

(A) BshA

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BS -----MRKLRIGITCYPSVGGSGIIATELGKQLAEKGHEIHFITSSIPFRLN--- 47
BA -----MKLKIGITCYPSVGGSGVVGTELKQLAERGHEIHFITSGLPFRLN--- 46
BC -----MEKLRIGISCYPTVGGSGVVATELGKQLASRGHEVHFITTEIPFRLD--D 48
DR MGSAAVGGPRPHLYFPAMSFPSASVASTLGPKI AVLCHTGAGSGVVATELGKLVADAGHEVHFVGTAMPFRLTGH- 79
MX MNAP-----LNVAITCFPTFGSGMVATEIGLAMADRGHRVHFIAARDLPVRLHGA- 50
SA -----MGKRMKIGITCYPSMGGSGIIATELGKIKLAERGHEVHFITSNIPFRLR--- 48

BS TYHPNIHFHEVEVNOYAVFKYP-PYDLTLASKIAEVAERENLDI IHAHYALPHAVCAYLAKQMLK-RNIGIVTTLHGTDI 125
BA KVYPNIYFHEVTVNQYSVFQYP-PYDLALASKMAEVAQRENLDILHVHYAIPHAICAYLAKQMTG-ERIKIVTTLHGTDI 124
BC KVYPNIFFHQVEVNOYAVFKHP-PHDLASAASKIAEVILTHDLDLLHVHYAVPHAICAILAREMSG-KDIKIMTTLHGTDI 126
DR QGLRGPYFHQVGGFAYALFEQP-FPELSAANTLSEVILEHGVDLTHAHYAIPHASAALHARSITG--KTRVLTTLHGTDV 156
MX N--RKVV FHEVTESDY PALQQSGTYPIALASKMIEVASYERLDILHVHYAVPHATAAWMAREVLGHKAPRVVTTLHGTDI 128
SA KPLPNMIFHQVEVNOYAVFQYP-PYDITLSTKIAEVIKEYDLDLLHMHYAVPHACGILAREMSG-KDIKIMTTLHGTDI 126

BS TVLGYDPSLKDLIRFAIESSDRVTA VSSALAAET YDLIKPEK--KIETIYNFID-ERVYLKKNNTAAIKEKHGIL-PDEKV 201
BA TVLGS DPSLNLIREFGIEQSDVVTAVSHSLINETHELVKPNK--DIQTVYNFID-ERVYFKRDMTQLKKEYGIS-ESEKI 200
BC TVLGFEP SLRPLIRY GIEQSDIVTAVSYDLARQTNELVRTDK--PIQTVYNFID-EQVYYPKQVEQLRACYGLS-ETDDI 202
DR TLVGTEPAFQHTTRHAIERSDHVTAVSHSLAAETREVFVDR--DIEVIHNFVDSDRFRRIIPD-PGVRARFAHP--EEAL 231
MX TLVGIDPSYLPITRFSITRSDAVTVPSAYLRRATWRGFDIPESVPIDVIANFVD TARYAPVRDRACLALFPALRDHEPV 208
SA TVLGYDHS LQGAIKFGIEKSDIVTSVSKSLAQETHETHEI IETNK--EIIPIYNEFVR-ENEFPTKHNTALKSQFGIA-PDEKV 202

BS VIHVS NFRKVKRVQDVIRVFRNIAGKTKAKLLLVGDGPEKSTACELIRKYGLEDOVLM LGNQDRVEDLYSISDLKLLLSE 281
BA LIHIS NFRKVKRVQDVVQAFKIVTEVDKLLLVGDGPEFCTILQLVKNLHIEDRVLFLGKQDNVAELLAMSDLM LLLSE 280
BC I I H I S N F R P V K R I M D V L K T F Q L I V K S R D A K L L L I G N G P E L P I A R Q F V E E N D L T N D V L M L G N Q K H V A E L L S M S D L M L L L S E 282
DR I V H V S N F R P I K R V E D V V Q V F A R I A S E I P A R L L M I G D G P E R A R A F E L A R E L G V I G R T Q F L G S F P D V Q T V L G I S D L F L L T S S 311
MX L I H V S N F R P V K R I T D V A I F T E V H R H R P C R L V M V G D G P E R S P A E R M L R E M G L E G R V A F L G K Q D R F E E L V A A S D V F L L P S E 288
SA L I H V S N F R Q V K R I D T I I E T F A K V R E K I P S K L I L L G D G P E L V P M R Q L T K E L N V E E D V L F L G K Q D C V S E F Y Q L S D I V L L L S E 282

BS KESFGLV LLEAMACGVP CIGTNI GGIPEVIKNNVSGFLVDVGDVTAATARAMSILEDEQLSNRFTKAAIEMLENEFSSKK 361
BA KESFGLV LLEAMACGVP CIGTRVGGIPEVIQHGD TGYLCEVGD TTVGADQAIQLLKDEELHRNMGERARES VYEQFRSEK 360
BC KESFGLV ALEAMACGVPVIATNIGGIPEVVEDEETGYLCSLGNIEEAAAKAISLLAD DQKRQAFKRAALNRVKQSEFDSQH 362
DR HESFGLA ALEAMSCEVPVVASNAGGIPEVVOHGVNGLSDVGDVDDMAHHALKILRDQETYQQMGQAARRTAVEQFHPRL 391
MX QESFGLA ALEALS CGIPVVASDLGGIPELVTHGETGFLAPLGDVPAMARHVLT LVEDAERWQGFSHRARAQVLERFQKEP 368
SA KESFGLT LLEAMKTGVVPIGSNAGGIKEVIKHGETGFVVVDVGD CDSASDYAIRLLEDKVLYNKLQKNMLADIAERFGSEL 362
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BS IVSQYEQIYADLAEPE----- 377
 BA IVSQYETIYDVLRRDDKNGKI- 381
 BC IVSQYEHLYEAMLKEEPL---- 380
 DR IVPOYLAAVRRLAEQSASTF-- 411
 MX AIDRYEALYRRLLTGPLRR--- 387
 SA ITDQYEYYQKMLNEHNKSKGE 384

(B) BshB1 and BshB2

BS BshB1 -----MYNADVLAFGAHSDDVEIGMGGTIAKFKVQEKVMICDLTEAEL-----SSNGT 49
 BS BshB2 -----MKEHVLVILPHPDDESYGVAGLIAALNRKKDIPVITYACATLGEMGRNMGDPFFANRETL 58
 BA BA1557 -----MSGHLILAFGAHADDDVEIGMAGTIAKYTKQGYEVGICDLTEADL-----SSNGT 49
 BA BA3524 -----MERHVLVVFPHPDDEAFAAGGTIRLLTDQGVVPTYACGTLGOMGRNMGKNVFANRETI 58
 BA BA3888 -----MKNERHVLIVFPHPDDESYCVAGTILAYTQRNVPLTYVCLTLGEMGRAMGNPPFATRESL 60
 BC BshB1 -----MAETVDILACGAHPDDIEIGMGGTVATYIQKGYNVAFLLTLAEL-----SSNGD 50
 BC BshB2 -----MKKQSHVLVIFPHPDDEAFGVSGTISAYIDAGTPVITYACLTGOMGRNLGNPPFATRESL 60
 SA BshB1 -----MTDERHVLVIFPHPDDETFSSAGTIASVQRGVPTYACLTGOMGRNLGNPPFATRESL 60
 MX BshB1 -----MSANGTAYGIDVLAFGPHPDDELFCGGLLASMAARGYRTGIVDLTRGEK-----SSRGT 55
 DR BshB1 MPTTLQTVYGEAQPLDWLCLAPHPDDAEIGAGGTLIRLAQAGRAVGILELTRGEK-----GTQGT 60
 DR BshB2 ----MTSSSTPAPRATLLVIFAHPDDEAFSVGGTLTHYARQGVVVLAQATRGEACKITVPG--MTVDDL 64

BS BshB1 VSLRKKEAAEAARILGADKRIQLTLPD----RGL-IMSDQAIR-----SIVTVIRICRPKAVFM 103
 BS BshB2 PLLRKQELINACKEMDINDLRMLGLRD----KTLEFEDDEYLAD-----IMEEIIDVKPSLIVT 114
 BA BA1557 IELRKKEAKAAARIMGVKTRLNLAMPD----RGL-YMKEYYIR-----EIVKVIRTYKPKLVFA 103
 BA BA3524 PNIREKELKDACVAMGIQDLRMLGFHD----KTLEFEDVDFVAD-----KIEAIIQEVNPSRIIT 114
 BA BA3888 YAIREKELKRATNILGIKDLRMMGYRD----KTLEFETPGELRR-----VIQKVEELNPSLVIS 116
 BC BshB1 IASRQQEAKAAAEQLGVRARYQLELPD----RGLTYIGEEKLE-----EVVDIIRLTRPTLVFM 105
 BC BshB2 ADIRRKELQQAAMVGI TDLRMMGYRD----KTLEFEQPGRLKQ-----MVLDLVAELKPSLVIS 116
 SA BshB1 PSIRERELEEACKVIGITDLRKMGLRD----KTVEFEPYEHIDS-----MIKSLIDDTNPSLIIS 116
 MX BshB1 LQSRAEETEAAATRALGLAHRENLELPD----GWLNPWAGFDTPPEPERARTAAVARVVEALRRLRPELVV 121
 DR BshB1 PAERQAE CVAAARLMDLSWRGQLGLPD----GELADTPPPFAH-----ALAAALRTVRPRVLV 114
 DR BshB2 GAQREQELREACRALEIEPPVFLDYHDSGRYERTRHDDPTALMNVN--PLDAEVKLRALIEDVQEQVIVT 132

BS BshB1 PY-KKDR-HPDHGNAAALVEEAIIFSAGIHKYKDEKSLPAHKVSKVYYMINGFHQP----- 157
 BS BshB2 FYPGHGV-HPDHDACGEAVIRALYRKKKED-----RPTICMAITRNREEVLGEA----- 163
 BA BA1557 PY-YEDR-HPDHANCAKIVEEAIIFSAGIRKYMPE--VPPHRVESFYHYMINGFHKP----- 155
 BA BA3524 FYPEHGV-HPDHDVAFGRAVVRVSRMSTEE-----RPVIHAVAITKNREAVLGEPE----- 163
 BA BA3888 FYPGYAV-HPDHDATGEAVAEALATIPENK-----RPTFYAVAFANNHEAEIGPE----- 165

BC BshB1 P--AADR-HPDHGQCGALIKEAIFNAGIRRYGNG---EPHKVKAAYSIFYNGFAKP----- 155
 BC BshB2 FYPGYAV-HPDHDATGLAVASALAE LPKSE-----RPTFYAVAFSNNHEKEIGPA----- 165
 SA BshB1 FYPGYAV-HPDHEATADAVIRTVRMPKEE-----RRLTLVAFSNDATEALGEP----- 165
 MX BshB1 PW-EQER-HPDHEAASALVTRALFFAGVRFDAEPAAEPFTPRQVLYYPMRHLTEP----- 175
 DR BshB1 PH-WHDR-HPDHFGTYHLTKRAIHLAALKKADLG--GDPWRVQRVLLYQNSDISA----- 166
 DR BshB2 FDPHGAYGHVDHLQMHRAIVAAFFSTGHLPSGGP---QRLYYTAMTHQAAAQISRLGHDQSLDPLVYGV 199

BS BshB1 ----DFVIDISDTIEAKKQSLNAYKSFIPSKDSVSTP-LTNGYIEIVEAREKLYGKEAGVEYAEVSFPN 222
 BS BshB2 ----DVVLDIKEVADIKMNALRAHRTQTEG-----MLRELEEKLNNEPVMATWFEFEIYWTYQWND--- 221
 BA BA1557 ----NFCIDISEYVSQKVEALEAYESQFSTGSDGVKTP-LTEGYVETVVAREKMFGEVGVLYAEGFMSK 220
 BA BA3524 ----DVVNNISEVFEHKLAALGAHRSQTEA-----MLEETHAKIKNKDAATLKWLQLEQFWTYKWE---- 220
 BA BA3888 ----HVKNEVKEYVPPKLEALQAHASQFAT-----KVTE LKREYEDGVETVWEWLEREPFWIYPFKDKNK 226
 BC BshB1 ----DFVVDVTDNHSAKVAALQAYKSFVAQG-GVQTP-LTDGYIEAVIARDRLFGEVGVVALAEGFVAE 219
 BC BshB2 ----DIVHDVSAYAIRKLDTLRAHASQLAW-----TLPSLEKAYYDGVVEAKERLCNERFWTYPFPA---- 222
 SA BshB1 ----DIQNDITDFKDLKIKAFEAHASQTGP-----FLKQLASPEIDGKQHS--FLTVEPYWTYHFKS--- 221
 MX BshB1 ----SVIVDVSAVYERKLA AVHCYASQVLP RPDPPTLVGSPLSVSSLEARDRFHGAQIGVTHGEPYILR 241
 DR BshB1 ----NVLVDIGSVMTEWEAAIRAHTSQFAG---GYVSETVTPPEI IERRQGR LTYWGTLLRVKYAEPFEAE 229
 DR BshB2 DSTLAVTMDVGAYAENKKAALAAHGTMGETSLMGR LSPDERAALEERMLGKESFSIGGTRTAIREYPLR 269

BS BshB1 -----GC----- 224
 BS BshB2 ----- 221
 BA BA1557 KPVL LHADLIGGCK----- 234
 BA BA3524 ----- 220
 BA BA3888 ----- 226
 BC BshB1 KP-LVMANLLEGCGR----- 233
 BC BshB2 ----- 222
 SA BshB1 ----- 221
 MX BshB1 EALGLADPLDHFRNSFAKPLFFPSRT 268
 DR BshB1 EPL-LLDPLGL----- 239
 DR BshB2 GLFDG VGV EGLV----- 281

(C) BshC

BS -----MQLTELSIKNQNVFVQHYIDGKEEMSSFFDYSIHHKDMWRERLEDLSSRFF-A 52
BA BA4058 -----MEIKEISVP-QQGVVADYMNKGKEIQSCFDY-MLTEDAFKQRVQDLREREF-F 50
BC -----MRFEALDTRRLTGFLAEYVNQPDQCSDFESYRWKTNGWEQERSEDLAKRSFSH 53
MX MHRFRWRARRDLLSRHAVTSPFSTAWLRGDASALSFLPDDYRHREARARAVAAAASRAV-- 58
SA -----MCKVVSINEKQDFIPKIKSSDPVITGLFOYDAAQQISFEKR---MSKENNGR 50

BS REELAAYLTSYHNKFGS-SAMQSAIEKLDKDPSSAAVVGQQAGLLTGPLYTIHKIISIIIV 111
BA BA4058 RQDLVTHLLEYNTKLOAGEATIQNKALGDENTYVVLGQQAGLLTGPLYTIHKIISVLQ 110
BC RQALCRLEEARHAPLRKREACMDNIHKLKQENALVVVAGQQAGLMTGPLYTAYKAMSVIL 113
MX SPALLDVLGAQNARLAPSPARERNLLAKPGTVAVVTGQQMGLFLGPLYTLYKAASAIV 118
SA EAALANVIREYMNDLKLSSQEQLNIQHLAN-GSKVVIGQQAGLFGGPLYTFHKIFSIIIT 109

BS LAKQQEKEIQVPIPIFWVAGEDHDLDEINRVHTSEENG---PVKKKLPQSYWKKSSAAS 168
BA BA4058 LAKEKEESLGVKVVVFWIAGEDHDMDEINHFTVTKNKK---IKKTIFHDRNPKKASASE 167
BC LAKQYEATLNQPVVPLFWIAGEDHDLDEVRYVHYLKGDM---WKKLMLGDE-PNGEAAS 169
MX TARALQEETGRPCVPVFWLQTEDHDLPEIDHCVIPRPGGGPCRLALELPDAATSRAPIAH 178
SA LSKELTDTHKQQVVPVFWIAGEDHDFDEVNHTFVYNEHG-SLHKVKYHTMEMPETTVSR 168

BS TSLDQEKCAAWIDDVFAAFEETDHTNTLLDNVRCLEESVTFDFFELLIADLQEEGLV 228
BA BA4058 SELSLEDCKRWIEEIFKTYPETNFTKDVLFQIDDSLRSNTYVDFFGHLIMKMFVNSGLI 227
BC KVLPPKELDTFLAKLFASLPETSNTLTKAMVTQAAATAGTYTEFFKLLMHELPHYREGLL 229
MX RHLG-PSVLPALATLRAELEAEPAEEFLSLLERAYRPEATLAGAFTDVLSSLEFADEGLV 237
SA YYPDKAELKQTLKTMETIRMKETVHTQGLLEICDRIIDQYDSWTDMEKALLHETFKAYGVL 228

BS LLNSGDPGIKKLETAMFQKILRENDELARAVSDQAFMRQAGYKPIIESGKEQANLFYEY 288
BA BA4058 LVDSHHPERLKLKLEVPFFKQIVSKYKEVQEGHNNQORVIKELGYKPIIETKSNVHIFMEI 287
BC FLDSNDPELRATERPFFKQIRKVDALQEQAAAGEARFVEKGYPSPIATEKQNAHLFYTL 289
MX FLDPRDARLAPLAAPVHRFALQEQAGALSSVLAARAEALTRAGYTVQVHVRPGSPLSEFSP 297
SA FIDAQFEPERLKMEMPFFKILKKHQLLDDAFRATQKRTQNGQLKAMIQTDN-VHLELHD 287

BS EDE---RFLIE---KDNGRFVIKELDLGWTRDELHTHMEEHPERFSNNVVTRPLMQEFLI 342
BA BA4058 DNE---RVLLE---DNQGFVKGKDGYSFSYKELIEEMERSPERFSNNVVTRPLMQEYVF 341
BC DGK---RRRLD---YEAGRFYVRETERQFTKEELLAEVDSHPQRFSSNNVVTRPLMQEWLL 343
MX DALDGPYRRLDPAEADAWSLVGHPESSAITQDALHAALEREPLRFTTSALLRPLLQDTWL 357
SA ENM---RQLVS---YDGKHFRLNKTDKKYIKEELINIAENQPELFSNNVVTRPLMEWLF 341

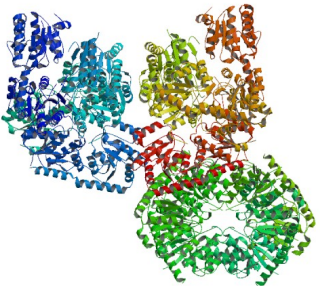
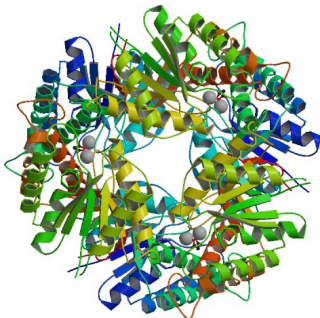
BS PTLAFLAGPGEINYNWGEIKQAFVVMGFKMPPVMPRLNITILERHTEKFLAERNISLQDAI 402
 BA BA4058 PTLAFIGGPGELAYWSELQQVFHTIGFRMPPVVPRIITITYIERDIATDLHDLQLQESDPF 401
 BC PTLAFVAGPGELAYWATLKDVFALFDYKLTPIIPRLSATFVPCRVEKHLRERKEAAETI 403
 MX PTAAAYVGGPGELAYFAQLAPLYAHAGRPMLAIPRARFRVLDDRRARWLKGVGLQPDEVN 417
 SA NTVAFIGGPSEIKYWAEIKDVFELFDVEMPIVMPRLRITYLNDRIEKLKSKYNIPIEKVL 401

BS ERGTENQRETYFERQIPEEFTAVMDQAKSQIEAIIHKTVRQEALKV---DQSLEPLLLKNA 459
 BA BA4058 FNNVDKLRNWLNSNOIEEPIDERFVEAKKEIIDIHKSLQQFVKKI---DPGLSAFAGKNE 458
 BC LGEGEKLEKEAWLASOHSYPVAQRAQAAEAIEAAHLPFRELAGEI---SPTLKKMGKNR 460
 MX VPR-DALLTRLATRDAPESLETPEALEARLFGAFASELERVAGQVSAVDANLQDALRRTQ 476
 SA VDGVEGERSKFIREQASDQFIEKVEGMIEQQRRLYQDLLDEVAGN---QNNINLVNKNNE 458

BS AFIQDQQLQFLERTVMKRIEEKEGYVLKDYERIQNSIKPLLAPQERIWNIMYYLNRYGPKF 519
 BA BA4058 FKINEQIELLERMLKRNVEKKHEVELNKFRIQFALRPLGAPQERVWNVCYLNOFGLDF 518
 BC AFIQGGQIAFLKERMEREIREQHQVGLSKYDEAMTWLHPKDAPQERILHSFILLNTAGIDI 520
 MX GTVRVAVSRLTGRYRRALARADATAAAEQVDRLRTEFLFPEDAPQERILGLPYFACRIGTRA 536
 SA IHIQQDYDLLKRYLLN-IERENDISMKQFREIQETLHPMGGLOERIWNPLQILNDFGTDV 517

BS FTT-FKNLPFSFQNOHQVVKL 539
 BA BA4058 VDR-VMEKPFSSWNGKHHVIKL 538
 BC FSR-LLEKKPPHTGAHLVIFYV 540
 MX FTKRVLDACVPFSGDSKDLTP 557
 SA FKP-STYPPLSYTFDHIIP 537

D. Percent Identity/Similarity for BshA, BshB1, BshB2 and BshC orthologs. Structures shown are from the PDB as indicated by the PDB Identification number.

	Identity/similarity	Structure
BshA <i>B. anthracis</i> (BA1558) <i>B. cereus</i> (ABC2070) <i>S. aureus</i> (SAR1469) <i>D. radiodurans</i> (DR_1555) <i>M. xanthus</i> (MXAN_6195)	63.9/79.5 56.1/76.3 54.4/73.4 38.9/59.6 41.1/62.3	2JJM 
BshB1 <i>B. anthracis</i> (BA1557) <i>B. cereus</i> (ABC2071) <i>S. aureus</i> (SALG_02510) <i>D. radiodurans</i> (DR_2363a) <i>M. xanthus</i> (MXAN_6194)	58.1/70.1 48.7/66.1 22.2//41.5 29.9/46 31.4/48.5	2IXD 
BshB2 <i>B. anthracis</i> (BA3524) <i>B. anthracis</i> (BA3888) <i>B. cereus</i> (ABC2104) <i>S. aureus</i> (SALG_02510) <i>D. radiodurans</i> (DR_0450) <i>M. xanthus</i> (MXAN_6194)	56.6/72.9 43.4/62.4 45.7/64 47.5/69.7 26.4/39.9 21.1/35.8	
BshC <i>B. anthracis</i> (BA4058) <i>B. cereus</i> (ABC2366) <i>S. aureus</i> (SALG_01369) <i>D. radiodurans</i> (DR_1647) <i>M. xanthus</i> (MXAN_6193)	40.8/63.2 36.7/57.2 32/53.1 18.4/32.7 24.7/45.6	