

## Accessory publication

**Table A1. Univariant analysis of variance for total arsenic among locations and tissues for each species**NS, not significant at  $P \geq 0.05$ ; MS, mean squared

Species	Variable	d.f.	MS	As	
				<i>F</i>	<i>P</i>
<i>Ecklonia radiata</i>	Tissue	3	15412.1	32.415	<0.001
	Location	2	1148.5	2.415	NS
	Loc × Tissue	6	548.1	0.347	NS
<i>Haliotis rubra</i>	Tissue	3	12705.4	11.895	<0.001
	Location	2	2379.6	2.228	NS
	Loc × Tissue	6	241.8	0.226	NS
<i>Turbo torquatus</i>	Tissue	2	4859.7	26.880	<0.001
	Location	2	182.7	1.011	NS
	Loc × Tissue	4	266.9	1.477	NS
<i>Heliocidaris erythrogramma</i>	Tissue	2	14.9	77.018	<0.001
	Location	2	4.3	22.365	<0.001
	Loc × Tissue	4	0.984	5.075	<0.01
<i>Centrostephanus rodgersii</i>	Tissue	2	10676.0	4.433	<0.05
	Location	2	406.1	0.169	NS
	Loc × Tissue	4	1920.2	0.797	NS
<i>Odax cyanomelas</i> <sup>A</sup>	Tissue	9	1012.5	14.568	<0.001

<sup>A</sup>A one-way analysis of variance was conducted on the *O. cyanomelas* as the fish were only caught at one location and therefore comparisons among locations could not be made.

**Table A2. Total arsenic concentrations (mean  $\pm$  s.d.) of *E. radiata* and animals among locations**

Order – Family	Species	Tissue	Broulee As $\mu\text{g g}^{-1}$ (n = 5)	Long Beach As $\mu\text{g g}^{-1}$ (n = 5)	Rosedale As $\mu\text{g g}^{-1}$ (n = 5)	All locations As $\mu\text{g g}^{-1}$ (n = 15)
Laminariales	<i>E. radiata</i>					
Alariaceae	Stage 1	Blade		74 $\pm$ 31		
		Meristem		68 $\pm$ 15		
		Stipe		68 $\pm$ 10		
		Holdfast		110 $\pm$ 42		
	Stage 2	Blade		40 $\pm$ 5		
		Meristem		47 $\pm$ 4		
		Stipe		45 $\pm$ 14		
		Holdfast		153 $\pm$ 31		
	Stage 3	Blade	52 $\pm$ 8	48 $\pm$ 8	62 $\pm$ 20	55 $\pm$ 14
		Meristem	68 $\pm$ 21	48 $\pm$ 11	43 $\pm$ 25	53 $\pm$ 22
		Stipe	48 $\pm$ 10	53 $\pm$ 12	34 $\pm$ 2	46 $\pm$ 12
		Holdfast	132 $\pm$ 42	110 $\pm$ 42	101 $\pm$ 16	113 $\pm$ 33
Archeogastropoda	<i>H. rubra</i>	Muscle	58 $\pm$ 54	45 $\pm$ 11	55 $\pm$ 10	53 $\pm$ 31
Haliotidae		Gonad	72 $\pm$ 22	58 $\pm$ 27	93 $\pm$ 44	74 $\pm$ 33
		Digestive	123 $\pm$ 43	98 $\pm$ 32	121 $\pm$ 54	114 $\pm$ 42
		Gill	57 $\pm$ 21	41 $\pm$ 2	55 $\pm$ 19	51 $\pm$ 17
Vetigastropoda	<i>T. torquatus</i>	Muscle	16 $\pm$ 5	18 $\pm$ 5	18 $\pm$ 3	17 $\pm$ 4
Turbinidae		Gonad	53 $\pm$ 7	37 $\pm$ 10	58 $\pm$ 25	49 $\pm$ 18
		Organ	42 $\pm$ 11	50 $\pm$ 14	49 $\pm$ 21	47 $\pm$ 15
Echinoida	<i>H. erythrogramma</i>	Visceral mass	59 $\pm$ 48	46 $\pm$ 15	149 $\pm$ 63	76 $\pm$ 64
Echinometridae		Gonad	72 $\pm$ 99	8.6 $\pm$ 2.0	17 $\pm$ 8	10 $\pm$ 7
		Food pellets	6.8 $\pm$ 1.5	28 $\pm$ 18	13 $\pm$ 2	16 $\pm$ 13
	<i>C. rodgersii</i>	Visceral mass	32 $\pm$ 10	97 $\pm$ 64	66 $\pm$ 26	74 $\pm$ 48
		Gonad	5.1 $\pm$ 1.5	50 $\pm$ 43	42 $\pm$ 15	55 $\pm$ 59
		Food pellets	7.8 $\pm$ 2.9	21 $\pm$ 11	36 $\pm$ 52	21 $\pm$ 31
Perciformes	<i>O. cyanomelas</i> <sup>A</sup>	Muscle	–	–	–	6.4 $\pm$ 1.5
Odacidae		Liver	–	–	–	12 $\pm$ 2
		Kidney	–	–	–	14 $\pm$ 9
		Foregut	–	–	–	25 $\pm$ 3
		Hindgut	–	–	–	27 $\pm$ 4
		Gill	–	–	–	14 $\pm$ 1
		Heart	–	–	–	16 $\pm$ 4
		Brain	–	–	–	7.7 $\pm$ 2.3
		Eyes	–	–	–	77 $\pm$ 25
		Gut contents	–	–	–	37 $\pm$ 7

<sup>A</sup>Only 5 replicates of each tissue were analysed for the fish *O. cyanomelas*.

**Table A3. Total and methanol/water extracted arsenic (mean ± s.d.) of species and tissues from pooled samples**

Total column recoveries (% ± reproducibility of replicate measurements) were calculated by the total sum of species off all columns divided by the total arsenic injected onto the column

Species	Tissue	Total As µg As g <sup>-1</sup> <sup>A</sup>	Acetone % <sup>B</sup>	Methanol/water % <sup>B</sup>	Total column recoveries %
<i>E. radiata</i> Stage 1	Blade	44 ± 2	1.2 ± 0.2	88 ± 6	84 ± 6
	Meristem	51 ± 1	0.6 ± 0.1	106 ± 7	93 ± 6
	Stipe	52 ± 2	0.4 ± 0.1	88 ± 6	97 ± 7
	Holdfast	88 ± 5	0.24 ± 0.04	89 ± 6	96 ± 7
<i>E. radiata</i> Stage 2	Blade	29 ± 1	0.6 ± 0.1	73 ± 5	92 ± 6
	Meristem	46 ± 3	0.21 ± 0.03	92 ± 6	98 ± 7
	Stipe	28 ± 1	0.20 ± 0.03	90 ± 6	85 ± 6
	Holdfast	149 ± 2	0.4 ± 0.1	107 ± 7	91 ± 6
<i>E. radiata</i> Stage 3	Blade	46 ± 1	1.0 ± 0.2	83 ± 6	84 ± 6
	Meristem	38 ± 1	0.4 ± 0.1	85 ± 6	100 ± 7
	Stipe	31 ± 2	0.12 ± 0.02	98 ± 7	100 ± 7
	Holdfast	91 ± 8	0.24 ± 0.03	106 ± 7	77 ± 5
<i>H. rubra</i>	Muscle	36 ± 2	1.0 ± 0.2	104 ± 7	95 ± 7
	Gonad	54 ± 4	4.6 ± 0.7	86 ± 6	77 ± 5
	Digestive	112 ± 1	2.3 ± 0.4	100 ± 7	98 ± 7
	Gill	45 ± 1	2.8 ± 0.4	79 ± 5	85 ± 6
	Gut contents	84 ± 5	0.4 ± 0.06	75 ± 5	103 ± 7
<i>T. torquatus</i>	Muscle	13 ± 1	2.9 ± 0.4	62 ± 4	90 ± 6
	Gonad	31 ± 2	5.7 ± 0.9	57 ± 4	94 ± 7
	Organ	38 ± 1	1.0 ± 0.2	73 ± 5	96 ± 7
<i>H. erythrogramma</i>	Visceral	41 ± 2	2.4 ± 0.4	105 ± 7	94 ± 7
	Gonad	10 ± 1	8.9 ± 1.3	98 ± 7	83 ± 6
	Food pellets	12 ± 1	1.5 ± 0.2	36 ± 2	87 ± 6
<i>C. rogersii</i>	Visceral	53 ± 1	1.8 ± 0.3	97 ± 7	109 ± 8
	Gonad	13 ± 2	16 ± 2	94 ± 6	85 ± 6
	Food pellets	10 ± 1	0.8 ± 0.1	25 ± 2	104 ± 7
<i>O. cyanomelas</i>	Muscle	5.8 ± 1	1.0 ± 0.2	74 ± 5	94 ± 7
	Liver	12 ± 1	12 ± 1	53 ± 4	97 ± 7
	Digestive	22 ± 1	5.0 ± 0.8	72 ± 5	89 ± 6
	Gill	11 ± 1	11 ± 2	62 ± 4	89 ± 6
	Gut contents	29 ± 3	0.7 ± 0.1	89 ± 6	87 ± 6

<sup>A</sup>Mean and s.d. for triplicate measurements of a pooled sample. <sup>B</sup>Percentage recoveries based on the difference of the recovery of arsenic from the extraction compared with the total arsenic determined by inductively coupled plasma mass spectrometer (ICP-MS).

**Table A4. Methanol/water extractable cationic and anionic arsenic species from different growth stages of *Ecklonia radiata***

U, unidentified; Gly-riboside, glycerol-riboside; DMA, dimethylarsinate; PO<sub>4</sub>-riboside, phosphate-riboside; As<sup>V</sup>, arsenate; SO<sub>3</sub>-riboside, sulfonate-riboside; OSO<sub>3</sub>-riboside, sulphate-riboside. Arsenic species concentration ± calculated uncertainty (reproducibility of the measurement was calculated based on repeated measurements (*n* = 3) each of 0.5, 1, 10 and 100 µg L<sup>-1</sup> standards during each analytical run and compared with the initial calibration

Sample	Tissue	Cations		Anions					
		U 2 µg As g <sup>-1</sup>	U 3 µg As g <sup>-1</sup>	Gly-riboside µg As g <sup>-1</sup>	DMA µg As g <sup>-1</sup>	PO <sub>4</sub> -riboside µg As g <sup>-1</sup>	As <sup>V</sup> µg As g <sup>-1</sup>	SO <sub>3</sub> riboside µg As g <sup>-1</sup>	OSO <sub>3</sub> -riboside µg As g <sup>-1</sup>
<i>E. radiata</i>	Blade	0.23 ± 0.01 (0.7)	n.d. <sup>A</sup>	1.1 ± 0.1 (3.3)	0.31 ± 0.03 (1.0)	6.5 ± 0.7 (20)	n.d.	24 ± 3 (74)	n.d.
Stage 1	Meristem	0.07 ± 0.01 (0.1)	n.d.	0.84 ± 0.04 (1.7)	0.21 ± 0.03 (0.4)	7.2 ± 0.8 (14)	n.d.	42 ± 5 (83)	n.d.
	Stipe	0.19 ± 0.01 (0.4)	n.d.	2.4 ± 0.1 (5.3)	0.26 ± 0.03 (0.6)	12 ± 1 (28)	5.6 ± 0.6 (13)	23 ± 3 (53)	n.d.
	Holdfast	0.09 ± 0.01 (0.1)	n.d.	1.7 ± 0.1 (2.3)	0.28 ± 0.03 (0.4)	15 ± 2 (19)	n.d.	58 ± 6 (77)	0.27 ± 0.03 (0.4)
<i>E. radiata</i>	Blade	0.04 ± 0.01 (0.2)	n.d.	1.1 ± 0.1 (5.3)	0.28 ± 0.03 (1.4)	2.9 ± 0.3 (15)	n.d.	15 ± 2 (76)	n.d.
Stage 2	Meristem	0.03 ± 0.01 (0.1)	n.d.	0.90 ± 0.04 (2.2)	0.15 ± 0.02 (0.4)	4.5 ± 0.5 (11)	n.d.	35 ± 4 (86)	n.d.
	Stipe	0.03 ± 0.01 (0.1)	n.d.	1.4 ± 0.1 (6.5)	0.14 ± 0.02 (0.7)	2.0 ± 0.2 (9.6)	n.d.	17 ± 2 (83)	n.d.
	Holdfast	n.d.	n.d.	1.4 ± 0.1 (0.9)	0.45 ± 0.05 (0.3)	11 ± 1 (7.8)	n.d.	132 ± 15 (91)	0.60 ± 0.06 (0.4)
<i>E. radiata</i>	Blade	n.d.	0.19 ± 0.01 (0.6)	2.1 ± 0.1 (6.5)	0.51 ± 0.06 (1.6)	5.9 ± 0.6 (18)	n.d.	23 ± 3 (73)	n.d.
Stage 3	Meristem	0.02 ± 0.01 (0.1)	n.d.	1.3 ± 0.1 (3.9)	0.13 ± 0.01 (0.4)	7.1 ± 0.8 (22)	n.d.	23 ± 3 (73)	n.d.
	Stipe	0.06 ± 0.01 (0.2)	n.d.	2.6 ± 0.1 (8.5)	0.19 ± 0.02 (0.6)	4.4 ± 0.5 (14)	n.d.	23 ± 3 (76)	n.d.
	Holdfast	0.07 ± 0.01 (0.1)	n.d.	1.9 ± 0.1 (2.5)	0.38 ± 0.04 (0.5)	8.3 ± 0.9 (11)	n.d.	63 ± 7 (86)	n.d.
Peak time (min) mean ± s.d.		5.76 ± 0.17	6.07 ± 0.39	6.75 ± 0.09	2.82 ± 0.02	5.00 ± 0.08	8.38 ± 0.32	8.87 ± 0.40	19.4 ± 0.9

<sup>A</sup>n.d. <0.01 µg g<sup>-1</sup> As based on 20-µl injection. Arsenic species below detection limits were AB, Gly-riboside, TriMeOH, TMAP, DMAE, AC, TETRA, As<sup>III</sup>, MA.

**Table A5. PCA results of arsenic species proportions in intertidal gastropod species**

Factor loadings in bold have more influence on the samples location in three-dimensional space. PC1–3, principle component axes 1 to 3; AB, arsenobetaine; Gly-riboside, glycerol-riboside; TriMeOH, trimethylarsonioriboside; TMAP, trimethylarsoniopropionate; DMAE, 2-dimethylarsinoyl ethanol; AC, arsenocholine; TETRA, tetramethylarsonium ion; DMA, dimethylarsinate; DMAA/MA, 2-dimethylarsinoyl acetic acid/methylarsonate; PO<sub>4</sub>-riboside, phosphate-riboside; As<sup>V</sup>, arsenate; SO<sub>3</sub>-riboside, sulfonate-riboside; OSO<sub>3</sub>-riboside, sulphate-riboside; Thio denotes oxygen replaced by sulfur on the arsenic atom

Axis	Eigenvalues	%Variation	Cumulative % variation
PC1	10.94	34.2	34.2
PC2	3.79	11.8	46.0
PC3	3.39	10.6	56.6
Variable	PC1	PC2	PC3
AB	0.178	0.156	-0.13
Unknown 1	0.254	-0.215	0.054
Unknown 2	0.231	0.029	-0.039
Unknown 3	<b>0.286</b>	0.06	-0.024
Gly-riboside	0.111	<b>-0.448</b>	0.065
Unknown 4	<b>0.291</b>	0.061	-0.028
TriMeOH	<b>0.299</b>	0.024	-0.025
TMAP	0.039	0.099	<b>-0.453</b>
DMAE	<b>-0.033</b>	0.042	-0.405
Unknown 5	<b>0.287</b>	0.076	-0.013
AC	0.118	0.059	0.155
TETRA	-0.005	0.092	-0.062
Unknown 6/7	<b>0.291</b>	0.061	-0.028
DMA	0.12	-0.082	0.013
Unknown 8	<b>0.291</b>	0.061	-0.028
Unknown 9	0.246	0.067	-0.05
DMAA/MA	-0.01	-0.093	0.12
PO <sub>4</sub> -riboside	-0.022	-0.021	<b>-0.425</b>
As <sup>V</sup>	0.028	<b>-0.468</b>	0.073
SO <sub>3</sub> -riboside	<b>-0.036</b>	-0.075	0.062
Unknown 10	-0.021	0.019	-0.442
OSO <sub>3</sub> -riboside	-0.019	0.029	0.222
Unknown 11	0.01	<b>-0.463</b>	0.009
Unknown 12	<b>0.292</b>	-0.046	0.004
Thio-SO <sub>3</sub> -riboside	0.241	-0.242	0.081
Thio-PO <sub>4</sub> -riboside	0.022	<b>0.199</b>	0.267
Thio-OSO <sub>3</sub> -riboside	0.073	0.187	<b>0.320</b>
Thio-Gly-riboside	0.026	<b>0.208</b>	0.308
Unknown 13	-0.022	-0.21	-0.034

**Table A6. Methanol/water extractable cationic arsenic species from *Ecklonia radiata* ecosystem organisms**

AB, arsenobetainie; U, unidentified; Gly-riboside, glycerol-riboside; TriMeOH, trimethylarsonioriboside; TMAP, trimethylarsoniopropionate; DMAE, 2-dimethylarsinoyl ethanol; AC, arsenocholine; TETRA, tetramethylarsonium ion. Arsenic species concentration  $\pm$  calculated uncertainty (reproducibility of the measurement was calculated based on repeated-measurements ( $n = 3$ ) each of 0.5, 1, 10 and 100  $\mu\text{g L}^{-1}$  standards (AB, TMAP, AC, TETRA) during each analytical run and compared with the initial calibration

Sample	Tissue	AB $\mu\text{g As g}^{-1}$	U 1 $\mu\text{g As g}^{-1}$	U 2 $\mu\text{g As g}^{-1}$	U 3 $\mu\text{g As g}^{-1}$	Gly-riboside $\mu\text{g As g}^{-1}$	U4 $\mu\text{g As g}^{-1}$	TriMeOH $\mu\text{g As g}^{-1}$	TMAP $\mu\text{g As g}^{-1}$	DMAE $\mu\text{g As g}^{-1}$	U 5 $\mu\text{g As g}^{-1}$	AC $\mu\text{g As g}^{-1}$	TETRA $\mu\text{g As g}^{-1}$
<i>Haliotis rubra</i>	Muscle	33 $\pm$ 2 (92)	n.d. <sup>A</sup>	n.d.	n.d.	0.15 $\pm$ 0.01 (0.4)	n.d.	0.26 $\pm$ 0.1 (0.7)	0.60 $\pm$ 0.03 (1.6)	n.d.	n.d.	0.11 $\pm$ 0.01 (0.3)	0.25 $\pm$ 0.01 (0.7)
	Gonad	14 $\pm$ 1 (39)	0.21 $\pm$ 0.01 (0.6)	n.d.	n.d.	1.9 $\pm$ 0.1 (5.2)	n.d.	4.4 $\pm$ 0.2 (12)	0.07 $\pm$ 0.01 (0.2)	n.d.	n.d.	0.57 $\pm$ 0.03 (1.6)	0.34 $\pm$ 0.02 (0.9)
	Digestive	28 $\pm$ 2 (25)	0.33 $\pm$ 0.02 (0.3)	0.48 $\pm$ 0.02 (0.4)	1.2 $\pm$ 0.1 (1.1)	4.4 $\pm$ 0.2 (3.9)	1.2 $\pm$ 0.1 (1.1)	24 $\pm$ 1 (22)	0.37 $\pm$ 0.01 (0.3)	n.d.	n.d.	1.3 $\pm$ 0.1 (1.2)	1.8 $\pm$ 0.1 (1.6)
	Gill	18 $\pm$ 1 (59)	0.05 $\pm$ 0.01 (0.2)	n.d.	n.d.	1.8 $\pm$ 0.1 (6.0)	n.d.	1.9 $\pm$ 0.1 (6.4)	0.52 $\pm$ 0.03 (1.7)	n.d.	n.d.	0.29 $\pm$ 0.01 (1.0)	2.4 $\pm$ 0.1 (8)
	Gut contents	0.15 $\pm$ 0.01 (0.2)	0.26 $\pm$ 0.01 (0.4)	n.d.	n.d.	12 $\pm$ 1 (19)	n.d.	1.9 $\pm$ 0.1 (2.9)	n.d.	n.d.	n.d.	n.d.	n.d.
<i>Turbo torquatus</i>	Muscle	5.1 $\pm$ 0.3 (67)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	0.03 $\pm$ 0.01 (0.4)	n.d.	n.d.	0.04 $\pm$ 0.01 (0.6)	0.31 $\pm$ 0.02 (4.1)
	Gonad	7.7 $\pm$ 0.4 (46)	0.06 $\pm$ 0.01 (0.4)	n.d.	n.d.	1.1 $\pm$ 0.1 (6.5)	n.d.	0.013 $\pm$ 0.001 (0.1)	n.d.	n.d.	n.d.	0.22 $\pm$ 0.01 (1.3)	0.73 $\pm$ 0.04 (4.4)
	Organ	13 $\pm$ 1 (50)	0.08 $\pm$ 0.01 (0.3)	n.d.	n.d.	1.4 $\pm$ 0.1 (5.3)	n.d.	0.23 $\pm$ 0.01 (0.9)	0.07 $\pm$ 0.01 (0.3)	n.d.	n.d.	0.18 $\pm$ 0.01 (0.7)	4.6 $\pm$ 0.2 (17)
<i>Haliocidaris erythrogramma</i>	Visceral	12 $\pm$ 1 (31)	n.d.	n.d.	n.d.	1.7 $\pm$ 0.1 (4.2)	n.d.	n.d.	0.86 $\pm$ 0.04 (2.1)	n.d.	n.d.	0.05 $\pm$ 0.01 (0.1)	0.04 $\pm$ 0.01 (0.1)
	Gonad	6.9 $\pm$ 0.4 (83)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	0.22 $\pm$ 0.01 (2.5)	n.d.	0.07 $\pm$ 0.01 (0.8)	n.d.
	Food pellets	1.3 $\pm$ 0.1 (36)	n.d.	n.d.	n.d.	0.17 $\pm$ 0.01 (4.5)	n.d.	n.d.	n.d.	0.55 $\pm$ 0.03 (14)	n.d.	n.d.	n.d.

<sup>A</sup>n.d. <0.01  $\mu\text{g g}^{-1}$  As based on 20- $\mu\text{l}$  injection.

**Table A6. (Continued)**

Sample	Tissue	AB µg As g <sup>-1</sup>	U 1 µg As g <sup>-1</sup>	U 2 µg As g <sup>-1</sup>	U 3 µg As g <sup>-1</sup>	Gly-riboside µg As g <sup>-1</sup>	U4 µg As g <sup>-1</sup>	TriMeOH µg As g <sup>-1</sup>	TMAP µg As g <sup>-1</sup>	DMAE µg As g <sup>-1</sup>	U 5 µg As g <sup>-1</sup>	AC µg As g <sup>-1</sup>	TETRA µg As g <sup>-1</sup>
<i>Centrostephanus rodgersii</i>	Visceral	7.9 ± 0.4 (14)	n.d.	n.d.	n.d.	0.93 ± 0.04 (1.7)	n.d.	n.d.	n.d.	1.1 ± 0.1 (2.0)	n.d.	n.d.	n.d.
	Gonad	3.9 ± 0.2 (38)	n.d.	0.11 ± 0.01 (1)	n.d.	0.51 ± 0.01 (4.9)	n.d.	n.d.	0.19 ± 0.01 (1.8)	n.d.	n.d.	0.03 ± 0.01 (0.3)	0.06 ± 0.01 (0.5)
	Food pellets	0.58 ± 0.03 (23)	n.d.	n.d.	n.d.	0.08 ± 0.01 (3.1)	n.d.	n.d.	n.d.	0.31 ± 0.01 (12)	n.d.	n.d.	n.d.
<i>Odax cyanomelas</i>	Muscle	0.15 ± 0.01 (4)	n.d.	n.d.	n.d.	0.14 ± 0.01 (3.5)	n.d.	n.d.	0.07 ± 0.01 (1.8)	n.d.	n.d.	n.d.	0.08 ± 0.01 (1.9)
	Liver	0.50 ± 0.02 (8)	n.d.	n.d.	n.d.	0.26 ± 0.01 (4.1)	n.d.	n.d.	n.d.	n.d.	0.08 ± 0.01 (1.2)	0.04 ± 0.01 (0.6)	n.d.
	Digestive	0.21 ± 0.01 (1.5)	n.d.	n.d.	n.d.	1.6 ± 0.1 (11)	n.d.	n.d.	n.d.	n.d.	0.50 ± 0.02 (3.6)	0.04 ± 0.01 (0.3)	0.05 ± 0.01 (0.3)
	Gill	0.96 ± 0.05 (15)	n.d.	n.d.	n.d.	0.66 ± 0.03 (10)	n.d.	n.d.	n.d.	n.d.	1.5 ± 0.1 (24)	n.d.	n.d.
	Gut contents	n.d.	n.d.	n.d.	n.d.	2.6 ± 0.1 (12)	n.d.	n.d.	n.d.	n.d.	0.81 ± 0.04 (3.6)	n.d.	n.d.
Peak time (min) mean ± s.d.		4.09 ± 0.06	4.98 ± 0.06	5.76 ± 0.17	6.07 ± 0.39	6.75 ± 0.09	7.33 ± 0.04	7.93 ± 0.06	8.82 ± 0.14	8.95 ± 0.26	10.1 ± 0.1	11.0 ± 0.2	13.1 ± 0.2

**Table A7. Methanol/water extractable thioarsenic species from *Ecklonia radiata* ecosystem organisms**

U, unidentified; Thio-SO<sub>3</sub> riboside, thio-sulfonate-riboside; Thio-PO<sub>4</sub>-riboside, thio-phosphate-riboside; Thio-OSO<sub>3</sub>-riboside, thio-sulfate-riboside; Thio-Gly-riboside, thio-glycerol-riboside. Arsenic species concentration ± calculated uncertainty (reproducibility of the measurement was calculated based on repeated measurements ( $n = 2$ ) of 0.5, 1, 10 and 100 µg L<sup>-1</sup> standards (arsenobetainie, AB) during each analytical run and compared with the initial calibration)

Sample		U 11 µg As g <sup>-1</sup>	U 12 µg As g <sup>-1</sup>	Thio-SO <sub>3</sub> - riboside µg As g <sup>-1</sup>	Thio-PO <sub>4</sub> - riboside µg As g <sup>-1</sup>	Thio-OSO <sub>3</sub> - riboside µg As g <sup>-1</sup>	Thio-Gly- riboside µg As g <sup>-1</sup>	U13 µg As g <sup>-1</sup>
<i>Haliotis rubra</i>	Muscle	n.d. <sup>A</sup>	n.d.	n.d.	0.17 ± 0.01 (0.5)	n.d.	0.11 ± 0.01 (0.3)	0.06 ± 0.01 (0.2)
	Gonad	n.d.	0.10 ± 0.01 (0.3)	0.02 ± 0.01 (0.8)	n.d.	n.d.	n.d.	n.d.
	Digestive	n.d.	0.22 ± 0.02 (0.2)	0.44 ± 0.01 (0.4)	0.17 ± 0.01 (0.2)	0.05 ± 0.01 (0.04)	0.04 ± 0.01 (0.04)	n.d.
	Gill	n.d.	n.d.	0.08 ± 0.01 (0.3)	n.d.	n.d.	0.04 ± 0.01 (0.1)	n.d.
	Gut contents	0.15 ± 0.01 (0.2)	0.05 ± 0.01 (0.1)	0.40 ± 0.03 (0.6)	n.d.	n.d.	n.d.	0.07 ± 0.01 (0.1)
<i>Turbo torquatus</i>	Muscle	n.d.	n.d.	n.d.	1.0 ± 0.1 (14)	0.12 ± 0.01 (1.7)	0.25 ± 0.02 (3.4)	0.02 ± 0.01 (0.2)
	Gonad	n.d.	n.d.	0.08 ± 0.01 (0.5)	0.06 ± 0.01 (0.4)	n.d.	0.04 ± 0.01 (0.2)	n.d.
	Organ	n.d.	0.02 ± 0.01 (0.1)	0.13 ± 0.01 (0.5)	0.13 ± 0.01 (0.5)	0.05 ± 0.01 (0.2)	0.15 ± 0.01 (0.6)	n.d.
<i>Heliocidaris erythrogramma</i>	Visceral	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
	Gonad	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
	Food pellets	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
<i>Centrostephanus rogersii</i>	Visceral	0.04 ± 0.01 (0.1)	n.d.	n.d.	0.11 ± 0.01 (0.2)	n.d.	0.02 ± 0.01 (0.04)	0.04 ± 0.01 (0.1)
	Gonad	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
	Food pellets	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
<i>Odax cyanomelas</i>	Muscle	0.02 ± 0.01 (0.5)	n.d.	n.d.	0.12 ± 0.01 (3.0)	n.d.	n.d.	n.d.



**Table A7.** (Continued)

Sample	U 11 $\mu\text{g As g}^{-1}$	U 12 $\mu\text{g As g}^{-1}$	Thio-SO <sub>3</sub> - ribose $\mu\text{g As g}^{-1}$	Thio-PO <sub>4</sub> - ribose $\mu\text{g As g}^{-1}$	Thio-OSO <sub>3</sub> - ribose $\mu\text{g As g}^{-1}$	Thio-Gly- ribose $\mu\text{g As g}^{-1}$	U13 $\mu\text{g As g}^{-1}$
Liver	0.02 ± 0.01 (0.3)	n.d.	n.d.	0.05 ± 0.01 (0.8)	n.d.	0.04 ± 0.01 (0.7)	n.d.
Digestive	0.02 ± 0.01 (0.2)	n.d.	0.06 ± 0.01 (0.4)	0.07 ± 0.01 (0.5)	n.d.	0.09 ± 0.01 (0.6)	n.d.
Gill	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Gut contents	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Peak time (min) mean ± s.d.	6.35 ± 0.19	6.85 ± 0.08	7.55 ± 0.12	8.26 ± 0.36	10.0 ± 0.7	13.5 ± 0.4	16.1 ± 1.0

<sup>A</sup>n.d. <0.01  $\mu\text{g g}^{-1}$  As based on 20- $\mu\text{l}$  injection.

**Table A8. Methanol/water extractable anionic arsenic species from *Ecklonia radiata* ecosystem organisms**

U, unidentified; DMA, dimethylarsinate; DMAA/MA, 2-dimethylarsinoyl acetic acid/ methylarsonate; PO<sub>4</sub>-riboside, phosphate-riboside; As<sup>V</sup>, arsenate; SO<sub>3</sub>-riboside, sulfonate-riboside; OSO<sub>3</sub>-riboside, sulfate-riboside. Arsenic species concentration ± calculated uncertainty (reproducibility of the measurement was calculated based on repeated measurements each (n = 2) of 0.5, 1, 10 and 100 µg L<sup>-1</sup> standards (As<sup>III</sup>, DMA, MA, As<sup>V</sup>) during each analytical run and compared with the initial calibration)

Sample		U 6/7 µg As g <sup>-1</sup>	DMA µg As g <sup>-1</sup>	U 8 µg As g <sup>-1</sup>	U 9 µg As g <sup>-1</sup>	DMAA/MA µg As g <sup>-1</sup>	PO <sub>4</sub> -riboside µg As g <sup>-1</sup>	As <sup>V</sup> µg As g <sup>-1</sup>	SO <sub>3</sub> - riboside µg As g <sup>-1</sup>	U 10 µg As g <sup>-1</sup>	OSO <sub>3</sub> - riboside µg As g <sup>-1</sup>
<i>Haliotis rubra</i>	Muscle	n.d. <sup>A</sup>	0.38 ± 0.04 (1.1)	n.d.	n.d.	n.d.	0.65 ± 0.07 (1.8)	n.d.	n.d.	n.d.	n.d.
	Gonad	n.d.	1.3 ± 0.2 (3.6)	n.d.	0.11 ± 0.01 (0.3)	n.d.	6.0 ± 0.7 (17)	0.04 ± 0.01 (0.1)	6.4 ± 0.7 (18)	n.d.	n.d.
	Digestive	26 ± 3 (24)	3.2 ± 0.4 (2.9)	2.4 ± 0.3 (2.2)	0.80 ± 0.09 (0.7)	n.d.	4.3 ± 0.5 (3.9)	n.d.	8.6 ± 0.9 (7.8)	n.d.	0.01 ± 0.01 (0.01)
	Gill	n.d.	0.29 ± 0.03 (1.0)	n.d.	n.d.	n.d.	4.7 ± 0.5 (15)	0.08 ± 0.01 (0.2)	n.d.19 ± 2 (29)	n.d.	n.d.
	Gut contents	n.d.	1.5 ± 0.1 (2.4)	n.d.	n.d.	0.17 ± 0.02 (0.3)	2.0 ± 0.2 (3.1)	27 ± 3 (41)	0.05 ± 0.01 (0.7)	n.d.	n.d.
<i>Turbo torquatus</i>	Muscle	n.d.	0.09 ± 0.01 (1.2)	n.d.	n.d.	n.d.	0.30 ± 0.03 (4.0)	n.d.	1.2 ± 0.1 (7.1)	n.d.	0.09 ± 0.01 (1.3)
	Gonad	n.d.	1.8 ± 0.2 (11)	n.d.	n.d.	n.d.	3.3 ± 0.4 (20)	n.d.	0.97 ± 0.11 (3.6)	n.d.	0.40 ± 0.04 (2.4)
	Organ	n.d.	1.2 ± 0.1 (4.5)	n.d.	n.d.	n.d.	3.4 ± 0.4 (13)	n.d.	0.15 ± 0.02 (0.4)	n.d.	0.79 ± 0.09 (3.0)
<i>Heliocidaris erythrogramma</i>	Visceral	n.d.	0.77 ± 0.08 (1.9)	n.d.	n.d.	n.d.	23 ± 3 (58)	0.23 ± 0.02 (0.6)	n.d.	0.51 ± 0.06 (1.3)	n.d.
	Gonad	n.d.	n.d.	n.d.	n.d.	n.d.	1.1 ± 0.1 (13)	n.d.	0.36 ± 0.04(9.8)	n.d.	n.d.
	Food pellets	n.d.	0.38 ± 0.04 (10)	n.d.	n.d.	n.d.	0.89 ± 0.10 (24)	0.04 ± 0.01 (0.9)	0.48 ± 0.05 (0.9)	n.d.	n.d.
<i>Centrostephanus rogersii</i>	Visceral	n.d.	2.4 ± 0.3 (4.3)	n.d.	n.d.	n.d.	42 ± 5 (75)	0.28 ± 0.03 (0.5)	0.04 ± 0.01 (0.4)	0.39 ± 0.04 (0.7)	n.d.
	Gonad	n.d.	0.72 ± 0.08 (6.9)	n.d.	0.57 ± 0.06 (5.5)	n.d.	4.2 ± 0.5 (41)	n.d.	0.18 ± 0.02 (7.1)	n.d.	n.d.

**Table A8.** (Continued)

Sample	U 6/7 μg As g <sup>-1</sup>	DMA μg As g <sup>-1</sup>	U 8 μg As g <sup>-1</sup>	U 9 μg As g <sup>-1</sup>	DMAA/MA μg As g <sup>-1</sup>	PO <sub>4</sub> -riboside μg As g <sup>-1</sup>	As <sup>V</sup> μg As g <sup>-1</sup>	SO <sub>3</sub> - riboside μg As g <sup>-1</sup>	U 10 μg As g <sup>-1</sup>	OSO <sub>3</sub> - riboside μg As g <sup>-1</sup>
<i>Odax cyanomelas</i>	Food pellets	n.d.	0.49 ± 0.05 (19)	n.d.	n.d.	0.80 ± 0.09 (31)	0.07 ± 0.01 (2.6)	0.56 ± 0.06 (14)	0.03 ± 0.01 (1.2)	n.d.
	Muscle	n.d.	0.29 ± 0.03 (7.2)	n.d.	n.d.	2.6 ± 0.3 (64)	n.d.	0.98 ± 0.11 (16)	n.d.	n.d.
	Liver	n.d.	1.7 ± 0.2 (27)	n.d.	n.d.	0.10 ± 0.01 (1.6)	2.3 ± 0.2 (36)	4.2 ± 0.5 (30)	n.d.	0.26 ± 0.3 (4.1)
	Digestive	n.d.	3.5 ± 0.4 (25)	n.d.	n.d.	1.3 ± 0.1 (9.1)	2.1 ± 0.2 (15)	0.82 ± 0.09 (13)	n.d.	0.25 ± 0.3 (1.8)
	Gill	n.d.	0.45 ± 0.05 (7.1)	n.d.	n.d.	n.d.	1.6 ± 0.2 (25)	9.8 ± 1.1 (43)	n.d.	0.08 ± 0.01 (1.2)
	Gut contents	n.d.	4.9 ± 0.5 (22)	n.d.	n.d.	n.d.	3.3 ± 0.4 (15)	6.4 ± 0.7 (18)	n.d.	1.2 ± 0.1 (5.2)
Peak time (min) mean ± s.d.	2.23	2.82 ± 0.02	3.12	3.61 ± 0.18	4.63 ± 0.13	5.00 ± 0.08	8.38 ± 0.32	8.87 ± 0.40	15.8 ± 0.1	19.4 ± 0.9

<sup>A</sup>n.d. <0.01 μg g<sup>-1</sup> As bases on 40-μl injection.

**Fig. A1.** Principle component analysis (PCA) of arsenic species in *Ecklonia radiata* ecosystem animal tissues.

