

Supplementary Table 1. List of genes used to construct the species tree.

| COG | Name | Functional Category | Description |
|------------|-------------|----------------------------|---|
| 20 | UppS | I | Undecaprenyl pyrophosphate synthase [Lipid metabolism] |
| 30 | KsgA | J | Dimethyladenosine transferase (rRNA methylation) [Translation, ribosomal structure and biogenesis] |
| 48 | RpsL | J | Ribosomal protein S12 [Translation, ribosomal structure and biogenesis] |
| 51 | RpsJ | J | Ribosomal protein S10 [Translation, ribosomal structure and biogenesis] |
| 52 | RpsB | J | Ribosomal protein S2 [Translation, ribosomal structure and biogenesis] |
| 60 | IleS | J | Isoleucyl-tRNA synthetase [Translation, ribosomal structure and biogenesis] |
| 80 | RplK | J | Ribosomal protein L11 [Translation, ribosomal structure and biogenesis] |
| 86 | RpoC | K | DNA-directed RNA polymerase, beta' subunit/160 kD subunit [Transcription] |
| 87 | RplC | J | Ribosomal protein L3 [Translation, ribosomal structure and biogenesis] |
| 88 | RplD | J | Ribosomal protein L4 [Translation, ribosomal structure and biogenesis] |
| 89 | RplW | J | Ribosomal protein L23 [Translation, ribosomal structure and biogenesis] |
| 90 | RplB | J | Ribosomal protein L2 [Translation, ribosomal structure and biogenesis] |
| 92 | RpsC | J | Ribosomal protein S3 [Translation, ribosomal structure and biogenesis] |
| 97 | RplF | J | Ribosomal protein L6P/L9E [Translation, ribosomal structure and biogenesis] |
| 98 | RpsE | J | Ribosomal protein S5 [Translation, ribosomal structure and biogenesis] |
| 102 | RplM | J | Ribosomal protein L13 [Translation, ribosomal structure and biogenesis] |
| 103 | RpsI | J | Ribosomal protein S9 [Translation, ribosomal structure and biogenesis] |
| 124 | HisS | J | Histidyl-tRNA synthetase [Translation, ribosomal structure and biogenesis] |
| 172 | SerS | J | Seryl-tRNA synthetase [Translation, ribosomal structure and biogenesis] |
| 177 | Nth | L | Predicted EndoIII-related endonuclease [DNA replication, recombination, and repair] |
| 193 | Pth | J | Peptidyl-tRNA hydrolase [Translation, ribosomal structure and biogenesis] |
| 194 | Gmk | F | Guanylate kinase [Nucleotide transport and metabolism] |
| 195 | NusA | K | Transcription elongation factor [Transcription] |
| 197 | RplP | J | Ribosomal protein L16/L10E [Translation, ribosomal structure and biogenesis] |
| 198 | RplX | J | Ribosomal protein L24 [Translation, ribosomal structure and biogenesis] |
| 199 | RpsN | J | Ribosomal protein S14 [Translation, ribosomal structure and biogenesis] |
| 200 | RplO | J | Ribosomal protein L15 [Translation, ribosomal structure and biogenesis] |
| 201 | SecY | U | Preprotein translocase subunit SecY [Intracellular trafficking and secretion] |
| 203 | RplQ | J | Ribosomal protein L17 [Translation, ribosomal structure and biogenesis] |
| 211 | RpmA | J | Ribosomal protein L27 [Translation, ribosomal structure and biogenesis] |
| 216 | PrfA | J | Protein chain release factor A [Translation, ribosomal structure and biogenesis] |
| 222 | RplL | J | Ribosomal protein L7/L12 [Translation, ribosomal structure and biogenesis] |
| 228 | RpsP | J | Ribosomal protein S16 [Translation, ribosomal structure and biogenesis] |
| 238 | RpsR | J | Ribosomal protein S18 [Translation, ribosomal structure and biogenesis] |
| 244 | RplJ | J | Ribosomal protein L10 [Translation, ribosomal structure and biogenesis] |
| 256 | RplR | J | Ribosomal protein L18 [Translation, ribosomal structure and biogenesis] |
| 268 | RpsT | J | Ribosomal protein S20 [Translation, ribosomal structure and biogenesis] |
| 275 | MraW | M | Predicted S-adenosylmethionine-dependent methyltransferase involved in cell envelope biogenesis |
| 285 | FolC | H | Folypolyglutamate synthase [Coenzyme metabolism] |
| 292 | RplT | J | Ribosomal protein L20 [Translation, ribosomal structure and biogenesis] |
| 313 | YraL | R | Predicted methyltransferases [General function prediction only] |
| 319 | YbeY | R | Predicted metal-dependent hydrolase [General function prediction only] |
| 335 | RplS | J | Ribosomal protein L19 [Translation, ribosomal structure and biogenesis] |
| 336 | TrmD | J | tRNA-(guanine-N1)-methyltransferase [Translation, ribosomal structure and biogenesis] |
| 354 | YgfZ | R | Predicted aminomethyltransferase related to GcvT [General function prediction only] |
| 359 | RplI | J | Ribosomal protein L9 [Translation, ribosomal structure and biogenesis] |
| 360 | RpsF | J | Ribosomal protein S6 [Translation, ribosomal structure and biogenesis] |
| 361 | InfA | J | Translation initiation factor 1 (IF-1) [Translation, ribosomal structure and biogenesis] |
| 445 | GidA | D | NAD/FAD-utilizing enzyme apparently involved in cell division [Cell division and chromosome partitioning] |
| 481 | LepA | M | Membrane GTPase LepA [Cell envelope biogenesis, outer membrane] |
| 482 | TrmU | J | Predicted tRNA(5-methylaminomethyl-2-thiouridylate) methyltransferase [Translation, ribosomal struct.] |
| 486 | ThdF | R | Predicted GTPase [General function prediction only] |
| 495 | LeuS | J | Leucyl-tRNA synthetase [Translation, ribosomal structure and biogenesis] |

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| 504 | PyrG | F | CTP synthase (UTP-ammonia lyase) [Nucleotide transport and metabolism] |
| 522 | RpsD | J | Ribosomal protein S4 and related proteins [Translation, ribosomal structure and biogenesis] |
| 525 | ValS | J | Valyl-tRNA synthetase [Translation, ribosomal structure and biogenesis] |
| 532 | InfB | J | Translation initiation factor 2 (IF-2; GTPase) [Translation, ribosomal structure and biogenesis] |
| 533 | QRI7 | O | Metal-dependent proteases with possible chaperone activity [Posttranslational modification, chaperones] |
| 536 | Obg | R | Predicted GTPase [General function prediction only] |
| 539 | RpsA | J | Ribosomal protein S1 [Translation, ribosomal structure and biogenesis] |
| 571 | Rnc | K | dsRNA-specific ribonuclease [Transcription] |
| 592 | DnaN | L | DNA polymerase sliding clamp subunit (PCNA homolog) [DNA replication, recombination, and repair] |
| 691 | SmpB | O | tmRNA-binding protein [Posttranslational modification, protein turnover, chaperones] |
| 707 | MurG | M | UDP-N-acetylglucosamine:LPS N-acetylglucosamine transferase [Cell envelope biogenesis] |
| 751 | GlyS | J | Glycyl-tRNA synthetase, beta subunit [Translation, ribosomal structure and biogenesis] |
| 771 | MurD | M | UDP-N-acetylmuramoylalanine-D-glutamate ligase [Cell envelope biogenesis, outer membrane] |
| 806 | RimM | J | RimM protein, required for 16S rRNA processing [Translation, ribosomal structure and biogenesis] |
| 812 | MurB | M | UDP-N-acetylmuramate dehydrogenase [Cell envelope biogenesis, outer membrane] |
| 816 | YqgF | L | Predicted endonuclease involved in recombination (possible Holliday junction resolvase) [DNA recomb.] |
| 849 | FtsA | D | Actin-like ATPase involved in cell division [Cell division and chromosome partitioning] |
| 858 | RbfA | J | Ribosome-binding factor A [Translation, ribosomal structure and biogenesis] |
| 1185 | Pnp | J | Polyribonucleotide nucleotidyltransferase (polynucleotide phosphorylase) [Translation, ribosomal] |
| 1207 | GlmU | M | N-acetylglucosamine-1-phosphate uridyltransferase [Cell envelope biogenesis, outer membrane] |
| 1214 | YeaZ | O | Inactive homolog of metal-dependent proteases, putative molecular chaperone [Posttrans./chaperones] |
| 1825 | RplY | J | Ribosomal protein L25 (general stress protein Ctc) [Translation, ribosomal structure and biogenesis] |
| 1841 | RpmD | J | Ribosomal protein L30/L7E [Translation, ribosomal structure and biogenesis] |
| 1862 | YajC | U | Preprotein translocase subunit YajC [Intracellular trafficking and secretion] |
| 1932 | SerC | HE | Phosphoserine aminotransferase [Coenzyme metabolism / Amino acid transport and metabolism] |
| 1949 | Orn | A | Oligoribonuclease (3'->5' exoribonuclease) [RNA processing and modification] |
| 2924 | YggX | S | Uncharacterized protein conserved in bacteria [Function unknown] |
