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|               |           |                |                |                                                                                      |    |
|---------------|-----------|----------------|----------------|--------------------------------------------------------------------------------------|----|
| NTDB id 1159  | ABDM36    | RS04765        | WP 001166105.1 | .....MEALIEKIKKEYKLIYICTGLGLLVGGFFLLKPAPQTPVKETNLQAE...VVAISKDLSVEKEVSKKEEKEEPL..... | 0  |
| NTDB id 1150  | A1552VC   | RS08580        | WP 001166105.1 | .....                                                                                | 0  |
| NTDB id 1395  | DSB67     | RS04445        | WP 010649155.1 | .....                                                                                | 0  |
| NTDB id 1362  | HI 1008   | AAC22669.1     |                | .....                                                                                | 0  |
| NTDB id 1382  | A4U84     | RS07375        | WP 062924234.1 | .....                                                                                | 0  |
| NTDB id 595   | KW2       | RS08725        | WP 021037687.1 | .....MEKILDKLKEYWKIM.LLVVCALIAGGIFYIFTNSPKPAETLSVEN....LSSS...STKSSVSKFNSSSSEK       | 65 |
| NTDB id 521   | SMSK321   | RS04960        | WP 000443804.1 | .....MESIIEKIKEYKIIV.ICTGLGLLVGGFFLLKPAPHTPVKETNLQAE...VVAISKDSSTEKDVKKEEKEEPV       | 69 |
| NTDB id 493   | SM12261   | RS04300        | WP 000387351.1 | .....MEAIIEKIKEYKIIV.ICTGLGLLVGGFFLLKPAPQTPVKETNLQAE...VVAISKDSVSEKEVVKKEEKEEPL      | 69 |
| NTDB id 263   | KZH43     | RS04195        | WP 000387330.1 | .....MEAIIEKIKEYKIIV.ICTGLGLLVGGFFLLKPAPQTPVKETNLQAE...VAAVSKDLVSEKEVNKKEEKEEPL      | 69 |
| NTDB id 222   | SPD       | RS04535        | WP 000387330.1 | .....MEAIIEKIKEYKIIV.ICTGLGLLVGGFFLLKPAPQTPVKETNLQAE...VAAVSKDLVSEKEVNKKEEKEEPL      | 69 |
| NTDB id 188   | SPR       | RS04295        | WP 000387330.1 | .....MEAIIEKIKEYKIIV.ICTGLGLLVGGFFLLKPAPQTPVKETNLQAE...VAAVSKDLVSEKEVNKKEEKEEPL      | 69 |
| NTDB id 153   | SP        | RS04730        | WP 000387344.1 | .....MEAIIEKIKEYKIIV.ICTGLGLLVGGFFLLKPAPQTPVKETNLQAE...VAAVSKDSSTEKEVKKEEKEEPL       | 69 |
| NTDB id 1069  | ABD1      | RS03060        | WP 043960841.1 | .....                                                                                | 0  |
| NTDB id 1041  | HON27     | RS14740        | WP 005124713.1 | .....                                                                                | 0  |
| NTDB id 105   | BSU 25590 | NP 390437.1    |                | .....MNWLNQHKKAIILAASAAVFTAIMIFLATG....KNKE....PVKQAVPT...ETENTVVVKQEANNDE           | 57 |
| NTDB id 36    | MW        | RS08230        | WP 001793467.1 | MVLLYQFLLRYKDFLTQWKLYIISAVVLIMVLIGFIFWRQDDYTSRNFENKDNALKQSTSENSSLSKVEDVQVKDGDNSK     | 80 |
| NTDB id 20    | SA        | RS08005        | WP 001802022.1 | MVLLYQFLLRYKDFLTQWKLYIISAVVLIMVLIGFIFWRQDDYTSRNFENKDTALKQSTSENSSLSKLEDVQVKDGDNSK     | 80 |
| NTDB id 1014  | ACIAD     | RS13855        | WP 004924483.1 | .....                                                                                | 0  |
| NTDB id 72923 | BD33      | RS00055        | WP 002853093.1 | .....                                                                                | 0  |
| NTDB id 1242  | Cj0011c   | YP 002343483.1 |                | .....                                                                                | 0  |
| NTDB id 1127  | NGFG      | RS10560        | WP 003703428.1 | .....                                                                                | 0  |
| NTDB id 1126  | NGFG      | RS09375        | WP 003703428.1 | .....                                                                                | 0  |
| NTDB id 1125  | NGFG      | RS07215        | WP 003703428.1 | .....                                                                                | 0  |
| NTDB id 1108  | NGFG      | RS06525        | WP 003703428.1 | .....                                                                                | 0  |
| consensus     |           |                |                |                                                                                      |    |

logo

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| NTDB id 1159  | ABDM36    | RS04765        | WP 001166105.1 | EQDLITVDVKGAVKSPGIYDLSPVGS.RVNDVAVQKAGGLTEQADSKSLNLAQKVSDEALVYVPTKGEESASQHTGSGAP.. | 33  |
| NTDB id 1150  | A1552VC   | RS08580        | WP 001166105.1 | .....MQIKTK...IVTLFLSLCLPT.....LPLLANAEETAPAAQ.....                                | 33  |
| NTDB id 1395  | DSB67     | RS04445        | WP 010649155.1 | .....MQIKTK...IVTLFLSLCLPT.....LPLLANAEETAPAAQ.....                                | 33  |
| NTDB id 1362  | HI 1008   | AAC22669.1     |                | .....MKWMLTLCLLT.....LAPMSWAE.TKTKAD.....                                          | 25  |
| NTDB id 1382  | A4U84     | RS07375        | WP 062924234.1 | .....MKTL...FTSVVLCGAL.....VVSSSFAEEKATXQTAQSVVTT                                  | 36  |
| NTDB id 595   | KW2       | RS08725        | WP 021037687.1 | .....MKKL...SRYTFSLLFG.L.....FSATTFAEKVTSTSTHTPVVM                                 | 37  |
| NTDB id 521   | SMSK321   | RS04960        | WP 000443804.1 | NKNEIMVDLKGAVAKPNVYQISSDE.RLVDLIRQAGGFTDQADQKSINLSAKLKDEEVIVPKVGESSSSESTDSPGTG..   | 142 |
| NTDB id 493   | SM12261   | RS04300        | WP 000387351.1 | EQDLITVDVKGAVKSPGIYDLSPVGS.RVNDVAVQKAGGLTEQADSKSLNLAQKVSDEALVYVPTKGEESASQHTGSGAP.. | 146 |
| NTDB id 263   | KZH43     | RS04195        | WP 000387330.1 | EQDLITVDVKGAVKSPGIYDLSPVGS.RVNDVAVQKAGGLTEQADSKSLNLAQKVSDEALVYVPTKGEESASQHTGSGAP.. | 146 |
| NTDB id 222   | SPD       | RS04535        | WP 000387330.1 | EQDLITVDVKGAVKSPGIYDLSPVGS.RVNDVAVQKAGGLTEQADSKSLNLAQKVSDEALVYVPTKGEESASQHTGSGAP.. | 146 |
| NTDB id 188   | SPR       | RS04295        | WP 000387330.1 | EQDLITVDVKGAVKSPGIYDLSPVGS.RVNDVAVQKAGGLTEQADSKSLNLAQKVSDEALVYVPTKGEESASQHTGSGAP.. | 146 |
| NTDB id 153   | SP        | RS04730        | WP 000387344.1 | EQDLITVDVKGAVKSPGIYDLSPVGS.RVNDVAVQKAGGLTEQADSKSLNLAQKVSDEALVYVPTKGEESASQHTGSGAP.. | 146 |
| NTDB id 1069  | ABD1      | RS03060        | WP 043960841.1 | .....MQYSMRFWKNKYFVLIMLCLGV.....ISPSVCAQSFDQNFQEWKVKQMQMYDQ                        | 48  |
| NTDB id 1041  | HON27     | RS14740        | WP 005124713.1 | .....MQYSMRFWKNKYFVLIMLCLGV.....ISPSVCAQSFDQNFQEWKVKQMQMYDQ                        | 48  |
| NTDB id 105   | BSU 25590 | NP 390437.1    |                | SNETIVIDIKGAVQHPGVYEMRTGD.RVSQAIEXAGGTSEQADEAQVNLAELIQDGTVVYIPKKGEEETAV.....Q      | 127 |
| NTDB id 36    | MW        | RS08230        | WP 001793467.1 | NKGPVYVDVKGAVKHPNVYKMTSKD.RVVDLLDKAQ.LLEDADVSQLNLSEKLTQKMFIPH.....K.GQKNVEP        | 149 |
| NTDB id 20    | SA        | RS08005        | WP 001802022.1 | NKGPVYVDVKGAVKHPNVYKMTSKD.RVVDLLDKAQ.LLDDADVSRINLSEKLTQKMFIPH.....K.GQKNVEP        | 149 |
| NTDB id 1014  | ACIAD     | RS13855        | WP 004924483.1 | .....MSIR.HFF...T....FFWAT....LL..TLFSMQIVFAQGFDQQYDAWKTQQKAHDT                    | 44  |
| NTDB id 72923 | BD33      | RS00055        | WP 002853093.1 | .....MKKLLFLF...F.....                                                             | 9   |
| NTDB id 1242  | Cj0011c   | YP 002343483.1 |                | .....MKKLLFLF...F.....                                                             | 9   |
| NTDB id 1127  | NGFG      | RS10560        | WP 003703428.1 | .....MSRGGA....TPYRFLLR.HIV...ARCG.LLFAT....LKGKTMKKMFVLF.CML.....                 | 43  |
| NTDB id 1126  | NGFG      | RS09375        | WP 003703428.1 | .....MSRGGA....TPYRFLLR.HIV...ARCG.LLFAT....LKGKTMKKMFVLF.CML.....                 | 43  |
| NTDB id 1125  | NGFG      | RS07215        | WP 003703428.1 | .....MSRGGA....TPYRFLLR.HIV...ARCG.LLFAT....LKGKTMKKMFVLF.CML.....                 | 43  |
| NTDB id 1108  | NGFG      | RS06525        | WP 003703428.1 | .....MSRGGA....TPYRFLLR.HIV...ARCG.LLFAT....LKGKTMKKMFVLF.CML.....                 | 43  |
| consensus     |           |                |                |                                                                                    |     |

logo

|               |           |                |                |                                                                                    |     |
|---------------|-----------|----------------|----------------|------------------------------------------------------------------------------------|-----|
| NTDB id 1159  | ABDM36    | RS04765        | WP 001166105.1 | .....VEEGIVITVNINTASAEELATLLKGGIGLKKAAQIVDYREANGPFTHIDDLTNVKGIGEATV                | 94  |
| NTDB id 1150  | A1552VC   | RS08580        | WP 001166105.1 | .....VEEGIVITVNINTASAEELATLLKGGIGLKKAAQIVDYREANGPFTHIDDLTNVKGIGEATV                | 94  |
| NTDB id 1395  | DSB67     | RS04445        | WP 010649155.1 | .....KYEGIEITVNNSATAQEITALLIGIGEKKAAQDIVEYRNEHGPFKTAADLTQVKGIGEATV                 | 86  |
| NTDB id 1362  | HI 1008   | AAC22669.1     |                | QAEA.....QVAPAVVSDKLNINTATASEIQKSLTGIGAKKAAEIVQYREKHGNFXNAEQQLLEVQGIGKATL          | 103 |
| NTDB id 1382  | A4U84     | RS07375        | WP 062924234.1 | QQ.V.....AATQKVNANVVNINTATASEIQDKLVGIGAKKAAQIVVEYREKNGKFLNVEQLTEVSGIGKATL          | 103 |
| NTDB id 595   | KW2       | RS08725        | WP 021037687.1 | .....S.....S..VSNQISTTSGPKVNINKADLTTELQK.LTGIGQKKAQDIIDFRMKNNGDFKSIEDLGKVS         | 208 |
| NTDB id 521   | SMSK321   | RS04960        | WP 000443804.1 | .....SSTSCKDKKINLNKASLEELKQ.VKGLGGKRAQDIIDHREANGKFKSVDELKKVSGIGAKTI                | 206 |
| NTDB id 493   | SM12261   | RS04300        | WP 000387351.1 | .....SSTSKEKKVNLNKASLEELKQ.VKGLGGKRAQDIIDHREANGKFKSVDELKKVSGIGAKTI                 | 206 |
| NTDB id 263   | KZH43     | RS04195        | WP 000387330.1 | .....SSISKEKKVNLNKASLEELKQ.VKGLGGKRAQDIIDHREANGKFKSVDELKKVSGIGGKTI                 | 206 |
| NTDB id 222   | SPD       | RS04535        | WP 000387330.1 | .....SSISKEKKVNLNKASLEELKQ.VKGLGGKRAQDIIDHREANGKFKSVDELKKVSGIGGKTI                 | 206 |
| NTDB id 188   | SPR       | RS04295        | WP 000387330.1 | .....SSISKEKKVNLNKASLEELKQ.VKGLGGKRAQDIIDHREANGKFKSVDELKKVSGIGGKTI                 | 206 |
| NTDB id 153   | SP        | RS04730        | WP 000387344.1 | .....SSTSKEKKVNLNKASLEELKQ.VKGLGGKRAQDIIDHREANGKFKSVDELKKVSGIGGKTI                 | 206 |
| NTDB id 1069  | ABD1      | RS03060        | WP 043960841.1 | KLNISKSSSHSNSSKISQTKNFNDSTGQIHLNQANVNEFQQ.LKGIGEKKAAQIVVEYRQKNGSFKNIDEIKNVKGIGPAIF | 127 |
| NTDB id 1041  | HON27     | RS14740        | WP 005124713.1 | KLNITKSSHSNGSKISQTKNFNDSTGQIHLNQANVNEFQQ.LKGVGEKKAAQIVVEYRQKNGSFKNIDEIKNVKGIGPAIF  | 127 |
| NTDB id 105   | BSU 25590 | NP 390437.1    |                | QGGG.....GSV....QSDGGKGALVNINTATLEELQG.ISGVGPSKAAEIAIAYREENGRFQTIEDITKVS           | 195 |
| NTDB id 36    | MW        | RS08230        | WP 001793467.1 | QIGVNSV.....HV....KNGNTNNTKVNLNTASVSELMS.VPGVGQAKANAIVEYRNQQGAFQEI                 | 219 |
| NTDB id 20    | SA        | RS08005        | WP 001802022.1 | QIEVNSV.....HV....KNGNTNNTKVNLNTASVSELMS.VPGVGQAKANAIVEYRNQQGAFQEI                 | 219 |
| NTDB id 1014  | ACIAD     | RS13855        | WP 004924483.1 | RLNSSASHHSLSKP...TQQSGTGKVNINSATAKELQQ.LHGVGEKKALAIVEYRQQYQKGFASVDDLQ              | 119 |
| NTDB id 72923 | BD33      | RS00055        | WP 002853093.1 | .....ALTAFLFGAVNINTATILKELKS.LNGIGEAKAKAILEYRKE.ANFTSIDDLKKVKGIGDKLF               | 69  |
| NTDB id 1242  | Cj0011c   | YP 002343483.1 |                | .....ALTAFLFGAVNINTATILKELKS.LNGIGEAKAKAILEYRKE.ANFTSIDDLKKVKGIGDKLF               | 69  |
| NTDB id 1127  | NGFG      | RS10560        | WP 003703428.1 | .....FSCAFSLAAVNINAASQQELEA.LPGIGPAKAKAIAEYRAQNGAFKSVDDLKVKGIGPAVL                 | 104 |
| NTDB id 1126  | NGFG      | RS09375        | WP 003703428.1 | .....FSCAFSLAAVNINAASQQELEA.LPGIGPAKAKAIAEYRAQNGAFKSVDDLKVKGIGPAVL                 | 104 |
| NTDB id 1125  | NGFG      | RS07215        | WP 003703428.1 | .....FSCAFSLAAVNINAASQQELEA.LPGIGPAKAKAIAEYRAQNGAFKSVDDLKVKGIGPAVL                 | 104 |
| NTDB id 1108  | NGFG      | RS06525        | WP 003703428.1 | .....FSCAFSLAAVNINAASQQELEA.LPGIGPAKAKAIAEYRAQNGAFKSVDDLKVKGIGPAVL                 | 104 |
| consensus     |           |                |                | ***! !*! !* * !*! ***!***!***! ** !***** *!***! ***                                |     |

logo

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|---------------|-----------|----------------|----------------|-----------------------------|-----|
| NTDB id 1159  | ABDM36    | RS04765        | WP 001166105.1 | RNNAARILL.....              | 103 |
| NTDB id 1150  | A1552VC   | RS08580        | WP 001166105.1 | RNNAARILL.....              | 103 |
| NTDB id 1395  | DSB67     | RS04445        | WP 010649155.1 | RKNEDRILL.....              | 95  |
| NTDB id 1362  | HI 1008   | AAC22669.1     |                | EKNRDRILIF.....             | 112 |
| NTDB id 1382  | A4U84     | RS07375        | WP 062924234.1 | EKNRDCIVIE.....             | 113 |
| NTDB id 595   | KW2       | RS08725        | WP 021037687.1 | EKLKDEISID.....             | 218 |
| NTDB id 521   | SMSK321   | RS04960        | WP 000443804.1 | EKLKDYVTVD.....             | 216 |
| NTDB id 493   | SM12261   | RS04300        | WP 000387351.1 | EKLKDYVTVD.....             | 216 |
| NTDB id 263   | KZH43     | RS04195        | WP 000387330.1 | EKLKDYVTVD.....             | 216 |
| NTDB id 222   | SPD       | RS04535        | WP 000387330.1 | EKLKDYVTVD.....             | 216 |
| NTDB id 188   | SPR       | RS04295        | WP 000387330.1 | EKLKDYVTVD.....             | 216 |
| NTDB id 153   | SP        | RS04730        | WP 000387344.1 | EKLKDYVTVD.....             | 216 |
| NTDB id 1069  | ABD1      | RS03060        | WP 043960841.1 | EKNKSRIAL.....              | 136 |
| NTDB id 1041  | HON27     | RS14740        | WP 005124713.1 | EKNKSRIAL.....              | 136 |
| NTDB id 105   | BSU 25590 | NP 390437.1    |                | EKIKSSITVK.....             | 205 |
| NTDB id 36    | MW        | RS08230        | WP 001793467.1 | DKLKSIFTI.....              | 228 |
| NTDB id 20    | SA        | RS08005        | WP 001802022.1 | DKLKSIFTI.....              | 228 |
| NTDB id 1014  | ACIAD     | RS13855        | WP 004924483.1 | EKNRDRILAI.....             | 128 |
| NTDB id 72923 | BD33      | RS00055        | WP 002853093.1 | EKIKNDITIE.....             | 79  |
| NTDB id 1242  | Cj0011c   | YP 002343483.1 |                | EKIKNDITIE.....             | 79  |
| NTDB id 1127  | NGFG      | RS10560        | WP 003703428.1 | AKLKDQASVGAPAPKGPAPVLPVAVKK | 131 |
| NTDB id 1126  | NGFG      | RS09375        | WP 003703428.1 | AKLKDQASVGAPAPKGPAPVLPVAVKK | 131 |
| NTDB id 1125  | NGFG      | RS07215        | WP 003703428.1 | AKLKDQASVGAPAPKGPAPVLPVAVKK | 131 |
| NTDB id 1108  | NGFG      | RS06525        | WP 003703428.1 | AKLKDQASVGAPAPKGPAPVLPVAVKK | 131 |
| consensus     |           |                |                | ***** **                    |     |

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 similar  
  $\geq 50\%$  conserved