

Table S3. The 16S rRNA gene database source of OHRBs in Figure 4 and their substrate range.

Name	Substrate Range	ID	Reference
<i>Anaeromyxobacter dehalogenans</i> 2CP-1		643594130	
<i>Anaeromyxobacter dehalogenans</i> 2CP-C	2,6-Dichlorophenol; 2,5-Dichlorophenol;	640712235	Sanford et al., 2002
<i>Anaeromyxobacter</i> sp. K	2-Chlorophenol; 2-Bromophenol	642762693	
<i>Deferrisoma camini</i> S3R1	Not Studied	2517270461	-
<i>Desulfobacula phenolica</i> DSM 3384	Not Studied	2616666760	-
<i>Desulfobacula toluolica</i> Tol2	Not Studied	2524508170	-
<i>Desulfomonile tiedjei</i> DCB-1	3-Chlorobenzoate; 2,5-Dichlorobenzoate	2509740724	DeWeerd et al., 1990
<i>Desulforhopalus singaporensis</i> DSM 12130	Not Studied	2596710058	-
<i>Desulfosarcina variabilis</i> Montpellier	Not Studied	2502441539	-
<i>Desulfovibrio indicus</i> J2	Not Studied	2688214528	-
<i>Dethiosulfatarculus sandiegensis</i> SPR	Not Studied	2629331604	-
<i>Geobacter lovleyi</i> SZ	Tetrachloroethene; Trichloroethene	642676148	Sung et al., 2006; Wagner et al., 2012
<i>Plesiocystis pacifica</i> SIR-1	Not Studied	641164571	-
<i>Deltaproteobacterium</i> sp. NaphS2	Not Studied	AJ132804.1	-
<i>Desulfocarbo indianensis</i> SCBM	Not Studied	NR_126285.1	-
<i>Desulfoluna spongiiphila</i> AA1	2,6-Dibromophenol; 2-Bromophenol; 4-Bromophenol; 2,4-Dibromophenol; 2,4,6-Tribromophenol; 2-Iodophenol; 3-Iodophenol; 2-Bromo-4-fluorophenol; 3,5-Dibromo-4-hydroxybenzoate; 3,5-Dibromo-4-hydroxybenzotrile	NR_115979.1	Ahn et al., 2009; Liu et al., 2017
<i>Desulfuromonas chloroethenica</i> TT4B	Tetrachloroethene; Trichloroethene	NR_026012.1	Krumhlz, 1997
<i>Desulfomonile limimaris</i> DCB-M	3-Chlorobenzoate; 3-Bromobenzoate; 2,3-Dibromobenzoate; 2,5-Dibromobenzoate; 3,5-Dichlorobenzoate	NR_025079.1	Sun et al., 2001
<i>Desulfuromonas michiganensis</i> BB1	Tetrachloroethene; Trichloroethene	AF357915.2	Sung et al., 2003
<i>Desulfuromonas michiganensis</i> BRS1	Tetrachloroethene; Trichloroethene	AF357914.2	Sung et al., 2003
<i>Desulfovibrio bizertensis</i> MB3	2,6-Dibromophenol; 2-Bromophenol; 2,4,6-Tribromophenol; 2,4-Dibromophenol	NR_043808.1	This study
<i>Halodesulfovibrio marinisediminis</i> DSM 17456	2,6-Dibromophenol; 2-Bromophenol; 2,4,6-Tribromophenol; 2,4-Dibromophenol	NR_041631.1	This study
<i>Desulfuromusa kysingii</i> DSM 7343	2,6-Dibromophenol; 2-Bromophenol; 2,4,6-Tribromophenol; 2,4-Dibromophenol	2599544949	This study
<i>Desulfovibrio</i> sp. TBP-1	2,6-Dibromophenol; 2-Bromophenol; 2,4,6-Tribromophenol; 2,4-Dibromophenol; 4-Bromophenol	AF090830.1	Boyle et al., 1999
<i>Desulfovibrio dechloracetivorans</i> SF3	2,6-Dichlorophenol; 2-Chlorophenol	NR_025078.1	Sun et al., 2000
<i>Geobacter thiogenes</i> K1 ^a	Trichloroacetate	NR_028775.1	De Wever et al., 2000

a-Reductive dehalogenation of *Geobacter thiogenes* K1 may involve a sulfur-sulfide cycle.

References:

1. Boyle AW, Phelps CD, Young LY. 1999. Isolation from estuarine sediments of a *Desulfovibrio* strain which can grow on lactate coupled to the reductive dehalogenation of 2,4,6-tribromophenol. *Applied and Environmental Microbiology* **65**:1133-1140.
2. De Wever H, Cole JR, Fettig MR, Hogan DA, Tiedje JM. 2000. Reductive dehalogenation of trichloroacetic acid by *Trichlorobacter thiogenes* gen. nov., sp. nov. *Applied and Environmental Microbiology* **66**:2297-2301.
3. Sanford RA, Cole JR, Tiedje JM. 2002. Characterization and description of *Anaeromyxobacter dehalogenans* gen. nov., sp. nov., an aryl-halo-respiring facultative anaerobic *Myxobacterium*. *Applied and Environmental Microbiology* **68**:893-900.
4. Sun B, Cole JR, Sanford RA, Tiedje JM. 2000. Isolation and characterization of *Desulfovibrio dechloracetivorans* sp. nov., a marine dechlorinating bacterium growing by coupling the oxidation of acetate to the reductive dechlorination of 2-chlorophenol. *Applied and Environmental Microbiology* **66**:2408-2413.
5. Sung Y, Ritalahti KM, Sanford RA, Urbance JW, Flynn SJ, Tiedje JM, Löffler FE. 2003. Characterization of two tetrachloroethene-reducing, acetate-oxidizing anaerobic bacteria and their description as *Desulfuromonas michiganensis* sp. nov. *Applied and Environmental Microbiology* **69**:2964-2974.
6. DeWeerd K, Mandelco L, Tanner R, Woese C, Suflita J. 1990. *Desulfomonile tiedjei* gen. nov. and sp. nov., a novel anaerobic, dehalogenating, sulfate-reducing bacterium. *Archives of Microbiology* **154**:23-30.
7. Wagner DD, Hug LA, Hatt JK, Spitzmiller MR, Padilla-Crespo E, Ritalahti KM, Edwards EA, Konstantinidis KT, Löffler FE. 2012. Genomic determinants of organohalide-respiration in *Geobacter lovleyi*, an unusual member of the *Geobacteraceae*. *BMC Genomics* **13**:200.
8. Liu J, Lopez N, Ahn Y, Goldberg T, Bromberg Y, Kerkhof LJ, Haggblom MM. 2017. Novel reductive dehalogenases from the marine sponge associated bacterium *Desulfoluna spongiiphila*. *Environmental Microbiology Reports* **9**:537-549.
9. Ahn Y-B, Kerkhof LJ, Haggblom MM. 2009. *Desulfoluna spongiiphila* sp. nov., a dehalogenating bacterium in the *Desulfobacteraceae* from the marine sponge *Aplysina aerophoba*. *International Journal of Systematic and Evolutionary Microbiology* **59**:2133-2139.
10. Krumholz LR. 1997. *Desulfuromonas chloroethenica* sp. nov. Uses Tetrachloroethylene and Trichloroethylene as Electron Acceptors. *International Journal of Systematic and Evolutionary Microbiology* **47**:1262-1263.
11. Sun B, Cole JR, Tiedje JM. 2001. *Desulfomonile limimaris* sp. nov., an anaerobic dehalogenating bacterium from marine sediments. *International Journal of Systematic and Evolutionary Microbiology* **51**:365-371.