

## Appendix 1 – Chemistry: organic and trace metal data

The tables in this appendix are the results of the chemical analyses of ICES/IOC workshop samples for the German Bight sampling stations 1 to 9 and the drilling site transect sampling stations A to G, R. The following analyses were performed.

**Tables 1 and 2.** General characteristics of sediments by SOAFD Marine Laboratory, Aberdeen, UK.

**Tables 3 to 8.** Trace metals in dab liver and sediments by SOAFD Marine Laboratory, Aberdeen, UK. Trace metals in benthos by the Tidal Waters Division, Haren, The Netherlands.

**Tables 9 to 14.** Selected PCB congeners in dab liver by the Institute of Marine Research, Bergen, Norway. Selected PCB congeners in unfractionated sediments by NISR, Texel, The Netherlands. Selected PCB congeners in fractionated sediments by IFREMER, Brest, France. Selected PCB congeners in benthos by the Tidal Waters Division, Haren, The Netherlands.

**Tables 15 to 19.** Selected PAHs in sediments by MAFF, Burnham on Crouch, UK. Selected PAHs in benthos by the Tidal Waters Division, Haren, The Netherlands.

**Table 20.** Selected organochlorine pesticides in dab liver by the Institute of Marine Research, Bergen, Norway.

The data were entered onto the ICES computer by S. Wilson of ICES, and tabulated by M. R. Carr and Mrs J. Crocker of the Plymouth Marine Laboratory. The data can be obtained from ICES, Copenhagen, Denmark.

The figures have been compiled (by M. R. Carr) from the above tables. Aromatic hydrocarbon data were totalled into 2- and 3-ring compounds and >3-ring compounds. Only 2 PCB congeners (IUPAC numbers 28 and 180) have been plotted (due to large correlations between the different congeners), and no metals data or dab liver data from the drilling site transect have been plotted.

As a result of variance-to-mean relationships in the original data, all values were log transformed before analysis. The pooled standard deviation from 1-way ANOVA was used to construct 95% confidence intervals; these, and the means, are displayed on the following figures on transformed axes (logs to the base 10). Symbols without error bars are for single replicates.

In order to facilitate comparison, the same axis scaling has been adopted for equivalent samples from the German Bight and drilling site transect.

Table 1. General characteristics (%) of sediment from Van Veen grabs or boxcores taken from the German Bight sampling stations (1 to 9) and the drilling site transect sampling stations (A to G) during March 1990

Station	Fines	Moisture content	Inorganic carbon	Organic carbon	Total nitrogen
1	74.8	56	1.85	2.53	0.26
	84.9	53	1.46	2.34	0.26
2	40.4	41	0.96	0.96	0.10
	51.6	34	0.87	0.96	0.10
3	44.4	44	1.26	1.52	0.15
	37.0	42	0.81	1.99	0.12
4	20.4	27	0.79	0.52	0.05
	19.5	28	0.84	0.50	0.05
	19.9	29	0.87	0.57	0.06
5	16.8	25	0.97	0.45	0.05
	14.5	26	0.88	0.27	0.02
	25.5	31	1.00	0.63	0.07
6	14.6	22	0.32	0.44	0.03
	19.6	28	0.66	0.38	0.02
	6.6	21	0.35	0.12	0.01
7	10.4	23	0.15	0.26	0.02
	5.9	20	0.14	0.16	0.01
	6.4	20	0.13	0.16	0.02
8	5.5	22	0.04	0.13	0.02
	2.5	20	0.02	0.10	< 0.01
	1.8	21	0.01	0.11	0.01
9	0.1	16	0.06	0.05	0.02
	-	19	0.02	0.05	< 0.01
	-	21	0.03	0.05	< 0.01
A	18.1	29	0.49	0.47	0.04
	13.9	25	0.44	0.34	0.03
	11.2	14	0.34	0.28	0.02
B	13.2	21	0.39	0.37	0.03
	15.4	23	0.48	0.32	0.03
C	12.6	22	0.41	0.29	0.02
	13.3	20	0.37	0.32	0.03
D	6.3	22	0.29	0.16	0.01
	19.2	25	0.49	0.46	0.05
E	6.6	18	0.31	0.19	0.01
	4.3	18	0.27	0.14	0.01
F	6.0	20	0.34	0.18	0.02
	14.8	24	0.44	0.37	0.03
G	16.1	24	0.53	0.42	0.04
	12.8	19	0.47	0.33	0.03
	7.6	20	0.44	0.23	0.02

Table 2. General characteristics (%) of sediment (size fraction < 63 µm) from Van Veen grabs or boxcores taken from the German Bight sampling stations (1 to 9) and the drilling site transect sampling stations (A to G) during March 1990

Station	Inorganic carbon	Organic carbon	Total nitrogen
1	1.75	2.35	0.26
	1.81	2.58	0.29
2	1.89	2.71	0.27
	1.69	3.63	0.42
3	2.07	2.67	0.30
	0.90	2.17	0.19
4	1.90	2.94	0.34
	1.58	2.72	0.33
	1.61	2.91	0.34
5	1.61	2.91	0.35
	1.60	2.64	0.36
	1.62	2.43	0.33
6	0.97	2.61	0.34
	1.59	2.28	0.29
	1.76	2.18	0.27
7	1.06	2.18	0.30
	1.20	2.03	0.24
	0.82	2.58	0.32
8	0.82	2.69	0.32
	0.80	2.68	0.35
	0.55	2.93	0.38
9	1.15	4.51	0.58
	1.01	4.86	0.62
	1.66	5.51	0.67
A	1.29	2.35	0.23
	1.25	2.11	0.22
	0.95	2.56	0.24
B	1.48	1.92	0.19
	1.25	2.15	0.22
C	1.16	2.23	0.23
	0.68	2.79	0.25
D	1.14	2.22	0.23
	1.15	2.07	0.22
E	1.06	2.33	0.28
	0.91	2.33	0.27
F	1.40	2.13	0.23
	1.32	2.35	0.23
G	1.44	2.22	0.23
	1.38	2.28	0.23
	1.49	2.12	0.24

Table 3. *Limanda limanda*. Trace metal concentrations ( $\mu\text{g g}^{-1}$  dry wt) in dab liver taken from the German Bight sampling stations (3, 5 to 9) and the drilling site transect sampling stations (G and R) during March 1990 (4 to 15 ind. sample<sup>-1</sup>)

Station	Arsenic	Cadmium	Copper	Mercury	Lead	Zinc
3	122	0.27	19	0.44	<2.22	108
	29	<0.18	12	0.37	<1.83	104
	-	<0.24	33	0.38	<2.40	128
	-	<0.22	12	0.39	<2.19	118
	34	<0.34	21	0.41	<3.42	136
5	-	<0.25	15	0.54	<2.48	122
	31	<0.26	40	0.51	<2.55	139
	-	0.84	30	0.62	<2.81	130
	103	0.65	26	0.45	<2.49	118
6	177	0.53	28	0.53	<2.65	131
	183	0.58	34	0.47	<2.62	126
	184	0.56	40	0.41	<2.55	123
	177	1.01	28	0.47	<3.38	155
	210	0.58	26	0.47	<2.91	129
7	284	0.61	34	0.42	<2.35	141
	303	0.37	30	0.37	<2.67	133
	118	0.77	37	0.41	<2.26	125
8	270	0.85	28	0.53	<2.66	136
	125	0.89	28	0.54	<2.48	131
	267	0.86	23	0.48	<2.69	140
9	196	0.68	12	0.31	<3.09	133
	154	1.00	15	0.41	<2.28	121
	174	1.06	15	0.26	<2.65	137
	95	0.78	14	0.35	<3.55	114
	147	0.86	14	0.25	<2.53	125
G	367	<0.33	41	0.40	<3.31	155
	288	<0.26	34	0.42	<2.62	138
R	231	0.41	32	0.76	<2.91	149
	263	0.37	36	0.37	<2.34	125

Table 4. Trace metal concentrations ( $\mu\text{g g}^{-1}$  dry wt) of sediment from Van Veen grabs or boxcores taken from the German Bight sampling stations (1 to 9) and the drilling site transect sampling stations (A to G) during March 1990

Station	Arsenic	Cadmium	Copper	Mercury	Lead	Zinc
1	7.6	0.709	18.7	0.505	60.0	28.8
	6.5	0.627	15.8	0.371	47.1	167.4
2	3.9	0.291	7.2	0.110	25.1	148.2
	3.4	0.260	5.7	0.094	17.7	60.3
3	5.0	0.328	8.7	0.154	26.6	77.1
	3.6	0.275	7.4	0.093	24.5	73.1
4	2.3	0.134	3.4	0.046	14.6	55.4
	2.5	0.128	3.5	0.041	14.1	49.5
	2.5	0.133	4.0	0.049	15.5	53.1
5	2.5	0.131	3.2	0.028	13.2	21.5
	1.5	0.085	4.5	0.013	9.6	43.9
	2.9	0.151	9.2	0.041	15.8	55.1
6	2.2	0.020	2.5	0.014	11.3	12.0
	2.7	0.024	4.2	0.022	12.7	36.7
	1.4	0.008	1.1	<0.006	6.4	25.4
7	1.3	0.006	2.1	<0.006	8.3	19.5
	1.4	<0.003	2.7	<0.006	8.3	14.0
	1.4	0.003	1.5	<0.006	6.5	15.8
8	2.3	<0.003	3.9	<0.006	5.9	8.4
	2.2	0.003	3.3	<0.006	4.4	7.0
	1.3	0.003	1.9	<0.006	5.9	8.3
9	0.6	<0.003	3.8	<0.006	5.5	2.6
	0.4	<0.003	0.3	<0.006	3.2	2.4
	0.4	<0.003	0.2	<0.006	3.4	1.9
A	2.5	0.023	3.2	0.016	11.6	35.5
	2.3	0.019	3.0	0.015	10.4	29.6
	2.4	0.014	4.5	0.010	10.0	26.8
B	2.4	0.014	23.4	0.015	11.7	30.1
	1.7	0.014	3.2	0.011	11.7	31.5
C	1.5	0.012	2.7	0.006	11.3	28.8
	1.3	0.011	2.7	0.006	12.4	24.4
D	1.3	0.003	1.5	0.006	7.0	23.4
	2.0	0.020	3.8	0.015	12.4	35.4
E	2.3	0.006	1.6	<0.006	6.7	25.2
	1.5	<0.003	1.2	<0.006	4.8	22.0
F	1.4	0.006	1.6	0.006	6.9	26.3
	1.6	0.017	3.1	0.011	12.9	34.4
G	1.8	0.017	3.3	0.016	13.4	37.4
	1.6	0.016	2.6	0.012	9.7	32.8
	1.7	0.009	1.9	<0.006	9.6	29.7

Table 5. Trace metal concentrations ( $\mu\text{g g}^{-1}$  dry wt) of sediment (size fraction  $< 63 \mu\text{m}$ ) from Van Veen grabs or boxcores taken from the German Bight sampling stations (1 to 9) and the drilling site transect sampling stations (A to G) during March 1990

Station	Arsenic	Cadmium	Copper	Mercury	Lead	Zinc
1	10.0	0.65	20	0.39	57	159
	12.9	0.66	21	0.41	60	168
2	10.7	0.64	19	0.37	57	159
	14.7	0.77	23	0.43	72	185
3	11.0	0.51	17	0.28	52	136
	9.2	0.57	19	0.40	62	159
4	9.9	0.59	22	0.40	102	160
	8.6	0.52	21	0.39	57	167
	9.5	0.55	21	0.34	65	255
5	8.3	0.40	20	0.23	66	206
	9.5	0.36	18	0.27	68	87
	10.6	0.34	20	0.23	70	189
6	8.4	0.11	16	0.13	43	147
	8.9	0.14	20	0.15	48	105
	10.5	0.17	22	0.16	56	139
7	12.6	0.11	16	0.09	58	112
	7.9	0.12	17	0.10	45	106
	15.4	0.11	41	0.10	60	130
8	12.2	0.16	16	0.06	45	111
	13.3	0.14	18	0.06	57	116
	35.4	0.11	18	0.09	79	126
9	17.9	0.36	19	0.20	85	139
	30.4	0.33	22	0.11	155	132
	18.8	0.81	26	0.26	83	141
A	7.6	0.10	19	0.11	39	94
	7.7	0.09	18	0.18	62	111
	7.7	0.09	19	0.17	57	119
B	12.3	0.10	16	0.12	34	102
	11.2	0.09	18	0.13	51	107
C	12.7	0.07	19	0.15	59	118
	8.2	0.07	17	0.13	44	108
D	11.6	0.11	18	0.13	74	121
	8.9	0.09	19	0.24	63	109
E	11.1	0.07	22	0.13	73	115
	12.6	0.10	20	0.16	91	135
F	6.7	0.13	19	0.17	51	99
	7.1	0.10	21	0.17	83	108
G	8.3	0.09	21	0.13	58	114
	7.3	0.09	19	0.14	50	102
	6.7	0.12	18	0.15	59	113

Table 6. *Pagurus bernhardus*. Trace metal concentrations ( $\mu\text{g g}^{-1}$  dry wt) in hermit crab tissue taken from the German Bight sampling stations (3 to 9) and the drilling site transect sampling stations (A, D to G) during March 1990 (2 to 20 ind. sample<sup>-1</sup>)

Station	Replicate	Size	Cadmium	Copper	Mercury	Lead	Zinc
3	1	–	0.42	210	0.31	1.7	141
4	1	Small	0.66	198	0.32	1.2	125
		Medium	0.56	182	0.29	1.2	135
		Large	0.92	191	0.43	3.5	139
	2	–	0.58	188	0.29	1.4	132
5	1	Small	0.48	197	0.19	2.1	122
		Large	0.42	173	0.22	1.1	142
6	1	–	0.64	184	0.34	2.5	155
		Small	0.60	208	0.32	5.8	114
		Large	0.79	204	0.33	6.7	123
7	1	Small	0.66	218	0.24	1.5	114
		Large	0.63	190	0.21	0.8	129
	2	Small	0.69	167	0.22	0.1	113
		Large	0.75	196	0.23	1.0	126
8	1	Small	0.75	231	0.17	3.5	132
		Large	0.75	196	0.29	0.9	124
	2	Small	0.74	164	0.18	1.4	119
		Large	0.78	151	0.23	4.9	126
9	1	Small	1.27	144	0.22	3.0	121
		Large	1.23	182	0.22	2.3	141
	2	Small	1.34	200	0.18	1.5	137
		Large	1.38	148	0.23	1.8	140
A	1	–	0.80	165	0.64	1.4	124
D	1	–	0.70	247	0.36	1.8	131
E	1	–	0.95	218	0.38	1.6	115
F	1	–	0.77	207	0.33	1.4	121
G	1	–	0.75	238	0.33	1.8	133

Table 7. *Aphrodite aculeata*. Trace metal concentrations ( $\mu\text{g g}^{-1}$  dry wt) in sea mouse tissue taken from the German Bight sampling stations (3 to 9) and the drilling site transect sampling stations (A, D to G) during March 1990 (2 to 20 ind. sample<sup>-1</sup>)

Station	Size	Cadmium	Copper	Mercury	Lead	Zinc
3	–	0.75	18	0.27	33	250
4	–	0.86	12	0.20	17	209
5	–	1.60	12	0.19	18	201
6	Small	1.44	20	0.17	10	234
	Large	2.09	24	0.21	17	364
7	Small	0.85	18	0.19	16	227
	Large	1.29	18	0.24	26	364
	Large	1.39	21	0.24	31	378
8	–	1.06	20	0.17	27	310
A	–	2.16	21	0.25	23	245
D	–	2.77	23	0.26	29	303
E	–	2.89	25	0.28	26	311
F	–	2.17	21	0.22	23	219
G	–	2.20	21	0.22	23	233

Table 12. *Pagurus bernhardus*. Concentrations of selected PCB congeners (ng g<sup>-1</sup> fat; IUPAC numbers) in hermit crab tissue taken from the German Bight sampling stations (3 to 9) during March 1990 (2 to 20 ind. sample<sup>-1</sup>)

Station	Replicate	Size	28	31	49	52	101	105	118	138	153	170	180	187
3	1	-	10.1	4.2	8.3	4.8	40.5	48	189	452	592	109	157	215
4	1	Small	7.8	3.3	7.2	7.2	25.5	43	159	316	409	53	77	201
		Medium	7.0	3.5	8.4	6.0	21.4	37	130	254	330	41	66	158
		Large	8.4	4.2	5.1	6.1	27.5	79	260	485	590	59	81	319
4	2	-	9.8	4.3	8.3	7.2	23.6	47	159	301	383	45	59	193
		Small	6.3	3.7	4.2	2.6	18.5	35	118	204	268	23	31	129
5	1	Large	7.9	3.6	6.0	3.0	23.0	36	118	199	268	21	32	115
		Small	4.3	2.7	1.5	1.5	15.5	24	89	186	254	24	38	145
6	1	Large	6.0	3.0	1.5	1.5	14.9	30	104	205	278	21	32	168
		-	4.8	2.2	1.3	1.8	12.7	25	85	166	231	17	26	137
7	1	Small	4.6	4.2	1.8	3.7	9.2	16	47	88	137	13	21	59
		Large	4.5	3.5	2.0	2.0	6.6	10	38	117	185	13	23	69
	2	Small	3.6	5.6	1.2	3.2	5.6	11	31	64	94	9	14	50
		Large	3.8	3.3	1.4	2.8	5.6	12	35	67	106	8	12	45
8	1	Small	3.5	2.5	1.5	2.0	5.5	11	32	58	87	8	13	38
		Large	4.3	1.9	0.9	0.9	6.2	17	50	95	135	10	19	61
	2	Small	3.6	3.6	1.8	3.1	7.6	10	33	64	90	8	16	43
		Large	5.2	3.8	1.9	1.4	5.7	13	41	73	107	8	11	44
9	1	Small	4.3	3.6	1.8	1.8	4.9	13	35	47	58	5	7	26
		Large	5.1	3.2	1.9	1.9	6.4	17	46	61	83	6	8	32
	2	Small	3.9	2.0	1.3	1.3	6.5	19	51	74	98	7	9	40
		Large	4.0	3.3	2.0	2.6	5.3	13	37	52	63	5	8	27

Table 13. *Aphrodite aculeata*. Concentrations of selected PCB congeners (ng g<sup>-1</sup> fat; IUPAC numbers) in sea mouse tissue taken from the German Bight sampling stations (3 to 8) during March 1990 (2 to 20 ind. sample<sup>-1</sup>)

Station	18	28	31	49	52	101	105	118	138	153	170	180	187
3	30	20	20	27	53	53	43	150	307	400	70	103	167
4	28	21	12	14	14	45	45	152	228	244	43	59	97
5	13	22	9	11	16	34	45	147	192	174	22	31	74
6	17	14	6	8	25	20	17	56	157	211	17	23	84
	26	15	9	6	15	20	23	78	208	251	20	26	133
7	65	12	12	12	50	15	12	30	92	100	10	12	45
	27	17	14	14	71	20	10	41	122	129	14	20	58
	20	13	13	7	33	20	10	39	107	130	13	23	39
8	17	11	-	11	38	14	11	35	91	101	7	14	38

Table 14. *Pagurus bernhardus*. Concentrations of selected PCB congeners (ng g<sup>-1</sup> fat; IUPAC numbers) in hermit crab eggs taken from the German Bight sampling stations (4, 5 and 6) during March 1990

Station	18	28	31	49	52	101	105	118	138	153	170	180	187
4	3	12	5	40	7	32	51	167	327	395	48	66	171
5	2	9	6	23	4	28	50	158	253	332	28	36	149
6	3	7	5	4	3	23	30	103	200	261	19	28	134

Table 15. Concentrations of selected PAHs (ng g<sup>-1</sup> dry wt) and total hydrocarbons (µg g<sup>-1</sup> dry wt) in sediment from Van Veen grabs and boxcores taken from the German Bight sampling stations (1 to 9) and drilling site transect sampling stations (A to G) during March 1990

Station:	1	1	2	2	3	3	4	4	4	5	5	5	6	6
Napthalene	-	86	-	25	14	33	5	14	8	5	7	-	14	8
C <sub>1</sub> -Napthalenes	-	120	-	39	23	58	11	27	12	12	18	-	52	27
C <sub>2</sub> -Napthalenes	-	340	-	110	52	120	29	77	32	35	57	-	130	74
C <sub>3</sub> -Napthalenes	-	220	-	65	36	82	19	55	19	25	50	-	74	50
Anthracene	-	41	-	9	7	10	2	5	3	3	3	-	4	3
Phenanthrene	-	140	-	33	26	82	11	21	13	13	17	-	26	20
C <sub>1</sub> -Phenanthrenes	-	77	-	21	17	26	8	17	13	12	16	-	25	19
Fluoranthene	-	140	-	55	37	73	14	27	18	16	25	-	30	20
Pyrene	-	110	-	42	32	50	12	24	15	14	20	-	29	18
Benz[a]anthracene	-	36	-	12	12	18	5	8	5	6	7	-	8	8
Chrysene & triphenylene	-	54	-	89	18	26	7	11	8	8	10	-	13	11
Benzofluoranthenes	-	92	-	27	35	40	16	22	20	18	18	-	25	24
Benz[a]pyrene	-	18	-	4	10	9	5	5	6	6	3	-	7	8
Benz[e]pyrene	-	31	-	6	13	17	6	9	8	8	6	-	10	10
Perylene	-	49	-	12	14	17	6	7	8	5	4	-	3	4
Total hydrocarbons (GC)	15.5	4.9	44	1.5	1.3	0.6	0.1	<0.1	<0.1	2.9	10.2	0.2	8.1	<0.1
Total hydrocarbons (UV)	76	72	31	26	40	30	22	24	18	27	16	29	28	45

Table 15 (continued)

Station:	6	7	7	7	8	8	8	9	9	9	A	A	A
Napthalene	-	4	5	3	1	4	2	-	<1	<1	9	8	7
C <sub>1</sub> -Napthalenes	-	13	20	9	3	11	60	-	<1	<5	50	<10	31
C <sub>2</sub> -Napthalenes	-	32	65	25	8	28	20	-	<1	<10	150	<10	96
C <sub>3</sub> -Napthalenes	-	20	30	16	4	17	<10	-	<1	<10	100	<10	59
Anthracene	-	<1	<1	<1	<1	1	<1	-	<1	<1	3	4	2
Phenanthrene	-	9	8	6	3	5	4	-	1	1	20	27	14
C <sub>1</sub> -Phenanthrenes	-	6	9	6	2	6	<5	-	<1	<5	23	27	15
Fluoranthene	-	9	8	6	3	5	3	-	<1	<1	19	27	13
Pyrene	-	7	8	5	2	4	3	-	<1	<1	17	24	12
Benz[a]anthracene	-	3	3	2	1	2	<1	-	<1	<1	7	10	5
Chrysene & triphenylene	-	5	4	4	2	3	1	-	<1	<1	11	14	8
Benzofluoranthenes	-	9	11	12	4	7	<1	-	1	<1	25	12	19
Benz[a]pyrene	-	4	1	3	1	2	<1	-	<1	<1	7	<5	7
Benz[e]pyrene	-	6	3	5	2	3	<1	-	<1	<1	11	6	9
Perylene	-	1	<1	1	<1	1	<1	-	<1	<1	4	<5	4
Total hydrocarbons (GC)	<0.1	1.5	<0.1	1.2	1.8	<0.1	<0.1	<0.1	<0.1	0.4	11.6	35.2	7.4
Total hydrocarbons (UV)	10	20	12	15	5	5	4	2	1	1	43	41	33

Table 15 (continued)

Station:	B	B	C	C	D	D	E	E	F	F	G	G	G
Napthalene	16	9	13	7	-	15	9	3	3	12	7	16	4
C <sub>1</sub> -Napthalenes	69	30	<10	29	-	67	38	10	11	95	24	64	13
C <sub>2</sub> -Napthalenes	260	85	170	92	-	260	110	24	27	<10	65	190	36
C <sub>3</sub> -Napthalenes	220	66	140	62	-	170	71	15	19	210	46	130	25
Anthracene	4	3	3	2	-	6	2	<1	<1	4	2	4	1
Phenanthrene	32	19	24	15	-	37	14	6	8	28	14	36	9
C <sub>1</sub> -Phenanthrenes	28	20	29	16	-	38	15	6	8	30	15	32	9
Fluoranthene	38	20	27	15	-	43	16	5	6	38	14	<5	8
Pyrene	33	18	24	13	-	35	13	5	6	29	13	<5	7
Benz[a]anthracene	13	7	9	6	-	13	<5	2	3	11	5	58	3
Chrysene & triphenylene	16	11	13	9	-	17	8	3	4	11	8	94	5
Benzofluoranthenes	<5	25	30	24	-	32	18	7	6	33	21	<5	8
Benz[a]pyrene	<5	8	<5	8	-	7	<5	2	3	<5	6	<5	4
Benz[e]pyrene	<5	11	8	11	-	12	7	3	4	10	9	<5	6
Perylene	<5	3	<5	4	-	<5	<5	1	1	<5	2	<5	1
Total hydrocarbons (GC)	0.8	1.7	2.7	1.7	0.1	32	0.9	<0.1	0.1	0.2	0.6	0.1	0.6
Total hydrocarbons (UV)	43	36	29	39	16	45	17	14	20	37	31	32	19



Table 16. Concentrations of selected PAHs (ng g<sup>-1</sup> dry wt) and total hydrocarbons (µg g<sup>-1</sup> dry wt) in sediment (size fraction <63 µm) from Van Veen grabs and boxcores taken from the German Bight sampling stations (1 to 9) and drilling site transect sampling stations (A to G) during March 1990

Station:	1	1	2	2	3	3	4	4	4	5	5	5	6	6
Napthalene	100	-	43	310	80	34	52	67	52	41	49	45	67	110
C <sub>1</sub> -Napthalenes	190	-	73	850	140	52	94	150	83	84	110	71	220	440
C <sub>2</sub> -Napthalenes	660	-	180	2920	630	130	240	470	210	210	240	180	650	840
C <sub>3</sub> -Napthalenes	300	-	72	920	250	73	150	180	140	120	<40	86	470	360
Anthracene	38	-	15	170	40	14	20	26	22	13	28	14	17	19
Phenanthrene	210	-	62	670	130	55	88	210	85	66	220	62	93	190
C <sub>1</sub> -Phenanthrenes	110	-	49	460	80	53	78	<50	78	58	<40	61	110	<30
Fluoranthene	210	-	81	850	180	65	96	210	100	70	100	63	88	180
Pyrene	160	-	67	680	150	60	79	140	87	56	51	55	81	180
Benz[a]anthracene	26	-	25	140	47	24	33	26	34	24	<15	22	36	29
Chrysene & triphenylene	40	-	45	160	55	39	56	20	58	43	<15	40	53	15
Benzofluoranthenes	150	-	99	<70	70	100	140	<30	140	110	<30	120	130	<20
Benz[a]pyrene	28	-	28	<40	18	28	41	<15	42	39	<15	29	40	<10
Benz[e]pyrene	23	-	38	220	28	40	52	<15	57	48	<15	45	56	<10
Perylene	-	-	41	-	-	37	59	-	62	37	-	30	20	-
Total hydrocarbons (GC)	55	36	3	111	5	12	4	3	6	13	22	72	4	4
Total hydrocarbons (UV)	173	173	141	717	109	117	170	232	170	225	98	237	238	242

Table 16 (continued)

Station:	6	7	7	7	8	8	8	9	9	9	A	A	A
Napthalene	16	69	59	53	50	31	21	80	-	56	65	29	57
C <sub>1</sub> -Napthalenes	31	230	190	170	130	80	53	150	-	83	240	120	210
C <sub>2</sub> -Napthalenes	75	470	510	430	400	210	140	<100	-	170	710	410	620
C <sub>3</sub> -Napthalenes	30	<40	310	260	<50	110	63	<100	-	36	530	310	460
Anthracene	3	<15	9	12	<15	8	4	<30	-	8	17	4	16
Phenanthrene	36	140	75	150	180	73	49	67	-	110	130	59	100
C <sub>1</sub> -Phenanthrenes	5	<40	52	110	<50	66	43	<100	-	77	150	56	120
Fluoranthene	28	97	70	100	97	62	42	160	-	86	120	45	97
Pyrene	20	130	53	80	93	47	32	87	-	63	100	32	85
Benz[a]anthracene	8	28	25	40	21	21	15	<30	-	28	46	12	41
Chrysene & triphenylene	18	42	43	64	22	40	30	<30	-	55	72	18	60
Benzofluoranthenes	40	<30	98	200	<30	130	99	<60	-	210	190	25	160
Benz[a]pyrene	6	<15	23	53	<15	26	20	<30	-	32	58	5	46
Benz[e]pyrene	17	<15	41	80	<15	51	39	<30	-	56	83	7	71
Perylene	30	-	9	19	-	11	8	-	-	29	27	0	20
Total hydrocarbons (GC)	14	6	4	311	9	6	22	17	602	17	2	14	14
Total hydrocarbons (UV)	211	270	253	442	238	247	215	381	698	596	297	410	341

Table 16 (continued)

Station:	B	B	C	C	D	D	E	E	F	F	G	G	G
Napthalene	44	55	39	51	18	43	29	23	-	43	87	36	59
C <sub>1</sub> -Napthalenes	170	190	160	180	63	130	89	84	-	160	300	160	230
C <sub>2</sub> -Napthalenes	590	560	480	460	230	380	240	270	-	550	890	540	680
C <sub>3</sub> -Napthalenes	450	400	370	350	65	250	130	220	-	470	520	550	400
Anthracene	10	13	6	11	3	12	6	5	-	6	27	8	11
Phenanthrene	65	110	61	98	34	78	62	44	-	75	200	89	93
C <sub>1</sub> -Phenanthrenes	73	100	56	100	<15	76	50	34	-	57	240	71	100
Fluoranthene	71	85	59	82	29	62	38	47	-	78	120	82	67
Pyrene	58	75	46	75	22	56	33	29	-	56	110	53	65
Benz[a]anthracene	20	33	16	33	6	22	13	10	-	18	47	24	26
Chrysene & triphenylene	23	49	23	50	8	38	23	17	-	27	81	35	46
Benzofluoranthenes	68	130	29	140	54	110	36	22	-	48	210	88	120
Benz[a]pyrene	13	37	8	41	<5	35	18	7	-	11	64	15	32
Benz[e]pyrene	25	56	8	59	<5	49	27	10	-	11	98	31	52
Perylene	-	11	-	14	-	18	5	-	-	-	27	-	8
Total hydrocarbons (GC)	20	23	4	4	3	15	7	9	2	-	1	3	9
Total hydrocarbons (UV)	304	401	292	307	320	325	292	327	271	-	274	400	407

Table 17. *Pagurus bernhardus*. Concentrations of selected PAHs (ng g<sup>-1</sup> fat) in hermit crab tissue taken from the German Bight sampling stations (3 to 9) during March 1990 (2 to 20 ind. sample<sup>-1</sup>)

Station:	3	4	4	4	4	5	5	6	6	6
Replicate:	1	1	1	1	2	1	1	1	2	2
Size:	-	Small	Medium	Large	-	Small	Large	Small	Large	-
Anthracene	2.4	2.2	3.0	1.9	1.7	5.3	3.0	1.9	1.5	1.3
Phenanthrene	34.6	34.4	60.6	70.4	32.8	192.4	94.3	82.8	64.2	57.1
Fluoranthene	25.0	17.8	24.4	32.6	24.2	51.8	33.2	19.3	16.4	14.9
Pyrene	27.4	17.2	33.3	24.2	24.8	36.5	22.4	14.7	11.9	10.5
Benz[a]anthracene	7.2	3.9	2.5	7.9	4.0	4.8	6.6	4.3	3.0	3.5
Chrysene	10.1	6.7	5.5	10.3	8.6	18.0	7.9	5.4	2.5	4.8
Benz[b]fluoranthene	11.9	3.9	9.9	-	8.1	-	-	-	-	-
Benz[k]fluoranthene	5.4	2.2	2.5	6.5	5.2	-	-	6.6	-	0.9
Benz[a]pyrene	4.8	1.7	1.5	5.1	4.0	9.5	4.2	2.3	1.5	1.8
Benz[e]pyrene	8.9	3.3	3.5	4.2	8.1	-	-	5.8	4.5	3.1
Benz[ghi]pyrene	5.4	1.1	4.0	4.7	4.0	-	-	-	2.5	-
Dibenz[ah]anthracene	1.2	0.6	1.0	0.9	1.2	-	-	-	-	-
Indeno[cd]pyrene	8.9	3.9	3.0	-	6.9	-	-	-	-	-

Table 17 (continued)

Station:	7	7	7	7	8	8	8	8	9	9	9
Replicate:	1	1	2	2	1	1	2	2	1	2	2
Size:	Small	Large	Small	Large	Small	Large	Small	Large	Large	Small	Large
Anthracene	1.8	-	1.2	2.4	3.0	2.4	2.7	1.0	2.5	3.3	2.0
Phenanthrene	102.4	37.4	30.1	60.7	88.9	38.8	42.5	48.0	111.4	135.9	52.8
Fluoranthene	29.1	21.7	11.5	16.9	25.8	10.9	15.2	15.2	37.6	38.4	19.8
Pyrene	17.5	13.6	9.9	10.8	19.9	7.6	13.9	10.5	29.3	25.4	12.5
Benz[a]anthracene	1.8	6.1	4.0	3.8	4.5	1.9	4.5	3.3	8.9	8.5	4.0
Chrysene	7.4	5.6	2.8	5.6	7.0	5.2	7.6	6.2	20.4	16.3	9.2
Benz[b]fluoranthene	-	-	-	-	-	3.8	5.4	4.3	24.2	-	9.9
Benz[k]fluoranthene	8.3	3.5	2.0	1.4	3.5	0.5	2.2	2.9	13.4	9.1	4.6
Benz[a]pyrene	3.2	3.0	1.2	0.9	3.0	0.9	1.8	1.9	11.5	5.2	2.0
Benz[e]pyrene	7.4	3.0	2.0	3.3	-	0.9	6.3	3.8	16.5	-	4.6
Benz[ghi]pyrene	-	-	-	1.4	7.0	0.9	0.9	1.9	23.6	24.7	3.3
Dibenz[ah]anthracene	0.9	-	-	-	-	-	0.9	0.5	4.5	-	1.3
Indeno[cd]pyrene	-	-	-	-	-	2.4	0.9	2.4	40.1	-	5.3

Table 18. *Aphrodite aculeata*. Concentrations of selected PAHs (ng g<sup>-1</sup> fat) in sea mouse tissue taken from the German Bight sampling stations (3, 5 to 8) during March 1990 (2 to 20 ind. sample<sup>-1</sup>)

Station:	3	5	6	6	7	7	7	8
Replicate:	1	1	1	1	1	1	1	1
Size:	-	-	Small	Large	Small	Large	Large	-
Anthracene	33	7	8	12	10	5	10	11
Phenanthrene	490	199	298	260	386	271	380	383
Fluoranthene	270	72	124	107	123	82	119	150
Pyrene	293	95	174	104	123	100	125	136
Benz[a]anthracene	97	31	51	41	39	25	37	38
Chrysene	143	50	82	64	62	45	64	80
Benz[b]fluoranthene	280	52	126	93	120	97	125	146
Benz[k]fluoranthene	167	43	67	81	81	67	85	91
Benz[a]pyrene	80	20	42	46	39	27	37	38
Benz[e]pyrene	187	43	87	81	97	67	102	108
Benz[ghi]pyrene	237	36	112	121	114	87	136	143
Dibenz[ah]anthracene	47	11	23	29	29	20	27	28
Indeno[cd]pyrene	300	74	174	225	175	139	190	185

Table 19. *Pagurus bernhardus*. Concentrations of selected PAHs (ng g<sup>-1</sup> fat) in hermit crab eggs taken from the German Bight sampling stations (4, 5 and 6) during March 1990

Station:	4	5	6
Anthracene	3	3	2
Phenanthrene	45	108	57
Fluoranthene	42	62	33
Pyrene	89	62	45
Benz[a]anthracene	14	19	11
Chrysene	12	17	11
Benz[b]fluoranthene	7	9	23
Benz[k]fluoranthene	3	4	7
Benz[a]pyrene	2	3	6
Benz[e]pyrene	4	5	16
Benz[ghi]pyrene	1	1	7
Dibenz[ah]anthracene	1	1	2
Indeno[cd]pyrene	2	3	7

Table 20. *Limanda limanda*. Concentrations of organochlorine pesticides (ng g<sup>-1</sup> fat, detection limit 0.1 ng g<sup>-1</sup>; nd: not detected) in dab liver taken from the German Bight sampling stations (3, 5 to 9) and the drilling site transect sampling stations (G and R) during March 1990 (pool of 4 to 15 ind. sample<sup>-1</sup>)

Station	a-HCH	HCB	b-HCH	Lindane	Aldrine	op-DDE	Dieldrin	pp-DDE	op-DDD	Endrine	pp-DDD	op-DDT	pp-DDT
3	15	39	6.6	71	4.9	231	72	206	5.0	nd	59	nd	5.0
	9	33	4.0	37	nd	11	67	151	3.2	nd	32	nd	3.2
	11	38	4.8	51	3.5	18	64	156	3.8	nd	43	nd	5.8
	12	37	5.1	54	2.1	8	41	141	4.9	nd	43	nd	3.8
	10	27	4.5	45	2.4	11	57	123	nd	nd	31	nd	nd
5	10	38	4.5	38	2.2	12	49	124	4.2	nd	28	nd	nd
	12	38	5.9	44	4.2	10	52	114	5.2	nd	44	nd	4.4
	7	41	3.6	24	4.0	9	40	122	nd	nd	32	nd	4.9
	9	56	3.9	33	4.7	12	69	387	4.6	nd	73	nd	9.6
6	7	26	3.2	23	6.1	10.0	53	117	4.7	nd	18	nd	7.2
	10	36	6.7	31	3.4	39	53	129	5.5	nd	30	nd	4.3
	14	34	2.9	45	nd	8	60	163	nd	nd	54	nd	nd
	11	29	3.2	36	3.4	155	60	187	7.6	nd	33	nd	nd
	12	42	6.0	33	5.9	12	61	157	nd	nd	35	nd	nd
7	18	25	6.3	30	5.3	11	46	114	nd	nd	17	nd	1.6
	20	30	2.8	35	10.0	28	53	155	nd	nd	20	nd	nd
	19	33	4.3	27	14.0	17	57	176	4.1	nd	25	nd	1.9
8	19	31	3.2	25	8.0	129	58	201	nd	nd	26	nd	nd
	19	33	3.0	25	11.0	37	55	205	3.8	nd	26	nd	3.9
	21	31	3.2	25	7.4	14	55	148	nd	nd	27	nd	nd
9	12	31	2.5	9	2.9	10	50	150	nd	nd	28	nd	nd
	12	42	1.9	8	nd	9	65	301	3.7	nd	50	nd	15.0
	9	33	2.1	7	5.7	27	66	169	4.2	nd	21	nd	nd
	13	36	2.8	10	3.1	8	42	159	nd	nd	28	nd	nd
	15	33	2.7	10	6.8	19	46	150	3.4	nd	24	nd	5.0
G	11	31	4.5	23	3.6	10	47	92	nd	nd	11	nd	3.0
	18	25	8.6	33	10.0	15	53	133	nd	nd	18	nd	3.2
R	15	38	7.3	29	3.8	9	46	154	nd	nd	32	nd	nd
	13	25	2.7	23	6.6	15	55	130	nd	nd	17	nd	2.7

## CHEMISTRY: METALS

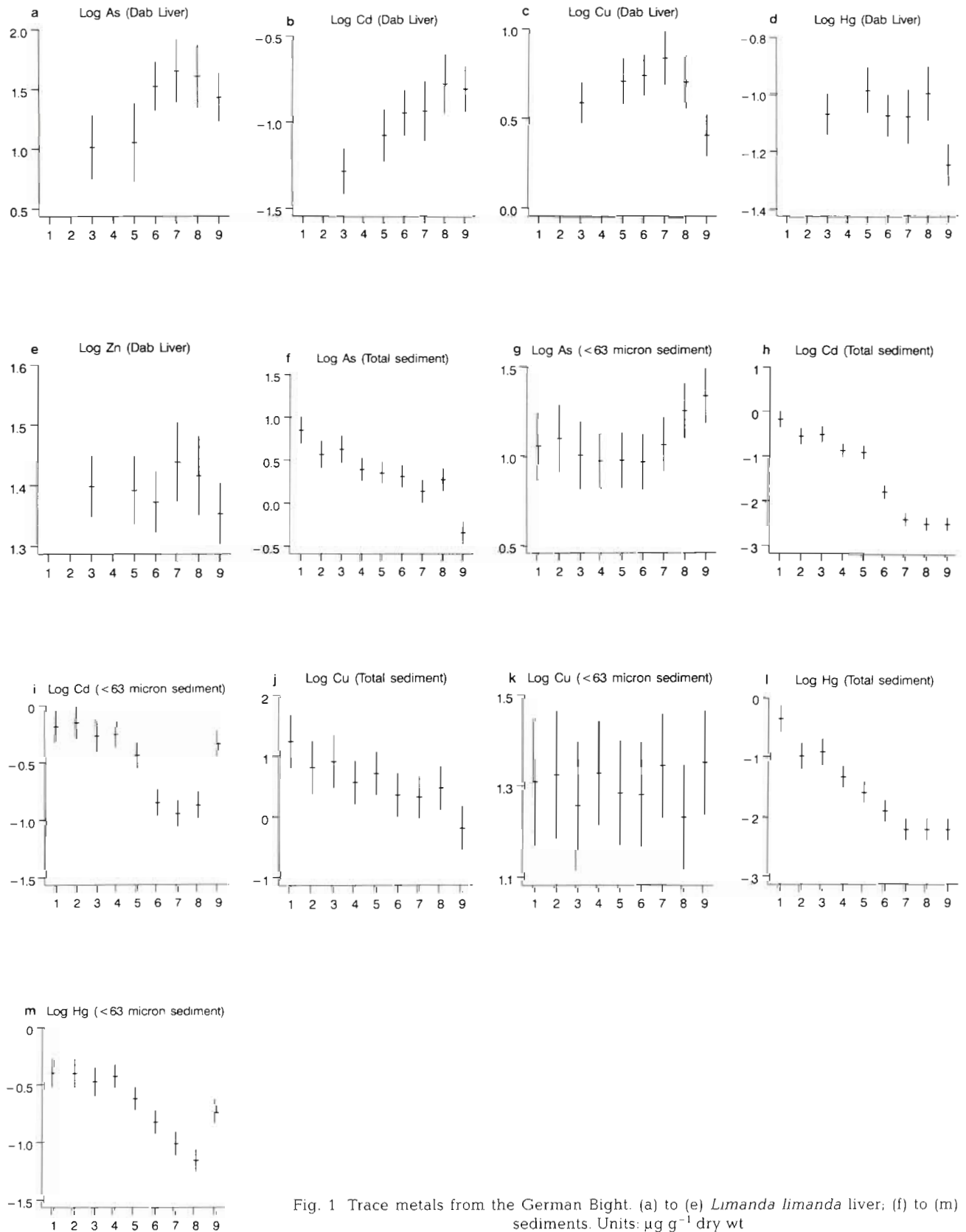


Fig. 1 Trace metals from the German Bight. (a) to (e) *Limanda limanda* liver; (f) to (m) sediments. Units:  $\mu\text{g g}^{-1}$  dry wt

## CHEMISTRY: METALS

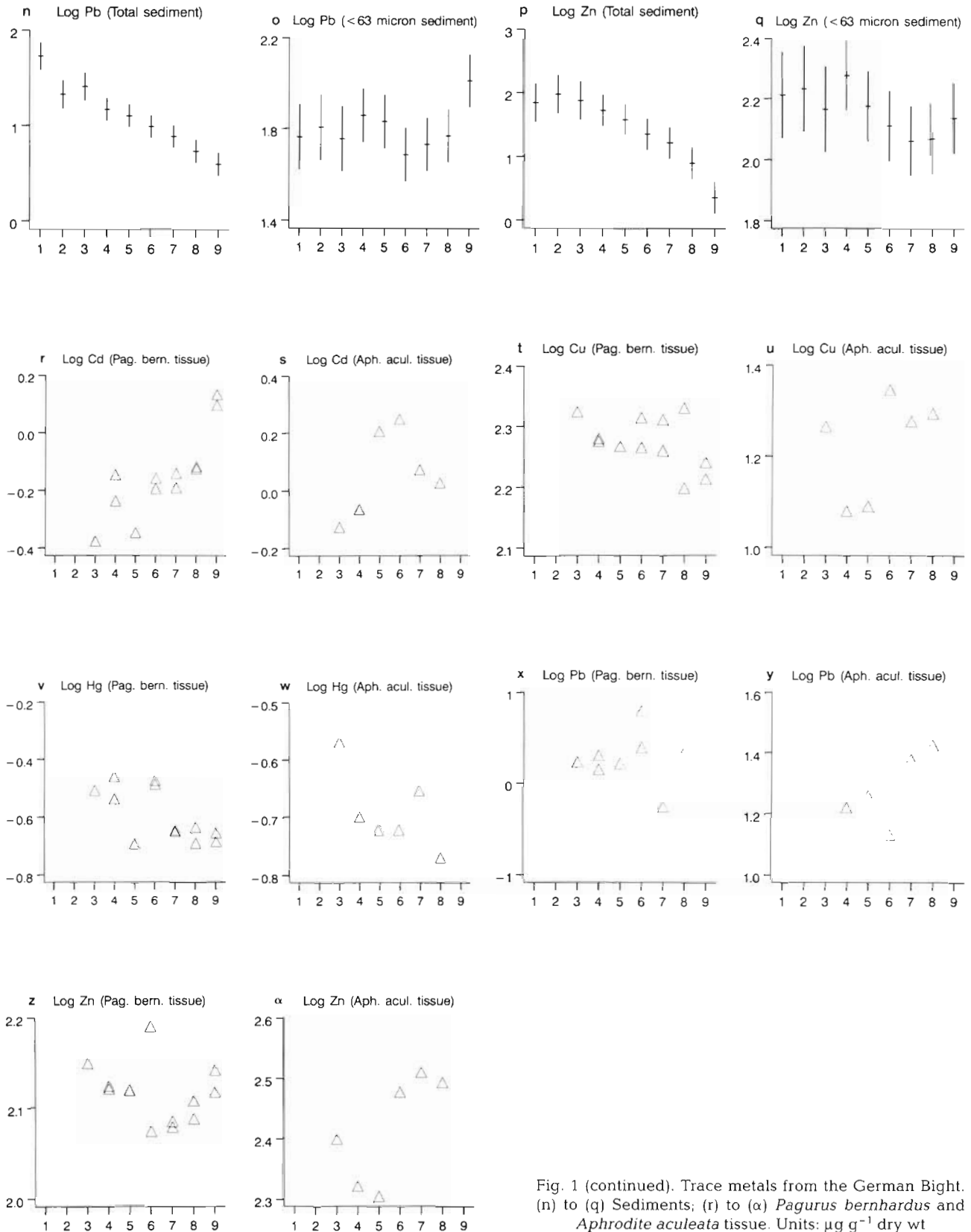


Fig. 1 (continued). Trace metals from the German Bight. (n) to (q) Sediments; (r) to ( $\alpha$ ) *Pagurus bernhardus* and *Aphrodite aculeata* tissue. Units:  $\mu\text{g g}^{-1}$  dry wt

## CHEMISTRY: CHLORINATED HYDROCARBONS

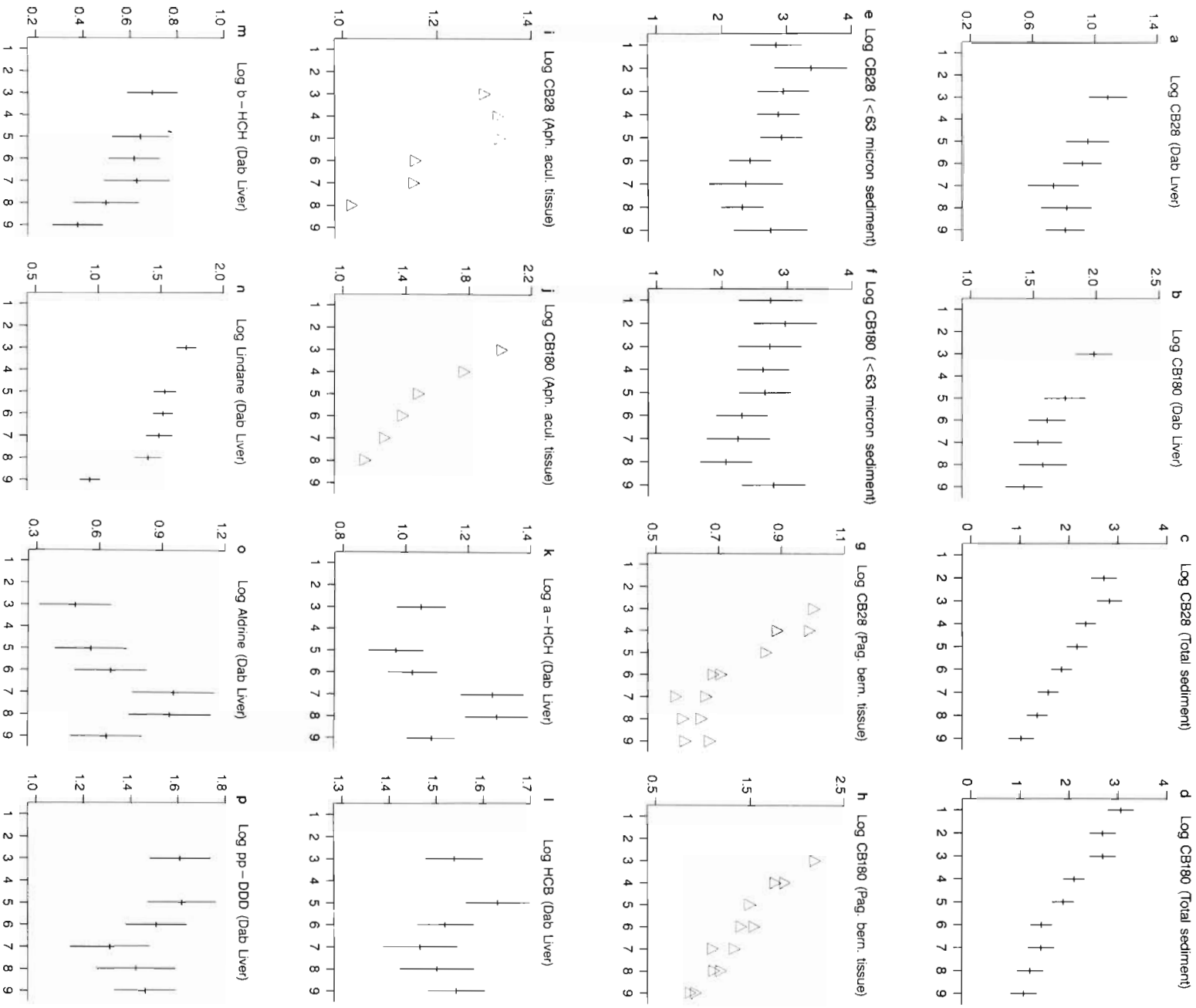


Fig. 2. Chlorinated hydrocarbons from the German Bight: (a), (b) PCBs for *Limanda limanda* liver; (c) to (f) PCBs for sediments, (g) to (j) PCBs for *Pagurus bernhardus* and *Aphrodite aculeata* tissue; (k) to (p) organochlorine pesticides for *Limanda limanda* liver. Units: (a), (b)  $\text{ng g}^{-1}$  fat wt; (c) to (f)  $\text{ng g}^{-1}$  dry wt; (g) to (p)  $\text{ng g}^{-1}$  fat wt

## CHEMISTRY: AROMATIC AND TOTAL HYDROCARBONS

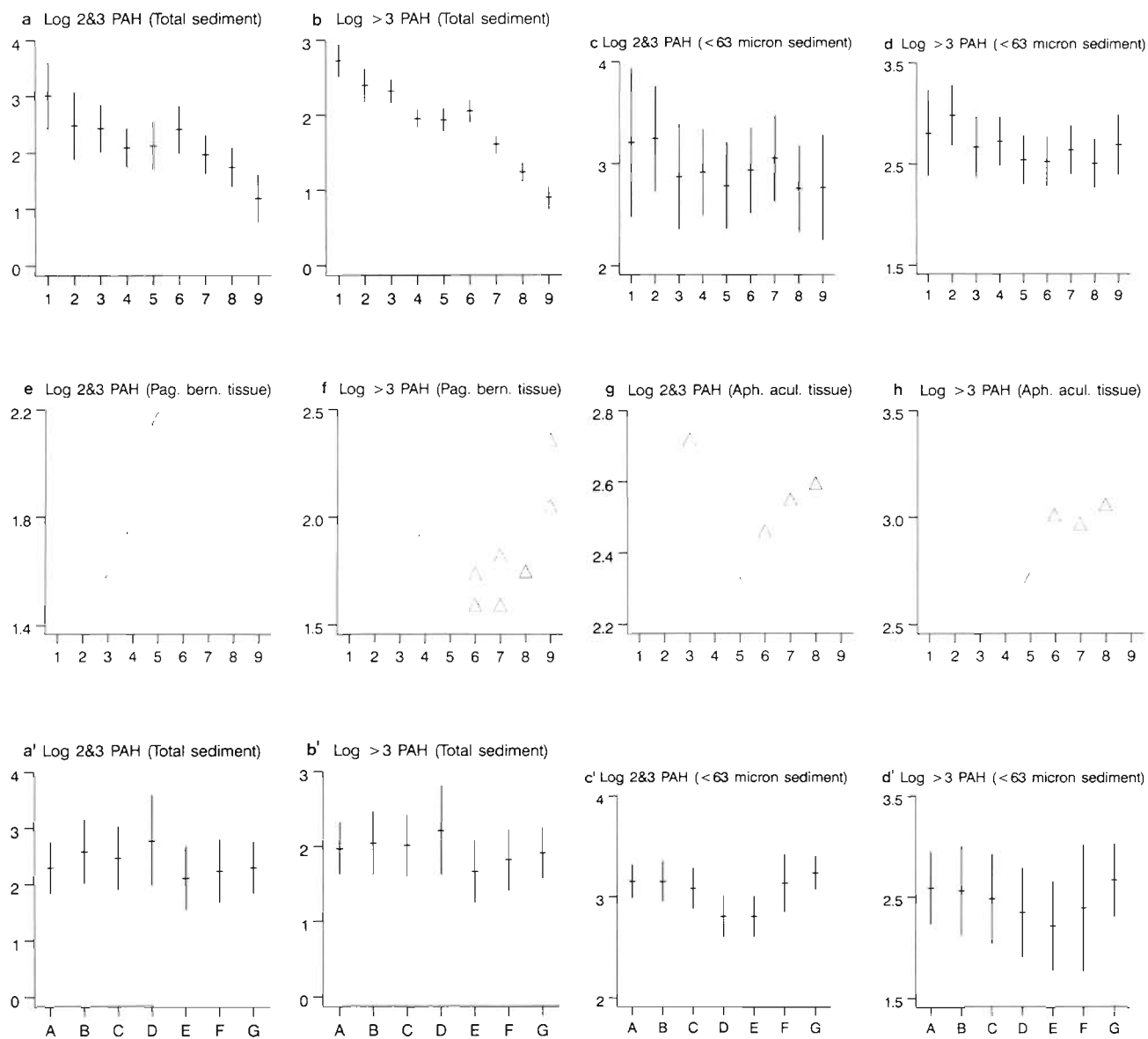


Fig. 3. Aromatic hydrocarbons. (a) to (d) Sediments; (e) to (h) *Pagurus bernhardus* and *Aphrodite aculeata* tissue. Units: (a) to (d)  $\text{ng g}^{-1}$  dry wt; (e) to (h)  $\text{ng g}^{-1}$  fat wt

## CHEMISTRY: AROMATIC AND TOTAL HYDROCARBONS

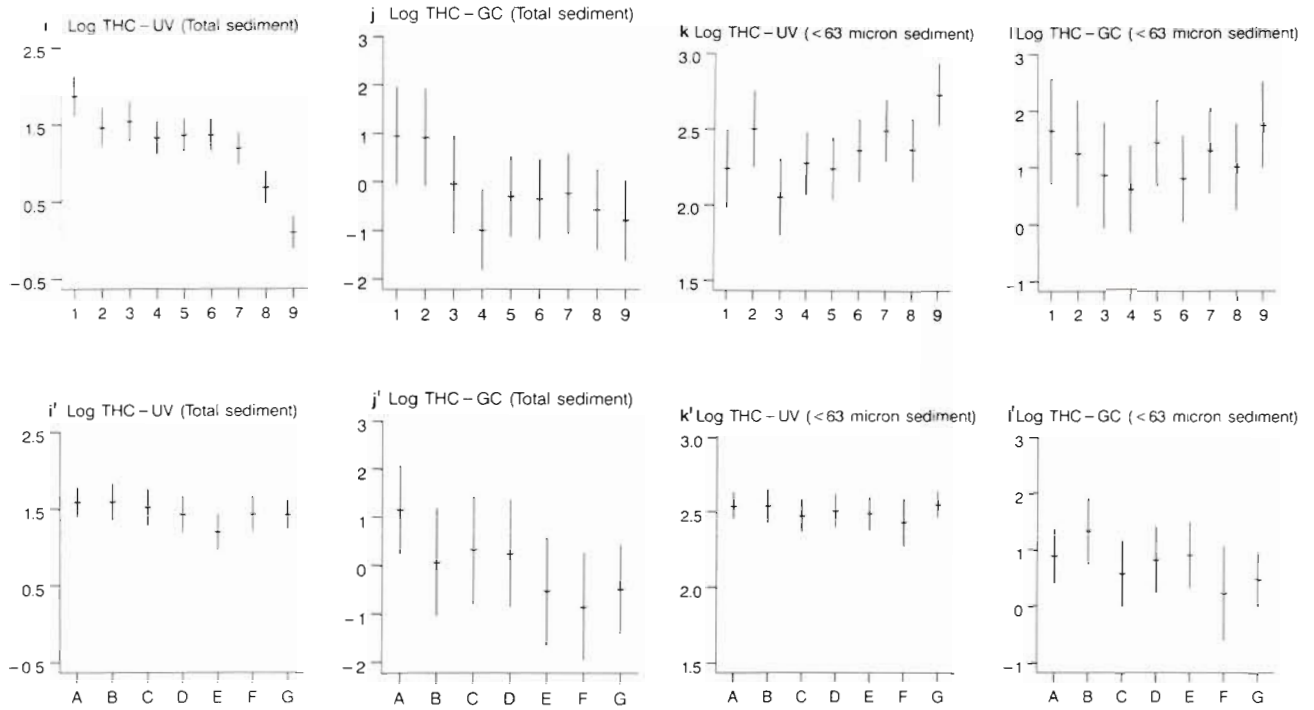


Fig. 3 (continued). Total hydrocarbons by UVF and GC. (i) to (l) Sediments. Units: (i) to (l)  $\mu\text{g g}^{-1}$  dry wt