**Table S1** Final growth yields (mean OD540 ± standard deviation) of *S. stellulata* (DSM 5886), *A. crassostreae* (DSM 16950), *A. sediminilitoris* (DSM 29439), *T. aestuarii* (DSM 15283), and *S. marina* (DSM26895) on 2AEP as sole N or P source with corresponding negative and positive controls. All conditions were performed in triplicate.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Organism | +Pi +NH4 | -Pi | -NH4 | 2AEP (P Source) | 2AEP (N Source) |
| ***Alliiroseovarius crassostreae* DSM 16950** | 0.90±0.018 | 0.082±0.012 | 0.013±0.009 | 1.050±0.018 | 0.278±0.008 |
| ***Aliiroseovarius sediminilitoris* DSM 29439** | 1.10±0.037 | 0.108±0.003 | 0.04±0.009 | 0.748±0.019 | 0.344±0.018 |
| ***Shimia marina* DSM 26895** | 1.045±0.020 | 0.157±0.019 | 0.04±0.009 | 0.827±0.013 | 0.290±0.023 |
| ***Thalassobius aestuarii* DSM 15283** | 1.003±0.030 | 0.179±0.052 | 0.005±0.001 | 0.869±0.094 | 0.294±0.005 |
| ***Stappia stellulata* DSM 5886** | 1.01±0.07 | 0.07±0.008 | 0.026±0.004 | 0.98±0.005 | 0.543±0.036 |

**Table S2** Phosphonate transport and catabolism gene complement of strains used in this paper. Strains used for growth curves and/or proteomics are highlighted in bold. + = present, - = absent.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Organism | PhnWAY | PhnWX | PhnJ | PhnY\*Z | AepVWX | PhnCDE | PhnSTUV | AepP |
| ***Alliiroseovarius crassostreae* DSM 16950** | + | - | - | - | + | - | - | - |
| ***Aliiroseovarius sediminilitoris* DSM 29439** | + | - | - | - | + | - | - | - |
| ***Shimia marina* DSM 26895** | + | - | + | - | + | + | - | - |
| ***Thalassobius aestuarii* DSM 15283** | + | - | + | - | + | + | - | - |
| ***Stappia stellulata* DSM 5886** | + | - | + | - | + | + | - | - |
| ***Pseudomonas putida* BIRD-1** | - | + | - | - | + | - | - | + |
| ***Pseudomonas flourescens* SBW25** | - | + | + | - | + | + | - | - |
| *Chitinibacter tainanensis* DSM 15459 | - | + | - | - | + | - | - | - |
| *Paraburkholderia insulsa* LMG 28183 | + | - | + | - | + | + | + | - |
| *Alicycliphilus denitrificans* BC | + | - | - | - | + | - | - | - |
| *Oceanimonas smirnovii* ATCC BAA-899 | - | + | - | - | + | - | - | - |
| *Burkholderia cepacia* RB-39 | + | - | - | - | + | - | + | - |
| *Ruegeria faecimaris* DSM 28009 | + | - | + | - | + | + | - | - |
| *Collimonas fungivorans* Ter331 | + | - | - | - | + | + | - | - |
| *Burkholderia cepacia* GG4 | + | - | - | - | + | - | + | - |
| *Burkholderia territorii* MSMB1499 | + | - | - | - | + | - | + | - |
| *Aeromonas hydrophila* NF1 | - | + | - | - | + | - | - | - |
| *Plesiomonas shigelloides* GN7 | - | + | - | - | + | - | - | - |
| *Variovorax* sp. GV051 | + | + | - | - | + | - | - | - |
| *Sinorhizobium medicae* WSM419 | + | - | + | - | + | + | - | - |
| *Sinorhizobium meliloti* 1021 | + | - | + | - | + | + | - | - |
| *Terasakiella pusilla* DSM 6293 | + | + | - | - | + | - | - | - |
| *Vibrio alginolyticus* NBRC 15630 | - | + | - | - | + | - | - | - |
| *Vibrio diabolicus* CNCM I-1629 | - | + | - | - | + | - | - | - |
| *Vibrio cyclitrophicus* 1F97 | - | + | - | - | + | - | - | - |
| *Arthrobacter* sp. YC-RL1 | + | - | - | - | - | - | - | + |
| *Streptomyces albulus* CCRC 11814 | + | - | - | - | - | - | + | + |
| *Acidobacteriaceae* bacterium S15 | - | + | - | - | - | - | - | + |
| *Roseobacter* sp. MED193 | - | - | + | - | - | + | - | - |
| *Falsirhodobacter* sp. alg1 | - | - | + | - | - | + | - | - |
| *Rhodococcus rhodnii* LMG 5362 | - | - | + | - | - | - | - | + |
| *Rhodococcus fascians* A22b | - | - | - | - | - | - | - | + |
| *Ruegeria pomeroyi* DSS-3 | - | - | + | - | - | + | - | - |
| *Streptomyces sulphureus* L180 | - | - | - | - | - | - | - | + |

**Table S4** List of primers used in this paper.

|  |  |  |
| --- | --- | --- |
| Primer | Sequence | Plasmid |
| AepSTU ArmA\_fwd | attcgagctcggtacccgggCTCGAGGTCACAGTCGATC | pkmob*SacB-aepSTU* |
| AepSTU ArmA\_rev | ggtcatgttaGCGACCTTGTACTTGCCTTTTTC | pkmob*SacB-aepSTU* |
| AepSTU ArmB\_fwd | acaaggtcgcGAAGGTCAAGGCCGACGAAA | pkmob*SacB-aepSTU* |
| AepSTU ArmB\_rev | taaaacgacggccagtgccaACACTGTGCGATGTAGGAGC | pkmob*SacB-aepSTU* |
| PhnWm-ArmA\_fwd | tacgaattcgagctcggtacccgggAGCTACCTCCAGGCGCCC | pkmob*SacB-phnW* |
| PhnWm-ArmA\_rev | accacaccgatacCCCAGGAGCCCCAGTCCA | pkmob*SacB-phnW* |
| PhnWm-ArmB\_fwd | tggggctcctgggGTATCGGTGTGGTCGGGG | pkmob*SacB-phnW* |
| PhnWm-ArmB\_rev | cgttgtaaaacgacggccagtgccaCCGATCTTCAGGCCGCCT | pkmob*SacB-phnW* |
| PhnX\_ArmA\_fwd | tacgaattcgagctcggtacccgggCACTGCACGAAGCACTGC | pkmob*SacB-phnX-gm* |
| PhnX\_ArmA\_rev | ctctagagtcgacATCTGGGTGGGAGCGAATG | pkmob*SacB-phnX-gm* |
| PhnX\_Gent\_fwd  | ctcccacccagatGTCGACTCTAGAGGATCCCCGG | pkmob*SacB-phnX-gm* |
| PhnX\_Gent\_rev | gccggcaaacagtTTGGCCGCGGCGTTGTGA | pkmob*SacB-phnX-gm* |
| PhnX\_ArmB\_fwd  | acgccgcggccaaACTGTTTGCCGGCTCCCG | pkmob*SacB-phnX-gm* |
| PhnX\_ArmB\_rev  | cgacggccagtgccaagcttgcatgGGGCCGGTTGGCCAATTTC  | pkmob*SacB-phnX-gm* |
| AepP\_ArmA\_fwd | ATTCGAGCTCGGTACCCGGGGAACAGCACCAGCAGGATG | pkmob*SacB-aepP* |
| AepP\_ArmA\_rev | CCGTGACGCCCTTGTCGAGCATGAAACCTG | pkmob*SacB-aepP* |
| AepP\_ArmB\_fwd | GCTCGACAAGGGCGTCACGGTGTTCATCG | pkmob*SacB-aepP* |
| AepP\_ArmB\_rev | TAAAACGACGGCCAGTGCCACGGGCCTTTGACCAGCGG | pkmob*SacB-aepP* |
| pBB:AepP\_fwd | gctgcaggaattcgatatcaGCTGCCGTGCACGGCCAC | pBB:*aepP*-km |
| pBB:AepP\_rev | taccgggccccccctcgaggTTAAGTACGCAGTGGCTTGATTGCCATGC  | pBB:*aepP*-km |
| pBB:AepXVWBIRD\_fwd | gctgcaggaattcgatatcaCGGCGCCAGGCCAGGTTG | pBB:*aepXVWBIRD*-km |
| pBB:AepXVWBIRD\_rev | taccgggccccccctcgaggTTACTGCTGGGCCACCTTCTCC | pBB:*aepXVWBIRD*-km |
| pBB:PhnWX\_fwd | ctatagggcgaattggagctGAGCATGGCCTGCGCTTC | pBB:*phnWX*-km |
| pBB:PhnWX\_rev | cgaattcctgcagcccggggCGTTCTAGCTCAGGTTTGTCG | pBB:*phnWX*-km |
| pBB:PhnWprom\_fwd | ctatagggcgaattggagctGAGCATGGCCTGCGCTTC | pBB:*phnWpromX*-km |
| pBB:PhnWprom\_rev | tgtagttcatTCCGTTATTCCTCACAAGCGG | pBB:*phnWpromX*-km |
| pBB:PhnX\_fwd | gaataacggaATGAACTACAACAACCCC | pBB:*phnWpromX*-km |
| pBB:PhnX\_rev | cgaattcctgcagcccggggCGTTCTAGCTCAGGTTTG | pBB:*phnWpromX*-km |
| pBB:AepXprom\_fwd | ccaccgcggtggcggccgctgatttctgctggcttcttcg | pBB:*aepXBIRDpromaepXVWStappia*-km |
| pBB:AepXprom\_rev | ccgttcccatggcatggcctcatcgaag | pBB:*aepXBIRDpromaepXVWStappia*-km |
| pBB:AepXVWStappia\_fwd | aggccatgccatgggaacggtatcaaagactttcggac | pBB:*aepXBIRDpromaepXVWStappia*-km |
| pBB:AepXVWStappia\_rev | cgaattcctgcagcccggggtcagcccggatcgcgctg | pBB:*aepXBIRDpromaepXVWStappia*-km |