Supplemental Material to:

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The tracrRNA and Cas9 families of type II CRISPR-Cas immunity systems

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303229466 Veillonella atypica ACS-134-V-Col7a                  : KQDYFVGLDIGTNSVGWAVT----N----------TSYELL---KFHSHKMWGSRL----FEEGESAV----------TRRGF-RSMRRRLERRKLRLKLLEELFADAMAQV-DSTFFIRLHESKYHYEDKTTGHSS-----KHILFIDEDYTDQ---------------------------DYFTE-YPTIYHLR-KDL
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : FSDYYLGFDIGTNSVGWCVT----D----------LDYNVL---RFNKKDMWGSRL----FDEAKTAA----------ERRVQ-RNSRRRLKRRKWRLNLLEEIFSDEIMKI-DSNFFRRLKESSLWLEDKNSKE-------KFTLFNDDNYKDY---------------------------DFYKQ-YPTIFHLRDELI
374307738 Filifactor alocis ATCC 35896                         : TKEYYLGLDVGTNSVGWAVT----D----------SQYNLC---KFKKKDMWGIRL----FESANTAK----------DRRLQ-RGNRRRLERKKQRIDLLQEIFSPEICKI-DPTFFIRLNESRLHLEDKSNDF-------KYPLFIEKDYSDI---------------------------EYYKE-FPTIFHLRKHLI
320528778 Solobacterium moorei F0204                           : QGNYYLGLDVGTSSVGWAVT----D----------TDYNVL---KFRGKSMWGARL----FDEASTAE----------ERRTH-RGNRRRLARRKYRLLLLEQLFEKEIRKI-DDNFFVRLHESNLWADDKSKPS-------KFLLFNDTNFTDK---------------------------DYLKK-YPTIYHLRSDLI
291520705 Coprococcus catus GD-7                               : KQEYFLGLDMGTGSLGWAVT----D----------STYQVM---RKHGKALWGTRL----FESASTAE----------ERRMF-RTARRRLDRRNWRIQVLQEIFSEEISKV-DPGFFLRMKESKYYPEDKRDAEGNCPEL-PYALFVDDNYTDK---------------------------NYHKD-YPTIYHLRKMLM
42525843  Treponema denticola ATCC 35405                       : IKDYFLGLDVGTGSVGWAVT----D----------TDYKLL---KANRKDLWGMRC----FETAETAE----------VRRLH-RGARRRIERRKKRIKLLQELFSQEIAKT-DEGFFQRMKESPFYAEDKTILQ-------ENTLFNDKDFADK---------------------------TYHKA-YPTINHLIKAWI
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : LKEYYIGLDIGTASVGWAVT----D----------ESYNIP---KFNGKKMWGVRL----FDDAKTAE----------ERRTQ-RGSRRRLNRRKERINLLQDLFATEISKV-DPNFFLRLDNSDLYREDKDEKLKS-----KYTLFNDKDFKDR---------------------------DYHKK-YPTIHHLIMDLI
224543312 Catenibacterium mitsuokai DSM 15897                  : IVDYCIGLDLGTGSVGWAVV----D----------MNHRLM---KRNGKHLWGSRL----FSNAETAA----------NRRAS-RSIRRRYNKRRERIRLLRAILQDMVLEK-DPTFFIRLEHTSFLDEEDKAKYLGTDYKDNYNLFIDEDFNDY---------------------------TYYHK-YPTIYHLRKALC
24379809  Streptococcus mutans UA159                           : KKPYSIGLDIGTNSVGWAVV--TDDYKVPAKKMKVLGNTDK---SHIEKNLLGALL----FDSGNTAE----------DRRLK-RTARRRYTRRRNRILYLQEIFSEEMGKV-DDSFFHRLEDSFLVTEDKRGE--------RHPIFGNLEEEV----------------------------KYHEN-FPTIYHLRQYLA
15675041  Streptococcus pyogenes SF370                         : DKKYSIGLDIGTNSVGWAVI--TDEYKVPSKKFKVLGNTDR---HSIKKNLIGALL----FDSGETAE----------ATRLK-RTARRRYTRRKNRICYLQEIFSNEMAKV-DDSFFHRLEESFLVEEDKKHE--------RHPIFGNIVDEV----------------------------AYHEK-YPTIYHLRKKLV
16801805  Listeria innocua Clip11262                           : KKPYTIGLDIGTNSVGWAVL--TDQYDLVKRKMKIAGDSEK---KQIKKNFWGVRL----FDEGQTAA----------DRRMA-RTARRRIERRRNRISYLQGIFAEEMSKT-DANFFCRLSDSFYVDNEKRNS--------RHPFFATIEEEV----------------------------EYHKN-YPTIYHLREELV
116628213 Streptococcus thermophilus LMD-9                     : TKPYSIGLDIGTNSVGWAVT--TDNYKVPSKKMKVLGNTSK---KYIKKNLLGVLL----FDSGITAE----------GRRLK-RTARRRYTRRRNRILYLQEIFSTEMATL-DDAFFQRLDDSFLVPDDKRDS--------KYPIFGNLVEEK----------------------------AYHDE-FPTIYHLRKYLA
323463801 Staphylococcus pseudintermedius ED99                 : RKPYILSLDIGTGSVGYACM--------------DKGFNVL---KYHDKDALGVYL----FDGALTAQ----------ERRQF-RTSRRRKNRRIKRLGLLQELLAPLVQ---NPNFY-QFQRQFAWKNDNMDF--------KNKSLSEVLSFL----------------------------GYESKKYPTIYHLQEALL
352684361 Acidaminococcus intestini RyC-MR95                   : GKMYYLGLDIGTNSVGYAVT--------------DPSYHLL---KFKGEPMWGAHV----FAAGNQSA----------ERRSF-RTSRRRLDRRQQRVKLVQEIFAPVISPI-DPRFFIRLHESALWRDDVAET-------DKHIFFNDPTYTDK---------------------------EYYSD-YPTIHHLIVDLM
302336020 Olsenella uli DSM 7084                               : TDEYNIGLDMGTNSVGWAVT--------------DKAGAIA---HFKGKPTLGSRL----FDAAQTAA----------GARIH-RSQRRRYVRRRWRLDLLQSLFQDEVSKV-DSEFFCRLRQSRLYVGDREKGHA----DYTWPIFNDSDFNEV---------------------------DYYKR-FPTIYHLRKWLM
366983953 Oenococcus kitaharae DSM 17330                       : ARDYSVGLDIGTSSVGWAAI--------------DNKYHLI---RAKSKNLIGVRL----FDSAVTAE----------KRRGY-RTTRRRLSRRHWRLRLLNDIFAGPLTDFGDENFLARLKYSWVHPQDQSNQAHF----AAGLLFDSKEQDK----------------------------DFYRK-YPTIYHLRLALM
310286728 Bifidobacterium bifidum S17                          : VDDYAISLDIGNASVGWSAF----T----------PNYRLV---RAKGHELIGVRL----FDPADTAE----------SRRMA-RTTRRRYSRRRWRLRLLDALFDQALSEI-DPSFLARRKYSWVHPDDENNADCWY----GSVLFDSNEQDKR----------------------------FYEK-YPTIYHLRKALM
258509199 Lactobacillus rhamnosus GG                           : NQPYGIGLDIGSNSIGFAVV----D----------ANSHLL---RLKGETAIGARL----FREGQSAA----------DRRGS-RTTRRRLSRTRWRLSFLRDFFAPHITKI-DPDFFLRQKYSEISPKDKDRF--------KYEKRLFNDRTDA---------------------------EFYED-YPSMYHLRLHLM
300361537 Lactobacillus gasseri JV-V03                         : KNEYIVGLDVGTNSCGWVAM----D----------FQNTIL---RMHGKTAIGSHL----FDAGNSAA----------DRRAF-RTTRRRIKRRKWRLKLLEEIFDPYMTEV-DPYFFARLKESGLSPLDKRKN--------VSSIVFPTALEDK---------------------------KFYCN-YPTIYHLRYDLM
169823755 Finegoldia magna ATCC 29328                          : EKKYYIGLDVGTNSVGWAVT----D----------EFYNIL---RAKGKDLWGVRL----FEKADTAA----------NTRIF-RSGRRRNDRKGMRLQILREIFEDEIKKV-DKDFYDRLDESKFWAEDKKVSG-------KYSLFNDKNFSDK---------------------------QYFEK-FPTIFHLRKYLM
47458868  Mycoplasma mobile 163K                               : NKKVVLGLDLGIASVGWCLT----D----------ISQKED---NKFPIILHGVRL----FETVDDSD-DK---LLNETRRKK-RGQRRRNRRLFTRKRDFIKYLIDN-NII-ELEFDKNPKILVRNFIEKY----------INPFSKNLELKYK---------------------------SVTNL-PIGFHNLRKAAI
284931710 Mycoplasma gallisepticum str. F                      : KPEVTIGLDLGVGSVGWAIV-------------------DN---ETNIIHHLGSRL----FSQAKTAE----------DRRSF-RGVRRLIRRRKYKLKRFVNLIWKYNSYFGFK------------------------------NKEDILNNYQ---------------------------EQQKL-HNTVLNLKSEAL
363542550 Mycoplasma ovipneumoniae SC01                        : KKNITIGFDLGIASIGWAII-------------------DS---TTSKILDWGTRT----FEERKTAN----------ERRAF-RSTRRNIRRKAYRNQRFINLILKYKDLFELKNISDIQRANKKDTENYEKIISFFTEI------------YK---------------------------KCAAK-HSNILEVKVKAL
384393286 Mycoplasma canis PG 14                               : KRKVTLGFDLGIASVGWAIV-------------------DS---ETNQVYKLGSRL----FDAPDTNL----------ERRTQ-RGTRRLLRRRKYRNQKFYNLV-KRTEVFGLS------------------------------SREAIENRFR---------------------------ELSIK-YPNIIELKTKAL
71894592  Mycoplasma synoviae 53                               : KEKIVIGFDLGVASVGWSIV-------------------NA---ETKEVIDLGVRL----FSEPEKAD----------YRRAK-RTTRRLLRRKKFKREKFHKLILKNAEIFGLQ------------------------------SRNEILNVYK---------------------------DQSSK-YRNILKLKINAL
238924075 Eubacterium rectale ATCC 33656                       : FMKYILALDIGIASVGWAIL-------------------DK---ESETVIEAGSNI----FPEASAAD-NQ-------LRRDM-RGAKRNNRRLKTRINDFIKLWENN----------------------------------------NLSIPQF-------------------------------K-STEIVGLKVRAI
116627542 Streptococcus thermophilus LMD-9                     : MSDLVLGLDIGIGSVGVGIL-------------------NK---VTGEIIHKNSRI----FPAAQAEN-NL-------VRRTN-RQGRRLARRKKHRRVRLNRLFEES-------------------------------------------GLIT-------------------------DFTKISI-NLNPYQLRVKGL
315149830 Enterococcus faecalis TX0012                         : --MYSIGLDLGISSVGWSVI-------------------DE---RTGNVIDLGVRL----FSAKNSEK-NL-------ERRTN-RGGRRLIRRKTNRLKDAKKILA------------------------------------AVGFYEDKSLK-----------------------------------NSCPYQLRVKGL
315659848 Staphylococcus lugdunensis M23590                    : NQKFILGLDIGITSVGYGLI-------------------DY---ETKNIIDAGVRL----FPEANVEN-NE-------GRRSK-RGSRRLKRRIHRLERVKKLLEDY-------------------------------------------NLLDQ---------------------------SQIPQ-STNPYAIRVKGL
160915782 Eubacterium dolichum DSM 3991                        : MGRLVLGLDIGITSVGFGII-------------------DL---DESEIVDYGVRL----FKEGTAAE-NE-------TRRTK-RGGRRLKRRRVTRREDMLHLLKQA-------------------------------------------GIIS---------------------------TSFHP-LNNPYDVRVKGL
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : -MGYRIGLDVGITSTGYAVL---------------KTDKNG---LPYKILTLDSVI----YPRAENPQ-TG--ASLAEPRRIK-RGLRRRTRRTKFRKQRTQQLFIHS----------------------------------GLLSKPEIEQILA----------------------------TPQA-KYSVYELRVAGL
310780384 Ilyobacter polytropus DSM 2926                       : -MKYSIGLDIGIASVGWSVI-------------------NK---KDERIEDMGVRI----FQKAENPK-DG--SSLASSRREK-RGSRRRNRRKKHRLDRIKNILCES----------------------------------GLVKKNEIEKIYK-----------------------------NAY-LKSPWELRAKSL
325677756 Ruminococcus albus 8                                 : MGNYYLGLDVGIGSIGWAVI-------------------NI---EKKRIEDFNVRI----FKSGEIQE-KNRNSRASQQCRRS-RGLRRLYRRKSHRKLRLKNYLSII----------------------------------GLTTSEKIDYYYE------------------------------TA-DNNVIQLRNKGL
187736489 Akkermansia muciniphila ATCC BAA-835                 : SRSLTFSFDIGYASIGWAVI--------------ASASHDD---ADPSVCGCGTVL----FPKDDCQA---------FKRREY-RRLRRNIRSRRVRIERIGRLLVQA----------------------------------------QIITPEM---------------------------KETSG-HPAPFYLASEAL
117929158 Acidothermus cellulolyticus 11B                     : PVTWRLGVDVGERSIGLAAV----------------SYEED---KPKEILAAVSWI----HDGGVGDE-RS--GASRLALRGMARRARRLRRFRRARLRDLDMLLSEL----------------------------------GWTPL-PDKNVSP----------------------------------VDAWLARKRLA
189440764 Bifidobacterium longum DJO10A                        : GKRYRIGIDVGLNSVGLAAV---------------EVSDEN---SPVRLLNAQSVI----HDGGVDPQ-KNKEAITRKNMSGVARRTRRMRRRKRERLHKLDMLLGKF----------------------------------GYPVIEPESLDKP----------------------------------FEEWHVRAELA
283456135 Bifidobacterium dentium Bd1                          : HRRYRIGIDVGLMSVGLAAI---------------EVDETG---FPIRILNIQSVI----HDGGIDPQLGKKKSISRKAISGVARRTRRMRRRKVVRLRQLDATLESL----------------------------------GFPIVE-PDSLDT----------------------------------WEIWLTRAKLA
38232678  Corynebacterium diphtheriae NCTC 13129               : -MKYHVGIDVGTFSVGLAAI---------------EVDDAG---MPIKTLSLVSHI----HDSGLDPD-EIKSAVTRLASSGIARRTRRLYRRKRRRLQQLDKFIQRQ----------------------------------GWPVIELEDYSDP----------------------------------LYPWKVRAELA
187250660 Elusimicrobium minutum Pei191                        : DKPYRIGLDLGVGSIGFAIVS-MEE----------NDGNVL---LPKEIIMVGSRI----FKASAGAA----------DRKLS-RGQRNNHRHTRERMRYLWKVLAEQ-KL-------------------------------ALPVPADLDRKEN--------------SSEGE--TSAKRFLGDVL-QKDIYELRVKSL
319957206 Nitratifractor salsuginis DSM 16511                  : -MKKILGVDLGITSFGYAIL--QET----------GK-------DLYRCLDNSVVM----RNNPYDEK-SG--ESSQSIRSTQ-KSMRRLIEKRKKRIRCVAQTMERY----------------------------------GILDYSETMKIND---------------------------PKNNP-IKNRWQLRAVDA
325972003 Sphaerochaeta globus str. Buddy                      : SRPYSIGLDLGVGSIGVAVA----A----------YDPIKK---QPSDLVFVSSRI----FIPSTGAA----------ERRQK-RGQRNSLRHRANRLKFLWKLLAER-NL--------MLSYS-------------------EQDVPDPARLRF---------------------------EDAVV-RANPYELRLKGL
261414553 Fibrobacter succinogenes subsp. succinogenes S85      : -MKKILGLDLGTNSIGWAVV---NA----DEITRDDGSRYL---KPNGISAAGSRIIPMSADILGDFE-KGNSISQTAERTRM-RMARRLHERALLRRERLLRVLNLLDFL--PKHFADKIDRYGKFTDDSEP---------KLAWRKNTEGKYEFIFQDAFNEMLAEFKDKQP--EIVEEGKKIPY-DWTIYYLRKKAL
60683389  Bacteroides fragilis NCTC 9343                       : -MKRILGLDLGTNSIGWALV----N----------EAENKD---ERSSIVKLGVRVNPLTVDELTNFE-KGKSITTNADRTLK-RGMRRNLQRYKLRRETLTEVLKEH------------------------------------KLITEDTILSE---------------------------NGNRT-TFETYRLRAKAV
256819408 Capnocytophaga ochracea DSM 7271                     : -MKNILGLDLGTTSIGFAHI----V----------EDENK----EKSEIKELGVRIVSLTTDEQSDFE-KGKSITTNANRTLK-HGARLNLDRYQQRRKYLIDLLQKA------------------------------------NLITPSSILAE---------------------------NGKNT-THSTWQLRAKAV
90425961  Rhodopseudomonas palustris BisB18                    : VVRRILGIDLGIASCGWGVVD-ISG-------------------AGGGIIATGVRC----FDAP--LI-DKTGEPKSATRRTA-RGQRRIVRRRRQRMNGVRRLLCEF----------------------------------GLLPDPRPDALNQAMRRISTASAA--------------------A-QVTPWTLRAAAH
373501184 Prevotella micans F0438                              : MIQKIFGLDLGTNSIGSSVRNL-------------ELGENL----TEQLEFFSSDI----FGSSVSKNSNGREYSLAGNRSAH-RRSRGLNEARRRKLWATLDLLIEH-GLC-P-MSPDSLMQWRTYDKQKGLYR-------QYPIEDKDFNAWIMLDFNG---------------------DGKPD-YSSPYQLRRELV
294674019 Prevotella ruminicola 23                             : -MERILGIDTGTNSLGWAIV---------------DKDEN-----QYHLVAKGTNI----FSEGVKIE-KGIESSKAAERTEH-RSVRKHYWRRKIRKIRLLTILSDN-DLC-PRLKHEQLRQWR-------LKK-------VYPTDDTFMEWQR---------------------------TEDKA-QVNPYKFRYICL
365959402 Flavobacterium columnare ATCC 49512                  : -MTKILGLDLGTNSIGWAI----------------RDTENE---GINQILDKGARI----FSEGVKSE-NGKEISRAAERTAY-RSARKIKYRRKLRKYETLKVLSIN-GMC-PLSVEEVEQWKKSGFK-------------EYPLNPEFLDWLR---------------------------TNEDK-NINPYLFRDKAS
312879015 Aminomonas paucivorans DSM 12260                     : --------MIGEHVRGGCLF----D----------DHWTPN---WGAFRLPNTVRT----FTKAENPK-DG--SSLAEPRRQA-RGLRRRLRRKTQRLEDLRRLLAKE----------------------------------GVLSLSDLETLFR-----------------------------ETP-AKDPYQLRAEGL
83591793  Rhodospirillum rubrum ATCC 11170                     : IEPWILGLDIGTDSLGWAVF--SCE----------EKGPP----TAKELLGGGVRL----FDSGRDAK-DH--TSRQAERGAF-RRARRQTRTWPWRRDRLIALFQAA----------------------------------GLTPPAAETRQIA-------------------------------------LALRREAV
294086111 Candidatus Puniceispirillum marinum IMCC1322          : --MRRLGLDLGTNSIGWCLL---------------DLGDDG---EPVSIFRTGARI----FSDGRDPK-SL--GSLKATRREA-RLTRRRRDRFIQRQKNLINALVKY----------------------------------GLMPADEIQRQAL-------------------------------A-YKDPYPIRKKAL
121608211 Verminephrobacter eiseniae EF01-2                    : AVAYRLALDLGSTSLGWAIF---------------RLNEAR---EPTAIIRAGVRI----FSDGRNA--NS--EPLAVHRRVA-RAMRRRRDRLLKRKKRMHDQLVQH----------------------------------GFFPAEVAERKEL-------------------------------E-RLNPYQLRAKGL
344171927 Ralstonia syzygii R24                                : EKQHRWGLDIGTNSIGWAVI-------------------ALIEGRPAGLVATGSRI----FSDGRNPK-DG--SSLAVERRGP-RQMRRRRDRYLRRRDRFMQALINV----------------------------------GLMPGDAAARKAL-------------------------------V-TENPYVLRQRGL
159042956 Dinoroseobacter shibae DFL 12                        : ---MRLGLDIGTSSIGWWLY--ETD----------GAGSDA---RITGVVDGGVRI----FSDGRDPK-SG--ASLAVDRRAA-RAMRRRRDRYLRRRATLMKVLAET----------------------------------GLMPADPAEAKAL-------------------------------E-ALDPFALRAAGL
288957741 Azospirillum sp- B510                                : VQPYRLSFDLGTNSIGWGLL---------------NLDRQG---KPREIRALGSRI----FSDGRDPQ-DK--ASLAVARRLA-RQMRRRRDRYLTRRTRLMGALVRF----------------------------------GLMPADPAARKRL------------------------------EV-AVDPYLARERAT
92109262  Nitrobacter hamburgensis X14                         : SVLYRLGLDLGSNSLGWFVT--HLE----------KRGDRH---EPVALGPGGVRI----FPDGRDPQ-SG--TSNAVDRRMA-RGARKRRDRFVERRKELIAALIKY----------------------------------NLLPDDARERRAL-------------------------------E-VLDPYALRKTAL
148255343 Bradyrhizobium sp- BTAi1                             : LRAYRLGVDLGANSLGWFVV--WLD----------DHG------QPEGLGPGGVRI----FPDGRNPQ-SK--QSNAAGRRLA-RSARRRRDRYLQRRGKLMGLLVKH----------------------------------GLMPADEPARKRL-------------------------------E-CLDPYGLRAKAL
34557790  Wolinella succinogenes DSM 1740                       : MIERILGVDLGISSLGWAIV----E----------YDKDDE---AANRIIDCGVRL----FTAAETPK-KK--ESPNKARREA-RGIRRVLNRRRVRMNMIKKLFLRA----------------------------------GLIQDVDLDGEGGM-------------------------FYSKAN-RADVWELRHDGL
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : -MARILAFDIGISSIGWAFS------------------------ENDELKDCGVRI----FTKVENPK-TG--ESLALPRRLA-RSARKRLARRKARLNHLKHLIANEFKL-------------------------------NYEDYQSFDESLA--------------------------KAYKGS-LISPYELRFRAL
291276265 Helicobacter mustelae 12198                          : -MIRTLGIDIGIASIGWAVI--EGE----------YTDKGL---ENKEIVASGVRV----FTKAENPK-NK--ESLALPRTLA-RSARRRNARKKGRIQQVKHYLSKALGL-------------------------------DLECFVQGEKLATL-------------------------FQTSKD-FLSPWELRERAL
229113166 Bacillus cereus Rock1-15                             : -MNYDIGLRIGITSCGWSII-------------------NK---DLERIEDLGVRV----FEKAENPD-GT---ASAAPRREA-RKSRRKHRRKKHRIERIKRLIVQH----------------------------------DLLSKKELDSLYL-----------------------------SPF-NIDVWNLQVEAL
222109285 Acidovorax ebreus TPSY                               : MAQHVFGLDIGIASVGWAIL------------------------GEQRIIDLGVRC----FDKAETAK-EG--DPLNLTRRQA-RLLRRRLYRRAWRLTQLSRLLKRK-------------------------------------GLIADAKLFA---------------------------KAPSY-GDSAWELRRQGL
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : MKKRILGLDIGIASVGWALVE-FDD----------EFQDNK---KKGTIIKSGVRI----FTRAETPK-ER--ESLAKPRREA-RSQRRRIRRRVERLNSIRELFVKN-GVV-E----------------------------EWSVSKKNPNNIY---------------------------ITLNQ-IKTPWQLRMESL
182624245 Clostridium perfringens D str. JGS1721               : DINYALGLDIGITSVGWAVI-------------------NL---DLNRIEDLGVRI----FNAAENLK-DG--SSLALPRRLA-RGRRRLLRRKAYRVERVRKLILKN----------------------------------NILTKEELEGLFK-----------------------------NKE-VIDVWEARVKGL
220930482 Clostridium cellulolyticum H10                       : -MKYTLGLDVGIASVGWAVI-------------------DK---DNNKIIDLGVRC----FDKAEESK-TG--ESLATARRIA-RGMRRRISRRSQRLRLVKKLFVQYE---------------------------------IIKDSSEFNRIFD---------------------------TSRDG-WKDPWELRYNAL
154250555 Parvibaculum lavamentivorans DS-1                    : -MERIFGFDIGTTSIGFSVI---------------DYSSTQ---SAGNIQRLGVRI----FPEARDPD-GT---PLNQQRRQK-RMMRRQLRRRRIRRKALNETLHEA-GF--------------------------------LPAYGSADWPVV-------------------------------M-ADEPYELRRRGL
257413184 Roseburia intestinalis L1-82                         : KMDYRIGLDIGIASVGWAVL--QNN-----------SDD-----EPVRIVDLGVRI----FDTAEIPK-TG--ESLAGPRRAA-RTTRRRLRRRKHRLDRIKWLFEN-----------------------------------------QGLINIDDFLKRYNM---------------------AGL-P-DVYQLRYEAL
218767588 Neisseria meningitidis Z2491                         : PINYILGLDIGIASVGWAMV--EID-----------EDE-----NPICLIDLGVRV----FERAEVPK-TG--DSLAMARRLA-RSVRRLTRRRAHRLLRARRLLKR-----------------------------------------EGVLQAADFDENGLI---------------------KSL-PNTPWQLRAAAL
15602992  Pasteurella multocida subsp. multocida str. Pm70     : NLSYILGLDLGIASVGWAVV--EIN-----------ENE-----DPIGLIDVGVRI----FERAEVPK-TG--ESLALSRRLA-RSTRRLIRRRAHRLLLAKRFLKR-----------------------------------------EGILSTIDLE--------------------------KGL-PNQAWELRVAGL
319941583 Sutterella wadsworthensis 3 1 45B                    : RFSCSIGIDMGAKYTGVFYA---------------LFDREE-L-PTNLNSKAMTLV----MPETGPRY-------VQAQRTAV-RHRLRGQKRYTLARKLAFLVVDDMIKKQEKRL--------------------------------------------TDEEW-----------------------------------
254447899 gamma proteobacterium HTCC5015                       : NYISPIAIDLGAKFTGVALY---------------QYLEGA---DCTQEVAKGLLV----DDRGNVTW-------SQEGRRGK-RHQVRGYKRRKMAKRLLWLILDSEYGIKR------------------------------------------------EEVT-----------------------------------
54296138  Legionella pneumophila str. Paris                    : QILSPIGIDLGGKFTGVCLS---------------HLEAFAEL-PNHANTKYSVIL----IDHNNFQL-------SQAQRRAT-RHRVRNKKRNQFVKRVALQLFQHILSRDL---------------------------------------------------N-----------------------------------
331001027 Parasutterella excrementihominis YIT 11859           : THIIGVGLDLGGTYTGTFIT---------------SHPSDE---AEHRDHSSAFTV----VNSEKLSF-------SSKSRTAV-RHRVRSYKGFDLRRRLLLLVAEYQLLQKKQTL--------------------------------------------APEER-----------------------------------
34557932  Wolinella succinogenes DSM 1740                       : MLVSPISVDLGGKNTGFFSF---------------T--------DSLDNSQSGTVI----YDES-FVL-------SQVGRRSK-RHSKRNNLRNKLVKRLFLLILQEHHGLSI---------------------------------------------------------------------------------------
118497352 Francisella novicida U112                            : FKILPIAIDLGVKNTGVFSA---------------FYQKGTSL-ERLDNKNGKVYE----LSKDSYTL-------LMNNRTAR-RHQRRGIDRKQLVKRLFKLIWTEQLNLEW---------------------------------------------------D-----------------------------------

Motifs                                                         : ________D_RNAseH_I______________________________________________________[____________________RRR__________________]_____________________________________________________________________________________

#positions selected for tree reconstruction (272)              : --*****************--------------------------***********----********----------*****-*********************-*---------------------------------------------------------------------------------------------
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Supplementary Figure 1. Multiple alignment of selected Cas9 sequences. Accession numbers are indicated on the left followed by bacterial names. The conserved motifs and residues are indicated below the alignment. All analyzed Cas9 (formerly Csn1) sequences exhibit the protein architecture as previously described.[55,56,58] The conserved N-terminal RuvC (RNase HI) motif with catalytic aspartate and the central HNH motif with catalytic histidine and two asparagines were shown to be involved in target DNA cleavage by dual-tracrRNA:crRNA–Cas9 during the CRISPR interference step.[38] The functions of other conserved motifs remain to be elucidated. Informative positions that were chosen for the tree reconstruction are indicated with asterisks.

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303229466 Veillonella atypica ACS-134-V-Col7a                  : ------MENGTDDI------RKLFLAVHHILKYRGNFLYEGA--------------------------------------------------------------------------------------------TFNSNAF-TFEDVLKQALVNITFNCFDTNSAISSISNILMESGKTKSDKAKAIERLVDTYTVFDEV
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : ------KNPEKKDI------RLIYLALHSIFKSRGHFL---------------------------------------------------------------------------------------------------FEGQNLKEIKNFETLYNNLISFLEDNGINKSIDKDNIEKLEKIICDSGKGLKDKEKEFKGIFN
374307738 Filifactor alocis ATCC 35896                         : ------ESEEKQDI------RLIYLALHNIIKTRGHFL---------------------------------------------------------------------------------------------------IDGDLQSAKQLRPILDTFLLSLQEEQNLSVSLSENQKDEYEEILKNRSIAKSEKVKKLKNLFE
320528778 Solobacterium moorei F0204                           : ------HNSTEHDI------RLVFLALHHLIKYRGHFI---------------------------------------------------------------------------------------------------YDNSANGDVKTLDEAVSDFEEYLNENDIEFNIENKKEFINVLSDKHLTKKEKKISLKKLYGDI
291520705 Coprococcus catus GD-7                               : ------ETTEIPDI------RLVYLVLHHMMKHRGHFL---------------------------------------------------------------------------------------------------LSGD-ISQIKEFKSTFEQLIQNIQDEELEWHISLDDAAIQFVEHVLKDRNLTRSTKKSRLIKQ
42525843  Treponema denticola ATCC 35405                       : ------ENKVKPDP------RLLYLACHNIIKKRGHFL---------------------------------------------------------------------------------------------------FEGDFDSENQFDTSIQALFEYLREDMEVDIDADSQKVKEILKDSSLKNSEKQSRLNKILGLKP
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : ------EDEGKKDI------RLLYLACHYLLKNRGHFIFEGQ--------------------------------------------------------------------------------------------KFDTKNSFDKSINDLKIHLRDEYNIDLEFNNEDLIEIITDTTLNKTNKKKELKNIVGDTKFLKAIS
224543312 Catenibacterium mitsuokai DSM 15897                  : ------ESTEKADP------RLIYLALHHIVKYRGNFLYEGQ--------------------------------------------------------------------------------------------KFNMDASNIEDKLSDIFTQFTSFNNIPYEDDEKKNLEILEILKKPLSKKAKVDEVMTLIAPEKDYK
24379809  Streptococcus mutans UA159                           : ------DNPEKVDL------RLVYLALAHIIKFRGHFLIE---------------------------------------------------------------------------------------------------GKFDTRNNDVQRLFQEFLAVYDNTFENSS-------LQEQN---VQVEEILTD-KISKSAK
15675041  Streptococcus pyogenes SF370                         : ------DSTDKADL------RLIYLALAHMIKFRGHFLIE---------------------------------------------------------------------------------------------------GDLNPDNSDVDKLFIQLVQTYNQLFEENP-------INASG---VDAKAILSA-RLSKSRR
16801805  Listeria innocua Clip11262                           : ------NSSEKADL------RLVYLALAHIIKYRGNFLIE---------------------------------------------------------------------------------------------------GALDTQNTSVDGIYKQFIQTYNQVFASGI-EDGSLKKLEDN---KDVAKILVE-KVTRKEK
116628213 Streptococcus thermophilus LMD-9                     : ------DSTKKADL------RLVYLALAHMIKYRGHFLIE---------------------------------------------------------------------------------------------------GEFNSKNNDIQKNFQDFLDTYNAIFESDL-------SLENS---KQLEEIVKD-KISKLEK
323463801 Staphylococcus pseudintermedius ED99                 : ------LKDEKFDP------ELIYMALYHLVKYRGHFLFD-------------------------------------------------------------------------------------------------HLKIENLTNNDNMHDFVELIETYENLNNIKL-------NLDYEKT-KVIYEILKDNEMTKNDR
352684361 Acidaminococcus intestini RyC-MR95                   : ------ESSEKHDP------RLVYLAVAWLVAHRGHFLNE-----------------------------------------------------------------------------------------------------VDKDNIGDVLSFDAFYPEFLAFLSDNG-------VSPWVCESKALQATLLS-RNSVNDK
302336020 Olsenella uli DSM 7084                               : ------ETDEKADI------RLIYLATHNIVKHRGNFLRE-------------------------------------------------------------------------------------------------NNKSLSSRDANPAQAVKSLRLALNDWCSERDYECAWKGEEDDGAIDEAILNVLADGEKGRSDQ
366983953 Oenococcus kitaharae DSM 17330                       : ------NDDQKHDL------REVYLAIHHLVKYRGHFLIE---------------------------------------------------------------------------------------------------GDVKADSAFDVHTFADAIQRYAESNNSDE-------NLLGKIDEKKLSAALTDKHGSKSQR
310286728 Bifidobacterium bifidum S17                          : ------EDDSQHDI------REIYLAIHHMVKYRGNFLVEGT--------------------------------------------------------------------------------------------LESSNAFKEDELLKLLGRITRYEMSEGEQNSDIEQDDENKLVAPANGQLADALCATRGSRSMRVDN
258509199 Lactobacillus rhamnosus GG                           : ------THTHKADP------REIFLAIHHILKSRGHFLTPGA--------------------------------------------------------------------------------------------AKDFNTDKVDLEDIFPALTEAYAQVYPDLELTFDLAKADDFKAKLLDEQATPSDTQKALVNLLLSS
300361537 Lactobacillus gasseri JV-V03                         : ------SEDKKFDL------REIYLAIHHIVKYRGNFLYNTP--------------------------------------------------------------------------------------------VKDFEASKIDVKDSLEKLNELYERLDSEFTVELDSSNALEIEKIIRDKKVFKINKVKSIHQLLSLK
169823755 Finegoldia magna ATCC 29328                          : ------EEHGKVDI------RYYFLAINQMMKRRGHFLIDGQ--------------------------------------------------------------------------------------------ISHVTDDKPLKEQLILLINDLLKIELEEELMDSIFEILADVNEKRTDKKNNLKELIKGQDFNKQEG
47458868  Mycoplasma mobile 163K                               : ------NEKYKLDK------SELIVLLYFYLSLRGAFF---------------------------------------------------------------------------------------------------DNPE-----------------------------------------------------------
284931710 Mycoplasma gallisepticum str. F                      : --------NAKIDP------KALSWILHDYLKNRGHFYE-----------------------------------------------------------------------------------------------------------------------------------------------------------------
363542550 Mycoplasma ovipneumoniae SC01                        : --------DSKIEK------LDLIWILHDYLENRGFFYD-----------------------------------------------------------------------------------------------------------------------------------------------------------------
384393286 Mycoplasma canis PG 14                               : --------SQEVCP------DEIAWILHDYLKNRGYFYD-----------------------------------------------------------------------------------------------------------------------------------------------------------------
71894592  Mycoplasma synoviae 53                               : --------KEEIKP------SELVWILRDYLQNRGYFY---------------------------------------------------------------------------------------------------KN-------------------------------------------------------------
238924075 Eubacterium rectale ATCC 33656                       : --------TEEITL------DELYLILYSYLKHRGISY---------------------------------------------------------------------------------------------------LEDALDDT-------------------------------------------------------
116627542 Streptococcus thermophilus LMD-9                     : --------TDELSN------EELFIALKNMVKHRGISY---------------------------------------------------------------------------------------------------LDDAS----------------------------------------------------------
315149830 Enterococcus faecalis TX0012                         : --------TEPLSR------GEIYKVTLHILKKRGISY---------------------------------------------------------------------------------------------------LDEV-----------------------------------------------------------
315659848 Staphylococcus lugdunensis M23590                    : --------SEALSK------DELVIALLHIAKRRGIHK---------------------------------------------------------------------------------------------------IDVIDS---------------------------------------------------------
160915782 Eubacterium dolichum DSM 3991                        : --------NERLNG------EELATALLHLCKHRGSSV---------------------------------------------------------------------------------------------------ETIEDDEAK------------------------------------------------------
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : --------DRRLTN------SELFRVLYFFIGHRGFKS---------------------------------------------------------------------------------------------------NRKAELNP-------------------------------------------------------
310780384 Ilyobacter polytropus DSM 2926                       : --------EAKISN------KEIAQILLHIAKRRGFKS---------------------------------------------------------------------------------------------------FRKTDRN--------------------------------------------------------
325677756 Ruminococcus albus 8                                 : --------SEKLTP------EEIAACLIHICNNRGYKD---------------------------------------------------------------------------------------------------FYEVNVEDIED----------------------------------------------------
187736489 Akkermansia muciniphila ATCC BAA-835                 : ------KGHRTLAP------IELWHVLRWYAHNRGYDN---------------------------------------------------------------------------------------------------NASWSNSL-------------------------------------------------------
117929158 Acidothermus cellulolyticus 11B                      : --------EEYVVDETERR-RLLGYAVSHMARHRGWRNPWTT--------------------------------------------------------------------------------------------IKDLKNLPQP--------------------------------------------------------
189440764 Bifidobacterium longum DJO10A                        : --------TRYIEDDELRR-ESISIALRHMARHRGWRN---------------------------------------------------------------------------------------------------PYRQVDSLISDNPY-------------------------------------------------
283456135 Bifidobacterium dentium Bd1                          : --------SSYIQDDETRK-EDVSIALRHIARHRGWRNPYSN--------------------------------------------------------------------------------------------VESLFVDVAP--------------------------------------------------------
38232678  Corynebacterium diphtheriae NCTC 13129               : --------ASYIADEKERG-EKLSVALRHIARHRGWRNPYAK--------------------------------------------------------------------------------------------VSSLYLPDGP--------------------------------------------------------
187250660 Elusimicrobium minutum Pei191                        : --------DERLSL------QELGYVLYHIAGHRGSSA---------------------------------------------------------------------------------------------------IRTFENDSE------------------------------------------------------
319957206 Nitratifractor salsuginis DSM 16511                  : W-------KRPLSP------QELFAIFAHMAKHRGYKSIATE--------------------------------------------------------------------------------------------DLIYELELELGLNDPEKE------------------------------------------------
325972003 Sphaerochaeta globus str. Buddy                      : --------NEQLTL------SELGYALYHIANHRGSSS---------------------------------------------------------------------------------------------------VRTFLDEEK------------------------------------------------------
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : --------EKALSK------EELSWILLQFNQKRGYYQ---------------------------------------------------------------------------------------------------LRGEEEEIPQDKKIEYLAQKVVKVEATD-----------------------------------
60683389  Bacteroides fragilis NCTC 9343                       : --------TEEISL------EEFARVLLMINKKRGYKS---------------------------------------------------------------------------------------------------SRKAKGVEEGTLIDGMDIARELYNNNLTPGELCLQLLDAGKKFLPDFYRSDL-----------
256819408 Capnocytophaga ochracea DSM 7271                     : --------TERIEK------EEFARILLAINKKRGYKS---------------------------------------------------------------------------------------------------SRKAKTEDEGQAIDGMAIAKRLYDENLTPGQLSLQLLQQNKKLLPDFYRSDL-----------
90425961  Rhodopseudomonas palustris BisB18                    : --------QRLLSN------EELAVVLGHIARHRGFRS---------------------------------------------------------------------------------------------------NAKNEAGANA-----------------------------------------------------
373501184 Prevotella micans F0438                              : --------VRQFDFDQPIERYKLGRALYHIAQHRGFKS---------------------------------------------------------------------------------------------------SKGETIADQEK----------------------------------------------------
294674019 Prevotella ruminicola 23                             : --------TQKLDLSDITQRFILGRALYHLNQRRGFLS---------------------------------------------------------------------------------------------------NRKEATKES------------------------------------------------------
365959402 Flavobacterium columnare ATCC 49512                  : --------KQKVTL------FELGRALYHIAQRRGFLS---------------------------------------------------------------------------------------------------NRLD-QSAEGVFEEHNPQIQNLIEDLDSSNTILNELKEYYINLGIID----------------
312879015 Aminomonas paucivorans DSM 12260                     : --------DRPLSF------PEWVRVLYHITKHRGFQS---------------------------------------------------------------------------------------------------NRRNPVEDGQERSR-------------------------------------------------
83591793  Rhodospirillum rubrum ATCC 11170                     : --------SRPLAP------DALWAALLHLAHHRGFRS---------------------------------------------------------------------------------------------------NRIDKRERAAAKALAKAKPAKATAKATAPAKE-------------------------------
294086111 Candidatus Puniceispirillum marinum IMCC1322         : --------DEAIDP------YEMGRAIFHINQRRGFKS---------------------------------------------------------------------------------------------------NRKSA----------------------------------------------------------
121608211 Verminephrobacter eiseniae EF01-2                    : --------HEALTP------GEFARALFHINQRRGFKS---------------------------------------------------------------------------------------------------NRKTDRK--------------------------------------------------------
344171927 Ralstonia syzygii R24                                : --------DQALTL------PEFGRALFHLNQRRGFQS---------------------------------------------------------------------------------------------------NRKT-DRAT------------------------------------------------------
159042956 Dinoroseobacter shibae DFL 12                        : --------DEPLPL------PHLGRALFHLNQRRGFKS---------------------------------------------------------------------------------------------------NRKTDRG--------------------------------------------------------
288957741 Azospirillum sp- B510                                : --------RERLEP------FEIGRALFHLNQRRGYKP---------------------------------------------------------------------------------------------------VRTATKP--------------------------------------------------------
92109262  Nitrobacter hamburgensis X14                         : --------TDTLPA------HHVGRALFHLNQRRGFQS---------------------------------------------------------------------------------------------------NRKT-DSK-------------------------------------------------------
148255343 Bradyrhizobium sp- BTAi1                             : --------DEVLPL------HHVGRALFHLNQRRGLFA---------------------------------------------------------------------------------------------------NRAI-EQG-------------------------------------------------------
34557790  Wolinella succinogenes DSM 1740                      : --------YRLLKG------DELARVLIHIAKHRGYKF---------------------------------------------------------------------------------------------------IGDDEA---------------------------------------------------------
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : --------NELLSK------QDFARVILHIAKRRGYDD---------------------------------------------------------------------------------------------------IKNS-D---------------------------------------------------------
291276265 Helicobacter mustelae 12198                          : --------YRVLDK------EELARVILHIAKRRGYDD---------------------------------------------------------------------------------------------------ITYGVE---------------------------------------------------------
229113166 Bacillus cereus Rock1-15                             : --------ERKLDN------REFARVLIHLVQRRGFQT---------------------------------------------------------------------------------------------------IRKSVE---------------------------------------------------------
222109285 Acidovorax ebreus TPSY                               : --------DRLLTP------LEWARVIYHQCKHRGFHW---------------------------------------------------------------------------------------------------TSKAEEAKADS----------------------------------------------------
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : --------DRKLTN------EQFAVVLTHLAKHRGYKS---------------------------------------------------------------------------------------------------LRK------------------------------------------------------------
182624245 Clostridium perfringens D str. JGS1721               : --------DYKLSR------EEWAKILINFCKRRGFKS---------------------------------------------------------------------------------------------------NRKNEAK--------------------------------------------------------
220930482 Clostridium cellulolyticum H10                       : --------SRILKP------YELVQVLTHITKRRGFKS---------------------------------------------------------------------------------------------------NRKE-DLS-------------------------------------------------------
154250555 Parvibaculum lavamentivorans DS-1                    : --------EEGLSA------YEFGRAIYHLAQHRHFKG----------------------------------------------------------------------------------------------------RELEESDTPD----------------------------------------------------
257413184 Roseburia intestinalis L1-82                         : --------DRKLTD------EELAQVLLHIAKHRGFRS---------------------------------------------------------------------------------------------------TRK---AETAAK---------------------------------------------------
218767588 Neisseria meningitidis Z2491                         : --------DRKLTP------LEWSAVLLHLIKHRGYLS---------------------------------------------------------------------------------------------------QRKNE-GETADK---------------------------------------------------
15602992  Pasteurella multocida subsp. multocida str. Pm70     : --------ERRLSA------IEWGAVLLHLIKHRGYLS---------------------------------------------------------------------------------------------------KRKNE-SQTNNK---------------------------------------------------
319941583 Sutterella wadsworthensis 3 1 45B                    : --------------------KRGREALSGLLKRRGYSRPNADGEDLTPLENVRADVFAAHPAFSTYFS--EVRSLAEQWEEFTANIS------------NVEKFL--------GDPNIPA---------------------------------------------------DKEF--------IEFAVAEGLID------
254447899 gamma proteobacterium HTCC5015                       : --------------------EPLLKFINGLLNRRGYTYI----SEEVDEESMNVSPLPFSEMMPDYFN--SSAPLLEQLAKLLSDKN------------KLVRFR--------AEGKIPS--------------------------------------------------NKNEF--------KKL-LDTALDGKY----
54296138  Legionella pneumophila str. Paris                    : --------------------AKEETALCHYLNNRGYTYVDTD-LDEYIKDETTINLL--KELLPS-----ESEHNFIDW--------------------FLQKMQ------------------------------------------------------------------SSEF--------RKI-LVSKVEE------
331001027 Parasutterella excrementihominis YIT 11859           : --------------------ENLRIALSGYLKRRGYARTEAE-TDTSVLESLDPSVFSSAPSFTNFFN--DSEPLNIQWEAIANSPE------------TTKALN--------KELSGQK---------------------------------------------------EADF--------KKY-IKTSFPEYS----
34557932  Wolinella succinogenes DSM 1740                      : --------------------DVLPDEIRGLFNKRGYTYAGFE-LDEKKKDALESDTL--KEFLSEKLQSIDRDSDVEDFLNQIAS--------------NAESFK---------DYKKGF---------------------------------------------------EAVFASATHSPNKKLELKDELKSEY----
118497352 Francisella novicida U112                            : --------------------KDTQQAISFLFNRRGFSFI----TDGYSPEYLNIVPEQVKAILMDIFDDYNGEDDLDSYLKLATEQESKISEIYNKLMQKILEFKLMKLCTDIKDDKVSTKTLKEITSYEFELLADYLANYSESLKTQKFSYTDKQGNLKELSYYHHDKYNIQEFLKRHATINDRI-LDTLLTDDLDIWN

Motifs                                                         : _____________________E___________R_RNAseH_II____________________________________________________________________________________________________________________________________________________________

#positions selected for tree reconstruction (272)              : --------------------****************--------------------------------------------------------------------------------------------------------------------------------------------------------------------
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303229466 Veillonella atypica ACS-134-V-Col7a                  : NTPDKPQKEQVKEDKKTLKAFANLVLGLSANLIDLFGSVEDIDDDLKKLQ--IVGDTY----------------DEKRDELAKV--WGD---------EIHIIDDCKSVYDAIILMSIK-------EPGLTISQSKVKAFDKHKEDLVILKSLLKLDRNVYNEMFKSDKKGLHNYVHYIKQGRTE---------ETSCSR
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : SDKQLVAIFKLSVGSSVSLNDLFDTDEYKKEEVEKEKISFREQIY-----------------------------EDDKPIYYSI--LGE---------KIELLDIAKSFYDFMVLNNIL-------SDSNYISEAKVKLYEEHKKDLKNLKYIIRKYNKENYDKLFKDKNENNYPAYIGLNKEKD---------KKEVVE
374307738 Filifactor alocis ATCC 35896                         : ISDELEKEEKKAQSAVIENFCKFIVGNKGDVCKFLRVSKEELEIDSFSFSEGKYE-------------------DDIVKNLEEK--VPE---------KVYLFEQMKAMYDWNILVDIL-------ETEEYISFAKVKQYEKHKTNLRLLRDIILKYCTKDEYNRMFNDEKEAGSYTAYVGKLKK---------NNKKYW
320528778 Solobacterium moorei F0204                           : TDSENINISVLIEMLSGSSISLSNLFKDIEFDGKQNLSLDSDI-------------------------------EETLNDVVDI--LGD---------NIDLLIHAKEVYDIAVLTSSL-------GKHKYLCDAKVELFEKNKKDLMILKKYIKKNHPEDYKKIFSSPTEKKNYAAYSQTNS-----------KNVCSQ
291520705 Coprococcus catus GD-7                               : LNAKSACEKAILNLLSGGTVKLSDIFNNKELDESERPKVSFADSGY----------------------------DDYIGIVEAE--LAE---------QYYIIASAKAVYDWSVLVEIL-------GNSVSISEAKIKVYQKHQADLKTLKKIVRQYMTKEDYKRVFVDTEEKLNNYSAYIGMTKKNGKKVDLKSKQCTQ
42525843  Treponema denticola ATCC 35405                       : SDKQKKAITNLISGNKINFADLYDNPDLKDAEKNSISFSKDDF-------------------------------DALSDDLASI--LGD---------SFELLLKAKAVYNCSVLSKVI-------GDEQYLSFAKVKIYEKHKTDLTKLKNVIKKHFPKDYKKVFGYNKNEKNNNNYSGYVG-----------VCKTKS
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : AIMIGSSQKLVDLFEDGEFEETTVKSVDFSTTAF----------------------------------------DDKYSEYEEA--LGD---------TISLLNILKSIYDSSILENLLKDADKSKDGNKYISKAFVKKFNKHGKDLKTLKRIIKKYLPSEYANIFRNKSINDNYVAYTKSNITSNKRTK---ASKFTKQ
224543312 Catenibacterium mitsuokai DSM 15897                  : SAFKELVTGIAGNKMNVTKMILCEPIKQGDSEIKLKFSDSNY--------------------------------DDQFSEVEKD--LGE---------YVEFVDALHNVYSWVELQTIM---GATHTDNASISEAMVSRYNKHHDDLKLLKDCIKNNVPNKYFDMFRNDSEKSKGYYNYINR------------PSKAPV
24379809  Streptococcus mutans UA159                           : KDRVLKLF---PN--EKSNGRFAE------FLKLIVGNQADFKKHF--ELEEKA-----------PLQFSKDTYEEELEVLLAQ--IGDN--------YAELFLSAKKLYDSILLSGIL--TVTDVGTKAPLSASMIQRYNEHQMDLAQLKQFIRQKLSDKYNEVFSDVSKDGYAGYID----------------GKTNQ
15675041  Streptococcus pyogenes SF370                         : LENLIAQL---PG--EKKNGLFGN------LIALSLGLTPNFKSNF--DLAEDA-----------KLQLSKDTYDDDLDNLLAQ--IGDQ--------YADLFLAAKNLSDAILLSDIL--RVNTEITKAPLSASMIKRYDEHHQDLTLLKALVRQQLPEKYKEIFFDQSKNGYAGYID----------------GGASQ
16801805  Listeria innocua Clip11262                           : LERILKLY---PG--EKSAGMFAQ------FISLIVGSKGNFQKPF--DLIEKS-----------DIECAKDSYEEDLESLLAL--IGDE--------YAELFVAAKNAYSAVVLSSII--TVAETETNAKLSASMIERFDTHEEDLGELKAFIKLHLPKHYEEIFSNTEKHGYAGYID----------------GKTKQ
116628213 Streptococcus thermophilus LMD-9                     : KDRILKLF---PG--EKNSGIFSE------FLKLIVGNQADFRKCF--NLDEKA-----------SLHFSKESYDEDLETLLGY--IGDD--------YSDVFLKAKKLYDAILLSGFL--TVTDNETEAPLSSAMIKRYNEHKEDLALLKEYIRNISLKTYNEVFKDDTKNGYAGYID----------------GKTNQ
323463801 Staphylococcus pseudintermedius ED99                 : AKRVKNM--------EKKLEQFSI---------MLLGLKFNEGKLF--NHADNAEELKG----ANQSHTFADNYEENLTPFLTV-----E--------QSEFIERANKIYLSLTLQDIL--K-----GKKSMAMSKVAAYDKFRNELKQVKDIVYKADSTRTQFKKIFVSSKKSLKQYDATPND--QTFSSLCLFDQYLI
352684361 Acidaminococcus intestini RyC-MR95                   : YKALKSLI---FGS-QKPEDNFDANISEDGLIQLLAGKKVKVNKLF---PQESN-----------DASFTLNDKEDAIEEILGT--LTPD--------ECEWIAHIRRLFDWAIMKHAL--K-----DGRTISESKVKLYEQHHHDLTQLKYFVKTYLAKEYDDIFRNVDSETTKNYVAYSYH--VKEVKGTLPKNKATQ
302336020 Olsenella uli DSM 7084                               : AKEIAKLTGVDCGDAKQSKQCNEA------IAKAIVGLKVEMKNIFGEFPAEKT-------------SYIYLSSDEDVEAVRES--CPDD--------SGELFQALCKLYSAYILQELL--SYADP-SGQTISANMVAKYKQYGRDLRLLKELTRTYAPQKYDLFFRGETYAGSSDYVVDEAR---GYTRYNLGTTKANY
366983953 Oenococcus kitaharae DSM 17330                       : AETAETAF---DILDLQSKKQIQA------ILKSVVGNQANLMAIFGLDSSAISKDEQK----NYKFSFDDADIDEKIADSEAL--LSDT--------EFEFLCDLKAAFDGLTLKMLL--G-----DDKTVSAAMVRRFNEHQKDWEYIKSHIRNAKNAGNGLYEKSKKFDGINAAYLA---------------LQSDN
310286728 Bifidobacterium bifidum S17                          : ALEALSAVNDLSREQRAIVKAIFAGLEGNKLDLAKIFVSKEFSSENKKILGIYFNKSDY---------------EEKCVQIVDSGLLDDE--------EREFLDRMQGQYNAIALKQLL-------GRSTSVSDSKCASYDAHRANWNLIKLQLRTKENEKDINENYGILVGWKIDS-----------------GQRKSV
258509199 Lactobacillus rhamnosus GG                           : DGEKEIVKKRKQVLTEFAKAITGLKTKFNLALGTEVDEADASNWQFSMGQL-----------------------DDKWSNIETS--MTDQ--------GTEIFEQIQELYRARLLNGIV-------PAGMSLSQAKVADYGQHKEDLELFKTYLKKLNDHELAKTIRGLYDRYINGDDAKPFLREDFVKALTK-------
300361537 Lactobacillus gasseri JV-V03                         : TENKERTKLIKDVSKQIINAILGYKTKFETILLKNISKDEADDWEFKLTDVDA---------------------DNKFENLIGD--LNEN--------EQEILLEIRNLANAITLSNIV-------EEGKTLSESMIDKYNKHSDDLELLKQVISDHPDRDKAKKLALAYDLYVNN------------------RHGKLL
169823755 Finegoldia magna ATCC 29328                          : NILNSIFESIVTGKAKIKNIISDEDILEKIKEDNKEDFVLTGDSY-----------------------------EENLQYFEEV--LQE---------NITLFNTLKSTYDFLILQSIL-------KGKSTLSDAQVERYDEHKKDLEILKKVIKKYDEDGKLFKQVFKEDNGNGYVSYIGYYLNKNKKITA--KKKISN
47458868  Mycoplasma mobile 163K                               : --------------------------------------------------------------------------DTKSKEMNKN--------------EIEIFDKNESIKNAEFPIDKI-----------------IEFYKISGKIRST---------------------------------------------------
284931710 Mycoplasma gallisepticum str. F                      : ---------------------------------------------------------------------------DNRDF---------------------------NVYPTKELAKYF---------------DKYGYYKGIIDSKEDNDNKLEEELTK----------------------------------------
363542550 Mycoplasma ovipneumoniae SC01                        : -------------------------------------------------------------------LEEENVA-DKYEG---------------------------IEHPSILLYDFF---------------KKNGFFK--------SNSSIPKDLGG----------------------------------------
384393286 Mycoplasma canis PG 14                               : -------------------------------------------------------------------EKETKEDFDQQTV---------------------------ESMPSYKLNEFY---------------KKYGYFKGALSQPTESEMKDNKDLKEA---------------------------------------
71894592  Mycoplasma synoviae 53                               : --------------------------------------------------------------------------EKLTDEFVSNSF------------PSKKLHEHYEKYGFFRGSVKL-----------------DNKLDNKKDKAKEKDEEEESDAKKES--------------------------------------
238924075 Eubacterium rectale ATCC 33656                       : --------------------------------------------------------------------------VSGSSAYANG--------------LKLNAKELETHYPCEIQQERL---------------NTIGKYRGQSQIINENGEVLD---------------------------------------------
116627542 Streptococcus thermophilus LMD-9                     : --------------------------------------------------------------------------DDGNSSVGD---------------YAQIVKENSKQLETKTPGQIQ-----------------LERYQTYGQLRGDFTV-EKDGKKHR---------------------------------------
315149830 Enterococcus faecalis TX0012                         : --------------------------------------------------------------------------DTEAAKESQD--------------YKEQVRKNAQLLTKYTPGQIQ-----------------LQRLKENNRVKTGINAQGNY--------------------------------------------
315659848 Staphylococcus lugdunensis M23590                    : --------------------------------------------------------------------------NDDVGNELS---------------TKEQLNKNSKLLKDKFVCQIQ-----------------LERMNEGQVRG-----------------------------------------------------
160915782 Eubacterium dolichum DSM 3991                        : --------------------------------------------------------------------------AKEAGETKKV--LSM---------NDQLL------KSGKYVCEIQ-----------------KERLRTNGHIRG----------------------------------------------------
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : --------------------------------------------------------------------------ENEADKKQMGQLLN----------SIEEIRKAIAEKGYRTVGELY---------------LKDPKYNDHKRNKGYIDG------------------------------------------------
310780384 Ilyobacter polytropus DSM 2926                       : --------------------------------------------------------------------------ADDTGKLLSG--IQE---------NKKIM----EEKGYLTIGDMV---------------AKDPKFNTHVRNKAGS--------------------------------------------------
325677756 Ruminococcus albus 8                                 : --------------------------------------------------------------------------PDERNEYKEE---HD---------SIVLISNLMNEGGYCTPAEMI---------------CNCREFDEPNSVYRKFHNSAASK-------------------------------------------
187736489 Akkermansia muciniphila ATCC BAA-835                 : --------------------------------------------------------------------------SEDGGNGEDT---------ERVKHAQDLMDKHGTATMAETICREL-------------------KLEEGKADAPMEVSTPAYKN------------------------------------------
117929158 Acidothermus cellulolyticus 11B                      : --------------------------------------------------------------------------SDSWERTRESLEARY---------SVSLEPGTVGQWAGYLLQRAP-----------------GIRLNPTQQSAGRRAELSNATA------------------------------------------
189440764 Bifidobacterium longum DJO10A                        : --------------------------------------------------------------------------SKQYGELKEK--------------AKAYNDDATAAEEESTPAQLV-----------------VAMLDAGYAEAPRLRWRTGSKKPDAEGY------------------------------------
283456135 Bifidobacterium dentium Bd1                          : --------------------------------------------------------------------------SEQYEELR-------------RKAEEKLGTSLSGNPTSAEIVECI----------LKRQVG-EVQLRTRSRKGVNGNAVEKE-GL-----------------------------------------
38232678  Corynebacterium diphtheriae NCTC 13129               : --------------------------------------------------------------------------SDAFKAIR----------------EEIKRASGQPVPETATVGQMV----------TLCELG-TLKLRGEG-------------GV-----------------------------------------
187250660 Elusimicrobium minutum Pei191                        : --------------------------------------------------------------------------EAQKENTENKKIAGN---------IKRLM----AKKNYRTYGEYL-----------------YKEFFENKEKHKREKISNAANN------------------------------------------
319957206 Nitratifractor salsuginis DSM 16511                  : --------------------------------------------------------------------------SEKKADERRQ--VYN---------ALRHLEELRKKYGGETIAQTI---------HRAVEAGDLRSYRNHDD-------------------------------------------------------
325972003 Sphaerochaeta globus str. Buddy                      : --------------------------------------------------------------------------SSDDKKLEE---------------QQAMTEQLAKEKGISTFIEVL------------------TAFNTNGLIGYRNSESVKSK-------------------------------------------
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : --------------------------------------------------------------------------QKKGDDVWYNVYLENGM-------IYRRTSKAPLDWEGKVKEFIV----------------TTEVENDGETPKKDKEGNIKRSFRAPKEDDWTLLKKKTEADIENSHKTVGCYIYDSLLNNPKQ--
60683389  Bacteroides fragilis NCTC 9343                       : --------------------------------------------------------------------------QNELDRIWEK--QKEYYPEILTDVLKEELRGKKRDAVWAICAKYF---------------VWKENYTEWNKEKGKTEQQEREHKLEGIYSKRKRDEAKRENLQWRVNGLKEKLSLEQLVIVFQEMN
256819408 Capnocytophaga ochracea DSM 7271                     : --------------------------------------------------------------------------QKEFDLVWNF--QKQFYPDILTDIFYKELQGKGKDAT--------------------------------------SKAFSKRYHFDTTENKGSKESVRLQAYQWRAEAISKQLSKEEVAYVLTEIN
90425961  Rhodopseudomonas palustris BisB18                    : --------------------------------------------------------------------------ADETSKMKKA--MEA---------TREGLAKYHAFGDMIANDPKF---------------ANRK----------------RNRDKD----------------------------------------
373501184 Prevotella micans F0438                              : ----------------------------------------------------------------NEKKPIAEEGADIANEMKAS--ETK---------LSKGLVAYMQENHLKTVGEAF-----------------AKL---EDERVRIR--------------------------------------------------
294674019 Prevotella ruminicola 23                             : -----------------------------------------------------------------------------EGTVKEG--ISS---------LSKD----MKDSGCEYLGEYF-----------------YQLYQ-QGKK--IR--------------------------------------------------
365959402 Flavobacterium columnare ATCC 49512                  : --------------------------------------------------------------------------ETEKSGFKKD--LDEGEKKLKSLYNSLVAITKKNANDIETCKQEL--------------IARLNKKEDLGKVKGKIKDISQAMLDRNF--------------------------------------
312879015 Aminomonas paucivorans DSM 12260                     : --------------------------------------------------------------------------QEEEGKLLSG--VGE---------NERLL----REGGYRTAGEML---------------ARDPKFQDHRRNRAGD--------------------------------------------------
83591793  Rhodospirillum rubrum ATCC 11170                     : --------------------------------------------------------------------------ADDEAGFWEG--------------AEAALRQRMAASGAPTVGALL-----------------ADDLDRGQPVRMRYNQSDRD--------------------------------------------
294086111 Candidatus Puniceispirillum marinum IMCC1322         : --------------------------------------------------------------------------DNEAGVVKQ---------------SIADLEMKLGEAGARTIGEFL-----------------ADRQATNDTVRARRLSGTNAL-------------------------------------------
121608211 Verminephrobacter eiseniae EF01-2                    : --------------------------------------------------------------------------DNDSGALKQA--ISE---------LRKRIQ----DSDCATAGEWF----------------WKERMQQKPEGVRGQWVRARYRKTPSTTDEGKKRIG-----------------------------
344171927 Ralstonia syzygii R24                                : --------------------------------------------------------------------------AKESGKVKNA--IAA---------FRAGM------GNARTVGEAL-----------------ARRLEDGRPVRARMVGQGKDEH------------------------------------------
159042956 Dinoroseobacter shibae DFL 12                        : --------------------------------------------------------------------------DNESGKIKD---------------ATARLDMEMMANGARTYGEFL-----------------HKRRQKATDPRHVPSVRTRLSIANRGGPDGKEEAG-----------------------------
288957741 Azospirillum sp- B510                                : --------------------------------------------------------------------------DEEAGKVKE---------------AVERLEAAIAAAGAPTLGAWF-----------------AWRKTRGETLRARLAGKGKEAA------------------------------------------
92109262  Nitrobacter hamburgensis X14                         : --------------------------------------------------------------------------QSEDGAIKQA--------------ASRLATDKGNETLGVFFADMH----------------LRKSYEDRQTAIRAELVRLGKDHLTGNARKKIWAKVRK---------------------------
148255343 Bradyrhizobium sp- BTAi1                             : --------------------------------------------------------------------------DKDASAIKAA--AGR---------LQTSM----QACGARTLGEFL---------------NRRHQLRATVRARSPVGGDVQAR-------------------------------------------
34557790  Wolinella succinogenes DSM 1740                      : --------------------------------------------------------------------------DEESGKVKKA---------------GVVLRQNFEAAGCRTVGEWL-----------------WRERGANGKKRNKHGD------------------------------------------------
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : --------------------------------------------------------------------------DKEKGAILKA--IKQ---------NEEKL------ANYQSVGEYL-------------YKEYFQKFKENSKEFTNVRNKKES--------------------------------------------
291276265 Helicobacter mustelae 12198                          : --------------------------------------------------------------------------DNDSGKIKKA--IAE---------NSKRI----KEEQCKTIGEMM-----------------YKLYFQKSLNVRNKKES-----------------------------------------------
229113166 Bacillus cereus Rock1-15                             : --------------------------------------------------------------------------IQEEGKLLEN--VSE---------NERIM----KVNGYKTVGEMF---------------SKHEKFTHHKRNKDGS--------------------------------------------------
222109285 Acidovorax ebreus TPSY                               : --------------------------------------------------------------------------DAEGGRVKQG--LAH---------TKALM----QAKNYRSAAEMV-----------------LAEFPDAQRNKRGQ--------------------------------------------------
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : --------------------------------------------------------------------------DDKAGKVLEA--ISQ---------NKKRL----NDSDYRTLGEMF---------------CKNESYKEHKRNKGGE--------------------------------------------------
182624245 Clostridium perfringens D str. JGS1721               : --------------------------------------------------------------------------DKEAGQILSS--ISY---------NIEKM----KETNSRTIGEYI-----------------YNEVKNSEDSYAPLRNKFGE--------------------------------------------
220930482 Clostridium cellulolyticum H10                       : --------------------------------------------------------------------------TTKEGVVITS--IKN---------NSEML----RTKNYRTIGEMI-----------------FMETPENSNKRNKVDE------------------------------------------------
154250555 Parvibaculum lavamentivorans DS-1                    : --------------------------------------------------------------------------PDVDDEKEAA--------------NERAATLKALKNEQTTLGAWL-----------------ARRPPSDRK-------------------------------------------------------
257413184 Roseburia intestinalis L1-82                         : ----------------------------------------------------------------------------ENGAVLKA--TDE---------NQKRM----QEKGYRTVGEMIY----------------LDEAFRTGCSWSEKGYILTP--------------------------------------------
218767588 Neisseria meningitidis Z2491                         : ----------------------------------------------------------------------------ELGALLKG--VAD---------NAHAL----QTGDFRTPAELA-----------------LNKFEKESGHI-----------------------------------------------------
15602992  Pasteurella multocida subsp. multocida str. Pm70     : ----------------------------------------------------------------------------ELGALLSG--VAQ---------NHQLL----QSDDYRTPAELA-----------------LKKFAKEEGHI-----------------------------------------------------
319941583 Sutterella wadsworthensis 3 1 45B                    : ------------------KTEKKAYQSALSTLRANANVLTGLRQMGHKPRSEYFKAIEA---------------DLKKDSRLAKINEAFG----------------GAERLARLLGNLS------------NLQLRAERWYFNAPDIMKD-RGWEPDRFKKTLVRAFKF-FHP-AKDQNKQHLELIKQIEN---------
254447899 gamma proteobacterium HTCC5015                       : ------------------KDEKKELSEAWGNILIASENVLKSTVDGHKSRSEYLANIKE---------------DIKSNEELEKQISSK-----------------EIDGFYNLVGHLS------------NFQLRLLRKYFNDPNMSGV-SYWDEKRLEKYFYQWVQG-WHTKGGTDEAEKKNIILKTKG---------
54296138  Legionella pneumophila str. Paris                    : ------------------KKDDKELKNAVKNIKNFITGFEKNSVEGHRHRKVYFENIKS---------------DITKDNQLDSIKKKI-----------------PSVCLSNLLGHLS------------NLQWKNLHRYLAKNP-----KQFDEQTFGNEFLRMLKNFRHLKGSQESLAVRNLIQQLEQ---------
331001027 Parasutterella excrementihominis YIT 11859           : -----------------AKEILANYVEGRRAILDASKYIANLQSLGHKHRSKYLSDILQ---------------DMKRDSRITRLSEAFG----------------STDNLWRIIGNIS------------NLQERAVRWYFNDAKFEQGQEQLDAVKLKNVLVRALKY-LRSDDKEWSASQKQIIQSLEQ---------
34557932  Wolinella succinogenes DSM 1740                      : ------------------GENAKELLAGLRVTKEILDEFDKQENQGNLPRAKYFEELGE---------------YIATNEKVKSFFDSNSL---------------KLTDMTKLIGNIS------------NYQLKELRRYFNDKEMEKG-DIWIPNKLHKITERFVRS-WHPKNDADRQRRAELMKDLKS---------
118497352 Francisella novicida U112                            : FNFEKFDFDKNEEKL-QNQEDKDHIQAHLHHFVFAVNKIKSEMASGGRHRSQYFQEITN---------------VLDENNHQEGYLKNFCENLHN-----KKYSNLSVKNLVNLIGNLS------------NLELKPLRKYFNDKIHAKA-DHWDEQKFTETYCHWILG-EWRVGVKDQDKKDGAKYSYKD---------

Motifs                                                         : ________________________________________________________________________________________________________________________________________________________________________________________________________

#positions selected for tree reconstruction (272)              : --------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
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303229466 Veillonella atypica ACS-134-V-Col7a                  : EDFYKYTKKIVEGLAD-----SKDKEY------ILNEIELQTLLPLQRIKDNGVIPYQLHLEELKVILDKCGPKFPFL-----HTVSDGF------SVTEKLIKMLEFRIPYYVGPLNTHHNIDNGG--------FSWAVRKQAGRVTPWNFEEKIDREKSAAAFIKNLTNKCT------YLFGE-D---------VL--
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : KSRLKIDDLIKVIKGYLPKPERIEEKDKTIFNEILNKIELKTILPKQRISDNGTLPYQIHEVELEKILENQSKYYDFL--NYEENGVSTK---------DKLLKTFKFRIPYYVGPLNSYHKDKGGN---------SWIVRKEEGKILPWNFEQKVDIEKSAEEFIKRMTNKCT------YLNGE-D---------VI--
374307738 Filifactor alocis ATCC 35896                         : IEKKRNPEEFYKSLGKLLDKIEPLKEDLEVLTMMIEECKNHTLLPIQKNKDNGVIPHQVHEVELKKILENAKKYYSFL----TETDKDGY------SVVQKIESIFRFRIPYYVGPLSTRHQEKGSN-------VWMVRKPGREDRIYPWNMEEIIDFEKSNENFITRMTNKCT------YLIGE-D---------VL--
320528778 Solobacterium moorei F0204                           : EEFCLFIKPYIR---------DMVKSENEDEVRIAKEVEDKSFLTKLKGTNNSVVPYQIHERELNQILKNIVAYLPFM----NDEQEDIS-------VVDKIKLIFKFKIPYYVGPLNTKSTRSWVY--------------RSDEKIYPWNFSNVIDLDKTAHEFMNRLIGRCT------YTNDP-----------VL--
291520705 Coprococcus catus GD-7                               : ADFYDFLKKNV----------IKVIDHKEITQEIESEIEKENFLPKQVTKDNGVIPYQVHDYELKKILDNLGTRMPFI-----KENAEKI------------QQLFEFRIPYYVGPLNRVDDGKDGK--------FTWSVRKSDARIYPWNFTEVIDVEASAEKFIRRMTNKCT------YLVGE-D---------VL--
42525843  Treponema denticola ATCC 35405                      : KKLIINNSVNQEDFYKFLKTILSAKSEIKEVNDILTEIETGTFLPKQISKSNAEIPYQLRKMELEKILSNAEKHFSFL----KQKDEKGL------SHSEKIIMLLTFKIPYYIGPINDNHKKFFPD-----RCWVVKKEKSPSGKTTPWNFFDHIDKEKTAEAFITSRTNFCT------YLVGE-S---------VL--
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : EDFYKFIKKHLDT-IKETKLNSSENEDLKLIDEMLTDIEFKTFIPKLKSSDNGVIPYQLKLMELKKILDNQSKYYDFL--NESDEYGTVK---------DKVESIMEFRIPYYVGPLNPDSKYAWIK--------------RENTKITPWNFKDIVDLDSSREEFIDRLIGRCT------YLKEE-K---------VL--
224543312 Catenibacterium mitsuokai DSM 15897                  : DEFYKYVKK------------CIEKVDTPEAKQILNDIELENFLLKQNSRTNGSVPYQMQLDEMIKIIDNQAEYYPIL-----KEKREQL------------LSILTFRIPYYFGPLNETSEHAWIK----------RLEGKENQRILPWNYQDIVDVDATAEGFIKRMRSYCT------YFPDE-E---------VL--
24379809  Streptococcus mutans UA159                           : EAFYKYLKGLLN-------KIEG-------SGYFLDKIEREDFLRKQRTFDNGSIPHQIHLQEMRAIIRRQAEFYPFL-----ADNQDRI------------EKLLTFRIPYYVGPLARGKSDFAWL------------SRKSADKITPWNFDEIVDKESSAEAFINRMTNYDL------YLPNQ-K---------VL--
15675041  Streptococcus pyogenes SF370                         : EEFYKFIKPILE-------KMDG-------TEELLVKLNREDLLRKQRTFDNGSIPHQIHLGELHAILRRQEDFYPFL-----KDNREKI------------EKILTFRIPYYVGPLARGNSRFAWM------------TRKSEETITPWNFEEVVDKGASAQSFIERMTNFDK------NLPNE-K---------VL--
16801805  Listeria innocua Clip11262                           : ADFYKYMKMTLE-------NIEG-------ADYFIAKIEKENFLRKQRTFDNGAIPHQLHLEELEAILHQQAKYYPFL-----KENYDKI------------KSLVTFRIPYFVGPLANGQSEFAWL------------TRKADGEIRPWNIEEKVDFGKSAVDFIEKMTNKDT------YLPKE-N---------VL--
116628213 Streptococcus thermophilus LMD-9                     : EDFYVYLKKLLA-------EFEG-------ADYFLEKIDREDFLRKQRTFDNGSIPYQIHLQEMRAILDKQAKFYPFL-----AKNKERI------------EKILTFRIPYYVGPLARGNSDFAWS------------IRKRNEKITPWNFEDVIDKESSAEAFINRMTSFDL------YLPEE-K---------VL--
323463801 Staphylococcus pseudintermedius ED99                 : RPKKQYSLLIKELK----KIIPQ-------DSELYFEAENDTLLKVLNTTDNASIPMQINLYEAETILRNQQKYHAEI-----TDEMIEKV-----------LSLIQFRIPYYVGPLVNDHTASKFGWM----------ERKSNESIKPWNFDEVVDRSKSATQFIRRMTNKCS------YLINE-D---------VL--
352684361 Acidaminococcus intestini RyC-MR95                   : EEFCKYVLGKVKN--IECSEADKVD-----FDEMIQRLTDNSFMPKQVSGENRVIPYQLYYYELKTILNKAASYLPFLTQC-GKDAISNQD---------KLLSIMTFRIPYFVGPLRKDNSEHAWL------------ERKA-GKIYPWNFNDKVDLDKSEEAFIRRMTNTCT------YYPGE-D---------VL--
302336020 Olsenella uli DSM 7084                               : DDFQKSVKELFK----GTDALQDER-----YQEMMVAFGEQKFLRRLKTSDNGSIYYQLHLEELHTILENQGKHYPFLLS----EEDKI-------------ESLVSFRIPYYVGPLTRKNAAIGHDGKERFAWSSRK-DGMEHAVITPWNWEEIIDRDKSAEDFIMRMTGDCT------YLQGE-P---------VL--
366983953 Oenococcus kitaharae DSM 17330                       : EDDRKKAKKIFQDE-ISSADIPDDV-----KADFLKKIDDDQFLPIQRTKNNGTIPHQLHRNELEQIIEKQGIYYPFLKDT-YQENSHELNKI---------TALINFRVPYYVGPLVEEEQKIADDGKNIPDPTNHWMVRKSNDTITPWNLSQVVDLDKSGRRFIERLTGTDT------YLIGE-P---------TL--
310286728 Bifidobacterium bifidum S17                          : RGESAYENMRKKANVFFKKMIETSDLSETDKNRLIHDIEEDKLFPIQRDSDNGVIPHQLHQNELKQIIKKQGKYYPFL----LDAFEKDG------KQINKIEGLLTFRVPYFVGPLVVPEDLQKSD-----NSENHWMVRKKKGEITPWNFDEMVDKDASGRKFIERLVGTDS------YLLGE-P---------TL--
258509199 Lactobacillus rhamnosus GG                           : ---------------------EVTAHPNEVSEQLLNRMGQANFMLKQRTKANGAIPIQLQQRELDQIIANQSKYYDWL--AAPNPVEAHR-----WKMPYQLDELLNFHIPYYVGPLITPKQQAESG----ENVFAWMVRKDPSGNITPYNFDEKVDREASANTFIQRMKTTDT------YLIGE-D---------VL--
300361537 Lactobacillus gasseri JV-V03                         : QAKDVLGSKKTLSKEDFYKEVKKNLDDSKASQEILDTIALDSFMPKQRTNENGVIPYQLHQLELDRIIKNQGKYYPFL--KEVNPVSSHL-----KEAPYKLDELIRFRVPYYVGPLISPNESTKNKQTK-KNQNFAWMIRKEQGQITPWNFDQKVDRMASANKFIKRMTTKDT------YLLGE-D---------VL--
169823755 Finegoldia magna ATCC 29328                          : IEFTKYVKGILE---------KQCDCEDEDVKYLLGKIEQENFLLKQISSINSVIPHQIHLFELDKILENLAKNYPSF--NNKKEEFTKI---------EKIRKTFTFRIPYYVGPLNDYHKNNGGN---------AWIFRNKGEKIRPWNFEKIVDLHKSEEEFIKRMLNQCT------YLPEE-T---------VL--
47458868  Mycoplasma mobile 163K                               : --------------------------------------------------INLKFGHQDYLKEIKQVFEKQNIDFMNY-----EKFAMEE------------KSFFSRIRNYSEGPGNEKSFSKYGL-----------YANENGNPELIINEKGQKIYTKIFKTLWESKIGKCS------YDKKL-Y---------RA--
284931710 Mycoplasma gallisepticum str. F                      : ----------------------------------------------------YKFSNKHWLEEVKKVLSNQTGL--------PEKFKEEY------------ESLFSYVRNYSEGPGSINSVSPYGI---------------------YHLDEKEGKVVQKYNNIWDKTIGKCN------IFPDE-Y---------RA--
363542550 Mycoplasma ovipneumoniae SC01                        : ----------------------------------------------------YSFSNLQWVNEIKKLFEVQE---------INPEFSEKF------------LNLFTSVRDYAKGPGSEHSASEYGI---------------------FQKDEK-GKVFKKYDNIWDKTIGKCS------FFVEE-N---------RS--
384393286 Mycoplasma canis PG 14                               : --------------------------------------------------FFFDFSNKEWLKEINYFFNVQKNI-------LSETFIEEF------------KKIFSFTRDISKGPGSDNMPSPYGI---------------------FGEFGDNGQ-GGRYEHIWDKNIGKCS------IFTNE-Q---------RA--
71894592  Mycoplasma synoviae 53                               : --------------------------------------------------EELIFSNKQWINEIVKVFENQSYL--------TESFKEEY------------LKLFNYVRPFNKGPGSKNSRTAYGV--------------------FSTDIDPETNKFKDYSNIWDKTIGKCS------LFEEE-I---------RA--
238924075 Eubacterium rectale ATCC 33656                       : --------------------------------------------------LSNVFTIGAYRKEIQRVFEIQKKYHPEL----TDEFCDGY------------MLIFNRKRKYYEGPGNEKSRTDYGR---------------------FTTKLDANGNYITEDNIFEKLIGKCS------VYPDE-L---------RA--
116627542 Streptococcus thermophilus LMD-9                     : --------------------------------------------------LINVFPTSAYRSEALRILQTQQEFNPQI----TDEFINRY------------LEILTGKRKYYHGPGNEKSRTDYGR---------------------------YRTSGETLDNIFGILIGKCT------FYPDE-F---------RA--
315149830 Enterococcus faecalis TX0012                         : --------------------------------------------------QLNVFKVSAYANELATILKTQQAFYPNEL---TDDWIALF----VQPGIAEEAGLIYRKRPYYHGPGNEANNSPYGR------------------------WSDFQKTGEPATNIFDKLIGKD-------FQGEL-----------RA--
315659848 Staphylococcus lugdunensis M23590                    : --------------------------------------------------EKNRFKTADIIKEIIQLLNVQKNFHQL-----DENFINKY------------IELVEMRREYFEGPGKGSPYGWEGD----------------------------------PKAWYETLMGHCT------YFPDELR---------SV--
160915782 Eubacterium dolichum DSM 3991                        : --------------------------------------------------HENNFKTRAYVDEAFQILSHQDL---------SNELKSAI------------ITIISRKRMYYDGPGGPLSPTPYGR--------------------------YTYFGQKEPIDLIEKMRGKCS------LFPNE-P---------RA--
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : --------------------------------------------------YLSTPNRQMLVDEIKQILDKQRELGNEKL---TDEFYATY-----LLGDENRAGIFQAQRDFDEGPGAGPYAGDQ----------------------------------------IKKMVGKDI------FEPTE-D---------RA--
310780384 Ilyobacter polytropus DSM 2926                       : --------------------------------------------------YLFSFSRKLLEDEVRKIQAKQKELGNTHF---TDDVLEKY------------IEVFNSQRNFDEGPSKPSPYYSEIGQ-------------------------------------IAKMIGNCT------FESSE-K---------RT--
325677756 Ruminococcus albus 8                                 : --------------------------------------------------NHYLITRHMLVKEVDLILENQSKYYGIL----DDKTIAKI------------KDIIFAQRDFEIGPGKNERFRRFTG--------------------------------------YLDSIGKCQ------FFKDQ-E---------RG--
187736489 Akkermansia muciniphila ATCC BAA-835                 : --------------------------------------------------LNTAFPRLIVEKEVRRILELSAPLIPGL----TAEIIELI---------AQHHPLTTEQRGVLLQHGIKLARRYRGS----------------------------LLFGQLIPRFDNRIISRCPVTWAQVYEAELKKGNSEQSARERAEK
117929158 Acidothermus cellulolyticus 11B                      : --------------------------------------------------FETRLRQEDVLWELRCIADVQGL---------PEDVVSNV-----------IDAVFCQKRPSV----------------------------------------------------PAERIGRDP------LDPSQ-L---------RA--
189440764 Bifidobacterium longum DJO10A                        : --------------------------------------------------LPVRLMQEDNANELKQIFRVQRVP--------ADEWKPLF------------RSVFYAVSPKGS---------------------------------------------------AEQRVGQDP------LAPEQ-A---------RA--
283456135 Bifidobacterium dentium Bd1                          : --------------------------------------------------LPTKLMQSDNAAEIRRIFKVQRI---------DDETGRKL-----------LRAVFKACSPKGS---------------------------------------------------VERRVGRD--------ALAPGL---------PR--
38232678  Corynebacterium diphtheriae NCTC 13129               : --------------------------------------------------LSARLQQSDYAREIQEICRMQEI---------GQELYRKI-----------IDVVFAAESPKGS---------------------------------------------------ASSRVGKD--------PLQPGK---------NR--
187250660 Elusimicrobium minutum Pei191                        : --------------------------------------------------HKFSPTRDLVIKEAEAILKKQAGKDGFHKEL-TEEYIEKL------------TKAIGYESEK-----------------------------------------------------LIPESGFCP------YLKDE-K---------RL--
319957206 Nitratifractor salsuginis DSM 16511                  : --------------------------------------------------YEKMIRREDIEEEIEKVLLRQAELGALGL--PEEQVSELI--------DELKACITDQEMPTID----------------------------------------------------ESLFGKCT------FYKDE-L---------AA--
325972003 Sphaerochaeta globus str. Buddy                      : --------------------------------------------------GVPVPTRDIISNEIDVLLQTQKQFYQEIL---SDEYCDRI------------VSAILFENEK-----------------------------------------------------IVPEAGCCP------YFPDE-K---------KL--
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : ---------------------KIIGKLVRTVERKFYKEELTQILKKQVELIPELRDDNLYKQCIEELYPINEAHRNTIA---KTDFANLF-----------INDILFYQRPLKS---------------------------------------------------KKSQIDNCP------YEERI-FIDSKTGEKKKV-P
60683389  Bacteroides fragilis NCTC 9343                       : TQIN-------NSSGYLGAISDRSKELYFNKQTVGQYQMEMLDKNPNASLRNMVFYRQDYLDEFNMLWEKQAVYHKEL----TEELKKEI-----------RDIIIFYQRRLKS---------------------------------------------------QKGLIGFCE------FESRQIEVDIDGKKKIKTVG
256819408 Capnocytophaga ochracea DSM 7271                     : NNLN-------NASGYLGAISDRSKELYFNRQTVGQYLYAKLQENRHNSLKNKVFYRQDYLDEFERIWETQASFHKEL----TDELKKQI-----------RDVVIFYQRKPKS---------------------------------------------------QKGLISFCE------FESKEIEIEKDGKTITKNIG
90425961  Rhodopseudomonas palustris BisB18                    : --------------------------------------------------YSHTAKRSDLEDEVRAILRAQLRFGSAAA---TETLAQTF------------ADVAFFQRPLQD---------------------------------------------------SEDRVGDCP------FEPGQ-K---------RA--
373501184 Prevotella micans F0438                              : ------------------------------------------------NNESYRAIRSQYQDEIKEIFTYQK------KLSVESELYERLTSEKKG------VGTIFYKRPLRS---------------------------------------------------QRGNVGKCT------LERNK-P---------RC--
294674019 Prevotella ruminicola 23                             : --------------------------------------------------NHYTARKEHYLKEFKAICSKQE---------LDDALIEKL------------EKAIFDQRPLKS---------------------------------------------------QKGQVGTCT------FEKGK-S---------RC--
365959402 Flavobacterium columnare ATCC 49512                  : ---------------------KTLGQY------------FFSLYNKERIRNQYTSREEHYLEEFIIICQTQGIEGINT----NEKLPEKK----FTGLAKDLYRAIFFQRPLKS---------------------------------------------------QKGLIGKCS------FEKNK-S---------RC--
312879015 Aminomonas paucivorans DSM 12260                     : --------------------------------------------------YSHTLSRSLLLEEARRLFQSQRTLGNPHA---SSNLEEAF------------LHLVAFQNPFASGED------------------------------------------------IRNKAGHCS------LEPDQ-I---------RA--
83591793  Rhodospirillum rubrum ATCC 11170                     : --------------------------------------------------GVVAPTRALIAEELAEIVARQSSAYPGL------DWPAVT-------------RLVLDQRPL-----------------------------------------------------RSKGAGPCA------FLPGE-D---------RA--
294086111 Candidatus Puniceispirillum marinum IMCC1322         : --------------------------------------------------YEFYPDRYMLEQEFDTLWAKQAAFNPSLY---IEAARERL------------KEIVFFQRKL-----------------------------------------------------KPQEVGRCI------FLSDE-D---------RI--
121608211 Verminephrobacter eiseniae EF01-2                    : --------------------------------------------------YDLYVDRAMVEQEFDALWAAQAALQPGLF---TEAARAEL------------KDTLLYQRDL-----------------------------------------------------RPVKPGRCT------LLPAE-E---------RA--
344171927 Ralstonia syzygii R24                                : --------------------------------------------------YELYIAREWIAQEFDALWASQQRFHAEVL---ADAARDRL------------RAILLFQRKL-----------------------------------------------------LPVPVGKCF------LEPNQ-P---------RV--
159042956 Dinoroseobacter shibae DFL 12                        : --------------------------------------------------YDFYPDRRHLEEEFHKLWAAQGAHHPEL----TETLRDLL------------FEKIFFQRPL-----------------------------------------------------KEPEVGLCLFSGHHGVPPKD-P---------RL--
288957741 Azospirillum sp- B510                                : --------------------------------------------------YPFYPARRMLEAEFDTLWAEQARHHPDLL---TAEAREIL------------RHRIFHQRPL-----------------------------------------------------KPPPVGRCT------LYPDD-G---------RA--
92109262  Nitrobacter hamburgensis X14                         : ---------------------RLFGDEVLPRADAPHGVRARATITGTKASYDYYPTRDMLRDEFNAIWAGQSAHHATI----TDEARTEI------------EHIIFYQRPL-----------------------------------------------------KPAIVGKCT------LDPAT-RPFKEDPEGYRA--
148255343 Bradyrhizobium sp- BTAi1                             : --------------------------------------------------YEFYPTRAMVDAEFEAIWAAQAPHHPTM----TAEAHDTI------------REAIFSQRAM-----------------------------------------------------KRPSIGKCS------LDPATSQDDVDGF---RC--
34557790  Wolinella succinogenes DSM 1740                      : --------------------------------------------------YEISIHRDLLVEEVEAIFVAQQEMRSTIA---TDALKAAY------------REIAFFVRPMQR---------------------------------------------------IEKMVGHCT------YFPEE-R---------RA--
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : --------------------------------------------------YERCIAQSFLKDELKLIFKKQREFGFSF----SKKFEEEV------------LSVAFYKRALKD---------------------------------------------------FSHLVGNCS------FFTDE-K---------RA--
291276265 Helicobacter mustelae 12198                          : --------------------------------------------------YNRCVGRSELREELKTIFQIQQELKSPWV---NEELIYKLLGNPDAQSKQEREGLIFYQRPLKG---------------------------------------------------FGDKIGKCS------HIKKGENSPY------RA--
229113166 Bacillus cereus Rock1-15                             : --------------------------------------------------YTSVVTRSLLLKEIKTIFNSQRILGNVFS---TQKLESDY------------LYIWGSQRPTLTYEQ------------------------------------------------LMSMVGNCI------YEKKE-K---------RA--
222109285 Acidovorax ebreus TPSY                               : --------------------------------------------------YDKALSRVLLGEELALLFATQRRLGNPH----ASDFFEKL----ILGDGDRKSGLFWQQKPALSGAD------------------------------------------------LLKMLGKCT------FEKGE-Y---------RA--
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : --------------------------------------------------YINSVARELIEEEVEKIFVKQREKGNNFA---DVNTEREY------------LKIAFSQKPAGS---------------------------------------------------ISKMVGFCT------FENGE-K---------RA--
182624245 Clostridium perfringens D str. JGS1721               : --------------------------------------------------YKMCVSRDVIREEIHTLFEKQRELGNNFA---SDEIEDKY------------FEIFNSQRPFSNFED------------------------------------------------LEKLVGFCT------FERKKHK---------RA--
220930482 Clostridium cellulolyticum H10                       : --------------------------------------------------YIHTIAREDLLNEIKYIFSIQRKLGSPFV---TEKLEHDF------------LNIWEFQRPFASGDS------------------------------------------------ILSKVGKCT------LLKEE-L---------RA--
154250555 Parvibaculum lavamentivorans DS-1                    : --------------------------------------------------RGIHAHRNVVAEEFERLWEVQSKFHPALK---SEEMRARI------------SDTIFAQRPVFW---------------------------------------------------RKNTLGECR------FMPGE-P---------LC--
257413184 Roseburia intestinalis L1-82                         : --------------------------------------------RNKAENYQHTMLRAMLVEEVKEIFSSQRRLGNEKA---TEELEEKY------------LEIMTSQRSFDLGPGMQPDG----------------------------------KPSPYAMEGFSDRVGKCTF----LGDQGE-L---------RG--
218767588 Neisseria meningitidis Z2491                         : --------------------------------------------RNQRGDYSHTFSRKDLQAELILLFEKQKEFGNPHV---SGGLKEGI------------ETLLMTQRPALSGDA------------------------------------------------VQKMLGHCT------FEPAE-P---------KA--
15602992  Pasteurella multocida subsp. multocida str. Pm70     : --------------------------------------------RNQRGAYTHTFNRLDLLAELNLLFAQQHQFGNPHC---KEHIQQYM------------TELLMWQKPALSGEA------------------------------------------------ILKMLGKCT------HEKNE-F---------KA--
319941583 Sutterella wadsworthensis 3 1 45B                    : ---------------------------------------SEDIIETLCTLDPNRTIPPYEDQNNRRPPLDQTLLLSPEKLTRQYG-------------------------------------------------------------EIWKTWSARL---TSAEPTLAPAAEILERSTDRKSR----------VAVNGHEP
254447899 gamma proteobacterium HTCC5015                       : ---------------------------------------AP-LLKTLKSLSADLTIPPYEDQNNRRPPKCQSVLLSDEKLTMHY--------------------------------------------------------------PKWKEWVGQLVK-QNDNAYLNENV------------------------------
54296138  Legionella pneumophila str. Paris                    : ---------------------------------------SQDYISILEKTPPEITIPPYEARTNTGMEKDQSLLLNPEKLNNLY--------------------------------------------------------------PNWRNLIPGI---IDAHPFLEKDLEHTKLRDRKR----------------IISP
331001027 Parasutterella excrementihominis YIT 11859           : ---------------------------------------SGDVLDVLAGLDPDRTIPPYEDQNNRRPPEDQTLYLNPKALSSEYG-------------------------------------------------------------EKWKSWANKF---AGAYPLLTEDLTEILKNTDRKSR-----------IKIRSDV
34557932  Wolinella succinogenes DSM 1740                      : ---------------------------------------KE-IMELLTTTEPVMTIPPYDDMNNRGAVKCQTLRLNEEYLDKHL--------------------------------------------------------------PNWRDIAKRL-----NHGKFNDDLADSTVKGYS---------------------
118497352 Francisella novicida U112                            : -----------------------------LCNELKQKVTKAGLVDFLLELDPCRTIPPYLDNNNRKPPKCQSLILNPKFLDNQY--------------------------------------------------------------PNWQQYLQELKKLQSIQNYLDSFETDLKVLKSSKDQPYF--VEYKSSNQQIASG

Motifs                                                         : 

#positions selected for tree reconstruction (272)              : --------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
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303229466 Veillonella atypica ACS-134-V-Col7a                  : ----P-KSSLLY-SEFMLLN-ELNNVRI--------------------------------DGKALAQGVKQHLIDSIFK-----QDHKK-------MT---KNR----IE--------LFLKDNN---YITKKHKPE---------------ITGLDGEIKNDLTSY-RDMV-----RILGNNF----------------
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : ----P-KDSFLY-SEYIILN-ELNKVQV--------------------------------NDEFLNEENKRKIIDELFK-----E-NKK-------VS---EKK----FK--------EYLLVNQI--ANRTVELKG---------------IKDSFNSNYVSYIKF-KD--------IFGEKLNLDI------------
374307738 Filifactor alocis ATCC 35896                         : ----P-KHSLLY-SKYMVLN-ELNNVKV--------------------------------RGKKLPTSLKQKVFEDLFE-----N-KSK-------VT---GKN----LL--------EYLQIQDK--DIQIDD------------------LSGFDKDFKTSLKSY-----LDFKKQIFGEEIEKES------------
320528778 Solobacterium moorei F0204                           : ----P-MDSLLY-SKYNVLN-EINPIKV--------------------------------NGKAIPVEVKQAIYTDLFE-----NSKKK-------VT---RKS----IY--------IYLLKNG---YIEKEDI-----------------VSGIDIEIKSKLKSH-HD--FT---QIVQENKC---------------
291520705 Coprococcus catus GD-7                               : ----P-KDSLVY-SKFMVLN-ELNNLRL--------------------------------NGEKISVELKQRIYEELFC-----K-YRK-------VT---RKK----LE--------RYLVIE----GIAKKGVE----------------ITGIDGDFKASLTAY-HD--FKE--RLTDVQL----------------
42525843  Treponema denticola ATCC 35405                       : ----P-KSSLLY-SEYTVLN-EINNLQI-----------------------------IIDGKNICDIKLKQKIYEDLFK-----K-YKK-------IT---QKQ----IS--------TFIKHEG---ICNKTDEVI---------------ILGIDKECTSSLKSY------IELKNIFGKQVDEIS------------
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : ----P-KASLIY-NEFMVLN-ELNNLKL--------------------------------NEFLITEEMKKAIFEELFK-----T-KKK-------VT---LKA----VS--------NLLKK-----EFNLTGDIL---------------LSGTDGDFKQGLNSY------IDFKNIIGDKVDRDD------------
224543312 Catenibacterium mitsuokai DSM 15897                  : ----P-KNSLIV-SKYEVYN-ELNKIRV--------------------------------DDKLLEVDVKNDIYNELFM-----K-NKT-------VT---EKK----LK--------NWLVNNQ---CCSKDAEIK---------------GFQKENQFSTSLTPW-IDFT-----NIFGKIDQS--------------
24379809  Streptococcus mutans UA159                           : ----P-KHSLLY-EKFTVYN-ELTKVKY--------------------------KTE-QGKTAFFDANMKQEIFDGVFK-----V-YRK-------VT---KDK----LM-------DFLEKEFD---EFRIVDLTGLDK------------ENKVFNASYGTYHDL-CK--IL-DKDFLDNSK----------------
15675041  Streptococcus pyogenes SF370                         : ----P-KHSLLY-EYFTVYN-ELTKVKY--------------------------VTEGMRKPAFLSGEQKKAIVDLLFK-----T-NRK-------VT---VKQ----LK-------EDYFKKIE---CFDSVEISGVED------------R---FNASLGTYHDL-LK--IIKDKDFLDNEE----------------
16801805  Listeria innocua Clip11262                           : ----P-KHSLCY-QKYLVYN-ELTKVRY--------------------------IND-QGKTSYFSGQEKEQIFNDLFK-----Q-KRK-------VK---KKD----L--------ELFLRNMS---HVESPTIEGLED------------S---FNSSYSTYHDL-LK--VGIKQEILDNPV----------------
116628213 Streptococcus thermophilus LMD-9                     : ----P-KHSLLY-ETFNVYN-ELTKVRF--------------------------IAESMRDYQFLDSKQKKDIVRLYFK-----D-KRK-------VT---DKD----II-------E-YLHAIY---GYDGIELKGIEK------------Q---FNSSLSTYHDL-LN--IINDKEFLDDSS----------------
323463801 Staphylococcus pseudintermedius ED99                 : ----P-KNSLLY-QEMEVLN-ELNATQIR------------------------LQTDPKNRKYRMMPQIKLFAVEHIFK-----K-YKT-------VS---HSK----FLEIMLNSNHRENF-MN---HGEKLSIFGTQD------------DKK-FASKLSSYQDM-TK--I-----FGDIEG----------------
352684361 Acidaminococcus intestini RyC-MR95                   : ----P-LDSLIY-EKFMILN-EINNIRI--------------------------DGY------PISVDVKQQVF-GLFE-----K-KRR-------VT---VKD----IQ-------NLLLSLGA---LDKHGKLTGIDT------------T---IHSNYNTYHHF-KS--LM-ERGVL--------------------
302336020 Olsenella uli DSM 7084                               : ----P-KCSLLY-EEFCALN-EFNGAHW--------------------------TVD-GDDERRFDAAQRERIMCDLFR-----R-TRS-------VT---YNK----VS-------DWLERK-Y---NFTGARVRGGQGE-----------HG--FESKLGSYIFF-CK--DVFKTDGLDE-A----------------
366983953 Oenococcus kitaharae DSM 17330                       : ----P-KNSLLY-QKFDVLQ-ELNNIRV--------------------------SGR------RLDIRAKQDAFEHLFK-----V-QKT-------VS---ATN----LK-------DFLVQAGY---ISEDTQIEGLADV-----------NGKNFNNALTTYNYL-VS--VL-GREFVENPS----------------
310286728 Bifidobacterium bifidum S17                          : ----P-KNSLLY-QEYEVLN-ELNNVRL---------------------SVRTGNHWNDKRRMRLGREEKTLLCQRLFM-----K-GQT-------VT---KRT----AE--------NLLRKEY---GRTYELS-----------------GLSDESKFTSSLSTY------GKMCRIFGEKYVNE-------------
258509199 Lactobacillus rhamnosus GG                           : ----P-KQSLLY-QKYEVLN-ELNNVRI--------------------------------NNECLGTDQKQRLIREVFE-----R-HSS-------VT---IKQ----VA-------DNLVAHGD---FARRPEIR----------------GLADEKRFLSSLSTY----------HQLKEILHEAIDDPT--------
300361537 Lactobacillus gasseri JV-V03                         : ----P-ANSLLY-QKFTVLN-ELNNIKI--------------------------------NGKRISVPLKEELYNNLFK-----K-NST-------VT---TNK----LK-------SYLKENYNLI-NVEIKGLADEK-------------KFNSGLTTYNKLRNL----------KIFDQQLDDLN------------
169823755 Finegoldia magna ATCC 29328                          : ----P-KSSILY-SEYMVLN-ELNNLRI--------------------------------NGKPLDTDVKLKLIEELFK-----K-KTK-------VT---LKS----IR--------DYMVRNN---FADKEDFD----------------NSEKNLEIASNMKSY-ID--FN---NILEDKF----------------
47458868  Mycoplasma mobile 163K                               : ----P-KNSFSA-KVFDITN-KLTDWKH-------------------------------KNEYISERLKRKILLSRFLN-----KDSKS-------AVEKILKEENIKFE--------NLSEIAY---NKDDNKINLPIINAYHSLTT----IFKKHLINFENYLIS-NENDLSKLMSFYKQQSEKLFVPNEKGSYEINQ
284931710 Mycoplasma gallisepticum str. F                      : ----P-KNSPIA-MIFNEIN-ELSTIRS---------------------------YSIYLTGWFINQEFKKAYLNKLLDLLIKTNGEKP-------IDARQFKK----LREETIAESIGKETLKDVENEEKLEKEDHKWKLKGLKLNTNG----KIQYNDLSSLAKFVHKLKQHLKLDFLLEDQYATLDKINFLQSLFVY
363542550 Mycoplasma ovipneumoniae SC01                        : ----P-VNYPSY-EIFNLLN-QLINL------------------------------STDLKT-TNKKIWQLSSNDR-NELLDEL---LK-------VKEKA-KI----ISISLKKNEIKKIILKDFGFEKSDIDDQDT--IEGRKIIKEEP-TTKLEVTKHLLATIYSH------SSDSNWININNILEFLPYLDAICII
384393286 Mycoplasma canis PG 14                               : ----P-KYLPSA-LIFNFLN-ELANIRL---------------------------YSTDKKN--IQPLWKLSSVDKLNILLNLFN--LP-------ISEKK-KK----LTSTNINDIVKKESIKSIMISVEDIDMIKDEWAGKEPNVYGVGLSGLNIEESAKENKFKFQDLKILNVLIN-LLDNVGIKFEFKDRNDIIKN
71894592  Mycoplasma synoviae 53                               : ----P-KNLPSA-LIFNLQN-EICTIKN---------------------------EFTEFKNWWLNAEQKSEILKFVFTELFNWKDKKY-------SDKKFNKNLQDKIK--------KYLLNFA---LENFNLNEEILKNRDLENDTVLGLKGVKYYEKSNATADAALEFSSLKPLYVFIKFLKEKKLDLNYLLGLE--
238924075 Eubacterium rectale ATCC 33656                       : ----A-AASYTA-QEYNVLN-DLNNLTI--------------------------------NGRKLEENEKHEIVERIKS-----S--NT-------IN----------MR--------KIISDCMGENIDDFAGAR----------------IDKSGKEIFHKFEVY----------NKMRKALLEIGIDISNY------
116627542 Streptococcus thermophilus LMD-9                     : ----A-KASYTA-QEFNLLN-DLNNLTV------------------------------PTETKKLSKEQKNQIINYVKN-----E--KA-------MG---PAKLFKYIA--------KLLSCD----VADIKGYR----------------IDKSGKAEIHTFEAY----------RKMKTLETLDIEQMD--------
315149830 Enterococcus faecalis TX0012                         : ----S-GLSLSA-QQYNLLN-DLTNLKI-------------------------------DGEVPLSSEQKEYILTELMT-----KEFTR-------FG---VND----VV--------KLLGVK----KERLSGWR----------------LDKKGKPEIHTLKGY----------RNWRKIFAEAGIDLATL------
315659848 Staphylococcus lugdunensis M23590                    : ------KYAYSA-DLFNALN-DLNNLVI-----------------------------QRDGLSKLEYHEKYHIIENVFK-----QKKKP--------T---LKQ----IA--------NEINVN----PEDIKGYR----------------ITKSGKPQFTEFKLY----------HDLKSVLFDQSILE---------
160915782 Eubacterium dolichum DSM 3991                        : ----P-KLAYSA-ELFNLLN-DLNNLSI--------------------------------EGEKLTSEQKAMILKIVHE-----K--GK-------IT---PKQ----LA--------KEVGVS----LEQIRGFR----------------IDTKGSPLLSELTGY----------KMIREVLEKSNDEHLE-------
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : ----A-KATYTF-QYFNLLQ-KMTSLNY--------------------------QNTTGDTWHTLNGLDRQAIIDAVFA-----KAEKP----TKTYKPTDFGE----LR--------KLLKLPD---DARFNLVNYGSLQTQKEI------ETVEKKTRFVDFKAY----------HDLVKVLPEEMWQ----------
310780384 Ilyobacter polytropus DSM 2926                       : ----A-KNTWSG-ERFVFLQ-KLNNFRI----------------------------VGLSGKRPLTEEERDIVEKEVYL-----K--KE-------VR---YEK----LR--------KILYLKE---EERFGDLNYS---------------KDEKQDKKTEKTKF------------ISLIGNYTIKKLNLSEKLKSE
325677756 Ruminococcus albus 8                                 : ----S-RFTVIA-DIYAFVN-VLSQYTY----------------------------TNNRGESVFDTSFANDLINSALK-----N--GS-------MD---KRE----LK--------AI--------AKSYHIDIS---------------DKNSDTSLTKCFKYI----------KVVKPLFEKY--GYDWDKLIENY
187736489 Akkermansia muciniphila ATCC BAA-835                 : LSKVPTANCPEF-YEYRMAR-ILCNIRA--------------------------------DGEPLSAEIRRELMNQARQ-----E--GK-------LT---KAS----LE--------KAISSRLGKETETNVSNYF---------------TLHPDSEEALYLNPAVEVLQRSGIGQILSPSVYRI-------------
117929158 Acidothermus cellulolyticus 11B                      : ----S-RACLEF-QEYRIVA-AVANLRI----------------------------RDGSGSRPLSLEERNAVIEALLA-----QTERS-------LT---WSD----IA-------LEILKLPN---ESDLTSVPE---------------EDGPSSLAYSQFAPF-DETSARIAEFIAKNRRKIPTFAQWWQEQ----
189440764 Bifidobacterium longum DJO10A                        : ----L-KASLAF-QEYRIAN-VITNLRI---------------------------KDASAELRKLTVDEKQSIYDQLVS-----PSSED-------IT---WSD----LC--------DFLGFK----RSQLKGVGS---------------LTEDGEERISSRPPR-----LTSVQRIYESDNKIRKPLVAWWKSA---
283456135 Bifidobacterium dentium Bd1                          : ----ALKASLAF-QEYRIAN-VLTNLVI--------------------------SE--DGTKRKLTIAEKQRVFGFL-S----SNETDD-------IT---WID----VA--------EKLGLER---RQIQGVGCLT-------------ADGEERISSTPPRNIT-------ALHIHSAKPVIREKLVAWWKAASPTV
38232678  Corynebacterium diphtheriae NCTC 13129               : ----ALKASDAF-QRYRIAA-LIGNLRV--------------------------RV--DGEKRILSVEEKNLVFDHLVN----LTPKKE-------PE---WVT----IA--------EILGIDR---GQLIGTATMT--------------DDGERAGARPPTHDT-------NRSIVNSR---IAPLVDWWKTASALE
187250660 Elusimicrobium minutum Pei191                        : ----P-ASHKLN-EERRLWE-TLNNARY-----------------SDPIVDIVTGEITGYYEKQFTKEQKQKLFDYLLT-----G--SE-------LT---PAQ----TK--------KLLGLK----NTNFEDI-----------------ILQGRDKKAQKIKGY----------KLIKLES-----MPFWARL----
319957206 Nitratifractor salsuginis DSM 16511                  : ----P-AYSYLY-DLYRLYK-KLADLNI--------------------------------DGYEVTQEDREKVIEWVEKKIAQGKNLKK-------IT---HKD----LR--------KILGLAP---EQKIFGVED------ERIV-----KGKKEPRTFVPFFFL-AD--IAKFKELFASIQKHPD------------
325972003 Sphaerochaeta globus str. Buddy                      : ----P-RCHFLN-EERRLWE-AINNARI---------------------------------KMPMQEGAAKRYQSASFS-----DEQRH-------IL---FHI----AR--------SGTDITPKLVQKEFPALKTSII------------VLQGKEKAIQKIAGF---------------RFRRLEEKSFWKRL----
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : VKCIA-KSNPLF-QEFRLWQ-FIQNLRI----------------------------YQREKEIDGKLLTDIDITSECLK-----S-EED------------YVR----LF--------DWLNDRETIEQEDLLKH-------LFNTKK-SKNKENPYRWNYVEDKVY-PCNETRA--TILKGFSKCGINASVL-------
60683389  Bacteroides fragilis NCTC 9343                       : NRVIS-RSSPLF-QEFKIWQ-ILNNIEVTVVGKKRKRRKLKENYSALFEELNDAEQLELNGSRRLCQEEKELLAQELFI-----R--DK-------MT---KSE----VL--------KLLFDNPQELDLNFKTIDGNKTGY----------ALFQAYSKMIEMSGH-EPVDFKKPVEKVVEYIKAVFDLLNWNTDILGF
256819408 Capnocytophaga ochracea DSM 7271                     : ARVVP-KSSPLF-QEFKIWQ-ILNNV---ICKRKGIRKKKISAKTTQLDLLNESSQTIFS----LDMECKQLLFDELNL-----K--GD-------LK---SDK----VL--------KLLGYSPQEWEINYNQLEGNRTQK----------ALYEAYLKIVEMEAH-DVKDILQIKSAKDDWSLDESPLSASEIREKVK
90425961  Rhodopseudomonas palustris BisB18                    : ----A-RRAPSF-ELFRFLS-RLANLKL---------------------------AVGRSPERRLTAEEIALAAKGFGE-----T--KK------TIT---FKS----LR--------EALDLDP---NARFSGIG----------------KDKEASLDVVARTGG-----AAYGTKTLK----DALGDAPWRSLSR--
373501184 Prevotella micans F0438                              : ----P-IGRPEF-EEFRAWT-LINNIKIRE------------------------TAGEPYKQLPIKLRQ-ELLKDCFLS-----KVKAD-------FK---FED----IR--------KYIEKRL---GLSFSNDDK-------------------TINYKDSVSIA-ACPVTVRMKKLLGENWANCRIDGEKRRQAHGK
294674019 Prevotella ruminicola 23                             : ----P-SSHPLY-EDFRMYS-FINNIKVQV------------------------DTLYDKGERSLTDEEKQLIIPLFKR-----KSKRT-------FP---FED----IA--------KKIAGKN---NYCYIKSNE---------------EKAYKFNYQMDTQVS-GSPVNAQLEEIFGEDWLSSVCEVYTL----AN
365959402 Flavobacterium columnare ATCC 49512                  : ----A-VSHPDY-EEFRMWS-YLNTIKI--------------------------GTQSEKTLRFLTLEEKLKLVPKFYR-----K--SD-------FN---FEV----LA--------KELVEK----GASFGYYKS---------------SKKNEFFYWFNYKPT-DSVSACVVSASLENAI-----GKDWKIKTFEY
312879015 Aminomonas paucivorans DSM 12260                     : ----P-RRSASA-ETFMLLQ-KTGNLRL--------------------------IHRRTGEERPLTDKEREQIHLLAWK-----Q--EK-------VT---HKT----LR--------RHLEIPE---EWLFTGLPYHRS------------GDKAEEKLFVHLAGI----------HEIRKALDKGPDPAVWDTLRS--
83591793  Rhodospirillum rubrum ATCC 11170                     : ----L-RALPTV-QDFIIRQ-TLANLRL--------------------------PSTSADEPRPLTDEEHAKALALLST-----ARFVE------------WPA----LR--------RALGLKR---GVKFTAETE---------------RNGAKQAARGTAGNL--------------TEAILAPLIPGWSGW----
294086111 Candidatus Puniceispirillum marinum IMCC1322         : ----S-KALPSF-QRFRIYQ-ELSNLAW-------------------------IDHDGVAHRITASLALRDHLFDELEH-----K--KK-------LT---FKA----MR--------AILRKQGV--VDYPVGFNL---------------ESDNRDHLIGNLTSC-------------IMRDAKKMIGSAWDRL----
121608211 Verminephrobacter eiseniae EF01-2                    : ----P-LALPST-QRFRILQ-EVNNLRL---------------------------LDEALREVPLNLAQRDAVVSALEG-----KKELS------------FAA----IR--------KLLTLSG-----KFN-------------------LEDEKRAELKGNATS-------------VILARKDLFGDAWAGF----
344171927 Ralstonia syzygii R24                                : ----A-AALPSA-QRFRLMQ-ELNHLRV--------------------------MTLADKRERPLSFQERNDLLAQLVA-----R--PK-------CG---FDM----LR--------KIVF------GANKEAYRF---------------TIESERRK--ELKGC----------DTAAKLAKVNALGTRWQAL----
159042956 Dinoroseobacter shibae DFL 12                        : ----P-KAHPLT-QRRVLYE-TVNQLRV---------------------------TADGREARPLTREERDQVIHALDN-----KKPTK-SLSSMVLK---LPA----LA--------KVLKLRDGERFTLETGVRD---------------AIACDPLRASPAHP-----------DRFGPRWSILDADAQW-------
288957741 Azospirillum sp- B510                                : ----P-RALPSA-QRLRLFQ-ELASLRV---------------------------IHLDLSERPLTPAERDRIVAFVQG-----RPPKAGRKPGKVQKSVPFEK----LR--------GLLELPP---GTGFSL------------------ESDKRPELLGDETGA----------------RIAPAFGPGWTAL----
92109262  Nitrobacter hamburgensis X14                         : ----P-WSHPLA-QRFRILS-EARNLEI---------------------------RDTGKGSRRLTKEQSDLVVAALLA-----N--RE-------VK---FDK----LR--------TLLKLPA---EARFNL------------------ESDRRAALDGDQTA-----------ARLSDKKGF---NKAWRGF----
148255343 Bradyrhizobium sp- BTAi1                             : ----A-WSHPLA-QRFRIWQ-DVRNLAV---------------------------VETGPTSSRLGKEDQDKVARALLQ-----T--DQ-------LS---FDE----IR--------GLLGLPS---DARFNL------------------ESDRRDHLKGDATG-----------AILSARRHF---GPAWHDR----
34557790  Wolinella succinogenes DSM 1740                      : ----P-KSAPTA-EKFIAISKFFSTVII---------------------------DNEGWEQKIIERKTLEELLDFAVS-----R--EK-------VE---FRH----LR--------KFLDLSD---NEIFKGLHYKGKPKTAK-------KREATLFDPNEPTEL-EFDKVEAEKKAWISLRGAAKLREALGNEFYGR
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : ----P-KNSPLA-FMFVALTRIINLLNN----------------------------LKNTEGILYTKDDLNALLNEVLK-----N--GT-------LT---YKQ----TK--------KLLGLSD---DYEFKG------------------EKGTYFIEFKKYKEF-IK-------ALGEHNL----------------
291276265 Helicobacter mustelae 12198                          : ----C-KHAPSA-EEFVALTKSINFLKN----------------------------LTNRHGLCFSQEDMCVYLGKILQ-----EAQKN----EKGLT---YSK----LK--------LLLDLPS---DFEFLGLDYS--------------GKNPEKAVFLSLPST----------FKLNKITQ---------------
229113166 Bacillus cereus Rock1-15                             : ----P-KTSWAF-QYFSLLQ-KINKLKV----------------------------SDDNTLRKLSKEERDIVIELAFK-----K--KN-------VS---FVD----IR--------KALKLND---NTKFNHLTYSHVVE----------TKKVEKATFIELKGY----------HLIKKQLKDRNVELTQEL-----
222109285 Acidovorax ebreus TPSY                               : ----P-KASFSV-ERHVWLT-RLNNLRI----------------------------VVDGRSRPLNEAERQAALLLPYQ-----TETSK------------YKT----LK-------NAFIKAGLWGDGVRFGGLAYPSQAQIDAEK-----TKDPEDQFLVKLPAW----------HELRKAFKAAGHEALWQQISTPA
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : ----P-RDSYSA-ELFKVLC-TINNTTF--------------------------TDMKTGEIRSFSKEEIGKTLETV-------KNVKD-------VK---YAK----IR--------KDLGLED---SVKFSGVDYRENA-----------KSKGEGEIFVSMKTY----------HEIKSKIEKLSKEKWDNLKG---
182624245 Clostridium perfringens D str. JGS1721               : ----P-KHCISS-EEFTLYE-GINKLSI----------------------------IKDGEKRKLSEEERTLVVNEAFN-----K--KE-------IK---YTT----LR--------KLLGLSE---EELFSTLTYSIDKD----------ISKTENTKFVSLKGY----------HEIKRAIEKGVSKKAWQDIEN--
220930482 Clostridium cellulolyticum H10                       : ----P-TSCYTS-EYFGLLQ-SINNLVL----------------------------VEDNNTLTLNNDQRAKIIEYAHF-----K--NE-------IK---YSE----IR--------KLLDIEP---EILFKAHNLT------HKNP----SGNNESKKFYEMKSY----------HKLKSTLPTDIWGKLHS------
154250555 Parvibaculum lavamentivorans DS-1                    : ----P-KGSWLS-QQRRMLE-KLNNLAI-----------------------------AGGNARPLDAEERDAILSKLQQ-----Q--AS-------MS---WPGVRSALK--------ALYKQRGEPGAEKSLKFNL---------------ELGGESKLLGNALEA-KLADMFG--PDWPAHPRKQEIRHAVHERLWAA
257413184 Roseburia intestinalis L1-82                         : ----A-KGTYTA-EYFVALQ-KINHTKLVN---------------------------QDGETRNFTEEERRALTLLLFT-----Q--KE-------VK---YAA----VR--------KKLGLPE---DILFYNLNYKKAATKEEQQKE---NQNTEKAKFIGMPYY----------HDYKKCLEE---RVKYLTENE--
218767588 Neisseria meningitidis Z2491                         : ----A-KNTYTA-ERFIWLT-KLNNLRIL----------------------------EQGSERPLTDTERATLMDEPYR-----K--SK-------LT---YAQ----AR--------KLLGLED---TAFFKGLRYGK--------------DNAEASTLMEMKAY----------HAISRALEKEGLKDKKSPLNL--
15602992  Pasteurella multocida subsp. multocida str. Pm70     : ----A-KHTYSA-ERFVWLT-KLNNLRIL----------------------------EDGAERALNEEERQLLINHPYE-----K--SK-------LT---YAQ----VR--------KLLGLSE---QAIFKHLRYSK--------------ENAESATFMELKAW----------HAIRKALENQGLKDTWQDLAK--
319941583 Sutterella wadsworthensis 3 1 45B                    : LPTLAYQLSYAL-QRAFDRS-KALDPYALRAL-------------------AAGSKSNKLTSARTALENCIGGQNVK------TFLDCARRYYRE-ADDAKVG-LW---------------------FDNADGLLERSDLHPPMKKKILPLLVANILQT---DETTGQKFLDEIWRK--QIKGRETVASRCARIETVRKS
254447899 gamma proteobacterium HTCC5015                       : ------TLANAL-HRIVERS-RSIDPYQLRLLIS-----------------ITDAEKRNDLAGYKRLKLSLGSEVDE-------FLLLVKNIVDE-TKEAREG-LW---------------------FETENKLFFKCGKTPPRKEKLKSTLLSAVLGK-NLSDDEQSSFIEEFWKSGTPKIERRNVRGWCRLASQVQKT
54296138  Legionella pneumophila str. Paris                    : SKQDEKRDSYIL-QRYLDLN-KKIDKFKIKKQLSFLG--------------QGKQLPANLIETQKEMETHFNSSLVS------VLIQIASAYNKE-REDAAQG-IW---------------------FDNAFSLCELSNINPPRKQKILPLLVGAILSEDFINNKDKWAKFKIFWNT--HKIGRTSLKSKCKEIEEARKN
331001027 Parasutterella excrementihominis YIT 11859           : LPDSDYRLAYIL-QRAFDRS-IALDECSIRR--------------------TAEDFENGVVIKNEKLEDVLSGHQLE------EFLEFANRYYQE-TAKAKNG-LW---------------------FP-ENALLERADLHPPMKNKILNVIVGQALGV---SPAEGTDFIEEIWNS--KVKGRSTVRSICNAIENERKT
34557932  Wolinella succinogenes DSM 1740                      : ------EDSTLL-HRLLDTS-KEIDIYELR-----------------------GKKPNELLVK------TLGQSDAN------RLYGFAQNYYELIRQKVRAG-IWV--------PVKNKDDSLN--LEDNSNMLKRCNHNPPHKKNQIHNLVAGILGV-KLDEAKFAEFEKELWSA---KVGNKKLSAYCKNIEELRKT
118497352 Francisella novicida U112                            : QRDYKDLDARILKQFIFDRV-KASDELLLNEIYFQAKKL---QKASSELEKLESSKKLDEVIANSQLSQILKSQHTNGIFEQGTFLHLVCKYYKQ-RQRARDSRLYIMPEYRYDKKLHKYNNTGR--FDDDNQLLTYCNHKPRQKRYQLLNDLAGVLQVSPNFLKDKIGSDDDLFISKWLVEHIRGFKKACEDSLKIQKD

Motifs                                                         : ________________________________________________________________________________________________________________________________________________________________________________________________________

#positions selected for tree reconstruction (272)              : --------****-*******-*****------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
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303229466 Veillonella atypica ACS-134-V-Col7a                  : --------------------DVSMAED----------IITD----ITIFGESKK------MLRQTLRNKFGSQ----LN-----DETIK-K-LSKL----RYRD------WGRLSKKLLKGIDGCDK---------------AGNGAPKTI-------------------------------------------------
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : --------------------YKEISEK----------SILW----KCLYGDDKK------IFEKKIKNEYGDI----LN-----KDEIK-K-INSF----KFNT------WGRLSEKLLTGIEFINL--------------ETGECYSSVM-------------------------------------------------
374307738 Filifactor alocis ATCC 35896                         : --------------------IQNMIED----------IIKW----ITIYGNDKE------MLKRVIRANYSNQ----LT-----EEQMKK--ITGF----QYSG------WGNFSKMFLKGISGSDV--------------STGETFDIIT-------------------------------------------------
320528778 Solobacterium moorei F0204                           : --------------------TPEEIER----------IIKG----ILVYSDDKS------MLRRWLKNNIKG-----LS-----ENDVK-Y-LAKL----NYKE------WGRLSKTLLTDIYTINP--------------EDGEACSILD-------------------------------------------------
291520705 Coprococcus catus GD-7                               : --------------------SQRAKEA----------IVLN----VVLFGDDKK------LLKQRLSKMYPN-----LT-----TGQLKG--ICSL----SYQG------WGRLSKTFLEEITVPAP--------------GTGEVWNIMT-------------------------------------------------
42525843  Treponema denticola ATCC 35405                       : --------------------TKNMLEE----------IIRWAT--IYDEGEGKT------ILKTKIKAEYGKY----CS-----DEQIKK--ILNL----KFSG------WGRLSRKFLETVTSEMP------------------GFSEPV-------------------------------------------------
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : --------------------YRIKIEE----------IIKL----IVLYEDDKT------YLKKKIKSAYKND----FT-----DDEIKK--IAAL----NYKD------WGRLSKRFLTGIEGVDK--------------TTGEKGSIIY-------------------------------------------------
224543312 Catenibacterium mitsuokai DSM 15897                  : --------------------NFDLIEN----------IIYD----LT-VFEDKK------IMKRRLKKKYA------LP-----DDKVK-Q-ILKL----KYKD------WSRLSKKLLDGIVADNR---------------FGSSVTVLD-------------------------------------------------
24379809  Streptococcus mutans UA159                           : --------------------NEKILED----------IVLT----LT-LFEDRE------MIRKRLENYSD------LL-----TKEQVKK-LERR----HYTG------WGRLSAELIHGIRNKES-------------RKTILDYLIDD-------------------------------------------------
15675041  Streptococcus pyogenes SF370                         : --------------------NEDILED----------IVLT----LT-LFEDRE------MIEERLKTYAH------LF-----DDKVMKQ-LKRR----RYTG------WGRLSRKLINGIRDKQS-------------GKTILDFLKSD-------------------------------------------------
16801805  Listeria innocua Clip11262                           : --------------------NTEMLEN----------IVKI----LT-VFEDKR------MIKEQLQQFSD------VL-----DGVVLKK-LERR----HYTG------WGRLSAKLLMGIRDKQS-------------HLTILDYLMND-------------------------------------------------
116628213 Streptococcus thermophilus LMD-9                     : --------------------NEAIIEE----------IIHT----LT-IFEDRE------MIKQRLSKFEN------IF-----DKSVLKK-LSRR----HYTG------WGKLSAKLINGIRDEKS-------------GNTILDYLIDD-------------------------------------------------
323463801 Staphylococcus pseudintermedius ED99                 : --------------------KRAQIEE----------IIQW----IT-IFEDKK------ILVQKLKECYP------EL-----TSKQINQ-LKKL----NYSG------WGRLSEKLLTHAYQ----------------GHSIIELLRH--------------------------------------------------
352684361 Acidaminococcus intestini RyC-MR95                   : --------------------TRDDVER----------IVER----MT-YSDDTK------RVRLWLNNNYG------TL-----TADDVKH-ISRL----RKHD------FGRLSKMFLTGLKGVHKETGE---------RASILDFMWN--------------------------------------------------
302336020 Olsenella uli DSM 7084                               : --------------------DYTMIEQ----------IILW----ST-LFEDRD------ILKRKIEEAYGGD----RL-----TSEQIKV-ICKK----RFTG------WGRLSKRLLTDIKVNTDTG-----------RKSIMDVLREG-------------------------------------------------
366983953 Oenococcus kitaharae DSM 17330                       : --------------------NEELLEE----------ITEL----QT-VFEDKK------VLRRQLDQLDG-------L-----SDHNREK-LSRK----HYTG------WGRISKKLLTTKIVQNADKIDNQTFDVPRMNQSIIDTLYN--------------------------------------------------
310286728 Bifidobacterium bifidum S17                          : --------------------HRDLMEK----------IVEL----QT-VFEDKE------TLLHQLRQLEG------IS-----EADCA-L-LVNT----HYTG------WGRLSRKLLTTKAGECKI--SDDFAPR--------KHSIIE-------------------------------------------------
258509199 Lactobacillus rhamnosus GG                           : --------------------KLLDIEN----------IITW----ST-VFEDHT------IFETKLAEIEW------LD-----PKKINE--LSGI----RYRG------WGQFSRKLLDGLKLGNG-------------------HTVIQ-------------------------------------------------
300361537 Lactobacillus gasseri JV-V03                         : --------------------YDKDFER----------IIEW----ST-IFEDKA------IYKDKLKTIKW------LS-----DRQIDK--LSKI----RMQG------WGQLSKKLLSQLTDNNG---------------------QTI-------------------------------------------------
169823755 Finegoldia magna ATCC 29328                          : --------------------DVEMVED----------LIEK----ITIHTGNKK------LLKKYIEETYPD-----LS-----SSQIQK--IINL----KYKD------WGRLSRKLLDGIKGTKK-------ETE--------KTDTVI-------------------------------------------------
47458868  Mycoplasma mobile 163K                               : NNN-----------------VLHIFDA--------I--SNI----LN-KFS---------TIQDRIRILEGYFEFSNLK-----KDVKSSEIYSEIAKLREFSG------TSSLSFGAYYKFIPNLI------SEGS--------KNYSTI-------------------------------------------------
284931710 Mycoplasma gallisepticum str. F                      : LGK-----------------HLRYSNR--------VDSANL----KE-FSDSNK------LFERILQKQKDGLFKLFEQ-----TDKDDEK-ILAQ--------------THSLSTKAMLLAITRMT--------NL--------DNDEDN-------------------------------------------------
363542550 Mycoplasma ovipneumoniae SC01                        : LDR-----------------E-KSRGQ--------DEVLKK----LT-EKNIFE------VLKIDREKQLDFVKSIFSN-----TKFNFKK-------------------IGNFSLKAIREFLPKM----------F--------EQNK---------------------------------------------------
384393286 Mycoplasma canis PG 14                               : LELLDNLYLFLIY-------QKESNNK--------DSSIDL----FI-AKNESL------NIENLKLKLKEFLLGAGNE-----FENHNSK-------------------THSLSKKAIDEILPKL----------L--------DNNE---------------------------------------------------
71894592  Mycoplasma synoviae 53                               : --------------------NTEILYF--------LDSIYLAISYSSDLKERNE------WFKKLLKELYPKIKNNNLEIIENVEDIFE---ITDQEKFESFSK------THSLSREAFNHIIPLLL------------------SNNEGK-------------------------------------------------
238924075 Eubacterium rectale ATCC 33656                       : --------------------SREELDE----------IGYI----MT-INTDKE------AMMEAFQKSWID-----LS-----DDVKQCLINMRKTNGALFNK------WQSFSLKIMNELIPEMY-----AQPKE--------QMTLLT-------------------------------------------------
116627542 Streptococcus thermophilus LMD-9                     : ---------------------RETLDK----------LAYV----LT-LNTERE------GIQEALEHE--------FA-----DGSFSQKQVDELVQFRKANSSIFGKGWHNFSVKLMMELIPELY-----ETSEE--------QMTILT-------------------------------------------------
315149830 Enterococcus faecalis TX0012                         : --------------------PTETIDC----------LAKV----LT-LNTERE------GIENTLAFE--------LP-----ELSESVK-LLVLDRYKELSQSISTQSWHRFSLKTLHLLIPELM-------NAT--------SEQNTL-------------------------------------------------
315659848 Staphylococcus lugdunensis M23590                    : --------------------NEDVLDQ----------IAEI----LT-IYQDKD------SIKSKLTELDI------LL-----NEEDKEN-IAQL---TGYTG------THRLSLKCIRLVLEEQW-------------------YSSRN-------------------------------------------------
160915782 Eubacterium dolichum DSM 3991                        : --------------------DHVFYDE----------IAEI----LT-KTKDIE------GRKKQISE---------LS-----SDLNEES-VHQLAGLTKFTA------YHSLSFKALRLINEEML-----KTELN--------QMQSIT-------------------------------------------------
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : --------------------SRQLLDH----------IGTA----LT-LYSSDK------RRRRYFAEELN------LP-----AELIE-K-LLPL----NFSK------FGHLSIKSMQNIIPYLE-------MGQ--------VYSEAT-------------------------------------------------
310780384 Ilyobacter polytropus DSM 2926                       : IEE-----------------DKSKLDK----------IIEI----LT-FNKSDK------TIESNLKKLE-------LS-----REDIEIL-LSEE-----FSG------TLNLSLKAIKKILPYLE-------KGL--------SYNEAC-------------------------------------------------
325677756 Ruminococcus albus 8                                 : TDT-----------------DNNVLNR----------IGIV----LS-QAQTPK------RRREKLKALNIG-----LD-----DGLIN-E-LTKL----KLSG------TANVSYKYMQGSIEAFC-------EGD--------LYGKYQ-------------------------------------------------
187736489 Akkermansia muciniphila ATCC BAA-835                 : --------------------AANRLRR--GKSVTPNYLLNL----LKSRGESGE------ALEKKIEKESKK-----KE-----ADYADTP-LKPK----YATG------RAPYARTVLKKVVEEIL-------DGE--------DPTRPA-------------------------------------------------
117929158 Acidothermus cellulolyticus 11B                      : --------------------DRTSRSD----------LVAA----LADNSIAGE------EEQELLVH---------LP-----DAELE-A-LEGL---ALPSG------RVAYSRLTLSGLTRVMR------DDGV--------DVHNAR-------------------------------------------------
189440764 Bifidobacterium longum DJO10A                        : --------------------SDNEHEA----------MIRL----LS-NTVDID------KVREDVAYASAIEFIDGLD-----DDA-----LTKLDSVDLPSG------RAAYSVETLQKLTRQML------TTDD--------DLHEAR-------------------------------------------------
283456135 Bifidobacterium dentium Bd1                          : RET-----------------MVELLSN-----------TVDID--RVREDMDYS------SAVAFIDSL---------------GDEELTA-LDSV---DLLSG------RAAYSRQTLKQLTERML------NTDD--------DLHEAR-------------------------------------------------
38232678  Corynebacterium diphtheriae NCTC 13129               : QHA-----------------MVKALSN-----------AEV----DDFDSPEGA------KVQAFFADL---------------DDDVHAK-LDSL---HLPVG------RAAYSEDTLVRLTRRML------SDGV--------DLYTAR-------------------------------------------------
187250660 Elusimicrobium minutum Pei191                        : --------------------SEAQQDS----------FLYD----WN-SCPDEK------LLTEKLSNEYH------LT-----EEEIDNA-FNEI---VLSSS------YAPLGKSAMLIILEKIK-------NDL--------SYTEAV-------------------------------------------------
319957206 Nitratifractor salsuginis DSM 16511                  : --------------------ALQIFRE----------LAEI----LQ-RSKTPQ------EALDRLRALMAGKG---ID-----TDDRE---LLEL-FKNKRSG------TRELSHRYILEALPLFL-------EGY--------DEKEVQ-------------------------------------------------
325972003 Sphaerochaeta globus str. Buddy                      : --------------------SEEQKDD----------FFSA----WT-NTPDDK------RLSKYLMKHLL------LT-----ENEVVDA-LKTV---SLIGD------YGPIGKTATQLLMKHLE-------DGL--------TYTEAL-------------------------------------------------
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : --------------------SPELEMA----------LWHI----LY-SVEDKK------EIETALTHFAQKQG---WN-----DDFAK-V-FSKA---KPFKKD-----YGSYSEKAIKKLLSLMR-------MGK--------YWNQDN-------------------------------------------------
60683389  Bacteroides fragilis NCTC 9343                       : N-------------------SNEELDN-----QPYYKLWHL----LY-SFEGDNTPTGNGRLIQKMTELYGF------------EKEYATI-LANV---SFQDD------YGSLSAKAIHKILPHLK-------EGN--------RYDVAC-------------------------------------------------
256819408 Capnocytophaga ochracea DSM 7271                     : AIFQTLGICTKILYFDPLL-PVKEFEE-----QDSYQLWHL----LY-SYESDDSTSGNETLYRILEKKYAF------------KREHARI-LANV---ALQDD------YGSLSTKAIRKIYPNIK-------E-N--------QYSTAC-------------------------------------------------
90425961  Rhodopseudomonas palustris BisB18                    : --------------------TPETLDR----------IAEI----LS-FREDIT------SIRNGLEDLGLDSL---VV-----EALMQ---AAANGDFKEFTR------AGHISARAARNIIPGLR-------EGL--------VYSEAC-------------------------------------------------
373501184 Prevotella micans F0438                              : NNN-------------NEHIVSYTEED----------IWHV----CY-NAEDPE------EVSNFARKALH------WD-----ENKIK-E-LVRLW-TSIPQG------YAMLSLKAIRNINRMLL-------LGL--------KYSDAVLLAKLPDIVPVSDEDILAITKEFLQLEDKLNQEKQINNIVNSLIANYKS
294674019 Prevotella ruminicola 23                             : NKS-----------------RFQIMND----------VWHV----LF-FYDDED------KLKEFAKDRLQ------LD-----DELAE-K-FSKI---SIPND------YAALSLKAIRKIMPYLRD------YGL--------IYSEAVFLANLVDVLPQHVWGIKE------------MREAAIENVI---------
365959402 Flavobacterium columnare ATCC 49512                  : QTR-----------------NTEKNEV--TKSVDYKDLWHL----LS-VATSDT------YLYDFAIEKLK------LE-----PKNAK-A-FSKT---KLKKD------FASLSLAAIAKILPYLK-------QGL--------LYSHAVFMANIENIVDADIWKDEEQQKFIQSKIVELVDNYIVEKSKLELIN----
312879015 Aminomonas paucivorans DSM 12260                     : --------------------RRDLLDS----------IADT----LT-FYKNED------EILPRLESLG-------LS-----PENAR-A-LAPL----SFSG------TAHLSLSALGKLLPHLE-------EGK--------SYTQAR-------------------------------------------------
83591793  Rhodospirillum rubrum ATCC 11170                     : --------------------DLDRKDR----------VFSD----LWAARQDRS------ALLALIGDPRGPTR---VT-----EDETAEA-VADAIQIVLPTG------RASLSAKAARAIAQAMA-------PGI--------GYDEAV-------------------------------------------------
294086111 Candidatus Puniceispirillum marinum IMCC1322         : --------------------DEEEQDS----------FILM----LQDDQKGDD------EVRSILTQQYG------LS-----DDVAEDC-LDVR----LPDG------HGSLSKKAIDRILPVLR------DQGL--------IYYDAV-------------------------------------------------
121608211 Verminephrobacter eiseniae EF01-2                    : --------------------DAAVQDE----------IVWR----LV-SQESEG------ALIAWLQQHTG------VD-----GVCAEAIVNTRL-----PDG------YGRLSRKALERIVPALQ------REVC--------TYDKAV-------------------------------------------------
344171927 Ralstonia syzygii R24                                : --------------------SLDEQDR----------LVCL----LL-DGENDA------VLADALREHYG------LT-----DAQID-T-LLGL---SFEDG------HMRLGRSALLRVLDALESGRDEQGLPL--------SYDKAV-------------------------------------------------
159042956 Dinoroseobacter shibae DFL 12                        : ----------------------EVISR-----------IRR----VQ-SDAEHA------ALVDWLTEAHG------LD-----RAHAEATAHAPL-----PDG------YGRLGLTATTRILYQLT------ADVV--------TYADAV-------------------------------------------------
288957741 Azospirillum sp- B510                                : --------------------PLEEQDA----------LVEL----LL-TEAEPE------RAIAALTARWA------LD-----EAT-----AAKLAGATLPDF------HGRYGRRAVAELLPVLERETRGDPDGRV----RPIRLDEAV-------------------------------------------------
92109262  Nitrobacter hamburgensis X14                         : --------------------PPERQIA----------IVAR----LE-ETEDEN------ELIAWLEKECA------L------DGAAAAR-VANT---TLPDG------HCRLGLRAIKKIVPIMQ-------DGL--------DEDGVA-------------------------------------------------
148255343 Bradyrhizobium sp- BTAi1                             : --------------------SLDRQID----------IVAL----LE-SALDEA------AIIASLGTTHS------LD-----EAAAQRA-LSAL----LPDG------YCRLGLRAIKRVLPLME-------AGR--------TYAEAA-------------------------------------------------
34557790  Wolinella succinogenes DSM 1740                      : FVA-----------------LGKHADE----------ATKI----LT-YYKDEG------QKRRELTKLP-------LE-----AEMVE-R-LVKI----GFSD------FLKLSLKAIRDILPAME-------SGA--------RYDEAV-------------------------------------------------
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : --------------------SQDDLNE----------IAKD----IT-LIKDEI------KLKKALAKYD-------LN-----QNQID-S-LSKL----EFKD------HLNISFKALKLVTPLML-------EGK--------KYDEAC-------------------------------------------------
291276265 Helicobacter mustelae 12198                          : --------------------DRKTQDK----------IANI----LG-ANKDWE------AILKELESLQ-------LS-----KEQIQTIKDAKL----NFSK------HINLSLEALYHLLPLMR-------EGK--------RYDEGV-------------------------------------------------
229113166 Bacillus cereus Rock1-15                             : --------------------QPKDYDA----------IAAA----ST-FFKNDI------EFRDYLRNQYLDSNGKRKSNIA--NKVFEDK-VIAAVFELNFSK------VCHLSFKSLYKLIPHLE-------KGL--------DYKEAI-------------------------------------------------
222109285 Acidovorax ebreus TPSY                               : LDG-----------------DPTLLDQ----------IATV----LS-VYKDGA------EVVQQLRQLA-------LP-----EPAASIAVLEKI----SFDK------FSSLSLKALRRIVPLMQ-------SGL--------RYDEAV-------------------------------------------------
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : --------------------NTELLDS----------IVNI----IA-NLKDDE------SIKKEFQKLK-------ID-----EDIIDV--LLNF----EFKK------FINLSFKALRKIIPFQF-------QGQ--------KYITAS-------------------------------------------------
182624245 Clostridium perfringens D str. JGS1721               : --------------------NRNLLND----------IAYV----LT-LGKTDD------EIEKQLRLRN-------VP-----EELFES--LLDM----SFNK------FNNLSIYALEKILPFMK-------EGY--------QYNEAC-------------------------------------------------
220930482 Clostridium cellulolyticum H10                       : --------------------NKESLDN----------LFYC----LT-VYKNDN------EIKDYLQANN--------------LDYLIEY-IAKL---PTFNK------FKHLSLVAMKRIIPFME-------KGY--------KYSDAC-------------------------------------------------
154250555 Parvibaculum lavamentivorans DS-1                    : DYG-----------------ETPDKKR----------VIIL-------SEKDRK------AHREAAANSF-------VA-----DFGITGEQAAQLQALKLPTG------WEPYSIPALNLFLAELE-------KGE--------RFGALV-------------------------------------------------
257413184 Roseburia intestinalis L1-82                         : --------------------VRDLFDE----------IGMI----LT-CYKNDD------SRTERLAKLG-------LV-----PIEMEGL-LAYT----P-TK------FQHLSMKAMRNIIPFLE-------KGM--------TYDKAC-------------------------------------------------
218767588 Neisseria meningitidis Z2491                         : --------------------SPELQDE----------IGTA----FS-LFKTDE------DITGRLKD-R-------IQ-----PEILEAL-LKHI----SFDK------FVQISLKALRRIVPLME-------QGK--------RYDEAC-------------------------------------------------
15602992  Pasteurella multocida subsp. multocida str. Pm70     : --------------------KPDLLDE----------IGTA----FS-LYKTDE------DIQQYLTN-K-------VP-----NSVINAL-LVSL----NFDK------FIELSLKSLRKILPLME-------QGK--------RYDQAC-------------------------------------------------
319941583 Sutterella wadsworthensis 3 1 45B                    : FGG-----------------GFNIAYNTAQYREVNKLPRN-------AQDKELL------TIRDRV------AETADFIAANLGLS-----------------DEQKRKFANPFSLAQFYTLIETEV-------SGF--------SATTLAVHLENAWRMT---IKDAVIN-----------------------------
254447899 gamma proteobacterium HTCC5015                       : YGV-----------------YLK-EYGLQQ---LHKLEAGKK-----LDDKPLA------LLYKNS------GLIASKIGEALNIE-----------------PDEVSRFASPHSLAQIFNIIEGDV-------AGF--------NKTCRACTYENIWRMQEEKVESLLTNQLLSE------------------------
54296138  Legionella pneumophila str. Paris                    : SGN-----------------AFKIDYEEAL-----NHPEH-------SNNKALI------KIIQTI------PDIIQAIQSHLGHN-----------------DSQALIYHNPFSLSQLYTILETKR-------DGF--------HKNCVAVTCENYWRSQKTEIDPEISY-----------------------------
331001027 Parasutterella excrementihominis YIT 11859           : YGP-----------------YFSEDYKFVK----TALKEGKTEKELSKKFAAVI------KVLKMV------SEVVPFIGKELRLS-----------------DEAQSKFDNLYSLAQLYNLIETER-------NGF--------SKVSLAAHLENAWRMT---MTDG--------------------------------
34557932  Wolinella succinogenes DSM 1740                      : HGN-----------------TFKIDIEELR---------KKDPAELSKEEKAKL------RLTDDVI----LNEWSQKIANFFDID-----------------DKHRQRFNNLFSMAQLHTVIDTPR-------SGF--------SSTCKRCTAENRFRSETAFYNDETGE-----------------------------
118497352 Francisella novicida U112                            : NRG-----------------LLNHKINIAR------NTKGKCEKEIFNLICKIE------GSEDKK------GNYKHGLAYELGVLLFGEPNEASKPE----FDRKIKKFNSIYSFAQIQQIAFAER-------KGN--------ANTCAVCSADNAHRMQQIKITEPVED-----------------------------

Motifs                                                         : ________________________________________________________________________________________________________________________________________________________________________________________________________

#positions selected for tree reconstruction (272)              : --------------------------------------------------------------------------------------------------------------****************--------------------------------------------------------------------------
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303229466 Veillonella atypica ACS-134-V-Col7a                  : ----------------------------------------------I---------------------------------------ELMRNDSYNLMEILGDKFS-FMECI-EEENAKLA---------------------------QGQVVNPHDIIDELALSPAVKRAVWQALRIVDEVAHI----------KKA-LP
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : --------------------------------------------------------------------------------------EALRRTNYNLMELLSSKFT-LQESI-DNENKEMN------------------------------EVSYRDLIEESYVSPSLKRAILQTLKIYEEIKKI----------TGR-VP
374307738 Filifactor alocis ATCC 35896                         : ---------------------------------------------------------------------------------------AMWETDNNLMQILSKKFT-FMDNV-EDFNSGKV--------------------------GKIDKITYDSTVKEMFLSPENKRAVWQTIQVAEEIKKV----------MGC-EP
320528778 Solobacterium moorei F0204                           : ----------------------------------------------I-----------------------------------------MWNTNATLMEILSNEKYQFKQNI-ENYKAENY----------------------------DEKQNLHEELDDMYISPAARRSIWQALRIVDEIVDI----------KKS-AP
291520705 Coprococcus catus GD-7                               : ----------------------------------------------A-----------------------------------------LWQTNDNLMQLLSRNYG-FTNEV-EEFNTLKK-----------------------------ETDLSYKTVDELYVSPAVKRQIWQTLKVVKEIQKV----------MGN-AP
42525843  Treponema denticola ATCC 35405                       : -----------------------------------------------------------------------------------NIITAMRETQNNLMELLSSEF-TFTENI-KKINSGFE--------------------------DAEKQFSYDGLVKPLFLSPSVKKMLWQTLKLVKEISHI----------TQA-PP
304438954 Peptoniphilus duerdenii ATCC BAA-1640               : ---------------------------------------------------------------------------------------FMREYNLNLMELMSGHYT-FTEEV-EKLNPVEN------------------------------RELCYEMVDELYLSPSVKRMLWQSLRVVDEIKRI----------IGK-DP
224543312 Catenibacterium mitsuokai DSM 15897                  : ---------------------------------------------------------------------------------------VLEMSRLNLMEIINDKDLGYAQMI-EEATSCPE-----------------------------DGKFTYEEVERLAGSPALKRGIWQSLQIVEEITKV----------MKC-RP
24379809  Streptococcus mutans UA159                           : -----------------------------------------------------------------------------------------GNSNRNFMQLINDD---ALSFK-EEIAKAQV---------------------------IGETDNLNQVVSDIAGSPAIKKGILQSLKIVDELVKI----------MGH-QP
15675041  Streptococcus pyogenes SF370                         : -----------------------------------------------------------------------------------------GFANRNFMQLIHDD---SLTFK-EDIQKAQV---------------------------SGQGDSLHEHIANLAGSPAIKKGILQTVKVVDELVKV----------MGRHKP
16801805  Listeria innocua Clip11262                           : -----------------------------------------------------------------------------------------DGLNRNLMQLINDS---NLSFK-SIIEKEQV---------------------------TTADKDIQSIVADLAGSPAIKKGILQSLKIVDELVSV----------MGY-PP
116628213 Streptococcus thermophilus LMD-9                     : -----------------------------------------------------------------------------------------GISNRNFMQLIHDD---ALSFK-KKIQKAQI------------------------IGD-EDKGNIKEVVKSLPGSPAIKKGILQSIKIVDELVKV----------MGGRKP
323463801 Staphylococcus pseudintermedius ED99                 : -------------------------------------------------------------------------------------------SDENFMEILTND---VYGFQ-NFIKEENQ------------------------V---QSNKIQHQDIANLTTSPALKKGIWSTIKLVRELTSI----------FG--EP
352684361 Acidaminococcus intestini RyC-MR95                   : -------------------------------------------------------------------------------------------TNDNLMQLLS-E---CYTFS-DEITKLQE------------------------AYYAKAQLSLNDFLDSMYISNAVKRPIYRTLAVVNDIRKA----------CGT-AP
302336020 Olsenella uli DSM 7084                               : -----------------------------------------------------------------------------------NPNNGQRSRTMVFMEVLRDE---DLGFQ-KAIDGLNR------------------------DYFREHNNGLMD-VNDLPGSPAIRRSINQAVRIVDEIASI----------ARK-EP
366983953 Oenococcus kitaharae DSM 17330                       : -------------------------------------------------------------------------------------------TKMNLMEIINNAE-DDFGVR-AWIDKQNT------------------------TD--GDEQDVYSLIDELAGPKEIKRGIVQSFRILDDITKA----------VGY-AP
310286728 Bifidobacterium bifidum S17                          : ---------------------------------------------------------------------------------------IMRAEDRNLMEIITDKQLGFSDWI-EQENLGAE-----------------------------NGSSLMEVVDDLRVSPKVKRGIIQSIRLIDDISKA----------VGK-RP
258509199 Lactobacillus rhamnosus GG                           : ---------------------------------------------------------------------------------------ELMLSNHNLMQILADET--LKETM-TELNQDKL-----------------------------KTDDIEDVINDAYTSPSNKKALRQVLRVVEDIKHA----------ANGQDP
300361537 Lactobacillus gasseri JV-V03                         : -------------------------------------------------------------------------------------IEQLWDSQNNFMQIVNQSD--FKDAI-AVANQNLL-----------------------------VNTSVEDILNEAYTSPANKKAIRQVVKVVDDIVKA----------ASGKVP
169823755 Finegoldia magna ATCC 29328                         : --------------------------------------------------------------------------------------NFLRNSSDNLMQIIGSQNYSFNEYI-DKLRKKYI-----------------------------PQEISYEVVENLYVSPSVKKMIWQVIRVTEEITKV----------MGY-DP
47458868  Mycoplasma mobile 163K                               : --------------------------------------------------------------------------------------SYEEKALQNQKN--------NFSHS-NLFEKTWV--------------------------------------EDLIASPTVKRSLRQTMNLLKEIFKY--------SEKNNLEI
284931710 Mycoplasma gallisepticum str. F                      : --------------------------------------------------------------------------------------QKNNDKGWNFEAIKNFDQK-FIDIT-KKNNNLSL------------------------KQNK--RYLDDRFINDAILSPGVKRILREATKVFNAILKQ---------FSEEYDV
363542550 Mycoplasma ovipneumoniae SC01                        : ----------------------------------------------------------------------------------------------NSEYLKWKDEE-IRRKW-EEQKSKLG------------------------KTDKKTKYLNPRIFQDEIISPGTKNTFEQAVLVLNQIIKK---------YSKENII
384393286 Mycoplasma canis PG 14                               : --------------------------------------------------------------------------------------------GWNLEAIKNYDEE-IKSQI-EDNSSLMA------------------------KQDK--KYLNDNFLKDAILPPNVKVTFQQAILIFNKIIQK---------FSKDFEI
71894592  Mycoplasma synoviae 53                               : --------------------------------------------------------------------------------------NYESLKHSNEELKKRTEKA-ELKAQ-QN-----------------------------------QKYLKDNFLKEALVPLSVKTSVLQAIKIFNQIIKN---------FGKKYEI
238924075 Eubacterium rectale ATCC 33656                       : ---------------------------------------------------------------------------------------EMGVTKGTQEEFAG------LKYI-PV-----------------------------------------DVVSEDIFNPVVRRSVRISFKILNAVLKK----------YK--AL
116627542 Streptococcus thermophilus LMD-9                     : -----------------------------------------------------------------------------------------RLGKQKTTSSSNK-----------------------------------------------TKYIDEKLLTEEIYNPVVAKSVRQAIKIVNAAIKE----------YG--DF
315149830 Enterococcus faecalis TX0012                         : ----------------------------------------------------------------------------------------LEQFQLKSDVRKRYSEYKKLPT---------------------------------------------KDVLAEIYNPTVNKTVSQAFKVIDALLVK----------YGKEQI
315659848 Staphylococcus lugdunensis M23590                    : ---------------------------------------------------------------------------------------QMEIFTHLNIKPKKI----NLTAA-NKIPKAMI--------------------------------------DEFILSPVVKRTFGQAINLINKIIEK----------YG--VP
160915782 Eubacterium dolichum DSM 3991                        : ---------------------------------------------------------------------------------------LFGLKQNNELSVKG--------------------------------------------------MKNIQADDTAILSPVAKRAQRETFKVVNRLREI----------YG--EF
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : ---------------------------------------------------------------------------------------TNTGYDFRKKQISK------------------------------------------------------DTIREEITNPVVRRAVTKTIKIVEQIIRR----------YG--KP
310780384 Ilyobacter polytropus DSM 2926                       : ---------------------------------------------------------------------------------------EKADYDYKNNGIKFKRGE-LLPVV-DK---------------------------------------------DLIANPVVLRAISQTRKVVNAIIRK----------YG--TP
325677756 Ruminococcus albus 8                                 : ---------------------------------------------------------------------------------------AKFNKEIPDIDENAKPQ--KLPPF-KN-----------------------------------------EDDCEFFKNPVVFRSINETRKLINAIIDK----------YG--YP
187736489 Akkermansia muciniphila ATCC BAA-835                 : ---------------------------------------------------------------------------------------RGEAHPDGELKAHDGCLYCLLDTD-SSVNQHQK----------------------------------ERRLDTMTNNHLVRHRMLILDRLLKDLIQD----------FADGQK
117929158 Acidothermus cellulolyticus 11B                      : ---------------------------------------------------------------------------------------KTCFGVDDNWRPPL------------------------------------------------------PALHEATGHPVVDRNLAILRKFLSSATMR----------WG--PP
189440764 Bifidobacterium longum DJO10A                        : ---------------------------------------------------------------------------------------KTLFNVTDSWRPPA------------------------------------------------------DPIGEPLGNPSVDRVLKNVNRYLMNCQQR----------WG--NP
283456135 Bifidobacterium dentium Bd1                          : ---------------------------------------------------------------------------------------KAVFGVDDNWKPPV------------------------------------------------------DAISTSVGNPAVDRVLKIVNRYLLACQKR----------WR--NP
38232678  Corynebacterium diphtheriae NCTC 13129               : ---------------------------------------------------------------------------------------LQEFGIEPSWTPPT------------------------------------------------------PRIGEPVGNPAVDRVLKTVSRWLESATKT----------WG--AP
187250660 Elusimicrobium minutum Pei191                        : ---------------------------------------------------------------------------------------EEALKEGKLTKEKQAIKD-RLPYY-GAVLQEST----------QKIIAKGFSPQFKDKGYKTPHTNKYELEYGRIANPVVHQTLNELRKLVNEIIDI----------LGK-KP
319957206 Nitratifractor salsuginis DSM 16511                  : ----------------------------------------------R------IL--------------------------------GFDDRE-------------DYSRY-PKSLRHLH----------------------------LREGNLFEKEENPINNHAVKSLASWALGLIADLSWR----------YG--PF
325972003 Sphaerochaeta globus str. Buddy                      : ---------------------------------------------------------------------------------------ERGMETGEFQELSVWEQQSLLPYY-GQILTGST------QALMGKYWHSAFKEKRDSEGFFKPNTNSDEEKYGRIANPVVHQTLNELRKLMNELITI----------LGA-KP
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : ----------------------------------------------IDKNTLDRIDKIINGEYDEKIS-------------------NRVRDNAINLKDIS-----DFRGL-PVWLACYI----VYDRHSEAKDCTKWNSPE------EIDSYLKKFKQHSLRNPIVEQVVTETLRTVRDIWIQ----------EE--QI
60683389  Bacteroides fragilis NCTC 9343                       : ---------------------------------------------------------------------------------------VYAGYRHSESSLT------REEIA-NKVLKDRL----------------------------------MLLPKNSLHNPVVEKILNQMVNVINVIIDI----------YG--KP
256819408 Capnocytophaga ochracea DSM 7271                     : ---------------------------------------------------------------------------------------EKAGYKHSKLSLT------TEELE-ARELKNII----------------------------------PLLKKNALRNPVVEKILNQMINVVNALIEKNSERDAEGKITKYFHF
90425961  Rhodopseudomonas palustris BisB18                    : ---------------------------------------------------------------------------------------ARVGYDHAARLS---------------------------------------------------------VPLDQVGSPVTRKALSEALKQVRAVARE----------YG--PI
373501184 Prevotella micans F0438                              : KLEENRFADHNYQYQLGEGDDEDINTQIKSHIGAKLWVQIGADEQTKIFQAVRSKYQDFFKSYKRKFVESP-KLGELLVAFLTEKFPNVKSKQWERLYHPS-----QIAIYRPIPVDNDR-----------------------------SKLRLGNPNIGAIKNPTVMRVLNTLRRRVNQLLDD----G----VIS-PDE
294674019 Prevotella ruminicola 23                             : ---------------------------------------------------------DVMHSYDKNNIDGI-TLEGCVKTFLKERY-QVSDDNLKKLYHPS-----MLDPY-PRQRPNDE-----------------------------GVFQLGSPRISSVKNPMAMHSLFRLRKVVNLMLKK----G----YIT--PD
365959402 Flavobacterium columnare ATCC 49512                  : -------------------------GLLKIYNTEDKEGRKVYYSKEAESLFEADLRKKLVPFYKANIIIEEHEQEIIFQDLFPILMDQLKKQEFIKIGRLDKQIEAFLEGENEEGQIFCNH-TDKLKKLYHPSDIEVFKKKTIKDEWGNEKVVLGSPLTTSIKNPMAMRALHQLRKVLNTLIAN----D----QID--ED
312879015 Aminomonas paucivorans DSM 12260                     : ---------------------------------------------------------------------------------------ADAGYAAPPPDRHP-----KLPPLEE----------------------------------------------ADWRNPVVFRALTQTRKVVNALVRR----------YG--PP
83591793  Rhodospirillum rubrum ATCC 11170                     : ---------------------------------------------------------------------------------------TLALGLHHSHRPRQERLA-RLPYY-AAALPDVG-----------------LDGDPVGPPPAEDDGAAAEAYYGRIGNISVHIALNETRKIVNALLHR----------HG--PI
294086111 Candidatus Puniceispirillum marinum IMCC1322         : ---------------------------------------------------------------------------------------KEAGLGEANLYDPYAALSDKLDYY-GKALAGHV------------------------MGASGKFEDSDEKRYGTISNPTVHIALNQVRAVVNELIRL----------HG--KP
121608211 Verminephrobacter eiseniae EF01-2                    : ------------------------------------------------------QAAGFAHHSDLGFDFDYAEDEVQQVG---------EHTIASTGEVQAQYAFKQLPYY-GKALQRHV------------------------AFGSGDAKDHEEKCYGKIANPTVHIGLNQVRTVVNALIRR----------YG--HP
344171927 Ralstonia syzygii R24                                : ----------------------------------------------V----------------------------------------AAGYPAHTADLENGERD--ALPYY-GELLWRYT-------------------------QDAPTAKNDAERKFGKIANPTVHIGLNQLRKLVNALIQR----------YG--KP
159042956 Dinoroseobacter shibae DFL 12                        : ---------------------------------------------------------------------------------------KACGWHHSDGRTGECFD--RLPYY-GEVLERHV------------------------IPGSYHPDDDDITRFGRITNPTVHIGLNQLRRLVNRIIET----------HG--KP
288957741 Azospirillum sp- B510                                : --------------------------------------------------------------------------------------KLLRGGKDHSDFSREGALLDALPYY-GAVLERHV------------------------AFGTGNPADPEEKRVGRVANPTVHIALNQLRHLVNAILAR----------HG--RP
92109262  Nitrobacter hamburgensis X14                         : ---------------------------------------------------------------GAGYHI------------------AAKRAGYDHAKLPTGEQLGRLPYY-GQWLQDAV-------------------------VGSGDARDQKEKQYGQFPNPTVHIGLGQLRRVVNDLIDK----------YG--PP
148255343 Bradyrhizobium sp- BTAi1                             : ---------------------------------------------------------------------------------------SAAGYDHALLPGGKLSPTGYLPYY-GQWLQNDV-------------------------VGSDDERDTNERRWGRLPNPTVHIGIGQLRRVVNELIRW----------HG--PP
34557790  Wolinella succinogenes DSM 1740                      : ----------------------------------------------------------------------------------------------LMLGVPHKEKSAILPPL-NK-------------------------------------------TDIDILNPTVIRAFAQFRKVANALVRK----------YG--AF
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168       : ----------------------------------------------N----------------------------------------ELNLKVAINEDKKD-----FLPAF-NE-----------------------------------------TYYKDEVTNPVVLRAIKEYRKVLNALLKK----------YG--KV
291276265 Helicobacter mustelae 12198                          : ---------------------------------------------------------------------------------------EILQERGIFSKPQPKNRQ-LLPPL-SELAK--------------------------------------EESYFDIPNPVLRRALSEFRKVVNALLEK----------YG--GF
229113166 Bacillus cereus Rock1-15                             : ---------------------------------------------------------------------------------------LCAGYNFRDENKRDKKL--FLPVI------------------------------------------------QQETNPVVHRALTQARKVINAIIRE----------YG--SP
222109285 Acidovorax ebreus TPSY                               : -------------------------------------------------------------------------------------AQIPEYGHHSQRIEPGAAKHLYLPPF-YEAQRKYA------------------------GKGDHIGSMQFRDDADIPRNPVVLRALNQARKVVNALIRE----------YG--SP
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : ---------------------------------------------------------------------------------------TSAGYSLKQEGIKN---------------------------------------------------KLVPPAKENINVAVVARAFAQTRKVINAVIRK----------YG--QF
182624245 Clostridium perfringens D str. JGS1721               : ---------------------------------------------------------------------------------------EKAGYNFKAIYEGVRTK--KLPVI-EI---------------------------------------------DEIVNPVVNRALAQTRKVINSVIDK----------YG--SP
220930482 Clostridium cellulolyticum H10                       : ---------------------------------------------------------------------------------------NMAELDFTGSS--------KLEKC-NKLTV--------------------------------------EPIIENVTNPVVIRALTQARKVINAIIQK----------YG--LP
154250555 Parvibaculum lavamentivorans DS-1                    : ------------------------------------------------------------------------------------NGPDWEGWRRTNFPHRNQPTGEILDKL-PSPASKEE-----------------------------------RERISQLRNPTVVRTQNELRKVVNNLIGL----------YG--KP
257413184 Roseburia intestinalis L1-82                         : ---------------------------------------------------------------------------------------EEA-GYDFKADSKGTKQK-LLTGE-NVNQTI-----------------------------------------NEITNPVVKRSVSQTVKVINAIIRT----------YG--SP
218767588 Neisseria meningitidis Z2491                         : ---------------------------------------------------------------------------------------AEIYGDHY-GKKNTEEKI-YLPPI-PA---------------------------------------------DEIRNPVVLRALSQARKVINGVVRR----------YG--SP
15602992  Pasteurella multocida subsp. multocida str. Pm70     : ---------------------------------------------------------------------------------------REIYGHHY-GEANQKTSQ-LLPAI-PA---------------------------------------------QEIRNPVVLRTLSQARKVINAIIRQ----------YG--SP
319941583 Sutterella wadsworthensis 3 1 45B                    : -------------------------------------------------------------------------------------------------------------------------------------------GETVRAAQCSRLPAETARPFDGLVRRLVDRQAWEIAKRVSTDIQSKVDFS----NGI--VD
254447899 gamma proteobacterium HTCC5015                       : --------------------------------------------------------------------------------------------------------------------------------------IHGERKVPLKSAMCTRLSADSTRPFDGQMASIIEHIARKIAQHKIAQINDVPK------EFS--ID
54296138  Legionella pneumophila str. Paris                    : ---------------------------------------------------------------------------------------------------------------------------------------------------ASRLPADSVRPFDGVLARMMQRLAYEIAMAKWEQIKHIPD------NSS--LL
331001027 Parasutterella excrementihominis YIT 11859           : ------------------------------------------------------------------------------------------------------------------------------------------------SAQCCRLPADCVRPFDGFIRKAIDRNSWEVAKRIAEEVKKSVDFT----NGT--VK
34557932  Wolinella succinogenes DSM 1740                      : -------------------------------------------------------------------------------------------------------------------------------------------FHKKATATCQRLPADTQRPFSGKIERYIDKLGYELAKIKAKELEGMEA-------KE--IK
118497352 Francisella novicida U112                            : -----------------------------------------------------------------------------------------------------------------------------------------NKDKIILSAKAQRLPAIPTRIVDGAVKKMATILAKNIVDDNWQNIKQVLSA-----KHQ--LH

Motifs                                                         : ________________________________________________________________________________________________________________________________________________________________________________________________________

#positions selected for tree reconstruction (272)              : ---------------------------------------------------------------------------------------------------------------------------------------------------------------*************************----------------
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303229466 Veillonella atypica ACS-134-V-Col7a                  : S---RIFVEVARTNK--SEKKKKDSRQKRLSDLYSAI---KKDDVLQSGLQDKEFGALKSG----------------L-----ANYDDAALR-----------------------------------SKKL-YLYYT------QMGR---CAY-TGNIIDLNQLNTDN----YDIDHIYPRSL-TKD------DSFDN
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : K---KVFIEMARGGDESMKNKKIPARQEQLKKLYDSCG--NDIANFSIDIKEMKNSLS-------------------------SYDNNSLRQ------------------------------------KKL-YLYYL------QFGK---CMY-TGREIDLDRLLQNNDT--YDIDHIYPRSKVIKD------DSFDN
374307738 Filifactor alocis ATCC 35896                         : K---KIFIEMARGGE--KVKKRTKSRKAQLLELYAACE--EDCRELIKEIE--------------------------------DRDERDFNS------------------------------------MKL-FLYYT------QFGK---CMY-SGDDIDINELIRGNSK--WDRDHIYPQSK-IKD------DSIDN
320528778 Solobacterium moorei F0204                           : K---KIFIEMAREKKSAMKKKRTESRKDTLLELYKSCK--SQADGFYDEELFEKLSNESNS----------------------RLRR-----------------------------------------DQL-YLYYT------QMGR---SMY-TGKRIDFDKLINDKNT--YDIDHIYPRSK-IKD------DSITN
291520705 Coprococcus catus GD-7                               : K---RVFVEMAREKQ---EGKRSDSRKKQLVELYRACK--NEERDWITELN--------------------------------AQSDQQLRS------------------------------------DKL-FLYYI------QKGR---CMY-SGETIQLDELWDNTK---YDIDHIYPQSK-TMD------DSLNN
42525843  Treponema denticola ATCC 35405                       : K---KIFIEMAKGAE--LEPARTKTRLKILQDLYNNCK--NDADAFSSEIKDLSGKIE-------------------------NEDNLRLRS------------------------------------DKL-YLYYT------QLGK---CMY-CGKPIEIGHVFDTSN---YDIDHIYPQSK-IKD------DSISN
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : K---KIFIEMARAKE--AKNSRKESRKNKLLEFYKFGKKAFINEIGEERYNYLLNEIN-------------------------SEEESKFRW------------------------------------DNL-YLYYT------QLGR---CMY-SLEPIDLADLKSNNI---YDQDHIYPKSK-IYD------DSLEN
224543312 Catenibacterium mitsuokai DSM 15897                  : K---YIYIEFERSEE---AKERTESKIKKLENVYKDLD-EQTKKEYKSVLEELKGFDNTK-----------------------KISS-----------------------------------------DSL-FLYFT------QLGK---CMY-SGKKLDIDSLDK------YQIDHIVPQSL-VKD------DSFDN
24379809  Streptococcus mutans UA159                           : E---NIVVEMARENQ------FT-------NQGRRNSQ--QRLKGLTDSIKEFGSQILKEH----------------------PVENSQLQN------------------------------------DRL-FLYYL------QNGR---DMY-TGEELDIDYLSQ------YDIDHIIPQAF-IKD------NSIDN
15675041  Streptococcus pyogenes SF370                         : E---NIVIEMARENQ------TT-------QKGQKNSR--ERMKRIEEGIKELGSQILKEH----------------------PVENTQLQN------------------------------------EKL-YLYYL------QNGR---DMY-VDQELDINRLSD------YDVDHIVPQSF-LKD------DSIDN
16801805  Listeria innocua Clip11262                           : Q---TIVVEMARENQ------TT-------GKGKNNSR--PRYKSLEKAIKEFGSQILKEH----------------------PTDNQELRN------------------------------------NRL-YLYYL------QNGK---DMY-TGQDLDIHNLSN------YDIDHIVPQSF-ITD------NSIDN
116628213 Streptococcus thermophilus LMD-9                     : E---SIVVEMARENQ------YT-------NQGKSNSQ--QRLKRLEKSLKELGSKILKEN--I--------------PAKLSKIDNNALQN------------------------------------DRL-YLYYL------QNGK---DMY-TGDDLDIDRLSN------YDIDHIIPQAF-LKD------NSIDN
323463801 Staphylococcus pseudintermedius ED99                 : E---KIIMEFATEDQ------QK-------GKKQKSRK--QLW---DDNIKKNKLKSVDEYKYI--------------IDVANKLNNEQLQQ------------------------------------EKL-WLYLS------QNGK---CMY-SGQSIDLDALLSPNATKHYEVDHIFPRSF-IKD------DSIDN
352684361 Acidaminococcus intestini RyC-MR95                   : K---RIFIEMARDGE------SK-------KKRSVTRR--EQIKNLYRSIRKDFQQEV-DF--L--------------EKILENKSDGQLQS------------------------------------DAL-YLYFA------QLGR---DMY-TGDPIKLEHIKDQS---FYNIDHIYPQSM-VKD------DSLDN
302336020 Olsenella uli DSM 7084                               : T---NIFIEVTREED------DP-------RKKGKRTK--RRYDAIKSALEKFKKDDPSLW-------------------KELCEKAPGDMD------------------------------------ERL-SLYFM------QRGK---CMY-SGRPIKIEELHTGK----YEVDHIIPRSY-IKD------DSFEN
366983953 Oenococcus kitaharae DSM 17330                       : K---RVYLEFARKTQ-----------------ESHLTN--SRKNQLSTLLKNAGLSELVTQ--------------------VSQYDAAALQN------------------------------------DRL-YLYFL------QQGK---DMY-SGEKLNLDNLSN------YDIDHIIPQAY-TKD------NSLDN
310286728 Bifidobacterium bifidum S17                          : S---RIFLELADDIQ---PSGRTISRKSRLQDLYRNANLGKEFKGIADELN--------------------------------ACSDKDLQD------------------------------------DRL-FLYYT------QLGK---DMY-TGEELDLDRLSSA-----YDIDHIIPQAV-TQN------DSIDN
258509199 Lactobacillus rhamnosus GG                           : S---WLFIETADGTG--TAGKRTQSRQKQIQTVYANAAQELIDSAVRGELEDKI-----------------------------ADKASFT--------------------------------------DRL-VLYFM------QGGR---DIY-TGAPLNIDQLSH------YDIDHILPQSL-IKD------DSLDN
300361537 Lactobacillus gasseri JV-V03                         : K---QIAIEFTRDAD--DKAKISQTRANKLRKVYKELSNELASETIRNELERV------------------------------AKDQKLLK-------------------------------------DKY-YLYFM------QLGR---DAY-TGEPINIDDLGQ------YDIDHILPQSF-IKD------DSLEN
169823755 Finegoldia magna ATCC 29328                          : D---KIFIEMAKSEE---EKKTTISRKNKLLDLYKAIKKDERDSQYEKLLTGLN-----------------------------KLDDSDLRS------------------------------------RKL-YLYYT------QMGR---DMY-TGEKIDLDKLFDSTH---YDKDHIIPQSMKKDD------SIINN
47458868  Mycoplasma mobile 163K                               : E---KIVVEVTRSSN-------NKHERKKIEGINKYRK--EKYEELKKVYDLP------------------------------NENTTLL--------------------------------------KKL-WLLRQ------QQGY---DAY-SLRKIEANDVINKPWN--YDIDHIVPRSI-SFD------DSFSN
284931710 Mycoplasma gallisepticum str. F                      : T---KVVIELARELS-------EEKELENTKNYKKLIK--KNGDKISEGLKALGISEDEIK----------------------DILKSPTKS------------------------------------YKF-LLWLQ------QDHI---DPY-SLKEIAFDDIFTKTEK--FEIDHIIPYSI-SFD------DSSSN
363542550 Mycoplasma ovipneumoniae SC01                        : D---AIIIESPREKN-------DKKTIEEIK--KRNKK--GKGKTLEKLFQILNLENKGYKLS--------------------DLETKPAKL-----------------------------------LDRL-RFYHQ------QDGI---DLY-TLDKINIDQLINGSQK--YEIEHIIPYSM-SYD------NSQAN
384393286 Mycoplasma canis PG 14                               : D---KVVIELAREMT-------QDQENDALKGIAKAQK--SKKSLVEERLEANNIDKSVFN-------------------------DKYEKL-----------------------------------IYKI-FLWIS------QDFK---DPY-TGAQISVNEIVNNK----VEIDHIIPYSL-CFD------DSSAN
71894592  Mycoplasma synoviae 53                               : S---QVVIEMARELTKPNLEKLLNNATNSNIKILKEKL--DQTEKFDDFTKKKFID---------------------------KIENSVVFR------------------------------------NKL-FLWFE------QDRK---DPY-TQLDIKINEIEDE-----TEIDHVIPYSK-SAD------DSWFN
238924075 Eubacterium rectale ATCC 33656                       : D---TIVIEMPRDRN-------SEEQKKRINDSQKLNE--KEMEYIEKKLAVTYGIKLSPS----------------------DFSSQKQLS------------------------------------LKL-KLWNE------QDGI---CLY-SGKTIDPNDIINNPQL--FEIDHIIPRSI-SFD------DARSN
116627542 Streptococcus thermophilus LMD-9                     : D---NIVIEMARETN-------EDDEKKAIQKIQKANK--DEKDAAMLKAANQYNGKAELPHSVF------------------HGHKQLA--------------------------------------TKI-RLWHQ------QGER---CLY-TGKTISIHDLINNSNQ--FEVDHILPLSI-TFD------DSLAN
315149830 Enterococcus faecalis TX0012                         : R---YITIEMPRDDN-------EEDEKKRIKELHAKNS--QRKNDSQSYFMQKSGWSQEKF----------------QTTI--QKNRRFL--------------------------------------AKL-LYYYE------QDGI---CAY-TGLPISPELLVSDS----TEIDHIIPISI-SLD------DSINN
315659848 Staphylococcus lugdunensis M23590                    : E---DIIIELARENN-------SKDKQKFINEMQKKNE--NTRKRINEIIGKYGN----------------------------QNAKRLV--------------------------------------EKI-RLHDE------QEGK---CLY-SLESIPLEDLLNNPNH--YEVDHIIPRSV-SFD------NSYHN
160915782 Eubacterium dolichum DSM 3991                        : D---SIVVEMAREKN-------SEEQRKAIRERQKFFE--MRNKQVADIIGDDR-----------------------------KINAKLR--------------------------------------EKL-VLYQE------QDGK---TAY-SLEPIDLKLLIDDPNA--YEVDHIIPISI-SLD------DSITN
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : D---GINIELARELG------RNFKERGDIQKRQDKNR--QTNDKIAAELTELGI----------------------------PVNGQNI--------------------------------------IRY-KLHKE------QNGV---DPY-TGDQIPFERAFSEG----YEVDHIIPYSI-SWD------DSYTN
310780384 Ilyobacter polytropus DSM 2926                       : H---TIHVEVARDLA------KSYDDRQTIIKENKKRE--LENEKTKKFISEEFGIK--------------------------NVKGKLL--------------------------------------LKY-RLYQE------QEGR---CAY-SRKELSLSEVILDESM--TDIDHIIPYSR-SMD------DSYSN
325677756 Ruminococcus albus 8                                 : A---AVNIETADELN------KTFEDRAIDTKRNNDNQ--KENDRIVKEIIECIKCDE-------------------------VHARHLI--------------------------------------EKY-KLWEA------QEGK---CLY-SGETITKEDMLRDKDKL-FEVDHIVPYSL-ILD------NTINN
187736489 Akkermansia muciniphila ATCC BAA-835                 : DRISRVCVEVGKELT-----TFSAMDSKKIQRELTLRQ--KSHTDAVNRLKRKLPGK--------------------------ALSANLI--------------------------------------RKC-RIAMD------MNWT---CPF-TGATYGDHELEN------LELEHIVPHSF-RQS------NALSS
117929158 Acidothermus cellulolyticus 11B                      : Q---SIVVELARGAS------ESRERQAEEEAARRAHR--KANDRIRAELRASGLS---------------------------DPSPADL--------------------------------------VRA-RLLEL------YDCH---CMY-CGAPISWEN---------SELDHIVPRTD-GGS------NRHEN
189440764 Bifidobacterium longum DJO10A                        : V---SVNIEHVRSSF------SSVAFARKDKREYEKNN--EKRSIFRSSLSEQLRADEQME----------------------KVRESDL--------------------------------------RRL-EAIQR------QNGQ---CLY-CGRTITFRT---------CEMDHIVPRKGVGST------NTRTN
283456135 Bifidobacterium dentium Bd1                          : Q---SVQIEHVRESF------SSVAKAKETERVQGERA--RYRNDLRRELCEQ-EGLN-------------------------KIRESDI--------------------------------------RRW-ESVQR------QNGT---CLY-CGSPITFRT---------CEMDHIVPRKGVGST------NTRVN
38232678  Corynebacterium diphtheriae NCTC 13129               : E---RVIIEHVREGF------VTEKRAREMDGDMRRRA--ARNAKLFQEMQEKLNVQG-------------------------KPSRADL--------------------------------------WRY-QSVQR------QNCQ---CAY-CGSPITFSN---------SEMDHIVPRAGQGST------NTREN
187250660 Elusimicrobium minutum Pei191                        : C---EIGLETARELK------KSAEDRSKLSREQNDNE--SNRNRIYEIYIRPQQQVIITR----------------R-----ENPRNYI--------------------------------------LKF-ELLEE------QKSQ---CPF-CGGQISPNDIINNQ----ADIEHLFPIAE-SED------NGRNN
319957206 Nitratifractor salsuginis DSM 16511                  : D---EIILETTRDAL-------PEKIRKEIDKAMRERE--KALDKIIGKYKKEF-----------------------------PSIDKRL-------------------------------------ARKI-QLWER------QKGL---DLY-SGKVINLSQLLDGS----ADIEHIVPQSL-GGL------STDYN
325972003 Sphaerochaeta globus str. Buddy                      : Q---EITVELARELK------VGAEKREDIIKQQTKQE--KEAVLAYSKYCEPN-----------------------------NLDKRYI--------------------------------------ERF-RLLED------QAFV---CPY-CLEHISVADIAAGR----ADVDHIFPRDD-TAD------NSYGN
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : D---EIHLELGRDLK------NPADKRKKMSENILKNE--NTNLRIKAMLMEFMNPSMGIE----------------NVRPY-SPSQQDILRIYEENALDNLTKDDKDFDFI----SKISKQAQPSKTDIIRY-KCWLE------QKYR---SPY-TGKTISLSKLFTPA----YEIEHVIPQSL-YFD------DSFSN
60683389  Bacteroides fragilis NCTC 9343                       : D---EIRVELARELK------KNAKEREELTKSIAQTT--KAHEEYKTLLQTEFGLT--------------------------NVSRTDI--------------------------------------LRY-KLYKE---LESCGYK---TLY-SNTYISREKLFSKE----FDIEHIIPQAR-LFD------DSFSN
256819408 Capnocytophaga ochracea DSM 7271                     : D---EIRIELARELK------KNAQKRYEMTQNINKAK--LEHQKISEILQKEFGIK--------------------------NPTKSDI--------------------------------------IRY-RLYQE---LEHNGYK---ELY-TNAPIARDMLFSKN----IEIEHIVPKAR-VFD------DSFSN
90425961  Rhodopseudomonas palustris BisB18                    : D---YFHIELARSVG------KSAEERKQLTDGIEARN--VEKAKRRKQAEEHLGRAPSD---------------------------DEL--------------------------------------LRY-ELAKE------QNFK---CIY-SGDAIDPAGVAANDTR--YQVDHILPWSR-FGD------DSYLN
373501184 Prevotella micans F0438                              : T---RVVVETARELN-------DANTKWALDRYNRIRR--DENEKIRKILKELNPTTNSISEQDIDKARYIFEQCETDFYTDGKVPYYNKDI------------------------------------KKY-KLWLE------QGGQ---CLY-TGQTINLTNLFNPNA---FDMEHTIPKSI-SFD------NSDQN
294674019 Prevotella ruminicola 23                             : T---KVHIEFSRDLN-------DANKRWAIQTWQRENE--KERERCRKEIEKYIASPS----------------------------DTDI--------------------------------------LKY-QLWEE------QNHK---CLY-TGDEIRITDFLGDNPK--YDIEHTIPRSA-GGD------STKMN
365959402 Flavobacterium columnare ATCC 49512                  : T---RIHIEMARELN-------DANKRKGIQDFQNENK--KFREEAIKEIKKLYLEECHKD----------------V-----NPTEDDI--------------------------------------LRY-QLWLE------QGKC---EIYEEGNNISICDIIGSNPS--YDIEHTIPRSI-SQD------NSQMN
312879015 Aminomonas paucivorans DSM 12260                     : W---CIHLETARELS------QPAKVRRRIETEQQANE--KKKQQAEREFLDIVGT---------------------------APGPGDL--------------------------------------LKM-RLWRE------QGGF---CPY-CEEYLNPTRLAEPGY---AEMDHILPYSR-SLD------NGWHN
83591793  Rhodospirillum rubrum ATCC 11170                     : L--RLVMVETTRELK------AGADERKRMIAEQAERE--RENAEIDVELRKSDRWM--------------------------ANARERR--------------------------------------QRV-RLARR------QNNL---CPY-TSTPIGHADLLGDA----YDIDHVIPLAR-GGR------DSLDN
294086111 Candidatus Puniceispirillum marinum IMCC1322         : D---EVVIEIGRDLP------MGADGKRELERFQKEGR--AKNERARDELKKLGH----------------------------IDSRESR--------------------------------------QKF-QLWEQLAKEP-VDRC---CPF-TGKMMSISDLFSDK----VEIEHLLPFSL-TLD------DSMAN
121608211 Verminephrobacter eiseniae EF01-2                    : T---EVVVELARDLK------QSREQKQQTQREQADNQ--KRNEDIRKRIAPILETSPE------------------------RVRDRDI--------------------------------------KKW-ILWEELNKKDIADRH---CPY-SGERISATMLLSEA----VEIEHILPFSR-TLD------DSLNN
344171927 Ralstonia syzygii R24                                : A---QIVVELARNLK------AGLEEKERIKKQQTANL--ERNERIRQKLQDAGV----------------------------PDNRENR--------------------------------------LRM-RLFEELG---QGNGLGTPCIY-SGRQISLQRLFSND----VQVDHILPFSK-TLD------DSFAN
159042956 Dinoroseobacter shibae DFL 12                        : H---QIVVELARDLK------KSEEQKRADIKRIRDTT--EAAKKRSEKLEELEI----------------------------EDNGRNR--------------------------------------MLL-RLWEDLNPDDAMRRF---CPY-TGTRISAAMIFDGS----CDVDHILPYSR-TLD------DSFPN
288957741 Azospirillum sp- B510                                : E---EIVIELARDLK------RSAEDRRREDKRQADNQ--KRNEERKRLILSLGE----------------------------RPTPRNL--------------------------------------LKL-RLWEEQGPV--ENRR---CPY-SGETISMRMLLSEQ----VDIDHILPFSV-SLD------DSAAN
92109262  Nitrobacter hamburgensis X14                         : T---EISIEFTRALK------LSEQQKAERQREQRRNQ--DKNKARAEELAKFGR----------------------------PANPRNL--------------------------------------LKM-RLWEELAHDP-LDRK---CVY-TGEQISIERLLSDE----VDIDHILPVAM-TLD------DSPAN
148255343 Bradyrhizobium sp- BTAi1                             : A---EITVELTRDLK------LSPRRLAELEREQAENQ--RKNDKRTSLLRKLGL----------------------------PASTHNL--------------------------------------LKL-RLWDE------QGDVASECPY-TGEAIGLERLVSDD----VDIDHLIPFSI-SWD------DSAAN
34557790  Wolinella succinogenes DSM 1740                      : D---RVHFELAREIN-------TKGEIEDIKESQRKNE--KERKEAADWIAETSFQV--------------------------PLTRKNI--------------------------------------LKK-RLYIQ------QDGR---CAY-TGDVIELERLFDEGY---CEIDHILPRSR-SAD------DSFAN
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : H---KINIELAREVG------KNHSQRAKIEKEQNENY--KAKKDAELECEKLGL----------------------------KINSKNI--------------------------------------LKL-RLFKE------QKEF---CAY-SGEKIKISDLQDEKM---LEIDHIYPYSR-SFD------DSYMN
291276265 Helicobacter mustelae 12198                          : H---YFHIELTRDVC------KAKSARMQLEKINKKNK--SENDAASQLLEVLGL----------------------------PNTYNNR--------------------------------------LKC-KLWKQ------QEEY---CLY-SGEKITIDHLKDQRA---LQIDHAFPLSR-SLD------DSQSN
229113166 Bacillus cereus Rock1-15                             : N---TIRFVVANDLA------KTYKQRKELESTLKKNR--AENEKIKTKLLSMGII---------------------------NPTGMDI--------------------------------------VKY-KLWYE------QSGI---CLY-TGRQMELSSLFKPGY---SIVNHIIPYNR-SFD------DTYHN
222109285 Acidovorax ebreus TPSY                               : I---AVNIEMARDLS------RPLDERNKVKRAQEEFR--DRNDRARSEFERDFGY---------------------------KPKAAAF--------------------------------------EKW-MLYRE------QLGQ---CAY-SQQPLDIQRVLDDHNY--AQVDHALPYSR-SYD------DSKNN
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : D---QINIELATELK------NSKFDRSKIEEGQKKFQ--SQKDKIFKEVQELRGGM--------------------------TPSSSLL--------------------------------------LKY-RLWRE------QDER---CVY-SGRKISFEDLLDTGF---LDIDHIIPYSK-SMD------DSFNN
182624245 Clostridium perfringens D str. JGS1721               : V---RINIELARDLA------KNFKDRKLIEKEQKENR--ANLDKIRENLRELMDK---------------------------EPTVVEV--------------------------------------LKY-RLWEQ------QRGE---CAY-TQSQIPLERLFSPGY---CEIDHIIPFSR-SFD------DSLSN
220930482 Clostridium cellulolyticum H10                       : Y---MVNIELAREAG------MTRQDRDNLKKEHENNR--KAREKISDLIRQNGR----------------------------VASGLDI--------------------------------------LKW-RLWED------QGGR---CAY-SGKPIPVCDLLNDSL---TQIDHIYPYSR-SMD------DSYMN
154250555 Parvibaculum lavamentivorans DS-1                    : D---RIRIEVGRDVG------KSKREREEIQSGIRRNE--KQRKKATEDLIKNGIA---------------------------NPSRDDV--------------------------------------EKW-ILWKE------GQER---CPY-TGDQIGFNALFREGR---YEVEHIWPRSR-SFD------NSPRN
257413184 Roseburia intestinalis L1-82                         : Q---AINIELAREMS------KTFEERRKIKGDMEKRQ--KNNEDVKKQIQEL-----GKLS----------------------PTGQDI--------------------------------------LKY-RLWQE------QQGI---CMY-SGKTIPLEELFKPGY----DIDHILPYSI-TFD------DSFRN
218767588 Neisseria meningitidis Z2491                         : A---RIHIETAREVG------KSFKDRKEIEKRQEENR--KDREKAAAKFREYFPNFVGE------------------------PKSKDI--------------------------------------LKL-RLYEQ------QHGK---CLY-SGKEINLGRLNEKGY---VEIDHALPFSR-TWD------DSFNN
15602992  Pasteurella multocida subsp. multocida str. Pm70     : A---RVHIETGRELG------KSFKERREIQKQQEDNR--TKRESAVQKFKELFSDFSSE------------------------PKSKDI--------------------------------------LKF-RLYEQ------QHGK---CLY-SGKEINIHRLNEKGY---VEIDHALPFSR-TWD------DSFNN
319941583 Sutterella wadsworthensis 3 1 45B                    : V---SIFVEENKFEF------SASVADLK----K-------NKRVKDKM---LSEAEKLETRWLIKN-------------------------------------------------------------ERI-KKA--------SRGT---CPY-TGDRLAEG----------GEIDHILPRSL-IKDARGIVFNAEPN
254447899 gamma proteobacterium HTCC5015                       : I---PIIIESNQFSF------TAELEEIKRGRGS-------AKAKKA-----KELGEKSKAGWVSKT-------------------------------------------------------------ERI-KTS--------SEGI---CPY-TGAPLGGS----------GEIDHIIPRSL-TGRTKKTVFNSEAN
54296138  Legionella pneumophila str. Paris                    : I---PIYLEQNRFEF------EESFKKIK-GSSS-------DKTLEQ-------AIEKQNIQWEEKF-------------------------------------------------------------QRI-INA--------SMNI---CPY-KGASIGGQ----------GEIDHIYPRSL-SKKHFGVIFNSEVN
331001027 Parasutterella excrementihominis YIT 11859           : I---PVAIEANSFNF------TASLTDLKYIQLK-------EQKLKKKLEDIQRNEENQEKRWLSKE-------------------------------------------------------------ERI-RAD--------SHGI---CAY-TGRPLDDV----------GEIDHIIPRSL-TLKKSESIYNSEVN
34557932  Wolinella succinogenes DSM 1740                      : V---PIILEQNAFEY------EESLRKSKTGSND----RVINSKKDRDGKKLAKAKENAEDRLKDKD-------------------------------------------------------------KRI-KAF--------SSGI---CPY-CGDTIGDD----------GEIDHILPRSH-TLKIYGTVFNPEGN
118497352 Francisella novicida U112                            : I---PIITESNAFEF------EPALADVKGKSLK-------DRRKK------ALERISPENIFKDKN-------------------------------------------------------------NRI-KEF--------AKGI---SAY-SGANLTDG---DFDGAK-EELDHIIPRSH----KKYGTLNDEAN

Motifs                                                         : ________E_______________________________________________________________________________________________________________________{____________________________HNH_____________*_***___________________*

#positions selected for tree reconstruction (272)              : ----***********--------------------------------------------------------------------------------------------------------------------------------****---***-********----------***********----------*****
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303229466 Veillonella atypica ACS-134-V-Col7a                  : LVLCERTANA-KKSDIYPIDN--------RIQTKQKPFWA-------------FLKH-------------------------QGLIS-------------ERKYERLTRIA------------------PLTADDLSGFIARQLVETNQSVKATTTLLRRLYPDI-----------------------DVVFVKAENVSD
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : LVLVLKNENA-EKSNEYPVKK--------EIQEKMKSFWR-------------FLKE-------------------------KNFIS-------------DEKYKRLTGKD---------------------DFELRGFMARQLVNVRQTTKEVGKILQQIEPEI-----------------------KIVYSKAEIASS
374307738 Filifactor alocis ATCC 35896                         : LVLVNKTYNA-KKSNELLSED---------IQKKMHSFWL-------------SLLN-------------------------KKLIT-------------KSKYDRLTRKG------------------DFTDEELSGFIARQLVETRQSTKAIADIFKQIYSS------------------------EVVYVKSSLVSD
320528778 Solobacterium moorei F0204                           : RVLVEKDING-EKTDIYPISE--------DIRQKMQPFWK-------------ILKE-------------------------KGLIN-------------EEKYKRLTRNY------------------ELTDEELSSFVARQLVETQQSTKALATLLKKEYPSA-----------------------KIVYSKAGNVSE
291520705 Coprococcus catus GD-7                               : RVLVKKNYNA-IKSDTYPLSL--------DIQKKMMSFWK-------------MLQQ-------------------------QGFIT-------------KEKYVRLVRSD------------------ELSADELAGFIERQIVETRQSTKAVATILKEALPDT-----------------------EIVYVKAGNVSN
42525843  Treponema denticola ATCC 35405                       : RVLVCSSCNK-NKEDKYPLKS--------EIQSKQRGFWN-------------FLQR-------------------------NNFIS-------------LEKLNRLTRAT------------------PISDDETAKFIARQLVETRQATKVAAKVLEKMFPET-----------------------KIVYSKAETVSM
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : RVLVKKNLNH-EKGNQYPIPE-------KVLNKNAYGFWK-------------ILFD-------------------------KGLIG-------------QKKYTRLTRRT------------------PFEERELAEFIERQIVETRQATKETANLLKNICQDS-----------------------EIVYSKAENASR
224543312 Catenibacterium mitsuokai DSM 15897                  : RVLVVPSENQ-RKLDDLVVPF--------DIRDKMYRFWK-------------LLFD-------------------------HELIS-------------PKKFYSLIKTE-------------------YTERDEERFINRQLVETRQITKNVTQIIEDHYSTT-----------------------KVAAIRANLSHE
24379809  Streptococcus mutans UA159                           : RVLTSSKENR-GKSDDVPSKD---------VVRKMKSYWS-------------KLLS-------------------------AKLIT-------------QRKFDNLTKAE----------------RGGLTDDDKAGFIKRQLVETRQITKHVARILDERFNTETDENNKKIRQV------------KIVTLKSNLVSN
15675041  Streptococcus pyogenes SF370                         : KVLTRSDKNR-GKSDNVPSEE---------VVKKMKNYWR-------------QLLN-------------------------AKLIT-------------QRKFDNLTKAE----------------RGGLSELDKAGFIKRQLVETRQITKHVAQILDSRMNTKYDENDKLIREV------------KVITLKSKLVSD
16801805  Listeria innocua Clip11262                           : LVLTSSAGNR-EKGDDVPPLE---------IVRKRKVFWE-------------KLYQ-------------------------GNLMS-------------KRKFDYLTKAE----------------RGGLTEADKARFIHRQLVETRQITKNVANILHQRFNYEKDDHGNTMKQV------------RIVTLKSALVSQ
116628213 Streptococcus thermophilus LMD-9                     : KVLVSSASNR-GKSDDVPSLE---------VVKKRKTFWY-------------QLLK-------------------------SKLIS-------------QRKFDNLTKAE----------------RGGLSPEDKAGFIQRQLVETRQITKHVARLLDEKFNNKKDENNRAVRTV------------KIITLKSTLVSQ
323463801 Staphylococcus pseudintermedius ED99                 : KVLVIKKMNQ-TKGDQVPLQF-------IQQPYERIAYWK-------------SLNK-------------------------AGLIS-------------DSKLHKLMKPE-------------------FTAMDKEGFIQRQLVETRQISVHVRDFLKEEY-----------PNT------------KVIPMKAKMVSE
352684361 Acidaminococcus intestini RyC-MR95                   : KVLVQSEING-EKSSRYPLDA--------AIRNKMKPLWD-------------AYYN-------------------------HGLIS-------------LKKYQRLTRST------------------PFTDDEKWDFINRQLVETRQSTKALAILLKRKF-----------PDT------------EIVYSKAGLSSD
302336020 Olsenella uli DSM 7084                               : KVLVYREENQ-HKTDALLIDS--------SIRQKMGGYWR-------------MLHD-------------------------AKLVG-------------DKKFRNLFRNH-------------------IDDKAMKGFVARQIVETSQMVKLVQTLFEARY-----------PNT------------RIVPVKAGISHD
366983953 Oenococcus kitaharae DSM 17330                       : RVLVSNITNR-RKSDSSNYLP--------ALIDKMRPFWS-------------VLSK-------------------------QGLLS-------------KHKFANLTRTR------------------DFDDMEKERFIARSLVETRQIIKNVASLIDSHFG----------GET------------KAVAIRSSLTAD
310286728 Bifidobacterium bifidum S17                          : RVLVARAENA-RKTDSFTYMP--------QIADRMRNFWQ-------------ILLD-------------------------NGLIS-------------RVKFERLTRQN------------------EFSEREKERFVQRSLVETRQIMKNVATLMRQRYGNSA----------------------AVIGLNAELTKE
258509199 Lactobacillus rhamnosus GG                           : RVLVNATINR-EKNNVFASTL---------FAGKMKATWR-------------KWHE-------------------------AGLIS-------------GRKLRNLMLRP------------------DEIDKFAKGFVARQLVETRQIIKLTEQIAAAQYPNT-----------------------KIIAVKAGLSHQ
300361537 Lactobacillus gasseri JV-V03                         : RVLVKKAVNN-GKSDNVPVKLYGNRMAAD-LGMTIRHMWE-------------KWKD-------------------------QGLIT-------------KTKYNNLIIDP-----------------DKINKYESSGFIHRQLVETSQIIKLVSTILQSKYPDT-----------------------EIIVVKARYNHY
169823755 Finegoldia magna ATCC 29328                          : LVLVNKNANQTTKGNIYPVPS------SIRNNPKIYNYWK-------------YLME-------------------------KEFIS-------------KEKYNRLIRNT------------------PLTNEELGGFINRQLVETRQSTKAIKELFEKFYQKS-----------------------KIIPVKASLASD
47458868  Mycoplasma mobile 163K                               : LVIVNKLDNA-KKSNDLSAKQFIEKIYGIEKLKEAKENWG-------------NWYL-------------------------RNANG--------KAFNDKGKFIKLYTID------------------NLDEFDNSDFINRNLSDTSYITNALVNHLTFSNSKYKY---------------------SVVSVNGKQTSN
284931710 Mycoplasma gallisepticum str. F                      : KLLVLAESNQ-AKSNQTPYEF--------ISSGNAGIKWE-------------DYEA-------------------------YCRKFKDGDSSLLDSTQRSKKFAKMMKTD-----------------TSSKYDI--GFLARNLNDTRYATIVFRDALEDYANNHLVEDKPMF---------------KVVCINGSVTSF
363542550 Mycoplasma ovipneumoniae SC01                        : KILTEKAENL-KKGKLIASEY--------IKRNGDEF-YN-------------KYYEK---------AKELFINKYKKNKKLDSYV-------DLDEDSAKNRFRFLTLQD------------------YDEFQV--EFLARNLNDTRYSTKLFYHALVEHFENNEFFTYIDENSSK--------HKVKISTIKGHVTKY
384393286 Mycoplasma canis PG 14                               : KVLVHKQSNQ-EKSNSLPYEY--------IKQGHSGWNWD-------------EFTK------------------------YVKRVFVNNVDSILSKKERLKKSENLLTAS------------------YDGYDKL-GFLARNLNDTRYATILFRDQLNNYAEHHLIDNKKMF---------------KVIAMNGAVTSF
71894592  Mycoplasma synoviae 53                               : KLLVKKSTNQ-LKKNKTVWEY-------YQNESDPEAKWN-------------KFVA-------------------------WAKRIYLVQKSDKESKDNSEKNSIFKNKK-------PNLKFKNITKKLFDPYKDLGFLARNLNDTRYATKVFRDQLNNYSKHHSKDDENKLF--------------KVVCMNGSITSF
238924075 Eubacterium rectale ATCC 33656                       : KVLVYRSENQ-KKGNQTPYYY----------LTHSHSEWS-----------FEQYKA-------------------------TVMNL----SKKKEYAISRKKIQNLLYSE-----------------DITKMDVLKGFINRNINDTSYASRLVLNTIQNFFMANEADT-------------------KVKVIKGSYTHQ
116627542 Streptococcus thermophilus LMD-9                     : KVLVYATANQ-EKGQRTPYQA----------LDSMDDAWS-----------FRELKA-------------------------FVRES---------KTLSNKKKEYLLTEE-----------------DISKFDVRKKFIERNLVDTRYASRVVLNALQEHFRAHKIDT-------------------KVSVVRGQFTSQ
315149830 Enterococcus faecalis TX0012                         : KVLVLSKANQ-VKGQQTPYDA--WMDGSFKKINGKFSNWD-------------DYQK-------------------------WVESR----------HFSHKKENNLLETR-----------------NIFDSEQVEKFLARNLNDTRYASRLVLNTLQSFFTNQET---------------------KVRVVNGSFTHT
315659848 Staphylococcus lugdunensis M23590                    : KVLVKQSENS-KKSNLTPYQY--------FNSGKSKLSYN-------------QFKQ-------------------------HILNL-----SKSQDRISKKKKEYLLEER-----------------DINKFEVQKEFINRNLVDTRYATRELTNYLKAYFSANNMNV-------------------KVKTINGSFTDY
160915782 Eubacterium dolichum DSM 3991                        : KVLVTHRENQ-EKGNLTPISA-------FVKGRFTKGSLA-------------QYKA-------------------------YCLKL-KEKNIKTNKGYRKKVEQYLLNEN-----------------DIYKYDIQKEFINRNLVDTSYASRVVLNTLTTYFKQNEIPT-------------------KVFTVKGSLTNA
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : KVLTSAKCNR-EKGNRIPMVY-------LANNEQRLNALT-------------NIAD-------------------------NIIRN-------------SRKRQKLLKQK-------------------LSDEELKDWKQRNINDTRFITRVLYNYFRQAIEFNPELEKKQ----------------RVLPLNGEVTSK
310780384 Ilyobacter polytropus DSM 2926                       : KVLVLSGENR-KKSNLLPKEY----------FDRQGRDWD-------------TFVL-------------------------NVKAM----------KIHPRKKSNLLKEK-------------------FTREDNKDWKSRALNDTRYISRFVANYLENALEYRDDSPKK-----------------RVFMIPGQLTAQ
325677756 Ruminococcus albus 8                                 : KALVYAEENQ-KKGQRTPLMY---------MNEAQAADYR-------------VRVN-------------------------TMFKS---------KKCSKKKYQYLMLPD------------------LNDQELLGGWRSRNLNDTRYICKYLVNYLRKNLRFDRSYESSDEDDLKIRDHY------RVFPVKSRFTSM
187736489 Akkermansia muciniphila ATCC BAA-835                 : LVLTWPGVNR-MKGQRTGYDF-----VEQEQENPVPDKPNLHICSL------NNYRE-------------------------LVEKLDDKKGHEDDRRRKKKRKALLMVRG----------LSHKHQSQNHEAMKEIGMTEGMMTQSSHLMKLACKSIKTSLPDA-----------------------HIDMIPGAVTAE
117929158 Acidothermus cellulolyticus 11B                      : LAITCGACNK--EKGRRPFASWAETS--------NRVQLR-------------DVID-------------------------RVQKL----KYSGNMYWTRDEFSRYKKSV----------------VARLKRRTSDPEVIQSIESTGYAAVALRDRLLSYGEKNGVA--------------------QVAVFRGGVTAE
189440764 Bifidobacterium longum DJO10A                        : FAAVCAECNR--MKSNTPFAIWARSEDA----QTRGVSLA-------------EAKK-------------------------RVTMFTFNPKSYAPREVKAFKQAVIARLQ--------------------QTEDDAAIDNRSIESVAWMADELHRRIDWYFNAKQYVNSASIDDAEAETMKT-----TVSVFQGRVTAS
283456135 Bifidobacterium dentium Bd1                          : LAAACAACNK--LKSNTAFSVWARTEGAANRKVSQRDAIE-------------RVKT-------------------------FIFNK--SVPPREQRAFKQAVISRLRQAE-----------------------SDPAIDNRSIESVAWMADELHRRIEAYFNQDADVSGNTPAT-------------QVWVFQGRVTAL
38232678  Corynebacterium diphtheriae NCTC 13129               : LVAVCHRCNQ--SKGNTPFAIWAKNTSIEG--VSVKEAVE-------------RTRH-------------------------WVTDT--GMRSTDFKKFTKAVVERFQRAT-----------------------MDEEIDARSMESVAWMANELRSRVAQHFASHGT---------------------TVRVYRGSLTAE
187250660 Elusimicrobium minutum Pei191                        : LVISHSACNA-DKAKRSPWAA--------FASAAKDSKYD---------------YN-------------------------RILSNVKENIPHKAWRFNQGAFEKFIENK--------------------------PMAARFKTDNSYISKVAHKYLACLFEKP-----------------------NIICVKGSLTAQ
319957206 Nitratifractor salsuginis DSM 16511                  : TIVTLKSVNA-AKGNRLPGDW-------LAGNPDYRERIG-------------MLSE-------------------------KGLID-------------WKKRKNLLAQS-------------------LDEIYTENTHSKGIRATSYLEALVAQVLKRYYPFPDPELRKNGI--------------GVRMIPGKVTSK
325972003 Sphaerochaeta globus str. Buddy                      : KVVAHRQCND-IKGKRTPYAA-----------FSNTSAWG-------------PIMH-------------------------YLDETPGMWRKRRKFETNEEEYAKYLQSK--------------------------GFVSRFESDNSYIAKAAKEYLRCLFNPNNVT--------------------AVGSLKGMETSI
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : KVICEAEVNK-LKDRQLGYKF-----IAEHHGEKVQLSQG-------------EVVE-------------------------ILSVDAYEKFVKENYANNRIKMKKLLMES-----------------------IPDEFIERQLNDSRYISKVVKGLLSNIVREKIDDENYEPEAVSK----------NLISCNGAITDR
60683389  Bacteroides fragilis NCTC 9343                       : KTLEARSVNI-EKGNKTAYDF----VKEKFGESGADNSLE-------------HYLN-------------------------NIEDL------FKSGKISKTKYNKLKMAE---------------------QDIPDGFIERDLRNTQYIAKKALSMLNEISH-------------------------RVVATSGSVTDK
256819408 Capnocytophaga ochracea DSM 7271                     : KTLTFHRINS-DKGEYTAFDY----IT----SLNSEEELN-------------QYLT-------------------------RVENA------YKTKSISPTKYKNLLKKA---------------------SEIGDDFINRDLRDTQYIAKKAKEILFQVTK-------------------------NVLSTSGSITDR
90425961  Rhodopseudomonas palustris BisB18                    : KTLCTARSNQ-NKRGRTPFEW--------FEADKTDVEWM-------------EYVA-------------------------RVENL--------QEVKGRKKRNYSIKDA---------------------AAIEDKFKARNLTDTQWATRLLADELSRMFPPRECERAICGRADGGNDGLTIVEERRVFTRPGAITSK
373501184 Prevotella micans F0438                              : LTLCESYYNRFIKKNNIPTDMPNYDKDVTINGKEYTAIKPRLQRWKERVDRLSRNVDFW-----------KGQARRAQDKDRKDECIREKHLWDMELAYWKGKLERFTMTD-----------------------VTDGFKNSQLVDTRVITRHAVLYLKSIFN-------------------------HVEVQRGETTAE
294674019 Prevotella ruminicola 23                             : LTLCSSRFNRDEKKTKLPAELVNHDE-----------ILERISNWKEKYEDIDKQIR-------------KISTKGATSKEDKDSKIRRRHYLILQRDYWRGKYQRFTMTE-----------------------VPEGFSRRQGTDISVISRYARMYLKSVFK-------------------------QVYIVKGIATSD
365959402 Flavobacterium columnare ATCC 49512                  : KTLCSLKFNRSIKKQKMPVEL-----SNYNDILPRIAHWKKEAEEL------TRQIE-------------------------TISRSIKSAATKVAKDKNIRKRHYLTLKR---------DYILGKYERFTWEEPKVGFKNSQIPDTGIITKYAQAYLKSYFK-------------------------RVESVKGGAVAE
312879015 Aminomonas paucivorans DSM 12260                     : RVLVHGKDNR-DKGNRTPFEA----------FGGDTARWD-------------RLVA-------------------------WVQAS----------HLSAPKKRNLLRED-------------------FGEEAERELKDRNLTDTRFITKTAATLLRDRLTFHPEAPKD-----------------PVMTLNGRLTAF
83591793  Rhodospirillum rubrum ATCC 11170                     : MVLCQSDANK-TKGDKTPWEA-----------FHDKPGWI------------AQRDD-------------------------FLARLDPQTAKALAWRFADDAGERVARKS--------------------AEDEDQGFLPRQLTDTGYIARVALRYLSLVTNEPN----------------------AVVATNGRLTGL
294086111 Candidatus Puniceispirillum marinum IMCC1322         : KTVCFRQANR-DKGNRAPFDA--------FGNSPAGYDWQ-------------EILG-------------------------RSQNL------------PYAKRWRFLPDA------------------MKRFEADGGFLERQLNDTRYISRYTTEYISTIIPKN-----------------------KIWVVTGRLTSL
121608211 Verminephrobacter eiseniae EF01-2                    : RTVAMRRANR-IKGDRTPWEA-------RADFEAQGWRYE-------------AILQ-------------------------RAEGM----PPRKRYRFAEDGYQRWLGKD-------------------------RNFLARALNDTSYLSRLAANYLRLVCPQ------------------------GVRVIPGQMTDK
344171927 Ralstonia syzygii R24                                : KVLAQHDANR-YKGNRGPFEA--------FGANRDGYAWD-------------DIRA-------------------------RAAVL------------PRNKRNRFAETA-----------------MQDWLHNETDFLARQLTDTAYLSRVARQYLTAICSKD-----------------------DVYVSPGRLTAM
159042956 Dinoroseobacter shibae DFL 12                        : RTLCLREANR-QKRNQTPWQA-----------WGDTPHWH-------------AIAA-------------------------NLKNL------------PENKRWRFAPDA------------------MTRFEGENGFLDRALKDTQYLARISRSYLDTLFTKGG----------------------HVWVVPGRFTEM
288957741 Azospirillum sp- B510                                : KVVCLREANR-IKRNRSPWEA----------FGHDSERWA-------------GILA-------------------------RAEAL------------PKNKRWRFAPDA------------------LEKLEGEGGLRARHLNDTRHLSRLAVEYLRCVCP-------------------------KVRVSPGRLTAL
92109262  Nitrobacter hamburgensis X14                         : KIICMRYANR-HKRKQTPSEA----FGSSPTLQGHRYNWD-------------DIAA-------------------------RATGL------------PRNKRWRFDANA------------------REEFDKRGGFLARQLNETGWLARLAKQYLGAVTDPN-----------------------QIWVVPGRLTSM
148255343 Bradyrhizobium sp- BTAi1                             : KVVCMRYANR-EKGNRTPFEA-------FGHRQGRPYDWA-------------DIAE-------------------------RAARL------------PRGKRWRFGPGA------------------RAQFEELGDFQARLLNETSWLARVAKQYLAAVTHPH-----------------------RIHVLPGRLTAL
34557790  Wolinella succinogenes DSM 1740                      : KVLCLARANQ-QKTDRTPYEW----------FGHDAARWN-------------AFET-------------------------RTSAP------SNRVRTGKGKIDRLLKKN-------------------FDENSEMAFKDRNLNDTRYMARAIKTYCEQYWVFKNSHTKA-----------------PVQVRSGKLTSV
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : KVLVFTKQNQ-EKLNQTPFEA----------FGNDSAKWQ-------------    -------------------------KIEVL--------AKNLPTKKQKRILDKN-------------------YKDKEQKNFKDRNLNDTRYIARLVLNYTKDYLDFLPLSDDENTKLNDTQKGSKV----HVEAKSGMLTSA
291276265 Helicobacter mustelae 12198                          : KVLCLTSSNQ-EKSNKTPYEW----------LGSDEKKWD-------------MYVG-------------------------RVYSS----------NFSPSKKRKLTQKN-------------------FKERNEEDFLARNLVDTGYIGRVTKEYIKHSLSFLPLPDGKKE---------------HIRIISGSMTST
229113166 Bacillus cereus Rock1-15                             : RVLTLTETKY-EKGNKIPFEY----------FGAEETCWN-------------EYEK-------------------------RVSTS---------KKIHDKKREKLLIRN-------------------FDIEYENEMISNNVFDTHYIGSYFEKYIDEHLQFKKSTKKQ-----------------KVFSIHGNMVAH
222109285 Acidovorax ebreus TPSY                               : KVLVLTHENQ-NKGNRTAFEY-----LTSFPDGEDGERWR-------------TFVA-------------------------WVQGN---------KAYRMAKRNRLLRKN-------------------YGVDESKGFIDRNLNDTRYICKFFKNYVEEHLQLAARADGDTAR--------------RCVVVNGQLTAF
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : KVLCLAEENR-NKKNDIPFNY----------YQRIDRDWN-------------LLIS-------------------------IITSM---------KNMKIAKKSRLLKQE---------------------LSDIEGFIERNINDTRYATRYIKDFLENNLEFKENEFIKV----------------KVQARSGGLTSV
182624245 Clostridium perfringens D str. JGS1721               : KILVLGSENQ-RKGNRTPYEY----------FGEDSERWN-------------SFEI-------------------------WVKGS----------YLNYKKKANLLKKK-------------------FSEEEQRDWKARNLQDTKYICRYISNFVNNRLEFKESENKQ-----------------KVITVNGRATAY
220930482 Clostridium cellulolyticum H10                       : KVLVLTDENQ-NKRSYTPYEV-----------WGSTEKWE-------------DFEA-------------------------RIYSM----------HLPQSKEKRLLNRN-------------------FITKDLDSFISRNLNDTRYISRFLKNYIESYLQFSNDSPKS-----------------CVVCVNGQCTAQ
154250555 Parvibaculum lavamentivorans DS-1                    : KTLCRKDVNI-EKGNRMPFEA----------FGHDEDRWS-------------AIQI-------------------------RLQGM---VSAKGGTGMSPGKVKRFLAKT-----------------------MPEDFAARQLNDTRYAAKQILAQLKRLWPDMGPEAPV-----------------KVEAVTGQVTAQ
257413184 Roseburia intestinalis L1-82                         : KVLVTSQENR-QKGNRTPYEY--------MG--NDEQRWN-------------EFET-------------------------RVKTT----------IRDYKKQQKLLKKH-------------------FSEEERSEFKERNLTDTKYITTVIYNMIRQNLEMAPLNRPEKKK--------------QVRAVNGAITAY
218767588 Neisseria meningitidis Z2491                         : KVLVLGSENQ-NKGNQTPYEY--------FNGKDNSREWQ-------------EFKA-------------------------RVETS----------RFPRSKKQRILLQK-------------------FDED---GFKERNLNDTRYVNRFLCQFVADRMRLTGKGKK------------------RVFASNGQITNL
15602992  Pasteurella multocida subsp. multocida str. Pm70     : KVLVLASENQ-NKGNQTPYEW--------LQGKINSERWK-------------NFVA-------------------------LVLGS----------QCSAAKKQRLLTQV-------------------IDDN---KFIDRNLNDTRYIARFLSNYIQENLLLVGKNKK------------------NVFTPNGQITAL
319941583 Sutterella wadsworthensis 3 1 45B                    : LIYASSRGNQ-LKKNQRYSLS-------DLKANYRNEIFKTSNIAAITAEIEDVV-------TKL-Q---------------QTHRL----------------------------------------KFFDLLNEHEQDCVRHALFLDDGSEARDAVLELLATQ------------------------RRTRVNGTQIWM
254447899 gamma proteobacterium HTCC5015                       : LIYCSSKGNH-DKGNRVYVIE-------QLNDKYLKKQFSTSDVNLIKKKIKTTI-------QRFTE---------------GGEKL----------------------------------------RSFSELSREDQKAFRHALFV---PELKSEVTSLLAVK------------------------NITRVNGTQAWL
54296138  Legionella pneumophila str. Paris                    : LIYCSSQGNR-EKKEEHYLLE-------HLSPLYLKHQFGTDNVSDIKNFISQNV-------ANI-K---------------KY-------------------------------------------ISFHLLTPEQQKAARHALFLDYDDEAFKTITKFLMSQ------------------------QKARVNGTQKFL
331001027 Parasutterella excrementihominis YIT 11859           : LIFVSAQGNQ-EKKNNIYLLS-------NLAKNYLAAVFGTSDLSQITNEIESTV-------LQL-K---------------AAGRL----------------------------------------GYFDLLSEKERACARHALFLNSDSEARRAVIDVLGSR------------------------RKASVNGTQAWF
34557932  Wolinella succinogenes DSM 1740                      : LIYVHQKCNQ-AKADSIYKLS-------DIKA------------GVSAQWIEEQV-------ANI-K---------------GY-------------------------------------------KTFSVLSAEQQKAFRYALFLQNDNEAYKKVVDWLRTD------------------------QSARVNGTQKYL
118497352 Francisella novicida U112                            : LICVTRGDNK-NKGNRIFCLR-------DLADNYKLKQFETTDDLEIEKKIADTIWDANKKDFKF-G---------------NY-------------------------------------------RSFINLTPQEQKAFRHALFLADENPIKQAVIRAINNR------------------------NRTFVNGTQRYF

Motifs                                                         : ________*___________}______________________________________________________________________________________________________________________________________________________________________________[____

#positions selected for tree reconstruction (272)              : **********-**********--------------------------------------------------------------------------------------------------------------------***************************------------------------************
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303229466 Veillonella atypica ACS-134-V-Col7a                  : FRHNNNFI-------------------------------------------------KV--------------------------------------------RSLNHHHHAKDAYLNIVVGNVYH----EK--FTR---------------NFRLFFKKNGANR--------------------TYNLAKMFNYDVICT
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : FREMFDFI-------------------------------------------------KV--------------------------------------------RELNDTHHAKDAYLNIVAGNVYN----TK--FTE---------------KPYRYLQEIKE----------------------NYDVKKIYNYDI---
374307738 Filifactor alocis ATCC 35896                         : FRKKPLNYL------------------------------------------------KS--------------------------------------------RRVNDYHHAKDAYLNIVVGNVYN----KK--FTS---------------NPIQWMKKNRDT---------------------NYSLNKVFEHDVVIN
320528778 Solobacterium moorei F0204                           : FRNRKDKELP-----------------------------------------------KF--------------------------------------------REINDLHHAKDAYLNIVVGNVYD----TK--FTE---------------KFFNNIRNE------------------------NYSLKRVFDFSV---
291520705 Coprococcus catus GD-7                               : FRQTYELL-------------------------------------------------KV--------------------------------------------REMNDLHHAKDAYLNIVVGNAYF----VK--FTK---------------NAAWFIRNNPGR---------------------SYNLKRMFEFDIERS
42525843  Treponema denticola ATCC 35405                       : FRNKFDIV-------------------------------------------------KC--------------------------------------------REINDFHHAHDAYLNIVVGNVYN----TK--FTN---------------NPWNFIKEKRDNPKIAD----------------TYNYYKVFDYDVKRN
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : FRQEFDII-------------------------------------------------KC--------------------------------------------RTVNDLHHMHDAYLNIVVGNVYN----TK--FTK---------------NPLNFIKDKDNVR--------------------SYNLENMFKYDVVRG
224543312 Catenibacterium mitsuokai DSM 15897                  : FRVKNHIY-------------------------------------------------KN--------------------------------------------RDINDYHHAHDAYIVALIGGFMR----DR--YPN-------------------MHDSKAV----------------------YSEYMKMFRKNKNDQ
24379809  Streptococcus mutans UA159                           : FRKEFELY-------------------------------------------------KV--------------------------------------------REINDYHHAHDAYLNAVIGKALL----GV--YPQ-------------LEPEFVYGDYPHFHGHKE--------NKATAKKFFYSNIMNFFKK-----
15675041  Streptococcus pyogenes SF370                         : FRKDFQFY-------------------------------------------------KV--------------------------------------------REINNYHHAHDAYLNAVVGTALI----KK--YPK-------------LESEFVYGDYKVYDVRKMIAKSEQEIGKATAKYFFYSNIMNFFKTEIT--
16801805  Listeria innocua Clip11262                           : FRKQFQLY-------------------------------------------------KV--------------------------------------------RDVNDYHHAHDAYLNGVVANTLL----KV--YPQ-------------LEPEFVYGDYHQFDWFKA--------NKATAKKQFYTNIMLFFAQK----
116628213 Streptococcus thermophilus LMD-9                     : FRKDFELY-------------------------------------------------KV--------------------------------------------REINDFHHAHDAYLNAVVASALL----KK--YPK-------------LEPEFVYGDYPKYNSFRE-------RKSATEKVYFYSNIMNIFKKSIS--
323463801 Staphylococcus pseudintermedius ED99                 : FRKKFDIP-------------------------------------------------KI--------------------------------------------RQMNDAHHAIDAYLNGVVYHGAQ----LA--YPN-------------VDLF----DFN-FKWEKV------------REKWKALGEFNTKQKSRELF
352684361 Acidaminococcus intestini RyC-MR95                   : FRHEFGLV-------------------------------------------------KS--------------------------------------------RNINDLHHAKDAFLAIVTGNVYH----ER--F---------------------------------------------NRRWFMVNQPYSVKTKT---
302336020 Olsenella uli DSM 7084                               : LREAAGLV-------------------------------------------------KC--------------------------------------------REANDFHHAHDAFLACRIGLFIQ----KR--HPS--------VYDNPIGLARIMRDYARMQ----------------AREYKKSHCLAHTQGFIVNS
366983953 Oenococcus kitaharae DSM 17330                       : MRRYVDIP-------------------------------------------------KN--------------------------------------------RDINDYHHAFDALLFSTVGQYTENSGLMK--KGQ--------LSDS------AGNQYNRY-----------------IKEWIHAARLNAQSQRVNPF
310286728 Bifidobacterium bifidum S17                          : MHRYLGFS-------------------------------------------------HK-------------------------------------------NRDINDYHHAQDALCVGIAGQFAA----NRGFFAD------GEVSDGAQNSYNQYLRDYLRGYREKLSAE-------------DRKQGRAFGFIVGSM
258509199 Lactobacillus rhamnosus GG                           : LREELDFP-------------------------------------------------KN--------------------------------------------RDVNHYHHAFDAFLAARIGTYLL----KR--YPK-------------LAPFFTYGEFAKV----------------------DVKKFREFNFIGALT
300361537 Lactobacillus gasseri JV-V03                         : LRKHLNLY-------------------------------------------------KS--------------------------------------------REVNDYHHAIDAYLSAICGNLLY----QV--YPY-------------LRPFFVYGQYKKFSS--------------------DPKKEKIIYDKTRKY
169823755 Finegoldia magna ATCC 29328                          : LRKDMNTL-------------------------------------------------KS--------------------------------------------REVNDLHHAHDAFLNIVAGDVWN----RE--FTS---------------NPINYVKENREGDKV------------------KYSLSKDFTRPRKSK
47458868  Mycoplasma mobile 163K                               : LRNQIAFV-GIKNNKETEREWKRPEGFK-----------------------------SI----------------------NSNDFLIREEGKNDVKDDVLIKDRSFNGHHAEDAYFITIISQYFR----SFKRIER---------------LNVNYRKE-------------------------TRELDDLEKNNIKFK
284931710 Mycoplasma gallisepticum str. F                      : LRKNFDD-----------------SSYAK-----------------------------K--------------------------------------------DRDKNIHHAVDASIISIFSNETK----TL--FNQL----------------TQFADYKLFKN--------------------TDGSWKKIDPKTGVV
363542550 Mycoplasma ovipneumoniae SC01                        : FRAKPVQKNNGPNENLN------NNKPEKIE---------------------------K--------------------------------------------NRENNEHHAVDAAIVAIIGNKNP----QI--ANLLTLA-------------DNKTDKKFLLH--------------------DENYKENIE--TGEL
384393286 Mycoplasma canis PG 14                               : IRKNMSYD-----------------NKLRL----------------------------K--------------------------------------------DRSDFSHHAYDAAIIALFSNKTK----TL--YNLI----------------DPSLNGIISKR--------------------SEGYWVIEDRYTGEI
71894592  Mycoplasma synoviae 53                               : LRKSMWRK-------------------N-----------------------------EE----------------------------------QVYRFNFWKKDRDQFFHHAVDASIIAIFSLLTKTLY-NK--LRV----------------YESYDVQRREDG--------------------VYLINKETGEVKKAD
238924075 Eubacterium rectale ATCC 33656                       : MRCNLKLD-------------------------------------------------KN--------------------------------------------RDESYSHHAVDAMLIGYSELGYE----AYHKLQG---------------EFIDFETGEIL----------------------RKDMWDENMSDEVYA
116627542 Streptococcus thermophilus LMD-9                     : LRRHWGIE----------------------------------------------------------------------------------------------KTRDTYHHHAVDALIIAASSQLNL--------WKK-----------QKNTLVSYSEDQ-------------------------LLDIETGELISDDEY
315149830 Enterococcus faecalis TX0012                         : LRKKWGAD-------------------------------------------------LD-------------------------------------------KTRETHHHHAVDATLCAVTSFVKV----SRYHYAV------KEETGEKVMREIDFETGEIVNEMS------------------YWEFKKSKKYERKTY
315659848 Staphylococcus lugdunensis M23590                    : LRKVWKFK-------------------------------------------------KE--------------------------------------------RNHGYKHHAEDALIIANADFLFK----ENKKLKA---------------VNSVLEKPEIE----------------------SKQLDIQVDSEDNYS
160915782 Eubacterium dolichum DSM 3991                        : FRRKINLK-------------------------------------------------KD--------------------------------------------RDEDYGHHAIDALIIASMPKMRL--------LST---------------IFSRYKIEDIY----------------------DESTGEVFSSGDDSM
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : IRSRWGFL-------------------------------------------------KV--------------------------------------------REDGDLHHAIDATVIAAITPKFI----QQ--VTK----------------YSQHQEVKN-----------------------NQALWHDAEIKDAEY
310780384 Ilyobacter polytropus DSM 2926                       : LRARWRLN-------------------------------------------------KV--------------------------------------------RENGDLHHALDAAVVAVTDQKAI----NN--ISN----------------ISRYKELKNCKDVIPSIEYHA-----------DEETGEVYFEEVKDT
325677756 Ruminococcus albus 8                                 : FRRWW-LN-------------------------------------------------EK---------------------------------TWGRYDKA-ELKKLTYLDHAADAIIIANCRPEYVVLAGEKLKLNK-----------------MYHQAGKRITPEYEQSKKACIDNLYKLFRMDRRTAEKLLSGHGRLT
187736489 Akkermansia muciniphila ATCC BAA-835                 : VRKAWDVF-------------------------------------------------GV-----------------------FKELCPEAADPDSGKILKENLRSLTHLHHALDACVLGLIPYIIP----AH-----------------------------------------------------HNGLLRRVLAMRRI-
117929158 Acidothermus cellulolyticus 11B                      : ARRWLDIS------------------IE-----------------------------RL-------------------------------FSRVAIFAQSTSTKRLDRRHHAVDAVVLTTLTPGVA----KT--LAD--------------------ARSRRV----------------------SAEFWRRPSDVNRHS
189440764 Bifidobacterium longum DJO10A                        : ARRAAGIE-------------------------------------------------GK-----------------------------------IHFIGQQSKTRLDRRHHAVDASVIAMMNTAAA----QT--LME----------------RESLRESQRLIGLMP-----------------GERSWKEYPYEGTSR
283456135 Bifidobacterium dentium Bd1                          : ARKASGIE-------------------------------------------------GR-----------------------------------IHFAGEWKKTRLDRRHHAVDAAVIAMMNHSAA----QTLVERD----------------SLRLSQWITR----------------------KPETWKNYPFSEGQK
38232678  Corynebacterium diphtheriae NCTC 13129               : ARRASGIS-------------------------------------------------GK-----------------------------------LKFFDGVGKSRLDRRHHAIDAAVIAFTSDYVA----ETLAVRS-----------------NLKQSQAHRQ---------------------EAPQWREFTGKDAEH
187250660 Elusimicrobium minutum Pei191                        : LRMAWGLQ-------------------------------------------------GL------------------MIPFAKQLITEKESESFNKDVNSNKKIRLDNRHHALDAIVIAYASRGYG----NL--LNK------------------------------------------------MAGKDYKINYSERNW
319957206 Nitratifractor salsuginis DSM 16511                  : TRSLLGIK-------------------------------------------------SK--------------------------------------------SRETNFHHAEDALILSTLTRGWQ----NR--LHR--------------MLRDNYGKSEAE----------------------LKELWKKYMPHIEGL
325972003 Sphaerochaeta globus str. Buddy                      : LRKAWNLQ-------------------------------------------------GI-----------------------DDLLGSRHWSKDADTSPTMRKNRDDNRHHGLDAIVALYCSRSLV----QM--INT------------------------------------------------MSEQGKRAVEIEA--
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : LKKDWGMN-------------------------------------------------DVWNSIILPRFIRMNQITGKDCFTTTNAEGHLIPQMPLELQKGFNKKRIDHRHHAMDAIVIACTTRDHV----NL--LNN----------------EAAHSKFNAT----------------------RYQLQRKLRRFEKAV
60683389  Bacteroides fragilis NCTC 9343                       : LREDWQLI-------------------------------------------------DV-----------MKELNWEKYKALGLVEYFEDRDGRQIGRIKDWTKRNDHRHHAMDALTVAFTKDVFI----QY--FNN----------------KNASLDPNAN----------------------EHAIKNKYFQNGRAI
256819408 Capnocytophaga ochracea DSM 7271                     : LREDWGLV-------------------------------------------------DV-----------MKELNMPKYQSLGLTEVEERKDGNKVTVIKNWTKRNDHRHHAMDALTVAFTKPSYI----QY--LNH----------------LNARKDENNK------------------NYSVILAIEEKETIKVPTN
90425961  Rhodopseudomonas palustris BisB18                    : LRRAWGLE-------------------------------------------------GL-------------------------------------KKQ-DGKRVEDDRHHAVDALVLAATTESLL----QR-----------------------------------------------------LTVEVQRREREGRPD
373501184 Prevotella micans F0438                              : FRKILGLQ-------------------------------------------------SI----------------------------------------DEKKDRSLHSHHAIDATMLTVIPSAAKR---DR--MLE---------------------------LFYKIEETKKALKNYNDNNKTGLNLELKGLEEKLDK
294674019 Prevotella ruminicola 23                             : FRKMWGIQ-------------------------------------------------DE----------------------------------------YAKKERVNHVHHCIDAITIACIGKAEY----DK--LAD-----------------------------------------------YRHQYDDYLFQGK-TK
365959402 Flavobacterium columnare ATCC 49512                  : FRKLWGIQ-------------------------------------------------ES------------------------------FIDENWWKHYK-DKDRDKHTHHTIDAITIACMPKDKY----DL--LAH----------------AWRLEDEQDKKAAKVLIE--------------QAKPWKTFKEDIEKI
312879015 Aminomonas paucivorans DSM 12260                     : LRKQWGLH-------------------------------------------------KN--------------------------------------------RKNGDLHHALDAAVLAVASRSFV----YR--LSS------------------------------------------------HNAAWGELPRGREAE
83591793  Rhodospirillum rubrum ATCC 11170                     : LRLAWDIT--------------------PGPAPRDLLPTPRDALRDDTAARRFLDGLTPPPLAKAVEGAVQARLAALGRSRVADAGLADALGLTLASLGGGGKNRADHRHHFIDAAMIAVTTRGLI----NQ--INQ------------------------------------------------ASGAGRILDLRKWPR
294086111 Candidatus Puniceispirillum marinum IMCC1322         : LRGFWGLN-------------------------------------------------SI------------------------------LRGHNTDDGTPAKKSRDDHRHHAIDAIVVGMTSRGLL----QK--VSK------------------------------------------------AARRSEDLDLTRLFE
121608211 Verminephrobacter eiseniae EF01-2                    : LRGKFGLN-------------------------------------------------SV-------------------------------------LGLDGKKNRNDHRHHAVDACVIGVTDQGLM----QR--FAN------------------------------------------------ASKQARENGLTRLVQ
344171927 Ralstonia syzygii R24                                : LRAKWGLN-------------------------------------------------RV------------------------------LDGVMEEQGRPAVKNRDDHRHHAIDAVVIGATDRAML----QQ--VAT------------------------------------------------LAARAREQDAERLIG
159042956 Dinoroseobacter shibae DFL 12                        : LRRHWGLN-------------------------------------------------SL--------------------------------LSDAGRGAVKAKNRTDHRHHAIDAAVIAATDPGLL----NR--ISR------------------------------------------------AAGQGEAAGQSAELI
288957741 Azospirillum sp- B510                                : LRRRWGID-------------------------------------------------AI---------------------LAEADGPPPEVPAETLDPSPAEKNRADHRHHALDAVVIGCIDRSMV----QRVQLAA------------------------------------------------ASAEREAAAREDNIR
92109262  Nitrobacter hamburgensis X14                         : LRGKWGLN-------------------------------------------------GL---------------LPSDNYAGVQDKAEEFLASTDDMEFSGVKNRADHRHHAIDGLVTALTDRSLL------------------------------------------------------------WKMANAYDEEHEKF
148255343 Bradyrhizobium sp- BTAi1                             : LRATWELN-------------------------------------------------DL---------------------------------LPGSDDRA-AKSRKDHRHHAIDALVAALTDQALL----RR-----------------------------------------------------MANAHDDTRRKIEV-
34557790  Wolinella succinogenes DSM 1740                      : LRYQWGLE-------------------------------------------------SK--------------------------------------------DRESHTHHAVDAIIIAFSTQGMV----QK--LSE------------------------------------------------YYRFKETHREKERPK
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : LRHTWGFS-------------------------------------------------AK--------------------------------------------DRNNHLHHAIDAVIIAYANNSIV----KA--FSD----------------FKKEQESNSAEL--------------------YAKKISELDYKNKRK
291276265 Helicobacter mustelae 12198                          : MRSFWGVQ-------------------------------------------------EK--------------------------------------------NRDHHLHHAQDAIIIACIEPSMI----QK--YTT----------------YLKDKETHRLK---------------------SHQKAQILREGDHKL
229113166 Bacillus cereus Rock1-15                             : LHSRWGFN-------------------------------------------------KN--------------------------------------------SREIYLNHAVDAAIVAVLTDQLI----RN--IAD------------------------------------------------YYRRDNILEQKGSLK
222109285 Acidovorax ebreus TPSY                               : LRARWGLT-------------------------------------------------KV--------------------------------------------RGDSDRHHALDAAVVAACTHGMV----KA--LAD----------------YSRRKEISFLQEGFP-----------------DPETGEILNPAAFDR
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : LSYNWGMS-------------------------------------------------KD--------------------------------------------REESYFHHAKDAIIVACSTQGMV----QY--ISK---------------ISQQYEN--------------------------DKDKMKKIKDKTENC
182624245 Clostridium perfringens D str. JGS1721               : LRSRWGLN-------------------------------------------------KV--------------------------------------------REDGDKHHALDAAVVGVTTQGMV----QK--ISK---------YSKAHELYTVRKNDEFV----------------------DVETGECVDVDEYKE
220930482 Clostridium cellulolyticum H10                       : LRSRWGLN-------------------------------------------------KN--------------------------------------------REESDLHHALDAAVIACADRKII----KE--ITN------------------------------------------------YYNERENHNYKVKY-
154250555 Parvibaculum lavamentivorans DS-1                    : LRKLWTLN-------------------------------------------------NI-------------------------------------LADDGEKTRADHRHHAIDALTVACTHPGMT----NK--LSR------------------------------------------------YWQLRDDPRAEKPAL
257413184 Roseburia intestinalis L1-82                         : LRKRWGLP-------------------------------------------------QK--------------------------------------------NRETDTHHAMDAVVIACCTDGMI----QK--ISR----------------------------------------YTKV---RERCYSKGTEFVDAET
218767588 Neisseria meningitidis Z2491                         : LRGFWGLR-------------------------------------------------KV--------------------------------------------RAENDRHHALDAVVVACSTVAMQ----QK--ITR----------------------------------------FVRY---KEMNAFDGKT-IDKET
15602992  Pasteurella multocida subsp. multocida str. Pm70     : LRSRWGLI-------------------------------------------------KA--------------------------------------------RENNNRHHALDAIVVACATPSMQ----QK--ITR----------------------------------------FIRFKEVHPYKIENRYEMVDQES
319941583 Sutterella wadsworthensis 3 1 45B                    : IKNLANKI--REELQNWCKTTNNRLHFQAAATNV---------------------SDAKNLRLKLAQNQPDFEK----------------------------PDIQPIASHSIDALCSFAVGSAD------------AERDQNGFDYLDGKTVLG------LYPQSCEVIHLQAKPQEEKSHFDSV----------AIFK
254447899 gamma proteobacterium HTCC5015                       : AKKIASLL--AEHL----DKQGRDYTLSAHQIDP---------------------WSVSKQRKMLASAEPIWAK----------------------------KDPQPAASHVVDAVCTFLEALEQ-------------PHTASRLKTISSTSFEKTGWRSALIPDLIKVDALDRRPKYRRYNIGST----------SLFK
54296138  Legionella pneumophila str. Paris                    : GKQIMEFL--STLA----DSKQLQLEFSIKQITA---------------------EEVHDHRELLSKQEPKLVK----------------------------SRQQSFPSHAIDATLTMSIGLKE--------------FPQFSQELDNSWFINH------LMPDEVHLNPVRSKEKYNKPNISST----------PLFK
331001027 Parasutterella excrementihominis YIT 11859           : VRSIFSKV--RQALAAWTQETGNELIFDAISVPA---------------------ADSSEMRKRFAEYRPEFRK----------------------------PKVQPVASHSIDAMCIYLAACSDPFK---------TKRMGSQLAIYEPINFDN------LFTGSCQVIQNTPRNFSDKTNIANS----------PIFK
34557932  Wolinella succinogenes DSM 1740                      : AKKIQEKL--TKML------PNKHLSFEFILADA---------------------TEVSELRRQYARQNPLLAK----------------------------AEKQAPSSHAIDAVMAFVARYQKVFKDGTPP-NADEVAKLAMLDSWNPASNEP------LTKGLSTNQKIEKMIKSGDYGQKNMREVFGK----SIFG
118497352 Francisella novicida U112                            : AEVLANNI--YLRA-KKENLNTDKISFDYFGIPTIGNG-----------------RGIAEIRQLYEKVDSDIQAYAK------------------------GDKPQASYSHLIDAMLAFCIAADEHRNDGSIG---LEIDKNYSLYPLDKNTGEV------FTKDIFSQIKITDNEFSDK-KLVRKKAIEGFNTHRQMTR

Motifs                                                         : _R____________________________________________________________________________________________________________*__*_RNAseH_III__________________________________]________________________________________

#positions selected for tree reconstruction (272)              : *******------------------------------------------------------------------------------------------------**********************---------------------------------------------------------------------------
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303229466 Veillonella atypica ACS-134-V-Col7a                  : NAQD----------------GKAW---DVKTSMNTVK-KM-------------------------------------MASNDVR---VTRRLLEQ------------------SGALADATI------------------------YKASVAAKAKDGAYIGMKTKYSVFAD-VTKYGGMTKIKNAYSIIVQYTGKK---
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : --------------------KNAW---DKENSLEIVKKNM---------------------------------------EKNTVN--ITRFIKEE------------------KGELFNLNP-------------------------IKKGETSNEIISIKPKLYDGKDNKL-NEKYGYYTSLKAAYFIYVEHEKKNK--
374307738 Filifactor alocis ATCC 35896                         : G-------------------EVIW---EKCTYHEDTN-TY--------------------------DGGTLDRIRKIVERDNIL---YTEYAYCE------------------KGELFNATI----------------------------------QNKNGNSTVSLKKGLD-VKKYGGYFSANTSYFSLIEF-------
320528778 Solobacterium moorei F0204                           : --------------------PGAW---DAKGSTFNTIKKY-------------------------------------MAKNNPI---IAFAPYEV------------------KGELFDQQI-----------------------------------VPKGKGQFPIKQGKD-IEKYGGYNKLSSAFLFAVEYKGKKAR-
291520705 Coprococcus catus GD-7                               : G-------------------EIAW---KAGNKGSIVTVKK------------------------------------VMQKNNIL---VTRKAYEV------------------KGGLFDQQI-------------------------------MKKGKGQVPIKGNDERLAD-IEKYGGYNKAAGTYFMLVKSLDKKGK-
42525843  Treponema denticola ATCC 35405                       : N-------------------ITAW---EKGKTIITVK-DM-------------------------------------LKRNTPI---YTRQAACK------------------KGELFNQTI--------------------------------MKKGLGQHPLKKEGPFSN-ISKYGGYNKVSAAYYTLIEYEEK----
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : S-------------------YTAWIADDSEGNVKAATIKK----------------------------------VKRELEGKNYR--FTRMSYIG------------------TGGLYDQNL--------------------------------MRKGKGQIPQKENTNKSN-IEKYGGYNKASSAYFALIESDGKAG--
224543312 Catenibacterium mitsuokai DSM 15897                  : KRWKDGFVINSMNYPYEVDGKLIWN--PDLINEIKKC----------------------------------------FYYKDCY---CTTKLDQK------------------SGQLFNLTV--------------------------LSNDAHADKGVTKAVVPVNKNRSD-VHKYGGFSGLQYTIVAIEGQKKKGK--
24379809  Streptococcus mutans UA159                           : ----DDVR-------TDKNGEIIW------KKDEHISNIKKVLSYPQVNIVK--------------------------------------KVEEQ------------------TGGFSKE------------------------------SILPKGNSDKLIPRKTKKFYWD-TKKYGGFDSPIVAYSILVIADIEKG--
15675041  Streptococcus pyogenes SF370                         : -LANGEIRKRPLIETNGETGEIVW------DKGRDFATVRKVLSMPQVNIVK--------------------------------------KTEVQ------------------TGGFSKE------------------------------SILPKRNSDKLIARKKD---WD-PKKYGGFDSPTVAYSVLVVAKVEKG--
16801805  Listeria innocua Clip11262                           : ----DRII--------DENGEILW------DK-KYLDTVKKVMSYRQMNIVK--------------------------------------KTEIQ------------------KGEFSKA------------------------------TIKPKGNSSKLIPRKTN---WD-PMKYGGLDSPNMAYAVVI--EYAKG--
116628213 Streptococcus thermophilus LMD-9                     : -LADGRVIERPLIEVNEETGESVW------NKESDLATVRRVLSYPQVNVVK--------------------------------------KVEEQ------------------NHGLDRGKPKGLFN--------------------ANLSSKPKPNSNENLVGAKEY--LD-PKKYGGYAGISNSFTVLVKGTIEKG--
323463801 Staphylococcus pseudintermedius ED99                 : FFKKLEKM-------EVSQGERL------------ISKIKLDMNHFKINYSR--------------------------------------KLANI------------------PQQFYNQ-----------------------------TAVSPKTAELKYESNKSN------EVVYKGL-TPYQTYVVAIKSVNKKG--
352684361 Acidaminococcus intestini RyC-MR95                   : -LFTHSIK----------NGNF-----VAWNGEEDLGRIVKMLKQNKNTIHFTRF-----------------------------------SFDRK------------------EGLF---------------------------------DIQPLKASTGLVPRKAG---LD-VVKYGGYDKSTAAYYLLVRFTLE----
302336020 Olsenella uli DSM 7084                               : FLSSG---------FDEETGEIFK---DDWDAKAEVEGIRRVLNCRQCFISRMPV-----------------------------------EGDTR------------------YGGRYWG----------------------------ETIYSPKGKHKHEIPLKQG---LD-PNLYGGYSDLLYSYFLIYEASDVSS--
366983953 Oenococcus kitaharae DSM 17330                       : GFVVGSMRNAAPGKLNPETGEITPEENADWSI-ADLDYLHKVMNFRKITVTR--------------------------------------RLKDQ------------------KGQLYDES--------------------------RYPSVLHDAKSKASINFDKH---KP-VDLYGGFSSAKPAYAALI---------
310286728 Bifidobacterium bifidum S17                          : RSQDEQKRVNPRTG------EVVW---SEEDKDYLRK-VM--------------------------------------NYRKML---VTQKVGDD------------------FGALYDETR------------------------------YAATDPKGIKGIPFDGAKQD-TSLYGGFSSAKPAYAVLIESKG-----
258509199 Lactobacillus rhamnosus GG                           : HAKKNIIAKDTG--------EIVW---DKERDIRELD-RI-------------------------------------YNFKRML---ITHEVYFE------------------TADLFKQTI---------------------------YAAKDSKERGGSKQLIPKKQGYP-TQVYGGYTQESGSYNALVRVAEA----
300361537 Lactobacillus gasseri JV-V03                         : NFI-----------------SQIFENKSNDIISLETKKKV------------------------------FDKKDIIEKLKHAYN--YKYMLVSR------------------ETETHDQEM-----------------------FKMTVYPRLSRDTKKSRNLISKKKDMP-TEIYGGYTNNSDAYMVIARINKKKGT-
169823755 Finegoldia magna ATCC 29328                          : G-------------------KVIWTPEKGRKLIVDTL-----------------------------------------NKPSVL---ISNESHVK------------------KGELFNATI---------------------------AGKKDYKKGKIYLPLKKDDRLQD-VSKYGGYKAINGAFFFLVEHTKS----
47458868  Mycoplasma mobile 163K                               : E-------------------KASF---DNFLLINALD-EL------------------------------------NEKLNQMR---FSRMVITK------------------KNTQLFNETL---------------------YSGKYDKGKNTIKKVEKLNLLDNRTDKI-KKIEEFFDEDKLKENELTKLHIFNH--
284931710 Mycoplasma gallisepticum str. F                      : TEVT----------------DENW---KQIRVRNQVS-EI--------------------------AKVIEKYIQDSNIERKAR---YSRKIENK-----------------TNISLFNDTVYSAKKVGYEDQIKRKNLKTLDIHESAKENKNSKVKRQFVYRKLVNVSLLN-NDKLADLFAEKEDILMYRANPWVINLA
363542550 Mycoplasma ovipneumoniae SC01                        : VKIP----------------K------FEVDKLAKVE-DL--------------------------KKIIQEKYEEAKKHTAIK---FSRKTRTI-----------------LNGGLSDETLYGFKYDEKEDK----------------------------YFKIIKKKLVT-SKNEELKKYFENPFGKKADGKSEYTVL
384393286 Mycoplasma canis PG 14                               : KELK----------------KEDW---TSIKNNVQAR-KI--------------------------AKEIEEYLID--LDDEVF---FSRKTKRK-----------------TNRQLYNETIYGIATKTDEDGITN-------------------------YYKKEKFSILD-DKDIYLRLLREREKFVINQSNPEVIDQ
71894592  Mycoplasma synoviae 53                               : --------------------KDYWKDQHNFLKIRENAIEI------------------------------KNVLNNVDFQNQVR---YSRKANTK------------------LNTQLFNETL--------------------YGVKEFENNFYKLEKVNLFSRKDLRKFIL-EDLNEESEKNKKNENGSRKRILT----
238924075 Eubacterium rectale ATCC 33656                       : DYLY----------------GKKW---ANIRNEVVKA------------------------------------------EKNVK---YWHYVMRK------------------SNRGLCNQTI---------------------RGTREYDGKQYKINKLDIRTKEGIKVFA-KLAFSKKDSDRERLLVYLN--------
116627542 Streptococcus thermophilus LMD-9                     : KESVF---------------KAPY---QHFVDTLKSK-EF---------------------------------------EDSIL---FSYQVDSK------------------FNRKISDATI-----------------YATRQAKVGKDKADETYVLGKIKDIYTQDGYD--AFMKIYKKDKSKFLMYRH--------
315149830 Enterococcus faecalis TX0012                         : --------------------QVKW---PNF-----RE-QL----------------------------------KPVNLHPRIK---FSHQVDRK------------------ANRKLSDATI---------------YSVREKTEVKTLKSGKQKITTDEYTIGKIKDIYT-LDGWEAFKKKQDKLLMKDL--------
315659848 Staphylococcus lugdunensis M23590                    : ---------------------------EMFIIPKQVQ-DI-------------------------------------KDFRNFK---YSHRVDKK------------------PNRQLINDTL-------------------------YSTRKKDNSTYIVQTIKDIYAKDN-TTLKKQFDKSPEKFLMYQH--------
160915782 Eubacterium dolichum DSM 3991                        : YY------------------DDRY---FAFIASLKAI-------------------------------------------KVRK---FSHKIDTK------------------PNRSVADETI-----------------------------YSTRVIDGKEKVVKKYKDIY-DPKFTALAEDILNNAYQEKYLMALH--
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : AAEAQRMDADLFNKIFNGF-PLPW---PEFLDELLARISD------------------NPVEMMKSRSWNTYTPIEIAKLKPVF---VVRLANHK-----------------ISGPAHLDTI---------------------RSAKLFDEKGIVLSRVSITKLKINKKGQV-ATGDGIYDPENSNNG------------
310780384 Ilyobacter polytropus DSM 2926                       : RF------------------PMPW---SGFDLELQKRLESENPREEFYN---L--LSDKRYLGWFNYEE-----GFIEKLRPVF---VSRMPNRG-----------------VKGQAHQETI-------------------------------------RSSKKISNQIAVS-KKPLNSIKLKDLEKMQGRDT-------
325677756 Ruminococcus albus 8                                 : PIIPNLSEEVDKRLWDKNIYEQFW---KDDKDKKSCE-EL---------------------YRENVASLYKGDPKFASSLSMPV---ISLKPDHK-----------------YRGTITGEEA---------------------------IRVKEIDGKLIKLKRKSISEITA-ESINSIYTD------------------
187736489 Akkermansia muciniphila ATCC BAA-835                  : --------------------PEKL---------------------------------------------------IPQVRPVAN---QRHYVLND------------------DGRMMLRDL----------------------------SASLKENIREQLMEQRVIQHVP-ADMGGALLKETMQRVLSV---------
117929158 Acidothermus cellulolyticus 11B                      : TEEPQSPA------------YRQW---KESCSGLGDLLIS------------------------------------TAARDSIA---VAAPLRLR-----------------PTGALHEETL----------------------------RAFSEHTVGAAWKGAELRRIVE-PEVYAAFLALTDPGGRFLKVSPS----
189440764 Bifidobacterium longum DJO10A                        : YES-----------------FHLWL--DNMDVLLELLNDA------------------------------------LDNDRIAV---MQSQRYVL-----------------GNSIAHDATI----------------------------HPLEKVPLGSAMSADLIRRAST-PALWCALTRLPDYDEKEGL--------
283456135 Bifidobacterium dentium Bd1                          : KTR-----------------FKEW---LDCMNALLDLLND-----------------------------------ALDSDRVPV---TRCQRMSL-----------------GNSQAHAATI----------------------------RKMKRVELFSPMDADLIRRAST-PALYCALTR-LPEYSPEKGL-------
38232678  Corynebacterium diphtheriae NCTC 13129              : RAA-----------------WRVW---CQKMEKLSALLTE-----------------------------------DLRDDRVVV---MSNVRLRL-----------------GNGSAHKETI----------------------------GKLSKVKLSSQLSVSDIDKASS-EALWCALTR-EPGFDPKEGL-------
187250660 Elusimicrobium minutum Pei191                        : LSKILLPPN-----------NIVW---ENIDADLESF-ES----------------------------------SVKTALKNAF---ISVKHDHS-----------------DNGELVKGTM----------------------YKIFYSERGYTLTTYKKLSALKLTDPQK-KKTPKDFLETALLKFKGRESEMKNEKI
319957206 Nitratifractor salsuginis DSM 16511                  : TLADYI--------------DEAF---RRFMSKGEES-LF-----------------------------------YRDMFDTIRS--ISYWVDKK----------------PLSASSHKETV------------------YSSRHEVPTLRKNILEAFDSLNVIKDRHKLTT-EEFMKRYDKEIRQKLWLHRIGNT----
325972003 Sphaerochaeta globus str. Buddy                      : --------------------MIPI---PGYASEPNLSFEA---------------------------QRELFRKKILEFMDLHAF--VSMKTDND-----------------ANGALLKDTV--------------------------YSILGADTQGEDLVFVVKKKIKDI-GVKIGDYEEVASAIRGRIT--------
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : IDGKEREVAKEF--------LKPW---DSFSSDSKNILEN---------------------------IIVSFKQNQRVINKTTNA-FLHFDENGK----KTFIKQGKGDSWAIRKSMHKDTV----------------FGEINLRKVRSVSLNEAIKVPERVLNKKIKEKIL-ELKNNKIDAKNIKKYIEENHTGGYGID
60683389  Bacteroides fragilis NCTC 9343                       : A-------------------PMPL---REFRAEAKKHLEN---------------------TLISIKAKNKVITGNINKTRKKGG--VNKNMQQT-----------------PRGQLHLETI---------YGSGKQYLTKEEKVNASFDMRKIGTVSKSAYRDALLKRLYE-NDNDPKKAFAGKNSLDKQPIWLDKEQM
256819408 Capnocytophaga ochracea DSM 7271                     : NGKNKRVFIE----------PIP-----NFRQVAKKHLEE---------------------IFISHKAKNKVVTKNTNKP--AGT--DKQQITLT-----------------PRGQLHKETI---------YGKYQYYINKEEKIGVKFDERTIAKVSNPVYREALLKRLQA-NDNDPKKAFAGKNALSKNPIYLDESKT
90425961  Rhodopseudomonas palustris BisB18                    : DIF-HC--------------AEPW---RGFRADVRRTVYGSET------------------------------------MPGIF---VSRAERRR-----------------ARGKAHDATI-------------------------------KQIREIEGERLVFERKPVE-KLTDKDLEKIPIPKPYGQVSDPKRL--
373501184 Prevotella micans F0438                              : EKK-----------------DCRV---GRRVNDLDRF----------------------------------------INENIIV---SHHTKDQA---------------LTPAHRRLRKR--------------------------GKIVGGKEHPRW-QTGDSLRGEIHK-ASYYGAITQFAKDANGKVLMKDGQAQI
294674019 Prevotella ruminicola 23                             : PTF-----------------DKPW---PSFVIDI-KH----------------------------------------IQDELLI---AHYAKDNL---------------EKFTKKNLRGKD-------------------------GRIIRDKFGNKLQMKGDTSRNSLHN-DKFYGAINHEGEIKYVYRTNI------
365959402 Flavobacterium columnare ATCC 49512                  : ETEILVSHFTPDNVKKQ---SKSIIKNRGKKVYVLKN-EL----------------------PVNFKNKIEGKDYFKLKFDSKI---LYKIPKKK---------------EKQTDTFYEELP----------KNYLNGVEGKDYFKINTTGKTFYKIPIFNQGDTIRGSLHQ-ETTYGAIKLPDIDIETKKPLHTDKGGF
312879015 Aminomonas paucivorans DSM 12260                     : NGF-----------------SLPY---PAFRSEVLARLCP----------------TREEILLRLDQGGVGYDEAFRNGLRPVF---VSRAPSRR-----------------LRGKAHMETL----------------------------------RSPKWKDHPEGPRTAS-RIPLKDLNLEKLERMVGKDR-------
83591793  Rhodospirillum rubrum ATCC 11170                     : TNF-----------------EPPY---PTFRAEVMKQ------------------------------------------WDHIH---PSIRPAHR-----------------DGGSLHAATV---------------------------FGVRNRPDARVLVQRKPVEKLFL-DANAKPLPADKIAEIIDGFA-------
294086111 Candidatus Puniceispirillum marinum IMCC1322         : GR------------------IDPW---DGFRDEVKKH------------------------------------------IDAII---VSHRPRKK-----------------SQGALHNDTA-------------------------------YGIVEHAENGASTVVHRVP-ITSLGKQSDIEKVR-------------
121608211 Verminephrobacter eiseniae EF01-2                    : DM------------------LLPWW--PSYYDHVERA------------------------------------------VRHIR---VSHRPDHG-----------------FEGAMMKGTAHGIRED--------------------------------------GIREDG-RIKQRPKAKGSADH-------------
344171927 Ralstonia syzygii R24                                : DM------------------PTPW---PNFLEDVRAA------------------------------------------VARCV---VSHKPDHG-----------------PEGGLHNDTA-------------------YGIVAGPFEDGRYRVRHRVSLFDLKPGDLSN-VRCDAPLQAELEPIFEQD---------
159042956 Dinoroseobacter shibae DFL 12                        : ARDT----------------PPPW---EGFRDDLRVR------------------------------------------LDRII---VSHRADHG----RIDHAARKQGRDSTAGQLHQETA---------------------------------YSIVDDIHVASRTDLLS-LKPAQLLDEPGRSGQVR----------
288957741 Azospirillum sp- B510                                : RVLEGFK-------------EEPW---DGFRAELERR------------------------------------------ARTIV---VSHRPEHG-----------------IGGALHKETA-----------------------------------YGPVDPPEEGFNLVV-RKPIDGLSKDEINSVR-----------
92109262  Nitrobacter hamburgensis X14                         : VI------------------EPPW---PTMRDDLKAA------------------------------------------LEKMV---VSHKPDHG-----------------IEGKLHEDSA----------------------------YGFVKPLDATGLKEEEAGNLVY-RKAIESLNENEVDRIR-----------
148255343 Bradyrhizobium sp- BTAi1                             : --------------------LLPW---PTFRIDLETR------------------------------------------LKAML---VSHKPDHG-----------------LQARLHEDTA---------------------------------YGTVEHPETEDGANLVY-RKTFVDISEKEIDRIR-----------
34557790  Wolinella succinogenes DSM 1740                      : L-------------------AVPL---ANFRDAVEEATRI----------------------------ENTETVKEGVEVKRLL---ISRPPRAR-----------------VTGQAHEQTA----------------------------------------------------KPYPRIKQVKNKKKWRLAPI------
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : F-------------------FEPF---SGFRQKVLDK------------------------------------------IDEIF---VSKPERKK-----------------PSGALHEETF--------------------------------------------RKEEEF-YQSYGG---------------------
291276265 Helicobacter mustelae 12198                          : --------------------SLRW-PMSNFKDKIQES------------------------------------------IQNII---PSHHVSHK-----------------VTGELHQETV--------------------------------------------RTKEFY-YQAFGG---------------------
229113166 Bacillus cereus Rock1-15                             : F-------------------PEPW---KSFSIELEARISP------------------QVRDLIKKLNLDSYLDVDILHIKPVF---ISKKPRRK-----------------VNGEAHKSTI----------------------RSLIGINEIGKTVTCIKTRLEDIP-----FDENGDFPMYGKDT-------------
222109285 Acidovorax ebreus TPSY                               : ARQHF---------------PEPW---THFAHELKARLFT----------------DDLAALREDMQRLGSYTTEDLGRLRTLF---VSRAPQRR-----------------SGGAVHKETI--------------------------YAQPESLKQQGGVIEKILLTSLKL-QDFDKLLNPESNDHFVEPHR-------
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : I-------------------PKPW---DSFRADVEES------------------------------------------IEGIF---VSFAPRHK-----------------VTGSAHKETI-------------------------------YSKKHLEKERYVTVKKSLD-KIKLSDLENIPCNE-------------
182624245 Clostridium perfringens D str. JGS1721               : IRKDIL--------------PRPW---RGFSEELKLRLSD-----------------NPLEELKKSPIETYNEEFIKENVKPIF---VSRVPFRK-----------------ISGKLFKETI-------------------------------------YSERAFKDGYFVS-KKSLVDLKRGDLDNFYNYEC-------
220930482 Clostridium cellulolyticum H10                       : --------------------PLPW---HSFRQDLMET------------------------------------------LAGVF---ISRAPRRK-----------------ITGPAHDETI--------------------------------RSPKHFNKGLTSVKIPLT-TVTLEKLETMVKNTKGGIS--------
154250555 Parvibaculum lavamentivorans DS-1                    : --------------------TPPW---DTIRADAEKA------------------------------------------VSEIV---VSHRVRKK-----------------VSGPLHKETT------------------------------YGDTGTDIKTKSGTYRQFVT-RKKIESLSKGELDEIR-----------
257413184 Roseburia intestinalis L1-82                         : GEIFRPEDYSRAEWDEIFGVHIPKPW-ETFRAELDVRMGDDPKGFLD-------------THSDVALEL-DYPEYIYENLRPIF---VSRMPNHK-----------------VTGAAHADTI------------------------------------RSPRHFKDEGIVLT-KTALTDLKLDKDGEIDGYYNPQS----
218767588 Neisseria meningitidis Z2491                         : GEVLHQK------------THFPQPW-EFFAQEVMIRVFGKPDGKPEF----EEADTPEKLRTLLAEKLSSRPEAVHEYVTPLF---VSRAPNRK-----------------MSGQGHMETV------------------------------------KSAKRL-DEGVSVL-RVPLTQLKLKDLEKMVN---RER----
15602992  Pasteurella multocida subsp. multocida str. Pm70     : GEIISP--------------HFPEPW-AYFRQEVNIRVF---DNHPD---------------TVLKEMLPDRPQANHQFVQPLF---VSRAPTRK-----------------MSGQGHMETI------------------------------------KSAKRL-AEGISVL-RIPLTQLKPNLLENMVN---KER----
319941583 Sutterella wadsworthensis 3 1 45B                    : EGIYAEQFLPIFTLNE--KIWIGYE--TLNAKGERCGAIEVSGKQPKELLEMLAPFFNK-PVGDLSAHATYRILKKPAYEFLAKAAL-----------QPLSAEEKRLAAL--LDALRYCTSRKSLMSLFMA----ANGK--------------SLKKR----EDVLKPKLFQLKVELKGEKS-----FKLNGSLTLPVK
254447899 gamma proteobacterium HTCC5015                       : DGIYAERFLPILIDEN--GLMAGYD--IDNSLKAKGADVVFESLSPFLLFK--GEEVGAQSLSDWQERIDGRYLYMSIDKVKAFDYL-----------QEKVGEKDIAAEL--LNSIHFTQRKTELRAKFSD----DSGK--------------KMKTL----DAIRKSLKLTVTVNEIGKRKE---KCGFSGTIGIPAK
54296138  Legionella pneumophila str. Paris                    : DSLYAERFIPVWVKGE--TFAIGFS--EKDLFEIK----PSNKEKLFTLLKTYSTKNPGESLQELQAKSKAKWL----------------------------YFPINKTLA--LEFLHHYFHKEIVTPDDTTVCHFINSLRYY-----------TKKES----ITVKILKEPMPVLSVKFESSKKNVLGSFKHTIALPAT
331001027 Parasutterella excrementihominis YIT 11859           : ETIYAERFLDIIVSRG--EIFIGYP--SNMPFEEKPNRISIGGKDPFSILSVLGAYLDKAPSSEKEKLTIYRVVKNKAFELFSKVAG-----------SKFTAEEDKAAKI--LEALHFVTVKQDVAATVSD---LIKSK--------------KELSK----DSIENLAKQKGCLKKVEYSSK---EFKFKGSLIIPAA
34557932  Wolinella succinogenes DSM 1740                      : ENAIGERYKPIVVQEG--GYYIGYPATVKKGYELKNCKVVTSKNDIAKLEKIIKNQDLISLKENQYIKIFSINKQTISELSNRYFNMNYKNLVERDKEIVGLLEFIVENCRYYTKKVDVKFAPKYIHETKYPFYDDWRRFDEAWRY-LQENQN-KTSSK-------DRFVIDK----------------SSLNEYYQPDK
118497352 Francisella novicida U112                            : DGIYAENYLPILIHKELNEVRKGYT--WKNSEEIK--IFKGKKYDIQQLNNLVYCLKFVDKPISIDIQISTLE-----ELRNILTTNNIAAT----------AEYYYINL--KTQKLHEYYIENYNTALGYKKYSKEMEFLRSLAY-RSERVK-IKSID------DVKQVLDKD-------------SNFIIGKITLPFK

Motifs                                                         : _____________________________________________________________________________________________________________________H__________________________________________________________________________________

#positions selected for tree reconstruction (272)              : --------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
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303229466 Veillonella atypica ACS-134-V-Col7a                  : -------------------------------------------------GEEIKEIVPLPIYLINRNATDIEL-------------------IDYVKSVIPKAKDISIKYR---------KLCINQLVKV---NGFYYYLGG----------------KTNDKIYIDN----------AIELVVPHDIATYIKLL---DK
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : -------------------------------------------------KVKTFERITRIDSTLIKNEKNLIK---------------------YLVSQKKLLNPKIIKKI---------YKEQTLIIDS------YPYTFTGVDSNKKVELKNKKQ-LYLEKKYEQ-----------ILKNALKFVEDNQGETE-----
374307738 Filifactor alocis ATCC 35896                         : -------------------------------------------------EDKKGDRARH---IIGVPIYIANM-----------------------------LEHSPSAFL---------EYCEQKGYQN------VRILVE----------------KIKKNSL-------------LIINGYPLRIRGENEVD---TS
320528778 Solobacterium moorei F0204                           : -------------------------------------------------ERSLETVYIK---DVELYLQDPIK---------------------------------YCESV---------LGLKEPQIIK------PKILMGSLFSINNKKLVVT-----------------------GRSGKQYVCHHIYQLSI-----
291520705 Coprococcus catus GD-7                               : -------------------------------------------------EIRTIEFVPL---YLKNQIEINHE------------------------SAIQYLAQERGLNS---------PEILLSKIKI------DTLFKV----DGFKM-------WLSGRTGNQL----------IFKGANQLILSHQEAAI-----
42525843  Treponema denticola ATCC 35405                       : -------------------------------------------------GNKIRSLETIPLYLVKDIQKDQDV-------------------------LKSYLTDLLGKKE---------FKILVPKIKI------NSLLKI----NGFPC-------HITGKTND------------SFLLRPAVQFCCSNNEV-----
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : -------------------------------------------------RERTLETIPIMVYNQEKYGNTEAV--------------------------DKYLKDNLELQD---------PKILKDKIKI------NSLIKL----DGFLY-------NIKGKTGD------------SLSIAGSVQLIVNKEEQ-----
224543312 Catenibacterium mitsuokai DSM 15897                  : -------------------------------------------------KTELVKKISGVPLHLKAASINEKI------------------------NYIEEKEGLSDVRI---------IKDNIPVNQM------IEMDGGEYLLTSPTE-------YVNARQLV------------LNEKQCALIADIYN--------
24379809  Streptococcus mutans UA159                           : -------------------------------------------------KSKKLKTVKALVGVTIMEKMTFER----------------------DPV----AFLERKGYR---------NVQEENIIKL------PKYSLF----------------KLENGRKRLLASA-----------RELQKGNEIVLPN-----
15675041  Streptococcus pyogenes SF370                         : -------------------------------------------------KSKKLKSVKELLGITIMERSSFEK----------------------NPI----DFLEAKGYK---------EVKKDLIIKL------PKYSLF----------------ELENGRKRMLASA-----------GELQKGNELALPS-----
16801805  Listeria innocua Clip11262                           : -------------------------------------------------KN-KLVFEKKIIRVTIMERKAFEK----------------------DEK----AFLEEQGYR-----------QPKVLAKL------PKYTLY----------------ECEEGRRRMLASA-----------NEAQKGNQQVLPN-----
116628213 Streptococcus thermophilus LMD-9                     : -------------------------------------------------AKKKITNVLEFQGISILDRINYRK----------------------DKL----NFLLEKGYK-----------DIELIIEL------PKYSLF----------------ELSDGSRRMLASI----LSTNNKRGEIHKGNQIFLSQ-----
323463801 Staphylococcus pseudintermedius ED99                 : ----------------------------------------------------KEKMEYQMIDHYVFDFYKFQN----------------------GNEKELALYLAQRENK-------DEVLDAQIVYSL------NKGDLL----------------YINNHPCYFVSR------------KEVINAKQFELTV-----
352684361 Acidaminococcus intestini RyC-MR95                   : --------------------------------------------------DKKTQHKLMMIPVEGLYKARIDH----------------------DK-----EFLTDYAQT-------TISEILQKDKQK------VINIMF----------------PMGTRHIKLNSMI-SIDGFYLSIGGKSSKGKSVLCHA-----
302336020 Olsenella uli DSM 7084                               : -------------------------------------------------GERVLRFIG--IPTSIAARMANQK----------------------RLE----EYVSRLALQ-------ENLEHVRMVRKI------MKKQLI----------------EVDNCRLLVTAA------------DAVTNATELAFSL-----
366983953 Oenococcus kitaharae DSM 17330                       : ----------------------------------------------------KFKNKFRLVNVLRQWTYSDKN----------------------SED----YILEQIRGK---------YPKAEMVLSH------IPYGQL----------------VKKDGALVTISSA-----------TELHNFEQLWLPL-----
310286728 Bifidobacterium bifidum S17                          : -------------------------------------------------KTRLVNVTMQ---EYSLLGDRPSD-------------------------DELRKVLAKKKSE---------YAKANILLRHVPKMQLIRYGGGLMVIKSAGELNN------------------------AQQLWLPYEEYCYFDDL---S-
258509199 Lactobacillus rhamnosus GG                           : -------------------------------------------------DTTAYQVIKISAQNASKIASANLK------------------SREKGKQLLNEIVVKQLAKR---------RKNWKPSANS------FKIVIP-----------------------RFGMGTLFQN---AKYGLFMVNSDTYYRN------
300361537 Lactobacillus gasseri JV-V03                         : -------------------------------------------------EYRVFGVPMRELVNLRKAEKNGRY----------------------NAYLKQVLEPEIMYSK---------NGKKNKTISS------FEIVKA-----------------------KVPYKQV------ILDGDKKFMLASSTYVQ-----
169823755 Finegoldia magna ATCC 29328                          : -------------------------------------------------KKRIRSIELFPLHLLSKFYEDKNT-------------------------VLDYAINVLQ------------LQDPKIIIDK------INYRTEIIIDNFSYLIS-------------------------TKSNDGSITVKPNEQMY-----
47458868  Mycoplasma mobile 163K                               : -------------------------------------------------DKNLYETLKIIWNEVKIEIKNKNL----------------NEKNYFKYFVNKKLQEGKISFN----EWVPILDNDFKIIRK------IRYIKFSSEEKETDEIIFSQSNFL-----KIDQRQNFS----FHNTLYWVQIWVYKNQK---DQ
284931710 Mycoplasma gallisepticum str. F                      : EQIFNEYTE----------------------------------------NKKIKSQN------------------VFEKYMLDLTKEFPEKFSEFLVKSMLRNKTAIIYDD---------KKNIVHRIKR------LKMLSS-ELKENKLSNVII----------RSKNQSGTKLS--YQDTINSLALMIMRSID---PT
363542550 Mycoplasma ovipneumoniae SC01                        : MAQSHLSEF----------------------------------------NKLKEIFE-KYNGFSNKTGNA------FVEYMNDLALKEPTLKAEIESAKSVEKLLYYNFKP--SDQF--TYHDNINNKSF------KRFYKNIRIIEYKSIPIKF----------KILSKHDGGKS--FKDTLFSLYSLVYKVYE---N-
384393286 Mycoplasma canis PG 14                               : IIEIIESYG----------------------------------------KENNIPSRDEAINIKYTKNKINYNL-YLKQYMRSLT-KSLDQFSEEFINQMIANKTFVLYNP---------TKNTTRKIKF------LRLVNDVKINDIRKNQVIN----------KFNGKNNEPKA--FYENINSLGAIVFKN-------
71894592  Mycoplasma synoviae 53                               : -------------------------------------------------EKYIVDEILQILENEEFKDSKSDI-----------------------NALNKYMDSLPSKFS---------EFFSQDFINKCKKENSLILTFDAIKHNDPKKVIKIKNLKFFREDATLKNKQ-------AVHKDSKNQIKSFYESY-----
238924075 Eubacterium rectale ATCC 33656                       : -------------------------------------------------DRRTFDDLCKIYEDYSDAANPFVQ-------------------------YEKETGDIIRKYS---------KKHNGPRIDK------LKYKDG----EVGACIDISHKY-------GFEKGSKKV----ILESLVPYRMDVYYKEE---NH
116627542 Streptococcus thermophilus LMD-9                     : -------------------------------------------------DPQTFEKVIEPILENYPNKQINEK---------------GKEVPCNPFLKYKEEHGYIRKYS---------KKGNGPEIKS------LKYYDS---K-LGNHIDI-----------TPKDSNNKV----VLQSVSPWRADVYFNKT---TG
315149830 Enterococcus faecalis TX0012                         : -------------------------------------------------DEKTYERLLSIAETTPDFQEVEEK----------NGKVKRVKRSPFAVYCEENDIPAIQKYA---------KKNNGPLIRS------LKYYDG----KLNKHINITKDSQGRPVEKTKNGRKV------TLQSLKPYRYDIYQDLE---TK
315659848 Staphylococcus lugdunensis M23590                    : -------------------------------------------------DPRTFEKLEV---IMKQYANEKNP----------------------LAKYHEETGEYLTKYS---------KKNNGPIVKS------LKYIGN----KLGSHLDVTHQF-------KSSTKKL------VKLSIKPYRFDVYLTDK---G-
160915782 Eubacterium dolichum DSM 3991                        : -------------------------------------------------DPQTFDQIVKVVNYYFEEMSKSEK------YFTKDKKGRIKISGMNPLSLYRDEHGMLKKYS---------KKGDGPAITQ------MKYFDG----VLGNHIDISAHY-------QVRDKKV------VLQQISPYRTDFYYSKE---NG
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : -------------------------------------------------DKVVYSAIRQALEAHNGSGELAFP-------------------------------DGYLEYV---------DHGTKKLVRK------VRVAKKVSLPVRLKNKA-------------------------AADNGSMVRIDVFNTGK---K-
310780384 Ilyobacter polytropus DSM 2926                       : -------------------------------------------------DRKLYEALKN---RLEEYDDKPEK---------------------------AFAEPFYKPTN---------SGKRGPLVRG------IKVEEK----QNVGV--------------YVNGG--------QASNGSMVRIDVFRKNG---K-
325677756 Ruminococcus albus 8                                 : -------------------------------------------------DKILIDSLKT---IFEQADYKDVG---------------------------DYLKKTNQHFF---------TTSSGKRVNK------VTVIEK----VPSRWLRK-----------EIDDNNFS-----LLNDSSYYCIELYKDSK---GD
187736489 Akkermansia muciniphila ATCC BAA-835                 : -------------------------------------------------DGSGEDAMVSLSKKKDGKKEKNQV----------------------------KASKLVGVFP---------EGPSK-----------LKALKA------------------------------------AIEIDGNYGVALDPKPV-----
117929158 Acidothermus cellulolyticus 11B                      : -------------------------------------------------EDVLPADENRHIVLSDRVLGPRDR-----------------------VKLFPDDRGSIRVRG---------GAAYIASFHH------ARVFRWGSSHSPSFALL------------RVSLADL------AVAGLLRDGVDVFTAELPPWTP
189440764 Bifidobacterium longum DJO10A                        : -------------------------------------------------PEDSHREIRVHDTRYSADDEMGFF--------------------------ASQAAQIAVQEG---------SADIGSAIHH------ARVYRC-----------------------WKTNAKGVRKY--FYGMIRVFQTDLLRACH----D
283456135 Bifidobacterium dentium Bd1                          : -------------------------------------------------PENRGREIVLNGRHIRSTETVDFF--------------------------ASGAAQLMVRNG---------SAEIGDSIHH------MRIYRYRK-----------------------TGAKSQEY---VYGMIRVFQIDLLH--------
38232678  Corynebacterium diphtheriae NCTC 13129               : -------------------------------------------------PANPERHIRVNGTHVYAGDNIGLF--------------------------PVSAGSIALRGG---------YAELGSSFHH------ARVYKI-T-----------------------SGKKP------AFAMLRVYTIDLLP--------
187250660 Elusimicrobium minutum Pei191                        : KSAIEN-------------------------------------------NKRLFDVIQDNLEKAKKLLEEENE-------------------KSKAEGKKEKNINDASIYQ---------KAISLSGDKY------VQLSKK----EPGKFFAISK---------PTPTTTGY-----GYDTGDSLCVDLYYDNK---GK
319957206 Nitratifractor salsuginis DSM 16511                  : -------------------------------------------------NDESYRAVEERATQIAQILTRYQL--------------MDAQNDKEIDEKFQQALKELITSP---------IEVTGKLLRK------MRFVYD----KLNAM--------------QIDRGL-------VETDKNMLGIHISKGPN---EK
325972003 Sphaerochaeta globus str. Buddy                      : -------------------------------------------------DKQPKWYPMEMKDKIEQLQSKNEA----------------------ALQKYKESLVQAAAVLEESNRKLIESGKKPIQLSE------KTISKKALELVGGYYYLISNNKRTKTFVVKEPSNEVKGF---AFDTGSNLCLDFYHDAQ---GK
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : SS-----------------------------------------------KIDVFYFTKETKERFFATRKTLDT--SFNQAKIKDSIADSGIQKILLAHLKSKNGDAEQAFS---------PDGIDEMNKN------IVELNNGKFHQPILKVRVYEKADKFAVGQKGNKKVKFV----EAAKGTNLFFAIFEKDG-----
60683389  Bacteroides fragilis NCTC 9343                       : RKV----------------------------------------------PEKVKIVTLEAIYTIRKEISPDLK---------VDKVIDVGVRKILIDRLNEYGNDAKKAFSNLDKNPIWLNKEKGISIKR------VTISGISNAQSLHVKKDKDGK--------PILDENGRNIPVDFVNTGNNHHVAVYYRPV---ID
256819408 Capnocytophaga ochracea DSM 7271                     : KTL----------------------------------------------PEKVNLTYLEEDFSIRKDISPDNF--KDLKS--IEKVIDQGVKRILIKRLQAYDNDPKKAFVDLEKNPIWLNKEKGIAIKR------VTISGVNNAQPLHIGKDHLGK--------TTLNKEGKEIPVDYVSTGNNHHVAIYR--------
90425961  Rhodopseudomonas palustris BisB18                    : -------------------------------------------------RDELVESLRAWIAAGKPKDRPPLS-------------------------------------------------PKGDVIRK------VRIQTNDKVSVEING--------------------G------TVDRGDMARVDVFRKKN---KK
373501184 Prevotella micans F0438                              : DPTIYYVI---RRELKYKRSTQDSGFTNW--------------------EDLEKVIVDTDLFGLMKGQFPEGT-----------------------SFKDACEQGFYMIKKGK-------NGEGDVKTHR-----IRHVRCKAVKTALRIKEQT-----------YKSSKDYKQFF--YAAVGDLYVMCYY----T----
294674019 Prevotella ruminicola 23                             : -----------------------EAL-D---------------------AKSIGNIVDPTVRSIIESAIAIHG-----------------------SLKAAINKGIWM------------NEEKHIPIKK------VRVFRNDVKKPIELKDQR-----------DLSDKDYKQHY--YVTNDGNYMMLIFSKLNN----
365959402 Flavobacterium columnare ATCC 49512                  : ILKKDIKG-----------------------------------------NEIVFFVVRK---EISKISENDVQNIVDNVVRKKIENAIANSLITFKIVKKKKVAVIKEGVTIWMREPNIEKGIEGIPIKK------VRIITN----SVKNPIEIKVHS-------PLSKSRHKHKQKVYGQNDENYAMALYELDG---KR
312879015 Aminomonas paucivorans DSM 12260                     : -------------------------------------------------DRKLYEALRE---RLAAFGGNGKK---------------------------AFVAPFRKPC----------RSGEGPLVRS------LRIFDSGYSGVE-----------------LRDGGEVYA----VADHESMVRVDVYAKKN---R-
83591793  Rhodospirillum rubrum ATCC 11170                     : -------------------------------------------------SPRMAKRFKALLARYQAAHPEVPP--------------------------ALAALAVARDPA---------FGPRGMTANT------VIAGRSDGDGEDAGLIT------------PFRANPKAAVRTMGNAVYEVWEIQVKGRPR-----
294086111 Candidatus Puniceispirillum marinum IMCC1322         : -------------------------------------------------DPLIKSALLNETAGLSGKSFENAV-------------------------------------Q---------KWCADNSIKS------LRIVETVSII-------------------PITDKEGVAYK--GYKGDGNAYMDIYQDPT---SS
121608211 Verminephrobacter eiseniae EF01-2                    : --------------------------------------------------KTITLIPID---EPRQLARHGVD-----------------------------------------------AEGKPLPYK-------------------------------------------------GYASGSNYCIEITKNGK---GK
344171927 Ralstonia syzygii R24                                : -------------------------------------------------DARAREVALTALAERYRQRKVWLE----------------------------ELMSVLPIRP---------RGEDGKTLPD----------------SAPYK---------------------------AYKGDSNYCYELFINER---GR
159042956 Dinoroseobacter shibae DFL 12                        : -------------------------------------------------DPQLRKALRV---ATGGKTGKDFE------------------------NALRYFASKPGPYQ---------------AIRR------VRIIKPLQAQARVPV--------------PAQDPIK------AYQGGSNHLFEIWRLPD---GE
288957741 Azospirillum sp- B510                                : -------------------------------------------------DPRLRRALIDRLAIRRRDANDPAT----------------------------ALAKAAEDLA---------AQPASRGIRR------VRVLKKESNPIRVEHGG------------NPSGPRSGGPFHKLLLAGEVHHVDVALRAD---GR
92109262  Nitrobacter hamburgensis X14                         : -------------------------------------------------DIQLRTIVRD---HVNVEKTKGVA----------------------LADALRQLQAPSDDYP-----------QFKHGLRH------VRILKK----EKGDYLV------------PIANRASGVAYK-AYSAGENFCVEVFETAG---GK
148255343 Bradyrhizobium sp- BTAi1                             : -------------------------------------------------DRRLRDLVRA---HVAGERQQGKT-------------------------LKAAVLSFAQRRD---------IAGHPNGIRH------VRLTKS----IKPDYLV------------PIRDKAGRIYK--SYNAGENAFVDILQAES---GR
34557790  Wolinella succinogenes DSM 1740                      : -------------------------------------------------DEEKFESFKA-------------------------------------------------------------DRVASANQKN------------------------------------------------FYETSTIPRVDVYHKKG---K-
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : -------------------------------------------------KEGVLKAL-----ELGKIRKVNGK---------------------------------------------------------------------------------------------------------IVKNGDMFRVDIFKHKK---TN
291276265 Helicobacter mustelae 12198                          : -------------------------------------------------EEGVKKAL-----KFGKIREINQG---------------------------------------------------------------------------------------------------------IVDNGAMVRVDIFKSKD---KG
229113166 Bacillus cereus Rock1-15                             : -------------------------------------------------DKYTYTAIKE---RYLEFNKDKEK---------------------------AFSTPLYKLKR---------NGEPGNQIKS------VKIIDT----RNIVN--------------KVNQGKG------IAYNSNIIRVDVFSRDQ---K-
222109285 Acidovorax ebreus TPSY                               : -------------------------------------------------NERLYAAIRQ---RLEQFGGRADK------------------------AFGPDNLFHKPDKN---------NQPTGPVVRS------IKLVRG----KQTGI--------------PIRGG--------LAKNDSMLRVDIFTKAG---K-
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : -------------------------------------------------NCGIIRVLKE---RLEKFKNDSLK---------------------------AFADPVHMPTKC--------PNKKGPVIRS------VKIKESNKT--------------------GIEVRKG------LAERGEMVRVDVFIKDK---K-
182624245 Clostridium perfringens D str. JGS1721               : -------------------------------------------------DKKLYDAISE---RMKEFNYNGKK---------------------------AFESPFRKPTK---------SGKEGPVVRS------VKIKSA----VPFKD--------------GIPMNEG------LVAKEGMVRIDIYEKEG---K-
220930482 Clostridium cellulolyticum H10                       : -------------------------------------------------DKAVYNVLKN---RLIEHNNKPLK---------------------------AFAEKIYKPLK---------NGTNGAIIRS------IRVETP----SYTGV--------------FRNEGKG------ISDNSLMVRVDVFKKKD---K-
154250555 Parvibaculum lavamentivorans DS-1                    : -------------------------------------------------DPRIKEIVAA---HVAGRGGDPKK--------------------------------AFPPYPC--------VSPGGPEIRK------VRLTSK----QQLNL--------------MAQTGNG------YADLGSNHHIAIYRLPD---GK
257413184 Roseburia intestinalis L1-82                         : -------------------------------------------------DLLLYEALKK---QLLLYGNDAKK---------------------------AFAQDFHKPKA---------DGTEGPVVRK------VKIQKK----QTMGV--------------FVDSGNG------IAENGGMVRIDVFRVNG---K-
218767588 Neisseria meningitidis Z2491                         : -------------------------------------------------EPKLYEALKA---RLEAHKDDPAK---------------------------AFAEPFYKYDK---------AGNRTQQVKA------VRVEQV----QKTGV--------------WVRNHNG------IADNATMVRVDVFEKGD---K-
15602992  Pasteurella multocida subsp. multocida str. Pm70     : -------------------------------------------------EPALYAGLKA---RLAEFNQDPAK---------------------------AFATPFYK--------------QGGQQVKA------IRVEQV----QKSGV--------------LVRENNG------VADNASIVRTDVFIKNN---K-
319941583 Sutterella wadsworthensis 3 1 45B                    : QDWLRIC-----------------------------------------------DSPELADAFGKPCS-ADELTSKLARIWKRPVMRD--------------------------------------------------------------------------------------------LAHAPVRREFSLPAIDNPSG
254447899 gamma proteobacterium HTCC5015                       : SAWENLL-----------------------------------------------DEPLLETYWGTKMP-PQEIWEKVYRKHFPRNIPN--------------------------------------------------------------------------------------------QAHRKVRKDFSLPVVDSVSG
54296138  Legionella pneumophila str. Paris                    : KDWERLF-------------------------------------------NHPNFLALKANPAPNPKEFNEFIRKYFLSDNNPNSDIPN------------------------------------------------------------------------------------NGHNIKPQKHKAVRKVFSLPVIPGNAG
331001027 Parasutterella excrementihominis YIT 11859           : VEWGKVL-----------------------------------------------WNVFKENTAEELKD-ENALRKALEAAWPSSFGTR--------------------------------------------------------------------------------------------NLHSKAKRVFSLPVVATQSG
34557932  Wolinella succinogenes DSM 1740                      : NEYKLDV-------------------------------------------DT--QPIWDDFCR------WYFLDRYKTANDKK-------------------------------------------------------------------------------------------------SIRIKARKTFSLLAESGVQG
118497352 Francisella novicida U112                            : KEWQRLY-------------------------------------------RE--WQNTTIKDD------YEFLKSFFNVKSIT-------------------------------------------------------------------------------------------------KLHKKVRKDFSLP-ISTNEG

Motifs                                                         : ________________________________________________________________________________________________________________________________________________________________________________________________________

#positions selected for tree reconstruction (272)              : --------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
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303229466 Veillonella atypica ACS-134-V-Col7a                  : --------YDLLRKENKTLKA-----------------SSITTSIYNINTSTVVSLSNKVGIDVFDYF----------------MSKLRTPLYMKMKGNKVDELSST--------------------GRSKFIKMTL--------EEQS-----------IYLLEVLNLLTNSKTTFDVKPLGITGS-------------
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : --------ENYKFIYLKKRNN-----------------NEKNETIDAVKERYNIEFN---------------------------EMYDKFL--EKLSSKDYKNYINN--------------------KLYTNFLNSKEKFKKLKLWEKS-----------LILREFLKIFNKNTYGKYEIKDSQTKE-------KLFSFP
374307738 Filifactor alocis ATCC 35896                         : --------FKRAIQLKLDQKN-----------------YELVRNIEKFLEKYVEKKGNYPIDENRDHITH--------------EKMNQL---YEVLLSKMKKFNKKGMADPS--------------DRIEKSKPKFIKLEDLIDKINV-----------INKMLNLLRCDNDTKADLSLIELPKNA-------------
320528778 Solobacterium moorei F0204                           : --------NDEDSQYLKNIAK-----------------YLQEEPDGNIERQNILNITSV-------------------------NNIKLFDVLCTKFNSNTYEIILN--------------------SLKNDVNEGREKFSELDILEQC-----------NILLQLLKAFKCNRESSNLEKLNNKKQ-------------
291520705 Coprococcus catus GD-7                               : --------LKGVVKYVNRKNE---------------------NKDAKLSERDGMTEEKL-------------------------LQLYDTF--LDKLSNTVYSIRLS--------------------AQIKTLTEKRAKFIGLSNEDQC-----------IVLNEILHMFQCQSGSANLKLIGGPGS-------------
42525843  Treponema denticola ATCC 35405                       : --------LYFKKIIRFSEIR-----------------SQREKIGKTISPYEDLSFRSYIKENLWKKTKNDEIGE---------KEFYDLLQKKNLEIYDMLLTKHKDTIYKKRPNS----------ATIDILVKGKEKFKSLIIENQF-----------EVILEILKLFSATRNVSDLQHIGGSKY-------------
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : --------KLIKKMDKFLVKK------------------------KDNKDIKVTSFDN--------------------------IKEEELIKLYKTLSDKLNNGIYSNKRN----------------NQAKNISEALDKFKEISIEEKI-----------DVLNQIILLFQSYNNGCNLKSIGLSAK-------------
224543312 Catenibacterium mitsuokai DSM 15897                  : ------------AIYKQDYDN--------------------------LDDILMIQLYI--------------------------ELTNKMKVLYPAYRGIAEKFE----------------------SMNENYVVISKEEKANIIKQML-----------IVMHRGPQNGNIVYDDFKISDRIGRLK-------------
24379809  Streptococcus mutans UA159                           : --------HLGTLLYHAKNI----------------HKV------DEPKHLDYVDKHK--------------------------DEFKELLDVVSNFSKKYTLAEGNL-------------------EKIKELYAQNNGEDLKELASSFI-----------NLLTFTAIGAPATFKFFDKNIDRKRY-------------
15675041  Streptococcus pyogenes SF370                         : --------KYVNFLYLASHY----------------EKLKGSPEDNEQKQL-FVEQHK--------------------------HYLDEIIEQISEFSKRVILADANL-------------------DKVLSAYNKHRDKPIREQAENII-----------HLFTLTNLGAPAAFKYFDTTIDRKRY-------------
16801805  Listeria innocua Clip11262                           : --------HLVTLLHHAANC----------------EV-------SDGKSLDYIESNR--------------------------EMFAELLAHVSEFAKRYTLAEANL-------------------NKINQLFEQNKEGDIKAIAQSFV-----------DLMAFNAMGAPASFKFFETTIERKRY-------------
116628213 Streptococcus thermophilus LMD-9                     : --------KFVKLLYHAKRI----------------SNT------INENHRKYVENHK--------------------------KEFEELFYYILEFNENYVGAKKNG-------------------KLLNSAFQSWQNHSIDELCSSFI---GPTGSERKGLFELTSRGSAADFEFLGVKIPRYRDY------------
323463801 Staphylococcus pseudintermedius ED99                 : --------EQQLSLYNVMN--------------------------NKETNVEKLLIEY--------------------------DFIAEKVINEYHHYLNSKLKEKRV-------------------RTFFSESNQTHEDFIKALDELFK---VVTASATRSDKIGSRKNSMTHRAFLGKGKDVKIAY------------
352684361 Acidaminococcus intestini RyC-MR95                   : --------MVPLIVPHKIECYIKAMESF-------ARKFKENNKLRIVEKFDKITVEDN-------------------------LNLYELFLQKLQHNPYNKFFSTQF-------------------DVLTNGRSTFTKLSPEEQVQTLL---------NILSIFKTCRSSGCDLKSINGSAQAARIMISADLTGL----
302336020 Olsenella uli DSM 7084                               : --------DEMKIISTCAKC----------------ING------ADPSAIDKIGNAQ--------------------------DSFFDNLKRRGSDRCALLFSQLKL-------------------DKLSQNFYMISSDDKSKILISIL----DRIRAKSNSVDLSLVGGAKHAAQMKFDFNAKLN-------------
366983953 Oenococcus kitaharae DSM 17330                       : --------ADYKLINTLLKT----------------KED--NLVDILHNRLDLPEMTIE------------------------SAFYKAFDSILSFAFNRYALHQNAL-------------------VKLQAHRDDFNALNYEDKQQTLE----------RILDALHASPASSDLKKINLSSGFGRLFSPSHF-------
310286728 Bifidobacterium bifidum S17                          : --------QGKGSLEKDDLKK--------------------------LLDSILGSVQC---LYPWHRFTE--------------EELADLHVAFDKLPEDEKKNVIT--------------------GIVSALHADAKTANLSIVGMTG-----------SWRRMNNKSGYTFSDEDEFIFQSPSGL-------------
258509199 Lactobacillus rhamnosus GG                           : --------YQELWLSRENQKL--------------------------LKKLFSIKYEKTQMNHDALQVYK--------------AIIDQVEKFFKLYDINQFRAKLS--------------------DAIERFEKLPINTDGNKIGKTE-----------TLRQILIGLQANGTRSNVKNLGIKTDL-------------
300361537 Lactobacillus gasseri JV-V03                         : --------NAKQLTLSQNSMQ-----------------AITDNCENDTEEEKALEEKALIEAYDEIL-----------------TNIDKYLPLFDIN------------------------------KFREKLHAGREKFINLSLDVKK-----------DTILQVLNGLHDNAVMPKIKSLGLSTP-------------
169823755 Finegoldia magna ATCC 29328                          : --------WRVDEISNLKKIE------------------------NKYKKDAILTEEDRKIME---------------------SYIDKIYQQFKAGKYKNRRTTDT--------------------IIEKYEIIDLDTLDNKQLYQLL-----------VAFISLSYKTSNNAVDFTVIGLGTECG-------------
47458868  Mycoplasma mobile 163K                               : --------YCFISIDARNSKF--------------------------EKDEIKINYEKLKTQKEKLQI----------------INEEPI---LKINKGDLFENE----------------------EKELFYIVGRDE------KPQK-----------LEIKYILGKKIKDQKQIQKPVKKYFPN-------------
284931710 Mycoplasma gallisepticum str. F                      : AKKQ----YIRVPLNTLNLHL----------------------GDHDFDLHNMDAYLKKPKFVKYLKANE---------------IGDEYKPWRVLTSGTLLIHKKD--------------------KKLMYISSFQN-------LNDV-----------IEIKNLIETEYKENDDSDSKKKKKANR-------------
363542550 Mycoplasma ovipneumoniae SC01                        : GKES----YKSIPVTSQMRNF----------------------GIDEFDFLDENLY-NKEKLDIYKSDFAKP-------------IPVNCKPVFVLKKGSILK------------------------KKSLDIDDFKE-------TKET-----------EEGNYYFISTISKRFNRDTAYGLKPLK-------LSVVKP
384393286 Mycoplasma canis PG 14                               : SANN----FKTLSINTQIAIF----------------------GDKNWDIEDFKTY-NMEKIEKYKEIYG--------------IDKTYNFHSFIFPGTILLDKQN--------------------KEFYYISSIQT-------VRDI-----------IEIKFLNKIEFKD-ENKNQDTSKTPKR-------------
71894592  Mycoplasma synoviae 53                               : --------KCVGFIWLKNKND-----------------LEESIFVPINSRVIHFGDKDKDIFDFDS------------------YNKEKLLNEINLKRPENKKFNSI--------------------NEIEFVKFVKPGALLLNFENQQ-----------IYYISTLESSSLRAKIKLLNKMDKGKA-------------
238924075 Eubacterium rectale ATCC 33656                       : S-------YYLVGVKQSDIKF-----------------EKGRNVIDEEAYARILVNEKMIQPGQSRAD----------------LENLGFKFKLSFYKNDIIEY-----------------------EKDGKIYTERLVSRTMPKQRNY-----------IETKPIDKAKFEKQNLV-----------------------
116627542 Streptococcus thermophilus LMD-9                     : K-------YEILGLKYADLQF------------------------EKGTGTYKISQEKYNDIKKKEGV----------------DSDSEFK--FTLYKNDLLLVKDTET------------------KEQQLFRFLSRTMPK---QKHY-----------VELKPYDKQKFEGGEALIKVLGNVANS-------------
315149830 Enterococcus faecalis TX0012                         : A-------YYTVQLYYSDLRF--------------------------VEGKYGITEKEYMKKVAEQTK----------------GQVVRFC--FSLQKNDGLEIEWK--------------------DSQRYDVRFYNFQ-----SANS-----------INFKGLEQEMMPAENQFKQKPYNNGAI-------------
315659848 Staphylococcus lugdunensis M23590                    : --------YKFITISYLDVLK--------------------------KDNYYYIPEQKYDKLKLGKAI----------------DKNAKFI--ASFYKNDLIKLD----------------------GEIYKIIGVNSD------TRNM-----------IELDLPDIRYKEYCELNNIKGEPRIKK-------------
160915782 Eubacterium dolichum DSM 3991                        : --------YKFVTIRYKDVRW------------------------SEKKKKYVIDQQDYAMKKAEKKI----------------DDTYEFQ--FSMHRDELIGITKAEG------------------EALIYPDETWHNFNFFFHAGET-----------PEILKFTATNNDKSNKIEVKPIHCYCK-------------
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : --------FVFVPIYIKDTVE------------------------QVLPNKAIARGKS-----LWYQI----------------TESDQFC--FSLYPGDMVHIESKT-------------------GIKPKYSNKENNTSVVPIKNFY-----------GYFDGADIATASILVRAHDSSYTARSI-------------
310780384 Ilyobacter polytropus DSM 2926                       : --------FYTVPIYVHQTLL------------------------KELPNRAINGKPY----KDWDLI----------------DGSFEFL--YSFYPNDLIEIEF---------------------GKSKSIKNDNKLTKTEIPEVNL-----------SEVLGYYRGMDTSTGAATIDTQDGKIQ-------------
325677756 Ruminococcus albus 8                                 : --------NNLQGIAMSDIVH------------------------DRKTKKLYLKPDFNYP-----------------------DDYYTHV--MYIFPGDYLRIKSTSKKSGEQL------------KFEGYFISVKNV------NENS-----------FRFISDNKPCAKDKRVSITKKDIVIKL-------------
187736489 Akkermansia muciniphila ATCC BAA-835                 : ------------VIRHIKVFK-------------------------------------------------------------------RIMALKEQNGGKPVRILKK--------------------GMLIHLTSSKDP------KHAG-----------VWRIESIQDSKGGVKLDLQRAHCAVPK-------------
117929158 Acidothermus cellulolyticus 11B                      : A-------WRYASIALVKAVE----------------------SGDAKQVGWLVPGDELDFGPEGVTTAA--------------GDLSMFLKYFPERHWVVTGFEDD--------------------KRINLKPAFLSAEQAEVLRTER-----------SDRPDTLTEAGEILAQFFPRCWRATVA-------------
189440764 Bifidobacterium longum DJO10A                        : DLFTVPLPPQSISMRYGEPRV-----------------VQALQSGNAQYLGSLVVGDEIEMDFSSLDVD---------------GQIGEYLQFFSQFSGGNLAWKHW--------------------VVDGFFNQTQLRIRPRYLAAEG-----------LAKAFSDDVVPDGVQKIVTKQGWLPPV-------------
283456135 Bifidobacterium dentium Bd1                          : --------ASSENLFAVQLPS------------------------QSVSVRYGDKNVVQAIQ----------------------EGRAEYLGHIVPNDEILISYEGVRMKDSEKIGAYANDF----SGTASELAQRRHWVVVG-SDVSK-----LALRPSYLSEEGLENSGSESERLSKQTRKVIEG-------------
38232678  Corynebacterium diphtheriae NCTC 13129               : --------YRNQDLFSVELKP------------------------QTMSMRQAEKKLRDALA----------------------TGNAEYLGWLVVDDELVVDTSKIATDQVK--------------AVEAELGTIRRWRVDGFFSPSK-----------LRLRPLQMSKEGIKKESAPELSKIIDR-------------
187250660 Elusimicrobium minutum Pei191                        : --------LCGEIIRKIDAQQ-----------------------------KNPLKYK---------------------------EQGFTLF--ERIYGGDILEVDF---------------------DIHSDKNSFRNNTGSAPENRVF-----------IKVGTFTEITNNNIQIWFGNIIKSTGG-------------
319957206 Nitratifractor salsuginis DSM 16511                  : --------LIFRRMDVNNAHE------------------------LQKERSGILCYLN------------------------------EML--FIFNKKGLIHY-----------------------GCLRSYLEKGQGSKYIALFNPR-----------FPANPKAQPSKFTSDSKIKQVGIGSAT-------------
325972003 Sphaerochaeta globus str. Buddy                      : --------LCGEIIRKIQAMN------------------------PSYKPAYM-------------------------------KQGYSLY--VRLYQGDVCELRASDLTE----------------AESNLAKTTHVRLPNAKPGRTF-----------VIIITFTEMGSGYQIYFSNLAKSKKGQ-------------
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : -----KRSYLTIPLNVMIDCQ------KQYGNQWKNNIEAYLKEKELVEKDVKLQFILSPNDLVYLPTE---------------G---------SIDKKRIYKVV------------------------------SFTNNRLYAIPYAI-----------AKSIVD-----KNEF---TQLNKIEFT-------------
60683389  Bacteroides fragilis NCTC 9343                       : KRGQLVVDEAGNPKYELEEVV-----------------VSFFEAVTRANLGLPIIDKDYKTTEGWQFL----------------FSMKQNE--YFVFPNEKTGFNPKEIDLL---------------DVENYGLISPNLFRVQKFSLKN-----------YVFRHHLETTIKDTSSILRGITWIDFR-------------
256819408 Capnocytophaga ochracea DSM 7271                     : -------DKEGN----LQEQI-----------------VSFFDAVVRAQQGIPIIDKTYKQAEGWQFL----------------FTMKQNE--MFVFPNATTGFNPAEIDLL---------------DPKNKKLISPNLFRVQKIATKD-----------YFFRHHLETNV-ETDNILKNVTW-KRE-------------
90425961  Rhodopseudomonas palustris BisB18                    : AVWE----YYVVPIYPHQIVA--------------------------LNDPPDRAVIAYAEDKDWKEI----------------DSSYEFL--WSLFGLSYVEISKANGE-----------------CIDGYFRGLHR-------GTGA-----------ASVCKHISLGKDATVSGI----------------------
373501184 Prevotella micans F0438                              : ---------DGKK-RDFKIYS------------------------------LYDISNHRKSGTEDIPKFIT------------DKKGNHLPLDYKLRTGDMVLLYKDNPEEL---------------KDLDQVNLKRRLYKVNRFESEGL----------IILLTHHLSTTTERGCSIGKIENYQNL-------------
294674019 Prevotella ruminicola 23                             : ---------KGREIRQHVVIN------------------------SLEATEVIKSHKRSQVGKVVWESY---------------YSKEGFDLIYKLKSGTMILLYENNRDEV---------------WDLDIRNLQKRLYIITKMKYDGR---------IYMMHHQEAREKKDLEEKSGSFKINEDY-------------
365959402 Flavobacterium columnare ATCC 49512                  : EFELINN-FNLAKLLKQSQSY-----------------YPLHKEKEIKGKKILVPIEKRNNKDVILKR----------------GQQVVFYDKTVENPKDISEIIDFRERIY---------------IIEGLTIQRQKDKKTSKVNEYG-----------IIQLRHFKEARKSEEISKDNFKPDGEF-------------
312879015 Aminomonas paucivorans DSM 12260                     : --------FYLVPVYVADVAR------------------------GIVKNRAIVAHKS---EEEWDLV----------------DGSFDFR--FSLFPGDLVEIEKKDG------------------AYLGYYKSCHR-------GDGR-----------LLLDRHDRMPRESDCGTFYVS-------------------
83591793  Rhodospirillum rubrum ATCC 11170                     : --------WTHRVLTRFDRTQ-------------------------------PAPPPP--------------------------PENARLV--MRLRRGDLVYWPLESG------------------DRLFLVKKMAVDGRLALWPARL-----------ATGKATALYAQLSCPNINLNGDQGYCV-------------
294086111 Candidatus Puniceispirillum marinum IMCC1322         : K-------WKGEIVSRFDANQ----------------------------KGFIPSWQSQ-------------------------FPTARLI--MRLRINDLLKLQDG--------------------EIEEIYRVQRL-------SGSK-----------ILMAPHTEANVDARDRDKNDTFKLTSK-------------
121608211 Verminephrobacter eiseniae EF01-2                    : --------WEGQVISTFDAYRIKAAADAAARAGQVISTVEADS----IVRKSGWERLR-GAQS---------------------QNGQPLV--MRLVIGDSVRMEVD--------------------GRDEVMRVVKMS------GK-E-----------MVFAPVREANVDKRNNMPDEQDPFTYTYKRA---------
344171927 Ralstonia syzygii R24                                : --------WDGELISTFRANQ----------------------AAYRRFRNDPARFRRYT------------------------AGGRPLL--MRLCINDYIAVGTA--------------------AERTIFRVVKM-------SENK-----------ITLAEHFEGGTLKQRDADKDDPFKYLT-------------
159042956 Dinoroseobacter shibae DFL 12                        : --------IEAQVITSFEAHT------------------------LEGEKRPHPAAKRL----------------------------------LRVHKGDMVALERDGR------------------RVVGHVQKMDIANG-------------------LFIVPHNEANADTRNNDKSDPFKWIQI-------------
288957741 Azospirillum sp- B510                                : R-------WVGHWVTLFEAHG------------------------GRGADGAAAPPRL--------------------------GDGERFL--MRLHKGDCLKLEHK--------------------GRVRVMQVVKLEP-----SSNS-----------VVVVEPHQVKTDRSKHVKISC-------------------
92109262  Nitrobacter hamburgensis X14                         : --------WDGEAVRRFDANK------------------------KNAGPKIAHAPQWRDA-----------------------NEGAKLV--MRIHKGDLIRLDHE--------------------GRARIMVVHRLDA-----AAGR-----------FKLADHNETGNLDKRHATNNDIDPFRW-------------
148255343 Bradyrhizobium sp- BTAi1                             : --------WIARATTVFQANQ------------------------ANESHDAPAAQPI-----------------------------------MRVFKGDMLRIDHA--------------------GAEKFVKIVRLSP-----SNNL-----------LYLVEHHQAGVFQTRHDDPEDSF-----------------
34557790  Wolinella succinogenes DSM 1740                      : --------FHLVPIYLHEMVL------------------------NELPNLSLGTNPE--------------------------AMDENFFK-FSIFKDDLISIQTQGTPKKPAK------------IIMGYFKNMHGANMVLSSINNSP--CEGFTCTPVSMDKKHKDKCKLCPEENRIAGRCLQGFLDYWSQEGLRPP
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : K-------FYAVPIYTMDFAL------------------------KVLPNKAVARSKK-GEIKDWILM----------------DENYEFC--FSLYKDSLILIQTKDMQE----------------PEFVYYNAFTSSTVSLIVSKHD-----------NKFETLSKNQKILFKNANEKEVIAKSI-------------
291276265 Helicobacter mustelae 12198                          : K-------FYAVPIYTYDFAI------------------------GKLPNKAIVQGKKNGIIKDWLEM----------------DENYEFC--FSLFKNDCIKIQTK--------------------EMQEAVLAIYKSTNSAKATIEL-----------EHLSKYALKNEDEEKMFTDTDKEKNKT-------------
229113166 Bacillus cereus Rock1-15                             : --------YYVVPIYLRDFIK------------------------GSLPNKIITAAKG---FMQWPET----------------DNSYTFL--FSIFPNDLIKVV----------------------PKEGKFIKAKNE------NKEN-----------INLTEILGYFKGLDSSTGAFTLESHDG-------------
222109285 Acidovorax ebreus TPSY                               : --------FHLVPVYVHHRVT-------------------------GLPNRAIVAFKD---EDEWTLI----------------DESFAFL--FSVYPNDYVKVTLKKE------------------QQSGYYSGADR-------STGA-----------MNLWAHDRAASVGKDGLIRGI-------------------
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : --------YYLVPIYVSDFKN------------------------KDLPNKAIAALKL---ENEWIMI----------------DKTYSFK--FSLFKDDLIKIKKKKE------------------EIFGYFGGVHR-------STGT-----------IKIKSRHKPKEIDEGI------------------------
182624245 Clostridium perfringens D str. JGS1721               : --------YFVVPVYRYQLAK------------------------GIVPKRAAIAKKD---ELKWPIM----------------DQTYNFK--FSIYKNDLIEVKYDKKG-----------------VYFGYYDGFDR-------NSAS-----------LTIEKHDNSERYRSIG------------------------
220930482 Clostridium cellulolyticum H10                       : --------YYLVPIYVAHMIK------------------------KELPSKAIVPLKP---ESQWELI----------------DSTHEFL--FSLYQNDYLVIKTKKG------------------ITEGYYRSCHR-------GTGS-----------LSLMPHFANNKNVKIDI-----------------------
154250555 Parvibaculum lavamentivorans DS-1                    : --------ADFEIVSLFDASR------------------------RLAQRNPIVQRTR--------------------------ADGASFV--MSLAAGEAIMIPEG--------------------SKKGIWIVQGVW------ASGQ-----------VVLERDTDADHSTTTRPMP---------------------
257413184 Roseburia intestinalis L1-82                         : --------YYFVPVYTADVVK------------------------KVLPNRASTAHKP---YGEWKVM----------------EDKD-FL--FSLYSRDLIHIKSKKDIPIKMVNGGMEGIK----ETYAYYIGADI-------SAAN-----------IQGIAHDSRYKFRGL-------------------------
218767588 Neisseria meningitidis Z2491                         : --------YYLVPIYSWQVAK------------------------GILPDRAVVQGKD---EEDWQLI----------------DDSFNFK--FSLHPNDLVEVITKKA------------------RMFGYFASCHR-------GTGN-----------INIRIHDLDHKIGKNGILEGI-------------------
15602992  Pasteurella multocida subsp. multocida str. Pm70     : --------FFLVPIYTWQVAK------------------------GILPNKAIVAHKN---EDEWEEM----------------DEGAKFK--FSLFPNDLVELKTKKE------------------YFFGYYIGLDR-------ATGN-----------ISLKEHDGEISKGKDGVYR-V-------------------
319941583 Sutterella wadsworthensis 3 1 45B                    : G------FRIRRTNLFGNELYQVHAINAK--------------------KYRGFASAGSNVDWSKGILFNELQHENLTE----CGGRFITSADVTP---MSEWRKVVAEDN----------------LSIWIAPGTEGRRYVRVETTFIQ--ASHWFEQSVENWAITSPLSLPASFKVDKPAE--FQKAV---GTELSEL
254447899 gamma proteobacterium HTCC5015                       : G------FRVKRKTPNG-YNYQLLAIDGY--------------------SAVGFKKEGDNVDFKSPALVPQIAESKSVT-PISSELVHLDKNEIVY---FDEWRKIDISDSDLKQF----------VSSLELAPGSQNRFYIRFTVDEDQ--FERHF----------KSALRVNGIQDLDTVNKTFD-----WNREIPSL
54296138  Legionella pneumophila str. Paris                    : T-----MMRIRRKDNKGQPLYQLQTIDDT--------------------PSMGIQINEDRL-VKQEVLMDAYKTRNLST----IDGINNSEGQAYA--TFDNWLTLPVSTF--KPE----------IIKLEMKPHSKTRRYIRITQSLAD--FIKTIDE---------ALMIKPSDSIDDPLNMP--NEIVCKNKLFGNE
331001027 Parasutterella excrementihominis YIT 11859           : A------VRIRRKTAFGDFVYQSQDTNN---------------------LYSSFPVKNGKLDWSSPIIHPALQNRNLTA----YGYRFVDHDRSIS---MSEFREVYNKDD---------------LMRIELAQGTSSRRYLRVEMPGEK--FLAWFGE--------NSISLGSSFKFSVSEV--FDNKIYTENAEFTKF
34557932  Wolinella succinogenes DSM 1740                      : K-----VFRAKRKIPTG-YAYQALPMDNNVIAG-----------------DYANILLEANS--KTLSLVPKSGISIEKQL------------DKKLDVIKKTDVRGLAIDNNS-------------------------------FFNADFD--THGIRLIVENTSV----KVGNFPISAIDKSA----------------
118497352 Francisella novicida U112                            : K------FLVKRKTWDNNFIYQILNDSDSRADGTKPFIPAFDISKNE---IVEAIIDSFTS--KNIFWLPKN-IELQKVD----------------------NKNIFAIDTSK--------------------------WFEVETPSDLR--DIGIATIQYKIDNNSRPKVRVKLDYVIDDDS------------KINYF

Motifs                                                         : ________________________________________________________________________________________________________________________________________________________________________________________________________

#positions selected for tree reconstruction (272)              : --------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
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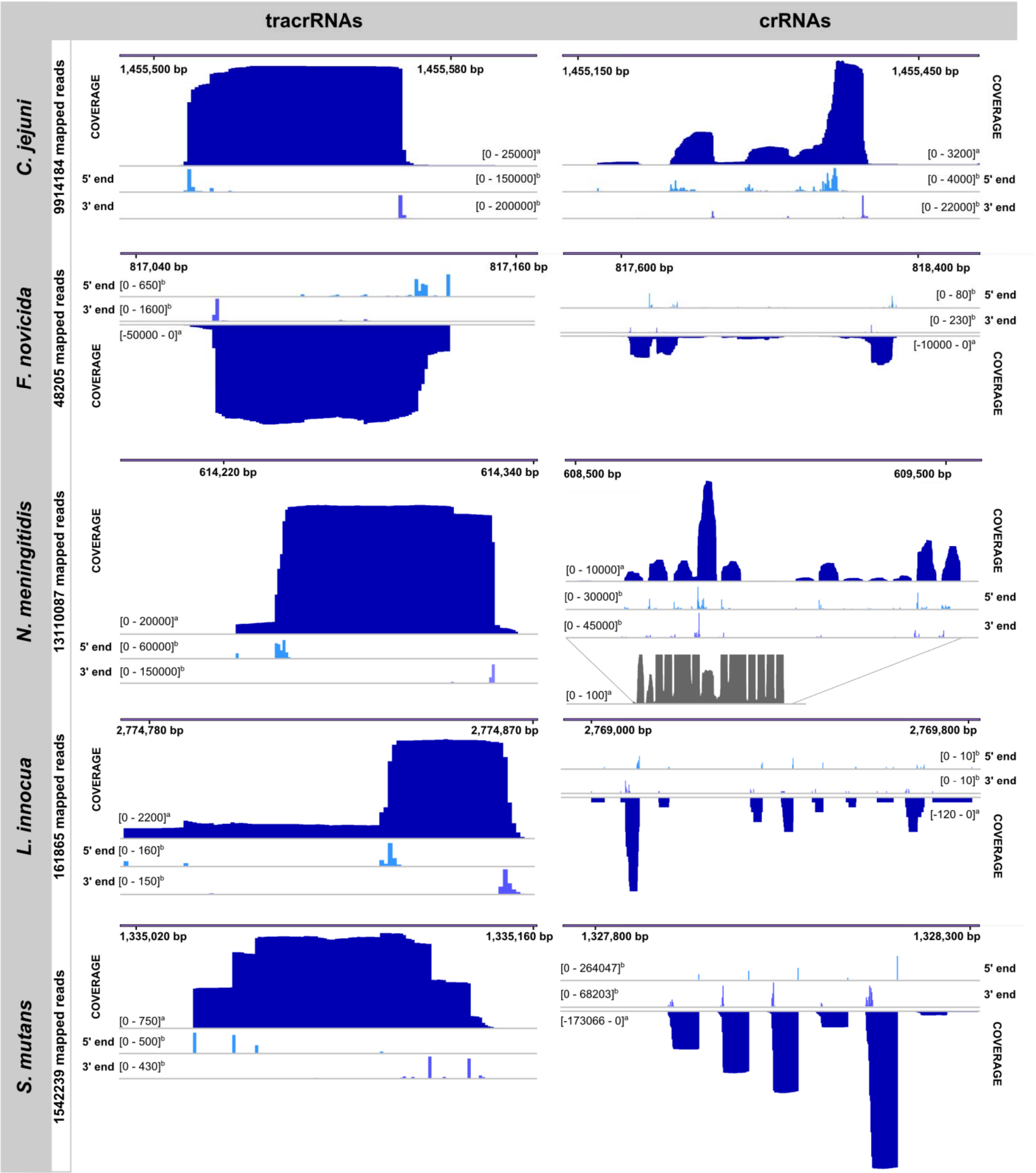
303229466 Veillonella atypica ACS-134-V-Col7a                   : --RSTIGV----------KIHNLDEFKII-NESITGLYSNEVTIV-------------------
34762592  Fusobacterium nucleatum subsp. vincentii ATCC 49256  : EDTGRIRL----------GQSSLGNNKELLEESVTGLFVKKIKL--------------------
374307738 Filifactor alocis ATCC 35896                         : -GSFVVKK----------NTIGKSKIILV-NQSVTGLYENRREL--------------------
320528778 Solobacterium moorei F0204                           : -AGVIVIP----------HLFTKCSVFKVIHQSITGLFEKEMDLLK------------------
291520705 Coprococcus catus GD-7                               : -AGILVMN----------NNITACKQISVINQSPTGIYEKEIDLIKL-----------------
42525843  Treponema denticola ATCC 35405                       : -SGVAKIG----------NKISSLDNCILIYQSITGIFEKRIDLLKV-----------------
304438954 Peptoniphilus duerdenii ATCC BAA-1640                : -TGVVFIP----------KKLNYKECKLI-NQSITGLFENEVDLLNL-----------------
224543312 Catenibacterium mitsuokai DSM 15897                  : ------------------TKNHNLNNIVFISQSPTGIYTKKYKL--------------------
24379809  Streptococcus mutans UA159                           : ------------------TSTTEILNATLIHQSITGLYETRIDLNKLGGD--------------
15675041  Streptococcus pyogenes SF370                         : ------------------TSTKEVLDATLIHQSITGLYETRIDLSQLGGD--------------
16801805  Listeria innocua Clip11262                           : ------------------NNLKELLNSTIIYQSITGLYESRKRLDD------------------
116628213 Streptococcus thermophilus LMD-9                     : ------------------TPSSLLKDATLIHQSVTGLYETRIDLAKLGEG--------------
323463801 Staphylococcus pseudintermedius ED99                 : ------------------TSISGLKTTK--PKSLFKLAESRNEL--------------------
352684361 Acidaminococcus intestini RyC-MR95                   : --------------------SKKYSDIRLVEQSASGLFVSKSQNLLEYL---------------
302336020 Olsenella uli DSM 7084                               : ---------------------NPASSFVLIDQSVTGMFERRTRIGL------------------
366983953 Oenococcus kitaharae DSM 17330                       : ---------------------TLADTDEFIFQSVTGLFSTQKTVAQLYQETK------------
310286728 Bifidobacterium bifidum S17                          : ------FE----------KRVTVGELKRKAKKEVNSKYRTNEKRLPTLSGASQP----------
258509199 Lactobacillus rhamnosus GG                           : -GLLQVGS----------GIKLDKDTQIV-YQSPSGLFKRRIPLADL-----------------
300361537 Lactobacillus gasseri JV-V03                         : -LGFMQFS----------SGVPLSENAKLIYQSPTGLFEKRVKISDL-----------------
169823755 Finegoldia magna ATCC 29328                          : ------KP----------RITNLPDNTYLVYKSITGIYEKRIRIK-------------------
47458868  Mycoplasma mobile 163K                               : -------------------------WKKV-NLTYMGEIFKK-----------------------
284931710 Mycoplasma gallisepticum str. F                      : -FLMTLST----------ILNDYILLDAKDNFDILGLSKNRIDEILNSKLGLDKIVK-------
363542550 Mycoplasma ovipneumoniae SC01                        : VAEPSTNP----------IFKEYIPIHLDE----LGNEYPVKIKEHTDDEKLMCTIK-------
384393286 Mycoplasma canis PG 14                               : -LMFGIKS----------IMNNYEQVDISP----FGINK--------------KIFE-------
71894592  Mycoplasma synoviae 53                               : ----VSMK----------KITNPDEYKIIEHVNPLGINLNWTKKLENNN---------------
238924075 Eubacterium rectale ATCC 33656                       : ------------------GLGKTKFIKKY-RYDILGNKYSCSEEKFTSFC--------------
116627542 Streptococcus thermophilus LMD-9                     : --GQCKKG----------LGKSNISIYKV-RTDVLGNQHIIKNEGDKPKLDF------------
315149830 Enterococcus faecalis TX0012                         : --NLNIAK----------YGKEGKKLRKF-NTDILGKKHYLFYEKEPKNIIK------------
315659848 Staphylococcus lugdunensis M23590                    : -------T----------IGKKVNSIEKL-TTDVLGNVFTNTQYTKPQLLFKRGN---------
160915782 Eubacterium dolichum DSM 3991                        : --MRLMPT----------ISKKIVRIDKY-ATDVVGNLYKVKKNTLKFEFD-------------
336393381 Lactobacillus coryniformis subsp. torquens KCTC 3535 : ------------------GIAGLLKFEKY-QVDYFGRYHKVHEKKRQLFVKRDE----------
310780384 Ilyobacter polytropus DSM 2926                       : -----MRI----------GIKTVKNIKKY-QVDVLGNVYKVKREKRQTF---------------
325677756 Ruminococcus albus 8                                 : --AVDLMG----------KVQGENNGKGISCGEPLSLLKEKN--------------------
187736489 Akkermansia muciniphila ATCC BAA-835                 : ------------------NKTHECNWREVDLISLLKKYQMKRYPTSYTGTPR------------
117929158 Acidothermus cellulolyticus 11B                      : ------------------KVLCHPGLTVI-RRTALGQPRWRRGHLPYSWRPWSADPWSGGTP--
189440764 Bifidobacterium longum DJO10A                        : ------------------NTASKTAVRIV-RRNAFGEPRLSSAHHMPCSWQWRHE---------
283456135 Bifidobacterium dentium Bd1                          : -KGWVVAV----------N-ILAKYHPVVIRRNALGEPRFRTNSGMPVSWRWDR----------
38232678  Corynebacterium diphtheriae NCTC 13129               : -PGWLPAV----------NKLFSDGNVTVVRRDSLGRVRLESTAHLPVTWKVQ-----------
187250660 Elusimicrobium minutum Pei191                        : -QDDSFTI----------NSMQQYNPRKL-ILSSCGFIKYRSPILKNKEG--------------
319957206 Nitratifractor salsuginis DSM 16511                  : -GIIKAHL----------DLDGHVRSYEVFGTLPEGSIEWFKEESGYGRVEDDPHH--------
325972003 Sphaerochaeta globus str. Buddy                      : --DTSFTL----------TTIKNYDVRKV-QLSSAGLVRYVSPLLVDKIEKDEVALCGE-----
261414553 Fibrobacter succinogenes subsp. succinogenes S85     : ------DN----------KESIKDACVPV-IIDRLGNVIEFNGKRL------------------
60683389  Bacteroides fragilis NCTC 9343                       : ------------------SSKGLDTIVKV-RVNHIGQIVSVGEY--------------------
256819408 Capnocytophaga ochracea DSM 7271                     : ------------------GLSGLKDIVKV-RINHLGDIVSIGEY--------------------
90425961  Rhodopseudomonas palustris BisB18                    : ------------------GLKTLASFKKF-TIDRLGRKFEIPREVRTWRGE-----ACT-----
373501184 Prevotella micans F0438                              : ------------------PTAIRCGIKTI-KFLIMGKHRDFVIRN-GNIEFKH-----------
294674019 Prevotella ruminicola 23                             : ------------------RPLIVNSYNQF-NALVQDLDFEINDLGEIRRLI-------------
365959402 Flavobacterium columnare ATCC 49512                  : ---KINEN----------KPTRKMNHNQF-TAFVEGIDFKVLPSGKFQKI--------------
312879015 Aminomonas paucivorans DSM 12260                     : ------------------TRKDVLSMSKY-QVDPLGEIRLVGSEKPPFVL--------------
83591793  Rhodospirillum rubrum ATCC 11170                     : -----QSA----------EGIRKEKIRTT-SCTALGRLRLSKKAT-------------------
294086111 Candidatus Puniceispirillum marinum IMCC1322         : ------SP----------GKLQSASARKV-HISPTGLIREG-----------------------
121608211 Verminephrobacter eiseniae EF01-2                    : ------------------DQLRKAKARQV-TISPIGELRDPGFKG-------------------
344171927 Ralstonia syzygii R24                                : -----KSP----------GALRDLGARRI-FVDLIGRVLDPGIKGD------------------
159042956 Dinoroseobacter shibae DFL 12                        : ------GA----------RPAIASGIRRV-SVDEIGRLRDGGTRPI------------------
288957741 Azospirillum sp- B510                                : ------------------DQLRARGARRV-TVDPLGRVRVHAPGARVGIGGDAGRTAMEPAEDI
92109262  Nitrobacter hamburgensis X14                         : ---LMASY----------NTLKKLAAVPV-RVDELGRVWRVMPN--------------------
148255343 Bradyrhizobium sp- BTAi1                             : -RWLFASF----------DKLREWNAELV-RIDTLGQPWRRKRGLETGSEDATRIGWTRPKKWP
34557790  Wolinella succinogenes DSM 1740                      : RKEFECDQ----------GVKFALDVKKY-QIDPLGYYYEVKQEKRLGTIPQMRSAKKLVKK--
218563121 Campylobacter jejuni subsp. jejuni NCTC 11168        : ------------------GIQNLKVFEKY-IVSALGEVTKAEFRQREDFKK-------------
291276265 Helicobacter mustelae 12198                          : --MTRESC----------GIQGLKVFQKV-KLSVLGEVLEHKPRNRQNIALKTTPKHV------
229113166 Bacillus cereus Rock1-15                             : -SLLARGI----------GTKNLLLIEKY-QVDVLGRYNKVGNEERQDIKIQQN----------
222109285 Acidovorax ebreus TPSY                               : ------------------GVKTALSVEKF-NVDVLGRIYLAPPETRSGLA--------------
189485225 uncultured Termite group 1 bacterium phylotype RsD17 : ------------------GSRCLLDFRKF-QVDVLGNYTEVKHEKRMPAYITRKDKKH------
182624245 Clostridium perfringens D str. JGS1721               : ------------------LKVGVLEINKY-EVDVLGNYHKVKLGGN------------------
220930482 Clostridium cellulolyticum H10                       : ------------------GVRTAISIEKY-NVDILGNKSIVKGEPRRGMEKYNSFKSN------
154250555 Parvibaculum lavamentivorans DS-1                    : ------------------NPILKDDAKKV-SIDPIGRVRPSND---------------------
257413184 Roseburia intestinalis L1-82                         : ------------------GIQSLDVLEKC-QIDVLG-HVSVVRSEKRMGFS-------------
218767588 Neisseria meningitidis Z2491                         : ------------------GVKTALSFQKY-QIDELGKEIRPCRLKKRPPVR-------------
15602992  Pasteurella multocida subsp. multocida str. Pm70     : ------------------GVKLALSFEKY-QVDELGKNRQICRPQQRQPVR-------------
319941583 Sutterella wadsworthensis 3 1 45B                    : LGQPR--------SEIFIENVGNAKHIR--FWYIVVSSNKKMNESYNNVSKS------------
254447899 gamma proteobacterium HTCC5015                       : LIPPR--------SNLFLLETGQKIT----FEYIANGANAEVKKAYSLRRA-------------
54296138  Legionella pneumophila str. Paris                    : L-KPRD-------GKMKIVSTGKIVT----YEFESDSTPQWIQTLYVTQLKKQP----------
331001027 Parasutterella excrementihominis YIT 11859           : LPKPREDNKHN--GTIFFELVGPRVI----FNYIVGGAASSLKEIFSEAGKERS----------
34557932  Wolinella succinogenes DSM 1740                      : -KRMIFRAL----FEKEKGKRKKKTT----ISFKESGPVQDYLKVFLKKIVKIQLRTDGSISN-
118497352 Francisella novicida U112                            : MNHSLLKSRY---PDKVLEILKQSTI----IEFESSGFNKTIKEMLGMKL---AGIYNETSNN-

Motifs                                                          : ___________________________________G____________________________

#positions selected for tree reconstruction (272)               : ----------------------------------------------------------------
```



Supplementary Figure 2. Expression of bacterial tracrRNA orthologues and crRNAs revealed by deep RNA sequencing. Expression profiles of tracrRNA orthologues and crRNAs of selected bacterial strains are represented along the corresponding genomes by blue bar charts (Images captured from the Integrative Genomics Viewer (IGV) tool). *Campylobacter jejuni* (GenBank: NC_002163), *Francisella novicida* (GenBank: NC_008601), *Neisseria meningitidis* (GenBank: NC_003116), *Listeria innocua* (GenBank: NC_003212) and *Streptococcus mutans* (GenBank: NC_004350). Genomic coordinates are given. [a]Sequence coverage calculated using BEDTools-Version-2.15.0 (Scale given in reads per million). [b]Distribution of reads starting (5') and ending (3') at each nucleotide position are indicated (Scale given in numbers of reads). Upper panels correspond to transcripts from the positive strand and lower panels correspond to transcripts from the negative strand. The negative coverage values and peaks presented below the axes indicate transcription from the negative strand of the genome. Predominant 5'- and 3'-ends of the reads are plotted for all RNAs. Note that given the low quality of *L. innocua* cDNA library, the reads are shortened for crRNAs, and an accumulation of the reads at the 3' end of tracrRNA is observed, presumably due to RNA degradation.

Supplementary table 1. Bacterial species containing type II CRISPR-Cas loci characterized by the presence of the signature gene *cas9*.

Cluster[a]	Strains[b]	Cas9 GI	Length (aa)
1	*Enterococcus faecium* 1,231,408	257893735	1340
	Enterococcus italicus DSM 15952	315641599	1330
	Listeria innocua Clip11262	**16801805**	**1334**
	Listeria monocytogenes serotype 1-2a str. F6854	47097148	1334
	Streptococcus agalactiae 2603V-R	22537057	1370
	Streptococcus agalactiae A909	76788458	1370
	Streptococcus agalactiae NEM316	25010965	1377
	Streptococcus anginosus F0211	315223162	1345
	Streptococcus bovis ATCC 700338	306833855	1373
	Streptococcus dysgalactiae subsp. *equisimilis* GGS 124	251782637	1371
	Streptococcus equi subsp. *zooepidemicus* MGCS10565	195978435	1348
	Streptococcus equinus ATCC 9812	320547102	1377
	Streptococcus gallolyticus subsp. *gallolyticus* ATCC BAA-2069	325978669	1370
	Streptococcus gallolyticus UCN34	288905639	1371
	Streptococcus macacae NCTC 11558	357636406	1338
	Streptococcus mutans NN2025	290580220	1345
	Streptococcus mutans UA159	**24379809**	**1345**
	Streptococcus pseudoporcinus SPIN 20026	313890160	1326
	Streptococcus pyogenes SF370	**15675041**	**1368**
	Streptococcus pyogenes MGAS10270	94990395	1368
	Streptococcus pyogenes MGAS10750	94994317	1371
	Streptococcus pyogenes MGAS2096	94992340	1368
	Streptococcus pyogenes MGAS315	21910213	1368
	Streptococcus pyogenes MGAS5005	71910582	1368
	Streptococcus pyogenes MGAS6180	71903413	1368
	Streptococcus pyogenes MGAS9429	94988516	1368
	Streptococcus pyogenes NZ131	209559356	1368
	Streptococcus pyogenes SSI-1	28896088	1368
	Streptococcus thermophilus LMD-9	**116628213**	**1388**
2	*Bacteroides coprophilus* DSM 18228	224026357	1509
	Bacteroides dorei DSM 17855	212694363	1504
	Bacteroides sp. 20 3	301311869	1517
	Capnocytophaga gingivalis ATCC 33624	228473057	1436
	Fibrobacter succinogenes subsp. _succinogenes_ S85	**261414553**	**1512**
	Flavobacterium columnare ATCC 49512	365960762	1459
	Fluviicola taffensis DSM 16823	327405121	1458
	Mucilaginibacter paludis DSM 18603	373954054	1473
	Prevotella bivia JCVIHMP010	282858617	1485
	Prevotella buccae ATCC 33574	315607525	1457
	Prevotella melaninogenica D18	288802595	1354
	Prevotella veroralis F0319	260592128	1496
	Psychroflexus torquis ATCC 700755	408489713	1052
	Sphingobacterium spiritivorum ATCC 33861	300771242	1426
	Weeksella virosa DSM 16922	325955459	1440
3	*Actinobacillus minor* NM305	240949037	1056
	Actinobacillus pleuropneumoniae serovar 10 str. D13039	307256472	1054
	Actinobacillus succinogenes 130Z	152978060	1062
	Haemophilus parainfluenzae T3T1	345430422	1052
	Kingella kingae ATCC 23330	333374624	1000
	Neisseria bacilliformis ATCC BAA-1200	329117879	1077
	Neisseria cinerea ATCC 14685	261378287	1082

Cluster[a]	Strains[b]	Cas9 GI	Length (aa)
3 (*continued*)	*Neisseria flavescens* SK114	241759613	1081
	Neisseria lactamica 020-06	313669044	1082
	Neisseria meningitidis 053442	161869390	1082
	Neisseria meningitidis alpha14	254804356	1082
	***Neisseria meningitidis* Z2491**	**218767588**	**1082**
	***Pasteurella multocida* subsp. *multocida* str. Pm70**	**15602992**	**1056**
	Simonsiella muelleri ATCC 29453	404379108	1065
4	*Lactobacillus farciminis* KCTC 3681	336394701	1126
	Streptococcus gallolyticus UCN34	288905632	1130
	Streptococcus gordonii str. Challis substr. CH1	157150687	1136
	Streptococcus infantarius subsp. *infantarius* ATCC BAA-102	171779984	1129
	Streptococcus macedonicus ACA-DC 198	374338350	1130
	Streptococcus mitis ATCC 6249	306829274	1134
	Streptococcus pasteurianus ATCC 43144	336064611	1130
	Streptococcus suis 89-1591	223932525	1122
	Streptococcus suis ST3	330833104	1122
	Streptococcus thermophilus CNRZ1066	55822627	1128
	***Streptococcus thermophilus* LMD-9**	**116627542**	**1121**
	Streptococcus thermophilus LMG 18311	55820735	1122
	Streptococcus vestibularis ATCC 49124	322517104	1128
5	*Bacteroides cellulosilyticus* DSM 14838	224535832	1219
	***Bacteroides fragilis* NCTC 9343**	**60683389**	**1436**
	Bacteroidetes oral taxon 274 str. F0058	298373376	1434
	Capnocytophaga canimorsus Cc5	340622236	1430
	***Capnocytophaga ochracea* DSM 7271**	**256819408**	**1426**
	Capnocytophaga sputigena ATCC 33612	213962376	1426
	Flavobacterium psychrophilum JIP02-86	150025575	1354
	Kordia algicida OT-1	163754820	1391
	Parabacteroides johnsonii DSM 18315	218258638	1443
	Parabacteroides sp. D13	256840409	1424
	Prevotella oralis ATCC 33269	323344874	1391
	Zunongwangia profunda SM-A87	295136244	1388
6	*Lactobacillus brevis* subsp. *gravesensis* ATCC 27305	227509761	1377
	Lactobacillus buchneri ATCC 11577	227512703	1239
	Lactobacillus buchneri NRRL B-30929	331702228	1371
	Lactobacillus fermentum ATCC 14931	227514633	1381
	***Lactobacillus gasseri* JV-V03**	**300361537**	**1391**
	Lactobacillus jensenii 269-3	238854567	1391
	Lactobacillus johnsonii DPC6026	385826041	1375
	Lactobacillus ruminis ATCC 25644	323340068	1375
	Lactobacillus salivarius UCC118	90961083	1149
	Lactobacillus sanfranciscensis TMW 1-1304	347534532	1331
	Pediococcus acidilactici DSM 20284	304386254	1364
7	*Gemella haemolysans* ATCC 10379	241889924	1392
	Gemella moribillum M424	317495358	1385
	Megasphaera sp. UPII 135-E	342218215	1352
	Peptoniphilus sp. oral taxon 386 str. F0131	299144352	1341
	***Veillonella atypica* ACS-134-V-Col7a**	**303229466**	**1398**
	Veillonella parvula ATCC 17745	282849530	1398
8	*Actinomyces coleocanis* DSM 15436	227494853	1105
	Corynebacterium accolens ATCC 49726	306835141	1099
	***Corynebacterium diphtheriae* NCTC 13129**	**38232678**	**1084**
	Corynebacterium matruchotii ATCC 14266	305681510	1089
	Mobiluncus curtisii subsp. *holmesii* ATCC 35242	315656340	1123

Cluster[a]	Strains[b]	Cas9 GI	Length (aa)
	Mobiluncus mulieris 28-1	269977848	1091
9	*Gluconacetobacter diazotrophicus* PAl 5	162147907	1050
	Gluconacetobacter diazotrophicus PAl 5	209542524	1003
	Methylocystis sp. ATCC 49242	323139312	1080
	Methylosinus trichosporium OB3b	296446027	1082
	Rhodopseudomonas palustris **BisB18**	**90425961**	**1066**
	Rhodopseudomonas palustris BisB5	91975509	1064
10	*Acidovorax avenae* subsp. *avenae* ATCC 19860	326315085	1045
	Alicycliphilus denitrificans BC	319760940	1029
	Alicycliphilus denitrificans K601	330822845	1029
	gamma proteobacterium HdN1	304313029	1025
	Nitrosomonas sp. AL212	325983496	1044
	Verminephrobacter eiseniae **EF01-2**	**121608211**	**1068**
11	*Campylobacter jejuni* subsp. *doylei* 269-97	153952471	984
	Campylobacter jejuni subsp. *jejuni* 81116	157415744	984
	Campylobacter jejuni **subsp.** ***jejuni*** **NCTC 11168**	**218563121**	**984**
	Helicobacter canadensis MIT 98-5491	253828136	1007
	Helicobacter cinaedi CCUG 18818	313144862	1023
12	*Coriobacterium glomerans* PW2	328956315	1384
	Eggerthella sp. YY7918	339445983	1380
	Gordonibacter pamelaeae 7-10-1-b	295106015	1371
	Olsenella uli **DSM 7084**	**302336020**	**1399**
13	*Lactobacillus casei* BL23	191639137	1361
	Lactobacillus casei str. Zhang	301067199	1361
	Lactobacillus paracasei subsp. *paracasei* 8700-2	239630053	1362
	Lactobacillus rhamnosus **GG**	**258509199**	**1363**
14	*Prevotella buccalis* ATCC 35310	282878504	1218
	Prevotella ruminicola **23**	**294674019**	**1204**
	Prevotella tannerae ATCC 51259	258648111	1234
	Prevotella timonensis CRIS 5C-B1	282880052	1218
15	***Bifidobacterium dentium*** **Bd1**	**283456135**	**1138**
	Bifidobacterium longum **DJO10A**	**189440764**	**1187**
	Gardnerella vaginalis 5-1	298252606	1186
	Scardovia inopinata F0304	294790575	1178
16	*Anaerococcus tetradius* ATCC 35098	227501312	1361
	Lactobacillus iners LactinV 11V1-d	309803917	1369
	Peptoniphilus duerdenii **ATCC BAA-1640**	**304438954**	**1364**
17	***Coprococcus catus*** **GD-7**	**291520705**	**1338**
	Dorea longicatena DSM 13814	153855454	1340
	Ruminococcus lactaris ATCC 29176	197301447	1341
18	*Phascolarctobacterium succinatutens* YIT 12067	323142435	1087
	Roseburia intestinalis **L1-82**	**257413184**	**1140**
	Roseburia inulinivorans DSM 16841	225377804	1152
19	***Dinoroseobacter shibae*** **DFL 12**	**159042956**	**1079**
	Maritimibacter alkaliphilus HTCC2654	84685065	997
	Sphingomonas sp. S17	332188827	1090
20	*Flavobacterium branchiophilum* FL-15	347536497	1473
	Flavobacterium columnare **ATCC 49512**	**365959402**	**1535**
21	*Burkholderiales bacterium* 1 1 47	303257695	1428
	Parasutterella excrementihominis **YIT 11859**	**331001027**	**1428**
22	*Prevotella denticola* F0289	327314511	1218
	Prevotella micans **F0438**	**373501184**	**1425**
23	***Acidaminococcus intestini*** **RyC-MR95**	**352684361**	**1358**
	Acidaminococcus sp. D21	227824983	1358

Cluster[a]	Strains[b]	Cas9 GI	Length (aa)
24	**_Staphylococcus pseudintermedius_ ED99**	**323463801**	**1334**
	Staphylococcus simulans ACS-120-V-Sch1	410878248	1112
25	**_Mycoplasma gallisepticum_ str. F**	**284931710**	**1269**
	Mycoplasma gallisepticum str. R-low	294660600	1270
26	**_Elusimicrobium minutum_ Pei191**	**187250660**	**1195**
	uncultured Termite group 1 bacterium phylotype Rs-D17	189485059	1032
27	_Francisella tularensis_ subsp. _tularensis_ SCHU S4	56707712	1123
	Francisella tularensis subsp. _tularensis_ WY96-3418	134302318	1125
28	_Clostridium spiroforme_ DSM 1552	169349750	1116
	Eubacterium dolichum DSM 3991	**160915782**	**1096**
29	**_Eubacterium rectale_ ATCC 33656**	**238924075**	**1114**
	Eubacterium ventriosum ATCC 27560	154482474	1107
30	_Staphylococcus aureus_ M06/0171	403411236	1053
	Staphylococcus lugdunensis M23590	**315659848**	**1054**
31	**_Francisella novicida_ U112**	**118497352**	**1629**
32	**_Sutterella wadsworthensis_ 3 1 45B**	**319941583**	**1422**
33	**_Bifidobacterium bifidum_ S17**	**310286728**	**1420**
34	**_Wolinella succinogenes_ DSM 1740**	**34557932**	**1409**
35	**_gamma proteobacterium_ HTCC5015**	**254447899**	**1397**
36	**_Treponema denticola_ ATCC 35405**	**42525843**	**1395**
37	**_Oenococcus kitaharae_ DSM 17330**	**366983953**	**1389**
38	**_Fusobacterium nucleatum_ subsp. _vincentii_ ATCC 49256**	**34762592**	**1374**
39	**_Legionella pneumophila_ str. Paris**	**54296138**	**1372**
40	**_Filifactor alocis_ ATCC 35896**	**374307738**	**1365**
41	**_Finegoldia magna_ ATCC 29328**	**169823755**	**1348**
42	**_Catenibacterium mitsuokai_ DSM 15897**	**224543312**	**1329**
43	**_Solobacterium moorei_ F0204**	**320528778**	**1327**
44	**_Mycoplasma synoviae_ 53**	**71894592**	**1314**
45	**_Mycoplasma ovipneumoniae_ SC01**	**363542550**	**1265**
46	_Streptobacillus moniliformis_ DSM 12112	269123826	1259
47	**_Mycoplasma mobile_ 163K**	**47458868**	**1236**
48	**_Mycoplasma canis_ PG14**	**384393286**	**1233**
49	**_Sphaerochaeta globus_ str. Buddy**	**325972003**	**1179**
50	**_Rhodospirillum rubrum_ ATCC 11170**	**83591793**	**1173**
51	**_Azospirillum_ sp. B510**	**288957741**	**1168**
52	_Streptococcus sanguinis_ VMC66	323351495	1167
53	**_Nitrobacter hamburgensis_ X14**	**92109262**	**1166**
54	**_Ruminococcus albus_ 8**	**325677756**	**1156**
55	**_Enterococcus faecalis_ TX0012**	**315149830**	**1150**
56	**_Acidothermus cellulolyticus_ 11B**	**117929158**	**1138**
57	**_Nitratifractor salsuginis_ DSM 16511**	**319957206**	**1132**
58	**_Acidovorax ebreus_ TPSY**	**222109285**	**1131**
59	**_Lactobacillus coryniformis_ subsp. _torquens_ KCTC 3535**	**336393381**	**1119**
60	**_Akkermansia muciniphila_ ATCC BAA-835**	**187736489**	**1101**
61	**_Ilyobacter polytropus_ DSM 2926**	**310780384**	**1092**
62	**_Bacillus cereus_ Rock1-15**	**229113166**	**1069**
63	**_Clostridium perfringens_ D str. JGS1721**	**182624245**	**1065**
64	**_Bradyrhizobium_ sp. BTAi1**	**148255343**	**1064**
65	**_Ralstonia syzygii_ R24**	**344171927**	**1062**
66	**_Wolinella succinogenes_ DSM 1740**	**34557790**	**1059**
67	**_Aminomonas paucivorans_ DSM 12260**	**312879015**	**1052**

Cluster[a]	Strains[b]	Cas9 GI	Length (aa)
68	***Parvibaculum lavamentivorans* DS-1**	**154250555**	**1037**
69	***Candidatus Puniceispirillum marinum* IMCC1322**	**294086111**	**1035**
70	**uncultured Termite group 1 bacterium phylotype Rs-D17**	**189485225**	**1032**
71	*Blastopirellula marina* DSM 3645	87307579	1027
72	***Helicobacter mustelae* 12198**	**291276265**	**1024**
73	***Clostridium cellulolyticum* H10**	**220930482**	**1021**
74	*Streptococcus downei* F0415	312866154	994
75	*Treponema vincentii* ATCC 35580	257456748	992
76	*Mycoplasma iowae* 695	350546886	933
77	*Listeria seeligeri* FSL N1-067	313631816	874
78	*Listeria ivanovii* FSL F6-596	315301624	849
	Butyrivibrio fibrisolvens 16-4	291518097	765
	Coprococcus comes ATCC 27758	226325213	686
	Francisella tularensis subsp. *holarctica* LVS	89256630	158
	Francisella tularensis subsp. *holarctica* LVS	89256631	393
	Haemophilus pittmaniae HK 85	343519679	650
	Helicobacter hepaticus ATCC 51449	32266975	131
	Helicobacter pullorum MIT 98-5489	242309214	702
	Neisseria subflava NJ9703	284799897	587
	Nitrobacter hamburgensis X14	92118334	641
	Oribacterium sinus F0268	227873236	653
	Prevotella disiens FB035-09AN	303237415	795
	Pseudoramibacter alactolyticus ATCC 23263	315926102	586
	Treponema phagedenis F0421	320536384	738
	uncultured Termite group 1 bacterium phylotype Rs-D17	189485058	166

[a] Sequences are grouped according to the BLASTclust clustering program. Only sequences longer than 800 amino acids were selected for the BLASTclust analysis (see Materials and Methods). [b] Representative strains harboring *cas9* orthologue genes are listed; GI, GenInfo Identifier. Bold, representative sequences of each group chosen for the alignment and tree formation. Grey, discarded, incomplete Cas9 sequences (see Materials and Methods). Sequences that were not clustered are listed at the bottom of the table. They were considered as possible Cas9 sequences based on the presence of conserved motifs and/or other *cas* genes in their immediate vicinity. As incomplete, they were not selected for further analysis.

Supplementary Table 2. Predicted pre-crRNA repeat:tracrRNA anti-repeat base-pairing in selected bacterial species.

<table>
<tr><th></th><th>Strain[a]</th><th>CRISPR type II identifier[b]</th><th>pre-crRNA repeat:tracrRNA base-pairing[c]</th></tr>
<tr><td>🟩</td><td><i>Francisella tularensis</i> subsp. <i>novicida</i>
U112</td><td>NC_008601_1[d]</td><td>GUUUCAGUUGCUGAAUUAUUUGGUAAACUACU-GUUAG
|||||||||| |• ||||||||||| |||| ||
CAAAGUCAACAAUCUAAUAAACCAUAC-AUGAACACAA

GUUUCAGUUGC-UGAAUUAUUUGGUAAACUACUGUUAG
•|| ||| || | |||||||||||| | | |• |
UAAUGUCU-CGUAAUUAAUAAACCAUGUAAAUAUUAAA</td></tr>
<tr><td>🟩</td><td><i>Wolinella succinogenes</i>
DSM 1740</td><td>NC_005090_2[d]</td><td>GCAACACUUUAUAGCAAAUCCGCUUAGCCUG-UGAAAC
|||||||||||||||||||||| |• • • |||||
CGUUGUGAAAUAUCGUUUAGGCAAGCUACGGAACUUU

GCAACACUUUAUAGCAAAUCCGCUUAGCCUGUGAAAC
||||||||•||||• || •||• ||||| | • ||
CGUUGUGAGAUAUUAUUAGGGUAGGUCGAAAUUGUUU</td></tr>
<tr><td>🟩</td><td>gamma proteobacterium
HTCC5015</td><td>ND[c]</td><td>GUUUCAGAGCUUAUCCCAACAAACCA-ACAGCUGAAAC
  ||||||• |||||||||| | | ||| ||||||
AUAAGUCUUACGUAGGGUUGUAAGAUAUGU-GACUUUA

GUUUCAGAGCUUAUCCCAACAAACCAACAGCUGAAAC
|||||||||||||| ||| |||| | || |
CAAAGUCUCGAAUAAGGUCGUUUAUGAGGGAACAAUA</td></tr>
<tr><td>🟩</td><td><i>Sutterella wadsworthensis</i>
3 1 45B</td><td>ND[e]</td><td>GCGAAGAUCAUAACGCUACGAGCUAUAGCACUGAAAC
•|• |•||||||||||•||||||||| || |||||
UGUCUUUAGUAUUGCGGUGCUCGAUAACGAACCUUUG

GCGAAGAUCAUAACGCUACGAGCUAUAGCACUGAAAC
  • |||||||||||||| ||||||||| | | |
AAUCUCUAGUAUUGCGAUACUCGAUAUCCUUUAGUGG</td></tr>
<tr><td>🟩</td><td><i>Parasutterella excrementihominis</i>
YIT 11859</td><td>ND</td><td>Not possible to analyze – too short contig</td></tr>
<tr><td>🟩</td><td><i>Legionella pneumophila</i>
str. Paris</td><td>NC_006368_1</td><td>CCAAUAAUCCCUCAUCUAAAAAUCCA-ACCACUGAAAC
  ||| | ||||||||| || | ||| ||||||
AUUUAAUCUUUAGUAGAUUUAAAGCUAUGG-GACUUUA</td></tr>
<tr><td>🟨</td><td><i>Listeria innocua</i>
Clip11262</td><td>NC_003212_2</td><td>GUUUUAG--AGCUAUGUUAUUUUGAAUGCUAACAAAAC
  ||||• |||||||||||||||||•||||||| |
  AAAUUGAACGAUACAAUAAAACUUAUGAUUGUUAUA</td></tr>
<tr><td>🟨</td><td><i>Streptococcus thermophilus</i>
LMD-9</td><td>NC_008532_5</td><td>GUUUUAG--AGCUGUGUUGUUUCGAAUGGUUCCAAAAC
  ||||• ||||||||||||||||||||| |||| |
  AAAUUGAGCGACACAACAAAGCUUACCAAAGUUUGG</td></tr>
<tr><td>🟨</td><td><i>Streptococcus mutans</i>
UA159</td><td>NC_004350_1</td><td>GUUUUAG--AGCUGUGUUGUUUCGAAUGGUUCCAAAAC
  ||||• ||||||||||||||||||•|||||| ||
  AAAUUGAACGACACAACAAAGCUUACUAAGGUUGUG</td></tr>
<tr><td>🟨</td><td><i>Streptococcus pyogenes</i>
SF370</td><td>NC_002737_1</td><td>GUUUUAG--AGCUAUGCUGUUUUGAAUGGUCCCAAAAC
  ||||• |||||||||||||||||||| |||| |
  AAAUUGAACGAUACGACAAAACUUACCAAGGUUGUU</td></tr>
<tr><td>🟨</td><td><i>Fusobacterium nucleatum</i> subsp.
<i>vincentii</i> ATCC 49256</td><td>ND</td><td>GUUUGAGAGUAAUGUUAUUUUAAAUAGAUUCAAAAC
|| |• | • || || | ||| ||•||| ||||
CAUAUACGAGGUAAAAAAUAAUGAAUUUAAUUUUUA</td></tr>
<tr><td>🟨</td><td><i>Filifactor alocis</i>
ATCC 35896</td><td>NC_016630_2</td><td> GUUUGAGAGUAGUGUAAUUUCAUAUGGUAGUCAAAC
 | • | ||||||||||•||||||||||||||| |
ACUUGG-CACAUCACAUUAGAGUAUACCAUCAGUU-GA</td></tr>
<tr><td>🟨</td><td><i>Peptoniphilus duerdenii</i>
ATCC BAA-1640</td><td>ND</td><td>No significant anti-repeat found</td></tr>
<tr><td>🟨</td><td><i>Treponema denticola</i>
ATCC35405</td><td>NC_002967_1</td><td>GUUUGAG--AGUUGUGUAAUUUAAGAUGGAUCUCAAAC
  ||||• ||||||||||||||||||||||| |||
  AACUUGAGCAACACAUUAAAUUCUACCUAGAAUUUA</td></tr>
</table>

	Strain[a]	CRISPR type II identifier[b]	pre-crRNA repeat:tracrRNA base-pairing[c]
🟨	*Coprococcus catus* GD/7	ND	No significant anti-repeat found
🟨	*Solobacterium moorei* F0204	ND	GUUUGAGAACUAUGUAAAUUAUGCUGGUAG-CAAAAC | • |||||||||||||| || •• | | || AACUUGAAUGAUACAUUUAAUA-GAAUGACCAUAUUC
🟨	*Veillonella atypica* ACS-134-V-Col7a	ND	GUUU-GCGAGUAGUGUAAUUCUGUAAAUCUCUAAAAC || •| ||||||||||||||||||•|||•||||| AACUUGAGCAUCACAUUAAGACAUUUGGAGGUUUUG
🟨	*Acidaminococcus intestini* RyC-MR95	NC_016077_1	No significant anti-repeat found

🟨	*Finegoldia magna*
	ATCC 29328
		NC_010376_1	GUUUGAG-A-AUGAUGUAAUUUCAUAUAGGUAUUAAAC
			  ||||• ||||||||||•|||||||||||||||||
			  AACUUGAGUACUACAUUAGAGUAUAUCCAUAAUUUG

🟨	*Olsenella uli*
	DSM 7084
		NC_014363_7	GUUUUGG-G-GCAGUGUCGUUUUGACUGGUAAU-CAAAC
			  ||||• |||||•|||||•||||||||||| || |
			  AAACUGAGCGUCAUAGCAAGACUGACCAUUAAGUCU

🟨	*Lactobacillus rhamnosus* GG	NC_013198_2	GUC-UCAGGUAGAUGUCAGAUCAAUCAGUUCAAGA-GC || | |||||||||||||||||||•|||||| | AGUUGAGCAUCUACAGUCUAGUUAGUUAAGUUCAAC
🟨	*Lactobacillus gasseri* JV-V03	ND[f]	GUUUUAGAUGGUUGUUAGAUCAAUAAGGUUUAGAUC |||||||||||•|||||||||||| |••|•||• || CAAAAUCUACCGACAAUCUAGUUACUUUAGAUU-AGU GUUUUAGA-UGGUUGUUAGAUCAAUAAGGUUUAG-AUC ||| |• ||||||||||||||||||•|||||| | AAAUUUAGACCAACAAUCUAGUUAUUUCAAAUCACA
🟨	*Catenibacterium mitsuokai* DSM 15897	ND	No significant anti-repeat found No sequence upstream of Cas9 available in the analyzed contig
🟨	*Oenococcus kitaharae* DSM 17330	ND	GCUUCAGAUGUGUGUCAGAUCAAUGAGGUAGAACCC • | |||||||||||||||||||||||||||| AAGUUACGACACACAGUCUAGUUACUCCAUCUUGGG
🟨	***Bifidobacterium bifidum*** S17	NC_014616_1	GUUU-CAGAUGCCUGUCAGAUCAAUGACUUUGACCAC |• ||||||||||| ||||||||•|||| || AGUUAAAUACGGACAGUCCAGUUACUGGAACUAGUA
▒	*Staphylococcus pseudintermedius* ED99	NC_017568_1	GUU--UUAGCACUAUGUUUAUUUAGAAAGAGGUAAAAC || •| • ||||||||||||||||||||•||||||| AAUUGAAU-UGAUACAAAUAAAUCUUUCUUCAUUUUG

🟧	***Eubacterium rectale***
	ATCC 33656
		NC_012781_2	AUUUUAGUA-A-CUGAAUAAUUUACGUGACUGUAAAAC
			  ||||||| | ||||| |||||||||||||•|||||
			  AAAUCAUCUAGACUUUUUAAAUGCACUGAUAUUUUA

🟧	*Enterococcus faecalis* TX0012	ND	GUUUUUGU--AUUCUCAAUAAUUUCUUAUCAGUAAAAC •||||||| ||||||||||||||||||||||||||| UAAAAACAUCUAAGAGUUAUUAAAGAAUAGUCAUUUUA
🟧	*Streptococcus thermophilus* LMD-9	NC_008532_2	GUUUUUGUACUCU-CAAGAUUUAAGUAACUGUACAAC ||| |• ||| |||||||||||||||||| || AAACAUCGAAGACGUUCUAAAUUCAUUGACACAUUC
🟧	*Staphylococcus lugdunensis* M23590	ND	GUUUUAGUACUCUGUAAUUUUAGGUAUAAGUGAUAC |• • | |||||||||||||||||||||• | AAGUCAUCUAAGACAUUAAAAUCCAUAUUCAUGUUC

🟧	*Eubacterium dolichum*
	DSM 3991
		ND	GUUUUGUUA-C-CAUAUGGAUUUUUGCUAGAUUAAGAC
			  ||||||| |||||••|•||||||||||||| ||
			  AAACAAUCUAGUAUAUUUGAAAACGAUCUAAUACUA

🟥	*Mycoplasma mobile* 163K	NC_006908_1	GUUUUGGUGUAGUAUCAUUCUUAUGUAUUCUUAAAC ||||•||| ||||||||||||||||||||||| AAAAAUCACUACAUAGUAAGAAUACAUAAGAAUUGA

	Strain[a]	CRISPR type II identifier[b]	pre-crRNA repeat:tracrRNA base-pairing[c]
🟥	*Mycoplasma ovipneumoniae* SC01	ND	GUUUUUGUGCUGU-ACAAUUUCUUACUAGAGUAAAAC | ||| || ||• |||||||||||||||||||||| AAUAAAAAC-ACGCUGUUAAAGAAUGAUCUCAUUUUA
🟥	*Mycoplasma gallisepticum* str. F	NC_017503_1	GUUUUAGCACUGUACAAUACUUGUGUAAGCAAUAAC •||||||||| | |||||| ||||||||||||||| AAUAAAAUCGUG-C-UGUUAUUAACACAUUCGUUAUUA
🟥	*Mycoplasma canis* PG 14	ND	GUUUUAGUGUUGUACAAUAUUUGGGUAAACAAUAAC || • | ||||||||||||||||||||||||| ACUAAAUCCUACAUGUUAUAAACCCAUUUGUUAUUA
🟥	*Mycoplasma synoviae* 53	ND	GUUUUGGGGUUGUACAAUUAUUUUGUUAAGUAAAAC •||||||••|•|||||||||||||||||||||| UAAAACCUUAGCAUGUUAAUAAAACAAUUCAUUCAU
🟦	*Bacillus cereus Rock* 1-15	ND	No CRISPR array
🟦	*Ilyobacter polytropus* DSM 2926 plasmid pILYOP01	NC_014633_2	No significant anti-repeat found[d]
🟦	*Aminomonas paucivorans* DSM 12260	ND	AGCAUAGCAUUUCGGAGUGCGGCAGGGAGCUAUGAC || | || ||•| | |||||||||| | | | UCCUCUCCUAGACGAGGAAGCCGUCCCUCCCUUCCG
🟦	*Clostridium perfringens* D str. JGS1721	ND	AUUAUAGCAUAUCGAGAAUUUA-CUAGGAACUAUAAC ||||||||||||||| |||| |||| ||||||| CCAUAUCGUAUAGCUCUCAAAUUGAUCAAUGAUAUU
🟦	*Clostridium cellulolyticum* H10	NC_011898_3	AUUAUAGCAUAUCGGAGCCUGAAUUGGAGCUAUAAC ||||| |||||||||||||||||||| ||||||| UAAUACCGUAUAGCCUCGGACUUAACAACGAUAUUA
🟦	*Acidovorax ebreus* TPSY	ND	AGUGUAGCUAUCCGGGGUGAGAGAGGGAGCUACAAC | ||| | ||||||||||||||| | ||| ||| UAACACCAAUAGGCCCCACUCUCGGCAACGACGUUA
🟦	*Neisseria meningitidis* Z2491	NC_003116_10	GUUGUAGCUCCCUUUCUCAUUUCGCAGUGCUACAAU •||||||| | ||||||||||||||||| ||||| UAACAUCGUUGCCAAGAGUAAAGCGUCACGCUGUUA
🟦	*Pasteurella multocida* Pm70	NC_002663_3	GUUGUAGUUCCCUCUCUCAUUUCGCAGUGCUACAAU •||||||• | |||||||||||||||||| ||||| UAACAUCGUUGCAGAGAGUAAAGCGUCACGUUGUUA
🟦	Uncultured Termite group 1 bacterium phylotype Rs-D17	ND	GUUAUAGUUUCCUUCCUCUCUCAGAUGUGCUAUAAU •|||||•| || |||||||||||||• | ||•|| UAAUAUUAUUGGUAGGAGAGAGUCUAUUCAAUGUUU
🟦	*Wolinella succinogenes* DSM 1740	NC_005090_1	AUUAUAGCGAGGAAUGGCUGAGUAGGCGGCUAUAAC |• • ||| •|||||||||||||||•|| • | CAGCGACGCGAUUUACCGACUCAUCCGUCGCCGAUA
🟦	*Campylobacter jejuni* NCTC11168	NC_002163_2[g]	GUUUUAGUCCCUUUUUAAAUUUCUUUAUGGUAAAAU |||| || ||| ||| | || | ||| || CAAAUACAAACAAAUUUUUUUACUAAAAACAUAAUA GUUUUAGUCCCUUUUUAAAUUUCUUUAUGGUAAAAU •|||||||||||||||||||||||| •| | UAAAAUCAGGGAAAAAUUUAAAGAAUACUCUAAUAU
🟦	*Helicobacter mustelae* 12198	NC_013949_1	AUUUUAGCAUAAACAUAUUUAUGAAGUGGCUAAAAC ||•|| ||| | | | ||| | ||•| || || UAGAACGGUAAUAUUUCAUAUAAAUAACUGUUUAUG
🟦	*Roseburia intestinalis* L1-82	ND	AUUAUACCAUACCAAGUGAUAACAGGGA-AUUACAAC |||||| ||||||||||||||| •|| ||||||| UAAUAUAGUAUGGUUCACUAUUAAUCCAAUAAUGUU
🟦	*Lactobacillus coryniformis* subsp. *torquens* KCTC 3535	ND	GAUCUAUUUUAGCUGAAAACUGAAGGAAUCAAUAGC ||||||||||||||||||||| | • | ||||• CUAGAUAAAAUCGACUUUUGAAUGAUAUC-UUAUUUU

<table>
<tr><th>Strain[a]</th><th>CRISPR type II identifier[b]</th><th>pre-crRNA repeat:tracrRNA base-pairing[c]</th></tr>
<tr><td>*Ruminococcus albus*
8</td><td>ND</td><td>Not possible to analyze – too short contig</td></tr>
<tr><td>*Rhodopseudomonas palustris*
BisB18</td><td>NC_00795_4</td><td>AGCCUACCACGGGGAAAUCGGUAGGGAAGCCACGGC
|• | | ||||||||||||||•||||||||||
UUAGUACGCCACCCUUUAGCCAUCCUUUCGGUGCCG</td></tr>
<tr><td>*Cand. Puniceispirillum marinum*
IMCC1322</td><td>NC_014010_1
NC_014010_3</td><td>AGUAUAGCACUCUGGUGAUUGAG-AGCCUAGAGCAAC
   |||•|||||||||||||||| |||||| | |
CGUUAUUGUGAGACCACUAACUCCUCGGAUACCAAU</td></tr>
<tr><td>*Verminephrobacter eiseniae*
EF01-2</td><td>NC_008786_1</td><td>AUUGUAGCUCACUGGGAUAUGCGCACUGGCCG-GAAC
   •|| ||||||||||||||||| |||| || ||
GCCUAUAGAGUGACCCUAUACGCGAGACCUGCGAUU</td></tr>
<tr><td>*Ralstonia syzygii*
R24</td><td>ND</td><td>AGGUUAGCAGAUCGGGAAUUGCGCUCUGGCUAC-AAC
   ••|||||||||||||||||||| || |||| |||
AAAGGUCGUCUAGCCCUUAACGCGAAAC-GAUGAUUG</td></tr>
<tr><td>*Azospirillum* sp.
B510</td><td>NC_013854_2</td><td>AGUGUAGCCGAUGGGGAUCGGGGGUCCAGCCG-CAAC
 | • | |||||||||||||||||||||||| ||
ACCUUUAAGCUACCCCUAGCCCCCAGGUCGGCAAUU</td></tr>
<tr><td>*Nitrobacter hamburgensis*
X14</td><td>ND</td><td>No CRISPR array</td></tr>
<tr><td>*Bradyrhizobium* sp.
BTAi1</td><td>ND</td><td>No CRISPR array</td></tr>
<tr><td>*Dinoroseobacter shibae*
DFL 12</td><td>NC_009952_2</td><td>AGUUUAGCUGUUCAGAAUUCGGGGUCCAGCCG-CAAC
 ||•| •|||||||||||| |||| ||||| ||
ACAGAAAUGCAAGUCUUAAGCGCCAGCUCGGCAAUU</td></tr>
<tr><td>*Rhodospirillum rubrum*
ATCC 11170</td><td>NC_007643_6[h]</td><td> ACUCUACCAUGGCGGUGUGGGACGGGGCCAUGGAAC
  ||||| |||||| ||||||||||||||||||||||
GCGAGAUAGUACCG-CACACCCUGCCCCGGUACCUUG

ACUCUACCAUGGCGGUGUGGGACGGGGCCAUGGAAC
||||||||||||| ||||||||||| | • |
UGAGAUGGUACCGGCACACCCUGCCAAGAGGGCAAA</td></tr>
<tr><td>*Elusimicrobium minutum*
Pei191</td><td>NC_010644_1</td><td>No significant anti-repeat found</td></tr>
<tr><td>*Spirochaeta* sp.
Buddy</td><td>NC_015152_1</td><td>GGUCAAUCUUAACAAAAAUCAGCGGUCAUCCCCAAC
| | |||||||||||||•|||||•| ||| | ||
CAAUAUAGAAUUGUUUUUGGUCGCUAAUAGAGAUUA</td></tr>
<tr><td>*Prevotella ruminicola*
23</td><td>NC_014033_4</td><td>GUUGUGGUUUGAUGUAGGAAAGGAAUG AUAUACAAC
•|||||•| |||||||||| |•| | •| ||
UAACACUAUUCUACAUCCUUAGAAUGCACACGUUUU</td></tr>
<tr><td>*Flavobacterium columnare*
ATCC 49512</td><td>NC_016510_1</td><td>GUUGUGGUUUGAUUAAAGAUUAGAAAACACGAUAUU
•|||||•| ||||||||||||||| | | |||•
UAACACUAUUCUAAUUUCUAAUCUUAU-UAAAAUAGA</td></tr>
<tr><td>*Prevotella micans*
F0438</td><td>ND</td><td>No CRISPR array</td></tr>
<tr><td>*Parvibaculum lavamentivorans*
DS-1</td><td>NC_009719_1</td><td>AGAGUAGCAAAUCGAGAGACGGCCGCAAUCCGCAGC
   ||||||||||||||| ||| ||| | ||||•
AGACAUCGUUUAGCUCUCCGCCAGCGAAAAGCGUUC</td></tr>
<tr><td>*Bacteroides fragilis*
NCTC 9343</td><td>NC_003228_4</td><td>No significant anti-repeat found</td></tr>
</table>

	Strain[a]	CRISPR type II identifier[b]	pre-crRNA repeat:tracrRNA base-pairing[c]
🟦	*Capnocytophaga ochracea* DSM7271	NC_013162_2	UGUUAUCAAUCGCAAAACUACAAAAUUUGAAAGCAAUUCACAAC |•|||| | • || |||||||||||||||||||| AUAAUAUGGAUGAAAACAGCGUGUUAAACUUUCGUUAAGUGUUA
🟦	*Fibrobacter succinogenes* subsp. *succinogenes* S85	NC_013410_1	GUUGUUAUUGCACUAGUAAAACUAGAAAAUCUGAAAGCAAUUCACAAC • • | ||• |||| | | | |||||||||||||||||||| GUUUUUAAAAU-UGAUAUAAUAAAAGUAUUAGACUUUCGUUAAGUGUUA
⬜	*Nitratifractor salsuginis* DSM 16511	NC_014935_3	GUUUUAAGACCCCUCAAAA--CCCCACCCUGUUACAAU •|||||||||||||||||| ||| ||||||||||| UAAAAUUCUGGGGAGUUUUUUGGGAUGGGACAAUGU
⬜	*Akkermansia muciniphila* ATCC BAA-835	NC_010655_1	GUUGUACUGUGCCUUAUUUUGGA-UUCAAGGCAAAAC |||| •||||||||• |||| ||| | | || GUACAUUUUACGGAAUAGCACCUCAAGGGCA-UAUUC
⬜	*Acidothermus cellulolyticus* 11B	NC_008578_17	No significant anti-repeat found
⬜	*Corynebacterium diphtheriae* NCTC 13129	NC_002935_1	No significant anti-repeat found
⬜	*Bifidobacterium longum* DJO10A	NC_010816_1	No significant anti-repeat found
⬜	*Bifidobacterium dentium* Bd1	NC_013714_9	No significant anti-repeat found

[a] The vertical color bars represent subclusters of similar Cas9 orthologues as in Figs. 1 and 2.

[b] The CRISPR loci belong to the type II (Nmeni/CASS4) CRISPR-Cas system. Nomenclature is according to the CRISPR database (CRISPRdb). Note that *S. thermophilus* LMD-9 and *W. succinogenes* contain two type II loci.

[c] Upper sequence, pre-crRNA repeat consensus sequence (5' to 3'); lower sequence, tracrRNA homologue sequence annealing to the repeat (anti-repeat; 3' to 5'). Note that the repeat sequence given is based on the assumption that the CRISPR repeat-spacer array is transcribed from the same strand as the *cas* operon. For the sequences that were validated experimentally in this study, RNA sequencing data were taken into account to determine base-pairing. See Fig. 2.

[d] Two possible anti-repeats were identified in the *F. tularensis* subsp*. novicida, W. succinogenes* and gamma proteobacterium HTCC5015 type II-B loci. Upper sequence pairing, anti-repeat within the putative leader sequence; lower sequence pairing, anti-repeat downstream of the repeat spacer array. See Fig. 2.

[e] Two possible anti-repeats were identified in the *S. wadsworthensis* type II-B locus. Upper sequence pairing, anti-repeat; lower sequence pairing, anti-repeat within the putative leader sequence. See Fig. 2.

[f] Two possible anti-repeats were identified in the *L. gasseri* type II-A locus. Upper sequence pairing, anti-repeat upstream of *cas9*; lower sequence pairing, anti-repeat between the *cas9* and *cas1* genes. See Fig. 2.

[g] Two possible anti-repeats were identified in the *C. jejuni* type II-C loci. Upper sequence pairing, anti-repeat upstream of *cas9*; lower sequence pairing, anti-repeat downstream of the repeat-spacer array. See Fig. 2.

[h] Two possible anti-repeats were identified in the *R. rubrum* type II-C locus. Upper sequence pairing, anti-repeat downstream of the repeat-spacer array; lower sequence pairing, anti-repeat upstream of *cas1*. See Fig. 2.

Supplementary table 3. tracrRNA orthologue and crRNA sequencing data.

sRNA	Strand	Size mature form		Region of interest		Reads	Coverage (%)	Sequence	5' end read number			3' end read number		
C. jejuni NCTC 11168 (NC_002163.1), total mapped reads: 9914184														
crRNA	→	crRNA1	36	1455167	1455202	781	0.0079	AGTTTTTAAAAGAGCTTGGCGGTTGTTTTAGT CCCTTTTT	1455162	A	1	1455198	T	5
4 spacers									1455165	G	2	1455199	C	5
									1455166	C	3	1455200	C	16
									1455167	A	419	1455201	C	72
									1455168	G	19	1455202	T	385
									1455169	T	7	1455203	T	82
									1455170	T	75	1455204	T	30
									1455171	T	24	1455205	T	112
									1455172	T	9	1455206	T	5
									1455173	T	11			
									1455174	A	4			
		crRNA2	38	1455231	1455268	2658	0.0268	CAAAGTTTCATTAGTTGAATTTAACTGTTTTA GTCCCTTTTT	1455227	T	4	1455264	T	3
			29	1455240	1455268				1455228	T	1	1455265	C	14
									1455230	C	37	1455266	C	60
									1455231	C	206	1455267	C	240
									1455232	A	72	1455268	T	1364
									1455233	A	34	1455269	T	348
									1455234	A	59	1455270	T	29
									1455235	G	280	1455271	T	44
									1455236	T	168	1455272	T	15
									1455237	T	130	1455273	A	2
									1455238	T	36			
									1455239	C	259			
									1455240	A	317			
									1455241	T	148			
									1455242	T	298			
									1455243	A	157			
									1455244	G	40			
		crRNA3	35	1455300	1455334	4729	0.0477	AAGAATGAGGATGATGATATTTTACAGTTTTA GTCCCTTTTT	1455292	T	16	1455329	G	21
									1455293	C	62	1455330	T	479
									1455294	T	5	1455331	C	23
									1455295	A	12	1455332	C	48
									1455296	C	23	1455333	C	179
									1455297	A	367	1455334	T	1226
									1455298	A	143	1455335	T	220
									1455299	G	563	1455336	T	54
									1455300	A	1014	1455337	T	49
									1455301	A	415	1455338	T	55
									1455302	T	242	1455339	A	1
									1455303	G	589			
									1455304	A	55			
									1455305	G	2			
		crRNA4	26	1455376	1455401	17404	0.1755	GTGTGCTAAAAAAAATGGACTTAAATGTTTTA GTCCCTTTTT	1455360	T	6	1455398	C	63
									1455361	G	2	1455399	C	645
									1455362	A	9	1455400	T	9844
									1455363	G	261	1455401	T	1518
									1455364	T	51	1455402	T	481
									1455365	G	598	1455403	T	763
									1455366	T	77	1455404	T	578
									1455367	G	552	1455405	A	4
									1455368	C	579			
									1455369	T	901			
									1455370	A	816			
									1455371	A	227			
									1455372	A	262			
									1455373	A	1072			
									1455374	A	1269			
									1455375	A	1991			
									1455376	A	2204			
									1455377	A	1978			
									1455378	T	371			

sRNA	Strand	Size mature form		Region of interest		Reads	Coverage (%)	Sequence	5' end read number			3' end read number		
tracrRNA	→	tracrRNA1	65	1455502	1455566	833829	8.4105	AAGAAATTTAAAAAGGGACTAAAATAAAGAGTTTGCGGGACTCTGCGGGGTTACAATCCCCTAAAACCGCTTTT	1455496	T	1	1455565	G	12371
		tracrRNA2	58	1455509	1455566				1455497	A	31	1455566	C	713292
									1455498	A	27	1455567	T	74594
									1455499	G	24	1455568	T	10412
									1455500	A	19	1455569	T	9580
									1455501	A	232	1455570	T	426
									1455502	A	435	1455571	A	91
									1455503	T	369	1455572	A	97
									1455504	T	253	1455573	A	542
									1455505	T	85			
									1455506	A	65			
									1455507	A	193			
									1455508	A	33472			
									1455509	A	615001			
									1455510	A	131879			
									1455511	G	16444			
									1455512	G	9390			
									1455513	G	1053			
***F. novicida* U112 (NC_008601.1), total mapped reads: 48205**														
crRNA **13 spacers**	←	crRNA5	52	817556	817607	117	0.2427	ATAACTCGACCAATATTTGACAAAGTTTCAGTTGCTGAATTATTTGGTAAACCT	817612	T	10	817557	A	3
									817611	T	10	817556	C	55
									817607	A	53	817555	T	13
									817606	T	7	817553	C	12
												817552	T	1
		crRNA6	56	817627	817682	116	0.2406	GGCAGGTTTTGTATGGTCATATAGGAGTGTTTCAGTTGCTGAATTATTTGGTAAACCT	817685	A	4	817629	A	4
									817682	G	23	817628	A	3
									817681	G	13	817627	C	53
									817679	A	2	817626	T	20
									817677	G	4			
		crRNA7	66	817699	817764	11	0.0228	AGCTATAGGGTTACCTATCTTTTGAGTGTTGGCAAATAAGTTTCAGTTGCTGAATTATTTGGTAAACCT	817764	A	4	817699	A	2
									817763	G	1			
									817754	T	4			
									817745	T	2			
		crRNA9	53	817845	817897	24	0.0498	ATGCTTTTAAACTACTGATATATACGTTTCAGTTGCTGAATTATTTGGTAAACT	817897	A	3	817845	C	7
tracrRNA	←	tracrRNA1	74	817065	817138	2808	5.8251	GTACCAAATAATTAATGCTCTGTAATCATTTAAAAGTATTTTGAACGGACCTCTGTTTGACACGTCTGAATAACTAAAAA	817140	A	2	817066	A	28
		tracrRNA2	64	817065	817128				817139	T	2	817065	C	1523
									817138	G	615	817064	T	440
									817136	A	9	817063	A	7
									817135	C	2	817062	A	10
									817134	C	37	817061	A	19
									817133	A	26	817060	A	14
									817132	A	7	817059	A	6
									817131	A	328	817058	G	5
									817130	T	355	817057	C	32
									817129	A	165	817055	A	10
									817128	A	484			
									817127	T	24			
									817126	T	55			
									817125	A	32			
									817124	A	19			
***N. meningitidis* Z2491 (NC_003116.1), total mapped reads: 13110087**														
crRNA **16 spacers**	→	crRNA1	48	608456	608503	1346	0.0103	TATCCATTCCCAGCCGGAAATTAAGTTGTAGCTCCCTTTCTCATTTCGCAGT	608453	T	30	608500	T	25
									608454	G	105	608501	C	77
									608455	T	64	608502	G	175
									608456	A	259	608503	C	293
									608457	T	4	608504	A	78
									608458	C	21	608505	G	505
									608459	C	175	608507	T	1
									608460	A	118			
									608461	T	39			
		crRNA2	50	608520	608569	685	0.0052	GCCTTTTTACAAGCTCGCTTTCTTTGTTGTAGCTCCCTTTCTCATTTCGCAGT	608517	T	5	608564	T	8
									608518	C	41	608565	T	16
									608519	T	7	608566	T	8
									608520	G	61	608567	C	31
									608521	C	21	608568	G	101
									608522	C	44	608569	C	173
									608523	T	21	608570	A	43
									608524	T	31	608571	G	6
									608525	T	17	608572	T	2

sRNA	Strand	Size mature form		Region of interest		Reads	Coverage (%)	Sequence	5' end read number			3' end read number		
		crRNA3	50	608586	608635	12402	0.0946	TAAAGGTTTCTGTTGCGACCCGAATGTTGTAGCTCCCTTTCTCATTTCGCAGT	608583	T	5	608631	T	75
									608584	G	3	608632	T	114
									608585	G	513	608633	C	414
									608586	T	2243	608634	G	1510
									608587	A	2091	608635	C	2219
									608588	A	188	608636	A	297
									608589	A	233	608637	G	52
									608590	G	744	608638	T	8
									608591	G	1152			
		crRNA4	49	608653	608701	26361	0.2011	TAACTTTGACCGTGTGCAATCCAGTTAGTTGTAGCTCCCTTTCTCATTTCGCAGT	608646	T	7	608697	T	295
									608647	C	127	608698	T	569
									608648	T	203	608699	C	1167
									608649	T	377	608700	G	4910
									608650	T	2751	608701	C	4968
									608651	A	477	608702	A	764
									608652	A	1334	608703	G	62
									608653	C	11694	608704	T	4
									608654	T	3665			
									608655	T	382			
		crRNA5	49	608719	608767	28747	0.2193	AACCCACTAAATTTTGCAAATGCGGTTGTAGCTCCCTTTCTCATTTCGCAGT	608717	G	20	608764	T	426
									608718	C	1171	608765	C	1316
									608719	A	8128	608766	G	3040
									608720	A	116	608767	C	6431
									608721	C	59	608768	A	1049
									608722	C	420	608769	G	102
									608723	C	1089	608770	T	11
									608724	A	557			
		crRNA6	50	608784	608833	121014	0.9231	TTTTTTTGTACTGTTGTTTGAACGAGTTGTAGCTCCCTTTCTCATTTCGCAGT	608781	G	42	608830	T	2295
									608782	C	630	608831	C	7060
									608783	C	10039	608832	G	13864
									608784	T	26026	608833	C	44472
									608785	T	11430	608834	A	6853
									608786	T	8248	608835	G	802
									608787	T	3648	608836	T	69
		crRNA7	52	608848	608899	24611	0.1877	TTCGTTTCAGATAGCAAACGCAGTAGTGTTGTAGCTCCCTTTCTCATTTCGCAGT	608846	A	28	608896	T	369
									608847	A	631	608897	C	1114
									608848	T	11039	608898	G	3441
									608849	T	753	608899	C	9015
									608850	C	239	608900	A	1558
									608851	G	2205	608901	G	137
									608852	T	1910	608902	T	8
									608853	T	826			
			84	608916	608999	901	0.0069	ATATGACGGTGGGCAACTGGTACAGGTTGTAGCTCCCTTTCTCATTTCGCAGTGCTACAATGCCGGATATGACGGTGGGCAACT	608913	C	6	608996	A	6
									608914	G	3	608997	A	2
									608915	G	2	608998	C	2
									608916	A	266	608999	T	259
									608917	T	17	609000	G	171
									608918	A	96	609001	G	24
									608919	T	26	609004	T	16
		crRNA10	49	609049	609097	5027	0.0383	CTTTTGTATTGATTCAAGGTGCTTGTTGTAGCTCCCTTTCTCATTTCGCAGT	609046	T	89	609094	T	81
									609047	C	37	609095	C	218
									609048	G	647	609096	G	845
									609049	C	1614	609097	C	1237
									609050	T	583	609098	A	219
									609051	T	208	609099	G	36
									609052	T	104	609101	G	7
									609053	T	18			
		crRNA11	52	609112	609163	22711	0.1732	ATTCGTCGATGATGGAAACTCGAGCATGTTGTAGCTCCCTTTCTCATTTCGCAGT	609109	A	58	609160	T	540
									609110	G	331	609161	C	1263
									609111	T	99	609162	G	2850
									609112	A	10627	609163	C	4882
									609113	T	1234	609164	A	552
									609114	T	66	609165	G	52
									609115	C	191	609166	T	15
									609116	G	4906			
									609117	T	136			
		crRNA12	52	609178	609229	5067	0.0386	TAGCCAGTGCTAAAACCGCACCCGCTTGTTGTAGCTCCCTTTCTCATTTCGCAGT	609175	G	4	609226	T	57
									609176	G	3	609227	C	189
									609177	G	42	609228	G	576
									609178	T	897	609229	C	1348
									609179	A	72	609230	A	321
									609180	G	584	609231	G	33
									609181	C	154	609232	T	2
									609182	C	314			
									609183	A	38			

sRNA	Strand	Size mature form		Region of interest		Reads	Coverage (%)	Sequence	5' end read number			3' end read number		
		crRNA13	51	609245	609295	4666	0.0356	ATAGAAATACATACGCCGAGTAATTAGTTGTAGCTCCCTTTCTCATTTCGCAGT	609243	A	6	609292	T	65
									609244	A	62	609293	C	201
									609245	A	1311	609294	G	475
									609246	T	141	609295	C	1039
									609247	A	116	609296	A	229
									609248	G	44	609297	G	25
												609298	T	1
		crRNA14	51	609311	609361	7147	0.0545	TTTTTGTAATTGTTCTGCCTTTTTTAGTTGTAGCTCCCTTTCTCATTTCGCAGT	609308	T	12	609358	T	136
									609309	T	22	609359	C	442
									609310	C	207	609360	G	858
									609311	T	1190	609361	C	2335
									609312	T	774	609362	A	540
									609313	T	577	609363	G	69
									609314	T	195	609364	T	5
									609315	T	37			
		crRNA15	50	609378	609427	49818	0.3800	ACGGCGGAAACCATTGCCACAAAACGTTGTAGCTCCCTTTCTCATTTCGCAGT	609375	C	319	609424	T	532
									609376	C	7253	609425	C	1414
									609377	C	7249	609426	G	2553
									609378	A	19015	609427	C	7448
									609379	C	547	609428	A	1854
									609380	G	307	609429	G	210
									609381	G	190	609430	T	10
		crRNA16	50	609444	609493	42398	0.3234	AATAATAACCCAATACACGATGTTAAGTTGTAGCTCCCTTTCTCATTTCGCAGT	609441	A	8	609490	T	579
									609442	A	548	609491	C	2197
									609443	A	3686	609492	G	6466
									609444	A	4638	609493	C	13217
									609445	T	1428	609494	A	2438
									609446	A	2861	609495	G	200
									609447	A	1322	609496	T	12
									609448	T	287			
tracrRNA	→	tracrRNA1	163	614162	614324	208318	1.5890	TTGTCTTATTTATATACAAATAGATTATTGACTTATCATCTCACAACGGCTAGAATCCCAAACATATTGTCGCACTGCGAAATGAGAACCGTTGCTACAATAAGGCCGTCTGAAAAGATGTGCCGCAACGCTCTGCCCCTTAAAGCTTCTGCTTTAAGGGGCATCGTTTAT	614158	C	1	614319	G	311
		tracrRNA2	100	614225	614324				614161	A	1	614320	G	109
		tracrRNA3	82	614243	614324				614162	T	2	614321	G	258
									614164	G	1	614322	G	150
									614223	A	596	614323	C	41244
									614224	C	39	614324	A	128531
									614225	A	14761	614325	T	167
									614226	T	169	614326	C	4197
									614227	A	276	614327	G	36
									614239	C	208	614328	T	122
									614240	G	42037	614329	T	865
									614241	A	39965	614330	T	1132
									614242	A	22890	614331	A	1061
									614243	A	51186	614332	T	2788
									614244	T	17711	614333	T	3758
									614245	G	4192	614334	T	77
									614246	A	488	614335	C	18
												614336	G	3
												614337	G	3
												614338	T	1
***L. innocua* Clip11262 (NC_003212.1), total mapped reads: 161865 (Note: low quality of the RNA library)**														
crRNA **10 spacers**	←	crRNA1	35	2769606	2769640	2	0.0012	GGTAACTTTGCCTAGGATAGTTTTAGAGCTATGTT	2769640	G	1	2769606	T	1
		crRNA2	22	2769540	2769561	2	0.0012	CATTATGTTTTAGAGCTATGTT	2769561	C	1	2769540	T	1
									2769560	A	1			
		crRNA3	24	2769468	2769491	3	0.0019	GAGTTTTAGAGCTATGTTATTTTG	2769491	G	3	2769468	G	1
		crRNA4	27	2769402	2769428	7	0.0043	TTATAGTTTTAGAGCTATGTTATTTTG	2769428	T	5	2769407	A	1
									2769427	T	2	2769406	T	1
												2769405	T	1
												2769403	T	1
												2769402	G	1
		crRNA5	26	2769337	2769362	5	0.0031	TAAATGTTTTAGAGCTATGTTATTTT	2769362	T	3	2769339	T	1
									2769360	A	2	2769337	T	2
		crRNA8	23	2769142	2769164	2	0.0012	TACAAGTTTTAGAGCTATGTTAT	2769164	T	1	2769143	A	1
									2769163	A	1	2769142	T	1
		crRNA9	30	2769072	2769101	19	0.0117	TTCATGTTGTTTTAGAGCTATGTTATTTTG	2769101	T	6	2769079	T	4
									2769100	T	1	2769078	T	1
									2769099	C	4	2769075	T	2
									2769098	A	3	2769073	T	3
									2769097	T	3	2769072	G	6
									2769096	G	2			
		crRNA10	28	2769000	2769027	19	0.0117	GTTTTAGAGCTATGCTATTTCGAATACT	2769027	G	1	2769000	T	1

sRNA	Strand	Size mature form		Region of interest		Reads	Coverage (%)	Sequence	5' end read number			3' end read number		
tracrRNA	→	tracrRNA1	90	2774774	2774863	367	0.2267	ATTGTTAGTATTCAAAATAACATAGCAAGTTAAAATAAGGCTTTGTCCGTTATCAACTTTTAATTAAGTAGCGCTGTTTCGGCGCTTTTTTT	2774774	A	34	2774861	T	2
		tracrRNA2	76	2774788	2774863				2774783	A	1	2774862	T	47
		tracrRNA3	68	2774796	2774863				2774786	C	1	2774863	T	150
									2774787	A	1	2774864	T	67
									2774788	A	22	2774865	T	30
									2774794	C	1	2774866	G	15
									2774795	A	1	2774867	T	6
									2774796	T	5			
									2774797	A	2			
									2774799	C	5			
									2774801	A	1			
***S. mutans* UA159 (NC_004350.2), total mapped reads: 1542239**														
crRNA **5 spacers**	←	crRNA1	38	1328162	1328199	267104	17.3192	GCCATTAATTAATATGGTGAGTTTTAGAGCTGTGTTGTTTCGA	1328201	A	8	1328166	G	18547
									1328200	C	178	1328165	T	41345
									1328199	G	264047	1328164	T	53386
									1328198	C	191	1328163	G	9084
									1328197	C	167	1328162	T	59197
									1328196	A	117	1328161	T	28333
												1328160	T	4240
												1328159	C	18236
												1328158	G	26742
												1328157	A	5573
												1328156	A	17
		crRNA2	36	1328098	1328133	26578	1.7233	GCTAGCGCAGTTAGTGCTCTGTTTTAGAGCTGTGTTGTTTCGA	1328135	C	4	1328101	T	37
									1328134	A	13	1328100	G	800
									1328133	G	25656	1328099	T	6395
									1328132	C	212	1328098	T	11256
									1328131	T	25	1328097	G	301
									1328130	A	62	1328096	T	1453
									1328129	G	25	1328095	T	1755
												1328094	T	447
												1328093	C	1302
												1328092	G	1996
												1328091	A	670
												1328090	A	5
		crRNA3	34	1328034	1328067	138134	8.9567	TGTTGTGTCATCATAGTTAGGTTTTAGAGCTGTGTTGTTTCGA	1328069	G	4	1328036	G	2880
									1328068	C	66	1328035	T	733
									1328067	T	134361	1328034	G	68203
									1328066	G	609	1328033	T	37212
									1328065	T	321	1328032	T	24528
												1328031	G	1003
												1328030	T	889
												1328029	T	610
												1328028	T	124
												1328027	C	371
												1328026	G	546
												1328025	A	145
		crRNA4	35	1327967	1328001	104705	6.7892	CAATTAGACAATAGACAAACGTTTTAGAGCTGTGTTGTTTCGA	1328003	T	8	1327969	T	348
									1328002	T	36	1327968	G	8606
									1328001	C	101017	1327967	T	59863
									1328000	A	681	1327966	T	25845
									1327999	A	216	1327965	G	756
												1327964	T	3053
												1327963	T	1433
												1327962	T	1602
												1327961	C	864
												1327960	G	839
												1327959	A	322
		crRNA5	37	1327899	1327935	63999	4.1497	TTCGGACATGACTTGCCACAGTTTTAGAGCTGTGTTGTTATCGA	1327940	A	4	1327902	G	902
									1327937	T	6	1327901	T	3296
									1327936	A	17	1327900	T	12381
									1327935	T	62587	1327899	G	19843
									1327934	T	1029	1327898	T	2864
									1327933	C	108	1327897	T	14180
									1327932	G	19	1327896	T	2061
									1327931	G	36	1327895	C	2079
												1327894	G	5259
												1327893	A	630

sRNA	Strand	Size mature form		Region of interest		Reads	Coverage (%)	Sequence	5' end read number			3' end read number		
tracrRNA	→	tracrRNA1	102	1335040	1335141	1299	0.0842	GTTGGAATCATTCGAAACAACACAGCAAGTTAAAATAAGGCAGTGATTTTTAATCCAGTCCGTACACAACTTGAAAAAGTGCGCACCGATTCGGTGCTTTTTTATTT	1335038	G	1	1335140	T	13
		tracrRNA2	88	1335054	1335141				1335040	G	466	1335141	T	64
		tracrRNA3	80	1335062	1335141				1335041	T	6	1335142	T	29
									1335042	T	1	1335143	A	13
									1335051	T	4	1335144	T	6
									1335053	G	3	1335145	T	13
									1335054	A	415	1335146	T	1
									1335055	A	2	1335149	T	1
									1335057	C	1			
									1335058	A	1			
									1335062	C	186			
									1335063	A	15			

For the bacterial species studied, all tracrRNA orthologues and mature crRNAs retrieved by sequencing are listed, including coordinates (region of interest) and corresponding cDNA sequences (5' to 3').

The arrows represent the transcriptional direction (strand). Number of cDNA reads (calculated using SAMtools), coverage numbers (percentage of mapped reads) and predominant ends associated with each transcript are indicated.

Numbers of reads starting or stopping at each nucleotide position around the 5' and 3' ends of each transcript are displayed, the predominant ends are indicated in red in the sequence. The putative primary processing sites are indicated in dark blue (see Fig. 3). The sizes of each crRNA mature forms are indicated.

The number allocated to each crRNA species corresponds to the spacer sequence position in the pre-crRNA, according to the CRISPRdb. The number allocated to each tracrRNA species corresponds to different forms of the same transcript. Note that given the low quality of *L. innocua* cDNA library, values should be considered carefully.