

1 **Supplementary material**

2 Table S1. Isotope signature of several chemosynthetic species found at cold seeps (CS) and reduced sediments (RS). EP: Eastern Pacific; IP:
3 Indo-Pacific Ocean; NEA: North East Atlantic; NP: North Pacific; NWP: North Western Pacific; SEP: South Eastern Pacific; WA: Western
4 Atlantic; WP: Western Pacific. References: 1- this study; 2 - Sahling et al., 2003; 3 - Levin and Michener. 2002; 4 - Vetter and Fry, 1998; 5 -
5 Conway et al., 1989; 6 - Thurber et al., 2010; 7 - Dando et al., 1986; 8 - Duperron et al., 2007; 9 - Compton et al., 2004; 10 - Olu Le Roy et
6 al., 2004; 11 - Carlier et al., 2010 ; 12 Decker et al., 2010 ; 13 - Sellanes et al., 2008; 14 - Spiro et al., 1986; 15 - Cary et al., 1989 ; 16 -
7 Cavanaugh et al., 1992; 17 - Olu et al., 2009; 18 - MacAvoy et al., 2008; 19 - Schmaljohann et al., 1990; 20 - Gebruk et al., 2003.

	$\delta^{13}\text{C}$	$\delta^{15}\text{N}$	$\delta^{34}\text{S}$	Location	Site	Depth (m)	Ref.
BIVALVIA							
Solemyidae							
<i>Acharax gadirae</i>	-34.7 to -27.2	-3.4 to 2.7	-25.7 to 11.9	NEA	Gulf of Cadiz	556-3902	CS 1
<i>Acharax</i> sp.	-36.1 to -34.7	0.1 to 1.0		WP	Sea of Okhotsk	382	CS 2
<i>Acharax</i> sp.	-33.5	0.6 to 6.6		NP	Gulf of Alaska	4413-4447	CS 3
<i>Solemya elarraichenis</i>	-34.0 to -32.1	2.0 to 6.1	-16.5 to 2.2	NEA	Gulf of Cadiz	358-1115	CS 1
<i>Solemya reidi</i>			-30.4	EP	Sewage outfall	90	RS 4
<i>Solemya velum</i>	-33.9 to -31.5	-9.8 to -7.7	-31 to -28.2	WA	Salt Marsh	?	RS 5
Solemyidae und	-32.3 to -30.7	-0.7 to 4.4		WP	NZ methane seeps	1040-1056	CS 6
Lucinidae							
<i>Lucinoma asapheus</i>	-29.8	4.4	4.3	NEA	Gulf of Cadiz	358	CS 1
<i>Lucinoma borealis</i>	-29.0 to -24.1			NEA		0.5	RS 7
<i>Lucinoma kazani</i>	-30.5 to -28.2			NEA	Eastern Mediterranean	507-1691	CS 8
<i>Divaricella irpex</i>	-23.1	-0.9		IP	Roebuck Bay	3.5 – 8.5	RS 9
<i>Myrtea amorpha</i>	-30.1 to -27.7	-1.0 to 1.4		NEA	Eastern Mediterranean	1950- 2025	CS 10; 11
<i>Pseudomiltha</i> sp.			-10.6	WA	Lousiana slope	400-700 m	CS 4
Thyasiridae							
<i>Thyasira vulcolutre</i>	-35.9 to -34.4	2.1 to 5.6	-27.6 to 1.3	NEA	Gulf of Cadiz		CS 1
<i>Conchocele bisecta</i>	-33.1	4.2		NWP	Sea of Okhotsk	700	CS 2
<i>Thyasira und</i>					Haakon Mosby MV		CS 12

<i>Thyasira methanophila</i>	-35.4	10.2		SEP	CMSA	710-926	CS	13
<i>Thyasira sarsi</i>	-39.5 to -28.2			NEA	Norwegian fjord	60		14
<i>Thyasira striata</i>	-28.9	-5.2	-6.0	NEA	Eastern Mediterranean	2025	CS	11
Mytilidae								
<i>"Bathymodiolus « mauritanicus</i>	-52.4 to -48.9	-1.0 to 0.9	16.8 to 18.3	NEA	Gulf of Cadiz		CS	1
<i>Bathymodiolus</i> sp.			10.5	WA	Lousiana slope		CS	3
<i>Bathymodiolus</i> sp.			8.2		Brine seeps		CS	15
<i>Bathymodiolus</i> sp.	-35.6 to -32.7	-10.5 to -4.2		NA	Mid Atlantic Ridge		HV	16
<i>Bathymodiolus boomerang</i>	-67.0 to -62.4	-3.1 to 0.3		NEA	Gulf of Guinea		CS	17
<i>Bathymodiolus childressi</i>	-63.5 to -43.7	-16.1 to 3.7		WA	Gulf of Mexico (4 sites)		CS	18
SIBOGLINIDAE								
<i>Siboglinum Ib</i>	-35.9 to -33-1	0.2 to 12.2	-8.4 to 6.5	NEA	Gulf of Cadiz		CS	1
<i>Siboglinum Ia</i>	-38.2	3.0	1.1	NEA	Gulf of Cadiz		CS	1
<i>Siboglinum Id</i>	-49.8	4.2	6.0	NEA	Gulf of Cadiz		CS	1
<i>Siboglinum If</i>	-38.7	-1.3	-16.8	NEA	Gulf of Cadiz		CS	1
<i>Siboglinum cf. poseidoni</i>	-44.5 to -41.0	2.7 to 3.6	-8.2 to 3.6	NEA	Gulf of Cadiz		CS	1
<i>Siboglinum poseidoni</i>	-78.3 to -73.6			NEA			RS	19
Siboglinidae	-38.2 to 61.0	-2.7 to 2.5		NP	Gulf of Alaska	4413-4447	CS	3
<i>Lamelisabella denticulata</i>	-43.7 to -35.2	-0.6 to 6.6	-11.8 to -7-7	NEA	Gulf of Cadiz		CS	1
<i>Polybrachia</i> sp.1	-36.9	-1.1	2.5	NEA	Gulf of Cadiz		CS	1
<i>Siboglibnum atlanticum</i>	-45.8							13
<i>Siboglinum plumosum</i>	-43.4 to -39.0	4.2 to 7.0		NWP	Sea of Okhotsk	382-392	CS	2
<i>Lamellibrachia</i> sp.	-22.9							13
<i>Lamellibrachia</i> sp.	-35.9 to -28.8	2.2 to 4.9		IP	NZ methane seeps	800-1050	CS	6
<i>Oligobrachia haakonmosbiensis</i>	-56.1 to -51.1			NEA	Haakon Mosby MV		CS	20
Sclerolinidae	-38.0 to -30.5	0.8 to 1.2		NWP	Sea of Okhotsk	1522	CS	2
<i>Sclerolinum contortum</i>	-48.3 to -34.9			NEA	Haakon Mosby MV		CS	20
<i>Escarpia southwardae</i>	-36.2 to -24.2	2.5 to 2.9		NEA	Gulf of Guinea		CS	17
Frenulata und	-66.6 to -36.1	-4.4 to 7.3			NZ methane seeps	800-1050	CS	6