FICHES D'IDENTIFICATION DU ZOOPLANCTON

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FAECAL PELLETS

by

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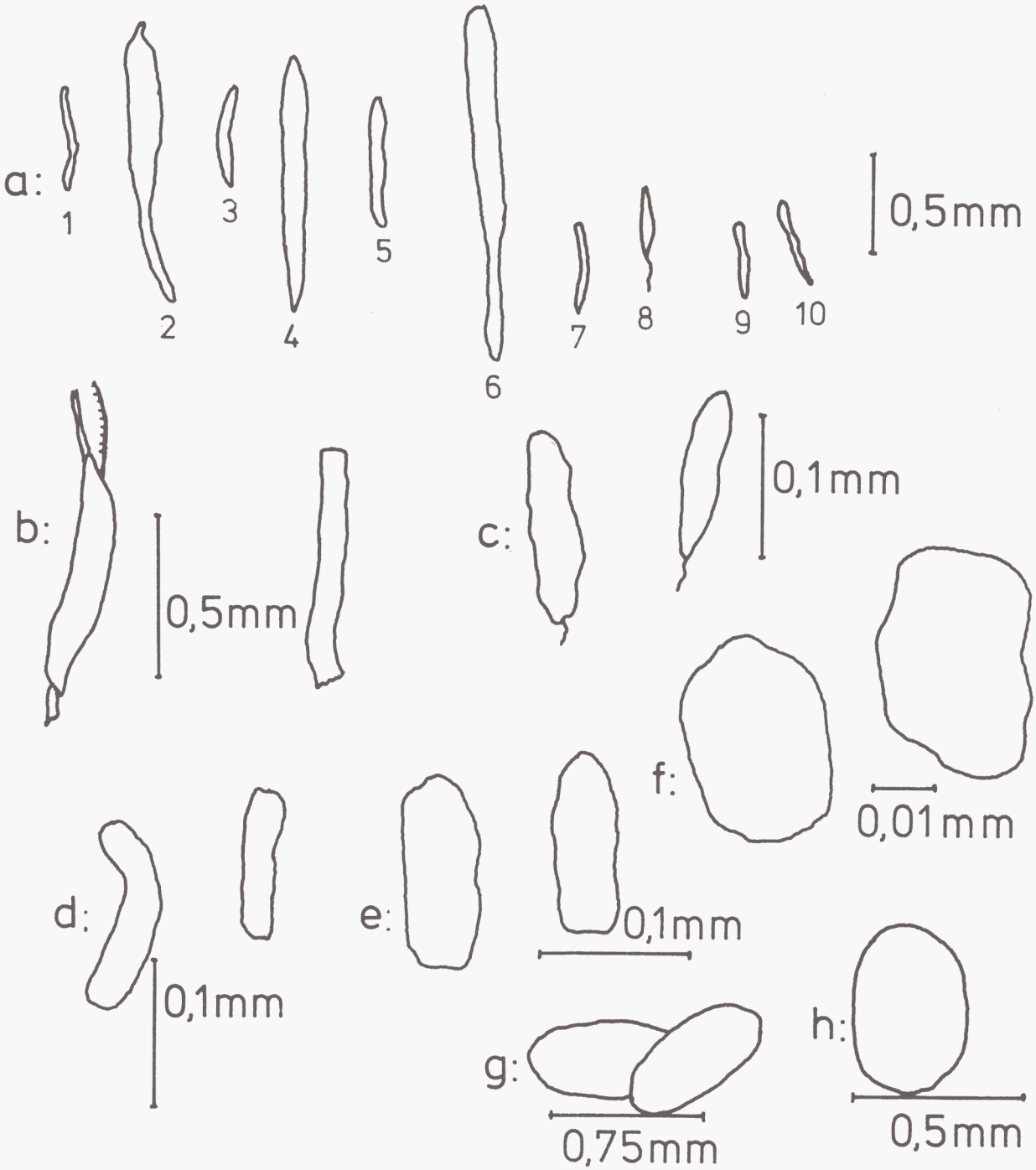

Faecal pellets of some planktonic crustaceans and benthic invertebrates.

a: Faecal pellets of *Calanus finmarchicus*. 1 and 2: Male and female fed on *Skeletonema* and *Nitzschia*. 3 and 4: Male and female fed on *Skeletonema*. 5 and 6: Male and female fed on *Ditylum*. 7 and 8: Unknown food source. 9 and 10: Animals fed on *Biddulphia*.

b: Faecal pellets of *Meganyctiphanes norvegica*. Note the crustacean spines in the left faecal pellet.

c: Faecal pellets of *Centropages hamatus* (with tail piece).

d: Faecal pellets of *Pseudocalanus elongatus*.

e: Faecal pellets of *Acartia bifilosa*.

f: Faecal pellets of *Oithona similis*.

g: Benthic pellets: Faecal pellets of Maldanid-Rhodine sp.

h: Benthic pellet: Faecal pellet of *Syndosmia alba*.

Faecal pellets

There are many plankton research programmes in which a knowledge of faecal pellets would be valuable, e.g., egg productivity, food chains, etc., but present knowledge is far from satisfactory. Copepod pellets are probably the most important group. This sheet attempts to show the little information that is available, and it is also hoped that, in revealing this scarcity, it will stimulate further research into a most useful subject.

Table 1. Characteristics of the faecal pellets of different planktonic crustaceans

a = number of faecal pellets examined, b = mean length of faecal pellets, c = mean length of the tail piece, d = mean breadth, e = length/breadth, f = characteristic form, g = food used in the investigation.

Species	a	b	c	d	e	f	g	Author
Calanus finmarchicus ♂	?	550 μm	–	45 μm	12·2	Cylindrical	*Skeletonema* + *Nitzschia*	Raymont and Gross, 1972
Calanus finmarchicus ♀	?	950 μm	510 μm	180 μm	5·3	Cylindrical	*Skeletonema* + *Nitzschia*	
Calanus finmarchicus ♂	?	520 μm	–	60 μm	8·4	Cylindrical	*Skeletonema*	
Calanus finmarchicus ♀	?	1350 μm	–	130 μm	10·4	Cylindrical	*Skeletonema*	
Calanus finmarchicus ♂	?	685 μm	–	80 μm	8·4	Cylindrical	*Ditylum*	
Calanus finmarchicus ♀	?	1200 μm	670 μm	155 μm	7·7	Cylindrical	*Ditylum*	
Calanus finmarchicus	?	200–400 μm	Present	50–100 μm	–	Cylindrical	?	Moore, 1931
Calanus helgolandicus	2	650 μm	–	100 μm	6·5	Cylindrical	*Biddulphia*	Corner et al., 1972
Acartia bifilosa ♂	132	123 μm	12 μm	34 μm	3·7	Cylindrical	*Chaetoceros decipiens* + *Chaetoceros socialis* + *Detonula cystifera* + *Skeletonema costatum* + flagellates 4 μm Ø	Martens, 1976
Acartia bifilosa ♀	192	142 μm	23 μm	53 μm	2·8	Cylindrical		
Centropages hamatus ♂	79	110 μm	39 μm	33 μm	3·3	Cylindrical		
Centropages hamatus ♀	156	139 μm	43 μm	43 μm	3·3	Cylindrical		
Pseudocalanus elongatus ♂	133	157 μm	21 μm	31 μm	5·2	Cylindrical		
Pseudocalanus elongatus ♀	106	157 μm	22 μm	31 μm	5·2	Cylindrical		
Oithona similis ♂	62	36 μm	–	26 μm	1·5	Ellipsoid		
Oithona similis ♀	181	36 μm	–	26 μm	1·5	Ellipsoid		
Spicodiaptomus chelospinus	?	250 μm	–	77 μm	3·3	?	Phyto- and zooplankton powder	Abdul Kader, 1975
Spicodiaptomus chelospinus	?	288 μm	–	68 μm	4·2	?	Zooplankton powder	
Spicodiaptomus chelospinus	?	385 μm	–	74 μm	5·2	?	Ground filamentous green algae	
Spicodiaptomus chelospinus	?	115 μm	–	58 μm	2·0	?	Groundnut cake powder	
Spicodiaptomus chelospinus	?	269 μm	–	64 μm	4·2	?	Coloured filter-paper powder	
Palaemonetes pugio	?	1–20 mm	–	50–200 μm	–	Cylindrical	*Nitzschia closterium*	Johannes and Satomi, 1966
Meganyctiphanes norvegica	?	Up to 4 mm	–	100–150 μm	–	Cylindrical	Mainly crustaceans	Moore, 1931
Euphausiaceae spp.	?	1040–7300 μm	–	48–176 μm	9–65	Cylindrical	"Natural food"	Fowler and Small, 1972
Artemia salina	10	1250 μm	–	390 μm	3·2	Cylindrical	*Phaeodactylum*	Reeve, 1963
Artemia salina	10	1530 μm	–	425 μm	3·6	Cylindrical	*Dunaliella*	
Artemia salina	10	1370 μm	–	365 μm	3·8	Cylindrical	Sand	

Description

Shape:

The characteristic shape of most of the faecal pellets of planktonic copepods and euphausiids is a cylinder with rounded ends (*Calanus finmarchicus*, *Calanus helgolandicus*, *Acartia bifilosa*, *Centropages hamatus*, *Pseudocalanus elongatus*) or often frayed ends (*Meganyctiphanes norvegica*) (MOORE, 1931). The surrounding membrane can form a tail piece, and the frequency of occurrence is different in the different species (*Acartia*, 11 %; *Pseudocalanus*, 30 %; *Centropages*, 50 %) (MARTENS, 1976). No tail piece could be found on the faecal pellets of male *Calanus finmarchicus*. The mean length of the faecal pellets is relatively great compared with the breadth, with the ratio of length to breadth of the faecal pellets of *Calanus* spp. varying between 6:1 and 10:1 (CORNER et al., 1972). In euphausiids it even varies between 9:1 and 65:1 (FOWLER and SMALL, 1972).

The faecal pellets of the cyclopoid *Oithona similis* are characteristically ellipsoid in shape and without tail pieces. The mean ratio of length to breadth is 1·4:1. This resembles the type of some faeces of benthic origin described by MOORE (1931), as for *Syndosmia alba* or for a young maldanid worm, with a length to breadth ratio of 1·6:1 and a characteristically oval to ellipsoid shape. The faecal pellets of the benthic animals are much larger, so confusion with planktonic faeces (length 500–750 μm) is unlikely. They have a brownish, massive non-transparent structure, whereas the faecal pellets of the planktonic species are of a greenish brown, more transparent structure.

Size:

The length and breadth of the faecal pellets of a single species may vary even if a constant source of food is maintained. The length of faeces of *Acartia bifilosa* varied between 50 and 240 μm; *Oithona similis*, 20–80 μm; *Centropages hamatus*, 50–200 μm; and *Pseudocalanus elongatus*, 50–270 μm (MARTENS, 1976). With different sources of food the size also varies, and for *Palaemonetes pugio* by as much as 2000 % (JOHANNES and SATOMI, 1966)!

The mean values of length and breadth of the faecal pellets of the species mentioned above show significant differences (MARTENS, 1976), so that an analysis of the distributive function of length or breadth of a natural "faecal pellet population" should lead to a specific identification on the species level. The size and shape of faeces of mainly carnivorous species (e.g. euphausiids) may be affected by indigestible remains of food, e.g., large crustacean spines (MOORE, 1931). The faecal pellets of the males of some species were normally smaller than those of the females (*Acartia bifilosa*, *Centropages hamatus*, *Calanus finmarchicus*) (RAYMONT and GROSS, 1942; MARTENS, 1976).

REFERENCES

ABDUL KADER, H., 1975. Observations on the production of faecal pellets in *Spicodiaptomus chelospinus* Rajendran (Copepoda: Calanoida). Indian J. Ecol., 2.: 188–189.

CORNER, E. D. S., HEAD, R. N., and KILVINGTON, C. C., 1972. On the nutrition and metabolism of zooplankton, VIII. The grazing of *Biddulphia* cells by *Calanus helgolandicus*. J. mar. biol. Ass. U.K., 52: 847–861.

FOWLER, S. W., and SMALL, L. F., 1972. Sinking rates of euphausiid fecal pellets. Limnol. Oceanogr., 17: 293–296.

JOHANNES, R. E., and SATOMI, M., 1966. Composition and nutritive value of fecal pellets of a marine crustacean. Limnol. Oceanogr., 11: 191–197.

MARTENS, P., 1976. Artspezifische Merkmale der Faeces von vier dominierenden Copepodenarten der Kieler Bucht. Helgoländer wiss. Meeresunters., 28: 411–416.

MOORE, H. B., 1931. The specific identification of faecal pellets. J. mar. biol. Ass. U.K., 17: 359–365.

RAYMONT, J. E. G, and GROSS, F., 1942. On the feeding and breeding of *Calanus finmarchicus* under laboratory conditions. Proc. R. Soc. Edinb., 61: 267–287.

REEVE, M. R., 1963. The filter feeding of *Artemia*. III. Faecal pellets and their associated membranes. J. exp. Biol., 40: 215–221.

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