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Heye Rumohr[1], Thomas Brey[1] and Sven Ankar[2]

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1) Institut für Meereskunde, Düsternbrooker Weg 20,
D-2300 Kiel, F.R.G.
2) Askö Laboratory, Inst. of Marine Ecology, Univ. of Stockholm,
S-10691 Stockholm, Sweden

Contents

Introduction

There have been a number of attempts to relate basic physical measurements of aquatic invertebrates i.e. length and weight to each other and to other measures that are easy to obtain (i.e. Slobodkin & Richmond 1961, Brawn et al. 1968, Lie 1968, Prus 1970, Kreutzberg & v.Oertzen 1973, Tyler 1973, Lappalainen & Kangas 1975, Bast & v.Oertzen 1976, Petersen 1977, Chambers & Milne 1979, Norrbin & Bamstedt 1984).
An important reason for this is to reduce laboratory work required for preparing data for benthic production studies.
This paper presents a compilation of published and unpublished data on conversion factors with special reference to Baltic invertebrates, supplemented by data from other marine areas. General conversion factors for main macrobenthic taxa have been computed and their validity assessed.
Beside the general importance of such a compilation of conversion factors they may also serve Baltic benthos investigators to convert "old" wet weight biomass data into more appropriate units of biomass: dry weight, ash free dry weight or energy content (Joule).
This study was promoted by the Baltic Marine Biologists Working Group 11 ("Secondary Production"), to facilitate comparative benthic production studies.
During the preparation of this compilation many members of the working group and other colleagues have opened their drawers and hidden files to supply us with their unpublished results (H. Cederwall, S. Hansson, P. Kangas, N. Kautsky, A. Lappalainen, J. Ostrowski, E. Persson, B. Saebø, M. Weigelt; see also list of contributors in Appendix II).

The collected conversion factors are presented at three levels of precision:

(1) Average conversion factors 'weight -> weight' and 'weight -> energy content' for main taxonomic groups.
(2) Conversion factors 'weight -> weight' and 'weight -> energy content' for individual Baltic species.
(3) Length - weight - relationships for individual Baltic species.

The applicability of these factors is discussed in the light of seasonal variations and geographic gradients which include factors like exposition, spawning cycles and other biotic and abiotic influences. Following the results of this study tentative recommendations will be proposed that will also go into the revised edition of the BMB-recommendations.

Methods

A variety of methods have been applied by various authors to obtain many kinds of conversion factors. The methods used for the data in this compilation are listed in Appendix II.
A critical factor in comparing different studies concern whether fresh or formalin preserved material was used since all preservation media have a distinct influence on the weight (e.g. Mills et al. 1982, Brey 1986).
Further, it is necessary to know the time of exposition and the temperature used in drying and combustion since the weight can be altered quite significantly when certain limits are passed (e.g. Winberg 1971).
The most important question concerns the date at which the sample was taken, since the spawning season and other seasonal influences have distinct effects on the weight to length ratio of many species.
Geographical information is also needed, especially when the limits of distribution of a certain species are reached, and when hydrographical features differ considerably between the sampling areas.
Additionally laboratory methods have to be considered carefully since even the measuring technique may be a source of error in a study.

Results

The results are presented in Appendix I in groups according to their precision.

(1) Average conversion factors 'weight -> weight' and 'weight -> energy content' for main taxonomic groups.

Data on Gastropoda, Bivalvia, Crustacea and Polychaeta have been analyzed. Bivalves with extraordinary thick shells like Arctica islandica and Astarte spp., and crustaceans with heavy calcareous skeletons as well as very large species and juveniles have been neglected.

Appendix I: 1.1. shows the average conversion factors for wet weight -> shell free dry weight (WW -> SFDW), dry weight -> ash free dry weight (DW -> AFDW) in molluscs, and the factors for WW -> DW, DW -> AFDW and WW -> AFDW for crustaceans and polychaetes. The WW -> AFDW factors have been calculated from the others.

Appendix I: 1.2. shows the average conversion factors for DW -> Joule/mg, SFDW -> Joule/mg and AFDW -> Joule/mg for the different taxonomic groups.

(2) Conversion factors 'weight -> weight' and 'weight -> energy content' for individual Baltic species.

Summary data for 92 species are presented in Appendix I: 2., 29 mollusc species, 33 crustacean species, 14 polychaete species and 17 species of other taxa. All data available, including seasonal and geographical variations, are presented.

(3) Length - weight - relationships for individual Baltic species.

These data (Appendix I: 3.) are for 44 species (21 mollusc species, 15 crustacean species, 4 polychaete species and 4 species of other taxa).

Discussion

The average conversion factors for main taxa have small confidence limits (see Chapter 1.1. and 1.2. in Appendix I), although very different methods have been used (see Appendix II) to determine weights and energy content.

The factors for converting WW to AFDW, which are calculated here from the other factors, are close to the factors published by Lie (1968). Lie found the average AFDW in %WW factors for bivalves, crustaceans and polychaetes to be 5.5, 15.0 and 13.3. The factors computed in this paper are 6.9, 14.5 and 13.2, respectively. Only the conversion factors for bivalves differ markedly. We assume this to be related to geographical effects, because Lie's data refer to animals from the Pacific coast of the USA, whereas the greater part of the data compiled here is from the Baltic Sea with lower salinity and unsaturated with $CaCO_3$. The shells of bivalves are usually thinner in areas with lower salinity (e.g. Arntz & Weber 1970) and this leads to a higher AFDW/WW ratio.

The conversion factors for the species (Appendix I, 2.) show that even in single species there is a wide range of values due to geographical, seasonal and individual differences, and possibly also to interannual variations in the condition (see e.g., Lappalainen & Kangas 1975 [Fig.2] or Davis & Wilson 1983 [Fig.1]).

This is especially true for the conversion of weight into energy, where seasonal differences in condition, different life stages or sex result in large differences in energy content. Throughout the course of a year, maximum to minimum flesh weight of a given size may differ seasonally by a factor of 2 or 3 (e.g. Beukema & deBruin 1977, Chambers & Milne 1979).

The length - weight relationships (Appendix I, 3.) show the largest variation among the data compiled here, although the relationships given by individual workers indicate always a strong correlation between length and weight.

Length - weight relationships show the same effects as mentioned above, but additional factors influencing the equations should be noted.

Length measurements are certainly not standardized, e.g. in the literature one can find that either shell length or shell height of bivalves have been correlated with weight. Some investigators stretch bent animals before measuring, others do not, etc. There is a lot of variation in body length determinations, all affecting the calculation of the length - weight equations.

The relationships obtained are also influenced by the size range measured as well as by the weighing procedure, e.g. sometimes the

shell halves of bivalves are opened and the water in the mantle cavity is removed before weighing. In other cases, especially in small bivalves, this is impossible without damaging the animal.
Furthermore, the equations are only valid for the body length intervals which they are based on, and should not be used outside this size range.
The equations should be used with caution, if data on sampling date, geographic sampling area, life stages, sex, size range and laboratory methods used are missing.
Beside all these variations, which are induced either by nature or by the methods used, benthic investigators should consider some basic statistical problems of length - weight relationships:
Length - weight relationships are usually established by fitting a linear regression to the logarithmic data:

$$\log(w_i) = a + b * \log(l_i)$$

The estimates of the slope b and the y-axis intercept a by a "prediction model" could be seriously biased. They should be substituted by an estimate through a "functional model" according to Ricker (1973) or corrected by a factor according to Baskerville (1972) and Sprugel (1983).

Conclusions

It is ovious that much information is still required. Data are particulary required for DW -> AFDW and AFDW -> energy relations in polychaetes. Also AFDW -> energy relations of the following species are scarce or even lacking: Arctica, Astarte, Crangon, Nephtys, Terebellides, Spionids (no data!), Priapulids.
These gaps should be filled in the near future, to make model computations more easy and reliable.

How to use this compilation:

(1) Average conversion factors 'weight -> weight' and 'weight -> energy content' for main taxonomic groups.
These factors seem to be hard facts. They will be useful in all cases where the aim of the investigations carried out is above the species level, e.g. community biomass or biomass of

trophic groups.

(2) Conversion factors 'weight -> weight' and 'weight -> energy content' for individual Baltic species.
The general validity of factors which depend on any term including calcareous parts (e.g. WW and DW of Molluscs) is poor because shell weight is related to salinity.
Geographical, seasonal and individual differences should always be taken into account, if any conversion factor for single species is used.

(3) Length - weight - relationships for individual Baltic species.
Individual weight is usually only required for a high level of precision in benthic research work. Therefore, the equations compiled here must be used with utmost care. In many cases, it may be preferable for workers who need such relationships, to produce their own.

References (see also Appendix II)

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Davis, J.P. and J.G. Wilson (1983): Seasonal changes in tissue weight and biochemical composition of the bivalve Nucula turgida in Dublin Bay with reference to gametogenesis. Netherl. J. Sea Res. 17: 84-95.

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Winberg, G.G. (1971): Methods for the estimation of the production of aquatic animals. Academic Press, London, N.Y., 175p.

Sprugel, D.G. (1983): Correcting for bias in log-transformed allometric equations. Ecology 64: 209-210.

Appendix I: Data

(In the following the sign '#' indicates a reference number, e.g. #10 is reference No 10 in Appendix II.)

1. Average conversion factors for main taxonomic groups

The average conversion factors for main taxonomic groups (which are Gastropoda, Bivalvia, Crustacea, Polychaeta) are compiled in two tables in chapter 1.1. (conversion factors weight -> weight), and chapter 1.2. (conversion factors weight -> energy content). In the case of the weight -> energy content factors, the median is used instead of the arithmetic mean, because some of the data sets are not normal distributed.
We did not include DW -> energy content factors for Bivalvia and Gastropoda, because these data are scare and show strong dispersion. However, an additional conversion factor AFDW -> Joule/mg for all taxa was computed.
We did not calculate any general factor for Echinodermata, because there are large differences in body composition (e.g. $CaCO_3$-content) in this group.
The 'number of species' given for each conversion factor refers to the minimum number of species included. Due to the fact that many authors published factors related to higher taxonomic groups (e.g. family or genus), the real number of species included here may be distinctly higher.

1.1. Average conversion factors: weight -> weight.

Arithmetic mean and 95% confidence interval.
WW = wet weight, AFDW = ash free dry weight
DW = dry weight, SFDW = shell free dry weight
1) AFDW%WW is calculated from the other factors.
2) except Arctica islandica and Astarte spp.
3) except Balanomorpha, large Decapoda and juvenile stages.

Taxon	type	factor %	95%-conf. interval	number values	number species	references
Bivalvia 2)	SFDW%WW	8.1	±1.1	53	24	< a >
	AFDW%DW	15.6	±1.5	31	18	< b >
	AFDW%SFDW	81.3	±2.1	53	22	< c >
	AFDW%WW	6.9 1)	-	-	-	-
Gatropoda	SFDW%WW	10.2	±1.1	46	27	< d >
	AFDW%DW	23.5	±7.3	8	6	< e >
	AFDW%SFDW	83.7	±1.9	49	27	< f >
	AFDW%WW	8.5 1)	-	-	-	-
Crustacea 3)	DW%WW	20.2	±1.0	65	39	< g >
	AFDW%DW	71.7	±3.4	53	35	< h >
	AFDW%WW	14.5 1)	-	-	-	-
Polychaeta	DW%WW	17.6	±1.2	80	59	< i >
	AFDW%DW	75.2	±3.4	69	48	< k >
	AFDW%WW	13.2 1)	-	-	-	-

< a >: #5, #7 , #10, #13, #49.
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< c >: #10, #17, #49.
< d >: #10, #13, #17.
< e >: #14, #32.
< f >: #10, #17, #36.
< g >: #5 , #7 , #10, #13, #32, #33, #39, #41, #49, #50, #51, #54.
< h >: #10, #12, #14, #15, #32, #33, #37, #39, #49, #51.
< i >: #5 , #7 , #10, #13, #15, #32, #33, #41, #44, #49, #51.
< k >: #10, #14, #15, #16, #32, #33, #37, #49, #51.

1.2. Average conversion factors: weight -> energy content.

Median and 95% confidence limits of energy content (Joule/mg).
DW: dry weight, SFDW: shell free DW, AFDW: ash free DW.
1 Joule = 0.239 cal, 1 cal = 4.187 Joule.
1) except Balanomorpha, large Decapoda and juvenile stages.
2) except large Decapoda and juvenile stages.

Taxon	weight type	median [Joule/mg]	95%-conf.-limits lower	upper	number values	number species	ref.
Bivalvia	SFDW	18.85	18.63	19.33	50	38	< a >
	AFDW	22.79	22.07	23.45	37	32	< b >
Gastropoda	SFDW	17.16	16.49	18.29	44	43	< c >
	AFDW	22.63	21.77	23.58	42	42	< d >
Crustacea	DW [1)]	15.25	14.49	16.89	60	45	< e >
	AFDW [2)]	22.45	21.51	23.44	45	40	< f >
Polychaeta	DW	16.46	14.19	17.50	36	28	< g >
	AFDW	23.33	22.22	24.89	19	17	< h >
All taxa	AFDW	22.78	21.95	23.33	143	131	< i >

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< c >: #22, #37, #42, #49.
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< e >: #12, #13, #15, #18, #20, #22, #29, #30, #37, #41, #42, #49, #50.
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< h >: #10, #12, #15, #17, #18, #37, #42, #49.
< i >: #10, #12, #15, #17, #18, #20, #24, #25, #29, #30, #37, #41, #42, #43, #49, #50.

2. Conversion factors for individual Baltic species

Abbreviations:

WW	= wet weight,	DW	= dry weight
AFDW	= ash free dry weight,	SF	= shell free
N	= number of values included,		

[additional number in brackets = number of individuals]

1 Joule = 0.239 cal, 1 cal = 4.187 Joule

If two values are connected by a hyphen, these two values are the lower and upper limit of the whole range of values given. If two values are separated by a slash, these values represent two measurements.

2.1. Mollusca

2.1.1. Bivalvia

Abra spp. (A. alba, longicallus, nitida)

- A. (Syndosmya) alba

DW	=	31.3	% WW	(N=104 [1345 ind], #51)
SFDW	=	12.4 - 16.5	% SFWW	(seasonal var., #15)
AFDW	=	83.6 - 88.0	% SFDW	(seasonal var., #15)
	=	85.9		(mean, #15)
AFDW	=	18.0	% DW	(N= 217 [2246 ind], #51)
Joule/mg SFDW:		17.02 - 20.26		(seasonal var., #15)
		18.80		(mean, #15)
Joule/mg AFDW:		20.23 - 23.61		(seasonal var., #15)
		21.89		(mean, #15)

- A. longicallus

AFDW	=	16.8	% DW	(#54)

- A. nitida

AFDW	=	18.5	% DW	(#54)

<u>Arctica islandica</u>

SFWW	=	19.3 - 22.2	% WW	(#9)
	=	12.8		(#40)
DW	=	53.2	% WW	(N= 45 [153 ind], #51)
SFDW	=	3.3	% WW	(#8)
SFDW	=	13.9 - 19.5	% SFWW	(Jun.-Nov., #44)
AFDW	=	2.9	% WW	(#8)
	=	3.4		(#44)
AFDW	=	11.9	% SFWW	(#44)
AFDW	=	9.1	% DW	(N= 11[42 ind], #14)
	=	10.0		(N=583, #51)
AFDW	=	88.4	% SFDW	(#8)
Joule/mg WW:		0.63		(#8)
Joule/mg SFDW:		18.76		(#8)
		16.88		(#50)
Joule/mg AFDW:		21.22		(#8)

<u>Astarte</u> spp. (A. borealis, elliptica, montagui, sulcata)

- <u>A. borealis</u>

DW	=	69.9	% WW	(N= 56, #41)
	=	72.9		(N= 19, #51)
SFDW	=	5.0	% WW	(Aug., #10)
AFDW	=	7.2	% DW	(N=127, #51)
Joule/mg AFDW:		21.27 / 22.83		(N=3/3, Aug., #10)

- <u>A. elliptica</u>

DW	=	76.6	% WW	(N= 20, #51)
SFDW	=	2.1	% WW	(N=105, #46)
SFDW	=	3.1	% DW	(N= 98, #46)
AFDW	=	7.7	% DW	(N=106, #51)

- <u>A. montagui</u>

DW	=	70.6	% WW	(N= 12, #51)
SFDW	=	3.0	% WW	(Aug., #10)
AFDW	=	7.1	% DW	(N= 85, #51)
Joule/mg AFDW:		21.96		(N= 2, Aug., #10)

- *A. sulcata*

AFDW	=	77.0	% SFDW	(N= 7, #37)
Joule/mg SFDW:		18.35		(N= 7, #37)
Joule/mg AFDW:		23.84		(N= 7, #37)

Cardium spp. (C. edule, fasciatum, glaucum, hauniense)

- *C. edule*

AFDW	=	90.4 - 94.3	% SFDW	(seasonal var., #17)
	=	92.2		(mean, #17)
Joule/mg DW:		2.26 - 5.57		(#22)
Joule/mg SFDW:		19.13		(#22)
		18.62 - 19.48		(seasonal var., #17)
		19.08		(mean, #17)
Joule/mg AFDW:		20.02 - 21.53		(seasonal var., #17)
		20.59		(mean, #17)

- *C. fasciatum*

DW	=	31.7	% WW	(N= 26, #51)
AFDW	=	14.9	% DW	(N= 41, #41)
	=	22.9		(N= 79, #51)
Joule/mg DW:		2.72 - 5.07		(#22)
Joule/mg SFDW:		18.63		(#22)

- *C. glaucum*

DW	=	52.7	% WW	(N= 49, #32)
	=	54.1		(N= 95, #32)
	=	56.5		(N= 34, Oct., #41)
SFDW	=	12.1 / 19.7	% SFWW	(Jul./Dec., #44)
AFDW	=	4.4	% DW	(Dec., #44)
AFDW	=	16.8	% SFWW	(Dec., #44)
AFDW	=	11.5	% DW	(N= 23, #32)
	=	9.7		(N= 38, #32)
AFDW	=	85.3	% SFDW	(#44)
Joule/mg DW:		15.5		(#30)
		14.49		(N= 12, Oct., #41)

- C. hauniense

SFWW	=	36.0	% WW	(N= 30, Oct., #7)
SFDW	=	7.2	% WW	(N= 30, Oct., #7)

Corbula (Aloidis) gibba

DW	=	56.7	% WW	(N= 41 [222 ind], #51)
AFDW	=	6.0	% WW	(N= 8 [406 ind], #14)
	=	6.5		(#51)
AFDW	=	12.2	% DW	(N= 41 [1879 ind], #14)
	=	11.5		(N=329 [12142 ind], #51)

Leda pernula

SFDW	=	20.5 / 18.3	% SFWW	(Mar./Jul., #44)
AFDW	=	3.9	% WW	(Mar., #44)
AFDW	=	14.1	% SFWW	(Mar., #44)

Macoma spp. (M. balthica, calcarea)

- Macoma balthica

SFWW	=	40.8	% WW	(N=137, #9)
DW	=	48.2	% WW	(N=295, #32)
	=	52.8		(N= 15, Apr., #41)
	=	53.5		(M. balthica & M. calcarea, #55)
SFDW	=	6.1	% WW	(N=137, #9)
	=	6.5		(0.556-1.620mm length, N= 9, #7)
SFDW	=	13.3	% SFWW	(N= 19, #39)
SFDW	=	17.0	% DW	(#6)
AFDW	=	12.0	% SFWW	(N= 19, #39)
AFDW	=	11.4	% DW	(N= 58 [8447 ind], #14)
	=	16.7 - 22.8		(seasonal var., #32)
	=	21.0		(mean, #32)
AFDW	=	18.5	% DW	(N= 84 [873 ind], #51)
AFDW	=	76.9 - 97.2	% SFDW	(seasonal var., #32)
	=	91.1		(mean, #32)
	=	90.4		(N= 19, #39)

Joule/mg WW:	1.64 / 1.72	(#49)
Joule/mg DW:	4.90 - 12.06	(#22)
	15.44	(N= 9, Oct., #41)

(Macoma continued)

Joule/mg SFDW:	16.12 - 19.05		(seasonal var., #17)
	17.79		(mean, #17)
	20.60		(#22)
	16.73 / 19.08		(#49)
Joule/mg AFDW:	18.93 - 22.23		(seasonal var., #17)
	19.97		(mean, #17)
	16.95		(#21)
	18.39 / 24.18		(#49)

- M. calcarea

SFDW	=	1.8	% DW	(N= 7, #33)
AFDW	=	14.4	% DW	(N= 7, #33)
	=	19.2		(N= 16 [90 ind], #51)
	=	90.4		(N= 19, #39)

Modiola modiolus

SFDW	=	15.4	% SFWW	(Apr., #44)
AFDW	=	3.2	% WW	(Apr., #44)
AFDW	=	12.4	% SFWW	(Apr., #44)

Mya spp. (M. arenaria, truncata [1 value])

SFWW	=	51.3	% WW	(N= 26, Apr., #5)
DW	=	53.8	% WW	(N= 52, #32)
	=	45.2		(N=129, Aug., #41)
	=	34.2		(M. trunc., N= 11 [18 ind], #51)
SFDW	=	7.6	% WW	(N= 26, Apr., #5)
SFDW	=	14.8	% SFWW	(N= 26, Apr., #5)
SFDW	=	14.7	% DW	(N= 26, Apr., #5)
AFDW	=	6.3	% WW	(N= 11, #33)
AFDW	=	15.7	% DW	(N= 44 [3053 ind], #14)
	=	15.4		(N= 29, #32)
	=	16.1		(N= 11, #33)
	=	19.9		(N=135, #51)

Joule/mg DW:	4.35 - 6.82	(#22)
	14.01	(N= 6, Oct., #41)
Joule/mg SFDW:	19.30	(#22)
	18.67	(#30)

<u>Mysella (Montacuta) bidentata</u>

DW	=	47.9	% WW	(N= 44 [609 ind], #51)
AFDW	=	5.2	% WW	(N= 5 [795 ind], #14)
	=	7.2		(#51)
AFDW	=	11.3	% DW	(N= 35 [3650 ind], #14)
	=	15.1	% DW	(N=327 [5151 ind], #51)

<u>Mytilus edulis</u>

SFWW	=	30.5	% WW	(#7)
DW	=	43.6 / 40.2	% WW	(N=389/123, #32)
	=	33.9		(N=301, Oct., #41)
	=	38.2		(N= 18 [58 ind], #51)
SFDW	=	5.0 / 5.0	% WW	(Aug., #10)
	=	4.6		(#26)
SFDW	=	14.0 - 17.7	% SFWW	(N= 29, seasonal var., #24)
		15.9		(mean, #24)
SFDW	=	15.0	% DW	(#19)
AFDW	=	3.9	% WW	(Dec., #44)
AFDW	=	17.7 - 21.2	% DW	(seasonal var., #32)
	=	20.0 / 22.5		(N=114/65, #32)
	=	23.8		(N= 63 [230 ind], #51)
AFDW	=	86.0 / 86.0	% SFDW	(#10)
	=	83.2		(Dec., #44)
	=	90.9 - 93.9		(seasonal var., #17)
		92.1		(mean. #17)

Joule/mg DW:	3.56 - 8.46	(#22)
	14.88	(N= 15, Oct., #41)
Joule/mg SFDW:	20.78	(#8)
	19.99 - 20.89	(seasonal var., #17)
	20.45	(mean, #17)
	21.73	(#22)
	20.73 - 23.41	(N= 28, seasonal var., #24)
	21.50	(mean, #24)
	20.98 - 21.35	(#30)

(*Mytilus* continued)

Joule/mg AFDW:	21.74 - 22.53	(seasonal var., #17)
	22.18	(mean, #17)
	21.61 - 24.63	(N= 28, seasonal var., #24)
	22.46	(mean, #24)
	23.59 / 23.80	(N=3/3, Aug., #10)

2.1.2. Gastropoda

<u>Apporhais pespelicani</u>

SFDW	=	24.0 / 25.1	% SFWW	(Aug., #44)
AFDW	=	4.7	% WW	(Aug., #44)
AFDW	=	20.4	% SFWW	(Aug., #44)
AFDW	=	85.0	% SFDW	(Aug., #44)

<u>Buccinum undatum</u>

SFDW	=	22.6 / 24.3	% SFWW	(Jul./Dec., #44)
AFDW	=	11.1	% WW	(Dec., #44)
AFDW	=	22.0	% SFWW	(Dec., #44)
AFDW	=	90.5	% SFDW	(Dec., #44)

<u>Hydrobia</u> spp.

SFWW	=	43.7	% WW	(N= 30, Apr., #5)
DW	=	67.0	% WW	(N= 30, Apr., #5)
	=	65.6 / 65.9		(N=114/215, #32)
SFDW	=	10.7	% WW	(N= 30, Apr., #5)
SFDW	=	24.5	% SFWW	(N= 30, Apr,. #5)
SFDW	=	15.6	% DW	(N= 30, Apr., #5)
AFDW	=	20.5	% DW	(N= 35 [3650 ind], #14)
	=	15.1 - 17.9		(#22)
	=	17.9 / 15.1		(N= 28/ 86, #32)
	=	20.5		(N= 45 [209 ind], #51)
Joule/mg AFDW:		24.61		(#20)

<u>Littorina littora</u>

AFDW	=	87.0 - 92.0	% SFDW	(seasonal var., #17)
		90.7		(mean, #17)
Joule/mg SFDW:		18.70 - 21.41		(seasonal var., #17)
		19.76		(mean, #17)
Joule/mg AFDW:		21.03 - 22.99		(seasonal var., #17)
		21.77		(mean, #17)

<u>Lymnaea</u> spp. (L. spp., peregra)

SFWW	=	37.2	% WW	(L. spp., N= 74, #32)
SFDW	=	6.9		(L. peregra, #20)
SFDW	=	28.5	% SFWW	(L. peregra, #20)
AFDW	=	38.3	% DW	(L. spp., N= 25, #32)
	=	40.5		(L. peregra, #20)

<u>Paludestrina (Potamopyrgus)jenkinsi</u>

DW	=	51.8 / 52.7	% WW	(N= 23 / 66, #32)
AFDW	=	22.3	% DW	(N= 14, #32)
	=	24.9		(#20)

<u>Theodoxus fluviatilis</u>

DW	=	62.0	% WW	(#7)
	=	67.6 / 70.5	% WW	(N=239/62, #32)
SFDW	=	6.2	% WW	(#7)
	=	4.6		(#26)
SFDW	=	9.3	% DW	(#26)
AFDW	=	12.9 / 15.3	% DW	(N= 24/77, #32)
	=	15.4		(Jul.-Oct., #20)

2.2. Crustacea

2.2.1. Amphipoda

Bathyporeia pilosa

DW	=	24.0	% WW	(N=188, Aug., #41)
Joule/mg DW:		13.47		(N= 2, Oct., #41)

Corophium spp. (C. volutator, insidiosum)

- C. volutator

DW	=	21.9	% WW	(N= 70, #32)
	=	13.7		(N= 39, Oct., #41)
	=	21.2		(N= 35, #5)
	=	71.1 - 81.6		(seasonal var., #17)
	=	77.3		(mean, #17)
	=	74.5		(N= 29, #32)
Joule/mg DW:		13.27 - 16.85		(seasonal var., #17)
		15.41		(mean, #17)
		11.79		(N= 6, Oct., #41)
Joule/mg AFDW:		18.68 - 20-90		(seasonal var., #17)
		19.90		(mean, #17)

- C. insidiosum

DW	=	12.9	% WW	(N= 9 [30 ind], #51)
AFDW	=	79.7	% DW	(N= 16 [454 ind], #14)
	=	83.8		(N= 22 [72 ind], #51)

Gammarus spp. (G. spp, duebeni, oceanicus, salinus, zaddachi)

DW	=	15.4 - 26.4	% WW	(G. spp., N= 34, #24)
	=	19.2		(G. spp., N= 99, #32)
	=	18.2		(G. spp., N=391, #32)
	=	19.1		(G. oceanicus, N=205, #32)
	=	21.1		(G. salinus, N= 74, #32)
	=	21.7		(G. zaddachi, N= 38, #32)
AFDW	=	71.9	% DW	(G. spp., N= 76, #32)
	=	71.8		(G. oceanicus, N= 46, #32)
	=	71.2		(G. zaddachi, #12)

(*Gammarus* continued)

Joule/mg DW	Joule/mg AFDW	
10.23	-	(G. sp., N= 34, Oct., #41)
16.11	-	(G. spp., #7)
13.75-16.68	18.69-21.74	(G. spp., #24)
19.66	27.57	(G. spp., juv. 4mm, #26A)
18.64	24.84	(G. spp., juv. 2-5 mm, #12)
18.47	21.50	(G. duebe., females + eggs, #30)
15.90	19.49	(G. ocean., males 6-14mm, #12)
16.12	20.16	(G. salin., males 5-11mm, #12)
15.72	22.07	(G. zadda., juv. 2-5 mm, #12)
16.37	20.51	(G. zadda., females 5-10mm, #12)
15.57	22.18	(G. zadda., males 7-18mm, #12)
12.97	20.92	(G. zadda., males 12-19mm, #12)

Haploops tubicola

DW	=	24.2	% WW	(Feb., #44)
AFDW	=	17.4	% WW	(Feb., #44)
AFDW	=	71.9	% DW	(Feb., #44)

Phoxocephalus holboelli

DW	=	13.6	% WW	(N= 4 [319 ind], #14)
AFDW	=	11.7	% WW	(N= 4 [319 ind], #14)
AFDW	=	84.9	% DW	(N= 33 [2431 ind], #14)

Pontoporeia spp. (P. affinis, femorata)

- *P. affinis*

DW	=	19.4	% WW	(N=517, May/Aug., #41)
	=	23.6		(N= 37, Aug., #7)

Joule/mg DW	Joule/mg AFDW	
14.6	-	(N= 8, Oct., #41)
19.01/27.22	23.95/32.57	(adult/juv, #27)
22.3	-	(N= 1, #7)

(<u>Pontoporeia</u> continued)

- <u>P. femorata</u>

DW	=	19.2	% WW	(N=292, May/Aug., #41)
	=	15.5		(N= 50, #39)
	=	18.0		(#52)
	=	20.9		(N= 22, Aug., #7)
AFDW	=	13.8	% WW	(N= 50, #39)
AFDW	=	88.6	% DW	(N= 50, #39)
	=	84.5		(N=104 [350 ind], #51)

2.2.2. Isopoda

<u>Asellus aquaticus</u>

DW	=	20.7	% WW	(N= 37, #32)
AFDW	=	68.2	% DW	(N= 15, #32)

<u>Idothea</u> spp. (I. spp., aleutica, baltica, chelipes, ochotensis)

DW	=	22.6 / 23.0	% WW	(I. spp., N=159/36, #32)
	=	20.6		(I. baltica, N= 55, Apr., #41)
	=	21.0 - 24.0		(I. chelipes, fem., #47)
	=	22.3		(mean, #47)
AFDW	=	90.0	% DW	(I. spp., N= 35, #32)
	=	75.9		(I. balt., N= 5 [42 ind], #51)

Joule/mg DW	Joule/mg AFDW	
24.87	25.92	(I. aleutica, eggs, #12)
23.45	24.70	(I. aleut., embryones, #12)
21.98	24.41	(I. aleut., 0 days old, #12)
25.33	26.46	(I. balt. basteri, eggs, #12)
23.24	25.12	(I. balt. bast., embryones, #12)
20.47	24.95	(I. balt. bast., 0 days old, #12)
8.63/10.22	-	(I. balt., juv. 0/20 days, #12)
6.70/11.26	8.71/17.92	(I. balt., juv. 1.95/4.0mm, #12)
13.98	-	(I. balt., #22)
14.19	20.94	(I. balt. bast., all sizes, #12)
13.13/17.54	18.01/19.68	(I. chel., juv. 2-5/4mm, #12)
16.60	21.66	(I. chel., fem. & eggs, #12)

(*Idothea* continued)

Joule/mg DW	Joule/mg AFDW	
14.66	19.25	(I. chel., males 5-15mm, #12)
24.16	25.54	(I. ochotensis, eggs, #12)
20.68	-	(I. ochot., embryones, #12)
19.00	23.57	(I. ochot., 0 days old, #12)

Jaera albifrons

DW	=	13.3	% WW	(N= 24, May/Aug./Oct., #41)
	=	23.3		(N= 63, #32)
AFDW	=	70.8	% DW	(N= 10, #32

Mesidotea entomon

DW	=	19.9	% WW	(N= 42, May/Aug., #41)
	=	22.2		(N= 36, #32)
AFDW	=	65.2	% DW	(Jul.-Oct., #20)

Joule/mg DW	Joule/mg AFDW	
-	24.36	(Aug., #10)
27.55/23.07	28.89/26.46	(eggs/juv. 0 days, #12)

2.2.3. Mysidacea

Mysidae

DW	=	19.9	% WW	(N= 90, #32)
AFDW	=	90.0	% DW	(N= 10, #32)

Gastrosaccus spinifer

DW	=	18.0	% WW	(N= 11 [30 ind], #51)
AFDW	=	12.2	% WW	(N= 5 [10 ind], #14)
AFDW	=	83.6	% DW	(N= 37 [324 ind], #14)
	=	86.9		(N= 84 [182 ind], #51)

Mysis spp. (M. mixta, relicta)

- *M. mixta*

DW	= 13.3	% WW	(N= 16, May/Aug./Oct., #41)
Joule/mg DW:	15.12		(N= 5, Oct., #41)

- *M. relicta*

AFDW	= 90.0 - 92.5	% DW	(seasonal var., embryos, #23)
	= 89.9 - 92.5		(" ", juveniles, #23)
	= 90.5 - 92.5		(" ", females + eggs, #23)
	= 91.9 - 93.4		(" ", females, #23)
	= 88.4 - 94.0		(" ", males, #23)
Joule/mg AFDW:	30.47		(embryos, #23)
	22.73		(juveniles, #23)
	23.50		(females + eggs, #23)

Neomysis integer

DW	= 12.8	% WW	(N= 16, May/Aug./Oct., #41)
Joule/mg DW:	14.97 / 13.54		(N= 4/ 24, Oct., #41)

2.2.4. Other Crustacea

Balanus spp. (B. balanoides, balanus, crenatus, improvisus)

- *B. balanoides*

Joule/mg SFDW:	19.86	(N= 11, #49)
Joule/mg AFDW:	22.20	(N= 11, #49)

- *B. balanus*

Joule/mg SFDW:	15.46	(N= 6, #10)
Joule/mg AFDW:	22.57	(N= 6, #10)

- *B. crenatus*

DW	= 47.4	% WW	(Feb., #44)
AFDW	= 3.9	% WW	(Feb., #44)
AFDW	= 8.2	% DW	(Feb., #44)

- <u>B. improvisus</u>

DW	=	50.7	% WW	(N= 44, #32)
SFDW	=	3.2	% WW	(#26)
SFDW	=	8.9	% DW	(#26)
AFDW	=	3.9	% WW	(#26)
AFDW	=	10.8	% DW	(N= 10, #32)

<u>Crangon</u> spp. (C. crangon, septemspinosa)

DW	=	19.1	% WW	(C. crangon, N= 48, Dec., #41)
	=	26.0 / 24.0		(C. septemspinosa, Spring / November, #50)
AFDW	=	90.7	% DW	(C. crang., N= 9 [11 ind], #51)
Joule/mg DW:		17.41		(C. crang., #12)
		17.25		(C. crang., #22)
		11.42		(C. crang., N= 26, Oct., #41)
		17.90 / 17.12		(C. septe., Spring / Nov., #50)
Joule/mg AFDW:		20.39		(C. crang., #12)

<u>Diastylis rathkei</u>

DW	=	20.8	% WW	(#12)
	=	19.9		(N=101, Aug., #41)
	=	17.2		(#55)
	=	11.8		(N= 61 [8293 ind], #51)
AFDW	=	14.0	% WW	(#30)
AFDW	=	56.7	% DW	(N= 20 [916 ind], #14)
	=	59.6 - 69.0		(seasonal var., #15)
	=	65.7		(mean, #15)
	=	66.5		(N=438 [31530 ind], #51)
Joule/mg DW:		14.58 - 17.69		(seasonal var., #15)
		16.55		(mean, #15)
		15.12		(#22)
		12.02		(N= 19, Oct., #41)

(*Diastylis* continued)

Joule/mg AFDW: 24.47 - 25.64 (seasonal var., #15)

25.19	(mean, #15)
25.1	(eggs, #43)
16.9	(juv., #43)
18.7	(males & females, #43)
16.4	(females, #43)
19.0	(females & eggs, #43)

Eupagurus bernhardus

DW	=	27.1	% WW	(Nov., #44)
AFDW	=	16.7	% WW	(Nov., #44)
AFDW	=	61.6	% DW	(Nov., #44)

Hyas coarctatus

DW	=	38.1	% WW	(Feb., #44)
AFDW	=	22.8	% WW	(Feb., #44)
AFDW	=	59.8	% DW	(Feb., #44)

Ostracoda

DW	=	44.0	% WW	(Cyprideis litoralis, #7)
	=	63.0		(Heterocyprideis sorbyana, #7)
	=	61.0		(Paracyprideis fennica, #7)
AFDW	=	8.0	% WW	(Candona spp., #7)
AFDW	=	20.0	% DW	(Cyprideis litoralis, #7)
	=	46 / 50		(N=130/70, Aug., #53)
Joule/mg AFDW:		25.10		(Cyprideis litoralis, #7)
		24.62		(Candona spp., #7)

2.3. Polychaeta

2.3.1. Polychaeta errantia

<u>Aphrodite aculeata</u>

DW	=	22.4	% WW	(Jul., #44)
AFDW	=	15.6	% WW	(Jul., #44)
AFDW	=	69.6	% DW	(Jul., #44)

<u>Eteone longa</u>

AFDW	=	13.6	% WW	(N= 6 [40 ind], #14)
	=	25.1		(N= 32 [30 ind], #51)
AFDW	=	83.3	% DW	(N= 38 [623 ind], #14)
	=	83.1		(N= 27 [50 ind], #51)

<u>Harmothoe sarsi</u>

DW	=	15.3	% WW	(N= 21, #7)
	=	13.5		(N= 48, Apr.-Aug., #41)
	=	14.7		(N= 37 [110 ind], #51)
AFDW	=	15.7	% WW	(N= 9 [108 ind], #14)
AFDW	=	79.1	% DW	(N= 24 [291 ind], #14)
	=	90.6		(N=356 [1303ind], #51)
Joule/mg DW:		15.29		(N= 3, Oct., #41)

<u>Nephtys</u> spp. (N. spp., ciliata, incisa)

DW	=	14.4 - 17.8	% WW	(seasonal var., #15)
	=	16.8		(mean, #15)
	=	21.8		(N. incisa, Apr., #44)
	=	17.1		(N= 3, #11)
	=	11.4		(#33)
	=	18.0		(N= 37 [341 ind], #51)
AFDW	=	17.5	% WW	(N. incisa, Apr., #44)
AFDW	=	69.4	% DW	(N= 42 [429 ind], #14)
	=	70.7 - 82.6		(seasonal var., #15)
	=	78.3		(mean, #15)
	=	69.4		(N= 3, #11)
	=	76.2		(#33)
	=	74.2		(N= 37 [341 ind], #51)

(<u>Nephtys</u> continued)

AFDW	=	80.3	% DW	(N. incisa, Apr., #44)
Joule/mg DW:		17.00		(N. ciliata, N= 3, #13)
		15.50 - 19.75		(seasonal var., #15)
		17.52		(mean, #15)
		15.80 / 17.40		(N. incisa, all seasons / Aug - Dec, #44)
Joule/mg AFDW:		19.60 - 25.10		(seasonal var., #15)
		22.17		(mean, #15)

<u>Nereis</u> spp. (N. diversicolor, pelagica)

- <u>N. diversicolor</u>

DW	=	15.7	% WW	(N= 93, #32)
	=	15.5		(N= 47, Aug., #41)
	=	18.1		(Dec., #44)
	=	18.0		(N= 20, Apr., #5)
AFDW	=	14.9	% WW	(Dec., #44)
AFDW	=	75.3 - 88.1	% DW	(seasonal var., #17)
	=	82.8		(mean, #17)
	=	84.4		(#32)
	=	82.3		(Dec., #44)
Joule/mg DW:		21.45		(N= 5, #12)
		16.48 - 19.70		(seasonal var., #17)
		18.04		(mean, #17)
		15.35		(Oct., #41)
Joule/mg AFDW:		23.33		(N= 5, #12)
		20.90 - 22.47		(seasonal var., #17)
		21.76		(mean, #17)

- <u>N. pelagica</u>

DW	=	16.6 / 15.4	% WW	(N= 3 / 3, Nov./Feb., #49)
Joule/mg DW:		24.51 / 21.99		(N= 3 / 3, " , #49)
Joule/mg AFDW:		27.71 / 24.40		(N= 3 / 3, " , #49)

<u>Scoloplos armiger</u>

DW	=	14.9	% WW	(N= 40 [2065 ind], #51)
	=	12.4		(N= 7, #55)
AFDW	=	11.2	% WW	(N= 8 [393 ind], #14)
AFDW	=	56.3	% DW	(N= 22 [1024 ind], #14)
	=	79.3		(N=236 [7803 ind], #51)

2.3.2. Polychaeta sedentaria

<u>Arenicola marina</u>

DW	=	18.2	% WW	(Sep., #44)
AFDW	=	13.7	% WW	(Sep., #44)
AFDW	=	75.3	% DW	(Sep., #44)

<u>Aricidea</u> spp. (A. jeffreysii, suecia)

DW	=	13.6	% WW	(A. suecia, N= 30, Apr.-Oct.,#41)
	=	13.7		(A. jeffr., N= 6, #55)
AFDW	=	72.8	% DW	(A. jeffr., N= 19 [190 ind], #14)
	=	80.3		(A. jeffr., N= 40 [115 ind], #51)

<u>Pectinaria</u> spp. (P. hypoboreia, koreni)

DW	=	19.2	% WW	(P. hypo., #13)
	=	6.9 - 11.3		(P. kor., seasonal var., #15)
	=	39.6		(P. kor., N= 17 [43 ind], #51)
AFDW	=	50.5 - 85.7	% DW	(P. kor., seasonal var., #15)
	=	52.0		(P. kor., N=318 [2841 ind], #51)
Joule/mg DW:		14.21		(P. hypo.,N= 5, #13)
		13.68 - 19.75		(P. kor., seasonal var., #15)
		16.72		(P. kor., mean, #15)
		13.02		(P. kor., #22)
Joule/mg AFDW:		18.62 - 25.82		(P. kor., seasonal var., #15)
		22.22		(P. kor., mean, #15)

<u>Pygospio elegans</u>

DW	=	24.4	% WW	(N= 20, #32)
AFDW	=	11.1	% WW	(N= 6 [1857 ind], #14)
AFDW	=	61.9	% DW	(N= 23 [7224 ind], #14)

Polydora spp.

DW	=	20.3	% WW	(N= 42 [264 ind], #51)
AFDW	=	83.5	% DW	(N=167 [3645 ind], #51)

Sosane gracilis

DW	=	21.4	% WW	(Feb., #44)
AFDW	=	18.7	% WW	(Feb., #44)
AFDW	=	87.4	% DW	(Feb., #44)

Terebellides stroemi

DW	=	19.6	% WW	(T. spp., #13)
	=	17.0		(N= 4, Nov., #5)
	=	15.5		(N=134, Aug., #41)
	=	13.6		(N= 38 [1850 ind], #51)
	=	13.8		(N= 7, #55)
AFDW	=	60.9	% DW	(N=110 [1099 ind], #51)
Joule/mg DW:		10.47		(T. spp., N= 3, #10)
		17.34		(T. spp., #13)
Joule/mg AFDW:		24.95		(T. spp., N= 3, #10)

2.4. Other Taxa

2.4.1. Turbellaria

DW	=	23.6	% WW	(N= 69, #32)
AFDW	=	78	% DW	(N= 92, Aug., #53)

2.4.2. Nematoda

DW	=	23.0	% WW	(#7)
AFDW	=	80.0	% DW	(#7)
	=	76 - 93		(Aug., #53)

2.4.3. Nemertini

DW	=	20.5	% WW	(Prostoma obscurum, N= 27, #32)
	=	25.5		(N= 15 [39 ind], #51)
	=	12.2		(N= 7, #55)
AFDW	=	22.0	% WW	(#51)
AFDW	=	86.2	% DW	(N= 62 [127 ind]. #51)
Joule/mg DW:		21.3		(P. obscurum, Jul., #26A)
Joule/mg AFDW:		22.5		(P. obscurum, Jul., #26A)

2.4.4. Priapulida

<u>Halicryptus spinulosus</u>

DW	=	19.0	% WW	(Apr., #7)
	=	9.2		(N= 7, #55)
	=	8.2		(N=139, #41)
	=	7.6		(N=52 [293 ind], #51)
AFDW	=	6.5	% WW	(#51)
AFDW	=	86.1	% DW	(N=368 [1117ind], #51)

<u>Priapulus caudatus</u>

DW	=	8.8	% WW	(#55)
	=	6.2		(N= 36, Apr./Aug., #41)

2.4.5. Oligochaeta

DW	= 18.0	% WW	(Nais elinguis, N=10, Apr., #7)
	= 13.0		(Clitello arenarius,N=10,Apr.,#5)
	= 19.0		(N= 13, #32)
Joule/mg DW:	22.79		(Dina microstoma, #42)
	21.51		(Limnodrilus sp., #42)
	22.11		(Tubifex tubifex, #42)
Joule/mg AFDW:	23.23		(T. tubifex, #42)

2.4.6. Insecta

Chironomida Larvae

DW	= 19.5 / 19.0	% WW	(N= 67/34, #32)
	= 21.0		(N= 30, #7)
Joule/mg DW:	22.30		(N= 9, #29)
	22.33		(N= 3, #30)
Joule/mg AFDW:	24.28		(N= 9, #29)
	23.34		(N= 2, #30)

Trichoptera Larvae

DW	= 19.8	% WW	(N= 50, #32)

2.4.7. Echinodermata

Asteroidea (Asterias spp., rubens, vulgaris)

DW	= 24.3	% WW	(A. vulg., #13)
AFDW	= 56.0 / 42.0	% DW	(A. spp., Aug., #10)
	= 50.6		(A. rub., N= 13, #22)
	= 50.7		(A. rub., N= 5, #37)
	= 38.0		(A. rub., N= 21 [39 ind], #51)
Joule/mg DW:	8.55		(A. vulg., #13)
	5.23 - 11.81		(A. rub., #22)
	10.50		(A. rub., N= 5, #37)
	8.92		(A. spp., N= 7, #19)
Joule/mg AFDW:	21.10		(A. rub., N= 5, #37)
	23.60 / 22.12		(A. spp., N=3/3, Aug., #10)

Ophiuroidea (Ophiura albida; Amphiura chiajei, filiformis)

Joule/mg AFDW: 20.94 - 24.83 (3 different species, Aug., #10)

- Ophiura albida

DW	= 66.0 / 61.7 % WW	(Nov./Apr., #44)
	= 55.7	(N= 13 [43 ind], #51)
AFDW	= 8.4 / 8.6 % WW	(Nov./Apr., #44)
AFDW	= 12.7 / 13.9 % DW	(Nov./Apr., #44)
	= 12.7	(N=230 [1793 ind], #51)

- Amphiura chiajei

DW	= 44.9 - 52.9 % WW	(seasonal var., #44)
AFDW	= 12.2 - 13.5 % WW	(seasonal var., #44)
AFDW	= 25.0 - 30.1 % DW	(seasonal var., #44)

- Amphiura filiformis

DW	= 38.6 - 43.6 % WW	(seasonal var., #44)
	= 40.2	(juv., #44)
AFDW	= 13.7 - 17.0 % WW	(seasonal var., #44)
	= 14.1	(juv., #44)
AFDW	= 33.3 - 39.0 % DW	(seasonal var., #44)

Echinoidea (Echinocardium; Echinocyamus; Strongylocentrotus)

- Echinocardium cordatum

DW	= 17.7 - 21.9 % WW	(seasonal var., #44)
AFDW	= 2.9 - 3.1 % WW	(seasonal var., #44)
AFDW	= 14.2 - 16.4 % DW	(seasonal var., #44)

- Echinocyamus pusillus

DW	= .47.9 % WW	(Sep., #44)
AFDW	= 7.2 % WW	(Sep., #44)
AFDW	= 15.0 % DW	(Sep., #44)

- Strongylocentrotus spp.

Joule/mg DW:	12.06	(N= 3, #10)
	3.69	(#13)
Joule/mg AFDW:	23.66	(N= 3, #10)

Holothuroidea (Cucumaria)

- Cucumaria spp. (C. elongata, frondosa)

DW	=	47.8	% WW	(C. elong., Jul., #44)
AFDW	=	8.2	% WW	(C. elong., Jul., #44)
AFDW	=	17.2	% DW	(C. elong., Jul., #44)
Joule/mg DW:		12.86		(C. frond. [without $CaCO_3$], #13)

3. Length - weight - relationships

Usual log-log-regression form of length-weight-relations:

$\log_B(w) = b * \log_B(l) + a$; r, N

B = basis of logarithm,
usually 10 unless otherwise stated

l = length

w = weight (WW, SFWW, DW, SFDW, AFDW; see 1.1)

b = slope

a = y-axis intercept

r = correlation coefficient

N = number of values included
an additional number in brackets [] is the number of individuals included.

Additional parameters included here (if available) are:

- units = units of weight / length,
  in mg / mm unless otherwise stated
- range = range of length included in regression
- area and time of sampling

3.1. Mollusca

3.1.1. Bivalvia

species	weight	b	a	r	N	range	area	time	ref.	
Abra alba	WW	2.94	-0.842	-	-	-	Kiel Bay	-	#15	
(=Syndosmya alba)										
A. nitida	DW	2.702	-1.403	0.971	196	4 - 13	W.Norway	-	#54	
	AFDW	2.786	-2.221	0.934	146	4 - 13	W.Norway	-	#54	
A. longicallus	DW	3.008	-1.597	0.956	148	7 - 20	W.Norway	-	#54	
	AFDW	3.016	-2.379	0.962	111	7 - 20	W.Norway	-	#54	
Arctica islandica	WW	3.08	-0.779	-	-	-	Kiel Bay	-	#15	
	SFWW	2.888	-9.590	0.96	-	-	Atlantic	-	#36	loge, g/mm
Astarte borealis	WW	3.034	-0.813	0.996	56	7 - 26	Hanö Bight	-	#41	
		3.035	-0.617	0.999	47	-	Kiel Bay	June	#46	
A. montagui	WW	3.475	-0.888	0.997	18	-	Kiel Bay	June	#46	
A. elliptica	WW	2.878	-0.498	0.998	53	-	Kiel Bay	June	#46	
		3.087	-0.835	0.999	57	-	Kiel Bay	June	#46	
	DW	2.853	-0.643	0.997	46	-	Kiel Bay	June	#46	
	SFDW	2.791	-2.084	0.995	49	-	Kiel Bay	June	#46	

Bivalvia (continued)

species	weight	b	a	r	N	range	area	time	ref.	
Cardium edule	SFDW	3.108	-1.972	0.99	29	-	Ythan -	Nov.	#17	shell-height
		3.752	-2.919	0.99	28	-	Estuary	Jan.	"	"
		3.709	-2.907	0.99	21	-	"	Mar.	"	"
		3.412	-2.336	0.99	21	-	"	May	"	"
		3.125	-2.078	0.99	29	-	"	Jul.	"	"
		3.209	-2.090	0.99	24	-	"	Sep.	"	"
	AFDW	2.479	-1.354	0.999	16	[90] >= 2	Kiel Bay	Jul.	#14	
		2.412	-1.222	0.991	20	[619]	"	Aug.	"	
		2.662	-1.403	0.999	12	[60]	"	Dec.	"	
	AFDW	3.458	-3.854	0.992	18	2 - 6	Skagerrak	Aug.	#34	loge
		3.401	-5.225	0.998	38	4 - 21	"	Nov.	"	"
C. glaucum	WW	3.634	-1.263	0.964	34	5 - 12	Hanö Bight	-	#41	
		2.916	-0.503	0.996	75	5.6-25.5	Askö	Aug.	#5	
	DW	3.655	-1.403	0.945	34	5 - 12	Hanö Bight	-	#41	
		2.848	-0.867	0.987	75	5.6-25.5	Askö	Aug.	#5	
	SFDW	3.274	-2.538	0.967	55	-	Tvärminne	Jul.	#28	
		2.792	-2.032	0.974	58	-	Tvärminne	Aug.	#28	
C. hauniense	WW	2.932	-0.553	0.998	30	1.66-7.9	Askö	Nov.	#5	
	DW	2.760	-0.782	0.993	30	1.66-7.9	Askö	Nov.	#5	

Bivalvia (continued)

species	weight	b	a	r	N	range	area	time	ref.	
Macoma balthica	WW	3.127	-0.964	0.999	15	2 - 21	Hanö Bight	Apr.	#41	
		3.049	-0.814	0.998	137	2 - 19	Askö	-	#7	
		3.049	-6.962	0.995	9	556-1620	Askö	-	#7	µg/µm
	SFWW	2.486	-0.476	0.99	50	2 - 22	Gdansk Bay	-	#39	
	DW	3.165	-1.307	0.996	137	2 - 19	Askö	Aug.	#6	
		3.307	-1.481	0.993	44	5 - 18	Hanö Bight	Apr.	#41	
	SFDW	2.846	-1.534	0.96	126	-	Ythan -	Feb. 9	#17	shell-height
		2.825	-1.565	0.94	116	-	Estuary	Mar. 7	"	"
		2.434	-1.208	0.96	118	-	"	Apr.11	"	"
		2.260	-0.876	0.90	97	-	"	May 4	"	"
		1.839	-0.327	0.92	71	-	"	Jun. 6	"	"
		3.089	-1.540	0.99	66	-	"	Jul.13	"	"
		3.134	-1.892	0.98	72	-	"	Aug.11	"	"
		2.950	-1.452	0.99	66	-	"	Sep. 6	"	"
		2.941	-1.454	0.97	54	-	"	Nov.22	"	"
	SFDW	2.943	-1.928	0.964	97	-	Tvärminne	Jul.	#28	
		2.897	-1.544	0.987	59	-	"	Jul.	"	
		2.897	-1.780	0.990	50	2 - 22	Gdansk Bay	-	#39	
	AFDW	3.192	-2.158	0.997	112	1.5-19.5	Kiel Bay	May	#14	
	SFAFDW	2.847	-1.754	0.99	50	2 - 22	Gdansk Bay	-	#39	

Bivalvia (continued)

species	weight	b	a	r	N	range	area	time	ref.	
Mya arenaria	SFWW	2.993	-1.498	0.992	26	13 - 63	Askö	Apr.	#5	
		2.945	-2.259	0.986	26	13 - 63	Askö	Apr.	#5	
		3.179	-2.635	0.985	66	-	Tvärminne	Aug	#28	
	AFDW	2.134	-3.163	0.951	19	1 - 3	Skagerrak	Jul.	#34	loge
		2.680	-3.804	0.993	30	4 - 10	"	Aug.	"	"
		2.749	-3.553	0.995	42	4 - 25	"	Nov.	"	"
		2.770	-4.425	0.996	13	35 - 77	"	Apr.	"	"
		2.605	-3.741	0.992	1[illegible]	34 - 75	"	Jun.	"	"
		2.797	-4.410	0.997	16	33 - 62	"	Oct.	"	"
Mytilus edulis	WW	2.326	-0.354	0.986	253	3 - 42	Hanö B.	-	#41	
	DW	2.476	-1.059	0.979	48	9 - 39	Hanö B.	-	#41	
	SFDW	2.468	-1.789	0.949	155	mean 13.7	Tvärminne	-	#28	

Bivalvia (continued)

species	weight	b	a	r	N	range	area	time	ref.	
<u>Mytilus edulis</u>	SFDW	2.630	-2.075	0.99	39	-	Askö	Jan. 4	#29	4m depth
		2.709	-2.175	0.99	35	-	"	Feb. 9	"	"
		2.678	-2.147	0.99	39	-	"	Mar. 1	"	"
		2.444	-1.838	0.99	38	-	"	Mar.21	"	"
		2.636	-1.905	0.99	35	-	"	Apr.23	"	"
		2.630	-1.925	0.99	35	-	"	May 22	"	"
		2.265	-1.573	0.99	35	-	"	Jun.28	"	"
		2.300	-1.623	0.99	31	-	"	Aug. 2	"	"
		2.437	-1.843	0.99	33	-	"	Sep. 5	"	"
		2.665	-2.099	0.99	35	-	"	Oct. 9	"	"
		2.562	-1.942	0.99	35	-	"	Nov.21	"	"
		2.587	-2.001	1.00	32	-	Askö	Mar. 8	"	15m depth
		2.502	-1.663	1.00	35	-	"	Apr. 3	"	"
		2.761	-1.936	0.99	19	-	"	Apr.17	"	"
		2.534	-1.621	0.98	20	-	"	May 3	"	"
		2.481	-1.641	0.89	20	-	"	May 29	"	"
		2.695	-1.936	0.99	20	-	"	Jun. 6	"	"
		2.064	-1.262	0.99	20	-	"	Jun.19	"	"
		2.365	-1.731	1.00	35	-	"	Aug.19	"	"
		2.614	-2.013	0.98	19	-	"	Sep. 2	"	"
		2.571	-1.915	1.00	35	-	"	Dec. 7	"	"

Bivalvia (continued)

species	weight	b	a	r	N	range	area	time	ref.
Pisidium sp.	DW	2.56	-0.81	0.99	-	1 - 6	Bothn.Bay	Jul-Oct	#20

3.1.2. Gastropoda

species	weight	b	a	r	N	range	area	time	ref.
Hydrobia spp.	WW	2.308	-0.543	0.94	30	1.2-5.3	Askö	Apr.	#7
	DW	2.237	-0.660	0.983	30	1.2-5.3	Askö	Apr.	#5
H. ulvae	DW	2.416	-0.750	0.99	54	-	Askö	May	#31
		2.676	-0.908	0.99	54	-	"	Jul.	"
		2.573	-0.841	0.99	93	-	"	May, Jul	"
	SFDW	2.363	-1.587	0.93	32	-	Ythan Est.	Nov. 1	#17
		2.228	-1.457	0.85	29	-	"	Jan. 3	"
		2.174	-1.392	0.86	24	-	"	Mar. 4	"
		1.972	-1.326	0.89	22	-	"	May 6	"
		1.414	-1.108	0.87	23	-	"	Jul. 2	"
		3.353	-1.994	0.88	21	-	"	Sep. 2	"
Littorina litt.	SFDW	3.594	-2.510	0.99	26	-	Ythan Est.	Nov. 1	#17
		3.422	-2.299	0.96	16	-	"	Jan. 3	"
		3.609	-2.518	0.98	23	-	"	Mar. 4	"
		3.058	-1.940	0.96	22	-	"	May 6	"
		4.333	-3.449	0.94	17	-	"	Jul. 2	"
		3.879	-2.799	0.99	25	-	"	Sep. 2	"

Gastropoda (continued)

species	weight	b	a	r	N	range	area	time	ref.
Lymnaea peregra	DW	2.61	-1.02	0.99	-	1 - 20	Bothn. B.	Jul-Oct	#20
Potamopyrgus jenkinsi (Paludestina)	WW	2.594	-0.629	0.985	30	1.45-5.3	Askö	Nov.	#5
Theodoxus fluviat.	DW	2.80	-0.54	0.99	-	2 - 8	Bothn. B.	Jul-Oct	#20
Valvata piscinalis	DW	2.48	-0.40	0.98	-	1 - 5	Bothn. B.	Jul-Oct	#20

3.2. Crustacea

3.2.1. Amphipoda

species	weight	b	a	r	N	range	area	time	ref.	
Bathyporeia pilosa	WW	1.788	-0.816	0.971	188	2 - 7	Hanö Bight	Aug.	#41	
B. sarsi	DW	2.02	2.86	0.976	6	-	Kiel Bay	-	#3	µg/mm, loge
Corophium volutator										
males	WW	2.933	-1.473	0.943	11	5 - 9	Askö	-	#5	
females + juv.	WW	2.709	-1.443	0.986	22	2 - 8	"	-	"	
fem. + males + juv.	WW	2.989	-1.574	0.984	35	2 - 9	"	-	"	
males	DW	3.273	-2.422	0.934	11	5 - 9	Askö	-	#5	
females + juv.	DW	2.567	-2.040	0.970	22	2 - 8	"	-	"	
fem. + males + juv.	DW	2.938	-2.220	0.973	35	2 - 9	"	-	"	
		2.443	-1.709	0.98	41	-	Ythan Est.	Nov.	#17	
		2.514	-1.702	0.95	40	-	"	Jan.	"	
		3.419	-2.488	0.96	37	-	"	Mar.	"	
		3.140	-2.197	0.97	40	-	"	May	"	
		2.700	-1.932	0.96	29	-	"	Jul.	"	
		2.507	-1.773	0.99	32	-	"	Sep.	"	
		2.440	-1.881	0.943	39	3 - 9	Hanö B.	Oct.	#41	
C.insidiosum	DW	2.72	1.70	0.997	28	-	Kiel Bay	-	#3	µg/mm, loge

Amphipoda (continued)

species	weight	b	a	r	N	range	area	time	ref.	
Gammarus spp.	WW	2.760	-1.447	0.99	43	2 - 24	Askö	Apr.	#7	
		2.219	-0.795	0.962	302	3 - 25	Hanö B.	May-Oct	#41	
	DW	2.140	-1.659	0.993	89	3 - 25	Hanö B.	Aug.	#41	
G. salinus	DW	2.44	0.81	0.98	23	-	Kiel Bay	-	#3	µg/mm, loge
Microdeutopus gryllotalpa	DW	2.44	1.95	0.968	15	-	Kiel Bay	-	#3	µg/mm, loge
Pontoporeia affinis	WW	3.060	-1.619	0.997	37	2.9-8.7	Askö	Aug.	#7	
		2.105	-1.123	0.906	81	3 - 9	Hanö B.	May	#41	
		2.116	-1.097	0.973	134	"	"	May	"	
		2.417	-1.268	0.979	302	2 - 8	"	Aug	"	
	DW	2.853	-2.281	-	-	-	Bothnian Sea	Jul.	#1	
		3.269	-2.729	-	-	-	Bothnian Bay	Jul.	#1	
		3.075	-2.258	0.992	37	2.9-8.7	Askö	Aug.	#5	
		3.086	-2.715	0.97	-	-	Askö	Feb. 3	#16	
		3.845	-3.004	0.99	-	-	"	Aug. 8	"	
		2.732	-2.117	0.99	-	-	"	Dec. 4	"	
		2.836	-2.340	0.99	-	-	"	Jan.17	"	
		2.021	-1.735	0.91	-	-	"	Apr.	"	
		3.006	-2.340	0.99	-	-	"	Jul.26	"	

(Amphipoda continued)

species	weight	b	a	r	N	range	area	time	ref.
Pontoporeia femorata	WW	3.012	-1.598	0.996	22	2.9-9.2	Askö	Aug.	#7
		2.662	-1.218	0.99	50	2 - 11	Gdansk B.	-	#39
		2.342	-1.225	0.982	74	3 - 9	Hanö B.	May	#41
		2.302	-1.073	0.944	55	"	"	Aug.	"
		2.434	-1.135	0.973	154	"	"	Aug.	"
	DW	3.003	-2.281	0.988	22	2.9 -9.2	Askö	Aug.	#5
		2.992	-2.347	0.98	50	2 - 11	Gdansk B.	-	#39
	AFDW	3.042	-2.444	0.98	50	2 - 11	Gdansk B.	-	#39

3.2.2. Other Crustacea

species	weight	b	a	r	N	range	area	time	ref.	
<u>Crangon crangon</u>	DW	2.848	-2.452	0.988	48	10 - 35	Hanö B.	Dec.	#41	g / mm
<u>Diastylis rathkei</u>	WW	3.130	-2.216	-	-	-	Kiel Bay.	-	#15	
		2.973	-2.229	0.974	101	5 - 14	Hanö B.	Aug.	#41	
	DW	3.259	-3.166	0.945	101	5 - 14	Hanö B.	Aug.	#41	
<u>Idothea baltica</u>	DW	2.623	-1.869	0.975	55	6 - 15	Hanö B.	-	#41	
<u>Mesidothea entomon</u>	WW	2.629	-1.430	0.995	42	5 - 56	Hanö B.	May,Aug	#41	
(=Saduria)	DW	2.78	-2.12	0.98	-	5 - 50	Lulea	-	#20	
		2.50	-1.66	-	-	33 - 49	Bothn. B.	-	#28	
<u>Jaera</u> spp.	WW	2.662	-1.249	0.988	24	2 - ?	Hanö B.	-	#41	
females	WW	2.722	-1.271	0.935	17	2.9-4.2	Askö	Apr.	#5	
males	WW	3.399	-1.402	0.895	8	1.5-2.4	Askö	Apr.	#5	
mixed	WW	2.473	-1.126	0.96	25	1.5-4.2	Askö	Apr.	#7	
females	DW	2.911	-1.813	0.970	16	2.9-4.2	Askö	Apr.	#5	
males	DW	2.569	-1.650	0.876	8	1.5-2.4	Askö	Apr.	#5	
mixed	DW	2.668	-1.648	0.981	25	1.5-4.2	Askö	Apr.	#5	
<u>Mysis mixta</u>	WW	3.233	-2.481	0.990	16	11 - 22	Hanö B.	May-Oct	#41	
<u>Neomysis intiger</u>	WW	2.722	-1.873	0.972	16	10 - 18	Hanö B.	Aug-Oct	#41	

3.3. Polychaeta

3.3.1. Polychaeta errantia

species	weight	b	a	r	N	range	area	time	ref.	
Harmothoe sarsi	WW	2.672	-1.376	0.96	21	1.9-17.0	Askö	Nov.	#7	
		2.870	-1.727	0.976	48	5.0-24.0	Hanö B.	Apr,Aug	#41	
		3.333	-1.268	0.996	22	2 - 10	Tvärminne	Aug.	#45	l=breadth
	DW	2.415	-2.060	0.96	21	1.9-17.0	Askö	Nov.	#5	
		3.254	-1.863	0.994	84	1 - 6	Tvärminne	Aug.	#45	l=breadth
	AFDW	3.398	-2.000	0.993	84	"	"	"	"	"
Nereis diversicolor	WW	2.388	-1.612	0.99	20	9.9-57.0	Askö	Apr.	#7	
		2.341	-1.609	0.976	47	5.0-24.0	Hanö B.	Aug.	#41	
	DW	2.500	-2.517	0.97	20	9.9-57.0	Askö	Apr.	#5	

3.3.2. Polychaeta sedentaria

species	weight	b	a	r	N	range	area	time	ref.
Aricidea suecia	WW	2.833	-3.060	0.953	134	10 - 21	S.Baltic	-	#41
Terebellides stroemi	WW	2.410	-1.511	0.986	4	6.3-20.0	Askö	Nov.	#5
		2.407	-1.574	0.989	134	7.0-24.0	Hanö B.	Aug.	#41
	DW	2.417	-2.309	0.962	4	6.3-20.0	Askö	Nov.	#5

3.4 Other Taxa

species	weight	b	a	r	N	range	area	time	ref.	
3.4.1. Priapulida										
Halicryptus spinulosus adults	WW	1.037	-0.480	0.99	13	1.7-39.0	Askö	Apr.	#7	1 = 1 * ø2
"		2.972	-1.419	0.968	139	2.0-25.0	Hanö B.	Aug,Oct	#41	
larvae	WW	3.244	-7.778	0.99	3	1200-1300	Askö	Oct.	#7	µg / µm
Priapulus caudatus	WW	2.429	-0.890	0.925	36	2.0-30.0	Hanö B.	Apr-Oct	#41	
3.4.2. Insecta										
Chironomus larvae	WW	2.831	-2.350	0.981	30	5.3-16.4	Askö	Apr.	#5	
3.4.3. Echinodermata										
Asterias rubens	DW	0.871	0.786	0.983	68	-	Kiel Bay	Jun-Aug	#4	l=ø[cm],loge
	AFDW	0.938	0.323	0.978	68	-	"	"	"	" "

Appendix II:

References to the data in Appendix I

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Table of applied methods

refer. No	storage	DW °C / h	AFDW °C / h	calorimeter type	area
1.	?	?	-	-	Baltic, Gulf of Bothnia
2.	Fresh	60/>24	?	-	Baltic, Askö
3.	Formalin	105/ 12	-	-	Baltic, Kiel Bay
4.	Formalin	80/ ?	500/ 3	-	Baltic, Kiel Bay
5.	Fresh	60/>24	-	-	Baltic, Askö
6.	Fresh	60/24	-	-	Baltic, Askö
7.	Fresh	60/24	-	-	Baltic, Askö
8.	Fresh	80/ 24	250/ 1 +550/ 1	Phillipson	Baltic, Kiel Bay
9.	Formalin	-	-	-	Baltic, Kiel Bay
10.	Fresh	100/12-24	500/ 16	Parr	Canadian Arctic
11.	Formalin	?	?	-	Pacific, Seattle
12.	Fresh	60/ 24	500/ 6	MBC-3	Baltic, incl Lit.
13.	Fresh	75/->c	-	Parr	Atlantic, N. Scotia
14.	Formalin	85/ 24	520/ 24	-	Baltic, Kiel Bay
15.	Fresh	80/ 24	250/ 1 +550/ 1	Phillipson	Baltic, Kiel Bay
16.	Fresh	60/336	-	-	N. Baltic Proper
17.	Fresh	freeze-dried		Gallenkamp	North Sea, Scotland
18.					
19.	Formalin/ Alcohol	100/10-48	550/ 6-24	-	North Sea, Norway
20.	Fresh	60/>24	525/ 4.3	-	Lulea Archipelago
21.	Fresh	70/ 24	-	Phillipson	Atlantic, Massachu.
22.	Fresh	80/ 24	550/ 24	Phillipson	Baltic, Kiel Bay
23.	?	?	?	?	S. Finland
24.	Fresh	60/>24	?	Gallenkamp	Baltic, Askö
25.	Fresh	50/ 48	500/ 2	Gallenkamp	Irish Sea, N. Wales
26A	Fresh	60/>24	?	Phillipson	Baltic, Askö
26.	Fresh	60/ 24	-	-	Baltic, Tvärminne
27.	Fresh	60/ ?	?	?	Lake Ontario
28.	Fresh or Formalin	70/24	-	-	Baltic, Tvärminne

refer. No	storage	DW °C / h	AFDW °C / h	calorimeter type	area
29.	Fresh	60/>24	-	-	Baltic, Askö
30.	-	-	-	-	Baltic, Literature
31.	Fresh or Formalin	60/ 24	-	-	Baltic, Askö
32.	Formalin	70/ 24	350-400/2 +500-550/3	-	Baltic, Tvärminne
33.	Formalin	95/4-8	200-500/8.5 + 500 / 16	-	Pacific, Puget Sound
34.	?	60/to const. weight	550/ 5	-	Skagerrak
35.	?	-	550/ ?	-	Öresund
36.	Fresh	-	-	-	Atlantic
37.	Fresh	60/ 48	500/ ?	Phillipson	Koster Fjord
38.	?	?	?	-	Baltic, Mecklenb.
39.	Fresh	?	?	-	Baltic, Gdansk Bay
40.	Fresh	-	-	-	North Sea
41.	Formalin	100/ ? or 60/ ?	-	-	Baltic, Hanö Bight
42.	-	-	-	-	Literature
43.	Formalin	?	?	Phillipson	Baltic & North Sea
44.	Fresh	105/ 12	550/ 5	-	?
45.	Fresh or Formalin	60/ 24	500/ 3	-	Baltic, Tvärminne
46.	Fresh	80/ 24	-	-	Baltic, Kiel Bay
47.	Formalin	?	-	-	Baltic, Gulf of Finl.
48.	Fresh	?	?	?	?
49.	Fresh	60/ ? or freeze-dried	-	Phillipson	Atlantic
50.	Fresh	60/ 5	-	Parr	Atlantic
51.	Formalin	80/ 24	520/ 24	-	Baltic, Kiel Bay
52.	Fresh	60/>24	?	Gallenkamp	Baltic, Askö
53.	Formalin	60/ 12	550/ 4	-	Gullmar Fjord
54.	Fresh	100/ 24	550/ 24	-	Norway
55.	Formalin	according to BMB-recommend.			Baltic, Bornholm