#### **Supplementary Information**

# Structural and molecular rationale for the diversification of resistance mediated by the Antibiotic\_NAT family

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Supplementary Figure 1 – Sequence alignment of the Antibiotic\_NAT family.

Sequences are grouped and shaded according to phylogenetic reconstruction in Figure 1. Includes meta-AAC's, AAC(3) enzymes from clinical isolates, and sequences identified through BLAST searches of NCBI. Darker color or shading of amino acids indicates higher conservation. Major and minor subdomains are indicated with solid and dashed black lines, respectively, above the sequence alignment.

major subdomain

|         |   | 1 10 20 30 40 50   |
|---------|---|--|
|         | AAC_3_IVa_WP_063840268.1  | MSSAVECNVVQYE.WRKAELTGQLLNI TTPGGVLLV SGFRSVRPHED TIGHTEMTQQNE.SRTSETVDQLTAL YRPGGVLLV SGFRSVRPHED SSVIA   |
|         | S_meliloti_WP_027993499.1<br>Rhodomicrobium_WP_088346198.1  | MTQQNE.SRTSETVDQTTALTRPGGVLLV TSFRSVREVEG FSVIA  |
|         | metaAAC0016_AIA14255.1<br>metaAAC0074_AMP57367.1  | MKRDYVLEOSLTFAATSRA.MSAAEV\$SQLLAL WRRGGVLLV WSFRAVRFIAG TIGLID  |
|         | Sphingomonas sp. WP_029724114.1   | MKV.TSQAELVAQ1RAL YREGGVLLV SSFRAVREVEG IGLIA  |
|         | metaAAC0018 AIA14757.1<br>Allokutzneria albata WP 03043120.1  | MKV TSCAELVACIRAL RECOVILA SFRAVRSVEG IGJIA M. TSVOHITOCIRAL RECOVILV SFRAVRSVEG IGJIA MAE. MSFEOVATOLIRIT SREGVILV SFRAVRSVEG IGJIA   |
| Froup 1 | Archangium gephyra WP 047855546.1   |  |
| oroup i | Createbaston fuscus WD 042420505 1  |  |
|         | Myxococcus_fulvus_SEU16843.1<br>Sorangium_cellulosum_KYF78036.1   | MSDE ISCOMERCIRAL REACULLY SERAVREUED IGUVA MHG PSVSTVAELLAL ROCCULLY SERAVREUED IGIIR MHE PSVSTVAELLAL RECCULLY SERAVREUED IGIIR MHE PSVSTVAELLAL RECCULLY SERAVREUED IGIIR   |
|         | Sorangium cellulosum WP 04498544.1  |  |
|         | Stigmatella aur. WP 013378336.1<br>Sandaracinus amyl. WP 053233315.1  |  |
|         | metaAAC0033 $\overline{A}IA\overline{17596.1}$  |  |
|         | metaAAC0022_AIA16407.1<br>AAC 3 IXa WP 063840269.1  | MTE PSVOBVYBELRAL TRECCYLLV GAFRAVRAVEG IGLIR<br>MMERET ISQKAVTROLIDI VRPCCYLLV BAFSKVRBVEG IGLIA<br>MBEMSLINHSGGP VYRSRIKHDLADI SLODGVYVIF BEMSAJGYVAG GOTIG  |
| Froup 2 | AAC 3 VIIa WP 063840272.1   | MDELALLKRSDGP.VTRTRLARDLTAL LCDCDTVMF TRMSAVGYVAG TTVIG  |
| noup 2  | AAC 3 Xa WP 012377682.1<br>AAC 3 VIIIa WP 063856943.1   | MDETELLRRSDGP.VTRDRTRHDLAAL VPGDTVMF TRLSATGYVSG CTVID MDEKELIERAGGP.VTRGRTVRDLEAL GAGDTVMV TRMSATGYVNG GTVID  |
|         | AAC 3 IIIa WP 063840261.1   |  |
|         | metaAAC0008_AIA12232.1  |  |
|         | P_aeruginosa_WP_023911614.1<br>metaAAC0030 AMP48516.1   | msttis.htrsqtwnhinvi trectini syvkavgavyg nailq b<br>mtdsndhl.vrhqqiveeitti taacqivmv asykaigriyg nyvyq b  |
|         | metaAAC0071 AMP57363.1  | mtdsndhl.vrhgolveelett vaacolvmv asvkalgring nvyvo<br>matpserl.irksalktyfsal stacotvml tsvksigwiyd eiyir   |
|         | AAC 3 IIIb $\overline{W}P$ 088170001.1<br>AAC 3 IIIc $WP$ 063840263.1   |  |
| roup 3  | Bosea_lupini_WP_091829703.1   | MTSPPASF.VPASLAADISRI APPDAVMV AAVSKYGRIID DTIIA<br>MTSPPASF.VPRASLAADISRI APPDAVMV AAVSKYGRIID DTIIA  |
|         | P_aeruginosa_WP_042854441.1<br>Rhizobium_etli_WP_039618492.1  |  |
|         | Devosia insulae WP 069908639.1  |  |
|         | Uncultured AAL92107.1<br>metaAAC0038 AIA18843.1   | MTSRV.ATRSSLADDISAT LADGDAVLV AALROVGKIVG DAIID U<br>MSSRV.STRSSLAEDIRAT LADGDAVLV AALRKYGKIVG DDILD U   |
|         | Uncultured AAL92107.1   |  |
|         | Inquilinus limosus WP 026870780.1 metaAAC0032 AIA17598.1  | MEV. TSOAELVAOLRAIS REGGYLLV SFRANREYED LIGILE MKV. TSOAELVAOLRAIS REGGYLLV SFRANREYED LIGILA MKV. TSOAELVAOLRAIS REGGYLLV SFRANREYED LIGILA MKV. TSOAELVAOLRAIS REGGYLLV SFRANREYED LIGILA MKT. TSOUNTED LIGILE REGGYLLV SFRANREYED LIGILE MKTSOUNTED LIGILE MKTSOUNTED LIGILE MKTSOELSOOMESCIRAIS TREGGYLLV SFRANREYED LIGILE MKG. PSVSKVVARLIAIS TREGGYLLV SFRANREYED LIGILE MKG. PSVSKVVARLIAIS TREGGYLLV SFRANREYED LIGILE MKG. PSVSKVVARLIAIS TREGGYLLV SFRANREYED LIGILE MKTSAPGAFSI VUDEKE BODIRTI TEEGTYLLV SFRANREYED LIGILE MKTSAPGAFSI VENEKERSEN TEEGTYLLV SFRANREYED LIGILE MKTSAPGAF VENEKERSEN TEEGTYLLV SFRANREYED LIGILE MEEMSLINHSGEP VENEKERSEN TEEGTYLLV SFRANREYED LIGILE MEEMSLANGE VENEKERSEN TEEGTYN TE |
|         | AAC 3 -IIe WP 163592000.1   |  |
|         | metaAAC0043 ACT97599.1<br>Uncultured AGC09640.1   |  |
|         | AAC 3 VIa 6BC2 WP 063840273.1   | .MTDPRKNGDLHEPATAPATP.WSKSELVRQLRDL YRSCDNVMP VSLRAVGELAD CTLVD  |
|         | Massilia_alkWP_027865365.1<br>Niveispirillum_cyWP_102114653.1   | mrcldl.lrkdittrqtrat frankstmt grandgelad halle b<br>mbskitp.ipraalyrdttnt fygaptymv aslkaygelyid agyve b  |
|         | Hydrogenophaga_sp. WP_086125356.1   | MHTP.LFRDQLVEQLRAL LRSCDTVMV ASLKALGEVQG AADVAH  |
| roup 4  | metaAAC0034_AIA17583.1<br>metaAAC0035_AIA17960.1  |  |
|         | metaAAC0029_AMP47836.1  | M. IGLDQLVDHLQRL YQAGDTIMI ASLKAIGEVYG ASSYVA  |
|         | metaAAC0070_AMP48506.1<br>Ensifer sp. KQW34869.1  |  |
|         | AAC_3_IIg_WP_012695485.1  | M.NPARTTYONERAL TOSUPLENV ASLANICAVED MANUAL M.NETETADLERI YEPGPLIMV ASLKAVGEVEG ARSVVS I M.NETESTPADLEGI YEPGPLIMV ASLKAVGEVEG ARSVVS I   |
|         | AAC 3 IIb WP 033147097.1<br>Sinorhizobium sp.GL2 KSV77101.1   |  |
|         | Sinorhizobium_WP_058327775.1  |  |
|         | AAC_3_IIc_CAA38525.1  |  |
|         | AAC 3 TT= WD 063840264 1  | W HENDE TENT TO THE VICTOR TO THE TARTEST AND THE TOTAL THE TARTEST AND THE TOTAL THE TARTEST AND THE TARTEST  |
|         | AAC 3 IIa WP 063840264.1<br>BA2930 3E4F   | M.HTOKATTEALOKI VOSCOLLMV ASLKSIGEVEG AETVVA I MINDIVASTOLP.NTIKTITNOLKKI KKENTVIV SSLSSIGWISG WANVE   |
|         | AAC 3 IIa WP 063840264.1<br>BA2930 3E4F<br>BSYOKD/2MYG<br>SrFrbF_3SMA   |  |
|         | AAC 3 IIa WP 063840264.1<br>BA2930 3E4F<br>BSYOKD ZNYG<br>SrFrbF_3SMA   |  |
|         | AAC 3 II WP 063840264.1<br>BA2930 3EFF<br>BSYOKD 2NYG<br>SIFINF 3SMA  |  |
|         | AAC 3 IVa WP 063840268.1  |  |
|         | AAC 3 IVa WP 063840268.1<br>S_meliloti_WF 027993499.1   |  |
|         | AAC 3 IVa WP 063840268.1  |  |
|         | AAC 3 IVa WP 063840268.1<br>S meliloti WP 027993499.1<br>Rhodomicrobium WP 088346198.1<br>metaAAC0016 AIA14255.1<br>metaAAC0074 AMP57367.1  |  |
|         | AAC 3 IVa WP 063840268.1<br>S meliloti WP 027993499.1<br>Rhodomicrobium WP 088346198.1<br>metaAAC0016 AIA14255.1<br>metaAAC0074 AMP57367.1<br>Sphingomonas ap. WP 029724114.1<br>metaAAC0018 AIA14757.1   |  |
|         | AAC 3 IVa WP 063840268.1<br>S melīlotī WP 027993499.1<br>Rhodomicrobīum WP 088346198.1<br>metaAAC0016 ATĀ14255.1<br>metaAAC0074 AMP57367.1<br>Sphingomonas sp. WP 029724114.1<br>metaAAC0018 ĀTĀ14757.1<br>Allokutznerīa albata WP 03043120.1   |  |
| roup 1  | AAC 3 IVa WP 063840268.1<br>S meliloti WF 027993499.1<br>Rhodomicrobium WP 088346198.1<br>metaAAC0016 ATA14255.1<br>metaAAC0074 AMP57367.1<br>Sphingomonas sp. WP 029724114.1<br>metaAAC0018 ATA14757.1<br>Allokutzneria albata WP 03043120.1<br>Archangium gephyra WF 047855546.1<br>Cystobacter fuscus WP 043428585.1   |  |
| roup 1  | AAC 3 IVa WP 063840268.1<br>S mellioti WP 027993499.1<br>Rhodomicrobium WP 088346198.1<br>metaAAC0016 ATA14255.1<br>metaAAC0016 ATA14757.1<br>Sphingomonas sp. WP 029724114.1<br>metaAAC0018 ATA14757.1<br>Allokutzneria albata WP 03043120.1<br>Archangium gephyra WP 047855546.1<br>Cystobacter fuscus WP 043428585.1<br>Myxococous fulvus SEUI6843.1   |  |
| roup 1  | AAC 3 IVa WP 063840268.1  S mellictl WP 027993499.1  Rhodomicrobium WP 088346198.1  metaAAC0016 ATA14255.1  metaAAC0016 ATA14757.1  Sphingomonas ap. WP 029724114.1  metaAAC0018 ATA14757.1  Allokutzneria albata WP 03043120.1  Archangium gephyra WP 047855546.1  Cystobacter fuscus WP 043428585.1  Myxococcus fulvus SEUI6843.1  Sorangium cellulosum WP 0498544.1  Sorangium cellulosum WP 0498544.1   |  |
| roup 1  | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 AIĀ14255.1 metaAAC0016 AIĀ14757.1 Sphingomonas sp. WP 029724114.1 metaAAC018 AIĀ14757.1 Allokutznerīa albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum KYF8036.1 Sorangium cellulosum WP 04498544.1 Stigmatelīa aur. WP 013378336.1  |  |
| roup 1  | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 Alāl4255.1 metaAAC0016 Alāl4255.1 Sphingomonas sp. WP 029724114.1 metaAAC018 Alāl4757.1 Allokutznerīa albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum KYF8036.1 Sorangium cellulosum WP 04498544.1 Stigmatelīa aur. WP 013378336.1 Sandaracinus amyī. WP 053233315.1 metaAAC033 Ālāl7596.1  |  |
| roup 1  | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 ATA14255.1 metaAAC0016 ATA14255.1 Sphingomonas sp. WP 029724114.1 metaAAC0018 ATA14757.1 Allokutznerīa albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 04498544.1 Sorangium cellulosum WP 04498544.1 Stigmatelīa aur. WP 013378336.1 Sandaracinus amyl. WP 053233315.1 metaAAC0033 ATA17596.1 metaAAC0032 ATA17596.1   |  |
|         | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 ATA14255.1 metaAAC0016 ATA14757.1 Sphingomonas ap. WP 029724114.1 metaAAC0018 ATA14757.1 Allokutzneria albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus EXUI6843.1 Sorangium cellulosum WF 0438544.1 Sorangium cellulosum WF 0438544.1 Sorangium cellulosum WF 043853.1 Sorangium cellulosum WF 043853.1 sorangium cellulosum WF 043853.1 sorangium cellulosum WF 0438554.1 Sorangium cellulosum WF 043853.1 sorangium cellulosum WF 0438554.1 Sorangium cellulosum WF 043853.1 sorangium cellulosum WF 04385.1 metaAAC0033 ATA17596.1 metaAAC0023 ATA17596.1 metaAAC0022 ATA16407.1 AAC 3 IVA WF 063840272.1  | CONTROL   CONT   |
|         | AAC 3 IVa WP 063840268.1 S meliloti WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 AIA14255.1 metaAAC0016 AIA14255.1 Sphingomonas sp. WP 029724114.1 metaAAC018 AIA14757.1 Allokutzneria albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6643.1 Sorangium cellulosum KYF78036.1 Sorangium cellulosum WF 04498544.1 Stigmatella aur. WP 013378336.1 Sandaracinus amyl. WP 053233315.1 metaAAC0032 AIA17596.1 metaAAC0032 AIA17596.1 metaAAC0022 AIA16407.1 AAC 3 VIIa WP 063840269.1 AAC 3 VIIa WP 063840272.1 AAC 3 VIIa WP 063840272.1  | CONTROL   CONT   |
|         | AAC 3 IVa WP 063840268.1 S mellioti WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 AIA14255.1 metaAAC0016 AIA14255.1 Sphingomonas sp. WP 029724114.1 metaAAC0018 AIA14757.1 Allokutzneria albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 043498544.1 Sorangium cellulosum WF 043498544.1 Stigmatella aur. WP 013378336.1 Sandaracinus amyl. WP 053233315.1 metaAAC0032 AIA16407.1 AAC 3 IVIA WP 063840269.1 AAC 3 VIIa WP 063840269.1 AAC 3 VIIa WP 06384026.1 AAC 3 VIIIa WP 06384026.1 AAC 3 VIIIa WP 06384026.1 AAC 3 IVII WP 06385043.1 AAC 3 IVII WP 06385043.1 AAC 3 IVII WP 06384026.1 AAC 3 IVII WP 06384026.1   | CONTROL   CONT   |
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|         | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobīsum WP 088346198.1 metaAAC0016 ATĀ14755.1 Sphingomonas ap. WP 029724114.1 metaAAC0017 AMP57367.1 Sphingomonas ap. WP 029724114.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEU16843.1 Sorangium cellulosum WF 043428585.1 Sorangium cellulosum WF 043428585.1 Sorangium cellulosum WF 043428585.1 Sorangium cellulosum WF 04383315.1 setaAAC0033 ĀTĀ17596.1 metaAAC0033 ĀTĀ17596.1 metaAAC0033 ĀTĀ17596.1 AAC 3 IVIA WP 063840269.1 AAC 3 VIIA WP 063840272.1 AAC 3 VIIA WP 063840261.1 metaAAC0036 ĀTĀ12232.1 P aeruginosa WF 023911614.1 metaAAC0071 ĀMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 ĀMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 ĀMP57363.1 AAC 3 III WP 063840263.1 Baca 3 III WP 063840263.1 Baca 3 III WP 063840263.1 Baca 3 III WP 063840263.1   | TANALORG   |
| roup 2  | AAC 3 IVa WP 063840268.1  S meliloti WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 ATA14255.1 metaAAC0016 ATA14757.1 Sphingomonas ap. WP 029724114.1 metaAAC0018 ATA14757.1 Allokutzneria albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium_cellulosum WP 043428585.1 Sorangium_cellulosum WF 043428585.1 Sorangium_cellulosum WF 0439534.1 Sorangium_cellulosum WF 78036.1 Sorangium_cellulosum WF 0439534.1 Stigmatella aur. WP 013378336.1 Sandaracinus amyl. WP 0532333315.1 metaAAC0033 ATA17596.1 metaAAC0022 ATA16407.1 AAC 3 IVIA WP 063840269.1 AAC 3 VIIA WP 063840269.1 AAC 3 VIIA WP 063840261.1 metaAAC0036 ATA12232.1 AAC 3 VIII WP 063840261.1 metaAAC0037 AMP48516.1 metaAAC0071 AMP57363.1 AAC 3 III WP 088170001.1 AAC 3 III WP 088170001.1 AAC 3 III WP 08810001.1  | CO   |
| roup 2  | AAC 3 IVa WP 063840268.1  S meliloti WF 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 ATA14255.1 metaAAC0016 ATA14255.1 setanacoule Arabitation of the setanacoule Arabitation of | CO   |
| roup 2  | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobīsum WP 088346198.1 metaAAC0016 ATĀI4755.1 metaAAC0016 ATĀI4755.1 metaAAC0017 AMP57367.1 Sphingomonas ap. WP 029724114.1 metaAAC0018 ATAI4757.1 Allokutzneria albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 0489544.1 Stigmatella aur. WP 013378336.1 Sorangium cellulosum WF 0489544.1 Stigmatella aur. WP 013378336.1 Sandaracinus amyl. WP 053233315.1 metaAAC0033 ATAI7596.1 metaAAC0022 ATAI6407.1 AAC 3 IVA WP 063840272.1 AAC 3 IVIA WP 063840261.1 metaAAC0008 ATAI2232.1 P aeruginosā WP 023911614.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840263.1 Bosea lupini WP 063840263.1 Bosea lupini WP 063840263.1 P aeruginosa WP 042854441.1 Rhizobium etlī WP 039618492.1 Devosia insulae WP 069908639.1 Uncultured AAAP2107.1 metaAAC0038 ATA18843.1 Uncultured AAAP2107.1   | TARALCPG   |
| roup 2  | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobīsum WP 088346198.1 metaAAC0016 ATĀ14755.1 metaAAC0016 ATĀ14755.1 metaAAC0018 ATĀ14757.1 Allokutznerīa albata WP 029724114.1 metaAAC0018 ATĀ14757.1 Allokutznerīa albata WP 047855546.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 043428585.1 Sorangium cellulosum WF 043428585.1 Sorangium cellulosum WF 043233315.1 setaAAC0033 ATĀ17596.7 metaAAC0033 ATĀ17596.7 metaAAC0022 ATĀ16407.1 AAC 3 IVA WP 063840269.1 AAC 3 IVA WP 063840269.1 AAC 3 IVA WP 063886943.1 AAC 3 IIIA WP 0638802161.1 metaAAC0008 ATĀ12232.1 P aeruginosā WP 023911614.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840263.1 Bosea lupini WP 063840263.1 Bosea lupini WP 063840263.1 P aeruginosā WP 042854441.1 Rhizobium etlī WP 063840263.1 Dovosia insulae WP 069908639.1 Uncultured AAAP2107.1 metaAAC0038 ATĀ18843.1 Uncultured AAAP2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATĀ18843.1 Uncultured ĀAAP2107.1 Inquilinus limosus WP 026870780.1  | TRABLEDG TLVMP.SWSGLDDEPEDPATSPVIPDLGVVSIT I LRABLEDG TLVMP.SWSGLDDEPEDPATSPVIPDLGVVSIT I LRABLEDG TLVMP.SWSGLDDEPEDPATSPVIPDLGVVSIT I LRABLEDG DG LLVMP.SWSGLDDEPEDPATTPAGSDLGIVALT I LRABLEDG DG LLVMP.SWSGLDDEPEDPATTPAGSDLGIVALT I LRABLEDG DG LLVMP.SWSGLDDEPEDPATTPAGSDLGIVALT I LRABLEDG CLVMP.SWSGLDDEPEDPATTPAGSDLGIVALT I LRABLEDG CLVMP.SWSGLDDEPEDPATTRAREDLGIVACT I LRABLEDG CLVMP.SWTGDDDLLPDAATTMFSARDLGVVACT I LRABLEDG CLVMP.SATGDDDLLPDAATTMFSARDLGVVACT I LRABLEDG CLVMP.SATGDDDLLPDPTTTANREDLGIVSSL I LRTALESS CLVMP.SMTGGDDDLLPDPTTTANREDLGIVSSL I LRABLEDG CLVMP.TMTDGDDDLLPDPTTTANREDLGIVSSL I LRABLEDG CLVMP.TMTDGESVPDPSTPT.TDMGITAEL I LRABLEDG CLVMP.TMTDGESVPDPSTPT.TDMGITAEL I LRABLEDG CLVMP.TMTDGSSSC CLVMP.STPT.TDMGITAEL I LRABLEDG CLVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TMM.SSSC CLVMP.SMDDSMDDSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TMM.SSSC CLVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TMM.SSSC CLVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TMM.SSSC CLVMP.TMTDGSSSC CLVM   |
| roup 2  | AAC 3 IVa WP 063840268.1  S meliloti WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 ATA14255.1 metaAAC0016 ATA14255.1 setanacoule ATA14757.1 Allokutzneria albata WP 029724114.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 043428585.1 Sorangium cellulosum WF 043428585.1 Sorangium cellulosum WF 043428585.1 Sorangium cellulosum WF 04395544.1 Sorangium cellulosum WF 04395541.3 Sorangium cellulosum WF 04395843.1 Sorangium cellulosum WF 043878336.1 Sandaracinus amy1. WP 053233315.1 metaAAC0032 ATA17596.1 metaAAC0033 ATA17596.1 AAC 3 IVIA WP 063840269.1 AAC 3 VIIA WP 06384027.1 AAC 3 VIIA WP 063840261.1 metaAAC0036 ATA1232.1 P aeruginoza WP 023911614.1 metaAAC0037 AMP48516.1 metaAAC0037 AMP48516.1 metaAAC0037 AMP48516.1 Bosea lupini WP 08817001.1 AAC 3 III WP 068840263.1 Bosea lupini WP 098192703.1 P aeruginoza WP 023916441.1 Rhizobium etli WP 0982703.1 P aeruginoza WP 0289618492.1 Devosia insulae WP 069906639.1 Uncultured AAL92107.1 metaAAC0038 ATA18843.1 Uncultured AAL92107.1 metaAAC0038 ATA18843.1 Uncultured AAL92107.1 metaAAC0038 ATA17598.1 AAC 3 - III WP 026870780.1 metaAAC0038 ATA17598.1 AAC 3 - III WF 058592000.1  | TRABLEDG TLVMP.SWSGLDDEPEDPATSPVIPDLGVVSIT I LRABLEDG TLVMP.SWSGLDDEPEDPATSPVIPDLGVVSIT I LRABLEDG TLVMP.SWSGLDDEPEDPATSPVIPDLGVVSIT I LRABLEDG DG LLVMP.SWSGLDDEPEDPATTPAGSDLGIVALT I LRABLEDG DG LLVMP.SWSGLDDEPEDPATTPAGSDLGIVALT I LRABLEDG DG LLVMP.SWSGLDDEPEDPATTPAGSDLGIVALT I LRABLEDG CLVMP.SWSGLDDEPEDPATTPAGSDLGIVALT I LRABLEDG CLVMP.SWSGLDDEPEDPATTRAREDLGIVACT I LRABLEDG CLVMP.SWTGDDDLLPDAATTMFSARDLGVVACT I LRABLEDG CLVMP.SATGDDDLLPDAATTMFSARDLGVVACT I LRABLEDG CLVMP.SATGDDDLLPDPTTTANREDLGIVSSL I LRTALESS CLVMP.SMTGGDDDLLPDPTTTANREDLGIVSSL I LRABLEDG CLVMP.TMTDGDDDLLPDPTTTANREDLGIVSSL I LRABLEDG CLVMP.TMTDGESVPDPSTPT.TDMGITAEL I LRABLEDG CLVMP.TMTDGESVPDPSTPT.TDMGITAEL I LRABLEDG CLVMP.TMTDGSSSC CLVMP.STPT.TDMGITAEL I LRABLEDG CLVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TMM.SSSC CLVMP.SMDDSMDDSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TMM.SSSC CLVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TMM.SSSC CLVMP.TMTDGSSSC CLVMP.STPT.SGMGITAET I LOAALCPTG.TMM.SSSC CLVMP.TMTDGSSSC CLVM   |
| roup 2  | AAC 3 IVa WP 063840268.1  S melīlotī WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 ATA14255.1 metaAAC0016 ATA14255.1 setaAC0018 ATA14757367.1 Sphingomonas sp. WP 029724114.1 metaAAC0018 ATA14757.1 Allokutznerīa albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WP 04498544.1 Sorangium cellulosum WF 04328585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 043378336.1 Sorangium cellulosum WF 0438233315.1 metaAAC0033 ATA17596.1 metaAAC0022 ATA16407.1 AAC 3 IVIA WP 063840269.1 AAC 3 VIIA WP 063840269.1 AAC 3 VIIA WP 063840261.1 metaAAC008 ATA1232.1 P aeruginosā WP 023911614.1 metaAAC001 AMP57363.1 AAC 3 IVII WP 063840261.1 metaAAC001 AMP57363.1 AAC 3 IVII WP 063840261.1 metaAAC001 AMP57363.1 AAC 3 IVII WP 063840261.1 metaAAC001 AMP57363.1 AAC 3 IVII WP 063840263.1 Bosea lupini WP 081870001.1 AAC 3 IVII WP 063840263.1 Bosea lupini WP 081870001.1 AAC 3 IVII WP 063840263.1 Devosia insulae WP 069908639.1 Uncultured AAL92107.1 InetaAAC0038 ATA1843.1 Uncultured AAL92107.1 metaAAC0038 ATA1843.1 Uncultured ABC908640.1 metaAAC0038 ATA1959.1 AAC 3 - III WP 163592000.1 metaAAC0034 ATA17595.1 AAC 3 - III WP 163592000.1 metaAAC0043 ACT97599.1 Uncultured ASCO9640.1   | CO   |
| roup 2  | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobīsum WP 088346198.1 metaAAC0016 ATĀI 47255.1 metaAAC0016 ATĀI 47255.1 metaAAC0018 ATĀI 47257.1 Sphingomonas ap. WP 029724114.1 metaAAC0018 ĀTĀI 4757. WP 03043120.1 Arlchanglum gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus EXUIG843.1 Sorangium cellulosum WF 044895544.1 Sorangium cellulosum WF 043233355.1 sorangium cellulosum WF 043233355.1 sandaracinus amyl. WP 053233315.1 metaAAC0033 ĀTĀI 7596.7 metaAAC0033 ĀTĀI 7596.7 metaAAC0032 ĀTĀI 4607.1 AAC 3 IVA WP 063840269.1 AAC 3 IVIA WP 063886943.1 AAC 3 IVIA WP 063886943.1 AAC 3 IVIA WP 063886943.1 AAC 3 IIIA WP 063886943.1 AAC 3 IIIA WP 063886021.1 metaAAC0013 ĀMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 ĀMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 ĀMP57363.1 AAC 3 III WP 063840263.1 Bosea lupini WP 09829703.1 P aeruginosa WP 042854441.1 Rhizobium etlī WP 09968492.1 Devosia insulae WP 069908639.1 Uncultured ĀAP2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ĀTĀI8843.1 Uncultured ĀAP2107.1 Inquilinus limosus WP 026870780.1  | CO   |
| roup 2  | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobīsum WP 088346198.1 metaAAC0016 ATĀI4755.1 metaAAC0016 ATĀI4755.1 metaAAC0017 AMP57367.1 Sphingomonas ap. WP 029724114.1 metaAAC0018 ATĀI4757.1 Allokutznerīa albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SzUI6843.1 Sorangium cellulosum WF 048428585.1 Sorangium cellulosum WF 048495544.1 Stigmatelīa aur. WP 013378336.1 Sandaracinus amyl. WP 053233315.1 metaAAC0033 ĀTĀ17596.7 metaAAC0022 ĀTĀI6407.1 AAC 3 IVA WP 063840272.1 AAC 3 IVIA WP 063840261.1 metaAAC0030 ĀMP46516.1 metaAAC0071 ĀMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 ĀMP57363.1 AAC 3 III WP 063840263.1 Bosea lupini WP 09829703.1 P aeruginosa WP 023911614.1 metaAAC0071 ĀMP57363.1 AAC 3 III WP 063840263.1 Bosea lupini WP 09829703.1 P aeruginosa WP 04285441.1 Rhizobium etlī WP 039618492.1 Devosia insulae WP 069908639.1 Uncultured ĀAP2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ĀTĀ18843.1 Uncultured ĀAP2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATĀ18843.1 Uncultured ĀAP2107.1 Inquilinus limosus WP 026870780.1 Massilia alk. WP 027865365.1 Niveispirillum CV, WP 102114653.1   | CO   |
| roup 2  | AAC 3 IVa WP 063840268.1  S melīlotī WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 ATA14255.1 metaAAC0016 ATA14255.1 setaAC0018 ATA14757367.1 Sphingomonas sp. WP 029724114.1 metaAAC0018 ATA14757.1 Allokutznerīa albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WP 04498544.1 Sorangium cellulosum WF 04328585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 043378336.1 Sorangium cellulosum WF 043378336.1 Sandaracinus amyī. WP 0532333315.1 metaAAC0033 ATA17596.1 metaAAC0032 ATA17596.1 metaAAC0022 ATA16407.1 AAC 3 VII WP 063840269.1 AAC 3 VII WP 063840261.1 metaAAC0058 ATA1232.1 P aeruginosa WP 023911614.1 metaAAC0017 AMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840263.1 Bosea lupini WP 091829703.1 P aeruginosa WP 023911614.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840263.1 Bosea lupini WP 091829703.1 P aeruginosa WP 02894441.1 Rhizobium etli WP 039618492.1 Devosia insulae WP 069908639.1 Uncultured AAL92107.1 metaAAC0038 ATA1843.1 Uncultured ABC90640.1 AAC 3 VII WP 063840273.1 metaAAC0038 ATA1598.1 AAC 3 - III WP 163592000.1 metaAAC0043 ACT97599.1 Uncultured AGC09640.1 AAC 3 VIA 6BC2 WP 063840273.1 Massilia alk WP 027865365.1 Niveispirillum cy WP 102114653.1   | CO   |
| roup 2  | AAC 3 IVa WP 063840268.1  S melīlotī WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 ATA14255.1 metaAAC0016 ATA14255.1 Sphingomonas sp. WP 029724114.1 metaAAC0018 ATA14757.1 Allokutzneria albata WP 03043120.1 Archangium gephyta WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 04484584.1 Sorangium cellulosum WF 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 043233315.1 sorangium cellulosum WF 0438233315.1 metaAAC0033 ATA17596.1 metaAAC0022 ATA16407.1 AAC 3 IVA WP 063840269.1 AAC 3 IVIA WP 063840269.1 AAC 3 IVIA WP 063840272.1 AAC 3 VIIA WP 063840261.1 metaAAC0036 ATA16232.1 P aeruginosa WP 023911614.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840263.1 Bosea   Iupinī WP 091829703.1 P aeruginosa WP 042854441.1 Rhizobium etlī WP 039618492.1 Devosia insulae WP 069908639.1 Uncultured AAL92107.1 metaAAC0038 ATA1585.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATA15958.1 AAC 3 III WP 063840263.1 Devosia insulae WP 06908639.1 Uncultured AAL92107.1 metaAAC0038 ATA15598.1 AAC 3 III WP 0638636536.1 Niveispirillum cy WP 102114653.1 Hydrogenophaga sp. WP 068125356.1 metaAAC0034 ATA17588.1 metaAAC0035 ATA17960.1  | CO   |
| roup 2  | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobīum WP 088346198.1 metaAAC0016 ATĀI 4755.1 metaAAC0016 ATĀI 4755.1 metaAAC0018 ATĀI 4755.1 Allokutznerīa albata WP 029724114.1 metaAAC0018 ĀTĀI 4757.4 Allokutznerīa albata WP 029724114.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus EXUIG843.1 Sorangium cellulosum WP 048495544.1 Sorangium cellulosum WP 043233315.1 sorangium cellulosum WP 043233315.1 metaAAC0032 ĀTĀI 47596.1 metaAAC0032 ĀTĀI 4607.1 AAC 3 IVA WP 063840269.1 AAC 3 IVA WP 063840269.1 AAC 3 IVA WP 063840269.1 AAC 3 IVA WP 063840261.1 metaAAC0032 ĀTĀI 232.1 P aeruginosa WP 023911614.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840263.1 Bosea lupini WP 09829703.1 P aeruginosa WP 04285441.1 Rhizobium etlī WP 063840263.1 Bosea lupini WP 09829703.1 P aeruginosa WP 04285441.1 Rhizobium etlī WP 039618492.1 Devosia insulae WP 069908639.1 Uncultured AAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ĀTĀI 588.3 AAC 3 -IIE WP 163592000.1 metaAAC0038 ATĀI 8843.1 Uncultured AAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATĀI 8843.1 Uncultured AAD2107.1 AAC 3 IVA 6BC2 WP 063840273.1 AAC 3 -IIE WP 163592000.1 metaAAC0038 ATĀI 8843.1 Uncultured AAD2107.1 Inquilinus limosus WP 026870780.1 MesaFila Akc WP 063840273.1 AAC 3 -IIE WP 163592000.1 metaAAC0038 ATĀI 588.1 INNeispirillum Cy WP 102114653.1 Hydrogenophaga sp. WP 086125356.1 metaAAC0034 ĀTĀI 758.1 metaAAC0034 ATĀI 758.1 metaAAC0034 ATĀI 758.1 metaAAC0034 ATĀI 758.1   | TARALCPG   TLVMP   SWSG  |
| roup 2  | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobīsum WP 088346198.1 metaAAC0016 ATĀI4755.1 metaAAC0016 ATĀI4755.1 metaAAC0018 ATĀI4755.1 Allokutznerīa albata WP 029724114.1 metaAAC0018 ATĀI4757.1 Allokutznerīa albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 048428585.1 Sorangium cellulosum WF 048428585.1 Sorangium cellulosum WF 04895544.1 Stigmatelīa aur. WP 013378336.1 Sandaracinus amyl. WP 053233315.1 metaAAC0033 ĀTĀ17596.7 metaAAC0022 ĀTĀI6407.1 AAC 3 IVA WP 063840269.1 AAC 3 IVA WP 063840269.1 AAC 3 IVA WP 063840269.1 AAC 3 IVIA WP 063886943.1 AAC 3 IVIA WP 063886943.1 AAC 3 IVIA WP 0638840272.1 P aeruginosā WP 023911614.1 metaAAC001 AMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840263.1 Bosea lupini WP 09829703.1 P aeruginosā WP 04285441.1 Rhizobium etlī WP 039618492.1 Devosia insulae WP 069908639.1 Uncultured AAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATA18843.1 Uncultured AAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATA187960.1 metaAAC0038 ATA187960.1 metaAAC0038 ATA18786.1 metaAAC0034 ATA17788.1 metaAAC0034 ATA17788.1 metaAAC0034 ATA17788.1 metaAAC0034 ATA17788.1 metaAAC0034 ATA17788.1   | CO   |
| roup 2  | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobium WP 088346198.1 metaAAC0016 ATA14255.1 metaAAC0016 ATA14757367.1 Sphingomonas sp. WP 029724114.1 metaAAC0018 ATA14757.1 Allokutzneria albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 0449854.1 Sorangium cellulosum WF 0449854.1 Sorangium cellulosum WF 043933315.1 metaAAC0033 ATA1756.1 metaAAC0022 ATA16407.1 AAC 3 IVA WP 063840269.1 AAC 3 VIIA WP 063840269.1 AAC 3 VIIA WP 063840272.1 AAC 3 VIIA WP 063840261.1 metaAAC0036 ATA1232.1 P aeruginosa WF 02391614.1 metaAAC0071 AMF57363.1 AAC 3 IIIA WF 063840261.1 metaAAC0073 AMF48516.1 metaAAC0073 AMF48516.1 metaAAC0073 AMF57363.1 AAC 3 III WP 063840263.1 Bosea lupini WF 069908639.1 Uncultured AMF2077.1 Rhizobium etlī WF 069908639.1 Uncultured AAT92107.1 Inquilinus limosus WF 06870780.1 AAC 3 VIA GECZ WF 063840273.1 AAC 3  | CO   |
| roup 2  | AAC 3 IVa WP 063840268.1 S melīlotī WP 027993499.1 Rhodomicrobīsum WP 088346198.1 metaAAC0016 ATĀI4755.1 metaAAC0016 ATĀI4755.1 metaAAC0018 ATĀI4755.1 Allokutznerīa albata WP 029724114.1 metaAAC0018 ATĀI4757.1 Allokutznerīa albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus SEUI6843.1 Sorangium cellulosum WF 048428585.1 Sorangium cellulosum WF 048428585.1 Sorangium cellulosum WF 04895544.1 Stigmatelīa aur. WP 013378336.1 Sandaracinus amyl. WP 053233315.1 metaAAC0033 ĀTĀ17596.7 metaAAC0022 ĀTĀI6407.1 AAC 3 IVA WP 063840269.1 AAC 3 IVA WP 063840269.1 AAC 3 IVA WP 063840269.1 AAC 3 IVIA WP 063886943.1 AAC 3 IVIA WP 063886943.1 AAC 3 IVIA WP 0638840272.1 P aeruginosā WP 023911614.1 metaAAC001 AMP57363.1 AAC 3 III WP 063840261.1 metaAAC0071 AMP57363.1 AAC 3 III WP 063840263.1 Bosea lupini WP 09829703.1 P aeruginosā WP 04285441.1 Rhizobium etlī WP 039618492.1 Devosia insulae WP 069908639.1 Uncultured AAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATA18843.1 Uncultured AAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATA187960.1 metaAAC0038 ATA187960.1 metaAAC0038 ATA18786.1 metaAAC0034 ATA17788.1 metaAAC0034 ATA17788.1 metaAAC0034 ATA17788.1 metaAAC0034 ATA17788.1 metaAAC0034 ATA17788.1   | CO   |
| roup 2  | AAC 3 IVa WP 063840268.1  S melīlotī WP 027993499.1 Rhodomicrobīum WP 088346198.1 metaAAC0016 ATĀI 4755.1 metaAAC0016 ATĀI 4755.1 metaAAC0016 ATĀI 4755.1 metaAAC0018 PĀTĀI 4757.1 Allokutzneria albata WP 029724114.1 metaAAC0018 PĀTĀI 4757.1 Allokutzneria albata WP 03043120.1 Archanglum gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxcoccous fulvus EXUI6843.6 Sorangium cellulosum KYF78036.1 Sorangium cellulosum WF 043428585.1 Sorangium cellulosum WF 043233315.1 metaAAC0032 ĀTĀI 7596.1 metaAAC0032 ĀTĀI 7596.7 metaAAC0032 ĀTĀI 407.1 AAC 3 IVA WP 063840269.1 AAC 3 IVI WP 063840272.1 AAC 3 VII WP 063840272.1 AAC 3 VII WP 063840261.1 metaAAC0003 ĀTĀI 753.1 P aeruginosa WP 02891614.1 metaAAC003 AWP48516.1 metaAAC0071 AWP57363.1 AAC 3 III WP 063840263.1 Bosea lupini WP 09817000.1 AAC 3 III WP 063840263.1 Devosia insulae WP 069908639.1 Uncultured AAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ĀTĀI 8843.1 Uncultured ĀAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATĀI 8843.1 Uncultured ĀAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ĀTĀI 8843.1 Uncultured ĀAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ĀTĀI 8843.1 Uncultured ĀAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ĀTĀI 8843.1 Uncultured ĀAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ĀTĀI 8843.1 Uncultured ĀAD2107.1 Inquilinus limosus WP 06830273.1 Massilia alk. WP 027865365.1 Niveispirillum cy WP 102114653.1 Hydrogenophaga sp. WP 086125356.1 metaAAC0038 ĀTĀI 7583.1   | DAALGPG STLVMP. SWSGLDDEPFDPATSPVTPDLGVVSLTT I LRAALGPE SLVMP. SWSGLDDEPFDPATSPVTPDLGVVSLTT I LRAALGPE SLVMP. SWSGLDDEPPDPATSPVTPDLGVVSLTT I LREALGPE SLVMP. SWSGDDDAPPDPTTPAGSDLGUVALL I LREALGPE SLVMP. SWSGDDDAPPDPTTPAGSDLGUVALL I LREALGPE STLVMP. SWSGDDDAPPDPTTPAGSDLGUVALL I LREALGPE STLVMP. SWSGDDDEPDPTTPAGSDLGUVALC I LREALGPE STLAMP. SATGDDDEPDPTTTANREDLGUVALC I LREALGPE STLAMP. SATGDDDEPDPATTANREDLGUVALC I LREALGPE STLAMP. SATGDDDLPDPTTTANREDLGUVALC I LREALGPE STLAMP. SATGDDDLPDPTTTANREDLGUVALC I LREALGE STLAMP. THITDGSESPEDPFSTPT. TDMGTTALL I LREALGE STLAMP. SMAD. SHAD SHAD SHAD SHAD SHAD SHAD SHAD SHAD  |
| roup 2  | AAC 3 IVa WP 063840268.1  S melīlotī WP 027993499.1 Rhodomicrobīum WP 088346198.1 metaAAC0016 ATĀI 4755.1 metaAAC0016 ATĀI 4755.1 metaAAC0016 ATĀI 4755.1 metaAAC0018 PĀTĀI 4757.1 Allokutznerīa albata WP 029724114.1 metaAAC0018 PĀTĀI 4757.1 Allokutznerīa albata WP 03043120.1 Archangium gephyra WP 047855546.1 Cystobacter fuscus WP 043428585.1 Myxococcus fulvus EXUIG843.1 Sorangium cellulosum KYF78036.1 Sorangium cellulosum WP 043233315.1 sorangium cellulosum WP 043233315.1 metaAAC0032 ĀTĀI 47596.1 metaAAC0032 ĀTĀI 4607.1 AAC 3 IVA WP 063840272.1 AAC 3 VII a WP 063840271.1 metaAAC0008 ĀTĀI 232.1 P aeruginosa WP 023911614.1 metaAAC0071 AMP57363.1 AAC 3 III b WP 08817000.1 AAC 3 III b WP 08817000.1 AAC 3 III b WP 08817001.1 AAC 3 III b WP 08817001.1 AAC 3 III b WP 08817001.1 AAC 3 III b WP 08817000.1 MetaAAC0038 ĀTĀI 8843.1 Uncultured AAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATĀI 8843.1 Uncultured ĀAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATĀI 8843.1 Uncultured ĀAD2107.1 Inquilinus limosus WP 026870780.1 metaAAC0038 ATĀI 8843.1 Uncultured ĀAD20107.1 AAC 3 - IIE WP 163592000.1 metaAAC0038 ATĀI 8843.1 Uncultured ĀAD20107.1 MetaAAC0038 ATĀI 7583.1 metaAAC0038 ATĀI 7583.1 metaAAC0038 ATĀI 7583.1 metaAAC0038 ATĀI 7960.1 metaAAC0009 APW 7866.1 Ensifers p. KQWA3469.1 AAC 3 III WP 063840264.1   | TRABALOPG TLVMP.SWSG.  LDDBP#DDATSPVTDLGVVSTT  IRABACOPG TLVMP.SWSG.  LDDBP#DDATTSPXTDLGVVATT  IRABACOPG TLVMP.SWSG.  LDDBP#DDATTSPXTDLGVVATT  IRABACOPG TLVMP.SWTG.  LSVSTDPTSTT.DGWTVATT  IRABACOPG TLVMP.TWTDG.  LSVSTDPTSTT.DGWTVATT  IRABACOPG TLVMP.TWTDG.  LSVSTDPTSTT.DGWTVATT  IRABACOPG TLVMP.TWTDG.  LSVSTDPTSTT.SGWGITATT  IRABACOPG TLVMP.TWTDG.  LSVSTDPTSTT.SGWGITATT  IRABACOPG TLVMP.TWTDG.  LSVSTDPTSTT.DGWGITATT  IRABACOPG TLVMP.TWTDG.  LSVSTDPTSTT.DGWGITATT  IRABACOPG TLVMP.TWTDG.  LSVSTDPTSTT.SGWGITATT  IRABACOPG TLVMP.TWTGGG.  LSVSTDPTSTT.SGWGITATT  IRABACOPG TLVMP.TWTGGGT.SGWGITATT  IRABACOPG TLVMP.TWTGGGTGGGGGGG |
| roup 2  | AAC 3 IVa WP 063840268.1  S melīlotī WP 027993499.1  Rhodomicrobium WP 088346198.1  metaAAC0016 ATA14255.1  metaAAC0016 ATA14757367.1  Sphingomonas sp. WP 029724114.1  metaAAC0018 ATA14757.1  Allokutzneria albata WP 03043120.1  Archangium gephyra WP 047855546.1  Cystobacter fuscus WP 043428585.1  Myxococcus fulvus SEUI6843.1  Sorangium cellulosum WP 04498544.1  Sorangium cellulosum WF 04498544.1  Sorangium cellulosum WF 043833335.1  sorangium cellulosum WF 0583233315.1  metaAAC0033 ATA17596.1  metaAAC0022 ATA16407.1  AAC 3 IVIA WP 063840269.1  AAC 3 IVIA WP 063840269.1  AAC 3 IVIA WP 063840272.1  AAC 3 IVIA WP 063840261.1  metaAAC0036 ATA1232.1  P aeruginosa WF 023911614.1  metaAAC0071 AMP57363.1  AAC 3 III WF 063840261.1  metaAAC0030 AMP48516.1  metaAAC0031 AMP48516.1  metaAAC0031 AMP57363.1  AAC 3 III WP 063840263.1  AAC 3 III WP 063840263.1  Devosia insulae WF 069908639.1  Uncultured AAL92107.1  metaAAC003E ATA18843.1  Uncultured AAL92107.1  metaAAC003E ATA18843.1  Uncultured AAL92107.1  metaAAC003E ATA18843.1  Uncultured AAL92107.1  metaAAC003E ATA17598.1  AAC 3  | TARALIC PG   |

|   | 100                    | 110                        | 120       | 130  | 140                     | 150                | 160   |
|---|------------------------|----------------------------|-----------|--|-------------------------|--------------------|---|
| AAC 3 IVa WP 063840268.1  | WRLPNVK                | RSAHPFA.FA                 | AAGPQAEQ  | IsoplFlpph:  | PASPVARVHE              | TDGQVLLL           | GHDANTT L   |
| S_meliloti_WP_027993499.1   | WRLENVT                | RSDHPFA.FA                 | ATGPLAAF  | trspslplpph:   | APASPIGRIHE:            | LDGOVLLL           | FEHDSDTT L  |
| Rhodomicrobium WP 088346198.1 metaAAC0016 AIA14255.1                    | WRMPGVL                | RSDHPHA.FA                 | AIGPRAAA  | TADPLPLPPH:  | L PASPVGRVHD            | 19991111           | GHDANTT L   |
| metaAAC0016_AIAI4255.1<br>metaAAC0074_AMP57367.1                        | WRLPGVR                | RSDHEHA FA                 | AFGPOAGU  | T T A D P L P L P P H  | PASPVGRVHD              | 114477.7.7.        | GHDANTT L   |
| Sphingomonas sp. WP 029724114.1   | WQQPGVV                | RSAHFDA.VA                 | AIGPÉAEW  | VTADPLPLPPH<br>TADPLPLPPH<br>TGGPFVLPPA<br>TGGPFVVPPA                        | APGSAIDRIRE.            | AGGÕILLL           | GHDANTM L   |
| metaAAC0018_AIA14757.1  | WQQPGVV                | RSAHFDA.VA                 | AVGPMAEW  | I T T G G P F V V P P A I  | APGSAIDRIRE.            | AAGQILLL           | GHDANTM L   |
| Allokutzneria_albata_WP_03043120.1<br>Archangium gephyra WP 047855546.1 | MKOPGVL                | RGDHPTSTFA                 | AVSKYAQF  | LVAPQPLSPPH(<br>LCAPQPLAPPH  | ьковичькунь.            | ####ATTT           | GHDANTT M<br>SHSEDTT L  |
| Cystobacter fuscus WP 043428585.1                                       |                        |                            |           | CAPOP SPPH   |                         |                    | SHGENTT   |
| Myxococcus fulvus SEU16843.1  | WRQPGVV                | RSTHPGGSFA                 | AAGPHAVE  | CRPQPLSPPH(  | PDSPVGQVHA:             | reedviri           | THSEDIT L   |
| Sorangium_cellulosum_KYF78036.1   | WRQPGVL                | RSGHPGGSFA                 | AAGRFAEF  | I CAPQPLSPPH   | SPDSPPGRVHE:            | 14¢\$QVLLL         | THAENTT L   |
| Sorangium cellulosum WP 04498544.1<br>Stigmatella aur. WP 013378336.1   | WRQPGVL                | RSGHPGGSFA                 | AAGPFAEF  | CAPQPLSPPH   | SPDSPPGRVHE.            | 1 4 4 4 A T T T    | THAENTT L   |
| Sandaracinus amyl. WP 053233315.1                                       | WREPGVV                | RSTHPGASFA                 | AEGPOAHA  | CAPOPLSPPH   | VDSPVGRVHE              | Iddavili           | PERSESTT L  |
| $metaAAC0033$ $\overline{A}IA\overline{17596.\overline{1}}$             | WRKEGVL                | RSDHPGGSFA                 | AE GPLAAF | ICEPQPLSPPH<br>ICAPQPLSPPH<br>ICATQPLSPPH<br>ITAPHPVAVPH                     | SQDSPVGRVYE:            | reegarrr           | THSEDIT L   |
| metaAAC0022_AIA16407.1  | WQLPGVR                | RSDSPHA.FA                 | AAGSEAEF  | TAPHPVAVPH   | LDSPPGRVSE.             | APGRALLL           | GHGEDTT I   |
| AAC_3_IXa_WP_063840269.1<br>AAC_3_VIIa_WP_063840272.1                   | RRRPGAV                | RSRHPDASFA                 | AL SPAARE | LMAEHPWDHPH(<br>LTADHPWDDPH  | PDTPLAKLIA.             | M G G B V T. T. T. | PIDIMIL   |
| AAC 3 Xa WP 012377682.1   | RRRPGAV                | RSRHPDVSLA                 | ALGASAPA  | LMDAHPWDDPH  | SPGSPLARLVA:            | LGGRVLLL           | PLEALTL L<br>PROTMIL L  |
| AAC 3 VIIIa WP 063856943.1  | RHOPGAV                | RSRHPDASEV                 | AVEPAAHE  | LMDDHPWDDPH  | PDSPLARLAG.             | AGGRVLLL           | PLDTLTL L   |
| AAC 3 IIIa WP 063840261.1   | RTWPCVH                | RSANPEASMV                 | AVERQAAI  | LTANHALDYGY<br>TTQDHPINYGY   | VESPLAKIVA              | IEGAALWI           | APLDTITL L  |
| metaAAC0008 ATA12232.1<br>P aeruginosa WP 023911614.1                   | RTWPGTH                | RSINPEASIV                 | AT SAUAAS | TODHPI DYGY  | SAGSPLAKIVE             | H R G R V T. M T.  | GHGEDTT I PICTMTI L PICTMTI L PICTMTI L PICTITI L PICTITI L PICTITI L PICTITI L |
| metaAAC0030 AMP48516.1  | RGWPGAR                | RSLNPEASVA                 | AIGARAEW  | TQDHPLDYGY<br>TQDHPLNYGY<br>TNDHSLKYGY<br>FTADHPLDYGY                        | AGSPLEKIVA.             | ARGOVIML           | PLDTLTL L   |
| metaAAC0071_AMP57363.1  | RKW <mark>PGA</mark> K | RSMHPDGSFC                 | ALGKQAFF  | LTNDHSLKYGY  | SVHSPLGKLIA:            | LEGKVVLI           | SPLNNVTL L  |
| AAC 3_IIIb_WP_088170001.1   | RTTPGTL                | RSGNPGASLV                 | ALGAKAEW  | FTADHPLDYGY  | EGSPLAKLVE.             | AGGRYLML           | PINNVTI L LPIOTLTI L LPIOTLTI L LPIOTLTI L LPIOTLTI L LPIOTLTI L                |
| AAC_3_IIIc_WP_063840263.1<br>Bosea_lupini WP_091829703.1                | RTTPGAL                | RSGNPGASIV                 | ALGAKAEW  | FTADHPLDYGY  | SAGSPLAKTUE.            | A G G R A T. M T.  | PIDTLTI L   |
| P aeruginosa WP 042854441.1   | RTTPGAL                | RSGNPGASLV                 | ALGAKAEW  | FTADHPLDYGY  | GAGSPLAKLVE             | GGGKVLML           | PIDTLTI L   |
| Rhizobium_etli_WP_039618492.1   |                        |                            |           | LTADHPLDYGY  |                         |                    | PLDTMTL L   |
| Devosia_insulae_WP_069908639.1<br>Uncultured_AAL92107.1                 |                        |                            |           | FTADHALDYGY<br>FTADHALDYGY   |                         |                    | PLDTMTL L   |
| metaAAC0038 AIA18843.1  |                        |                            |           | FTADHALDYGY  |                         |                    | PLOTMTL L<br>PLOTMTL L  |
| Uncultured AAL92107.1   | RTTPGAL                | RSGSPGASMA                 | ALGGEAEW  | FTADHALDYGY(   | POSPLGKLVE.             | AEGKVLML           | PIDTMTI L   |
| Inquilinus_limosus_WP_026870780.1                                       | RTRPGAR                | RSANPGASFA                 | AVGGRADW  | FTAGHALDYGY  | EQSPFARLVQ.             | ARGKVLML           | PLDAMSI L   |
| metaAAC0032 AIA17598.T<br>AAC 3 -IIe WP 163592000.1                     | RTYPGSR                | VNVHV.ARFV                 | VWEKHTDF  | LTPQPWDYPF(<br>LTEPHELGHAL   | HGSLLERFVE              | pakarrr            | SDHDNVTF L  |
| metaAAC0043 ACT97599.1  | VOAPGAR                | RSAHPDASMV                 | AVEPLANT  | LTEPHEL GHAL   | SEGSPVER EVR            | l da kat. t. t.    | PINSVIAL  |
| Uncultured AGC09640.1   | RTYPGSV                | VNDHV.ARFV                 | VRGRHARE  | LISKQPWDYAF  | KDSALDRFVQ:             | reekirrr           | CDHDNVTF L  |
| AAC_3_VIa_6BC2_WP_063840273.1   | RTYPGCR                | RTAHPDASMA                 | AIGPDAAW  | LVAPHEMGAAY(   | PRSPIARFLA:             | HAGKILSI           | PLNSVTA L PLNSVTA L CHENVTF L GEDAVTA L GEDAVTA L PLDAVTV L                     |
| Massilia alk. WP 027865365.1  | RMHPGCR                | RSAHPDASMA                 | AIGADALW  | VAPHPMDSAY   | GPGSPIERLLH:            | REGNILSI           | GPDAITA L   |
| Niveispirillum_cyWP_102114653.1<br>Hydrogenophaga_sp. WP_086125356.1    | COLPGAV                | RSAHPDANMA                 | AIGAKAHE  | LVTEHELGQAY  | PGSPLERFVO.             | Addovimi           | PIDSVTV L   |
| metaAAC0034_AIA17583.1  | CĞY <mark>PGA</mark> W | RSAHPDASMA                 | AIGPRASE  | LVRPHR GDAY<br>VRPHR GDAY<br>LISPHA GQAF<br>LISPHA GQAF<br>MIEPHV GRAF       | PGSPLERFVŠI             | MRGŘVLML           | APLDAVIV L  |
| metaAAC0035_AIA17960.1  | CGYPGAW                | RSAHPDASMA                 | AIGPRASE  | LVRPHR GDAY  | PGSPLERFVS              | MRGRVLML           | APLDAVTV L  |
| metaAAC0029_AMP47836.1<br>metaAAC0070_AMP48506.1                        | RKWPGAL                | RSGHPDASML                 | AIGAQAEY  | LISPHALGQAF  | PGSPLERFVK              | REKALLI            | PPDAVIV L   |
| Ensifer sp. KQW34869.1  | VDTPDAL                | RSAHPDASMV                 | AVGSLARE  | MIEPHVLGRAF  | OGSPLERFVK              | ROCKVILL           | PPDAVTV L PPDAVTV L PLDAVTV L PLDSVTV L   |
| AAC 3 IIg WP 012695485.1  | LQTPGAR                | RSAHPDASMV                 | AV SPLAG1 | LEKPHELGUAF  | 5 P G \$ P L E K F V E. | качкушьь           | TENTIS ATA P  |
| AAC_3_IIb_WP_033147097.1  | LEAPDAR                | RSAHPDASMV                 | AVGPLAAT  | LTEPHRLGQAL  | EGSPLERFVG              | HGGKVLLL           | PLDSVTV L   |
| Sinorhizobium_sp.GL2_KSV77101.1<br>Sinorhizobium_WP_058327775.1         | VEAPGAR                | RSAHPDASMV<br>DSAHDDASMV   | AVEPLSET  | LIEPHRLGQAL  | INGSPIORFVE             | FRGKVLLL           | PLNSVTA L   |
| AAC 3 IIc CAA38525.1  | VOAPGAR                | RSAHPDASMV                 | AVGPLAET  | LTEPHK GHAL  | EGSPVERFVR              | Iddkalli           | PLNSVTAL  |
| AAC 3 IIa WP 063840264.1  | VQAPGAR                | RSAHPDASMV                 | AVGPLAET  | LTEPHELGHAL  | EGSPNERFVR              | LGGKALLL           | PLNSVTA L   |
| BA2930_3E4F   | RTYPNVV                | RSNHPLGSFA                 | AWGRHAEE  | ITVNQSLSMSL  | SEESPLRK!YD             | T D G A I T T I    | GYDSNTS V   |
| BsYokD_2NYG<br>SrFrbF_3SMA  | RSYPEVK                | RSNHPNYSEV                 | AWSKHKNK  | LLNQHPLEFGLOVVAEHGLTERLO   | SEQSPLGKLYI.            | RESAATTT           | DFDSSTC F   |
| 521251_50m  | nnuonv                 | WOODIT MADE W              |           |  | STORT THE ATE           | THE SERVICE        | - STHONIO E   |
|   |                        |                            |           |  |                         |                    |   |
|   | 17                     |                            | 180       | 190  |                         | 200                | 21 0  |
| AAC 3 IVa WP 063840268.1  | HLAPLMA                | K <mark>VP.</mark> .YGVPR  | HCTILQ.   | GKLVRVDYLENI<br>GKPIRVDYRENI<br>GRALRIDYAENI<br>GQRVQIRYGENI<br>GRAKRIDYGENI | н                       | CCEF               | RFALADRWL K   |
| S meliloti WP 027993499.1   | HLAELIA                | K <mark>VP.</mark> .YGVPR  | HCTVLD.N  | GKPIRVDYR <b>E</b> NI  | H                       | CCQ1               | IFNLADAWL R   |
| Rhodomicrobium WP 088346198.1   | LABLMA                 | GVPYRTPK                   | HCTVLR.E  | GRALRIDYAENI   | ) H                     | CCEF               | RFALADDWL R   |
| metaAAC0016_AIA14255.1<br>metaAAC0074_AMP57367.1                        | HIABLIT                | SVPY, KTESY<br>GVPY, RTPSY | THATE V   | GRAKETDYGENI   | и п                     | CCAF               | REALADIWL G   |
| Sphingomonas sp. WP 029724114.1   | HLAELLG                | GAPYRSDYHY                 | TRA       | GVRV. DYGEN  | s                       | CCE                | (FALADDWL R   |

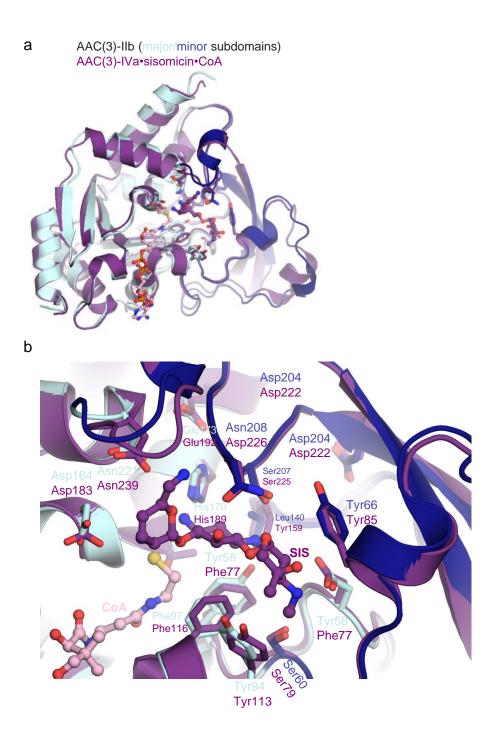
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220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  240
      AAC 3 IVa WP 063840268.1
S_meliloti WF 027993499.1
Rhodomicrobium WP 088346198.1
metaAAC0016 AIRI4255.1
metaAAC0074 AMP57367.1
Sphingompas sn WP 029724114
Smellott WP 027993499.1
Rhodomicrobium WP 088346198.1
metaAAC0017 ANDF57367.1
Sphingomonas sp. WP 029724114.1
metaAAC0018 ATA14757.1
Allokutzneria albata WP 03043120.1
Archangium gephyra WP 047855546.1
Cystobacter fuscus WP 043428595.1
Myxcococus fulvus EVIG484.1
Sorangium cellulosum KYF78036.1
Sorangium cellulosum KYF78036.1
Sorangium cellulosum WP 04498544.1
StigmatelTa aur. WP 013378336.1
Sandaracinus amyl. WP 053233315.1
metaAAC0033 ATA17596.1
metaAAC0033 ATA17596.1
AAC 3 IXA WP 063840269.1
AAC 3 TYLA WP 063840269.1
AAC 3 TYLA WP 063840261.1
metaAAC0030 ATA12232.1
P_aeruginosa WP 029911614.1
metaAAC0007 AMP48516.1
metaAAC007 AMP48516.1
metaAAC0017 AMP57363.1
AAC 3 IIIL WP 063840263.1
Daca 1 IIL WP 088170001.1
AAC 3 IIIL WP 06880263.1
Dosea lupini WP 091829703.1
P aeruginosa WP 042854441.1
Rhizobium etli WP 039618492.1
Devosia insulae WP 069908639.1
Uncultured AAL92107.1
metaAAC0032 ATA175788.1
AAC 3 - IIE WP 063840273.1
Massilia alk. WP 027865365.1
Mssilia alk. WP 027865365.1
Mssilia alk. WP 027865365.1
Mssilia alk. WP 027865365.1
Mstariburd AAC 3 VIG 6BC2 WP 063840273.1
Mstariburd AAC 9 VIG 6BC2 WP 07785.3
Mstariburd AAC 9 VIG 6BC2 WP 07785.3
Mstariburd AAC 9 VIG 6BC2 WP 07785.3
Mstaribur
               SrFrbF_3SMA
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AAC 3 IVA WP 063840268.1

S melīlotī WF 027993499.1
Rhodomicrobīum WP 088346198.1
metaAAC0016 ATRI4255.1
MG...
Sphingomonas sp. WP 029724114.1
metaAAC0018 ATRI4757.1
Allokutznerīa albata WP 03043120.1
Archangium gephyra WP 047855546.1
Cystobacter fuscus WP 043428585.1
Myxococcus fulvus SEUĪ6843.1
Sorangium cellulosum KVF78036.1
Sorangium cellulosum WP 0449854.1
Stigmatelīa aur. WP 013378336.1
Sandaracīnus amyī. WP 0532333315.1
metaAAC0022 ATRI6407.1
AAC 3 IVA WP 053840269.1 Sandaracinus amyl. WP 053233315.1 metaaAc0023 AlA17596.1 metaAAC0022 AlA16407.1 AAC 3 IXA WP 063840269.1 AAC 3 VIIA WP 063840269.1 AAC 3 VIIA WP 063840261.1 AAC 3 VIIA WP 063840272.1 AAC 3 VIIA WP 063856943.1 AAC 3 VIIA WP 063856943.1 AAC 3 VIIA WP 063856943.1 MetaAAC0008 ATA12232.1 Paeruginosa WP 023911614.1 metaAAC0030 AMPA8516.1 metaAAC0071\_AMPS7363.1 AAC 3 IIID WP 088170001.1 Paeruginosa WP 024854441.1 Phizobium etli WP 03829703.1 Paeruginosa WP 042854441.1 Phizobium etli WP 039618492.1 Devosia insulae WP 05908639.1 Uncultured AAL92107.1 metaAAC0038 ATA18843.1 Uncultured AAL92107.1 Inquilinus limosus WP 026870780.1 metaAAC0032 AIA17588.1 AAC 3 --IIe WP 163552000.1 metaAAC0032 AIA17581.1 AAC 3 --IIe WP 163552000.1 metaAAC0043 ACT37599.1 Uncultured AAC0043 ACT37599.1 Uncultured AAC0036 ACT37599.1 Uncultured AAC0037 ACT37599.1 Uncultured AAC0036 ACT37599.1 Uncultured AAC0037 ACT377599.1 Uncultured AAC0037 ACT377599.1 Uncultured AAC0037 ACT377599.1 Uncultured AAC0 BsYokD\_2NYG SrFrbF\_3SMA

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### Supplementary Figure 2 – Structural analysis of Group 4 AAC(3)-IIb vs. AAC(3)-VIa.



a) Superposition of overall structures. b) Zoom of active sites, sisomicin and CoA are shown in ball-and-stick representation.

## Supplementary Table 1. Aminoglycoside susceptibility of $E.\ coli$ harboring Antibiotic\_NAT genes

 $E.~coli~BW25113~\Delta tolC\Delta bamB~$  expressing individual Antibiotic\_NAT genes under the control of the  $P_{bla}$  promoter in vector pGDP3. Shown are MIC values in  $\mu g/mL$  grouped and coloured as in

Figure 2. Raw data used to derive this table is shown in **Supplementary Data 1.** 

Group 1 Meta-Meta-HMB0022 HMB00033 Control AAC(3)-IVa AAC0016 AAC0018 APR 4 > 256 > 256 TOB 0.5 > 256 ≥ 64 > 256 > 256 > 256 **GEN** 0.25-0.5 128-256 ≥ 256 KAN 8 2 128-256 64-128 32 AMI 1-2 1-2 1 1-2 1 1 NEO 64-128 1 64 128 8-16 64-128 **PAR** 2 128 16 64-128 128-256

| (2r       | OH        | n            | 7 |
|-----------|-----------|--------------|---|
| <u>ui</u> | <u>vu</u> | $\mathbf{P}$ | _ |

|     | AAC(3)-<br>VIIa | AAC(3)-<br>VIIIa | AAC(3)-IXa | AAC(3)-Xa |
|-----|-----------------|------------------|------------|-----------|
| APR | ND              | ND               | 4          | 2-4       |
| тов | ND              | ND               | ≤ 0.5      | 16-32     |
| GEN | ND              | ND               | ≤ 0.5      | 8         |
| KAN | ND              | ND               | 2          | 64-128    |
| AMI | ND              | ND               | 1          | 1         |
| NEO | ND              | ND               | 1          | 1         |
| PAR | ND              | ND               | 2          | 4         |

Group 3

|     | Meta-<br>AAC0008 | Meta-<br>AAC0030 | Meta-<br>AAC0038 | Meta-<br>AAC0071 | AAC(3)-IIIa | AAC(3)-IIIc | AAC(3)-IIIb |
|-----|------------------|------------------|------------------|------------------|-------------|-------------|-------------|
| APR | 16-32            | 16               | 32-64            | 4-8              | 8-16        | ND          | 8           |
| тов | > 256            | > 256            | > 256            | > 256            | > 256       | ND          | > 256       |
| GEN | > 256            | > 256            | > 256            | > 256            | > 256       | ND          | > 256       |
| KAN | > 256            | > 256            | > 256            | > 256            | > 256       | ND          | > 256       |
| AMI | 1                | 1-2              | 1-2              | 1-2              | 1           | ND          | 0.5 – 1     |
| NEO | > 256            | 64-128           | 256              | 1                | 128-256     | ND          | 256         |
| PAR | > 256            | > 256            | > 256            | 4                | > 256       | ND          | > 256       |

### Group 4

|     | Meta-<br>AAC0029 | Meta-<br>PAAC0032 | Meta-<br>AAC0035 | Meta-<br>AAC0043 | Meta-<br>AAC0070 | AAC(3)-IIa | AAC(3)-IIb | AAC(3)-IIc | AAC(3)-VIa | Meta-<br>AAC0034 |
|-----|------------------|-------------------|------------------|------------------|------------------|------------|------------|------------|------------|------------------|
|     |                  |                   |                  |                  |                  |            |            |            |            |                  |
| APR | 4                | 2-4               | 8                | 4                | ND               | 8          | 16-32      | 2          | 4          | 8                |
| ТОВ | 64               | 4-8               | > 256            | 32-64            | ND               | > 64       | > 256      | 64 - 128   | 8          | > 256            |
| GEN | > 64             | 64                | > 256            | ≥ 256            | ND               | > 64       | > 256      | > 256      | ≥ 256      | > 64             |
| KAN | 16               | 16-32             | ≥ 256            | 16               | ND               | >64        | > 256      | 32         | 16         | > 256            |
| AMI | 0.5-1            | 1-2               | 1                | 1-2              | ND               | 2          | 1          | 0.5-1      | 1-2        | 1-2              |
| NEO | ≤ 1              | 1                 | 1                | 1                | ND               | 1          | 0.5-1      | 0.5-1      | ≤ 1        | ≤ 1              |
| PAR | 1                | 2                 | 2                | 2-4              | ND               | 2-4        | 1-2        | 0.5-1      | 2          | 1                |

ND = No data.