

**S1 Table. Uniprot ID, class, family and genus for each sequence in clade 1 of the phylogenetic tree in Fig. 2. Uniprot ID's in bold have had their biochemical function confirmed.**

| Uniprot ID    | Class                      | Family                   | Genus              |
|---------------|----------------------------|--------------------------|--------------------|
| A0A023RQI8    | Gammaproteobacteria        | Aeromonadales            | Aeromonas          |
| A0A034T0Y7    | Gammaproteobacteria        | Enterobacteriales        | Edwardsiella       |
| A0A062UCG5    | Alphaproteobacteria        | Rhodobacterales          | Hyphomonas         |
| A0A067Z508    | Alphaproteobacteria        | Rhodospirillales         | Gluconobacter      |
| A0A069PXZ6    | Betaproteobacteria         | Burkholderiales          | Caballeronia       |
| A0A071LXC7    | Gammaproteobacteria        | Enterobacteriales        | Mangrovibacter     |
| A0A075K263    | Gammaproteobacteria        | Xanthomonadales          | Dyella             |
| A0A085A2Q2    | Gammaproteobacteria        | Enterobacteriales        | Trabulsiella       |
| A0A085FZS1    | Gammaproteobacteria        | Enterobacteriales        | Buttiauxella       |
| A0A085GD91    | Gammaproteobacteria        | Enterobacteriales        | Ewingella          |
| A0A085H8Y5    | Gammaproteobacteria        | Enterobacteriales        | Kluyvera           |
| A0A098G881    | Gammaproteobacteria        | Legionellales            | Legionella         |
| A0A0A1VI09    | Betaproteobacteria         | Burkholderiales          | Acidovorax         |
| A0XXD3        | Gammaproteobacteria        | Alteromonadales          | Alteromonadales    |
| A6GNP7        | Betaproteobacteria         | Burkholderiales          | Limnobacter        |
| B1EHK7        | Gammaproteobacteria        | Enterobacteriales        | Escherichia        |
| B1FXN7        | Betaproteobacteria         | Burkholderiales          | Paraburkholderia   |
| B1Y242        | Betaproteobacteria         | Burkholderiales          | Leptothrix         |
| B6ESJ5        | Gammaproteobacteria        | Vibrionales              | Aliivibrio         |
| <b>C1DJH7</b> | <b>Gammaproteobacteria</b> | <b>Pseudomonadales</b>   | <b>Azotobacter</b> |
| C1F830        | Acidobacteriia             | Acidobacteriales         | Acidobacterium     |
| <b>C6C639</b> | <b>Gammaproteobacteria</b> | <b>Enterobacteriales</b> | <b>Dickeya</b>     |
| D2TJX4        | Gammaproteobacteria        | Enterobacteriales        | Citrobacter        |
| D4GGJ4        | Gammaproteobacteria        | Enterobacteriales        | Pantoea            |
| D4I4C0        | Gammaproteobacteria        | Enterobacteriales        | Erwinia            |
| D4Z750        | Alphaproteobacteria        | Sphingomonadales         | Sphingobium        |
| D4ZDH8        | Gammaproteobacteria        | Alteromonadales          | Shewanella         |
| D5RT22        | Alphaproteobacteria        | Rhodospirillales         | Roseomonas         |
| D5VN36        | Alphaproteobacteria        | Caulobacterales          | Caulobacter        |
| E5YMK9        | Gammaproteobacteria        | Enterobacteriales        | Enterobacteriaceae |
| E6VA10        | Betaproteobacteria         | Burkholderiales          | Variovorax         |
| E6WVP8        | Gammaproteobacteria        | Xanthomonadales          | Pseudoxanthomonas  |
| F3KSG2        | Betaproteobacteria         | Burkholderiales          | Hylemonella        |
| F3QLR1        | Betaproteobacteria         | Burkholderiales          | Parasutterella     |
| F3WPG2        | Gammaproteobacteria        | Enterobacteriales        | Shigella           |
| F7J6E9        | Alphaproteobacteria        | Rhodospirillales         | Asaia              |
| F7SZ97        | Betaproteobacteria         | Burkholderiales          | Achromobacter      |
| F8EU29        | Alphaproteobacteria        | Sphingomonadales         | Zymomonas          |
| G0JSC4        | Acidithiobacillia          | Acidithiobacillales      | Acidithiobacillus  |
| G2LTG4        | Gammaproteobacteria        | Xanthomonadales          | Xanthomonas        |
| G4FBH4        | Gammaproteobacteria        | Oceanospirillales        | Halomonas          |
| G8NVC8        | Acidobacteriia             | Acidobacteriales         | Granulicella       |
| G9Y4A6        | Gammaproteobacteria        | Enterobacteriales        | Hafnia             |
| G9Z1B0        | Gammaproteobacteria        | Enterobacteriales        | Yokenella          |
| G9ZV92        | Alphaproteobacteria        | Rhodospirillales         | Acetobacteraceae   |
| H1S6Q5        | Betaproteobacteria         | Burkholderiales          | Cupriavidus        |
| H2FU08        | Gammaproteobacteria        | Aeromonadales            | Oceanimonas        |
| H3N3Q6        | Gammaproteobacteria        | Enterobacteriales        | Klebsiella         |
| H5UZU6        | Gammaproteobacteria        | Enterobacteriales        | Atlantibacter      |

|               |                            |                         |                         |
|---------------|----------------------------|-------------------------|-------------------------|
| H8L5Y7        | Gammaproteobacteria        | Xanthomonadales         | Frateuria               |
| H8NM68        | Gammaproteobacteria        | Enterobacteriales       | Rahnella                |
| I2B429        | Gammaproteobacteria        | Enterobacteriales       | Shimwellia              |
| I3ZBZ8        | Acidobacteriia             | Acidithiobacteriales    | Terriglobus             |
| I7ZEG1        | Gammaproteobacteria        | Nevskiales              | Hydrocarboniphaga       |
| J2ZQA7        | Alphaproteobacteria        | Sphingomonadales        | Novosphingobium         |
| J7L458        | Gammaproteobacteria        | Enterobacteriales       | Pectobacterium          |
| K2J202        | Gammaproteobacteria        | Gallaecimonas           | Gallaecimonas           |
| K8AJK1        | Gammaproteobacteria        | Enterobacteriales       | Cronobacter             |
| K8W9J6        | Gammaproteobacteria        | Enterobacteriales       | Providencia             |
| L0MB51        | Gammaproteobacteria        | Enterobacteriales       | Serratia                |
| N9U5Z5        | Gammaproteobacteria        | Aeromonadales           | Aeromonas               |
| <b>O82859</b> | <b>Alphaproteobacteria</b> | <b>Rhodospirillales</b> | <b>Komagataeibacter</b> |
| <b>P0CW87</b> | <b>Alphaproteobacteria</b> | <b>Rhodospirillales</b> | <b>Komagataeibacter</b> |
| <b>P19449</b> | <b>Alphaproteobacteria</b> | <b>Rhodospirillales</b> | <b>Komagataeibacter</b> |
| <b>P58931</b> | <b>Gammaproteobacteria</b> | <b>Pseudomonadales</b>  | <b>Pseudomonas</b>      |
| Q0BGA2        | Betaproteobacteria         | Burkholderiales         | Burkholderia            |
| Q1LL41        | Betaproteobacteria         | Burkholderiales         | Cupriavidus             |
| Q1Z1Y1        | Gammaproteobacteria        | Enterobacteriales       | Photobacterium          |
| Q2KWQ7        | Betaproteobacteria         | Burkholderiales         | Bordetella              |
| <b>Q59167</b> | <b>Alphaproteobacteria</b> | <b>Rhodospirillales</b> | <b>Komagataeibacter</b> |
| Q5DZ42        | Gammaproteobacteria        | Vibrionales             | Vibrio                  |
| Q7NUL9        | Betaproteobacteria         | Neisseriales            | Chromobacterium         |
| <b>Q9RBJ2</b> | <b>Alphaproteobacteria</b> | <b>Rhodospirillales</b> | <b>Komagataeibacter</b> |
| R5ER77        | Gammaproteobacteria        | Aeromonadales           | Succinatimonas          |
| R5ZZP5        | Environmental Sample       |                         | Proteobacteria          |
| R7C4E5        | Betaproteobacteria         | Burkholderiales         | Sutterella              |
| R8ASE3        | Gammaproteobacteria        | Enterobacteriales       | Plesiomonas             |
| S0DGN1        | Termite Gut metagenome     |                         | termite                 |
| S3JCV4        | Gammaproteobacteria        | Enterobacteriales       | Cedecea                 |
| T0HPV1        | Alphaproteobacteria        | Sphingomonadales        | Novosphingobium         |
| T5KJM8        | Gammaproteobacteria        | Xanthomonadales         | Stenotrophomonas        |
| U1AWG4        | Betaproteobacteria         | Neisseriales            | Pseudogulbenkiana       |
| U1JDB6        | Gammaproteobacteria        | Alteromonadales         | Pseudoalteromonas       |
| U2N5A4        | Gammaproteobacteria        | Enterobacteriales       | Serratia                |
| U2ZIB6        | Gammaproteobacteria        | Pseudomonadales         | Pseudomonas             |
| V1H354        | Gammaproteobacteria        | Enterobacteriales       | Salmonella              |
| V5ULC0        | Betaproteobacteria         | Burkholderiales         | Pandoraea               |
| V6MIR1        | Gammaproteobacteria        | Enterobacteriales       | Proteus                 |
| W0AAD7        | Alphaproteobacteria        | Sphingomonadales        | Sphingomonas            |
| W0HMN9        | Alphaproteobacteria        | Rhizobiales             | Candidatus              |
| W0HSV3        | Gammaproteobacteria        | Enterobacteriales       | Sodalis                 |
| W0LDE9        | Gammaproteobacteria        | Enterobacteriales       | Chania                  |
| W6JCV5        | Gammaproteobacteria        | Enterobacteriales       | Kosakonia               |
| W8TUT1        | Gammaproteobacteria        | Enterobacteriales       | Yersinia                |
| W8X0N1        | Betaproteobacteria         | Burkholderiales         | Castellaniella          |