELSLVELACETDFVARNKDFIDAGTKIAATALGQKASSQNESLESMVKDIAS
LIKENIALKRVA YFNAGMNEHLH SYLHGEGRIGVVVKFRASDPNAFKNEKVASFVHDVAL
HVA AAFNPMFLDESKVPASWLAEQKDIFQKQVELDEKMKS KPAKVIEGILAGKVKKLLSEV
CLMNQGFVRDEKVS VADALAQISKETGFS LAIVDYYFAKVGQN*

>SPBIB_v1_100202|ID:27162353|frr| ribosome recycling factor [Uncultured spirochete bib]
MESIKAA YEERMKKT V SALHDEFNAIRTGRASPALLDKVRVDYYGQKTPLSQVATISVPE
ARLVIQPWD RSLFSEIEKAILKSDLGLNPSNDGKVLRIAIPPLTEQRRKELVKTARNIA
EQSRVAIRNIRRDGLEELKQLQSAGGVAEDAVKKEETELQKLT DAYIAQIQILETKERE
IMEV*

>SPBIB_v1_100203|ID:27162354|ispU| undecaprenyl pyrophosphate synthase [Uncultured spirochete bib]
MNENRVPSHVAIIMDGNGRWAKARGLP RTEGHQKGLEAAKRIVLAARKEGVKFLSLYTFS
TENWKRTTQEVGFLMSLIRVHLTKELDFYRENEIRIVHSGDRAGLPGEV IELD KAIEDT
KHHHALTVNLAINYGGRDEIVRSVQRLCRTDSPHIDENAIQQSLDHPEIPDPDLIIRTGG
EMRLSNFLLWQSAYS ELYFSPKYWPDFMPEDFHAALADY AHRERRFGAAH*

>SPBIB_v1_100204|ID:27162355| conserved membrane protein of unknown function [Uncultured spirochete bib]
LNANTRSRLLLFFGGIPLFALV LFFLPFGHYALLALLVLAVQYLSSLELRAML RKSERAD
PGNFVTIVGLVQSLAVYIACVAGARPLEAAAVMFLISILCLMIVLSPIAFS KKE SFPLLL
STAGSISLAHFYTGILPGFLMLIVAGFPDAKNAITFALLTFGNDSLAWLFGKLF GKRRN
VVDVSPNKS VAGFIGGAIGSIAGAF LGLGPLAGSWKPEGSRYLVL SLILGAGMAFFVIAG
DLFESALKRSAGMKDSGVIVPGRGGVLDSFDSL YFSAPFFVAFSYLARLFFL*

>SPBIB_v1_100205|ID:27162356|dxr| 1-deoxy-D-xylulose 5-phosphate reductoisomerase [Uncultured spirochete bib]
MPKRIILGAAGSIGRQSIEVIRQSAATEEPLVLAGFSVHHNAKVLLSLKNEFPHARAAY
TGDAASAPTGADWAGPEALAQLLSAVQADIVVNGIAGAAGLSASILALQNRMH LALANKE

SIVMGYRLKQLADDNDLSIIPVDSEHAALFQLTQKIGMHAIAELTITASGGPFRTLPLE
RLAEMTADDACKHPVWKMGRKISIDSATMANKGLELIEASKLFDMPQEHIRVLIHPQSYV
HAMVRTFDGALYAQISEPDMRLPIHAALHWPHTYPSFGHAELAGKTLEFFEPERNRYPL
VWLARNAMDAGDAACIAYNAANEIAVARFDAARIRFTQIAQVVSETLAHSWNLPVSSFED
IFDIDMKARQISEELVEHIAW*

>SPBIB_v1_100206|ID:27162357| Membrane-associated zinc metalloprotease [Uncultured spirochete bib]
MVTIILGLIGLSLVVIVHEFGHFLIARTVGVDFEAFSVGWGPALLTHKGKKTEWRLGVLP
IGGYCKLKGEDGFRAAIEQKLDIFPADKGSFYAAHPLKRIAIALAGPLFNMIFAVLVFTF
VVAIGTTIRTAPNRIVLSSETGTTMQAGSSNPADMAGLQTGDILQSIDGRTIRDYSDLQE
IIASNPGKALSQVQLRNGSIQNLVLTPLRDANTGAGVIGVYPWIDPLVSSVKEQSPAIA
DLKPGDKILSANGKPIRNTIDLMNSFKAANGPVELTLERNQNLSTTHIAKSLEETGIAF
VSITRTDKASSLPDAIAKAKETMSTFALTIRSIGLLFRGVNIFKAVSGPARITYLIGTA
ASEQIKVEGLAGLVPVLSFLAFLSVGLAIMNLLPLPVLDDGGLLVFFIELARRRPLSAKT
LYRYQFIGAAAFVLVLFVVATMSDIFFFAAR*

>SPBIB_v1_100207|ID:27162358| protein of unknown function [Uncultured spirochete bib]
LRLQREEVFMHFFHFCPNPACAYHQHAPKERWFVAAGFYVTKTFGKVQRFRCQACXX

>SPBIB_v1_110001|ID:27162359| protein of unknown function [Uncultured spirochete bib]
MFRERAFVSRLSLDLLDQKLWKRAFSTPLKTSAEYLPRYALA*

>SPBIB_v1_110002|ID:27162360|dnaB| Replicative DNA helicase [Uncultured spirochete bib]
MAGPSLKDKLPLYNADAEQACLGALLIDPESMNTVLRYLRPESFYEPSNQETFEALISMH
EKGQKPDILTSEELRSRGLDRIGGTAYIASLASFTPSAANVEYYARIVQEMATRRRLI
QLSAEMAAMAHEETMDIDRVLDELQAKIFEISQNRRTIDYHSAKEIVTETMLLIEKLSTN
PEAFTGVPTGITDLAMTSGLQNSEFVVIGARPSVGKTALALTIAAHASIDLKIPTAFFS
LEMSESAIMLRLISSEARIPAERIRTGRIRTTDYDSLMEAAARIYEAPLYIVDMPNMKLL
ELRTMARRLVLERGVKILFIDYTLVTHENADLPRWEQISAIRSLKALARELNIPVVAL
SQLKREAEGKQPTLADLRESGSIEQDADLILFLHREREMNKAHDQQSDQVETDLIIAKQR
NGPIGKTSVWFKSSYAKFVNMERHEHK*

>SPBIB_v1_110003|ID:27162361|rpII| 50S ribosomal protein L9 [Uncultured spirochete bib]
MKVILNQDIPNLGEIGDIKEVAAGYARNYLLPKKLVVMVYNEKSAAMLQKRQAEILAIKEQ
KRLASRSLKEKLEADTLVISMPAGSNGKLYGAVTNHTIADLKKGIEVDRKKIEVPGRS
IKSVGNKYKAVKLYEKDEAALRVSIEAQAVASAEKKAGEGEAKKHRPRRQRTETEPATA
EEQAAAFEAAVNRGQLS*

>SPBIB_v1_110004|ID:27162362| membrane protein of unknown function [Uncultured spirochete bib]
METQNSMDPILVRANRRKIPVWVSAGVLSGLFYASGFIAVAFLVPVQFAFAKDGKKEGLL
SMLASLAVIGIGNAMRLSSLGFMQFSVLVQTFLPPLLLCGIGALNMLAVDSWKKVIAVS
VILAGVFGFLLKASIGTQEVQQAIAIILQLLGSSGTQLPDAATIARDYVAPAVEVILDC
YGALLFLMLAASWSIGNRLGEKGTGADGTMQKGSIRSIVVPRWLLWPSILAWGLLLLVLVY
GHKQGALAIVAWNASLAAASWYALQGIGLISYFFESKGMHRTTGLMLVLLILLILLDRKV
GLAVAILMPVLGVSEVWLQYRIRKGA*

>SPBIB_v1_110005|ID:27162363|rpsR| 30S ribosomal protein S18 [Uncultured spirochete bib]
MDEMKDIEDVKVSRPEADQQDSRRDQDDRNGPRKKGKGFRRKVCRCFCTQKVVIDYKDADM
LRRYTTERGKILPRRITGTCSKHQRELAVNIKRARALALLPYVVK*

>SPBIB_v1_110006|ID:27162364|ssb| Single-stranded DNA-binding protein [Uncultured spirochete bib]
VSDINVVVLVGRLTRDSELKYTPSGY AICRFSIAVNRSKKQDEGWVDEPHYFDIEFYGKS
AEGLSKYLLKGRQVAVQGELRQDRWEKDGQQRSKVVVASTIRPLGSPQGTDA SNRRYA
PDSVPAKPEPSNGQASIPPGVDEFTDDIPF*

>SPBIB_v1_110007|ID:27162365|rpsF| 30S ribosomal protein S6 [Uncultured spirochete bib]
MRQYELVTVLNSEEDQFKAGKQAVADLLAQFKAIDVKEEDMGDRPLAYPVKMMRAHYVL
YRMSIEPASIVALERAIMLSPAILKHLVVKVED*

>SPBIB_v1_110008|ID:27162366| transposase [Uncultured spirochete bib]
MFVQTLFEKKTGRITLLFYITARRVKGKIVKTKVKRIGYLDEFDAYPDPLTHFRQEAKRL
TQEAQLKTLTVTFMDEHFSFGAGFAATEDAAVEKADRTFHYGVLPPLLQLYRELKIDAF
RIKAQYTKVDFNHNHLFQMLVFGRILFPESKLATWRDRTRILQHSDFSDDAVYRALPFFA
QIKDALVQHLHEQVQRQYHRDTLLYYDVTNYYWEVDREDELKRKGVSKHRPEPIVQLG

LCMDNSGLPVTYGLFPGNTNDVATMRPMMQHLAESLGTKHLIYVADKGMGGMGNIAQIIL
EHNGYVISSSVRKADAELRRYILDHEGYTELAGGSFKYKSRLVPCTLYVDTPDGRKKQIR
INERQVVFWSERYWKKARHDRDMAIAKAMARAGYGENTVLNNHAGNRFIKKEIFDPDTRK
EVDHPEFSFALDQELLDSEEELDGYLIRSNVVGREGDAPFNQPYRWHAKDNLFELNRP
VVDLDIIDMYRGLWRIEESFKITKSQLKARPAFVHRQDSIEAHFLSCFVALLLLRLEKR
TGEKIPVATIVESLRKAQLVQLEDETYVNACCDNVIEAIGQALELDLTKKYYTKGELKAL
RGKTAKS*

>SPBIB_v1_110009|ID:27162367|hisS| Histidine--tRNA ligase [Uncultured spirochete bib]
MPTITPRVLKGFDFLPDAEMARASLVKKLEQVFAVSGFVPIIDTPVLEYAEILLGKGGGE
TDKQVYRFLDHGERDVAMRFDLTVPFARFMAEHVDEL YLPFRRYHIAKVWRGENTQRGRY
REFMQCDFDIVGTDSASADADIVLTAQAAMTKLQVGFSLRVNHRALFNRFLAHIDASDK
SVDILRAVDKLEKIGQATANALSSLVGSPLASDILEFIRKEDSFEATLTKMHRFCAQKD
QAADMAKDRMLKIMECVSAAGFENRMVLDPSITRGLDYTG MVLETTLAALPEIGSVCSG
GRYDELASLYTDKPLPGV GASVGLDRLMAALEAIGKPVVSDESTQILINQDDIQLPEMH
RLANLLRADGFAVEVFPEPKVVAQYTYAERKHIPLALFLGNASKPYTLRVLGRRENIEI
ADFAIGDAARKELDGS*

>SPBIB_v1_110010|ID:27162368|trmB| tRNA (guanine-N(7)-)-methyltransferase [Uncultured spirochete bib]
MARDDAKPLEGDQLHNSSPLEGSQLLDGVSRSFVVRSGRLTEAQRRAIEVWGPTYIIPFT
PVPLDFAKLFDEQRPVILEIGFGMGQATWQIARDRPNYNLGIIEHAPGVGRLIMDLREH
NIANVRIIQHDALEVLRTAIPPELAGLHIFYPDPWPKKRHHKRRLMQKAVICLMAEKLA
SGGYLYFVTDIEEYGEFAKNALESCKLLANRYEGFAPRQDWRPVTKFEGHANESGRNAFE
LMFIKS*

>SPBIB_v1_110011|ID:27162369| Helicase-associated domain protein [Uncultured spirochete bib]
MMNPHDLPIYQQRKILDALEKNQVIVVESPTGSGKTTQLPIILYEAGYAARGIIGVTQP
RRIATLSVSDFIARQLGSAIPGIIGYKMRFE DATASNTVIKIMTDGILLQEMKLDPFLSR
YGVIMVDEAHERSLNIDFILGLLKKVLEARSEFRVIVSSATINAEIFSEYFSECPVIRID
APMFPVRVYDAIKPVS DLPQPAGEHEAGYRSSDDALYDKILSIVGRVLDGDAGAEPGD
ILIFLPGEKTIKGLQQLIASRWAAKLYCIPLYARLGKDEQERVFDPPPGKIKVVIATN
IAETSVTIDGITVVIDSGLAKINYNPKTFTASLIETPISKASCNQRKGRAGRTRPGICY
RLYSIKDFESRPLYPTEEIHRTDLSEVLLRMAELGITDFEHFDFITRPPKSAIRGAIEVL
NLLDSLNPDRTLTRIGEMMCAFP LPKLSRMIVEAILKYPDVIAATLIAS AFLSTTSPYI
LPPGEETEARA AHHQFRDPMGDFASYLRLYEA FVAARDKTRFCERNYLDERTLHEIVRIR
EQLELIVSDLGVPISGGAIADYICAVSRGLIQFVCARQGRGMFRSLTAERI QIHGPSVM
FRQDADFIVAGEIVRTTRMYAMSVSPLSKAQLYRISPELADQLIRLRQKTSMPPRSRED
AYRSRNHKEQRGGRKSEISSHDLPOKEKLESLVLGGEVFP IEGKKPSLRTVVL DWNRLK
RIASQIGPADEDLGKGLKAKIEWGKYQLFGNEKFSTVLKALKWMDIEKDLSSGWP KHKNY
SFEADKSESEEDSLEKRRRTLEELADSLGSVLHVTKV GKTGKLGFIGLYSDEAGNFWFQP
TRSFSEALNQLASAE LLVDYAKDLGLEAELKDKIGLLYRRLN DFFSSL*

>SPBIB_v1_110012|ID:27162370|xseA| Exodeoxyribonuclease 7 large subunit [Uncultured spirochete bib]
MHADDWLADSVQSSSPLSVS QLTLLIKNDLENKYPDVTVEGEISNCKVAASGHLYFSLKD
DQAVLQAVMFRDMLALS FVPRDGMKVWARGGISVYAGRGQYQLIARTMRAAGLGDILAM
LEERKQKFAKEGLFDQDRKKQIPAFPERIAV VTSATGA AIRDIIHVLRRRNPKAHILLP
AAVQGEAAASIAARIRQANQWSIADV LIVGRGGGSIEDLLPFSEEIVVRAIAESRIPVI
SAVGHETDWALSDYAADLRAPTPSAAAEMASKDLGLVQKEIEHFETVLAQSMRQIIEHAR
QRLSLVSPRSMESMLVRRHMLLMQRFD TATEAIEQGMRSKVD AFSHRIALAA SAIELSNP
KAIMKRGFSIVRKS AEIIRSAEMIKPGEEVHISFYRGEANASILSAQAEDARSKNDEGL*

>SPBIB_v1_110013|ID:27162371|xseB| Exodeoxyribonuclease 7 small subunit [Uncultured spirochete bib]
MKDFEKKIARLEQLAEQMRD TDLPLEKSFEIFE EGITLARSLKKEDELQ GKVEVLLNSL
EEDESPRTAAFEDQAQNIQP*

>SPBIB_v1_110014|ID:27162372| CTP pyrophosphohydrolase (fragment) [Uncultured spirochete bib]
MSYRWEFPGGKVEETETDEEALERE FLEEFGARIQVVRYLGETMF AHRGRMRILAAWEIR
MQPKDVAMLNEHSEAAWLPFESITKMDLADSDRSLLPLVQA AFSALQQKM*

>SPBIB_v1_110015|ID:27162373| protein of unknown function [Uncultured spirochete bib]
MRSLVSMQSLLLDASTRELFNFSADGLMEV ASLRLWYALQ QEMLSLGALTGKSKDTIAI

AALCGKGDNAGDALAMLRHAKMDGFQRLSVFIPDPATMKENARLNLCRAERC GIDIIRYD
LAPDELEKKLTAQDILLDAVLGTGVKGAAKEPAAALISALASAKKAAVSEKSHFPYLSI
DVPSGLSDEWEPGFPCVQADATLCIEPMKEALFMHAARPYAGKIIPVGGIFPLWPNEAHP
RVWEIESADLPEFLPPISPWAHKMQRGRVAIFAGSAAGAGAAMHCVRGAAASGAGYIALY
CDEELYSAYLSALGDYAIVRVYSDDTFSAEWDALVIGPGWGIGEKREGQLARLLQSKTP
IILDADGVRLFAHLAEQHSRNGTLRFFKAPLVLTTPHPGEFSALQKFISQEEAAQFQSSGM
VNQVCSLAQKFGIVVALRASTTHIAFPDESCAICDGSTPGLGVAGSGDVLSGLAGGLAR
WRAARELRAASELNEGDHGMWKDPLSAAIISAVLVHAAAGRSLFDAQGWFNPEELARTCA
RISSWQLDCLKAQ*

>SPBIB_v1_110016|ID:27162374| exported protein of unknown function [Uncultured spirochete bib]
MNRRCRTRLLLLGVLLVLASCKVSSDEAKTHALFDIGYGKTDFTLDSASEKNNIGLSIN
KGIFHILSRGEAKILSISSYGQTLAMWYDPARGSAPMILKDVKIDAGSSKEDMGRFATQV
SFVDPWPMAADSRQTLVADRKSQVVSANGTENSAYGAEPDRIVRRFDANGKELGPLGQE
GIAGSPFPEIMRLEITENDTLAVICASETETLVYFYDRNGVFLHLLKLDNTLPIPAQIL
KKNPEGKGLRIIPSLESIIIPAYVAGKTEVILKINYYLENYDVGTVLTSIDQLGGWILQI
DASAGSILNAFPLQSGMSETGVNLQLVAACKDSFLTRWADQYLG GELLKFDSSGKVTGK
LSIRCPDEAAAFVAMTVGDDGYLYLLASLPSALRMYAWKIPGM*

>SPBIB_v1_110017|ID:27162375|secA| Protein translocase subunit SecA [Uncultured spirochete bib]
MSGNILAALLGSKKEKDIKAVLPLLHRINELEPWALSLSADDFPKMTTKFKDRLSKGETL
DDILPEAFALVREAARRRLGERPFDVQLIGGIVLHQGKIVEMKTGEGKTLSSVTAAYLNA
LTGQGVHVITVNDYLAERDSQWMGQIYTFGLSVGCILSSMDNVARKTSYACDITYGTNN
EFGFDYLRDNMVWSLDQKVQRGHAYCIIDEIDSILIDEARTPLIISGPADDDTYKVNEVN
RLALSLVEAKKNPETGEYPDESKGEVLEGGDFKIDEKSKRVMFTSEG MNHIESLLQKRGLI
KGS LFD PANFEFVHYFTQAVRAQRLFNKDVDYVVDNQQVQVDEFTGRILHGRRYSEGLH
EAIEAKERIKIARRNRTLATITFQNYFRLYK KLAGMTGTADTESEEFNKIYNLDV VVIPT
NRPVVRDENDLVYLNTEKFDAILNEIKTLHTKGQPILVGTVSIEKSEKLSAMLTNGI
RHEVLNAKNHAREALIISEAGAKGAVTIATNMAGRGTDIKLGGNPEFRARRKAGTEAPEE
KYREALLHEYDLWARDYEEVKSLGGLCVIGTERHESRRIDNQLRGRSGRQGD PGRSIFFI
SLDDDLMRLFGGENFKQLMSKAGMKPGEPIYHPLL NKSIESAQKKVEERNFEIRKHLLEY
DDVLNKQRNFIYEQRNAILADTDLIERVRTSATEMLED RSDLLDQSIKENQNKAIADFCS
WLFDTFGIDLSPKQVADLHRSGTIIQEIQLLDQDLSAKIESAGAESLNFFIRFSYLQEI
DEKWLDHLESMEALREAVYLRSYAQKNPLLEYKLEGS DIFESLILSIRHNIASKVFRVRI
QQKVEQTATIPSRAPRIEVAQTSHQSVGSFAGESEA VRQESAIAAAAAPPAATVIRQQGK
IGRNDPCPCGSGKKYKHCHGR*

>SPBIB_v1_110018|ID:27162376| putative Fibronectin-binding A domain protein [Uncultured spirochete bib]
MSLNCEEIELILSEPLEGMKIQNIFQPSYDAIVLELYGRGNRLFYLISIAHNACRIHPL
TAPPAKNERPLRFMECLRSRIKGGTIIHAEQISKDRIIKIEITKADEKGS PAKLFLYARL
WSGAGNVLLVSEEGIIIDALRRLPSRQEISGA AFALPAPRDAASQSAKPYTIRDLQGP
FWQRIEHFYSEHTGQLSRDALIAQVREIFSRKYSSLENRLSALS AKQNEYQQAERFRQIG
DILIGGYAIEMQGTKTFARALDFYENREILIEIEPSATPAQNAARYYEKYHKAKTGIDDI
AAELERCRTSMSQLKTWLSKLEAEPDPIVIAQALRKGGAARTKEKMRFP CQHIEYKGWTI
LIGKSGKENDEILRHIARGSDLWLHARDYSGSYVFIRA IKNKSPPEVIQTAARLAIYYS
KARKNLGGDVHTTYVKNLRRAKDGPVGLVIPYLEKNIYISFTEA QIKDILDESLSGEEIE
Q*

>SPBIB_v1_110019|ID:27162377| conserved exported protein of unknown function [Uncultured spirochete bib]
MKRAGSVFCVLLVLAFACTAPAIAQQKSKVVVSVLKGPSGLSSAWMMSELLKTSPDEF GF
ITVASADMVVAKLLNGEIDAGVLPVNIAAKL FNAGAPIRALAVVGNGMVKFLT TDPDLAS
LADVKGKTIYIAGQKATPDFLFQYLCAAYGLNAGSDYTPVYNL AYPEIAAGLAAGKIRYA
VLPEPFASQAILKNASIRAAVDLKEWQLRTNQEDY PMSL FVARKELVESNPEKARILLD
SYRASLRKAKEDPSGTGKLAESLDLGVSAQVAASA IPLSNFVFIEAPAARHSIETLLSVF
LQFEPASVGGKLPDSAFYAIIR*

>SPBIB_v1_110020|ID:27162378| Binding-protein-dependent transport systems inner membrane component
[Uncultured spirochete bib]
VENCLIVLSMQSSARPSWTPLAWRLLGIACFLVAWQAASSIVKSELILPGPPIVLKALAN

LSTTAKFWSAVSGSLARVLESFIISIAIGLLSGFISGISQPAKAFLSPFITGVRATPVLAL
LILLAMFWFPSSQVPVFSVFLMAFPVMHTSAEAGIRSV DQNLLQMSRLFHVPKRVMLWRL
RVPSALPYILSGAKNALGLCWKVVVAGEVLSQPRMALGSAMQESRLMLETADVFAWALVT
ILLCGLSEYLFGLLSARANLVYLSVAPQVSRQSSI*

>SPBIB_v1_110021|ID:27162379| ABC transporter related protein [Uncultured spirochete bib]
MSMAIQNLKRFGDLLVLDSVSFEMQASSITAILGPSGCGKTTLLNILSGILAADAGAMA
GLEDKRFSYCFQEPRLAWLIAEDNMRYAMASLQDTNTIEQRISRFLEEAGLTEFRHFRP
HQLSGGMQKRLSLARAFAPSDILLDEAFSAVDLKQKIELMQAFLKLWKDERPTAVIVT
HDIHDALFLADQVVVLSQRPARVRGILQINTPHEARLFGSNELAAEYEQQLYSLGFASTLD
QDANMPAN*

>SPBIB_v1_110022|ID:27162380| putative Multi-sensor hybrid histidine kinase [Uncultured spirochete bib]
MPKIAVLEADAVIALDIKSIEQANLASVDVFESFGALEPELTEQHFNLLVIDIDDNREE
DIQTATRVRDFGIHCIVISDHASASLVKLEAEPLGMLVKPFSSRELIANVETGLYRV
SMEQKLRDSERRYRNLFAYSLSARCISAFDGAILERNNAFETQFGLPQKIRNIQELFTEE
SIWNRVLDLSLEKQVQLQEELRTRDSGEGARDVLSFSYFQDEQNETRVLCEFIDITESKR
LRDELFSQKLEAIGRLAGGVAHDLNNTSMIGSLEMIKLDAGTSKEISEDIAGMEHVI
QKTSALTRQLLGFSSRRKSFSPA VLDLREVLSDSHKMLKRLIPEKIYISLSPDPCPVIA
DAGHIEQILLNLVFNARDALETADNPHISILLSHTAVKREKAGKSLVPEGNYALIEVKDN
GIGIEPAVMEKIFEPFFTTKGEKGTGLGLSIVSSLVDLNGGYIGAESTPSAGTTFRIWL
PLAKGSQTSEVSEASSVLP TENIYNHYASELKGKRILVDDDESVLATCKRTLERAGCLT
ETCVNAGEALLLEHHTFDLLVDIVLPGVYGTTELWQRLKKGNSVVSCLYMTGYEPHSLG
VETEPIPKPFAPAALIEACA KAIKRGRA*

>SPBIB_v1_110023|ID:27162381| exported protein of unknown function [Uncultured spirochete bib]
MKREKRFIISLIPVLVLAFLFQSLTADEASIAPEPSEAMAGNIEQLAANDPEASIAML
SDLFEKQREKGEPLENSIIGGKAVELFGKSASTMLGLFRKALQEGDIVTAKRLSFAHTI
SRYASLYESLKNVLPADFSAMGEPAVRLQLIFLEAEAKFKKNGYVAGKAVLAAALSAEPS
LLSIRDVPSAISKEIDSAQEPALFFLSWAERAKANNDIEAAA WFGAMAGQIKFEAVSPQG
EKEDWIASAVSGVTVYVDRGFKIQGGYSVPDRVLGTGFQIAPGLYLTNHHVVQSEVDPS
YKGYRSLRSPDNPQARVPAKVIGWDEEMDLALLQSEEKLSVIYIPSSMKFQAGDRVF
AVGSPIGLENSVTAGVVSSLSRKIISYGEAAQIDVPVNQGNSSGSPFLANGLLVGMVFAG
LPSFQNFALPVQWIVSSLPALFSGTSSVHPRLGIVLGGKSGQNPVVLSDLDKVSRAFR
AGDVLKEINGVPAKDIASIQQLAAVPPDALCMVEAQRDFQPVRRLRRIQNTGGASLIPA
WDTIKRITYILEGILGARLEQLEDSSKVGGLYSVSWVCPAEAADETGIAENDTINIHKIQL
DRKNKVFIFESAKSRLSGYFERTIRLELPAESAII*

>SPBIB_v1_110024|ID:27162382|ftsH| protease, ATP-dependent zinc-metallo [Uncultured spirochete bib]
MSDQNDNSNDKRPELPPAVKGNRAALAVFFSLIVLFGVYLFFGQKENSREIPYSSFLSYL
DLGEVKSVRIIDQRDIDGYLIGKNGAEMSFTTKIPYFDSELMARLQNKGVSVTGAVSGTS
PFQILFELTPWIFGFILWIMMRQMGGNKAFFSGKSKAKLYNDSEKRVTFDDVAGQKEA
KYELMEVIDYLNPKKFKVKGAKIPKGVLLVGMPTGKTLLIAKATAGEANVPFFHMSGSD
FVEMFVGVGASRVRDLFEQGRKHAPCIIFIDELDAVGRTRGSGLGGGHDEREQTLNQMLV
EMDGFDTKDG VIVLAATNRPDVLDPALLRPRGRFDRQVVVAMPDVQERKDILKIHMSKIPV
AENV DVERLARATPGTSGADLANMVNEAALFAIRKSKDIVEMEDFEDARDKILMGVARKS
LVIADDEKRSTAIHESGHALLHYFLPNSDPLHKVTIVPRGRALGLALSLEPKDTYSRTYG
WLYDRIVISYGGYAAEKIVYGETTTGAAQDIKQATEIARKMVREWGMSDAIGPVSLGDEE
EPIFLGREIAQHKDYSEETARKIDAAIQSLSSALEKAMSILTREKDRLLALADRLMQIE
TLEDSDVRTLLGLQDGKFVEEGAVKC*

>SPBIB_v1_110025|ID:27162383| putative tRNA(Ile)-lysine synthase [Uncultured spirochete bib]
MRGEAVDRLELRMRILLALGIKPETPLALAFSGGLDSVLLNLLVRCGLRNIRAVHVCH
NIRPADELAREKVLIKETCMKMHVNL TIVNVKEGAIDQYASKARCGIEAARHFRYRALV
RSAQRFGIRTVATAHHADDQVETFLGMVRGGSRLALSGIEPVRMLSASQGIYIIRPLLS
FERVELFQYAMRKGIVWSEDSTNADTAFMRNKIRHVLIPLLNAEFPSWKTSVLSYVEQIR
EEHEFVERSQAQKILHLLAQVEGEELLDIELLKKERRLMRLAVIKLYLARLGGGIAASRE
AVEELDQAISSNKKRIEAGGFEDLAEGFLKFCGKTRGSSAQAVRAISPLDSYEKDDQYF
LMVPAAGTYRCGPYIIQISEYEHGSTLHDTTPPATANSLVCAFFPFILRNRRAGD TVLGPA

GQKAVDTYLKEIKIAARLRHAVPVIEDKDGIAAVIPSAFGNAASARPLLRLDPALCQNKKM
KYILLSMKGDSTINVRSKR*

>SPBIB_v1_110026|ID:27162384|rpLY| 50S ribosomal protein L25 [Uncultured spirochete bib]
MEHIELKVSPPRGKLTGELNKRKEGKVPAQLYGKEISPVIFIDREEFGSAARRITESM
IIDLNLEGKKYPSLMKEIQKANISGDLHIDFNLIERGHKIHVKVPLHLTGSAGVREGG
ILEHAIHDIEVECDPMLPEKIEVDITDLEANHALHLRDIAIPEGVKVLTNPETVIAIK
FARAEVEKVEAPEAAEAEAAAAAAQPAAEAGAAETAEK*

>SPBIB_v1_110027|ID:27162385|spoVG| putative septation protein SpoVG [Uncultured spirochete bib]
MEVTDIRIRKVSSEGKLYAVTVTFDECFVHVNVKIIIEGKSGMFIAMPSSRRTKTGEYKDI
AHPICPDFRSKLQEKILAAYNDSKANDTTVPEFD*

>SPBIB_v1_110028|ID:27162386|ispE| 4-diphosphocytidyl-2-C-methyl-D-erythritol kinase [Uncultured spirochete bib]
MILLTKNPFAYTVWLMEETNITAFKINIGLKIFDRRKSGYHDIESLFQNVDIADSLRIR
PNNVGKIVIEGDIGCAPEQSTIYHAAKHFCMEFEDKSPITGVTIKVEKGIPSGAGLGGAG
ADAAATLFGMNELFEKRLSRAELARIGSHVASDVAFFLYGGAAIVRGRGEYVFPIEPRTD
FGLVILQPTWASSTPAAYAALDNYRAIRGIEHACTSEDAAGYSINLPNEQLEKIYRSPIQ
KWGFENDFLPVLAEKKKQYSEMLSLLEAGAAAYVNLTGSGSCVFGVFDNAEAAQKASCTC
SSLLFGEGDRAQSFAAHIIAAKPLARSMIVSYIQDCNEDTRSDKERPCYGSY*

>SPBIB_v1_110029|ID:27162387| protein of unknown function [Uncultured spirochete bib]
MNHKTTMTADPQEDFEIITLTHGNSANTIYSLRQTVRFDGAYDDEFDYDSDDDFEDEDL
EDDEDDEDDEDLDDDFEDDDEDLDEDEDLDEDDFEDDDFDYEDDTDE*

>SPBIB_v1_110030|ID:27162388| putative Ribosomal silencing factor RsfS [Uncultured spirochete bib]
LDSKAFAYQSAEILARHNALDVLVMDIHDTAGWADYFVIATSTSAAHMRGLERHLEEFFA
NAEISLLNKPEVTDDQSWLLLDGGNVIIHIMTNEARAFYDLESLWFNAPRFSVTFNGKKE
S*

>SPBIB_v1_110031|ID:27162389| conserved protein of unknown function [Uncultured spirochete bib]
MNELQPGIFKRSVLPDLLLVLAAISAFIVVRLTQKGTVEAVIKKDKAMGILFIFEQEKK
PVSNQLLIWYPSRRKAAIMDIPGSMGIILKSANRMSSIDSVYDSRNPARYVKEISDYLR
PIDGWLTYDERGLSKTVDLLEGIQIFLPEPAMGNNALPDVSLPGGSVLLDGEKASQYLY
ACSADSYTEEISRKQRLVLSLSQLSQKSGVISSSKGLRLIASKPKSNFSLETREEIFRH
FVQIDVEMTITQFISGSFRTFEGRKLLFPYDYGELARDIVSQTAKALGTENSTNLQKSAV
TIEILNGTGSKGVAGAASVLFESYGYKVVSVGNASSFDYAKTVMYDNEGDKSALQQVADV
IGCKSFGNPDDLPGPRKANVTIILGKDFNGRYCVGQ*

>SPBIB_v1_110032|ID:27162390| conserved protein of unknown function [Uncultured spirochete bib]
MDYIGISEILSQVEKTVEIELSAKRLAHCSTAETSFLCERFGLDVEKGRLAGIAHDMC
RELVYEEQERIIAQFGSCLDRFHASPSLQALLSDPVYRKKMIHGPAACMLCHEFGVDDA
DILEAIALHSIADNGASDLAKVVYIADKLEPLRQRPSDAEEMLHTLNLDALFVYTLANVV
RWFQESGKSLSPYTAELYNRMLQP*

>SPBIB_v1_110033|ID:27162391|nadD| putative nicotinate-nucleotide adenylyltransferase [Uncultured spirochete bib]
MRIALLGGSFNPPHIGHIILAEIILGTLDYDRVLFIPANIPPHKEPQGDPGTDMRLAMLH
ATLEGWSEFAIEPCELKRPGISYTIDTLREISRKYSFDGKPLVIGDDLAPDFLKVWKDP
ELILEYADIIVAHREHAEELSLPYAHRYIKNLLIPVSSTLVRERIANHGAWRSLVSPGVQ
EIIETYGLYRNI*

>SPBIB_v1_110034|ID:27162392|obgE| GTPase involved in cell partitioning and DNA repair [Uncultured spirochete
bib]
VIKFADEAIITVASGKGGDGCVAFRREKFIPFGGPAGGDGGRGGDVIFVVKRNLRTLAYL
RYRQNFRAQNGQPGMGKNMHRDGEDAIEVPPGTIIRDAETGEILKDFSARTWKALQE
GERWVFLKGGKGGWGNTHYKNSVNQAPHFAQPGQPGQERKLIKIELSLIADIGLVGFPNAG
KSSLLDYFTNARPKIAPYPFTTKIPNLGVLTVNDRDIILADIPGIIIEGAHEGAGLGIRFL
KHIARTACLAFLIDLSDDNWRSAPPTLLHELEMFSPELAKKPRILLGTKLDLPEAQEHK
DFYAAFPEEQAYCISVFSGAGLDQLKQVFFFEKVEAHEASELHSAETESLFETIDFDDEE
LPE*

>SPBIB_v1_110035|ID:27162393|rpmA| 50S ribosomal protein L27 [Uncultured spirochete bib]
MPHKGVNGRDSNPQHLGVKAYGNQHITAGTIIVRQRGSRINPGKNVGMGKDDTLFALADG
MVSFREHKGKKFVDVEPVTNA*

>SPBIB_v1_110036|ID:27162394|rpIU| 50S ribosomal subunit protein L21 [Uncultured spirochete bib]
MYAVVEINGKQYRAENGKNLLVDRLDAAPGESVVFKEKVLLAGENTAFGTPYVKGASVKA
TVNEEVKGDKVVVFKYMPKKHYRRTHGHRQQYTVLTVNEIVGA*

>SPBIB_v1_110037|ID:27162395|argS| Arginine--tRNA ligase [Uncultured spirochete bib]
MEHYIDQWKTIIAAHLRTIADKKGIVDFSLTLNDIIAEKPPKPELGDIGFPMFAFAKQFR
LSPAQIASEVAQSEQLLDENEKRDWPGNLKAVGPYLVNLYLERTRAVTFLLSNAANPDWG
SSAVFSGRKMIEFSCPNTNKPLHLGHLRNNVLGESLSRIMKAAGAENVKKNLINDRGVH
ICKSMLAYLAYGEGRTPEDGLKSDHFVVGKYYVLFNKLKEEDPQAEQKAQELLQKWEAGD
PEVIALWKKMNDWAVDGMETYRRQQVSFDEYHFEHETYKLGKKEVLEGLERGVFYRGED
GAIWIDLEDLGLGKKVLLRKDGTSIYITQDIGTAIMRHESWPFQQLIYVVASEQQYHFV
LFEVLKRLGYDWASSLYHLSYGLVNLPTGRMKTREGTVVDADDLIDELARLAAVEIAEK
RADAVGDIQSVAGQIALGALHYLLQISPAKDMLYNPEQSLSFTGDTGPYIQYMGARASS
ILRKHDQGGEGNAAQGIPKANLLSSDADWPLVRTLMELPSIIEESAKGKDPSILAGYAHAV
ASEFSAWYRDNVPLINEDPNLSASRLALVRAVKSVMRASSELLCVPFLEAM*

>SPBIB_v1_110038|ID:27162396| conserved protein of unknown function [Uncultured spirochete bib]
MTRMPGAISREKFAQIAPAVHQEKEGFVSVTVIPRAPKNEIAGFRNGSLLVKVTVAPEK
GKANEAVLAAIAEFLDIAPSNLRILRGHTCRNKMVLLQNIG*

>SPBIB_v1_110039|ID:27162397|ligA| DNA ligase [Uncultured spirochete bib]
MPDTSRLESEKNARVNELEAEIKRHQKLYNNGEPEISDEEFDALWDELESLDPGNPLLK
AVGTDRSERWPKSPHRMTMGSLSKATDPESFLAWAAKVQYPLYLVQYKLDGASMEQYDE
GHFVRGVTRGDGVIGDDITPNVAKMNGVPKELPEPFTGAVRGEVLMSSRMHDAKYADKAN
CRNAANGLMKRKDGVGAEDLDIICYDAVSSLATGTPFDTERKKAWLERMGFKVPTVEC
ESPEAVIAYRAKIMDIRPDLEYDIDGLVVKGDRIDREDASKLRPELQIAFKFSPEEAVTT
LREVEWSESGATVTPIGIVEPVRLAGTTVQRANLANPDMIRSMDLRIGSKVVITKRGEII
PKIESLVENPPDAVQIEIPTHCSLCSAELIDEGTSLYCPNPACPGKAYHRLEKWLSVIDI
KDLGSALLKRLFDSGKVTRIPDLYRLSVQDLLAFERMGEKSAQKIIRNVHARNEVSLSDF
IAGFDIEGIGVLMADKLIAGIDTLDKLFAASPSDFEKIDGFAEITARSLYDGLRVVEKD
MRELAEQGYVRILPAARSSGEEAAGVAGKSFCFTGELESIKRSEAEKLVRAAGGTVKSSV
TKDLDYLVNTDPTSGSEKNRKAQEFVIPDETQFLALLGRK*

>SPBIB_v1_110040|ID:27162398| conserved protein of unknown function [Uncultured spirochete bib]
MRYFAIQVATRHEDDWLDRIQDQIEHVKFHKIMKKMYIRKRGKTKLEEVPVLPFYIFFEH
PEEELPLEVLSKIRHSRFFIRFLPSNEAPRPLDRHDSDIIRHFVNFGLIPPSLVKFD
QKIKVVQGPLQGIEGFIVKVDRRKHRAKVRLTIAESVMILDLSFEVMESDSTEAEAKGSR
HAEKRVHSV*

>SPBIB_v1_110041|ID:27162399| protein of unknown function [Uncultured spirochete bib]
MQKNEYIPFDQLEVPGMLYACMIRATAQIGHILAIRPPALPSGYSILTADQLPLRNLKI
SSVSIPVFASDTVSYAGETVGLIIGPDPLLVEEFASSTAVECDGDSVHRDWRMFSSRIA
ARLNLQRGNMPEVSQNDSPVFNYSVSIPEGFEFSFNSGIGALAEWDYDKLKLACPTLWPE
HVRSSLASILEASPSDIELLPVLMNDSSEFYFWYPSLLAARAFAAWTLKRPVKLIVSIK
RERQYLPRVQGISLWFKSIWSSKTSRLLGIECRFSIPTGTYSVFANKILRKTAAHLA
PGLPVSITGFAIRTNVPMGAIESPASAAIYAMLQAHIAQAARALDRDVFELSQSTLSRM
DTSKKAGALGIAEIPFAKIAKPLLEKTDFMRKYAAYELVHKRNPGGKEALLRAISFLAY
QGASDFLPESARKSEVRLSLDRNLKAHVESDAAFASERLKAALTTLIADNLKIPPAHIF
AMQKSPHPDSVPLMSSSGIAMLGDIVRRASARVQRLRFREGLPISAHAFSSVRAQENSTN
VLSKIERPSLGAAIEVEYDTRSGIFQFIRIHISVNAGKILSPLNAKSAIRAASINAMRS
CLVSTSPNAAERNDMYDHILSRSTIAIELLDDEKSTIPRPVGDIVHSLVLSCFLGIMQQL
NETNRFILPFRPVSAIAEGAQQ*

>SPBIB_v1_110042|ID:27162400| putative FAD binding domain in molybdopterin dehydrogenase [Uncultured spirochete bib]
MNLSEIHFPQTIPPELLTISREKNIQLIGGATTFGYLQPTRYLSFPNTIAITSRIPELHA
IHKTERMISYGAACLTSELEHVYPFEHPQSASLLRTVATSAVRNVATIGGHLMYDCSFLS
LWPLFACLDAELEFRAASQSHIKNIWYLVDENGRHCAAGNELLARIRIPLLSIDHIYIKR
IGGNIFPGGDGAHLVSLTSVDRRSINFFRLVLAGARAFRDFEAEQRIISASHPLSPKIAQ
TVLHMYAESLRKTNFWNADLILPLIGQVLEDLQR*

>SPBIB_v1_110043|ID:27162401| putative Tetrapyrrole methylase family protein [Uncultured spirochete bib]
MENKKKESGSLYLIPTPIVPYPALWKPALLRAMISPAILDRLFRMTHFIVESEKSALRL
LSRILPADRLNELVFMLLDEHSTSNLDNAPLAALKNGNDCALLSEAGMPCADPGSALVA
AAHAENLRVVPMMGGESSMLALAGSGLNGQKFCFLGYLPVREQDLRKMLVAEGTKASSDG
AARVFIETPYRNAKTFKACIESLPERLHFSFACAFGTQNSLIKSMQVARWRNFLFEPPSQ
PAVFCFGLPAVLPQPQQHRGCRA*

>SPBIB_v1_110044|ID:27162402|mfd| Transcription-repair-coupling factor [Uncultured spirochete bib]
MKVHTLQALFDRISRNAALKEIRVHLELGRLPLHLQNSENSALAMSLALLSRQTKRRFIV
VLPSDQETEEFAQDLALTDKVLNFPSPWPGAPYRAIPVRSRIFERTSALAKLAENDFEI
MVVSARTLAIIVPPKSYMLAHTLKLEERQLFDPTKISERLAEFGYLRVPSVSLPGEYALR
GEVLDFSMPEGETAIRVHFDRIEKITRFDPATQSGHERIQIILRPLKEVIWDTSTIA
RLKEKAVELARTDARMEQIIEALASGQEIQGEFVFPFAFDSMHSIVDYADDHTVVFVVA
RERIDALAENIRKEYASMYRLALREMLVPPPDLIQLNDSLSSISRALFCYALKGVDES
SSRIALGAEPFRSYFGNIRLFREELAGFEKDG YQTWIFASSEPAERIASLIQDDSIIV
HGPISSGFIFPELRLRAVSEHELFGRRKHVPRSLGKTKSAAIESFIELSPGDYVVHVNYG
IGRFSGIERLTVLGLERDYIRIDYAGEEKVFPVIEQANLVQRYIGNEGEAPHLDSLGSRA
WENRKRVRKSVEELAERLIRYARRKAAKGFAPPD TDWQM QFEATFPFEETEDQIRCI
EEVKRDMESPKPMDRLVCGDVGFGKTEIAMRACFKAITAGKQVAFLAPTTILAEQHYENF
LERVGEFPVRVELLSRLIDKKNQMKILKGLADGSIDM VIGTHRILQKDVRFKDLGLLVID
EEQRFGVKDKERL KEMKAGVDCLTLTATPIPTLHMSLLKIRDMSVLQTPMERQSIQTF
VEEFPELVARAIRNEIARGGQIFYLHNRIETLPEVEQFIRQLVPEALVESAHGQIDPRD
LESIMHRFIHGAFHVLVSTTIENGIDIPNVNTIIDRADNYGVSQLYQLKGRVGRSDRQ
AYAYLLYPDKRALSELAMKRLQIISDFTEL GSGFKIALKDLEVRGAGNLLGREQSGDIYA
VGFDLYLKLLEAVSRLSGVEGEEEEPYLEYSGFIPDSYISVPMIKMEIYKRIASVSN
QDEIDSLHMDLEERFGPIPEEALSLLALAEMRVLCKLAISSLRERENGLVTVEFSKVSKI
SVEKILRLIRESSGAIRLSPDKPNAIQIQTKAIGLKEKSAYLKERLSFLAG*

>SPBIB_v1_110045|ID:27162403| protein of unknown function [Uncultured spirochete bib]
MFALILIEDTSVADLVLRLDQESGISAISYRDPKVIDHIAEIKPDVLIIRQKDFPLHIP
LIAAMVRFSESLQRCRIVVIGDEVPSFMQCWQITEEKLQKDASSLARLVFSGAVSPGHRG
SRLVAKAQRMVKE*

>SPBIB_v1_110046|ID:27162404| Regulatory protein ArsR [Uncultured spirochete bib]
MDTTPKPCNEEQ LTPYAQKFKAIGHVPRLKILCLIVHQEVPCVGDIVRCLDQPQPVSQH
LAILKRYGIVSSEVKKTRRIYSISDPFIKNLIDSMICEIGTSAPEPKK*

>SPBIB_v1_110047|ID:27162405|ispG| 4-hydroxy-3-methylbut-2-en-1-yl diphosphate synthase [Uncultured spirochete bib]
MAANISGGVPAERKAVKVGDVLMGQGWVPSIQTMWKDPLPAFSSPDDERLQPILKRLVAL
KAIGCQIRFAVPDIAAAEALGMLAGFSPMPVADIHFDWRIALRCMDFPIAKVRINPGN
IGAEWKVREVAAKALDKGPIRIGINGGSLPKDLDGEPDLALAALCAAAREIEVLESMHF
SDIVVSLKLNPEPETVIRANELFAAQYPYPLHLGVTEAGPLVAGVVRNTAALVPLLKKDIG
ATIRVSLSDTMEQEVLAGKEILACAGKMGARIVSCPRCGRATFDTHAFTARWMERLYS
IGVDISVAVMGCVVNGPGEARHADIGITGSGNSVLIFKHGEIVRRIAKEEADKAFGEELD
ALVREKSM*

>SPBIB_v1_110048|ID:27162406| conserved membrane protein of unknown function [Uncultured spirochete bib]
MNIALIGAACVLGLAATGSGIGAGIAGMAAIGSWKRSYLNNKTPSFLVAFAGAPLTQTI
YGFILMGRMLNSSKDPLLLL AAGVMSGLAIGMSAVAQQQAAAAGCDAFGETGKGFANYIT
VVGLCETVALFVLAFTFSAV*

>SPBIB_v1_110049|ID:27162407| putative V-type ATP synthase subunit I 1 [Uncultured spirochete bib]
MIVPMKKFYLIVLDKDRSVPERLRKLGVAHVEELPGSGETYQALERKSEAETVYYLLS
NYEDKKS KSKHPAREGKGLSQIEAAKLLVQEVSA LKHEFDLNERASQLAREMDRIATWG
EVSVSQLAEVSEKTGLSIHFFEAPSKEAAHIPEELEYVRLAAPK GKIRLGVLIEEGK KLP
ELPAIFQEFLPPEMPLSSMRQEAASIDRRKKEIEAELRARTVHASVLKSYLDELESNITL
ERLRSGMPSQAQFAYLQGFVPARDCDRFKKMVAR YGWAAAFDDPSDEELPPTLVENPPAI
RIIDPVFEFLGTVPNYREYDISLWFLMFFSLFFAMIFGDGGY GSLIVLASLVSIVLGK RK
GQKASDAQKLFLLLGAVTVVWGALTASWFGIQYNHLPYILQNISLPLINGQNPNSSESNIK

VFCFIIGLVQLSIAHIKNIKRDFFPNLKFMSQIGSLLLLAGMFNAALNLVIDAQRFPISRW
ALICIASGFSLVFVFGNWNKGIVPSLVECLKGLIPTFLGTVSFADIVSYIRLWAVGLAG
LAISQTVNGMAAGILGGAAGFLLGFILKLLIAVMLLAVSHSLNFVLTVLSVVVHGIRLNM
LEFSGHLGMEWSGYKYNPLREAKSSPAPMQSTLEETGV*

>SPBIB_v1_110050|ID:27162408|atpD| V-type ATP synthase subunit D 1 [Uncultured spirochete bib]
MAKIKLTKNELKKKDALKMYQRYLPTLQLKKQQLQVEVRSVQTRLEQLLARKATLEKEY
DPWIAVFSEQEKARKSNGEPLLRIVSVRTDEGNIAGVTIPVFQDIEFERSVYDLYAAPVW
IDSALTLMEQLLRTQMELEIVTRQRELLAHELRIITQRVNLFEKVKIPETIADIRKIRIY
LGDQQTAAQVVRGKIAKRKVEGAGR*

>SPBIB_v1_110051|ID:27162409|atpB| V-type ATP synthase beta chain [Uncultured spirochete bib]
MNKIYSRIESIVGNVIAVKAQDVAYGELAQVKTRYGMSLAETIRLDKEMVFLQVFAGGRG
ISTGDEVRFGLGHPMQVSFSDNLLGRIFDGAGEPRDGGPMLSDNLITIAGPSVNPYKRIVP
REMIRTGIPMIDVFNTLVKSQKLPIFSVSGEPYNQLLARIAMQAEVDLIVLGGMGLKYDD
YLFFRDSLEQGGALSKTIMFVHTAADPIVECLMVPDISLAVAERFALKGKNVLVLLTDMT
NFADALKEIAITQEQVPSNRGYPGDLYSQLAARYEKAVDVSDAGSITILAVTTMPGDDVT
HPVPDNTGYITEGQFYLHGGHIEPFGSLSRKQMVNGKTREDHRSIMDAMIKLYAAYRDT
LEKSMGFQMSVWDRKLLKYGELFEQRMMDLVNIPLKALDQCWETLAECFEPRETGLR
SDLIQKFWVGRK*

>SPBIB_v1_110052|ID:27162410|atpA| V-type ATP synthase alpha chain [Uncultured spirochete bib]
MTEGIVTAVNGNMVSVETDGNVTMNEVAYIETGTRSLKSEIIRIRGNSVQVQVYEITKGI
KVGKNVRFNELLVELGPGLLQIYDGLQNPLPEIAEKVGYFLEPGLYLKALSRETRWH
FTPLAKVGDTLQRGMAIGWVPELHFRHIIMVPFDLYGEWKLADILPEGDYTIDENVAHVV
DAKGNTKPIKMWFSWPVKRAVDCYSERLKPSEPLVTKTRIIDTFFPVAKGGTYCIPGPF
AGKTVLQQVTSRNAEVDIVLIAACGERAGEVVETLKEFPEIIDPKTGRSLMERTVIIICNT
SSMPVAAREASVYTAVTIAEYRQMGLDVLLADSTSRWAQAMREMSGRLEEIPGEEAFP
AYLESVIAAFYERAGIVQLYNGQKGSVTIGGTVSPAGGNFEEPVTQATLKVVGAHFHGLSR
ERSDARKYPAIHPLDSWSKYEGIMPQRAVQYAHSLFERGAEVGAMMKVVGEEGTSLEDYV
VYLKSEFLDAVYLQQNSFDPVDAAVPPDRQKHMFSVLKILASQVKYKDKEDAREFFYDL
RQTMMLDLNGTPEDSEMYDSLAKVEQALADRNPENRGLKAISALE*

>SPBIB_v1_110053|ID:27162411| conserved exported protein of unknown function [Uncultured spirochete bib]
MKRYWYFASTLPSFPFGAPPPFAQEFDALCERLVDKSDRELIQAAGAAVRGEYTGTEK
SPFLKAFFEWERGTRNALAMLRAREFKWDPEPWIRPGSTNTDALQAAQAIHSASDPLQAE
LTFERERWIAVERLSALSAFELDYILAYKIKLLIATRCISFQRDRGAEGFRIFYQDIVDA
AADVASSALDTGVAT*

>SPBIB_v1_110054|ID:27162412| putative V-type ATP synthase subunit E [Uncultured spirochete bib]
MEIQVQELLERIRNEGIEATAKKQAEIIEKAQAQADEIIRAKKEAEEALTEAERRIASM
DAASRESLLQASRDTMIALKQSVRMFVESALNADIEAFAFDKMAAQVIPEIVRILASSQS
GDIEVLLPPTLEEKIDASIAARLSKELARGITFKPYPAIDAGFRVAVEGSAVQFDFTSES
IAQILSVRVNRLLAEYLKEASGSLT*

>SPBIB_v1_120001|ID:27162413|mgtB| Magnesium-transporting ATPase, P-type 1 [Uncultured spirochete bib]
MTKLPLLLPFLKKRGSSANGGISSDEYRLISLCSVVQSTLSELETSARGLSEKEVDKR
ISEFGRNELSQLKLSFWEDMFERFKSPLVIQLLIATVSAIIGEATSSIIVGAMILLSV
GLSYILDSRSNKEVEALGKRVSRTYVLRDGAETEIRMSEIVPGDIVLLQAGAIVPADVR
VISAKDFFVSESALTGESMPVEKTANPPAEPVKSAMELPNACFMGTSVTSGTARAVVTT
GAHTLFGAISKKLIERREETSFDKGVRSFTWLMIRFMLVMVSVVFLIVGITKGNWLEALL
FALSVAVGLTPEMLPMIVTVNLAKGALAMAKKKVIVKKLPSIQNLGSINILCTDKTGTLT
QDKVVLEHHVDIIGNKSDEVLYAYLNSYFQTGLKNLLDRAVIEHVDLNVDECHLVDEL
PDFQRRMSVVVEYEGDNVLICKGAVEEYSCCTHYQIDEEIYPLIDMIRADLFEEVQKL
NQEGFRVLGIAAYREFRPTKTTFTVQDESQILLLGYIAFMDPPKESATEAIKLLAKAGVGV
KVLTDGNGLVTEKVCRDVGIPTSAITGAELGALDAAAFSEKVRSCVVFVKLTPSQKEQI
VKELRRQGNIVGYMGDGINDATAALKAADVGISVDSAVDVAKESADIVLLEKSLVLEEGI
MEGRRIFANIIKYIRMGASSNFGNMFSVLGASYLLPFLPMQPLQILTNNLLYDFSQTGIP
MDNVDSSELITKPKWDINNIKRFMIFIGPISSIFDYATFALMWFFFKASAYIDPGIAAAQ
KDAIARLFQTGWVFSLLTQTLIVHIIRTRIPFFQSRASGPMLLTTLAVMAIGAWLPYS

PFAAMLGLVPLPGVYWLWIAGFLITYSVLTHKVKRWFMRREFEGA*

>SPBIB_v1_120002|ID:27162414| putative PTS IIA-like nitrogen-regulatory protein PtsN [Uncultured spirochete bib]
MDSILDALQEGRLFELPENDKNHALQFLAHIIEAFPQIPTGTDIVGNVMAREKSMNTALG
KGWACPHARVDFEEDLMCVVGWSPSGIDYGAPDQGPVSIITMYLVPSNQRNHYLREISIM
AKVLKSSPEIDKLSSIKELNDVRNYLLDLISASKETVGPDARARMIRLQSKAALATQPVA
DLSNLVIEPVSIIAGTGFKPLALTQNLLELLNFVESTAGLAERLDSGTYQNGIWRIVRRS
ATAYQGGRTVFDCAIMPAKASQKA*

>SPBIB_v1_120003|ID:27162415| Translation elongation factor G [Uncultured spirochete bib]
MSYTTEKIRNIAIIGHGGTGKTTLEHILFQGGMISKPETVDSGKTVSDYGEDEIARKIS
VRSSLTHVNTNDCKINLIDAPGAGDFVGEAILAIRATETAMLVIDGKSGVQIETVKLWRI
LERHQKPRMVFVTRLDEDRASFASALSDVKEKFKAIKVPVVTIPMGEFTAFCGVIDVLNRK
AYPRPASHDQKEEATEVPPEFSEAVEAARAQLFEAAAEGTDELMEKYLLEGELTQEETLQ
GLQKALAMGKIVPAFAGSGIANSFTAFAISFAVQSVPSPLLRTPKALDPEGNEIEVSID
PSKQASGFVFKTQIDQFSGRLCYVKVMTGTFQPDMDMVTREAHKERIGKLYTLQGKKLE
EVPFLPAGDIGILAKLVSLKTNDTISQFDQLISYIPLRPLSPVHMLAISAVNKKEEDKLS
ELLYKAAEEDLTFRVNYNAETKEMVIAGMGEQQINMILDKIKAKIAAETRVPRVAYRE
TITKKAGAETHKKTGGHGQYGRVVFIEPLERKGYEFENRIFGGA VSKGFMPGIEKG
IHQAMEAGVLAGYPVVDVKTAVDVGKEHPVDSSEMAFKLAARGAFREAMKQANPVILEPI
MNLVSVFVEEKYLGDMSDLGRRGKISGQNPIGGGIVQIDAQVPQAELLRYAIDLRSMST
GTGSFEIEFSHYAPISGKIAEDVIKAAQAFKTQEAEIE*

>SPBIB_v1_120004|ID:27162416|nrdR| Transcriptional repressor NrdR [Uncultured spirochete bib]
MKCPYCGSLEDKVIDSRTLANGEAIRRRRECLACGLRFTSYERIEEKPLMVVKRDGRREP
FERQKIERGLVRALEKRPVSQMSIENLINEIEDEAAEQAKASNEISSEDLGRMVLRKLYA
LDKVAYIRFASVYRKYDTLNEFIHEIERLEKGGTE*

>SPBIB_v1_120005|ID:27162417| SPFH domain, Band 7 family protein [Uncultured spirochete bib]
MSYIFVGFALAAWWIVFIIVGIARKQTPIAVFLIILFFVWAVPEVLLLLSNPEFASVLF
IVPFILLVQMMRVIPEYQRGVLFRLGRMQKVIQPGFNLVLPFGIDILRKVDMRTFTIDVS
KQEVITRDNPVIVDAVVYFNVPVLA VVKVADYTKSTSLLAQTILRSVLGQHELDEML
SKRAELGQILQRLDDATDPWGIVTAVEIKAVELAETMKRAMARQAEERERRAKVIAA
EGELQASEKLAQAADVLAQSPASLQLRYLQTLTEIAVEKNSTIIFPLPMDFLKALTKLAG
KDQE*

>SPBIB_v1_120006|ID:27162418| conserved protein of unknown function [Uncultured spirochete bib]
MTFSEKLLKFMETSVDASKEFLEKAADQAQVWGEMGKLKIEILQLRSKAQSLTAKLGAEV
YNLLIEKNEPMIGASTPEIEPLIKELEQLGSLIDEKEALYRSKGGKDSLDNEKEK*

>SPBIB_v1_120007|ID:27162419| HAD-superfamily hydrolase, subfamily IA, variant 3 [Uncultured spirochete bib]
MQRYPALIVFDLDGTLADTIKDIADSVNRRIAMYGFEPHNVDA YKRMVGDGFLSLIEKA
IPNDAARNSELVQEILARAVQEYAAHSLDATKPFDGAKETLKLSDRGIQLAVLSNKPQD
LSASIVGALFRDIPFIAVWGNLPDRPRKPNPAAVLQICELANIAPQNCAVFGDSSIDMKT
AKASGMTAVGALYGYRSRELLDAGADFLIASPQDLIALFGAE*

>SPBIB_v1_120008|ID:27162420|pgcA| Phosphoglucomutase [Uncultured spirochete bib]
MNHEEILARAKEYISFETDQFFSDEVKALLEKGDWKELEDRFYRDLEFGTGGLRGVIGGG
FNRMNTLVVTRATQGLCDYLKEQFPDKPLSACIAYDSRRKSKEFSLATALVFAANGIKAY
LFSSLRPTPELSFAIRKLGADTGVVVTASHNPPQYNGYKAYWNDGSQVPPHDTGIIQKV
LKVRDVKLMPESEARAKLLVNIDKDIDEAYVAMVKSHLLRPELFSKMADSVKVIYTPLH
GTGAMLFERIMKDLGLNVLTVPEQREPNGEFPTVSYNPEEAAALSMAIEFGKKTADVV
MATDPDADRLGIAVPDGS GGFTLV TGNQLGSLHLDYIALTLKELGRMPPRPASIRSIVTT
EFQKAIKAEKHGIA SFELTGFKWIADLMRQFESNGYDFVYATEESYGHLEQEVDRDKDGI
SAAALTAEMTLYWRSSQKSLDRLEDLYREFGYFEEKGLSAYFEGEKGMQIMSGIMDAYR
REQPKQFGGIPVWTRDIKAGTAWDRAGKISSISLPKSDVIQWRLEEGTLLTVRPSGTEP
KIKYYILCHSVGEDLAKTKAETKRKIAAIEADIKAVIDAHRK*

>SPBIB_v1_120009|ID:27162421| Exonuclease, DNA polymerase III, epsilon subunit family (modular protein)
[Uncultured spirochete bib]

MTENNGAPLWASLFSDAQPKHEPPSPWYRKRNGAWEGVSWPDPVCGGEPWEMRTYVALDV
ETTGLNAATERIVEFALVPFAFDAEGALIEIQRFSALVNPGIPIPLQASRIHGIRAEDVA

NEPLFGEVAPAVLELCKNRVIVGHNVMFDIGFLEGELEGGRAGYALETEECADSFGMAKIAF
PAMQSYNLGKLAFAALGLPSDATHRALGDALTCMRLFAAAARTLANRCV*
>SPBIB_v1_120010|ID:27162422| protein of unknown function [Uncultured spirochete bib]
MRFAAKCALFGIAGILAALLRFTMKMIAPYPTISGVVLPETSALVESTIAQSKPALNFF
EELASLDIDRMQNASVAEVRARVRDFISTGLALGMEPEALAAELIPSSGHIIAMLIDSGD
SEEFSDIDGVSLPAKLSYQRIALNPLMASLRSQFEAIFDSAYAILKKYGRITPFRWLEP
EAARWKGGITLPGKFSRPRISDLDYSHTYALDIFLQDVQYLPGDIQRGPIVHSLSDGIVV
AAETGWIGFPRTSEGLSFLAGGISPKSGNGIIISPDEHKYYSYFHLVDVFRKQQLVRA
GQPLGHGGNSGINARKQGGGEHLHLEVFDANAGRFLRNTQLIALLKASIKKRPVAPQE*
>SPBIB_v1_120011|ID:27162423| putative Glucokinase [Uncultured spirochete bib]
MSKTFLVADIGGTNTNLALARHDGKTIELVFKERYSTQDERSLLEPVQRFLKAASSLGFS
EAIDFCCVSGAGPVQADETIQLTNAPWSISASELSALLGVPVRLINDFTALS AVTLLNY
KNEAEITRPLPHLDGSLGEPADGLMLIVGAGTGLGVGVDRHKGKSVTAYPSEGGHSELPCF
DALSHYFSEWLSERYGYPAGAELAISGQGANIFEVCTEKL DARMIAAEYGIPQPGSGS
GLGSGLDAGLEASLDAGPSELSKGILKTPRTAWPAAIAANSRTDAHCA LTMELFVRLYAL
KAANLVSILLPRGGVWL AGGSSKNETWLENHRFMRWF EKNYAPHIREFLSKTPVLIVK
NYDISLLGAAEAHQFSEHG*
>SPBIB_v1_120012|ID:27162424| UDP-glucose pyrophosphorylase [Uncultured spirochete bib]
MMKEAQLHQEIHPDLRADMLAKHIDIELALSILD RYNRGEFDHVEKIVPAGVPPVDGIHV
VDVRNRQANTTLFKFPKREALQNL AERNVKLPEGIPETTESGAAYLLDAAKLEAIGRQI
VPCAYGVLNNGSATSADLRKNRAIDEALFSALKPAFERYSGLCRDLPKGLTPAYINPD
GSPGASFLELKMRARLLAANRAGFAASDALV VAPENGSA PRSSMLSTEARAGQPERLFMP
LYQMTSMGNHDQLLSAYAELSSSPFLSTLSLRTGLDAAQWLSGKQPLIAAYTHSSEGM PK
RIFDRAYGKEHSSLALPGGHGQCFMVLADTFRALQQGIRYAMLSNVDNLGAFIDPVELA
ILAISGRPAGFDFA YRTPIDVKG GILVRTQDGTKNVVDIGPAIDIKEVETLEKQGEAILF
NCATGIFDLEWLVPNLENIAHSLPVRFTDQVKDAGSYSQAEQVTWEIVSLLPDFVAF AVN
KERRFLAAKMLAEMLLTSGFGNDVPSVPEVLRQVGAALHDGQSWLLQNVYGLELVNGCWV
PPEIFKN*
>SPBIB_v1_120013|ID:27162425| putative Trimethylamine-N-oxide reductase [Uncultured spirochete bib]
MGFLPYFCGKDCGGDACPLLA EVEAGR VVGMHHPAAGQWIRACGKGMRAHIEHYSPHRI
TKPLVRRGPRGSGDFVEASWDEALALVARRLSEIRAEGGPGAVMSIASAGSTGALHNTEV
LALRFLNAIGGAVHVSIGNYSSNAANYALARIFGASVGETGFDPASTAFSNLIVLWGANPL
EARLGAELPSRLVEAKKRGSRIVAIDPRYSRSARGLGAEWIPVRPGTDPALGYALLYEIV
NSPQYDHEYVAERTEGFDALVRFVLGEIDGIPKSPQWAAPICGIEESMIRRLVHLWWQDQ
PVMLIPGYSIQRVEYGEEAFRLTVAIQLATKNSGKLGASSGSINNRLPGITIAKMREIPE
SIPSETVYSKVPVLRWADAVLNPQQYGLGKIRMLYSAGGNFLNQGANIQKNIEAFEAVD
FAVCHELFLTPTARYSDVVLPAADPF EKEDIGIPWAGDYVLYKPKIFEPEGMARSDFQIF
SELAERLGAKEIFTGGKNESQWIAYLMAESGIPDIEAFKQSGFYAMPQRLRAGLDAFFAD
PGSNPLQTKTGKIEFSSPLWTYEMARFWEQRNGAKEDNAKEDDTAPKGNADPKAPKKGG
GELSAGSSFKLLTPKVAEYVHSQRGAFPSAKKARVHMHPEDLALIGATEGAVLCIRNDY
GAVLAVASLDANIRRGTVWLEEGAWAEPENGLDPNGSANMLTSDRGTTLESTSCIMHGIEV
WIELPPGARS*
>SPBIB_v1_120014|ID:27162426|lon| Lon protease [Uncultured spirochete bib]
MSTSELIPIDQILPNKLPITLVGKPIFPGIFTMIGKEPDIQLVEQAISTDGMIGLVL
QKDDTDEPSAGNLYQVGTAAKVIKKINLPDGGINIFISTFKRFKVKKYMSKEQPIIAAVT
YLDDTNYDTDEVKALTRALISEMKQLSEN NPLFSEEMRLNMINIDNPGKIADFIASILNI
EKKEQQEILETL DVRRERMEKVLIHISKEKELLRIQKKVQAEINEKIEKSQRDYFLREELK
AIKQELGMAGDARSSDYQRFREKIDSFNLDGEIKEIVEQELEKFNLMEPSSEYMVTRNW
LDLVCSLPWNAPLSADFDIKHAQKVLEEDHYGLKDVKDRIEYLA VRKLRDSRGTILCL
VGPPGVGKTSVGRSVARALGKQFFRFSVGGMRDEAEIKGHRRTYV GALPGKIIQGLKLT
SRDPVFMIDEIDKMGISYQGD PSSALLEALDPEQNFSFRDH YLDLPFDISNIFFIVTANT
LDTIPRPLDRMEVIQLPGYVDVEKIEIARHYLIPRSLERNGLAKNQVKYTRDALLAMID
GYAREAGVRNLEKALDKIHRKIAKAI VIENKQEERFVIDKHA VEKYLKPIFRDDELKRA
TRPGMAVGLAWTSMGGDTLIEAVANPGKEGFKLTGQMGSVMQESAGIAYTYVRNIAAQK

YNIDAQYFESRQIHLHIPEGATPKDGPSAGITMATALLSLVLGKRIKDRLAMTGELSLTG
QVLPIGGLREKTVA AKRNKIKEIIPA ANEKDLDEIPEHVKKGLVFHPVTRMEEVIDIAI
GS*

>SPBIB_v1_130001|ID:27162427|queD| 6-carboxy-5,6,7,8-tetrahydropterin synthase [Uncultured spirochete bib]
MYHIRVEAEFAAAHRIVHYNGK CERLHGHNKVRVWVSGATLGDGGMLIDFAVVKNALKS
LIAEKLDHRDLNEIREFEDDPSAERIAKYIFEQLSKALPDVPLSAIDVFETDASMARYVP
DR*

>SPBIB_v1_130002|ID:27162428|murE| UDP-N-acetylmuramyl-tripeptide synthetase [Uncultured spirochete bib]
MAKFLSDLIAGLDILEIRGKVERPVSGVAYDSRDCKPGFLFFALPGIHTDGTKEYIGDAIR
NGAIAVVHEGALKSCPADITTLRVADCRWAMSAISSTFYENPSSSLCVIGVTGTGTEGKSTT
VFLIYQLLNLTGFRAGFFSTVMSDTGEGEKPNPQHQTTP EATAVHEMLANMRDNGLRYAV
VEASSHGLSLRTARLAHVAFDIGLVTNVTHEHLEFHGTWEQYRSDKANLFRHLGENSSKK
QLVGLSCAPYGIVCADDPSASYFIEQSAVPCKTYSSKGF AADLIAADIKSDLEGSDFSV
GTVNSQRTRIRARINLPGAFNVQNALGAILATS AATRLHWSAFIPYLPKLPVGRMQR
ITGQPFVDIIDY AHTPSSFKEILPLRSTTKGNIICVFGSGGERDRAKRPQQGRIAADYC
DIVILSDEDPRGEDPRALLEEIAAGCELP RGERLFLIPDRPTGIRKAFSLAKAGDLVLL
LGKGHENSIIYADR TIPYDEEATALSILAEMGFCRKGKT*

>SPBIB_v1_130003|ID:27162429|ddl| D-alanine--D-alanine ligase [Uncultured spirochete bib]
MMKTIAILYGGRSGEHEVSLISASSIIAYLEKSKYR VLPVGITKKGEWYLQHLPEWAFVP
PEKGIMRSLPAIEPGERVVA VPGDGLWVEQAKGLKKLDIDIVFPVLHGTFGEDGTVQGLL
ETADLPYVGADVLGSAVGM DKEASKRLWLSAGLPVVDYISVGEEDISDGNLQALTRRIET
RFGWPCFIKPCSCSGSSVGT SKVSQPEMLKNAVASALRWSERALVEAYVEAREIECAVLGN
EHPVAFPPGEVVP SHEFYDYEA KYKDPNGATLLIPAPLAEETRTRIMSLAVAAYKYASIK
GMARVDFVVEKLTGAVFLNEINTIPGFTAISMYPQMCIQGGLAYPDLLDKLIELGLENYS
KKRSLEYDFSKS*

>SPBIB_v1_130004|ID:27162430|rocD| Ornithine aminotransferase [Uncultured spirochete bib]
MNSQDYITLDNRYGAHNYHPIPVVISKARGCKVWDPEGREYYDFLSAYS AVNQGHLHPHI
VAAAKA QLELVTLTSRAFHNDKMGLFLKKLCDYTGYEKALPMNTGVEAVETALKAARRWG
AEIKGIENGKQNIICAAGNFHGRTLTA VSMSSDPESYVNYGPYVPGFVRVPGDAEAARA
AIDKNTVAILVEPIQGEAGVVVPPDG YLSALRKICTENGILLIFDEIQTGFCRTGRRFAW
QYEGARPDIMCLGKALGGGIMPIS AIVADHEIMDVFTPGTHGSTFGGNPLADAVGVAAIE
VLEQEHLEENAYRLGEHFRKAVRAVSSPKIRLV RGKGLLNAVVEENFDA YPAACLALKEN
GILAKQTHGNIIRFAPPLVITEDELEDALARITGVLASV*

>SPBIB_v1_130005|ID:27162431| exported protein of unknown function [Uncultured spirochete bib]
MLKRLYIAAFLVAFALAAWLVALQRQETLQASIPIENRTVMLESSNEKNQVQQQSAVQQR
ARIAPVPEEIFLKTIDLNLDDDEDFEQVIISRKSTSSQALSIVIAKFSPALGIYFRYFDG
EIAATKSDSIIVQPEDVTGDGIVDLVVQGLDASNNQTLTIFRRLSDRGYAKVFSGRGASV
VLQENTETEK PRAASILETREIGSNVLLQSKYIWNRLSAFEKTSEIALDQKARPIFAG
PSGVDVGAFLSWMDRLWTNSDNTAGARFLYLD AKNQELIFSDQQIQQRWIMKSSERNR
LYITCSTSESSDLDRVVVIEARAENEIAVSVIDQQIATFRRDEGWSSIYRTASMPNAVAT
EHPKMPQFDQSFLFRYLGDEGSVLV LSPVKSILVIKGYREGIARLYEYDGRQVLDLFLQ
IQQNGLASERYFY LISIEQSKDGSVERLHLEPATMSADGVSISYLSPIYIFKKTS*

>SPBIB_v1_130006|ID:27162432| exported protein of unknown function [Uncultured spirochete bib]
VSMRGKARNGTGDFWRPRAYLAFLFLFIASSVWGQTYRNL SQARQAASSAKTADSLTTVL
KTAITQLPVRDSIALCEEFE PKVPAAFKAELRGTVGGLYLLL GQINDAKSWYAKAAGLDK
KYTMQALRLAIMAGDQKT V LQLL KSESLSRESQEIAAIWISLLDGEYSKASATANQALSS
TTDPQSRREILFLKYIADFGLYGTANSSILKEFPLSIEADMIQGVFSSAPLILSVGLSW
LGSPTILADLAQKNLAKQDNKSDSGQWLQVGYFSAKENAERLSRNL SAKGYQTRIVETK
NSNGDSRWAVHVA AKDDWQKTQSM LKDQGYESYLVQP*

>SPBIB_v1_130007|ID:27162433|miaB| (Dimethylallyl)adenosine tRNA methylthiotransferase MiaB [Uncultured spirochete bib]
MKQYHIETYGCEMNKAESAAMEATLREHG WKR VSEQDADLVILNTCTVRTTAENRAWNRI
SQLSARKKERAFALAVVGCMAEQHKGAIQKKAPGVDYVLGTFQKQSFGLMLDLVAKGEKI
DVLEETPTYVFGASYHEPGA FRSFV PIMHGCNNFCSY CIVPYVRGREISRNP SNILKEID

QLEDLGVREITLLGQNVNSYRWEEQGHVLDLDFPGLLKLARHLHDRQSSDAHGRIGWIRFL
TSHPKDLSDSLIDTIAEDPIFCRHIHLPVQSGSNSVLARMNRKYTREYYLSLVDRLLKAAM
PDLTLSTDILVGFPGETDDDAEQTLDMRQVRFAYSFMYHFNARGGTPAASMPDKVPDKT
KKQRLARVIALQKEITSALMRERLQGTDEVLIIEGVSRRSKKEVLARTARDEMVLPAQAQ
RIGQFARVKLVSIISGNTFRGEEV*

>SPBIB_v1_130008|ID:27162434| membrane protein of unknown function [Uncultured spirochete bib]
MESNLPVDPKNLTDKGTAKVMSTAAGLGMGLGNALLGIPVVGTVISAGLLGLGAIGLFGK
SKTDKASGTVLAAAGIAGLTTLFIPGVAHSLLSLGGIGLLGFGVFNLSFLKGLKSKK*

>SPBIB_v1_130009|ID:27162435|foIE| GTP cyclohydrolase FolE2 [Uncultured spirochete bib]
MVDVQSFQDDRHIQKVGKGLRYPITLLDKTEKYQHHTAVVNLVANLPRELKGTHMSR
FIEVFDEYRHDLSPNVIRMLRKIRTELDAQSAYTDIHFPYFINKAAPVSGQTAIMS YDC
FYEASCSEKGRFIAGVIVPVQTVPCSKAISDGGAHNRGLVTLQVSLGPFWFEDLIR
IVEESGSSELFTLLKREDEKFITEKAYSQPRFVEDVVREVYLKVDALNRFPWFSVEAENF
ESIHNHSAYAYVEKSERSKIEPVHEGHGKIDTFMLD*

>SPBIB_v1_130010|ID:27162436|foID| Bifunctional protein FolD [Includes: Methylenetetrahydrofolate dehydrogenase
; Methenyltetrahydrofolate cyclohydrolase] [Uncultured spirochete bib]

MSAVLIDGKIAEEIRSELGKVSALRTAGVVPGLAVILVGENPASVSYVTAKEKACEEI
GIQSFETRFPENVAESVLEKIAACNRDPKVHGILVQLPLPRHIDERRVIGRIDPSKDVD
GFTPINLGRMLLEPCYIPCTPLGIIELLRSGVPTNGARAVVGRSNIVGKPLANLLIR
KSVNATVTVCHTGRDLAAHVKEADIVACAGKPGLVSIDMIKPGACIIDVGVNRPDPPT
KKKGYRLCGDVFEEASKVAGWITPVPGGVGPMTITMLLSNTIDAAARISDIALQ*

>SPBIB_v1_130011|ID:27162437| conserved protein of unknown function [Uncultured spirochete bib]

MGETEPNELAKIRAQYLGNETIKELSQSNPTKVGLKRSSEFYRLDAEGNCIYNPEPQGL
TAAREALSMHFAEKGRGISPDNLFFCASTSEGYAWLFLKLLCDPGDVVLIPKPGYPLFEHL
AMLEFVRTSAYPLEYSHPSGWHIDIAAIARYLETQQGRRAKAIIVINPNNPTGSYIRASE
RAAILELCERYELALIADEVFFDFPLSDSIECASFIGEERVLTFVLDGLSKRLGMPQMKL
GWICVSGPSMLESRAKKRLELIADTFLSAGTPIMNALPRLSSEDSFLEEMRRRIRENYA
IYRSILEFNESPHRVLACQGGWTALVESPSYMDEEKTAALLLLQKGIAAQPGYFFDMEKG
IHFAFSLILPQDSAAAWSERYDRFFENLEAR*

>SPBIB_v1_130012|ID:27162438| CoA-disulfide reductase [Uncultured spirochete bib]

MRLVIIGGVAAGATAAARARLDENAEITILEKGPYVSFANGLPYRISGDIQKRGLLIL
QTAEGFFARYRVNVMNLNTEAIGIDRQNKVNRVVRTKDGSEVPYDKLILAQGGSPIRPIE
GLDSPNVFNLWTIPDTEKIEAFIKEHAPKHAIIVGGGFIGLEAAEAFQKRGISTTIVELM
NQLMPPADPEFGAQIAEALAEHGVDSITGKSVVRIDWNARTATLNDGSTLPADIILLAVG
VRPNLELAKQAGLEIGSSGGLVVDEFRLTSDEPIYAAGDMIEVIRKPDGAKVRIPLAGPA
NRQGRIATNALGGSMYSGALGTSVVKVMDYTFMSMTGLSEKAAAAAKIDARAVTIHKAH
HATYYPGYEDLSLKIVYRREDGKVLGAQAFGKEGVEKRIDVLAVAVYAGLTLQNVAEIDL
SYAPPYSSANDPMQMASFAALNDMQGFSKFVSAQEAIALIKQGS AKVLDVRTYVEYLNH
IKDSMHIPLDELDRIEEIPDENLLIVSKAGFEGHLAYRQLSQHGRNAIRYITGGYMSLR
LLKEAQNIIEEGE*

>SPBIB_v1_130013|ID:27162439| Rhodanese-like protein [Uncultured spirochete bib]

MALNPVEELIKNGAIVDVRTEEEFEEEHYPNAKCIPVNEIMQRANEIGPKDKPVVLYCA
SGARSA YAARILKSLGFAKVINAGGLYDMPNY*

>SPBIB_v1_130014|ID:27162440| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]

MERLRKGLLDFLGFALVSILLVLSGCGGGSKSKTLYIFNWTYYTPDSVIQKFEKEYGVKV
VYDTFASNEEMFAKLKAGGSNYDITFSPGDYVSIMIKEGMLEKIDKSKLKNYGNIDPAVL
ALCDFDPGNQYSIPYYMGAAGVAVNKTQVQNYDKSWSIFARKDLANRMIMLDDMREVMGD
ALKYLGYSVNTVDQKQIDEARDLNNVWKPNNLKFDAEAFKSFSAAGEVWVAQGYAESIF
AEVDKANWKDVDFIPKEGGPSYLD SMVILKGSKNKDLALKFIDFIHRPEIYA EFCDYFG
FPSTANV PARALKKGESWYRPEDLLNCELKKDVGADLEKYNAAWQAIRVGK*

>SPBIB_v1_130015|ID:27162441|potC| polyamine transporter subunit ; membrane component of ABC superfamily
[Uncultured spirochete bib]

MHALKKPKAIRAILWRTRRMLRKGGAARKFMPARSSLSNVIIYVWVIGFLFLPLFVLVL
YSFN SGRQATWQGFSEWYQKLVMA SPELWRAFLNSVIIAFGSAMMSTIIGTLAAVGTAR

YSFKLKS FVSTMSFVPMILPEIVVGVSLLIFFAGVGLKLG L AT V W I A H T T F N L P F V Y L L V
SARLEESDPSIVEAARDLGANEMQILFRILPMALPGILSAFLTA V T L S L E D F V I T F F V T
GPGGTTLPLYIYSMIRFGVSPVINALSAVMVAGTVLLIYPMRNFLKVFAAR*

>SPBIB_v1_130016|ID:27162442| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]

MKKQVGLYYSLPQIMWLLVFFAAPLGIIIAYSFLKKGLYGGVEPQFSLEAYTAMANPNIL
IVTWRTLKMSVIATILTLIIALPCGYSIARSQNQAMRFLVIVPFWTNFLVRIYAWIAIL
GNEGFLNDIIRALHLRSESVQFLYNQTA V I L V L V Y M Y L P Y A I L P L F S T I D K F D F T L L D A A
RDLGASRFQSYVRILLPNIKSGLVTAGLFTFVPIFGAYA V P L L I G G K D S Y M L G N I I A D Q L
TKTRNWPLASSISMTVTILTTGLVFLIAMRKPREQKQVFDADPGLITPVASGR*

>SPBIB_v1_130017|ID:27162443|potA| polyamine transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]

MKGADV DIVGVSKFFGFSFQALKNVSL S I S K G E F F S L L G P S G C G K T T V L R L I G G F E E P D S G
TIAIEGKNVIGLPPDKRHCNTVFQSYALPHLSVFENVAFLRIRKIPQQLVREKVMRYL
SLVQLEMHAACKPSQLSGGQRQ R V A I A R A L I N E P S I L L L D E P L S A L D A K L R Q H M L M E L D A
IHDKVGITFIYVTHDQQEALSVSDRIA VMNMGEVLQIGTPRQIYENPATEFVARFIGETN
VFSLKILSIDGTKIYGEVDGLGPMFVDD E T D A K P G E T V L A T I R P E K I R I S A D L P N T N G G R
INVLHGIVA E P I Y S G F Q T K Y V V Q L D T G M M V T V Y R Q H A N W S E G I P D I E W K D E V Y L S F S A S D
MVIVEMHEQ*

>SPBIB_v1_130018|ID:27162444| Glutamate formiminotransferase [Uncultured spirochete bib]

MGKPLVECVPNFSEGNDRAKIEAIANVIRSVPGVSLLDVDPGADTNRTVYTFVGGSPDAVK
NAALEAARAARELIDMRMHKGAHPRIGALDVCPFVPVSGISMEECVALARDFGQKLAEEF
DVPVYLYEKAATRPERQSLADIRAGEYEGLSAKLSDPAWQPDFGPARFDPRWGATVTGAR
EFLVAYNINLNTKDKKIANDIALAIREAGR T T K D P N G N T I K V P G R L A A V R A I G W Y I D T Y Q
CTQVSINLLDFRKTPLHLVFDTVREEAEARGVYVTGSELVGLIPLEAIRACGQYYRKKMG
KSPGLADHELVEIAVQTLGLRSVQPFEPK K I I E W A M S E I S P L V T M K V A S F V D T V S S D S P
APGGGSVAALAGALGAALAAMDANLTVGKKGYENVFEQLSALAVRAQELKSALLEIVDED
TKAFNAVMDAMRLPKSSDSQKKMRDVAIEAAGKQAALVPLHTARLCLDTMKLSLEAARSG
NANSATDAATGCNMAHAGLQSAIMNVRVNIKT LADEKFKS Q L A Q E C V A L E E Q A E A E K A E L
DRFMTSVLAG*

>SPBIB_v1_130019|ID:27162445|tatC| Sec-independent protein translocase protein TatC [Uncultured spirochete bib]

MTYIEHLAELRKRLIVVIVFFLGF SILCFGWSKQLATFLVSPAQPVDVFLSPPDLFMTY
LSLSLYAGFILSLPIILYEVGMFIWPGLEKRERRAIFLSLLL GALLFIGGA AFGFFVMLP
YMLRFFLGFGEIKPMISIRDYLG F V G Q I V L S F G L A F E L P V V T T A L A G L G I I T S A Q L K S
ARKIAVLLIFIVAAILTPPDVISQLLLALPMLVLFEGSIVLASLVEKKS K S K V Q E A A *

>SPBIB_v1_130020|ID:27162446|tatA| Sec-independent protein translocase protein TatA [Uncultured spirochete bib]

MFGRIGPMELILILVIALVIFGPKKLPEIGKAIGDAFKAFKKTQEDVTKEVDKITS D S P A
KSSDAKESVQKDADKNETAKS*

>SPBIB_v1_130021|ID:27162447| protein of unknown function [Uncultured spirochete bib]

MEGKEKLAFSAVILNGGQGVRFGGIDKQLLEIDGVPIGFALAKTLVQSCEEVLIVGKKNA
IYKPLEVQQIEDAVPGLGPAGLLAGMMKARADWIYLC A V D M P F F S Y S L S K Y M Y G R A L S K
EADIIVCQYKGELQPFFAFYRKS L A G A L A S F V T S G V K P S L R R F I S S R S Y D L V S L K E L Q D I
GEQEAIFCNINNSGSLDAARQIALEHGLFIDTRL*

>SPBIB_v1_130022|ID:27162448| protein of unknown function [Uncultured spirochete bib]

MPSLSTFMQILKWADWDSPEQMNCAMPFGEILQTIAQLLPVLDAAPERMDTISPDQAKD
LLDSAIRLYILAPSIVNVLLNYKICVEHGLPLHPTVYYELKEARKYRISHSLGEIQRANE
LFWKSIDVARACCRLDQRACQDLANFASEL P F S V K S F I Y T A V Q D T Y T W I G S Q P S L L L A L A
DKIRTSYTPHLVVA A A H G S I M P A L V L A E L L Q V P L Y F V R F S M F K R H D E E P I V S L S D Q A W L F
DFRDKEVILYDEDVAGGRTLESFLKRLSPLFRQSKTAC SIRHAGSSI Q P D F F G K I W W E *

>SPBIB_v1_130023|ID:27162449|rex| Redox-sensing transcriptional repressor Rex [Uncultured spirochete bib]

MKMKLSYAPSIRRLPSYLHIIRTFQRTGEPYISGTWIANELNLEPIQVRKDLAITGIVGK
PKKGYPVEQLISAIEHYLAWDVEQKAIIVGAGNLGSALTGYQEFRNHGLHIVA A F D S D P A
KVGKSVHQIQIYKMDQLKEIVEAMNVT L A I L T V P S P Y A Q S S C D A L V A A G I R A I W N F T N V K
LKVPDDVLVQREDLSSGYAILSVMRTRSEHLS*

>SPBIB_v1_130024|ID:27162450| protein of unknown function [Uncultured spirochete bib]

MRILVISGQRGAGKSSLCRYIAEYAKARSIACYGCIETSLRGKNGVPYQIGLADLASGQT
YLA AERPRDRTDVVPFQFHTEAFAHIQASHEEFLHRTSASIQTSAPERFGQSHEKEICIID
EIGPLELERHLGHADFLKMVLNRRCDVLTVTRSSLQNALLAQLNENIPQYDVLIIIEID
KKSRRAAQNAALS YIGLA*

>SPBIB_v1_130025|ID:27162451|iscR| HTH-type transcriptional regulator IscR [Uncultured spirochete bib]
MIEKEVPMRATTRGLYALKAILTLAKTSDGQTPVSLHQIASFEGLSPEFLQQIFYRMRK
AGIIQATRPGGGGFYLSKKPEEISVYEILLAAGETLEIVPCAPERSRRRACEQFSSCDAG
KFWSKMEILIEYARSKHLSLMTAGGI*

>SPBIB_v1_130026|ID:27162452| Orotidine 5'-phosphate decarboxylase [Uncultured spirochete bib]
MDFFERLESIIETRDSVLCIGLDPAFSAEEIAAKGKHACADQALERNVRIIEATADCVAA
YKPNIAFYEALGDAGMAALRKTLD SIPKEIPIIIDAKRGDISSTAAAYAHALFGELHADA
VTLNPYLGLDTPFLEWKGKGFVLCRTSNPGAGFLQDIIIIEGKPLYIEVAKRCAALQK
KVGLVVAGNDLEALRKVRAVAPSQWFLSPGIGAQQGQADLAFAGARDGKILVVAARS
IADASDPAKAAVALRDAMRTARDTMLKQNK TENIQAAPA AAKAAQKAIADLKKAFVDALL
STGCFRLGEFTL KSGKKS PFYIDLRKL VSDPRAMKIAAQAYASLASECEYDRIAGIPAAG
LPLATAASIEIGKPMIWRMPVKEHGTGNRVEGEFRAGEHILLDDLITGASKIEAIDI
LRSEGLIVQDLVVLIERGAQGRQDMGSAGVNLRAFIHVKELFDVLLQNGTIDSRKYEQLM
EYVAQE*

>SPBIB_v1_130027|ID:27162453| conserved exported protein of unknown function [Uncultured spirochete bib]
VRRIALFLVLLTILTPVFAQDNQSKGFDL GIVLGTDLLPDPKDTTIPPAMD SWTKVGF RP
EVAFGKLA VGLDLTFRFKFASGSTTSFEIYEPDWIPQPGKTTILDVYLPKLLYVRYGFQ
IDPFYFKAGSISDFNLGNGLIMDNYSNMLFLPQRRIFGMQVGV DGNLFGFPYVGIEALSG
NLAKFDVIGGRVYIRPLAFMNKSLFGRLQVGAIGVYDRDPLMYADDTAYGTSFGTSSPTY
VIGVDVTLPIQLNPLFSLTTFAEGAMEVNKAMGAMTGVRGRL LGFISYGLQLRYLQDNFI
PAYFDTNYDLYRAERFAFIRDNPAGTAYTPSWLASAGVDIFKSLINVRATVDAPFKALPS
PATSNPADYPHLLGRLTLNKGLIPNFSVAARYEKYFLGKKSGNIFSDLIDPTDASIGMTV
SYWAGAAVVSLDYIYSWNPTKNDFDVSSGLSIGFQL*

>SPBIB_v1_130028|ID:27162454| putative DNA mismatch repair protein MutL [Uncultured spirochete bib]
MMGVIRILPQETSRRIAAGEVIDRPASALRELLDNAIDADARDIAISIAQGGIEEITVTD
NGFGMTKEDLELSVLEHATSKIYEPDDILKARTLGRGEALASIAAVSRLEIASRPRGSN
EGWLLRSVPLQPPAIDAFCKEGTRVTVRGLFESYPARKQFLKRPQSEALLCRTTFIERA
LSHPHLTFRWQSANDA EVFLPGTHAERIARCYPDLAHAPLFD AVSEAQGLHIHIVYADIS
VYRRDRKYIQVFNRRKVPEWGVLSLVEYEF AKYLPGGAHACAFLFLEIDPGLADFNHHP
AKKEVRLKNAQEVHAAIHALLSSELKARYSGSTQDLSARFSDMQEPEFFAADRSQPQLNF
AASAFETRREQEWGARWPSFSEAQNQKRAASNSLPADFWQKIRANNENGPRIYGRGPGPF
LLFELDGILFIMDQHAHERILYDRLKAKEGISQSLVPYLIDPEDNEHFLEEAQALEF
IGYRISKEESA WAVEAVPAIAASQALEALVEWLHQPSVESTPLDSIAAALACKAAVKDGD
ILDQAAERLIAEALALKEPRCPHGRPVLIAPREKLDAMFGRTLA*

>SPBIB_v1_130029|ID:27162455| Metallophosphoesterase [Uncultured spirochete bib]
MKKKLRILCVADEVDLLVYSSQINERFADIDL VLSAGDLPDEYLEFIASMLNRPLVSVAG
NHDRSDSPRDRESLRYISDQQRPG LGRIRFSIKKESGISILGLPGSIRYNNNGQNQYSDAW
MTCKIICMLPRLLIRLLFGRSVDIILAHSPPRGIHDGGDPAHTGFSAYRWLIRVAKPYY
FIHGHVHLYDLQSLRELNVGDTAVVNVYGH SVITLLKEDRDAG*

>SPBIB_v1_130030|ID:27162456| conserved protein of unknown function [Uncultured spirochete bib]
MPDDFHTQAEMDFYRAKTKALTARIIGMLKPSVTDLMPFEEAKQLLK PQSETYRGITTV
LDKIIGSEGRYRDFTRFFFPKKEHLKARWTGIDTLHYKDIVLPPILYEMGGVYFVRDGN
HRVSVARSLGQEYIDAEVISLQSEIRLNADMSIDDIKHAVIEYEKKRFYQETNYPHIVGT
DDLDFSEPGRFD TIREHVYVHKYYLNQHMTEEIPFHQALYSWHENVYQPLGQAIEAENLL
SLFPGRTVSDLYIFLVAHWDDLKRKYGRYVEIEEAESFKSQARSARKK PAGMLKALILN
FAKKVKNFFEKS*

>SPBIB_v1_130031|ID:27162457| putative 1-acylglycerol-3-phosphate O-acyltransferase [Uncultured spirochete bib]
MSMLINSAIVIGALLTLFALEFSLVLEYIFAPRSRKNALCSRYEQYGAKLLFGLFRIFRG
FNVDIRNPRKLHIPKHCLVIANHQSLLDIIVLIYMLGFERMPRFVAKKELQFGIPLVSFT
LRKGGHCLIKRRGAPIDTMR SISKMAR SCKLEQASPVIFPEGTRSRDGR LGVFYAAGVRK

ILEIEAIPVAAIAIDGGWRVATIRDFLRRFGKEPYVVEIVEIYEAPRGKHEIARVLDDAH
KKIGMSLETMRSLI*

>SPBIB_v1_130032|ID:27162458|rpsT| 30S ribosomal protein S20 [Uncultured spirochete bib]
LSARNLSAEKRQRQNEKRRLRNKSAKTAIRSAAKKVVVAATEKKDTTAAKEALLQMIKLI
DSAAHKGIVKKNTAARKKSRMQKLVNRLG*

>SPBIB_v1_130033|ID:27162459|hup| DNA-binding protein HU [Uncultured spirochete bib]
MADKLTKAELIDALYESLSPSSRTTRKEIHELIDGLFSEIKSAILEGKIVELRGFGTFEV
KLRKGRSKARNPKTGEIVSVSDHG VATFRPGRELKKASWEMNTDRIPKSFRKRD*

>SPBIB_v1_130034|ID:27162460| protein of unknown function [Uncultured spirochete bib]
MKVLSFEPPEPFATQIGQSVILNGKLRSNLPLSLRCTLRGSIEGTFVRIERSAHIEANSC
TVQNAVIAGCFTGRIKAVDSL VFLPSSHISADIYTARLQIIEGATFEGGIEMPGFSATDD
VTGTSH*

>SPBIB_v1_130035|ID:27162461|rho| Transcription termination factor Rho [Uncultured spirochete bib]
MAIYRRKKSAPAQPESPDTTNYDSSLTKEDRIMNESQVEEQFSANNGTLFDEHTVQPPED
KDQNHTDVHSTDSTRNQTQKARRPVAKIRLKKKPSNTHIEQEESEQIVEETEPESAIESS
NGFVVASLPSDDHQHQKFAEASRLELESRADQRNETRARLSINDLSKMGIVELRELGAKN
GINHDLLITLKKQELIFNILKAHTEHGIIYAYGSLEILPDGYGFLRSPQNSYLPGTDDI
YISPSQIRLFNLKTGDTVYQGIRSPKEGERFFAMLRIEQINFNEPSVAQNRIPFENLTPL
YPTQKLNLETATEEISTRIINLFCPIGKGQRALIVSPPRTGKTILLQKIANAITANHPEV
YLIVLLIDERPEEV TDMERTVQAEVISSTFDEQATRHVQVAEMVLEKAKRLVEHKRDVVI
LLDSITRLARAYNQTVPTSGKILSGGVDSNALHKPKRFFGAARNIEQGGSLTIATALID
TGSRMDEVIFEEFKGTGNMEINLDRRLSDRRLFPAINIKKSGTRKEELLTEELQKIWV
LRKVINPMDDIEIHELLDRMMKTKNND AFLKSMNTPYQGMD*

>SPBIB_v1_130036|ID:27162462|rpmE| 50S ribosomal subunit protein L31 [Uncultured spirochete bib]
MKQGIHPKYELTTITCAGNVFETRSTVKNIQVEICSACHPFFTGKQKLVDTAGRIERFN
KKYGIKSSSENK*

>SPBIB_v1_130037|ID:27162463| Non-canonical purine NTP pyrophosphatase [Uncultured spirochete bib]
MELIATNNHYKAHELKPLFPRHALLLPADLGIADFNPEENGTSFFENARIKAEALYALV
HKPVLADDSGLCVDALDGKPGIESARYGSVNGHLLSADEKNSLLSQLAGIRNRQCAFVC
CLVLYLGKQRFIAVEETLEGQIGDAPQSGHGFYDPIVFLPSYGKTVAELSAQEKNRISH
RGKAAQRMAAILDALEGNLLD*

>SPBIB_v1_130038|ID:27162464| protein of unknown function [Uncultured spirochete bib]
MDSKNYIELVRRMYAHPRLYGFFSEDEISEALSRYRSRIETILDRAEKESITREAYLLSS
MRFVAKSVHRHYSSNLSENAYVYSHFSEDAVLEVPADAFFDRNRRRIQDADTSGIGFSP
QVFIGKLAPERRLLYLVIKCAWDIDEELLGKCSYALGMPEQYLFNLIELVKRRTEASRS
QIHLNEKLNILWIRMRVLELRDLTAIAKSDREEVRSCLERCRCRKYRQLLEKRSRHKSSI
SNEFISDLLNVPKGSVDSGLYLRKNAQSRKPLAEYQELG*

>SPBIB_v1_130039|ID:27162465| protein of unknown function [Uncultured spirochete bib]
LCDRVEQKSFCVVLSDPVQALSVAEDSRICPPNIMPFPIAKLEPY YCRVRAEISLFRP*

>SPBIB_v1_130040|ID:27162466| DHH superfamily protein, subfamily 1 [Uncultured spirochete bib]
MKPAPKSLLEFIEGHDCFYILGHREPDGDCIGSQLALASMLQSMGKRAHVLSSGPFNRIE
ILPFEARFKSEVPAERDFERTAALVLD CSSMSRIGNIAERMPDIPAAFIDHHATAGAVGP
YDWLDESAPAVSAMILLMEAMNHAPTKEEAELLFFGLSTDTGFFRHLDEHSSETFRIAA
RLVDAGVSPKR VFMAINGGRTLASRRMLGELLRIQPY YEGRLLVSWVTIDDQQKYGMSS
RDSDLLYQLMMGIVDCEVCFVVKQETDDMCTVGLRSRDSVNVAKIAEKYGGGGHRLAAGL
SMNGKVNQVVHTLVDAFSSVFS EDTEGK*

>SPBIB_v1_130041|ID:27162467|argF| Ornithine carbamoyltransferase [Uncultured spirochete bib]
MNPSALKGRSLLTWIDFNPEEIRYFLELSKKVKEEAKKGVKQRFKGKTIALLFEKRSTR
TRAAFETA FGEEGHPVFLSNQDIQLGSKESIEDTARVLGRMFNAIEFRGFKQEYVEILA
KYSGVPPVYNGLTDL YHPTQALADVLTIEESFGSCKGKQLCFVGDGRNNVARSLMVISAKL
GMHFTIVSPKELWPDNELKNCETYAKDSGSKLKITDDIEEGVKGADAIYTDVWVSMGEE
ALKAERIKLLSSYQVNAELMAKTGNPNCIFLHCLPAVKGEEVTFDVIIEGPQSRVFDQAEN
RKHTIKAIMLATI*

>SPBIB_v1_130042|ID:27162468| Endonuclease III (modular protein) [Uncultured spirochete bib]

LCALACCNMAIVDNLMSTQNSRPSKILASYSVPALLDEVYGRVPIWPDAPHLLHYRSC
FELLVAVILSAQTTDEQVNSVTDELFNRYPDAHSLAHAEISEVERIIHPVGGFFHVKARHI
IEAAQMIEARFDGKLPSPFDQLELPGVGRKTANLVAACHEVPGIIVDTHVLRVLCRLG
ISPKKDPPLAESIVRAHLAPEKHTHFSYSVNRHGKFTCTARKPACTQNGAPCPLDICPK
IGITSLKNDAE*

>SPBIB_v1_130043|ID:27162469| protein of unknown function [Uncultured spirochete bib]
MESEYPESSEEIQEIPDPVAKLARERFKIDHLAPLQRFVIANILDADTENLLPYRQLVL
FPTGFGKSVCFQLPSLVLEGLTVVYVYPLLALMNDQKRRRLDEAGIPCALFRGGLADEEWRA
QETA VSSKKARIVIANPEILATSRLRQFLSRCRIAHFVIDEAHCISEWGETFRPTYTLTG
ESAEKLAPHVMSAFTATAGPDIVSSIEKRLFRGNA YRLVTSEADRPNIHYAVVQTLSPTR
TLRRLSSCQKPAIFERSRPGTRMKAEFLRSVGFAATRFYHAGLSRAERNEIESWFQKA
EDAVLVSTNAYGMGVDKKNIRTVIHTGLPDSAEAYIQEAGRGRDGKDSFAVLIHNAER
AGPVGSDLPLQEQRKARFAPYPLIETCRREFLLHLLGETETPVCGACDNCELEMKMARSF
SSDGSPPRWRDMSIHQRGMPCMPHWRLLQAEGFLETLLLVAANQRRWTMSECIRMLG
PHGIGRGNVTGGLYGWSRTEREEMVSSLLALSIIIPRRGIWKGSIKLSKEGREFLSVFK
RFAARSAHHSWRAELEV*

>SPBIB_v1_130044|ID:27162470|pgi| Glucose-6-phosphate isomerase [Uncultured spirochete bib]
MVTYKNLDRCSSFDSLKKIQAIKLSEKLSAQRIASFWRHAAAMSICYAFAPVDDQIIEK
LQALTDEQELVEKYRLLVEGEIMNTGEKRMVLHHMARGRLGKTVRWEGQDMEAFYSQEKQ
RFYEFARKVRDGSIRSSVGTQFAQVQVQIGIGSDLGPRACIALSRWAVSHKRARLAPWF
ISNVDPDDADSVLSHIDLESFLVLSKSGTTQETLANETLVRERLRASGLNPDLHMVAV
TSKTSPLAGNPHYLD SFYIDDFIGGRYSTSSAVGGVIISLAYGPETFEFLQGAHEADKL
AFEPSLRHNPVLM DAMIGVYERNVLGWPCTAILPYAEPLSRFPAHLQQLDMESNGKS VSR
TGEPLSYSTGPVVFGEPTNGQHSFYQLLHQGTDIVPLQFIGFLQNQISPD MHSEGSTSR
QKLLANLVAQMLAFAIGKSDSDPNKMFPGNRPSTLIIGDELGPRQLGALFSHFENKVMFQ
GFAWNVNSFDQEGVQLGKVLAKKALGAISKGESTFDARLDALISAALHTSLKAQMOPDTA
GKE*

>SPBIB_v1_130045|ID:27162471|murG| UDP-N-acetylglucosamine--N-acetylmuramyl-(pentapeptide)
pyrophosphoryl-undecaprenol N-acetylglucosamine transferase [Uncultured spirochete bib]
MMSAEIAAQPGETQHAATQAGANAQPCIVFTGGGTGGHIYPGLAVIDELRRLGFTGRIAW
IGSEKELDRSIVASHGIEYFAIPSGKFRREISFQNLTDLGRIVAGYFRAKSVLKMLRPAL
LFSKGGYVSVPPCRAATALGIPVFTHESDASPLATRLNSAHAERILTSWEDTARCFPQS
LRSRIIRTGNPTRPDLFEGDKARGLKLLGFSDDRPIFLVGGGSGAKEVNRLVLSLRL
CPTVQIVHQTGQAHYEDVLHAIPDDPAIRAA YRPLAYIGKEIADIYAASDIVAGRAGAGT
VWEAASLGKPMILPLSGTGTRGDQVENAALASKAGAAIVLEGDKATPEAFVA AVQSFLN
PEAYSAALNACRKLAVPHDFADPNLQSLDVANSINNAGSQYATEFIARLILARIGWR
ETQ*

>SPBIB_v1_130046|ID:27162472| putative Colicin V production protein [Uncultured spirochete bib]
MSTMDWVFS AVVVILAARCFVRGVFHEVLSVASVAVGFLAGLLSNTVIVQVLPKVGANS
LPYQAQYIIAFVLCFIAGFIIMKIIERMIREGLEASSLDIFDRVLGLALGIIEGFIIVGL
FIVILQIQPFDTKALLAGSLYAKLLGPIEPALGGSITPLLKNGDLPGVIQNLKKGK*

>SPBIB_v1_130047|ID:27162473| putative DNA polymerase III domain-containing protein [Uncultured spirochete bib]
VFENLLFQDKAKEQLLAMIASGTVPPALLFAGAEGSGKLTAALEFARVLSCEKEALWNCE
CAQCAHHRSLTHPDL LFGPRSFPQEPSAAADYFLRTPNATSYYTFVRAVRKLLKRFDPA
LWSGEEARLSKAASSIEAIEEQLDISSMLASGHTQKLGDTANRIVETALSLEPLVPDGI
PVFMVRNMAAWASLTPAGKRKTIILQNADTANESARNAMLKILEPPESVRFVLTASRA
TVIATILSRSLISFDARTSEQAQQIVSRLFR TQEKVEDVSEFFRKKSPFPDRAESAAA
LFVGALLADAMRGDEAISGELASALVSKARESRSVLDVLRVSEETGGFGLKNAKFADA
PSVFLRAVARQLARISSDASSAALVMLVDRLSSKLRDVA VQNRTYNRSPELLLEAFANI
FGVSHESV*

>SPBIB_v1_130048|ID:27162474| PAS/PAC sensor signal transduction histidine kinase [Uncultured spirochete bib]
MKA VYENALRRIDRIPPEGLKQIINLSAENSIYE AALNSTLD AIIVC DLEHKPLFINRT
AEKILKLP SWTGEFFIWEQLKDDEIVGFFRKTLLADENILNREISLNRPGGTRVLSISIS
ALLSNGRISGNLVHMEDITEKRRREAQLRRAESLAALTTLAAGVAHEIKNPLASIRIQLG

IIRRIEKNCKKTESIFHNISLVEQEIDRLNAIVVDFLFAVRPMDITLIHDEVAE
VAELMSKEAESQIRVITKFDADLPNVMIDRKYKQALLNIVKNAIAAMPEGGTLTISVS
VRNDELLIAVSDTGIGIPEELLAKIFEPYFTTKESGTGLGLTITFKIIKEHNGEITVESS
PGIGSTFTIHLPIQPPEQKSLPPWEDGVKIDGSHTED*

>SPBIB_v1_130049|ID:27162475|atoC| fused response regulator of ato operon, in two-component system with AtoS:
response regulator ; sigma54 interaction protein [Uncultured spirochete bib]

MRATLLVVDDETNIQREGLAQLFSMEGYDVRTAKDGLEAKTIVDREDIDIITDYKMGRMS
GLDLLQYVSTHPGIPVILTAHGSVDKAVEAMRQGAFFVAKPPNTDHLVNLVRRALLET
RELYRTNIELKAEVESQRARSYIIGQAPSIKRIFDLIRKVAPTKASVLITGESGVGKELV
ADAIHNLSPRKDKPFIVHCAALAESLLESELFHEKGAFTGAAARKRGRFEMADGGTFL
LDEIGEINQNVQIKILRVLQERKFERVGGEEETIEVDVRLIAATNRDLKKEIAEGRFREDL
YYRLNVVNIHVPLRERREDIPLLAFLKEFSEENGKQIEGFDPKARQALYTYDWPNGV
RELRCVESA VVMASGKLITIDDLPPGPRSSGQTRNICIPALSSMEDAERILIAETLALV
GGNKSAAEILKIGRKTLYQKIEQYIGIGSQEAPASSASGE*

>SPBIB_v1_130050|ID:27162476|whiG| RNA polymerase sigma factor WhiG [Uncultured spirochete bib]

MDYASLEENRLWELYRRTADIRDELVLRVYCLVVKYVAGKVSVTLPMSVEYRDLVGYGN
FGLLDAIEKFDPKKHVKFKTYAVTRIRGAIYDHLRELDWVPRSVRRKTKQIERIAKLES
HLGRPATDEEIAAEMGIERKELMKIMAKVASSILSLQEIWPMGAESEGGTIGDTLES
SANPDVTLEREEIRRVIVEAIQELPDKEKKVLVLYYYENLTLREIGRILEVTESRVSQLH
TKAILRLRAKLSNRRKGIL*

>SPBIB_v1_130051|ID:27162477|hslU| molecular chaperone and ATPase component of HslUV protease [Uncultured
spirochete bib]

MAETDTLTPHRIVEELDRYIVGQKKAKKAVAIALRNRIRRQRLPEEIREEIAPKNILMIG
PTGVGKTEIARRLAKLSGAPFIKVEATKFTVEVGYVGRDVESMVRDLMASAVSMVKEEMET
QVAEEAKRRAEDRLLLEILLPGIASSDEPVGESQATVIVPSSGTETREKFRLLREGKLD
REIEITVPAQGPQIELFAGTQFEEMNIALGGLQNLFGGKKKKKTTTVAEALPLLEAEERE
RLVDQEKIVQEARRRTQESGIIFVDEMDKIANREGKGASGIDVSREGVQRDLLPIVEGTT
VNTKWGPVDTTHILFIGAGAFNVAKPQDLPELQGRFPPIRVELDALTGEDFVRILTEPKN
ALVTQYTQLLGTEDVTLEFTEDAIARIAEIAAANRQSENIGARRLQTVMERLLEDVSEF
ADKYAGTKVTIDKAYVDEHFKDYVQQQDLSKYIL*

>SPBIB_v1_130052|ID:27162478|hslV| peptidase component of the HslUV protease [Uncultured spirochete bib]

MEIHATTVLA VRKDGHVAMAGDGQVTMNNVTLKSNARKIRTIYNGKVLGCFAGATADAFT
LFEHFEAKVQEYGGDLTRASVELAKDWRDTRILRKLEAMLLVADQTKMFLSGTGDVVEP
SEDAIAIGSGGTYYAAAIAYLDASRRVEEAAGAQQVSDLTSIPGYFSAREIAQKSLEIA
SSICIFTNDRIVVEEI*

>SPBIB_v1_130053|ID:27162479|xerC| Tyrosine recombinase XerC [Uncultured spirochete bib]

MDARLVDYLEYLEAVRGLSPKTVEVYRRDLAQYEVFLDGNVDAADATDIRAFAGSLVMD
KRAPASVNRALS AVRGFYKYRVRFHQNEADPAREVENVPAGRPLPSFLFEEETKTL DLSL
DGNAFRDVRDRALLEVLYSTGSRVSEVCGMELPRLNLSAGSVRVKKGKSKERLVFLCETA
RAALKRYLPYRAALMMRRGIEEHDRFLVNAKGLPLGPRGAEKIVERRRVQAGIKKHLTPH
TFRHSFATHLVAAGADMRVVQEMLGHSSISTTQVYAHVDMERLRRVYEQAHPHGSKGK*

>SPBIB_v1_130054|ID:27162480|topA| DNA topoisomerase 1 [Uncultured spirochete bib]

MAASKKEMAGVSAKPAKQKTLVIVESPAKARTIEKYLGTHYRVLASNGQVIDLPKSRMAV
DVEHDFEPEYITVRGKAAKLKELTDEAKRSTAILASDPDREGEAIA YQIGKYLKEKTKD
TPIRRVTFNEITRPAVQEAMAQPRDIHMSLVEAQKARRVIDRLVGYTSLPLWKKVKSGL
SAGRVQSVALKLICDREQEVEFSPIEYWTIDAHLRAHQHLVRAELALFDGEKPSIRNES
QANSIIAALS GKP AVVTDIQYTDRSIKPKPPFTSKLQQTAANRLGFTSTKTMKVAQQLY
EGIDMGHQRLGLITYMRTDSTRISESALRETHEWLAQYFPAQTPDSPIRYSVSNAAQDAH
EAI RPT RVDITPDEAARYIKGDHLKLYTLIWERFVASQMKPAIRTYTADIQVGEGLFRA
SASSFLEEGFYK VIRLGASKEERTSHQLPLEKGQTLVAEKIQGLQHFTQGPSRYTDATIV
RALEELGIGRPSTYAPTITLIERYYVQRDKRQLVPTALGKIINEILSKNFPEVINTSFT
ARMESMLDKVEEQKVDWVSELKKFYFPLKDKVADVMHALEDMHGTLDEATNETCPKCGKP
LVKKLGRYGYFLSCSGFPECTFTKSVPLAKCPKCGGDIVPRVSTKGRKRFYGC SNYPEC
DFMTLYKPTNATCPKCGWFLVEKYDKKKGMHKACINPDCDYLHSSDDGKEGA*

>SPBIB_v1_130055|ID:27162481| DNA protecting protein DprA (modular protein) [Uncultured spirochete bib]
MKAACAELRVNLHGGISKMAHRKPRVEMRSSLVHAELERIAENIPLLD AVELPLKLALHR
LHFLSWQERLLILENIHCKEDFLSLGLAEIESFLYRSIRAREPDMARIWEQAERDAEQLV
RMGAKFVCVTDKEYPPLLREIHRAPFGLFVRGDSRCLGLQAVTMVGTMRPTWAGVRAAVH
LAREAADAGLCVVSGLARGIDAAHRGALQSAGKATIAVLPCGLDRVYPPSNRPLAAGII
AAGGCLVTEYPPGVSLDRYRFPERNRILAGFSRLTLVIEAPEHSGALITAEFALNEGRDV
AVAAECSSSRNAGADALSKEGACQVRSAGAEIMAIMSGSGAWDWANGRSIIIGRD*

>SPBIB_v1_130056|ID:27162482|xerD| site-specific tyrosine recombinase [Uncultured spirochete bib]
VSILVRRFQAYLLSTRRRSILTADVYIREIEMLETFLLYKGYKTPLDASGEDLLTYLVYRS
QSGLRQTTMARIVASISFYRFCLNEKFRTDDPSIQIRTPRQDRNLPDVLAPESVEYVLD
SIDISTPNGLRDRALFELIYSCGLRISEAAGLTFQQLYLEEKLLRVLGKRHKERLVPFGD
EALYWLKKYLAEARPLLEKNGKSDVFVFNQEGRGISRKGIWKRFQIRAKSGIKAKVHTF
RHSFATHLLAGGADLRTVQELLGHTDIATTQIYTHIDEASLGMYPHKEYFPRK*

>SPBIB_v1_130057|ID:27162483|ftsZ| GTP-binding tubulin-like cell division protein [Uncultured spirochete bib]
MAIELVDDNGIGSPTVIKVIKVTGGGGSNAINRMIMAGLKNVQFIAVNTDLQDLGRSKAEI
RLGIGSKITKGLGAGGKPEIGEKAAVEDRDKIEQALRGADMVFTAGLGGGTGTGSAPII
AQTARDLGALTVAVVTKPFTFEGRIVNRIAEEGFSKLKQAADTVIVIPNQNLKIVDKKT
PLKEAFRIADEVLRQGVQGISDLITLAGDINIDFADVRTVMMEGQGDAIMGIGVNGENRA
QDAAEKAVNNPLDDARIEGARNILVNVTCGEDFSLTEYQDVIDLITSKAAEDAHIIAGV
VSDSSLKDEVVTVIATGFGAARQKFSKTPSKSGISMPLGSARPSEFLGPNEWPLREDR
PGQDRDRPAADRDRPAPKENFGKISFDPESDNDELDIPTALRNKRLMSEDFGRR*

>SPBIB_v1_130058|ID:27162484|ftsA| Cell division protein FtsA [Uncultured spirochete bib]
LIFNQALWCIKQRRPSLADTSIVALDIGTSVTKAIVGAFDENGFEFIIIGITALSNGLRR
GVVLNIEGTLNSITSALDAELMSGADIRAVSLALSGANVESFNTNGQVAITGRGREITQ
EDIVRVHEAARAVSISMDREILHVIPRSYTVDEQKGVNPLHMTGVRLECGVHIITGSVS
TVQNMFKCVTRAGYRVEQSYLGILGSARCVLTDDELDLGLLIDIGGGTTDFMVFADSEP
VFTSAIPAGGSQITGDISIMLSIPVDAERLKKESGASWADAIDPEETVIVPGFGAREPV
ELERRKLVSIQPRVEEIFEMVNERLVKNGLKEYIKAGVVLTTGGSALLPHIDDCARAVFG
VPVRIGTPLAIQGLDAEYRSPAFSAVVGVALLEAERTGAVSESSGRKKVRKKGKQGSFSLF
KWIKDRFF*

>SPBIB_v1_130059|ID:27162485| protein of unknown function [Uncultured spirochete bib]
MTEIEMRERQLAEKQTTQTERTPTRQPQAKQPQAKQPQASQSQNERSLLSVSDTYSVNII
HSTTRRETSMPGTAASKGIANKLAAEPARGASGRAAFPAGRVAPEPGPVAPASGRISFPS
GRVAPASVKLTESADRLSALTRAKKAKKPSGLRILAAALALFCVLAASVVALPRLTKIE
SIRISGLETLTENAIVSAIGAIGDESLLTLNLKEIKARIEQNPRVAQARVFRMLPSALGV
DVRERSAVAVIMISSDQGSKLALIDGEGTAFALVEAEDSKSPDLPVISGVHFEQFQPGQR
LPDMLGPLFADLQKIRNESPELLAFSEIRIVRISEYSAELLMYPVHMKTAVRMPLRLSA
DALRNSLVVLDILRSRGYGNQPSEIDFQSGTVVYQTKEAVSG*

>SPBIB_v1_130060|ID:27162486| putative cell division protein FtsW [Uncultured spirochete bib]
MQKESRTDRQDLQQRQTDWQMIAAIIVLSMIGLFALWSGSIGFAIRNGGPNIIIGKQAIL
YAVSLVFMALVAVLPVRFRLRGVLPFVVAIGIVGLALPVFSPLGVMINNARRWIRIGSFTL
QPSELWKPVLVLYLASFLEKRKEHIVESGMATFPALVLVGLSAFLIYLQQDFSTSILVVA
IALAMLYLAGTPLVFIASLGGFSLLYGGLMIFSSQYRIERLVGFLMPDHHHTVNYQMYS
ALRAIRAGGLWGKGIGLGLSKISSIPEVQSDFIFAAFVEEAGFIGVTVVLALWAFIMVRA
GKGLARTDYFSKLAGFGLITLSSQMLLNLA VVTGIVPTTGLALPFFSSGGSAALMTSIT
CGVLINLSGSHERIAHSEMSFVMKGAHD*

>SPBIB_v1_130061|ID:27162487|mraY| phospho-N-acetylmuramoyl-pentapeptide transferase [Uncultured spirochete bib]
MLREIFLPLVKYFTPFNIFRYLTFRSAYAAVTALVICYLIGPWMIEKLRVLKFGQSIRD
GPQTHLAKTGTPTMGGILILAVVVS VVLWIDVKSGYSWIALLSLVGFGLIGAADDLLKI
KKHTSDGLSPIQKLALQFVVS GAAAYAIYRITGPTATKLYVPFFKVHVIDLGAFWLPIAM
IYVTAWSNAVNITDGLDGLASGLVIFAILAFSILTYITGRADWSQYLGIPYIKQASELTV
FNFALLGACVGFLLWFNAHPAEVFMGDAGSLSLGGVLGVLVSLMVKKELLLL VIGGVFVMEI
GSVMLQVLYFKMTKGKRLFRMAPLHHHFELLGLKETKVVVRFWILGGIFALIALSTLKIQ

*

>SPBIB_v1_130062|ID:27162488| UDP-N-acetylmuramoyl-tripeptide--D-alanyl-D-alanine ligase [Uncultured spirochete bib]

MANPDLPTAELPVLFRAGELAGLIGGACKGFLDAPIRSVVADSRAAKLDSMFVALKGERT
DGHLYIKQAIENGARVVMMAEFSSRRDMALDAIHASNMGEKICLILVDSTMKGIQQAACEYR
RRNSLLRIGVTGSSGKTTTKECIAAILSACYPPESVAMSPGNLNSDIGLALALFDLRPQH
TIGVFEMGINRKGEMDELASMYEPDIAVITNIGTAHIGMFGSRDEIAKEKKGKIFSHFDGH
QKALLWEDDQYRQFLASLVRGTVHYYGLKSTEGIEKIENLGLKGWRIGWKQQTIEFGFPG
QHNLLNACAALSANMLELDPAQASRGLSSVKPLFGRSEIREGRITVLQDCYNANPDSIA
AAIEFFSALPSDNRKILVLGSMLELGEESERAHENVGLMAGNSGAEAIPLFGQEMAAAEA
ALKGRSFKGMLMLTDSMNELIEAVSGFVQPGDLLLVKGSRGMALERLTKALEEKGFLLSPS
GKASGGSHAS*

>SPBIB_v1_130063|ID:27162489| putative cell division protein FtsL [Uncultured spirochete bib]
MNARRFWILAIITCLFIGLLVFQTSRYAALKSNVISLQRMEMDLIKTGKELDANIAKLVS
LERIEKAALKNGMQIAAPEQRIIVTDIQAGNKQEASTNGKP*

>SPBIB_v1_130064|ID:27162490|rsmH| Ribosomal RNA small subunit methyltransferase H [Uncultured spirochete bib]

MPEQIEGKAAELFLHVPVMLEEVQGLAAKIQPLSLYIDCTLGAGGHAEALLSMYPDLRCV
GIDADPDACERAFGRLSRFAERLSIINAYYDDALADLCVCSSAGKVLGANLSDLCNSSHA
PRASFILFDLGLSSYQLGASGRGFSYSADEPLDMRFSPDAPASAEELIHLSEAKLADLI
YAYGEERYSRRIAHAIVAARKKESIHSAAARLASIIADAVPAQYRHGRIHPATRTRFQALRI
AVNDELGRIERALVSALELLAPGGICAVISFHSLEDRIVKHFFAEKAKTGRFSLEWKKPR
GPSLEEIKANPPSRSAKFRAIRAVAMRSEQAQQGASA*

>SPBIB_v1_130065|ID:27162491|mraZ| Protein MraZ [Uncultured spirochete bib]

MKLLTGEFKNMLDEKGRSLPARLRSDDLPSLVLTQGVDTCLWLFAPPEWEELSQRILAS
TSLFQARSRLIQRRIIAPAQEVVDKLGRISSIPQSLRDWAGLSKECIIIGISRYVEIWDS
QRYQAYLAENQSEFLSAAEELGGLTLS*

>SPBIB_v1_140001|ID:27162492| putative PP-loop domain protein [Uncultured spirochete bib]
MNAILAGKREPWFERLLLQMAAITQYSMIGREDGILVGLSGGKDSLALLALLAVWNRGV
RPLRACYVENRQFPQNKGSLEALGTFCALLRVPFSIREIETDVRGCFPCSHARRKALAE
EAVERGCTRIAIGHTRTDLVQTAILNLAHHGTLQGLLPIRQYFENAFVVRPLIFLDETD
IWRIVRRLDLPVQKSSCPLADNSERAKAAAILKALESMPGAAANIARAANSALNLV*

>SPBIB_v1_140002|ID:27162493| conserved protein of unknown function [Uncultured spirochete bib]

MSEISLLNALVHHFDVVVRDPVWGDVHMDAPLHALFQSKSFMVLDRIQLGPVALVYPGA
THTRKAHSLGVYYIARRMALALVEKGEIDFVSKTGLRSFLVAALCHDIGHFPYAHSLKDL
PLSRHEALAGEMIVSEPLRQYVSSCGADPEQTAAIIDPDRSAGESRETLFRSFLSGVLD
PDKIDYLTRDAFYCGVPYGIQDADYIMRRLVHDDRLAIDLKGEISIEALIFAKYQMYRA
VYWHPTVRAATAMVRKAVYLGAEGLVLPNSLYGLDDTSFGRLMNHSHKFAFPKLAREAE
KHIFRLADEHAFDEENPVHADLLDISKRIDAESTLAQAAELPETDVVIDIPERIKLETDL
MVKIDDHFEAFDQRSTLFPQETVAKVAGALRTIRVYLRPQSNPDLKIKIQLVQALLG*

>SPBIB_v1_140003|ID:27162494| Methyltransferase [Uncultured spirochete bib]

VLTSRLDFSDYEHVDFVSGYIFHAADGFLGHLLEEVPAVTRVDGELVSSWNKNGKAPFDL
ASHPVFWTRNVWVEPFLLEFGSISEAARTLKAIQRNWSSVPVRFARRTVLISEQLPHIPT
KPRRFPELPSAPMGAFLLDEHLILGSAKCSNPFPGGAFEFEEKNNDPPSRA YRKLWEA
LILAGKMPRGERCLDAGASPGGWTWVLASLGAVLSVDRAPLEPRIAQMNPVWEMKHDA
FTLKPEDIGRVDWLCSDVICYPEALWQWISKWLASGLAKNYICTIKMQGNTYDRATTLKF
ASVPGSRVVHLWHNKHELTWIKLDAARTQTELSATQQA*

>SPBIB_v1_140004|ID:27162495| UvrD/REP helicase [Uncultured spirochete bib]

MDIDFRSELDPQYAAVTA AEGPVLIAGAGSGKTRVITYRIAYLLARGVPQEAILALTF
TNKAAKEMVERAHSALTGLALKNLVSTFHSFGAWMLRKEAAVLGYRPNFSIYDEQDRTRA
IRECAHELGIAAENLDPVRLSQLFSALRSGYGKPGELSQRELELYALYRKTLLKIYNAMDF
DDLIALPLELLQEHEEVREKYRSRFRYIMIDEFQDTSLLQYEFIQQLSEGNICVVGDDDDQ
SIYSWRGADYRNIERFETDHPGFVEIKLERNYRSTGSILTAANTVIAHNVRKKEKELWSP
QGTHGTPISFFEAEDDDAEAEKIEKIRELRFSEHADWENFGILVRTNALADAIEDSLVE

HNIPYRVAGGPSFYQRREIKDIIAYLKAAANPDDVSVLRVNLVPRRGIGRATVEYLSNI
AKAHSTSLHHAEEAARQAVFAPKESHMOKALAEVFSFFDYLGELRSALLEKILVSRAIR
TIVEDVGYWQYLLDEHKKNDKAAVWKFRNIELLAASAERWEKDPDTFEKGIFAYLARISL
TVRDDANEEEGRLSLLTIHAAKGLEFDYVFIIPGCENGILPHARSLEEGGGDIEEERLFY
VAVTRAKKQLFLSRALHRKKNGSLQETLSPFLSELQNLMMVMADAQKPAVSEEDLKKEF
FSRLKSRLGA*

>SPBIB_v1_140005|ID:27162496| Small multi-drug export protein [Uncultured spirochete bib]
MNAPILMTIFFSILPISELRGAIPYAVYQGLPILAAAISIAANICVPLIAFLFLNSIHK
LLYKFSPYRSFFDRVVERTRKKVHAKVEKYGYWGLLLFVAIPFPVTGAWTGALGAWILGL
SYKKAFFAIAGGVLVAGVIVSILVALWGAGTQTIFFKTMH*

>SPBIB_v1_140006|ID:27162497| protein of unknown function [Uncultured spirochete bib]
LYKSLWMLFKNKKAMSGTHIFAAIEMAAAARIGRPWYTA YGIAPLSSEIGKMEKKIVMRI
GAFIATIARDSLDCLGKAEMC*

>SPBIB_v1_140007|ID:27162498|miaA| tRNA dimethylallyltransferase 1 [Uncultured spirochete bib]
LTKPLATNCLPVDVAVILAGPTASGKTDLLDSMFGAGVAEWLPRLRDAWSIDLQSVHVLSA
DSMQAYRFMDIGTAKPDSGLKKRLVHHLIDIKNPDEQYTAGEFVARADALCTELTEQHIL
PVVSGGTGFYLMNFCGLPSAPPSLPEIRAQVAQELEHAGTAALRAELARADPEIAAKIH
EHDVYRLTRAVEILRSSGKPPSFFAPQKVPRQGRFVVLGVTRPRDELLELRIHARVEAMM
KAGLAE EVAQLVARGYSREDPGMQAIGYREFFELSGRPLETISEAIELHTRQYAKRQMTF
FRALPGIQWIAPEPEQLFRALAEAN*

>SPBIB_v1_140008|ID:27162499|rpoZ| DNA-directed RNA polymerase subunit omega [Uncultured spirochete bib]
MIMPLEALINYSNGSYELAAAVSMRAYQLAVLQTPVEVEKNNGKVVSMATQEILDKTIGYK
LLAG*

>SPBIB_v1_140009|ID:27162500| protein of unknown function [Uncultured spirochete bib]
MSSISSDQRMHIEILGQSFSIKTDDSPEYIQSLVSELKQRYAVISTRMGVADPLRVAILA
GLFLLDDLKKTQGQKLSGAEARENTSARSTLSELDEEQILAQLDKRLGELGI*

>SPBIB_v1_140010|ID:27162501| protein of unknown function [Uncultured spirochete bib]
MMLNLEQIRALESRVEKAVVLITKLRQENADLEARLADVLRSAELLKNQKEELERQLAAQ
TRAANESSRLEGLIARAKEAEEKAANAELKAAEAEERAAAMERKAQAADDEISHYRERA
LTAERRVAELESKAEEELRTEQERIEQGLMHASKLDSFEDMVLEMSLGAGARSES AVKPE
AQHIAAPLQDVGQESDEQAASDISEPDSGGGEGEKEEPDDNSSPDLKSRDAPFRGGENELDI
F*

>SPBIB_v1_140011|ID:27162502|rpIT| 50S ribosomal subunit protein L20 [Uncultured spirochete bib]
MPRAVDGTRRKDHRKILKHAEGFWGRRHSNYKVAKDAVAKALSDAYKDRRDKKG VFRRL
WIARINAACRMRDISYSRFIGLYKADV CIDRKMLADIAVRDPAAFDAVVEKAKAALQG*

>SPBIB_v1_140012|ID:27162503|rpmI| 50S ribosomal subunit protein L35 [Uncultured spirochete bib]
MPKMKTKKAAAKRFTLTASGKVKYKMNLRHILTKKTTKRKRNLKAGFLDVGVPVYQIRK
KLLPYG*

>SPBIB_v1_140013|ID:27162504|infC| protein chain initiation factor IF-3 [Uncultured spirochete bib]
LAEKDLRINEQIRVREVRLLIDDKGEQRGIVSTLEALRIAREAGLDLVEVAPQSVPPVCRL
LNYGKYKFEQEKKVKDAKKRAKVTELKEIRMQP KIAEHDLD FKANHVREFLEDGNKVKVT
IRFRGRELAHTEIGEEILKRILAKLEGAFVLERPPLMEGRFMSMVLQPKAGAVKKQPEGD
TVNTASGPEH*

>SPBIB_v1_140014|ID:27162505|fba| Fructose-bisphosphate aldolase [Uncultured spirochete bib]
MTSYKELGLVNSKELFRKAMEGGYAIPAYNFNNMEQLQAIQACVETKSPVILQVSSGAR
KYANATMLRYMAKGA VEYSKELGYAIPVHLHDHGDSFELCKDCIENGFSSVMIDGSHLP
YEENVALTRKVCEFAHAQKDYVTVEGELGVLGVEDDVSAEHSHYTRPEEVVDFVSKTGV
DSLAI SIGTSHGRAKFRPEQCTRTADGVLIPPLRFDILEEIEKRIPGFPIVLHGSSSV
VEYVRMIEQYGGKLPDSVGIPEEQLRKAARSAVCKINIDSDGRLAMTAMIRKVLFEHPEE
FDPRKYLGPAREDELKLYMHKNSEVLGSANRA*

>SPBIB_v1_140015|ID:27162506| exported protein of unknown function [Uncultured spirochete bib]
MKS YACFRRSAFAALCFILAVAGSLGLLSGCSHPPVSAMLDEAFALVYPDLSARLVREFP
VPSSAAKTA AKATSPYLSYPVQPGKIESLAQSI AQSWPSGSTSSSAHIFVASPAVAHAFP
VKLLDEGSTCVSLFSRAEPALPEIAQLAESPSGRTLAIMWDSEWAYRQIGLIAGYRIGIE

RKNGNTEVNAAILFSSGLGRSEADLDAFVEAFRTAMETAGARDSDNGQALLPFNIDHMNL
PGDKLEQALSALAQIKDKKPSLLVIAAGSRTALEKAQEMKDIELAADLRGLGQGIPTRNL
FAAIGENNSAIIAIRNAAQLIEKKDVMPPHIVKPALQFSKEAARIDAILKRTAGQ*

>SPBIB_v1_140016|ID:27162507| conserved protein of unknown function [Uncultured spirochete bib]
MSTIIFYISKILRPVVASPLFIAIIFSTIALFLLRAKSRLQRVIKALALVLLLVAVISK
PFVATGLARLWEYPRSDLDDCLSKGPYAAIVVLGGSLDPVASKPGAIEGNDSFERLVAAA
ELYRKGAAPIVIASGGTGSLSYADRREAPFMAEFLELMGVRRNAVVEDKSRNTFENAVY
SKAYLEKREGSGNAKPGRILVTSAWHQRRASAIFRKAGIDFYPPYSVDSLVAFMLPSDL
FPDAWALTRSTRILIEMAGFVAYRIMGRL*

>SPBIB_v1_140017|ID:27162508| conserved protein of unknown function [Uncultured spirochete bib]
MRLVTLVENVVYNTQLSAEHGLSLYIEYGGHRILFDTGQGDRFLKNAEVLGIDISLVDAL
VLSHGHDHAGGLETFCRANKNARIYIKAGFFEPKFNKDRKFIGIHYNESLFAGRLLITVK
SRTEIFPGLYIMTDIPITNAWDTHFEDLYVQGEHGLVLDQFNDEQFLVLKENGASVITG
CAHRGISNIVRAAKSAFDLPVRLVLGGFHLSKSSDDMADRLLIQELSTFDIEKLGCCCHTG
VEKYARIKSFFGERAFYNCTGTDYAGTDYKGAEYKSAAPLQ*

>SPBIB_v1_140018|ID:27162509| putative Uncharacterized deoxyribonuclease YcfH [Uncultured spirochete bib]
MSAVFTDSHAHLEIVSQRLGKEVLEEVLAA YGRAFGAGARAE EEP AIVLDVGT EPGDLEM
RRALVRQCASQRSAQFVKFSAGVWPGLEALADPDCAMSLLERDIERGVDAVGECEGLDYH
MAASPQAQKVLFSAQIELALRHRLPLVVHSREAFEDTHSLVAPAASRIPVIIHCFGYGPE
EARAFLESGCFISFAGNMTYPKASRLREALALVPPDRLLLETDAPYMNVPVLRGKASSPL
DIARTYALASELLHIDIEELRKRITKLNLRILGNSQ*

>SPBIB_v1_140019|ID:27162510|clpB| protein disaggregation chaperone [Uncultured spirochete bib]
MNYEQFTLKAQEALRDAAIAQKNDHGSIEPEHLLSALLEQEGGVVSSILERLGADRGR
DRGLQDLLSHLPKAYGEATQVYFSPALQKVVAKAEGESKAMKDEYVASEHLFLAMLSVES
RAASLLKSAGITREGVLSVLKSIRGTQSASDENAEKYQVLEKYTRDLTALARSGKLDPV
IGRDEEIRRMQVLSRRTKNNPVLIGEPGVGKTAIVEGLAQRIISGDVPDSLKDKKLLAL
DLGSLVAGSKFRGEFEERLKAVISEIVKSEGKIILFIDELHTLVGAGAAEGAMDASNLLK
PALARGELRAIGATTLDEYRKHIEKDAALERRFPVFCAPPSVEDTIAILRGLKERYEVH
HGVRRDDALIAAAVLSDRYITSRFLPKAIDL VDEAASRLKMEIESQPTELDQIQRKL
QLRMEADALKKETDPASVERRGKLEKEIADLSEKRDAMNARWQDEKRLIEEIRQLKQRIE
EYKVEVDQLVRDGQLAKASEIKYGKLVDTQRKLEELSKKVQEEKDKPRLREEVSDEDIA
RVVSLWTGIPVSKMLSSEMQKYVELESQAKRVIGQERALRAVADAIRNRAGLSDP
LGSFLFLGPTGVGKTELAKALAEFLFNDERALTRIDMSEYMEKHSVSRLIGAPPGYVGYE
EGGQLTEAVRRRPYSVVLDFEVEKAHPEVFNVLQMLDDGRLTDGQGRVVDVFRNAIIMT
SNIGSEFILEMKSMDEIRSRIDELKTYFKPEFLNRIDEVVVFDRLDET MIRKITDLRLA
ELAQLAARSIALEVHEAAKDYIAKEGFDRQFGARPLKRAIQNLL ENPIAKKLLAGEILE
GDTVTVSLAGRELAISTKRPA*

>SPBIB_v1_140020|ID:27162511| conserved protein of unknown function [Uncultured spirochete bib]
MSQKEKEQELDQLLPAIPEDFRAVIMYGMTKEEALAIMRAVKS V G P S M Q E V A F A M S T E T N
IQWPLGQLVAELSEEHRMMKEYRAAHGKESIVS*

>SPBIB_v1_140021|ID:27162512| protein of unknown function [Uncultured spirochete bib]
MHFHFCPNPACAYHQHAPKERWFVAAGFYVTKTFGKVQRFCQACXX

>SPBIB_v1_150001|ID:27162513|argR| Arginine repressor [Uncultured spirochete bib]
MKERAERLKTIKAIKENRVDSQEKLLQLLEDHGYSVTQATLSRDLKFLKVGKLS DGRSG
YYYSIPSEERRESERHYIQDFLRGYVSIDWNQSLVVVRTFSGHSDSVALAIDNMGFDEV
IGTISGRDNVVFIALKQGIGSDEFIRSLKAKIPDFEET*

>SPBIB_v1_150002|ID:27162514| putative L-lysine 2,3-aminomutase [Uncultured spirochete bib]
MHDVIAQGGPLPFRATRFWFLANEPENCKKNENGVPVDPILAQAIPSPSEALVTSWELR
DPLGESSHTIFEHAVRQYHSRVLVRATGQCFLFCRHC FRRSLLPSERSFMDSKAIKALAA
YLAVHQEVREVLISGGDPLTAPDASLASLFEAVRSVPRPILIRLCTRTPVVL PQR L T S D L
IALLSKMRPLQMVLHINHPKELSQEFMEKAELLRAGIPLHSQTVLLRGINDAASVLIEL
FSALNRAGIHPYYLFGQDLAAGTAHFRVPLSKGLALYENLRKELSGLELPRYAVDAPGGG
GKIYLPEDIAERRADLWILRAPDGS LHEYPEEG*

>SPBIB_v1_150003|ID:27162515|guaA| GMP synthase [glutamine-hydrolyzing] [Uncultured spirochete bib]

MDKIVILDFGSQYTLIGRRIRELGVYSEIVPGERKPDSSALLEGCKGIVLSGSPYSAWQE
GSPAPDLAMLGTGLPILAICYGIQWLTMHAGGVVERCETREYGSMRVRFLPAVQDSGRAA
TLLEGLPDSFLSWMSHGDSIVRPGEEDVVGISESGVPAILAHRARPWFGLQFHPEVSHC
EHGMDILANFVFRICGAERGWSMEAYLEQEARLLRERVGKEPVLLISGGVDSTVAGAF
LKSLLDPDQVYLLYIDTGLMRKAENEEVMHNLSRLGARHLEAVDAEAQFLSALKGVADPET
KRHIIGDMFVKVQQDAVVRGIPDAFLAQGTLYTDLIESGKGVGNKAQVIKSHHNVRSP
IEKKRAEGRVIEPLDRLYKDEVRLGRVLGLPEEIVGRHPFPGLGVRILGDITKEKCD
ILREADSIFIAELRKRGLYDRIWQAFVLLSVRSVGVAGDERAYKYVVALRAIQSEDGMT
AQPFAFEPKDLFEISAAITNRVQQIGRVVYDISSKPPATIEWE*

>SPBIB_v1_150004|ID:27162516|purA| Adenylosuccinate synthetase [Uncultured spirochete bib]
MNVVVIIGAQWGDEGKGIKIVDFLASDAQIVVRFSSGGANAGHTIVLGGEKYALHLVPSGILY
PDKIVILGSGMVIDPEALFQELAGLEQKIDWKGRVFISDRAHIVFPRYRELDKQAEAGR
ARPIGTTGRGIGIAYSLKASRDGIRLADIDDERLVNLPGDDRAWLSIWKERLLPLRIDL
AAYLQRHRNSWRLFEGAQGALLDIDTGTYPFVSSGMSCAAGAAAQGGIGPRHIDRVLGVF
KAYTTRVGNPFPTEFADDSPLSLSQYIRNVGNEYGTTTGRPRRCGYLDLVALRYACTVN
SIDRLVLTHIDVYDGLLEEFACVGYKIGDKVIEDFPASVRDLTGARPVLRKFSGWKTPLG
KCRTYEELPLRAREYIEFIEEFTETSISIISVGS DRKQ TIVRESPWIK*

>SPBIB_v1_150005|ID:27162517| conserved protein of unknown function [Uncultured spirochete bib]
MKHSPSIALVLNAHLPFVRKPQYAQFYEERWLFVISETYLPLLRMFRKLELEGVPPFKLG
MVFSPDLLSMLSDPLLCDRYVAYLDSQIELALKEKRRLGSDAAFAPLADMYEMYRRSRD
EFENLHGRNIIRAFDYYSKKG YIELMTTAATHAFLPLYS DIPEVINAQIETAI IHRSEF
GKNPAGFWLPQLGWYKGLAPRLRAYNINYSIVTTKGALLGSPLPFYGSFSPVMTPAGLAA
FIRDAGATKAVWSETEGYPHPVYRDFYRDIGYDLDTGYLAPHLSGVERGYTGFKYWAVT
GKTDLKRPYEAASAQAVAHAEYLSSRKVQARAASFWMKDKPPIIVCPYDAELFGHWW
FEGIQFLEAFFRAASRRDEEAI RLVTLSEYLAENSELPESEPEFSSWAEGGYAEVWLDGR
NDWVHRHTRKAAERMRELTVRFPNETGLRERILNQAAREVLLSMSSDWALLRSGKAADF
ASRQIRESIYNFNHIYEMLSAHTVETEWITSLEKRHNIFPHMNYRVFSPKQ*

>SPBIB_v1_150006|ID:27162518| conserved protein of unknown function [Uncultured spirochete bib]
VPVRILTSGALLSHYSAVDPEKLSLLSDDELRLLAEKMGYVPDELERVFLIEEIIIDAFE
EDTSEKVFSDHTPGHVEEKLAGHGFIPSQSEEIVIPDHYNETYISAIVRDPLWIFAYWD
IAASLREKILAEFEKPLLRVSEIADSEKAFHYDVSVSFDDRKYINVPYPKRSYRIDL
CIAKTQKAKVIARSNVVRMPAQYMDMPSKLPQMTKSLILSGSEDLNLIEPREENSLRIL
NMDGE*

>SPBIB_v1_150007|ID:27162519|fhs| Formate--tetrahydrofolate ligase [Uncultured spirochete bib]
MSVQRINPVPQDVDAIQSANIQPISEIAARYSLDEKYLEHYGVDKAKIHLEFLADPPKQA
KRAKYIDVTAITPTPLGEGKTTTTIGLAQGLGYIGKKSIA TIRQPSMGPTFGIKGGAAGG
GYSQIVPMTDFNLHLTGDIHAVSAAHNLC AALDARMYHESRWADSYFEKLGKLNIDP
YAVLWRRVVDMMNDRTLRSIIIGMGLENGPLRETGFDISVASEVMAVLALATSLDDLKR
LGRIVVALDKSGNAITTEDIGVAGAMTILMKDALKPNALQTLEEQLAFVHAGPFANIAHG
NSSIVADLIASQIADYVVTESGFGSDMGFEKFM DIKCRASGLMPDAVVLVATVRALKMHG
GGPKVTPGKPLASSYTQENLELLQKGLCNLQEHIRIIRTYGLPVVVSINAFPTDTEA EHA
LIKDAALKAGAFDAVISKSWALGGEGAADLAMA VDKAASMPHEPKLLYPLDMSLKDKIEI
IARQIYGAGSIVYTPEANA ALEKYTALGYGNFPICMAKTQYSLSHDPALKGAPKGFEPV
REVRLSAGAGFIVPITGEITTMPGLPSKPAYIGMDIDTATGRITGLS*

>SPBIB_v1_150008|ID:27162520|appC| Oligopeptide transport system permease protein AppC [Uncultured spirochete bib]

MIARRSQKIVFSLAVLYLLMLVAAAIAAPLLSPYSPSEQYLDRRFHAPSLDNLLGTDNLG
RDILTRLLYGARSALIVGLVAVSIAFSLGGLVGLLAGMGPKHIDSVLMLLMDSLLSFPTI
LLAITVVSFMGYGLVQVMVALGVISSPVFARLVRAETLSVKTEGYVEAARALGTPPAKIV
VKHIIPNIMGKVIVQCSLTFAQAVVIESSLSYLGVTQPPAASWGLMLKDARNYLAQAPW
MAMYPLCLALTVLA FNIIIGDSLSEFNPRLG*

>SPBIB_v1_150009|ID:27162521| Dipeptide-binding ABC transporter, periplasmic substrate-binding component [Uncultured spirochete bib]

MKKVPRIASLCLFAFSAASLVVAQTKGTLVFGLSGNPDTLDPQKTAGTLTFQVVKSFYD

TLVEPNTDGTIVPALAESWTVSPDGLIWTFLKRRNVVFHNGQPFTSKDVSRASLERIKDEA
TASPKRSEFAAIKEIRTPDAATVVIVLSQPYAPLLASLASGWGAILPSGLIASGHNFGAE
PVG TGPFKFEKWIRDNKITMVRNDTYWMKGLPKLAKVEFQIIPERAVQVQGLSAGVIDAV
EFIDPEDLPLFSSNPKVSIIKELTSLIMVMAMNCSREPLNDRVRQAVNYAIDKQVVDV
AYGGGKVGSTFLDTGNAYYTDFSYLYPYNPKARQLLKAAGVDTREFTITVPQNYPLHVK
AAELIQQMLEKVG MHV KLQLVDWSTWLSVYNGGNYDFTVIGHTGKLDPDGTLAGYGTGK
YVKWINATAAQKIKEAAISDFAARKKLYTEVLEIMAKEVPFVYLGTSYRYVGT RSNVVD
FRMTPNLDTFDFRWTELK*

>SPBIB_v1_150010|ID:27162522| D-ala-D-ala transporter subunit ; ATP-binding component of ABC superfamily
(fragment) [Uncultured spirochete bib]

MQCRNIVKIHRGRGVEGERHGFRAVDNVSIEIERGRIFGLVGESGCGKTTLARAILYLDP
PTSGSVLFDGVELGSLKPPMLRKYRKRMQIIFQDPHSALDPRMTVYDSLSEGLINIGVDK
ARRDKKIRELLDRVGISSTYSRRFPHEFSTGQRQRIVARALTMDPEFLILDEPVS NLDV
SIQAQIINLLMDLKKDLNLT YLFISHDLNLSYMCDDVAVVMFGGRIVEQAPTEALLAHPG
HPYTRLLASIPGGAGR*

>SPBIB_v1_150011|ID:27162523|dppD| dipeptide transporter ; ATP-binding component of ABC superfamily
[Uncultured spirochete bib]

MDESAPLLKIENLNVRFSHRGKSVHALRGIDISFYKDEIHGLVGESGSGKTVTATSIMGL
LPRPSAEIISGSVFYKGNLLMPEDELRTYRGRAISMVFQEPAYLNPAFKIGGQIEEM
VMLHMGLSKVA AKARARELLKLVGLGRDGRVLDAYPHELSSGMKQRAMIAIAISCNPDFL
IADEPTTALDVTLQKQILKIRTLKNIENMGVLFISHDLGVIREIADRISVIYAGKIVES
AGKESL FNKPMHPYTRLLMLSIPDARHRGRKLATIPGQVLDATSTPEGCLFAPRCPLAEQ
RCFSLTPELVEHEKGHLAACHFAGKSWNL*

>SPBIB_v1_150012|ID:27162524|gsiC| Glutathione ABC transporter, permease protein GsiC [Uncultured spirochete
bib]

MDLARFI AKRLLRLVLT VLLISTIVFFVIRVIPGDPALLIAGIDATPSDIAAIRAKLGTD
RPLSAQYFDLW KVAHLDFGNSMISEEPVTALILQRFPLTLALAVLGMVIGTVIAPIGI
LSAVKPWSAWDYVGLVMSQLGMAIPSWLGFLLVFAVKIPIFPLFGAETLASLVLP AF
SLGFARAAILLRHTRASMSEELSKEYIAAKAKGLTDRMIKYKHALKNALLPIITVAGIE
FGYMLGGAIIEQVFSLPGLGRLFLYAIYQRDFPLIQGGVVFIAIVFSLVNFAADVLYSV
VNP KIRLE*

>SPBIB_v1_150013|ID:27162525|pcnB| Poly(A) polymerase [Uncultured spirochete bib]
VRIRYFRNTKGG LQAKARVYDNTEHNIDPSLVDRDASAIVKRLVSHGFTA YIVGGAVRDL
LLGKRPKDFDIVTDALPNRIRKIFSNSRIIGRRFKLVHIYANHKIFEVSTFRSLSTGTIG
NEYGTIDEDVQRRDFTINALYDPLTFELDLFGLEDLRANRLKAIIPLEKIFREDPVR
MIRGVKYAAVNNFSFSFALRFAIHRDAALLKEVSSRLAEFYKIIASGKS AIIIQWLD R
YKLLQYFLPEVSNLRRSKDFKDTFFQHLES LDALARTPEDASLLNNASAAEIVQTDRRL
ISPFVAWFVRQRLRDFARREDVPKEPPAFRQA AFADIREFLAPLNLPRVALEEAMEWVLQ
EDSLMPAPPVPKRRKRSPRRKKSQR AEAHIEISDANLQ*

>SPBIB_v1_150014|ID:27162526| conserved protein of unknown function [Uncultured spirochete bib]

MKKFQASDGKELAYLRYDPKEKPKAVVLIGHGMNDHKERFIPLAEALTPIGISCWIPDLR
GHGDTDPDVNKGYLADSDGFERVVQDLVELGDYASKEMGGLPLFYFGHSFGALVGMALIA
VNGKYFDGAILSAPPAQPNPFLDKIGGLIVSIGAAIRGLHAPAKLANQMTFGDYAKTPN
ARTRFDWLTRDASIVDAYIADPKCNFICTYGFYRDLIHGLRKVY GEGFLESIPPTLPLFL
FCGSADPVIGMQAGCEKLAQQFRSLGIIDFETKCYEGGRHESINEINRMEVLNDIADWFS
RHIR*

>SPBIB_v1_150015|ID:27162527| protein of unknown function [Uncultured spirochete bib]

VHIDAYRLADEEEFFQTGGEELLGAPGTL SLIEWSERIAHILPPESQIITITVEENGARL
IMLEGDWIEALRWGHFTIPACKETSL*

>SPBIB_v1_150016|ID:27162528| putative tRNA threonylcarbamoyladenosine biosynthesis protein Tsab [Uncultured
spirochete bib]

MTIL AIDTSTPILKIGVYKGLIQATIVQPPLTHAEQIIPAIEETFRKAGIAPANAGLIA
VAGGPGSFTGLRIGIATAKGLSLALGIPLVLVPTLDIYGF AWREMGGIVVPVIDARKHRI
YCARYSHGQNMGELMDIEPDQLLPKIDAE EEVHFIGPDADLLESICLERPGWIIHEPDAE

KEVAIAELGLRIFEEKGPADDAARPIYLREPEIGIPLAR*

>SPBIB_v1_150017|ID:27162529| conserved protein of unknown function [Uncultured spirochete bib]
MAVEIRKVESGKDLRQFIDFPVRLYWDEPNYVPAPRLDEMRTLKDKNPAFEFCEAEYWT
AWKDSKMAGRIAGIINHRYIEKWGNKYARFGWIDFIDPEVSKSLETTVERWAASKGMKA
VHGPLGFTDLDRGMLVEGFDQMATLATIYNYPYPKHLEALGYRKDIDWLQYQIFTPKE
IPEKVQRVTELLAKRSGVHL YEWTDKR VIVQKFGKELFKLIDETYSGLYGTTP LTERQVE
TYIKQYLG FVEPRFTKILVDEEEHLIGFGISMP SLSEAFYKSRGRLFPFGWYYILNALKH
PKVLDL YLVSVKPEYQARGVLAII MNAFQRSAL EAGVEYAETNLELEDNVKVQSIWKDYP
KRQHKNRAYIKEL*

>SPBIB_v1_150018|ID:27162530| conserved protein of unknown function [Uncultured spirochete bib]
MAEWHEIKYQEIFEGTLTGLKRRREVDPVFSIEDAERQLSHLYILDGNDWLGRGELGDIV
SQATIAAYELFIQEWKVEIGGEHGG*

>SPBIB_v1_150019|ID:27162531| Cystathionine beta-lyase [Uncultured spirochete bib]
MLHKSATIRQTDIALNPIDVSYIPHHMNEDALSEHAVSPPIFQTSNFCFSSFV ELKAALE
DEVGSCLYTRGNNTVNLVESKIAALEHGEKAKLLGAGVAAISNAVMAFVRQGDHIIICVA
DSYGWMQRLLTYLERFGVSHTIVDGTRTEDIERAIRPETRIIYLESPTSLTFFIQDIPAI
TAIAKAHGIRTIMDNSWATPIFCNPIDFGVDLVVHLSKYLGGNSDIIGGVIVGKAEDID
HIVWQESLQMGAVADPFMAWLVMRGMRTLHIRMPVHYRSALAVAQFLENHPRVASVNYPM
LASHPQHELAQKLFRRGSGLFSFRLKTHSVEDVARFVDSLFLKRAVSWGGYESLVFPEA
AHYAGSVPADRLNLIRLHIGLEDASLLVQDLAQALEGV*

>SPBIB_v1_150020|ID:27162532| conserved protein of unknown function [Uncultured spirochete bib]
MDRLETLRILSQAADWDAAAPSTRIEQSSCAPLDSAHTKAPSCPASEASRAGSSSPDSA
VREDAAYGICRVKRLGGGSVPILKVLLSNACSYNCAYCVNRRSSNVRRASFQDELARTV
SDFDARGRIHGAFISSGVLGTPDETMEQLIWTARSLRERYGYQGYLHLKVIPGASPD LVR
LAMRYATRVSVNIELPSEESLVRIAPDKSPDAILSPMSLIAEHMRELQLNKADKPADDSL
STIAASPLTAGQTTQMIVGASPEPDSTILALARHLYQSFNVRRVYYSAFRPEGTDPSLPH
PAAPPYTREFRLYQADMLFRWYGFEPDELFEQSEYLDLDPKAAWALRHPGLFPVELMT
ADFLQLVRVPGIGPTAARRILEARKKGGDLDFQHLQKMRIRLRNAAWFITLRGKTPFMEAG
FDAFLPDDPGFGVFAPGFAVSRALDHPEILREIHKDKKPPVPPTQQELDFLS*

>SPBIB_v1_150021|ID:27162533|lipA| Lipoyl synthase [Uncultured spirochete bib]
MTIPKPSWLKVQLPHGREWRHVEEVLASKGLHTVCDEARCPNKGECWGAGTATFMIMGDT
CTRGRFCVAVKTAHQGQPLDPAEPLHLAEAVKALGLKYAVITSVDRDDLDRGA AHFAAC
IRAIRELSPGTLVEVLIPDYVGTELSTVLDKPDVLAHNVETVRRQLQSVDRRRASFDKSL
QTLREAYAAGIPTKSSLLLGLGETEDEVLDA LRELSTGVSIVVMGQYLRPTPQEIPVTE
YITPTRFAEYAEKARALGFASVISAPFARTSYHAREAWGAVDKSARKTGSGPRRGHEAET
EGNTQGGSKS*

>SPBIB_v1_150022|ID:27162534| conserved protein of unknown function [Uncultured spirochete bib]
MKLDLIGKPGGCKLLRMTLEVEPLSPASRLQRISIRGDFFAVP EEAFFEEVEHELEGTAL
DELGARFDALVLEKGIQCAGIGGAGLAELVQNLLVQKEQQHGT*

>SPBIB_v1_150023|ID:27162535| Biotin/lipoate A/B protein ligase [Uncultured spirochete bib]
MAHEFRLLLETGFHTAAFNMGLDEALLGSVAEGKSLPTLRFYGWKPPAVSIGYFQGLHEEV
DVDACRAAGVDVRRITGGGAVFHHYEVTYSIVVPLSHQLARPNILDSYRLLGGIIDGL
ALLGIEAEFAPINDIVTGGKKISGNAQTRKRGCILQHGTILLDVEVDLMFSLKVPQEKA
RGKLIEDVKERVTSVQHFFKNRGQTPIFKFLYEETVAALKQGFASALDLSLVGSSPDEAE
LAEAQR LADEKFA SRHWTELR*

>SPBIB_v1_150024|ID:27162536| putative Histidine kinase [Uncultured spirochete bib]
VLTALFQNTILISISVLYHFISRSLKGPWAVSVLNGVLLGVTAILTMLTPFEIEKGLF
YDARSVVIGIAGFFGGPLTAAIAATIALAYRIPRGGAGVIPGSLIVFPAILSI IAWQAR
QRYPANPQGRKPHMVLETWFLGLIIHASV VLAQLALPGGRWHQIPLMLFPFLVVFPLVF
SLICLLFFDNERITKAALDLAESEARYRSLFENHHTVMLIIPSTGRIVDANPA AVEFYG
WDRATLISMRIQDINTLSPEEVEAEMARARMRDNVYFYFKHRRANADPVDVEVFSGPITI
KGT ELLYSIVHDNSLRIRAERELQALTQSLEQQVLDRTVLLEAQSRRQLQELNKEYEAFAY
SVSHDLRAPLRAIAGFSAILGESLQAQGILKPAPDQKSAGSEANTIEAPDFGHLLDRIQS
NVS RMQQLIDDM LMLSRAGTRKMNPQPIDFTQMAREILGELTEQQKGRHFECTVQDGMTA

IADPDLARILLVNLISNAIKFTKDRDIAHIEVGIEQNSDVPRFFVRDNGVGFDDVAAAGDR
LFAPFQRFHSEASFEGTGIGLSIVKRVVARHNGRVS AESVPGQGATFYDFDFGEVKQT*

>SPBIB_v1_150025|ID:27162537| Response regulator with CheY-like receiver domain and winged-helix DNA-binding domain [Uncultured spirochete bib]

MTATTSHESILIVEDNPDDAELVVIALRQKGINLPYLIARDGEEALDIAFRRKPLPDQKP
IEPGLILLDLKLPKNGIEVLKELRSSQRTRYVPVVVLTSMLEEDMIQSYENGANSFVR
KPVDFATFQHYIELICHYWLHTNLHPALAISQRPTS*

>SPBIB_v1_150026|ID:27162538| protein of unknown function [Uncultured spirochete bib]

MTIVPQETDLNILIVEDNRDDVDLLMYRLRKSFKSVSYTHVSTLEQYLEAVRHLANGKLD
RTSYNIIISDWA VPGYDGFVALQALQDVDETIPIVVS GTIGEPTAVALIKAGAYDFVLK
DQSAHLPYVITKALEWADQRRIEQEQRRIEMQTKALSCSPIAMAILDNEGTFEWINPAY
EVL TGWTLAELKGGHLLWEFTALASQSDCSQVFEELHKEAHQCEGMETRKDGSRYHELRLQ
LAKLLDTNTTSQR YLLIRQDITFLKEYRTRLEIDAELPQILANCQTLHALYQQAAYIRR
TFDIERAGFIRLDEQGTSVPPWYGDDMSQSLSLGIIQGTRFPVIVSGTTKALCVVEWKPS
FMEGSALLLSYALEKMEQPLARLEAQENAREWMKRLSLLDVFREYFGSGRNFGAAISKVI
RLIRETLRADSITLYISNNDGTAFACRNYDGFRTDLIKGAIQAGQKNVGLAVKELRIVAA
DDLAQDSSYVPQFRELIAREHFVSQYCVPVILFNEVQAVLELFFRHPFKPDETWLFAQA
AA YQTGLALEFQSVIEELDGAYQELQSANESIEGLSSALEFRDEETEGHTLRVTALFMS
FASRFIQDENELKKLRIGSLLHDIGKIGIPDAILNKPSPLTPEERA VMQKHPLISKEILS
RIPSLGDCVDIPLYHHEKYDGTGYPYGLKGEEIPLAARIFAVIDVYEALTS DRPYRKAWS
KEKAIEYIRDNAGTHFDPEIALRFMELNL*

>SPBIB_v1_150027|ID:27162539| Transcriptional regulatory protein [Uncultured spirochete bib]

MTVRGIAEKAGVSIGTVDRVLHGRGRVSPETKERILSIVRESGYTPNPIARHLKLNKHT
FAIVMPDLDEDSGYWRIA YSGVQKAQKELAAFGVNIKRFEFNRYNRSSFAKAMAAFD PGL
FSGLLIAPVPEESLLLLRRMPTDFPVVFFDAQIPSFTPLTRIGQNAFQSGMLAGRLLEA
FSKRKGPYIIVSTHSEDIHQKRIEGFQAYFALAPHTIVLRECFDIEHKEKREFFVRQLL
SEFPSIDGIFVTNASVHGIAARINSRAESPHVAIVGYDLVPENVRQLQAGTIDCIVSQRQ
DHQGYQGLYQLYRKVVLGQDVEAEIEMPIDIYLKENLLQQALPEPQKIIS SPAPAIAPSA
RLQGI*

>SPBIB_v1_150028|ID:27162540| Periplasmic binding protein/LacI transcriptional regulator [Uncultured spirochete bib]

MKKLLL VVLVLSLLVPIAVFGQGAKKPVFVMVPKGVHPYYP EPCYEGFKAAA AKYGVTVQK
VDPQKFELPLQVKVIEDLIAQRVDGIAISALDDAGLVPVIADAIKAGIKVITFDAPAPSS
AALTYIGTDNETAGYEAGKKMADLMNKEGEIII LQGGLGAANLNLRTKGFKRALAEVAPK
IKVLDVVDVQGDFAVATNKTEAILQTYPNLKAIFAVSAEGAPAAANVLRQQK KSGKIILA
GFDDLKDTLEGIKDGTVSFCLVQKTYKMGWLSVEKLLDAMAGKQIPKVIDTGVLVFTKSN
VNTYMDMKKEFNP*

>SPBIB_v1_150029|ID:27162541|rbsC| D-ribose transporter subunit ; membrane component of ABC superfamily [Uncultured spirochete bib]

MVAQEKK SILATLFSYRESAIFLALIILMATVTIFAPNFMSGSNLYLVSRQISFVA VVAF
GELFVILTGGIDLSVGSVMGLSGVVAAGAMAGGQSIILSVLLGLATGIALGLINGLLISY
VRIAPFIATLGMLSFARGVILIVTKGW PITNIPKPF LIVGQGD FLSLPIPLWVMIVLAAV
AHFLLSRTAFGRRTYAIGGNEQATFLSGINVKKIKVFLY MISGF MASVVGII LIARFNSA
QADTGTGWELDAIAAAVIGGTSLSGGSGSIFGVII GAAIMGVIRNGLVLMRVSPYWQTAV
IGIII VLA AVLDR IKNK*

>SPBIB_v1_150030|ID:27162542|rbsA| fused D-ribose transporter subunits of ABC superfamily: ATP-binding components [Uncultured spirochete bib]

MSEPLLALKHISKSFPGVKALDDIDFSVQKGEVVGLLGENGAGKSTLMKIISGVYTPDSG
DIFWQDKKIKLKSIMDAQEKGIAIFQELNNCPNLSALENLF LGHEIRTSANFVDFRAMK
KKAKEIFS YLDVQIPLERPVGKLSVALQQMIEIGKALLADAKLIIMDEPTSSLTDKEVQK
LFQIVKELKERGIAVIFISHKLEEVFIITDRIVVLRD GKHV GELK TSAATQDELVALMVG
REMHSFFSKRTKEASDETILKIENFSGPPYIRGVSFYLRKGEILGLAGLIGAGRTELALL
MIGAEQKTSGNMVLHGKEIDVRSPWQAIQHGIAYLSEDRKMKSLVLQMPVRANITMAIHS
AVTGALGMLDRKKELEITNSFIRLLDIKTS GPEQTVNNLSGGNQKQVVLAKWLATKPSIL

ILDEPTRGIDVHAKAEVHKIITDLADKGTSIILISSELPEIVALSDRVVVMHEGQVKSVL
EKKDISQENIMSTVFS*

>SPBIB_v1_150031|ID:27162543|araB| L-ribulokinase [Uncultured spirochete bib]
MEAVHNPQYVIGIDYGTDSGRAVITDASNGHEMASAVAPYPRWSKGLYCDPAKNQFRQHP
LDYIESLETVMQKLAQTGTELLPHVKAMAIDTTGSTPCLVTEHIEPLAMLPEYSDNPDA
MFVLWKDHTATDEAFQINELARKWKVDFTMYEGGVYSSEWFWAKLLHIAKAAPDVIRAGF
SAIEHCDWMPALLTGTRSLSQVKRSRCAMGHKAMWHESFGGYPGDEFGLALHPPELVRIKK
TLGTETFTSDTVFGALTGEWALRLHLSAGIPVAVGAYDAHMGAVGGGVEEGVLVKVMGTS
TCDMIVGPKPAEENRAGKPSSEEHAGGARAGGGGRATGDHVGEAQTEGGRAAAGESEHLVK
GICGQVDGSIVPGMLGYEAGQSAFGDVYAWFKNLLMWPLRELGTVEVDQGTVEVDAQAARAF
IEELDSRIMLMLEKAASQINPGESGVLALDWLNGRRTPDANQKLKGALTGLTLGTTAPMI
YRALIEATAFGTRAIVERFELEGVQIRKIRAIGGVARKSPLVMQIVADVLRPIEIVASD
QSVALGAAMFAAVVARIYTSVPHAQAAMKPNIEAVVTPNAANTAIYDGLYRQYLKLGFSI
EKELT*

>SPBIB_v1_150032|ID:27162544|araA| L-arabinose isomerase [Uncultured spirochete bib]
MKAFDSYAFWFVVGSTLYGPKVLEQVNAHALRIAFLNQNAAIPATVVPVAVVTSPEEIT
SLFRKANADPSCAGIITWMHTFSPSKMWIQGLSENAPLLHLHTQFNRDIPWDSIDMDFM
NLNQSAHGDREHGFIHTRLKTLRKVVVGYWQDELVLNRIAAMRAAVAFADGKTAKVARL
GDNMREVAVTEGNKVSQAQIQFGWQVNGYGIGEIARRYAEASPRDIDAVLEQYQSRYVILD
SVRHDSQFKQVREQAAIEVALRQFLADTRAGAFITTFEDLAGLPQLPGLAVQNMADGY
GFGAEGDWKTAALVRAMKTMARGLEGGTSFMEDYTYHLEPGNELVLGAHMLEVCPTIAAV
KPQIEVHPLSIGGKDDPARLVFEAKPGMAVAATIIDKGDSEFRILNEVEAVALPRAMPKL
PVARALWKPLPNFKSALELWILAGGAHHTSFSYVVTSEMLEDYARMAGIEVVVIGKETS
V
PLLRKELEKDFLR*

>SPBIB_v1_150033|ID:27162545|araD| L-ribulose-5-phosphate 4-epimerase [Uncultured spirochete bib]
MLESLRKEVLQANLELSDRGLALFTWGNASAIADRARGLIVIKPSGVPYERMTAGDMVIVD
LDGKVVVEGTLKPSDDLPHLVLKYAFSSAMGIVHHTSTYATAWAQAGQDLPAEGTTHADH
FYGSVPCTRLTDEEILGDYELETGKVIVETFKSRAIDPSSVPAALVHSHGPFVWGTSAL
EAVHNAAVLEEVAKIAILSRMIAPPSPMQASLLARHFERKHGKNAYYGQK*

>SPBIB_v1_150034|ID:27162546| protein of unknown function [Uncultured spirochete bib]
MNIKIILNGGLKTCKSYSKEYIHEAVKSWLTDKDVLEVVDVREQAYKLDELAAYAKQFF
QENTFPVYIDRLIAIGQIPDKNSLFEVS AKLDEYQITREAIYKAAKEYELVPAEQEAE
EV*

>SPBIB_v1_150035|ID:27162547| Extracellular solute-binding protein [Uncultured spirochete bib]
MKRVLLAAMIALVALSAFAQQKVTLTIESWRNDDIQWQDQIIPAFEKKYPNIHVVFAPT
PPAEYNGVLNSKLEGGTAGDLITARPFASLALYNKGYLADLTNLPGMNNFSNVAKSAWI
TDDGKHVFAVPMASVIHGFFYNKDIFKKNLKVQTKAEFMQVLEAIKKDGRYIPLAMGT
ADMWEAATMGFQNIQPNWKGEEGRLLALLAGKQKYTDEPYIKTWKELASWAPYLPKGYQA
VKYPDAQQLFTLGKAAIYPTGSWEIWLFEKDAAFELGIFPPPVEKKGDTVYISDHTDIAL
AMNAKTKYPEEAKKFLWMTTAEFASLYSNALPGFFTLNHNKITLKDPLANEFLSWRATC
KSTIRNSYQILSRGDQYGAPNLENELWQVSAAVINGTMTPEEAGKRVQAGLDKWYKPKK*

>SPBIB_v1_150036|ID:27162548| Sugar ABC transporter, permease protein [Uncultured spirochete bib]
VLDIRGSRKFPFLVFLGPAACIYTLFMIYPLAESLILSFFSVQPDNSYVFSGFANFVK
LFTSDTAPRFWGALKNNVLFIIHMLVQNPIGLLLASLLVTKGKARGFYRTVLFMPTVL
SVVIIGFIWQLILNPLWGVAESMMRAVGLGKLFQPWLGLPQYALPAVALISVWQFIGIPM
ILFYTALIGIPDELIEAAVVDGCTETQAFWRIKFPILPTIGIVSILTFVGNFNADFLLIY
TMKGAFAGPAYSTDIMGTLFYRTFFGQQLQGNPTMGATVATMMFLIILTGVLIYMFLFQ
RRVKTYQL*

>SPBIB_v1_150037|ID:27162549| Carbohydrate ABC transporter membrane protein 2, CUT1 family [Uncultured
spirochete bib]
MMKRRASRSRDLARQRFRLQLQHILVFFSLIALFPILLILMNSFKLKKYIFAAPFALP
NAKTFSLIGYDTVLQRSNLIVNFGNSIIVTVASLFLILLFGSMAAFALSGYKFRGNAFLG
FYLSIGIMIPIRLGTVSLLKLMASLGLVNTLTGLLIIYIAQGLPLTIFILTSFMSQIPDE
LKDAGRIGDASEYRIYALVLPLVRPALGAIGIFTMIPIWNDLWFPLIVAPSAKTATITLG

VQQFLGQYVSDWNAVLSALVLAMVPVLLLVLVFSRQMIRSVTAGAIAKT*

>SPBIB_v1_150038|ID:27162550| putative dehydrogenase [Uncultured spirochete bib]
MKIGIIGTGFMGSTHAGAWKKTGAKIAGFLADPPSEAEQIAREYGAHVFSLSLEELIESVD
VVDICSPHTLHSDMAIAAARAGRHIKCEKPLARTVEQGEAILDACRIAGVRLVFAHVVRVY
FPEYALAAARVHAGDIGKVGTAQYRRLSYRPPKPVGNWFLDEEKSGGILLDLMIHDFDIA
RWIAGDVVSVYAKKVSSFRKESPADYGMVILTHASGALSHVAGAWAYPPPVFRTGFEVCG
DAGVIQHDSSESPIEALLKQEKSEAPDVGLPASPLAESPYDLEIADFYRCLIEGGEPV
SAADGLAALKIACAAIESAKTGQVIALDSRREARQAELELTGELATSKGGQR*

>SPBIB_v1_150039|ID:27162551| Oxidoreductase domain-containing protein [Uncultured spirochete bib]
MKIGIMSAAHVHADAYIGCLRSIPEVDIVGIADHDNERGALFAQQYGLHYFASYEALLGQ
KLDGVIITSENAFHIELAKKAAQTGVHILCEKPLATNVRDAKEIVDAAKKASVILMTAFP
MRFVSPVVRTVKEELVSGKLGALLCFNASNQGQLPPRDRAWFTDPVLAGGGAIADHVVHLA
DIMRWYVGTEVVEVYAAANRIFHADEVQVETGGMVSMQFENGIFATIDCSWSRPDSWPSW
GGLSFDLITDKGAVRVDAFRQNLTIYPAPKASASSANAKTAPADTTGVASGAGADHDWTT
AHSHGDRGFGPRWLYWGS DANQAMIEEFISAIQEGRQPAVTGEDGLAAVRIIEAAYKSIQ
EGKAIMV*

>SPBIB_v1_150040|ID:27162552| conserved protein of unknown function [Uncultured spirochete bib]
MHFNLYKSGTA AVDLDDSRIIDVVLKPKRPLADALESVRRVLAKPEGTPPLAEMLAAR
KPKKLIVVNDITRPTPYSVLMPLLEVIQKAGIPDSHVTLVTATGIHDPHTPEQNILVY
GEEICRRFRVISHNATDPAGLVYKGLPSGYDFWLNKL VDEADFLITIGVVMPHYFAGFS
GGRKSILPGVAGKETVQKNHARMVELMDNLPPIRENPVSLEMIHAARLAGVDFILNVVVD
DNEQVVEVVAGDFEKAWYKAVDVSESMYMIPIKEQADITVSAASGFPRDINLYQSQKALD
HADRATKKGTTILVAECREGYGEKVFEFEMNRGWTPQHIMAEIKAHFVMGGHKAYGFAK
VAAEKNIIMVSSLPEKIVASCFARKAGSVQEA VEMALKEQGTEARFIIMPEGSVTPVIA
AKDG*

>SPBIB_v1_150041|ID:27162553| conserved membrane protein of unknown function [Uncultured spirochete bib]
MTYEVLMSQLTSIFTVQNLLYMIIAIVLGIMAGALPGFTATMAVALMIPFTFTMSPVSGL
ITIGALYCATIFGGSFSAILLNTPGTPSSIGTTFDGYPMAKKGRGMEAIYTATIGSGVGG
ILGTFLILFAVPLAKAALKFGPPEFFWVAIFGLTISSISEGSLKGITAGVLGILVSM
IGNAPVGGDMRFDGLVSLQGGVEIVSVLIGFFCIPEIFRMAMNPSSKYTDENVVSLEKG
SLKRAFHHVFGHPLATLRASIIGLFVGILPGAGGNIANLIAYNEAKRASKHPETFGTGEP
QGVVATETSNNAVVEGAMVPLLALGIPGSPPAAIHYGALLQGLSPGPQLFVRNASLVYA
FMLSFFVANILMVIIGFFAGKGMVKTVIKVPVRVLIPSILFLTILGSYAIRNNAMDVIIM
FLSGIIGYILKDLGFNTGAFVLGLLGPPIAERGFVQGFMLGMNMSVKMPWIIFFTRPLSI
VLIVLSIISGAWPIFRAAMKKRDRSAIAEALAFSTSGSGTDVDGSQKKTINSYIGAAI
VFGISALFYLQIGKWSKYAIMAPRSILILLIALGVALLVKGRIPKPEKVIPSFAINRSLV
FLVVVGLLWVFLMEKVGFVVTSM AAYTAILIAYYPGKGARRVIESLLIAGVIVFGMYLLF
EKLLNVTLPLGILI*

>SPBIB_v1_150042|ID:27162554| conserved exported protein of unknown function [Uncultured spirochete bib]
MKMVKRVAMVLI AVLVLGSAFAQFPQKPLSYVIPFNPGGESDIFARAQQPLLEKILGQK
VVVSYKIGGGGAVGWAELVRTKPDGYTFMGYNLPHIILQPLSLANAGYKTNEIVPVYTFM
STPNILAVSANSFPKTLDDFVKFAKANPGAVTVGGSASASANEIGTVLNFNKLGIKTTYI
PFTGSGDAIPALLGGHVSALMTYTTMGNQYEGQIRVLAVASEKRVSSLPNVPTFRELGYD
LVEGAYRSAAVPNTPEGVKKVLADAFDKINKDPEFAKKMEANGFKLEFYGPKESEKLVE
EKIKVYTPLVSELGK*

>SPBIB_v1_150043|ID:27162555|leuD| 3-isopropylmalate dehydratase small subunit 1 [Uncultured spirochete bib]
MKITSSLVYKFGNNDTDQIYPGRYLELTDHEEIGRHAMEGADPTFPSRFKKGIIVAGT
NFGCGSSREHAVITLKNIGVA AVLAKSFARIFYRNCINLALPAIMPELDSFGLEEGQSI
DLDLARGVLT SNGVSHHFVPLPEDILELIDRGGVFALYKS*

>SPBIB_v1_150044|ID:27162556| protein of unknown function [Uncultured spirochete bib]
MRVSLYFDKFERGSVIVPLKADAAVAGETT*

>SPBIB_v1_150045|ID:27162557|leuC| 3-isopropylmalate dehydratase large subunit 1 [Uncultured spirochete bib]
MHAIEKILALASGKSQVSAGEIVTAEIDVAEVNDLYLQVVKSFYELGGTEVKFPDRTTFV
FDHYSAPTIKAADNHRQMREFCKKMGIKALFDIGKGVCHQVLIESGFVSPGSLVVETDS

HTTTLGALGAFGTGVGATDMALILRNGSLWFRVPEVMKIVLDGELKPGVMAKDLILHVIG
 KLKQDCAIYKCVFEFAGSAVDAMSIDERLVLCNMSVEMGAKAAAYIQPDEKTYAYLARYGIQ
 HAKREVFTDPDYRYSAEYHYDVGTIEPSTALPGSVDNLALVREQEGIHIDQIFIGTCTGG
 RLNDIETAARILRGKKVAQGTRLVVIPASEVVFVKQALAKGYVQTLVEAGAVFSTPGCGPC
 LGAHEGVLASGETCLTSSRNFPGRMGSTEAKIYVVPATAAASALSGETITDPRSNLSK*
 >SPBIB_v1_150046|ID:27162558| Sigma54 specific transcriptional regulator, Fis family [Uncultured spirochete bib]
 MAIVFIAPDGHIERVEKLSGASREKIIVAQGLLEN AISVARKYQEEAEVFISRGGTVLV
 LRQADLNIPVEMQVTARDLAVALKKAELVKKEKFRIGVVSFPNMIQQLKDFLPFFSLD
 ITCYELSIGEDVEKKLKLAMNDGMDVLLGGVTTYAFAKRNGLPVVLVESGETSVKYALEE
 AKRIVAAQRLKERRAEELRIITESISEAIIAIDEKGAISRMNNAARQLLSKSQYSFRDHG
 TRGSSSSPRMGTEDASLPAALRNVIHEKKESRKIIELGNKRLLVNVIPVTVKGA VASSVA
 TLQDVSHIQAMEEEIRREMYFKGYTAKFHFDIVAHDPITQKTIDLAKRFASTNAAILIH
 GESGVGKEVFAQSIHSASMRSSRPVAMNCAAIPESLIESELFYVDGAFTGARKKKGKPG
 LFELAHGGTIFLDEISEMPFHLQARLLRVLQEHQVMRLGDDKIIPVDVRIIAATNRDLPM
 LIKSGQFRNDLYWRLNVLNLYLPLRERKKDILPLIHHMLHESDGCGLAPQISDDCKLYL
 ESYWPWGNVRELKNFCERISAICDEPILTTALAASLLQADNRAAERSEQKMGTELGSTFP
 PQPKDIFSSSESLRNLVDSFGSIQAAAHYLG IHR TTLWRHLSKPD LAKRKQSGV SQ*
 >SPBIB_v1_150047|ID:27162559|parE| DNA topoisomerase 4 subunit B [Uncultured spirochete bib]
 MQSKTWRISGSKAKLAVRGSFGDGGFGQGLHIIKNKNTNGIHNAQRFWGQRLKSPVPRPP
 AHVSIYVNGKNPVYDESKIKTLSSLEHIRLRTGMYIGRLGDGSSPDDGIYILLKEVIDNA
 VDEFIMGAGDHILVQIDGSRARIRDFGRGIPLGKVICVSVINTGAKYDDDVFQFSVGLN
 GVGTKAVNALSKEFRVVS YREGRFFEARFARGILIDTREGGSREKTGTLVEFIPDEEIFG
 EYSFIFDFIEKRLWNYACLNPG LILSLNGKEFHAEKGLFDLLSAELGESPLYDIGWFRGD
 RIEFAFHTHTKEYGEEHFSFVNGQYTS DGGTHLSAFREGFLKAINDFEQASYRGEDVREGL
 AA AVAIRIKNPIFESQTKNKLGNSDIRPWILQEVKKG VDEILRRNPQAAKILQEKILTNE
 KLRTELNIVRKEAKEAARKIELKIPNLKDCKAHLGDGGLGERSTIFITEGQSAAGSMVST
 RDVHTQAIFSLRGKPENMFDRPRSAIYRNEELYNLMMALGIENNVENIRYARIVIATDAD
 YDGFHIRNLLLTFFLTYFEELIVKGRVYLLETPLFRVRTKKQTRYCYSVRERDEAIKELG
 PGTEVTRFKGLGEISPAEFGQFIGKDMRLVKVDIQTLSVPELLGFFMGKNSPERRKFIM
 ENLVTEL*
 >SPBIB_v1_150048|ID:27162560| DNA topoisomerase (ATP-hydrolyzing) [Uncultured spirochete bib]
 VAYIKKLLTDNFLYYASYVIMDRAIPELDDGLKPVQRRILHSLFEMDDGKFHKVANVVGH
 CMKYHPHGDAIASALVYLANRGMFIETQGNFNGNPITGDEASAPRYIECRCTQFAKEIFY
 RPKITRYVDSYDGRNKEPVVFPKIPVVLMLGAEGIAVGMSTKILPHNPVEVLKAEIACL
 QGKPFALLPDFPTGGIVDCSEY AEGTGKVRVRALLDTS DPKKIVIKEIPFGSTTESLIAS
 IEEATRLGHLKIASISDFTTDKVEIEIKLARGVYAQDIVDALYAFTECERSISCNCLVIR
 DEKPTLTTVSEIVRYHAGKLLNLLRQELELERDELRAEIFARTLERIFIEERIYKSIESK
 RTSDSVIKAVIDGFKPFSKELKQAIGTEDVEHLLKIPIRRISLYDIERAQNEMEKIQQQL
 SEIDKHLNNLVEFAIDVLKTYIKMLEANWPRRTKIKTYKKIEARAVARHDIALRYDAEAG
 YVGTEVS GEKVLEVSAYDKILVLRKNGIYTVLPLPDRIFV GQELLWIAIANKELLSEQPI
 TMIYKLLPKGAYIKRTIIDS WLTGKDYSLVPENAEIIGFSTEKEFSFQLEYKPKPRIKK
 IKEIFNASRYPLRGKQAQGIKLTDREIANFIIIPSSIGKSNSLEPENLLPINLCMSQNK
 KQNTGTEDNSLIQIDDSRRESRKKQAKEQSPSQSSLKEKRNQTIQSKKEQPAIISVKRA
 KSKKMTTKMIEKNPSESQSIQQNEAKVSQLELGFSTSVPKNSSESKEQTRTDNAASHSRG
 LLEAALKKHKNDR*
 >SPBIB_v1_150049|ID:27162561| protein of unknown function [Uncultured spirochete bib]
 MVRVKIAITTYEPALYTDLYPVFEDSPHLIIVDEYNRIQKYSPEITAKGTIRGKTEWIS
 RGAKVLVTGSIEDEHYEKLTKAGIAIDWVGFGNAKDLVERARKSAAFLVDKLT KVKVVRT
 RFDKRLRPKSYTTCYEIPYIGNDPQFIEELERKAKRQGKKRLLKPKEEEDLDEGFDEEDD
 DLFQ*
 >SPBIB_v1_150050|ID:27162562| protein of unknown function [Uncultured spirochete bib]
 MRKPRFTLPGARYHIIARANRGEFIFQRREIKDLFLALIRKAKKRYKFAIETFCIMDSHI
 HLIIRPLEGESISRIMQWLLSVFALRFNRFFGLIGHVWMDRFKSFILFTDAQRMKAHAYI
 ANNPVSAGLVHSPYHYSHSAAKFILAGDFSIIKPPNLLEFYCNLEMTYHS*

>SPBIB_v1_150051|ID:27162563| putative Malate permease [Uncultured spirochete bib]
MTLSRVVSIFLLL VVG FIAQKRKILSDGIKTISNFVLRVFLPFTIISFSDKSISLSAAG
DLLKVAIFAIGVHALAIFISKLAYSRFPDPKRKILTYITVFSNCGFMGFPVAESVFGKIG
LMYTSIYVMVFNIFVWTYGIALLESEGKEKKNIWHSILLNPGNIAFAIGFVLWVLPFGLPE
TLNYAVLLLGNCTTPLSMIVVGATLANLGIKGLFSGTEVWIGSIMRLFVVPALVLLLFI
LIGIRSDAAKVANFLAAMPAAAQTVIFAERYDADVSLASRIVFISTVLSAITIPLASGIIA
G*

>SPBIB_v1_150052|ID:27162564| conserved protein of unknown function [Uncultured spirochete bib]
MRLIRCEYDQKGVYHGRIEKDEVILFEYFPQIEMKDGQKRILLAEKGRVPLSVVHLKAPC
VPGKAVCVGLNYRDHAKEFGLAIPASVPLFIKSTSLDPDEKILYPSISSRVDYEAELV
AVIGAKARNIEKKDALNYILGYTCGNDVTARDLQPKDGQWTVAKSFDTFMPLGPWIETEL
DPSNLRIQAILNGEVRQLSSTENLIFNVADLVAYVVSQIMTLEPGDVMITGTPSGVGMQK
GDRIAIEIQGIGRLENIVA*

>SPBIB_v1_150053|ID:27162565|yeiN| conserved hypothetical protein [Uncultured spirochete bib]
MNPYLDITEEVADALHAGLPVVALESTIISHGMPWPRNLETALAVEDAIRKEGAVPATIA
IINGRLKVGLSREELTLFSNSSLHPAKVSRDLPIVVAQNGNGATTVASTMIASMAGIR
FFATGGIGGVHRGAELTWDISADLDEFARTDVAVVCAGAKAILDLAKTMEYLETKGVPVI
GYRTSELPAFYSRESGVMLSQRADDPMEIARLLHAKWSLGLSGGAVIANPVPIEYSMTKN
EIDAAIEQALEELAEKRIKGAAVTPYLLARVAEITGGDSLETNIALVINNAHLAARIAIA
YEQMSEK*

>SPBIB_v1_150054|ID:27162566| protein of unknown function [Uncultured spirochete bib]
VHRIEESSEPYCVVIGGINIDIQGFCAAHIEKDSNPGVITRSLGGVGRNIAENLVRLGV
RTELITVLGNSPAWEALISRIEHLGIGVSHSPRLADVPLPMYLCILERDGLVSAVADMR
AIERLQIEHLENQDSSLRKAACIIDGNLPKACIEWIAQQYHAANSQNKKTIPAALSSTE
RENVFVSRDFADPAGKDQNGDRGFQNAVQSQIAVSQHPILIADPVSSSKAVKFRDCFGL
FDIAKPNLAEASTIANFGPTATPSQIIAALKAKSILPNELYLSLGEKGMVIEDDSIHEI
SLPASNLRPPAANRSGAGDAACAALAWVSIRSMFSERLKNGQFSNLRPSAKAKFALSAAL
LASASKRPVNPKLDPRMLCEKIKFWYPELSDLVEYMMQNGGII*

>SPBIB_v1_150055|ID:27162567| putative Heat shock protein DnaJ domain protein [Uncultured spirochete bib]
VDQIFDRLERLVRAWTSSAFGEGFGRNNFGSSDIFKDQDLADAWEELESYLDPSKTESER
EAEMRRRSEFRSQASNDQDPRKAIERQAVQDAYRFLGLEPYAPFAEVKARYKELLKKHHP
DRHTASPEDMKTATAVSAKINAA YQLIETWEEARAQKAR*

>SPBIB_v1_150056|ID:27162568|polA| DNA polymerase I [Uncultured spirochete bib]
MNEKDPLYVLDVYAFIYRSYFAFIRKPLRNSLGENVSAIFGFFRFLFSLFEQRKPILFAA
ALDSIGPTFRHEQFLTYKATRQKTPEDLIAQIPKIESILRALEVPTIRCEGYEADDVIAT
LATQCSREKRACFIVSGDKDLLQLVGGFTKALRPSEGFSFREINENGVLKEWGVLPDQIR
DYLSTGDASDNIPGVKIGDKTAQKLISQFGLDSIYQHLNEIEPESLRKKLEAGREDA
FLSKDLISLCDNVSPCPSDVASLRASLNMAAAAPLLLREEMKSLVPESLRNKKGVQTSVP
KASTRTSAEADKNEIQTSVPNLSNKLKPEVKHGEGLASIEAQASQQSPSLFSRTDNVPVY
QAILEEEKLEEIIDAALAHGVCAFDTETNSLDSHARIVGFSLCYEAGKAWYIPLSPDS
KCIPIHKKALAALSRLVSATQMLLVGHNLKFDINVLAAGGTEVTSPCFDTMVAAWVLDAEA
PSFSLSSVAARFLGLSGLEYDQVVPKGATFADVPLATAVQYAAEDADFSFRLYQRLSKEI
DSAQLHNVFYDIEMPLLPILAEMERTGIRVDADKLRAYGVELENELAKIQSEVFHLVGH
FNLGSPKQLADVLFVERKLPVQKRTKTGFSTDTSVLEELAPLDPVPQLILRHRLTLKLN
TYIEPLAALAETSGRVHTTYVQTGAATGRLSSRDPNLQNIPIRDEEGRRIREAFIAEPGH
KLISADYSQIELVVMHLSKDPNLKAFKEKVDIHKRTASFIFGIPEDQVDASQRRIAKT
INFGVIYGMSAFRLARDLGISNALAKEFIDSYFSTYSGIAEFIKRTIEEAQETGITSTLF
GRKRRILGINSRNKTEQQAHRVAVNTPIQGTAADIVKIAMIKIHRALATQMPEVRMLLQ
VHDELIFEAPESSVPAIDLIKEEMEHAVQLDVPLRVSVESAISWGMHL*

>SPBIB_v1_150057|ID:27162569|coaE| Dephospho-CoA kinase [Uncultured spirochete bib]
MHIIGLTGGYCAGKNEVAKILSA YGWEVVDVDKLGHAALSLSLAIKHAFGSHVMNEDGS
VDRTKLQIVFSNAQQMQILES L VHPAMLSLLDREIQRAREQKKEKFCINAALLYRFPQL
SLCEAVIEVQAPLFLRVSRAKKRDNLSATRALKRIFSQRELWKLPRKGAQVIFILLNSGK
KEQLENKTKKLIKLSQDLQR*

>SPBIB_v1_150058|ID:27162570| putative Sporulation repeat domain protein [Uncultured spirochete bib]
MSDRSKKILWIAVAVSGFALVVFLAAFLFPSEASESRPFDLTRRSPSKPLSPNDFSAF
PSIVVQPSGESSQLPTDSQANSTSEKKSSSTVIVVPAPAAQTNMNASQTEGESAVASSA
PKPASSVSGQSAVKTPQTSVPAKPPATSVAPVPAKPPSPSPSTKAASSAEYWIQ
VGSFSAKGTADKLRDEFTARGMTSIIA VKEIGGRNYYQVKVGPYPYSADEAKKWLSTVKAV
QGASQDAFVTTR*

>SPBIB_v1_150059|ID:27162571| Purine-binding protein BAB2_0673 [Uncultured spirochete bib]
MRKIVLGLIAILMLVSLVLPATAQAKKPLKVA FVYIGPPGDLGWTYEHERGRLAAQKYFG
DKIETKYIENVPEGPDAERVIRQYAIQGYDVIFTTSTFGYMDPTYAVAQEFPKVIFEHCSG
YKTAPNMATYFGRIIEARYLTGIIAGRMTKSNKIGYVA AFPIPEVVRGINGFTLGVRSVN
PNAKVQVVWTNTWYDPVKEREAVALLDAGCDIIAQHQDTTEPQKAAQERGLSIGYDSD
MGKFGDVLASAVWNWETYYIATIQNILNGTWKTHEFWGGLKDNI AKLSDSLSPRVPANV
RKEVEDAQKKILSGWKIFSGPIKDQSGKVYKAGEVVPDDKQLSMDWFVEGVVGVKQV*

>SPBIB_v1_150060|ID:27162572|yufO| Uncharacterized ABC transporter ATP-binding protein YufO [Uncultured spirochete bib]

MSETVIPKVEMRGISKSFPGLANDCVLMLHRSEVLALLGENGAGKSTLMNVLCGLYRP
DKGEIYINGSYADIHSPRDAQKYGIGMVHQNFKLVDSMSVLENILGLKDEPFIPDFKRV
RQRLVDLAAQYHLKVDPNANIWQLSVGEQQRVEILKLLYRNAEILILDEPTAVLTPQESH
ELSRVVHAMKQEGKSAVFITHKMEEVMEFSRVMVLRKGVVAEARTADTPKELARMMV
GREVLFQIEKKPFCPEVLELSNIDALGDRGLLALNNVSFQLRAGEILGIAGVAGNGQR
ELA EVVTGLRRSTKGALRIGNKDMTNKSPLEIIRQGV AHIPQDRSSVGAVGDLSVASNLA
MKQYRSRPLAAGIFLLPKRIVDLARALIEKFHIATPSPQTQVKFLSGGNVQKILAREIG
AARTVMVA VYPSRGLDVGATETVRRQLINQRDGGGLVLFSEDLDELLQVSDRIAVLFEG
RIMGIFDADKADIEQIGMLMAGMSKEATA*

>SPBIB_v1_150061|ID:27162573| Inner-membrane translocator [Uncultured spirochete bib]
MKFVFEKRKSTSPALILVPLISFAVSLVLTALLAIFGADPFKTYAAMA V GAFGTSHGF
AETLVKAIPLMMTGLGVAIAFRLKFWNIGAEGQLTLGGVAAAGVALFMERYFPGRSLLFA
ALFGLLAGALWAGIPAILKTTLKVDETLVTLMMNYIAILYSEFLYGPWRDPKGYGFPG
SRMFSANAWLPRIMGRAHVGIWVGIALAILWLVLKRTRWGFELQIIGASQKAARYQGIA
VERNILAVMLSGALCGLAGAFEITGISHRLQQLSIGYGYTAIIVAWMSQLNPLAVPFV
AIALAGLSVGGDQVQMVMGLPAAMGVVMQGLILFPMLAGSLFTEYRFLVVKPEPRAACPE
PSQE*

>SPBIB_v1_150062|ID:27162574| Inner-membrane translocator [Uncultured spirochete bib]
MDFLTSILTITIRAGTSLTIATIGEILTERSGILNLGVEGIMLMGALSAFTAVFYSHSIA
IGLLVAIGVGGLLALLHAFLTTTMRANQVVSGLSITLFGTGFSSFLGQRLGPVANNFRLV
GLRAERIVPLAPEWVKQIPIISAFFNQDIITYLVYILLPLAWFFLYKTRPGLWLRVSVGED
PQTADAMGIDVTKTRYLYTILGGMMIALGGAHLSLSYTPGWSENITGGRGWIVIALVIFS
MWNPARAVWGALLFGGINAVQFRLQASGTSIPANFLNMMPYIGTIIVLVVMTWWEALS
VGAPAAALGTSYMREDK*

>SPBIB_v1_150063|ID:27162575|ade| Adenine deaminase [Uncultured spirochete bib]
MNRDVIDAATGKTICDVNYTNCTVVDVLSGRFLPNSIVSVKGGFIAGINDGLDAKESINL
EGMFLAPGLIDAHVHIESSLLTPAEYARVVLPRGTTTVVADPHEIANVMGYDGMRYMLNV
SRDIPLDVYFMVPSVCPATDFDTAGAAALYASDMHQFLQEPRVLGLGEVMNYPGVLARNPQ
LMDKIALFQSNRPIGDHSPGLRGASLSAYVVAGIGSDHECTTPEEAL EKVEKGM YIMLR
EGSTAKDLRPLLPAITRENASRFMLCSDDRHCNDLRDEGHMDFSLRMMLEGGIDPIDAIR
IASSNAARWFGIPGQGAIA PGYKADFVAFPSFEYFEAKIVVKNVIVARN GALVQEFATV
GTPIRDSVNIKWLTIDDFVIPDKGKPV RVIEVNRESLLTGNGISRLEGIRGRLSADIERD
ILKIFVIERHTGSGNIGKGFHGLGLKRG AIGSTISHDSHNMIAGVDDVSIFKAARHLN
KIKGGLVYAVGDEILLDLPLPVAGLMSDKPADFVIERLTA FEKLF RQEGLTATSPLMTLS
FMALPVIPSLKITDMGLVDVDRFERVSLYVD*

>SPBIB_v1_150064|ID:27162576| xanthine dehydrogenase, Fe-S binding subunit (modular protein) [Uncultured spirochete bib]

MALLYIKVNNAWRGLASAE GMPVLDVARGELGLTSTKEGCREGDCGACAVLVGEQIANTV
RYRAVPSCLLALGELK GKHLLSLEGLIEGTEDGLTPVMRAFIEENASQCGFCTPGFIAL

TSWLAEPQVPDLGALRAVDGNLCRCTGYAAIRRAAARLVEQFRDLPLEPIARLKALVSA
QVLPQSVLKFIEESKSSSLQTSVPNGATIGTGLDMAGHDNKKAVASTLDPVIVGGGTDF
YVRNPDPEDEGFSPLLTRMIPEFALVEYRDEPQGQWLEIGAAVTVRDFVVSPLVQREIPGI
GRFETMFASTLIRNLATVGGNIVNASPVADITSMLMALGAQLVIVPEARAYEPQAPIRLC
PLEQFFLGYKKLDRPGEVLKAIIPAGANRKFSEKASKRKNLDIAAVNTAIAFKIEEK
HFKDVRISLGGVAPVPMGLTAAMEVLEGAPCNPADRKTLASLAMKTAQAASASISPIDV
RGSADYRRRMVHQLMLAHFVRFEEASGIAEELFP*

>SPBIB_v1_150065|ID:27162577|xdhA [H] Xanthine dehydrogenase, molybdenum binding subunit [Uncultured spirochete bib]

MKEADMKVDDKKSMAFLDEADARSGTAHHEAISIPDAASVIPESLPNVLGQTQYIDDIPRP
AGCLQAAVRLSDSAHARILAIHTEEALSLDPSVRVILAKDIPGTNQIGFNKPDEPLLPEE
EWEYWGQPIAIVVAKTRSLARKAAGLLRVESEELPAVIDPREAAAKGDFILPPRTIACGN
VEEAFKCAYYVEGRVDSGGQEHVYLETQGAIAQVIDGRRMHVISSTQGPTGVQRAVAQV
LGLPMNMVEVEARRLGGAFGGKEDQAANWASMAAVASWVCGKPVLYLNRKDDMRATGKR
HPYTTDFRVGADADGKLLAFEADYYQNSGSTCDLSAAILARTLLHATGAYQIPNVRVTGY
MCHTNLPSFTAFRGFGAPQAFFVIEAAMDALAQKMGTEVVELKRRNLFREGDRTYYGMA
ERVRASESVERLLAKVDYPALSQRIKTFNATHRLQKKGLGFIPVAFGISFTKLQMNQAGA
LVHVYTDGSVVVSTGAIEMGQQVARKIALVTARTLGVPVSYVTVQRTTTLTVANTVPTAA
STGADLNGMAAKIACQEIRGRLVQKAADLLKAAPEKIDIREGIILCDGKPASLTWKQLVE
AMHAARQDLSAHGFYATPFLEYDMKAERGRPFAYHVYGAALVEATVDILRGTSTLDSVSI
VHDIGDSIDPAVDRGQIEGALAQGLGWSLLEDLRFPGDKPLSDTLSTYKVPDVTMPEN
IDIEFLPIENPTAPYNSKAVGEPPLQYGIAGYFAVLDAIRAAIGKPIVYYNLPLIPEKI
SDLLAEMGSDPLEPAGKRDTALQAH*

>SPBIB_v1_150066|ID:27162578| putative Allantoinase [Uncultured spirochete bib]

MIIANVAAALPGERDFHLVDILIKEGKIAWIKEAGSFQRDSRLANEYAAEEMLDAKGLLA
FPGAIDPHVHFDEPGFTHREDFLHGSAAEARGGVTTVIDMPCTSIPPVTTPHALEGKLSI
VRDRALVDYAFFGGINGTMLPEEISDVVQSLANRVVGFKCYFISGMDTFPAVNDTQFAAA
AKACAKEGRPLLLHAEDSNVIAEASQERQSLRGSQAPSWADYYTSRPMEAEIAAVHKALK
LAGQYTKYLHIVHVGTKAAIAASEKGASCETCAHYLAFDETDFARFGAALKTAPPVKSP
EQKAILWRLLAEGRLSFVASDHAGAPEYEKFTDNPLTAYGGIPGTGTLFPYLLSEGLFAK
RLSLERFLEATSGGAARRYGLWQKGSLMPGKDAADFVLVDPDHTTYLDPSHMMSKSSITP
FAGMRLSGRIEGTFVRGSYVYASVRLAAALRHQANPAFSNEVGMILAKPGFGKFLTWGYR

*

>SPBIB_v1_150067|ID:27162579|ygfK| putative oxidoreductase, Fe-S subunit [Uncultured spirochete bib]

MSKVMKTTSLPALLTRMAGEYLAKRTIFEIPEATWLDVFAQESSESPGITVMSANVSIPLG
PAAGPHTQIAPNLVAAYLSGARVFELKTVQENDHLDIDKPCIDALDEGHNVWSTELSLD
QAREEYINAWIAINLLARIFSRKPGDFMFNMSVGYTLDGIKSEKMDAFIEGMRRPEATEY
WEKAIDQLKAFIEEPIFAEAFGQAALERARPIAEHMPVRPVHSVTLSTMHGCPPDEIERI
GRYLIEEKGFDTYIKLNPTLLGYNRARVILNQLGWTDIILKPESFSDHLQFDAALALIQS
LTETAAARGRRFGIKLSNTLANINDGRTLPGAERYMSGRALFPITIHAAKLARALPDFP
ARFSYCGGVSAFNAADLLKAGLGPLTIATDLLKPGGYQRMAHMVKDVLGALTSVPERPDA
DALDQLAKDALEAPYYRKEWREGTAAIGRQLPLFDCFAAPCIEACPVHQKAPAYIAATGS
GDADRGMVILSDNPLPAITGVLCDHVCQEHCSRVDYEGAVRIRDVKLATVRASEAALAA
EVAPAWPHAPKGTAVIGAGPAGLACAWYLAQYGGQKAVVFDTSVPGGVANFIPSFRIA
REDIAADIARLEKLGVEFRFGVDVRSAEKKAEGFERIVIASGAHTAREMHLKSGSVRVV
HALEFLGVCMAKGAEHFAGAKNVLVGGGNTACDAVRMATRIPGVKSVLWSYRRTRKEMP
ADLEELTNAIEEAKALQHNKAAALFNGGTSNILVELTLPEVMQPGSITLRRMKLAEKDAS
GRRAPVPTEETFDLPCDLMITAVGEKPDPTFLAAGFIEVKGKGLPAVDEGTMETSVPGIY
VCGDARRGPSSIIASEADGRAAMAILKNLGIEAASADYRAPAWSSEARASRGKILPSLD
PGDPGFAAREAERCLACDTACLRCVEVCPNANMVIDTDRLFDQPAQILHIDRLCNECGN
CGLFCPWNGEPYSGKPTLFDKDDLHNSQAGFAFAGNKARPFLVLRRAEKGGAVLELPYL
AWSGAISVPAQRPMIALARTIWADHRYLVEVHE*

>SPBIB_v1_150068|ID:27162580|ssnA| putative chlorohydrolase/aminohydrolase [Uncultured spirochete bib]

MILFHNVRILELEPPSVSEPTDVAVYESGEGDRAGTVAAGPNLAVQYPTAKVAGEGGYL

SAGLVCGHTHLYSALARGMLVDIKPSKDFQAQLLDHLWWRLDRAIDPVILRSSALVGCSDA
LKAGVTSLVDDHSHASPECIDGSLSIIEAIEAVGVGILCYETTDNRNGMAGARASVAENVR
FAKEIDAIRASGAKPLVEASIGAHASFTVGNETLEALAEAVRSTGRGIHIHLAEDKFDV
DARHRFGKDPVERIDAVGALNDRSIIHGHWLSPSEVEIMNARGAFLAHNARSNMNNSVG
YNILLPTFANVVLGTDGGMADMLEEFKFAVFRHRESQGPWWPGDFLKVLRGNALIERHF
AQDFAPGTTTRASTPAVAPTSTLVTSGEGGFPGFGAVQVGAPADLVLDYDSPTPLVGDNI
AGHFAFGMSSRSARTVMVAGNVRILDHRPLYDDATIQAEEAREQALRLWKRMEER*

>SPBIB_v1_150069|ID:27162581|ygeY| putative peptidase [Uncultured spirochete bib]
MDSKKILEKAREYRDYTAQNLSKIIQVPAFSTTEKERIYLLKQLSEEAGMEDLWIDGLGS
LLGRVKGKSKKIVFDAHIDTVGVGDETQWKLPPFSGLIKDGLVHGRGASDQLGGAASMIT
AARILKELGYSGDYEVWFSFTAIEEDCDGMCWKYLIEEEKFVPDLAVSTEPTSCRLYRGR
RGRMEIQIDIKGISCHGSAPERGDSAAKYAARAALAIEKLNRLQPDDEKFLGKGTIVVS
QIDVHGSPQCAVPDQAMLYCDRRLTWGETDEIAIKQVEDALREAGVNNFTVHMPEYRKP
WTGTEYHQELYFPTWKIPADHMLVQSGADAYKSLFGKEPVVDKWTFTSTNGVAICGRHKIP
VIGFGPGDEAQAHAPNETTRIDDLEIAAAFYAALPYMLEAHK*

>SPBIB_v1_150070|ID:27162582| putative threonine synthase [Uncultured spirochete bib]
MQWLYRCPACGRTYPIEPGRYLCDHCAKEQRPDEPLRGVLECTWEGGNPEPGSVPLPVEE
RFFPPIPVGQTPLWAPERLRAELSMPLWLKDDTCNPSGSYKDRASWLVAAFARKFGIKE
IVLASTGNAASSMACIGAAAGIKIKVYVPKSAPIAKRVQILQYGAEIEVDGTYDLAFDQ
SLAYSNATGMLSRNTAYNPLTIEGKKTASFEIARDLAAGASRSAPRYLAPDHVFPVPTGDG
VIIAGVIRGFEDLVRLGWIDKMPTIWAQAEGSSAIARALATGRFEAVPSNTIADSISVD
IPRNGYFALDKLRRHSGRAVVVSDAEILEAQRYLSRASGLFAEPSSACAFAGFLKARAE
DPNAQVVVMLTGSGLKDIKSAALGVGLKI*

>SPBIB_v1_150071|ID:27162583| conserved protein of unknown function [Uncultured spirochete bib]
MKSHIEKILLTEKETLLVPLWSKAMESRRQNPIFFDRTSKEILDRIEYDFANLKIPRKT
AVMLCIRAKKMDYVKEFLASHPTSIVIHLGCGLDSRYMRVDNGEVEWYDLDMPEVIELR
RKFYEETSRYRMISSSVNNGWISAIASQGLAMVIAEGLFMYLKEEEVKALILALKEAF
PGCLLVFDAYSVLARSVREHPSIKKTGAVIHWGIDDASAIEQLSEGIRLKEEWYFTQAD
DIKKLGFGRFALFGIAGLFSAAKKAHRILYYSL*

>SPBIB_v1_150072|ID:27162584| Pyridoxal-5'-phosphate-dependent protein beta subunit [Uncultured spirochete bib]
MIDLNVNESQRKKNIERCRQKIGILLPTFAQMRDPAKIPESIKKELSNIGLWDVHPRNLF
VTWHNEPKFEGGGYGPVNYIEIPRAITGTKARIVGLAGKWFPTGAHKVGAAYACLAPELV
TGRFDPTTKKAVWPSTGNYCRGGAYISRLACPSVAILPAEMSRERFEWLKTIAEEVIAT
PGCESNVKEIFDKCIELQRTRHDVVIFNQFDQLPNHLWHYAITGPAMEEVFRAIGGQNAH
VGGVVLSSGSAGTLGSGSYIKEKFPKLA VGEALQCPTILENGFGGHRIEGIGDKHIPW
IHNFRDTEAAVGVDDDELPMRFIRLFNEPAGRKLLIDAGADPTVVNKLDWLGISGVGNLIA
AIKFAKYELGEDDIVFTMFTDSMAMYQSRLAELTAERGPYDQRQADRDRYDRLQGLSVDY
VFEMTHIDKRRAHNLKYFTWIEQLGKDLSELRAQWDDYRTYWGGLHQQADALDRLIEDFN
AEVLK*

>SPBIB_v1_150073|ID:27162585| 8-oxoguanine deaminase [Uncultured spirochete bib]
VILLKDCFVAVPADAGADGANSRRRFLAHGVDILLDGNRIAKIAPNIEAPEGATVIDA
SRHVVPGLVNTHHHFYQTLTRNLPAVQDAKLFDWLVYLVEIWKYLDPEAVYWSSMLAMA
ELAKTGCTLTTDHHYLYPAGFGGDIPSLQFRAASDIGLRFAPTRGSMRSRKKDGGLPDT
TVQDEDTILAHSEETLRRFHDPAPDAMRKVALAPCSPFSVSERLMKDSAVLARKYGARLH
THLAETSDEDDYCVQVYGRRPLQLMQDCDFVGPVWYAHGIFNDEELDFLAKTGTGVAH
CPSSNMRLGSGICRVHEMLDRGVPVGLAVDGSASNDTSDMLGEARQALLQRIRYGSAGL
TAGEAMYIATEGGARILGFDQAGTIAEGRADIALFDVMKLEYAGALSDPLAALLFSGYN
HEVDHLIVGGRQVVRHGMLVSADEEMIRRNALSACERMYRKAGIV*

>SPBIB_v1_150074|ID:27162586|ygeW| conserved hypothetical protein [Uncultured spirochete bib]
MDKIHSMIQLRAKKIDMAGKDFLLTWEKSSDEIEATFLVADILRAMREQNISPRVFDG
IAVSNFRDNSTRTRFSFASACDLLGLYVQDLDEGKSQIAHGETVRETANMISFLTEAIGI
RDDMYLGEGDRYQREVGKALDEGVKAGVLPSPRTVVNLQSDIDHPTQSMADFLHLAHYFG
GLDKLKGKIVMSWAYSPSYGKPLSVPQGVIGLASRFGMDIVLAHPKGYDLIPDVVELSK
KQAQASGGSFTYTDSDMDEAFKDADIVPKSWAPYDVMLRRVPLLHAGDKDGLKALEKEAL

ANNAKFQDWECTEEKMKLTKDGKALYMHCLPADITDVSCKAGEVAASVFDYRDDTYREA
SYKPYIIAAMILGKFRNPASMLESLTARGKQRVYGI*

>SPBIB_v1_150075|ID:27162587| Cation diffusion facilitator family transporter [Uncultured spirochete bib]
MQRIRTI RLASWIALVGNFILAVTKVLVGFISGSLVLSGDIDSSTDVLIAMTLFAAR
ISAKPGDKEHPYGHGRAETVASAVIAFVFFAGSQVLVSAIKAILSGERAVMPAPIALWV
TVFSITGKLALSYSQFHFGKKAGSNMLIANGKNMRGDVVTSVAVLVGLGLAFLTGPVLD
KILAILVALWIIKNAIGIFLEANTELMGTADRGPYLDFNAISSVPAAGNPHRVLRRI
GSMLVADLDIEVDPHMTVAQGHDIALAVEAAIKDAMPEIYDVIVHIEPNGNVEKERYGLT
ASDAGISE*

>SPBIB_v1_150076|ID:27162588| putative Hemin import ATP-binding protein HmuV [Uncultured spirochete bib]
MKTKLQPIGGIADSATGTATGTEDQATPILQASELSFGWSAERQVLDSISLEIARGQTLA
ILGPNAGKTTLLSILTGKLAPLRGQVVLEGHPLSDYSARERAWRIAFLPQLEKLPFNFR
VLDFVLMGRTPHMEALALPGTEDEKAARDALDSLGMASFEERNIGELSGGEFQLVRIARC
LAQGASILVLDEPVSMLDAPAHARQIADALAGLATVVGKTIITYTTHDIGLGLFLGGRALILA
QGRVQWEGESSGLRDAEMLARAFGITFSMREMPVSF*

>SPBIB_v1_150077|ID:27162589| Transport system permease protein [Uncultured spirochete bib]
VSSKVEKEPKGAQGSEGKESGAQRSGQAQLAKGATRSDWALRSGGTARSAWAHRHLS
ALLVGLLLIVFALALFIGRYPKPGFLNPAALVSDPLARQIVLNSRLPRMLGAVLLGLVLG
GAGASLQAVFGNPLVDAGFLGVSQGAAFGAVALVLGLRAYSLIAVLAFGMAVLALALS
WLAERFRYGGQILRLLAGLAVSAFFSLLAMMKYVADPLSQLPDIVFWTMGSMVPMGWK
RLESSAPIALAALAVLYAMRWRVNLSSLDDTVSHSLGIRPGVERKIVSVAAGVGMVTA
VCGVVGWVGLVVPQIVRAIDGPDGRSVLPRSM LGGAIFVLVSDTLARSLFSGEIPLGIVT
SLFGALSFAILLTMRKVELAR*

>SPBIB_v1_150078|ID:27162590| putative Periplasmic binding protein [Uncultured spirochete bib]
MKRYKLFLLTALFLVAAFGAFAQQRIVLGGRAVPMLADAVYLFPKTSSRVVAFASDQGL
GIFMSAIDPDFKSKERFDKSAGAEVYASFKPDVLILKSMMNQLKAPLDALGIPQLYLNL
ETPEQYYEDIATLGKVLGNEKRASEVVSWFASHEASIVSRTSKIEPAKRPKVLIMQLAVS
GESVWQVPPDSWIQTIMAERAGGQAVWKGANPGSGWATVSIEQIAAWNPDFVFIISYSGN
SSGAAEAFKDLRLSALKAVRNGSVYGFPLDFYSWDQPDTRWILGFTWLAKRVHPELFD
ISVARTTREFFSFMYGFDDAMFRTIIQPKIAGDLGEQF*

>SPBIB_v1_150079|ID:27162591| putative ABC transporter, transmembrane region:ABC transporter related
[Uncultured spirochete bib]
MNASKRTQGRGQAAGKGLQGSATKAKKARANRSNTAASPSTAKSGPLSHIRWIREVWREK
QGLIWLLLFLTLLSSAVAVAFPLLTQKLFLLERAIDTHMNKGAAMAQVKRIALYFVAIG
LAGFVAGTFPGIRGALNMVFDYIVRKRYFSEVMQKDIRFFSYFRSGDVITRLTSDISDFP
KLSWFLCSGIFRAVESASKVTFCIAAMLSLDWRLALASLASLPIMLLVFTRTQSAIYDRV
NKNEQAISAINNQLMSFSGVKVIKAFASEEKYTRFFDDALARRFETEMGVIKLETILQL
IYQYIDYVAQVALVFGGLMVTRRTISIGTFYAFYNYLNM LIYPVLDIPQLFVFGKRAFV
NIDRLEEMRRYATESAAAEGA VPEGSLQKSTLAETEMEGAQNPPSQHASKPAPLPVSPA
AWLTRLQSLRFEKATVYYERKHKPAIAEIGVEVRAGDKILVIGPVGSGKTTLIK TALGLL
EPRSGRVLLNGRPVRELGPLERRGLVGYVPQDPLLFSGTIRENILLGLKEGQTL SQLEME
RILEVSRLSDELA AFPEGLETRLGQRGTSVSGGQKQRIAIARALAGYPSLLLLDDMTASL
DTNNEEALWKSLAEMPEFTRA AVIAVSHRLSSIQYVDRVLFLKNGRIAGFGTHAELMAEN
AGYREFVAEHVQMPGA*

>SPBIB_v1_150080|ID:27162592| Xenobiotic-transporting ATPase [Uncultured spirochete bib]
MANQLMTNQPAKNDYLR TILSYLSRYRMLALPGIGVMILIAMGQLAGPYILKQIIDVAVP
KEDTSLLLGYAFVAVSVTGALS YVGMMLLARLGLSIVTLIKQDIFSHLLKLPASFFD
SHPVGELMSRTETDTERVRDMFSNLGANLIVNVL TMLGIFAVTFALVPKLALIMFGVSVT
LLAVMIVFFSKIFPMYEKARSLYAGIAAKVAEFVQGIEVLKAYGRTGWAEAQLDAAAKQK
VALDVRISLIEYSMMSALNALIGPLFIVALLLLYAPKVLAGTMTLGMILLFVEYGARLLR
PIAEIAESLRSMQQARTSLSRIRKLMATEEEPNRGTGKAPSLQHEIRFDHVWFAYNDEDW
VLRDLTFTIPKGSFAAIVGASGSGKSTTIGLICGFMHPQKGCIRIDGTPLDEIDIVAWRK
KIGLVLQEAYLFPGSVLENTLYHDEIDEKTVWSAISMVHANEIDSLEGLSTNLWERG
GNLSSGERQLISFARALTMNPELILLDEATSNVDMATEKRIKESMEVLRKGR TMVVVAHR

LSSILKANTIFFLSEGRLIAQGSHESLYENLLEYRQLVDQQFPAGKGGRA*
>SPBIB_v1_150081|ID:27162593| protein of unknown function [Uncultured spirochete bib]
LPECRKARYNISVWHFRTFYRRYAKNYTEKLGLLTFYQGQSTYDQSTSKK*
>SPBIB_v1_150082|ID:27162594|fucI| L-fucose isomerase [Uncultured spirochete bib]
MAENKDFEMQQARNRLKGSAPKIGIRPTIDGRLGGVRESLEAVTMGMAKAAAKLISENLR
HPTGEKVECVIADTTIGGVAEAAACA EKFAREGVA VTLT VTPCW CYGSETMDTDPLTIKA
VWGFNGTDRPGAVYLA AVLA AHSQMGLPAFGIYGHVQDLTDTDKIPADVAEKILRFAKA
GLAAAWMRGKSYLSVGSVSMGIAGSIVNPDFFREYLGMRNEYVDMSEITRIEIKIYSEA
EFRRAMEWVKTYCKEGPDNNPPEKQHSRARKDRVWEMSVKMAMIVRDL MVGNPDLRRKGL
GEEALGHNAIAGFQGRQWTDHFPNGDFLETILNSSFDWNGIRQPYLVATENDSLNGVS
MLFGHLLTGSAQIFSDVRTYWSPEAVQRVTGWKPTGLAEHGFHILNSGATCLDGTGCQR
LDGKPAIKPWWQVEANEAKACL DATQWRYANLGYFRGGGYSSDFLTEGGMPVTMTRINLV
KGLGPMIQIAEGYTATLPQEVHDTLDR TDPTWPTTWFV PRLTGTGPFKDVYSVMASWGA
NHGAISYGHIGADLISLAAALRIPVAMHNIPQEKIFRPSYWN AFGMDPEGADYRACAALG
PLYR*
>SPBIB_v1_150083|ID:27162595| Transcriptional regulator, LacI family [Uncultured spirochete bib]
MARETVTIRNVAQRANVSTATVSRVLNNDPRVRYETKQVVLEAMESLGYKLNIVARSLKT
SRHTHTIGVLAPDLAGDFFMFIAESMNRELTLHGYSLVVSTSRDSEEEEEAKRIRHLAERLV
DGIVLIPVGSSSAYLSQVSALHIPVFDRALEGFESDQVLVDNEGGA YEAVCALIGEGH
RRIGFLGGKPEVTTAKERFAGYCRAMEEAGLEIEQKYVRFHGPTLPFGYRTMEEIHKDPD
SPDTWFIVNLF AHLGATS YLVTEGGERAQHITFAAFDEMPYSPLLR YCRYAVQQPIAEMG
KAAANLIIDRIEGKGPPEPQILRFTRLIQHPLVR*
>SPBIB_v1_150084|ID:27162596| Auxin Efflux Carrier [Uncultured spirochete bib]
MEQASGSLFSIAILMTAGYMLAKRGWLGERAIDGLKKIITNLTLPLLLLRAFLRLTPDGR
NVILALGVFASCAIMGLAGALLAGIARLPRPETRLLFQGF EAGMLGYALFAGFHTAERLP
AFAALDMGQVIYVFTVLMVQMSMRPEGEQGASKTAVFPWWDI AKSKVLWAIGAGIVLSLL
TPGFADMLAVRSGFAGAVFDTVGG LTTPLVCLVIGSSLSTGIVFDRDLLRVVAFRAVLGL
GLGLVFAYLIVPALGFSEWHSRAAIVL FVLPPPFI PVYHKGKANFVSSVLTSTVVSIA
LIAVLAIAGVA*
>SPBIB_v1_150085|ID:27162597|fucU| L-fucose mutarotase [Uncultured spirochete bib]
MLIGIKPCISAELLSVLYRMGHGDEIVLADAFFGGDALNARVIRADGIRIPDLLDGILRL
INLDSYVEAPVIMMQPSVGDVLDPEVERHYREVIDRYWPDTPPIARLERFAFYERTKKAF
AVVMTGETVKYANIILKKGVPVSD*
>SPBIB_v1_150086|ID:27162598| PfkB domain protein [Uncultured spirochete bib]
MIVACGESLIDMVP AEHGSKLFEACPGGCPYNSAIAAARLGAPTWFLGKTSRDFLGDTIV
SKLVDSGVDVSLARS DQAVTLAFVERDQAGNAKYAFYSADAADRFFLPSDIPAKLPDSA
VFLLVGSISLVQEPCSTILALIEREHERKLISFDPNVRPNLISSKSEYRARFEWICRRS
AIVKASDSDLEWL YECPANEAA NKVLGLGPELVALTRGEHGLALTKQVRIELAAAKVAV
VDTIGAGDSFHAGLLAALGWLKVDRKDLASLSEQNLSAALRLATSVAALDCTKRGA EPP
TLHELAVFDPEAVLIAPGIVPQFNAKERIC*
>SPBIB_v1_150087|ID:27162599| ABC sugar transporter, periplasmic ligand binding protein [Uncultured spirochete
bib]
MKKRTVILALALMLVAAASLAAQTYIPLISKGFQH QFWQAVKEGALKA AKDFNVNITFE
GPESEAMVDKQIDMLAAALAKKPNALGFAALDSKAAIPYLQQA KAAGIPVIAFDSGVSDS
IPLTTCATDNVAAAAYAADKMAELIGGAGEVA VIVHDQTSRTGIDRRDGFVNRIKSKYPK
ITIVSVQYGAGDHLKSTDLAKAIIQAHPNLKGF FGANEGSAIGVLNGVKEMGKIGKIVVI
GYDSGAQQIAAIRSGEMAGAITQNPV GIGYKTVEYAVKALKGEKFPKFIDTGFYWDKTN
IDDPKIKAVLYQ*
>SPBIB_v1_150088|ID:27162600|rbsC| D-ribose transporter subunit ; membrane component of ABC superfamily
[Uncultured spirochete bib]
MADKSNGT PAIASIAKITAGTKGAAARQKILAFSSLVLLIIAFSLLSPNFFQPYNLIAIM
LATAVNGVLAIGVTFVIITGGIDLSVGTMMTFTA VMAAQTVAVWNLPVILGVLMA LFVGT
ICGLASGVMI AKFKLPPFIATLGMSMLTKGLSLIIAKSKPIYFTNAPSFAKISMGSLPFP
MKDFQIPNAV IILFGLAILASFVLNSTIFGRYTFAIGSNEEAVRLSGINTDRWKIAVYAV

NGLICGIAGILIASRLNSAQPALGQGYELDAIAAAVIGGTSLSGGEGTILGTIIGAFIMS
TLTNGLRILSVPQEWQIVTTGIIIFAVYVDMLRKRR*

>SPBIB_v1_150089|ID:27162601|rbsA| fused D-ribose transporter subunits of ABC superfamily: ATP-binding components [Uncultured spirochete bib]

VAEPIIVVRNLSKAFPGVQALKDVPQFDLYPGEVHTLVGENGAGKSTLMKILSGVYQRDTG
EILINGKPAEIHNPRAAQKLGISIIHQELNLMNHLTAAQNIYIGREPRKPGGFVLDEKAL
NAQARKLFETLRMDFDPRVKVGELTIAKQQMVEIVKALSFNARVLMDEPTAALNETEVE
ELFDIIRHLRSQGVGIIYISHRMDELFRISDRITVLRDGGQYMGTFRASETNLQIPLMV
GRKIDETARRIPEGKLGEEVVRNLRNLRGRLVRNVSNVRKGEILGFAGLMGAGRTETAR
AVFGADPIDSGEIVKGGKVVIRHPRDAVRHGIGYLSERDRKRYGLAVGMDVLDNICMTDL
PTFMNAMGVLRPKMQAAAEKQVETLSIKTPSLMQKVKFLSGGNQKVVVAKWLVKNCDV
LFFDEPTRGIDVGAKQEIYLLNKLASLGKAVVMISSELPEILRMSDRIIVMCEGRITGE
LDGARATEEEIMKLATQRETVMKTA*

>SPBIB_v1_150090|ID:27162602| Transcriptional regulator, DeoR family [Uncultured spirochete bib]

MLYDLSDRERAILLELADRYSVSEFSSILGVSEVTIRGDLSALEEKGYLLRSRGGAI
AIHRNIIERQKLHVAEKQKIARKAAELVHDGDRIMIEAGTTTALITRYLVGKQDVQIVTN
SMLAFSYARVNPQINLITGGSFRRRETESLVGPVAVQSLGSFNARLAFVGTGDFSLARGM
TTQLTEGAEIVRAMSKRAEITWLIADSSKFDKIGFVSVLPLQAVHGIITDAGLSQEAVQA
LQAEGLEILLA*

>SPBIB_v1_150091|ID:27162603|acoC| TPP-dependent acetoin dehydrogenase complex [Uncultured spirochete bib]

MATTIIMPKLGNTVESSVILSWKVKPGDAVKADTVLCEIETDKATMDVPAGLEGTVLALL
HKEGDDVPVLEPIAVIGAPGEPIGEPTPEKKSSSESEPAQAQTARPAQPSLADHSAPTAEPA
VAEKHASPRARQAMFQLGVDIEAIPLGSGPQGRIIERDVIAASFAEPKAADGIASQTTQA
AAQEAQPATAAQPAAPAGQSPTQPAQEYETISLIGIRKRIANRMRESIQTTAQYTEH
GSADAERLLALARLKAQKNPELSGITIGDLVLAAVIKVLPEFPEFNAHLEEGTLKLYKP
IHLGVAVDTPKGLMVPVVRNAQALSLSALSKEVKRLAQACQNGTIDPDSLSGSTFTVTNL
GAYGIEQFTPVINAPETAAILGVCAIRPALIQKEKGIETRMRIGLSLTADHQVIDGAYAAR
FLARLAEVITDIDFLFMSF*

>SPBIB_v1_150092|ID:27162604|lpdA| Dihydrolipoyl dehydrogenase [Uncultured spirochete bib]

MAHYDVAILGGGPGGYLAAERLAEHLRVALIEKGDIGGTCLNIGCIPTKTLNSAKLYT
HAKESSPFIETEGVRVNWQRTLEWKNEVVTRLRRSLELTLKKAGVEIVRGSGLTGAKT
IEVRPETKNQKALSEPAGTASANLASADLAPTGPLQLEADQIIIATGSSPILPPIPTAG
NPAIKDSTGLLSLSEIPQKLCIIGGGVIGVEFASLFSALGSMVTVIEMMDEIVPVMDPQM
AMMLRNALKQVTFLRSTKVTAVNGNKVEYQTKTGEQGSVEADIVLMSVGRKANIEGWGAQ
EAGLEIKNRSIATDEHMRTNLPGVWAIGDVTGKSQLAHAA YRMAEVAVADILARRTGQHG
PQIFVPETVPWALYSMPAAAGVGYTESEAKAKGYEIEVIRSPYGVSGRFIAENGFSAPGS
IKIIMEKDSQRLGIIHLLGPYASEHIWGLALALERRLPWSALQNMVFPHTVSEVIREAA
WNAHK*

>SPBIB_v1_150093|ID:27162605| Pyruvate dehydrogenase (Acetyl-transferring) [Uncultured spirochete bib]

MPKSLPVEPSQVRKSGTLKIPEIPLNQYTRNIDVERARFGNEGLRAILHDMIIVREFETM
LNSLKTMGAWEGIEYNHKGPAHLSIGQEA AVVGQAAALDPEDFIFGSHRSHGEILSKCLS
AARKLDEPRLQSVMTSWLDGETLEFAKRMPHSDTFSLARNFIVFGTLAEIFARKAGFNRG
MGGSMHAFFTPFGSMPNNAIVGGSADIALGSALFKRINKKPGIVIANIGDASMGC GPVWE
AMMMASMDQYRTLWPESAGGAPPILFNFFNIFYGMGGQTYGETMGFGV LARAGAGVNPEA
MHAERVDGLDPLAVADAVLRKKKILLEGKGPVLLDTITYRISGHSPSDASSYRTKEEIEE
WQKNDSIAELSQYLLKHSIIESEDLAAMRNEIHSTIFEAVKLATNESACPRADGKFIESV
MYSNKKILKLEDREPEVLQAGEDNPRVQAIARRARYAFDADGKALPKNKVYQFRDGFIEA
LLYHFKADPTLAAWGEENRDWGGAFAVYRGLTEALPYPRLFNSSISEGAIVGSGVGYALS
GGRAVVELMYCDLGRAGDEIFNQASKWQAMSAGVLKMPLVIRV SIGNKYGAQHSQDWSA
LVAHIPGLKVYFPATPYDAKGMMLHALSGTDPVVFLESQLLYDIGEQFEKDGVPQGYEL
LEGKPAVRKPGKDLTIATYGATLYRALEAARILEEKYGISTEVMDLRFLAPFDYEPLIES
VRKTGRLVLASDAVERGSFLHTIASNVQTLAFDWLDAPVAVVGSRNWITPAAEMESIYFP
QPQWIVDTVHERVLPPLPGHTPSSVQTAQDIARRYRAGV*

>SPBIB_v1_150094|ID:27162606| conserved protein of unknown function [Uncultured spirochete bib]

VQPDYPRIDIKIAESIIADPARSPGERLEALSAIARAMGLRLQTGPARRPPARSGESNNH
IHTCYSFSPYTPAGAALAARRAGLDVAGSVDHDSYAAAGEMRAACAMLDLGVVTGFELRV
SLKAAAHEFPEATARLLTERKLNPNDSAGIYMTIQGVPASARAEVEAFLEPVRSARYAR
TERMVERANALLSSFGLPSINFKNNDIVDRSKFAEGGTITERHLLAAVSRSMLSAMQGP
LVDWLEAKLGLALSASQRRLLSDPENPFIMYDLLGSLKAGFLDRIFIQPDDEECVDRDAI
ALARRIGAIAYA YLGDVAESPTGDKKAEKFEDEVLDELMPALKELGFPAITYMPPRNTK
AQLSRLQKLCAQYDFMEISGVNDINQPRQSFRCPELLEPEFRHLDDATWAMVAHEALSSID
RRFAFFANDNPFARLPKERISLYSKAGREIDFADPYSLERITNSLLKEKFL*

>SPBIB_v1_150095|ID:27162607| putative Sorbitol-6-phosphate 2-dehydrogenase [Uncultured spirochete bib]
MKIKVTPSAIPIVRGLMLSASFSCMVKTRPESFACPGERTNESADGPIDRRPEERAEE
HIRLVLDGILPQSEIEDAELAQALQHSLTQPQAQAIRRQLRIGDVCLDIMGAAGASIAL
DLVPLEPLDRRYQMMVQSPGDASLLSSASRASVVRGKIALVTGGAQGGFAEIARGLAHS
AVVWIADINLPAAQSFQTLSSSETGTPSAFAIDIDVSSEASVQRAFEIIALTTGGLDLVI
SNAGILKAGSLLTQPVQEFRLVNEVNYVGGFNIAQHAARLLRLQWLGAPDWFTDIIQINS
KSGLQGSNKNSAYAGSKFGSIGLVQSFALVEYRIKVNACPGNFFDGPLWSDPQRGLF
VQYLNSGKVPGARTIEDVRAFYESKVPMGRGCYGPDLKAIYYLVEQVYETGQALPVTGG
QVMLN*

>SPBIB_v1_150096|ID:27162608| Carbohydrate kinase, FGGY [Uncultured spirochete bib]
MTDAIAVLDIGMTNKKVLYSTELALLDEKRVFAPLMLDGLETHDLAAMERWFLSTLRE
YSQRFHIKAIAVSTHGATFVCTDSEGNPAPCIYYTHEPSQDFHERFFALAGERKMLQAT
TGTPDFSALINPAKGLFFLNERYPKFTSARWVLSYPQYWGMRLTGKPSAEGTYIGCHTF
LFDWERGTYSVADALGIRDKLSLPIGQAWEVLTGKPEIAQQTGLPPDTIVTLGIHDSN
ASILPHLASAAGRDFVLNSTGTWCVLMHPVEKYGFEPDELGKVFFNRSANWNTPIKTAIF
LGGKEYEAWIQIISLQGHASKDLPAQTQEDYQRLKEQRYFILPEIVPGSGQFPFSIAR
AVENGKVFLSEIEQGRDVPVFLKEPRIGQAVLNLIVLQTEVALQRTGLAEGAEILTEG
GFRNNSDYNRLLASAFPENSIYLTDLKEATSFGTAMTALAALNHIDPKELTRFIHIEKAL
VAPMLPSETLGAYRNAWHARMQKI*

>SPBIB_v1_150097|ID:27162609|yggP| putative dehydrogenase [Uncultured spirochete bib]
MKTKAVRLYGVNDLRLEEFDLPPIKDDEILARVSDSICMSSHKLAMQGDKHKRVRAPLA
QNPVIIGHEFCGEIVEVGKKWAHKFKPGMPFAIQPALNYKGTLWAPGYSYQYIGGDATYI
IIPNEVMEMDCLEEKADAFFMGSLEPVSCIIGAYHAQYHTKPGSYVHEMGIREGGSLA
LLASVGMGLGAIYAIHGGKRKPARIVVTDIDQARLDRAQTLITVESARQKGIELIYINT
KDMADPVAALRELNGGKLFDDVVFAPVRSLVEMADKLLANDGCLNFFAGPTDPNFSAML
NFYNVHYESHHLVGTSGGNTDDIRESLALMAQGLLRPEAMITHVGGNAVAETTINLDKI
PGGKKLIYTHKKLDLVAIADFAERGKTEPFYAALAEITARHQGLWCKEAEDYLLANAPEI
*

>SPBIB_v1_150098|ID:27162610|yugJ| putative NADH-dependent butanol dehydrogenase 1 [Uncultured spirochete bib]
MDEFVFNPTTIYFGKRYEAEVGRIAAQYGKRVLLHFGGSAERTGLLPAIRKALTEAGI
SYFELGGVQPNPRLSLVYKGIELCRKNSVDLILAVGGGSAIDSAKAIAGTVYEGDVWDF
YTGKAFPTKALPVGTVLTIPAAGSEASPGSVITKEEGLLKRAVNADCIFPRFSILNPERA
FTLPPAQIANGVTDIMCHLMERYFTNSKPVEFTDRLIEATLRTVIAAAPRVLANPTS YDD
WAELMWAGTVAHNELLNTGRVGDWASHDIEHELSAIYDIAHGAGLAIVTPAWMKYTLKHD
VARFAQYAVRVWGVEDNYFDPERVAREGIARLEVFWRSIGQKVRLSEIGIDDSRIAEMAR
KCTDDDAHTVGHFVPLRSKDIEAIYRLAL*

>SPBIB_v1_150099|ID:27162611| Argininosuccinate lyase [Uncultured spirochete bib]
MATLWQVGGGEGLDPAVDRFLSSLAVDARLVFEDIECSQAHAIMLGEQGIIPQVDASALV
DELA KIRKDLQSGALAVDQSAEDVHSFLEAELTRRLGDIGKSIHAGRSRNDQVAAAFKLH
VRNACRQTRARVLDASACLVAERNIETLMPGYTHLQRAQHVTLAHHVLAWCAALERDA
DRFADAATRANESPLGAGALAGSGLSVDRETAELIGFSRVSMNTMDAVADRDAIEYAA
SAATLMMHLSRACEDIVLWASSEYSFVKISPRASTGSSIMPQKRNPDPaelIRGKAGR VF
GNLQALLVMEKGLPYAYNRDLQEDKALFFEIEETINGALEAFKVLVQSIEPDAGRMRAL
DEGYLEATDVAEFLVKAGVPFRTA YQAAKLLVQRCVDEQKSLRAITQADLAVHEAFEKAG
ANAAELAEYLEPQACVARRMQTGGPAPLRTREQIDRLRAWLHLATR*

>SPBIB_v1_150100|ID:27162612|argG| Argininosuccinate synthase [Uncultured spirochete bib]
MKKKIVLAYSGGLDTTVIVPWLKENYDCEVIAVCGDVGQEAADFDAIGKRAIASGASKFIK
LDQKEEFVKEYLWALVKAGTPYEKKYLLGTSAAARPLAKGLAEVALAEGADAVAHGCTGK
GNDQVRFELGVKAFAPEMEVIAPWRIWDIQSREEEIAYLEARGIPVPMKKS SDSYSRDDNL
WHISHEGLDLEDPANEPHFEGMLKMCVTPEKAPDKPEYVTIGFQNGVVPVSVNGEKLDPVS
IVSKLNKIGGANGIGIADMVENRVVGMKSRGVYETPGGTIIMEAHDRLEMLCLDKKTLSTF
KMTVAQRFAEILYEGEWFSP LCKALCAFVDSTQSTVTGQVTLKLYKGNIFAGATSPYSL
YDASLASFTTGPLFSHKDSTGFINLFLPTKVRARLNERIKKDG LAAGPDVVKPGSSGYT
APAGD*

>SPBIB_v1_150101|ID:27162613| protein of unknown function [Uncultured spirochete bib]
MKNTISCDFMQVYLNYYVIKQRAFKKERPGLVSWSCGPVSLAGQRLFLFFAFLS*

>SPBIB_v1_150102|ID:27162614| putative tagatose-6-phosphate kinase (Phosphotagatokinase) [Uncultured spirochete bib]

MLQNSNISRTSIEAGGQNQDNQEQESHNQNSQIQDGHSSAGPREPSFLCVCLNPTIQKTL
VFSKIHAGEVNRTAQWRIDVAGKGIPTRIFTQLGERAVHLTQLGGPNRDWFLSMCAEDQ
IPIEWWESDAPIRFCTT LIEESEGHATELVEESHVPVAPGTSEAIARFSELVQKTSAVLL
SGTVATGIVPGTMARLAEIASKAGARLYLDIKKQDLLECFHPLCVKPNLEELAQTGLI
PYDEVREETTARRLVAETGRKFYERFGTYLVVTRGAKSTLYWDGRQLCEQPVPNPVNRNP
IGSGDAFGAGLARILERGGSIHDAVKEGTRLGGLNAAQLKPGSIFP*

>SPBIB_v1_150103|ID:27162615| Sodium:dicarboxylate symporter [Uncultured spirochete bib]
MVEEKKKGVLDWYFKTNLLARILIGLILGAI VGIILGFFPSSVKPFVDNSKFFGDLFIRL
LKMIVVPVVLFSLVAGAASIAPSRLGRVGVKILVYYLLTSAFAVLIGLIFANIFQPGAGF
NVVGDAAIKKEATAPTLVQILLNIVPTNPFESLMKGDVLP IIFFAVVFGIGLSYIKDSK
QQALAKSGTVLLDGVNAAAETMYKVVRGIMQYAPIGVFV LIAQVFAQQGPKAIGPLLMVT
LAVYVALIVHLVVTYGGLLSVYKLGFWKFLKGANEAMITAFVSRSSSATLPVTMRCSEEN
LGIPRSISSFTLPLGATINMDGTAIYLGVCAMFIGFATNQPLTINQQLTVIITATLASIG
TAGVPGAGAIMLLMVLESIGLKVTEGSAVAAAYAMILGIDALLDMGR TSLNVTGDMVGS
IVAKTEKELDMAKWK*

>SPBIB_v1_150104|ID:27162616| Aspartate racemase [Uncultured spirochete bib]
MKRGTIGILGGMGPDATAAFFSMLVRLDVAPRDQDHLHIIVDS DPSIPDRTRHLLEGGEN
PLPVMLSSARLLAAGADVAGMPCMTAHAFLPNLRRNCTLRILSAFEETSKALDSFT PPI
RALGILGTIGTKQTRLFETAMPDKTILWPDEDTHRAKVMEAIYGKNGIKAGNLGEEPHQL
LIQAAHRLIAQGADAI VAGCTEVPLVLSQRDFEMPFI DPMEYLARALIVA AKGVYSDHQS
K*

>SPBIB_v1_150105|ID:27162617| Cupin 2 conserved barrel domain protein [Uncultured spirochete bib]
VIIRANERTFETRHEMRGGKGDVSLAMLSNEALAPHLR LRFSEL TIPPEAGIGTHTHSGET
EYFFIIIEGNATVNDNGVTTIVHPGDVLITGGGALHN IENHTAEPVRLVAVIVTEA*

>SPBIB_v1_150106|ID:27162618| Ring-hydroxylating dioxygenase, large terminal subunit [Uncultured spirochete bib]
MIPNQWYVIASSNEVG I KPVGMTRFGEKLVLYRTASGFLVCLSDMCAHRGAALSLGKVCN
GDQIQCPFHGLE YDPSGKCMVIPANGRSTP VPSNFRVRSWPVYEAHGFIWVWYGSEPTP
EIPEFFDDIPKDAKYATVADHWKAHYSRV IENQLDCVHLPFVHYNTIGRGNRTL VNGPAV
EWVSDHKFFMYVYNETDNGQKPKKPDEVPMPSPNGYKIEFLFPNLWENRIADKVRVLA AF
VPVDEENTLLYLRFYQAFARIP IIGTLIARAAMPFN VYVAHQDRRVVQTQVPKASGLKIG
ENLFQGDLP ILEYRKKRQQLQESARPR*

>SPBIB_v1_150107|ID:27162619| conserved protein of unknown function [Uncultured spirochete bib]
MLFRDRCDGKRITGQH ALNALMPYMMRGRNESAVYYGREINIENALAYLKL I KKAQADTE
AQERFTL FSLILTAALKTIALY PRLNRFVHRRALYQRKHIAFSFIVKQRFDHDAPEVNAK
VFFDPEDSFETVSMKINAAILDAREHGEGDGERFANIFHRIPGGKALIMGVYRILEYFNI
APWSLIRMDPLYSS IYIANLGSIGLNAPFHHL YEWGNTSIFMVIGKIFSKELWHGATRTR
QRYIDL RVTLDERIADGLIFAEAA SVFSRLLS SPDLLNLSIEELKQALS*

>SPBIB_v1_150108|ID:27162620| Type I antifreeze protein (modular protein) [Uncultured spirochete bib]
VRLFTFLRFIAIFCIYFIYIFSLREVIAMPTYEYECRVCSYTFEAFQSINDDPIKTCPLC
GGEVKRLIGGGTG VIFKGS GFYITDSKKSSSASTSAKKSASSESSGSSAGCGAGCACSP
AKESA*

>SPBIB_v1_150109|ID:27162621| protein of unknown function [Uncultured spirochete bib]
LAGEQAHPAPQPALLPELSLEDADFFALVDAEEDFFESVI*

>SPBIB_v1_150110|ID:27162622|kb| glycine C-acetyltransferase [Uncultured spirochete bib]
MYGTFKDELAKKLEAIKAEGLYKDERVIITPQGA AIRVADGKEVLNFCANNYLGLSNDPR
IRAAAVEAMERFGYGLSSVRFICGTQSQHKDLERKIADFLGMEDAILFSSCFDANGAVFE
PLLDEESAIIITDSL NHASIIDGVRLCKAKRWYKHADM RDVEEIDPETGKPLKGLERCLK
EAQGS HVIMIATDGVFSMDGDIANLNAICDLAEKYGALVMVDDSHATGFMGVHGRGTWEY
CNVAGRVDIITTTFGKALGGASGGVIAARKEIVEYMRQKGRPYLFSNTLAPAIVGGTLKA
IEILTESTELRDRLESNTALFRRLMTEAGFDIRPGEHPICPVMLYDEKLAHRMADALLDE
GIYVIGFSFPVPRGKARIRVQISAGHSEAQIRKA VDAFKKIGKRLGVI*

>SPBIB_v1_150111|ID:27162623| Rhomboid family protein [Uncultured spirochete bib]
MRIRYNAPVTLTFTLLAAIVLVLSQTIAPSLIPTVFSTPAPFHSNAFVDYLKLFTHVLGH
ANIQHFIGNFTMILLGPILESVYGSFLLLSILITALATGLANTILFPNVVLLGASGVV
FMMIMLSSITNFSKGEVPLTFILIMIVYLGQVWDALTKQDNISQFSHIIGGLVGSFLGF
YRKK*

>SPBIB_v1_150112|ID:27162624|exoA| Exodeoxyribonuclease [Uncultured spirochete bib]
MVKIYSWNVNGIRACAQKGFLEWIAASDADFVCVQEIKLQGDQLTEELRHPVAGSGKRYH
SFWAFAERKGYSGTGIYALREPVSVSGMGGQEFDSEGRTVVADYGGFVLVSAYFPNSQEA
GMRLDYKLR YCDSMLDFCERMRRARGKHVIVAGDYNIAHKPIDLARPEQNEGNAGYLPEER
AWMDRFTAAGYIDTFRWFCKEPGHYSWWSYRAPKAREKNIGWRLDYHCVDPEFAPALSAA
GIHPEVMGSDHPCVSLFLDV*

>SPBIB_v1_150113|ID:27162625| putative ROK family protein [Uncultured spirochete bib]
MTHEEQHPERAHLIRERNQRLVLR LIFRTGILS QSKAVQRTGLKAPT VFRIFSDLEREG
IEAVSEPPSRSPKNRKKGRRPVNYRIRSSAA YVVGIDFWARSAAAIQDFAGNLVAERGV
CFASPPSAEDALDIANLIRDMLVESSIDRSKLLGIGV GAGPSVSVSSGVVQFYARIPGM
NEFPLGERLRLSFSVPVIVTNNASIVALAEERYGQARGVSSLFLFLVRAGVGGAFIQNGK
LVSDRSRTAFEVGHLSIDPSGLACSCGNRGCELYLNEETVCTALSQIEPCAGIEDAERI
LSANNPEVDAALKPILEISAHAVRDIRLLAPEAVLIVTRSKSLSEHIAQAASADFERND
QRFGPPGARI IASEYNPVLACKAACDLVYEEYFAHGFGEGSGFPGGGFMGGSQQRSAGQQ
PSGAQAE*

>SPBIB_v1_150114|ID:27162626| protein of unknown function [Uncultured spirochete bib]
MNQEF EKNSALFFGSTRYVQPRWRAMPAQQKFSHSLNEESDRYVHALAKLEQEDEEIP
SDRGPIVFRDGLFQIDMSQIEEKGDIDIELKKLIDSIIGE*

>SPBIB_v1_150115|ID:27162627| putative ATP-dependent helicase YoaA [Uncultured spirochete bib]
MGKKQTAIVDAVQRFTTQAQQELKNAISDMEGREVF AIGALDSRGLIKKLEILARGSEGA
VPAPFRDRDSAQVLIHNHPSGELFPSDADVLVAEAAADGLGSYVDNAVAKVLVVAEPV
RAKLIRPLNPDEIAAVLDDGGKLSLKMPEFEPRTS QVDMARDVAALISDGGILIAEAGTG
VGKSFAYLIPSLAWAIGNNERVVVSTATINLQQQIFK KDFPVVSSLFKKPAKAAVVKGRG
NYLCKRRLYEAIEEDALFSDTSIKLRQILEWDNNGGSGDKSDLSLPDDDPIWNRVCS
ESDYCLSSRCPYHEKCHVVRVRLEAASAQLIIVNHVLLADLEAKRTREGVLNTILPSYKALV
LDEAHAIESSATSLFSESFSKRSIQRLLGRLVRKKKRTQTGILPSLRRLPDIPAALLDTA
SKQADAAAAAADAFNASALASYPEKESLLIKNLESFSRSAFLSALQSLERDLAMLVTRL
GEILEAMPPEFEDEESVVELKLT SRSIEEAAALVPRFKNPDAEPQTIFWMQIDRKNPREA
VVICTATPLEVAPLLAERLFSKVRTCICTSATLTINNSFDWWRNRVGLPTKKDGETSKAM
STMGATAGTTEGAIDAPIRNRQYPSFPYRRNALLAIDTSAPPPDGTQFQAYLNTAVARL
LHASRGRALVLFTSHKALRDYDYVAPLLEKEGILALRQGQKDRYSLLHTFINDISSVLF
ATESFWEGVDAPGETLSLVIITKLPFRVPTDPIQASRAA AIDARGGNSFAEMSIPEAVIL
FKQGFGRLIRHSNDRGVVAVL DVRIA KKA YGNLFISSLPECKLETGPLDQLCTSVAKFLD
SEG*

>SPBIB_v1_150116|ID:27162628| protein of unknown function [Uncultured spirochete bib]
MTDMEATLPCAAFLNPVQQYAWGRTEGIAPFIEIPPLNGLPAGEVWVMGSHHRAPSKAIF
DKGAVPLDELVRAAPEHWLGSKAARHYGDL PFLFKVLAAGAPLSLQLHPDAKAAKQGF
EAAAGIPLLAPDRSFKDPNHKPELAVALTPFKALAGFRPLEHIAQFLGPELCRALSWSNI
ARTEDLRLFMRRLEFARGAGFMPLNMLLESRAQTLA ASTASEEREAGLLALDLKARYPGD

PGQFAPFIFNILSLEPGEGLFVPAGVIHAYLTGSILEIMACSDNVIRAGLTIKHIDIELL
CDILDPDAKPLVVEPYITHAEGVEHAVWNTPADEFRLERLDDLSSANFAYAPEGPEILLC
TQGKAHIQAGSAFDLKARSSLFVAGSCEQVAVKGPATVWRAIGPAPKAADAAGNSLTIWV
DGDSLPRDLRPLLVKRVLSPRKYGEVLVNVHFVAARALSGVPAHCMTLVEPGEGAADRCI
ESLAQPGDIVITRDIPFAERLLAKNIHVINDRGNVFTDRDSIAERRSIRDVMAELRAVGIA
QSSPKGSQRTSAETKRFADALERTIVKAARLKKAAAR*

>SPBIB_v1_150117|ID:27162629| Glycosyl transferase family 51 (modular protein) [Uncultured spirochete bib]
MSDRPQGERPHKERARGKNRKPRSLGVRIVRVVVLAVLIAHLAYIGITSALILVYKFANP
PTTVLMIYRSIISHWKVQKPIPLPLANIPLSVRRMLVSVEDGKFYEHHGIDMEAFKRAKA
LNEKIGKPMYGGSTITMQVARTLFLVDPKSYVRKYLEVIAALELEFILSKNRILELYLGY
AEWGKGIFGIERAARVYYGTSVRNISADQAARLIALLSSPIKYTPDTLYRSLILRERYAY
LVQKYVSPIAETKSEAEAPPPAGIEPSADIEPSADVSAEVESAGPPSETAVPAEPAAPSE
PAEIVAPEAPAGDTP*

>SPBIB_v1_150118|ID:27162630| putative Major facilitator superfamily MFS_1 [Uncultured spirochete bib]
MSDQHQRSAKSGMSVSGKHYSIILLAVITRFLQWGILGILIPVSNLLRMSKGLTLPGLF
AAAITAGIVVALELPTGVIADRIGRKRITYLASLAFMAASCAALLFASGFAMVSLAFALYG
VSRALSSGSLEALMIDRYIEANGDSTLHRLMSFVSAADTAGLALGCIAGGYIPGLWTAIA
LNSNRYQGNLLVMLAFLFLTMLVVFSVAEEKPDPQKQATLRRFMAESLSFIRFSPALLA
FLGAGAAWGIAFSAIETYWQPQVASIVGSAGSDRLNGFLSAGYFLTALIGSLAATPBLEK
TKKNPGLLLLILRLLMVALALQTSAGGFAALYLSMFFWNGMASPPEATVLNRLPSDKRA
SMLSAVSLAVQLGGLVGSVAFGLVVKSSGIRVAWFIAAGVLA VSSFLFPFAASHYGGQTK
NSSQSTPGV*

>SPBIB_v1_150119|ID:27162631| conserved membrane protein of unknown function [Uncultured spirochete bib]
MKKFTWLACLGLAIVLVAGIIGFSVQTAGGKVQIRDVRFVGSNGTVMSALLYVPKNATAK
TPAPGILAVHGYINARETQSGFAIELARRGYVVLALDETGHGYS DSPAFANGFGGPDGLA
FLRSLDIVDKNNIGMEGHSMGGWTLAAAATMPDAYKSVVLEGSSTGKPYAAEGSTTWPR
NLAVVFSTMDEFVLMWGVPRGKDAPKSPKLQAVFGTTDPIEPGKIYGSIEDGTARALYQ
PVTTHPGDHLSNAAIGY AIDWFAKTLSGGNPIPSSNQIWFVKELMTLAGFIGFVLFILGV
GGLLSVPVFAPVAKVPPAGKPAKGAGLWIGALIAAIPALTFFTFMGWGAKWIKAGSFW
PQNITSQLAIWALLNGVISIVLFLWHFVLNRKNGAKAEDYGIGL TWSDAWRTLLYGFVAV
IVCGVFLLGVADYLFKIDFRFVWLALKFPSQIQARIALAYAPVFFLYYLVASLALNSQLK
LGGKGAARYWFAIGTASAGFLVLLLEYIPLFAGGTLLSAAQPLNTIIAQFLPLMIVT
SLFSTWFFEKTGRIYAGALINALFISWYIAAGQATHFLVR*

>SPBIB_v1_150120|ID:27162632| protein of unknown function [Uncultured spirochete bib]
MNTKVPALKGLKIIEFMLTASEPITMSQIAERLGYKVSEVQRTVTYLSAEQYLIRNGAG
SYMPGPKIYQFADQNRETILINRAEGPMRSFAEKTAASVHLSVLVEEMLHVIFEIESKEI
VRISIRPGLYKAGSTASGRLLAYAQSPILAATERQKIMELGYAFKDDIDCVQGVYALAVP
ICTQSGSCIAALASPYVLPARGAKEAFRQELVEPLKRAANDIASLL*

>SPBIB_v1_150121|ID:27162633| Pyruvate/ketoisovalerate oxidoreductase, gamma subunit [Uncultured spirochete bib]
MTEKTFIAGFGGQGVISLGLWVYSAMKEGLKVTFFPFYGAEKRRGGIARASVIVSNDEIT
SPLVTSADSVVMNQDSVEIGEKVCKEGGTIFVNSSLVKKDPPARDANIVHVPCNDIALK
LGDVRIANMVMMGALSKVTGAVKLDNLETVLKSFFPASKHSLIALNIAAVEEGKKAV*

>SPBIB_v1_150122|ID:27162634| 2-oxoglutarate synthase [Uncultured spirochete bib]
MELAYGHPKSLKPIQTKYCPGCGHGVHRLIAEVVDEMGLQTKAIIITNPVGCISWADLYF
DFDSVQPAHGRTPAAATGIKRMLPDHLVICYQGDGDLAAIGTAEIIHAANRGEKFTTIFV
NNAIYGMTGGQMAPTTLVGQHATTAPGRDPGVAGMGYPIRVCELLATLEGTKYLARGSV
NNMVNIRKTKNYIRKAFEAQMRGEGFTMVEILSQCPNTWQMNPVQSVLEKNMITYYPL
GEIKNTLNATAGAPATSPAKAN*

>SPBIB_v1_150123|ID:27162635|vorB| Ketoisovalerate oxidoreductase subunit VorB [Uncultured spirochete bib]
MAEEIRLMKGNAAIGEA AVRAGCRA YFGYPITPQNELTAYMAKHMLAKGRFTIQAEESEVA
AINMVYGAASTGARAMTSSSSPGVSLKQEGISYLCGADLPAVIVNVARSGPGLGGISPSQ
GDYFQATRGGGHGDYYTIVLAPKGVQDAADLTYEAFSISEKWRVPVLILADGLIGQMMEG
VVLPEPIDPATLPRKPWAVGHAVEMGRPNHVTSMNLPDELEAANHARYARYERIKKDI

NRYEEDVEDADVVFVAYGTSARVSHGALQMARAKGMKVGLFRPISLWFPYARLHELAE
 KGKRFVEMSMGQMIEDVRLAVNGKAPVYFYGRCGGNIPSQEEVFAEVARLMGK*
 >SPBIB_v1_150124|ID:27162636| conserved protein of unknown function [Uncultured spirochete bib]
 MAIKGSVEIDRERCKGCQLCIRACPTKVLGVDTEPNSWGYFPAKVIADKCIACGNCFAV
 CPDVAITVYKL*
 >SPBIB_v1_150125|ID:27162637|ptb| Phosphate butyryltransferase [Uncultured spirochete bib]
 MKHISEIIEKAKTFGRKLAVASAQESSVLEAVVDAYNEGIAEPILVGDPAAIRAAAKEA
 NGGKGVDISRFELIEEANLSAAAARAVALVRSGEAAFLMKGIIDTSLLLRAALNKESGIN
 AGRASHVAVMEVQTYHKLLVLTDAALNIAPDLPAFVDIINSVAVVANALEVKTPKVALL
 AAVEKVNPKMPCTVTASILTQMNRRGQIKNCIIDGPLALDNAISAESARIKKIQSDVAG
 DADILVAPNIEAGNILYKCLLDLAGAKGAAIVMGAAPVIVLTSRADTAETKLASIALASL
 LGSTSLRA*
 >SPBIB_v1_150126|ID:27162638|buk| Butyrate kinase 2 [Uncultured spirochete bib]
 MSLAILVINPGSTSTKFAVFEGGTRILDQSISHSAEEIARFPSIAAQYEFREKAIQDVLL
 QKNFDACKLGAUVVGRGGLLHPIPGGVYRINEGMKADLLAAKYGEHASNLGALIADAFARP
 LGIPAFIADPVVDELDDVARVSGNKLFRNSIFHALNQA VARRFAKERGRSYEELNLI
 VAHMGGSVSIGLHRQGRVVDVNQALNGEGPFSPERSGTL PAGDLAKLCFSGRYTQQEVLK
 MITGKGGMVSFLGTNDMREVERMREEGNKEADLYYRAFVYQVGKYIGSLAAAACGKVDGI
 ILTGGAIFWKELTDRITEMVSFIAPVVVYPGEGELEALALAGQMALSGEIEIKEYVP*
 >SPBIB_v1_150127|ID:27162639| protein of unknown function [Uncultured spirochete bib]
 MREPGVFCDALRTLAKVSIEMAFQNLQISLAFHLHISGILHILLYISGVAACHWLSSS*
 >SPBIB_v1_150128|ID:27162640| conserved protein of unknown function [Uncultured spirochete bib]
 MIGFFEHLFLIRGVKTYALVGSSGTGKSFRACLVAQKYGIDLIIDDGLLIRGDQIIAGR
 SAKKDPYLGAVKTALFDEREHREQVSRALQHERFRKVL VIGTSERMVQKICERLQLPHP
 VKVIKIEEATKAEIEKAVQSRKVEGKHVIPVPALEIKRNYPSIFYDSVRVFLKRSFGVG
 ATLPKLYEKS VVRPEYAKRGRVAISEAALSQMVVHCVNEFDPNVRIMRLAIRNDTQGYRI
 TVVLEVPFGTRLASKIYSLQEYIVDSIEKFTGILVAEVNIVIDRLAVRPQKEQKWGRAID
 ARRQSV*
 >SPBIB_v1_150129|ID:27162641| Phosphoglucomutase/phosphomannomutase alpha/beta/alpha domain I [Uncultured
 spirochete bib]
 MSRIHPILGLPIADPNKIPLSRENLPSEDIQNAARSLILSASGWRKVFADPSTEDTYA
 QWAYDRSAENSLSRTISSADAVIVAGMALVFASFIKEQCKGRAPIVLLGIDTRPTGPAIA
 DVFARVLIGEGCSVRYLFI VPAPEIMAFAAQTTSPLDNEAHADAFAYISASHNPPGHNG
 LKFGIGGGVLTGNQIAPMIAALKSFIADPDSRSLAAISKADPRALAQCYESVAHWKRF
 SQSAYMLFAHRVFTDEDSL ERQEEVLSAIA TACEKRPLGVVAELNGSARTQSIDQDWLSA
 LSLQTKMLNVEPGIFAHRI VPENDSLED CRAALAEAHQENPAFMLGYVPDCDGRGNLVY
 HSRMLQSAVPLEAQQVFALACLSELA YLKWKGETRPVAVVVNDATSMRIE AIAALFGA QV
 FRAETGEANV VACA EKL RSEG WVV RILGEGSNGGNITHPSKVRDPLSTLGSIVRLRLRGD
 ANSGKTCFNLWLDAIGASDRYRPDYLEDIIDS LPQWATTS AFEPYAALKIASNDKVALK
 NAYQRLFLEEWPRMQPQLAARFGIAAWKALATIGANEQEIGSDFGASGNGGLRIVLFSHA
 GEARAFLWMRGSGTEPVFRIA VDIKNGSSEDEAWLRSWHTRL VMQADLLVSKAQDIVG*
 >SPBIB_v1_150130|ID:27162642|rnhB| Ribonuclease HII [Uncultured spirochete bib]
 MKKSTNYCTFETVLKIPVHL VCGIDEAGRGLAGPVAAAAAILSPDFPMEILNDSKRMSK
 ARRENAFQVITEKALDWSVGWATVEEIEQRN ILGATLLAMERAFQGLRKMPALVVVDGIF
 TPTLMADGAAVEAATMPKADGVVPAVMAASILAKVARDH CMDCLDQTMPGYGFRVHKGYP
 TRLHREAIAALGPSRYHRLSFQLLAQESPLLFDPSGE*
 >SPBIB_v1_150131|ID:27162643| protein of unknown function [Uncultured spirochete bib]
 MWTSARALLMEESILSFLRTREYECVQAGEAVQSARSVPAGPPLFQIYVHRHSRTAAFEA
 IDGIAVQWLDGAVHLILPPSPHDDAGL VALLKDTSNIRRIAGTKHAVMRITGKMPSMNWN
 HALFLLMQLPHAQSSHSQQPHSLLRQKHVSDTPRV DGEVRCVDASFEDLNALVSLHLE
 YEREELALYSADASETEMRMRSLLANQIVCMAWAGNEAIGKVNTNARGIYCDQIGGFYVK
 KEWRSMGIGTNLLLYLLKKIEA EGRH AVLFVRHDNLAALRVYQHLGFLAVGEY AISVARQ
 HI*
 >SPBIB_v1_150132|ID:27162644|trxB| Thioredoxin reductase [Uncultured spirochete bib]

MSQPYDFAIIGAGAAGLAAAQYGARANLKTUVIEEMAPGGQALLIDALENYPGIEEPISG
YDLAERMRVQAERFGASFIDASVSNVRKENGFRVETSNGPVESLTVLVATGAKHRQLEI
PGEQEFMGKGISYCATCDGPFKFKRMLVVGDDAACDEATYLSKLSAQIVMIHRRDRFR
AQKALAQRVLSNPSIQVRFNTVAKEIRGDTKIRSVLLENVLTHEITEEPFEAVFIFIGSI
PQTEFLKDTGVALDETGYIITDCTMQSSIPGLFAAGDVRATPFRQVITAAADGAIAAHAA
ANYIDEQRGQAYR*

>SPBIB_v1_150133|ID:27162645| protein of unknown function [Uncultured spirochete bib]
MNDPDSRSLLEMARGQVRHLLSSLPDIVYILDEQGHFVFLNEAAALLGYEPSALIGKHFS
VIIHPEDRPNISRDIVVEKIRQANKFPEIAPKLFDERRSGERMTRELEVRLVHRDGHIIY
GLVNAYGERDIDVPLLADLVGNAHTIGVIHDISAMHLYQQSLEESLAAKEQLLREIHRV
KTNLQLVASLAHLKQLDSARRDTSEVLRELEAQVKSIALVHEALYNSEQIDRISAGKFFA
QFCHAAEEALESVGVSTVHLRFSSTDCSLDPDRLVPLALATLEILGGAYRFAFEKRAETEI
RLDYRCLENGEQVLELEGEGLMSAADSMVLHALLRQANARLETEVKEGARQRCRMVLLNH
SEKDAENREQGRAE*

>SPBIB_v1_150134|ID:27162646| Histidinol phosphate phosphatase, HisJ [Uncultured spirochete bib]
MAFSFHSTHSTFCDGKADARTMAEAAFAHHYTHLGFSAHAPVPFKTRWNLPWERAQSYVET
VRALAQEFEPKGMKIFLGLLETDYAPGITMPDNPAVDVFLDYRIGSVHYITAPGEEPFTV
DEPQEEFARNVLRWEPDGDYRRIWKRYWQYMSEMIARGGFDIIGHFDLVKKNPDGRWFD
EQDPAYLDAAFQAVELAAEKQLVAEINTGGIARGKHHEAYPSVRILKRMHERGLRLTLGD
DAHAPSHIGTYQHAAIDAARRAGYQSLWYLDAPGVWKEISIDEAARSR*

>SPBIB_v1_150135|ID:27162647| Transcriptional regulator, TraR/DksA family [Uncultured spirochete bib]
MDNAFIERMKNLLLTQRQEILDITIAESNEQLRTVLSETDPKDSADIASDDIDRIMIEALI
SQDLKRYRAIEAALLRISQGRYGLCAKCGKKIPQERLEAIPYAVLCVECQKSDERRNR*

>SPBIB_v1_150136|ID:27162648|infA| translation initiation factor IF-1 [Uncultured spirochete bib]
VAKEEAIEVEGIVKEALPNTMFRVELANGHIILAHLSGKMRKHRYIRIVPGDKVKVGLSPY
DLNRGRIIYREK*

>SPBIB_v1_150137|ID:27162649| putative 1-acyl-sn-glycerol-3-phosphate acyltransferase [Uncultured spirochete bib]
MIHARRYHPTNFKFFTWLMRYTYGLWLRRA YRIVAINAELFKELKPPFILVGNHTLLDP
FIANAFVFPPIHWVASDGNMRSPIMRFLIKLVGSIPKSKAIPDIETVNWIVDIIRKKG
VVGMYPEGQSTWTGTTPFAFYSSAKLLRLLRVPVVLAKTQGGYLTKPRWSHVRRPSKVEI
AFSVLFTPEQLRTTPIADIDAALNNALAYDDTEWCKREAIRFESARGAESLELALYICPK
CGAKASLHNGNRFACDRCDFSVEYGADGSFALPPGSADPVFLPPFSSEPFLESIAHWK
LQSAFMQAELAEWLRAARWDPIFSDENIQLKKGKRIDSMTMLRGRIDL FIDRLEFRDAH
KPGGATGPLIFPLDTVEAEGVLKWNFFEFYQGMNVYRVVFGDPKASGRKYADAIGLLHEL
SHSHLPGR*

>SPBIB_v1_150138|ID:27162650| Na⁺/glutamate symporter-like protein [Uncultured spirochete bib]
MDFSWKFVIDAGLISIALVFATFLRSKITFLQKYLVPNALTAGFLLPIYNYLLPSIGYA
TNRLGDLVYHLLNISFISMSLRSSPPKIKGSRNNGVVLGMSAVILFGYASQAILGLLLTL
FFLPKIHAFGLHLPLGFALGPGQAY AIGKGWESMGFEGGASVGLTFAAIGYLWACFGGM
LLIHKGIRKGMKSDQLTAMSDKAMLTGIIPREAEKPIGAQLTTDSEIDSFSYHAALVV
FVYFLSFLFLKGLTLVLGFAGKAGMELATNLWGINFISAIHAIIVRKIIDALKLGYVLD
DNSLTRISGMAVDYMVAGALAAISLVFVGKYWFPIVLMSTLCGFMVYYTLPWVCSRIFRD
FRFERMLMLYGVSTGTLSTGLALLRVM DPEFKTKVSSDYMLSAGLTFVLALPFILAINLP
AKAYTSGSMTPFWIFIAIAAAYLVFVAVVYWILARKRRFAMPSPDNFYRPGK*

>SPBIB_v1_150139|ID:27162651| putative Transcriptional regulator, Crp/Fnr family [Uncultured spirochete bib]
MNDREIAKLATCNLFRNVSIERFADFMKAARYREHEFRKGE LILLQGCMYASLYILLDGS
AYAEMTDDEGRMRVETFAPVEALASAVLFSKPVLPVTVGAQSDCRIISFPKEEIKMC
MSEKAILEGFLADSGARVQFLSERLRLTRFATLRQRIADWLVRKAQAQHTMLRDSSETAQ
SPSPAQQNPVSIRVEPSFEKMADLMGVARPSLSREL SHMRS DGLIDMEGRTILEDIEAL
KNIRNSKSRQP*

>SPBIB_v1_150140|ID:27162652| putative NAD(+) diphosphatase [Uncultured spirochete bib]
MKKDPQRFMLFRGQDCLVPAQAAGQLQ SMAELADSTAASGAHFPNFPEISPGSVSWPAGA
IPLSLFSAKPDGYSYSVVFVQGVVYGAVLLKDDDEPFAEVASLGAFVPPFSRQLALSFS
HLGRFVLLARAHAQWAAVSRFCGACGAPLVDANGNEDVREPLDDHAYGTRFCPRCKRLFF

PRMSPVVIVLVRGKEILLEHNVRFPGNRHSLVAGFVEIGETLEEAAREIREEAGIEVK
NLKYVRSQPWPFPSLMLGFVADWAGGEARPDGKEIDHLDWYTADNLPELPMKGSARWI
IDTFMAGGFSNF*

>SPBIB_v1_150141|ID:27162653|upp| putative uracil phosphoribosyltransferase [Uncultured spirochete bib]
MEQRVSKILKAEDLDGYLSAKDLDYLSQMDSLYRHAMVSFNILATSTSESQKHREEQTL
IDLYNRMGSLMQEICAAEPRIQVYSFVSPQETHGEVSRLIAKLRDVTSTGRQEFVYYIQRA
FELLFTLAFGGSGRTNKNYLIVRTPVTIPVQNFAVHKIPNVDDAVHDTVMCMVLRGALLP
SMILSKEIQEYSSTGYITPFALFKIKRDDTKSETTMEYVLDLDHSYFDLAQLDGKHLFFA
DPMNATGGSLVTVVKYLLEQGVKSPASVKFFNVISALKGSLRVVRAIDNITYTLWMDPSL
NERAYIMPGLGDAGRINGSDEEGHPRDMLRLVADYGTNITGLYRSQRLRIIEETVLRHRS
*

>SPBIB_v1_150142|ID:27162654|pduL| Phosphate propanoyltransferase [Uncultured spirochete bib]
MLETKMIVNLSNRHIHLSHEDVEALFGKGYQLTKTKDLMQPGQFACAETVTIKGPKGQFE
GVRILGPERKETQCEILASDVFKLGVPVGPVRESGQLEGSFPFEIIGPKGSVKKEKGLII
AKRHIHFDPESAKRFGVVDKQLVALKVGEERGAILLNVCVHPTYAALCHLDFDEGNAL
GIGSGVTGEIVQV*

>SPBIB_v1_150143|ID:27162655| DhnA-type fructose-1,6-bisphosphate aldolase-like enzyme [Uncultured spirochete
bib]
MNEGAILRMQHIFREDGRTVIVAADHGAIAGPLKGIESPRLARLCAEGGADAILAHRGF
VRAGLEAWKRQLGLVLRASGGFTTLGGRFEEELIAGAEDAVRWAADAVAITVKFGHAREG
EFIKNAAGLISACEPCSLPVMIEAMAFEKGEFSTRADALAIAVRAAEEIGAAFIKAAMPQ
SIDDFVQIARGTHVPIVLLGGERTDSLPALESIARAMDLGASGVAMGRNIWGQDRPREI
LEAVVGLVHGGWDIQKVIHCEHHT*

>SPBIB_v1_150144|ID:27162656| putative Pentulose/hexulose kinase [Uncultured spirochete bib]
VIFAIIDFGTSRAKGAIFDALGACLGMAEVELTEDSRSSGLIHEIDARGWLTAMAEIAGRL
LDPLDQTARATLKALVICGNGPTILPIDEHGEPLANAITWLDRAFFESEESAALGYSL
DAAFNLPKILWIRRHMLRLYEASRYFVSCPEFVAGRLTGEWTTCLPNRGYTKIHWDEAAL
RALALDERKFPPSIGIGGIVGHVQAQAAEAYGVAPGLPVVMGGPDFIASLLGTATVAPGR
TCDKGGTSEGINLCAATDLANAAPSASRAASSGLLVMPHIIPEYYNISGVISTSGKALAW
FKDRFLPEESFGAIYSRAERAKPGASGLVFLPYLAGERSPHWDPDASGVFLGLRLEHDL
AMVRAVMESTAFAMRDVISVMEAGAHVEDLRSTGMPAQSAIWNQIKADITGKPVKVPAP
SEPELAGCLAIGRFALGEEKSLAQAAEHVFAPRAIFEPREYAALYDELFSVYRETYRRL
ADLFPLLRRAGHTAGSAQEEKP*

>SPBIB_v1_150145|ID:27162657| Theronine dehydrogenase-like Zn-dependent dehydrogenase [Uncultured spirochete
bib]
MKA AVL VAPGRFEIEERPRPEPKENEVLVKLEACGICTLEQRLFTGAMRLPLPLVPGHEA
AGLIAAMGSKVIEELSPGQKVALDLVERCGECYYCRIGKSNLCLNRYKNPARMLGGFSEY
IVVRPNQIFVPDSVSYEEASFAEPLACCIHSLKRLKVAMTEDLLIIGAGTMGLLHVLA
RSMGLRITVSEPDAVRRDTAKALGADFVIDPAKTDIVEFGREITDGIGFSSCVITSPSPA
ALEPAIRAMAKAARINIYAYEDVMQIPLDLNTIHRNELLITGTEGRVQEDFFQAVRLLS
FGKIDVKPLISARTSFSTIEEGFRTALSGKAYRVVLMHSLP*

>SPBIB_v1_150146|ID:27162658| putative Mercuric resistance operon regulatory protein [Uncultured spirochete bib]
LTERLLKIGELASLFGVTSRTIRYYEELGLIEASNRTEGLHRRYPADVIRLKRIEELKR
LGLTLGQIREFFMLY AEDPSGEKCRLLMLQIYEDQKKEEEAKILEARRHIAQIEENITAI
KEKKSFFSFCPGDECKDCSFDGFCDES VYNQLKE*

>SPBIB_v1_150147|ID:27162659|tpn| Membrane lipoprotein Tpn38(b) [Uncultured spirochete bib]
MRRFLVAFVLAIVAGTALWAQAPRIGVFIPGVREGSPIYDTMAKGAERLAAEISGASIKI
FEAGFNQAEWEEKLTSFVASGKFDIVITSNPSMPELVNNVSKSFPKQKFCICLDGYLPGNP
NVYSALYNQLEQGYVTGYLAGLVVISGMKGTNPDKKIGMIIGQNYPVMDKMIIPGMQGL
KAADPAFQLDIRVLGNWYDAKAADLSRSLYAAGADIILPICGSASQGA VKVAQETGKYL
VFFDDNEFARAPDNILGCAVLHQEDLAYRSLKAAIEGKLPFGKADVVMGMEGYIEFLNTN
PAYIKNVPEPIRKKVDAAIQSIKSGQLTFQVPSL*

>SPBIB_v1_150148|ID:27162660| putative Uncharacterized ABC transporter ATP-binding protein YufO [Uncultured
spirochete bib]

MQPMIAVRMRGISKRYFSPGIRANDEATLEVERGSIHAIVGENGAGKTTLMKILAGLELP
DAGTIEIEGKPVHIQSPAARELGIGMVHQHFLMFDDLTTAENIFFGLEPLRVSKIPGVL
GILDRQSLVEQTRRIAADYGFVLDPMAQAGDLSISARQQVEILRQLARNLHILILDEPTS
VLTEQETTALFEKLAEIRRMGHTIIIIVTHKIDEVMRIADRVTVMRQGKTVGTYDIAATTA
NELACLIMGTNVCEEISPRTEPAAQGPVVFQIEGLSARGHHHGETGVTDLHFAVHAGEVL
GVCALSGNGLAELEDALGGFLVPSKGFICFDGSRDLDIRRIHEYRQLLKKGAIGYLPSTRM
RRSMALSLTVRDNFMAVSRTRYFQRGWLESTLATRQTQDALHSFDISAQPEQKTVELSGG
NIQKLAIARLFSIQLPKLLILCEPTWGLDIKSTENVHRRILDAKAAGSAILLSSDVDEI
LALADSIMVLYRGRAVLLASNSGELNRERIGEYLLGARSE*

>SPBIB_v1_150149|ID:27162661| putative ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]

MHSERELPAGARIALAVALSITLAAAVLALFTKDFSPALGQFFFEPPFANRYFFGNYSIADS
VPLMIAGLGVLIAFRSRNFNLGGEGQIYAGAIAAGMLALSPPERIPPAQAWLFAALAGMV
AGGLIGALSILKALWHVSEMISSFLISAIVLNVGDYLLITGPFQDPASNFQTTTRQISSQL
LLPRILAPSKLDISVFIGLALIAVLAIMSKHTRPGFELRVCGENEEFARYCGIPVALYQS
AAMAISGALYGLAGALIVMGPQARVMRGFSSGLGWSAISVALLAQSSEAGILPSALFIAY
LKAGSDHVMIGSGVPSEIISILQAAAMFFITARHFPVRKRRRP*

>SPBIB_v1_150150|ID:27162662| putative ABC-type transport system, permease component [Uncultured spirochete bib]

MSTPITILADILKYTIAAATPLLFA SIGGLFSQLAGMLNIALEGLMGLGAFFGMAAAGAS
GSLVVGAMAGVAAA VVGSWLMGIITIKFKANL FITGLAVNLLAVGITAVLSQSWFHTKAV
VAFDIPRVMLAFPAFLGRIPFIGPVLFSQNILSASAWLWVIAAAFIIRNTRHGVRIRATG
MNEEAVNALGYRDPDRYHMAALIWSGVGSGLGGFALGVSISAFVFNITAGRGWIALVAMYL
GRGKPLWIAASCLLFALAESLSNYVQGFS AIPPLLVLALPYAVTLVSLVAAAAGKKD*

>SPBIB_v1_150151|ID:27162663| Pyrimidine 5'-nucleotidase [Uncultured spirochete bib]

MIRALLFDLNTLYSEATGLETGVLQRMNQFVADIFNLPFSEAGKFRREHAKPYGTTLEW
LMREKGFAPER YFSYIHPEGEEDCLEPDHVLRLMLNSIPLPKAVLTNAPREHAERILAK
LGAIECFIGVYDIWFNELLGKPNPKAYLRALDASGFALQETL FVDDL PKYVKGYADLGGP
AVLKDEMNRFPDLPCRRIQTIELPEVLDEIGMKAS*

>SPBIB_v1_150152|ID:27162664| Peptidase S54, rhomboid domain protein [Uncultured spirochete bib]

MIPIGDDNSGRRGKAVVNWILIGLNVFVFIQKFALDDYATLALAAIPEEILSGHRLFT
LITSQFTHAGFAHILGNMIFLAVFGDNVECRIGKLR YILLYLLSGTFGMILLQILLALMAG
GAALQMPLVGASAAISGVLASYLVLPGNKVVVLLFYFIPTALSAWVVIGFWFVLQVLGG
LSGLASIQSGGTAYFAHIGGFVSAYLWSRGYKKKELERILAWRKRLAGDSDGFHWWIVD
D*

>SPBIB_v1_150153|ID:27162665| protein of unknown function [Uncultured spirochete bib]

MAERNERYRGLFLHAKDTARGDRIVTFLCKEGLSLFLFGGPKSSLRSVATPYILADIEV
YHRRNDFSKLTGATILETFDSLHTSFSHMQAAAAAAEFVIRTSAFGGEYGLALQMITTL
LRELPSIEEDSAPYAMYAFLWNALAPQGLAPDISACEHCGKRFTEEGALPGRLLAGERSF
LCARCAEERRREGFPASAMILIDAMVLQCLREILDVSYQAARCMSVNPSSLHIEAIIES
LAESAAEGPLQSLRLFH*

>SPBIB_v1_150154|ID:27162666|pdp| Pyrimidine-nucleoside phosphorylase [Uncultured spirochete bib]

MRAVDILMKKRAGETL TEAEIRFIIDGYVKGEIPDYQISALLMAIFFRGMTAKETA ILTE
TMLDSGDRMDLSGIPGPFVDKHSTGGVGDKISLPLAPMVAACGVKVPMMSGRALGHTGGT
LDKLESIPGYRTGLELSEFRKGLIEDGFAMTGQTARVVPADKKLYALRDVTATVESIPLI
TASILSKKVAEGADGIVFDVKCGSGAFMKTYNDAKALASSLVATGTAMGKR VVA VLTDMS
QPLGYKVGNFLEIEETLDCLEGKGPQDVMELTFRLGAWMLVLGGAAETIEEGRARCEEAI
SSGAALERFYRN VVRQGGNVGQMLKRRGSWRSDFARELKAENDGYIESIDALDIGLAGVY
LGVGRNRTE DNVSPTAGFIFEKKRGDLIKKGDRIAIAYGKDEASLDPAMALARKAVSISK
EAPQPLSLVIEITAP*

>SPBIB_v1_150155|ID:27162667| Single-stranded-DNA-specific exonuclease RecJ [Uncultured spirochete bib]

MKWTKKEIDPTLVREIARRYQIDTLTASILVRRNITEPEQLRFYLEDLQLLHNPFLFAS
MEDAIDRLLMAHDEDEKVLVFGSDTDGITSTALMTELLRDFGLEVFHKVPEGEEPYGLS
VSAIDFAAENNISLIVTVDCGISNHDEVAYAQRKGIDVIIADHHHLQAPAPPEAIAVLDP

KLPDCGYPPFRDLGCGVALKLAHALAIARLGMYPKPFALLYAGSALSLEAAGLADDAGG
ADSAMVADSVSALTIEAVRLDNLIETSRLKIRSGSDGVFSPDTLEKLEKFLRGRVIAWN
KKEIHSFFREHFGNAEALDVMDLGQLSAGFWPAMARSPFASLVRASRLKKYAGSAHSAID
TLKGIFSA YVLQTLQSQNLLTERMFQLAALGTIADLMPLKDENRIIVRKGVESINASPSN
GIRELKSGLGLAKPLGAIEIAWQITPTINAAGRLGTPKLALDLLQAKTVESAITAASALI
QANSERRRLGTEAWENIREALNQSLEKSGGKYAVVGSSEIKPGITGLLASKAANIMKVPV
IVAVFKADGTCTGSIRGGANFPLTRLLAHCADLFLDYGGHDSAAGFTLKTERWQSFLERL
SEFMAQTEYNAEPELSIDAELPHAYVTPELVNLCLRFEPFGEENDPLVFCSRQVSMIDA
QVVGKNGKNHLKLTDFGTYKWPAMLWDGAERLERDFSFRKGDRAVDILYKVTMNYWNGEE
RPQLELYDIRRAEG*

>SPBIB_v1_150156|ID:27162668| exported protein of unknown function [Uncultured spirochete bib]
MRSTCPVKFLLLGLLLGSASVPRAFSQTVELPAVHIEETLPFDLLAPSAGTTIIEEHAIQ
TSAAPDPLSLLSSVPGVILSPTGSEGAQASVSLRGSTSNQVLLVLDGVRVTDPATGLTDF
SRLGIPLDQIVQIEVQRGGLSAQYGADAVGGVIHHTRRGSKNLSARISLENTSFLPSSI
TIGNGLSAITVPFVGSALIDGQSLSLAENQWLSAWAKISRAANGYPYDNTNGERRRREN
AGLLAASGGLQTRFPLSAGEISSAKVSYRSVGGIPGSLDIPTPEAHQEDWNANLTMQFRT
DALLAGALALELSPYAQAGGIRYQSSQTSAVDSHISYRAGLDSSLSWLPWNNGEVKAGAS
FRYDRLESSVVKGAGGSAPERFSGGIFAEPSFGFGTWTAVPALRFDMTNDFPSGVSASF
LIHDFSKQTAIRATISSAYRAPSFDDLYWPASGGAEGNPSLKPESASISGDISLTHKEDAC
TWSVGTAFARYARDVILWQPDDAGIWKPSNFGNALYPGIEAESSWKAGSWNLGANYTFLYS
YVLSGNLSLSDRRVPYVPVHAASLSASRRTTKAFKSAFLFTYQSLRFTTTGNRAFLPATL
IANAKLTWELGPRSDFELSFQNLFDERYEA VKGYPM PGFSLSATVTLRFEGARPGQN*

>SPBIB_v1_150157|ID:27162669| exported protein of unknown function [Uncultured spirochete bib]
MNKLWQRIGRPVLFAGMIAVLLAGLAGCDLFLSPQGSSAVVFAVDSKNGNVYEIDADKAE
SAAVPLVSTQQNATGKMIISGTFKAFKAVASWQNTSPGLYWFDLSSKTPAVAQIGPKISAQ
YICIASSTKGYVSSADWAGTYANAVYFPNPPSSPSAGFGTAISGFDAGFYQDVAYVDDGN
GTGRV FVADNGNGKVYRLNAEGTLVEKSFAASAGGTTGLLAGEFDSNGDGVAEAGV FVAN
SGGYDANWNPLPGSIDFIPLGASSDADV VVVQSDLSATALAFLDATHLAATSYGHTWLID
LSKLASDASRLTEIKTSSGASFGSMDIAVREGYAYVPDGAQT VYRFGLNSPTTAIPTGKS
GEMITNIAVRQ*

>SPBIB_v1_150158|ID:27162670| protein of unknown function [Uncultured spirochete bib]
MRQRRNQLFVYRAAGLALSLAIHALIIFAPIGMRAVRQPFFVSLNIDELREADVLSREAP
KVIQDPGQIKQIKQELALKQTEAPETTQPFEKEAVLPQAEAPETTQETFGKKAAPPQT
ETPKIQVPDKSAVSETIAAKEPQERLSAQAEIAREIPEPSALEEAPAPARAMSEMPIEA
SATLPAAPAVPIAESEVQFAPAEPKAPQAAQAFQAAPQAARSTEPTLSDVPADAL
QPTPSQALSVPQAEKPLPAKPKPILSREGLASSLIALLQSISGDVPAGQKQAKGAISRSS
VSTAQSSAAIAPQEGVFHDDAEIIRAEHVNDFLAKRKSGLAAFQGEQKPESALVPASLH
ESQLQPIAQGSAAESSAGSLEARAEGSASLTNQHAIQNDSGSANAVVEVREQSRADGALA
RSDASEPSGIDAPESPKSAVSASDLDTESPLILEKPLERDPLEPARAEPVQAEPARSKSA
SMESAPASYDTVESLAAAIAAGKLAAQKQYPAAALKRKSSEGTVRIALQVAPDGTLASLAIQ
SRSGSAILDEAALQLVRSIFPLHIRLETA VSLIPVEYRIPR*

>SPBIB_v1_150159|ID:27162671| conserved membrane protein of unknown function [Uncultured spirochete bib]
MSNKKEQKKQASLQSGALQPHVSQPEAQKKQPEPQKQAPGLSSFAFPILLVLFV VAGFL
LRGALAPLLSKKEALREWVLAFGAFGWLVFISLQILQVVIFIPGEVMQISGGFIFGFWG
GLALTIAGIGIGSAINFLGKALGPQFLMAILSREQYEKLQRYAKDARTFAGLILLFLIP
GIPKDVLCYFAGAGEREFLYFIVASMLARMPGIIGTTLAGSAVYKDKLGLVVVLA VVTAI
AMILGIFFRNKIEAAIKKLLHRKKA*

>SPBIB_v1_150160|ID:27162672| Transcription factor [Uncultured spirochete bib]
MPNDQTTDFQIDQRVVYPSQGVGRIMEIREKAFNGQKTLYYIIYLEFSDMTVMVPVDKVE
ALGIRPLVSREEAETALEYISQAASTIPSDWKLRYQMNDLLKKSIMDIAAVVRSLYQR
SKIKELPILERKLYESALNLLQDEIAFALDRPKEEIVKIIRANLDK*

>SPBIB_v1_150161|ID:27162673|ispDF| Bifunctional enzyme IspD/IspF [Includes: 2-C-methyl-D-erythritol 4-phosphate cytidyltransferase ; 2-C-methyl-D-erythritol 2,4-cyclodiphosphate synthase] [Uncultured spirochete bib]
MSTSLSKPIAPSLPLDGRVFALITAAGSSTRFGGQKKELEQFEGCTVLERAIEPFIETC

SGIVVTCPPGARAEFEAFFAQSALSPVIARLERGFAIVEGGSTRQDSVLFGLGALKELGC
DRDIVLIHDGARPWISADLVRTTIEQTRMHGACLPLAPLVETPKIVKGQVVHTHPSRAHV
MTAQTPQAFSFEILAAHELAAREGYVATDDAMIWDHYVGPVFWIEGERQNRKITYREDL
FGSPAMPEAKPAAAPTTRTGIGYDIHPLIADRPLLAGVQIESDRGEAGYSDGDVWLWAL
IDALLGAAALGDIGTHFPPGKPEWKNADSTALARKVAAMLHRQDWHIVNIDCTVILEKPR
LGPYREQICSAIARALNIPQGSVSFKAKTKEGFDAVGRGEAIEAHAIVLIAR*

>SPBIB_v1_150162|ID:27162674| membrane protein of unknown function [Uncultured spirochete bib]
MTSLAAYFLALFGNLLSLGFSLQKKYVSWLSAKRRGVRIKRGEIIGWLSGFTLMNLQPI
FNYLALGKLAPNIVAAIGGSNIVFTIILSYFLLGERIPAGKIPWIALMAGSLALAGFVGQ
ESSKQFQVEAFWTAFFIPTGFAMLVLLANRKMTPAQVGIFLGSAAAGALGGFMVLALALR
MTRGSDFMWIFSPYL VYIFCGISSFSIKQVAFERGRMAAVAPSFYGLLVLYPSIATYF
VSSVPLHPQQILAFGLISVSIILISL*

>SPBIB_v1_150163|ID:27162675| protein of unknown function [Uncultured spirochete bib]
LISFENWKEGFLVTVAGQRLWHS AKRPAV FVHRAGEMRSAWRSAGTCLPTMASGRSALF
RFSGGLVMREELRDARSVA AFADYSSAYSTAFSLYFSCLDKEIDSVRLRFHDMPKAHWN
GLGPREQHLARGTIALPLGARSAAFAMDGRFILCSSS GERKLR FSEAEMLFDLDLPAEVH
FGYARTPAEACRLWRY SFGSLDSFFENPDES YRG AHSGKSQTLIAAEARAH SVVIPQEA
GLLGSLSFSGAGPEDYQQLNMAVAQAVREGSIWKYANLMLCQPDIALPAQFRREIGNAFI
SLGDILPARLKNRYAKIRAGLEKYWEFCRMRWTE DGIPALLHPSLLYPQDVALESRDDLL
MAGADMV FAPNLKEK GELASL VLPEGEV VHF WTSRIYPSGRVT VHAPAGAPALFYRAESE
YSWLFDSVRQVASRL*

>SPBIB_v1_150164|ID:27162676| L-fucose isomerase [Uncultured spirochete bib]
MKETITLGVVCLARTTFDYAAAKELWDGIRSNLEAIENVRIVAPHALVFEVDEAKAAASQ
LARAQVDGLVIISGTFHLGHLALEL VKT VHAPVLLWGLPELPYNGGKIRLNSVCGVNLNA
SNLYKSGVQNYHV TIGEHIDMNWVDAIRVLKVL SRSHIGILGYRAHGFFNLSVADLALYR
QTGILIDHYELSEVWNFPASDEAVQARATQLRGIFDVSGITAEQLHKVAMLA VKLQGF
KYALDALAIRCWPEFAAEYGISPCAAMSL LQSEHRILACEGDVEGGLSMLMHRVGAETP
FLDFESQVDFEKDFALFWHCGVAPCNLWDGRCVRS LD TYFAGGKGV TAD FVLKEGELS
VLRLDSSEGKYRVFLQRARAIPMEKELKGTYLKAKFDVPVKQVLDK VIGKGV AH HASV
VYGN YIEPFRIA AKIAGWEVIE*

>SPBIB_v1_150165|ID:27162677| bcsP| 31 kDa immunogenic protein [Uncultured spirochete bib]
MKKIFAIALCLVLATSVFAQQRFLTIATGGTAGTYFPLGGALADIWNKNIPKMNATAQST
GASIANINLLKGGNVDVIFTQNDVANYSYNGTELLKDQAYKDLRGMVCLYNETIQLVALE
SSGIKTLADLKGRVSVGAAGSGTEANARQILEAAGLTYNDIKVQYLSFGESANNMKDG
NIDAAFNTAGIPTAAIQDLSVSKKMVLVPVDKEAASKLMAKYPFYAVQVIPAGTYQGQTQN
VTTVA VKSMLAVSSKMPADLVYELLKTMFDHTDRLIAAHAQGKNVKLETALEGMSIPLHP
GAEK FYKEKGILK*

>SPBIB_v1_150166|ID:27162678| protein of unknown function [Uncultured spirochete bib]
MNDGAGQSVPRRLDKAGMERTKR SRWFILAAVILGTAIAGAALLAFLFNVLVSALII
KDSTGAIIVRLPLQDQGQFVHHYIHSIHKTPVDEYFEVHGSSLDLTKVKYDTYGVGMPSDA
GEGFSIENGRFVVVLRHSFSSIPRVSIVPDHGVIIIGTLPFTRWVPQESAITLSAGRM
LIFRNGRISPK*

>SPBIB_v1_150167|ID:27162679| TRAP transporter, 4TM/12TM fusion protein [Uncultured spirochete bib]
MSDSRKT VPEENAAVDAQEILKKFDKEANYRTYVGGFAKVISAIAISFSVFQLYTAIFGV
LDAMIQRSIHLSFGLTLIFLLYPTS KKWRSRSLHPVDAVLA VIGALAPMYIIVNYQKLVL
RAGTATPLDIVFGVIGLLL VLEAARRVVG VPMV VIALVFIA YAFAGPYIPGKLAHRGASF
ETLIQHLYFTTEGVFGIPLGVSSTFIFL FILFGAFLERTGLGQLFIDL ANAVAGWAAGGP
AKVAVLSSALMGTVSGSSVANVVG TGSFTIPMMKRLGYKPEFAGAVEATASTGGQLMPPI
MGAA AFLMAEFTNIPYARIIGAAVVPAILY YFGVWAGVHFEAKKSGLRGMNRDEL PKLKN
IILERGH LIPLVAIIYLLVTGFTPMKAALWAIILSIASSWLKKSTRIPPIEIVRGLEAG
ARAALGVLAATAACAGIIGVVTLTGLGLKLGSTLVELAGGRIVPTLFFTMITSLILGMGV
PTTANYVITSTIAAPA VIMLLSKQAGLDPYAVAPASII LPAHMFAFYFGIADVT PPVAL
AAFAGAGIAKANPMKTGINASKLAI AAFV PYIFVLNPQMLLFNVNAITFIWMLITSLVG
IIAIAAAVNGWLITTLWYERLIGFAGGILLIYPGLTTDLMGLALVAVMAISQIVRARA

RALKAR*

>SPBIB_v1_150168|ID:27162680| Aspartate kinase [Uncultured spirochete bib]

MKILKFGGTSVSGSPDAVRALVGIVKDSGERIIVVSAFSGITDSLLEAAKLASGGGEWRAI
FETIANRHHSMIDALLEGSFSEPATAYVRSLLDELSSLLYGISLVRDLSARTLDLVASFG
ERLSAFIVAQALSQAGIAAEPVDARQFIITDARFGSAHWLQAETERRALAFFSAFPRVAV
VTGFIAATADGITTTLGRGGSDFTAGILGACLDAEEIQIWDVDGILTADPRAVPDAFVI
PEISYLEAMEMSHFGAKVLHPPTILPAMAKGIPVRILNTFNPSPGSPGTKIVREAAPSSWPV
RGIAAIPISISLLLLQGPGLPGVTGIAGRMFAALASAAVNVILITQGSSELSICCAVLPQD
AENGARALKEEFKYEISTGTIQKPAIEKDLIIAVVGGEMMKHRVGISGRVFKALGRNGIN
VVAIAQGSSELNISIVVSAQDRGKAMSAIHDAFFLAGVRTVNVFLVGTGLIGGTTLLAQVK
AQHERLFDHSIRVRVAGIANSRLMLIDANGIDVSDWKTALAEERGEPTHLETFVRQLTHL
NLPNACFCDCCTASDAPIRYETLLAASISIVTPNKRANSGLPLVRYQRLMRVAREMDVPYR
YETTVGAGLPVIGTIQDLVASGDEIFKIEAVLSGTISFIFNNLGSDFEFKFSALVRQAKE
LGYTEPDPRDLSARDIVRKTILAREAGFPLEEAGVRIEPLISKRIAQAPTVETCMVLL
PEMDAEIEARRSNAARHGTVLRYVSAITKEGASLSLSEYGPESPFFSLTGTDNMNVITSK
RYSQNPLVIRGPGAGADVTAGGVFADILKTAESYL*

>SPBIB_v1_150169|ID:27162681|gcdB| Glutaconyl-CoA decarboxylase subunit beta [Uncultured spirochete bib]

MEAFFSHFISSTGFIAMTWGQLIMLTVSCILLYLGIVKEYEPLLLVPIAFGMLLANLPAS
GITDGPKDGLVGGLIYYLYQGVLGIYPPILIFLGIGAMTDFGPLIANPWSLLLGAQAQLG
IFIPFILAYYLGFDLKSCGSIAIIGGADGPTAIYVTSRLKPELLGPIAIAAYSIMALVPL
IQPPIMKALTTKKERLVKMAQLREVSKAERVVFPILVTILIGLLLPAAVPLVGSMLMLGNL
FRESGVTERLSDTAQHALINTLTIFLGVSVGSTASAVRFLNPQTLMIIGLGLFAFSCGTA
GGVIFGKIMYWITKGVNPLIGSAGVSAVPMAARVSQVVGSKEDPTNFLLMHAMGPNVAG
VIGSAVAAGVLLTVLG*

>SPBIB_v1_150170|ID:27162682|gcdC| Glutaconyl-CoA decarboxylase subunit gamma [Uncultured spirochete bib]

MKHYRITVNGKTYEVTVEDLNRPGHSGGAAAVSQAPAAVSSAASLPAAPSAQPAAPSNG
ETVVTVKSPMPGTVISFKVIAGQQVQRGDVLLLLLEAMKMENEIVAPQDGTVVVALRVPASA
SVNTGDPLVDLA*

>SPBIB_v1_150171|ID:27162683| protein of unknown function [Uncultured spirochete bib]

MTNPWMIMLVGVITVFVALFLIILFLLGFPKFFSALKKKEHKKLAPLPEIVEVTKKKAQA
GLLSQSPAEDDEELIAVLTAAVAARGSELGSFAIAQVKQAAAEGGGFNTPVWGRVERLS
RK*

>SPBIB_v1_150172|ID:27162684|pccB| Propionyl-CoA carboxylase beta chain [Uncultured spirochete bib]

MEEKLRELEERQAKVRAGGGPKRVAQAQHDKGKMTARERIEMLLDPGTFVELDAFVEHRAT
ELGMDKIDAPGEGVVTGYGLVNGRTRCVFAQDFTVIGGSLGEMHASKICKIMDLAVKIGC
PCIGINDSGGARIQEGVDALSGYGEIFYRNTLASGVVPQISVIMGPCAGGAVYSPALTD
VFMTEGTSNMFITGPQVIKAVTGEEVSSDLGGARVHSEVSGVAHFSFPDEQSTIEAIRK
LLSYLPQNNVEDPPVAETGDDPNRIDEGLADLMPDSPNKPYDVRDIIARLVDAADFFEVQ
PNYAKNIVTGFARLAGRAIGIIANQPKYLAGVLDINASDKATRIFIRFCDSFNIPLLTLD
TAGYLPVGVQEHGGVIRHGAKLLYAYSEASVPKLTIVILRKAYGGAYIAMCSRHLGADQVF
AWPTAEIAVMGPEGAANIIFKKEIEEAPDPAARKDKIEEYKRSFANPYKAAARGYVDDV
IDPAHTRMRLCNALNMLLKGKQSMPSRKHGNIPV*

>SPBIB_v1_150173|ID:27162685| conserved protein of unknown function [Uncultured spirochete bib]

MNTLKLHDHIGIAVEKIDAALPVWEGILSLPLHGIEEVADQKVKTAFMPIGESEIELLEST
DSEGPICKFLAAKGQGVHHLAFRVANIEAALAELKAKGVRLIDETPRYGAGGARIAFIHP
KATGGVLVELCERA*

>SPBIB_v1_150174|ID:27162686| putative enzyme [Uncultured spirochete bib]

MYDLIRRCIEGDVRAVARLITLLESGDREAYAALYRLKDHAGRAQVIGITGPPGAGKSTL
ADKLIAQFRSRGLKVGVLAVDPSSPFGGAILGDRLRMQGHATDPGVFIRSLAARGSLGG
ISKATHAAIRVLDAAGYDIVLVETVGVGQSEIDIVRVADMVVLVSVPLGDDIQVIKAGI
MEIGDIFVVKADRDRGADRVRREIRAMLELQAQLKRGQTPEGGPDTLAARAPEFLHHTGL
AEGWQPKAGNESGAPGEKESITPKPGVLPEAGTVSAALVNQEAGTISAALIIPPVLKTI
AETGDGVKELADAIFFSHFETLSRTGELERKRLESIRYQLGQFVSNEIVHLMSLPELAAAQ
DELAHKVFSRKMVDVYSAGIALFHTIIEQGASHEHPQA*

>SPBIB_v1_150175|ID:27162687|yliK| fragment of methylmalonyl-CoA mutase (part 2) [Uncultured spirochete bib]
MERKIRVLIKPLDGHDRGAKVIARALRDAGMEVIYTGLRQTPEQIVSAAIQEDVDVIG
LSILSGAHNHLFPRVVELLKQSGAENVLVFGGGVPEEDIPFLKSKGIAEVFGPGTPTSK
TIEFIRANLKRPLN*

>SPBIB_v1_150176|ID:27162688|yliK| fragment of methylmalonyl-CoA mutase (part 1) [Uncultured spirochete bib]
MTDLEKLEQDFNTWTTKVEKANEEKYPERKKQFVTGNSAPVKRVYTPLDQKDFDYEKKGLGL
PGEFPYTRGVQPTMYRGRWLWTRQYAGFGTAESNARYKYLLEQGQTGLSVAFDLPTQIG
YDSHPLSEGEVGVGVAIDSLADMETLFGGIPLDKVSTSMNTINAPAAVLLAMYIAVAEK
QGVASADKLNQTIQNDILKEYIARGTYIFPPAPSMRLITDIFEYCAKNVNPWNNTISISGYH
IREAGSTAVQEVAFTLADGIAVEAAIKAGLDVDEFGPRLSFFFNHNDLFEEVAKFRAA
RRVWAHIMRDRFGAKNPKSWMLRFHTQTGGSTLTAQQPDNNIIRVTLQALAAVLGGTQSL
HTNSRDEALALPTEEA VRIALRTQQIIAYESGVAETVDPLAGSYYVESLTDRIETEVLQY
IKRIDLGGAVKAIEQGYIQQEIQDSAYAWQMDVEKNERIIVGLNKFQVKENPPKGLLRV
DPAVGERQKQKLAALRSSRDQGAVNATLAALRNAARSADNLMFPILEAVKAYATLGEICG
VLRREEFGYKPNVMF*

>SPBIB_v1_150177|ID:27162689|korC| 2-oxoglutarate synthase subunit KorC [Uncultured spirochete bib]
MRVEFRLSGSGGQGLLLAGIVLADAAIQDGKNAVQTQSYGPEARGGSSKAEVVISDGDID
YPKATEPDFLLALTLDAFRTYGPLMKKGIITDTSVAADLPSAGTRLEALTAGVPVITLP
ILETASKKLGRAVVANMVALGVLGGLSGV ASPKALREAVRSRVPKGTEDLNLAALEAGLA
LAEEAKAQLAASGVRPRA*

>SPBIB_v1_150178|ID:27162690|korB| 2-oxoglutarate synthase subunit KorB [Uncultured spirochete bib]
MAEFLSYFRQDRLPHIWCPGCGNGTGTGALVRAIDKLGIDKNNIVMVSGIGCSSRSVGYL
DFDTLHTTHGRAIAFATGVKLARPLKVVITGDGDSAAIGGNHFIHAARRNIDITIII
NNDTYGMTSGQASPMPHGMGLTTPYGNVEYNFDLCELAKAAGATYVARATTYHYVLE
ELISKAIMHKGFVVEALSQCPTYFGRKNKIGGPVETLNWIKDQNTINVKAAAALPPEKRE
GKILIGELHNVEKPEFTQQYLEVIAKVQRANPTYARNKGVPGCELNSD*

>SPBIB_v1_150179|ID:27162691|korA| 2-oxoglutarate synthase subunit KorA [Uncultured spirochete bib]
MAEKAKLMQGNEACTMAAIAAGLEFFAGYPITPSTEAEMCAEELPKVGGKFIQMEDEIG
SISACIGASLTGAKAMTATSGPGFSLMQEAIGYASLCEIPVVIINVQRVGPSTGMPTSPA
QGDLMQARWGTHGDHPVIALVPGNVKECYELTFRAFELSEKYRVPVIVLSDEVIGHMREK
VVLDPDPANYKIPVRAMPASPAGYKPYAADPNGGVPLMAPFGMGYRWHCTGLFHDENGAPS
SKPEVASTLMRRLHVKVGSRAEELADYFAEGLDDCELA VVSFGSSAMAALSAVRRARSEG
HKVGMLRLKTVWPFPTKTVRGLLSSAKKIIVPEMNLGQLALEVERAAGCDRVPVIRLGKVN
GELFHPDEVFAAIKEAL*

>SPBIB_v1_150180|ID:27162692| conserved protein of unknown function [Uncultured spirochete bib]
MAKYIKIRDVTLRDGQQSQFATRMNNEQVKA VLDDYRASHFYAMEVWGGAVPDSVMRYLN
EDPWHRLGTIKQGIGDASKLTALSRGRNLFGYNPYPDSVIEGFCKNAIASGVDIMRIFDA
LNDIDNMKSSIRFVKEAGGLADCAVCYTVDPHFSFRDRVNALFSGKKIPPKIFTVDYYVK
KAKELAALGADMITIKDMAGLIDPVA AQAQLIKALKNELEIPVDLHCTHCTPGFGVASLLAA
MVNGVDIVDTAVLSFGGPAAPAYEIIIRVFADRLGIATGVDNAAVARIDRRLREIRKELS
AYDQYKKLPPELDLSKDSLPPQVSKLFDDALEAAVGGKYQKSLAICQEIEKAFNYPEPDE
IVRHAQIPGGMYTNMMAQLKEAKLEQHLNEVLHIVPRVRLDSGLPPLVTPTSQIVGVQAV
NCVIAINQGDLYTNVSKNFAELIAGSYGKTPWPVDPEFRFKICGTREETPYDTSKYKPQ
PNPPVAEAGGALLAMNEKEQLLLELFPVATKFLRNKRIE EWKAAHP EEA AKAEASA AVR
AAGMAAGSAPGGQEDSVLSIYESADYEPADGESPEFWEEAPGWAGG*

>SPBIB_v1_150181|ID:27162693| conserved protein of unknown function [Uncultured spirochete bib]
MQQFPFCPNPRCRWHKEAPKGWAKAKGFYTTKAFGRIFQFCRACHTTFSSQTFSLSY
VKRPIPLPDVLRITSGESLRAISRNLVSLRLVTNRIDRLARQAIGLHAQALSARVSTD
DICIDGFVSFDGSQYFPSEIPIAITAHSQFVLD FSHASRRRS GSMTPAQKEKASLLYARC
PLERGAIAQSFRETLESALALQPPSPHRPFVLITDEKPDYRRVLRLEAFRNQTEERRLV
HWTIWSKLPRTIHNPLFSSNYIDREL RKDLAHHHRET VCFNRNV ANGMHLALYLLAHNY
LKPFIRAPRGRSGSHAEAA GIPASWVRQFAHSLTGGMRMFLSRLRLSATLKRTEWEGW
KTPGKEKTEYLPKYAFM*

>SPBIB_v1_150182|ID:27162694|rtcB| tRNA-splicing ligase RtcB [Uncultured spirochete bib]

MQIERIDPFTCLIPAHGDMRVPARLYVSDQLFSLKQDKALDQLVNVARLPGIVSYALGM
PDMHQGFAPIGGVAAFDVDEGVVSPGGVGFINDCGVRVILTSLREEEVRPKLDAIGKKL
FARVPSGLGSKGLIRLSAKEARAAMAEGVPWALGKGFAEPADLRAIESHGCLGSDPLAV
SDEAVNRGKEEFGTLGAGNHFLEIDRVEQIFDPETAQKFSLFEGQVLVWIHTGSRGLGHQ
IATDYIARMRPKMAQYKLELFEHDFVSIPLRDPLAGEYLAAMAAAANFAWINRQMITHAV
REVFSEEFGKPADSLGMRLLYDVAHNIAKFEDHIVGKSESQTRGTISAALTSRLLVHRK
GATRAFPAGHPELLDLAHDAGQPVLLPGDMLRGSYILVGTERAMRESFGSVAHGAGRKMS
RHAAAKEVSFEALS RQMGQKVRLLAADKRLACEEAPAAAYKDVDVAVVETVTGSGLARVVA
RTRPLLVIK*

>SPBIB_v1_150183|ID:27162695| putative Glutamate racemase [Uncultured spirochete bib]
MGGLTVVRSCLAGVPLDIVYVGDNANVPYGNRPLTEIVALTERMLDVLDRRGVEAVAIA
CNTISATVDMLESRSKIPLVDIIRPAARAMAGLSELHVGLFATEFTVQSGLHAKLVRELN
PSVEVHGVASARLAALIDSPWDEAAIREEIASMIKMRRVGPVRTVLLGCTHYPIVQNV
FEELAPDMRFIDPAGLQANEVLRVAVGATAPAKSPQLASEESAISLEVITSGDPAA YRQM
LDKLGIPPAQRFTQL*

>SPBIB_v1_150184|ID:27162696| conserved exported protein of unknown function [Uncultured spirochete bib]
MKTFKCRGQTPIFYFMIAALMLTG VQGAWAQMPGSPAPQLPSSPSAVEKRSIRVQGGQASM
SVEPDIAMLT LGVETQSDTAAKAQQLADRASKVLAALTGAGIDRAKIKTSYYRVSPVYS
TKQDKQNVIIQYKAETTIQVEISDIPAMAGLVDLTMNAGANAVRSLNFRKNMEAFKAQL
IEAACKDAQLKAQAALRGLAGNGAGLRLGAPISVDVQDSFSARNAGEAMMFKAAASPDFV
SAGELEISVAVAVEFEILVNSSH*

>SPBIB_v1_150185|ID:27162697| putative Esterase/lipase [Uncultured spirochete bib]
MIFIHRQPQSARSMLLERAFRRAGVKESSDSEQPRFITRQYAKSLLSAEPPLHIRARLGV
QSIAVAGSRVHVLTPRFEGCARCILYLHGGSYVATFTRQHWNFLAKLAERTKSVIIAPDY
PLAPEHRWADAYRMLFALWESIGLALPHKDVVLMGDSAGGGLALGFVQALRDAHLTMPAS
VIMLSPWLDVTMENPHIQTLDEVDPFLSVEALRKAGAAWAGGSNPRRMEISPIYGHFEG
PPMSLFIGTKDILWADCRRLRDICLV TGAHLDY YEYEHMMHVWMLMPIRESKQALDQIAG
ILTTQPECASHDAVQKFKTWGQTPS*

>SPBIB_v1_150186|ID:27162698| protein of unknown function [Uncultured spirochete bib]
MSRERFFDDRQRIIDAAVSLISEIGYENFSTRRLAAKLGISPMTLYNYFENKEEIVQATI
ADAYGKALSAIQNELKEYFEGDVACPLKGFVEIGRKLKDFSVQYPKMYALLFMMDLRPYT
DHPSIQSRYEYAFRKTAEERLLDKSIEEELHRHIYLYEVLGALVRNFHSGCGPVDEQTFE
AHLALAYDRLLKPFEQYFAECEKAR*

>SPBIB_v1_150187|ID:27162699| YbaK/prolyl-tRNA synthetase associated region [Uncultured spirochete bib]
MIPEKVQKILDRHNLKALEFEPGSTPTAETAQRIGVQTGQIAKSLLFKGKSGRVAMIVC
AGDARISSRKMALFGEKMSMTDADETFALTGFRPGGVC PFGIENIEIFIDESLARWDTI
YPAAGNDATGVPITVQILIQATNGQPCDLCE*

>SPBIB_v1_150188|ID:27162700| conserved membrane protein of unknown function [Uncultured spirochete bib]
MQYSVVVTSAMLSALTMPFILNFAHSRKL YDIAGGRKNHNGNIPRLGGLGMFLAFATMVA
AFSIVQTGPVSRELWSRGDKLWPFVAVGLMHTIGLMDLKAQPAPLKLGVQVLAALVVA
LAGYRFRGFGFRADVLTESWSWLSIVLSVGWIVGVANAINFIDGLDGLAGSISFIAAMAF
GIFYYQSGDASSFLCLSVAGAAVGLFFNFPAPRAKIFMGDSGSLFLGFCLAVMPFLGQ
AQAGAVGIGAGTQGAQAGLGLIPSITLLGLPVFDALRVIALRVREGVSPMKADRQHIHYL
FADSGYRPLAVIGVLDVAAIMLVAAVFLAASMPQSLGYLLMLISIGILFILFRYAMSLKP
DKAS*

>SPBIB_v1_150189|ID:27162701| conserved exported protein of unknown function [Uncultured spirochete bib]
MRRRITQAAVFLALIAILAACQISSPVVPTKISLKPFLSLIVGESETLTPVVEPANASV
EDLDWESDDSSIATVDSTGKVTAIAEGD TVIRVATQYGLKAECDVYVATVSVRDVTLDKT
SLTLKESHMYTLVATVLP SNATNKNVTWSTSNASVVKLVKNDAGKEDGTIFANAEGTAVI
TVTTVDGNTATCTVTVIKEQ*

>SPBIB_v1_150190|ID:27162702| protein of unknown function [Uncultured spirochete bib]
MRLKKGLRLIFVGGTTGLEIWHAAANIAIKARKTAACVILLRMVFALLIEIFYLLNKYIGT
LRISS*

>SPBIB_v1_150191|ID:27162703| protein of unknown function [Uncultured spirochete bib]

LGKNQYELGASLYGNNARFSSKLLXX

>SPBIB_v1_160001|ID:27162704| protein of unknown function [Uncultured spirochete bib]
MKSTLHESEYSLLEAIYASIAQKEASGALSQRELAQASGLSLGMTNALLKRFVERGWIKL
SHLNKRKMLYALTAEGIEEISRRVVDYFSRASHNAALYRKRIDAFVRAVAEQGYTALELV
GPDELDFLFDYACEKNGLSFLKDRKGRHFSFASDQKLIVVMTGDSEIESAALPAGTLAVE
FSEILALSEQDS*

>SPBIB_v1_160002|ID:27162705| putative Soluble ligand binding domain protein [Uncultured spirochete bib]
VVEVSKAVRIVSIEGEVRRPGRYQLLPGEVVKELVSYYGDALESGKTDLVVLTRKATSQ
KPESESVVF DLGGKGLPELMDGDRVRIPSREEYLPVYIEGAVAGDQLALSGANTAQTLS
SNNQTL SNKNPTLSTTDQTVSGTDQTTT SKDQSLSSANQTLSSSNQNAVQATYAIRAPF
RKGLSISLLRPMKDKILSSADLAHAFIIRKGNQDQNYIDLERLLYANDLRYDFELQPED
RIVIPFGSMSVFVTGEVTKSSWVTITGLTRLRDVIQPFTRYSSIRDVTVKNQDGIKTY
DLFKADRYGDLSDPPLRPGDEIRILPFKNLITIQGEVKRPGTYQLLPGEGLKELVERYA
DGFTEKANLSRLTIVHYLSDASPVGKAKQFDYTKNPNMPLRLYDEITVPSMQELLPVVWF
EGAVGVGSGTSTPETSQRTPYTFPPGETVSSQAALANRKLFSAVSDLSNAYLLRSDGSRK
VNLARFIYDYDLAGDVALQPGDTIIVPFRQFFVSVSGAVRYPGRYPYIPDREWSYYIGLA
GGFDTEKNSGQKITIYDAKSQKVDQANRMIQPEDNIVAASNSFTYQLMRISTILSTVLSL
VAIIVNLTGLKL*

>SPBIB_v1_170001|ID:27162706| protein of unknown function [Uncultured spirochete bib]
MHSRHLGGLFPCDSRRLHRRIDRQNPQGRDGGEVQSDQLRKGEYVMKKFLILIMALAVA
VSAWGQFTLPSGTTSTGTTSTGTTSSQSALGGQSTQGIDTTQLLQAAGASSSTSQKTSLS
VTVPE SQVRAMLAMSTPEYPVTPGDVYALS YLRATQQDTISLLVEGDGSINAGFLGRIQT
SGMTFRALKEMLEKVIASYPSSNPSLVIVSTGLFSVNIRGEVLSSQIFTAWGLTRLSEA
VKGLATPYASLRDVIVRGRDGASKAYDLFKADRFGDPSQDPLLRPGDVIEVKKADRILL
EGQVRRPGIYQLLPGEVVGELVRVYGDGTLVSAKTDITVLTHKASAEKPASESIVFDLIG
SSLPALVDGDTV RVVSREEYLPV VXVEGAVQAGTVLISESAVSQAGTGGTSVAQGTXX

>SPBIB_v1_170002|ID:27162707| conserved protein of unknown function [Uncultured spirochete bib]
MTEQNECMDNAMNRAPAAQPAPSLQSPEDDDEISLVDLAAVLWKRKWLIVGITVTA VIGV
LAYAIGSLMLPPEKSYLPNVYAKATMLIQTSSSSSLAAALSSSGLASLAGLNASAGNTN
GALAEVLATSNSTLDALNAKFNAERNKARKPKTKDEKPLISDIRESIKKNSAKLDAK
TNLFVVS YTDIDPAFAKEVVDEVVRLLSERFAVLGGNKALEQKALLEKLAEVDTA VKNL
EAQVKAFQNKYGVIVQVEALATEQITILARLRSELIMKEMEIANYQKISNINDPVM TQLKN
ERDGILAKIKEIETGVGSGSRVMPSQKELPTIAFEYARLQRDLAVQTEVFKMLTQQYELA
KLNASGQEPVFQILEMAEVPDKKSGPSRGMICIVATLAAFFLAILVAFIAESIDKIRKDP
ETVARFKAISSGKESM*

>SPBIB_v1_170003|ID:27162708| protein of unknown function [Uncultured spirochete bib]
MSILTRLFFVLLADERIELFELDFIFGADEGGVWGVDDDDVLAAEKGDDEV RG VGGDGEV
AGTFDEEGFGSVLGGWCALGVPGAARRGEHGAV ALRIGVREGAVGVVP*

>SPBIB_v1_170004|ID:27162709|manC| Mannose-1-phosphate guanylyltransferase [Uncultured spirochete bib]
MSRYAVILAGGSGVRLWPLSRESMPKQLIPVLKGSLLAAFERLEGVIPPERRWACGGA
RYETVVRTKIPAIGRYIGEPEGRDTLAAIALSCALVRKEAPDAAVAFLTSDHVIEPVERF
REALRAAFATAEAHPDTLMTFGVAPTFAATGYGYLELGEQLRKRGS DPFLQMAAEEAGAN
AAIRRVRRFREKPD LATAERFVAEGPAHYLWNSGMFVFKASRLLELLAKYEP AIAEAIER
IARAESSEEQAALMRDIYPTITKKSVDY GIMEPASQSDSVTIACVPLDLEWKDIGSWNAY
GSLADPDPQNGAMLAAARSPRHAEGTPTAQDRPETL FVESTGNLAVTTDPSHLIAFLGC
KDIVVVHTPDATL VCPKNKVEELKKLYPFV SQQHKE*

>SPBIB_v1_170005|ID:27162710| conserved protein of unknown function [Uncultured spirochete bib]
MTTLIPRPALMERIENAFAITPIVTL LGARQCGKTTIARIIAQKTQAPIFDLED PADDAA
LSHPMLALS DKRGLIVIDEVQRRPELFPILRVLVDRPDNAARFLLGSASPHLVRGVSES
LAGRTSFVDMQGFSLDEVGSEAWQKLWLRGGFPRSWLADSDAASLEWRKGFIRTF LERDI
PQLGISIPAAGLSRFWTMIAHYHGQVWNSSVLARSLGISDKTVTRYLEILEGTFLVRRLP
PWYENLGKRLVKSPKVYLRDSGILHALLGIADMDGLLSHPSV GASWEGYALETLLSRFPG
AQASFYATYS GAELDLVLDLGTTRYGFEMKLNQAPTLRSMTIALEDLGLSHLYVVYPGT
KTYPLAESITAVPLQSVPEIAE*

>SPBIB_v1_170006|ID:27162711| conserved protein of unknown function [Uncultured spirochete bib]
MIPRIELASLLDDLSVFPVAVALLGARQAGKTTLAMEVQKLRDALYLDLESERDRAKLAEP
ELYLSEHLDRVLILDEIHRVQVLPVLRGLIDQRRRAGRAGLFLLLGSQSPELLRQTGE
SLAGRIAYRELTPFWVLEVPKGQDDRLWVRGGFPESFLAESSARSLRWRQDFIRTYLERD
IRQFDVRLMPETLRRLWVMLAYLQGSVMVNAQLARNVDVDVKTINRYLDLLTDLFLLRRL
QPWHVNIKRLTKAPKLYIRDSGLSHALLGIEDREALLSHPVVGPSWEGFVIENLLTAAG
ANYQSYYYRTASGAEIDLVLVPPDQRLWAVEIKRSLTPKPERGFYIACEDLKPAQRVYVY
PGDERFPLGHDTEAISLRELAGLLRGG*

>SPBIB_v1_170007|ID:27162712|mazF| mRNA interferase MazF6 [Uncultured spirochete bib]
MMRGELWWADFGLPFGSEPGFRRPVVILQDDAFNTSNIHTTIIVPLTTNMALAEAPGNV
LPKDESSLKDSVLVVSQLSAVDKQRLIERIGTLKRQTL EEVEEGIKLILNLT*

>SPBIB_v1_170008|ID:27162713| Ribbon-helix-helix domain protein [Uncultured spirochete bib]
MKT AISLPEGLYKEAEKTA KSLGIPRSQ LFAKALQE FITRHAKDNIT EDLNKVYSNQKQD
VHNLNVENASIESIRELTKND AW*

>SPBIB_v1_170009|ID:27162714| putative ATPase (AAA+ superfamily) [Uncultured spirochete bib]
MIQRPLYLEKIRPFMNTDVVKVLTGIRRCGKSVMLELIQQLVQNGIAPSQIIAINFESQ
ALPFPRDIQGA YTYIKA AVAKAAVTATA ANGEATRSGRKIYFLDEIQELEGWERLVNSC
MIDFDADIYITGSNATMLSGELATYLGGRYVEIKVYPFSFREVLDMLSAGGSQ LSEAEAF
RRYL VFGGMPFL YRYAFDDASTLQYLNDFDSIILKDIAQRNHIRDIDKLRLLILYLVAT
TGNTFSARSVM DYLNKNEKRSISTETIYNYIEYCKEACL IHMVPREDLIGKRLSTQEKIY
LVDHGIREALYGN NQRDINQ TLENIVF MELVRRGYEVTIGKQRSLEVDFCARKGGTKVYL
QVAYLLADDATVEREFS ALETIPDNYPKFVITMDEIDRSRNGIQHYNIRRFLLEAR*

>SPBIB_v1_170010|ID:27162715| ATPase (fragment) [Uncultured spirochete bib]
MELRRLTSDIYFFD NAAECDFV VNAHREKPLCMQVCSHLNHDNEAREIKGLMKALSFFD
LAEGYIITAAARDEIITQGK KLHVIPAWEDLAATCGLSR*

>SPBIB_v1_170011|ID:27162716| protein of unknown function [Uncultured spirochete bib]
MSIDNKVAFSRVVKKIIDVAGEAAQFHEYEIFMSFISL LLEYMFQ*

>SPBIB_v1_170012|ID:27162717| conserved protein of unknown function [Uncultured spirochete bib]
MPKVRPNPGTRSVQWRLVLCEGAKDKSESAYFKALINDRRNPDRLEVKVVDTKKNTAR
ELVREAKKLKATNKDQVWVVFDDKDG YTLHAQAFDQAAANGIKIAFSSICFEY WLLLHFGY
TTRPFANCSELIA YIRTEYGYDYDKSSPLTYAKTKHLLAQAKTNAQRCKRYQLQSNPADF
PIYEMNPYTNVDEL VTAIEQFSVEEA*

>SPBIB_v1_170013|ID:27162718| conserved protein of unknown function [Uncultured spirochete bib]
MLIDFTLENYLSFKDKATISLVVPGWKEPEHTRYVLEVERGKYALS PFAAIYGQNAAGKS
NVIKALMDFVNLVLYSHTLGIDAPIPSYKPYKLDISRQSAPILFETEFIAEGIRYLLNVI
FDRNSILQEELVYYPQGR RALLYSRKKGESIRFGTGFKGTTKKGLEQFLRPNALFLSTAVN
LSNEQLRPVYKYFQTKYRFHVAMDSSEHPIMGTTLTLLAEDPIKREGYKKAILSFLNAAD
ISVKDVVIRKDETLIKNIVFPDIPQVVKDKFIENLVNRPFLGHTLYKGAESMGENVLFD
LGKEESGGTIKMYELAGEVIESLKS GGVLLIDEFSSGLHPQLCEFIVGLFRDRSINTKGA
QLIVTSHDTNLMARDDIYRDELWL VDRDSHGTS ELYSINDFSKDEV RKGNTNLEK WYLDGR
FKA VPSIDPSAFKLEVSD*

>SPBIB_v1_170014|ID:27162719| conserved protein of unknown function [Uncultured spirochete bib]
MPTLQVRDLPEDVYVQISYLA EKEHRSLAQESIVLLKEGIAAKLGNKERRRKLLEKMSDL
TVDGKAFPDPVDLIREDRER*

>SPBIB_v1_170015|ID:27162720| conserved protein of unknown function [Uncultured spirochete bib]
MIIVLDASAAVEIALNRAHSTQLREILRKADLV LAPDTFPSEITNVFWKYASFSAMPIDQ
CEKGIDYCIDLIDEYREIKTMCREVFSESLNNNHPSYDLFYLV LARRFNASILTIDKKMK
ERAQAMKIKLAYEDS*

>SPBIB_v1_170016|ID:27162721|rmlB| dTDP-glucose 4,6 dehydratase, NAD(P)-binding [Uncultured spirochete bib]
MRSLSLILVTGGAGFIGSNFIHWLFAQPEFAGR VINLDALTYAGNLENLADIEARYGKGA
GGLGAVPRYVVFVQGDICDRPLIERLFAEY GIDTVVHFAAESHVDRSILGPEAFVRTNVLG
TYTLLDVARQAWCAPTGGMREDVLFHHVSTDE VFGSLGEEGYFTESTPYDPRSPYSASKA
ASDHLAKAYHHTYGLPLT LSNCSNNGPYQFPEKLIPLMILNMLEGKPLPVYGDGRNIRD
WLYVEDHNEAVWTIMRKGQSGRTYNIGGENEWENIRLLERLIELVAEEARLDIARLRGLI

TYVKDRPGHDRRYAIDCTRLKTELGWHQRATFDEGLRATVRWYLDHREWVEHVRSWAYRA
WLEQNYARRV*

>SPBIB_v1_170017|ID:27162722| conserved protein of unknown function [Uncultured spirochete bib]
MATNLAIDDRLLNEALEIGGYKSKKDTVNAALEEFIKRRKTNDLINIFGTIEYDSSYDYK
KMRSR*

>SPBIB_v1_170018|ID:27162723| conserved protein of unknown function [Uncultured spirochete bib]
MKRVLVDTSVWVSLALRKKKEWTKEEQLVVDHLSKLRNLNVVLIGPIRQEILSGISQKEKF
DLLKEKLSIFEDHAIDMHDYELAAEFYNECRHHGIQGSHIDYLLCAFAVNHDLTIFTLDK
DFQNYKEYLNIQLENFV*

>SPBIB_v1_170019|ID:27162724| putative Glycosyl transferase group 1 [Uncultured spirochete bib]
MKIAFLTQYYPVSDSTRSLYSDLMDIEISSFGHEITVFRSEEERVFGRPEVSSRKNITIVS
VPTGRVTKTNIMIKTANILLTEPRYL GAMRMHYAGSIPDMIIVTTPITFCSAASYRKK
GSMVYLLKDIQPQNAVLDGMMKKEVLSYFFRAKEKKLYKNADVIGCMSEENKKYLLHH
NLFLRNKKIEINPNSIKPSTFQIDAKQGDELLREYKIPREKIKIYGGNLGKPGQIDFLL
EVLDKSKEIENVHFIICGSGTEYSKLEKFKVTHPDHPITLIKYLKNSRYRLLLSQMDIGL
IFLDRRFTIPNFPQRLDYDFDLPVLAATDKNTDFGKMLINNKCGLWLESGLDIDAFMKN
LEYLVSNPDIRISMGKNGRALLDSEFSIKKSAQLIIDKFNLLSDPIS*

>SPBIB_v1_170020|ID:27162725| putative UDP-N-acetylglucosamine 2-epimerase [Uncultured spirochete bib]
MKTCLKVVTVIGTRPEIIRLSEVIRACDKAFDHILVHTGQNWDTLNEIFFKDLELRAPD
RYLNVVGADLGETMGNIIAASYKMLKEIQPDALLVLGDTNSALCAIPAKRLKIPIFHMEA
GNRCFDQNVPEEINRKIVDHIADINLPYTEHSRRYLLAEGFRKEHIFVTGSPMPEVIHRN
MEKIKSSKALETYGIERNYFVLSMHREENIDIEYKFNGLVKALDAIAETYGLPIIFSTH
PRTWKRLEAAGIKLNPLIKQVKPLSFTDYCRLQVDAKCVISDSGTLSEESAILRFPVLL
RNSTERPEAVDKGSIVIGGYTAESLVQSIALAIDFFDRKDHRSADYVDEDVSAKVVKIIG
GYTPIIKKVIWNK*

>SPBIB_v1_170021|ID:27162726| putative NAD-dependent epimerase/dehydratase [Uncultured spirochete bib]
VRILVTGANGFIGKNLLARLGREKDFEILPFDVENREEDLYEYLKNADRIVHLAGINRPL
TPEEYMQGNFGLTSRIAFLKQNKQIPVIFSSIIHAERDNEYARSKRAAEDRLKLYAER
TGASVSVFRFANVFGKWCPRPNYNSAVATFCHNIAHELPIITINDPSASLRLIYIDDVDAI
VRELEHPYEGFAFVDAGPVYETTGVKVAEQICMLHEYRPGKGFVPDFSDFLKKLNTTYLS
YVETDKLALPEIKSDNRGWLFELMKSPHAGQIFVSTTRPGFIRGNHYHDTKVEKFCLVK
GRARILLRKIDAHEKIIYDVDDSRIRIVDIPPGYTHSIENTGSEDCIVLFWANEIFDPSR
PDTYVLEV*

>SPBIB_v1_170022|ID:27162727|capD| UDP-glucose 4-epimerase [Uncultured spirochete bib]
MKASSTLMITGGTGSFGNAVLRKYLKTDIKEIRIFSRDEKKQDDMRHLYKDPRVKYYIGD
VRDIESVRSIAKGVYIFHAAALKQVPSCEFYPVEAVKTNVLGANNVLTAAIEEGVKRVI
VLSTDKAVYPINAMGMSKALMEKVMIAKSRELDNGKQVFCGTRYGNVMASRGSVIPLFIE
QIMQGKPITITDPEMTRFLLHLDEAVELVEYAFEHGKNGDIFVKKAPASTLADLATALKE
LLHADNEVKIIGTRHGEKLYETLVNREEMAKAEDLDGYRIPADTRDLNYDKYFSNGDRK
VQEVVEYTSHTTRLDVEGVKLLLLTDCVQDAMKERGLL*

>SPBIB_v1_170023|ID:27162728| conserved protein of unknown function [Uncultured spirochete bib]
MKILQINSVFNYGSTGKIVEQLNSLIMKQGWTSYVAYGRHFHNSILKFKFSSTLEVIIN
ILETRIFDNHGFQTQHATKCLVSYIEKIKPDVVHIHNLHGYYINIQLFKYLKNSSLPVI
ITLHDCWTFTHCAHFDYIGCEKWKHEHCMKCPQIRSYPASFFIDRSYKNFELKRELFNSI
SNLTIVPVSEWINGLVQQSFLASKSRVVIKNGVNLDFKPLNSRQSIINKYNLQGRYIIL
AVASIWSARKGLNDILCIADNIGNEYLFIVGDRINKVASKRSNVKIIRKTEDQEELVEL
YSAADLFINPTYEDTLPTTNIHALACGTPVLTNTGGSPETIDSETGFIVPKGDIDAMIQ
VIRSFQKQKDSMTVACRKRKAEKYFNKDERFMDYIKLYERILKGEK*

>SPBIB_v1_170024|ID:27162729| putative glycosyltransferase EpsF [Uncultured spirochete bib]
MINKIKILHIVSDLNSGGVENMLYNYINYIDNSKFDIAFVSHSYGGMINDQLLKAGFRVF
YVTPRKKNFKNILDLWKYMHSDNWDIVHSHINQMSAIPILLARISGIRVRIAHAGSKI
YNDKIKKIIYNILSKIILYNANYLMACGTDAAVRVFGKRIVRQKKVIYLNKNAIDLEKFSY
NKKSAQYLRNLGINERYIILHVARLSEEKNHIFSIEVFCCLIEKNPNMRLLIIGEGPLK
EKLKQKVLLGLDNKVSFLGARKDVSSFMSLADCLLLPSFHEGLPLVPIEAQANGLQCYL

SKNVPEEVVLTEKACRLDLSLGPVWAEYIYNNLSKERISDKKIIQKAGYDIKLAACKLE
NFYIVSATKMGKILYLSTLFNC*

>SPBIB_v1_170025|ID:27162730| membrane protein of unknown function [Uncultured spirochete bib]
MSNIYNIKKEKISYYLSILCMITIFNTDSIRVFGNLSIFYIILILYLFYELFSGKIFLKH
INKYINIIGISSVGFIIINILISDLFAKELNIFVIIGNIYPLIGTIIFLFLINEDNKKYFV
DYSVYTNIFYISCQIHAIYGLLQAILFIFFGIRTNNVRSILNLRVSGLFPDANIYSFSV
LMALSFLLSKENKNSNIITIFRKILIIINLIVIFLTGSRTAFIVAILIIILNFYFKIKN
IKYKIMFIFFLLFLIIININNIINLIDYYTYNILGRNIDVESDIRISILWKTALEIFFKH
PLIGAGTDAVMRQTGTLAHNMILALLSDRGIIGTLIYLFPLIYFLKAKKGNKENILMVI
SYLLASMGISNWNLRIPILLFFNIWELEINRK*

>SPBIB_v1_170026|ID:27162731| conserved protein of unknown function [Uncultured spirochete bib]
MKVLLISYFFAPQNTIAAVRTTKIAKYLRILGYDVEVVCGPPTFIDPILKSDLKEIKKLN
VVHGLKMYEKKSKEFINNNVYKNSILKKILRKIKSILYKVLNPPPVYLAFLNSLIWVY
NARKILTNKIFYDYDISSYGPISGSHILGLYLKLRHKKIFWIADYRDPMIDDKQKSTIRF
IYSIYQYLSLKYADISLCVSKGLKEELASLQANAKLYIITNGYDNEDMSFLNQEQLNKNK
LIFSAGSMYAGKRDLSPLFSILNELAIEKKIDIKLIKILYMGNEFSTIKEMAKPYELDE
ILVDLGFVSRDKALNILNSDVLLLASWNTKKSQGILTGKIYEMILLKKPILAFINGYAK
NSELKEIIVKLNNGGFVYEEGDKDSYNSIKDKIASLYKQKFESFFISQEYNMEFRAKYDYK
NIVKTLNIIHDNKK*

>SPBIB_v1_170027|ID:27162732|wbpA| UDP-N-acetyl-D-glucosamine 6-dehydrogenase [Uncultured spirochete bib]
MTLSEQLLEKIEKNTVKVGIIGLGYVGLPLAVSFARKGISVLGFSEKKAQAVNEGRNY
IGDVDDTELARLVQEGHLSATIDFTRIAECDAVIICVPTPLDKFKKPDMSYIERACVDIG
RNMHRGTFISLESTTYPTTTEEFMKPIIERESGMKEGVDFWLCFSPERVDPGNKTYKTDN
TPKVVGGLGEEAQKIALALYGKAIQYLYPVSSPRAAEMVKILENTYRLVNISLINELALL
AGKMQINIWEVIEAAKTKPYGFQAFYPPGIGGHCIPLDPFYLEYVAKGLNFDLTMIDAA
GKINNLQPYRMMNKIAFALNRHKKPMNGSTILFLGVA YKPDIDDARESPALEVMSLVAHK
GAKVQYHDPYIPEVTDEHGRHWQGVLSDEILASADCVVFTTNHSCFDIEHIVEKANLVV
DMRNAVERVNIENEKVFKL*

>SPBIB_v1_170028|ID:27162733|wbpD| UDP-2-acetamido-3-amino-2,3-dideoxy-D-glucuronate N-acetyltransferase
[Uncultured spirochete bib]
MRNNELIEMPAAGGGIYYRHESYVDEGAQVGEGETKIWHFHVSHVMAGARIGARCSLGQNVN
VGGRAVLGNTVKVQNNVSIYDDVIIIEDEVFCGSPMVFTNVINPRAFVERKHEYQETRVKR
GASIGANATIVCGVTLGEYCFVGAGSVVTKDVPA YGLVYGSPARQHGWCRCGVKLGEDL
VCPECGKRFKNEKGLEERV*

>SPBIB_v1_170029|ID:27162734| putative nucleic-acid-binding protein [Uncultured spirochete bib]
MAKR VYLDANVLMAMFRGTHDIAHKA FEVINDNEIEIVCSDALWLELMPKPLFNKNQEEV
EFYQAIQFDQSEYAKWDLVDLNDAKNIAKSYGIAAMD AIIHISTAINKKVDVFYTNERDTP
MFRVSDIKIISLATA*

>SPBIB_v1_170030|ID:27162735| protein of unknown function [Uncultured spirochete bib]
MNAVSYKEKDMSSFFDTSRIYAYAFHRNKEVSKVYHFVYDDAFDDLSTNATSIRYILSKN
VVNRESNIPTSIVPKTELVRKLLAIRKKYMEGGKLLSLEEIAEEIQNRRGGLNNGQASI
P*

>SPBIB_v1_170031|ID:27162736| conserved protein of unknown function [Uncultured spirochete bib]
MEVKDLPAYLERSPLVEAIWEIRFNVPALSIGDLLPGIVFVHLDASHKGYVLNQLPFVQ
IPRDIIDTNEFNKFKQAKYRIESTKSPYLHYHIGEHMVSLNCRKPYEGWGAFKNKIIELIGI
LKRAPFEFIEVKPSLR YINFLPQNVIPSLPWLRIKLNIGDFLITMTPLQIRAE L PETEC
THTVQIVHPAQLVMHEAD AENKGIIVDIDSVLNNTQHSLDDTVAQIEM LHAKNKEFFFHQ
ILTEDAIEKFGPKYTEEASV*

>SPBIB_v1_170032|ID:27162737|degT| Pleiotropic regulatory protein [Uncultured spirochete bib]
MNVPFYTTSTREYQNRKA EFDAAVRGVMERGFILGEEVA AFEREA AEFLGARYAVGVASG
SDALVIGSDILDFKDGAEVLTPTFTFFASTSCVARLGGKPIVDMDPKTLNMDLADAERK
VTKKTVGIIPVHLFVQPTPMQKVMDFARAHGLKVLEDAEAEAWGMESRVDG SWKKAGTIGD
IGIY SFFPTKTLGAYGDAGLMVTNDEELYKKIKSYRVHGSSVKYHHDYIGYNSRLD TLQA
AILRVKLRQTKEAIAARARHAAHYTERLSRLPEVRIPRVAGGNRGVYYVYNILVPQRDDL

AAFLKEKGIGTSIYYPLPLHLQKCFSYLGYKEGDFPVAERVCKEILALPIYPELRDDEVD
YVCDIASFYK*

>SPBIB_v1_170033|ID:27162738|wbpI| UDP-2,3-diacetamido-2,3-dideoxy-D-glucuronate 2-epimerase [Uncultured
spirochete bib]

MLEIMTIVGARPOFVKA AVFSRQVRARPYADKIRETIVHTGQHYDENMSDIFFREMEIPE
PDVNLGIGSGTHGAVTGAMLAGIERLILERKPDLLVYGDNTSTLAGALAASKLHVPVAH
VEAGLSYMMIMPEEQNRRLADHLATWLFCTNTAVENLAKEGIVHHGLAHPADNKAVL
QCGDIMYEASRYRPKAMEQIEARLRALPDRFALLTLHRAENTDDPTRISAIVRALNRFD
SIEFVFPVHPRTRKILAQYGLELKSHIHAIEPVGYFEMLALEDKCSFVVTDSGGVQKEAY
FFQKPCITLRDATEWRELVEHGWNTLTGADETAILAALASMPKYGDDVTLYGDGTTAARI
ADALLSWQKVR*

>SPBIB_v1_170034|ID:27162739| conserved protein of unknown function [Uncultured spirochete bib]

MIKKKNSTSKSWIVRNMAEIMKSIAIIGCGRISFKHIEAAIKHADRI SLVAVCDPIIERA
EQRKTEYQKAFFGAQVAVYADYRQMLEQEKPDI CAIATESGYHPRIAIDCLEAGAHVICE
KPMALSTQDADAMIASSRRTGKKLAVCFQNRFNAPVQKARRALEAGRFGRL LHGSIQVRW
NRNESYYAQAPWRGTWELDGGTLMNQCTHGIDLLQWMMGEDAVRVQAVTRRFLRPIEAED
FGAAIVEFASGAVGIIEGSADIYPANLNETLSLFGERGSVIGGLAVNRIETWRFADAPQ
VGDTEEA VLNPDEKDPPTVYGFHGSALYADFLDAIEQDHEPLVSGEKGGKALEIILAIYK
SQKTGRPVELPVDFFTLEMKGTFDA*

>SPBIB_v1_170035|ID:27162740| conserved protein of unknown function [Uncultured spirochete bib]

MITIYIPNNKKECEYIINIFFREIFDIEYCINYEYS DYYEILIDNDRKIYIKDSFFSK
FLKEKEYLDKKYIPLDIKFAESNLFHTEKLPVIYGEDLIRIGDDNCTIYCDIDIFASAFF
MLTRWEEYVNKARDQHDFPGIESIAYKYGFLDRPAVNEYAELLWSMLKFLGYNRPRKEH
QYQMMLTHDVDEPFEIAYKPLGLILKNIAGDVIKRKEYAIAVKKAMD LFEKTENKLSFDN
FFSFDYIMEQSEKRGLES AFYFLPSGPEMQFRPKIENPTMKNLLKSIHQRGHEIGIHH
YETYRNEKAFLDDVELLKKALNENRIEYQIKGGRQH YLRWEMPTTYNYQNAGLEYDTTL
SYADVAGFRGCICYEFTPFDFLKREKLKIKERPLIAMECSIIDER YMNMGYTERALDYFK
KLKDQCRKYNGNFVLLWHNSRLRNDQEKKFYEQVLDC*

>SPBIB_v1_170036|ID:27162741| protein of unknown function [Uncultured spirochete bib]

LGKNQYELGASLYGNNARFSSKLLXX

>SPBIB_v1_180001|ID:27162742| Glycosyl transferase [Uncultured spirochete bib]

MNTNNPALSIIPYNSKEFIEELLSSIPRNKQNEIEV IIVDDKSDNDHVLYLEKLILKY
NNYLNINLYFNKG VKSAGTCRNIGLDFAKGKWVLFADADDYFKKDFYIIVSRYFQSDYDI
IFFTPDSFNIRTRKRGIRHISYENLIWEYLKNPNKENTLKLKYFRTP TSKMIKMKVITD
NKIRFDEVIVCNDDMFSVKLGKTIKKICATKESIYIITEMDNTLSKRRGKNYYLAFLDVN
IRVYDYLKRNLLENF KILGYDSIAINILIIAYRIYKINIYLLIYTLKRLKENNIPLFKP
IVQKIKKYFFRALPQ*

>SPBIB_v1_180002|ID:27162743| protein of unknown function [Uncultured spirochete bib]

MSYENLLEILIPTYNRKRYLEKNL KILSNIIRNINAQNEISILISDNSSSDGT KEMLEIF
KINNSDIKINIYIQKENIGLKNNSL FVLKKAIAKYVMYLGDDDYISEEYLLKIKNIISNT
NCVTCIVPSNIAIDLQGNIPKRGRDFKKSTKIYKKG YLTASQFMWRGHQLSGIVFKRKD
TLGNYYKNCEDNIYLFMYFVGFNAIRGDLIHLTEY PVKVTAAPQELKDWNYGKDGLV SER
FKNSYCLFKNKLIYKFIAEYYLTMNNNRGFLYKILKNDIFS FMIYFSNYLKCKYVSIIGK
IFFIMLTIYDSCRILNKIIKEVIKRR*

>SPBIB_v1_180003|ID:27162744| putative O-unit flippase [Uncultured spirochete bib]

MREKINLSNINKLFTKDVISTYLNQIWRIISG PLSLILLPMFITPEIQGFWYTFSSISAL
AVFADLGFTTIILQFSAHEFAFLQFSESLDLLGPEEYKKRLASLFRFVLK WSTSIVIIAF
PVIFIIGYILFIQKANIFVWLAPWMIYSIGAAIGFYTNVISSFIQGC DQVSNVQKLSLQT
SIVGTLSMFLSLVLFHGLYSISISLLLANLYNLGEILIKYQKFLKTLWKTEPDKTNWKHD
ILGLLWKYALSWSSSYLIFKIYTPLMFQFHGPVEAGKVGISISLITSM TSLANVWISANI
PKINILIAKKDWIQLDRNFKKILILIVVTYIFEIFVLIFIMIFKQNIFFIKIFSRFVSI
VPMTMLITGWFFQIIISCLAA YLRGHKQEPYVLLSITHGIIIALSTYVSAKYLPVNLYFS
GFFLSYLIIFPWAIIYIFIKKRKEWHL*

>SPBIB_v1_180004|ID:27162745|rfbE| CDP-paratose 2-epimerase [Uncultured spirochete bib]

MTYLITGGCGFLGSNIAAYYINRGEKVIVFDNLYRFGSEKNLEWLHSLNGYFKYIKGDIR
NIYEIEPVIKENKPDIIHFHAGQVAMTTSIENPYLDFEINVKGTINVLESVRKYIPETII
CFSSTNKVYGDLKYIEFEEQDLRYIAKKYTNNGFDETMPLDFHSPYGCCKGAADQYMLDYS
RIYGLNTIVFRHSSIFGDRQFSTKDQGWVGFQKAYEIKNGILKEPFTISGTGKQVRDI
LFNSDLIECYNLAIQNIERTRGQVYNIGGGMENSFSILELKFVLENDLNKIMIFKLPWR
ESDQKVFVADISKAKRDFNWFPKIDKYEGIKRMYKWVEAINQ*

>SPBIB_v1_180005|ID:27162746| NAD-dependent epimerase/dehydratase [Uncultured spirochete bib]
MDKLLIVGGFGFIGKNLVEYLYEKYNIVIIDKKIDKEFFIKFKKELKFYQYDFITEEMFK
LHKIIKENPNYIINLISIVTTERNLEIFEEMIKINLNVLLKLFNCSKKLSSLKLFIQFG
SGEEYGNILPPFKETDRENPNSPYALAKQLTTNSSIMLNKNYDFPIVVVRPGLFGKYQN
ANKFIPYTISQLLKNEEINITLGEQKRDFIYTLDFSRGIELLMENYKYFIGEIVNLSSGK
SISLKEIVLFSKEYIKSNSKINFGAISYRENEIKNFLDISKFEKGVKQKFEIDIMQRIK
EYIDYLGKD*

>SPBIB_v1_180006|ID:27162747|rfbG| CDP-glucose 4,6-dehydratase [Uncultured spirochete bib]
MIDHDFWKGKRVFLTGHTGFKGSWLSIWLNELGAGVYGYALEPPTDPSLFVAADLENKIH
SVKGDIRNFENLKKAVLSAQPEIVIHMAAQPLVRLSYEQPLLTYETNIMGTANLLEAMRG
CASVRSVVIITTDKCYDNKEWLWGYRENDTLGGYDPYSSSKACAELVVGAYRNSFFNPKD
YGRTHHVAIATARAGNVIGGGDWAKDRLVPDIVKAISEGRKVLIRNPEAIRPWQHVLEPL
SGYLILAEERLYTKGTEYAEA WNFPGPYDADAKPVRWIVEKLCMSWPDAAAGFEIDIAPKPHE
ASYLKLDCSKSMNRLGWKPTWNLETSLSKIMDWNLAFLRSEDIYEVSQISDFEADNTN
NINLKT*

>SPBIB_v1_180007|ID:27162748|rfbF| Glucose-1-phosphate cytidyltransferase [Uncultured spirochete bib]
MKVVILAGGYGTRISEESDLKPKPMIEIGGKPIWHIMKIYSHYGFNDFIICCGYKGYVI
KDYFHNLYLHQTDITIDLGNQIEYHDSSEPWVTLVDTGLNTMTGGRIKRIQPFVGD
PFMLTYGDGVSDIDILALLNFHKQHKRLATLTA VQPSGKFGALGIDSQNAVIQFQEKPKG
DGAWINGGFFVCEPGIFDYIRSGDETIWERQPLEDL SRDGQLSAYKHENFWQPMDLRDK
NELERLWATSNAPWKVWE*

>SPBIB_v1_180008|ID:27162749|rfbH| Lipopolysaccharide biosynthesis protein RfbH [Uncultured spirochete bib]
MAKTEKELRAQIAELVKEYYDIKFAPKPFEPGKSMVRYAGR VFDEKELQSLVDASLDFWL
TSGRYSEAFESAFCAFTGAEY AFLVNSGSSANLVALASLTSPLLGDRLKRGDEVIAVAA
GFPTTVNPIIQYGMVPVFDVEIGTYNIDVRQLEKAISP KTKAIFLAHTLGNPNLDAIM
KLVEKYNLWLIEDCCDALGSTYKGRLAGSFGHIA TCSFYPAHHITMGEGGCVF TSDETLA
RAARSIRDWGRDCYCAPGESNTCGKRFSATYGTLPKGYD HKYVYSHIGYNLKV TDMQAAI
GVEQLKLPKFIARKANFKAWTEGFKKFGDAFILPKA TEGSDPSWFAFPVTVSENA GFT
RTELT DYLNHGVETRNLFAGNLLRQPAYIGIEHRVAPGGLERTDRIMNDTFFLGTYPGL
KKEHIEYTLGIVEEFLKSKGVA*

>SPBIB_v1_180009|ID:27162750| putative Nitric oxide dioxygenase [Uncultured spirochete bib]
MSNPVKLKA EVLFIKSFDPDYSVKFKPASNPPRFKAGQFLHLAIDDYDPAGGFWPESRV
FSIASAPGMPELEIVYSVKGRYTRRMADHLSPGREVWLKLPYGNFNIDTSIAPGQDVVMI
AGGTGISPFLPYFHGLLANNQKGR TVRLYYGIRENSMLLAELIEHCARAGLIEASL FVE
NEKPNLHLPSFIRQESGR LDIRQIHAESSNLNNSAFFISGPPAMITAFKDALSQAGISPE
NIKIDEWE*

>SPBIB_v1_180010|ID:27162751| protein of unknown function [Uncultured spirochete bib]
VRARLPDIPLRSFTLDEIHELADYTTLYGSLLKDAYAEYLTFGGYPGPVLAPAPLRDLIL
KELLSTYLHKDVAGYQRVEHIGGFNNMVRLLSAQIGSQLNKSELGSTLRLNAETVNR YLD
ILEGTFV FSLVPPWFSNPRKEVSKMPKVYVNDPGILLATGARPAIRSPYDLLDGHAVENA
AFLTLARRFERIRYWR TTGGAEIDFIVETNRGPLPIEVKFS AATSTEPVALRNFRSTYPD
ARQGIIVSRDAISSKGVPLIPAYVMD FVEV*

>SPBIB_v1_180011|ID:27162752| conserved protein of unknown function [Uncultured spirochete bib]
MQRTLMMKLLLEWKARPSRMPLLLYGARQV GKTYLLQEFGR TCFQDTIYINFETDSRLASE
FSGDIDPHRLIGVLELYFN RKINPDSTLIILDEIQACERAL TSLKYFCERAPQYPIVAAG
SVLGVTVHRNQHSFPVGVKVEMLTLYPMDFE EFLRALGQEALIDVIREAYANHAPLP GALH
EKALELFKTYLMVGGMPGAVLAYLKDGRMLDALS VQSLILSSYVADMSKYASPAETTRIL
ACFDSIPAQLAKENRKFQYKVVKKGGSATIFGPSIDWLVAAGVVLKCDRIEHPFIPLAAH

RDLSAFKLYMADTGLLLCKSGVPASIMFSGWDNSTFSGAIAENYVAASLKAKGYPLYWE
SKGTAEIDFILPRGEEVIPIEVKAGVHTKSRSLGVYRAQYKPDHVIRISHRNFVNGIQ
AVPMYAVFCM*

>SPBIB_v1_180012|ID:27162753| conserved protein of unknown function [Uncultured spirochete bib]
MKNRKIGSSILEIADKPGSRILVITGARQTGKTTLARHLFP EYTFLSIEDPVLRSYANL
TALQWKDLYPHAILDEVQKEPRLIESIKSVYDQWEEPRYVLSGSSQLLLEKVRSLAGR
CSIIDL YPLTIPELETESWNDPVADSPFQSM LRFPEEIPARIQSLLPDFRLDPNHARIMH
AWNHYVRFGGYPALTNPDMEDEDRYRWLAN YVRTYLERDVRDLASFRDLEPFVKLQRVIA
LQTASLVNHS AIGQQVGLSSKTVQRYLRYLEMSYQVVVLPASGNERKRLVKSPKIHMLD
YGV LQAVVQKRGSP TGLEFESMVVAEL YKQANTILSDARFTYLR TLDGREVDLLIELDAG
YLA FEIKTTEHASTADIRHLRDLGDILDKPLLHAFVLSNDPTTKTLAPGMTAVHAA YLLG
SETG*

>SPBIB_v1_180013|ID:27162754| conserved protein of unknown function [Uncultured spirochete bib]
MRTISFDVPEIDYLQLMEKLG YAYPRDKVTKLLRSGELVRIRKGLYLSTTTPVPYSKEI
LANLIYGPSYVSLEYALQRHGLIPEAVRIITSVT TGRKKRYSTPVGIFDYVHLPERCFAP
GMQYESLDRRRSYLIASPAKALFD TFLRYP AVRS AEIESHLFENMRIDEEEF SRIDFSG
IELLLEQCHRPSIRALRQLVQRRKPHG*

>SPBIB_v1_180014|ID:27162755| protein of unknown function [Uncultured spirochete bib]
MADTLSVLVEKRHPQSLDEYDSA EVMYRIREGMDGMGVRRDDGIGQDKRDGFWGRFLK*

>SPBIB_v1_180015|ID:27162756| conserved protein of unknown function [Uncultured spirochete bib]
MMDNEEITRKIIACAFQVHNSLGGGFLESVYRNALLIELSGAGLSVIKEKPISVFYQ NHL
VGSFYADIIVEDSVVLELKAIEALAKVHEVQLVNYLKATGYDLG LLINFGPLRVDV KRKT
RVFMPGLDRARRDEQDGTG*

>SPBIB_v1_180016|ID:27162757| conserved protein of unknown function [Uncultured spirochete bib]
MMKFETLLALFGDQVIFDFTSVL VLCGESRESTRVALHRMKKAGKIIELKRGLY AFAAPY
RRVPLNAAALANLLYAPSYLSERWALS WYGVPEKTAIYTSVTTRP TRSFENAMGVFQYR
TIQTTLFGPYRTDTIMGQQVSIAPPEKALFDL WYLEHGEWTQARMEAYRFEPRAVDTAAL
RALIAASDLPR LARAMRVWEDYAREAAQGVII*

>SPBIB_v1_180017|ID:27162758| conserved protein of unknown function [Uncultured spirochete bib]
MKNDALGLVHSIADPTDRLNVLREYIQALILRSLHESQAFTSIAFFGDTALRFLFNLPRF
SEDLDFSLELEKEYRPV VWMQKIKRDLQFQGYEVSISW NDRSAVHVAVWVGIPHLLKEAGL
SGHSEEKLSVKLEFD TNPPKGAVCASTLINRHTLFAVRHYDLPSLMAGKVNALL TRSFCK
GRDWYDLVWYRSRPPVEPNLELLRNAL AQQGVHLDGDWRTLVRDRIKHTEFEVITKDVA
PFLESHEDAKLLRPEYITALLEEGLG*

>SPBIB_v1_180018|ID:27162759| conserved protein of unknown function [Uncultured spirochete bib]
MIKDMILRQKYEKEKIVKGN YVERKERSTAKKWLESDLIKVITGPRRAGKSVFAFM LLKE
SPFMYFNFDDESIRLRNEFN TDELIKSLHEVYGQSKIVL FDEIQNL PQWELFVNRLQRQG
YNLIITGSNSKLLSKELSTALTGRHIPIEILPFNFREFLSAKHFD FKEEFLQIPQKKGEL
LRLAEEYLLTGGFPEIVTKDLELKEYLRTL FDSIILKDVVQR YRVKYTSEISDIGTFLVN
NFASLLSFRKIQNALSRSITTTK KYINYLEESYIFFELS QFSTKAIERMKS PRKMYIVD
NGYITAKSVRTSFD RGKLENLVFIELVKQKKEPN SDFYKTRNGREVD FVIRENLHIS
ELIQVSYDTSNIETTQREIKSLIEAREELNAQELEVITWDEEKEIEKNGKTITFKPILKW
LLHS*

>SPBIB_v1_180019|ID:27162760| AAA ATPase [Uncultured spirochete bib]
MKRYALEMLRKWKNEPNRKPL VIRGARQVGKTELVRIFAKEEFDTLIEINFDEHPGKASL
FADEDILSVIRYIEIDSNMKISPGT TLLFLDEIQAAPS VLSRLRYFYERIPQLHVICAGS
LLDFALSEPTFSMPVGRIEFL YLGPMTFGEFLLARGQGELEDYLESYSLTRTIPEAIHAK
LRSSLRDYFLTGGLPGVVKASVQSNCDLEDVAREQHSILQTY YADFGKYKQKVNVPFLQG
IFRNIPAQVGKTVKYTSLNSQARAAQVKENLELLEKARLIYRVFHSDGNGIPLGAEINPS
YFKLIFLDTGLLSAFLGLRLTDFLPNAEYTLIHS GAVAEQFVGQHLLYSAEPWAEP SLYY
WNRQSPGSTAEVDYLMQCRGQVPIEVKAGSRGRLRSLHMFVQEKQVPLAVRFNTDLPSI
HSTHTAIAGKEARPFVLLSLPLYLVEQTQRLVEGMGDWTGLQDGTG*

>SPBIB_v1_180020|ID:27162761| protein of unknown function [Uncultured spirochete bib]
MEFGLFASIRWTQRIRDSLLVIRLLSTIDEFHYSQGLGMLEDGMYIFDADKTVQDEF RV

ELDVPVENEYTFG*

>SPBIB_v1_180021|ID:27162762| putative DNA polymerase subunit beta [Uncultured spirochete bib]
MNSSAVRSKEETIARLREYCGAQDDILLILHGSAAHQDLRAESDIDIALALRHPISIDE
KLDYILIFSICGREIDLSDLRTIGGLFLHQVLSKGILILNRDIELYTKLVLSLICIED
IHPILQHAQTL*

>SPBIB_v1_180022|ID:27162763| protein of unknown function [Uncultured spirochete bib]
VVYATTTMSTSKKRYEVFENFAKEMGATFSTNLSLSEGERSLLEEFARHIHEINTVDDP
LFTPGERFRLADTYNLSVDEGDIELFTVELSRLFDKTTLTKKTLASDTAMRDQATERA
LNRVLTGIQYTGISEPHQRELRESGAEASDILDAFKPSILKNHTVNILREDLMDIYERF
LLWMRMTRDGMALSTRDRHRVEALLKKMIDLLNLAYVLNEPTPSSDPLVQRLIASSDAR
MEQTVVYTSALKELESIMPSRQKSDDNWDWLDI*

>SPBIB_v1_180023|ID:27162764| protein of unknown function [Uncultured spirochete bib]
MQTQYRVFLNQRVTARVAQMOPAERRRFAEKIRFLALGIWEGGVLVKKLSGTTRKVLFEA
RLTKGDRLLFTLGKIDDQSAVYLWALVKHDDVTRAARAGFPDNAPFLDFPIDTEETIEEL
YLDTAPEQWHTQEGIEEKVVADYGPQKWNVLDDDEWERLLAAHTLSELDFHLYLSNAQYA
ILARDPPLL VSGTAGSGKTTIALYYLSRKEFLGASRLFVTYSPYLRDEASKLYRGLVKGN
PLEDRPPFPDFLTIEELQRQNIDPHSPLQNPATFVGLNEFTSLIAAHPLAKNYDPELLWE
EIRAILKGAMPYSLKRLETLARELGSGSICLSHRQELAAELARYRQLSFGGRDAICAA
SSAFSTMEDFSNALGMRPQEGEFQVVSRLVLEFLKKKKEFLTRPLLSLEEYEFGLGKKRAPN
FIYDRKELYALATYYEKKREEQGLYDEIDLAKRALIERKRMQDPRVWDLVICDEIQDMTD
VHLELLFDLCKNRDHVLFAGDERQTINPSGFRWEAVRARFFESGARVPEISRLSLNFRST
GAIVELGNALLDLKKTFFVAGKFEARES WKFTGKPPVIEGIEEARILHIVRQSGTNRSI
LVRSPEEKRRLIAQLGTEL VFTIQEAKGLEFDTVLLWKFIEDETSNALWSTMTHGATHGA
PEALLPHLSHELNLLYTAIMRARSILTIYDGLKPSAVWGAGRLSSLVITNDTSLLEESW
SKASSPEEWNRRQGMFFARGYYAAAECYRNAAHREKEKEARGWAA YQAHDYLHAAPLFE
QSGDIARAAWCFEQSGELATAMALYTQLGDKTSHTRLSILALEREGRYAEAGRVLKMG
VDHALEDWRRGGEYELLADYYKKKKDYHHC AHFYEKAGNYEKA VFYKKNHEEAHAFELI
LARATGPGADPAAVEFLRKEADRCMATRRFAQAATLYVSLNAHQEAAEAYRMAGAHHERAA
LEFSRAKMYHEAAHEYS LVPNIERALAEWKA YVPETHDQRLAKLQGIDTLQWKL IARNPS
PEKAYNQAMANALFDEALQTLERGEYLNALALFIFKEQKQMLECLRHHDDMLALYTV
RVAHFTLWSQYRAHKARVVDARKAIGYLSKIYMSELTGHAHALEMARGLVLLLEDILDA
ADRSMLPQLKNEMLFSLSMLADFCRSSVENLVNAGKDLLRLLARLRDYSRISTAGLDWMS
RFKETPAMRSVVGYLDELALSNDPLLTVCSSLVRKASFDPEILATQAVDESNEWQFLSAI
PETKDKVVAYLLAQHRIQDAAATLRFNRAHLEAAELLESNGYFKDAAQIYEYLNWEHAF
AIYTRIGDQHRIARMYEHKGDYLA AIELWKQLGFPTQVQRLTRKYQKTIANSHQTHLDFG
D*

>SPBIB_v1_180024|ID:27162765| conserved exported protein of unknown function [Uncultured spirochete bib]
MMKKIILALGIASLCIACTVNPKD ATITEKFVISDPCVKLTDQLASIIHAEDLQGANDAET
AQNILNWQHEYMKYADPGTQEDASYAMRWNYFLPGIFPVSEMI SERTMQEDGKTKIYGVC
WDFAAVFISVAKSYQLTTRMTAWKEYMPGVTGGQNGMGPT EYNALPKPLLAHGVDFDFTQDQ
INAAAHETWKHYRAEVFIDGTWKAYDGTDPDGTGDYVNDANYTLVSWDEGAKAALT TKE*

>SPBIB_v1_180025|ID:27162766| conserved protein of unknown function [Uncultured spirochete bib]
MLFSCIMERKSILDLQIWQKKS DRKPLILHGARQVGKTWLLKEFGKRCYKNVAYINFEEN
ERMAALFASNLDVGRLLTGLRIEAGCPIEPASTLLIFDEVQANPRAL TSLKYFAENAPEY
HIAAAGSLLGIAMHAGTSFPVGKVEFLDLYPLSFEEFLWALGEQELAEMLGGRDWQFIEA
FREKLIDYLYKYVVGGMPECVSTFVATGDLNKARELQERLLNAYEQDFSKYADPAMVPR
IRAVWNSIPSQ LAREQRKFMVGLVREGARARDYELAIQWFC DAGLLHKVYRVSKPGIPLR
AYQEDNAFKLFMVD TGLLAAHAHIPISTMLRGSDFE EAKGALTEQYVAQELRLRNDIDV
FYWSSDTSRAKVD FLIQC GESLYPLEVKAAENLQAKSLR VYRDKFAPPRCYRTSLSPYRE
ESWLNIPLYALAGLRF CQ*

>SPBIB_v1_180026|ID:27162767| protein of unknown function [Uncultured spirochete bib]
LFSTRHIMKSTRAELQSAKVAQGESGCTVQISWMLGAQSAREAAWPYILECAARQPAC P
TGPTCLTCLQLPAHR SFEGGEVVAADGDGEAAQVGLAGAEVKEGGEVLFWRQGGFGGGS
PAQFADAARLMQSHPTGVAPPLRSSRTRRMASRRSFM TGFKI*

>SPBIB_v1_180027|ID:27162768| protein of unknown function [Uncultured spirochete bib]
VRLHQAGCVRELRRGGAPKAALPPEKDLASLLDFFRARQSYLSRLTIPISRDYLA AFKTA
MGWEL*

>SPBIB_v1_180028|ID:27162769| protein of unknown function [Uncultured spirochete bib]
MNGIETAAQLPPGTAIIFITA YDRYAIKAFELHAFDYILKPVMKDRLEEAI RRVRELRRG
GATPVGCD CIRRAASANCAGEGPPKPPCRQKRTSPPSLTSSAPASPT*

>SPBIB_v1_180029|ID:27162770| protein of unknown function [Uncultured spirochete bib]
VGTGKRTGPLLDHIVPA VRVLA FNAAAATNKA EFKKLNPGVKVYIINPGGTEAMIKKL
EAEKGS PQADIMHSGDSSNYLYAKKQGLLLPSKHIFRRASLPAQKGFHAISPQGSRLGTA
LNTIIPSFSSNPTSSSSMSKCPK*

>SPBIB_v1_180030|ID:27162771| protein of unknown function [Uncultured spirochete bib]
MGNKTAGIGRWRIAVMGTLLQLCLGTVYAWSYFQKPIMERFGWSNSQTAWTFSIAIGALG
LAAAWSGMNLAKYGPRGALEKLWARKVQRDRARADGVRLTRVWRLPARAQSRRC SVPGKF
GARFSPRDSCLCGSCFSSTSRRASCSSAFSHP*

>SPBIB_v1_180031|ID:27162772| membrane protein of unknown function [Uncultured spirochete bib]
MELFPEAHNGAIRLVQQSDGVDVQHRDRGAWARRSLERDEPCKIRPARGLGKALGSEGSA
GQSAGGRGAANQGVAPAGQSAEPALLSSREIRGAIFSARFVLMWL VFFLNITAGIMFIGF
QSPMIQDMVHAQDPGKSAELAGVGATLIAISSMFMNGFGRLFWGGLSDRIGRTRVFRIL
GSQVLVFVELLFVRSPMVFGMLVCYVLLCYGGGFGAMP SYIAIVFGPRMMAV VYGAMLTA
WSAGGIVGSQIVAFIKDRWPGGAVAASAAQAGAKVAQVAGGAAAGVNTGAAAAGAGPGVR
VAAGAANVAAAGPAAMTAASWIFLIGAALLALGFGLSFLSDGENLRKGV*

>SPBIB_v1_180032|ID:27162773| conserved protein of unknown function [Uncultured spirochete bib]
MSIEKEYDARIDKKKRLTIRGARYSNYHVCEYENGTVVLEPRELVPPFEVSKHTLEMMS
AMMNFKN GKASAPVDLSAFSEK*

>SPBIB_v1_180033|ID:27162774| conserved protein of unknown function [Uncultured spirochete bib]
MFSIRLGVPEMEALWAE LSSKAKMGT LGKNEAKLYIKMGKAMGLLSNNPKHPALHSHEIE
ALSRRYGQKVWQSYLENK KSGAGRM YWVYGPEQNEITIIGLEPHPEDKKSSGYEKIRLSA
TGQKEA*

>SPBIB_v1_180034|ID:27162775| conserved protein of unknown function [Uncultured spirochete bib]
MKNRKSALSIMARKDKPGSRIIVLTGARQTGKTTLARHLFP EYQFLSIEDPVL RNAYASL
TASQWKELYPKAILDEVQKEPRLIESIKSVYDQWEEPRYVLSGSSQLLLEKIKESLAGR
CTIIDLYPLTIPELETESWDDTIADSPFQIMLSHPGDISRQLESMLPDFRLDANYAKKMK
AWNHYVRFGGYPALTSQLNDEDRFEWLKQYVRTYLERDVRDLAMFRDLEPFV KLQRYIA
LQTATILNYS AVGHNIGITTKTVQRYVQYLELSYQVLILPSWSRTEGKRLVKSPKIHFLD
YGV LQAVVQKRGSP TGLEFESM VIAELYKQAKNILSDARFWYLRTFDGKEVDLLVELSQG
YLA FEIKTSEKVS IADARHLRDLSDVLDKPLLHSFVLSNDTATKNLAPDITAIHPAYMLG
*

>SPBIB_v1_180035|ID:27162776| Toxin-antitoxin system, toxin component, RelE family [Uncultured spirochete bib]
MAYIVRISKQADKTI AKAPKAVQ QKFALLDDLEKYGPIRKDWPNFSALGNGLYHCHLSY
SWVAVWRNEKASVLVEVEYAGSRESAPY*

>SPBIB_v1_180036|ID:27162777| protein of unknown function [Uncultured spirochete bib]
MRVVEKAHHIEDSKLIAVSAEEAGKILEYAKQIDPHAHFVEETPLSDGFISP HESGWYQ
DVKRSWHPGITLRIRRENAGLTQAQLSRMTGLAVANISAIENGRSMGLNVAKKLATALK
RPVSEFIEKS*

>SPBIB_v1_180037|ID:27162778| conserved protein of unknown function [Uncultured spirochete bib]
MSGYEK FYEESLYPLQNGILRTLAPVCGNVL SLTGGTALSRIYFHHRYSDDLDFGNSVE
HFNEIVEASLSALENAGYQFVKGSIIRHEA YTVAVVRNGGTNLKLDVNDVAAHFGECIA
HPLYPRIDSVRNILSNKLTALYRLEPKDIADLYFIACSYQFDWAVALQEAESKEAGLDAI
TIADIISTFPRDMFKA IKWITPDPGDFFKSLTIMTRDILHASPNSLAM*

>SPBIB_v1_180038|ID:27162779| protein of unknown function [Uncultured spirochete bib]
MFTREKLELLAGIVWDYDTPETLLAVLEGRQEKAGGV DKS AIYRLLRALPWQNI VGL
IGADEAIAMLT TENIAHLWPRELKEHYERLRKILRGEPVSPSEWDS PNACARLRQRTFSH
RWYRAQ*

>SPBIB_v1_180039|ID:27162780| protein of unknown function [Uncultured spirochete bib]

MSQSSNSPKAPTSKPPAHVPEGASFLVRLDPLECAKKVLIPSHRFEPFHSYRISIPRLEI
RLPDASPLPKKNIVLPYNEILRFHNLLNFMDFYMLEEMYPGNFPADLAQASQAFDRLIR
LSVFDLEPLFPGGIQGSYVRLSVQRYQKGIFTAAPVTPEEASRLDREAWFSTMDAAFAR
AFDELKFPRRNDTLLSLVYRYGGEALYGNPAAALIDYLDKRAAEIIFGGENLIWKKGV
DPEHIVLSGLDAYGTGSRKPGKASPAARTTSTPTSAPARAENSAAPAKTSNSASAAPPK
TAPAQTNGAPSEARPIAPVRAPAKPRKGRKPSLKARLNRFEEAYEFANADEIKALMLD
MAYRGTTLQDLWDRFFESSPQWTVFPEAADELIDLIEDYCDALANYDPERDGFGEEMRAA
LVDIYANYIAWMRRLDTKLRSPEDLPIEKFTELANLISSLNEFMLIMNSPAKRGPGDPSE
REVLEQFFDSVDYMRQAVTDLEHEIETIALRKKKGV*

>SPBIB_v1_180040|ID:27162781| conserved protein of unknown function [Uncultured spirochete bib]
MSSVTANVLMIGDIVGAPGLRALFTFLPSLIKKTEADLVIANGENALKGFGIGEEIEAAM
RSYGVVDVITSGNHVWERKEAADLLEAEPALLRPANYPRSLPGRGVAHIEGQSAPGLPAPT
RASGASGHFEWLVVNLQGRREL YDIDCPFAKADQILANAARENPGALIVVDFHAESNEEK
EALAWYLDGRASVVAGTHTHVPTADERTLPKGTGYLTDLGMTGPVDSVIGMNGDICVRRF
LTQIPYKMETAECSAAMGALFRIDPESRRRCVGIERYVYKSL*

>SPBIB_v1_180041|ID:27162782| rny| Ribonuclease Y [Uncultured spirochete bib]
MAPFVWYIVLPLAGLILGWMIRWLYARFQLSSAEREAEHVLQDAIKEAEAKKKELLVEAK
DQIIRERNQQERELDRRIELQKYERRVLLKEENLDAKLASIERIEANLKSRENAIAEKE
AFLAGQEERYAAELERVSGFTAEEAKKLIQNMENEARHDAQVLINKIDQEAQLTADKKA
KDILLTTIQRATESTAESTVSSVSLPSDEMKGRIIGREGRNIRTLETLTGVDDIIDDTP
EAVVISCFDPIQREIAKISLERLIADGRIHPARIEEMVQKVTREITQKLYDEGEKVVFDL
GLHNMAPELIRAVGRLYYRTSYGQNVLMHSKEVAVIAGLLAAELGLNREIAKRGALLHDI
GKGIVTDSMDMNAEIGTEIAKKFGEDPRVINAIAAHNDVEPTCPESVIVQIADAISAAR
PGARRETLDNYIKRLEDLEAVAESFSGVEKAFAIQAGRELRIIVNNEQISDDQAKDLCKS
IAKKIESDLRYPGRIKVTIIRETRIVEYAR*

>SPBIB_v1_180042|ID:27162783|rbpE| putative RNA-binding protein RbpE [Uncultured spirochete bib]
MAKKIYVGNMNYNTSERQLQDLFAQYGEVSTVNIIVDRFTGKAKGFGFVEMENAEAADAA
IAALNGQEFMGRQLRVNEAQEKPRYEKEDAGYRSRRY*

>SPBIB_v1_180043|ID:27162784| conserved protein of unknown function [Uncultured spirochete bib]
MSMEHLIEQFRHKVARTPMHFVRSIHDSIQWNARLIGIRGARGVGKTTLLQHIKQTFQAQ
DLNKVLYVSLDNLWFSHLSLELADSFACKGGTHLFLDEVHRYPSWSQILKNLYDDYPEL
FITFTGSSLLHLLDAKADLSRRAVVYTMQGLSFREYLALANMAFPAPFSLEKILSEHEAV
SAEIVSQFKPFQFFPAYLQTGYYPYFAEEPDTYPLRLEETINMTLELELPLLRRLDIAYI
PKLKQLLSIIAESAPFIPNISKLSEKIGLNRQTMLTYLGYLSEAKLIRPLYRDAHGVSA
QKPNKLFLENTNLMYLFKQSVDIGNARETFLANQLACGHELFSFADTGDFIVDGSITIEV
SGKNKTRKQIKDIPDSYVAADNIEYGFGRKIPLWLFGLY*

>SPBIB_v1_180044|ID:27162785| protein of unknown function [Uncultured spirochete bib]
MVKKVKKRGQTPFLKSDGHQLSVWEGTASLSEPV RADKYLSETLALMSRSQLKARGACLF
CNGKEVKLSHKIKNGDHLRLEWTEAPSEEITPEPVPLTILYRDADVVIDKPOGMVTHPA
AGNWSGTLANGILWLSLHGEDARATGLQTENEA EAKNELELNRESRAISESKSEPEPEPN
STSKREPENEPIPFYTSFRTLPLSPPRAGIVHRLDKDTSVVIIVARTARAHEFLCRQFH
DREARKEYLAIVRGAPPTTEGRIDTWLARS PRDRKKFAVSPSGRGKHALTLYKVRAIWEI
PARAESATRAALSRPNTASRAAASCAESA VPTATPPGRPITASRAAASTRPGTACASEA
PQSLSRSPSKKATSPQRYTLVALYPRTGRTHQLRVHMAHLGCPILGDPIYSKKDTLFPD
ATLMLHARRLKIRLPADNEFHIFAAPLPEHFHMIAMMLDAQGIRRRAST*

>SPBIB_v1_180045|ID:27162786| protein of unknown function [Uncultured spirochete bib]
MLEVLGKGRGKDVFEVIGGQADFKAPGVEHEGGIGKESVFFAVDWVAKNGAAEVGHVDAQ
LMGAACAGIEGDEGVALGRSGLLGAAPRKALGRFGGAGGPGAGAGCGGAGSGDGAARRR
GGWDRRFGTGRGSAGSGIGAR*

>SPBIB_v1_180046|ID:27162787|truA| tRNA pseudouridine synthase A [Uncultured spirochete bib]
MQQNPDFQQPPVKASARPD SMPSRAS TLRTIKLVLAYDGTDFSGWQRQKNGRSVQEELE
KALSKMHGHEIRVNGAGRTDAGVHAMGQVASFYTDIQSIPADRFTLALNKLMPRDVRLS
SEEAPADFHARFDASLRRYRYFLVCGGTPDPFALRCAHFVPYPRVAVLNAMA AVVLGEH
DFSTFASAQDKSPSRSRHISES VFFFEGEKLVYQIAGNAFLWKQVRSLVGTMLELERIAE

SPAHGESLMRELLDSRDRSKAGATAPACGLFLWNVEYGQRVHGHPRRHSEEAYG*

>SPBIB_v1_180047|ID:27162788|acpS| Holo-[acyl-carrier-protein] synthase [Uncultured spirochete bib]
MISGIGIDIVHIDRIRRWENPGILVRFHFAEIETARSRSKGMALSLAARFAAKEAFGK
ALGSLAHFALKEVAVVNDSAGRPYMELEGNARREFERHGGGTIHMSTHEGDNAAVAVVI
IEKGN*

>SPBIB_v1_180048|ID:27162789| putative YbbR family protein [Uncultured spirochete bib]
MSLDARISKLEENWPAKVISLVIAIFIMFLYNLTRLDQRLITVQLNISEGRSFPSTDYP
KTVRVVIRGERDQIYRIREADIVASLDLTRYQSEGVFRVPVKLERRGEARDIDPLELRAD
PAEPIGFERLAAKRVAISPTFKGFLEQGYELISYEIVPSEIAIEGPSNLIANTKDISTD
VIELSGKTGDFSLTVPLSKPSDLINLIDVNTVRFRTARIQKQERRITLNNVPIKAVNLDDPA
LGFAETMPTGKMTLLPRQGQDAAAADAHLQADFKGITKPGQYTVPLTPVVPDGYDVEAY
DPLVISVHVRTAQSVQSVLPGLLAPSGSSGLPAFPAPAAPSTQP*

>SPBIB_v1_180049|ID:27162790| conserved membrane protein of unknown function [Uncultured spirochete bib]
MNAPALVNFLVTVYVRPVLDAVAILAFLIYKTYQLVMTEAVYLIRGLLILVAIYGAAFFLN
LSTVTWIMNILAPGLVVSLAILQPELRRIFIQLGRQSIKQKAAARTSWIDAAVSAAVY
LAEKRRGALIVIARKVGLSSYIEKGIALDALVSTSLIAVFEHDNPLHDGAAIISQGRLA
SAGCFLPLSDQQDIRKTFGSRHRAALGISEESDAVVLIASEETGALSLEYDSKLYYDLSA
DEILERLRMLFSESRSRSMTSEADYEP*

>SPBIB_v1_180050|ID:27162791|folP| Dihydropteroate synthase [Uncultured spirochete bib]
MSDSPASAHQCNEQTELTRITLKLPRQRSLLYGAQPLIMGIVNVTPDSFFEGSRKYEPQA
AVEAALAMVSHGAHIIDFGAESTRPGSIEIDPKEERARLLPVIERFRAASDAVISVDTRH
PEVARAALEAGADILNDIEALAAPGMAEIAAKHHAAVVLMHMQGTPATMQIAPAYADCLE
EVYTFLRAVTKGAIAGVSAESIILDPGIGFGKLEHNLALLRGIGRLRSLGFPVLIGLS
RKRLVGELTGREIPERLAGSIGGALAAWMAGADIIRVHDVAETVDAFRVFTAIFPARPSG
KEFSREVS*

>SPBIB_v1_180051|ID:27162792|dxs| 1-deoxy-D-xylulose-5-phosphate synthase [Uncultured spirochete bib]
MVQYIDMALLDHISGPADLKELSLAELRRLADEIRSRIVETVQLNGGHLASNLGVVELTI
ALHRVFHSPQDAIVWDVGHQCYPHKILTGRAERFHTLRRQGGISGFPKREESEHDIFDTG
HSSTAISSALGLLAARTQTGKQGRVIAVVGDGVLTSGMAMEGLSNAGQLGLPLILVLNDN
RMSISRSVGSISRYLSKLSASMRYSQSFRAHIDAAVLKIPRIGKPLSEFINRSKRAVKAIF
FKENLFVDYGFYVGPIDGHSITAMIDAFHVRLNLRPVVVHVITKKGKGLERAEEDPES
FHGLGPSCPDIPGAGESHGESFSSCFANSLIELAEHDARVMAITAAMASGTGVAKMLER
WPQRFVDVGIAEQHAVTFAAGLAQGGLRPVVAIYSTFMQRAVDQVFQDVSANVPVLFAL
DRAGAVGEDGETHQGIYDIALFKAMPNLIFFAPADGDELAAFMKLSLSLDAPCMMRYPKA
FSPCANGAMRPLEVGKGTMMRERAGARILVCAVGPLAYSAADASDALEKKAVLADVYNVR
FLSHIDEEYLASLCARYDAILTAEDGVRVGGFGETLAAILARRGVRAGIRSLGFENTPLA
QASRDALLAQAGLNTKGIQKALEELQRSLGPESKKNAYAASVAAATARATPIPVGVEVQ
HVR*

>SPBIB_v1_180052|ID:27162793| protein of unknown function [Uncultured spirochete bib]
MHMLIDIKILHLHRPIYYEKIELVSDEIQNNAISALAAARYGECLLVFRNDNLLILSDDGP
HLASKLVPSTAYRIAVRDGGKGSTDTASAIPDESQGNIVGRSAPRQLSADYSIARFTLSA
ADYAFFQWRAESAPQPSIMFEEFAREIWWERLETEGAWFLRLVLEDGKTSVQALRLVLST
LCKRGH*

>SPBIB_v1_180053|ID:27162794| protein of unknown function [Uncultured spirochete bib]
LGRYSAFSFPVGRHSFFQLLAMVGLKGLRVRNARSSKLLYXX

>SPBIB_v1_190001|ID:27162795|alaS| Alanine--tRNA ligase [Uncultured spirochete bib]
MITIHELRRKYIEFFKARGHSEISGKSLIPENDPTVLFTTAGMHPLVPYLLGEPHPAGKR
LTDYQKCI RTGDIDAVGDPSHLTFEMLGNWSLGDYFKKEAIRWSYEFLTSPEYLGIDPA
KLSVTVFTGDEGVPRDEESASIWRSLGIPEERIYFLPREDNWWGPAGETGPCGPDTEMFV
DTGKPACGPDCRPGCHCGKYFEIWNDFVMQYNKKNKNDGSYEPLAHCVDVTGMGIERTVAML
QGKKSVEYETEAFTPIAVLESITGKRYGALDNNPETDRSFRIIADHIRAATFILGDPKAV
LPSNIGAGYVLRRLIRRAVRHGRKLGIDGIFLAKPAEAVIEIYKEPYPELLENRARILEE
LEREERKFLETQKGEHEFEKMLPNLLRNPEKIMPGRALFRLYDITYGFPIELTEELASEN
GLAVDRAGFDEAFKKHQELSRAGSEQVFKGGLADHSEVVTRYHTATHLLHKALRIVLGEH

VAQKGSNLTAERLRFDFSHAPMTQEQAIEVERIVNEQIARDLPVSMTMMPLEEKASGA
IALFGEKEYEPVVKVYTIGDFSKEVCGGPHVTHTGELGKFKITKEQSSSAGVRRYIAILE*
>SPBIB_v1_190002|ID:27162796| protein of unknown function [Uncultured spirochete bib]
LKCIFITQVRSRAEKAHARLLIDSIRAFGGPMRDCEIWFATK PANEP CDDLEGLQVKVI
PLSVQRKFM DYPF GDKVFTCATAEAMAASDTGSLIWL DPECLVVQPPLFDLGGEEFAAAL
RPVHVHNVGLLVSEPLDPFWKGIFRTVGIEDIEFAVESFVDRQAIRAYFN SHGLAVRPGN
GLFRKWLKSFERLVSDREFQLEACCDNFRRLFLFQAVFSAVVVSDVEREKIRILPETYNY
PYNLHEQIPAAWRAAALDDL VCLTYEGRTLAPCRVTDIEIHEPLRSWLETRKGGQAFETAH
*

>SPBIB_v1_190003|ID:27162797| conserved protein of unknown function [Uncultured spirochete bib]
MRVVFVSGGFGNVGISTVRALLSAGHEVCVFEHPSAKEKRSARLRELLKASGSKLKVVFFGD
ITDEAALSEAMACFGIDGSSEGLDAVIHLAGIIPPLADRDPELAYRINVGGTRALLAVCS
ILPRPPRFV FASSIALYGDRLASPWIAATDPLLNDTYSKTKQECEALIKSAGLDWVILR
LSYVVSSDWLPFD PMLFEVPPATRF EVLHTEDAGRAFAAACQNPDAAGRIFNIGGGAACR
TTYRAYLDRLMRLFGLGSSSFLPDELFAKCNFHCGWFVDSDEAEAVLHFRSKTLEDYYSE
VQWRTRFLRPLASIAAFVVKPWMRSLSPYRVS PGRVRS PQLV*

>SPBIB_v1_190004|ID:27162798| protein of unknown function [Uncultured spirochete bib]
MPRPKTEEKRLILD TAKRLF ALEGVGVSMNEMAE AIGIPV GSIYTYFDSKQVLVETIIE
EGWNEYRLWLEEGIAAIQLGNQ NADARLIALKILSFLVNKALPKLFS DVELIMLLLAEAG
TTARLEEKLYFSSMITKL VSECQVSGAAENDPRQYNTGITVLLLGALET LRLSSKTDLK
LGADDIQAFFRLIVENALGQGLPDTD*

>SPBIB_v1_190005|ID:27162799| Asparaginase/glutaminase [Uncultured spirochete bib]
MLEYLCAAWYYTVIMNPEAIRIIVTGGTFDKHYDEIKGELTFTETHVPEVLKRARVSPV
QVELNQLIDSLYMQEANRQSVLDACKRAPERHIIITHGTDMAETA KLIGSARLDKTIVL
TGAMIPYKILDS DALFNFGTAFAAVQLLPAGVYISMNGRIFD WNRVRKNKTLGVFEEIQE
*

>SPBIB_v1_190006|ID:27162800| protein of unknown function [Uncultured spirochete bib]
MLEFLFFVLAKILESNNVTEDEIRKNEAIQKEAAITSLAAFFLVKNTDFFSDCTLKILPK
KPKYSQ*

>SPBIB_v1_190007|ID:27162801| exported protein of unknown function [Uncultured spirochete bib]
VQSEKKS VFLTRKKAARLVIAASFCIASFFLISSVTLFDSSIFASTKNKNSSIMFAVTL
KNNGSYSDPVSRLYINDKTKNQVLKFFSAITNSMPVAKAILDNSIAHNVRPSLAFAYV
ESRYNPKARSVNTSGSLNSGLFQLNSSVFDKISEKQVFDPHYHNARIGISHLKEYLILSED
EFTALAAYNAGITRIAEQGIPGVTFKYISEVSIMERKIMDLFVASMALSGNPL*

>SPBIB_v1_190008|ID:27162802| Transcriptional regulator, TetR family [Uncultured spirochete bib]
MMYEK WGIWYNNISTEGVILSGQVAHEKRRQEILEKALDVFIEEGYEDTT FQKIAERCGI
TRTILYLYFENKKQIFAESLKRFLGSVEIEIAVVAHDESMNSEEKILKIGEMVVEACEKE
SKLLSVVLDYLLRLKAAGGNPDEK VRRRTVRMRHILADIVIEGKKRGEFSETSSVKGTV E
IFFALVEATVFRLVVLGRKEATGLAEALTPFVQSMRP*

>SPBIB_v1_190009|ID:27162803| Alpha amylase catalytic region [Uncultured spirochete bib]
MALQISRSLRSVNVPPKHLWMPSGAIAPDSVSARVVAQKFQLPASELRALS LIDDASRI
IIDLYRQQLSKMLRHITESAMGTEKDRSALADVLKELALEFPPEVFDGIADASDWLESS
SQA KDGKMLSHREAALEQLILVRLFNENPACVSYRPLFDDGVSPAGTAAAGSLAAKTPYL
AVFLKLEEALKALPGLSYEK GKALDLISFLREPAKRAPQSLKAQLQWIVDNWGELLGDFR
LALLAGIDMINEETAPRFPAGGPAHAYHYRSSLHEYEKFSADR NWMPSLVLLAKNTLVW
LHQLSVIYGREISRLDQIPDEELITMAERINGLW LIGIWQRSPASEKIKKLCGNPEAAA
SAYS LFDYEISPELGGWEALDAFREQCRQFGIRLAADMVPNHTGIDSFVVRTKPELFMSV
PYCPFPSYTFNGPDLSSDPSVGIWLEDHYYSRTDAAV VFKRLDRHTGEVRYIYHGNDGTG
MPWNTAQIDFLNPAAREAVKERILHVASHFSIIRFDAAMVLAKQHIRRLWYPAPGAGGA
IPSRSEHAMSD EAFDKAIPNEFWREVVDLCAEKAPDTLLLAEAFWLMEGYFVRTLGMHRV
YNSAFMNMLKEEKNSLYRLTIKNTQEFDRDILKRFVNFMSNPDEETA VAQFGKGDYFGV
ATMLATMPGLPMIAHGQIEGFTEKYGMFKRSYKDETPDRDFIARHEREIFLLRTRPLF
SDIEHFFLYDYMRADGTIDENVFAYTNGQGEQRALILYNNCWERTSGRIHNSCAFTQKSP
SGKKHLETITLAKALGVEPSPDNYLIMHEIRSGLWFIYRSEEIASSGLQVALEGYQSKVF

LEISSVHDTEGRYARLYEIVDSKGIADLDDALLEADQPDLFRALHNAIVSLNGVEAVESL
SKSEAIARA AIFSEMFFSRLCATAGCEYTHPASRAESIRRAVSWMSSVLSGLYNPEILDE
APLAAYRIGAPRKRLTLLVYAFISALAKSFAADGLEDIGRVVEEYRITKKLREFAVALS
RTIPDEPENSIDPSAEAEIAIAWALRADAKLFAASAVSNSGKKESAVGASPSAHDILEWA
FSNALMRAALGVNHYRGTEYFNRRERFEAFIGLLPAFGWIDSITQIFPEGDVDAVEFWHLR
AELLAHEADSGYLTKTLENVLAHASP*

>SPBIB_v1_190010|ID:27162804| protein of unknown function [Uncultured spirochete bib]
MDRRAARYAELLKTPIGSDIERYVRDNTVIFAFPSQDAADSWARALLASKVFKAVALDRF
LGFPELLRTIGLDDERERESERAGTRMAQHADRWA WAIRALES LKGSEAQHSLVLRILP
TLPGGESYSISHLRLVRLVPALYEIDAYARQSRKEPLGSAEKQRQFAFLREELEDL KAL
ARHYRDFLNDQNIIDYHFLAQDQSLSSGHHVRAYGLKRDFARLGLGIEHEQSRLYFPESA
LPDFSEIRLPPYIQFDSAIDEIEYVFASISEEIEQGLEPEDIAISVCRLNPQKAAWIRQI
AADCGVPVSIRSGSPLSSTPFGRLRAIQQASREGLTLDALDSLAAFTSIQNRDPEAWRQ
LRITAARAHIPSPSPNAAYVHGLWKESAQIGMSVLNLVQKYDALWKDITEVAQSKNFSGL
YLAILRFLERWVDTTKLSAESYTDRSMRMALDELQAFVEREDAFQTSHFSPFEVYLAALS
TKNYIPVMAENAVRVDFGTAGLAAISQYIIGASQDGLAAYFENQTALRSELASLLGLD
GTYRIEELVALHSLGDAHFSFARESFDGYEVAHPFFGAALAEANANAMRNGTASVLSRVPR
RVERAIWQSTTMLASDTPLALTKGQKQRFSEGFSAFPGLAFDTRTYAHPAPLDAPIAKR
FLKATDSFDFDRDFAIFSPHSLRDRMRCGFRWFASRIGAADMYALDDL SMILGNFLHTTY
QRIIRALMQHASASTSSEVTDDIFLDIFKQAAKTAEEMFASKGPGIRPALMTYFDRARH
RLKTLQEFELAFQPYRREGFELPFEHVFDSEKAILRGRIDCIFSRIDESAGNAQCLVII
DYKKNSIPKASAMRPRGQESSGVVDDSDIEDTASSMAVQELQVPLYALAEELDGKLVEG
ALYWSIEKAEGVAYIAPPALPPGYGLAKAFKTA SETADVRAVLRQTLAAASMAVRNGELI
DLALDRASCDCPFRALCRYWYFLES*

>SPBIB_v1_190011|ID:27162805| protein of unknown function [Uncultured spirochete bib]
MNKLDLDDAQR LA ACTKSTAVVTAGAGAGKTRALVGRFLYLVEEHVEPESILALTFTRK
AAAEMFQRVYEALGRPENARPD LASRLSNAHIQTLDSFCREIVAGCATLYGYTPDFVIDE
TACAEVAHKTA YRYVLEQM QADGLRELLGAFGFDAVVSDFASFSGSANVEPHWIGQH VCH
RSFEIGMREFEQTGTSVVQQMQAIAARILDEAGKGTISDFKEGSAKTVRVAQVLEALDT
DASKDGASPEPGTGSMQQFSRLKAFLDYIDKPENSVNFQRVGKKDIEIAIKEQGQLLLRD
KLLKLRQIIDFELFLPQYRAAMERLDEYADALCEEKRRANIMNYKDLGALAVDILSRQ
KDIREYWASRFYILIDEFQDNNAIQKRLLLLLSQEPGIEPGPASAESSTGAGRPAKIAE
GKLVFVDEKQSIYLFRGADVSVFKALASELAAERFALARNYRS AKALIDFFNEVFAVVL
QPADPAQPQAFEAIYERMEASPEPEPPGFVPRIEYHLVSDEVPLEGTSLQEEAGPGSSAA
TSSGAAARVAKLGSALSARESMAFRMAMWIRNA VESSPLYIRCKDSL RKAEYSDIAILM
RTTSRQYEIEKYL RMLAVPFVTETTASLFT EAPVNDLYFILRLLLD SHDLFATAAVLRSP
LCRITNDGYVSILTEKLSLAELRARS PS GALAGLSAEDQAAVQRMVFFYDAFSAIADHLP
LMEISFAWERAFIGLSILSDPQRHPYLEHWN AIRSIAAETEAQGGHVPEFLRTLRAFID
QKRLFDSSTIQKEEAQGVRLMTIHKSKGLEFPVILIPWMEAGTNKSGGSDLWGVL DAPPD
TNQDRYFTIDIGFHDRADNGSNILQTQARTLRVEKEHAETKRLFYVACTRAIDHLIFGA
APRSYDTSFHALLFQSTYKLHPSAAGYPEAERQQTENPQEERPAAEHAEATSSRHLAR
IKLSFEPLAFEQEVHRERRATQKPD LAQVAAMYERARIVDLKRPARKLTVSAVKAHVRS
EAPVPAFSPRII QETCFEPASEVFEKKRAAQEGTSDPAAFGTLVHELFAHLASGKPFETF
SPSAMYRTARNSLRADTAGIASVSRNPTGTELQKKPSDEIARAYREL VPLLNSDCFKTLL
QGNTVSIEYPFLLSIPPWMLEGRIDMLIEQSSEVILDLKTDARFAPIDYALQLGIYQKA
IRELFPDKRVRAGLVYLRFGTFAWIEGELEESAIARYCEALAAAQE*

>SPBIB_v1_190012|ID:27162806| Chromate transporter [Uncultured spirochete bib]
MRMPARAEDITKTEPTWHIFLVLAQINTLTLGGGYVIVPAIGNAFEKQGWIEEEEFYRI
FSRAQVFPGPALSTAF LASYRIAGVPGAIAAVLGTVLPPFFALILVGGFISLYGNTELF
KRFLGGAGAVVPGLVASMLWKTTKNRKWSVRAVIEVVGLAILLVFPSAAFFLLLGGIAV
FYIGRLVWKS*

>SPBIB_v1_190013|ID:27162807| Chromate transporter [Uncultured spirochete bib]
MEILSVSLAFFKIGIVAFGGGWSVVGLIKHEIVPRWMNAEAFNSLIAIAQSTPGPIALNA
ATLVGWQKAGFLGALAATFSVILFPLLAMSSALAF AKYIPLKRSLADESLRSGSMAMILM

TLWTLLPRTALPMPWIFALAAFGITAFTKLNNAVYVILGAGALNMLIGALH*

>SPBIB_v1_190014|ID:27162808| conserved protein of unknown function [Uncultured spirochete bib]
MTEMANTHDIAKTAGTAGAPNAARAASAANAINAAPLFEAFSMPESPVDESMRRALFVQL
TAQLLRSFAGRALSITFLAGAGTRWKASLLKARENPGAWPAGEVAASFPLDAPRGLFPV
PDFIHGEKGEGRIAMAAYAVEAVRAIKEHILVVRGWEREIEAQVLNPLEMPHSRIAFFTQ
KEGPDGQVSGHGDAALQCMSLWQNARYVVTNFAGDANSPLTVELALRAFAAFDAKGLIEIG
VIIPVAMTEKPAYPVFLEENGLPAGFWHEKLAGSKPNAAPTSLTNVGIRVYRADWLRRAL
LLLKERYYVEGQGPDAAGWHIPGNDPSKRECALDNVDNLLAEMRLARVMPVSLPRELTPLK
SLGEYPAFVQAVKEVQREWREIRRE*

>SPBIB_v1_190015|ID:27162809| putative ABC transporter, permease protein [Uncultured spirochete bib]
MIPTYPEFAPLELDAREALYPNLNLLPDGISEFTFAGLYLFRHTYNYRISRLPDGNLVIS
GHRREKSFFYLPCCFPSVDLFDKLMHQYDYMRHMSETQANQHRIELEARGYLVFEDRDNF
DYLNRDLAMLNGRAYHKKRNLVNGFVSSYSCEQRAFTKARIKDALAVLEEWRTAKGVD
GDYAAARDALEHFEVLGLRGAVYYIENEPVGWCLGEPLAKGKMFIAHFEEKACDRFKGIYQ
FINQAFASLAKHYRYNREQDLGDEGLRQAKMTYRPVGFVKKYMFHPDRADFAPQPLE
PPAECGPGTVHECSDD*

>SPBIB_v1_190016|ID:27162810|pepT| Peptidase T [Uncultured spirochete bib]
MNRTIEFLSRPYADEVMNRFVSYAKIDTQSNRHAEEPTTKGQWDLARTLERELREMGVP
DVELDDRCYLIARLPASPGKEQAPCIGLMAHMDTASDVSGSGVKPRIIRDYDGKAVQLSE
QYILDPAEFPDLAEHVDDTIIIVTDGSTLLGADDKAGVAEIMTAIAWLIKHPLEHGPIDI
YFTPDEETGKGMDHFPLKKARAVACYTLDGGKAPEIEAECFNAYAVKAEFFGKVIHIGAA
RGKLANAVAMAASFIGMLPRSESPEATDSWYGYCYPIEVSGTIDHAWTEVYLRDFSSDRM
QERIAALKAFAAAVEVQFPGGQVKLAITQQYLNMKQKLDQAQPAVLEKLERAIKTAGFEPV
MKPIRGGTDGSRLEMGIPTPNLFTGGYNYHSRFEWASVSEMALAVETIINLVLIWAE*

>SPBIB_v1_190017|ID:27162811| NAD(P)H dehydrogenase (Quinone) [Uncultured spirochete bib]
MNALVILAQPKKQSFNSAIAAEIVRSLGQOGYDPVGLIDLADAFNPVMPQEELPRKFSF
DETLRYQERIQAADRVVFPDWGGPPAIMKGFDRVFRPGIAYGFREADFKNADAPG
LFSQKRFDVFITTDAREPESGILNDWPPVMVWKENVLTFCGVTEADVHVFWNLRHSTYAQ
RKAWLDSIHSMLAIQPRSAQD*

>SPBIB_v1_190018|ID:27162812| conserved protein of unknown function [Uncultured spirochete bib]
MAEKTEKFLEALLEMLKAVKDPELGYSDVLDGLVYRAEQTEDGIEVDFTLYIGCPLEA
QLRRDIERTLQKKTGIRPVRRARLVWNPPWTIDRASDEIRLNMGYAIW*

>SPBIB_v1_190019|ID:27162813|sufC| component of SufBCD complex, ATP-binding component of ABC superfamily
[Uncultured spirochete bib]
MQEGLIIRGLSAGLENKRIIDALHLEVPDGEVHALMGPNGHGKSTLANILMGHPGYAVEE
GEVLFDDGENLLDLEVWERARKGLFLAFQYPAEIPGVTVSKFLKRIADLRRNPPRNTSVFL
SELKENLRMLDIEPAFVNRYLNDGFSGGKRRMEILQLLTIQPRFAIFDETDSDGLDIDAL
KVVAAGINHMRRGPGFSALVITHYRRLDLVKPDKVHILEKGHIVACGGFELVELLERDGY
DGIRRIVANPANPEVREAVYEH*

>SPBIB_v1_190020|ID:27162814|sufB| component of SufBCD complex [Uncultured spirochete bib]
MSTESAALQPDSIRAIGEGYAERFGFSMPNRSIVKTSQGLTEETVRAISKTKDEPEWML
RFRRLRALHLFQTLPMPTWGANLSQLEFGSMTYYSKPTESAKDSWDALPADIKSTYERLGV
PEAERKFLAGVGAQYDSEMZYHNIREDLKKKGILFSDVETAVREHPGLVKRFFGTVPVPPD
DNKFAALNSAVWSGGSFVYVPPGVHVDIPLQAYFRVNSQAFGQFERTLIIADEGSFVHYI
EGCTAPVFSKDSLHSAVVEIILPNSRIRYSTVQNWSSNMYNLVTKRAFAYDNAIMEWVD
GNIGSKVTMKYPAIFLMGPGARGEVLISIAFAGKGQEQDTGAKIFHFASNTSSVITSKIS
KDGGTASYRGLVKVEAGLTNIKSKVECDALILDPHSRSNTYPTMDIRSEQATMEHEAKVS
KISEEQFLFYLSRGLSEEEAAMIVNGFIDPLVKELPMEYAVELNRLIELEMEGSVG*

>SPBIB_v1_190021|ID:27162815| SufBD protein (modular protein) [Uncultured spirochete bib]
MSGTILDTLKVSRREKANDAAALLFPADSKSSGLKRLDIAISSPASGALSGAPQEPKEPA
EYEQYREASIALGAGAEAAVLVRFVAAGAASQDRAADEPARMQDARLARAENPETPGSLR
LTTSLHIRLAHAHARLNLYVLSNLPASFSREALSHAALSEGAVLWTVNVFDEGNGLYTTR
IELEGESELDFAAGYGARCTTEGEHALSIHHTAPHSKSRTILKSALKDSAHLAFRGLIH
VENTARGTDAYLANRNLVLEDGARAESFPQLKIETDEVACSHGATTGGPRQEELFYLSMR

GLDRAAAKNMLVLGHLGSVLNRLPPDLAEEMEDIAASALGLNAQGSCI*

>SPBIB_v1_190022|ID:27162816|sufS| selenocysteine lyase, PLP-dependent [Uncultured spirochete bib]
MKTTFSALAEGADISINAAVARELKKEYPIFRTLPNLVYLDNAATTQKPLSVLDAERDFY
MQSCANVHRAIHTIGEEATARYEKARSSMARFIGAAPKELIFTRGTTESINLVARTFGET
LREGDEILSVMMEHHANMVPWQQLAERRGVVLFKIPVTDLGELDLAEYEKLVSPRTRLVA
VTMVS NVLGTINPIDRIVATARSAGVPVLLDAAQAAPSMPLDVKALGADFVAFSGHKMYG
PFGIGILWGSETMLDRMPPFLGGDMISEVRLEGFSVNELPYKFEAGTPPIAQAIGLEAA
AEWLSSVGLEALGEYESALARRFLDAIKDIPGLRVMGSARQRAGIVAFTLENAHAHDVAA
YLDRRGIAVRAGHHCAPLARRFGVVSSARASFGAYNLPEDADAAARALADAQEAL*

>SPBIB_v1_190023|ID:27162817|SUF system FeS assembly protein, NifU family [Uncultured spirochete bib]
MSDPYQAIYEEIIHEHYKKPKYRRILEGLPYAENPSCGDRVRISIQVGDDGHIAAFAFDG
SGCSISMSSADILAEDLIGKTPEEARAQVERFLAVLRGELDVDELDAYGDAAAFKGIARL
PVRVKCAALAWRAALAQLDAIKSKGNKAAAS*

>SPBIB_v1_190024|ID:27162818|atoA| acetyl-CoA:acetoacetyl-CoA transferase, beta subunit [Uncultured spirochete bib]
MPEYIENKEIIAQRIARFFKTGDVVNLGIGLPTLVGNYIPKEVTVILQSENGLIGLGPEP
APGGEDKDLTNAGGKAVTILPGGCFDSATSFGIIRGGHVDTYTVLGVLEVDQEGNLANYK
IPGKMVPGMGGAMDVLVAGSRHVIAATTHFEKSGASKLRRC SLPLTAAHEVDYVVTDLGF
FVVS GHSFILKEVFAPWTAEWIIAHTADVLAEDILLWEPA*

>SPBIB_v1_190025|ID:27162819|atoD| acetyl-CoA:acetoacetyl-CoA transferase, alpha subunit [Uncultured spirochete bib]
MIAKPVISAREAAALIQPGSVVHIGGFLGCGSPDAIIAALCEAHIGELTIVCNDTAIYDP
KTGRTTGLAPLILNHLVRKVITSHIGTNAETQKLMSSGEIEVELVPQGT LAERIRAAGFG
LGGILTPTGAGTEVEQGHVFEVNSRKYLLELPLPGDV AIIKAKKGDRA GNLVYAKTARN
FNPIMAPACSLVIAEVEELVEIGTIDPDHVHTPSIFVDYLVTA*

>SPBIB_v1_190026|ID:27162820|Na+/H+ antiporter NhaC-like protein [Uncultured spirochete bib]
MENFGILALLPPVLTVLLAIWTKDVIVSLFLGIFAGAMTVAGGNPLQALVRLTDLLA EML
ADGWNIRIILFCALLGALVGMWHKTGAAYAFGSWAGKKAKSKTSVLLLTWIFGIIIFIDD
YFNSLTIGACMRPVTDEKKISRAKLAYILDSTAAPVCIAPISSWVITVMSYTKGSEGFD
KLGISEFTYFIRTI PNLYALFAILMVAFVAFKGRDFGPMARSEARA EKGLGLFDEKKYG
IVAGKLDQKAATTNATWFDLPLLLLIVCAVVFPPVTTWMGSIDGENIHNMG EAMASMS
LGEAFNNTDASKALFYSIMFAIVFSYIYFLLRLLNISQSAEAIVDGIKSMVPAIVILSL
AWSIGFIIKKSPEDGGVGLANYLAQAVRGGNFPLWLLPLIVFLISCVISFSTGTSWG TMA
IMIPIAMPIAVALGEKMGLSGNALINITVYSTASVMGGA VFGDHCSPISD TTILSSTGAN
CPHLEHVATQMPYAVFVAICAAFGIVTLGITDSTILALLVTA VLFVAVGIAVLPKVWGVQK
YKLED*

>SPBIB_v1_190027|ID:27162821|kamE| D-lysine 5,6-aminomutase beta subunit [Uncultured spirochete bib]
MAHIIRPYGDTMDDGKVQLSFLPVPAGSRALEAARRIALAWGFHEAEV VHMAMPMSDEFT
FFVVYAATQHGDWDTVEGDRDDSEKPMTMDEINAFIRAHIGR KVVVVGACTGFDAHTVG
IDAIMNMKGYNHHYGLERYEMIEAHNLGAQVPNETLIDYAEAHNADAILVSQVVTQKNSH
VHNLTEFIELLEAKGERGRFICIAAGPRISNKLA AKIGFDAGFGHGTYAEDVATFIVKKM
VQEGRK*

>SPBIB_v1_190028|ID:27162822|kamD| D-lysine 5,6-aminomutase alpha subunit [Uncultured spirochete bib]
MVTNKLNLPEKIDRARELAKNICAPVLD FIDAHTT V TVERATL RLLGADGVSTEGAPVP
NLVVDALRDKMSEGA AVWYANALVQTGLEQ GELDRRIAEGFN IATLPMGDRQKAKELAAA
LARRQFSRIDANRAYRESKLEEFKGRSHSPLL YLIVATGNIYEDVKQAQAAALAGADVIA
VIRTTAQSLLDYVPYGP TTEGFGGTYATQENFRIMRQALDEVMEREQR YIYQNTNYASGLC
MPEIAAMGALERLDMMLNDSMYGILFRDINMYRTFVDQRFSRMINA YSGIINTGEDNYL
TTSDAFEKAYTVLASQFLNERFAYAAGLKPWQMGLGHAFEMDPSIENGILYELAQAQMAR
EIFPEHPLKYMPPTKHMSGDIFKGLVMDNMFNFVSKATGQGIHLLGMLTEAIHTPFMMDR
HIAVETALYVMNGIESIMDEIEFRPDGLIVRRAHEVLDRTLGFMEEVERIGLMESIEKAM
FADISRRTGGKGFEGIVEKGEYFNPVESMLERSLGLA*

>SPBIB_v1_190029|ID:27162823| protein of unknown function [Uncultured spirochete bib]
MKKPLPVPPHVL SFSQADSLFARLAPLSPYGKERVAEIGFFTD FEALSFYDDIEAAGAA

LDSLEHSARRDKLFWHLSRLTRIPESLAGTSGNSAPGSSGAANFSASNSAAKKISASSPS
NADAWGLMELFLVKKFLVHYKGIFELLDDEARTRFGFFFSTQELLDVLSAGGSDAESFSI
SERHEPALAAVRARIARLSETALERRRKLQEAARTAYGIDFAGREMLILPVDKALDAMGK
GRLGQGPLLAADPYDSRSMIRLVPDTELLEAEEARRKARDEEKLEQAAIVRLSALVVA
AKDALQSYCRAVKRFDYSLAQWKLAEQELGMVRPRLRARGTACIQCHGARFIPLEEECRER
GVAYMPLDFELDTPVGILSGSNMGGKTCVLQTLVFLQLLAQCGMFVPAAAFETVVFGWID
VIGAAGESRGRGLSAYGFEIRRLIEVLHAAKNEPGFAVFDEFHTTSAKEAQALMQAAVE
QLASLSGTVALFATHIECSLPEGKGTAYRMAGLDSEARARSIIESTPAQSERSLDALLAQI
NSLMQYKVIRTGKASAHAKSDALAVARLLGLDKDLVDRAQELLAESDTRRAPPAQDKQKE
RGAE*

>SPBIB_v1_190030|ID:27162824| exported protein of unknown function [Uncultured spirochete bib]
MSLNAALFAGRNVNFIAGFAAASGKTMLAKAILALLREKGLKCALISAGYEGGGREPAGAP
ALKMPSLEMPTFEVEKGEVFSTAANALPFLDCMPELIAGPVGSSALGPVILARAERSGSA
ILAGPARSEALATLVEAARHLRGIDAVIIDGTLDRLTQISVLPDPQLYCAVRADRADCQQ
IAKRMATFYQLVHLPKWDASRAREGEALIFEGALSSATLEKHKSARDIPILIKDITRVFL
RPDEIASLSARGRLFIQQEISFRGFVVALRDIEPEEFMFYLPHDVADSILSWNPYEHEEG
SRFAQQAQAADIGRSARYKRGDV*

>SPBIB_v1_190031|ID:27162825|kamA| L-lysine 2,3-aminomutase [Uncultured spirochete bib]
MQEFPDFWRRIPLYKEVTAKEWYDWHWQMAHNIRDIDTLAQVVPLTDKERHDISEVLKV
FRMAITPYASLIDPANPVCVRLQAIPRIQETHFLASDQVDPLHEDVDSPVPGLTHRYP
DRVLLLATNICSMNCRHCTRRRFVGHEDAHQSEELIDAAVEYIRKTPPIIRDVLISGGDPF
VMSTERLERIIAKVRAIPTVEIIRIGTRTPVVMMPMRVTDELVNMLKKYHPIYVNTHFNHP
KELTKEAKEACEKLADAGIPLGNQSVLLRDINDCPVLMKKLVQKLLVIRVKPYYIYQCDM
SLGISHFRTTVSKGIEIENLRGHTSGMAVPTFVIDAPGGGGKIPVMPDYLITSNEKRVI
LRNYEGVITSYEETPYHEDCGQCRICYDEPWLNPTCGVAKLLSGEEKVLEPKNLKRGKC
*

>SPBIB_v1_190032|ID:27162826|kce| 3-keto-5-aminohexanoate cleavage enzyme [Uncultured spirochete bib]
MDRKMVITCACTGAETTKAQNPALPVTPEEIIADAAAYDAWRAGAAILHLHVRDGGKGNPTMS
PRIFKKTMEIIRKCDIVIEITGGAVGDSPEARLAPLVELEPEMASLDCGTVNFGNDYI
VNPLPVMRRFAEAFRKSRRVPTLECFDVGHVYASRILIDEGLVEPPFHYGFVLNVPGSV
YSIENLLAFQHALPSGSFFTVMGIGRASLPAQYGAIAAGGWIRVGFEDNVYYAKGQLAAS
NAELVERAARIAKEAQFGIATSDDVRSMLKLR*

>SPBIB_v1_190033|ID:27162827|kat| 3-aminobutyryl-CoA aminotransferase [Uncultured spirochete bib]
MAAKEYPRLKDRSMQMYTEAKEICPGGIMGIRRPYNFVEGEYPIFLERGYAGHIIDVDG
NDYIDMLCAYGPILGYNEPEITQAVQAQLEKGFCSLVQPIQNELERRLVSLIPCAEQA
ILVKTGSDATSLAVRIARGYTDRKYILRCGYHGWHDWCVEVQGGVPEEISSLTIEFEYGK
LDDLEEKLAHKGEVAGVIITPVGHPNAKPVMAPPGYLEAVKELVHAYGAVLIFDEVRT
GFRVSMGGAQERYGVTPDLGTFGKALANGYAISAVVGKREVMQVAEKKVFSSTFFPNL
EMVAAMKCLDILEREKVPDSLWKRGTQFLARLREIERSGMPVTVSGIPPMPYMTFNPHP
ADKEKTYRARREYFYTQTIRRGFLIQPYHHWYIAHRHTDADLEKALAAIEEALELTARRF
PIGS*

>SPBIB_v1_190034|ID:27162828|kdd| L-erythro-3,5-diaminohexanoate dehydrogenase [Uncultured spirochete bib]
MPMGDKYGTTHRVIEPAGAMPQTAQKLDNDMSKLFNDNEILVDVIALNIDSASFTQIENEAA
GDEEKIKAIIMNIVSTRGKQNPVTGSGGMFIGRVAKIGPALASRDLPKPGDKIASLVLS
LTPLKIDRILAVHKDIDRVEIEGQAILFESGIYAKLPDDMDERLALAALDVAGAPAQTAK
LVKPGDKVLVLGAGGKSGLLCCYEAMKRVGPTGRVVANIHSERSRTYIQDMGLAHEIVVA
DATKPVFELTQVLSANKGHEFDIAISCVNIQGTEMAAILPVRDGGIVYFFSMATSFTRAA
LGAEGVGKDVLMIIINGYTKDHAIEITLWELRENPKLRAFFESQYVK*

>SPBIB_v1_190035|ID:27162829| protein of unknown function [Uncultured spirochete bib]
MHDDLEKGRMLSSFNFKEYETVTANSNAFKGVEIDLMIELKDWKQSPGDPYTLLELRD
GKTLVAFALIHRVSGRNFTDFIRFIVLDQDYRSSSAIQHLFDMIDAELLKIPFAVIRVE
ISSVKRDSLGEQALENAGYSLIGHIPTYYGENDDFYFYIKAIFRNPPNFIKISKPFEDQA
ASAAPLEEIHTLEE*

>SPBIB_v1_190036|ID:27162830|yvgM| putative molybdenum transport system permease protein YvgM [Uncultured

spirochete bib]

MFDLSPLYISLRAATLSSAIVFVLGTVVARLCYTMQGRKATIVDITLTLPLVLPPTVLGF
FLLVLFKNGPFGILLAKIGQRGILFSWKASIIAATVVSFPLMYRSALGAFRQIDQELLW
AGRTLGMSEWKLFFVHVMVPEAWPGLIAGLALSFSRSLGEFGATLMIAGNIPGKTQTIPMA
IYFATAGGDMQTAWIWVGIIVASCVSLALTTHFDSRRKG*

>SPBIB_v1_190037|ID:27162831|yvgL| putative ABC transporter substrate-binding lipoprotein YvgL [Uncultured
spirochete bib]

MKKRFFVCLFVLLSVVAGFAQGSSRQKTELLISAAASLMDCMNELKAVYMAKNPSIIRC
NYGSSGALQQQIEQGAPADLFFSAGLKQMQUALIDKGLMDTSTVRNILENYVVLVVPKNGI
KLSSFDDLNRNPSVTKIGLGDPKSVPAGQYAVQVFRNLGLSDAIAGKLVLAADVREVLFWV
ETGNVDAGVVYSTDAQISDKVTVSAIAPENSHQKIVYPVGVVKDSAFPKEAKAFEDFLFC
DEAARIFAKYGFVSVI*

>SPBIB_v1_190038|ID:27162832| Molybdenum cofactor synthesis domain protein [Uncultured spirochete bib]

VQRGMKAICASSEKGTPKRPMKEATLKNWGLEGDAHAGTWHRQISLLSADTVDAFNRQ
GANVADGDFGENLLAYGLDFPCLPVGTAALVCGDVVLRMTQIGKVCHSGCDIQKRMGKCM
PTEGAFARVLHGGILRPGMPIEAYTAQRVFLCASDKGYAGERKDESTPALHHLVTEEGY
EVVGTALLPDDREQLSALMARICDSYTADLLLTTGGTGLSLRDVTPEATIDIAERMVPG
AELMRLRSLSVTARASLSRAVCATRKQTLIVNLPGSPKAAVENLQAILESLPHGLAILQG
TQGECAVDSHI*

>SPBIB_v1_190039|ID:27162833| Molybdenum cofactor biosynthesis enzyme [Uncultured spirochete bib]

MTDGDAGLRDSFGRIHTYLRSLVTEACNYRCRYCGPGVVHRGLSDDQLVFLCSLFRSMGI
RALRITGGEPTVRPGLIPLIARLSSLGFERLALTTNGTSLVRDARALKEAGIQSVNVSLD
AVDADLYASLTGGFPVRPVLEGIAAALSEGLAVKLNCLVLLADTYRNQVRQLMAFARKLGI
PLRFIELMPFGD GARWEGVSTATLVAFLEEEYGEESPRGPKGSEPWGS GPAEYRRFVGGV
DVGFIGALTSCFCSQCQRLRLTNEGQLKTCLYHPDRLDIRQLLERGSPPEEICRRIEAFV
LRKQLRHAFQTGPVEWPLSSVGG*

>SPBIB_v1_190040|ID:27162834|moaC| molybdopterin biosynthesis, protein C [Uncultured spirochete bib]

MNGAMTHVDEDGKAIMVDVSAKVDTKRTAIAASGRIFMSRQAFDAIAGGTVPKGDVLAAR
IAGIMATKQTSSLIPLCHNLLTSAQLDFRLLSEECAIEAVCTVASTGKTGVEMEALTA
TISLLTIYDFCKAIDRSMHVEDVHLQFKDGGKSGCYDRR*

>SPBIB_v1_190041|ID:27162835| Molybdopterin biosynthesis enzyme [Uncultured spirochete bib]

VKLIRTQDAVGHILCHDMTQIIVGVTKDARFRKGVVREEDIPVLLSMGKENLYVWEKQE
GMLHENEAAEILCNATKNDHMERSEVKEGKIELKATCEGVLQIDLERLLRINSLGDVIA
TRHNYARVKKGDKLAGMRVIPLVIDAAKMDQVAIAGVSNPVLVSIKPYVIRRCTVLVTGN
EVKKGIIEDTFSRVVEKKLAEVGVSVSRKILTDDEVYISSCIKQAVADGEEMVLCTGGM
SVDPPDRTPKAIRNSGARIVSYGAPVLP GAMFLVSYIGDVPVLG LPGCVMYEDRTIFDIL
LPRFVARIPVTAHDIASLGNGLCLKCRCTCTFPNCGFGNGGI*

>SPBIB_v1_190042|ID:27162836| Molybdenum-binding protein [Uncultured spirochete bib]

MAFSFYIRIPFTSDGSFFGPGVNELLHNIDTAKSLSAAANMMGMSYSKAWKIIHVAEKKL
GYPLTVKSIGGAAGGSSLTEKGRSFMERYDAFVADSYKAVEACFQRYFPEAQQ*

>SPBIB_v1_190043|ID:27162837| UbiA prenyltransferase [Uncultured spirochete bib]

VTFRQFSGIVELRTKIVSASTYSIGLLYALAVKGSVDPLKALLLGVAGLLVDMGTTGFNT
YFDWYRNVDDPRFNREEAKVLIHEGVSPGSALGISLICFGLAGAIGFALTWMVGLPLMVL
GLCSMLVGGFFYSAGPKPISSTPFGELFAGGFLGSVYFCICLYVLTGTISGRFLLVSLPQT
LAI AAILSANNACDIEGDSAAGRWTAVVLGKALAPLLIYVEMGSALLLLMIFGFSGILP
LYSAWCAMLGIGVVFILNRMHRIGYSHETKGPIMGKISLAFMVQSAQAIALSLMLIFS
KGFLN*

>SPBIB_v1_190044|ID:27162838|guaB| IMP dehydrogenase [Uncultured spirochete bib]

MGFESFSGGAEGTLFDDVLIVPGYSEVLPSEVDISAELVPGIRLKAPVLSAAMDTVTDSR
LAI AAIARIGGIGIIHRNMSPEAQAAEVYKVKRSESGMISDPVWLPETATLAEAEHLMETY
RISGIPVVDPPQTERLVGIITNRDRRFCGPEMOKPISEFMTKQNLVTAPAGTSIEEAKAI
LRQHKIEKLPLVDSEGRLKGLITIKDIFKRDEYPDAATDSRGRLLAGAAVGVGADLEERV
ALLASRGVDVLVVDTAHGHSKKVIDAIRRISAAPHIPVIAGNVVTAEGTRALIEAGASA
VKVGVGAGSICTTRIISGAGMPQLSAIYECAKAARAYGIPVIADGGIRYSGDIVKAI AAG

AETVMLGSLLAGLEEAPGELVLYEGRQFKSYRGMGSVGLALQGYGRDRYSGSQSNGKLVPE
GVEGMVYPYRGKLSHYMVQMLGGLRSGMGYAGARTFTELKARMVRITAAAYAESHPSIV
ITKEAPNYQKRD*

>SPBIB_v1_190045|ID:27162839|purH| Bifunctional purine biosynthesis protein PurH [Includes:
Phosphoribosylaminoimidazolecarboxamide formyltransferase ; IMP cyclohydrolase] [Uncultured spirochete bib]
MPLALISVYDKKGLEQFAQRLARLGWTFLLASGGTSAALRGAGIEPVDIAEYTGSSSELLSG
RVKTLHPAIHAGILARPEPADLEELRAHGYPIDLVVVNLYPFKTAQAANASEAEIIEQ
IDIGGVALIRAAAKNFARVCVICDPEDYERIALEAESGGIGAETRRELAAKAFAHTAAYD
RAIAEWFAQKAGGAAEREAATGAALASGILPASFEFRGIVERTLRYGENPHQKAFFVIPV
GDWGGSFVSMRKEGSFASEGGSAVSPIVESGGPSPGQPQVRGSIGGSSESIQPIVRGPLG
GRSDSIQPKVRGPLGGQVLGGKELSYNNLLDLDAAWRAVLSFEQPAAVIVKHLSPCGAAE
AENLKDAYEALACDPVSAFGGIVALNRPLDVSTAEALRELFLECVAAAPSFEEDARDVLK
AKKNLRLVEADPLVFSTLCKELRSAAGLLVQEPDRGDPIDTTWRVVSARQPTEAEMESL
RFAWKLQHVKSNAIVLAKGHASVGIGGGQTNRVDAVRQACERAGARAKGAVMASDAFFP
FADGIEAAAEAGVTAVVHPGGSVRDVEVLAADRLGLAVVHTGVRHFRH*

>SPBIB_v1_190046|ID:27162840|purN| Phosphoribosylglycinamide formyltransferase [Uncultured spirochete bib]
MSNVLRLVVLASGEGSNFQALLDAIESGIRGARIEGLVCDVPGAGCVQRAVQHGIPSI
LPGPARAKRGSPERLAYDERLAVIVRSWRPDYVLLLGWMRLLSQAFLQHFPERVINLHPA
LPGTFPGTHAIERAFEAFLAGSIEKTGVMHLVPDEGVDAGPVLRFVPIYKEDTLEIL
TARIHSVEHREVVAMVEDLARSKSINYFYEKEIANASRADFGL*

>SPBIB_v1_190047|ID:27162841| phosphoribosylglycinamide synthetase phosphoribosylamine-glycine ligase
(modular protein) [Uncultured spirochete bib]

MNVLLVGSGAREHALAMAIAASPLCEKLVIAIPGNPMDVGEAAVALGDIEGLVSLAVA
MQADLVVIGPEAPLAAGLADRVRQILCFGPSAAAARIESSKAFKAFMRRHGIPTAEG
KSFSDAEQAKRWARNFVRPVVVKASGLAAGKGVIVPSSLEETEAAIDTLELGGDIVIEE
KLEGEELSLIALCDGTSYKVLPAACDHKRLDGDGKPNNTGGMGAFAPACTIEEAEQLARI
VIEPAMRGLAEEGTPFVGALYAGLMLTEEGPKVLEYNARFGDPETQAILPLIRSDVLVLL
EACARGAIRVTPLDLRVSSAAVCIVLASKGYPERPVTEKPIRIGVLPERAFCLHAGTKKP
GTKKPGDELVSAGGRVLSVVGLGASLEEARAVAYETVTQIHFDGMQYRSDIGNRADRVAK
AICAAALGRVESHDSGAESAYAKAGVNIDAGNRAVELMKEAVRSTYGPVVAGIGAFGGQ
FDASVLKGFVKPVLVASTDGVGKTSLSLGLALGRLEGLGMDIVNHSINDILVQGARPLFFM
DYAAGKLDPEHVAEVVSGMAQACREAGCALLGGETAEMPGTYQAGEVDIAGTIVGAAEA
EKLLPRADLSEDDILLGLASSGLHTNGYSLARAVIAGMDLEEVQPELGESEADALLRPHR
SYLPLLERALEAQSPVKALAHITGGGMVENLPRILPHLDARIRADSWTWPPLFMLLQA
WGSVSDEEMRRVFNLGIGMVVIVGANETDRMRALLPEPAFVIGKLVPGSGKVLV*

>SPBIB_v1_190048|ID:27162842|purF| Amidophosphoribosyltransferase [Uncultured spirochete bib]
MNLDCERFSHEPRHCGGSANGWRSKPRGPEYPDDSQPRESCGIVAVIADEAARVAFFG
LFALQHRGQESAGIATLDKGSIHMHKDVGLVSQVFRDQNLALAGSIAIGHTRYSTTGKS
SARNAQPFVIDTQYGPLALGHNGNIANAPALRKTLLSRGLGLMTGSDSELLAMMLAGTQG
SDWIERIEAAMKEWVGAYSLVILTAEGVYAVRDPWGFRLAWGRIDAGGFVASETSLR
VMGCSFYEEISPGEILHFDTKGLVQRARADIDVSHAACSFEYVYFSRPDSVWNGKNIHAV
RRRLGEILAEAPAAADIVIPVPDSSIAAIGYARQSGIPFGEGLVKNRYIGRTFIEPTK
ALRRQGVALKFSPLRETLEGARIVLVDDSIVRGTTTAPLVKLCRQAGAREVHLRIASPRI
LHPCYMGVDMGTPNELIAVGKGEDEIARLLGADSLAYLSIEGLSEAIGVKGLCRACFDGQ
YPIPVDEGFTKESFETERSAEASGHPETIGRGQV*

>SPBIB_v1_190049|ID:27162843|purE| N5-carboxyaminoimidazole ribonucleotide mutase [Uncultured spirochete bib]
MEAEMVQGRVVILAGSPADMAHVDAIQRALGSFGIMSLVRIASAHKTPCRLDMIGRYEA
EEIPTVYITVAGRSNLSGLVDAATPYPVIAACPPPSEQWAMVDIWSLRMPSGVAPALIL
DPANAALFVAKLFALENTELRGRIASFQKQNADRLIEEDEKVLKAGRAE*

>SPBIB_v1_190050|ID:27162844|purC| putative phosphoribosylaminoimidazole-succinocarboxamide synthase 2
[Uncultured spirochete bib]

MVSENLIQMLLPKAFNSTGRAEGEGKVREWWGLEGGTRFIATTDRLSAFDRVLARVPFKG
QVLNELSAFWFRQTADIIDNHLISVPDPHCSVVREARPLPVEVVVRGYITGVSTALWRR
YELGERVIYGQRFPEGMRKNQKLPQPIITPTTKGGPTGHDERLEPREVVEKGYLDARTWS

AVQDAAIALFERGTEVA VRAGLILVDTKYEFGLNSDGTLMMLIDEVHTPDSSRFWLASSYA
ERFEAGQEPESRDKEFVRLAYAEKGYRGDGEPLMPDALWVQASLVYQELYERLTGMDFV
PSAYPVEGRVLEALARERAVRRGVEAGAGKSRRG*

>SPBIB_v1_190051|ID:27162845|purQ| Phosphoribosylformylglycinamide synthase 1 [Uncultured spirochete bib]
MKALVLKAPGTNRDYDVAEAEIYAGGTTVLLPLSELRERPALLLDYGMVIPGGFSYGDA
LGAGKLLALDFECFFAEAVMRFVEEKRPVLGICNGFQALIKTGILPGAPFERHTFTLAQN
ARGNFECRWVRLRASTNSIWTRGIEGFSCPVAHGEGRFASLPNVVESLRVAGCIALEY
ANERGEPAQGSYPDNPNNGSIGDIAGICNSDGNVGLMPHPENAVFPWQSASMPGWAEDGA
LRLFRNGIEYARS*

>SPBIB_v1_190052|ID:27162846|purL| Phosphoribosylformylglycinamide synthase 2 [Uncultured spirochete bib]
MDMATRNFLYRIEVRNKGSGGPRIEALQADVRLSMGTLRSARQIALYFVEGEIAPEEMN
LLGLFLFSDPVEQEFRWEVVGQGRSEIDAGGARTGDFGGAAAAEIVSLAPAEIAGAGAS
SPRVVEICRKPVTDPVAIEIVRAAQELGVKGLKRAATGVRWELEADWLDEQSVARITKM
LLANPVIERWEFGEIRPVFPQESARVPVETYDIAAMDDAALIALSAERRALDLEEMCA
IRTWFAGAGRAATDVELEMIAQTWSEHCVHKTFKADVEVRGELWQKDAAGAAGKLENA
QPHSPYPPVHGFSTYIKKTTEEIAAPWVRSFVNDAGIVSFDGQWDISFKVETHNHP
AIEPFGGANTGVGGVIRDIMGVSARPIAVMDILCFGPPDMPEEELPQGS�HPRMIARGVV
AGVEDYGNKMGIPVNGAIHFHPGYAANPLVYCCGVGLAPAGVHHHEPKAGDRVIVLGG
TGRDGIRGATFSSMRMDGSTGDVAGASVQIGDPIVQKRTLDVLLAARDAGLYDAVTDCGA
GGLSSAVGEMASELGADIELEKIGTKYPGLAPWEIWLSEAQERMVLA VPEVSVGAFALC
SRFGSEFDIGSFRGDGRLVIRMRGEVLDLPMFVHKGIPQKRLVAEAPVKNRGQTTSL
PKGAPQKVKKRGLTPFFKNVSCERIVRRYDYEYVQGGTVVKPFAGPEGDAPQDAAVLKPQG
TGGAWGIALSNALRPDYAEIDPYRAAWAVVDEAVRNAVAVGSDPERIAILDNFCMGPND
PAVMWALLESARGLRDAALAFGTPIISGKDSFYNEYLGPDGRRHAVPPSLLVSALGFVPD
VSKAVTSFLKSPGDSIWL VGRFEPFSLDKDAAGAEADLGA VPGVDPGAQVVYKALFEAMQ
AGEVAAAHDLSEGGLTLALAEMCMGRKGDIVLPPSQEPAGRAMKECAASPLGLHGMVR
DLLLFGESAGCLLVEVRAGQDEAFGRHFGEQAFRIGAVSQMPVMRIHDGDSEILSVSIS
DMLKAWKDSAGEVLP*

>SPBIB_v1_190053|ID:27162847| Citrate transporter [Uncultured spirochete bib]
MGRQDGAYASGLCEPFTGTSETVREWPCGLFLCTAEFRIANMGVRAVNVFILVVLVLYA
GIIAMQDKKAWVSLGAGLVLVIGGATSASHAISSLINWNILLIYLGSVLAEFIYSRVP
AFLAERIVERSPSVGVAVAIILLTGLVSAFVENVATVLLVAPVMIELARRTKKNLAQLM
IGLAVMANLQGTATLIGDPPSMIFADFAHYSFNDFFRAGRPSIFFAIQLASIVGALYFF
FYFRSMEGDGRSLPAERIVSWVPAGLLGLMIAGLAGLSALSAGGGIHSASGIFVVS
LAGVGLGWLGWVRKERA EARNMVRHLDWGTLAFLVGIFVVVGTVSESGLLDGLGIALAKWTGGS
AALGFSLIIAFSVLVSGFVDNVPYIAAML PVA AKFAATMGGRPELFMFGLLIGSCIGGNL
TPFGASANIVAVSLSEKNGAKVNVWSWLKIAGSFTVLTVAAGLFWVWFVWR*

>SPBIB_v1_190054|ID:27162848| conserved protein of unknown function [Uncultured spirochete bib]
LRLQGEVFMHHFHFCNPACAYHQHAPKERWFVAAGFYVTKTFGKVQRFRCSFCGKYFS
TQTFSLDYFAKRKIAYPQIETLLSSSMSIRALSRRFFSASCSTIQNRIDRLAXX

>SPBIB_v1_200001|ID:27162849| ABC transporter related protein [Uncultured spirochete bib]
MNILSLKNISLSLKSGLPFESVRMDIDERDHIGLIGKNGAGKTSLLRLIAGLVEPDRGTI
SRTKNFTFSYLAQNTEFDPSLSLREFLYQGESTEIRMLVQGPTLHGRDSKRDHEAQPPIS
VENRYFALLRELGFSDFDAPMQHLSGGELKKAALARALAPYSNFLILDEPTNHLDVETIE
WLESRLRSAQA FILVTHDRWFLDATVNRIAEIERHTLTLYPGSYAKYLEKKSVELASLS
RSENKRLANLKIELEWLNRGARARATKSERKKEIEAMRASLIEKPAAYTFMSQEVRLG
KKVCVLKDVSLAYGDRALFRGFSHEFLPGSKTAIIGPNGSGKTSLLSLIAGLRKPTAGSI
TLGETVRLSFFRQTNEAVNPEMSILDYIQEHADHFRLPDGSSLDVLLERFGFERTFQM
QKLRTLSGGEIRRLMLVRLLAESPFLLLDEPTNDLDIETIERLEEYLSDFSGSLIVVSH
DRLLVDRLAQDMLIITGKTIERFTGTIFYFEWNIRKQQAETQFESKQKESALQKQKQSP
KSQGGQFTLQSRKPQSTPARTKLN YKEQKELEHLTEHIEQMEQRKKALEEAFQGP KPGS
SLAHAKKEYDEL CRLIESDLLRWEELADRL*

>SPBIB_v1_200002|ID:27162850| putative Branched-chain-amino-acid aminotransferase [Uncultured spirochete bib]
MTTDKENKGSRFESMCVPGSLEPADLASLDWSKLGFSVTVTPYMGGSVAGPDGVFEPCAV

VKTGVLRVPPQACALNYGQSIFEGMKARRGVDGKIRLFRPEANAARFARSAERFMMPAVP
QDLFIETVTKVVKANRDYIPPAEKGSLYIRPVLFIGIKTLQPAPADTTMFVVYVQVGVY
FKGMATISIKADDTFQRAAARGTGWVKAAGNYAPCFLPAYEAKHEGFSDVLYLDHDGVNV
EEVGSANFAMVKGKLYVADSPSILKGITRDSVMRIAMEMMLGIEVVFAPLELERVLGLGK
YASEGPADEAFCTGTAAAIPIGSMKWKGQSYTFGGGAIGPITQKLFDAIDGIQTGRRPD
PYGWTVVVE*

>SPBIB_v1_200003|ID:27162851| protein of unknown function [Uncultured spirochete bib]
MPRSAKAIRWEIYSRPNKQKGPVYYVRAVDIQTKKALLTRSTGSDSRKAARELIAELSA
KMDFTRLAAAKTGNVDAASASQMENMPLSEYFVLFWNKEKSFYLLARADSGKPLSSAYVA
AQYANVKTHAEPFEGFKTTALRDANLFLIETYIRHLRAKGVSGNVVGDCLNAIRTPLSWA
MKRGLVLEPFSFSGIIRPKETYRTRGMITREELARIIALDVADTIQPRPRLKKGETHETP
GPVDLRIKVGVLHLGAMRAGEIRALRWAIDFEQNRHIEQNFVEGDGLKAPKRESYG
IVPLAEPLREPLQALRTLAFKLGRYNINEYVLFSLTPNKPISIKGLEHGYSRLLEWIGI
PPEAQKARRLTLHGGWHFAASLLADEIGPALARKITRHRSLQAFKGYDHESAEALDAARK
ALQFEPKNEKAAE*

>SPBIB_v1_200004|ID:27162852| transposase [Uncultured spirochete bib]
MYRTKEKVPEFEKFDMMVFGGKLNQRWVILANLIPWDRVEEKYAALFVSNNRGPALPVR
VALGALIIKEKSKLADEELVEYIRESPLYQYFLGFEGYKDELFPDPSMMVHFRKRLSGNI
LKEINAMIIRQKEEAESHDDQEPPEGNGKGLIVDATCAPIDIRFPHDVTLLDEARRK
TEQIIDTLHEQAPTGYEKPRTYRKIARKEFLRFIRNRKPREQTIRKALKKQLQYIERNLR
IINDYKGLVGLGGLSRKQYSDLVVIHEL VWQQRHLYTKKSHSIEGRILSISRPHVRPIAR
GKARGMYKFGAKLSVSLVNGLVEVHRLSWEAYNESQDLKGQIEQYKRRYGHYPEVVCADK
IYRTRENLYQCQEY GIRLSGPKLGRPFAESEKNRAILREQRRIEREDESTRIAVEGKFG
GKRRYSLDRIGTKFRKTSESAILMVLVLMNLMVLYRKKAKAFFVSLLDGLFKIVREHLED
NTGCLLRDLTVKRGFFRNPYVQLYA*

>SPBIB_v1_200005|ID:27162853| conserved protein of unknown function [Uncultured spirochete bib]
MAIIRLEKVKKTYPLGKTVVPAVKGVDFEIQKSDFISLAGPSGSGKTTILNMIGCIDTPT
EGVVEIDGVKTSDLNDKEITRLRHRTIGFIFQSFNLIPVLNVYENIEFPLLIGDTGISQK
EQKKWIQFLIEEVGLGQWQKHRPNELSGGQRQVAIARALVTKPKIVLADEPTANLDSAT
GETIINLMKMNKELGTTFLFSTHDQKIVDLADHVIRLKDGLVSENYRPAV*

>SPBIB_v1_200006|ID:27162854| putative ABC-type transport system, involved in lipoprotein release, permease component [Uncultured spirochete bib]
MVILKIAFRNLEHKVKTAIVGTLIALAVMFMVVTGNSILDTIRTGMKQSYSANYTGDLIV
HGTSKDSFLLASGPGAASGSDIPQIPEFQTVRSSIEQMPQVQSVLPLLSGSASISLNEE
TAGFTMLWGANFDEYALMFPDSLEFTQGGFPEEPGPYILLSVREAAEKETGKPLHIGD
SITLAGFGASGSRLEATIAGFFRFKRGNEQLNLVSLIDANILRSLKGMTRNPMGVDIAS
SSLGANGTTEAATTDELFGNGGSLVQTIQPVQSGALVNYDAILGDT SIRNRYTELDPNA
WNFLLRKDSASIPATQESIQTMLTTGSIDAQVSDWSWGAGTVATLAMALQFIFNIIIA
IILVVAIIIMNTLVISVTERIPEIGTIRAIGAGKGFVRRMILWETLTLVAVGLVGLLI
GSVLLL VVNRVGIASSNMFFAILFGGSTLRPVLMSGSLVWVSLLAAVAIGLVSSLYPASIA
LKIAPVKAMQKI*

>SPBIB_v1_200007|ID:27162855| putative ABC-type transport system, involved in lipoprotein release, permease component [Uncultured spirochete bib]
MLQMIRIALRNISRQKRSILLGSAIAFGFLVITLVNGFTGGLLKTTKENLSHLFGGHIY
ISGSIVSPLGSELPMIQDSFAAEEAIIKASDRVASVQYRSKTTGTLYFGNKEQTQKLEGV
DFAAEQSFRTNIDISKGLADIDKPGSLILPEATAKKLGV EIGETLLYRASTVTGQQNIG
EFTLIATTTSSSVMMVMDTGYTSKAYLNTLIGLDEGDYQSINIFLKDVAEVQTVADRLYSN
LASNAPVSPRISADSTSSPRNMSAMRSSLMGMNQIVQVAKEEQWKGTKFSVTTIEDLMSP
ILSLLSIIQAVAFVFIILLVIIMVGMINSYRMVMIERTEEIGTMRALGVQKSGIRTIFF
TEALSEAVLGTASGFVLALLIGGILSLINFGSGSFLSLFLARGHFVLQFSIPEALKNMLI
ICVMSIMAVYLPARSAANLEPAQALRATY*

>SPBIB_v1_200008|ID:27162856| conserved exported protein of unknown function [Uncultured spirochete bib]
MRKRYALVSLVIVLLLVPMSGIFAQAASAVPDFKAMLKTIDERSNFTGRDFSAKIKMVSE
DPEKGTTRVAKTFRRDRDDSFLILFMEPADQLGQGYLKLGDNMWVFDYDPQSRKFTHSSLK

ENVVQGTDAKNSDFRQSTYSVDYTVTSWTEGKLGAYDVWILELQGATNEVTYPYKKIYVTK
KDQLLLKSEDYSLSKRLLRTSYFTSYAKIGTSYIANSVMYVDALVQGKRSTSITFTDISLD
NLPDSVFTKAYLERVNR*

>SPBIB_v1_200009|ID:27162857| exported protein of unknown function [Uncultured spirochete bib]
MNMRTLFYSIVSAGLLMAGLFPLQAQTDDDELFGSSESLVTEAPLVKPVESASDISTGLL
KTETVKIGGAFTFSLAGTAAGDSTIFSDYPTPSVVSADLYADARPADNFRFFIKGRFSY
PYTSDSSGNNPFSREAYADIEPLSGINARLGKQTANWGVGYFFSPGNLLDFGTIDPENP
TEERTGPLAVKFQRSQRTSNYYLYLLDLSAYSGGPIGLAPKAEWVLGSESLGAYWQND
KPWAVTGSITFPMGPLDMFVEGAVKGNIDKNFLVLNGPALTAETRQDKIFGQGTIGFSWS
MDDSEGRYSLSLRGQYYNGLGYENSDFIAYPMQVASLLQKKTITVQDLKERGQHYGAG
SLGISKILSSDFGLSFFWLGNLSDSSGKTSATLSWSGLDKLNCSIAYSYAYGQEGTEFRP
VGSVASSITLKVSLSMATF*

>SPBIB_v1_200010|ID:27162858|regX| Sensory transduction protein regX3 [Uncultured spirochete bib]
MKARVLVIEDDQALADLMVLYLEREGLECHIAPSAEAALPIMEQNEIDLILLDINLPGM
GFEFLQELRTHCTVPIIIVSARETEEDIITGLSMGADEYITKPVAPRVLVARVRALLRRM
HMQNNDEAGRRETQFGPYTIDFDACMLMKGSERVPLSAREFDVLAFLVENAGKTYAPEEI
YTQVWGQQYGDITTIGVYIQRRLKKEANPAEPRYLITVKGKGYLFSYDN*

>SPBIB_v1_200011|ID:27162859| putative Integral membrane sensor signal transduction histidine kinase [Uncultured spirochete bib]
MTIKTKLLVIVLVIVLLPLISGGLLIAYQRFTAGTSSYFLLMESVQNVSRRVQLFLDSGN
YDAFSKLPDGTIVIKSDDGRILFQNPITLDISAFGKDTKQDYHMFRRFSSKSGSGTVYLS
YSSDVKTRDLYGLPFKIVFAIILFIIGTALGILKGLDVSIRKLENATKKIASGDLDFP
ADEFITSDLASLGQALDQMRIQLKEDRERRDRFIMGVSHDLKTPLAGIQGYTAALRDGMA
DTPEKQQAYYKIIADKASILEGRLGHLINLAKVTTNEWYQTL EEQDLNSFLEETGRSLAE
YASFHGGFFLEIKNELPKPCPLFDKDMIRRVFENLVSNALAYGDKTIPVLIHGRRVSDSE
TLEIIVENGGTPIPEHRDKLFEPFRGDRSRNSSGFGLGLASVKSIIESHGWTINLDTQ
AMNRTRFVIQIP*

>SPBIB_v1_200012|ID:27162860| Alkylhydroperoxidase like protein, AhpD family [Uncultured spirochete bib]
MAQQFYKKMYSLEPGYIILYQALRTMKYMVKGKRRKEISPEFIERIMLAVTEVNGCEVCT
YGHTKMALEQGMSSNEEIQKLLAGVTDGIPDDEVKAVFFAQHYADTRGHPSAASWQQIVDT
YGTTKALGILGAIRAIMFGNAYGIVLSAFRNRIKGPVEKSNLLYEISMMISIVVFLPIA
AVHALVSSLLGVPIIKGE*

>SPBIB_v1_200013|ID:27162861| conserved membrane protein of unknown function [Uncultured spirochete bib]
VKTFKGILLIFGILGLTLLIWILATPSIEIPLDRLSHILAGLSLGLFLVFILSTRNKR
IETWFGGLQNVYVFHKYLAIFSVALIFIHGRLSESVAEISNGGEKTL SAAFSGFGQILFI
VLVLIALFSKKMKYENWRIFHRLIIPYALGVYHTYFSSRYNLF EFSPLSIWVGLTSLMG
LSAGLYMLFFYQKAQFRYKGGKITDIKRV SASSIEIAIKLETTLVYQSGQYVFLKIFQKGI
EKAPHPFISISGGDGSIIYLTIKGLGDYTKQLYSELKEGTAISLDGPYGHLD FEKGRDKQL
WIAGGIGITPFISYLKHTADKTITL FYSFRGEEEA VYKDFLEKYQKDNPRFSVHFVDTA
KSDRLHFDGYELEAGTDVYICGPEKMIKQHSRYFKRHFKNARIFYEGFKFK*

>SPBIB_v1_200014|ID:27162862| TRAP transporter, DctM subunit [Uncultured spirochete bib]
MTLVLFSGSVLVLAVGAPIATAMAGSGLITILLSGLFN PENAINPVQAVQSFFSSIDSVA
LLAIPFFILAGDLMNKGGLAKRLVNFAGMFVGRITGGLGMTAVLSCMLFAAISGSGIATA
AAIGGVMLAGFKDHSYPKSYATAIVASASPVGIIIPPSIAFILYGTLSKASVGS L YKVG
PSGILIIALLVTYLTAKKHKIPRPVRLGNKSVKEVVIDTLVALGTPV IIVGGVFLGI
FTPTESAIAAVIYSIIVGVFVFKEIKLKDLP SILMQSAISSAGIMIIIAAASLFAWVMY
LQIPQKAFAEAVLSLGMNKYTLLFAVNITVLFAGMFLESSAIQVIIVPLLLPILEALHIDL
VHFGIILTTNLAIGMVTPPFGLTLLTSSRVLGASLKDSIAEVWPFLLSLIVVLFIIITYFP
SVIMWVL*

>SPBIB_v1_200015|ID:27162863| putative TRAP transporter, DctQ-like membrane protein [Uncultured spirochete bib]
MKLLFKISDTIDRICGWAIVSLFSIMIISFALQVILRYFIGTGFKWTEELTRYANVWAVM
IGFAMIAKRRNHINISVLEEILKGRNKKWLIIVQQLISLVIFTIMFIISFRLIKLAGSQL
TTNMRLPKRWVYWIYPPAFS V FVFQTFIGILQGIQDVKMTSEVQA*

>SPBIB_v1_200016|ID:27162864| conserved exported protein of unknown function [Uncultured spirochete bib]

MKKRLIGGMIVATMLFVVVGGGAFAQKEIKLGHIAAPNTAYDNWAKEFKRQVEEASNNKYK
IIYGGGQLGGSTALMEGLQAGNIQLAVITTSINQFVRELDVLDLPLFRNWDHVEKFL
ASDVNKKLLTFGDQYGLHFLSNMPRGYRHVTTSAKVGPIPKPEDLKGVKIRVAESSLYID
TFKALGANAQAMAWGEVYTALQQGTVDAHENTIVTTRDYKINEVQKYMSETGHVFAFATL
MAGYDWRKLPADDQIIFQKAANDSAIKLGIIQKNDEAKAKADLISKGMIFNSVDTAPFI
EKVKPVIDKYAKGEIKKLYDEIVAIR*

>SPBIB_v1_200017|ID:27162865|mhpE| 4-hydroxy-2-oxovalerate/4-hydroxy-2-oxopentanoic acid aldolase, class I
[Uncultured spirochete bib]

MSRISITDTSLRDGSHSVSHQYTSSDVEKVVAALDDAGIDIIEVTHGDGLGGSSLTYGYS
VENELDLVSTAVKVAKKAKIAVLLVPGIGTLELLKEAHKRGASVVRVATHITEADVSEY
IKAAKQMGMFVVGFLMMAHMADIDKLEQARIMESYGADVIYATDSAGALLPDDVYARVA
ALKNALRVPVGHHAHDNLGCAIANSLAAKAGATYLDGSLGGMGAGAGNAGTEMLVAALK
KSGYEIGADLFKTMDAAEKVLLPLVVEKQKQMPHDSNSLIMGYAGVYSSFMLHARKAAE
RFGIDVRNVLIEVGRKAVGGQEDWIIQVAYDLAKATGKAI*

>SPBIB_v1_200018|ID:27162866|mhpF| acetaldehyde-CoA dehydrogenase II, NAD-binding [Uncultured spirochete
bib]

MAKKIKSAIIGPGNIGTDLLFKLQRSPLLEVA YVVGKESPGIEIARKFGIPTTIKGUIDE
MLAVDEIKIVFDATGAIPHLQHAPKLKAAGKIAIDLTPAAVGPYVPSVNLDESIFALDN
VNLVTCAGQATTPIVYAINRVAEVYYAEVSSVSSKSAGPGTRQNLDEFIETTTKALQTI
GGADSAKTIIVLNPAEPPILMRNTIHTVRKPDLAIRASIDDIIKKLRIYVPGYRFLVE
PILQDDVTTVIEVEGLGDFLPKYAGNLDIINAAAVFIGEQFAQRILEGRR*

>SPBIB_v1_200019|ID:27162867|mhpD| 2-keto-4-pentenoate hydratase [Uncultured spirochete bib]

MALSKYEIDAAANDLHNAWVTANPVTLSDRFPNLDVDSA YEIQMLNVERALAAGKKISG
KKIGLTSKAMQNMLNVDTPDFGHLFSDMEVKDGRIERRRMIQPKVEAEIAFVLSRDLDMP
GEILVEDVLESTEYVIAALEIVDTRIKDWKISLVDTVADNASSGMYILGNVKKKIYEIDL
KAEKMDLDFKNGEKMNSGSGTDVLGDPAFCAVLANKMRNYGTLKKGEVILSGALSAAIA
AEKGDTFKATYSSLGEVEVTFY*

>SPBIB_v1_200020|ID:27162868|todF| 2-hydroxy-6-oxo-2,4-heptadienoate hydrolase [Uncultured spirochete bib]

MEEKNQANPEIGESIITGGFKTNYHDVGSQDPVLIHGSGPGVSAWANWRLVIPKLAARR
RVIAPDMVGFYTERPENIDFNMDMWGKQLVDFLDALNLEQVDLVGNSFGGALALWMAIY
HPDRIHKLVLMSGMGTEFKITKGLDHVWGYQPSLEAMRVAINSFVYDKAIATEDLVKMRY
EASIRPGYQETFGRMFPAPRQKGVDMMASKYADIAAIRHETLIHGREDEIPIETSMTL
FQLIPNAQLHMFQKCGHWTQIEQNLRFVAVVEAFLAGEF*

>SPBIB_v1_200021|ID:27162869| Transcriptional regulator, IclR family [Uncultured spirochete bib]

MRRLSELCSALYNHGMPRKPKALSTASYKEDKSTDATPTVTQEPNRAFTPRPSGYIQSVD
RALSILEIFSSRKPEIGVSEIARLLNLNKSTVFGLISTLERRGYIEQNPDNGLYRLGLKT
IELSQNKLSAFSTAEIAHPILRKLVDTVKETVHLAIYDRGEVVYIDKVECDNALSIAFI
GKRNPAYCTGVGKCLLAFQTDEEIERVLRPLEKRTPKTITEIKRLKDELATIRKSKIAIY
DDEEFSIGLKCFAAPVIDARGAVCAAVSISIPTIRLDVERESFLETSVRGAAKASEALG
YQNQ*

>SPBIB_v1_200022|ID:27162870| protein of unknown function [Uncultured spirochete bib]

MRFPGSEDKFSYVLGMPFGTEYIKAITSTKPFATMEADFSDLQGPAAAITRGLSVVSD
STRAEALAVYAIMP*

>SPBIB_v1_200023|ID:27162871| conserved protein of unknown function [Uncultured spirochete bib]

VPSLRISFQRTDEQIQPGSEIKINWNQIFASDDQILQNPSTLLLRPKYTVAMFMGEKELY
SHEATIIIAFSVIDQSAFEKAWENDEARKIFHEKQIMKTLWPILRQQVLDGMTRLGLPGI
PLPWII*

>SPBIB_v1_200024|ID:27162872| Acetyltransferase [Uncultured spirochete bib]

MNITIRNETPEDFRRVEEITREAFWNLYVPGCVEHYLAHVMSHEDFMRELDVVALADGR
LVGNIMYTRSFVENEQGGRLTITFGPVSVLPEYQRKIGSALIRHTIQKARESGHAAII
IYGSPYNYCKHGFKSGRDFNIGNAEGRYPFSLVLELKEGVFAGHAWKYHESVVFIDPA
AAEFDRTFEPKEKGRWRYTQEEFSIACRH*

>SPBIB_v1_200025|ID:27162873| conserved protein of unknown function [Uncultured spirochete bib]

VRYFISIERIKLVRVSWLLYIQVDVDEHPDERGRYIITGSHQLHIRAKVSQSLAGRTALL

ELLPLSIEELNAGIAMDRDEYLVTGFLPRIYQEGLDPSMLYRNYQTYVERDVRQIASI
RNLLAFETFLKLLAGRVGQILNLSDLANSTGVSSTLSEWLSILEASFIVYRLKPYFRNF
GKRLIKAPKLYFLEPGLVNYLLGIRDVQQIPTHPLLGGMFENLVVSEAIKACLNARMNPN
LYFLRDSKGLECDLLVERENRLMPIEIKASRTFSADFCKKFSAIRKLDPAFETGVVYGG
DRSFEYAACKVIGFADTAQLFGGKTPADQQVIMK*

>SPBIB_v1_200026|ID:27162874| protein of unknown function [Uncultured spirochete bib]
VNIHTAGSSTSIQVKEMYIFYQRIFSILTLHQMD*

>SPBIB_v1_200027|ID:27162875| putative Metal dependent phosphohydrolase [Uncultured spirochete bib]
MRFPQLNYAPKKIQGFYIFLFMLVLFTSLYGFYRLKSHDFSMYIESIQHSSQIIVEQTAN
IVSYGFFQWDQMRHAIATDNIQFYQEQFDKIKELEPKYIETVTIQKEALNVEQMYQIAKQ
GNALAIRFRIFDDLGNPLEGVYVLAEFNYKKLLSQLDSRHVLKIADQGYPLPFGFNAAA
SKSLLGIGHYLSAISVALLVLLMTTFEQQSIRNHYHEDGLYRIISLFEKDSYATANHSR
KVALISEFIGKKAGLRGAALRNLTIAALLHDIGKIGVPEHIIDKQDKLTDEEFKIMKKHA
NLGAEIFRLYPEISHLSDIVLHHHERIDGSGYPEGLKGDPEIPFAARIIAIADVYEALTAD
RPYHKATSPEQAVRTMASMPLDPMLEIVKNDFQELEAMLRKKQEEA*

>SPBIB_v1_200028|ID:27162876| ThiamineS protein [Uncultured spirochete bib]
MKITLEYIGFLKIEGIKSGTVVEAPNGSTAASILDMCKLTGSYRKYIVPIINGERSSSHDR
VLKDGDRMFIYLPVGGG*

>SPBIB_v1_200029|ID:27162877| Thiamine biosynthesis protein ThiF, family 2 (fragment) [Uncultured spirochete bib]

MVAANMHGPKTAKPGGQAKGADFLARNPPALEHIAGKRVGIIGLGGLSNIAMMLARAGI
TSFRLADFDTVSLENLNRQHYFSAHIGLAKTDALAAQMKALNPGIELELWPTRIEEEDLD
AFAQDCDVLVEAVDDAATKAMIYAWFRQEKRALWLVTASGLGGLEPANTIRTMHLAGKLI
ACGDFETSSSENGNGVCAPRVMLVAAHQALAVLRILAGVEAEA*

>SPBIB_v1_200030|ID:27162878| conserved exported protein of unknown function [Uncultured spirochete bib]

MQKISRFTLSLLAVAFIAFVPLAAIAGDNALTITGTVVEVQKYGNLTVDIKPKALYDAG
FALGDVLNVTIGGNVLKIPFCTSYSDVDTGSLVVRDDQKNNLLVVAINMGNFSTKYNAKV
GDTLTFGLAEKAGYLSEYLIRQLKRTNVRSDYATDSIFANFRSIATTGIKPLVYRSSNP
INNEIGRAAYADALAQAVGIKTVLNLSDSEADIQKYLAAPGFKSNYYKSLYEAGVKALN
MGVDLTAPEFGAKLAEGLRFLIQNDGPYLLHCTEGKDRAGFVSAVLESMLGARLQEVVAD
YMMSYENYYGVKKGTDQYTAIANSNIVTSLTTAMSGLPKGTDISGMPLAKFAQWYLSIG
LSSDEIAALKVKLSASAVLKAPNVTGTVTQIEKYGHAVTDITIADFNALGFKFGDMVTVV
FDNGFVLEAPYLDGYVNNGDPLVRAYPGQTNIAVCINYGKLNVAQVDVGSKFTIMLSR
PGAYLTQYEIRRLVRSNKREDYTSDEVFANFRNIALGGIAKGVLYRSSPIDNQLGRAAF
ADRLIKEAGVRTIVNLSADSADNMKNYLAAKDFASPYAALAGSNQVIFLNMNLAFADEF
RANVIKGLVFMAEHNGPYLVHCTEGKDRTGFFAALVEALMGASKDEIVADYMQSYIDYYG
VKKGTDQYTLISQDVLGMLKVIAGTNDLKDADLAAGAKSYLLQGGMKAEQIEALKAKLST
PIAASDASPAGTLISAI FNAMRHQSREVFVS*

>SPBIB_v1_200031|ID:27162879| Oxidoreductase, 2-nitropropane dioxygenase family [Uncultured spirochete bib]

MRAINSKLLHVAVKEITLISRELKALVIGDLSARIPPIQGGMGVGISLSGLAAAVANAGG
IGVIAAAGIGLLEPDGFKDFLGANIRALRREIRKARSLTKGVLGVNIMVALSNFADMVRT
AIEEKIDIIFSGAGLPMNLPEYLHGSTTKLVPIVSSGRAATLLARRWLERYNLPAFV
EGPMAGGHLGFKAEQLEDPAFALENIVPEVIQAVRPFEKTGRKIPVIAGGGIYTGADIR
KFIEMGASGVQIATRFVATNECDASIKFKNA YIEASKEDLRIKSPVGMPPGRAIDNKFLD
DVEQGGKKPFTCPYHCIITCDVEKAPYICISLALLNAQKGNLENGFAFAGANAWRIEKIVP
VQDLMDELVEEYEASYKG*

>SPBIB_v1_200032|ID:27162880| Ketol-acid reductoisomerase [Uncultured spirochete bib]

MNTTFKSRVFAVEKVQFGPNEEYVVRGGRHLFLLPKAFDQIRQIGVLGWGSQGPAQAQN
LRDSLEGTGIRVKVGLRQNSSSWKLAEEAGFRTEGTGEMMDVARESDLVLLLISDAAQ
AELYPQIFKALKPGATLGLSHGFLAVLKIHGDKFPANINVIGVCPKGMGPSVRRLYEQG
KHINGAGINTSFAVEQDIDGKATDYALAWSIAIGAPFTFQTTLEKEYLSDIFGERAVLLG
AVHGIVEFLFRHYQAQGMSPPEAFVHATESITGPISKITISRKGLIGVYNSLSEKDKEIFR
KAYGAA YRPNYEHREIYDEVASGNEIRSVILANKRIEAMPMAKIDGTFMWKTGEKVRAQ
RNEAAIPLEPFTAGVYIACMMAQIDLLAEKGHAYSEIVNESVIEAVDSLNPFMHFKGVAY

MVDNCSITARLGARKWASRYDYILMQEAEPLWAEGKGEDEALMQKFLQHPVHGALSVAAS
MRPSVDIAVQ*

>SPBIB_v1_200033|ID:27162881| exported protein of unknown function [Uncultured spirochete bib]
MKHSSLFKHYWWAALVSLFLAMSCASAPSAQAPSAPQSQAAVASSSGALPAPQQAQAQP
GVAAPKSDIWPKIYDDETYLTTFDSSWSEGEAVGAIKNLQNAMVEFTAGIPFSELDVDPY
GLRAKWSWTEGSFIKSANLIIPFDQVSYLLEHYPLNKEYKWGLLVGIANANPASIRTP
TRDAAERLGKAILVLAKARGAKVSLPNVRFVGFASLSPLSEAQAQAAGILQSGGIIISWVFK
ESPAEKAGFSPQDIITKADGKPVQKSDDLFSAINDAAGKSQIKIDGIRRSYRIDNKMY
VEIFVPVTFTLAIEQAGGAK*

>SPBIB_v1_200034|ID:27162882| exported protein of unknown function [Uncultured spirochete bib]
MNRKRIACAAALCAVFAGALFAQGADPKVTPAWVTEKQIAQQTQTQTQAQPEAPKAKGF
NVFFIGYDYPTLSGALAPALAAWNSPFNFSLGFESANSAGSSMLSGLELEFFIAAPSKGL
RLQMNELVMIGYSLALKPVRFNIGARLGLSLLDVTDNNSASNTYTGLGGLVGPEASLYAE
LAPDFWLWVRGRYALS YFMSLISNGASPLDTGSNSLNTLSLEAGLAFRM*

>SPBIB_v1_200035|ID:27162883|aroQ| 3-dehydroquinone dehydratase [Uncultured spirochete bib]
MKNLNIAVIHGPNLNLGTREPGIYGAETLDQINKEIEQEAKKCGATTEFYQSNIEGQLV
DYIHSKAGKIDGIVINAGAYTHYSIALRDAIAAVNIPAVEVHLSNIYKREEFRHTSVIAP
VCIGQISGFGAYS YILGLHALLHALGQAS*

>SPBIB_v1_200036|ID:27162884| Methylase involved in ubiquinone/menaquinone biosynthesis [Uncultured
spirochete bib]
MNHRRERHARLFNRIAIPYSWFFAGQTRS YARCFDIGRTALPSPQGKRALDIGCGTGAFTS
ALRAEGWDVEGIDVAQEMIAHA AKSGLRCSVVDILGAHSIADTSFDLVSAAYVAHGLPLE
DRLILYRECKRISKDTVLFHDYSENKRLLSIVEYLEGGDYFNFIRTVRQELADNFSDVK
VLRVGPQSAWYICKP*

>SPBIB_v1_200037|ID:27162885| protein of unknown function [Uncultured spirochete bib]
MRPKDIDHRTAKTGFCMRNHFLSHINAFDIPSFSPQRRRERPCAADIERPLALRRRQG
CSSDIETSGIGSRLAGKKPAVGYGDAVEKPSMALAMIHVQTIYL VVSAKSG*

>SPBIB_v1_200038|ID:27162886| putative Membrane-bound serine protease (ClpP class) [Uncultured spirochete bib]
VHRSGKRNLRLRYAGWLPFFMMLITLPAAHAASPRDIIFGGIAWGLRQTSGPVDPGPNTF
SNSPDQVWVDEQGRAHLTLQKRDNVWTASEMMAKKDAGYGT YRFTVSSSVSSLDPNIVFG
FFTWDKAPEAFNREIDIEISRWGVKDGPNGWFTVQPYDVPGNQHAFNLPKAASYTFEMRW
DKGLVEFVLYCDGKLSEYWKYAGRVPEPGRARLRINLWLFGRKAPQGPYPYEVVISDFSY
VPSR*

>SPBIB_v1_200039|ID:27162887| protein of unknown function [Uncultured spirochete bib]
MRKRVA VMGAGISGRHSLNRNRWGK WYRWLRRSKKRMRLRMGILYYVLRSGHIPLKTKLL
GSLALGYFLSPIDLIPDFIPILGQLDDA IILPLLIAFTLRSVPKELVRDCARKAIREPVS
LSKNWRAGAVVVL IWI FILALLGCWIIKCIHA*

>SPBIB_v1_200040|ID:27162888| conserved protein of unknown function [Uncultured spirochete bib]
MDMTKDGEKMKLTARIFFIAGFYV VRYIIYGIKISGTKNIERCKSPLVFVSNHEGAFGPV
SLLSTLPVRAYPWVTHEIMSRRECAAYLQKDFTEAALKLGPRLNAIVSKIICYACVAIMQ
ALRAIPVYRNSRKILGTLQYSLNMLEQGNILIFPEIPSTAKNTQLGDLYTGFLHLARMY
YSRHSQPLTFVPIAVNKKARRV SIGSPVIYNPDNPFWLEKERLKQEISGEIQDMFSSMEE
ARISG*

>SPBIB_v1_200041|ID:27162889| FAD-dependent pyridine nucleotide-disulphide oxidoreductase [Uncultured
spirochete bib]
MKIVIIGNGIAATSAATKIREFDASCEITMLSDENTPFYSRPRLLDYL AGKVSFEQITIK
SEQWYNKLNIELVSGAKVFSITPQENKIITSKGDISYDALLV ASGASAATPPFFRPDLKN
VFRLRTKEDADRIIAAAQHVRTAAIIGGGLLG IETGFALTSRGLTTTVIEIADRLLPKQL
DAESSLLLKASLEEKGLRFLTGKQAAALDADREGLCITCTDATVLRADIIVVSAGIRPNV
GFLEGSVNVGRGIIVDEKLRTNIGNIYAAGDCAEFRSTLYGIWPAAKEQGEIAGAIAG
QDAVYNGSIMSAKLVVGVIEVASIGDIAVGLGTRTESQREGSSFRKLFYENGR LKGAILI
GDTSDYFKLQKEIALPAPRQSA*

>SPBIB_v1_200042|ID:27162890| MATE efflux family protein [Uncultured spirochete bib]
MELAFHLHQSTAQRDRILNGPISQTLFLAAPTMLGIVQALMPLMDGLFINNIAGTLVA

SSVTFSEPVINMAMALAQGLSVAAMAIIIGQLNGRGSFDESKRTSTQIVVMGSILGCLSAP
 LLVVAIIISARINQQISHNVFLYLSLYALVLPFSFLESIYNGLKNANGKPEAPFIRMVL
 MLALKILFNFVFIYALRLGIVGCVLSSLAANILITVWMFWELFVKKGPDRLELRGFRFDM
 MAVRQLFQVGAPAMLNTFILNLGFFLINTEVEKYGPVVLNGQGIANNITQVAFILPGAFS
 SAVTTMVSMNIGAENPGKAKKSLVGGAVLSAITAAIVIAVIVPLSSHLTILFTRRADVLE
 IANRALHIYTYSVIGFGVTITIQGAFIGLTKTRVPLVLGVLRWFLRYLFILATEKYLYKY
 YAVFWGNLFSNYTASFAIAFLISRTRWESAIRQKEPKSS*

>SPBIB_v1_200043|ID:27162891| transposase (fragment) [Uncultured spirochete bib]
 VTDRQGKRTKSLVNERQIVVYSAQYAQRARMERALAVEKASGQIYALSKDAKPSAYGAAK
 YLKKVPFDRSTGECMPETEYLVMLDEARIEKEEQFDGYVICTNVIGREQGEAPFSGPYR
 YTPDGGFFQLNRTVTDDDIIEIKGLWRIEETFKVMKSELKARPVFLSTESHIRAHFFICF
 VSLLLMRLLERYLDWQYSAAAMQALASACGTSVGKNLYVFDYYDAVLEAIGKNLGDIFS
 KQSRTLQEIRHLLAQTKRKH*

>SPBIB_v1_200044|ID:27162892| protein of unknown function [Uncultured spirochete bib]
 LLASNDIGADDIVAVELLLLFDPGFIEHHQVLSLGHAFAGAAVEGHLLEVLRRPIGAWFC
 ILRERIDLSRGFLDRERALHAGTLGILRTIDDNLPFVHKALGPFPLAVGHPYLSGRIATL
 VFGKERA VRIVDGSIAXX

>SPBIB_v1_210001|ID:27162893| transposase (fragment) [Uncultured spirochete bib]
 MFLGTYEKKTGRTRLKIVEAYRQDGRPKQRMIDLGYLDELQKIYPDPIAHFKQVAQQM
 TAEKKAQKESRQVQLDPYAALRPFDPAPATISRKNIGYAALSFLYHELIDTVLNNRQR
 GTKFSANLNSIFKMLVFSRALFPDSTRGAWENRGIFFEEADYSHDEVYRALDYFLAWRPA
 LVRQLHERLKTRYGRQTLFFYVDVTNYFEIDEPSLRAKGVSKHEHRPNPIVQMGLLLDA
 QGLPVS YEL YRGNTNDGTTLPSMLDDAVLDLGMHHLIMVADKGMMSGDNI AKLRLGHG Y
 VMSYSVRGADKAFQEYVLDEEGYTA VYD TDGTL LAKHKSRYAPREIWVTD RQ GKRTKSLV
 NERQIVVYSAQYAQRARMERALAVEKASGQIYALSKDAKPSAYGAAKYLKKVPXX

>SPBIB_v1_210002|ID:27162894| protein of unknown function [Uncultured spirochete bib]
 MXEYSTVLNALQCITYNIMKNIVKKFLAAYAKRNYFSVPLKETAKVRRREKFI*

>SPBIB_v1_210003|ID:27162895| conserved protein of unknown function [Uncultured spirochete bib]
 MPLLQVRDCPEDIYKKIVLAARRKNRTIAQQTVVLLGKSLGQEE SNIERRKRLLEKIQTR
 NISSETTKEIDAVALLREDRDR*

>SPBIB_v1_210004|ID:27162896| PilT protein domain protein [Uncultured spirochete bib]
 MTAVLDVSA AIELLLQRDKKDLFTATYEKASWIIAPDLYIIELSNVLWKHYKAQKISHAE
 CMQYVEDGIDMIDDFFEVKELWKEALGEGIRNAHSIYDMYYAVLARRNDALIMTNDEQLS
 SICKKLNIEVVG*

>SPBIB_v1_210005|ID:27162897| Mannitol-1-phosphate 5-dehydrogenase [Uncultured spirochete bib]
 MKPMP TLVQFGAGNIGRSFIGQLFATSGYEVIFIDVAKPLVEAINARREYNIVIKRSSAA
 DEVL TIRNVYALDGNDAVAEAVADTDYVATSVGLGALPHIFPVLARGIELRAQRYPRG
 PLDIIIAENIHDGARYFRQSLEELLPPGFPLAENVGLVETSIGKMVPIMRKEDLATDPLL
 LFAEYNELIVDKHGFRGLLPQIPTLNPVENIKA YVDRKLFIHNLGHAAAAYFGFSQSPG
 TRYIWQALELPGLASKVRTAMRQSAAALVREYPNDLTLASLEGHIDDLLRRFANKALGDT
 IYRVGRDLYRKLARNDRLIGAILLAARHDL PYSVIAEA VRAAISFRAVDEEGRL YPRDTE
 FIANEVPKGLAGILRDVCGLRES DVIDREVIARILY*

>SPBIB_v1_210006|ID:27162898| PfkB domain protein [Uncultured spirochete bib]
 MLTISGTGCALMDYLYADVRLDSEAFVRYRSRQSGDGGLEPGKLVFVEDLERFAGKPFAG
 ILEELTGGAKPDRANLGGPSIVALIHA AQMLEGHNAHIRFLGARGNDASADEIMNIVARM
 PLDVSGYRAFEGHTPFTQVFS DPTYDQGHGERTFVNERGVADLFAPEHLPDSFFDSDIVA
 FGGTALVPQIHNNLTALCKRARAGGAVVVVNTVYDFRNEAKGGRWLLGESDETYGFIDVL
 VMDKEEALRLSGTESSEAALDFRAKGTGAAIITDGV RDILFYSDGSLFSVPALSGLRFL
 APGKGS LPACSLPVSAEIRRVLASPKPKGDTTGCGDNFAGGLLASIAIQLEAGQKRGS L
 DLVDACSM AIVSGGFSCFYIGGTYQEARPGEKKQEIEHYKLYREQLSANAADRARGE*

>SPBIB_v1_210007|ID:27162899|zraR| Transcriptional regulatory protein ZraR [Uncultured spirochete bib]
 MTKTATILIVDDEEGIRHGLTRLFE GEGYAVAGAEDVAQA EKIASAKKIDIAILDVRLKG
 SASGLDLLARLKNEDSDLPV IIIITGYGSIESAIEAMKRGASDYILK PVDNEALLALVRRN
 LEVAQLKRDNRYLKKELLQKTYQRHIITKNPEILNIARLDSVKDSTASILITGESGTGK

EVFARYIHFTSTRSAGPFVVSINCAALSELLLSEFLGHEKGAFTGAIERKIGKFELADNG
TLFLDEIGDMSPSVQAKLLRVLEESSFERVGGTKRISVDIRVVAATNNDIHELIRTGKFR
SDLYYRIAIVEIKLPPLRERIEDIPYLAEFFINMYAERYKKHIDGISSEVMQRWLSYRWP
GNIRELQNVIHQAVLLCTGNRIEADTLLNCGDEAAGIGQGTPVASGAGAFRPERYPSLKE
LGEAAAAYYERQRIESALAKANGNKSSAARALGITRKTLLLEKLRRYGIC*

>SPBIB_v1_210008|ID:27162900| putative Histidine kinase [Uncultured spirochete bib]
MRFFARTFNSFISVILQAILVILLVSGSITRSQEEDSKKELKTEALNVYDNFNSWKRAL
WGTIVDLNKSSELRHMAAQKHIAPEPLEAYLRKAASQAGAEFLIKNNWSTFSAVRPL
TEKPVSPKAQDFYIDRPHYPYVEMVLADNTLYFCGSVRVSADNGRYLDIFIVKRVDEALM
RQLSFNSRVRALVSLNSHFVVGTIAGTGFLWVHMGRSFSTSYTVVNELVEEGVPYAVVIQ
QSGNARLAGSQTDSPASLGNVPAKTEATLYICTFSLSEYRARVNFNRSILLVSLVAL
FTILLSAGLSKAVTDPVSQLRKAMIRLKSGEKALLSGPKKGEIADLFQGFNDMSAQIAE
DSRALSAAHQEITRIKEYNDKIFNSIQEKILVINAQFAVEKANRAFLEYCGQAEDAVALGR
NIDELSLALFDEPVHTSIRAIISGGKSSDAQIRRTSSGHSFEIKFYPLLEHEAATTSIHC
IMVIEDITAKVAYEEKIRQAEKLASISMLSAGVAHEINNPLSSILTNVQNLIKAERDLER
LKDLQVEQETKRIARIVRSLLFSSSTRTEKPATDINAIRNIVQLVGYSFREESSIVI
EPHNGENLPPAAIGEDECKQIILNLIKNALEAIGTSGRIRIETAFLPSESMVQCVCVSDTG
KGIPNALLPRIFDPFFSTKAESGNSGLGLSVVYGLVSKFEGLIDVESEVGKGTTVRIKLP
AAPSGLRQ*

>SPBIB_v1_210009|ID:27162901| ABC transporter [Uncultured spirochete bib]
MAHLLAKNITKRFGLTAVDNVSFHVDEGEVVALVGDNGAGKSTLIKISGVHVKPDEGE
IFLNGQEIHIDSPIDAISHGIETIYQDLALAENMDVPSNIFLGRERTKKILGFVNVVDYE
HMSSESARKVLDRLDIRIPSLKSNIRNLSGGQRQAVAISRSIYWNAKVLIMDEPTAALGIS
EQKKVLELVSSLRQGIAMIIISHQMYDVFSVADRIIVMRRGIKAGERLVKDTSTEEIVS
LIVGAESVEKRSQ*

>SPBIB_v1_210010|ID:27162902| putative ABC transporter permease protein y4mJ [Uncultured spirochete bib]
MQTETAEKQGTLPPELLGRNWIALFIVLLVFFSVVARSFFSFDTAQLIFFNGTEVFLLA
AELFVIITGGIDLSVGFVMGFATVVSSKLMVACVALGFSPFWSILAASVVTLLIGLVPGL
VNGWLVAACLRVPAFIATFSMLGVTHGISELLTQGIPTKNLPALAGDIGNGSFFYVAPGGA
ISFFSRPQVARGQTVLAIIPNMVIFAFILFIFLFAFILGKMKFGRHLYAIGGNIDAAIRSG
INVKRDLIKAYVISSLFASLAGLSYVMKYITGKPDAGANMLLEAIAAVVIGGASMAGGSG
TVGRITL GALVIAIETGLRIIGMQTFMTYILVGVILILAVIIDQVFPNRNR*

>SPBIB_v1_210011|ID:27162903| putative Ribose transport system permease protein RbsC [Uncultured spirochete bib]
LAAESTSNGERLKGAPGGGGFFQTAIGRFSARNWALIFLFIMIVIFSLGSSGFFDIVNF
QNIHLSGTGAFLAAAEELLVITGGIDLSIGYVYGLSSVLGAKVMQILYAGGAGGAGSMP
VWQVIALGCLAALSVSILPGLANGVLVTRFRVPPFIATMGMWGICNGITLFLADGFMPVM
GAPSEINAIGNSYFLYIDPSKISFFAKPSYITQANIRSVLRLVPNSLFLSLAVLLVLGF
VLGRTRFGKHTYAIGGSM DAIRSGINVRHLVMIYVIASFSVSGVAGLFLNFQTGIGNYT
PSGANYELMAVA AVVIGGASLTGGKGRILGTA VGVVLVLA VLENGLQIIGVSAFYRYIGV
VLLTIAVIIDRAFPDLF*

>SPBIB_v1_210012|ID:27162904| putative amino acid ABC transporter, substrate-binding protein [Uncultured spirochete bib]

MKKRYSAVFAILLILLTVAPVFGQAACKQLTFLFMPGVQDPFYTTMEKGVRAKCKELGVN
LIVAEYPKAWGPEYQVPILQAYAQRGGFDGLLIAPTSVDALKAPLKAIYDKGVEIITVDT
FLGDGDYSKPNTDYNFPLSYIGSDNYLGGKMIAEHLAKLVGEKKGKVFCEATNPDASSVAA
RVKGF RDGIAQFPNMKLVGVVEWCLDVQQAQEQTLAALQKDKDIVGIFGTNVFSAQGANQ
AVVNAGLVGAIKIASWDATITNIENLKKGVIDLVLAQKPGEMGSLGVEWLYKYLTQKVQV
PKKVIPGFEFFTKDNVNDPNMQQYIYQ*

>SPBIB_v1_210013|ID:27162905| PilT protein domain protein [Uncultured spirochete bib]
MLNSILIDTGPLIALFDKDDTYHNKVKDFIKNAKYRFITTA VITEVSHMLDFNINAQID
FFEWIMKEGVILQEISQKDISRIIELTKEYSDRPMDFADATLVIAAEKTGIKKIISIDS
FDIYRLPGKVKIENVFHLDFHFRGSFE*

>SPBIB_v1_210014|ID:27162906| CopG-like domain-containing protein DNA-binding [Uncultured spirochete bib]
MTTVRLPIEIEQRLEILAQKKHKSKTDLIREALEKLFIQEESKDSYELGEEYFGKYGSG

DGSLSTITYKDKLKDKINAKLNSH*

>SPBIB_v1_210015|ID:27162907| protein of unknown function [Uncultured spirochete bib]

VYAEDSGWGPSRGRNFVQVPAGVGFIEVREGQSQTGIELSDLRFVGEF*

>SPBIB_v1_210016|ID:27162908| conserved protein of unknown function [Uncultured spirochete bib]

MIYRACEPYLRKIASQFPVVLITGPRQSGKTTLARYAFDPYSYVSLENLDTADRAREDPR
GFLAQYRLKVIFDEIQRPLSLLSYLQQIVDEHPQPGSFIITGSQQFNLMAAATQSLAGRI
GRLELLPFSTGEIYSYNPSLLTDSTTSIRRGWYPPIDRSLDADLWYENYIATYLERDVR
QIDNIRDLLTFRRLSLCAGRTAQLVNLSELAGECGVSHNTIKAWLSVLEASYLVKLVQP
YYRNFNKRIVKTPKLYFLDTGLAARLLGIRTDDQLANHPLRGALFETYVFSSELLKKRMNG
QAPWEIYFWRDHGGIEVDFILESGGTLIAVEVKSGATFHPDFTTNLSRFAGFAGSDLTHA
ALIYGGMEAFTFKDVSVPWNQMDLL*

>SPBIB_v1_210017|ID:27162909| protein of unknown function [Uncultured spirochete bib]

VKTGEVLGRGTTPDFGVDFDRTKPNAFIRPSRYEPLMRYAQPPFGYLKEDISSRMLSLISR
TGEPKGGSFVYDQEGRLIGNWFAVPDAKLHEMSWDDMLAFAPHYLDTRRIEMGFSGRLWS
AFTSASPST*

>SPBIB_v1_210018|ID:27162910| Major facilitator superfamily MFS_1 [Uncultured spirochete bib]

MSERAPAHWFVAMATLLMICLGTVYAWSYFQTPIMKAYGWNTTQVSLIFSFTILFLGV
AAAIGGVVLPVGPRLALSILSLGYAVAALALSISLALLYIGYGFIGGTGLGLGY
VTPVTIAKWFPDRKGLATGIVVMGFVGFALVMSKVLAPLLSLTGSNLVTTFLFAVLF
FAITMTSSSFLRTPPPDWKSGASPSKTDSVGNAPSAMLSQFPRTAANVPSPLEAFRAAKG
DILSARLLLWLMFFCNISAGITVVGFGQSPMFQKLLAQSNPALTSVALAAMGATLIAVTS
IFNGVGRFFWGAVSDRVGRIATFRIMLGSELVIFILLIITHQPILFAALLCWVLLCYGGG
FGIMPASVAELFHPNKMTVIYGAALTAWAAGGVVGPQITAFIQDSVPERASTLSFIVGAC
FVALGFALSLIIQIRAKKSGRRA*

>SPBIB_v1_210019|ID:27162911| protein of unknown function [Uncultured spirochete bib]

MQYIAFDCHKRYTYAVVEDQDKGRVMEQRIHRKGEIREFLSRHEPGSPVALETIGSWYW
IVDEIEAAGMLPRLVNARKAKMMLASSKKTDRDLAKGLNTLQRAGTLPTVWIPPGAVRDI
RELFRTRMVLTREVTURLKNRILSCFSKYGISFNDDTSDAFNVKGRASLESALSLLPSHTCF
AVQNLLGQLDAVKHSIKEFEARINQVKNIAPR*

>SPBIB_v1_210020|ID:27162912| protein of unknown function [Uncultured spirochete bib]

MRHEALHFRHVQLYERLTKATKGGHVAIGAVARHLAEATYVWLTTKSAYREPNTKCSSTV
VSSRKG*

>SPBIB_v1_210021|ID:27162913| conserved protein of unknown function [Uncultured spirochete bib]

MSSKAMSLKGRINHYAKKNIAAQVVLQNYMFERFLERLSKSEYQEKFVIKGGMLVAAIV
GLDTRSTMDLDTTLRNLPLTEEQITQAIQSICGIDLKDEVAFKVSVASIRKDDRYGGFC
IRMDAVYDTIVTPLSIDISTGDVITPSAVLYEFSSIFDESVRIRLWGYNIETVMAEKVET
ILSRGIFSTRPRDYDIYILGTTQKYDKALFLEALSATAEHRGSKAILSAPAEIFENISE
SRDLRQMWAYKYQKKFPYAQDVTYEAIIIEVLRSLLFQ*

>SPBIB_v1_210022|ID:27162914| putative abortive infection protein AbiGI [Uncultured spirochete bib]

MGINSEILQEMKKNNVITTSQVLQLGYSKALLTKYVKAGLLERSGHGVYILPDAVNDDM
YALMLRSSKIIFSDHTALFLNGLSERTPFRHTVTIPSDSALPASIKDECTCFYIKPELHR
LGMIEKKTTFGNTVRCYNMERTICDFLRSRNRCDDETVISAVKNYAVSKGKNLNLLEDYA
KRLRVEKVLKRYMEVLL*

>SPBIB_v1_210023|ID:27162915| Phosphonate-transporting ATPase [Uncultured spirochete bib]

MISVHDILVSFSLGGGAEHTVLRNLTLEVKRGQTVSIIIGSNGAGKSTLLNAIAGTVPLQA
GKILFDGQDVTPLPEWERAHVGRVVRQDPLAGTAGDMTVLDNLALAARKGPRRFRIATPP
KFAREMAERVAELGMGLENRLHENVSRLSGGQRQALTLMAVLSRPSVLLLDEHTAALDP
ANAEIVGELTRRFIEEFQLTALIVTHDMKRALDQASRVMMHEGSIIADLSGPEKDRMDV
PGLVRLFKQARGAEYAEDRDLLS*

>SPBIB_v1_210024|ID:27162916| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]

MIEGILVEGLIYSILALGVFVSFRVLDLDFPDLTVEGSFPAGAAAGAVVAQAASASPLPLVH
ALAVPAGLLAGFIAGGLAGFVTAGVHHRLKVPPLLAGIVTMTGFYSINLRILGGKPNLPL
ITNNPMLAQARSFLSLLSPEGALLASCVLVCLVLFGLLDLFFHTEIGIAMGALGDNENA
VIQAGIQPNRLRTWGIMLANALPGLSGAMAAAYQGFADVNLGQGVVAAGLATVMLGELVV

HSQFIDVQLARVFLGSIIFRALMYAARSWGYYVAGITPNDLRLLTALLIIASVAISRYGRK
KR*

>SPBIB_v1_210025|ID:27162917| ABC transporter substrate binding protein [Uncultured spirochete bib]
MRRTRMFFVALAIIGMVLLSCAPKNAKVIGVAKFVSHPALDAIEKGIVDELSSKSKSDYKI
DLQANADMNTAAQIAQRFKQEKVALAVGIATPTAQALANQIKDRPVIYSAVTPVVSAGL
VSSWDKGGANITGTSMDTPVREQLDLLRSLKDVKRVGNIYSSGEANSVAIAAIVKQYCQE
NGLEYVESTITNSSEARQAILSIANRIDGLYLGNDNTVFSALSGIAEVALEKKIPVVTAD
PSSAETIPVLAALGYDYRMYMGVATGKIVVRVLNGEKTADIPALLPKDSEDMSFVLNLDTA
KKIGISVPQAVVDKAKVIISDGQVTRK*

>SPBIB_v1_210026|ID:27162918|braC| Leucine-, isoleucine-, valine-, threonine-, and alanine-binding protein
[Uncultured spirochete bib]
MKRTYMLLAVFALAGLMVFSGAQNAFAAPTIKIGVAGAHTGDLASYGLPSVNAAKLVVKN
INDKGGINGQKVELVIEDDQCKPELATNAAAKLVSAKVAVVIGHICSGATKAALGIYKDS
KIVTISPSATNPPLTQSGEYPNFFRTIAPDDAQAKLAATFLAKTLKLLKIAVLHDKGDYG
KGAELVKQYAEYGVQVPLFEGINPGAPDYSAVVNKISNAKVDGVDVWGGYHPEASKLVQ
QMKDKGMNIPFISDDGVDNTFIEVAGKYAEGVYATGPTDTSTNALAIKAIEEHKKTFTGT
EPGAFFLNAYAATQALLNAIEKAGSTDYNKIVAALKSNYVDTPLGHISFDQKGDIIIGFGF
SVYQVKNGVFVELK*

>SPBIB_v1_210027|ID:27162919|livH| leucine/isoleucine/valine transporter subunit ; membrane component of ABC
superfamily [Uncultured spirochete bib]
MEYFLKFLSGTAKGSIYALIALGYTMVYGIQLINFAHGEIYMIGGFTALILGGFFFSN
GMPVWLVLFSVLLSIYASAFGYTIEKIA YRPLRGKPRLSALISAIGVSIVLQNFVLLA
QTEKFMPPSYLPEFSWLQPYKEYINSTQLIILGVTAIMVFLTLIKFTRIGKAMRATA
QDMHMAQLVGVDVNQVISVTFIIGSSLAAIGGVLCISYMGQINYYIGFVAGIKAFVA AVL
GGIGSIPGAVLGSFILGWTESLGTGYISSDYEDAFVILIVILLIKPDGILGRTQRQKV
*

>SPBIB_v1_210028|ID:27162920| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]
MKSRSLLADIGKSFLIAIWFMVLLFPLMVMKVNVSKGVAQVQFRWNMLPLVGIAAFVLSL
LWRFALEWNEKRGNDSTRAGGPLAKLKALTSQYLGIAAVRKGALFILLAFALAYPFLFGMY
HTNVMITAFIYIILALGLNIVVGLGLLNLGYAAFFGVGAYTYGLLWKYVGHFSIAAGID
PGWLFWISLPLAGIATLFGILLSPLVRLRGDYLAITLAFGEIFRMVMQNSGDITGGA
TGISLIPRPWLFNIKLTPQKAATYIYFIAIVLVLITIFVRRIEDSKVGRALEAMREDEI
ACQAMGINLVRNKLITFALGAFWAGIAGVMAAQTTYINPDSFTLWESIILMAVVIGGT
GSIPGAIGGAILLKLPEYFRALAQYRMLIYGIAMILVIIFKPDGLIPRKRKQYTFKEKE
LAK*

>SPBIB_v1_210029|ID:27162921|livG| leucine/isoleucine/valine transporter subunit ; ATP-binding component of ABC
superfamily [Uncultured spirochete bib]
MSTQQLQSKQSILEIENLSMAFGGLRAIDGVSMHIDEGEIAALIGPNGAGKTTIFNCITG
VYKPTTEGTVSIRNKNQIEHGHGLKPDIIHNHGLARTFQNIRLFNNMTVLENVMIGRHNS
LKAGIFKAIVRDSSTKEEQRVIEESYLILKLLKLDMYINETAGNLPYGEQRRLEIARAL
ATDPFLLLLDEPVAGMNAQETKELEETINIIRDQEHITILLIEHDMSLVMNVSERIYVLD
YGRLLAEGTPHEIKRNPDIKAYLGE*

>SPBIB_v1_210030|ID:27162922|livF| leucine/isoleucine/valine transporter subunit ; ATP-binding component of ABC
superfamily [Uncultured spirochete bib]
MALLELKNVSTFYGNHALKSISISVEEGEIVTLIGANGAGKTTTLMSICGITPVRSGEI
LLKGQNTKVS PNKIVQMGVSQVPEGRRIFFQLTVSENLDMGAFRRDKEGIKRDMEEVF
SIFPRLAERRNQLGGTSLSGGEQQLAISRALMANPHLLLDEPSLGLAPLIVQSIFEI IQ
RINKERKTTILLVEQNANMALKIASKGYVLQNGVIKMADTAAHLENEEVRKAYLGL*

>SPBIB_v1_210031|ID:27162923| putative signal transduction protein with CBS domains [Uncultured spirochete bib]
MKVGQRMTRNPITITPDVTVPEAQAIMRREKIKRLPVLDNKGKLVGIVTTLDLIHASPS
ATSLDIYELHYLLSKLKVEMTRNVITVDEDLPIEEAARIMADNGISGLPVMRGNVLIG
IITETDLFKLFIELFGARHKGIRLTLLPEKKGELAKVSNATKAGGNIVSFATFEGEDP
TNA YCAVKVTGVEKDALIQALTPVVEKVVDARET*

>SPBIB_v1_210032|ID:27162924| Resolvase domain-containing protein (fragment) [Uncultured spirochete bib]

MRIGYARPSVLQPDAELQVKALQDAGAEEKIYTENVLSNEADRPAFEEALGSLGAGDTLIV
ASLDRLARTTTTELFYIIIEIIRGAAAFASLKEALDTSADDGEAGRVFLRTLGAITEFERA
ILKEWQRESIEAAKTRRGHESKSGRRRR*

>SPBIB_v1_210033|ID:27162925| putative transcriptional regulator [Uncultured spirochete bib]
MELSELFKALSDPTRLLILRLMIEEQQLCVCEIVTILGIPQYQVSRHLSVLKQADLVQF
QKIGTWAYHYFNDSTPINQMLAELLRKAMPVEKYQTEFNRLRDLRALRFNGKCVVGFEEE
KGTAGIKKPARKS*

>SPBIB_v1_210034|ID:27162926|arsB| Arsenite resistance protein ArsB [Uncultured spirochete bib]
MEGAKKLSFVDRYLTLWIFLAIGAGIAIGYFWPGFGQFISAMSIGTTTPIAIGLILMMY
PPLAKVKYEKMGQVFNKLLALALIQNWLVGPLVMFGLAVIFLRAHPEYMIGVILVGLA
RCIAMVIVWNDLAGGDRELGVGLVAFNAIAQVLFYAVYIWFLLTVLLNMFGLANGIQINI
SMWESAKTVLIYLGIFFSGMGTRYILQKIKGSEWYETKFIPKISPLTLIALLLFTIVVMF
SLKGEFIVKQPLDVLIVAIPLVLYFVLMWFVTFFIGKAMGANRQTISLAFTAGSNDFEL
AIAVAIGIFGISSGEAFATVIGPLVEVPVMILLVNAAIKMKGLFKQKPSFEV*

>SPBIB_v1_210035|ID:27162927| putative OsmC family protein [Uncultured spirochete bib]
MNEHPQSKKYEISLSRENGKIALASAHGSTLRMSLVGTEPELGFTPPETVIAAYGACIMS
NINKVAQAESLKIDDIRIDFTAQKRNDPLGLEHHCIAVKSSAPKEKLQQLLTKATTDG
TATNALQEGLKADFQFEV*

>SPBIB_v1_210036|ID:27162928| protein of unknown function [Uncultured spirochete bib]
MEKIKQNSAGDASLGVLDRIQPLLLVAAIAIGLLLASIMPAFARRLEPSAT*

>SPBIB_v1_210037|ID:27162929| protein of unknown function [Uncultured spirochete bib]
MSDTIRVRVIAPPAAPNACGDTWEHAVQLIETRISARYPGTVTFEFVPLFSKAFFDMPLV
VQALGDGTAQMPVILVGDRIIQSGGKISESKIRAEIEGILHGKDQTEQRG*

>SPBIB_v1_210038|ID:27162930| protein of unknown function [Uncultured spirochete bib]
MEARLQQAADRISTLGNPKVSTFRNANDFFNDSELAALRKRYNENLIARKKQYDGT
LTQEELNTIRTLQAQVSNHPITQRFVQARAELVDVLTECNLSAISELLGFNYAQAAPPAN
CG*

>SPBIB_v1_210039|ID:27162931| conserved protein of unknown function [Uncultured spirochete bib]
MTDIMLEAESYVQASRLAKAIAATGNYAIFEKARDRLSTDAEARNMLKQLEAAEQKAQL
SASWGGLSDHERRKLERMQQETFKQPTILAFLEAQKSLIAELQELNRYMTEKLGIDLADM
TKPQTGCCG*

>SPBIB_v1_210040|ID:27162932|arsA| putative arsenical pump-driving ATPase [Uncultured spirochete bib]
MKAQYIFFSGKGGVGGKTTMACATAVHYAESGKKTLIITTDASNLDVFEFESRIGHKITPL
GIENLWGMEIDPKATEEYRERILAPMRAVMPVSVMKVMEEQFNSPCTTEIASFDRFVDF
MVMEQSENEIPYDVIIIFDTAPTGHTRILLELSVDWSKHIEESAKGGGNTCIGPVASIQEN
KKKYDEATRLLGDPSTRDFVFLQPEGTSLYETKRSKAELEGIGVKSIVRLIVNGILPQEV
CTHPFFRSRYEMQQKYLQIRQDFKESITYMRQRDGEIKGIESLRAIARDLFSKDRTTSS
YRLSTSFETPTQGGLVQAASLFDLINPTPGKTKAVFFTGKGGVGGKTTVSTAVAYGLGQKG
YKTLTLLTDPASHIGQVLQQS VGSSISKIEGAENLWATMIDQKQAAEYKARIADAEEK
YSPDTLAAVREELESPCTEEMAAFDKFMGYVESDEFDVFVIFDTAPTGHTRLIELPFDYE
DQVGMMVATTAESASVKSETQHRFEKIIARMKDPEHSLFAFVVPESTPVVEAYRAMLDL
KDAGIETKFVVANQVLP AEICTNEFFMKRRAMQVKYLAEIETLFFKPKITIMPLLDTEITG
LPMVAEASELLLAERKTESA*

>SPBIB_v1_210041|ID:27162933| Arsenical resistance operon trans-acting repressor ArsD [Uncultured spirochete bib]
MPAKIELFDPPMCCPGGLCGPAIDPVLLDLNEAILRLKKEKGIAVERYLLSQGKFMEN
PEVLALLQHQGTEILPATAVNGHVVKTKNFPTYEELKQWASEPAPITQGASA*

>SPBIB_v1_210042|ID:27162934| conserved protein of unknown function [Uncultured spirochete bib]
MKDKDMVDEYDFDKSIKNPYIKNLKKSVTIRLEPDTVNYFKSLSRDIGIPYQTLINLYLT
QCAKEKKKPEVVWQ*

>SPBIB_v1_210043|ID:27162935| Oxidoreductase, short chain dehydrogenase [Uncultured spirochete bib]
MLRTRPCLDPAGGLPYPVDIMSWLSLGGKVVWITGASSGIGRSLAVEAARRGAWLILSGRN
VPAL EETAALCERARLASENQNAQKDEQEASPGARNHA ACTLLPFDLADPEARLEAAQK
ALTIHGRIDVLM LNAGVSQRAK FVETSADVFN LIMETNFFAAVDIVRAVLPQMCSHSSGV
IACVSSVAGLMGAPWRTAYSASKHAQAGFFSSLRTELYGSGIQISIVYPGFVRTAISENA

LAGDGTRHGKLDPLQKFGQNPEVTARTIWDKLETGKLDIKVAFELKARLGVFLSRYFPAL
FVRSISRHGGL*

>SPBIB_v1_210044|ID:27162936| putative type I restriction enzyme HindVIIP M protein [Uncultured spirochete bib]
VARQKRNAQEAEVSGATIGYEAQLWKMADALRGSMDAAEYKHVVLGLIFLKYISDAFEEH
HATLQAERAQGADPEDPDEYRAVNVFWVPPEARWAHLRAQAKOPTIGQLVDDAMAAIERD
NPALKGVLPKDYARPALDKQRLGQLIDLISNIKVGDEAARSKDVLGRVYEFYFLSQFASAE
GKKGGFEFYTPRCIVKLLVEMLEPYRGRVYDPCCGSSGMFVQSVEFIRAHANGNGNGGKAR
ADISIYGQELNYTTWRLAEMNLAIRGIEGQIAQGDTFHNDRFPDLKADFILANPPFNVS
WGGERLAGDKRWQYGVPPKSNANFAWVQHIVYHLSPTGVAGFVLANGSMSSNQSGEGER
KNLIEANLVDCMVALPGQLFYSTQIPACLWFLARDRQDGRFRDRRGEILFIDARKLGRMV
DRTHRELTDKDIKKIADTYHAWRGEKECGQYADVPGFCKSAPLDEVRTHGYYVLTTPGRYVG
AEAQEDDDEPFEEKMQRLVAQWREQQAEAAKLDAIAANLKLGYGE*

>SPBIB_v1_210045|ID:27162937| conserved protein of unknown function [Uncultured spirochete bib]
MANKSRKPEQNARVPEQTEARRLDAGIAGDLPADYATLLTELKQRIREERVRVLAANAA
MVLlyWDIGRTILQRQAQEGWGAKVIDRLSADLRREFTDMQGLSPRNLYMRAFAAAWPD
RHIVQEVLAQITWYHNIALLDKLDAPEVRLWYARKAHEEGWSRNILVLQIERRLHERQGK
AITNFAATLPPADSDMAAQIFKDPYLFDFLTADPRRERELEQSLIDHIQRFLLELGGAF
AFVGRQVLLLEVGDREFFVDLLFYHLKLRVYVVELKAGPFDPAYVGMNLYLSAVDDLRL
HPDDKPTIGLLLCKGKDRLVVEYALRDVTKPIGIAEWETRLMATLPEELKRSLPTVEELE
AELENVAHKTQEEGYGG*

>SPBIB_v1_210046|ID:27162939| protein of unknown function [Uncultured spirochete bib]
MGGEVRPFGQLFVEPTRNGLTRPKTVRGNVVKMVMNMGELFAYPRLCNAPMERVPLRPSEY
ERFLLKEGDLLFARQSLVLEGAGKCSIFLGDDEAVTFESHITRVRDPTKANPCFYFYF
QSHHGAAIRSIVEQGAGASGIRGSDLESVDVQWCPLPEQRTIANILGTLDKIDLNRRM
SETLEQMARALFKSWFVDFDPVRAKMDGRWRRGESLPLPDLYDLFPNRLVDESELGEIP
EGWEVKPIGDLADVVGSTPKTERSEYWEGGTHHWVTPKDLGLSMPVLLDTERKITDAG
LAQISSGLPEGTVLLSSRAPIGYLAIAEIPVAVNQGFAMKPRRDMSNFLLRWARSAH
EDIVSQANGSTFLEISKSSFRAIRTVAPAASVMDAFDRISRSMYRKVVEHERESRTLAVL
RDLLPKLISGELRVKDAEKFLKERGL*

>SPBIB_v1_210047|ID:27162938| protein of unknown function [Uncultured spirochete bib]
VVRLKIVKVEAGVGFSSRIKPDTGYV*

>SPBIB_v1_210048|ID:27162940| conserved protein of unknown function [Uncultured spirochete bib]
MSEDNANEIDRFEIGGENLLSKVSMGFFQTSNDTLPLGTETLPREELDDIRVRIGTLLKT
ETVSFLLGAGASVDCGGQLIGLVPLAVERDLHRKDTAGTTEAQAQWLKVFYLAVSHSGG
GDTPVSEDEIRSQQKLEGKEVKSLLANFEQVLATLHRWRSALPSTGGRLRVSTSTVT
LDANAEDLDECLRRATRALAIACNLPTEDKEGGISTYKAFIRKLLTRPLNLKRVNIFTLN
YDTLVEQASDADGVLLDGFVGTYRRVFRPESYEQDLYFPAETTEGRVHRFDRVLHLYKL
HGSITWRATKPSINNPYGIESERFNLNDTQPVLIIYPTPAKYGETLGMPYAELFRRFAAAV
VRPQSVLFVIGYGFGEHVNAIIRQALAVPSFTIVIVDPAPNSDFVKALRKQNDPRVWIS
EGSRIGTFEGFVKEVLPDLREEEILKKVVATHQSLSKKENTGRGDMSDDN*

>SPBIB_v1_210049|ID:27162941| ATPase-like [Uncultured spirochete bib]
MTTDFEIGRVVAVDTAQVTIELNSDLKGMRSRSTYEGPHEVGRINSYVIIPVGARRLVAMV
TRVVLVEEAEMKADRTMVTLPAAARLMKATLIGTIDGDKFRQGVSLFPVLDNPVYLAGRA
DLDAIFGPIESKQTPPNMDEPGYCIPIGESAVVQGRPIRIDPDVFFGKHAAILGSTGSG
KSCTIASLIQSIRKQPTVKRTTFVILDTNGEYRSFQRQKKGDTWEDIGSRKVLVYPSDP
SKAAERLVIPYWFMAEDFVRIFQASKGVQRPVLLSLRLARNEAGSASPLATLREELIL
ELNRIWLSLGGDEKTSKDVRDLAKGLKTRIEQEDLSQGWTDASTEFSLNKDEVAKALDNV
IKTADNNIDNGTYPKVLPAADARKQIRDAIDPIYQNLGTGTHIGDSTNVAGRSADAPSYFDK
LKFRSRHLEQVLRREESGGARARDYTGTMLLRIDRLLADTRFDFMFGPVDGVLPNPVHAL
ASFLRDTLIGISLQNGDLSKVEDIPTGRLPFYDRQRNNEGPDVVDVILDLSLLAAEVLNV
TALIGRLILEFLQRLGEYGGEEARGSLPVILVLEEAQNYIQPRSAEDESISR VFERIA
REGKRYGLSLVVASQRPELSKTVLSQCSSFIVHRLQNPEDLRYFKEIVPAIYGPMMLDQI
PALAPQATALVLGECVSAPALVKIRTASPVPRSRDPKFYRYWVSDNPPEVDFESICEKWE
THNEIDAVPSKQKRNEEDNTR*

>SPBIB_v1_210050|ID:27162942| putative type I restriction enzyme HindVIIP R protein [Uncultured spirochete bib]
MNSFTESTVESAAALAWLESAGWQVAYGPDIAFGMPAAERADYGEVLPQRLRDALARLNP
GLPAEALEDAFRKLTRPEGADLIQRNRALHRLLEIEGVNVEYREPDGSIRGAQAHVISFDF
PLANDLLAVNQFTLIENKHERRPDIVLFVNGPLAVIELKNAASENATIWTAFHQLQTYK
TEIPSIFLTNAVMIIVSDGLEARVGTLSAGREWFKPWRTISGEALADARLPELQVMIQGLL
APHRLALVQNFIVFEDDGSRIKKMAGYHQFHAVQAAVQETLRAAGLGQLEYVNDRSGG
RYMAGPNHAGKRGDRRVGVVWHTQSGSKSLTMVIFYAGRIIREPAMANPTLVVLTDRNDLD
DQLFRFTSRCQDLLRQPPLQAESRAHLRKLSSVDAGGVVFTTIHKFFPEEKGDYRYPVLS
RRNIVVIADAEHRSQYDFIDGYARHMRDALPHASFIGFTGTPIEKADANTRAVFGDYISI
YDIQRAVEDGATVPIYYESRLAKLALNEAERP KIDEDFEEVTEGEEVERKEKLKTKWAQL
EAIVGAEKRLRLVAQDIVTHFEQRLEAMDGKAMVVCMSRRICVELYREIVSLRPEWASEA
DEQGAIKVVMTGASDPIDWQCHIRNKKRREALADRFRDPADPFKLIVRDMWLTGFDCP
SLHTMYIDKPMRGHGLMQAIARVNRVFKDKPGGLVVDYLGLAHELKAALATYTESGGTGS
TAINLDEAIAVMREKYEICCGLFHGFDRSTWTTGTPAERLGLLPSALEHLLAQENKRF
LHAVRELSQAFALAVPHEEALAIRDDVSFFQTVQTALSKRVPGDTKPEEELDHAVRQIIS
RAIAPEGVVDIFAVAGLEKPDLSILSDEF LAEVRGMPQRNLAVELLQKLLKGELATRRRK
NLVQARSFAEMLEQTIRRYQNRAIEAAQVIEELIQLAKEMREASARGEQLGLTEDELAFY
DALETNDSAVKVLGDETLRSIARELVNIVRNNVTIDWTLRENVRAQLRVLIKRLRKYGY
PPDKQEKATQTVLEQAALLSAEWTA*

>SPBIB_v1_210051|ID:27162943| conserved membrane protein of unknown function [Uncultured spirochete bib]
MSDILLILFTLLFPVLLLYLKERVRFMAKWSTLIVCYIAGLALGNIGILPASASALLDTL
SSVAVAISIPLLLFSVDIKKWKELSGKAILAFVLAALSLSLVSGLIYAFFRTKSAESANV
AGLLVGLYTGTPNLAAIKTALNVDKNVYLAVHTSDIVLSAIYLLIVMSIAKPILKHILP
LKNWDGNIASPENLSFTTRFSYFRKGLWKKIVSGFGLALAIVGVSLGVSMMLVPPDFQTM
VTILLITSMALAASFVPRIRTLPMTFATGEYFLYVFAVAVGAMGNITQIFNSAGTYFIYV
AIVLFGSFLVHAALCALFNIDVDTMLIVSTSAICSPFVGVVAVSLKARKLILPGITTGI
IGYAVGNYLGIALAQLFKAIGG*

>SPBIB_v1_210052|ID:27162944|fumI| Aminopentol aminotransferase [Uncultured spirochete bib]
MSGEMGNPGEQSEGPSKAKQGQSRRAEKRFETSIAYFERAAKVIPGGIYGSKSPGFLVPG
HFPYYLSHAKGSRIVDVGNEFIDYLCGYGSQIVGYGNPAVDEPALAQARKGDLLNQPH
VMVELAERLIGLVDGMDWAVFVKNGTDATTLATSIARADTGKQIIIAEGAYHGAANWCS
TNVFPVFTLAEQRDVRYPYNDVAALAEALFRQHREKIACVILTPYHHPTYKPPQLPTPEF
IATVERLCHSEGAYFIMDDIRANFRLSMKGSHSFFGAHPDMITMGKALANGYPLSVLLGT
EGLKKTASSFFITGTYWMSAVPMIAAMATLDEMERTLGGTERLAQLGRMLKEGLES LGREA
GFSARISGPPAIPYLTDEDPDLFLNQRFCAMADRGVFMHPHNWFISLAHTEADIAQT
LEAAKGAFALRDSRKPVTLHQSFQSGSEH*

>SPBIB_v1_210053|ID:27162945| protein of unknown function [Uncultured spirochete bib]
MNTKLSQLSSEEKAVLARLKAWLALQLAAEAVRNDEGLRQACPAAGISLKLAIKRGAGAM
QLVVKNGIARVYVSGWPQLVLFPPGSASAIRVLSGSKGTAVPLPLRPGAFKALGFFRKAS
SRATELLRGAETPEDVRARLLLAATLYGLEAVAGDTYLARRMQIIPDGVVAVRAGEIEYF
VEKRGNAIHVIEAQQRPDVLSFADYQSAIDVLSGKRQAVVALGSGKVRIEGLLPLVQGL
FVVLDRLSWYLGVAL*

>SPBIB_v1_210054|ID:27162946| protein of unknown function [Uncultured spirochete bib]
LPALPGGAQGAMLASGLTNEYKVVSIERRKGRSGEVEGVAGIAARC*

>SPBIB_v1_210055|ID:27162947| DNA mismatch repair protein MutS domain protein [Uncultured spirochete bib]
MKVFLMYKDRDFDPQAPLAPQTDALMQDFDVIDILLKAMSAGDRFLYDISKSALFQSLMDE
GTILYRQQVLDSDIRNEKIVRDIYALADEAVEAKRKNWFGVFGAYPGSILHGAVRMLEAY
LPMLERLRVIAREKQSVFRSKGFTRFFAMIQNELNDEYVRTVSQYLKDLRFDSGVMISAK
LGEGNELTGHALRKNPKDKNWIRRILGPKTPSYAFSIDARDEAGTRALGELRDRGINFA
ANALAQSAHDVESFFRILKNEVGFYIACNLREKLASIGEAVCFPVPSAPKSLQLEFSGL
YNVCLSLFSGKKS VGNDVCANGKNLAIITGVNEGKSTFLRSVGIAQLMMQAGMFVPATR
FRADIRSGVFTHYRRKEDRDMGSGKFDEELKRMNTIVDQIKPHSLILFNESFASTNEREG
SEIARQIVSALLES GAKVFFVTHLYTFAAQFREKANKTTILLRAERRQDGRTRFRIVEGA
PSQRSHGEDLYYKVFEEEV*

>SPBIB_v1_210056|ID:27162948| DNA mismatch repair protein MutS domain protein [Uncultured spirochete bib]
MIAVSMFLFENPEDTRRASAFDMPEYFVDLNLQILEGINGGLSEYGLQHIFYQHLSNARE
VQFRQAIMRDMKPDFLAKIKAFSSRFRRSMRRSLASLEKLYNLHHRQGWFLVAAYCES
VESLAGTLRDAELGSVGLRSLRDYLIAYASSEFSLTKSEMEGLMQSLGEIHYSIIKLN
TVRVKKEFENEIDYSADIDDTFSRFRQGATKSYLLKIPSSIGLNHVEAQILDCVAKLYPEI
FASLDEFCKAHASFIDETIDTFEREIQFYISYLDYIGPLRRAGLSFCHPEIAESDKNTYA
QGFFDLALAKKVSMTSTRVVPNDFSLQGKERMIVITGPNQGGKTTFVRAFGQLHHLAIG
LPVPGTGVRLFLYDAIFTHFEREETIKSQRGKLDHEIIRIHNSLERATPSSIFILNEIFT
STTVKDSLFLSRKVLEKILALDAIACVTFLEDELASMDDRIVSMVSCVDPQDPSIRTFKV
ERRLADGLAYARSIAEKYHLTYESLKNRFARAQGGRNPREMRGNDSMARFGEALS*

>SPBIB_v1_210057|ID:27162949| exported protein of unknown function [Uncultured spirochete bib]
MRKKKALGRLLAAFFLVMCASIAFAQPQEPTLADLPSILDHMLDNHYMPSAQVGLGSFTY
TDTQLPTPFARWFEDELRLAFAKTAKMKLFDKQVAAAMDPAIRALYGDFFGTDRADSILY
GKYAQDDRGVLTMTLTDLSTGGLISETRYAVPASAIPSNVNVQPSVKMVQTAALSOLF
TSSGAGGQAGSGQQGAAQDFVVTLSTDRGQAVYRDGERLTLLVTSSKDAYLKIYHVDVN
GVAQLIWPNRFGGSGKIKAGEALKFPGPNDKFQYVLGRPYGTEYIKAVASTKPFATMEAD
FSDLQGSAAVIAISRGLTVVSSDTTRAELVVYEILP*

>SPBIB_v1_210058|ID:27162950| Major facilitator superfamily MFS_1 [Uncultured spirochete bib]
MSIKDRPALASRDYRLFVVGQGISVIGTWLQNTGQAWLVKLTNSPLKLGILTSVQYLP
SLLLSLFIGPILDRYPKRSILLWTQSLFAFSAALLAAIVFSGREQYWHVLAIAAFTGLVT
AVDWPARGSFVSEQVEDKDAVVNAIALNSTIFNIARVIGPAIGGALIAAIGIPWTFALNA
LSYLAVIASLWAMRSGRVAYAPKSGHYRSDIREGLAYIKKRKISIGLLAIVGVITTFLLN
FNILIPSYAKLTLGLGADRYGILMSAMGVGAMLAGILMALGGRALQPKPGFIFGAGFILS
TAMILIGLQRNFIISAILLAACGFGMSSFATMCNTSVQIQSSAMRGRVMAAYNLVFGS
TPFGSLYTGQISDMLGSDAGFLISGAIGLLFLLSMRLFIAPKVFSGVKSFAQLKDSEG*

>SPBIB_v1_210059|ID:27162951| Phosphoglycerate kinase [Uncultured spirochete bib]
MQGPRLKIRPVTELELHGKTVIFRPDINSPIDPTTKRIVNTNRIEKTVPPTLNMLERGAK
VALIAHQGDTLDYQNLPLAEHAEILSRLSGHRVSYIDDVCGPAAQAAVKALSPGEAVIL
GNLRYLAEIESTFETVVKLTAEEMTQTWLVRSLAPLADYYVNDAFAAAHRNAPSMVAFQE
ILPTAGGIQLMEEYTALKSVMENPRRPCVYVLGGAKISDAFDMMRKVLTDGSADYILTAG
VTGIVMHIARGVDFGPTITKFLADRALDTFIPEAKSLLKEFSSHYVLPVDFAYDANVGQG
APSSAQAGTKPGQSTSHNSKPVRAEAPVGSPLKDRLLPDVGRQTIELFKEYIGKAGSIFV
NGPAGMYEHEPWSGDTREIWQAIADAPGYTVIGGGDTITAAATRFDTLSKYGYVCTGGGAM
VRFLAGKRLPLIEAMERAFERNLQAPLRR*

>SPBIB_v1_210060|ID:27162952|gap| Glyceraldehyde-3-phosphate dehydrogenase [Uncultured spirochete bib]
MAKVKVGVAGYGVIGQRLADGVALQGMELVGVADVAVTSLVRALREKGMYPYKFFLAPE
KREEFDKAGIPVSGTLEDLVQQVDVMLDATSAGVGAKNRLLEYKYGKKAIFQGGEKNSVA
DVFFHGYANYEKGIGAQFLKLTSCNTTGLIRAVDCIDRKVGVEKVAITIIRRVADPGDYH
RGLTNALQIDKAPSHQALDLMTIMPHVDATGILVHTPVTHGHIITVVATPKKSVTPENVI
EFFREHPRIRVVSIAEGFLGNASLFRYARDLGNPRGDMYEIAAWEDTVVMSGKDVMFAIN
VPQEAUVIPENMDAVRACMRMQLDRIEATDTTNRYLIGIGKWRNPG*

>SPBIB_v1_210061|ID:27162953| putative NADH oxidase [Uncultured spirochete bib]
MSESKYVNLFKPIKIGNFVAPNRICHVPTDISSANADGSVNQRVITYHEEIAKGGTGFII
VGASTPDKATGRPTVTCIAVDEDPLIPGLAELAEAMHRHGAKCAVQIQHPGRQSAWPRHD
MISATDMVVDLPGSAGHEVVYAESKAKGKSIRAMSVEEIIDLIEKFAEGAWRVQQAGFDG
VELHGAHGYLEIAQFMSPYVNRNDRFGGSFQSRMRFPLEIARIQQKCGKDFPIGIRYSG
DEFIEGGRNLEESVKVAQVMEEAGVAWLDISAGIFELPGPTMDPMYYPQGWNTYAAEEIK
KHVHIPVITSHSLREPDYCEKIIAEGKADMVGLSRQLIADPYWANKARASQTEEIRKICIS
CLVGCWQESLMIKRHMRCAINPAIGDERFINFGPASKKMKLAIVGGGGPGGMEAARIATLR
GHDVTIFEKGEELGGAILYCCTVPGKSKMRWYADWLRRQIANLGKVVYSTIPSAEQLKE
FDVFIATGGKVEKPDIPGINSSRVFTFEDVLRCKVKGCEFVWPKDGKKAPADVGETVLIW
GDHFGAADTAELGMEGKKIIIVTENSQFAAWMEPCHKDVFDKHLKGGQGEGLKGVFAH
PAQVITDSTVLEIKDDGSIVLLSGKFEKSVVKADTVVLAKVVPNDSIAEEYRKAGLLVTV
IGDAKKVRNLRNAVADAADRAFLGENAQLNANKEIIANLPTGISL*

>SPBIB_v1_210062|ID:27162954| putative Transcriptional regulator [Uncultured spirochete bib]
 MGIETFRPASRLSLSEQVSKHILAKISSGELLPGDRVVEAQICKELHVSSIPVREAIREL
 VANHILEYVIHRGAQVREVSMTRETIDALEVKSVELEPLAANLAGLKNLRNQLKLRKYIPQ
 MRKALEANDHVAFAQSNQEFHRHIVEAAGNAILLRLWEQLAFDIRTKPLMDYLRIADPEQ
 LIGEHQNVDAIEEGDTKKIGYMLEIHSVHLVNHLREKMAENAEAEKHILVINKRRKQV
 *

>SPBIB_v1_210063|ID:27162955| Xylose isomerase domain-containing protein TIM barrel [Uncultured spirochete bib]
 MKLGFVSAILPEYSFEQVIDFASENGFKCVEIMCWPKGKAERRYGGVTHIDMDLMDKQKA
 DYIFEYISNKNVHISAVSYYPNNMDPDPQERQFYNEHLKKVIIGARMLGLHNVNTFVGRD
 QNKNLSDSIADFRKIWPDIVKFAEDNDVRIGIESCPMYFTMDEWPGGKNLAGSPKIWREL
 FSIIDSRYFGLNYDPSHLVWQRMNYIAPIYEFKDKIMHVHIKDAQLYQDRLDDVGALAPP
 LEYHYPKIPGLGDIQWGWKFIASALRDIRYKGAACIEIEDYSFEDSLEDRLALRQSKAYMN
 QFIL*

>SPBIB_v1_210064|ID:27162956| putative ABC transporter permease protein y4mJ [Uncultured spirochete bib]
 MKAQAHVSTALDSSFFSKYKLLIVAALLIIFLVLGEIIVSDFLSVGQILLTIKLSFFIA
 LFGLCQMIVIAAGGSGLDLSVGYTATVTAVLTAKLMDGKNENIWIAILVALALGFIIGVL
 NGFFVSYIKLPLLVVTLAMSQMIQGAINVYTAGKNITGKPSILQLIAAKTTGFVPIIIF
 LLILLTIIVMLILNKTRIGILLYGVGANPTAAHLSGVDIKRVRFLSYVVSIGLASFIGLL
 LLGNMGIAFKDMGSNYVMPSIAAAVVGGSVLAGGDGNYLGVVVGAIQLTLTNLLVALGW
 GDAGKWTGFGIVLFLLLIVYVSNRRKR*

>SPBIB_v1_210065|ID:27162957| putative Monosaccharide-transporting ATPase [Uncultured spirochete bib]
 MQGKSMETKRTLDRDFTSKPEFSSLLILLVMFALTAILQKNFFEIKSIMRNINAFAPLIL
 VTMGQAVVIISGGIDLSSGTALSLLTCVLTSMKKNDPITGLYGIIVAFIVALLIGLING
 FGIGYLRIIPVISTFATSFIWLGIALFLRPTPGGESVSWFGVFYNFDTLKDIFGFFGTLS
 GFLPSSLIIIIGCILWYVISKTKTGRYIYAVGGNSESAYESGINTAKTQMIVACMINSIF
 IFLAALFFVGGQTGSGDARMGDPLTLRSIAAAVGGIALSGGRGNVYFALVGALILSFVVK
 IIFFANIPYAYQTLVGGAIIVVAIAGSQAYISYSTKTKEIKIG*

>SPBIB_v1_210066|ID:27162958| ABC-type sugar transport system, ATPase component [Uncultured spirochete bib]
 VNILEAKNIKKNFVGGVAALSGASLTCREGRITLLGANGSGKSTLSKIIAGVYAPDDGEI
 TYLGKKIHYKNPHEAKQQGIGMVYQNLVPELTVWQNIIVLGDERNAGYFLDDKNARERT
 TDIVHKLLPTLDIEKKVFELTPSEMQVVEIAKAVSRKPKLLILDEPTAALEKVVQVTSLFN
 MMKELASSGVAIIFTSRHLWEVVEICHDLTIFRNGRNVGSMDFDKDEKDVKKIIFYITGS
 QSETSIAKTAETCGETRLSIKNSLGTILRNISFDLKKGEILGVGGLAGQGQELMLAL
 AGNFPKIGCDARIDGKPIKLTKPSKAIRNGIVLVPGDRETEGLFSKHSVFSNLIFSIGV
 DKKIFIIPHRKLLKKECEQIVDILALKAASLDAPVSTLSGGNQQKVVIGKWLGLEIKVLLL
 SDPAKGIDIGAKADLYSYIVNQVRSTGMSVVLASDTKELIEYCDRLLIMYEGSIVATLG
 TEEITEENIIRASMHVEKE*

>SPBIB_v1_210067|ID:27162959| putative Periplasmic sugar binding protein-like protein [Uncultured spirochete bib]
 MRRKGFIVCILLVLLLVGVVSLGAAPKKAPVVGISTGSSGTSWRNIMIDALQTVGKEYK
 AAGKIADYLIVNNVTNGDATEQANIIRDFISRGVDIILVNPNSPDALNGVIKEAQAAGIL
 VVAFDATVTAPNVLNVTLDHYA WNLKNVEYIASTLKSNAIQIYGLDGHPANNDRIRATA
 DVLKKYPNIKLIANTTGYWDQTKAKEVAAQIIGSGKQIDAVITQDGEAYGVLSAFLDAGK
 LPKVMFGDPGTAFKKEWKKLRDCKADFKACAQPNPPGIGGTAFRMLNLNNGKTFKPGVL
 KDNTYFYKVGMFITDDNFEEGWALLKDKPDDYLLSEIMSQKDVDFALFQ*

>SPBIB_v1_210068|ID:27162960| conserved protein of unknown function [Uncultured spirochete bib]
 MKSSVQAKPVVESGFRNAVALGNGIFRVLVDAEGGMPELSRKCCGDTFINAHWLPWFRGM
 APSPEAGNLQSHELFQKIPLLERIAGNFPCVPSFGSDPVDGVEIPPHGWTANEQWQLES
 AGTDENKRYAWARFQMTSPSDRMKLEFEKTDLVFADES VHYSILRIKNSLTKDIEINAAW
 HNTIGFPFLTKNCKISASAKNFSTPPKGSEFDMTGRLAIGSKFTDLDRAPLRDGGTVDLA
 IVPDMIGYTD FITGAVPKEAKLGWSACVNSELSLAYITWFMGPDTVQTDEIGLCFNNFWM
 QYGGRPYAPWAMYEGAPDQTFCLGMENSIGAWANGLADSIKHELLGRPTTLKLSCEGQK
 TLLYATGLFDLGSEALDEPVKHIEPTSAGLRLEFNHVAISVKADGSLERLRSIARSND CF
 A*

>SPBIB_v1_210069|ID:27162961| putative dipeptidase YkvY [Uncultured spirochete bib]

MCRLPENVLMLSGHWPLCGDAVLVFP AEGNMVCIVPETQVEEVSAEIWDAQILAYAHGRH
DSPDQEREIERCLIDLANKNSWKTIGYEGTFEGIAAPGNVAEPRVPSKRFEQLLKSATSK
ATFIDAQELLDLLRKTKTAWIEKIRLANEIANIGFEVFFEMVDAGRS AIELAAAVEQAI
MVKGTGYKKARRVRAFAQVAVGKDETLAGWRPFVTTNRKLQKGELAILAVVADGYWA
DRTRVRVAGSASPELQRLSDIVKQAQDAAISAIYPGVCASKIDKQARGIISKNGLENEFV
HITGHGVGFRYHEGYPI LAPGSSQALLPNAIVTVEPGVYLPDFGGIRIEDDIVVTSEGE
ILAPFSRQLS*

>SPBIB_v1_210070|ID:27162962|gdh| Glucose 1-dehydrogenase [Uncultured spirochete bib]
MSAEQYSPNEAPKRKIYEV LKQGKALVTGASKGLGAGIAAALAEAGCDVLVNYASDRKG
AEETA AVVEKFGRKAHIFKADVSKEEEVLAMFGEMKRIFGRIDILINNSGIQVNAPFHEM
TLDQWNKVIGINLTGQFLCAREAVKAFMKQGINPEISCSMGKILHISSVHDVIPWAGHVN
YAAAKGGIMLLMK SIAQEVASLKIRVNSLSPGAIRTPMNV EKLVSPEEYKRILLDHIPVK
RIGEPEDVGRAAVWLVSDDSDYVHGATLYIDGGMTLYPEFASGG*

>SPBIB_v1_210071|ID:27162963| Uncharacterized oxidoreductase HI_0048 [Uncultured spirochete bib]
MLENLSSLFSLKERVAVITGGGGDL CGTMSRALS IAGCKVAVLDILLSKAEAVAEAIRAE
GGIAQAYACDVLDEASLKSAYEAICSSLGVPDILINGAGGNNPKGSTKA EFLDPEKLDDP
ESSNFFDLDFDGV RKTDFDLNFLGTFLPTKVFSRGMVEKGGK GAILNISSMGAFNPLTQVGA
YSAAKAAVANFTKWLA VHFARTGVRVNALAPGFFMTEQLRFLHIDQKTGEPTPRSRKVIS
HTPMGRYGNPEDLLGAVIYLLSDSASFVTGAVLPIDGGFSSYSI*

>SPBIB_v1_210072|ID:27162964| Xylose isomerase domain-containing protein TIM barrel [Uncultured spirochete bib]
MISLGFVSAILGDKTFEEV VDFASANKFACVEMMCWPVGKAERRYAGVTHIDVDRLDDAK
VAYIKNYLSQKKVFISGLGYPNPLDEDETKRGVYIEHIKKVIHGAARLGPV VNTFIGR
IPLKDPEYNFSLFKEIWPDIVKYAETQGVKIGIENCPMYFSKDEWPSGKNLAYS PAHFRK
IFEIIPSKNFGLNYDPSHFVWQQMDYLKPIKEFKNRLFHIHIKDVKVDKDR LDDVGILAT
PLEYHSPRLPGLGDVDWSKFFSVLVESGYRGPACIEVEDRNYEKFPE DVRTALLQSRNYV
SQFLVLE*

>SPBIB_v1_210073|ID:27162965| Oxidoreductase domain protein [Uncultured spirochete bib]
MKELNVGIIGLGFIPVHLQALRKIPHLNVVAIADKAGSSIKEKVEALGVEK WYENYEDL
LARKDVDAVHICSPNHLHAEMAKKALLAGKHVVCEKPLAVSSAQAKELVELATQKNLVNA
VHFNIRYYPLIRHLRTMVQKGDIGRIFSIQGSYLQDWLFYETDYNWRLESKLSGESRAVA
DIGSHWMDLIEYV SGLKIKQVFADFATIHPIRKKPLKPVETFAGKMLKPEDYSDVPIDTE
DYATILFRFENGERGVLTVS QVSAGRKNRLYFELDGSRQSAVWDSEVPNQMWFGHRDGP
EIIIMKDP SLVYPESRKLITLPGGHQEGFNDTPFQLFSEFYEDVRNGKPS EKPSYPTFKDG
LRELVLCEHILKSNRSGSWVTVE*

>SPBIB_v1_210074|ID:27162966|xylA| D-xylose isomerase [Uncultured spirochete bib]
MAEYFVGHKEYFPGIGKIRCEGPKSDNPLAFKFYNPDRKVGQKTMREHLRFAVAYWHSFG
ADGTDPFGAATHIHPWTS DARNPMEA YEHKLDA AFEFFTKLGVDFYCFHDRDLAPEGQTP
IESERNLAHMVSLAHERQKATGV RLLWGTANLFSHPRYMNGAATNPEFGVVAHAAAQVKA
AIDATIELGGQGYVFWGGREGYMSLLNTNLKREKDH LARFLTMARDYGRAHGFKGTFYIE
PKPMEPMKHQYDFD VETVAGFLRAYGLDKDFRVNIEANHAELAGHDFQHELETAALGIF
GSVDANRGDPRNGWDTDQFPIN YD TTLAMLAILRAGGFTTGGLNFDAKIRRN SVDPADL
FEAHIGGMDAFAAGLLAAQR IIEDGKFDAFVSQRYSSFDTGDGKR FEDGRMKFEELAA
PAGPDVGR TSGKQERLENLIMQYVVLGVE*

>SPBIB_v1_210075|ID:27162967|xylB| Xylulose kinase [Uncultured spirochete bib]
MYSVCGIDLGTQ SCKIILYDPGAKRILAKAQAPLDIIAENNGTREQKA EWYEAALADCFA
AIDPGLRATIAAIGVSGQQHGFVPLDAEGKAIRPVKLWNDTSTAVECAELTSSAGGQAAL
LAETGLMLPGYTAPKILWLKKHEPQAYARLRHVLLPHDYVNFL LTSNYVTEYGDASGTA
LFDVRVRRWSRRISDLIDPQLIDFLPSLIGPKPAGRVSAKAAQRFGIPEGALVAAGGGD
NMMSAIGTGTVRDGF LTM SLGTSGTLYGYSDRPVVDPEGNLA AFCSSTGGWLPLLCTMNC
TVASEQVRALLGMSIEELNARAEAAPIGA EGLVVL PFFNGERIPNLPNGRASINGATAAN
FSKENLARAAMEAAIFGM RIGLESFRKLGFAAQEIRLAGGGAKSRLWRQIAANVTGLPVR
VPEEEEEAAFGAAIQALWC FEQASGKKKGIEELVDEHVALRDGSTVEPEPESVARYEEAY
ANYSKYLAALSLLYR*

>SPBIB_v1_210076|ID:27162968| Transcriptional regulator, AraC family [Uncultured spirochete bib]

MKIKDAVYVYRLISGERLAWHGRYHAHARGEYEFHYFMEGQGALLINKAKYIIDGGQIYF
VRPREFHSILPEAVEKPISYYAILFEPEAGNPVDEDIIALMGHIWRARTRALPADTKDRF
LLDDLRLSKSPSNQSRKAAEHALLSILYRWFDHFDSPPALGSSRAKNEHVERALSIMS
KLVREKLSDDLAAKGLGLSEEFIRLFRHHLGMSPFQYFTRLKIEAASAVLVDNQLTISD
VAYRFGFENPFHFTKVFKKCTGLSPREYRKMFFEAGKPPSAAVAEKT*

>SPBIB_v1_210077|ID:27162969| protein of unknown function [Uncultured spirochete bib]
MNEPETTLEFAVDSLLEVLPSVWDRIRSNFRAAGTSKFGITLEQFHTLRHIYKGCCYTG
IAEKRVSCSAVSQAVDVLVTKGLVTRAQESGDRRQFRLELTPYARRVLDENYEMENRALI
KQKIARLSREQRAIVVQSMEILKAVFISA*

>SPBIB_v1_210078|ID:27162970|yfiB| Uncharacterized ABC transporter ATP-binding protein YfiB [Uncultured spirochete bib]

MKEFKLLHYAKPYWKLALFSLVMLVAMVGFDLAVPRLVGRIIDKGIRQKDLQVVLTSSA
VMLGLSLLSALVAVLNSISSIRVGESIARDLREAMFVKIQHFSYGNIDKFSTAKLMVRLT
SDTAAVQRLFQMSLRIGTRAPLSMIGSIVLMFVTSKTLALAMMPILVAGGIVIVYFSVRL
EPIFRTVQQRDLRLNTVLQENIAGAHLVKAQFVRGPYESSRFEKANKNLADENIRVMQLMS
SMSPILTMLINTGIVLVVWLGGGQAIHGNLSLQIVAFNTNYLMATLQPLTMMTQLSNNWA
NGLASAKRINEVLDAELEVSEAPDAVSLPEPSRGEIEFEGVSFHNGATDLAVLEEICTR
AEPGKTTAILGATGSGKSSLVNLIPRFYDASSGRVRIDELDRRLRSDSLLEHIAVVPQD
TVLFTGTVRDNIRYGRPNATEDEIIAAKAAQAADFIMRMPKGYDTHIEERGVNLSGGQK
QRIAIARALVCKPSILDDATSSVDVETETQIQNAIAKAAALGTTVIMVAQRISTVLNAD
KIIVLDQGRIVAEGTHKVLKSSPIYKEIYDSQLGAGVRHGL*

>SPBIB_v1_210079|ID:27162971|yfiC| Uncharacterized ABC transporter ATP-binding protein YfiC [Uncultured spirochete bib]

MAYETTPSVQDVRASFQRRAGRPKFEKAADPRKAMVRLKYLGPFKSLLILVVGFIYLY
SLLGLAGPYLMGRAIDKSIGGKDLHGLLVTALLMLAAFLSNFFNIANLIMARISQNAL
KNLRGDLFAHIQTLMSRFFDTHPAGGLMSRLTNDIDAINQTVSQNIISLIASILTMIGIL
ASMFILNHWLALASLVVIPIMYWFSNFIKYTRKGFRELQKDLGELNAVAEETVSGFKVI
KAFFRNESAIETFRQKNNAVFKSAVYANSYAMLLMPLTGVLGSAFFVIVLASLGGWLALKE
LVSIGMIATFINYAQNFTSPLRQLSNLYNSIQAALAGAERVFEIIDTKPETPDLPAVPA
GRFKGEVSLRNVVFGYNPERVIIRNFSLEIPAGQTIALVGPTGAGKTTITNLLTRFYDIQ
EGQIRIDGIDIRAIRKADLRRNLALVLQDTFLFADTILENIRFGRLDATDEECFEARMA
EADHFIRQLPRGYHTNLSERAGNLSQGQRQLLSIARAILANPSILILDEATSSVDTRTEL
RIQKALLRLMEGRTSIVIAHRLSTIRDADSIVVINNGEIVEQGNHEELLERRGFYHHLYM
SQFKGNEI*

>SPBIB_v1_210080|ID:27162972|crcB| putative fluoride ion transporter CrcB [Uncultured spirochete bib]
MAMKDLLVFFGGGLGALSFRVFSRGISMRFFTAIPSGTLFVNVTGSLLMGFFFNLLNAS
LLPAGYRALITVGFAYTTTFSTYALETVALLRKEYLPAFWNFFLNVLTFVAIVIGMV
ISSALYSVIRSEGILHR*

>SPBIB_v1_210081|ID:27162973| conserved protein of unknown function [Uncultured spirochete bib]
MHFEEDDMLLRIRYIGESDTYKGGKPVYEQIVLKARALKLSGATVIRGEMGFGAHSMSAN
VLSLSTDLPVVIEIVDKEENIEKLLPFLDEVLLLEGLVTKESIHVYRYQAR*

>SPBIB_v1_210082|ID:27162974| conserved protein of unknown function [Uncultured spirochete bib]
MERRDIPIDQFHYDPAQLREHWLVLCAGDFEAGAFNTMTISWGSYGQIWNKMFFQVFRP
TRYTFEFMEKYGTFTLNAFEPKYKPAISIIGSKSGRNGNKIAEAGLTPMVS RVVAAPCFK
EASLVIECRKMYWQDLEHAHFLDPSIEGNYPKKDYHRMYFGEIVHVSRI*

>SPBIB_v1_210083|ID:27162975|ltaA| L-allo-threonine aldolase [Uncultured spirochete bib]
MNYIDLRSDTVTWPTTEAMRKAMAQALVGDDVYGDDPTVNELERLAAEMTGKEAALFVPSG
TFGNQLSLFTWCPRGSEVILGEQCHIIQHEAGAASVIAGVQTRPIFAPDGILPLETIEER
IRGNDIHYPTSLICIENAHSLGRVIPLSYMKEVAQLAHAHGLPVHLDGARLFNAAVSMG
VSAIEISSMVDSVMFCLSKGLCAPVGSMLAGSREFIEKARRRRKIMGGGMQRQVGLAAAG
LIALKDMTRRLAEDHENAHYLAQLAWIPGIEVEKEALDINMVFFKLPAGIDGSALVRYF
KERGVLINPPEQGWCRFVTHYWIHKEDIDKVIGLMNDICIGTL*

>SPBIB_v1_210084|ID:27162976| conserved protein of unknown function [Uncultured spirochete bib]
MANKGLLMCVCQGNCPFSFQQMNIFDVGNAIRREKLVDYVGIHPQLCSTDGDKFLSTLLKG

ESTDELYVAACDPTMQVKMFRDALESAGFSKEHIHGVDIRNMTTEQAVGSIKNMLGADKK

*

>SPBIB_v1_210085|ID:27162977| putative Dinitrogenase iron-molybdenum cofactor biosynthesis protein [Uncultured spirochete bib]

MNIVVMAKGAGLGAWVDDDFAHARQIVLVKDSGGFEAAANPFASSAGAENSAKLAQFILS
KFQDIGAIVAGAFDEDAKANLQEKEISMFIAAKGSVMELAEAARAGSLTRA*

>SPBIB_v1_210086|ID:27162978| conserved membrane protein of unknown function [Uncultured spirochete bib]

MSISTIYILVAAGLLVFSFIKNREKTTKALMVAGRVALMVLPVLLFVFLMGILEVFPVPR
EVFTSLGSGHGVLGIVLGELLGVFALIEPAAVFPFAGFLHQSGASYGAVVGVFVMSAILI
GIVTLPLEIQQFGARFTITRNVVALLIFGLGLVFMVAL*

>SPBIB_v1_210087|ID:27162979| conserved membrane protein of unknown function [Uncultured spirochete bib]

MKMTHENAASEQHKKNHKGSaelVKSaiIYVALAVVWVLGTTIITPQGGVHVAGIVYKTF
SGVLAIIAAVFLIGLIQVWLTPEQVSKVLGKEAGWKGLLSATLPMILGGSFLVIFPLL
KTLREKGARTSSVVAFLFAWSAKAPLLPLEIKFLGLPFAALRLVSIPVLAAILGLLAEWI
IDKPLRDAGLEIPER*

>SPBIB_v1_210088|ID:27162980| conserved protein of unknown function [Uncultured spirochete bib]

MNLLLEIQNLSLFKEGRPILNNSMIDIWDGHVHAIIGPNGAGKSTLANIMGLSGYRDFEG
DILFEGESIKALSVDERARKGITLLFQEPARFEGGLGVSQFILAGAKEKSRTVVEEALQKA
GLSPEKYVKRAVDKTLSSGERKRIELASIAMKPRLLMDEPDSGVDIDSIKIFAVIKE
MRHMGSTVILITHSPEVLKHADHAFLICAGTLVDKGMMSRMFDYFNGKCVPCVHVGVQPS
NTLLSGSSAPAVAVS*

>SPBIB_v1_210089|ID:27162981| SufBD protein [Uncultured spirochete bib]

MSEQATADKEKLLAELLASINQHSFAPDVAHVEIHGNQVLNKNLVEGLLVESETIEDGVK
VHIRVRKGVTLKNPVNFCFGLIPDNGIQRIIIIDTVIEEGAHAKFIANCTFPNAVNIQHLM
NAVITVEKGASLSYFERHVHGPKGGVTIVPLTKVIAREDSRFSTEFELIKGAAGVIELDY
EAEVEKNATVDMKTRIFGRSSDRIHIKEAAHLSGEGATGVLTSIALKNTASANIENEIV
ADAPYARGHVDCKEIVQDEATARAIPVQVNNHLAHVTHEAAIGSVDSKQLETLLSRGLN
EDQATDLIIQGLLGSDPFS*

>SPBIB_v1_210090|ID:27162982|dppF| dipeptide transporter ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]

MADIILSIKNLKKYFEPHQSFQAQSIIGGGQKKLIKA VDDISFDIRRGEIFGLIGESGSGK
TTTGKLVKMLIEPTSGQMIFNGEDVTRLDKEKLKEYRRKVQMIFQDPYASMNPRFKIKDV
LEEPLIIHKVKATIEERTKMIVKALEEVKLTPAEYEMGRWPHMLSGGQRQRVATARTLIL
NPLMLVADEPVSMIDLSTRAEILYMMKEVQKELGLTYLYITHDLSTARYFTDRIA VMYLG
RIVEIGRADDIIDNPLHPYTQALIEAVPEPESEGKVNIIKELPIYGEIPSPANIPRGCRFH
TRCPYATDACKTEPEPELMLDGEEHYHACRRAYEIKAEERSAKAAG*

>SPBIB_v1_210091|ID:27162983|oppD| oligopeptide transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]

MNSLLKVENLEMYYFTSKGAVRAIDNISFELMPGETIGLVGESGCGKTSLGTSILRMPTP
PGRYVGGKIFVDGLDVIPLPEKEVRKNIRWQKISMVFQGAMNCLTPVYTIGHQMMETLNE
HADMSRADADSLIKEYLG YVGLPPEIMGRYPHELSSGGMKQRAVIATALFLKPEIVILDEP
TTALDVIVQAQIINLLKLLKQFNLSFMFITHDLAEAEVSDRICVMYAGKIVEFGTNEQ
IYGRQGPAHPYTERLLAATPRLFKKVEKLHFIPGTPPDLIAPPKGCRCRFSRCNKAFGRCF
EEEEPLIEIEPGHMAACWLHHRG*

>SPBIB_v1_210092|ID:27162984| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]

MTFGDIK YRLNEFWSEFRKERSGLIGLIGILIIALLIVIFEPLILPWKDVNTKWRSIDYWQ
DNSANAPPAWTFNAFTKLKAPVTMRLEDAKKEETELDGGIKLVTYTFDYHYTADKAPLDVI
LHITGHGDIPFQVAIERPDGETIDLAQRFEQGLSGQDIRLSIDNDGREAAFTFVKNYESQ
EALQFSGKSLRTADVLFNIAQPGMAKEFKPLKGTYKLIKAMLLDPENSSVEEPIVVT
GSVSGILGTDDSKRDLFSGLIAGLKWALLIGFLTSAISVLIGVMYGIISAYFGGAVDSVM
QFVYQIVNSMPVLPVLIVISAIFKPNYMLILVMVLFVWTGSVMTVRSMALQIKEETYIE
AAKALGAKKSRIIFKHMVPILIPYSFASMA SVPSAIVYESSVLLGLGDATIVTWGQIL
HDAMQGAAILKGIWWWILPPGLLIAIMGMTFAFLGFSMDKILHPKPKTR*

>SPBIB_v1_210093|ID:27162985| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]

LHAKNDEYFDILFNQKEQVAFMYKWFALKRVLKGIIFTYIIIFIMSVLFNTVNEQTMRAS
IEDQVRAESMRLKNMQPSAIQRFFQQRRDELHLYRLDRPLLERILFRTWNTVTFNFGKS
TIKSSRGERDVITIIGEAI PRSLILFTLAAAIEIAVGIILGLKKAQKPGGTLDRTTSL
TMIVYGMPTFWLAMILIMFFVYQLKIFPSAGMHSVPPPQGIMYFIDLLWHMTLPLLTLL
IGFWGVSVFVRNIVLSILQEDYIMAAARARGIPENRVLFGHTLRTAAPPLITISVLSLLAS
ISGAIIFEGIFSWPGLGNLYWIAVQQNDIPVLMGDLAVTVGLYQLGLIMLDLTYGFMDPR
IKVGGKA*

>SPBIB_v1_210094|ID:27162986| ABC-type transporter, periplasmic subunit [Uncultured spirochete bib]
MKKILFVSVLAVAVLFSAAAQAKNGPIADKVIYDVRMDQTIAIKDTAEGKTDVFFTGLDG
KTFKGIQPADA EKLSAYAVPSGSWSLLL NPIP NKAPYTFVHKDGR TIFNPLAIREVRYAI
NWLIDRKKIVDEILLGAGEPALTAQTGPGPGTYKFNLVPAKLGMTVRGNEKKALADIEAA
MKEAANLPENKGLVKSGQWWTYNGEPVTIRFIIRVDDPSGRLLLEGRYIADQLEKAGLKV
ERLEYDRSKAGKLVYSGDPAAWEWSMYTEGWGAGATRAWWVDVTISQMYAPYYGYMPGGMT
DGFWNYENKEIDKIAQKNINGWFLTADEYWNNDNMKVQEMALKEAVRIYVCSQVQYYVANK
ARFNSRMLYGLGDGLNNWSVRSADV KPN DKGEKVL RVTQYSARGGLFMSSWDPVGVGDGFS
DVYSA AIVEACTDPSTFEAPNSAKDTPLRVKYDLKKVETKLAAGKEGEPVGLIDVDKAA
LIYNSKTKKWETGVEFKDVGDKYDYVKNNAIKSYSKLSDLQYIYGKWHSGQPVTLADIM
YATAFAYEWANKSDDDDKYDEAYASQYQSTLPISKGTVLNKDGTFTTYFDNWPMDKDR
VAATGTVSPKAGNPGRQTMVSWEIYEALAKLVAEGSKSGTQYSFSSDPSVTEVDVINPKC
VADIKAKLQDFVAAKYVPDTIKQWVTPEQAVARYNAAIKFIDTYGHA YISNGPFFISKVD
YNANYIELSAFRDYPKSDYFPKLFRTTITRIDDVKVPATAQRTADAKIDIQVSAVTPD
DTAKAADSKAKVTVSMILADNSEKLYTAKYVSAGNFQVVIPAKDLGVLKPGAYTLVVQSV
LASESPSVQASSLVLF*

>SPBIB_v1_210095|ID:27162987| conserved protein of unknown function [Uncultured spirochete bib]
MEGNPMNIAGAENGHFVDANGRWLILRGVNLGGSSKIPKVPDGRTHLREGFYDGAHISFI
GRPFLEEAD EHFARLVRWGQHFRLLVTWEAIEHEGPGIYDVQYLDYIEGIAEAAARHG
ISLFIDPHQDVWSRWTGGDGAPMWTLEAVGFEPRLHASGAAMLHQEMGQQYPQMWFNS
HLRLGCATMFTLFFAGNDFAPGVLASGEPIQDFLQRHYIEAFGALARRLTAYPNVVGFD
LNPEGEGFIGLS DIRKNRSDFVLPGLAPTPLEAMSAGEGLTTFANEIRIKGLGLQNVGRK
PLGTPGKRAWKDGEVCIWRRAGVWDIEGGTAVAKKPQWFALKDNLAGGSPHAFFNEKYLK
PFIERYAAHIDAASASSRKRTRRFMMFIESSPVGDMPTIKQGAAWN FVNAAHWYDALTLTM
KRWTGFIA YDSATQKVIIGPRAVRHYFKEALARIANHSKEHMENAPT LIGEFGLPFDING
GHAYRTGDFKIH ERSALSAYYDGLDANLLSATIWN YTADNTHAYGDGWNGEDLSVFCREDG
GGRALAGFVRPYAMAVAGKITLMEFDHARGTFVLEFEPNKRIKAPTEIFV PGLQFLHGAD
IVLSGGELMDLSNSSPAALQEEKLSGLSAKAGKRYVLSGMERESFLILRIEADPDAQVC
RLSILRR*

>SPBIB_v1_210096|ID:27162988| conserved exported protein of unknown function [Uncultured spirochete bib]
MRVLCLMVAIIALVAFPLMGQEKNLVLEGDWEGILKVGSASLRIFHIASAQGRYTATMD
SPDQGARGIPVSAVRLDGSSVLEVASIGGSYTGSDASFSKIEGKWKQSGMAFPLVLNK
SKKGAQAQQNTPELQDAPALQGAPAPQPQNQSVQVSQEPTPPFPYAKDVEFINEKAGIV
LAGTLTVPNGAGPFPAAALVSGSGPQNRDEEILGHKPFVLADYLTRRGIAVLR YDDRGV
GLSKGDFQSATTDFDADDAEAAL EFLARQP GIDAHRLGVIGHSEGAIIASMLGARDPDVA
FIVMLAGPGIRGDALLMQNTALGRASGLSEAQIAQANELNRRLYDIALEDGDAAILQKK
ILDVLENAIDTAEELTQE QKTAQKEKASLIAAQLVSPWMRSFFAIDPSEY LKQMRIPVLA
LNGSKDLQVPASENLAIRA ALESAGNRSATVVELDGLNHLFQHATTGLPSEYGEIKETF
APEALALIGDWILKMNVR*

>SPBIB_v1_210097|ID:27162989| Ribokinase [Uncultured spirochete bib]
MRILNFGSLNIDYVYRVDSFVKPGETKAAQSLSVFPGGKGLNQLSLAMARAGLAVAHAGKV
GKEGGFLETLQKGGVDTRLIETSAIATGHAI IQVDDKGGNCILLFGGANQDIDEHYDR
ALAGFGSGDMLVLQNEISSMASIISKAKSRGMAIALNPSPYSESILSYPLELIDIFIMNE
IEAEGISGTHEPEAAASLIARSFPQARIVITLGENGLCLYK GELVRQKAYKVQAVDTTA
AGDTFSGYFLAGLVEGLSTKNALDLAARAAAICVTRKGAADSVPWRKELE*

>SPBIB_v1_210098|ID:27162990| Aldo/keto reductase [Uncultured spirochete bib]
MIPQIPFGRTGHNSRLLFGAAALANVSQAEADSALNLVLDSGINHLDTAASYGQAEERM

GPWLAQHRHEVFLATKTEKRTKKEALAELESLRLLHTDYIDLWQMHVLIKDDDEWDIAMG
EGGALEAFVEARQKGMVRFGLVGTGHGKAAPAMHLRSLERFDSDVLPWNWPLAQDTAYA
AAVRTLLYVCKKRNVAVQIIKAFLRRPWCDRPHMRATWYEPLEAPADISLALGWAWGIEG
AFVNSAGDIHLLPTIIQEAARQPARPTDEAMAQMALRLGMQDLFA*

>SPBIB_v1_210099|ID:27162991| protein of unknown function [Uncultured spirochete bib]
MSRTDGAEAGKLKIGDHWNVISIIALSQNNPLKAVAEFVENSIDASARNVAIIRGKQKNE
YYLRITDDGCGIQDFRYVATHIGDSIKRKLKVQSGDIQGEFGIGLLSFWTIGETLTLTS
AGKDGVARTMQLVKGPNPSYAIRETGMLFARPGTELLIHPLLPGIRSISAEKIQNFLASEL
RDRIARSGVHIAIIDHTTRRELVVEPRKFRGRLIHQLPEARCPFGEIYVELYLAESPQEA
AVGLYKHGTRVIADISRLERFARSPWDSRCIEGIIDASFLQLTPGTRDGIVQDEVYDSFC
VALEPVEEALGALLEEQKRALEEEASRQLLNRVTRAFREAFLYLPEEDYSWLAARVREPR
RAPSAGTSSQSGAGEASANGEGSDYRESSSRTEEQNPATHASSESSDSLGDSENAALGEY
IPEPNRQQSKTVQKSFDEFAGPLHKLMLSPSSSVIGTSEERRKFKAIARDRAGRLIDSGID
FAWHLSEGGGALDGINSPIAEYIAPEEPCVATIELRASQGDITLTATAITVTAEIKRA
SGTGSAQRRGLPGYTYKKAPGELWRSRYDAENAILINNAHADFIHASRQPMTKLRYIAR
LFAKELVLANFPEASREEILERLVELTLYTEENLK*

>SPBIB_v1_210100|ID:27162992| conserved membrane protein of unknown function [Uncultured spirochete bib]
MLEIPALAKILVIFALIVVAAARRIHLGLAAAVGGIALAIWQGMPSAIALAVAKELTNP
DLILLVILLTGIMMFSAMKKSAMDASFNAIAESAPSRRIALAVAPLLIGTLPMPGGAI
ISAPLVGAMNDDDGRRPETLSAINYWFRHVLELVWPLFPFILTVGLTNLSVMQLVLLNL
YAPFAVFGLGLIFILPKNGKTAATMPASKTAVNNTFRDTAKFGRLVRGIAPLGMILGSYV
VLDLIWELVAPGVALDAPTKSLIGRYVPVLCGLLIGSLYLKNTKGEKIFKHSITASTIE
LIAVIVGIRLFSALMSAADLAHAASMEANAGIPAIFVIALLPFISGIVTGVGMGYVGLS
LPVGLGLASSDIPFKVGVVIAGAFGYSGMMLSPLHVCMVVTAQHFKTTLPATIRKFALP
LGIFLVIAIAYTALLSVVLR*

>SPBIB_v1_210101|ID:27162993| conserved membrane protein of unknown function [Uncultured spirochete bib]
MLLPYSFYNSAWKFLSIALVVGLAVGGYFVPELGLGVIALILFALLTNARSSRSFCAGFC
PNGRSLSVFEKTSKHKRKLPPFLASREFRMLCALMMFCVISLLSQSNGSLAAIGKVFWA
IYLASIGISTIAGLLWKPRAWCAFCPMGTLQDTIKGH*

>SPBIB_v1_210102|ID:27162994| HAD-superfamily hydrolase, subfamily IA, variant 3 [Uncultured spirochete bib]
MEGSWRPDDSSLKGYAMSDIIFKAVLFDMDGVLVDSERLIAESAVRMFKERYGLSVRHED
FVPFVGAGENRYIGGVAEKYGLAIDIEKAKAWTYEYIGKLAKAHAAGMRAIPGAVDYVRQ
CRAHGLKTALASAADRKVLINLEYLGLGPDEFDVLVTGGDVAHKKPHPEMYLKAAEALG
VLPSECLVVEDAVNGTIAGVRAGARVLGITSSFPEAELRKAGASWIAADLARAPLPWELD
*

>SPBIB_v1_210103|ID:27162995| Cupin 2, conserved barrel domain protein [Uncultured spirochete bib]
MFGKHS DAGFHQPIPGNHKTLCTYGAHTLLVEVRLNKDALLPEHQHPYEQTGYLVSGRIR
MFIDGKARELDPGDSWCIPMDVLHKVEVLEDAVVVEVFSPTREEYLKYENPEDIIR*

>SPBIB_v1_210104|ID:27162996|czcD| Cadmium, cobalt and zinc/H(+)-K(+) antiporter [Uncultured spirochete bib]
MVMDAHDHHDHSDSEALEVEESGGKLLASILITSATLIAEVVGGILTGSLALLSDAAHVF
LDIFALGLGYIAVLMSKRAATGKHSFGFYRMKVLAAFINGATLLIVSFEIIREAIGRFAH
PQPIIAGPMLIVAIIGLVANLIVAFVLKGHSHDDLNARAFLHVLGDALSSVGVIAAGVI
ILFTGWYWDPLAGILIALVILRGAFSVLKEATHILNEGSPENADSAEVAEIAEIEGVK
GVHDAHVWALEPGYRVLSAHVLDLDDQPLSATAEIMDHKIDMLHDHFEIKHTTIQFECGDC
GQCGSAIRA*

>SPBIB_v1_210105|ID:27162997| conserved membrane protein of unknown function [Uncultured spirochete bib]
MSVKEWSPNKKLLVLFVFLAA YFIPFQAPRVSGAINEAFLMLSEYAQQHVILCLIPAMF
IAGAITVFLNQQAVMRYLGPDAKRLMAYGVASVSGAILAVCSCTVLPFKGIYKKGAGLG
PAIAFLYSGPAINILAIVLSAKVFGGLKGIARTVTAILFSVVIGWLMAQIFKKDDEKRAA
DARLFKAPLGEERPRTLGTQSIYMASMIGILVFANWANSRGGSPVWDIAIYHAKWWITGGFA
AVLAYTVIRWFNADDRMAWVVA TRDFALQILPLLFGGVLVAGFLLGRPGHEALIPNSWVA
GLVGGNSIFANLFASAAGALMYFATL TEIPIVQGLLGAGMGQPALALLAGPSLSLPSM
LVIAGEIGWKKTLTYVGLVVALSTLAGLVFGAIA*

>SPBIB_v1_210106|ID:27162998| Redox-active disulfide protein 2 [Uncultured spirochete bib]

MKIQILGPGCPKCRILLEQHAREAVNELGIQAEFEKIEEVDDIMAFGVLMTPALAIIDDEVK
VVGRVLTQDKIKALLS*

>SPBIB_v1_210107|ID:27162999| Regulatory protein ArsR [Uncultured spirochete bib]
MKQLERRYERRAEIFKALANPLRLVMLEKLADKPWCVCALADELGVDKSIVSKYLSQLKS
AGLIEDTRKGTLEVEYRLVAPCILQVASCHEETIQEQKKKLLSEE*

>SPBIB_v1_210108|ID:27163000| Citrate transporter [Uncultured spirochete bib]
MSPNISAVYVLILAFVGIASGKFPRLAMNRASIALTAAVLLVVLGGLTTQEALAVVDTE
TLALLLMMIIVANLRVSGFFLIAGGRVLSIARSPRILLAIIVVLVSGVLSALFLNDTICL
MFTPLVAEMARRSGRDGRPYLIALATSANAGSCATSIGNPQNMLIASQSGIPFGTFVLAL
GLPSLIAMLLSYWMTVLMFPSEFRANTMLRQPVGCVTADAEAGHAEMSPYLMYKSLAASA
LLLVLVLLAGVRTSHAALIAASILLITRRVHPERIFAEVDFTLLVFFSGLFVLTAAVARTD
AFAMAMQWLTPHLQRPGLFAAAIALASNLVSNVPAVMLLSPAARAMANPQPAWLMLAMA
STFAGNLTLLGSVANLIVAEQSEKSGIHIGFVDYLKVGLPVTLLSIAAGTLWLGIIIL*

>SPBIB_v1_210109|ID:27163001| putative NADH dehydrogenase/NAD(P)H nitroreductase AF_2267 [Uncultured spirochete bib]

MDLNDTLKTIFSRKSVRAYAEGAVSKEQLEMLVRAGMAAPSAVDQRPWEFVVVTERATLN
ALASRLPYAKMAAHASAAIVVCGDLRRQWGGPDSVMWVIDCAAAAENVLLAAESLGLGAV
WTAVYPYPERIRSVRELLGLPDYIQLALIPVGIPIRGGEKAKDKWNPERVHWEKW*

>SPBIB_v1_210110|ID:27163002|arsC| Protein ArsC [Uncultured spirochete bib]
MVKVLFLCVHNSARSQMAEAFCKKYGEGKFVAESAGLEPGKLNPNYVVRAMAEVGDISKN
ATKSVDFHNEGRTYNVVTVCSKEAAERCPIFPGAPITLHWPFDDPSSFKGTDEEIMQK
VRSVRDAIEQKVMEFVSQWPRVSE*

>SPBIB_v1_210111|ID:27163003| Dihydrolipoyl dehydrogenase [Uncultured spirochete bib]
VESKQYDFVIGAGPGGYVAAIRAAQLGLSAAVVEKDLVGGVCLNIGCIPSKSLIHAQL
FAQGKALLEKTGAKVDLSNFDYSLVWKASRLAADRLSKGVNFLLRKNKVDLIK GKAMLSG
ASTVDVETPGGSVQLKAKAILLATGSRPRPIPGFAFDEKKIFSSTGMLMSDKLPKRMFIL
GAGAIGMEFAYVLNAFGVEVTVAEELLPRVPLEDEEASKIVEKEFRLRGVTMYTGARASG
AEVKDDHVVIHLTDAQGAPLDIEADAVLVSVGRATNTEGLGLENLGVRMERGIYITGDYH
ETSCAGIYAVGDITTPQLAHTASKAGEIVAERVAHLLKGTNPRTVDRHLHVASAVYC
EPEVASFGLSEASAKEKIRHEVARFPYRGNGRAVATEAPEGQVKIVFDPDTKAILGASI
VGEGAADTIHELLLASKAELTIEDVAELVHAHPTVSEAIMAAKAALGRAIHI*

>SPBIB_v1_210112|ID:27163004| putative Lipoate--protein ligase [Uncultured spirochete bib]
MPIVAQSYKVVSDSPLDIISFEECLVNSWAGEEALLLFYVNAPTVIIGRNQNYWREVSPS
CKVPVFRVSGGGAVYHDEGNLWALIVPRAIHSQDDELA AVASAIGTLGVYARPGARGG
IFVSLGDGETQGKISGTARRFGTQNVLHHGTLLVSADIAALKASLGGIKVFEDSSIASVP
GHPVNL SRFLSSLSVEELMLHLSRTLGSAPATIELADFWNKEKTIARRVFKNPEDLERE
FDFCVECEEFEAHRKQFGSKEWIIDRSPFVSVVVSNGRAKAVVRVQEGKILQVVPLEAGD
SVSARYADELNAHFEGMAFD FRMPEIMGKEYQRGIEAI*

>SPBIB_v1_210113|ID:27163005| exported protein of unknown function [Uncultured spirochete bib]
MKLVKVI GLLVALTLFSCAPKLAQKDLDAANAAFADAQNAKADVYAPDEFKAAQDAKAA
LDAELAAQDAKTSKSYKQANDLIKAFADASKKAKDAAATNMDKVKGEVAQLITDIDAQY
AAVQALAAQASKDAKKA AKAKLNVKDINARVEAAGKSISDAKATNDSQDYAGARDQLNTV
KATLDELKASLEAAGFVAQ*

>SPBIB_v1_210114|ID:27163006|speE| Spermidine synthase [Uncultured spirochete bib]
MKKIIERLNPCHGCFYYDITKVLVRVRS AWQTIELAESPEFGKVLLLDGITQVALKGEERY
HESLVIPAMLSHPDPQRVLVIGGGDGGVLREVLTFTGTVRNAMVELDEAVISFSKQYMPE
ISAGAFDDPRAEIVVGDGRAYVEQCPDTSFDVVIMDMTPDFGPSEKLYTREFFA QVKRIL
RGAEGVFAMHGESPIARPAAYACIEKTLRKVFSCVKS AFTYVPMYGTLSFKFASGTTDC
ASLSAKDVGSLLNARCERMPKYCMPQTYKAIFAPEPAAIEALFHPEGRVIEDRRSHFPDA
FDPQGA*

>SPBIB_v1_210115|ID:27163007|speD| S-adenosylmethionine decarboxylase [Uncultured spirochete bib]
LVRRVKGKTLKLEGFNNLTKSISFNIYDICYARSRESQIEYLEYVDEEYNSKRLEEIVEN
VTRMINAKLVSVSTQDYDPRGASVVALINEGSPVADEHIKSDKEQTGPAPFVIGHLDKSH
IAIHTYPEYHRLTGLASFRVDIDISTCGMISPLSALNYLIESFDSEVVIIDYRVRGFTRD

HKGRKVFIDHDISSIQDYIDQDILERYITYDINILSDNNFHTKMRKKEIRLKDFLFGDEV
TSLDPKEKERIRRALLHEIQEIFECRNLNMRSGR*
>SPBIB_v1_210116|ID:27163008|potA| Spermidine/putrescine import ATP-binding protein PotA [Uncultured spirochete bib]

MSVRLVNITKEFADPEREGGKLVAVRDFNLEIQEGEFVTLLGSPGCGKTTTLRMIAGFEM
PTTGEVWIGGKNVSNPPNKRDTSMVFQSYAIFPHMSVEQNVGFGLELKGPKAEITREV
RQIMEVMGIADLAHRRPDQLSGGQQQRVALARAIVNRPSVLLFDEPLSNLDAKLREQMRV
EIRRIQQTFKITSVYVTHDQAEAMTVSDRIVVMSKGRMMQVGSFPEIYSRANRFVADFI
GRVNLLSVTVERLEQEKNIVRGTDGSRYEAASAASGVAEGGKALLMVRPESLSVESSAGA
APAAEGRMAFAAQVIDKTVYLGATVEYEIDAGYERPILAVSHDPVDAGFWRTGDRVVRLY
SPRAAHLPPPESE*

>SPBIB_v1_210117|ID:27163009| conserved membrane protein of unknown function [Uncultured spirochete bib]
MAHGISKAAAEELRRAARDPVLVAGSLIVFVLYPLISVGAASLDVGGGKTGLGVY
RDVIRSAYLKAFYNSLMMSTLTALVGTLLIGFLFAFAVTRAKVPLSKFFNILAIPIVSP
PFIGALAIIMLFGNGLITWNLLKIQNFPIYGFNGLFLAQVVTFFPVAYLTLKGVLESMN
PVLEDAALDLGGSRWKVFTKVTPLAFIGIASSVLLLFVETLADFGNPLILAGSKFPILS
VQAYLQIVGMYDLKGAASVLLLVPSLIFFYAQRALVNRKYYTTVTGKPPQSTTQIVSP
GARIALFVFLFVALVVGLIYFSIVGAFKVVWGFHDHLLTLDHFKFVFGVGFKAVRDTLM
IAGIATPFAGLLGMVIAFLVVRVKFPGRKFVEGVSMLSFAVPGTVIGIGYILAFNHKPLA
LTGTLAILLNFVFRYIPVGIESGKALLASIDPSIEEAAVNLGADSRKTFSRITLPMILP
AFFSGLVFAFVRAMTAVSAAIFLVSSRWNLMTVHIMAQVESGNLGAAAAYSLLLVLIVAA
AISLIRVALKSQYSKYGGAMLHF*

>SPBIB_v1_210118|ID:27163010| conserved exported protein of unknown function [Uncultured spirochete bib]
MKARRMILYMLAIIAIVPAFAKPGQTLVVYSSVDEVNAKKIFDAFTADTGITVQFVQLS
SGPAYARIKAEASNPQADVWFGAPSENHIIAKEEKLTPYKGPVDFDKLSKEFKDPDGYWR
SFYMNPMFAFVNKEVLARIGAPKPTSWADLLNPAKYGQIQMPSPQSSGTAYNIVASLVVM
MGEDKAFDYMKKLSPNVQTYTSSGTAPSKAVQLGQCAIGIQFTPAFFEIDKGFPIEVIF
PKEGVWFEAPAVSILKGAKNLEAAQTLVDWLTTKGQSVYTEKKTYFYPVLPVPLGAGM
PAFESLKTIDVDIAWAGEQKKRLVERWVNEVLTAK*

>SPBIB_v1_210119|ID:27163011| putative Beta-lactamase [Uncultured spirochete bib]
MRSTVSSMSNEIQRLTIDAIEHQWFAGAVIRLEQEGEVLYEGAFGSAIKTAQLQAPMSAT
TQFDIASLTKLFTTTAILKLVSEGRDLDAPLVTVADGKLA VLLGAEESGSNRRVADVLE
KVSTRALLTHSSGIHYWYPFYAARESIKASARSAGSPAGSPVENPAASPAGEPYSAFDS
IFETVLARFPLQHTTIYSDINFMLAGFIVETVSGPLHEAIPKLVCPVPLGLERCAYLKDA
SSARNAFEAGGDSTYAATEFGNRIEMKMVADLGLHFSGWRSIDQPIVSAPNDGNCHYFFH
GVAGHAGIFTTARDLCRLGNLYAGVDNANYIADDLLEEA VTDHGNRGLGFQFGPRYPQG
CGHTGFTGAYLFVSRNRHLSLSILTNRHLVPEPRDIDPFRKAI AELAIITI*

>SPBIB_v1_210120|ID:27163012| putative GCN5-related N-acetyltransferase [Uncultured spirochete bib]
MQIKIEDAVPGDIAQCARIACDSEIGQRYGFVEETLAARIQMRLQEGDVVLVARDMGAIE
SASSSNGAPSDIIGFAWIDTKGGFGQAPYLKLI AIDASRRSTGAGSLLLSAFEERTRGAG
RAWFLLVSDFNDRAIHFYKKGHYAVVGTLPDFAKDGITELIMYKRQEA*

>SPBIB_v1_210121|ID:27163013|oppF| oligopeptide transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]
MNTIQPLLEVKNLKVYFPIEKGIVIRKRIGWLKAVDDVSFLVQKGEAVGLVGESGCGKST
TALAIAQLQRITNGQILFEGRNLSALPPSELYAERNFQMVFDQPYSSLDPRMTAFDSIA
EPLRIQVRRGSLNLSEADIRKVKVLDLMDKAGLSRTFAHRYPHEFSGGQRQRIGIARALAL
SPKLVIADEPVSALDVSISQILNLMKDLQAEGLTYLFIAHNLA VVEYFCGRIVVMYLG
TIAEIAPSEMLYHEPLHPYTKALLSAVPIPDPPRERQRSRILLKGDVPSPEERVGC PPF
ERCPSAMDICNAQRPLLREAGAGHMVACHLYAREGDSHANKN*

>SPBIB_v1_210122|ID:27163014|oppD| oligopeptide transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]
MIIGTEPVLSVRNLSTRFMTSSGTVKAVDGV SFDVRKGEIFGIVGESGSGKSVTNLSILR
LIPMPGQIAEGEIMLYGKNLLAANEHELQMVRRGGSISMIFQDPM TSLNPLLRLVSLQIAE
ALELHHGLSRKEAEKKA VELLKAVGIPDAERRAQEYPHQFSGGMRQRVMIAMAIGCNPD L

LIADPTTALDVTIQAQILDRLRRLSDTRTMSVILVTHDLGVVAGMCDTVAVVMYAGKIVE
QASVDPLFREP KHPYTOGLLASVPRIDRAWSERLYSIPGAPPNLVDLPPGCAFAPRCEHA
MPICSQSYPPQIEMDDGSGNKRTVRCWLHADNVPVHR*

>SPBIB_v1_210123|ID:27163015|yIiD| putative peptide transporter permease subunit: membrane component of ABC superfamily [Uncultured spirochete bib]

MARLLKNPIALVGLAIIALYTLIVIIISQFWLPFDPLQMDVAHILES PFR TGH LFGTDEF
GRDILSRIMKGTGISLLIAVLATAIGATIGTFMGVWAGFLGGAWDHWIMRLADVLFSFPS
LLLAIFVMAILGENTYNVIAISIVYIPQFARVSRGAVLAIKNNEFVRAAFSSGADRRFV
LSRHLLPNIMMPIIVQSSLSLSVAILLESALSFLGLGVQPPHPSWGNMLSSARKVMMLAP
WTAIYPGLAIMGLVLGFNLLGDGLRDILDPRLRNIK*

>SPBIB_v1_210124|ID:27163016|nikB| nickel transporter subunit ; membrane component of ABC superfamily [Uncultured spirochete bib]

MGRYIFRRLLSLIPVLLGVSIIVFFLVRLIPGSALQMYLGTQVEATPEQMEELRRIFGED
RPVPVLYVEWLGRLLRGDLGYSRLTGREVLDPILQRLPLSIELTFYALFLSLIIGIPLGI
LSALKHDPVTDVSIRITGLLGLSLPQFWLASLMVIAFSGFRGWIPMGNYVGLFKAPLDNL
RMLFFPSLAIGIGLAAVIMRYTRNSMLEVLQMDYIRTAQAKGLAKRIVIVRHARNAILP
VITVAGFNTGYLLGGAIIVIEVFALPGMGRLALYAIYQRDYSLIQIVLVIAATLFLVNL
VTDLIYAAVDPRIRLETREG*

>SPBIB_v1_210125|ID:27163017| ABC-type transporter, periplasmic subunit [Uncultured spirochete bib]

MKRLLAIGLALAMVAGIVPAVFAAGEEKVLTIGVDQEAIGLDPHIVTSFSSHRRVDLLYN
KLVRH DENL KIVPDLAESWEIPDNQTYIFNLKGVKVFHDGTELT AQDVEFSLNRILDPKT
ASPGRSYISSIKSIEVLGPYKVKVTL S APLASFL EGLASNNCAIVSKAAVEKYGNLQKVA
VGTGAFMLKEWIPDNSMTLVKNPNYFEKGLPYLDKIIFRVIPEQASLLAGIKAGTLDMAQ
INDASTILLAKRDSNIVVMQKPGINVRTFGFNTTRKPFDDARVRQALS LAIDRNEIVTVA
EFGMAQPTGPIAGATQWALPLSKLPYTPDYAKAKALLAEAGFPNGFTFKIVTANSFEG
GLSVAQVIQNQLKKIGVNAELEVVEWGIYDRWVKRDFDSMVELRGGSGEPDRFLYRTH
STGGVNNFLFKDADVDRLLDKGRVLT TYAERKPVYDELQV VLAEKAPIIFLYCPFETHVL
SKQVKGFQVGYGSLYYLIQTQK*

>SPBIB_v1_210126|ID:27163018|anmK| Anhydro-N-acetylmuramic acid kinase [Uncultured spirochete bib]

MESEKTASSLFRLSAYQSRHERALIGIMSGTSFDGIDAVLVRIITDERGHASLAMEGHY
SLPYSQELQKRLALCSPETARIDELVYAHAA LAE WYAGAVEGLLGMAGRKAQDVYAICL
HGQTVWHAPVPRAFPGPSGQSV AARGTLQIGSAPLLHERTGIPVIYDFRSRDMAAGGEGA
PLAPFVDALLFGSLERGRIVQNIGGIGNATVIPAGAGNEAVFAFDTGPGNMVMDELAKRF
SNGALAYDKDGLLAARGRVSHELLEPLEDPYFSRKPPKSTGREVYGAEFAARFAVRGRA
LGLSDADIATATAFTAETIVRAYRDFVFLVPIDDVIVGGGALNPSLMAMIRERLPAH
ATLRTTADYGIPVLAREAIAFAVLGHEALMGHPSNLP AVTGASHEVILGSLTL*

>SPBIB_v1_210127|ID:27163019|rbpA| putative RNA-binding protein RbpA [Uncultured spirochete bib]

MGKKLYVGNLSYNTTEDSLKERFEAFGHVESVRIITDRDTGSSKGF GFIEMGTDAEAQAA
IASTNGQEV DGRMLKVNEAMDKPRDDRSRDNR RRGSSYSY*

>SPBIB_v1_210128|ID:27163020| NADH-quinone oxidoreductase, E subunit (modular protein) [Uncultured spirochete bib]

MAMNGKKGAGETDDAVGNTSILPNTTAPKTQIKYRDTLLFRLHEVQNRTRGKTWITKEEL
AGIAQDYGIPLAELDGIVSFYTMFSRERRGRHVIRLCDSLSCRICGSLDIYQHLRKKLGI
SRGMITTGDGAFSLEIVNCLGACSTSPNIMIDHLSGLSLAEIDAMLDRLAKEEV*

>SPBIB_v1_210129|ID:27163021|nuoF| NADH:ubiquinone oxidoreductase, chain F [Uncultured spirochete bib]

MSNIQYITGFATLENPLDIDSFVAKGGFSLHLSALAMTPAEVISEVKRSGLRGRGGAGFP
TGLKWESVAGDDERYLVCNADEGEPGTFKDRFVLEHAPFLVLEGMAIAAYATGAQTGYVY
VRGEYPHVVASLSSAIASAVKAGYLGEYILGSNFSFNVEVRKGGGSYVVGDETALLNSLM
GNRGYPFLKPPFPTEKGLWGKPTIVNNVETL A YVPYIFTHGAEAFASIGSPDSPGLKLF
ISGHIAHPGVYEFPMGTTVRELAAAAGGILGNLKA VQIGGTAGPIFDTAALDYPLDFASM
RKAGGALGSGALVFMNTTVNMAHVLEVTMRFFAEESCGQCFPCRYGTRQLAFMANKIASG
QGKLEYLDLMRDTTHVMVGASFPCFGQSIAPLESLLDRFGDEIVSFIKQQEFLKEAAV*

>SPBIB_v1_210130|ID:27163022|hndD| NADP-reducing hydrogenase subunit HndC [Uncultured spirochete bib]

MKNVTLTINGKKISVPEHTTVFSAAEKAGISIPALCRHEDLEPKGACGMCIVKIEGQPGY

KRSCVTAVEEGMEVLTSTAEIRDIRRGILELVLAHPADCLQCIKHGKCELQTLAERFEI
RDLRYDRYTRGLPVDRSSFGIVRDMNKCIGCGRCVQVCNEVQTVASIFFHGRGSNTIVSP
AYGTTMGDSVCVNCGQCIVYCPVGALYEKEAIEEVWKAIDDPDKVVVAQIAPAVRVAIGE
EFGLEPGELSIGKLYSALKALGIDVVFDTNFSADLTIVEEATEFLERLKESGPFPLITSC
SPGWIKFGETFYPELLENVSSCKSPQQMLGALIKTHYAESRGLDRNNIVSLSIMPCTAKK
FEAGRPEMRSSGARDVDYVLTREIARMIRQVGDIFRNLDPGTPDPLLSRYSGAATIFGA
SGGVMEAAALRTAYELATGKALEKVDVFDVVRGMTGVKEAEIDVDGTPIKVAVTNGLANARK
ILDRVAEDKRRGRSSYHFIEIMACAGGCVGGGGQPIPNTLARRARRIEGLYREDRSLPLR
KSHENPEIRALYAEFLGSPGSEKAHALLHTKYSPREQYQFSE*

>SPBIB_v1_210131|ID:27163023| protein of unknown function [Uncultured spirochete bib]

MFILKIDIVLVGYTLYGAVHVPFRFRVSPGIQRTVL*

>SPBIB_v1_210132|ID:27163024| PilT protein domain protein [Uncultured spirochete bib]

MTKILLDTNAYTAFMAGDQHVLSYMVDSEVVYISTIVIGELFAGFYGGDKVLQNKEELKI
FLSKDSIKIIDVTMETAEIFGELKSALARKGRMIPLNDIWIAAHAIEYGSKLITYDEHFK
NIDGVRIWEYLN*

>SPBIB_v1_210133|ID:27163025| conserved protein of unknown function [Uncultured spirochete bib]

MKSITIHSIDPDLKKISEKSKELGLSQNRTVKAILQNALQSDNKAARKEMFSDLFGKWK
PEERAAFEKQIIDLEELNDSWAK*

>SPBIB_v1_210134|ID:27163026| exported protein of unknown function [Uncultured spirochete bib]

MVKAKKTKEKIVKQKSFIVAALALVMVALAVGVAGAQTREPLVPQKAREK*

>SPBIB_v1_210135|ID:27163027| conserved protein of unknown function [Uncultured spirochete bib]

MMKPAIVYVTRTGHCRTLAEMASRIAGGRVWEIGDKERRNGFFGFIRSGRQSTFNMATPI
EDPNADLHDIDTLILVTPIWAGKLAPPVRTWMRSHVEEVRGKRILLIASNSGGSTVRLQQ
SFEKEFLPIDGLLSVPIQLSEEQKLEKLEAFLGKS*

>SPBIB_v1_210136|ID:27163028| ABC transporter, ATP-binding protein [Uncultured spirochete bib]

MAQLKLVDTVTKKFGDVIAVNKLNLEVEKGECFSFLGSPGCGKTTTLRMIAGFEDLDEGEL
SVDGKVFSSSFKKYYLPPEHRDFGMVFQAFVWPHLTVYDNVAFPLQIRKIPRHEIAKRV
KMALQSTGLTHREESYPGKLSGGEQQRIALARAIANPKVMLLDEPLSNLDAKLREEMRF
EIKDLQKKFGFTIIVYTHDQAEAMALSDRMLVMDHGIVQQVGHPLIYNKPANKFVFSFI
GLSNFIPVNIIEGKAVIDGSNETASFEAPLELGKKAFLACRPSEVDFVEEPTGANQLPP
AIRARVARRTYLGDIVDYKVAVGNAEIRIQKPRRVQGPIEGSLCTIRINRTLWYPLE*

>SPBIB_v1_210137|ID:27163029| ABC-type Fe³⁺ transport system permease component [Uncultured spirochete bib]

MNTGNKLSTANIVLLFSILILVVIVAVPVILIFITAFFENGKFNIAGIAKILSDPPTYQA
LLNSLIIAAGTTLVSTTVGTFFAWLVARVDLPLKTKMKALFLVPFMLPSFIGALAWKVLL
SPRAGYINKLLMAIFGLSKAPIDILTIGGIIAIESMYLFPFVFLQVEGSLERMDPTLEES
ARISGANLFTITRKITLPLVMPSILAGALLVALYSLAHFGVPAILGTEKGIYNIPTKIYE
RIYASGGSFNIRVGTILSTILVISAALILKLQDMLLKKGQYQIIAGKSMRPMVMKLRGL
KIPLLIISILYIGITVILPTVTIFLVGGLKTYGLSFELKNMTWNNYLKIFQWKMTKDAIW
NSLYLSLGAAFVTMLAGTMISYVIVKMKVVRGKFIQLFLGVLPSLPGTVIALGVILTWGS
RFGINLYNTPWIIFVAYIARYMAFSIKSNSASLSQVSDSLEEASRACGATHWQSLKNIVI
PLIKPGMISAFFLIFLALRELTTSVLLYGPTTRTIGVAIYALNEDGETVRAAALASIAL
VIIFAGETIIRKFLARLDQAKVKVQE*

>SPBIB_v1_210138|ID:27163030|potA| Spermidine/putrescine import ATP-binding protein PotA [Uncultured spirochete bib]

VADLQLSAVSKSYGTHRVLDKITFKVNSGECFTLLGSPGCGKTVILRLIAGFESPDEGEV
SIGGHVVATAKHSLPPEERHIGVVFQDYAVWPHKTVYENIAYPLEIAKMPHEQIKSAVSD
AIDQVNLAGLAQRYPYQLSGGQQQRVALARALVTKPDVMLLDEPLTNLDANLREEMRFEI
KELQRKTGTTIFYVTHDQEVALAISDKMAVMDDKGIIRQIGSPDEVYERPIDAFVYQFLG
IPNFIPVAIKSGQAFIDTDAVQGAELPLQALADFPSPQRFPGPKGKLACRPMDVILRSI
HPETMVKAKIVRLSLLGPIVDYLLDIGGIAIRAQMOTEAAMAQDLLIEEGQECGVRFAEP
KWFSEDGEAIR*

>SPBIB_v1_210139|ID:27163031| ABC-type Fe³⁺ transport system, periplasmic component [Uncultured spirochete bib]

MRRALLVLMALLVTGIVPVIAQPKEKLMVYTSMKEVLIGEIRDAFTKKYPNIQFDYYSAG

AGKIMAKIAAERQSGKLVVDVLWTSEIPDFYSLKKEGVLQRYESPEAKYVVSPLNDPDYE
FTPARLGLTGITYNTNKIKTPPTQWSDLLGPA YKDGFAIANPALSGTSMVSVGMIANNLG
WDFIQKLRANGAKMGQSGQVDDTAAGDLAACIGVDYITIDKIKLGAPLGFAYPKEMLV
IPSPVAIFKGTPLNAAAQKFVDFLLSKEGQTHANNYTLPVRKDVPIVQGVGLVAPDEAV
KRAMKIDYLLKLMVEKQAVIDKFTEIMQKK*

>SPBIB_v1_210140|ID:27163032| exported protein of unknown function [Uncultured spirochete bib]
MPMALGIAVLRGLEKPKPFSKRIVAGISLALISFAVMVVDIQRSIKQEDPAAAYAAILVLR
SRRIAELAASIEAISFQFFMNRLNNTLSAYVNDAERYDISKWNTVFSQHMEGLAQTVP
IEDAIFFAIPDPNKIPLMMDLSTRATYQPVRSIIMQKAIASGKSVWDVCMGASKSAAQ
NVNKLVCARLITNIDTHVPLGVLLVNPDRARAVSGSSWDEDANAAPKTDYTLIDE
NSKILVSASLSQIGLQAQAQVPGFSEHFPLNKAASPSGKYKARALSGAKATQGLFWVIYE
RVPDRLWTLVSVILPVSVDPLPLFFRIFIIAGFAASVWLILSVLRGGEATPDQSQPPAQL
EAIPDWFKALAPREKVVMLLLKGLSNKEIAYHLAIREQTVKNYLHGIYKKGVLGVQDRFSA
LLLMQNAHLNIETIKDYAEKNPSEFSVSIDILA*

>SPBIB_v1_210141|ID:27163033| protein of unknown function [Uncultured spirochete bib]
MQNQNRGFRITIQFKTIQSGACFKSYGLSRYHGNGTIFQVLQMKDFLVKFIKRSPLAVGLVS
ANAVLGAAGAAGFLPWL VVVPLFLVISGVELLLTLRSEAGAKAILAEEDRERKERDAAI
LADVAQARKRLALLRIAEPEVKA AVERLVYAAGMYLESCAKGNERDPFAEDAVLSVTKIV
DEYLRLADAERMGARLKSESEDFVRASEFSSEIGPSSSSNPDKPDRSATTDNDSAAQEP
EPSLAQRMVRLLDKAAS TISERLALPLGGMEGDHAVLDAMKAREELEEE*

>SPBIB_v1_210142|ID:27163034| conserved membrane protein of unknown function [Uncultured spirochete bib]
MKRAGIVFVFLFIFGMVLQPLGALEARLVSAEIYTLGSDGKAVVQHSLVWNVSSGTMGG
FYFQGEKAPFVWDMERCWADLPDGTRQPLEIKRAGDKWDILLARGKRTNGLSTWVLTGYT
DLLAADMAGLTQKADGEKLFHFWAPPEWDQALDHRTVTIILPIEVSREGESGDSRERLA
DLGFATEKQVNEKNKIDWYAADGSDGKSYLAIRFHQEKPAAYASQELQFYLSASKVEAAF
GPLFGALAQGTGAASGGAARSTSASGSSANAGKGRSASPGASTQNFWDWQRYPLLALFLC
GGVAVLGVLLYRKKVLGFPKAVAKAEGIAWAGDSWTPPRIVEGTYAVPGKVAEDLHPVEV
ALLFELPLPRVAVVMIKILEDEGTARIVQEAPLRLEILKASSADPYGDIFLKAFDSEGWW
LSGFMADFFEEALKRLQEKTWDCDIEATKAFYRKKIEEEEEAAAGAESEAAADARRRRSYW
YPFMYVYSHPYCANLGLPKFESGSYASFMASACFSGCFSPKNLSGTAGACYSACHNAC
HSACHQACHSACHSACHSACHSACVSGGPH*

>SPBIB_v1_210143|ID:27163035| Radical SAM additional 4Fe4S-binding domain protein [Uncultured spirochete bib]
LSLRIGRSLVGRASAFPIPGSPEGTGTDLAWIDDFWSKAGEHIFCREDDGALILPPNR
VYKVNATAASLIAYLKRGGKVAKLKLP SAEAQRTALFFGDLASLYRGDEPVNGTVSAET
YSFSFTRLPLVGEIALT YRCNNACRFCYAGCGLTKSLTPFLTRPARPTADYKHIIDIFA
DEAQIPFFSFTGGEPTLRSDLEELIAYAQQK KLITNLVTNGTLIDAARAHALKEAGLGS
QVSIEGPSADIHDNLAGRPGAFTETLAGIKALQEAKIPTQTNTTITRANLAVIHQMPAYL
ASIGIHRFAMNLFIP TILGEEADRLFVSYEEIGPYVDAVAKEAKKLGMTFFWYSPTPCFN
YNPIARGHGNKSCAAADGLLSVAPDGSVLPCSSWDEPIGNLFSQSFRDLWFSEAARFYKE
KRFAPAPCTSCSFVACQGACPLYWRYTHSEPSGFKKT*

>SPBIB_v1_210144|ID:27163036| membrane protein of unknown function [Uncultured spirochete bib]
MNPVTVQYRIRGLSTEARLILFGAASLCGILLQVFWPVAGPLVGTLLLLLPLFLLSAQPW
SNKPKDKGEEDWQPVGDAELDRIADAFKSAREIKIPLWYRPGFGIPFTVALAILTSIFGT
GLTLPGLLAMDALILFWPALNFLKIKIWPKEFEMVMQAIQAARSVPLPDGILCTPYLRL
DRDDQGLRIPENARLML EPRRKPEDLVGAQLQVAINKGPNPVPYLYAVVLTHGKGQSWQ
KARSLRIPGFEVEPGGDADYGTVVIRQSTDRGGYHTKPEDCRRLVQVVVQVLKEL*

>SPBIB_v1_210145|ID:27163037| Cell wall-associated hydrolase (Invasion-associated protein) (modular protein)
[Uncultured spirochete bib]
VKGEDAGLLYPRSCVPNYLIVPKIVMKVLASLA AKSIDALRLAALGIAVCLFASSCSIFI
SYEIVPASVEIRTAIRYAQKYAELGAVYEWGGQDPLPRKIAVDCSGLVIRCYEYACGDY
GASLLFKDTTAKGLRQYSSLIASPEKGD LIMIGDNNEISHVALFTRKEDGRLYFIDATSL
TGMVSMRSYAENDPKFIEFRRMNVINKK*

>SPBIB_v1_210146|ID:27163038| exported protein of unknown function [Uncultured spirochete bib]
MRLPSKPESLFWAILAMVMLLTACTMNNEDDIWTWGNYPELGTGPVEFKVVPLEDGTFN

EITPMGHMNLPHIPTSAGGFSFLSNGYSQPVKAPADGVITAIRYTHVFNVDGTKSFPD
YAVRIYHTNTFITWYDHLAIDDTILAKTGLAEGWTKAYVPVKAGDVFGKTAASSEQVT
GLGMYAYDKEKTLDFINPEKYGPFGAHAVFAFDYFRNDIKTQLFAYIKRTAEPGGKIDF
DVAGTLSGNWIVEGSNVISSPNPWNWYLSFSYDMYYPESRRISIGVELGTTIGKSNGLT
QPVEGPDYTAARTGSDPVRYKLADAMEGLSSLPATSDIKYTLAQQVVEENKIKVELFDGN
IDNPSFTENAKYYTR*

>SPBIB_v1_210147|ID:27163039| Fe-S oxidoreductase [Uncultured spirochete bib]
MDGLKKVFAKRAVNLTLYLEGDPQENLSKAVNALMPLAKRDGIKQLESQAKQIMAEKDN
PYRNILRVFHEIAPNVRRRFVTNFVNASMIGPDRAQMLKYKHDCNIPWAILMDPTSAC
NLHCKGCWAAEYNKTDSDMDYALLDRIIREGKELGVYFYIYSGGEPTIRKNDLIKLAQVHN
DCMFLAFTNGTLVDQDFALALGEVGNFALAFSIEGFEEATDFRRGAGTYTKVIEAMQYMK
QIGAPFGFSAVYHGKNTREQVGNEAFLDFLIEQGCMEFGWYFTYIPLGKDADTALIASPSQR
EYMFHWVREMRDCKPIFLDFWNDGQYVDGCIAGGRSYLHINSAGDVEPCAFIHYSNVNI
RNVSLLEALKSPLFKQYKELQPFKNHLRPCPLLDNPEALSAMVKASGAHSTQPIDKEDV
DELTAKEKAKEWAPVADGLWAEELPEYSKAKARREERKTQE QIMKQLKTMRPLKTK
EDKKKIFSLRL*

>SPBIB_v1_210148|ID:27163040| protein of unknown function [Uncultured spirochete bib]
MPKIVDHDNRKREILEKALELFSLGGFHASSFAEIAESCGLSRTNMYNYFKSKEEIFFYA
VEDIFNRISVEIDRIARQKNVSIVRKLSSIYEIFTDNSAIGRYSFIITELAQKLNENAE
FLAKLQEAALKRQKIESLLYREGNPILAPQVPVIATLFFSLVESSISHSLFIDKGFION
NIASLLNLESFV*

>SPBIB_v1_210149|ID:27163041| conserved membrane protein of unknown function [Uncultured spirochete bib]
MQRNLLFAAVFAIAMAYLEAAIVVDLRKLYGITDIMASLSSFDAQISRIEIGREAAATLV
MLWALGWIAAGKQLQRIGFFIFAFGVWDIFYYIWLHIFIGWPHSLLDWDLFLIPLPWWG
PILSPVLIALIMAIIGVQLVSEARGIAIQPKTAEWLLLVSGLAMLYAFMADALAVRHL
NLEMLGMLRPSSFQWPIFLVGFILSVASCGKFLAAVKSDDKAGGRITT*

>SPBIB_v1_210150|ID:27163042| conserved protein of unknown function [Uncultured spirochete bib]
MMLQKETKTDDTEAFCLVLGGGGAKGVYHIGVWRALKKLGIVDCFIGTSIGAVIAAFLA
QGSDEILEQIGHIISLDNLDLPEDFIKNGELKFNLQSLRSLPDDFISVINNRGLDTKPF
RQLIESNLDEKALRNSGKDFGVVTINVSCLKHQEVFIEDMEQGSVVDYLLASSAFPGFKN
PKIEGKSFIDGGIYDNIPYAMARKRGYRRIIVSDLSGMGRTRKPDIAGCITVYIKNSIDM
GWVLDLNRNFLDSFMLLGYLDTLRTFGHLAGYSYFIEFDTNAEKNFAPKISIPFSQSPKY
MCYDRRKLIALECAASVLNVERIRTYTYAELRTAIAEHRYEVENKIAAATASSRKGIMN
LAKVVSEAVATRQFTECPYYYYCLVNKLFPKSTARILKNTLVRIFPELPVGAAFIEGMES
DSLNF*

>SPBIB_v1_210151|ID:27163043| putative Phospholipid/glycerol acyltransferase [Uncultured spirochete bib]
MSFDVVHTEKRIAQSAGVSGPRNAEDYDPEKELDANRYALIVQQSKVPIIALFNAAVKED
TSFLLPLMLLATIRTMRRIPRTFFIRNGPEYERYVFKTIHWWARRICRIGRIRLQVSGAE
KIRPDRAYLTVSNHRSPADIPVLFDAIPQNAAFVANGMFRMIPAFSFWMRASGTVFIEQG
NQKAELAAFKTMIRRLKQGRSLILFPEGHTHQGPGIDTFSRGGIYAAVLAGVPIVPVCLS
GTDKVIKPGSLHINRRSRVIVEFGAPIETRHLMGMAAKKNIDTILHDTIAGMLDRQTSKQG
GRPRQA*

>SPBIB_v1_210152|ID:27163044| GtrA family protein [Uncultured spirochete bib]
MNAARVIAGFAKAQVSAFLGGIVDYSVMILFVQLFHIHYAIGIAGGIVGAAVNFAINRY
WSFYSPKGRYSDPVTVQGMKFPVCMASIAMKATGTYWLVQAVSLDYRISRLAVDAIISL
AFNYQMQRWVFKKVRSEKKH*

>SPBIB_v1_210153|ID:27163045| conserved membrane protein of unknown function [Uncultured spirochete bib]
MKRPIHSVTEILDIAIAQGRQRTNLLRKYEQRFIAFLVRFIPSWVSSNMLTAVGFLGNVLV
FLSFVLAAKISGYWFLGLIAGFAISWFGDSLGRYAYRNKPRKWKYGFALDIAVDWLGIV
LIGLGFILYANGYLKIVGYAFITFYGLEIIIALMRYKITGNYSIDAGLLGPTARIAISL
FLIEIVFKGTLQYMALVAVAVLISSFSELKLLDAADAQDREKRAQDRESKNIVELK
RAEKR*

>SPBIB_v1_210154|ID:27163046| transposase [Uncultured spirochete bib]
MAITKEVLDELLKEYKGPEDLTGPEGLLQKLTALIERAMDAEITTHLGYEKHDQSEKDT

TNRRNGRTKKTVRSDQGPLEIEIPRDREGTFEPAIVPKHQREFKGFDDKILSMYSRGM
REITEHLKEIYGTEISPELVSRVTDEVKELLEAWRARSLETSYPIVFLDALMINVREDGK
VVKKSIMYALAINWEGRKELLGLWIDQAEGAKFWMRVLSELKNRGLQDILIAVVDGLSGF
PEAIATIFPKTEIQLCIVHMVRNSLKFPYKDRKAVAADLKALYASPSEEAAALDIFA
AKWDSRPFMISRWRMRWPEVVTYFKFPEMIRKAIYTTNAIESLNYTVRKVTRNRLSFP
AEAAMKLVFMAQNISKKWTMPIHEWKSALGQFIIFYGDRVPL*

>SPBIB_v1_210155|ID:27163047| Phosphoglycerate dehydrogenase [Uncultured spirochete bib]
MSKRVLITSRSFGQVSEEPNIFKENGIEVDFQNDYNEEKFSIIGNYDALIIGAHEFS
PKAMEKAKKLIICKKHGAGLDNINLEAAKKYNIRVTNPATNSNAVADLAFGLMLDVARK
ISFAASRVKDGLWERVIGTDVCYKTLGVIGFGAIAKNVAKRAGGFGMKVLAYDPYVTDLP
DGFPHVSLVTFEDVIKQSDFISVHVPLNDATRNLIGREQMEMMKGAFIINTSRGGIVNE
EALYEYLKNGHLAGAGLDVTEKEPPTGSPLLTLDNVTVPHIGMYSKEAINAVSVICARN
VVKMLNNEQPDIHV*

>SPBIB_v1_210156|ID:27163048| conserved protein of unknown function [Uncultured spirochete bib]
MYNIYFDSGTSNTRVYLLKDEEMVDVAQKNVGSKDSSIAGSNQVLLQGLKELYDRILDNN
GLNDAQIEGVYASGMVTSFPGIKEVPHLSTPITVEKLYSSMYTHYEGEFFKRDIHLIRGA
KTIAEGFKVDKYNISVANMRGEEIEVFGILSDLSDEWKRGNATIFLPGSHTHIVYVKQG
IFHDILSTFSGELFHAISTSTILSSISSEVDQLDEEMVIQGYRNLNEYSLNALYIAHA
MKIFNASNKIERKSYLEGVINGGVVLGFENTVKKRWKEVDRVIIASSSNIKAVYEILLKE
LERKFEILTLVASGKESFAVKGFIEILKGGVLCQKECL*

>SPBIB_v1_210157|ID:27163049| putative 2-dehydro-3-deoxy-6-phosphogalactonate aldolase [Uncultured spirochete bib]
MASNIKDEIFKGGKIVAIIRGIGSDRILDTVGALLEGGIKLEVTFNQEDESALDITLKL
ELIKSKYDQVCLGAGTVITEDQVQKAVDAGAEYIISPNTDINIIRRTKELGKISIPGAF
TPSEMVAAYNAGADIVKLFPAJILGIEYIKAVLSPLSHIPVVAVGGINVDNVNQFIKAGA
KGVGVGGNLVDKKAISGEYHKITLVAQTYLKKLEES*

>SPBIB_v1_210158|ID:27163050| Putative KHG/KDPG aldolase [Includes: 4-hydroxy-2-oxoglutarate aldolase ; 2-dehydro-3-deoxy-phosphogluconate aldolase] (modular protein) [Uncultured spirochete bib]
MQNLKELFFATGVIPVIKIESAERADGLAGALRAGGLRVAEITFRTKAAAGVIEKFASRH
PDIVVGAGTVTTKTEVDSALSSGAKFIVSPGFNPEICAYCIEKKIPVFPVSNPSLIEQA
MSLGLTILKFFPAEVSOGTKALKAFESVYQAVTFIPTGGIQENNLNEYLTIKNVLACGGS
WIVPTDLIEAGKFDALIALIQSCRRSMLGFLPLTSEMKLDNASGADADRLSSPVLELKT
SIRRTLAMLGMNEETSSSAKSIIISLGDTRIRIIE*

>SPBIB_v1_210159|ID:27163051| conserved protein of unknown function [Uncultured spirochete bib]
MDVIKELLEGIPLPKMVKVKMAFSAKKVADVEAAVRQELAKPGICDSIKPGMHIAVGVGS
RGLANLPTLVQVLVDELKKGAVPFVVPAMGSHGGATAEGQTEVLANLGVTEASAGCPV
SSMEVVEIGRLDNLPLVYIDKNACADGIVFIARVKPHTAFRGPNESGLVKMVAIGLGKQ
KGAESCHSYGFKYMAEHIVAMTKIALARTPILFGLATVENAYDEIARIVAVPAADIIETD
CKLQVEAKANMPSLMFKQIDVLIVDQIGKDISGDGMDPNITGRFPTPYASGGPDVSKLVV
LDLTDKTHGNANGMGLADFGTHRLANKVNFQMTYANGLTSTVVLPTHMPTILES DYDAIR
AAIKTCNARDYSRVRVVRKIDTLHLGEIMISEAMLAEARTIAGITVVGEPQAMKFDAAGN
LVREED*

>SPBIB_v1_210160|ID:27163052| conserved membrane protein of unknown function [Uncultured spirochete bib]
MKLELVTEIGILAFGIATLVQSFHIRILKFGGSMGGDVFPKALSIVLIILSAIVFIIDL
KYLQNKYLKKTASATEGASVVKSAKERGYLNVLFFTVLFAIDIFSIRYIGFVMAMIPLI
FANYLLQKKEIRKTDWLIALVYAVGVTVAFWALFEKVFEVMLPQGIWF*

>SPBIB_v1_210161|ID:27163053| conserved exported protein of unknown function [Uncultured spirochete bib]
MKKIALSMVAFLVMFSAFFVAISPAAYDPKPVTVVVPYSPGGASDITARLLAEYWKY
GKEMVVTNVVGAEGAVARQVLNTKADGYTVLWYHQAILGNYYLGVADISWKDLTPACVV
MKTSRVTVTRNSSPWKNLREALDDAKKNPKKYIYGAGAGGIALEYGPLEMDAPGAFRVV
PNEGGAQRIAALLGNHVDAIPVALISVVQYLKSGDIKCLALHDVESDPFIPDVPTASSQ
NIKNLVFPMTNTFFFPKNTSQNIVNDFNGIIAKIVVDPEFKKKLADMAYTVPFKTKGDL
EKFWSDQDSVYKEVAKYVK*

>SPBIB_v1_210162|ID:27163054| conserved membrane protein of unknown function [Uncultured spirochete bib]

MDAFLQVFTFGMHVTFQPLNLVIAIGTLWGMIFGAIPGLTATMGVAIALPFTYKMDTAS
SLALLSSIYIGAISSGGFISAGLLNMPGTPSSIATTFDANPMVKQKASLAMSLSLASSFA
GGILAVFIAIVATYGLAQVALKFGPFEYFSVGLLAFAGCVGMFGDKLFKSIISLVLGLVL
AMIGSDVLTGVNRLTFGIPNLAAGIDILPLLMGLFGMSEILFALDNKESNVVPPDARNNL
MGWKSFFSAFKLIISRSHIFNFIRSFIIIGFAIGVFPVGGATSSVVAYGVAKSTSKHPEK
FGTGIPDGIASETANNATIAGALVPLLGLGIPGDSVTAVMIGGFIIHGLFPGPLLFREN
PQPVIYVIFASQIIANLVMVLLGVFLMKFLIRTLSEIKSHILLPVITAAMIIGSFALYNRVF
DIGVTLVFGFVGYIFKKIDFPTVPLITSFILGPIVEKNLRQGLASSGGSLPLFTRPLSL
GLLIGAVILFAIGMYVSFFAAKRVESQK*

>SPBIB_v1_210163|ID:27163055| conserved protein of unknown function [Uncultured spirochete bib]
VVVFFETVGAANVAAAPKPITFKFAIIDDESSSHYRGAKKISLEMAAAIKTQINIEIANS
GALSGETVVEIAMSCVIDITTADNFVLTGTFMCCMS*

>SPBIB_v1_210164|ID:27163056| conserved protein of unknown function [Uncultured spirochete bib]
MNKPVSLLEFAYEKIKEDIMHGKYTPGEKLNIGEIAKDFNISCTPVKEALNRLASEGFIE
AIPRHGMMLKVLVSKDIEDMLNVRKMIEMYSAKLAAANVQKHPEIIRMKKLLPLMEALG
DHEYVEATKLEQYHGLFVVKLTENNRLIEMYEKLFVGSFAFYVYSIGNFPLARASEASRE
HMQMYNYLLEAKGDELSELMGRHMQATIELLEDLISKDTEHRFKIN*

>SPBIB_v1_210165|ID:27163057| conserved protein of unknown function [Uncultured spirochete bib]
MSVLILETSTSSAKALLYDEIKGIVSTKIIPYNKEKNSIAMQDCDDVCRSVLEAGRQIAF
SQDVEAIALCGTWHISIVVCDRSMKPVSPSYSWAYTDSMPEIANIRKDHRLTDLYHRTGC
MVHSTYGFYTLMLKNSGMEFRDKLFASQAGYIFYTMTGERVESSTMAGTSLLNHVKQ
YDPFILSMLGLDAEQFGRVLYTYRDTFPLKNIADALGVKPGIPVVPAYPDGAMNQVGS
LEYGIMTMSVGTSAALRFTVDKPMIPEEPSTWCYVGVDSWVSGAAISGAGSCVDWLRSSV
FNGNMSFKTLESAAASQESTPVFLPFVFGERSPGWQDDRLGGFFDVRPQHGYGSMYRGLL
EGICFNLRQCYSLTISIAGEPKEIRLSGGIINSPFWTQMLSDVLGRELIVSRFDQASSLG
SVALALFALGKLAKLSDFKVDSTYTKVLPRESQEYKNKYERYLYWYNLTR*

>SPBIB_v1_210166|ID:27163058| Phosphoglycerate dehydrogenase [Uncultured spirochete bib]
MFNIIVTARSFGQANPEPIRLLENGCRIEKLNMNPLSASELLALVAEADGIIAGLDQY
DALVIENAKRLKVISRYGVGYDNVDLEAAKRKGVAVTFTPGTNENSVADLAMTLLLCASR
NIVSMDKYVKSGLGSRVIGSEMWKKTGLIIGTGRIGKGLARRAVGFSMNILAYDAYPDTA
FAQQVGLTYCSLDRLRESDFISIHCPDTETRSLIGAAEFVAVMKPTAVLVNTARGGIVD
EEALYNALVQKKIAAAALDVTVQDPPTGSPLLGLDNCIITPHIGGYTRDAVLNMGMLAAR
NLIAVLKGEPCFRVV*

>SPBIB_v1_210167|ID:27163059| protein of unknown function [Uncultured spirochete bib]
MRTARHGPNMSPITHVVNIHVDLAAQNVSIQEWSGTEPRNLVIQGLKEPKHVLLVIFLG
IAEYSNGYVCANEKLG*

>SPBIB_v1_210168|ID:27163060|rhIE| ATP-dependent RNA helicase RhIE [Uncultured spirochete bib]
VNFSSFSFDGTITKAIDRAGYTDATPIQAQAIGPILEGKDVGLAQGTGTGKTAALFALPML
QRLLTGKRCTARALILSPTRELAEQTRKAFEALGKETNLYALSIYGGVSTSAQIRSLKRD
MPEILVACPGRLDLMGQRVVSLLKDIEMLVLEADQMFDMGFLPSIRQIEALPTGHQTL
MFSATLPSEIRSLAREFQKDPVRIEIGNSRPVETVNHIVYPVMQADKYAVLASILQENAT
GQALIFTKTKHRAQKLATQLLDAGHSAAALHGNLSQGQRDKAMLFRTGKARIMVATDIA
ARGIDISGISHVINFDMPDTAEAYTHRIGRTGRMMHSGIALTLATPDDRSMLKIIERLIG
KPIEHKIVSLAEIDVTASIEEHQKVAWNQRGSYRLEHGERSDRRPDTHEARPGMHTNRPE
ARKSRPDSRGLKPFKQSGAQNGVSHGKTHDAAHNAVHFRDTRNSAPNAALRSRDSRNAI
RSAAPRSGGRYPKEYASIP*

>SPBIB_v1_210169|ID:27163061| conserved membrane protein of unknown function [Uncultured spirochete bib]
MPYCPDCGVEIGNAPRCPLCGSPNPKAVPDAQNPCKDADITGKHPAANIIFEGGEGIFSK
EEKRTVLWEVLSVAFIAIVVLGAVNLFESRRLSWSLYPVVSILLWVEATAFLVLKNMQ
VLRIVLGAIAAPPALLALGFVSGSPRWAFLAIPAVLVESLTGALVLAIGKSKRKGLNL
VAYVLAVALCIGLEMFIDLFARGVVVFDWAPICAIALLPIAGFLLYLHYRVVKATNLR
RLFHL*

>SPBIB_v1_210170|ID:27163062| Elongation domain-containing protein [Uncultured spirochete bib]
MHIWARRSREQQFIHTRREDEQGEWYALDAAIIMPAVANEITSLFRFEAELDAPIDVD

VMGKALELTVRRMPYFNVRLRRGFFWYYFEPCHTLPHLYPDSPPSPSQLWDINKRGTRMFR
IRCEANRVAGEFSHALTDGTGGMTFLKTLANYFLLKGIAPGAELSEGEFRDILTSQSFI
ESPSIPSDEFEDAYQRYFPKGLPFPDTGPNAFHMKFKCLPKGQYRVISGELNLTEALGEA
RRHGASLTELMATAVYLDALQQIWHETVPRPKEHYIAVEVPLNLRMTMFPSKTFRNFSFLV
IAEDMRLGMRSFEELVMRTHYQMKLEYDRMSIAKHLRSNAGSARNPVVRAVPLFIKDIFA
RIFFAKFGESMLSGFISNLGQVKMPPGFTPHIQRFQGFIPAPSLTTLTNASMLSWGDKLIV
DFGSLTESRELERLFFRRLRSLGLQVRVSCRLDQAEAKAQSKEEPNAILS*

>SPBIB_v1_210171|ID:27163063| conserved membrane protein of unknown function [Uncultured spirochete bib]

MIATFINAAAVIVGSLIGLLIRKGIKEEYRKVVFTAAGLTSLTIGIQMALKTSHILSFAL
ALMIGGLLGTLLDVEGGIERFGERLKQRFASKSEGAFAGFLNASILFCAGAMAIVGSFR
AGTEGNYSLIFTKSVLDGFVSIIFAGAMGIGVAFSALSILVYQGALTLLSVYIKPYVSDL
MLAEITGIGGALVIMIGFGLLEIKSFKTGNFLPALIIIVLVLVMPVLKFL*

>SPBIB_v1_210172|ID:27163064| conserved exported protein of unknown function [Uncultured spirochete bib]

MNRRIFRAFALITLALLVSIFASCASSPPPAPPDASAQKIIQLAQERYDAYDLNGAQYYY
QVLLERYGSDPEYMLNAKYEMAFIEYKKGNTKAIAGFKEVIARYDAPDGQTLSQTWKVL
SEKLLAKLTGGK*

>SPBIB_v1_210173|ID:27163065| conserved protein of unknown function [Uncultured spirochete bib]

VRRFRCTRCGKSFSTQTYSTHYLKRIVSYRDVLYRLAGGESLRGMSRALGCSLSLLTNR
IDRLARQGIALHARMLRARRGKEDICIDGFVSFDCSQYFPNEIPIAVGRTSGFVLDVSHC
TRKRSRSMRQDXKAKAALYSTIRLERGGIXRSFREVLAATSLAVQPPQPXXPFVLITDEK
PDYARLVKLAAYWGEGXGRLVHLXISSHXPRTIHNPLFSSNYTDRELKDLANHHRESV
CFNRNVANGMLRLWAYLMWHNYLKPYRIRWPKGRPXTHAEASGIDATXLEXVYRSFFEE
RAFLTRSPXLMARSWKKEWRTPGKEKAHEYIPRLALG*

>SPBIB_v1_210174|ID:27163066| ABC transporter related protein [Uncultured spirochete bib]

MAFIQLSGVALSFGARDIIRDATLNLQAGSRAALTGPNGAGKSTLMKIAAGLLKPDAGDV
IISKGARVVYLPQTGIRFEYGTVHDIAEEGFRFFRNLVEEQERIGRQLESSGLSEKETAR
LLDQHHEIGETLENAGYWRREEKIADVLRGLDFKHRDFDRPAAELSGGWQMLALARILL
EDPDIMLLDEPTNYLDLEARTWLENFLKDYRGAVLVVSHDRYFLDVTVREYELFSGLT
RYAGTYSQYEARRSQELALFEAWERQQEEIQRIEDFIRRFYKESKAPQVQSRIKMLEK
ITPIEPEGMKRIHFSFPPAPRSGQVVVRIRDLKAYGNQLVIGAFSLEVERGQKLALVG
PNGAGKSTLMRLISGSDPYLTGSISLGANVQIGYFSQESAELMESSATVEEEAASVCPD
MLPKLRNLLGAFLFRDDDIEKPIVLSGGERSRLALLKLLKPSNLLVLDEPTNHLDLTS
KDILLEALKKYEGTVIFVSHDRQFLDELADRVLLESCGTSPLRYHGNAYYLEKKAQEAA
GETLSQSASFSPVENVGQNSPPVTDWENKARKAHLRKLKRREEEISTRIGAIAAEKQQL
QEQLAHPATYMNGEKTRATLASIEALEQEAENLNEEWMEIAEMLSAEES*

>SPBIB_v1_210175|ID:27163067| protein of unknown function [Uncultured spirochete bib]

MSLNSNENMHAARFLLIGLVLALVFSTLGIGCARLEGWGVVIWSVKGTTAKAGAVVPVYL
KSNISKTYVIGLPDDSKAKIEVPLSTLEFFSSKNAAEKRAKEFAPFASLYLSAGRDGLPV
REKPSVSTRRVYRLRLGESVVKVLSRVDGEAVFTGGRALPGEWYFVQATDGTGRGYVFSNTM
VLYEEKENAAAPVIGTSPAPSAALLDMIYAQPWRPAYYQLMLDDDAVDPDLFALQYGLFA
DAKNSQVRIELPGYSSVFRFSSVSQGGDWLIFEGSKLRVRFENESTIVADWSGTDSVLPD
EGWGSNAQSARFIKLDTSIPVVLSENSRRDSELKAFFQRSAMAQSNATSASTSTSTITF
LSDLAGILSIDARGTFEWSHTDQLPAGFAPEILAGSAGAAIPGAPATGAPTTAGPASNAP
ASSAATASVPIKGIKIRFGLHLGTSLSA WMGGFSLLVGDKPDREDYVYRFENGQLVIKA
SPVTLRGTTESLDSRFSFVNYL VVK*

>SPBIB_v1_210176|ID:27163068| Ppx/GppA phosphatase [Uncultured spirochete bib]

MSDTQPKDTARASTQTPRLHAAIEIGSTGIRLIVAELDAKGLRILDRASKQSRLGRDVF
TMGSISRDLRETIAILGSESELLQGYGLKPDIIQVIGTSALREANRDTFIDRVNLQTG
FHVRIVEDIEENHLMYLA VQKALQDERSFLSRANAMILEVGGGTTEVMLLKKGQMVSSHS
LSIGTLRMDEQIRESARQPREFIEMYLESNIKTACDVLAEPLDSVRTFVLIGSDARFA
AYCLSGKNFDHYAVLDRNQFVEFADSVASMSLQECMAQYHLSWSEAEGYAAGLTIERMFL
EKTGADIVIVPNVSIREGILLAQVQGMQKIEQELRRQVVASARSLAKRFHYDEDHATHV
KNLSLELFDALKKEHGLGKHERMLLEVAAILHDIGTYLRTSGHHKHGEYIVANSEIFGLN
REDINIVSNVRYHRKSPPLATHVNYIALPREARIVVLKLAAILRVADALDRSHSGRVRE

LSFERTEDRFLMRPSQSLDFSLEKLSLAEKGDMFEDVFGLLPVLI*

>SPBIB_v1_210177|ID:27163069|ppk| Polyphosphate kinase [Uncultured spirochete bib]
MNKLPMLNRELSWLDYNARVLAEGLKPSTPLLEKLNFMRI FASNLD E FFMV R VAAVKSAL
LNKQTSEEWAGMHPDLLDAIHQKVQQYDTLYAHLHEIVLPGLAANAHLSSQDAWSSR
EWRYLERFFAEKVYPLLTPLRLEPDYFYPSTGSLQVHVAFRLEGEQSIAIVQVPKNIDRFI
ILPQDLTIAAEPEAGQPQGNVLRALLEDEVLAFGSKLFSGLKVQHGLIFKVN RDADFSV
DEDRDDDFLAAMEEVL TGRQNSTPVRM VYTGSDQILVDALMRSALGPLDVYHVDWLLDL
GRTTALCDPEFYRGHGLVPAPSLFFSQWKPVRSFDEKGSIFDWIDEHDFVNL PYESFDV
VQRFIEESANDPSVLGKITLYRTSGMGSPIVHALAKAARSGKQVVVVLEL KARFDEEKN
ISWATELEQAGAI VTYGVARLKVHAKAALVIRRRQDGS IARYLHLSTGNYNEKTARSYVD
FCLFTAHESLCTDVALFFNILTGYSSIQSLSFIAVAPFDLKQRIIALIDREASQSTPESP
GLIIAKLNALSDPDIKALYNASAKGVQIMLNVRGVCTLIPGLPGISEHIEVRSVLGRYL
EHGRMLYFRNAGSEELYLSSADWLSRNMEKRIELFPVLDAELRARCKDILMAYFKDNTH
SYRQDQLGEWEDLSQTGTGGEARLCVQERLYKLAKKALHSREEKEEILQVRRSKSATAAP
ASKNPGD*

>SPBIB_v1_210178|ID:27163070|nagD| Ribonucleotide monophosphatase NagD [Uncultured spirochete bib]
MKATEETLKNIRKKQAFIIDMDGVIYHGNVLLPGAAQFVDWLRRQKKRFLFTNSSERSP
EELSQKMARLGIDVGP GHFYSSALATAAFLANQKPNGSAYVIGEPGLIHALYRVGYTMNN
INPDYVVVGEASSYNLDTLIKAVRLVIGGAKLIGTNPDLTGPGEGGLVPACGALVAPIEL
ATGRKAYFVGKPNPLMMRHARTLGATREETVIIGDRMDTDIIAGIESQIETVVLVTGVT
ARQDLPKYAYAPDHVLEGIFEIPEAIEHTPDEAAAGKM*

>SPBIB_v1_210179|ID:27163071| Alpha amylase catalytic region [Uncultured spirochete bib]
MISSETDAIYQIYLRNFTKEGTFRAAIPQLAHIASMGFTWVYLTPIHIPIGKEARKGLLGSP
YAIYDYRAINPELGTLDVFEAFVEAAHANELKVMIDVVYNHTSPDSVLAREHPEWFLKGP
DGKPARCEDWSDVDFDYSASPHLWVELISTLAMWRDRGVDGFRCDVASLVPAEFWKQA
RTRVNQYDPGVRKELRPLVWLAESVHPAFLRRMRSEGYGAWSEPELHAAAFDLTYDYDGW
ERLEVKKFKKRGQTPIFKYFEYLYAQETLYPKGAKKLRFLNHDQERAASRFGRGDMLKA
WTVLYQFLPGVALTYMGQELALEHRPSL FERDPIEPSGGDPHFEQFFVSSLKATTEAKRD
APFFSWSIFDDDVVFC LRSTAPAREATPIEEAMVKS GNYLLIARAGGGGRGQTSRAARLL
APFDIHGTELLSGEPVNYPRGSDIPSPALLVRLGN*

>SPBIB_v1_210180|ID:27163072| exported protein of unknown function [Uncultured spirochete bib]
MNKGIYDKNSGPAHNIAVASLAMAAIWLITPLRPAVSANEQKTAMLA WGGDLVVQTVYGG
RIAEPSPRGTRKK*

>SPBIB_v1_210181|ID:27163073| conserved protein of unknown function [Uncultured spirochete bib]
MSDAKSPSFAENRPLDTETTPFPGGPRAPETDFDDAFAAAAARDYRMLLDKEYPVDASLK
LVGDRYRLSHNGRMMLYRGILSRSASQINLAKLVRASWEGAELGIDGYNVLF TLTNYLHG
HPMFIATDGFLRDVGGAHGRIADHRGFERMAEVVAEMLSQLNLSKVTFFLDAPVSSSGKQ
AAFLREAFARCAVNAEVRL ENGVDHFLACWEGELIATADSAIIARTSAHVFDLARYILER
QFNAHFPPPLASLIA*

>SPBIB_v1_210182|ID:27163074|plpC| Outer membrane lipoprotein 3 [Uncultured spirochete bib]
MKGSWMKGTKVSGKAAA AVKRAPSLGRTLIAFAFLALFVASGFAQTGGKLVTLKVGATPI
PHGDLLQLVKPDLEAQGIKLEIVELTDYVTPNILLA EKQLDANFFQHLPYLNDFCADRKL
QLESAGQVFVAPLGLYSRKYKKLEDIPAGSVITLPNDPTNEARALILLENKGLIKINPKA
GLKATIRDIAENPKRIVFREIEAPQLPRTLDDAAA IINGTWAMQSGFIPARDSLILEGA
ESPYANIVAVRKGDANDPRVVALVKALQTQKVVDYLISKYNGSFVPAF*

>SPBIB_v1_210183|ID:27163075|metI| DL-methionine transporter subunit ; membrane component protein of ABC superfamily [Uncultured spirochete bib]

MNEALSLLAKPLGETLLMIAASTLIAGILGGLVGIFLALSNDRFAGKHRGARFAKRLAD
RAINMLRSFPYIILMVLVLPLSRLIVGTS LGTLAAIVPLSVA AIPFLARIVESALSEVDS
GVIDA AISCAASKTRILFAILPEALPSLVSGTLT MISLLGYSAMAGVIGGGGLGD LAI
RYGYQRFRGDVMAVAVVTIILVELIQFSGTAIARSIRAKR*

>SPBIB_v1_210184|ID:27163076| DL-methionine transporter subunit ; ATP-binding component of ABC superfamily (fragment) [Uncultured spirochete bib]

MFHAGRPEEAANQALIAHPPYQAPLAGDRTPMPGAVFQDIPVSASIFPRTALRLDAISKA

FGSHTVLDEISLNPVKGQIHGIIKSGAGKTTLIRIAGLLDKPDRGSVFFEGINAPVHEL
RGQELLEARRKVGFIQSFNLFASRTAGENIAFFLEAAGWPSAKIRARVQELLDLVLGLAD
KADRPSSRLSGGEKQRVAIARALANHPSILLSDEATSALDPETTRSVLDLIRNLRDMLGL
TVVMVTHQMEVRRICDSVSVIASGSIVEEGLVSEIFAHPRSAAKAFLKEGQHE*

>SPBIB_v1_210185|ID:27163077| putative Positive regulator of sigma(E) RseC/MucC [Uncultured spirochete bib]
MKEAATVTKIDGMVTIAVKMQEGCGVCGNNGTCKIRMSNLLAYNKNHISIKEGENVIVE
VPSVEQAKSAFWVLGLPLIMLFVGYGVGALVFRAPTEGPAVASAGAGFVLALLVGMMVQR
RKRLESFPYILAKEGEGLY*

>SPBIB_v1_210186|ID:27163078| Phosphoesterase family protein [Uncultured spirochete bib]
VAITIVFFGEIVGKTGVFTVKSTMAEIRRRFQPDFVLANADSATGGAGLGIQHAVYLRKL
GIDCITMGEAAYYKPDMEFYKAGWVLRPANLPEGDPGRGWKIFQKEGKIAVVALLGQ
SGFARVHADNPFPAVDQLSHILHRETSCIVVNFHAATTAEKLSLARHADGKVSALLGTGG
KVLTA DARILPKKTAITDLGRIGSILSVGGFDPEVKVKEFLTGVPAWGDASAQPEAQG
VCIRFDDEGVALSIESFRIQGKEIVDEGSSDSNQN*

>SPBIB_v1_210187|ID:27163079| CMP/dCMP deaminase, zinc-binding protein [Uncultured spirochete bib]
VSDYRRPTWDEYFMEVANAIKCRATCDRGRSGCVIAKDNQILATGYVGAPAGLPHCDDVG
HQMCKMLHEDGTITEHCVRTVHAEQNAICQAAKRGVAINGATLYCRMTPCRTCAMLIINC
GIVRVVAEYRYHDAAESEEMFKMAGIKLEYVHNEVLKYDRQ*

>SPBIB_v1_210188|ID:27163080| Peptidyl-prolyl cis-trans isomerase [Uncultured spirochete bib]
MKHRSVFSAIILVLSSFSIISCQAQESRPDGMAYAILKTNKGNIVISLEFEKAPLTVGNFV
GLAEGKLDATKGPYNGLTFHRVVADFVQGGDPIGDGTGGPGYRFPDEIVPDLKHDAP
GVVSMANAGPNTNGSQFFITLEAAPWLDGKHSVFGKVIEGMDVVKQIQQGDRIESVTIQR
FGAKAKAFDASQKAWDQRLSAAYATLNALNAQKRESDLALIAQKWPDLKPDEKGFQKTI
RKGFGDTPKTGSKVSVIYKGMLLDGTVFDQSSLSGGPFSFTIGKGEVIDGWDSVVSTMQK
GEKRFVIPPPELAYGAQSIGDVIPPNSFLAFEIELVSIRE*

>SPBIB_v1_210189|ID:27163081| protein of unknown function [Uncultured spirochete bib]
VQHRNPYFGTIGDIEYLQPIINAIGDFGNSDSRISLIFMIISF*

>SPBIB_v1_210190|ID:27163082| exported protein of unknown function [Uncultured spirochete bib]
MKGISRIAIRSFLAILLILSLPFAASAQTPGKTSATIQLAVYVPPVLQSLDFAPNGAAN
IVGYLGTNPGGFRNGFELKPYSIFNLGAARLVSNLTSSYSIVVQSMNGGKLNQSSGSEI
AYDLLIGGMPAARYGDSFRMVTAMKTARDGTDLPVSIALGNIPASASYGVYSDSLLFNVM
AN*

>SPBIB_v1_210191|ID:27163083| OsmC family protein [Uncultured spirochete bib]
MTKEIQMNWLDGMAFQSELDGHTLVIDADDSVGGTNRGPQPKGLLLVSLAGCTAMDVISI
LKKMREPVSWFNLKVSGLDTEEHPKKFTSFKVIYQFKKSDGLNPDNVQKAVELSQNKYCG
VSATLRKAADLAWEIEYI*

>SPBIB_v1_210192|ID:27163084|fusA| Elongation factor G 2 [Uncultured spirochete bib]
MAFDIQMMRNIGISAHIDSGKTTLSERILFYCRKIHAIHEVKGKDGAGATMDSMDLERER
GITIQSAATNVQWKDYAINLIDTPGHVDFTIEVERSLRVLDGAILVLCSVAGVQSQSITV
DRQLKRYHVPRLAFINKCDRTGANPFKVKSQLGEKLGPNPAFVTIPIGLEDKFEGVIDLI
DMRAVYFDGPNGEELRFAEIPAHLVKDAERYREELLEAASMFSDELAEAYLEGEVTKDLL
LAAIRKGTIEEKFPVPFVGSAYKNKGVQLLLDGVVDFLPNPSERHNVALDLSNNEAEVEL
KADDKAKTVALAFKLEDGQYGQTYVRIYQGMIRKGDELYNTRARRKFKVGRVLRMHASS
MEDINEGSCGDIVALFGIECASGDTFCHPDLNYAMTSMFVPEPVISLAINPKDTSKSSDQM
SKALNRFTKEDPTFRTYVDPESNQTIQGMGELHLEVYIERMRREYKCEVTTGMPQVAYR
ETITQRADFNTHKKQTGGSGQYGRVAGYIEPLKDEHYEFVDMIKGGAIPAEFIPSCDKG
FRAAMEKGTIGFPVTNVRVINDGQSHPVDSIDIAFQLAAIGAFREAYEKAKPAILEPI
MKVA VETPNEFQGNVFASLNQRRGIIMANTEDGTFSRVEAEVPLSEMFGYSTVLRSLTQG
KAEFSMEFEKYAKVPTSISEQLRKDYLEKRKKDQK*

>SPBIB_v1_210193|ID:27163085| conserved protein of unknown function [Uncultured spirochete bib]
MLKEEFIRKSPVRIFENSIEGGLHAGDIGVLASKKGIGKTSVLVQIALDKLMQGEKVIHV
SFNAHTSYIISWYENIFSEIARRKNLENIDDIKEQLVRNRMIMNFTQEGVSVDQITRTIK
ALINEGGFNAKTIIVDGFDTRATAERFEKVKAFLEAEMQLEAWYTCTLAEAEPLDPPQGI
PVVLR EIEPLISVIVVLEPKKDFIHLRVVKDHERRNPSDMNLLLDPRTLIAEA*

>SPBIB_v1_210194|ID:27163086| conserved exported protein of unknown function [Uncultured spirochete bib]
MTYAACFLLGAAPAGADAKASRTTSGRGCWRSALIFFIIAARSLFAQTLQRLSFSGF
E WYVRQTTEPEGPMNNLFGGTGTSVDVLPDGLRLSITYREGDWYAAEVWTTKSLGYGTYT
FRIRTPLAQLHPDLIFGAFTYSRALGYFHREIDIEFSAWGKKVSDLRGQYVIQPFDKQGN
MHSFPAKPYAGPSSQQFTWLPDRIEFASWLGYGKPPAGDPRLIDAWTFNDAKSIPKPSA
AIHMNLFLDGRPPGKKDGLQLVIIDGFEFKAAPK*

>SPBIB_v1_210195|ID:27163087| putative 6-phosphogluconolactonase [Uncultured spirochete bib]
MILHVYTSDDVWLRAASEFIFSGLSEAREVRNAREAPQRSLLHCLAGGATPKPIYEALAR
DPQCAEIANARSIHLWVGDEREAEPGSGFRNSEMIAAAFYKYSPTAFVLHQWPPGRRALAA
RTYEEELSTFASERVRANQPIFDLTILGMGEDGHTAGLFLSDDFQSPADSLKRATILPNS
LVMLTEAPQEPKSRMTLAPEILRSSRRILVLMQGLTKVRVLIANLVGEREDPIKHFLNET
CEVIARI*

>SPBIB_v1_210196|ID:27163088|zwf| Glucose-6-phosphate 1-dehydrogenase [Uncultured spirochete bib]
MNIATDMPYCRLDTRFSPQPALFIVFGASGDLANRKIFPALYDLYLEKQLPDELLMVGA
ARRNYSTKEFREILRASCLAHSRHQDEALHTDAWHAFSQRVFIQNDVADPQSYEPIRRL
VGEQDRSVLEGLAPHIAIPHNILYYLAVTPEFFPVIENLGRMGCGSNASAPGWRRLVVE
KPYGKDQRSAAASLTEALHKWFEERDIYRIDHYLGKEAVQNLLHFRFANTIFEPVWNRNYI
DRIEITVAEQEGIGTRGGYYDGFGAARDMLQNHLTQLLCLTVMPEPATLSPEHIRDEKVK
ILRAIPDYSPQEILARARRGQYAVGTNARGEVVPDYLNKAVRPDSTTETFASLTLSVEN
WRFSGVPITLRTGKALAEKYSEIVLYFKRPPSALFAAQCGDLLAPNSLTVRIQPDEGIWL
SFNAKVPGEPAIRANSLRFSYREVADYFPEAYERLILDALSGDSTLFIKRADESELAWQVI
DKLEAAWASADPKAAPESGGLLKYQAGISLRDLIAQVREPVLREPVLREGLV*

>SPBIB_v1_210197|ID:27163089| putative RNA methyltransferase YpsC [Uncultured spirochete bib]
MRAIAVCAIGLEKVLARDLAHLGFREVGRSAGR VVFNVSTNALAEDLTKANIGLRTADR
V LLVVGEFKAFDFDGFYQGIYSLPWEAFCAKDTRVLIERARANGCKLHAQATLQSMQA
KAI YAALMEHFHVRNMPETGRMLEVRIYGDNDWWQIVIDTSGEALSRRGYRRFTHEAPL
KETI AASLLFLAGWSRSRPLIDPFCGSGTIPIEAALYACNAAPGLKRRFAFEDFPEMDQ
NKVED MRLFFRQQVRRDIRDIRASDLDTKALELARRNATLAGISEFIKFFNADAREL
VPPEAAI RSAEVRGDMAQSGIVTAGAASPGAASGPPAGTRGIMLANPPYGQRLASP
DEARALYRELS PMLKRYLDAGWECGFLSADKEFGAIGVEPTSVRMIVSGQETIFFN
WFSAGIAEAGGHAP RSSNEHRRSRAPISPNEHRSRPSGSPQADPQRRPSGSPQEIR
QGRAPRSPSQ*

>SPBIB_v1_210198|ID:27163090| Iron-containing alcohol dehydrogenase [Uncultured spirochete bib]
MQNFEWVTPTKVFFGAGILNRLGLETSLWGKRALFLYGKGSIKTSGLYNTVVAQLR
GANI FFVEHADVQPNPRIAHATEGARKAKEHDLDCIVAVGGGSVIDEAKAIAV
GALHDEPLWDF YTRKAVFRDALPIAVQTLPATSEMNGASVMTNEETHEKFSIR
GEMLYPKLAFLDPSLT LSIPVQYTA YACTDILSHLMEGYFTATADFP
LQDGMVEGVCRAVMGSLETILKTPRDFEA RSTIMWAGALAWNGLL
KAGVEGASIPNHMIEHPLSGMYDIAHGAGLSIVIPAWLKYMKSH IAHRIVL
FGQRIMGLEKQLDGKPAIEASDIVIEALEAWYQHIGTPIRLKEAGLQALDIDA
CTKQAMALSKLWGVPGYTEADIRAIYRLMA*

>SPBIB_v1_210199|ID:27163091| exported protein of unknown function [Uncultured spirochete bib]
MRIRRMYSWAVMLLALVIAMMSLPDLLAAAQEISNLKPLLHVQTRWFDIYAPHELEAQA
WRLSSFADNTYSKLNFFDTQPSRHRIPVLISDIAHSLNGYSTLLPSNRIVIFLASADPR
GQLASMADELESVFLHEL VHCITLNERKGGWKALAWLGGDWVAPEGWMMMPQAL
VEGTAVW AESRLSAENGAAGESRAEDDVAGRENQASAKSGRLNDPAALQIVRIE
REWQNRLLWDVS GLADFYGSGSLAYLYGGLFADYLAERFGPEILGQLWHDA
AAGNIFRFGFDGTALSKGILEV KTGVRPQTLWADFLSWIDSGMEKAGEVRDA
VELFSGYIGAFDVGEGVVYYFDGDKKGVYA RAILDGQRKGVESQ
GKEAESRGQTEPRRLFAADENLRNIRFNVRFHALDIDWIRPLPDG RTIPARY
QFDFETKTL SYIRDLPIPPAGAALAVAQNGSSRENIFLYDPWTDPESGTDYGL
VRLGSTILPARRTAEGKTEMIDIPGYAVRWISPGFRLDSEGSAAARGIRFALT
LIPENGI SRLGILEEEHGSWLLL VQNAPEGGICQPVYANVTKIVYLSSKKDGL
KALNVL DIGEIDK QSTSASSLSTIPVEWQDAVRWAQLHYLEAMQEPKQTA
AIKKTDTLFPALFSSSRIPYAE GNTAGLVL TGSDLSEAAWQVFAGWDFSN
WRPSESAHIQLGAGEWHVLFVSADQSVLYAS LGRVSSVSAVLK WERSFV
PLFRSLSADLHGIFAGFQDAYPLAEVFLSPDSTSWAIGLDA QYQSLYRSR
KPPYDQYGFALAAAGADYEVASRSGFGGMSLGGSSITVPGRVGLSAYGAYAPF

GGVAFSPALRLLASGSSIMPSAVQAPYPSYREYSSLLISLSNWWYAFGEVDVRLFSIEAGWM
LRMPLSPSWALRRIIGRAGVRGAGLEIDSTPSALCSAFARVEFDLAILAGMVATSHTMFS
VEAAWAFMAQKVGGSPHINIGINAEL*

>SPBIB_v1_210200|ID:27163092| HAD-superfamily hydrolase, subfamily IIB [Uncultured spirochete bib]
MKNSESRLQCLRPIASLTPQEARAIRYVLMDDTLTTDGLKPPESYAALWALHKAGLIV
IPVTGRPAGWCDMIAREWPVDGVDGNGALVFWESEGRRLKSMTHPDAVPNSDPRLAALR
DQVLAQVPGTRLARDQFSRLYDIAIDFAEEEPILPLTAAQSIKALFEGGGAHAKISSIHV
NAWMGEYDKLSMVIRYLSARFSYDDDRNRATVVFVGDSPNDEPMAHFQMACGVANILKY
RELISQLPHFVTRRESGAGFAEFTATLLERRAAKASP*

>SPBIB_v1_210201|ID:27163093| conserved protein of unknown function [Uncultured spirochete bib]
MAVVISASRRTDIPSYADWFFERLMEGFVDVRNPNPKLMRRVLLDPESVGCLVFWTRD
ARPMLSRLDELEPYAFYFHITIIIGYGAALPSGPLASEAVEMLKALASEIGQNRVIWRYD
PVLLAGCYDANWHIRNFAALAKELSGSVRHCVISIYDAYRHTDVRLKKAGFLPLCGARGG
EGASEKSSAHYQLLAKELTEIAASEGIFVSFCAEPELQQVQPSLGLGCIDSAIISELTHQ
SFSSRKDKNQRPACKCIESVDIGSYGTCPRGCLYCYADRTGKKQARNSSG*

>SPBIB_v1_210202|ID:27163094| Phospholipid/glycerol acyltransferase [Uncultured spirochete bib]
MDTIKSKYAHLIGEIIAHVPQNAHVSEENVYQQGIAALLPYIDTIIHDYIDDCSDIEGIE
NLASLHAHAKRGESCLMLMEHYSNFDLPVFHYLLRRSGQKGEEIASDIVAIAIGIKLNEEN
PAVHAFARAYSRIVIYPSRSMQIIKEKYKDPKELYQEIKRSISINHAAMKALSAAKESGK
LILVFPAGTRYRPWDPSKRGVREIASYIKSFSKFLVSVNGNILRINPSGDMEDDILQK
DRVIYNVSPVHDSKEFLASVKYDLHFRDDKKQAIVDTIMDLLDAMHKETEDRCKG*

>SPBIB_v1_210203|ID:27163095| Rhomboid family protein [Uncultured spirochete bib]
MQTNSILRRPFRFRFFNATLYLIAANVLIFALGYVWPMVTYALALSPQAVMAGWVWQVFT
YMFAHANLTHLLVNMLGLFFFGTPVERTLGSLEFLLYLLSGTFAGIASFAIYAFSGAWN
TMLLGASGAVFALLAFGLVYPKAMVYLYGIPIRAPLMVIGYTAIEIVFTLLGAASSVA
HLTHLAGFVAGAA YFPVRLGMNPFKRLRER*

>SPBIB_v1_210204|ID:27163096| conserved exported protein of unknown function [Uncultured spirochete bib]
MKKYALVALFAVAVFGMAFAVVPPTTQSGTVSISGSVAEVFSLVTPETYGTIANGSTA
ETWSIGNVVVTSNVKNWTISVSSANSGLVHSDNTEKIA YTM TLGSLVTDQSLASAWTS
AAQPRTAKVGNSYALS VKFGPSADYYQAGTYGDTLVTISHN*

>SPBIB_v1_210205|ID:27163097| protein of unknown function [Uncultured spirochete bib]
MKTEPDSEGRKGSTFSIALSCVLCALAI FSFLMLRESAYRSESALLKSVSEKVAGQISAK
IQTILEIGEQRQLLLTDSGKTYASLKL LADESLAKLQYIDSITVAPGAI VRYCFPEEKA
SGAIGRDLLDGPDRMQALVRAVSRKKA VLQGPTLSADGRNLAFLRVPVFNGADLWGFVSV
GFDTRMIEYLELGAAFPGLIAVASSEPEESGNSVFWGDQSAVQGYPARVKAGVENVSW
TVYAASNYPARQAIWWGVALVALSILSLGLFVSRI FTGRHLPERTMGVNIKAELALKEAS
FAVAPFVPQEKVEKVWPGASEAECDELPRQAALAEDEADARIPGAAPSSEQPGPPGSP
ISMSGAPVSPAQPGTNETIRLAPERPVSVLVVDDSEVNREILLRMLALKG YEAEAVDSGA
AALSTLKKRTFDVVLIDCIMPDMDFALAREIRKSEASTGDKKKPVALIAMSPRHDL EEA
ERSSQAGFDSLLVKPFTMTALDQKIGERVL*

>SPBIB_v1_210206|ID:27163098| exported protein of unknown function [Uncultured spirochete bib]
MKKFFLLVLAAMFSGLPVFAADSVSTTLQATVGAALSITTTIPGTKALDPTQTS AALGSV
TITSNL TNWKIVIHSANGGKMVRS GSTDVYPYL VTFGATTGIDLATDY EIIKSAPQSAVT
TNVSVTYQTAATLGISAGTYEDVLTISLVAI*

>SPBIB_v1_210207|ID:27163099|secF| Protein-export membrane protein SecF [Uncultured spirochete bib]
MKRLIRFSKFFLPAMIISSTIIVLGLIGYFTKGFNLGVDFQAGINETIQLAYPAGEVSFT
GKGNAELTVSETQLMLVFSGAEAQKRTVALDYKSYPTLADIKAA LGKETGISVKLSEGS D
ALPSSSIVPTYQGNTLLSVNPVKLYRAPINDSERFASIDIVREALKPLGQVSVQTINPVT
SQRYLVRVRDDGKNPQFTTMIPQTIRQLIEDKVGKDRVVVVKTDYVGP RYSQTLGQQSAW
LVLVTL LLLILLYSTIRFKIEYALGAVLAIMHDALIMVAFIVWTRMEFNTTTIAAILTILG
YSINDTIVQFDRVREERKIHPSERFVDVLDRALTLTLGRSVITLTTMLAVLALFLFTTG
SIKDFALALLIGMTSGVYSTIFIASAFVLMWENRRAGKERKQAKLQKDV PDKAPGKAPAG
V*

>SPBIB_v1_210208|ID:27163100|secD| Protein translocase subunit SecD [Uncultured spirochete bib]

MSKFRLLVVI AVLAVAFMFLFPSIQWYFLTPKEDQAI AVGSREQIREYSRRMTYLIITD
LKQKATAKDTTDL SGQKMYSVAIESAKKAYSLAKKPAPKTWDAI AILSAFSGERSMFD SI
ESRYREHVL SLKNVHSNAVQLGLDL AGGMSAVIQADLKGLSEKLG HDLSSAEKEDAMKRA
VEILNSRIDKFGLTEPVIR RQGEDQIYIEIPGAADPERLNSIIMGKGNLAFYLVDSEAST
AVSSYLATNPV GIDEQTMVVDK PGLVPEGKIVRKVYK KDSYGLDEFTGEYLVLEGK PGLD
GSHIQSATVSSDPITGKPETNFVLDKEGGDLFYKLTSENVGKTMAVVLDDR VKSYARIQE
PIRESVRITGFSSDEAESLALLLR TAALPISLSVVSQQAIGASLGEDSIAQGR TAILVGI
LSIFVFMFAYYKWAGLNATIAQVLNLYLMLS VLTAFKLT LTLPSIAGFVLT TGMAVDANV
IIFERIKEEIRAGKTRAAAIDAGFHKAFWAVMDSNITIIAALFMAQLGTGPIQGFAISL
AIGNITSLFTSLFV SRLIFDFETDVLHATHTSISWRVR*

>SPBIB_v1_210209|ID:27163101| Preprotein translocase, YajC subunit [Uncultured spirochete bib]
MNGIQNGLVLLQGT TAANPTGQLVSTIVTFGLVFVIFYFLIIRPQNKKQKDMQKMIAGVK
KGDKIVTIGGIHGVVA AVKETTVMVKVDDGTRIEFSKSAIASVSPAKAE EKASEPVEEAA
EKAEDK*

>SPBIB_v1_210210|ID:27163102|yqeA| amino acid (carbamate) kinase [Uncultured spirochete bib]
MAARKTIVVALGGNAIIEEGTEGTTEQQFENTR KSMKAI VGMIAEGHKVVLTHGNGPQAG
VHLIRNEAASAQVPPSPLNVIVADTQGS MG YMIAQSLANALRAEGIEKDIVTVVTQVEVD
PNDPSMQNPSKYVGP FYKAEQVEKLRERGWIKEDPMRGYRRVVPSPKPLDVIEKDTIKD
LIDDGKVVI AVGGGGIPVKRDTDGMLSGVDAVIDKDRASALLASLIDADELIILTGVDKV
AINFRKPDQQVFDHLTVAECEKYMAEQFPKGS MGPKIEAACDFIRRGGAKVIITSMENA
TAAVDGKAGTVITA*

>SPBIB_v1_210211|ID:27163103|ispH| 4-hydroxy-3-methylbut-2-enyl diphosphate reductase [Uncultured spirochete bib]

MCMGVRRADELARQA AQEAANEGARVFTY GPLIHN PQAVAELEALGVHVLDTKEVEDGSA
SIPDLNDAIVVIRAHGASLAAISRMRMGCRIIDATCPRVIKSQRLARHYEKL GWQVVLI
GDPRHGEIAGILGHTSNAIVVDGPTTALKIARKLKDKPCALIAQT TIRQEDYDAVIAIFQ
ANVPTITAECTICPATRERQQALVELCGQVDAVLIVGGKNSENTKRLYASAI ECGKPAWH
IETASELTAEMARYERIGITAGASTPDFIVDQIQEVLGAMASRRKFTLAGGQS*

>SPBIB_v1_210212|ID:27163104| Nitroreductase [Uncultured spirochete bib]
MNILHEIEDRRARRGLSEEPIDERIAAELVYAATLAPSCFNNQPWRIVMVSNEPGSAQAE
GIRAALTPGNAWAQKASWFFVLCTAAHLDCRMDEGRDYAYFDL GQAAMAIELQAQHEGLI
AHPMAGFSPSKVRAALSIPKEIVPLV VLAIGKPGPTDALSEQQKASENSERIRKPLGEVV
FLGSFGNPLQG*

>SPBIB_v1_210213|ID:27163105|udk| Uridine kinase [Uncultured spirochete bib]
MPPVKIIGISGGSGSGKTTIVRKISEMVSD FVFLPQDNYYKSAEFINNRNITAFNFDHPD
AFDNDLLIQHLTSLKNGESIDMPVYDFVHHRRT EQTIHIQTCKLVIFEGIMIFTNKQVRD
LIDLKIFVDTPDDIRFIRLSRDIKERGRTVDSVVEQYLT VVRPGHYEFIEPTKAYADII
IPEGGFNERALDVLVTFINSVVYP AEGREKADSVPERKPPAVL*

>SPBIB_v1_210214|ID:27163106|msrA| Peptide methionine sulfoxide reductase MsrA [Uncultured spirochete bib]
METGEKTEKALLAGGCFWCLEALFKRVPGVLSV TSGYCGGAAPHPTYEEVCEGTTGHAET
VEVVDLAVISYREILDFFWKFHDP TTLNRQGADIGE QYRSVIFYLDANQRELAELSKSA
AQAAFDRPIVTSIEPAGHFWPAEAWHQKY YERNPDAPYCRFVIAPKLAKLR*

>SPBIB_v1_210215|ID:27163107| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]
MNILTFVNVLSIGIPFSVALLLASTGEMFNQRAGVFN LGCEGIMSMGAFLAFMPAHL LQ
NTSLAPYANLIGIAAAIAIGALFGLL FALVTVTFRAPQGIAGIGLHMFGWGVAGTLFRYF
VGGVTGVPGLKNLPIPLLSRIPIIGPLL FN L NGLAYAAFILVPASWYILFKTPWGLKVRA
VGTYPRAADTMGVNVSRTRYQALVAGGMLAGLAGAYLSLGQA KMFADDIVAGRGFIAVAL
VYFGRWNPYLILGGSLLFSVAQSFQLAIQVLGIRFPYEFAVMLPYVLVIVVLALTPGSVT
RGP AELGKPFDRKRV*

>SPBIB_v1_210216|ID:27163108| ABC-type uncharacterized transport system, permease component [Uncultured spirochete bib]

MKSTYRALYIFAISLAAALAAILLGAVVLEILGKDPLAVYK VILTEPLKDLFGLTEISVR
MVPLILVALGIAISFRSGILNIGAEGQIQMGVIAAAAAAIYLPPLPKIVILPLVLVAGAL
AGAIWASIAGWLKAKLNVSELLSTVMLNYIAAQLYGFLLRGPMIDPAELQVGS GTPQSVR

LPKAAWIDRIIPGMRLHYGFVIAIVLAILVYVFLWRTKWGYALRAAGAGPKAARYGGIKV
ETCLIAAMALAGAFAGLAGAIEVTGLHRRRAIEGISSGYGFSGIVVALFGGLHPAGIVPSA
FFFGLLLIGADMTQRIMSVPANMVLVLQGAVILSIIAAKMLIADQYLFERFARMLEKRGR
KAAGGKTKAGAGKAGAAKVDRRREQP*

>SPBIB_v1_210217|ID:27163109|yufO| Uncharacterized ABC transporter ATP-binding protein YufO [Uncultured spirochete bib]

MNNEPIHSLAVEGITKRFPGLACDSISLDVGEHEILAIVGENGAGKTTLMNILMGLYQP
DEGKILINGREVFHFRTPVDAYATGIGMVHQHFMLVPNLTV AENVLLGMREFQKFLWQDME
GVRKRIREISERYNLPVQPDAYIWQLSVGEQQRVELVKTLC LGARFLILDEPTSALTPQE
TDDLIALLLKRMSSDLSIIFISHKLAEVTALSDRIAILRQGKV VYRGTTSQSVSNLASLM
TGHEVVLPCNECTGGSGETILEIRNLKVRSDRGFFALDGLSLSLQKGEILGLAGVSGNGQ
RELADALAGLRKVESGSILFRKKELANKSPRSIIEAGIGYIPEDRNEEGIVPPFNVRDNL
ILKDFRSKHFKGPFRRFDETRQNAEELQKRFDIRCASL NVAAGSLSGGNIQKVILAREL
ARKPEVLI AVYPTRGLDMGAEEFIHERLLELRSQGTAILLISEELDELLNLSDRIAVIFK
GKILATMPTRETSKKKLGLLMAGISGEGAA*

>SPBIB_v1_210218|ID:27163110| putative ABC-type transport system, periplasmic component/surface lipoprotein [Uncultured spirochete bib]

MKRFLCVLIALCLIAGAAFAAPKTKVKIALIVESTVDDK GWCQSMHDAITAVQKKYGTAL
VEYSYSEKMKPVDAGSAARQYVAKGFDIICHGAQYKNLVLEMADDFPKTTFAFGTSGEI
GPKNVFTYMPSEETGYINGIAGLVTRTNKIGLVGPVDGGDAARYNRGFILGVKAVNPN
AVVQVAYTGSFGDFVKAELAHTQIKAGADVLTGSAQQALGALRAVAEYKDKPIWWLGQD
TEQLKVPESYKVIAAASYAYAAVVEQLIDKRQSGVLGGEVIPLNFANGGFIYKFNDNVGP
VLTADIRKQAEKALADITASKLTIAWQSVK*

>SPBIB_v1_210219|ID:27163111| PP-loop domain protein [Uncultured spirochete bib]

MKHARSTLAKL TEVAIRRYNMIEEGDRILIAVSGGKDSSCLAWDLALKRQWWDVPFEIAA
CHVATDLASAGYSNPVDDSWLKAKMADWNIPFVRIDVPVAGRLKPSETMNCYWCATQRRT
ELMKY AQANGFNKLALGHHMDDILETLLMNMMRKGEFATMPPVMPYRKYPLTVIRPLALC
EERQIIACADELGLTSHCTCSFNLDGERKKT KRLIDQITGGSSHVKNIFASMSRIRPD
YLA*

>SPBIB_v1_210220|ID:27163112| putative 2'-5'-RNA ligase [Uncultured spirochete bib]

MRLFAALPLPAAAQHRIA EYCRTIAPSFALARPSWVPEENLHLTLHFFGELDQKNAATLQ
NLLEAEAINCPSLTLRIGNLSVLPSLRAPRVL YLHTRIEPAAPLFLSLIDRLRIIAAQIGA
ETDSRPWKAHLTLARLKEPWIPELSSLPAAPEISFAIDAFELMQSRLTREGAMYS CVRRY
AFLTCSR*

>SPBIB_v1_210221|ID:27163113| putative Diacylglycerol kinase catalytic region [Uncultured spirochete bib]

MKPDDLAEGLNAIFARSPVFPEKSLIIDVIANPKAGGFSRIHHSRKR FNELKEIVRRSLQ
LPERASPYALKMHLTERCGHAAIVQRILDRSPSNGKDSCHLIITAGGDGTSLETAERLT
KLPESEKDRFGLVRLPFGTGNDGSEGRDLLVALGRFLGSAAFERRAALRVTPSEEGGLP
RYSFNIASIGLDA YVADMTNRLKRHFPGDSYRFWVNIGTLFYDRIYNVGD MHLKAWGEDG
KIVMDSTGPRLLVAMGVSGNRQYGSNKKILPNDTNCVAVSQTSLFRKLILKGPIEQGRHE
NIPELVHFSAEKLMIEYGERIPLQCDGETNELAKCDFPLIMERVRNA YNVVVPVLA*

>SPBIB_v1_210222|ID:27163114| Multi-sensor signal transduction histidine kinase [Uncultured spirochete bib]

MILDASSLIPALSFCIYIPFIVFGLASKKERNVNSFLEYMGFMALWSFGSFM MHANTGLF
TPLIWNRVMLVGLLGGPITIFGTLIYFSRTEKRRYRILLYFGYIIYIFLL YLNFSGKIIVT
DAGFEGNVFHYSLGPGAPIAYSLSYFYLLAILLILWELRTNPDRFLKRSLRLV VAGVVI
MLLGVAANLYAPLGRYPVDLLAATINAAIIFSVYKYRLVHYSAVMLNIFL TLLVIIFAS
VIYMLFFVPVFALDRVIPFSELALLSVLLGIVSALLSPLRTATQALLERI YGGKSFLYY
QELRKFSADLTSIVNLEDLAKLTVDNVISTFKLEWAFVLINDYNARNFRII ASTGLAF AE
TYGETTDQHVI VPRTDQFVQAYQLRTIQNQAA YQRTISIKLSKGEINETVQASLVLPLK
FKERLNGFIVLGPRIEKDYNNQYDLEILQFLTDQASVAMEN AISFERLRQQQKRLQETNE
ELTLNRNKLEAFFDGIATPISIQDINYNIVTANYAARRYFEKPLEELV GSKCYKVYFN RD
RPCAECLAQDCLHTKLPFSAEKQDSRTQLTFALNFYSIPTPKGSVGSFIEFFQDITKQKT
LQEELIQSEKLAGIGTLVSGIAHEINNPLGGILGTADLMLPETPESSTLREY TLDIIRYA
QSAAEVIKDLMTYSRKTRTSAEPINIITILENSLKMAMRGIDFGTIIVRKSYDSVKEILA

NPTELQQVFLNLIIVNAVQAMNSDGLTLSCRQEEDDVIITVQDTGTGIDKENLDKIFNPF
FTTKEAGAGTGLGLSIAHHIVTKSGGRILLDSQEGKGTTFVILLAASQDKDRHLIHAKE
ETRFEDSFYLQRKVLVGEKGYQEETIRRKCDDEVAFHILAYKGLQPIGTVSLHLSEEEGR
VPIEENFSIAHYLDGSLYAEIDRLAVAKEERGSLIPFSIMALAYLYARGRGAKKIFLDVF
SDEVKLIKMYEKLGFEEIGSYSKPLPCTVMMMDHVSRYEQEVSMEHFVKPFFSRLVPKI
DFSGQDLHYVMKAMDEISAKFPKESADEQQVGEAM*

>SPBIB_v1_210223|ID:27163115| conserved membrane protein of unknown function [Uncultured spirochete bib]
MVSIIIFICGFAVLMFAEWRYVHFSSRKSQRALRGKTPGLLPGHHTALQAAGYIAVAAGMLI
SLLHEGLALHIPPLVRTISLCIGLLGGALLVWTVFIEIPVGAKKHAVEPGCAYHYGSYGM
CRHPGFWWFLIFTLGIALWKSDFYAFLLFFFENALNLLLILLQDKYTFIVQFRDYQEYQK
KVPFLLPGPKQDG*

>SPBIB_v1_210224|ID:27163116| Response regulator containing a CheY-like receiver domain and an HD-GYP domain [Uncultured spirochete bib]

MTTLQKRTVLIVDDDVSMMQKVLSSLMSKKGIEYAIKNGREAIIDLLESGLDISPDAILLDI
RMPVMPGLAALPQIRSILPSVPVIMLTAFGDLETGLAAMKSGAFDYLKPKSSIDKIQETL
EKALSYRDIMEMKAEERKREYRLELEHRVESSYQELGDVYRKLKQMNIAAYALAETI
EAKDRYTQGHCEVRWLSSLLGKVMRLPDEEIEQLEYAALLHDIGKIGIPDSILNKEGPL
DDRERDVIRMHPIIGAQILSTVEFFAKAAAAVRHHHERWDGKGYPDGAQGEQIDHLARII
SLADTLDAMATSRPYRTALDFDEVISELKSMRGTQFAPDVVDAFFAAELDKAYLKRLEE
TGKNII*

>SPBIB_v1_220001|ID:27163117| conserved protein of unknown function [Uncultured spirochete bib]

MTEALSFAEREQRKRTIISYAVAIGLYALLFGAGLLFDLFRPPIMDLNKTIVNIQGPV
VNDTGKGGSPVEKKDTVATERPAPPPSPAPKQAQTAAKTAPATPSPAPQAEA VPVPVTPA
VQQPVEPWTPGERGPGSRVSSSESVLSPGEGQVPWGTGQAIKIMKAEKGNTVETTLGGS
SETVQGSLYVPIYLGMPPLSSVSADLFNAIPDEIIPHTVITSADARKRAFLNYYVKNGN
EYVLKNPAPLDVREKLWEMLEDAGYNAELADYKAGRSLSPVVIGFSITKDRQLRGVELLQ
SSGDPDIDAAVLYGFKRASFWNKSGDTIQGRFVYRF*

>SPBIB_v1_220002|ID:27163118| conserved protein of unknown function [Uncultured spirochete bib]

MARDHRIQPKINFDLTPIDIVLQLVIFMTTTTFRTAPGISLQLPGSKTAQSIATPELR
VIVVSANEIYLDKTKTNLAGLELLLKRKRVSGSSASQIRAVLEGQSGAEYQLIISVLDALR
MNGIENVGLITRKEKVVQ*

>SPBIB_v1_220003|ID:27163119| putative tolQ-type transport protein [Uncultured spirochete bib]

MLDFISKGGPILWVIMALSVVALAIIERLLYLRRISIDEEKLFLRIKTSLMEEHYSEAL
AICDQNVSPFSALLKVGIENRNQPEYLQRELLKDAAMESINLERGLPALGTISNISTLL
GLLGTVTGTMKAFGVLGKFGAVSDPSALASGVAEALITTVGGLVVAIPVIMFYNYFASKV
NYIITRLETQVNSLVDLISTYAGESSANTAEPKPAKEG*

>SPBIB_v1_220004|ID:27163120|purB| Adenylosuccinate lyase [Uncultured spirochete bib]

MVFLIQFLGHNCYYVRMQNFDQFQSPFSWRYGSQAMRIIWSETYKRRLWRRVWVGLAKAQ
SRYGLVTSSQIAELEHAADIDIEKAQEIEQSLRHDLMAELRTYASQCPIAGGILHLGAT
SMDIEDNADALRIRDSLNLKDKLADLLSVLVDKIERYAAVPAMAFTHLQPAEPTTLGYR
YAFYAQDLADTYERFNDALRNIKGGKGFKA VGTSASYAELIGVEHLDEFETALSEELGIR
FFDVATQTYPRIQDYRVLSLLAELAAVLHKMAFDLFRILQMPILIGELSEPFGRQVGSAM
PFKRNPIEA EKIDSLARL VASYPGVAWGDAALSGLERTLDDSANRRVILPEAFLACDELL
QSMKKLIEGQSVDETAIQRTAQAYAPFAATERVLMALGKKGADRQEAHERLRDLAMIAWN
AVREGEPNPLRQLIQSDEFFASRLSSDAIESLFDVDTYIGAAEKRARIVAARIRSLFR*

>SPBIB_v1_220005|ID:27163121| Single-stranded DNA-binding protein [Uncultured spirochete bib]

MNHLNSILVEGNLVRDPNLRGTPSGNQVCDFTVATNRSYKVADQKYENEVSFYDVEAWSR
LGAACAQNLKKGGRGVRVVGRLKQDRWTDTEGKPHARVKIVAEHIEFKPMTKANKEETSKS
DEFIEEAKRSEASMAVF*

>SPBIB_v1_220006|ID:27163122| putative HTH-type transcriptional repressor AllR [Uncultured spirochete bib]

MSESAGKALDILFYLAKEGEGVSLARLSKETGMNKATALRYLTVLESKGVVERCLAGWTL
GLSLFELGSKVPVRQLVAEKVRPIIERLARETGESSNLAYLAGDTAIYLDRAEANRSLRM
RSMPGDRLPLYCTGVGKAILSQTEERIRAILGPGPLPKITDSTLTDPEIIHEAMRARE
LGYGVDREEFEIGLTCYAMPLRLPGSDFVGAISISGPTARMKNPEIRERFLAILRQAVQD

ATDMLSPYHYFENLPENRGD*

>SPBIB_v1_220007|ID:27163123| Peptidase U32 [Uncultured spirochete bib]
MNYNTRSWGGGAGPQPRPGPSGRIFPLHKVENTTKCLHQRAIHDIKDTVKRIELLAPAGS
PEALDAAISEGADAVYLGLRSFNARMRSANFAFNQFEAAVYACHDRLRKVYVTVNTVFEE
READRLYQLLEYLVSVPDGIIVQDVGVAKMASEYFPSLHLHGSTQMNVAASSAGCNQLSR
SGFKRAVLARELSMEEIRHIRQYTSLELEVVFVHGALCVSASGLCLFSSYLGGKSANRGM
TQACRRLYEGENSTGYFFSPDDLQIEYLPALIDAGVNAFKIEGRMKS AEYVGTVVVSAYR
YLIDNYEIDTERAVLKAKAMLQADFARSKTNFFITGAPDIYIHPDQAGGTGIHLGRIRDA
RTIDDKRWALMNTYEGLAERDSVRIHRADDSGRITAKIQAIKYGVDGMLLQLDGDWRQND
DVYLIQTAGMARRYKSILPKNLDRFRKFPSTHAAPQVLPVLDLKKLDAALPLGTYVLAG
KVADLHAALTFRPKRAMILFDKLNAEVMRREEATL PFKRERLILWLDPYCTETDLAWLQL
ELEHWIEKGVSVIVANNQAHFSLLRGKDVCIAGPWL YTFNQWALAYYLEQGAQAIVPPY
EISRQDL YRLAEYLPAQIFMPVLFAYPDLFRIRADLSRTY GQTHFADRDGNFELVGRRD
YSVVIPEQPFSLVLDLVPNLKKQGFSR FILDLSNAEPARGLYRDIARAAEQFKPLPNTSRF
NWKDGFWSEEKMHSADEAPKAPASRSSQPGQLARRSATKASAPARSGKKDNEKSKPPRSA
KKAARGRFSPSKKPPRQP*

>SPBIB_v1_220008|ID:27163124|fusA| Elongation factor G 1 [Uncultured spirochete bib]
MSLEKIRNIGIMAHIDAGKTTTTERILFYSGKTYKIGEVDGGEATMDWMDQEGERGITI
SAATTTFRDHQINIIDTPGHVDFTAEVERSLR VLDGAI AVFCVGGVEPQSETVWHQAD
RYHVPRIAFVNKMDRLGADFEAVLQDMKAKLGAHPVPLNIPIGKEGGFEGVIDLIEMQEI
RWNEGDGEMTRTPIAPEREMAHWRRENLLDAVSSHSDIVTSL YLEGASIPADIIRPEIR
KACIAQRFPVPFAGASRRNIGVQPLIDAIVDYL PAPDEVGAIKAFHTKKEEEVDIPCQTS
GYPLGLVFKVQYDREAGSLCYVRMYSGLHNSSTVYNTS KKKRERITRLLRMHANKSEPI
DSVSAGDIAV FVGLKLAQTGDTLGTEGYV LLEKMHFPEPVISVAIEPKT LSDRDKLKEA
LEILAREDP TFAVHEDEETGQIIIRGMGELHLDV L VTRVVREFKVQAKIGNPQV TYRESI
STKVQHTERFHKVIAGKENTAGITIEVEPLPRGSGN QYKKAIRAHEVP EEIFDAIERGIT
SAFSSGIQYGYPAVDIGVSLV SIEYSEL TSTPFAFEACANMAYDAACRAASPV LLEPIMK
VDILTPKEFVGEVMSLVSQRGGFIHGSESKA VAEVIHAQAPL ATMFGFTTSLRSVSQGRA
SFSMEFSHFEPKR*

>SPBIB_v1_220009|ID:27163125| protein of unknown function [Uncultured spirochete bib]
MHIYTIGFAAVLLMLSGPGAQIKENIIDAILPRQSDPQCGYAVAAALIN FVKT AICLAD
IQKGSASPTFSLEKIQAASLMHSYGKTPPLSLADLEKLLSMEGISSTPFRVPKDESLKL
IAGAALPVV VHIGEPYPHFLGLGGDEEHILFFDPG SGLVALTHEESIALISGYFLIPEK
TIAARPLEDYEKAFRKLKQLIWNVYWDCAQN*

>SPBIB_v1_220010|ID:27163126| conserved protein of unknown function [Uncultured spirochete bib]
MPMDFVNSPRVDTLVTESEKKVFELFETMVRTTGQERVQSAIALANLLGNPGEFSFYIDC
TEDQRIIRVFHLLRVFRENMTLLIHKTWVDGSEN LQQDQLLGD LARFIQEFRDGRIVSAF
RSFVGISRQIPSLFLGSLGKANDFLEYAFRIDPKFGLFFWYIAEIDLQLRNIESIPEHRE
LFELEVLIGTFVISCF*

>SPBIB_v1_220011|ID:27163127| conserved protein of unknown function [Uncultured spirochete bib]
MAKEIRILPETKVGEGFIPPQYLGPD ETEYRIRDEQLRLLGKDPSDYRSLTTHELEILVR
NNNTCNDWSHFLVKDPFCPELVRNNLFSGLIRISKLEHVSLEHHDIA MAAGIFNSQIIAC
DIGDNCIISNCAYLSHYIIDDHCILINNAEIQVSNHAKFGNGIVMESENE SVRITLDVMN
ENGGRWIYPFNGMLSGDAWLWAKFRDRTRLQERFRQMTDARFDKRLGRYGIIGRNSVLKH
NRIKDTYIGESAYIKGSNKLKLNLTINSEDAPTQIGEGVEMVNGILGFGCRV FYGCKAV
RFVMCDSSALKYGARLIHSVLGENSTVSCCEILNNLIFPAHEQHHTSFLIASLIKQSN
LAAGATIGSNHNSRAPDGEIEAGRGFWPGLCTSVKHSSRFASFCLLAKSDYKHELNIKFP
FCLVDSDETHGRLMLSPGWWWHSNSYALMRNEKKFKERDKRVDTSIRFVYSPFAPDTMSE
IFEGLAILEHAAGEAAMRAISSNDSGSMFGDRIFALLAKISDAAVEPKAGTEEELKLV
QLGALILSSSKDPLPFEVTVRGFENS NR PQVIKPCAGWRSYREMLLWFAIQTVIPALEA
APLSSDPYEYLSSLLSASACKNIETEWENLGGFLVRRSKLEDLIERIESGNIQSWDALHE
EYRRLSAEYEH DALAFAWCILGYLSLAIEESA IWDHNEAHLPEPSRETFIQMLRDAHVLA
SEIAQRVFATRAKDWANPFRKATFRSEAEQIAVHGKVEENSAIQAVKKDMHEVQRAIDRA
LERLGTALNLG*

>SPBIB_v1_230001|ID:27163128| Urocanate hydratase [Uncultured spirochete bib]
MNSSPYTISLDFDELPPPEPVFEPGIRRAPRREAELSPAQERLALKNALRYIPQKWHEKLA
PEFLKELRERGRYGYRFRPQGRKGLPIDQYPGKCLEGRAFRVMIDNNLDFDVALYPYE
LVTYGETGQVCQNWQMRYRLICKYLEILDENSTLVVESGHPLGIFASHPYAPRVIITNGLM
VGMFDNQKDFNIAAAMGVANYGQMTAGGWMYIGPQGVHGTYNLLNAGRLKLGVS KDGD
LAGKLFVSSGLGGMSGAQGKAIIAGAASIIAEVDRSRIDTRFSQGWVSRVADSLEN AVR
LAI AARDKGEPIAVAYHGNIVDLLEYLDAQNIRVDLLSDQTSCHVPYDGGYCPVGITFEE
RTRLLAEDRTYFRALVDASLRRHFEVIMRLVRKGTFFDYGNSFLKAVFDAGVKEISKNG
VDDKDG FILPSYVEDILGPELFDYGYGPFRWVCLSGKKEDLIKTDHAAMECIDPNRRGQD
RDNWIWIRDAEKNKLVVGTQARILYQDAFGRMNIAHKFNEMVRKGEIGPVMLGRDHHDTG
GTDSPFRETSNIKDGSNVMADMAVQCFAGNAARGMSLVALHNGGGV GIGKAINGGFLVL
DGSERVDRVIRMALS WDMGGVARRSWARNPHAMEVCDEFNRERA EFGVITMPNLVDENL
LDAVISALNLV*

>SPBIB_v1_230002|ID:27163129|trxA| Thioredoxin [Uncultured spirochete bib]
VTENLNKETFLEKVFNYEKEKEWKYNGELPAIIDFWAPWCGPCRMVGPVLEKISDEYAGK
LIVYKVNTDEEQELAAAFGIQSIPSILFIPVNGQPQMAVGALPKSTIESAIKDVLGVEAA

*

>SPBIB_v1_230003|ID:27163130|mdh| Malate dehydrogenase [Uncultured spirochete bib]
MDNDVTWWKFDEVEAFMKAGFEAVGVAPEVA AVCADVLISADKRGVDSHG VGRYKPIYLD
RIWAGILNPKTTTFD VVRETPTTAVIDGHNGMGHYIAKRAMELAIEKAEKYGIGMTVCRNS
THYGAAFYARMAVEHGMIGLTTT NARPAIAPTWGVEPMLGTNPLTWGMPSEDEFPFMLD
CATSVTQRGKIELYDRLGKELPDGWVIGQDGKYRHDTHQVLTDLTQDKAAL TPLGGLGED
LGGYKGYGYAMVV ELLSSALSQANFMKALADIGPDGKKKPIELGHSFLAINISAFCDLED
FKHHVGEVSRQLRASKKAPGAERIWTPGEKEHEIWL YRKDKGVPFNPPLK KAFKEVKERC
NLNIELPF*

>SPBIB_v1_240001|ID:27163131| protein of unknown function [Uncultured spirochete bib]
MARTPYREIWGIERAAEEVWNWEKVVISALNLV*

>SPBIB_v1_240002|ID:27163132| conserved membrane protein of unknown function [Uncultured spirochete bib]
MAKSRLHKL YRSILSTLSFSAELRKMRELNAKIDQPESITPPPPFHPQGANRWFKRRRI
TIAESYLMVVRDLDSRHSSARLDALRKLADVAFHSANIDYPLNTARVQSALIKEVVKHRS
NKRRQLELLYDFSMSTRGQH QVIRKLCDELNIELPEKGMQIGDLGYGWDGHVHDTATSG
RKNPTQLIIDAFIKGISRVTVAYGSVSDLDMMEEALEAGNILGLHVSIALEFSVMVDGAR
YHFMAELPRFNSKEELRGFFSSHASDLTSFFQGLDINRENRLDAVRRLLET FNADTLPTI
NEGFEHKPEYCLAPLSDEL LATIPNMNITPLHLAEFMYMR YRPVLQKR VWFYKVLREKI
RSSSLADPARKAEKDTIEK KYAELRKELRNLSPDTLLSEYFEDPHAISYQTVFEDIESLS
DMLHQAGCTIKFIH PLEYGVEKATRVLEQCSHCIDSAEVYNTQDCAGRSPEEVEAFARIF
NERNKRAHSGR KVIIPVCGSDATGRNPKIPGMGFVFEDRIIGKLRQR YIKRHVALPPLV
SAMVRAEDAPVDEEHL DLRVPCIISM GKVSAGEGYTSTSEDEVIGPVRAWRYFNPAFKN
TIRTLIGFFVAT SFIGPWYALLWLGITGFRNSIADLISYRGTRLN QWKLKSINFDNVAQS
LFWTGFSPILGFVKANFD AIWPVHDGFVFNLVKFFFISFANGLYLASHNTLRGFDKSV
VRANIFRSILAWPLATV FAPLGNALAI PSIVQTKIWSDVVAGFIEGGNKYRKVLRQRQKT
LEEIPTIIHSGSTQYIAML DILYLFSEPRMQSIIKAVLSPYVLFTRRLRKNSSLRLT
LLVELHKTMC EERVWTELIDYIVANYDEEMADDLVDL VADALPDLQEWLGHLIAKYGESS
GLLKKFGIGRK*

>SPBIB_v1_240003|ID:27163133| protein of unknown function [Uncultured spirochete bib]
LDSVLQSRRYKAVCGRAGW MAPQETT VQPLAAVEETVDAPETADGAWLARRNGSPFR AFN
QRGPWWNSGAQH MNYAFP KKYFDSMGLVSMIDRLCLSR*

>SPBIB_v1_240004|ID:27163134| RNA-directed DNA polymerase and maturase, group II intron origin (fragment)
[Uncultured spirochete bib]

VTRTEETNPETTKLIERL VERGTMREAYARVVG NKGAAAGVDKMTVEALKPWLQAHWVEVK
GRLLRGT YRPEVVRGVEIPKPNGGKRQLGIPTVVDRFIQQALHQILSPIFEPEFSANSYG
FRPGRGAHDAIRK AKEYQLAGKRWVVDIDLAKFFDEVNHDLLMARI AKKVRD KKVLRRLIR
RYLQAGIMKDG VVWDRDKGTPQGGPLSPLSNIMLDALDKELEKRGLSFCRYADDCNIYV
GSERAGMRVMESITRFIEGTLKLVNREKSAVARPWERKYL GYSFTNERKVRIQVSASSI

ERFKEKVKALFRGAHGRNLGRFIRETINPFVVRGWIQYYSLADTKQFAEELDGWLRRLRC
NLWRQWKRPWTRLKRLMERGLPEETAVRSAPLTS AARGGTLAPST*

>SPBIB_v1_240005|ID:27163135|serC| Phosphoserine aminotransferase [Uncultured spirochete bib]
MKRVINFNAGPAAIPLEVLQKAQEEMLDWNGTGMSVMEVSHRSKEYEAMHNEAQDLFRKL
AGMGPEWKILFLTGGASSQFFMIPMNYLFGGRKATYLV TGHWGKAAIKEAKHFGPFDVLT
TENPDGTFTRVLRQDEIKIDPSSTYVHMTSNNTIFGSQWHYWPEVGKVPLVCDMSSDIFS
RPPFADKFSLIYAGAQN LGPSGVTVV AIREDFYNLAQEQA KLPTMLSFRTHAENNSLYN
TPPCFSIYILNLT LKWLNTVGGLDKMAKINEEKARILYQAIDNSDGFYCGPVEKDSRSQ
MNVVFRLATPEMEETFVKEAKAADIIGVKGHRSTGGIRFSTYNANLVENVKKAADFMEEF
RRKHR*

>SPBIB_v1_240006|ID:27163136| D-isomer specific 2-hydroxyacid dehydrogenase NAD-binding protein [Uncultured spirochete bib]

MVILLADAFAPDLPGR LATFG EVTSDMSRLGDAEVLIVRSKTKVDKAMIDAAPKCRYIIR
GGVGVDTIDVEYAKSKGIAVDNTPEASSLAVAELAFALMIAMPNHLVRADNSMKEGKWLK
KELERTELNGKTLGLIGRIGHELALRAKAFGMSVIA YDKYVTSSEVASLVSLDEVYAK
SDYISLHTPLTDETRGMINAASI AKMKKG VYLINTCRGQVVVEQDIADALNSGKMAGYAT
DVYNKEPPEGSPLLKAPNVLMTPHLGASTEENLLRLGDSIVARLKKYSGK*

>SPBIB_v1_240007|ID:27163137| conserved protein of unknown function [Uncultured spirochete bib]

MIGARERLERMGVTVPEIYLPSAGIDYRKWAVVACDQYSSEREY WEDANREIGEAPSTLR
LIFPECYLEDADKDARIANIQR TMREYLEKGILESKGYAFVLVERTTPFEAKPRLGLVVA
IDLERYQY GKDSKSLIRPTEGTIVERLPPRMAIRRGAALELPHIMILIDDPARTVIEPMY
ERRQYFERAYDFDLMKNSGHVVRGWL VREENQLARVAEALERLADPKAFRAKYGKDEVLLF
AVGDGNHSLATAKAIWEETKAA YAGSPGAEAILAQHPARYALVELVNL YDEGLPFHPIHR
VLFNIDAQDFLKKLVEAGANIA YMPDAAQAFAAVDASA AKDAGSSHVFAFVSDSRAGTIT
FETPRARLAVATI QEHIDAYRASHSEVGIDYIHGTASTETLGRKKGNLGLYLPPVDKSSF
FSVVIHDGVMPRKTF SMGEAPEKRFYIEARRITND*

>SPBIB_v1_240008|ID:27163138| exported protein of unknown function [Uncultured spirochete bib]

MSKMPANKGKIVL FVLGATAANL VLMAACFALLMV FYSLALS KILPPEALIWAIAVAFLL
ALVISTLVYRKLLKFLRDRYHLDEYLGIPSK*

>SPBIB_v1_240009|ID:27163139|spA| Lipoprotein signal peptidase [Uncultured spirochete bib]

MKKAIFWAPLVCAVLIIADQIVKALV VSHIPEGRIYARFFGDFVWIVHARNTGAAFSLG
ASSAPLVRFLFFIALPVVVLGGVLVYYFRAAHLTLLLRWSMGLILGGGIGNLIDRIFRPE
GVVDFISLKMYGFLGMERFATFNIADSAITIGEILLIIGLLIAELQRSKVHPS*

>SPBIB_v1_240010|ID:27163140| putative GTP cyclohydrolase 1 type 2 [Uncultured spirochete bib]

MTITEFDAWARSFLEIDQLQQIDDSLNGIQVSCSSAKQIKKLAVAVDACAESIRRAHAAG
ADLLFVHHGMFWGKPEPVSGSLRERLKM LLEFDMGLYACHLPLDRHPEVGNNAQLVNLG
VTERRPFGIYHGITIGWAGTLPNPM SLDEILKILPDRSSPKSVIAAGPSEINTVAIVSG
GAPFESLEALAAGIDL YITGEPSSHVYHYMLEGGMNFVAAGHYATETWGVKAVA EKAHAE
LGL ETIFIDLPTGL*

>SPBIB_v1_240011|ID:27163141| protein of unknown function [Uncultured spirochete bib]

MIYWNADLAAKISCSRQEMETLLPYIDHLVDVSRTLHQ TGIQPSADQFSSEKDIFFRYGL
LLVSEGLAGDILEEILAVLLYVSEEKGIAFLRQCVAAEAILSIANGDDQDTLLRKLLPYC
GVDRALAALAKGKTEHAD*

>SPBIB_v1_240012|ID:27163142| protein of unknown function [Uncultured spirochete bib]

MLIERLGHMYALWGPSGKAPER NPRIDQTIQSVRRFIAAIQETS EDRKALFTQSQQSRRK
AMKLAYLLLASESDAAAIRDAFLSSGLSSGQRASKLDALIWL AGTEAASRGIHYPY TIFL
IMTAFFGPAAAETELRWLQEKAKATIPTLEEFIVPGDLTD TIEEALKEPARLQRTIRIAG
MPLSASAFAGCSLYYIEKILVLIGPIGASILAEMIHSARQLMSDEISTAQQAFDLFAQ
EEGETEAPENQRIKGLEAFEEEEVFADPDLIRSTTKIVMLAEAKVLKATLSSMSDNEIAS
ILRCMEAIAHERLLSLISPRGQKHVLTVIQKTGNTTNSRMLRDAQLFAQKLLASYAPKNL
KPGESLSIPEEVRALISSLLSRE*

>SPBIB_v1_240013|ID:27163143|proC| Pyrroline-5-carboxylate reductase [Uncultured spirochete bib]

MRYKLGII GAGKIGEAILAGSLAKGLLAPSDVILSVRTEQHRQNLEEKYHAATV LHNREV
AKQSEILISVKPRTIFEVLQEIADIIPDES VVVSTAAGVTLESMQTRLARKIALIRAMP

NLGVSVCEGMTALAPARFTEEDKVEKVKQLFESVGRAIVLDEQYMDAVTGLSGSGPAYVY
LIIERALADGGVVKMGLPREVSIELAAQTVLGAAKTVLVTGEHPAKLKDQVTTTPAGSTIDGL
MELEDGGLRVTLIKAVVKATERAHQLLHK*

>SPBIB_v1_240014|ID:27163144|dapD| 2,3,4,5-tetrahydropyridine-2,6-dicarboxylate N-succinyltransferase
[Uncultured spirochete bib]

MNSAADELKRIFEESGSFCDAHWVFLDALEKGEIRVVEQQADGSWKVNSWVKTAILS GF
KKGGLSAWPWPASSPAAALGSDPGSASPSGKTIKSSGSRGEEENGFFDRPAFPFRHFE
IGDGVRMVPGGSSVRRGAFVASGVVIMPPSYINVGAWVDEGTMVDSHVLVGSCAHIGKRV
HLSAGVQIGGVLEPPQASPVIIEDGAFIGGMCGIFEGIIVRKRAVLAPGVIIITKGTKLFD
LVNGRELSGEVPENAVVVS GTRPAHGEFASEKGISLSVPCIVKYRDEKTESSVVLESALR
G*

>SPBIB_v1_240015|ID:27163145|dapA| 4-hydroxy-tetrahydrodipicolinate synthase [Uncultured spirochete bib]

MKQKIEGLGVAIATPFDDAFNVDYAGFERLLDFLCGRDFESAAGEYAEAAFRDEAARAKF
QRFWQAESGGADFIVVLGSGTGEATVEPDERRELIRRAVKRILGIPIVVGTSNSTKAAV
RLTEEAVDLGADAVLVVVPYYNKPTPGGLNAHFEAVAKAARGKPVVYVNPGRGTGLNLVP
AVLNQLWQISGVEAVKESGNLAQIGEICRTLPQGKTVLSGDDGLALPAI AVGAEGLVSV
AANILPRRYKALVDAARAGRREAKALHARLLPFTDALFLESNPIPLKAALKLTGLCGEA
VRLPLAPAVQTTRERLASVLAALGARELA*

>SPBIB_v1_240016|ID:27163146| putative 4-hydroxy-tetrahydrodipicolinate reductase [Uncultured spirochete bib]

MQIGIFGAGKLATAIAEEANALNVKAGSSADVVRFDIVWMVDMGDPMPSRHADVAIDASV
PDAVEAHLAWAIDTGTPIVATTGWEIPDIAARVVGQKTA VLVSPNFSFAVTFMRRMATQL
ATFVDWYGEGLAVFEHHHA AKKDAPSGTAKSLAQAIISGSKRYAGWNASGWEQWDMSKV
PIASLRAGTETGVHEL VFDAPHEQLSIVHRARNRRVFASGALCAAQWIQGRKGVFGMDDV
LESLLGNA*

>SPBIB_v1_240017|ID:27163147| Aspartokinase [Uncultured spirochete bib]

MTALVMKFGGTSVGNAERIREVARIVQSRQGRKRIVVVSAMAGITNLLFEMAEARQHDL
DRAVQILSKIEQMHLASRLDLATPDIIGRIKEIVENLQRRIHGIDLLGELSPRTMDEV
ASSGERLSSILVAGYLGCPDLLDARKVIRTDSHFGTARPKLAAIKKLAALHIVPLLESYDI
IVTQGYIGSEDAGDTTTLGRGSDYSAGLIGAALQADEIEIWT DVEGILTADPRLVPSAR
TVEVLSYQEAELASYGAKVLHPATVRPALDAGIPVTIRSTFKPDGMYSTISPGESSGRP
CVAIAMRRNVVVISVTQESMTDQAGFLAKLFDVFGRRGVSVDLVSTSEICVSVSLDKSAP
LEALTQDLEKLGQVSIARERAVIAVVGDLLRKTPEVLRKTFIAIDGIPVDLISMGANAIN
LSLIVQEAQADRAVQNLHAAFFEEGER*

>SPBIB_v1_240018|ID:27163148|asd| Aspartate-semialdehyde dehydrogenase [Uncultured spirochete bib]

MANIQHHS AFSPKKKIPVTILGATGVVGRFLRRIAHPWFYPAFLAASDRSAGKTYSEA
CQWHLPLPYAGCGDMVVVPCSPAAAFSPVFSALDAGPARDIEPLFAAKGAYVFSNASA
FRMDEDVPLLIPELNPEHFGLLENQKAKRGWKGAIVTNPNCCTVMLAAPLAALQSRFGID
AVMVTSMQAISGAGYGPVPALDIVGNVPIRNEEPKVESES NKILGTLTAGLGLAITP
APFVVSATCTRVVIDGHTLSISVRLAAKATIDEVAEAFTLFEPKTAPYSLPSAPEKFLQ
FLKAEDRPQARKDVEEDSGMRISVGRRLRTPILD FKFISLGHNTERGAAGASVLNAEMAL
AMGVLQGVGE*

>SPBIB_v1_240019|ID:27163149| protein of unknown function [Uncultured spirochete bib]

MSLSISNAMNSFSRALLRSDEPGIAIGEYLNELSQLRPLSYAACGRSTHQESLRCIVLG
GDEQVYGSNIAVGDEVRLGAAPCGFALEVDEC VQKRIREGIVIEAPAKQNGSTAFVLSMM
FSADAPELLLSASQALRTAAQLVEEYLSMRARLAEIERDSGRPVGSDPVL TWCGIVGN
SDVMREVFTMVEQVAGTDASVLLLGESGTGKELVARAIHQKSSRANNPFVAVNCAALPES
VIESELFGEKGAFTGAFEQRKGRFEQANGGTLFLDEIGELSPGLQVKLLRFLQDHRFER
VGGNTSIEANVRVIAATNRNLQESVDQGD FRPDLYYRLNVFPINIPPLRERADILLAD
HFVAKFNRENTK KIQRISTPALDLLMIYHWPGNVRELENCILRAAILSTDGVIHAYHLPP
SLQSAASTGTEPSTGLDAAIARLEKELIIEALKLENGNAAAAARRLGATERRVRYAMQRY
RIDARRFKTKL*

>SPBIB_v1_240020|ID:27163150|glnA| Glutamine synthetase [Uncultured spirochete bib]

MNDASSTFSLPDHFGSRCFSNDVMRERLPRSAFEAILEIQAGKRELTDIAEIVAAAMKE
WASDLGATHYTHWFHPLSGLTAEKHESFVSPQPNGGMLMEFSGKELVKGEPDASSFASGG

LRATFEARGYTAWDVTSPAFLKRNADRYVLCIPTAFVSYAGHALDKKVPLLRSM EAINRA
GLRLLRLLGDTESERIITYAGPEQEYFLVNAELYRKRPDLLCGRTVLGTMAAKGQELED
HYYGAIEEKAAAFMNELNSELWAMGISAKTQHNEVAPNQFEIACIYSQANIAADANQLVM
ETIRKVAEHHGMAALLHEKPFAGINGS GKHNWSIGTDKGANLLDPGEVANAPNEKDAAY
KFMRFVLFSLAVIEAVDRRAGLLRAATATAGNDRRLGGHEAPPAILSVYLGDP LHDLFDS
LETQNGAQKIANAFLELGIRSLPKLPKDFSDRNRTSPFAFTGNKFEFRMVGSSQS VATPL
TMLNAVAEAEIEHIALDIEQELSKGISILDAARLAARKSWQEHRRVVFNGNGYSAEW TRE
AEKRGLPMFRSAVDAIQELTKADNVRMLTSLGIFLAEETEARQVVYLERYSKQIKIEAGM
TIDLVRRSVIPATSEAASTRYSAACTNIASLGAPSVIQETLAKRIAQLTGKAAEALDRLEK
TLNDASHIEDELERAKAFRDSVVPRTDEVREICDELERLTPKDLWPLPTYGELLFTL*

>SPBIB_v1_240021|ID:27163151| membrane protein of unknown function [Uncultured spirochete bib]

MKFLRSLVPWILVIVILAALYLPDLGPENYKDFDSFFANERIRQGIAGYEVAIIKDGEI
AFNKAYGFDGERKTLESATPLYLGPASEILTGTLQCQVNEKKITLDAPIAQFIPELASL
KARRASSAALDMPLTLRQLAAHRVAFPEKDLAAFDPGTTGLEAGLPDPELFLKSHFPTEK
YTRSRLSYRIVGAILEKATGKPYSDLLES MITIPLGMYLTTAKPSSIAQI AVGSGSFFGL
SFPYREKVPIDAAASDGIVTTSADIAKFLKFV VSPQRGQAIPGLSSSQTPLLYQPLYKDG
DTGFGWRILESKDGRFIFQGSIRGYASRIVIYPERNAAILSSQNGILISNFILPMLV
TSAEQILFNGESRPPFPSWRAELVAGFIFFIYLLS IILQTLSSYSWARDLLKYRESSISQ
LYARFAFARTIGLLLRVLA VVLAPFAAGYLVGRAVPYQELIAFEPGIASVLMTAMLFGV
IRNISRIILYMRLRRA*

>SPBIB_v1_240022|ID:27163152|livF| leucine/isoleucine/valine transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]

MLEIQNLSVHYGGIHALQGIDLSVPEGKIVTLIGANGAGKSTTLRTIVGLVKPTGGKVLL
RDNVISGRQTQEIVQMGIVLVPEGRRIFPNLTVEENLLGAYARNDKEGV LKDLHDVYDL
FPRLRERRLQKGGT LSGGEQQLAVGRGLMSRPKLLMMDEPSLGLAPLIVKMIFEIIRQI
NAEGTTVLLVEQNAKAALEIADYGYVLETGRITLQGKGRELLSDDRVRKAYLGEAQ*

>SPBIB_v1_240023|ID:27163153|livG| leucine/isoleucine/valine transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]

MSENTSDLMLSTAHLTMKFGGLTAVSDLNLEIRKNEIVGLIGPNGAGKTTAFNVITGMY
PTEGKVLFKSRDITGLKPHSITALGIARTFQNI RLFKEMSVLENV LVACHMSINTGIFGA
TLHLPGYRSRESEARRFSMELLEK VGLVHLAYEKGTSLPYGQQRRL EIVRALATKPKILL
LDEPAAGMNPQESRELMDFIRKIRDEFDLTIFLIEHHMQVVMGVCEHMYVLDYGV TIAHG
DPASIQKNPKVIEAYLGVD*

>SPBIB_v1_240024|ID:27163154| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]

MKATTGKQPFALTRNKLLTIIALAAFAVLAIANSFFDAFTLRVFNMC AIYIVLALS LNL
LNGFTGLFSLGHAGFMAVGAYVCALLTMTPEL KEMNYFLVPIVPWLRNITIPFLPAILIA
GLASAFVGF LIGAPVLRRLRDDYLAIATLGFGEIIRVLITNAQPITNGA QGLKGLPRYATT
FSVWVAAGLVTLFMVLLMRSSYGRAMKAVRDELA AEAMGINVFRVKVTSFTVSSFLAGV
GGALLGHMITTIDPKMFTFMLTFNILLIVVLGGIGSISGSVISAI VVTILMEALRFLDEP
MNLIFFKTEGLPGLRMV VFSILLMVMVIYRQRGLMGNKEFSWDMLQGLFVKKGRKGGDHV

*

>SPBIB_v1_240025|ID:27163155|livH| leucine/isoleucine/valine transporter subunit ; membrane component of ABC superfamily [Uncultured spirochete bib]

MTLSLLFQHIVNALSLSGLYALIAIGYTMVYGILRLINFAHGDFMLGAYVAFYGITLVS
LPWWAALLVSIAFTALFGIGLERVAYKPLRDS PRISIMISAIGASFLLES LAVLIFGGRP
KGVVPDVL SKVIHFGSVSMITISLIPLFTFALLGVLVWIVNKTKTG MAMRAVSTDIEA
ARLMAVDVNKVVSFTFGIGSLLAAFGGIMWSFKYPQLNPLMGMM PGLKCFIAAVIGGIGS
IGGAVMGGFLLGIIEMIVAFPLT LSGYRDAFAFILLIVVLLVKPTG LLGKRQAEKV*

>SPBIB_v1_240026|ID:27163156| Extracellular ligand-binding receptor [Uncultured spirochete bib]

MKKAVGCMLLVLGIAALIVACGPAAPKTVKFGVFEPLTGANAGGGALEVEGIKLANEMYP
TVKVGDKYKIELVIADNKSDKVEAANA AQRLVDKDKVNVVLG SWGSSLSMAAGPIVKNA
KVS AIGLSCTNPLVTKGNEY YFRVCFIDPFQGTVMANYAFKNLNAKKAVIIREVSNDYSV
GLAKFFADSFKQLTG DENAILAELNYNTGDTDFSAQLTEVKKFKPDVIFAPGNYTESALI
IKQAKELGIKTQFLGGDTWETPEFIDVGKQAVEGVVSTFFATETPITDTSKVFLDAYRQ

KYNKEPAAVTALGFDGYLVARDAIQRAGSLDKEKVRAAIAVTKDFPGATGMITL NEDGDA
VKS AVIKTIKDGKFTYMATVQPY*

>SPBIB_v1_240027|ID:27163157| conserved protein of unknown function [Uncultured spirochete bib]
MERYDVVIVGTGPAGLGA AFELLGRKPSLRILLDDKLQVSSGGLRNDCKMNFTWPIGFPL
ECWDEATGTYYLKRVEAFLEPRIMEKRNIDVYARRAEKIGVKLIDVRQSHLGT DGGLELI
KALTARLTALGAEISLGEEMLSVDQATRTVQTDKRAVQYRYLLVAPGRGGFAFLQQLMEH
LGVEYRDNVVDIGIRVETREEHYPIVRDYYDPKFLFPKTRTFCTNSRSAHV VQEKEYGDE
KGGYWYSVNGHAWSEQRAANGLVNFILKTVTLTQPLASGQEYAQMLGRLAALLGGGRPI
MQRIGDFRLGKRSFADEFTGDLYDFKPTLP SCTPGDISLCIPAKTMRAIWNAMKLLD TVV
PGVMHPSTIMYYPEIKLYANRPVFIDEYFQVVPGIFFAGDGAGTSRGITAAWASGLRAAD
GMLKEFDF*

>SPBIB_v1_240028|ID:27163158| conserved protein of unknown function [Uncultured spirochete bib]
MSEHFMIDKDKQKQLQNIILKLHQGASVAEVKKEFATLIQGVSAAEVAQMEQALIDNGMP
VEEIQHLCEVHVEVFKASLDKEKISSKVP GHPVQTMLDENKAARARLRALKKAVLAWRFG
LGQKEQVLAALDDMSKIIVHYTRKENQLFPYLEKKEFTGPSRVMWGKHDEIRALFKEAHS
KVEQNDKSAISSLHPLAGKISRMI FMEEHILPEAVRRLSDEEWAHIRIGEDAIGFAWIR
PGAVYDPYLVLAGAVTAKPQPA AAIPESTAIPAVGATHHASPVPASDLVELATGKVPAGL
LSAALATMPVDISIVDAQDKV VYYSDSPDRIFPRSPAVIGRAVQNCHPQKSVATVNRILD
AFRKKEKTRARFWLEMGRFILIEYRALYDAAGAYIGTLEFSQDLTELRTLQGQRLLDW
D*

>SPBIB_v1_240029|ID:27163159| protein of unknown function [Uncultured spirochete bib]
MKAFDSADLAGISIGSSLDGFQK KLAGSGISFTDYVRESHIRKWTGEALAHALKIRTALV
LGLQEFLVSQNILNIDRVSMSPVTDPLCHNVEHAPVILFQNTPT YRTTHSMIYSKMLACMN
PFVPGVYIDSPNIRLELPSETARHKYLIDFSQMDIELKRSRKLTPEDYFDRPEVTKAELE
QERDRALDFEDLIYAVKKILAFAPESLRALGVT LAVPQKPFPRFFKDEEEDHDASSLE
ERLGQKAGVQFFWVLGLLRENYDLVYPYLSRDGKRPPKASITSRQIFNYDLCAAPLYQDG
SLGRAYEVLSSGGLREWVYEAIVARLLDNGILREEPQFDDHGNLLNMATLDGYGPFLTVAR
MCDEKGEGLFPETFGGGLGIERTL FALLHGPSVKDIDELTCFGKNPDKVLPFLF*

>SPBIB_v1_240030|ID:27163160| protein of unknown function [Uncultured spirochete bib]
MMNIFCNTIGTGVPGIGIAIYAPIEINA AKRHAIIFVLSLFSMLSIGRTMAKKYV FVNTA
QRGTA*

>SPBIB_v1_240031|ID:27163161|bioY| Biotin transporter BioY [Uncultured spirochete bib]
MESMNERLTNAIIACLFAALISIGAYIAIPIPGTPVPIVLQNMFI LA AFILGPWWGLAA
VVFYLVLGAVGMPVFSGGTGGLVKFAGPTGGYLVGYIPAVVAMGLLSRLGKSRWYFNMLA
GIAGMAIVYLFVARLKA VLHVDWAKALATGLIPFIPGDIAKIAVAGILAPPILKALSQI
EQSTNA*

>SPBIB_v1_240032|ID:27163162|cbiO| Cobalt import ATP-binding protein CbiO [Uncultured spirochete bib]
MPELFRADALRHVFPDGTAAIDNVSL SIAEGEFLIAGRNGAGKSLLMRHFIGLSKPSSG
AVFYRGQPVPAQIPLIRREVG YVFDTEAQIFGQTV EEDLAFGPANLGMQGDLEDAVQH
ALKEAHLEGMENRRPNTLSGGEKRRLAIAGV LAMSPRCVILDEPFANLDFPSVQEILAVL
EVLRAEGKTLIVLTHEIEKVFALATRLVILDKGHIVFDAPPGEAQQSDFGSSGLVCPYQE
CYPWLMTH*

>SPBIB_v1_240033|ID:27163163| membrane protein of unknown function [Uncultured spirochete bib]
MADDTLNPFAFEAGKSWLAVFHPVAKLAFLIAVASAAMRSEPGLLAALFLIAFIGQFSMP
RAGKGALYSISVLILFSALVRGILPGDGRIFDVGTLSDSAIYALRLLTVYLYSRLFYATT
RVSEIGDWMTAFTRTMRRIVGVGQRDVSAQSSAAA AVNNRPTIHSNNIRQASILSDPGML
FSLVLLFLPRIFD TYQRIKEAGEVRAINLSRRNLRRSLAMLEQLIIASIVQAWRTAAAME
IRAYSPARTLRLQKFAWGDWAMAGAAIALLFLAKL*

>SPBIB_v1_240034|ID:27163164| putative Adenylate/guanylate cyclase with Chase sensor [Uncultured spirochete bib]
MEHDRSSMPEFHSAMSRKARFFWALAVGLGIMLVFLWLGATEHLGMAIYDSQMRAHAAPT
KRSAMSSGGAQSAEHGKIALVMIDQSSLDWVQKELGLGWPPRELYGILAGYLRDAEAQ
AYDILFTEPSTFGPEDDAKCAQAMTEAGNVV LATLASKKPVLDV PNALSGHVAAIVDSDG
ICRKYQAWMSQDDRRLLSLGLAAVSKSSNPKEL AASLPADGAVLLKFGSPARFERYSAAQ
VIAAAMDSVQGNAKGSATGEASPQSPQIDFS GKVVVVGLSAPGLMDRQATPIDPALPGM

EIHATFIDNMFNHTFMQRTPIWLEMLV GALGAALMAFAPMVHKRLIAALAVIIAVGTPIA
LCLVLFGNLVFFNPISALVA AFAALVA AIGLGYQA EGRQKAYLRR AFAQYLSPEVISSLV
DQPETLQLGGELKTITTLFTDMVGFTSASEKLNPTQLAAFMNEYLGIISEILAMGGTLD
KYVGDAVVAFWNAPLSVDDHAYRALATAVRIQARLGAASKELEQRYGIAPRTRIGVATGK
AIVGNLGSRRFAYTAVGDSVNIA SRLEAANKAIGTSILTMRDTVQHAIRNAEPSSSTE
EIALGLPEGGAMIVRRLGLASVEGKEQPVELWSVEHSHGVSVEPWGVRRIPK*

>SPBIB_v1_240035|ID:27163165| putative Peptidase, M48 family [Uncultured spirochete bib]
VHVVSLRSRSLVAVLAGLVLALATLLFSSCTVSPEALQLFLNQALLQGMITPEQARLIRE
AARSFQTESRPFTYEEYEAIGRVVAAA VLSQYPVYNQPELTAYVNKIGQGLSFFSARPLL
PQGYHILILDSDEAHFAAPGGFVLVTRGLLSLATSEDMLAALLAHEISHTALGHGLVSL
ASYRMGDLAMYAALSTQAANTENKETAALFSAAVHDFVSLISVQGY SQAMEFEADAEAM
HILYEAGYRTSALKELVSALADTQNEHIQQYSMQHPLPADRLARIAVLEQQYEQA AELKA
RRAAARNTAGMFRLESQFSDIGYPASEGSVLEASINAFGPRPQVFGTVAPLELIRRERFE
AMKRLF*

>SPBIB_v1_240036|ID:27163166| conserved exported protein of unknown function [Uncultured spirochete bib]
MKHRFSILIVLVMVIAAVTYAQGKPAETTMLIRVEKTAVRATPSFASPVLLFAAYRTPVA
VVQIENGWVLGFVQGLSKPGYIHISALAPAKVSLSSDAASAPPLQESEIVLAGKGFSS
LESALKEGNAFNDAVDEMEKLTYSFAECLAIFIQIGIDFSPGEL*

>SPBIB_v1_240037|ID:27163167| Exonuclease I [Uncultured spirochete bib]
MPATMLWYDLETFGRDPQH DRIAQCALIRTNEALEE IADPIVLYCRLPPDYLPDPEACYI
HGITPQEAERKGISEYEFALRIMHEMAVPNTTVVGYNSIQFDDEFIRRLFYRNLLDPYVR
EWKNDNSRWDIINLMRAVHDLKHEGFEPVNGDGNPSFRLEELAKANNIAHETAHDALFD
VRATIGLAKKVQHTY PRLYEWYHHRRRENLA PLVNL SLREHMLVHTSQLYTRPNGCTTV
IAPLGLVEADRHALVAYDLRFKPEPFAQMS EDEL RDLLF TERLEGATGPQRPPITMIRLN
SCPYLAPVKALTKDSSKRLGIDIEQCRQNLRELEA VPGLKERLIAAYRHEKKTSEELDPE
YALYGGGFYPDEDRKELERFHEVLREQGPHAAKNEFLRITYRDQRIPTLMGRLLARNFPE
TLTAEQHVS WRKHASGWVQLPLEKGATALADYAQLEAQIAQMREDDPRKPIARALLDWKA
HIEDFIRER*

>SPBIB_v1_240038|ID:27163168| conserved protein of unknown function [Uncultured spirochete bib]
MKRQELVYQLISELANYLLHGNPKKMVISLHMEADGFHIAAIDDRPRTDSEIAEIEHSLM
IQRPELASYYGTMVGHDL LGTARLEMIGWQIKGVKLERIPEGGIMINLWIGSEGFDPKM
FTLEQGT*

>SPBIB_v1_240039|ID:27163169| conserved membrane protein of unknown function [Uncultured spirochete bib]
MVQGTKTLKVFAVTVMVLVLLAGIIDGDVGPVQGFIRLQVTPARLVSD FVAVEGVGATL
FNVAAVGFLGYFFLLNGL EITGAALALFTMMGFAFFGKTLFNCIPIMAGVSLSALIVK
KKPRDYALIAMFGTAMGPLITFLAFEVGVKPVFALPGSFLIGLIGIILPPIAIAMLRLH
QGYNLVNVGLTAGFVGLFTASLSHAAGADILPLSMWGTEREPLLIAIVPAIVLIAVVCIV
AENPGHGHSNIGQAGR DMLKIMAMSGRLPSDFSD FVSSKGALLNASIIGLLFWIFMVALG
APLNGPVLGGLFTLIGFAFFGKHPKNVFPVVLGIIAIFVFGKSILAPGPLLAILFGTAL
APLAGEFGPVIGFVAGFLHLVIVDRTGAWHGGMDLYNNGFAAGLTATLIVSIIDWYKSSK
SD*

>SPBIB_v1_240040|ID:27163170| NAD-dependent aldehyde dehydrogenase [Uncultured spirochete bib]
MNNGIFHIPRPVNEPVFN YAPGSPERAALKQEIERLRKDRMDIPLIIGGKEVRTEKTAPI
RRPDAHNEVLGVYHIAGEEEARMAIKAALDAKAEWAALPWEERA AVFLRAAELISVKYRA
LMDAATMLCQSKTAHQAEIDAVCEVIDFLRFNPWYMEQIYNQ QPDNAKGEWNRSA YRPLE
GFVYAVTPFNFTSIAANLPTAPAMMGNVVWKPASNAVYSNYMLMKLYMEAGLPPGVIN
LPGSGGAISNVVLS SPDFAGFHFTGSTE VFRSLWKQISSNLEQYYVYPRIVGETGGKDFI
FIDPSAELANTVTAVVRGAF EYQGQKCSAASRLYIPASRSKEFIDALVAEISAIPMGEIT
DFRNFGAVIDEAAFNTICGYIERARTS GEAKVIAGGACDKSRGWFI EPTLILTENPRSE
SMVNEIFGPVLTAYVYDDHDMEAA YRLVDSTSPYGLTGAIMATDRQRINRALLALQNAAG
NLYINDKPTGAVVGRQPF GGARASGTNDKAGSYLNLLRWVSAVAIKENFAPSSWRYPFM
LGDD*

>SPBIB_v1_240041|ID:27163171| conserved protein of unknown function [Uncultured spirochete bib]
MKINEVVAVVTGGASGIGETVAKYFAAQGAKVVIGDVVQE QIDRVVGEIKAAGGKAVGVK

TDVTKDADVAALMDTAVTAFGAINVVVPCAGIIRDGVMINTDKETGKVKRVMETDQFRAV
IEVNLIGSFITLREAARRMVDNKWQGVLFITSSVNVKVGQVQINYSSTKA AVAIWPRILA
GEFQMKGIKIRVMGIAPGYVGTMPVKGMNQDALNEILKDVHIGRLIEPEEIARAIAMVV
ENEAFDGTCLFITGGVTFGARAIK*

>SPBIB_v1_240042|ID:27163172| Regulatory protein TetR [Uncultured spirochete bib]
MVEKPPLSKRKLQARETRKRILESALSLFREKGFQVDSIDEITSAAGVSKGSFYTYFQTK
SDIIIEFRLIDDYYQKKESAIMRSPEAVSRLIAFTKYQLDYIHKNLGFRTLSILYINQM
SAFYDQKILANRERTLVRLVSKIIADGQASEHIRQGDPIELAEWMNRCMRGFFLDWAISK
GSLDIRKDGMRFFSEFVLPALIAHPARQS*

>SPBIB_v1_240043|ID:27163173| conserved protein of unknown function [Uncultured spirochete bib]
MAHYRNLVFKGGGVRGIALYLGALQYLYEHNYMQHVERVAGTSAGAITALATALNLGSFDE
LKRISDSLDFRKVPAEEDERSIRNNPPRLIALTDYRELALFKNLQCSMRLVQEKGWYSS
DYFYKWLRALIAGQFAVEKEFYTFADFRDASLHRDGREFLNLYVTGTDITNRMARVFSFE
TTPEMEVALAVRISMSIPLFFEAIEYQYPGTDSPQLYADGGVMWNYPVNIFDEPRFGRLQ
ENGINQETLGGFFITSPDRTHYKPVKNMIDYVSALFESLLLQVEHLTATGEKNFGRTVFI
DDCGVRPTDFDIDTRDDRYAALFESGYEATKDFFSAKTDWASFFRGLRARLGWKEIG*

>SPBIB_v1_240044|ID:27163174| putative Methyltransferase type 11 [Uncultured spirochete bib]
MREQRFAMSMMLTVILLFSATFTARSQTPAMAPTASTWMPHADACKEHTMALYENMASVFD
MLFPLDRNCITALEMLVRSESGSPGSPMVLDLGAATGTLVAALNEKGNVAVGIELNPAMA
ARAKSPVIEGSMRDAVEIARRWFSAATDTRPAADAFLDAVLCLGNTLPHLEPGERAPFF
SNIRSLRPWAPFVIQILNYGRADIGPGFAFPEISAVNVRFSRRYAPGPAPGSLSLTRL
RIECEIYEDTTVLYPISPSTLAALLGRAGFSHIDFYSGWSLQLFDEGKDMYCICIARL*

>SPBIB_v1_240045|ID:27163175| ATPase-like, ParA/MinD [Uncultured spirochete bib]
MSFVPEKKPNPSIKRVIGVVSQKGGVKGSMVASLLAESLASRGLRVGLLDADITGPSIPR
MLGIDSFRAESDGEHLYPIENEDGIKVLINLFNEKEDEPVIWRGPLLAKAIDQFWSDTI
WGDLDYLIIDFPPGTSVALTAFTQIPFSGIVVVA TPQDYVSMIVRKSVMASMLKTPVL
GVVENMRTMVCPHCGNEVALFDDGTQNGAQRMGPLLLASLPWRKELAQSRALRWSALSEA
ARKDADSLANEVELALASSTGAAATNTGASNVGTGASSSASPQT*

>SPBIB_v1_240046|ID:27163176| Dinitrogenase iron-molybdenum cofactor biosynthesis protein (modular protein)
[Uncultured spirochete bib]
MDDDKLARELFAGADLVVLESDEAEALRLADLENLYQGKAAQLMGISRQTFGRILDRAHR
KVADALLNGKALKIEQARAPCLERPPFNEKFKSGGQTPFLNLEETSMKIAFVSDDGTTIS
QHFGRAAYYVVLTIENGKVIQKEKRSKLGHTQFSLHHEHHEHG TAGAGHGFEPGAMERH
ASMAQAILDCKALIVGGMGAGAYQGKIQAGIEPIVTDLESIDEAAAAYIAGTLKNHIEYL
H*

>SPBIB_v1_240047|ID:27163177| Serine--glyoxylate aminotransferase protein [Uncultured spirochete bib]
MKGKRLLMIPGPIEFTDEVLAEMSLPTLSHVDPQFIEEFGQAIEKMRKVWLAPNGQPFV
AGSGTLAMELAAANITEPGDNVLIVHTGYFSDRMADIFRLHGANVDIVPSEVGDLPVSEV
VRAALTIKKYKILSITHVDTSTGVRADVKNLAAA AHETGTLVVVDGVCAVAGEELRMEEW
GVDIALTASQKAVGVPPGLALLVASSRAIDAFKARKSPVRAYYCDWQYWLPVMEAYEAR
AA YFGTPPVNLVRALNVSLGQILSEGMDARFARHAKNARAFRAGLTAMGVKFPAREEY
ANTLTA VWYPEGIDASVLGYIAAEGAVLAGGLHPAIKTKYFRIGHMGMSDASEILATLGA
IERGFARAGYRFSPGSAVAAAQAVLAKG*

>SPBIB_v1_240048|ID:27163178| conserved protein of unknown function [Uncultured spirochete bib]
MYEYPMWNYFEPKDTRWYRWKLDGASIW MRKNGEWRFTLV SIPFKVIQSDARGPEQADP
PADVSISLAVASGKKVALRPYSPPIPYLVSARNDVKIHPGTEAWFTIALPPIMRIELEG
HALFEGSPFTTTSTWFGDKTSGNLCLSLPVELDPECKNEQGYAASSISRDEAIPADPLLQ
ESLQKAARYLACKSLIQCRIVRNKSKEVLDLRLAIFTDL MNVYEKDGMLISDTVVITG
TADGSLQTNIDDTSCKKLKKIYSAPKTGLNEVLIKRGVSFLRSITGL*

>SPBIB_v1_240049|ID:27163179| MscS Mechanosensitive ion channel [Uncultured spirochete bib]
MKSSILPDFFTRLYNEALTPAFWQKAIGIAFAAILLAFRILQVIVSR TLRKTMPEPKA
QLIRKTIRYTGYYVAIASILQSMGINLSALLGAAGIAGIAIGFAAQTSVSNLISGLFLIS
EKSFQIGDVIQAGDITGIVMSIDLLSVKLQTFDNKFVRIPNETI IKTNNV NITRFPPIRL
DITVGVSYNSDLKKVTELLKDIAAKNMYALDNPEPLILIDKFDKSSINILLGVWFEQSKL

VDLKNSIIIDIHERFDKEGIEIPYSKMDIYIKEKP*

>SPBIB_v1_240050|ID:27163180| Glyoxalase/bleomycin resistance protein/dioxygenase [Uncultured spirochete bib]
MQFCWVTLNVNDMEKSLWFYRDIVGLPLNRTFSPAPGDQIAFLGSGETQVELIRNEKNAP
TPFSQNIISLGFKVDSLEKTMELLKANGVPVHAGPFQPNPSVRFYVLDPNGLRVQFVEDV
KQG*

>SPBIB_v1_240051|ID:27163181| Pseudouridine synthase (fragment) [Uncultured spirochete bib]
MPIPVMQHRKERRAPPVSKAPAGHLPAGRAQFLYEDSDLIVVDKPAGLPVIAPEGSRKT
LYDIVTAHMQKTNPGRAAVVHRLDRDTSVMLFAKNARVKKALMDNWNKLVRRCYTAL
VEGLMPSETGTLDSWLIENRAGQVYETKPGTRGALRAITNWKIIAAAEAGAPYSLVELELE
TGRKHQIRAQLAAIGHVPVAGDARYGARTDPASRLCLHAHLLEFEHPFTHKVLVFESPVPK
VFYQSENPGRPHGRL*

>SPBIB_v1_240052|ID:27163182| Glucose 1-dehydrogenase [Uncultured spirochete bib]
MSTISDLDFDTGKTVLVTGASGGLGAGIARVFAAAGAAIHFHSGRERAENLRDSLPGP
GRHECIQADGSSENEIGSCMEQVARLCGESGLSVLINNAGVYPSSALLDIDLATWHAVMD
TNLSSMHLFTREAAKIMRPGSAIVNIASIEGLKPVRAHAHYAVSKAAVIHYTMAAALELA
PLGIRVNSVSPGLVDRPGLVEDWPEGYKRYVSAAPLGRVGTPEIGYSCLFLASKAADWI
TGVNLVVDGGASVVPQ*

>SPBIB_v1_240053|ID:27163183| protein of unknown function [Uncultured spirochete bib]
MEERALWRHRASHGIHGMRLKSCEGFDELSAVWVAFKQFGPPYEREVLQGKRWRHGSAEQ
GPSAARRETRTLNNEGWNWDFARPKI*

>SPBIB_v1_240054|ID:27163184| Purine nucleoside phosphorylase (fragment) [Uncultured spirochete bib]
MNEAVQKAINVIRPKLSSVPCLALVLGSGLVLAEEGKHATTISYADIPYFPVSTAPSAI
LFFMEVYFDVAGLSRRHHPYPGS*

>SPBIB_v1_240055|ID:27163185| Basic membrane lipoprotein [Uncultured spirochete bib]
MKRIFITALVLSLVFALGAGAQSAPFVAMTTDANGLDGSFNDGVWAGLKKAEAEGLAR
VKVVEAHAMTDYIPNLSGLAEDGAQLVFGVGLMVEQIQEAAKMNPKTFYAGIDHFYDDP
IPPNLIGISYKEQEAGYLAGIVAGYMTNKYSKNSKLLNDKNVIGAVLGMDDIPPVERYLAG
YIAGAKSVNPKVDVRYIVAGTFSRAKGEAALALADQGADIIQLIAGLTGMGVIDAARE
RKFFALGADVQNSAAPDYVLTSALKGTTMSAYITIKDLAAGKLKGGVNRVFLAEGAID
IAPFHQFDSIVPAEVKNAVAKAKADIASGKVKVPASLAELGIKK*

>SPBIB_v1_240056|ID:27163186| Inner-membrane translocator [Uncultured spirochete bib]
MIDFFAALLTPQLFEATVRLATPVTFAALAAVVCERSGVTNIAMEGVMLVGAFFAAWVGW
ISGNPWLGLLGGIAASALFSLFAWVVSLLHINHVVGTAIMNILAFGLTRYLMMVFYGRQ
GTSEAVAKTLHHYKFAIPLSDIPYVGPFFNQTPLVYLSISVFAWAWIFKRTRLGLSL
IASGEHPMALETLGRSVYRVRYLAILISGVLCGFAGAFLSIENSNSFTEGMTNNGRFIAL
AANIAGGWRPVGVFASLFFGFVDALQMRVQSLGIVKIPSEIFIVFPYVATIVAIAGLVR
KSRPPAAVGKDFNIEGDGE*

>SPBIB_v1_240057|ID:27163187| Inner-membrane translocator [Uncultured spirochete bib]
VSVSAPRRIRMVLKALSLILAVPGVLLYLASYFWGAWLLCAIALYAADRFLAVGSAVFG
SEARKLLSRAIVPVAGIGSALLIGAVIMAITGYNPISSYGALFYGGLVRNWHISVLNATP
LIFTGLAIAFAFQGGFFNIGAEGQYYIGVIAATWMGLGSTLPGIIAIPAIFAVAAIAGAA
LNAIPIILKVKVTKGAHEVVTMMFAVVRTLSPMFIRAHGGDPALTSHPYTTDLISESVWL
PMFKDFLPGANYRLHIGVLLAIGAAFLVRFILMKTDLGYKIRAVGHNPVAAMTQGISVAR
ITAASLFISGLAAIAGATQVLGLDHRMFQDLNAGYGWNGISIALLARNNPIGIIFTSLL
WGVLDAGGQYMARTTQTPNAIIEIVKGIIFLMLAEVIYKRAGSVFGRWAGRFTAARKG
AGA*

>SPBIB_v1_240058|ID:27163188|yufO| Uncharacterized ABC transporter ATP-binding protein YufO [Uncultured spirochete bib]

MPKSDESPLVLETRGITKRFDHIIANNISIKLRKGEIIAVLGENGAGKSTLMNILFLGLY
KPTSGSILIDGLPVSFDSPRDAIAKGLGMVHQHFMLVPTLTVTQNIIVLGKEPVRLGHVLY
KRARRSVVELSKRYGLTVNPDARLEDLSVGLQQRVEILKALYRNARVLILDEPTAVLTPG
EVEELFAVLRNLAADGTSIIIITHKLEEVKALSDRVYILRRGELVGEERTASASAAELAN
FMVGRDVVLAVERPAPRPKPEPIFSLESFVHSSRGLPALKGVDLAVGRGEILGIAGVEG
NGQKELCEVIAGLITPDSGKILFKGEDVSRWSVRRRMDAGMGYVPQDRRVSGLVLPFSVE

ENLALGRSDRPLSRHGFMKFAALRAQALQLMENYDIRTSGPEARVSTLSGGNQQKIILA
REFSRNPDFLLISQPTRGLDVGAIEYVYRRILELKERGVAILLISMELEELFALADRIAV
LHGGQVVFESPTATTNEAQIGEYMIRGRYSIS*

>SPBIB_v1_240059|ID:27163189|mtnA| Methylthioribose-1-phosphate isomerase 1 [Uncultured spirochete bib]
MNDSGSISASSVPRSLRWEDEEGGELYILDQTKLPGEVVEERQDSAEQVWESIRQLKVRG
APAIGIAGAYGLVIGLKPLVDLRLREFLTQAERIAAYLNSSRPTAVNLSWALNRMLAFAR
SNAEKAGTSAVLYKLLVGEAKLIHAEDRAICRGIGESGEVLLNEGCGVLTHCNAGALATS
ELGTATAPMYLAFSHGKRFRVYADETRPLLQGARLTSWELKRAGLDVTLICDDMAAYVMS
KGLVNL CIVGCDRVAANGDTANKIGTLGVAILAKHFSIPFYVACPSSTFDFATATGADIH
IEERSAEVTSFGARETAPKEIKVMNPAFDVTPHELISGFITEKGIVRPDYRKNLERAFR
*

>SPBIB_v1_240060|ID:27163190| Transcriptional regulator [Uncultured spirochete bib]
MLAIERRNRILEKLRNQGIITVAEMAAEFSVSEETIRRDLYKMEVTDGVRQRTYGGAYIAK
AVRTDIPISIRENIYLPKGETIADLCATLVDEGDTVMLDSSTTSIHIADHIKTKRNIVVI
TNSLKIVDTFANSADVKKVICAGGTLRHSQLSFVGPAERTLEAYYADKAFVSCVGLDMEK
GATDADELEAEVRKMLNNAEKILVADATKFGKFSLSLIYPLDGINVLVTDRQPDVAVWL
RELTAKKIECLYGTGNPE*

>SPBIB_v1_240061|ID:27163191| Class II aldolase/adducin family protein (fragment) [Uncultured spirochete bib]
MLNGMSGSIKEDICEIGRRMYASGFVAANDGNISVRVSDNQFVVTPTLVSKGFMVNPMLI
TVDLGDHVVVEGSFKPSSSELKMHLAVYRARPVDGAVVHAHPPAATGFAVAGKALDRPYMPE
LFVNLGVVPLAPYATPSTEEVPRSIGLIAEHNAVLLANHGVLAWGRDLAEAYSRLTIE
LYAKILISSFAVGEPPQIPDNKLRALAQIREALGVKGDISTAM*

>SPBIB_v1_240062|ID:27163192| protein of unknown function [Uncultured spirochete bib]
VWVAGLQENAVASWLSAQAAARFTLTARSLCYFIRAPYEHVGHFGQ*

>SPBIB_v1_240063|ID:27163193| conserved protein of unknown function [Uncultured spirochete bib]
MYTVTKIVYSESAPDPEIACFLEDIYQECNRRERLELDPLAIVRRYSEPADIEVAGLVCS
TLAFGSVELILRACEKALVPLGEHPAVALAGMRPEEISQAWGSFQYRFCFPKDMIALMTA
IQRVLIDYGSLEVLFSGKDDGAGDRDGGGMSAAPSILSAASAFVGHRLRQFASEA VPGGLR
QNLLPDPARGSACKRFLFLRWMVRHDEIDSGCWKSVDPARLIVPMDTHMVKTCRERLGF
LPAASGAQVAPGGSRKGLKTSIPTLADALRVTAARLYAPDDPVKYDFALTRPGIDPRP
GDERFGCL*

>SPBIB_v1_240064|ID:27163194| exported protein of unknown function [Uncultured spirochete bib]
MKFRFRFSIAIRRYFRAWIIIVFVMSAGTPLITEAQALPKIDTEQLKKISGESAEIEGL
IIRATPQSITDARARIETSPYLSAPDKAALGAIASGVGLILYGPKDSRFEIPVAAQ GASQ
KYITYLVGLVDVFAGKNPQIFASEPCSTMTELISLSYFRSAKSEVREKVN GALSRFDAL
GGVSVVPM LIRGQTALDSKEYSIAEKEFSSALLD TKSEKSACGFARASLALGK PQA AKN
ALDPIAAGIITSSTSAEFKALYGLTLYNLNNVLD AEA WLASALNDDPGRTEVLVPLA QAA
IQRDYS AASRYLESAAKAFSQDRTWLVLKSQYALENS RQADAERFARS AVRYFPKDPVA
LSQLIQALEKSTDEARHAEAADLAKAVLDLAMEDTALVPLEEARRAQAKN QALQFLVSE
SYNHQDWARAAAYLQAAGSLPLDKNMVATILRKS GNVQASIQFASSWYAQEPGSEKA VEA
YLRSLAMATGGGLASVAPASDVHTGLGIALSALGVGKEGSANSALLDLVLK FIAAPYSKE
LKSFLYYMSASLQSDENKAIDQLKNAL AERADNVEALVSLADIYLARYNRQFDKRDTTNR
DRAMRYLGQAKALSPTDKDLLARISQLEAQLK*

>SPBIB_v1_240065|ID:27163195| conserved exported protein of unknown function [Uncultured spirochete bib]
MKSANKGRGVVVFVFTSLCVLFLCFALFLSSCSNDLLAPLGIGSNDFISISNKAQAKDLRD
ALEILHSPRLKKS GYYPVQRMLAARRISTILIEDGQQARAARFLSSLAEHDA YEAWYLF
AAGAVYESMGSAPIARILYERIIETVPDMTIDGQSIHRTCLVKLIDSDNPPEKKTAWFKE
FIQRFPDADEIGPFHFLLAKEYEALGQWTQAIEEYRRFLPYFGVSVPGYSDAHDYARKMV
EFNDSPKDWTYADLGELVAGIRKAI AARSPTLRKYMSKAGFFAMS WYKEGGEDS NSNVL
FNFSNFMTKGPIYVAPALDPSFNDSEAF LRTSGWTGYIPVWYLCFRKVNFPADPKVHGNW
EWAGIYFGEKMQ*

>SPBIB_v1_240066|ID:27163196| putative Gamma-D-glutamyl-meso-diaminopimelate peptidase [Uncultured spirochete bib]
MIRKCCLCMLASLCIAVPLISATEAEGAFHISAVSTEGSSSALSETPSSSSAAHTPLAPA

PTSQAAPDSASIVPPEAPEELPSSPLEESQEPIDLSQLVPEELSLEEHAKSLQYDIPMPW
GHELFEKYRQYYLSDRGRKILLSTMEKAAPFMDYIESKVAEYGAPQELAFPLVIESAFSP
FAVSRSGATGIWQFMKNSINGYGLTITEWVDERRDFMKSTDAAIKKLIDNYNDLKDWPLA
IAAYNAGLGALRRAVNAAGGDTDFWNIYDKGLVSKQALDYVPKFLAVASILRYPDLYGLA
LPPRQLKWEAIPLDRQVDLKLLASKAEIPLDTLKLGNELHYTITPPDDSHLLKVPAEKS
DQVKAILSDPNAPLVRDYIYKVKQGDTLTAISRHYGVSISMIKVNPNGLNPDRLKIGQTL
MIPLSLQPLNPSMSSNASSGSASAQSTSHTVQKGD TLYGIARRYGTTVQKIASLNGISVN
SVLRIGQKLKVPTQP*

>SPBIB_v1_240067|ID:27163197| Acetylornithine deacetylase / succinyl-diaminopimelate desuccinylase [Uncultured spirochete bib]

MTELAQISKFLDLQEKGIIELSLTAYPALAPESGGIGEIEKAAALEKWLKAEGIQNIQ
HYDAPDERVPSKVRPNLVATIPGKRKDSPVWIMAHLDVVPEGERSLWSDPWKVVVKDGGK
VYGRGVEDNQQLVSSVFAALAFVKLGIVPERTIKLLFIADEEVGSKFGIQYLLEHHDLF
SKDDIIIPDGGSPDATEIEVAEKNICWLKVTTKKGKQTHAAMPDKGANAFLAGCDLALRI
HRLEKTAFTARDALFSPDRSTISPTKKEANVPNINTIPGEDVFYVDMRLLPVYPVSMAL
EISRLSHAIEAEYGVKVSIDVVQSNESRATPATAPMVEMLARAARQVYGVEAKPIGIGGG
TVGAYLRKAGYDCVWWSKMNETAHQPENADIANIIGDAKVFATLAMME*

>SPBIB_v1_240068|ID:27163198|galE| UDP-glucose 4-epimerase [Uncultured spirochete bib]

MNVLVIGGAGYIGSHVARYFADRGLKIDVLDNLSTGTDKDNLFDPYSFFEEDILDYKAVAA
IMRRGYDAVVHLAAAKAAGESMLKPEKYAVQNLGTINILNAACEAGIKKFVSSSAIY
GEPKYLPIDEAHPKEPANFYGFTKLEIERMLEWYDRLKGLKFAALRYFNAAGYDPEGRVR
GLEKNPANLVPVIMEVAAGLRPHLDVFGTDYPTPDGSGVRDYIHVTDLADAHYRALLQLD
AHAESFAVNLGSEGLSVLEILEAARRITGRPIPAHITGRRPGDPATLVASSAAARKLLG
WQAKFSDMETIATSWRAYAQHSHSHIH*

>SPBIB_v1_240069|ID:27163199| protein of unknown function [Uncultured spirochete bib]

LSLTTKALISERCAECQALSSVTNLA YEFEVKASFLASIRRGGFHASFSFLPKPGX

>SPBIB_v1_250001|ID:27163200| conserved exported protein of unknown function [Uncultured spirochete bib]

MHRFGLHCFTLKYRKTFLATFLFLLGMSAFAFTFMPMSISISPSGAQSIASFRLTNDGGQ
QIAIVIKAMTRDIDENGNEINPADKDFTIFPTRVVVQPN SFQNIKVQYKGTPLAKEAA
YRIIAEQVPIDFTQQQTSGVKVLFRYIAALYVTPTNV AHKLSVSKVEYAEQEGKKGFLVT
ITNSGTRHALINDPVLKIAGGTGISITLKDDAVKAIQQQNLLAGNVRRFFVPSDDAKPNT
TYTGTLSATIE*

>SPBIB_v1_250002|ID:27163201| exported protein of unknown function [Uncultured spirochete bib]

VFFRKLMSVILLFFVMGISISFAQTPPSQAISNAPITHDTIVPDLEITIALSINGKPAG
EVNAGIWQNQAVLYKKLAAQLLIEHLRPDIYSVIFDSVFRDLTWLTADDFALVGISFEFD
SAQLTISITIPPEYAPVVDIDFVPEQVPNYKPI LRAAPFSGFIQNESALQISNVTSNTLN
YSTQLLAMIDLMGTHLVGSGNISVSNAALSYSVDNAYALWSDFARKLQISLGKISIPVVG
AQTQSTLYGISIGTSDFEKYIVRQGFIDDMTEFTIHKLARVSVEVNGKPIRTMMLAPGNY
RILDLPFTSGLNEFVLRIEESDGNVQVLRRIIPRESNILQVGTSKFALSAGTGIQDWKEL
FASGYWLFGISPAFSGGFNIQADIRSAMGGLTWVSALPIGTINGSASLVGRWDGWGEMFA
PAASANYVFSMPGNSSIPSLGLSFSYRGKGFMP PATSAPDSAPPSLLSFSASLYSAIFS
RTNASIGYSLNRILSSPTAMTHEIYASISQSFIKGGNLSLSGRLSFPSSGSPTFSAILTF
SIMPRESYARSLNFMQTTDGTSLGILDKFSAFGQVDFDNINTSSFLPGSGESSVFNIGV
RNTSEFYDVSAAGSFAHDSSLNTDTLTGNLQFR TTLAFVGS HVAFTRQIPDSFIL IATSP
SLKKESALYRLSSGAQYFAAKGQNIILPLTSYTTT VLSVDLVESPINLNPRYPFVLVSPA
FRSGILFQSDVVKRYMLYGRVLDVTTGKPV EYLPGLDIYDLGGSMVTSTFSDEM GHFEIYDI
LPGTYTIEWPEGYGTTQFELSESGEDTIDLGDV VVHVRGK*

>SPBIB_v1_250003|ID:27163202| exported protein of unknown function [Uncultured spirochete bib]

MSRKLLLLAVIYVGVMAAGSQTLSLNPITAPATV TYDPDSSSDTTGPQFSITVRLSKKP
RYTFYFFVTINGSPTVNSRDLVLT DNSALSILSKFYKDS AFTQEILGGNGSGMTSTQVLY
GQFNKNTSVLTQTFTVYPWIGKNQVPYGT YAGTFTARLYQGT VGVAGTLRDSNFYTA
IVNQKVDVRIGPATGSYDTGSAIYNINLGEVSS GASGTF AIFLKANTAYTLKMSAASGGY
LTSTTTSDKIQYMLTIDGASKTLGPDIIIDQ ETAKQLYSKVLLGAISVAAGQDVEAGQYS
DTISFTISAN*

>SPBIB_v1_250004|ID:27163203|malQ| 4-alpha-glucanotransferase [Uncultured spirochete bib]
MQIPRSCGILLHPLSLGGPWPCGTMGEEARAFVDFCAHAGIGWWQVLPPLGPTAYGDSPYQ
SPSAFAGNPLYLIDPKALMDEGLLAPEEVEGYLTGFNGAESSRASGVSTGSSTNYIDYAL
LFRENARLIEAAWRRFGSREGGARLAKFQQFGNAQASWLDDYALFAAIKEHEGHRPWNEW
PEAFRCREPDIAIRFVSEQAERIGRIKFTQYIFWTQWQKLRQYAHERCVRIGDIPIFAA
YDSADVWAHPELFQLDAEGMPHVAHVPPDYFTATGQLWGNPLYDWTAAHAKTGYAWWKAR
VQHTLSLVDVLRIDHFRGFEAYWAVPAGEPTAEHGRWEKGPGLHALFNALKEALGELPIIA
EDLGFITTEVIELRDSLGFPGMRILQFASFESQTDNNDYPHNYPQHICIA YTGTHDNDTAMG
WIEHAAPQARKRALAYLHGGRRTFSWDLIRAAWSSPAMLA VAPMQDFLGLGSEARMNYPG
TTGGWWRWRLPEGALSPALARKIKRLSKIYFRI*

>SPBIB_v1_250005|ID:27163204| protein of unknown function [Uncultured spirochete bib]
LYSFSRSLVGKRTCPAIARGPLAQLAEQRPFKAWVPSSILGRLISNIFYKQLAAAFARA
AYLFFGDMRIFYEKGSVRKAKKVKKRGQTP*

>SPBIB_v1_250006|ID:27163205| exported protein of unknown function [Uncultured spirochete bib]
VEYRVNRAVAIMALAMLSSFSLAAQTVVPGLPKDARSMGMGGSFKVFAEGYSSLWGNPA
GLAARGSLTVADSATWAYVQPTPLNIKNIIRVLGQQATHDES VATLDGLINENDFGMGES
LGFSGWTGNLGLGLTSIVDALVTGDALAGSKLAITSQTNAVLMGMAWPVNLGPFGRIGAS
ARGFYRIETLPGGWPFDSLAEALNRQDLYSIIKVYNVQGGFGIAIDAGATFSIGPFSIG
LMMRDYGDKFAMNESTIEDIANFSMVPSSGGIDTYVFKPVYTAGLALKLYQDFLFSFSFYV
EADDPLALFPLVTRDIDAMFSRLHIGVDLKFLKFLRAGFNQGLFSFGAGLDLIILEVD
AALFSEPIAAGGRIGRTGIALQGAIRF*

>SPBIB_v1_250007|ID:27163206| protein of unknown function [Uncultured spirochete bib]
LLTDQWYNSKVERIVILEQQAAGAMGQRLVVCFSMLFFAFVQLFHPIL*

>SPBIB_v1_250008|ID:27163207| conserved exported protein of unknown function [Uncultured spirochete bib]
MKRKAMIFILLIMAVLAATAQTTLQFTSPMPKDARSMGMGGAFRVFSEGYSSFFGNPAGF
AGMSSLTLIDMSTWAYLAPTSNLGRVQSIISGSASNSDILSWAGDWLAKNNGLGAGASI
GAGWVGAKGISLGVNLVTDELA YGNLLGAKLLSTTQANGVLGLAYPIHLGPVWFKIGVD
GRVFYRVQSKPTTGWGFNTILDFLNDTFSASSL TLLGGYGFAADAGIILGLGPVMLGFT
ARDFGMFEKVGDFTAQDVIDKQFSALPLSGTTAALTPSYTAGLIRLFENGMEFPEPVYA
EVDNPISLVSSDILSDVLNSLHAGAQLRMLRFVTVRGGGLNKGWYSLGAGIDLAFVEIDA
AIFTEELGLYAGDKGRSGISVQAAIRFGR*

>SPBIB_v1_250009|ID:27163208| exported protein of unknown function [Uncultured spirochete bib]
MRSKYVAYAALLAIIVLFFTGCDALITNVFKDANLGQPSAATIQNQDAATLIQQAGITSG
AVSDTFIQTVISDETTKNQVLATLQGTVDGTGPAEAQAAQALILDIKLADIGADAVMDNL
NAAVQGLATLANSNEQLNPQDIINALLPAELANNPANLASFIDNLAGLGTVDVDTLAQKID
ANNGTVADGLDIATIAQTAALVKFVEIVEPASEYSTGEAIANAVEDLKNDSNADVTKYFA
AQPDIASLADNTTLQTLFDAAGLSALLDKMKSGS*

>SPBIB_v1_250010|ID:27163209|mtaB| Threonylcarbamoyladenosine tRNA methyltransferase MtaB [Uncultured spirochete bib]

MTLLRVAFQTLGCKLNQLETESVADRFLATGAKIVPFHEEADLYVVNTCTVTSKAEQKAR
HDIRAALAKVPHAVVVATGCYAQMEPGALALGERVIVIPGDLKASLLALAEWLSNWQG
HGELLHAVQEWQEEIQSAAGVAAAGTPLAAGTSLGALVGAQSAPVNASSVPGTSLGALPT
DRFAFNPERFAMHSRPAKIQDGCNNRCAYCRVCLARGPSVSLPAQEALARVRKLEQAGK
AEVVLTVGNLAQYRDSALGLDFSGLLAFLIQGTERINFRISSYEPERIDDAFLAVFANTR
VRPHMHLVQSGCTETLRRMARPYS AERVRAVLDLRASRHPFLAADIAGFPGETDAE
FEQTFSLSELDFAWIHAFPFSPRPGTRAADMKPRIPERIERIARLIALAHSGKQSYI
ERWIGREVEMVVEHEGFGQDDAEQFDQALTRRNADTHRGLPKVGQPEADSSSVIAALS
RIIGTTENYLKAEAVQKGSGRQSGIPAEAFKTRKALEALGLRPGDTRILIQNVLADNN
AEVSAFFVDTWTS*

>SPBIB_v1_250011|ID:27163210| putative TPR protein [Uncultured spirochete bib]
MMHKRLKQAHILVFCVLLLLGGDIGYVFSQALPSSIAAPYGMTGSDLLRMSQEGKHNEVA
LLAPEVLRKNPQDLDAYIAYAWSMNALKEYTKARDIAQGGYAKFNDARLAQALGEALYYL
GENAAALS NFQEYLAKFPEGNKVASTYYLCGELFVRMGKFNHADI AFSTALQYNPSNARW
WERLWVREKTSRYLAALKA YEQAISLNPSLQDAQSGRMRMLAKIKD*

>SPBIB_v1_250012|ID:27163211| conserved protein of unknown function [Uncultured spirochete bib]
MSEEEVKLSVVDEEEVDTVIGSEIEFDGEIESSQSLMIKGGKISGSIRCKTELYITEQAEV
NATIHAATVVVRGKVRGDVSADSLIAVLDWGHVEGDLSAPDIYLSPCFFNGKTVFTS*

>SPBIB_v1_250013|ID:27163212|rsmA| Ribosomal RNA small subunit methyltransferase A [Uncultured spirochete bib]
MTINFDSPVSIRTFLEAQGLAVSKKFGQNFLVDRGMRRERIEALDVQPGMSVWEIGPGIG
SMTEIILQKGADLTTFEIDYGFVRVLEEMFGSDSHFSIVKGDMLKTWRSVSRPDRIFGN
LPYSAAFAIADLLEQDCVPTRMVFTLQKEAARRMAARPGTKDYSSLSVLCASVCDVRIL
FDIGASAFWPQPRVTSSVLLVPKDPVAPEKRKDFSDFVRAAFSSRRKTLRNALHVWAH
THIPSMNETEFESLLAACLAKIGARPDVRAEALPPRQLWDL YDLLASASNSASTGTGACT
STSTNASGSPA*

>SPBIB_v1_250014|ID:27163213| membrane protein of unknown function [Uncultured spirochete bib]
MRVEPACIAAIGLWLGFLVGGSGLLDLVLA WVGAAFAIAMECWPRKTRGMPRTLMIAGAL
CFGLAMSAGVRLRYQAQQGSMAQQISTMQKSTAQAALLEGGLHLEAIEGVLVGDVTQVTSK
ENRRFDVSVQAAEFGAPGIKVRCEWKRAVFLKRPAPSLALITGAGERMLAGTTIRAERLK
GGDFVWVDERDLKVSGLTPLLARLRAAIAARFASALFAVAGRAGPLTQALLLGVKDELDT
EFKGLFQSAGCAHMLALSQHL SIICTLAALAAKRVLHREKLARRASFVFAWLFVWLAGP
GPSLLRAVFMLTAAEVGRMLDRPQSSFALLSLASLMLALFDPSSITSLSSIYSFAAMAGL
VLFAGRFDYALRPYMPARISQAFASCAAVCGTAPVSILVFGTFVPAGILAATIAAPVML
VFMWLGLGAGLIGVFLPIVASVSAPLLGTLQDVLLAILSFGAWLPALQTGTGMVDRALFC
AGIVSIWVLIYAVPMLQWKKSRMQMQRMLILPSISPWGGLSL*

>SPBIB_v1_250015|ID:27163214| membrane protein of unknown function [Uncultured spirochete bib]
MADLSLKRFSGYIIMLLAYITAWADILLAIPEPPAFSALWFISVLLKNVIRIAFVLYIAS
QLTLFAKSKWKEALVQAPSRHDARQALVVMFISLGCAGVGVLVSWLSGIANPLFIAHNRL
PLLVLFPILLSSLSVGYAEELFFRFFMIDGLMEAGAPVNAAA VVSILIFALSHHAQGF
GIGFAAVLAAFYTSRFRKGFGLHSLALGHALYDGIILLIVLA*

>SPBIB_v1_250016|ID:27163215| protein of unknown function [Uncultured spirochete bib]
MKPEVRAINSLDLSALAGRAWTEKDLSLAIDKWLPMLPRSTREALTGLAVEKLKTDPA
RMPLAIAATFAGVLLKEYDGTPLTAEWREL RDVISDCADELDMDNVTYAMSLIMDYGAL*

>SPBIB_v1_250017|ID:27163216| Methyltransferase type 11 [Uncultured spirochete bib]
VKRSVKKPVKKHEWFEDEGFWD AFAPFMFDETRWALADPEVEHILALTGIQPPAKVLDLC
CGVGRHSLAFARRGFQVTGVDITASYLEAARESAEAEKLAIEFAQADARQFVRPGEFALC
VNLGASFGYFSDAREDFGLLKRCREN LAPGGALVLETIGKETAARDFVEEEKIARDGWEA
SARYSIIGEWKLG NFWKAQKGALVFERSFAIRLYSGTEL RALLRKAGFTHIEIYGDLDG
RAYDQHATMLVAVAKLR*

>SPBIB_v1_250018|ID:27163217| exported protein of unknown function [Uncultured spirochete bib]
MKCFSAMLLAFVVCVAPFLAALDPESP GSSPGSSVLQVPQASETPEAPSQ LPPQMLPI
LTEPADPSGFFFAAEQMRMQAGDAGLAPEQARLAEFMYTLAFRFAKGPAALEAGRSLFLL
LSTQGRLEAASTAREWLQSFDPDWTMYRNL YDTLMAQGSFPDAFALVSELSKAMPSTAK
SRSTELSWMEYNARFGMQDYSWAANGPPFIKTRTPDSYIAKIYRLYAAVPNV PQNQAALA
LFRAAAATEKNYADAIA YARPILPTFSGSDTPRAWISELGKSFY GAGLYREGIDFFLAALG
FALPAPSPAPSQSSLEAPLSAPVPERTPFMNSAPIIDRAHVSTELSWVMAFY LARMYQGL
GENQTAASVFIDLVPFAFSS ESDSALWYWLDITMNAIAATDSTLGD LGQDDANGIQAKR
SLELSALSQAAALWKSPSYFEDIVANYMRLLREGAWNDVVRLCVLMSQKLTASMKGPLL
YLSGRLIETGRASADLSTESDFWKWLAPT NQNQSSPNAATNAVSQNPPDSGSNSQIPSAP
SAPLALNTSPLFFQSLLRENGIEEHYRTLAAWRLGKEPILADTPVLDKNFDIVSAITSQ
LPQSDTPPV SDEKLKEVDFITQSLDYGLEALAAKQVAVLSPFSTDSLLWLA AKFTEHEQ
YYPALRIGSEALTRKPA AKPELAYALLYPRAWPEHFSELTAPRNIAEPLAYAI VRSESMF
NQRAVSRSGAMGLS QLLPGTAAETARGLKMSQYALFDPKDNLTIGLTY YGYMLQRFDGRP
ARAAIAYNAGPSRMAQWARDWGNLEDDILIELYPVAEPRQYTKNIIAALNYGKMY YGIS
SKDMLDFMLAGKALPQPASVQPAQNAATSAPASAPTAQSLSEPA PAPAAPAPDTSQPTLA
PAP*

>SPBIB_v1_250019|ID:27163218|sua| Threonylcarbamoyl-AMP synthase [Uncultured spirochete bib]
MEILSTSEADLAKAARALREGKLV AIPTETVYGLGANAYDERAVARVFEAKARPTFDPLI

VHIARIEDLNEVAREVPPSARALANALWPGPLTMILPKKPEIPDIVTAGLPTVAVRFPKH
AIAQRIIALAGVPAAPSANPGFYISPTTAKHVIAMLRDKVDFIVDGGPCDVGVESTVID
MTGTSPILRPGGMALESIEAIIGNVSIQAQPGRSPGTTNTLDTAGVPEKGLPSPGQTLS
HYAPSTPLYLFDADSLPRSAKESEIPHSVALVFDSSIRAKELESYHIFEQVVALAPSGDM
REAAARLFSLLHEFDARGYEAIFAERVPEAGLGRAINDRLYRASKK*

>SPBIB_v1_250020|ID:27163219| B3/4 domain protein [Uncultured spirochete bib]

METKLIFAQDTGLKKLRLALIELEGLHWERAEEVAPPEALFEIILEQARASGTEARVSQPQ
SPARDSRLTESRTRAVRDMLRNGSYKPAGRAKPSSEYLLAAALDGDGDFPRVNPFDVAVNLA
SLKYLPMISFDADKAGGALVCRLGAAGESYVFNSGGQIIDLEDLLCVCAPAVESGIS
RRAAAPEAGAGGIPIVNPVRDSMATKLFECANAIAYIYAPSGAEGADLEQAAADIAAWC
GRACDRTAIRLF*

>SPBIB_v1_250021|ID:27163220| protein of unknown function [Uncultured spirochete bib]

MNVAIVCEKVNGRAQMAGQARFYEKHKLGSTYGETPVCCYNIMPWKPN*

>SPBIB_v1_250022|ID:27163221| protein of unknown function [Uncultured spirochete bib]

LKACGIVESVLAISSCHKLLIQYLKDFWTYETSPYVREKHLNGQCIGRRYVLESLHRGS
SRTPKYESVCRCVHGPLL*

>SPBIB_v1_250023|ID:27163222| exported protein of unknown function [Uncultured spirochete bib]

MRRLIAIRLAFFSLIAVIALPLCAQQYEALDRIALVIGNSNYEGTAKLKNPVNDAQDIG
ATLSSLGFDAEVLTDADLYSMEDSVLRFDRDKLAKSPNSVGGFFYYAGHGVQSGGENYLIPV
DARLNSESMLRTRAVPLQFVLDSLSEAHNKLNIIVLDACRDNPFWARSSARGLAVVGGQ
PPASIVVYSTSAGRVAQDGTGRNGMFTTELLKHLPTPGLDITEVLRRTGEGVQAKTDGAQ
IPAIYSQFFGFLRLAGEGEGGGLAQGSAAQSATYGSAQGGTQEALGDASLDYLPAFFDDA
PRNTKLAIAKAEELTWDEKWLAWRLLEKTDPNDRDPYILAEKIRTALDGNSYTDNYRGF
SFYDTPPDGDVVKARADGTIDEEYFDFDPHAAVQVLLDRGVEIPPVLALALGDFYYNVYN
YYPYYPDDWSLTSDEILADGLRWFDLANENYIVVDTTSVIHYAELLMKAGRNTDAVAILS
DQVEWEPDDRILRQTFVDALVRAVQIDEALGQLDMLIANTGSKEEALDYKQAAQIAFDN
QKSAQLEHYLAALEKDYPPDDWFGPAMRHRLAVNTGDKLRAQKIAEDLLTHFPPSVSTDAL
ESILTNWLLDPAGPSAGLSFLDSSILAAKKGKPRELGIFLYRALYRYFTVEKDPFAFKARD
AAIQRSFEDIDSAEKYLQAGPEPDMLESIKHIREEWGKGGK*

>SPBIB_v1_250024|ID:27163223| conserved protein of unknown function [Uncultured spirochete bib]

MIRRPWWEARIRALWERKPIVWLSGVERRAGKTVLCKSLEGVQYYDCELPSVRREMOPES
FLRAANGKFLALDEIHLRDDPALLLKIAADHFPDVHIVATGSSTLGASAKFRDLAGRKA
ELQLTPLCEADSNFPQYSDRTRRFLHGGLPGFFLSMDRDDRYSSEWMEAFWARDILELFR
LERRSSFLKFAELLMASQSGRFNAASFAASCGVSRPTIMNYLAILEATHLVLVVRPYHGG
AAKEIVATPCVYAFDTGFVAWAQGLHEIPAKEKGGFFWEHLVLNELDAILQGSPSIMHWRD
KEGHEVDFVLAPRGAPPIAIEAKWSADAFEPEGMQAFRALHPGIVNLVVSANVDQPFERE
MKGLAVTFCPLSALANLKTGSDPDF*

>SPBIB_v1_250025|ID:27163224| conserved protein of unknown function [Uncultured spirochete bib]

MLGKSGSDPDLQIIFKFRGQTPKLLKNSKPRPAIAICKFNFQLAKAKHFYYHSYMIPRIA
EHRIRSLCAQFPAAIITGPRQSGKTTAKALFPDRPYLNLELPDPTLERISHDPRGTYPL
RRSGAVIDEAQRFPEISSWLQGIIDEEPKAGTWILTGSQDQGLRQSVSQTLVGRAAYARL
FPFVSDLSGNPIFSSSSTDEIIQRGWYPPLFDRPFVPSDWYEQYVALYLERDLSRLINI
KDLSQFRKFFSLCAGRTGQLNLSDLARDTGTSHHTARSWLSVLEQSFIVFELQPFYRNF
QKRIKSPKLYFYDSGLAAWLGIREPGQVTNHPLRGNLFETMVIADIIKRSEAIGTGER
FSFWNAPSSGEVDLVIERGTEISAIEVKSTATFRPELASGLEKWSRLASLPPERLAIAYD
GNERFQFKGINIIPWRAFGQ*

>SPBIB_v1_250026|ID:27163225| Putative oligopeptide transport ATP-binding protein YkfD (fragment) [Uncultured spirochete bib]

VVLDESPSALDVSIIHAQILLLLDSFSKEKNLTYFFITHDLGVVVKHFCDRILIMYLGNVCE
LAPTKKLFHKPLHPYTTSLAAVLRPVVHKKSTQESILQGEVPSAVAPPPGCPFHTRCPK
RMEICTQAKPELAEIEPEHFVACHLYSKAERAPSRENALARQ*

>SPBIB_v1_250027|ID:27163226| ggt| Gamma-glutamyltransferase [Uncultured spirochete bib]

MNFDPTYLPYASARYPIYAQHGMVAASSPQASAAAGLEMLRRGGNAIDAAVAAATTLTVVE
PTANGIGSDAFALVWIEKERRLYGLNASGWTPRDISIEKVLAAPGSATGGSEMTGGARGA

EARSTEASGAAQSGKMPTYGWWSTMVPGAPKAWAALVARFGALSLSEVMAPAIDYAENGY
PASP NLARMWQRAFEKYRKT CVGPAFEEWYRTFAPEGRAPAAGETVRLPNHARTLRAIAE
SSADAFYRGELADRIVADSREFGGFFCKEDFAEYEAGWVEPISVNYRGYDICEIPPNGQG
IVALMALNILKEFEFTTRESPETFHLQWEAMKIAFADGLAHVTDPAAMRVAAADLIQPGY
GSLRAREIEPPGGPARLYTAKTPPKSGTVYLCTADSEGNMVSYIQSNYMGFGSGVVVRGTG
ISLQNRGADFSLDP AHPNCLAPRKKTYHTIIPGFILKDGRAFGPFGVMGGYMQPQGHVQT
VTNLVDFHLNPQQALDAPRWQWILGKKFMVERAFP AEIAEALTRRGHEIEVSPDSTPFGR
GQILRLPNGTLVGGTEGRTDSNIACY*

>SPBIB_v1_250028|ID:27163227| Major facilitator superfamily MFS_1 [Uncultured spirochete bib]
MNDTIENKNLSFRFGLNYFLLLAIYGISSPYLQLMVRRLGYSPA AVGIFLGGFFELVGIT
GPIFLAQKADRFGRLKPFLFASGIMAIAGLALLAPFRIPLVTLISLTFLSLGLKTPILL
DTSLLRAIEKSAELGKKQPNYGLLRGIGSIGFVVVAIIVQSIPGFDASSAGTIAFAQGIL
ILLFLAGL FALPEVGH TQPRNEKIAFSFKWLDSTFMLGLAVIALGRLAMASVGSFFSMYL
TEELHWHAVGAMWALSATVEIPFIMLSWKFIQRKSPMLAVAIASGAI VVRLLIYAIFPTP
AGAITGQLLHSLCYGLFQPA AIAFVN LKTPPAERATGM AIYMGLGIGLPSFLGSALGGTI
VEALGYRWLFASYTLFAIASLVLFWRHREELTGVR*

>SPBIB_v1_250029|ID:27163228| Cupin 2 conserved barrel domain protein [Uncultured spirochete bib]
MLSIVTPMVRHESEIESVEVKGEGISGVRKQILVGPNDGWQGYMRVFALEVGGNTPAHRH
PWWHVNYVLEGEGETVFIDGVGHVVKAGSVAHIEGGKLHQFVNTGAVPLKFI CLVPPEGDHY*

>SPBIB_v1_250030|ID:27163229| putative enzyme [Uncultured spirochete bib]
MNTVRWGVLSVSNHYRLRVHHLQLAGSELSKVVAIASRDTAKAETAACELGIRRSFGSYEA
LLADPEIDAVYLP LPHLHA EWVKKAADAGKHVLC EKPFA MNAQAADAIRYAESKGVKV
MEAFMYRFHPQWAHAKEVVQS GEIGK VLFVHVQFTFNK DPNRINRILEVGGGAIMDIGC
YACSSSRFIMGKEPVRAISLVSRDPEFGTDALSSGMLDFGDARALFTVSTQAFPVQQVDI
VGTSGSISIFIPNMYGDVPAEMRIVTGIGPRTVRLGPAGQYRLMFD AFSKSIIEGTPVP
TPPEDAIANMRALDALFRSEKSGSWEKII*

>SPBIB_v1_250031|ID:27163230| NUDIX hydrolase (modular protein) [Uncultured spirochete bib]
MKKTKEQNELQPD DSTQVSSDA YIRSL EDKMNHALERLGGIGAAASAFHFCPS CGSPKLY
SVRSRMWK CPTCGFEYFHN VATAAGIIIESRGAILMLRRHKDPMK GKFALPGGFVEPGER
AEDAALRECYEEIGWSPAHINFLATFPNVYQYQGV PYATCDVYFFSRGNIVDFDDFELDP
EETESLQFVNVT AIPWADIAFESA VRALRYFLLHESIGIPPQMPDFE*

>SPBIB_v1_250032|ID:27163231|uvrC| UvrABC system protein C [Uncultured spirochete bib]
MSMKTREGVPAVSTVGESKEVITRPVNPAAPVGRDPNAPEIPHPETDTERRARKTLVKQ
APQNPGVYLMRDETGEIIVGKAKHLRNRLSSYFSGKKDIKTRHLVSRIHQIEWVLA AHE
YEALLIENNF IKEHSPRYNINLKD GKTYPSIRITSEEFPRVFRTRRIINDGSEYFGPFPS
AETIDTYLDLIKRMFPLRRCVKMKKRATPCMY YHIGRCPGPCAGKISRE DYLERVDEVK
LLSGD TESLVKDLEREMRRAAGELRFE EAARLREAIKAIQSF IGHSNAVDFNNDARDYV
AWEAEGEQVS YVVFQMR EGKLRNRDSFIEHLVSDELETLDAFLARYYEEGRTPPATIFVR
RADSTDAIARYLSERFDSRIDVRVPDSE RHWAVMNLAVQNAKEELAKRRRMHGDF AALAE
LKEALGLGSMPLRIEGFDIAQLGGKHTVASLV SFRNGIPDKKNYRYFKIRSVEGQID DFA
AMREAVARRYTRLINEEAELPDLVLVDGGTGQVSAAKEILDDLGLDIDL AGLAKRDEEVW
LPGRSKPVVLAKDSPALRVLVAVRDETHR FATGLSRKLRISDATFRVLQEVPGIGDVRAK
SILREVG SLEAVAQAEPGYITSIAHVNEETARKVIDAARKTV DVARRTVDTEEEPETED*

>SPBIB_v1_250033|ID:27163232|tktB| transketolase 2, thiamin-binding [Uncultured spirochete bib]
MNIPALQSI ALSVRSLTIDAIQKANS GHPGMPMGAAELGAYLYGVELRYNPGDPKWLNRD
RFVLSAGHGSMFLYSLLHMAGYDLSLDDIKAFRQV GSKCPGHPEYGVTPGVETTTGPLGQ
GISTAVGMAIAERMMAAHFNKPGQEIIDHYTYVVAGDGCLMEGVASEACSLAGHLGLGKL
IVYYDSNHISIDGSTNIAFTEDVGKRFEAYGWQVLKGS MYNFEELASLTAQAKADTSRPT
LIMLESVIGK GAPS KQGTSGVHGSPLGEE EARKAKEALGIPLDKPFWVAPEAYAYFKAHR
MALEGEYQSWQARFEAWRNANPD LAAELERWLEGKPAHELDLPAFKLGEKVATRNASGKC
LAAVASAWPNLVGGSADLTSPNVTQLPANS DGMPLVFGKENPAGRYIHFGVREHAMAAIA
NGIAVHGGLRPFVATFLVFADYLRPSLRLSALMRLPVIIYLTHDSIYIGEDGPTHQPVET
LASLRAIPNLKVIRPADA EETA VAWRIAMERTDGPTALVLRQNL PVLEKADPDWPYTMV

LGAYVVQNPARSPEVTLVASGSEVSLATAAADIVRKQRPELAIRVVSVPDRQAFYAAPAP
VREAVLAPGSLVFVAEAGVAQGWEHLAPPERILSIERFGESGPGDKVAEHLGFTAQAFAD
MILAQFSNF*

>SPBIB_v1_250034|ID:27163233| putative Histidine kinase [Uncultured spirochete bib]
MSDENISGSSPFSHIRKLRPHERAMFAGIFFVLVIVLGA VGYFSWQSILRDKKLYTELAS
RFKAEQIASWYNNHMEAAEISASSVIFDAVADAIADPGSPCLKRIENYLTPILRSFN YA
DSAVMTPDRKILVSLTGFAQPDCDMIQKELAARNNSEPFMTSLHLVSPYAKPGLHIVIPL
VDKKTQKPIAYVVHTVFSDDFLYPMLAQWPGNEHTGETLLLKRTDGMIVLNPLKLVRI
AFSLQISASDPDTVEARAGRGETGFLSGKDYRGKRVLAVASRVPELDWTVL SKIDISEAF
SGWFLTLVILILFGIIFVALVAGAYVLLSSRAISTYRARDLLQRTERNEALLNAILER
IDSLVVIPGKNLAVQFSNQAYQARFGTEWPKDLPDPQQATPEGPKPEQARKIDIVDKNGN
HARLLIFPIKIELRGQEPLLGYVMRDITELESALDVVQQLNQELS QKVQEQTQRIIDADE
ELRAIAATISHDLAAPVRSIESFSELLYQEISERSSAEAMDYLMRIRRASASMASLTSDL
ITFLSLDTVPLSLSEFDFSLAAQEITSDIIRNPGRRYQITIMPGLKMQCDRKL MNIALR
NVIDNAFKYCSDN TITAEIGKIGQSGIFVKDNGIGMMPDEIKKIFTPFSERKDERYKPG
FSVGLAVTKKIIERHGGRIEIESELGKGT TVYFKF*

>SPBIB_v1_250035|ID:27163234| conserved membrane protein of unknown function [Uncultured spirochete bib]
MKQSFLSVTILLILITDPLGNIPLFISLKHVPGARRPFVILRECAIAFLVLVGFLFFGH
VFLGALGLSDQILRISGGVILFLIALNMIFPGTGGRLVEDEV DGEFFIVPVAIPLIAGPS
AITYVMLLMKSDPSRSMEWVGAIFVAILVTMVSFFLSGKLKEWLGPRALSAIERLMGLVL
TAIAMEMLLGGLAQYLG NLPR*

>SPBIB_v1_250036|ID:27163235| conserved membrane protein of unknown function [Uncultured spirochete bib]
MRRDIKGILAMVGT AIFWSLGGLFIKLLIDWHPVTIAGARSLIAALFILAVARKPKLNFSR
NQVLA AVAYSITMLLFVYANKHTTSANAILLQYGAPVYVMLLSGIMLGERPLPEQIGALV
AIVVGMGLFFADSLSLGHLVGDIAAVLAGITFAIHILFMRRQKEGSPLESLLLGHGMTAV
IALAISVFLPAPVMSGKAIAAIFGLGIVQIGFAALLFSYAIKRISAIQSSLIAIVEPALN
PVWVFLAIGEKPMGRAILGGTIILAAVVMSSVVSISEASRNGRAANAEGSA*

>SPBIB_v1_250037|ID:27163236| fused putative transporter subunits of ABC superfamily: ATP-binding
components [Uncultured spirochete bib]
MAGDERNLSIRGDLAVWNGTNCIENAQRERGRHGM SIAQSKGSVRTQTLKNQCLPLYLKL
GRSVRPLTQTSIFRYSVRMPTTDDK KIIYSMYRLSRRYGTQVLKDISLSYFYGAKIGVI
GLNGSGKSTLLRIMAGLDTEYSGEVACAPGYTIGYLPQEPHLEPGKTVRDIVAEGVQEIM
DLHAEFERVNEAFGDPDADF DALAVKQAEIQEKIDALDAWDIDAKLEFSMDVLRCPDPDQ
VVDTLSSGERRRVALCRLLLK KPDILLDEPTNHLDAETVAWLEQFLRSYPGTVIAVTHD
RYFLENVAGWILELDRGEGIPWKGNYSSWLEQKRQRLEEEEEKGSSMRARTLDRELEWIAM
SPKGRHAKSKARIERYERLLNQDTKEKIRDVRLVIPPGPRLGDIVIEAKGLAKAFGDTV L
FEGLDFTVSPGAIVGIIPNGAGKTTLLNMIVGKEKPDAGTLRLGETVRLAYADQMRARL
DPEKTVWETLSEGLDIKLGRIE VPSRAYCAWFNFSGADQQK KVGILSGGERNRLNLAL
MIKEGANVILLDEPTNDLDVNTLRAL EALDDFAGAAMVVSHDRWFLDRVCTHILAFEGD
SQAIWFDGNWSEFAEWRRAQLGIEADRPHRLVYRKLER*

>SPBIB_v1_250038|ID:27163237| Methylated-DNA--protein-cysteine methyltransferase-related protein [Uncultured
spirochete bib]
MATALTLRILDAIRAVPYGKVASYGQIALVAGHPRGAGGARDVVRILASMSEKQNL PWWR
IVRKDGSIASPGSGAELQRALLAQEKVEFTKDKKATPGAFWNGQPAK*

>SPBIB_v1_250039|ID:27163238| nagB| glucosamine-6-phosphate deaminase [Uncultured spirochete bib]
MRVIIQNSYELVARWAA YHVMQRINEHPANAPFVLGLPTGSTPLGMYHELIRLCSE GKVS
FQNVITFNMDEYVGLPAADPRS YHHFMWENFFSHIDIRKENVHILDGMAPDLDEECRRYE
EAIQHAGGIDLFGVGGVADGHIAFNPEGSSLSRTRIKTLTRDTKLANARFFDGNPDRVP
SYALTVGVGTIMDAREVMILVSGIEKARALHNAVEMGVNHMWTL SCLQLHPKAILV CDDD
ATSEMRVGT VRYFKEIEGPHLVNWA*

>SPBIB_v1_250040|ID:27163239| N-acetylglucosamine-6-phosphate deacetylase [Uncultured spirochete bib]
MRKTVHSAFCIH NATVIAGYARMDRS AVLVEDNAIADIFSERRFAQKTFPPEVELIDAQG
AYLTPGFIDTHIHGIGGYGTEDLSADSILEMSRILPAWGVTSFTPTIYPMPEEDMIMAIR
AVVSAMGREPGA EIVGVHLEGPFISPAQLGVQRVEFVRPVDLGLMQRLWDASEGNIVSMT

VAPELKGMRELALFCIRLGIVLQAGHTDASYENMIEGMQAGIRHSTHMFNAMSRLHHRNP
NAVGAFLIQPDLSCIEIADGLHVHPDLIRLLFRDKPEGNIVLVTDSLKPTKQASDTPMFA
NDEEVYLANNFLFYRASDGVIAGSSLTMVEGVRNLISFGVPLESAVKMASANPARIFGLHA
RGMISPGYRADIVLADSEFDVQMTIIGGEIKYSCAAGGTTGGAAAGA*

>SPBIB_v1_250041|ID:27163240| exported protein of unknown function [Uncultured spirochete bib]
MKRFAVVALAFIAAIALLGAQEPQTPASFYAEATQDTQEVINASRLQSKGQWSKAWNLL
AAFDADNKNNGYVLAEKIRLALEGNVANGMLISFGFVDLAEGQNLDELTRANPPEKQNMADF
NPLDLAGALEKSGEAVPPVLSYEMGNLYQVYKDFGDNWIQDSQTIQQA AVENYDRALAY
ETYTDRSLSNQAELLINLQQYDGAEKVLRKAIAAYPEELNFQVNLASTLNDLGRFDEVYP
IVDAIIAKPDTGDATYNAYVEGIKAGLNSGDEAKTDAYVEAMIARFPDEYVPMLIQHLLIA
VRMGNEKANAADA VTAKFVDPNVVRSLLSTWLNAQDPAAGFAYLNRAYEKEYASEDKA
AGTLIFYRALMYAQTAATADDLKLALADLQEANTRFSTVYEPDNPIFQTINQLNDEWKQA
LEQPAPAEAGTAPEAAPADQSQQPAQTPEVAPGAQDEPAGASSSDATSGATE*

>SPBIB_v1_250042|ID:27163241| protein of unknown function [Uncultured spirochete bib]
MLLIRHNQAFWDTTVGQQILTDLIYRKISDAQRTFIDSASQHGIELACPSGCGKCCHGF
MPDVLPIEADYIAYYLLSNSKVFSAAEAPSLQIASSAENSPPCPFHDPDRPGENCRIYPA
RPLVCRFLFGYSAIKDKNNRSLYRLCRYMPAPQGLDARILDQDTIISKV GALPPLMTDFAM
EVLSDLPSQAAERKPLIEAIRPALARIGTTLQYCPEPNA*

>SPBIB_v1_250043|ID:27163242| Deoxynucleoside kinase [Uncultured spirochete bib]
MSRKYVVVAGNIGAGKSTLVNLLAEHLGFIA YFEPVSENPFKDFYADMPRWAFQSQLFF
LANRADMHRRLSADPHSVVQDRSLYEDAQVFAKNLYQQGIMGEREWRVYQNL YETLAEIL
PHPSLVIIYIRASVPTLQARIARRGRDFEAAIPDSYLEGLNRLYEEWISSFTLAPILTIPG
DSLDFVAESRDLQVILRTVRKRLLEDNQPYLFPFEM*

>SPBIB_v1_250044|ID:27163243| conserved protein of unknown function [Uncultured spirochete bib]
MDTIVTGLFNDGYVPIMDGVTVTVRNYALWLRKKGPTVYVITPFVVPNYKDTDPFPVIRFL
SIPTIVRPPYRIGLPDLDIRLQFILKNRDFDIVHAHSPFAAGNLALRVAREKHIPVIATF
HSKYRDDLMRAIAFKPIVDEQMKRIVDFFYSDHVWVPQESVALTLREYGYKGPYDVVEN
GIDFEPADITQCWARGAEYKLPEEYSVGLYVYGQHILEKNLEFLVRS LPAVMDALPNFR
MVVVGKGYAKETLVDLARQLGISDRVIFHDVIYDRELLKDIYARADIFLPSLYDTSGLV
VREAAAMKTPSVLIRGSDAAEFIRDQENGFLCSEDKVDFFAQTVVRALS DKDSLKKVADQA
QKTLCRTWENIAEEVAQRYSSILERWAR*

>SPBIB_v1_250045|ID:27163244| conserved exported protein of unknown function [Uncultured spirochete bib]
MAKLALS LAVVCALSTAPGFAQSWPEGKDSDRFDAGQGALEIAFLGHGSLVLLYKGSYIY
VDPVSQYANFSKYPKADLILVTHEHGDHLDAGAIAVLSKNGTRIILPEASRQKLGKGEAL
GHNHTVEAAGARVMAVPAYNVTPNRTGYHPKDRKDNNGYVITAGSLRIYIAGDTEPIPEMA
NLDPIDITFLPMNQPYTMTPEQAAASARVIKPKILYPYHFGSTDTAALQKLLAANPEIEV
RIRNLQ*

>SPBIB_v1_250046|ID:27163245|mntH| manganese/divalent cation transporter [Uncultured spirochete bib]
MALTDRKTQAGAHPGTHDEANPASSHPNGHKSDAKLIK SATDVLEGKSKKGF FARILPF
MGPAFIASVA YVDPGNFATNISGGAQFGYLLLWVIVASNL MAMLIQALS AKLGIATGKNL
AEQCRMRYPRWFVVALWLLMELVAMATDLAEFLGAAVGFNLLFGIPLWAAAILTGITAFI
ILALERYGFRSLEAVITGFVS VIAISYVIEIFLGKPDWGQVAHHA FVPEFKGPSSILLAA
GILGATVMPHAIYLHSSLMQNRVVVREPALLKCLFRYEIIDVVVAMGVASLVNGAMLIMS
ASTFHAQGLTEVGSLEEAYRTLEPLLGKAASWVFAISLLFSGLSASVGTMAGQIIMQGF
MNFEIPVWLRRIITMVPSIVIIALGVDPTKALVISQVLLSFGLPF AIPLISFTSNEKLM
GVLVNRKTTKALAI FVTGVILLN VYLLYVTFAGG*

>SPBIB_v1_250047|ID:27163246| putative UspA domain-containing protein [Uncultured spirochete bib]
VYKNIMVPLDGSSTAETALPMAMYLAQAFEADITLFHAI EKNPPEQI HGERHLEHAE EAR
RYLEEIARRFQGYAFKGRILSHVHLEESADVATSIADHMT ELGPDLVVMC SHGRSNFTQ
VLIGSLATRVI GLGSAPVLLLKSDA AERSATKSGAPGIAHV VVALDN ASIHDKAIDY GKE
ISEAVHARLVLLSVPTFSSLKGDGGWGLMSPATSSAILDIEEQK LREHLSAHQKSLAE
AGIACSISVLRGDP AHEITGVAKKLDQPLIVL GTHGRSGMKAFWKG SVA AKIVSLSSAPI
LLVPLHE*

>SPBIB_v1_250048|ID:27163247|tpx| lipid hydroperoxide peroxidase [Uncultured spirochete bib]

MATITFKGNPVQTSGLTPAKGTKAPDFRLTGSDLKDVGLADFAGLVKILNIVPSLDTGVC
AASARAFNKAAASLGNVILTISRDLPFAQKRFCEAEGIDKVVTLSELRDREFGKTYGVE
MITGPLAGLLSRAVVVLNKDNTVVYTTQQVPEIAQEPDYESALLAAKKAL*

>SPBIB_v1_250049|ID:27163248| protein of unknown function [Uncultured spirochete bib]
MIQPMELQYVVRGYDCGYGGPLKPFALANFFQEAAGAHALALGIGMEDMWAKGLTWMLAR
IDIRIERLPPEGQTVVVRTWPVGTKRLFAQRCIELVDSSGVKCAGAMYEYIVVDIKTRRA
VRPERTLPIDLRTDIPWFPDLEPGIDGAFAALAQALQSANFGQHEEADIPSADFIAAQ
GFMPAFSIEARARHIDHNGHVNNAHFINWLCDAVPMPPGAHLSRIKIDFVHEILKGEHVH
AWAKANDLATFESSLSSAPDGSLHNPAPQSENTHAQTWLTALSVGKELVARGMLSITTAE

*

>SPBIB_v1_250050|ID:27163249| putative glutamine-fructose-6-phosphate transaminase [isomerizing] (Glucosamine--fructose-6-phosphate aminotransferase) [Uncultured spirochete bib]

MCGIVSLVYKDENPSMGKEAEALLKRLEYRGYDSTGASFIGKDKRITLRKQVGAPSKVCP
LLNIPSFSGQRFQVWRWATYGAVTDVNSQPHHVRCVELVGAHNGNISNTDTLKAWLTA
RGHAVVSDNDGEIIVHLIEEQYAAAQSLASSELHLRKYANAGIIEGVPDGVLRMIEAI
RKAESLAEGSYAAAVADPQLPGVFAIKSGSSLYAGMGSDSHGDFIVLSSDLTSVLSKTRA
LIPLSEGEIWFDTKQYLIFSLQGQPFSSHPRLKRSLSIKDTQLSPEYQHIMEQEISS
PNNINQVLRYYFRDPSIEPLAELFEERKDDCKETADKIASLSERFGSEALISGMREVFDS
SAWNEVEARVQNAGAAHFVGLDFISDEAELLKELALDPLSRDRLLLMDKVIVWRKRRAV
LRYTGELKNAIHEASHSGGRIYLVASGTSYHAALTAFFFNEMAHIPVYPCNPGIFRSMY
FNCLSSNDLIIGISQSGETKDLVDIFQDVKKASPSVRLVSIVNNENSRIPOELSDFYLLP
LCGPEIAVAATKSFTSQIAILYLIAASFMSPEQRIRDNLLKAKDLMTETIETRMGDIETV
AAHLFAAPSIHILGTGLIGLAREGALKIREVVLNHTEGYDAAEFKHGPNTILGRNTILSL
ADIEKLVGTEPIRGIGNELFEKLTNNYPLVFICPPEERDRRITISQIHTHKIRGADIVLI
AEPQQELALAVEGKPMGAESYWSKYIPLPPSGDPCLFVFSATIVLQYLA YRMSVRKMEWL
DSLGIQNHGVHPDAPKNVSKSITVD*

>SPBIB_v1_250051|ID:27163250| UTP--glucose-1-phosphate uridylyltransferase (modular protein) [Uncultured spirochete bib]

MGRIIKALRYTASGFVVKVRGWIEGQSAAAGAASGAARPGLVRLGIARNVRIAGARPGFR
FFSTKLHETPPQVHSGRPELQRAAPPVTIIMKGIIVAAGYGTRFLPVTKTIPKEMLP
VTPSIA YIAKEFVDSGITDIIVISSRRKKALEDYFDREIELEELFMREGREDRLEKIRPF
PARISFVRQAEMKGTGHALMQVSHLLGGEPICIVAYPDDIVIGTVPLARQLMSVYEQTGKC
VLATYEPGDVSRYGVIDPAPDGVSVRGFVEKPAAGSEPSHEVSIQRFLYTPEFFGWLAQ
GWEHHGSGEYHYVYALNKMIEKGVAYARVDGTRLDTGELGGFFEAQLYNAMQEPALKLV
LARFVAEHGAELGLGGSRPDRK*

>SPBIB_v1_250052|ID:27163251| Major facilitator superfamily MFS_1 [Uncultured spirochete bib]

MRPIRKFLNVYSGLPSSLYVLF AATVINSVGMFVFPFLTLYLTGRVGMTQQEAGFFMIV
NFA YIPANFIGGKIADTFGRKMLMVA AQVLSGLCYPCGFAGIGGNVRWFLLASVFFDGL
TDPARSAMMTDLTTPETRRRAFSLTYLGHNLGFAVGMMIAGFLFEKSTSWLFWGNAIAIL
AAVSLVALKVPETKPSREQVEASFGSGATDEAHRGNIIQALLSRPYLVMFTILTGLYGFV
YAQHRFALPLQTKEFFGARGSVIYGTLMTLNATMVIVLSTPIMALTQRWKPINAVALAGI
LFALGFGLIGLAPSULLMYLTTAIWTLGEIVNATNEGTYVANHTPISHRGRFQAVLPLIG
GLGWSVSPVVGWFTDRFGLKTA WPYLGIAALACIGIWYLGIIENRPGRKLGKARAM*

>SPBIB_v1_250053|ID:27163252| Phosphatidate cytidylyltransferase [Uncultured spirochete bib]

VRIDHVVTRADRIDHEQNRIHFQSPAEEIKIELTRKSLHLLIICIPLLDISPAVPIVA
LLIGMLVYSTSEWLRHRGIIVPIIAPITEHAARRRDGNRFVIGPITLALGALLAIIIFDP
LQAKVAILALAIGDSFSSLIGKSFGRIPMPLSGGKSFEGSVFCFLTVLVA VVFTGKFI
ALIIAAATASVEFWPTKDWDNLIPLAAGIIASIVL*

>SPBIB_v1_250054|ID:27163253| membrane protein of unknown function [Uncultured spirochete bib]

VTRNFRFTYWFISIVSLALAGSILLAIRTGTDKRLPFFLADARLYTEYFFFGAPVGIQ
LAAALQICFLLCSSAVLIIVLFTFQKTVSAEVYLIALWAFVDAEALRLVMLIISQRST
SIGPLVSLTRVVYGARFTGLISLFISGLYAVGIGHERPQTGYLLAILFGAMIAMLIPISI
DRFQSSFMLAAGYRDITMIVTISLIVINFIDYVVAARLKEDSSYVFAGIGLTIAGSWVW
LWNRPLMGGIGIALFAAGLFGVIKRLHKIYIWK*

>SPBIB_v1_250055|ID:27163254|proS| Proline--tRNA ligase [Uncultured spirochete bib]
MAEKITPREVDYSQWYIDIILNAKLADYSPVKGSMVIRPRGYAIWEKIRDEFDRRFKETG
HENAYFPLLIPMSFLEKEAEHVDGFAPELAVVTHGGGEKLEOPYCIRPTSETIIWAMYRN
WIQSWRDLPLLINQWANVVRWEKRTLFLRTSEFLWQEGHTAHETEKEAREETLRMLEVY
RDVVERYLAVPVVPLKSESEKFAGAVDTYSIEAMMQDKKALQAGTSHFLGQNFQAFADV
KFQSRQGELEYVWATSWGVSTRLVGAVIMTHSDDKGLVLPPTLSPEDAVIPIYRNDTKA
AVTAFAEKLQAELRAAGFKIVLDIDDSSSPGWKFAEWEMRGTVPRIEIGPRDMQAGQVVM
VRRDTGEKLFVPVGEAGARLRELQTQIQASLYERAKAFHDANTVPVSTLGELIEFFGVET
AGTSGAKGGFAEALWCGSAECEASLKEKTKATLRCIPLGKQDHIEGKCAICGAPAKHRAI
FARNY*

>SPBIB_v1_250056|ID:27163255| protein of unknown function [Uncultured spirochete bib]
MSSAEKKEIYLDALKDAAMSSAPSPDFADVRYKAEQRPRKVRRIAFSAAITAVAAAAS
FWIGIAWNSQTSRDIALIDSWTVSAAAPVAVSVSTTQGAQNEIVLTAYQTSPVNLVQDLW
ESSAGTGL*

>SPBIB_v1_250057|ID:27163256| putative RNA polymerase sigma-H factor [Uncultured spirochete bib]
MNSNELLVRAMSAEKKEFGRLKPDDSAATAQVSLPAGDDPVDLSLAEHAAKGDKGAFERL
MWRWWDRIIRGYCATFVAFDPELAEAAQESLIRIYKALPRWRKESLGGYLYGICRTASL
DVIRSRARHSARMSVEDFDSLSESPHSTGEANVLQEEANQMLAKAMQRLDPEDRSMLY
LHEVEGKGLAELGAMYNLPVGTVKSRLFRVRDKLSVMLKEMGYELR*

>SPBIB_v1_250058|ID:27163257| exported protein of unknown function [Uncultured spirochete bib]
MKSNAKLLVMLFLIAAVALVSAQGGPGMGMQGVMPGSAVREWFKSLNLTNDDLKLEKT
LAARELELVKAQNEIKILQTKVANMLLEPNPDMAQIEDAVAKSLEWEKTVRMIQIERQVE
IRKILGEQRWQSVLLLVREARMSEKAGKFANSFSAKGLSPDEADRYTRLLKVLRRIM*

>SPBIB_v1_250059|ID:27163258| exported protein of unknown function [Uncultured spirochete bib]
MRTSRKAIVFLMVGAMLVAVTAGAFQAQGFGRMGPGVAVPGYGFNRATPVAPSYGYGARG
WATVPGTAVPRTWNNKSFNPSLGFMGMMGSSGYGALHYFYQKLSTEDKAKVDKLVQ
DTAEQILPLQNELRSLKLALNGYVWDTNPDKAKIDETIAKIADLQKKIQELRTNSILEIN
KIFQTAQ*

>SPBIB_v1_250060|ID:27163259| protein of unknown function [Uncultured spirochete bib]
LKKHRLGLLAGMKARMKAQQVLSVPKTVLRACLKGIKAVELKKEKLRDRSMHLRKNRSL
LPARTRAATAKLGVALAQTADSFVLVALMK*

>SPBIB_v1_250061|ID:27163260| protein of unknown function [Uncultured spirochete bib]
MTDSAARAVYCGYENGGMEKVTAKRIWHKKTMTISTSFACIAMAVLMLSAPSLFAQE
VEAWFKKPANAALYSQVREDVIAMASQMQUALGLSDSILASRLEEGARKKVSPNILQASLQ
GDLQRAIAAALILKENGLFSPDKKATAAVEQILILMRAGTSEDEFRLSKAAIAKSGKR
ESALSRAISALSVVAEAQATYQLNGTDRERLALALIASDMNEKRFDLSILASMNFAQAGY
RGSEALTKALEKASLGASGGHESADEGATGSVPGTQNGSQGMPQGNQGGGAQEGKTQGSQ
HAPTEKPQPPASTNQGSHGKTGGSPGSNSR*

>SPBIB_v1_250062|ID:27163261| protein of unknown function [Uncultured spirochete bib]
MMNCTTTHAFVDSWEKGVPEGSVAEFKVHLEQCQEQCAQQFSILLPLIERDTAALQGQY
TAGMRITSGQDQFVDNVMAAIAATRNPSIEPAHRAPVRRALTRQARVLRFPALAAAAAAI
FIVGLGLGLFFGTRNGWTVTVRFVLNAPDAQSVQLAGDFTSWSPEGYALKKIGAEGTWEI
TVPLKKGHIYVYNFVINGTTWIADPKVPAMVDDGFGGSSLLRL*

>SPBIB_v1_250063|ID:27163262| putative RNA polymerase [Uncultured spirochete bib]
MEKEAASSVQSTMSKAKANQGSFDEKVVVEEILAGNSNAYRRIVETYSARVLAFCRSRMR
SEEDARDAAQEVFIRAYASLASFRSNENFASWLFIAAANNVRTHFRLFSSRKHKKEEFAK
EIAVAPIPDPAEEAEQNLRAEALRQAVASLPLDLRKPVELYYFAELSVEETASVLKLGQE
AVKSRLFRARKALRQAIEKNKAPSHPFAPAEPEAAHQRADHVQPKQSS*

>SPBIB_v1_250064|ID:27163263| exported protein of unknown function [Uncultured spirochete bib]
MIPKQKLLVFVLVLA VGFGLYSAAAQTAETTPATTTDSTDLQDEIAAVDEAAQIDNTAL
LTKLSAQFQVDLAVLQDLNAQGYTTGQIWLALALEISLQSGKPLADAVAQAASMNTSGHGWG
VLAQALGIDPGSQEFFALKEKLQIRTRTMASEVAAEHGNRVMTQQQTQNRQAQTGADQDNA
HGAGSGKSGANGAGGAIGAGGAGGAAAGHGSANGAGASGNDPKR*

>SPBIB_v1_250065|ID:27163264| protein of unknown function [Uncultured spirochete bib]

MRGLVEDSVRTGDGNFLIDTGNLNLATLSEYLRLNIFERWCVSRTSLPFS*

>SPBIB_v1_250066|ID:27163265| Peptidase M16 inactive domain protein [Uncultured spirochete bib]
MSFILQKETA VPELDSILRLYRHEQTGARLLSVINKDENKVFGITFRTPRRSDGVAHIL
EHSVLCGSRKYPVKEPFVELMKGSLNTFLNAMTYPKTCYPVASTNLKDFYNLVDVYLDA
VFYPNLTEYTFLQEGWHYEVDPQTKEFSYKGVVFNEMKGA YSDPEDMHDDLCCRSLYPDT
SYGLDSGGDPLEIPTLSYQEFLDFHKKYYHPSNSFIFYGDDDPERRLALMEEWLAPFGL
ASIDSLPQAQMRFDPEPRYIEYMYQAGEQDQPKAYAAVNWALRGHGNVLHAMQASILFHIL
TGTSASPLRKALIESGLGEDLAGFGYSEELLQTAFSVGLKGVPTNVREVEKLIFSTLEA
LAREGIEKDAIEASLNTIEFALREKNTGRYPRGLAVMLEALNEWLYNQDPIEALAFAGPL
EKTKKAYADNPRLFSELIDELLVGNTHRTTVVLLPSPDANKAREEA EKAMLDKARMAFSD
AELAQIMRATDELRRQLQDTPDSPEALATIPVLSLEDIPKEAPVLPSELLLLTETPQEGGT
VAQGGQSAMDARRSETASSAFYHELATGGIVYLDLGFSAKLESRLPYVSLGRLLLEM
GTDKESYVQLIQRIGINTGGIRSTSVSASRWDSREPSWFLLRAKALPEKAESLADILID
ILTGARFDNPERLRQIVLEEKAAQAEAMLVPAATRMVSLRLRSRFPADWASERLYGIEHL
FFLRSLAQKIESDWPSVLADIEDVRRAILVRDNLIVNVTDRATLNSCIPALRRIVKALS
PERAHVTSGTRSARNSWIHEAISACDPASVSKPAAETLELPAQVNSVGMILPLWNSKAPA
GAWLVVTKFLDTTYLWEQVRVIGGAYGGYSNLDLASGLLLLLSYRDPNIERTLDVYRNVA
AFLKTCSPPEEIQKSIIGTIGDIDAYQLPDAKGFNALMNTLTGYTQEARQQIRDSILAA
SPDDFRHLGALIEEALGTSMTGVLGAPDRIEQALHALPAPLERLSMY*

>SPBIB_v1_250067|ID:27163266| Peptidase M16 domain protein [Uncultured spirochete bib]
MKFAICERYRRLSRLFAAVMFVFLIVASAGAQT SFIRENAPT FTKTVLSNGIPVYMKVQD
ANRVFHVSLVLQGGSLVTPPEQAGWENIALKT MARSSQNYPYEKAAAILDRTSSSIGTAV
QFEYSTFSLTTLDKYRDELLALWGDMLTAPSFSA DDFGKAKDEVLSLSLQSVEQNPWSTTQ
KVMNQAYFKGHPYAVNPEGTEESISPMATDARKWYAEHFSADRIFVAVGDFNPAELAK
KLEALLGQVSGPKLGAVSRPSPFPMGPGSLIMQEHEQAKGTL YLRGDFAAPAPGSDDYF
AMALAARMFSDLLFSVVRDKYGA VYTPSAMIRSFLANYGSIMYKTSAPDKIKQYIDEAA
GLLARGRVVSVDPKTEADGYMPIGEAIDTYKQLYMNEYFEAVRSNAAIASLIIRSVLRT
GDPADWLKDQKRIDMLDADAVQRAFNTYVLGG AFLWVAVGDQTLDDKLDPRAFEAIRF*

>SPBIB_v1_250068|ID:27163267| Peptidase M16 domain protein [Uncultured spirochete bib]
MNLKKKAGRQVLALVMALISVLAIPGQQLPQS QIGGAELSAAPGLIQNAKLENGLELFFV
VENHSVPLVTVCVAFRGGALAQTPQTAGL FHLYEHHMFNGNDKYPTKDAFTAALNRMGTT
NWNATGKEYINYITVPSDKLADAVDFWAH AVMNPTLNYAVLENEKQVVLNEIRGYHSD
PAQIASNALESRMFPQFPWRKNIDGPESNVAQATVADLRDMQHAYYVPTNMALMVGDDTT
IDQVRALAEASFQKWTWAPPEVLGEP PQGPIQGIRLVTS EDQFYRGIAQVQFRWRGPDV
TRQTFD TYVSDVLLFLLSSPSGPFKSAIMRKVFGLYDAEYIDFTYPTARDGGNYIFSTYM
LVQKPAAEPEVLQRVENLRQIVLSEFEQIAKDPKAYFGEGALEEAKTKLVDQNIYALESA
GSFVTDTLTFWWSTAGTDYFFDYEANCRKVTWEDISSLRKYLIGEAGAASGTADSSPAA
SARPPAATLVRLRSSTFSADPRMDSKITELGYTRVTADNAFWWQK*

>SPBIB_v1_250069|ID:27163268| Phosphoribosyltransferase [Uncultured spirochete bib]
MNKHHYTYQEIHRLAQSIASRVNESGFNP DVIVAIGSGGFIPARILRTYLSKPILAVGVV
YYDMNDKPM EYPRKVQWIEEAEKQLAGKRILLVDEVD DSRVTLEYCTRELLAYHPAALAV
AVLHDKRKEKRGQFPFVQVFGQTLDDVWIVYPWDAIDIDEHDRNARARPKEGL*

>SPBIB_v1_250070|ID:27163269|fur| Fe²⁺/Zn²⁺ uptake regulation proteins [Uncultured spirochete bib]
MNELVKFEQYLRTHGQKMTRPRRIILKAFIETEGH LTTEDILREAKKVDPGIGQATVFRT
IRLIADAGLAREALQDDGARKFEHLADHPHHDHLL CVGCGKIIIEFLSPAIEKEQQKIFSQ
YAFPRGHMMELLGLCPECQAKQKKGE*

>SPBIB_v1_250071|ID:27163270| protein of unknown function [Uncultured spirochete bib]
MLLAELGPGQKFKVLRVTFGG EIGKRLADLGFISGAEGHV VRAALFHGPMQIRLADYDLI
MRRHEAKLVEIELLQPVPVSEPAEHAVIDIRPNATGM RPKGMRHLNRGFHHGRPGCP
*

>SPBIB_v1_250072|ID:27163271|feoB| Ferrous iron transport protein B [Uncultured spirochete bib]
MQEKRALTIAGNPNSGKTSIFNAITGAH HKVGNYPGVTV EKREGTLEYHGWRIHVVDL
PGTYSLTAYSLEDEVVARDFVLNEKPDIIVDVLDSSNLERNLYLLLQLIELGLPVVAALNM
ADEAAAKGILIDDKTL SRTLGVPMIPTIGSRGQGVTELLDAVIETFETHKMPRMP SYGED

IEAHIAALVHLLLEQDEAFAAAYSPRWIAIKLIEKDPDARRRIEQHVRAAEIHTALEAAWH
WITLHYGKDAEILSEQRYGYIHGAVAEAVHRKRLRGISLTELDRFVMHPLVGLPLFFF
VIWGIFKLTFLVGEYPAWLEQLFGSLEGLVQNSVLPGAVRDLLINGIIHGVGGVFSFVP
LIVILFFCISILEDGTGIARAFLTDHFLHAIGLHGQSFMPLMLGFGCSVPAIMATRTLK
SPKERIATILAIPIFISCGGKLPYVLLAGAFFARNASTVVMVMYASGVVLSVLSTFFLRR
TVLKGQSMFVMELEPPYRIPTLKGVLWHVWEKTWSYARKAGTIILAVSVMWLITSYPKA
RGIQYEI HARQSVAEAQPGLSEAAISARA EVLVRQYQLEHSIAGQFGKLI EPVIAPIGF
DWKVGVALIPGLAAKELVVSTLGVLYGAPVDENSELSLRQSLREAPDWSPRIALALMVF
ILVMPPCFASLATIRAEAGDKWLAFQVVYSLVLAWVISFLVSLAGRAFGM*

>SPBIB_v1_250073|ID:27163272| conserved exported protein of unknown function [Uncultured spirochete bib]
MRKAGFAMILALLVLCV GILPAGAQPVVSAKQDIAVFALGYGWFIPSQALGTIDLRIQQ
VFSNIGRFTVFGTAQRLSSEGVQQFIDALRQAKQANFVLPEKYQFGEAFLTKAEFERLTG
AFIVVVPVVTNFAVYWD SKAGSWNCNITGVT FIDATGGTVISIESIDTSGSDKTNQNA
VMSAINSIPSELEYRIRAI PAFAQISTRILEAKGSRVKIQLG SNMGLKKGDEYAI VTKQTI
GGIEDSKETGLLITDVSQQLSMGRVLYRSGALDGNTQLKEIARRGTDLDLYFHMSGGES
LPGLRATVSRGFYPLRPYIGIQMPLSLAFSFLGVTIIPVNAVIGAEYMMPIGRLHIAPYA
GVGLTYAHLTAIWRSYESDYLSHIGLQAGGRVGYLLSRDMRLFVDAGLDYWLALDNLLFN
DYGGVTIGAGISFKL*

>SPBIB_v1_250074|ID:27163273| 2',3'-cyclic-nucleotide 2'-phosphodiesterase [Uncultured spirochete bib]
MKRFFVILCALLAMTMSLAAQSKTVDLTFIETSDIHGSIYPYNFITAKPAATSLAQVASL
IKEERSVPGTEVVLLENGDSLQGGQPTVYYNFEKTS GPHIWSQAVNFLGYDAVGVGNHDI
EAGHAVYDKMYEELQAPVICANAVKPDGTPYFQPYSVIERNGVKIAILGMITPKIPDWLP
PQFWTGMFEDMVQS AKKWPPIKEKEHPDLLIGLFHSGVDYTYGNVTRDTPNENASQL
VAEMVPGFDLIFVGH DHAGWSGQGWDPVNKKKIDVKDPNGKVPPIYGPLNAARNVAVVKM
NLTWNDQTSWDKIVRGGLIDMTKYQDPDFMAKFQPGFDEIKKWVDRPIGKMDGVITTR
DSMFGDSAFVDLIHQDLSDNPSLGLKPADISFAAPLSADSKIPSSPDGTL YVRDMFN
LYVYENFLYTMTLTGKQVKDFLEYSYQYWFDTMPNEGNHLINFQKDK EKL VFDNRTNMP
MTATRYNYNSAAGINYVDVTQPPGNRISISCMSDGRAFNPDATYTVAINS YRSGGGGG
HLELGAGLDKETIRTMKLVNGATTKDLRYFLLKWFEKQDGPVTVMPIGNWEV VPSDLAEL
GTKTDYPLLYPSK*

>SPBIB_v1_250075|ID:27163274| Heat shock protein Hsp20 [Uncultured spirochete bib]
MNKRPYMDIGSIFDDIFEAAKDFGEKMKNFAPGFEGPGPEDNCEGPRPGPGCHGMGGGAW
FEAHGDENVDYYPNYSYPLNIYMLPKSLVFEFALAGFDEKNMSLSFQGDY MVFSAKME
MEQPEEGVRYFKRRLKLDIDRQKYYVPADKFDQEKVKA VFRNGILKVTVPPKEV VDTNE
GIKIEIVKEGE*

>SPBIB_v1_250076|ID:27163275| conserved protein of unknown function [Uncultured spirochete bib]
MQELICITCPMGCHLSVDTDAQ GEMKVTGNRCVRGEQYAREEIFNPRRVVTFCTAVLPD
GSLPGPSSNLPRRVVVRTTAAFPKERIPELLDVLRGITVRLPVARGSVVLERALGMEVNV
VVSRSIGA*

>SPBIB_v1_250077|ID:27163276| FAD-dependent pyridine nucleotide-disulfide oxidoreductase [Uncultured spirochete bib]

MKQLTFDAVVVGGGAAGMSAALELDARGHSVLILEREDTLGGILMQCIHNGFGLIEFNEE
LTGPEFAQRFEKVSARNIQASLRTTVLDIREEEGRVVYAVSPSQGMMRIEARAVVLAM
GCRERNRGNIRIPGTRPAGIYTAGLAQRLVNIEGYIPGKDVVIIGSGDIGLIMARRMTWS
GCKVHAVIEILPYPSGLTRNIVQCLNDFGIPLYLSHLVTDIYGKDRVEGIEVTPIESGAL
MHEKAFKACD TVLLSVGLVPENELSRNAGIEIQPTTNGPWVDSMLMTSLPGVFACGNVL
HVHDLVDYVVEEARRAGANAAAWLSGYRPSREIRIKTGSNIRYVLPARLNPERENRLYMR
SLVVKNDARLEVRDGNVVRSRKLAHVQPSEMLS TLGPEDVAAAGRDSVVEIALV*

>SPBIB_v1_250078|ID:27163277| FAD dependent oxidoreductase [Uncultured spirochete bib]
MEQYDVAIIGAGVCGANIARKLSQYELDVALLEKEIDVSLGTSKANS GIVHGGFHDHIST
LKARLELQGALMFDRLHEELDFPFERCGILVAALHEDEMRAIEQLYLQGVENG VIGIEMC
SRERMLELEPKLNPDVVGGLYAPSGGILEPYRFVFSLVESARKNGVQVKTEFEVAQAERD
GEFWQIQSKAGETIRARYV VNSAGLHADTISAAF GAERFTIAPRKGEY YLLDRTTKAKPS
RVIFVPTEVSKGILVIPTVEGTVLIGPTASPAQDKEDFATTRDQLEHILHSARMMVPSI

SENDVITSFAGLRASYGNDFYIANSEKAPAFVQVAGIQSPGLTASPAIGEYVKDLLKKAG
LRLVEKPSWDPYVHKVPRARDADPYTLDTLVAQDPAYGDIVCRCERVSEAEIVKAIRAGH
TTLDGIKYYTRAQMGRCCGGFCTYKIIRILMRETGMSWDQITKHGGNSAILKGS*
>SPBIB_v1_250079|ID:27163278|glycP| Glycogen phosphorylase [Uncultured spirochete bib]
MRIVSHTIKPALKGRLARLDLARNLWLSWNFDVSLFIRIDNDLWLAAGQNPVKMLGML
SQEKIDELAADQSFLSDLDEVYARFQRYLKSXPWYRGPSSIIAYFSMEYGLDVSLSPTYS
GGLGVLSGDHMKTVSDLGLPLVGVGLLYRQGYFKQYLNADGYQQETYPENDWYNMPVERC
VDQSGAPILITVDMAGRSISAGIWRVDIGRAQLYLLDTNIPENQPEDRTITATLYGGDKE
MRIKQEILLGIGIRALKALGIKVAATHMNEGHS AFLALERIRSLMEEFHLDFHSAMQAF
IPTNIFTTHTPVPAGNERFGIDLMDKYFRAVSVGLGLDWNFLSLGRENPFNDQESFCMT
VFALHLSAKSNGVSKLHGEVSRKMWQGLWPELELKEIPIGHVTNGVYPRTWISHDMLSL
DRFLGPKFYFEPDNPEVWASVDRISDEELWRTHERRERLVATCRQKLAASYVRLGMPDG
EVLRSSDVLSPYALTLSFARRFATYKRGTLLEDPRLIKLLSNKDMPLQLVIAGKAHPH
DQSGKDLIRELVHFSRREDVFGRIVFIEDYDMAMGRYMTSGSDVWLNTPRRPLEASGTS
MKAGMNGVLNCSVLDGWWAEA YTPDIGWAIGSGEEYQDQDLQDKIEAQDL YDLLEHEILP
LFYSRGRDNTPRAWAKMRASMKAIGSQFATHRMLKEYYSQYYEAALNESRALEADGYKA
SVSLAAYIDKVRRAWQRVRIVEFKDDGAPVVSRTTITVSVLVDLAGLSPDDVAVECYKG
RLSSKGEILDGARLPMTLVGPEGHYFRYQCAMHGEITGQIGHSVRVLPSPALDGRFIPG
LVRWAQ*

>SPBIB_v1_250080|ID:27163279| protein of unknown function [Uncultured spirochete bib]
MERFLQRIGCAEDQVIVSFARLIGDQFFAQKKDILVNDENAEYRAPLIAALAGKWLEASA
QEGMEHPRVLLLAEKGEVLAQLRGLLEQAGIESTICVSKEETESSAERLATASFGISAD
LFMTAVLEQSFKPREFGLVIIEGADLFGELPSELQRKVVWGYLLPPWERRAVLFAQRLGVR
AKNTAIDFANSPGTVTLKKARASLDAISAEFYRVLSEEKFKALLSHLAAAGAQQGHAAIV
FCNLRQTSREVEARLRLNHIPAEHVSAAAPPAKNEMLFQRFQKLQEIGDQQENREQGAEP
LESPENLESAHMQLVLVVSNDNLEALPDELALFAIHYDIPLDADIYLERVRAMRSRGASM
LGLVCERYEVGLSAIESRFGIRVECKEATDMANIKDASEGVPLDLERGHVTKRADFPQOT
GVPETRVSERRAPETRAPAAPDRPRSIQERKMHTRISERGGKFERKKTDRKKGRQQPTRA
GSKNSDRNPSLYSMSTEERLA YFRNKYRGILKTPSSEASPAPQHGAVSPDPSTNPENDG
IVKRLIGKFFSGGKAAE*

>SPBIB_v1_250081|ID:27163280| NADH dehydrogenase [Uncultured spirochete bib]
MATKKILILGGGYGGVWAGKILEKHFRKREDVEITLVDRKPFHTLMTELHEVAGWRTEPE
SVQVLFKKIFGAKRINVVLDTIEKVDFEAKQATGKVCTYDFDYIILGVGAPEFFGTPGI
AENAFTLWSFEDAMKVRKHVEEKFYEASLETDPKRKKLLTFVVAGAGFTGIEMIGELLD
YRDVMCRKYFLDPKEVRVNLNIEALPSILPILEEPLRAKAEKYLQKRRCDVMLNSAIIGAE
PGKVLLKSGQIVETETFIWTCGVKGSSFAGQLGLPAGKRNRIDCDMELKSTKYPFVYVVG
DISGLMQEGKPLAQIVETAHFTAEEAAKNIISDIDGGERHQFKPNYHGFMISSIGSHYGVS
NAGGMKTSGFIALAIKHLINWYLLNIAGINQVWEYLKHEFLDMKNRRSIIGDFASYKIR
PYWPLLLRMWLGLMWVFEKIGEGWLAFAASGSKSGWMFSPGVVQAGVKAAEATSGASA
WESAGQAAATAATGAAAAASAAPA VAATSAAASAVASSAAAAAPAATSAAASAAAAAPAATG
GTQAATQTFKAVWDLTKPIFDPNGLVTWFRHTFMDGIFAYLPYTFQAMIVVMEIGIGL
ALFGGCFTWLAASIGMCIVFTLSGMFAWNQLWFVFAAILMLGGLGRSFGIDYWLIPAI
KRWWNGTRFARKWHFYADDPTK*

>SPBIB_v1_250082|ID:27163281| Trans-hexaprenyltranstransferase [Uncultured spirochete bib]
MTQYWNDFPDIKDFLSETEALILSILENSTLPLREEVGRVLESVGGKMLRPALVYVGGFEG
LNPDRKKWSKKQEKRLVNIAAAIELLHTATLIHDDILDRASHRRGIPTLHQTLGTTNAIL
AGDWLLSRCYRIIAQYVHPSRAVLLAEFVSAICKAEINQDLTKYTFALSRRRYLQTIAGK
TAALFALALHIGSAETGCSTFTTQALRRTGYNLGMFAFQIIDDILDYESSLEELKKPVGND
IREGLCTLPLIYALEEKGEKIRPLSDIRAHPSVGSVLNLVHETDAIKRARKDAERYTR
LAHAEIARLPEGKPRRDLELIVNSLLVRTY*

>SPBIB_v1_250083|ID:27163282| Bifunctional protein: zinc-containing alcohol dehydrogenase quinone
oxidoreductase (NADPH:quinone reductase) Similar to arginate lyase [Uncultured spirochete bib]
MASTMKAMVIRRTGGPDVFEEAELLIPEPKAGQVLVKIAATSVNPIDCKVRSGAVAILPP
FPAVLHGDLSTVVEVGQDVRKFKEGDEVYGLVGTGGEGGALAEFAVCDEQLLAHAPRS

LPLDEAAVLPVVGITAYQGLRRKIRLEKDRMLLVQGGSSGVGHIVVQMGKAFGAQVAAAA
SSDEKIAVVASAGADWTIRYDQETAQYVERITGGKGFDDVFDTAGGANLPLSFEAARRG
GDIVTIAARAIVDLSLMHSGKLNHVVFSLLPILYGEGRAQMGGDLEAIARLVDDGLIRP
IIPRTFSLSSIAEAHRFLETESHYGVVHVQ*

>SPBIB_v1_250084|ID:27163283| Acylphosphatase (modular protein) [Uncultured spirochete bib]
MSAGRIVFLGWHFHLGFTIIRKRDIQLEHRESVSENMQAFHAIVKGEVQGVGFRMSAII
RAEQLGLTGWVRNTPDGDVEVWAEGNTQALEHFYAWLQVGPSAARVDEVIKTDEQPRGIY
KRFSVAF*

>SPBIB_v1_250085|ID:27163284| FAD-dependent pyridine nucleotide-disulfide oxidoreductase [Uncultured spirochete bib]

MKAVDVLLVGGSATGLVAATTAKSNYPEKSVAVIRKEEKVMIPCGIPYIFNTVGTSNNNI
LPDEGLVKLGVVEIIVDEVLEINGKAKTCTTKNGLEIAYDKLILGTGSLPSVPRWLKADL
ENVFTIPKNKDYLDQLQQLQTMKKIVVVGAGFIGVEVSDELNKGKEVTLVEILPHALG
ATFDEEFAAEAEALLIQRGVKLRTNIGIEEILGDKKVAQVKLNNGELLDADAVILSLGYQ
PNTELAKKMGLELNAFGFIKADQYRRTSMPDVFAAGDCAEKIDFSTGKISKVMLASTACS
EARTAGLNLVELNTFATFRGTVGIYSTCIGDTAFGVAGLIEKTA AEGFKIVVGSFTGVD
RHPGKIPDAHKETVKLIVSKHSGVVLGGEVMGGKGAGELINAIGIAVQNHMTINDLLMMQ
IGTQPLLTASPAAFPLIKAAEVA AAKALKK*

>SPBIB_v1_250086|ID:27163285|copA| fragment of copper transporter (part 1) [Uncultured spirochete bib]

MPVYKTFALKGMTCAACVAANERAVGKLPGIARVSVNLATERMEVEFDPTAVDVAQIQAA
VKKAGYEAELLEKPSAPPIYEAYGWTRFTVSAVFAVILLYIAMGSMIGLPLPPFIDHR
TAPLAFALVQLVLLIPVLVAGKSFYIHGFKSLFHLSPNMDSLIAIGTSSAILYSLFSMWR
IASGDHSASMQLYFETAIIITLIMLGKNLESRSKRRTSEAVRKLMLKLRPAIATILEGEQ
ERKVPVDDVKPGNLLLVRAGERIPVDGKVRSGNSSVDESMLTGESMPVEKASGAPVYSGT
INLNGSLVMIAEKVGEDTALARIIRLVEEAQSSKAPIARLADQVSAVFPVVMGIALIAA
FGWLIAGHTITFALT V FVSVLTIA C PCALGLATPTAVMVG TGKGAELGILIKSGEALETV
HKIHTVLFDKTGTITKGPALTDVVP AEGY STEEVLGLAASVELASGHPLADAI V SQARE
KGLAISRPDHVETIPGKGIVAKISGGVAGSATLAVGNAALAESLGISIPKHASDLQEKAT
QLAGMGKTPMFMKNSLPVGLIAVADQPRPEARAVVAALKKLGIDVAMITGDSRCTADAI
AAQVGISEVYAEVLPSEKASIIKRIQASGRKIAMVGDGINDAPALAQADVGI A VAAGTDI
AMESADIVLMHNNICDVATAIHL SRRVIKTIRQNLFWAFGY NVLGIPIAAGLLYVFGGPL
LSPVFAAAAMSLSSVSVVTNALRLKGYRKPEASCE*

>SPBIB_v1_250087|ID:27163286|copA| fragment of copper transporter (part 2) [Uncultured spirochete bib]

MKLLKIEGMSGHCVMHVQSALEDVPGVKS AKVNLLEREAIVDGDNLDDQALRAAVADA
GYR VVQIIP*

>SPBIB_v1_250088|ID:27163287|dnaJ| chaperone Hsp40, co-chaperone with DnaK [Uncultured spirochete bib]

VAKRDYYEVLGVPKTATKDDIKKAYRKLAIQYHPDKNPGDKNAEEKFKEATEAYEILGDE
QKRQAYDQFGFAGVEGMAGTSQQDYANVFHDFEDLFSFGDFSSIFGSFFGEGAQQRGSS
RVNRGANLRYDIELPFEKA VFGTTIEISY SRDDTCKTCSGTGSRDGQGRKICSMCKGTGQ
IRRSSGFFAISQPCPVCHGEGTVIENPCPDCGGIGVVKKQKIRVTIPAGVEDGKRVTVP
GQGNAGPNGGPPGDLHVFIHVRPHDIFERQDDDL YCAAYVDFATAALGGEIIPTLEGRK
ISVQVPAGTQSGKLLRIKEEGVPISGGRRGDLYIKIFVKVPVRLSRRGRELLEEFRTVEG
ETNQPELLRLKDVPH*

>SPBIB_v1_250089|ID:27163288|dnaK| chaperone Hsp70, co-chaperone with DnaJ [Uncultured spirochete bib]

MGRIGIDLGTNSCVAVMEGGEPIVIANSEGQRTTPSIVGFTAKGERVVGQPAKNQMIT
NAENTIFSIRFMGRRYAEVQQEIKMVPYKVIDNGNDVRVEAGGKLYSPQEISAFILQKM
KKAEDYLGEPVTEAVITVPAYFNDSQRQATKDAGRIAGLEVKRIINEPTAASLAYGFNK
DQKKEKTIAVYDLGGGTFDISILELGEVFEVKSTNGDTHLGGDDFDRRIMQWL VDEFKN
DTGIDLSQDRMALQRLREASEKAKIELSNMQQTEINLPFITADASGPKHLQKTLTRARFE
QMCMDLIERTREPCMALADAGLTA AQIDEVILVGGSTRTPRVQQMVREIFGKEPSKGVN
PDEAVAIGAAIQGGILGGEVKDVLLLDVTPLSLGIETLGGVFTRLIPRNTTIPCRKSQIF
STAADGQTA VSIHVLQGEREMASQNRTLGRFDLVGIPPAPRGVVPQIEVTFDIDANGIVHV
SAKDLGTGKEQKIRIEASSGLNDSEIDRMVKEAEAHAEEDRRERERIDARNEADSLIYTT
EKALKEVGDKIGAGEKAAVENAIKDLKSVMEGKDTELIKQKTEALKQASYKLSEELYRNA

SAQSGGAAGGSASGAAGAANESASSESNDQTKNADDVDYKVVDDDK*

>SPBIB_v1_250090|ID:27163289|grpE| Protein GrpE [Uncultured spirochete bib]

MSKHKHEHGQSSNTMKPEQTMSAESLSSLNQQAEGQAGVPEVEIQPDAEPDMAGQPGAQ
PGA VTTPEAQLAAAKAEIELLKAQLAELNDKYLALAEQVNFRKRMTKEKEEYQQYALST
LLSDLIPVLDLDFDRSLEAAAQSQNDVSKVIEGIRLVQKRLLDTLANKYGLARYDAEGSVF
DPHMHEAMFSDQGDVTEPTVTQEFMPGYKLHDRVIRA AKVKVTPANNGAEKAPAQMEKA
QGQAQDESSTANSSSSGQNDV*

>SPBIB_v1_250091|ID:27163290|ccmL| Carbon dioxide concentrating mechanism protein CcmL [Uncultured spirochete bib]

MRIASVIGTVVATMKQEKL SGRKLLLVREVNTAGKASGEPFVAIDTV DAGKGDIVVVTEG
SSARQTTFTDGLPIDA VIVAVIDSLEVEGKV TYRKQ*

>SPBIB_v1_250092|ID:27163291|eutA| reactivating factor for ethanolamine ammonia lyase [Uncultured spirochete bib]

MDNTRRMISVGIDIGTTTTQVVFSELSLVAIARAGQIPRLDIADRSVLFESDIVFTPLID
SRTIDADKLSIIIRAQYEKAGILPSQVETGAAITGETARKQNADKVLAAIAGLAGDFV
TVAGPNVEGMIAGRSGSAAAYSRQHFATVANIDIGGGSANGALFHLGEIEASAAMNFGGR
VIELDGPVVRAITNAGEAICASVGIKLKPGRPSLGLDRKITDAMAELTILLVEGGTSPL
AEKLYQTAPLPGNANLKNIMFSGGIGYYYYNPIGLNSVEDVACHDDIGPLLAESLRKETR
FSRYTILQPKETRRATVLGASAQTLTSGSTIWADPSILPLKNVPVTALVSGSDPSDITE
ALRRWDLNPSNDIFAIALDMQHGLDYKELSRIAENLAVFAKDLPPDKPLIVITKRDYAQS
LGQTIKIDKNRPLLIIDQVGLEEGDYIDIGSPLMDGRV VPLVVKTLIFYH*

>SPBIB_v1_250093|ID:27163292|eutB| ethanolamine ammonia-lyase, large subunit, heavy chain [Uncultured spirochete bib]

MALRTKLF GKTWEFPDIRVLMGKANEKSGDRLAGLAADSAEERAAARIVLADIPLSALK
ENPAVPYEQDEVTRVIQDGINETIYNEIKGWTVGELREWLLSEKSSGDDIARISTGLTSE
MIAAVAKLMSNIDLVAASKIRVERHAVNSIGLPGMLASRLQPNHPTDSPEGIRAALYEG
LSYGS GDAVIGINPADDSYASVARLLDMSYDVVKTWEIPTQTCVLAHVSTQMRCLKSGSP
VGLVFQ SICSERGNASFGISVGM LDEAFTLAKKYCYHGGPHYMYFETGQGSALSANAHN
GWDQLTMEARNYGLARRYSPFIVNTVVGFIGPEYLYNSEQIHRA GLEDHFMGKLSGISM
VDVCYTNHANTDQNASENLSVLLTSAGCNFFIGVPMADDAMLSYQSLSFHDIATLRELF
LRPSPEFEAWLESIGLMRNGRLTERAGDASFFLSR*

>SPBIB_v1_250094|ID:27163293|eutC| ethanolamine ammonia-lyase, small subunit (light chain) [Uncultured spirochete bib]

MIDAKTIEALVDAVVSELES LAEKPKIAAAKPQSQQGPQS QPADGSAVAPAMQ TALMSGV
KNPVDPEGLLALKQTTTARICAGRAGPRLRTEDLLAFQADLAITKDALEKQVDPLLEEF
GLFTVTRKITGGKEEYLLRPDLGRRLSDEAKKIISERCIRNPDIQICVGDGLSARAIEAN
LAKIFPVLKAGCETAGLSMGTPFFIERCRVGMNDIGDLLEPKVVILLIGERPGLGRADS
MSAYMGYKPHAGLTDADRDVICNIFDGGGVNPLEAGAYAIRLAERMIKAGASGIQLKLE
GEAK*

>SPBIB_v1_250095|ID:27163294|eutL| putative carboxysome-related structural protein with putative role in ethanolamine utilization [Uncultured spirochete bib]

MSVLDPIFAHALAVRIIPKVSDEYARAIGLEPSQTS LGFITADNDDALYV SIDEATKMAD
VEVVYAH SFYAGARHSSGIYSGEI IAMLGPDPT EVKAGLDAAIRYLETRALWYSADAHD
GVAFFPHVVSRI GSYLASVSGLPEGASVAYLVAPPLEGSFALDAALKAAAVRIAAYTAPP
SETNFMGAILTGEQSACEAAALTFQEAVLDVAQHPIMY*

>SPBIB_v1_250096|ID:27163295| Acetaldehyde dehydrogenase [Uncultured spirochete bib]

MTEIFDADLVSIQEARRLANAAKEAQKKWAGASQEEVDRVCAAMAEAGAAA AEKLARLAV
EETGFGVVEHKVLKNLLTSRDLWTAIRDVKTVGIIGRDESRGLVRIANPMGVVVALIPST
NPTSTAFFKTMI AVKARDAIVVAPHPSAVRCTFEATRVM AEAAVKAGAPEGLIACMEHVS
LQGTDALMRHKATSLILATGGTPMVRAAHSV GKPAYGVGPGNVPCYIDRSADLPQAARLL
VASKAFDHSVICATEQA AVVDKPIAGRFAELVQAEGA YFVSESEANALRRYLFPD GAIN
PTAVGKSPQVLAKAAGFSVPDSARILARLSKVGPEEPLSREKLT TVLWYEV DGWREGC
NRSLELIHFGGEGHSIALHARDEAVITAFGLEKPVHRIVNTMSSLGAVGVTTGIAPSMT
LGPGGVGGAITGDNISVQHLFTVKNIVYGLRDAPAPAMTDGTD FEHLHAPRTTVSAEEIE

QIAQRVLAELQNRHVQ*

>SPBIB_v1_250097|ID:27163296|cchA| putative carboxysome-like ethanolaminosome structural protein, ethanolamine utilization protein [Uncultured spirochete bib]

MAELSQLALGMVETKGLVGAIEAADAMVKAANVTLIGSEYVGGGYVTVMVRGDVGVKSA
TDAGGAAAKRVGELVSVHVIPRPDPSVEMILPQKTKGSFSGRGND*

>SPBIB_v1_250098|ID:27163297| conserved protein of unknown function [Uncultured spirochete bib]

MAESFQLRVYSYLDRMQPQFAAFVGTITQGDLPAGMAALYIEVAPGNEVFRLVDIAVKT
TEARPGAQIVEREFMFEIHSQSQAQVLEAGHIVLDRLSLHEEERIKPFIASVQVITNVD
PYQAQLLNRFRRGSMIVPGETMLVLECAPAA YINFAANEAEKGATIKLIHISSVGRFGRM
WLSGSESEILQARDAAINALES LN GVEGR*

>SPBIB_v1_250099|ID:27163298| protein of unknown function [Uncultured spirochete bib]

MIITEAELREVWKNHGHTMPEIPPGARLTPAARDFLVTIGSSAIANPQSVETGVSNNVS
GGSMELSASRGRILITSTDIDDILAAHPATLIVHPEVTITDVARDRNRNAGIRIIPFARE
KPAAPGPISYNMTAQPPSAMLAAQARAGRTETAPQNSRNEQNDET FNAVKKAVMARLNGE
VDDYLVDAVLKRVLGLTK*

>SPBIB_v1_250100|ID:27163299| ABC transporter substrate binding protein [Uncultured spirochete bib]

MKKISIVLIVAMLSGSMFAAQATSTQDMNALIAAAKKEGQLTVIALPRDWVNYGEIIDTF
SKKYGIKVNELNPEGSSGEELEAIRANKGNKGPQAPDVIDVGLSFGPLAKQEGLIAPYKV
QWDSIPNEIKDKDGYWYGDYYGVLA FEVNADIVKNL PKDWS DLLKPEYK GK FALS GDPR
TSNQAIMTIVAASLSQGGSLTNMEPGLRFFDKLNKAGNFVPLIAPGTVASGETPITVRW
DYNALSNRDKSAGNPNI AVIIPETGVVAGVYVQAI SA YAPHPNAARLWMEFLYSDEGQIL
WLKGYGHPARFNDLAKRNKIPADLAAKLPPASAYAKAVFPTIEEQNI AKKYIAEQWDNIV
RIDVQKR*

>SPBIB_v1_250101|ID:27163300| ABC transporter permease protein [Uncultured spirochete bib]

MTDSLKKERSNQKGAEQTTGASGALSLSAAKSNWKDWLGLIPFFLFIFAFMVIPAGSLL
VGA FQNRDGSFTLINFSHLLKPNIISSYLITIRLSATTALLGGLIGFLLAYAITIGGLPE
GVRSFVSTFSGVASNFAGVPLAFAFISTLGRVGLVTVILKTVFGIDLYESGFNLYSFWGL
ALTYIYFQIPLMVLIIQPALDGMKKEWREASENMGASTFQYWFHIGIPVLLPSLLAALIL
LFGNAFGAYATAFSLTGGLINIVPILIGAQIRGDVLHDPNLGYAMALGMV LIMA I TILAY
SWLQKISSRWVK*

>SPBIB_v1_250102|ID:27163301| ABC transporter permease protein [Uncultured spirochete bib]

MSGKGTGRKALSWVWLVLGLAYFFIPLISTFLFSLKGGKGVLSFVAYQHVFADPNFLKTF
TFSLQMSIYTILVGLLIVPTAIWINLKLPKVKPLIELFSLMPFVIPPVLAFLIKSYA
RPPLALVSSPALLVAGYVVISFPYIYRSIDTGLT SIDLKV L TEAAQSLGAGWGSILFRVI
LPNLRTALLSAIFLTFATVIGELTLAVLLAWPAFGPYMAHVGRDLAYEPAALAILSFMMT
WGSISIIQILSRGIPGSRSNVGGGLH*

>SPBIB_v1_250103|ID:27163302|potA| Spermidine/putrescine import ATP-binding protein PotA [Uncultured spirochete bib]

MGFIELHGVSKSFGKNTVVRNLFLSVEKGEFVSFLGGSGCGKTTTLRMIAGFEIPSSGKI
LVDGKDVSNVPPAKRNLMVFQNYALFPNMTVRKNIGFGLKIAGVSAHEIEKRVD EMLAL
IHMEEFANRYPHQLSGGQQQRVALARAIAVRPKALLLDEPLSALDAKIRVRLRDDIRAIQ
QKLGITTIYVTHDQEEAMSISDRIA VMRNGKIEQIGTPFEIYNRPATSYVASFIGTLNLL
EATVVDANNGIVSIGSMKLTASSLDRMQDKPVKLTVRPEALSFANPADPVTADTNVLSG
TIETIKFLGSTVRYVMKFGDTFMYMDRFNNPQLELPKKGDPVSVIFSKEACRILPADEES
ANSLKGTEEEL*

>SPBIB_v1_250104|ID:27163303| RNA polymerase sigma-54 factor [Uncultured spirochete bib]

LQTQRPVLAQQQQLKLSPRMIQAIRLLALPLQELSEQIRQELENPALELLTDNAELSLD
VMEDSLDTFRDSEDTLREAEYSDEAFGFNNDENDRTAIIIEQTIA TEESLQEHL SGQLG LL
PLNDAERQVAERLIQNTDENGPHILPPQEICPDCEPGTLERILSLLQRLDPPGTCTSGYR
ESLIVQAQIAANAPRKTIEVLTSHFEDLQTRNRS AIKKS LGLNDRELDHIIDFIRTLDPF
PGRSFSRARPRYIVPDLAMWLEDGEIKVRLNDDIVPKLGINRLYTELASRASRGEAEKFA
REKVENARFFIDSIKRRNETLLKTAYAIADAQKAFFVGGPQALKPLTLKEIAQKIEVHEA
TVSRVVNGKYVQTDWGT FELRRFFTNAVNHDNGENISKEAAKAQISQIIDELASRREKIS
DRIIAEILARRGINVARRTVAKYRSELGK*

>SPBIB_v1_250105|ID:27163304|raiA| Ribosomal subunit interface protein [Uncultured spirochete bib]
MKIDVRSVHFDLSDQSRQYLDTKISRIDYAKDMIVDLLFVFTK DAGQFRLEVTANFRW GK
QAHIVETSLELNP GIDVLIDKLDQKIVKEKEKIQEKK*

>SPBIB_v1_250106|ID:27163305|hprK| HPr kinase/phosphorylase [Uncultured spirochete bib]
VKEQEPVNF TVLDMLSLELKEQNDLSLRCVAGRAGLSREITVPDLNR PGLALAGFYDSFA
WERLQIFGRGESAYINKIEADGVDEPIYAKLFSYQIPCCIFTNNIQPTAHFAAAAADAAGC
PVLITLSSVEFSIRVIRILHDIFAPKIIMHGVLVEVFGIGILLGESGVGKSETALALI
ERGHRLVADDVVEIRCLNGTLLMGQGTNKVIGHHMEIRGLGIINITHLFGVGAIRDKKQI
QLVIQLEDWDPNKVYDRIGMDEL TIDILGVKVPKLEIPVKPGRNIPIIIETAAMNERLKK
MGYHSAREFNQNILRWLESESARAMYFSRDDY*

>SPBIB_v1_250107|ID:27163306| Transcriptional regulator, LacI family [Uncultured spirochete bib]
MKNSKISIIYEVARLAGVSKSTVSRVISDRGGSVSPETLERNRAIEQLGYRKN SIAAGLR
TRKTYIVLVMIPDVANPFWSEIARAVQDKLEPESYSV VIGSTYWSEEREARYYELAQMSR
FDGVILNSVTDNIELIKKLGVP AVLIGERVAAQNIDTVGTDTMQATKVGMQYLYDLGHRR
IALATSEHGSEYLSLRARAYKDFLHEKGLPFDPSLVFSVNLNEEGGRELAKRFLAMPDW
RNRADSLFCGNDIL AIAAMSEFRKFGIIPGIDISIIGMDDVPAASQTY PPLTTVRKPRER
IGQAAAELLLKRMENPAGQPEKHLFPGELVIRDSVIDRRKR*

>SPBIB_v1_250108|ID:27163307| ADP-ribosylation/Crystallin J1 [Uncultured spirochete bib]
MKTRSEVLSDRATYESRAIGAFIGLAIGDAVGD LGRSQEHRNKYGLITKLLDDGKSTDDT
EFGVLTARALLDTKGALTSDTAASAWRRYILDRGGAKKRAGRPLYGAIENLSRGMQPPLT
GRYNVMNIDDGAAMRASPHGILWAGDPERAAASAAADACVSHDADGIWAAQATAAAVAIA
IANGSVDEIVEAARRCLPAGSWIASAMNTAMDICNRHPDIEEA YEELHTKLWTPEHAAAP
EAIPQMFAIFRLCAGDPRRGLLWSANFGRDADTISGLVCSLSGAVHGAEAFPTEWTESLR
KPSGTCLDFAAEEDIVSLATELVALSCELGA*

>SPBIB_v1_250109|ID:27163308|lpIB| Protein LpIB [Uncultured spirochete bib]
MVALAKKKEWSLLLLLAPALLYFLIYHFIPISGMVMAFQDYRIFGKSPFVGFKHFRILFA
SPAFLQVLRNTLIISFMKIVLFFPLPIIFALMLNEVRSSILRKFIQSTTYLPHFLSWVVI
AGIWI AFLSPANGGLNQLREMFNLAPKDYMTDKG AIRWVLFASETWRSLGWDSIIYLAAL
ASISPSLYESADLDGAGALQKMR YITLPELLPTMVTVFILNMGFFLNAGFDQVFNMMNDS
VISVVDILD TYVYRIGLLNMQYSFSTAASLFGKVIGLVLILAAHQGSRKITEKGLW*

>SPBIB_v1_250110|ID:27163309|ytcP| putative ABC transporter permease protein YtcP [Uncultured spirochete bib]
MVKKVKTPAVELFWRWLFTALLLLVCVIVLVPMLNLLALSLSNPARVPEVRGLTVFPKGF
SLINRYVLAANPLFVRSFLNSVFITVVG TALNLLVTSMAAFALTRPKLPFRRFFMVLIII
VMILEPALVTEYLVIKKIGLMNSLWAVILYKTVNVY YLILMRYFEEIPPSLIDAAQVDG
ASNMTVLRKIVMPLAKPALATLGLFYGVFHWNEYFRASIYLTDPMKYPLQLILRQFVVD
DTASLIGSGTLFSYDEAARLSYDALQASTIIVAILPVLIVYPLILKYYARGVMEGGVKE*

>SPBIB_v1_250111|ID:27163310| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]
MKKHSIVLWLMVAMLVGTGVALAGA QPKVRLVLKDLDTDPNAAQFIQLIEKGM AAAGTPVK
IEIVKVP SGNYAEKISLMIMSGDIPDIIYFQGGDDKIAMQN LLEDLRPYVAKSKYIKNVL
DPHSKTRLESYPYL VVWAPPRVRAPVIRKDWFDTLPSAKAVATNPTVD TYALFKDLVQK
KGAKFGISITGATNGVEELDSIFDGAFGITSTWMKGADGQWVYCRVTPNEKQKLEFYAKL
YKEGLLDPEYLTKKWD TKEQVFYEGKAGIAGVAPGSIDVYANKMMKTQNTTLVPLPPA
GKAQGLGPFVDVIKESRGFAIPVTSKVKDA AFAVLDFMWSPAGLKI AKLGIPGLHYIEEP
NRYVLTDKYAEWYNGWFGDSFNGFV PDKPLSRPIMTEAAVEAGKLA VKYMMPDKTFLIPE
QYIANWDAMTNLYKEYNADIVTGKKPISAFDEFVQKWYSAGGTELTKYAQTKLK*

>SPBIB_v1_250112|ID:27163311| ADP-ribosylglycohydrolase [Uncultured spirochete bib]
MPTIPSDYLERVYAGLLGKNIGIRLGAPVEPAIWTYERIREVYGDITSYIKPYRNFAADD
DANGPVYFVRP LLEKVERLRNKEGGWLGSLPQSAVGAGEGNPVAPLAIEPSEVARAWLDY
SREGVGMFWWGGYGRSTEHTAYLNLKHGVPAPESGSIARNGKVTAEQIGGQIFIDTWGLV
WPSNPEMAAEYAVRAASVSHDGEGLHGARFIAGCIAAAFRET DVEAVVGAGRAMLPADSA
YAAVVDVAVLRFHAQHPSDW RACQEYLLAEWGYDKWPGLCHIIPNAGVCVLALLY GKG SFA
RTVEIATMCGWDTDCNAGNVGTIAGVLYGLDALPAHYRAPVND SIVLSGLPGTLNILDIP
TFAKRVAEAGYMLAGEAVPASITEALQRGDGERAIWFD FVLPGSTHGMRVSDPTRFAARH
RSGALEFQFERLVKEESGKLFFKPFYRRDDFDDERYNPIFSPIARPGQKVRIEFMLERWE

QSIGVEGYVRDTFTRQDIITGTIFPQEGEPCRLDFQIPSLDGSFPDEIGLKITSFSGK
GKRDSGRLFIRHFSIEGKASYTIDMAKQSVFEGCVTPFSDGGTWSIESGRLHLMTPVQA
ASYTGGYRVGDQRITAQVRPIAGDCHMLLVRTQGATRGYWAGFDGPGHVAIYKNDAGFTR
LANAEYSWQAGRDYVMALEAIGSSICLSIDGEKVLEIDNDRFDSGMLGCGTLRASRALYG
PFTVEEL*

>SPBIB_v1_250113|ID:27163312| putative HpcH/HpaI aldolase [Uncultured spirochete bib]
MTEYTPSTAGTLSKSDCLVVYRPSKEPVSVTVRSSVGRLEFRSIEDTAKSMLGVFVGVKGTG
LLEIEDDGALNLVLSARIETTLRLAGFELNISLLERDRTFSAAKIQREPSAKQLPRRRL
YIPGNQPNLMINADLFGADTLIFDLEDSVPPERKLEARILVRYMLSDTHLFRESELAVRI
NPIDSSCGREDLEEIVNSRPQAIVLPKCESARDIQVLDAELARLEAREGLPLGSILILPL
IETAAGVLAAKEIAAASPRNAALCFGYEDFISDIHSSAGERSLRSASTPANHDGEMPHSS
SQPEALLAKQMIVLAARAAGIDPLDSVISDTEDKEALRSSCEEARMMLGMSGKAVIHPVQI
PAVKSAFHPSEEEIMQAKAIVEAYERSVVEGKGTAAALGDTMIDVPVVERARLLNDYRIG
D*

>SPBIB_v1_250114|ID:27163313|citF| citrate lyase, citrate-ACP transferase (alpha) subunit [Uncultured spirochete bib]

MTIGSGTDMEWKTNALGRAIPLEIEGRKLVFAGAFADPTGAAIAASKDISTQSGKKKLR
PVPWRGKPKDKLTKSWDDLFDRLDIHDGATISFHHHLRDGDAIVLEVVKRLAERGIRNLT
APSALFSVHDALVPYIRAGVITKIEGSMNGAVGAACSRGEMPKTCVLRSHGGRQRAIQDG
DLKIDVAFIAAPCADAFGNANGLYGKSACGPLGYPKPDSEYANKVTVITDNLVSYPCLPW
AICGSNVQDYVLQVESIGDSSKIVSGTTRLTRSPQQLLIADLTARFIEAAGLMHEGFSFQA
GAGGISLAATVFLAERMRRAGVKASFAHGGATKVLVDLLKEGLLSSIVDLQSFDLDAVRS
CAENPSHVASDPFISYGPRSAGCVANMLDVAI LGATEIDLGFNVNVVTHSDGLLLHGIGG
HSDAAASAGCTIITAPFRKRIPIVREEVTTVTCPEVVDVLVTERGIAINPRREDLLER
AKKAGLPCIKISELLHDVREITGAPELPRFKDRVAMIEWRDGSIIDVVREIESI*

>SPBIB_v1_250115|ID:27163314|ptsH| Phosphocarrier protein HPr [Uncultured spirochete bib]
MVELETTIKNRAGIHARPSALIAQTAIKFASRVYLEKSGNRINAKSIMGIITLAASFGTK
IKIITEGPDEQQA AEAIKALFESGFNEELG*

>SPBIB_v1_260001|ID:27163315|argD| Acetylornithine aminotransferase [Uncultured spirochete bib]
MKERFMNTYARTGLVLDHGVGARLFTVDGTEYIDFTAGIGVNSLGHGHPRLVEAIAAQA
KIMHVSNYFLTEPSIELAEKLTEATGFDTVFFCNSGAEANEGMFKLARKYGSSKNPDKNV
IVTLKQSFHGRITTTVTATGQDKFHKFFGPFVYAEPEPIAGLDALLGPNVCAFAFE
PIQGEVVRPLSRAYLQAAEKMCRRERDILFCADEVQTGVGRTGAVLACERLGVPRDVTAI
AKGLAGGVPIGAVLARGKAADVFPQGDHGTTFGGGALAASAALVVLSELESPGFLDEVDQ
KGRHLMELVEGFRHPLVKDVRGMGLMIGIGVKVDPHKIVDAARAHRLTLTAGDDTVRLL
PPLVITMEEIELGVAALKQALDDVSSAPNLVPELK*

>SPBIB_v1_260002|ID:27163316|argB| Acetylglutamate kinase [Uncultured spirochete bib]
MDEQFNADVLEALPYLRRFSGKIIVIKYGGAAAMINEGVRQSVIQDLILMQQVGMRPVLV
HGGGPEIDRMLKKNLKESELFVEGLRYTDDDETMEIVQMVLGKVNKDLVELFSRMGGKAVG
LCGSDGGLFMANRFRKNGQDLGLVGDVQSVNTELLRLLDNGIIPVVASIALRNDEEGGF
YNVNADTAAGALAIKAEKLLITDVPVGMEDKSDLETIREMDVQMAKSLIKRGVIKA
GMIPKVEGCLQALAKGVSAAHIVDGRSPHSLVELFTDTGMGMTMIR*

>SPBIB_v1_260003|ID:27163317|argJ| Arginine biosynthesis bifunctional protein ArgJ [Includes: Glutamate N-acetyltransferase ; Amino-acid acetyltransferase] [Uncultured spirochete bib]

MKQTRGGVTAPKGLASGVHVGIRKNREKKDLALIWSEVPCAAAAYTTNRVKGQPLIVT
QEHLADGRAQAIANSNANTCTGEEGIKAARRMAELVAQHLPVKAEDVVVASTGVIGQQ
LDVSVIEAGMGELVAGLSKGSIDAREAIMTTDTMKKEIAVVEEIGGVLTIGAIKSGS
MIHPNMATMLGFITTDCAITSEMLDKALKFAVRKSFNRVSDGDTSTNDMVAILANGMAG
NPLIDQEGNNFDEFDALEFVCVELAKMIARDGEGATRLIECTVSGAVSEEQAEALS KGI
ITSSLVKAAMFGADANWGRILCAMGYTRNDFDPDKVDVAFESPRGYIEVCKAGAPLPFNE
EKAKKILNNQEVEIIVDLHAGDAEATAWGCDSLSEYVVRINGDYRT*

>SPBIB_v1_260004|ID:27163318|argC| N-acetyl-gamma-glutamyl-phosphate reductase [Uncultured spirochete bib]
MIHVIGILGATGYAGLELTRILLQHPVDRLSASSVSFEGKSLEDVYPSMVNVVDGSALPP
LEKAEDVMARADIVFSCPLPHGHAETAGWQCVEDGKPFIDISADFRFGTHEELFKK WYGAG

YEYPEVHAQAVYGLPELHRTAIKSARLIANPGCYPTAAELGLMPALQEGIADLSSIVITS
MSGVTGAGREPSQTTHYPEAADAASPYKVGSHRHQPEIDLLLSEMAGA EVHSVFTPILAP
MNRGILSTICFGLVHTISAADLHALYADRYAGEPFVRLPLGSTASNRFVKYSNYCDISV
HLSADGSKAVIISAIDNMVKGAAQAVQNMNILLGFDETEGLRFIPPAF*

>SPBIB_v1_260005|ID:27163319| protein of unknown function [Uncultured spirochete bib]
MENLLAEKTDSYRLQAIIGVVLKAGNIENAI AFCFALAAAALRRA*

>SPBIB_v1_260006|ID:27163320|hppA| putative K(+)-stimulated pyrophosphate-energized sodium pump [Uncultured spirochete bib]

MLTSGVLWAI AALLLALLYSLVTSSRIRKIPLANSDIQRISGYIEEGAY AFLTREYRTVA
YILPIVALMLLFWNVGIMKLQSI SFLIGAILSASAGWFGMSIAVKANSRTAEAAQKGIQP
ALRVAFSSGSMGMTVVGLVLLGISGVLG LLLLIPGADSVLGETIFPIVSGFSLGASMMMA
LFARVGGGIYTKAADVGADLVGKVEVGIPEDDHRNPAVIADNVGDVAGMGADLFES
YAGSIIGCMVLGIAVQASPFMQIKLSILPLIAAGTGVIASLIGTLFVHINRSGNAQKALN
AGSVGAALISMLLLL PVIRLTIGTERFVSGTHEAGWLG IYFACVIGLAAGTAIGLITEYY
TGS DTPPV RKIAKSCTTGAATTIISGLGVGMSSTVFPI LVIGLAIGFSNWL AGLYGIGMA
GLGMLLTLGIQLSV DAYGPIADNAGGLAEMSEMPPEVRKITDSLDAVGNTTAAIGKGF AI
GSALLTSLILIVAFISATGLQPSVMNLTNPHVLIGLFIGAMIPFFFSALAMD AIYQAAFA
MIEEVRKQFRSKPGILEGTEEPDYRSCVDISTQTALKSMILPGISAIAAPILAGLIGGPA
VLTGLLVGATVSGGLLAIFMSNAGGAWDNAKKLIESRPEGGKGS GDHRAAVVGD TVGDPF
KDTAGPSLNILIKLMAIISLVLAPLLKLA WG*

>SPBIB_v1_260007|ID:27163321| conserved protein of unknown function [Uncultured spirochete bib]
MASEKHYMIIHPNHSLIASQLEPEHFIRHYVQGSTRYFEGRLIFVEVDPDYRHPYFDID
TAY AELKPHEDGRPKATKFIKSYR VLEHVDYNALGKLYISNSLGDYVELESKP YEPSIDT
DEFRIMLEVNPLRFIVLTKLNCHDFGQFITDPRNSKGAPKMAFTLLEFDTQEFLKEYEEN
PLIRCYVPGIHPARLVSAIEEVRTTPGKVVKGISLDCPIDRISYKYLKEGFMFAEHGKPC
KFYPYLDLDTVERKFKFWKSM*

>SPBIB_v1_260008|ID:27163322| conserved protein of unknown function [Uncultured spirochete bib]
MELKIGLVAEKEIVVEDKHVASHLGGSGVVPVYATPTMVLHMEETS RQAVDHL LGPDGATV
GAYMAVKHLAPT PKGMRVRIRAELTKIDGRMLTFKVEAWDEVEKVG EAEHVRAIISMAKF
AERIEKKKRAAGA*

>SPBIB_v1_260009|ID:27163323| Alpha/beta hydrolase fold protein [Uncultured spirochete bib]
MIQLQTLIVLPSVANHGDLGNRARI LQNEQKVRY YWHMAVAVALYLVA VLLLAGIAYPLM
FRPKCRSLEFTKQYSLEHGEIDESFLGLDWKDFSFSPNGYTLRGQYLRGKEDAPAALFV
HGITWTRYGM AKYMKPFIERGWNVA AFDLAGHGESKAPRRFHPSFGFY EKFDVKEGVKAL
RALFPKALCVGLFGESLGSASVLQYALLAKKDSSAEVDFIVADCSFSSAWDELLEQLRMV
HVPNCIAWPAAQGV RGLARLLRGFDLKD AAPAKAIMEADMPILFAHG MEDRYVPTIMSVR
MASARLSGGIGLTELVLIPGATHAKGILTDKERWLSAVNAFIDRVCD AKKKAAAK*

>SPBIB_v1_260010|ID:27163324|trpS| Tryptophan--tRNA ligase [Uncultured spirochete bib]
MERKRILTGDRPTGKLHLGHYVGLANRVRLQDEYECFFIADLHTLTTKPEKENIEQLS
ENVHSAVLDYLSVGIDPKKSVIYLQSAVPEVTELA LFFQNLITVPRLSRVPSLKEMAQNA
HIEEMPFGLLGYPVLQAADILLPRAHLVPVGKDNEAHVEVTREIARRFNLYGETFFIPE
AMISEFGSLAGTDGNAKMSKSLNNAIFLSDDEKTVIKRVMSMYTDPKRIRADIPGTVEGN
PVFIYHDAFNPNKAEIEDLKARYRAGKVGDI EVKEKLARALNTFLDPIRERRAYYESQKG
LVEEILYEGTMRMREEARQTL SLAKKAMGMSSVWNRISRKAERQKKAASGQVGE*

>SPBIB_v1_260011|ID:27163325| putative Diguanylate cyclase [Uncultured spirochete bib]
MEIDSSAIRSLFIDSSLSEFFDETDLFYIDFQSSIARSCSTLRYLGYEDADLLDILGAFP
VHEADRERVELMQKRIESGETDKVIDSFRVASKKDSRFPWLRFSIKVLGREPDGKPTALI
GHVTDVDDLIASQEEIRERLVEIDAMRELIGAINKSLDFEETFKRIIEQLHRIIPFDRAT
VQAFENDSLTVIAGYGYPKSDIMGLVFP AKGIDNPVRAIQTQRPIVCNDVSHDFPGFIA
PSKDFTSLSWL GIPMVYEGQAIGLIALDSHLPNFYTDQHVRVATAMA EHIATAFEHARSH
QLVTVQAMTDRLTGLANRYGLEMRGTELFQKAIENDQPIGVFMLDIDHFKQVNDMYGHSY
GDMVLQQIASTIRTQIRNEDYAVRYGGEEFVLLPGLGPRESLIVAERLRIKISQTEVEK
GRKLPTV SIGIYAAVPGSLDILHEFIRKADLALYTAKEAGRNRSRVWSTSPEFYVSE*

>SPBIB_v1_260012|ID:27163326| protein of unknown function [Uncultured spirochete bib]

MVYMNFAKRLFDAAMARHAAEWYGISKAEGALGNKGQVQKIAENLRALQRGLTGDRAR
VASGYMDEKSALQAYLLYWPVSFYETA AVLAE LAERRTL PNIQT VLDL GSGP GPGSFAA
SLFGAERAVLVDASQAALDVASKIAEKGRQGGSSMELSALAKDLQDFSVGILSRFSSSSI
EPSAGFSAGRALLEPPFDLIASHSINELWHDEPERIERRRNMLLSLLPALREGGLLII
EPSAHYTSIPLLALRDSLLEAAGSFTGGNFAVSDEARATLAADPAA AHLFCVGPCHSDP
CPMRAIGDRPCFSEWKWDAPTLVRKLAEMAGLDRTSLKASWVAFQKTGEKLGAVFARNMG
ADFGGQGIVFARQGADFAEHAANSAAPPPAAARPSGLPPAAGPAISGRIVSEPMLNKAGR
IRYIVCTENGQLSTISAPQNDPTAIHAQASTLGGFFNLARGDLIEASGLEERGRSHFGIIP
ASSLRIKMKAPRF*

>SPBIB_v1_260013|ID:27163327|hndD| NADP-reducing hydrogenase subunit HndC [Uncultured spirochete bib]
MVNVKVNIPVQVAEGSTVLEAAKKANVKIPTLCYNPDLSPWASCGICVVKIEGSNKMLR
SCCTPVSEGMSIISNDPDLVQTRKTVIELILSTHPDDCLACPRNQACELQTLAQEFGIRE
QPYKKMVRDIPQDTSTGSLILNPSKCIRCGRCVEVCQEMQGVWAVEFLGRGESIRIAPAA
DVKLGDSPIKCGQCSAHCPVGAIIYENDQTKLVWDALMKEGPEAKTCAVQIAPAVRVALA
ESFGLPPGTDLTGKIYTALRRLGFDAVFDTNFSADLTIMEEGTEFVHRLTGALKAGMQQA
TADKSMPLITSCCPAWVDYMEKYYPDMIPNFSTAKSPQQMMGAMIKTYWAAKAKVDPAKI
YSVSIMPCTAKKFENSRDESMYSSGYKDVDTLTTRELARMIKQAGIDFLNLPSEPDSP
LGPYSGAGVIFGATGGVMEALRTAYFLVTKEELKDVNFTAVRGLSGIKEATVHINGIEL
RVAAAHQMGNIATVLDQVRKAREEGRETPWHFIEVMACRGGCIGGGGQPYGATDEVKLR
MRGIYDNDEKQEYRCSHDNPYIKQIYAFLQKPASHKAHELLHTQYKERPLYLK*

>SPBIB_v1_260014|ID:27163328|hndC| NADP-reducing hydrogenase subunit HndC [Uncultured spirochete bib]
MAYKNFILVCGGTACESSHSEEIYRNLIKEAEALGVSRDVQVVKTGCFGFCEKGPIVKVL
PSESFYVEVKPEDAHEIIAEQVVKGREVTRLLYRKDKKSDTAKLEDIEFYQKQFRIVLRN
CGVINPESIDEYIARDGYKALEKALFEMAPEEIIAEVKASGLRGRGGAGFPTGLKWEAAR
KSPGDVKYIVCNADEGDPGAYMDRSTIEGDPHSILEAMVIAGRAVGANFGYIYIRAEYPL
AIERLKAIAQAKEYGLLGKDLGSGDFDIEIRLGAGAFVCGEETALLQSIEGKRGMPR
PKPPFPAVKGLWGKPTVINNVETLANIPVVLTRGAQWF AAIGTEKSKGTKVFALTGKINN
SGLIEVPMGTTLREIIFDIGGGIKGGRKFKGVQTGGPSGGIIVEKDLDTPISESLTALG
SMMGSGGMIVMSEDDCVVDVSKFYMAFCVDESCGKCAPCRIGTKQMYGLLDKISKQGEE
ADLDKLEQIGRAMTKASLCMLGGSAAANPTLSTLRHFRAEYLEHIRDKKCRAGKCKDLVVY
EIDPAKICIGCLCARRCPVPCITGEKKKPHVIDGSKCIKCGECYTACKFGAVIKR*

>SPBIB_v1_260015|ID:27163329| NAD(P)-dependent iron-only hydrogenase iron-sulfur protein [Uncultured spirochete bib]
MAKMTLEQLRAFREGKRQELEKRNVEGKDIQVIVGMGTCGIAAGAKLTFDAIVA ALEKHN
MADKVVVRQTGCMGLCYVEPTVEVVMPGMPPVIYGKMTSDVAEELVVKHLVEHSLLDNHI
FDRPAVDIVAH*

>SPBIB_v1_260016|ID:27163330| Histidine kinase [Uncultured spirochete bib]
MHYAIADFLDLVQNSVEAGAQSIEVDIDEAPDGLRVRIADDGCGMDEHEKARALDPFRS
GGAKHPGRKVGLGLPFVQAVTLAGGWFSKSEKKGKTEVQFFFPGKSVDSPPLGDPVAL
FTALLSMAEKSELKIRTRARDGLSYEVKKSSELAEAVGELASASSLSLVRQFLASQEEG*

>SPBIB_v1_260017|ID:27163331|hndA| NADP-reducing hydrogenase subunit HndA [Uncultured spirochete bib]
MVAGDIEFSTELQAYIDEWCKKEGGLVMMLHRIQHEFGYIPRAAAEKLSRISGIPLAKIY
GVITFYHFFKTTKPGKHRIAVCMGTACYLKGGQDLLEETRSILSIEPDEVTDGGLFSIDE
VRCLGCCGLAPVMMIDDEVHGLAKEQLPDIIAKYRAL*

>SPBIB_v1_260018|ID:27163332| putative Tetratricopeptide TPR_1 repeat-containing protein [Uncultured spirochete bib]
MANSEKNKLIADLNNQAVSLIDAGRYQEAINLLDKALVLDPSRTGVLFNRAEAHRLAGNF
DAARSDLLSELQMEPDSPEVLHALGLLAYEQDDFAQASEFYRKALDKDPLYASAWNDLGV
VAFRSEKYDEARAAFEKATSLDPDFSDAWFNLADTYDELGLADKRAYALKKLHAARMRTG
EKPDSEDRA*

>SPBIB_v1_260019|ID:27163333| putative Protein kinase family protein [Uncultured spirochete bib]
VNPGDIIIGTYVLDRLGKGVTA STWLAHLAQDTPSAAAGNERSENGAAENQPERISATHP
ESPPNNAPTSPPVVLKIFDLAETSSWKPLDQFKREAEILRTLNHPRIPKYIESFDLAQGG
HFEFVLMQYIEGETIESHVSSGKKFTEAHIEQMLAELADILAYIGSLRPPIVHRDINPR

NLILQPDGHVALVDFSGVQDAIRSALYPGATLVGTAGYIPVEQVSGRATHRSDLYGAAAT
AVFMLTGRNPAELPMRNLKIDLSGLLYLSPGLAYVLGNWLDPDQDRRFLSAAKAAAILRG
EEPVPPTAALASSPSNARSSENTRNIESLQSSRRALISHILSEPDTGRESVDYPAELPSDS
RLEIQPLDPGLYIKLPRGKRAGSSSGFAFFPIVWLGFFVWTTMTLRMRAPMFFPLFSIP
FWIAGVAMLKSFLKPSITDTELFITPDGLLKKSSSFISNSAQQY AISDVGTAKVQRSSVQ
LNNRYLKELAEAGTGTTLTFGLGLSDRELYLEKRINEELEKLLKLPRE*

>SPBIB_v1_260020|ID:27163334| Transcriptional regulator [Uncultured spirochete bib]
MENPVQHTFFRYLTYSDEDEQWEMVCTDAGYTEVPPYTIYPPNKEGHPRIQFQVAVGRTL
NEYQIIYITKGEVGFETSGRHYDVKPGSIIMVFPVGRHFYKPVYEIGWMEYWVGFKGGHF
ELLRERGFLLNPQEPFIEIGLQNNVLDLYNEIIAEVRDQKPLYQIVASSKILALIAEINAC
ARRRAQASHAAQVVEAAKMMVEKIYGDIDINSIATALGISASRLNDIFKTYTSMTPYQY
YIHIKHAASKLLEQGDLVKEVAYRLGFEDQYHFSRLFKKKTGIAPSQWRAFMYE*

>SPBIB_v1_260021|ID:27163335| conserved protein of unknown function [Uncultured spirochete bib]
MHMHARNIYHKCKNIHCALGERPYTRWYMKENSAHIPTVGLFGIGLDTYWAQFPGLRERL
LSYQAETAALLEGAGAMVVDAGLVDTVDKARAAGALFREKKVSLVFLYITTYALSQTVLP
VAREAGAPMVIINVQPAKNIDYEFNSLGDALMTGEWLANCQSCCVPEIANVFNRNGIP
YHIITGYRGEPPVEAELAQWVRAARVAEALRKTNIGILGHYYEGMLDVYTDVTRMAGVFG
SQFNLIEMDYLAQLREKVSPAQIEAKIAQFRSEFEVSECEESELVRAARTSCALDALVE
EKSLGALAYYYEGTAGNVHQDIVTSVIAGNTLLTAHHVPVAGECEVKNALAMKIMDLLDA
GGSFSEFYLDYEDDVVLWGHGPAHSAIAEGKVKLVLPLLYHGKPGKGLSIQMSVRNGP
VTLLSVVEGASGKVFLTAEGESVPGPTLQIGNTNSRYRFPLPARDFSEAWSKEGPAHHC
AIGVGHVAAEIEKTAALFGIECHRIC*

>SPBIB_v1_260022|ID:27163336| rbsA| fused D-ribose transporter subunits of ABC superfamily: ATP-binding components [Uncultured spirochete bib]

MAEYILELRHISKYFPGVQALKDVHFQLKPAEIHAIMGENGAGKSTLIKITGVYQPDEG
EIYFNGERIHFKSPLDAQRLGIAAVYQHVACFPDLSVLENIFLGHESFDPVTRKIRWREL
RKKAEILLQSLDADFSPSTTMGNLSIAQQQIVEIAKALSVDKILIMDEPTAPLSRRECE
DLYHIVETLRDKGVSIIFISHRIEDMYRLAERVTVLRDGNVIATWDVPGLEQSRLVQGMV
GREITQYFSPRHATIGEEIFRVEGLSRTGFFKNISFSVRRGEIVALTGLVGAGRTEICES
IYGIAPRDSGRFFLEGKEITINTPAEALMQGIGYLPEDRMKQGLVLDWDLIRNITLASLR
SFCKNGFMQPSKERDMALSLADNLKVKASNIYAKAATLSGGNQKLVAKLLTSKLLKII
LDEPTKGVVDVGAKTEIYRIMNQLAEEGYGIIMISSEMPEVLGMSDRIVVIREGRKSAEFE
TPNASQQAILESAMTANGREAHAIAG*

>SPBIB_v1_260023|ID:27163337| Ribose transport system permease RbsC [Uncultured spirochete bib]

MQSQDKMQTGQNADGQTKAASRPDAIISRAESTSRAETLARNTETYRELGLAIFVILS
VIFQIRNPKFLSLSNIKDMLANTAILSILTVGMMMVIITRGIDLSIGSTMALAGMITSLT
VSANPSISPFLSLAQGMAVGLAAGLTIGVLVAYFNILPIIATLGLMNILRGMTYLISKGK
WVSA YQMSAGFKNLSTGTTFGINNLIIFAIYIYIYAYFINQTKTGRYIYAVGSSPDTAE
LIGIKRRRIILLVYALMGLLAGLAGVLWVSKFASAQGDVAVGYELNVIAATVLGGVSVAG
GRGKVSIGILLGSILFGILANALPLINISPFWQQFIQGLVILAAIISNVLLQRRNDRLALK
KRVJ*

>SPBIB_v1_260024|ID:27163338| rbsC| ABC transporter periplasmic subunit [Uncultured spirochete bib]

MTEKTSTIDVNKPRGLRKYQWEIFLVVFLAVNVVNSFLSPYYLTLDTFVSTPMNFLDKA
FLVLPMTMIILGNIDVSVGSIVALTSVLMAVSYNAGLPMPLAMVLALVISTTCGLINGL
LQIKFRELSATIITLSTMTVYRGIAYVILEDRSAGRFPWSFSLAWGYIGKVPFILIVFV
LAAIVFAILLHTTRFGRMVFAVGNNKTACEYSGIRTGRILGVSVITGLMAGFTSLFLTS
RMGSTRPNVALGYELDVIAMTVLGGISTSGGKGRIAGPLISIFLIGFLNYGLGLRNVSAQ
VLLIILGFLILSVLVQNFTDRPRQSSSKSGKSAAPTHRSDAGSGSDIHGNSAQGG*

>SPBIB_v1_260025|ID:27163339| Sugar ABC transporter substrate-binding protein [Uncultured spirochete bib]

MKKTFTVVALVLIALALVMPASVFAAEKAKYAIVFKNTGNPYGEKQMEGFKNNGIEEQGFE
AILRAPDLPTAEAQIQIEQLIAQKVA AICIVGNDYDALVPVLKKATAQGIKVFSLDSSV
NPQARLTHVNQADSEKIGQTLIKAA YDMAGGKGEIAILSATSQASNQNIWIDFMKKELAK
PEYKNLKLKVAYGDDLDRKSVSETEGLLRSYPNLKVIIAPTTVGIAAAGKVLTDKGLKG
KVMLTGLGLPSEMAEYIENGVCYPMFLWNPIDVGYLGAYVGTALVSGKITGKVGDKFSAG

RLGNYTITKAPDGGTEVLLGPPFKFDKSNINDWKKVY*

>SPBIB_v1_260026|ID:27163340|yiiL| L-rhamnose mutarotase [Uncultured spirochete bib]
MKRNAFAMQLKPGNEAEYKRRHDQIWPELKAELRKAGVSDYSIYLDPETMRLFAIQLAD
DETSSTLPESPIVRKWWDSMKDLMETNPDNSPKVWPLTEMFHMD*

>SPBIB_v1_260027|ID:27163341| putative bifunctional rhamnulose-1-phosphate aldolase/alcohol dehydrogenase
[Uncultured spirochete bib]

MNLETLIEISRRYGADPDYVLAGGGNTSLKDGDVIAVKASGALLGTIDENGFVQLSLSKL
RALFDMALPSDSEAREKIVLEKLLLEARLPGQTRRPSVETLLHALFPYRFVIHLHPALVNG
MLCSRQALSAAETLFRNEASVLPYITPGYILADAVRRVFEHRTSSGMSPPKILFLQNHGV
FVAEDSVEEIEALYAHIFETLKAKVQPLPEEGLRGGPARGYEAIAA VA EKAVETAATKF
NVRFFFTSNSLIGHFLASPEAFVPLSSPFTPDHIVYAGAWPLFVNISEAQSSHEHLISKID
EYRIRYQEMPKIIAIQNLGIFGLGQDESAAKRACELFGDAAKIAWYARISFGSVHPMQPAD
IEFIRSWEVEKYRASIAASSNPAS*

>SPBIB_v1_260028|ID:27163342|rhaA| L-rhamnose isomerase [Uncultured spirochete bib]
MSRIEQEYKSARETYADLGVDTDQAIKTLSSIPLSIHCWQGDDVIGFDGATSLSGGILAT
GSYPGRARNAEELRADAFAFAHIPGQKRFLNHAMYAETGGTKVERSALQPRHFDWVAV
AKEQKIGLDFNPTFFSHPLAASGWTLAHPDENIRKYWIEHGKASRRIAQAIADSLKDVVV
NNLWVPDGSKDMPADRLGPRRLKESLDAIYAEKLPNDRVLD A VESKLF GIGSESYVPGS
HEFYFGYASQKAIGLCYDMGHFHPNESVADKISATLLYVPYLIHLSRGLHWDSDHIVW
NDAITDVCREIIRM RVWDRIHLALDYFDSSVNRISAWIIGARSAQRALLYALLEPVEAMR
TEEERGDGFSRLALIEESRSLPFAAVWRHYCEMQNPAGPEWIEDVKDYEEKVLEERG*

>SPBIB_v1_260029|ID:27163343| conserved protein of unknown function [Uncultured spirochete bib]
MAVISIRLNEEEEKMLAFLEKQFAKDKSSLIK YSLNELYENYIDNKLIEEFEAKEKETGP
KFLGAKEILADI*

>SPBIB_v1_260030|ID:27163344| conserved membrane protein of unknown function [Uncultured spirochete bib]
MTEFVNNIWRWVSDLPALGAPLILLVGWAIKILKLIMPKILAVLKFDVLAGKIGVNEF
LRKGVH VQYAPSKLIGVFLYWVVMMLVLAMAASVLDQRAAESIWSWLF GA IPTILAAGITA
AIGVLIVNFLSNFVLTIMNNA GMGSATLVQRLIRAVGYIIVVVMVVDQLGLGQSIVSILL
LLIGSIALGIAAIGLGCKDMARQYVESLIRAIRERERASHGTDLEG*

>SPBIB_v1_260031|ID:27163345| putative opine dehydrogenase [Uncultured spirochete bib]
VKKTDWSGILEHLERVA AKGKDMVWCIA GAGNGGISMAGHLGLLGFPVQIYNRTDEHLNA
IRWYKGIEVEGAVSGFGPVRLATSRIGEAIAGTDVIMIVTPSTAHYGLGTLMAPFLEDGQ
IVVLNPGRTGGALEFRAALDREGCTARVVIVEAQTFIYASRMISRNGKHIFRIKNGVPVS
ALPSFLTPAVLKVIDVAFPQFIAGSNVLATSLLENIGAVFHPALTLNAAWIESTGGDFEY
YLQGISPSVARVLQAIDDERLALARALGIRTVSAREWLYLTYDSVGADLCSAIRATISYA
GIKAPKTINHRYIWEDVPM SLVPMASIAAMYGVETPAINLTIDLANLMHGV D YRANGRTV
HTLGIEGLSVEELHRLVTEG*

>SPBIB_v1_260032|ID:27163346| Cobalamin B12-binding domain protein [Uncultured spirochete bib]
MYKVSQNDVIGLIKPAIDAHTLGILAFQAQLRDCGIRVEIADEDASKELDALVGRPSIER
LVRWVRAKGIDVLGFSYRLDPDRGVELFAQLVEHLKS AKMLAKDGGPIKALWFAGLPPAC
KKAKQRVPFVDAVFHGDETYQEILEILGLPAHLVPQQASAELAYDKARLEFGTEIVKNRA
YLDVAPVDRSGSPGFGTWGERVIDRVRHGIAHNLPPLMRAHVGPYAEDRSQAV ALFLDWT
SRLAKSGLLDVLSIGSSQLTQSHFGEDWTGLSNGGGVPINSPEEYRRVWQAARPMLVRTY
AGTKRVPDMAKMHEQSLDICWHALSLWWFSKLDGRGDNSVLENLVEHFEALRHIASSGKP
MEPNVPHHFAFRGCDDVGYIVSGYVA AKA AKLQGIRTLILQTMLNTPKYTWGIQDLAKAR
ALRMLVRDLEGPDFAVILQPRGGLDYFSPDMEKARAQLAAVTMLMDDIEPDDPASPQIIH
VVSYSEGVRLADPDVVQESVRITRYALSEYRRLKRKGMPEY GKHS MVEARTRHLYEEAR
RMIKFIEATIPEPYSRGLYAMMKAGVFPLP WLSACRDEFDAAVSQPVQFMHGGVQTVDK
DGKPLAVSQR LFGIARNLERMGFAPQEEHGEKN*

>SPBIB_v1_260033|ID:27163347| putative D-alanine--D-alanine ligase [Uncultured spirochete bib]
MRLQIIMKKKTDRKIA VENEVRYARMTGIYNGAGFEAYFSYAANINDLETIIRENLPLDV
LCGIDHLPEEKDGITVSTNVHGW FESHNVLYIGSDPEVIERALS KASLKRKWEADGIRTP
PFVHVEAGEAGLKEGIQKLVLD AFPIIKPENLGN SKGIDENSI A WNVDEL SRVLARMI
SLYSGHILVEHYLGAYPDVKEITCAMIQGQGAMQCMPAFLGLAQPKRFHLITSDDKDGH

TVMSPLEPEQMERFVPFAQSAFESAGVRDYARGDFFADGKFWAIEINGQPMIPDRWFEE
AAGFDGISEAQYL VGIVAAGYRRLRAQGKLTSAFPAGARALLERTRLAEDLSAETPHKGG
LQDV*

>SPBIB_v1_260034|ID:27163348| protein of unknown function [Uncultured spirochete bib]
VHHEIALVFALIAGDHCFAINYSTKSRLAFFKTKFVIIADMWYILK*

>SPBIB_v1_260035|ID:27163349|pcm| Protein-L-isoaspartate O-methyltransferase [Uncultured spirochete bib]
MITCNERKDERNFMVHTQIAARGVRDKRVLDAAMRKVPRHRFVPVSCSSEA YEDFPLPIGS
GQTISQPYIVAFMAEMLRLNGSERVLEIGTGSGYGTA VLSLLAKEVFSVERIAALLERAR
EVLEALKVENVHLRLADGFFGWAEAPFETIILSAAPFDIPNAIVNQLADGGRLVAPVGS
LGAQTLVRITRRGAHFDTEALLDVAFVPMRPGVSEL*

>SPBIB_v1_260036|ID:27163350| conserved protein of unknown function [Uncultured spirochete bib]
VWTVSATDEYIEWFCSLPGKAQEALLAKVLLLEEFQPQLGRPHADTLKGSRIKLNKELRA
RTHAQVLRVLYYFDEERQGLLLIGGDKKGRNEKDFYSRLIQMAEEIERYR*

>SPBIB_v1_260037|ID:27163351| conserved protein of unknown function [Uncultured spirochete bib]
MAIKNAIEAMEAVMTPEQVSRARAAAEREMLAIRLAELRERKGRIRQSDMKAFSQTISK
IERRKDMKLSTLIDYLEGIGMGLEIRVYPKNAKGSKSHKSQTILKV*

>SPBIB_v1_260038|ID:27163352|mtaD| 5-methylthioadenosine/S-adenosylhomocysteine deaminase [Uncultured
spirochete bib]

MALLIRHALVEGAESDILIQGERIARVVPEDSIPLDGSDEIEVIEARGMAAIPSLVNAHA
HSAMTLLRGIAEDMDLMPWLNEAIWPREARLTAEDVYWGTRLA AIE MIRAGTTLAADMYF
FPEAQAQAARDSGMRVFISFPLIDGLDEARGLAQQKACDEFFKRLPDCGPASIFALAGHS
VYATSASSWRYIARFAKEHGLFIHIHLAETETEDRECRKTGMSPTAYLDSLGLVLPNTF
AAHCLWLDARDWDLAQRGVTAVHNPVSNMKLASGPAFDYEAARRRGVRVLLGTDGAASN
NSLNLFSMDK MAGLLQKH HYKDPKRWPVREILAAASRN GHEFFGTGGGRIETDASADLVL
IDLARAEMTPCHDLASNLVYANAGAAVDTTICAGRVLMLHGVIEGEKEVREEAARRAQAL
K*

>SPBIB_v1_260039|ID:27163353|punA| Purine nucleoside phosphorylase 1 [Uncultured spirochete bib]
MHSFEEIQAAAALLRERLGEAPACALVLGSGLGGADELERPVALSYKEIAGFPLSTAPG
HAGRFVAGYVEGVKVLAMQGRFHCYEGWDASQIAFPVRVLRAYGVKVL LLTNAAGGVNTD
FRPGDFMLIRDHINLSGRNPLVGANDERIGPRFPDMSKAYDPALRELAKGAARDLEIGHL
EGVYAWFLGPSFETPAEIRMARTLGADAVGMSTVPEVIAAVHCGMRVLGISCITNLAAGI
LDQPISGDEVLEISAKKRPEFSALVKAIIRIGAEDAALAGMPRGAAWRS*

>SPBIB_v1_260040|ID:27163354| conserved exported protein of unknown function [Uncultured spirochete bib]
MHNMKIVPIGTTFFVVLVLLCAGCGRNPAGSGDLPQVNTNTAFDLQGFNICA WGKNWWSDA
ALVDKALKFALEEGANFLALDWPVNFNDGTMVAFEHSLHPHWNDMQR LIEKAKQMGFYI
MLKPHTTKAESAE NRNIWNTDTAIFLPGTFFSAYKGYLEELADFATQNNVDAICIGTEMN
HLDTGFRDQWSELVA AVRARFAGLV TYDAFFNRWCCSVPDIGEVC FWDLVDMIGVSLYVP
VTRNDDASVEEIRRGWFESIEPEFEISDVIA YLKGIAQDADKPLMALEGGYQSVSGGLYD
MTGPSTHKT VNYDLQSRGLDAYLRVLS ENKDSWFKGVSLWQLTPSMLSSNNLQTIWHTQE
FTVYQKPAAEIVKQHFFK*

>SPBIB_v1_260041|ID:27163355| protein of unknown function [Uncultured spirochete bib]
MNSLRWLPTEKKIYAKIFINAAGVYGDVISRKAGIDAYTITARKGEYILLEPNEKYNVHH
IIFPSPTKTSKGII VTKTITGYILLGPN AVDMPETEKSNNYTTREGLKEVLKKQKSLCQH
YRRNWRSRHLPDCVLSRIPMTLFWKTMLYQLTSLRLAQDFGVRNQLYNFTCYADLELGV
DLGASWQNQLIQWIKGKGLGTS DILYRHSGSWQV*

>SPBIB_v1_260042|ID:27163356| N-acetylglucosamine-6-phosphate deacetylase (fragment) [Uncultured spirochete
bib]

MRHLAAGGTTQHLATIVTRPHEHMVRNLKAIVRARQESALLRFAIHGAHLEGPWISLEDG
PRGAHDPRYIRKPDFEEFQKLQDAAQGLIKKAPRLRFSQRS*

>SPBIB_v1_260043|ID:27163357| protein of unknown function [Uncultured spirochete bib]
MSIRQILKSRMIVCTVPDARKQDAVYMALNAPRRWRNNTASCNNCHSPS*

>SPBIB_v1_260044|ID:27163358|glbB| Ferredoxin-dependent glutamate synthase 1 [Uncultured spirochete bib]
MQQRKKEMHNYRIGILGLSSGAPGPGASSIKRANIIKQQLLEPSRGAYSTLSPNPSGLYL
PEHEHDACGLGIVVDLKKKSSHSVISDAL TILQNLEHRGAVGGDKKTGDGAGILCQIPDR

FFRREMAINDDMPYGIGMFFLPASHNAFVSAKLVSNIAAERGFGLISWRDVPILPQVLGE
RANKTMPRISQAAFVQLNPPAIVESEDDARTRASLRSPSDDFERSLFILRKYIEQEAKRA
GFSFEFYIPSLSSRIIVYKGMFVASQFANFYDPLRDPLFESQFAIVHQRYSTNTLPSWP
LAQPFHMAIHNGEINTLRKNNSMKARQATMASPLLGAFFKDIADVLEAGSDSAIFDNI
FELLVHAGRSPEQVFAMMVQEPFGEGLRISHDKRAYYDFHAAMLETWDGPAAMSFTDGRV
VGAALDRNGLRPFYSLTKSGYFIGASEAGVLDLDES DIVERGILRPGEMVLVDLENGRL
INDAEIKTRISRQKPYRRWLETNRIELRGLFSAPDVRPSSAELAHLISYFQYDNETMNIL
KPMMLLQKQEA VSAMGTRKPPAILSRTVPVPL YAYFRQRFAQVTNPAIDPYRESAVMSLENY
IGTQKNLLEETPEHCKQLKLQRPILSNSDMEKLNKSRVPGFSSATVSMLTPAARIRLEEE
LDRMCREAEHHIDQGANLILSDRGLDEQHA AIPALLAAA VHTYL VDAKKRHLAGLVVE
TGEVRDVHEIAVLLAYGASGVNPMVMVFELLPSISDQLEERPSAEMMLADHYIEAVNKGILK
IMSKLGIATVSSYRGRSMFEAVGLSEGLVKRYFRGTESRFGGIGLKEIADDMLSRHRAAF
GSEQESAILPDRTGHQPVNEPRQAAGGAANQATDQAADQATDQVANQTVRQTAVPWPPSL
AAKLTAKAVREGDAAAWRAYADGMDSAARPPFALRDLFSFKSGSPLTSSSPLPLDQVQPAE
EIIKRFSVAAMSLGAI SPEAHETLAAGANAIGSWSNSGEGGEDSERHTYKDKGLDSQNAS
KQIASGRFGVTARYLATGLELQIKIAQGA KPGEGGQLPGAKVNEYIAKLRHSPKPGVTLIS
PPPHDIYSIEDLSQLIHDLCINPSARIAVKLAAQAGVGTVAAGVAKAGADCIIIVSSGD
GGTGAAPLSSLDYAGSYWEAALPEILQVLAMNSLDLNTVIQVDGRLRTARDVVI AAILGA
REFAFGTAALIAMGCIACGRCHLGKCPVGIATQEPEFRAKFKGRPEHLIAFFKFLAEDVR
KILASLGAKTIDEVIGKYELLD FSGRASTAREKMLDFDHIKEALEIARRYPLVEGQDLAS
DTTPAIPLEAGLRNFRPEKRQDFSIDAEAA LLQKCARLLQERASTSRLEFSLPIRNSD
RSVGAALSGEIRAGLKLEPDTVSVTFRGTAGQSFGAFLAQGVLFRLFGEANDYLGKGLS
GGRIIVRPRRESRCQPEHNVIAGNVCLYGATAGEVFLNGKVGERFCVRNSGALAVAEGTG
NHACEYMTEGIVVILGKTGINFGAGMTGGVAYVFDEDQLFDTRCNLSDVDIAAVTSAEDI
DQLRTIHERHQNLTGSPRAKMLSEWDSYLPFLKVVPR*

>SPBIB_v1_260045|ID:27163359| putative amidase [Uncultured spirochete bib]

MNRKRLSRRCGGLEPGIPDTCEEYTLRDFQREFGAGRLSSAQLVDY YLGRIAVLDCPGA
GSDCEGQALRSLLYLNPEARSIAEERDRERRAGIVRGPLHGIPVVLKANINTADQMPTTA
GSQALHGFLAPEDAPLVAKLREAGAVILGKANLSEWANFRSTHSSSGWSSEGGQTKNPYV
LERNPSGSSSGSAVAVSANLCA LSVGTETDGSII SPASINGIAGIKPTGGLVSAEGIPI
SFTQDTAGPMARTLEDAIVLLEAMSGRDYSGVLGGNLAARPLEGMRLGYAEKLSRFLPQV
EDIMKKSIAALENLGAEIVPVDIEPDEEVQKAEYQVLLYEFKYGIEQYLARYVAARADSA
STPWPRTLRDIIAFNTAHADTAMPHFAQEILIEAAGKGSLEEPEYKNALALCRAFEKEKG
ISAFTAKYRLDAIVAASNSPAWKTDHVLGDHYVGGNTSLAAIAAAPHITVPAGFVGELPI
GLSVFGVPHSEEVLFRIGLAFERAVKARKAPCYKGV*

>SPBIB_v1_260046|ID:27163360| Transcriptional regulator, RpiR family [Uncultured spirochete bib]

MILGKIKETLPRMSPNFRKIASFILDNDNNVAFTSIYSLSEALDISTATLVRFAKSLGYK
GYQSFKKDLQEEIQHRLQPYDKVSLSKLGTLP EEKRLQKLIQNEYNNLRSTLNNLQKDF
ETMIGAVQSARRIFAGFGITRHF AQILQTTFLASQKDV FVITGSVSDYSPQLKSFGAS
DIMFLMTFPPYSAEVKHVASVAKERGGFLCLFTDSASCPVYSKADVVIKCTTNSLLMSNS
FVGLVSVIHVFIHMLLLSSENGGKNIRNGLEMEKMGYSIIADAGEQSCS*

>SPBIB_v1_260047|ID:27163361|iadA| Isoaspartyl dipeptidase [Uncultured spirochete bib]

MLVIQNAEVFSPAPLGKLDILVGGAKILAMEPHIDPAVLPGETEVLDARGMMLVPGFIDG
HQHFTGGGGEGGFQTRVPELTISMNFSNGVTTAVGLLGTDSLTRSIENLYAKTQAFNAEG
MTAFMLTGAYWHPSPTLTG SVARDMVFLQP VIGVKLALADSRGPHIDAKDLAALASDVQV
AALVANKPGIITVHTGIRTQGLDLIFEIVEQFEIRASIFVPTHINRKGKGLTSQALALAE
KGCVV DATCSQAPLEPDSRLTAADFACMARDNLLGQVSFSSDAGGSMPIWNQDRSRII
GMGVGMPSLLFELDLLVNKKGVPLEQALMPLTTTPARIYGLENSKGALRVGMDADLLTI
DPASFEIRDVVALGSVA VRNKIVEKKGYFEHGS DTSIHA*

>SPBIB_v1_260048|ID:27163362|yliA| putative peptide transport fused subunits of ABC superfamily: ATP-binding components [Uncultured spirochete bib]

MAVTHPFMHEDEILT IKDLSL SFPGYHGYTQVLHNVSFSVKKGETLAIVGESGSGKVTM
RRVMQLLANVRTDSGRILLRKR DGTVLDITNISHKD ATKIRGADLSMIFQEPMTSLNPVF
TIGDQLLEAVLIHQ RISK AQAMQKVMELLE LVRIPDKARRVNDYPFQLSGGMRQRVMIAM

ALACNPQVLIADDEPTTALDVTIQAQILALIQLSLQEKLHISVVFITHDMGVVVAEIAADRVVV
MYQGQVVEENDVHSVFSSPSHPYTQALLKAVPKLGSMTGRPFATLPILEMSKELSRKPG
DAAPQEKTIDTADYTKPPLLQVRNLTHFIADKTFFGRTTHVVRAVQDVNFDLFEGETLG
VVGESGCGKSTTGYSILKLVPAQGKVLFMGSDILTLPDSELKHYRRDIQVFQDPYASLN
PRIRIGTAIEEPLVIHNIGTPEERKKRVEYLLDCVGIPRKHKDRYPHEFGGQRORIAIA
RALATQPKIIADEAVSSLDVSIQATVNLMLLELQKEFKLSYLFISHNMAVIERVSNRVM
VMYLGHVVESGTRMQVFENPMHPYTRKLLAIPVPDPTRRSNFGMLSGEIPSTIHRIEDA
TPRIEYIEVEPGHFVASTKEGISFGA*

>SPBIB_v1_260049|ID:27163363|dppA| DppA2 [Uncultured spirochete bib]
MKAKHLVLALMMVLIISAIPLFAAGKDIIYASDSTTKTLDPHDTSPTYSGAIERAICQGL
LGFDKNLNIPLLAESYTYNDSATEFTFKLRKGITFDGAPFNAQAVKVNIDRLMTGKYV
RSSLMAPVKEVKIIDDYTVKFILKEPFGAFLNALAHPGALMLSPKALQEYGGDDVSKHPVG
TGPFMFSEMVSYSYVLIKKNPNYWRGTVKVDSEKIFVPIPENGSRVAMLRAGQAQYIYMP
AELLKLVENDPNIDVIKQPSIERYLILNTKSKPLSDERVRQAINYALDKKAIINIAWGG
AATEADSIFPSALPFFKKQGPWPYDLAKAKALMKEAGYENGFKVVFLTPNASARLRATEM
VQQQLKAIGITGDIQSM DVASFYDKLAKNKLETVGETPFIAFGGWSSTGDADWATRPLI
STEAFFPNMSNYGFFEDKTVDNLIKAGLTTADPKVRANAYAQLQDYVWSKAPWGYLFDVT
LIAAKSKNIKGIYPMADGAFTVEEAEIVQ*

>SPBIB_v1_260050|ID:27163364|yliC| putative peptide transporter permease subunit: membrane component of ABC superfamily [Uncultured spirochete bib]
MLKYFIRRCLSILPULLVVSILVFLFVHLLPGD PARIMAGPDADEATINRVRTELGLDKS
LPEQYLN YMGR LFRGDLGKSLRSLKLPVAQEIALRFPPTLYLALASMVWSILFGVLF GAYA
AMHRGKWQDYTAMLVAVSGISMPQFWLGLLLMQLFAVHLGWLPVTGFTGKFKEILPLSLT
LGATVA AIIARFTLSSFLDVLQEEYINTARAKGLSERVVMWKHAFRNALIPVVTMVGLQF
GFLGGSVVVETVFAWPGLGRFMIESVSVRDYPVLQALLLLYSFQFVVINLLIDMLYAVI
NPEIRYK*

>SPBIB_v1_260051|ID:27163365|yliD| putative peptide transporter permease subunit: membrane component of ABC superfamily [Uncultured spirochete bib]
MAEKTITPFMIFWQKFKKQKSAMVAGIFIFLLILAAIFAPFIAPYDPYAIDYGNAMMPPS
PQHWAGTDIYGRDILSRIIYGARISLTVGISSVTIGAI VGVSLGLISGFFGGFLDEIIMR
SADVLFAFP GILLAI AVVAILG PGLVNVVA AVAIFS IPTFARIVRSNTLSL KESLYVRAA
RSMGASNK RIMFVHIMPGT LSGAIVYFTMRIGTSILTASSLSFLGLGAQPPTPEWGAMLA
ESRDYIGVADHLTIFPGIAIFLTVLAFNIFGDGLRAAFDPKLR*

>SPBIB_v1_260052|ID:27163366| exported protein of unknown function [Uncultured spirochete bib]
MKRILPIAAIFLLFALIPVIAQTEAELKATYENAVKLAAAAPQDYTLNWQAARAARKYGD
YLVKNEVPGWKDTARAAAKEGMKYGEIAFKLNPTGIEGWYWGGLCVGTYSDCVSVLKALA
EGLKGGKTQMGFENAYKFDKTYDNGGPILSLGRFWQVLPGIAGQDRKKAQELFNEYIQLFG
SSPDANS DVWYFRGQLYKDTNRAALAKADLEKAAAMGNKDAQKLLGEMK*

>SPBIB_v1_260053|ID:27163367| protein of unknown function [Uncultured spirochete bib]
MKKIELVP IESMSVDFQS YGVCVSVDNRPDYDSPEFKFWNKLGIIESQNKCSICMVESY
PQKQSLSTVFECHTRTGETLIPVENDVLLVLGLSKNSQHNEMDYDSVKAFLVRKGTAVIL
NPGTWHYAPIAQHEVVHTFVVFHDHATPDSVVIKIDSQDAGVGWEIAN*

>SPBIB_v1_260054|ID:27163368| putative 2-hydroxy-3-oxopropionate reductase [Uncultured spirochete bib]
MNIAVIGTGIMGTGIGLTLSSKGH TVHCYNRTRENAQELIAAGGKYFSSPAEAAKDAEYI
IIFVWNKEALYNVLNGESGLVMGARQGGQIYIDMSTQLPETAKEEVKMFKAKGADFIDAPV
HGSKAEARNGLWIMAGADSQVFAKALPLLKEIGETVHYMGPVVGSGCVAKLCGNHLVSAI
VASLGESLVM AKKSGINSEELLKLWSEVDFRSPIDGVGHSMINHEFDVSFHLRTMVKDT
ELIRNYESIGVPVLISNIVHELNVGQNMGWGEQNASAIVKVFEKFAGVE*

>SPBIB_v1_260055|ID:27163369| Dak phosphatase [Uncultured spirochete bib]
MEALLREHLEPLFFSIKESFERNKEFLIDLDSKTGDGDLGLTMSKAFSAAHESVKASNSS
NLGQILAMAGIAISRAAPSTMGTLMATGFMRRGGKAIENAQRIGTKEMADFWLAFSKGIAD
RGKATEGDKTILDVAAPVAKSFSASAEKNESLAVAMRYALDAAGKALEATKSMIAQHGKA
AVFREKTIGLQDAGGSALYILVKTMHDFVLA*

>SPBIB_v1_260056|ID:27163370|dhaK| PTS-dependent dihydroxyacetone kinase, dihydroxyacetone-binding subunit

DhaK [Uncultured spirochete bib]

MKKFINKPENFVDEMLKGIYASHPQQVMFVANDLRCYVRKEAVKGGKVGIVTGGGSGHLPL
FLGYVGEMLDGCavggvfQSPSSEQILEVTKAVEQAGVLYLYGNYTGDILNFDMAAEM
ADIEGIKTATVVGNDDDVASAIKGEENKRRGVAGIFFLYKAAGAAAEGMSLEEVKRVAEK
AKANVRTMGVAFTPCIVPEVGKPSFTIGDDEMEIGMGIHGEPGIRRGKLLPADKIVDEM
YPIIKDLPFEKNNEVAVLINGLGATPKEELYILARRTLHILEEEGLKVFHVYVGEFATSM
EMAGASISLCKLDEELKRLIAAPAFTPFSSQKQL*

>SPBIB_v1_260057|ID:27163371| Sugar ABC transporter, membrane spanning protein (Sugar) [Uncultured spirochete bib]

MDGKLLSGKRRYMAADRSLQLLLIAIVVFIIMALLNPGKFLTLLNIESMAYQFPELGII
SLGMMIAMLSGGIDLSIVSIANMASILMGLILTKMMPQNAANNQIVLFVAFALLISLLTG
LISGLINGFLIAHVGIPIALATLGTSQILTGIAIVITKGYAVPGFPEIFLKIGNSKLFIF
PIPFLVFLACAIVLFFLLQKSSFGIRLYLIGTNIKASVFSGIKVKSIKMSYALTGVLAS
IAGIVMTARTNSAKADYGSSYVLQAVLVAVLGGVNPAGGFGSVIGLSIAVLSLQFLSSGF
NMLRFSNFATEFTWGMFLLIMGINYFQNKRIKSSK*

>SPBIB_v1_260058|ID:27163372| putative ABC transporter permease protein [Uncultured spirochete bib]

MKKLLQQHEFVVTVFFLVVILIGAINPAFFSIGNIFSLKSMIIRGILALGVLIVIIISG
NVDISFTAISAFAMYTTSKIMLALFPEGGLLLAFAIGGLIGLLLSINASFVAGMKLPAL
IVSLGTSSAIRGFMLAFIVKIIINLPASLIAYSRSYIAKFTDASGKIVTLPSAIIMLIA
VTIIVWFILRYTMLGRGVYALGGDPVSTERAGFNIKAIQYFIYCFMGFLSGIAGVLHSVF
MRNANPFDIVGTELIVIASVVLGGASITGGKGTVYGTLLGVAFTVLIENSLIIIGVPSYW
QKVVIIGLIIVVSTAASALREKFAKLEIS*

>SPBIB_v1_260059|ID:27163373| putative ribose/galactose/methyl galactoside import ATP-binding protein [Uncultured spirochete bib]

MEQVFLAVENIDKSFAGVHALNDVSLKIKKGEIHCLAGENGSGKSTLIKVIAGVEKPD
QIIIDNKKYHHLHPIDAIHEGIQVIYQDFSLFPNLTVAENLALNSQLEMRRKLVSWKQVK
ETAEKALQLINVDLNLVENLPVADKQLVAISRALMQDAKL VIMDEPTTALTQKEVER
LFKIIKSMQEKISTLFFVSHKLREVLDISERLTILRNGQKVIEGNVEEFDETKITYYMTG
RNVSSNKFISEKSGDEKPIVSVTNLSSDGFDDINFDLYKGEVLGITGLLGSGRTELAL
ALFGYSPADKGEIHINGQKIHKSIQDAMRNGIAYVPEDRLNEGLFMKQSI SRNIYV
DSIKKALGLINVSEADSIASLIKDLNINADDPLRPVQTLSSGNQQRVVLARWLSTKAKL
IILNGPTVGVDIGSKTDILEKLELAKEGLGIMIISDDIPELVQTC SRILVMHKGKIIRT
LEGDEIEEK AISNILNLD*

>SPBIB_v1_260060|ID:27163374| ABC sugar transporter, periplasmic ligand binding protein [Uncultured spirochete bib]

MKRRILLGMLLAMMVVGLVSAQTATTASKKFTIATVVKVDGIAWFDRMREGVVKFGKDTG
NTTFLLGPAKADAAEQVKIIEGLIAQKVDAICVVPFSPEALEPVLLKARDAGIIVISHEA
TNQQNIDYDIEAFVNEEYGAHMMDNLA KFMNYEGEYANFVGSLSKSHNQWMDGAEARQK
EKYPKMKLVSRNNEYDDQNIAYQKTKELLTKYPNLKGILGSASTTAPGAGLAVEEAGLQ
NKVSVVGTSLVSSSGQYLKSGAVKMIFFWDPADAGYVMNKMAL TLLTGKIDG MNLGVK
GYEKIKRDPQNPKV FYGQAWVDVTPANMNQYNF*

>SPBIB_v1_260061|ID:27163375| Regulatory protein LacI [Uncultured spirochete bib]

MAGTLQDIADAAGVSIATVSLVLNGKEGISAETRQKVMQAAEALNYRPKKHQSLMSANSR
NTIQFLKIAMHGHTVNRDHNVFISDYIDGMFREAQRQGYKLEIANIKGESIDYIIDLIS
RKPEGAILLGTFSQNDVIALKSIDFCPIVLDYFDYLDLNFVDMNNSDAVYKII EYL
SCGFRKIGFINSNVQTRNFYLRKQAFIGSMQVLGQKVDENYIVDVDSTFN GAYKDMMVHL
SRGIKLPECYFCANDIMSYGCIKAFKENGIRIPEDLSIVGFDNLPMSASMDPPLTTIDVS
KQKMGHFAVTLLELIQSPERKNSVKILVGSDLIRKSVAPKI*

>SPBIB_v1_260062|ID:27163376| Xylose isomerase [Uncultured spirochete bib]

MPRYSVILGNLGNLTCDRFLSTGYKNQPSKEIMIRQASEIEGVEGIELVGSWDIDEHNADQ
IGDLLGKYNLSCVSIIPDLFSQKKWGTGSIASKDPDIRAQAMDYLF SICEISRKIGCSLI
NIWPGQDGYDYCLQANYLAERQIIENIKKLAFYFPLRFSLEYK LKEPRTHSFLARASD
TLLVAMATELPNVGV TIDTGHALFAYENMAESA VMLDMSGK KLFHLHFNDNYRYWDDDMI
VGSVHLVEYVELLYWLKKIDYNGWYSMDQYPYREDGKHAIEESVKFIQAIERKLTPSAMK

EIDNLLAEGKAVESQKWREFIFS*

>SPBIB_v1_260063|ID:27163377| D-tagatose 3-epimerase [Uncultured spirochete bib]
MRKIGIYYAFWTREWDVDFPFIQKVKSLGFDQLEINGGTFAEMSAAEQKRLVDEAKRCG
IVLSYGIGLTANHDVSSLDESVRQSGVRFMQQMIEAVGEAGGGMIGGTVHSAWPSTLPEG
TTNKRPLYEQSKKSMRELKVAEDNGVILNVEVINRFEQYLLNTCEEALAYVEDIQSPAC
RILLDTFHMNIEEDSIGGAIRKAGRHLAALHLGETNRKPPGLGRMPWKEIREPLDSIHFD
GPLVMEPFITKGGQVGRDIAIWRDLIPNPDYDRLARDAAAFVVRKTLCE*

>SPBIB_v1_260064|ID:27163378| putative Carbohydrate kinase, FGGY [Uncultured spirochete bib]
MSQTCAPLHIGIDLGTGSLKLSAYAGERAFSASCGYDIFSPEPGIAETDPEAWIAALKTA
WLAVCAQLQNAGLPIELASIGLSAQMHGFVPISETGAALHNAILWADLRGAAYAGLYSSL
LAGSFDRLMNAPAAGLTALILLWMKHHEPELYAKTHYILFPKDYLRFRLTGDIATDPGDA
SASLLYDFRTCWAEDAIEALGMDHSLKPVIRDSFSPGGVVTGKASRETGLPEGVLVATG
SADKACEIYGSFFGEYFRELALAGSPDMGIMSRQAPARGKFLNSAPLRGTGMNSALSRE
DMHSAPFRGHDSWQSPKAAQVSIGTGIQVVIPVRGLAPYEPGLNFFESCVPVRYRMAA
MLNGGLALEWVLSMLNADWESLYRAMDEGKTRLPQDLLFLPYLTGERSPYQNPARGAWI
GLGLHHTRNDLLSAALLGVACTIRLGMESLGVAPDASVYCVGGSTRFKTWMNIVSEVTGR
ALFVTDQPDASVRGAAAIGRAAAETGAFDARRLPAPLETTRIEAESPAWIEHYYSRKFSS
YEALFGGHE*

>SPBIB_v1_260065|ID:27163379| NAD-dependent epimerase/dehydratase [Uncultured spirochete bib]
MKVLFIGGTGNISSACTDEALGRGYEVFHLNRGTHPEREKPGVRTLKADIRDTQAVKAAL
RGLRFDVSVQFLAFRPEHVKADIEIFDGITDQYVLISTCSAYRKPSLTPVITEDTPLENP
FWEYSRLKIACEWVLAGSGAASHTGNGEETARTEEKVRIIKEKARDEDVAFSEAEQRSFP
YTIVRPSHTYDNGWIPGCFGSASYGLAWRMLNGLEVVPVPGDGQSLWTLTHASDFAVGLVG
LLGKREALGQAFHITSDEHLTWDIAHSIIGEALGVQPKIVHIPSDFIAKVLPERGAGLLG
DKAVSVLFDNSKIRRFVPEFAPRISFTEGIHRSLAWFDAHPDLKVPDKAMNADMDAILER
WQLCAQ*

>SPBIB_v1_260066|ID:27163380| putative dual use protein Tyr:Ser/Thr phosphatase [Uncultured spirochete bib]
MIFSELKIPGSSGIIGMASCPGRWTQLAAKSSMKAAALLGPQLAAQAAPSIAPQPAPPDE
QTHDYLVRDLAIIAWGAEILVSLIEPSEYVLAGVERLPELVPIGIRHIELPIADFSVPD
NRWENAWEREGALVRSALRRGGKVCIHCMGGYGRGTGMVAARLLIEFGVEPEEAIARVRS
RPGAIEMPQQEAWVLKLRQA*

>SPBIB_v1_260067|ID:27163381| exported protein of unknown function [Uncultured spirochete bib]
MRQKAIRSLFLAVVCLLAVSPVLAQKVQGEAGIGFMAISPNTDTIANFAVGDMLYGV
VSYAVKPWLGVSTDVLYLGDSYYGPGSGMFNEGPSSWAGLQASGDKANWKYYESFIYAP
LSINLMAPLGIVRPYLGLGPAFYFHFSTNQDTAFTDYLKTHYGSAVVGRIGQGFTARV
GFDVFLGDSLSIGAGYVVREDTPVTVFKDIGDLNFYKEKGYLFLVGRFYIK*

>SPBIB_v1_260068|ID:27163382| protein of unknown function [Uncultured spirochete bib]
MTENQFKESAAGWQNEFSASITIIASDFTILYMNDKSAAVNAKWGGKALIGKDVRACQQG
RNERRVH*

>SPBIB_v1_260069|ID:27163383| TRAP transporter, 4TM/12TM fusion protein [Uncultured spirochete bib]
MRKLDGKVKIAIYVYIIAVGVFHL YTSIFGNFEAYLQRALHLSMVLPLVFLYPISSKLLK
DSAVPFYDWWLAGLSFLPGAYIAANYWAISTRIVQVDPITTTQLVLGILLVLLLEATTR
IVGMPLTIIALVFLLYMGVAAKIPGLFQGISFSVPEIVEEVFLTDEGIFSSPLGVSATYV
MIFLIFGGFLEKSGVGDFFMRFAQAFTGTQPGPALIAVTSSCLFGSISGSAVANVYGTG
TFTIPLMKKIGYPSFFAGAVEAVASTGGQLMPPVMGAGAFMASFLGLPYRTVMIAAIP
ALMYYGAVFLMVRLSAHKYGLKGLSAEELPKKKDVLKDSYMPIPLVGLVYFLLAGATPMR
AAVFGIVLAWLVSFFKPKSQNAKRRLSIIIGAVISVLITVAFVFRFVEPIIKGNIGLW
ILVAGFVAATFLNDGMKPKDVLDAIYSGTSGIPLVAIACATAGIVLGSVALTGIGGKLVG
FVLSFAKDYRFLGLLLIMASILLGMGLPTTGAYILASALGAPILVKMGIPPLSAHMFVF
YFAVISNITPPVALAAFAAASISGANPNKIGFQAMRLGFLAFVVPFAFCYDQGLLLQASP
IANVLAVATGIISVLAFGYFWVGYIKHPIPLWMRAILLVAGVMALAPQVLYVAISAGLVI
VCYILSASGKVVAHVHQAQAAVLKE*

>SPBIB_v1_260070|ID:27163384| TRAP transporter solute receptor, TAXI family [Uncultured spirochete bib]
MRRVMILLLVFVILVGASAQSKAGWPDQLKFMSGPPGGNWFALGTALSEMWSKNVIQTTS

SSGGVSNILNVDAKKADFGFTVASLLGAAIAGEEDFEGKAVKNAVIMANLYTQYTYFIM
RKDFAEKNGIKSVDDMIKADIPVRFATLKPGTASEFVIKALFKKGYGTDYDKLKKKKWTF
EFTSYDGGADLLADNHLDCFAFSVGKVASVVMNIESNTPVVILPVGQKALDALAAAYGTT
TFTVMPGVYKSVTTPIKTVGDYTCIVIRKDFPDNLVYELNKSMTWANRDNLAMAVKDISEL
NPKEALPEGLPAHPGSVQFWKSAK*

>SPBIB_v1_260071|ID:27163385| Transcriptional regulator, IclR family [Uncultured spirochete bib]
MAEVNSVKKALAILDLLSDRNSRSLSEISKALALPKSTVHSLLETTLARVLERDVESGS
YSLGIRLIELGYCAQTGLDLVRIAAPFLKGLNVRFDETVHLLTVLDNDEVLYIDCIESQRR
LRTYSVIGVRAPLHCTSVGKAILAFLDDGEIRRIIAERGLPGFTENTITTEARLWEEIAH
IRDQGYAIDREHEDHLRCIGAPIFNARGEVFASMSLSGPAERNTLERLESMVSALLEAT
GEISHRLGFRNREFSRARGENHITPANSY*

>SPBIB_v1_260072|ID:27163386| DctP family TRAP transporter solute receptor [Uncultured spirochete bib]
MKKAVFAVVALLMLASPAIFAQQKPVKLVFTSVSVPGDAHTQAMFVFKDEVEKLSGGQIQ
VDVYHSGQLFTQQAEQDAIRKGTVDMVYTSAQWLAEFIPYLSMFGAAYTFQSVDQMTKTF
NGPIGKKIFEEVAQKTGIRPLVAYYLGTRQLNLTAKVGPITRPEQMKGVKLRVPNSPTWI
AMGKALGANPTPMFNEVYMGLKTGAIEGQDNPLPTDKNAKFYEVTKYIVLTNHVVDSTW
PSINEKKWQSLTKEQQGWLMQAAEKARQFCDKTNLDNEKNILDFFRQQGLTVIENPDRAA
FAAYAKNSYLTESKDISKDWDLNLYEEIQKLG*

>SPBIB_v1_260073|ID:27163387| conserved membrane protein of unknown function [Uncultured spirochete bib]
MPFWLKKTKGFLVDCIELYLPMLTFTVLFVFSFMSQIVARYLKFPLIWPEELSLICFIWTA
LLGGLYAKRTGSHVAFTMLYDAAKPLQKAMRIAGNALLTSLILIFIPSWNYIQFMAYK
KSDALRIPMNWAYFPFIVFLADMIVRLVIDIVKDIAGKASGGGK*

>SPBIB_v1_260074|ID:27163388| TRAP transporter, DctM subunit [Uncultured spirochete bib]
MNLALIVFFVSFTLIFLLRIPIAPGMMMASAFYFALSKNPAASLDMVAMQFLTNMNASFI
LIAVPLFVFMAEIMNSGKVTNMIFSANALVGKRKGALGHVNVVASIIFSGMTGSALADA
SGLGSMEIKAMREQNYDDGYTCAITAASATIGPIPPSIPMVFYSMLSGASIGYLFLGGV
LPGLLIGVGLMIYTAIARARNYPEGQSLKPLEFWKLTLSIPALFSVVLLGGIYTGV
TPTEAGALAAFYALLVSVFLYRAFGWKDFKQVLVNTVVRTTGTLSSLVGSAYAFSYIVTIE
KIPNFVASLMLGLTTNKYVMLLIINVFLALGMFIDTMAITLVFIPIVLPIINQLGIDL
HFGVVIVLNMIGLSTPPYGMMLLYVVSIGSGTPLKTIKEIIPMIFVIVVVLFLITYIPD
IVLLIPRLSGYR*

>SPBIB_v1_260075|ID:27163389| Dihydrodipicolinate synthase [Uncultured spirochete bib]
MNKTIPDGVWPTMITPYHEDGRIDWDALEKLVEWHIERRVAGLFAVCQSSEMFHLSLRER
LELARMSIKFAAGRVPVLVSGHVADSLDDQIEEAKMMADTGADAFILVTNRLAKRHESDD
VFKRNLELFLDRFDRDILLGFYECPAPYKRLISPPELMRFVVGTRFRGFLKDTSCRMGDIK
AKLEAARGSGFKLFNANAATLLASLRAGASGYSGIMTHFHSDLVWLCRNWASRPQEAEE
LQDFLGLASVIEYQLYPVNAMYALQLEGLPITLYSRRADARQFTESMRLEVEQMMRLSHK
FSERIRSLD*

>SPBIB_v1_260076|ID:27163390| Class I peptide chain release factor [Uncultured spirochete bib]
MNKELLAASILDNAVIDFARSSGPGGQNVNKNVNTKVIARVPLCTLAGLDDKEMELVRTRL
AGRINAKDEIVSVQEERSQVQNRERALNKLIALIVAAARRMPPRIPTKPTRASKERKLT
TKRRRAAIKGYRQKPLE*

>SPBIB_v1_260077|ID:27163391| exported protein of unknown function [Uncultured spirochete bib]
MKKKSGLKALALIVALAVIALASCDINAPAGTVVDLNSSEKSLASADASGLSKGKPKTP
VVEKIVGTAIAPDCFFFEFDMVGQKQKAFARALVPVSPDGYIKNGKLLYNTKRYKIASFVY
DQASGYLQGTTAQEGGVSYAFAGLYSQDSGFFGTISKFEQGVKESGYFIGSPMLGGKNIA
NYIGVATYLFPTPTPQTLVFNTILDFDAGTAVGTWSESGEGWNYSLHGPIAGTVEGDSVN
FNASVLPFRPYMLYDMTAVGSGTFKNGKKTVSGDFTIYYGDLVLPSSLTATKEMP*

>SPBIB_v1_260078|ID:27163392| NYC1 chlorophyll b reductase [Uncultured spirochete bib]
MNIQDSKSLVVIITGGTRGIGRGLAKCFLER GASVVISGRIGEVVRRAVEELKAEVAGPG
SALKSAEAVPVAGTECDVREFAQVQALWDYAISSFGRVDIWINNAGIGQPQSDIDELKPD
LIRDIFGTNCTGALYGCKVAMTGMRAQGDGAIYNLEGLSGNSIVRGMAAYGASKRALAY
ITDSMAKEAEGSGVIVGALRPGMVVTDLIIGEYAGKPEEWKKVRRIFNILSDRVETVAPW
LVDQMLQNRRNGRRIWLTGLKTMGRFLSAPFVKRSVYPEME*

>SPBIB_v1_260079|ID:27163393| conserved protein of unknown function [Uncultured spirochete bib]
MENQKTRIAIAYDFDGTLAGSLPEHGLLQDLGIESASFWNEVKERAETQDADEILAYMC
LLEKAKERGIEITESRLGSYAANIPFFEGVVEWFGRINKYAAELGVGIDHFVISSGLRE
IIAASAIAPCFKFVFAKYLYDERGMASYPAVSINYTTKTQYLFRINKGIFNFFDNKRIN
TWIRLDRRPYPFKRMIIYIGDGDTPAMKMTRYQGGYSIAVFDPLKWDDLSQQAKIYKLI
AEDRVQYVAPAVYSEGSLLDIAVKGIIGKIANEP*

>SPBIB_v1_260080|ID:27163394| RecG-like helicase [Uncultured spirochete bib]
MTVYKGLARDFKDDVARNVIDEKIANCFLRQFGYYPGSSERNNSWTYSLRFMDTIIRIGSI
PDDCGVLIEFNIPNTNKRIDFLITGKDENGGSNFVVELKQWQEARATPYKDVVITFVGH
GERTVAHPSYQAYSNTFLVDMNTSIQQNRIGGHACAYLHNYQPKRNEPLLEQHMETVL
KAPIFFKHVDVRKLQDYIASKVGRGNGTEVLKHIENGEVVRPSKELIDCVVGLLKGNDEFIL
LDDQKVAFEAIMSICSSRDKTVMVMVKGPGTGKSVIALNVFGKLLQGKKNVRFVAPNAA
FRNVMLETLVKNDRQRVRVKNLFMGSASLWECRDNEFNVLVDEAHRLKNEMAYGYKGD
NQIEDIISSRIVIFFVDDRQRIRPEDIGSSDEIARIAKKYNADLHEFSLDAQFRCAGAK
DFIAWVEKALQIDSSARTTAWDRESDFRIYSTPNKLFKAVKEKNDEGFKARLVAGYAWD
WTSLSENNDRAQILDVSMPEYDFAMPWNQRTKSELWAILPNGLEQIGCVHTIQGLEFDYI
GVIIGNDLRYNRATGKVEAVWNEYKDKAGKKGLKNDPVTFNALVKNIYRILLSRGMRCGY
VFCRDKNLRDYLQGLYDSKLEYADYFVEENNSALWAAEGGHGKPEDKNSYSI*

>SPBIB_v1_260081|ID:27163395| conserved protein of unknown function [Uncultured spirochete bib]
MEKKPIIVVDGLGGGIGSQLCTRVRQAFGHDEILALGTNASATEQMIKAGADRASGE
NAIRVSINLGQIILGPIGIVLPDAMMGEITPRIARAVMHASSKKILLPVNQPFFILAGLP
PSSLSRCIEEAVALVASELGLAVH*

>SPBIB_v1_260082|ID:27163396| putative cation ABC transporter, periplasmic binding protein [Uncultured spirochete bib]

MGIGSSHSKRSLVWMFLALLCLSALPLAAQDKPVIASSTSWVQAYAIAGAKNIVTIAPFE
LQHPPEYEIKPSDLLAVQHASLIVYSGYEKFAKKLAETAQNSNLRLAVYTDNVPSTIIA
ESKKIAEALGTTQAQEQWAKSFTAFSDAMRERVAALPDKRVVVQAYMKTFFALWGLDQV
GTFGPGEPSPAVVLDLIKKKPMVLDNYHNPGGKALAESLGVPHVLLINFPGKDGTRTIE
DVFLYNEKAILSQIGK*

>SPBIB_v1_260083|ID:27163397| putative Zinc import ATP-binding protein ZnuC [Uncultured spirochete bib]
MLDDTSMPGDMPTPGDMRPNPPLLSAKNLSIGYKRSEPVVRNICIDLTARTQRRTVIGF
VGPNGAGKTTLLKTCLGLLPPLDGELRLLGVDTRTAAFAQTRKKLAYIPQNRPEGNSGQL
RISVREAVSFGRLGKLGLTGRFRGLDREAVEAAIAYCGLEDIADKAVQDLSSGGQFQRVSI
ARAMAAEPALYLFDEPGSYLDEEGQKAMRTLHHSIAKSGVPLILVTHDRRLVKLCDAVIV
FRKGTALLNTSAFLAETRGREI*

>SPBIB_v1_260084|ID:27163398| putative ABC-3 [Uncultured spirochete bib]
MMELLHIPAFSRAIALFASGLAFPLLGIYIFSLELIPARFGVMHLSLLGATVGLILGVD
PVLFAMLFSAAGFAISGLSVRRSGGTSGGAMALLMTASLGIVFILFYKTNIHAIEAFNL
FWGNVLAALDKTEVLLVVIVSALILAGTARFLRPISAVLFDRETAFAFGFPSTVVYTAILV
VVCAGIGLGMRTGALMVDAVTLLPALAAQSLKKNFKPTMLLASLFGVCINLAGFALAVI
FDLPTSPAIIVGTVCVLAACRLAARRNLKKGSDPVS*

>SPBIB_v1_260085|ID:27163399| Na/Pi-cotransporter II-related protein [Uncultured spirochete bib]
VTSWFQIVLQLAGSLAIFMYGMTLLSDGLQRAAGERLQRILQFITANRVVAVLTGCLITI
IIQSSAATVMTVALANSGLLSLKQSIGVIIIGANIGTTITAWIIAVVGIKFNVLAAAIP
LVGIGYLLTLMKRSEKLDAGIALGLGFLGLEYIATAVPKPSPELLAFLGRFSPET
QPLSLILCVAAGAVLTMIIHSSAATAMIPLAVKGILSFEIAAALTIGANIGTTIDAFL
ASLKGEATAKRAAWAHILFNVIGAVWAVIVFRPFLGLVRLVSGYGNGAGAIGIAIASLHT
LFNGINTLLFLPFINQYEALLKKLVREREGGEHRMVYIAPSLHPAPELSQLQARAEIRAM
AGRCRGMFDASLDLVSNEKKDMRGRLEWFQREEQYLLDDMREALVGFLKQVQADMPESL
RARVLGKMQIVAELESASDECFSIAELMVKKSRRDLKFDEEAALSLKPYGEAVKQFFDFI
TSNLDRLDATEFGKAGEIENQIDSFKKELKKMARKRLNAGADARTELLYIDLVRHFEDI
GDCLYAVAGELERI*

>SPBIB_v1_260086|ID:27163400| conserved protein of unknown function [Uncultured spirochete bib]
MSFRWNEEKNAALLKQERHMSFERIVVAIEEGHLIGVLEHPNKEKYADQMILVVEIDEYAF

CVPCVKEKNGDYFLKTLYPSRKYTRFFKLGGKL*

>SPBIB_v1_260087|ID:27163401| conserved protein of unknown function [Uncultured spirochete bib]
MTIDEDRELIQSVENGEWQPVKDFDSVREKLVKAAKETALKDYRMNIRISKRDVELLKAK
ALEEGLPYQTFVTSILHKFITGKLKEGV*

>SPBIB_v1_260088|ID:27163402| membrane protein of unknown function [Uncultured spirochete bib]
MEAKQKTHAKASVVVARKPRTRASAAGGSAAGGRSNGGRTKPSVFKSARGIVAIAFIVLG
ASALLSMLIWTRYPSVWKPIVVPKMLIGIFSWAAYYLPVWLFWAAALAFVPKFCPRITY
LLGISALPFVVVTA FARLSSNPGQFFESHPSMAKVG LSSLYAALGFLFAASLVIVVAGYI
KLT EWLKTNGYIKTRAERAQAGKGQSFGEKLATFVKNISMRRREERRKRKEEARLARA EML
AQQNISLHIPEVPAPDPLKSGGQTPNFNFSGPAPGAAAAQANPSPAATAALDAAGISFTS
VPPARPAQPGDEPKKAIVERILERKAAKTYHVPIDGLLNTYPDGQYWIIDDKTRASAGVL
KETLA EFGIEAEVTGIRKGPVITMFEILPAHG VKISKITNLSDNIALRLAASSVRIVAPI
PGKHAVGIEVPNERRAIVSLRELIESDHFRQTKMEIPVALGKDIAGEVQLVDLTQMPHLL
IAGATGSGKSVCVNSIILSILYKRTPEEVKLMLIDPKIVELKLYNDIPHLMTPVVTEAKK
AFQALQYICEMERRY SMLDSLGVDRDIRSYNRRVRERNLAQEKL PYIVVIIDEFADLMQT
TGKELESTLARLAAMSRAVGIHLVLATQRPSIDVITGLIKANIPSRIA FMVASKFDSRTI
IDMVGA EKLLGRGDMLFSGAQDPFPV RMQGA FVSEEVERVVAHVKT LGEPEYIDDEIFI
DEEDLEEPTLFDEEGSDPLFEKALEIVLQQGKASVSFIQRRLKIGFNRAARLVEMMEEKG
IVGPAQGSKPRDVLRNPEVFDSPEGGGEGRS GHGGLHSGPEEEEEG*

>SPBIB_v1_260089|ID:27163403|slyD| FKBP-type peptidyl-prolyl cis-trans isomerase SlyD [Uncultured spirochete bib]

MEIKKDRVVTIDYTLRDDTGRLIDSSAGSEPLVYLHGNENIIPGLEKELEGKNPGEAIEC
SIKPGDAYGDRDEALVFKVQKKDFGENVEVAPGMQFEAHGENGVQIVTVVKVDGEEVTL D
ANHPLAGETLHFDVKVVDVREATPEELEHGHVHTGHDHEEFEENEEDFEVEDSSES*

>SPBIB_v1_260090|ID:27163404| conserved protein of unknown function [Uncultured spirochete bib]
VPRASIFMKFYSKVRVRLDLVIFGVAAALVVGTSLLVLNRQSGTRYVQMTGETGEWIAP
LNKDAEYQIPGLGITYVHIHDGTA AVVDS PCKNKLCILAGAISEPNQWVACL PNKVFVR
ITSSGTNDSSGGVDAGAF*

>SPBIB_v1_260091|ID:27163405| putative heptaprenyl diphosphate synthase component I [Uncultured spirochete bib]

MPAPSSPSCGNVRSRFSNRADVTALLAAFCFFLSAIEYMLPKPLPFMRLGIANLPILLAV
DMLPFNWFLVLA AAKVVGMSIVSGTLFSYVALFSLAGTMVAALVMRGVRRRTGGHAVSLVG
VSVAGAVTSNAMQMLIARYVIFGEVAWLIAPLFLVTGLITGTLMGFFAEFFVEHSGWYSC
AMGESDDLAFGFEEDEEGSGESGASGDSAAAESKDSASARVQ GASGNAADFSSQNEKKLK
PDRGARKSQRNERRFERRHRYEDMFEPWVGALLGAGIAIFFLLQRDIVAKVLYLAVFILW
TWFAGKRFLISTLVVSAGIVAANLLIPSGRVLAKIGPLAITQFALTEGLSKALTFEGLI
YLSKAAIMPGLRFPGRFGSIIAQAFQYDRIIEYRGKVHAKTVISDIDRLLQVVWTSARI
SGEAEASAASKGAQAGPAHRSRVHRSLLAAGIAAAVVIIIPFAAKLIAS*

>SPBIB_v1_260092|ID:27163406|leuS| Leucine--tRNA ligase [Uncultured spirochete bib]

MAKYPFKEIEQKWQQRWEEDQTFRAVEDEHY PKEKRRYVLDMFPYPSGAGLHVGHPEGYT
ATDIYCRYLRMNGYNVLHPMGFADFGLPAENYAIQTGTHPAVTTYTNINRFRTQIKSLGF
SYDWSREVTTC DPEYYKWTQWIFLQLFKKGLAYEAEMPINWCP SCKTGLANEEVKDGHCD
RCGTKVVRKRIRQWVLKITAYADRLLEDLDKLDWPEPIKLMQRNWIGKSEGATVIFKIDG
HDATLEIYTTRPDTLFGATYMLAPEHPLVPSITTPDRLAAVNAYIDEAAAKSDLERTDL
AKDKTGVFTGAYAINPVNGARIPIWISDYVLISYGTGAIMAVPAHDSRDWDFAKKFNLP
IQVVAKPGETGPFDRPAECFEGEGIAVNSSEFNGLPTAEFKQRITAWLEERGIGKKAIN
YKLRDWLFSRQRYWGEPIPVVHCEHCGIVPLPEESLPLTLPEVKS YAPTGTGESPLATIE
EWWQTTCPKCGPARRETNTMPQWAGSCWYYLRYLDPHNPKAFADR SKIDYWMPVNLVYG
GAEHAVLHLLYSRFWHKVL YDLGLANTDEPFMRLVNQGMILGEDNQKMSKSRGNVINPDD
IVANYGADTMRVYEMFMGPLEVSKPWSTAGLVGVS RFLERI WALSERAIIDALMSPELEK
LLHKTIKKVTNDTATLNFNTAISQMMIYSNELAKLESIPRAAWEPFVLLIAPYAPHLGEE
LWAKLGHTESVSKAAWPTYNEALTHDEEKEIVVQINGKVR SKFTAPAGTAREQLVEMARQ
AEKISDWLAGKEIIKAI AVQDKLVNFVIK*

>SPBIB_v1_260093|ID:27163407| protein of unknown function [Uncultured spirochete bib]

LLWILLKWP MHGKYSVMNLAYEFVKASLYASIRRGGFHASFSFLPKPGLCVSPARTERT

LVRXX
>SPBIB_v1_270001|ID:27163408| conserved exported protein of unknown function [Uncultured spirochete bib]
MMKERQTMWRVGLVVSILAASLVLAEVFSKQVEHPAFSRMQGAADRMTRAEAAIAARRVA
LGAIDPNLDPYRTGLIGAESSFLTTTVGDIVAKRTTTTTAFAALVVRVYFYELGLRPGDR
IAVGSSGSFPGILLAVLSACAETGVEPVIITSIGASEYGANIEGLSNAEMVAACRDAGIW
PFMPAAISPGSDADQGISSLYRLEPSDELARYAHDIAARLQVPFIKGNLEESIALHLRT
YQQAGPIKAFVNIGGADVNFVGGDTSCLKLKPGLILPSVGRQSKLGGLVGYYSRGPVVIH
LLNIKGLALQSGIPIDSNPFAPLPADVITYSRKKLEWLLILGLVLASAALA*

>SPBIB_v1_270002|ID:27163409| CapC protein [Uncultured spirochete bib]
MAGTSIIISIVLGFVFSELTGWLTGGLVVPGYLALYVDQPLRIVMTYAAAALAFVAVKLL
ARVTILFGRRRFMAFILAGICAGALLDMMTGMLPPSGSDLRAIGYVVPGLIANDTWKQGP
AKTLLASLAVTLATRAVLLLIAH*

>SPBIB_v1_270003|ID:27163410| putative Capsule biosynthesis protein CapB [Uncultured spirochete bib]
LIQAIAAAAFAFGLAVAGIIRRAVEHDLSCVLHRILVNGTRGKSTVTRLIAAGLRAGGI
TTIAKTTGSAARLVLPDGSEQPIHRKQGATIMEHAWFAHMAQKARAQAMVAECMAIRPDT
LSVVENALSQSTIGIITNVRLDHEDTMGQNLASIAGCLSLTIPRNGKLFVGPKEPELLA
IIRKRATERGAALLETVAPGPEIEGYCARFAYPMFAENLALALACAACGVPREIALQGML
DAAPDPGVWPTLDLEWKGKTFRIINGFAANDAESTLALWHAESHFDVAAHQIDVKVLVY
NHREDRPWRLDQVLSLVRPIGADLVCVIGAPRALTKRRIAKSGLALPFLVLDSDAPEYLF
AQIESHVPQAAPQATAHVPPQATAHVPAQAAQKAARIGILLTGNIKGAGMALTEGFSAMA
ARAAAGASAARAAKEAKAEKQAARRERT*

>SPBIB_v1_270004|ID:27163411| protein of unknown function [Uncultured spirochete bib]
MQTKGLVNMPNNIVPVISPDDVLDSFLALGKCNLDMPSWIFETARTSALAKNDCQVLH
APSWAIRHGVAFFSSRERDLIIRADSTESNESDGWTAKQTVRPVAGAGLEGAQDQLVLS
LPHRVEHRRWFVSYIEDCFGAGFRARFEDRLKSPHEERCTYHSLKNTSGWIEMISGNPL
VCTPPKVQAGQRLFIVAVPYPS*

>SPBIB_v1_270005|ID:27163412| conserved exported protein of unknown function [Uncultured spirochete bib]
VNYNKRGLAVALAVAALFVLCIAQAFGQQGSQKREQPAIGLSIVLLEVRPGPGVARIFLL
SDLDSGLAGTAFDTPVFEFADEAGQADGVLHPEGANHTEGELLQPALFVCAGTHENEIAG
ILAA YWLIKGRVHGAKL FVMPRANAAGATWSLQNPQSPRILQAIPGISRTFRYGARLSN
LAYETVSDPPLFSPAAPAGFPALAGQEMRNLNREYPGSTDSSMTARLAFaitsLLKKN
ISIAIDLHEASAGSNLGSIVTRPESLDEAALAVLDLEETAGKSFRLLEESKPEFAGYSHW
EWGKLGIIHAFLVETFNPAQPSDDPAVDQFNNAKSPLAERVYAHLWAVQALMANAGVSLGI
SVNIEGLPASVLEVEAWLKAPLSGAAP*

>SPBIB_v1_270006|ID:27163413| conserved exported protein of unknown function [Uncultured spirochete bib]
MKRTVYFILTLFVLGFGSTSAQTAALIPPQLAGIFEAPGFITSAGQTSDAIIVKVLVNT
RLKLNFGYDIAAKPQAVSGAKTLVVLGASNKGLGAAGLSIEQETERVKAVLALAKSEHM
RIIAMHTGGTARRGESSNAIALCVPHADVAVIVEGGNNDGFFTDLCAKEKVPLVMVPSI
AEAGNVLKGLMAK*

>SPBIB_v1_270007|ID:27163414|ggt| Gamma-glutamyltranspeptidase [Uncultured spirochete bib]
MMKTKMHGERESTGNQHRWLGGFSKILLAIGLLFFVLSPSVFAADTIKPEVTARNGMVAS
AQPLASAAGLEILMAGGNAVDAVASAFALGVVEPNATGLGGEGMMVIYLADKKVTTSID
YRSMAPLADMSKVKFPDPGHVSVAVPGTVAGLCLALEKYGTMSLAQVMAPAIRYARNGFI
VSDTLASTIKDRFDPISKNDALLAILAPEGLPLEAGQIIRNPDLATTLEKIAAGGPDVFI
KGEIADAI AEDMAKNGGYITKADLAA YTAIEREPVRGTYRGYEIISAPPPVGGLSVIEML
NILENFDLASEQPLSPRNVHLMAEAMKRGFADNSAFIGDPAYTKVPVAGLLDKEYARQRV
KEIDPAKMTPAVKAGTPPEHPSTTHLSVVDKNGNMVALTQTISSFWGACVAVPGTGILN
NEMQNWSSKGPNSYAPGKRMRTTIIAQTIDGRPFVTMGTPGAGRIISTMVILAVNLLD
YHMGVQEAIESPRFYARDTEKNLSIEARVPKETQDWLKSIGYSIKEYPDFDLFFGGAQAI
VVDLETGIMHGGADPRRDGAVVFGF*

>SPBIB_v1_270008|ID:27163415| conserved exported protein of unknown function [Uncultured spirochete bib]
MRKRYSKALVMVLLLVAAGLPAQGASTILHDVRPDPAVTKIAWLSEWFSPLAGTPADT
RVFILDGKPGATVAVAGGTHANEIAGILTAVLLVESAVPQTGRLLIIPNLNNSASTWTE
STQLPAWIAIRTPSGTRFFKYGARYTNRVHQGTPDPEQYIHPKSNERLEGQESRNLNRVY

PGKPDGTLTERLAWAVMQLLKQEHVDVAFDLHEAGPESRLANMIVANPKNLDMGAMAVLS
LELEGIKMKLEPSSSEFYGLSHREWGDETQACAFLIETPNPAQSLDSADPAEDSAYPLSV
RVATHLASIQAILDAWNADAPEGKKAFTFRWSEWENIARQGVGSFLK*

>SPBIB_v1_270009|ID:27163416| CoA-disulfide reductase [Uncultured spirochete bib]
MARYVIVGGVAGGASTAARLRMDERAEIVMFERGSHISYANCGLPYYAGETIKERERLF
VMTPEKFKAWLNVDRVRTEVEAIDRGAKSVRVRELDGREYSLTYDALVLSPGSEPIRP
PLPGIDDPRIFTLRSVSDIDQIKSFIDEHRPERTIVVGGGFIGLEMAENLHTRGSFVTIV
EALDQVMNPLDFEMAAIVHQHLKQKNVELYLSSAVARFEKAGSRAVVVLADSTRLDADMV
VLSIGVRPETAFKQAGIETAPNGAILVNEENLQTNPSIYALGDAIAFPHILGMAMPIP
LAGPANKQARIVADNIVKGAGTRRWSGAIGTSIAKVFDITAAAAGVAEKLKKNIPCMS
IITHGSSHASYPGAQPLTIKTVFAPDGTLLGAQVVGVDGVDKRIDLIADYIRRKAKVTE
LGEIEHAYAPPFSSAKDPVNIAGMTAENVLTRLRHAASVAVLKGNGAYILDVRTEEE
FQLGAIPGAVNIPLDNLRLRLSEVPRDRAVLVYCGVGLRGYLAERIMRQNGWTEVFNLSG
GYKTWELASEPQSHKGVYKPGLAAIQSASAKGAQELLHTTFAEGSGMPESIAAKRQAIVQ
IDACGLQCPGIMRLKTEIDRLPEGGRVVISATDPGFVRDAASWCNVTGNLLISMEESKG
VYTAMIEKAVKQSAMAAATGMAASQGGAPIVQYSPKGASIIVFSNDFDRALASFVLANGA
AAAGKDVMTMFFTFWGLSVIRKPDAPRVAKDFMGKMFGMMLPKHAGVLSLSKMNFGGLGQL
MMKARMKAKRVDMLISMIAQARQAGVRLVACQMSMDIMGVKREELMEGVEIGGVATYMDA
ASQSGVNLFI*

>SPBIB_v1_270010|ID:27163417|gpmA| phosphoglyceromutase 1 [Uncultured spirochete bib]
MHTLVLRHGESEWNKENRFTGWTDVLDTKGVSEAKESGKALKNAGFQFDIAYTSVLKR
SIRTLNFILDELDMQWIPVRKEWRLNERHYGALQGLNKAETAKKYGEEQVHVWRRSYDIR
PPELALDDPRFPKDRRYAGLDPSELPRAESLKDTIARFMPLWHNEISGDVQKGARVIV
AHGNSLRALVKYLDRISEDIADLNIPTGIPLVYELDDMLTPARHYLGDDEAVKAAAEA
VANQGKAK*

>SPBIB_v1_270011|ID:27163418| conserved protein of unknown function [Uncultured spirochete bib]
MNGTTKTRRLAIRGGLLVYVLLMVLMMITGRRHTILIDNKDAADGSYSAINGMEVAIDR
QESSEYYPGDRDKAMVQGQTHKIKVTIFDDNKTIKEFKVPLWSDVMIISVPKLIAGVEP
WIEPFTMAEQIQEAQESGPPAGETSFQSIGPAQPMEVEQVPTP*

>SPBIB_v1_270012|ID:27163419| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]
MSAQKKFVKFFSQYAVVIIFVMITVAIIPPSGLSIKYILQEITRLGRNSFLVLALLLPI
YAGMGLNFGMTLGAMAGQVGLIFAVNFGISNWHGLLALLVGLPISVFLGWICGLVMNRA
KGREMVTGYILAFFINGIYQFFVMYMLGSVIPMGNRAIVLSRGGYRNTLNLESVRQSLD
NILVLRVGGYAVPVVTFIIIALLCIFVWFKKTKLQDMRAVQDMVVAEAAGIPVEKTR
IIAIIISTVLACAGQIIFLQNMGNLATYNAHDQTGFFAVAILVGGASVTHASIANVFIG
VTLHSMFVVSPLAGQKLFGSAMIGEYFRQFIGYGVIALSLVLYAWRTRKAAADARLGLR
GGTNGSTKVS AVKNGANGAAGNGGQA*

>SPBIB_v1_270013|ID:27163420| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]
MRNLKTFIEDFGWPRIIFLFLFIMAPFVRVRLDASISDVLNRFQNAIMVLAMVPM
IQSGCGLNFGALGIVSGLLGATLSLQFQLHGILGFLGAIALAAPFALVLGWIFYAKLLNK
VKGEEMTIAMYVGFSFIMFMCIMWLILPYNNPTMVWGYAGKGLRTTITVEGYWLKILNNF
LAIRIGQFFVFPTGLLLFVGLFAFLMWLFLRSKTGTAMTAVGSNPDFARASGVDVDKMRT
ISIIISTFLGAVGIIVYEQSFQFIQLYTAPSPMVFPAAAILIGGASINKASMVNVLVGT
ILFQGLLTMTPSVINSLLQTMSEVIRIIVSNGMILYALTRKIKVSK*

>SPBIB_v1_270014|ID:27163421| Monosaccharide-transporting ATPase [Uncultured spirochete bib]
MANGSPLLSIQHVSKDFYGNVVLHDVSFDLREGEILGLVGENGAGKTTLMRILFGMPVIA
ETGGFQGSVIIGGSEVHFSSPFDALDAGLGMVHQEFSLIPGFTTTENIVLNRESMRPSIL
NDVFGDRMSILLRDKMRERA EKAIGKLGIELDPDMLVSEMPVGHKQFTEIAREIDREQTR
ILILDEPTAVL TESEAEVLLQTLKRLASEGIAIIFISHRLQEVLAIANRIVVLRDGHVVK
DTPNEHVSMRDIA SWMVGRSLGETGARSEGRKFS DIALKVHHLWVDMPGETVRDVSFDVH
KGEIFGIGGLAGQGKLGIPNGIMGLFPAGGEVILEGNTVPLNAPAKALAMGMGFVSEDRR
GVGLLLDESLEWNIAFTAMQVHRQYLLKVLGGLFSQRDERAMEDLCKEYVSLLDIKCTST
KQKAKELSGGNQKICLAKAFAIKPSLLFVSEPTRGIDVGAKKL VLDLHNYNRDFGTI
VMVSSELEELRSICDRIAIVDEGRIAGILPPTADISEFGLLMSGAMEAVNA*

>SPBIB_v1_270015|ID:27163422| conserved exported protein of unknown function [Uncultured spirochete bib]
MKKLVAVVLVLAFLVVGADVFAQAKAKFHIGVVTGTVSQSEDDLRGAEQLIKEYGSVKDG
GMIQHITYPDDFMSQQETFISSVVALADDPLMKAIVINQSIPGTAEAFKRVRRAKRPDILL
LSGEPHEDPLVIQGAADLALSADFVSRGYTIIWAAKQLGAKNFVHISFPRHMSYESLGRR
RAIMEQACKDLGLNFYFETAPDPTSDVGVAGAQQFILEKVPQWIQKYGKNTAFFCTNDAH
TEPLLKQLFAYGGIFVEADLPSPLMGYPGALGLDLSKEAGDFPAILKKVEAAVIAKGGAG
RFGTWAFSYGYTLTAGLGEFAKRVIEGKAKKDSMKDVFDSLKGYTPGAKWNGAYYVDMGT
GVRANKQILYMDTYVFGKGFLLPTTQKQVPEKYTIKMHN*

>SPBIB_v1_270016|ID:27163423| putative Adenylate cyclase [Uncultured spirochete bib]
MAQASEHYRDFPPARMDATIEPMQFSRKRFADELYYYSNQFVLFVMIISLTSGSWQNAI
VTSLIVLLFMLVQTGLLTVQGHIPVLRLLYSFITPAGYSILRATLSDIAFTETATMLLWG
ASVYIAVFQTLVLRRPFLKRLTETALSVGSALIFILFYAYLDRISVTGAFSRGEIDS
EAMIQALRIQSFPSVDFKIRAPQHLFALFGVISDFMMLVARMRAITLQQRLTQLEMP
KEDQRILAASHTAESEGSKEPESHTISEPVAQSAASTLSTANSPELSGLPLQSPTSLS
VTVVSSDIVGFTDLSEQLGRTAATLLNRYAYIWITHCAGSFGGRIASLSADTVVIIFGLV
DSDRSADRALNATYAFLEELEGLREDMVVQSLPSDIKISVGIHAGFVTAALLGPPGQQKM
SFYGDITIAVAARLDSLCREFHQNLVSHAAYRRLTLESQVTLERFSEVLLRKSTRPMPPLY
AKKP*

>SPBIB_v1_270017|ID:27163424| exported protein of unknown function [Uncultured spirochete bib]
MNLRRNNLSGKSRARISENAHLQSRASHKIDALVSFAALLVVVAATATAILFVSCSGSLD
ATLKTGDSVRAAVRLDVPDALSGRVRQFVGLGSREPLFNTEAVRNQFLGRTSIMLVDAST
PSPEVLTSVVWVPNIDALIADTSLVPQGMIOFRKIPAQGSAPAMRELSVLSRENAPYML
KLFPGVDKRIVESLSPALEPDPVSAAEYRLNLEQVIIGKKYMAAFDACAVDIVITVPR
IAAAAGGSFSGPIFRAKLPLFDLLTLEKPIVFSVRWPE*

>SPBIB_v1_270018|ID:27163425| PHP domain protein (modular protein) [Uncultured spirochete bib]
MILTFDFHNHNSCLSPCASLENSPSEMAKRARQKIEIFALTDHNSALNSATFAIACARQG
LIPFFGLEMNPFEEAHLAIFPDPLAALAFSDQVYRYLPQLEIDPGQFGDQVVVDPKDEI
LAMPAAWYGNALQESFAFFADAHAHNAEALVIPAHVDRAQFSVYSQLGFLPPGAYDAVEAV
GADPDPVLSGRHCVISDSDAHVLEHVGRSSAVEIADEAIVNELRAGLAAMVERWKQWGH
SENAQHMKSadGSDDICKAGISTAIPGLAPLVSFLAEWYPRRESLALLEAMRRSFHEKKA
WSVYKRPAL*

>SPBIB_v1_270019|ID:27163426| conserved protein of unknown function [Uncultured spirochete bib]
MKHNTMTTRQIFELIDAEVIQGDfDEAPVAGVYTSDDLSDVLANGRNATVLTIQAHQNT
IAVASIVGISLIICNSRPIVDNMAEAAVQERIGVVRTSLSQFEVSGRLWQALHAQGEPD
DSHIRFS*

>SPBIB_v1_270020|ID:27163427| ABC transporter, ATP-binding protein (modular protein) [Uncultured spirochete bib]
MGAPIFAHNANAQKKAGKLMIELTNISKTYAKSGTKAVDSLTLRIPDGAIFGFLGPNAG
KTTTIRIMTGAIEADSGSVLIDGIDLAKEPMEAKRRFGLVPDTPDLFSRLRAYEYLNFA
DVYGVASDRITVIEELAAARFELSDALKSPIGSMRGMRLNLIASLIHKPHNWILDEP
IVGLDPHAFAFALKELMRAHAASGGTVFFSTHVMEVAERICDKLAIINKGKLVFTGDLEGL
RELRESRGRLSGQVPLVGAPNFSAREAGMVNIEGADQREESLEALFLALVEEGEQVPEEV
SKL*

>SPBIB_v1_270021|ID:27163428| putative Membrane protein [Uncultured spirochete bib]
MRSPFISLLSLSLKSVAIHLPTQKELASPKVLLKTFGWIVLAVVLLADFGFMFAMMDIG
MHDALAPFGMQSLMLIYATVTASVLVFLFAFITSLSFFSSAPNEALFLTMPFKPSELLAA
RMATVYAIEAPIAFLVMSIAAGVYGIKNSPPFDYVWMLLNALALPLVPLAVSYAVLMPL
VSASRWLRRKNTILYVGGFIGLALALGFNWYLQTMARIEDPVLLRKLIDNELNFADIA
NWWPPAWLTMTAIGNSSMPAAFAATLANLALGTALAAAAATIFGRSYTKILANFGELAAV
KGKIGRSQAQAVFAPRPVFISLVQRELHLMNREPMYFLNGPFVIVLLPVILAISLIAQQG
QIQQALQQLRPLLDGQAGYLIPAGIGVFLASSTSIACAFSRDAKAIYFLKSLPLEPRDI
IAAKLVHALLFAALGIVFGVVGVLGLLGIRLVDAIVALVAVLGAVTNICGLVIDTFWP
RLSWENPMSALKRNPNTIIVILGTMGLVAGLGALSASLPFQKYSFALLYGTVFLAAGIGF
GVLLFRKGS AFLRQMEP*

>SPBIB_v1_270022|ID:27163429| Holliday junction resolvase-like protein (modular protein) [Uncultured spirochete bib]

MRFGWLFSRAAAVYAECMNI E GLHAGLQAGPAIIAALIVFSALVIAAGVLA YRAGRQRGL
LEAELSEGERMDLARKDAIERSRAVL S GQISEQIAPWLPDFPANPSDARFIGKPVDFVAF
CGADEGVVREIVFIEVK TGRSALSPVERSVREAITQGQVRWVEYRLE*

>SPBIB_v1_270023|ID:27163430|pckG| Phosphoenolpyruvate carboxykinase [GTP] [Uncultured spirochete bib]

MQFPSYVKHARLLSWVSSMKDLCKPDFVYWCDGSEEEYNTICQSLVASGTFIPLNPEKRP
NSFLARSDPSDVARVEDRTFICSRRKVEAGPTNNWMDPKQMK S ILSLFDGCMRGR TMYV
IPFSMGPIGSPMSYIGVEITDSA YVVANMRIMTRMGRKVIEALGENGDFVPAMH SVGMPL
AVGQKDVWPCKENK KYIVHFPETREIWSY GSGYGGNALLGKKCFALRIASVIARDQGWL
AEHMLVLGVESPDHEKTYVAAAFPSACGKTNFAM LIPPKA FEGWKVTTVGD D IAWIRPGK
DGQVRAINPEAGFFGVAPGTS AKSNPNAMATIRANTIFTNTALTPDGDVW WEGMTPNPPE
GLIDWQGKPWDPSSGKPA AHPNARFTAPLYQCPSVDPEWENPEGVPIKAFIFGGRRSTVY
PLVYQSFNWIYGVYLAATLGSETTAASTSAVGHVRRDPFAMLPFCGYNMASYFN YWLRFG
RWSCNPPRIFGVNWRKDK EGNYLWPGFGENIRVLKWIVDRANNHGKA VESPIGWMPRYE
DICWDGLEFSEEKWAELMSVERDAWMSEILSHEELFMKLYDRLPKELIFVKELMISSLWR
APEHWEFAKVEISSYDD*

>SPBIB_v1_270024|ID:27163431| conserved exported protein of unknown function [Uncultured spirochete bib]

MRVVYIIILIAAVIIAVIFAVQNSAPITVAFFGWSATASMSLVLVLT LGAGILIGMLLILV
PSIWKRM RALS VQKKKTREFQKQKQKEDEKSSTPEAAQAENPSPEQNKGK*

>SPBIB_v1_270025|ID:27163432| conserved protein of unknown function [Uncultured spirochete bib]

MDFLVASPKDMERRRLVPGSFD A VIVSGDAYVDHPSFGAALIGRWLEAHGYQVAILARPD
PDDPEVFRMF GK PRLAFLVTAGALDSMVSSYTANKKPRSHDEYAPEGDRSLCLRADGTIG
KSKLGRVNARPDRAAIVYSNL CRQAYKGVPIILGGIEASLRRLAHYDYWSDTVRRSVLLD
AKADLLLYGMAERQILEVMEKLAQASKADSSTGHASGAVGTEVDLRGIRGTVWAVHASKF
EQALAAAPQPGTEVLP AFEEIQPDSDEGRRAFARSFKIQYRNTDPWSAKRLIEPCGDRFV
IQEPPEFPLSREELDKVYELPYQRAWHPMYDPFGGVPALTEVKFSLNSSRGCFGACSFCA
LAFHEGRVVT SRSID SIVREAQSFAKMPDFKGYIHDVGGPTANFRAPACDKMAQKGACID
RRCLAPTPCANLEVDHSEYRELLKRLRSLPGIKKVFIRSGIRFDYLM LDRDRGFFRDLVE
HHISGQLKV APEHVSDRVL DLMGKPP IETFDRF AEEYSRLNQKFGKQQYLVPYFISGHPG
ATLEDALELALYLKRFGFIPDQVQDFYPTPGTLSTAMWRTRMNPLDGTSVYIPRGTKERA
LQRALLQFSKPENHEMVREALRMLGRTDLIGRGHECLVQP*

>SPBIB_v1_270026|ID:27163433|nanA| N-acetylneuraminase 1 [Uncultured spirochete bib]

MVRNRKAASLAKGIFAALPTAFDQAGNVDEKALCFLVRNLLQKGVEGFYVGGSTGECFL
SEAERKEVLEIVLDA AEGKVPVIAHVGMSTIVAVSLAQHAAACGASAVSATPPFYFSYN
LDKIYSYADIAEASGLPVLVYNIPAFSGRNFGHNEIDRLLDIPGVAGLKHTSMNL YELE
RIRVKNPDKILFSGYDEVFLPALVSGADGMIGSTVNLMP ELFLDIK KLFILGDIAAAQKL
QAKVNSVIEALAGGLFPRRLNMRLALPGCPAANAESHFFQFLAKRWN*

>SPBIB_v1_270027|ID:27163434| 3-oxoacyl-(Acyl-carrier-protein) reductase [Uncultured spirochete bib]

MSNERIEEDIFSVEGYIAVVTGGMGQLGRQFVKSLAERGAKVAIFARHAPDRASIKQVFA
GLSERIIA VPDITK KETIKQGLSIVMNTWGIPHVLINNAGLDTQPSAPPEVSGPFENFP
DEVFREVV E VNLVGTFLCCQVIGAEMAKAGRGSII NIGSIYGMLS PVQDIYAYKEAKTGI
PFVKPVAYSASKSGVYNLTRYLATYWAAKGVRVNTLTPSGVWRSTQDPEFQANYCAKMPM
KRMAREDEFNGAII FLASQASSYMTGSNLVIDGGWTAW*

>SPBIB_v1_270028|ID:27163435| conserved membrane protein of unknown function [Uncultured spirochete bib]

MVQYLFNGFANLISSGSIFALFIGVFLGIIIGALPGLTATMGIAL LIPFTYGMNPAFALS
LMIGIFAGGIYGG SISAILLKTGTPAAGATVLDGYPLAQKGQAGKALAI STIASALGGL
IGALILTFLAPQIARIAVLF GPPEYVLLGAYGLTMISYVAGKSMAGIFMGLLGLL I STI
GIDPISGFPRFTFGQLNLLSGLSLLPVLIGLFAAAQAFEGVEKHNEIQVKQVKITKIGIS
GHEFIQILPHIIKSAFIGTFVGA VPGTGTDIAAFLSYGEAKRSSKHPEEFGTGRIE G VAA
PESGNNACVNGAMIPMFTLGIPGEAATAVMLGGLMLLGLQPGPLL FKENPQVIYTVFAST
ITSNLLILVLGLIGARFFAKVLQLPMKLITTLIFVLAIGSYAMRNNVFDVGVTHIAGFL
GYILVKADYPVPPVLLGLLGPLVESNLGRTHIISEGNLLVFFTRPLCWLFWTLILYTHI
SNILKSRKTKV KASSQEAKE*

>SPBIB_v1_270029|ID:27163436| conserved membrane protein of unknown function [Uncultured spirochete bib]
MVSFKVVKWLDLFLGLIGIALLIGVYILSESFPEPEHEAQLGASVFPRIVSALLAVVGIFIA
LQSLKKKSNAELHIENAKMVFFTFILLLYGLLVKKAGFLILTPVFIHAVLLNIMKYSTII
INLLTSILT TAGIYLVFKIFLSVPLPEGILGF*

>SPBIB_v1_270030|ID:27163437| conserved exported protein of unknown function [Uncultured spirochete bib]
MHKRIFGIILLMSFLVAMGISAQAKFPTKPIKIIVPWNAGGGTDAVARALARSGEKYLGV
PVVVENKPGGSGAVGLAEVVQAAPDGYTLAILVELGFMDKTGVYVYPFCKDFTPIMNLNT
DPAALTVKAGRFKSVQEFIAAYAKANPGKLVGHSGTGLLWHLAAAVFAKEAGITLTYVPF
DGAAPAIAALIGNQIDA VTVSGAEVQSQVKAGELTMLACMGDKRLANFPQIPTLMELGYK
VNISTFRGIGGPKGLPADRV TILHDAFKKMMEEPEFIETLNKMGLGIDYRSTADYKKLAD
DTAAALEPVLTELGLLRKK*

>SPBIB_v1_270031|ID:27163438| Dihydrodipicolinate synthase [Uncultured spirochete bib]
MKKGKKFSGIIPPIVTPFDESIGNDR TIFRREVRHLISCGVHGLSPGGSTGEGAALTDEE
LAELIGIIREENTEGLPIVAGVIRTSTQAAVKTALA AKAAGANALMVTPVFYNVLPDEK
GNYSFYEAIAEAADLPVYIYVQNEITPD AFSRLNIPNVIGIKQSVGGIMAFYDMVL
TNGDRGMIYSATDEM LYSTFDLGADGAISAILSLFPKLCVKMWNLAKDGDNAKARHIQDA
IYPVWKA VRGPQFPARMKAALKILGRDCGFSRSPMSEVTESQVAQMKLLLENIRDE*

>SPBIB_v1_270032|ID:27163439|dapA| 4-hydroxy-tetrahydrodipicolinate synthase [Uncultured spirochete bib]
MVKDFGRILLPLITPFDKNEEV DYDKYKQLARYALEKNYCD SIIVTGTGTFEINTLSFDER
VNLLAALEAVDVGKVPVIAGVGC ASTRETV ALAQA EKLGA DCLMVVAPFYCKPTQDAVY
AHFKA VHDATNISILLYNIPIFTGINMEPALVGKLAALSRIIGIKDEAGLNPIQITDYLL
ATKQIKPGFLLYNGDDLMLMPTIPQGAIGIVSGGAHLVGDRIKVF DL YEAGKNAEATEV
YRDIFRLFRGFGVNGRVHPNPMLRAAIEIVTGIQVGP RRPLDPITSSEREFLIALLKEV
KLI*

>SPBIB_v1_270033|ID:27163440| GntR domain protein [Uncultured spirochete bib]
LNQKIRKIERVSITDQVVKQLQALIMSGEFKIGDKLPTENDFCAQFGVGRSTVREALRVL
AAMGMIQIQAGKGAYVTKDKD NSFD AIKYWFAEKHAELSELIEVRMGIEPLA VRLAIQRA
SPESIKIQEIHQAFKLA AIRKDHIELATLDES FHNAI IQASGNLLIKIGKLIADSMME
FRARSFAVIENINHATIPHEKIVEAILKK DERAGTLAMIKHLEISKHDMEQVAHEIEKT*

>SPBIB_v1_270034|ID:27163441|dapA| 4-hydroxy-tetrahydrodipicolinate synthase [Uncultured spirochete bib]
MLQKEKYGKRLVPIVTPFKNDMSVDYDAIVKIG EILLKR DYADS FVLTGTTGEFFTMTSD
ERIKIFETMKEAFGARIQLIPHTGAASTQE AIALTRKAKELGFDL VMVVAPYYTKPSQKE
IINHFSLIADVVDIDIMLYNIPIFTGVNIEPE SLRELSKKSNIVAIKEEAELRPKQISEY
LLATPEDFIVYCGDDTMVLEAL AQGGNRIGGFISGGCHLFGDRM KKM INFLSGNVLEAG
RIQLELLPLL RSLGQNGRTNPVCLLKGAMAMVGYPSCLPRLPLTPATDDEM I K V K SIMVR
IGLI*

>SPBIB_v1_270035|ID:27163442| protein of unknown function [Uncultured spirochete bib]
MKNAHVKLRTSREFPTISIDDAFKINRNFEKRRNDKTVA VSWWCYAVL DLGLRQPGYCS
S*

>SPBIB_v1_270036|ID:27163443| protein of unknown function [Uncultured spirochete bib]
MRLSVGVDLHKTQFTVYWRREGDSEGRF AQYLTNEEGYCCFEELEK AFEQGHEVA VVVE
CTGNARYFKNRVEKCGVRV VIVNTLKFV VNESVRKTD RHDAA TLAEFLEK GMLPEARLC
SQHSEELRRMLKERSSSLVRTIVSVKNQIHGLLLCLGIESTRAGLQSQKEHRLIQDILAAH
GYVGGAVDPLFDILDRLDEEVK KLGLIAELTADNPV VQLIRTIPGAGVINAATL RAYID
DISRFTTPRQLAAFASVVP*

>SPBIB_v1_270037|ID:27163444| protein of unknown function [Uncultured spirochete bib]
MVQVVLGMVRQKRWTGRYRLIVRYDRM KKAKGSGRSIIA VARALSEILWHMLTQNEPFDE
AKMIDPKIRRKAVEMQAAAFDVVA*

>SPBIB_v1_270038|ID:27163445| TRAP dicarboxylate transporter, DctP subunit [Uncultured spirochete bib]
MKNWKKLLVIVVLFCVVDLLAEQPIVFKLAFTDP PYL KIGDLQVMHHSYAGMVAFKSA
LEKLSGRIVVELYPYGR LGD ANENIQIFSGTLQGATPADGAVAPFYKDIQVFSIPYAF
GSALEAYNLWDGVPVKALFDNMAKV SGLRVLAIYDNGGFRSFSNNKKPIKTAADMKGLKI
RTMTIPVHMEMVKALGASPTPIAWLELYNALQ TG VVDGQENSAATILGGSLQEVQKYYTL
DEHFLGSAMIVTSEKWLKSLPPDLQTAIQAGKIAEYAARGTSRANDSLALALQKAGVQ

IYYPTSAEIAATFKAASQQPVIDWLKKNINPSTVDTVLSALK*

>SPBIB_v1_270039|ID:27163446| putative C4-dicarboxylate transport system permease small protein [Uncultured spirochete bib]

MRTEKGIFAFIEKIITYITDILMAANIILILLSVFFRYVLGHALVWSEELAKFILVWTVF
LGASNAIRRWENLRVTFILDKLHLNASRVFDMVLKAVASGFIAFLFILALKSIPNVWSRE
MAPALGINMVIPELGIIVGLALMVLQICIGLIISFFMRSNL*

>SPBIB_v1_270040|ID:27163447| TRAP dicarboxylate transporter, DctM subunit [Uncultured spirochete bib]

MTAFWISTLGLIIFITLGMPIAFSIGMASVGFILMTNPMMLVIVPLRMFSGVNSFTLLAL
PFFVMSAEIMVRGGVSSRLFALVNMLVGRVRGGLAYVNVVQSTIFGSISGAALSDVAALG
KMEIDAMVENGYDRDFSCALTAASSIQSPLIPSSSTAILYAGIMSMSVGGVLLGGLVPGL
LIGGTQCLYILFRGRKLNLPKVTLTYDRKTKAKIWRDGLVALGMPAILIGIVGGVFTPT
EAAAVAVFYSLIAAFLIYREAKPKDIIIEALEATVKTSATLFMIVALAASYSWALGSRIP
EQIATFILGISHNRYILLIMNVLLIIVGMWMETGAAIILFAPILGPIATMAGVSPLHFA
VIMIVNLVIGLITPPVGVVLYATCTVGQTTLERLVKALKPFYILSFSCLLLITFVPDIAL
FVPRLVGLVK*

>SPBIB_v1_270041|ID:27163448| 3-dehydroquininate synthase [Uncultured spirochete bib]

MRNGNPYLGGGRYIQIEGAVHLVGQELKRYKAKRAFIIGGHTALSIALSPIETSIKSERI
DYLVEEFQGHCTLKKVASLREKAERFDADIIVGVGGGKALDTAKLLANDMNLSVITVPTS
AATCAAFAILSVVYNDNGDVLYSVFHNREVASVLVDMEILTSHCPTRMLAAGIADALAKF
PEIAFSMEYASDWEKTVLPSAALVLSKHNWDLFFQKGGKKALEDAGTKLSPELEDVVCAG
IALTGTVSSLVSGGRQLAVAHSFYDSICKNFKQQQRKFLHGEIVSAGILLQMLVNGMESA
QIDETRNFSSIGTPVSLRDLIDIEPTSFNIDAIYTYIRTTMNLLEGWMTERLRAGLNGLL
SL*

>SPBIB_v1_270042|ID:27163449| Electron transfer flavoprotein subunit alpha (modular protein) [Uncultured spirochete bib]

VHIIVTIKQVPETDKVKMDPETGTMVRSGLSIVNPLDLYAIEEALVLKERFGARITVLS
MGPPDAERALREALSMGCDEAVLLTDRVFAAGSDTWATSRVLAEAVKKIGAFEIILAGERA
TDGDTGQVGPALAAWLGIPVISYASGLELFADLGSAGAEEKGGVFPFAPSTVRARRLTEEGY
QILETEMPCLITVVKEIASPRLPTLRGKKFARSAQVLRWGARELGLGTEDAGLPGSPTRV
TKIFYPKVSRDGERLVARDEEGIARAVNRIFALLEEKGCLSSVPEAALATAHQERTSLYS
KASTTHENLERASLDQEAARNHSAAKLSPTEPSAAELSASSPGAAKSAVPKPEVWIIAER
RHVGLDSVSFELLARARTLADALHTSLAAIVVAPSLADEEVQALIAYGADSVIALESNLF
DDFVCETWADALFALARERKPDIVLAAATTTGRTLMPYLA AKFGTGLTADCTELAIEEGT
GLLLQTRPAIGGNIMATIKTPKHKPMATVRPHSAQPLSPDFERKGI VLR TQALQPAESR
AGTQQIAVRTRVLSMERNTKGFENLEGARMVVSGGRGLKKAENFKLVRELADALGAVVGA
SREAVDRGWISYPHQVGLSGKTISPEIYLCAGISGAIQHLAGIRTA KTIISINSDPEAPI
HAVADLAVVGD LFEILPRLAERVRS AKTGISTEGNHAL*

>SPBIB_v1_270043|ID:27163450| FAD linked oxidase domain protein [Uncultured spirochete bib]

MLYNRVTEEIIRELAVIAGARNVLLDPAKLEAYSHDETSKEEYAHMPEVVVTPESTVAVA
AIVKLANRAHIPLTPRGAGSGLSGGAIPVFGGIVISLEKMNHVREIDYENLTMTVETGIV
TNEINNLVKDKGLFYAGYPMSLETCMLGGNIAENAGGGKAIKYGVTSRYILGLEFVTPAG
DIVWLGGKLA KDVTGYDLVHLIVGSEGTLGIATAAIIKLI GLPAAKSDLLV LFRSPQEAI
SCVPVILSKGLIPTAIEFMDRRSVETS CAYLNENLPYAQCGAMLLIEMDGRDPALVESEA
EAVGDL CMEQGAIEVYVADNRTTQERLWAI RRNIAEAFK VYCPVQSLEDIVVPPASIPAV
IPELDRIAAQFGITIPCYGHAGDGNLHATLVKDPEMSMEDWHRIEPQALEALYEAISKLG
GKISGEHGIGLKRKEYMKRFMSPVELELLKAIKRA WDPNLMNP GKMF DLEKIG*

>SPBIB_v1_270044|ID:27163451| exported protein of unknown function [Uncultured spirochete bib]

MKGLKMEASGVFRSSARLRALMLLAVLFMFAPSAQPVHAQDVLSIQQWSFFADTAGERI
SGPGQHVSIGLIGGLTPRLELD FSAVTMLTPKPGD SLLGAVSLGYSLLAERWINDRVPPN
WVSM LAEIGFLGGGTELWARGFSGATPKAQVFVRFTPLVLGNSFYRRRDRL LALGFAYDL
LKQRGSFFFNFFAIDASLRR*

>SPBIB_v1_270045|ID:27163452| exported protein of unknown function [Uncultured spirochete bib]

MERLLNMKHS MRFVIFIMLCYVAASSGMVYAAEPWHV GIVVGTEGFAAKGFDNGEYMRA
GLLFDPPFKGIQPAWFLGALVPVNPLDFSG LMLNIGIELRYMARTAHSSFFVREWKYAP

AVSAEMLIDPAGGREVGFVVS AQLVRFWFGESYVSFLGTELVLDSKGLVSGWGASLIRLT
AFVH*

>SPBIB_v1_270046|ID:27163453| exported protein of unknown function [Uncultured spirochete bib]
MQKNYSPMLRGMFPYRFAFGVLALLATISAMVILGGCATSQGAGSLANSIGLVNSVSLA
NSGADSTQSIEAFLESNGFSRIQTNEPIIHYSAESWKASLLNTIAQAKKSVFVLVFLANR
NEFNAEIYDALIAKAAEGVPVYFLDATS YERIFHNPKWNDEIVAPSEVFRGTVKWAEF
NPLRLERIAALPWLLVRDHRKIVMVDGETIYAGGYNLNIYSFAPLDQNGNEDAMVEIQSP
DAGRALAPSLAETWNQFSVESLNLEDIAPAVATGAGGSIGATAAASPEASAGSQTASMDS
TTSQDTPLACPPNANKGAVNAWLGNQVIGETRSEALYRAIFDYAQEEVWL VQAFAMPT
TIMQMVKQALQRGIQVNIMLSDDQIS PAMDKAVHYTVLPLEAGAHVFIYKSAGNALLHY
KLAMMDRKIVALGSPNFNYRSVRLSNEIVFVFDNERTIGVVSQNLSELQKRARPVSIEEA
QKWRGFSYFMSYLLSVPGG*

>SPBIB_v1_270047|ID:27163454| putative dTDP-4-dehydrorhamnose reductase [Uncultured spirochete bib]
MCRIASIYTSEKGRFAQGRRALAGLEAEGGAGWRFFLQNTCEGIFISMKLLVTGASGLLG
RSLMKLLASYPNIETKGVAFSRAKAPLEKLDL TEERSVALFFAHFRPDVVIHLAERRPD
IVDTDLERARAINIDATQIIARECAKRGVFLLLISTDYVFDGSAPPYFPNSPVHPLNEYG
RMKVEAEKVAETALSGIVRAFGGRSVGAVLRIPILYGPVEYLEESSVTEIALALKSTEPR
NIEHWAHRYPAHVDDVSTAIMAIVEACMQRTAACGPFPRFLLSGKEAYTKYEMAKAMAAA
LGIDASHIRPDPSPPKGAPRPRDCRMDTSLLESLGWRQEKYFSSSIGDIKPPFS*

>SPBIB_v1_270048|ID:27163455|pdxS| Pyridoxal biosynthesis lyase PdxS [Uncultured spirochete bib]
MEQNFWSSRQSEQWRIKVGLAEMLKGGVIMDVTNAAQAKIAEKAGACAVMALERPADIR
AQQGVARMSDPKIIKEIQDAVSIPVMAKCRIGHFVEAQILEALGVDFIDESEVLT PADDR
FHVYKHNFKVPFVCGCRDLGEALRRIGEGAAMIRTKGEAGTGDII EAVRHMRTVRDEIAR
LTRLPDEELMTAAKELGAPFELVWEVAKTGKLPVPNFSAGGVATPADAALMMQLGAESVF
VGS GIFKSGNPERRATAIVSAVVHYKDPKILAEISED LG EPMVGIGLDELNENQRIAGRG
W*

>SPBIB_v1_270049|ID:27163456|pdxT| Glutamine amidotransferase subunit PdxT [Uncultured spirochete bib]
VSSSRIGV LALQGDYEAHLKALARASENAVETIEVRRPADLESIAALIIPGGESTVMGML
LERFGMFELLSRIANGMPVFATCAGIILLAKNIEASEQTRLGVLDVTVRRNAYGRQVDS
FHAPVQTTIPEIGTIDGVFIRAPKIIALGPGVEVLAVYQGD PVMVRQGNIVAATFHPELL
PGAPVHRWFIQSF*

>SPBIB_v1_270050|ID:27163457| conserved membrane protein of unknown function [Uncultured spirochete bib]
MPTEFLVLLLILLNGFFSLSEMALVSSRKARLKSEADK GKSA YQLAFKTRESPSRYLST
IQVAITLIGILTGTVSGTTISQRLAAWLATFP ALEKYAASISIAVVVLAITFLSVIIGEL
VPKSIALHNPEQIAAFTIRPMHFLSVLFFPVVRLLSAATDGLVRLMGFHRAAESAITPEE
VKILVEQGEESGVFETAEREMVEGVNLDDRRVTMFMTPRTDVVALD TADSREAHVRAII
EHA EFGYLPVVEGDLHAIGMLEVKRALTRLAQGRFAGIRECMQS AVMIPESFSGLQALG
ILKNAKKSAGLIVDEYGGVSGLVTIGDLLEV VANLSEIEQQEEPQIFKRS DGSYLVDGSM
PIDFAEALELNVEQFSREYD TVAGFVLHRTGTIPKAGDTIEWPPLSIEVVDMDGKRID
KVLVKKTE*

>SPBIB_v1_270051|ID:27163458| exported protein of unknown function [Uncultured spirochete bib]
MKPPKSALEGLYILLLL FVLALIHFPQTLGAQENEPARDPVTASFDQAFADGDPVRNV
IEPVFVGEAGFVQRLNIRTRSGTQGSPTDAQASVHPPLGLVLSGGSARAYAHIGVLKEL
EKAGIYPDFIVANSMGAIIGMLYAAGFSPDDIQLLIHAIP LDSYFDIVLPTNNGGFINT
FAAAMRMLVGNLDISETAIIPIVTAEDLPSRRQIWF AEGSFERIMTAAFSMPAVFEPQHV
GNFILIDGGIAAIVPIEPAQRFTDRLIVSTALYNRAMSFSNPLTVVNRAIDIGKTRTSMG
ALEKTSAFIIRNDVETLSYMQFSDPNLIARGEESAARAIAALDAQERAQLENPPPSLV
ELRARMHQKLIK TIEALRTGVMPASAPTIRAAPALRLFPPI LGFAGETETIPRAGLSAVF
SAWRKTSLSYFAAIAPETGKQWALDGSININPIEALVIGASARLWGDYSSTAILGHTPA
MWEFAGSLKSATFVGATKIGFVASADVIREIGEGSATWQSIGLVSAASVTPGFDQDAHAI
VPWYSLEAGGFAENTVSAQLSAGLEGLMIGLHAGLFSRVRGFAKVALNGNAFLESEFD
GFRGGAARAAAASSLITNAELAIAPRSLFFDIAETALVRNLELAPFFDTKWSAPAGGAGS
FAMKDWAAGLCFSFQASAFGLPATISAYASYSGSHVFTFQVRAGALFPSR*

>SPBIB_v1_270052|ID:27163459| conserved membrane protein of unknown function [Uncultured spirochete bib]

MKTWKVALLAALAIIVAGPVLAQNAVKGVTDDVHAEKGFDFSVLGGIGYGWRGFGMSGGV
EYIFQKFDIPGFPLTMGVMGLAGLDFGSGFDVSAAGMATLHWGLKAYKDFPEFLRKFDWY
MGLGLGVGIIPFGFGMSSGGGVSYYVNEKLALDLSFYVNHVGGASGVGGTIGIRYKL*
>SPBIB_v1_270053|ID:27163460| DNA-3-methyladenine glycosylase I [Uncultured spirochete bib]
MNRCPWCGSDPLYLRYHDEEWGVPVHNERTHFELLETQQAGLSWRTILGKREAYRAAF
AYFDPEKVARFSGPEIERFLADPSLIRNRRKLEAAVANARAFLNIQERYGSFDAWIWRFV
EGRPILNTWKDICELPARTPLSDLISNEMKKAGFAFVGSVTIYAHLQAIGVNDHLVSCF
RHEEIARLAASSAPG*

>SPBIB_v1_270054|ID:27163461| Ferroxidase [Uncultured spirochete bib]
MLSQK MIDRINLQINREMYSAYLYLAMAARMNEAGYTGIGKWLTVQYHEEMFHAMKFAKY
LHDQNATVAYTKIDTPEFKEKDVKSLFQHVLAHEQSVTASIREIMDLAIAEKDYATQALA
QWYINEQIEEEKNDTQILQNIDLLGNSAQQGLFMLNIELGKRDPSPVPLDFNKI*

>SPBIB_v1_270055|ID:27163462|thrC| Threonine synthase [Uncultured spirochete bib]
MVIRYTSTRNGRVNASIAEAIQVQGMPPQDGGFVVPVQIPALPPEALNEPGLSYAELAWLVL
APWFDWSEYELRPLIERAYIAQNAPGGEALFDVPEIVPLRAAGSLGNHPLFLELFGHGT
CAFKDLALSLLGRLLQESLEKCDIDEPLLILTATSGDTGSAALAGLGGQPGIRIAVIYPA
EGTSEIQQLQMTSVPVEGRLVVGRLGNFDDAQRVAVKRIFQIAGNPDPFHAIKSSANSI
NIGRLLPQIVYYVKAWRELYFSRFLRQGEFDDVVPVSGNFGDILAARYAKAMGLPIGKLV
CASNSNRILHDFSTGVYDRRREFTKTLSPSMDILVSSNLERLLYHALEENPELVAMTMQ
KFERKGVFELSEKNRATIADFRASWADDAQTLETIRSMWESHGLLVDPHTAVACKVARDV
YTKGTEVSGETDTSAPIVVAATASPFKFPAAACLEALQGKKGPTSEKGGKDLQLAFELSRLT
GLPVPKPIAALVSAKINHSTIIDESDLERVLTEFAQQEAGIARIL*

>SPBIB_v1_270056|ID:27163463| putative Homoserine kinase [Uncultured spirochete bib]
MIEIEVPATSANIGPGFDCLGIALSLSNTVRVEKASETRLKGCPPQWAGPDNLFRLSRFQ
ACALLQTSVPEIEVEFITRIPPARGLGSSASLAVAGAAAALLLYAQPKAGTELDILKEQK
NQHLLLKAATAVEGHPDNAAPAIYGGFTAAAIKEDISIIRADAPAEWRFAACIPDFDLE
TSVARKALPDVYSRADVVHAISHAVLTALAIRNADISSLGRVCELDRIHEPYRRPLVPDFE
DVENACRANGAAAVWLSGSGPTILAVFESSVPAKSLASDIAAHAKRRWQVVPPLHADNMGL
RAQISP*

>SPBIB_v1_270057|ID:27163464| putative Methylated-DNA--[protein]-cysteine S-methyltransferase [Uncultured spirochete bib]
MIPIQWKETQAFSTSVPTRFGSIVVVWQGEAPILSRIYLPRNDCALVSQAHTDFPILEQ
WNDRRLLPDLISRATEAICAAAESKPAQFPFKLLRPLQYLNFRQTILSLEASIPFGHV
STYLELAKASGKPSAFRAVASALSHNPFLLIPCHRVIASNGSLAGYQGGLEMKRFLER
EGVPFSSSGMVNLHLARLWHFS*

>SPBIB_v1_270058|ID:27163465| conserved protein of unknown function [Uncultured spirochete bib]
LKWQPACSILNNMNKALSPIVMPALFVGHGLAINAALNNDFTESLRLRTRLPSPDAIAV
ISAHWSTPEVRVTSSPFKQIFDSIEFQEELYAISYAPPKPDADTICSLLLTAGINAK
SDSTRGIDYGAWGILVHLFPEAQIPVVEISLSYHIDTKKIVNVGKALQRLNERILLIGS
GALVQNLKISKNIKAKPYPWALEADRKIAAIIQAGDASALSEFALRNRLERSPAMPTPEH
ILPAIAILAMKEKDDRISFFHESFQNASISMRSFIIHGH*

>SPBIB_v1_270059|ID:27163466| conserved protein of unknown function [Uncultured spirochete bib]
MHFHFCPNPACAYHQHAPKERWFVAAGFYVTKTFGKVQRFRCSFCGKYFSTQTFSLDYF
AKRXX

>SPBIB_v1_280001|ID:27163467|gidB| Ribosomal RNA small subunit methyltransferase G [Uncultured spirochete bib]
MNHEPLLARGLAALDFDISSGILDKLIQYLDEIERWNPLYGLVSAEGEDLVIKHVLDLSL
PWRVLAELLASLDSSIARNGMATVIDIGTGAGFPGIPLAIAFPERPFVLIERLEKRVRF
ESAITLLGLSNVEIRQGTAEENEQAFQCVVFRALRPFQDCKLFRSIWKKIQPGGALFAYK
GRLMHARLELAELSEDAVLGNLAARAQIVSVWVPFLEEERCVVIARKA*

>SPBIB_v1_280002|ID:27163468|pyrG| CTP synthetase [Uncultured spirochete bib]
MRKLLFVTGGVCSSLGKGAASSIGALMEARGFSVQMVKIDPYLNVDAAGTMSQYQHGEVY
VTDDGAETDLDLGNYGRFTTAKLSRANSITGQVYKAVIEKERAGEYLGRVQVVPHTN
EIKQRILAVASNPEVDMTIVEIGGTVDIESVPFLEACRQLIHEYGKQNAVSIHVTLVPA

VSGGEIKTKPTQHAVKELQEVGIQPDALILRSAPLSDDVRRKISLFTNVEEEGVISGYD
APTIYEVPLAFYNQKLDTFLLRKMNVESRHAELGKWQAVVQAVTKPSRKVKIAVVGKMYD
LHDSYKSIWEALCHGGIAHNAGLEIEKVDSSRLEDSNADLEAIFKGIHGILVPGGFGERG
IEGMIRAARYARENKIPYLGICLGMQIMVIEYARSVIGWQDAHSTEFNKATPHPVVCLLE
EQTRIKNYGGTMRLGAYEAVTKAGSFIRAA YGTEQISERHRHRYEVNNDIRQELEAHNLT
ISATTPNGELVEACEWPEHPWSVGVQFHPEFKSRPTSPHPLFKEFIRAALSHAGA*

>SPBIB_v1_280003|ID:27163469| exported protein of unknown function [Uncultured spirochete bib]
MAGNARAWKTFARSNARAFCALCLLSLCSMVLLACSPPAEDVTQSAQAEAPDARFSDLTR
DEYRNGKHSRITAQIATWYEPDQRLEIEHLAFTAFNTDDGSISASGEAEKATFYESSGD
IEFSGYVHLKSAEGDISFKTDHLAYKRALDIFETPLSDVTINAKNQLFMAGRGLLFDVK
QKYEIRESVSGSVYQ*

>SPBIB_v1_280004|ID:27163470| exported protein of unknown function [Uncultured spirochete bib]
MKFANQYPVPFINKMEYYSIMKTRAPFWLLIIVMIFTAFQAGFAQASKPAASAQPTAPAS
SQQAPAPSQPAAPSGSPQPAASQTTEGKKPITFSARSVQGVLAAGKENTILTGSVKITG
SLVITADRVELSGEDYVNVVCSGNVANDSEKGFSLVAEKLNYQRDSEIGIAQGVAVND
TKNNTVINAEWVRFQKQSIFEAAVSVLVLKEDMSIRAEYAHYNRDTEEIRLHGGAVAIT
ETGQLQGDITASSDWSNLQISGEVSGNITSKEKTATQ*

>SPBIB_v1_280005|ID:27163471|lptB| putative lipopolysaccharide transport protein B: ATP-binding component of
ABC superfamily [Uncultured spirochete bib]
MSIAILEAAHLRKSFGKRLAVADVFSMQTGEVIGLLGPNAGKTTVFYMIAGFLKPSAG
TVHFDRKPIDRLPMFKRAMLGISYLPQEASIFRRMTVEENILAVLEARSSLSPAGRREKA
RMLMEEFGIQHVAKQPAYTLGGERRRTEIARALAIEPKFLLLDEPFTGIDPIAIREIKH
LIQSLSSKIGILLTDHNVRDALAITTRAYIISKGVIVAQGEQSIIDDPLARETYLGQD
FEM*

>SPBIB_v1_280006|ID:27163472| Hydrolase, TatD family [Uncultured spirochete bib]
MRYFDTHAHIGLIYDDPIEQLLVCQQAQKLAGVSRIVSICNSLVDFKQVYENLKPAEHVYH
AVGVSPSEVNNPGKDWQRYIEEATRLPRVIAIGEIGLDYYHKFGDKRSQIELFIDQLEIA
ARLNLPVIIHNREAGHDVLDILRDRIPPAGAVLHCYSENAAYAADILDGLDVYFSFAGN
LTYRNARNLHETVAFLPLDRILLESEAPFMVPAEFRNKRNMPEYLPSTAQFLADFLNIDV
EEVAETTYQNACRFFRLNP*

>SPBIB_v1_280007|ID:27163473|dus| putative tRNA-dihydrouridine synthase [Uncultured spirochete bib]
MSTKKMPPFLLEKQWLAPYFLAPVAGYSDVAFRAICAEMGAALCYTEMVSAEALVRNHA
KTKELLARDPAETHYAIQLFGANPATLAKAAEIVSAFQPAVIDLNCGCPVPKIIKAGAGS
ALLKTPERIGEIVRAMRNATSVPISVKIRTGWDEKSINYLETAGMAIEAGACAITLHGRT
RAQGYSGKADWDAIKALAAQTSVPIFGSGDVFSADDAIAMQEYTGCDGVMARGAIGNPF
IFQELCQRAAGQRIDEALSPKVVSQTALHLELAVKYLGEQTACIEFRKHFCAYTKGFVG
GAALRAQAVRCSTFVEFQRLLELFAESAA*

>SPBIB_v1_280008|ID:27163474| protein of unknown function [Uncultured spirochete bib]
MKREGFFRGVQACVGAMALCVLVLFNNSCNQSPQSALIWTDIPELVVAAQLFNRENDQFAV
DVEYKENAATALMKTNKPPSLIIAKFLLSKPVIRKLDPLDDLFSRYVDPNDMYSALLDA
GKQGVQQILLPVSFDCMVLVERKSDSLGAGASMLDLDAIREAGDKFTRTEKGVLSAMGFS
SVWNMEFAESWLLAQDAGFSPNPWKQTSVPKSGDAKTWPLLWPKDRLEQSVLALNSLDS
KVKKDDADAFASYFNKPGYQLVLENRVLFWPMKASDFFKLPYSAKSRLRYRYPANQKL
ILTEGTRYLGVKGAAGKKAFAFSKWLLTPANQEKIWKEMETQRLLPDHVGPLDGFSSL
KQTNETVLSRYFPEYAQNKIVAGTLRSPVALPDYWDSFSRDFFWWLKTMMLTSGEGTESD
AQKGTIGEDFQASFEQYLGTMPTDWLASSR*

>SPBIB_v1_280009|ID:27163475| Radical SAM protein [Uncultured spirochete bib]
VQANQKNSKPLINWHSRDLKERYGEHVWRLGIDAGFSCPHRSPDRLKGGCRFCAPDGNIA
AYQKAASSVPSVAQQIERALVFTRRRYHANAFFLYFQAYSCTNAPVKALAAIYDNAIDAF
WMALERITPLERDGLNFAQKGENAASTSFLTSTSPKGLVVSTRPDCFDSEKAALLASYR
ERGMEVWVELGLQSAHEETLLFIRRGHGVKEFLDAMEIAGKAHLRRAVHMLGLPGESH
MMLETARIVANTGTEGVKFDHDFRIAKGSFAFAFPCGEITAMHPSRLPGLLADCLEVLPP
STEIRISADFRPEEAINIHAPLDKHHLARLVEDELRRRSCQGQRFNTSP*

>SPBIB_v1_280010|ID:27163476| DNA polymerase III, gamma and tau subunit [Uncultured spirochete bib]

VPQSAWLYALCLLYPSPSCYFSYMPFEVTAATRKRPQNFEQLAGQNFVAATLISSLEQGR
IAHAYLFSGPRGCGKTSTARILAKALNCEHGPTPHPCGTCASCLSISSGSSLDVIEIDGA
SNTSVDNIRQIKDEVLFAPNSGRYKIYIIDEVHMLSMSAFNALLKTIEPPPYIVFIFAT
TEPHKVPATIKSRCQQFNRLVPAETILELLRQAAAETGVETEEALLWIAREAAGSVRD
AYTLFDQIASFSGTKITAQNIRDTLGLVGLDRLNALFRAIVANDTKAAFTTLDEILIRGV
SPEQFLSDAVDYCRSILLIHNDIQKEGLLCAPRSTFDADVLGVLTKERAEYAIAVLLDTY
RHLKETIDPRFELELAIAKLSRISAYISQSELFDAIKAIKHTFLPQGSSQKGLPLPFQER
ASKNDSAEAPLLRDLRSRQPESQSAQSARQTSRPSQPETLAQKNNSQYSSPLDQEKPS
VQLSASRSGTEVEPASSVSSPSELRKRIIAKLRAENLFLASALEKSGEWIPKHNGFIIP
VVNKVELDLISRFSALIASTGAQLMGAPCAIEAHLQKLQEVLDHEDSPKKSALMRDSETG
NAHAQISSDEVPHDQTPETNLLKEKSTLSSFQSAEDAFNGSDEGSLPQNNPAPSSLDE
NDIRLIELVRKMFKGKVIETKPAFEPESAESRTSAHASVPIIEPPDIPEEPEEFPDTEE
ESYD*

>SPBIB_v1_280011|ID:27163477| Nucleoid-associated protein Spica_0202 [Uncultured spirochete bib]
MDLSNIFDMLKNPQALKAQAEEMQKKMNAIRATGQAGGGMVKITLSGNMEMLECEISPEL
SEFKDIPLQLDLIRAAHNAAEKIKEEIQNEFAGSLGGFGSGMPFGNLPNGFSGTEV*

>SPBIB_v1_280012|ID:27163478|recR| gap repair protein [Uncultured spirochete bib]
MKAIEDLVSLTRLPGIGRKSALRIAYSLKSDIAFSEALADHIRTLRSTIHFCACGCSY
AESELCQVCSASRDRSIMCVVEQPQDVITIEASKEYKGLYHVLGGLSPLEGVGPDKLN
IGKLIQRIHSSISTSVPIREIIATNPTIEGDTTALYLKLLLEKEPVKVTRLATGIPVGG
DLEYADRLTLARSFHGRSAL*

>SPBIB_v1_280013|ID:27163479| conserved protein of unknown function [Uncultured spirochete bib]
MRASAIHVLNAEVITCQELADDLEIITACGSDMMSDVIAFVKDRVALLTGLTNPQVIRT
AELMDIRLIIFVRGKKPSSEMIQMAKEQSIMLMSTQDSMFIACGKLYQAGIMGDIAYQAR
*

>SPBIB_v1_280014|ID:27163480| Anti-sigma regulator [Uncultured spirochete bib]
VLIEYIIPRMDFSAAGKASTDMKRRLTQLGLPVALIKRIAIAMYEAMNVIAIHGDGGKAE
VEILEDICISTRFTDKGPGIADIELAMQEGFSTASEEIRNMGFGAGMGLPNMKRNADELII
QSEPGRGTTVIMRFLQTGEL*

>SPBIB_v1_280015|ID:27163481| Fe-S cluster domain protein [Uncultured spirochete bib]
VNNKTLQNQENNIRTFHVSQLDADLCVGCTTCIKFCPTKAIRVRDGKAKIFEDRCIDCGE
CIRRCPKGAKKAISDPLFILDGYDLKVALPAPSLYAQFGTRYSDIFAALHHMGFDEVF
DVAWGAIVATEITRSILAKPGPAPRISSACPVIVRLIQQRFPPLIPNLMPILPPSEIAAR
EARKRLSEISRKIGIFLSPCTAKVTAVRMPLGYSQSSIDAVISFSDIFLPLKRALEERK
PLSPKKGFKSSVPQASSGHSPILPMDNLEPGMGWARS DGELDALRIPDSVSVDGISNVI
DLFEAIENGNIESIQYIEALACPGGC VGGPMAVENPHIARSNMRQRCQKDNLAAEASSP
MKAIKPPSPKLPEQEELPSYIWTEQVSPKPVLVLDADLSKALEMAEKIDTIHAQLPGIDC
GACGAPDCDCLAEDIVRGFASIEDCRLLEHPYSKGTKENIHSEGLST*

>SPBIB_v1_280016|ID:27163482| conserved protein of unknown function [Uncultured spirochete bib]
LNKKDFPHIHFYDQDFVDIYDRTWAWIADCWTNGGSQTKIGKIKFFYYPEKKKLDLFLEQV
FSSFFLVYSNRIYSANGLDALYALQEPDGAIRTA YDIETGQAVMPADNPLGVTLPLLAW
AEFNLYHKTANKKR VKEVMPALSKHYKWLEANFKMPNGLFATPLSSTGMDNSPRENARYF
IDFNAIAMNALYLSALGDILNDKDASFLYKRDYFSIKTRINSKMWNADDGFYYDLDENE
NQVKTKTIGTYWILLAEIPNEERA EKLVAKLKDPHCFGTENPFPSLSADHPAFDRKGQGF
RGSVFPWLT F MVIKGLEKYFYELARDSAIRHLYYILDSMHASDHESNRHHSRPTVWSAY
QPMNEGKAIWDEHPDWPLPNHFPSNGLSTVTLIENIVGLYISLPRKTVDWIIPNLEVMG
IENLSLKRNMITILSSKSGRGWEIHMESEKLYYFTINVLGKKKKTLPIPSGKCSMLIDKI
*

>SPBIB_v1_280017|ID:27163483| protein of unknown function [Uncultured spirochete bib]
MSRERRDRSARERNSHDQGFADPREKALDQLTNLYVKDAISLEEYERLADEMOKASDPQS
VLNSVIVAGSGGKSAQEGSNRTPFDSTDKPLSLNQDISRSKASFEPLSPNSALNSFPRPG
DFFLCIMGERKVNGRMLLGKSASSITLMGSTVIDLRDIEVPASGMHIEVIAIMGETRIIV
SPDMLVHLSVVPIMGEAISRADVPFGSNNQGILEIGGVALMGSVSVRVVP*

>SPBIB_v1_280018|ID:27163484| conserved protein of unknown function [Uncultured spirochete bib]

MNIVISLGGSSIVAPQEGPSGIFLMQFRNILLSWLNQDARRAIIIVVGGGAAARNWQKAYRE
FLSNFSEVNGDRGLRDFSCSNEALDRIGIAATRLNAQLVKEVFADCCIDPIITDPSSGFE
ANRILVAAGWKPGFSTDYDAVLLAERFSAKKVINLSNISQIYSDPRINPAARPLSRIT
FDSLKMTGADWNPANVPFDPVAAARAREIGLKVFASGTNLQNLSDILYEKAFVGTII
E*

>SPBIB_v1_280019|ID:27163485| putative Peptidase M20 [Uncultured spirochete bib]
MKKKIEIDDTQALAIRLVRAPSVTNTSGESSFPDVLISILREQPFSLHPELIHDPVPIEG
DSKGRNVLAFAFGKSSCVLAGHYDVVDTNAYGVLEPFADFPEALSKRMLQMLSSKTN
LSSSELLKLDLESTAFIPGRGMLDMKSGLAAGIAAMVRFLKDDRTGNILFIAVPDEEG
SSTGMKAAKMLSDFADEHALHYEAINLDASVDSGDGAEGKAVFLGVSVKLLPFVVFVG
KPAHAGSPFDGFNPVIASAVFAREIECNSDSMNIRALVPGEPPPPSILYYREMRNRYDV
TMPADVFCVAVNLTFEKDPEKVFDFHKTIVQKALDNSISLIYERASAFSRKKNEHVVTMYK
FSSEIEFHHELAKRAERVVPGILDRLQRFAEKSPEDKVQQTFFKIVHELLSYAQIEGPSA
IVGFAPPFYAKAQLDSERDQGFSLIHKDEVMSFNRDYGESIKLRPYFPGISDMSFLAPSV
SREAIEFVKKESAVLQSYLDKYLESPLDTPVINVGWPWGREYHQNGERHRHYAFSLLPEL
LFRLCNRLFHANN*

>SPBIB_v1_280020|ID:27163486| AMP-dependent synthetase and ligase [Uncultured spirochete bib]
MLKEAEQKYPDIYALKRTDSGYMPTTFKEVRQKARQFAAWLLANDLKAGDRAAIIAEGS
PEWLISELGVLSAGMISVPLSIKLLPDEIPFRIQHSEAKVICCTHNLQLEKLANALNLAGL
KKIDIVYLDDEIEWQGSILKHKVRDDSFITLQKALSVGSVLLKEKKEYEERLDLIENET
KENDVVTISYTSGETGNPKGIMLTHLNYWSNCHDAVELFDNPLYFRTLLILPVDHSAHT
VGLYTAMLCGISLYFVDSRGGIATLRNIPINLKESNPIFLLTVPSLSGNFMKKIIAAIE
EKGGFIEKIFKSGINAGILWHGDGFHTPPFQDRLKSFFPYFIARFLVFNKVKKALFGNSI
RFCVGGGALLDIKQQQFFAALGVVYQGYGLTEAAPVISSNSPRIHKFGTSGAIAPSVKC
KIMDEMGTELTPGTIGHITITGENVMLGYKNPEATAEALREGRLWTGDLGYIDEDGFLV
VVGREKALLIREDEGEKYSPEEIEEAITASTEVDQIMVWCDHKKYTIALVTLDENKVKHL
IRNSINTAEQLLSILTDEFYRFKTDPAKAKVQPAWIPAVFQILEEPFSEQNGTINSTMK
LVRHKAQIYQDLIAFSYTSSEGSTTLNKQNLKIRKHFSLK*

>SPBIB_v1_280021|ID:27163487| protein of unknown function [Uncultured spirochete bib]
MVIEDSFLRIKQQLNEGRRFAVISLVNTQTSVPQRAPQNAQKLILCENGQSYGSLGGRE
FEMEAIEQAKACLALRSSKFWWIEEIPRIDESFPDSTKRKIEVFIEVYEPQPKLIIGA
EDISLATAIIAQNLDFKIIILDERSEIANKSKFPMASHIICGPNLEQALSPILDQSSYIV
VNFQFNRYERAVRYCLGKEWAYCGILGSKKKIVSLRKKLIEEGFSTEQLNRINAPIGLDIG
AQTQYEIAISIIAEIIAVRHNKKA VFMKSVM*

>SPBIB_v1_280022|ID:27163488| Ribose-phosphate pyrophosphokinase [Uncultured spirochete bib]
MSYSDPHTLGIACPGAEAFANQVIRKLSGIYKHRFARKAQAIASRYHITPELVIRKINF
ANDCNTGMLFLPGNTDRYRPPQFKINVRHTFFANGEIKTEILESIRGRNIYIFQDIENHQ
PISFNDGTVHKVLSVNDHIFNLFAVDAAMQAGAAEINLVLPYYPYSRQHKKKGREGLTA
ARIGKMLES LGVNRITLDIHSKEIENAFDRLRMENLHASFQIIDKLMSIVDIAKEEMVV
LAPDTGAVDRNKFYANALQKPLALLYKERDYSKVSKNAADSNISEVRLLDVTKVVFMA
DDMIGTGGTLIKAMRYLKD LGATKVICAVSLPLFSGNAVDDFDAAYKEGLFFRIIGTNAI
YHNELLKKEWYIQSDVTGLFAQVISLLHHRSLSSLLDNRDVARLIKRKLESNSNTKSV
PSNPQSDQRD GASNSIDDVIPYGAADKQ*

>SPBIB_v1_280023|ID:27163489| putative hydrolase (HAD superfamily) [Uncultured spirochete bib]
MKLFLRPRHLHRAGVLAFLDGLTYHNPEYLKFEESQIEQLADYLHIPNQAASSVLQRK
KLRKERQLPPTSLANIFKEIGVDDLIIEWRKRKLRPHNWLAPDLLYESLNALKKFYQL
ALITNNPRVIAEESLDALGVASLIATIALDDTGKSKPDPAPFQFLQSMNQAENCIVI
GDRYDIDIHPALNEGMSGILIDNVKEIYLLPKLLLP*

>SPBIB_v1_280024|ID:27163490| conserved protein of unknown function [Uncultured spirochete bib]
MSLVTFGEIMLRLKSPGQERLFQSPLEATFGGSEANVAVALARLGIPARFVTLDPDNI
GHECMREL RSHGVDVSGIKFKKGRMGYFFENGANQRPSNVIYDRAYSTLSEMEPSDIDW
GKAFEGAKWFHVSGITPAVSQKCADATIFAVQTAKKMGLMVSFDLNYRAKLWNYGIEARA
VMSEIARSADILIGNEEDYQKSLGIKGPKEASSGELDIDEYQTMCESTLNAPNASIAAV
TLRESHSADSNW SGMVVARGQRFISRKYHIADIVDRVGAGDSFSAGLIFGLIKYGEPGA

ALEYAVALSCLKHSIPGDFALIEPGEVEKLLGGDTSGRVQR*

>SPBIB_v1_280025|ID:27163491| 2-dehydro-3-deoxyphosphogluconate aldolase/4-hydroxy-2-oxoglutarate aldolase [Uncultured spirochete bib]

MKDLKALFYSTGIIPVIKIESLDKADGLAQUALRSSGIHVAEITFRTKTAPGVIERFASRH
SDILVGAGTVTTKEEVDSALSAGAAFVSPGFNPVICSYCIKGVFVPGVNNPSLIEQA
IAMGLSVLKFFPAEVSGGVRALKAFESVYSSVSFIPTGGIQENNINEYLALKNVLACGGS
WIVPTDLIEAGKFEAIEGLIGSARRTMLGFLPLQHGDRLNREKADAGARIGDGAAIEVK
TTSLRRLAILQAEGFSSVLGSEVMRGKSMAAAEIEIPSLHGRIRLVE*

>SPBIB_v1_280026|ID:27163492| putative beta-D-galactosidase [Uncultured spirochete bib]

MIVTRLEDINRYRGLSTNLDTAFDWLLKEKWQNLQGGKHTIFGEAIYALVQSYKSKDHAA
CRFEAHRSFIDIQMLTSGEEIIEALPREGLEVLEPYKPDIEFYVTPKDSAACQLFMKPG
LAIFFPEDAHRPCMIAGDGPEDIGKIVIKVAV*

>SPBIB_v1_280027|ID:27163493|kduD| 2-deoxy-D-gluconate 3-dehydrogenase [Uncultured spirochete bib]

MILDSFKLDGKVAIVTGSSTGLGQGYCIGLAEAGADIVGVDYVESPETAQIVRARGRRFL
EIKANLMSIEPIQGIIDAAVKAFGHIDILVNNAGIIRRQDAIDFSEKDWDVMMNINIKTV
FFLSQAAARQFIAQKTGGKIINIASMLSFQGGIRVPSYTSSKSAVMGLTRLLANEWAKYN
INVNAIAPGYMATNNTAPLRADPSRSEEILSRIPAGRWGTQEDVQGAAVFLASSASDYVN
GYTIAVDGGWLR*

>SPBIB_v1_280028|ID:27163494|kduI| 5-keto 4-deoxyuronate isomerase [Uncultured spirochete bib]

MHTREAVNSEFVKALDTQRLREHFLIERVFPVPGEMSMVYSHVDRMIVGGITPTSVPALP
VSKELGTDFFLERREMGIINIGGSGAIEVEGIRHQLGPREFYISMGTKNVFLSENPNE
PAKFYFNSAPAHACQTRRVTLTDQAKHVEMGSDAECNKRVINQYIHPAVLETCQLVMGMT
MFYEGNVWNTMPAHTHERRMEVYL YFDMPEDRVVHFHFMGKPEETRHIVVRNEQAVISPSW
SIHSGVGTGKYTFIWGMAGENQAFTDMAVPMVLL*

>SPBIB_v1_280029|ID:27163495| Transcriptional regulator [Uncultured spirochete bib]

MAEIKVQSLDRFTNILEILAREPNGLTLAEIARQLDLPRSTAFRLAVLLQRDYVRKALD
TNR YRLGPGFIELSSYYLNNLELKTESAPYMRELAALGTIVFLARRQGSMMVYIDKQDQ
FTSLRKYAIIQQKPL YCTSLGKALMLDMDDEIRRLHAAVKFEKFGPNTHQNIDSLIED
IHRCKVRGWAQDNEEAEPGMNCVAAPIRDYRGQIISISTSWIPESRPDLEPGKVAIQVM
KAAREISAAMGFRGNH*

>SPBIB_v1_280030|ID:27163496| Nitrogen-fixing NifU domain-containing protein [Uncultured spirochete bib]

MLFEEVKSAIENVRPSLMADGGDIELVSVSDDGVVVKVRLTGACGACPYSIMTLKQGV EAY
LKKVVPQVTEVQQD*

>SPBIB_v1_280031|ID:27163497| Protein Soj homolog [Uncultured spirochete bib]

MARIIVFVNQKGGVGGKTTSAINIGASLALQHKKTLIDFDPOGNLTSGIGGTLTHTNIYH
VISGLAEIKNVIQPLSIPRLFLAPSSVDLSGATIELVDRPDRNDYKRAIAPILEDYEFI
LIDCPPSLGLVTLNGLAAATEVVIPLQCEYFALEGLSLIIQTIGLVQKSINPNLKIGGIL
LTMFDARTRLSQEVVRQVTEYFKDKVFKTIIPRNVRLSEAPSHGLPAILYDPTCIGAKSY
ESVTKEIMNRG*

>SPBIB_v1_280032|ID:27163498|spo0J| Stage 0 sporulation protein J [Uncultured spirochete bib]

VAKFGLGKGLGALIPERQQFFEQSGQEASESPVRVVSIDSLSPNPDPQRKTFQSQESLNEL
AESIRRHGLLQPLL VQEQAPGKYIIIAGERRYRAARLAGLLELPVILRSEDESHLELSL
VENIQREDLDPIEEAQAYVKLMEITGATQERVAEMVGKSRVAIANAVRLLKLPEDIQSAV
KEGSITPGHARNLLSIEDENERQKLFDRIRHENLSVRQTEQEAQKLQAALQNQK GKARKS
RSGSSDDYEALDPLLRELKEKLIERLGTKVEITGSVDAGSIKIYFSQDDLQRIYDILD
IQ*

>SPBIB_v1_280033|ID:27163499| exported protein of unknown function [Uncultured spirochete bib]

MHCLKRGPKHASKTHKGVLPRTSTPFHMFQKWGQRLKPKVFAHFLTIIIMIPASGLFAQ
QSASSATVSISKMTSALPKTFQATLPQGVTFQGGSPILRTAEHIGGKMLLAPSLEGVQT
IINHISATTGTNLIIEALVFLPSPTLGGSYSASSQIDALGLLFNQFRSLQGIQYWSASR
KIMRTLYTDAFRVDNPNDKNKIKDPETIAEFRAILPQKTYIYQKDQTFSGIITEVQCAVS
QTTFLMTNTNVTPLRLIGIPVLSADGIRTGFLAAPSPEGVFLYFVTSIKSPSIGRDRVFE
SASNKALALLHWFTEAASARSIIEPVHLPWNIDDLPEIRLKQAANNP*

>SPBIB_v1_280034|ID:27163500|eno| enolase [Uncultured spirochete bib]

MSIIEYVEAREILDSRGNPTIEVDVLEDDGTLGRAAVPSGASTGEYEAVELRDGDKKRFL
GKGVLTAVENVNTTIAGEICGLDALEQVDIDRTLIELDGTENKAKLGANAILGVSMATAR
AAAEYLGPLYKYLGGAAHTTLLPVPMSNIINGGKHADNKIDFQEFMIMPVGAESFREAIR
MNAEVFQTLKGILKSEGQNTTVGDEGGFAPNIENEQALQYIVRAIEKAGYVPGEQIAIAL
DPAASELFEEGGGKGYRFWKSNDPKIFSSDDMIELYMRWVEKYPIVSLEDGLDQNDWDGY
VKLTKTLGKKIQVMGDDLFTVNTKRLAKGIEIGACNSILIKLNQIGTVTETIETVNMAGR
AGYTA VVSHRSGETEDTFIADFTVAMETGQIKTGSMSTRDRIAKYNQLMRIEDEMEGIAE
FWGKKVFYNVRG*

>SPBIB_v1_280035|ID:27163501| Membrane protein [Uncultured spirochete bib]
MLTRRLDEAKEAWKRRDSEAARRAHLPTKSAEERHTTGKGGKYLKSIYGGLDGTITTFAA
AAGVAGAALAPGVVLIVGLANLLADGLSMSIGDYLSKSESEYEAAEREREAWEVENYPE
GEKLELEEIYRARGMAEADAKAVVDIISKDKKAWVDTMMVEELGIMQSDESPVANAIATF
ISFAAFGFLPISAYVVALFVPSLDAIRFPLACFLTGATLFLGLGALKTIITGKWFISGLE
MLLVGGVAASAAAYLVGVLLGGLA*

>SPBIB_v1_280036|ID:27163502| DJ-1 family protein [Uncultured spirochete bib]
MKKACLLLAEGFEEVEAITPADFLRRAGIEVTITGIASRKVKGSHGIVETDAGPEALAK
DYDVIVLPGGQPGANNLAASPAVRDLLIRHSQKGLIAAICASPAVVLHGSCNLLQGKKF
TGYPGTEVSVKGAHFVPDRVVIDGNYITSRGPGTAGFEFAIAIIAALEGRQKADEVAQHAL
QK*

>SPBIB_v1_280037|ID:27163503|y|jgF| Enamine/imine deaminase [Uncultured spirochete bib]
MSKECVFASGAPAALGPYSHANKAGNFIFASGQLGLDPATGALVEGDVKAQAKQALQNLA
IVLKASGCSLSDVVKTTVFLKDIRDFAAVNEVYGSFFQKDFPARSAIQVAALPKDGLVEI
EAIAAYKE*

>SPBIB_v1_280038|ID:27163504|patB| Cystathionine beta-lyase PatB [Uncultured spirochete bib]
VNYDFDSIIDRTSTHSLKWDTRRLPPGCKDALPLWVADMDFACPPPEVVSIAIQERAAHPIY
GYTGRSQGNYQSFIAWMQRNGWKIQKDWIVFSPGVVPALNLAVLAYTQPGDKIILQPPV
YYPFASAVLNNGRQLVENPLVLDNGRYTMDFSLENKIDSRTKLLILCSPHNPVGRVWRK
EELERLVDICAKHDIVISDEIHSIILGTEVHHCTATISEKAAAITVTLTAPNKTFNLA
GLQIANAIIPNKRLRDAFAIQTENIGLGLSNIFGMVAQEAAYEKAEPWLEALLAYLKGNF
EFLKNFLAEHIPAIKVLPLEGTYLPWLDCRALGLSDAELHDFFLKAKLWLDDGTMFMTG
GSGFMRINIACPRAILKQALEQLEAAALQAS*

>SPBIB_v1_280039|ID:27163505|mntP| putative manganese efflux pump MntP [Uncultured spirochete bib]
MLTYILVGFALAADAFAVSVSAAACTDVLPLFLIGLRAAFMFGLFQFLMPIAGWLLGSAFS
QFIQGFHDWIAFGLLGFVGGKMLFEAIRARRKQECPPDDSPKSHGILKLNTLFLALAT
SIDALAVGLSYNILGHPVLVPSLIIGITTFVCLIGIEFGKRLKEVLEEWAEIAGGSILV
LIGLKILVEHLSNGR*

>SPBIB_v1_280040|ID:27163506| Flavin reductase domain protein FMN-binding protein [Uncultured spirochete bib]
MNSIYEEIPANEAYSLQNPGGVIFLCTRGSVPEGALRESRYNFAPLAWCTPYEYDPISKI
LLVCDTSHKTRFDIQENSEFAIALPSFDMRDLEQAGSVSGFAVDKFAHFSVQYFESKSI
DVRIPSGVVGWMECTLERIVIEGTSIVFGAVKQAFAPDAWARRLHYVNDDETWYKPGER
L*

>SPBIB_v1_280041|ID:27163507| exported protein of unknown function [Uncultured spirochete bib]
MQRRLPFLAMLALCCTTQIFAAPGIAFTLNSIKTNSDIAGLPLPTGADLTLELPLGST
STAFTLRAAAGYESRMILRSTATMFPIAEPDAGVNRFFWTNALAELGVKQYLLHKEHE
QAWLFLVVRGRYENNSPSFPTLFPDAQAVRSASVGGIAFDSIRWLGKNVKKGVSAELS
YEYSPDFANFSGTPADFGANFTAKAFVPLSASFATYLALYGVGDYALGSHIPHEVLT
FGGITGKIGDMVRGAQPWGYEAPAKTYVSAELRVAGPSMFRDFAIYPVGYLFADAAAY
GSLYGSPLADNSGMASAGAGASVSVLNLWLWLGAYAGWRLPVDPLSAIYYGSAHGFFWN
FTFVAHY*

>SPBIB_v1_280042|ID:27163508| conserved exported protein of unknown function [Uncultured spirochete bib]
MKKIIVALLVLVVASAVWAQTPGGLSAAKSTRMEADFTKIVTDMGWGTVDTRPVLAERM
WDYFYFFYPVLNKDKQITGYVWAKDIRIASHYEDILVIINPDGTLQNWVVSANTRHADFY
TDFAKKTQGAAIQKFIGMDSKRDWNQATDAVSGSTFSAKFFGELKAVLACFKIYVIDAG
KLIK*

>SPBIB_v1_280043|ID:27163509| putative Phosphoesterase PA-phosphatase related protein [Uncultured spirochete bib]

MAFIESMHAAELQFIQQLQSFLGLGFRIPMQFVSFFASEAFVIAVVPVLYWCIHRKKGAE
FGLLILGSALFINLWVKQLLAWPRPYEIIPSLALAKESTYGMPSGHSQLSVVFVAFIAEFL
PAGLRVPAMIIMPLLIGFSRIYLGVHFPSDVVGGYIIGVAFFGLFKAFGLKVEPMLRDSG
WRLRVILAAALSFINNLLLPSDTMISGAFLGASIGFTFASRNVPIDQRDDVRHKLLRYLA
GLATTGIIYLALKFASSPLASISGNNQEQLIRFIRYALVGGWVSYGAPFMFLKLGLAKRE
SS*

>SPBIB_v1_280044|ID:27163510|apbE| Thiamine biosynthesis lipoprotein ApbE [Uncultured spirochete bib]

MSFSRTYSIRITRAFLALSALLFGTISGRAIYAEDLTRTDFVLGTVCTIRLIDGGNANT
LSEAFARLRSIEDHMSANKDGTEIAQINANAGKEPVKVSSEDTFYVITKALEYARLTNGAF
DPSVGPLVKLWNIGNNGGEKVPPERELAAKALVGWQQVMDAATRQVFLKPKGMRLDLGA
IAKGYAADEVAKILIAHKVKAADVLDLGGNVLVFGSKKDKSPWRVGIQNPESARGEYLGIA
TGAQMTVVTSGVYERYFIQDGKRYHHILSTETGWPVDNGLVSVSIISKSSIDADALSTSL
FILGIEKGMALLKNFPDTPYAVFIDKDKKVYLSPGASKVFTLQEKNYHLAEK*

>SPBIB_v1_280045|ID:27163511| putative enzyme [Uncultured spirochete bib]

VASTIWRLKVGPIGVNICYIAESNGSTVIIDPGAEPKIHAFNAHSLKPSMVVLTGHGLD
HSAAIADLFELLGTELPIAIHPDDAQYLGADGQQTNRALFEAIKAPSYFHSFWKPLPPAT
VFLSDETVPVGTTLHVIHTPGHSGKSICLYEASLDAGSYGTDEDEGRGAAGWSCIISGDT
LFRDGVGRTDAPSDPVALERSLRKLAQYSYMTLVFPGHGPRTTIGRELSAPFHE*

>SPBIB_v1_280046|ID:27163512| protein of unknown function [Uncultured spirochete bib]

VPNDNAAPKFNEKTLEAFLEGLLDELKHPQDAKLLVEVRRAFRKKVPFHMRSYASALMIL
RAAGIYRPKATRQAPQEQLQRQPAKREQFKSEQRSEQLRSESPRNQQAQNEQSRSEPPG
AEHTNKEMISLFSVSMGKRHHLKPLELKKRIAERAGISPDLSLGRVHLLNYSFIEVPASES
QRIIAAMAGAELNGRAIEIKPAKKRSESVSEGG*

>SPBIB_v1_280047|ID:27163513| 3-dehydroquininate dehydratase [Uncultured spirochete bib]

MSKKGKPKICICLSGKTIEENLRILERYRAVVDYVELRADCLEPSEFNIRSFPEKAQLP
CILTIRRKQDGGNFEDGEVRLVLFKALSFPKPKDAKANYAFVDLEDDFRTVPVIEEACHT
FGTRIVRSHYFHDGIPENFDAAEQIAQEDDEIPKLVVNPQSSADFIRFLEWATRVPKRE
HLLIATGAYGIVSRVLAWRFGSTWTYASPLHSGMEIAAPGHFDPFDLRNIYNFDLVNEQT
ELYSLIGQHSILASLSPYLHNKAFREMGKDALLVPTPVDSFADGLKILELLGGKGAITV
PFKEDVLPFLAFHSTDVVKRIGACNTLVRRGDWAGYNTDADGFERSLLEFLGKQDLSGCR
ATIIGAGGAAKSIALALFRKGARCLVLNRTYSAGRDLARKYNFLYSHLDDRASDLISEYS
DIIVQATSVGMREELDPISFYEFKGEVVFVFDLIYHPSKTLKRAEEAGCRVLNGYKMLC
YQAAGQYKLMDEPPPIYAQLEQPKFS*

>SPBIB_v1_280048|ID:27163514|era| GTPase Era [Uncultured spirochete bib]

VPKSAFVAIIGRPSAGKSTLLNALCGAKVSIVSSVPQTTRNAIRGIVSHPEGQLIFVDTP
GYHLSDKKFNKLRDLVMQSLSDVDLILYVIDATREPGKEEEAIVELLKEAPRTVIAN
KIDHPDAKPLLVEEFILPRMPEAKRITISAAQKTNLAALEQLFLLAPAGPLWYPEEITYT
DQEPVFRIGEIIREKAILHTRDELPHAIAVEYRESTKRADGVLFARFDILVERDSQKPIL
IGRQGSVIKRIREEAEADLKELFDYPVKLQLQVVDVDPDWRNEETLSRMIF*

>SPBIB_v1_280049|ID:27163515|pth| Peptidyl-tRNA hydrolase [Uncultured spirochete bib]

VRVTLRRIQLVRFIMIRLCAFLGNYGKEYRLHRHNVAWLFLESMRISADLHWSTKFKGTI
AQADFGYGVKVSILKPHTFMNLSGESVVEAARFYRCSPEEILVVHDELEMPFGAFGYKFSG
GLGGHNGLRSLEKHLGTRDFWRLRFGIGRPDHSIAGYVLSPFADDELDTLTKTKVFPEAE
KTFYTLFTEGIEGYEERYRKKVVKQAP*

>SPBIB_v1_280050|ID:27163516| PHP domain protein [Uncultured spirochete bib]

MISNLHLHSCFSDGMSWPEDIALDAARSGLDMVALTDHDTMAGVARFCAACASRGMQAIP
ACEIDVNEPQIDYKSELLAYFPGAEPAAAGAPATRILRESLRNRRARLEFLINSARELYP
DKELSFEDLFRDKTRMEYDSALADEISWSKVDLFLYLKARRCIDPDMNYKAFKCKFFANG
LLKKYKLDKPDIASVVAHVHADNGFVVLPHFGHLWDDDAALMHKETEKLRSKLAWFRRAG
VDGVELYWYNADYRSKINELVRTVARPQGFFFTYGSDCGHPGSGKHTITKFKGNFEGFP
VRQADGHQSEGHQGSAGHASPNTAG*

>SPBIB_v1_280051|ID:27163517| protein of unknown function [Uncultured spirochete bib]

MFQLTDAILERIVFAMEDQTNEWLIDLRTGDIVDRSEVSDEDLEAVPERYTDLPFWSSRQ
GFTILEAFAATVTSPPPELKLALNAALRRGKGVFKAFRHALSSNDALYRRFQEFKLNAMRP
TIEKWMHAIQEEDALAAVKEEPEDLADIASELEIQTVALSEAPFDVGQVISDYATETYT
TYPALSKWALLEIHEKLT SWIREPWIA YASIDGTHPLVLGIYSLKPLEGTACCAVWGIF
ASKECATMGIEWPLLDRISEATAAGASLIILDGPLFPSSLNEEATSHGFMQAGSSLWKM
L*

>SPBIB_v1_280052|ID:27163518|fabD| Malonyl CoA-acyl carrier protein transacylase [Uncultured spirochete bib]
MSGGSMKTCFLFPGQGAQYPGMAKDFYETSKGVRELFTASEASSMDLKTLLFESDEETL
KQTKNTQIAIALAGAAAALSAKEHGIVPQGAAGFSVGEWPALAEAGVISHYDMFRLVSER
GRLMDEAGAHSGGSTMSAVLYLSPEKIEQVIAEAGLTQCWIANYNSPSQCVISGTEKDIG
IAEEKLRQAGAKRVIRLKVSGAFHSPLMHEAYEAFKELVEAITFSDPTINLYSNVSGKRM
ESGAEAKKYASLQIISPVRWIDEEVNIAADGFELCLETGPGTVLTGLWKASGSSISCAA
GTLDALVSFSL*

>SPBIB_v1_280053|ID:27163519|fabG| 3-oxoacyl-[acyl-carrier-protein] reductase [Uncultured spirochete bib]
MGKLEGEVCVITGASRGIGQAIARFKKEEGALVYGLSRSKPEANIEWIPCDVADEVISIE
SAVNSIFQKENRIDIVVNNAGITRDGLIMRMKTEDWDVAVLNANLRSAFIMSRAVSRMMLR
QRSGCILNISSVVLHGNGGQANYAASKAGIIGLTKSLAKELASRNIRVNALAPGYIETA
MTSVLPDAAKQSLTTSIPLARPGTPAEVAAALFLCSPRASITGVVLNVDGGMGM*

>SPBIB_v1_280054|ID:27163520|fabF| 3-oxoacyl-[acyl-carrier-protein] synthase II [Uncultured spirochete bib]
MNRRRVVVTGLGVVSPGLNDIPTFWSNVKANKSGIAPITMIDSSELA VKIAGEVKDFNPG
LRDPKESKKMDRFAQFAVCAALEESAQLQKESLDPLRTGVCLGTGQGGSATIEEAGV
RLTERGPSRVSPMTVAKGLANFGAAQIALSLGVHGNMTVVTACAAATDAIGQAMHLIRD
GHADIMFTGGSEASIVRMCMAFINIQALSSRNDAPEKASRPFDKDRDGFVMSEGAGILV
LEEYEHAKARGAKIYAEIAGFGATCDAHHLTAPDPEGMWVAKAIELALNDAGMKPEDIDY
ISAHGTSTPLNDPIETKAIKHAFGPHAYKLVSSLKSMIGHCIGAAGAIETIAAILGMNE
NYIHPTINLDNPDPECDLDYVPNKGINMPVRAVFKESMGFGGQNAVLVVTKA*

>SPBIB_v1_280055|ID:27163521|glgX| Glycogen operon protein GlgX homolog [Uncultured spirochete bib]
MSGHFRALPKELHIFPGNPLLPGAMPHPQGVYFSVFSRHATGMILCLYESPHDDKPAASL
RLDPVRNRTGDIWHCYIPGLKPGTYLWRAEGPFAPHEGHRFNPNKVLIDPYAKALTDGT
LDLCSALAYDESSPKDLSFSEKPNDCMPKCVVIEDNFDWEGDTPLNYPLKDCIYETH
VRGLTRSSSAKVKHHGTYRGGVEMIPYFKDLGITSLEFLPVQEFDSAERFRHNPVTGEQL
SNYWGYAPLAFAPKTSYAYPDGVDHDSYDPEFPVKEFKYMVRELHKAGIEVILDVVFNH
TAEGNELGPTLSFRGFDNSIFYMLAEDKRYRNYSGCGNTLNCNHPVMRTFIKECLRYWV
VTMHVDGFRFDLGSILGRDSQGNLLPNPPVIESIAEDPIMRNTKIIAEAWDAGGAYQVGS
FPGGRWAEWNDRYRDDVRKFWRGDEGMAPHFATRITGSSDLYLKNGKRPFHNSINFVTSHD
GFTLNDLVSYHQKHNEANGEDNQDGLNENYSSNYGIEGPTDVPFIEEIRNRQIKNFFATL
LLSIGTPMICGGDEFRRQTQNGNNA YCHDTEMNWDWSYKQHKDIYRFAKLLIGFRKNH
QAFRREDFRGETDQNTANPEAPDILWFDEHGNPPLWTS LGKVLVARINEHKSSENSK
VPIYSYLLAFNASPEAIQIQLPDDNTEDTWKRIVDTSLPAPHDFEENEYLALGAPHTYVM
GPRSFVLLIAGH*

>SPBIB_v1_280056|ID:27163522| putative SEC-C motif domain protein [Uncultured spirochete bib]
VKTTSGTSKAAFYLRKGIYELAHHRPAKALALLRQSVEITPPSCENDLSKALYWLSIALL
RLDQRELA VKSLANAQKIRRSYARKVYVRNINEYGM LKRP TRELDDL YAFVSIQLSSYL
LKKPQHRFGSQAESAVLKLILETWKQLKDSDEFKSLECGEKLLFRKLLKIDFIFGSYS
TSPRYSERFAMNIASVGMRTCSCGSGLPFEQCCGRVQGLSEI*

>SPBIB_v1_280057|ID:27163523| RNA polymerase sigma factor [Uncultured spirochete bib]
MMERKKTKETRSSAQFDENVLSMYLREINRIPLLSREEENEYATRAALGDELA KAILAK
SNLRFVVNVAKKYQNQGLPLADLIAEGNIGLLNAIEHYDVTKGYHFISYAVWWIRQAILK
AICEKSRMIRLPLNRANELVQIEKARNLFEGELSEDAEIREVAEFLEMEPEHVKDIISIS
RDLISLDAPVYDEKNSTTVGELIENEHHESPEQNAIQSSLREDINKVLAALTAKEREIE
YRFGNLNGKRPMSLKEIGDRMHLTKERIRQIEKAALKKVAVPETMEILQAYMA*

>SPBIB_v1_280058|ID:27163524| putative Polyprenyl synthetase [Uncultured spirochete bib]
MEHLFLEFTQQA KATISAHIASILHENQPMFSRISGTGAWLASEMEDFADSGKMLRGLA
ILGAQLLGMQNQKNSVSLAAGLELLQAGLLVHDDIMDHDEKRRGKPTFHIRIRNKIQWPD

QALSAPLAVQLAEAQSICAGDLFFFLAWQEIAYLPQRVSVTVAQEHAKVTLAQMVDVALG
YVEGFDPDISSVIEMYRHKTARYTVALPLMAGALLLDNCTSEVLKSLERLGESESLGIVFQLQ
DDRLGLFGDETAIGKPVGSDLKEGKTPYILALIPQLSESEMKRFSIFRAQALEPSELE
WIRSLIVSRGVDAKIRSLIDNQIELARKALADLGQFEAVSEETMILLADDFIDYLSRER*
>SPBIB_v1_280059|ID:27163525| protein of unknown function [Uncultured spirochete bib]
MMRLSLYLLGHNYLKPFRIRAHKGMHPRTHAEAAGIPVHLVQHVFVQALTGGIRDFLSRCT
LSETMRRTWEKRWKTPGKDKAEYLPKYALA*

>SPBIB_v1_290001|ID:27163526|gyrA| DNA gyrase subunit A [Uncultured spirochete bib]
MSESGNIIQPIEEVVKTSYLYNAMSIVSRALPDVDRDGLKPVHRLLFAMEELGLRNNA
PTKKSARITGDAMGKYHPHGDLSLYDALVRMAQDFSLRYPLVQGQGNFGSIDGDPPAASR
YTEAKLSKIGEMLADLDKETVDFVFNYPDESLEKPSVLPSAIPNLLINGSSGIAVGMATN
MPPHNLREVAQAIEAYIENPDISIDLMNYVKGPDPFTGGIYGMQGIRDAYATGRGRLT
VRGRFIIETMKS GREQIVFTEIPYALNKTTLVTRIAELVRDKQIDGISDLRDESDRDGIR
IVLELKKGAITKIVLNQLFIHTPLQSTFGVINLALVNGAPKCLNLKELITYYVQHRFEVV
TRRSQYELKKAERAHILRGLVIALQNIDEVVAIKASRNVDTAKTNLRRERFGLSDAQAQ
AIVDMRLGRLTSLETEKLLAELKETEARIEYLRALLADSAAIHAVIKKEIHELAEKYGDE
RRTEIVPNQVEQINIEDLIKPEEMVILISNKGFIKRISVNQYRSQGRGGKGSNSTSLED
DFLQQLFIANTHDYLLFISSWGKAYWLKALEIPEASRQARGSHIRSLAISQDEEITAVV
DFSDFSKQYILMGTGKGVVKKVATKEFANAKTRGIIGISLDDGDRLVSAILTGGTDEVM
LISRKGLALRMQESQVRQMGRARGVRLTLQEEDELAAMLRVDSEESMLIITQNGYGKR
VKYDLFTPHSRGTRGQIYEPDESSGEVIKAITVREEDEVMVITSMGKTIKLNVS AVRQM
GKAARGVRIVNIDPPDLVIGMDKIVQQVELEGSAPNLVPELK*

>SPBIB_v1_290002|ID:27163527|gyrB| DNA gyrase subunit B [Uncultured spirochete bib]
MESTVNNYSASTIQVLKGLEAVRRRPGMYIGSTGIEGLHHLVYEVVDNSIDEALEGYCDN
VVVALEKQDIVRVEDDGRGIPVDIHPTEGISALELVMTRLHAGGKFDKKNYKVSGLLHG
GVSVVNALSTWLEVYVHTGGKVYYQKYLRGIPEKPVVQIGETDKRGTIVRFQADPEIFEE
TVYSFDILSNRLRELAFLNKGIKISLLDERLAQPKRIEFHFEGGLREFVEYLNKNKSAIH
REVIYFSGTRDDVEIETGIQYNDGYNETMFSYVNGINTREGGTHLVGFRNALTKVINDFF
KKSXYNKKLEENLSGDDVREGLTAVLSVKVQEPQFEGQTKGKLGNSEVKGIVESFLADQL
DLYFQKNPDVINIILDKCTMAARARIAARQARELTRRKSLEASSLPGLADCQEKDPTK
CELFIVEGDSAGGSAKMGRNRVFQAILPLWGKMLNVEKARLDRVIGNDKLQPIIASLGTS
IGEDFDVSKLRYHKVIIMADADV DGS HIRTLTLLTFFRYMTELIEHGHVYLAMPPLYRIV
YDKEVRYAYSDEEKDHILSEINKDSSKIAVQRYKGLGEMNPEQLWETTMDPERRMIKRIT
MEDAVLAEEMFVTLMGGEQVEPRRLFIEENALAVSNLDV*

>SPBIB_v1_290003|ID:27163528|dnaA| Chromosomal replication initiator protein DnaA [Uncultured spirochete bib]
MIDESNETVWQKALEIAKSQVPESEFIMWFRGLGYLGFENGITLLRANNTFLRDQFMRKYG
DFMREILSSILGMQVNLVSAEQPSAIEQRLPLQKAAATSLNSSAKKAKEKPNPQQAASPV
TSISDEEISNNSYPAYSRTQESRTANLQPRYTFESFVVGENSENFAFNAAAA VAEIPGT
SYNPLLIYGGVGLGKTHLMHAIGNRIAERHPELRIICVTAEDFTNEFIKTIHRTTNEFK
NKYRNIDVLLIDDIHFFQSKHGVEELFHTFNALYDSGKQLVFTCDRPA SELKDFSERLK
SRFMMGLKTDLTTPGFETRAAIIRKKLELYKRTFSEDVINLIAKSIETNVRDLDSCHQI
IAYS DLINVEPTYDIAQNIKQLTNAFKPAAINVSSIIKTVADYYKLSISDLKGGKRSKN
IALARQVAMYIIRETTDYSTTEIGSEFNDRDHTTVMHSCQKIEDLIKFD SIFASAMNRLI
QDCKENSST*

>SPBIB_v1_290004|ID:27163529|dnaN| DNA polymerase III subunit beta [Uncultured spirochete bib]
MKFICDRDFTSREIAIAQDIIASKNAFMSIMSNVYLETTDSKLIIRATDAKVGFE TEIPVS
DSEPGSLTVFCDKLMAITNSIPEGDMLFEQRESSVEIRPLSKKVRFLKTIAGDKFPELP
RIEENQYFILQAHLRKMISQTIFS VNDETRFFMNGVFMKLPDDVVAMVSTDGRRLAF
ISTPVGNIPDFASAIIPKALS VLMKRAPDEGQILVAVNEKNIFFRFGNYQLSSFLIEGK
FPNYQKVIPHDQRNHFIVSKDDLQAALRRVSLFVEKSNK VILNVSSKGLVLESEETELGA
AREELPCEYEGEDVVILLSNRYLEDPLKVLDTDKLAI EFTDPSRAITLRPEPAANYFHII
MPMQQP*

>SPBIB_v1_290005|ID:27163530|recF| DNA replication and repair protein RecF [Uncultured spirochete bib]
MAFEQIRIARFRNIEETELELGAGNIFLLGENGQKTNFLEALYCLSYGNSFRTHQDREL

PMHGSPEFLRAQWREINSPAQEQISIRYSIEGRKEIRINDKLLSDRKELVAHNPAVVFC
HEDLAFAAGVPEERRFFFDQCAGMLWLDYIDLLRFYRRVLKHRNIALKTDTFSILDTLDE
QLAQYGHEIMAYRKRLSQLFIARFPQMYELVSQLGTEVSIRYSPSWPLDSSKEEIMALLA
EYRTKDIEAATSLSGPHRDRWIFTRGRNFAAFASGTGQLRLASLILRIVQVHLYAELSA
EVRCPVLLDDVLELDVAKRRRFFSLLPAKDAGAQA VFTFLPEEPWREYADESTIVYR
VSNGRFSREESR*

>SPBIB_v1_290006|ID:27163531| protein of unknown function [Uncultured spirochete bib]
MDDFRVKKAGEILSRFFDEKTLRSATQFESFRASWKNIVGQRLADHSPKPKSILRRTLLIS
ADHAGWIQLLQIDQERILQRIAKNFPELEITSLAFTVEEAASEAKQSPQVQARQPGSPLA
PLAESLPLQPEPDAAHARKASKSVLPAPLKEIFARLQRPRGD*

>SPBIB_v1_290007|ID:27163532|rpmH| 50S ribosomal protein L34 [Uncultured spirochete bib]
MKRTYQPSRTKRNRKFGFRARMKTKGGRLILKRRRAKGRIKLSVADEKKKY*

>SPBIB_v1_290008|ID:27163533| Ribonuclease P protein component (fragment) [Uncultured spirochete bib]
MQVLYKGEQESRAAFIAVRSFSGAVARNRAKRLARES WLLLRHSVKS GFDIVFVLYPGFA
ALSDCRSAMQYLLHKADLLR*

>SPBIB_v1_290009|ID:27163534| putative membrane protein insertion efficiency factor [Uncultured spirochete bib]
MNIVNKLSPFLLVAIRIYQLVISPLFPSCR FYPTCSSYSYQAIRKYGPFKGLVLSFKR
VIRCHPGNPGGFDPVP*

>SPBIB_v1_290010|ID:27163535|yidC| Membrane protein insertase YidC [Uncultured spirochete bib]
MSNIFEQEPSSKEDRRRTIIAVVLSTVIVSAGFMVQNALFPPATQQSTATQTPAQGTLP
AQNTSAPAVAVPSPIPVKTASSSSIPVPA AERTYIIETDVMSATLTNAGGEIVSLTLKNH
RDKSGAVDLIVRGSSGANGLSLSFGSATAPVRELMNAQWLDESKTAIEFSRMFEAPLAGS
DQKVPFVLKRAYSFKKGEYLFALGISIEQPDGKPIALGANGIAYRLDLGPQIGPRFDQLP
KNADYRKYIAEIDGKKKSEQPKANTPTVIAPSASWLAMSGKYFTFIAVPKAPMSGYEIET
AQDPLIKQTNTLSLLRSTFSGVSTTDTYYFYFGPKTSAELGKYEYADKNGFGLASLKLED
AMEGSGMLGWLENFLKFLNFFYKLIPNYGIAIILVTVLKALFYPLTKKSSMSTARMAE
LQPKIQELQAKYKGNPQKLNQEMAELYKRENYNPMMSGCLPLLIQFPLFIAMYNLFNHFD
LRGAMFIGGWINDLSLPESIINFGNFR LPIVGWNDLRALPIIYLFSQLLYGKFTQSPQSA
QNSNQASQMKLMMYGMPIFFFILYDVPSGLLIY WITNNVLTILQQIVINDLMKKHKLA
RAE AATSTGGGPVSAGTGETSSRTAGNATKPAASKLASGKKA AVDAKARPVGRAGSKEGF
SEKVTKWLENKAGKTEKGSKR GATGKSGPNSGSGSAKGSPPKKNN*

>SPBIB_v1_290011|ID:27163536| putative RNA-binding protein [Uncultured spirochete bib]
MIYEFEGKTEREAIELAAQELGLDTS SFDVEIENQSGGLFKKGKVRIRVHTKDAPRQAQ
QDAPEEKSEKQERHDVEPIPMDDFERKMVEWTK E VIEHMGYSSDVSVAFREP KKLGLRID
TESASILIGKKGRNIDALQLLANVYAGTLGHNDMKIVL DSENYRLRREEALVRIAYETA E
EVRRSGRSVLLEPMNPFERRIHTTLNDIID IETKSEGEGLMKQVRVMLKGRK*

>SPBIB_v1_290012|ID:27163537|rfnC| Electron transport complex protein RnfC [Uncultured spirochete bib]
MVIWGGFVIIFQHIASNAKKL VFSAESALIFKGD LSTMSIRTFKGGAHPPERKDRSGGKP
IERLTSVPQVVIPVNQHFGAPIQPLVKVGEFVKAGQKIADA EGRMTVPLHASVAGVVKKI
EPRMQSNNT EGLCIVIEPKDPPEGESAQDFMPPLDPFACTKEEALARIRAAGIVGMGGAG
FPAHVKLAPTKPISYVIANAVECEPYLTIDERTLIETPEKIVDGVAIVMKT VNAPEGVIA
IEENKHAIPYVQKAIDQSPQVKAGMKIRIQELKTKYPQGGEKMLITAITGKQVPSGGLP
MDVGCVVS NVGTLCAIVDAFREGKPLIERGFTVTGGACKTPKNL VAPIGTLISDLVKASV
VETDEESLAKVIFGGPMMGVA VPSYEIPVQKNTSGVLLMSKEEAMQYEEETCIRCGRCIR
ACPTAVSPALLAIAIESGN YAEAEKIGLLDCIECGSCSFVCPAHRHLVQRFRV GKQVLR
LKQKEAQNVR*

>SPBIB_v1_290013|ID:27163538| Electron transport complex, RnfABCDGE type, D subunit [Uncultured spirochete bib]

MSDRKLLSSSPHIFSPVDT PRIMLSVVIALMPATAYGIYLYGLPALGVVVVTSIAAAVVS
EFLFRKLIKASMTVGDFS AVVSGLLLALILPPSTPLWMVALGAIFAIVIAKEFFGGLGAN
PFNPALIGRAFLMSFPAAITSWMPKGLGLPADALSAATPLNLLKQGNALADVAKYFGA
SDTGAFYRQLFMGYRSGSIGESSILLVLLGGLFLLGIGVIQWIVPVSVLASTFVFSWLLG
MDPVLGLLTG GIVFGAFFMATDYATRPLTPY GQAIFGIGIGLITVLIRKFGGYPEGV TYA
ILIMNILTPFLNKL RVKKYGFVPPPKPARPSKEATK*

>SPBIB_v1_290014|ID:27163539| Electron transport complex, rnfabcdGe type, g subunit [Uncultured spirochete bib]
MKKDMVKLGITLALFASLACASLAVVYSFTKESIEKQSEMQLTASLKEVFPEASVFDQVQ
DLASDPDPNVKFEAVYEVKSDKAPLGLAIKATGSSYGGNATLLVAVDLHRSIAGVRVMELK
DTPGLGMNASSPTYYYVDKTKKTTFTGQFNGKYLDAFEVKKDVIAITAATITSKSLTKII
KTAGDAAIAYMDKKAAMSTGDAGAPADANAQTQAGGN*

>SPBIB_v1_290015|ID:27163540| Electron transport complex subunit E [Uncultured spirochete bib]
MKKLYSIFKQGIIFDNPLLMLMIGLCSAIAVTTNVSNGIGMGLAMTFVLLFSEVIISLFR
KLIPSAIRIPVFIIVIAAFTTMVDLVMKAYFPDLKSMGVFIPLIVVNCIIMGRVEAFAS
KQNLVSVIADSLGMGLGYTWVLIGLAAVRELLGNGTLAGIQIMPSSYQPILFFILPPGGF
FVFSLFIAFNIWLKKKMEASQRTKELAAKKEAA*

>SPBIB_v1_290016|ID:27163541|rsxA| putative inner membrane subunit of an electron transport system [Uncultured spirochete bib]
MDLMKIFLLALLVNNIVVMRFLALCSYIGMTSDVQGQSVGMGFAVTFVTVLATAATWPIYN
YILVPLNLTFLQILIFILVIASLVQLVEFYLKKNVPGLYSAMGIYLPITTNCAILAVTF
ENISFKYNFIESIAYSVGVSLGYLLAMVLLAGIRDRMKTSPVPKFLQGTPILFMATALIG
IAFMGFSLIK*

>SPBIB_v1_290017|ID:27163542| Electron transport complex, RnfABCDGE type, B subunit [Uncultured spirochete bib]
MVGTLITFGFSAVLALVLGVALGFFREKFKVERDPKIDEVREALPGANCGACGYPGCDG
YSEAVATGRAPTTKCSVGGSSATAEALAKIMGVEGGAEDKVAVLLCQGAVDKTVSKGEYN
GIQTCRAAKLSTGSIKTCWSWCQGFQDCVNVCKFDALAMGEDGLPHVNYDNCTGCGLCVE
ECPQKILTLVPRDRVGSIVLCSNRSTVKASVIKTCVKGCICELCVKSCPEGAITMVNGI
PVTDYAKCTSCGICVEKCPKCYKMLEVDVFGTKKLVPMVMEQAQA*

>SPBIB_v1_290018|ID:27163543| putative Lipoprotein [Uncultured spirochete bib]
MQLKSRPIGRLKYFIFMQVLSNNTMKFLRGGARGRSIGAVKSISVAHIIAARFIAARIV
AIAALWSALAVLPAYS AVTAPPLLGRASADSRQAVIKAAEAFLGAPYRLGGKTKSGIDCS
GLVYAAFLKATGIKVPRTVRDLSKWVLVIPRQDLVPGDLVFFDLEASATATSVPSQTSVP
QNA AFLSKADHVGIYIGEGIFIHAASSGSPKGVIKSSLSEAGWKHRFLFAGRALPASALS
GIAAEWGGGVGLGHLDLSSPFVSLRSFNGWGELSLPIANNFAAGIRLGIADRYLGVV
RVPAELDIGQISGFSLFAGPALTFGSSVHVIATGGIRWSPLLFSSGAQRFGIY AELRYDH
YVPLAGQPDNAVADMNACVSFSIGFRLRSVKY*

>SPBIB_v1_290019|ID:27163544|yefM| antitoxin of the YoeB-YefM toxin-antitoxin system [Uncultured spirochete bib]
MDAVSYSDLRQNLKSYMDKVYKDHDPLIITRKNENLVLLSIDEYNSLMETTYLLSNDAN
AEHLKKSIAQYTAGNVSKRELLNDE*

>SPBIB_v1_290020|ID:27163545|yoeB| toxin of the YoeB-YefM toxin-antitoxin system [Uncultured spirochete bib]
MNKLFTEAWKDYIYWHETDKKQLKINDLTKEIDRMPFEGTGKPEALKQNLQGFWSRRI
DHEHRIVYKVEENQVIFISFRYHYSK*

>SPBIB_v1_290021|ID:27163546| transposase [Uncultured spirochete bib]
VKLLCSIAQVSRSGYYRYLLITQKPNKDARLAEKVREVQEAVCYSYGAKRMAHVLSESEQ
VPINHKRIARIMQKYL LGARILRRHPEYWYRQRHKVRLSDRQCAPNILNRDFLAPCPLK
KLVTDVTWISCADGTLYLSAVMDLFNRQIISYTLRRTTATALSPILELVGSYNLQGT
VHSDRGPA YRSEYQALLRKHGIVTSYSRAGNCWDNALMECFFGHMKCELGFVTGSQKKQ
RVAQVSQKIHEYL VFYNKTRIQKNLGVVSPMGYKMLYTSSIESNNVST*

>SPBIB_v1_290022|ID:27163547| protein of unknown function [Uncultured spirochete bib]
MKYRKAERGS MKYPLELKQKVLKDYFEGKDGIRGLERTYGIQHQLILSWIKTCQQPSYRM
RQGKVPKEAALHLNEPPVFNDPRKELEYLRAENAYLREMLMLSGVRKNGRKKKALPPSND
SAHEATP*

>SPBIB_v1_290023|ID:27163548| Tryptophan synthase beta chain 2 (fragment) [Uncultured spirochete bib]
VSTDRGLVQSETGKFKPTLTIIACVGVGWSNFAGLAFPFVKKKIEGADIEIIPVEPASCPS
LTKGKFTYDLGDVAGMTPYLAMYTLGHTFMPHPMHAGGLRYHSMSPVLSQAAAEGLLSPS
AVPQL*

>SPBIB_v1_290024|ID:27163549| protein of unknown function [Uncultured spirochete bib]
VAPETSHALAQVIREATKAKKEGKEKVILFSLSGYGLLDMQRYADYFPGKLSNLELSEAE

IEKALAGLPKLETVG*

>SPBIB_v1_290025|ID:27163550| DNA and RNA helicase [Uncultured spirochete bib]
MRIIADLHIHSHYSRATSPKLTTPPYLDRWARIKGINLVGTGDCTHPGWLAELEMEQLEPAE
GGFFQLKSTLRREFDAGEALAEGLPAPTGDSPVRFVLTGEISTIYSRDGRTRKIHVVIL
PDFAAAAAFQARLERMGNVSSDGRPILGVDSRDLFAALLDADERSILVPAHIWTPWFSAL
GARSGFDSIEECYGD LAPRIGAIETGLSSNPPMNWAVSALDRFAIISNSDAHSPEKLGRE
ATVIDMENSFAGLAGALTGGGPAGRIAGTVEFFPQEGKYHYDGHACGCVLSPAESAAYG
GLCPVCGKPLTPGVMRRVAELADRPVDETAASCPDYAGTNRPPYKSLIPLPELLAELLGT
GSGSKKVAAYGTLVERAGSEFALLDRNEAEIETLGTAGVPGELLAMAVGRMRSGQVSI
KPGYDGEYGVIIHAFAPGERIESKAGAGLFDDETGTGEEETAPAGRARAGTLTASEPAGRK
KDATPPAALDKAPKSVPESTRAAFGLDPAQEAAVNHPGGPALIVAGPGTGKTTVLALRIA
RLVEGGLDPSSILAITFTNKA AELRGRIEGTIGGARAARLTAATFHAFCLSVLREHTAD
ASLLSSFGVLDEEEKTAFLNLA VRPSQGRGSGRAEASRTLADNAQTDLLQASLTKTSRP
QKVRRLASYIEERKRFLLLPGDRVPRLGPAGDGLAELAAELGVPLDVLDDVA YARYRD
ELKRAHALDFDDL VAGAARLLAARPEILSAYRARFRAIFVDEYQDVNFAQYALLRLLAPG
TDSAELCVIGDPNQAIYGFRGSDRRFIERFLADYPGAAIYRLVRSFRCAPGIIGAAGRLV
GAELGGSGTVVALSRCEFPDASEAEGIAREIDRLIGGTRFFAIDSGVAGSVGAGSGAGL
ASQAHTASREGPALSSLGECAILVRAAALAQPIEKALLDHGIPYRFIDKPPWWEGERIS
VLSL VRAAARIDVRPDAGIKRAVEATA CAIIGQHNTROGQASPEKVLRARLPGLSPA EAV
RAAIDLLDGEAAAGASKAVAAGVPRVAFGTRPGESLERLISQASLYPDFASFLDDLALGS
PQDGYEAHAECVSLMTIHA AKGLEFDYV FVAGLEEGLLPFTLFEGHGGARAGDRKSGESE
ENSGEAGREDSARRRERIEEERLLYVAMTRARVGLYLSWARSRHFLGRKLSLGPSRFLA
QIEDLVPKVEQTPPRKPKPQLDLF*

>SPBIB_v1_290026|ID:27163551| putative Methylglyoxal synthase [Uncultured spirochete bib]
VSVDLSSNLSKCLDFCKRLVQINGESLDSIKRIALVAHDKEKRELA EWVQYNWKT LVKHD
LISTGTTGRLVEETMIAKAGDVRPEGLRLTLLKSGPLGGDQQVGALIAEGKIDIMIFFLG
SYVSPSPRRRCQSPFEDSRSLQHSGL*

>SPBIB_v1_290027|ID:27163552| transposase (fragment) [Uncultured spirochete bib]
VTFLYSVMDSAYDASPIREYISGKGHVPLIEINTRRGCTRSFSPAQE ARFAIRTTVEGAN
AHLKDWLLPAQLFVRGVTKVTFRLLYGVLC LAALKILQYFILPSLQTE*

>SPBIB_v1_290028|ID:27163553| protein of unknown function [Uncultured spirochete bib]
LCKKRSEK GIRVIGRSPQPRVYLLKGGNMGFYDPQHRKKRCVLSREL VFKALLQIITQVQ
KDLHSTKNFCYTLHGRGHSC*

>SPBIB_v1_290029|ID:27163554| protein of unknown function [Uncultured spirochete bib]
VTSPMKSAEILGGMQILLDLSYDLQECFED*

>SPBIB_v1_290030|ID:27163555| protein of unknown function [Uncultured spirochete bib]
MYRKKEKVAEF EKFDMMVFGGSLRRANRWARLTDLIPWDEVEACYASLFVEQNSRPAISVR
VALGSLILKENLQYCKARGIRLSGPKLGRPLSDIAKNQKQLREEQRIARQDERMRNAVEG
KRRYSLDRIMTRLQATSESTIMMVFLVMNLGRLLRKTASAFFALLVSLISRLRAQHIVS
NHAAQAA*

>SPBIB_v1_290031|ID:27163556|metK| methionine adenosyltransferase 1 [Uncultured spirochete bib]
MTQPLLRPFTSES VSEGHPDKICDQISDAVLDA CLA KDKHSRVACECF TTTGLVLVGGEI
TTHTYVDIQQVARSVVREIGYDNPEYGLDWASMAVLNSIHNQSPDIAQGV EGHGLKEYEG
KQGAGDQGM MFGFACNETPELMPTPI LAHKILQKASAVRKAKEIAWMPDGKSQVTVEY
DGHKPVRI SAVVLSQQHDEINGSGHYLEYEIRQTLIEKVIKPVLA PTGLLDERTRYFIN
PTGRFVIGGPAGDTGLTGRKIIVDTYGGMGRHGGGAFSGKDPSKVDRSAA YMARYIAKNV
VAAGLADRCELELAYAIGVPEPISVLVETFGTAKVDEFAIEQAILKVFDLSPRGIIETLQ
LKNPIYRATAAYGHFGRDSFSWEKTDKIEALHKAIR*

>SPBIB_v1_290032|ID:27163557| putative Zn-dependent protease-like protein [Uncultured spirochete bib]
MMIATIREAIASINAHDTIKISDWRLVERRLERQERY YVASKAEQARAVDETLYSLTVYV
DTIASGAGGSGGTSSGAGTGSLPNAASGSASSAGTNNPSASPALKKFRGEATITIQPTFS
RAECEAKIRQA AFAASKSRNPWFELPEPSAPKTSVPVSGFEALSPAERIETVRHAFFSAA
NRFGGNARINSLEL FITKETKRLNLSRGFDFASTIWRGYSEFVVEADSSSGTVELFDIE
FSEPDASRLSEAIETRLAQVRDRAHAAPMPTLQGLSVILRGKEAEVFGWFFHNSRTEMI

YSKASAFEAGKSVQESDKGEAPVEPLDVFAEPVISGLPSSSAFDADGFPLERTAVIEDGI
LKTIGSIRHADWLGVPKGAFLFSVSPGTMSLDEMHAAPYLEPVMFSDFRLLDPVTGDF
GAEVRLAYYFDGAKVVPVTGGSSISGSLALRAAMRRSKEVGLAAHSLCPKAVMLQGVIIIT
GAC*

>SPBIB_v1_290033|ID:27163558| Peptidase U62 modulator of DNA gyrase [Uncultured spirochete bib]
MPKRTHSPFLLEAKPVLGEVIEHLKPWFYISVLATDDRGLSYFALPGETRTAEPMWVQR
GFVFRAQREGKVAEYACAVLPGAAQESVSFASTRSRASASAEIADAVRARLDSLLADPT
LIAFPQIADEPAAAEFLGEIEEDPFTADPEDVLSRLAVLREKLTGKVVVMAQSRYECD
VSRLFLSPNRSMLMQSFLWSQAYLFGVARRGQMSKMSYRPASGRKGLEILRGLETSVPELA
QELADLLEAVPMEPEGEYEVILDPDMAGTLAHEAFGHGVETDMFFKKRAKALEYLGKRVGS
DLVTMYDGAAGVDQTGSYLFDDDEGTLATKTCVIENGILKGGISDTLSALALGIPRTGNR
REAYSHKAYARMTNTYFAPGTSTLEEMIASVKHGWQLSQLNSGMEDPRNWIQLICMVGR
EIKDGKYTGRVASPVVCSGYVPDVLSAVSMVSSDFELGGSGACGKGHKEYAKVSSGGPYV
KTRMRLG*

>SPBIB_v1_290034|ID:27163559| putative redox protein [Uncultured spirochete bib]
METSKREMKVLITGKSENPTKINLRAGKFELAIDEPKSLGGTDQGPSPVQVLLMALAGCL
NVTGHEVARQKGLTLHGKVMRIEGVMNPCTFLGCSFEERAGFQKIMVNITPDFEDATDAQ
IEEWMKETENRCPVTDNIRADTDIEVKVAKE*

>SPBIB_v1_290035|ID:27163560|glT| glutamate and aspartate transporter subunit ; ATP-binding component of ABC
superfamily [Uncultured spirochete bib]
VEKYIEINNAVKSFGSVKALCGVSLTVKKGEVVLVIGPSGSGKSTLLRSVNRLERLDSGE
IFIDGESVTDPNADIRHIREEVGMVFQSFNLFPHLTVIDNITLAPITVLKKTDEAIDQA
RSLAKVGLSDKEKAWPEQLSGGQQQRVAIARALAMNPKVMLFDEPTSALDPEMIKEVLD
VMTELAREGMTMLVVSHEMGFARAAANRIIFMDAGQIVVEAPPETFFTSPREERTRKFLE
HIL*

>SPBIB_v1_290036|ID:27163561| Polar amino acid ABC transporter, inner membrane subunit [Uncultured spirochete
bib]
MMKGSPLSGRDSKNPNQTTINVTGTLIPLKDEGSLLSAWNISFFGAVALLVILPLFSPD
PYLRILSFVPDGLVATFSVTLISIFFALLIGLFAGLGRISQKLFINRIATVYVEVIRGIP
LLVQLFYIYYALGPLLRKGPAAAILAMSICYGAYMAEIFRAGMQAIPKQMEAAALGM
SRSMAMRKIIIPQTIIRIIPPIGNEFIALLKDSSLVSILAVSDLLRRGREYASTSFYFE
SYTHIALIYLVMTLFFSRLVGMMEERLRHRGKVH*

>SPBIB_v1_290037|ID:27163562| ABC-type transporter, periplasmic subunit family 3 [Uncultured spirochete bib]
MKKSWPVFASVILIAIVALGVTSLSKAKTKITVATDATWPPMEYVDENKNIVGFDID
LVNEVAKAAGFEVEIKNTAWDGIFAGLAAGNYQAIASSVTVTDERKATMDFSEPYVNAGQ
VLVVRKNTTGVTTLADMIGKKVGAQIGTTGAIIEVGKVQGVELKTYDEVGLAFEDLANGNI
DGVVADSPIAANFALQNASYKEKLMIVGKPFTEWLAFAFKKGDTKTQKLFNDGLAKVKS
SGKLDLVKKWLQ*

>SPBIB_v1_290038|ID:27163563| protein of unknown function [Uncultured spirochete bib]
LAFAAAAFLRHLIQSHREVRGTIEFLGMRGFARALLRALAVSIFMLHS*

>SPBIB_v1_290039|ID:27163564| conserved protein of unknown function [Uncultured spirochete bib]
MSFNNDISLQRRPDAQPLELLSPERTMEIVLEALRELVEYELAVVMRLEAPDRLVVRKAV
GPLYTPRLEGYSISLTRRQDIARLLEHKEPKLFGHEHAHIDTYDILDLPNGHSCLVAPL
YIESTLIGLLTLDHRACNRFSPSIVRFISTISKLISVSMVQSDASRSLMEKTRELTEERN
RLDESADAFRDLVGVSAVWRRVLDVRLVAVADVPVLLTGETGTGKEQVARKIHQLSHR
ASGPFIAVNCSALVSSLAESLFGHEKGAFGAVAMRRGRFELADGGTLFLDEIGDLPLE
LQPKLLRVLQDGKFERVGGESVAVDVRIIAATNIDLESAIAAGKFREDLWYRLHVFPIH
LPPLRERDEDAALLAEYFVSQIRRRPGFESLALSPSAIERILATEWRGNVRELRNAIERA
AILARGGSIFAHLVPATNAYQARQAQGAYQADSAATSASTAISEPSSMYFPPLDDALRA
HIIAALKKSGGKIYGSNGAASLLGMKPTTLQSKMKKLGIRSSSFSAPPDTKP*

>SPBIB_v1_290040|ID:27163565| putative peroxiredoxin [Uncultured spirochete bib]
MEQQNFHMPLLGDDFPTLTLQTTQGVMLNPGDLKGRWFVLFHPADFTPVCTTEFVGFQR
LMPEFEKLGVKLIGMSVDQVFSHIKWIEWIKEKLGVEITFPIAAANDSIANALGMLHPGK
GTNTVRAVFVVDPPQSKVRLVIYYPQEIGRNMEEVLRVAVKALQVADKNNVAVPANWPNEL

IKDRVIISPAKTVTEAATRLKEYDGYDWWFCHKAL*

>SPBIB_v1_290041|ID:27163566| Thiol-disulfide isomerase and thioredoxins [Uncultured spirochete bib]

VKPVQSYNEITQLIQQNEAVLFYCSAPSCGVCKSLKPKVIELVQSHFPNLPMYYYVDIDAI
PEARQQLSVYSVPAVLVYFKGKELIREARNFGIMELGAKIDRYYSMIFESAV*

>SPBIB_v1_290042|ID:27163567|hipA| regulator with hipB [Uncultured spirochete bib]

MPRLSKNRSLCIWMNGLYVGRWSINRQKGHEFYDASWLDSPPEARPVSLSLPLAPADFYV
SGKIVESYFENLLPDSSTEIRQRIRARFGAASLSSFDLLAEIGRDCV GALQILPEFEVPGT
SEVLEAREVNESEIESILNRITSNGPMFQAFDDAFRISIAGAQEKTAMLFHGGQWKVPLG
STPTTHILKLPLGRIGAAGIDMSTSIENEWLCSRIVSSLGLATAKCDIARFGDAKVLVVE
RFDRRFAHDGQWVLRIPQEDFCQANGYSSSQKYEADGGPGIVSIMKFLGSGNPQRDREA
FFKAQIVNWLLAAPDGHAKNYSVFIERQGRFHLTPMYDIMSAYPVIGHGKNRIPPEHLKM
AMAFVGNRHYEWDKIRLSHIRETARRCDYERDAEELLSLLSRVPGALSEISSTLPERF
PESVAEPILNGMLKAAQRLAHEVS*

>SPBIB_v1_290043|ID:27163568| Transcriptional regulator [Uncultured spirochete bib]

MTYLVTTHQLAMALKIARKTLGLTQAQAGALVGLLPKTISALENRPESCSVDSLFRLLS
ALNLELSLSPKASSEPESTSMQAQEGW*

>SPBIB_v1_290044|ID:27163569| Signal transduction histidine kinase [Uncultured spirochete bib]

MKLRVRLSMYFLLVICVVAGSSLIHQHTTENLFRSFIFSGDSEKAKIYATILADYYAEN
KGWQDLQSFLSEIPQIAFSGIDRRIHGGQGTLRISGYPEKTISALLSDRIA VADKNGVIV
ADTAAKILHTVHPASHLKYGIPIFANSEHVGTVLVGS MIDSSITGINERFLSSIVTSLIW
GVLISAGLALFLGLIFSAQVTKPIVSLTGAVHHVAEGDLSIVVNAEGNDEIADLAKSFNR
MIEELKRELENARKQIIADSAHEL RTPVTLIQGTIEGMIDGVFPIDIPTLKS VHEETVRLS
RLIDMLRELEHIESGKLVLSLETINVM DILHKA EALFASSAKEKDIALSVDPDAPPLIK
ADYLRLSEVIYNLISNSIKYTPSGGRVRLRTKNDEKRAVTRIYVEDSGPGIPAEERERIF
ERFYRIDKSRSPDRGGRGLGLAIAREIVKAHGGNIAVTDSELGGA AFIIEMKAAS*

>SPBIB_v1_290045|ID:27163570|regX| Sensory transduction protein regX3 [Uncultured spirochete bib]

VSAKILVADDEEKIAKMVATYLEASGFQPIAYDGLQALHAFREHLPDCIILDINMPGPN
GLDVAREVRKTSSVPIIFLTARADELDRIVGLELGADDYISKPFSPRELVARVRILRRT
MQSGKDTSQTELLRHGPIEIDLKRLVRVSGETKDLTTIQIDILSFLMREPGRVYSRMEI
LEACIGSAYEGYERTVDAHIKNIKALGDDSDNPKFIATVRGAGYKFMEQPE*

>SPBIB_v1_290046|ID:27163571|copA| fragment of copper transporter (part 2) [Uncultured spirochete bib]

MKLLTIEGMSCGHCVMHVKSAL EEPVGVAKAEVDLIKKSAMVEGEDLNDIALKHAVTEA
GYRVSAIYGRH*

>SPBIB_v1_290047|ID:27163572|copA| copper transporter [Uncultured spirochete bib]

MIKVAQM QINGMTCAACAQASERA VKKLPGVEEAAVNFATEKLFIFKFDGKLGIDEIKAA
VAKAGYEAVELAAEKKHTQSHAAIDEHQA AKEREIRILWTKFIVSALFSAPLLYISM GAM
LGWPLPAVIDPMNYPLRYALIEIALVIPVIAAGHRFYSVGFKAIVHRSPNMDSLIAMGTS
AAILYSLFSLNIANGNFKA VENLYFETAGVIITLILLGKSLEAVTKGRTSES IKKLMGL
QPKTATIIRNGIEVEIPIDEVEVGDII RVRPGEKIPVDGVIVTGRTAIDESMLTGESMPV
EKEVGDKVIGASINKNGSITFRATKVGADTVL SHIIKLVEDAQSSKAPIAKMADIVSGYF
VPVVF AIAVIAAVVWLLLGHTLVFALT VVAVLTIACPCALGLATPTAIMVGTGKGAEHS
VLIKSGIALETAHKIDTIIFDKTGTITKGKPEVTDILPVKGFSEDEILGFAASA EKGSEH
PLGEAIVHAAEEKGIALYEASDFNAVPGQ GIEATVLYKHVLLGN AKLMAANNIELGEGTS
AADHLSAQGRTPMFIALDGT YAGLIAVADVVKESSAHAAIALHSMGIQVAMITGDSK KTA
AAIAAQV GIDRVLAEVL PQDKALEVKKLQAEGRKVAMVGDGIN DAPALAQA DIGIAIGSG
TDVAMESADIVLMRSDLMDVPTAIKLSKNVIRNIKQNLFWAFGYNVLGIPVAAGVLYAFG
GPLLNPIIAAAAMSLSSVSVLTNSLRLKRFKPF*

>SPBIB_v1_290048|ID:27163573| conserved membrane protein of unknown function [Uncultured spirochete bib]

MGMKRAVLFVTD MICSACETRIARAVKAIDGVIAVRVTLKGGRV DIEYDDEKTTSEAIKA
AIENAGYTVGKNKNAPT MIAIGIFILVSLYIIANASGLFNAIPAIDSSLGYGMLFIVGI
LTSVHCVAMCGGIALS QVAQLDGCQMRGDTSRVLLADEKYKNLIPGLLYNSGRVVS YTI
VGGAVGALGSVFSFSPVAKGIIAAAAGFFMIFFLKMLGILSALPRIPR VIPAPIQNVAN
RFSSALRN RGPFAVGLLNGLMPCGPLQTMQLYALGTGSILAGALSMFIFSIGTVPLMLVF
SLAAAFIPKKFVPMVKASAVLVIFLGLITFSRAASLAGIALSGFPFFGSGLVQLSNGLP

EAQTVRQSENGTNGGFIKANLQGGVQTVLTDGSSGYLPLFAVQAGIPVKWTIRVTADGL
NGCNNPITIPSYGIRKTLEPGDNLIEFTPEKEGVIVYTCWMGMVSSRITVVKDLAQANSL
PGSKGLTPSDLLANGLQQSGGISGLSGCCTAQPVNQP*

>SPBIB_v1_290049|ID:27163574| High-affinity iron transporter [Uncultured spirochete bib]
MGAALLITFRETLEAALVIGITLAFLAKADLKHLKPAVWVGAAVGAASAIAAYLFIAIL
GGFEGRAEQIFEGIVMLAGAILLTLLILWLNKKDMKAAMESRVMATASAGSFWGIALLAF
VSVLREGIETVLFISSTRSSGLAGFLGAAAGIVLAIALGVAFRSGARMPLKNFFAVTN
ILLLLFAAGLVGQSVHELNEAGIVPPFVEQIWNLNPPSNGEAYPALHEKGAIGGFLKGLF
GYNGDPSLTETAAYLAYLISIGTILLRRNKLKSHYSR*

>SPBIB_v1_290050|ID:27163575| exported protein of unknown function [Uncultured spirochete bib]
MVMVTLIIRVATVVLVGMIVMLMPVAVMMMVITLAACLFWDWNKLHAAHRALARLVIGLVSL
TFHETRVFHKSLMLPHNRIHP*

>SPBIB_v1_290051|ID:27163576|copA| fragment of copper transporter (part 2) [Uncultured spirochete bib]
MKYACLMKCEGNKTYDKPGKCPVCGMKLVPVEEASSQGNDDHHHDSHGHEHHDHTNKHGGD
SDDQSHHDSHHNARNLCICGTENCDGRCVTNCQCTFQERNLAMPVPLAVSGKAEAYICA
MRCEGDKTYPKPGDCPVCGMHLVKVVAFGAPSGEEDEEMAAFKAMRGKFIKLSALFALPV
LFLSIGELIPGLGEFIGSLFSRKTNLLIQLVLSLPVVFWSASFYAKGIKSVISKNLNMF
TLIALGTGAAWLFSVVSTLAPGIFPDSLKTADGFVPVYFEATVILALITILGQMLELLAH
AKTNSAIKELLNLVPAEALVIRNGKEMKIPLAEVVVGDILRVKPGKIPVDGSLREGSGV
VDESMITGEPVPVEKGGQDKVTGGTINTNGSFIMVAEKVGGDTLLARIVAMVNEASRSKA
PIQLADTVAAAYFVQVVILISLATLFIWGFASFVSKWDHGIVNAIAVLIACPCALGLATPV
SIMVGTGKGAKSILIKNAKAIEQMRKVDTVLVDKTGTLTMGKPAVTVVKGYSDSEDEV
LRLAASVDRNSEHPLAAAIVSAADKGLALSPTTDFTSVTGKGAKALVDGRIAAVGNACL
VREMLGEPATESNDDYERNLQAEGHTVMYVIEGDRIAGIIGVSDPIKESTPNVVKRLKHL
GVHIVMLTGDNKTTAGAVAKSLGLDDFVAECLPEDKFETVKKMQAKGAFVAMAGDGINDA
PALAQADVGIAMGTGTDVAMESADITLVKGDLTGIARAKALSVAVMRNIKENLFFAFAYN
VLGLPIAALGLLNPIIAGLAMALSSVSVLSNALRIKGVKLD*

>SPBIB_v1_290052|ID:27163577| putative sensory transduction system regulatory protein (modular protein)
[Uncultured spirochete bib]

MKDRIHIRNTVKGNILVRYSLIAAAVAVTTIVTGVILVSVLENHYIRLHASLYAELSST
VRGEKNSSEAFIILSRFPHVRSTAIWTASGASVMAPETGPLSGVGPLSRTAGKNAMNGA
LKGKLGIVPAPNEGLVILIPILTHEGAVEGIVGLLEDDTELKDIQFVQLTVAATVMMSG
VLLYALLFGIFLKANQEQQKAADRLRKTDFDVIIVFAMSSLSGLRDQETGGHLERTQAYTEV
LLNGLRRSAKFRKTLDKDYIKDIITSAPLHDIGKVGIADSILLKKGKLEPGELESMRQHT
VLGGDLLAKAANKLPFPSSLTVAESIRHHHERWDGSGYPDGLAGESIPLAARVVSLADV
YDALRSTRPYKKAYSHEDAVRIIREGRGTQFDPDLVDVFANVESRFAEIFDTMKFD*

>SPBIB_v1_290053|ID:27163578| putative Nitroreductase [Uncultured spirochete bib]
MKGFLVSLLLAVTVFGAFAQDIELPRPAVKSGVDLLQAIKDRRVSKAFVKREVPASELST
ILWSGLGMRAADAVSSATKAGRNISFSGDNAYINVYVLTEKGAWKYIPDITYKLDFAKGD
LRATVSKASVPDAAIMFLFTVDNALMPSFLKGNPGIFQQMANATAGFAAQNMALVANTYK
LATVVQYTLSPAGAASALRLGKDEAPLFIMQAGYTE*

>SPBIB_v1_290054|ID:27163579| Amino acid-binding ACT domain protein [Uncultured spirochete bib]
MKIKQINVVLENTAGQLFELAKLLHKGDIDIRSLFVTESEFSTVHLIVDKFDTAKRLLK
EHGYFINEVEVFALKAEDRPGGFMKILEVLKANGLNIEYVYGFGEKSDNHAVFIFRITEI
DKAIELLKSGAVGYLTADNVAGKRQGSSELIDDF*

>SPBIB_v1_290055|ID:27163580| conserved protein of unknown function [Uncultured spirochete bib]
MMIWGYGPGIFGTFGWGGIIMGLSMMAIPILGGVFLFRYFQERREEPPAWKSALEALRKR
YARGEITEEYQKIKSIIKSEFENSLHSH*

>SPBIB_v1_290056|ID:27163581| Hydrogenase large subunit domain protein [Uncultured spirochete bib]
VPEVFERMRGLYTPCTDIRRKIFVGVTRFVLAGKKPEDIDYLPFDIIMMGKPTYRCCSYR
ELSIVKQRIRLAFGLPLIEERDNTVPVSAGIGEAFDRKVISAPLVNVIRAACEKCPEDKV
IVTDMCQSCMAHPCSIVCPVNAISFPNGGKAFIDQKKCVKCMKCVKACPYQSITRMVRPC
AAACGVDAIHSDPDGYATIDQDKCVNCGLCTVSCPFAAISDKTEL VQILHQLMGPEDRRP
YAILAPSFVQGFGRLASPGAIVAGLRAVGFGRGVREVALGADCDTLLAKRLAEKSSPDNP

QHKTFLGTSCCPSWVKTARRHFPEFADNIAESFTPMVETAKIIKDQDPSARVVFIGPCIA
KKAEALEPEMQPYVDHVLTFEELAAIFVAKDIDLAEITPVEFPDEASALGRGYAVAGGVA
TAAIETARQKYGKENIARADTLRNCRAMLADIKSGKTSPELVEGMACPGGCVGGPGTL
IGLLSARNEVGKFAGLAPKNPATLTK*

>SPBIB_v1_290057|ID:27163582| conserved protein of unknown function [Uncultured spirochete bib]
MKPIKVRVCVGTNCCYAGSETLLDMLENDVDLSAFIEVEAVPCKNKACDGRNSPVVEIE
NKVLLNATPEIVMEEIERLATARIIIEETQRA*

>SPBIB_v1_290058|ID:27163583| conserved exported protein of unknown function [Uncultured spirochete bib]
MKRVGVVSLLIALLIVAGALFAQGMGGNYGGSGMMGNWDYIPPGDAKPLSIEQAKDQAQ
KYLWYDDTLVSEVMEFSNHFYVEIAEKEGKNAFELLLNKYTGAVSPEPGPNMMWNQ
KYGRMTGSMGGNFIAQSETDSMTISEAKAHDLAQKFLDAQNTGLKVEDGADRFYGYTYI
HVLKDGKTYGMLGVNGYTGQVWYHSHWGAFIDMKEFDGSM*

>SPBIB_v1_290059|ID:27163584| Fe-S oxidoreductase [Uncultured spirochete bib]
MEAATQEALKKLFESKLNKAMRLYLDTCAHCGLCVEACHVYQAMPETKYTPVGRAEVVRK
LFKRYFKMQGKIAPWLGEVIELDDKSVNMAEAAFSCTGCRRCVTVCPFGIDTQQVMNIA
KLLLIGAEKQPQILAMLSMSIAKGETWKETANDYIAALNNLAPEVEALAPTPPGRPAIP
IDVENANVLYVGLSGKHSIVPAAAILNAASENWTISHFEAVNFAAWLGDGEKQRLIAKRI
IMEAERLKVKEVAVVECGTATRVLKFMTGSHPFRIVSIVELIARYIEQGRIKVKPGTISG
TLTYHDPCQLGRNGGVMEEPRYIIGKLTDFVELTPNKEANWCCGGGGGLISLGEHEFRM
KTGKVKVDQMRASKADTICTACENCHTQLTELNEHYGLGMKVESLTNLVAHALTGFGA*

>SPBIB_v1_290060|ID:27163585| membrane protein of unknown function [Uncultured spirochete bib]
MDPQAVSAASQAVVHTGFALFLDKLYYFIMVPLVYISVIVMIVGIVAKIVSIVRAPIPAF
SLKTYPAKKRPFLAALGDTFGMPMIRKEKPLFWFFLMMFHIGIFFLFFGHLDLFPQVNLN
PPESRHMIGAGAVGLSVTIPTFYFLFRRFKQGERHISVPSDYLLLLLLLLLFIPLLGDMSIW
GNSWTANGFVMTKADFKNYFGILKSFSFVDPRTVLHGSHYHFVVLHVFLAELFMMILPFT
KIVHTFFSLPLNLLRRR*

>SPBIB_v1_290061|ID:27163586| putative redox protein, regulator of disulfide bond formation [Uncultured spirochete bib]
MSDYTVAKTLDCKGLACPMPIVRLSQEIAKIKVGEVIEMFTTDPGSLADVPSWAKSTGNA
VLENKQESGVIHFFVKRQK*

>SPBIB_v1_290062|ID:27163587| conserved protein of unknown function [Uncultured spirochete bib]
MDIEKELADIKAKLEAMPGKENKLSMVFSGDLKQIAALIIATGAAAMGMKVVLFFYTFW
GTSALRDPAAKKNVNGKSFMGKMFGLPKGRNKLKLSQMHHMAGMGTAMLKDLMKKNVASL
DQLFEAAGMLGVQINICQMSMDLMDLKREEMIDYPHLNVCGVATFLNDAKESAIQLFI*

>SPBIB_v1_290063|ID:27163588| Biofilm growth-associated repressor (fragment) [Uncultured spirochete bib]
MADLKHDASRAAVIADLLKALAHVPRLRIVALLIENEATVSALEQLLGVVQSVVSSQQLRI
LRMADLVQYRRVKGFATYSIKQPRLVDLIHCLEGCRTGDL*

>SPBIB_v1_290064|ID:27163589| Methylenetetrahydrofolate reductase [Uncultured spirochete bib]
MPVIKMCQRNMSKALLCFPESNIYAVLCTMKSILQVIKEGRPVLFDGAMGTELYKRGVF
INRCFEEANLAPELVLSVHRDYRDAGAEVLTNSWGAGRYKLARHNLQDHVQEINKQAA
SLARQVAQDSLYVAGSVGLPRLPVGALSEHDALDAFREQMEALIGGGVDFILLETFG
DAAEAAQAVRAARSIATSPVVFASMTIDMSGNPLFGLTLEEAMDRLEAGADVIGLNCV
GPQPMRLAAKRMHSHRSDIPLLEPNAGMPRQIEGRMMYMSSTPEYFATYTKYYLQEGVRF
VGGCCGTTDPHIRSMARTRVQYRAMCKDHDFAEGECAGKGLGDRGPGGRGPSEISGAGKI
VSFVPIGSKSGGAKPEAGKAEVERIPFAEKSQLAAKLARGQMVYSLELVPPSGTTLDTII
DKARIAKQAGIDAINIPDGPRATSRVSTLVTAIMIEQQVGLLETILHYTCRDRNLISMQAD
LLGAHAIGLRNILCITGDPPKLDYDPDATGVFDIDSIGLTRMIYRLNGGFDISGKPIGKP
TGLSHGVGVNPGRAFETEMERFRKKIDAGAEWAITQPVFDRAVMEEFLDYIERNGLHIS
IIMGIWPLSSLKNALFMKNEVPGIEIPDEVIQRMEHCASAESAREEGVAIARELYESLKG
SIQGVQLSAPFGRIDLALRVIGK*

>SPBIB_v1_290065|ID:27163590|metH| homocysteine-N5-methyltetrahydrofolate transmethylase, B12-dependent [Uncultured spirochete bib]
MKRSEKYALLERLAFERILILDGAMGTMIQRRRLSEADFRGQRFADHPVNLAGDNDVLCL
TRPDVIRDIHRAYLEAGADIIETNTFNATAISQADYKLEPWVREISRAGASLARQACDEA

QASNPKKPRFVAGSIGPTAKSLSIAPDASDPGKRAVSFDEMAAAAYRECALGLIEGGADVL
LIETVYDTLNAKAAIWAHISVFRELGKELPLMISGTIADASGRLLAGQTARAFWHSIAHA
EPFSIGFNCSMGAESLLPFVEEIAEEAECAVSLHPNAGMPNELGEYDDSPENMARVLREF
ARGVEKNERHGANIIGGCCGTTPEHIRAIAEALDGIRPRFFRPKTFASGWSSHQKHSVLA
GLEPLDISPETLFFVNIGERTNVAGSRAFARLIREGKLTEALEVARAQIEAGAQIIDINMD
DPLIDSANTMARFLDLVAEPDIARVPVMLDSSNWNTLLEGLKHLQGGKIVNSISLKDGE
ETFLGRARTIRRLGAAILVMAMDEHGQAEDYERKISICERAYRLLTEQAGIPAEDIILDP
NIFAIGTGIEEHRNHAVDYIAAVAWIKRNLPGALVSGGVSNSLFAFRGNEALRSAMHAVF
LYHARAAGMDMGIVNPAQLVPYDEIPDIRERIEDLVNRRPDAAERLIEVAAGLSGSAS
GQPGEASEKLSPKDRVIHALVSGKSETLKDDIEELRRQYARALEIIEGPLMEGMNKVGS
FGEGKFLPQVVK SARVMKEAVHILQPYIEAEQAGQPSSRGKILLATVRGDVHDIGKNIV
SLILSCNGYEVIDLGVMSERIVEAAIEYRVDAVGLSGLISPSLEEMGRVASLMEARGL
HIPLLVGGATTNPLHTALRIAPEYSGPVIHVGDASQAPGVMDKLLSEGRNSYLEQVRME
QENTRTRYQEGRELVRYVSLEEARNASASNLVPPVRPHEPGPAVLAFKVADLVPMIDWS
HFFRAWGLKGRYPDILQDPQKGEEARRFYRDAMELLERAARSGLLEVKSVFGIFPAARAQ
DDILIYAGEDRTSLRARLPCLRQQRFKPEGGYLCLADFLQAAESGKPDWIGAFVAVNAGGN
LEESKIALDAKADDYRALLIASLADRLAEASERLYMLVRDAYWGFCSGVEGIRPAPGY
PTCPDHRDKALIFSLLDVNQRIGLSLTFESFMMRPASAVCGWYFASPSARYFSVGKIGRDQ
VEDYAARRGEPPEVAEAWLIGALNYDPSAKASSENIPACPSCLRPR*

>SPBIB_v1_290066|ID:27163591| conserved protein of unknown function [Uncultured spirochete bib]
MSKGAGRPHRGAPVRERFYRDTMGKRFRSWTIQYKESDLWIGVSPESWSPGMEGTAIAAL
MDARKQIEGYGRSRKSAANFFETLAPMDDDLAPPVVRAMLQAGLKAGVGPMAAVAGAIA
EHVGRALISAFGCKEIVENGDDLWLAFFSSPLEIAVFAGNSPLSGVLGIEIQPELSPCGL
CTSSGTVGPSSFGYADAAVILCRDAATADAWATAAGNMVQTADDIEPALASLRKASEVL
GALIVVGDRMGMQGCFLKPLPKGHN*

>SPBIB_v1_290067|ID:27163592| NIL domain-containing protein [Uncultured spirochete bib]
MKEKYILEYTEQVVEEPIIYSLVKHFDVKVNILRAEISPGREGSMLVEIECEPDSLARAE
AFLNEHSVRMIPAEISLGFQEQEACIDCGACTAVCFSGCLTIGEPDWKLHVDRSKCIACGL
CVPACPLGLFTLKFGD*

>SPBIB_v1_290068|ID:27163593| conserved protein of unknown function [Uncultured spirochete bib]
MQKTYEEINEKIARGEAVVLTAEEVARMASELSPAIEAARVDVTTATFGAMCSSGCFIN
FGHPEPGLRMESVSLNGVPIFGGLAAVDA YIGTTEVSPSNPCYGGGHLIEALVRGERLVL
EAHGKGTDCYPRRSARTIIDKDNVNEIIMVNPRNAYQNYPAATNSSNRIMYTYMGTL LPR
FGNITYSTSGELSPLLNDPELKTIGIGTRVFLAGAQQGFVSWNGTQFNTEKPRNEFGLPVS
NARTLMLTANVKKMDPAFIRAA YFER YGVSLFLGVGIPIVLDIEDIARSVSVSNQQIQT
ICDYAAPGHPGIAKVS YAE LRSYVTLEGKKIRTAPLSSLT KAREIAEILKKQVASGLFP
LAPPVQSLPDHAVVRGLRVEGDAI*

>SPBIB_v1_290069|ID:27163594| Small GTP-binding protein [Uncultured spirochete bib]
MNPSSENPAHARATNESPLSESIIVIA GIRNAGKSSLLNTLFEKEVAIVSPVAGTTTDP
VVRKMELPGLGPVAFIDTAGIDGEGELGAMRTQKTKARLASSIVVFASPAHRAPQPQEI
RFLEQLKSSKKPYISVLTHADCGFDA AKLQWLSKEQYIAVDNLKGYGAAEVRKALSALKD
IVHFEPSPLEGLVQEGDTILLVAPVDLAAPKGR LIQPQVETIRDGLDRDCTV IIVKEREL
LETYNRLMEKPRLVITDSQAFSKVAADIDPDQPLTSFSILFARKKGELDTFLRGISALNN
FPAGGHVAVMEACSHHRQADDIATVKIPRLFQQLVQPNARFSVARSLEVVKTMPCDLIIH
CASCMLNETAVHARIEA IAGLGIPVTNYGLFFAWANGLLPRALEPFPEYEMVYRPFRRNG
HAT*

>SPBIB_v1_290070|ID:27163595| Aspartate ammonia-lyase [Uncultured spirochete bib]
MYGEQTRHAVENFGRGQTPRDFIAALAEVKKAIFTA IQESEHRYAPEVYAAICTAIEEIR
CGLHDAAFPLPLAQGGAGTSLHMNFNEVLASLVQSR TNVPFHFLDEGARYQSTNDVIATA
VIIVACRRLREIEAGVIALQEALVAKEQAWRGIVVTGRTEWQDALPMSLAQVAGAWAGAV
ERDRWRLHKIKERLRTVPLGGTAIGT AFFVPPEYLFLAEKHLRAITGLPLSRSQNL PDAI
ANQDQLAEVASGFSLVAGTIKLCNDLFFYTSSAVREL VHP SLQWGSTIMPFKTNPVMIE
YAKGLAMRANA YCSAVMQYAHEGNLQLNAFLPFILDGLLHASDDLGEALRALSEKLLPRL
EASVTKIVYNLHSSLALLNALRAVVPYEALKTFYESHCKEGACFPFASIEELVRTLSKES

GIAEEILYSQLEAFAPTKPGAMSAPPEKP*

>SPBIB_v1_290071|ID:27163596| Radical SAM domain protein [Uncultured spirochete bib]
MSSPAFLPQLTEQEVRLAQLPLEDLTPRAHAVSLEYHGTSVFLRGLIEATNHCAQNCLY
CGIRRNNAKVRRYRLSREEILAIVERGFAFGFRTFVIQGGEDPCYTTEFLASLCEEIKNR
TAGKAAITLSFGTKSLAAYRSLARAGADRYLMRFETADPVLHEKLRNGNSLASRLKALDC
IRESGLQVGSFGMVGLPGETEETLIQNIMLAGKINMDMGGVGGPFIPHPDTPLRCAVQKPI
ELAIRATALLRLMLPHCHIPATTAAGSLDPLGREKMLAAGANVLMPNITTVEHKKDYQLY
PGKICIDESGFQCVSCQAMRIASVGLSISWDRGDALRLKERSHVW*

>SPBIB_v1_290072|ID:27163597| Biotin and thiamin synthesis associated [Uncultured spirochete bib]
MLTATQTFLDYAKLEELSGLSAPSFAQVEKILAKAKRLKGITTEEAALLAVQDPAQLSL
LLAAAHYIKKEIYGKRLVLFAPLYTGNFCTNDCLYCGFRRSNHSLERKRLTMDEIAQQTS
ELLKQGHKRILISGEAGNQSLEYTLEAIQTSYSVREDTARVRRINVEIAPLSVEGFRAL
KKANIGTYVCFQETYNPELYAMYHPDGPKADYRNRLYVMDRAMEGGIDDVGIGALFGLGN
YRYEVLAILHAHLEAAFGCGPHTVSVPRIEPAKGAPLSFNPPAPVSDIDFKKLIIVIR
ISLPYTGILSTRESPALRKEIFAYGVSQISAGSKTDPGGYSAHKEDNGQFSVGDNRTE
EVIDLIDDGYIPSFCTGCYRRGRVGADEFMDLAKPGLIKEFCLPNGLVSFAEYLYDYASP
PTRQKGLALIEAMKTTAPAKVAHVLDKALLDTASGERDIYL*

>SPBIB_v1_290073|ID:27163598| conserved protein of unknown function [Uncultured spirochete bib]
MEKRIGVVAILIEGRDNIPAIN SILSNHSDIINGRMGLPFKDRGVQIISLIVEGNPDQIN
ALTGPLGRLKGVQVKSILTRAIGDDADAHRDTNFS*

>SPBIB_v1_290074|ID:27163599| conserved membrane protein of unknown function [Uncultured spirochete bib]
MNKDKASYSFVFLVLSIFLACLLISNIIAGKLILVFGMVLP S A VILFPITYILGDVFTE
VYGYEKTRSIIWIGFAANMLMSMIFMIAVALPYPGFFKQSA YATVLGLTPRIVLASLIA
YWAGEFANSISLSILKCLTKGKFLWVRTIGSTVVGQSFDTVLFISISFAGNVPLSVLLQM
MAAQYLFKVAYEAVLTPFTYKVVGYIKRIEGIDTFDHGVEYNPFKLGAK*

>SPBIB_v1_290075|ID:27163600|queF| NADPH-dependent 7-cyano-7-deazaguanine reductase [Uncultured spirochete bib]
MAEYKFEILGKKVSEPMRKLETFPTPEHVKKVVLDCDEVTS LCPVTGQPDWETVRIEFEP
DKFCIESKSLKLYLWSFREEGAFCELSARIAQDIFDVCKPRWVKVTV AQKARGGIAITA
ESRIPDLEQGAGA*

>SPBIB_v1_290076|ID:27163601|ribD| fused diaminoxyphosphoribosylaminopyrimidine deaminase;5-amino-6-(5-phosphoribosylamino) uracil reductase [Uncultured spirochete bib]
MHEFFMQSALDLARKGTGLVHPNPLVGAVLVRDGEIIGRGFHAFYGGPHAEVMAIDNAIL
SGNTDFSNTTLYVTLEPCCHF GKTPPCTSLILNSGIRSVVVG MEDPNPLVAGKGIRILKE
AGIDVEVGILEAECRELN RVFITYITTGKPFVLLKSGLSLDGKISTASGESRWISCEESR
KDVHRLRSEYMAIMCGIETVLSDDPALTVRMVEGRNPIRIIADSHLRIPMDSNIVTTAHK
IKTIIATTEDSDTAKAEKLDAGVHLYTRQTEGHVDLQKLM TILGQMEIDSILLEGGGT
LAFSALKAGIVNAVRFYMTPVLLGGQRARTVIAGEGFSALADACKIENIRIGSCGSDILI
EGTVCSPA*

>SPBIB_v1_290077|ID:27163602|ribE| Riboflavin synthase [Uncultured spirochete bib]
MFTGIIIEVGYVRSITRGAHSARITLAHTVCQGTRLGDSIAVNGVCLTVTEISSSVFVS
DIMAETLQRTTLGELQCGDAVNLERALTLATRLGGHLVSGHVDGAGTIRSILKEGIASIL
EITCPELLKYIAVKGSIALDGISLTVCGVSDSSFSVSLIPHTQM QTNVYLKKVGD TLNI
ECDLIARYVEKLIMSKIPDEAEHPRPVLTEELLRLSGFIGGEL*

>SPBIB_v1_290078|ID:27163603|ribBA| Riboflavin biosynthesis protein RibBA [Includes: 3,4-dihydroxy-2-butanone 4-phosphate synthase ; GTP cyclohydrolase-2] [Uncultured spirochete bib]
MNSVEEAIRAFRAGKMVIITDHEDRENEG DVCIDAQFATPEVINFM AHFACGLICVPMEQ
RRLELELQPMVHHNEDNHGTAFTVSDHIETATGISA FERAHTIQKLIDTSCGPADFRR
PGHIFPLAGRTGGVLERQGHTEAVLDLVKLARSEMPASSNTAIAGVICEILDSDGTMARQ
KSLENFAKTHNLCMISVADLVRYRKDREGGITRETETILPTEYGNFKLVGYTENATGKEH
LALILGDISGDEPVL CRVHSECLTG DALGSLR CDCGEQYKEAMRLISRQGRGILVYLRQE
GRGIGLINKLKAYALQDTGIDTVDANIHLGFPADMRDYRIGALILRDLGVRSVRLMTNNP
QKIESMEQNGIKVFQRIPLHIQANTYNK FYLR TKQERMHHQLETLQILNRS AK*

>SPBIB_v1_290079|ID:27163604|ribH| 6,7-dimethyl-8-ribityllumazine synthase (Lumazine synthase)(riboflavin

synthase beta chain) [Uncultured spirochete bib]

MKIMEGNLIAQHIRIGIVAGRFNEFIVSKLLEGALDGLKRHGIDDTNIIMAWVPGAFEIP
LVAKKLAERTDIDVVICLGA VIRGSTPHFDYVAAEVSKGVAQVSLSSEKPVIFGVLTEN
IEQAIERAGTKAGNKG YDAALS AIEMANLMRALSE*

>SPBIB_v1_290080|ID:27163605|thiC| Phosphomethylpyrimidine synthase [Uncultured spirochete bib]

MYSTQMDAARKGLITEQLRLAA AWEQLDEEVLRALVAQGKAVIPANKRHKNLVPRAIGRT
LKTkinvnlGTSRDCSDQEAEMEKVRTALALNADALMDLSSFGNTHSFRKRLIDESPVM I
GTVPIYDAVVYYNKPLREITAEEWLATVRMHAEDGVDFMTIHCGLNRATAERFKKNPRLT
GMVSRGGSLLFSWEMMTGKENPFYEHYDELLAICREYDVTISLGDACRPGSIADASDAVQ
IEELIVL GELTRRAHDQNVQVIIEGPGH MALDEIAANMKLEQRLCDDAPFYVLGPLVTDI
APGYDHITAAIGGAVAASAGAAFLCYVTPAEHLRLPTLEDMKEGIIASRIAAHAADIAKG
VNGAREWDNSMSQARKNLDWKEMFALAVDPEKARRYRAESKPELEDTCTMCGKMCAMRNI
NTIMRGEEVDVI*

>SPBIB_v1_290081|ID:27163606|thiD| bifunctional hydroxy-methylpyrimidine kinase and hydroxy-
phosphomethylpyrimidine kinase [Uncultured spirochete bib]

MSSSSMRHVLSIAGSDTSGGAGIQADLKTMSACGVFGMSVITALTAQNTQGVQALHQVDA
DFVGAQIDAVFSDIRVDAVKIGMLGTLAVMKVIGKRLRWYRPKWIVVDPVLQAKNGYPLM
EDTAKDIFLSEIVPLADLITPNLPETAALAGFVPQTMAELESAGKKILSLGAKAVLIKGG
HRKTDADDVLTN LGVHVFKGERLTSQHTHGTGCSLSSAITAYLARGLTILEAIERAKNY
VRVGIEHGLNIGHGIGPIHHFYNYHGVEPQL*

>SPBIB_v1_290082|ID:27163607|thiM| hydroxyethylthiazole kinase [Uncultured spirochete bib]

MNQTNFEAMNLADVLENLRSSSPLIHHITNAVTINDCANITLALGGSPVMADSPEEASEM
VGFAGALVINMGLTHPSAILSMEIAGIRAREMGKPVIFDPVGAGATQFRRNTAEELRKY
RPTIIKGNASEIKFLAGEASNQRGVDSL DSEADQAAIALARSSGAIVAATGAIDT VTDGK
SMYKIGGGTAMLGRITGTGCMTSSLVGCFC SVMSSHLFAAILGIMAMKLAGEKAQKALKP
GQGTGQFRINLFD AISLLTPSDFLWKERITYVTL*

>SPBIB_v1_290083|ID:27163608|thiE| Thiamine-phosphate synthase [Uncultured spirochete bib]

MLRFDSSLCLITDRSFCPKADFFPILETAIDSGVTWVQFREKSGLADREMFELGQKVREL
TARKGVPMIVNDRDLAMALDADGIHLGQGD LPLWAAKKLWRPDKIYG VSAQTLEQAEKA
LHDGADYLGIGALFPTISKND AIMVHHRQIELIRMLGVPLIGIGGITPERIKDIRRFGFS
GIAVISAIWGAPDPAKAVKTFVQQWKDV*

>SPBIB_v1_290084|ID:27163609| Haloacid dehalogenase domain protein hydrolase [Uncultured spirochete bib]

MLTSKAVLWDKDGTLLDTFGSWIDVERKLA EAMAAEYGFSSVKEQDYIQRVLFRLGVKPD
GTVSGQGVLASGTSEAIIGEFYSAFLEMDSFISEKKQSFFSLAKSKLAEILEQSPITPIP
AQGAQEALRFFKDLGLCQGLATSDSLANAQRDMAAAGFLDYFTFIAASDTIEQPKPHPCS
VYAFADFCGVFPSEVLVIGDTPADEAMAVAAGASFVAVLSGTGVVQDFSPKANVVDLLD
LPGFFALPPFCIFSSSRMPRRN*

>SPBIB_v1_290085|ID:27163610| conserved exported protein of unknown function [Uncultured spirochete bib]

MKYLSTQNRKARRTYLAAGILILFTASCSTQPAPIGQASLPPSASASSPQAKEGVMYSM
ALPQSSAGPLAFVAQTGLPGSNGQTAALGSQPEFNTEEYQRIVDNPFRNTLGNPVSTFSI
DVDTASYANVRRYLMESRKLPPKDAVRIEEMINYFTYSYAPPTGEHPVAATLTMAPAPWD
PDHWLLRVAIKAKEIETANLPPSNLVFLMDTSGSMDEDNKLPLLKQSLKIMVEKLRPQDK
VSIVAYAGTAGLVLDATSGAKKETILSAIERLEAGGSTAGGAGIKLAYEVAKRNF IQGGN
NRVILCTDGD FNVGVSSTSDLERMIEDKRKENIYLTVIGVGTGNIKDSRMESLADKGN GN
YAYIDNLLGK KVFVKELWGNIFTVAKDVKIQIEFNPAIVSEYRLIGYENRLLAREDFND
DTKDAGEMGSGHAVTAFYELVKRGLDPQLNDLTFQQITIVPSNDVLIFKLR YKTPGDGQE
ASKLISMRFDQQALYKEFAACDDDFRFASAVVEFGMLLRDSPYK GSSSWKSAMDRARAAK
GADPDGYRAEFVKL VEMAELVAGE*

>SPBIB_v1_290086|ID:27163611| Radical SAM domain protein [Uncultured spirochete bib]

MAELMVGLRKTSLVDYPGRIAATLFLPGCNLRCPWCHNRELVEPQGFAAAQNLNINEAHF
RAATQNFSVTGAQSPAQAPENAPALIPLSQALDIIQKRKNVLGGIAITGGEPTLRPELPD
IVAAIHRLGLDVKLDTNGTLPLSLEKLLREDETRPDYVAMDLKLAPDRYRKL LPPGGRLSA
HKLAAHEPQKMSDEDSHASPGQNLRRSVELLRQYGIPHEFRTLALPGSFITEKDIEELAA
LVDESPWYFAGFRGGNCLDPQWDLLKEPAPSEVEALVQVARALGKHAMVVRGV*

>SPBIB_v1_290087|ID:27163612| Anaerobic ribonucleoside-triphosphate reductase [Uncultured spirochete bib]
MFNEIQSSAKSTVQKPQYVVKRSGALEEYDAAKIKSALQKAFAAVGFLVSAPETQERIDR
ITSFVEELVTQLLASRHPHSIPAIEEIQDLVETALIESKEVSVAKAYILYRARHEAIRDT
RKLLEDIDATMDGYLNQSDWRVNNANVNYSLGGLLHNSGTITARYWLKNIYSEEIAEA
HRNADFHIHDLMSFSGYCAGWSFLQLIQEGLGGVDPKIRSKPARHLSTLMQQA VNFLGCM
QNEWAGAQAFFSFDYISPFVKEDHLSDEIKQCLQSFIFGVNTPSRWGSQAPFTNITLD
WVVPEDMKNMAAVVGGTMMDYTYGDCQEEMDRVNRAFIELMLEGDADGRGFQYPIPTYNI
TENFNWSDNARLLFEMTSRYGTPYFQNFVNSDLKPQDVRSMCCRLQLDKRELKRRGGGL
FGSDEFTGSIGVVTLNLPRIGYLAKDEDDFFRRLGKLMDLAKESLVTKRKVISRLLDAGF
FPYTKRYLKHLDNHFNTIGIVGMNECLLNFFSKDVTLATEQGQAFALKTLQYMRDRLVAY
QEATGELFNLEATPAESTSYRLARHDKERYPDIITAGTAEPYTNSSQLPVMYTNDFDA
LDLQEELQRAYTGGTVFHAFLEAIDWRTCRDLVKTIAYSIRIPYFTISPTYSICPTHG
YLNGEHFSCPVCGAETEVSRIYGYRVRNWNK GKREEYKERKMFALKAD*

>SPBIB_v1_290088|ID:27163613| conserved protein of unknown function [Uncultured spirochete bib]
MPESLKLVLHVAQVDKWEGAISNAANFLKPAAPGEHLEIRIVANSDAVLACAPCSPKLE
LLEMLTKHGVEIFLCKNSLKKHGIPADSLPILKTVPAGIRTLVDLQNEGWRVYVRP*

>SPBIB_v1_290089|ID:27163614| conserved membrane protein of unknown function [Uncultured spirochete bib]
MAKKMPRIQLIRRISLGIFLVAVTVLTLHQQVQNMPSIDALDPFGGIETLFKYLAGEF
IKKIVPANIVLLVGIILGVLSRFFCGWICAFGALQGVFGWLGGKIFKRRFVVPKVDV
VLRWAKYPILVAIVYFTWKTGTLVIRPYDPLAAYGHLSAGLSAVWAEFAVGFVILVTLV
LSMFYERVFCKYVCPGLAVNAILSRIPLFRIKRITTCISCARCDKACPMNIDVSHADTI
SSPECIACMECVSACPTKKNLVTTLAGKTVAVGKIAALGLAIYLGTMGVGALLGKLDVF
GPTLSQKATSGTLAIGDIKGSSTWAEVATAFGIDLERLYREAGVDASKVPPETKLKDTGA
LIGKTFEADTARFAVSKITGIPYAGENAAPASPAATPSGAAPSSAEPTSAAPSSSAAAAP
ASPTPAAAPAAVSPVPAPTSTPANAAQSSAPAASATQLTVPPDFALEGTMTVKDIAAALK
TSEVAVIKQLPADFPDTPDKPLRDLKDQYGYTMTVLKERFAK*

>SPBIB_v1_290090|ID:27163615|palH| Alpha-glucosidase [Uncultured spirochete bib]
MKLVLIGAGSAQFGFGTLGDIFSSKVLKGSIALVDINGESLSRVQAAGQAFIEANGLDF
TLAHTDRREALKGADFVVISIEVGNRFELWDQDWMIPLOQYGIPQVYGENGGAGGLFHAL
RITPAILDICEDCASLCPDAFVFNFSNPMATAITTVLRKFPNLRFIGLCHEIASLERYLP
LMLDVPFSELELRAAGLNHFSVLVSARYRTSGKDAYPDILAKAPAFFEKVLGYSDILEYI
QTTGNIPRTEGETGLPDIGRTESSRAWSDRGLFRHILERFHLLPITSDSHIGEYIQWAHE
VADHKGILDFYMLYRASLSMLKPTIELKVKERVVPIIEGILGDTGYEEAAVNIMNTGLIP
SLPDSVAVEVPARVWRKGLEGIAFPDYPKGFAALLRNYTGVDLTAEAILQKSKDLAIQA
LLVNPVVTACARVPELVNVMIERQAQWLGYLK*

>SPBIB_v1_290091|ID:27163616| Transcriptional regulator, LacI family [Uncultured spirochete bib]
MVTIIDVAKAAGVSPSTVSHVLNGKRPISDATKKRVHDAIVALGYEPNPNAQALRSTSSG
IIAFYASDITEVFSTLIIQGAERICRENNYIMIFASGVEFNNDIAEAMHFLKRRRIDGLI
VSFGIRKRIENRLPKALDFPVVSINARVSDDIPSIQPDYSGGREARYLLQRGAKNPAI
IGGPESRLASEERIQGFVDEMAAQSIQFDRDKMIVYGDFSFDSGRTCMATLLQRDRSIDA
VFCANDYMAAGAITEAQKQNIQQLRIVGYDNREFDWFVPIPTTFSPLAEMGEKGA
STLIRMIKGEKPEPFHVVIPSSLVTRASS*

>SPBIB_v1_290092|ID:27163617| Glycoside hydrolase family 31 [Uncultured spirochete bib]
VKLEIKHLSKLSIRNSKAEIYGENGALFITPFSNFFHIEYKIGFSRDLTSEADQNLASEF
DVPTINCCNFESIKELEDRFVVFQNDARLEVLKETAVVSVYWKNNLAFGGTIGNSDTVLP
KFPLRIRYESQKAEHQGIGEEWPAQFNFRSEPDIFFGLEKTKGLNKA YRRFKMFNRDA
LGYEPEYSDPL YISIPFYFQESRRHSTIAGVYFPSEAVEEIDFLVESNFYTAVSMAGPY
AYIVFVGDYKEILAHYLTLVGTPALPPKFAFGFFGSSMSYAEPKDAQKILEYFQKVEE
YGIPCEGMYLSSGYIKAENGRRYTFLWNTAKFPNPKEFIQSIRERGRYRLCCNVKPGFLLD
HPWYEALKTKGYFIKNTLGEAAVEYYWGN YASLIDFSKEEAYNWWKEQIKKAFLELGILG
IWNNDNEFELEDDEIQMTKTLPLVMSKASYEASQEVFSGKRPWVISRSGFTGIQKFSSTW
TGDNVSDKSMIMNIPMGFNLGLSGLFFYGHDIGGFYGPRPGKDLLLRWCQSAVFQPRFI
MHSWNPDPGIPTEPWLYPEILDAIRGLRLRYKFLPYIYSSAIRSVLESVPLEIPLWLEFF
SDDSLDVDSANHLVGDALLVPPQSVGEHTIDCRFPQGTMWLSSDLATWYWGGSSTVQM QY

PEQEPLFFFRAGSAIPFESRQSGPLEGYSDSVHVLIIPIPAELTQSTVFHVYEDDGLSEM
QDGSYNCFEFVQHKLGDTSVQLSITMKSQAHNAPKPRTLVLSLPPGYGFYDSPAGASTNS
ECTMKLFSKGQTESVRIVKLPDSWSSALI*

>SPBIB_v1_290093|ID:27163618| putative Sugar-binding periplasmic proteins/domains [Uncultured spirochete bib]
MKRRFLLASIFLLVVGIFAFGQAQKELTALWFYDDPSELEFLNKKAAEYSTSHPGVTIKV
NTVAYNDLFTRLTQLVAGNNPPDIVKLTDIRPEIEPFILDLSKYHGKDFLKPFIGVAAA
LNREGRILGAPLDVTANGIILNKTLFDKAGVAIPSKEKAWTYNEFLQAISDVKKKTGALY
ALVWDVTPHRWSTYLFENGGSFYDSTGRKSNFNSPAIIQALRGFADMFDKGYIPKSIWIG
SENPRDMFFSGQAVAWMSGSWQVKAMLDNIKNFEWTAGPNPYVTTRSSVLGYKVFSAFST
SKYPDIAADFIKFFTSKENNSDYAKSLMTIASRTDTGTINYGNAQASSALNNLAYELAIS
PLPASTDIANPVMGYVWNTVKENVIAVLTTKTKTAEQAAAAINAQIEDSLRIVYGK*

>SPBIB_v1_290094|ID:27163619| Permease component of ABC-type sugar transporter [Uncultured spirochete bib]
MSKRKIPIAPYIFIAPAILIFLLFIVVPAMEGFLQSLFTRGIIIVRQDIPALRSRFVGLFN
YQKLVSDPRFLTAFGKTILFTLITVPSIMVVSLSLALLLQEKIHGVGIARAMVYWPMSIS
PIIIIGIAWRWILGYDTGILNYFLTFLFHIDKQPWLIDNARAFISVIVVSIWAQTGFFMVIF
IGGLNTIPDSYYEAARIDGANKWQQFSGITLPLLRPTLLVLVLSTINAFKVYQLVTVLT
SGGPGRATAFLVQNIYEEAFSKPLSVGYAAAQSVVFFFVMLLSIAQFKLSKEESV*

>SPBIB_v1_290095|ID:27163620|MalG| Sugar permeases [Uncultured spirochete bib]
MKSRLVIGFLKYLIVIVSVIFFFPMLWVVISAFKGESEFLNPPRILPVHFTLDNFKS
GLKFGNFTQYFVNSAYVTITSTIITVIISTMAGYGFKFKFGRDVLFIGVMATLMFSLE
IIMIPMFLTCLKGYGLINTFIGIIPPAATPTGIFLLRQHMR SIPDELLEAAKIDGAN EYQ
IFTKLIVPLSVP AISTLTIFSFWRWNDYLPFLVINDDKKRTVPLALANFVGGQYAVRWG
DLLAMTTLSIPTLIIFLIFQKYFIKGISMTGLKG*

>SPBIB_v1_290096|ID:27163621| putative LmbE family protein [Uncultured spirochete bib]
MPSSIERIDVLVIGAHPPDAEIGAGGFLLAAKNRGYRTGIVCISDGSAGASGDVSQRKRE
AENAAFVLKIDALHFLGMEDLHIPFDKTAELIEKLLVEMRPGILITHSPDDWHPDHRLVW
QIVDAAWALANRRSRHGEDRIERPRMLQFSTDVLR AHKPALLVDISAF AEEKQKALSCHA
SQSEIVKNVLA FNALWGASIGALYAEPFFTSEPLVLTSSLGLLEKL*

>SPBIB_v1_290097|ID:27163622| putative Glycogen debranching enzyme [Uncultured spirochete bib]
MSRLQDIGNGWLAGDAPFLLPFSGSRLQGFFNHRGSLDIALWGAGKIGSLYVRAAERAVG
RRSFVEYRVSPNVLELKSETRTVRLSAMVDEPVIVVYQESRGDPSNQNTFVPAKNYLWQ
TESGKQIHTSFIFGESARLSAIHEELFCYENSVHDSQGKKLRVSFFVIGSAQETKRALE
KLKSHIHPSEANAFVARSIPTEQYMSKLTQHGLSEHSCTTQAIHCFHAAFSCVKSDDSG
NFAGIAAGIGYSIPARSYFRDSYWTCLALLPFTPDIVRQQILFLEKGVYENGEAPSGLIF
PTDAGMRYWEERKKADPALARDHVRPLDWWSDHFDSPLFFVNLVFDYIDFTADWSILDEG
TGQTILEKIRTIFSGYKALEDADGVVPKPFHDRDWADNVFRQGA VTYDVALYYGALAKAS
RLDGAF AARAQALRRAAAKRLWLDDKGYFAEFVQSDGYAETHLAIETITAIHFGLATEEQ
SRKILKAVKQLLFTRNNAQPFGDWGVMSVFPGY SARTKRRGKSLFPYRYHNGADWPYWD
GLLAWILAERNPDYQYALTRWWEYGLEQGWPEPVEYFSPFPGRGSPLQAWSSLSLRAIY
EAKKKLL*

>SPBIB_v1_290098|ID:27163623| putative Signal transduction histidine kinase [Uncultured spirochete bib]
MSKFHRSFSFRYRLTLWYIAVFSISLLAYQTFSYFELKANLISQMDAGLLSAMDQTIQNL
DVENGNLALQNVEKTPIKPLSETQTALRIRILDADGNVIYSASGFPAIPIHQ SALHALGD
HSKPIYQTIQLGTEHYRVVTA VLIAGTQTKNFLQIANSLSNIDKELSSFIVRFLVGLPF
ILLIAAAGGLFLANTALKPIVEMKNLAEHVREDRLSDRLHYQGSPDEFGLAATFDSMLD
RLEASFAREKRFSADAAHELKTPLTALKGKLEVALSRPRTAKEYEEALTNMKG DVERLIS
LSADLLLLSRMG NVALSSRAEKIDVGELLDSCVDQIITAFDPKHVTVKRNYEH HVEIEGV
RDYLVRLFLNILDNAVKFSNTEVMLSISIKVQARKAAVIEISDNHGHGIPKSEIPFLFQP
FYRVESDRSRLHGGAGLGLAIAHEIAEAHGGQIEISSAVGEGTRATVALPLSLKQ*

>SPBIB_v1_290099|ID:27163624|cusR| Transcriptional regulatory protein CusR [Uncultured spirochete bib]
MRILVVEDEKSIVDFLSQGLKESGYAVDIANDGQTGLDYALATQYDVILLDVMLPKLNGF
AVVRELRRASIKTPVIMLTARSTVDDR VHGLDAGADDYLVKPF AFAELLARIRALLRRPS
ISTDTAISFGDIELDTIKHEFRRRGERIELSGREFSILEYFMRNPGQVLTRTQIAEHIWN
FDA YAGSNVVDVYIGYLRKKIDEDPSHSYIKTIRGVGYRFSPEG*

>SPBIB_v1_290100|ID:27163625| exported protein of unknown function [Uncultured spirochete bib]
MKKAKIAILALMVGLIGLLGVSAQSASATPPVTAPAAATSTAPAAPAGTAQADQEGQHEF
EGEENDGAESQEEASVENDEKDEKNKETEVAESESQSAADTDNIEVQE*

>SPBIB_v1_290101|ID:27163626| protein of unknown function [Uncultured spirochete bib]
MLLFAGLIVSFIPAQEASPAPAAKHDSLQALGFNITIEDLVRLDLQRSLFLDPAAKVNT
DWQDKFDELVVREIPATANRYAYAVDSQGLQYVVIRGTHNLRNAILDLEYWKDRSPILG
INLHHGFEKAALAVFNDLEPRLKPKMPIVVAGHSLGAAEAIIVGMLLTKNGYTVEKILAS
GPPKVTDDDEGWQFESLPVIRVVSAYDPVPFLPPKSFYPESPYTQAGMLLMLLDGPYVTI
AEPTYFDNMPAAFKGVQKLD AHFDVIDHRIWIYADRAREKLA ALEYVPFAGWEQYAKPRG
DAKDAPKK*

>SPBIB_v1_290102|ID:27163627|icd| isocitrate dehydrogenase, specific for NADP+; e14 prophage [Uncultured spirochete bib]

MKAFSKLTAPTEGSAIEIDKGGSLKVPDNPIIPFIEGDGIGKDISPVMRAVVDAAVQKAY
GGKRKIHWF EYAGEKALS VYGENEWLPTETLAAIREYKVAIKGPLATPVS GGIR SINV A
LRRELDLYACVRPVRYPFGVPSMKHPERLNVVIFRENTEDVYAGIEWPAGSPEARAIIE
TINATPHEGRKIEDIAATAIGIKPISETGSKRLIRAIRYALAMGLPSVTLVHKGNIQKY
TEGAFRTWGYELAQKEFSEQTIQGTEAAPAPGKVAIKDVIDTAMFQELLRPEEYSVIAT
TNLNGDYLSDACAAQVGGLGMAPGANIGDNAAVFEATHGTAPKLAGQNKANPGSIILSAA
LMLEHLGWKEAADMIQKGMVGAIAKKRVTYDLASQMEEATMLSCSEFGKEIIANME*

>SPBIB_v1_290103|ID:27163628| Aconitate hydratase [Uncultured spirochete bib]

MAGMNLVQKLIKSHAVNVSLADAERGASLSSGKEVLKIDQTLTQD TTGT MAYLQFEALG
IDHIKTERSVS YVDHNTLQVSFENADDHNYLQDVSAKYGIIFSRPGNGICHQVHLERFGV
PGKTLGSDSHTPTAGALGMLAIGAGGLDVALAMAGFPFSFPYPKIVRVNLKGRLGPMVS
AKDIVLEILRRLTVKGGVGKIFEYSGEGVKT LTIPQRATIANMGAEMGATTSVFPSDEQT
KRFLEAQGRGQDFIPLSADPDAA YDEEIEIDLSVLEPLIALPHMPDKVVPVRSVAGTPVD
QCFIGSCTNSSYIDLAMSAKILKGRHVAEKTSLVIAPGSRQTL LMISRAGILTDLIEAGA
RILESACGPCIGIGQAPRTGGISLRTSNRNFEGRSGTKDAFVYLVSAETA AASAIMGVIT
DPRDLGNI EPPVPERFAVDDAMIIFPKPEGRSQSIRRGPNILPLPEFKPIPNTIEGEVL
LVMGDNITTDHILPAGSKIMSLRSNLPAISEYCFSAIDPSFPKRARAASGGILVAGENYG
QGSREHAALSPRYLGVGTVIAKSYARIHRQNLVNAGIVPLIFETPQDAEKIRQGNRLAI
LNLFEGLQSNRIEVQNLTTGAVFMTKHGLSERQIEILRAGGALNAARCEFEKHKYAKSET
SDCNSD*

>SPBIB_v1_290104|ID:27163629| Citrate synthase [Uncultured spirochete bib]

MDMQYYLSKIFENNKIEEDLYARYDVKRGLRNANGTG VVVGLTRVGDVHGYIMDEGERVP
VDGKLYYRGIDVEMLVKHAQQENRYGYEEAVYLLMFGNLPTRSELDAFTRYLGEKRALPD
NFAEDSIMKAPSPNIMNKLARSVLACYAYDPNPEDLSPGNVLRQCLELIARFPTIVAYS
MAKKHYDRESLFIHTPAANGSTAETLLSLIRPDQKFTRLEAEVLDLALIIHAEHGGGN
STFAVRVITSTDTDTYS AIAAGVGLKGNKHGGANIKVMGMMENIKASVKDWSDEEEVAA
YLARLLKGEAYDR TGLIYGQGHAVYTLSDPRATLLRSKAEELAAEKGF EKEFQLYRTIEH
LVPTVFQQVKGSTKPICTNVDFYSGFVYQMLGIPEELFTPLFAISR VAGWCAHRMEEIVA
GGRIIRPANKCVQPRLAYVPLAERG*

>SPBIB_v1_290105|ID:27163630| protein of unknown function [Uncultured spirochete bib]

MMTNGLLDPIFPIEGAKCIAEAAERAYATTTCDGLITANNKHYKYIPNLECRRFEP EHS*

>SPBIB_v1_290106|ID:27163631| putative xylanase/chitin deacetylase [Uncultured spirochete bib]

MKKNHLVKLSSLALLFAFFALTSCATAPKPSYLDPIRWWDQGGQDPIKELAIETPEQLAA
RVPKRTDPKIVLLMYHNIVFGRTGGEYNRDLYNFEHDLVFLRNRTQIIGLDELPGIQSGK
KKLDTDASIITFDDGDL SIYAVVFPLLKQYDIKATFFIITDFVGT TGYVSWDQLKQMSDY
RNAKGEKLF TIGSHSLDHKRFDEIPADQIPRELSESKLAIESKIGAPVRYFALPFGAGAG
RKEIIETAKNLGYWGIR SSTTGAMTPSTIDMFNIPAFYMTNERADILAQQIYAKLLGR*

>SPBIB_v1_290107|ID:27163632| protein of unknown function [Uncultured spirochete bib]

LPPRVVPPATPAIRNIYSILFAPKVKLDYSLASYELKQSINSAADLPPYYQDSIKISYW*

>SPBIB_v1_290108|ID:27163633| Extracellular solute-binding protein family 5 [Uncultured spirochete bib]

MNRKRKAIAGLLFLAALSVAVAANIPKDTLVVASNSEIFKSFDPGVCFEVEPSVYVKNIY
ANLVTLMVDGAFTVPDLAEKWEQSSDGKTWTFYLRKGAKFANGDPVKASDVEYSYRRA

ITINKSPAWLFKDTLGLTVDSIKAVNDTTVTIVTNGAPSNIVLSVLAANIGGVLNEKEVR
AHEVSGDMGQAWLTDHSAGAGAYVLKEWKRKTQIVLTANKNYFNGEPPKIITIVRDVPEA
SDRYLLLKKGVDVAVWQITVEQAASLRDKSEDVALISTPAQSLEYVAMNASWGPFKDNRV
RQAVKYAIDYDAIINKVREGFAIKNQFLAIGYFGYKESNPYKRDVEKAKKLLADAGYPN
GFEVEIVTSEDIRRAEAVVVQSNLADIGIKSNIVVMPAAQMYDKYRNQGLQMIVAGWGI
DYPDADALAKPFADYTVKQLAWRNAWLDDKAAAMTAAAKEINDKKRAQMYIDL VQYWQV
NGPFAMILYQPIEYWGIRKEVKGYDKAFEGYNVHCNFTLISK*

>SPBIB_v1_290109|ID:27163634|ddpB| D-ala-D-ala transporter subunit ; membrane component of ABC superfamily
[Uncultured spirochete bib]

MELSSFILKRLILMVVVIFGVLIIVFVVTRIIPADPVGAILGGNAPPAAVDAMRHQLGLD
KPIFMQLLDYLGGLRGNFGNSLVSSRSVITDILEYLPATIELAISSIIFAVLLGTTLGL
LSAVFRNRFIDHFSRVFSILGISLPGFWLGLLILFFYYRLGWLPSGGQYDMFLSPTRVT
GLVLLDSVITGEWNVFFNAIKHLILPTFILGYSSTASIMRASMLDVLHQNYIRTARA
KGLPKKTVILRHARNALIPVVTIIGLEFGGLLSGAVLTETIFSWPGLGRYIVNSLLTLD
YPAISGGTIFIALIYSVVNLVVDILYAALDPRMRA*

>SPBIB_v1_290110|ID:27163635|ddpC| D-ala-D-ala transporter subunit ; membrane component of ABC superfamily
[Uncultured spirochete bib]

MRKPSSDKKISGQSAFREFLRERKPMMLDDVRHTVYLWKKTPLALVGTVIICLFLVALFA
PLLAPYSPIATDLSRKLEAPSAAHFPGLDQFGRDVLRSVIMGTRIEVSHIIVISVISIVI
GLIVGIVAGYFGGIIDEILMRITDIFLAFPRVLAMAFAAALRPTLTNAIIAISLVEWTV
YARLARAEAMKIRSQPYIEAIRAVGASNIKIMVFHVLPMSSPIIVQLTMRMGTIILTA
SLGFLGLGAQPPLPEWGAIVSDGRSYLMNNWWITAFPGMAIAVTVLGFNLLGDGIRDILD
PRIRR*

>SPBIB_v1_290111|ID:27163636|oppD| oligopeptide transporter subunit ; ATP-binding component of ABC
superfamily [Uncultured spirochete bib]

MEQQRGDLDISGLRVVFNTYAGQVKALNGVELWMNHGERLGVVGETGCGKSVTALSVMR
LIEEPGEITSGALWFEGRNLAQLSENDLNSIRGKDIAMIFQEPVAALNPVMKVGAQIVEN
IECQRASADAGQIPDKRAFSEIMRDMLGRVGLDWQRTEENLYPHELSSGGMAQRVMIAMALS
SKPKLLIADEPTSALDVTIQAQILNLLNKL VRETQTA VLLITHAMGVAAQFCDFIAV MYA
GNVVEYGSVQSIFRNPLHPYTKGLLNAVPKIGRTDELQSIPGIVPDLIDPPSGCRFHPRC
PYRKPDCDTLEPTLRAAKTEPAADRHHVACFLYQNDA*

>SPBIB_v1_290112|ID:27163637|dppF| dipeptide transporter ; ATP-binding component of ABC superfamily
[Uncultured spirochete bib]

MQSSTSDDMLLQVSHLQKFFAVRKNLYSKPLYVKA VDCCSFSIQRNTVFGVVGESGSGKT
TLGRVLLRLIEATGGSVLFDNTDILSLNTQELRLFRRRMQIISQDPYNSLHPRKVVKKLI
GEGLOIHFQLSAQEIDTRVRDILTLVGLREEHMYRYPHEFSGGQRQRIAIARALVLKPEF
IVLDEPTSALDVSVAIILKMLKDLKDFALTYMLITHDLAVIDYMADYVAVMYLGQIVE
SGSKDDIFKRTAHPYTSLLIDSVPPTPSEHWSGHILNGEIPSIHSPSGCRFHPRCPQA
KEICKTAEPEVVEVQPGHVVMCHFPLGS*

>SPBIB_v1_290113|ID:27163638| protein of unknown function [Uncultured spirochete bib]
LEARLMPSARRMMRAEHALYLARQLSADFVVSIALDIEVNPLRADPEFYRQAHPFC*

>SPBIB_v1_290114|ID:27163639| putative Beta-lactamase [Uncultured spirochete bib]

MQMTETQRAAQFIEQYIPEAMHETKTPGYSVAVMKDDELVYGGGFGWRDRERFLPATADT
LYGIGSCTKAFVATAVLLLAERGALTLEDPAAGRYIPLKLRATGGTPDGAPNIGAFDGS
SGPITIHLLTHSSGLPSLSTSEILLQQGLGLETGVPLASAEDFYRWNGAQDEISALPG
ERFFYSNESYRMLGHIIQTVSGMPFYQFIAENILKPLGMERSTFVRSEYERDADKMRPYW
AKPDGTIVPAEFYPYDGLIPDFSFIVAAGGLISSVRDMMKFLSANMPGRAAKPGRAAIS
ENVSLTGNAAPLLKPETLGRMQTKYIDRPAGYYGSNGYGYGWTITDNFLGHKMVAHGGSI
EVSTAYAAFLPEKRMSVMLAANSSGMPHATIAEGILAALLGQDPYEAI PVFDIKKRMNLL
AGTYETYS AVSVRIFAKGGLLYLEQKNPFIDS VVPLIPEDDYLRNFRFYTLTEGVRLPI
EFRVGPKGIDL YIERDRYHKVG*

>SPBIB_v1_290115|ID:27163640| putative Branched-chain amino acid transport system carrier protein BraB
[Uncultured spirochete bib]

MADTKKQALSFGAVLVVSAAVFSGHFGVGDITFPAMLGRTTGASWFIAALGYGVVNSFMV

FLAYLAISRQNSSFLGLTSMVLGKGFAIAYTTIAVLIMGPVFILPRVSSATHEMAVAQFF
PSIPIWVTLVYFALNYYFAYNRSKVIDRIGKYLAPALIVFMILVIKGFAPLSAVAST
GSSTAFSDGIINGYNTMNALGASIFGIWIINELKRRGIEDAKSRSSSTIITIGIFAALALL
LTSTGLTYLGASSGGLFPDAAIGVLSVKIAEGLLGYFGKIVFAVIALACITTSVGLTSA
AGDTFEQMSGGKIKYKFTVAASSIIGFLLGLIGLSKIVGYTVPWLMLIYPALVIIIIMSL
FTDFLKVKLATQAGVLVAILFSIGDFLAGLGIANTPFSKLNAAAMPLGKQGLAWLFPSIAA
IVVFQIIAVIGRGKKAPDEAVKP*

>SPBIB_v1_290116|ID:27163641| putative Metallo-beta-lactamase domain protein [Uncultured spirochete bib]
MNTMDMLDNLSVRVVAEDSVMYESPFWGQHGISLYVTASKDGFVRHILIDVGSHEALLH
NMRLMGIDPASIDAIVLTHCHYDHTQGLAEVLRAIGKTDIPVIAHPDLFRLNFIDKPYLR
HVGITSDDAKSNLEKIGAAFFLTADPLQLMPGLATTGYIQRQTDFEEVGIPLKTTIDTQNH
LVQDPMNDDISVIGAVKGGKIVILSGCSHAGIVNITKHAIAMSGISEVTSIIGGLHLVEA
PMERIAKTVDALDSL VVGSYAGHCTGFNAQVELRKKFGTRFMPLQTGNYFEYP*

>SPBIB_v1_290117|ID:27163642| conserved protein of unknown function [Uncultured spirochete bib]
MLIEVQFSMYPPIREAHISPFQKAVNIIESFGLPVQVGPMSSTITYGESATIFKAFDRIIE
EFAGSTQFVLITTISNACPVDFSQNKSSSKSSL*

>SPBIB_v1_290118|ID:27163643| conserved protein of unknown function [Uncultured spirochete bib]
LHKTRSIVSAKESIQA YIYFWRDNIGTEIDVVFEESSLKLRALIEIQSGKTFSPNSPRISKH
GSVFGFVAGRLRAHL YKTQALVCYHANNHNDMEAGSSSPVTDPKVLFDDFANEYDSWFL
TPAGRKVF A FELDLLNSLPALSGIHLLIEIGITGLFAIEFQKRGANVEGIEPSPKMRAI
AEKRGLEV KYGLGEAIPYPDNSFDVVLAMTSIEFSKMPERFLQEMVRVTKPSGIVAVGVL
NLWSLYGISRRVKGLFKKSLYDEAHFYSYRELKKFLSTYVNNVEVKSTVFLSPSPNFIL
ERADAIEHFGRHHLVPFGALLVGTGKKAQRK*

>SPBIB_v1_290119|ID:27163644| NAD-dependent protein deacetylase (modular protein) [Uncultured spirochete bib]
VLILD DTVAGEPPKL V KRVRLPSVALDEWPANSGPFCYTDNMTS QSQISRDCDSASPENL
QALYDMLLASRHCVAFTGAGVSTLSGIRDFRGKNGLYKTPDADKIFDIDIFRQDPSFYK
MTKDFIYGLGDKKPSVVKVLAELEKRGILKAITQNIDLLHQKAGSRRVIEIHGSPSLH
HCPRC A WSMTFSEVA AIVRAGDIPRCKCDAVLKPDITFFGESLP AEALAE AIEEARSAD
LLLVLGSTLLVYPAATLPEYTL EHGGR LVIVNDMATHLDA AASLRFS DLGSVDFDFLEKKL
KC*

>SPBIB_v1_290120|ID:27163645| protein of unknown function [Uncultured spirochete bib]
MSNEEAMRALMSIEGFRSLNQDIETIINKSEAVKCLKREANDRQLAKEEKLKLESEEKEY
KSKRRQIQEKLIK FATRIPAFMYLTDYRERTLKDVITQLEPGLFKKVTGLTVKDFELLIS
LGVFNSALMND AVYKFKRYEDASLR YVGIDRHEGEDIGLYDTILRKEEYDQTFMNIAAER
*

>SPBIB_v1_290121|ID:27163646| conserved protein of unknown function [Uncultured spirochete bib]
MPMSRGT VFTDHSNLYLSGTPFRAIASGEFNEFDLNEFFRAEGIGKDARFKYENEVQKWL
DLIRGSFLETTVDNLKMGARKPPFPYSDARLLNVLTHTLWFLPSVASCYAMRNLM AQRQN
KFYHDYTVVVAAGNAAGIGVA ALEPVLKAMDDPLKTKTITLSCGKLTGVTVRPWTGIFM
LRNSSSPETYFQA AFRVQSPWTLKNPDGQSPNEELILKEECYVDFDFAPDRALRQIADYAC
RLDVNEANPEKKVEEFISFLPVLAYDGSSMKRIDAAGILDMSMSGTTATLLARR*

>SPBIB_v1_290122|ID:27163647| protein of unknown function [Uncultured spirochete bib]
LSWSHYAEILKADNDLEISFYTRQCEKEHWSVRELKRQMKSMMLHRLHSVKTNLVC*

>SPBIB_v1_290123|ID:27163648| protein of unknown function [Uncultured spirochete bib]
MQKQAKSKQRVANHGEVLTGEREVNAML DLVKPETEQIDSRFLEPACGTGNFLAEILK RK
LRVVEDRYAKSQIEYERKEITVGTEMIDKLWNSSRKA VPKPSRGLTCWIGFPRT*

>SPBIB_v1_290124|ID:27163649| GCN5-related N-acetyltransferase [Uncultured spirochete bib]
MKIKIANL TEESLQDAPEWDGYPFCKYCLYWEFFGESTGPIEQSKDKAIRMKTAWLQRT
NEHFGNCGKIA YVDGVAEGYAHYAPPGFFPRVAEYQAGPPSQEAVLISCLFIPRHRFRKL
GLGSQLLDNVLAELKQRGIGAVETFARKGKADNPSGPAEFYFRNGFRIYRDDAEYPLLRL
VL*

>SPBIB_v1_290125|ID:27163650| Helix-turn-helix domain protein [Uncultured spirochete bib]
MPSSFGQRLKAARIMAGLSMDALVAKMGRVSKQAISKYENNLMSPDSETLIALSEALEV
KPDYFFSKYEIAVDSINFRKKAALGKKAMETLKARIKDTIERYAELESFFPASLPFTNPL

SDYVISSLDDIRKAAMELRKAWGFGLEEPISYIINCLEEHSIRVLEINGSDFSDFGLSGWV
KQSPFIILNSNAPSDRKRLTALHEFAHLSLKFSDSLNSEREKLCBSFGGAFLLPRGVLV
KELGLKRTEISFFELDRLKKQYGISMQAIMYRAKQEEIISEYVYESFSREISARNWRKQE
PNRYPIDEHPLRFEQLLHRAISEEMISISKAAYLANTSIEDIRCQELLKNDTAHP*
>SPBIB_v1_290126|ID:27163651|adh| Alcohol dehydrogenase GroES-like protein [Uncultured spirochete bib]
MKA AVFAEFGAPLTISEVDPDPKAPDGGVVLAVDATGICRSDWHGWQGHDPDIKLPHVPGH
ELAGTIVEVGKSVQNWKIGDRVTMPFVAGCGHCTPCLTGNQQVCDNQFQPGFTHWGSFAE
FVAIRYADMNLVRLPDAIDSATAASLGCRFATAFRALEAQAKVRAGEWVAIHGCGGVGLS
AIMIAAAMGARIAIDIQSDKLAMARELGAEVVINSREVPDVLSAIRDVTGGGAHVSM DA
LGSRQTCFNSIACLA KRGHVQVGLMLADQSHPEIPMDLVVARELEIYGSHGIQAHRYSV
LLGMIAAGKLHPERLITARLSLAQGV EFLHKMDQFPGTGINVITSF*
>SPBIB_v1_290127|ID:27163652|ymdB| conserved hypothetical protein [Uncultured spirochete bib]
MKTLYRSPDGR CIVAVGDITTECD AIVNAANSSLLGGGGVDGAIHSAGGPQILEECRTL
RAGPLKEGLPPGRAVATTAGRLPAKRVIHTVGPIWRGGEHHEDETLESCYRESLAVAARE
GLACVAFPAISTGIYGF PKVRAARIAWKT VQEFLAGSPASMPRVIWVFFSEADAALFMN
ENKLTENKSIV*
>SPBIB_v1_290128|ID:27163653| Response regulator receiver protein [Uncultured spirochete bib]
MGKLDK KVRTFSALEIAKLCGVVNQTAINWIRAGHLKAFTTPGGQYRVYAEDLVTFLKER
DMRIPEELHEDLTMPVDLGLALIVDDD KDLNTILKRLLEKIEELRVAQAFDGF EAGR II
AERHPAIVLLDLNLP GVDGFS LCKKIRSDESFGQPAVIAMTGIAQEEAQP KMMEAGADAF
FAKPLNFDALIAKIRELLEARKNQ QGKIEE*
>SPBIB_v1_290129|ID:27163654| conserved protein of unknown function [Uncultured spirochete bib]
MEATTVLDSSSIEAL TIDESGIAQRIAQELAIRLSQVMAVLSLSAEGCTIPFISRYRKER
TGNLDEVQVRDCIQKFQSYKNLEERRLEVLKGINALGKLDAFLYENIQKAKTLAELEDLW
APFKKKKTRGMLAQEKGLGPLAELMAKAPLEEVLAAPS FVRLDDEHP ELSVPSAEAR
AGARDILAERLSQDAEIRAYVKHVVMQNGVLSVKGIGEEKREQSTYQMYWDYKEPLSTL
KHRVLA VNRGEREGELDVSIEIDDVLVEELVLERVRPANAQHKEALADGLARLLLPAVR
REIRSDLTESAEMHAIDVFSTNLRNLLMQPPLRGTRVLGIDPGIRTGTKCAALDET GKFL
DYFVINQETKPDQGGKDVAAA VTKHKLSVIAVGNGTGSHEVQKLVAEIAENHLDCRFAV
VDEDGASVYSASDLAREEFPELDLTIRGAISIGRRLQDPLAELVKIDPKSIGVGLYQH DV
NQQLADRLDEVVSSVVNQVGNLNTASYSLLKYVSGINGSLAKKIVKFRDASGVIRNRS
LLKEIPGLGEKTFEQCAGFLKIPEGDNPLDNTWVHPENYALAAEILPIVKSGRDP SREER
AALKEYGVGDITLDDIITELKKNRDPREDLPPPLLQGVLSFEYLQPGMKVKGKVKNV
VDFGAFVDIGIKESALIHVSEMGRDFVKNPMEVLRVGD LKEFTIISIDPVRRRIGLSLRS
DAKVQAGGVQANA EKPKVVTD SRTNLAGSATTSEGRRADKRHAPREPEGDGMTYNPFADL
LKKR*
>SPBIB_v1_290130|ID:27163655| Prevent-host-death family protein [Uncultured spirochete bib]
MKNLSV GELKNQFSEVLEKI QKGESFGILYGRKKKPIAMIVPYAEKTKKSKRQIGLLEGK
VDIRFADDFKMTEEELLGQQ*
>SPBIB_v1_290131|ID:27163656| PilT protein domain protein [Uncultured spirochete bib]
MNYLLDTHVFLWALTKTEELSRKAKEAIENPGNEIYISAISFWEISIKTRLK KLDLGPLR
PDDLQYAEKMEFQAISLTP EAMTY YKLNENSHSDPFDRMLVWQAISRNMALISKDNEF
AKFIPYGLTLVW*
>SPBIB_v1_290132|ID:27163657| putative Acetyltransferase, GNAT family [Uncultured spirochete bib]
METHHVPGARQENRAGSP SLSGRALMIRSATLEDSPALASLAGQLGYPASPEKVRERLPR
YIGAPEARVIVAEHEGQVIGWTSIEVVDHFYLDKFAEISGFVVDERFRGQGVGHALMQEA
ERWTA AHGLSTLRLKTNVVREDAHRFYENLGFERTKTQYTYVKKLARLAADL*
>SPBIB_v1_290133|ID:27163658| conserved protein of unknown function [Uncultured spirochete bib]
MAINFERLAGNTFVAR GPTNIGLYICRREGVPGESVLAEGVPIEAQSGKAASQA HGG SRA
FLIDSGGDADAGRRILRE CERLGVHLAGIINTHSNADHCGGNAFLQARIGCAVCATEAEA
AFLGYPLLETSFLAGGYPQKALKNKFLMAPVSRATHILNPPCALSLDAEGQIQMRTLFGK
QVQVRALPEGVVS GEPAPRAEPESQSDPQSECRIVSLPGHYFGMVGVMTPDRVFFAADAL
AGKPILEKYHIFFFYDLAAELET LAMLETIEADWFVPSHAEPTQDIRPLVELNRRKINEI
ADVIVGLCAGGQDVRESGGHSLEDIFAGVCAHYGISLDDNQHVLVGSTIRSYLSWLSNQG

RLEYSFINGRMIFKVKQ*

>SPBIB_v1_290134|ID:27163659| exported protein of unknown function [Uncultured spirochete bib]
MSKKKANQARGCTRNFNKRVAAGFGRTAMLVALLFLIAGGSGTAFQAQGH LAVDLGHPVYS
VIETAELRGV VTRLSSVKPYTSQQVAELLAQMLGHMEAFSPSEQALIQHYAKEFKAGKGV
EQALWQDAAGTARAGIRVEATTRFGV GELVDLMDGSGATALKDLWHINSRWV PYLAGEPL
PWLSMKGEAGFTFDKIEKNLYLPYEFTKEWDAGHIWLGTPRYS DGTLDYPTASYDIREDI
AAETDSGSLMVRLSRFRDWDGIGSGSFSLSGTARPFVGFETVFRPSKFFAISGLV GSLTN
WEKGENEKSTITSLIADTNGDGLINLNDTPVFSALS YQKMLGLQRMELFPFDWLTISATS
TLVGAKRFELGYFSPLLFSVMYQNQLADVDNLGVQVDGQILVPRIGKFYASFYADEMEIT
NLSELFTKVRNMFALQGGVKVPIPGLSFATVTAQYTKIEPFVYSHYATWY PDPYRLRV DTS
YTQDGENLGYLPPNSDEFLVNLEAMPAGWRVGLKYRFVRHGDNPQADWDNHLPEIFGD
VNKYMDYNQLYSYNKNFLHDGIYDYNHIGTINVS WKPIQPPKLLGASIPFELGAGYGLSY
TWWEDGTGAGRPVSAPQWKNVLTMSVKLFL*

>SPBIB_v1_290135|ID:27163660| conserved exported protein of unknown function [Uncultured spirochete bib]
MRRIGIFAVLLVAASGFTFAQSSSLTRVGCILGVGGLGDLSFN DLVYAGLQKAQKELGI
QFDYVEPQSISDFETYLRKMASKAYSVIISVGYDQVDPLTKVAPQFP GQKFAIIDESLN
LPNVVSYVSKEEESFLVGALAGFLKKANTAKNPTIGFIAALDIPLLDK FYAGYEAGARY
VNPSVKVIANYIGGNAPFS DITTAKEIALKQFNQGANIIYHAAGG SGLGVFQAAKEKNFY
AIGVNSNQNPIDPNHIIASMLKRVDTAAYKIAAAAKQGNLETGKT VILGLADGGIDYTVE
GSKVTIDPKILKAVNDIKQSIVDGKLI VPDTHAKVEAFLKANTYK*

>SPBIB_v1_290136|ID:27163661|yufO| Uncharacterized ABC transporter ATP-binding protein YufO [Uncultured spirochete bib]

MPAILMKQISKAFDKL KALDHVDFEVDAGEVHCLLGENGAGKSTLMN ILYGLYHADAGEI
YIHGKAVHIANPKIAQQYHIGMVHQHFMLIESMTVLQNIILGNEAGR FTIDYAKNRSRID
ELEKLYHFDFDLDTPI SALS VGEKQRVEIFKALYRGADIVILDEPTAVL TPQEVDVLFRI
LDDMRKQGKTIIFITHKLHETMVLSDRVTVLRNGKIIIGSLRTEE VTPKILATMMVGYAID
FDIVKSTFKPGKPVLELRQLKVLAASHATISLQVRQGEIYGIAGVDGNGQQELEGILAGT
AKPLSGRIIFNGEDITAMPAAKRKAKGIALIPSDRLQNAILPGMPIIDNYLLGFQHNSMF
SHFGILRFNVLKKHADNMVNQYSIKISALEQPISQLSGGNQKIVFSREAGLNPLLLVAV
QPVRGLDIGAIDAIHRQLLQLRDRGKAILLISTELSEIMEMSDTIGVLYKGELIAQRKAG
EVTIEQLGLFMAGERPE*

>SPBIB_v1_290137|ID:27163662| conserved membrane protein of unknown function [Uncultured spirochete bib]
MTRNRKYLEDVGFSLVA ILLSFLLVAVIMLILGYNPIEAYKALFEGAFGSSYSLSLTL SK
SVPLIFVGLAVGFALQ GGLFNIGGEGQIYIGGFVAAITGLLLSHTIPAFITLPVAVLSGM
AGGFLWGGTIGLIKAKLNINEVIVAIMMNYIAQLMTSYFVNGPFIAAKS MTPQTEILPLN
LQLPKIIPNTQLTTS LYALIMCVLYGFVMKRTVFGFEVKAMGNLHSAATGGIYVARNT
VLIMALSGALAA MAGIFEVFGTYGRFIDGFSSGIGFTGIAIAFIGQSTPIG IILASLLFG
SLQAGAMQMSMMAGISANINNVIQGLVIVFIATPNIIRFAFGKRRS*

>SPBIB_v1_290138|ID:27163663| conserved membrane protein of unknown function [Uncultured spirochete bib]
MATMMFVVNMLTMTFRLAVPIALASIGVSI SERAGIINLGI EGIMLLGALGGAVGSYVFS
NAWMGILLALITGIAIGVLYAFFVLKFEANQSVIGIGLNIIASGLTVVIVKFIWKKEGIS
GIVTQMSTYSVPFLRNIPVIGAFFTDQSPFILLTLIALACSYGMWRTKIGLRLQAIGEN
PLAAATAGIPVARYRTGAI VVGSSLAALGGAYLSIVHSNLFVSNMVAGRGFIAIAANILG
GWNPMGSLLASLLFAFAQALRFQFSAVHFDPQISQIIPYVITLLVLVGVGRKTRAPAKLG
VLE*

>SPBIB_v1_290139|ID:27163664| Amidohydrolase family protein [Uncultured spirochete bib]
MSRIFLRHGI VLTIDDCDA YYPDGCIVIEHEKLIFVGEDAQH PGIHPEDSVLDMRGKLIM
PGLINTHVHSHSPLFRNFGEDVPLQVWLNDIMWPAESHMTEEHAYYAALHTCLEFISSGV
TTFADQFYFADAVARAVEKSGLRAFLCSSIFENGKSERGQTVQTAADFIAAWKGRNPLIT
PGLGPHAPYSVSAEQWRSIVALSQATHTLIHTHISETKTENRKSFAEKGESPTKWLES LG
VFSCPTLAAHCIYLSDEDIAVFRNHNHVHSYNPVS NLKLVSGIMPYLKKTAGVQISLGT
DGAQSNNTLDLLQDLKLA VLIQKQKENDPAFFSVFDAVRLVTIEGAKALGLDSVIGTLEA
GKQADLIALDIQQPHLQPLHTDSIQMLY TMLVYCASGKDVT DAMVQGTWLMKDREILTLD
VHSV LHNTADISEQLRKKAGLTGD*

>SPBIB_v1_290140|ID:27163665| Phosphorylase [Uncultured spirochete bib]
MALDKNAITKNTKQYHIELNVGDIGEYVLLPGDPARSDRVAKYLDDAKLMANHREHRTFT
GYKGIKVSVTSTGMGCPSTAIAAEELIHIGARHLIRIGSSAALRPDIKIGDLLITTAAM
KNEGTSKFYVPENFPAVPDFEFTHLLIDVAKEMTSGSDKRVFAGISSTDDAFYGETPEFI
KKLQDLKIQNIEMEASALFTIGHLRDVTACICGASGNLTTGEVIYTTENYKLAEAWDLE
IRVVLEAIYRNEQRKKS DVRM*

>SPBIB_v1_290141|ID:27163666| putative Regulatory protein GntR, HTH [Uncultured spirochete bib]
MNNEESLKFRETKKPL YVEIYEKLFQFIEERNFHEGDRLPGENSLASELGVSRTTLRQAL
VLMTEDGVIHRIHGKGNFIANLAPRNLAGLENIANPVKAFTTVPVDEINIDMRFEAASEY
VMKLFGEYKSKVVMASDRWYRSGPRLIACCFASFSDLDVISSHNIDIQDAEIVKAFLEKQV
YELSSVSLNHINITNRKEFSNINIKMDSNTLILLSETLYSSENKILTHNKYYLDPLYFDI
VANGRHINRI*

>SPBIB_v1_290142|ID:27163667| putative Acyltransferase [Uncultured spirochete bib]
MRYRKGAPLTNDTPFSRLIWDILIALIALVGVWPISRAFYRIKIGRGCDATSSAGMDEGSP
SRLNTPNATRTSPIASVPPKLPSPAILVSNHCOMPLDPLFHGLAIFPRRTFFTLLEETCEA
PVLGSFVRLGGIPLPRNRARLNDIEQAVAHALSTRGLIHFYPEGECFLGNQNIYPFKAG
AFYFAIKFGAPVPIVTVLKKRAGHSTFRGQKSSRIQVTVHVLNPIQPPACGATAHETLA
RAIRFSNQVQDLMQAEIERCGGDKSLYRGMPRIKGVND*

>SPBIB_v1_290143|ID:27163668| putative Glycosyltransferase, family 2 [Uncultured spirochete bib]
MSIALLTAYGIIVFAACIFFFFVTVSNIFFWL VHTQSIPEKESGPSVAVLVPARNEALRIR
PCLDSLLKQNYRSYQIYVIDDNDSTDETWEILKSYMQRYPKFKAFRAEPLPEGWYGKPHA
LQELSGHVEEYMLCTDADTVHKPDSIGRAIAVAERYKADLVTGYVHHVMPTFAEASVEP
SIYILTMLAMPLYLIPLVKSSKISHAIGQFMLFRRSFFEKIGGYEPVRKQATEDVKMANI
VKQGGRIAFVDLRMSVECRMVNDYRGAIQGIKNAIDYLGKNTLFLFLGTVAVPLVFFV
PIIWFNIPWLGPAVPFLKASAILTLYTWILEAIDRRLPAYVPFIYPLIFVNALSALWS
GYRQVRKEGGVEWKGRKVI*

>SPBIB_v1_290144|ID:27163669| exported protein of unknown function [Uncultured spirochete bib]
MRVLHSRRQKVGQLASAMAFVLLLLNGYYTGAQQAPAQSAFLAPPQNPSVGNFQFPFAG
ALSPKQELLPGVAFPQELSADAVKAFLGLRDDVYNNVPETIDAMAASLLKIVAGAPLSP
ADRSLMNARIAYLAGRSWNDHKNKKQAVPWFEQAVSAARSVIDISGETPTSLIVLAEPLG
ELSILKDLGFLLANGPKIGQYASKALESDPHNKALLLKASALAYPPPIWGGNYKKALEA
YAAILPITEPGLPRDVLFDLVRGIATAYANLKLSEHAAWWFRAALELYPENNYAKSELEK
LSQ*

>SPBIB_v1_290145|ID:27163670| conserved protein of unknown function [Uncultured spirochete bib]
MCDTVILMDNSGKPAFFGKNSDRHPEEPQALLYISERAPSTVMLREGVEYQDKGFALLS
KPSWMAGGEMGVNSQGLSIGNEAVFSRFPDEHGILGMDILRAALSACASAKEALDFITS
FIEKYGQGGNGAYK GKLIYNSFLAADPQEA YIIETAGKRWAWRSAMVADAISNAYCIED
DYKRLDMQTRKEIAPV NKRAACSDSDPGRKGRNSWKAHVEDRKYLFFTKGEQRRSSSL
GGLMRIA AERASSAQTEAQNEAQSEPKAQLEKIFSLRSHEGATKPGPFLSRMKNLCVHP
GLFPQSATTASMVVEYLPGGALVWHTDSSYPCISLYKPVLLKDGRFYSLWKPLCAENKAE
ERYASWNSHRQWAVKSGHLQLSAKEDFALS RDAAQASIIRIAQQAFDSVSREKGS PERIS
SVYANEVA AIVGEWEKRWGN*

>SPBIB_v1_290146|ID:27163671| exported protein of unknown function [Uncultured spirochete bib]
MDRTRPSSLVILLFILSII LAVATVAVTRII EHSRPDVCAQFTIYLEKLQPQSM LVAATT
QERYSASKEFTAKLLAIFKIKAKIRLSALADV TYVISAADPSAWSARWNP KKRI LSISTP
PPDCLLP AVHTDTIEIV SENANLLTNTIFRLKEEA ARMQSELSNDLMVHAKASLDEPQVL
QSIEDGVRRFALVFCESAHIGKPA AIDIQLAPRLTER*

>SPBIB_v1_290147|ID:27163672| ggt| Gamma-glutamyltranspeptidase [Uncultured spirochete bib]
MEAHMKKLAFV FALFVAALSALSAQLPVNLYGRAASGPNVVA AAKPEASQV GIDILKKG
GNAVDA AVATGFALGVLEPNASGVGGGGFMIKMKDMTEPVVIDFREMAPSKSTPTMYLG
ADGKVPNSTIEGGLAVGV PGEVKGLLYALEHYGSGKLSRADI IQPAIQWALTGVPVTVN
LASIIKDNYGKLVKYENGAQIYLDGLPYE VGDVIYNPDLAKTLAKIVKEGTDAVYKGEI
AEAIVKEVQKRGGILTLEDLANYE VKIRK PVEGSYRGYKVYSVPPASSGGTHLIEILNIL
ENFDVKKLGFQTAQSAHLWSEILKLT FADR SKY MADTEFVKVPLAGLTSKEYAKEQAARI

DLNKPLAPVTAGDPWKYESGSTTHFSVMDKEGNMVAVTKTINYFFGSGV TIPGWGFIMND
EMDDFVATPGSVNSVEPGKRPLSSMSPTLVLDPQGRSFMTIGSPGATRIFPTVAQVISNV
IDFGFPIQEAILAPRVWQGASGALNIEGRYPASALDGIKKLGHDVTIRGDWDAYFGGVHA
VVYDYDKGVLYGGADPRRDGQAAAF*

>SPBIB_v1_290148|ID:27163673| conserved exported protein of unknown function [Uncultured spirochete bib]
MIGRQRKLPASLQRAFSRLPHGAGCFSRKGFMSMKRSRVSLLVAAVIAVLAPLSLAAAYNL
KAPFASQPALLTSIGQSADVEMAKAIINRLKISFTMDSL VKAQGLASSNAKTLIIVIGGS
SKGLGAAGISADAELERTKALLAEAKKRGMKIIGLHIGGEARRGELSDRFINAALPSCDY
FIVVEDGNNDGLFTKLCGTKIPLDVVQKISQVGEPLAAAFK*

>SPBIB_v1_290149|ID:27163674| conserved membrane protein of unknown function [Uncultured spirochete bib]
VSQEFLLFILMVG VFAAGCFALKWPVSVSMLLAAVAGALAGGVQNPRIHLVEGTFGYVDT
ILTIATAMMFM TGF RDSGALEAL TAAVIRKFNKLPGLLMILLTFVIMVPGMITGSSTASV
LTAGAVVAPMFASMGMSALDSGALISIAAILGMIAPPVNIPAMIIGGGIDMPYVGF EIP L
ILLTFPLAIAFALWFGWRNVKVRDRSKVVESLDFSALNQYGAWRLFSPLILIFVLMILDK
TVPRVFGLGMPLIFLLGTALTWMTGKRFEILKSAKKAIEDVLPV LGILVGVGMFIQIMTA
TGVRGFIVNALSVPALLYVMIAVSIPLFGAISAFGSSSVLGVPFMLALLGKDQIIAAA
SLSLIAALGDFMPPTALAAIFA AKVVGLEKYGGVLKKLVPGLIIAVYGILFIVFSKQIR
ALY*

>SPBIB_v1_290150|ID:27163675| conserved protein of unknown function [Uncultured spirochete bib]
MFYIYLAILAVVLALTVWVLFDTKKLSLQVTAAMVIVPLLLRLLMIK*

>SPBIB_v1_290151|ID:27163676| Succinylglutamate desuccinylase/aspartoacylase family protein [Uncultured spirochete bib]

MQKHTISAIICLAGALVAAA IAGASFLAMRKPDLIVRGPVTDVKMLSDWFPGLKGT PGD
TEVYILKGADDGASMLVLGGTHPNEPAGHIAAIMLIENAQPKSGTLYVIPRANASGFTAN
DPQEGAPQSFTIQT PNGPRVFRYGS RATNPIHQWPDPNVYIHASSGQTLSGSETRNLNRG
YPRPDGTLTERVCY GIVQLIKKENVTITVDLHEASPEYPVINAIV AHPKAMQLASDMVL
GLEMQDIKISLEPSPVNL RGLTHRELGDFTDLPVLMETANASQGR LRGR TDEALVLTGK
DKWYVRAEKLGRLYVPYDENGHPLEERVGRHVAAISELMNSWNLEHPEKPLEVEGLPGYE
DFLTKGIGAFLLPVP AKN*

>SPBIB_v1_290152|ID:27163677| Plasma-membrane proton-efflux P-type ATPase [Uncultured spirochete bib]

MAQGVQPSTGAFSDSTEAFKTL SLEETLAKLNASVDGLTAAEASARLARLGLNAIEEKKA
HPLAQFLSRYWGPMPWLL EIAILLA AFLGHVTE SVIIFLLLSINAVIGFMHQ RNASKALE
LLKKRLAVNARVLRDRNWQTIDATEL VPGDIILVKLGDIVPADVKIVRGNLSVDESSLTG
ESLPAERSENSIVYSSSIARQGEATCLVLNTGGNTFFGKTASLVKIAKPVSHQEEVMLTI
VRYMMYLGIVSSFAVGIYALVLHIPFLMILSFIVTFLIGAVPVALPAVLTIVQAAAGSQM
AKKGALVTRLD AIEDAASISVVCFDKTGTITQNKLSVVGSAASPGFSEDDVVRI AALASS
ADNMDLIDSAILNAAAARGLATKGCAQLSFTPFSPATRRTEAVIECAGSRYHVLKGAVPI
ILELCSDTSESARSDINAHVALFAQKGYRTIAVARAPLGAATGNVQAAPESPELIGILA
LADPIRSDSRAMIADLRALNVKPIMLTGDSLAIAREISVQAGIGPNIISIKELDGMDEGA
QARKVAQIDGFAEIPEDKYRIVKLLQKSGYMGVMTGDGVNDAPALKQAEMGIAVSNAAD
VAKASASVLTQEGVGVIVQAIRLSRRTYQRMLTWVINKVTKVVQVLGLLIAGFFLFRNM
ILSMLDMSLLVFANDFVTMSLATDNAKDAQAPNQWKVKNITLASLAIGLLAAQGIGGIF
IGQDLLGLDFGHMQTFVLLMLIFTSQFRVLIVRERRCFWDSMPGTLLLASTGSTMAIFFL
MGAFGFIIPALGARETGLALAYSLVFTA VLDLCPKRLFFKLFHVD*

>SPBIB_v1_290153|ID:27163678| NADP-dependent oxidoreductase domain protein [Uncultured spirochete bib]

MFYRRLGSAGIKVSVLSLGSWVTYGSQVDTEAATQMIKFAYDHGINFFD NAEVYAGGKSE
TIMGQAFRKLGLRRGSYL VSTKLFWGINEGPNEKNTLNRKYLLEGIEGSLERLGMKYVDL
LFCHRDPDPETPIEETVWAMHDIVSSGKALYWG TSEWSAEQIREAWEIADKRNL RKPQMEQ
PQYSLLVRTKVEKEFARLYEGIGLGLTTFSPLASGLLSGKYKNGIPKDSRFALPGYEWLQ
ERWYHDEVIATIENTLRPIAESLGCTMSQLALAWVARNPVSTVITGASRLS QLEENL GAL
DVLPKLTS DVLQKIDKALEPILQKSS*

>SPBIB_v1_290154|ID:27163679| putative DNA repair exonuclease, SbcD [Uncultured spirochete bib]

MPGARLYFNVGARRIEPFMKTYYTDVRKGRFAMDERAGIFKILHISDLHLGKSLRSRDLA
EDQAHILSSIVRETARLAPDLVLIAGDIFDRSIPSESAQTMFGRFMADLRRALPFDGRIL

VIPGNHDSARRVAFAAELFEAVGIHLVSNVRPVPALVLEKGGKRAAVWALPFVTHGAFHE
FRRTWLDAADEFPETGAGRMADHMASIIANLRPHFAEYDMNVLAHHCYVRGAELSESDSA
FIGGTEAVPASLFEPFDYVALGHLHRMQALSPHMWYSGAPMAMSFSGDGGSDKNSDKGFLC
VEIDAANGHLTVSPIALEPLRKMKRVRGFSFELTKETPEPADQDYIEVVLTDTDPVYNF
SELAKRFPNLAGVQQEAFQKIALGGAGDNLGASAQPWLSLSRERNVHAAVLEDFRSFAKY
ILDEEPAEELVAAFEALIAEMAEERE*

>SPBIB_v1_290155|ID:27163680| protein of unknown function [Uncultured spirochete bib]
MRPIRLAFEHFGPYAERQDIDFSALEDFFLIYGKTGSGKTTIFDAIAYALYGEAIGGRSN
LEREFASRFSSQGSKPWVEFEFSASSAQWKVYRSVPYKKQNRKGKESAAAEEAALYRMNE
ASKSYELVADRITPVNEALLDLLRLRADEFSKIVLLPQGEFQEFLEMKTSDRAAILEKLF
DVSMYEKATEMARRKVDLLSSSLSAKNDELERLASELGSDPLARIAAMRKAFEGFRAQIE
ETKENASHLDTEIAQINERIELWQAFMSARAAFIELEHSHKPSFEARAASLDAAKNLATLA
GLAQSVRSQHEDFLAVLKEAQRAGTELSKLEKARLEVEKNKERLPGLKNRQNELQRTAAL
YQRALDAWRRKEETARNLDELQKKISIALDSCAAREQELALTRKRIFEFEALLAKEPEAQ
ALTQNNVAIEALKRAEGLAKQLERLNSQRAQILREIQSTEDSLLTASRDLASAEAARSR
LEDAFRLAQAGIFAAALEEGEPCPVCGLHHPASLPNYAPDEQTVRQAQDAVETQKAR
HAGLVQKKESLAQRLQDIEHEIGSLQQSISEEWQNREELASLRQEAEIESSKAIEALAQS
LKERKRILDTELEQYRLTRDALRTSRQQFEAAEEAFNQARQEREQLEKTKAELQARLDSL
AEQAGEHDPEPLENTRALSQDLQGEIIEQRAQEWQMA YRATS AQLDIHLSSELEKGN
SLGPAFVRFEESERLDVRVLLRTLEKPGIAKDAALQTSVPQKIFVPEESPHEAPARAKP
PSALDALS DLAGILLQTAKGNETADR KARVGR TASILSEAFRAAGQKEAEAEAEADAL
SLVAHVQQTAWPTDRLRSEEQAVSAFREA YARAKAA YDALAARARRLNEDA AKSFS DQEI
ESEEHALIDARDALVLRKKDLEDTLAELQRARAEIGAQLDQFKRSLERYNELQQQYSAAT
QEFGKMEKLSRLSGDLIKGKKLPFKNYVLGAQFREIAARASERLYRMSSGRYIVEADPL
SGTGNQKIGLELFITDAWNGARRPVGTLGGGEKFMLSISLALGLADSIQERAGANRIESL
FIDEGFGSLDAESLSLAISVLDELRGDKTIAIISHVDELYSRIPSRIVVEKGVGGSRLRL
ERD*

>SPBIB_v1_290156|ID:27163681| Alcohol dehydrogenase [Uncultured spirochete bib]
MHEFYSPTKIIFGEGCASETAPRLREMGATKVLIVTGKSSTASSEGFRDLCKGLDAAGIQ
WVHFAEVSADPETSTVDKGAEVYRANDCNAIIGFGGGSPIDCAKGIAASIGEGRPIDRFV
GTGLAFTKPVPLVAIPTTAGTGTEVTNAAVFTIVDEHGHRSKKGTSSQFYFPLRAIVDP
LLHMSMPPSLTAATGMDALTHAIEAFVSRFHTPVSDMYCLEAVRRIGRSLRAACRVGSDS
GTGDGAFGAGRGLKASGNSSGNRALLEARS DMALAATLAGVGLSQAGLGMVHGFAHPVG
AMAGLAHGLANAILLPFVMEALIPDAGERLSAIGEALTGKRGTSAQDAVRDIARLGRDIG
IPENLEAAGVPQRYFEDILADALSYRRRKASPRAFDTDEL RGLLARMYSGKVEA*

>SPBIB_v1_290157|ID:27163682| putative Cl-channel voltage-gated family protein [Uncultured spirochete bib]
MQEFFSIYPKSKLQPDYCAPIEHPDATRLYGLKNGNLYTHTRIIYAYAALTGAVSGLLV
VAYRTAIVSAEHFRDALIGNAPPAKVLLWLGIVATGAIFTALFVRRSPLIKGSGIPQVK
AFLMRRINFDWKRELPLKFAGGTFALGAGLSLGREGPSIQLGALAGTAIEDIFHIPDYRR
FLVTAGAAAGISAAFNAPLAGVLFCEELHRNFSPVMLTVTMIA SFMANVVMWIFFGTSP
IFELTILETLPLRYFTVILGIGVLAGALGSLFNIGLLGFQKLYRRVVPREEFRVIS AFL
MAGAISIVFPMIAGGGNHLVSFPLLSTMSFFAIALLAAKFVFTLFSYASGAPGGIFLPM
LAIGSVLGGLVYSLLGLFGYQSPYLPNYILLGMAGFFVAVVRAPITGAVLITEMAGSFAH
FPAFIFVSIATLTANLLRTKPIYDSLLAQIPPLYPEQITHAAATLHIPFMEGSSIIHLVS
ELKERLPGECILTGMIRGEERLFPYPSMEILPGDEALIEVDQRAARLLKEELLKLGMPTE
DEQEIKSNGAAFT*

>SPBIB_v1_290158|ID:27163683| oppA| oligopeptide transporter subunit ; periplasmic-binding component of ABC
superfamily [Uncultured spirochete bib]
MRKLLFAMIALLA VVGLSAQDFTIVNGAEPASLDPHAVEGVPEHRIYMALFEGLTVSDPR
TNRAIPGIAESWSFSKDYKTITFKLRKGAVWSDGVEITADTVVKS WLRKMDPKNAFQYAD
LPAMYIAGAMDYLEGKAGPESVKIRAVDKYTFEVQLVGPCPFFADMTTHYAF AIVPIHAI
EKYGGQDWVKPGKIVSNGPFVLSEWKPQEKIVVVKNNKYWDAKNVALKKVTFIANDDINVG
YNLYKTGAADWTETVPLELMDEVKLRKDFHVAPEYGTYYYIFNVTRKPLDDARVRKALAM
AINKNDLVNKVTRGGQIPANGFVPPSAGYTPAKGYGYDPETARKLLAEAGYPDGGKGFPTL

QILYNTSASHKRIAEFIQAQWKDNLGINVGLLNQEWGTYLDTRSQSHNFDMARAGWIGDY
LDPSTFLDMWVTGGTQNDGLYSNPKYDELMAKSRVTSGSERYQIMMDAEKVLIDQDMAVL
PLYYYVTQNLIDLNKWDGWYPNPLNTHPWKFVVRPKK*

>SPBIB_v1_290159|ID:27163684|oppB| oligopeptide transporter subunit ; membrane component of ABC superfamily
[Uncultured spirochete bib]

MARYFIRRALSLIPTLFFIVITLSFFLIRLAPGGPFAREREVPEAILQNLMKRYHMDPEPLF
KQYLRYMGDIVRWDFGPSYRYRDLTVNEIIDRGLPVSMGLGVISLVLAAVGGVAVGIIISA
LKQNKWQDYVAVSIIVIGISVPLFVMGPVLQLIFGMKLIKILPIGWISTHGLKAVILPAL
TSLFPYFAYIARLSRASILEVLRSDYIRTARAKGLKESVVVWKHVLRGALLPVVTYLGA
FSGIVVGSIVIESVFLVPGIGRPFVQSALNRDYTLMAEVVVYSIILIANLVVDLIYGL
LDPRISYK*

>SPBIB_v1_290160|ID:27163685| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]

MANKKLQQA VNEFNQVMKPVSLWADAWKRLRKNKMALISLFIVSIYILISLFAPIILTSAG
VLIDYRKQVITNASLPPSLKPAGELVVKKIEARIASLEQRVKEKAEEQSAFGSFFNFAT
DQTQPESAAEATPSDQGDTSFTFTYQGEFSGNTTDPVVRELISQKETLEKVKAEALDTN
PDYKLVYILGTDDLGRDMFARIYGGRIASIAIGIVGTLTAALVGLIGAISGYVGGWLDN
LLMRFVDIMYGLPYMLIVIIIIMAMIGEKGARSGFVVLVFAIALVSWLTISRVRGQIISLK
NSEFVEAARSMGASSWRIIFRHLNPTLGVIIVSTLMMPSFIMNESFSLFGLGV SAPD
ASWGTLVSEGVRAMESYAWQLLGPGIAMTIFLFCMNFLGDGLRDALDPQSKNRT*

>SPBIB_v1_290161|ID:27163686|oppD| oligopeptide transporter subunit ; ATP-binding component of ABC
superfamily [Uncultured spirochete bib]

MTDEVILEVKDLKTYFMVDEGLVKA VDGVDVDFQLHRGETLGIVGESGSGKSVTNLSIINLI
PVPPGKIAGGQVLFHGKDLLKMPPEIRDIRGNKISMIFQDPMTSLNPFLRISTQMVEI
ELHQGLDKKAAKEKAIEMKLKLAGIPAPEKRIDQYPHQFSGGMRQRVMIAMALSCNPEILI
ADEPTSALDVTIQAQILELMQELTRKLGTA VIMITHSLGVVAGMCDTICVMYAGRIVERG
RTEEIFESPKHPYTVGLIHSVPRLDQETKGRLYSIPGQPPNVIDLPDCCPFFPRCEKAMD
ICKKKYPPSVSFENGQSASCWLYAKEA QNA*

>SPBIB_v1_290162|ID:27163687|oppF| oligopeptide transporter subunit ; ATP-binding component of ABC
superfamily [Uncultured spirochete bib]

MPDHKVLVDVRGLKMHFPIKASFFSKAKNFIYAVDGIDFQVRKGETLGLVGESGCGKSTT
ARAI AQLYKPTAGEVILNGKDLTKLPPQEMIEARKNMQMVFQDPYASLNPRMTAGDIIAE
PIRIFQKRGLIDMSTEERNDRVEHLMK VGLSRFFKNRYPHEFSGGQRQRIGIARALALN
PELILCDEPVSALDVSISQILNLFKDLQDEFGLTYLFI AHDLSVIKYISNRVAVMYLGL
IVEIADAADLYKNPLHPYTQALLSAAPIPDPKIEAKRKRIILTGDVPSPKQRPGCNFYD
RCSKHMDICKQARPMLKEASPGHEVSCFLYHKPE*

>SPBIB_v1_290163|ID:27163688| Dihydroorotate dehydrogenase [Uncultured spirochete bib]

MVSLQVSRFGLVFPNPVIAGSSGLTGNIKSIKELARNGIGGIVLKSLEEQILMEARREA
SKGGVIYQEEIDDIYIGYYEKKHSLSEYLALIRDAKHEVSVPIASINCVSGGEWTEFAS
EIRSAGADALQLNIFGRNSDPGSIVRAVKDKINIPLIAKIGYYFSDVSAVVSEIERAGA
DALVLFNRPYSIDFDIEKLSLKQGA YFSSREEMSVPLRWISMLFGKVHAPIFASTGIHNG
DDVVKMLLAGAAGTEVVSSLYRNSPEVIAQMKARLESWMDAHGFETIEAFRGLLSQELSS
APETYERVQYMKYYGELQERRDGAGN*

>SPBIB_v1_290164|ID:27163689| Multisubunit Na⁺/H⁺ antiporter, MnhE subunit [Uncultured spirochete bib]

MKHGREAVILFIGLFLVWVLITWSVQPQELLTGAALVLVLTLMRSVYPLLEGIRPGITP
LFSMVAYIFIFIWQLILANIDVAKRVLSPSLPINPGIVKVKTKGLKSPLAKVMLTSSITLT
PGTSLSNVQDDEIFHWIDVKGNDVESASKAIVAVFEQGLKGVVE*

>SPBIB_v1_290165|ID:27163690| Putative antiporter subunit mnhF2 (fragment) [Uncultured spirochete bib]

MITISLILIGLSAVLTVFRLIKGPSLFDRLVASDTLSVIGMAFLVLAIEIVQTTSYMDVA
LVYGIVGFLGTVTIARFFMRVSK*

>SPBIB_v1_290166|ID:27163691| conserved protein of unknown function [Uncultured spirochete bib]

MTVVGEILMLIGGIFLGLSLGLVRMPDVYNRLQTGTKASTLGAMSIGLSAIFLLPGAAG
KAVLLVVFIVIANPIASNTIGRSAYLSGIKLSEKSVSDAWGVQASGEAGMVEGAAADATI
TGAAPEATDNKGA*

>SPBIB_v1_290167|ID:27163692| conserved membrane protein of unknown function [Uncultured spirochete bib]

MVAMVIVVSVLLIGLAAGAI FMRSLSGAVILLGTVSLLVSATFLLLAAPDVAITEAAIGS
ALTTLVYVVLVKRTNSVDSLEDGSNLQTGKRSESAHNGGSPAGGSHA*

>SPBIB_v1_290168|ID:27163693| Na⁺/H⁺ antiporter MnhB subunit-related protein [Uncultured spirochete bib]
MRKVIGVLLIASFAFFIFSLVMRDLWVEDPAAVRTLQGAAIEQTIPQSGAANTVTAIVVQ
FRGLDTLGEVTVLFLSALGVALLSGEFAGRGLKEVFRDDGGFILYNGARLVLPIIVLVGV
YIVAHGHLSPGGGFPGGVLVATAVYAVLMTGVKNELSTRLMAVIEGFAGLAFVGLGLLGL
LSDRFSLANVLPKGSFGMLFSAGIPLIYAAVGTKVAEELSTLVTSLTGSDYASAEKEA
QGGKR*

>SPBIB_v1_290169|ID:27163694| NADH-ubiquinone oxidoreductase chain 4L [Uncultured spirochete bib]
MISVSAVLYSTSMILILLGLYGVLTRKNLVRVVISLDVMDLGVNIFLVTIGYIRDGRAPI
YLSDAPLSLVDQASNMDPLPQALVLTAVIGFGVTAVALTLIMRLYERNGTVMVSDLRG
LKW*

>SPBIB_v1_290170|ID:27163695| putative NADH-quinone oxidoreductase subunit N [Uncultured spirochete bib]
MVSPMLLIAMPLGAAFLIVLLGSKMAARIVAIATVAFLAVLAPIWLSAAISEPFVIVLAD
VLPPLGIAFGLDAVSAGFALLIAVSGLLVLLYSFPYIPHAGEFKGKEKAEVRYAIFLLL
LAGAFGLVMTKDIFNLFVFFEILCISSYLLVAYSQEERALEAGFKYMLVLSIGS AFMLVA
IGLSYRLSGSLAMADIAKALAAAPNSYATLVSVLFLVLFVGFIEAAVFPLNTWLPDAHSSAP
SSISAVLSGFVIEVALVVLVRLSLNVFSGAMLSVLAVALAGILVGEMAALGQKELKRAL
AFSSIGQVSMMLFAFTLGSEIGKWAGLGQLMHAGAKSALFLVSGYFIVRTGSHEIEAYR
GLGRKMPAAGAFFAIAALSLVGMPLFGFFTKLRIVEAAAAHSAIGYAGIVVILFATVI
ESIYLFRIVRTLYGANAEVAASGAASGDLPAFAWIAVAGFVLLVLVGGFMIPSFDRLLQP
MAAVLATI*

>SPBIB_v1_290171|ID:27163696| putative NADH dehydrogenase (Quinone) [Uncultured spirochete bib]
MLTSMLLILPLAGFLTSLAAAWVPASSKARASGAVQKIIAGIGFAALFVFAFLAKSEIG
TGYLGIPLFGLWLNFGTLQLSWYFVAMVAGISLVTVLFSLQGLRDDGRYPFYIWLFSKT
FGMLGVLLSADMLTFFIMWEVMSWCTYFLLQQGHEKAKRAGAGYLVYAVTAGMILLAGLL
YVYFNVGSFDFRTIQKAFSGFGAGRIIVAMLLVLVPMLEAAAYPVHWWLPSAYANAETG
ISAYLAAISTRIGIYGMTMFLFAGFGLTALNLVTANKYVSANEVLMIIAFTMVVPTFTA
LFQHDAKELMTWHSIGQGGYMI VGIASSTTLGIAGGLFHVFNHMTYVSLILFSIAAVEYR
TGTTNLNKLGLIKKQPVAYLGLLFGIIGLAGIPPMNGFVSKWLIYRALILSGHPFIALA
AFIATLGTILSVYKLIHNMFLGQLPERYNDIKEVGMWGMRLPIIFMMAVVWLTGAFPPTVL
AVVADIQQSLGLERVAYSVHGVAEMGQLNMLVINIVFIGGLFVSWLIYLAGGKRKHIGQ
YDNYAAGHFLDKSIPYNYNYNFYAGMEHIFERLLHKPPVKRAEQALATFVSGTSEYVCRI
FTGNITTSAYVVA AVVVILLVLGGGR*

>SPBIB_v1_290172|ID:27163697| Respiratory-chain NADH dehydrogenase, subunit 1 [Uncultured spirochete bib]
MSVLSIVVWIIAYPLIIFCIGVLLGGYERKFSARVERRIGPSWIQPFYDVIKLSMCKTNN
SHGYMHDVAIIMLLGGTMLTYFVPVPGFSYFSQFGDFLVISYLLLIPSLGMALGVGETA
NPNGSIGISRALQMLAGYEVFILTFIGVAMKEQTTSMLDIIRVQQAGGFVAWGIAHPL
LGVAALIALQGMLEKPFVIVAPHEIATGPMTEMGGKYL GIMFIQHIAVPLELTLYIN
LFLGGASNWLEYLVKLFVLWTALISVNMVFRFRVDSAVKFMWKISLPLAALGVIGIMLN
IA*

>SPBIB_v1_290173|ID:27163698| NADH ubiquinone oxidoreductase 20 kDa subunit [Uncultured spirochete bib]
MAKELTQKAAWDRVLAKLKNSLWMLHYCTGCGAIELPPTMTARYDMERFGIMPMTPRQ
ADILLITGYLSVKTLKRVILVYEQMQAPKYVVGFGSCTINGGMYWDSYSTIKSLDQYLPV
EMYLACMPRPEAIIKGFSLIDRVGKGEANSWRDYENYEFYRKNQEELFGGPIQSYQD
IPADAQKFGILEARQ*

>SPBIB_v1_290174|ID:27163699| NADH-ubiquinone oxidoreductase chain C (modular protein) [Uncultured
spirochete bib]
MKRRVIDVTARLYKATSSAEHARSESEGAAQFVEDDVS NKMSLEEMRARI EKTAGFPGFV
VLQKQKRIQGEIPADKLYGFAVTLKNTLGFELHLSAISCVDWIDEGRFELVYHFWNYEQG
ILVQAKISIDRENPSQPTITDLWQPAKFFERDIHEMFGVDFP GNE DLSKYILSDWQGPPP
MRKDFHTREFAHSQYHFKDYEPEWDDKVQGGYHSNHA VPDAEAQEVIMPGRKAHASDRW
WKEAQHE*

>SPBIB_v1_290175|ID:27163700|nuoD| NADH-quinone oxidoreductase subunit D [Uncultured spirochete bib]

MSEKMNIIVTVNDGRTL YPGASAPENREYNMFIGPNHPGIEGNFALKLTLEGDTIVQARTD
AGYLHRGFMEQRL YMQNIAIVPRICVDPDPNEENYARAIEAIAHIEVPRRAQFIRV
MMLELSRIASHLFAFGGFAGTLGLYTMPNWSISDRDRILELFEALTGARIYHIYIIPGGV
RRDLPEGFAQRVKDTLFYIESKLPEYDNLLFENSIIRKRSRIGVIPPEKAMEWGVTPGN
LRAAGFAHDVRIDDPYEVYNELEFDPIAHESDALARMLVRRKEVEESIRIIRQVLDKMP
SGPVWNKQPNNPLKWKVPAGDAYVRTESSKGEYAYYMVSNGDVRPYRVHVRGASVTHGVHV
LEKLLIGTRIEDASQVMFSLDACPEVDR*

>SPBIB_v1_290176|ID:27163701| 4Fe-4S ferredoxin iron-sulfur binding domain protein (modular protein) [Uncultured spirochete bib]

MFNPGSILKPLTALRYLGEKPDITIKVPFVERPAADRYRGFHINDLDKCIGCGTCAEICDN
DAIRMVPVEGKEAGVGRGTQYRPAIDYGRCCWCALCVDVCTTGSLKMTREYIHISPDANSF
FILPNEKSIHGESAPKEGWTADKQVNFLDLDRVPMKELSAEERGDSFIEIVKGFSGKEEAI
KEASRCVSCGLCTAVCPANMNIPEYIEAIWNDDIHEAGRQMYKTNPLSDVCGRICTHKCE
TACSIGNRGKPLSIRWLKRYAMDAIPQEQYLSLVDQNVKKGKVAIVGSGPSGLSASY
YLALMGYEVTVFAYPKAGGMMRYGIPSYRLPDAVLDKDIGLIESLGVTIKTGTRVGKDV
QFEDLHQQFDAVLIATGFHEGRSTKVPDTHPMVFAIDLLSRIRRGIEFPVEKEIVVIG
GGNVAMDIARSLARLQKQKYGEVHLIVTSLETRDIMPADKEEIEEAEIEGIVFHPGRGPE
EVLIEDSNIVGLKTSRCTR VFDEQKRFPNPAFDKNDIEIYKGNMVEAIGQGNMSYLGDY
ATKLEYDGRRIKVTPTYQSSLGWLFVAGDIIKGPDVINGVAVGHKAAIGIDEYLAQTPDD
HVTTIDDCIKIAREYEKQEIRQLDALLKNKDLQEA EFGEGAAALGLVLQELLDQHNRNLA
QLLMLLGNENFRIHLRQELKREL RARDFSRYANLAPLPGTPGGAPFSEGD LVAFLALREQ
KGFELYNDIFYLSGHKEFEFIIESLREAQRKA VEKVEAL*

>SPBIB_v1_290177|ID:27163702| protein of unknown function [Uncultured spirochete bib]

MEIPLRLVARKDGSIFYGISLSFRLVMGGMLILLGAAIVLEEFRA GPIGWIAIFLLLLGV
IYKEDWLFVDVNTKTVSGLVGFYPM LKKTQLTFEEIGYIQLAAFSKGTVPGSKEEESSNRD
AFESMRGKDSREGFKSSFD FARRKKLYIALLLITKNEEHYLLDMTPARRAIRLAQAGKAL
AALIGCSFLDNIAE*

>SPBIB_v1_290178|ID:27163703| Transcription factor/trp operon repressor (modular protein) [Uncultured spirochete bib]

MSRNPPELMRESIAEMASALEGADSALIEQFFYSLFTVAEAEDEIAKRWALVKELAKGTPQR
KIAENLGLSLCKITRGSRELKPKGSPFRQLLDRLASLTATAADQNAQPDPSPPE*

>SPBIB_v1_290179|ID:27163704| Phosphoglycerate kinase [Uncultured spirochete bib]

MQGPRLKIRPVTELELHGKTVIFRPDINSXIDPTTKRIVNTNRIEKTVP TNLMLERGAK
VALIAHQGD TLDYQNLPLAEHAEILSRLSGHRVSYIXDVC GPAAQA AVKALXPGEAVIL
GNLRYLAXEISTFETVVKLTAEEMXQXWLV RSLAPLADYVND AF AAAHRNAPSMVAFQE
ILPTXGGIQLMEEXTALKSV MENPRXPCVYVLGGAKISDXFDMMRKVLT DGSADYILTAG
VTGIVMHIARGVDFGPTITKFLADRALDTFIXEAKSLLXXXXSHYVLPVDFAYDAXVGQG
APXSAQAGTKPGQSTSHNSKPVRAEAPVGS LPKDRLLPDVGRQTIELFKEYIGKAGSIFV
NGPAGMYEHEPWS DGTREIWQAIADAPGYTVIGGGDTITAA TRFTDL SKYGYVCTGGGAM
VRFLAGKRLPLIEAMERAFERNLQAPLRR*

>SPBIB_v1_290180|ID:27163705|gap| Glyceraldehyde-3-phosphate dehydrogenase [Uncultured spirochete bib]

MAKVKVG VAGYGVIGQRLADGVALQGD MELVGVADXAVT LSVRALREKGM PYKFFLA APE
KREEDKAGIPVSGTLEDLVQQVDVMLDATSAGV GAKNRLLYEKEYGKKAIFQGGEKNSVA
DVFFHGYANYEKGIGAQFLKLTSCNTTGLIRAVDCIDRKVXVEKVAIT IRRVADPGDYH
RGLTNALQIDKAPSHQALDLMTIMPHVDATGILVHTPVTHGHIITVVATXKKS VTPENVI
EFFREHPRIRVVSIAE GFLGNASLFRYARDLGNPRGDMYEIAAWEDTVVMSGKDVMFAIN
VPQEAVVIPENMDAVRACMRMQLDRXEATD TTNRXLGIGKWRNPG*

>SPBIB_v1_290181|ID:27163706|iolE| Inosose dehydratase [Uncultured spirochete bib]

MEKNIRLAIAPIGWTNDDMPELGGEIPFEQCVSEMALAGFEGSEVGNKYPRDPEVLNKAL
KLRGLTICNAWFSSFLT TTKPLKEVERDFVQQCDFLYAVGARVIGAAEQGNSIQGKPLPVF
DAKPRFTKDEWKRVTEGLNHLGAVAKQKGMRLVYHHHMG TGVTTEEIDRFMEMTDPDLV
GLLYDTGHLVFSGEDHLAVLKKYLKRIWHVHLKNVRFDVVERAKREKWSFLQAVRNGAFT
VPGDGGLD FAPVFEILKNAGYKGWVVEAEQDPALANPLEYAIKARQYIREKAGI*

>SPBIB_v1_290182|ID:27163707|iolD| 3D-(3,5/4)-trihydroxycyclohexane-1,2-dione hydrolase [Uncultured spirochete]

bib]

METIRMTVGGQAIVRFLDNQYIEFDGKVEKFVGGVIGIFGHGVVVLGEALAAPGHNLPI
QAKNEQGAGHVAIGYAKQNNRRKIMAVTSSIGPGALNMVTAASTATVNHIPVLFPLPGDVF
ADRQDPVLLQLEVPHDATISANDAFRPVSRFYDRLTRPEQIMTALIHAMSVLTPAQGG
AVTIALPQDVQGVAYDYVPVELFDQRIHHIERRPPTSAQVARIVSLIKSAEKPYVICGGGV
RYSEAGRALADFCKKFDIPLGETQAGKGSVPWDHPCNLSGIGVTGSLAANRLAKEADLII
GVGTRFGDFTTCSKWLFQNPVKARFVSINVAPFDANKMNAEPIIADAKLTLLAMSRALGAA
DYKARWGDKIARAREWAREVDSLTYQEDPMGLSQIRVIGELNDVLLPKNAIVVSGSGSI
PSDMQRTWRTRVPGTYHMEYGFSCMGYEIAASLGAKLAMPERECVAIVGDGAYTMLHTEL
LTAVQEGRKIIVVCDNSGFQCIDNLQHSQGIAHFGNEWKRDPETGLLAGEQVQVDFAK
NAESWGALGLRARTVEEFRKAVRRALRAKGPVVIHARVSPKSMTHGYESWWRVGTAEVSD
NPEVVRAAEEMKAELAKARKF*

>SPBIB_v1_290183|ID:27163708| Myo-inositol catabolism IolB domain protein [Uncultured spirochete bib]

MVLHHS GDY AEGYELLVLRSGDRAHMLMDFASLSLQKGT SWRSNANDERAFLLAEGMVEF
LVSTKVEWVGSSSEDWIPDLKSIYIESLAEGGTRIRASRTS LLEENPIVLHLPAGTEVEIQ
ALSERAVLYVSATSNDARFAPRLYLPFECQTEFRNEGTLQETSTRIVRTVFNKTNAPWSN
LVLGEVVNQGRWSSYPHHPQPEIYHYRFYPEQGFGMTALGTEAYLVRNRD TLLITDS
KDHPQVAAPGYAMWYLWVIRHLDGNPYISPEFNPDHVWVDKPGAQIWEMRRERQ*

>SPBIB_v1_290184|ID:27163709|yrbE| Uncharacterized oxidoreductase YrbE [Uncultured spirochete bib]

MSDKITVGVIGAGRIGKIHVSNIVYYMPEARVKT VADANLTPEIEAWAKSLGIPHVTKDA
EEMLRDPEISVVLICSSDTHADYIIKAAHAGKHIFCEKPV DLTIAKVKAALAAVKEAGV
RLQIGFNRRFDHNF AHIRELAKSGALGQVQLVKITSRDP APPPLAYVKVSGGIFLDMTIH
DFDMARFQAGSEVEEVFASGAVLVDPEIGKAGDVDTA IITLKFANGALGVIDNSRKA VYG
YDQRVEVFGSGGCAATENDTPSQVRLSDGSGVHGDKPL YFFLERYRDAFIAEMRAFFEAI
KTGSETPVTGNDGLMNLAIGLAAKSLAEHRPVKVSEVL*

>SPBIB_v1_290185|ID:27163710| Xylose isomerase domain protein TIM barrel [Uncultured spirochete bib]

MIETRRFALNRIAAPALRLAEFFGLAAELGLSAVELRNDIR DGAVTNGLKASEVVQLARE
AGVRIITINALQQFNLPSARAKALDELDSLALCKEIECPALV LCPNNRADDARSPEQKY
HDTVEALNTYAPLFSAAAGVLGYVEPLGFSISSLASAEVALKAIHESGASCYRVLVDTFHS
YLGPDSPAMFDDPAVIQKIGLVHVSVEASIPKQSFSDAHRV LPGAADV MNSAALMARLE
KAGYRGMYSFEPFSAEVQALGAKELASALRASIEYLSHA*

>SPBIB_v1_290186|ID:27163711| Inner-membrane translocator [Uncultured spirochete bib]

MAQQSDVVGKFINRYAIFIVLVVMIVVLSFLSPSFLTAQNLINVLITESGRGILAIGVAFT
IISRGIDLSVGSIVSLTSVIAASLVQEPSYSARIFPNLPLLPPIVA VIAGLSAGTIVGIT
NGALIA YTAIPPIATLGSMIARGLALILTNA YPVPMLRPEFKIIGQLLGPIPVVIV
FALVALIAYVILSHTRFGKNVYAIGGNVNAARTSGIKVSKNLIAYAVSGFCASIAGILI
TARAASGIATLGNNYELDAIAAATIGGTSHTGGIGTVPGI IAGILILGILNGLLLGIS
PYLQQVIKGVIIIVSAVVFDMRKNARQK*

>SPBIB_v1_290187|ID:27163712|mgIA| fused methyl-galactoside transporter subunits of ABC superfamily: ATP-binding components [Uncultured spirochete bib]

MEDYILEMKGIVRTFPGVRALNGVDLQVKTGRVHGLMGENGAGKSTLMKCLVGINPPDSG
EIWLRGKKVTIPNPYTALKLGIAMIYQELNPV LERSVMENIWLGREPMMRGAAGFLVDHK
AMYEQTRQLLSELEIDIDPKIKVKELSVAKMQMIEIAKAYS NADIVIMDEPTSALTPNE
VKHLFDMIRKLKERNVAVIYITHKMEEIFQIAD ETVT LRDGNHIITEPIEKMTIDSLISA
MVGRRLTEMFPKMESKIGDVKMSVRHLEVPGLLHDISFDLRKGEILGVAGLVGAGRTELM
EALFGLRQRSAGEILIDGKKTDIRTPADA IKA GIGFLTEDRRLNGIIPVLSVKINTIVAN
LAHYTKFGVFLNHKKISKDC EYKERL KIRTPSLEALIQNLSGGNQKVLVARWLLTNPE
ILILDEPTRGIDVGAKAEIHTITKLACEGKSIIMVSSEMPEILGMSDRILVVS RQITA
VLDRKEADQETIMRYAAAKYNNNQVA*

>SPBIB_v1_290188|ID:27163713| Periplasmic binding protein/LacI transcriptional regulator [Uncultured spirochete bib]

MSIGKKLILAVIALTLVAGTAFQAQTYHIGVTLYDRDQFIS SLEQAILEAAKKYPNVVVD
SQDAKQDVNQMAQVDVFATKKYDAVIVNLINTDTVETIIQR ARGIPVIFVNRPRDAVI
DGVKTA YVGSQEYDAGRMQGEFLAKFFKGT ELYVLFMGQLG LENTNERTRGVKETLEK

AGFKLVKVVYEDTAEWDRWKAMNQMQQLLGTGKQFDVVICNNDDEMALGAIEAMKALKMDLK
KIPVVGIDATPPAKEAVKKGEMAMTVFQNAKAQGAVALDFALKAAQGQKIEKFGWVPFEP
VTIENVAKY*

>SPBIB_v1_290189|ID:27163714| Oxidoreductase, NAD-binding domain protein [Uncultured spirochete bib]
MNKVKIGIVGLGRLGKRHAYNLANLVPGAELIAACSPIRAECEWAGTELGVPELYASFDE
MLEQASLDAVWIASSTYHAQQALAAALERGLHVFVEKPMGVTLEECAEIERAVQAHSNQV
FLVGFVRRFDPSYRYAKDLIEAGKIGTPFLVRSQTCDLDEYAEFQLEFVKTGGGIFLDMN
VHDIDLARWFIGSEIAEVHVSVGGSFVHQGFATLGDADNTVCLATFKNGAIAVLSASRTAF
HGHDTHTEIVGTKGILKIGTTPRKNRVEIFDSAGARTDCVRDFYERFEEGFITEAREFVA
CIREGRKPEIRPDGTAATRVMAMTESFRKGTVVKLQI*

>SPBIB_v1_290190|ID:27163715| conserved membrane protein of unknown function [Uncultured spirochete bib]
MLVEKRFFPLYIVLFCVYTLFGISMTVIGATLPKIFADFGWSYTTAGAVIALGSGVGYFLS
SYVAGILLSALGFRLTISFALLFIFIGLEFFAATPTPWLNMLLYFIVGVGGGIELAVDW
GTLRMEGPGGGRAMSLMHGAFSIGAFVGPLIAILISARLQWTLVYRGIGVLFLLIAIFL
QFMPLSALGRDRGHAPGSSRRDLFKHPAYWLGFFALFVYVGVELGISNWIAEYFVSVFKT
PIPTGSFMVSLFWAGLLGRFGLPVIQRSITREKILISLSVMAVSVIGLATVGFGLGTGA
LLNVIAGMLVMLSGFGCSIYPTVMSIIGDFFPHTQSEA VGFAAMGGGMGGFAFPYLMMSG
ISAAWGIRTGFLTYALFSLVIVALNVSIVRAEHNGGIKST*

>SPBIB_v1_290191|ID:27163716| protein of unknown function [Uncultured spirochete bib]
MKADRRRTADYRALILPTEGAFFKQSLDENLFRSYDSII*

>SPBIB_v1_290192|ID:27163717| Transcriptional regulator [Uncultured spirochete bib]
MTSIKDIARLAGVSPSTVSRVLNEREYVREEVRQRVLDIVKEQGYVQNHVARSMVLQRSF
TIGVVIPYLFNMFQRQLFASMEFFLEQHGYKTQFFFLRWSEASEQAFLRRLKSETLDGII
FIHELDPNIIYQYIQUERELPVALCTFEKSEFGFPAVHVVEEASASLAVNYLLQKGHRNIA
LITGEHFSFRQREAGYKKALAAHGLQVNPელიIRAASYNPEAGRASMLTLIKRKQPMSA
VFAVTDELAIGAMKALYEAGLRVPEDVSVIGLDDIDISAFSTTPGLTTVRQPIFEMGKKA
DLVCDWIAHGRAQGS AELFSTTIVERESVQARVKE*

>SPBIB_v1_290193|ID:27163718| protein of unknown function [Uncultured spirochete bib]
MDELMQAIKNAMKSEIDSVTIYSEAAALRAEGDVAQFFALRADEEKRYHNWLLSYKELLG
GQMPSTNLAAEIQTQHRSPIFSQEFLTRV ASDRHVSAAVSSAVLLELNATQHYQKMAEL
AKEPHLKAFFNSLSEWEMRHYEELLKIQEESRQFWFEEQQFEPF*

>SPBIB_v1_290194|ID:27163719| ABC-type transport system, periplasmic component [Uncultured spirochete bib]
MKRMLRALFFILFALGLAGASFAQAKKPALKIAVSIPPMQEWVSRIAGDRASITLVLPPG
SSPHAFEPSRQLAELGQADIWFTISVEYEYSLRPKVSAMFPKLSIVDVTKNVKFRTL RP
GEQETGEPASVGQLDPALNDRDQHTWLGYEQAKAEITFIRDTLIAKDPAGTEVYKKNYDA
YLKEIDAVYNSLRTKLAPLAGSKVFVYHPAFGYFLDMFNITQEAVELGGKEPTQKELTAL
VELAKKERAKAIFVQAQFSQSAQAQAVAKAVGAAVVPIDPLASDWLANLGRMGQALLNAGQ
RGK*

>SPBIB_v1_290195|ID:27163720| Sulfate-transporting ATPase [Uncultured spirochete bib]
MRGKGVSSMGSAVAAKVAAETA AASTAGAVAAPSAAGATECADSINAAEEHLPHPENVA
IWCQHAFRFKIDIEVFDVVSFHVHRGEFVALTGKNGAGKSTLLKLIVGLLEPSRGKVLVF
GAPPRGRIESIGYVPQHAGFDPAFPIQVEEVVGMGRSLGSLPIAKHQKKEEIEWALRQAE
VHDLRARPF SALS GGQRRRVLVARALVGHPKLLVLDEPTANMDMDSEKKFYETLARIKGT
TTVLIATHDSDFVSALADTVLCVGNVDHPHSVHRHAIERAVNAPAELYGGEVVRVRHDI
ELPDNACCEGKE*

>SPBIB_v1_290196|ID:27163721| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]
MSGFLQALLNPAVPFVRNALIGSVLAAFLFGVLGSLVTVRRIAGLAGAISHTVLGGIGLA
LFLASRGAPKWSPMLGALVFAILAALTISVSLKAKQREDTVINALWAIGMSLGVVFLA
KTPGYADPMSYLFGNILLVTSGDLYLLAALNVIVIALVARYYRHIEAASFDEEFAATKGV
PVTAIYLGLLLIIAIAIVLLQTFVGIVMVIAMTLTPAGTAGYFSRNLAGMMIHATILSLV
FSVSGLA VSWTFDLPAGAVIVLLSGAVFLAFSIGNMLSKRSKRKADQQTGLEGSA*

>SPBIB_v1_290197|ID:27163722| Ferric uptake regulator, Fur family [Uncultured spirochete bib]
MTKARMHVLESISRakePLSARQLCERYAQEHDPATYRALHYLEEKGLSDSFILHCSEH
GTERYYVVHAGEHRHWFHCEHCHRFTDLGLCRFDTLVDQMSKEKGLSVTSHTFYATGICK

ECRDKG*

>SPBIB_v1_290198|ID:27163723| NQR2 and RnfD family protein [Uncultured spirochete bib]
VIKFLKQPMRKLVLIALAPIYLFISIWMYGLRVVAAAVVVFVCGIATEWLFERKRQGVSE
AVLVSCALFALAFPPKTPLWILAVGIIFAVAMAKGVYGGFGRNIFNPAIAGRAFYISFA
IVLSRAYTGFNGFVIGAVDVLSSATPLAQMRAKAVPLSSLVFGLRPGALGESMTLLIVL
AGVYLILTKTASWKIIVSTLVGGAVTNLILLAVGAALKALPMESLLAGSFLFMSVFMATDP
VSAPKRQQSHYVYGALIGATAVLIRTFSAFPEGTSFAILFGNTFANLIDIAVDSL VKKAP
AQAKAPAKPEGGA*

>SPBIB_v1_290199|ID:27163724| FMN-binding domain protein [Uncultured spirochete bib]
MKLNRNSVIYAAVFTFVVCVAFVILAIANQVTLARVNANKRLESRTAVLKAFLADSTT
PSSEIDSKYTQLVTEKSVEKATAYTATIDGQTYVAVKLTMPGLWGPITAVLATDPAGTVV
RGFEIVDQQETPGLGGRISEPWFSQAQFKGKKVLPDGTIAFEQGSQGNFDPNNGTVDAIT
GASRTSDFVRALVNRSLALARQIGGTL*

>SPBIB_v1_290200|ID:27163725|nqrD| Na(+)-translocating NADH-quinone reductase subunit D [Uncultured spirochete bib]

VSDTGKTSAPAKVSPAGKVMRDGLWYNNPIFVQVLGICSTLAVTNLNRNTLIMVLGVSFA
TSMGSMTSLALRELIPRKVRMIVQVLVLSFYVIIIIDIVLRAVYQPAISKQLGPYVGLIITN
CILMGRAEAFASNPPGLAFLDGLANGLGYGWVLLVIAIVREFFGFGSLFGFKLVGDWFT
PWTIMVMAPS AFLVAIALWIANNYKAKVAAA KAAAPGAAGAPAGQGGKP*

>SPBIB_v1_290201|ID:27163726|nqrE| Na(+)-translocating NADH-quinone reductase subunit E [Uncultured spirochete bib]

MIDAPSVGLLSLFLASILTSNVLLANFLGTCSFISISKDFKSSMGLGVAVTLVIGITAAV
CWAVLYFIIQPLGIEYLSFIIFIIVIAGVVQMLEMIIDRFSPALYLALGIFLPLITVNCA
VLGVILFMQIRKYSFPQAVIFGFGSGAGWWLAIMLLASIRKKLDSNNAIPAGLKGITL
ITIGFMAMAFVGFSGMIAVQ*

>SPBIB_v1_290202|ID:27163727| Ferredoxin--NAD(+) reductase [Uncultured spirochete bib]
MSPILVGPLTVAGISAVLALIIA VLDKALNNYGDVEISINGGERKLEVKGGSPLLSTLAA
ENIFVPSACGGRGTCGACKCKVISDVGPHLPTELPFMSPDEIAHNRLSCQVKVRKNI
ELPRELFSIKKYKTHVEKIRDVTHDIKEVLFALDSGEIDFVSGQYVQLVPPYGD
QRAYSMSSKPSDKKHVELLIRLVPGGIATTWVHKFLKEGDAVELVGPFGFRVHDT
PAAMICVAGGSGMAPFKSIFYNLYETSAPFEKDIWYFFGARTSKDMFYLEELRELQAKWPRFHL
VAALSEPSPEENWAGDTGLITDVLDRYLQTVIPKNDKGWEGYLCGSPGMINACINVMKKN
GITEDIYYDKFA*

>SPBIB_v1_290203|ID:27163728| conserved protein of unknown function [Uncultured spirochete bib]
MKQSPADKQAFERMAPGIITAAGFLGFDERSPDRIIAEDERA FEELGLDFNNVADRLEEL
AHKGEAGLGEPIV GELLVQSGDARGMLPCPWEDGFFHKNAVSVSPADTPLEACVEGEDM
LIYSEL SIHMLRAHHFCQGRGSPFRLEPTLLKQLLF*

>SPBIB_v1_290204|ID:27163729|pyk| Pyruvate kinase [Uncultured spirochete bib]
MEKRTKIVATIGPACESLATIKDLIREGVDVFRNLNFSHKTYEEATR DVTMIHEARKALDR
PVAIMADIKGPAVRLYGYAEEIALKPGTEL TIESADPAGIEKLVSSKPLHVYTNLPDIDR
ICAIGQKVILMDGYFSGKVVRKAPKAVVVA VENEGGLRPKAHLTLPGVDYPIPFSEKDI
NDISWAVEKDIDYIALSFVRCATDVEEVRRLVQRTALSQGKTTNIKLIAKIESSRGLENI
DEIIRAADGIMVARGDMGVEMPIENVPIAQKQIIRKCYLAAKPVITATQMMESMMENPMP
TRAEVSDVANACFDSTS AVMLSGETAIGKYPVQVVRMMRTVVETVEKEFDYIDFHHDVPP
EVQNGDIPAIMSYNAVSVAYRCDANALIVLTETGHAARLLSRLRPRMPIYAFLTNERLYH
QMALNWGVPEFIHSGKGRRLDAVVAE AISICKRKGLLKS GDRVVIVAGLPLAHQGTNMI
RVETIE*

>SPBIB_v1_290205|ID:27163730| putative tRNA/rRNA methyltransferase (SpoU) [Uncultured spirochete bib]
VKSERAAKGAMLD SGQAAVMKSGDMRPEIDLELLSKLKEKNLAALGLIVLEGRIVIEKAL
EAGVVPRLLVCTEAEEYWQEKSRNRTVVQGS AAPQTRTPAQNSSKPKQTGASSFPVRVMN
HEALCAFVDFK FHRGAI AIAEMPRIRRF EAAQNEL SASQASMLSMARLPRPDDSVARTIY
ERSREAF LCLWDITDPSNLGALIRTAAGLGASGILLGPGCANPYRKAIRASMGNAF SV
LWSADLALLDTLRLGGAEIVGATLSEQAVSLDVWAAQQGGFLILILGNEGYGLPQEVLSR
CTSEVSIPMARGVDSLNVAVAGGILMYELFGKIRGTEKESQQKALKKVPKLGINGDRYPD

SVDLIREDRREQ*

>SPBIB_v1_290206|ID:27163731| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]
MKRKSIAMAFLLIVAFGFLAVQGAFQAQKSRLVFMTAGDVNMLALGQNVFAPGFMAENPNV
QVITIHTGPGNAGSQTIYEKLLAEKKANKAAGDVDVALVHEIFMKWSMDQDLLQPYAQMT
NTWKYVTSFPAKTSLGINIEGYVMPLFQSQTAIAYNPDYVKNPPKSYAELKEWVKKNPBK
FGYNGIKGGASGVAFVMGWVYAETGKYKKYAVTGPFDKAEVDSWEPAYKALKEFNKNIVI
TAGNVGTLDALNRGEIWMGPVWVDMFFTFMNEGKLDPKMRLALPEPGMPGQPMFFVIPKN
APNELSRKFIEYVTSPIQANEIVIRFNWYPGIDGSALKGSIPQEVFDKIYRDVTPADL
QKKGLAFPLADYYNAMLEAYERWAQ*

>SPBIB_v1_290207|ID:27163732| Binding-protein-dependent transport systems inner membrane component [Uncultured spirochete bib]

MTSLQPKMWGERKLPPYVLLLFPVTFMVLMYAWPFISSVLQSFIIISGKEGGLTLANYVK
VWELYRKDIAFTFAVTIFNTFLVGVVAVIFSUYFRLRQNRVSALLSAIFKLPIFIPFVVV
SQMMNSFLAPHGLLNTALAQLGLVNLDPKPLQLFNFAGLSFGFAWKQIPFVLIHGGGFQM
IDNSYIEAARSIGAKLPSVILRVLPVPMNKSSIIIVALVLVYSQIIGTFTLPYMLIGGKVPT
TITVDIAHRVNYFRDFGVANALGVCSYIMVLFATAAYLRSKIKEARQEVSQ*

>SPBIB_v1_290208|ID:27163733| Binding-protein-dependent transport systems inner membrane component [Uncultured spirochete bib]

MKRILKKS AELALLVTVFLIVIGPMVSLFLWSVAQKWYWPHPLPQAITFDYWAQALGLKT
SLAIGAVSIVSAFTLSILIALATVVIAMAIAIPAGYALAKYKIPFGTIILFLFLLPNAFP
QQPVFVNILQVFTKIGLSGTIPGVMLIHILVGLVYGVWITNATFRSIPPSMEEAARSVGA
TAFKAFYKISLPLAAPGLFSSAVFVFLTSLDEFTGTFFIGLPFINTLPLTLYSSSGYNMQ
FASVIALILLVPSVIFMLLIQKVLKAEYVGGMG*

>SPBIB_v1_290209|ID:27163734|fbpC| Fe(3+) ions import ATP-binding protein FbpC [Uncultured spirochete bib]

MAELVLKDLVIKYGKVTALNRLNLTIKDGELVTLLGSPGCGKTTTLRSVSGFLPVQEGDI
FLNGKRITDIAPENRGIGLVFQNYALWPHMTVFKNLAFGLELRKLPAAEIKKRVA AVLAS
VKMDEYADRFPRLSGGQQRIALARAIILEPDILLDEPLSNLDALLREQMRFEIAAIH
NRLGITMYVTHDQTEAMVISNRIVVMRNGKVMQEGKPEDIMRPRNKFFVAGFMGTTCFL
EGIVERFDGERCILKTNDGFELYGIGTELQIGHKAYAAVRPEYILLGKRAEASYGSSERN
CFKAIVDRSNFTGELLDYQLKLSNFIRAKEYEAKTIYGIGQTVDVKIDEERLPVHDTD
PEAVAV*

>SPBIB_v1_290210|ID:27163735| putative Ribonuclease Z [Uncultured spirochete bib]

MRLCFFGTSSAIP SARNGYTSFLIELANKTVLVDTGDNAIRSMLEMGRDPMMLDAILLTH
EHADHLGAFPAFIAALECMNRKTKLLVIMQPELEKRVLTLLALFDYYPEQLHFELEFAAE
WHTDGLKIDLLPGNHSKFTMMPRFVADNRTLLYTADTRYKAGQYAALGAACHTLIHEATY
SHPKLPQDTRHSSALEAGMAASEIGARNLFLCHFQDDAYKNPTEPAIEAAQSFSGGEIIVP
GLMQWYTIKED*

>SPBIB_v1_290211|ID:27163736| putative HTH-type transcriptional regulator DegA [Uncultured spirochete bib]

VTNATIEDVAKACGLSRATVSRVINGEPNVKPLTIEKVKKAIAELGYHPNIHAQALSGGG
AKTVGIMLPRIWRSYSSLLSSIEEVAAQEGYYALIMAKDYLNKNAERIFDEGRVDGFIFR
NMDHVEEHERLFLRLRKRNVFVLIGNPLRDYPAITIDNVGGGRAVAKHFAMHGFRKIVY
LGGPSDNVDSNDRYFGFRIGFEESGMNPEGILRINGDYSTKSGYNAISEIMLTQKPAIF
AANDRMALGAILYLHKNVCVVPQDIAIAGFDDSYFAKYITPALTTVRQPFREMGTAAAMKQ
LCSMLKGSSANPGKIILPAKFIVRASCPCPYSHDDSLDVLDAVENSE*

>SPBIB_v1_290212|ID:27163737| putative Major facilitator superfamily MFS_1 [Uncultured spirochete bib]

MEHTSYRVYPYRWVILAATMLVNFTIQTWIAYSPTSAAAAAYSVSEMAVGGFFAMSFMI
AFVFPFSIPASWLIDRFYVWTVGAASMAVGIFGLLRGAAGHNYALAFVTCGIAVAQPFL
LNSWTKIPAAWFPARERATAVGLITIASILGTAAGLVLPMLAERMSIAQVQLVYGVAAAS
VAAGVFVLAAREKPRLPDESACRERAFMIEGLKHALRTPSFVRFLVIAFIGMGIFNGVT
TWVEGIVRPRGIGSSQAGMLGAIMLVGGVAGAVIIPFFSDRSARRTPFIILGLAGAIPGL
LGLALAPGFALIAASAFVLGFFLIAVNPVGMQYAAEVARPTPEGTSNGLVTLAQVSVLL
VYAMEAINNATGSFTTSLMAVTALLAFSVFWGTRLEEKTKGKES*

>SPBIB_v1_290213|ID:27163738|yoeB| toxin of the YoeB-YefM toxin-antitoxin system [Uncultured spirochete bib]

MKLLFSEHAWEDYLFWQNSDPTMLQRINQLILEIQRTPFSGKKGKPEPLKFALKGYWSRRI

TEEHRIYKVVEDTVFIAQLRYHY*

>SPBIB_v1_290214|ID:27163739|yefM| antitoxin of the YoeB-YefM toxin-antitoxin system [Uncultured spirochete bib]

MEAITYTKARANLAKTMDLVCDNHDPVIITRNSDQAVVLSLEDYQSLEETSULLKSPAN
ARRLLESIQQLESQHGIEHSIDS*

>SPBIB_v1_290215|ID:27163740|glpK| glycerol kinase [Uncultured spirochete bib]

MRYNTPMDRNSNYILALDQGTTSRILFNHGDGIIIGVKQIPFRQIFPKPGWVEHDAEEI
WQTQLAAARGAIEAAQIESGQIAAIGITNQRETTVVWERATGKPVYNAIVWQCRRSSGIC
DELGRGAPEIRARTGLVLDAYFSGTKLWLFREYPELRARAERGELMFGTIDSWLIYN
LTGAHATDPSNASRTMLFNIYERRWDEELLRLLEVPQILPEVRPSSGIFGKAKRELFGA
EIPVAGVAGDQQAALFGHACFEPGDVKNTYGTGCFTLMNTGPFVSKHNLLTTVAWDLG
KGYTYALEGSVFIAGAVIQWLRDQMDLLADSAESEQLARSVEDSQGVYIVPAFVGLGAPY
WDSEARGTVVGLTRGTSRAHFVRAALESIA YQSMDFEAMKKDSGRALSCIKADGGASAN
SFLMQFQADITGTRVILPEVSETTALGAA YLAGLAIGYWSGLDDVRKNWRMRREFMPRMA
EEVRAELIDGWRKAVATARNFR*

>SPBIB_v1_290216|ID:27163741| SagB-type dehydrogenase domain protein [Uncultured spirochete bib]

MQYERFEGRWFLKSNWHLVKSGQSDQMKGVPVPLQEEPPAPEDCVISLPPPALLAHDGG
AAGSVASNALSTALYRMLVGRKSRRKYSKEPLSLEELSYLLWAIEGVKENKKGKFSFRTP
SGGARHPLDVYVFAHKIKNLNVGLYR YLPVEHQLVLERQGDSEALDEALNGQFWNAACI
VMWAAVPYRSEWRYGKAADKLVALDAGHSCQNL YLACEALGLGTCAIGAYDQEKLDAYLG
LDGEDMFALYAAPVVKLQGGGA*

>SPBIB_v1_290217|ID:27163742| conserved protein of unknown function [Uncultured spirochete bib]

MTIDTVKLAPEDCNIIVGQSHFIKTVEDVAEIMVSSVPGVKFGLAFNEASGPCLVRTEG
SDPALIEAAQKMALSVGAGHTFYLVIGPGAYPINVLDRIKASPEVCRIFCATANPVEVVR
SVTEQGAAILGVVDGFAPKGVESDKAARKAMLRKFGYKF*

>SPBIB_v1_290218|ID:27163743| Achromobactin ABC transporter, ATP-binding protein CbrD family protein (fragment) [Uncultured spirochete bib]

MSPERLPRHIPGIPETSRGLVEPQLAGSRLAGITFKQNEAPGRASLEASSLAIGWEQGRK
KHILAQNISFKVYAGHLVALVGPNGAGKSSLLRTIAGLQAPCGLLSLLGKNIAQIPVEE
RASLLACVFNERMESGYLTVSEFVAFGRYPYTNARNRLTSEDKHKIAAALALVGMNSFAQ
RTFVSLSDGEKQKVQIARAVAQDTPVLVLDEPTAFLDAPSRIEIFRLAERLAQEAGRAVV
LCTHEVDLALKTADELWVLDREHRFTAGAPFVVARSGAIGRAFDLPTVAFDSL TGTFRPR
SAR*

>SPBIB_v1_290219|ID:27163744| Transport system permease protein [Uncultured spirochete bib]

MLVWLGLCVLILALIDISIGSVRIPLVDVWNTLAGKPPSPEWAAIIRIFRLPKLATAIVA
GASLSISGLVLQSIFRNPLAGPDSLIGAGASIGVAVLMFAGSAVGALGAGAGGVGVAGG
ALLGNL PALGYTLLVVAASAGAGAVLLVILVISRRFEQVVTVLIMGLLVGYLTSSIVSLL
VYFGSPQKVQLYLAWTYGSFGGVRTGELPYLAGAAALGFVLIIGETKALNAFLISERFAS
TIGIRVRTSRTKLLIAASILAGSVTAFCGPIAFLGIAAPHGARMLTRSAEHRILVPSAAL
IGICFALLADILSSLPGKGA VLPINPLLALIGSPIIISMFFRREKGPIGEEAR*

>SPBIB_v1_290220|ID:27163745| Periplasmic binding protein (fragment) [Uncultured spirochete bib]

MRRTVGIFLAFLFIASSTCAFAQSGGLQAGSQTGAQIGPQTSVQIAAQAGVPAGSQIRAGF
SIEQRTGYKILTVSNLWPGANATRTYVLYPRGSQPPKDIKADLFIQVPVQRVLYSTTYI
PALEGIGELEAIVGVDNASYVYSPALRERI QAGKVIETSKNWMPDIERLIALKPDVIFNY
GLGNEWDTFPMQEVGLPVVLLGDWNEQDPIARAQWAVFIAAFFNKEEKALERVNALAKA
YTTLKSLAAGSATRPKVLVNGPFRGIWTVSGGQSF MARI IQDAGGDYLVADSKDTGGLNL
SIEAVFERAMRADIWLNVPVYGANRIADIRALDPRFAALPVLQKGQIWTNELRMSPGGSND
YFESAVMNP NLVLADLIAIFHPELLPGHKFMYYKLLNE*

>SPBIB_v1_290221|ID:27163746|proB| Glutamate 5-kinase [Uncultured spirochete bib]

MQLSELAEEAAKAETAATEVETKATPEATAEAAAARAALAKANRIVVKIGTATITKPAS
TPARLTRAFSPDGKSFLPEESATAGGRTNIDTA YIYHVAEQFAGLVQEGKQIILVTSGAI
GMGARELGLTKRVTEVRMRQACAAIGQPILMEEYRRAFGVFGLVAAQLLVTRDEWDDRAS
YLNLRVETLLESRVIPVFNENDSVSTAEIGNAFGDNDRLSA YVASKIDAELLIILSDV
DSL YDSDPRENPNAKPIPVRELSEKHLAAAGGRGSEFSTGGMKTKLAAVAIARDAGCRV

VIAHGREPVIARVAAGEPIGTLFDAHALKNRIRWLKNSQPRGRLTIDQGALAAIRERN
SLLPRGVIAVEGDFGRGAVVLVNGVVKIISNFSSAELLAVMGKRSDEIDALLGPDAPHVV
ARPEEMAFLDE*

>SPBIB_v1_290222|ID:27163747|proA| Gamma-glutamyl phosphate reductase [Uncultured spirochete bib]
MNMQERLEHASRAAAQLLSVGIEVKNAALMRIAQKLEESREEIARANQRDLAQAQASGLP
APLLKRLVFDDKKLADVLGIRDLLAMPDPVGRVLEARLLDDGLVLRVSCPIGLIAMIF
ESRPDALVQMASLAVKSGNAIVLKGGEARASNALASIIARAGEEAGLPQYWLTLLESR
EEIGELLMYDQYVDL VVPRGSKEFVARIKATSRIPLGHADGVCHVYVHEDADPAMAAAI
AIDSKTQYPASCNAAEVLLVNFKFGGLTPLLKFLAQAGVVDVCPRTARMISPDIPFNK
SDDDWSVEYDLRMAVKIVDSLDEAIAHINRYGSGHTDTIVCASPLAARTFMQGVDSASV
YHNASTRFADGYRYGLGAEVGIATGKLHARGPVGLQGLLTYKWLLEGQGHIVADYASGAK
RFLHKDLPLDESPHAQ*

>SPBIB_v1_290223|ID:27163748|ykwC| Uncharacterized oxidoreductase YkwC [Uncultured spirochete bib]
MPQKTIGFIGLGMGGAMAGHIRASGERLLIYTRTKSKAQMLLDAGA EWDRSPKELAH EC
DVIFTMVGYP SDVEEVYFGPEGLIENARPGAILVDATTSRPDLAVRIYEAAKARGLGALD
APVSGGDIGAKNATLTIMVGGDEEAFQSVKPLLEV MGKTVIRQGGPGAGQHTKMANQIAV
AGNLLGAVEAVTYARSAGLDPRRMLLSIANGAAQSWQLSNNVPKMLDGNFDPGFYIKHFL
KDLRIALDAAHVMKIELPMVALAERLFAKLVAEGMGDLSTHAIYLLYERGLV*

>SPBIB_v1_290224|ID:27163749| protein of unknown function [Uncultured spirochete bib]
MSDAYDQWQRIFASSAAGFVVHVDGVIADINETAIKILGGADKNDFIGKRFMEDFIHPDF
HPIIKLRREQLKSGGQVLPVEMRIRRLDGLVDVLSAATGILSGESLYVEVLLIDITSV
KRRERLLEAFSEMMNITTEEQNPLDIKGAMRHLQQAMQCLYPESAYAGYVSFFSMAKHL P
FASRTMQKYMQPTVYTFSPLPAGFEKWLMDTASDYSQPWDDDSALTAIIDIPSSVENEGK
AVLQPFVMDGRAFGCFFWTFKKGGIPIRLDEDKERLKAFLSLAVLSSIKTFFLRQENVQRT
SDLGILHQATLQIGKIDNLQDIANA VLDILQKEKGWRPAVIRFKSRTADILETTACRPAR
AMTEEELRLYIRKINDLVRKPGQGMTGYVIEHGEPISLDLPSDPRYIETDPGIRFGIYA
PIPIEGKVEGAIGVESADYAFSESDL AFLSSLGELTGMAVRSVRLIEVLSERVRWLEILH
EINLQVGV EAKPEELYGILINRAMKATGAESGALLIYDAEQNVLKSHAARGWLKTITKEP
FTARDGITGTVFSTGRTRLSPHLEDDPLLSRSRAFVPAGRANIAVPVKAGGMVIGVFHL
AMKAPVSFSQEFIELVEMFGSYAGIIIRRIQLIDAQRSAQSELRKA YDETLEGWARAIGM
RDEETLRHTSRVVKIALAIGKAMHLDAQSLEDLRRGALLHDIGKIGIPDSILRKPGLSK
EEQRIMQTHVSFANELLKPIKYLERAI VVPYSHHERWDGTGYPQQLKGEDIPLLARIFAV
ADVYDAMTSDRPYRSAHTKDEALIYVRTQAGKHFDPKVVEAFLSVVDSIDAQMDEQ*

>SPBIB_v1_290225|ID:27163750|thyX| Thymidylate synthase ThyX [Uncultured spirochete bib]
MQDSTIKTARAGECANRTVRKLALQALGLFCYNAPMAHCIVPEAEAILDKEFPVLDKGFV
RLVDYLGGDQRIVQAARVSYGEGTKSYREDAALIDYLLRHEHTSPFEQVVLTFHIKLPF
VARQWIRHRTARVNEISGRYSIMKDEFFLPEPEALAPQSEDNKQGRADIPFDPETANRIR
AILKEGGELSYQQYQRLDLGLAREIARIVLPLSLYTEWYWQIDLHNLFRFLMLRLD SHA
QREIRQYAEVILDITRKVAPAATASF EKHLHGVRFSGPPEMDELRRRLGLGQHDRADSAE
SAPGTNQPQFSEPAANQPSSSSVSLLSKKELERFEEKLKSSRQL*

>SPBIB_v1_290226|ID:27163751| putative Glycoside hydrolase clan GH-D [Uncultured spirochete bib]
MNPTIEATFQKIPGDVLKILFRAREDFSCDEPLLELGEFEVRELCHALGNECRAAEEASG
QKAVALERSRSRFVWINGWQSWSFAGEIARMERPRRAFYKRVLNVFVDHPAEVALRQRAR
RFLHRHDIISHFMLGLRSGDLRLALVSDNVARYMG TSAIGAAGVGRASGTASSGSATDEK
AGDSAVSGARLVDTFGASLYLPPISFLLRGNKIRIFAYAEGGNFRRGQIVARVAVLIAPG
YFALKDKIAGLWGAHGRFEDLRWLSLEAQS AKGAGFEGGASSGARAGQGSEEP AHPFQG
VIGGYESWYNHYTAIDERIIGADLASIGANNIVNNYFIRGRPTVFQIDDGWEL AIGDW
EAHPEKFP SGMAALACRIRDKNLIPGLWLAPFLLMPDSKTAKAHP EWILRDRDGAPVRAG
WNPNWGGDVWCLDLSLPEVEANLASLFDMVVNEWGYRYLKLDFLYAGLMRGAFAGRKGGA
WEHYARIMARILEFSIAADGSPV AFLSCGAPIESTAPFMPLMRSGADTREHWEWPQLRLI
GHQGRPSAKLNMQDSIGRAILDKTL LLLCDPDVIFCRTER TSLKDTEKFLVGMVAAMFGSQ
IMSSDDPAGFGRVPPQSGQLSEPEFTNQILDWYQRIESKKFGVERSSVRVREVYRFFSRE
KAVYGMINLS DREQFSDGAPVPKHSMLIFGA*

>SPBIB_v1_290227|ID:27163752| Inorganic diphosphatase [Uncultured spirochete bib]

MSKTVYVIGHKNPDTDSVVA AAAAYAALKRAQGQPQVKAARAGAVNPQTEYIFQRFVPLP
EFIPDLIPKAEYYIDELPPVIREHTPLWEALVLEQSPRQVMPIVDAIGAYKGLFYNAF
AKNILTKINPHRKA VIPTSIGHLIDTIKAQPLVPTDCEAMFN GRIVVASLSAERFQDYIH
AEPAHNKVVLVGDREEVMRIAIEAGVRA LIITNGFIPSKDITKLA EAKGVAILISSYDTS
STSLALYSTPVISVADASIPIGPRDFMKTAKLAI AASPARAVPIVDDGGKVVGLLTEG
DLIREPNIELILVDHHEFSQA V DGIQNYHIQEVIDHHRIGTFSTPYPITFINRVVGSTST
IITSMYRESRTPLDRAIASILLCGILSDTLVFKS ATTTDTDREMADY LASITDLTIEELG
RDIMGSASLAARLPIDQLLRMDRKEYEVQ GKKLTVS QIELTNSQELLARQEEVLQGLAHI
RTEMGAYLAALMATDITKFESILYIDADREFYAYLSYPMQQPGIYLKDVLSRKKQLMPA
LTEMVQAALG*

>SPBIB_v1_290228|ID:27163753| TraB family protein [Uncultured spirochete bib]
MPQTIRTIQLGERQIILVGT AHISKESIEEAKETIRQE EPGRVCVEIDMGRYQAIQQDSR
WEQLDIKVLKEGKGFLLANLALAGFQKRLGADLGTKPGEEMMAA IETAQEMGIPWSAI
DREVQLTLKRAWAKSNLWNKSKLLASLIESAFSREKVS ESDLEKLKESNELESMMNELAE
FMPSVKEVLIDERDRYLATKIFETTEQKVVA VVGAGHMNGIEQWLGKLRGEVAADVSDI
EDMPKPGWFAKSAGWLIPLLIVALIAIGFFRS GSQASLAMIERWILLNGSLAALGSLVCM
AHPVTIIASFLAPVATLNPVLAIGLFAAVIEA YFRKPTVQDAENLADDVTSFKGFYKNR
ITHILLVFFLSSIGGMIGNFIALPILASRAIG*

>SPBIB_v1_290229|ID:27163754| putative DNA polymerase III, delta subunit [Uncultured spirochete bib]
MAEALIPPVWILAGPEIGLKEAFVADIIGKARKLGGDEPEVHRIYAGDTLPLEAISLLQN
SSLFSSWVIVEFRNAEQLSQKADIDALASYCGAPAENTV LLLLETDGYSVPKAI EKTVPSPS
CRKTFEFELFENELAGWVRCELSGAALTLDEEALESLEL VPHDTAALKAACLILSASFPS
GTKLAAPDVEAAILRSKPEDAFTLFDRIAQGD LAVSLEVLNSVLDSRRGDANQIIAALVW
SFRRLQRIGEALARGERFEDVCLREQARSKTIQRQIRAALQRYS PADCRRIIVALSETEG
AIRGPLGSVFDRLHLLITSITEKGQGLAAAGWSEQGIYPHLVL*

>SPBIB_v1_290230|ID:27163755|lexA| LexA repressor [Uncultured spirochete bib]
MKDLTSRQKEILNFIHEYIQTNNYPPTVRETARAFSISVKGAYDHLKALEKKGHKTSEK
RSRSIELIAPPQGDAPVIQIPLLGEIAAGRPIFADENFERTIAIPADLVANRVPHFAVRV
KGDSMIGAGILSGDIAIEQCETAQNGDIVVALLEENVTLKRFFIENNR YRLQAENPRYA
PIYTQDLRILGRLRGIYRSY*

>SPBIB_v1_300001|ID:27163756| protein of unknown function [Uncultured spirochete bib]
MMRLSLYLLGHNYLKPFRIRAHKGMHPRTHAEAAGIPVHLVQH FVQALTGGIRAFLSRCT
LSETIRRTWEKRWKTPGKDKAEYLPKYALA*

>SPBIB_v1_300002|ID:27163757| Xaa-Pro aminopeptidase [Uncultured spirochete bib]
VKHSKYSRQAALADELAKRGLGAVMVSDFEHGRDSSLRYLCGQPSDAIFILSAKGTSAL
IAWDINMASRLGEADHIAAYTDFGRQPQKALAAALKLLDVPKGAKVALPASTPYPDYIDF
VHALTDFDLVCEKSGVGTFIQEMRARKDTDEIALYRRIASNTDQLIDMIEKEICAGMLLT
ETDIALFLEREARRMGAEGMGFETLAAGPERSFGIHFPTFTNEHF AAEGLSILDFGARF
EGYTS DVTMSFVSDSLRTEQKTMVGLVEEAHRIA VEACGPGVPLLSVAKLVDDFFAKAGW
TMPHSLGHGIGLDAHEAP TLSMRADPSALLEPGHIVTIEPGLYHPEFGGVRL ENDLITE
NGAEVLTHSRIVRL*

>SPBIB_v1_300003|ID:27163758|pyrC| Dihydroorotase [Uncultured spirochete bib]
MTDRFVMPMPDDFHAHLRQGEPLMQYARQHAGQFGRVLLMPNTMPPIFNVARL TEYRADV
ERALAAIPDSERFEPLFTFKILPSMLAAEIESFARAGAIAGKYYPSTTNAADGPRSFD
DVDEVLSTMEESGLVLCIHGENPEVPVFERERAF LPQVERLLARYPHLRIVLEHLSDEES
VRFVEQGPANLAATITAHLLFTVDDMIRDSMNPHLYCKPVLKFARDREALRS AVLSGSK
KFFFGSDSAPHREKKECTAAAPGVYSAPAALPALVELFDSLGLSDALIPFMAEYGAIFY
GLAAPSRTITLERAPWQVPQLIDGVVPM CAGKTLAWRIWGRN*

>SPBIB_v1_300004|ID:27163759|murA| UDP-N-acetylglucosamine 1-carboxyvinyltransferase [Uncultured spirochete bib]
MDKYIIEGGYPIKGMLT LSGNKNAALPCIAATTLADEPVILRNIPAI EDVLMFVLRNL
GASVEEIDAHSWRIDPRSISR YEVP EELARKVRASILFAGPLTARFGKAVLPPP GGDTIG
RRRIDTHILALQELGARIAEATLNFS AVKLVGAPVFLDEASVTGTENAIMAAVLAEGTT
TLTNAACEPHVQDLCAMLIQMGAEIEGVGSNRLVIHGKKS LHGVEFAISSDY MELGSFIG

LAAVTGGDLRIEGVRTEDLPLKVGFSKLGVTWDLKGNVLRPNTAAALRVVDPDIGGQIPK
IDDAPWPGFPADLTSIMTVVATQAEGVALIHEKMFESRMFFVDKLSMGARIVLCDPHRA
VVYGPSKLVGNMVSVDVRAGMAMVIAALCAEGTSTIHNVYQIERGYENLSARLSAVGAH
IRKEQED*

>SPBIB_v1_300005|ID:27163760| conserved protein of unknown function [Uncultured spirochete bib]
MGMFERLKTVISSNINSLISKAENPEKMLNQMIIIDMNEQLIESKKA VAMAI ADEKKLERD
LMENRAKADEWEKKAMLA VRAGRDDLAKEALLRKQEFEGYANQLAQQWEAQKQSVEKLKE
ALRQLQSKIEEANRKKNILIARAKRAEAQQRINQTMSSLSGNKSAFDTFERMERKVDIEIE
ASAEAMKELEEASSGASLEKQFAQLESSPQAADAMLEELKKKMLTEDAGRTSSQP*

>SPBIB_v1_300006|ID:27163761| conserved protein of unknown function [Uncultured spirochete bib]
MSSLPKIEQYLIDLGISYQEISKNAWLIEDENKGYPKMMVSLSDPIVIISADVMPVPKEN
AETLFRMLLELNATDLLHGAYAISGNDIIVIDTLEHASLKDDEFASIESISFALLEHYK
KLASYIHTTEE*

>SPBIB_v1_300007|ID:27163762| protein of unknown function [Uncultured spirochete bib]
MPSRLLSRIQKIPQAGSDALISSQISSDFPDCAVARFVGAVTDSNLEIVAKSFENILSGG
IQYLIVDFSAIDDISPAGIGLLALRQKLRDRRGDLILCSMRPRMERMNRVLGLEGYFSA
AIDISAAKTGLKELTTYVYPISVRCPCDSLIDIDRPGRGRCQTCEAVITAFPDGSITLG

*

>SPBIB_v1_300008|ID:27163763| Short-chain dehydrogenase/reductase SDR [Uncultured spirochete bib]
MNGIPSGKARGEMVASSTFNRFALVIGGSGGIGRAVSLELVRRGARLLVHGRQAEERMK
TSSPASLSTFDYAFDSPRNFIQALDARLADMRAEPDIVICAFGPFSEKPLEMVSAEWEY
LTMANLALPGAMASHFLAGMKARGYGRFLFFGGTRTDAIRPFRKTAAYAAAKTGLGV LAK
SIAASAGDRNVA AVVVCPGPTDTEYLNAETRARHASLTATGSLLPAKLIAHASLDLIDAD
PCIASGAIVALDGGFDPESSR*

>SPBIB_v1_300009|ID:27163764| protein of unknown function [Uncultured spirochete bib]
MKKLLYFEQDSSRIRPIVV ALSKHFEVSVAGDLELAATLRQKEPRILLFGLASLPGAFS
IHILDRIKQIMLNLHEEKLASRSALS VVMHGDSDRWQQICEPYIAALREIPFCDIYVIP
AATNPDELAVSIINIKRANRHLRTARMSATAEVPIIGNSTKMRHVIEQIRTYADKHHHPVL
IVGETGTGKEL AARALHFWGKRSHHFFVALNCATIPETLFESEMFGTERGAYTDASTRMG
AIEQADNGTLFLDEIGSLSLASQPRLLRVLETGEYRRLGDPHPHSAQFRLVSASCINPID
LAAKNKFRSDLVYRIADLVIEIPLRHRAEDIPLLA AHFCSHFSKDAFSLEQNALDKLCA
YHWPGNVRELRSVIARACANNSTGRIFADDIQFLYQWKFEGNSQPEVSA*

>SPBIB_v1_300010|ID:27163765| protein of unknown function [Uncultured spirochete bib]
MESLNIPCALVEGVRFDFPSRFAISALPYIWDDEKNHQICFVSSSQWNAAKRRDEFSGMI
ASADLVLPKDRAVAGRVLAAQGAESRSWPVPFVHQMLLDAMHESAEQPELEIPSIEHIPE
MYRPQKVITLLSAIEQRNGSVFLLGGAPVTLIKAKKNIRATFPGLAIVGSMHGLYRPQE
EAALIEAIQKSTPMLILAGAPLPSGERWIPHHMAATRSGIFLYHGAILRWFAGS*

>SPBIB_v1_300011|ID:27163766| putative Ribosomal RNA small subunit methyltransferase E [Uncultured spirochete bib]

MRQIVFPGALRGKTA YLLDAKTAHYLIDVRRMKAGDVFEAIDEEGSRFRCTIVSRENEGA
HVRLESIEPDDLAAQQDRQLQIALVQALPKGQKFDLIRQAVELEVNLIVPVITKFCVAE
EAPERASKLERRRRIREALQSGSSALTEIVPAARLSELDKVLREHGFDRENSLRIMF
HESDAANSKPLHELLAHMQNRVAICIGPEGGFSEEDYSALAEMGFMVHHAQGPIMRVETA
AIFAISAVRVIALEREIWNR*

>SPBIB_v1_300012|ID:27163767| Carboxyl-terminal protease [Uncultured spirochete bib]
MNETETSEVRTPVERTPVEHTPAEHTPVVRKRLFSLAFVVILALSFITVAVPESYAQQA
KTPDAKQYSQLLQNIQFILQNYVEEPDPTKLYQGAVKGM LDSLGDYPYSAFLDEDMMSDL
MSDTTGTGGVGLYISKQTTVPTEDTPRYIEVVSPIEDTPAWKEGIRSGDLITKIDGEDT
SPLSVDKASAKIRGEAGTTVTLTFKRGNYEFVTFTRSKIEIPA IKNAIITASGNIGYI
RIVEWNPNTPVRMKA VLQDMHAQGIDRWIIDVRSNPGGLLSSVVDVSDLFLSSGVIVSTK
GRTISENYEYKAKPDLAIPATDRIIVMTNQGSASASEIFAGAMKDTKRALLLGQKTYGKG
SVQQIFPLDKAGFKLTMARYYTPSGVNI DKVGI EPDIKVPEPELSDKELAEVQRLYDAGD
IARFLKNPTPSVEQRKQFAAELA QKYTPALILEKLVRDESERSQPARIYDLEYDVQLQ
KALDLIESQDFLNQLES AKTLADLKKSTN*

>SPBIB_v1_300013|ID:27163768| membrane protein of unknown function [Uncultured spirochete bib]
MLVAGILAFIRIFALGVA AVSLGMTDFGGASTAILRVFQLYGLLFFVYLLFLQYFRPSARE
ALKTPCLLISAAAPVLSVLTLLAFVKGVGKSIPVDLVKTSSSIFVVILMDLLILGLVGM
SLKAKFPREGGQKQAQSRGVPTVDAPDSPVPAHNSDTTNEVS*

>SPBIB_v1_300014|ID:27163769|lgt| Prolipoprotein diacylglycerol transferase [Uncultured spirochete bib]
MVAMLEFPKWLSPEIIPGLPFRWYGLMYLIAFSVAWLLFRRESKRLRAPWTEDEAANFFI
WSIVGILLGGRLAGTLIYEPSNYYWIKPWFIFWPFDESFAVGFQGM SYHGGFVGLIVAT
LIWCKVNRWNWLDWADLIAVSAPLGYTFGRLGNFINGELWGKVSTAPWAMLPNAERFSA
KEPWVQEVARAVGIRLVSMNDMVNLPRHPSQLYEALLEGIVLWLVLWFFVRKRRTYRGKS
VAIYAIGYGVARFIVEYFREPDSGLGYILALGDPQAPTARFVSLFNFSMGQILSFLMIVG
AVIFMLYARKHFRIAPGEPMFVDAAKRGESGDFGAGRQKGTSGARGTDGIRENSGPRTSK
FNAPSARKLRKKIK*

>SPBIB_v1_300015|ID:27163770|nadE| putative glutamine-dependent NAD(+) synthetase [Uncultured spirochete bib]
MRVSLVQMNSTIGDFKGNVDRMLEFVGGQILKAFSATERPDLIVFPEQSICGYPPMDLLDQ
ESFLFGSISALRRLQKLLPQDIAVGVGYVDKNREGAGKSLVNAYSVLYGGKV VFSQAKTL
LPTYDVDFDEARYFEPARARQVFSQPFGRVGF AICEDFWWEAPDASQKYSIDPVKELMDAG
ADILIVPSASPIAGKLQTRLRLAEKAVRAGSIPVLYCNAV GANDSLVFDGRSFAMDERT
TIRGICGWGEEVLT YD TVSGKAGRLILGAMHGEGATSPTAEIEKSSDA AHTDATEAATTQ
ATAAQ AIDLQTERSEEIRRALIVGIQDYLRKSGFSRVCLGLSGGIDSALVAVLATQAIGP
ENVTCIAMPSRFSSAGSLDDAVELCRRNKLRLERIEVPFTAYLNALAGPFAGRPYDTT
EENLQARIRGTLMAWSNKFNLLTTGNKSELATGYCTLYGDMNGSLAPIADLYKTEVY
ALAAHINRSAAAQGREEPIPDIIAKAPSAELRHNQKDQDTLPEY PVL DGILRLYIEENR
TMDEIIDAGFDRATVRKTLEMTAKAEYKRRQAAPAIKVSKRAFGVGRRLPLARTIHEIQ*

>SPBIB_v1_300016|ID:27163771| Glycerophosphoryl diester phosphodiesterase [Uncultured spirochete bib]
MQHPSLLPDFRPLFAHRGLNRIFLENTIEAFRAAHDAGVPGIELDVHLTLDGALVVFH
DDTSGRIEKQVNPSAPERNL SIEGSTLAELRALSIGPRIPLDEL FETFGNRMYYDIELK
CRSASDTGLASSVAASIHRHGLEKHCVISSFNPFALRHFRKAEPDIPIGIIWNKSKELYW
FLRHGEGTLIANADFLKPEFPIAAHLLLYLRILARRPIVPWTVNDVSIARKLLKGG AEGI
ISDEADAVRAAVWH*

>SPBIB_v1_300017|ID:27163772| protein of unknown function [Uncultured spirochete bib]
MTPQELSRLDYEGASEMLLACATDAKKYEKEIASLQAQAAEWKSKARLAQDRNMEELSQA
ALQKSAELEAKAQELALELNSIQRDIEDLRTALPIIKAKQRSVDPDQLLAELSMLVGL
TAQTPESDTKPNQNPEEPTPGTRLGALQEGHSPVDDALAE LKKKMGLL*

>SPBIB_v1_300018|ID:27163773| protein of unknown function [Uncultured spirochete bib]
MNRIAQKVTRFVGLDVHAETISVAIAETGVEVRYLGSISNRPE SVSKLIKKIGTGGKWKS
LLRSRTDGCIVLAIDKSEDRV*

>SPBIB_v1_300019|ID:27163774| protein of unknown function [Uncultured spirochete bib]
LYWQLTKARIGCEVIAPALVPMRAGDRAKTDRRDAEQLAQSYRAGELTPVWVPDEAHEAL
RDLVRAREAAVQDRLRVRHRFKEVFASVWSAAGEKDDAMDTSLPGMDQEGGDV*

>SPBIB_v1_300020|ID:27163775| transposase (fragment) [Uncultured spirochete bib]
MTPWTLRYLEWIKKEVTFEEEEALQWTL EYMNEVEHCSLRITRLDGLIDKAVENAPEAMR
EVVAALQALRGIGKVTA VTIVAEVGQLSRFPTARQSMGYIGTVPSEHSSGETIRRGGITK
TGN AHIRRIIEVAWLQRHKQMLSQAVKLRQERLDPEIQEIALKAMHPLH DRYFRLTARG
KSKQQVVTA VGRELLGFIWAIGILVERKNA A*

>SPBIB_v1_310001|ID:27163776| conserved protein of unknown function [Uncultured spirochete bib]
MPMQSFPPFCPNPHCVWHSNAPDFAWAKPKGFYTTKXFGRVQRYQCAACHRTFSSXTFSLA
YYVKRPVALPDIVARLVSGESLRAMSRNLAVSLNLLSNRIDRLTRQAIXX

>SPBIB_v1_310002|ID:27163777| protein of unknown function [Uncultured spirochete bib]
VAGGTLVALDAAKXLGGIEALGLRPSEIWCVTVPD TVRIRAEREGLHRHLPP*

>SPBIB_v1_310003|ID:27163778|mnmE| tRNA modification GTPase MnmE [Uncultured spirochete bib]
VAISYWRMPRSYFDRNTPIAALATPEGRSALAVVRTAGANAIELVARCF SNRQALLDAQG
YQAVYGFIDPSSGEYIDEVIALVFRAPHSFTGENAVEIMSHGSPA VVERILDVLYAQGF
SPALHGEFSFRAFVQGKTDLVRAEAINELTHASCEAARHDALQRLSGALS RKLGEIRDLM
VDLLADINAKLDYPEDEGPEESSRWLEIMHHARDALSVLIQSYPGGRLRQEGFLVVIAGR

PNAGKSSLFNLFAREERAIVSPEPGTTRDWIETWISIGEFVRLVDTAGLRSSQNMIIEAE
GVRRSQSLLERADVILYLVDGVAGLNDEDEFAAKHPEALLWKNADLSRCLPAPEGWIA
LSAKDVRSFGEFENIVIDRLRSYARTTQKAGTLERQIRIASERQAGLLKQSDLALSQALE
AYTAGAGLDLVALHIREAAEAIGEITGDIAADEVLERVFSTFCLGK*
>SPBIB_v1_310004|ID:27163779|mmnG| tRNA uridine 5-carboxymethylaminomethyl modification enzyme MnmG
[Uncultured spirochete bib]
MADFEAIVIGGGHAGIEAALALARLGTTLFITQNPDTIGRMSCNPAIGGLSKGNLVREV
DALGGQMGIADATAIQVRMLNQSRGAAVQAPRAQSDKALYASLARQTLEAQPNTIFMD
TVTDIIVSEGSSGARAGYAVSAAGTASAPSSRHIEGVRTERGNEISAKVVVLTGTGFM
KLFIGLWSGSGGRLGEPAAIGLGTALRAKGFVGRMKTGTPARIKRDSIDFSKLEAQYSD
PRKIFFSFLEQDYNRPDVPYIVYTNQNTHEAIRAGLDRSPLFSGVITGKGPRYCP
KVVRFDPDRERHQVFIEPEGLSTDEMYLNLSSSLPEDVQERFYHSIPGLEHAVIVR
VEYDYLDPALYASLESKLV EGLFIAGQTNGTSGYEEAAAQGLMAGINARRKLDGEP
LGRNEAYIGVLIDDLVTLSPKEPYRMFTSRAEYRLALRHDTADLRLTPYAIEIGLAD
RECFEKRLQGIDEAKALLSRRKIQKEDSAHIPELEKHIGQTLADAIRDPKVGALLDDE
ALSHIAQLLPETAAMQASSVLTAVLNERYKGYLEKEERLAARLSKADKMLIPDKFDYS
KGLSKEASEKLSNQRPLTIGQASRIPGVRKSDVALLYIAISRPSP*
>SPBIB_v1_310005|ID:27163780| conserved protein of unknown function [Uncultured spirochete bib]
MAVIKSALELALERTKNLQVDESLOKASEAKLEGRKAASRWLEEPESVDFKALAGAIPE
HRQTFLRAAFEVLSTQVQLPLNTGIDKAKLEAAGKAIIVLCGLSSRFGSEREAKLAQQQ
QSLFQQILQFLGQYSEEMKRAEQAIRNQWAPKLKEKERQLAAQLGQNVRIDPMSDPEFA
FYRKNIDAMRKNYANALEEAKNQLAALCGFATNE*
>SPBIB_v1_310006|ID:27163781| CDP-alcohol phosphatidyltransferase [Uncultured spirochete bib]
MDEGERIASLRRSILATTSIFFVAQCALFLIFAVSAGFVTQYWSLFLPISAGFHILLIM
LLLQDDFVIESNGRKLDRINLANVITLSRVSTLPTLLVLVIAAKQYRIRIPLLLILVALI
FLTDFDGRISRKTNQVTRVGRMMDSASDYTLVLSVIFQYLLIPGWFFVLVIVRLGI
QAFMAILIVVRRRIEKPSTFMGKVTVASIMVLYTLEIQLALQERFLLVFRIA EWIVAI
IIVIGIFDKIVSFFDALKSKPSAP*
>SPBIB_v1_310007|ID:27163782| CDP-diacylglycerol/glycerol-3-phosphate 3-phosphatidyltransferase [Uncultured
spirochete bib]
MTAADKITLSRVIAPLFFFVFMVQFIPRQIAIVLLWIMFGWMELSDLIDGRVARANQQV
TSFGKLFDPFADVISRVTYFLAFTSIGIMPWWVLVVLYREFGILFLRMLLGLKGIAMGA
RAGGKLGAGVYMTAGLVSLMLYTVRVTGFLGGVASLLETITIVVYIAAAVLSLASFADYL
VQFRKLYK*
>SPBIB_v1_310008|ID:27163783|ilvI| acetolactate synthase III, large subunit [Uncultured spirochete bib]
MEYTGARILMESLLLQSVDTVFGYPGGSVLYIYDELRYRDRIRHILTSHEQHAHAADG
YARSTGKTGVCIAATSGPGATNLVTGIATAHMSVPLVAITGNVATSLLGKDSFQEV
ITMPIIKHNWIVKNVEDLAEVVREAFFIARSGRPGPVLIDIPKDVITAKTEWQAVADAN
LSVPIPGSAMLSSRRARLSSRNEQTTFSKDKIDQAITMIETSERPFVYAGGGVIASNACE
LRELIERIKAPVALSLMGISCLPPSHPLYTGLIGMHGVSASNRVQEADLILAVGARFSD
RVVSRADSFASQAKILQLDIDPAEINKNIQTEHHIIGDLKLVLSRILGGMKSKQELTPPS
LAQKRAEWLSKVEAWKSIHPEANFKPSAFHPRFIIETVAQRLGEDAIVATDVGQHQIWA
QFYPPFAKPRTFLSSCGLGTMGSLGFAIGAKTAHRERPVVLTGDSFRMNCGELATAVN
YHLPILIVILNRTLGMVRQWQTLFYDERYAETTLDKRPPDFVRLAEAYGAAGFRADSKV
GFLAALDEAMAHIAEGRPAVIDALIDQDEQVLPMPVGGKAIDEQIM*
>SPBIB_v1_310009|ID:27163784| putative enzyme [Uncultured spirochete bib]
MAELKITPQMEILDTTLRDGAQGEGISFSLQDKIAVVKALDQLGVSFIEAGNPGSNPKDM
EFFREAPKLELEHAKLCAFGATRKRGTIPEQDEAIQSLAAQTDITIVIFGKSWDLHVLHV
LRVSHEENLAMIAETISFFKEKGTVIYDAEHFFDGYRANKEYAMATVQTALSAGADSIV
LCDTNGGSFPDLIEEGVRTVLGLGSGKVGIIHAHNDAGMAVANSVMAVKAGARHVQGLV
FGERCNAALAAVIPSIELKLQLHCLPKGKLENITETARLVAEIANVMPDDMPYVGLRA
FAHKAGMHADGILKTRTSFEHIDPALVGNWRRFLMSEMGGRAAIAERIKKLDPSVTKEHP
VTAALAAKLSLEAEGWQFEGADASFELLARRELKGYKPLFSIEREYVQSTHPSEEGNIC
STAWVKVKVDHSTEIAASEGNPVALDSALRQALKRFYPELSKVRLTDYKVRVIDSRSA

TGARVRVLIESTDGVHVWTTIGVSTDIIEASSKALADSIEFSLIQATETKNF*

>SPBIB_v1_310010|ID:27163785|ilvH| acetolactate synthase III, thiamin-dependent, small subunit [Uncultured spirochete bib]

MNRHVVSALVENRSGVLSRVSGLFSRRGFNIDGLTVGETENPSVSRMTIAVTGDEQVLDQ
IIKQLGKLVAVRELDPASCIRRELMLIKVKADESVRPAVIEIASIFRSRIVDVPST
ITIEATGDSEKLEGLLLLLRITYGIIELARTGLVAVERGSSILNITI*

>SPBIB_v1_310012|ID:27163787|trkH| Trk system potassium uptake protein TrkH [Uncultured spirochete bib]

MHLKSILRMLSAILMIVSLFILACGFFSITEKNQVRVIVSFFIPAGVGLAFFLFMLFICR
KDSKPFLLTKRDGFLFVTLVSWVFASAIGALPFVLSGYIPSYIDAFFETMSGFTTTGASILT
NIEVLPBALLWRATTHWLGGMGIVVLLVAILPTLGFSAIRVIEAEAPGPSIDRIAPHIS
STAKVLWLIYLGTLGLEVLLLVIIGMTLFDACHAFATMATGGFSPKNASVAYYNSGFVH
AVITIFMFLAGMNFTLHYRLLSGNLSILKDTFEFRVYFAIFAISSVIIGVDLLVSGMYRN
FGESLRFSSSQVSSILTTTGFATANFGQWPEVSQTILFFLMFIGGCAGSTGGGKIVIRIV
VLFKMAVTEMRYVANPRGVYAIFLGNKALRKNVIYDIAALVFLYFAFFISVIVISFSGV
DILTSVTAVIANLGNIGPGLGKVGPAFNYPFFPWAKLWLAFAMLVGRLEVYTVLILFSR
KFWRSF*

>SPBIB_v1_310013|ID:27163788| putative TrkA-N domain protein [Uncultured spirochete bib]

MKIAILGAGLLGSLIAHELITENRDVVIIEKNPNVAKAISNDLDCIVEEGDGERLDTLMS
AGVADADWFIACGSDENIVSCGIVAEAFKNVKTIARTRNPYFASFKNKGKRILGVDYI
INPEAETAETAIARIIFRGMSPETIDVKEAGIQLRRIHCSSQARIIGKPLSDVRSRSLIGPEF
MVPVAVMRKGEIVPAGDFVFEEDDSA YILGEP SWLDRLFGPCKSTLRKFSSLVIFGAEAL
TSLLLQELGIEQIVAHTRRSRDRGALSLLGNPRIKVIDGNREALKALSTTFPDIEPINHQ
MSEERLIDEENIGSADIVLCLTSHQSINILTALLAQEAGARRTLALVTNDLYSNILDPLN
INIVINEKTVVSGTILDRVRKAKIRRLYSFPRNEYELIEIQISKSFERLGFERNLNLPK
GFLVTFIIHESKTIVPTGDTRIQENDLVGLIVKKEQIGRLESIFGA*

>SPBIB_v1_310014|ID:27163789| putative Ktr system potassium uptake protein D [Uncultured spirochete bib]

VSIRIQIGKEKSLILYFTGLIAAGTILFSMPFATKTGSMRFVDALFTATSAVCVTGLTT
VDTLVSLTRVGGQFVLILLIQLGGLGIIAFSTLYLFSRKRISVITRGFTGDYTVPSVEFRT
RKIITQIIGWTAGFELLGTLIWPVLSRSGYTLFDSLFAISAFCNAGFSTLRSGMENFR
DEALMNVTMILICGGLGFIVLQDIARLIQKKLHLYHSSIVLRVSVGLIIGAILFF
ILENNHAFKGMMSGASKIMASFFQSVTSRTAGFDTVPQAKLTSAAQFVTIILMFIGASPGS
TGGGIKTTTTFYLMMLVALRFREGGVLVDRNRAVMPYSIFKAAAVVVRAVIIVLA VTVVVL
LIAEQVHGNPLGIETAIFESVSAFGTVGLSIGITPHLSAVSKLALVSAMFMGRVGLFAMA
IPSSKYSTERYARSPRADILL*

>SPBIB_v1_310015|ID:27163790| putative TrkA N-terminal domain protein [Uncultured spirochete bib]

MRQFAFVGLGSFAMSMLERIAEITDQIIA VDDDQARIEHVKEMVSTAYTMNLLDGEAFER
VFHDPVDVAIVDVESNGAAVLLVTFRLKKGVPPIIVKSNSEYEELLRLVGATRNVNSD
REATRITPLVLSSSLTNFMPISGDLVLAEVIAPDFVLGKTVIETDLRRKHHVNVVAVKH
SLQRNVNEEAEGVFNDLDIAYRFQAGDVLLVTGKESDVFVFSGVQKTAEHEKKKVNFSVL
LKSMFSRKKQDDTKK*

>SPBIB_v1_310016|ID:27163791| 8-amino-7-oxononanoate synthase [Uncultured spirochete bib]

MDIFQKCFDFDLKQAMEKGLYPYFQPLDGLGTEAVFHGRRLIMIGSNNYLGLTMHPKV
REAARKALEEFGPSCTGSRFLNGTLKLHEELARLAAFVKGDAALVFSTGMQTNLGAISA
LIGRNDVVITDKDDHASIVDGCRLGIGEMKRYVHGDLQLERILQKIPPESGAMVVVDGV
FSMGGDIVDLPKLVVCHRYGARLYVDDAHSGLVGGGRGTAWHFGLTDKVDLIMGTFSK
SFASLGGFVAGDKDVINYIKHTARSFIFSASLPAPNAMAFAALEVMETEPEHVQRLWEN
AHFMMKGFRELGNIGNTQTPPIVIGEDETCFRFWKELFDGGVYTNPVISPAVPEGMA
LLRTSYMATHTKEQLQRALDIFEKAGKKGFGII*

>SPBIB_v1_310017|ID:27163792| DNA repair protein RadC [Uncultured spirochete bib]

MEEWQAYEKAALSIESSTSPDIRERMVRFSGSISNLDL VVAILGTGIPGKPVRRLLARE
VLDQITQSTHSFDINKLMVIAGMGEAKSCAVAAAIELGRRIFSTRGTRITMPKDAYPLLI
HFADLRQEHFIVISLNGGHEVNAVREITKGLINKTVVHPREVFADPITDRACAVIVAHNH
PSGNLEPSEEDLDITKRLRQSGDILGIPVLDHLVFSETGYFSFVEHGLIAPTK*

>SPBIB_v1_310018|ID:27163793|rbr| Rubrerythrin [Uncultured spirochete bib]

MKSLKGTKTEVNLLTAFAGESQARNRYTYFASKAKEEGFIQIQLIFEETANQEKEHAKRL
FKFLEGGTAKVTAEPAGVIGTTRENLAEAASGENYEWKEMYPGFAKVAREEGFDAIAAV
FEAIAVAEKQHAKRYEALMANIDAGR VFKRDKKVVWRCLNCGYLFEGTEPPKVCACAHP
QAYFELLGENW*

>SPBIB_v1_310019|ID:27163794|dfx| Desulfoferrodoxin [Uncultured spirochete bib]
MTQKKQIYKCMKCGNIVEVLHEGEGELVCCGPEMMLFVENTTDAAKEKHVPVLEKTKDGW
WVKVGSVPHPMEEKHYIEWIELLADGNSYRAFLAPGQEPKAFFPVKAQVQAREYCNLHG
LWKA*

>SPBIB_v1_310020|ID:27163795| conserved protein of unknown function [Uncultured spirochete bib]
MISREDFVFCIGYDGDTAIVDAKAKKEFGRLSTMELAEKGLYRAAFASALYSEKPEEMQS
FIEFFNKKAGTQYTEAGQLSRLFGVYLESVSKVKAL*

>SPBIB_v1_310021|ID:27163796| putative SAM-dependent methyltransferase [Uncultured spirochete bib]
MVFKTYQIEILKHRLSSRSRAFFFTFFCAFLSLLTFLSFPSLPPSARNRYCISMATII
LKSKEDIRIRRGHPWIYDNEIARVEGEPEPGGEVEVRDARGLHVGYAFFNPNSKIRARVY
SRTAKKADEEFFVRAFEAAWKWRKFCFGEPAIERRLSRLVYGEADSVPLIVDGFVGGAT
GTEGLWLSVQFLSLGVEMRKAIEILKALRSVFNPDGIAERSDAPVRALEGLPESVGVWGS
VPERIVIEENGALFEIDLLGGQKTGWFLDQRANRAAAKYVSRAQWADSPNKAIGARVLD
MFCNQGGFSVLAAKAGAASVLAVDSSRDALALLRKNAALNSVSDRITIVEANAFDYLRDL
EKMGRFDLIILDPPAFKNRAALESARRGYKELNLRAMHLLERGGVLVTFSCSHWFSPE
MFDVLAADAFDSNRRLHILEERTQDLDPILSGYDESRYLKCRIVQVV*

>SPBIB_v1_310022|ID:27163797| conserved protein of unknown function [Uncultured spirochete bib]
MPRPMKYRIINGRPITNIFKPAGIPQRELEEVILTLDELEALRLADLERKYQEDA AKLMG
VSRQTFGNIIASARKKVADVLVNGKALRIEGGFVDISGGSFVCLDCRQEWNPSPGSETPH
NCPHCGSSNIRSRT*

>SPBIB_v1_310023|ID:27163798| Fe-S oxidoreductase [Uncultured spirochete bib]
MYAYGPVPSRRLGRSVGVSPICEKTCYSYSCVYQCLGRTKTLTKRHSFFPKEAVFADIEK
VVRANEGKIDYITFVGDGEPTLSLDL GALIHECKQNFYKVA VITNGSLLWMEDVRQDLR
EADVVNITMATSDPDTFKGMHRPHGSLRFEQVWQGIQQFAAEFKGQIWA EIMLVDMVNTD
TEAMKSLKTLIDSVHPERTYVMAPTRPPAEPWVHMMPRPETILEALALFGGENVTQLEEGS
FGLDEFHSAVEAISEICRRHPLRIAQARTIEAYFAQRTLDRLIASGKFKIISYQNRKYVL
PSEFVFGKQEQS*

>SPBIB_v1_310024|ID:27163799| Cobyric acid ac-diamide synthase (fragment) [Uncultured spirochete bib]
MCFRPNLSLGSRRNNHRASERNLILVTIMSGKGGVGGKTTVA VSFATQLARRGEK VLLADL
DVEEPNAGLFLQKQRKDSVDAVVYRPKWREDL CIFCGKCQGFCKFN AIAALPKYIIVFPE
LCHSCYACSDLCPASALSMVPAKIGQIQQYSVNENLVFIEGRLDIGQEIASTLVRQTRDK
ALREAQTAGIQWLVFDAAPGTACASREAMIKSDAVILVTEPTPFGLHDMSLAYQLAKASR
KPCALVINKDSPGYAGIEKFANEEKVPIIARIPYNSRLAQS YSEGNIPVGAFFPALEHALS
RIASWLLKVRAGGQP*

>SPBIB_v1_310025|ID:27163800| Cobyric acid ac-diamide synthase [Uncultured spirochete bib]
MIRIAILSGKGGTGKTSVAASFGYLAGKRAVLCDCDVDASN LALVAGAQN IQSREYSGGM
VAVIDPEACIGCGACARVCRFDAIEKAGPKYRIEAA SCEGCGYCPRVCAFNAISMVERKS
GDIFTGQSRFDSAIVYAELSIGAENSGKLSTQVRRLADEIAE EKGAEVIIDGPPGVSCP
AIAAATGTNYILFVSEPTRSGVSDLERAMEMARKLKIPGGVLVNRADINEVLSRKIEAIT
MQTGNDFWGAIPLSSDFVRAVRNGKTVLEETDDERITSALTQTWRSILERFQKWQ*

>SPBIB_v1_310026|ID:27163801| Dinitrogenase iron-molybdenum cofactor biosynthesis protein (modular protein)
[Uncultured spirochete bib]
MALDIGTISEMAITAIMTKTTMGGKLIIFSASENKGKDSFLDDRFGRAAGFVVYEEETD
QWSWIDNASNVNAAGGAGVQAGQAVVNSGATVYIGAQLGPKAMAVLARSTMKLFAGVPGK
TARENELFKAGKLEKIE*

>SPBIB_v1_310027|ID:27163802|radA| DNA repair protein RadA homolog [Uncultured spirochete bib]
MKKPSIIFRCSACGHEEPKWLGRCPCEGQWNTMLEAKTAGRF EKDSSAFSLPLESVNPAL
GTRVSSGISELDRVLGGGFMGRSAILIGGEPGIGKSTLLLEASAKLGA KGKALYISGEES
AAQIRLRAERIGALSQIEIFCGNDLHACLSVMDSVHPLLTVVDSIQTIHSPEAGAVPGT
PNQIKFCTQELVEWAKSHDSIVVLVAHVTKDGMIA GPKAAEHLVDAVISFEQAENALRVL

RTSKNRFSSDELGFFLMGGEGLAELPDPSGIFMVRREGHLPAGIAVAIVHEGSRILLAE
VQALTIPSKSGIMRVYSRIDPLRVSRIAAVLEKQTRLDFSSQEIVNVAGGLRLTEPAV
DLPLACALYSARTGQALPLGSAIAGELSLAGEVRPVRSMDRRAKSASQLGFERIIGPGVL
LPGEGLSKGTLSDQAARAAQHASQSFRWTRASSLKDTLRLWNQENRT*
>SPBIB_v1_310028|ID:27163803| putative 4-alpha-glucanotransferase (Amylomaltase) [Uncultured spirochete bib]
MKCIHNNERISGLVVPLLSLRKNKSAACGVFSDLTELAKLAKQWGLSLIQLLPLNDTGNG
TSPYSALSAFALHPIYISLPEVPKTMESLGAPLAQSAIDILKKAENKLARAHAGNKRVAF
EAVLSDKLAALRSVWNESEQEYCRPLAELFAAQETWAKSYACFMALKEKYGLAPWWEWPEY
RDVPTDIETLWDSSETGEEARFRLWLQILAREQLKDAAHSVAGMSIDIMGDIPILLAKD
SADVWCDRDIFILNSQAGAPDMYSPRGQNWGFPLYNWDALKAGDYAFWRQRLAYADQFY
TSYRIDHVLGFFRIWAISAFESEAFLEGEFEPSERLARSELSALGFSDERITWLSKPHIPE
WKIQNMEARCIDAFNRAEGAPHVVSQAGDTKASADRRISLVQRLDHLRQVCFSRIKNEPLF
LFSAQIRGSADINSKVAALKGDFPQAASALSDYAQSMCEWWTDRALYEVEPDRFVFTWEY
HNTTSWKSLSMQEQEALQKAAELASKSLAEWEARGRELLSMLVASTGMQPFAEDLGAVP
PCVPKVLKELKIPGLRVLRWEREWKPGQPYIQLETYESLSVACTSVHDSSSMRQWWEIE
ADRAQLWAMFKMAEKDALLSSLLANCSQEAPALEPSAAAVLVRALVLSASNVVYPLQ
DILACHPEWREPDARDERINVPGTTLPSNWSYRVRENLRTLASDKDFAAFVSRIAVRGAS
K*

>SPBIB_v1_310029|ID:27163804| Nucleoside recognition domain protein [Uncultured spirochete bib]
VNFLKDELRRRIAGKSLKRTIDTSWFLIKIMVPVSLLVTLGWSGLLAKIAVVRPLMRL
GLPGEAALVYISGALLNNYSSIAVMSSMNLSLRDATILAVMCLISHNLLVETAVMKSIGS
SALKMALLRIGTAMVGGFLLNLILPASFAQIQLFSASATANSFAWPTMASWALSTLKLTA
RIIVYILALMFAQTLLEQFNLMEWLSKWLGWLMRLFGLEPSMGFMWIVINIVGYAYGAGI
IKAARDEGRMTLQEGDLFNHHAISHSLEDTVLYAAISIPVLWLIVPRLALAVVVVWGE
RLRRYLFRRSLKAGVV*

>SPBIB_v1_310030|ID:27163805| conserved protein of unknown function [Uncultured spirochete bib]
MNILLDTHYLLWAFLDTRIEKRLMDIILAEDNEIFYSQASLWEISIKYNLGKLVFEGIS
PEDLYREIENSFLRCRTFTNDELISFYRLPIEHRDPDRILVWQAITSYFFLSSDGKAD
AYTKYGLKILH*

>SPBIB_v1_310031|ID:27163806| conserved protein of unknown function [Uncultured spirochete bib]
VGGGARAGMINVQLDHYVLIRYTTIMKTFQVAEIRAQFSSVLKEVEAGSEIGITFGKKKE
TIAVIVPIEQYKKMKERKLTLEGKAKIRISEDWTISDEELLNS*

>SPBIB_v1_310032|ID:27163807| putative Cytochrome c biogenesis protein transmembrane region [Uncultured
spirochete bib]
MNQPDLIAAFAAGLVSFISPCVPLLPAYLSLLSGLTIKELSGQQKRAKLLTASLMFSAG
FTLAFTLLGIIFSGGMSFAGAGASRLFGQIAGIIVIVLGFNIMFDFIRILNNDARLIQKF
AGKGRGQVNSFLMGLAFAAGWSPCIGPILASILLMAARNANIAAAALLVAYSAGFAIPF
IASALFFERLSPLLGFLKKHGNGVRIVSGLLVAFGIVMVLGVSRSISALAAQAGIVLLS
FDASSPFFSRLIGAAVWLLFAALSFRVILNRRRTHLQEEAIAPDQTQPASPQTTANSYST
RRPTLPWLLSALFFVLAILEIAGAIGLVRIIGGWLTFTGI*

>SPBIB_v1_310033|ID:27163808| conserved exported protein of unknown function [Uncultured spirochete bib]
MAHSQNRPLSSRLIFQSSSFILLSLIIVLSSAQPAAAAETRPWYASGLEALGFYVFDQPF
EQPNFSVAAINGSLKSRLSTKGNITLLNFWATWCPPCKQEIPITIKLHETMKGEKFEIMA
IDLGEPPASVKTFLQNKITYPVYVDPKNSLAALYASRGIPTTYILDKNGKFIAGIIGAF
EYDNPEFVRIMKELARK*

>SPBIB_v1_310034|ID:27163809|clpP| ATP-dependent Clp protease proteolytic subunit 2 [Uncultured spirochete bib]
MKLAEPQTTETEAKRPEEPLSERFLKTRTVLLVGEVDKDLSEKVVQRLLLLDSMSEEPIT
LLIDSPGGDVYAGSFIDVIRFIKAPVRIVGIGLVASAAALILLAVPKERRFGLPNSSYL
IHQPLSGMNGVATEIEIHARELEKTRARINEIIAEATGQQLEKITKDTDRDFWMNAPEAM
QYGLIGKVIASRNELI*

>SPBIB_v1_310035|ID:27163810| putative Endonuclease/exonuclease/phosphatase [Uncultured spirochete bib]
VRPAFLFFAAIAMLVISCRCSLGSVDQAQEIRIVSYNVHNLFDAAEESGNEYPEFKPSKGG
WTKELYAKRLASVIEAVRSLGKGDGSAQARDPILCVQEIENEKVLADLAEHFRKGA
RYWAISGPKDSIIHTGVLRSFPVTAMHTHSVMDAWGFGPLRDILEVELDTSGATSDADRI

LLLICHWWSKREGEQETESARRAAAALLAQRIREIESEKPDLPPIVCGDFNESPDEYLRI
SRRYPTALMPLESGSPPAAAEGEPLWVSQSFLQPGSSPDDASRVALYSPWAEKPDGFSI
AYRDKREQFDGFLNNAALQDGFGLYEGFCTSESPVLFDAASGKPFWEWNGTSGYSDHLPVC
LVLQKNAGQARVRY*

>SPBIB_v1_310036|ID:27163811| Gluconate transporter [Uncultured spirochete bib]
MVSGVVALLLLLLAVILIIITGTRYKMNAFLVLIGVSFVFGLLIGLKPLDVIAGIKNGFG
GTLTNIGIVIVAGTIMGTILEKTGAALSMTQAILKLVGKSRAPLAMNVAGYIVSIPVFCD
SGYVILNPLNKALAKESGISMVMAVALSTGLYATHTMVPPTPGPIAAASALGADLGKVI
LLGLIAIPASLAGLLWATKFAKRYEIEPEIHETYSEIVKKFGKLPGTFLSFLPIVLP
LILLSVAEFPSKPFNGGFRIFLSFIGDPVTALIGVLVSLLLVQKGELKNAISGWMGE
GIKESAILVITGAGGAFGQIIKASPITEFIKTNMAGMQLGIFLPIISAALKTAQGSST
VAIVTTAGIMAPLLQTLGLDPALTTIAIGAGSMVVSHANDSYFWVVSQFSGMPVNIAYKA
YTSATAIEGAVAFIAILILSLFVH*

>SPBIB_v1_310037|ID:27163812| putative Tetratricopeptide TPR_1 repeat-containing protein [Uncultured spirochete bib]

MNKLYATLCERFGLNAYIAGDYAKAERWFRKLEQSEPNSIRVLRNLGVILLAQGRSEAE
RYLLKEEKLYGSSFYRHSALADLAYATGKRKEAERRYKALQEPECAEGGKAFHMRLME
KRLAICEDEKRFATRAMELFAEDLREAGAHEDAVAMFLKSFELDETNPALNNAAS
ILFNKQSKPEEAKPLFEKAFELSHSIQVARNLELCQQSLNRTKKRNS*

>SPBIB_v1_310038|ID:27163813|ttuD| putative hydroxypyruvate reductase [Uncultured spirochete bib]

MMNTKTMLNLRQDAEAFRAAVERVRPERLFSYSLSLDGSKLVVGDGQAVRGYDLDKYER
IVLAAFVKASIPMAASLAALLGERVSQGLVITKAPEGGQPLAFDPETRTLFTERSIHIE
AGHPVPDQRSMLAGKEMALASQVREWEKRGSHLVCVLISGGGSALLSSPAEGLTLEDK
AAVTRLLLACGATIHEINAVRKHLSAIKGGLLARALFPAETLALVLSVMDGDDLDIASG
PTVPDTSTWQDVKAIFDRYGLFDALPESVVIIEEGCEGERPDTPKPGDPIFRACSTILV
GTNFHAIIEAERKSKDLGYHTLVIGTRLSGEAREIAKVFSGAVQDILLHKIPVATPACII
AGGETTVTIRGHGKGGRNQEMALSFEELAHYPSALRGQLDRIAFLSAGTDGNDGPTDAA
GAFADAAVIERAKAHALNPAHYLAENDSYTFFDKAGALFKTGPTGTNVCDIQILIVK*

>SPBIB_v1_310039|ID:27163814| conserved protein of unknown function [Uncultured spirochete bib]

MKSDSQLKLAVIDADNTQPAIIDGLLAEIAKYGIASVKRIYGDWTNPNLRGWKERLLEY
AIQPVQQFAYTTGKNSTDSAMIIDAMDLLYTENLDGFCIVSSDSDFTRLAARLREDGKLV
LGFQQRKTPKPFVAACDKFIYTEILQENVGETDEERESHDPKDAASKRAAAQPDIKDDKK
LKALLSAAEEAADEFGWAYLGEVGTYIANRLPEFDPRNYGFRKLGELIKATNLFEIDER
TNPMVPGKQVYLRKHRGRS*

>SPBIB_v1_310040|ID:27163815| conserved protein of unknown function [Uncultured spirochete bib]

MTDTQFARFCDVREKIRLYISSISENAQWILEAQRVYNARGYYEADLETPVVYNLALED
ITAKSEPRFIIIVADNPGIQEQKAKNHRYLVGQSGKLAVSWFRENLGIDFRSSTLIINKTP
IHTPKTAELRLLVRAAGSRSDDELADLLVDSQREMARFAFDLLEILECPLWVSGIGELRPK
GIFRPWAEELRALCLGAPFELRERVWLFRRHFSMNQFAIEYANARRAMMVDPKAQNTQKA
SRVNPNGVSDPGATYAMLAEIGRKNRTTILGF*

>SPBIB_v1_310041|ID:27163816| conserved exported protein of unknown function [Uncultured spirochete bib]

MRVFSLIATTLAAAFVSSSACAAQKNDTL SRLPADIRAEAQAALSAVRLGDEDRSRIA
AAINQAPSEFASLFHEVRAVMNADPNLLRRVDKTVLALPASFIPGDLVSLDGAFPYAVSKK
GMMLRKPAREALARMAEAARKDGITLVSSAYRSYEQKTVFERNVKEMGKIEAERVSAP
PGMSQHQLGTAIDFGSITDAFAETAASKWLAHAHASTFGFSLSPKNMEEVTGYRWESWHY
RYISPAQAQMQRFFLGVQQYLIEFLSGV*

>SPBIB_v1_310042|ID:27163817| Cof-like hydrolase [Uncultured spirochete bib]

MNRNKPAAPIKLIALLDLDLTLRADLTISEQNKQALQRAENLGIHIVLASGRNYHSMRRY
AEELFIHRRGDYLISSNGAQLIRASSGRLIEDLKLAAFCKEVASDLERKGYLWQLYIGG
KIYCNRMNKWAIMDQEFTGQPLEVIRDFDITLSEDQTKILVCGEPEQIEALYQGLVNRIG
DRAEIVTSKPYFLEILPKGATKGAALERLTARLGLDMESVLAIGDARNDYDMIFKAGWGC
APANADEIRAIARFVSARTNEEDA VADILEWGLTPFLKI*

>SPBIB_v1_310043|ID:27163818|murJ| Protein MurJ homolog [Uncultured spirochete bib]

MAPQENHENSAAARASTPETAASPTPTLESDAASAKMVRSAAGMLSVLTMISRVLGLIREM

TKARFLGTGIYSDAFTVFSFIIPNFTRRLFAEGSITVAFIPTYKGYLHAQNDEETRTFLSA
SLTVLTICVTA AVALGIALAPWIVKLFVSEPVETALLTRIMFPFLALVSFAALLQGILNS
HEIFNPSGLAPILFNICFIVVPWL VGSRLGNPARAMAVGVVIGGLAQALVQLPAVLRLLGI
RFGFMNPARAFLNPGMRKV FALIAPTILGMAAYQVNDLVSTAFASRAGTGVASSLQYSLR
LQELILGIFAVSAGTVLLPRLADAVREHAWRDYSSTLGRMTMSLLLLTVPVAVFMSMAFPE
RIVTLLFKSGDFTDVS VRLTASAFFWHQTGLVFIAMNRLIAPAFYARS DTKTPTWAGIAS
FGVNVVLVLALAFRFQGPFI AFALSFSSAMNTGLLVWALIKGNIEGVRHELWDALKYAIR
MAIFSAVAVVPALFVDRAVYAKVADAH SRLISAGVPLVAGTVVFAAVGIALLVLTKDSVA
ASITNAFSRKTRGRGR*

>SPBIB_v1_310044|ID:27163819|rpmG| 50S ribosomal protein L33 [Uncultured spirochete bib]
MASKKKQNVEIIALQCTECKRRNYTTKKNRKTQDKLELMKYCKWDRKHTLHRETKVK*
>SPBIB_v1_310045|ID:27163820|secE| Protein translocase subunit SecE [Uncultured spirochete bib]
MKKIIQFFKDSY AELAKVVWPSKEDVIAS TKIVVISTVAVALVLGLIDFLVLGIEVVFR
*

>SPBIB_v1_310046|ID:27163821|nusG| transcription termination factor [Uncultured spirochete bib]
MAKAWYILHVYSGYENKIEKTIRMLIDSGELSRDIVTDVKVPAEEVAEIKDGK KRTVSRK
ILPGYILVEMDLPENGWKATCAIIRNITGVTGFVGSASNVPVITMEEVKRILQRTGEL
KGERQVHFRQTFTVGEQVKIIEGPFESFSGVIDEVNAEKSKIKVSVQIFGRSTPVEVDMA
QVEKM*

>SPBIB_v1_310047|ID:27163822|rplK| 50S ribosomal protein L11 [Uncultured spirochete bib]
MAKKKITAIVKLQCPAGKATPAPPVGPALGPHGVSAPMFCQQFNDRTKNMEPGLVIPAI
TIYQDKSFTFILKTPPASVLIKKACGIEKGSALPQKDKVAKLSKAKLEEIAKLLPLDNA
NDLEAAKRIIAGTARAMGVEVEW*

>SPBIB_v1_310048|ID:27163823|rplA| 50S ribosomal subunit protein L1 [Uncultured spirochete bib]
MKHGKKYNEVAKKVDPSQAYELGAACALVKELKTAKFDETVEVHIRLNLKKSQSVRDTV
LPHQFRGEKRILVFCRPERVKEALEAGATYAGDAELIEKIKGGWLD FDI AVATPDMMKDV
GKLG MILGRRGLMPNPKTGTVTNDLPASLNELRKGRTEYRTDKSGIHL PVGKVSMEPEK
IAENLNTLVEEISRKR PADAKGDFIASIYLTPTMGPSVKVVLNKSEKR*

>SPBIB_v1_310049|ID:27163824|rplJ| 50S ribosomal protein L10 [Uncultured spirochete bib]
MAIKASKLQPRKIEAIGMLKEMISSNDFIFTEYRGLTVEQITSLRRQLREKGV ELHVVK
NNFARLAFEELGFSQDVAPVLTGPTAVAFVK TDSNEVAKVLLDFAKETPALVIK GAMVGR
QFMDSHQVEALS KLPGRNQLIAMLMSAMQGPAQNLVYVINA IPTKLVRVLKAIEEKKAQE
NA*

>SPBIB_v1_310050|ID:27163825|rplL| 50S ribosomal subunit protein L7/L12 [Uncultured spirochete bib]
MAALTKEQIIDAIASMTVLEVSELVKAMEEKFGV TAAAPVAVAAAPAAGAAAAPVEEKTE
FTVVLKGNVPADKKIAIIEVRAITGLGLKEAKDLVEAGDKPLKENVSKEEA EKVKKQIE
AAGGQVEVK*

>SPBIB_v1_310051|ID:27163826|rpoB| DNA-directed RNA polymerase subunit beta [Uncultured spirochete bib]
MAYTEQKIKRIYIGKDYRDVMDIPDLIDIQVSSYERFLQRDKLRKGEPLDLIGLEEVFRG
TFPIESPSGDLVIEYEHYSLDEKAIKYSELECKQKGLTYSVPLKAVINLVFKKTGEIRQK
EIYLGDIPLMTDRGTFIINGAERVIVSQIHRSPGVVFSHEKGVFSARIIPYRGSWLEFEI
DQKHDLIAKIDRKRKILGTLFLRAIGIQTREDIIAFYTTKQVELSENQTEKDALVGKI
LAKAVYIELDGEEKR LFRAGDKIHLHEIDELINLGIGSVEVINFDDEKSLHNEMILNCFE
REDVKLVKETPDQDEPTKEDAISAVYSVLRPGEPISLENAERDLHNMFFTARQYDLG SVG
RYKLNKKFDFDKTLTLTKDDIVATMKHLINVYYGEANVDDIDLGNRRVRAV GELMSNV
MKVAFSRMERTAKDRMTGKDLETAKPQDLITIKPIVAAIKEFFGTSQLSQFMDQVNPLAE
LTHKRRNLALGPGGLNRDRAGFEVRDVHYTHYGRMCPIETPEGPNIGLIVSLATYTTVND
YGFLETPYRKVVKGKVTDEIEYLSAIDEDKYYIAQASARIDTAGKFLDQSI SCRHQGDYT
MRRPDEIQYMDVSPKQIISVSAALIPFLEHDDANRALMGSNMQRQAVPLVFTEPPRIGTG
MEWKTA YDSGVLMAKARTGTVEFVDANRIVIRPDKMESPD DTDVYQLIKYQRTNQDTCFN
HRPIVKRGEHVLKGQVIADGPATSQGELALGRNILAGFVPWNGYNYEDAILISERVVKED
LFTSIHIKEFILEVRD TKLGP ERITRDIPNTSEKMLDNL DGEVVVRIGAKVKS GDILVGK
VTPKSDTDTTPEFKLLNSIFGEKAKDVRDSSLR VPHGIEGTVIDVQRMSRANND DLAPGV
EETVKVLVAVKRKLKEGDKMAGR HGNKGVVARVLPVEDMPYLEDGTPLD ICLNPLGVPSR

MNIGQIMETELGWAASTLDEWYACHVFQSPSQEQIEEKLQQAGLPVSSKVMARDGKTGEY
FKNPITVGVVYFLKLHHLVDDKM HARSTGPYSLVTQQPLGGKAQFGGQRLGEMEVWALEA
YGAANTLQELLTIKSDDMTGRSKIYEAIVKGEPHTAAGIPEAFNVMVQELRGLALDIKVY
DSKKGKQIPLTERDEDEDIKKQSGAF*

>SPBIB_v1_310052|ID:27163827|rpoC| RNA polymerase, beta prime subunit [Uncultured spirochete bib]
MRDIQDFDNISIH LASPEMIRAWSYGEVKKPETINYRTLPERDGLFCERIFGTTKEWEC
YCGKFKSIRYKGVICDRCGVEVTNSKVR RERMGHIELASPVSHIWFYRSVPSRMGLLLNL
PMATLKSVLYYEKYIVIDPGETELKMQLLTDEEYREAMDRYGGGAFTAGMGAEAIRSLE
QIDLDKLSQELRQKMIERGAKADKRLKRIEIVEAFRSSGNRPEWMILTVIPVIPPELRP
MVQLDGGRFATSDLNDLYRRVINRNNRLKLLQLNAPDIIYNEKRMLQEAVDALFDNTR
RRRAVKGAGNRPLKSLADMLKKGKQGRFRQNLGKRV DYSGRSVIVVGPPELKMWQCGLPTK
MALELFKPFIMKKLVEKD VVNIKKAKMLVESETPEVFAVLDEVVKEHPVLLNRAPTLHR
LGIQAFEPILVEGKAIKLHPLVCKAYNADFDGDQMAVHVPLTHAAQAECWTLMLSSRNLL
DPASGKTIVYPSQDMVLGINFLSRHRPGTKGEGKRYSSPEELLACEYGACDYQALVYVQ
TPKEPVWDSYAKPATLNGSKLIKTSAGRILLNEALPKEIPYINYALTDKDIRSLIEYVYR
TNGPFITVNMLDTIKEMGFKYATFFGATIGMDDIVIPKEKTEMIKANKEVEAIQQQYLA
GHITQDERYNRVVEVWSKTNEELTAVMMKTKLEKDRDGFNNIYMMAHSGARGSKNQIRQLA
GMRGLMAKPSGDIIELPIRSNFREGLSVIEFFISTNGARKGLADTALKTADAGYLTRRLV
DIAQDVVVNDDDCGTINGAIHTAIKDGDEIIESLKERIIGRFTLDPIRHPITGEIIVGSN
EEITEEIAEQIEAAGIEEVSVRTVLTCEAKHGVCRCYGRNLATGKTVDIGEAVGIIAAQ
SIGQPGTQLTMRTFHIGGAATKAAEENRISLRYPAYVVDIEGTYVKTDLGHFLFTRRGYI
YVNRVFGAFELSKGDVVLVEDGQRVMKDDPVIRKADGAEIKSPSISYAKVLEGKLLLIAQ
EQKVEIRNGSEVVVTKGQILLANETIATFDPFNDPIISEHDGIARYEDIVPGSTLKEEIN
AETGNVEKIITDVGSRD TKEPRILITDEAGNDIETYLPEGAYVNVEDGEPVKAGKILA
KILKESAKAMDITGGLPRV GELFEARKPKTPAVLAMVSGTVSFGGSLK GKRVINIRDSFG
KVYKHLVPKNRLLVRNGDKVAAGELLCDGSKNPHDILAILGEQACQRYLMDEVQQVYRA
QGV TINDKHIGVIIRQMMKKVEIVNPGDTVFIY GQQIDKHKFH DENRRVEEEGGQPAVAR
PILLGITRASLKIDSFFAAASFQETTRVLTDAAIKGEIDQLRGLKENVIIGHLIPAGTGM
KQYRQVRLFDAVNDDLNSLVEEVLEKRKQERELAPPAILQDR TTNDVSFDEPSVFDNDEG
FSEDVEPSE*

>SPBIB_v1_310053|ID:27163828|rpsL| 30S ribosomal protein S12 [Uncultured spirochete bib]
MPTINQLIRFGRKQNKQWTKSPALMGCPQRRGVCTRVMTVTPKKPNSALRKVARVRLTNG
IEVTA YIPGIGHNLQEHS AVLVRGGRVKDLPGVRYHIIRG TKDALGVEDRKQGRSKYGA
KPKA*

>SPBIB_v1_310054|ID:27163829|rpsG| 30S ribosomal subunit protein S7 [Uncultured spirochete bib]
MGRKKKSIDRGHAPDVKYNSTTVSRFICRMMWQGKKSICTSIMYDALELLQKSGQPALD
AFNKALENVKPSIEVKSRRVGGATYQVPIEIRESRREALAMRWLINAARARTGKAMA ECL
ADELFD AFNNTGTAIKKKDDMHKMAEANKAFAHYRW*

>SPBIB_v1_310055|ID:27163830| putative Elongation factor G [Uncultured spirochete bib]
MPTESQPRGWLFLFVQQKYTD PAMNMQAAPISIRNIGILAHIDAGKTSITERVLHVAGVR
EKAGNVDEGTTATDYLTIERQHGITIKTAAVRFIHKGVRFHLLDTPGHVDFSAEVDRVLR
VLDGAVIVLCAVSGVQVRTGF IASGCRAHKIPRMYFINKMDRRGADFFAAMQEIAGELGE
SVLPLQVPTFEHQWNGIADLVNLRWFPAMLDMS ENIAQAGESPASLDSIGLPIDQAPIS
EKSQRQIEQYREKILDRASMYDDRLTEMIVNGQQISP AHIRDALRPAIQRQDIMPALCGS
SFSDISTALLLDAVIDYFPDPLERGCPPAKDLKNGSELN LPAAPDAPFSAYIFKSVLSQN
LEPLGWLRIWSGTIREGMKVMAMPARKHVQIQRLYGVNGADVEHIESAAAGEIVGARLSF
MEAGGT LCAANLQIIYESFKNPEPLVFMVIEPSSQAELPQLREALKHFSMEDVSLSVSEE
KDTGRIT IAGQGELHLDIIRERL KKEYGLRVRAGNPQVPKIERL KKAARLADQFVGDFFG
ERLAVGLGVFLENEKDNNANSLHVASGIRLSANYEACILRAMETVLA VGPCEGWPIVGTK
VIVESFMPPGGAAGSTDKRSETAVEAAASSILRKA VNLAGTVVFVPIVQVSVEVPDDWFG
SALASLQARGARIEAVEDTGGVKSIVAYAPMENLFGYATSLRSITEGRGVYQAKFDHYGS
AREY*

>SPBIB_v1_310056|ID:27163831|tufA| protein chain elongation factor EF-Tu (duplicate of tufB) [Uncultured spirochete bib]

MAKEKFERTKPHMNVGTIGHIDHGKTTLSAAITMYCGRKFGDKVLKYEDIDNAPEEKARG
ITINTRHLEYQSNKRHYAHIDCPGHADYIKNMITGAAQMDGAILVVSAPDSVMPQTREHV
LLARQVGVPAILVYLNKVDLVDDPELLDIVEEEVRDLLNFYGFPGDKTPIIRGSFAFKAMT
EPDNPEATKSIQELLDAMDSFFPDPERAIDKPFMPLIEDVFSISGRGTVVVTGRVERGVIIH
VNDPVEIVGIRPTKQTVVTGVEMFNKLLDEGQAGDNIGTLLRGIDKKEVERGQVLAKPGT
ITPHTKFRGQIYCLSKEEGGRHSPFFSGYRPOFYFRTTDITGTVKLPEGKDMVMPGDNSE
IEVELIYPIAMEKGLKFAIREGGHTVASGQVTEVIA*

>SPBIB_v1_310057|ID:27163832| protein of unknown function [Uncultured spirochete bib]
LLLLPAASGWLLDKQFSECYYSVPLKGGGTLLCEMVPRAH*

>SPBIB_v1_310058|ID:27163833| rpsJ| 30S ribosomal subunit protein S10 [Uncultured spirochete bib]
MKDRIRVRLRGFDVRLVDDSAKSIKTVQNAGSKVSGPVLPTRINKFTVLRSPHVHKKS
REQFEMRTHKRLIDIIDPTPEVMDALMKLELPSGIDVEIKQ*

>SPBIB_v1_310059|ID:27163834| rplC| 50S ribosomal subunit protein L3 [Uncultured spirochete bib]
MIGVIGKKVGMTQIFDETGRVVPVTVVQVVPNVVVSKKTAEKDGYNVAVVGVYEEKKSRV
TKPYAGQFPEGIAPTRILREFRDFEKEVDVQSIDASVLDGVRFVDVIAKSKGKGFQGVV
KRWGFEGGRATHGSKFHREPGSTGNSTYPHHSFKNIKMPGHMGNERVTVQNLKVVVRVDAE
KGVVLRGALPGPRNCDVLIRKSVKKS*

>SPBIB_v1_310060|ID:27163835| rplD| 50S ribosomal protein L4 [Uncultured spirochete bib]
MEGKVISLSGKELRTIELSDAVFGLPINEDVIWYAVNNELANARVGTASTKDRGEVHGTN
RKPFQAQKGGGRSRHGDLKSNIYVGGGISFGPKPRDYSYAIPRKAKQLSLKTILSLKIQDG
LVSIIEDFTVESGKTKDLLKVLNVVDLKNPARTVLILKDDDDPMIKRAARNIPWLSYLT
NRLRAHDLFYARKVVMLEGASAKLNEFYASETKE*

>SPBIB_v1_310061|ID:27163836| rplW| 50S ribosomal protein L23 [Uncultured spirochete bib]
MEYDAILIEPVLSEKSNIMREIGQYIFKVDARATKPMIMEAVAKTFNVHPVSCKVINVTS
KPKRLRGRPGRTAEWKKAIVRLQKGETIRVFEGA*

>SPBIB_v1_310062|ID:27163837| rplB| 50S ribosomal subunit protein L2 [Uncultured spirochete bib]
MAIRTFRPVTPGLRHRVQVINEEITSNESKPVKSLTKGKRSTGGRASNGRISVRHHGGGH
KRKYRIIDFKRDKFGVPGKVSGIEYDPNRSANIALITYADGEKRYILSPKGLKVGQIILS
GPEAPAEVGNALPLDKIPVGFTVHNVELTLGRGGQLARSAGVSALIAAKEGDYVVLKLP
GEQRMVFKKCIATVGQVGNEEHMNERIGKAGRTRWLGIRPTVRGTMNPDVHPHGGGEGK
GKGYKQPVSPWGQPAKGYKTRDTHKPSGRFIVKRRK*

>SPBIB_v1_310063|ID:27163838| rpsS| 30S ribosomal subunit protein S19 [Uncultured spirochete bib]
VRSVKKKGPFIKSLYKKVTEMSRAGDKKLIKTYSRSTIIPEMVGGTISVYNGKTWIPV
YVTENLVGHKLGEFAATRVRFRGHAGSDKKAEEK*

>SPBIB_v1_310064|ID:27163839| rplV| 50S ribosomal subunit protein L22 [Uncultured spirochete bib]
MANTKTGYRATSKWLIASPFKVRPVADLVRAKPYTEAMAVLENMPHKGAKLIRKVVASAA
ANALNKNRKLGEDMLYIKELRIDEGRPMKRIWFRARGRADMQLRRMCHISCVVDEIGKKT
EA*

>SPBIB_v1_310065|ID:27163840| rpsC| 30S ribosomal subunit protein S3 [Uncultured spirochete bib]
VGQKVNPIGLRIGINKDWSHWYVEPREYAKTLHEDLAIRRRLELPETKGADISEIEII
RHPQRITIVIHSARPGVLIGIKGANIDKIGAEIQKITQKKLQIKIKEIKKVDNAQLVSQ
NIARQLENRQSFRRSMKSAIQNALKAGAQQCKVRLSGRLGGSDMSRTEELKEGRIPLHTL
RADIDYGFSEANTTFGKIGVKVWIYQGMVYAQDKNEDAGQLARKAKREPAGEARGERREG
SQERRDRRERGERSERGERKPSAKPDADRAEGEARS*

>SPBIB_v1_310066|ID:27163841| rplP| 50S ribosomal subunit protein L16 [Uncultured spirochete bib]
MLIPKRVKHRKQQRGRIHGEAHSNTIAFGDYGLVCLEPHWITNRQIEAARIALNRYIKR
GGKMWIRIFDPKPYSKPAETRMGRGKPGPEYVAVVKPGTVLFEVSGVEPKAAEEAMRL
AGSKLPVKTFAVREEME*

>SPBIB_v1_310067|ID:27163842| protein of unknown function [Uncultured spirochete bib]
MRFVVFVVGFNTRLRLVHILSVERMQLAHDNFYDNGLIHLVGNLQNLALSHFLDVRI
HVPSPEELFLLRDAALGFGDPGFDPRDLAAKISLLERILYVPDHHLESKVKVFLSKLIA
LDEHLFHLQIFE*

>SPBIB_v1_310068|ID:27163843| rpsQ| 30S ribosomal subunit protein S17 [Uncultured spirochete bib]
VDTNIQKMTEGKLVLQGIVVSDKMDKTIVVEIIMRKLHPLYRKYVNKTKRVKAHDENNEA

HVGDTVSVVECRPLSRDKRWRLVEIVERAK*

>SPBIB_v1_310069|ID:27163844|rpIN| 50S ribosomal protein L14 [Uncultured spirochete bib]
MIQVESMLNVADNSGAKTVQCIKVLGGTRRRYASVGDIIVVAVKSALPNSAIKKKGSVEKA
VVVRTHKEYKRPDGTYIRFDDNACVIIDANKNPKGKRIFGPVARELREKDYMKIISLAPE
VL*

>SPBIB_v1_310070|ID:27163845|rpIX| 50S ribosomal subunit protein L24 [Uncultured spirochete bib]
MANAKYKLRKEDLVQVIAGKDKGKQGKILKIDHEKGRVIIAGINMVKKAMKKKSQTDRGG
IVEVEAPLHISNMIICKKCNKPVIRIGYKFEGEIKKRVCRKCGEVL*

>SPBIB_v1_310071|ID:27163846|rpIE| 50S ribosomal subunit protein L5 [Uncultured spirochete bib]
MAEAKVYIPRLKKLYREKVAPELFTELGYTSKMQVPRLVKVIVSMGVGEARENKLLDAA
VGDIEITGQHAVKTKAKKSIANFKIRKQGIEIGARVTLRGNQMWEFLDRLMNVALPRVKD
FRGVNPNNGFDGHGNYTLGLTEQIIFPEIDFDKIEKVMGLSVSIVTTAETDTEAKSLLAKL
GMPFRR*

>SPBIB_v1_310072|ID:27163847|rpsH| 30S ribosomal subunit protein S8 [Uncultured spirochete bib]
MSVSDPIADMLTKIRNANAARHEKVDIPTSKLLEIVKILKTEGYIKNFKKIQADGQNF
RIFLKYDEENNPPIHGLSKVSKPGRRVYTYGEMPRILNGYIGIMVISTSDGVITGRKAVE
KQVGGELICTVW*

>SPBIB_v1_310073|ID:27163848|rpIF| 50S ribosomal protein L6 [Uncultured spirochete bib]
MSRIGMRPVAIPQGVKVTVEPTVFHVEGPKGRLSQEYRPDVAIAVKNGEAVVERKNDSKQ
AKAYHGLYRSLNSMVTGVSQGFKRALVINGVGYRAEVQGNFLVLSIGYSTDVVAVIPDG
LKVSVEQNGQKVVIEGIDLAKVGKFASEVRSLEPEPYKGGKIRYEEEKIRRKVGTGTVK
*

>SPBIB_v1_310074|ID:27163849|rpIR| 50S ribosomal protein L18 [Uncultured spirochete bib]
MSVRELSDKIRKDRRRTHVRKTIVGTAEKPRMTVFRSNLHLYVQVIDDTLGHTLASVST
MEQQFRSLRATVQTGGVLGEEIGKRLLLEKGITQVVFDRNGYKYHGIVKAIADGARKAGIK
F*

>SPBIB_v1_310075|ID:27163850|rpsE| 30S ribosomal subunit protein S5 [Uncultured spirochete bib]
VERTRRDDSGVQDGYTEKLIQLNRTAKVVKGGRRFSFSALTVVGDQKQGHVGFVGFKANDV
TEAIRKSVRAKRAMVTPVKHGTLPHEVTGLYKATTVYMKPACPGSGVIAGGPVRAILE
CAGYTDIISKCVGSRTSVNVVRAVFLGLDQLLDAQTIKNRGKTLKDMWS*

>SPBIB_v1_310076|ID:27163851|rpmD| 50S ribosomal subunit protein L30 [Uncultured spirochete bib]
MARIQITLVRSTIGQKPNARATVRCLGLRKIGSSTIQEASPOILGMVNRVRHLVETKEVE
*

>SPBIB_v1_310077|ID:27163852|rpIO| 50S ribosomal subunit protein L15 [Uncultured spirochete bib]
MTDFNLHAPEGAKKRKHIVGRGDGSGWGGTAGRGNKGQQRSGGKTYPGFEGGQMPLYRR
LPHRGFSNYPFRKEYQIVNIRDLEGKFQAGDTVDTVSLFMKGLVRKPELPVKLLGEGQIE
IALTISVDAVSSSAKTKIEAAGGKVEVPAATGSSADA*

>SPBIB_v1_310078|ID:27163853|secY| preprotein translocase membrane subunit [Uncultured spirochete bib]
MAGTLVDIFRVKELKDRIFFTLFWLAIFRLGAFLPIPGINASALQSYFANQANTGGGIDT
YLDFFAGGAFKNFSLFMMGVMPYISAQIIMQLLLVIFPKLKNIAEEEEGRRKISRWTRIG
TIGIAIQSFSVTVWADRIPNAIAMSNTMYTIVAITVTTGTMFLVWIGEQITKRGIGN
GISLLIFAGIVARLPNATYELIKKIQLGEINAVYAIVVLIMFVAVVALVVLEQQGQRKIP
VNYAKRIVGRRMYGAQNTYIPFKINPSGVIPVIFASSLLTFPLQIAQSFGVQAKWLRDFS
YWLRPSTGFWYNFFYVVFIIFFAYFYTQVTLNPQEISKNIRENGGSIPGIRSEKMEEYLTR
VLNRIILPGSLYLGLIALIPTLVQRLFNFPQMA YLLGGTSLILVGVDLDTMAQVEALL
KMHHDGLVRKGHIRSRNL*

>SPBIB_v1_310079|ID:27163854|rpsM| 30S ribosomal subunit protein S13 [Uncultured spirochete bib]
MARIAGVDLPNKHVDIALTYIYGIGRTSAIKICEATGIDPAKRINDLSNEEINELRKVIE
NEYKVEGRLRTEIALNIKRLMDIGCYRGLRHRKGLPVRGQRTRTNARTRKGKRKTVANKK
KAV*

>SPBIB_v1_310080|ID:27163855|rpsK| 30S ribosomal subunit protein S11 [Uncultured spirochete bib]
MNVAATTTKTKKRKEKKSVEYEGNVYIQATFNNTIVTVDLNGNAISWSSSGSHEFRGAKK
STPFAAQTVTEAAAQKAIQAGLREVHVVFVKGPGIGRESAIRQLGVMGLKVKSINDVTPIP
HNGCRPRKARRI*

>SPBIB_v1_310081|ID:27163856|rpsD| 30S ribosomal subunit protein S4 [Uncultured spirochete bib]
MARYIGPVCRLCRAEGRKFLKGDRCRSDKCPINKKRLPPGKAPKTRLGKKSEYAVQLRE
KQALKRNYGLMEQQFRNTFEKALGLPGKTGDNLILLERRLDNVVYRLRFASSRAQARQL
VNHGHIAVNGKRVNIASYLVRAGDVISVIGAAKKMESIRQALEEVQKSGVMPWLEVNADE
MTGRFVTNPQRQDVTDIADIKEQLVVELYSK*

>SPBIB_v1_310082|ID:27163857|rpoA| DNA-directed RNA polymerase subunit alpha [Uncultured spirochete bib]
MARKNLLKGFKKPKGITYEQSESTDTYGKFVAYPFEPGYGTTVGNTLRRILLSSIQGYAI
TAVRITRYDDEGVPHVITSEFETIPGVVEDTIEVLNLLKLRVKLPNDKEELTLEYEIKG
MEELRGSFFADQSSLIVLNPELKIASLDPSVHLGLELQVNLGRGYVPSEVNEKFIDVVG
IPMDAIFTVPKKVKYSIEPTRVGQRSDYDKLVLEIWTGDTIKPEDALGEAGKIAKDHFSI
FINFDENEAGGEETSDEIEERVRQILNMPVEEELS VRSFNCLKNANIRTIGDLTKKTEE
EITKTRNFGKKSLEIKTKLAEWNLSLGMADYSALRNHIKLNMKKEESDEA*

>SPBIB_v1_310083|ID:27163858|rpLQ| 50S ribosomal subunit protein L17 [Uncultured spirochete bib]
MKHKIGYNKLNRAAHRKALIRNMVTVLFKQEKIVTTKAKALEARRAAEKLITRAKEDSV
HNRRIASARLYGEDAVAKLFTDIGPRFKERNNGGYTRILKLGNRANDNASLVVLELVGQKA
DEKKAEREKRKAERKTKKQA*

>SPBIB_v1_310084|ID:27163859|livF| leucine/isoleucine/valine transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]

MLKVTNLKVNYGKIEAIKDVSEFVDPDGKIVTLIGANGAGKTTTLRAISGLERAAGGSIVF
EGKDITNLEAHKIVPLGISHVPEGRKIFPTLTVKENLELAGWTIKDKTEVNRIDQVCEI
FPRIKERLSQLGGTSLSGGEQQMLAVGRALVTGGKLLLLDEPSMGLAPVLVDEIFDRIVAI
NKQGTTVLLVEQNAMEALEIADFAYILEVGYTTISGEAKAIEHDQRVREAYLGV*

>SPBIB_v1_310085|ID:27163860|livG| leucine/isoleucine/valine transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]

MTPLLKIEHLTHFFGGLRAVYDFNFEIPEGSYGLIGPNGSGKTTIFNLITGIYDPTEGA
INFQGENIKGMKSFRIVHKGIARTFQNLRFGNLSAIDNRIARHYTTTSSLFASILRLP
SFKSEERAVKREALELLDLMHLSNRAMETAKNLPYGELRRLEIARALATKPKLILLDEPA
AGMNPKEVDDLMRLISRIRDEFKVTVFLIEHHMQVIMGICEWIKVIDFGETIAEGLPDKV
KNDPRVLEAYLGKRG*

>SPBIB_v1_310086|ID:27163861| Branched-chain amino acid ABC transporter permease protein [Uncultured spirochete bib]

MNVRKLPRFLIAVVLFYIVVEVLYRTEILNGYLLHIINLSLIYVILATSLNLINGITGQF
SLGHMGFAAVGAYVSGSLTTLILKLSVTDPASMLPFILSIIAGGVVAAFVGFGLIGFPSLR
LKG DYLAIVTLGFGEIIRTIFNNIDAVGGPRGLLGIPKFSNFTVILVATFLT VVIIRNLI
ESSHGRAMLSIRENELAAELVGINTTRYKVMMAFTFGAFFAGIAGLLAHLIQLAHPTQFG
FIKSVEVLIMYAGGVGSLTGSILAAFGLTFLSEGLRLGIRALADATGLPIGGEW RMVVY
ALLIFIMLFRNEGLMGMRESRIK NVEVD*

>SPBIB_v1_310087|ID:27163862|livH| leucine/isoleucine/valine transporter subunit ; membrane component of ABC superfamily [Uncultured spirochete bib]

MGSIFSLQQILNGLQLGSIYALIALGYTMVYGVRLINFAHGDFMIGAYAAYGSFYLFN
ALVAGRSGTLAFLVLLAAMIGGASIA YLTNKFA YKPLRYKPKLSSLITAIGVSMFIEYFF
SALPAIGPSYRSFPDIIVRKEIRLGN AVISNLVIIDLAVAAILMVGLTLLVRKTTLGKAM
RAVSQDKDAARLMGIDIEKVISFTFMVGGAFAGAAGLLAGMTYPRIFPYMGILPGLKAFI
AAVLGGIGNIPGAMLGAYIMGIAETFASAYNSLIGEGIAFAILILVLLIRPRGLLGEKIA
DKI*

>SPBIB_v1_310088|ID:27163863| Branched-chain amino acid ABC transporter substrate-binding protein [Uncultured spirochete bib]

MKKVLFVMALVVLVAASYAQDIKIGGIGPVTGEAATFGISTKNGMTMAVDEWNAKGGIFG
GRKAKLIFEDDKGDPSEGAI VWNKLIQQDNVVAIVGTVM SKVSLVGAPISQAAGIPMISP
TSTNEKVTLVGDYIFRACFIDPFQGT VGANFAYNDLKARSAAAIFDLGNDYTKGLAENFK
KQFEKLGKIVAFEGHPTGTTDFKAQLTKILQGKPDVIYIPDYNDVGLIAKQARELGFK
GPLVGGDGWDSPELVKIGGTA VENGFFTNHYSSDKRAIVQDFVKKYKAKFGAEPDALAA
LGYDAMYIMLDAIKRAGSTKGAAIRDALKATDINVVSGRIKFDENRNPIKSAVIIIEIKNG
KQVYRTTVNP*

>SPBIB_v1_310089|ID:27163864|rarD| Protein RarD [Uncultured spirochete bib]
MAQEKAQTSMEHETRTGRFSQKQGLFAAIGAYGLWGIPLYWKLLSSVPLQLAHRILW
AAVFCLMLLLARKEMSSLGVALKDPRKRVLVGAAGLLVTNWNWGMYYIYAVNSGHVLETALG
YYINPLLSVALGAMLFREHIDRWTRIAVGIALVGIVAAGILYGQVPWISLILAITFALYG
AVKKGLGLAPITSLALETFSVAPLAFALAVMHAQGAGSFGNAGLRVTALLALSQVVTAV
PLLLFGVA AISISLQLIGFIQYLTPSQQLLGLFLYKEKPNAAVVA AFVAVLVAVVIFAV
TRFKKGEPA*

>SPBIB_v1_310090|ID:27163865|hutI| Imidazolonepropionase [Uncultured spirochete bib]
MAENRQKALFVHNIGELWTAEGLRAAAGPAMGRVKKFRDTCLYIEDGRISAIGEEARLRA
AATAAPTFAEGRACVPGFIDSHTHFIFAGWREDEFYWRAQGIPYMEMHQGGGIQKSVD
ATTRASLEELVRLGKARLETMLSLGITTVEGKSGYGLDKETELRQLQAMDELSTVMPLTI
IPTFLGAHSIPPEYKDRPREFLAFLVREVFPLFKKRGQTPFVDIFCEEGVFGIEDSRWYL
EQARAAGFALKLHADEVKPLGGAGLAAELGATSADHLLKASDQDIQALAAAGTIACLLPL
TAFNLREPYASGRRFIDAGCAVALASDLNPGSCYSQSIPLIFALAVLYLGMSIEEALTAL
TLNGAAALGLAAQTGSLEPGKDADFLLLNAPSPGHLAYHAGMNLVHSVFKRGILVWQNGN
VLGPARI*

>SPBIB_v1_310091|ID:27163866| conserved protein of unknown function [Uncultured spirochete bib]
MVTKRDHGIHLDRTPQERSRLISYINIKLESGLPIYSKEGTGFVQLAADMLESFRQKE
RLLPRVLPSPDQRIQTFIDRYLADLGLARVPQIPSNLVLDRYGMARELSLPPDGHKHIS
PTLTSYRVRNGVLHNPKSDRRTTEGVFHIVEGGLPIPPDKKAVPKLAFARILEAALNPPP
ELLELPFTAGENEKARTFVSVLLRPVVRPEIPGYCEERSMEVRRFFAPGSLVANVDFVESI
FGNSGDPFIPENDASIDPVHWTGTTGCILATHLTELTKKELGLPHWDEATERQRCDGMC
WREPTEKYNDGRAFKVCARDESGVILTIIADNYFGYSKKEIKSHISYSANLLGLVEEHA
GGALVFPSYNLGTFRVPTDNLKSKGHS�HDVFTIMRGRIEMKQEGYAVDLTFPNIYLPE
DAYISLEDQMAHWVSDGREESLRVLPDYIYVHPTGYRVHMERHPATGAWRLIGTAAEGLL
CHKPCTVSGGGKSEIAKSIHDAITYMPIIIADFDKDMRAVKEIIEKDYGNRFRDEAENHG
KDARPVLSPKRSLGSVIKLLSPSPAYNDEYNEWLRSIPERIKSLVFLVKRFYRPDWGDDW
LSHFSVDAVNGTTGNILKFEGRPIMGSYL RVGKNEHGMNRRFFKLRQDFMPAFKLQWEDDI
SASIVVPVDQLEDLPEWAQNHL SLKFAKNCEARFFQRPDDAIIRGYDKQTEKDFARQDNF
VSNFEPLTRADASRIIENTINFYEYTEPMRKFIETEKDPNFEYFVASNCFRLVDGAPSK
NPRYLQLDPTYVNPQAKYLAELGPRLYRRIPADKALPQPVGAVLPGRRNNPADPKAGIRP
LAVYGPPIHYQDLPELFMDFVCSLTGKSPSTTGAGSEGALTKGPFNALVPTDLNALLAF
ILTYAGFTTAAGHIGHKYKMDHDISLMMPELWARMGPEERDPEFLKSHGYLEKVEDFKY
KGR LIPASRLGWITPLFAATYLGRLFDTPSVVFPEDMLRPELQSLEEFVDGIENIAAAM
EKSAKAYFEDGSVEAAIPPLKAVLSVMA YGNYEGKSIQDPEVRKLF DREYVLSSDWYRER
LERYREHEIAYIESSISYLRKFLAERAEPKSLTERRVQAE LSSAHGRLEQLMAPNYLKRI
WGSIGLDPLYQQQQA*

>SPBIB_v1_310092|ID:27163867|hutH| Histidine ammonia-lyase [Uncultured spirochete bib]
MQCYRENRRLSITLLYGILKNMNDVIIDGCSLSIPELVVVARHKIPVRLDPDAEERMRS
REVVELAVKKKLVKYGITTFGFKFCNV TISDEDNALLQKNLIMSHACGQGEFPAPEIVRA
MMVLRANALAVGNSGVRPLL VQRILDLVNADIVPVVPEKGS LGASGDLAPLAHIALVLIG
MGEAFYKGNRM PGALALAEAHIAPLVLEAKEGLALINGTQAMTAIGALAVYDALMLYRSA
TIASALTFQALRGITEALDPRIHELRRQKGQIDAAQDLRWLLED SLLTTKPSGTRVQDAY
ALRCTPQVHGACVAAIQHVWDIISAELNAVTDNPLIFPHVLHEGGDILSGGNFHFGEPLAL
VLDYLGIAAAELANLSERRLERMVNPALSEGLPAFLTINGGLNSGFMIVQYSAASLSEN
KVL AHPASVDSIPSSANQEDHVSMTIAARKARQIIDHSQRVVAMEIL AACQALDLRAIQ
LGLSSIDESLSPATRSIYRMLRTVVRFTDKDRIMYPDIDAVVELVSDGTLPE SIDRWSWN
PGPVVPC E EYV*

>SPBIB_v1_310093|ID:27163868| conserved membrane protein of unknown function [Uncultured spirochete bib]
MKRRESAASLFGVIVAVIWGMTFLSIKVALRELGPMSLSLFRFVIASVLLAGIMAASRTS
FAIAWRDVPLLALSSFVGVTLYFFFENNGILRLTASESSLIGVIPVVTLIG EILFLRTR
PGRLIALGIVLSFVGVALIVLRSESASASPLGYLYMVGAALS WVYGFATKPLSGRYPML
AITFWQM VIGAIGCIPFAVAERQVWAGLSATALFNAA YLGIFGSAIGYWLYVIVLEHLGP
GRSSVFINLIPVVSVAASFVILGERLSALQIAGGIIAISGVYMATVSSQAKRHQ*

>SPBIB_v1_310094|ID:27163869| conserved membrane protein of unknown function [Uncultured spirochete bib]
VEKFFKLQERGTSVRTEVVAGITTFMTMAYILAVNPGILSATGMPAGGVFTATALSSAIA
IFFMAFLANLPALAPGMGLNAFFAFSVVLGMGYSWQLALTAVFLEGILFVLLSFFNVRE
AIVTAIPTNVKRAVSVGIGLFIAGLQNAHIVKNDATLVSLGKVTQNTGLLAIIGLFI
MGFLLAKKVKGALLIGILVTTVIGIPFGITKIPESWSPLARPAAPLLFQFQFDKVFITLDF
FVVFVFTFLFVDIFDTIGTLVGVTQAGLINKKGEIPQVKGALLADAIGTVAGACLGTSTV
TSYVESASGVAEGGRTGLTALTGTGVLFLALFFAPVFLIPSAATAPALIIVGLFMMSPI
KEIDLSDYTEAIPAFLTIIMPLAYSIAADGLMFGIISYVVLKALAGKFKDITVVTWIVAI
LFVLKLIIG*

>SPBIB_v1_310095|ID:27163870| putative Transcriptional regulators of NagC/XylR (ROK) family, sugar kinase [Uncultured spirochete bib]
MNEQWIFGIDGGGTSRLRIENLEGSLLFQSEGPSLNPRSAGWDGSRQRTL VQLFSEMYEQ
TGLVPDSCLSGFAGVAGIDRAEDTGTMLGLIRNAARLGPDTALEVKNDSIPALAGAFGEL
RGILLIAGTGSIAVANGAGRIIRSGGWGHILGDEGSAYWVGLRALNAAIRFHDRRGPQT
DLLGSALAFFEERDPFALIPAVYEPFDKARIAAFARIVAEERERGVDEVAEQIFKEAAEEL
ALLAISIALRLGEVLGGRIAFAGGFFSNNERLWHDTIARIIASLPRHRIYSPQADAASG
ACLLARQNIKPRF*

>SPBIB_v1_310096|ID:27163871| putative Beta-lactamase [Uncultured spirochete bib]
MAHNSSTDLSEKASTPDRVLAAGPGVPLDALLDSAIANKLCTGAAGAVSIDGKIVWSRC
AGKTALESDEAQLARTRATSVSEFSISEPPVLEPAVSPAPITTTQTLFDAASLTKPLATA
LLVMKAVESGALDLDAPLGKYLPEIHSQAAHIPLIALLTHTGGMPAIPALERFFPDSARL
DRQEALAQFIRSPEFAAGRHRVEYSCTGYILVGAVLERISGMLLGTLFEQEIARPLALSC
AAFAPRILDSGEPFAFKGAAQTEFCPWRKKRMDGQVHDESAYCLGGHSGNAGLFLSLEDA
LVLGNLFLQEGISRKQLLRPETMRTMLQERTIGLEERRSIAFKLHGQDTADGPLWPAQS
FGHTGFTGTSIFFEPGRKLVAVLLTNRVYYGREATAGLIVAFRKEFHSGVWRAFC*

>SPBIB_v1_310097|ID:27163872| conserved protein of unknown function [Uncultured spirochete bib]
MHISNLPATPVRCGLDHFIAADSSRRNKRYGLATNPSAITSTGIPAWKAFMQNSLGPVCLF
GPEHGFRGAAQDAVHVKDELFGKIPAYSLSYGNRFKPEPVMLEGLDAVVFDMQDVGCRYYT
FLYTLAYMMEACETVGVPLIVLDRPNPIGGRKVEGSPIPKEADSFVGGYGLPPRYGLTIG
EFARYLRGEYYPDCALEIVPLSGWDARQPWAETDLPWPLPSPNLPSLSCAELYPGTCLVE
GTWLSEGRGTSRPFIEIGAPFVDGEALREALSALGLPGLVFMSLFFTPTASKYK GALCEG
VLVSVDREAVRSLDTGIAVVHTIHRMYPHDFRWREDWENPELSFFDRLAGNTTLRCMID
SGAPLEECLAF AHEGEERFLKLRQNYLIYGAI*

>SPBIB_v1_310098|ID:27163873| Binding-protein-dependent transport systems inner membrane component [Uncultured spirochete bib]
MMFKLNGLQKAIAWIFLALLAFVNLYPIGIMILSSFKSTREIFLKPFNLPAVWRWSNYVS
AWQRADFATYFKNSILVTAASIAAILLVSSMAAYVIARFDFKFKRGIYLFLLAGLALPTR
LAIPIFLIMRSLHLLDKLSGLVIVYAAGGIAFSVFLVNFKFKLPRDIEDSAKIDGAGP
FRIYWQIDLPLLKPALVTVAMFNFDVWVNDFFFPLILLSSRVKKTIPGLQAFFGEYITIE
WDVLFALNISVLPILIFLILSKQFIAGMTEGALK*

>SPBIB_v1_310099|ID:27163874| Permease component of ABC-type sugar transporter [Uncultured spirochete bib]
MRGRAGRSLSDRPGKAGSSEARPILYLSEVDVRKYSFLWMLFPALLLYTVFIAYPFFSSL
GLSFYDWP GIGPKKFIGLSNYKNILSGFMAPEFYRALGHNIVFFIWSLILSVVPGLFFAF
LLSADIKGTKFLKVIYFFPNTLAIVVVGFLWGLLLNPQWGLVNQLFRVLGLGFLAKPWL
NTSTALPTIIFVTAWRGLGFYILVYLAAILGIDREMTEAARIDGATEMQIAGRILPHLL
PIIATTSMLKFIWTFNIFDIVYAMEGTQGGPAGSTDVLTGLFYRIAFGGGLGSSQVGMGLG
ATVVTLLIFLLVFPVSIFYVFIVEKRVERGE*

>SPBIB_v1_310100|ID:27163875| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]
MAKRFLMAMLLLCLMMPAWAQSKPATVTIWGWRAQDQVDVWKS VETALKAKGEQITIKYEV
FPPTEYDSKLLVSLQGGVGPDLMYTRRLPGARTQALIDNSYL VPLDSSVDLSNFDNVLSL
FIRSNNKTWGVPFANQIVGIFYNKAMFDKYK LKEPQTWDELVQVAETLQKNGITPFFVSG
KEAWTLAMQNAMVGVSYPGDAWIGKLAEGKAKFTDPEYVNMLKDLNALKKYYQKDFMANT
TAEQDVAFAMEQVAMVFGVWGNTNWLKTNPD LKFDYFPVPPKDKNLPAKAYIYMDGAYG
LSSASKNKDAAIKVLNYAGTKAYGELFSSTTGEITAIKGVTMPASKPILVKCYNKMVTIA

STNRYWVGSPFDAGMPSVYNILQENMQKMYLDQMTPEELAKKLQDGISTWYPAFKK*
>SPBIB_v1_310101|ID:27163876|yfeU| putative PTS component; possibly regulatory [Uncultured spirochete bib]
MDFQALDDYLERATTESRNARSANIDKLP TIEILRIINEEDKGVPF AVEKVL RDIAALVE
DIVRAFTSGGRLVYIGAGTSGRLGVLDASECPPTFGVPPGMVVGIIAGGEAALRNSIEGA
EDEPEEGMLALRNIDFC SRDVLVGITASGSAPYVLGAMQYAREQGSVVGAI SCNRESKTF
ALAHHRILLEVGPEVITGSTRMKAGTAQKLVNMLTTTSMIRIGKVYGNLMVDLTPVNRK
LVDRSKRLIRQATGCTKDEAEAAFLASGGKPKIAILMIALGISAETAQELIQGGQGR LAD
AMRIYSQSKKGR*

>SPBIB_v1_310102|ID:27163877| Transcriptional regulator, RpiR family [Uncultured spirochete bib]
MNYGALETIAQSM PRLADTERRIAEFVQAS PQKVLHLNIAELARQAGTSSAAVVR FCKRI
GAEGYSDFKLWLAKDVYQGWNEKYLPDLGLESQTPASKAIHDMAEAVRR TMSALAAATLSP
QAVEEAAERIRTAAMTALFGVGASGLVAADFHQKLSRIGLPSSYLFDTHAQITASCALRP
QDIAFVISYSGETDAMIEVADQAKARGCFLIAMTMAGTNRLCGRADLALSIPAVERVYRS
AAELSRLSQLAAIDILFNVIISYDIDGAI AALERSMQATHGF*

>SPBIB_v1_310103|ID:27163878| putative Diguanylate cyclase with PAS/PAC sensor [Uncultured spirochete bib]
MSIETLRTILYATSAIVGFLVIYSAARQKSHLARYFFFAALCAFLYIFGYASELGAHSLE
EIRFWLKF EYFGLSFVSSFWLLSWKLWYSRNPRFRMVVLV FVIPAITLFLVSTQEFQGL
FYRSLRLSDIDGHHLAII EKGPWYVWQLVYQS AFIIMSILQWLSWRRRGGVFKSSGFWM
FVSTLSLLPWIVYQLGKSHNGIDLAPFGIALSIF FIAIAVLR YGTLSSEEVFLYSIFAG
IDDGVVILDRDGRISDFNAAQKIFPWLNSSSIGMPISDPADASLFNFDAPLKMEKVVEL
AGNKRY YQGRFTLIYEGRSVLGRVYFFRDITDSRRLTNRLRKL ANFDALTSLYNRRRFME
RAEKVLANAQRAWKNIALLMIDVDHFKNVNDRFGH AVGDRVLA AVGRIIRRRCKQKGFAG
RYGGEEFVLLRGAQREQALDIGEGIRRSIEGIAIEKRMIPVRVTVSIGVSSCSEKEGAY
DLDELLMSADRALYLAKNRGRNRVEG*

>SPBIB_v1_310104|ID:27163879| Isoform II [Uncultured spirochete bib]
MKKFLSMIALFAMLLPAVWSQDNHIDTIRADAPALADYGPYTIGVTTLTFVHPGQPDIVN
YKPGQPMPT YDRPLTCEIWYPATLVPGQAPS GEYLN VVTRDPSLKV TLYGRAVRNAAPDK
SAAPYPLVLISHGYPGNRFLLSHLGENLASKGYVVVSIDHTDSTYS DQGTFPSTLYNRSP
DQFFVLDSMARLNADDRGTGLAGMIDADKTTLIGYSMGAYGVVNSLGGGLSANIVKNATF
SPGNILEARAAGNPAYTASLDQRVKAGVAIAPWGMNYGFWD AEGKGIKTPIFFMAGSKD
TVAGYSPGSHTIFDLAINADRYFLT FENGSHNSAAPMPAPKEVRAKGS LGAKVASHYLDA
VWDNVRMN NIAQH FITAFLAKYIKGDPNADSWLALIENGADGKWSVDEK GQPKPDHTYWK
GFGNNQAVGLKLEHRLPGAR*

>SPBIB_v1_320001|ID:27163880| protein of unknown function [Uncultured spirochete bib]
MMRLSLYLLGHNYLKPFRIRAHKGMHPRTHAE AAGIPVHLVQH FVQALTGGIRAFLSRCT
LSETMRRTWEKRWKTGPKDKAEYLPKYALA*

>SPBIB_v1_320002|ID:27163881| conserved exported protein of unknown function [Uncultured spirochete bib]
MKRKVAVFAVLIGLVAFAVFAETSLPLYGNAAAKADNALTIESMLTYAIQDEYLARAEY
VAIMAKFGQIAPYSNIKQAEEQHISWLKDMFATLKLAVPADEAAKYIHAPGTLKEAAQAG
VQAEIDNIAMYERFLAQPV LKDPRYASVVDLFTLLRDASKNH LAAFQKQLQKY*

>SPBIB_v1_320003|ID:27163882| DGC domain protein [Uncultured spirochete bib]
MAENSGTNNVEFRRLQGCSTD TENMDIIFACDGAASVGVGNHVAIDL TNAGV GARMCCT
AAVGAGSDAHVNIGKRARRVIAINGCANRCVSKIMEQRGVKVAHEYVIATMGVSKIPTLD
FNEADVERISKKIAEDLGYDIKAKN*

>SPBIB_v1_320004|ID:27163883| Two component transcriptional regulator, winged helix family [Uncultured spirochete bib]
MTIPTKIL AIDDEPDVTRSIRLTIAVQEP EWTVVEASSGEQGLM LLSQEKPDLVLLDLRM
PGMSGLET LRRIRAFSNVPIIVLTVTNNELDEVNSLEEGADDYITKPF GHLELVAHIKSV
LRRSRGHEPGHEEKY YDGEFSIDFGRRIVAIGYREVPLTSTEYALLKILADNPGQTIPAE
TLLARVWGPNALDNRNYLKVYVRRLREKIEKNPAEPEYLISVRGLGYRLERHSK*

>SPBIB_v1_320005|ID:27163884| putative Histidine kinase [Uncultured spirochete bib]
MAYMARSSGKFRAVSGLSIRKLLPLR LFPQKSTIEHKPSSIKEQTIDYFLPVARAGVVA
VSALIILAEYHQIQSVVPALWFL ELVLYNIAAGLYSRTSSMLSKKRYLAIISDMLEAT
ILVGVTTGGYDSPFFPMFLFVMAELALYFDWKIGALS IITMNGLQIIFTAIQMAGAEPQVK

FEVIENRFFRLIIVGLLFLVLAESLRKEDLARKRAIHLISGLISRLNDIFAQLGNAQFDID
KVLHTILQGANALDSVAFSAVMRQVVPDKKWKIQAALGDSVCTPYIPLDSLGNLIDSMGD
SEIMATEKIKDFSPCSSAVQQFVMIRLPAYSSKENGVLVGINTTDALEPEDKTFLHALS
IQTQLALHNAILFNETKQQYEALKSFKKTQNTFFSSAAHELKTPLTVLKVLVSTLAMTAS
SWTKDQREMLATIQSNVERLETLTNMLATARLEAMNVALSRQPVDMKAI AERTVREMLT
LIEEKNLTITIAPEEPWPPFFADPARIRDIIANLLSNAIKFSPVGGGLIGIHFEQTGAMGR
ICVSDAGPGVPPTERDKIFEKYYSQDAGARAGTGLGLYIAHQLALLHGGDLWFDSRGS
RTRFCFSIPLYLEGVTEDDHSDENSGNR*

>SPBIB_v1_320006|ID:27163885| conserved membrane protein of unknown function [Uncultured spirochete bib]
MKTAKTLGWLTGVVGVWEILAPFIIGYSNVGGATANAILGILLAGFGLWVGLGKAAGTV
RTLSWINALLGLWVLLAPFILGYSGTSGGATWNDVIVGIVVIILEVWGASAAKKEA*

>SPBIB_v1_320007|ID:27163886| protein of unknown function [Uncultured spirochete bib]
MKNPQEKMKSIKSVASPDPLQNLNVYLKLIPISEFTKLIPSVDPVRYRGSVCFS*

>SPBIB_v1_320008|ID:27163887| protein of unknown function [Uncultured spirochete bib]
MRLLEYRLDWQYSAAAMQQALASACGTSVGKNLYVFDYYDAVLEAIGKNLGIDFSKQSRT
LQEIRHLLAQTQRKH*

>SPBIB_v1_320009|ID:27163888| IstB domain protein ATP-binding protein [Uncultured spirochete bib]
MIRTPQERERTRITIASMSRKLMLSSRVVELCESEATPRQEEFLKVLSEEIDRRERGGK
ARLLNRAGFPVFKSFEDYDFSEIRFPPALSKEELLRADFIPEKKNLVLYGGVGTGKTHMA
IALGIAACEKGLSVRFLTVTELVLKLTEAYKAGTLERLIRDLKQLDLLILDEWGYVPVDR
EGSQLLFRIIADSYESKSLITTNLEFSKWGGIFTDEQMAAAMIDRLVHHGHLLEFEAKS
YRMTHALMRQPGGTAKPKTTVEAGSRLGEGGA*

>SPBIB_v1_320010|ID:27163889| protein of unknown function [Uncultured spirochete bib]
MNNPGAWKNSGIRELIPDPLKSLMDRQQRTQLHATLKTMTLSSEYGFIEAVQALEEGVQ
RSRTSFHDAAILAARIAGYGLNMAPERGQDLHVYDEFLEGVQV*

>SPBIB_v1_330001|ID:27163890| transposase [Uncultured spirochete bib]
MFLXTLYXKKTGRTRLKIVEAYRQDGRPKQRMIQDLGYLDELQXIXPDPIAHFKXVAXQM
TAEKKAQKESRQVQLDPYAALRPFDPAPATISRKNIGYAALSFLYHELIDTXLNNXXR
GTKFXANLNSIXKMLVFSRALFPDSTRGAWENRGIFFEADYSHDEXYRALDYFLAWRPA
LVRQLHERLKTRYGRQTLFFYYDVTNYYFEIDEPDSL RAXGVSKEHRPNPIVQMGLLLDA
QGLPVSVELYRGNTNDGTTLPSMLDDAVLDLGMHMLIMVADKGMMSGDNI AKLRLGHG
VMSYSVRGADKAFQEYVLDEEGYTA VYD TDGTL LAKHKSRVAPREI WVTDRK GKRTKSLV
NERQIVVYSAQYAQRARMERALAVEKASGQIYALSKDAKPSAYGA AKYLKKVPFDRSTGE
CMPETEYLVMLDEARIEKEEQFDGYYVICTNVIGXEXGEXXFXXPYXYTXDGGFFQLNRTV
TDDDIIEIYKGLWRIEETFVKVMKSELKARPVFLSTESHIRAHFFICFVSLLLMRLLEXRL
DWQYSAAAMQQALASACGTSVGKNLYVFDYYDAVLEAIGKNLGIDFSKQSRTLQEIRHLL
AQTQRKH*

>SPBIB_v1_330002|ID:27163891| protein of unknown function [Uncultured spirochete bib]
MXEYSTVLNALQCITYNIMKNIVKKFLAAYAKRNYFSVPLKETAKVRRGSI*

>SPBIB_v1_330003|ID:27163892| protein of unknown function [Uncultured spirochete bib]
MKNPQEKMKSIKSVASPDPLQNLNVYLKLIPISEFTKLIPSGLLQFLSKAQRNNSFSHKLLEIFLQY
FS*

>SPBIB_v1_330004|ID:27163893| protein of unknown function [Uncultured spirochete bib]
VGFSKSHDVNKMMTNIAKIIMSFSFFNFLL*

>SPBIB_v1_330005|ID:27163894| exported protein of unknown function [Uncultured spirochete bib]
LKKLKLIMIFAMLVIIIFTSCDLLKPTGTLTSLATDPWLPTITFSGQKTQLEKDQTMVT
ATVSPAPDTYAWYLDGKAISGATTNSLTIGSTLEIGTHVITLIVGKGDYRSSEEFMEVI
PVAAAATLAINPATITNGTINTTYTFTLTAASLPANLTQVKFNWNFGDGTDDSETVTVSN
KTA STTISHAYTADSAYGLVVTIDDGTNTLATA YASILIGTANAGTNYDLTVLDQWTAAN
SGGYGITVDTWDISTLPNGVVFDFLKFDAYSMPDKFIVEYDPGTIVYNSGWRGDASYEGPK
YPGGIAGIGAGQSLAMFAKGTQQYFKITIIGGESGTAWEYSMKARQP*

>SPBIB_v1_330006|ID:27163895| Cna protein B-type domain (modular protein) [Uncultured spirochete bib]
MMQITKRISILFLIMVAGLLFGCMQPLSQSAGKGDVEVLIDGARTIQPSDVEIKIVSY
VLSGTGPNGATLANKTFTASPYTESKLAEGAWTFTVNGLNAAGSIVASGSNTATIIANST

VSVSVVLTVPVKDGS GTGTFSLSGTIPSAVTLSSFTGVIAPSTGGANTTFAVTVSGTNFSY
SNSTLPVGSYILTLVASQAAGAWRGVYALRIYQGKTSTLSLNLTA DDFAGATINGVAKYY
DKAANQYSGISVTTITSTTDFAPASVTTGNAGSFNFTGLDAGTYIIEAKDPNAVYQPTS
ITITIGSNETVTTPLDLVLT KAGNHVVFIRDSNTEWELAGVPATVMGDLIETEIGLTEGTG
ANQY EYKTSSDMAAYTPSLGDVVIIGGDQSQAFYDAYTTNKS KFDTFVNNGGTMWYIACD
NGWAEGDFTSSLPGGVTWRDSYEYYIDIVYFQHPITKNFPTQLYGYASHGGFDNLDVAN
ITGLMVYVKEDAGALPTYIEYRYGLGKVLATTTPLEYYVTNGSTDMPTGFNTTYKDLFKL
MLVRSIKYIMGKTVSDTIPASDAGAIPKALTPIRMSH*

>SPBIB_v1_330007|ID:27163896| putative Subtilisin-like serine protease [Uncultured spirochete bib]
MKKIALLIAGIVLLILGCQPTITYFSLAVSVSGTGGSVVITYPNTTSIEKGSSVLLTAVPS
PGYVFDSSWGGITSNQNPLSFAMNQDYSIVAHFKVLPADTSKTVKYTLDAQWESYEKYDR
LINTVASVKSIGSKAVPNFKTADYFSLDVNASSRPKAILVKYKTGVSQKSADSLKSIGTK
DLMLDASVPPFQRIVVNSDKYAEIPSMLSFLKSQPDVEWAEEDLISKALYAPDDAYYSYQW
NFDKIGMPAAWDYTMGESDVIVAVVDTGAYFPLTDLGQTRFVQGFDFVNNYL NPFDDNGH
GSHVIGTIAESTNNGIGVAGMAPGIKIMPVKVLAWDGFYASDIAQGIYFATNNGAHIIN
LSLGGNYSA AIEDAVNYAISHGVLVVAAGNDGTSTLNYP AALS NVLSVGATNDLNLV LAP
YSNYGYGLDIVAPGGDFSRILHNNEY NEDYPAGILQQTY YGGSIGY WYFQGT SMAAPHVA
GLAALLKSKNNSLTAADITAIENSATDLGASGYDTQYGYGLIDAAKALGIPGYIVSDQV
TSSIVLKPDEIEKWQINAAPGALIALTLGFASDTGSLSFSLVNSEGTEVA VGSQANNAINL
NYIVTSANKGTY YFVIKYKP*

>SPBIB_v1_330008|ID:27163897| Hydrogenase [Uncultured spirochete bib]
MIKALRSRLHQGYKTNAFPAENRPLPERYPGAPRLETERCTVCGACKAICPTSAISVQSG
EPAGAEPRLALDLGRCIFCRKCETACPEGAI AFTGSFRMGARAKAGLVLGSPHVSSTRT
SRLDVSNDAHKAVSTGAGN QALNSEETRLIEALDRKMLKIFGRAMKIRQVSAGGCNACEA
DVNVLETIGFDLSRFGISITASPRHADAIIVTGPVSKNMELALRKTYEAMPSPKLVI AVG
ACAISGGIYRGLPDVCGGADAVIPIDLYIPGCPPHPMTILNALLELLDRVPRKN*

>SPBIB_v1_330009|ID:27163898| NAD-dependent dehydrogenase subunit [Uncultured spirochete bib]
MKLFTNGSAMSVEDIPVVD FEFFARSIAEAVKSGASIVALFAVPDYGKGAARTAAELTAL
PTNAATEKRARLFAFLGLPTKGMIGGIAADIGSAPPSLTPKIPQA HMFEREIFENTGIVP
VGHPWLKPV RKIFDYDFYSLEGGQTHEVA VGPVHAGVIEPGHFRFQCYGEEVEHLEIALG
YQHRGIEKALAGGPDRTIHF METSAGDTTIGHATAYAMLIEALTSTQPDARAEAVRGIA
LELERMANHIGDLGALAGDVGYLPTKSFCGRLRGEVLNLTAEICGNRFGRGIVQPGGVGF
DIDEKMATSIAARLQKIVKDTDEAVGLLWDSPSVLARFERTGMLKKETALELGLVGPAAR
ACGIERDVRSDYPSGIYKYAAIPVATYPSGDVYARAMVRMLEYQRSASAILDVLAALPAG
NTGKPASRALPARSV ALSVEGW RGKICHCAITDNRGAFLYYKIVDPSFHNWPGLAYALR
GQQISDFPLCNKSFNLSYCGFDL*

>SPBIB_v1_330010|ID:27163899| putative Hydrogenase-4 component F [Uncultured spirochete bib]
MNMLFGGFLAVPVFGVLLILVSKSSRQALMIMLATALGGALLSGALAAQVAQAGVIEVAG
GLFRADHFSAWHMILAIIVFLPSSVYAYTYFEGGKGIDLYAKRFGMLWLGAF AAMSTA
LLSGNIGIMWVAIEASTLFTAFLIFRQGN AASLEAMWKYIIMCSVGVAF AFITLLMAAA
GQQAGLEGGDSL LLLQKIYLRGALKPSLALTA FIFILVGYGTKAGLAPMHNWLPDAHSQA
PGPVSAMFSGFLLNAALY CILRFLPLFSPSDGGASVLQGGKAGSMLVGAALASSKAQIL
MGFALLSLVISSAFIFFQKDAKRMLAYCSVEHMGIIAFAYALGPVGTIAGLFHTLNHSFA
KTAGFFSAGSLGKKLHTNELARFSGASKRYPLYAIGFAVSLLALIGVAPFSVFMSEFMLV
SSTVAARRFVPLAIFLAATSIVFLV MLKHAIAILWKSPPDQAQAYTPGCAPGGTFSGAPA
IAPHKNANPTEFSAPSGVPPISEYL VIGLPLAFLVLGLWMPHGLSDFLTKALDSLWSMK
*

>SPBIB_v1_330011|ID:27163900| putative NAD-dependent dehydrogenase subunit [Uncultured spirochete bib]
MTSLQNMLLIVVLITDLTMAANSRLGTCINITAIQGFALGFLPLAIGLEKGMNFELVAIA
VIGIALRGILFPYILHRSLNSGTSRELKPIVGYFLSVAIVLVLIFASLWISIRIDFIAP
QLLLLSTVALSTIFAGTFFIVGRRLAIMQILGYILLENGIYCMGLAFVQDIPMIVELGVL
FDAIVAVFVMSVATNKIHEEFEHFDIQKLD SLKG*

>SPBIB_v1_330012|ID:27163901|hyfC| HyfC [Uncultured spirochete bib]
MNDILAKLLPLVVALVFAPLAMGIIQKVKAFFAGRKGFVPVQMYRDLYKLMHKGIVYSRS

TTWVFR LAPLLVLA VSLIAVAWLPLGGLRGLFSFQGGFIFVAYLFGLARFATLLASLDTA
SAFEGMGANREALFAILAEPATLLAFAALILTSGNSSLWGAIWQESSFAEFGVPLLA
LVSFILALSNSRIPVDDPTTHLELTMIHVEMILDNSGPDLAYIEYASALKVWFYLVLM
ANIITAFSISGWAQILAMFGFAFLLAGIIGVVESSIARLRMKKVPDFIGSAVAFALLAL
VLEGIL*

>SPBIB_v1_330013|ID:27163902| Hydrogenase-4 component B [Uncultured spirochete bib]
MMLFGIGIGVLVGGGLLTLVLKKSAGINKLGMASVVAGNVFVIVAALLGLSGRYAGEVYQ
FFLPLPVGAVLFLSPLSSFFLLIIAVVTGLAAVYAPKYLAHYGEMPWRFKAHWLLYNLL
AASMMLVVTAQNAVFFMLAWEGMSLSSFFLVLFQNERTKVRRAGWIYLVFTHVGAACLLV
MFALLAQVSGSFDAMDAMRAAAAGFSPGLKAAIFVLALVGFGMKAGFFPMYVWLPEAHPAA
PSHVSAVMMSGVMIKTAIYGIVLTLGLLGGGQGTLMWGWTLVVLGLVSGIFGIAFAAVQQ
NAKRLLAYSSVENIGIATGLGVWFIGMASSNEVLARLGLMAALLHTVNHALFKSLLFMG
AGALQLATETLDLDRMGGLLKKMPSGLAIIAGAVAISGLPPFNGFVGEFLLYSSVFAQG
FGSSLVRAVYVIAILGGLSIIIGALAVFTFTKLVGTSLLGEPRTDHAHAHEVPASMYVPM
LVLAGLCLFIGLPLPVMSALKVLADSGLAVVQGQLPSGIVSSLAAMQWVAFALIGLIGV
FALVRSRVLSLHKVENTSRHKVGGSTTWDCGYHNPTPRMQYTASSFAQPLASFAQPLYSPI
RDGSIGPDLFPAPVARKISFPDLILDRAIKPMYSWISRAFETFSIIQHGNTHWYVLYIVI
ALLAVLWFSFVI*

>SPBIB_v1_330014|ID:27163903| DNA-binding protein, excisionase family [Uncultured spirochete bib]
MKLSVKDVSRLFNISDKTVYRWIQADNLPHYRIGGQYRFSYSELLEWAAAHGAKIRAEFL
DEVAEADDCDVSIATALEAGGINYRIEGSTKEEILSSIVSLMRLPESINKDIFLQFLAR
EKLGSTAINGIAIPHVRNPVVHSETPQISLFFLEKPVDFGALDGVVSTIFLIVSPNI
RCHLKLQAQLMFVLRDEKVLMLSKVASRNEILAAIRNAERPVLERRQSEIEDMSRAHTA
SEQQGGEP*

>SPBIB_v1_330015|ID:27163904| membrane protein of unknown function [Uncultured spirochete bib]
LPLPGAFAAFRDEPCYLRLSSNTDVLNMNIELVAAAEFAKSEARNYLSYGIIFGILIAMA
FYGFFLVSLKYRSYLYFILYTVSVGLWLFYVQGFQVLFQMPGFDQAMLWFWAGMFIT
WGTIFTISFLELQKTSRFLFYILAAALGKATQHAALVEMSLSFSCPAFQRTRHFMLQSES
ASISKPRACA*

>SPBIB_v1_330016|ID:27163905| protein of unknown function [Uncultured spirochete bib]
MRIIDGQSIATISLGIVDLQGNESAESFIERADSAMYAAKQRGKNCVVM*

>SPBIB_v1_330017|ID:27163906|appF| Oligopeptide transport ATP-binding protein AppF [Uncultured spirochete bib]
MNNVILELKHVSKHFALSGLRNISKVVHAMDDVSFFLNKGESLALVGESGSGKTTTASVI
AGMYEKTSGEYLDGQPVLPFKTREASLRYYKKKVQMIFQDPFASLNPTHTIRSILERPFL
IHKLAGSTRELEAMLCDSLEMVGLSPAKEYLHRFPHELSSGGQRQRVNIARTFAVSPEIL
ADEPTSMLDVSIRIGIMNMLDLKEKKHVSFLYITHDLAGARYMSTRIAVMYAGMIMEIG
PTEEVIANAVHPYVQLLKASAPAQEGVRKAAIPAKGEIPSLVHPPSGCRFHTRCPYAKK
ICSEEVAMPARDIGNGHFVRCVLV*

>SPBIB_v1_330018|ID:27163907|oppD| Oligopeptide transport ATP-binding protein OppD [Uncultured spirochete bib]

MHADAILLRNLKAGYATNAGFVRAVDDVSLTLHRGEFLGIAGESGCGKSTLAYSIMRLL
RDNARIESGSIIFDGTDITSLDEKAMNEYRWTRMAMVFQSAMNALNPVLSVEEQLVDAVL
AHKQVTRADAKKTAMEMLELVDINAERIASYPHQLSGGMRQRVMIAMALLLKPDLLIMDE
PTTALDVVVQRSILQKIEELRHIFGFSVIFITHDLSLLVEISDSLAIMYAGKICEYGPSR
EVYASPDHPYTKGLMNAFPTLTGPISRMGGIEGQAPSLSPPPGCRFAPRCNVAIDACTK
EVPLLQVTSPPGRLCACRLCGGNHE*

>SPBIB_v1_330019|ID:27163908| ABC-type dipeptide/oligopeptide/nickel transport system, permease component [Uncultured spirochete bib]

MIRDFFKTLIKNKKSLSGLVLLGFFILVALFAPLLAPYPPKTDREHTTLLLEENKGDPEV
LSEETEGQNREKSVYTVTITQKYEKTTEYFPTRAKPSKDHLGTNHAGNDLFSQIIMGTR
VSLFVGLATGLFVTFISLSLALLSGYLGILDDVISFVTNVFLVIPGLPLMIVIGTYVPM
HGVLPILILSLTSWPYPTLRLLRSQVLTLLKNRDFVRASKMIGERTSFLIFREILPNMISI
VMSEFFTVSLSAILGEATLEFIGVGNITVVSWGTLIYWAQANGAILMGAWWWFLPPGLLI
ALTGTAFVLINFGIDEISNPRLLRKR*

>SPBIB_v1_330020|ID:27163909| Binding-protein-dependent transport systems inner membrane component [Uncultured spirochete bib]

MKYLARKFGMLIFTLFVMSINFFLPRMLPGDPAKALMDRMIEGVEAEKLESVRAAFGLDT
KDSLVPVQYGKYLNTVKGDLGISLSRFPMPVSSVLASALPWTIGLMGLCTIIGFSIGTLL
GIWAAWKRQTKLASFTVGGFTFIRSFYFWLGLFLIYIFSFKLKVFPPLGGAFSVDQTRGS
AGWWLSVVQHILPAFTITLSSIGAWLLMMRNNMINVLAEEFITLAIKGLPMQRIRLMY
AARNAILPSVTGFAMSGFVGGGLITEMVFAYPGMGYMLYQAVNAKDYPLMQAIFLIIA
ASVLVANFLADIAIMLLDPRVRDGAK*

>SPBIB_v1_330021|ID:27163910| ABC-type dipeptide transport system, periplasmic component [Uncultured spirochete bib]

MKKKLMVAMVLLSLFVATTVFAQAPARGGILKMTPSKQGVLQKNFNPFS PAVLESALGCI
YETLIYFNNANGTANPWIAESWSWSNDLKEITFVIRQGIKFNDDGTPLTADDVVSAMLGK
TNKALDMSGLWSEGLQDVTASGNEVTFKFATVNVTTLEKFGNLYIVPKAIWSKVQDPLTW
TGNTNPVGSFPMLDPASFNEQSYKLVNPNYVWQKGADGKPLPYIDGIQYVSTTNEQIAF
KLMNGEYDWAAYS LPNVDA YVAADPANNKYWFPEGNLVFLYMNNLRPPFDNVNVRKAFAM
AISQKDITRKMSPSPVPADMSAVKKSFSIAEEGKAKYNITYDKAKARKLLESEGYKLN
KGIYEKDGKALSFKLYVPTDWDWIGAAETIASMLKDIGVEAITQSAWPVPFQTSLETG
DYDMAVSFITTGTPYQFNRLYSANYAGLGEKAKVFSNMRYKNADIDKNLEAYRSEPN
PEKQKVYISAVVTQFMKDTPCVPLFFNPTWFEYTTNRFVWGWSADNPYAWPSVIGMQKVP
ILLNIHKK*

>SPBIB_v1_330022|ID:27163911| putative Uncharacterized lipoprotein YbbD [Uncultured spirochete bib]

MRWEYNDPFMIEHTSWQYKKHLPLEWKIGQMLAVGFPAGADGIASLARVVKASYAGNVIL
FTRNTPDVAETRKAASVKTLIREVTGVSPLIADQEGGIVARLKGGLTPLPGAMAQAAA
YLGGGIQKSDIKALGKICAEELRSLGINWNLAPVADVNSNPSNPVIGVRSYGENPKLVAD
LASAFAAGLEEGVLATAKHFPGHGDTSDSHLDIPLVPHGIERLEAIEFVPPFRRLVDEG
IPAVMTAHIRLPSVEPDMLPATLSSRVLQGLLRKKGFEIICSDCMEMKAIADHFPNAF
VMAVKAGVDILFISHTAEKQLYAAHSIYEAVKKSEIAESQIDASVERILAAKEKINQTS
FDA YKKT VAGPHAV ALAKKISRTSLVLAQGSITKPPSGSVLVDVVPGNITNAEDSLHSV
SIHAELTRQNAPIFSCAVPLNPKEEDIAAALSCAERYLSAPASAIQETEA KPALILALHA
PMLHSGQMKL VQASVRFAQDRSCPLL VILTRNPYDAPSIAKEAARANLPAPTIVCSYEYS
EASVASIVAFLTGKLEAKGICPVTVEG*

>SPBIB_v1_330023|ID:27163912| putative Acetyltransferase [Uncultured spirochete bib]

MDYAINTEPLLKNESSLWNRCLGSEFPLDIRLLVQQISLDRDLHVFFARDEASGML
IGAVLAKRATRPNLNGEIPARSYISCILVAPEFQHKGIGKNLLKTAESWCRHQHAATIAL
GSDYFHFFPGPPYNATAESDHAI AF FEASGYTKGTIEEDVIANVQSLDIPLPPASRTTKA
PGFHACSTPELRPRIFDFIRAF PGRWNNEIHEAFAAGMRDEDLVLVIRDSQSVAGFA
RIYDEESPILGPGLYWRALLGPNPGALGPIDAA YRGLGLGMDLLRAALAEKARGIRN
TVIDWTDLGAFYAKLGFVPWKRYVMMQKKIE*

>SPBIB_v1_330024|ID:27163913| protein of unknown function [Uncultured spirochete bib]

MAHSLPVSTSRPPRARGLKPVQNTTSNSYNLVAPPAGAWIETNVVVGIVKRIASRAPAGR
NNKHFSAGTQKNKPSTLQK*

>SPBIB_v1_330025|ID:27163914| protein of unknown function [Uncultured spirochete bib]

MLLEAGLNLVVAPPAGAWIETDPLKSDITNDIVAPPAGAWIETE*

>SPBIB_v1_330026|ID:27163915| protein of unknown function [Uncultured spirochete bib]

MLLEAGLNLVVAPPAGAWIETTKETVDENGTRQSRPPRARGLKHKPWL*

>SPBIB_v1_340001|ID:27163916|cas| CRISPR-associated endonuclease Cas2 [Uncultured spirochete bib]

MMVLVSVDVNVNTPGGARRLRVARTLSNHGQRVQFSVFECVVDPAQWVKLRADLENIID
KENDSLRYYYLGSNWKHRVEHIGAKPSLDLDDPLIV*

>SPBIB_v1_340002|ID:27163917|cas1| CRISPR-associated endonuclease Cas1 1 [Uncultured spirochete bib]

MRKLLNTLYVTTQGSYVHRDGETVVIEQEKKILQVPIHMISSIVCFGNVLCSPALLGFC
AERSVSIAFLTEYGHFLASVNGPTTGNVLLRRNQYRMADSEESCRNISANIVA AKCANC
LILHRGTRDHGEKIDTHSIKMASSIERLIGQIDSASDTDAIRGIEGMAAAEYFAVFNQL
IVDQKDAFMFNDNRNRPPLDPVNALLSFIYTLVHDIRSALETVGLDPAVGFLHKDRPGR
PSLALDLMEEFRPVIADRLVLSLINRRQVNPKGFSRAANGAVTMDDETRKTVLVEYQKRK

QEEVYHPYIEETVPIGLLFFIQANLMARFIRGDIDGYPPFFWR*

>SPBIB_v1_340003|ID:27163918| CRISPR-associated protein Cas4 [Uncultured spirochete bib]
LNEDADLIPISALQHLLFCERQFALIHIEGIWSENLFTEAGKVLHERVHQEHHEKRRLYR
QEFGMAVRSLSGLIGKCDLVELYLEPSGKIAEAFVFEFKRGKNKEEEDKVQLCAQAMC
LEEMLDIMIPEGQIYYLQDHRRTIALDQALRKKVVQLADRARELILKGETPLAIFEKRK
CTTCSLVEQCMPSSSTGLQSKSVSRFIRAQLKATESECDK*

>SPBIB_v1_340004|ID:27163919| CRISPR-associated protein Cas7/Csd2, subtype I-C/DVULG [Uncultured spirochete bib]

MSLEKRYDFVLFFDVKDGPNNGDPDAGNLPRIDAESGHGIVTDVCLKRKIRNYVGLVKNE
QPPYEIYVKEKAILNKQHERAYIALGIDLSSDEGKRKGGDKVDIARDWMCKNFFDVRTFG
AVMSTGINCGQVRGPVQLTFARSIEPVVASEHSITRMAVATEEEAKKQGGDNRTMGRKYT
IPYGLYRVHGFISAPLADQTFSEEDLNLLWDALEHMFHEDRSAARGLMSSQRLIIFEHN
SKLGNRPAHELFAIEVVASDSTAPARDFSDYKTMLDGNIEKAFKTVVPV*

>SPBIB_v1_340005|ID:27163920| Csd1 family CRISPR-associated protein [Uncultured spirochete bib]

MILQALKEYYDRKAADPESTIAPPGWELKEIPFVLVLDGTSLVQIEDTREGQQNRGKKF
LVPQAEKKTSGIKANLLWDTPAYVFGIQDLEGLFEKEKERKRQLPQQRAAFLDRIRNDL
PDTAKRKALISFLENATEEHLSEYSHWPEILKTNANISFRFLDELDFYCRSQAIAQAVNA
KLHSRETNGICLVTGENDEICELHNPICKGVQGAQTTGGNIVSFNLAPFCSYNKKQGTNAP
IGYMSMFAYTTALNSLLSKESRQLVLGSAATVFWSSSEKTDFFENDFSIFFSEPPKDNPD
VGTENIRALLSPLSGGYRNDTGNEKFIYILGLSPNASRLAIQLWLPGTVSSFKDKIAQHF
EDFNVEKRESEPRYYSLWRVLTNIVPQDKTDNIPPLVHQFMYAILTGTPYPQSLLQSAI
RRIRSDAEDRVTPVRAALIKAYLNRYIRYYSKNTEKELTMALDIEQPSIGYQLGRLFAVL
EKIQEEANPGINATIRERYYGSAACSSPVTVFPTLMRLKNHHLAKLGNRGRVYFERFIGG
IVGKIDDFPSHLDLHEQGRFAVGYYHQRFDFTKKD*

>SPBIB_v1_340006|ID:27163921|cas| CRISPR-associated protein Cas5 [Uncultured spirochete bib]

VKGFCLEVWGDYACFTRPEMKVERVSYDVMTPSAARAIFEAILWKPAIRWHITRIEVMNP
IQWVSVRRNEVGCIFTSPTKAQLLGANGDPMGFYIEDNRQQRASYFLRDVRYRIHAWFEF
IPESRKTNHSVNQEIWADIEEKATYERKDENEAKYAAMFERRAKKGQCFHRPYLGTREF
ACNFMFVEQPELAKPPLSLNQDLGWMLYDMDYGHPENPIPRFFRAKLENGVLLTDENIVE
VRS*

>SPBIB_v1_340007|ID:27163922| CRISPR-associated helicase Cas3 [Uncultured spirochete bib]

VL YIKLPKLISKADWVVAQAQKTGENDQEITMSEKDTSCMQAIAHV RKNPDGSWAAPHSL
QEHKNTATRAAKFAESFNSEWARSCGILHDAGKARDEWQLYLRRKSDYWEDEANLKN
SNRIEHSASGAKYAEVVLGKIGRILSYCIAGHHAGLPDLEGDNSSLLNRFEHAKTEDIQ
CWYKDSVIRELPDKKHLSPWKLNQEQQSILMSLWIRMLFSCLVDADYLDTESYMEPER
VSSRGKYPSLSEIKTRFDDFIKKIRDSLAKGDTVPVQIRRHVLDQCRLAGSWEPGFFSL
TVPTGGGKTLSSMAFALEHAIHKKERVIVYIPYTSIIEQNANEFKALGNDAIIEHHSN
IAEDVDTGKARLAAENWEAPVIVTTTVQFFESLFAAKPGRCRKLNHANSIVIFDEAQLV
PPEHLKPILETLDALVAKFRVSAVFCTATQPVFEKQKDFPSFPGLSNGKVREIHKDVPSI
FSAMRRVAVKIPEDLSTPLSWEKLADALKKEPQVLCIVSDRRSRELHALMPEDTYHLSA
LMCAQHRSEVINEIKGKLRGDQVRVISTQLIEAGVDIDFPVYRAIAGLDSIAQSAGRC
NREGYLNASGKLRVVLFIPLPPQGILRKASETTLILLKQGLSDPISHEAFKAYFSEL
YWKLNSLDLYGICDLLYPQPPALGIMFRTAADKFRIIDDSAMKTILIPYEKGASLIRELK
QIGPSSRILRKLQRVTVNVYANQFERMRARESIEEIFPRIFVLRESCMLEYSLKVGLLAD
DVPNDPQLFIG*

>SPBIB_v1_340008|ID:27163923| conserved protein of unknown function [Uncultured spirochete bib]

VSQMERIFFIDRTIQERGGVNVRTVSSTFEVSERQAKRDIEYLRYL GAPVEWSAPKRQY
IYSAPWDGLKFASEKSLFALAFFRAILDYRYSYIPVLSEELIDELKRKIGARYASIAEHVR
YELPDLQPISDDISYRICRSLLEQHNLRITYRDAHDVESERTIVPLRLINYAGKWYCAAY
DSLSGKLRVFAIARIKEAYEAEPHFPLPGDDEIERFLSSSYGIFKGDPVGTATLFRNG
AARAIRDQIWHPDQVLTIPDNAGDEYTVDSLPLVHDWTELLGRALRCGADCEVLGPQEFR
ERWKEEIERMREMAGKGD*

>SPBIB_v1_340009|ID:27163924| Sodium/hydrogen exchanger [Uncultured spirochete bib]

MSRKLLIAGLALFALALPVFAQSEQSTPTEQITQFVFLAVIIFAARLGGIAAKAISLP

SVLGELIAGILIGPFALGAIPLPGFPAGFFPVSGGEPISIMLQAFSNIAAIILLFSSGLE
TDLMLMKYSLAGSVVGGIGGVVFSFLFGAELGTFTHQPLFAPVNLFIGIMSTATSVGIT
ARILSDRKKMDSPEGVTILAAAVFDDVLGIIFLAVVVGIVAVLEGSKAGGLSAGAILGIS
AKAFGLWLSFTALGLIFSKQISAFLLKIGGEGHFNILALGLAFFIAGIFEMEGLSMIIGA
YIVGLSLSKTELSFIIQDKTKVLYELFVPIFFVVMGMQVQISKILEPSVLIFGLLFTLVA
ILAKVLGCGPLSFLGFNKGALRIGVGMVPRGEVALIAGIGLSAKILEPGFFGASILM
TILTTILAPILLNILDKGGGRGTRKEAKTTTSEEFVVELPNADLAGLLSSYLLEDLQREG
FYVQLMSISDDISHIRKGDVSLSLKVDGSKLILEAVPEDMPFVRIMVYETMVKLDANLKD
LKETYDPESMRKTLDVETIRKDPTRKILDPOCIEVDMKATNKEEAIVELIELLDRVHHL
KDKNKVLADVLEREKIMSTGMQHGAIPHARTEGTDKPVLAIGIHKKGIDFQIDGTPAH
IIALIASAGDPAPHMQLVTLGSLGSDIVREQLLHAKTREEAAKILGV*

>SPBIB_v1_340010|ID:27163925| Pseudouridine synthase [Uncultured spirochete bib]
MKKHVWRQMCHQGWRTLPAAHTFFLRAFFCYDEVYMLSILFEDDEILVVDKPAGLPAQPG
EGVKDDVVGVLERQLGYKPFVHRLDRDTAGCMMLAKTKAAAAQWSQLIASKDIVKRYYA
WAAGEPQKKNQVIDAALDGRKGAQEARTFWSLKEAWRLADAQAVSLELELKTGRMHQIR
RHLAAIGLPILGDDRHGDFALNKALRRFGIRRLMLWAYMLMLPGGTIVRASLPPHFAAFK
EMLARSGAIQQ*

>SPBIB_v1_340011|ID:27163926| protein of unknown function [Uncultured spirochete bib]
MRKPFELAMGAWWIVPDGRTIAVPSFHESWLASHPAIASGCLHTVDFVQKSGWLSVTLYS
EGMIEIISRDISDARQREAIHQLFEMNKSLIKKIVVFQPSIEGCLTAEGPLVASWERFVA
ELDGLARALPAAQVSSEAEPLAKGLPAAEALPAARASSEATPAAQQE*

>SPBIB_v1_340012|ID:27163927| conserved protein of unknown function [Uncultured spirochete bib]
MHIGNVHIGTCGFSYDEWKGQFYPADLPAHEMLRYYSLVFSFVELDHTWYRIPSPAQLER
MALVTPSDFRISLKVHRSLTHEVDEHWQTHAAEFCNAVSAALASTGRLGCVLVQLPYRFSY
TPENRKYLANLLATLAEFPLVVEFRNATWYQERVFDALKARNVALVVDRPDLPLPPES
VIITSDICYRHLHGRNADLWWSGDATSRYEYRYSQELKDRARLVRAMSRQAKTVFVAFN
NHARGNAPANAAFLQSILAEQQA*

>SPBIB_v1_340013|ID:27163928| conserved membrane protein of unknown function [Uncultured spirochete bib]
MIFTALARIVSVVISVYMLLCAVRIFFSWVPSLAQTKWGSLIARLTDPYLELFRAIPLFR
TPTVDFSPIVALAVLSVINNLVFTLSYAVRITVGFILSLLLDAGWSAISFLLGFFLVIAL
VRIIGYIAKLATLHPLWQILDGIINPLLFRVNRFIYRGRAVDYLQGLITGFVVVLLARAI
GGWAIRILTSLLMSLPF*

>SPBIB_v1_340014|ID:27163930| conserved protein of unknown function [Uncultured spirochete bib]
MLTSKQRSMLTALASKDCVMQALGKNGLTAQFVATIDGLLAHHELVKIKFLDFKDEKRG
AEELAAARTKSELVRVIGHNAIFYRQNPDPKRRINLA*

>SPBIB_v1_340015|ID:27163929| protein of unknown function [Uncultured spirochete bib]
VRICRAAHRKPSRFLNRGLTPFLKFFDLCKVDAALFGVGVLA VENGIVADNADKLGLGSS
GQFLGYSALFVLKIEKFYLYKLVVSQKSIDRSDKLSGQAVLAERLHHAIL*

>SPBIB_v1_340016|ID:27163931| Major facilitator superfamily MFS_1 [Uncultured spirochete bib]
MSVPLSSQKLSKARSTFNIFNLSFSFVFSVSGSIITLALRMGAQNSIIGLLNALVYIT
FFMLPLGKRLVRRTSIIKIFGWGWVIRYIMLLPILFAPVLASKGNMGLAILLLIIGTAGF
HISRGVAMIGNNPVLGLLSSGGGDKPRSDQGRYLVNVSVVNSVAAIFANIVLAFLGQQA
SLWTYAIAIGIGILSGLLGCVFLFKVPEPEFSFNNEQSLWNVTREALLKPEFRAFIFTF
MLLSFSLGMGRAFLPVYAKEVFAQGDDAIMVYSIVAGLGSIAMGLITRLVVDRLGSKPLF
IIYSMIGLISFLPIALIPGSGALMGAPAIIGLFLSVVHFLSSFGFAGEENAGQVYYFGLV
PKEKMLDLAVIYNLAYGIGGSLGSLGGLLEIFSNVGLSQAGSFRLYYALISVVLVFI
YSMRNLPHMGAKSVGQSLSVLFSPRELRAFDLLTRLDQSASAHEEVRILQELGKSESKLT
QKELVEYLHSPRFEVRSEALLALESIPELDAETIGALIREVRTNVYSTAYVAARILGKQR
SDVAIPVLIDSLKEPDYMLQSMAMIALARLARGARQAIPEIEEVIRSTENPRVRISGAYALE
LFGSIDSIPSLISCLKAEDRPANVSDELVLAISGILGIDKEFYLLYSEFIDDAKSGVAQL
TAHAHDVPLEKERLEAWMAAIQELFAAKPNPIPLARLLLNTTRITGSLLLSDALLDPKL
EYPGFNFLCAYVALHTENLRDF*

>SPBIB_v1_340017|ID:27163932| MATE efflux family protein [Uncultured spirochete bib]
MKDLTKGDEATTLITFALPMLLGNVVFQQFYNMVDSFVVGRFVGTNALAAVGVAFPVIFLL

VALIMGITMGSSVLISQFFGARDRERLASTISTSYIFLFGAGIFMSVLGFFSVPFILNIL
AVPPEIYAEARSYMSIILGGMLITFGYNGVSAMLRGVGDSKTPLYLLVAASLMNVVLDLV
FVIVFHWGVAGAAWATLISQAFSITAMVIFNRTESHMKVELKKLSWNKEIFGSMIKIGL
PTGIQQTLSLGMMLTRIVNEFGPATMAAYTAAARIDSFASMPAMNLSQALMTFTGQNM
GAGKTERVKKGHRAAIMNIVISLSITLLVTLAGHWLIGIFTTDGAVIDIGARYLLIVGF
FYIIFGTMFINGVMRGAGDVFIPMISSLLALWIVRIPCALLFTKVFGMGSDGIWWSIPA
GWFVGVFVFTTWYRTGKWKTkVLRPPPLAEEIE*

>SPBIB_v1_340018|ID:27163933| MazG family protein [Uncultured spirochete bib]
MEIDTIPLLETLAGQMSEQILPEAEQAAAFAKLFFTIVARLRAPDGCPWDLAQTPTSIRGN
IEEAYELAEAITENDSAHIKEENGDLYLLATMVGYSQEQGRYHVADALREAARKLIRR
HPHVFGDSTVDSPEQVVEQWNDIKERIEGRRKKDSLLDEVHRHLPPEKAYKIQKKAACA
GFDWQKREDIWLKLAEMEELKTAAGNAESAGADSAGAEPAVGMESAGAASSVRKAPIAN
PDALIEEFGLDFTVINAARLYGVDPMLALHRSNEKFSRRFRHVEARMKASHLAMTPEHM
TQMDAFWDEAKRAEDGARADNARRAEDSLRARGTQPTEHAQPASRLDIPRSRP*

>SPBIB_v1_340019|ID:27163934| membrane protein of unknown function [Uncultured spirochete bib]
MEQAYSQSIEHTAAAMRKENKHATPIDASTMNLQKSGFFFFSVASLFLVLYSIIVILLP
DTAAIPRYPPEMLFLIGLFAIGFLASIIAELVWLEPVLLLAFLPLHLSDHITSMYSMCA
FIIAIELYRIDYFKTGGLAKIFLCFAYYALSIALVGTALRVFFVEIAMPIIFIFLFFLY
LLPVFKGKWQIRIARPRQTIHYKELNLTRETLDYLKECLHGAAFKFKEIAAHHHVSESTVRN
TFAHIYHKFSVTDKAELLSKFADFDIID*

>SPBIB_v1_340020|ID:27163935| membrane protein of unknown function [Uncultured spirochete bib]
MIDAWRAFLQCRQVMSILKIYKWTVACGFLVALLLLPSQIFPKTPRGMLELDKIVHGF
LFGVVTAVFCAEHRRWTKVSPFFLLSFAIIGAFSFLTEVSQALATKTRHFDLKDFGADLIG
IAAGLLLMRLIARLTQK*

>SPBIB_v1_340021|ID:27163936|ydbK| putative 2-oxoacid-flavodoxin fused oxidoreductase:conserved protein; 4Fe-4S cluster binding protein [Uncultured spirochete bib]

MTNSKNMVMIDGNAAAHV AHACSDVIAIYPITPSSPMGELADEFSSMARKNIWGSVPQV
VEMQSEAGAAGAVHGALTTGALSTTFTASQGLLMVPMNYKIAGEATPTVFHIAARAIAA
HALSIFGDHQMTRQGTWALLASNNVQEVMDMALVAHAATLKARVPFLHFFDGFRTSH
EVSKIEELSYDVIRAMIPEDKVREHRARGLNPEHPEIRGTSQNPDVYFQGREATNKLYEA
TPAIVEETMAQLAKLTGRTYNLFYAGAPDAERVIIIMGSGADTAEEAEYLAKQGEKVG
VVKVHLYRPFVVEHFIKAIPATVKSIAVLDRTKEPGAIGEPLYEDVRTAIGEAMGKGTGP
FKSWPMVVGGRYGLGSYEFTPAMVKSVDNLKAEQPKNHFTVGVDDVSFTSLPYDESFH
LPSEGVVECLFYGLGSDGTVGANKNSIKIIGDETDNSAQGYFVYDSKKAGTYTISHLRFG
PKHIKPYLVTKADFLACHKFSFLEKIDMLANLKEGGTFLNPSYSADEVWDNLPVEVQK
EIIDKKVRFYVIDAMSIADKSGMGRINTIMQTAFKISGVLPEAQAVELIKKYTKKTYM
RKGADIVQKNLDAIDMALGATHEVKVGKATSTKHMLPPVPPSAPEFVRETLGEIIAQRGE
KVPVSKIPLDGTFTPTGTTQYEKRNIAEKIPVWEPSICIQCGNCTMVCPHAVIRMKAYDPA
LLANAPATFKSADGKGKELAGLKVTVQVAPEDCTSCGACINICPAIDKANPGRKAINFGP
QMELRETEKANWDFFLSIPETDNKFLNLSIPKGIAMKRPLFEFSGACAGCGETPYVKLVS
QLFGDRAVMANATGCSSYGGNLPPTPYTKRADGRGPAWSNSLFEAAEFYGMRLTTDK
QAEYARELLDTAKTNGVPADLIDRILANAQENEEQIEAQANVAELRKALASKKEDWAKE
LDNVADALIRRSVWVGGDGWAYDIGFGGLDHVIASGKNVNLVLDTEVYSNTGGQASKA
TPIGAIARFATSGKDIFKKDLGMIAMSYGYVYVAQIALGANMNQTIKAIRESYNGPSI
IIAYSHCINHIDMMKGMQKIAVQSGVWPLYRYDPRLKAEGKNPFQLDSKEPDYSKLE
QYMYAEVRFKSLVQANPERAKMLLEKQRSIERRYKEYRYLADRPF*

>SPBIB_v1_340022|ID:27163937| dTDP-glucose pyrophosphorylase [Uncultured spirochete bib]
MKLLVLAAGIGSRFGGIKQLAPVGPNGETLLEYSLFDALRAGFSEIVFLVRPEIEEDFRT
MVL SRLPASVQWQLAYQTSTSMLEKSIVRARENGRIKPWGTGHALLCARAQLEQSGPFA
VINADDFYGPRAFAGVQANLANPQEFCAFAGYRLDDVVPQEGVVSRAICTIDADGLLGTI
VEHKRVWRRGQEFISEIDGKQYVLDPQTVVSMNLWGLSEIFA WAERMWRDFLSEpanyg
SKEFFLPDIVNAMVAHGAVRVRMIPASMRSGFLTNPGLDLEETRERIARMIAGDYAPLW
RGK*

>SPBIB_v1_340023|ID:27163938| putative UDP-N-acetylglucosamine diphosphorylase [Uncultured spirochete bib]

MSDFPRLWNIEESEFADLFAQLEAPWEALHSLDGYLASLLQKADVSGQVVLSPVPEGVHI
EGLVYIAEGCVIESGAFIRGPAWIGAGCEIRSGCYIRGGVIAGSGAVLGHASEFKHCILL
SHAQAPHFNYYVGDVSLGIHAHIGAGVILSNYRLDGGKVPVVRAMGAGERIETGLAKFGALI
GDYCEIGCNTVLPNGTILGAQSVVPLSNIRGTWPPGSRLPG*

>SPBIB_v1_340024|ID:27163939| conserved protein of unknown function [Uncultured spirochete bib]
MSIPHFAGKFFSKPLFNPTDFLAYLERIGKPLSHRPAPDAVILSYQKSLFDHVVEHYVPE
RAQGYFGQFIYYLDGPRNIPQTRRQLAIAAGFGVGAPAAAVMLEELIAWGVVDFVSMGMA
GSLREDLPPGSIVLCDASIRDEGTSYHYLPDDSDVFPDRALTEKLADELSAAGLPFARGA
TWTDDAIYRETPVEVEYFRKKGALVEMEAALFAVAHRDARIASCFSVSDTLAYLEWK
PEFHSEATRETLEKLFRVASDVLLR*

>SPBIB_v1_340025|ID:27163940|sudB| Sulfide dehydrogenase subunit beta [Uncultured spirochete bib]
MHGTHRIVSKTQLSEEVFRIEVEAPLVARERKAGQFVIVMYDEEYSERIPLTIADADPVR
GTVTLIFQTVGASTHKLALKNPGDEIVLLGPLGNPHTIERFGWAVCVGGGIGLAPLYPIA
KAMKEAGNRVTVISGARTKDLLIMQKELVAIADEHIVVTDDGSFGRKALVTEPLKELCMQ
SPPPDIVVTIGPPIMMKFCAETTRPFGVKTLASLNTIMLDGTGMCGGCRVAIGDQTKFVC
VDGPEFDAHLVDWNGMMMRLGTYKEIEKEAHRCHLEMQIAKLEAHAADKESAK*

>SPBIB_v1_340026|ID:27163941|sudA| Sulfide dehydrogenase subunit alpha [Uncultured spirochete bib]
MSHKEDFTMDNAELELAKLRAAPITPKIRLQIPPQDMPAQDPAARRSNMEEVALGYTPAQ
AMLEAERCLQCKNAPCISGCPVRIDIPGFIGIKIEGDFLGASKIHKTNLLPSICGRVCP
QETQCQAPCTVGKALGGVEKAVQIGRLRFVADYERAQGAMEMPHVAPPTGRKVAIVGAG
PAGLTCAVDVRREGHEVTIFEAFHKPGGVMVYGIPEFRLPKVLVQSEAEVLECMGVDFEL
NFLVGRTRPLRALMSGDYDAVFIGTGAGLPKFMNIPGENYVGVFSANEYLTRANLLKAY
MRGMAGTPIYPSRRVAVLGGGNVAMDSARMALRLGAEVRVLYRRTREEMPARAEVAHA
MEEGIIFFDLKSPTRVLGDDRGRVAALEVLSYELGEPDESGRRRPVPIRGSEQIIPFDTV
IVAIGNESNPLISHTTPELQVDKHHILVDEKQKTSIERVYAGGDIVLGAATVILAMGEG
RRAAQAINELQ*

>SPBIB_v1_340027|ID:27163942| putative Tetratricopeptide TPR_1 repeat-containing protein [Uncultured spirochete bib]
VSRGRLIPLRFFSLFLMLSSIVGGVQQLWAEDTYNAALSLFWEGRRLEMAETRQAESQQA
FQRSLAMTERLLATDAANPDLQTLKTNLFRLLRYVDTVVYAQSVLNSRQDYRILETMAE
ALYFLGKNDEALSAFSRYFTLSPENDDRRSSAYYYVGEIYFRIKKYEHADIAFSTAVALE
KNMYYYWWYRLGIVKEVLGQYRAYEAFNTSLSLKSNFKPALDAKERVKAKSSL*

>SPBIB_v1_340028|ID:27163943| putative p-aminobenzoyl-glutamate hydrolase subunit B [Uncultured spirochete bib]
MTKNISENRACSADLAVFVARNAEVYDSIARDIWEHPEVSHEEARSSAVYRERLAARGFR
VQEFPEMPYSFCAEWGESGPVIAFMGEYDALPGMSQACATERQPVVAGAPGHACGHNLLG
MGSLVAAEGLVFLSQTGMRRARVRFYGCPAEESLGRIPLVKAGRFNDVDAAMTWHPADVN
TPHRYRTSANLSFVVSFQGKASHAGMAPHAGRSALDAVQLFNLSIEFMREHVPPGTLFHY
VISDGGAKPNIVPEHASVHLYVRAPDAQSVHEVMKRVKAIHGAELMTETKASIEIKAGK
CDFIPNTPIQDTILEAMTAIPLPEPTPEEIEFARELQKKVAPADRQATLAPIGAPLSLLK
QPLHLEVGDGEGKRIGGSLDTGDVSYVPTGQMNAATWPLGVGAHTWQSCAASGSAWAM
KAARYAGASLAYAGFLLVSKPERLARAKDEHRSVPTYRSTMDY*

>SPBIB_v1_340029|ID:27163944|mtaD| 5-methylthioadenosine/S-adenosylhomocysteine deaminase [Uncultured spirochete bib]

MQPENPLDRRPVLLPDL CIRGGA VLTLD AKWRIFDPGFVAIKDSRIVAVGHLAEAEQWPA
RETLDVSGTLIMPGYVNAHTHISMSPFRGAMEDAPDRLTRFIFPLENAMVRSKLVYDAAM
FTIAEMVRSCTCFADMYFEEVVARAADAAGVRALAGETVVD FPAPDADRPYGGIERAE
HLAKDWKGHPRIRPCLAPHAPYTVDASHLAEIAALAEKLDIPVMMHVAEMDSEHARFSAT
HGSVLRYLDTTGILSPRLIAVHMLYLDEEDIALAAKRGISVAHCPVSNKSGRPICPAWR
LSEAGVSVGLGTDGPLSGNTMDMQTITSMYPKLQKVREHRRDIVPARTALYAATMGGAHV
LGLSADIGSLEEGKRADIQVVALDDFNVLVPHDWAYATAVYALQAHNVRDVLVDGRFVLRD
GKLQFADERELKERLLYHARQSAATIRALQPAMPHHTAGT*

>SPBIB_v1_340030|ID:27163945| conserved membrane protein of unknown function [Uncultured spirochete bib]
MIHFIAGVVTSANYWFIVLRSTAPILLVTLGAVITAQAGIMNMALEGSMLWAALTGVIVS
AATQNVWIGLLAGIGASVLVALVLGLFALKLHANPVLSGVALNLVATGGTVFVFLSLTGD

KGISSSLASKVLP SLSIPVVKDIPWIGKV VSGQNVVYIAAVSVVVIDLILRRFAIGRRI
RATGENVEAARAAGINPVRIKFFTLIISGILAGFAGCFLSMGYTSNFTSGIAAGRQYVAN
AAQVVAGGTAVGSIFAAMLFGLTDAMATYLNIGNLMP ELIQUALPYAVTILGFVVVTFVRD
RREAERKRKLFAGTAMQKEKADAA*

>SPBIB_v1_340031|ID:27163946| ABC-type uncharacterized transport system, permease component [Uncultured spirochete bib]

MNSIKRFFTDRESLAPALVTLFAGLFSLLAGIVLIFIVSKNPVQSVRNFL LAPFLRSYNF
YYLLIVMVPITFTGLALCIVYQLRYMSLIVDASFYTGAVVATALGTLISLPSGVHPAVAM
IAAGIVGGLIGLLPAILKIRWRANELVSSLMLNYVFYFLGSFVILYYLRDRSQTILSSLP
FKKTFLLPRLVANTQLHVGFLIAAGFVVLVSIFLYRTRWGYEIRLTGANPRFAMYAGIPV
TSVILYAHFISGFLGGVGGAVEMSGLYRAFIWQMNPSYAWDGVIVAMLARRNPKFVPLSA
LFFAYLRVGADFM SRRGDVAFEFITLLQGLIILASDRIVNYFRERQLRKQLLKNSRRE
SR*

>SPBIB_v1_340032|ID:27163947|yufO| Uncharacterized ABC transporter ATP-binding protein YufO [Uncultured spirochete bib]

VNYIVRTEKLSKIYPNGTFANKSVDFAVMEGEIHGLVGENGAGKTTLMKMLYGEEQPSQG
SILIDEKPVSLASEFDAIKAGIGMVHQHFMLVPSLTAENLVLGKEPKRKRTRTFDLAAA
VSITEELSKHYNLPVFAKARVADLSVSMRQKLEILKALYRGARILILDEPTAVLTPQETE
ELFVELKTLKQQGKTIIFISHKLKEIFNLCDRVTVMRDGRMIATHNVADVDVHQISNEMV
GREVRFEIARPPMAPGEPALRVRELSYVDDFAIPKLKHSVFTLRRNEILGVVGVVDGNGQT
ELVEIITGNEKALSGKVFA YSTEVTNRSAGFVRRCGIAHIAEDRMTVGTALPASIEQNL
ADRYRNRQFSTRAGFLRSREMAAYAGRLVHEYDIRCNSANQPVASLSGGNMQKV VVAREF
TANASILVISEPTRGVDIGAIEYIHTKIMEMRSAGKAILLVSSDLQEV MALSDSLIVMHE
GEIVAYFPDAAA VTDKELGLYMLGIKRQSDEELRKVLHE*

>SPBIB_v1_340033|ID:27163948| putative CD4+ T-cell-stimulating antigen [Uncultured spirochete bib]

MKKLKVVVLLLIAAIFLPSTAQTQKKANVLLISGSLGDKGFNDSARGALDMIKQKYGA
NATVKYTELGTDVAKFAPALEDAGAEGYDVVFCSSNNFN SA VQEVAAARYPKTLYVMYDGWI
KEDIGNVYSIQYKNSEAGYLAGALAGLMTKYTADPKINADNVIGFVGGRDITGINDFFVG
YIAGA QKMNP SIKIINYVNSFTDTAKAKDQALVQYKSYNADIVYHAAGRAGLGVFDDAAV
ETGKYAIGVDTDQASLFGNEPKKADLILTSTMKRVDLTLFQAF EKFMNGEKLGGKKVYVG
AAEGVIA YAPFNKAMPASIKTELEKLQADIKAGKVSIPS AFSMTADEINKMRDSVNAAK*

>SPBIB_v1_340034|ID:27163949| Peptidase M20 [Uncultured spirochete bib]

VLPTLCRMNCFGA AKYIAWTKGAGYGDVMNISELKTAVDAEILSQREETIKLAFRLASIP
EAGFEFETMKELERQLAACGVKAEVGLARTGIRATIGPAGAPNLVLLADMDALPTRGAP
NDIMHSCGHHAQMSIMLAVFSALHALGIPEKLGFRSLV GAPAE EYTHLDERKALRVKGE
IRYLSGKQELIRLGVFDDAACVIKYHSMADSPERMATVNGTLNGFVAKQALFVGKAAHSG
AAPDQGVNALNA AVIALMAIHSQRETFRDSDHIRVHPILKEGGTTVNTVPDRARIETYIR
GASIEAIQNAARKVDRALGAGAMAVGASVTVSTTPGYQPFRPSDALGVRLAASAARFLPE
TAIDLHDYSYASDDIGDVACLVPACQLGFSFGSGTIHSADFKASDPERAYILPGRILADL
VLDLGADGGRKAQEIRSAFKPTLDKAA YLA YLDSCFEEKTYSFKD*

>SPBIB_v1_340035|ID:27163950| conserved protein of unknown function [Uncultured spirochete bib]

MFKAVIFDFGNVLCGIDRESFVRKAAQYTSKMSADELLRALWGTQLEFEFETGRFDSHEY
FRRVQEMAGLGPSYSYEEFVEDYKRIIPNP DGEKGL E TAAKLGMRTFVLSNTSFLHASV
IFDNEILGTYPELYILSYKVGAMKPDPRWLKLEYARLDPADCLYIDDIEQY CQAARSL
GMSAFCYDFCIHNLSQVLNMLQ*

>SPBIB_v1_340036|ID:27163951| Iron ABC transporter, substrate binding protein [Uncultured spirochete bib]

MKKFAVVALCLLIAVSAWAAGGKVVVYTAHEETIINALVPMFEKETGIKVEYVKMGSGDV
IKRAKAEAARPQADV IWSIGGEQLEAENQILAPYTPKEWDKINPVYKVG TNWLPYTGIMN
VFIVNTKMLTPDKYPKSWTDLMDARFKKNISSARADKSGSSYMQLCNVLSIYGDKGWDIY
KGIMKNMVISASSGAVPKFVNDGEQAVGITLEDNAFRYFAGGGPV AIVYPTDGTVAAPDG
IALLKGAPNLEN AKIFIDWCLSKPVQEYLVDAMARRPVRIDTKDPKGLVPLSQVK TIPYD
FGWAAKNKDAFVKKFVDIAMELGL*

>SPBIB_v1_340037|ID:27163952|fbpC| Fe(3+) ions import ATP-binding protein FbpC [Uncultured spirochete bib]

MASIQIIDLEKHFGEVKALSGINLEIDKGEFFTLGSPSGCGKTTLLRTIAGFYHQDKGDI

YIDGELINNVPA YQRNTGMVFQNYAVFPHMTVFDNVA YGLRVRKLPKDEISRKVSAAALKS
VHLEGYEQRTPEKLSGGQQQRVGLARAMAIEPRVLLFDEPLSNLDAKLRIEMREEIRAVQ
KALGITSIYVTHDQEEALVISDRIAMNQGVIQQIGKPWEIYTNPQNMFVA YFVVGKINML
TMHLEEGAEGNLRRARLGRLLIPAEGTKDLQEVVVAFRPEDMVEAEAAGRKNEITGLM
KTVSFMGSVARFELDVEGQLITVDRHRPREADMPQKGAPVAFAVPVESILLFDPKSGLRI
GKGAQQ*

>SPBIB_v1_340038|ID:27163953| ABC transporter, membrane spanning protein [Uncultured spirochete bib]
MSQAAETRRGTATAPGNSGLPAGRSSLQHPGRRADFWTLVIFAGFAIVVFLIYPLFDIF
RYSFLDKTTKAFSMSNWKEFFSKMYLRAFVHSHVIALLTFFSIVLGIPLAFFTTRYRI
RGTNLLTTLVLALLSPTFIGAYS WITMLGRNGFLRLMFQSIGINLPPIYGPLGIVLADT
LQYYPFISLMTAGALMTIDRSLEEASENLGARSVRTFFDITLPMIIPSVTGGALIVFMMS
LSNFGTPMIIGGNLVLPTLAYNLYTSEISETPGMASTVSIILMLCASVVIVLQQWMSSR
RKYASMLVNRPIVKQLKGIKSVVAHFVCYLIVFLSTLPLAVIVYYSFRKTS GPVFKSGFG
LDSYRQIFFDVPKTVMNSFLYSLIAVLLIASVGTLLGFVIARKRNAAVRALDPLLMIYPM
VPGTVLGIGFIVAFNRPPILAGTATIILTYFIRRLPYSVRSAA SILKQIDPALEEAGI
NLGSPPGRTFR TITLPLMQGGIISGAIMSWV TSMNELSASILLYVGKTMTPIKIYLSVA
DGYFGTASAMSTILLVVTGVAMFIVNKYFNRGSETFIAA*

>SPBIB_v1_340039|ID:27163954| Fructose-2,6-bisphosphatase (modular protein) [Uncultured spirochete bib]
MYPRFESKFSLSDEETTALQRLQADGEFFSVLDHSMSVFILRHGQSEGNARNTYQGR LDF
PLSAQGEKQARAAGEWLSQFKPEIMLASPMQRARRSAEIVGEAAGISAIEFADMLIELDT
GIFSGVDPDTAARKYPEIWNEFLARSWDAVPGAESSMLYARALCVWQKILELGQQGTSR
IVCMTHGGLVQWLLKSTMGVH SWLPLL PMSNCGISEYEIEMVKKGNPAFVQWTAINFHPP
AAPEGPKPVF*

>SPBIB_v1_340040|ID:27163955| exported protein of unknown function [Uncultured spirochete bib]
MRIRTAIAVA VCLLLGAAMQPFAFESGCEPSDPAFWAGI HGIPLDQDECAAIVGGDVRMS
LNPDRTKLIVNVIDNEYEARLGRIPPKQVLELDVHNRI VNTTNAPFMPATRDGRELAAAV
STTTKPSPFPEGYWTITAIKPRDDKYGPYFISTNAIGRVEVYENDGAGGQIPIGIFKDLG
YALHANTNPFNVSKSYGCLVLRQDDVATLARILEADKQENPKAVQKILVPPSRARMRDW*

>SPBIB_v1_340041|ID:27163956| exported protein of unknown function [Uncultured spirochete bib]
MKKNYFFFLFMAGIVVLFMLASCKQAKVTEKPLQTVPQQAASQPKTSESGAPHPEAATKM
PAIERKNESILLVYKHTGFGYVESYGFDTYVFRLADPSGQISGGIVYQRTSDGEVEAIH
YNVTRSSDEITLAASGADKKSWSATLKLKDS SIDVSGQQKLSAKLDKALVFASTDGN YSE
SYSIDQAAPEMPSEIKKGDSTLEKKGK WTFPENNKAMYVQTKPDDTENTEGFQVSLWREDN
GDLRFRTEGPTPINEVYASGLSAVL AGDHALSNAVLLDLMLGESRYLRPVYAF AISRRGA
GK*

>SPBIB_v1_340042|ID:27163957| deoD| Purine nucleoside phosphorylase DeoD-type [Uncultured spirochete bib]
MSIHIAAQKGQIADKILLPGDPLRAKFIAENYFENPICFNQVRNMLGFTGT YKQQLVSVM
GTGMGMPSLSIYVNELIREYGVRRILRVGTCGSMREDVKVRDIVLAMSASTDS AVNQVRF
RGMDYAPTASFTLLKAAWDAATARALRVFAGPVLSSDMFYTEDPEQWKLWAKFGVLAVEM
ETAELYTLAAKYGCDALS VLTISDHLVTGEATNAQERQLSFRSMMEVALVAILA*

>SPBIB_v1_340043|ID:27163958| protein of unknown function [Uncultured spirochete bib]
MLFSVGNLVT LAIVVAMFGAYHLLTADNRSLEKLRMGEKLDKDELGAYVESKAEEIKHYG
IDL DVQQKAAKVVLEKIQAQATIDSESE SITAIDRFKEYDEILSQLMDMTKRVDQ NIA
HLAEKNEFIEALARRLEVAGKKMDAIEADLPKVKDQFAQDAKRILDGFRDDILDQLNERL
TGIVNLF DQSKGDAESAIAQASALNNQIDQKTELAL EKAASRAQNI EDEAFQTLRARLAA
DFKELSRQTDEQIAALSQKLDMLVQSVQAKLGETNASTE AQVKESQRRLSEAKASIAAMS
AEMVRIQKETAEASAALAAKFQAERASLEE QFAQFGQAFEAHRASFEKEFMSEISALRES
LENAKTQAETLRAAAEGNVSAALNEFEQGIYKDLDSHKA AVYEQVDKWLSSMDAKIRKIS
QDAVEQRKAEEARLAQEVNAELKRIKDSLYTQAQKIERDIEALKNV*

>SPBIB_v1_340044|ID:27163959|rpsU| 30S ribosomal protein S21 [Uncultured spirochete bib]
VRTIRQVIVEDNEPLEKALKRFRMVEKEGIIREWKRREYFEKPSAIRNREKKALERKLM
KKTRKSQEGKY*

>SPBIB_v1_340045|ID:27163960| conserved exported protein of unknown function [Uncultured spirochete bib]
MRPRYASLLSAVAVCSLILIFFAACGQNTSSQGIDKPNPKLKT VTLTIGEATVKA EVAMT

ETERNRGLMYRTSLRDGEGMLFVFDQRDQVSWFWMKNTKLPLSIAYIISDGTIVQILDLP
YSEPRPSARSIRYALEVPQGWFRAGVKVGDKVAIPPL*

>SPBIB_v1_340046|ID:27163961|def| peptide deformylase [Uncultured spirochete bib]
MLNIVTYGDPVLTEKAQEISAFDHDLEKIVIDMQDAMKRDHGIGLAAPQVGISKRLFLVG
LDDERLRIFVNPRIVAMSKETNEYEEGCLSFPLYFTVVRPSAIDIEAFDIKPKFRISA
DGLLARVIQHEYDHLGILFIDRVSPAQRRLALAHYSRMLNM*

>SPBIB_v1_340047|ID:27163962|fmt| Methionyl-tRNA formyltransferase [Uncultured spirochete bib]
LRVLFAGSPEIAVPALEAIAASHHEIAAVLTNPDSKVGRGLKVEQTPVASAARRIFGERV
PIFTFETLKAEARSGISACKPDILVSFA YGKIFGPKFMALFPKGGINVHPSLLPRWRGSS
PIQHAILAMDSETGISIQTIAPEMDTGDLVSRIPGLGRETARTLSELCARLAAPLVVE
VLDQIEHGTVKAQPQIGTPTYCSKISKEDGLIDWTRASREIDARIRAFDPWPGSYTFLRG
MRLSILEAEPVDDFSPSDVPGHVTVNQPGTIIAVVAPKGMVVQGTGQGFVAVKQLQLATRK
ATGYREFANGMRDLIGTILGLL*

>SPBIB_v1_340048|ID:27163963| PASTA domain containing protein [Uncultured spirochete bib]
MAKKDITQTIKEAASKAPEKVTA AVKSAVDIASEQHKRISSEWTKPQKRTFVLFALMFVV
MIIFAVFVFFLTLKGEERTMVPDVRMDLADALVKMQQRELYPRLTLRFTDNPLDRNLVL
DQSPPPGSIVKAGRRINLVSRGAVLKDIEDYSGRNIDDLRLYLQGLSTTTKGLVSIREP
PLYIFDISAPGTILDQNPKEGTEISGPTILDLVSKGPEAKDIAMPSLLGLTLREMASKA
ATTPLIFS YKMRAAHDKEAPGTVEQSEPADKNLQLDRVQITIAAPAARKGYTAGVFY
TLPEYPYAVPVALDVIVPNGTRTTLYSVKHPGGSFSAFVSVQSGSVLVLMVSGAEVTRKE
VR*

>SPBIB_v1_340049|ID:27163964| conserved protein of unknown function [Uncultured spirochete bib]
MNAQGEIPVEIIHLYTYDIGRAIDLKVASLVPAHHDMEFAKRRDTPVSLTLPKPLVLSI
STDECDSKCFDKFSAQAKIYEDGAILIVRYKTMSRFEDLPQKANMLIRDISSANSIEQF
AESSFKMVHEALRTAVAGYKELTKNDRETYTAFCLLECPGGDPRAFIDANKDVAASLLSG
EPVGTLLHMSQIEQILNKPFSYRKDDIAIFDLERCLIDPAADYDDVIMMAEHANYRLIEL
RELDLFLDKWLGAEQDIRRLYLSGNRRKFSRDLRLKLAQIQGLRFDALFTLENLDNSS
KIIGDYFLGSIYHRLCEIFNTDEWKISIERLNLQNIYELVKNDS TEQRMITLELVFIA
VCVIFPILQILQVMLLK*

>SPBIB_v1_340050|ID:27163965| putative Beta-galactosidase [Uncultured spirochete bib]
MQRAWNAGWYYRPGPAEPVFLSEEWAGPDAVAGAAKTDRGMTTTTGAAMAAGAATQDSP
VGLPAAGWIPVHLPHDMIGAPLNSFDERTFARKGCYAKLLTMEQLARAWSDVDEASPKK
ENLGQEAAPSEKDGAQPGA VVPVTPDKEDDFSPSSAHRSGAPAIFLRFEGVSVSCRVWVN
GRLAGSHTGPYTPFEVRIDPHLKLEPEAPPSDRPAVPGAQPSARHNVRPAWILVEVDSSE
DAGAPFFGGVVDYLVFGGIYRGVSLEVHTGAWVGTVWCAPRPLGDMLEGQWIAEVKVQIE
AAEQLPPQAKIRAQLFSGNDLIIESAPVESPAGHAATKAKEVLLSLAVNKPRLWDIDDP
FLYRLEVALLDESGRAVDMQEIRTAERTAEFGPSGFYLNHRRVFLRGLNRHQEYPYTYA
MGPDARQRRDAEMLKQELGCIIVRTSHYPQSPYFLDACDELGLLVFEELPGWQHVGDSWQ
EHALRDLRDMILRDRNHPSIVLWGV RVNESQDNHDFYTRTNALARELDPFRPTAGVRYIA
HSELLEDVYTFNDFIYDGEPTPFISEPAKVLPKHHKKAPYLITEHTGHMFPTKSFQDEER
LVAHSLRHAHILDTAMGNPRIAGCIGWCAFDYHHTKDFGSGDRICYHGVADMFRIPKYAG
FLYASQVSPSERLVLEPASHFAKGERDAARMLPVYVFTNCAIDVYRGASLVGRFSPDKT
HFANLPHPPVVIDDLIGKRIEAGWPGRDAALFCKLASKAMAAGASRLSLMEKLMGLFM
HRRKLSMRQIEELVIRYGMGWGSADESIRLVGILNGKEVAERTFGADSTAQGLVAEADSN
QLCAVSEEEWSSTRIVVRAVDQYGNTPFVFEFESIETEGPISLTGPSRLRAGGASAFW
VAAGGLKGHARIIVSSPRFESPALVELEIV*

>SPBIB_v1_340051|ID:27163966| protein of unknown function [Uncultured spirochete bib]
VNGSMSESEFDAAKAQASAGSAESPGTDKPPITPQQFFDSLLLIEDFLRYGCRSGRKVEI
SLPGDLPIETGLATRKAQLEALAAQVSECTACALSESRTQTVFGEVSDPEVLVIGEGPG
AEEDRQGLPFV GASGKLLDKMLAAIGLSRQTNCYIGNIVKCRPPNNREPTPIERAACIGY
LRAQIAILKPRFILCVGR TAAHGLLDLTDPI SRLRGRTFEFEGIPVVITFHPSALLRDAS
LKRPAWEDLKRFRALIDGSTRVEE*

>SPBIB_v1_340052|ID:27163967|priA| Primosomal protein N' [Uncultured spirochete bib]
MSASFVRVAFPIPVVEETFWYRNPGFAPLEIGMRVEAPLGKRAKATGYAIEIADSVLDDPA

RIREILRVVDAEPLFDLEMLGLGKWLAAAMYHCSLGEALSAMLPSARRERQDLSEEFDEVE
LSSSPLELTPGQRAALQGILAEPEGMFYLYGPTGTGKTEVFLQLAEAAALAKGQGVLYLVP
EIALTRQVEQDARRRFGGSCAIIHSRLTPSRKLAEWRRIAKKEARIVIGARSAVFAPID
LGLIIDEHDTGYKSGTTPRYHARQVAMHRASLAKARLVMGSATPSPEAWHACLQGGQIH
RFDLATRPAGGSFPLIHIVDMRGREGLISDELAEALREAKTAGRQAILFLNRRGFARTLI
CQTCGTEITCKHCSVPLTYHKSSGRLTCHYCGYSEPKLLACPTCGSLDLAWASYGTERIE
EELRERFPDMSLARLDTDSAGTKGKLEETLRAFRNGQIDMLVGTQMVAKGLNFPGVRVVG
ILMADQGLAMPDFRAAERVFLIVQVAGRAGRHRPDGLVVFVQTRKPDSPRIIRLAAAGDVL
GFLERELEMRRHLEFPAGRLCRLVFRSRLAHDARNAESAARHLAEEPQFADIEVL
GPSECPLAIIADNHRYQLIFRARRFQALQHFVKMLKPRIELPSSVYLEIDIDPVNMM*

>SPBIB_v1_340053|ID:27163968|ackA| Acetate kinase [Uncultured spirochete bib]
MVILTLNCGSSSVKYQVYDWDKDLASGIVERVTIGGSFITHKVRGRPDYEVEHECPNH
IVAIELILKTLVDPEVGVISDLSMIKAVGHRMVHGGSKFAKSSIINGDFLETFKSLNELA
PLHNPANLMGVEAAKTILPDVPHCAVMDTAWHQTMPASSYMYALPREWYEKYMVRRYGFH
GTSFLYNAKRAAVLLGKDPFETNLIIAHIGNGSSINAVKNGCSYDTSMGLTPLEGLVMGT
RSGDIDPGIIFHVMRKTGMTASEIEKKNKESGVLGLTTKWADRRDVENAAEKGDPIAIL
AQQVEAYRIKKYIGAYYAALGHVDAIVFTAGVGMPEIRKLATHGLEELGIIVDEKKNLA
LAKCRNAELDITGAGSKVRVFIPTDEELVMTEDTVALINGTYDVHTNYRYFENRDYVN
KARAEGLQRDLEKKPWLKDIVARIP*

>SPBIB_v1_340054|ID:27163969| exported protein of unknown function [Uncultured spirochete bib]
MKKLIVLLLALAMVGAFAADAPKAVATFGAYLDSYGDFMDGLGPTLYSETYYNYSSGGV
GFSATVTGGEDIFKQVRNYSVSYQVLPKVLVLAGRLRETGGARLTSYIDGNFSTRIANV
QNGMMGQVSYQGVGLAVFSKLDLTLNTNVGLSYTAKGVAKLVGGYLGTSSEIWWGADIQA
VKGVARVGRNTPTKNYIYATAGSSALVKNLDLGLDADIVLATGAFNYGAQVKAQYALT
DKYSAGVKVWYDNGDAWYGNNGLAAKAYGVINFAQGDMVVGKYNAAATSTFSIPDFEVW
F*

>SPBIB_v1_340055|ID:27163970| exported protein of unknown function [Uncultured spirochete bib]
MNITKRPSAGLPLYSVLGVAVISVMVSLLVFSCATARKYDPGAPKVAIARASDAEIAKYGP
NFLVNPFKEPSIIVLGKTYDFYIVKISLNLDKQTKIKVIASSQGPSGADTPAAAYTQAEFV
HFWDVVSNEGPNDEYERRKTTIERTVIPELSFSEGSGQNSYFLVFGKHPVKRPITYE
VQVILDSGEAFVSETLE*

>SPBIB_v1_340056|ID:27163971| conserved protein of unknown function [Uncultured spirochete bib]
MPLQELILQHDVWYLTDAESMQEALGALVKTVDLPEGLDREALLDALLAREDLASTAIGN
GIAIPHVRRFGSESLQHDIVVVAYLFAPVDWKALDGIPVHTLFLVLAKDEASHLQLLAEI
AHVASDESFAFLKTM PDRAALVERIQKIEQLD*

>SPBIB_v1_340057|ID:27163972|rlmE| Ribosomal RNA large subunit methyltransferase E [Uncultured spirochete bib]
MAGYERPDYWTLKAKKEGYPARSVYKLEEIIVRKFGLLKGFGGRTGAGKEDSVRSPSSGA
SGAGAPGPAILDVGAAPGSWSLWLLRQMKGAGRLVAVDIQDLGIAPADSNFSFIKGSILV
DSVRARLREAGPNLVVSDAAPATTGNRLVDQARSEELVEAVMGLALEVLAPGGALVMKI
FQGGEEKRLIAELKKHFAQARAFKPEACRAESFETYLVASGFARRDEQDKRL*

>SPBIB_v1_340058|ID:27163973|htpG| Chaperone protein HtpG [Uncultured spirochete bib]
MANYAFKTEVNQLNLITHSLYSHKEVFLRELISNASDAIDKLYLTVSDDAFKTLSEFP
RITVTLDEDAKTITVSDNGIGMDEEELADNLGTIARSGTRAFLERLGENERKASNLIQF
GVGFYSAFMVADHIEVVSLKAGTDKAFVWKS DGKSGFEIEPAVRAGFGTDVILHINDEGT
EYLSRWSLEELLKRYSNHIAWPIHLVSKEKTYAKDPAKAESKTVDEQVNSASALWRRPKP
ELTDKDYIDFYKSLTGDEKDPLLWIHTKAEGTIEYSSLLYIPSHVPADLYIPTREQGIKL
YVKRVFITDKELQILPPYFRFVRGVIDSDDLPLNVSREMLQHNRMVMMTIQQATLKKLFSE
LEQLAATNPEKFKTFISLFGVQLKEGILSDWTNREPLLKLVRFKSTLAEDWTSLADYKSR
AGEGRKTIYYLTGENEARLRASPLLEVFKEKIEVLLGTDEIDELAFGGIGEYEGMQFKS
VQQVDAEEELGKDQSEHKDRGEKAVKILKRVLGDVRKDVRLSKRLGKSPSCVVVDKDEFT
PQYRKLMLERLTNEPAPEVKPILEINAEHPLIERLVALDTRKELSGGDLATVQEIEDLSHV
LFYEAMLAEGEHFEVPQDFAERLNRLAKSS*

>SPBIB_v1_340059|ID:27163974| putative Peptidase M23 [Uncultured spirochete bib]
VPEGLRSWKEKEKRWYSRMVQGISSGLDVVRVAVRRFFSWGRTRFVFAVIPQSEKPARKL

ELSRFSLIAIGVAALVFAGSAIASISAYGAAALKASALHTQLAKANESIDKMRETTENLL
SKTAQFQEKLQIVTIVQSKGKPDPAQSADNILKTAGLSDLIPGRFSDDPVS RDVLRLEG
IAGTLDNSVAALDQIANVLASQKDIMTEVPNIWPIKGNLGHITMYFGQENENPFSTGQWYL
HTGIDISTNRVGDVPLATADGKVIDIHYNASLGNSTITQHSHGFTTRYGHRLRGFAVKKGQ
RVSQGDVIGYLGNTGKTTGPHLHYEVYLGTSLLIDPLRFLNIRKEYHE*

>SPBIB_v1_340060|ID:27163975| protein of unknown function [Uncultured spirochete bib]
MSKQGFSDCVIGQGVKAEGRIEAPGMVRIDGEFSGDIISGASVIISKDAVMHAHIRARDL
LVAGFFSGTAIVQNEVRYVETARVRADCTGKMLVVEPGALVQGKFMNRNSDAQ*

>SPBIB_v1_340061|ID:27163976| Stage 0 sporulation protein YaaT (modular protein) [Uncultured spirochete bib]
MSDEYTDHNLPEEMFDILHEEEYETPKQSKAPPANAEELPQPIYRLKTLHSSETFHAYYV
PTGSETHFMKQCDLEAALEGPRPQEKPAQSLEQCRVSLAVNTAEPSSAAQAVVAAAFIIP
NRSLVIAPTKYGRDLVEVLGVVRDLSVVNADELVLIERPATVDDYRRYLENLEREKEALA
KCRERIEAHNLPKLVSAHCLLEDGKILFFFTAESRVDFRDLVRDLVSLFHARIELRQIG
VRDEARVTGGCGVCCGRILCCHGLSDKLNVPVSIKMAKDQNLNSLNSLKISGPCGRLLCCLSY
EHQFYRDARRELNEG NRFTYDGT LFKVIEVNVLSNRIRIAGEDGRLLDMAARLKYADG
HWTIIIEEQV*

>SPBIB_v1_340062|ID:27163977| Cytochrome C biogenesis protein [Uncultured spirochete bib]
MIATIAFGLLLSLVIQIVFLFKKEGGQDGISPWLSLAAGILLVEIVRRSIAIRFVALT
GMFESLIFLACFLALLIFALRYFKSAKGNRVIPFGATIIVIFLALASSPLAPSDIKPPI
PALQSGWLVLHVSFTFIGEVFFAVGFVSAILQLVSKDEEKRRSYDRITYTSIAVGYPIFT
AGALIFGAIWAEKAWGVWWSWDPKETWALITWLTAYLHFRLVRKSTSKLVPALVIIGF
VIAMFTFFGVNFKLGLHLSYA*

>SPBIB_v1_340063|ID:27163978| membrane protein of unknown function [Uncultured spirochete bib]
MKAFFDKLYNALRSVKLAVVLLVLLALFAIAGGIIPQGKAASYIEHFSGAGSRILALA
LDHVFSFLFLLVSAIFAINLTVCTFHRLTNELFKPREKRRHGPDLLHIGLIILLFGGIL
TSRSRTETFINLRKGD SARLPGGAKIVLVDLKYEQYDPGRPKSWESTVAIDKNPPPEASA
PVLTHEEEGGDTLGTTFADPTLNNSLSSAKASSEPATSSAAPAAPAISAE TGAGPGLP
SSPAPSTPIAELPQYRIRVNTPLRLKGYSIYQQNWHTEKQVVL RDAMGMQFFLEPGMRET
TKDGFVLFMALDTSQGAGGAAVAVAAAPA VAAAPSAIFLLEQNGKRTVVKAAPEKIGS
FTFSGYIDQPVSGLA VVSDKGYPFVAAGFILVILGVFITYIRKLLKGILA*

>SPBIB_v1_340064|ID:27163979| Split solet cytochrome c [Uncultured spirochete bib]
MAEVEKILEKDVSRRSFLKTTGIGLGVAAGALVFGTGIAGAQTQTGTVAEAPLPYVELDP
EEARLRGHAGYYMAGCMYGA FYAILSMLEKVG GPYNQIPYRMAGYGRGGAANWGTL CGA
LNGAAAANLVAPDADTNKL VSELLGWYTITPFPSDKSNAIASAKGFKYDAKPYPTLVHV
TSVSN SPLCHASVANWIKKSGYELGTAERKERCARLTGD TAAHAVELLNAWKAGTFVPTF
KVDDQTAACIQCHEGDMEGKMACTTCHEPH*

>SPBIB_v1_340065|ID:27163980|aspS| Aspartate--tRNA ligase [Uncultured spirochete bib]
MLFEQRTNTCGELRAADIGKSVVLNGWVHRKRDHGGITFINIRDRYGVTVQVVVDADSPRE
LLDIAADLKM EYCL SIRGTVRPRPDTMVNPSMPTGEIEVKAERIQILSRCAPLPFMIDES
TDAKEDMRLTYRYLDLRSFSMQKKIRLRHEAAFAVREYL VGNGFYEIETPTFIRSTPEGA
RDYLVPSRLYPGKFYALPQSPQLYKQILMVSGFDKYFQLARC YRDEDSRGDRQPEFTQID
IEMSFVTREDVLT LVEGLMGHVFKKTLGVQLPAQFVRIPYDEALDRFGTDKPD LRFGMEL
QDFAPFVDEHCSFQAFHEVTKGGTVKALV VPGKADYSRKQIEELEAKAKVYKAHGLAWM
KVSPAGVLEGGASKFFSDHARIIQDLGAKPGDLILLVADEKKKI ACTALGAVRTQLGKDI
GLCDRAVFAFAWVDFPLFEYNEEEQRWEAAHMFMPQAQYHDSLEADPGAVKGDLYDL
VLNGYEIASGSIRIHDP ELQKRIFRIVGMTDEEAQRKFGFLLEAFKYGPPPHGGIAPGFD
RLVMLMAGETSIKEVIAFPKNSFAVSPMDQCPNEVDERQLKELHIKIEKEE*

>SPBIB_v1_340066|ID:27163981|bcp| putative peroxiredoxin bcp [Uncultured spirochete bib]
MIKEGERAPNFALKDASGKTWTLADFRGKPFVL YFYPKDNTPGCTTEACNFRDRYDEFKK
RGIEVVGVSADSEKSHQSFAAKKNL PILLSDPGKTTINA YGAAGEKKLYGRVFFGTIRC
TFVIDGEGVVRKVFPK VTPAGHADEVLEWLSSVLNLG*

>SPBIB_v1_340067|ID:27163982| GntR domain protein [Uncultured spirochete bib]
MEKKRGELVQQLRKMI AEPGRFPDSKLP SERELAQSLGVS RNLLREAVITL EALGYLEVR
ERQGTFITAPAADDFVASLRFASLWPEEMLCQLMEMRLVIEVPIAGLAALRRSDEEVKAM

RRCIADLEQASLRPDGGASEGAQWDSRLHMLIVNAARNPLLSRLYEGLAATMERYISMSR
VILL AIDGWPAKIVAEHEALVEAIARQDPQGAEEAQRHHLGSALKALKALTKKN*

>SPBIB_v1_340068|ID:27163983| TRAP dicarboxylate transporter, DctP subunit [Uncultured spirochete bib]
MKRVLA VAMLMAMVGVPLFAIDIKLAHVVNEQDAFH LAATKFKELTEKYTNGEVKVTIFP
NAV LGDERTLLERMKMGIVDAGVITSGPFVNFVVPKFGVVDMPFLFRDAEHAYKVL DGP
DKLFADLEPQGWKGLAWAERGFRLNLTNNKRPINKPEDVAGLKIRLMQNPIYVDSFKALGA
NAV PMAWTEAL TALQQHTIDGQENPLNVIVSFKL YESQKYLAI TRHAYAPAPIIMSMMTW
KKLTPAQQTAVLKAAREAAQYERDYNQNEAGWLKELADKGMVITRPDLSAFLKAVKPVY
DTYSDKFGKDLINAILETK*

>SPBIB_v1_340069|ID:27163984| Tripartite ATP-independent periplasmic transporter DctQ component [Uncultured spirochete bib]

MAESDKAGRNASPLHLLSDGVNKVTEGALFASLLVLVGVTF LQVVFRFFFTALTWSEELS
SFLLVVWSLLGTAVAFKRGSHIAVTFVLDRLGPLARRLVQTLVALLGLAFFGIVVWYGGV
MMGSEASQVTPAMGLSMRWIYLMYPIAGVIIVLHIVDSLVA VVWQKEA*

>SPBIB_v1_340070|ID:27163985| TRAP dicarboxylate transporter, DctM subunit [Uncultured spirochete bib]
MGYLLFGAFFVLM LIGVPIGLAIGLSALIVFVSMGIPLQ MVPQTLLEGNSFALVAVPFF
VLAGDILAKGGISERIVAFEAALGRIRGGLSVSVLASM FIAAISGSGAATTA AVGASL
LPDMKTKKYDVAESAALIAAAGTIGVVIPPSVPMVLYAVIAGESVAKL FVGGFIPGILMG
LGLIGWAA YKAKVRGYPRGERLPLKVVGKRFLSSFWGLMSPV IILGGIFTGIFTPSEAAA
VAVVYSIVIAAFVYKALDFKKFYKL VVGSVTSALIMFIIATAK LFGWGLAFYQIPQAVA
SAMLKLTGNVPFLVYLMIGIIVLLAGMFMETASALIILTP IFIPAVVGVGGNLVHFGVVL
TIGLAIGMATPPVAIDIYVASAITGLPMGKISKPILPMLILAL VFFVVMYVPDIVMVL
RLVMGKG*

>SPBIB_v1_340071|ID:27163986|ilvD| Dihydroxy-acid dehydratase [Uncultured spirochete bib]
MISDRAKKGASRAPHRSLMKANGFADWEIERPWIGIANPYNQIIPGHVHLRRITEAVKAG
VYAAGGLPIEFPTIGVCDGIAMNHIGMKFSLPSRELIMDSIEVMVRGHAFDAIVLVTNCD
KIIPGMAMAAAKLNIPALVISGGPMLAGRYQNRDVLSTMFEMV GKHAAGTISDEELAEI
ENVACPGCGSCAGMFTANTMNCMMEALGLALPGNGTIPAVYAERDRLAKDAGRAIMALVE
RDIKPRDILTRAAFENAI AVDLALGGSTNTALHLP AIAHSAGIDLPIDLFNEIGERVPHL
CSMSPGGPHHIQDLYAAGGVQAVMARLSERGLIKTGALT VVTGQTVSSNLKRARVRDDNVI
RPLDKPYHEKGLAVLHGSLAPLGSVVKQAAVAPEMMVHTG PARVFNSEEEAYAAIMAQK
INDGDVVVIRYEGPKGGPGMREMLSPTAALAGMGKDKTVALITDGRFSGATRGS AVGHVS
PEAAEGGPIALVHEGDLIRVDIPGKKLDILVGEAELARRRAEWKPYVQPV ESEFLNRYRR
AVTSGARGAILE*

>SPBIB_v1_350001|ID:27163987| protein of unknown function [Uncultured spirochete bib]
MGGGSSAFRPADTVGLEVVVPHKVGPEAQHAVCDIAVEADTLTMVVRQVLSELAIGV VRR
KEWIVDRPXX

>SPBIB_v1_350002|ID:27163988| protein of unknown function [Uncultured spirochete bib]
MLRLWAYLMWHNYLKP YRIRWPKGRRPATHAEASGIDATALENVYRSFFEER AFLTR SPL
SPTMARSWKKEWRTPGKEEA EYLPKLALG*

>SPBIB_v1_350003|ID:27163989| 6-phosphofructokinase [Uncultured spirochete bib]
MPDFS IETLGKCSVDSPLGLAGLTGTGGPVFVRDDQFICYNIEARP GERPLLTRDQLLEV
AGPRQKIYFSPSHVHAGIVTCGGLCPGLNDVIRAI VRSLWHL YGVRRISGIRYGYK GFLP
EYGLEVIPLDPDIVDDIHKIGGTILGTSRGGGDR TSEIVDTIEQLN LNVLFAIGGDGTQK
GALAI AEEIERRK LKIAVVGIPKTVDN DIEFVEKTFGFDTAVVKASEAVAAAHMEAH SQI
NGIGLVKLMGRDSGFIAVHTVLA VHEANFVLIPEVPFDLEGPQGF LPMLEKRLARRGHAV
IVVAEGAGQHFFTQEVKFDASGNRKLGDIGLFLKEKIEEYFKAKNKEINLKYIDPSY MIR
SAIAEPVDSMYCERLGNAVHAAMAGKTKLLIGLVNNEFVHIPIRAATSKR KQVNPEGSL
WRDAIEATQQPMSMVNPK*

>SPBIB_v1_350004|ID:27163990| protein of unknown function [Uncultured spirochete bib]
MNDEGLYV GIVTRAKNTGVARPEAWLAECGWDEWHAGRGKREETLNSAGAAQALCVRLPR
WVRGFGAAKPGATNLRQTLKAVRNAVEADV RAGRVMFLLA EFPHSFTYSVGNRLWLD RVL
GELEGLPLVVGFWSAEWYTSRLIEGLKQRNVALCLYDAPRLPGLPPAVEVLTADR VYARF
LSRNGAAWKNGQFGHVLDYRYTKKELANIVPRLLMWRRKAEAVGMV FANGRWAAESAALM

NRLLSAHVEAQLPKGGGP*

>SPBIB_v1_350005|ID:27163991| putative DNA-directed DNA polymerase [Uncultured spirochete bib]
MTSGTIIHVNVI GLMAA VEEIVDPGVRGRPFVVARPDIPRAIVLDLSPEAYREGVRRGML
VQTACARVRALKVVPPRPELYEKVDQSLLEAAFCFTPLVERAGRHLFLDVNGTRRLFGA
PEDVARLLGEIADQTGLVPTVALASTKTAAKVASRVFRPFGFAPLSVNDEGELVARQPV
ELLPGVGVKLLPRLISLEIGEIGTLASLSMDEAQAISARGPELVLRARCVDDSPVNPEPP
SRRMLAGETVFEPDCADPDLLAWRAREIVAELGFRMRKEGFGAHFVMAKLVYTDGAVASR
SVRAGQGASFVADIQLCEAAERAVRQAWERRVRVRKQLIELGGFEPAGPELDFEPLPFF
KAPEIDSTGIQTRRIAMHMRVQSALDRVHGKYGQSAIVPAAAFLYREGSLVC*

>SPBIB_v1_350006|ID:27163992| Error-prone DNA polymerase [Uncultured spirochete bib]
MLTPLVTHSAYSLLWGVLTQQQLVEAAASAGWNALALTD CNGMYGLPVFLDACKERGLRP
IVGVECTGGWGRVVTIARTKEGFSRLTRLLSARA AVLNEAGLPA YTRFVTLGRDNKQHSE
ALAKADTLLWCELA AIAAMSDPGLFLLSDSPIFLREVPCSPWLFALLSTAHASQWRALLK
TGHKPVLSPEITFLEPGQREVQRLLAAIGLVTVREV PGLMLAPEAAAF EYARAADNAGE
IGLSLASDNSGSAAWFASAPLESRFCDESSLAEAA TANRCITEEALSEPFGDFV FPMWQ
AAGATDEVAGTCAPND DAGAGISAPVALRRLAYEGAARRY GSLPPAVRERLEYELGIIIE
KGFCDYFLVVNEI IKKAKRICGRGSAAASIVSYALGITD VDPIAHNLFFDRFLNPRKDP
PDIDVDFAWDERDSVLEETVRMFGAEHCARVANHNCFRFRGALRDTARAFGMPDEETSAM
ERRIEHNRDAALASADSVWKDIFLLAIRITGLPRNLGTHSGGIII VPGNSADHVPVERTG
SGILVTAWDKDGVEDAGLVKIDLLGNRSLAVVRDAIQNLHENGIELDLERWRPEEDADTI
AMIARGDTMGV FVYVES PAMRL LQKKTGVGDF AHLVIHSSIRPAANRYIEEYIERLKGKA
WKPLHPVLAELFSEY GIMCYQEDVSKVAVALAGFSSSDADAI RKVLTKKDRGHRLEMWK
QRFYEGAAARGVAPDVIDAVWDMIMSFSGYSFVKAHSASYAMLSFQSAWLRAHYPAEFMA
AVLSNHGGFYSTLAYASEARRMGLELLPPDVNESALRCKGKDGAIRWGLGMIAGLSESTL
KALVEARGGDTTPRRSSIFRPFVSVEDFAARVPFSREEAEAFV GSGALDSIAKGMGRPAV
LMALLKACTARARHAGPGLFEDPERISRGAHISSTSHTRISSE GSPSSSKTSERRIALSQ
MQWLGTTLSCHPLSLVPGALQMPRLQAVALDRHIGEYVRLAGWLITAKEVLT THEEPMEF
LTFEDETASFETVLF PAGYKQFRPALLEGGAFFVEGRVEESHG AITVTIAALRRLPAIPK
LAETPRAPPSGFGYASKFGYQAVSRN*

>SPBIB_v1_350007|ID:27163993| protein of unknown function [Uncultured spirochete bib]
MDRIVAVSDTVNAGIHALALAEANGGSISAREAAERLQVSPSYLAKIMQKLAIKGLLTPT
RGLGGGYALTKPAEQISCLEVLTLLEGDLPRRECLFAKAVCRTGT CALRTFCADTEKRLR
TALETITVA AVARSF*

>SPBIB_v1_350008|ID:27163994| hcp| Hydroxylamine reductase [Uncultured spirochete bib]
MYCNQCQETMKNTACTLAKGVC GKPAETANLQDLVLHVCKGIGYWASKALPLGFYSEDDA
FYVTRMLFATITNANFFTQDFEHWIAEGLERRERIRL A YVAKGG AIDSTPPDAATWSAAN
VEAIRTAAAAGKGALTEIADEDIRALKALVLYGLKGMAA YVEHAY AIGISERGIFEFMLK
ALAQLADERVSKDALVSLVLKTGKAGVDAMALLDRANTGAYGKPRITKVRTGVRNRP GIL
ISGHDLRDLHDLLEQTKDTGIDVYTHGEMLP AHYYPFFEKYDNL YGNYGNA WWKQDVEIE
KFHGPVLFTSNCLVPPKESYKRVFTTGIVGFEGCTHIPDREPGKMKDFSAI IEMAKTCE
PPEQLEDGTIVGGFAHDQVFALADTVVEAVKSGAIKRFIVMAGCDGRQPKRSYYTEVAEK
LPDNTVILTAGCAKYRYNKLDLGDIGGIPRVL DAGQCND SYSLALVALKLKEIFGLDDVN
KLPLSFDAWYEQKAVLVLLALLYLGFKNIRLGPTLP GFLSPRVAEIL IENFGIKGIATA
DEDVAAMVAGR*

>SPBIB_v1_350009|ID:27163995| HAD-superfamily hydrolase, subfamily IA, variant 3 [Uncultured spirochete bib]
LIKLYIFDEGGVLIRNHTIVDKVAAALRMESEEFRLMLQDIFALSRGEIDSAEFWRRFA
TRSGIEPGEDYLR TLFKPARDEPTFELVKELAQHARV VCGTNTINSHHQINIELGMYEPF
HSVYASHLLHYAKPDPEFWRIILKAEGVSPAEAFFTDDSPDNIEAARS LGIHAVLYTDAA
GLRRELVALGAPLRSPFIR*

>SPBIB_v1_350010|ID:27163996| conserved protein of unknown function [Uncultured spirochete bib]
MSEFHPWL YEARGQKAVAALAKNGFDALYLPSAAQAAEKVLEYVEPGAKVGF GGSMTIKS
MNIAALAEQKGAIILDHNRPGLGAE EKMEILRAQLTCDVFISSANA V TLEGFLFNVDGNG
NRVAALSFGPRKNIVVAGINKVVKDLDEAYERL KAYAAPLNNKRLSKPNPCTTAGYCADC
ALPTRICRIYHILKRKPSLSDFTVIIVGEELGF*

>SPBIB_v1_350011|ID:27163997| Response regulator receiver protein [Uncultured spirochete bib]
MDVAMPVMNGIEATRQIKKEGIDSIVIMLTAFGDEKAMEEAAEAGADDYLTKPVEMHALK
ARIELAKKARTFHVARSKLLIENKMLIGVKEEEINACIEENYSLSAELLYRLSLAAEFRD
DDTYEHTRRVGRNAAMIAQYIGKDAEYIYLLTQAAPLHDIGKIGISDTILLKPGSLDNDE
FETMKTHTIIGKKILNGSQTKILQLAESIAYSHHERWDGSGYPQGLQGESIPLEGRIVCI
ADSMDAMFSKRPYKKGMPPEKVKEELQKNRGLQFDPTMVDAVLEHWEEIADMYHAEAGG*

>SPBIB_v1_350012|ID:27163998| putative two-component system hybrid sensor and regulator [Uncultured spirochete bib]

MNTAQKQIKAYLRSAFFYSVVAVLVYFFLRNLHFGYMEHLLFEFSSIFFAMTLFVLYVIA
PRWKQSEGLIIFGIVLLFVSLLDVVHAVRFSGFPGTSDMPSSVTFWVLARGLQAFGLIAA
ATRKDILAGKKTSTTLLSILLPITAGIGLFIYSVLPSPGIFIEGKGTALKANLEILYAI
LFLLFAILMRHEPEAFIAGALFAFSEIAFITYVNVTDPRILGHILKATGFLALGLFSLK
KYFLMPLKEMAEVQRTYSAENQGLKSTYETLTQRWNEMIKCREKIIQCNSIDAILSLERE
FFADPSKTIRLAKFEKDRLLFKNDPGLPEEKSAYLPEQFERIDMENGTTVFLDKESGFYL
NIYKPFLLFIDLAKKNLLEKNQIALLNKLVEEEKYRIDFLRSFSHELKTPLNVIYGYLQ
LFSTEAFGAMSAQAKTALNEMIESVKKSNEIINDLLNLAESAESGAVSVKCDRIQLKSFLN
RILVEAKKNALLKNLDFVIECDGEPEISVDPKLFGLVISNLAASNAVKYTDKGHVRFARA
DDKTGIMIEVKDTGTGIPAEIDAIFKPFKKEHARGGFGLGLSLVKTYTQLIGGKVSVE
SQVGKGSTFRIEIPPLPKIDVSKVAKGQKADFLLEPKTTRDMLKILLKDSVVEEAESD
EKGIVAALSTLPDMIITDFGLQRTTGDQLIKRMRTYPELADRKFLLLTGRSSDLTDDI
PVIEKGNIDLQHLAKVLMAIRNDAIALVFCKGESEERLDRAKGIVRTQLAGRDSVEIDIS
EPGLSELCLFDEAYFLTPTDSESRQKIENIIFRRKTYFSKENVVLEV*

>SPBIB_v1_350013|ID:27163999| PIN domain protein [Uncultured spirochete bib]

MLRTQNIPKFSVITYGELIYGARKSKHPEKNMATALRIAELFPVIDIHRGIIIFGELK
AKLETSGSRIDDMDLLIASTAMYMNFSVLTNSKGFHFGRIEDLPLENWNREDI*

>SPBIB_v1_350014|ID:27164000| protein of unknown function [Uncultured spirochete bib]

MSKEPSGIERSCAIREIKLAGGGLARRWQARHQPRHAGGKGGWAGGPRGSSGA*

>SPBIB_v1_350015|ID:27164001| Metallophosphoesterase [Uncultured spirochete bib]

MNQEGKKPGAMPARRTMFLAALVALVGLIIMNSYHYSLEGARGLYVWHPLLALKILLFMG
LVPIAIAIVSLPLEKLAKKWPMLVMRWISMAASILVGAISIALLAFLIIVPRIGSLEPAR
LELIDPAKGIHALGTQPAEASFSAGTTNKGAAQPGIALQPPQSAALQPAIIAQARSPLDM
PLLRLSFSSDPHWGADTSNAQARTQILESIAQRKPDFAFFMLGDTVETGNSATQWNFALSD
LEALIPHVPVRPLLGNHDALFGGQYLRYKAFFPKGFSSDSGSPYYWSIDAGAATIVAIDL
PWGTENFGARQRAWLEKTLAAADPHKPLIVLSHSYFYASGYDDPDFGSPWYDHYQNIPAL
VPLFEKYGVDFVISGHNHYQELLAHNGIAYAIVGSMGGIPDPQPSYRSPWSQWIAVGVHG
WLDVEVQPGKLILVFRDEQGAERHRAELRY*

>SPBIB_v1_350016|ID:27164002| putative sucrose phosphorylase (Sucroseglucosyltransferase) [Uncultured spirochete bib]

MNEYMNMKIKDLLIFIYGREQGM LTFDSLQQLIPKKTSSKAAKLRDSLTEKDTCLITYG
DMLQPSKKEPETHSQTALQLKEFLERWNHGSFNYLHILPFHPYSSDDGFSVIDYREIDP
ALGDWNDIAALAKEYKLVFDLVLNHGSKQSAWFQSFLENKESYRDWYITKPADFDVSSVF
RPRMHPLLPFFRKDGSVVFVWTTFSEDQVDYNLANPQVLLFEKIFFEYIEHGARIVRL
DAIAYIWKEDGTSCIHHPKTHAIVKLLRALIDYLELDVLILTETNPNEENLSYFGKGDE
AHLVYNFALPPLVLHAAVSGDASPLRTWANTLPQPGEPIFFNFLASHDGIGVLPINGLV
DDLDFKKTNTVIERGALVSYKNAQSGPVPYEINCSYLSAVAPLSLGTSKERARAFLCCH
GVLFAFAGLPAVYFHSWVGSEQWEEGPQLFGYNRAINREKPRKDIVETALNDEHSLRASV
YTGFEKLLTFRKSERSFAPDIPQQLPAEGSVFALARGPDPSGRYVLCIQNLSNNQAKFD
LRTAPKIEILIQHGIDSEMLLSPWETRWIGYGGGKAISMLEI*

>SPBIB_v1_350017|ID:27164003| conserved protein of unknown function [Uncultured spirochete bib]

MHIQQMWIERCAGVLGKNLPEQNVLEKLHYRYTCPAREKGTYPQLWWDSCFHAIYRWF
DPDMAWEELQSLLMHQFEEGPD TGMVPHMSHLAENGALSAQQLFQNKNSSTITQPPLISI
AALAVHKKAPNKNILAKLYPKLLAYHDWFDRRRDDHDGLAAIHPWESGWDASQRWDSL
MGLHACTKEELFELEQKRKNLVSILA AHKYDAKTLAHVPEGFYAEPADFNIRAADLMAL
AEIAGELGKIAESRELEMRAKAVQQAVHDKMISFKDGELFVHDLLGASEEKSAVDHAGKF

VLLFCQCLSASEAESISLQLFRSADCYATPFRVPSTSRFDALFNPKEYWRGNVWLPVNWLIWRGLLSYGYKEKAHTILEDISLVQNSGFCEFFDPITGKAGEKYGQSCPRNQSWSTIVLDMVLDSEQUIIEGKADE*

>SPBIB_v1_350018|ID:27164004|ugpC| sn-glycerol-3-phosphate import ATP-binding protein UgpC [Uncultured spirochete bib]

MVSYLKLNSLKKTYPNGVTAVKIDIDLEIEKGEFVVILGPSGCGKTTTLRMLAGLEEVTVNGSIILDGRDITHLPPRQRDISMIFQSYAVVPHMTVAENIAYPLKLRKMDKHTIHSKVQEVARICNILDYLNRYPAQLSGGQRQRVAVARALAVDSKLSLMDEPLSNLDAKLRTSVRTFLKEIHRNTGATTIFVTHDQAEAMALADRIVVMNEGKIEQVVGSTREIYNQCGSLFTAQFMGTPPANIQKVSLISNQRLIANDKNAETQFSLDLGNQSAFPGIDRYIGEEIFLAIRPENINISKPKGNETSIEIVEPQGAYTILVTKVFGSEWKIMLEGDIDIRIGQKVSLIIDPGKIMLFDQSKKRNVNFS*

>SPBIB_v1_350019|ID:27164005| ABC transporter permease [Uncultured spirochete bib]

MSMHPGKLWSRTVFLILATIASTVILPILYFLTISFASNYEAYQFPAKIFPTFSYSAQLRYNAEKGSYTLKKKGSTYEA VKTTQDVSDFLYCKSQLNVLLSSAAVQELFDKAKNTDHALPIKLLKDFFRNYIVFFILAEGMTMRALFNSLKAAGWTILISLILGGVSGYIMARYKFKFSNTFSTSLLVVRMFPAVALSLPLVVYIMKMNL YDTSFALAI VYAVPNIALTAWITSSIFKGISVELEEAAMVFGATRLLKTLMTITFPLAFPAAIASSLYAFLAAWNSITALIMTNNNPTLALLVYRTVGSSTIPNLPAAGAVVLLVPSLIFTFIKNYINQLWGKVAL*

>SPBIB_v1_350020|ID:27164006| conserved membrane protein of unknown function [Uncultured spirochete bib]

MNRMRRAGFFKSPIWFLVPVIIYYAAFWRPTISVIIESFTDKSGVFSFANYVRLFSQKSMRTAFLNTILFTLGSAILQFILAFALALWLNKKFRFSNLVLFITLIPMAFPPAAV GILWKTGLYRFGWINSFLCSLGLMNPANPVDWMSFRNL YAVILLIHDITWTVLPSVMILLAGLQNFNKEFEEAGWVFGANKFQTLKDIVFPIMKPTIITAMILRMIAAVQVWLIAMIFGYNVVPFLVERIAYNVDVITFAKYARKDAYTISVIVAAIVLISVSIYLRVSGEKQKGGEIA*

>SPBIB_v1_350021|ID:27164007| putative Extracellular solute-binding protein family 1 [Uncultured spirochete bib]

MAKSRVTFIAVFLILIGLASPPFFVMAQGTQKGEKIKIVSQMFYDPAQQQYIKEQILPKFTAETGIEVELQVVANASELYKVIQAQQQTGKWSTDILIAHDSTAVPIVQEYRAVQPYTKIPAGTYITQFDDNFVQGGKRYFVPLQADVYLTIANRKALPYLQKLG YDINNLTWEQLAEWVRLIKKETGLPKYVFPALAGKFATYEFNAVQLAYGDKYVPAFNTPASQAAFKL VASMKEGILPSSPTIDFPTASLATEEAWITVFHQAYANASFSQAPDKFIVAPVPIGGSGKRGTIIGGHGIGIAGSTHKA AAEKFVEFFLRDDILYAVMKNTGPWIPSKAEITSKLKDDPSDQIMKMGLATLTGPTLIDRVRVAEYQDWGQVKRLYEEVIGDILAGKDINKQYLD AKQKELES LKVN*

>SPBIB_v1_350022|ID:27164008| Oxidoreductase domain protein [Uncultured spirochete bib]

MNAQKGAIQSILIGAGNRGAETYGRFALAHWPWFKFTAVAEPNPVRRTNFAAQHDISEEKSTDSWEKLLFVTPRDVVFVFCSPDRFHVEQVLALIERGCSIVLEKPVV VNAQQCATLSKLALGKNTNII VCHVLRYPFFSTLKRLLDKGKIGRAITFNLQENIAYYHFAHSYVRGNWRNTSLASPSILAKSVHDL DILYWLAGAPPETV VSMGDL SWFKKENS PENAPDRCLDGC PHADTCPWYAPDLYLTENTGWPTS VISDDTSLASRMQAIETGPYGR CVYRCDNDVMDHQDVLIRFKNGINASF SMNALTYNKTRIIQISGSEGEIVGDLDEGWIEVRTFLHGTKERIQLGSSVGHNGGDVGLMNDIASIFKQIDDSPEPETNKTIQIKNSKSSIEESLEGHWMAFAAEESRKKGIFINMDAYKRDGVSTRETVNI*

>SPBIB_v1_350023|ID:27164009| putative AraC family transcriptional regulator [Uncultured spirochete bib]

MLVLFCECTNLHDLSDSILFDMNPVREIITYTPGYSFCIQYFDDRRLHFNWHYHEDI ELVLIKNGEGQA HIGDLVKHYKAPAGFLLGPSLPHGLLSIGFLQGWIIQFQEKHIKYPNAPSEFINILNVIGESKKGLSFSSPAIVDCLPLMENLNSSNGLDKWLWLLKVLNVLSQDKNRELCSLLPHNQEVLTDRFEQAITQIFNEIDKTYNLEEVSRKVG MKVSSFCCKTFKKRYGLSFI EYIHSIRINNAKLLIQTKFYIDDICYESGFNNVSFFNRKFKEVTGLTPSEYRKRYREA

*

>SPBIB_v1_350024|ID:27164010| 5'-nucleotidase/2',3'-cyclic phosphodiesterase-like hydrolase [Uncultured spirochete bib]

MLQRIGKFAVLVA AIFTLAFTGSLSAQGS LPNLPANVQITFAHTNDMHGRIVESKDVIGF PKIYAAVQELKAKNPNTLLVDVGDTFHGLPVVNIDQGQTAVKLMNELGYAYMTTGNHDYNYGFARLLELAKMANFKILAA NVYKDGQRVFPAYDIRDMGGVRVAFFGLATPETAYKTDPK

GIQGVTFSDPIVEAKLVVAELAGKYDLLVCLSHLGVDSSDPTSITLAKFVPQIDILDG
HSHTSLADIQKNTTNTLITSTGAYGTGLGVVDVVVGS DRKVISKTARTITPQNSPDLKG
DPRIATMLSDLVKAQDAVLSQVVGQTSVPLEGKREIVRTQQSNLGTLIANAMLYVTGADF
ALMNGGGIRDSIPAGNITLKQIYTVQPFNGYIQTGKVLGKEIDAILENGVGKLPAPDGRF
PHLANLTYALDASKPAGDRVSDIKIGGVVDPDPKEYTIATLNFLFNNGDDYRMLVGKAKN
DFPSDAEVFIAYLKHLGTVTNENMVYQK*

>SPBIB_v1_350025|ID:27164011| putative PfkB domain protein [Uncultured spirochete bib]
MTFTQPSEHQFDIAFLGQYTKDTHITKSETRIVDGGAYFYGSAAAAALGLKVAAITRLAA
SDFASFRLLERGVTVKAIPTKSTCLQLLYPSDNPDERVLSVTSVAEPFEPADVASITA
LVWSIGASIRGEVSLDVLKAIKAKGARIGLDAQGFVRVVRDGTLAYDREWPEKAEVLSLV
DVFKADVVEAEILTGTRDLRQAARELAGFGVAELVLTHADGVVVYAGGSFHEAPFKPKSL
VGRSGRGDTCLASYLAARITMPPNEATFWSAALTSLKMEALGPFAGTQADIEAALHERYG
LHKVENT*

>SPBIB_v1_350026|ID:27164012|fbpC| Fe(3+) ions import ATP-binding protein FbpC [Uncultured spirochete bib]
VSVRDFSARSSNVTLIHLTKKFRSLDGSGEIVAVNDVNLEIQAGELVTILGPSGCGKTTT
LRMIAGFEYPTSGSILIGGRDVAMIPPNKRGLSMVFQSYALFPHLSIYENVAYGLRVQKL
PAQEIRERTERALELMQLTTMARRFPSQVSGGQQQRIALARAIVIEPSVLLFDEPLSNLD
AKLREYMRDELRLKQKRLGITSLYVTHDQSEAMAISDRIVIMKDGCIQQVGTPREIYAYP
HSKFVADFMGKANFINVNLGMEGETVGLGGREGAGSSEISAAAERAARIEIEGRQFVVP
RPGAVAPKAGKALLVVRPETLKL VPLGESASEADLSAGSARGSPGISALKGRIDRFTYFG
NIARYEVSTENAPLLIESYNPGASQILEEGAAVGVIVDFESARLLPADEQEHR*

>SPBIB_v1_350027|ID:27164013| ABC transporter permease protein [Uncultured spirochete bib]
MRKNTRFSIAHLVRDPVLLFLVLLVFTGLILFILFPLYKIFVYSVTNNEGRLSFQAAIDM
FTSKAYARPLGNSMLLGITGVLATLIGYIFAYALTRTDIPLKGFRTIATIPISPPFI
LSLSMIFLFRNGLITRKLIGIEDANVYGMHSLVVVQTISFFPIAYLTLTGTL SKLNPAV
EDAALNLGASKARIFRTVTLPLSVPGILSSLLLVFIQSMEDFSNPAVISGSFSTLSVEAY
RTITGMYDMRGGSLMALMLLAPTIAFVLQKYWLAGKSFVTVTGKPTTARAQSRDPKLVW
PLFAFCMLVAIIILFYGTVLVGAFVKIWGINFSFTWSHFKYVMTL GWQPLRNSVILALA
STPIAGLLGMIIAFLVVRKEFP GK RAMEFVSMLTFAVPGTVVVGIGYILAFNDKPFMW TGS
AFLLMAFTFRNMPV GIESGTSTLIQIDRSIEEASTILGATGAVTFRRISLPMLKQAFFS
GLVYSFVRAMTAVSAVIFLISPRWNLATISIFSLFEASKYS DAAA YIVVMIVII VVAIGG
LNLLVGLLGNSGTVASGGNSERT*

>SPBIB_v1_350028|ID:27164014| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]
MRKIFLSMFALMFCVIPLLSVGAQGTAEYKLLTVYTALPESELPTYFSQFEKDTGIKIY
VRLSAGELLARVRAEKNNPQASVWFGGSYDNFVPASKEGLEAYQSPELKNIPKVVYWDPE
GFANPFYVGAIGFACNTEWFKKGLPYPTSWDDLLKPEFKSQISMAHPGTS GTSY TILAT
IVQMRGEEGAWKYFTALNQNRQYTKSGVTPPMDVGLGEAAIGITFSHDGLKPAFEGYPV
AMSFPKDGTGYEIGCMALIKNGPAKETANGKRFIDWMLSKRGQDLFETS KSF R I P V N T L A
TPPKGAISVDSLKVINYDAVWAGQNRNRLVEQFTKVVAASNLK*

>SPBIB_v1_350029|ID:27164015| PfkB domain protein [Uncultured spirochete bib]
VKYDIIMLGHISKDIIIDEKGQENRLYGGALLYSSISAARSGARVLAITKAAKGDFGALD
VLKQQEGIELVVLESPASTSIRNVFLSSDHERRQTLLSRAEPFSAADIPEEAEAEIIDL
AGL FV GELPDSLIEELA QREPGKRASGERKSGKRAKIAVDAQLLRE A QPDGRMIFRDWK
NKHRYMPYVSYFKADAAEAEILTGLTDREKAARVIASWGG SAGGSPWAGREPEVMITHNT
EVIVLAGGQIYRAPFTPSNRSGRTGRGDTTFAAYLAWRLSHGPEESVRFAAALCSIKMET
PGPFSGTIEDVFKRMR*

>SPBIB_v1_350030|ID:27164016|plsY| Glycerol-3-phosphate acyltransferase [Uncultured spirochete bib]
MLAMILGIILAYLAGSFPTGLVVGKLFKGDPRQQGSKATGATNVFRVFGAKAAIPVALV
DVGKGALAVFLAAWVGRNAALPREALQVAGAVAAMVGHVFPVFAGFRGGKGVATGAGALI
MMAPVAAIFCVLGFLLVVGLTGIISASSITAALILPIAIALGAQGSPPNPWLLGLGIAIA
IFIVFTHRANIGRILRGEEKSFEQFRFLRRKKHD*

>SPBIB_v1_350031|ID:27164017| putative DegV family protein [Uncultured spirochete bib]
MRKLGRRSHARSTIASNEKQAGALICPALPFDIECNIVNLMKISYLDGPRLSRALTAGSQ
TLIQNSASLDAINVFPVDPDGTGTNMASTVRAITSSLA AFRPKNAGSVLKRAAQ SALAGA

RGNSGAILAQFFSALAEELQHDARIGAKRLANAAVSAAEKTRRALSIPKEGTILTVLHDW
AHAMHEKAQQSDDILHVFIAYESAKASLARTRNMLPEMKRAGVVDAGAKGFVHMLEGIV
QLIRSGSLKEAARADKSLQASTGAMLDQAPNDVDVLLASSDSQFRYCTEALVHGEGLDL
DAIRTQLSQYGDSVVVAGTESLAKIHVHTDAPYQVDFDLDSQGLVDSHKVDDMELQKLLA
HRAQLAGQNQRAAAATEKPTCAIVTDTGCDLPEAFLFEHGVKVPALITIDGKTRPDGPA
LDIRAMHRLMREHPDFSMSTSQPTDAAFSRAFAIAAGHSNEILYIGLTAALSGTFQAGVR
AATSLFRGSAAPAGQTGQDGRTERAGHTEQTGQTERSPPHFVAFDSRTVTAQGILT
SRAVEMAEHGLSAGEIARALETLRDRMVFFVAVRNLSLIRSGRLHGVKSVILRKFGLRP
LLTTNKEGKAETAGIYAGEKNTVSALLSRIKKAFSAGSRAELHISHVDAPEEAQKLADLC
AAYLHPESKIVISEMGPVLAASLAWLGAISVAGLPESVPKLV*

>SPBIB_v1_350032|ID:27164018| putative CoA-binding domain-containing protein [Uncultured spirochete bib]
MAEKYKRGLTPVRLDAKARALRDEAIRIAARAKAEGRSALTELEGMALLSAMGIRTPRYW
LVSSADEFLGRLGEKTSSNVSIMPGPFPGAKAVVKVISPEILHKTEVQGVEIVDNTTASI
VDALRRMEGRFAGARLDGFTVNEFIAFEPKLGHEMIFGYRFAPDFGPVVSFPGGGIYTEY
LATKFRQGAANLILSPRVSNPKALEALLRENVYGLLCAGLRNTKPELAPEALQRAIQHF
LDAADALAAAGIGEFVNPMVLSHAGELVALDCLVTLKDFSSMGLASDKDGLPVNMAQQT
RPVQEIGRILKPASAAIIGVSEKGMNNGRIILRNLIENGFDTSHLYVVKAGIESIDGCRC
VPDVASLPEKVDLFLVIPAASTPATLAQIATYDKAWSVIVIPGGLEEKAGSESIVAEMR
RALSEARGQGKGPLINGGNCLGIRSVPGKYNTLFIPEHKLMPKPKVEPLAVLSQSGAFA
ICRISKHPAINPKYTITCGNQMDLTIGDYLDYLAQDPDLHVIAVYVEGFKPLDGEKTLEA
CRRITESGRSVIFYRAGRTQAGAGAAASHTASIAGDYPVTRQLFAQAGAIVCDSLDEFDD
AITLFTLLDGRKARGNRLAAVSNAGFECVAIADNLGGMVLSFGEATKAELEEIFRAARI
TEIVDIHNPLDLTPMAGDDAYEGSFRAALLDPSADLGIVGIVPLTVMMNLAADPAVHSE
DVTREDSIAARYGKLMRETDKPFVTVVDTGPLYDPLCRELEKYGVPVVRTADRALKMLEL
WRNSPAAR*

>SPBIB_v1_350033|ID:27164019| Indolepyruvate ferredoxin oxidoreductase [Uncultured spirochete bib]
MTCDIILCGVGGQGLSVSVVIARAAMASGFLVKQSEIHGMSQRGGQVLANLRISDKEIF
SPTIPK GKADIIFAFEPLALRYLSWLSVERGTVVAATTPIRNIPSYPDIESVLAEIRKL
PRARLIDADSLAKQAGNVRSANLVLVGAAADLLPVPPEAIEKEIVALFSRKGEAVVQANL
KAFEYGRSIQHG*

>SPBIB_v1_350034|ID:27164020| Indolepyruvate ferredoxin oxidoreductase [Uncultured spirochete bib]
MAEMVLSGDEAVAQAALDAGLSGGFAYPGTPSTEIMEYLQEHLGDKRAGAGDADGSAETG
SVLEVRTAPRVAQWCANEKTAYESALGVSFAGKRAMVSMKHVGLNVAMDPFTNSALVRIH
GGLVVVVADDPGMHSSQDEQDSRLLADFAVPCFEPSDQQEAYDMTRLAFDYSEEHEVPV
LVRLTTRLAHARALVTMAPARDVPARGKCTDPYSWILMPEMARRRWLALLDKQPIFRADA
EAASRLVLGSKELGVITCGLARAYYKENEDEWARAHGGERPSHLHIGRYPVGAEKIRALV
AHVKRVLVIEEGYPYIERDLRGIFGTPVPVAGKMTGEIPLAGELSADSVRLALGLQAREG
SAVAGIEVPGRPPQFCQGCPHADSITALKKALEGEAEFFTASDIGCYTSLALPPWNAVES
CVDMGASVGMARGAASVGQKHAIGVIGDSTFYHSGMTNLIDAVRYRTPMTLLILDNGTTG
MTGAQPTISGTSQLPKLLEGLGVEKEHIRVLEAHKRALDTNVA AIREEIA YDGVSVIVMV
RECIEWLKKARKS*

>SPBIB_v1_350035|ID:27164021| Glutamine synthetase, type I [Uncultured spirochete bib]
MKLSEWNGDFAGIDYVSFIVIDIDGRMRAVSLPSSYASEAVLSKGIGFDASNFGYAKVHA
SDMVAVPDMESAFVEQKDNFNILHVFCNVQTMDOGFFAQYPRSVIRAAQHALQASGIGDD
AKMLVELEFYVFEDVRYSTTAHHSYYYVESSEGIGEEYS DTPRLGMSQGYHRMAPEDRYQ
LLRNRAVKT MIDVGIPVKYHHHEVGAAQLEIELDFISMVKAADAVSLAKWILRNEAEGLG
LHVTFMPKPMYGVAGSGMHVHQFILKDGSRIFPGEGLYGLSDKGLAYTAGLLSHALTGSL
LAFSNPSTNSYRRLVPGYEAPVSATFAQGSRAAAVRIPGYLGKGEARIEFRTGDATANVY
YFLAAMLLAGLDGIQKGLDPVALGYAKEKPSEKHIFPMGLFHVLSGLKKDRSYLEPAFPS
ELIETWIARKEKEASYVYNAPVPQEYELYFD*

>SPBIB_v1_350036|ID:27164022| protein of unknown function [Uncultured spirochete bib]
MLSVCVSFFDTIVSYLVGLGKPGYNILAHELKCWGRSRGPSFKARVCELNRQGVLLRRL
GADMQAKTAAATDDAVRSSERGLP*

>SPBIB_v1_350037|ID:27164023| protein of unknown function [Uncultured spirochete bib]

MACASGKGACALHMPAQRQSRPRYASARAQSSKLCACHERYAQMVELADTLDSGSSAKAW
GFKSPSGHFQALFGEPFLLP*

>SPBIB_v1_350038|ID:27164024| putative Site-specific recombinase, phage integrase family [Uncultured spirochete
bib]

MGAKIRLRGKQKYFYLDICLNGKRRFEALHFALPADRQGQREAWALAEIIRRKRELQIAA
GRYQLVDPVGSKMTLIKYAEKIAAEYDKKMHLPKSLKYLRQYAGDTALVDVDERFIDAYR
AFLKQOGELGAKTAQHLYLAALKAVLARAERERLIERNPAKGVKPIRAPEHEKPYLTVEEI
QRLYNTPVEGELADEVRRGFLLSCTGLRLGDIRSLLWGDIREPEPMIKKRQNTGDIV
SIPLAPIAWELIDDKRLHRQDELVFPRLATKGVNPHQPLIAWRKRAGIEKAFGWHAGRH
SFAMMTLEASGDIYAVSRLLGHSDIKITEVYLRMTDQRKKEIIASLPQVKKDSERIIKLA
AEKK*

>SPBIB_v1_350039|ID:27164025| protein of unknown function [Uncultured spirochete bib]
MPKLTNIPIETFTKKVKS LAHEDAGTILTPSGIDRGILPQDAGTLPVRILQKYLRGTAG
LAYIQRKSLRAFRQEEHLSRTDLAKLFNVKVSQVARWLAPKKNNDLIPILVSDLMKAKI
YLIPKDLERVFSSITKVADDFKG*

>SPBIB_v1_350040|ID:27164026| protein of unknown function [Uncultured spirochete bib]
MNAAGYKKS PRGWGGHGAKGNSRTIINIDKNRENVKLPDWMRRKIAKIAARKDDFALFEE
QAVILLAAECSTFPKQAARIPESLREKLT YQRPDMLDPLERASIAIIAAQVEDLADIFVQ
HPYEDFFDLKARALAITLEEGGRV*

>SPBIB_v1_350041|ID:27164027| conserved protein of unknown function [Uncultured spirochete bib]
MSSDPYLDTVDELGAEEERAKKERLAKLEIVSGAALLTTHYEKPKYLWQGVLPDAGLAICA
ASKASGKTL LLLQLADAISRGRDFLGIPTTESKVL YLQLELSQRRTAQRLKMGIVPCAN
FDFAFRWPTGAEGLQALADSIEAQGYRLVIVDVLQLLWPIEADANSYQDVYAVLAPLRQL
ANDLGVMIALVTHRRKMETADYLDGVMGVSAMQANADVLLTLIRSRGEENAVLFLDGNDI
EAQKLALDFCTDPLGYRLSTASPEELRQTPERRRLIEYLREHGGHGRTSEIATALGIDDS
TVSRLRLADNGLIVRTQYGEYTLQKGIQTVQSVQT*

>SPBIB_v1_350042|ID:27164028| conserved protein of unknown function [Uncultured spirochete bib]
MEKAQNPCTALERDKMYQRPKVLECGEKLESIGDILHTHACKCYHYVCMEQNKIKRFL
ANGGYLRMSQAIAAGMSRHAFYALRDKG VVIQESRGLYKLSGQPDHPYPDL CVMSLRYPK
AILCLVSALSFHNATTQIPKEVNIALPRGSRT PAMRYPPLHAYFFSKASYETGIEEHIIE
GVGVK VYDLEKTIIDCFKFRNRIGMDVFLEAIKLYKAKAKVQPSRLAEYAKICSIEKAIT
PYLEAIL*

>SPBIB_v1_350043|ID:27164029| transposase [Uncultured spirochete bib]
MAITKEVLDELLKEYKGPEDLTGPEGLLKQLTKALIERAMDAEMTTHLGYEKHDQSEKDT
TNRRNGRTKKT VRS DQGP LEIEIPRDREGTFEP AIVPKHQREFKGFDDKILSMYSRGMTT
REITEHLKEIYGTEISP ELVSRVTDEVKELLEAWRARSLETSYPIVFLDALMINVREDGK
VVKKSIYMALAINWEGRKELLGLWIDQAEGAKFWMRVLSELKNRGLQDILIAVVDGLSGF
PEAIATIFPKTEIQLCIVHMVRNSLK FVPYKDRKAVAADLKALYASPSEE AALAALDIFA
AKWDSRFP MISRSWRMRWPEVVTYFKFPEIIRKAIYTTNAIESLNYTVRKVTRNRLSFPS
AEAAMKLVFMA LQNISKKWTMPIHEWKSALGQFIIFYGDRVPL*

>SPBIB_v1_350044|ID:27164030| conserved protein of unknown function [Uncultured spirochete bib]
MNNAVYTKFVIGSSRLIKRDISASIRQLFDLSKRENRPFG EVLQYYAIERFLFRLSKSK
YADR FILKGALLSVWHSEVLRSTMDIDLLGRLENSEETITAAIQ AILEQNVIDDGIVYH
ASTITTEAISEDARYRGIRVSFEATLAVAKIRLKIDIGFGDSMYPAPQSQEFPVLLDQEA
PHLLCYSRENAIAEKFEAMVKLG NLSRMKDFFDI WLLSRYFSFDQAILAKALKLTFTQR
ETKMDTSV VFSPEFSSLKQVQWEAFRKRQKLSYSPAQFSEVVNSLSRFLPCVSSEMADV
GEAMIWKPRGPWERKVKE*

>SPBIB_v1_350045|ID:27164031| transposase (fragment) [Uncultured spirochete bib]
MRKVTNAKASAILQGMQDREL YEKLLGLKEPWSVENVTLDLPSATVTVAISHPKGAKFPC
PVCGTERPIYDHQRRWRHLDT CGFTTILEAEVPRIQCPEHG VKQVNV PWGEPGSRFTAL
FEAIAISLLKVASFS DVARHLRISWDAASGIMERA VRRGLARREAQPLRRXXXDETSFQK
RXEYVTVVFDQERS CVVDVLDGRKKETLKTWLAANQNALGTLESVSMMDMXDAYIXAVRXX

>SPBIB_v1_350046|ID:27164032| protein of unknown function [Uncultured spirochete bib]
MAFRAQELCCRLDPPGARCLQVASSKRTECRIRGTFAQPGMFGPRQWAFLSPLFEFPVF

LG AHLVDR LIEVLRHMKPVK TDFLX AIGXX

>SPBIB_v1_350047|ID:27164033| protein of unknown function [Uncultured spirochete bib]
MGGDFVREELLSVQFKTMLQHACDMYCEIMCYAPPDTKSYGNSEIAQALSDGRVAMAVS
WGGQAAPIVKAGRNNGIEFSITPLATSWNATWGIGIISAIDSARAAQVLCMLLELMDKHL
DRLVAEYAGSPVRISTYASAEINEKCPWLKAQLEMIQNARHLPSSDSSLVESV NKIGERIA
KAVHGAE*

>SPBIB_v1_350048|ID:27164034| Helicase domain protein [Uncultured spirochete bib]
MIHRYV FQRSR SMPGKR FLEERLTGATGYDRIAGYFDTSLFELAGEALEQVQGSIRIICN
SDIRARDVEAAAAAAREQAQRLSFFKHDPEDLAKGGS DRIARLARLLSGQGTAKLEVRVL
PDDVFLI HGKAGVMRYADGRRTSFLGSANETFAGWALNYELVWEDDSDEACDWVQQEFD
RLWSHPLAMPLSKAVVQEVERLSRRT EVRLEDWKKNP DAGGVA VESPVYREQFGLWPHQK
YFVSQA WKAHQAHGARFVLADQVGLGKT VQLGMVAQLIALSSEKPV LALLPKTLMEQWQV
ELWDL LQVPSARWNGTAWVDEESHEYQPRGRDPILACPRKIGLISQGLIVHSPESLQCLL
EREWSCVIVDEAHHARRRKL PAPERGPAIRNP DTECNRLY AFLFKLASKTESM LLATAT
PVQLHP IEAWDLLYLLSQNNPHVLGDVGSFWLDPEKALPVVLGEAELPQEA AEIWPWLKN
PFPSPWESPHAKRLRLDAHMSERTAVCGLSFHEL RPAARTWASSLCSVFFDQHMPFVRNI
IRRTRSYLESTINPATREPYLTLIGIELFGED EPIPVTGYLANAYQEAEAFCLT LSQRIR
AAGFLK TLLRRIGSSIEAGRRTVAAMLARSQAPL TEDDEANEPENNGQEVQTETLSALY
PLTEKETEILQRCASLLEASEEDPKWQVILHFLKDEGWAE EGCILFSQYYDTAYWVARLL
STAFPDLPIGLYAGADKSM LIHQGRELRKERTELKRMVKEHEL SILVGTDAASEGLNLQT
MGTLINIDL PWNPTKLEQRKGRIQRIGQKRESVKILNLR YKDSVEDRVHQVLAGRLQDIY
RLFGQIPDVLEDVWIDIALGEVEKAKQELDRLPHRNPFDERYGRIDS VADWERCAEVVNR
IEKIEVLKQGW*

>SPBIB_v1_350049|ID:27164035| ATPase AAA [Uncultured spirochete bib]
MREERIR SILTGGEHETVEFKQALTQVPESLYETIC AFLNHKGGDILLGVDDD GQVIGIP
EDKADAFCLDIANATNNNTLFSPPYLLYPQKLLFEGK WIIAVQVPES SQVHRLRNMVYSR
GASGDYRVTVP EHIKIVNRKRTFYSEAKVYPYLHVSDLDEKTLQKTRERIRNIRPNHPW
LDLSTEDFLRKAGLYCRDLETGTEGLCLAAALLFGKEETILN ILPFYKIDALLKRSNVDR
YDDRCYVQSNII EAYLQLMEFIERHLPDPFYLEGDVRISLRDKIFREL VANLLVHREYTK
ADQTRIL IYQDRVEFSNPCIPHWRGRIDPSSVVPFQKNPLLSKMFLQLGWVVEIGSGLMN
VMKYLPLYTRSGHAEILEYEDFRVIVYLEAAPQATPQATPQATPQATPQAPSDRIATILE
FCKIPRSREEIQDMLGLKDREHFRKEILEPLIITGKLELTIPDKPRSPHQKYVTKGYTP*

>SPBIB_v1_350050|ID:27164036| conserved protein of unknown function [Uncultured spirochete bib]
MPHTPFIEIQFPLARLSAESYKERKANLGQTLTGLGKWWGRKPLILVRASLLGLLMPASD
DPEKDRQIYYKILTMDEDGLWRRKTKTMSAADIAQRLEPREYEGLIERK GSTASWVRGVA
KADKERLERIAFARLPYEDKLA YCCRPEEIDGPSPEAWKDIN AHLG TSAHSLPELFEQLS
QKAFGHRARV GDCFCGGGSVPFEAARL GLEAYGSDLNPVA VLLTWGAINLIGGGKDVQEE
VRAQEA VVWQKVDEQITAWGIEHDGRGNRADAYLYCVEAKCPATGLWVPLAPSWVISEKY
RVVA VLR CN DARQGYDIDIIS GASDDQMRRAKQGT VKDSEMIDPEDPSRRYSIASLRGDR
RGPNGETIYGLRLWENENFVPQDDIFQERLYCVRWVTPQGERIYMAVTEEDLARERKVL
ELLKERFAEWQEKGYIPSKKITEG VETSRLFRERGW TYWHHLFNPRQLLVHGLFHYFSDN
INKTRYNIFSMGRIADWNSRLSGWMPHEGNAKGNNTFY NQSLNTL FNSTRPV LKLDTNW
FINFDKAVYFAKRKTITL MPLDARDV TYTADLWITDP PYADAVNYHELADFFLAWY EKHL
PRLFPDWYADSR AALAVRGADEDFK KSMVEIYANLARHMPDDGLQLVMFTHQDASVWADL
GMILWAAGLRV TAAWTIGTETSSGLKQGNVYVQGT VCLVLRKRLEQRRAWIDELYPQVEDE
VKRQLDAMQAIDDTLQPQFGDTDYQLAAYA AALRVLTSYDSIEGRDITHELFRTRAKNEA
SEFERIIDRAVSIATNYRIPRGISSFSWRNLEAIERLYLAGLELERH GELRQGAYQELAR
GFGVAEYKFL LGDAGANQARFKTPSELKRLYLSASQNSNDKGTGAF AASLLRHLLFAIHE
AVRTENPREGLNYLKAERLDYWSRREDLINLLDYLA AARNLSALTYWEKDAESAGLLAGL
VRNDYVGSR*

>SPBIB_v1_350051|ID:27164037| SMC domain protein [Uncultured spirochete bib]
MISRIQLSNFKT FEALDIEVGPV TLLIGPNNTGKTTVLQAL TLWDIALR KWWEQKALSSA
RTRTGVTINRQDLFAIPIPEARLLWYNLHTRSGMTSNANVFMTMRLEGITENKQWHAALE
FYYANPESLYARPVKGEDDPENLKLALKESFSYLPPMSGLSSSEERLEEGSIKRRIGEGR

TAEVLRNLLWKIYNKEETKWKDLTSAIKKHFGTEVLPPVYNPATSLISCRIRESGKPEMD
LTASGRGFQQALLLSFSLHSQPYTVLLLDEPDAHLEILRQKSLYMALASEVKAKNAQMLI
ATHSEAILDLASQNDTIIAFIGRPHQSKKSELKKALIEIPYSEYLSAEQTGTILYLEGT
TDLEFLRAFAEVLQHPVREKLERPCVKYLNNDMDLARSNFNGLKEALPDLRGLITDNL
QKIHMPGLVHMQWERNEIECYLPLPHVLERYFAGATPDSPLFETQTMGTLKRIIEDQ
TPPAALRDMQDDFWKETKISDKWLGTVLKKYYAELGLPVQINKGDYFLFARHARPEELDK
EIIKKLDILNDFLA*

>SPBIB_v1_350052|ID:27164038| conserved protein of unknown function [Uncultured spirochete bib]
VKAKLPGFGFDPEKHAHFFAVIFPSASKGESTIKVIEHFEWPGGEVPDDTTISFDNRDLKV
FIKREFFNEVADAIKAEFNRLTAHGLPTGRWPARGGTALLSASFGKELLLLWAIEDAS
TSDIQNAVHNWLGLSPEERWWLYTMTNAATGQALAGRNRGWRKAVRFALCENPVSGVIIR
KRLALEPSLFEEVEE*

>SPBIB_v1_350053|ID:27164039| conserved protein of unknown function [Uncultured spirochete bib]
MTIFDNCKPRQSVFDRTRRDTVLNLSDFLEGKLDQAAEQFFTENFVTAGMKMLIQKSF
RLSGTHDQPSAYLLSQAMGGGKTHSMIVLGLLARFPYLRAKLGHDFHLGSRPYKVIQFDG
RESDYPIGLWGALAEQMGKRELFNPLYSPLQAPGVTSWVNLLKGEPVILLDELPPYFNN
ARSIQIGASNLAEVTATALSPLLVAANKEELSNVIVISDLSSTAYEAGTGFINQALENF
RQETRRNVPIEPVATQGDEIFHILRTRIFESLPDTSVRDEVARHYAQAVENAKQMELTA
ESPASFAALLRESYPFHYSRLDYGRFKANAGFQQTRGLLRMLRAVVANLWESERAKQLE
LIHPYDIDLNDQEIFSEFSTINPNLNEAVRVDIANHGTSHAEELDTKLGGGTQAQDAAKL
LYVASLSTAQNPELGLRDSSELIAWLCRPGHDIRMRTDVLEQLPASAWYLHVSNDGRFYF
KNVRNLAATLHGYYVESYTQETRIKELREYLKSLFKPNRSDVYQDCLALPTWEEVQPAQDR
TILVITEPYPIHVSDQIPLHPLDRLYENLEYKNRIIFLTGDRDTMNEVLKNAALLKAIR
TILAEQETEKLSERDPQRIEAKKNEDRILINLRSSIQQTYSVVVYPSSDKLRKEIRFNF
DSNNYDGEAQIRAALLNARKFSEDGTGNLDSWIAKVEERLFDNQNPNVRWKDVKARAAGKTN
WQLHLPRLLDDIKAHAIRTGKWREEGEYVRKGPFAKEPTS VNVQVKSRRNDDTGKVTDIR
PVGGTKVLYEIGDSRPTTASEAVPNYSAFETGELKLTFLCVDENDPAREAKPVVWKNRIS
LKSRIFEQAGERFIELIAPANAFYTTNGSDPRSKGASYAGAFPIPKGCRLVQAIARKD
DIESELLRRDVTQAEQVSVDPLKPLVWKTGRFQNLTTADAWQLITRLTEYGAQADGITIY
FELPDTGEEINYSPEGIQKNGEAIRAILDLVGNFAGNVNISMVQRIHFSGQDFLDW
ANKDRIPYDINSEVRQ*

>SPBIB_v1_350054|ID:27164040| conserved protein of unknown function [Uncultured spirochete bib]
MRFYLAAMDNDWFRYLRLSQVPEDINFWQPSGKKPANLAKGEPFLFKLHAPFNRIAGLG
FFSAFATFPLGLVWEAFGERNGCDTLQALSRIKIAHYQGIRGEYDPRRLVVCNILTDPVF
FNDSEMIDAPLDWSSNIVRGKYDTEEA VGARLWDQVMQRLEARRFLEREAVGEIGTASV
VVPEPQWREVIKVRVGGAFRFMVTEAYRRACAVTADHTLPVLEAAHIKPFSEHGPHLV
SNGLLL RADLHKLFDDEGYMTVTPDYHIEISKALKEDFNNGKIYYAFHGQQLANLPENPAD
RPSREFLQWHNEVAFKVG*

>SPBIB_v1_350055|ID:27164041| protein of unknown function [Uncultured spirochete bib]
MHTECRSTRVLSGYSRPAVLVAVLLSGCALFQPYRNVTAYPPDSKPQWQDINSAAQICR
VYLDYPLSIHAVKVDLQAQNLNIAVYPLAASEAGEGTSLSKKVSTFAKENHCFVAVNAN
PFAPSSATEGDLRTITGICVANGNTVILIVIDGRTSESVGATEEEVALWMRYFGADDAIT
LDGGGSSAMAILDGTIVLENVPVHGNVPGVERAVATCIGFALRE*

>SPBIB_v1_350056|ID:27164042| conserved protein of unknown function [Uncultured spirochete bib]
MSAQDVRWIQRFNHFSKAFALQEAVELSKQRKLTKLEEGLIQTFEYTHEMAWNTLKDF
LEERGTKKLYGSKDATREAFKTGLIENGEIWMNMIESRNLTSHTYNEETATEVISAILHS
YFAEFSDFHARMQELKEERE*

>SPBIB_v1_350057|ID:27164043| DNA polymerase, beta domain protein region [Uncultured spirochete bib]
MTARFGLKETTIIKHSVFEKYPQVEQAILYGSRAKGNRNGSDIDLTLVGGDELTMNVL
YQIMDELDDLLLPTFDISYRDISDSVDRDHILRVGAVFYQRAAEPTHF*

>SPBIB_v1_350058|ID:27164044| conserved protein of unknown function [Uncultured spirochete bib]
MVPTKMDLDQIAKEEAELVLDQFTEEDA WELGCLMVEEAKKRQARIAIDIRPGQIMFHA
ALAGATPDNDEWIRKSNVFRFGKASLAVGVSLALAETTIEQKSFVSPLEFSPHGGAFP
IRVRGCGLVACATVSGLPQEEDHALVVACIRKFKERKTPR*

>SPBIB_v1_350059|ID:27164045| Glycoside hydrolase family 13 domain protein [Uncultured spirochete bib]
MNTQEIRKQKTRLCIIVGIVALILTACAFQPKIEEPSPLANYQTVEPGTIENMGNPKMEF
IVPAHDALKPAADDIVIIYYRNDGNYEPWGFWLWAIPGGDGALVWEKTKNLEVIGNVGYL
RFFKKGSTFGVNVIGSSGMFGLIPRKDSAWEKDGQDRIIDSRAGNEWVVFQGDQKTYHY
GPYVPSIEAARLISPNEIVLDSLGRYGLSLEPGPSGFSVRYADGSGEIAVVDAVNNADPA
NRKNYARRVKLTLGEEVRLDRPIEVVHPSFLAPTTVNTSGLAATMADNIVPPEGFKLGA
IYDAVHKSVEFRLWSPFASRVARLYRTSLASTADYSLDLAKDPNTGVWQGSFDSVDPDG
FFYEYSVFFGNKENIVLDPYALSMDAFTGQGPGRGAIVDPSKAQPEGGWQGYTDYQLEKR
EDAIIEISVRDFTIAPDAGTKARPGSFLAFVEKLPYLKELGVTHIQLMPVLNFYNNEL
ETAYEATGRANNNNYNWGYDPHNYFTPEGWFSSNRPDPYARMRELKTLIKEIHKAGMGVI
LDVVYNHTATPSILDDIVPGYYYRRDAKGDLTNNSGCGNDVATEREMASRLICDSLYYLA
DEYKVDGFRFDLMGLIDVNTLLKARAAISAIPGKEDILFEGEGWKMYHGPALTMVNQDYM
TQTNEVSVFNDEFRDILKGGGLNDRTKGLVTGRPVNTSLVFNNLAGRPMLYYKADDPGDS
MNYVSAHDNLTADNIAFNVGLSPKYPEERAEIAARAKLANFFVLTGQPIAFLHGGCERG
RSKPKNSTSEVIGEYVHNSYDASDDINQFPWTVPSEYAAMA EWVKGLIAIRKAEPGLHI
GDAATISSAMKQIPHADQLSMGWTVNYGGTTLAMLVNANFDTSIDFDVGIDLSKAVVLVD
ADEASPQGVSKPSGIQVSGTKATVAPLTA VMLKLLTP*

>SPBIB_v1_350060|ID:27164046| Pullulanase, type I (fragment) [Uncultured spirochete bib]
MNQNWKEFLTIDIAPGENRRIAWADKVGGLDLMSASPCAGEGYVHGQESRLKDVLEVSG
RTIRSRNLCHVQVLPGEVAFSKEKAGGTKNILRLALLMEADAFWIELDTSQASERADGPT
SADAFAIESDGNRGTVEGGGRSVCLVLPEAQAGEADWPQPHE YRYTAFSLWASAGIEIAI
ASRQPF AIDQSPLESEVQIPHGFGTIRVEFSVPRDAYGADVPGRLAGHNHTLYIAWGKNA
EEALTRALQLAAEDA IQHHRAATSDILSSMDIATGNDEFDKALRWAAFSGWSLVTREYGL
GIWAGLPWFRDNWGRDFTIALPGILLVTGHFAEAREIIRTFANRQNTDPTSPDFGRIPNR
WRSPDDVIFNTADGTLWFIREVWEYVQYTGDTAFALEMKPFLDRALTADITRSDEHGFLQ
HGDADTWMDARIRGKEAWSRGRDRAVEIQALFYTALLCGARIAELAGDFGHA AHYREAAS
KLRSSFLHYFWRPEANRLADRLYSHSEEADLRVRPNGCIALAASAILPEEQALLPIEIEA
VVLADCVSRLVYPYGVASLWQEDPLFHGRHDGSPLYHKDAA YHNGTIWGWNA GPVIQELL
KFGQISLAQSLAAELARQILHDGAAGTMSENLDAMP GPDPGKVPVSGAYSQAWSVSEFVRT
AFQSFLGFMPRLADGELIAAPYPGFSGTVKFGTDQQLYIAASRGNSIFEYQIEWLGEIGA
DSSLELHLHIATNKGIKAAPIRQGGQLHLRYDEASGKMHSVSSYPPLKQAHSVIETRL
VIPIQPAFKNLHFASPHLPPWNKPAREPQYLERIILGSADTANPAVYLIKRC*

>SPBIB_v1_350061|ID:27164047| Alpha amylase catalytic region [Uncultured spirochete bib]
MKRLGAFLLVAIALLSPLAQESGQLWWKDALGPAYQVLIYSFADSDGDYGD IKGLTNA
LNYLNDGNPFGGNDLGISAIWLSPINSASSYHGYDVKDYKAIDPRLGTMEDFEHFVADAH
SRGIKILD MFVNHTSREHPWFLDAMRSASSPYVAYYRTKQPGTQYGS GGMGRFYRYTRP
DGSVFEYFSAFWEGMPDLNLDNTD VVNELKDILAFWIGKGVDFRFDAAKHA FDPNEMPA
GTPTLALNKSFWNDLRRYCRRIKPDVMFIGEVLTESSAEIAAYASVFDGLDFPAARLTI
DAVNRMGPGAFPN SYLNNYRQYQRIPSFQPLPLTNHDQDRAMSTLLSGLGLNATAGAEP
ESGDNQATLAAKALALTKAKLAA AISQTLPLPLPFVYYGEELGMTGIRYQND DISRRDGL
WTSHPGIPNTDWAKKSGKAVPGQNRLTSPLDIQLQNPESLANFYGSL SLLRAASPAIRRG
GYVPVSWPGFDNASILAWLRGDDAQTVLVIHNLGTPFHAATPEGIQLRLLWASDEELSR
SAGLKTSQAALDVTVPAESSAVFEVLKP*

>SPBIB_v1_350062|ID:27164048| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]
MNASITIVSGKLSRRAKARRTGLKIFQYTWLVL TCLVVLVPILWMIVASFTRGKLLSGVP
LLPNFKNFSLEHYTYLFTYKSSQSGARFSDFVASFLRSL SIAVVNTAAVVLLSSMTGFVFA
RFRFRGKKSLLVSFLLLQMFPSFMGMIAIFMIFRTFGWLNKPLYLVFIYAAGAIPYNTYL
IRGYMRSISLSIDEAAMIDGASKTQVFFKIILPLSGSIIGFVAVNAFMAPWMDYMLPNQL
LDMQNQTVAIFLYRLTDPFITMYYNPLNFMAGALLATPITLVQFYMQR FIVYGMTAGAE
KG*

>SPBIB_v1_350063|ID:27164049| ABC-type transporter, integral membrane subunit [Uncultured spirochete bib]
MANAPIATNKPKSWKAKPLAVGIASLLVPGLGQWLN RQRLKALIWFFIPLFILAIELGSS
QWGRYLELKQKGKVPPEALATAAYQNASATQEETSSQSDYMSALFGDSGQEGQTAGSGDPF
ADSTNAQENNTPAGSGDPFAQAAVSEENNKPGSTSEAKGADAEQGN YFNATYVYPNYRPG

EPHYPIRDFGGFFTRGIWGLVTLGRLVIDQPYAGGYIELYNKISPWLSADNSIVLLGNGL
ICLAVLLILGLLWVLGAIDAYSTRKRILSSGQVERFSAFWKRTWDSLYVYIVSAPAFVLI
IMFTVIPIFFTFLAFTNYTYKIKLGAKLIEWVGFGTFSYLAVDPGWLSIFGQIFLWTIF
WAFMSSFTVYALGFVNAMIVESPLVRYKKFWRTIMILPWAIPSLVSLMMFRNAFDKDGLV
NQFLFATGLMEPVSKLLFNIGLAGQADQPIFWFQPIYNGKLARFVVILVNLWLGAPYHMM
MIIGVLSTIPKELYEAAIDGASGSQRFRYITLPMVLSATVPALIMTFSFNFNNGAVYF
LTGGGPVWDPKVPDSMRIVGSAMPGQTDILISWIYKLSFTKGFEQYNVA AVYSIIIFMI
VGGFSVFNLLRSKSFREEAGE*

>SPBIB_v1_350064|ID:27164050| conserved exported protein of unknown function [Uncultured spirochete bib]
MKRRMAFVMVLILIGTSVFAQSKAVWDAKNRQFQIEKGAKIRLGVDNDKVGAAIVQLWDQ
LHPEAKGIVEYMNLGAAGSADQITQLQGDAPDVVLAIDGEVSRNAQSLPLHKVIADAAK
SFAVEPFFSGANSMAVKFIPVAYDGMTFAWNKTMMDALKLDTKDANKDGLPDAFDTWEE
IFALAKKWQTSRPTYK GKPV TIVYPMCLDEVWSGYSNLTAGGWEIFPKADPANPGFDQDS
FRAGLEFIKAAADAMISVEVNGARTPAASMVWRWDDALNNETAPFFLVGTWMDVNGAETK
GGYDIKFGPMPTWNGKRLTPFVKTKGWIINGFTKYPSAAHEL YRIL YTRDGLQAMVNNSS
YIPALKPNATNTPSYRDDPNKAEMAKAFANYPEPSITLPKNPAKKAMDGYYGIGVNLEL
RDTWDGKKTAEQAANLINLYNKWYEENNK*

>SPBIB_v1_350065|ID:27164051|nplT| Neopullulanase [Uncultured spirochete bib]
MNVAAIYHRSTDAFCYSPDGRSLVIRIQTASDDIESVEVWVGDPYEWQRINQESIQA VVQC
VRIKANRIGSNGLSDYWEARWVPPYKRARYAFRLYGRDGSICDLGEKGLVRIDPADRDPK
IDYWNSFLFPYIHQTDTRAPAWVASTVWYQIFPERFRNGNPNNDPPGTPKWSRGPVQNR
EFYGGDIEGIIQGLDHIEALGCNGIYLTPIFASPSAHKYD TTDYFCIDPSFGTEEDLKRL
VDVCKAKGIRIILDAVFNHAGKEFGPWKDLVERGPDSVYRDWFRIRDFPLFSPGQDSGDS
RHTNFETFGFTTRMPKLNTPETREYLLEVAVKYVRDFGIDGWRLDVANEIDHEFWREF
RKRKAVNPDAYIVGEIWHDAMPWLRGDQHDAMNYPFSAITDFVLGNAWALTGKDFLH
RINAISFSYPDTVLQSTFNLLDSDHTDRIVTRFQDRELAKIALCLLFALPGSPCLYYGTE
YALEGSRDPDCRRCMIWDPQPDEKEFERFVASLVNLRRTWWKTFAYGTRESSFNDSFPGF
VALIIHDDAMRLALLVNRDTS AVPEAAWRDALGLHSSAPVEVILASQPFAGFLGGRSAVY
LHM*

>SPBIB_v1_350066|ID:27164052| conserved exported protein of unknown function [Uncultured spirochete bib]
MRKILSFIAAFLILGGIVFADVS VKEVGDGKVEVTFFFGSTKANQVVIAGDWDTDWQNGAI
PMTKVENGWEYKIVVPANTVMKYKFIADGTWIFDIKAPDKIDDGFGGFNGLVDVAELLAA
KKGTTTAAAAPASGGSKLRFQ TWSMVG TQAKFDTTNMEVQSAGVGVKSYFKISGNALP
SMPIYAEIALAENDGFENLYKKGSLAFSDGLTNLLVDTIFDPIYYIDGQRKAATYLGHLK
LGFSDSYVNFVTGYKYAKLPGHTNVSWITVDSEWEAGWNETGGFAVFSLGPALRKIGDWT
VNATIGPNKTADRAGNQYGLFSYATLQANANHYFDFQYNGAFGTTYKTIFDEIYEADFIGG
YAGKFDPVTIKANALYNLWGANVINDSYITAYNPSTSDVSGAKQGLGFLPNFAANTQVAY
AGDYFGTTLGYRLRGFQANMMYVEQGADGHTHLVDQLGALNSQRVWLDVFAYPLD TL SVG
LYGYVDLVLDKTA AKLPYNDKDNIQLYAKPSFELKLD R VFDIKTTLNGYVKLTYNTATAD
QFTRGTNTSQFLFEGGLKLSMADVSKTVKIDLYYGF DNNNANYLFNTLIGAVKLPSDL
TLQGGAGLRTPNAGVAASSSPFGFFVGVAQKFKALQKPTAYA QFVYNMDPYNDFGSGPSS
FNLNDFVTYNGVNNYVGTA AVRIGLHWDL*

>SPBIB_v1_350067|ID:27164053| conserved exported protein of unknown function [Uncultured spirochete bib]
MKRIMFTLAVLMAVIALTGCPHQHTQVYPAYSLPIKQNVSTTTNTAAIQVTATETANSYS
KYTVTINKNLVADVGGKFFVAGASIGSTSSNIGDNWNVTASSVTDAGLVGTVDNTGTFSIV
FYGKAPSWGNAADGAQFKICIYDDPSWNLVLGDAGGNFYVAGSTGNDIELTIDPNKL*

>SPBIB_v1_350068|ID:27164054| putative Lipolytic protein G-D-S-L family [Uncultured spirochete bib]
MYANEVCLFGDSIARGVILDACGSYKPIRESFAFLAASELGFSLINKARFGCTIAKGREI
IERFLGRNAAVTTCSASLADPAGISRAPSVPQTATNIMPENASPNVAIHIRTDNSHAADS
SRPRLAFLEFGGNDCDFRWDEISADPHREHLPATTPERFFHMYGEVLQMLKQNGFKPVLM
TLPLNAERYFAWFTRAGLDQAAILSWLGDVQFIYRWHESSAIWEIGEAHNVPVNNIR
KAFLEQRNYSRFLCKDGIHPNTEGHRLITSEIIFKAQE HMSV*

>SPBIB_v1_350069|ID:27164055| conserved protein of unknown function [Uncultured spirochete bib]
MDEKAYEAVKAYLDALLAGKPPAWEQLPDISLYMDQVVSYLERQLGGLFAAEDERAITPS

MINNYVKAKIVPRAESKKYNQEHIALLLSIFTLKRALSVQDLGALLDGKPEAGSYREFYE
LFRKALIECAASTAEIFAGLGIKKSERALSGEAEKANIANIDESKLRELALKLAVEAS
LRSLAAERLLAIARSRELSGTQKPSSSRALSAAQEPSGRREAKKG*

>SPBIB_v1_350070|ID:27164056| conserved membrane protein of unknown function [Uncultured spirochete bib]
MRTKIIAILLALCTLFLSSCLPGDGKNTVDRPANFLTGIWHGWIAPIISLIVSIFNGKIR
IYEVNNTGWYDAGFYMAVISGFGGLAVSRRKRRREE*

>SPBIB_v1_360001|ID:27164057|leuA| 2-isopropylmalate synthase [Uncultured spirochete bib]
MARKIYIFDITLTDGEQAPRCMNLAEKLEVARQLEKLGVDIMEAGFPAASPGDAAAVRE
IARTVKNVRVAALARALEKDIDTAWAIRKAESPRIHTFIATSPIHMEYKLRMAPEQVIE
AAAAAVRYAKHYSSDVEFSAEDASRSEPDFLCRIFSAIDAGATVINIPDVTGYAIPPEEF
ARLVAYIKANTPNIDRAMISVHCHNDLGLAVANSLAALRAGADQVECTVNGLGERAGNAA
LEEIVMALRTRRDFDLATGLDTAQIFSTSRVSKVTGVSQINKAIVGENAFAHEAGIH
QHGVLANRQTYEIMTPESIGLPQNSLVLGKHSGRHAFEERLKYLGFDLDSARIDELFAQF
KILADKKKTVTDRDIEALARGASGTIPETYKLERFAVQSGTQLAATCTIRLARKDGSVYE
KAAVGDGPVDAAFKAIDEIVGRTLELEDLSSVTSGEDAQGEATVVKVFEGRTWNGHGV
STDILEASIKAYLAAINTMEWEMAVYE*

>SPBIB_v1_360002|ID:27164058|leuC| 3-isopropylmalate dehydratase large subunit [Uncultured spirochete bib]
MNDTAYTEKAMTMTQKILATKAGLKAVEAGQLIEAKLDLVLGNDVTAPPAIGEFEKLSCT
RVFDPEKVALVPDHFTPNKDIKTAEQTLKMRQFARAQNVAHYFEVGMGIEHALLPEQGL
VTAGDCIIGADSHCTYGA VGAFATGVGSTDLCAMATGTTWFKVPSAIRVELSGTPRGW
VSGKDVVLHLIGRIGVDGARYKSLEFSGAGVGHMDFRFTIANMAIEAGAKNGMFPVDE
HTRTYLAYVGAKEPVVYAADPGAFYDDIVRIDLGAVPLTVSLPHLPSNTRAIIEVEGMPI
DQVVIGSCTNGRISDLRVAQAQILKGRKVAKGLRCIIFPATQRIYLEALREGLIETFIEAG
AVVSTPTCGPCLGGHMGILAKGERAVSTTNRNFVGRMGHTQSEVILAGPAVAASAVAGK
LASPEKVSDAVPDRAWLYRM*

>SPBIB_v1_360003|ID:27164059| 3-isopropylmalate dehydratase small subunit 1 (modular protein) [Uncultured
spirochete bib]
MQQGQKQSEHMSEYGNQRKGGQSTFSAKTGAQILRGTVHAYGDNVDTDVIIPARYLTTS
DPAELAAHCMEDIDREFLKKVKPGDIMVAGENFGCGSSREHAPLAIKAAGISCVIAASFA
RIFYRNAINIGLAILESPEAARALSDGDEVAVNFESGEIRSVKDGAIWKAQPPFPFIREI
IEAGGLVEATKRRLAVRQRDYGAEAYQPATRTKDAL*

>SPBIB_v1_360004|ID:27164060|leuB| 3-isopropylmalate dehydrogenase [Uncultured spirochete bib]
MNYRIGIVRGDGIGPEVVGAAALGVLEAVGARFGHAFAKEELLAGGCAIDASGEPLPEETV
ARAKACDAVLLGAVGGPKWDTLPSHLRPEKALLGLRSALRVYANLRPAVLLAPLREACPL
KDEIVGSGFDILIVRELTGGIYFGKSGRTEDGQAAFDTEFYTRKEIERILRVGYEAARKR
RLRLCLVDKANILESSRLWREVNARISAEYDPVETSAMYVDNCAMQLVRAPGQFDVIVTS
NMFGDILSDEASMLTGSIGMLPSASIGEPGAPGKPTMGLYEPIHGSAPDIAGKDIANPLG
TILSVAMMLRYSFNLNKEAEAVEQAVARVLEAGWRTADIALHKVESTTRIVGTKEMGRLV
AKEVQRSRI*

>SPBIB_v1_360005|ID:27164061| AzlC family protein [Uncultured spirochete bib]
MESSRSGKRRVVLAAAFKASIPVLLGYTTLGLAFGFTLVAAGLPWWMSPVMAIFIYAGAA
QFMGIGLITGGAGLFEIALLTLLNNGRHAVYGLSMLEQFKSAGKWKPYLIFGLTDETYGL
LTTVKPPAHVEQARFYAAVTALNQSYWVLGCTVGSLLGSALAFDARGMDFALTALFIVLL
VEQVRAVQRFEFYVAAFAACILALFIAAPRDFLLVALLFATGLLSLLRPRLDGRKPAPAS
TQGPQGGGEAQ*

>SPBIB_v1_360006|ID:27164062| Branched-chain amino acid transport [Uncultured spirochete bib]
MTRLFAIVVIMTLVTFFFTRAVPFLFFSRTKPPAFLDYLRQYIPPVVMITLVFASYKDIEF
TQTPFGIPAAAAGVLTALLHIWKRNVLVSIAGGTAVYMLVLRVL*

>SPBIB_v1_360007|ID:27164063| putative acetyltransferase [Uncultured spirochete bib]
MEIRKGSIEDVPAWFELVYAVKSENLPFLFEMTTPITLESSYRYMEKILSVDGSEVLCIF
DGSKAVGSLDCLRKERKEENHVASIGMCVAKASRGQGIGRRLLSLFEICKQEKKIEKIE
LDVFSNNPGAIALYKSLGFELEGVKKGSIRKDGAEIDLICMGKFLY*

>SPBIB_v1_360008|ID:27164064| putative alkylmercury lyase [Uncultured spirochete bib]
MGTMNITFLYFNGCPNSEPTLENLKTALAELENFADLSIIEVKDPQQAASLGLGSPSIL

VEGRDLETGRPPAGSAFSCRIYEIEGRRTGRLPKDYIKARLQSLAQTGL*

>SPBIB_v1_360009|ID:27164065| putative reductase [Uncultured spirochete bib]

MLKIAVIIGSTRPGRNGEAVGRWVYEQAKKRSDAQFELVDVKDFNLPLLDEPVPTSMHQY
TQEHTKKWSEKISGFDGFVFTPEYNHATTGALKNALDYLWTEWNNKAAGFVGYGSMGGA
RAIENLRLIMGELQVADVRAAVYLSLFTDFENFSVFKPLPNREAELNTMLDQLVAWAEAL
KAIRT*

>SPBIB_v1_360010|ID:27164066|ppiB| peptidyl-prolyl cis-trans isomerase B (rotamase B) [Uncultured spirochete bib]

MANPIVTFKTSKGDISEVFEEDNPITAAANFLEYVKLGFYDGTIFHRVIPGFVIQGGGFA
PGMEQKKTRAPIVNEASKAPPNARGTLSMARTSVPDSATSQFFINLVDNKSLDYRGPAG
AGYCVFGRVTEGLDVDAIAQVKTGRRPPHADVPVEDVVLISAKVV*

>SPBIB_v1_360011|ID:27164067| conserved exported protein of unknown function [Uncultured spirochete bib]

MKPNQSFSGSIVVCMGSSCYARGNIYTVHEIQSWLARHGLSASVELSGSLCGGRCKEGPVI
IINGKVYTNVMPETIEDILVHEFEKAGDPELVQPDSTCSNTSAGDSWRVDP*

>SPBIB_v1_360012|ID:27164068| conserved protein of unknown function [Uncultured spirochete bib]

MNRQVIYTETMRCQDCYKCVRECPVKAIQILDGHARVVEDICILCGHCVMPQSAKKVR
SDVERVRRLELKPVAVASLAPSFAAEFSGCTAGQLIASIRKLGFAAVSETALGADLVSS
AMRNELGQLADNGRNFLIGAACPAVVRYVSFYRPDLVPFLSENGSPMIAHARYLRSRFG
NALVVFIPGCIKKKEADESGGLVNAVLTFAELRQLFEEENIDPSAEKPTSNDTFFPQRP
SKGELYPIEGGMIAKQHGSTDVPCMSFSGMGHIQAALRDLDPGIPETGIFLELLACEG
GCINGPCSDASRGTVSKRMQILLYEKQGESEPFNTEIACQVKHSAKPVQRQVREEEIRA
ALALVGKKEPSDELNCSGCGYDSCREFAKAIVIGHAETMCLSYMRLAQKKANALLRAM
PSAAVVVNADLKVIECNEPFVRILEKDAQFVAEAKPTLEGADLRKLLPFWERFNDVLHHS
PGDAFIESDFRCGERILHGTIFSIEKQMIAGGLFQDITAPWIQKDRVIKEAKKVIRQNV
TVQKIAYLLGENAAESEEAALRSIIESFGGEVQ*

>SPBIB_v1_360013|ID:27164069| Stage II sporulation protein E [Uncultured spirochete bib]

MIESENKPMHADFFVEIGHWQVAKYGETSEGDVFISRKTEDGRII AVLSDGLGSGIKAGV
LAALTATIATGCSAARIPIKRTARIIMRSLPVCSEKISYATFTLVDIDTSNRIKVVEYD
NPAYMLVRQGVVEPLRSMVSVTKGGGRIAGHPKPATLRSSRFKAIEFGDRVIFSDGVTQ
AGMGSRNPLGWGLEGVRRFVSQMIANAIEISARDLARRIVTWALLDGDQAKDDITCAV
VYFRAARRLAVFTGPPLHPAHDNELARLFVSSPGRTHIAGGTTATIIGRELGRKITMDLK
HRDPELPPVASMEGADLVTEGILTLTKTADYLEQGAAPPELRQNAATAALRLMLDSIII
FFVGTKINEAHQDPNMPVELDIRRNVKRLAHLLEGKYLKQTTIRYI*

>SPBIB_v1_360014|ID:27164070| conserved protein of unknown function [Uncultured spirochete bib]

MKKVHVHTICAGTACYVLGGAELLGAIDSWIAKWGEQVEFEGTPCLGFCKSAGEAKAPYVL
VNGLVVEHTTAEKLEEMVNSALLGTEEEASSADAAARPGNAITRKDGGYASGR*

>SPBIB_v1_360015|ID:27164071| Hydrogenase large subunit domain protein [Uncultured spirochete bib]

MPREDNTTRIRRELLVRLGRLALEGTLADSIDDVPFDMTAEGWETMRCCVHHDRAILRLR
SYALLGGDVRGMDDVRKPLSVLAEGFQNSRCQDGAELGESGRFPLQVLGEACNACAHSRY
VVTDACQACVARPCKVNCNPKGAVTVNGRSHIDPKCVNCGLCCKSCPFHAIKVPVPC
VCPTGAISKGEDGIARIDEAKCILCGKCLRACPFGAPIEQTYLEAASWLREQARPLIAL
VAPATMAQFPVSSGKFMAGLYRLGFAAVAEVAEAACATAEREAELRERMHRSEGFLATS
CCPSWVLSKALGDVAGHVLHTPSPMAIAAKWARKRYPEARIVFIGPCLAKRAEARGFPG
EDGRKLVDAVLSAEEIGALFTAKDIQLQALEEARAVQLAEQSSLDLCYGRGFAQSGGVA
ASVQSVLENENSRIEVGSSWTIRTLVIQGLSKQVLALALWKNQAPDADLVEVMACEGGC
IGGPLAIAQAKSAAVFLQRYMSEPPPEAKVASSEAVEKAV*

>SPBIB_v1_360016|ID:27164072|carB| carbamoyl-phosphate synthase large subunit [Uncultured spirochete bib]

MNAQNTLRKPQKVLVLGSGGLKIGQAGEFDYSGSQALKALREEGVTILINPNIAATNQTS
EGMADATYFLPVPDFVRQVIEKERPDGILLSFGGQTALNCGLALSREGILYKYAVDVLG
TPVEAIELTEDRKLFAEHLRTLGLKTPESKAAVSVEEAIACADEIGYPVMARAGFALGGA
GSGICRNRRLVARCEKAFALSTQVLIEEWLGGWKEIEYEVVRDSADNCIAVCNMENIDP
LGIHTGESIVVAPSQTLTDEEYHSLRSIALKLIRSLGIVGECNIQYALDPNSGDYRIIEV
NARLSRSSALASKATGYPLAYVAAKLALGYSLTELNRNKVTGVTTACFEPALDYCVVKMPR
WDLKFKAVDTQLGSEMKSVEVMAIGRNFEALQKAIRMTGISELGLRADGKLLGKSFT
NLATALKKPTDRRLFAIYRALAEGWTVKKINSLTGIDSWFISKIATIQKCEAELAATVRT

ASRGGTSAASPSVCPPELLLRKAKRLGFS DAGIARILGCSEQEVRSWRESIGLRPAVKQID
TLAAEYPAQTNYLYTTYCAAQN DIAPSHTSILVTGSGPYRIGSSVEFDWCAVSA AQTCHQ
LDKKTIMVNCNPETVSTDYDICDRLYFEELSFERLMDIYEFEQPSGVLLSMGGQIANNLA
LPLFEAGALILGTSPQSIDRAEDRHKFSRLLDELGIDQPAWKELTTIEEARAFAS TAGYP
VLVRPSYVLSGAAMNVAWDDSLATFLGLAADVSSEHPVVISKFIENAKEIEIDAVARHG
KLIYHAITEHIENAGVHSGDATVVFPQRLYIETVRKILRITEQIAAALNITGPFNIQFV
ARQNHVMVIECNLRASRSFPFC SKVSRVNMIDLAVRAMLGEPVTAPPSLMYDQPWVG VKA
AQFSFRLHGADPVLGVEMASTGEVGCIGSEFNDAFMKAMVSVGYALRGK KILLSTGPLE
DKLDFIDSARTLAEMGCELYASRG TALFLKHFGIPVTQVHWPLEKAEPNILTMMRAREFD
LVINIPKNNRRRELKNDFLIRMAIDLNIPLFTNIKTARQYIESLAYTRRNGIEIRAWEE
YR*

>SPBIB_v1_360017|ID:27164073|carA| Carbamoyl-phosphate synthase small chain [Uncultured spirochete bib]
MFRKEKAAMLVLEDGTVFEGYSVGADVSSEGEVVFSTGLVGYPQSLTDPSYCGQILAF TY
PLIGNYGVPA LKRNSHSIPLNFESDRIQVSGVVVAEASFEP SHHSTNLSFPEWLKQEGVP
GIAGIDTRALTRLLREHGV MKGKILVEGAGLAHTNLEKADSPVKVVS VKEPIRYPAGPGA
PKLVLVDCGVKANILRILIDSGVDVTRVPWDYPFETLEYDGLFLSNGPGDPKACTRTIAH
LRHALTQKRPIFGICLGTQLMALAAGADTYK LKYGHRGQNQPAIERTSGRCYITSQNHGY
AVQEASLPPGWESWFTNGNDGTVEGIRAAGAPFKA VQFHPEGCPGPRDTEFLIHQFLDEV
QNRSAK*

>SPBIB_v1_360018|ID:27164074| Auxin Efflux Carrier [Uncultured spirochete bib]
MLSALQSVFSVILMIGLGFFLAKRRWFEGSSSALISRLVVNVALPAYMISNLMGGYDRAK
LLDMLPGLPVPFLVMIVSYVAAMGLARLIRVQKDRRGAFQSMFALSNSVFIGLPVNVLLF
GDASLPYALLYIANTTTFTWIGVYGI AVDGSIRKNGPRPSLVLSGLRRLSPPLLGF
AAVIMIMLGIRLPK SIMDTCRYLGSMTTPLSMLFIGIVARVEWKALRFERDFLVILAGR
FLVTPALMFFLVRGLDFPLLMKQVFLMQAAMPAMTQNPILAEAYGADAEYTAIGTSLTTV
LSMLSIPYMTLVGVLF*

>SPBIB_v1_360019|ID:27164075| conserved protein of unknown function [Uncultured spirochete bib]
MTDFDTLFLKRKSVRAYEDRPIQPRVRAQVLAATMRAPTAGDLMLYSVLEIEEQALKEKL
AETCDHQQFIKAPLVLVFLADYSRMMAYFEHHGVPEWCARTGRPAIKPRESDLLLACCD
ALIAAQTAAIAAESLGLGSCYIGDIMENWEIHRELLALPKYTFPITMLCIGYPTQQQKDR
LQPPRLPEQLIVMKNRYRPAAPEELASMYQGKGYGKFALHGDAENAAQALYDRKFAADFS
QEMRRSVAAMLKDWE*

>SPBIB_v1_360020|ID:27164076| conserved exported protein of unknown function [Uncultured spirochete bib]
MKGALIAFGLGTLPTGSLYVEIQFMGLAFAAWRFVLT LGALTITGLIMQRIISTK KKKKA*

>SPBIB_v1_360021|ID:27164077| Sell repeat protein (fragment) [Uncultured spirochete bib]
MKRLFVFLLVFFIAFAFASAQTSASDIASLRAAAENGDPKAQNSLGIKYFN GDGVAQDLA
EAARWFEKAADQGNATAQNNLGFLYEEGKGVPKDYAAALGWYQKAADQGYTAAQCNVAWL
YENGLGVAKDYEKAFHWYEE SAAQGYAYGQYSVGVWFYDKGLGVQQDFGEAVKWYTLAAEQ
GLPDAQYMLALKYENGEVDADYNEALYWYNESAYGENTDAMLALGFYYEFGFAVDDDPV
RALAWYMIANDYGSEEAAGYVTDLSKELTEEQIAKARLIADDF*

>SPBIB_v1_360022|ID:27164078| conserved protein of unknown function [Uncultured spirochete bib]
MSTSEKSDTSASNIPPSTQLARKIIEQLSTVIDPELQSDIMSLQLVENL FVGEDGSVSYT
FRPTSFACPYGVNLAMEIKKAIASVKGVTRQEIHIEGFVA AAKELEELLN*

>SPBIB_v1_360023|ID:27164079| conserved protein of unknown function [Uncultured spirochete bib]
MPYRDGTGPMGRGPMTRGRFGYCGAGAGFGAGFGPGYGMGYGRGFGRGMGFGAGFGWR
AAAYGAVPYAVPAVPTIEAQKSALEYAQKALELRLEAVKAELDALKKSESEAPKA*

>SPBIB_v1_360024|ID:27164080| Transcriptional regulator, PadR-like family [Uncultured spirochete bib]
MPGGPHGRFGAGRGMGRGPAGPMFLQACLLVLLHKGKSYGYSLAQDLKQFGFDPARIDIS
IYRALRGLEMQGLVETA WDENSLGPQRRMYEITPQGEAVLSAWMQLNHQRKLEIEALES
VYDEVTRHP*

>SPBIB_v1_360025|ID:27164081|trpE| Anthranilate synthase component 1 [Uncultured spirochete bib]
MNGRRGDEIVFSMPGERFTPFTLAKKLGSKAILESASF KQGRERYSLLLVDEAFRVRQER
DGVSVFVNGISRPWTPKSELAERRKKGKYDILDALS YIASQNAGVAPHLVPASGIGFLGY
DFAARCDTVKITAKPDAIGVPEAEFIVGHL YLVFDHFTDTIHGIALNYTEHEVDLDARIR

DLKKRLSDLDFSHLAPPEEA VSFNVISDEEADKRVYMDGVEKIRERIIAGDIVQAVLSRR
LVVSSLDALEGYRRIRSASPSYLFYIDFGTYALVGASPELVRLRNGVASIRPIAGTR
RRGSTPKDIELEKELLADPKERA EHLMLVDLARNDLGRAC TPGSVRMTRNFEPERFSHV
IHIVSEVEGIPAKDHTNLDVLRSAFPAGTVSGAPKIKAMEIISDLEPMDRSFYAGAVGYL
DAAGGFDT CITIRSALVKDGRWYLQSGAGIVYGSKPEREWEETNEKLAALRAALSGGK*
>SPBIB_v1_360026|ID:27164082|trpGD| Bifunctional protein TrpGD [Includes: Anthranilate synthase component 2 ;
Anthranilate phosphoribosyltransferase] [Uncultured spirochete bib]
MTILIDNYDSFTYNLYQLLARLSNEPVIVIRNDEINIEGIEALKPKRLVISPGPGRPENA
GISVAAIQHFAGKIPILGVCLGHQAICYAFGGNIIQAKHIKHGIAEEISLDGRGLFRTIG
NKS VFTRYHSLVIDEATLPSCLEITARSADGDIMGVRHTFFNIEGVQFHPESIASEAGEL
LLKAFLTYRREPFAFKFTLEKLLTRQDL DRETAESFMEELTDGALDTPKTAALLTAF AAK
GPAAVEIAGCAAVLRRKKT PFTTKVPVTDTCGTGGDEMGT FNISMAALAAAACGLPVAK
HGNRAVSSKSGSADFYEALGVPVNIPVAAAQTLLEKTNFVFLFAPFYHGAMKHAAPARKA
LGIKTIMNLVGPLSNPADASYQIIGVYDKALLRPVAAEARLLGVKRVMTMRSRDGMDEIS
PCALTDIVEISEDGIVKEYVFDPKAEGFGTYDHNELKGGDANDNAKLAL ELADGKGYPAL
EAATAINAGAALYISGRTKSIVEGAKQAAAALASGAVA AKIEELKMAARIFAADGGAYH
G*
>SPBIB_v1_360027|ID:27164083|trpCF| Indole-3-glycerol phosphate synthase/N-(5'-phosphoribosyl)anthranilate
isomerase [Uncultured spirochete bib]
MADILEKIVADRRRDLAKFGPSFGSRIPT RRLRPLVPFLAEPAAILEIKRASPSRGDIVQ
NLDPRKLVAAYAAAGARNISVLTERNYFKGSLEDLVDVAIARPELAYLRKDFLLQEEEEIE
LSYRAGADAVLLIARILDVDLLRRMAALCRSFGMTPFVEVREYEDYAKLTAAASDGVVLS
GANARDLATFAIDPLIPAAARSRLPGRAVYESGIDSAGAAA YARRLGFDGILVGEAAIKD
PGGISAIINGFQSAKEDASGIFWRRIAERRETRVNNLKRSLVKICGLARTEDALLAADLG
ADLLGFVFAESPRAASKQVVREYQYLYKQQRDLSKDDPKPLL VGVITEIHSTKAETAL
SLAREGILDAIQWHGESTPAALAALDVVLE GKAGRYAAARIGNAEDLAVIDLLRRSGEPR
ILADARAENVAGGTGMAIAAELAKFMADR GFLWLAGGLGVGT VGHALKSYAPELIDASSK
LEVEKGGKDHGLMAAFFKEIDEYAN*
>SPBIB_v1_360028|ID:27164084|trpB| tryptophan synthase, beta subunit [Uncultured spirochete bib]
MPTSDKIMARRSDKGYFGPYGGRYVPEVLRSAIEEIEEAF FEEIADPSFNAELERIRSEF
IGRPTPLLYASNASKLLGGADLYIKMEGLAHTGAHKINNAV GQALLAKRMGKRRIIAETG
AGQHGVATAAACAKLGI ECVVYMG AIDVDRQQPNVATMELFGAKVVPVYSGSKTLKDAIN
EAFRDWAESFSNTFYLIGSALGPSYPDMVRV FQSVIGRETKAQLAERGVTPEVLVACVG
GGSNAIGFFEPFLDDETPRLVGVEAGGIGQ GKGEHASRMTGNGARTGIVHG YKSRFLDD
DGQVAETHSISAGLDYPGIGPELASLGRSGRIEF RRA TDTEALEALTFLAKTEGVVFALE
SAHAASAALSLARSLQPEKAVV VNMMSGRGDKDLFITAPLLRPKEWKDFLERELVAMNVSQ
GAKK*
>SPBIB_v1_360029|ID:27164085|trpA| Tryptophan synthase alpha chain [Uncultured spirochete bib]
MSVERIPLMAHLVAGYPDASGCRAAARGLVEGGATYLEVQIPFSDPSADGPTIRDACSSA
LEKGS SVKESLALVADLHATY PEIPVFVMTYASLVFAPGIVTFV DAAAKAGAAGLIVPDL
PFDAD EQLAQACVAASEKIPGAICSIPVAAPSMKPIRLAAMIALGRPYIYAALRAGITGA
ATEINADTKMFLSAVNKGGSKIFGGFGIRSGA QARAVAPYVHAVVAGSVFVETVSAVVLA
QSPESKTASARSLQIRNEAIRRAVYKKAKEIIAG*
>SPBIB_v1_360030|ID:27164086| Radical SAM domain protein [Uncultured spirochete bib]
VESIVKPPEKITLALSHTDSIAFNKLIHVSPQTIDKLIDAPALRKAI AKVFEWSTYRSSL
SFKEYPRQVQLDKFYITRAFIKAIDAALASAQKSPVFRHSLVNSVLPAMFSAIDKTAERE
EAFKRRYGF GPPRFLVLSPTKFCNLHCTGCYANSDSASREKLSFETVDRIIREKTEVWGS
VFTVISGGEPLLYESEGKTILDLARAHQDNYFLMYTNGTTIDKEMARKLA EVGNITPAIS
VEGYENETDARRGKGIYK KVL SAMENLRAEGV PFGVSLTATKENAHLIPSKELVEYYTRL
GALYFWIFQLMPIGRASMDLVVTAEQRLDMYNRMFDLIKND RYFIADFWNGGTL SNGCIS
AGRMRGGGYLYIDWAGHVTPCVFNPYAAGNVNEIYTRGGELSEVLVSPYFESLQEWQKDY
AMNDEKYEGNWVLP CPMRDHYADMLKILEKTNPEPTDEAAAEALHDPTYHAAMIQYDKEL
EQTIGPLWKKKYLKH*
>SPBIB_v1_360031|ID:27164087| putative Transcriptional regulator, TetR family [Uncultured spirochete bib]

MENQVRERIVDQSKELFFNRGVRNVTMDELASACGISKKTLVYVNFPSKEELLHYIMMQLR
DELVERVRCILSDTSQPVFSRLRDVINA VSLHSMQFAPIFLEDVKRFQPGTWRELQTYKK
NGIADAIRTLIHDGQAQGYIRKLPENFIIHVCFALIDDILTPETMLELSMPFHDLFEHLM
SLFFEGFLTEDGKKAIYYIESS*

>SPBIB_v1_360032|ID:27164088| membrane protein of unknown function [Uncultured spirochete bib]

MAKFVYKFRFFIIAAFVLLTLVAALFIPNLRFDGDIQALAPTNVSSVEEYKSVSQTFFGA
DSLAFSAQSEHLFTPEALSEAAAIGKELQSLPDVSDVSVFTYVEPVNTTDGLSFIPYVD
PDALPQDQASADALRARLSGIKTVSGKLLSADGDTLLYIIQAAPNVSRIRLIEGIQGIMK
THPGFSFQMAGTSFIDYQMVSYMKHDVVVLVAFGLVAVLLVLLIGFRSLRGIFLPLFTIG
CSLIITFGFMGLLHAKLTIVALIIPVMLIAICNNYAIHFLTRFYEDVVFVNGMTDKVEIID
SSFKSLSKPVWLAFLTTVASFISFVTSPIPRIAEMGLFIAFGITYAFAMTMFFIPALLSV
LPPPKKHRRYHANEALISNIAQKAGRITKRRLAILAVTLVIAIAGIIFIPRIVVDSELA
NYFNPKDPVRQGIDFINKKVAGSQIIVSLPLDPRTAEGLA KARQFQDYAESLGSVGSVF
SIVDSIQTLNRVFDNDPAFDTVPDNDDEAAAQLLLLVETSLSPERLVQLVSEDYQNLCSF
IQLKAVDSATLQKTADMLRAKAHEIVGPQGVAIAGVSLISNQLNHLVIISMLQSFAIAFV
LIFAFVAFGFRNIPAGLASAGIMIAIVLVVFGFMGFAKIELSTATALVASITLGVGIDYL
IHFSARWFSERTSGKSLEEATSRTLSTGRGIINAMAIIFA VIPPFFSQFRPIMYFGIL
CFMSILLSLIGGLAVMPAMLSA VPERFFKRIRVG*

>SPBIB_v1_360033|ID:27164089| exported protein of unknown function [Uncultured spirochete bib]

METLKISRIHAPRRARAPRGRHVVMVLALLSVGIAGPAWAQASLSGEISAFSGVFFTDSDG
SFKAGDYFQPSVSLKLAPSYASGPLTMKGELTGSISLADTGYAASMKLGETYATVDVAEG
LSFTAGSKIISWGTA L VANPEGFINPVDSLSQLVSENRSDWLLPVPLASAKYIKGPFSFE
AVALPFFRPSTIPAATSRWYPAQLAVLDAKNGSVIPASLPSFPGATFSVSTTPADPALNI
ETMQGAGRTSLALGAVDVGLSGWYGFTKTPAFDVTTVGMPINVDITASYKRQGA VGMMDM
SATVLDSSVWLESALYLPEYYIGTENSGLPVALEKNTLKS AFGMDRTFSIGSIGDLYCA
LEGNLSWILDYDSRLASAIKETGLGATLVTEYRSPSQDFTVRLVVMEPDFLSVDTTKQYL
VRLSMKAKLADGYSL SAGATLFEGTSGTIGQYANNDFA YVAVTASF*

>SPBIB_v1_360034|ID:27164090| conserved protein of unknown function [Uncultured spirochete bib]

MNNCAQIAGARASRAPGKPAHCGATTIFAAKSLFVLLFGLVLMITAGAQTTSQSGYDIMK
KANDKPTGNDMTANVLMKITSKTGSVKTREFVMYELKQKDGSSSILIKFLQPADVKGTSF
LTLESGNGEKSQYIYLSLKKVTRIAASDKNKPFMGSDLYDDFGSRKLD DYSFNLLGEE
ILEGRACWKIESVSKDTSQSTS KIISLVDKESYIVLVDFYDKTGALYKQMVVQKTDKIS
GFWTMLELEMKNLSTGSSTSLKFDVVKYNTGLSPSMFSKDGLGK*

>SPBIB_v1_360035|ID:27164091|uppP| Undecaprenyl-diphosphatase [Uncultured spirochete bib]

MLVFQSIILGIVQGLAEFIPISSSAHLVIIPWLFGWNNPTL TSLTFDVALHLGTL LAVLV
FFASDWARLIGAWFKSIFQFKIGDDPDRRMAWYLVLACIPGGISGVLLESKIGQAFHSDP
IPKGSMLFMAGAIALLALLWLADKLATHRRAFGKIKARDALYIGLAQAFVIPGVSRSR
STITAGLAVGLEREAARFSFLLSAPIIAGAGLKS LYDLLKQVKAGAIAGTELAIFPIGF
VAAAISGFLCIKFLLA YLRKHSTAVFVWYRFALAALVLIVALARG*

>SPBIB_v1_360036|ID:27164092| transposase [Uncultured spirochete bib]

MFVQTLFEKKTGR TLLFY YTARRVKGKIVKTKVKRIGYLDEF LDAYPDPLTHFRQEAKRL
TQEAQLKTLTVTF SMDEHFSFGAGFAATEDAAVEKADRTFHYGVLPLLQLYRELKIDAF
RIKAQYTKVDFNHNHLFQMLVFGRILFPESKLATWRDRTRILQHSDFSDDAVYRALPFFA
QIKDALVQHLHEQVQRQYHRDTLLY YDVTNYYWEVDREDELRRKRGVSKEHRPEPIVQLG
LCMDNSGLPV TYGLFPGNTNDVATMRPMMQH LAESLGTKHLIYVADKGMMGGMNIAQIIL
EHNGYVISSSVRKADAELRRYILDHEGYTELAGGSFKYKSRLVPCTLYVDTPDGRKKQIR
INERQVVFWS EYWK KARHDRDMAIAKAMARAGY GENTVLNNHAGNRFIKKEIFDPDTRK
EVDHPEFSFALDQELLDSEEELDGY YLIRSNVGVREGDAPFNQPYRWHAKDNL FELNRP
VVDLDIIDMYRGLWRIEESFKITKSQLKARPAFVHRQDSIEAHFLSCFVALLLLRLEKR
TGEKIPVATIVESLRKAQLVQLEDETYVNACCDNVIEAIGQALELDLTKKYYTKGELKAL
RGKTAKSR*

>SPBIB_v1_370001|ID:27164093|fruA| PTS system fructose-specific EIIABC component [Uncultured spirochete bib]

MILQRAFKPASIKIGLESEDKDELLEELVDVLAKTYPKDKKEFPREQVLDALWAREEK MST
GIYKGVAVPHATVEGIDSLHGVLGISKKGIEYESLDGSPVYLVFMLISSPGEAELHLDAL

RKIALLIQDPVLLDNLKMAARPEQVFALIREFEASAVL*

>SPBIB_v1_370002|ID:27164094| protein of unknown function [Uncultured spirochete bib]
MDSVDSIDKLEIERQAAAIKEAEDKASRILLDAKNKSESLKDKLAEARMKFESDLAA
SRDALRTQTQKEIEDYKASLKNIPLNQTALSALEDLLKQEA*

>SPBIB_v1_370003|ID:27164095| protein of unknown function [Uncultured spirochete bib]
MADSFEIAYLYARVCGAFSKMQLGEAGRELMRNPGGIPALWKL YFNEEPPTIPESKLIFE
AERKIIQRSISSFLRLAKPLSDSDAFIHALISKFEITAIKSMLFRLRSGEPRPEEISYSS
PVIEQALSAPWRLADMFDTPYAWLDNSWLDNIALAENKLDQRYYLDLWATASRIPKPKL
GAILDLVRWEIVYQNVIWALRIRRYNMSRQDATSMLVDIKGIDTTSALQTFDFDIDRL
DSFDSWPLKLLSNQTS AHLDVPVLEIRAQEELFTMVRRALHLHPFSYTPVYCYFKLLEY
ETSLLAVLESARLGVTAEQKSKYLWIPGEETA*

>SPBIB_v1_370004|ID:27164096| V-type ATPase 116 kDa subunit [Uncultured spirochete bib]
MSSVRMRRVELLLKSDIDAVLKYLGSSQCFQIY PDEIERIAHEKLAGIVESDEEKALA
SRLDNAKSKLDFIGTFFGLPVPQNIEDAHL PDEEMLSKLDILYERCADLKTRIAEQEAK
VDQLAESLHEAKAFSGLSQPFDELEKFSYVSIQIGHIAKEKLEDALEKALGARAVIPLDN
EGTILAAASRKGRFALETLSKAGFEKKSPPEASGVPAEAMSALEHAYQAEKLRLENLL
QEKKSLSSEQYGS LWQVMVSSVRLKQALILVETKLEQTEWYRLSGWVPVDRIDRMAKDII
GMLGERV SIRIFNPDETKSSGEKDTSEEVVLLKHNVFVSAFQGIVLSYGTPLYGDIDPT
PLVAFFFTLLFAIMFGDLGQGLVIAGLGLAMLKMKKGF LASYKRYALAFIAAGVGSMMVMG
LLVGSFFADDKVLVPLERILTRLILGQPKDRFLQIMPQGNINSMFYFFGFTVIGIGVIINS
TGLVINMINLMRRKEYGEALFTKTGLAGSLAFWWAIGMGVRVILGAKLGWIDIVGLGIPL
LAMFFAEPLKALVDKAQGGKPEQVSLMDSL VGGAVELIETLSYYASNTMSFLRVGAFALA
HAVLSFVVFTMAELVRGKSSSGMAFQLIVYIIGNVIII GLEGLIVTIQVIRLQYYEFFSK
FFARTGKTFKPVSFSE*

>SPBIB_v1_370005|ID:27164097| conserved membrane protein of unknown function [Uncultured spirochete bib]
MKKKLLAGVMTFASSIAFAQTQTA AVPASAQTAKYIGAAIAVSTAVLAGGFAVAKIGAA
AMGAMA EKPELSGKALPYVGLAEGICLWGFLVALLIILL*

>SPBIB_v1_370006|ID:27164098| Vacuolar H⁺-transporting two-sector ATPase F subunit [Uncultured spirochete bib]
VAEIFVLAEEEEILAFGMIGVKGKAVTSRDDAIA TFRSIVQNKTCTIDRGVVDLSDCKML
ILSEDISDMIGKELADWQLSGEFPLIVEIPPLSGTSAQHTRLVDAVRQAIGIKIQ*

>SPBIB_v1_370007|ID:27164099| putative ATP synthase (E/31 kDa) subunit [Uncultured spirochete bib]
MEEIRGTEALEREILDDARKRAERIVRKA EDEAKALQAQTEQKIKAAIDALTQEYQTKQQ
TAEKEVRSRLPLEKMRLEIQYRDEVL RNAVAEVLAKIDPRLFGAWCLRGLKRQVELIRGS
KATISVKGLDSAYIEIKTLFQDAGSVSIK ESEAMKARGIIVEPDDNSYRISITENELVS
WLLDEERGELASALFGQTDSSATNTAGSPTGAGTSALKGARS*

>SPBIB_v1_370008|ID:27164100|atpA| V-type ATP synthase alpha chain 2 [Uncultured spirochete bib]
MSAGYITRISGPVIAAQQGMDDAGLYDVVKV GKAGLIGEIIKLGDVATI QIYEDNTLMRV
GEPVECMHRPLSVALGPGLIGSIYDGIQRPLPVLKNVSGAFLAPGLAGEPLDTSKKWHFV
PLLKAGDPIAPGTAFGIIQETASIQHRLVFDASVPASTADWIAPEGDYTCTATLVKSREG
KEYTAVSWWPVRAARKFTEKQITHEPLVTGLRVIDVLFPIAKGGSAAIPGGFGTGKTMTQ
HAIKWCDADIIVYIGCGERGNEMTEVLTEFPSLIDPRTGRSLMERTILIANSTSNMPVAA
REVSITYGTITAEYYRDMGYQVAVMADSTSRWAEALRELSGRLEEMPAEEGFPAYLPTL
AEFYERGGMVKTLEGKKGSVTIIGAVSPPGGDFSEPVTQHTKRFIRCFWALDRDLANARH
YPAISWNSYSEYTEDLIQYWDSIDPAWDALRTKTMDILKKERKLSEIVRLVGPDALPDE
QRLILLTADMINKNGFLQQSSFDTVDMYCAPPKQTFL LTCILTFHELAENA IKN GAPLLKI
SALPIKEKIIRLKTLENK VQEGQAVIQEIQQAFTQLGVGAQQGLSI*

>SPBIB_v1_370009|ID:27164101|atpB| V-type ATP synthase beta chain 2 [Uncultured spirochete bib]
MRGLEYHGILRADGPVIAAHRENVGFSELARVRDRTGELRLGRIVDISEQAIAVQLFSE
NTGISIDESWIEYLEKPLTFRVGDGIVGRIFNGLGDPIDGYPPITSSDLRDINGRPINPS
ARVYPRDFIQTGISAIDGMNTLIRGQKLPIFSGNGLPHNRLAAQIVRQARVLSGESQFAI
VFAGMGIKYDVARFFIDSFEEKSVLSRVVMFLSLADSPSIELVTPRTAL TAAEYLAYEK
NMHVLVVMTDMTNYCEALREVSAARNEVPSRKGYPGYLYSDLASLYERAGKIENCEGSIT
QLPILSMPNDDISHPIPDLTGYITEGQIVLERDLSQRGIYPPIAGLPSLSRLMKDGIGEG
MTREDHRDLAAQLFSAYAYVRSVRDLAAIIGEEELSDRDKIYLNFGDRFEREFLAQGEFE

NRSIEQTLDLGWKMLSILPEAELVRIPPKLIEKYLPRGTGNGDPAKE*

>SPBIB_v1_370010|ID:27164102|atpD| V-type ATP synthase subunit D 2 [Uncultured spirochete bib]
MAEPFPPTKTNLIKEKRSLLQALQGYDLLEKKREILVIELMNRMDALELLEQEIAKMTE
KAYATLRQMLLSVGRERALSISSLPVRDITLTASHVNVSGMTLPTLDVHASAPVLHYSFM
NSFAVCDETVEFTELLQKLSTAAGMRSIVWRLAREVRKTRRVNALDKMVIPRSREIVK
FIDASLDERERESLFAVKMLKQRLSEQDQT*

>SPBIB_v1_370011|ID:27164103| UspA domain-containing protein [Uncultured spirochete bib]
MKNMLETVLVAINGSDASISAFKYALAIKKSLSGRIIACYVVDATIRQLALSRIKVPPEE
SEEYERNLENSGRRYLNFCIELARQKQLSIETAIRKGSVSGEIVKASMELGADAILGGN
PADTLYRDAIADAYREILKNARCPVLFVKPPIGDELKAL*

>SPBIB_v1_370012|ID:27164104| protein of unknown function [Uncultured spirochete bib]
MLLCKWHLILSLAPYFWYFEMMRSKYSLYPLAAGIVIIVLGLSSCVSPLSWSSYSENLN
LLDAAAWKSDMSTLESELLGHPKLKSDTALQAQLSTAISQAMSDIDGAPDGESRRDAAIA
GISKACAIVGDGHTRINASPTARYPVALRFFPVSQSMASTEYELRVFAASDENASLLGGK
IARIGSKTVEEVLIDILAPALSIESALGKPGLEELKNAAIRAESLNAFMNPILMRGLGLAD
EQGLHLSFDTEASPTGCPAVYTVLESSDAFTWNYAIDPNAPPALSRQKPNENIWIYTIPEA
HPETLYLSFQSCESDAGPIFDEVIQLLKSSPAPNRLIIDMRTNSGGNSMPGTRFAQQLAD
TEVAKRKGGVVILVGPYTFSSALMNAADILKACGARGDPGSGNAVLAGEPLIEPMDHYGE
VVRFLPNSGLVIGRSSRLWEYSKTSGITPDNGFLGPTPDNLRAPTFEYRRGQDPVLEM
VL*

>SPBIB_v1_370013|ID:27164105| putative signal transduction protein with CBS domains [Uncultured spirochete bib]
MKKTAGDILEVKGHEVA AVSPDDTVLHALEVMAEKNIGAVLVMDEQGMVLGVFSEKDLAR
KLIKSHSCENEK VGNIMTKKVIFVQLDTSIEQCMNMMTQNRIRHLPVLDNRRVVGIIISI
GDVVKALIEVKDRIISEQAFELGQHERASTPGAV*

>SPBIB_v1_370014|ID:27164106| AMP-dependent synthetase and ligase [Uncultured spirochete bib]
MITLKKFTLAEVPELSAKQFASRPALSMVGGSVFTYQDFERESIAESLLHAGVKKGDR
VALLAENSPHWVMTYFGIARAGGIVVPIITDFIPAQICNIIDHSGARIVFVSEKLRKLS
DLPKDIEVRNVKTGRPFEEPGASPESASARTLFPDVEADDLAMIVYTS GTTGLSKGVMLT
HRNILSNATAACKSIIVLRRTDRLLSILPLAHAYEFTIGTVIALLSGSHIHYLDRPPAASV
LIPALQAVRPTIMLSVPLVIEKIYRSSIKPTLDGMKLYKSPILRPLIIRFAGMKLMKTFG
GKLRFFGVGGAPLAADVEEFLKKAHFPYAIGYGLTETAPLLAGCGPRTTHLRSTGPALKG
VQLRIADPRPDTGEGEIQAKGNIFKGYWKDEARTREVFTDDGWFR TGDLGYIDEKGRLF
IRGRSKTMILSASGENIYPEEIESIINQSPEVAESL VVEDEGGLTALVYLKSEVLENLEA
RLQDGLDAAGALSARVSQAISAEKSVAGTVSHAVVDVEKAVEHLENIRKEANSKLA AF
SRIQNVKIHREPFECTPTQKIKRFLYGKKKEGSREQGAAGDNHASSGIHQAGKS*

>SPBIB_v1_370015|ID:27164107| Response regulator receiver modulated diguanylate cyclase [Uncultured spirochete bib]

MSSIRILLVEDSITQAMRLRYVLEAEGFDVDVAANGADALTFLENNAPDLIISDVMMMPKM
NGYELCRKIRENPRYKETPIMLVTTLS DPTDVIRALEAGADNFTTKPYNEQALISRIRYI
LANAEIRKQRGSEIGIEVFFSGKKYFINSTRIQMIEFLLSTYESAIQKNQELFISNNKLLK
EALDNIITLQRNYRQLLETSQDAILVYDKDKMIRYANPAHALFSKEQKGLIGARLPIEE
DISTQKEIEIKDPYGNITFLDARSVSTDWDNETMTLSVLRDITESTQLRKELEQISLTD
LTGLYNRRGFKILSERMIKLARLQANMFILFGDMDGLKTINDTLGHLEGDNAIRTMASI
FKSAFRESDLVARMGGDEFVIGLINENFVFNRLVERMNELIGSFNAKGEAKFKLAVSIG
IERIAYDSQVPIEEMLSVADTKMYKEKEGKR*

>SPBIB_v1_370016|ID:27164108|cheB| Chemotaxis response regulator protein-glutamate methyltransferase 2 [Uncultured spirochete bib]

MIKVLIVDDSIIVSRQLLKYIFYLSGDIDVVAEAKDGAEAIRIIDDRKAPRPDIITMDIEM
PGIDGYETTKHILERHPVPIVVISNAMQYYSAEKAFRAMQAGAIAAVGKPPGLGSPDFYQ
KARELIDLKIRISGIKVRPRLSTAELEGHQKDSVHKSQVVEQKPLSRDQLQTWAQQNSPG
IVAIGASTGGPPAIQAILARLPADFPPIVIVQHIASGLAKNFAEWLDKTCPLHCKLSEE
SERMRPNTVYIAPNDIHLKVAYPDTLQFQMPDANELIVPAAEVLVHFSVAEYVGSRAIGIL
LTGMGRDGSRGLELKKAGALTIAQDRESSVYVYGMPEAEKLGAAACCYLPPEIAKILLE
IYNARKEKEQTR*

>SPBIB_v1_370017|ID:27164109| putative Chemotaxis protein [Uncultured spirochete bib]
MLNQEEFLKQLREAF AIESKEHIQTIASALLALEQTHGEPDQELIETTYRAAHS LKGAAR
AVDLKDIEYICHSMESV FQALKRDEIRPESQLIDTLHEALHLIELELSNSAVPATEIGAI
CERLDQQAKKGNAILSTSLAPPSPTQASVAPPSVPPSASTYKPETRPAIPSTIRVQAER
LDTLLRESENLIAIKQLHAQIQ AQLKSVLSLSEASSGNQARKDSIHALS AISNRLASES
VHISTIIDLIEEAQSVLMLPCS VLFDSFPLAA YDIAKSLGKEVSLDISGQTIELEKRIL
EKLKDPLMHILRNAIDHGI EPPGEREAHGKPRRGHISISVSHLDARHIEIIISDDGQGID
PESIRSTAVARRMFSESEA QKKTAGELYGLLFESGFSTSQIITDLSGRGLGLAIVKNAMD
ELEGSVRIKSEPRGRTSFHLVIPYTKASF KGNFVRVSEQTFVIPSSALEQGLRISQDAIT
AAGSANVIEYQDETIGIVHLGDILGISRPMETETPDHVIAVVCRSREKACAFIVDEIMGE
QDVLIKPLGSL LQKVRGIYGATTGANDEVIPILNMKEILELAFSSLFGPPGRVQPEKASV
ASASTEKT NAPKRILVVEDSITSRTLITSILSAAGFQVQAATDGI EGYTLLKSEPFDLVV
SDIEMPRLDGFG LTERIRNDATLANIPVILVTALESKEHKEKGIAVGANAYITKSNFAQS
NLETVRRFI*

>SPBIB_v1_370018|ID:27164110| conserved exported protein of unknown function [Uncultured spirochete bib]
MLKNMKMRAKLILGFGLVIIVMISLAWYSFTEQA AINRHLDDIINTHFATLTLVDEINIA
RVQLSQNVSD FVAASTASEIEKLYQSVQNDIQTIQTNITKLQTINTETETL KPLADLNAS
FARWLIYNEEVGLKNAKKQKELVQSFNTKGKEAFALVAEKVANIAESTKKRAADAYQNA
LAMQKSATTITILN ILGIAFAVLF AFVIGENIVRPIKQLVANLEEVANGNLQKHGIDDK
RKDEIGMLIKAFESFLDRFREQISEMNKMVLHLAASANEMSATSAQLGSSASETAASVME
TATTTEIRQVAQTTKDLAGT VTASSDQSYALS KESMTAILQMGENVQKIKNQMDNISQS
LLNLSEQSQMIAEITAAVDEIAEQSNLLAVNAAIEAAKAGEQGGKGFVVAQEVKSLADQS
KQSTRQVRKILADIQKATSGALMAVEQGNKEMQQGA EKMNQVDAAMRAIADSLSKSVQLV
QQIAYA VEQQFTGIDQINSAMNNVKTASAQNADAARNLEQVAASISDSGNK LKSFIEVYK
L*

>SPBIB_v1_370019|ID:27164111| protein of unknown function [Uncultured spirochete bib]
MQNVSKNSLLAANNSYPSASPVPESPEHSAHTTRTAEDILLARAKELAKGQRHTTKKTDI
RCIEFALSGMSFAFEMHSIREIMRNSMPITPLPFLPKSFLGLINVRGEVVPVIDLAHYLG
LSRPKEAKEV LKSLIILQKNEVA VAFPCERIVRIREFSKNELQPTIAAQSQVIASLAKGC
GRGGITVLDADAFMLQLQKSLNPE*

>SPBIB_v1_370020|ID:27164112| putative MCP methyltransferase, CheR-type [Uncultured spirochete bib]
MNKEQRTLHAAFDEHALKTLLEQNRNQIQR SLEANFGLKPGA VHYYS LKKA AHGLQEAEK
KPLPEIIRLLCEIPMREDV VRIIVPHITVYETYFFRHPEHFAWLRDSFLPGL EIRKRAKG
TLNITCWSAGCSTGEEA YSLAMTLFDYFKGQQGWELKVVATDINHESLDIARHG CYGEWS
FRDLPRETKERFFYECNDALELVPGLPRLKRYHIDTRIQQMVTFAELNLSAPQWDVSELS
ARTFDLIVCRNVLIYLHQDAAKALISRFAEYLEPNGALIVGPSEPWFLNDS PFVAQQIRN
GTIFIKKENS AQSEQHTKQLPAQRLENPNSIKTVAESLTPQKTAPAESLSP PQPTLKTTF
PVTMHEAPLRAKEEREEVIANARHLADSGEAA RAIELLS ELIQKETTDP ELYLRLGLAYI
HTRDLSSAESDLK KSLFLEPDNVVAYIALASIAKERGNESEMKKHYSNALHFLSKIEETA
VVPGSNGIPAKAMRDMISSLMAR*

>SPBIB_v1_370021|ID:27164113| protein of unknown function [Uncultured spirochete bib]
MPDSGTITPNISKQDL PANAAALNVCIFRVGQRLYCLPAASVEYVYPYCEITVPHEAESI
EGVINLRGSIIPVIDMGMKCEQRPLERDPAHKLLVARV GSHRIALHVEDVMDVIDVEPSG
WEETDAILPGIQVLTGIIKYQDGLALLYDPEHFFDTELAEREHAQKK*

>SPBIB_v1_370022|ID:27164114| conserved protein of unknown function [Uncultured spirochete bib]
MDPEMRKKIDETFAKVRE PQSDAPIVDLGLVEKV TYSEKEKTLLVRLAIGT PRWQCPACS
AINGVVKEGIVRRAKEAFEA AFPELKILVE*

>SPBIB_v1_370023|ID:27164115| conserved protein of unknown function [Uncultured spirochete bib]
MNPFLFTGILILGVGATVNYFLGVKKNRWLGKRLSVQSEEV LAPTETNYVNI GGAI GYNF
RYQLKGLWNEAKGTFTFVPRHSLLYMPVSFLIRGGDHYYLNIYTDKRLPGE GHII LASHL
RKAKIDGLEAMSRKDIELGGRKFVLLWRESRILDKLEKTALGFPEPQTLVHFCCFADNKT
LFLHLSPKNGVIQNNLSYFLKNAQVFLEK*

>SPBIB_v1_370024|ID:27164116| Arsenite-transporting ATPase [Uncultured spirochete bib]
MSPHISHKTAFFLKGKGGV GKTTLSASFALALARAGYKVLAASLDPAHNLGDALGLK LKSE

PQHVEPNLDALEIDLDAWVNTYLEESRSQLKSTYSYNVTLNLDSEFFKILKYSPGTEEYAM
LWAIEDIHCNLAPLYDVVVLDTPTALSLRFLSLPTISGLWVKELAKLREILSKRNTIV
RLNPGSPVKESCLDKDDDKVYGKLSIRQRLDALEHLFQKESFLNVIVNPDDL SVSEALR
IKDELDRLEIPISTICLNKRGMVNGQWHIHESLASIPLFSFDFESNGIRTRDQLTELGIQ
PLIDIFLKKGSLA*

>SPBIB_v1_370025|ID:27164117| protein of unknown function [Uncultured spirochete bib]
MTEKMKLLHLVRRGAKTFIQVQREKATGMLDFELKELENIFALLLLGGFAGIPSPAPIA
IELLPYLEREIVVLLARSDLSTDPICALMGMLEID*

>SPBIB_v1_370026|ID:27164118| Carbon starvation protein CstA [Uncultured spirochete bib]
MSTLIALLALVIYFGFYFLYGRITRDKVLKSQEAPQAPSKRLSDGVDYVPTSKYVFLFGHH
FASIAGAGPITGPAMAVAWGWLPGLLWIWLGNIFIGSIHDYLSLTASVRYDGRSMQFVAQ
DLIGKKAGKAFSFWILFLCILVVAAFGDIVAGQFAADGRVFSAFFFFCVAAIITGYFMYH
TKLGIGGGSIIIGVLIILAFWLGEILPINASKDTWFIVIFVYIVIASALPVNFLQPRDY
LNSFLLYFGLLVGGLAAIIAVKGFDSLPAATTSFSAVVIGGKPTPFWPAVPLVIACGALSG
FHALVASGTSSKQLRDEKDALFVGYGAMLTGFLSTIVVISIAAFGIAAMGEGNVLKTA
LNRFVLSYGTMVSTALPFLTPSFMKLFVAVVSSFALTTLDTTNRLGRYLQEMVLP
KSPGVYNTFNKQVAVSLIAFFGVGLAWTGNVTWPAFSGANQLIASIVMLTVAVVWVK
KLNPAAYTLVVLIPAIFLWVTVTAGIHWYEVIVPSFFATVANAAAQAKNYTTGVVVGAIN
IFMLVLFNFMIVAFFRNWNTKQAS*

>SPBIB_v1_370027|ID:27164119| protein of unknown function [Uncultured spirochete bib]
MKNVHGPVLDLGGGYFRIGSSQLVGSLSQNIYLLIDGDEAVLFGPGSAIDLAEVNRNIESV
APKDPVRTVIVHEQDPSSSSALSLEKEGLRFDVVTWRTWNSLRFYGLSSEPYIIDEHS
WVLRASGRTLQFLPTPYLYQPGAFATYDRATRTLLSGALFSSYSSEFSLYGEGADYLEQ
LKNFHRATMPSKDFLAPVVHSLASWDIGRILPAYGPIWRKNIRGILNQLADLECGELARS
KETQALQQQIVKENGSGEEVAHLKAELEKLRKVNEELNHSISVSRDRALRDPVTGLYSEF
FYKSFIEEEVAVRISDMGPQDNVLGVFGIDENIAQIEYKYGSREVEALLHGVAIITENL
PQTSMAFRLHGATIAVWMPAVLFDDAVALFDKIRYQVENS KAFVEPVTVSAGVATLSEAA
NLQPDLERLGADLTDLGI RRLARRRGGNMVYFASAEENESESKARILIVDDDEVNVDV
LRTFLSNEGFSVLSASDGQEALSILGKEIVDVVITELMVPKIDAYLLKESMLSKSATKDI
PVILISHLKTESTIRRAYRLGIVFYLQKPIILEELLGIVLNLTEAGSRA*

>SPBIB_v1_370028|ID:27164120| Glycosyl transferase [Uncultured spirochete bib]
MTIPSEYLLGA AVLFLWLT VVFLR TLLNKARLAIKQETLKSQRQLPQIFAPVYEQSKH
MMRMLLDHILYLTQNVNISAQQKQRLFNAETVSYFERTQMRRLASHNRFMRMNAARLLAS
FGTDNARKAIEKALLREKHFPTRLYLANALSDIKDARSLHALIQSLKGAHYWYRNKVNML
IASYGDALKDFMRGYYWSADIEIRELLVDLAGVIPCVELKEYLADILHRGFGEIGKIEKQ
TANLPSKCCYYCVHGQIEAGKDHRCQPYRGKVANNFHCWRYRTLVTSLSPAVSYHRLMVR
AAETLERFYPDELDC EYYLEHVDKDIQSI AVRSLGHSARERNVRTLLFYLERDETAQAAR
AGLRLLLNSHPQYMPQMIEAFRNSDGVLHNRLAEVLSSRIEYVLT KLLGYEHDF AAGVVN
ELITMGRVSELIEFLKRNRNKELEAKLVDIIRSRLSDSEVLARECGLFLPDHLLQELGIS
RISPLAKKREEKLD RKMVRRLYVMLSFAV VFFPLL YVLKYDRLGAMPFVQHLKYFVLNF
NINFAYYAMAVNAIYLGLLFLSKLNIRRASRLWELKGMTMLFKPRMLPSVSIAPAYNEE
MTIIESANSLNLKYPDYELVVNDGSKDNTLRTLIEHFDLKKTD FSYQERLKHYPIRGI
YTNPAIPRLIVVDKENGKADTLNAGINVASKEYFCGIDADSLES DALLKIASLTLDYG
VETPALGGNVFPINGCKVDK GKIEKIGVPRNWLARLQMV EYLRAFMCGR LGWDYLN SLLI
ISGAFGLFRKERVVAAGGYLTSSGQYQKDTVGEDMELVVRISRLMREK KLYRISYAFNA
NCWTEVPEEMSS LKKQRNRWQRGLIDIMNFHRKLIFNPSYGV MGLVAMPY YLIFEMIGPL
FEIQGYLMVAIAAIFGMLS VRLALLFFASILMGIFISSVRIA EHLNVYFSYRDTLKL
LKTAILENFGPRQLFSFWRVLGFLNAMRKPQGWDFARKGFAGSGQAGGKAA*

>SPBIB_v1_370029|ID:27164121| conserved exported protein of unknown function [Uncultured spirochete bib]
MKVKTKKEYFKTSLWIIIGILVFALFTALIAMPFVLWIAKPYRQLDIWVVDKTVPYSDFRE
HAGLFWLLNNEKIAKPATRVLYDKRSDYYGFYPTGKNEWRS LKLPQTGKKPDLIYIADTY
GVYRDDYMQSKMTAALPSLIYGGLNSEDYRVIQASLGGGNTIIAEFN TAASPTNSRDRAL
FERLIGLAWRGWIGNYYESLAQGGGVDPDWVANWETAKKEKWNYSGRGIVLLDENG NVEV
LTEAEDLGPKGMKVQFDGLLQKLGKIKPVSYRYWFEWVAADPLVEQVAHYSLDLTAAGK

KKLEALGLPQKFPVVLKFENSQYTSWYFAGDFADLQFSGTPYRMEGIRAIKRILADDTVD
NNSYFFWKVYAPLMHYILASA EKHRAEVRSEAALAGPTALRVNVRAVKDGIQLRTKNHEW
ETLFLRGVNMGLAEPGKYFTEFPYD TDYVRWFNYIGALGANTIRVYTLLPPEFYRAFRI
YNEAHPDAPLLLLQEIWPEEHPPGNDYLQPAYQEAFLKEIDYGIDAIYGRANIPERKGRA
WGIYTTD VSPWLIGWLVGRELESAEVLQTDANHKGATYKGTYSAGAKASPTEVWLAESL
DAVAATEAERYGQLHPVGIVSWPTLDPIEHDTEWDPNTGKKNRWNDRASIAVEHLDITDK
MTAGLFGAYHIYPNYPDFIVNEPAYNNYKDEYGVLR YGGYLQEFIKTHSRYP AIVAEFGI
ANGAGVAHLS PDGLNHGGIDETTAGRDILRMQAAIQKEGYAGAIIFEFMDEWAKKTWITE
PFKIPFDRRIFWHDVVDPEQNYGLIANESIPPEKPEQTISGSNALSSLEVAHDASYLYLT
IHLASGKKPQDCEVLLGIDTYNRTLQMSWPRSLGRTASGMEFLDIRNEEARILVNPSY
NIASARYATSLRQDGVFENMNMLVNGKVVTKDGREIPEKRFDISLMRQGPFDSEGNLWNV
EGNTINVRIPWGRNLVTD PSSLRVLNDTRTNLGD PGIDTLKASITDGFVFDGLVLDKHS
SVIGRLNANVTSPYIWN GWEETPPYRERPKSYSIVQDAWKVASEKDKPVRAD FVGAHSK
*

>SPBIB_v1_370030|ID:27164122| Peptidase M29 aminopeptidase II [Uncultured spirochete bib]
MQDQRLKLAHLLVNYSTKVQPGDKVLIENVNPEPDFVRLLEEVHAAGGLAFVSYRDKR
LERTLFMNAPEEQFALQAEFERARMDKMDVYIGFTNMQNSFAWQDLPQDKIELYNRHIWK
KVHIERRISNTRWVVLRYPSAAMAQNA GMSEDA FEQFYFDVCTMDYAKMSKAMDPLVALL
ERSDRVRVKGPGTDLEFSIKGMPAIKCDGTMNIPDGEVYTAPIRDSVNGVLSYNT PSEKD
GFKFENIVFEFKNGKIVRAEANDSERINKILDIDEGARYLGEFSFGVNPYITKPMLETLF
DEKIAGSLHITPGNSYDDCFNGNRSALHWDIVLMQDAASGGGEVWIDGVLVRKDGLFVQP
ELVALNPEALRT*

>SPBIB_v1_370031|ID:27164123| protein of unknown function [Uncultured spirochete bib]
MLRLWAYLMWHNYLKPYRIHWPKGRRPATHAEASGIDATALENVYRSFFEERAF LTRSPL
SPTMARSWKKEWRTPGKEKAEYLPKLALG*

>SPBIB_v1_380001|ID:27164124| conserved protein of unknown function [Uncultured spirochete bib]
MADKTSRLAGNAAGK WYVDSSCIGCGLCSSTAPDIFTLGDEGQALVIRQPQTASEIELAT
QALNDCPVQSIGNDGE*

>SPBIB_v1_380002|ID:27164125| Spore protein SP21 family protein [Uncultured spirochete bib]
MNSLVLYDNNPFDLIEKFFDDDLAPRFRTPAIDVYEEGDKYMLEAELPGLSDKDIKLEV
RNGQLTLSTAKSEKTEEKSKKGRWIRKERREFRFARSFTLPEDVDASAIEAHFKNGVLQV
IMPCKPEAAPKAIEVKID*

>SPBIB_v1_380003|ID:27164126| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]
MKRVIIVAFVLLLVGVTMVFGQKVGAYTTLEEPLAKELFDEFQKETGIVVNWQR LSGGEV
ESRLEAEKSNPQASIWVGGVGLNHISAKL KGLTPYKSKMLENTPLQFRDPENYVWGLYI
GPLCFVTNKNVAKA QGLVPPTSWADLLKPEYK GKIRMPNPTTS GTAYNTLTTLRYVFGGD
ENKVF DYLSKLDKNIDQYTKSGSAPGKSVAIGEIPAIAGYAHDNVKLRVEGADITITFPS
EGTGFEIASMSLVKGGPDPVNAK KLYDWVLSPKAQEI IAKWYVIPLSKLAKKNPNAF SIS
EIKTVNQDVIWDAANKERLLERWVKEIGSKR*

>SPBIB_v1_380004|ID:27164127| ABC-type Fe³⁺ transport system, permease component [Uncultured spirochete bib]
VFTKKKLIVFAIVCAIFAAGEYWIFSTIQASFEKNAAKEITALARAIAASAPENNESLAS
WTEQLPSTYHGYRFFAFKGVPGEEGSEPA GGDSALSELWKLPSNADIAAKAAESVSYLEV
FRWPSRVTFAGVPYTLIAPVPDAEGSSARAALLIAADASGYVAFGRLVQTLAVVTFVLF
ALGFGIATFSRDPISGYAILVLA AVVAVFVAYPLFEAVRLTLIKQGRFSFDVWKTILSNR
QYLQALWGSIQLGIVTATISTFIGFMYAFAVARTSMKGK KLV TALATMPVISPPFSLTLS
IILLFGKNGIITKQWGLQNFNIYGLGGLALVQTISMFP IAF LTMQGV LQAIDSTLEDAS
LDLNASRWHTF SHVTLPLAAPGLLSSWLLVFTNSLAD FANPLLLSGSYRVL SVESYIEVT
GMSRLNNGAALSLLLLPTLTAFLVQRRWVSRKSFVVVTGK PSTRLSDLAAPGARRALTG
FVVVVVSGLIVALYLTIVAGCFVKNWGIDYTF TLVNIHEALTRGKQALISTITLAGIATPI
AGVLSMVA AVILVRKKFPGKRILESLIMTPFAIPGTLV GISFILAFNKPPLL LVGTGAIL
VINYVIRELPV GLEGGVAALRQIDPSIEEAAADL GADQATIFRTIILPLIRPAFISSMSY
TFVRSMTAVSAIIFLISARWYHITI QIYNFSENLR FGLASVLATTLIIIVLAVFGLMRL
IRQSEFLEKTVTAQ*

>SPBIB_v1_380005|ID:27164128|fbpC| Fe(3+) ions import ATP-binding protein FbpC [Uncultured spirochete bib]

MATKSVPVTLSHVTKIFKDPKSKAEVHAVEDANFDVRSSELVTLGSPSGCGKTTTLRMIG
GFELPTKGKILIGD TDV TYLPPNGRQTATVFQSYGLFPHMDVFDNVAYGLKIRKLSHTEI
ENRVRTVLELVGLAELAHRAPGRSLGGQQQRVALARSLVVEPQVLLLDEPLSNLDALLRE
QMRVEIRRIQKSLGITAIYVTHDRIEAMSLSDRVIVMRNGVIQQIGTPGDIYERPVSMFV
AGFVGKVAFFPAQLEGIEAGGRAICTVGGKRV RAGSAAEGLGTGSPA VIMARPESLRLVE
KEDAISSTVTARVYLGSSVEIYVKTETGEILVQIDDPGKAIPSEGEAVWIGLNEALVR
VLP AE*

>SPBIB_v1_380006|ID:27164129| taurine transporter subunit ; ATP-binding component of ABC superfamily (modular protein) [Uncultured spirochete bib]

MVSLEDISFFYTVHGIPKPVFEHFSAQFEHGRITAVIGPSGCGKTTLLRLIAGLNT PQSG
RIVVEGRAEEKLQSRKVPAAGPRIAFIFQDFGLLPWLTVERNAGLGLEALGIPPAERHAR
VRGILEELGLSEWRKAYPVRLSGGMQQRVAVARALAINADLILMDEPFSSLDALTRESVQ
DMLRSIQRAHNTTIIIVTHSIEEA VYLADSVVVLVDGSM PAN YCQVVDNPHVWEQESAARA
PHVMQAPVPQQPPASPEASLNPRETSGYLAAV GALRHTFNQAVAQKAEAEEMAAAFAVP
AAAVTPLAAAVPAVPAVSAAPDVPAAALPAHKKLAPSVTRFLARSAQIFAAAVFLVAA
WWAAAALVQRPFPLPSPLAFAQFAVNLQKGVFQIHVLASARRVFFALLAAGPLAWVLGGL
AGRIPFFDNIFAPLVYFLHPLPKVAFPLMLFLGLGDASKIALMGLVIFGQLFVTGRDA
AKGIAPALLDSVRTLGFSRLSIIRLAIVPSTTPSLMSALRVSLGTAIAVFLSETFASID
GLGWYIMDAWSRIDY PDMYAAILALSLFGLFVYFAIDAIEAVLLRWRERT*

>SPBIB_v1_380007|ID:27164130| ABC-type nitrate/sulfonate/bicarbonate transport system, periplasmic component [Uncultured spirochete bib]

MKISAILIFALAVLIQPF TQASAAQQVQAAPLSIGIFADADSLPLIVADNEGLFQKEGISV
KLVRFSSAIERDSALQAGKIDGAVTDVLA VVLANQGGFPLKITS LTNGRYGVAVSPKSN I
QSMKELEGKNIAVSLNTIIHYFADWSAREAGLKADSLNLVPVPKMPVRLEMLLSDQIPAA
VMPEPFLTTAKLRGAKILVSSDDSGLEAGVLAFFPSVIAKNADTLKRFYRAYWNA AQRIN
AQP DQYRNMLIESLSFPDEAARVVFVPRYVKPRLPVQTSIETAAQWLLSKALIKALPKTA
DLVDASMVTGW*

>SPBIB_v1_380008|ID:27164131| putative aromatic acid decarboxylase [Uncultured spirochete bib]
MAMRYLVCITGASGALYSLRLMSALASRGVILHVVASQWGARVLLQETGRPLGYWLGKLR
LQGGPDGGPALITMHDSSDFSAPIASGSFRLNGTVIAPCSMGT LGLSLASGVCSNLIHRAG
AVALKEGWPLIVPRET PLSLV SIRAMATLKEAGAVILSASPSFY SKPESIESLVDTVVY
RILDHLGIIDKNIYRWSREEP*

>SPBIB_v1_380009|ID:27164132| putative 4-hydroxybenzoate polyprenyltransferase [Uncultured spirochete bib]
MALSSSTEPGILKRIGMIGDSVMITHLFLSLPFVVAAILLETEGRPPAAKLLWIIVAAF GA
RNAANALNRIIDRDIDAKNPRTAGRHLPSGKLAPRELWLFTFAMLALLVLGAAMLNPLCL
ALLPVAGLLLLGYSYTKRFTWLSHYWLGIACSAATMGAF LGISGTFHLRYFP LTAGVALW
VAGFDIYALQDIEFDRKEHLYSIPARFGETGARIIAASHLGAFAGFVSIYLFWDSPGL
FAAIGLALCFVLLVAEHLIAAQKTQNR IKLAA YTLNQIPIIYLCGVALDIYLR*

>SPBIB_v1_380010|ID:27164133| conserved protein of unknown function [Uncultured spirochete bib]
MAYSGLQEFISFLELKGELVRISA EVDPILEITEIADRVMRRGGPALLFEHV RGSRWPLL
INAYGSEKRMAWSLGAESLDEKAGEIDSLIQWAWSQLRDFSLLSALPEALSRLPIARSLM
PKKVGRAPAREVKDEGGFDLPIIQCWPQDGG RFLTLPV VCTIDPETKSQNWGM YRMQIY
DDRTAGMHWIHKDGAHFFQKYRAQGRRMPVVVALGGDPA VTYASTAPLPEGIWEAMFAG
FLRGKPAEVVEIGDTGILAPADAEFILEGYVDPDEERLEGPFGDHTGFYSLPDDYPV FHL
ERMTRRKTVPYPATIVGIPPKEDCFLAKATERLFLPLLKQLCPEITDINMPLEGVFHNCV
LVSIRKRYPGQARKVMHFLWGMGQLMYTKLIVV VDDD IPLKDL SMVAWRVFNNIDAKRDF
EFS DGPLDALDHSSPKPRFGTRLGIDATRKWPEEGHDREWPDPLAMRLDIVELVNSRWKE
YGIELD*

>SPBIB_v1_380011|ID:27164134| ABC-type antimicrobial peptide transport system, ATPase component [Uncultured spirochete bib]

MSDIIISLDKVKKVYFLDAVEVEALKDISLDIHAGDFVSIAGPSGSGKTTILNLIGCVDK
PTSGTVVVGKRTSDLDDDSL TELRHKSIGFIFQTFNLIPVLNIRENVELPLLLDNQSAG
SQSKIESKADRKEWVDFLIESVGLKDRMLHKPAELSGGQRQRVAIARALVMKPAIVLADE
PTANLDSATGESILRLMRHMNETFGTTFIFSTHDPDIVEEADHIIRLKDGR IIEDRRRNG

ASAALLAANLETAETGTEGGQL*

>SPBIB_v1_380012|ID:27164135| putative ABC-type transport system, involved in lipoprotein release, permease component [Uncultured spirochete bib]

MIAARLAWGNLGLHRRKSLIGMIMGILILFIGNSFIDTALSGLQRMFVQGYTGDLMLV
TGPTEFPTTVLGETAGSEEVLPHIAQIKKYEDFLAGRNDVAATLPLLSGQAAFGIGETEL
DSGYCFGVNADDYRKFPPDNVTLVSGEWPKAGDGPVLLSEPTLAILNKSATSPVQPGTH
IIMTALANSAGTVIREVTVKGVKFNQSNKQLEGLTLVDADTMRDLLGFASLRDGPVLT
GQEASFVSNFDPNALFENLFASDTTGAAPAAAAPASTGREGSDPSISSATSTVPSAQAT
VKADEVPAWQFLLRVKPGASSRLLSDLSAFSKQIADGDRVQDWIAGAGKVARTAVTIR
LAFDLLVAVVAVVVMMIMNVLIISVNERLYEIGTLRAIGAKRRVVRNMILYETAFLAAI
AGAAGLVIGFVVLLLLGKFGIRAPNLFFEALFGGQVLKPMVSAGAAIRAFIWILAMGLGA
SWYPTIVALRIEPIAMRGD*

>SPBIB_v1_380013|ID:27164136| membrane protein of unknown function [Uncultured spirochete bib]

MRLIHLKLAARNVRRQPHRTIALGGAVAFSALVMTLISGFVNGMDSA IQDNVTLYSGGHV
LVSGYTVSWSGRLQSRFADEAVANIVQSAYPEIRTASISQTRATVVFGSREVQLSLRGV
DWGKDELYHSSLILSKGDWKS LAAPRTMLMSAQTAARFGLSTGDAVLVRLSTASGQQNVT
DYTVAAIYDDGAAGGMSTAFVAFSDLTADLNMKEHEQQAIAIFLKNSTSAENAAQTITKA
LSEKGYTVSRGAAPTS GALSASSEFVSSVVGSGAAGTAATGTTTGTAAGSSGAGASRA
AAGTVTYVSTVQELAGEISSALGSIRWIGYAVFALMLIVSATGISNSYRMVLLERTKEI
GMLRCIGYKKKDV FSSFIAEGILLAGGAALVG VILGLPVGFGIGLVPFNPHGDFGTALVQ
GHLKFVPSIGQLALILVFTIVAVAAVFLPAKKAADVVPVEALRKA*

>SPBIB_v1_380014|ID:27164137| conserved exported protein of unknown function [Uncultured spirochete bib]

MVNMQRMTSKLSLVFLGLVLIFSAKAQGAPPAGGGQGGGAPMGGIGLPLGFLEQNKD YQ
FPDDITKYSATDFLMLVRRDIRSSFYDSDMTATITTVSVSPDKGTFVRKEQIFRRDKDD
AFLMLTLEPESRKGQGMRLVDNNMWRYDPTSRKFTHHTLKD TYENSTVRNND FRRWQRSI
DYSVEKITTGTLGNYTVIIGELKANND EVPFPYIRMYIEKDRKIVLKVEEYSLSMKLLRT
AYYTQYVQIGNSFVPTVQIFQDGLIPEKRSQV TYTDISTKPVDPDYFTKEYLERSQ*

>SPBIB_v1_380015|ID:27164138| exported protein of unknown function [Uncultured spirochete bib]

MKARNRPVSIALAAAALLVLSAGGLWAQTGTAPASQTPPAIDENALFGGPKDIVTVIDP
NVAATSVVQLVQDTKTYPVFLISGTAGAGLFGNYTPVGAASTDPQKLYGAVNLSGLEFDY
LPTKSLHFSVSADLLAVPSEILSASVGAYADLRASEL VRLYAAGSFDYDPNAYLSTKTYA
TPTFSLDELFDVDELGKKVFFRLGKQRISWGVGYWYKPSDVL SLSAIDPDNPTAAREGPF
AFKIDMPMKLNHAMLVYVPPINGDAGSFS AASKYDLV VNGWELSFAGFGRTDMLARPRGI
FTFTGAIGAFDVYGENVILYGS DRTYVQESSTAPGTYET YRVENIPFVQSTLGIKYSLSK
SNGLSFSAHVQGYNGTGYADSTILQKSAARTAVEHSATYQPTDLTQAGMWYLAGSTSIS
GRFGGRNLT VVTASAYALTNFSDRSVRFNPQLSVQVGDQGG RATLTLSDLTAIGALYSE
YAPNGNKTTPALTLTVFDKLSLQASVPITLDTDFSIKKVQTAFS VFWNAVSY*

>SPBIB_v1_380016|ID:27164139| Two component transcriptional regulator, winged helix family [Uncultured spirochete bib]

MHGRILIVEDTKELAELYQLYLQNEGFECLAFDAESALPLASNEEWDLIVLDLNLPGMD
GFEFLERLRKIKSTSV MILTAREADEDVIFGLGVGADDFVTKPCPPKVLAARVRAHIRRV
VALQTRQNGAIVRFGPFELDIEGMYLTKNSEPVSLSAREFNILKELVMHPGKPFPTPEDLY
AHVWGQEFGDISAVAVYIQRLRKKLEDDPANPYIQTQYGMGYRFNPEAF AEARP*

>SPBIB_v1_380017|ID:27164140| putative Integral membrane sensor signal transduction histidine kinase [Uncultured spirochete bib]

MKLLKRTQFAILTIAVTLFP IAFGLWFFTGQQAKRDPRQPTQLFLSEVAQLWSKDKNLTF
ADIRDAGERAE LPIIDAALIDADGTVLVSSFKGLPAGSKLQVADLARPP LMPQGKPGPEL
RFLPVDNSVTKSPLLLFDIRPFWTREDVRNRNFMLISSFALGAFLVAGLMSLLILRSTNT
AIKNLIDDTT TVASGKLDHEVKGSGAEELRSLAD SINHM RITLRDMISR RMNMLIGVSHD
LKTPIALIQGYTDALADN MASNEATRQHYLEIIREKSAQLEDLVSDLIEFMKIDDLNMPM
ETVDLGSFVLALGKRFEEDARLLGLEFVYGFSGAFSKEPPDGALADAALRGVPHGAAPSS
ARQSSAALHIKMNRMLVERAIENLVSNAFRYTG TGGRVEFSLQFDSGQPVLV VADNGPGI
PEEELPYVFDAFYRGTHSRQEAGHGLGLTIVKSIVDLHGWEIEAHNRTVDGAAIGVAAGS
AASHGLLIAIRMKAAAL*

>SPBIB_v1_380018|ID:27164141| conserved protein of unknown function [Uncultured spirochete bib]
MHISEIQLHRISDSELEALVDKTIEASGALLAKCILIPDITRFHSRAGQITDALVAK
LGPRVAAILPALGTHSAMTEEERAHMYPGSPSQLFKVHDWRHVDVELGRLPEERVSEISN
GKVRYSYPVQANRLTSGDIDFISVGVVPHVEVAGMANHAKNIFVGTGGKEAIDRSHYL
GAVCGMEGIMGRADTPVRALFDEGLSLAAGKLPITWILTVIGSAEDSSLALRGYFSSQD
RRCFEEAAALSARVNIQLEKPIQKAVVWLDPEEYRSTWLGNKSIYRLRMAMADGGELLI
LAPGLRSFGEDPNIDTVIRRYGYRPSSTEIQTLVAREPALADNLSAAAHLIHGSSEGRFRI
TYAPGPLVSKEEIESVGYQWADLGQALQRYTPQGRLTGSHSTRDGEPPFFVQNPALGLWS
TAARMQNTRSLRPSMRLG*

>SPBIB_v1_380019|ID:27164142| conserved protein of unknown function [Uncultured spirochete bib]
MKLSRFSIGTGDRFGMEGEAQIGAFQQLREHGGEADIVWNKSNREHVIIGSTPADQAKAA
AEA VKHAGWNGNWFVDADHISLKTVDWFLPHCNFFTIDVAETIGKQAPADARAA YLLRAS
FLLKEGA AIPVAKADLESVADKFLAAVLEAGTTYRYIAARKPAGSFVVELSMDETDA PQ
TPAQLAAILVAVAAEKIPLATIAPRFPKFLKGIDYVGDPAEFLAAFEAETR VVLWASSA
LGLPEGLKLSVHTGSDKFSLYGGIHEIVTKLGAGLHLKTAGTTWLEEIIGLAEAGGEGLA
IAKRIYATAYARIDELTAPYANVVEIDKARLPSQAVASWSDTFIRALRHDPGSTAMQA
DLRQLMHVAFKVA AEMGSQYTN AVRAH HASVARNVQHNL YARHLAPIVLGSTRRL*

>SPBIB_v1_380020|ID:27164143| putative Integral membrane sensor signal transduction histidine kinase [Uncultured spirochete bib]

MQKPHAESLKSSKRFPRLGIRGKILACFSIVLAFFLGLAVVMQNESIQLSREYGVNLSY
HLVHRFRLNLANFHGLTDRYLREPLSANPELIYNGIASLNAQYAE LPLEDYSIHAGFEV
RATGYGLDVYLPLVSRAVGLRAGGSPDYQAFVKATRIQGYIDVYLNRLSELMQSGEET
YAKLSRRSEILNKTILLSMIIASILAVIVIVLVTEAITAPLRKLAKEAEKLASGDLEAGI
VEAHTNDEVETLARSFASMASNIRAMVEGLKEKAELERLLHEEELALVSMGKALREAQFM
NLQEQMKPHFLFNALNTIARSALLERAERTESLALGLARLLRATIKDSGALSSLEEEITL
AQAYIEFQHARFGDRLKWKIDVPSALQSLKVPRLMIQPLVENAVRHGLEPKVEGGTVYIK
ARRRNTSLILWVLDDGVGISKEKLEEIREHIVFSLELKNRKPEELPVPTDAELPNSDPGE
SENELLNGTGIGLANLATRLAILYSGQCRFDIQADSDKGT LVRIMIPLGATTS*

>SPBIB_v1_380021|ID:27164144| protein of unknown function [Uncultured spirochete bib]
MIRILIADDEALERE AISHILRHIHLEEECVVDQAVNGYEAL EAAEKYEPDIAFLDIRMP
GMDGLEVAERLSRLGNPPFIIMVTAYDSFAYARMALRYGVLDYLLKPASSEIEAAVRKA
IYQIRRRREEAARRAEMHSIAADMEQIARMNIVDQLEAGSVADSDVTRLVKLRFGTEMWS
CAAIVAGARDGSSSASLSLALLEQHRFLSGIAERHLASDLGIPENLPSLFFAGSGERITS
MLLVAPFLDEKRSAESEPHAAFHAFQHRSRLAQFRYRCIDAGAGDLRFGACVSDAGLAS
AALAAAKAAFNLTA AECPIVLSPMPLAHGREAAAAGSLAGRTISWLQDHFMESIGLADA
AEYLHVSPSHLSRMLK KETGIGFGEMLV RTRIAHAKNLLANGIPAKEASFLVGF RDQSYF
TKVFIKVAGVSPSRYLDLGR*

>SPBIB_v1_380022|ID:27164145| TRAP dicarboxylate transporter, DctP subunit [Uncultured spirochete bib]

MKRMHKAALILMLILVPAMLFAQAKPIVLR LAETHPKGYPTELGDEEFARLVKERSGGRI
VIEVYPGSQLGEEKAVIEQVQFGAIDLTRVSISPLASFVPKLN AFQMPYLYRDS DHMWKV
LKGDIGKELLASLEPF GFIGLWFDGGARSFYNSKKPVRTPADL KGLKIRVQESLMMGL
VRAFGAVPTPMPYGEVY SGLQTGVIDGAENPPSYFSASHYEVAKY YTLDEHTMVPEIII
GSKISLGRLSKADQDLIKQA AFD AIDYQRAQWAA YVKLSMDKVIAAGCTIIPVPDKTEWI
KTVQPMYKTQSKEIQDLIARIQAVK*

>SPBIB_v1_380023|ID:27164146| conserved membrane protein of unknown function [Uncultured spirochete bib]

MKRTLITIVTLIHILLINLSKLMIVAMLLLVFANVVLRYVFNSGIYWSEEIALVLEVWFI
FLSLGLGVKHLHISINLVKRESMPAWLNKALDLLADIVFIIVGAVMVIY GIRLTQFTMR
SIMPATKWPAGILYVLPLSGFVVIVEALFHILGYNMFDEKIDAYLSGKGGKLGDIRSE
S*

>SPBIB_v1_380024|ID:27164147| conserved membrane protein of unknown function [Uncultured spirochete bib]

MTDPTIATVILMGGFALLMVL RVPITFSLALASIA TATYLNIP LMAIVQQMVQGVKSFSL
LAIPFFIIAGEMMGRGGIALK LINLANVLVGRIRGGLAMVNVVESMFFGGISGSAVADVA
STGTIMIPLMEKSGYDDDFSVAITVTSATQGIIPPSHNMIISVAAGGVS VGRFLFLAGF
VPGVTLGIALMIISYIISIKRNYPKEKKYSFKEAVKIFGDAFLGLMTAVIIMGGVVSGVF

TATESAAVAIYAFIITFFVYKEIPLKEFKGILYSTLKTLMVMALIASASAFSWLMAYL
RIPAIATEFLISITNNKILLMLINVLMLLLGMIMDMAPLILVTPILYPVVVGKLGKLS
IHFHILMINLAIGLCTPPVGSALFVGCVAVGKISIEKAAKAMIPFYFVMVIVLLLITYVP
QITMFVNLIMPGG*

>SPBIB_v1_380025|ID:27164148| 3-oxoacyl-(Acyl-carrier-protein) reductase [Uncultured spirochete bib]
MSFVESLFLGQKVVVVVTGGGALPSSMAIAFAKAGAKVALWGRGTHHPMSEAADEVKKH
AGLPAESRQVFGITVDTASTDACENAFDET VHSLGMPDILLNGVGGNMGRSSFVDFDEKV
FEEVLRNLNLMAGLMVPSRVFARRWINAGIKGSMINMTSMASYRGLSAVWAYDAAKAGVLN
LTQALAKELAPYGIRVNAVAPGFFVGNQNRALLFDEKTGELTPRGKAIISRTPFGRFGEF
EELWGAVLYLASEKSAGFVTGVSIPVDGGYLSdni*

>SPBIB_v1_380026|ID:27164149|uxaC| Uronate isomerase [Uncultured spirochete bib]
MAHFIDENFLLKNETAKRFFFGTAKDLPIIDYHCHLSPKAI AEDKPFDDIARMWLEGDHY
KWRIMRANGTPESLCAGDGPWEEKFVAYASALTKAAGNPLQQWSHLELRRIFGISEVLT
HNALKIREEANRVLATKKISPRSLLEQFNKVICITDDPIDDLHWHKAI ADEQRAGSAFQ
TKVLP AFRPKAMNTADIAAWNTYVDALGKSAGIEIGSYAALAEALARRHAYFHAMGCRL
SDHALLVPVFM PASESELDAIVQRARNGTVLSASEQAKLMTAVLSHLARLNAQKNWTMQL
HIGALRNVNHQLFKAFGPDVGGDCTSDEPIIPLA AFLGALDSERKLPKILYSLDPAKN
NPLVALAVSFTGASPFESGAKGSSRASGTMQVQVPGKVQVGA AWWFNDQKDGMERHLKEY
ASVGLLGAWVGM L TDSRSFMSFPRHEFYFRLLCNTIGEWVEAGELPDDPLYTESV VRAIC
WENAASYFGML*

>SPBIB_v1_380027|ID:27164150|ugpE| glycerol-3-phosphate transporter subunit ; membrane component of ABC
superfamily [Uncultured spirochete bib]
MAELTHNSNKA AHRACLIRRTFPHIMLWIGIAIIVFPIYFIFSASSHTSAEILAAPMPLN
IGPHLIENYRQALFEGTKNMGTPVLTMMKNSLIMALGISIGKIVVSLMAAFAIVYFKFPL
RNFCFWTIFITLMLPVEVRIMPTYKVISDLGMLNTYAGLILPMIVSATAVFLFRQFFMSI
PREIAEASQIDGATPMEFFSHILVPMTRTPVAAMFVIQFIYGWNQYLWPLLITTKPEFYT
LLIGINRMMMSGADVQIEWQIAMATTLAMLPPVLVVVIMQKQFIAGMTETEK*

>SPBIB_v1_380028|ID:27164151|ugpA| glycerol-3-phosphate transporter subunit ; membrane component of ABC
superfamily [Uncultured spirochete bib]
MSKQYEFKAPILPYILVLPQM VIVFIFFFWPAAQAILQSFYLQDPFGGRMIFVGFQNYSR
LLADPDYWQSFTVSTAFAVCITVGAMTISLFLAIQANKKIRFASFYKTMLIWPYAVSTLV
AGAIWLFMFNPVGVIA YMLKHTFHVDWQYLLNFNQAFLLTLAATWKQLAYNFVFFLAG
LQSVPATLIEAAEIDGASPSTRFWKIIFPMLSPTTFYLLVMNLVYGGFFETFPPIHQITQG
APGKSTGILVYKVWRDGVINLDLGSSAAQSVILMIMVILLTVFQFRFIERRV TY*

>SPBIB_v1_380029|ID:27164152|ugpB| glycerol-3-phosphate transporter subunit ; periplasmic-binding component of
ABC superfamily [Uncultured spirochete bib]
MKRVILLMAVLLMAVGAYAQTTFEFWHAMTGHNGEMVQVIADKFNASQKDYKVVPVYKGS
YVDTMNAGIAAFRAGNPPAIIQVYEVGTATMMAAKNAIKPVYQLMAENNMKWDPNMYIPT
IKSYYSTSDGRMLSMPFNSSAVMYYNKDAFRKAGLDPEKPPVTWPEFFEVAKKLKASGM
EGGFTTNWISWIQLENFSAWHNLPFGTRSNGFDGLDTQLVFNSPIHVRHFQNM YDLSKTG
VFIYGGRENKANPLFTSGRVGLHFESIGGYGNMKANCKFEFGVARLPYYPDVP GAPQNSI
IGGASLWVFNGRPQAEYKGVAEFFNFISQPEIQSLWHKETGYLPITNAA YELTKSEGYYK
TNPGLVAIKQLLNKAPTANSMGIRFGNFQIIREIEDQVWEDILAGKISVKDGLDKMVRD
GNKTLREFEKLYK*

>SPBIB_v1_380030|ID:27164153| Glycerophosphoryl diester phosphodiesterase [Uncultured spirochete bib]
LPEKARSSTIKLMKHCIACILAFLLSFASVSFAQPDRPMQANLSMEKIIMQTSRPLVIAH
RGFRGIAPENTLVSAQKGF DAGADMWELDVAA SSEGELVVIHDNTLVRTTNAASIFPKRS
PWTVYDFSLAELKSLDAGSWYAL TDPFKQIKSGRVA AKELQAFAGLQIPTLREALELTR
LGWRV NIEIKDATGFACDAWIVEKTAALIRELDMVPSVLVSSFNHEYLRRMKKTAPEIAV
AALIDKPIEDPVSVLKEIGAV ALNPNAKYLDEATVRTVRAAGFGVLPWTVNDPADMKRLI
QWGVGTGIITDFPDEGLKQVAGHL*

>SPBIB_v1_380031|ID:27164154| MutT/NUDIX family protein [Uncultured spirochete bib]
MIAGDNGARKWAMLSSRKVYECNVFSVFERESRGP DGRVGRFAVMEAKDWAVVVPYVRT
ENGTSFLMVRQYRHGADEVSLFFPGGVVEPGE EPAHAAARELAEETGWVSARILHAGTVF

PNPAIQDNHFHVVALDPEPKVTRNLDNSNEIIDAHLMPADEIRQKMGTGELRHALMVVAL
FLADKCVAAALDEKPARQAES*

>SPBIB_v1_380032|ID:27164155| Fumarate hydratase class I, aerobic [Uncultured spirochete bib]
MPHVSIEQFISFGPESEFEPLALPRPLQANGRIILEPESIRECAKLAFSRIAYKMPRSQ
AAFSAVLESPESSVNEKFVAASLLENARIAAKGTYPICQDTGTALVYGWRGDQVDIVHNE
EIEDLLAGGTAEAYAQESLRNSQLGPISMIEERNTRDNLPAQIQIRSVRGDSLALVFAK
GGGSTSRTSLTMESPAILRQDRLEETLRKRIQSLGSPGCPYTIAMVLGGTSPSETLYAA
ELAALGLLDNLPQSAGDDGTPLRDRFWEEKMLEIAKESGIGAQWGGVHLAAATRAIRLSR
HAANLPLAVAVSCAANRHAIAVIAGPKGWAIQKLAHYAKDSYPSFETLRKDVFDAAPHIEL
SKSSQDWLAQLRSFDAGTIVTLSPVIVARDAAHARLLKILEKEKHLDPDWFLGLPVFYAG
PTEAKPGHATGAFGPTTASRMDSYLEPFMNAGGSVVTIAKGSRGAEAKKAIHAHQGVYCA
AIGGAAALNAAHHRSLSHQFEDLGMEAVRAATLETLPVIAIDARGNDIYSKE*

>SPBIB_v1_380033|ID:27164156| conserved protein of unknown function [Uncultured spirochete bib]
MDATHADVALLRCEDYDRTKLDAIIAQAAEIAAGFPDVRGATILVKPNVLNASPAKAVTT
HPEFVGAVIRFALSQGAKEVLVGDSPGWQPGALAAKTSGIYDAVKQNGGKWVDFREASPH
AVNHGKRLRNIPLTWLEHVDIVINLPKLNHRLMTYTGAMKNLFLGLIPGTAKSAMHMQY
PGVMEFGEMLVDLALSIPRCFTFMDGIVAMQGEPPGSGTPYSLGIVLASQSIKLDWIAA
RCVGYDPALIPYLADGLRRTLQSEAIIEPAISPLSVQDVSHEGFELLPYHSELGRKLGAI
PNAMRAFAGSLIRLRPVFHTDKCIGCGACVQICPANALALDSKNKTHIVRIDDKLCITCF
CCEHVCPAKAISIGRVPMLWHRAKRS*

>SPBIB_v1_380034|ID:27164157| protein of unknown function [Uncultured spirochete bib]
MRYILVERVPRRMAIRLDRNNWVYYIGRGSNLRILLFSIGCMLFLLGSSFRPAPGPLSAR
GGSDATPFAASEDIVMPEPEDKLVKYTVYEVKRGDTLSGIAAQFDVSLDTLISINAFSTA
KALKPGQLLKVPNQSGIVHIPTKDATVQEIAAAYNISADRIIDANGLLTENIHAGRPLFL
PDVRLPAAQLREIAGTLFRWPVSGRITSWFGWRKDPFTGRRSFHNAIDIAAPYGSPIKAP
MDGRVIETGYSPILGKYVMMSHSGGWKTLYGHMSEIVVQEGQYVSQGRTLGRIGTTGYST
GPHVHFVVIKNGSLVNPLNYLP*

>SPBIB_v1_380035|ID:27164158|ptsI| Phosphoenolpyruvate-protein phosphotransferase [Uncultured spirochete bib]
MRITKGIAASPGVSIAPAFLFIDDSADIPQYHITTADIPAELDRFHEASLLAKREIEALR
DRAKLEAGEEQASIFDAHLMMLLEDPEVLDQIERSLNENLNFVESAILSFETEMVDKLS
PDPLIQERVSDVHDVIRRLGHLLKKERISLADLETEVILVAKDLLPSDMVGMRSRMIK
IVTESGGRTSHAAILARAFEIPAVLGVGNFVEQVKPGQSIYVDGDKGVVAIDPDEIFIQ
REKAARVARIQREKENRELSIPAQTKDGTRISLVANIEMPDEVANVIEYGAEGIGLFRS
EFLFLGGHVPGEQYKAYSKVQAMEGKPVITRTLDIGGDKVLPGLGAMGEKNPLLGWR
AIRFCLEKTELFKTQLRAILRASIHGKIKIMFPMISTIDELIRAQGLLAEAKWECKAHGY
EIDPNIEGIMIEVPSAAICADVLRSCDFFSIGTNDLSQYTLAVDRGNQKVAYLNEPYS
LAVLRLIRMTIGYGEHAHIGVSLCGEMAADPASAVLLVGMGLRSLSMSASAIPAVKRAIM
SVTIEQATALAHQALSMNNSAQVSALLASKLSL*

>SPBIB_v1_380036|ID:27164159|der| GTPase Der [Uncultured spirochete bib]
MNKTSQEDRQLKKPKSIKRSASADSSAPKRKQTSAPAASQTNEEAALPAFRYENLPLVVL
AGRPNVGKSTLFRLLGKRRAITDPTPGVTRDPIEECELRGTDKKVIVVDTGGFKIERE
GLDELVVARTLAYIERANLVLFMVDAMEITPEDEEFAAFLRPYAKKLILVVKADSPERD
ALVWTHAKWGFDVPLFISAEHNRNIDELSEAIAARLDFTSVRAVEIEKADIRIIMGKPN
TGKSTLLNALLGQERSIVSSEPGETTRDIVEGRFTWKGRGITVLDTAGIRRRKKKVTDNVEY
YSVTRSIADVNRADIVILLIDAEGLSDQDKIAFAVEAGRPVVFALSKWDMKPKMKNA
FEARDRLRFFFGQMAFAPVVAISAKEGEGIDKLMSTIISLYSKANRAIETAKLNQAVAR
WIEETPPPAGPRTRFKLRYAVQASMNPRFIFVTRPEAVAESYRSFLKNKLRLEFGLDG
IPIQLELRASHKDRMRS*

>SPBIB_v1_380037|ID:27164160| protein of unknown function [Uncultured spirochete bib]
MPYLSIGQLERLISVPASTLRFWEKTVPFLTPMRSKSGRRTYSLSEAALIARLKLALDR
KFLGRQAQQLLEFELLYGDQDMRAQINALRDEILLVLDCEKWREEFEEIRAAITSEKEF
FNGPENQALDGIH*

>SPBIB_v1_380038|ID:27164161|apeB| M18 family aminopeptidase [Uncultured spirochete bib]
MDQKIKRLMEFIDASPTPYHAVDNLIGMLDAAGAQLDERQVWQLEPGAMYVVSRSNSL

IAFRMGLRFSGDTGFLLAGAHTDSPSLKLRPEKQLKSKGYLRLALESYGSPILSGWLD RP
LGVAGNVAVREGSDIHSRLFVSDKPFVAVIPNLAIHLNREINKGFEYNLHQMPAVFGLAR
AENQEQSAGGSHAEREISEILERIGEQMAVDPANIVSADLRLFDYGPSQIIGEELINAP
RLDDLCLAGCLAVMEAFSASEAQEATQLACFFDAEEIGSMTPGGAQSAYLRDILARIVLASR
NSGQDFYRALANSACISVDASQAWHPGYPEKDFEFYTPVLGKGIKAVKSNANMNYATDFTS
LQIAETAATAKAHLQIQRYMARADIQPGKTIGPITASRTGISTVDVGHMPLAMHAIRETIA
ASDHLDMIALLRAFYS*

>SPBIB_v1_380039|ID:27164162| exported protein of unknown function [Uncultured spirochete bib]
MKFLRRFLPLLVVVALIFASCATNTGQVPTGTETPPTVTQGGQPQPQTPVPQEPSAEKYE
LQNLFAQANTLKTEATDFALGSLPDKFLEANREHDAVSAEYKDLVETPATYDGVKAYPL
KEKLEHLVSTWDSLIEGEMPLRAGVEKDSADEMRFAAMNVDAPIQAPTQYDAGLQYYSSQA
AMFADASNYAQAISTYQFAAAAFGNSAAAQVNSLRSDIEKNDYGGKYESIQMYFTMGEEK
YKEAQDLWAKGTLDDIAASTAALKEAQTYYSFVDTKGAELEAFEGKDKAASAQQEALSVK
ADINAPDEYQQALDILAEAEKNMADSSYVSAYSWYLDAASAFGTAHDAATARGPEVAEAI
AKAESNLADAKDRASELGLEENIYL TAAAEHLGKAKALKEELQYPDAIFETNEVANYIGL
SDNLVQQEAQIREKARIEQLKKDKAAADQAIADAKTRIAWADQVCLKDDYPKEYASASSS
MAAAEKAYEIEKYVPAKTLAEQVSSTLSDEFQQQVLASREAAKAKAAQAEERLKAANK
QAADVAISDAEARMANENSVRTDYPDEYKSASVAMVGAYVAYGNEDYVVSQKAEVVS
SILSNDFQAQVAADRAAKAQLARDKAEADQVLPQARARMANANIKADYPTTEYNSASA
AMTAAEKAYQAEKYAPATTLAKEVLSTLSPDFEAKVTSEAAKQMQDEIAKAGKAADALG
KAHSRMANANQVNLVADYPDEYRDASTSMQAADTAYSENKYDATTSLANDVIRILSDDFI
AQVNAEQAAKAQLARDKAEAEAVMAQAQARMAWADQANIKTDYPTTEYNSASAAMTASEKA
YEVERYAPATTLAKEVLSTLSADFEARVAVERAAKENQAKIAQNQKDAEAALGQAKDRYD
WATSKNAKNNYPDLKQGGALADANTAYNAADYVRAKLANQAYWTLMQIDEFAPLPAT
YKVRILPERRDCLWRIAEYPFVYNNPYKWPVLYEANKKTFKDPSPNPLIFPGQILKIPSI
KGEVRQGEWDAKKTYQPLAK*

>SPBIB_v1_380040|ID:27164163| protein of unknown function [Uncultured spirochete bib]
MRANAICRPHISGRKHIRAAFIGAAALAWMLWDGCSYSHSFPAGFVRFAPQLDAWENRS
EGFCLVLVSSSDRAQGFLEWNSQGIYGRIVQAQKNGNTVAITLGDGGMNGLQLSIFLKRK
SIIAEYFRKDKSALQPFRIEAWHVSSEEGMRVLGATFVEKLPNEGALSLRLQYVSAQDAA
RSRILDEILRRGMSPYNMAELRLAQKQEA AVAVQNRAPPPQEYEEIEYPVFISDQYLSIA
TQHLYFDGGAHGAASTTFDIIDRAEGKRLSAQDIFAGDWKAGLKL LLAELMRQSAFWGN
SGQEADLKALGLFESELYPSDDIFVCAGGVGFQYDRYQIAPWYMGEFIIILPWNELTSYL
SPAFKIPQ*

>SPBIB_v1_380041|ID:27164164|ileS| Isoleucine--tRNA ligase [Uncultured spirochete bib]
VYKPVDPKVNFPQEQESVVQFWEERNVFKKSISQREGAPEFVFDGPPFATGLPHFGHFV
PGTIKDIVPRYKTMRGYRVERRFVWDCHGLPVENLIEKELGLNSKTDIERYGVAEFNEAC
HSSVLRVYVKEWRQIVTRLGRWVDFDNDYKTMDPDYMEIWWVIKSLWDKGLIYEGYYILP
YCPRCSTVLSNHELSLGGYKDVHDP AISVRFKIVGVLASNKDPALADLANGSTYFVAWTT
TPWTLPSNLALALGPDIDYVCVIDGKERYILAESRLSAYYKHPESLQIAWKKKGHELGI
QYEPFLPYFADLSAKGAFVTVLGEHVTTEDGSGIVHTAPFGGEDDYEV LKGTGIPTVCPV
DAECKFTDEVPDYKGFVKDSKAIMERLQEGKLIKRDQILHAYPHCWRCGSPLIYRAV
SSWFVKIEPIKEAMLRANKSIYWLP AHIRDGRFGKWLENARDWAISRNYWGNPLPIWKC
DTCGKTICVGSRKELAE LGGDVPEDLHKHHIDKVTLP CSCGGTMHRIPEVLDCWFESGAM
PYAQNHYPFENKEKFDEHFADFCIGLDQTRGWFYTLTILAAALFNKPAFKACVVNGLV
LAEDGKKMSKSMRNYTDPSEVMDKFGADALRLFLMNSAVTKAEDLCYSDDGVKEVLKSVI
IPLWNAYSFFVTYANIDGFTADGFDCTDVENPLDKWILSVCEKLVADVTAGMEAYDMQAA
IGPMVEFVDSLNNWYIRRSRRRFW KSENDADKKSAYRTL YRVLRRRLTLVMAPIPVFTET
IYQNLKLENEPESIH LANWPTEEPQYRNLELERDMRIVRQAVSMGRALRVANDLKIRQPL
ASVQLITRQPEEQEVLARMEDILREELNVKSVFVHEKEEDLVEYHAKANFRVLGKELGAE
MKEAAKIAALDTS AIKRILVGEQVPLTLASGRVSLDASKVEIVREEK PGLKVLNEGTL
TVALDTTINPELLYEGYVRDLIRGIQNARKEAGLEVTDRIKLALFGDDELHTALERFSQL
VAEETLAVGIEWTKPKDGITVEAGEKSWTVSLQKA*

>SPBIB_v1_380042|ID:27164165| exported protein of unknown function [Uncultured spirochete bib]

VKCQGVRRMLLCQPTPNLFSCPAPSLVLCLVVGLLAAANPMAANAQSASLVFTTATGALA
GIAAPGSIAQGGFDEEIALKGRMNTGPVRASALISASLSSGYAALARWYGSSTQTMRF
WPGWTKGALAPDVLAAIEIQELALAVSAGHLRFEAGKFKWGVGKASRPSDIFRTMDYT
SLIPVSKNLPVRFSSMSRIEALASIDGDSTITAGARYFTSISMGGSSANGGLTGGL
SGGASSPFFVSEVGSFALSAGWRRKQGSADDEFAGSFELQVDAGPFAPYTEFSARTT
DSTA
YALAMLGTSLAISDLSTMEAQTALGQSSAGTQLFFLGTWKASDLTSISFPVFWLAD
AHI
LAASSIAQFQILGGRLDIFSATASWIFAGSPASFLWKIGAYWTRSLSTY*

>SPBIB_v1_380043|ID:27164166| exported protein of unknown function [Uncultured spirochete bib]
MKKASNYFVIISRFKAVFLFAAGALLMAQAVMAQGTGQDGGAAAAGSTAGSSREADAL
LEAIDSAQRYSSISYIGLMEITQGSRLVKKQFIANARGSDKVILEFTNPEDKGRMLRLG
STIWMYFPSEGETVRISGSLLRQGLMGSNLSYEEVAEGESLREAYSAQIIEEMLDGRLC
KLLKLVSSRTDISYPVRLWVDASRKIPLKIELYARSGILMKTMYVKEIEAIAGRQLPTK
VEIVDALKKNSKTVFSIQSVKIDVAMPDMSMFSMEALTK*

>SPBIB_v1_380044|ID:27164167| membrane protein of unknown function [Uncultured spirochete bib]
MNLISYAWRNLLRNTRRSLLAVLSTFLATLLVVAGNGLTEGFLDSMVRNYAKNETGHVNI
TTSSYRERARFLPIDDIADADQLVSEIEQMDGADAGAASAGSGITAAPRIRFSVLLSSG
LFTKPAVAIVGDPEKEKSLMLNRNLPGGSYCDEPGTAIIGSGLAKDLGLKPGDKLKII
ATRADGGIGFKSLKVSIGIFQTGTNALDGSIFQMRLDDAQNMLGMPGGAQQILVMLPDYRL
ADAWQKKIGAVLAAHGQGQLSVLPWSAIGDYPKLILMTSSIYMAMWFFIALLGAFIANI
MTMVVLERRETGILMAMGMPPRIILSFLLEGTMMGFVGLGTAAGIAFNAAFSRKGF
DLSSALAGFSWPIDNIKPTISVSGVLAGILFCTVAAAIMSLPSWRASRMEVVDALKAV

Q*

>SPBIB_v1_380045|ID:27164168| membrane protein of unknown function [Uncultured spirochete bib]
MKASSVLFRIAARNVLRHRRRTLITAIVLTVGIAVFIMFQSLLAGMDRVTIDTAIDYDS
GSISLRSPGSDPLFKNIAIKEPKAIDRLPALLPKGSTWTQRTRFYVQVSNWIDETPALA
FAVEPEKDKEVFKTSSTVQSGAWVSPAKAVIGLDLAKDLGVRIGDLIAVTAILPDGSLNA
IELEVGGIADLPLFSLSQAIYLSAQDAEALVGAPLPVTEIDIRIPPASRLDTLVAQSDA
AASALEKAFSGIEAMSIGEAMRDYLAAMRNMKSKFAIYVVVIVLLISAVGIFNTVLM
SMYS
RIREIGVLAAYGLDPGQIKRLFSLEGMLIGIIGSAGGVLLGAVFVWWLTSRGIAFGGMFG
NLDLGNLPKNLLIKGEWNPLAFIQSFSFGVLVSWLASLMPARKASHIEVTEALRFV*

>SPBIB_v1_380046|ID:27164169| conserved protein of unknown function [Uncultured spirochete bib]
MAEIIISLSDVTKIYKGETEVIALKDIDLVEQGEFAAVVGPSSGSKTLLNIIGCLDS
PTRGELSWRGAPMKSMNRTQLAAYRRMHVSFVFQSYNLIPVLTVAENVEMPLLI
EGMHDR
TAIRERALSIVEMVGLSDKANRYPTELSGGQEQRVAIARALVKKPSIVLADEPTANLDSH
TAGEIIKLMREINEKTQTTFLFSTHDPRIEMELAQRVITLRDQGIERDERGAP*

>SPBIB_v1_380047|ID:27164170| Transcriptional regulator, ArsR family [Uncultured spirochete bib]
MNLPLDKIIHERARLRILASLSSQPARTCTFTELRLDNLDMTAGNLSQLSVLESSGYIL
IEKKFKGKKPLTEIKLTELGNEAFRNYLETLDSMIAALKPHT*

>SPBIB_v1_380048|ID:27164171| membrane protein of unknown function [Uncultured spirochete bib]
MNISDQKLKEFEAALREIREAASHEAGIFHDKDLRKTFIWLSLGFSSIVIVAFCIAGHFLI
SESGTSGTSSAGIIFWTFAIMLAVGAAIKITLLSRIMSRKNKSIASLLRVIYKGPASVI
IAALLAVVICVFLVTEGLGPLAVSMSAIFAFAVFALDIRIQLPEFSALGWTLALGLV
SLFFIRGSPWLWGGIVWGGSFVSLGIAGIVASRAS*

>SPBIB_v1_380049|ID:27164172| protein of unknown function [Uncultured spirochete bib]
MRTEGVDIDFRFLEDVQSTENIRRVIRVSEGDVSVAVSNDSDLRYSIELEGIPGEIDAW
SCSVRAESIAILDAMANDFVRIAKCNIHVPSYISDIEVHSSRGSIEVRDISANILVISE
RGSITVSGAKFVEASSVNGSIHIENSEGCSARSIDGNLVCHRISGSVQAEMQNGSVTIDQ
VAKNVAVVSDQGKISVRRVGGRVRLISNKGDVELEVSGPFGGGEIQTYSGDISIQL
EHSS
VEFRAETLSGRIDASHPVNSAGMGPQRCAFRTGDGARRLYVKSVLGDIEVN*

>SPBIB_v1_380050|ID:27164173| Long-chain-fatty-acid--CoA ligase [Uncultured spirochete bib]
MADTIPQMFIEVTSKQPDVNVQLSKDSQKGFQPTTYQTLLREASICALGLRNLGIQRGDR
IGFISDNRKEWLIADLAILGLGAADVPRGCDATAQEIAIYLSWSECAFAILNDRQLQKI
LDIKASRLPFGSQLTEAPYAHLKTIILFDPPTSAISEEAARNGLQVLLFSDIMDTGRSL
YATDPDFYTKEAKAGARGDLATIIYTSGTTGDPKGVMLSHGNFLHQTEYLPSSIIGVKS
GE

IFLSVLPVWHSFERVVQYIILQAGATIAYSKPVGSILLADMQAVQPHWFTSVPRIWESIK
DSVYKSVRQSSAVKRAMFSVFIAIGEHAHYFRNMLLDRLPKFSPRSRAVDIGVAVIPFVL
LSPLRALGDVLFVKKIKEKLGKRFIAGVSGGGALPPSVDKFFDALGILILEGYGLTETAP
VLGVRLKNHPVSGTVGPIHRGTEIRIVDEHGALPPGHKGVQVRGPQVMLGYKRPDLT
AKILSQDGLDGTGDLGMLTVHGEIKIVGRAKDTIVLRGGENIEPVPIEQRLGESAFIQQA
VVLGQDQKYLAALIVPRQEALIAWAEENEIPFNDYPSLLDQPEVKELIDSEINSFVSMKN
GFKPFERIFRFALLPDPFEPGRELSAKQEMKRFTINELYKKQIRELFAE*

>SPBIB_v1_380051|ID:27164174| putative tRNA-dihydrouridine synthase [Uncultured spirochete bib]
MVPFPRGSLFLAPMVGITNRAFRTLVEYELGAPDWFVTEMASAEAFSLGGRNESIYLDPSP
RSLQTSVQFAARSPETLAKACNAVSQLPAEYRPAGIDINMGCSAPHIKGYGRGAALLDNP
SLAREMVAAREQWVGMLSAKIRISTSLGEDGTIALAQLASAGLDCITVHARLDTQKFR
RKADHRFAVLLAEVLPVIANGDITNREECAALLDSTHIHSLMIGRAAVQKPWLFASLK
SGAGAGEGERGTPGSSEPGAEPQYGTTRHMPEIDLLAIALRFIDLAETLLPPEWQRETCRR
VFSYYAANVSFAHHLRFSLVNAPSLGAMRQILRDYFNQVPQDRIFAQDQILA*

>SPBIB_v1_380052|ID:27164175|rpsP| 30S ribosomal subunit protein S16 [Uncultured spirochete bib]
VSVRIRLKRFGAKARPFYRIVVMDSRSARDSKTIDELGYYHPIETEDKQLLINETKVRDW
LSKGALPSDTVKSLLNKKGIQLG*

>SPBIB_v1_380053|ID:27164176| conserved protein of unknown function [Uncultured spirochete bib]
MERDLVEYIVKSIVDNPDAVNIKVIEGEKSTILELRVAESDIGKVGKNGRIARAIRLIL
SAAASSQSKRVILEILD*

>SPBIB_v1_380054|ID:27164177| putative Ribosome maturation factor RimM [Uncultured spirochete bib]
MDKKQKAEYLAVARLGAVRGLEGEIKLHSYSGEFSHIEKAGEIMLGGEAGLEDARPIRIV
QFLQGGWGASVIFEGFDTPEKARTLVGRELFLPREKACPLRPHEYYVADLVGMTATVNGL
AIGVIAAVLDGGADALLEVKRDSGGSALVPFRKEFVGEIDEEKGELEILSSWILE*

>SPBIB_v1_380055|ID:27164178|trmD| tRNA (guanine-1-)-methyltransferase [Uncultured spirochete bib]
MNIKVLSLFPEILEAYFSASIMKRAVGKGLVSFELVNIRDYAYDKHRKCDDEVFSGGAGM
LLKPEPLDRALAAAGSPEVRTVYVTPSGRLFNQAMAADFAKEENLVILCGRYEGIDQRIL
DTRVTDVVSIGDYVLSSGEVAAMVIDAVYRLVPGVISGESLSEESFSAGLLEYPQYTRP
EEYGNMHVPEVLVSGNHAAIARWRLRASLIKTLAYRPELLQTTIDLTGEIGRLLKEVIDGG
GENEPRAANSGGTGKN*

>SPBIB_v1_380056|ID:27164179|rplS| 50S ribosomal subunit protein L19 [Uncultured spirochete bib]
MNLVQQIQAEQARTDLPAFRVGDTRVVSFKIVEGRIERIQA YEGLVIAIKNSGASKTFTV
RKNSYGVGVERVFPLNSPRVDKVEIVKTGKVRRAKLYYIRTKVGKKS VKTLVGGRKSDK
PEA*

>SPBIB_v1_380057|ID:27164180| conserved protein of unknown function [Uncultured spirochete bib]
MFALQKCAVQKGRDGEDEAVRFLKSGWEVIYRNFRSRRGEIDIIALRDGILAFMEVKIA
NRFTQEDLQHVIKRRRSIIETS KLFLAMNRKYSQYHIRYDVILIAENACARHMEGAFA
ENDEAE*

>SPBIB_v1_380058|ID:27164181| protein of unknown function [Uncultured spirochete bib]
MKQNKVSRDLPGWAGSTPDDFLLADYDIAEEMKASSWKRLYELKHKLIDDHYLDGAIASI
AEMLSNRVKGKSR*

>SPBIB_v1_380059|ID:27164182| conserved protein of unknown function [Uncultured spirochete bib]
MNNEPNASPSKRPSGRFRSHSFRKKRPAKSSPSLEPTESQDPQAERVKKQELKICKVC
GKPIFDLAGAIASRDDGEPHFDC AIEILSKEETLASGEKIFYIGSGSFAVCYQAPGGKL
EIRRKIRWETAGSTQPWRKPMVSSPRLP*

>SPBIB_v1_380060|ID:27164183|serS| Serine--tRNA ligase [Uncultured spirochete bib]
MLDIRFIKENLEAVRQNIRDYMHADADLVVSLYDRRNALLRELEDARRLRNENAQAMKS
PMSAEDRAARIEEGKRLKETIARLETTELQEAESFAVEMAKIPNMAHPDAPRGKEDKDNL
EVKRVGSPTQFDPPKDHVELGQSLDIIDFDTATRVSGTKFYYLKNEAVILELALVRYAL
DILSRHGFTLMATPDIKTEILEGIGFNPRGAESNVYTLEGEDTCLIGTAEITLGGYHSG
TILDKSQLPIRYAGISHCFRREAGAAGQFSKGLYRVHQFTKVEMFVYCLPEDSGRIHEEL
RAIEEIEFSSLGVVDFRVDCTGDLGAPAYRKWDLEAWMPGRNNGEWGEITSTSNTCTDYQ
ARRLNRYRDDD GKNRFVHMLNGTAIACSRAIISILENFQQADGSRIPDALVPYCGFDV
IRPRKK*

>SPBIB_v1_380061|ID:27164184|prfA| peptide chain release factor RF-1 [Uncultured spirochete bib]
VTERIDQMRARIAEIDELISRADMMRDQKYLRELMKERARLAEVVATFDETQSLAVSLHD
TEALLEGETDPELRQLIEEELGQLRERFIRIEEKLKTLVMPRDPFADKAVIMEIRAGTGG
EEAALFAADLYRMYSRYADSRRWTLVMSMSETELGGIKEIIFSSISGEAAAYERLRYESGV
HRVQRVPATESSGRIHTSAVTVAVLPEMEETEIEIKPDDLIDVMRASGPGGQSVNTTDS
AVRITHLPTGIVVHCQDEKSQIKNKAKALRILRARLYELEDQKRQAARSAERRSQVGTGD
RSEIRTYNFPQNRLLTDHRIDLTLTKLDLVMEGDIDELLDALVAWGKQQAFESEGHALA*

>SPBIB_v1_380062|ID:27164185| putative Release factor glutamine methyltransferase [Uncultured spirochete bib]
MTVRELLLEAARTFSGSDTPFLDAVILLAHS�DVPKEKILAMLPEEACDVPASFFEMADR
RRRGESIAHIRGFREFYGRFTLVNDDVLSPRQDTEILVEAVLEAGDMCASMPNASRPLKV
LDLCTGTGAVAISIAAERPAAWHITASDISLKALEAAQQNAHRLALPSAVEFVASDLFSG
ILGQFDIIVSNPPYVPRQAQAEQLISDGWKDPLVALDGGIDGMDFVRAIIAQASEFLYKNG
VVLEMDPSQVSEAVALFKLAGFCEIRIWKDLAGRERVAGGRY*

>SPBIB_v1_380063|ID:27164186| (P)ppGpp synthetase I, SpoT/RelA [Uncultured spirochete bib]
MDELAQNFLSKAEIRFTAERKRDILSSAVMYCQHSHGDKKRASGEPAFYHDLRVAEILLDL
GMDLESIIAGLLHDTV AERVSGYAPGQAAQAASRRKVPGASEPARTERSKSEKETGTLNS
LLAAPNPQIEEMYGTDTALIVAGVNRLLSSVRAKNKSVHAAETMRKMLFALTSDIRVILVK
LADKLDMSRTLKYLPEDRQKEIATECIDIYAPLADRLGISWLKDELEDLSLKS LNREIFD
QIKDIVNARKEERQEFLKVKVTEKILSSAAKENIEVEVSARAKHFYSIYQKMRKRGKSAEE
LYDLLGIRLICRSVND CYSLLGLVHRLWKPIDGRFKDYIAMPKSNGYQSLHTTVIAYGGQ
LLEIQIR TREMHLVAEYGVASHWLYKKGSTAELPRLEDPIVNKLKQWNQFIIEGESYLE
EIKRELLRDSIFVFTPKGDVIELPAGATPIDFAFAIHTDVG AHCLGAKVNGSIASLDSEL
KNTQIVEVITSPNAKPNINWLKIAHTSKARSKIRQLLVQTGQAV AIDKHIVAARKGEKTL
PETGQARPHAHERPSEAPHA KSEEFPSVVEFHSMQ PGLVLRSEKAGVSVGGIRNMMIRIA
GCCRPVTGDRIVGYVSRGRGII VHREDCRSLASIA DFEERRIDVKWEDEAMNATARYRVT
TKKTFDIFSEIESTVRKCSGRLKEGKLG ERGDGTL SGFFILEVDARDDLKRVAKALRTL P
SILSIEEEAL*

>SPBIB_v1_390001|ID:27164187| exported protein of unknown function [Uncultured spirochete bib]
VRQNQIYSIAIFLLISILAILPVAAEPQLKTLGNGMTVLLNPIESEENVAILLAYHAGAD
AQTAQTAGLFLKLELALFNGPAASPGTTEPAA AIDVLEPNRIAGGASLDRFEFGFSVSKE
KLV PALDTILYLF SQRREFLLAQEDGVENARQSARALIKDSTLDSNAIHDMAIAKKLFS
RAPFRLDV LGADYVLEKADAATLRTFAATWL VPNNAFIAIAGNFDTDQIMNLLDERFGQL
PKASNPWSAPLA AFPKPGVTRPLFLVFPDSTMPSGMMQVELRYRGPDPKETSSFAALRML
EELANTPSSRFFTAIRKGM PKGAEPKEVRIAYSPNRNASWLSIIASIP LPSGKKPTDIVF
SFKELARGTELYMIKSNPAYFSAAEYQSARQALLEKTMAIQGDPLDAAAHAAALWSWGIP
SFVVFQESDAIMKTGQKELSQA VDTYVQKNLEVVTVRLNPDLYEANKKIFSSNGFETVTAQ
NAFWWR*

>SPBIB_v1_390002|ID:27164188| protein of unknown function [Uncultured spirochete bib]
MDYVRYCLASNLRLRRAILQMSQEELAQRADLSPGFANIETGRNFPSSKAILKISAALK
IEPWKFLDPQKQDLFFTRDEIFQWFEDSRKRLFGYPQNPEEEQKGNRPEDSTSPED*

>SPBIB_v1_390003|ID:27164189| Peptidase M24 [Uncultured spirochete bib]
MFTSETYIKRRTAFRQSLYDRGILNGTLLLLANSECPRNYPSNCYPFRQDSTWKYLVGLD
VPGIAFTLDIDSGHSCIYADDPGIDSIIWTGGTPTRSQLASQAACDEAASFSTLSALLAR
ERA AKKPVFIFPPYRAEQVSALVALLGLPDASPADFLKEHINTSVIAALVSLREIKEPEE
IAEIERAVTITKAIHEDILHNFRAGWTEKQAANRVL SLASEYGC ELAFATIATCKGAVLH
NAPTAYAATSNDTFLLDAGVEMPSGYAGDLTTTFVGERFDVQSREIYEVLSRVFNEAIS
VLGPGVRFIDVHKRASVALAQGLTSLGIMKGDPEKAVQAGAHALFFPHGLGHQIGLDVHD
MEGLGEDIVGYGDELGRSDQFGLHALRLAKTLKPGMVHVSVEPGIYFISELIERWRAQGIC
KDYIEYDNINKWMHVGGMRIEDWCITESGARRLGPEFDK KVA AIEAARSGK*

>SPBIB_v1_390004|ID:27164190| protein of unknown function [Uncultured spirochete bib]
MKEVFACAFLEDAIVVKSMLESAGIQAELLS DQMLDINPFYSIEPKGAKIVVSDSDEADA
KVIVDSFREHTRS DN*

>SPBIB_v1_390005|ID:27164191| putative Metal dependent phosphohydrolase [Uncultured spirochete bib]
MKKKLLIPSIIVLLTAF AVAGVFLLMQLYIADKSFDTLDRALKSLIDLQASAA YNGYFAW

TKMYDLVMQGNLTEANALADEIPKSFPLVASAEIMQGVPEENFVVGADGELLRIVYSIR
DDDEFRTAPNAVAVTIIQASKLLDIVSPNGFKIDMTGGRKTTYGIHVSNLMHISLWNII
AMVLLTILFASLLIQRVYVKKTAFFLDTRGLESIIYLFQEKMSSHRSRNVAVLALFLGK
KLGRLGKCLRNLVVAALLHDIGKIGVPTNVIKAGRLDSKEYMQIKQHPVISARILKSFK
EFERLSPIVLYHHEREDGSGYPEGLTGKDIPLESKIIAVVDVFEALVGERPYRNPIHPFS
AFEKLLKMPDQRIKVLIDNYSELNSFQPPRWVLSYSPWLLGV*

>SPBIB_v1_390006|ID:27164192| conserved protein of unknown function [Uncultured spirochete bib]
MREIYRQLADAGILFFEYGVTAALDAYYDEKPRPVRFVVAECSVIDLARCFSELQYPNLPY
ADAAFDTCESLALRTSFAESGGAPAGAIQESSMQESSVRFLCTEDALHCEVGGSWANFR
RNPQSDIFYDQGNYYDDLKAKAIPSCNTDTDNALFESAALATFHPEGYRLAKEPIPLPAC
TSSYFQKDLLITVLTGPYPAAGLELLKKSFGIAREWPEIALLDDVDHAKDYHPEGNGWNH
TLQTFYSYRKERDLVLSLALLHDIGKPESLSREGKRFDQHAELGARRARKFLARLGFSTT
TQEDVAFLIRYHMMPAALSVLPIQKTEPVITDPRFPALLELFRCDFESSYKDPEGYYEAC
NAYQTIRRNMKNPYRNADGSLKSRSKRTIAHY*

>SPBIB_v1_390007|ID:27164193| protein of unknown function [Uncultured spirochete bib]
MMQVDVEAFWANFEKEIGEKIISRTMGQHFSTRKSQGEWGLLVLSETALRFRPTPGENWF
DSLFRMAAPRVKPEPLADILVPLESIASIELPKKHFFDFLFSPPFTVFTLRIRIGNTEHD
LLGADSKCELFRWLLSNLPVAKGT*

>SPBIB_v1_390008|ID:27164194| conserved membrane protein of unknown function [Uncultured spirochete bib]
MSRTLEREAGKCYSPAMSRARGIAAGIGYSTIFGFSFLVTKETLAVLSPVELLASRFFIA
ALLMSGLALAGAIRIDFRQKPLGLLLMCLFQPVAYFIFETYGVANAATSVAGIILGALP
AGVAIVGAIVLKERLSALQYSGLAMSIIGVGLVALLGQQNAETKPIGVVFLTASMLSAV
IFNIASRKASERFSPAERTFAMMWSGAISFGIPAALQNIAGKGNIAALFNTAGSRFVPSW
AGILYLGVLSSVLAFFLINYSLTYLKASQSAVFTNMVTVITVLAGVLIRHEAFSWNQGLS
ALLIVIGIAVANSAGKREIQERS*

>SPBIB_v1_390009|ID:27164195| Amidohydrolase 2 [Uncultured spirochete bib]
MKNAAFYDVHCHLMNLSHPAFVSIIESLRHRPREVIYSQIASFEYLASSMLKRGGEKVRN
LLAVMDNDCADILFLMEDDLAQFEDAKNAKFKEPAPLREGSLHIGELSFDSLVTPLVM
DFSTPSTLTPDITYYKRPPRKPIEAQIVDIMYAIRRYRADRPQGFLRVYPFLGLNNTKNYRA
EGLLAYLEKWFAGYKKDESEFERRFMSMSANAPDCTPESYGLFAGIKLYPPLGFDPPWDD
PAEREKVEILYSFAESKGPITTHCDDQGYRIIPLESLLFTAPARYKPALEKYPNLVLN
FAHFGKRYIRMIGGRAQEDWRAQIVDLVLAYPHVYTDFTAGEPSFYGELANLLDSLSQ
NEAEKLSHRILFGSDFMVNLFKVRSDYRDYELFSQSGLAEMKLRFCSENPRVFLFGSGE
*

>SPBIB_v1_390010|ID:27164196| Aminotransferase class I and II [Uncultured spirochete bib]
MFEFGLERFFAEHEFNARYLLCTSDCESMPISTLLELSDNPGHALES�TKTWLGYTESR
GSPILREKIAKLYKGLEAKSILVHSGAEEAILNLYMATIQPGDTVIVNWPCYQSLHEIPK
SLGAHVIKWEIQRSPARWFFDPVELEQLIESAEGPDRRHGPGASFGFGSGPSPSLNARTN
SGSARKFSPGPNPTTHVKMVVLNMPHNPTGALMTQEEFSRVVEICAKRGITLLVDEVYRL
LELDGREPLPAACEVYENASLSVLSKAWGLAGLRIGWLATHRSDILDRVAAVKDYNISIC
ASAPSETLACIALDNSEKILARNKAICQSNLAHYRAFFDQHVELFSWIPPQGGSVAFPRL
SATAENAPWNEADKLAHEL VNDTGALILPGSLYGEYAAHFRIGLGRAAIPQGLDVFSKW
LENRRKI*

>SPBIB_v1_390011|ID:27164197| putative tRNA threonylcarbamoyladenosine dehydratase [Uncultured spirochete bib]
MSAMAMESPARFTDRTRIIVGENGLDALAKARVAVYGLGGVGAACALDLVRAGIGYLHVI
DFDIVEISNLNRLAIGFSRFVGMPPKTEAFMQAAREINTDIEILAEKTFFTSETATKVIAR
ECEIHADCVDLLSPKVSLLAAMRTQNLVFISSMGTAGRLMPERLKGMLMSEVKGCP LARA
VRQRLAKLQIPLDFPVVWSDEPAIKPMPREGQRGIQGSAPFVPQAAGHFMASWIVRKILE
DTHV*

>SPBIB_v1_390012|ID:27164198| putative Hydrolase, TatD family [Uncultured spirochete bib]
MYCDAHIHLVDLDSREPGFARRPLFPWRRAAVVSHDPDEFAASEKMQALLSPTIAGFGVH
PQNPDMRNADFLAALCREKKIRFIGEAGDFDFGDGPLRSRTPEAMKLQTEAFVFQARLAA
FEGLPLVIHLRKAADVLMAGHGRILADIPSVIFHCWPGRLEEANMLLKKGINAYFSFGTPL

LRDSSHAIESLIGLPLSRILSETDAPWQPPHGS AWTRLEDIATVVRKMSMVLKIEQSALE
SILEANFASAYLLNE*

>SPBIB_v1_390013|ID:27164199| protein of unknown function [Uncultured spirochete bib]
METILMDVRRFMRSILDLA HARSDVQVGSGRKADTHSKSASYRSIDTGS SVDVYGCGRGI
DIYSGKEAFEFYKKMSFDKMPPL*

>SPBIB_v1_390014|ID:27164200| Transcriptional regulator, PadR-like family [Uncultured spirochete bib]
MSAAEELYEKWKSQFRKGFLELCVLELLSKSGRSYGLAIMEQLNAGVDVTEGTLYPLLM
RMTKDESIEAQWETPDVGHPRKYVISSTGSALLGQMREEYERSAAARRTIMTGGHAE*

>SPBIB_v1_390015|ID:27164201| protein of unknown function [Uncultured spirochete bib]
MTRKEYIDILTQRLGGLDEASCADIILEIEDHIDGLVREHPEKSPEEIEGLEPPESLAD
SLREAAGLGPYEPHAEQPKSGQKAKKNVHITIDDIELEEAIKAFDIARIFRRNRDGT
KESQESQTS EDVHGSYEFGSDLASVHEVSVRCRSSDIRVLVADTSLAVRTPGEEHPRLE
LRYDSTRGTFGISTAHGKSEPD LIELRIPSTVDSLLVSTISGDVQVLD RIGLSIKTASG
DVDVAACAGDIEVRTASGDVSLAQCQENITVTTASGSVSIEADELCNAIEVSSASGDVLL
YYPELWDARVAVSTISGDIEHNGNATGRGTIVFGSGLAPVRITTVSGDISVRQMR*

>SPBIB_v1_390016|ID:27164202|cat| 4-hydroxybutyrate coenzyme A transferase [Uncultured spirochete bib]
MNLQDEYR TKLISIPEAVSKIKSDDNVVAMCASEPQGCMGQFHTVADRVENVRVFSCLT
LQPYDFYMKPEMKGHFELASWFHAPGSRAALKNNTGTVTYVPNMLHRSATDFIFARKPHI
FYGTCTPPDKHGYVSLSLGITYEKDILEAADLVILEVNPLLPRTFGDTHLHISEVDFEVE
HEQIVPELSPQPSETDLTIGRYIGELVEDGSTIQLGIGGIPNAAALALRDKKDLGVHTE
MIVDSMMELYEMGVITNRKKS FHKGKLVATFAMGSRKLYDWLDDNVAVEFMRGRWVNNPA
VVSQNSKMVSINTCLMVDLTGQVASESLGPVQYSGTGGQSDTAEGAVEGIDGKKGKSIAC
YSTAKGGKVSTIVPVLPEGTA VTLHRSLVDNVVTEFGIARLRGKTVRERARELIAVAHPD
FRAELTEKAKALGYL*

>SPBIB_v1_390017|ID:27164203| 3-oxoacyl-[acyl-carrier-protein] synthase, KASIII [Uncultured spirochete bib]
MAKAAIIGTGLYAPGQPIDNETLKKLTGVEFDSQRHEEKLGIKSRHARLSGLKETTADF
AEHAARDALQAAKVDPKDVGLFIVATDTPEYISPATSILLOGRLQGGETGAKSFDVGASC
ASFIEALDAAARHLITDSSMRYALVVG VYNMPAYIRDGDAFGWSIFADGAGAVVLERQEQ
GQSGYIDGAFVTDGTQWNFVGVYAGGTKLPVTRERLDSGEYGLQLLQKLPGDRNVKLWPP
LVQRLLKAKIPQTA VSHYLFTQINKSVIEQVMAVLGEPLHKTTMVM DRYGYTGSGCIPM
ALHEAVMAGRIKKGDLVVMVASGAGLAVGASLLKF*

>SPBIB_v1_390018|ID:27164204| putative Transcriptional regulator [Uncultured spirochete bib]
MGSDTRKALIESAASLFSARWYGIVSVAEICRSANLSNGAFYRHFKNKEEIFCAILDYVV
GQIESALAPLAQIEPNDR LRQFVRIIYDFSQNNTPLV RVVFREGQYRLF EYERKLKDVYEK
AFAVVFDRKPSTAEYLFALGGLRFASIRRAFHQIPVQPEAIVSILHSGILKEQPINADRV
FSTSITPLPIELLPSREQLLA EGRKLFGEKGYFETNIHEVASNAGLAIGSFYRYFESKE
AFYKEIIQSVGRDVRHFITLNLGNGLNRLERELRGLWLFILFLSM DRYCYNIVREAEFVL
PEEVRSYDAFHRYLKR EDSTITCDTTTCIEFMLGVAHYL GIEVIFDKSPDNARQVIEE
IGYLYTHGLSGDERLHNARN*

>SPBIB_v1_390019|ID:27164205| Beta-ketoacyl-acyl-carrier-protein synthase III [Uncultured spirochete bib]
MHVGIAGIGLYIPEHQMTASDLAKATSVPEDVIALKFGIKTKPIAGQEEPTSYMGFMAAQ
AALEDA AIPAEDVDLVIWCGAQHKDYPCWLAGLNVANRLGAIRAWSFDMEAMCGSMMAAI
DVAKSLMLARDDLNTVLLVSGYRNNDLIDLSYPPTRFMMDIGSAGSACVLRKNLGRNVVL
ASAFKGDGSLSEMCVVPVLGSKAWPPKPEDAQHASFIVPDEQVFKQKLGEVTMPNFYAVI
RESLKRSGLSERDIDYLAILHFKRSAHLAVLQELGLRENQSTYLEDYGH LGQNDQLLSIK
LGLETRKIRDGSRIVMVGAGLGFVWASTVVVWGPVAADHA*

>SPBIB_v1_390020|ID:27164206| Leucine-, isoleucine-, valine-, threonine-, and alanine-binding protein [Uncultured spirochete bib]

MKRMMLVLA VLVLFAGSAFAQGTTKLEGTIKLGGIWT LADITGKQGSAAAQLAVDEINAA
GGVLGKKLELIVVDDEGKADKAAA AVEKLATVDKVDV FVGGMASGAELGKIPAFKKYGV
VMSTGAAGSATVEKALGPSPE SDFYFHLHPWDYNQGAS YAEGWDAIQKKYPQIQIKKIFL
AYEEGAFGKSSWDATKVLFGSDKRYTIDGASFKS ALLGGGDYTA VLEAAKAFKPD LFIWA
GYDADALPMLQAKAMKFSPIYLGAPPGWPIGFGSSKLARNVMLYGMWSPAINDINPVS
AKFYKNYIAKYREEPATYFAPLAYS AVYIVAEGIKAAGTTETGPLVKALEQTKYVSPLGE

VITFKPSNIIKHQGITRQKILQWQNGIQEVIWPFETATAEPVYPPFAWK*

>SPBIB_v1_390021|ID:27164207| High-affinity branched-chain amino acid transport system permease protein LivH [Uncultured spirochete bib]

MGPSLRRLNLNIQAVKMAIKQRKAIIFAI SIATAVVLILWKPTVLIYGLQAAGLYAAVAI
PMGLVVLGIVHIVNLSHGFMMLASYATYTVCRALGVDPLIALIPAALVTALFGWVVFQLT
IRRALKAPELNQLILTFGLAIAFSQIINLIFTSQTYKLSLEYSSMSLDIGDLSFGVWSFV
FVAVAVIYAVGLQMFLTKTRTGKAALAVGQNPKGAAIVGIDVYRTYGLVFALAIGLVGAM
GALFLTKSAIFPGVGSPTMKSFSLVAMAGIGNIPGILGASVLLGLAENFLRSFRGTRDW
AEIVYFVLIIVILSRSLKGGKS*

>SPBIB_v1_390022|ID:27164208| Inner-membrane translocator [Uncultured spirochete bib]

MNRTLVRILLILIAVAVALPAFAGDYPLQVARNIMLYMALAISWDMLLRSGQISFGIAG
LFGIGAYAAILGVVRAGMPTWLSIPFAAVFAALVAFLIGFVILRLRAMYFSIVTLALGEI
FRIIVHNLHDFTGGPEGVVMQQGVMFGGNASKLYWLVLAGLLVAIAASYWFEKSRIHFAL
TAIRNNEISAKSSGVDIFRWLLAFVVTSAIQGMLGGIFVMSYGFAAPDVVFSADFTLLP
LAMALLGGVYSTRGPIFGAILLGLVAEWLKLKIPYGHLLVYVYGMIIIIVILFMPQGLKNLL
KPAAKRAEGRSA*

>SPBIB_v1_390023|ID:27164209| Branched-chain amino acid transport ATP-binding protein LivG [Uncultured spirochete bib]

MIKLRTTNLTKRFMGLVAVNNVSFSMEEGEILGIIGPNGAGKTTFINLISGIIMPSEGRI
EYKGDITWMPAHERARIGIARTYQLIHPLENLTIENVMVGSIFARGHSLKEGRRRAEN
LCHELGLTDLERDTSRLTILEVKKMEIARALANEPEVLFLDEVMAGLNSDETKELIAMVQ
KIAREKNLAVGVVEHVMGVIRELTHRIVVLEAGELIAEGKYEEVSRNPRVIEAYLGGGAA
*

>SPBIB_v1_390024|ID:27164210|livF| leucine/isoleucine/valine transporter subunit ; ATP-binding component of ABC superfamily [Uncultured spirochete bib]

MLKIQGLECGYGRMKVLEGINFEVGAESVGLFGPNGAGKTTLISAVMGMIKPWKGSIELE
GVRIGGAETFTIARMGVALVPQERELFPGMSVEDNLMLGAAAYIPHAKDDIPNQLEKVFEL
FPILKERRTQYAGTMSGGQQRMLAIGRALMSKPRLLILDEPSLGLQPSIVAEVFEVLKSL
KSSISILVTEQNVRESLKAIDRGYVLENGRIVLEDSAEGLKTNPVVKSYLGL*

>SPBIB_v1_390025|ID:27164211| putative hydrolase [Uncultured spirochete bib]

MASGFVAVNGIKLAYELSGTRGVGSADAPLVLLNGIAMSISHWKPLIAALPEGTRCLCHD
FRGQTLSEKPAGPYSLVMHADDLAALMDALHIERGHIVGTSYGSEVAMEFAIRYPERCAS
LVVIDGVSELDPVLDAAVVSWMETARTDARLFYKTMLPWTYSSGYIAAQKAILAAREEAV
AKLPPEWFKAFVELCKAFLDIDITPRLGAIACPTTVLVGEKDILKHKGFSEIARNIPGA
MLHVIPDAGHAVVIEQPAVVAEEIWQAVS*

>SPBIB_v1_390026|ID:27164212| Putative hydrolase or acyltransferase of alpha/beta superfamily (fragment) [Uncultured spirochete bib]

MASGFVVVNAIAMFFVEAGVATTAGAVSMAGAAAMAGAPSGAGADPWVGVVYVHGNTG
SSIWFSLVMNVPGCHVVAFDMPNFGQSSPLEGDISIQRYAAYVAGFMDAKGLKGAVVVGH
SLGGCVVQALALERPDLVKAMVLVDGAPNGLITPKDRHPAIELMRTNRAVLEQALRAVV
PTLKNDELFKAIVDDAQKMAQPAWIGNAEALSHFDITARCAEYKGPVLVIRGALDPIITA
DMAETTAKAYPGARLVTLLEGVGHVIVEQPDTFVRLLGDFVGEHV TAR*

>SPBIB_v1_390027|ID:27164213| 3-ketoacyl-CoA thiolase [Uncultured spirochete bib]

MSKVSIVGAYNTQFGSFVKKNKETGEVTDLKSIYDLMLEAGRGAIADAAIEAKDIDGVVW
GSFAPGLFANQEHLAAFATEIAPDALRFKPMYRCEDACASGSAAIYNALYALEAGRANIA
LVLGVEKMSLLDTKGTTKALAAASYWAEAGAKGYTFPGLFAEYAKGYAAHYSLDPATFSK
MLATVAALCYKNGIDNPLAHFGKGGPADRLGLTTAQAILDLPPEKNPMIAEPLRLHDCSL
ITDGA AAIVLVRDDTSLAKSDRAVKLAGFGHVNERIPISVRPNLYQLMAGKEAVRQAF AE
AGITARDVDLAEVHDCFTITQLLITEALGLSKDGQAGYDYMAGRFRDQCAVNLSGGL
KAKGHPVGATGVSMHALVYKQLIGEPIGAILTKKRPTVGVTFNVGGSGVTNSVSVLSR*

>SPBIB_v1_390028|ID:27164214| conserved membrane protein of unknown function [Uncultured spirochete bib]

MNIGDFLKRNTMAMVVMVILVGLGEKMAERFLPLYILAIGGSTWVVGGLNAMDNLLSA
LYSLPGGYAADKIGFKRSLFLFTALAMGGYLIVILFRSWQAVLVGAVFFISWTA VSLPAV
MSLVSKAVPKERRALGVSIHSFFRRIPMALGPIIGLLIGAYGTKNGVLVAFGA AFIMAG

FSLFLIQRYSMDNDAGEGKDRGSQKIPFKDMFNPALRSLASDILIRFAEQIPYAFVVVWA
VNSNGLTALQFGVLTTIEMVTAMLVYIPVANLSDKYGKKRFVLITFGFFTAFPVLLFSH
SFPMFVVAFIIRGLKEFGEPTRKALIMDLAPEAAKARTFGLYYLIRDVIVSIAALSSAAL
WNIAPAVNFLVAAGFGVAGIIVFAIFGKDLTMVSAQKAPASK*

>SPBIB_v1_390029|ID:27164215| protein of unknown function [Uncultured spirochete bib]
VQLVQHVFVQALTGIRAFSLRCTLSETMRRTWEKRWKTPGKTKAEYIPKYALA*

>SPBIB_v1_400001|ID:27164216| Long-chain-fatty-acid--CoA ligase [Uncultured spirochete bib]
MFLGHTPSGAPPISFPPHSRLLNAGWPNGYGRAAHSSSKEKCHKNIKPLLQERKDDI
SRVQALCLFSMELMCSIYDMRETEPWKFLDAYRGRVFTGKWPTLPQLFDIVTERFPDRP
CFTVYSPERVSLTYKEAQA VTKVAAYLHSGIAKGSVAVTGKNAPEWAVAYLAVLYAG
AVVVPIDYQLPTREILALIKAGDVSAAFIDEEEKFEEMQKELSTMPCFSLAKGTRNYIYDL
APPSGTKFEPPVPGQSLAAILFTSGTTGIPKGVMLSHENFVSDCFLAQSNLNISETDVF
YALLPIHHSYTMLAVFIESLSVGAETVFGKMMVVKQILSDLKQAKVTMFLGVPMLFNKLL
SGIMKGIKEKGAVAYALIRTLMAISGFIKKAFGVNP GKKIFHSVLEKASLSSIRICISGG
GPLDPQVFRQYNQLGIDFVQGYGLTETSPILTLNPVEHYKETS VGKVIPGAEIRIDNPNE
EGIGEIVVRGPMVMQGYKMP EETA EVLSE DGWLRTGDLGKLD DENYL YLAGRIKNLIVT
EGGKNVYPEEIE NEFQLYDEIEQILVRGYIPEGKSV AEEIEALVYPNQDWAAQNKL TSEQ
IEAQIQEIIAEVNQRLRPYQKITRIQLLNEPLEMTT TTKLKRQTS GSASNLVPELK*

>SPBIB_v1_400002|ID:27164217|valS| Valine--tRNA ligase [Uncultured spirochete bib]
MKSVELPKAYDPKTFERRVYEMWKTEGHFQPKVDRKRPF TIVIPPNVTGVLHMGHALN
NSLQDIQIRYRRMKGIPTLWLPGTDHAGIATQNVVERKLRKEGRERTQIGREAFIEETWK
VAKEHRAFINNQLERIGASVDWSRERFTLDEGLSKAVREVFV TLYERNLVYRGEYLVNWC
PSCGTALSDDEVEHEDEPGSLWHIYVELVDGTPPEWPSGRIE IATSRPETLLGDTAVAAH
PNDQRYTALIGK MVRLPLTDRIIPIIADSYVDPEFGTGLVKITPAHDPNDFLVGQRHKL G
STNILNPDATLSSAVPEKYRGMKVLEARKAVLADLESQGLLKSEEKIVHAVGH CYRCHTA
IEPYLSRQWFVRMKPLAEKALKAWQDGDVFFPKKWEHTYEHWLENIRDWCISRQLWWGH
RIPVIFYCKDCGATMVSREDPVVCTQCGSSNIYQDEDVLD TWFSSWLWPFSTLGWPKDTAD
LRYFYPTSALVTA YDIIFFWVARMIMAGMEFTGQSPFKEVYI HGLIRDKQGRKMSKSLGN
GIDPLEIVDEYGS DALKFTLAYNCAGGQDILLDRDSFKMGSKFANKIWNASRYILMNLEG
RTYLP ESEIVYNDTDRWILHRLNLA AKNVSQALESWRFNDAAQTAYS YFWDDFCDWYIEA
SKLSTKSSDEHEKDRATTVLLNMLDASLRLHPFLPFVTEEIYSMLPNANGKLISARYPE
WTAERDAPETE AHFVALKEIVTLVRTLRSEFQIPPEAAIPLNLVFDANFLHAKFITENIA
LISLLAGASSV SIGAPPSGSISLAGNGVTAQVQVRGLLDISKLIERLSKEKEKEKAYIS
KLEAKLSNPAFLSSAPADII EKEKEKLAASASKAAKLEMYIRELS*

>SPBIB_v1_400003|ID:27164218| conserved protein of unknown function [Uncultured spirochete bib]
MNSGENGPQDTGPN GSKSPA AESSQDAESPQDAKSPLSRQGSILRSDRLTMDKAAMLRLK
RMHLAPYIQLATCLIGKLR RSGGNMFRHQLDTMAILMDYGYIDS VLLKASLIHDLLEDAP
ETDPDTILSIDDESVDVYKLVLEVTRRPVENKAEFLNRIRDFGSLRAKVLKSADRISNMI
SLGYVTDDV FVRRYTDETEQFVFP IADERMLSELKELVATRREYLRNRIE I*

>SPBIB_v1_400004|ID:27164219|deoC| Deoxyribose-phosphate aldolase [Uncultured spirochete bib]
MNRKWKAEIAAAIDHTLLKATATSEQIRTLCAEAKEYTFKSV CVNPCWVPLCASELAGS
GVLIATVVGFP LGANSTAIKVEEARRAVAEGAREIDMVINIGKAKAGDWN AVRDEIAAVV
HASKPAIVKTI IETCYLTQDEKIAACRAAVAAGAAFVKTSTGFGTGGATIEDVRLMKETV
GDAAQVKASGGIKTYEDAVAMLEAGATRIGASAGVTIMKEAEA*

>SPBIB_v1_400005|ID:27164220| Uncharacterized ABC transporter permease protein YufQ (fragment) [Uncultured spirochete bib]

MFFKEIYPTFYIAIAMVFITWV VYKTPLGLMRACGEHPQAAASMGINVA KMRYFGVLV
SGALGGLGGAVMVL TADIQYTLVSIHGTGFISLASLVFGKWNPF GVLGAGLFFGFSTALS
FYAKDIKFLAGLPGEFFYILPYLLTIIALLFFAGKSVGPKAAGEIYDSGKR*

>SPBIB_v1_400006|ID:27164221|ams| Amylosucrase [Uncultured spirochete bib]
MQQGFDTFKKEFSARLSARGLPRYSGWPEFSARLEDELERLTGLLFELYGDRPDFAYWVE
NIVLGAFEAYRKRPTWLKARDREYPPESGWYLREDVIGAVCYVDRWAGTFRGIEERLPYL
KELGIKYLHLM PFFKSPERENDGGYAVSSYRETNPALGTIDELSALARKLARHSIALIAD
FVFNHTSDEHEWALAAKAGDEFYRDFYLTFPNWKEPEEYSKTLREIFPEARREGSFTWNEE

MQRVWVWTTFHYSQWDLNVRNPVFEAMAGEMLALANQGVAGLRLDAVAFIWKEKGTPCEN
LPQAHTIIRAFQCVARLACPSLVFKSEAIVHPDQIVQYIDLRECQLSYNPLLMAELWEAA
ATKEVRLLAYSIIKRRHNLPEGCAWVNYIRCHDDIGWTFADEDAALGIKGFDRHQFLNRF
YLGEFPGSFARGLSFQYNPVTHDMRICGTAASLAGIERDMRRDPGKNRETALRRFLLLYG
IAFSAGGIPLIYLGDELGMENDPDWDKDPHTKDSRWVHRPVWQEVLFRRERHNPATVTGQ
VFASIKKMIEQRSKHSVFVAVQGIEVLESQHPSVLLFRKKSSETLVVVGNFSECEATVPR
EVCARAFEGRLAVDLLASGAAAGEGASVGPLTLKSCELKWLLIEG*

>SPBIB_v1_400007|ID:27164222| GGDEF domain protein [Uncultured spirochete bib]

MIRFSRRIFTDLAIYMMGFVIGVVPFFMTLLGVPASYTMQLWFFIVCIIAGLIVGAM
NILLARSVVGSRLHLIANKMKQIGGYISSKTHEEIVTTCSPQECMVEKDSDELGECAES
YNQLINALYASFQQETMVKSFSQLLSSRLELDDLAASVLPMSLEHTGAEAGALLVEENDE
LRPAASFRINGVETLKDREFIKRVAQEKKRITIELPENIAVEGALLTFRPASIILEPIVY
HDVVLAIMLLAFIREPGEEAQRITIDLISPNSVAIRNSLSYDQLQRLAANDSLTGLFNRR
FGMARLQEEFGRAVRNSAPIGVCIFDLDFHKLVDNTYGHQVGDKVLVFLSKIIRSALREG
DIAMRYGGEEFMTILPGASMTDAYQIAERIRRMVEESEFQYGPQRIRLTISGGATSWPDF
DASSADALVKRADESLYAAKEAGRNRVTVL*

>SPBIB_v1_400008|ID:27164223| Cyclic nucleotide-binding protein [Uncultured spirochete bib]

MIDVNALQKYSLFGGVSPEQIEKIKPLLGTAFHEAGECPQIEGQPSDKIYFILSGEVEIV
KQGLVIARLKEGETFGEMELLDIMPISIATVRAATPLEVVTISNRALYEISKLDLKTFSMM
IMNLARDLSRRLRRMDELACLDSDNDILKK*

>SPBIB_v1_400009|ID:27164224| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]

MLKRNNVLVLLFAILAFVSAQTVTITYWQYYYESKVKLMDELIQKFQAANPGIKVEQV
TFPYESYNQKVAASIPAGEGPDIIINLFYGWLPTYVVKAGYLAELPASDFNKAYFDKNFYPF
VAESVQFGGKYYSVPTAVRTLSLFWNKKLFDKADGLDNPPTPKTLEELEAYSKKLSKYDAQ
GNLIQAGLAMQPTGQGHNWIREILFRQFGNTPYSSDYRKVTYADANGVAAFKWYTDRTK
DKVGYPNFATDDVTAFKSGKAAMNIDGSFRIATLKA VKDLEWGV AELPAYKGIKS NYASF
WTHGIVAGTSGKKLDAAIKFLKYITSPEVQELWLEKVGELPANPGLSEKYKNDPVISPFL
KGLAYAHATAFVDEAGQRTVLVDAVDEVVLKKVDPVAVALKNAAAKEQALIDDFWKQ*

>SPBIB_v1_400010|ID:27164225| Binding-protein-dependent transport systems inner membrane component (fragment) [Uncultured spirochete bib]

MTLATKRALTAYLFLALPLVFFLCVRLGPMVYMLVMSFTNWGLLRKTVKFIGFENYIILF
NDPVFLQALGNTRYAVFGAPIVILSLIALLLDSIPKGGKGLFRLIYVLPYITPVVAVS
WVWRWMYQPPPLGIINGILGILGLPAGEFLNSPTQALPSILAVNV*

>SPBIB_v1_400011|ID:27164226| putative ABC transporter permease protein YesP (fragment) [Uncultured spirochete bib]

MGYCTTIFLAGLQTIKEMSEAARIDGANDQQVLRITLPLLMPITFFLMVMEGIQFLRI
FTQVYNMSMQAMGGPLNSTKSAALYIYQKAFTNFEMARAASASVVLFLIIMVVTVLQVRF
FDKRVNY*

>SPBIB_v1_400012|ID:27164227| Binding-protein-dependent transport systems inner membrane component (fragment) [Uncultured spirochete bib]

MKHRNQMQRWGKVLPA YFILLFLSIIMLFPFVWMLSSSLKDVTQIYRLKLFPERPTLENY
RYILFSASTKFPQWFLNSVIVAICTTASVLFVFDL VGYTLAKFRFPKIVFFLIISTLM
IPTEMLVIPWYAMARALKWVNTYWGIMFPGMISAFGVFLMRQFMSTIPDDLIDAA*

>SPBIB_v1_400013|ID:27164228| transposase [Uncultured spirochete bib]

METALSELPDDVESLKKLVVEKARRAHELEATSKQLKEENAALQLKLEVTDKYETLQQK
FFGSSSEKRRKEDDNPQALLFNEAETYAEAPPKPEKSIPVKSHERKVRGRKPLPANLER
REFVYELSEAERTCPSGAVRPEIGQEVREELEFIPARFVNAHILKKGPCQCASC SHP
IVQAEPAKLIPGSSFNNTTIAFFLTSKFVDSQPFYRMEGILSRWGIDTSRASLCKVAVS
AGRAIGELLDELRKDLAASPVLQMDETVVQVLHEKNRSAQAKSYMWVARGY AEGKPVVFF
HYHPSRAKEIVQKFLHGYHGFVQTDGYAGYNEVGFSPGITHVGCLAHVRRKFFEAEQQGS
TEASAFLERIAEL YHA EKLVRKKFE EGVLTTEEFLAARTKEQGPRLSEMKA WLI AKQGS
PPSLSFGKAVHYALGQWDRIEKYLQHELLTPDNNAVENAIRPFVIGRKNWLF SNTPLGAH
ASAGIYSMIETAKANGHEPYKYL CYLFNALPKARSLEEK RALLPYKLAPNSY*

>SPBIB_v1_400014|ID:27164229| conserved protein of unknown function [Uncultured spirochete bib]

MYFKKDRAIHLVAGVTDMRKQINGLAQIANEKKSDRVFSGDYFIFLGKTHKVMKVL YWDR
TGFCLWVKRLEEETFPWTRKQKGIITLKREKLKLLKGDIFREHTEKRYVSVL*

>SPBIB_v1_400015|ID:27164230| Amidohydrolase 2 [Uncultured spirochete bib]

MRVIDSHVHFPENWIIDNGDPFEVSAPGKGTGYTSGRTKSSPSDAAKPAANKHAQWMENE
KARWESAWQFPAPEEISLEEGERWSNECSR YDFLKA VVFTAGSNQFAS ELVARHPNQF
RAYAHDPMLSDAAERLEKALTEQHLCGYKILGPKVDTPLSDKRFDPIWEVAQSHEIPVL
IHFGIMGAAGGIASHVNINPLAIHDVAKRFPDMPIIVPHFGTG YLFETLNL CWACPNVYI
DTSGSNQWMRWMPFDVTLES LFRKFHETIGASRIIFGTDSSWFPRGFTIDYLKAQNRAMS
DVG YSEDEKDMVLYRNIVYLLKMEHL*

>SPBIB_v1_400016|ID:27164231| Fumarate lyase [Uncultured spirochete bib]

MADKKFSQVYVENVLDPAYRNWKANFYAASLKVHKAHL CMLYETGIISKDKAKEIAGGIA
YLEHEFSAPGHIPEGVEDLYFLFEKALGQQIGDENAAWLHTARSRNDMDTTIFRLV LREE
LAVLIERLQVFSKALLARCLQGENELTVLFTHGQPANPSTTAHYLSSFLMETIGDMKWIV
QALADVNQSTMGACAITGSGFPVDRQYVSDLLGFENYIPNTYQAVSTSHWL VNAASTIRN
LMIDIGRFAADLLHKASSEVGLYRFPDDL VQVSSIMPQKRNPVILEHIRIQAEMVAGACD
AVAHSFLNVPYQDVNENADMIISKLIETIHES TSVIDLLQESVLKMKSDPARAREICRQF
GVTTELADSLVRIYGIGFRKAHHICA EYVASGYDIQTLRDSFFKETMQALDLSNRIEE
ILD LGTFIQVRKTPGGPSHEGIKAVYARAEEM LGDMEKNIISVKSKWHRADDALEEFKA
LIAG*

>SPBIB_v1_400017|ID:27164232| conserved protein of unknown function [Uncultured spirochete bib]

MIEHDTDPDSRLRFIAMDM DGTILDDGYQLSAHVAQTLRALQNKGGKLLIATGRIYASAH
EFLQGA FE PDG FVCTNGADIYGPNGVRIASHHIPAEAMPALIDASRRHSALVCCYIGDNW
IYERYSDMVAFYEQRSGMKGIQRSFDSL SGEDILKFLAIGPHEELLAIREKIAQKASRLL
ETVFSHSTMLEIMAGGVSKRRGLEECLE YFGGTMEETIAFGDAENDLEMLKAVGVGVAMG
NAHASIQAEVPHVTESVDEDGVARFLERLFGI*

>SPBIB_v1_400018|ID:27164233| Carbohydrate ABC transporter substrate-binding protein, CUT1 family [Uncultured spirochete bib]

MKKALIVLVFALAFASMVSAQTINVLFWDDAYPRTL MERIPEFEKATGIKV NIEILQPPQ
VFTKTSVSVSKDR TDYDLVCVDEGNIPLFASLMLPYDQWAPGKVFKK VDPNTVTPAMLDV
AQWDGKLI GLPINGNLYVWMTRKDLIENPKYKADFKAKYGYDLGVPQTFQQMLDEGTYFY
ENGIVSGGFGPFNGGPAGVFGEAIFMWESY GTHFIEWVKGKPTLVVDKAKAVQGM EFYKK
LMKISP KGAETMAHVERQA AFAADPKGVFTQFIWPAQIASYEDPKSLVAGKIVYSAPPA
GPAGRFAIRGTWAVNIPLASKNKDAAEFVYWWASKDIATWLVEKNTVPARTDAL TDPRF
AKTKPWLA AIADSMKYAAARPRFNEVAQVQDIVK KYWIMGITGQMP CDDAMQKIIDETKD
VLKKAGY*

>SPBIB_v1_400019|ID:27164234| Carbohydrate ABC transporter membrane protein 1, CUT1 family [Uncultured spirochete bib]

MFSRKPATELPRAQQGAGKARGRAPFLFLAPAIIVVFAVLIFPIIFSLFVSTYNWPLSQG
AGVRHFVGLGNYAALTQDPEFWNSLKLQLGFIFIAPIELLFGFAAALLNREFFGARVV
RLLLLLPVFFLPILSGMTWRFMLQPRYGPLNALLLKLGAPEITWLGNPATAYAAIIVQDI
WRMWPFMFMLLYAALTSIPQELMEAAEIDGAGFWLKL RSLTIPLLTPTILTA VLLRIIDA
LRVFSEVYVMTEGGPGSATMLFSLYTQRQAFGYQKVG MASAMAIFLLVISIVFAL TLVRK
NMSLDVLEEKAGA*

>SPBIB_v1_400020|ID:27164235| Carbohydrate ABC transporter membrane protein 2, CUT1 family [Uncultured spirochete bib]

MMKSLKTRKRIILNTIIAIVAFVLAIEL YPIVITVINGFRDINILSGQPFQLKQLT
LRSYELVLKNAGFRLGMQNSIIVGLLST AISVLIGAMASYGIARFHFKGRNGLAYSFLVF
RMLPQISLVISLYLMFSAVGLRDTISGITLAHTSFNVPYVIWLLL PFFTAVDKAYEEAAM
VDGCTRQGVFFKIFLPVAPGLVVA AVFAFLNSWNEFM YALITGVKAKTAPIAINGLLG
GETLTWGQACAAGTIMLVFVIFITLGMQKFLIRGITTGGVKG*

>SPBIB_v1_400021|ID:27164236|yihQ| alpha-glucosidase [Uncultured spirochete bib]

MPIERISFVKRSDGFSLYADERLVL SHSESAPFLFMGRGEARIAMHHGNFDIEDEIRELY
PLAQWDL DADGELVRLWSEGGRWAVTIRPEIVEGRLVVHISRAGIVARDSLFEGEVRVRL
SLPARPAEHVYGCGEQFSYFDLRGRKFP IWTSEQVGRNKSTRVTLEADLADHAGGDYWW

TFFPQPTFVSSDRYWVHMDSSAYSVDFRRTAHEVLCWELPAALVFGQAESMPAVLEDL
TEYFGRQLLLPEWVYKGVILGIQGGTEVCQKKLDKARAAGVPVAGIWAQDWEGINITSFG
QRLRWNWVWVWPERYPSLDAAIKAWRTEGVRFLVYANCYVGKGWSLCEEAAAKGYLVKNAQ
GEDYYVDFGEFDAGIVDLTNPEAFYWYAQALARHIIIEFGASGWMADFGEYLPTDAVLFDG
TPALLAHNLWPALWARCNNEAVRLAGAEGEVLYFMRAGFTGSQRWCPMMWAGDQNVDWSN
DDGLPSAVRAALGLAMSGHGLHHSDIGGYTTLFGMRRTKELFMRWAEQAAFSPLMRTHEG
NRPAENWQFDSDEETLAHLARMGRVHVLLADYLLKACVAENAARGMPVMRPLFLHYPEDEQ
AWTIDNEYLFGADLLVAPVIVEGARERTVHFPGDVWLDFTWTGEPWESRLAGDLIVKAPM
GKPPVFRADSPWKDLLRSVSNLVP*

>SPBIB_v1_400022|ID:27164237| putative N-acetylglucosamine-6-phosphate deacetylase [Uncultured spirochete bib]
MADSHTHEYIIIEGADLVLPDCILPHAALAVREGKIAHIQASGRSADIKKDSAFSGAPV
LHMPDSYVMPALVEMHIHGCGEWGFEKLAGPTDLVSAAAFLEQKGVGCFVPTLLWDEETV
ANLALAIERCGLPEYTLPLGLYLEGPFVNKARRGGIHPERIHAPDFVRKIVEAAGGHLK
IVTLAPELDGIEAVYRIFQEAGALVSLGHSDARLPAKLPAPHPYSITHLFNAMSGVDHKE
GGLANLAFSGDPDFVELNGDGIHVNATCLRLAARAVSADSLVLISDAVISAGMVHGSYRY
YGHEVISSERGVRYADTDVLMGSNRLGIDIVRNVEQAQVPLWQAVRAMSLTPRKALGQA
EEYGSLEVGKFAIFLWDKDLEIPVRPETLLARTDLRAE*

>SPBIB_v1_400023|ID:27164238|alr| Alanine racemase [Uncultured spirochete bib]
MDHRGTTAWIDLAAIRSNYRQLVKLAGGSVCPVIKADAYGHGALAVAHALEREGAPYLA
VALAKEALELRESGIQTPLLIFGVPEHSWSSIAIRLGCAQTAYTEEHVIRILASAAKSLGK
RAKAHIKIDTGMNRQGLSWTKARAFAGLLSDYPEIAVEGIYSHFADADNPDPSFTRLQLG
RFNEALAAFAEAGIVPKYRHANSALLFHPETRLDMVRPGILLYGLSPAPGIALPEGFA
PAMTLTTSIVHVREVPAGESISYGRTFSTERRSRIGVLPIGYADGYPRALSNRASVLRG
MCSPVGRVCMMDMTMIDLTGIPGARAGDEVIVFGGRDLPVSEISGLLGTIDYEVACMYSK
RVPRVHFDEPAQDS*

>SPBIB_v1_400024|ID:27164239|dapF| Diaminopimelate epimerase 1 [Uncultured spirochete bib]
MVDRSIPEGFHTHKYNALGNDYLVIDPAEFDVSLNEEAIRALCDNRNGVGSDDGILYGLA
SFEGGIWRVDGETLAEADNESRVARTSPFFLRIFNPDGSEAEKSGNGLRIFSLYLHESG
RVGFAPFEVQTKGGKVACTVLPGEGPERRITVAMGAPEILSNRLTFLIDGIEFRAVSVSM
GNPHCVLLGSRPSELARRIGPIIEHHPDFPNRTNVQFLEVLDRNIRIEIWERGAGYTL
ASGSSSCAAAAAAKHLGLVDDQVAVHMPGGVLEIDMREENIRMTGPAVRTFDALLAPALY
SAAYARH*

>SPBIB_v1_400025|ID:27164240| Amidohydrolase [Uncultured spirochete bib]
MENLLKEALAMQDWLIDTRRTLHRIPEPGNEEIKTSQAICAQLDALGIPYTRIGTGVVGL
LEGARSGRCIALRADMDALPIEEPQDRPYASQHPGYMHACGHDAHMTIALGAAKLLARRR
HEFSGSVKFLFQPAEETTGGAKPMIEAGCLENPHVDFVLGLHVIPELPAGQIEVKPGPFY
GASDNLEIRIKGKSSHAAYPEQGIDAIVAASAVVQMLQTIVSRISALDSAVITIGKIQG
GTRSNIIASEVVLGTIRTLSQVRKFIGASVEEVCAHTAAAYGASSEVHISPSYPVLVN
DEAATEFVRQTAIQVLGAPNVHLRQKPTLGVEDFAYYLRERPGAFWHLGCGKHPPLAADS
VGSISAGATAALHSPDFDIDESCLPIGVALQASTAMRWLLDI*

>SPBIB_v1_400026|ID:27164241| protein of unknown function [Uncultured spirochete bib]
LGSLSTNFETLQDIWISNAQSATLKSGLLEPLIILRSKDPNLTQGVYSDLLTICINQF*

>SPBIB_v1_400027|ID:27164242| Peptidase C26 [Uncultured spirochete bib]
MAQPLIGITSFADRARQPAPYISLKESYVRAIEAAGGVPVILPVADAVQACAIIPRLDGI
LFSGGGDIAPWYFGQEPLPGLGSYDTHRDEWEIELCNAAWDAKLPMLGICRGCQLMNVAR
GGTLIQDIERTKPDALQHNPAVPHDELCHDIAIEKESALAKLFGTGRLRVNSFHHQAVR
AACDFAVTARSSDGIVEAMEAKDGRFALALQFHPEGLFMRYPDFLAPFEALTRAAAARLS
SLRS*

>SPBIB_v1_400028|ID:27164243|lysA| Diaminopimelate decarboxylase [Uncultured spirochete bib]
MQRILHAKGQRMVTTHFPEGIVADDARWLFDFGADLAALAKEFDTPLYVMSEALIRQCAE
LRS AFLARYPGTRAYYASKAFQTLMLRIKDEGLGVDVVS GGELYAALKAGIPASEIIF
HGNAKTDEEISYAVQSGVGRLVVDNLEEIYRIEREA AHAGIAQTILFRVTPGVDSHTRF
ISTGSLDSKFGIPLASETARYVAALRECPHVEFAGLHFHVGSQLMENSSHLAALRIVLD
FAARLVREFGLAVKELDMGGGFGIRYLPEDNAPALSDFVDPMIALVREWSEREKLPAC

AIPEGRWIVGEAGLTLYRIVAVKEIPGVRAVAVDGGMGDNIRPALYEAKEYHAAIVGRAD
AGLGAASNQLRRVTIAGRYCESGDILIRDIDLPDPRPGDILAVFSTGAYCYAMASNYNRA
PRPALVMVKKGKARLSVRRETYDDVIHREK*

>SPBIB_v1_400029|ID:27164244| transposase [Uncultured spirochete bib]

MFVQTLFEKKTGRTLLFYVTARRVKGKIVKTKVKRIGYLDEFLLDAPDPLTHFRQEAKRL
TQEAQLKTLTVTFMSDEHFSFGAGFAATEDAAVEKADRTFHYGVLPLLQLYRELKIDAFL
RIKAQYTKVDFNHNHLFQMLVFGRILFPESKLATWRDRTRILQHSDFSDDAVYRALPFFA
QIKDALVQHLHEQVQRQYHRDTLLYYDVTNYYWEVDREDELKRKRGVSKEHRPEPIVQLG
LCMDNSGLPVTYGLFPGNTNDVATMRPMMQHLAESLGTKHLIYVADKGMMGGMNIAQIIL
EHNGYVISSSVRKADAELRRYILDHEGYTELAGGSFKYKSRLVPCTLYVDTPDGRKKQIR
INERQVVFWSSEYWKARHDRDMAIAKAMARAGYGENTVLNNHAGNRFIKKEIFDPDTRK
EVDHPEFSFALDQELLDSEEELDGYLIRSNNVGVREGDAPFNQPYRWHAKDNLFELNRP
VVDLDIIDMYRGLWRIEESFKITKSQLKARPAFVHRQDSIEAHFLSCFVALLLLRLEKR
TGEKIPVATIVESLRKAQLVQLEDETYVNACCDNVIEAIGQALELDLTKKYYTKGELKAL
RGKTAKS*

>SPBIB_v1_400030|ID:27164245| exported protein of unknown function [Uncultured spirochete bib]

MKKFVVFLVIGLVAGSLAWSATIGITVNAQAQKLEVTDAATWTIALDNTGTAIDVPNQQG
LTVKSSKASYTVTFTSTNGGTLNNGSYTMPYKVKVDTSSWVAGVATNNLSSYTQLTSAKP
IIFQLKTPTAGKTFPIGFNIEAYTDYYVDGAYTDTITISIAQS*

>SPBIB_v1_400031|ID:27164246| exported protein of unknown function [Uncultured spirochete bib]

MQAKNTAECNMKKYLTLTLLLLASIAVYSQSIGVTVIAAPVGANVTMNSYVWNITLAND
GVTSYLNDYQGIMTVKSGSSVNYRVDFSSQNLGYVKQGSSYQIPYYVYVTQLTTGHIGII
GTPAITLGYVQLTSTQSIQFNKKTPTGGIQFYVGFKITATAGEFFESGAYTDNMSITFTA
L*

>SPBIB_v1_400032|ID:27164247| exported protein of unknown function [Uncultured spirochete bib]

MDKIRPYLLAGLCGLLLGAGIVGGCWIYRAGNDAATNRAVISAQYQSAMADWQRRATELAA
TLDDVRRDARQSVELAGRINAVVTGYFSDIAKARTENELAVEQLRLAIDIYNVLRGFYDK
GFNATPKTGATAKP*

>SPBIB_v1_400033|ID:27164248| exported protein of unknown function [Uncultured spirochete bib]

MSGKKFKAWLIMTTVLVGIYMLTLFVAADILTSGIGATIVGAIAFGAVGYGGVQVADSWQ
RAKYRPELDRTEEEK*

>SPBIB_v1_400034|ID:27164249| protein of unknown function [Uncultured spirochete bib]

MIKDGIIAGFDELRLPSQPMNRRDHFHGALDIARGDGIVLSPVDGEAQGFVIFRGVEP
NVQVRSWTQGEKPDILALPWREYWQDIYGAIIVIERGTRKRLHILCHFVPSRVLNHDPEF
DGPFHSVYYLEERQKTRWPSHILMTDEVYVKQGQRLAPVGNAGFSTGPHVHWEVHHQADR
LDEYAKRVNPAKEYL*

>SPBIB_v1_400035|ID:27164250| protein of unknown function [Uncultured spirochete bib]

VDLGEKLSALELSHELASVWVGDDKKRDNGLRARVTKMAEVEIPAQSSITSLNSCVDD
QGKRLEAHIKEHSENKDDATIRAQKVRAYGVIVAALLGNAATIITVLLTRGK*

>SPBIB_v1_400036|ID:27164251| protein of unknown function [Uncultured spirochete bib]

MDYEQIQSLEAEIENLKKDLALTDWYVVRFAETGKPIPEEVLAEQEKQRINDLQEQIR
SMMAKN*

>SPBIB_v1_400037|ID:27164252| protein of unknown function [Uncultured spirochete bib]

MGVVSTGQLTYDVNDPTSSLFTEFDGDWASRWVNYVSGGEMSVAVDSTLPV GALALTV
GNSNGNDMVWLIAKQNPFDANKLYKLTIFYVKRTAGTGTTYLG VAGVAPDGVTLVNNTGV
NSFSNQHYIAASGVSPGSSWTKYVGYIKGTAATGTTSACPTPESPGKLHTNCRYFRPMIL
VNYTAAAGTNVVGAVTVEVMPELADIPNGNDTRDKAVASDAQLTAMASDSIITPQEKLFA
LGRWCEWYNDTAATSALPTAPTDDGRYKRIVDSANSVSGWTPPTAGTASAFYDALEALR
AYLFSSPGVVLAGTWSTNITITKSTWLTWVTAETAQALETEIAGKQGLTANLSNDSHL
VPTDADGNNGNFAGCATTMSIYKMGVDDSANWTV AARPSSGVTGSLSGKTYTVTALS VDA
GYVDLTASRTGYPSITLRFITVKAAGGAAFWLVSSADAIQKSQAGVYTPSTITFTGKRSA
SAGVVVDYAGRFI AETTDGSTYTDKYTSSANETSKTYTPSAGIKALRCRLYLAGGTSTL
LDEEIVPIVVDGPTGPTGPTGPQGPTGPAGQDAPRYLGLYAYANRGSITGMIAGDLVVLY
SATQAERGIYAYVSSTWTKQSTPTQDQIMRCMVGVLDVVRQGYGVSADYIGAGATSFETL

LVNFIYAQYALISGSIRAGTRYDQAGNETNPTKEGVWIGANGKIKGAINDVEPDQVTPSF
TRRQLFTSSGTWAVPAHVKWVVRTAMGGGGGGGGGGGGVTSASAEVGTAYDGNAGQNGGASS
FGSYVVANGGAGGTGTGGGGGGGGTQNGGSSDFIGGYNGANGGAGTAKGTTNSAATGKT
SGAGGGRGASSGLYDANVELSNASGGLTKTPTISAGRSKTNSASASVGIIVSNGGAGDAG
LYGAGGGGATGGCYAYKSPDASFSAWGASGGGGGAGALRQRVFRINEVYGQSITVTVGAG
GTGGTAGGGSTATGAAGNGGKGVVLEW*

>SPBIB_v1_400038|ID:27164253| conserved protein of unknown function [Uncultured spirochete bib]
MGIVSTGQITLYDYNDAAPIAFISASKGTAQVFTKDESITSYNPDYSSAANVLTAYVYV
NGVNVVNNLTNRKWGTTLGGSDLGTVSSITKSTNIDPANPVYVYFEGDYTDPVTMLVT
HVNAMITLHCVKSGTNAVVFVQVNGQLVIEGNPTGGTKNTASVTADLMRAAGIDNTGVTYQ
WFKSPYAAADQLDANHVDVAVAGKYSFKNTAGSAASAPADGTWADVKTLLVREDAVNDIGL
YLVKAKDADGNIYQAYFQIYDVSDPYDVKVVAATNGNVFQNGNGTKNLTPEVWYGNTKIDI
TNYTFTWKLKDKNGKSGFIDTARTSAAKTISSHTTGSSAVFTISSALSSAPVAGDVIRV
ISADGLKIESFEVASATTTAITIRSPQNGFSNNYPASTSDYANGKLWLYVGNAGATAGQKT
TTGSTALSVTGDDIDGLGTVFCDAINPNV*

>SPBIB_v1_400039|ID:27164254| protein of unknown function [Uncultured spirochete bib]
MIRKIFVELAFPGDSA WTDISALVLDKSWTIDRQAFNDEKKSTLTKFTCSLKFQDQILSK
IRAAEERIGIRVKDL DGNPLFFGAIEPAVSHETS DHIGDIAIEAADNSWRLDDKIKTTRQ
MPANVTDAGFYIWN PADQQHSICHILLTEAGYTEAEIDGSLSDLRQIEMVSV EAEASTYR
EVLDTLLMEHEL VLHAKPDGTLTLLSWRPAAITATIDKNLSLSTVKPFRFENRFDKRDGAK
ITWAQPEIIPDVLVYRENLPVDENG VFTGEAIAAGDYFPKDSIEDIYQSYVENWLD RPY
LARETRIKNKDLTLIATSEPR LFYDADDGITPDIAEFYKRAHIRFINNASETKKIYNFE
IKANVLIRKKIGITKASPLGTETDLLEYTSQYIFDSTAADALAQALAFDALAE EQYSFGL
NEIIEIGSRVRIIEQRNGTDVEAIIQKTRLSGESPVNEYEA VQFLYEGNLQLNHDYSLGN
QIWPPYDYQQVVQRLEDVSRV FYDQPVGPYKRGDLWISNGILYQSKETRGTGEFFDSDWE
WCIRSNLTTIESTNGDVFKPGENTTTTLIARCFRNGIEITDTLPDSAFRWTRVSRFPQQ
PPNDDETWNYNHASGYRTVEVTTDSIYARATYKVEILE*

>SPBIB_v1_400040|ID:27164255| protein of unknown function [Uncultured spirochete bib]
LIEDEKKKWEDYYKYLSQAKETAKEVLASGLLDQFN SIGAAMASGASSADAAEAAMHKF
FQSALQQTSM LALNAGLKL VEGGLPMLPV ALGLFALAGISGIAAGAIGAAGGVRQTDYD
QYIVNPIVDAETDLAKKRVDIIKQLEDEK KLRDENLKKIEESFNTEYEILKDQWQRGLI
STEQYKQQSASLRSQEE SAKAEANKPVEEAEALLAQIEAARDQKLSYLATEAKKRQDELN
SMSGWDFKFSGRDEELVAELDVL DARIKKVKEA QSLPEISAAKYGADFVTQGP KMLMLVGD
NPGGRERVRVEPIGTPNRYGPQPEQITIQISGDIYGIDDLYQKLEAAGRKLLKAGRVRTG
VFA*

>SPBIB_v1_410001|ID:27164256| protein of unknown function [Uncultured spirochete bib]
LRYSSRNSKRSLQRWRKCAMADVEDLKIILRAEVDKAIADLKRASREGKNAEKDWQ SIA
DTFQKNIQHSLSLKNAFS QLTMQIAGGLAIYDLAAKGIRAIQFAADSIREYKEAAEAHA
RLAAQIKATGGAAGFTAAQLEDMASRLQGSTRIEAEEINKAQSALLKFTSITGEQFAKAT
ELSLDLAAVLGGDVSGAAQTLGKALEDPI SGMSSLRRAGVVLSEGQEQLARSFAESGNTA
KAQEILKALQDRIGGVAAA V GKEDPAGMKRLQLAIKDVKEEIGELLAKNMKPFLDALAT
DIENFRKRLANSKTDAAA VVQAVKFGDLIDVGDVSGIRQAVQNL SGKVDKEIVKAWIEEA
KKRNPLATQAQAAAIRAAEEELAKMPALQVAGASGSANNDADIKAQEHIKNVTEELN KNI
QAIKLRSALGQEASSQELLTQYLNAYVKLIQNSDGLVTENNPAAKLLKIQIQALVNGQK
ELSQAELATYQIEKAGEIEAXX

>SPBIB_v1_410002|ID:27164257| protein of unknown function [Uncultured spirochete bib]
LAFADCAADDPDWENFAPDEYEILPSSIDESGKMLVKRRDVPNLLTDPLFLSGWKEWTRY
RRFGLPHGGGWRNEKPLVIRVIEVFEQEFEAKQAAEME KMRHG*

>SPBIB_v1_410003|ID:27164258| protein of unknown function [Uncultured spirochete bib]
VTTYEPDL SWNIWKEQPKN NAPGIMP DDEKVKVEITWPD IETFERLIGNDSTFATFITL
TKHCATKITGFS LHGEPIETGAELAAVRAGRTSKARELAINIGSYIFKESLLDEEEKN*

>SPBIB_v1_410004|ID:27164259| protein of unknown function [Uncultured spirochete bib]
MAVLKIRAGANPADPADVQLWFGEEAIENAKVIEAYNDHGK KRVIAEIIWEEKLGRKEVE
KSDKRKGDNLRAGSVVEHMEGTAQK*

>SPBIB_v1_410005|ID:27164260| conserved protein of unknown function [Uncultured spirochete bib]
MANRFSGTKNYLYLGLSLGTEVTTGSLSGEKFFKITAKGASSAFPADSVANDVVYNKPAIT
LASGDKAKPIELTKLGFVTNVPQSASKEKYENTVQTDVAKSYEEGDKPEISGTIDGYFTD
DANADLILKRFFRLIDDNGAGQKTYQPIETGVLHFFLGRRETTTVGQVEVMEYMPAIDS
LTVDKPMNGPQTFNFA YTVIGNEMPSITRRTITA*

>SPBIB_v1_410006|ID:27164261| protein of unknown function [Uncultured spirochete bib]
MKIWNIRYRTVKGYLEQNLNSKIEALATDANIACAAAKAFWVGWRDPFNLKDYNVVFVVPD
TLKRNDDAVTDDVSIHIAALKSPTPDSLSDQMGIYADAIATVIEDDPTLGGVAFEANVI
DFDFSLPAPGSPLIGALTAIIMVRMDRI*

>SPBIB_v1_410007|ID:27164262| protein of unknown function [Uncultured spirochete bib]
MISMTVQTKKYGDLGKFADNELLKMSARITSLWGESLANIYIRENQLSGQVLQVVTGETRA
SMGFYKLLKDKKATMVVRPGKGVKGLNYLAGMQRGMLAGRGRKVLIRPKPFMKPGFRAW
RATGEPRIKEEVFQAYLKHSFASGGSA*

>SPBIB_v1_410008|ID:27164263| protein of unknown function [Uncultured spirochete bib]
MMLSTDALTSWETA KTMLGFADDQQS VVEFLINAVSATANRISGRRLKARDYDLRLNGTD
KNSIVLPEYPIVSLSKVYIDGNREFPPESEIDPDMV SIDPDGGIIRLHDMIFPAGIGNVR
VIAKLGYPVPQDLELAVLEAISYNRRRLESGTTGMRQVSVDGTVTSQYELGLPLSIREV
FEGYRSNL*

>SPBIB_v1_410009|ID:27164264| Phage major capsid protein, HK97 family [Uncultured spirochete bib]
MDSVKEMLDNLGKEWKA FRD VNDQRLAAIEAKQGHAE L DAKLAAIEKELTESKAQINRV
MLGARLGGAEKSELYRAFTDWMRDPGRSQQFKA AVQVQTGGDGGYLVLPELEKTLQRVV
SDSVAMRQLANVKTIGGKSYLKNVNKGGITGGWASEGETRSGNNTTPGLAQIEIIPRELY
TLPSASQEALDDLD FVAAWLAEEAGIAFSSLEDA AFIAGDNGKPKGFLAETMVANSSW
AWEKIGYILSGAAGAFPTTHPGDVLIDLIALKAGYRNGAAWIMNDLTQS VVRKFKDGGQ
NYLWQPSFQLGKPD T LCGYPVMISDSMPDIAADAY SIAFGNFKQGYQIVDRKGVRLADP
YTTKGAVTFYTYKR VGGAVADYNAIKVIKFAAA*

>SPBIB_v1_410010|ID:27164265| putative Endopeptidase Clp [Uncultured spirochete bib]
MIRSKWYAIDIAPDYAEISVFDEIGGFGVSVTDFKEQFDSIKNAKQIRLLLNSPGGAVTE
GMAFYNLLASVRDKLTVEVIGLAASMASVVALAGSKLVMDEGTYLMIHNPWTITWGDADQ
LRKDADVLDKMRSELISIIYAAHSLKSPKEIGQMMDETWT LAQEAFDSGFADEVRET VQA
AALYDVS KIGFKKIPMALKHLD FR SIKTIRDFEAF LR DAGATRAEAAA IASGGWKALQRD
AEQPKSEDDGEIKEALSGLISILKGESNGL*

>SPBIB_v1_410011|ID:27164266| Phage portal protein, hk97 family [Uncultured spirochete bib]
MKFGERLRLAARALIFGSDDWVRAL KGY YETASGQIVTADTAMRIATVNACVRILSETVA
SLPLHVYQRLDNGGKERASDHPLYELLHSRPNPWQTSFEFREQMMSHLLLRGNFYAVKLY
HGDLIIDDLIPLNPDNVTVLQLPDYSLQYQIL TGTGSESIILGQKDILHIRGLSKNGILG
ESVISQARDVFGSALATQEYAGKFWRN DATPAGI I K VAKKLEKGEADRIREIWNDDHAGS
GNAHKLHVLGDGASFEKIEMTAEDSQLIETRRFQRSEIASL FKVPLMMLLQADTQTTTYAS
SEQFMLAFTMHSIRPWLVRIEQALQMQLFTAPQKYFPEFNLDGLLRGDLKSR YEAYKIAR
DAGWMSKNDIREKENMNPIENGDDYRSLAELQNAKNLTGGA*

>SPBIB_v1_410012|ID:27164267| Terminase [Uncultured spirochete bib]
MRNKWLFLAVAIMTASLRPEILYAEKVLNGEIVACKLVKLACQRHLDDLKRQNTTEKFPYT
FDAARADHAI AFIEQLRHVEGPSASTIGGRDNRIKLELWQKFFVGNLFGWRRADGTRRRFR
HVYFEVARKNAKTTLGAGIANYIFWADRPADPGCQIYFAATKQEQAALAWRIARLQIERH
PVLKNLGKTYESKQYIVKTMKDAKGRPISDWSSMRPLGQDSKTEDGLNPSLAIIDEYHA
HPTSEILDVLESGMMARLQPLTLILTTAGSNFDGPCYQVERPLAVGILEKTLQPIPEDVF
ALIYTLDEGDDFADPKVWIKANPNLGVSVMPQLLESRVAMALAAPARARDVKTKNFNIWQ
QSINRWITDDIWMACAEPVDEETLAGRHCTLGLDLSTNTDLTAICAAFPPAEPGEKWKTI
WRLFMPMDNLLERERQDKVPYTEWARLGLIPTDGN TVDYDFIEQEIRIFGDKYLIDEIA
YDPFKAGEVVAHLSSEFTMVA VPQRYNPMAIYSDIFERLVRKGELAHGGHPILRWMMMSCT
EVKADRQGNIMPMKPRRETS GKRIDGIVA AIMAIGRASITNGGETGFAKADEVVVG*

>SPBIB_v1_410013|ID:27164268| Phage terminase, small subunit, P27 family [Uncultured spirochete bib]
MPKPRVPTQIKVIRGTFRRNEAPANEPQPDLLKAAPKPPAHLNKWAKRMWKDIAGKLLAL
GMLTDIDLTYTLEVLCEQYGIYRELKDAITHRDT P AGREKISIAQYLAGQNSQTIPEYAAM

RAAFERYTALLKEFGLSPASRSRMDIPREPPKAVDPMEEELNAK*
 >SPBIB_v1_410014|ID:27164269| protein of unknown function [Uncultured spirochete bib]
 MDVAARHVYMAAKGLWMPTKPARMCKYPYCPNLTYDPSGYCDIHAAMRQAGRMPDKRPSS
 PRRGYGRDWQKVRAEVLTKAGIPRDLWPLYDVDHNPYPNPAIEPDHRKYTLIPRLHGEHS
 SKTNREDGGFGHRRGESISLQSFVNRMRCSMSHTTDSRGKGVVRA*
 >SPBIB_v1_410015|ID:27164270| protein of unknown function [Uncultured spirochete bib]
 MKTEQMAENLRQLYVAGKIEIGKTYHVLPSDCSGNGMDIALKNRLDESADYDLGNGVVAK
 CRCSVQVGSTRWGDGIPTLYSIEVYCPDNQSKIDLSKLSNESLRKLNALARKAGYKSCTE
 AYYDKIDEPVIKHEPWGFETKSGKFFPGIRTTKWWKSGNYRPAKTIIYLPESFNL*
 >SPBIB_v1_410016|ID:27164271| conserved protein of unknown function [Uncultured spirochete bib]
 MSRRTTVYLNKNLEALLKKYAERLNTDEGEYGQSATLTEILGRYDELVRAERRRLRDLFE
 ENEINLLLNNALSTIYSYQTIIGAVLADTEDEDEPSQFEFFGVDRALIEKLRNLTPGQQF
 ALVDWLEEMRSAS*
 >SPBIB_v1_410017|ID:27164272| protein of unknown function [Uncultured spirochete bib]
 MRNLELEMEA YRKANSYL YSKHIRNAEEIIRVALLQCKNPAIALSGGKDSVAMAGLVCKF
 CSPKIIWNDSGLELPESKSIIYEIADRFGLIIVAKGCAIEEAEAIIRGELSRYDKKVIN
 SIDTIINPVRKALIEHGIDLEFVGLRKKESIKRRMLLSQYGPIHYSKKWGKIAWPMMNW
 DGRDCLAYICENNLPIHPAYLMASDPAMARVSWAFDTAREAPAETEVVRRNYPEIYRKLK
 EAGLCQ*
 >SPBIB_v1_410018|ID:27164273| protein of unknown function [Uncultured spirochete bib]
 MHAINLIAQSVRTLAPALPCDPIEATCAVTGQVCPCLPRREVLGDSFTNIDCLRAPESF
 VGVDVYIAWFFGYKTTEDEKRLKCPERMASWICDGNFRELRSRIEIREMVLNGIPYKQWA
 AYTTSYKKGSLWARVNIGPRGIWRFEMIDADCRDENKTREYWNRMNAAVNAGIGRGI
 ETLDMPPYLTMKVGMKTWIEYEKWKAPIYQSGLYQFLAYLLPSAEERINAKSGIGNGGIS
 KSKQLSLF*
 >SPBIB_v1_410019|ID:27164274| protein of unknown function [Uncultured spirochete bib]
 MKDILLTIFAVLRFIYNHSHKITGKRNGSEFFADRIVQAATEKTLLAFAERLSKLVADIG
 SIWESRGVEFLRISGTQDAKVVYQWIRLYPRIVAMISALPRMEQVEEAIESIEIESVKED
 GCAIPQGGKYEIPIEITLSPLAHGADIKAGNATLFRRMQVLSDTGATLSLFPYSGNALRG
 QMRDLLADDFLRAIDIKPSRTNPPIALWFFHTIYAGGALEENSDAAKAFGKLLGTNGAIK
 AEGIYQFRDTLPMISALGCSIGNRIIEGRANFGDFRCCYEWSSNGNIKVSELMTWEFLTR
 REDFEGHEDGDNKSMIATIECIKPGVVLQGGIDIRGHASELERSVIGKGLSLLADRGFIG
 AYSRQGFQGVRIEIEENAPDGKLYENYLAENKKNKIIDYLESLGAICMP*
 >SPBIB_v1_410020|ID:27164275| protein of unknown function [Uncultured spirochete bib]
 MSIGKDLDEIAAELMRLDYGELHIVVRGGEIVSYSIIRSKLVLKRNEKEHKQLQEKQY*
 >SPBIB_v1_410021|ID:27164276| protein of unknown function [Uncultured spirochete bib]
 MSAPWRQVHKTFWSDPKVVDYFTPEDKFFYLITNEHTTQCGVYKISLKQIGFETGYSI
 ETVKNLVERFQNGLRIRYNPETNEIAILNWAKYNYPTTIKDNRFICIQEITAVKDKSL
 IADVLQNAVPEIRDALLMKGDVSTSDAPYKGLGSPSEAPYKPLGEEKEEQEQKQEQKKE
 KEREPRAREASFPQEKPENKPAVRLAEDWFRRFNSMTGAKTKPDSKSLELSRRLLEFL
 GNDLDMALLAVDYFRESHWRELWFACERWSRSGPEDLRKWEFRFASFADPENCQEILSRIA
 RQQETKSHDSFSAARPGDDEPPIDPEENAKAWQRINEFLRQKIAAHEAAMTA*
 >SPBIB_v1_410022|ID:27164277| protein of unknown function [Uncultured spirochete bib]
 MRIGSFVVKNDGSKTMSGEIGSDVGLSVPAGQRLYAKLVRNDKKKDAKSPDYFLEAWM
 PREKERKDYKMQFDPQRNDDAVF*
 >SPBIB_v1_410023|ID:27164278| protein of unknown function [Uncultured spirochete bib]
 MEYLPLDEQTKMPGLVLKLPQLEVIEQLLHAALDGGPQRWYTTLEQAHYRKHGSLPGGVSL
 KTIKNTLALQPRGGIPDGWVSGRKAWRAETIEEWCQIDDSNLEAYLKMYAPHLRVPKRIQ
 EANARHAIEYTAFAADKETEHEEEDPAARS*
 >SPBIB_v1_410024|ID:27164279| protein of unknown function [Uncultured spirochete bib]
 MANGKNEYKSDNEYVKFDRRSFASFKIFIEKLSGAAINPKHHAAMAILPKGWRNILAFSL
 WKNREEFEANLDEAAARLGAKILNDWWASADGILISVFPSSAFTFAQSIKDFHMLDEPA
 VDKASQKQILKGRK*
 >SPBIB_v1_410025|ID:27164280| protein of unknown function [Uncultured spirochete bib]

MITEVVEYWVDGRKVTTL DALLRIVGA KSNKEIDDVRA CLA QSKPYKVHRIKQVYGIPAI
RTGALLHDPCIHRLG*

>SPBIB_v1_410026|ID:27164281| protein of unknown function [Uncultured spirochete bib]
MIRLFIPGEP RGEPRTRATRTMSGKVLVYHDASADRWKQVQLAFALKRTAMLTGPPVAVS
MEFISKPKDPHGYYSTKKPDADNLAKAALDALTKARAWKDDAQVACLIVTKRFAQPKTGE
QAGAFIEIEELPQTMDPAFPASLAGYMGGRGFLRVCQ*

>SPBIB_v1_410027|ID:27164282| exported protein of unknown function [Uncultured spirochete bib]
MINRKICIFSLFFLLLLTLNAIAQSDSNYIVNYFVDDFGDPTEHKYLFTIVTGKFSNSAT
KDSILKVGVIADSEISFALYEYGSNRVTGSDYTDYVIKMKFPNGHIIKTTKIDKYSGR
LEISSIFDSSIDFDTMFSGNAPIKIYIEKDRPYANYSFVTFPSKEFISNNLGSDFFWI
Q*

>SPBIB_v1_410028|ID:27164283| Exonuclease (modular protein) [Uncultured spirochete bib]
MIIFTLLIVGLIYLIIRSKK PARKDIREPIYPRAMPPQKVHPRDMVVREIKEWLEGIE
LTDVIVFDTETNGFY PDESSL SIGAIRYSWDPYEKLKEKARFERYYYPKEPFNERAIMV
NGLTKEKIAELRGDATYPEHFLDDYLAFKEFCEGVRLIAGHNVSFDVGFVFPFLKNRRKLD
TMKSNADVVCVEWMDSKNDWKWPSLEETARFYGVFPNEDDAHGALYDAMIAGEILKRMLD
RAEVKVQII*

>SPBIB_v1_410029|ID:27164284| conserved protein of unknown function [Uncultured spirochete bib]
MGKTSGLKPGQKAPASGQYQTVGPKGGKKEVTAVKGEPLPPTDKPGSTYNLVDGTKNKS
GKA*

>SPBIB_v1_410030|ID:27164285|rflA| Phage P1-related protein in restriction modification operon RflA [Uncultured
spirochete bib]
MDDYINIYCD ESHLEHDHQAMTLGAIWCEK KKIKEITRRLIEFKGKYGLRH ESEIKWS
KISSNHYPYLDIIDIYFFDDDDLHFRGLIIPDKSILNHQKFNQTHDEWYYKMFFRLLTPI
IDPNYKYNIFLDYKDIQGAERITKLHDVLCNNMYDFNHSIIESIQLVKSHHVELIQLTDI
IVGALSYNARDLNTNAGKNKIIERIKQRSGYSLTRSTLYRESKFNIFIWDPENEDHNA*

>SPBIB_v1_410031|ID:27164286| protein of unknown function [Uncultured spirochete bib]
MLNFLPPLL TLEDVDYDPNRLIMEAYRIFRKFIDNKPYFHATPIKLAQGIGNDGKENTF
WHIISGTDKKITISKILILTA*

>SPBIB_v1_410032|ID:27164287| putative Integrase family protein [Uncultured spirochete bib]
MGTKYHLFRRLNLSKGGKYTVWYYWYKENGKQIRKPCGRGCR LKRDAE EFKLEAQES
TSAPSIHVLKSKNSNFASATYRTFQDLAAEMFLPDSLHLKRQTLADGIAIKETTRLAHRG
RLENYLIPKWGRSPFARFEDEGFA YDFQDWLVGLRKAGKDEPISNSLRNNILETMSICLR
EAKRKRLIKTVPDMGTIRFIRHSRRQNTLSLEEIYRLFPE DPAALDAVWRRKDSRDYPGI
GILFGTMFCLGLSAGLRSGELRAVSRDQFVIHSLQDGSYLYGLIVDRA YDSTGQISSALK
KGN DENLRHRAVILSDKTMRIVNLYLDASA VVDGPIFLFHGHPVSKELLNARWKVGLANA
QIDMSGNRRMTVHALRYTYNTRMKALVSEQTLHEFIGHNSSEM TDHYDRPHMEERLLQLA
DQRGAVERFWG*

>SPBIB_v1_410033|ID:27164288| protein of unknown function [Uncultured spirochete bib]
VRGANAFARANFAIRCVA VDPFRAVAQGLARLVRDQDVGGSNPLSPTTESHSIERLYLFM
*

>SPBIB_v1_410034|ID:27164289| conserved protein of unknown function [Uncultured spirochete bib]
MSEHSLLYSFRISADAASALEKLPACIDEANPVPERKRASLRYSIRD LWRSLTMERALRN
IDYLN NPAFFSA YLRYFLPWNLVRLIALLT ELPLELKN GATIVDMGSGPLTFPLALYCAK
PELRKVPLTIICADRPRIMEAGKLILELLAAKHGGELPPWNIELRHLRFGEPIREKADL
FCAVNVLNEFFWHHEGMLADDAAEVLRKIEHYCTAGGSMLLIVEPGEPRSGGLMSAIRAAA
ILSGNVVEAPCPHANACPM PGIFKSGQEYLTGRASQFAHKEAKDEGQKERA IKDNRLLEP
VQMPSPRTKY PWCHFSVPAEFAPRWLRKLSDESGLTKEKLSFSFLYIRKAEGNTSRGRVE
QARESLCRIVSDPILLPRDRAGKYACSAAGYTLVTAASGMELPASGSLVRMHKGGKIERPG
TPEIDRKSGAIVSY*

>SPBIB_v1_410035|ID:27164290|tdh| threonine 3-dehydrogenase, NAD(P)-binding [Uncultured spirochete bib]
MKALVKRKN EPLWME EAPVPKIGDNDLLIKVKKTAICGTDVHIWKWDTWAQRTIRLGQI
VGHEFVGEIVEMGRSVQGYKIGERVSAEGHIWCGVC RACRAGRRLCPNTV GIGVNRDGC
FAEYISVPAQNAWHVHDAIPDEIAAIFDPLGNATH TALSFDLVGEDVLITGAGPIGMAA

AI SRHV GARNVV VTDV NPWRLELAKKLGATRIVNVSKEDLKEVQKELEMVGGFDIGMEMS
GSPQALEQMIENMYNGGRMALLGLLPDGAGIDWSRVIFKGLFIKGVYGREIFETWYKMQT
MLLSGLDISPVITHRFSFDDFEKGF AAMLSGEAGKVVLSFE*

>SPBIB_v1_410036|ID:27164291| conserved membrane protein of unknown function [Uncultured spirochete bib]
MEKLALLAAFGTAVFWAFSAIFFEDASKKVGALAVNFWKVTF AFVFLAISGTVVRGVPPF
YDAPLRTWIFLGLSGLVGFVISDYFLFNAYVLIGSRITVIFQSLTPVFTALFAYIFIAER
MQAHRFVGM AVTIAGILIVL TRSKQSRQNNEGALS AKGLLFAFLSSVFQAGGMVLT KAG
LGDYSPISGTQIRAFIAIFGFAINALLIGQGAHVFLKVPKIREAFSSTIKGSVFGPFLGV
ALSLFSLQNTQAGATSTLMALTPVVIILPSVFILKQKIHAEVVGAAVAVAGAALFFLL*

>SPBIB_v1_410037|ID:27164292| Transport-associated protein [Uncultured spirochete bib]
MAVICISRELASYGEETAQELAKLNGYRIVDKEHIEAALTAIGIDANKQARYDEKNPGFW
ASLSQQRDEYLHFLTQAIYETALENNCII LGRGAHAILKGIPNLIGIRIGASKAVRVERV
RKAQNIDSRHALQIIESSDHD DRAGFH KYFFSVDWYNPSEYDMTLTTDRCNPVHAAA AIDA
FRKAFVGEAQEKEAVAKLQDLLLGSKIVTEITYNRKIPIHFLEAAVERGVVVLHG VANTH
AAVDSAVAAANL VPGVKQVESAIQLVQEFTVVP*

>SPBIB_v1_410038|ID:27164293| RNA methyltransferase, TrmH family, group 3 [Uncultured spirochete bib]
MQAALNLQKVVLVNYISSFHSIIETLRASPQGCMLYVAEGGRHAGPRIRQIIIEAEK RGI
AVRHLPMDLSRMCPEHRGLVLAAPLEARGMLSIEALCEHSSSKDAGLVLDHIEDPHN
LGAI VRSADAFGVDAVVIPTRRASPLTDAAERSAAGATAWLPVIQVKNLRAAVDQLKDAG
FWIYAADMSG SALGAKPLGKKVA ILLGNEGKGVSRILKDAAD ECI SIPMFGHVESLNVSV
SAAILMYEYRRAHALL*

>SPBIB_v1_410039|ID:27164294|pyrBI| Protein PyrBI [Includes: Aspartate carbamoyltransferase ; Aspartate
carbamoyltransferase regulatory region] [Uncultured spirochete bib]

MTRTGPFGKRTISV VND FSLDEQRYL YRKTRELKEAALSGSDVSKFRINDLDYQVYLIFM
ENSTRTRESFRNAGKFLGARVNVFDAATSSFNKNESITDAVKMLFGYSGESCFVLR TKLE
GVCTWLDEAFTEYAQITGKPKPSFINAGDGKHEHPTQEFLDEF SFLEQLGW NEDHIHIAM
VGDLYHGRTVH SKADGLRIFRNVEVDLIAPELLSMP SYVEKMKANGFQVRIFDSIEEYL
AQARVAPIWYFTRLQLERMGEAVLERTPYLRQAVTFRKDFLGKLPDGC RFYHPLPRDRNF
PTIPFFLDELPLNGWDGQSINGYWTRITEIAML AGRIGEDFE GEHARRPKFVDDFVHEAQ
AQEKRKPEYKVGIKPVEEGIVIDHIATGKPVGEIWDTIDAVRKILKLDVRSSHGVYHSNR
GPDIFKGIISLPDIISFGEKDLKKLAAIAPGCTLNLRHAHVAKKYRLSMPPRIYGFDEI
SCKNENCISFPANNEGVLT EFIRKGETTFVCKYCEREHKFRDIWDV*

>SPBIB_v1_410040|ID:27164295| putative Uncharacterized RNA methyltransferase TDE_2619 [Uncultured spirochete
bib]

MTAEMTLRVEKLSSHGEGIAFSEGKAVFIPYTIPGETVLCEITESHASFLRAQLLEIKT
ASPHRVDPPCPLFGICGGCALQHIDYTHQIRLKQETAQETFRRIGGFDPGELEIVTGEPY
HYRNRTQVHACKDSGLGFTKAGSRETVRTPHCPTLVPVLD RWFASENRKARPFHEL SALI
GDRPRFTAFAQDERIYIEGRDAYAHATVLGKEFRFPVAHFFQSNISVLEKLIARYIEPLE
GASALDLYSGAGLFLSLADRFESETECVESDSVAVEAARGNLSNARS AVRFS DIPAE RWI
KTPHARQSFECIVDPPRAGLTAEVRAWLAGTDARILTYVSCD HASLARDLRDLHSASWQ
TLSLTLDFDFYPQTGRLEAVARLSRGV*

>SPBIB_v1_410041|ID:27164296| Beta-lactamase domain protein [Uncultured spirochete bib]
MSITIRSLGAAEEVTGSKHLLDVDSTKILIDCGAFQ GKRAKADAKNRALLGDDVDPASID
ALLTHAHYDHCGLVPYL VKKGFKGSYSTSATRDLANLIMTDSAHIQERDADYLSRQAE
KKNETFDWKPLYDEFDVIQAMDQFVTG YHRPILIADGIQAEFLDAGHILGS AFIRVI AK
DKEGHTAVIGFSGDLGRKNKPIKDPECLDGIDFLLLESTYGDRLHESTDDAVARLEKLV
NRTAETRGLIIPAFAVERTQELVFYLHLLHDKGRIPEMPIWVDSPMALNATSIFAIHPE
CYDKETYDLFTTHAKNPF GFASLNFSRSVEESKMLNQA KGP MIIISADGMCEFGRIQHHL
MHGLGDPANTV LIVGYMAEGTLGRRLKDGAKEVRIHGDWYQVRADIQEIDAFSAHADWQE
AVDWLGCIDKKRLRKYLVHGEGEALTAMQKHVLDAGVQAAEIMKPGEIYTIA*

>SPBIB_v1_410042|ID:27164297|rpiB| Ribose-5-phosphate isomerase B [Uncultured spirochete bib]
MKIVIANDHGAVALKQHIVAWLKAQGHVVNLGVDVEERVDYDPQAE LA VQEYQKGSYDF
GIVCCGTGIGISIAANKHKGIRCALIHDSY TARMMAKEHNNANFVAFGGRVEYAEPVEQML
SIYMNAQFEGGRHTQRVAKLDALC*

>SPBIB_v1_410043|ID:27164298| conserved protein of unknown function [Uncultured spirochete bib]
VIRVGKKNAAEECRMGLEPGDTFECTYETPAEFCPTSFIKIFPAMEVVRCNGDLRALGGN
GPYETTFICPDGVVLFKLTAEKAK*

>SPBIB_v1_410044|ID:27164299| transposase [Uncultured spirochete bib]
MFMRITNSGKNGAYHYAQLAESRRDPATGKVKTSVIYNFGLVEQLDIPGMERLIASIRSI
LPASSAMAQGAPQDYEFGLSREIGPVWLLDQLWKKLGIDTALASLVKEHQYRTPVERMLF
AMVAQRIVAPGSKRSIERWLEKDVLIQGLGEVDVHRLYAAMDLLIESNEAVQHALFTHVT
KKLDDLVDILFLDSTTYFEIKGEDDHEGGLRKRKRGHSDKNHPELAQVVAFVTKGGIPR
AWVWPGNTSDHEIAQQVKHDLQWNLGHLVMVQDAGFNSARNRQILLQGGGDYIIGEKL
AGSKGEAVEALHRAGRYKTIEREGKVLCKDVLIDEGSATQRRYVIVQNPEAAQRDKETR
SQIVEEARRLAALAQLSGEPHRKAACRLRSHGIYGRYIGQRKDGTLFIDEEKMKRESLL
DGKFLISTSLMHCSTEEIVYGYKQLWEIERVFRDVKHVVDIRPVYHHLDDRIRAHVLI
IAMVLVRVAERTLSMSWRDIA YTLTDIRVGHTKGPDGELWLMSPLESEMQRNLFSTLKVKH
PPKIWDF*

>SPBIB_v1_410045|ID:27164300| transposase (fragment) [Uncultured spirochete bib]
MTERLVIDAFLQIGKEQPGSGLIVHTDQGSQSTGANFMAVGKKKGAIPSHSRKGPNPYDN
ALMESFYRILKREL VDDAGFRTRDQLVLNSSC*

>SPBIB_v1_410046|ID:27164301| conserved protein of unknown function [Uncultured spirochete bib]
MSRRKFDKEFKVA AVRLV VDEELPVCQVARELA VHQNSLYRWVSEYEKEYGESAFPGNGSK
IYNYQAEINRLEKRNRELEEEVELLKKFRVFL*

>SPBIB_v1_410047|ID:27164302| Sulfatase (fragment) [Uncultured spirochete bib]
MIVRWPGIIPAGTVCHTPWWYADFRPTIDEIIGNSMPTDCDGISILPLLYGNVEQLDSRY
YERIFYWEGYTYGFEQAVRWKNWKA VRKISAESGETSFELYDLASDLAEKNNLATNYSKL
VEKLRHQMISNRDTSPPFWPIQFH*

>SPBIB_v1_410048|ID:27164303| IstB domain protein ATP-binding protein [Uncultured spirochete bib]
MRRPRTNRTLLREEISQLLKKMAFSQTA VQLCEEETAPMEQFLNVLQSEMASREQARR
ARFLREAAFPVYKTLEGFDFTSVSLPPALS RDELLSMQFVAEKKNLV MYGPVGTGKTHLA
TALGVEACNRSMRTKFFTAELV VRLSEAHKEGMLDKLLKAVLRADLLIIDEWGYVPVDH
QGAQLFRVIADSYEQRSLLITTNLEFSKWGSIFTDDQMAAAMIDRLAHHGHILLFEGES
YRMKHALMRQKDQIKLPMA*

>SPBIB_v1_410049|ID:27164304| Integrase catalytic region [Uncultured spirochete bib]
MLTMNQIDQIKELQRQGYGPGEIASRLRIDRKTVRTYMKREDFNESLEAHTTWPSKLD
KPLIDEWLAEDQRMRFKQRHTAKRIHQRLCGEHAGEYDCSYPLVQRYVKAKKVAQRQMDG
FLELVWAPGEAQADFGAEVMEAGVRKTIKYL TLSFPYSNAGFTQVFEGETAECVAQGLQ
DIFGYLGGVPRRIVFDNATGVGRKIQQHVALNQLFLRFKCHYGFSVSFCNP NAGHEKGNV
ENKIGYTRRNFFVPLPVVDRLVDLNMQLFKKALQDHARKHYKKGQTIAALFAEEQTALSP
LPARPFNVERYERLRTDGYGKFCLDGKH WYSSAPEYASGEVTVGIKAREIVVYGP DGEVR
GEHRRYGEERSDSIDWHTSIAALMHKPSAWQNSHFRAATSPSVRQALDALPRDRLRDVL
KGLVQSSERFGFEVALASLEEAVSVARLDSYSVHAVAARHVYDGLYGIPAAGPDLGVYDR
AFIGEKEHTP*

>SPBIB_v1_410050|ID:27164305| N-acetylgalactosamine-6-sulfatase (fragment) [Uncultured spirochete bib]
MKKEIKYPNVIFILCDDFGYGDAGCYGGTSIPTPNIDKLAEQSMRFTQCYAGAPVCAPSR
CVLMTGLHTGHCTVRDNFAWKGLPPEGRVSLRRDDSIIAEDLKHVGYTTGIFGKWGIGE
EGTEGIPNLKGFDEWFGYLNQRHAHSYFPTYLWKNQKRIDFSPA KDGQQGPYSHDLIVNY
AIDFITRNADKKFFLYLPWCLPHEPYEIPAQYAWNEAKATWKDEEKAYASMVRKIDTDLG
RIMELLEKL RITNNTLLFCVM*

>SPBIB_v1_410051|ID:27164306| protein of unknown function [Uncultured spirochete bib]
MHDTDKLPNMIHISMIHIRIIIC SITNLGGIQHEERDKVSQCDFYFMR*

>SPBIB_v1_410052|ID:27164307| Arylsulfatase regulator (Fe-S oxidoreductase) [Uncultured spirochete bib]
MKKAFFLIKPVSGNCLACHYCFYRDLEHQIIHNF GFMSSTVDILIERAFELDADILT
FVFQGGEP TLAGLPYFEHFVKKQTCTKSNLRHQHPQINFSIQTNAIALNTEWARFFKRE
SFLVGISIDGARIIHDTYRTHYDGS GTWAEVMHGIELLRKEGVLLNALCVVTDFAADNAE
LIYNRLRNLGFEW IQFIPWLPPLKEESVLSSELLTPGAYAHFLKAIFDLYYQDWLHGSVV
HVQWFDNLVAIAAGMPPE SCGMLGCCPVNFTVEANGSVFPCDFYVSDEWCLGNIHDL SFQ

SMKEGIIAHHFIERSSSIDPSCRICFAFFLCRGGCRRYREPFDDGKLNRYCTAFKEFF
QYAGEHIMNMAAFYRN*

>SPBIB_v1_410053|ID:27164308| putative Ribose operon repressor [Uncultured spirochete bib]
MASIHDVARLAGVSAATVSRVLNSSGSVTDATRAKVVRAAMKRLGYIPNPSARTLRNNRTG
LLALITPEIINPYFAAVASGVQDMCRKSNYQLILCNTGGDESIEISYLNLLSNKQVDGII
IAPPGTHTNPKSDVRIRNLIDSNYPVIMIGKRFDSYVNCDIVTTNTAIGTREAMQHILD
GGHSRIAYLGGPNPSVAKTRLATFRSSLSAHGLIIDENLIFQTNLTLEDGYNICKLLDI
TNRPTAIFAVNDMVAIGAMIALQEAGIAIPSEMIVVGFDDIPLASIFRPSLSTVAQPKYD
LGYIAAERLIARIDRLIENFETISLPHLIRESSMSNKTPKMMINFG*

>SPBIB_v1_410054|ID:27164309|dppF| dipeptide transporter ; ATP-binding component of ABC superfamily
[Uncultured spirochete bib]

MNDKEDQILLEVENLRKYFAVKHGVLRKKGWLKAVDGVVSFELFRGETLGLVGESGCGKS
TTGRIILRLIKPEPNSQIFFHDNDKVIDIAKATPQELKYLRTMQIIFQDPYSSLNPWMK
IGEIIAEPLLIHKIMVGKELTNKVHSLLEMVGLDASYAMRYPHEFSGGQRQRIGIARALA
LNPTLVVCDPEVSSLDVSVQAQVINLLVDLQERLHLSYIFIAHDLGVVRYISRRVAVMYL
GRIVEIGSTEEIFHNPAPHYTEALLSSMLSTDPDSSKERLQLEGDVSPINVPSPGCPFHP
RCRYQQNKWPECVSDIPTPTSIYSDTHKVSCHFAPNLNLCGVETEGTVKIGVKNGFNT*

>SPBIB_v1_410055|ID:27164310|dppD| dipeptide transporter ; ATP-binding component of ABC superfamily
[Uncultured spirochete bib]

MEHLLIEDQLKTYFTDCGIVKAVDGVVSFSVEKGQCLGIVGESGCGKSQTALSIMGLVSK
PQGRIVSGKILYRDKKGHITDLATLSPNGYEYRSIRGKEIAMIFQEPISLSPVYTIGDQ
IVEALIEHTTLSKKEATHRAVELLKTGVIPAAEERIHDPHQLSGGMCQRAMIAMALSCE
PRLLIADDEPTALDVTIQLQILRLKELQERLSMGLMMITHDLGVIAEIAIDYVIVMYLKG
VVEKGPVRKILREP KHPYTQGLLQSRPSGTAGKVRNLNPIRGVVPSAIDPPAGCPFSTRCP
KVLDKCSAFPFFALWEEGHAAACWLYENFM*

>SPBIB_v1_410056|ID:27164311| putative Extracellular solute-binding protein family 5 [Uncultured spirochete bib]

MKSSRVVIAFLAMSAFAVVTAAAPSGTYKEAPQLAAMVQSGKLPVELRLPPNPVIVKP
LDSVGKYGGTIRKVVYTGVDWNLALFGVRAEPLLAADLEGNIVPNLLESYEYISGGNIL
RLYIRKGIKWSGDVFPFTVDDIYDLQTRGNKNMPLESAGLASKVVADKIVKIDDYTVLDP
LKEKYPLEFTIAYDPTVSPKHLYIKFDPRYDSTKTWQDLATAWSPSRNSAALVNLPLVLSA
WKVVEYVENVRIVAERNPYWYKVDNNGQQLPYIDRVVFNYVASTDTIPAMIMAGQVDFQA
RHLSLADFPFYKQNESMGYRTAVLPNTNLGPAIHLNYADKDPDLRKLFRKKEFRIALSY
GIDRLAISNTLFFGQAKPWGFSPLEGSPANPGNPYSTMYTQYDPSAANKLLDELGLKDTN
GDGFRELNGKPLSIIDMDKGGGAGPVQVVELIASQWQKIGIRAIANTIDRSLILARWKE
NSHDAFAWNVNGGVDPLQFTFAWSTTAAPDFMWGNVGVPLNEWQTSGGKTGVEPPAFVKE
MNGLVLEAQQELNAKKRNELARHITKIASENLYKIPTTTLVSVG VVSTKLANVPNSWTDG
ISVLSPRNIQPWQFFYK*

>SPBIB_v1_410057|ID:27164312| ABC-type dipeptide/oligopeptide/nickel transport system, permease component
[Uncultured spirochete bib]

MNFVLETGIRSPERCSCIRLKRDMGTGYILRRIGIAFVTLFFSTILIFAIKLPFGDFVS
YAISQSGGEGGLSSIADRMRFYGLDKPAIEQYSRWIGGLVRGDLGYSFLYRQPVLKIVW
NQMGWTVLITGLSMIFSWSIGSAIGIFSALKKYSFWDYLFTAFGFLGLSIPSFFLALIII
YMCISAGSVVTGGLFSPEYAVAPWSWARFLDLLKHIWIPVAIGTAQMAQVIRIMRGNLL
DVMNQPFIKTARAKGLSERKVIFKHAVRIAMNPLISLAGLSAPALVSGIVVTA VVNLNPV
IGPTFIVALKSQDMYLAGGYLLLMMVLLLIGNILADILLAWS DPRIRFD*

>SPBIB_v1_410058|ID:27164313| Binding-protein-dependent transport systems inner membrane component
[Uncultured spirochete bib]

MWKRFFKHKIALTGLVLLFLLIIPVVFVFAEFFAPYGLNETSSNSYAAPTRIRFTDEKGFES
LKPFVYDAQPSFDLNTGQTFWKEDTTPHYLRLFIHGSAYSILGLKLDIHLFGAEGGHVF
IMGTDALGRDVSRLLYGGRVSLAIAFITALFALIAGSLAGIVSGFFGGVADMIIQRVIE
LFITIPNIPLGLALAAFLPPNLPILLIAAISLVIALVMWANARQVRGKTLPLRDAVHV
QAAVALGASTPRVLLKHIFPAIYSHLIVVVTLAIPQAMLAEAGLSFLGFGVRPPLTSWGA
LLQDAQNFRTISLYPWVAVPGLAIAVTVLLLNFVGDGLRDATDPYLN*

>SPBIB_v1_410059|ID:27164314| conserved protein of unknown function [Uncultured spirochete bib]

MNNYSIRGLEVHDWSHIWNFKTMRRYMKFMVENDMNTLVLHHVGVLDLITFPAKFLGGGT
PTNSIFEVYNQIDQNIYRYALRENLNLYRRDFLKQLIKEARQCNIIDVYIEDKELWFSDFI
LNYKPDLIKNGVLCSEPFWWEEFLPAKYEELFVALPDLAGVVISFSGTGESRLAIANMHS
CNCDLCKKMPAQWHTNMILGTYGPFKNRGRKLVVRDFIYTKEEQEQFAEALKVIPQEVV
LSLKNTPHDFYPTFPDNPLIGRVGERPQWIEYDVNGQYFGWGVVPSIMFDDIEHRLAYGL
DHKVS GFFMRTDWEQVQDLSCFDGNLLNLYAAAILGKNPAADRREIVLRWLEGESMLDT
ACTPMQINETLDWLLKILEPTWSIMRGAVYVNGTVFSDNSLFHV SFGQPQWVAETHHSLK
NWFAEARDALGLTTKNVKFILEEKDRASKIMDEVLDV LALGRHALTETAYKDLLDRFELM
KAYVQGFCL ETRLWVFGRLWVENRLDMLPGFDRPVKSFLEEFVKIKEYIASVKGMPQLT
SYPACVLLNIERMECFIRDAEKKIMAMRPLE*

>SPBIB_v1_410060|ID:27164315| ADP-ribosylation/Crystallin J1 [Uncultured spirochete bib]
MQNYKERNSSRKRSELVFRDKVLGCWLGKNAGGTLGEPWERKFGVDEMFDVHWYSHIPE
GGIPNDDLELQLIWFQALKERGGITAWDLAEYWLDCVMYNFDEYGLSKANLKRGLVPPI
SGWHNNWFKNCMGSPIRSEIWACIAPGEPRIAKEYAFEDALCDHAGGESVFGEVFNVALE
SCAFFESDKYRLIELGLASIPESCLTSRSIRDAWDMHKKGIDWREARNILKDRYSIPLAQ
YSPVNMGFQIIGLLYGEDFGDAICKAVDCGWDTDCTAATVGAILGIIEGASRLPEKWIKP
LGYNISTNLRTGGIRNLRAPTDINELTDQVCAEAKRVLKFWD AEAIEDASEETRDESSC
FFRKYEFKIDRIAPYEPNVATWNLGTVSVSLRYLDSASIFSDRSTPLELEIHNPHEAIL
IEISVLLPEKWSVEPIRQQTFTIEAYDTAKVAYNISVSDGIIEDSNRGYFIISAKNRMAL
CAVPLVLLGGSKWLVSPLFEGKTLEDDCGIDESLVPSTMLEEWSIYWRSGNDLSPESFYR
GKPGSVFFFNSIWSPEETEVI LGSNTGRMKIWLNGQLCHTTVQPTCLRPNLGNGGGDGS
NYCNILHSGWNDMLIKLERGEKLL EAHVTLGKPNREYPKNLGEPCLG LRRAYFSWERGE
WL*

>SPBIB_v1_410061|ID:27164316| Lipolytic protein G-D-S-L family [Uncultured spirochete bib]
MVIDSNILAIKEKYLKYIWNPDGVSFFPALKDGTVIVFQGDSITDANRDRSVLAPNDM
FGLGGGYVFLAAATLLSHLPDRRLRIYNRGISGDKITTIKRWEQDTLALNPDFITVLVG
VNDYWHISKHGYKGSVELYKETYKNLIARTMKVLPQARLIICEPFAIRCGYVDESWFPEF
SKYQAVAFDIAESSGAIFLQSLFEVALRVQEATYWC PDGVHPSAAGAYLMASAWLNCI
AMLDDR*

>SPBIB_v1_410062|ID:27164317| protein of unknown function [Uncultured spirochete bib]
LRKRLLLMATYSKLR TSPEMIQTGYLSQDKSLVIESVEIWNVTLLFASKMGLTYES*

>SPBIB_v1_410063|ID:27164318| protein of unknown function [Uncultured spirochete bib]
MGLSMKERQRIIAETATRYREASKKEKGRILNELTALTGYNRLYAMHLLTW*

>SPBIB_v1_410064|ID:27164319| Integrase domain protein (fragment) [Uncultured spirochete bib]
MCGKRLKVSIRENLAFLALHEEYAITDAVRAELAAISPATIDRLLAKEKQTXWXXKRHST
TSEANHYKTKIPIRTYYGSEEQRPGYLEIDTVFHSGVTVHDEFCTLDATDTMTGWVEL
RALPNRGQRWVKEALVDVRSTLPFRLIAIDSDNGSEFLNRQVYDWCTREQISFTRSRSYH
KNDNPFVEQKNSQYVRQFVGYARYDTTEEF EALREVYQVLCPLLNLFPSTKLIKHREN
ATIHKTYDTPQTPFSRVLASPFVSLRAKEQLAVRKTGYDPVVLRYRLDTARQTTPCA*

>SPBIB_v1_410065|ID:27164320| Transcriptional regulator, LacI family [Uncultured spirochete bib]
MRTSLKELAKKSGYSVNTVSRALRDADDVKASTKSLIKQLAEEMGYIPNVVAKNLR LGKT
NTIGVVSADSSNPYFAEVILAIEDAARSHDYHILLVNTEESPEGEREAITLIERQVDGL
LIIPVFGEDANLERLKNLSVPFLLVGRWLPGLDHSILTDEYDKAKQVTSFLANGHTHV
LHLAGPSFVSSFDRIKGYRDAHSEAGIPVNEDLIVETDGHIEDGHRHINALIRKELPFT
ALFAFNDLVAIGAMRALKEAGYLIPQDVEVVGFDLDSRYLYNSLSSVRIPKQELGRIA
FESLFEHMTDPKKLYRRQTIESRLMLRETTTFENIGDSQIQGGIK*

>SPBIB_v1_410066|ID:27164321| Extracellular solute-binding protein family 1 [Uncultured spirochete bib]
MKKNRLVLALGLILIALMTVGAQKPIEISFWSLFTGGDGEFFDAMVKAFNESQNEIVMKT
DTVKFTNYTKLTAALS AKNAPDVVVMHQDRLVNYVPNGVLMQLDEYVQKANIDLSTFSP
APLNSCKFNGKLYAIPLDVHPLVMYYNKDLMAKAGVTKVPETLAE LISA AKA IQDKTGAI
GIAADNTTATYKAYTLTRLFMSLLMEQNV TILDASNKRANFNNAAGVKAYQALS DMVNKD
KLTPKQLDYDSSVSSFKLGKAGFHFN GVMVGGFESQSGLNFGVVQFPALLGKNAGWTGS
HTLAVPVQKTTDPDRIMAVMKFIDWMTQH GEMWAKAGHIPTRTTVYSKPEFKNLPHRAEY
ADAVKNTFAPPATHKWPELYDAISDSLEESIALNKDAKAALDQLEKKVNDILK*

>SPBIB_v1_410067|ID:27164322| Binding-protein-dependent transport systems inner membrane component [Uncultured spirochete bib]

MHLAGHTKRDILFSAPYLLVYLVFLAFPVVYGIYLSFFDWNILSGKAFVGLRNFVQAFS
DEKFKSSFFHTLQFVGLSTPILIVTGFLMALISVRPTKLGKAAESIFFLPYMFSTTVVGT
LWAWLLQKNFGLVNQLLQAIGLKGVGWLTDPNVAMLSIVWATLWWTAGFNMILFSAGMKQ
IPDEIYESARLDGAGKFVTLTRITIPLLKDTLLVVILQIIASFVFGQVYVMTGGGPYG
TTRVLVQYVYETGFNYFKLGYASAMSMVLFVVLVISA VQLLASKDDVQ*

>SPBIB_v1_410068|ID:27164323| Binding-protein-dependent transport systems inner membrane component [Uncultured spirochete bib]

MKKILLNMVAVLIALWLVP LLWLIIITSLKMENDVVTDHLLTFSAAPTFKNYIKALTTTP
IKQWLLNSFFVASVTTVLTFLDSTMAFVLSRMRFRGRKALYFLVLAGMMAPFESMIIQL
YLEFNAFKLLNTLAAVIIPRLALPVGVFILTQFFNGIPTALEEAA YIDGASRFKVFTSII
LPLGKSAMFAVAILSFIGSWNDLWPLIAISNSAKYTVTVGIANFQGTHGTEYALIMAGA
VIASIPQILIFLFRKNIVQGIAMTGIGK*

>SPBIB_v1_410069|ID:27164324| putative Glycoside hydrolase family 2 sugar binding [Uncultured spirochete bib]

MMKEASGNRFVEDSHIFAGHPNPSWARRTWMSLDGIWTITHRATKKEIRVPFPIGSKESG
VDFKDSGLFVYEREFLEPFLAKRYLLHIGACDYMTTVFVNGHLV GSHVGGYASFSFDI
TSVVKPGKNRIEIRVLDSHSPFQVRGKQTFMRNAFFVWYEGIAGIWQSVWLEEVGLRYLE
RAETSDFDFGQKLA VSVFLKPLDNKSEHIPDSSLRLRIDVKSSDGRGKEATRLLEADNGV
FKATFGFDEFNAALWSIETPNLHPMALTLLCGNTVFDTVETYFGLREISAGKDGFKINGK
PVFLKMVLNQGYYPGGVYTPLDYSRMAEDIRTIKALGYNGARIHEKVEAPYFHYLCDRLG
LLTSFEMPSFYLP SKKGFRRYESELKELILRDSMHPS CIMRMLFNETWGIWGVCRKSSST
RSFVEKMYRLAKHMDPTRPVIENSGWEHFMTDIVDFHHYLRNASLARNLYSKIRNGDEYT
LEGFSLRRVLEFYIKNQVPFATRSVFLEKPSNADVLPLFLSEYGGFGWYDTEKKNAVEES
IEEYTRDIVHSGLFCGYCYTQLYDVGSEVNGLMTFERNPKVDIECVRKANNWEKQ*

>SPBIB_v1_410070|ID:27164325| protein of unknown function [Uncultured spirochete bib]

VRAESELGEAIIQQNSIPMLGNKSGYTLTIQRTRFFLG NLTGYLASLECLIMQMSQLV
IISRFYFRLN*

>SPBIB_v1_410071|ID:27164326| conserved protein of unknown function [Uncultured spirochete bib]

MSRRKFDKEFKVA AVRLV VDEELPVCQVARELAVHQNSLYRWVSEYEKEYGESAFPGNGSK
IYNYQAEINRLEKRNRELEEEVELLKKFRVFLQKKKHVRF RYLAECVM*

>SPBIB_v1_410072|ID:27164327| protein of unknown function [Uncultured spirochete bib]

MLKMNQIDQIKELQRQGLGPGDIASRLGLDRKTIRKYLHKEDFNQPQRVPVHPSKLDLDRW
KPLIDAWLAEDQRMRFKQRHTAKRIHQRLCEEHAGEYDCSYPLVQRYVKARKAAQRQPGG
FLELVWAPGEAQADFGEAEVVEAGVRKTVKYLTLTFPYSNAGFTQVFGGETAECVAQGLQ
DIFRYIGGVPSRIVFDNATGVGRRIQQHIALNQLFLRFKCHYGFSVTF CNPNAGHEKGNV
ENKIGYTRRNFFVPLPVVDRLADWNDGLGQTARSCGTKSRSF*

>SPBIB_v1_410073|ID:27164328| IstB domain protein ATP-binding protein [Uncultured spirochete bib]

MAFSQTAVQLCEEEGTAPMEQFLKVLNRNEMASREQARRARFLREAVFSVYKTLEGFDFA
SVSLPPALTRQELTSLQFVA AKTNLVMYGPVGTGKTHLATALGVEACNRS MRTKFFTA AE
LVVRLSEALKEGMLDKLLASVLRADLLIIDEWGYVPVDRQGAQLLFRVIADSYEQRSLLI
TTNLEFSKWGTIFTDDQMAAAMIDRLAHHGHILLFEGESYRMKHALMRQKDQVKSPWPDG
EICTIFLGILA*

>SPBIB_v1_410074|ID:27164329| conserved protein of unknown function [Uncultured spirochete bib]

MNSSIRFGTCSWNYP SWVGLVYAETQRRAAA YLREYSQKYDTVEVDSWFYKIPDREEVAD
YLAQVLPSFRFTCKVPQELT LTHLRGNAGASTGVNPSFLSPDLFARFLEAVEPMIPRLD
AIMFEFEYL GKDKMPSLEAFLEKLD DFLTA VRERARGLPLAIESRNRNYLSTAYFSFLRD
RRLIPVFSEKRYLPHVYEVYWQYRNLVDTDIVIRLLGCDRAEIEKKTNEQWNTIHEAKPD
KQLILQMAMDIASQGHKVTINVNNHYEGSAPLTIEVMQKIQQKLGAEKKSSGS*

>SPBIB_v1_410075|ID:27164330| exported protein of unknown function [Uncultured spirochete bib]

MKRHLALFILLIIIFSVAA DQVELY YNGNYIKNFY LKDATGYSVLNLSTKSANAALTIT
IDETYGKHNQYFLNRLYRITSISKMKDGTIFTYESLLSLSQESTSFVSYAWIMPSAQYDG
YFSLRNSDGEILAVYFDFNLNITRIE*

>SPBIB_v1_410076|ID:27164331| transposase [Uncultured spirochete bib]

MFMRITNSGKHGAYHYAQLAESRRDPATGKVKTSVIYNFGLVEQLDIPGLERLIASIRSI
LPASSAMAQGAPQDYEFGLSREIGPVWLLDQLWKKLGIDTALASLVKEHQYRTPVERMLF
AMVAQRIVAPGSKRSIERWLEKDVLIQGLGEVDVHRLYAAMDLLIESNEAVQHALFTHVT
KKLDDLVDILFLDTTSTYFEIEGEDDHLGGLRKRGRHSDKNHPELAQVVVTFVAVTKGGIPI
RAWAWPGNTSDHEITQQLKHDLSQWNLGHLVMVQDAGFNSERNRQILLQGGGDFIIGEKL
RSGSKGEAVEALHRAGRYRTIEREGKTLCKDVLIDEGAATQRRYVIVQNPEAAQRDKET
RSQIVVEARRRLAALAQLSGEPHRKAACRLRSHGIYGRYIGQRKDGTLFIDEKMKRESL
LDGKFLISTSLMHCSTEEIVYGYKQLWEIERVFRDVKHVVDIRPVYHHLDDRIRAHVLC
FIAMVLVVAERTLSMSWRDIA YTLTDIRVGHTKGPDGELWLTSPLEMQRTLFTMLKVK
HPPKVWDFKSKKAPIGV*

>SPBIB_v1_410077|ID:27164332| transposase [Uncultured spirochete bib]

MGKVTKAEVSAILQGMQDRELYEKLGLKEPWSVENVTLDLPSATVTVVAISHPKGAKFPC
PVCGTERPIYDHQRRWRHLDTGFTTILEAEVPRIQCPEHGKQVNVVPWGEPSRFTAL
FEAIAISLLKVASFSVARHLRISWDAASGIMERA VRRGLARREAQPLRRIGIDETSFQK
RHEYVTVVFDQERSCVVDVLDGRKKETLKTWLAANQNALTALESVSMDMWDAYIGAVREA
HPDGEQKICFDRFVAQYFNKAVDKVRAEEHREFKTRGEQSPLTRTKHAWLRKGPDAAF
SSLARSNLKTARAWRIKEAAAELLRTKSHEEAARDWRKLLSMMRSRLGPVVKVAAMIRQ
YLWGILNAARLGATNAKNEAVNATIQLKVRACGFRNRSRFRKVMVILSHLGLSLLPEVMT

*

>SPBIB_v1_410078|ID:27164333| chpA| toxin of the ChpA-ChpR toxin-antitoxin system, endoribonuclease [Uncultured spirochete bib]

MVKPKKYVPERGDIVWLD FNPQLGHEQKGRPALVISFKEYNEKIGLALFCPITSKVKGY
PFETE VKGIINGCVLSDQVKNLDWTVRNVEFIEKIEDEKLNDIIDNILLIEK*

>SPBIB_v1_410079|ID:27164334| Transcriptional regulator/antitoxin, MazE [Uncultured spirochete bib]

MQTVVQKWGNSLGIRIPSVYAKEFNKLGNSVEIVKEGGKIIIPPKKTLEEMLSKVTKD
NIHAPIETGSSLGNEEW*

>SPBIB_v1_410080|ID:27164335| PilT protein domain protein [Uncultured spirochete bib]

MLNSILIDTGPLIALFDKDDTYHNKVKDFIKNAKYRFITTA VITEVSHMLDFNINAQID
FFEWIMKEGVILQEISQKDISRIIELTKEYSDRPMDFADATLVIAAEKTGIKKIISIDS
FDIYRLPGKVKIENVFHK*

>SPBIB_v1_410081|ID:27164336| CopG-like domain-containing protein DNA-binding [Uncultured spirochete bib]

MTTVRLPIEIEQRLEILARKKHKSKTDLIREALEKLFIQEESKDSYELGEEYFGKYGSG
DGTLSVITYKDKLKD KINAKLNSH*

>SPBIB_v1_410082|ID:27164337| Phospholipid diacylglycerol acyltransferase protein [Uncultured spirochete bib]

MPISKSTNWGRKEKMITYTESLRGVSHYSLDGFCEGWQPLTPLQLRSILKHSTYRILAM
DTEHTRIVGIITALS D KIH WAFIPYLEVIPAYQKQGIGKRLMELMIEKTKGIVCIDLTCD
TEMQAFYEQFGMVASHGMILRRYMDEK*

>SPBIB_v1_410083|ID:27164338| conserved protein of unknown function [Uncultured spirochete bib]

LANFKIAETETFEKKIQSSQYKFLYKQIQHYIYPLLRENPFYGNPKKLGGEYKEIYFR
IGDYRLFYTISEETVIIFILDIENRKDAYK*

>SPBIB_v1_410084|ID:27164339| conserved protein of unknown function [Uncultured spirochete bib]

MAKTITVRVEDTTYDIFKKA AEGQKRTISNYLEFAALNYTVNETVVDSEMKELAFEND
IKKGLADISAGRYK VIG*

>SPBIB_v1_410085|ID:27164340| Ribbon-helix-helix protein, CopG family [Uncultured spirochete bib]

MKKTNTITLRVPEELKERIENMATLQGVSMNQFALYAFTKELSELENSQYFKKYKLGKKK
EEIKGFDDVFSKVKPRNVDQWDTL*

>SPBIB_v1_410086|ID:27164341| Toxin-antitoxin system toxin component, PIN family [Uncultured spirochete bib]

MKVVLDTSVLFQALYSSTGASHAILKLIREGALQLPISIPVFEEYREVLLRQSSLDL FEL
STNDVQKIIDFIALIGVKTDIRFLRPNL RDENDNIFIELAFASGAHYVITKNVNDFKYD
ADLRFNEITIATPAEFMKIWRNTYEK D*

>SPBIB_v1_410087|ID:27164342| Plasmid stabilization system protein [Uncultured spirochete bib]

MSAKYTIVFSRYAEDDLSEIIKYYAEKNSQYALKLLDTLETRVQELREL PARGRIVPELA
QQNILEYRELIEGNRYRIIYVIQDSMVVIHAILDSRRNLEELLMQKLMRFYS*

>SPBIB_v1_410088|ID:27164343| Prevent-host-death family protein [Uncultured spirochete bib]

MNVNPKDTIKPISYIKTNAADMMMKFINDNKSSIIITQNGEAKAVLVDIDSYQEMRDAFSL
LKIIKLSEKDIAAGNYKESDAVFSNLRTSLSK*

>SPBIB_v1_410089|ID:27164344| conserved protein of unknown function [Uncultured spirochete bib]

MNKKVFIDSDVILDLLSKRQPFYPAAAEIFTFGDYGLDLYTSSLVFSNVFYILRKSVGN
EKAKELLRKLRLIRIPIVEKNIDMALNSTFTDLEDAIQYYSSCSFGIDVIVTRNTSDY
KNSEELLIQSPEEFINIISIEKE*

>SPBIB_v1_410090|ID:27164345| conserved protein of unknown function [Uncultured spirochete bib]

METKLTCLKLDQAIQRAKQYAEHNRSVSKLVEDYFRNLIVNRKDKTHYSPLVEELSGVI
TPDDINNSDYTSYLEAKYE*