

Supplementary Table S1. Primers designed for RT-PCR.

Target	Primer sequence (5' → 3')	Annealing temperature (°C)
<i>cooH</i>	GAATCTGGCCTCAAACCTGCATC	63
	CACTGGCGTATCAGTTTGAACG	
<i>echE</i>	CTTTCAGAAACGTTGCCCTCAC	70
	CGGGGAATTCCATATCAAACGC	
<i>hdrA</i>	ATTCTTGGCCCAAAAATGGTGG	68
	CACTTGCCTTTGGTAAGCTGAC	
<i>nrfA</i>	GCATGGACGAGACCATCAATTG	63
	AGCGTGTTTGAAGTCGACAAAG	
<i>frdA</i>	CGTGCTCAATATGCTTGAAGGG	63
	GTTCCATGAACTTGGGTTTCGG	

Supplementary Table S3. Gene repertoire involved in hydrogen metabolism (Modified from Pereira *et al.*, 2011).

	<i>Desulfovibrio aespoeensis</i>	<i>D. alaskensis</i>	<i>D. desulfuricans</i> ATCC 27774	<i>D. magneticus</i>	<i>D. piger</i>	<i>D. salexigens</i>	<i>Desulfovibrio</i> sp. FW1012B	<i>D. vulgaris</i> Hildenborough	' <i>Ca. Desulfovibrio</i> <i>trichonymphae</i> ' Rs-N31
periplasmic [NiFe] Hase	1	3	2	1	2	2	1	3	1
periplasmic [FeFe] Hase	1	1	1	1		1	1	1	
Ech-Hase	1		1	1		1	1	1	1
Coo-Hase			1		1			1	1
cytoplasmic [FeFe] Hase		2		4	1	1	2	1	
periplasmic Fdh	2	3	2	3	1	2	2	3	
cytoplasmic Hdr complex	1	2	1	1	1	1	1	1	1
lactate dehydrogenase	3	4	3	4	2	3	4	4	
cytochrome oxidase	1	2	1	2	1	1	2	2	
TpIc ₃	2	2	1	2	1	3	2	1	1
Dsr	1	1	1	1	1	1	1	1	1
Qmo	1	1	1	1	1	1	1	1	1
Hmc	1	1		1		1	1	1	1
Qrc	1	1		1		1	1	1	
Tmc	1	1	1	1		1	1	1	
Nhc	1		1		1				
Ohc				1		1		1	
Nrf	1		1	1	1	1	1	1	1
Rnf/Nqr/ Nuo	2	1	2	2	1	4	2	1	
Frd	1	1	1	2		1	1	1	1

Supplementary Table S4. Amino acids biosynthetic pathways in the genomes.

	<i>'Ca. Desulfovibrio</i> trichonymphae' Rs-N31	<i>'Ca. Endomicrobium</i> trichonymphae' Rs-D17
Alanine	+	+
Arginine	+	+
Asparagine	+	-
Aspartic acid	+	+
Cysteine	+	-
Glutamine	+	-
Glutamic acid	+	+
Glycine	+	+
Histidine	+	+
Isoleucine	+	+
Leucine	+	+
Lysine	+	+
Methionine	- (transporter)	+
Phenylalanine	+	+
Proline	+	- (transporter)
Serine	+	- (transporter)
Threonine	- (transporter?)	+
Tryptophan	+	+
Tyrosine	+	+
Valine	+	+

Supplementary Table S5. Cofactors biosynthetic pathways in the genomes.

	<i>'Ca. Desulfovibrio</i> <i>trichonymphae'</i> Rs-N31	<i>'Ca. Endomicrobium</i> <i>trichonymphae'</i> Rs-D17
FAD	+	+
Riboflavin	+	+
THF	+	+
Thiamin-PP	+	+
NAD	+	+
NADP	+	+
Pantothenate	+	+
CoA	+	+
SAM	+	+
heme	+	-
Siroheme	+	-
Vitamin B12	+	- (transporter)
Biotin	-	+
Lipoate	-	+
Menaquinone	+	-

Supplementary Table S6. Genes involved in oxygen resistance.

<i>Desulfovibrio desulfuricans</i> ATCC 27774	' <i>Candidatus</i> <i>Desulfovibrio trichonymphae</i> ' Rs-N31
Ddes_0076 Dyp-type peroxidase family protein	RSDT_pg_138 pseudogene of dye-decolorishing (DyP) peroxidase family protein
Ddes_0114 thioredoxin reductase	-
Ddes_0117 thioredoxin domain-containing protein	-
Ddes_0538 copper/zinc binding superoxide dismutase	-
Ddes_0633 rubrerythrin	-
Ddes_0897 rubrerythrin	RSDT_0752 rubrerythrin (NADH peroxidase)
Ddes_1199 thioredoxin	RSDT_0325 thioredoxin
Ddes_1200 thioredoxin reductase	RSDT_0324 NADPH-dependent thioredoxin reductase
Ddes_1386 rubredoxin-type Fe(Cys) ₄ protein	-
Ddes_1441 redoxin domain-containing protein	-
Ddes_1494 catalase	RSDT_pg_146 pseudogene of catalase
Ddes_2010 desulfoferrodoxin	RSDT_0359 desulfoferrodoxin
Ddes_2011 rubredoxin-type Fe(Cys) ₄ protein	RSDT_0360 rubredoxin
Ddes_2012 beta-lactamase domain-containing protein	RSDT_pg_062 pseudogene of rubredoxin-oxygen oxidoreductase
Ddes_2195 cytochrome d ubiquinol oxidase, subunit II	-
Ddes_2196 cytochrome bd ubiquinol oxidase subunit I	-