**Table S10. Strains and plasmids used in this study.**

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| **Bacterial strains** | **Characteristics** | **Reference** |
| *Escherichia coli* 803 | *E. coli* host used for transformation of large plasmids, Met- | Wood (1966) |
| JM101 | *E. coli* host used for transformation of pBluescript and blue-white screening, Thi- | Yanisch-Perron *et al*. (1985) |
| A118 | *E. coli* strain containing chromosomal Tn*5lacZ* insertion, used for transposon mutagenesis; kanr | Simon *et al*. (1989) |
| J521 | *E. coli* wild type strain BW25113 | Baba *et al*. (2006) |
| J522 | KEIO collection mutant in *acuI* of *E. coli* BW25113; kanr | Baba *et al*. (2006) |
| J523 | Rifampicin-resistant derivative of *E. coli* strain J522; rifr | This work |
| J557 | Spectinomycin-resistant *acuI* mutant derivative of *E. coli* strain J521; spcr | This work |
| *Rhizobium leguminosarum* bv. viciae 3841 | Wild type strain; strr | Young *et al*. (2006) |
| *Novosphingobium tardaugens*  ARI-1 | Wild type strain | Fujii *et al*. (2003) |
| *Sinorhizobium fredii* NGR234 | Wild type strain; strr | Trinick (1980) |
| J554 | *S. fredii* NGR234with a mutation in NGR\_c37150 (*vutD*); strr, kanr, spcr | This work |
| J555 | *S. fredii* NGR234with a mutation in NGR\_b20860 (*vutE*); strr, kanr, spcr | This work |
| **Plasmids** |  |  |
| pLAFR3 | Wide host-range cosmid vector used genomic and large insert metagenomic libraries; tetr | Staskawicz *et al.* (1987) |
| pRK2013 | Mobilising plasmid in tri-parental crosses; kanr | Figurski and Helinski (1979) |
| pET21a | Used for expression of cloned genes in *E. coli*; ampr | Novagen |
| pBluescript SK- | Used for expression of cloned genes in *E. coli*; ampr | Agilent |
| pRK415 | Used for expression of cloned genes in *E. coli*; tetr | Keen *et al*. (1988) |
| pCR-XL-TOPO | TA cloning vector used to construct small insert metagenomic libraries; kanr | Invitrogen |
| pHP45Ω | Vector containing the spectinomycin resistance cassette used for mutagenesis of *E. coli acuI* (*yhdH*) in J557; specr | Prentki and Krisch (1984) |
| pBIO1729 | *Halomonas* sp. HTNK1 *acuK* and *acuN* genes cloned in pBluescript; ampr | Todd *et al*. (2010) |
| pBIO1879 | Derivative of pK19*mob*, used to mutagenise *S. fredii* NGR234; kanr, specr | Todd *et al.* (2011) |
| pBIO2011 | *E. coli* BW25113 *yhdH* (*acuI*) gene cloned in pET21a | Todd *et al*. (2012) |
| pBIO2079 | Wastewater treatment plant metagenomic library cosmid containing *acuI*-like gene in pLAFR3; tetr | This work |
| pBIO2081 | Wastewater treatment plant metagenomic library cosmid containing *acuI*-like gene in pLAFR3; tetr | This work |
| pBIO2151 | Cast water biofilm metagenomic library plasmid containing *acuI*-like gene in pCR-XL-TOPO; kanr | This work |
| pBIO2152 | Fly compost metagenomic library plasmid containing *acuI*-like gene in pCR-XL-TOPO; kanr | This work |
| pBIO2153 | Cast water biofilm metagenomic library plasmid containing *acuI*-like gene in pCR-XL-TOPO; kanr | This work |
| pBIO2154 | Cast water biofilm metagenomic library plasmid containing *acuI*-like gene in pCR-XL-TOPO; kanr | This work |
| pBIO2155 | Cast water biofilm metagenomic library plasmid containing *acuI*-like gene in pCR-XL-TOPO; kanr | This work |
| pBIO2160 | Fly compost metagenomic library plasmid containing *arkA* gene in pCR-XL-TOPO; kanr | This work |
| pBIO2167 | *arkA* gene from pBIO2160 subcloned in pBluescript | This work |
| pBIO2170 | *Novosphingobium tardaugens* ARI-1 library cosmid containing *bau*/*vut* genes; tetr | This work |
| pBIO2173 | *S. fredii* NGR\_c37150 (*vutD*) cloned in pBluescript; ampr | This work |
| pBIO2174 | *S. fredii* NGR\_b20860 (*vutE*) cloned in pRK415; ampr | This work |
| pBIO2176 | *S. fredii* NGR\_c37150 (*vutD*) internal fragment cloned in pBIO1879; kanr, spcr | This work |
| pBIO2177 | *S. fredii* NGR\_b20860 (*vutE*) internal fragment cloned in pBIO1879; kanr, spcr | This work |
| pBIO2195 | *Bacillus megaterium* DSM 319 gene BMD\_3924 (*arkA*) cloned in pET21a; ampr | This work |

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