##### 5-aminoimidazole ribonucleotide biosynthesis I

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Gene name | EC | *E.coli* MG1655 | *S.mutans* UA159 | *S.pneumonia* Tigr4 |
| *purF* | 2.4.2.14 | + | + | + |
| *purD* | 6.3.4.13 | + | + | + |
| *purN* | 2.1.2.2 | + | + | + |
| *purL* | 6.3.5.3 | + | + | + |
| *PurM* | 6.3.3.1 | + | + | + |

purN, phosphoribosylglycinamide formyltransferase 1.

[an *N*10-formyl-tetrahydrofolate + *N*1-(5-phospho-β-D-ribosyl)glycinamide ↔ a tetrahydrofolate + *N*2-formyl-*N*1-(5-phospho-β-D-ribosyl)glycinamide + H+](http://metacyc.org/META/NEW-IMAGE?type=REACTION&object=GART-RXN)

##### 5-aminoimidazole ribonucleotide biosynthesis II

Not present in S.mutans UA159 and S.pneumonia Tigr4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Gene name | EC | *E.coli* MG1655 | *S.mutans* UA159 | *S.pneumonia* Tigr4 |
| *purF* | 2.4.2.14 | + | + | + |
| *purD* | 6.3.4.13 | + | + | + |
| *purT* | 2.1.2.- | + | - | - |
| *purL* | 6.3.5.3 | + | + | + |
| *PurM* | 6.3.3.1 | + | + | + |

purT, phosphoribosylglycinamide formyltransferase 2.

N1-(5-phospho-β-D-ribosyl)glycinamide + formate + ATP → N2-formyl-N1-(5-phospho-β-D-ribosyl)glycinamide + ADP + phosphate + H+ acetate + ATP ↔ acetyl phosphate + ADP

##### formate reduction to 5,10-methylenetetrahydrofolate

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | EC | *E.coli* MG1655 | *S.mutans* UA159 | | *S.pneumonia* Tigr4 | | |
| *fthS, fhs* | 6.3.4.3 | - | | SMU\_1073 | | SP\_1229 |
| *folD* | 3.5.4.9 | b0529 | | SMU\_572 | | SP\_0825 |
| *folD* | 1.5.1.5 | b0529 | | SMU\_572 | | SP\_0825 |
|  |  |  | |  | |  |

##### glycine biosynthesis I

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | EC | *E.coli* MG1655 | *S.mutans* UA159 | | *S.pneumonia* Tigr4 | | |
| *glyA* | 2.1.2.1 | b2551 | | SMU\_1082 | | SP\_1024 |
|  |  |  | |  | |  |

##### superpathway of L-serine and glycine biosynthesis I

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | EC | *E.coli* MG1655 | *S.mutans* UA159 | | *S.pneumonia* Tigr4 | | |
| *glyA* | 2.1.2.1 | b2551 | | SMU\_1082 | | SP\_1024 |
| *serA* | 1.1.1.95 | b2913 | | SMU\_1653 | | - |
| *serB* | 3.1.3.3 | b4388 | | SMU\_1269 | | WP\_001808482.1 |
| *serC* | 2.6.1.52 | b0907 | | SMU\_1656 | | - |

##### inosine-5'-phosphate biosynthesis I

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | EC | *E.coli* MG1655 | *S.mutans* UA159 | | *S.pneumonia* Tigr4 | | |
| *purK* | 6.3.4.18 | B0522 | | NP\_720534.1 | | WP\_000099054.1 |
| *purE* | 5.4.99.18 | B0523 | | NP\_720533.1 | | WP\_000805601.1 |
| *purC* | 6.3.2.6 | B2476 | | SMU\_29 | | SP\_0044 |
| *purB* | 4.3.2.2 | B1131 | | SMU\_59 | | SP\_0056 |
| *purH* | 2.1.2.3; 3.5.4.10 | B4006 | | SMU\_37 | | SP\_0050 |

##### L-homoserine and L-methionine biosynthesis

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | EC | *E.coli* MG1655 | *S.mutans* UA159 | | *S.pneumonia* Tigr4 | | |
| *metL* | 2.7.2.4; | B3940 | | SMU\_1748 | | SP\_0413 |
| *metL* | 1.1.1.3; | B3940 | | SMU\_965 | | SP\_1361 |
| *asd* | 1.2.1.11 | B3433 | | SMU\_989 | | SP\_1013 |
| *metB* | 2.5.1.48 | B3939 | | SMU\_1675 | | SP\_1525 |
| *metA* | 2.3.1.46 | B4013 | | SMU\_1466 | | SP\_1576 |
| *metC* | 4.4.1.8 | B3008 | | - | | - |
| *malY* | 4.4.1.8 | B1622 | | - | | - |
| *metE(metH)* | 2.1.1.14 | B3829(B4019) | | SMU\_873 | | SP\_0585 |
| *metH* | 2.1.1.13 | B4019 | | SMU\_873 | | SP\_0585 |

##### N10-formyl-tetrahydrofolate biosynthesis

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | | EC | | *E.coli* MG1655 | *S.mutans* UA159 | | | *S.pneumonia* Tigr4 | | | |
| *metH* | | 2.1.1.13 | | B4019  NP\_418443 | | | SMU\_952 | | | SP\_0585 |
| *folM* | | 1.5.1.3 | | B1616  NP\_416123 | | | SMU\_947(*drfA*) | | | SP\_1571 |
| *folA* | | 1.5.1.3 | | B0048  NP\_414590 | | | NP\_721345.1 | | | WP\_000162484.1 |
| *thyA* | | 2.1.1.45 | | B2827  NP\_417304 | | | SMU\_944 | | | SMU\_0669 |
| *glyA* | 2.1.2.1 | | B2551  NP\_417046 | | | SMU\_1082 | | | SP\_1024 | |
| *lpd* | |  | | B0116  NP\_414658 | | | NP\_720603.1 | | | WP\_001162908.1 |
| *gcvP* | |  | | B2903  NP\_417379 | | | - | | | - |
| *gcvH* | |  | | B2904  NP\_417380 | | | - | | | - |
| *gcvT* | |  | | B2905  NP\_417381 | | | - | | | - |
| *metF* | | 1.5.1.20 | | B3941  NP\_418376 | | | SMU\_874  (not ortholog) | | | WP\_000089968.1 |
| *folD* | | 1.5.1.5 | | B0529  NP\_415062 | | | SMU\_572  NP\_721007.1 | | | WP\_000192090.1 |
| *folD* | | 3.5.4.9 | | B0529 | | | SMU\_572 | | | WP\_000192090.1 |
| *fau* | | 6.3.3.2 | | B2912  NP\_417387 | | | SMU\_320 | | | WP\_000834312.1 |
|  | | 6.3.2.12 | | - | | | - | | | SP\_0197  NP\_344737.1 |
|  | | 6.3.2.12 | | - | | | - | | | SP\_0290  NP\_344828.1 |

##### pantothenate and coenzyme A biosynthesis I

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | | EC | | *E.coli* MG1655 | *S.mutans* UA159 | | | *S.pneumonia* Tigr4 | | | |
| *panB* | | 2.1.2.11 | | B0134  NP\_414676 | | | - | | | - |
| *ilvC* | | 1.1.1.169 | | B3774  NP\_418222 | | | NP\_720698.1 | | | WP\_000218054.1 |
| *panE* | | 1.1.1.169 | | B0425  NP\_414959 | | | - | | | - |
| *panC* | | 6.3.2.1 | | B0133  NP\_414675 | | | - | | | - |
| *coaA* | 2.7.1.33 | | B3974  NP\_418405 | | | NP\_721513.1 | | | WP\_000180487.1 | |
| *dfP* | | 6.3.2.5 | | B3639  NP\_418096 | | | NP\_721467.1 | | | WP\_001284128.1 |
| *dfp* | | 4.1.1.36 | | B3639  NP\_418096 | | | NP\_721467.1 | | | WP\_001284128.1 |
| *coaD* | | 2.7.1.3 | | B3634  NP\_418091 | | | NP\_720955.1 | | | WP\_001280753.1 |
| *coaE* | | 2.7.1.24 | | B0103  NP\_414645 | | | NP\_721948.1 | | | WP\_000516207.1 |

##### polymyxin resistance

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | | EC | | *E.coli* MG1655 | *S.mutans* UA159 | | | *S.pneumonia* Tigr4 | | | |
| *amA* | | 1.1.1.305 | | B2255  NP\_416758 | | | - | | | - |
| *amA* | | 2.1.2.13 | | B2255  NP\_416758 | | | - | | | - |
| *amB* | | 2.6.1.87 | | B2253  NP\_416756 | | | - | | | WP\_001134540.1 |
| *amC* | | 2.4.2.53 | | B2254  NP\_416757 | | | - | | | - |
| *amT* | 2.4.2.43 | | B2257  NP\_416760 | | | - | | | - | |

##### pyrimidine deoxyribonucleosides salvage

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | | EC | | *E.coli* MG1655 | *S.mutans* UA159 | | | *S.pneumonia* Tigr4 | | | |
| *cdd* | | 3.5.4.5 | | NP\_416648.1 | | | SMU\_1122  NP\_721509.1 | | | WP\_000246086.1  ?? |
| *kitH* | | 2.7.1.21; 2.7.1.145 | | NP\_415754.1 | | | SMU\_1086  NP\_721478.1 | | | WP\_000068144.1 |
| *thyA* | | 2.1.1.45 | | B2827  NP\_417304 | | | SMU\_944 | | | SP\_0669 |
|  | | 2.7.1.74 | |  | | |  | | |  |
|  |  | |  | | |  | | |  | |

##### pyrimidine deoxyribonucleotides biosynthesis from CTP

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | | EC | | *E.coli* MG1655 | *S.mutans* UA159 | | | *S.pneumonia* Tigr4 | | | |
|  | | 3.6.1.15 | | - | | | - | | | - |
| *nrdG* | | 1.17.4.1 | | NP\_417162.1 | | | SMU\_667  NP\_721095.1 | | | WP\_000451370.1 |
|  | | 1.17.4.1 | | NP\_417161.1 | | | SMU\_668c  NP\_721096.1 | | | WP\_000523249.1 |
|  | | 1.17.4.1 | | - | | | SMU\_991  NP\_721386.1 | | | WP\_001196049.1 |
|  | 3.6.1.6 | | - | | | - | | | - | |
| *comEB* | **3.5.4.12** | |  | | | **SMU\_1849**  **NP\_722165.1** | | | **WP\_000136976.1** | |
| *thyA* | | 2.1.1.45 | | B2827  NP\_417304 | | | SMU\_944 | | | SP\_0669 |
| *kthY* | 2.7.4.9; 2.7.4.12; 2.7.4.13 | | NP\_415616.1 | | | SMU\_1663  NP\_721996.1 | | | WP\_000033362.1 | |
| *ndK* | 2.7.4.6 | | NP\_417013.1 | | |  | | | WP\_000438289 | |

##### pyrimidine deoxyribonucleotides de novo biosynthesis I

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | | EC | | *E.coli* MG1655 | *S.mutans* UA159 | | | *S.pneumonia* Tigr4 | | | |
| *nrdA* | | 1.17.4.1 | | B2234  NP\_416737 | | | - | | | - |
| *nrdB* | | 1.17.4.1 | | B2235  NP\_416738 | | | - | | | - |
| *ndk* | | 2.7.4.6 | | B2518  NP\_417013 | | | - | | | WP\_000438289.1 |
| *nudL* | | 3.6.1.19; 3.6.1.23 | | B2251  NP\_416754 | | | - | | | - |
| *dut* | 3.6.1.19; 3.6.1.23 | | B3640  NP\_418097 | | | NP\_720778.1 | | | WP\_000701992.1 | |
| *mazG* | 3.6.1.19; 3.6.1.23 | | B2781  NP\_417261 | | | - | | | - | |
| *thyA* | | 2.1.1.45 | | B2827  NP\_417304 | | | SMU\_944 | | | SP\_0669 |
| *tmk* | 2.7.4.9; 2.7.4.12; 2.7.4.13 | | B1098  NP\_415616 | | | NP\_721996.1 | | | WP\_000033362.1 | |

##### pyrimidine deoxyribonucleotides de novo biosynthesis II

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | | EC | | *E.coli* MG1655 | *S.mutans* UA159 | | | *S.pneumonia* Tigr4 | | | |
| *nrdD* | | 1.17.4.2 | | B4238 | | | SMU\_991 | | | SP\_0202 |
| *dcd* | | 3.5.4.13 | | B2065 | | | - | | | SP\_0744(Not ortholog) |
| *nudL* | | 3.6.1.19; 3.6.1.23 | | B2251  NP\_416754 | | | - | | | - |
| *dut* | 3.6.1.19; 3.6.1.23 | | B3640  NP\_418097 | | | NP\_720778.1 | | | WP\_000701992.1 | |
| *mazG* | 3.6.1.19; 3.6.1.23 | | B2781  NP\_417261 | | | - | | | - | |
| *thyA* | | 2.1.1.45 | | B2827  NP\_417304 | | | SMU\_944 | | | SMU\_0669 |
| *tmk* | 2.7.4.9; 2.7.4.12; 2.7.4.13 | | B1098  NP\_415616 | | | NP\_721996.1 | | | WP\_000033362.1 | |
|  |  | |  | | |  | | |  | |

##### S-adenosyl-L-methionine cycle I

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gene name | | EC | | | *E.coli* MG1655 | | *S.mutans* UA159 | | | | *S.pneumonia* Tigr4 | | | | |
| *metK* | | 2.5.1.6 | | | B2942 | | | | SMU\_1573 | | | | SP\_0762 | |
|  | | 2.1.1.- | | |  | | | |  | | | |  | |
| *mtn* | | 3.2.2.9 | | | B0159  NP\_414701 | | | | SMU\_1632(pfs)  NP\_721966.1 | | | | SP\_0991  WP\_000689766.1 | |
| *luxS* | 4.4.1.21 | | | B2687 | | | | SMU\_474 | | | | SP\_0340 | | |
| *metE(metH)* | | | 2.1.1.14 | | | B3829(B4019) | | | | SMU\_873 | | | | SP\_0585 |
| *metH* | | | 2.1.1.13 | | | B4019 | | | | SMU\_952 | | | | SP\_0585 |