



*Kuenenia\_stuttgartiensis* α7 α8 β7 α9 β8

*Kuenenia\_stuttgartiensis* 210 MVDRMQGAGTRTFKRRGGMGLLGVITGKY.GMYRFNN.CLAIVDAHNRGVGPDQALIGGRNW  
*Jettenia\_caeni* 210 MVDAMKGAGTRTFKRRGGMGLLGVITGKY.GMYRFNN.SLALVDSHNRGVGPDKALIGGRNW  
*Brocadia\_fulgida* 210 MVDAMKGAGTRTFKRRGGMGLLGVITGKY.GMYRFNN.TLALVDSHNRGVGPDKALIGGRNW  
*Scalindua\_brodae* 212 TLTHWNGAGTRCFKRRGGMGLLGVITGKYMGYRFNS.MLALLDANRVGVGADKAMGRRF  
*Nitrospira\_defluvii* 211 MIEEMMGAGVTRTFKRRGMPILGMMGKH.ANTRFNNCVLPLLDSTWIRKVNPDQAOGGRYW  
*Nitrospira\_nitrificans* 210 MIEEMMGAGVTRCFKRRGMPILGFIGKH.SNTRFNNVPLPLDSTWIRKVNPDQAOGGRYW  
*Nitrospira\_inopinata* 210 MIEEMMGAGTRCFKRRGMPVLGIIGKM.GNTRMNGGINALLDSTWIRKVNPDQAOGGRYW  
*Nitrospina\_gracilis* 209 MIEAMGGSGPRTFKYRGGMGLLGVVVKY.GYRLAN.MVGLLDAIRGRGPGQVLLGGRAW  
*Nitrotoga\_sp.* 214 MIASMHGCGMKTMRFRSGMAALGVLRIRY.SIKRFAQ.GLALLDAYVRNVGPDASGAKVL  
*Hydrogenobaculum\_sp.* 207 MIDTMAGAGTRTLKFRGSMPLAVLRYV.GQYRMSN.MMALLDSTNRKVEPKDALIGGVGW  
*Beggiatoa\_sp.* 175 .....IPAMSQLSFA.AGSRFLG.....LMGGHLL  
*Thiocapsa\_sp.\_KS1* 185 .....IPAMSMVSFL.SGHRLSN.....LLGGTML  
*Nitrolancea\_hollandica\_Ib* 163 .....IPAYSVSFG.AGARFIQ.....LFFGGHL  
*Nitrobacter\_winogradskyi* 175 .....IPAMSMLSFA.AGTRFLLS.....LFFGGGLM  
*Nitrobacter\_hamburgensis* 175 .....IPAMSMLSFA.AGTRFLLS.....LMGGSLI  
*Nitrococcus\_mobilis* 180 .....IPAMSMLSFA.AGTRFLLS.....LFFGGAT  
*Escherichia\_coli* 192 .....IPAMSMVSYA.SGARYLS.....LIGGTCL  
*Aromatoleum\_aromaticum* 192 .....HVHAGSIAW.GAGFRMTY.....LMDGVSP

*Kuenenia\_stuttgartiensis* α10 α11 α12 β9 α13

*Kuenenia\_stuttgartiensis* 268 SNYTWHGDDQAPGHFFSHGLQTSDDVDMNDVRFSKLLVIQTGKKNLIEKMPFAHWLTFEVMERCG  
*Jettenia\_caeni* 268 SNYTWHGDDQAPGHFFSHGLQTSDDVDMNDVRFSKLLVIQTGKKNLIEKMPFAHWLTFEVMERCG  
*Brocadia\_fulgida* 268 SNYTWHGDDQAPGHFFVHGLQTSDDVDMNDIRFVSKLLVIQTGKKNLIEKMPFAHWLTFEVMERCG  
*Scalindua\_brodae* 271 SNYTWHGDDQAPGHFFVHGLQASDDVDFADLRYSKLLVIQVQKKNLIEKMPFAHWLTFEVIERG  
*Nitrospira\_defluvii* 270 NNYTWHGDDQDPSQPFWNGTQNCDDVLDSDMRFTKLNLSWGGKNFVEKMPFAHWLTFESMERG  
*Nitrospira\_nitrificans* 269 NNYTWHGDDQDPSQPFWNGTQNCDDVLDSDMRFTKLNLSWGGKNFVEKMPFAHWLTFESIERG  
*Nitrospira\_inopinata* 269 SNYTWHGDDQNPAPHWWSGVOGSDVLDSDMRFTKLNLSWGGKNFVEKMPFAHWLTFESIERG  
*Nitrospina\_gracilis* 267 SNYTWHGDDQAPGHSWTHGQTSDDVDFADHRYAKLLTIQWQKKNLIEKMPFAHWLTFESMERG  
*Nitrotoga\_sp.* 272 DSYSWHTDLPAGCPEVVTGHQMLDVEFMVYEHAKLLIVFVWGNPFICTKMPDLHWSESRKLG  
*Hydrogenobaculum\_sp.* 265 DNYSEHTDLPAPHTLVTGQQVDFDVLVTWEHAKLLIVLWGMNPGYTKMPSDHWLTFEQAQIKG  
*Beggiatoa\_sp.* 199 SFYDWWYDLPAPAEPEVWGEQTDVHESADWYNKAFIVSMGSLNLMTRTPDVHFAEARHNG  
*Thiocapsa\_sp.\_KS1* 209 SFYDWWYDLPHPVPEVWGDQTDVHESADWYQSAFYIWMGSLNLMTRTADAHFASEHKYNG  
*Nitrolancea\_hollandica\_Ib* 187 SFYDWWYDLPNSPEVWGDQTDVCEESADWYNSKFIIVSNANLNMTRTADAHFVSEARHNG  
*Nitrobacter\_winogradskyi* 199 SFYDWWYDLPSTFPEIWDQTDVCEESADWYNSKFIIVSMASNNMTRTPDVHFISEARTECG  
*Nitrobacter\_hamburgensis* 199 SFYDWWYDLPSTFPEIWDQTDVCEESADWYNSKFIIVSMASNNLNMTRTPDVHFISEARTECG  
*Nitrococcus\_mobilis* 204 SFYDWWYDLPNSPEIWDQTDVCEESADWYNSKFIIVSMASNNLNMTRTPDVHFISEARTECG  
*Escherichia\_coli* 216 SFYDWWYDLPAPSPQTWGEQTDVPEESADWYNSYI IAWGSLNVPQTRTPDAHFFTEVRYK  
*Aromatoleum\_aromaticum* 216 DINVDIGDLYMGAEHTFGKMHMGYSADNLLDAELIFMTCSSNWSYTYPLSSYHFLSEARYK

*Kuenenia\_stuttgartiensis* β10 α14 β11 α15 α16

*Kuenenia\_stuttgartiensis* 328 GKLVVITPEYSPSAQKADYWIPIRNN.TDTALFLGITRILMDKLYDAD.....YVKKF  
*Jettenia\_caeni* 328 GKLVVITPEYSPSAQKADYWIPIRNN.TDTALFLGITRILMDKLYDAD.....YVKKF  
*Brocadia\_fulgida* 328 GKLVVITPEYSPSAQKADYWIPIRNN.TDTALFLGLTKILMDKLYDAD.....YVKKF  
*Scalindua\_brodae* 312 GKLVVITPEYSPSATKADYWIPIRNTGISDITIFLTMTRKIMDNKWDYTD.....YVKKF  
*Nitrospira\_defluvii* 330 ARLVITPEYSPASRADYWIPIRVEP.TDGALFLGASKIILDENQDID.....YVKKF  
*Nitrospira\_nitrificans* 329 ARIAVITPEYSPTAQRADYWIPIRPEQ.SDGALFLGACKIILDENQDID.....YVKKF  
*Nitrospira\_inopinata* 329 ARVVVITPEYSPAYRADYWIPIRPEQ.SDGALFLGAMKIIVDENMHDDV.....YVKKF  
*Nitrospina\_gracilis* 327 GTLVTVCEYSPSTKADYWIPIRCPAGASDISIFLGCARKIIMDEGLVDV.....YVKKF  
*Nitrotoga\_sp.* 332 CHIVDISIDYHAMSNKADVDYIIRPG.TDPALGLGCHILIKNNWYDEN.....YVKKF  
*Hydrogenobaculum\_sp.* 325 IKVIVISNDFMARTADKVVITRTA.TDGALALSMAYVIMKEKLYDEN.....YVKKF  
*Beggiatoa\_sp.* 259 SKFVVFAPDFSQVAKYSDWVWVPEVHAG.QDGAFVVAVNVHVIILTEYVYKKEPSPFNAYMKQF  
*Thiocapsa\_sp.\_KS1* 269 GKLVNLSPDFSDVTKFADLWVPEVPE.TDTAFILSCIHVILQEFHVNRRSEYFHSYVAQY  
*Nitrolancea\_hollandica\_Ib* 247 TKFVVLPADDFSQVAKYSDWVWVPEVHAG.QDGALWMAAGDHWILKEFYIDRQVPYFIDYVKKRY  
*Nitrobacter\_winogradskyi* 259 TKFVVLSPDFSQIAKYCDEWIPVQAG.QDTALWMAANHVILKEYYIDRQVPYFIDYVKKRY  
*Nitrobacter\_hamburgensis* 259 TKFVVLSPDFSQIAKYCDEWIPVQAG.QDTALWMAANHVILKEYYIDRQVPYFIDYVKKRY  
*Nitrococcus\_mobilis* 264 AKFVVLSPDFSQVSKYADWVWVPEVHAG.QDLGIWMAVGHVVIYTEFYVYKQVYFIDYVYTRY  
*Escherichia\_coli* 276 TKTVAVTPDYAEIADLWLPKQV.TDAAMALAMGHVMLREFHLDNPSQYFIDYVYTRY  
*Aromatoleum\_aromaticum* 276 AEVVVVIVAPDFNPTPAADLHVPEVPEV.SDAAFWVGLSQQVMDIEKFLFDRO.....FVCEQ

*Kuenenia\_stuttgartiensis* β12 β13 α17 α18

*Kuenenia\_stuttgartiensis* 381 TDFPLVLRITD.....TLKRLVSPKDIIPNYKLODISDGPYHIQGLK.....  
*Jettenia\_caeni* 381 TDFPLVLRITD.....TLKRLQAKDIPFDYKLEDISHGASYKIHGLH.....  
*Brocadia\_fulgida* 381 TDFPLVLRITD.....TLKRLQAKDVFLNYQLEDISQASFKIHGLH.....  
*Scalindua\_brodae* 385 TDFPLVLRITD.....TLKRLQPEHEIKDYKQPELDY..SHSQGLT.....  
*Nitrospira\_defluvii* 383 TDMPVLRITD.....TLQYLDPEHEVLKDYQVDFTKSYSGRVQGLS.....  
*Nitrospira\_nitrificans* 382 TDMPVLRITD.....TLQYLDPRDVIQDYKFPDFSHSYSGRIQALK.....  
*Nitrospira\_inopinata* 382 TDMPVLRITD.....TLQYLDPRDVIQDYKFPDFSHSYSGRIQALK.....  
*Nitrospina\_gracilis* 381 TDMPVLRITD.....NLIRLHPDDYIPGYKNQPLPKD.GFTTKWMM.....  
*Nitrotoga\_sp.* 385 TDMPVLRITD.....NWKNLKASDIADYKLDLTHHLKVMKKEKPTLPVAFQATA  
*Hydrogenobaculum\_sp.* 378 TDLPVLRITD.....NAKRLLRASDIIPNYIPKALNQAVVYNPSPKQMPPPMKQE.KQ  
*Beggiatoa\_sp.* 318 TDSPFVVLN.QGEEGYEAGRLLRANTII.EAYKDEENGW.....  
*Thiocapsa\_sp.\_KS1* 328 TNLPVLRITD.QEGDHFASGRFLRASDV.AAYADEELADW.....  
*Nitrolancea\_hollandica\_Ib* 306 TDGPVLRITD.QTKGGAYSMPQLLRANRI.NRYKDVENGW.....  
*Nitrobacter\_winogradskyi* 318 TDLPVLRITD.PNGTYKTGRLLRSNRV.ARYKDVENGW.....  
*Nitrobacter\_hamburgensis* 318 TDLPVLRITD.PNGTYKTGRLLRARHV.PRYKDVENGW.....  
*Nitrococcus\_mobilis* 323 TDMPVLRITD.KDGSYRPGRYLSEEV.KKYKQENAAW.....  
*Escherichia\_coli* 335 TDMPVLRITD.ERDGYAAGRMLRAADLVDALGQENPEW.....  
*Aromatoleum\_aromaticum* 329 TDLPVLRITD.....TGKFLSAEDVDG.....GEAK.....

*Kuenenia stuttgartiensis*      β14      β15      α19

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Kuenenia_stuttgartiensis 422 . . . . . DEQREIIGDFVVDVAKS|KGPKAITRDDVGETLVK . . . . . KGIDPV
Jettenia_caeni 422 . . . . . DDQREIIGDFVVDVAKTKSPKAITRDDVGD|KLVV . . . . . KGIDPA
Brocadia_fulgida 422 . . . . . DDQREIIGDFVVDVAKTKNSPKPITRDDVGD|KLVV . . . . . KGIDPA
Scalindua_brodae 424 . . . . . KDQRGQLGDFVVDVSKTKDFKAITREDVGGK|KMMMA . . . . . KGIDPS
Nitrospira_defluvii 424 . . . . . ODQVQRLGGMVVDVLA|KGAVPLHREQVGVH|LAQ . . . . . SGIDPA
Nitrospira_nitrificans 423 . . . . . PEYIERLGGFMVVDVMAK|KQAVPLHREQVGH|FDK . . . . . SGIEPA
Nitrospira_inopinata 423 . . . . . PEQIQRLGGMVVDVLNK|KQAVPLHREQVGH|VYN . . . . . SGIDAA
Nitrospina_gracilis 421 . . . . . NFNRDKMPDFVVDVNT|DKPVAVTR|EDIGAKMRK . . . . . KNIDPA
Nitrotoga_sp. 437 FVKED . IRKFWGDNVVDVKK|TNKAVPLTR|DECGARYAA . . . . . KGVDSA
Hydrogenobaculum_sp. 429 YIPIQLRDQDINDFVVDVVK|TNSPKVVT|RDVGGK|YFDM . . . . . SSLDPA
Beggiatoa_sp. 356 . . . . . KFLMFDETS|GAPKM . PKGTMG|HRRWQE . KPGQWNLELKDGLDSS|PIEPL
Thiocapsa_sp._KS1 366 . . . . . KLPFCFDK . E|GELRL . PGGT|LGF|RWEEKNTGRWN|LNKNEADVTAQ|FFDPL
Nitrolancea_hollandica_Ib 345 . . . . . QLLVWDKQS . G|PRL . PKGCI|GYRWAKETGKWN|TMEDAMNT|FDLPL
Nitrobacter_winogradskyi 356 . . . . . KMLVLD|TAT|GEPRA . F|KGGV|GDRWGS . THGKWNLSAEDTLDNS|PIDPV
Nitrobacter_hamburgensis 356 . . . . . KMLLLDAN|S|GELRA . P|KQV|GDRWGS . VHGKWNLSGEDTLDNS|PLDPV
Nitrococcus_mobilis 361 . . . . . KQLVLD|RK|NETRC . P|KQV|GHRWAK . QHGQWNLKMEDALDNS|PIEPV
Escherichia_coli 374 . . . . . KTVAFNT . N|GEMVA . P|NGS|IGFRWGE . . KGKWNLEQRD|GKT|GETE|ELO
Aromatoleum_aromaticum 355 . . . . . QFYFFDEK|A|G|SVRKAS|R|G|T|L|K|L|D|F|MP|A|E|L|G|T|F|S|A . . . . .

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*Kuenenia stuttgartiensis*      β16      β17

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Kuenenia_stuttgartiensis 462 |E . . . . . G|S|F|K|I|K|T|I|D|E|K|E|T|E|V|V|M|T
Jettenia_caeni 462 |D . . . . . G|T|F|K|V|K|T|V|D|G|K|E|I|E|V|M|P
Brocadia_fulgida 462 |D . . . . . G|T|F|M|V|K|T|V|D|G|K|E|I|E|V|M|P
Scalindua_brodae 464 |E . . . . . G|T|F|Q|V|K|T|V|D|G|K|E|T|E|V|M|T
Nitrospira_defluvii 464 |L . . . . . G|T|Y|R|I|K|L|L|N|G|R|E|V|D|V|M|P
Nitrospira_nitrificans 463 |L . . . . . G|T|Y|R|V|K|L|L|N|G|R|E|I|D|A|L|P
Nitrospira_inopinata 463 |L . . . . . G|T|Y|R|V|K|L|L|N|G|R|E|I|D|A|P
Nitrospina_gracilis 461 |D . . . . . G|V|Y|D|I|K|L|V|S|G|K|I|T|V|M|P
Nitrotoga_sp. 480 |L . . . . . G|D|E|Y|E|V|T|L|V|D|G|K|K|I|K|V|V|P
Hydrogenobaculum_sp. 473 |L . . . . . G|E|Y|E|V|E|L|V|N|G|E|K|V|K|V|K|P
Beggiatoa_sp. 402 |L . . . . . P|V|K|Y|I|E|T|T|D|G|K|I|V|A|V|T|T
Thiocapsa_sp._KS1 412 |L . . . . . S|R|V|L|T|K|K|D|T|K|V|R|V|A|T|
Nitrolancea_hollandica_Ib 391 |L . . . . . V|S|R|R|A|V|P|I|K|Y|L|E|T|S|E|K|I|V|A|V|T|T
Nitrobacter_winogradskyi 402 |L . . . . . V|V|S|R|G|V|P|V|K|R|I|A|T|D|K|G|E|V|L|V|T|T
Nitrobacter_hamburgensis 402 |L . . . . . I|V|S|R|G|V|P|V|R|R|I|A|T|D|K|G|E|I|L|C|A|T|
Nitrococcus_mobilis 407 |L . . . . . L|Y|K|R|G|V|P|A|K|K|I|D|T|G|S|S|V|L|V|A|T|
Escherichia_coli 418 |L . . . . . L|E|N|V|L|L|H|K|L|P|V|R|L|Q|L|A|D|G|S|T|A|L|V|T|T
Aromatoleum_aromaticum 389 |L . . . . . R|L|K|N|E|K|T|I|Q|V|R|T

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*Kuenenia stuttgartiensis*      α20      α21      α22

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Kuenenia_stuttgartiensis 481 |L|L|E|M|Y|K|I|H|L . . . . . R . D|Y|D|I|D|S|V|S|V|M|T|N|S|P|K|D|L|E|R|L|A|K|D|I|A|T|I| . . .
Jettenia_caeni 481 |L|F|E|M|Y|K|I|H|L . . . . . K . D|Y|D|I|D|S|V|E|M|T|N|S|P|K|E|L|I|V|R|L|A|H|D|I|A|T|I| . . .
Brocadia_fulgida 481 |L|F|E|M|Y|K|I|H|L . . . . . K . D|Y|D|I|D|S|V|E|M|T|N|S|P|K|E|L|I|E|R|L|A|H|D|I|A|T|I| . . .
Scalindua_brodae 483 |L|F|D|L|Y|K|I|H|L . . . . . R . D|F|D|V|K|T|T|A|D|I|T|G|A|P|A|H|M|I|E|R|L|A|K|D|C|A|T|I| . . .
Nitrospira_defluvii 483 |I|Y|Q|L|Y|T|I|H|L . . . . . Q . D|Y|D|L|D|T|V|H|Q|V|N|R|A|P|K|D|L|I|V|R|W|A|R|D|C|G|T|V| . . .
Nitrospira_nitrificans 482 |I|Y|Q|L|Y|L|I|H|L . . . . . Q . D|Y|D|L|D|T|H|Q|I|T|R|S|P|K|D|L|L|V|R|W|A|R|D|S|G|T|I| . . .
Nitrospira_inopinata 482 |I|W|Q|M|Y|V|M|V|F . . . . . Q . D|Y|D|L|D|T|V|H|Q|I|T|R|T|P|K|D|L|I|V|R|W|A|R|D|S|G|T|I| . . .
Nitrospina_gracilis 480 |L|E|M|Y|K|I|H|L . . . . . K . D|Y|D|L|D|S|V|N|Q|I|S|H|A|P|K|D|L|V|V|R|L|A|R|D|I|G|T|I| . . .
Nitrotoga_sp. 499 |V|F|Q|L|Q|E|Y|L . . . . . E . E|F|T|A|E|N|T|S|I|M|T|G|V|P|V|E|A|I|N|D|L|A|L|F|H|K|H| . . .
Hydrogenobaculum_sp. 492 |N|F|Q|A|Y|I|E|L|L . . . . . E . E|N|Y|T|P|E|T|V|E|E|I|T|G|V|P|A|N|V|I|E|R|L|A|E|I|A|N|H| . . .
Beggiatoa_sp. 447 |I|F|D|M|L|M|A|H|F|G|V|D|R . E|L|G|G|E|Y|P|S|S|Y|D|D|S|D|Q|I|F|T|P|A|W|Q|E|K|F|T|G|I|D|K|S|T|V|I|N|F|A|N|Q|E|F|A|T|T|A|E|K
Thiocapsa_sp._KS1 472 |A|Y|D|L|L|A|S|F|G|V|N|R|G|L|S|G|S|G|Y|P|K|D|Y|D|D|A|S|E|A|Y|T|P|A|W|Q|E|Q|E|T|G|V|D|R|N|L|A|I|V|A|E|F|A|D|T|A|E|K
Nitrolancea_hollandica_Ib 435 |A|F|D|L|L|A|Q|F|A|V|G|R|P|G|L|T|G|D|Y|P|K|S|Y|D|D| . M|P|Y|T|P|A|W|Q|E|G|Y|T|G|I|G|R|D|T|V|I|F|A|E|F|A|G|N|A|E|A
Nitrobacter_winogradskyi 446 |G|F|D|I|M|S|Q|F|G|H|S|R . G|L|E|G|S|F|A|T|S|Y|D|D|E|D|A|P|Y|T|P|A|W|Q|E|R|H|T|G|I|G|R|E|T|A|I|F|A|E|F|A|T|N|A|E|L
Nitrobacter_hamburgensis 446 |G|F|D|I|M|S|Q|F|G|I|S|R . G|L|E|G|F|A|T|S|Y|D|D|E|D|A|P|Y|T|P|A|W|Q|E|R|H|T|G|I|G|R|E|T|A|I|F|A|E|F|A|T|T|A|E|Y
Nitrococcus_mobilis 451 |V|Y|D|L|N|M|G|Q|Y|A|V|R . G|L|P|G|D|Y|P|E|S|Y|D|D|L . K|P|Y|T|P|A|W|Q|E|Q|Y|T|G|I|G|R|D|T|V|I|F|A|E|F|A|G|T|A|E|K
Escherichia_coli 474 |V|Y|D|L|T|L|A|N|Y|G|L|R|G|L|N|D|V|N|C|A|T|S|Y|D|D|V . K|A|Y|T|P|A|W|A|E|Q|I|T|G|V|S|S|Q|I|I|T|I|A|E|F|A|D|N|A|D|K
Aromatoleum_aromaticum 401 |V|F|E|G|L|R|E|H . . . . . L|K|D|Y|T|P|E|K|A|S|A|K|G|V|P|V|S|I|L|E|R|L|G|R|K|V|A| . . . . .

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*Kuenenia stuttgartiensis*      β18      α23      β19

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Kuenenia_stuttgartiensis 519 |K|P| . V|A|I|H|Y|G|E|G|V|N|H|Y|F|H|A|T| . |L|M|N|R|S|Y|L|P|V|M|L|T|G|N|V|Y|F|G|S| . G|S|H|T|W|A|G|N|Y|K|A|G|N|F|Q|A|S
Jettenia_caeni 519 |K|P| . V|A|I|H|Y|G|E|G|I|N|H|W|F|H|A|T| . |L|M|N|R|S|T|Y|L|P|L|M|L|T|G|N|I|C|Y|P|G|S| . G|S|H|T|W|A|G|N|Y|K|A|G|N|F|Q|A|S
Brocadia_fulgida 519 |K|P| . V|A|I|H|Y|G|E|G|I|N|H|W|F|H|A|T| . |L|F|N|R|S|T|Y|L|P|L|M|L|T|G|N|V|Y|K|G|S| . G|S|H|T|W|S|G|N|Y|K|A|G|N|F|Q|A|S
Scalindua_brodae 521 |K|P| . V|A|I|H|Y|G|E|G|I|N|H|Y|F|H|A|T| . |L|H|N|R|A|T|Y|L|P|L|M|L|T|G|N|I|C|Y|H|G|S| . G|S|H|T|W|A|G|N|Y|K|A|G|N|F|Q|G|S
Nitrospira_defluvii 521 |K|P| . A|A|I|H|N|G|E|G|V|C|H|Y|F|H|T| . |S|M|G|R|A|A|L|V|M|M|L|T|G|N|I|C|K|F|G|T| . G|C|H|T|W|S|G|N|Y|K|V|G|I|W|Q|A|A
Nitrospira_nitrificans 520 |K|P| . A|A|I|H|N|G|E|G|V|C|H|Y|F|H|T| . |A|N|G|R|A|A|L|V|L|T|L|T|G|N|I|C|K|F|G|S| . G|C|H|T|W|S|G|N|Y|K|V|G|I|W|N|N|A|T
Nitrospira_inopinata 520 |K|P| . A|A|I|H|N|G|E|G|T|C|H|Y|F|H|Q|T| . |I|N|A|R|G|A|A|M|V|L|I|I|T|G|N|V|C|K|F|G|T| . G|O|H|T|W|A|G|N|Y|K|A|G|A|W|T|A|P
Nitrospina_gracilis 518 |K|P| . V|E|I|H|Y|G|E|G|I|N|H|Y|F|H|A|T| . |M|H|N|R|A|S|Y|V|P|L|M|L|T|G|N|V|C|P|K|G|S| . G|S|H|T|W|A|G|N|Y|K|A|G|N|Y|Q|G|S
Nitrotoga_sp. 537 |R|G|Q|G|I|S|T|G|A|G|T|N|H|Y|F|N|S|T| . |L|K|D|R|G|F|M|L|L|S|A|L|S|D|N|V|G|H|I|G|C| . A|F|G|N|Y|V|G|N|Y|R|Q|S|V|F|G| . .
Hydrogenobaculum_sp. 531 |K|G|T|K|I|T|T|G|M|G|V|N|Q|Y|F|H|G|D| . |L|I|V|R|A|I|F|L|V|A|A|L|T|G|N|V|G|R|E|S|G| . N|I|G|S|Y|A|G|N|Y|R|L|A|V|F|N| . .
Beggiatoa_sp. 506 |T|G|G|K|C|T|V|I|G|A|G|I|N|H|W|Y|H|N|N| . |L|M|Y|R|G|P|I|T|A|L|M|L|C|G|C|V|K|N|G|G| . G|L|A|H|Y|V|G|Q|E|K|L|A|P|I|S|I|W
Thiocapsa_sp._KS1 532 |T|K|G|K|C|L|F|I|T|G|S|G|I|L|H|W|Y|H|G|G|S|L|T|Y|R|S|E|A|V|M|G|I|L|T|G|C|C|G|R|N|G|G| . G|F|A|H|Y|V|G|E|K|I|R|N|M|A|A|I
Nitrolancea_hollandica_Ib 494 |T|Q|G|R|S|M|V|I|T|G|A|S|L|N|H|W|Y|N|N|G| . |L|C|Y|R|G|P|I|T|A|L|I|L|C|G|C|C|G|R|N|G|G| . G|L|N|H|Y|V|G|Q|E|K|L|S|L|V|S|A|W
Nitrobacter_winogradskyi 505 |T|N|G|K|S|M|V|I|V|G|A|S|A|N|H|W|Y|N|N| . |L|C|Y|R|S|A|T|V|A|L|I|L|C|G|C|C|G|V|N|G|G| . G|I|N|H|Y|V|G|Q|E|K|L|A|P|V|A|P
Nitrobacter_hamburgensis 505 |T|N|G|K|S|M|V|I|V|G|A|S|A|N|H|W|Y|N|N| . |L|C|Y|R|S|A|T|V|A|L|I|L|C|G|C|C|G|V|N|G|G| . G|I|N|H|Y|V|G|Q|E|K|L|A|P|V|A|P
Nitrococcus_mobilis 509 |T|K|G|R|S|M|V|I|V|G|A|S|A|N|H|W|Y|H|N|N| . |F|I|Y|R|A|A|I|N|C|L|I|L|C|G|C|C|G|R|N|G|G| . G|M|N|H|Y|V|G|Q|E|K|L|A|I|L|A|P|W
Escherichia_coli 533 |T|H|G|R|S|M|I|V|G|A|G|L|N|H|W|Y|H|L|D| . |M|N|Y|R|G|L|I|N|M|L|I|F|C|G|C|G|Q|S|G|G| . G|W|A|H|Y|V|G|Q|E|K|L|R|P|Q|T|G|W
Aromatoleum_aromaticum 437 |K|K|R|T|C|S|Y|I|G|F|S|S|A|K|S|Y|H|G|D| . |L|M|R|E|S|L|F|L|A|M|A|L|S|G|N|W|C|K|P|G|T| . G|A|F|A|W|A|Y|S|D|D|N|M|V|Y|L|G|V

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*Kuenenia stuttgartiensis*

Table with 2 columns: Species name and sequence alignment. Species include Kuenenia stuttgartiensis, Jettenia caeni, Brocadia fulgida, Scalindua brodae, Nitrospira defluvii, Nitrospira nitrificans, Nitrospira inopinata, Nitrospina gracilis, Nitrotoga sp., Hydrogenobaculum sp., Beggiatoa sp., Thiocapsa sp. KS1, Nitrolancea hollandica Ib, Nitrobacter winogradskyi, Nitrobacter hamburgensis, Nitrococcus mobilis, Escherichia coli, and Aromatoleum aromaticum. Sequence alignment shows conserved regions with asterisks indicating identity.

*Kuenenia stuttgartiensis*

Table with 2 columns: Species name and sequence alignment. Species include Kuenenia stuttgartiensis, Jettenia caeni, Brocadia fulgida, Scalindua brodae, Nitrospira defluvii, Nitrospira nitrificans, Nitrospira inopinata, Nitrospina gracilis, Nitrotoga sp., Hydrogenobaculum sp., Beggiatoa sp., Thiocapsa sp. KS1, Nitrolancea hollandica Ib, Nitrobacter winogradskyi, Nitrobacter hamburgensis, Nitrococcus mobilis, Escherichia coli, and Aromatoleum aromaticum. Sequence alignment shows conserved regions with asterisks indicating identity.

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*Kuenenia stuttgartiensis*

Table with 2 columns: Species name and sequence alignment. Species include Kuenenia stuttgartiensis, Jettenia caeni, Brocadia fulgida, Scalindua brodae, Nitrospira defluvii, Nitrospira nitrificans, Nitrospira inopinata, Nitrospina gracilis, Nitrotoga sp., Hydrogenobaculum sp., Beggiatoa sp., Thiocapsa sp. KS1, Nitrolancea hollandica Ib, Nitrobacter winogradskyi, Nitrobacter hamburgensis, Nitrococcus mobilis, Escherichia coli, and Aromatoleum aromaticum. Sequence alignment shows conserved regions with asterisks indicating identity. Above the alignment, domain labels alpha25 and beta23 are shown with arrows indicating their positions.

		β24 →	β25 →	β26 →	α26											
<i>Kuenenia stuttgartiensis</i>	690	YADFAFPAN	SWVFE	QFEFETNS	CS.NSNPF	IQIWGKTG	TTFVVE	SKD	DVVK	TLAGM	ASKLGEL					
<i>Jettenia caeni</i>	690	YADFAFPAN	SWAFEF	THEEITTS	CS.SSNPF	IQIWK	.GGIK	PVNSD	KDDV	MILAG	MAAKLGEL					
<i>Brocadia fulgida</i>	690	YADFAFPAN	SWVFE	THEEITTS	CS.SSNPF	VQIWK	.GGIR	PVNDT	KDDV	MILAG	MATKLGEL					
<i>Scalindua brodae</i>	692	YADVGF	PNNSW	VEFEHYE	VTCSC	.SNPFL	QVWK	.GGIK	PLHDT	KDDV	VPALVSKRMGEL					
<i>Nitrospira defluvii</i>	692	HADVAF	AVNSW	MVEFTYPE	EMTAV	.SNPWW	QIWK	.GGIR	PLDYTR	NDLD	SFAGVAAKLKEM					
<i>Nitrospira nitrificans</i>	691	HADIAF	AVNSW	MVEFTYPE	EMTAV	.SNPWW	QIWK	.GGIR	PLDYTR	NDAD	TFAGVAAKLAEI					
<i>Nitrospira inopinata</i>	691	HADIAF	AVNSW	MVEFTYPE	EMTAV	.SNPWW	QIWK	.GGIR	PLDYTR	NDLD	TFAGVAAKLSDM					
<i>Nitrospina gracilis</i>	689	YADFLA	AANSW	AFESYE	EITNS	CS.SNP	FHQI	WGGTG	IKP	VFDT	IDNLIHREFAKRLSQV					
<i>Nitrotoga sp.</i>	697	YSDIVW	GVDSW	LKWKHT	DMAC	SC.SNP	FLTV	SPITP	LR	RFD	TVGDVEVPAGLFRRAFTAM					
<i>Hydrogenobaculum sp.</i>	689	YSDIIL	GVDAW	ENR	FDIS	GC.TN	PF	LVW	PR	TQ	KRLFD	TNDIET	YALVAKRLSEL			
<i>Beggiatoa sp.</i>	756	YSDIVL	EPTAH	WYE	..	KND	INTD	.MHSF	IHPLS	.EAV	APN	WEART	DWNIIYKSI	AKGVS		
<i>Thiocapsa sp. KS1</i>	786	YSDIVL	EPTAH	WYE	..	KFD	LTC	TD	.LHS	F	LHP	FT	PA	HDPAYE	SKH	
<i>Nitrolancea hollandica Ib</i>	743	YSDIVL	EPTAH	WYE	..	KND	LNTD	.LHT	F	IHPLG	.AAV	P	P	W	EAKS	
<i>Nitrobacter winogradskyi</i>	754	YSDIIL	EPTAF	WYE	..	KND	LNTD	.LHS	F	L	H	V	L	G	.QAV	P
<i>Nitrobacter hamburgensis</i>	754	YSDIIL	EPTAF	WYE	..	KND	LNTD	.LHS	F	L	H	V	L	G	.QAV	P
<i>Nitrococcus mobilis</i>	759	YSDIIL	EPTAF	WYE	..	KND	LNTD	.LHS	F	I	H	P	L	S	.QAV	P
<i>Escherichia coli</i>	782	YSDIIL	EPTAT	WYE	..	KDD	MNT	SD	.MHP	F	I	H	P	L	S	.AAV
<i>Aromatoleum aromaticum</i>	645	YADIVL	EPCAW	YVE	..	KHE	M	T	TE	C	S	G	N	P	F	TF

<i>Kuenenia stuttgartiensis</i>	749	LRDKRF	EDN	NW	KFA	I.....	EGRA	S	V	Y	T
<i>Jettenia caeni</i>	748	LRDMRF	DV	W	KFA	AL.....	EGR	P	E	V	Y
<i>Brocadia fulgida</i>	748	LRDMRF	R	D	Y	W	KFA	AL.....	EGR	P	E
<i>Scalindua brodae</i>	750	LGDRR	F	A	D	Y	W	KFA	AL.....	EDR	P
<i>Nitrospira defluvii</i>	750	TGEQR	M	A	D	Y	Y	K	F	A	I
<i>Nitrospira nitrificans</i>	749	TGEKR	M	R	D	V	F	H	F	V	Y
<i>Nitrospira inopinata</i>	749	TGDKR	M	K	D	Y	F	A	M	V	Y
<i>Nitrospina gracilis</i>	748	TGDKR	F	A	D	Y	V	K	V	Y	E
<i>Nitrotoga sp.</i>	756	TGQ	R	F	A	D	F	F	K	F	V
<i>Hydrogenobaculum sp.</i>	748	TGDKR	F	K	E	Y	W	H	F	V	Y
<i>Beggiatoa sp.</i>	812	AEKHL	P	E	P	V	K	D	F	V	C
<i>Thiocapsa sp. KS1</i>	842	AKVH	L	P	D	P	I	E	D	L	M
<i>Nitrolancea hollandica Ib</i>	799	APSV	F	P	Q	P	V	K	D	I	V
<i>Nitrobacter winogradskyi</i>	810	SPLA	F	S	K	P	V	R	D	I	L
<i>Nitrobacter hamburgensis</i>	810	APLA	F	S	K	P	V	R	D	I	L
<i>Nitrococcus mobilis</i>	815	APSV	F	P	Q	P	V	K	D	I	V
<i>Escherichia coli</i>	838	CVGH	L	G	K	.E	T	D	I	V	L
<i>Aromatoleum aromaticum</i>	702	AAAR	G	L	T	E	.....				

<i>Kuenenia stuttgartiensis</i>												
<i>Jettenia caeni</i>												
<i>Brocadia fulgida</i>												
<i>Scalindua brodae</i>												
<i>Nitrospira defluvii</i>												
<i>Nitrospira nitrificans</i>												
<i>Nitrospira inopinata</i>												
<i>Nitrospina gracilis</i>												
<i>Nitrotoga sp.</i>												
<i>Hydrogenobaculum sp.</i>												
<i>Beggiatoa sp.</i>	863	VVRD	Y	K	N	L	Y	N	R	F	T	S
<i>Thiocapsa sp. KS1</i>	895	VTRD	Y	T	K	I	H	M	Y	T	L	G
<i>Nitrolancea hollandica Ib</i>	855	VERD	Y	V	N	F	Y	N	R	W	I	S
<i>Nitrobacter winogradskyi</i>	861	VERD	Y	A	N	L	Y	N	K	F	I	S
<i>Nitrobacter hamburgensis</i>	861	VERD	Y	A	N	L	Y	N	K	F	I	S
<i>Nitrococcus mobilis</i>	866	FERD	Y	S	L	I	Y	N	K	Y	I	S
<i>Escherichia coli</i>	889	VERD	Y	P	A	T	Y	E	R	F	T	S
<i>Aromatoleum aromaticum</i>	716	RKRR	Y	D	E	L	Y	K	K	F	T	M

<i>Kuenenia stuttgartiensis</i>	772	RLLDG	S	T	T	M	K	G	Y	T	C	E	D
<i>Jettenia caeni</i>	771	RLLDG	S	T	T	T	K	G	Y	S	F	V	I
<i>Brocadia fulgida</i>	771	RLLDG	S	T	T	F	K	G	Y	T	F	D	I
<i>Scalindua brodae</i>	773	RLFDG	S	V	P	T	R	G	Y	N	V	D	M
<i>Nitrospira defluvii</i>	773	RILD	A	S	T	T	F	F	G	S	A	D	V
<i>Nitrospira nitrificans</i>	772	RLLD	A	S	T	T	F	F	G	S	A	D	V
<i>Nitrospira inopinata</i>	772	RMLD	A	S	T	T	F	F	G	S	A	D	V
<i>Nitrospina gracilis</i>	774	RLFT	T	S	T	A	G	M	C	Y	N	I	D
<i>Nitrotoga sp.</i>	787	RVLN	A	G	S	A	T	R	G	M	V	F	A
<i>Hydrogenobaculum sp.</i>	771	RIIN	A	S	S	N	L	K	G	Y	K	I	E
<i>Beggiatoa sp.</i>	912	NGDT	Y	P	S	L	N	E	V	H	A	I	N
<i>Thiocapsa sp. KS1</i>	943	EKQ	R	P	N	M	E	T	A	A	K	V	E
<i>Nitrolancea hollandica Ib</i>	914	GGQ	R	P	R	L	E	F	A	E	E	A	C
<i>Nitrobacter winogradskyi</i>	920	GGK	R	P	S	L	E	D	V	L	D	A	C
<i>Nitrobacter hamburgensis</i>	920	GGK	R	P	S	L	E	D	V	L	D	A	C
<i>Nitrococcus mobilis</i>	925	GGK	R	P	S	L	E	D	V	L	D	A	C
<i>Escherichia coli</i>	939	PAK	Q	P	M	L	N	T	A	I	D	A	E
<i>Aromatoleum aromaticum</i>	747	.....											

α27  
β27

				$\alpha 30$		$\alpha 31$																	
			●●●●●●●●	●●●●●●●●	●●●●●●●●	●●●●●●●●																	
<i>Kuenenia stuttgartiensis</i>	800	M	..LLFR	TYPRHFF	W	..E	QVHE	..S	IPFY	TP	TGR	LQAY	ND	EP	E	I	E	I	E	I	E	I	E
<i>Jettenia caeni</i>	799	L	..LLYR	TYPRHFF	W	..E	QVHE	..S	IPFY	TP	TGR	LQAY	ND	EP	E	I	E	I	E	I	E	I	E
<i>Brocadia fulgida</i>	799	L	..LLYR	TYPRHFF	W	..E	QVHE	..S	IPFY	TP	TGR	LQAY	ND	EP	E	I	E	I	E	I	E	I	E
<i>Scalindua brodae</i>	801	L	..LNF	GTYPR	TPMY	..E	QVVY	..D	RF	FH	TD	DGR	LHSY	CD	I	P	E	A	I	E	I	E	I
<i>Nitrospira defluvii</i>	797	M	..VMCR	TYPRHPL	W	..E	ETNE	..S	K	P	H	WT	RS	GR	LE	T	R	I	E	P	E	A	I
<i>Nitrospira nitrificans</i>	796	M	..VMVR	TYPRHPL	W	..E	ETNE	..S	K	P	M	WT	RS	GR	LE	T	R	I	E	P	E	A	I
<i>Nitrospira inopinata</i>	796	M	..VMVR	TYPRHPL	W	..E	ETNE	..S	K	P	M	WT	RS	GR	LE	T	R	I	E	P	E	A	I
<i>Nitrospina gracilis</i>	802	L	..LLYR	TYPRHPL	W	..E	MYTE	..S	K	P	F	Y	T	P	N	G	R	I	Q	F	N	D	E
<i>Nitrotoga sp.</i>	814	I	..FMAR	TYP	RVSG	W	..E	QTAE	GG	G	I	P	W	Y	T	K	S	G	R	O	E	Y	M
<i>Hydrogenobaculum sp.</i>	798	L	..VMTR	FY	K	F	I	G	Y	..D	Q	T	V	D	..G	K	P	W	Y	T	K	S	G
<i>Beggiatoa sp.</i>	971	E	D	I	Q	R	O	P	R	R	L	L	T	S	P	C	W	S	G	L	M	N	E
<i>Thiocapsa sp. KS1</i>	1002	P	D	L	I	S	O	P	R	R	L	L	T	S	P	C	W	S	A	I	E	T	K
<i>Nitrolancea hollandica Ib</i>	973	F	D	L	T	R	O	V	R	R	L	L	T	S	P	C	W	T	G	M	V	N	D
<i>Nitrobacter winogradskyi</i>	979	Y	D	L	T	R	O	P	R	R	L	L	T	S	P	C	W	T	G	L	V	N	D
<i>Nitrobacter hamburgensis</i>	979	Y	D	L	T	R	O	P	R	R	L	L	T	S	P	C	W	T	G	M	V	N	D
<i>Nitrococcus mobilis</i>	984	Y	D	L	T	R	O	P	R	R	L	L	T	S	P	C	W	T	G	M	V	N	D
<i>Escherichia coli</i>	998	R	D	I	Q	A	O	P	R	R	L	L	T	S	P	C	W	T	G	M	V	N	D
<i>Aromatoleum aromaticum</i>	781	A	..HANE	V	D	V	T	K	E	T	Y	..P	M	R	W	..F	D	D	..K	K	V	F	P

				$\beta 28$		$\beta 29$		$\alpha 32$	$\beta 30$
			●	→	→	→	→	●●●●●●●●	→
<i>Kuenenia stuttgartiensis</i>	841	G	E	N	F	I	V	H	R
<i>Jettenia caeni</i>	840	G	E	N	F	I	V	H	R
<i>Brocadia fulgida</i>	840	G	E	N	F	I	V	H	R
<i>Scalindua brodae</i>	842	G	E	N	F	V	C	H	R
<i>Nitrospira defluvii</i>	838	G	E	N	F	I	S	H	R
<i>Nitrospira nitrificans</i>	837	G	E	N	F	I	S	H	R
<i>Nitrospira inopinata</i>	837	G	E	N	F	I	S	H	R
<i>Nitrospina gracilis</i>	843	G	E	N	F	I	V	H	R
<i>Nitrotoga sp.</i>	857	G	E	N	L	T	V	Y	R
<i>Hydrogenobaculum sp.</i>	839	G	E	N	L	I	V	H	R
<i>Beggiatoa sp.</i>	1029	G	E	H	L	P	T	Y	K
<i>Thiocapsa sp. KS1</i>	1060	G	E	D	F	P	V	Y	K
<i>Nitrolancea hollandica Ib</i>	1031	G	E	O	L	M	T	H	K
<i>Nitrobacter winogradskyi</i>	1037	G	E	H	I	P	T	Y	K
<i>Nitrobacter hamburgensis</i>	1037	G	E	H	I	P	T	Y	K
<i>Nitrococcus mobilis</i>	1042	G	A	O	L	C	T	Y	R
<i>Escherichia coli</i>	1056	G	E	S	L	L	V	Y	R
<i>Aromatoleum aromaticum</i>	825	G	E	S	L	P	T	H	K

				$\alpha 33$		$\alpha 34$		$\beta 31$		$\alpha 35$
			●●●●●●●●	●●●●●●●●	→	→	→	→	●●●●●●●●	
<i>Kuenenia stuttgartiensis</i>	893	S	W	E	T	K	K	T	K	
<i>Jettenia caeni</i>	892	S	W	A	E	T	K	K	T	
<i>Brocadia fulgida</i>	892	S	W	S	D	T	K	Q	T	
<i>Scalindua brodae</i>	894	P	W	S	E	V	K	K	T	
<i>Nitrospira defluvii</i>	890	P	W	S	E	V	K	K	T	
<i>Nitrospira nitrificans</i>	889	A	W	Q	E	I	K	R	H	
<i>Nitrospira inopinata</i>	889	S	W	D	E	I	K	R	H	
<i>Nitrospina gracilis</i>	895	P	W	S	S	V	R	T	T	
<i>Nitrotoga sp.</i>	916	T	T	K	E	L	M	A	T	
<i>Hydrogenobaculum sp.</i>	898	S	P	A	K	L	K	D	T	
<i>Beggiatoa sp.</i>	1051	..	..	..	..	..	..	..	..	
<i>Thiocapsa sp. KS1</i>	1082	..	..	..	..	..	..	..	..	
<i>Nitrolancea hollandica Ib</i>	1053	..	..	..	..	..	..	..	..	
<i>Nitrobacter winogradskyi</i>	1059	..	..	..	..	..	..	..	..	
<i>Nitrobacter hamburgensis</i>	1059	..	..	..	..	..	..	..	..	
<i>Nitrococcus mobilis</i>	1064	..	..	..	..	..	..	..	..	
<i>Escherichia coli</i>	1078	..	..	..	..	..	..	..	..	
<i>Aromatoleum aromaticum</i>	838	..	..	..	..	..	..	..	..	

				$\beta 32$		$\alpha 36$		$\beta 33$		$\beta 34$
			→	→	→	→	→	→	→	
<i>Kuenenia stuttgartiensis</i>	952	V	G	E	H	Q	I	H	I	
<i>Jettenia caeni</i>	951	V	G	E	H	Q	I	H	I	
<i>Brocadia fulgida</i>	951	V	G	E	H	Q	I	H	I	
<i>Scalindua brodae</i>	953	A	G	E	H	Q	L	H	I	
<i>Nitrospira defluvii</i>	949	V	G	E	H	Q	I	H	I	
<i>Nitrospira nitrificans</i>	948	V	G	E	H	Q	I	H	I	
<i>Nitrospira inopinata</i>	948	V	G	E	H	Q	I	H	I	
<i>Nitrospina gracilis</i>	954	V	G	E	H	Q	I	H	I	
<i>Nitrotoga sp.</i>	975	V	G	E	G	F	V	D	V	
<i>Hydrogenobaculum sp.</i>	958	V	V	D	A	F	I	E	I	
<i>Beggiatoa sp.</i>	1086	R	G	I	E	P	F	W	I	
<i>Thiocapsa sp. KS1</i>	1117	R	G	G	P	T	V	W	I	
<i>Nitrolancea hollandica Ib</i>	1087	R	G	I	E	P	C	W	L	
<i>Nitrobacter winogradskyi</i>	1093	R	G	M	D	P	V	W	I	
<i>Nitrobacter hamburgensis</i>	1093	R	G	M	D	P	V	W	I	
<i>Nitrococcus mobilis</i>	1098	R	G	M	D	P	V	W	I	
<i>Escherichia coli</i>	1113	R	G	G	P	V	V	W	L	
<i>Aromatoleum aromaticum</i>	869	R	G	Q	P	V	V	H	M	

		β35		α37	
<i>Kuenenia_stuttgartiensis</i>		→		○○○○○○○○○○	
<i>Kuenenia_stuttgartiensis</i>	1012	PYNCTMMK	HS	SAWIS	SDKTVQAHETRPDGRALS
<i>Jettenia_caeni</i>	1011	PYGVTMMK	HS	SAWIS	STERSVKAHETRPDGRALS
<i>Brocadia_fulgida</i>	1011	PYGVTMMK	HS	SAWIS	STERSVKAHESRPDGRALS
<i>Scalindua_brodae</i>	1013	PYHTTMMK	H	STNVATEKSVKAHENR	KDGMAMSK.DGYLSNFRY
<i>Nitrospira_defluvii</i>	1009	PYHVTMAK	H	HAPYVSTAKSVKGHETRP	PDGRAIAVDVTGYQSNFRY
<i>Nitrospira_nitrificans</i>	1008	PYHVTMAK	H	HAPYVSTAKSVKGHETRP	PDGRAIAIDTGYQSNFRY
<i>Nitrospira_inopinata</i>	1008	PYHVTMAK	H	HAPFVATPKSVKGHETRP	PDGRAIAIDTGYQSNFRY
<i>Nitrospina_gracilis</i>	1014	PYHTAMMK	H	SCWTS	STERSVKAHEERPDGRALS
<i>Nitrotoga_sp.</i>	1035	SQGSRMRY	Y	NAYAA	TYGSMEGARTRADGLAKS
<i>Hydrogenobaculum_sp.</i>	1018	PPGLAKI	W	FNMYGSSHG	SVKGTKVNKNGLAENP
<i>Beggiatoa_sp.</i>	1129	PQGVCIWY	H	SPERTI	.SIPKSPLRG.....GRRAG
<i>Thiocapsa_sp._KS1</i>	1160	PRDMSIVY	H	QTERIV	.NVPPFSSLAR.....ER
<i>Nitrolancea_hollandica_Ib</i>	1130	QMGTCMIY	H	APERIT	.SIPKSOVRG.....NRRG
<i>Nitrobacter_winogradskyi</i>	1136	QPGTCMY	H	AVERTV	.YIPKSQERK.....WRGG
<i>Nitrobacter_hamburgensis</i>	1136	QPGTCMY	H	AVERTV	.YIPKSQERK.....WRGG
<i>Nitrococcus_mobilis</i>	1141	QSGMCLY	H	AVERTI	.YIPKQIRG.....GRRAG
<i>Escherichia_coli</i>	1156	PAGMTMMY	H	AQERIV	.NLPGSEITQ.....QRGG
<i>Aromatoleum_aromaticum</i>	912	QPKQCLVY	H	WDAHQY	..L.....KGG.....WK..

		β36		β37		β38		α38
<i>Kuenenia_stuttgartiensis</i>		→		→		→		○○○○○○
<i>Kuenenia_stuttgartiensis</i>	1071	DSLFLHKA	K	IGMKFI	GF	EADNHCINTV	P	KETLVKTKAE
<i>Jettenia_caeni</i>	1071	DSLFLHKA	K	IGMKFVF	GF	EADNHGINTV	P	KETLVKTKAE
<i>Brocadia_fulgida</i>	1071	DSLFLHKS	K	TSMKFI	GF	EADNHGINTT	P	KETLVKTKAE
<i>Scalindua_brodae</i>	1072	DTLFLHKK	V	FMGFMH	GG	EADNHVVNTV	P	KETLVRI
<i>Nitrospira_defluvii</i>	1069	DSLPLGK	Q	ANALKFK	WG	EIDHHAVNTV	P	KECLIRI
<i>Nitrospira_nitrificans</i>	1068	DSLPLGK	S	ANGLKFK	WG	EIDHHAVNTV	P	KECLIRI
<i>Nitrospira_inopinata</i>	1068	DSLPLGK	H	AIAWKFK	WG	YQVDHHAINTV	P	KECLIRI
<i>Nitrospina_gracilis</i>	1074	DSLFLHKA	K	SKMKFM	GF	EADNHAINTA	P	KETLVKFS
<i>Nitrotoga_sp.</i>	1095	DTLANKK	V	FQEI	I	GHQNDVHCAN	G	AP
<i>Hydrogenobaculum_sp.</i>	1078	DTLVRK	D	LFGQTL	N	KGFMLDVCPT	G	AP
<i>Beggiatoa_sp.</i>	1174	GGYGO	.....			FTHLN	Y	WGPTGVN
<i>Thiocapsa_sp._KS1</i>	1210	GGYAO	.....			WTYMLN	Y	OGTSPSE
<i>Nitrolancea_hollandica_Ib</i>	1175	GGYAO	.....			WTYMLN	Y	WGPTGVN
<i>Nitrobacter_winogradskyi</i>	1180	GGYAO	.....			FTYGNW	Y	WGPTG
<i>Nitrobacter_hamburgensis</i>	1180	GGYAO	.....			FTYGNW	Y	WGPTG
<i>Nitrococcus_mobilis</i>	1186	GGSGQ	.....			FTYAWN	Y	WGPTG
<i>Escherichia_coli</i>	1200	GGYAH	.....			LAYGFN	Y	YGTVGSN
<i>Aromatoleum_aromaticum</i>	947	GGYEQ	.....			ERY	Y	FMNGSPAPVTD

		α39		β39
<i>Kuenenia_stuttgartiensis</i>		○○○○○○○○		→
<i>Kuenenia_stuttgartiensis</i>	1130	NE..NDFM	KKFL	NGELIKVDA.
<i>Jettenia_caeni</i>	1130	NE..NDFM	KKYLS	GELIKVEKA
<i>Brocadia_fulgida</i>	1130	NE..NDFM	KRYL	NGELIKIEKA
<i>Scalindua_brodae</i>	1131	NE..SKFM	KKLYL	QGGTTSVE..
<i>Nitrospira_defluvii</i>	1128	QE..NEFM	VKWL	KGEHIKIKV.
<i>Nitrospira_nitrificans</i>	1127	QE..NEFM	IKWL	KGEHIKIKV.
<i>Nitrospira_inopinata</i>	1127	QE..NEFM	IKWL	KGEHIKIKV.
<i>Nitrospina_gracilis</i>	1133	SPLKDR	FAEM	YLAGQY.....
<i>Nitrotoga_sp.</i>	1153	YE..SLQM	RTYL	KGAFVSR... .
<i>Hydrogenobaculum_sp.</i>	1137	NP..NKYF	KKYLE	AGYVIFV.. .
<i>Beggiatoa_sp.</i>				
<i>Thiocapsa_sp._KS1</i>	1258	A.....		
<i>Nitrolancea_hollandica_Ib</i>				
<i>Nitrobacter_winogradskyi</i>				
<i>Nitrobacter_hamburgensis</i>				
<i>Nitrococcus_mobilis</i>				
<i>Escherichia_coli</i>	1244	ESVK		
<i>Aromatoleum_aromaticum</i>				