

Table S7. Genes of *Trv. frisius* DSM111777^T, *Trv. winogradskyi* DSM 6702^T, *Trv. litoralis* 06511^T involved in sulfur metabolism annotated through KEGG, RAST, and manually. (1/3)

Gene	Description	KEGG code	<i>Trv. frisius</i> 006511 ^T	<i>Trv. winogradskyi</i> DSM 6702 ^T	<i>Trv. litoralis</i> stain 970 ^T
<i>2Fe-2S iron-sulfur cluster</i>	2Fe-2S iron-sulfur cluster binding domain protein	-	Thiofri_01465	Thiowin_02587	Thiosp_03924
<i>ABC transporter</i>	ABC transporter, substrate-binding protein, aliphatic sulfonates family	-	Thiofri_02470	-	-
<i>aprM</i>	adenylylsulfate reductase, putative membrane anchor	-	Thiofri_03809	Thiowin_00432	Thiosp_01612
<i>aprB</i>	adenylylsulfate reductase, subunit B	K00395	Thiofri_03808	Thiowin_00433	Thiosp_01613
<i>aprA</i>	adenylylsulfate reductase, subunit A	K00394	Thiofri_03807	Thiowin_00434	Thiosp_01614
<i>Arylsulfatase</i>	Arylsulfatase	-	Thiofri_02489	-	Thiosp_04764
<i>atsA 1</i>	Arylsulfatase	-	Thiofri_01662	Thiowin_01532	Thiosp_03518
<i>atsA 2</i>	Arylsulfatase	-	Thiofri_02024	Thiowin_04338	Thiosp_04768
<i>atsA 3</i>	Arylsulfatase precursor	-	Thiofri_02494	-	-
<i>atsB</i>	Anaerobic sulfatase-maturing enzyme	-	Thiofri_03176	-	-
<i>bchL</i>	ferredoxin:protochlorophyllide reductase, Fe-S ATP-binding protein	-	Thiofri_04154	Thiowin_00758	Thiosp_00715
<i>bcr 1</i>	Sulfonamide resistance protein	-	Thiofri_03590	Thiowin_00679	Thiosp_00849
<i>bcr 2</i>	Sulfonamide resistance protein	-	-	-	Thiosp_02057
<i>chuR</i>	Anaerobic sulfatase-maturing enzyme	-	Thiofri_01670	-	-
<i>cysA 1</i>	Sulfate/thiosulfate import ATP-binding protein	K02045	Thiofri_01536	Thiowin_04178	Thiosp_02421
<i>cysA 2</i>	Sulfate/thiosulfate import ATP-binding protein	-	Thiofri_02713	-	-
<i>cysC</i>	Adenylyl-sulfate kinase	-	-	Thiowin_00440	Thiosp_02505
<i>cysE</i>	serine O-acetyltransferase	K00640	Thiofri_04252	Thiowin_00261	Thiosp_00506
<i>cysH 1</i>	Phosphoadenosine phosphosulfate reductase	-	-	Thiowin_04141	Thiosp_02726
<i>cysH 2</i>	Phosphoadenosine phosphosulfate reductase	-	-	Thiowin_04146	-
<i>ddhA</i>	Dimethylsulfide dehydrogenase subunit alpha precursor	-	-	-	Thiosp_04187
<i>disulfide bond B</i>	disulfide bond formation protein B	-	-	Thiowin_01987	-
<i>dsbA 1</i>	Thiol:disulfide interchange protein precursor	-	Thiofri_00685	Thiowin_01988	Thiosp_01192
<i>dsbA 2</i>	Thiol:disulfide interchange protein precursor	-	Thiofri_03576	Thiowin_02628	Thiosp_04608
<i>dsbB</i>	Disulfide oxidoreductase	-	Thiofri_00683	-	Thiosp_04609
<i>dsbC</i>	Thiol:disulfide interchange protein precursor	-	Thiofri_02780	Thiowin_01861	Thiosp_02390
<i>dsbD 1</i>	Thiol:disulfide interchange protein precursor	-	Thiofri_01064	Thiowin_00530	Thiosp_00809
<i>dsbD 2</i>	Thiol:disulfide interchange protein precursor	-	Thiofri_03598	Thiowin_01631	Thiosp_01176
<i>dsrA</i>	dissimilatory sulfite reductase alpha subunit	K11180	Thiofri_03979	Thiowin_00378	Thiosp_04058
<i>dsrB</i>	dissimilatory sulfite reductase beta subunit	K11181	Thiofri_03978	Thiowin_00379	Thiosp_04057
<i>dsrC</i>	Intracellular sulfur oxidation protein	-	Thiofri_03977	Thiowin_00380	Thiosp_04056
<i>dsrE</i>	Putative sulfurtransferase	-	Thiofri_03977	Thiowin_00380	Thiosp_04056
<i>dsrF</i>	Intracellular sulfur oxidation protein	-	Thiofri_03976	Thiowin_00381	Thiosp_04055
<i>dsrH</i>	Intracellular sulfur oxidation protein	-	Thiofri_03974	Thiowin_00383	Thiosp_04053
<i>dsrM</i>	Intracellular sulfur oxidation protein	-	Thiofri_03972	Thiowin_00385	Thiosp_04051
<i>dsrK</i>	Intracellular sulfur oxidation protein	-	Thiofri_03971	Thiowin_00386	Thiosp_04050
<i>dsrL</i>	Intracellular sulfur oxidation protein	-	Thiofri_03970	Thiowin_00387	Thiosp_04049
<i>dsrJ</i>	Intracellular sulfur oxidation protein	-	Thiofri_03969	Thiowin_00388	Thiosp_04048
<i>dsrO</i>	Intracellular sulfur oxidation protein	-	Thiofri_03968	Thiowin_00389	Thiosp_04047
<i>dsrP</i>	Intracellular sulfur oxidation protein	-	Thiofri_03967	Thiowin_00390	Thiosp_04046
<i>dsrN</i>	Intracellular sulfur oxidation protein	-	Thiofri_03966	Thiowin_00391	Thiosp_04045
<i>dsrR</i>	Intracellular sulfur oxidation protein	-	Thiofri_03965	Thiowin_00392	Thiosp_04044
<i>dsrS</i>	Intracellular sulfur oxidation protein	-	Thiofri_03964	Thiowin_00393	Thiosp_04043
<i>erpA 1</i>	Iron-sulfur cluster insertion protein ErpA	-	Thiofri_01419	Thiowin_00786	Thiosp_01240
<i>erpA 2</i>	Iron-sulfur cluster insertion protein ErpA	-	Thiofri_01422	Thiowin_00789	Thiosp_01243
<i>fccB 1</i>	Sulfide dehydrogenase [flavocytochrome c] flavoprotein chain precursor	K17229	Thiofri_00955	Thiowin_03811	Thiosp_00360
<i>fccB 2</i>	Sulfide dehydrogenase [flavocytochrome c] flavoprotein chain precursor	K17229	Thiofri_04639	Thiowin_04304	Thiosp_00839
<i>fccB 3</i>	Sulfide dehydrogenase [flavocytochrome c] flavoprotein chain precursor	K17229	-	Thiowin_04954	Thiosp_01680
<i>fccA</i>	cytochrome subunit of sulfide dehydrogenase	K17230	Thiofri_04640	Thiowin_03812 Thiowin_04953	Thiosp_00359 Thiosp_00840 Thiosp_01681
<i>Formylglycine-generating sulfatase enzyme</i>	Formylglycine-generating sulfatase enzyme	-	Thiofri_01195	-	-
<i>frdB</i>	Fumarate reductase iron-sulfur subunit	-	Thiofri_02433	Thiowin_02199	Thiosp_02570
<i>glpE 1</i>	Thiosulfate sulfurtransferase	-	-	Thiowin_01009	Thiosp_00285
<i>glpE 2</i>	Thiosulfate sulfurtransferase	-	-	Thiowin_04777	Thiosp_03227
<i>Glycolipid sulfotransferase 1</i>	Glycolipid sulfotransferase	-	Thiofri_03329	Thiowin_01553	Thiosp_03079
<i>Glycolipid sulfotransferase 2</i>	Glycolipid sulfotransferase	-	Thiofri_02084	-	-
<i>Glycolipid sulfotransferase 3</i>	Glycolipid sulfotransferase	-	Thiofri_03154	-	-
<i>Glycolipid sulfotransferase 4</i>	Glycolipid sulfotransferase	-	Thiofri_03431	-	-
<i>hip</i>	High-potential iron-sulfur protein precursor	-	Thiofri_01507	Thiowin_03612	Thiosp_02354

Table S7. (continued 2/3)

Gene	Description	KEGG code	Trv. <i>frisius</i> 006511 ^T	Trv. <i>winogradskyi</i> DSM 6702 ^T	Trv. <i>litoralis</i> stain 970 ^T
<i>Fe-S cluster repair di-iron protein</i>	iron-sulfur cluster repair di-iron protein	-	-	-	Thiosp_01675
<i>iscA</i>	Iron-sulfur cluster assembly protein	-	Thiofri_04618	Thiowin_05010	Thiosp_00251
<i>metA</i>	homoserine O-succinyltransferase/O-acetyltransferase	K00651	Thiofri_03616	Thiowin_04204	Thiosp_01598
<i>metZ</i>	O-succinylhomoserine sulphydrylase	K10764	Thiofri_02417	Thiowin_01920	Thiosp_02563
<i>moaD</i>	Sulfur carrier protein	-	Thiofri_02058	Thiowin_03805	Thiosp_02808
<i>moeZ 1</i>	putative adenyltransferase/sulfurtransferase	-	Thiofri_01145	Thiowin_03616	Thiosp_01781
<i>moeZ 2</i>	putative adenyltransferase/sulfurtransferase	-	Thiofri_01505	Thiowin_03952	Thiosp_01810
<i>moeZ 3</i>	putative adenyltransferase/sulfurtransferase	-	Thiofri_01904	Thiowin_04257	Thiosp_02523
<i>moeZ 4</i>	putative adenyltransferase/sulfurtransferase	-	Thiofri_03751	-	Thiosp_03134
<i>moeZ 5</i>	putative adenyltransferase/sulfurtransferase	-	-	-	Thiosp_03275
<i>msrA 1</i>	Peptide methionine sulfoxide reductase	-	Thiofri_04119	Thiowin_04189	Thiosp_00058
<i>msrA 2</i>	Peptide methionine sulfoxide reductase	-	Thiofri_04910	Thiowin_04645	Thiosp_01071
<i>msrB</i>	Peptide methionine sulfoxide reductase	-	Thiofri_02674	Thiowin_01774	Thiosp_03006
<i>nifS</i>	Cysteine desulfurase	-	Thiofri_03253	Thiowin_02439	-
<i>petA</i>	Ubiquinol-cytochrome c reductase iron-sulfur subunit	-	Thiofri_00562	Thiowin_01122	Thiosp_00461
<i>phsC</i>	thiosulfate reductase cytochrome b subunit	K08354	Thiofri_01459	Thiowin_02593	Thiosp_03930
<i>pspE</i>	Thiosulfate sulfurtransferase PspE precursor	-	Thiofri_04596	-	-
<i>psrA</i>	Sulfur reductase chain A	-	Thiofri_00885	-	-
<i>isomerase 1</i>	Protein-disulfide isomerase	-	-	-	Thiosp_02174
<i>isomerase 2</i>	Protein-disulfide isomerase	-	-	-	Thiosp_03113
<i>putative iron-sulfur cluster-binding protein</i>	putative iron-sulfur cluster-binding protein	-	-	-	Thiosp_01691
<i>cysZ</i>	putative sulfate transport protein	-	Thiofri_02456	-	Thiosp_00022
<i>putative sulfate transporter</i>	putative sulfate transporter	-	Thiofri_04214	Thiowin_04056	Thiosp_00922
<i>putative sulfate transporter</i>	putative sulfate transporter	-	Thiofri_02282	Thiowin_03509	Thiosp_03919
<i>putative sulfate transporter</i>	putative sulfate transporter	-	-	-	Thiosp_04749
<i>dndC</i>	putative sulfurtransferase	-	-	-	Thiosp_02750
<i>sqrD</i>	sulfide:quinone oxidoreductase	K17218	Thiofri_01966	Thiowin_01274	Thiosp_02348
<i>sqrF</i>	sulfide:quinone oxidoreductase	K17218	Thiofri_02206	Thiowin_02851	Thiosp_01541
<i>soeA</i>	sulfite dehydrogenase (quinone) subunit A	K21307	Thiofri_03816	Thiowin_04202	Thiosp_01600
<i>soeB</i>	sulfite dehydrogenase (quinone) subunit B	K21308	Thiofri_03815	Thiowin_04201	Thiosp_01601
<i>soeC</i>	sulfite dehydrogenase (quinone) subunit C	K21309	Thiofri_03814	Thiowin_04200	Thiosp_01602
<i>soxA</i>	L-cysteine S-thiosulfotransferase	K17222	-	-	Thiosp_02372
<i>soxX</i>	L-cysteine S-thiosulfotransferase	K17223	-	-	Thiosp_02371
<i>soxB</i>	S-sulfosulfanyl-L-cysteine sulfohydrolase	K17224	-	-	Thiosp_02368
<i>SoxY</i>	sulfur oxidation protein	K17226	Thiofri_04248	Thiowin_00257	Thiosp_00502
<i>soxZ</i>	sulfur-oxidizing protein	K17227	Thiofri_04249	Thiowin_00258	Thiosp_00503
<i>redox-active disulfide protein 2</i>	redox-active disulfide protein 2	-	Thiofri_01884	Thiowin_00948	Thiosp_04292
<i>redox-active disulfide protein 2</i>	redox-active disulfide protein 2	-	Thiofri_03863	Thiowin_02022	-
<i>resA</i>	Thiol-disulfide oxidoreductase	-	Thiofri_01233	Thiowin_02240	Thiosp_01220
<i>rhdA</i>	Thiosulfate sulfurtransferase	-	-	Thiowin_01548	-
<i>sat</i>	Sulfate adenyltransferase	K00958	Thiofri_03810	Thiowin_00431	Thiosp_01611
<i>sdhC</i>	Succinate dehydrogenase	-	Thiofri_03070	Thiowin_01091	Thiosp_03026
<i>sdhD</i>	Succinate dehydrogenase	-	Thiofri_03071	Thiowin_01092	Thiosp_03027
<i>sdhA</i>	Succinate dehydrogenase	-	Thiofri_03072	Thiowin_01093	Thiosp_03028
<i>sdhB</i>	Succinate dehydrogenase iron-sulfur subunit	-	Thiofri_03073	Thiowin_01094	Thiosp_03029
<i>sgpA 1</i>	Sulfur globule protein CV1 precursor	-	Thiofri_01608	Thiowin_00268	-
<i>sgpA 2</i>	Sulfur globule protein CV1 precursor	-	Thiofri_04295	Thiowin_02802	-
<i>sseA</i>	3-mercaptopyruvate sulfurtransferase	-	Thiofri_01914	-	-
<i>iron-sulfur subunit reductase 1</i>	succinate dehydrogenase/fumarate reductase iron-sulfur subunit	-	Thiofri_03972	Thiowin_00540	Thiosp_01888
<i>iron-sulfur subunit reductase 2</i>	succinate dehydrogenase/fumarate reductase iron-sulfur subunit	-	Thiofri_02925	Thiowin_03147	-
<i>suFe 1</i>	Cysteine desulfuration protein	-	Thiofri_00626	Thiowin_00610	Thiosp_00250
<i>suFe 2</i>	Cysteine desulfuration protein	-	Thiofri_04617	Thiowin_05011	Thiosp_04458
<i>Sulfite exporter TauE/SafE</i>	Sulfite exporter	-	Thiofri_02039	Thiowin_03913	Thiosp_01779
<i>Sulfotransferase domain protein</i>	Sulfotransferase domain protein	-	Thiofri_00084	Thiowin_00890	Thiosp_00745
<i>Sulfotransferase domain protein</i>	Sulfotransferase domain protein	-	Thiofri_03647	-	Thiosp_01275
<i>Sulfotransferase domain protein</i>	Sulfotransferase domain protein	-	Thiofri_03635	-	Thiosp_01307
<i>Sulfotransferase domain protein</i>	Sulfotransferase domain protein	-	Thiofri_00082	-	-
<i>Sulfotransferase domain protein</i>	Sulfotransferase domain protein	-	Thiofri_03646	-	-
<i>Sulfotransferase family protein</i>	Sulfotransferase family protein	-	Thiofri_01058	Thiowin_04831	Thiosp_00805
<i>Sulfotransferase family protein</i>	Sulfotransferase family protein	-	Thiofri_04087	-	-
<i>Sulfur oxygenase reductase</i>	Sulfur oxygenase reductase	-	-	-	Thiosp_00861
<i>TusD/DsrE 1</i>	sulfur relay protein	-	-	Thiowin_02441	-
<i>TusD/DsrE 2</i>	sulfur relay protein	-	-	Thiowin_02484	-
<i>TusE/DsrC/DsvC</i>	sulfur relay protein, TusE/DsrC/DsvC family	-	-	Thiowin_03470	-
<i>thiF</i>	Sulfur carrier protein ThiS adenyltransferase	-	Thiofri_03134	Thiowin_01051	-

Table S7. (continued 3/3)

Gene	Description	KEGG code	Trv. <i>frisius</i> 006511 ^T	Trv. <i>winogradskyi</i> DSM 6702 ^T	Trv. <i>litoralis</i> stain 970 ^T
<i>thiol-disulfide oxidoreductase</i>	thiol-disulfide oxidoreductase	-	Thiofri_04208	Thiowin_04049	Thiosp_00810
<i>thiol-disulfide oxidoreductase</i>	thiol-disulfide oxidoreductase	-	-	-	Thiosp_00929
<i>thiosulfate reductase cytochrome B subunit</i>	thiosulfate reductase cytochrome B subunit	-	Thiofri_01577	Thiowin_02836	Thiosp_02858
<i>thiosulfate reductase cytochrome B subunit</i>	thiosulfate reductase cytochrome B subunit	-	Thiofri_01459	Thiowin_02593	Thiosp_03930
<i>thiosulfate sulfurtransferase</i>	thiosulfate sulfurtransferase	-	Thiofri_01783	Thiowin_02412	Thiosp_03786
<i>thiosulfate sulfurtransferase</i>	thiosulfate sulfurtransferase	-	-	-	Thiosp_04325
<i>ttrB</i>	tetrathionate reductase subunit B	K08358	Thiofri_03969	Thiowin_00388	Thiosp_04048
<i>tusA</i>	Sulfurtransferase	-	Thiofri_03750	Thiowin_02127	Thiosp_03274
<i>tusE 1</i>	Sulfurtransferase	-	Thiofri_02930	Thiowin_00374	Thiosp_00391
<i>tusE 2</i>	Sulfurtransferase	-	Thiofri_03019	Thiowin_00383	Thiosp_01069
<i>tusE 3</i>	Sulfurtransferase	-	Thiofri_03974	Thiowin_01425	Thiosp_01672
<i>tusE 4</i>	Sulfurtransferase	-	Thiofri_03983	Thiowin_01970	Thiosp_03114
<i>tusE 5</i>	Sulfurtransferase	-	-	Thiowin_01971	Thiosp_03194
<i>tusE 6</i>	Sulfurtransferase	-	-	Thiowin_01990	Thiosp_03228
<i>tusE 7</i>	Sulfurtransferase	-	-	Thiowin_03145	Thiosp_03279
<i>tusE 8</i>	Sulfurtransferase	-	-	Thiowin_03310	Thiosp_03380
<i>tusE 9</i>	Sulfurtransferase	-	-	Thiowin_03810	Thiosp_04053
<i>tusE 10</i>	Sulfurtransferase	-	-	-	Thiosp_04063
<i>ydeM 1</i>	Anaerobic sulfatase-maturing enzyme	-	-	Thiowin_01440	Thiosp_03823
<i>ydeM 2</i>	Anaerobic sulfatase-maturing enzyme	-	-	-	Thiosp_04706
<i>ydeM 3</i>	Anaerobic sulfatase-maturing enzyme	-	-	-	Thiosp_04736

Table S8. Hydrogenases related genes of *Thiorhodovibrio* spp.

Gene	Description	Trv. <i>frisius</i> 006511 ^T	Trv. <i>winogradskyi</i> DSM 6702 ^T	Trv. <i>litoralis</i> stain 970 ^T
<i>Coenzyme F420b</i>	Reducing hydrogenase, subunit beta	Thiofri_01984	Thiowin_01243	Thiosp_02229
<i>Coenzyme F420a</i>	Reducing hydrogenase, alpha subunit	Thiofri_02317	Thiowin_01546	Thiosp_02302
<i>hndA</i>	NADP-reducing hydrogenase subunit HndA	Thiofri_01447	Thiowin_02604	Thiosp_03940
<i>hndC</i>	NADP-reducing hydrogenase subunit HndC	Thiofri_01446	Thiowin_02605	Thiosp_03941
<i>hndD</i>	NADP-reducing hydrogenase subunit HndC	Thiofri_01445	Thiowin_02607	Thiosp_03943
<i>hoxG</i>	Uptake hydrogenase large subunit	-	Thiowin_04278	Thiosp_04182
<i>hoxH</i>	NAD-reducing hydrogenase HoxS subunit beta	Thiofri_01443	Thiowin_02609	Thiosp_03945
<i>hoxK 1</i>	Uptake hydrogenase small subunit precursor	Thiofri_00584	Thiowin_00538	Thiosp_01890
<i>hoxK 2</i>	Uptake hydrogenase small subunit precursor	Thiofri_02923	Thiowin_03149	Thiosp_04181
<i>hoxK 3</i>	Uptake hydrogenase small subunit precursor	-	Thiowin_04277	-
<i>hoxY</i>	NAD-reducing hydrogenase HoxS subunit delta	Thiofri_01444	Thiowin_02608	Thiosp_03944
<i>hupC 1</i>	Putative Ni/Fe-hydrogenase B-type cytochrome subunit	Thiofri_00586	Thiowin_04279	Thiosp_04183
<i>hupC 2</i>	Putative Ni/Fe-hydrogenase B-type cytochrome subunit	Thiofri_00605	Thiowin_04325	Thiosp_04453
<i>hyaB 1</i>	Hydrogenase-1 large chain	Thiofri_00585	Thiowin_00541	Thiosp_01887
<i>hyaB 2</i>	Hydrogenase-1 large chain	Thiofri_02926	Thiowin_03146	Thiosp_02759
<i>hyaC</i>	Putative Ni/Fe-hydrogenase 1 B-type cytochrome subunit	Thiofri_02696	Thiowin_03157	Thiosp_02350
<i>hybB</i>	Putative Ni/Fe-hydrogenase 2 b-type cytochrome subunit	Thiofri_01455	Thiowin_02597	Thiosp_03934
<i>hybC 1</i>	Hydrogenase-2 large chain precursor	Thiofri_01454	Thiowin_02598	Thiosp_03935
<i>hybC 2</i>	Hydrogenase-2 large chain precursor	-	-	Thiosp_04191
<i>hybD 1</i>	Hydrogenase 2 maturation protease	Thiofri_00587	Thiowin_02599	Thiosp_03936
<i>hybD 2</i>	Hydrogenase 2 maturation protease	Thiofri_00608	Thiowin_04280	Thiosp_04184
<i>hybD 3</i>	Hydrogenase 2 maturation protease	Thiofri_01221	-	-
<i>hybD 4</i>	Hydrogenase 2 maturation protease	Thiofri_01453	-	-
<i>hybO</i>	Hydrogenase-2 small chain precursor	Thiofri_01457	Thiowin_02595	Thiosp_03932
<i>hydrogenase 3</i>	Hydrogenase 3 maturation protease	Thiofri_01442	Thiowin_02610	Thiosp_03946
<i>hydrogenase</i>	Hydrogenase assembly chaperone	Thiofri_04418	Thiowin_00323	-
<i>hydrogenase</i>	Hydrogenase nickel incorporation protein	Thiofri_04882	-	Thiosp_00099
<i>hyfB 1</i>	Hydrogenase-4 component B	Thiofri_04365	Thiowin_00048	Thiosp_00423
<i>hyfB 2</i>	Hydrogenase-4 component B	Thiofri_04366	Thiowin_01315	Thiosp_00424
<i>hyfB 3</i>	Hydrogenase-4 component B	Thiofri_04367	Thiowin_01316	Thiosp_00425
<i>hyfB 4</i>	Hydrogenase-4 component B	-	Thiowin_01317	-
<i>hynB1</i>	Periplasmic [NiFe] hydrogenase small subunit 1 precursor	-	-	Thiosp_02758
<i>hypA</i>	Hydrogenase/urease nickel incorporation	-	Thiowin_04705	-
<i>hypB</i>	Hydrogenase isoenzymes nickel incorporation	Thiofri_04923	Thiowin_04659	Thiosp_00072
<i>hypC 1</i>	Hydrogenase isoenzymes formation protein	Thiofri_02316	Thiowin_01241	Thiosp_03280
<i>hypC 2</i>	Hydrogenase isoenzymes formation protein	-	-	Thiosp_04364
<i>hypD</i>	Hydrogenase expression/formation protein	Thiofri_02315	Thiowin_01240	Thiosp_03281
<i>hypE</i>	Hydrogenase expression/formation protein	Thiofri_02314	Thiowin_01239	Thiosp_03282
<i>Ni/Fe-hydrogenase</i>	<i>b</i> -type cytochrome subunit	-	Thiowin_02554	-
<i>Soluble hydrogenase</i>	42 kDa subunit	Thiofri_03672	-	-

Table S9. Genes of *Trv. frisius* DSM111777^T, *Trv. winogradskyi* DSM 6702^T, *Trv. litoralis* 06511^T involved in carbon metabolism annotated through KEGG online database.

Gene	Description	KO code	<i>Trv. frisius</i> 006511 ^T	<i>Trv. winogradskyi</i> DSM 6702 ^T	<i>Trv. litoralis</i> stain 970 ^T
<i>IDH1, IDH2, icd</i>	isocitrate dehydrogenase	K00031	Thiofri_01855	Thiowin_01731	Thiosp_03395
<i>sdhA, frdA</i>	succinate dehydrogenase flavoprotein subunit	K00239	Thiofri_02434, Thiofri_03072	Thiowin_01093, Thiowin_02200	Thiosp_02571, Thiosp_03028
<i>sdhB, frdB</i>	succinate dehydrogenase iron-sulfur subunit	K00240	Thiofri_02433, Thiofri_03073	Thiowin_01094	Thiosp_02570, Thiosp_03029
<i>sdhC, frdC</i>	succinate dehydrogenase cytochrome b subunit	K00241	Thiofri_03070	Thiowin_01091	Thiosp_03026
<i>sdhD, frdD</i>	succinate dehydrogenase membrane anchor subunit	K00242	Thiofri_03071	Thiowin_01092	Thiosp_03027
<i>metF, MTHFR</i>	methylenetetrahydrofolate reductase (NADH)	K00297	Thiofri_04212	Thiowin_04055	Thiosp_00923
<i>ackA</i>	acetate kinase	K00925	Thiofri_02256	Thiowin_03935	Thiosp_03554
<i>ppdK</i>	pyruvate, orthophosphate dikinase	K01006	Thiofri_02310	Thiowin_01234	Thiosp_03286
<i>pps, ppsA</i>	pyruvate, water dikinase	K01007	Thiofri_04696	Thiowin_03492, Thiowin_04722	Thiosp_04666
<i>fold</i>	methylenetetrahydrofolate dehydrogenase (NADP+)	K01491	Thiofri_02694	Thiowin_01484	Thiosp_02352
<i>ppc</i>	phosphoenolpyruvate carboxylase	K01595	Thiofri_01788	Thiowin_02645	Thiosp_01620
<i>fumA, fumB</i>	fumarate hydratase, class I	K01676	Thiofri_01973	Thiowin_01540	Thiosp_02230
<i>ACO, acnA</i>	aconitate hydratase	K01681	Thiofri_04001	Thiowin_04240	Thiosp_01407
<i>acs</i>	acetyl-CoA synthetase	K01895	Thiofri_03923	Thiowin_02135	Thiosp_03629
<i>sucD</i>	succinyl-CoA synthetase alpha subunit	K01902	Thiofri_04775	Thiowin_05000	Thiosp_00129
<i>sucC</i>	succinyl-CoA synthetase beta subunit	K01903	Thiofri_04776	Thiowin_05001	Thiosp_00130
<i>accC</i>	acetyl-CoA carboxylase, biotin carboxylase subunit	K01961	Thiofri_03602	Thiowin_01627	Thiosp_01172
<i>accA</i>	acetyl-CoA carboxylase carboxyl transferase subunit alpha	K01962	Thiofri_01789	Thiowin_02644	Thiosp_01621
<i>accD</i>	acetyl-CoA carboxylase carboxyl transferase subunit beta	K01963	Thiofri_02412	Thiowin_01915	Thiosp_02558
<i>accB, bccP</i>	acetyl-CoA carboxylase biotin carboxyl carrier protein	K02160	Thiofri_03601	Thiowin_01628	Thiosp_01173
<i>por, nifJ</i>	pyruvate-ferredoxin/flavodoxin oxidoreductase	K03737	Thiofri_01572	Thiowin_02842	Thiosp_01649
<i>pta</i>	phosphate acetyltransferase	K13788	Thiofri_02257	Thiowin_03934	Thiosp_03553
<i>maeB</i>	malate dehydrogenase	K00029	Thiofri_04337	Thiowin_00275	Thiosp_00363
<i>GAPDH, gapA</i>	glyceraldehyde 3-phosphate dehydrogenase	K00134	Thiofri_01882, Thiofri_03859, Thiofri_04206	Thiowin_02026, Thiowin_04047	Thiosp_00075, Thiosp_00931
<i>tktA, tktB</i>	transketolase	K00615	Thiofri_04207	Thiowin_01514, Thiowin_03464, Thiowin_04048	Thiosp_00930, Thiosp_03193
<i>prkB</i>	phosphoribulokinase	K00855	Thiofri_00011	Thiowin_00010	Thiosp_00011
<i>pgk</i>	phosphoglycerate kinase	K00927	Thiofri_04204	Thiowin_04046	Thiosp_00932
<i>ppdK</i>	pyruvate, orthophosphate dikinase	K01006	Thiofri_02310	Thiowin_01234	Thiosp_03286
<i>ppc</i>	phosphoenolpyruvate carboxylase	K01595	Thiofri_01788	Thiowin_02645	Thiosp_01620
<i>rbcL, cbbL</i>	ribulose-bisphosphate carboxylase large chain	K01601	Thiofri_00013, Thiofri_03064, Thiofri_04982	Thiowin_00012, Thiowin_01572, Thiowin_01759, Thiowin_04628	Thiosp_00041, Thiosp_00266, Thiosp_03020
<i>rbcS, cbbS</i>	ribulose-bisphosphate carboxylase small chain	K01602	Thiofri_03063	Thiowin_01760	Thiosp_03019
<i>xfp, xpk</i>	xylulose-5-phosphate/fructose-6-phosphate phosphoketolase	K01621	Thiofri_01636, Thiofri_02580	Thiowin_01664, Thiowin_03240	Thiosp_01912
<i>fbaA</i>	fructose-bisphosphate aldolase, class II	K01624	Thiofri_04202	Thiowin_04044	Thiosp_00934
<i>rpe</i>	ribulose-phosphate 3-epimerase	K01783	Thiofri_03927	Thiowin_03832	Thiosp_03736
<i>tpiA</i>	triosephosphate isomerase (TIM)	K01803	Thiofri_03015	Thiowin_01864	Thiosp_03325
<i>rpiA</i>	ribose 5-phosphate isomerase A	K01807	Thiofri_04351	Thiowin_01330	Thiosp_00410
<i>fbp</i>	fructose-1,6-bisphosphatase I	K03841	Thiofri_03755	Thiowin_04261	Thiosp_01574

Table S10. Genes of *Trv. frisiaus* DSM 111777^T, *Trv. winogradskyi* DSM 6702^T, *Trv. litoralis* 06511^T involved in nitrogen metabolism annotated through KEGG online database and Geneious.

Gene	Description	KEGG code	<i>Trv. frisiaus</i> 006511 ^T	<i>Trv. winogradskyi</i> DSM 6702 ^T	<i>Trv. litoralis</i> stain 970 ^T
<i>Hydrolase</i>	ADP-ribosyl-[dinitrogen reductase] hydrolase	-	-	-	Thiosp_02089
<i>can</i>	carbonic anhydrase	K01673	Thiofri_02566, Thiofri_02875	-	Thiosp_04803
<i>cah</i>	carbonic anhydrase	K01674	-	-	Thiosp_04665
<i>cowN</i>	CO weal-nitrogenase	-	Thiofri_01782	Thiowin_02413	Thiosp_01780
<i>Dinitrogenase cofactor 1</i>	Dinitrogenase iron-molybdenum cofactor	-	Thiofri_04121	Thiowin_04191	Thiosp_01060
<i>Dinitrogenase cofactor 2</i>	Dinitrogenase iron-molybdenum cofactor	-	Thiofri_03621	Thiowin_04210	Thiosp_01592
<i>draG 1</i>	ADP-ribosyl-[dinitrogen reductase] glycohydrolase	-	Thiofri_01467	Thiowin_02508	Thiosp_03922
<i>draG 2</i>	ADP-ribosyl-[dinitrogen reductase] glycohydrolase	-	Thiofri_03311	Thiowin_02585	Thiosp_00980
<i>draT</i>	NAD(+)-dinitrogen-reductase ADP-D-ribosyltransferase	-	Thiofri_01194	Thiowin_00052	-
<i>glnA</i>	glutamine synthetase	K01915	Thiofri_04606	Thiowin_04786	Thiosp_00295
<i>glnB 1</i>	Nitrogen regulatory protein P-II	-	Thiofri_01494	Thiowin_01382	Thiosp_00128
<i>glnB 2</i>	Nitrogen regulatory protein P-II	-	Thiofri_04774	Thiowin_04999	Thiosp_02763
<i>glnG 1</i>	Nitrogen regulation protein NR(I)	-	Thiofri_04602	Thiowin_00022	Thiosp_00292
<i>glnG 2</i>	Nitrogen regulation protein NR(I)	-	-	Thiowin_04783	Thiosp_04410
<i>glnL</i>	Nitrogen regulation protein NR(II)	-	Thiofri_04603	Thiowin_04784	Thiosp_00293
<i>gltB</i>	glutamate synthase (NADPH) large chain	K00265	Thiofri_04701	Thiowin_04758	Thiosp_04700
<i>gltD</i>	glutamate synthase (NADPH) small chain	K00266	Thiofri_04700	Thiowin_04759	Thiosp_04701
<i>hcp</i>	hydroxylamine reductase	K05601	Thiofri_03474	Thiowin_04302	Thiosp_01683, Thiosp_02885, Thiosp_03355
<i>narI</i>	nitrate reductase gamma subunit	K00374	Thiofri_03973	Thiowin_00384	Thiosp_04052
<i>NtcA</i>	global nitrogen regulator	-	-	Thiowin_03210	-
<i>nifD 1</i>	Nitrogenase molybdenum-iron protein alpha chain	K02586	Thiofri_01039	Thiowin_00876	Thiosp_00781
<i>nifD 2</i>	Nitrogenase molybdenum-iron protein alpha chain	K02586	Thiofri_01329	Thiowin_04854	Thiosp_03837
<i>nifH1 2</i>	Nitrogenase iron protein 1	K02588	Thiofri_01038	Thiowin_04855	Thiosp_00780
<i>nifK 1</i>	Nitrogenase molybdenum-iron protein beta chain	K02591	Thiofri_01040	Thiowin_00875	Thiosp_00782
<i>nifK 2</i>	Nitrogenase molybdenum-iron protein beta chain	K02591	-	Thiowin_04853	Thiosp_03836
<i>nifL 1</i>	Nitrogen fixation regulatory protein	-	Thiofri_00864	Thiowin_00699	Thiosp_03825
<i>nifL 2</i>	Nitrogen fixation regulatory protein	-	Thiofri_01299	Thiowin_00954	Thiosp_04256
<i>nifL 3</i>	Nitrogen fixation regulatory protein	-	Thiofri_01450	Thiowin_02314	Thiosp_04626
<i>nifL 4</i>	Nitrogen fixation regulatory protein	-	Thiofri_04381	Thiowin_02958	-
<i>nifW</i>	Nitrogenase-stabilizing/protective protein	-	Thiofri_02033	Thiowin_03920	Thiosp_03511
<i>nifX 1</i>	nitrogen fixation protein	-	Thiofri_01043	Thiowin_04850	Thiosp_00785
<i>nifX 2</i>	nitrogen fixation protein	-	Thiofri_01330	Thiowin_00874	Thiosp_03835
<i>P-II</i>	Nitrogen regulatory protein P-II	-	-	-	Thiosp_02267
<i>nitrogenase</i>	nitrogenase-associated protein	-	Thiofri_01530	-	Thiosp_01215
<i>nreC 1</i>	Nitrogen regulation protein C	-	-	Thiowin_01945	Thiosp_02664
<i>nreC 2</i>	Nitrogen regulation protein C	-	-	Thiowin_03114	Thiosp_04744
<i>ntrC</i>	Nitrogen assimilation regulatory protein	-	Thiofri_02851	Thiowin_01825	Thiosp_03613
<i>ptsN</i>	Nitrogen regulatory protein	-	Thiofri_04725	Thiowin_00316	Thiosp_04352
<i>N2 fixation</i>	putative nitrogen fixation protein	-	Thiofri_01332	Thiowin_00872	Thiosp_03833
<i>FixT</i>	putative nitrogen fixation protein	-	Thiofri_01041	Thiowin_04852	Thiosp_00783
<i>rnfB 1</i>	Nitrogen fixation protein	-	Thiofri_00862	Thiowin_00956	Thiosp_03600
<i>rnfB 2</i>	Nitrogen fixation protein	-	Thiofri_02816	Thiowin_03587	Thiosp_04258
<i>rnfC 1</i>	Nitrogen fixation protein	-	Thiofri_00861	Thiowin_00957	Thiosp_03599
<i>rnfC 2</i>	Nitrogen fixation protein	-	Thiofri_02815	Thiowin_03586	Thiosp_04259
<i>rnfD 1</i>	Nitrogen fixation protein	-	Thiofri_00860	Thiowin_00958	Thiosp_03598
<i>rnfD 2</i>	Nitrogen fixation protein	-	Thiofri_02814	Thiowin_03585	Thiosp_04260
<i>rnfE 1</i>	Nitrogen fixation protein	-	Thiofri_00858	Thiowin_00960	Thiosp_03596
<i>rnfE 2</i>	Nitrogen fixation protein	-	Thiofri_02812	Thiowin_03583	Thiosp_04262
<i>rnfG</i>	Nitrogen fixation protein	-	Thiofri_00859	Thiowin_00959	Thiosp_03597
<i>rnfG 2</i>	Nitrogen fixation protein	-	Thiofri_02813	Thiowin_03584	Thiosp_04261
<i>Signal-histidine kinase</i>	Signal transduction histidine kinase, nitrogen specific	-	Thiofri_04893	-	-