

## **Supplementary Information for the article**

### **Cryptic role of tetrathionate in the sulfur cycle: A study from Arabian Sea sediments**

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**Running Title:** Tetrathionate metabolism in OMZ sediments

## Contents

### Supplementary Figure

**Fig. S1.** Schematic diagram showing the sampling strategy adopted for the collection of sediment-samples from the SSK42 cores.

### Supplementary Tables

**Tables S1-S2.** Sediment-depths of SSK42/5 and SSK42/6 explored via duplicate metagenome sequencing and analysis of *in situ* microbial communities. Sequence accession numbers and basic statistics of the individual metagenome analyses are also given.

**Table S3.** Number of thiosulfate to tetrathionate-conversion genes identified within the metagenome assemblies obtained for the individual sediment-samples of SSK42/5 and SSK42/6. Since this Supplementary Table is more than one page long it has been provided as an Excel sheet named Table S3, within the Excel Workbook named Supplementary Dataset.

**Table S4.** Number of tetrathionate-oxidation genes identified within the metagenome assemblies obtained for the individual sediment-samples of SSK42/5 and SSK42/6. Since this Supplementary Table is more than one page long it has been provided as an Excel sheet named Table S4, within the Excel Workbook named Supplementary Dataset.

**Table S5.** Number of tetrathionate-reduction genes identified within the metagenome assemblies obtained for the individual sediment-samples of SSK42/5 and SSK42/6. Since this Supplementary Table is more than one page long it has been provided as an Excel sheet named Table S5, within the Excel Workbook named Supplementary Dataset.

**Tables S6-S7.** Pair-wise Pearson correlation and Spearman rank correlation coefficients calculated between the prevalence of two metabolic-types, or the prevalence of a particular metabolic-type and sediment-depth, in SSK42/5 and SSK42/6.

**Tables S8-S9.** Relative abundance along SSK42/5 and SSK42/6, for genera whose member species/strains have been reported for tetrathionate formation during their oxidation of thiosulfate to sulfate/ reduction of sulfate to sulfide.

**Tables S10-S11.** Relative abundance along SSK42/5 and SSK42/6, for genera whose member species/strains have been reported for tetrathionate oxidation.

**Tables S12-S13.** Relative abundance along SSK42/5 and SSK42/6, for genera whose member species/strains have been reported for tetrathionate reduction.

**Tables S14-S17.** Results of slurry incubation experiments with the sediment-samples of SSK42/5 and SSK42/6 in thiosulfate-containing chemolithoautotrophic medium.

**Table S18.** Results of slurry incubation experiments with the sediment-samples of SSK42/5 and SSK42/6 in tetrathionate-containing chemolithoautotrophic medium.

**Table S19.** Rate of oxidation (to sulfate) of tetrathionate during aerobic slurry incubation of various sediment-samples of SSK42/6 in tetrathionate-containing chemolithotrophic ASWTr medium.

**Table S20.** Genes for thiosulfate to tetrathionate conversion and tetrathionate oxidation identified within the contigs assembled from the metatranscriptomic sequence data obtained for the 275 cmbsf sediment-sample of SSK42/6. Since this Supplementary Table is more than one page long it has been provided as an Excel sheet named Table S20, within the Excel Workbook named Supplementary Dataset.

**Tables S21-S22.** Results of slurry incubation experiments with the sediment-samples of SSK42/5 and SSK42/6 in tetrathionate-containing heterotrophic medium.

**Table S23.** General features of the assembled genomes of the 6 tetrathionate metabolizing bacterial strains isolated from 275 cmbsf of SSK42/6, together with the percentages of metagenomic reads from individual sediment-samples of SSK42/5 and SSK42/6 that matched with sequences from each genome. Since this

Supplementary Table is more than one page long it has been provided as an Excel sheet named Table S23, within the Excel Workbook named Supplementary Dataset.

**Table S24.** Concentrations of sulfate, sulfide and thiosulfate in the individual sample-sites of SSK42/5 and SSK42/6.

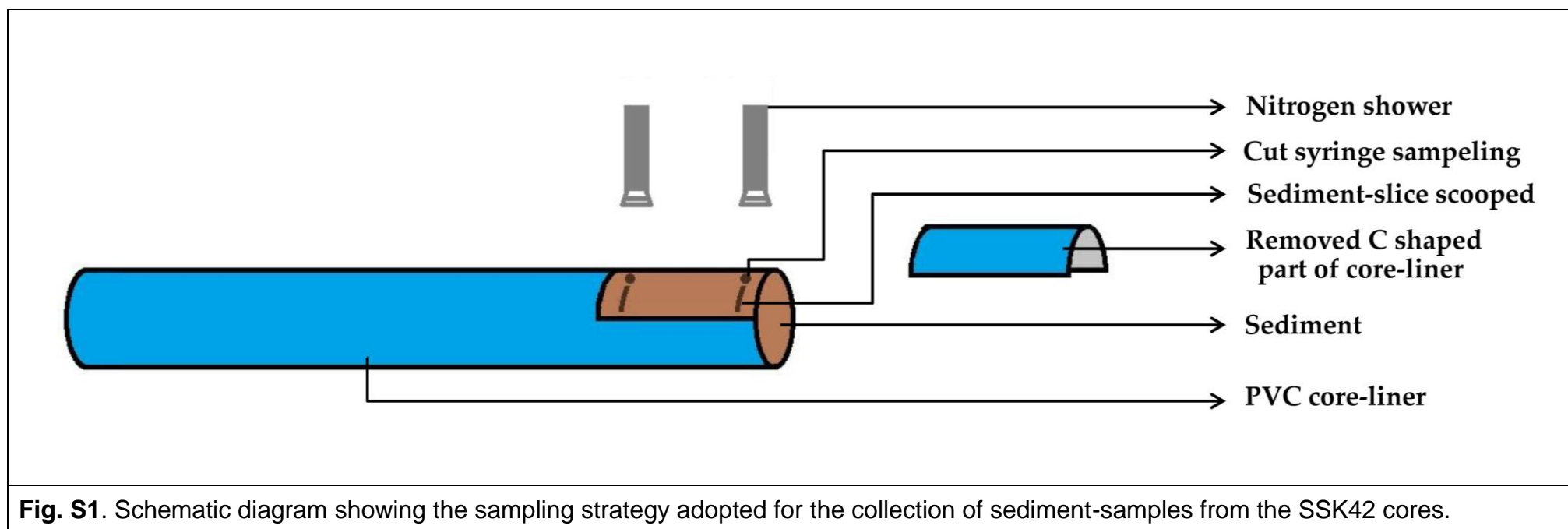
**Table S25.** Thiosulfate to tetrathionate conversion genes of *Pseudomonas bauzanensis* MTCC 12600 and *Halomonas* sp. MCC 3301, tetrathionate/ thiosulfate oxidation genes of *Pusillimonas ginsengisoli* MTCC12558 and *Halothiobacillus* sp. SB14A, and the numbers of metatranscriptomic read-pairs from 275 cmbsf of SSK42/6 that matched concordantly with the individual genes of this catalog. Since this Supplementary Table is more than one page long it has been provided as an Excel sheet named Table S25, within the Excel Workbook named Supplementary Dataset.

**Table S26.** Number of aerobic-respiration-related genes identified within the metatranscriptome assemblies obtained for 275 cmbsf of SSK42/6. Since this Supplementary Table is more than one page long it has been provided as an Excel sheet named Table S26, within the Excel Workbook named Supplementary Dataset.

**Table S27.** Aerobic-respiration-related genes, other than cytochrome oxidases, identified within the metatranscriptome assemblies obtained for 275 cmbsf of SSK42/6. Since this Supplementary Table is more than one page long it has been provided as an Excel sheet named Table S27, within the Excel Workbook named Supplementary Dataset.

**Supplementary References**

## Supplementary Figure



## Supplementary Tables

**Table S1.** List of sedimentary communities investigated along SSK42/5 together with the accession numbers of the metagenomic sequence datasets

Sediment-depths explored (in cmbsf)	BioSample accession number	Sample-replicate	Run accession number
0	SAMN04442175	1st replicate	SRR3646127
		2nd replicate	SRR3646128
15	SAMN04442176	1st replicate	SRR3646129
		2nd replicate	SRR3646130
45	SAMN04442177	1st replicate	SRR3646131
		2nd replicate	SRR3646132
60	SAMN04442178	1st replicate	SRR3646144
		2nd replicate	SRR3646145
90	SAMN04442179	1st replicate	SRR3646147
		2nd replicate	SRR3646148
120	SAMN04442180	1st replicate	SRR3646150
		2nd replicate	SRR3646151
140	SAMN04442181	1st replicate	SRR3646152
		2nd replicate	SRR3646153
160	SAMN04442182	1st replicate	SRR3646155
		2nd replicate	SRR3646156
190	SAMN04442183	1st replicate	SRR3646157
		2nd replicate	SRR3646158
220	SAMN04442184	1st replicate	SRR3646160
		2nd replicate	SRR3646161
260	SAMN04442185	1st replicate	SRR3646162
		2nd replicate	SRR3646163
295	SAMN04442186	1st replicate	SRR3646164
		2nd replicate	SRR3646165

**Table S2.** List of sedimentary communities investigated along SSK42/6 together with the accession numbers of the metagenomic sequence datasets

Sediment-depths explored (in cmbsf)	BioSample accession number	Sample-replicate	Run accession number
2	SAMN04442187	1st replicate	SRR3570036
		2nd replicate	SRR3570038
30	SAMN04442189	1st replicate	SRR3577067
		2nd replicate	SRR3577068
45	SAMN04442190	1st replicate	SRR3577070
		2nd replicate	SRR3577071
60	SAMN04442191	1st replicate	SRR3577073
		2nd replicate	SRR3577076
75	SAMN04442192	1st replicate	SRR3577078
		2nd replicate	SRR3577079
90	SAMN04442193	1st replicate	SRR3577081
		2nd replicate	SRR3577082
120	SAMN04442195	1st replicate	SRR3577086
		2nd replicate	SRR3577087
135	SAMN04442196	1st replicate	SRR3577090
		2nd replicate	SRR3577311
160	SAMN04442198	1st replicate	SRR3577334
		2nd replicate	SRR3577335
175	SAMN04442199	1st replicate	SRR3577337
		2nd replicate	SRR3577338
220	SAMN04442202	1st replicate	SRR3577341
		2nd replicate	SRR3577343
250	SAMN04442204	1st replicate	SRR3577344
		2nd replicate	SRR3577345
275	SAMN04442207	1st replicate	SRR3577350
		2nd replicate	SRR3577351

**Table S6.** Pair-wise Pearson correlation coefficient (CC denoted as  $r$ ) and Spearman rank correlation coefficient (RCC denoted as  $\rho$ ) calculated between the prevalence<sup>1</sup> of two metabolic-types, or the prevalence<sup>1</sup> of a particular metabolic-type and sediment-depth<sup>2</sup>, in SSK42/5.

Pearson correlation coefficient					
	Sediment depth	Prevalence of tetrathionate-reducing bacteria	Prevalence of tetrathionate-forming bacteria	Prevalence of tetrathionate-oxidizing bacteria	P value
Sediment-depth		2.06E-04	4.62E-04	6.99E-05	
Prevalence of tetrathionate-reducing bacteria	0.8734		1.24E-06	2.12E-08	
Prevalence of tetrathionate-forming bacteria	0.85	0.9557		4.76E-06	
Prevalence of tetrathionate-oxidizing bacteria	0.899	0.9805	0.9418		
	r value				
Spearman rank correlation coefficient					
	Sediment depth	Prevalence of tetrathionate-reducing bacteria	Prevalence of tetrathionate-forming bacteria	Prevalence of tetrathionate-oxidizing bacteria	P value
Sediment-depth		9.70E-04	3.09E-04	0	
Prevalence of tetrathionate-reducing bacteria	0.8462		9.17E-05	5.97E-04	
Prevalence of tetrathionate-forming bacteria	0.8741	0.8881		1.92E-04	
Prevalence of tetrathionate-oxidizing bacteria	0.9301	0.8601	0.8811		
	r value				

<sup>1</sup> Prevalence of a particular metabolic-type in the microbial community of a given sediment-depth was quantified as the percentage of total metagenomic reads from the sediment-sample that was ascribed to the set of genera typifying the metabolism.

<sup>2</sup> Sediment-depth was quantified in centimeters (below the sea-floor).

**Table S7.** Pair-wise Pearson correlation coefficient (CC denoted as  $r$ ) and Spearman rank correlation coefficient (RCC denoted as  $\rho$ ) calculated between the prevalence<sup>1</sup> of two metabolic-types, or the prevalence<sup>1</sup> of a particular metabolic-type and sediment-depth<sup>2</sup>, in SSK42/6.

Pearson correlation coefficient					
	Sediment depth	Prevalence of tetrathionate-reducing bacteria	Prevalence of tetrathionate-forming bacteria	Prevalence of tetrathionate-oxidizing bacteria	P value
Sediment-depth		1.63E-01	3.30E-03	1.48E-02	
Prevalence of tetrathionate-reducing bacteria	0.4109		6.36E-02	4.68E-02	
Prevalence of tetrathionate-forming bacteria	0.7483	0.528		8.02E-02	
Prevalence of tetrathionate-oxidizing bacteria	0.6566	0.5594	0.5024		
	r value				
Spearman rank correlation coefficient					
	Sediment depth	Prevalence of tetrathionate-reducing bacteria	Prevalence of tetrathionate-forming bacteria	Prevalence of tetrathionate-oxidizing bacteria	P value
Sediment-depth		1.10E-01	1.40E-03	0.0044	
Prevalence of tetrathionate-reducing bacteria	0.467		7.50E-03	6.73E-02	
Prevalence of tetrathionate-forming bacteria	0.8077	0.7198		4.40E-03	
Prevalence of tetrathionate-oxidizing bacteria	0.7527	0.5275	0.7527		
	r value				

<sup>1</sup> Prevalence of a particular metabolic-type in the microbial community of a given sediment-depth was quantified as the percentage of total metagenomic reads from the sediment-sample that was ascribed to the set of genera typifying the metabolism.

<sup>2</sup> Sediment-depth was quantified in centimeters (below the sea-floor).



**Table S8.** Relative abundance, along SSK42/5, for such genera, some member species/strains of which have been reported for tetrathionate-formation during the oxidation of thiosulfate to sulfate.

			Sediment-depth (in cmbsf)											
Genera	Reference	Tetrathionate-forming phenotype	0	15	45	60	90	120	140	160	190	220	260	295
			Mean relative abundance (as percentage of total metagenomic reads)											
<i>Acidithiobacillus</i>	(Hedrich and Johnson, 2013)	(i) $S_2O_3 \rightarrow S_4O_6 \rightarrow SO_4$ (ii) $S_4O_6 \rightarrow SO_4$	0.06	0.04	0.04	0.07	0.49	0.42	0.24	0.12	0.16	0.32	0.17	0.26
<i>Advenella</i>	(Ghosh et al., 2005)		0	0	0	0	0	0	0	0	0	0	0	0
<i>Halothiobacillus</i>	(Boden et al., 2017)		0.03	0.02	0.05	0.04	0.22	0.26	0.19	0.25	0.27	0.26	0.29	0.36
<i>Paracoccus</i>	(Rameez et al., 2019)		0.05	0.21	1.13	0.35	0.09	0.11	0.07	0.21	0.08	0.33	0.07	0.12
<i>Pusillimonas</i>	This study		0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.03	0.04	0.06	0.03
<i>Thiomicrospira</i>	(Watsuji et al., 2016)		0.07	0.05	0.11	0.12	0.53	0.55	0.50	0.65	0.81	0.68	0.98	0.99
Total percentage			0.22	0.33	1.34	0.59	1.36	1.37	1.03	1.28	1.36	1.63	1.57	1.76

**Table S9.** Relative abundance, along SSK42/6, for such genera, some member species/strains of which have been reported for tetrathionate-formation during the oxidation of thiosulfate to sulfate.

			Sediment-depth (in cmbsf)												
Genera	Reference	Tetrathionate forming phenotype	2	30	45	60	75	90	120	135	160	175	220	250	275
			Mean relative abundance (as percentage of total metagenomic reads)												
<i>Acidithiobacillus</i>	(Hedrich and Johnson, 2013)	(i) $S_2O_3 \rightarrow S_4O_6 \rightarrow SO_4$ (ii) $S_4O_6 \rightarrow SO_4$	0.06	0.08	0.11	0.09	0.15	0.18	0.19	0.20	0.28	0.23	0.34	0.16	0.12
<i>Advenella</i>	(Ghosh et al., 2005)		0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
<i>Halothiobacillus</i>	(Sievert et al., 2000)		0.07	0.13	0.26	0.18	0.27	0.37	0.35	0.39	0.92	0.52	0.55	5.98	2.58
<i>Paracoccus</i>	(Rameez et al., 2019)		0.18	0.53	0.53	0.60	0.28	0.16	0.18	0.15	0.20	0.09	0.11	0.71	0.35
<i>Pusillimonas</i>	This study		0.51	0.42	0.39	0.37	0.03	0.03	0.56	0.03	0.00	0.48	1.05	0.43	0.48
<i>Thiomicrospira</i>	(Watsuji et al., 2016)		0.21	0.35	0.58	0.43	0.76	1.00	0.88	0.86	1.31	1.32	1.55	0.51	0.55
Total percentage			1.03	1.52	1.87	1.67	1.49	1.74	2.16	1.63	2.71	2.64	3.61	7.79	4.08

**Table S10.** Relative abundance, along SSK42/5, for such genera, some member species/strains of which have been reported for the oxidation of tetrathionate to sulfate.

			Sediment-depth (in cmbsf)											
Genera	Reference	Tetrathionate oxidation phenotype	0	15	45	60	90	120	140	160	190	220	260	295
			Mean relative abundance (as percentage of total metagenomic reads)											
<i>Bosea</i>	(Das et al., 1996)	S <sub>4</sub> O <sub>6</sub> → SO <sub>4</sub>	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
<i>Burkholderia</i>	(Wittke et al., 1997)		0.00	0.71	0.64	0.87	1.15	1.01	0.78	1.02	0.78	0.94	0.81	1.01
<i>Campylobacter</i>	(Voordouw et al., 1996)		0.06	0.06	0.05	0.06	0.04	0.06	0.09	0.05	0.19	0.07	0.09	0.04
<i>Hydrogenovibrio</i>	(Nishihara et al., 1991)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Pandoraea</i>	(Anandham et al., 2010)		0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
<i>Paracoccus</i>	(Ghosh et al., 2006; Rameez et al., 2019)		0.05	0.21	1.13	0.35	0.09	0.11	0.07	0.21	0.08	0.33	0.07	0.12
<i>Pseudaminobacter</i>	(Lahiri et al., 2006)		0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
<i>Sulfurivirga</i>	(Takai et al., 2006)		0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
<i>Thiobacillus</i>	(Wood and Kelly, 1991)		0.08	0.07	0.17	0.25	1.59	1.47	0.80	0.91	0.75	1.24	0.73	1.26
<i>Thiohalorhabdus</i>	(Sorokin et al., 2008)		0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
Total percentage			0.19	1.06	2.02	1.55	2.87	2.65	1.77	2.2	1.81	2.62	1.71	2.43

**Table S11.** Relative abundance, along SSK42/6, for such genera, some member species/strains of which have been reported for the oxidation of tetrathionate to sulfate.

			Sediment-depth (in cmbsf)												
Genera	Reference	Tetrathionate oxidation phenotype	2	30	45	60	75	90	120	135	160	175	220	250	275
			Mean relative abundance (as percentage of metagenomic reads)												
<i>Bosea</i>	(Das et al., 1996)	S <sub>4</sub> O <sub>6</sub> → SO <sub>4</sub>	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0
<i>Burkholderia</i>	(Wittke et al., 1997)		0.54	0.86	0.93	0.75	0.87	0.91	0.87	1.33	0.82	1.00	0.96	0.66	1.28
<i>Campylobacter</i>	(Voordouw et al., 1996)		0.06	0.05	0.05	0.04	0.06	0.07	0.08	0.11	0.05	0.04	0.02	0.04	0.03
<i>Hydrogenovibrio</i>	(Nishilhara et al., 1991)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.04	0.00	0.00
<i>Pandoraea</i>	(Anandham et al., 2010)		0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
<i>Paracoccus</i>	(Ghosh et al., 2006; Rameez et al., 2019)		0.18	0.53	0.53	0.60	0.28	0.16	0.18	0.15	0.20	0.09	0.11	0.71	0.35
<i>Pseudaminobacter</i>	(Lahiri et al., 2006)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sulfurivirga</i>	(Takai et al., 2006)		0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
<i>Thiobacillus</i>	(Wood and Kelly, 1991)		0.22	0.34	0.66	0.47	0.91	1.19	1.02	0.92	0.98	1.27	1.26	0.31	0.34
<i>Thiohalorhabdus</i>	(Sorokin et al., 2008)		0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
Total percentage			1.01	1.79	2.19	1.87	2.13	2.34	2.15	2.53	2.09	2.42	2.41	1.72	2

**Table S12.** Relative abundance, along SSK42/5, for such genera, some member species/strains of which have been reported for the reduction of tetrathionate to thiosulfate or sulfide.

			Sediment-depth (in cmbsf)											
Genera	Reference	Tetrathionate reducing phenotype	0	15	45	60	90	120	140	160	190	220	260	295
			Mean relative abundance (as percentage of total metagenomic reads)											
<i>Alcaligenes</i>	(Barrett and Clark, 1987)	$S_4O_6 \rightarrow S_2O_3$	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00
<i>Alteromonas</i>	(Barrett and Clark, 1987)	$S_4O_6 \rightarrow S_2O_3 \rightarrow H_2S$	0.18	0.13	0.08	0.14	0.23	0.21	0.06	0.26	0.33	0.23	0.31	0.27
<i>Desulfotomaculum</i>	(Barrett and Clark, 1987)	$S_4O_6 \rightarrow S_2O_3 \rightarrow H_2S$	0.32	0.28	0.28	0.15	0.20	0.23	0.40	0.08	0.16	0.21	0.08	0.05
<i>Desulfovibrio</i>	(Barrett and Clark, 1987)	$S_4O_6 \rightarrow S_2O_3$	0.49	0.47	0.40	0.40	0.38	0.58	0.73	0.32	0.36	0.20	0.29	0.23
<i>Edwardsiella</i>	(Barrett and Clark, 1987)	$S_4O_6 \rightarrow S_2O_3 \rightarrow H_2S$	0.03	0.02	0.02	0.02	0.08	0.08	0.05	0.06	0.05	0.07	0.07	0.08
<i>Morganella</i>	(Barrett and Clark, 1987)	$S_4O_6 \rightarrow S_2O_3 \rightarrow H_2S$	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
<i>Pasteurella</i>	(Barrett and Clark, 1987)	$S_4O_6 \rightarrow S_2O_3 \rightarrow H_2S$	0.03	0.02	0.02	0.03	0.06	0.08	0.00	0.08	0.09	0.10	0.09	0.09
<i>Providencia</i>	(Barrett and Clark, 1987)	$S_4O_6 \rightarrow S_2O_3 \rightarrow H_2S$	0.03	0.02	0.03	0.02	0.07	0.08	0.06	0.08	0.09	0.10	0.05	0.09
<i>Serratia</i>	(Barrett and Clark, 1987)	$S_4O_6 \rightarrow S_2O_3 \rightarrow H_2S$	0.08	0.06	0.06	0.07	0.15	0.14	0.11	0.15	0.14	0.15	0.20	0.14
<i>Shewanella</i>	(Barrett and Clark, 1987)	$S_4O_6 \rightarrow S_2O_3$	1.21	0.83	0.70	1.26	1.87	1.84	1.69	2.09	3.42	2.00	3.04	3.50
Total percentage			2.37	1.84	1.59	2.1	3.04	3.26	3.1	3.12	4.64	3.08	4.13	4.45

**Table S13.** Relative abundance, along SSK42/6, for such genera, some member species/strains of which have been reported for the reduction of tetrathionate to thiosulfate or sulfide.

			Sediment depth (in cmbsf)												
Genera	Reference	Tetrathionate reduction phenotype	2	30	45	60	75	90	120	135	160	175	220	250	275
			Mean relative abundance (as percentage of metagenomic reads)												
<i>Alcaligenes</i>	(Barrett and Clark, 1987)	S <sub>4</sub> O <sub>6</sub> → S <sub>2</sub> O <sub>3</sub>	0.00	0.01	0.00	0.00	0.44	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.01
<i>Alteromonas</i>	(Barrett and Clark, 1987)	S <sub>4</sub> O <sub>6</sub> → S <sub>2</sub> O <sub>3</sub> → H <sub>2</sub> S	0.23	0.19	0.22	0.19	0.28	0.31	0.27	0.36	0.23	0.30	0.23	0.17	0.23
<i>Desulfotomaculum</i>	(Barrett and Clark, 1987)	S <sub>4</sub> O <sub>6</sub> → S <sub>2</sub> O <sub>3</sub> → H <sub>2</sub> S	0.28	0.12	0.09	0.10	0.10	0.08	0.13	0.10	0.11	0.03	0.03	0.06	0.04
<i>Desulfovibrio</i>	(Barrett and Clark, 1987)	S <sub>4</sub> O <sub>6</sub> → S <sub>2</sub> O <sub>3</sub>	0.49	0.26	0.27	0.24	0.33	0.23	0.31	0.33	0.37	0.23	0.11	0.15	0.19
<i>Edwardsiella</i>	(Barrett and Clark, 1987)	S <sub>4</sub> O <sub>6</sub> → S <sub>2</sub> O <sub>3</sub> → H <sub>2</sub> S	0.03	0.05	0.06	0.04	0.06	0.08	0.07	0.09	0.08	0.09	0.13	0.02	0.04
<i>Morganella</i>	(Barrett and Clark, 1987)	S <sub>4</sub> O <sub>6</sub> → S <sub>2</sub> O <sub>3</sub> → H <sub>2</sub> S	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
<i>Pasteurella</i>	(Barrett and Clark, 1987)	S <sub>4</sub> O <sub>6</sub> → S <sub>2</sub> O <sub>3</sub> → H <sub>2</sub> S	0.04	0.06	0.07	0.05	0.08	0.12	0.10	0.10	0.07	0.09	0.10	0.04	0.04
<i>Providencia</i>	(Barrett and Clark, 1987)	S <sub>4</sub> O <sub>6</sub> → S <sub>2</sub> O <sub>3</sub> → H <sub>2</sub> S	0.04	0.06	0.07	0.06	0.09	0.11	0.10	0.12	0.08	0.09	0.09	0.03	0.06
<i>Serratia</i>	(Barrett and Clark, 1987)	S <sub>4</sub> O <sub>6</sub> → S <sub>2</sub> O <sub>3</sub> → H <sub>2</sub> S	0.08	0.10	0.13	0.12	0.13	0.16	0.16	0.20	0.18	0.20	0.22	0.10	0.17
<i>Shewanella</i>	(Barrett and Clark, 1987)	S <sub>4</sub> O <sub>6</sub> → S <sub>2</sub> O <sub>3</sub>	6.47	2.32	2.47	1.64	2.38	3.29	5.59	3.69	2.03	2.53	2.38	0.77	1.13
Total percentage			7.66	3.17	3.38	2.44	3.9	4.38	6.73	4.99	3.17	3.57	3.3	1.36	1.91

**Table S14.** Rate of tetrathionate-formation in thiosulfate-containing chemolithotrophic ASWT medium by those sediment-samples of SSK42/5, which, in aerobic slurry culture experiments, oxidized thiosulfate only up to tetrathionate<sup>1</sup>.

Sediment-depths explored (in cmbsf)	Rate of tetrathionate formation (in $\mu\text{mol S day}^{-1} \text{ g sediment}^{-1}$ )
0	17.72
15	6.65
90	8.42
160	6.45

<sup>1</sup> These samples neither produced any sulfate from thiosulfate, nor further oxidized the tetrathionate produced from thiosulfate.

**Table S15.** Rate of formation, and subsequent oxidation (to sulfate), of tetrathionate during aerobic slurry incubation of various sediment-samples of SSK42/5 in thiosulfate-containing chemolithotrophic ASWT medium.

Sediment-depths explored (in cmbsf)	Rate of tetrathionate formation from thiosulfate (in $\mu\text{mol S day}^{-1} \text{ g sediment}^{-1}$ )	Rate of oxidation of the tetrathionate formed from thiosulfate (in $\mu\text{mol S day}^{-1} \text{ g sediment}^{-1}$ )
45	1.11	5.86
60	5.61	6.45
295	6.45	13.75

**Table S16.** Rate of tetrathionate-formation in thiosulfate-containing chemolithotrophic ASWT medium by those sediment-samples of SSK42/6 which, in aerobic slurry culture experiments, converted thiosulfate only to tetrathionate<sup>1</sup>.

Sediment-depths explored (in cmbsf)	Rate of tetrathionate formation ( $\mu\text{mol S day}^{-1} \text{ g sediment}^{-1}$ )
120	29.71
175	18.21
275	17.2

<sup>1</sup> These samples neither produced any sulfate from thiosulfate, nor further oxidized the tetrathionate produced from thiosulfate.

**Table S17.** Rate of formation, and subsequent oxidation (to sulfate), of tetrathionate during aerobic slurry incubation of various sediment-samples of SSK42/6 in thiosulfate-containing chemolithotrophic ASWT medium.

Sediment-depths explored (in cmbsf)	Rate of tetrathionate formation (in $\mu\text{mol S day}^{-1} \text{ g sediment}^{-1}$ )	Rate of tetrathionate oxidation (in $\mu\text{mol S day}^{-1} \text{ g sediment}^{-1}$ )
2	25.8	54
30	33.68	48
45	21.05	24

**Table S18.** Rate of oxidation of tetrathionate (to sulfate) during aerobic slurry incubation of various sediment-samples of SSK42/5 in tetrathionate-containing chemolithotrophic ASWTr medium.

Sediment-depths explored (in cmbsf)	Rate of tetrathionate oxidation (in $\mu\text{mol S day}^{-1} \text{ g sediment}^{-1}$ )
0	23.5
15	4.75
45	3.35
90	4.9
120	5.71
160	2.5
295	6.4

**Table S19.** Rate of oxidation of tetrathionate (to sulfate) during aerobic slurry incubation of various sediment-samples of SSK42/6 in tetrathionate-containing chemolithotrophic ASWTr medium.

Sediment-depths explored (in cmbsf)	Rate of tetrathionate oxidation (in $\mu\text{mol S day}^{-1} \text{ g sediment}^{-1}$ )
2	141
30	141
45	140
60	141
75	140
90	141
120	41
135	40
160	41
175	40
220	75
250	77
275	75

**Table S21.** Rate of reduction of tetrathionate (to thiosulfate) during anaerobic slurry incubation of various sediment-samples of SSK42/5 in tetrathionate-containing heterotrophic RVTr medium.

Sediment-depths explored (in cmbsf)	Rate of tetrathionate reduction (in $\mu\text{mol S day}^{-1} \text{ g sediment}^{-1}$ )
0	0.25
15	0.21
45	0.27
60	0.27
90	0.26
120	0.24
140	0.28
160	0.20
190	0.34
220	0.24
260	0.31
295	0.31

**Table S22.** Rate of reduction of tetrathionate (to thiosulfate) during anaerobic slurry incubation of various sediment-samples of SSK42/6 in tetrathionate-containing heterotrophic RVTr medium.

Sediment-depths explored (in cmbsf)	Rate of tetrathionate reduction (in $\mu\text{mol S day}^{-1} \text{ g sediment}^{-1}$ )
2	0.35
30	0.28
45	0.5
60	0.58
75	0.49
90	0.86
120	1.2
135	1.28
160	1.30
175	1.35
220	1.5
250	1.62
275	1.70



**Table S24.** Concentrations of sulfate<sup>1</sup>, sulfide<sup>1</sup> and thiosulfate in the individual sample-sites of SSK42/5 and SSK42/6.

Sediment-depth (cmbsf)	SSK42/5			Sediment-depth (cmbsf)	SSK42/6		
	Sulfate (mM)	Sulfide ( $\mu$ M)	Thiosulfate ( $\mu$ M)		Sulfate (mM)	Sulfide ( $\mu$ M)	Thiosulfate ( $\mu$ M)
1	28.83	62.08	0.98	1	27.67	0	0
15	27.93	57.26	0.99	15	25.49	0	0
30	25.77	59.32	-	30	26.67	321.32	2.5
45	23.19	61.39	0.99	45	23.10	603.25	5.2
60	22.45	99.24	1.5	60	20.80	586.36	4.7
75	19.71	194.22	-	75	18.82	710.18	-
90	17.26	313.30	4.2	90	17.27	1070.38	8.2
105	17.64	427.00	-	105	16.42	507.57	-
120	16.27	226.57	4.0	120	15.38	772.09	7.5
135	15.83	254.93	-	135	14.43	704.55	7
145	14.79	296.78	3.1	145	13.40	1172.73	-
160	13.02	270.07	3.5	160	12.18	1037.66	8.5
175	13.00	183.90	-	175	10.17	1071.43	8.1
190	11.04	154.30	3.2	190	9.29	947.61	-
205	10.55	203.86	-	205	7.46	1341.58	-
220	9.64	61.39	1.1	220	5.61	1274.04	11.1
235	8.35	54.51	-	235	4.18	1240.27	-
250	6.65	58.64	1.2	250	2.04	2010.27	-
280	4.38	54.51	-	265	0.87	970.12	6.8
295	7.46	51.75	1.1	280	0.28	1217.76	5.5
				295	0.47	1116.45	-

<sup>1</sup>Data for pore-water sulfate and sulfide concentrations were taken from Fernandes et al. (2018); values for thiosulfate concentration was determined in this study.

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