Electronic Supplementary Information

Bromoanisoles and Methoxylated Bromodiphenyl Ethers in Macroalgae from Nordic Coastal Regions

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Table S1. Replicate analysis of macroalgae[a].

		pg g^{-1} wet weight						
Sample	**Method[b]**	**2,4-DiBA**	**2,4,6-TriBA**	**triU1**	**triU2**	**2'-68**	**6-47**	**tetraU3**
Cladophora glomerata								
1	SOAK 1	126	515	16.7			54.6	
2	SOAK 1	120	497	16.4			39.0	
3	SOAK 1	102	559	15.6			35.8	
4	SOAK 1	122	504					
mean		118	519	16.2			43.1	
s.d.		10.6	27.9	0.6			10.1	
RSD %		9.0	5.4	3.5			23.3	
1	SOAK 2	131	553	18.6			41.0	
2	SOAK 2	103	405	13.9			29.8	
3	SOAK 2	102	565	14.4			38.6	
4	SOAK 2	121	572					
mean		114	524	15.6			36.5	
s.d.		14.2	79.5	2.6			5.9	
RSD %		12.4	15.2	16.5			16.2	
1	BLEND	136	455	13.2			53.1	
2	BLEND	70.3	401	10.0			26.3	
3	BLEND	77.2	373	*8.3*[c]			23.5	
4	BLEND	76.7	383					
mean		90.1	403	11.6			34.3	
s.d.		30.8	36.5	2.3			16.3	
RSD %		34.2	9.0	19.5			47.6	
		***p* -values (bold: significant)[d]**						
SOAK 1	SOAK 2	0.90	0.90	0.90			0.76	
SOAK 1	BLEND	0.20	**0.031**	**0.036**			0.63	
SOAK 2	BLEND	0.27	**0.026**	0.053			0.90	

a) tri-U1, tri-U2 and tetraU3 = MeO-BDEs with unknown tribromo- or tetrabromo- substituent positions.
2'-28 = 2'-MeO-BDE68, 6-47 = 6-MeO-BDE47.

b) See Table S1.

c) Below LOD.

d) One-way ANOVA, *post hoc* Tukey HSD test.

Table S1, continued. Replicate analysis of macroalgae[a].

		pg g^{-1} wet weight						
Sample	**Method[b]**	**2,4-DiBA**	**2,4,6-TriBA**	**triU1**	**triU2**	**2'-68**	**6-47**	**tetraU3**
Fucus radicans								
1	SOAK 1	703	5994	50.5	117	61.6	166	31.6
2	SOAK 1	843	6622	50.8	155	57.5	153	52.9
3	SOAK 1	911	6318	67.4	194	60.8	171	73.3
4	SOAK 1	857	7886	68.7	146	54.8	190	
mean		829	6705	59.4	153	58.7	170	52.6
s.d.		88.7	828.0	10.1	32.0	3.1	15.3	20.9
RSD %		10.7	12.3	17.0	20.9	5.3	9.0	39.7
1	SOAK 2	814	7391	57.5	196	72.8	186	65.6
2	SOAK 2	616	5642	40.9	93.5	51.0	129	33.4
3	SOAK 2	646	5572	47.7	135	65.3	165	51.7
4	SOAK 2	769	6984	52.5	101	78.1	160	
mean		711	6397	49.7	131	66.8	160	50.2
s.d.		95.3	928	7.1	46.7	11.8	23.4	16.2
RSD %		13.4	14.5	14.2	35.6	17.6	14.6	32.2
1	BLEND	641	6009	28.2	72.6	39.5	100	21.6
2	BLEND	628	5131	27.3	121	40.5	94.3	28.7
3	BLEND	620	3896	24.0	87.9	37.1	92.3	47.3
4	BLEND	557	4283	20.7	76.4	45.6	72.6	
mean		611	4830	25.0	89.6	40.7	89.8	32.5
s.d.		37.3	940	3.4	22.2	3.6	11.9	13.3
RSD %		6.1	19.5	13.5	24.8	8.8	13.3	40.9
		***p*-values (bold: significant)[d]**						
SOAK 1	SOAK 2	0.14	0.88	0.20	0.66	0.31	0.70	0.90
SOAK 1	BLEND	**0.0087**	**0.039**	**0.0010**	0.071	**0.018**	**0.0010**	0.38
SOAK 2	BLEND	0.22	0.083	**0.0026**	0.26	**0.0019**	**0.0010**	0.46

a) tri-U1, tri-U2 and tetraU3 = MeO-BDEs with unknown tribromo- or tetrabromo- substituent positions. 2'-28 = 2'-MeO-BDE68, 6-47 = 6-MeO-BDE47.

b) See Table S1.

c) Below LOD.

d) One-way ANOVA, *post hoc* Tukey HSD test.

Table S1, continued. Replicate analysis of macroalgae[a].

		pg g^{-1} wet weight						
Sample	**Method[b]**	**2,4-DiBA**	**2,4,6-TriBA**	**triU1**	**triU2**	**2'-68**	**6-47**	**tetraU3**
Fucus vesiculosus								
1	SOAK 1	825	3707		53.9	110	45.5	85.1
2	SOAK 1	1223	7159		71.1	101	35.1	101
3	SOAK 1	947	6805		65.3	134	38.5	115
4	SOAK 1	872	4413		42.6	83.7	29.1	41.3
mean		967	5521		58.2	107.1	37.1	85.7
s.d.		178	1717		12.7	21.0	6.8	32.1
RSD %		18.4	31.1		21.7	19.6	18.5	37.4
1	SOAK 2	1228	5056		89.5	122	32.5	55.9
2	SOAK 2	689	4178		50.0	71.0	23.4	35.2
3	SOAK 2	676	3790		47.9	64.7	25.4	50.0
4	SOAK 2	1118	8031		45.9	81.5	20.1	56.2
mean		928	5264		58.3	84.7	25.3	49.3
s.d.		287	1919		20.9	25.6	5.2	9.8
RSD %		30.9	36.5		35.8	30.2	20.7	19.9
1	BLEND	573	3669		33.7	61.2	19.4	32.5
2	BLEND	428	2076		28.4	39.6	11.7	*13.9*[c]
3	BLEND	664	4105		22.8	40.3	13.4	23.7
4	BLEND	706	3890		19.3	46.3	13.8	18.1
mean		593	3435		26.1	46.8	14.6	24.8
s.d.		123	923		6.3	10.0	3.3	7.2
RSD %		20.8	26.9		24.2	21.4	22.9	29.2
		***p* -values (bold: significant)[d]**						
SOAK 1	SOAK 2	0.90	0.90		0.90	0.30	**0.031**	0.069
SOAK 1	BLEND	0.07	0.20		**0.029**	**0.0053**	**0.0010**	**0.0037**
SOAK 2	BLEND	0.11	0.28		**0.029**	0.06	**0.045**	0.18

a) tri-U1, tri-U2 and tetraU3 = MeO-BDEs with unknown tribromo- or tetrabromo- substituent positions.
2'-28 = 2'-MeO-BDE68, 6-47 = 6-MeO-BDE47.

b) See Table S1.

c) Below LOD.

d) One-way ANOVA, *post hoc* Tukey HSD test.

Table S1, continued. Replicate analysis of macroalgae[a].

		pg g^{-1} wet weight						
Sample	**Method[b]**	**2,4-DiBA**	**2,4,6-TriBA**	**triU1**	**triU2**	**2'-68**	**6-47**	**tetraU3**
Ascophyllum nodosum								
1	SOAK 1	24960	27600		59.9	267	28.7	
2	SOAK 2	15950	20840		65.2	292	21.7	
3	BLEND	14560	18950		30.9	160	16.5	
SOAK1/SOAK2		1.56	1.32		0.92	0.92	1.32	
BLEND/SOAK2		0.91	0.91		0.47	0.55	0.76	
Fucus serratus								
1	SOAK 1	336.0	321.0		15.2	43.1		
2	SOAK 2	690.0	523.0		14.6	32.6		
3	BLEND	616.0	680.0		12.1	19.5		
SOAK1/SOAK2		0.49	0.61		1.04	1.32		
BLEND/SOAK2		0.89	1.30		0.83	0.60		
Rhodomela confervoides								
1	SOAK 1	118	333					
2	SOAK 2	87.5	362					
3	BLEND	75.5	337					
SOAK1/SOAK2		1.34	0.92					
BLEND/SOAK2		0.86	0.93					
Saccharina latissima								
1	SOAK 1	95	737					
2	SOAK 2	130	1273					
3	BLEND	133	991					
SOAK1/SOAK2		0.73	0.58					
BLEND/SOAK2		1.02	0.78					
Ulva intestinalis								
1	SOAK 1	70.4	563				19.5	
2	SOAK 2	61.5	634				34.9	
3	BLEND	68.2	780				*11*[c]	
SOAK1/SOAK2		1.14	0.89				0.56	
BLEND/SOAK2		1.11	1.23				0.55	

a) tri-U1, tri-U2 and tetraU3 = MeO-BDEs with unknown tribromo- or tetrabromo- substituent positions. 2'-28 = 2'-MeO-BDE68, 6-47 = 6-MeO-BDE47.

b) See Table S1.

c) Below LOD.

Table S2. BAs, tribromo- and tetrabromo-MeO-BDEs in Nordic macroalgae, pg g^{-1} ww.

Species[a]	Group[b]	2,4-DiBA	2,4,6-TriBA	TriU1-MeOBDE[c]	TriU2-MeOBDE[c]	2'-MeOBDE68	6-MeOBDE47	TetU3-MeOBDE[b]	∑BAs	∑MeO-BDEs
Bothnian Sea										
Cet	red alga	71	3290	22	18	80	56	23	3360	199
Chv	green alga[d]	<15	57	31	<10	47	25	<17	57	103
Clg	green alga	107	484	16	<10	<17	40	<17	591	56
Dif	brown alga	106	217	19	21	20	<17		324	61
Fur	brown alga	717	5980	55	142	63	165	51	6690	476
Stt	brown alga	<15	976	<10	<10	20	37	<17	976	56
Uli	green alga	67	659	<10	<10	18	27	<17	726	45
Skagerrak										
Asn	brown alga	18500	22500	<10	63	280	25	29	41000	396
Cev	red alga	210	970	<10	<10	30	<17	<17	1180	30
Ful	red alga	275	579	<10	<10	<17	<17	<17	854	<10
Fus	brown alga	612	548	<10	15	38	<17	32	1160	85
Fuv	brown alga	829	4740	<10	58	96	31	67	5570	253
Rhc	red alga	94	344	<10	<10	<17	<17	<17	437	<10
Sal	brown alga	119	1000	<10	<10	<17	<17	<17	1120	<10
Coastal Norway										
Ac/Sp	green alga	507	910	<10	<10	<17	<17	<17	1420	<10
Asn	brown alga	9790	47900	<10	<10	34	<17	<17	57700	34
Fuv	brown alga	1190	2780	<10	<10	18	34	<17	3970	52
Lad	brown alga	88	12300	<10	<10	<17	<17	<17	12400	<10

a) See Table 1 for full species names and collection information.
b) Nomenclature follows AlgaeBase (www.algaebase.org).
c) TriU1-MeO-BDE, TriU2-MeO-BDE and TetU3-MeO-BDE are compounds with unknown bromine substituent positions. See Figure 2 in the main paper.
d) Stonewort.

Table S3. Semiquantitative GC-HRMS analysis of pentabromo-MeO-BDEs in Nordic macroalgae, pg g^{-1} ww[a].

Species[b]	Group	6-MeOBDE85	6-MeOBDE90	6-MeOBDE99
Bothnian Sea				
Cet	red alga	17		
Clg	green alga			
Fur	brown alga	18	3.2	7.2
Uli	green alga			
Skagerrak				
Asn	brown alga	1.3	2.2	1.8
Ful	red alga			
Fuv	brown alga	6.3	4.6	
Rhc	red alga			
Sal	brown alga			

a) No internal standard, assumes 200-µL sample volume.
b) See Table 1 for full species names and collection information.