A SURVEY OF THE ECHINODERM ASSOCIATES OF THE NORTH-EAST ATLANTIC AREA

by

C. D. N. BAREL

Zoologisch Laboratorium der Rijksuniversiteit, Kaiserstraat 63, Leiden, the Netherlands

and

P. G. N. KRAMERS

Rijksinstituut voor de Volksgezondheid, P.O. Box 1, Bilthoven, the Netherlands

With 17 text-figures

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INTRODUCTION

Animals living in association with echinoderms are known from at least sixteen phyla. The majority belongs to some of the largest phyla (Protozoa, Platyhelminthes, Annelida, Mollusca and Arthropoda), but representatives of small and inconspicuous groups such as Mesozoa, Rotatoria, Tardigrada and

Entoprocta have repeatedly been recorded as associates of echinoderms. Vertebrates living in echinoderms are exemplified by the fishes of the genus *Carapus,* which are associated with holothurians.

Other examples from phyla which are rarely involved in intimate relationships with echinoderms are the ctenophore *Coeloplana astericola,* which was found in great numbers on *Echinaster luzonicus* from Amboina (Mortensen, 1927a) and the sponge *Microcordyla asteriae,* which was found at the bases of the arm spines of *Asterias tenuispina* at Naples (Zirpolo, 1927). Not only animals, but also a few plant species have been recorded to live in or on echinoderms.

The ophiuroid *Ophiocnemis marmorata* living on the scyphomedusan *Rhopilema hispidum* (cf. Panikkar & Prasad, 1952) is one of the rare examples of echinoderms acting as associates themselves, and possibly basketstars living on soft corals can also be considered as associates.

Since the first half of the 19th century a large number of papers has appeared in which relationships between echinoderms and their parasites and commensals are described. Most reports concentrate on the associate species, their taxonomy, morphology and distribution. Only a few general works focus on the hosts, listing the parasites and commensals associated with particular echinoderm species or genera (Mortensen, 1927, 1940, 1943; Clark, 1921, 1967; Hyman, 1955), but these lists are all incomplete and outdated now.

The aim of the present paper is to provide a more complete and informative survey of the available data on associates of echinoderms of the North-East Atlantic area. The material has been compiled from extensive literature search as well as from the authors' own field work in the Trondheimsfjord and the Gullmarfjord in 1967, and at the marine biological stations of Roscoff and Plymouth in 1968. At these collecting trips representatives of most groups of associates were sampled. The Scandinavian records are cited here as "Barel & Kramers, unpublished", while the records from the Channel coast are all quoted from the authors' 1970 publication.

The North-East Atlantic area has been defined as the area from Ireland and Brittany to Iceland, Spitzbergen and the Kola Fjord. Records of associations from other areas have been included when at least one of the species concerned, either associate or host, occurs in the NE Atlantic. In addition, records of associates and hosts both not occurring in this area are included in cases where the associate species is also known from echinoderm species occurring a. o. in the NE Atlantic.

We attempted to compile complete lists of records, not only including the names of the hosts and the associates, but also the geographic locality, the

location of the associate on or in the host, the number of associate individuals per host (intensity), the number of infected hosts (extent), and an indication of the size of the associates. In order to facilitate recognition of the associates a great number of figures has been added.

The information is presented in the "systematic list of associate records" (pp. 6 to 93). A list of the most common collecting localities has been added (pp. 93-94). The next section (pp. 94-108) contains a list of all echinoderm species occurring in the NE Atlantic area with the names of the associates known from each of them. Host-associate relationships are being discussed in the final chapter (pp. 108-112).

In general, the nomenclature is in accordance with recent publications, usually written by specialists of the group involved. Synonyms are included only as far as they have been used in the literature reviewed. As it was outside the scope of this paper, no attempt has been made to evaluate taxonomic discrepancies critically or to provide a taxonomically formal and complete list of synonyms. For the sake of completeness a small number of records has been included of associates that were mentioned by their generic of family name only, or even indicated by such vague terms as "parasitic mollusc" or "yellow amoeboid algae", but this was done only when at least the host species was clearly indicated.

Outdated host names were used in those cases in which the original indication could not be linked with certainty to a current name. These indications are often doubtful, especially where crinoids are concerned. Another example is "*Synapta inhaerens*", a name which was used, mainly before 1912, for at least three species of *Leptosynapta*, viz. *L. inhaerens*, *L. galliennei* (see: Cuénot, 1912) and *L. bergensis* (see: Kramers, 1971), and possibly also for *L. cruenta* (see: Bocquet & Stock, 1957). In those cases in which the host was only indicated by a generic name, the species name could not always be inferred from the context. Of course the same holds true for vague indications like "short spined regular echinoid" and "small sea urchin".

Throughout this paper no attempt has been made to deal critically with the biology of the relationships between the associated organisms. Therefore the neutral terms "associate" and "association" have been coined, instead of the qualifications "parasite", "commensal", etc. The latter terms have not always been consistently used in the literature, and many of the associations recorded are not known well enough to be classified at all.

Finally, the present survey is not aimed at a synthesis of the collected data. It is meant to provide a set of field data which may help in collecting the animals for further studies and in expanding the knowledge of their distribution.

SYSTEMATIC LIST OF ASSOCIATE RECORDS

The collected data have been arranged according to the taxonomic position of the associate species. Each associate species carries a sequence number. For each associate the information has been grouped under seven headings:
(1) HOSTS, indicates the various host species from which the associate has been recorded and the following data on the association: (a) source, (b) geographic locality, (c) location (in or on the host), (d) intensity (the number of associates per host, indicated as "Na"), and (e) extent (the percentage of infected hosts, indicated as "Fq"). Records from non-echinoderm hosts have been included but are not claimed to be complete. When intensity and extent have been quantified by an author, the numbers are presented in the following way:
— For intensity ("Na" in the list) e.g.: < 12/3h, less than 12 associates per three hosts; 4-6/h, four to six associates per host; >> 100, many more than a hundred associates found.
— For extent ("Fq" in the list) e.g.: 32/47, 32 infected echinoderms out of 47 investigated specimens; 4 means four infected specimens studied; 0/26, no infected specimens found among 26 investigated ones.
— In many cases, however, verbal expressions were used, which have been translated into a simple code: "+" = "some", "a few" etc.; "++" = "appreciable numbers", "rather many" etc.; "+++" = "heavy infection", "abundant" etc. Asterisks have been applied to indicate that items in one record specifically belong together.
(2) SYN., synonyms of the associate. This section does not provide a full account of synonyms but lists only those names used in references relevant to the particular aim of the present paper. Consequently the references after each synonym are not necessarily the authors and date of the species name but only refer to the papers on associate-records in which the associate has been described under that synonym.
(3) SIZE, dimensions of the organism as given in the cited references.
(4) REMARKS, general remarks on the associate species involved.
(5) NOTES, contrary to "remarks", each of the "notes" contains a specific comment on an item indicated in the section "hosts".
(6) FREE, the records which mention the occurrence of the "associate" without a host or without reference to parasitic or commensal behaviour. A complete account of such records has not been attempted.
(7) ADD. REF., (additional references) publications which mention the involved associate, but which do not contain original information relevant to the context. These are mostly review papers or articles dealing with other aspects of the associate.

PROTOZOA

General taxonomy according to Honigberg et al. (1964)

Sarcomastigophora, Chrysomonadida

1. **Oikomonas echinorum** Cuénot

Hosts: *Cidaris cidaris, Echinus esculentus, Echinus acutus, Psammechinus miliaris, Psammechinus microtuberculatus, Sphaerechinus granularis, Paracentrotus lividus, Spatangus purpureus, Echinocardium cordatum*
Cuénot, 1900, 1912: Arcachon, "our seas"; coelomic fluid; Na +++; Fq 100%.

Size: 6 × 9 μ (Cuénot, 1912).

Remark: This organism (?) has mostly been mentioned as "globule vibratile"; according to Holland et al. (1965) it is just a coelomocyte.

Sarcomastigophora, Dinoflagellida

2. **Prorocentrum micans** Ehrenberg

Hosts: *Antedon bifida bifida*
Cuénot, 1891: Roscoff, Concarneau; intestinal cavities; Na +++; Fq 100%.
—: "Comatule du rivage"
Pouchet, 1885b: Concarneau; digestive cavity; Na ++.

Size: up to 80 μ (Cuénot, 1891).

Remark: Possibly an accidental invader (B. & K.).

Free: Genoa (Gruber, 1884); Concarneau (Pouchet, 1885a); Kiel (Möbius, 1888); Limfjord (N.W. Denmark, Mortensen, 1897).

3. **Prorocentrum** sp.

Host: *Echinaster sepositus*
Cuénot, 1891: Roscoff or Banyuls [1]); ambulacral groove.

Size: 32-40 μ (Cuénot, 1891).

Note: (1) Cuénot himself is not certain about the locality.

Sarcomastigophora, Foraminiferida

4. **Truncatulina lobulata** Walker & Jacob

Hosts: *Poliometra prolixa*
Mortensen, 1912b: N.E. Greenland; on the cirri.
—: "Comatulids"
Clark, 1921: Barents Sea, Kara Sea; on the cirri.

5. **Truncatulina** sp.

Host: *Heliometra glacialis glacialis*
Clark, 1921: outside.

Sporozoa

Owing to the lack of a good comparative study of the forms mentioned, there are probably inconsistencies in the use of the generic names.

Sporozoa, Eugregarinida, Urosporidae

6. **Urospora synaptae** (Cuénot) (fig. 1A)

Hosts: "*Synapta inhaerens*"
Cuénot, 1891: Roscoff, Morgat; coelom.
Cuénot, 1892; Légèr, 1892: Roscoff, Archachon, Belle-Ile; coelom.
—: *Leptosynapta galliennei*
Cuénot, 1912: Roscoff, Arcachon; coelom; Fq ++.
Barel & Kramers, 1970: Roscoff; coelom; Na +; Fq 32/47.
—: *Leptosynapta inhaerens*
Barel & Kramers, 1970: Roscoff; coelom; Na +; Fq 1/26.
Syn.: *Syncystis synaptae* Cuénot, 1891.
Size: 20-88 μ (Cuénot, 1891); oviform 300 μ, vermiform 500-600 μ (Cuénot, 1892, 1912).
Remark: Labbé (1899) identifies this species with *Gonospora mercieri* (17); in line with Cuénot (1912) they are separated in this paper.
Add. ref.: Dogiel, 1909; Reichenow, 1940.

7. **Urospora chiridotae** (Dogiel) (fig. 1B)

Host: *Chiridota laevis*
Dogiel, 1906: Murmansk coast; blood vessels, coelom; Na +++; Fq +++.
Pixell-Goodrich, 1925: New Brunswick; blood vessels along first intestinal loop; Na +++; Fq 12/17.
Syn: *Cystobia chiridotae* Dogiel, 1906.
Size: 300-560 μ (Sokolow, 1911).
Add. ref.: Dogiel, 1909; Reichenow, 1940; Kudo, 1966.

8. **Urospora echinocardii** Pixell-Goodrich (fig. 1C)

Hosts: *Echinocardium* sp. [1])
Pixell-Goodrich, 1915: Plymouth; coelom.
—: *Spatangus purpureus*
Pixell-Goodrich, 1915: Plymouth; coelom.

Size: trophozoite 200-300 μ, cyst 100-200 μ (Pixell-Goodrich, 1915).
Note: (1) According to Reichenow (1940) the host is *E. cordatum.*

9. **Urospora neapolitana** Pixell-Goodrich (fig. 1E)

Hosts: *Echinocardium cordatum*
Pixell-Goodrich, 1915: Naples; coelom.
—: not *Echinocardium* sp., not *Spatangus* sp.
Pixell-Goodrich, 1915: Plymouth.
Size: trophozoite 200-300 μ, cyst 100-200 μ (Pixell-Goodrich, 1915).

10. **Lithocystis schneideri** Giard (fig. 1F)

Hosts: *Echinocardium cordatum*
Giard, 1876: Wimereux; body cavity; Fq + + +.
Giard, 1886c: Wimereux, Dunkerque, le Pouliguen, Concarneau (Normandy, S. Brittany); Fq 100%.
Légèr, 1896, 1897: Wimereux; coelom; Fq 100%.
Cuénot, 1912: Arcachon; coelom; Fq 100%.
Pixell-Goodrich, 1915: Naples, Plymouth, Port Erin; coelom; Na + +; Fq + + +.
Cherbonnier, 1951: Roscoff.
—: *Echinocardium* sp., *Spatangus* sp.[2])
Koehler, 1883 [1]): Marseille; inside the test.
—: *Spatangus purpureus*
Cuénot, 1912: Arcachon; Fq 100%.
Pixell-Goodrich, 1915: Plymouth; coelom.
—: *Paracentrotus lividus* (?)
Labbé, 1899.
Size: adult 1.5 mm (Légèr, 1896); gregarine 65 μ (Cuénot, 1892); trophozoite >> 4-5 mm, cyst >> 2 mm (Pixell-Goodrich, 1915).
Notes: (1) The "cyst" mentioned by Koehler (1883) is attributed to *L. schneideri* by Labbé (1899) and others; (2) Cuénot (1891) and Labbé (1899) mention these host species as *E. flavescens* and *S. purpureus.*
Add. ref.: Giard, 1877; Dogiel, 1909; Reichenow, 1940.

11. **Lithocystis minchinii** (Woodcock) (fig. 1G)

Hosts: *Cucumaria saxicola* [1])
Woodcock, 1904, 1906: Plymouth; respiratory tree or coelomic epithelium; Na + + +; Fq +.
Pixell-Goodrich, 1929: Plymouth; coelomic epithelium, cysts in body wall; Na + + +; Fq 14/35.

—: not *Cucumaria normani*
Pixell-Goodrich, 1929: Plymouth.
Syn.: *Cystobia minchinii* Woodcock, 1904. *Diplodina minchinii,* Woodcock, 1906.
Size: cyst 17-200 μ, adult 340 μ (Woodcock, 1906); paired gregarines 0.3-1 mm, spore 7-8 μ (Pixell-Goodrich, 1929).
Note: (1) Woodcock (1904, 1906) indicates the hosts as *C. pentactes* and *C. planci*; according to Pixell-Goodrich (1929) both are in fact *C. saxicola.*
Add. ref.: Reichenow, 1940.

12. **Lithocystis microspora** Pixell-Goodrich (fig. 1H)

Host: *Spatangus purpureus*
Pixell-Goodrich, 1915: Plymouth; coelom; Na ++.
Size: trophozoite < 1 mm, cyst 0.1-0.3 mm (Pixell-Goodrich, 1915).
Add. ref.: Reichenow, 1940.

13. **Lithocystis cucumariae** Pixell-Goodrich

Hosts: *Cucumaria saxicola*
Pixell-Goodrich, 1929: Plymouth; respiratory trees; Na +++; Fq 10/35.
—: not *Cucumaria normani*
Pixell-Goodrich, 1929: Plymouth.
Size: cyst < 500 μ (Pixell-Goodrich, 1929).
Remark: This species was described by Woodcock (1904, 1906) as a stage of *L. minchinii.*
Add. ref.: Reichenow, 1940.

14. **Lithocystis foliacea** Pixell-Goodrich (fig. 1D)

Host: *Echinocardium cordatum*
Pixell-Goodrich, 1915: Plymouth, Naples; coelom.
Size: trophozoite < 2-3 mm, cyst < 0.6 mm (Pixell-Goodrich, 1915).
Add. ref.: Reichenow, 1940.

15. **Lithocystis brachycercus** Pixell-Goodrich (fig. 1I)

Host: *Chiridota laevis*
Pixell-Goodrich, 1925: New Brunswick; intestinal epithelium; Na ++; Fq 11/17.
Size: 200 μ (Pixell-Goodrich, 1929).
Add. ref.: Reichenow, 1940.

16. **Lithocystis** sp.

Host: *Echinocardium* sp. [1])
Pixell-Goodrich, 1915: Plymouth; coelom; Fq ++.
Note: (1) Host indicated as "deep water sp. of *Echinocardium*".

17. **Gonospora mercieri** Cuénot (Giard)

Hosts: *Labidoplax digitata*
Leydig, 1852; Berlin, 1853 [1]): Trieste; coelom.
Cuénot, 1892, 1912: Trieste, Arcachon; coelom, intestinal wall; Fq ++.
—: *"Synapta"*
Mingazzini, 1891a, 1893: Naples; intestine.
—: *Leptosynapta inhaerens*
Mortensen, 1927.
Syn.: *Lithocystis mülleri,* Giard, 1886c. *Syncystis mülleri,* Cuénot, 1891. *Urospora mülleri,* Cuénot, 1892. (?) *Esarabdina synaptae,* Mingazzini, 1891a, 1893 (this species was identified as *Urospora synaptae* (6) by Labbé (1899)).
Size: free form 160 μ, cyst 180 μ (Cuénot, 1912).
Remark: Labbé (1899) considers *Gonospora mercieri* and Mingazzini's record of *Esarabdina synaptae* to refer to a single species: *Urospora synaptae* (see also remark to *U. synaptae* (6)); if *G. mercieri* is considered distinct from *U. synaptae,* Mingazzini's record is more likely to refer to *G. mercieri* on the basis of the available geographical data (B. & K.).
Note: (1) Described as "brown bodies", being part of the host organism.

18. **Cystobia holothuriae** (Schneider)

Hosts: *Holothuria tubulosa*
Kölliker, 1857 [1]): Nice; various vessels.
Schneider, 1858: Naples; coelom, vessels, intestine.
—: *Chiridota laevis*
Sars, 1861a [2]): Lofoten; blood vessel.
Syn.: *Gregarina holothuriae* Schneider, 1858.
Size: 125 μ (Sars, 1861a).
Remark: According to Woodcock (1906) this species is possibly identical to *Lithocystis minchinii* (11).
Notes: (1) Associate mentioned as "vésicules pedonculés"; (2) associate mentioned as "bottle-formed bodies", possibly belonging to this species according to Labbé (1899 and Woodcock (1906).
Add. ref.: Diesing, 1859; Mingazzini, 1891b.

19. **Cystobia irregularis** (Minchin) (fig. 1J)

Host: *Holothuria forskali*
Minchin, 1893; Woodcock, 1902, 1904, 1906: Plymouth; cyst in wall of vessel, free form in vessel; Na + + +; Fq + +.
Syn.: *Gregarina irregularis* Minchin, 1893. *Diplodina irregularis,* Woodcock, 1906. *Gonospora irregularis,* Reichenow, 1940.
Size: 5 mm (Labbé, 1899); double adult < 500 μ (Woodcock, 1906).
Add. ref.: Dogiel, 1909; Kudo, 1966.

20. **Cystobia stichopi** Lützen (fig. 2A)

Host: *Stichopus tremulus*
Lützen, 1968: Drøbaksund; cysts on mesenterium of longitudinal muscles; Na < 12/h; Fq 33-39%.
Size: paired adults < 600 μ, sporocyst 10-19 μ (Lützen, 1968).

21. **Diplodina gonadipertha** Djakonow

Host: *Cucumaria frondosa*
Djakonow, 1923: Kola Bay; in and on gonads; Na +; Fq 33%.
Size: 1 mm (Djakonow, 1923).
Add. ref.: Dogiel, 1965.

Ciliophora, Holotrichia, Gymnostomatida

22. **Lacrymaria catinensis** Russo

Host: *Paracentrotus lividus*
Russo, 1914: Catania; intestine; Fq +.
Remarks: "Nomen nudum" (Hentschel, 1924); "undoubtedly transient" (Berger, 1965).

23. **Loxophyllum** sp.

Host: *Paracentrotus lividus*
Russo, 1914: Naples; intestine; Na + +.
Remark: "undoubtedly transient" (Berger, 1965).

Ciliophora, Holotrichia, Trichostomatida

24. **Lechriopyla mystax** Lynch (fig. 2B)

Hosts: *Strongylocentrotus purpuratus*
Lynch, 1930: Pacific Grove; intestine; Na + +; Fq 80%.
Berger, 1961a: Friday Harbor.
—: *Strongylocentrotus franciscanus*

Lynch, 1930: Pacific Grove; intestine; Na ++; Fq 43%.
Berger, 1961a: Friday Harbor.
—: *Strongylocentrotus echinoides, Strongylocentrotus droebachiensis*
Berger, 1961a: Friday Harbor.
—: *Echinometra lucunter*
de Lopez & Lopez-Ochoterana, 1967: Vera Cruz (E. Mexico); intestine.
Size: 142 × 105 × 68 μ (Lynch, 1930); 112 μ (de Lopez & Lopez-Ochoterana, 1967).

25. **Plagiopyla minuta** Powers (fig. 2C)

Host: *Strongylocentrotus droebachiensis*
Powers, 1933a: Bay of Fundy; Na < 12; Fq 10%.
Beers, 1948: Frenchmans Bay; rectum, intestine; Na +; Fq 28/182.
Beers, 1954: Mt. Desert Island; rectum, aboral intestine; Na < 50/0.1 ml; Fq 41/165.
Size: 50-75 × 36-46 μ (Powers, 1933a); < 80-90 μ (Beers, 1954).
Add. ref.: Kirby, 1941.

26. **Plagiopyla nyctotherus** Poljansky & Golikova (fig. 2D)

Host: *Strongylocentrotus droebachiensis*
Poljansky & Golikova, 1959: Murmansk coast; oral & middle intestine; Na +; Fq 5%.
Size: 96 × 59 μ (Poljansky & Golikova, 1959).

27. **Plagiopyliella striata** (Uyemura)

Hosts: six Japanese echinoids
Uyemura, 1934; Yagiu, 1935: Japan.
—: *Allocentrotus fragilis*
Berger & Profant, 1961: Santa Barbara Channel.
—: *Strongylocentrotus franciscanus, Strongylocentrotus droebachiensis*
Berger, 1960c: San Juan Archipelago; intestine; Fq ++.
—: *Strongylocentrotus echinoides*
Berger, 1960a: San Juan Archipelago; intestine.
Syn.: *Conchophthirus striatus* Uyemura, 1934. *Plagiopyiela striatus*, Berger, 1960b. *Plagiopyiella* sp., Berger, 1960a, 1960c; Berger & Profant, 1961 according to Berger (1965) it is probable that these records refer to *P. striata*).
Size: 89.3 × 56.5 μ (Uyemura, 1934).

28. **Schizocaryum dogieli** Poljansky & Golikova

Hosts: *Strongylocentrotus droebachiensis*

Poljansky & Golikova, 1957, 1959: Murmansk coast; intestine; Na ++; Fq 56%.

Berger, 1961c: San Juan Archipelago; anterior intestine; Fq 66%.

—: *Strongylocentrotus franciscanus*

Berger, 1961c: San Juan Archipelago; anterior intestine; Fq 7%.

—: *Strongylocentrotus echinoides*

Berger, 1961c: San Juan Archipelago; anterior intestine; Fq 73%.

—: *Strongylocentrotus purpuratus*

Berger, 1961c: San Juan Archipelago; anterior intestine; Fq 11%.

Size: 42-270 × 29-186 μ (Poljansky & Golikova, 1957); 70-231 × 95-195 μ (Berger, 1961b).

29. **Thyrophylax strongylocentroti** Berger

Hosts: *Allocentrotus fragilis*

Berger & Profant, 1961: Friday Harbor *, Santa Barbara Channel; entire intestine; Fq 1/9 *.

—: *Strongylocentrotus droebachiensis, Strongylocentrotus echinoides, Strongylocentrotus franciscanus*

Berger, 1965: Washington State.

—: *Strongylocentrotus purpuratus*

Berger, 1965: California.

Syn.: *Plagiopyliella* sp., Berger & Profant, 1961 (according to Berger, 1965).

Size: 369.2 × 277.2 — 911.5 × 660.2 μ, depending on the host (Berger, 1965).

Ciliophora, Holotrichia, Apostomatida

30. **Ophiurespira weilli** Chatton & Lwoff

Hosts: *Amphipholis squamata*

Chatton & Lwoff, 1930: Wimereux, Roscoff; trophont in, tomont outside in cyst.

Chatton & Lwoff, 1935: Roscoff; intestine; Na < 20/h.

—: *Ophiothrix fragilis*

Chatton & Lwoff, 1930: Banyuls; trophont in stomach, tomont outside in cyst.

Chatton & Lwoff, 1935: Roscoff *, Banyuls; intestine; Na > 20/h *.

—: not other ophiurans

Chatton & Lwoff, 1935: Roscoff, Banyuls.

Ciliophora, Holotrichia, Astomatida

31. **Orchitophrya stellarum** Cépède (fig. 2E)

Hosts: *Asterias rubens*

Cépède, 1907a,b, 1910: Boulogne (N.W. France); testes; Na ++; Fq 3/6000.

Vevers, 1951: Plymouth region; gonads (♂); Fq 1-28%.

—: *Asterias vulgaris*

Smith, 1936: Prince Edward Isl. (Gulf of St. Lawrence); ovaria; Fq 25% (♀♀).

—: *Asterias forbesi*

Burrows, 1936: Long Island Sound; gonads; Fq 43/326 (♂♂), 4/302 (♀♀).

Size: 35-65 μ (Cépède, 1907a, 1910).

Remark: The host is castrated by the parasite (Cépède, 1907a; Vevers, 1951).

Ciliophora, Holotrichia, Hymenostomatida

32. **Anophrys echini** di Mauro (fig. 2F)

Hosts: *Paracentrotus lividus*

di Mauro, 1904: Catania [1]); intestine; Fq 100%.

Russo, 1914: intestine; Na + + ; Fq + +.

Kahl, 1934: Naples; intestine; Fq +.

—: *Sphaerechinus granularis*

di Mauro, 1904: intestine; Fq 100%.

Size: 50-150 × 10-40 μ (di Mauro, 1904); 40-65 × 12-14 μ (Kahl, 1934).

Remark: According to Berger (1965) this species is probably not an *Anophrys*.

Note: (1) Locality according to Kahl (1934).

Add. ref.: Hentschel, 1924.

33. **Anophrys dogieli** Poljansky & Golikova (fig. 2G)

Hosts: *Strongylocentrotus droebachiensis*

Poljansky & Golikova, 1959: Murmansk coast; intestine.

Berger, 1960c: San Juan Archipelago; intestine; Na +.

—: *Allocentrotus fragilis*

Berger & Profant, 1961: Friday Harbor; posterior intestine; Fq 4/9.

Size: 50 × 15 μ (Poljansky & Golikova, 1959).

34. **Anophrys** sp.

Hosts: *Strongylocentrotus droebachiensis*

Powers, 1933c: Maine; intestine.

—: *Diadema antillarum*
Powers, 1933b: Dry Tortugas Islands.
—: *Lytechinus variegatus*
Powers, 1935: Dry Tortugas Islands.
Add. ref.: Berger, 1965.

35. **Madsenia indomita** (Madsen) (fig. 2H)

Hosts: *Strongylocentrotus droebachiensis*
Holger Madsen, 1931: Frederikshavn (Denmark); transverse intestine; Na + + +; Fq 1/1.
Powers, 1933a: Bay of Fundy; Na + + +.
Beers, 1948: Frenchmans Bay; middle part intestine; Na + + +; Fq 182/182.
Beers, 1954: Gulf of Maine; intestine; Fq + + +.
Poljansky & Golikova, 1959: Barents Sea; anterior & middle intestine; Fq 34%.
Berger, 1960c: San Juan Archipelago; intestine; Na + + +.
Beers, 1961a: Gulf of Maine; intestine; Na + + +; Fq 150/152.
Berger, 1965: Denmark.
—: seven Japanese echinoids
Uyemura, 1934: Japanese coast; intestine.
—: *Strongylocentrotus nudus, Strongylocentrotus pulchellus*
Poljansky, 1951b: Vladivostok; intestine; Na + + +; Fq + + +.
—: *Strongylocentrotus intermedius*
Strelkov, 1959: S. Kuril Islands; Fq 89/143.
—: *Strongylocentrotus echinoides*
Berger, 1960a: San Juan Archipelago; intestine.
—: *Strongylocentrotus purpuratus*
Berger, 1960c: San Juan Archipelago; intestine; Na + + +.
—: *Strongylocentrotus franciscanus*
Berger, 1961: Friday Harbor.
—: *Allocentrotus fragilis*
Berger & Profant, 1961: Friday Harbor; intestine; Fq 5/9.
Syn.: *Entodiscus indomitus* Holger Madsen, 1931; Powers, 1933a,c; Uyemura, 1934; Poljansky, 1951b; Strelkov, 1959; Poljansky & Golikova, 1959.
Size: 80-117 × 20-23 μ (Holger Madsen, 1931); 69-120 × 14-40 μ (Powers, 1933a); 67-120 × 17-40 μ (Poljansky, 1951b).
Remark: The genus *Madsenia* was created by Kahl (1934).
Add. ref.: Kirby, 1941; Beers, 1965a, 1965b.

36. **Colpidium echini** Russo (fig. 2I)

Hosts: *Paracentrotus lividus*

Russo, 1914: Naples, Catania; terminal intestine; Na +++.

Powers, 1933a: Naples; Na ++; Fq 100%.

—: *Strongylocentrotus echinoides*

Berger, 1960a, 1965 *: San Juan Archipelago; intestine; Na 2 *.

Size: 65-75 × 30-35 μ (Russo, 1914); 55 × 25 μ (Powers, 1933a).

Remark: According to Kahl (1934) and Berger (1965) this species is obviously not a *Colpidium.*

Add. ref.: Hentschel, 1924; Kirby, 1941.

37. **Cryptochilum caudatum** Poljansky

Hosts: *Strongylocentrotus nudus*

Poljansky, 1951b: Japanese Sea; Na +; Fq +++.

—: *Strongylocentrotus intermedius*

Strelkov, 1959: S. Kuril Islands; intestine; Fq 100/143.

—: *Strongylocentrotus purpuratus*

Berger, 1960c: Washington State; intestine; Fq +.

—: *Allocentrotus fragilis*

Berger & Profant, 1961: Washington State; entire intestine; Fq 3/9.

—: *Strongylocentrotus echinoides, Strongylocentrotus franciscanus, Strongylocentrotus droebachiensis*

Berger, 1961a: Friday Harbor; intestine.

Syn.: *Cryptochilidium caudatum* (all authors except Berger, 1965).

Size: 115 × 40 μ (Poljansky, 1951b); 235.5 × 80.1 μ (Berger, 1965).

38. **Cryptochilum echini** Maupas (fig. 2J)

Hosts: *Paracentrotus lividus*

Maupas, 1883: Algerian coast, Banyuls; intestine; Fq +++.

Cuénot, 1891: not Roscoff; intestine.

André, 1910 [1]): Roscoff; intestine, perivisceral fluid.

Cuénot, 1912: Arcachon, Guéthary (S.W. France), Catania; intestine, perivisceral fluid; Na ++; Fq +++.

Russo, 1914: intestine; Na ++; Fq +++.

Dain, 1930: Gulf of Naples; intestine; Na +++; Fq +++.

Powers, 1933a: Gulf of Naples; imbedded in intestine; Na ++; Fq 100%.

Berger, 1965: Adriatic Sea.

Barel & Kramers, 1970: Morgat; predominantly second intestinal loop; Na ++; Fq 12/17.

—: not *Echinus melo*

Maupas, 1883: Roscoff.
—: *Psammechinus miliaris*
André, 1910 [1]): Roscoff; intestine, coelom.
Cuénot, 1912: Roscoff, Arcachon; second intestinal loop, coelom; Fq +++.
Barel & Kramers, 1970: not Roscoff; intestine,coelom; Fq 0/17.
—: *Sphaerechinus granularis*
Russo, 1914: intestine.
—: *Lytechinus variegatus*
Bray, 1925 [2]): Beaufort (N. Carolina)*, Bermuda; intestine; Na +++; Fq 1/22 *.
—: Japanese echinoids
Uyemura, 1934: Japanese coast; intestine.
Yagiu, 1935: Yaku Islands (Japan); intestine; Na ++.
—: *Strongylocentrotus echinoides*
Berger, 1960a: San Juan Archipelago; intestine.
—: *Echinometra lucunter*
de Lopez & Lopez-Ochoterana, 1967: Vera Cruz (E. Mexico); intestine.
Syn.: *Uronema echini*, Cuénot, 1891. *Cryptochilidium echini*, Powers, 1933a; Yagiu, 1935; Kirby, 1941; Berger, 1960a; Barel & Kramers, 1970.
Size: 70-140 μ (Maupas, 1883); 77.4 × 37.5 μ (Dain, 1930); 45-115 × 20-55 μ (Powers, 1933a); 80 μ (de Lopez & Lopez-Ochoterana, 1967).
Notes: (1) According to Hentschel (1924) André's specimens probably belong to *Entodiscus borealis*; (2) according to Bray (1925) the specimens from Bermuda are slightly different from Maupas' (1883) description.
Add. ref.: Russo & di Mauro, 1905; Kirby, 1941; Dogiel, 1927.

39. **Cryptochilum minor** (Yagiu)

Hosts: *Anthocidaris crassispina*
Yagiu, 1934: Japan; intestine; Fq 28%.
—: *Strongylocentrotus nudus*
Poljansky, 1951b: Japanese Sea; Na +; Fq 1.
—: *Hemicentrotus pulcherrimus*
Strelkov, 1959a: Yellow Sea.
—: *Strongylocentrotus echinoides*
Berger, 1960c: San Juan Archipelago; intestine; Fq +.
—: *Strongylocentrotus franciscanus, Strongylocentrotus purpuratus, Strongylocentrotus droebachiensis*
Berger, 1961: Friday Harbor; intestine.
Syn.: *Cryptochilidium minor* Yagiu, 1934; Poljansky, 1951b; Berger, 1960c, 1961.

Size: 32-87 × 16-40 μ (Yagiu, 1934); 62.9-77.8 × 27.2-38.5 μ (various authors, all cited in Berger, 1965).

40. **Cryptochilum sigmoides** (Yagiu)

Hosts: *Anthocidaris crassispina*
Yagiu, 1934: Japan; intestine.
—: *Hemicentrotus pulcherrimus*
Strelkov, 1959a: Yellow Sea.
—: *Strongylocentrotus droebachiensis*
Berger, 1960c: San Juan Archipelago; intestine; Na ++.
—: *Strongylocentrotus purpuratus*
Berger, 1960c: San Juan Archipelago; intestine; Na +++.
—: *Strongylocentrotus franciscanus, Strongylocentrotus echinoides*
Berger, 1961: Friday Harbor; intestine.
—: *Allocentrotus fragilis*
Berger & Profant, 1961: Washington State *, California; entire intestine; Fq 7/9 *.

Syn.: *Cryptochilidium sigmoides* Yagiu, 1934; Berger, 1960c, 1961; Berger & Profant, 1961.

Size: 69-107 × 21-41 μ (Yagiu, 1934); 93.6-152.5 × 39.8-54.4 μ (various authors, all mentioned in Berger, 1965).

41. **Tanystomium gracile** (Powers) (fig. 3A)

Hosts: *Strongylocentrotus droebachiensis*
Powers, 1933a: Bay of Fundy; Na +; Fq 100%.
Beers, 1948, 1954: Gulf of Maine; rectum; Na ++; Fq 181/182.
Poljansky & Golikova, 1959: Murmansk coast; Na +; Fq 16%.
Berger, 1961: Friday Harbor; intestine.
Beers, 1961a: Gulf of Maine; intestine; Na ++; Fq +++.
—: *Strongylocentrotus intermedius*
Strelkov, 1959: S. Kuril Islands; intestine; Fq 36/143.
—: four pacific echinoids
Berger, 1961: Friday Harbor; intestine.
—: *Allocentrotus fragilis*
Berger & Profant, 1961: Friday Harbor *, Santa Barbara Channel; posterior intestine; Fq 8/9 *.
—: *Lytechinus anamesus*
Berger, 1961: San Diego (California); intestine.

Syn.: *Cryptochilidium gracile* Powers, 1933a; Poljansky & Golikova, 1959; Strelkov, 1959. *Biggaria gracilis*, Kahl, 1934; Beers, 1948, 1954, 1961a,

1965a, 1965b; Berger, 1961; Berger & Profant, 1961.
Size: 78-125 × 40-55 μ (Powers, 1933a); 107.8-117 × 57.2-71.5 μ (Berger, 1965).

42. **Entorhipidium echini** Lynch (fig. 3B)

Hosts: *Strongylocentrotus purpuratus*
Lynch, 1929: Pacific Grove; intestine; Fq 16-43%.
—: six Japanese echinoids
Fukui & Uyemura, 1933a: Japan.
—: *Strongylocentrotus nudus, Strongylocentrotus pulchellus*
Poljansky, 1951b: Japanese Sea; Na +; Fq +.
—: *Strongylocentrotus intermedius*
Strelkov, 1959: S. Kuril Islands; intestine; Fq 2/143.
—: *Strongylocentrotus franciscanus*
Berger, 1960c: San Juan Archipelago; intestine; Na ++.
—: *Strongylocentrotus droebachiensis, Strongylocentrotus echinoides*
Berger, 1961: Friday Harbor; intestine.
—: *Allocentrotus fragilis*
Berger & Profant, 1961: Friday Harbor *, Santa Barbara Channel; posterior intestine; Fq 7/9 *.
Size: 253 × 126 μ (Lynch, 1929); 215-315 × 75-130 μ (Poljansky, 1951b); 284.3-479.3 × 146.1-192.5 μ (Berger, 1965).

43. **Entorhipidium pilatum** Lynch (fig. 3C)

Hosts: *Strongylocentrotus purpuratus*
Lynch, 1929: Pescadero Point (California); intestine; Na ++; Fq 18/50.
—: *Strongylocentrotus echinoides, Strongylocentrotus franciscanus, Strongylocentrotus droebachiensis*
Berger, 1961: Friday Harbor; intestine.
—: *Allocentrotus fragilis*
Berger & Profant, 1961: Friday Harbor *, Santa Barbara Channel; posterior intestine; Fq 6/9 *.
Size: 267 × 142 μ (Lynch, 1929); 287.4-356.9 × 151.8-189.5 μ (Berger, 1965).

44. **Entorhipidium tenue** Lynch (fig. 3D)

Hosts: *Strongylocentrotus purpuratus*
Lynch, 1929: Pacific Grove; intestine.
Berger, 1961: Friday Harbor; intestine.
—: three Japanese echinoids

Uyemura, 1933: Japan.
—: *Strongylocentrotus nudus, Strongylocentrotus pulchellus*
Poljansky, 1951b: Vladivostok; Na ++; Fq +++.
—: *Strongylocentrotus intermedius*
Strelkov, 1959: S. Kuril Islands; intestine; Fq 117/143.
—: *Strongylocentrotus echinoides, Strongylocentrotus franciscanus*
Berger, 1960a, 1961, 1961c: Friday Harbor; intestine.
—: *Strongylocentrotus droebachiensis*
Berger, 1961: Friday Harbor; intestine.
—: *Allocentrotus fragilis*
Berger & Profant, 1961: Friday Harbor *, Santa Barbara Channel; entire intestine; Fq 3/9 *.
Size: 314 × 99 μ (Lynch, 1929); 281 × 89 μ (Poljansky, 1951b); 364.7-447.5 × 130-172.5 μ (Berger, 1965).

45. **Entorhipidium triangularis** Poljansky

Hosts: *Strongylocentrotus nudus, Strongylocentrotus pulchellus*
Poljansky, 1951b: Vladivostok; Fq +++.
—: *Strongylocentrotus intermedius*
Strelkov, 1959: S. Kuril Islands; intestine; Fq 114/143.
—: *Hemicentrotus pulcherrimus*
Strelkov, 1959a: Yellow Sea.
—: *Strongylocentrotus droebachiensis, Strongylocentrotus echinoides, Strongylocentrotus franciscanus*
Berger, 1961: Friday Harbor; intestine.
Size: 216 × 146 μ (Poljansky, 1951b); 240.6-286.4 × 165.1-193.6 μ (Berger, 1965).

46. **Andreula antedonis** (André)

Host: *Antedon bifida bifida*
André, 1910: Roscoff; middle and posterior intestine; Na ++.
Syn.: *Conchophthirus antedonis* André, 1910.
Size: 70-110 μ (André, 1910).
Add. ref.: Raabe, 1938; Kirby, 1941.

47. **Entodiscus borealis** (Hentschel) (fig. 3E)

Hosts: *Echinus esculentus*
Hentschel, 1924: Aberdeen (Scotland); intestine; Na +; Fq 6/19.
Hentschel, 1924: Shetland Islands; intestine; Na ++; Fq 100%.
Hentschel, 1924: Millport; intestine; Na approx. 3; Fq 1/5.

Hentschel, 1924: not Plymouth.
Chadwick, 1925: Port Erin; intestine; Fq + + +.
Holger Madsen, 1931: Frederikshavn (Denmark).
Williams, 1954: Strangford Lough (Ire.); Fq + +.
Berger, 1965: Denmark.
—: *Psammechinus miliaris*
Hentschel, 1924: not Essex coast (Britain).
Holger Madsen, 1931; Berger, 1965: Frederikshavn (Denmark).
—: *Strongylocentrotus droebachiensis*
Holger Madsen, 1931: Frederikshavn; transverse intestine; Na + + +; Fq 1/1.
Powers, 1933a: Bay of Fundy; Na + + +.
Beers, 1948: coast of Maine; intestine; Na + +; Fq 182/182.
Beers, 1954, 1961a: Gulf of Maine; intestine; Fq + + +.
Poljansky & Golikova, 1959: Barents Sea; anterior & middle intestine; Fq 101/150.
Berger, 1960c: San Juan Archipelago; intestine; Na + + +.
Berger, 1965: Denmark.
—: seven Japanese echinoids
Uyemura, 1934: Japanese coast; intestine.
—: *Strongylocentrotus nudus, Strongylocentrotus pulchellus*
Poljansky, 1951b: Vladivostok; intestine; Na + +; Fq + + +.
—: *Strongylocentrotus intermedius*
Strelkov, 1959: S. Kuril Islands; Fq 122/143.
—: *Hemicentrotus pulcherrimus*
Strelkov, 1959a: Yellow Sea.
—: *Strongylocentrotus echinoides*
Berger, 1960a: San Juan County; intestine.
—: *Strongylocentrotus franciscanus*
Berger, 1960c: San Juan Archipelago; intestine; Na + + +.
—: *Strongylocentrotus purpuratus*
Berger, 1961: Friday Harbor; intestine.
—: *Lytechinus anamesus*
Berger, 1961: San Diego (California); intestine.
—: *Allocentrotus fragilis*
Berger & Profant, 1961: Friday Harbor; intestine; Fq 9/9.
—: *Echinus acutus*
Berger, 1965: Denmark.

Syn.: *Cryptochilum boreale* Hentschel, 1924; Chadwick, 1925; Williams, 1954.

Size: 115-140 × 75-95 μ (Hentschel, 1924); 200 × 90 μ (Holger Madsen, 1931); 143 × 87 μ (Powers, 1933a); 162 × 87 μ (Poljansky, 1951b); 112 μ (Poljansky & Golikova, 1959); 87-186 × 51-129 μ (Berger, 1965).
Add. ref.: Powers, 1933c; Kirby, 1941; Bruce et al., 1963; Beers, 1965a,b.

48. **Entodiscus powersi** Berger

Hosts: *Strongylocentrotus echinoides*
Berger, 1960a: San Juan Archipelago; intestine.
—: *Strongylocentrotus droebachiensis*
Berger, 1965: San Juan Archipelago; Fq +.
Syn.: *Entodiscus* sp., Berger, 1960a.
Size: 90.7 × 52.9 μ (Berger, 1965).

49. **Philaster digitiformis** Fabre-Domergue (fig. 3F)

Hosts: *Marthasterias glacialis*
Fabre-Domergue, 1885: Concarneau; skin excavations.
—: actinians and sponges
Kahl, 1934.
Syn.: *Uronema digitiformis,* Cuénot, 1891; Koehler, 1924.
Size: 0.09-0.11 mm (Fabre-Domergue, 1885).
Add. ref.: Kirby, 1941.

50. **Cyclidium stercoris** Powers (fig. 3G)

Hosts: *Strongylocentrotus droebachiensis*
Powers, 1933a: Bay of Fundy; intestine; Na +++.
Beers, 1948: Frenchmans Bay; intestine; Na ++; Fq 98/182.
Beers, 1954, 1963: Mt. Desert Island; intestine; Na +++.
Poljansky & Golikova, 1959: Murmansk coast; Fq +++.
Berger, 1960c: San Juan Archipelago; intestine; Fq +.
—: *Strongylocentrotus nudus, Strongylocentrotus pulchellus*
Poljansky, 1951b: Vladivostok; intestine; Na +; Fq ++.
—: *Strongylocentrotus echinoides*
Berger, 1960a: San Juan County; intestine.
—: *Strongylocentrotus franciscanus, Strongylocentrotus purpuratus*
Berger, 1961: Friday Harbor; intestine.
—: *Allocentrotus fragilis*
Berger & Profant, 1961: Friday Harbor; entire intestine; Fq 5/9.
Syn.: *Uronema socialis* Powers, 1933a. *Uronema powersi,* Kahl, 1934.
Size: 40-70 × 18-30 μ (Powers, 1933a); 44-67 × 19-40 μ (Poljansky, 1951b); 44.1-65.1 × 19.4-32.0 μ (Berger, 1965).
Add. ref.: Powers, 1935; Kirby, 1941.

Ciliophora, Holotrichia, Thigmotrichida

51. **Boveria subcylindrica** Stevens (fig. 3H)

Hosts: *Parastichopus californicus*
Stevens, 1904: California; respiratory trees.
Balamuth, 1941: Pacific coast U.S.A.; respiratory trees; Na ++.
—: *Cucumaria planci*
de Beauchamp, 1909: Banyuls; lung; Na ++; Fq 100%.
—: Japanese holothurians
Poljansky, 1951a: Vladivostok; water lungs; Na ++; Fq +++.
—: *Tellina, Capsa* (Bivalvia)
Stevens, 1904: Naples.
Syn.: *Boveria cylindrica,* Koehler, 1924.
Size: 37-116 μ (Stevens, 1904); 90-110 × 40-60 μ (Balamuth, 1941); 54-81 × 18-21 μ (Kahl, 1934); 25-90 × 15-37 μ (Poljansky, 1951a).

52. **Hemispeira asteriasi** Fabre-Domergue (fig. 4H)

Host: *Marthasterias glacialis*
Fabre-Domergue, 1888: Gullmarfjord; dermal branchiae; Na ++; Fq 100%.
Wallengren, 1895: Gullmarfjord; dermal branchiae; Na ++; Fq 100%.
Size: 20-30 μ (Fabre-Domergue, 1888).
Add. ref.: Cuénot, 1891; Kirby, 1941.

53. **Hemispeiropsis antedonis** (Cuénot) (fig. 3J)

Hosts: *Antedon bifida bifida*
Perrier, 1886 [1]): Roscoff; stomach.
Cuénot, 1891: Roscoff; between cirri; Na ++.
—: *Antedon adriatica* [2])
König, 1894: upper side of arms.
—: "*Antedon bifida*" [3])
Cuénot, 1900: Mediterranean, St. Vaast; body surface.
Syn.: *Trichodina antedonis* Cuénot, 1891; Koehler, 1924. *Hemispeiropsis comatulae,* König, 1894.
Size: 16-20 μ (Cuénot, 1891); 23-27 μ (König, 1894).
Notes: (1) Perrier mentions only a "ciliated infusorian", which Hyman (1955) interpretes as *H. antedonis,* host species and locality identified by Clark (1967: 189); (2) host species identified by Clark (1967: 259); (3) according to B. & K. probably partly *Antedon mediterranea.*
Add. ref.: Chadwick, 1907; Kirby, 1941.

Ciliophora, Holotrichia incertae sedis

54. "Holotrichous infusorian"

Hosts: *Asterias rubens*
Durham, 1888: Saint Andrews; slime on surface; Na ++; Fq ++.
—: *Antedon bifida bifida*
Cuénot, 1900: Roscoff; intestine; Na +++.
Chadwick, 1907: Isle of Man; intestine; Na ++; Fq ++.
Remark: The three cited findings do not necessarily involve the same species.

Ciliophora, Peritrichia, Epistylidae

55. **Rhabdostyla amphiurae** (Cuénot) (fig. 3I)

Host: *Amphipholis squamata*
Giard, 1880 [1]): Wimereux; Fq ++.
Cuénot, 1891: Naples; arms, near respiratory aperture; Fq ++.
André, 1910, 1911: Roscoff; surface; Na ++; Fq +.
Cuénot, 1912: Roscoff, not Arcachon; arms, near respiratory aperture.
Syn.: *Vorticella ophiocomae,* Giard, 1880. *Vorticella amphiurae* Cuénot, 1891; Koehler, 1924. *Rhabdostyla sertulariarum* var. *amphiurae,* André, 1910.
Size: ⩽ 40 μ (Cuénot, 1891).
Note: (1) Synonymy of Giard's *Vorticella ophiocomae* with *Rhabdostyla amphiurae* presumed by Cuénot (1891).

56. **Rhabdostyla arenaria** Cuénot (fig. 4D)

Hosts: *"Synapta inhaerens"*
Cuénot, 1891: Roscoff; skin.
—: *Leptosynapta galliennei*
Cuénot, 1912: Roscoff, Arcachon; skin, Na ++; Fq ++.
—: not *Labidoplax digitata*
Cuénot, 1912: Arcachon; skin.
—: *Asterias rubens*
Precht, 1935: Gulf of Kiel; tube feet, papulae; Na +; Fq 30/31.
Size: 56-65 μ (Cuénot, 1891, 1912); 40 μ (Precht, 1935).

57. **Rhabdostyla** sp.

Host: *Asterias rubens*
Cuénot, 1891: Gulf of Kiel; skin.

Ciliophora, Peritrichia, Urceolariidae

58. **Cyclochaeta asterisci** (Gruber) (fig. 4G)

Host: *Asterina gibbosa* [1])

Gruber, 1884: Genoa harbour; dorsal papulae.

Cuénot, 1892: Roscoff; dorsal papulae.

Syn.: *Trichodina asterisci* Gruber, 1884. *Cyclocyrrha asterisci,* Cuénot, 1891, 1892.

Note: (1) Host mentioned by Gruber as "*Asteriscus* sp." According to B. & K. it is possibly *Asterina gibbosa.*

59. **Cyclochaeta ophiothricis** Fabre-Domergue (fig. 4B)

Host: *Ophiothrix fragilis*

Fabre-Domergue, 1888: Concarneau; surface.

Cuénot, 1891, 1892, 1912: Concarneau, Roscoff, not Arcachon; surface.

Syn.: *Cyclocyrrha ophiothricis* Fabre-Domergue, 1888.

Size: 47 μ (Fabre-Domergue, 1888).

60. **Cyclochaeta astericola** Precht (fig. 4I)

Host: *Asterias rubens*

Precht, 1935: Gulf of Kiel; tube feet; Na +; Fq 30/31.

Size: 40-50 μ (Precht, 1935).

61. **Trichodina** sp.

Hosts: *Strongylocentrotus droebachiensis*

Powers, 1933: Bay of Fundy; intestine; Na 10-15/h.

Beers, 1948: Frenchmans Bay; intestine; Na +; Fq 4/182.

Berger, 1961: Friday Harbor; intestine.

—: not *Strongylocentrotus droebachiensis*

Beers, 1954: Mt. Desert Island; Fq 0/182.

—: *Hemicentrotus pulcherrimus*

Strelkov, 1959a: Yellow Sea.

—: *Strongylocentrotus echinoides, Strongylocentrotus franciscanus, Strongylocentrotus purpuratus*

Berger, 1961: Friday Harbor; intestine.

Size: 30-50 μ (Powers, 1933).

Add. ref.: Beers, 1964; Berger, 1965.

62. **Urceolaria synaptae** Cuénot (fig. 4A)

Hosts: "*Synapta*"

Ray-Lankester, 1868: Guernsey (Channel Isl.); body cavity.

—: "*Synapta inhaerens*"

Cuénot, 1891, 1892: Roscoff, Arcachon; body cavity; Na +++; Fq 100%.

—: *Leptosynapta galliennei*

Cuénot, 1912: Arcachon, Channel Isl., Roscoff; absorbing intestine; Na +++; Fq +++.

Barel & Kramers, 1970: Roscoff; absorbing intestine; Na ++; Fq 35/55.

—: *Labidoplax digitata*

Cuénot, 1912: Arcachon; absorbing intestine; Na +++; Fq +.

—: *Thyone briareus*

Hunter, 1936b [1]); Colwin, 1944: Woods Hole; digestive tract.

—: not *Leptosynapta inhaerens*

Barel & Kramers, 1970: Roscoff; absorbing intestine; Fq 0/26.

Syn.: *Trichodina* sp., Ray-Lankester, 1868; Hunter, 1936b. *Trichodina synaptae,* Cuénot, 1891; Koehler, 1924; Kahl, 1934. *Cyclochaeta synaptae,* Cuénot, 1892.

Size: 56-95 μ (Cuénot, 1891; two forms: 75 × 112 μ or 50 × 78 μ (Hunter, 1936b); two forms: 89 × 122 μ or 60 × 98 μ (Colwin, 1944).

Note: (1) Hunter (1936b) describes her finding as "closely resembling *U. synaptae*".

Add. ref.: Cosmovici, 1913, 1914.

63. **Urceolaria ophiocomae** Giard

Host: *Amphipholis squamata*

Giard, 1880: Wimereux; Na ++; Fq ++.

Remark: Systematic status doubted by Cuénot (1891); not cited in more recent papers.

64. **Urceolaria spinicola** Beers

Host: *Strongylocentrotus droebachiensis*

Beers, 1964, 1966: Mount Desert Island; short oral spines; Na ++; Fq +++.

Size: 48-72 × 22-34 μ (Beers, 1964, 1966).

65. **Urceolaria** sp.(?)

Hosts: *Strongylocentrotus echinoides, Strongylocentrotus franciscanus, Strongylocentrotus purpuratus, Strongylocentrotus droebachiensis*

Berger, 1965: Washington State; Na 3-100.

—: *Lytechinus anamesus*

Berger, 1965: California.

Size: 49-68 μ (Berger, 1965).

66. **Leiotrocha** sp.(?)

Host: *Asterina gibbosa*
André, 1910: Roscoff; ambulacra.
Size: 28-34 μ (André, 1910).

Ciliophora, Peritrichia, Vorticellidae

67. **Vorticella punctata** Dons

Hosts: *Asterias rubens*
Precht, 1935: Kiel; between papulae; Fq 2/31.
—: Hydroids and bryozoans
Precht, 1935; Kahl, 1934: Kiel, Norway.
Size: 39-53 μ (Precht, 1935).

68. **Vorticella** sp.

Host: *Amphipholis squamata* [1])
Cuénot, 1891: Concarneau; stomach?
Cuénot, 1912: Arcachon; on surface; Fq ++.
Note: (1) Cuénot (1891) is not certain about the host species.

69. **Zoothamnium vermicola** Precht (fig. 4C)

Hosts: *Ophiura albida*
Precht, 1935: Kiel; oral tube feet; Na ++; Fq 20/50.
—: *Ophiothrix* sp.
Changeux, 1961; on surface.
—: Polychaetes
Precht, 1935: Kiel; on surface.
Size: On *O. albida* 80-100 μ, on polychaetes 55-65 μ (Precht, 1935).
Remark: According to Precht (1935) this species should perhaps be placed in the genus *Myoschiston.*

Ciliophora, Spirotrichia, Licnophoridae

70. **Licnophora auerbachii** (Cohn) (fig. 4J)

Hosts: *Asterina gibbosa*
Gruber, 1884 [1]): Genoa, dermal branchiae.
Cuénot, 1891: Genoa.
Stevens, 1904: Naples; surface.
—: *Ophiothrix fragilis*
Fabre-Domergue, 1888: Concarneau; surface; Na ++; Fq ++.
Cuénot, 1891: Roscoff, Concarneau.

Stevens, 1904: Naples; surface.
—: *Astropecten jonstoni*
Cuénot, 1891: Banyuls.
—: *Doris* sp. (Gastropoda)
Cohn, 1866: Heligoland.
—: *Thysanozoon* (Platyhelminthes)
Van Beneden, 1876.
—: *Syllis* (Annelida)
Fabre-Domergue, 1888: Concarneau.
—: "many non-echinoderms"
Cuénot, 1891: Heligoland, Kiel, Naples, Dinard, Concarneau.
—: "Mollusca"
Stevens, 1904: Naples.
—: *Pecten maximus* (Bivalvia)
Williams, 1954; Bruce et al., 1963: N.E. Ireland, Port Erin; tentacles.
Syn.: *Trichodina auerbachii* Cohn, 1866. *Licnophora asterisci,* Gruber, 1884.
Size: 79-116 μ (Stevens, 1904); 15-115 μ (Fabre-Domergue, 1888); 50 μ (Cohn, 1866); 80-120 μ (Kahl, 1934).
Remark: Kahl (1934) prefers to consider the echinoderm-dwelling *Licnophora* to be a distinct species: *L. asterisci,* in line with Gruber (1884), who mentions it as distinct from *L. auerbachii.*
Note: (1) Host mentioned by Gruber as *Asteriscus* sp., which is possibly *Asterina gibbosa.*

71. **Licnophora macfarlandi** Stevens (fig. 4E)

Hosts: *Parastichopus californicus*
Stevens, 1904: Monterey Bay, Pacific Grove; respiratory tree.
Balamuth, 1941, 1942: San Juan Archipelago to S. California; respiratory tree; Na + + +.
—: *Cucumaria planci*
De Beauchamp, 1909: Banyuls; water lung; Fq +.
Size: 140-180 μ (Stevens, 1904).

Ciliophora, Spirotrichia, Euplotidae

72. **Euplotes balteatus** (Dujardin) (fig. 4F)

Hosts: *Strongylocentrotus droebachiensis*
Beers, 1954: Mount Desert Island; intestine, rectum; Na 5-10/0.1 ml; Fq 25/165.

Beers, 1961 [1]): Mount Desert Island; in and around host; Na 56/0.1 ml; Fq 54/78.

Berger, 1960c: San Juan Archipelago; intestinal tract; Fq +.

—: *Strongylocentrotus purpuratus, Strongylocentrotus echinoides, Strongylocentrotus franciscanus*

Berger, 1961a [2]): Friday Harbor; intestine.

—: *Allocentrotus fragilis*

Berger & Profant, 1961 [2]): Friday Harbor *, Santa Barbara Channel; entire intestine; Fq 4/9 *.

—: Any of the hosts mentioned

Berger, 1965a: N.E. Pacific; rectum, aboral intestine; Na < 50/h.

Size: 68 × 34 μ (Beers, 1954; Berger, 1965, 1965a); 60-90 μ (Kahl, 1934).

Remark: In Kahl (1934) no reference is made to the commensal habits of *E. balteatus*.

Notes: (1) According to Berger (1965a) "*E. balteatus*" of Beers is possibly a different species; (2) part of these "*E. balteatus*" belongs to *E. tuffrani* (Berger, 1965a).

Free: Cette, Kiel (Kahl, 1934); N.E. Pacific (Berger, 1965a).

Add. ref.: Beers, 1963, 1965c.

73. **Euplotes charon** (Müller)

Host: *Echinus esculentus*

André, 1910: Roscoff; surface, perivisceral; Na ++; Fq +.

Size: 70-90 μ (Kahl, 1934).

Remark: According to Hentschel (1924) and Kirby (1941) André's finding is merely an accidental invasion.

Free: Naples (Entz, 1884); Genoa (Gruber, 1884); Baltic Sea, Kiel, W. Denmark (Kahl, 1934).

74. **Euplotes** sp.

Hosts: *Strongylocentrotus droebachiensis*

Powers, 1933a [1]): Bay of Fundy; intestine; Na 10-15; Fq 1.

Beers, 1948 [2]): Bay of Fundy, Frenchmans Bay; intestine; Na +; Fq 24/182.

Poljansky & Golikova, 1959: Murmansk coast, Japanese Sea; intestine; Na +; Fq 38.6%.

—: *Strongylocentrotus intermedius*

Strelkov, 1959: S. Kuril Islands; Fq 3/143.

—: *Echinometra lucunter*

Urdaneta-Morales et al., 1966[3]): Venezuela; intestine; Na < 10/h; Fq 2.5%.

Size: 60 × 35 μ (Powers, 1933a); 71 × 43 μ (Poljansky & Golikova, 1959).

Notes: (1) According to Kirby (1941) possibly an accidental invader; (2) according to Berger (1965a) this record probably involves the same species as the one mentioned by Beers (1954, 1961) as *E. balteatus*; (3) "is this a real endocommensal?".

Ciliophora incertae sedis

75. **Uronychia** sp.(?)

Host: *Paracentrotus lividus*

Russo, 1914: Naples; intestine; Na ++.

Remark: Berger (1965) qualifies this record as "suspect".

76. Undefined ciliates

Hosts: *Echinus esculentus*

Chadwick, 1925: Port Erin; intestine.

—: *Ophiura sarsi*

Mortensen, 1933: stomach; Na +; Fq ++.

Size: approx. 2 mm (Mortensen, 1933).

GENERAL NOTE ON THE CILIOPHORA: André (1910) found (Roscoff) no ciliates in or on *Asterias rubens* (4 specimens), *Marthasterias glacialis* (3 specimens), *Echinocardium cordatum* (8 specimens) or *Ophiothrix fragilis* (3 specimens); Powers (1933) found no ciliates in *Echinus esculentus* (Aberdeen, Plymouth); Poljanski (1951b) found no ciliates in *Echinocardium cordatum* (Japanese Sea).

COELENTERATA

Hydrozoa

77. **Perigonimus cidaridis** Weismann

Host: *Cidaris cidaris*

Lo Bianco, 1899: Naples; on spines.

Add. ref.: Broch, 1928.

78. **Lafoea fruticosa** Sars

Host: *Poliometra prolixa*

Mortensen, 1912b: N.E. Greenland; on cirri.

Free: North Sea, Arctic, N. Atlantic (Broch, 1928).

79. **Cuspidella** sp.

Host: *Poliometra prolixa*
Mortensen, 1912b: N.E. Greenland; on cirri.
Free: North Sea, Arctic, N. Atlantic (Broch, 1928).

80. **Stegopoma fastigatum** (Alder)

Host: *Poliometra prolixa*
Mortensen, 1912b: N.E. Greenland; on cirri.
Free: North Sea, N. Atlantic, Mediterranean (Broch, 1928).

81. **Calycella syringa** (L.)

Host: *Poliometra prolixa*
Mortensen, 1912b: N.E. Greenland; on cirri.
Free: North Sea, Arctic, N. Atlantic (Broch, 1928).

REMARK: Although the species 78-81 have a wide distribution (Broch, 1928), their association with crinoids is only reported by Mortensen (1912b), which data are quoted by Clark (1921: 676). Unless the notion "associate" is conceived very broadly, the records of Mortensen presumably are to be qualified as "casually epizoic" (B. & K.).

Anthozoa

82. species of Palythoidae

Host: "*Dorocidaris* sp." [1])
Richard, 1903: Azores; on spines.
Note: (1) According to B. & K. possibly *Cidaris cidaris*.

PLATYHELMINTHES

Turbellaria, Archoophora

General taxonomy of the Turbellaria according to de Beauchamp, 1961; review by Stunkard & Corliss, 1951.

83. **Avagina incola** Leiper (fig. 5A)

Hosts: *Echinocardium cordatum*
Leiper, 1902, 1904: Millport; accessory canal; Na +; Fq 5-8%.
Westblad, 1948: not Bohüslan.
—: *Echinocardium flavescens*
Westblad, 1948: Bohüslan; intestine; Na 3-14/h; Fq < 100%.
Westblad, 1948: Trondheim, Herdla (Norway); part of intestine with shells; Na 50; Fq 2/2.

—: *Spatangus purpureus*
Westblad, 1948: Bohüslan, Herdla, Trondheim; intestine.
Westblad, 1948; Gage, 1966a *: Plymouth; Fq ++*.
Syn.: *Haplodiscus incola,* von Graff, 1905.
Size: max. 2.5 × 0.6 mm (Leiper, 1902, 1904).
Add. ref.: von Graff, 1903.

84. **Avagina glandulifera** Westblad (fig. 5B)

Host: *Spatangus purpureus*
Westblad, 1953; Gage, 1966a *: Plymouth; in host; Fq ++*.
Size: 100 μ wide (Westblad, 1953).

85. **Avagina vivipara** Hickman (fig. 5C)

Host: *Echinocardium cordatum*
Hickman, 1956: Derwent Estuary (Tasmania); exclusively oesophagus; Na 1-5/h; Fq 18/68.
Size: 1.09-1.37 × 0.62-0.64 mm (Hickman, 1956).

86. **Faerlea echinocardii** Dörjes (fig. 5D)

Host: *Echinocardium flavescens*
Dörjes, 1972: Herdla (Norway); in host.
Size: 0.8 mm (Dörjes, 1972).
Remark: According to Dörjes (1972) the undescribed species mentioned in a footnote by Westblad (1948) is in fact *F. echinocardii.*

87. **Aphanostoma pallidum** Beklemišev

Host: *Myriotrochus rinckii*
Beklemišev, 1915: Murmansk coast; intestine.
Size: 2.15 × 0.8 mm (Beklemišev, 1915).
Remark: Beklemišev (1915) emphasizes that this species is different from *Anoplodium myriotrochi.*

88. **Aphanostoma sanguineum** Beklemišev

Host: *Chiridota laevis*
Beklemišev, 1915: Murmansk coast; intestine, posterior part; Na 1-5/h; Fq 0-30%.
Size: 1 × 0.6 mm (Beklemišev, 1915).

89. **Otocoelis chirodotae** Beklemišev

Host: *Chiridota laevis*
Beklemišev, 1915: Murmansk coast; intestine, anterior part; Na < 30/h; Fq 0-90%.

Size: 1.5 × 0.45 mm (Beklemišev, 1915).
Remark: Rate of infection varies strongly with locality (Beklemišev, 1915).

90. **Meara stichopi** Westblad (fig. 5E)

Hosts: *Stichopus tremulus*
Westblad, 1926, 1949: Bergen, Trondheim, Dröbak; anterior intestine, body cavity; Na 1-7/h.
—: *Mesothuria intestinalis*
Westblad, 1926, 1949: Scandinavian coast; body cavity; Fq 1.
Size: 2-3 × 1 mm (Westblad, 1949).
Add. ref.: Westblad, 1951.

Turbellaria, Fleucithophora

91. **Umagilla forskalensis** Wahl (fig. 6A)

Host: *Holothuria forskali*
Wahl, 1906; intestine.
Wahl, 1909: Umago (Adriatic), Naples *, Norway; anterior intestine; Na < 14/h; Fq 29/47 *.
Westblad, 1953: Naples, Plymouth; intestine.
Size: 1.5 × 0.9 mm (Wahl, 1909).
Add. ref.: von Graff, 1908, 1913.

92. **Wahlia macrostylifera** Westblad (fig. 5F)

Host: *Stichopus tremulus*
Westblad, 1926, 1930: Bergen, not Trondheim; posterior intestine; Na < 23/h; Fq +.
Size: 1.5-1.6 × 0.4-0.5 mm (Westblad, 1930).

93. **Anoplodiopsis gracilis** Westblad (fig. 5G)

Host: *Holothuria forskali*
Westblad, 1953: Naples.
Size: 0.9 mm (Westblad, 1953).
Remark: Westblad (1953) suggests that this species might be identical to *Anoplodium gracile.*

94. **Anoplodium gracile** Wahl (fig. 6B)

Host: *Holothuria forskali*
Wahl, 1906: Umago (Adriatic), Naples *; body cavity; Na < 9/h; Fq 11/47 *.
Size: 1 × 0.5 mm (Wahl, 1906).
Add. ref.: von Graff, 1908, 1913; Westblad, 1953.

95. **Anoplodium tubiferum** Westblad (fig. 6C)

Host: *Holothuria forskali*
Westblad, 1953: Plymouth; Fq +.
Size: 0.9 mm (Westblad, 1953).

96. **Anoplodium stichopi** Bock (fig. 6D)

Host: *Stichopus tremulus*
Bock, 1926: Gullmarfjord, Dröbak; Na < 11/h.
Westblad, 1926: Bergen, Trondheim; Na 6-12/h.
Size: "a few mm long" (Bock, 1926).

97. **Anoplodium**(?) **myriotrochi** von Graff

Host: *Myriotrochus rinckii*
Danielssen & Koren, 1880, 1882 [1]): Spitzbergen; intestine; Na ++; Fq +++.
Beklemišev, 1915: not Murmansk coast; intestine.
Remark: According to von Graff (1908) the systematic position of this species is not clear.
Note: (1) Mentioned by Danielssen & Koren (1880, 1882) as "small reddish planarians", which were identified as *A. myriotrochi* by von Graff, according to Ludwig (1889-1892).
Add. ref.: Braun, 1887; Ludwig, 1889-1892; Cuénot, 1892; von Graff, 1903.

98. **Anoplodium**(?) **chiridotae** Sabussov

Host: *Chiridota laevis*
Sabussov, 1900: White Sea; body cavity.
Size: 0.5 mm (Sabussov, 1900).
Remark: According to von Graff (1913) this species is probably not an *Anoplodium*.
Add. ref.: von Graff, 1903, 1908; Bock, 1926.

99. **Anoplodium**(?) **clypeastris** von Graff

Host: *Spatangus* sp.
Moseley, 1874: Suez; surface; Na ++.
Syn.: *Derostomium* sp., Moseley, 1874.
Add. ref.: von Graff, 1903, 1908.

100. **Anoplodium** sp.(?)

Hosts: *Leptosynapta galliennei*
Cuénot, 1912: Roscoff, not Arcachon; intestine; Fq ++.
Barel & Kramers, 1970: Roscoff; intestine; Na 41; Fq 19/53.

—: *Leptosynapta inhaerens*
Barel & Kramers, 1970: Roscoff; intestine; Na 10; Fq 4/26.
—: *Leptosynapta bergensis*
Barel & Kramers, 1970: Plymouth; intestine; Na 1; Fq 1/5.
Size: 1.5 mm (Barel & Kramers, 1970).

101. **Anoplodium** sp.(?)

Host: *Cucumaria planci*
Monticelli, 1892: Naples; coelome.
Remark: Mentioned by Monticelli (1892) as "undetermined vorticide", tentatively mentioned as *Anoplodium* by von Graff (1903).
Add. ref.: von Graff, 1908.

102. **Anoplodiera voluta** Westblad (fig. 6E)

Host: *Stichopus tremulus*
Westblad, 1926, 1930: Bergen, Trondheim *; intestine; Na < 90/h; Fq 1/7 *.
Size: 1.5-2 × 1-1.5 mm (Westblad, 1930).

103. **Ozametra elegans** Westblad (fig. 6F)

Host: *Stichopus tremulus*
Westblad, 1926: Trondheim *, Bergen, Dröbak, Bohüslan; anterior intestine; Na 2/h *.
Syn.: *Umagilla elegans* Westblad, 1926.
Size: < 5 mm (Westblad, 1953).
Remark: Westblad (1953) puts it hesitatingly into the genus *Ozametra*.

104. **Syndesmis echinorum** François (fig. 7A)

Hosts: "grand nematoide vert parasite [1]) d'*Echinus sphaera*"
Silliman, 1881: Roscoff; on nematoid.
—: *Echinus esculentus*
Geddes, 1880: perivisceral.
Cuénot, 1892, 1900: Roscoff; coelom; Na 1-30/h; Fq 1/5.
Shipley, 1901: Plymouth; coelom (1*), gut (10*); Na 11*; Fq 1/1.
Westblad, 1926: Gullmarfjord; Na 19; Fq 10.
Westblad, 1926: Bergen; Na 71; Fq 5.
Bruce et al., 1963: Port Erin; gut.
Barel & Kramers, 1970: Roscoff; intestine; Na 15-123/h; Fq 8/8.
Barel & Kramers, 1970: Plymouth; intestine, coelom; Na 12; Fq 2/3.
—: *Echinus acutus*

François, 1886: Banyuls; intestine; Na ++.
—: *Paracentrotus lividus*
François, 1886: Banyuls; intestine; Na ++.
von Graff, 1903: not Trieste; Fq 0/22.
Briot, 1906: Marseille; digestive tube; Fq ++.
Cherbonnier, 1951: Roscoff; Fq ++.
Barel & Kramers, 1970 [2]): Morgat; intestine; Na 2; Fq 1/21.
—: *Sphaerechinus granularis*
Russo, 1895: Naples; intestine, few in coelom.
von Graff, 1903: Umago, not Pirano (near Trieste); intestine, rectum, not oesophagus; Na 19-133/h; Fq 100%.
von Graff, 1903 :Bergen * [3]), Trieste **; Fq 8/11 *, 5/5 **.
Briot, 1906: Marseille; coelom; Na ++; Fq 100%.
Wahl, 1909: Naples; Na 13; Fq 1/30.
Barel & Kramers, 1970: not Roscoff; intestine, coelom; Fq 0/3.
—: *Strongylocentrotus droebachiensis*
von Graff, 1903; Barents Sea; Fq 10/21.
—: not *Psammechinus microtuberculatus*
von Graff, 1903: Trieste; Fq 0/30.
—: not *Psammechinus miliaris*
Barel & Kramers, 1970: Roscoff; coelom; Fq 0/16.

Syn.: "ver parasite", Geddes, 1880. *Syndesmis* sp., Silliman, 1881. *Syndesmis*, Wahl, 1909.

Size: 2.25 mm (Silliman, 1881); 3 × 2 mm (François, 1886); 2.5 mm (Cuénot, 1892, 1900); 6 × 4 mm (Russo, 1895); < 6 mm (von Graff, 1903; Briot, 1906).

Notes: (1) about this "nematoide vert" no further taxonomic information is available; (2) doubtful record; (3) *S. granularis* does not occur at the Scandinavian coast.

Add. ref.: Braun, 1889; von Graff, 1908, 1913; Wahl, 1910.

105. **Marcusella atriovillosa** Westblad (fig. 7C)

Host: *Spatangus purpureus*
Westblad, 1953: Plymouth; intestine; Na 5; Fq 1.

Size: 2 mm (Westblad, 1953).

106. **Marcusella pallida** Hickman (fig. 7D)

Host: *Echinocardium cordatum*
Hickman, 1956: Tasmania; intestine; Na 11; Fq 10/86.

Size: 1.3-1.7 × 0.8-1.16 mm (preserved) (Hickman, 1956).

107. **Desmote vorax** Beklemišev (fig. 7E)

Host: *Heliometra glacialis*

Beklemišev, 1916: Kola Bay; parenchymatic tissue; Na 1->20/h; Fq 9/100.

Size: 2 × 2 mm (Beklemišev, 1916).

108. **Pterastericola fedotovi** Beklemišev

Hosts: *Pteraster pulvillus, Pteraster obscurus, Pteraster militaris*

Beklemišev, 1916: Kola Bay; in host.

—: *Pteraster militaris*

Karling, 1970: White Sea.

Size: < 2.5 × 1 mm (Beklemišev, 1916).

109. **Triloborhynchus astropectinis** Bashiruddin & Karling (fig. 7B)

Host: *Astropecten irregularis*

Bashiruddin & Karling, 1970: Cullercoats, Plymouth, Bergen, Gullmarfjord; not: Bangor (Wales), Isle of Man, Clyde; caecal diverticles only.

Size: 0.8-1.5 × 0.3 × 0.7 mm (Bashiruddin & Karling, 1970).

GENERAL NOTE ON THE TURBELLARIA: Wahl (1906) found no turbellarian parasites in *Cucumaria planci* (Trieste), *Labidoplax digitata* (Naples, Trieste), or *Echinocardium cordatum* (Naples); Beklemišev (1915) found no umagillids in *Myriotrochus rinckii, Chiridota laevis,* or *Thyonidium pellucidum* (all Murmansk coast); Westblad (1926) found no umagillids in *Echinocardium flavescens, Spatangus purpureus, Strongylocentrotus droebachiensis, Bathyplotes natans, Leptosynapta inhaerens* (Bergen), or in *Brissopsis lyrifera,* (Trondheim, Gullmarfjord), *Echinocardium cordatum, Thyone fusus* (Bergen, Gullmarfjord), *Echinus elegans, Psolus phantapus* (Trondheim), *Cucumaria frondosa* (Trondheim, Bergen), or *Mesothuria intestinalis* (Gullmarfjord).

Trematoda, Digenea

110. **Fellodistomum fellis** (Olsson) (fig. 8A)

Hosts: *Ophiura sarsi*

Tauson, 1917 [1]): Kola Bay; wall of stomach diverticles; Na 1-2/h; Fq 11.7%.

Cubrik, 1952 [2]): Barents Sea; intestine; Na 7-13/h; Fq 22%.

Doss et al., 1965 [3]): White Sea.

—: *Ophiura albida*

Mortensen, 1920, 1927 [3]): Gullmarfjord, not Danish coast; stomach; Na 2-7/h; Fq 8/9.

Syn.: *Adolescaria ophiurae,* Tauson, 1917; Mortensen, 1933.

Size: 1.36-1.97 × 0.66-1.06 mm (Tauson, 1917); 1.50-2.64 × 0.60-0.75 mm (Cubrik, 1952).

Remark: The form found in echinoderms is always mentioned as a cercaria or metacercaria stage.

Notes: (1) According to Tauson (1917) his form is most probably a larval stage of *Sterigophorus furciger* Odhner, or of a *Rhodotrema* species; (2) according to Cubrik (1952) his form is probably not *S. furciger*; he describes *O. sarsi* as being an intermediate host between the mollusc *Nucula tenuis* and a fish; (3) adult form commonly occurring in the echinoderm eating fishes *Anarrhichas lupus* and *Platessa platessa.*

Add. ref.: Doss & Farr, 1969.

111. **Himasthla leptosoma** (Creplin)

Hosts: *"Synapta inhaerens"*

Cuénot, 1892: Arcachon; in cyst on tentacles; Na < 2/h.

—: *Leptosynapta galliennei*

Cuénot, 1912: Roscoff, Arcachon; tentacles, coelom; Na +.

—: *Phascolosoma* (Gephyrea), *Arenicola* (Polychaeta)

Cuénot, 1912; Doss et al., 1965: Roscoff, Arcachon, Wimereux; coelom.

—: *Scrobicularia, Paludestrina, Peringia* (Mollusca)

Cuénot, 1912; Doss et al., 1965: Roscoff, Northumberland; foot.

Syn.: *Distomum leptomum,* Cuénot, 1892; Villot, 1879. *Echinostomum leptosomum,* Cuénot, 1912; Koehler, 1924.

Size: 160-240 μ (Cuénot, 1892).

Remarks: The form found in echinoderms is always described as a cercaria; according to Timon-David (1938) holothurians are probably exceptional hosts for *H. leptosoma*; the adult worm occurs in seabirds (Villot, 1879; Doss et al., 1965).

112. **Zoogonus mirus** Looss (fig. 8B)

Hosts: *Paracentrotus lividus*

Timon-David, 1934, 1938: Marseille, Banyuls; tooth muscles; Na 5-6/h; Fq 50-60%.

—: *Sphaerechinus granularis*

Timon-David, 1934, 1938: Marseille, Banyuls; tooth muscles; Fq + +.

—: *Arbacia lixula*

Timon-David, 1934, 1938: Banyuls, tooth muscles; Na 6; Fq 4/20.

—: *Psammechinus miliaris*

Stunkard, 1941: Wimereux [1]); tooth muscles; Na 1-36/h; Fq < 50%.

—: *Nassa reticulata* (Mollusca)
Stunkard, 1932 [2]): Roscoff.

Syn.: *Cercaria reticulatum,* Stunkard, 1932. *Zoogonus rubellus,* Odhner, 1902; Nicoll, 1909.

Size: cyst 0.25 mm (Timon-David, 1934, 1938); cyst 0.20-0.28 mm (Stunkard, 1941).

Remarks: Stunkard (1938) identified *Distomum lasium* as the larval stage of *Z. mirus;* later, however, he considered them as separate species (Stunkard, 1941); the form found in echinoderms is always mentioned as a cercaria or a metacercaria; the adult worm has been reported in fish species of the genera *Labrus* and *Anarrhichas* (Odhner, 1902; Nicoll, 1909; Stunkard, 1941).

Notes: (1) In the Wimereux region no stages of *Z. mirus* were found in the many snails, worms or fishes investigated; (2) data from Stunkard (1941).

113. **Metacercaria capriciosa** (Cuénot)

Hosts: *"Synapta inhaerens"*
Cuénot, 1892: Roscoff, not Arcachon; tentacles; Na 2-6/h; Fq ++.
—: *Leptosynapta galliennei*
Cuénot, 1912: Roscoff, Arcachon; tentacles, coelom; Fq ++.
—: *Ophiothrix fragilis*
Cuénot, 1892: Roscoff, not Banyuls, not le Portel; intestine, gonads; Na ++; Fq +++.
—: *Ophiura albida*
Cuénot, 1892: Roscoff; intestine, gonads; Na 1; Fq 1/1.
—: *Mysis* (Arthropoda)
Cuénot, 1892: Roscoff.

Syn.: *Cercaria capriciosa,* cercaria of *Distomum* sp., Cuénot, 1892, 1912.

Size: cyst 100-200 μ (Cuénot, 1892).

Add. ref.: Timon-David, 1938.

114. **Metacercaria psammechini** Timon-David (fig. 8C)

Hosts: *Sphaerechinus granularis*
Timon-David, 1934, 1938: Marseille, Banyuls; tooth muscles; Fq + +.
—: *Psammechinus microtuberculatus*
Timon-David, 1934, 1938: Marseille, Banyuls; tooth muscles; Na < 15/h; Fq +++.

Size: cyst 330 μ (Timon-David, 1934, 1938).

Remark: Systematic postition doubtful, host of the adult form not known (Timon-David, 1934, 1938).

115. **Nidrosia ophiurae** Mortensen (fig. 8D)

Host: *Ophiura sarsi*

Mortensen, 1933: Trondheimsfjord, Skagerrak, Davis Strait; gonads.

Size: "The size of a pea" (Mortensen, 1933).

Remark: According to Mortensen "One might perhaps suggest it to be a Trematod".

MESOZOA

Orthonectida

116. **Rhopalura ophiocomae** Giard (fig. 8E)

Hosts: *Amphipholis squamata*

Giard, 1877, 1880: Wimereux; bursa genitalis; Na +++; Fq 1/80.

Metschnikoff, 1879a, b, 1881: Naples, La Spezia (Italy); peritoneal cavity; Fq +.

Julin, 1881, 1882: Wimereux.

Koehler, 1886: Cette.

Giard, 1887a: Fécamp (near le Havre); Fq +.

Gaullery & Mesnil, 1901a, b; Gaullery & Lavallée, 1910: Wimereux, Cherbourg.

Caullery & Lavallée, 1908: Shore of Boulogne; genital sacs; Na ++; Fq < 10%.

Cuénot, 1912: not Arcachon.

Nouvel, 1935: Roscoff *, Concarneau; Na +++*; Fq < 9% *.

Cherbonnier, 1951: Primel (near Roscoff); Fq < 1/1000.

Bruce et al., 1963 [1]): Port Erin; body cavity.

Fontaine, 1968: Northumberland; gonads, coelomic epithelia; Na >> 100/h; Fq 2-15%.

Kozloff, 1969: Roscoff; mainly incubatory pouches; Fq 107/1685.

Kozloff, 1969: Wembury (near Plymouth); mainly incubatory pouches; Fq 1/>>100.

Kozloff, 1969: Oregon, Washington State coast; mainly incubatory pouches; Fq 1-3/>>1000.

—: not *Ophiura sarsi*

Kozloff, 1965: Friday Harbor; Fq 0/>80.

—: *Ophiothrix fragilis*

Fontaine, 1968: Northumberland; gonads, coelomic epithelia; Na >>100/h; Fq 1/73.

Bender, 1972: Bergen; Na >>100; Fq 1/300.

—: *Ophiura albida*

Bender, 1972: Bergen; Fq 2/100.

Syn.: *Intoshia gigas,* Giard, 1879, 1880. *Rhopalura giardii* Metschnikoff, 1879a, b.

Size: ♀ 150 μ, ♂ 66 μ (Metschnikoff, 1881); 154-162 μ (Bender, 1972).

Remark: Originally, Giard (1877, 1879, 1880) described the two sexes as different species (*Rh. ophiocomae,* ♂, and *I. gigas,* ♀) but Metschnikoff (1879a, b) identified them as being the same species, which Giard (1879a) agreed upon.

Note: (1) Citing Herdman (1920).

NEMATODA

117. **Oncholaimus echini** Leydig

Host: *Echinus esculentus*

Leydig, 1854; intestine.

Size: 4 mm (Leydig, 1854).

Add. ref.: Shipley, 1901.

118. **Philometra grayi** (Gemmil & von Linstow)

Host: *Echinus esculentus*

Gemmil, 1901; Gemmil & von Linstow, 1902: Firth of Clyde (Scotland), Plymouth; perivisceral fluid; Na ≦ 4.

Irving, 1910 [1]): Scarborough (Northumberland); coelomic fluid; Na 1; Fq 1/++.

Ritchie, 1910: Shetland Isles; in tests; Na +.

Cherbonnier, 1951: Roscoff.

J. E. Smith, personal comm.: Plymouth; Fq approx. 1/200.

Syn.: *Echinonema grayi,* Gemmil, 1901. *Ichthyonema grayi* Gemmil & von Linstow, 1902; Irving, 1910; Ritchie, 1910; Mortensen, 1927; Cherbonnier, 1951.

Size: ♀ 0.6-1.5 m × 1-4 mm, ♂ 50-200 × 0.53 mm (Gemmil, 1901; Gemmil & von Linstow, 1902); 4-5 m × 0.25 cm (Irving, 1910).

Note: (1) Irving (1910) is not sure whether his species is indeed *Ph. grayi.*

Add. ref.: Chitwood, 1933; Chabaud, 1965.

119. "Larva of **Agamonema**"

Hosts: *Leptosynapta inhaerens, Labidoplax digitata*

Monticelli, 1892: Gulf of Naples; in body muscles; Fq ++.

120. "Grand nematoïde vert"

Host: *Echinus esculentus*

Silliman, 1881; Roscoff; coelom.

Remark: See under *Syndesmis echinorum* (104)

121. "Nematode"

Host: *Echinus esculentus*
Shipley, 1901: Plymouth; coelomic fluid; Na 2-3; Fq 1/1.
Size: 6-46 cm × < 1 mm (Shipley, 1901).

122. "Nematode"

Host: *Asteronyx loveni*
Jungersen, 1912: Skagerrak; Fq +.
Remark: "Resembling a small Ascaris" (Jungersen, 1912).

123. "Nematode"

Host: *Brissopsis lyrifera*
Brattström, 1946: Gullmarfjord; coelom, mesenterium [1]); Na ++; Fq ++.
Size: In white globules 0.6-2 mm, worms < 1 mm (Brattström, 1946).
Note: (1) White globules in the mesenterium, worms in the coelom.

ROTATORIA

124. **Zelinkiella synaptae** (Zelinka) (fig. 9A)

Hosts: "Both Guernsey synaptae"
Ray-Lankester, 1868 [1]): Guernsey (Channel Isl.); body cavity; Na +++.
—: *"Synapta"* [2])
Zelinka, 1888: Trieste; only on the skin; Na ≦ 100/h.
—: *Labidoplax digitata*
Cuénot, 1892, 1912: Arcachon; body surface; Na +++.
St. Joseph, 1906: Arcachon, St. Vaast, Concarneau; skin.
—: *"Synapta inhaerens"*
Cuénot, 1892: Roscoff, Arcachon; body surface; Na +++.
St. Joseph, 1906: le Croisic (W. France); skin.
—: *Leptosynapta inhaerens*
Barel & Kramers, 1970: Roscoff; body surface, tentacles; Na approx. 100/h; Fq 8/26.
—: *Leptosynapta galliennei*
Cuénot, 1912: Arcachon, Concarneau, St. Vaast.
Barel & Kramers, 1970: Roscoff; body surface, tentacles; Na approx. 8000; Fq 54/55.
—: *Leptosynapta bergensis*
Barel & Kramers, 1970: Plymouth; body surface; Na 6; Fq 3/6.
—: *Terebella* (Polychaeta)
St. Joseph, 1906: Saint Jean de Luz; skin.

—: *Amphitrite* (Polychaeta)
di Milia, 1962: Livorno (Italy); surface.
—: *Polymnia* (Polychaeta)
de Beauchamp, 1965: Roscoff; tentacles.
Syn.: *Discopus synaptae* Zelinka, 1888; Cuénot, 1892, 1912; St. Joseph, 1906; Koehler, 1924; Mortensen, 1927.
Size: 1/500 inch (Ray-Lankester, 1868); 0.13 mm (Zelinka, 1888); 150-250 μ (Remane, 1929).
Notes: (1) Ray-Lankester (1868) mentioned the associate as "unknown rotifer"; (2) according to B. & K. the host involved in Zelinka's report is most probably *Labidoplax digitata.*

ENTOPROCTA

125. **Loxosomella antedonis** Mortensen

Hosts: *Poliometra prolixa*
Mortensen, 1912a: Greenland; attached to the cirri.
—: *Heliometra glacialis*
Osburn, 1919: Etah (N.W. Greenland); on surface; Na 1; Fq 1/>1.
Size: 0.5-1 mm (Mortensen, 1912a).
Add. ref.: Clark, 1921: 650.

126. **Loxosoma** sp.

Hosts: *Antedon petasus*
Mortensen, 1920: Gullmarfjord; attached to the pinnules.
—: *Amphilepis norvegica*
Mortensen, 1927: 223: oral side; Fq ++.

ANNELLIDA

Myzostomida

Synonymy of crinoids: Clark, 1967.

127. **Myzostomum alatum** (von Graff)

Hosts: *Leptometra celtica*
Carpenter, 1884; von Graff, 1884: off Cape Mondego (Portugal), Minch (Scotland); attached to the mouth.
—: *Leptometra phalangium*
von Graff, 1887: off Cartagena (Spain); between mouth and anus.
Prouho, 1892: Banyuls; disc.
Wheeler, 1896: Naples; disc; Na ++.
Remscheid, 1923: Bay of Sorrento (Italy); free on ambulacral groove.

Izquierdo, 1934: Valencia (Spain); Na 1.
—: *Antedon bifida*
Fauvel, 1927 [1]): Roscoff; buccal disc.
Prenant, 1959: Atlantic coasts.
—: *Antedon mediterranea*
Changeux, 1955: Banyuls; Na ++; Fq +/55.
Syn.: *Myzostoma alatum,* most authors.
Size: 2-3 mm (von Graff, 1884, 1887); 4 mm (Carpenter, 1884).
Note: (1) According to Cherbonnier (1951), Fauvel (1927) indicated the host erroneously as *Antedon phalangium.* It should be *A. bifida.*
Add. ref.: Stummer Traunfels, 1910; Clark, 1921.

128. **Myzostomum carpenteri** (von Graff)

Hosts: *Hathrometra sarsi*
Carpenter, 1884; von Graff, 1884: Faröer Channel; attached to disc.
Nansen, 1885: Bergens Museum; adherent to disc.
—: *Poliometra prolixa*
Mortensen, 1912b [1]): N.E. Greenland; in mouth, on disc, at base of arms.
Syn.: *Myzostoma carpenteri,* most authors.
Size: 2.3 mm (Carpenter, 1884); 3-4.25 mm (Nansen, 1885); 0.6 mm (Mortensen, 1912b).
Note: (1) Mortensen is not certain whether his finding indeed involves *M. carpenteri.*
Add. ref.: von Graff, 1887; Nansen, 1887; Carpenter, 1888; Stummer Traunfels, 1910; Clark, 1921; Remscheid, 1923.

129. **Myzostomum cirriferum** (Leuckart) (fig. 9B)

Hosts: *Antedon bifida bifida*
Thompson, 1836 [1]): Scotland [2]); "runs about on arms".
Müller, 1841; disc and arms; Na ++.
von Graff, 1884, 1887: Shetlands, W. Scotland, Torquay (Devon), Isle of Man, Anglesea (Wales); arms; Na ++.
Plymouth marine fauna, 1957: Plymouth; on surface; Na ++.
Izquierdo, 1934: N.W. Spain; Na 50-60/h; Fq +++.
Moore, 1937: S. of Isle of Man; on surface; Fq ++.
Cherbonnier, 1951: Roscoff; on the arms.
—: *Antedon petasus*
Loven, 1842, 1842a: W. Sweden; disc and arms; Na 1-2/h; Fq 2/10.
von Graff, 1884, 1887: Norway, Kattegat.
Carpenter, 1884: Arendal (Norway), Faröer Banks; Na 18.

Nansen, 1885: Romsdal, Bergen, Florø (Norway); Na ≦ 12/h; Fq ++.
Jägersten, 1934, 1940b, c [5]): Gullmarfjord; on surface; Na ≦ 100/h [3]); Fq 100%.
—: "Comateln" [4])
Schultze, 1854: Trieste; moving on surface; Fq ½%.
—: "*Comatula mediterranea*" [4])
Semper, 1858: Trieste; mostly on arms.
—: *Antedon mediterranea*
von Graff, 1877, 1884: Naples; arms; Na ++.
Wheeler, 1896: Naples; Na ++; Fq ≦ 100%.
Jägersten, 1940b, c [5]): Naples; Na 10/h; Fq +++.
—: "*Comatula*" [4])
Beard, 1898: Bay of Naples; freely on disc and arms; Na ++; Fq 100%.
—: "*Antedon*" [4])
Vayssière, 1920: Bay of Marseille; on surface.
—: *Poliometra prolixa*
von Graff, 1884; Carpenter, 1884: Cold N. Atlantic (Porcupine expedition); Na 7; Fq 2.

Syn.: *Myzostoma cirriferum,* most authors. *Cyclocirra thompsonii,* Müller, 1841. *Myzostomum thompsoni,* Diesing, 1858. *Myzostomum schultzeanum,* Diesing, 1858. *Myxostoma cirriferum,* Vayssière, 1920.

Size: < 3 mm (Lovén, 1842, 1842a); approx. 1.5 mm (von Graff, 1884, 1887); 0.2-2.5 mm (Wheeler, 1896); < 4 mm (Fauvel, 1927); 3-4 mm (Izquierdo, 1934).

Notes: (1) Thompson (1836) did not assign a name to his discovery which was described by Leuckart (1836); (2) locality not mentioned by Thompson (1836), but indicated by Diesing (1858); (3) compare numbers to Loven's record (1842); (4) according to B. & K. probably involving *Antedon mediterranea* or *A. adriatica*; (5) according to Jägersten the mediterranean form of *M. cirriferum* differs from the Swedish form.

Add. ref.: Schmidt, 1857; Nansen, 1887; Grieg, 1894, 1895; Lo Bianco, 1899; Cuénot, 1900; Graeffe, 1905; Chadwick, 1907; Stummer Traunfels, 1910, 1927; Clark, 1921; Remscheid, 1923; Fauvel, 1927; Jägersten, 1939a.

130. **Myzostomum fimbriatum** (von Graff)

Host: *Heliometra glacialis glacialis*
von Graff, 1884: S. of Halifax.

Syn.: *Myzostoma fimbriatum,* most authors.

Size: 1.8-2.3 mm (von Graff, 1884).

Add. ref.: Stummer Traunfels, 1910; Clark, 1921.

131. **Myzostomum giganteum** (Nansen)

Host: *Poliometra prolixa*

Nansen, 1885: Spitzbergen; sitting on disc near mouth; Na +; Fq +.

Jägersten, 1940: E. Greenland.

Syn.: *Myzostoma giganteum,* most authors. *Myzostoma gigas,* Stummer Traunfels, 1910.

Size: < 6 mm (Nansen, 1885).

Remark: According to Stummer Traunfels (1910, 1927) *M.gigas* and *M. giganteum* are the same species.

Add. ref.: Nansen, 1887; Clark, 1921; Remscheid, 1923.

132. **Myzostomum gigas** (Lütken)

Hosts: *Heliometra glacialis glacialis*

von Graff, 1884; Nansen, 1885, 1887: S. of Halifax, N. Greenland, Jan Mayen Island, Barents Sea; on surface.

Carpenter, 1884: Faröer Channel.

Derjugin, 1915: Kola Bay; on surface; Na + + +.

Jägersten, 1940: W. of Spitzbergen, E. Greenland.

—: *Heliometra glacialis maxima*

von Marenzeller, 1902: Japanese Sea.

—: *Tropiometra carinata carinata*

von Graff, 1884: Bahia (Brazil).

—: *Poliometra prolixa*

Derjugin, 1915: Kola Bay; on surface.

Syn.: *Myzostoma gigas,* most authors.

Size: 1.6-2.5 mm (von Graff, 1884); 0.9-9.7 mm (Jägersten, 1940).

Add. ref.: Stummer Traunfels, 1910; Clark, 1921.

133. **Myzostomum graffi** (Nansen)

Host: *Poliometra prolixa*

Nansen, 1885, 1887: Spitzbergen; migratory on disc and arms; Na 20-30; Fq +.

Syn.: *Myzostoma graffi,* most authors.

Size: ≦ 4.5 mm (Nansen, 1885).

Add. ref.: Stummer Traunfels, 1910; Clark, 1921; Remscheid, 1923.

134. **Myzostomum parasiticum** (Leuckart) (fig. 9C)

Hosts: *"Comatula mediterranea"*

Leuckart, 1830; disc.

Semper, 1858; Diesing, 1858 [1]): Trieste; fixed on disc.

von Graff, 1877, 1884 [2]): Trieste, Pirano, Naples, Messina, "all European seas"; attached to disc; Na 1/3h; Fq ≦ 25%.
—: "Comateln" [1])
Schultze, 1854: Trieste; ventral side of disc; Fq 6%.
—: *Antedon mediterranea*
Beard, 1894: Naples; Na approx. 60; Fq 32/32.
Wheeler, 1894, 1896, 1898: Naples; disc, mouth.
Beard, 1898: Naples; sessile on disc; Fq 1/3.
—: *"Antedon rosacea"*
Nansen, 1885: Bergens Museum.
—: *Antedon petasus*
von Graff, 1887.
—: *Antedon bifida*
Mortensen, 1927; on surface.

Syn.: *Myzostoma (Myzostomum) glabrum,* most authors. *Myzostoma (Myzostomum) tuberculosum,* Semper, 1858; Diesing, 1858 (According to von Graff (1877) *M. tuberculosum* is most likely identical with *M. parasiticum).*

Size: 4 × 4 mm (von Graff, 1877); ≦ 4 mm (Wheeler, 1896); ♀ ≦ 1 mm (Beard, 1898); 0.6-1.5 mm (von Graff, 1887).

Notes: (1) Possibly *Antedon adriatica*; (2) according to Clark (1967) the host may be *Antedon petasus, A. bifida, A. mediterranea* or *A. adriatica.*

Add. ref.: Schmidt, 1857; Nansen, 1887; Konstanecki, 1898; Lo Bianco, 1899; Cuénot, 1900; Graeffe, 1905; Chadwick, 1907; Stummer Traunfels, 1910; Clark, 1921; Fauvel, 1927; Jägersten, 1939a, 1940c.

135. **Myzostomum** sp.

Hosts: *"Antedon rosaceus"*
Nansen, 1887 [1]): Naples.
—: *Antedon bifida bifida*
Herdman, 1893: Port Erin; Na 20.
—: *Heliometra glacialis glacialis*
Ohlin, 1895: Inglefield Gulf (Greenland); on surface.

Remark: The three cited findings do not necessarily involve the same species.

Note: (1) "Myzostome in cyst".

136. **Pulvinomyzostomum pulvinar** (von Graff) (fig. 9D)

Hosts: *Leptometra celtica*
Carpenter, 1884; von Graff, 1884: Scotland: Minch, Loch Scavaig, Skye; attached to peristome.
—: *Leptometra phalangium*

Prouho, 1892: Banyuls; oesophagus, stomach.
Wheeler, 1896: Bay of Sorrento (Naples); digestive tube.
Jägersten, 1940a: Naples; oesophagus, stomach; Fq 10-20%.
—: *Antedon bifida* [1])
Fauvel, 1927: Roscoff; oesophagus, stomach.
Syn.: *Myzostoma (Myzostomum) pulvinar,* most authors.
Size: 3.2 × 2.7 mm (Carpenter, 1884); ♀ 4.5 mm, ♂ 1 mm (Prouho, 1892); max. 4.5 mm (Wheeler, 1896).
Note: (1) See under *Myzostomum alatum* (127), note (1).
Add. ref.: Stummer Traunfels, 1910; Fedotov, 1914.

137. **Protomyzostomum polynephris** Fedotov

Hosts: *Gorgonocephalus arcticus* [1])
Levinsen, 1887: Kara Sea.
Fedotov, 1914, 1916: not Kola Bay.
—: *Gorgonocephalus eucnemis*
Fedotov, 1912: Kola Bay; gonads; Na 1-3/h.
Fedotov, 1914, 1916: Kola Bay; bursa genitalis; Na > 10/h; Fq 47-50%.
—: *Gorgonocephalus caputmedusae*
Jägersten, 1940c: Herdla (near Bergen); Fq +/30.
Barel & Kramers, unpubl.: Trondheimsfjord; Na 10-20/h; Fq +/30.
Syn.: *Protomyzostoma polynephris,* Remscheid, 1923; Mortensen, 1927.
Size: max. 3.1 × 1.5 cm (Fedotov, 1912, 1914).
Note: (1) Levinsen (1887) and Fedotov (1914) mention this host as "*G. eucnemis*", Fedotov (1916) as "*G. agassizi*", and Clark (1921) as "*G. arcticus*".
Add. ref.: Derjugin, 1915; Remscheid, 1923.

138. **Protomyzostomum sagamiense** Okada (fig. 9E)

Host: *Gorgonocephalus* sp.
Okada, 1922: Sagami Sea (Japan); oviduct, bursal cavity; Na +.
Size: 5-20 × 2-11 mm (Okada, 1922).

Polychaeta

General references: Hartman, 1959, 1965; Dahl & Peus, 1971.

139. **Acholoe squamosa** (Delle Chiaje) (fig. 9F)

Hosts: *Astropecten aranciacus*
Delle Chiaje, 1825: Naples [1]); ambulacral groove.
Clarapède, 1870; Panceri, 1874: Naples; ambulacral groove; Fq ++.

von Marenzeller, 1874: Trieste; ambulacral groove; Fq + + +.
Darboux, 1900: Cette; Fq + +.
Zavodnik, 1960b: Isle of Krk (Adriatic); ambulacral groove; Fq + +.
Laubier & Paris, 1962: Banyuls.
—: *Astropecten bispinosus, Astropecten platyacanthus*
von Marenzeller, 1874: Trieste; ambulacral groove; Fq + + +.
—: *Astropecten bispinosus*
Darboux, 1900: Cette; Fq + +.
—: *Astropecten irregularis*
von Marenzeller, 1874: Trieste; ambulacral groove; Fq + + +.
McIntosh, 1877, 1900; Gibson, 1886: Southport (Britain); on surface.
Hornell, 1891: Ormes Head (Wales); ambulacral groove.
Allen, 1899 [2]): Plymouth; ambulacral groove.
McIntosh, 1900 [3]): Naples; ambulacral groove.
Cuénot, 1912: Arcachon; ambulacral groove; Na 1-6/h; Fq 100%.
Southern, 1914: Clew Bay; ambulacral groove.
Ditlevsen, 1917: off Plymouth; on surface.
Cherbonnier, 1951: Roscoff; ambulacral groove; Fq + +.
Davenport, 1953: Plymouth; ambulacral groove; Na $\leqq$ 2/h; Fq 75%.
Merle, 1954: Dakar (Senegal); ambulacral groove.
Barel & Kramers, 1970: Morgat; ambulacral groove; Na 3; Fq 1/9.
—: *Luidia ciliaris*
Panceri, 1874; Lo Bianco, 1899: Naples; ambulacral groove.
Cuénot, 1912: Arcachon; Fq 1.
Davenport, 1953: not Plymouth.
—: *Astropecten* sp.
Malaquin, 1894: West African coast: Bay of Dakar, Bay of Gorée; ambulacral groove.

Syn.: *Nereis squamosa* Delle Chiaje, 1825. *Polynoe malleata,* Grube, 1855. *Polynoe astericola, Polynoe asterinae* (cited in McIntosh, 1900). *Acholoe astericola,* most authors.

Size: 45 × 4 mm (Clarapède, 1870); 4-5 cm (Cuénot, 1912; Merle, 1954).

Notes: (1) Locality according to McIntosh, 1900; (2) "almost never without host"; (3) citing Delle Chiaje & Clarapède.

Free: Galway (Ireland, McIntosh, 1877, 1900).

Add. ref.: Graeffe, 1905; Fauvel, 1923; Paris, 1955; Clark, 1956.

140. **Adyte assimilis** (McIntosh)

Hosts: *Echinus esculentus*
Gibson, 1886: Port Erin; around peristome.

Giard, 1886: Concarneau; on surface.
Hornell, 1891: Irish Sea; near mouth.
Cuénot, 1900; Carton, 1965: Roscoff; oral surface; Fq + + +.
Southern, 1914: Clew Bay; around peristome; Fq + +.
Moore, 1937: Isle of Man; among the spines; Fq 20%.
Williams, 1954: Limestones (N.E. Ireland); on surface.
Plymouth marine Fauna, 1957: off Plymouth; among the oral spines; Fq + +.
Barel & Kramers, 1970: Roscoff; on theca; Na 1-2/h; Fq 4/9.
—:*Echinus acutus*
Laubier, 1959a: Banyuls; on surface.

Syn.: *Hermadion assimile* McIntosh, 1874, 1877, 1877a; Gibson, 1886; St. Joseph, 1888; Hornell, 1891; Cuénot, 1892, 1900. *Hermadion echini,* Giard, 1886; St. Joseph, 1888; Cuénot, 1892 (mentioned by these authors as a separate species). *Scalisetosus assimilis,* most authors.

Size: 3/4 inch (McIntosh, 1877, 1877a); 32 mm (Giard, 1886); 30 mm (Cuénot, 1900); 18-20 mm (Fauvel, 1923); 2 cm (Laubier, 1959a).

Remark: Generic name *Adyte* recommended by Pettibone (1969), in line with St. Joseph (1899).

Free: St. Andrews, W. Ireland, S. England, off Cape Gato (S. Spain) (McIntosh, 1874, 1877, 1877a, 1900); Bay of Biscay, Azores (Fauvel, 1914); Nolsø (Farøer) (Ditlevsen, 1917).

Add. ref.: Cuénot, 1912; Støp-Bowitz, 1948; Clark, 1956; Bruce et al., 1963; Cabioch et al., 1967; Laubier & Paris, 1962.

141. **Arctonoe vittata** (Grube)

Hosts: *Solaster papposus*
Pettibone, 1953: San Juan Archipelago, Puget Sound; on surface.
—: Eight pacific echinoderms, molluscs and polychaetes
Pettibone, 1953: Japan, Bering Sea, N.W. Pacific, Ecuador.

Syn.: See Pettibone, 1953.

Size: 20-90 mm (Pettibone, 1953).

Add. ref.: Clark, 1956.

142. **Antinoella sarsi** (Kinberg)

Host: *Spatangus purpureus*
Grube, 1876 (cited in Darboux, 1900): ambulacral zone.

Syn.: *Polynoë (Harmothoë) cirrata,* Grube, 1876; Darboux, 1900; synonymy according to Hartman (1959).

143. **Harmothoe impar** (Johnston)

Hosts: *Cucumaria saxicola* [1])
Giard, 1886: Wimereux; on surface.
—: *Cucumaria planci* [1])
Darboux, 1900; on surface.
Syn.: (?) *Evarne pentactae,* Giard, 1886; Darboux, 1900. Other synonyms, see McIntosh, 1900, and Fauvel, 1923.
Size: < 30 mm (St. Joseph, 1895); 12-25 mm (Alaeyoz y Sanz, 1905; Fauvel, 1923).
Remark: Only Fauvel (1923) mentions Giard's *E. pentactae,* as "probably belonging to *H. impar*".
Note: (1) Since Darboux (1900) cites Giard, it is probable that the same host species is involved in both publications.
Free: British Isles, Scandinavian coast to Azores, Mediterranean, E. coast of N. America (McIntosh, 1900; Southern ,1914; Fauvel, 1914, 1923); Antarctic (Fauvel, 1936); E. Russian seas (Ushakov, 1955).

144. **Harmothoe lunulata** Delle Chiaje (fig. 9G)

Hosts: *Astropecten irregularis*
McIntosh, 1877: Southport; on surface.
—: *"Synapta"*
St. Joseph, 1906: St. Jean-de-Luz; fixed on surface.
—: *"Synapta inhaerens"*
Southern, 1914: Blacksod Bay, Clew Bay.
—: *Leptosynapta galliennei*
Cuénot, 1912: Arcachon; beside host in the sand; Fq + + +.
de Beauchamp & Zachs, 1913: Roscoff; "accompanied".
Barel & Kramers, 1970: Roscoff; beside host in the sand; Na 1/h; Fq 3/43.
—: *Labidoplax digitata*
Cuénot, 1912: Arcachon; beside host; Fq + + +.
Orton, 1923: Millbay, Salcombe.
—: *Leptosynapta inhaerens*
Orton, 1923: Millbay, Salcombe, mouth of Yealm.
Mortensen, 1927: only St. Vaast; on the skin.
Davenport, 1953a: Salcombe; Fq +.
Barel & Kramers, 1970: Roscoff; beside host; Na 1/h; Fq 1/26.
—: *Acrocnida brachiata* [1])
Orton, 1923: Millbay, Salcombe; curved around disc and mouth.

Barel & Kramers, 1970: Morgat; beside host; Na 1/h; Fq 1/57.

—: *Leptosynapta albicans* [2])

McGinitie & McGinitie, 1949: Tomales Bay (W. coast of N. America); in the burrows.

—: *Leptosynapta clarki, Brisaster townsendi*

Pettibone, 1953: Puget Sound; on surface.

—: *Ophionereis reticulata*

Millot, 1953: Kingston (Jamaica); on surface; Na 2.

—: Various burrowing Polychaeta, Sipunculida, and Enteropneusta St. Joseph, 1888, 1895; McIntosh, 1900; Alaeyos y Sanz, 1905; Cuénot, 1912; de Beauchamp & Zachs, 1913; Johnstone, 1931; Davenport, 1953a; Plymouth marine Fauna 1957; Day, 1962: Dinard, Concarneau, St. Jean-de-Luz, Roscoff, Guernsey, Plymouth, Port Erin, Los Cantucos (Spain); in the burrows.

Syn.: *Harmothoe picta,* St. Joseph, 1888 (according to Fauvel, 1914). *Polynoe lunulata,* Hornell, 1891; Laubier & Paris, 1962. *Harmothoe marphysa(e),* McIntosh, 1900; Mortensen, 1927. *Harmothoe synaptae,* St. Joseph, 1906; de Beauchamp & Zachs, 1913 (according to Fauvel, 1923). *Malmgrenia lunulata,* Pettibone, 1953.

Size: 16-25 mm × 4-5 mm (St. Joseph, 1906); < 20 mm (de Beauchamp & Zachs, 1913); < 35 mm (Southern, 1914); < 10 mm (on *A. brachiata*), 15-20 mm (on holothurians) (Orton, 1923); 11-27 mm (Pettibone, 1953).

Remark: Pettibone (1953) considers *H. lunulata* and *Malmgrenia castanea* as belonging to one species: *M. lunulata*; on the other hand some authors explicitly distinguish between the different forms mentioned as synonyms above; these distinctions may be at the species or at the subspecies level (see e.g. McIntosh, 1877, 1900; St. Joseph, 1888, 1906; de Beauchamp & Zachs, 1913; Orton, 1923; Fauvel, 1923; Plymouth Marine Fauna, 1957).

Notes: (1) This host usually carries young associates, according to Mortensen (1927), Wilson (1935); (2) according to Clark (1907) *Synapta albicans* Selenka is a synonym of *Leptosynapta inhaerens,* although he mentions that Oestergren does not share this view.

Free: British coasts to Mediterranean and Azores, North Sea (McIntosh, 1877, 1900); S. France (St. Joseph, 1906); Arcachon (Cuénot, 1912); Roscoff (de Beauchamp & Zachs, 1913); N.E. Ireland (Williams, 1954); Puget Sound, Arctic to Azores, Arabian coast, Vancouver to Galapagos (Pettibone, 1953); S. and E. African coast (Day, 1957, 1960).

Add. ref.: Cuénot, 1900; Bohn, 1906; Moore, 1937; Paris, 1955; Clark, 1956; Day, 1962.

145. **Hermadion hyalinus** Sars

Host: *Echinus acutus*

Darboux, 1900 [2]): Storeggen (Norway) [1]).

Notes: (1) Locality according to Hartman, 1959; (2) citing Sars, without reference.

146. **Malmgrenia castanea** McIntosh (fig. 9H)

Hosts: *Spatangus purpureus*

McIntosh, 1877, 1900: Shetland Islands; near mouth.

Giard, 1886: Iles de Glenans, Iles de Loch (Brittany); near mouth.

Hornell, 1891 *; Herdman, 1893: Irish Sea, Port Erin; near mouth; Fq 100% *.

St. Joseph, 1898: St. Vaast; on surface.

Hornell, 1900: Channel Islands; oral side, near mouth; Na 1.

Cuénot, 1912: Concarneau, not Arcachon; near mouth.

Plymouth marine Fauna, 1957; Gage, 1966a: Plymouth; surface, near mouth; Fq ++.

Cabioch et al., 1967: Roscoff.

Barel & Kramers, 1970: Trezan Vraz (near Roscoff); oral surface; Na 2; Fq +/2.

—: *Spatangus raschi*

McIntosh, 1900: off S.W. Ireland; on surface.

—: *Astropecten irregularis*

Gibson, 1886 [1]): Great Ormes Head (Wales); ambulacral groove.

Syn.: *Laenilla castanea,* Giard, 1886. *Polynoe castanea,* Hornell, 1891, 1900. *Harmothoe castanea,* St. Joseph, 1898; Ditlevsen, 1917. *Malmgrenia lunulata,* Pettibone, 1953. See under *Harmothoe lunulata* (144).

Size: 18 mm (Giard, 1886); 7 mm (St. Joseph, 1898).

Remark: Pettibone (1953) considers *M. castanea* and *Harmothoe lunulata* as belonging to one species: *M. lunulata.*

Note: (1) According to Hornell (1891) the associate involved in this record is actually *Acholoe squamosa* (139).

Free: S.W. Ireland, Channel Islands, Shetlands (McIntosh, 1877, 1900; Gibson, 1886; Cuénot, 1912); Arctic to Mediterranean (Fauvel, 1914); Iceland, Farøer (Ditlevsen, 1917); Port Erin (Bruce et al., 1963).

Add. ref.: St. Joseph, 1888; Støp-Bowitz, 1948.

147. **Subadyte pellucida** (Ehlers)

Hosts: *Ophiothrix fragilis*

von Marenzeller, 1875 [1]): Bay of Muggia (Trieste).

Hornell, 1891: Irish Sea; on surface.
Cuénot, 1892: Roscoff; on the arms; Na 4; Fq +/10.
Cuénot, 1892: le Portel; on the arms; Na 3; Fq +.
Koehler, 1894: la Ciotat (S. France); ventral surface.
Cuénot, 1912: Arcachon *, Banyuls **, Pointe à Zoie; among lateral spines of arms; Fq + * [2]), + **.
—: *Solaster papposus*
Giard, 1890: le Portel.
Hornell, 1891, 1900: Irish Sea; crawling on surface.
Cuénot, 1892 [3]): not le Portel; on surface; Fq o/++.
—: *Astropecten irregularis*
Hornell, 1891, 1900: Irish Sea; ambulacral groove.
—: *Paracentrotus lividus*
Darboux, 1900: Cette; on surface.
—: *Antedon mediterranea*
Changeux, 1955: Banyuls; Na 2; Fq +/27.
—: *"Antedon", "Ophiothrix"*
Bruce et al., 1963: off Port Erin; on surface.

Syn.: *Polynoe pellucida* Ehlers, 1864-1868. *Lepidonotus pellucidus,* McIntosh, 1868, 1869. *Hermadion fragile,* Clarapède, 1868, 1870. *Hermadion pellucidum,* McIntosh, 1874; and other authors. *Hermadion fugax,* Giard, 1890. *Adyte pellucida,* St. Joseph, 1899. *Hermadion sabatieri,* Darboux, 1900; Cuénot, 1912. *Scalisetosus communis, Scalisetosus pellucidus,* many authors. All synonyms according to McIntosh (1900), Fauvel (1923), Hartman (1959) and Pettibone (1969).

Size: 7-9 mm (Ehlers, 1864-1868); 13 mm (Clarapède, 1868, 1870); 10 mm (von Marenzeller, 1875); < 20 mm (Giard, 1886); < 35 mm (St. Joseph, 1888); 8-11 mm (Cuénot, 1892); < 10 mm (Koehler, 1894); 12-32 mm (Fauvel, 1923); 22 mm (Pettibone, 1969).

Remark: species name *Subadyte pellucida* established by Pettibone (1969).

Notes: (1) Association "probably occasional coincidence"; (2) "much less abundant than in Roscoff"; (3) Cuénot doubts the finding of Giard (1890).

Free: Quarnero (near Martinsica) (Ehlers, 1864-1868); Shetlands (McIntosh, 1868); Naples (Clarapède, 1868, 1870); St. Andrews (McIntosh, 1874); Madeira, Brittany (Giard, 1886); Dinard, Channel Islands (St. Joseph, 1888; Hornell, 1900); Banyuls (Cuénot, 1912); W. Ireland (Southern, 1914); Azores, Cape Verde Islands, Monaco, S. African coast (Fauvel, 1914, 1923; Day, 1953, 1960; Pettibone, 1969).

148. **Lepidonotus** sp.

Hosts: *"Synapta inhaerens", Labidoplax digitata*

Darboux, 1900: Iles de Glenans (S. Brittany); Na +++.
—: *"Synapta"*
St. Joseph, 1906: Iles de Glenans, Concarneau, Roscoff.
Remark: All data cited by Cuénot (1912), who presumes that this *"Lepidonotus"* is probably *Harmothoe lunulata.*

149. **Ophiodromus flexuosus** (Delle Chiaje)

Hosts: *Astropecten aranciacus*
Delle Chiaje, 1825: ambulacral groove.
Clarapède, 1870 [1]): Gulf of Naples; ambulacral groove; Fq ++.
von Marenzeller, 1874: Trieste; ambulacral groove; Fq ++.
Marion & Brobetzky, 1875: Gulf of Marseille; ambulacral groove.
—: *Astropecten bispinosus, Astropecten platyacanthus, Astropecten irregularis*
von Marenzeller, 1874: Trieste; ambulacral groove; Fq ++.
—: *Luidia ciliaris*
Lo Bianco, 1899: Naples; ambulacral groove.
Plymouth marine Fauna, 1957: off Plymouth; ambulacral groove; Na 1; Fq 1.
—: *"Synapta"*
Pérez, 1905: Arcachon; in the galleries.
Bohn, 1906: Concarneau; in the gallery; Na 1; Fq 1.
Cuénot, 1912: Arcachon; in the neighbourhood [2]); Fq ++.
—: *Amphitrite edwardsi, Euclymene lombricoides* (Polychaeta)
Cuénot, 1912; Plymouth marine Fauna, 1957: Dinard, Millbay; in the galleries.
Syn.: *Nereis flexuosa* Delle Chiaje, 1825. *Stephania flexuosa,* Clarapède, 1870. *Podarke flexuosa,* Marion & Brobetzky, 1875. (?) *Ophiodromus vittatus,* Sars, 1861c; McIntosh, 1869 (probably synonymous, according to Hartman, 1959).
Size: 38 × 3 mm (Clarapède, 1870); < 23 mm (von Marenzeller, 1874).
Notes: (1) Found together with *Acholoe squamosa*; host referred to as *A. irregularis* by McIntosh (1900); (2) according to Cuénot *O. flexuosus* is not a real commensal like e.g. *Harmothoe lunulata.*
Free: Norway (Sars, 1861c); Lochmaddy (Scotland) (McIntosh, 1869); W. Ireland (Southern, 1914); Banyuls (Laubier & Paris, 1962).
Add. ref.: Graeffe, 1905; Paris, 1955; Clark, 1956.

150. **Exogone** sp.

Host: *Cucumaria planci*
Monticelli, 1892: Bay of Naples; body cavity.

151. **Sphaerodorum greefii**

Host: *Amphipholis squamata*
Giard, 1880: Wimereux; Fq 1/15.
Remark: This species is not mentioned by Hartman (1959).

152. **Ophryotrocha puerilis** Clarapède & Metschnikov

Host: *Cucumaria planci*
Monticelli, 1892: Bay of Naples; body cavity; Na 2-3/h.
Size: 2 mm (Monticelli, 1892).
Free: Mediterranean (Paris, 1955; Hartman, 1959).
Add. ref.: Caullery, 1914; Fauvel, 1923.

153. **Phylo foetida** (Clarapède)

Host: *Leptosynapta galliennei*
de Beauchamp & Zachs, 1913: Terrénèz (near Roscoff).
Syn.: *Aricia foetida,* de Beauchamp & Zachs, 1913.
Free: "Europe" (Hartman, 1959).

154. **Orbinia latreilli** (Audouin & Milne Edwards)

Host: *Leptosynapta galliennei*
de Beauchamp & Zachs, 1913: Terrénèz.
Syn.: *Aricia latreilli,* de Beauchamp & Zachs, 1913.
Free: "Europe" (Hartman, 1959).

155. **Ctenodrilus** sp.

Hosts: *"Synapta inhaerens", Labidoplax digitata, Holothuria tubulosa*
Monticelli, 1892: Bay of Naples; body cavity; Na ++.

156. **Flabelligera affinis** M. Sars

Hosts: *Psammechinus miliaris*
Giard, 1880.
Cuénot, 1900: Roscoff; on surface; Na ++.
Cuénot, 1912 [1]): Wimereux, Luc-sur-mer; on surface; Fq +++.
Plymouth marine Fauna, 1957: Salcombe, Plymouth; on spines; Na 7.
—: *Echinus esculentus*
Cuénot, 1900: Roscoff; on surface; Na 1; Fq 1.
Mortensen, 1927; among spines; Fq ++.
—: *Echinus acutus*
Plymouth marine Fauna, 1904, 1957: Plymouth; on surface; Fq ++.
—: "Sea urchins or free" [2])

Fauvel, 1914, 1922, 1927: Arctic Sea, Atlantic, Mediterranean, S. Africa; among spines.

Syn.: *Chlorhema dujardinii*, Giard, 1880. *Siphonostoma dujardini*, Cuénot, 1900, 1912; Koehler, 1924. *Siphonostoma affinis*, Plymouth marine Fauna, 1904.

Size: 2-6 cm × 2-10 mm (Fauvel, 1927).

Notes: (1) "Sometimes on other sea urchins"; (2) young specimens on sea urchins.

Free: Arctic seas, Atlantic, Mediterranean, S. Africa, E. Russian seas, W. Ireland (Fauvel, 1914, 1922, 1927; Southern, 1914; Ushakov, 1955).

Add. ref.: Mortensen, 1935, 1943; Paris 1955; Clark, 1956.

157. **Phalacrostemma cidariophilum** Marenzeller

Host: *Cidaris cidaris*

Marenzeller, 1895: E. Mediterranean; among spines; Na 2-3/h; Fq +.

Size: 20 × 4 mm (Marenzeller, 1895).

158. "Tubes of serpulid worms"

Host: *Poliometra prolixa*

Clark, 1921: cirri.

Tardigrada, Tetrakentronidae

General reference: Ramazzotti, 1969

159. **Actinarctus doryphorus** Schulz (fig. 10A)

Host: *Echinocyamus pusillus*

Schulz, 1935: Heligoland; on surface; Na 1; Fq 1/++.

Size: 170 μ (Schulz, 1935).

Remark: Possibly a facultative parasite, according to Schulz (1935).

Free: Heligoland (Schulz, 1935).

Add. ref.: Marcus, 1936; Cheng, 1964.

160. **Tetrakentron synaptae** Cuénot (fig. 10B)

Hosts: "*Synapta inhaerens*"

Cuénot, 1892: Roscoff *, not Arcachon; only tentacles; Na 1-3/h *; Fq ++ *.

—: *Leptosynapta galliennei*

Cuénot, 1912: Roscoff *, not Arcachon; tentacles; Fq 100% *.

Barel & Kramers, 1970: Roscoff; tentacles, skin; Na 30/h; Fq 22/48.

Barel & Kramers, 1970: Terrénèz (near Roscoff); tentacles, skin; Na 50/h; Fq 7/7.

—: not *Leptosynapta inhaerens*
Barel & Kramers, 1970: Roscoff; Fq 0/26.
—: not *Leptosynapta bergensis*
Barel & Kramers, 1970: off Plymouth; Fq 0/5.
Size: 100-180 μ (Cuénot, 1892).
Add. ref.: Richters, 1909; Marcus, 1929; van der Land, 1975.

Arthropoda, Crustacea

General taxonomy of the Crustacea according to the Plymouth marine Fauna (1957)

Ostracoda

161. **Cypridina globosa** Lilljeborg

Host: *Strongylocentrotus droebachiensis*
Lönnberg, 1898: Sound; spines above anus; Fq +[1]).
Note: (1) Locally very frequently associated.
Free: Sound (Lönnberg, 1898).

162. Unidentified Ostracod

Host: *Spatangus purpureus*
Gage, 1966a: Plymouth area; Na ++; Fq ++.

Copepoda, Cyclopoida, Ascidicolidae

Taxonomy of the Copepoda adapted according to Humes (pers. comm.)

163. **Enterognathus comatulae** Giesbrecht (fig. 10D)

Host: *Antedon mediterranea*
Giesbrecht, 1900[1]): Naples; intestine; Na 1; Fq 1/12.
Changeux & Delamare Deboutteville, 1956: Banyuls; coelom, mainly intestine; Na 11/12h.
Stock, 1959: Naples; intestine; Na 2[2]); Fq 2/50.
—: *Antedon bifida*
Grainger, 1950: Dalkey Sound (Dublin); intestine; Fq +.
Grainger, 1950; Plymouth marine Fauna, 1957: Plymouth Sound; gut.
Size: ♀ 3.8-4.5 mm (Giesbrecht, 1900).
Notes: (1) Males free-living; (2) only females found.

Copepoda, Cyclopoida, Asterocheridae

164. **Asterocheres echinicola** (Norman)

Hosts: *Echinus esculentus*
Norman, 1868[1]): Shetlands; on surface.

—: *Suberites, Halichondria, Haliclona* (Porifera)
Scott, 1893, 1905, 1906 [2]); Norman & Scott, 1960; Stock, 1966a, 1967; Hamond, 1968: Firth of Forth, Aberlady Bay (Scotland), Salcombe, Plymouth, Yealm estuary, Zeeland (Dutch coast), Norfolk; within.

Syn.: *Ascomyzon echinicola,* Norman, 1868. *Cyclopicera lata, Asterocheres lata, Ascomyzon latum,* many authors.

Size: 1.75 mm (Thompson, 1893); ♀ 0.70-0.75 mm (Giesbrecht, 1897, 1899); ♀ 0.8 mm (Sars, 1918).

Notes: (1) According to Stock (1967) this is the only record from *E. esculentus*; (2) according to Stock (1967) the *A. echinicola* of Scott (1905, 1906) was probably *A. suberitis.*

Free: Sunderland (Britain), Lough Swilly (Scotland), Isle of Man, Liverpool district, Durham, Risør (S. Norway), Naples, W. Sweden (Brady, 1880; Thompson, 1889, 1893; Norman & Brady, 1909; Sars, 1918; Lang, 1949).

Add. ref.: Claus, 1889; Herdman, 1896; Cuénot, 1900; Pearson, 1905; Leigh-Sharpe, 1935; Plymouth Marine Fauna, 1957; Bruce et al., 1963.

165. **Asterocheres lilljeborgi** Boeck (fig. 10C)

Hosts: *Henricia sanguinolenta*
Boeck, 1859: Farsund (S. Norway)[1]); on disc, arms; Na 4; Fq 1.
Hansen, 1923: Davis strait; on surface; Na 3.
van Oorde-de Lint et al., 1936: North Sea, Skagerrak, Davis strait; on surface.
Lang, 1949: W. Sweden; on surface.
Bocquet, 1952: Roscoff; on surface; Fq ++.
Bresciani & Lützen, 1962: Gullmarfjord; Na 50; Fq 5-6.
Barel & Kramers, 1970: Roscoff *, Plymouth **; Na 17/5h *, 2/3h **.
Röttger et al., 1972: Gullmarfjord; all over the skin; Na 102; Fq +++/32.
—: *Asterias rubens* [2])
Sars, 1918: off W. Norway.
—: *Solaster papposus*
Bocquet, 1952: Roscoff; on surface; Fq +.
—: *Luidia sarsi*
Bresciani & Lützen, 1962: Gullmarfjord; Na 1; Fq 1.
—: *Antedon petasus*
Barel & Kramers, unpubl.: Gullmarfjord.
—: *Echinaster sepositus*

Barel & Kramers, 1970: Roscoff; on surface; Na 1; Fq 1/3.

—: sponge

Brady, 1880: Westport Bay (Ireland); on surface.

Syn.: *Ascomyzon asterocheres,* many authors. *Artotrogus lilljeborgi,* Brady, 1880. Non *Asterocheres lilljeborgi,* Canu, 1891, 1892.

Size: > 1 mm (Boeck, 1859); ♀ 1.1-1.2 mm (Giesbrecht, 1897, 1899); ♀ 1.3 mm, ♂ 1 mm (Sars, 1918); ♀ approx. 1 mm (Röttger et al., 1972).

Notes: (1) Locality according to Sars (1918); (2) "as far as I remember".

Free: Firth of Forth, Loch Fyne (Scott, 1906; van Oorde-de Lint et al., 1936).

Add. ref.: Pearson, 1905.

166. **Asterocheres minutus** (Claus) (fig. 10E)

Hosts: *Paracentrotus lividus*

Claus, 1889: Trieste.

Giesbrecht, 1897, 1899: Naples; on surface; Fq approx. 50%.

Bocquet, Stock & Louise, 1963: Marseille *, Villefranche (Nice), Banyuls; Na 1-4/h; Fq 50% *.

—: *Sphaerechinus granularis*

Giesbrecht, 1897, 1899: Naples; on surface.

—: *Psammechinus microtuberculatus*

Bocquet et al., 1963: Marseille; Na 1; Fq 1/35.

Syn.: *Echinocheres minutus* Claus, 1889; Graeffe, 1902.

Size: 0.4-0.5 mm (Claus, 1889); ♀ 0.47-0.49 mm, ♂ 0.42-0.45 mm (Giesbrecht, 1897, 1899); ♀ 0.41-0.51 mm, ♂ 0.37-0.43 mm (Bocquet et al., 1963).

Free: Indian Ocean, Mediterranean (Sewell, 1949).

167. **Asterocheres thorelli** (Thorell)

Hosts: *Henricia sanguinolenta*

van Oorde-de Lint et al., 1936: Wimereux; on surface.

—: *Palmipes membranaceus*

Bocquet, 1952: Roscoff; on surface; Na 2.

—: *Corella parallellogramma* (Ascidia)

Thorell, 1859; Sars, 1918; van Oorde-de Lint et al., 1936; Lang, 1949; Bresciani & Lützen, 1962: Risør and Grimstad (S. Norway), North Sea, Skagerrak, Beltsea, Bohüslan; in host.

Syn.: *Ascomyzon lilljeborgi,* most authors. *Asterocheres siphonatus,* Giesbrecht, 1897.

Size: approx. 1 mm (Giesbrecht, 1897); ♀ 0.9 mm, ♂ 0.7 mm (Sars, 1918).

Free: Suez canal, S. Ireland, Indian Ocean, Mediterranean (Gurney, 1927; van Oorde-de Lint et al., 1936; Sewell, 1949).

168. **Asterocheres violaceus** (Claus) (fig. 11B)

Hosts: *Paracentrotus lividus*

Claus, 1889: Trieste; on surface; Na +++.
Giesbrecht, 1899: Naples; on surface; Fq approx. 50%.
Cuénot, 1912: Arcachon, Guéthary (S.W. France); mainly aboral side; Na ≦ 20/h.
Bocquet, 1952: Roscoff; on surface; Na ≦ 40/h; Fq 100%.
Rose & Vaissière, 1952b: N. Africa; on surface.
Stock, 1960: Banyuls; Fq approx. 100%.
Bocquet et al., 1963: Villefranche (Nice)[1]), Marseille; Na 18/h; Fq 100%.
—: *"Ophioglypha", "Ophiothrix"* *
A. Scott, 1896: Isle of Man, Blackpool *; washed from; Fq ++.
—: *Sphaerechinus granularis*
Giesbrecht, 1899: Naples; Fq approx. 50%.
Bocquet, 1952: Brest; on surface; Fq +.
Bocquet et al., 1963: Mediterranean [2]); Na 9/h.
—: *Psammechinus microtuberculatus*
Giesbrecht, 1899: Naples; on surface; Fq > 50%.
Bocquet et al., 1963: Marseille; Na 1; Fq 1/35.
—: *Psammechinus miliaris*
Cuénot, 1912: Arcachon; mainly aboral side; Na ≦ 20/h.
Lang, 1949: W. Sweden; on surface.
Bocquet, 1952: Roscoff; on surface; Fq 100%.
Bresciani & Lützen, 1962: Gullmarfjord; Fq +++.
Bocquet et al., 1963: not Luc-sur-mer, not Wimereux.
Barel & Kramers, unpubl.: Gullmarfjord; Na ++.
Barel & Kramers, 1970: Roscoff; on surface; Fq ++/20.
—: *Echinus esculentus*
Sars, 1918: W. Norway.
van Oorde-de Lint et al., 1936: North Sea; on surface.
Bocquet, 1952: Roscoff; on surface; Fq 100%.
Gooding, 1957: Plymouth; on surface; Na 50/h; Fq approx. 100%.
Bresciani & Lützen, 1962: Gullmarfjord; Fq +++.
Barel & Kramers, unpubl.: Gullmarfjord; Na 35.
Barel & Kramers, 1970: Roscoff; on theca; Na +++; Fq 8/8.
—: *Echinus elegans*
Sars, 1918: W. Norway.

van Oorde-de Lint et al., 1936: North Sea; on surface.
—: *Strongylocentrotus droebachiensis*
Sars, 1918: W. Norway.
van Oorde-de Lint et al., 1936: North Sea; on surface.
Bresciani & Lützen, 1962: Gullmarfjord; Fq ++.
Barel & Kramers, unpubl.: Gullmarfjord; Na 6.
—: *Asterias rubens*
Lang, 1949: W. Sweden; on surface; Na 1.
Barel & Kramers, unpubl.: Gullmarfjord; Na 23.
—: *Arbacia lixula* [3])
Stock, 1960: Banyuls; Fq +.
Bocquet et al., 1963: not found.
—: *Solaster papposus*
Bresciani & Lützen, 1962: Gullmarfjord; Na +.
Barel & Kramers, unpubl.: Gullmarfjord; Na 10.
—: *Porania pulvillus*
Bresciani & Lützen, 1962: Gullmarfjord; Na +.
—: *Marthasterias glacialis* [4])
Bocquet & Stock, 1962: Roscoff.
Bocquet et al., 1963: Roscoff; Na 1; Fq 1/33.
Barel & Kramers, unpubl.: Gullmarfjord; Na 16.
—: *Antedon petasus*
Barel & Kramers unpubl.: Gullmarfjord; Na 2.

Syn.: *Echinocheres violaceus* Claus, 1889, and other authors. *Ascomyzon thompsoni,* A. Scott, 1896. *Ascomyzon violaceum,* Plymouth Marine Fauna, 1957.

Size: ♀ 1.15 mm, ♂ 0.75 mm (Claus, 1889); ♀ 1 mm (A. Scott, 1896); ♀ 0.95-1 mm, ♂ 0.6-0.65 mm (Giesbrecht, 1897, 1899); ♀ 0.9-1.1 mm (Sars, 1918); ♀ 0.90-1.05 mm, ♂ 0.60-0.69 mm (Bocquet et al., 1963).

Notes: (1) This record may involve *P. lividus,* or *Sphaerechinus granularis,* or both; (2) probably Marseille and/or Villefranche (see note (1)); (3) "exceptional host"; (4) "occasional infection?".

Free: Firth of Clyde, Northumberland, Shetland, Irish Sea (Th. Scott, 1897a; Brady, 1900; Th. Scott, 1902).

Add. ref.: Graeffe, 1902; Norman & Brady, 1909; Bruce et al., 1963.

169. **Collocheres elegans** A. Scott (fig. 11C)

Host: *Ophiocomina nigra*
Grainger, 1950: Millport; on surface.

Syn.: *Leptomyzon elegans,* Grainger, 1950.

Size: 1 mm (A. Scott, 1896).
Free: Port Erin (A. Scott, 1896), Egges bønaes (Norway; Sars, 1918).
Add. ref.: Giesbrecht, 1897, 1899.

170. **Collocheres gracilicauda** (Brady) (fig. 11A)

Hosts: *Antedon adriatica*
Rosoll, 1888: Trieste; creeping on surface; Fq 1/> 100.
Graeffe, 1902: not Trieste; Fq 0/++.
—: "*Antedon bifida*" [1])
Chadwick, 1907 [1]): various localities; attached to surface of disc.
—: "Comatules"
Rose & Vaissière, 1952b: N. African coast; on surface.
—: *Echinus esculentus*
Bocquet, 1952: Roscoff; on surface; Na 2; Fq 1.
—: *Ophiothrix fragilis*
Stock, 1960: Roscoff, Northumberland; on surface.
Stock, 1960: Banyuls; on surface; Na +++; Fq approx. 100%.
Bresciani & Lützen, 1962: Gullmarfjord; Fq +++.
Hamond, 1973: Norfolk coast; on surface; Na 145; Fq ?/701.
—: *Ophiothrix quinquemaculata*
Stock, 1960: Port Vendres (near Banyuls); Fq +.
—: not *Antedon petasus* *, not *Ophiocomina nigra,* not *Ophiopholis aculeata*
Bresciani & Lützen, 1962: Gullmarfjord; Fq 0/++++*.
—: *Antedon petasus*
Barel & Kramers, unpubl.: Gullmarfjord; Na 1.

Syn.: *Cyclopicera gracilicauda* Brady, 1880; Th. Scott, 1892; Thompson, 1893, 1893a. *Ascomyzon comatulae,* Rosoll, 1888; Graeffe, 1902. Non *Collocheres gracilicauda,* Canu, 1893; Sars, 1918 (according to Stock, 1966).

Size: ♀ 1 mm (Rosoll, 1888); 0.75 mm (Thompson, 1893); ♀ 0.7-0.8 mm, ♂ 0.55 mm (Giesbrecht, 1897, 1899).

Remark: According to Stock (1966) the *C. gracilicauda* of Canu (1893, Boulogne) and of Sars (1918, Risør, Norway) is in fact a different species: *Collocheres gracilipes.*

Note: (1) According to Clark (1921) several other species of *Antedon* may be involved; Chadwick's data are probably not original.

Free: Yorkshire, Puffin Island (Wales), Firth of Forth, Southport (Liverpool), Port Erin, Loch Linnhe (Scotland), St. Monans (Scotland),

Plymouth, Salcombe (Brady, 1880; Th. Scott, 1892; Thompson, 1889, 1893, 1893a; Th. Scott, 1900, 1906; Norman & Scott, 1906); Naples (Giesbrecht, 1897).

Add. ref.: Herdman, 1896; Giesbrecht, 1899; Cuénot, 1900; van Oorde-de Lint et al., 1936.

171. **Scottomyzon gibberum** (T. & A. Scott) (fig. 11D)

Hosts: *Asterias rubens*

T. & A. Scott, 1895: Firth of Forth, Liverpool bay.

A. Scott, 1896: Liverpool district; Na + +.

T. Scott, 1896a: Loch Fyne; from.

Sars, 1918: S.W. Norway.

Bocquet, 1952: Locquirec (near Roscoff); aboral side, under papulae; Na +.

Bresciani & Lützen, 1962: Gullmarfjord; Na 4.

Stock, 1968: Dutch coast: Vlissingen, den Helder; excavations in skin; Na 15; Fq 2/+ + +[1]).

Gooding, 1957: not Plymouth; on surface; Fq 0/+.

Röttger, 1969: off Heligoland; aboral side; Na 4-175/h; Fq $\leqq$ 100%.

Röttger, 1969: Kattegat, Heligoland harbour; aboral side; Fq $<<$ 100%.

Barel & Kramers, 1970: Plymouth region; body surface; Na 2/53h.

—: *Spatangus purpureus*?

Gooding, 1957: Eddystone (Plymouth); in jar containing *Spatangus purpureus*; Na 1.

—: *Marthasterias glacialis*

Barel & Kramers, unpubl.: Gullmarfjord; Na 1.

Syn.: *Dermatomyzon gibberum* T. Scott, 1894; T. & A. Scott, 1895; A. Scott, 1896.

Size: ♀ 0.5 mm (T. Scott, 1894); ♀ 0.56 mm, ♂ 0.45 mm (Sars, 1918).

Note: (1) *A. rubens* investigated during 15 years.

Free: Firth of Forth, Port Erin, Liverpool Bay, Clyde Estuary, Cromarty Firth, Bass Rock (Scotland) (T. Scott, 1894; Herdman, 1896; T. Scott, 1897b; T. Scott, 1906); Norfolk coast (Hamond, 1973).

Add. ref.: Giesbrecht, 1897, 1899; T. Scott, 1905; van Oorde-de Lint et al., 1936.

Copepoda, Cyclopoida, Cancerillidae

172. **Cancerilla durbanensis** Stephensen

Host: *Amphipholis squamata*

Stephensen, 1933: Durban (S. Africa); dorsal or ventral side; Na 2; Fq 2/2.

173. **Cancerilla neozelanica** Stephensen (fig. 12A)

Host: *Amphipholis squamata*

Stephensen, 1927: Auckland Islands (New Zealand).

174. **Cancerilla tubulata** Dalyell (fig. 12B)

Hosts: *"Ophiura"*

Dalyell, 1851: orally at base of arms; Na 1; Fq 1.

—: *Amphipholis squamata*

Giard, 1887a: Wimereux *, Concarneau **, Fécamp (le Havre)***; oral face of disc; Na 1-3/h; Fq + *, + + **, 1/10 ***.

Canu, 1892: Boulogne (N. France); ventral side; Fq +.

Giesbrecht, 1899: Naples *, Bohüslan; Fq +*.

Cuénot, 1912: Arcachon *, Skagerrak [1]); oral face, near mouth; Na 1(-3)/h*; Fq 0-10% *.

Sars, 1918: S.W. Norway, Trondheimsfjord.

Mercier, 1922: Le Quilhoc (Luc-sur-mer); attached to oral face; Fq + +.

Rose & Vaissière, 1952b: N. African coast; base of arms.

Bocquet, 1952: Roscoff; ventral side of arm base; Na + +; Fq 1/100.

Laubier, 1959: Banyuls; attached to host; Na 1.

Zavodnik, 1960a, b: Adriatic Sea; Fq 1/18.

Bruce et al., 1963: Isle of Man; orally at base of arms; Fq 11%.

Carton, 1968a, b: Roscoff; Fq 80/1046.

Hamond, 1973: Norfolk coast; Na 1; Fq 1/+ +.

—: *Ophiocomina nigra* [2])

Thompson, 1894, 1895: Port Erin; "together in dredged material"; Na 2.

Williams, 1954: N.E. Ireland; on surface.

—: *Ophiothrix fragilis* [2])

Thompson, 1894, 1895: Port Erin; "together in dredged material"; Na 2.

—: *Ophiopsila aranea*

Williams, 1954: N.E. Ireland; on surface.

Changeux, 1957 [3]): Baleares; oral face of disc; Na 3; Fq 1/1.

Gotto, 1963 [4]).

Syn.: *Caligidium vagabundum,* Claus, 1889; Graeffe, 1902; Norman & Scott, 1906.

Size: ♂ ≦ 1 mm (Claus, 1889); ♀ 1 mm, ♂ 0.9 mm (Canu, 1892); ♀ 1.7-1.8 mm, ♂ 1 mm (Giesbrecht, 1897); ♀ 1-1.1 mm, ♂ 0.9-1 mm (Giesbrecht, 1899; Sars, 1918).

Notes: (1) not Cuénot's own data; (2) according to Cuénot (1912) these hosts are probably not correctly named by Thompson; (3) identification of copepod associate made by Carton (1968a); (4) associate recorded as *Cancerilla* sp., possibly being *C. tubulata.*

Free: Trieste (Claus, 1889); off Aberdeen, Moray Firth (Scotland), S. Devon (T. Scott, 1902; Norman & Scott, 1906); U.S. west coast, Baltic Sea, Barents Sea, Norway (Sewell, 1949, citing many authors).

Add. ref.: Canu, 1891; Moore, 1937; Plymouth Marine Fauna, 1957.

175. **Parartotrogus richardi** Scott (fig. 12D)

Host: *Ophiura texturata*? [1])

Giesbrecht, 1899: Naples; "together in dredged material"; Fq + +.

Size: ♀ 0.47-0.52 mm (Giesbrecht, 1899).

Note: (1) "Host" mentioned as "*Ophioglypha lacertosa*".

Free: Firth of Forth, Naples (T. & A. Scott, 1893; Giesbrecht, 1897; T. Scott, 1906; Sewell, 1949).

Copepoda, Cyclopoida, near Chondracantidae

176. **Ophioika appendiculata** Stephensen

Host: *Ophiomitrella clavigera*

Stephensen, 1935, 1940: S. Greenland, S. of Iceland, W. of Hebrides; in bursae; Na 1(-3)/h.

—: *Ophiacantha bidentata*

Stephensen, 1940: Iceland; galls in host.

Size: ♀ 1.5-1.9 mm (Stephensen, 1935).

177. **Ophioithys amphiurae**

Host: *Amphipholis squamata*

Bruce et al., 1963: Isle of Man; genital sacs.

Remark: Bruce et al. (1963) mention this associate as "possibly *O. amphiurae*".

Copepoda, Cyclopoida, Clausidiidae

178. **Leptinogaster** sp.

Host: *Echinocardium cordatum*

Bocquet & Stock, 1958: IJmuiden (Dutch coast); digestive tract; Na 1.

Remark: Copepodite V stage found.

179. **Presynaptiphilus acrocnidae** Bocquet & Stock (fig. 12C)

Host: *Acrocnida brachiata*

Bocquet & Stock, 1964: Bretagne, St. Michel-en-Grève, St. Efflam; oral

face, mainly arms; Na 5-8/h.
Barel & Kramers, 1970: Morgat; body surface; Na 40/57h.
Barel & Kramers, 1970: Salcombe; body surface; Na 12/2h.
Size: ♀ 0.63 mm, ♂ 0.58 mm (Bocquet & Stock, 1964).

Copepoda, Cyclopoida, Lichomolgidae

180. **Lichomolgus forficula** Thorell

Hosts: *Psammechinus miliaris*
Bocquet, 1952: Roscoff; on surface; Na 2.
—: *Ascidia canina, Ascidia mentula, Phallusia mamillata* and other Tunicata
Thorell, 1859; Norman, 1868; T. Scott, 1896a; Pearson, 1905; Norman & Scott, 1906; T. Scott, 1907; Sars, 1918: Bohüslan, various Scottish localities, Ireland, Plymouth, Orkneys, Shetlands, S. and W. Norway; branchial chambers; Fq ++.
Size: ♀ 1.25-1.5 mm, ♂ 1 mm (Thorell, 1859); ♀ 1.40 mm, ♂ 1 mm (Sars, 1918).
Free: N. Ireland (Brady, 1880); Irish Sea (Herdman, 1896); Mediterranean (Sewell, 1949).

181. **Lichomolgus maximus** Thompson

Hosts: *Echinus esculentus*
T. Scott, 1896 [1]): Firth of Forth.
—: *Pecten maximus* (Bivalvia)
Thompson, 1893: Liverpool Bay; branchial folds; Na 12.
—: *Pecten maximus, Pecten opercularis* (Bivalvia)
T. Scott, 1896, 1896a: various Scottish localities; in host.
Size: ♀ 2.6 mm, ♂ 1.65 mm (Thompson, 1893).
Note: (1) According to Cuénot (1900) this commensalism is probably accidental.

182. **Lichomolgus** sp.

Host: *Sphaerechinus granularis*
Grimpe, 1930.
Remark: No original data, references are not given.

183. **Pseudanthessius assimilis** Sars

Host: *Echinus elegans*
Sars, 1918: Romsdalfjord, Hardangerfjord (Norway); clinging to surface; Na ++.

Size: ♀ 1.85 mm, ♂ 1.35 mm (Sars, 1918).
Add. ref.: Humes & Cressey, 1959.

184. **Pseudanthessius liber** (Brady & Robertson) (fig. 12E)

Hosts: *Echinus esculentus*
Sars, 1918: Norwegian coast, Oslofjord.
Bocquet, 1952: Roscoff; on surface; Fq 100%.
Gooding, 1957: Plymouth; on surface; Na 1-2/h; Fq ++.
Bresciani & Lützen, 1962: Gullmarfjord; Na 1; Fq 1/++++.
Barel & Kramers, 1970: Roscoff; on surface; Na ++; Fq 4/8.
—: *Strongylocentrotus droebachiensis*
Sars, 1918: W. & S. Norway.
Bresciani & Lützen, 1962: not Gullmarfjord.
—: *Psammechinus miliaris*
Bocquet, 1952: Roscoff; on surface; Fq 100%.
Vervoort, pers. comm.: Oosterschelde (Dutch coast).
Barel & Kramers, 1970: Roscoff; on spines; Fq +/20.
—: *Paracentrotus lividus*
Bocquet, 1952: Roscoff; on surface; Fq 100%.
Barel & Kramers, 1970: Morgat; on theca; Na 1; Fq 1/36.
—: "short spined regular echinoid"
Sewell, 1949 [1]): Nicobar Islands (Indian Ocean); washed from; Na +++; Fq 1.
—: *Marthasterias glacialis*
Bocquet & Stock, 1962 [2]): Roscoff.
—: *Psammechinus* sp.
Hamond, 1973: Norfolk coast; on surface; Fq ++.
Syn.: *Lichomolgus liber* Brady & Robertson, 1875.
Size: ♀ 1.30 mm, ♂ 0.90 mm (Sars, 1918); 1.30 mm (Moore, 1937).
Notes: (1) According to Stock et al. (1963) this record involves a different species of *Pseudanthessius*; (2) "possibly occasional".
Free: Durham coast, Isle of Man, various Irish and Scottish localities, Ceylon (Brady & Robertson, 1875; Thompson, 1893a; T. Scott, 1894, 1896a, 1902, 1906; Herdman, 1896; Norman & Brady, 1909; Sars, 1918).
Add. ref.: Pearson, 1905; van Oorde-de Lint et al., 1936; Plymouth Marine Fauna, 1957; Humes & Cressey, 1959.

185. **Pseudanthessius sauvagei** Canu (fig. 12F)

Hosts: *Echinocardium cordatum*
Canu, 1891, 1892: Wimereux; on spines; Na ++.

Cuénot, 1912: not Arcachon.
Bocquet, 1952: Roscoff; Fq 100%.
Rose & Vaissière, 1952b: N. African coast; on surface.
Stock, 1960: Wimereux.
Barel & Kramers, 1970: Morgat; on surface; Na ++/11h.
Barel & Kramers, 1970: Salcombe; Na 2/6h.
Barel & Kramers, 1970: not Plymouth region; Fq 0/5.
Hamond, 1973: Norfolk coast; Na 6/7h.
—: *Spatangus purpureus*
Thompson, 1894, 1895: Morecambe Bay (England), Firth of Forth; on surface.
Stock, 1960: Banyuls; Na 1; Fq 1/50.
Bresciani & Lützen, 1962: Gullmarfjord; Na 1.
—: *Echinus esculentus*
T. Scott, 1905, 1906: Scottish waters; on surface; Na ++.
—: *Echinocardium flavescens*
Bresciani & Lützen, 1962: Gullmarfjord; Na 1.
Size: 1-1.3 mm (Canu, 1892); approx. 1 mm (Sars, 1918).
Free: Firth of Forth (T. Scott, 1894, 1906); Risør (S. Norway, Sars, 1918).
Add. ref.: Herdman, 1895.

186. **Pseudanthessius thorelli** (Brady & Robertson)

Hosts: *Asterias rubens*
Bresciani & Lützen, 1962: Gullmarfjord; Na 1.
—: *Pecten opercularis* (Bivalvia)
Norman & Scott, 1906: Plymouth region; Na +.
Syn.: *Lichomolgus thorelli* Brady & Robertson, 1875; Thompson, 1893a.
Size: 1.8 mm (Thompson, 1893a).
Free: Durham and Yorkshire coast, Port Erin, Firth of Forth (Brady & Robertson, 1875; Thompson, 1893a; T. Scott, 1894, 1906).
Add. ref.: Brady, 1880; Norman & Brady, 1909; Sewell, 1949; Plymouth Marine Fauna, 1957; Stock et al., 1963.

187. **Stellicola clausi** (Rosoll) (fig. 13B)

Hosts: *Marthasterias glacialis*
Rosoll, 1888: Trieste; Na 1; Fq 1.
Bocquet & Stock, 1962 [1]): N. Brittany *, Banyuls; on surface; Na 21/25h*; Fq +++.
Carton, 1964: Locquirec (N. Brittany); Fq ++.
Bocquet et al., 1970 [1]): Roscoff; Na < 10/h.

—: *Astropecten aranciacus*
Graeffe, 1902: Trieste; aboral side; Na 1; Fq 1.
—: *Asterina gibbosa*
Bocquet, 1952: Roscoff; aboral side; Na ≦ 3/h; Fq 3-4/100.
Stock, 1960: Banyuls; Na 2; Fq 2.
Bocquet & Stock, 1962 [1]): Roscoff, Banyuls; on surface.
Carton, 1964: Roscoff; Fq 4%.
Barel & Kramers, 1970: Roscoff; on surface; Na 3/20h.
Bocquet et al., 1970 [1]): Roscoff; Na 101; Fq 74/481.

Syn.: *Astericola clausii* Rosoll, 1888; Graeffe, 1902. *Lichomolgus asterinae,* Bocquet, 1952. *Stellicola asterinae,* Stock, 1960; Bocquet et al., 1970 (see also note (1)).

Size: 1.5 mm (Rosoll, 1888); ♀ approx. 1.36 mm (Bocquet, 1952); ♀ 0.99-1.34 mm, ♂ 0.77-0.95 mm (on *A. gibbosa*), ♀ 1.26-1.32 mm, ♂ 0.87-1.03 mm (on *M. glacialis,* Bocquet & Stock, 1962).

Note: (1) According to Bocquet & Stock (1962) and Boquet et al. (1970) the forms associated with *M. glacialis* and with *A. gibbosa* are distinct species, although closely related.

Copepoda, Cyclopoida, Micropontiidae

188. **Micropontius ovoides** Gooding (fig. 13A)

Hosts: *Brissopsis lyrifera*
Gooding, 1957: Concarneau; Na 1.
—: *Echinocardium cordatum*
Gooding, 1957: Plymouth region; Na < 4; Fq +.
—: *Echinocardium flavescens*
Gooding, 1957: Plymouth region; Na < 4; Fq +.
Bresciani & Lützen, 1962: Bonden (Gullmarfjord); Fq ++.
—: *Echinocardium pennatifidum*
Gooding, 1957: Plymouth region; Na < 4; Fq +.
—: *Spatangus purpureus*
Gooding, 1957; Plymouth marine Fauna, 1957: Plymouth region; Na 10-40/h; Fq +++.
Stock, 1960: Banyuls; on surface; Na ++.
Bresciani & Lützen, 1962: Bonden (Gullmarfjord); Fq ++.
Bruce et al., 1963: Isle of Man; Na 6; Fq 1.
Gage, 1966a: Plymouth area; Fq ++.

Size: ♀ 0.39 × 0.22 mm, ♂ 0.35 × 0.21 mm (Gooding, 1957).

Copepoda, Cyclopoida, Nanaspidae

189. **Nanaspis ninae** Bresciani & Lützen (fig. 13C)

Hosts: *Stichopus tremulus*
Bresciani & Lützen, 1962: Gullmarfjord; on surface; Na 100/2-3h.
Barel & Kramers, unpubl.: Trondheims Leia (Norway); on surface; Na 16.
—: not *Mesothuria intestinalis*
Bresciani & Lützen, 1962: Gullmarfjord; on surface.
Size: ♀ max. 0.9 mm, ♂ approx. 0.6 mm (Bresciani & Lützen, 1962).

Copepoda, Cyclopoida, Philichthyidae

190. **Philichthys amphiurae** Hérouard (fig. 14B)

Hosts: *Amphipholis squamata*
Hérouard, 1906: Roscoff.
Cuénot, 1912: Roscoff, egg sacs; Na + +.
Cuénot, 1912: not Arcachon.
Bocquet, 1952: Roscoff; genital sacs; Fq +[1]).
Size: ♂ 0.5 mm (Cuénot, 1912).
Note: (1) "searched for years but only a few specimens found".

Copepoda, Cyclopoida, Synaptiphilidae

191. **Synaptiphilus luteus** Canu & Cuénot (fig. 14D)

Hosts: *Labidoplax digitata*
Hartmann, 1856: Trieste; among tentacles; Na 16.
Cuénot, 1892: Arcachon; skin; Na ≦ 10/h.
Cuénot, 1912: Naples, Arcachon; oesophagus; Fq 100%.
Bocquet & Stock, 1957: not Roscoff.
—: "*Synapta inhaerens*"
Cuénot, 1892: Roscoff, Arcachon; skin, tentacle region; Na ≦ 10/h.
—: *Leptosynapta inhaerens*
Bocquet & Stock, 1957: not Roscoff.
Barel & Kramers, 1970: Roscoff; Na 32; Fq 16/26.
—: *Leptosynapta galliennei*
Cuénot, 1912: Roscoff, Arcachon; oesophagus; Fq 100%.
Bocquet, 1952: Roscoff; inside host; Fq 100%.
Bocquet & Stock, 1957: Roscoff; anterior part of body, tentacles, oesophagus.

Barel & Kramers, 1970: Roscoff; Na 98; Fq 38/55.
—: not *Leptosynapta cruenta*
Bocquet & Stock, 1957: Roscoff.
—: not *Myriotrochus vitreus*
Bocquet & Stock, 1957: Bergen; Fq 0/++.
—: *Leptosynapta bergensis*
Barel & Kramers, 1970: off Plymouth; Na 2; Fq 2/5.

Syn.: *Colaceutes mulleri,* Hartmann, 1856 (synonymy established by Stock, 1968a). *Remigulus tridens,* T. & A. Scott, 1893 (synonymy according to T. & A. Scott, 1897).

Size: ♀ 1.2 mm, ♂ 0.7 mm (Cuénot, 1892); ♀ 0.8 mm, ♂ 0.45 mm (Bocquet & Stock, 1957).

Remark: *S. luteus* was split into three species by Bocquet & Stock (1957): *S. luteus* on *Leptosynapta galliennei, S. cantacuzenei* on *L. digitata,* and *S. tridens* on *L. inhaerens* and on *L. cruenta.* All records that are not specifically identified otherwise, are placed under *S. luteus* here.

Add. ref.: Canu, 1894; T. Scott, 1900.

192. **Synaptiphilus cantacuzenei** Bocquet & Stock (fig. 14C)

Hosts: *Labidoplax digitata*
Bocquet & Stock, 1957: Morgat, Concarneau; anterior part of body, tentacles, oesophagus.
Stock, 1959: Gulf of Naples; oesophagus; Na 1; Fq 1.
Guille & Laubier, 1965: Banyuls; on surface; Na 18.
—: not *Leptosynapta inhaerens*; *Leptosynapta galliennei* and *Leptosynapta cruenta*
Bocquet & Stock, 1957.

Size: ♀ 0.7-0.9 mm, ♂ 0.45-0.5 mm (Bocquet & Stock, 1957).

Remark: see under 191.

193. **Synaptiphilus tridens** (T. & A. Scott) (fig. 14E)

Hosts: *Leptosynapta inhaerens* and *Leptosynapta cruenta*
Bocquet & Stock, 1957: Roscoff.

Syn.: *Remigulus tridens* T. & A. Scott, 1893 (according to Bocquet & Stock, 1957).

Size: ♀ 0.8-0.9 mm, ♂ 0.55 mm (Bocquet & Stock, 1957).

Remark: see under 191.

Free: Loch Linnhe (Scotland, T. & A. Scott, 1893).

Copepoda, Calanoida

194. **Euterpina acutifrons** (Dana)

Host: *Astropecten irregularis*
Bresciani & Lützen, 1962: Bonden (Gullmarfjord); slimy covering; Na 15; Fq 1.
Size: ♀ 0.5-0.75 mm, ♂ 0.5 mm (Lang, 1948).
Free: Ireland, Devon, Cornwall, North Sea, Skagerrak, Mediterranean, N. Africa, Atlantic & Indian Oceans, "cosmopolitan" (Brady, 1880; Pearson, 1905; Norman & Scott, 1906; A. Scott, 1909; Sars, 1918; Rose & Vaissière, 1952a).

Copepoda, Caligoida

195. **Lepeophtheirius pectoralis** (O. F. Müller)

Hosts: *Asterias rubens*
Stephensen, 1940: Skutilsfjördhur (Iceland); on surface.
—: All kinds of fishes
Stephensen, 1940: Iceland-Britain-Denmark.

Copepoda, Harpacticoida

196. **Stenhelia gibba** Boeck

Host: *Solaster papposus*
Bresciani & Lützen, 1962: Gullmarfjord; on surface; Na 1.
Size: ♀ 0.59-0.63 mm, ♂ 0.45-0.52 mm (Lang, 1948).
Free: Arctic, Norway-British Isles, Hudson Bay (Lang, 1948).

197. **Tisbe furcata** (Baird)

Host: *Cucumaria planci*
Monticelli, 1892: Gulf of Naples; body cavity; Na ++; Fq appr. 100%.
Syn.: *Idya furcata,* Monticelli, 1892.
Size: ♀ 0.7-1.5 mm (Lang, 1948).
Free: Arctic, Norway-W. France, Mediterranean, N. Atlantic, N. Pacific, New Zealand (Lang, 1948).

198. **Tisbe cucumariae** Humes

Host: *Cucumaria planci*
Humes, 1957: Banyuls; skin.
Size: 0.84 mm (Humes, 1957).
Add. ref.: Changeux, 1961.

199. **Parathalestris harpactoides** (Claus)

Host: *Solaster papposus*
Bresciani & Lützen, 1962: Gullmarfjord; Na 2.
Size: ♀ 0.7-0.8 mm (Lang, 1948).
Free: Iceland, Norway, British Isles, Mediterranean (Lang, 1948).

200. **Thalestris longimanna** Claus

Hosts: *Ophiothrix fragilis, Ophiopholis aculeata*
Bresciani & Lützen, 1962: Gullmarfjord; Na 4.
Size: ♀ 1.4-1.5 mm, ♂ 1.2 mm (Lang, 1948).
Free: Greenland-Norway-W. France, Mediterranean, Maine (U.S.A.) (Lang, 1948).

Copepoda, Monstrilloida

201. **Thespesiopsyllus paradoxus** (Sars) (fig. 14F)

Hosts: *Ophiothrix fragilis*
Bresciani & Lützen, 1962: Gullmarfjord; stomach folds; Fq << 50%.
—: *Ophiopholis aculeata*
Bresciani & Lützen, 1962: Gullmarfjord; stomach folds; Fq 50%.
Size: 0.5 mm (nauplius, Bresciani & Lützen, 1962).
Remark: This record concerns nauplius larvae only.

Copepoda, Notodelphyoida

202. **Doropygus pulex** Thorell

Hosts: *Antedon petasus*
Barel & Kramers, unpubl.: Gullmarfjord; Na 1.
—: *Ascidiella scabra* and other ascidians (Tunicata)
Thompson, 1889; Norman & Scott, 1906: Isle of Man, Plymouth; branchial sac.
—: Ascidians
Illg, 1958: Cosmopolitan.

Copepoda incertae sedis

203. **Chordeuma obesum** Jungersen (fig. 14A)

Host: *Asteronyx loveni*
Jungersen, 1912: Skagerrak; bursal pouches; Na ++; Fq appr. 100%.
Mortensen, 1912: Skagerrak; gonads.
Syn.: *Chordeumium obesum,* Mortensen, 1927.
Size: ♀ 4-5.3 mm, ♂ 2 mm (Jungersen, 1912); ♀ 3 mm, ♂ 1.5 mm (Mortensen, 1912).

204. **Parachordeumium tetraceros** le Calvez (fig. 15A)

Host: *Amphipholis squamata*
le Calvez, 1938: Villefrance-sur-mer (S.E. France); coelom, in galls; Fq 1.
Bocquet, 1952: Roscoff; genital cavity.
Fewkes, 1889 [1]): Newport (Rhode Island); brood cavity.
Size: 0.5 mm (le Calvez, 1938).
Note: (1) The associate was not named by Fewkes; it might concern *P. tetraceros* or a related species.

205. **Phthiriopsis emilii** Giard

Host: *Amphipholis squamata*
Giard, 1880: Wimereux; attached to arm; Fq +.

GENERAL NOTES TO THE COPEPODA: Gooding (1957) found no copepods on *Spatangus raschi* (Channel); Röttger et al. (1972) found no copepods other than *Asterocheres lilljeborgi* on *Henricia sanguinolenta* (Gullmarfjord).

Cirripedia, Thoracica

206. **Scalpellum scalpellum** (Linnaeus)

Host: *Cidaris cidaris*
Lo Bianco, 1899: Naples; spines.

207. **Alepas minuta** Darwin

Host: *Cidaris cidaris*
Lo Bianco, 1899: Naples; on the spines; Fq ++.

208. **Trilasmis kaempferi** (Darwin)

Hosts: *"Dorocidaris"* [1])
Richard, 1903: Azores; on surface.
—: Many kinds of crabs
Krüger, 1940; on surface; Na +++.
Syn.: *Poecilasma aurantium,* Richard, 1903.
Remark: Cited by Krüger (1940) as a "real commensal".
Note: (1) According to B. & K. possibly *Cidaris cidaris.*

Cirripedia, Ascothoracica

209. **Ascothorax ophioctenis** Djakonow

Hosts: *Ophiocten sericeum*
Djakonow, 1914: Barents Sea; bursa genitalis; Fq 10/11.

Stephensen, 1935: around Iceland and Farøer; bursa genitalis; Na 1/h.
—: *Amphiura microplax*
Mortensen, 1936 [1]): South Georgia; Fq 1.
—: *Amphiura belgicae*
Mortensen, 1936 [1]): South Georgia; in host; Fq 2.
Size: 2-3 mm (Djakonow, 1914); ♀ 3 mm, ♂ 1 mm (Stephensen, 1935).
Note: (1) Associate mentioned as "*Ascothorax*" by Mortensen (1936); incorporated in *A. ophioctenis* by Krüger (1940); according to B. & K. it possibly belongs to *A. bulbosus* of Wagin (1964).

210. **Dendrogaster astericola** Knipowitsch (fig. 15G)

Hosts: *Solaster papposus*
Knipowitsch, 1891 [1]): Solowezky Isles (White Sea); in host.
Knipowitsch, 1892: not White Sea.
—: *Henricia sanguinolenta*
Knipowitsch, 1892: White Sea; body cavity; Na 3; Fq 3/500.
—: *Solaster endeca*
Knipowitsch, 1892: White Sea; body cavity.
—: not *Marthasterias glacialis,* not *Ophiopholis aculeata,* not *Pteraster militaris*
Knipowitsch, 1892: White Sea.
Size: 9-10 × 10-11 mm (Knipowitsch, 1891, 1892).
Note: (1) According to Wagin (1950) in this case the parasite was in fact *D. murmanensis.*
Add. ref.: Okada, 1925; Krüger, 1940.

211. **Dendrogaster murmanensis** (Korschelt) (fig. 15F)

Hosts: *Solaster papposus*
Korschelt, 1933: Kola Fjord; body cavity; Na 7; Fq 1/1.
Wagin, 1950: Sakhalin (Sea of Okhotsk); coelom; Na 9.
—: *Solaster endeca*
Korschelt, 1933: Kola Fjord; body cavity.
Syn.: *Myriocladus murmanensis,* Krüger, 1940.
Size: 3-5 × 5-7 cm (Korschelt, 1933).

212. **Dendrogaster dichotomus** Wagin (fig. 15D)

Host: *Solaster papposus*
Wagin, 1950: Japanese Sea; body cavity; Na 1; Fq 1/10.
Wagin, 1950: Sakhalin (Sea of Okhotsk); body cavity; Na 2; Fq 1/3.

213. **Dendrogaster dogieli** Wagin (fig. 15E)

Host: *Pteraster obscurus*

Wagin, 1950: Sakhalin (Sea of Okhotsk); Na 2; Fq 1/5.

214. **Dendrogaster rimskykorsakowi** Wagin (fig. 15C)

Hosts: *Ctenodiscus crispatus*

Wagin, 1950: Japanese Sea; Na +.

—: *Hippasteria leiopelta*

Wagin, 1950: Sea of Okhotsk; Na 3.

215. **Ulophysema oeresundense** Brattström (fig. 15B)

Hosts: *Echinocardium cordatum*

Brattström, 1947: Sound area; perivisceral cavity; Na 1-9/h; Fq 17-64% [1]).

Brattström, 1947: W. Norway; perivisceral cavity; Na 1-9/h; Fq 15/408.

Brattström, 1947: not N. Norway; Fq 0/59.

Brattström, 1947: not Gullmarfjord; Fq 0/1469.

—: *Brissopsis lyrifera*

Brattström, 1947: Gullmarfjord; perivisceral cavity; Na 1-5/h; Fq 0.66%.

Brattström, 1947: Skagerrak and Kattegat; perivisceral cavity; Fq 1/89.

Barel & Kramers, unpubl.: not Gullmarfjord; inside host; Fq 0/150.

—: *Echinocardium flavescens*

Brattström, 1947: Skagerrak and Kattegat; perivisceral cavity; Na 2; Fq 1/14.

Brattström, 1947: not N. and W. Norway, not Bohüslan; Fq 0/554.

Size: 18-20 mm (Brattström, 1947).

Note: (1) great variation between localities.

GENERAL NOTE TO THE ASCOTHORACICA: Brattström (1947) found no Ascothoracica in *Brisaster fragilis* (N. & W. Norway), *Echinocardium pennatifidum* (W. Norway, Bohüslan) or in *Spatangus purpureus* (N. & W. Norway, Bohüslan).

Malacostraca, Isopoda

216. **Munna boecki** Kröyer

Host: *Hathrometra sarsi*

Mortensen, 1927; on the arms; Fq ++.

217. **Astacilla** sp.

Host: *Echinus esculentus*

Barel & Kramers, 1970: Roscoff; between spines; Na 3; Fq 2/8.

Malacostraca, Amphipoda

218. **Urothoe marina** (Bate)

Hosts: *Echinocardium cordatum*

Giard, 1876a, 1877, 1878, 1886a: Wimereux *; Cumbrae Island (Scotland); in the burrows; Na < 3-4/h *; Fq + + +.

—: *"Synapta"*

Pérèz, 1905: Arcachon; in the burrows.

—: "Synaptes"

Cuénot, 1912: Wimereux, St. Vaast, Roscoff, Concarneau, le Croisic (W. France), not Arcachon; in the burrows.

Syn.: *Urothoe marinus,* Giard, 1878.

Size: 2 cm (Bate & Westwood, 1868).

Free: Moray Firth (Scotland), Shetlands, Plymouth (Bate & Westwood, 1868; Norman & Scott, 1906).

219. **Urothoe grimaldii** Chevreux

Host: *Echinocardium cordatum*

Gage, 1966a: Isles of Scilly, Cornwall, Salcombe; with host.

220. **Melita obtusata** (Montagu)

Hosts: *Asterias rubens, Luidia ciliaris*

Bruce et al., 1963: Bay of Port Erin; on surface; Na + +.

Size: 7 mm (Bate & Westwood, 1868).

Free: Plymouth region (Bate & Westwood, 1868).

221. **Tritaeta gibbosa** (Bate)

Hosts: *Cucumaria planci,* and other mediterranean holothurians

Changeux, 1961: Banyuls; in folds of the skin.

—: "Many animals"

Enequist, 1950: Skagerrak; on.

222. **Amphitoe parasitica** Sars

Host: *Stichopus tremulus*

Sars, 1861b; on the skin.

223. **Pariambus typicus** Kröyer

Hosts: *Asterias rubens*

Kröyer, 1844; underside.

Mayer, 1882, 1890: Skagerrak, Danish and Dutch coasts, Liverpool, Firth

of Forth, Firth of Clyde, Portugal, Naples; between the podia.
McIntosh, 1888: St. Andrews Bay (Scotland); on the rays; Na ++; Fq ++.
Chevreux, 1898: St. Jean-de-Luz, Le Croisic (W. France); on surface.
Cuénot, 1912: Arcachon; between podia, or aboral side; Na +++.
Davis, 1967: Blackwater estuary (Essex); Fq ++.
Röttger, 1969: Heligoland; aboral side; Na ≦ 500/h.
Jones, 1970: Swansea; mainly aboral face; Na ≦ 147/h; Fq 50-67%.
—: *Solaster*
Mayer, 1890: Texel (Dutch coast).
—: *Solaster papposus*
Cuénot, 1912: Irish Sea, Texel (Dutch coast), Tahitou, le Portel; between podia; or aboral side.
—: *Maja* (Decapoda)
Chevreux, 1898: Bell-Isle; on surface.
Syn.: *Podalirius typicus,* many authors.
Size: ♂ ≦ 6.5 mm (Mayer, 1890).
Free: Limfjord (Danmark) (Mortensen, 1897), Arcachon (Chevreux, 1898).
General geography: North Sea, Skagerrak, Atlantic to Canarian and Cape Verde Islands, Dakar, W. Mediterranean (Chevreux & Fage, 1925).
Add. ref.: Jones, 1968.

224. **Caprella linearis** (L.)

Host: *Solaster papposus*
Bate & Westwood, 1868: on the rays; Na ++; Fq 1.
Remark: Bate & Westwood doubt whether the specimens are really *C. linearis*; they describe *Pariambus typicus* separately, however.
Add. ref.: McIntosh, 1888.

225. **Caprella** sp.

Host: *Asterias rubens*
Durham, 1888: Saint Andrews; in the slime on the surface; Fq ++.

Malacostraca, Decapoda

226. **Hippolyte hunti** (Gosse)

Host: *Antedon bifida*
Nouvel, 1953: Roscoff; on cirri.
Size: ♀ 12-13.8 mm, ♂ 4.4-9.4 mm (Nouvel, 1953).

227. **Hippolyte** sp.

Host: *Antedon bifida*
Malard, 1893; Clark, 1921 *: Saint Vaast; side by side; Fq +++*.

Crustacea incertae sedis

228. "Suctorial crustacean"

Host: *Antedon bifida bifida*
Carpenter, 1866: Plymouth; alimentary canal; Fq ++.
Add. ref.: Carpenter, 1884a; Cuénot, 1900.

229. "Parasitic crustacean"

Hosts: *"Antedon eschrichti"*
Carpenter, 1884a: encysted ventrally on disc.
—: *Antedon bifida*
Cuénot, 1900 *; Chadwick, 1907: Naples *; alimentary canal.
Remark: The two cited findings likely do not involve the same species.

Mollusca
General references: Franc, 1960, 1968.
Bivalvia

230. **Musculus marmoratus** (Forbes)

Hosts: *Cucumaria planci* and other holothurians
Changeux, 1961: Banyuls; in folds of the skin.
—: Ascidians
Franc, 1968: on surface.
Syn.: *Modiolaria marmorata,* Changeux, 1961.

231. **Lasaea adansoni** (Gmelin)

Hosts: *Spatangus* sp.
Vayssière, 1920 [1]): Bay of Marseille; on surface.
—: Sea weeds and Madreporaria
Nordsieck, 1969: Japan, Alaska, Greenland, Azores, Mediterranean; on surface.
Syn.: *Lasaea rubra,* Popham, 1940; Boss, 1965.
Size: 3 × 2.5 × 2 mm (Nordsieck, 1969).
Note: (1) This record is cited by Boss (1965) who mentions the host as *Spatangus purpureus.*
Free: Plymouth (Popham, 1940).

232. **Mysella bidentata** (Montagu) (fig. 16A)

Hosts: *Amphiura filiformis*
Winckworth, 1923: Loch Alsh (Scotland).
—: *Acrocnida brachiata*
Orton, 1923: Millbay shore, Salcombe; disc, occasionally arm; Na + +.
Winckworth, 1823, 1924: Salcombe; Na + +.
Popham, 1940: Salcombe; not attached to host; Fq +.
—: *Labidoplax digitata*
Gardiner, 1927, 1928: Fq + +.
—: *Pholas* (Bivalvia)
Pelseneer, 1919, 1925, 1928: in the burrows.
—: *Nereis* (Polychaeta)
Winckworth, 1923: Salcombe; in the burrows.
—: *Phascolosoma* (Sipunculoidea)
Winckworth, 1923; Gardiner, 1927, 1928; Salisbury, 1932; Popham, 1940: Salcombe, Helford (Cornwall); in the burrows.
—: *Phascolion* (Sipunculoidea), *Akera* (Gastropoda)
Franc, 1960.
Syn.: *Mya bidentata* Montagu, 1803. *Montacuta bidentata,* many authors.
Size: 1/8 inch (Montagu, 1803); $\leqq 7 \times 5$ mm (Popham, 1940).
Free: British and Irish coasts, Hadley Harbour (U.S.A.), Mediterranean, Finmark to Azores (Montagu, 1803; Forbes & Hanley, 1853; Hyndman, 1858; Sars, 1878; Verrill, 1882; Bucquoy et al., 1887; Scott, 1896a; Grieg, 1897; Byne & Leicester, 1901; Dautzenberg & Fischer, 1925; Tebble, 1966).

233. **Montacuta echinocardiophila** Habe

Host: *Echinocardium cordatum*
Habe, 1964: Chijiwa Bay (W. Kiushu, Japan); among the spines; Na 31; Fq 7/11.
Size: 2.6 × 1.8 mm (Habe, 1964).

234. **Montacuta ferruginosa** (Montagu) (fig. 16B)

Hosts: *Echinocardium*
Dautzenberg & Fischer, 1925: Locquirec (Brittany); on surface.
—: *Cidaris cidaris*
Jeffreys, 1868: Gulf of Lion (S. France); on surface.
—: *Echinocardium cordatum*
Giard, 1886a: Wimereux; Na 2-12/h.

Marshall, 1891: Torquay (Devon); in a track following an inch behind the host; Na 3-6/h; Fq ≧ 60%.
Allen & Todd, 1900: Millbay; Na + +.
Herdman, 1901; Byne & Leicester, 1901: Isle of Man; on the surface.
Cuénot, 1912: not Arcachon.
Winckworth, 1924: Salcombe; anal track of burrow.
Salisbury, 1932: Salcombe; anal track; Na ≦ 7/h; Fq + + +.
Moore, 1937: Port Erin Bay; by anal tuft; Na + +.
Pérès, 1937: Morgat; anal spines or besides them; Na 2-6/h; Fq + + +.
Popham, 1940; Oldfield, 1961 *: Salcombe; opposite anal siphon or on spines; Na ≦ 14/h *.
Williams, 1954: Bick Rock (N.E. Ireland); with host.
Gage, 1966a, b: Plymouth area, Cornwall, Scilly Islands; in burrows; Na ≦ 10/h; Fq 100%.
Barel & Kramers, 1970: Morgat, between spines, not attached; Na + +.
—: *Spatangus purpureus* [1])
Marshall, 1891: Guernsey, Scilly Islands; on spines, around mouth, fore-side; Na 2-6/h; Fq 1/3.
Gage, 1966a: Plymouth, Cornwall, Scilly Islands; sub-anal tufts.
—: *Brissopsis lyrifera*
Pelseneer, 1928; Boss, 1965 [2]): Sweden; on surface.
—: *Echinocardium flavescens*
Bruce et al., 1963: Isle of Man; by the anal siphon; Na + +.
—: *Echinocardium flavescens, E. pennatifidum*
Gage, 1966a: Plymouth, Cornwall, Scilly Islands; sub-anal tufts, ventral spines.
—: *Psammechinus miliaris*
Barel & Kramers, unpubl.: Gullmarfjord; Na 3.

Syn.: *Mya ferruginosa* Montagu, 1803. *Tellimya ferruginosa,* Sars, 1878; Winckworth, 1924.

Size: 1/4 inch (Montagu, 1803); 1-8 mm (Pérès, 1937); 9 × 4.8-1.5 × 1 mm (Popham, 1940); ≦ 9.7 mm on *Echinocardium cordatum,* ≦ 1.43 mm on *Spatangus purpureus* (Gage, 1966a, b).

Notes: (1) Upon *Spatangus purpureus, M. ferruginosa* is almost as abundant as *M. substriata,* according to Gage (1966a); (2) Boss (1965) cites Lovén (1848) who only mentions *M. tenella* (237).

Free: British and Irish coasts, Hebrides, Shetlands, Hadley Harbour (U.S.A.), N. Norway to Mediterranean, to Madeira (Montagu, 1803; Alder, 1850; Forbes & Hanley, 1853; Hyndman, 1858; Sars, 1878; Verrill, 1882; Oldfield, 1964; Tebble, 1966).

Add. ref.: Plymouth Marine Fauna, 1957.

235. **Montacuta semiradiata** Tate

Hosts: *Echinocardium* sp.[1])

Tate, 1889: Port Philip (Australia); on surface.

Cotton & Godfrey, 1938: Victoria (Australia).

—: *Spatangus multispinus, Spatangus thor, Spatangus* n. sp.

Ponder, 1968[2]): E. and W. of New Zealand.

Size: 2 × 1.5 mm (Cotton & Godfrey, 1938).

Notes: (1) Host mentioned as *Echinocardium cordatum* by Boss (1965); (2) associate mentioned as *Montacuta (Montacuta) semiradiata neozelanica.*

Add. ref.: Franc, 1968.

236. **Montacuta substriata** (Montagu) (fig. 16C)

Hosts: *Spatangus purpureus*

Forbes, 1841: Isle of Man[1]); Na ++.

Forbes & Hanley, 1853: Exmouth, off Durham (England); attached to spines; Na ++.

Jeffreys, 1868: Coast of Bohüslan, Finnmark to Mediterranean; attached to ventral spines.

Sars, 1878: Lofoten, Øksfjord (Norway); upon the spines; Na ++.

Marshall, 1891: Guernsey, Scilly Islands; spines, ventral end; Fq 100%.

T. Scott, 1896a: Loch Fyne (Scotland); on the spines; Fq ++.

Grieg, 1897: Ulvesund, Vaagsfjord (Norway); on the spines; Fq +++.

Allen, 1899: off Plymouth; attached to spines.

Pearcy, 1901: Moray Firth (Scotland); attached to spines; Fq ++.

Cuénot, 1912[2]): Arcachon; ventral spines.

Popham, 1940: Plymouth; attached to spines, usually underside anal spines; Na ≦ 3-4/h; Fq +.

Bruce et al., 1963: Isle of Man; attached to spines; Na ++.

Gage, 1966a, b: off Plymouth; usually on large ventral spines; Fq +++.

Barel & Kramers, 1970: Roscoff; ventral spines; Na ++; Fq 2/2.

—: *Echinocardium flavescens*

Jeffreys, 1868: Coast of Bohüslan.

Moore, 1937; Bruce et al., 1963: Isle of Man; on surface; Fq 1.

Gage, 1966b: offshore Plymouth; attached; Fq +.

Barel & Kramers, unpubl.: Trondheimsfjord.

—: *Brissopsis lyrifera*

Jeffreys, 1868: coast of Bohüslan.

Barel & Kramers, unpubl.: Trondheimsfjord.

—: *Echinus esculentus*

Jeffreys, 1868: Mediterranean; on the spines.

Cuénot, 1900: England; oral spines.

—: *Brisaster fragilis*

Sars, 1878: Lofoten, Øksfjord (Norway); on the spines; Na ++.

—: not *Echinocardium cordatum*

Marshall, 1891: Torbay (Devon).

—: *Echinocardium pennatifidum*

Gage, 1966b: offshore Plymouth; attached; Fq + [3]).

Syn.: *Mya substriata* Montagu, 1803. *Erycina seminulum* (mentioned as possibly being a variety of *M. substriata* by Jeffreys, 1868).

Size: 1/10 inch (Montagu, 1808); 0.6 × 0.5-1.75 × 1.5 mm (Popham, 1940; Oldfield, 1961); 0.3-2.4 mm (Gage, 1966b).

Notes: (1) Locality according to Moore (1937); (2) from data of Fischer (1869); Cuénot (1912) did not find *M. substriata* at Arcachon; (3) still less on this host than on *Echinocardium flavescens*.

Free: many British localities, Roscoff, W. Iceland, N. Norway to Mediterranean (Montagu, 1808; Forbes & Hanley, 1853; Hyndman, 1858; Brady & Robertson, 1875; Dautzenberg & Fischer, 1925; Oldfield, 1964; Tebble, 1966).

Add. ref.: Pelseneer, 1928; Boss, 1965.

237. **Montacuta tenella** (Lovén)

Host: *Brissopsis lyrifera*

Lovén, 1848: "likes to be on".

Ockelmann, 1965 [1]): N. Sound, Kattegat.

Barel & Kramers, unpubl.: Gullmarfjord.[2])

Size: 0.14 mm (Lovén, 1848); 2-4.3 mm (Ockelmann, 1965).

Remark: See note (2) under *M. ferruginosa* (234).

Notes: (1) "High coincidence of the two species in the same samples, therefore association is probable"; (2) host and associate together in one dredge.

238. **Devonia perrieri** (Malard) (fig. 16D)

Hosts: *Leptosynapta inhaerens*

Malard, 1903: St. Vaast [1]); mostly posterior part; Na 1(-3)/h; Fq +.

Anthony, 1916: St. Vaast, Ile Tahitou; on posterior region of the body; Na ≦ 3/h; Fq +.

Bateson, 1923: Plymouth; fastened upon skin; Fq +.

Winckworth, 1924; Popham, 1940 *: Salcombe; away from anterior end *; Na 1/h*; Fq +*.

Tebble, 1966: Salcombe, Falmouth (U.S.A.) [4]), Shetlands.

Barel & Kramers, 1970 [2]): Roscoff; on the skin; Na 1; Fq 1/26.

—: *Leptosynapta galliennei*
Herpin, 1915 [3]): Cherbourg; strongly attached; Na 1; Fq 1.
Barel & Kramers, 1970 [2]): Terrénèz (Roscoff); at base of tentacles; Na 1; Fq 1/43.
—: *Labidoplax digitata*
Pelseneer, 1925: Na + +.
—: *Leptosynapta tenuis*
Clench & Aguayo, 1931: N. Falmouth (U.S.A.); outer posterior portion; Fq 2.
—: *Leptosynapta bergensis*
Tebble, 1966: off Cullercoats (England).
Barel & Kramers, 1970: not off Plymouth; Fq 0/5.

Syn.: *Synapticola perrieri* Malard, 1903. *Entovalva perrieri,* Cuénot, 1912; Herpin, 1915; Anthony, 1916. *Montacuta donacina,* Bateson, 1923; Winckworth, 1924; Pelseneer, 1925.

Size: 3-6 mm (Malard, 1903); 5 mm (Herpin, 1915); 3-4 mm (Anthony, 1916); 7 × 5 mm (Popham, 1940).

Remark: Genus *Devonia* proposed by Winckworth (1930).

Notes: (1) Locality according to Cuénot (1912); (2) identification not certain; (3) Herpin (1915) mentions his record as "unknown mollusc"; although he specifies that *D. perrieri* does not occur in the same place, Anthony (1916) nevertheless suggests that this "unknown mollusc" might be *D. perrieri*; (4) this record involves *Leptosynapta tenuis* as the host.

Free: not at Arcachon (Cuénot, 1912).

Add. ref.: Winckworth, 1932; Boss, 1965.

Gastropoda

239. **Patella** sp. [1])

Host: *Paracentrotus lividus*
Simroth, 1888: Azores; on spines.

Note: (1) "And other shells, living and dead".

240. **Balcis alba** (da Costa)

Host: *Spatangus purpureus*
Fretter & Graham, 1962: Plymouth; with host; Na + + +.

Syn.: *Eulima polita,* many authors.

Size: 18 mm (Fretter & Graham, 1962; Nordsieck, 1968).

Free: British coasts, Finmark to Aegean Sea, Gulf of Lion, Adriatic Sea (Jeffreys, 1868; Ducquoy et al., 1882; Lebour, 1935a; Fretter, 1955; Nordsieck, 1968).

241. **Balcis devians** (Monterosato) (fig. 17G)

Hosts: *Echinus esculentus*

Watson, 1886: Madeira; among the spines; Na ≦ 5/h; Fq 100%.

—: *Mesothuria intestinalis*

Pelseneer, 1906: "Niso"(?).

Vaney, 1913, 1913a [1]): Norwegian coast; in digestive tube.

—: *"Strongylocentrotus* sp."

Odhner, 1914: Adriatic Sea; on surface.

—: *"Comatula mediterranea"*

Marshall, 1917: on surface; Na +.

—: *Antedon bifida*

Fretter, 1955: Millbay, Plymouth; attached to base of pinnule or moving around; Na 1.

—: *Holothuria forskali*

Fretter & Graham, 1962.

Syn.: *Eulima distorta,* many authors. *Eulima incurva,* Ducquoy et al., 1882; Nordsieck, 1968. *Eulima philippii,* Watson, 1886; Marshall, 1917; Ankel, 1936. Nordsieck (1968) mentions three species: *Eulima incurva, E. devians,* and *E. intermedia,* each of which probably covers part of the records given here.

Size: 4-8 mm (Ankel, 1936); 3 mm (Fretter, 1955; Fretter & Graham, 1962); 6 mm, 3 mm, and 7.5 mm, resp., for the three species mentioned by Nordsieck (1968) (see above).

Note: (1) According to Marshall (1917) in this case the snail is accidentally ingested.

Free: Finmark to Azores, W. Sweden, Shetlands to Channel, Mediterranean (Jeffreys, 1868; Sars, 1878; Ducquoy et al., 1882; Dautzenberg & Fischer, 1925; Lebour, 1935; Thorson, 1946).

Add. ref.: Pelseneer, 1920, 1928.

242. **Pelseneeria media** Koehler & Vaney (fig. 17B)

Host: *Echinus affinis*

Koehler & Vaney, 1908: Azores; between the spines; Na 1-4/h.

Size: 2.4 × 1.8 mm (Koehler & Vaney, 1908).

Add. ref.: Koehler, 1909; Pelseneer, 1928.

243. **Pelseneeria profunda** Koehler & Vaney (fig. 17A)

Host: *Echinus affinis*

Koehler & Vaney, 1908: Azores; between the spines; Na 1-4/h; Fq +.

Size: 4.5 × 2.8 mm (Koehler & Vaney, 1908).
Add. ref.: Koehler, 1909; Pelseneer, 1928; Nordsieck, 1968.

244. **Pelseneeria stylifera** (Turton) (fig. 17F)

Hosts: *Echinus esculentus*
Turton, 1825: Torbay (Devon); attached to spines; Na 12.
Jeffreys, 1864: Berwick (Britain), W. Sweden, Drøbak.
Simpson, 1896: off Aberdeen; attached to spines.
Rosen, 1910: Bohüslan; Na +.
Marshall, 1917: not Shetlands.
Lebour, 1932: Plymouth.
—: *Strongylocentrotus droebachiensis*
Jeffreys, 1864: Shetlands *, Bohüslan; anal area *; Na ≦ 6/h*.
Ankel, 1938: Gullmarfjord; among dorsal spines; Na 4.
—: *"Echinus pictus"* [1])
Jeffreys, 1864: Northumberland, Cork (Ireland).
—: *Paracentrotus lividus*
Jeffreys, 1864: near mouth opening; Na + +.
—: *Psammechinus miliaris*
Lebour, 1932, 1937: Plymouth; on surface; Na 1-3/h; Fq 3/12.
Thorson, 1946: Gullmarfjord; on surface; Na 2; Fq 1/1.
—: *"Echinus saxatilis"* [2])
Jeffreys, 1864: Plymouth.
—: "small sea urchin"
Dautzenberg & Fischer, 1925: Postrein (Brittany); on surface.

Syn.: *Phasianella stylifera* Turton, 1825. *Stilifer turtoni,* many authors. *Turtonia stylifera,* Rosén, 1910. *Rosenia stilifera,* Nierstrasz, 1913. *Stilifer stylifer,* Dautzenberg & Fischer, 1925; Lebour, 1932.

Size: 2 mm (Turton, 1825); 3-4 mm × 1.5-2 mm (Ankel, 1936); 4 mm (Nordsieck, 1968).

Notes: (1) Host is probably *Strongylocentrotus droebachiensis*; (2) host may be *Psammechinus miliaris, Paracentrotus lividus* or *Strongylocentrotus droebachiensis,* according to Mortensen (1943).

Add. ref.: Cuénot, 1900; Pelseneer, 1928; Fretter & Graham, 1962.

245. **Pelseneeria stimpsoni** (Verrill)

Host: *Strongylocentrotus droebachiensis*
Verrill, 1882a: off Block Island (U.S.A.); upper surface; Na + +.

Syn.: *Stilifer stimpsoni* Verrill, 1882a.

Size: ≦ 3.5 mm (Nordsieck, 1968).

Remark: Mortensen (1943) suggests that *Pelseneeria stimpsoni* might be identical to *P. stylifera.*
Add. ref.: Pelseneer, 1928.

246. **Stylifer** sp.

Host: *Rhizocrinus lofotensis*
Carpenter, 1884a: in a hole in the calyx; Na 2-3/h; Fq + +.
Add. ref.: Lützen, 1972.

247. **Entocolax ludwigi** Voigt (fig. 17E)

Host: *Myriotrochus rinkii*
Voigt, 1888: Lorenz Bay (Bering Sea); attached to inner body wall, anterior side; Na 1; Fq 1.
Heding & Mandahl-Barth, 1938: E. & W. Greenland; body cavity, attached to body wall.
Size: 10 mm (Voigt, 1888).
Remark: As Heding & Mandahl-Barth (1938) pointed out, *Entocolax ludwigi* of Schwanwitsch (1914, 1917) is in fact a different species: *E. schwanwitschi,* parasitic in *Myriotrochus eurycyclus.*
Add. ref.: Hescheler, 1900; Vaney, 1913.

248. **Entocolax** sp.

Host: *Myriotrochus* n. sp.
Østergren, 1901: between Jan Mayen and Greenland; inside host; Na 2; Fq 1.

249. **Entoconcha mirabilis** Müller (fig. 17D)

Hosts: *Labidoplax digitata*
Müller, 1852: Gulf of Muggia (Trieste); attached to intestinal blood-vessel; Na 69 [1]).
Schultze, 1854: Trieste; Na 5.
Baur, 1864: Trieste; ventral bloodvessel; Na 2-4/h; Fq 1/200.
Cuénot, 1912: not Arcachon; body cavity.
—: not "Guernsey *Synapta*"
Ray-Lankester, 1868: Guernsey (Channel Islands).
Syn.: *Helicosyrinx parasita,* Baur, 1864.
Size: 2.3 mm-80 mm (Baur, 1864).
Note: (1) "1-4 snails on 60 feet *synapta*".
Add. ref.: Fischer, 1865; Hescheler, 1900; Vaney, 1913; Pelseneer, 1928; Ankel, 1936.

250. **Enteroxenos oestergreni** Bonnevie (fig. 17C)

Hosts: *Stichopus tremulus*

Bonnevie, 1900, 1902: Bergen, Drøbak, Oslofjord; attached to intestine, mostly anterior part; Na ++; Fq 10%.

Barel & Kramers, unpubl.: Trondheimsfjord; body cavity; Na 3; Fq 3/35.

Lützen, 1968b: Drøbak; usually attached to oesophagus.

—: *Parastichopus californicus*

Tikasingh, 1961, 1962: Puget Sound, Washington State coast; attached to intestinal peritoneum; Na ++.

Kincaid, 1964: Washington State coast; body cavity; Na ++; Fq ++.

Syn.: *Comenteroxenos parastichopoli,* Tikasingh, 1961, 1962. (Kincaid, 1964, does not accept *C. parastichopoli* as a separate species).

Size: 100-150 mm × 4-5 mm (Bonnevie, 1902); 60-80 mm × 4-5 mm (Ankel, 1936); < 132 mm × 3-5 mm (Tikasingh, 1961, 1962).

Add. ref.: Vaney, 1913; Fretter, 1955.

251. **Odostomia clavula** (Lovén)

Hosts: *Spatangus purpureus*

Robertson & Orr, 1961 [1]): S.W. Sweden; round anus; Fq 1.

—: *Pennatula* (Coelenterata)

Franc, 1968: on surface.

Syn.: *Menestho clavula,* Robertson & Orr, 1961; Franc, 1968.

Note: (1) "Tentatively identified as *Menestho clavula*".

Add. ref.: Bullock & Boss, 1971.

Mollusca incertae sedis

252. "Parasitic mollusc"

Host: *Stichopus tremulus*

Kiaer, 1904: Drøbaksund; in the intestine; Na 3-4/h; Fq 11/24, 6/40.

Remark: This record is cited by Pelseneer (1928) as "gastropod".

Bryozoa

253. **Gemellaria loricata** (L.)

Host: *Poliometra prolixa*

Mortensen, 1912b: N.E. Greenland; on cirri.

Free: a.o. Plymouth (Plymouth Marine Fauna, 1931).

Add. ref.: Clark, 1921.

Hemichordata

254. **Rhabdopleura mirabilis** (Sars)

Host: *Rhizocrinus lofotensis*
Clark, 1921: 623 [1]): column.
Note: (1) Clark refers to Sars, who recorded this associate as a polyzoan, *Halophilus mirabilis.*

Chordata, Pisces

Perciformes

255. **Carapus acus** (Brünnich)

Hosts: *Holothuria tubulosa*
Emery, 1880 * [1]); Zänkert, 1940: Naples; body cavity, respiratory tree *; Fq + +*.
Arnold, 1953, 1956: Naples, W. Mediterranean, Adriatic, Aegean Sea, Atlantic ocean (?); body cavity, branchial tree; Fq 29/89.
—: *Stichopus regalis*
Emery, 1880: Naples; Fq + +.
Arnold, 1953, 1956: Naples, W. Mediterranean, Adriatic, Aegean Sea, Atlantic ocean (?); body cavity, branchial tree; Fq 3/6.
Leiner, 1960: Naples; body cavity, respiratory tree; Na $\leqq$ 5/h.
—: not *Holothuria forskali*
Arnold, 1953: Naples; Fq 0/3.
—: not *Holothuria polii*
Arnold, 1953: Naples; Fq 0/34.
—: not *Holothuria helleri*
Arnold, 1953: Naples; Fq 0/2.
Syn.: *Fierasfer acus,* many authors.
Size: 6-10 cm in *Holothuria tubulosa,* < 16 cm in *Stichopus regalis* (Arnold, 1953); 16-19 cm (Leiner, 1960).
Note: (1) And other *Holothuria* species.
Add. ref.: Ludwig, 1891.

Pleuronectiformes

256. **Bothus podas** (Delaroche) &

257. **Arnoglossus grohmanni** Bonaparte

Hosts: *Astropecten irregularis, A. aranciacus*
Weber, 1965: Porto Taverna (Sardinia); around [1]); Fq appr. 30%.
Note: (1) Taking food from the dust cloud around the sea star.

Schizomycetes

258. "Achromobactereae"

Host: *Paracentrotus lividus*
Tysset et al., 1961: Algerian coast.

Cyanophyta

259. **Dactylococcopsis echini**

Host: *Echinus acutus*
Mortensen & Rosenvinge, 1934: Bergen; attached to the test; Fq 1.

Chlorophyta

260. **Coccomyxa astericola**

Host: *Hippasteria phrygiana*
Mortensen & Rosenvinge, 1933, 1934: Rognesund (Norway); aboral side.
Size: 3.5-5.5 μ × 2-4.5 μ (Mortensen & Rosenvinge, 1933).

261. **Coccomyxa ophiurae**

Hosts: *Ophiura texturata*
Mortensen, 1897: Limfjord (Denmark); on disc and arms; Fq ++.
Mortensen & Rosenvinge, 1910: Limfjord, Gullmarfjord, not Kattegat; in tissue, dorsal side, tube feet.
Cuénot, 1912: not Arcachon.
—: *Ophiura albida*
Mortensen, 1897: Limfjord (Denmark); on disc and arms; Fq ++.
Mortensen & Rosenvinge, 1910: Limfjord, not Kattegat; dorsal side, tube feet, mostly in tissue.
Syn.: *Dactylococcus,* Mortensen, 1897; Grimpe, 1930.
Size: cells 6-8 × 1.5-3 μ (Mortensen & Rosenvinge, 1910).
Add. ref.: Mortensen, 1933.

262. "Green algae"

Host: *Solaster endeca*
Mortensen & Rosenvinge, 1910, 1933: Reykjavik; paxillae.
Remark: Possibly this record involves *Coccomyxa astericola,* according to Mortensen & Rosenvinge (1933).

Incertae sedis

263. "Yellow amoeboid algae"

Host: *Echinocardium cordatum*
Brandt, 1883; Buchner, 1930: underside of tube feet.

264. "Undetermined mold"

Host: *Echinocardium cordatum*

Légèr, 1897: Wimereux; intestine near anus; Na +++.

265. "Parasitic plant"

Host: *Ophiura sarsi*

Mortensen, 1933: Skagerrak; in the meshes of the dorsal plates; Fq +.

LIST OF COLLECTING LOCALITIES

Geographical designations of the collecting localities are mostly included in the text, the more frequent localities are listed below.

Arcachon: Atlantic coast of S. France.
Banyuls: French Mediterranean coast, near Spanish border.
Belle-Ile-en-Mer: S. Brittany, France.
Bergen: W. Norway.
Blacksod Bay: W. Ireland.
Bohüslan: Coastal province in S.W. Sweden (including Gullmarfjord).
Catania: E. Sicily.
Cette: French Mediterranean coast. This locality is the same as Sète.
Clew Bay: W. Ireland.
Concarneau: S. Brittany, France.
Cullercoats: Northumberland coast, E. England.
Dinard: N. Brittany, France.
Drøbak(sund): Oslofjord, Norway.
Dry Tortugas Islands: Florida, U.S.A.
Firth of Forth: E. Scotland.
Frenchmans Bay: Maine, U.S.A.
Friday Harbor: Washington State, U.S.A.
Fundy, Bay of: New Brunswick, Canada.
Gullmarfjord: Bohüslan, S.W. Sweden.
Heligoland: North Sea.
Kara Sea: N. Russia, E. of Novaya Zemlya.
Kiel: Baltic Sea, N. Germany.
Kola Bay (Kolskiy Zaliv): Murmansk, N.W. Russia.
Kuril Islands, S. (Kurilskiye Ostrova): N.W. Pacific.
Loch Fyne: W. Scotland.
Lofoten: N. Norway.
Luc-sur-Mer: Normandy, France.
Millbay: Plymouth, S. England.
Millport: W. Scotland, near Glasgow.
Monterey Bay: California, U.S.A.
Morgat: S. Brittany, France.
Mount Desert Island: Maine, U.S.A.
Murmansk: N.W. Russia.
Pacific Grove: Monterey Bay, California, U.S.A.
Plymouth: Devon, S. England.
Portel, le: near Boulogne, Channel Coast, N. France.

Port Erin: Isle of Man, Irish Sea.
Puget Sound: Washington State, U.S.A.
Roscoff: N. Brittany, France.
Saint Andrews: E. Scotland.
Saint Jean-de-Luz: Atlantic coast of S. France.
Saint Vaast-la-Hougue: near Cherbourg, Channel coast, N. France.
Salcombe: near Plymouth, S. England.
San Juan Archipelago: Washington State, U.S.A.
Santa Barbara Channel: California, U.S.A.
Southport: near Liverpool, W. England.
Tahitou, Ile: St. Vaast, N. France.
Trondheim(sfjord): W. Norway.
Wimereux: Channel Coast, N. France.
Woods Hole: Massachussetts, U.S.A.
Yealm estuary: near Plymouth, S. England.

ALPHABETIC LIST OF THE HOST SPECIES AND THEIR ASSOCIATES

This list provides an alphabetical arrangement of the current names of the host species, and of the synonyms used in the original papers.

The echinoderm class to which the species belongs, is indicated in brackets as "Crin." (Crinoidea), "Ast." (Asteroidea), "Oph." (Ophiuroidea), "Ech." (Echinoidea), and "Hol." (Holothuroidea).

All echinoderm species occurring in the N.E. Atlantic area have been included. For each host species a list of its associates is given, with their sequence numbers used in the "Systematic list of associate records". "No reference" indicates that in the reviewed literature no associates have been recorded from the species.

An asterisk indicates a host species occurring only outside the N.E. Atlantic area. As a consequence of the criteria applied for the inclusion of associates in the survey, the associate account of these host species will generally not be complete.

Non-echinoderm hosts have not been listed.

A

Acrocnida brachiata (Montagu) (Oph.). — *Harmothoe lunulata* 144; *Mysella bidentata* 232; *Presynaptiphilus acrocnidae* 179.

Alecto europaea — see *Antedon bifida.*

* *Allocentrotus fragilis* (Jackson) (Ech.). — *Anophrys dogieli* 33; *Cryptochilum caudatum* 37; *Cryptochilum sigmoides* 40; *Cyclidium stercoris* 50; *Entodiscus borealis* 47; *Entorhipidium echini* 42; *Entorhipidium pilatum* 43; *Entorhipidium tenue* 44; *Euplotes balteatus* 72; *Madsenia indomita* 35; *Plagiopyliella striata* 27; *Tanystomium gracile* 41; *Thyrophylax strongylocentroti* 29.

Amphidetus ovatus — see *Echinocardium flavescens.*

Amphilepis norvegica Ljungman (Oph.). — *Loxosoma* sp. 126.

Amphipholis squamata (Delle Chiaje) (Oph.). — *Cancerilla durbanensis* 172; *Cancerilla neozelanica* 173; *Cancerilla tubulata* 174; *Ophioithys amphiurae* 177; *Ophiurespira weilli* 30; *Parachordeumium tetraceros* 204; *Philichthys amphiurae* 190; *Phthiriopsis emilii* 205; *Rhabdostyla amphiurae* 55; *Rhopalura ophiocomae* 116; *Sphaerodorum greefii* 151; *Urceolaria ophiocomae* 63; *Vorticella* sp. 68.

Amphipholis thorelli Ljungman (Oph.). — no references.

* *Amphiura belgicae* Koehler (Oph.). — *Ascothorax ophioctenis* 209.

Amphiura borealis (G. O. Sars) (Oph.). — no references.

Amphiura chiajei Forbes (Oph.). — no references.

Amphiura filiformis (O. F. Müller) (Oph.). — *Mysella bidentata* 232.

Amphiura fragilis (Oph.). — no references.

Amphiura griegi Mortensen (Oph.). — no references.

Amphiura mediterranea Lyman (Oph.). — no references.

* *Amphiura microplax* Mortensen (Oph.). — *Ascothorax ophioctenis* 209.

Amphiura securigera (Düben & Koren) (Oph.). — no references.

Amphiura squamata — see *Amphipholis squamata.*

* *Antedon adriatica* A. H. Clark (Crin.). — *Collocheres gracilicauda* 170; *Hemispeiropsis antedonis* 53; *Myzostomum cirriferum* 129; *Myzostomum parasiticum* 134.

Antedon bifida (Pennant) sspp. *bifida* & *maroccana* (Crin.). — *Andreula antedonis* 46; *Balcis devians* 242; *Collocheres gracilicauda* 170; "suctorial crustacean" 228; "parasitic crustacean" 229; *Enterognathus comatulae* 163; *Hemispeiropsis antedonis* 53; *Hippolyte hunti* 226; *Hippolyte* sp. 227; "Holotrichous infusorian" 54; *Myzostomum* sp. 135; *Myzostomum alatum* 127; *Myzostomum cirriferum* 129; *Myzostomum parasiticum* 134; *Prorocentrum micans* 2; *Pulvinomyzostomum pulvinar* 136.

Antedon bifida (part) — see *Antedon mediterranea*; *Antedon adriatica.*

* *Antedon carinata* — see *Tropiometra carinata.*

Antedon celtica (Marenzeller) Sladen — see *Poliometra prolixa.*

Antedon dentata Say — see *Hathrometra sarsi.*

Antedon eschrichtii Müller — see *Heliometra glacialis.*

Antedon hystrix — see *Poliometra prolixa.*

* *Antedon mediterranea* (Lamarck) (Crin.). — *Enterognathus comatulae* 163; *Hemispeiropsis antedonis* 53; *Myzostomum alatum* 127; *Myzostomum cirriferum* 129; *Myzostomum parasiticum* 134; *Myzostomum* sp. 135; *Subadyte pellucida* 147.

Antedon petasus (Düben & Koren) (Crin.). — *Asterocheres lilljeborgi* 165;

* *Astropecten bispinosus* Otto (Ast.). — *Acholoe squamosa* 139; *Ophiodromus flexuosus* 149.

Astropecten irregularis (Pennant) (Ast.). — *Acholoe squamosa* 139; *Arnoglossus grohmanni* 257; *Bothus podas* 256; *Euterpina acutifrons* 194; *Harmothoe lunulata* 144; *Malmgrenia castanea* 146; *Ophiodromus flexuosus* 149; *Subadyte pellucida* 147; *Triloborhynchus astropectinis* 109.

* *Astropecten jonstoni* (Delle Chiaje) (Ast.). — *Licnophora auerbachii* 70.

Astropecten pentacanthus — see *Astropecten irregularis.*

* *Astropecten platyacanthus* (Philippi) (Ast.). — *Acholoe squamosa* 139; *Ophiodromus flexuosus* 149.

* *Astropecten squamatus* — see *Astropecten jonstoni.*

Astropecten sp. (Ast.). — *Acholoe squamosa* 139.

Astrophyton eucnemis — see *Gorgonocephalus eucnemis.*

B

Bathybiaster vexillifer (Wyv. Thomson) (Ast.). — no references.

Bathyplotes natans (M. Sars) (Hol.). — no umagillids (p. 38).

Brisaster fragilis (Düben & Koren) (Ech.). — no Ascothoracica (p. 78); *Montacuta substriata* 237.

* *Brisaster townsendi* (Agassiz) (Ech.). — *Harmothoe lunulata* 144.

Brisinga endecacnemos Asbjörnsen (Ast.). — no references.

Brisingella coronata (G. O. Sars) (Ast.). — no references.

Brissopsis lyrifera (Forbes) (Ech.). — *Micropontius ovoides* 188; *Montacuta ferruginosa* 234; *Montacuta substriata* 236; *Montacuta tenella* 237; "Nematode" 123; *Ulophysema oresundense* 215; no umagillids (p. 38).

Brissus lyrifer — see *Brissopsis lyrifera.*

C

Ceramaster granularis (O. F. Müller) (Ast.). — no references.

Chiridota laevis (Fabricius) (Hol.). — *Anoplodium chiridotae* 98; *Aphanostoma sanguineum* 88; *Cystobia holothuriae* 18; *Lithocystis brachycercus* 15; *Octocoelis chiridotae* 89; no umagillids (p. 38); *Urospora chiridotae* 7.

Chiridota pellucida — see *Chiridota laevis.*

Cidaris cidaris (L.) (Ech.). — *Alepas minuta* 207; *Montacuta ferruginosa* 234; *Montacuta substriata* 236; *Oikomonas echinorum* 1; Palythoidae 82; *Perigonimus cidaridis* 77; *Phalacrostemma cidariophilum* 157; *Scalpellum scalpellum* 206; *Trilasmis kaempferi* 208.

Cidaris hystrix — see *Cidaris cidaris.*

Comatula decacnemos — see *Antedon bifida.*

Comatula mediterranea — see (amongst others) *Antedon petasus*; *Antedon mediterranea*; *Antedon adriatica*; *Antedon bifida*.

Cribrella sanguinolenta — see *Henricia sanguinolenta*.

Crossaster papposus — see *Solaster papposus*.

Ctenodiscus crispatus (Retzius) (Ast.). — *Dendrogaster rimskykorsakowi* 214.

Cucumaria elongata Düben & Koren (Hol.). — no references.

Cucumaria frondosa (Gunnerus) (Hol.). — *Diplodina gonadipertha* 21; No umagillids (p. 38).

Cucumaria hyndmani Thomson (Hol.). — no references.

Cucumaria lactea (Forbes) (Hol.). — no references.

Cucumaria normani Pace (Hol.). — No *Lithocystis cucumariae* 13; no *Lithocystis minchinii* 11.

Cucumaria pentactes — see *Cucumaria saxicola*; *Cucumaria elongata*.

Cucumaria planci Marenzeller (Hol.), (partly *C. saxicola*). — *Anoplodium* sp. 101; *Boveria subcylindrica* 51; *Exogone* sp. 150; *Harmothoe impar* 143; *Licnophora macfarlandi* 71; *Lithocystis minchinii* (11, note); *Musculus marmoratus* 230; *Ophryotrocha puerilis* 152; *Tisbe cucumariae* 198; *Tisbe furcata* 197; *Tritaeta gibbosa* 221; No Turbellaria (p. 38).

Cucumaria saxicola Brady and Robertson (Hol.). — *Harmothoe impar* 143; *Lithocystis cucumariae* 13; *Lithocystis minchinii* 11.

D

Diadema antillarum Philippi (Ech.). — *Anophrys* sp. 34.

Diplopteraster multipes (M. Sars) (Ast.). — no references.

Dorocidaris papillata — see *Cidaris cidaris*.

Dorocidaris sp. (Ech.). — *Trilasmis kaempferi* 208.

E

Echinaster sanguinolentus — see *Henricia sanguinolenta*.

Echinaster sepositus (Retzius) (Ast.). — *Asterocheres lilljeborgi* 165; *Prorocentrum* sp. 3.

Echinocardium cordatum (Pennant) (Ech.). — *Avagina incola* 83; *Avagina vivipara* 85; No ciliates (p. 31); *Leptinogaster* sp. 178; *Lithocystis foliacea* 14; *Lithocystis schneideri* 10; *Marcusella pallida* 106; *Micropontius ovoides* 188; *Montacuta echinocardiophila* 233; *Montacuta ferruginosa* 234; *Montacuta semiradiata* 235; *Montacuta substriata* 236; *Oikomonas echinorum* 1; *Pseudanthessius sauvagei* 185; *Ulophysema oresundense* 215; no umagillids (p. 38); "Undetermined mold" 264; *Urospora echino-*

Echinus sanguinolentus — see *Henricia sanguinolenta.*
Echinus saxatilis — see *Psammechinus miliaris*; *Paracentrotus lividus*; *Strongylocentrotus droebachiensis.*
Echinus sphaera — see *Echinus esculentus.*
Elpidia glacialis Théel (Hol.). — no references.

G

Gorgonocephalus agassizi — see *Gorgonocephalus arcticus.*
Gorgonocephalus arcticus (Leach) (Oph.). — *Protomyzostomum polynephris* 137.
Gorgonocephalus caputmedusae (L.) (Oph.). — *Protomyzostomum polynephris* 137.
Gorgonocephalus eucnemis (Müller & Troschel) (Oph.). — *Protomyzostomum polynephris* 137.
Gorgonocephalus lamarcki (Müller & Troschel) (Oph.). — no references.
Gorgonocephalus sp. (Oph.). — *Protomyzostomum sagamiense* 138.

H

Hathrometra prolixa — see *Poliometra prolixa.*
Hathrometra sarsi (Düben & Koren) (Crin.). — *Munna boecki* 216; *Myzostomum carpenteri* 128.
Heliometra glacialis (Leach) (Crin.). — *Desmote vorax* 107; *Loxosomella antedonis* 125; *Myzostomum* sp. 135; *Myzostomum fimbriatum* 130; *Myzostomum gigas* 132; *Truncatulina* sp. 5.
* *Hemicentrotus pulcherrimus* (Agassiz) (Ech.). — *Cryptochilum minor* 39; *Cryptochilum sigmoides* 40; *Entodiscus borealis* 47; *Entorhipidium triangularis* 45; *Trichodina* sp. 61.
Henricia scabrior Michailovskij (Ast.). — no references.
Henricia sanguinolenta (O. F. Müller) (Ast.). — *Asterocheres lilljeborgi* 165; *Asterocheres thorelli* 167; *Dendrogaster astericola* 210.
* *Hippasteria leiopelta* Fisher (Ast.). — *Dendrogaster rimskykorsakowi* 214.
Hippasteria phrygiana (Parelius) (Ast.). — *Coccomyxa astericola* 260.
Holothuria californica — see *Parastichopus californicus.*
Holothuria forskali Delle Chiaje (Hol.). — *Anoplodiopsis gracilis* 93; *Anoplodium gracile* 94; *Anoplodium tubiferum* 95; *Balcis devians* 241; *Carapus acus* 255; *Cystobia irregularis* 19; *Umagilla forskalensis* 91.
* *Holothuria helleri* Marenzeller (Hol.). — no *Carapus acus* 255.
Holothuria intestinalis — see *Mesothuria intestinalis.*
Holothuria nigra — see *Holothuria forskali.*
* *Holothuria polii* Delle Chiaje (Hol.). — no *Carapus acus* 255.

Holothuria tremula — see *Stichopus tremulus*.

* *Holothuria tubulosa* Gmelin (Hol.). — *Carapus acus* 255; *Ctenodrilus* sp. 155; *Cystobia holothuriae* 18.

Hymenaster pellucidus Wyv. Thompson (Ast.). — no references.

K

Korethraster hispidus Wyv. Thompson (Ast.). — no references.

L

Labidoplax buski (McIntosh) (Hol.). — no references.

Labidoplax digitata (Montagu) (Hol.). — *Agamonema* 119; *Ctenodrilus* sp. 155; *Devonia perrieri* 238; *Entoconcha mirabilis* 249; *Gonospora mercieri* 17; *Harmothoe lunulata* 144; *Lepidonotus* sp. 148; *Mysella bidentata* 232; *Rhabdostyla arenaria* 56; *Synaptiphilus cantacuzenei* 192; *Synaptiphilus luteus* 191; no Turbellaria (p. 38); *Urceolaria synaptae* 62; *Zelinkiella synaptae* 124.

Labidoplax media Oestergren (Hol.). — no references.

Leptasterias muelleri (M. Sars) (Ast.). — no references.

Leptometra celtica (Barrett & McAndrew) (Crin.). — *Myzostomum alatum* 127; *Pulvinomyzostomum pulvinar* 136.

* *Leptometra phalangium* (J. Müller) (Crin.). — *Myzostomum alatum* 127; *Pulvinomyzostomum pulvinar* 136.

* *Leptosynapta albicans* (Selenka) (Hol.). — *Harmothoe lunulata* 144.

Leptosynapta bergensis Oestergren (Hol.). — *Anoplodium* sp. 100; *Devonia perrieri* 238; *Synaptiphilus luteus* 191; no *Tetrakentron synaptae* 160; *Zelinkiella synaptae* 124.

* *Leptosynapta clarki* Heding (Hol.). — *Harmothoe lunulata* 144.

Leptosynapta cruenta Cherbonnier (Hol.). — no *Synaptiphilus cantacuzenei* 192; no *Synaptiphilus luteus* 191; *Synaptiphilus tridens* 193.

Leptosynapta decaria (Oestergren) (Hol.). — no references.

Leptosynapta galliennei (Herapath) (Hol.). — *Anoplodium* sp. 100; *Devonia perrieri* 238; *Harmothoe lunulata* 144; *Himasthla leptosoma* 111; *Metacercaria capriciosa* 113; *Orbinia latreillei* 154; *Phylo foetida* 153; *Rhabdostyla arenaria* 56; no *Synaptiphilus cantacuzenei* 192; *Synaptiphilus luteus* 191; *Tetrakentron synaptae* 160; *Urceolaria synaptae* 62; *Urospora synaptae* 6; *Zelinkiella synaptae* 124.

Leptosynapta inhaerens (O. F. Müller) (Hol.). — *Agamonema* 119; *Anoplodium* sp. 100; *Devonia perrieri* 238; *Gonospora mercieri* 17; *Harmothoe lunulata* 144; no *Synaptiphilus cantacuzenei* 192; *Synaptiphilus luteus* 191; *Synaptiphilus tridens* 193; no *Tetrakentron synaptae* 160; no umagillids

M

N

O

Ophiactis nidarosiensis Mortensen (Oph.). — no references.
Ophiocnida brachiata — see *Acrocnida brachiata.*
Ophiocoma neglecta — see *Amphipholis squamata.*
Ophiocomina nigra (Abildgaard) (Oph.). — *Cancerilla tubulata* 174; *Collocheres elegans* 169; no *Collocheres gracilicauda* 170.
Ophiocten sericeum (Forbes) (Oph.). — *Ascothorax ophioctenis* 209.
Ophioglypha albida — see *Ophiura albida.*
Ophioglypha sp. (Oph.). — *Asterocheres violaceus* 168.
Ophioglypha lacertosa — see *Ophiura texturata.*
Ophioglypha texturata — see *Ophiura texturata.*
Ophiomitrella clavigera (Ljungman) (Oph.). — *Ophioika appendiculata* 176.
* *Ophionereis reticulata* (Say) (Oph.). — *Harmothoe lunulata* 144.
Ophiopholis aculeata (L.) (Oph.). — no *Collocheres gracilicauda* 170; no *Dendrogaster astericola* 210; *Thalestris longimanna* 200; *Thespesiopsyllus paradoxus* 201.
Ophiophrixus spinosus (Storm) (Oph.). — no references.
Ophiopsila aranea Forbes (Oph.). — *Cancerilla tubulata* 174.
Ophiopus arcticus Ljungman (Oph.). — no references.
Ophioscolex glacialis Müller & Troschel (Oph.). — no references.
Ophioscolex purpureus Düben & Koren (Oph.). — no references.
Ophiothrix alopecurus — see *Ophiothrix fragilis.*
Ophiothrix echinata — see *Ophiothrix fragilis.*
Ophiothrix fragilis (Abildgaard) (Oph.). — *Asterocheres violaceus* 168; *Cancerilla tubulata* 174; no ciliates (p. 31); *Collocheres gracilicauda* 170; *Cyclochaeta ophiothricis* 59; *Licnophora auerbachii* 70; *Metacercaria capriciosa* 113; *Ophiurespira weilli* 30; *Rhopalura ophiocomae* 116; *Subadyte pellucida* 147; *Thalestris longimanna* 200; *Thespesiopsyllus paradoxus* 201.
Ophiothrix rosula — see *Ophiothrix fragilis.*
Ophiothrix sp. (Oph.). — *Asterocheres violaceus* 168; *Zoothamnium vermicola* 69.
* *Ophiothrix quinquemaculata* Delle Chiaje (Oph.). — *Collocheres gracilicauda* 170.
Ophiothrix versicolor — see *Ophiothrix fragilis.*
Ophiura affinis Lütken (Oph.). — no references.
Ophiura albida Forbes (Oph.). — *Coccomyxa ophiurae* 261; *Fellodistomum fellis* 110; *Metacercaria capriciosa* 113; *Rhopalura ophiocomae* 116; *Zoothamnium vermicola* 69.
Ophiura carnea M. Sars (Oph.). — no references.
Ophiura lacertosa — see *Ophiura texturata.*
Ophiura robusta Ayres (Oph.). — no references.

P

Cryptochilum echini 38; *Entodiscus borealis* 47; *Flabelligera affinis* 156; *Lichomolgus forficula* 180; *Montacuta ferruginosa* 234; *Oikomonas echinorum* 1; *Pelseneeria stylifera* 244; *Pseudanthessius liber* 184; no *Syndesmis echinorum* 104; *Zoogonus mirus* 112.

Psammechinus sp. (Ech.). — *Pseudanthessius liber* 184.

Pseudarchaster parelii (Düben & Koren) (Ast.). — no references.

Psilaster andromeda (Müller & Troschel) (Ast.). — no references.

Psolus phantapus (Strussenfelt) (Hol.). — no umagillids (p. 38).

Pteraster militaris (O. F. Müller) (Ast.). — no *Dendrogaster astericola* 210; *Pterastericola fedotovi* 108.

Pteraster obscurus (Perrier) (Ast.). — *Dendrogaster dogieli* 213; *Pterastericola fedotovi* 108.

Pteraster pulvillus M. Sars (Ast.). — *Pterastericola fedotovi* 108.

R

Rhizocrinus lofotensis M. Sars (Crin.). — *Rhabdopleura mirabilis* 254; *Stylifer* sp. 246.

S

Solaster abyssicola Verrill (Ast.). — no references.

Solaster endeca (L.) (Ast.). — "green algae" 262; *Dendrogaster astericola* 210; *Dendrogaster murmanensis* 211.

Solaster glacialis Danielssen & Koren (Ast.). — no references.

Solaster papposus (L.) (Ast.). — *Arctonoe vittata* 141; *Asterocheres lilljeborgi* 165; *Asterocheres violaceus* 168; *Caprella linearis* 224; *Dendrogaster astericola* 210; *Dendrogaster dichotomus* 212; *Dendrogaster murmanensis* 211; *Parathalestris harpactoides* 199; *Pariambus typicus* 223; *Stenhelia gibba* 196; *Subadyte pellucida* 147.

Solaster sp. (Ast.). — *Pariambus typicus* 223.

Solaster squamatus Döderlein (Ast.). — no references.

Solaster syrtensis Verrill (Ast.). — no references.

Spatangus meridionalis — see *Spatangus purpureus*.

* *Spatangus multispinus* Mortensen (Ech.). — *Montacuta semiradiata* (var. *neozelanica*) 235.

* *Spatangus* n. sp. Ponder (Ech.). — *Montacuta semiradiata* (var. *neozelanica)* 235.

Spatangus purpureus O. Fr. Müller (Ech.). — *Antinoella sarsi* 142; no Ascothoracica (p. 78); *Avagina glandulifera* 84; *Avagina incola* 83; *Balcis alba* 240; *Lasaea adansoni* 231; *Lithocystis microspora* 12; *Lithocystis schneideri* 10; *Malmgrenia castanea* 146; *Marcusella atriovillosa* 105;

Micropontius ovoides 188; *Montacuta ferruginosa* 234; *Montacuta substriata* 236; *Odostomia clavula* 251; *Oikomonas echinorum* 1; unidentified Ostracod 162; *Pseudanthessius sauvagei* 185; *Scottomyzon gibberum* 171; no umagillids (p. 38); *Urospora echinocardii* 8.

Spatangus raschi Lovén (Ech.). — no copepods (p. 76); *Malmgrenia castaiea* 146.

Spatangus sp. (Ech.). — *Anoplodium clypeastris* 99; *Lasaea adansoni* 231; *Lithocystis schneideri* 10; no *Urospora neapolitana* 9.

Spatangus spinosissimus — see *Spatangus purpureus.*

* *Spatangus thor* Fell (Ech.). — *Montacuta semiradiata* (var. *neozelanica*) 235.

Sphaerechinus granularis (Lamarck) (Ech.). — *Anophrys echini* 32; *Asterocheres minutus* 166; *Asterocheres violaceus* 168; *Cryptochilum echini* 38; *Lichomolgus* sp. 182; *Metacercaria psammechini* 114; *Oikomonas echinorum* 1; *Syndesmis echinorum* 104; *Zoogonus mirus* 112.

Stichastrella rosea (O. F. Müller) (Ast.). — no references.

* *Stichopus californicus* — see *Parastichopus californicus.*

* *Stichopus regalis* (Cuvier) (Hol.). — *Carapus acus* 255.

Stichopus tremulus (Gunnerus) (Hol.). — *Amphithoe parasitica* 222; *Anoplodiera voluta* 102; *Anoplodium stichopi* 96; *Cystobia stichopi* 20; *Enteroxenos oestergreni* 250; *Meara stichopi* 90; "parasitic mollusc" 252; *Nanaspis ninae* 189; *Ozametra elegans* 103; *Wahlia macrostylifera* 92.

Strongylocentrotus sp. (Ech.). — *Balcis devians* 241.

Strongylocentrotus droebachiensis (O. F. Müller) (Ech.). — *Anophrys* sp. 34; *Anophrys dogieli* 33; *Asterocheres violaceus* 168; *Balcis devians* 241; *Cryptochilum caudatum* 37; *Cryptochilum minor* 39; *Cryptochilum sigmoides* 40; *Cyclidium stercoris* 50; *Cypridina globosa* 161; *Entodiscus borealis* 47; *Entodiscus powersi* 48; *Entorhipidium echini* 42; *Entorhipidium pilatum* 43; *Entorhipidium tenue* 44; *Entorhipidium triangularis* 45; *Euplotes balteatus* 72; *Euplotes* sp. 74; *Lechriopyla mystax* 24; *Madsenia indomita* 35; *Pelseneeria stylifera* 244; *Pelseneeria stimpsoni* 245; *Plagiopyla minuta* 25; *Plagiopyla nyctotherus* 26; *Plagiopyliella striata* 27; *Pseudanthessius liber* 184; *Schizocaryum dogieli* 28; *Syndesmis echinorum* 104; *Thyrophylax strongylocentroti* 29; *Tanystomium gracile* 41; *Trichodina* sp. 61; no umagillids (p. 38); *Urceolaria* sp. 65; *Urceolaria spinicola* 64.

* *Strongylocentrotus echinoides* Agassiz & H. L. Clark (Ech.). — *Cryptochilum caudatum* 37; *Cryptochilum echini* 38; *Cryptochilum minor* 39; *Cryptochilum sigmoides* 40; *Cyclidium stercoris* 50; *Entorhipidium echini* 42; *Entorhipidium pilatum* 43; *Entorhipidium tenue* 44; *Entorhipidium*

triangularis 45; *Entodiscus borealis* 47; *Entodiscus powersi* 48; *Euplotes balteatus* 72; *Lechriopyla mystax* 24; *Madsenia indomita* 35; *Plagiopyliella striata* 27; *Schizocaryum dogieli* 28; *Thyrophylax strongylocentroti* 29; *Trichodina* sp. 61; *Urceolaria* sp. 65.

* *Strongylocentrotus franciscanus* (Agassiz) (Ech.). — *Cryptochilum caudatum* 37; *Cryptochilum minor* 39; *Cryptochilum sigmoides* 40; *Cyclidium stercoris* 50; *Entorhipidium echini* 42; *Entorhipidium pilatum* 43; *Entorhipidium tenue* 44; *Entorhipidium triangularis* 45; *Entodiscus borealis* 47; *Euplotes balteatus* 72; *Lechriopyla mystax* 24; *Madsenia indomita* 35; *Plagiopyliella striata* 27; *Schyzocaryum dogieli* 28; *Thyrophylax strongylocentroti* 29; *Trichodina* sp. 61; *Ureceolaria* sp. 65.

* *Strongylocentrotus intermedius* (Agassiz) (Ech.). — *Cryptochilum caudatum* 37; *Entorhipidium echini* 42; *Entorhipidium tenue* 44; *Entorhipidium triangularis* 45; *Entodiscus borealis* 47; *Euplotes* sp. 74; *Madsenia indomita* 35; *Tanystomium gracile* 41.

Strongylocentrotus lividus — see *Paracentrotus lividus.*

* *Strongylocentrotus nudus* (Agassiz) (Ech.). — *Cryptochilum caudatum* 37; *Cryptochilum minor* 39; *Cyclidium stercoris* 50; *Entorhipidium echini* 42; *Entorhipidium tenue* 44; *Entorhipidium triangularis* 45; *Entodiscus borealis* 47; *Madsenia indomita* 35.

* *Strongylocentrotus pulchellus* Agassiz & H. L. Clark (Ech.). — *Cyclidium stercoris* 50; *Entorhipidium echini* 42; *Entorhipidium tenue* 44; *Entorhipidium triangularis* 45; *Entodiscus borealis* 47; *Madsenia indomita* 35.

* *Strongylocentrotus purpuratus* (Stimpson) (Ech.). — *Cryptochilum caudatum* 37; *Cryptochilum minor* 39; *Cryptochilum sigmoides* 40; *Cyclidium stercoris* 50; *Entorhipidium echini* 42; *Entorhipidium pilatum* 43; *Entorhipidium tenue* 44; *Entodiscus borealis* 47; *Euplotes balteatus* 72; *Lechriopyla mystax* 24; *Madsenia indomita* 35; *Schizocaryum dogieli* 28; *Thyrophylax strongylocentroti* 29; *Trichodina* sp. 61; *Urceolaria* sp. 65.

Synapta digitata — see *Labidoplax digitata.*

Synapta galliennei — see *Leptosynapta galliennei.*

Synapta inhaerens (Hol.) — see *Leptosynapta inhaerens*; *Leptosynapta galliennei. Ctenodrilus* sp. 155; *Himasthla leptosoma* 111; *Metacercaria capriciosa* 113; *Rhabdostyla arenaria* 56. (see also introduction, p. 5).

Synapta sp. (Hol.). — *Ophiodromus flexuosus* 149; *Urothoe marina* 218.

T

Thyonidium pellucidum (Flemming) (Hol.). — no umagillids (p. 38).

* *Thyone briareus* Lesueur Hol.). — *Urceolaria synaptae* 62.

Thyone fusus (O. F. Müller) (Hol.). — no umagillids (p. 38).

Toxopneustes droebachiensis — see *Strongylocentrotus droebachiensis.*
Toxopneustes lividus — see *Paracentrotus lividus.*
* *Toxopneustes variegata* — see *Lytechinus variegatus.*
Trichometra cubensis (Pourtalès) (Crin.). — no references.
Trichometra delicata A. H. Clark (Crin.). — no references.
Tripylus fragilis — see *Brisaster fragilis.*
* *Tropiometra carinata carinata* (Lamarck) (Crin.). — *Myzostomum gigas* 132.
* *Tropiometra picta* — see *Tropiometra carinata.*

Z

Zoroaster fulgens Wyv. Thompson (Ast.). — no references.

HOST-ASSOCIATE RELATIONSHIPS

In this section a few general aspects will be discussed, as they emerge from the collected data. In particular, consideration is given to the phenomena of host-specificity, morphological adaptation, and host-susceptibility.

Host-specificity

Among the associates of echinoderms all degrees of host-specificity can be found. Certain associates occur on many hosts ("polyxenous associates"), others seem to be restricted to one or a few related hosts ("monoxenous associates"). In Table I a list is given of the important groups of associates and the average number of host species from which the species of these groups have been recorded. The table clearly shows that there are considerable differences in the degree of host-specificity among the various groups involved.

Table I

Average numbers of host species infected by the species of the most important groups of associates.

Turbellaria	1.4	Myzostomida	2.5
Sporozoa	1.4	Annelida	3.2
Gastropoda	1.9	Trematoda	3.3
Ascothoracica	2.1	Ciliata	4.0
Copepoda	2.4	Bivalvia	4.3

Typically polyxenous associate species are common among the ciliates, the myzostomids, the polychaetes, the semiparasitic copepods, the trematodes and the bivalves. The numerous ciliates which have been recorded from the gut of echinoids show a very low preference for particular host species but they were never found in other echinoderms than sea urchins. It has been pointed out by Berger (1965) in his review of the group that the geographical distrib-

ution of these associates is determined by environmental factors, especially temperature, rather than by the availability of a certain host species. This is a clear case of ecological host-specificity, which means that the animals are associated with ecologically related hosts (cf. Baer, 1971).

A somewhat similar situation is found in certain polychaetes (like *Harmothoe lunulata* and *Ophiodromus flexuosus*), which apparently make use of any burrow of long and slender sand-dwelling creatures. The same may hold for copepods like the species of *Asterocheres, Collocheres,* and *Pseudanthessius.* These are often recorded as "free-living" but they are likely to be knocked off their hosts during rough sampling procedures.

The trematodes recorded from echinoderms are mostly species which parasitize birds and fishes, using echinoderms as second intermediate hosts. They show a remarkable lack of host-specificity and some of them are even known from representatives of other phyla.

Among the bivalves different degrees of host-specificity occur as may be exemplified by *Mysella bidentata* and the *Montacuta* species. The former occurs on a wide variety of hosts, whereas the amply documented species of *Montacuta* show a preference for certain host species. A similar example is presented by the copepod *Cancerilla.* Apparently some polyxenous associates select their hosts rather randomly while others have an obvious preference for one host species or a group of hosts but can manage with another if the preferred ones are not available (cf. Dogiel, 1963: 439). It is of interest to note that the host-preference of the *Montacuta* species is mainly ecologically determined (Gage, 1966b), while the more clearly host-restricted *Cancerilla tubulata* is indeed able to discriminate between its preferred hosts and related ophiurans (Carton, 1968b).

Examples of monoxenous associates are most common among the sporozoans, the turbellarians, the endoparasitic gastropods, and certain groups of copepods.

The Sporozoa are a somewhat neglected group, as may be judged from the paucity of recent papers. According to the scanty data available, the exhibit a high degree of host-specificity, which was also observed for the intestinal turbellarians. The latter group was studied more intensively, and its rather strict host specificity is supported by many negative records, cited at the end of the section Turbellaria (p. 38).

Sometimes an associate occurs in one host in one area and in another host in another area, while the distribution areas of these hosts are not at all or only partly overlapping. In these cases subpopulations (xenodemes) of the associate may be strictly monoxenous. *Pulvinomyzostomum pulvinar, Protomyzostomum polynephris, Enterognathus comatulae,* and *Enteroxenos oester-*

greni may illustrate this phenomenon but again we have to stress the paucity of the available data. Xenodemes of an associate which are isolated geographically or otherwise, may represent cases of incipient speciation. This matter has been discussed a.o. by Bocquet & Stock (1963), Bocquet et al. (1970), and Carton (1964) with respect to some semiparasitic copepods.

The reverse situation is found when cosmopolitan host species carry related associates in different parts of the world, e.g., *Cancerilla* species on *Amphipholis squamata, Montacuta* species on *Echinocardium cordatum,* and ciliates in *Strongylocentrotus droebachiensis.* This is contrary to the general rule that parasite speciation succeeds host speciation (Baer, 1971). It may, however, be explained by unjustified "lumping" of host species or "splitting" of associate species, but differences in rate of evolution may as well account for it.

Morphological adaptation

The echinoderm associates involved in this survey show the entire variety of "parasitic", "epizoic" and "commensalistic" ways of life, as well as all degrees of morphological adaptation. Some associates have an adult morphology which deviates from that of their free-living relatives to such an extent that their taxonomic status could only be established by a study of their embryonic development or their juvenile morphology, e.g. *Protomyzostomum,* the Ascothoracica, and some Copepoda and Gastropoda. The opposite situation is presented by e.g. the Polychaeta and most of the so called "semiparasitic" copepods, which do not differ conspicuously from their free-living relatives.

One might ask whether there is a general correlation between this morphological modification and host-specificity. It is intuitively expected that highly modified associates and endo-associates would tend to be monoxenous, while non-modified associates are polyxenous. This notion seems to be supported by the observations on e.g. the polychaetes, the copepods, the molluscs, the sporozoans, and the turbellarians. However, copepods like *Ophioika appendiculata* and *Micropontius ovoides* and some Ascothoracica present obvious exceptions. It seems to us that generalizations based on the present set of data are of limited significance in establishing the correlation between morphological modification and host specificity. The scrappiness of the data probably results in a large sampling bias e.g. many "monoxenous" associates are difficult to trace and have been recorded only once or twice.

Susceptibility

Certain host species may carry many different associates, while others are recorded to carry only one or two, or none at all. Apparently there are

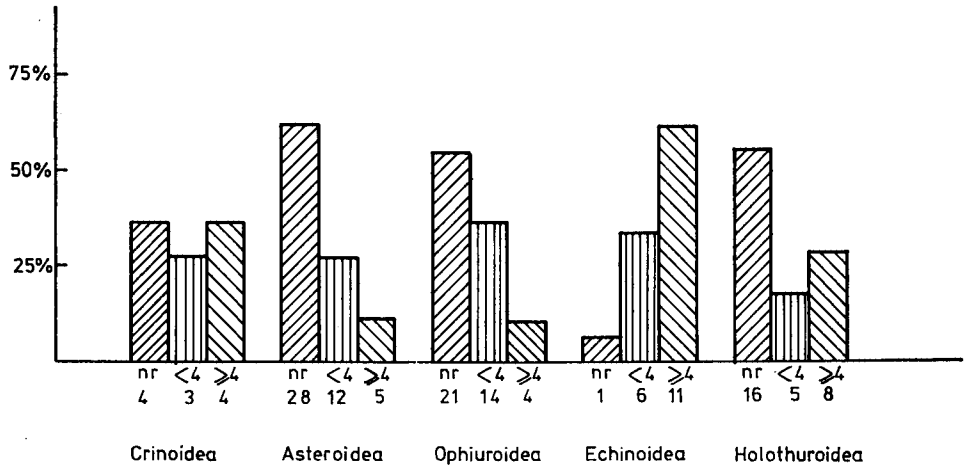

Diagram I. Percentages of host species, within each echinoderm class, which carry no associates ("nr"), only 1-3 ("<4"), or four or more associate species ("≥4"). The numbers represent the actual numbers of host species in each category.

TABLE II

Hosts carrying four or more associate species

Crinoidea		**Echinoidea**	
Antedon bifida	16	*Strongylocentrotus droebachiensis*	32
Poliometra prolixa	13	*Echinus esculentus*	21
Antedon petasus	7	*Echinocardium cordatum*	20
Heliometra glacialis	6	*Spatangus purpureus*	18
		Paracentrotus lividus	17
Asteroidea		*Psammechinus miliaris*	10
Asterias rubens	14	*Cidaris cidaris*	9
Solaster papposus	11	*Sphaerechinus granularis*	9
Astropecten irregularis	9	*Echinocardium flavescens*	8
Marthasterias glacialis	6	*Echinus acutus*	7
Asterina gibbosa	4	*Brissopsis lyrifera*	6
Ophiuroidea		**Holothuroidea**	
Amphipholis squamata	13	*Labidoplax digitata*	13
Ophiothrix fragilis	11	*Leptosynapta galliennei*	13
Ophiura albida	5	*Cucumaria planci*	10
Ophiura sarsi	4	*Stichopus tremulus*	10
		Leptosynapta inhaerens	9
		Holothuria forskali	7
		Chiridota laevis	6
		Leptosynapta bergensis	4

differences in susceptibility. In diagram I the species of each of the five classes of echinoderms are graphically divided into three categories: (a) the species from which no associates have been recorded (nr); (b) the species

from which only one to three associates are known (<4); (c) the species from which four or more associates have been recorded ($\geqq 4$). In table II the species of the last category are listed, with the numbers of associate species known from each of them. Only echinoderms occurring in the NE Atlantic have been included.

In diagram 1 the difference between the echinoids on one hand and the asteroids and ophiuroids on the other hand is most striking. Part of the difference can simply be explained by the fact that many of the echinoderm species are rarely collected abyssal species, which almost exclusively belong to the Asteroidea, Ophiuroidea and Holothuroidea. This obviously results in a large sampling bias, apart from the possibility that the abyssal environment is less attractive for certain groups of associates. Nevertheless the same general trend can be observed when only well-known shallow-water faunas are considered, e.g. those of the Plymouth or Roscoff areas (Plymouth Marine Fauna, 1957; Cherbonnier, 1951). Also in these areas, the proportion of echinoid species from which four or more species of associates are known, is larger than that in any of the other classes. These data suggest that echinoids in general are more susceptible to "parasitization" than the other echinoderms, which probably means that they provide a greater variety of ecological niches.

ACKNOWLEDGEMENTS

Of the many people who have contributed to this paper, prof. dr. L. D. Brongersma and dr. Jaap van der Land are to be mentioned first. Prof. Brongersma (then our teacher in systematic zoology) coached us during the predoctoral period of this study and due to his active interest, travelling funds and working facilities at other institutes became available. For six months Kramers could continue this work as a post graduate at the department of systematic zoology (University of Leiden, The Netherlands).

The stimulating interest and constructive criticism of dr. van der Land have been of great help to us at all development stages of the work, and in fact it inspired us to complete the paper.

The correspondence with marine biologists all over the world helped us in solving all kinds of specific problems. In particular we want to acknowledge dr. A. G. Humes whose advice on the taxonomy of copepods was of great value to us, and dr. J.-P. Changeux who sent us his unpublished research notes.

We are grateful to the librarians of the Teyler Museum (Haarlem, The Netherlands) and of the British Museum, Natural History (London) for the opportunity to study literature in their libraries. A special word of thanks

goes to Mrs. J. Bakker-Olijslagers (Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands) who traced hundreds of books and periodicals for us. A greater part of the figures reproduced from literature needed redrawing. To the artists mr. C. Elzenga and particularly Jan Herzberg we are indebted for accomplishing this substantial task.

The systematic list was scrupulously and inventively recomposed from previous versions by mrs. M. K. I. Vogelsang-Liem, who also patiently reformed our files into an understandable typescript of literature-references.

The following publishers and persons are acknowledged for the permission to reproduce figures from their publications:

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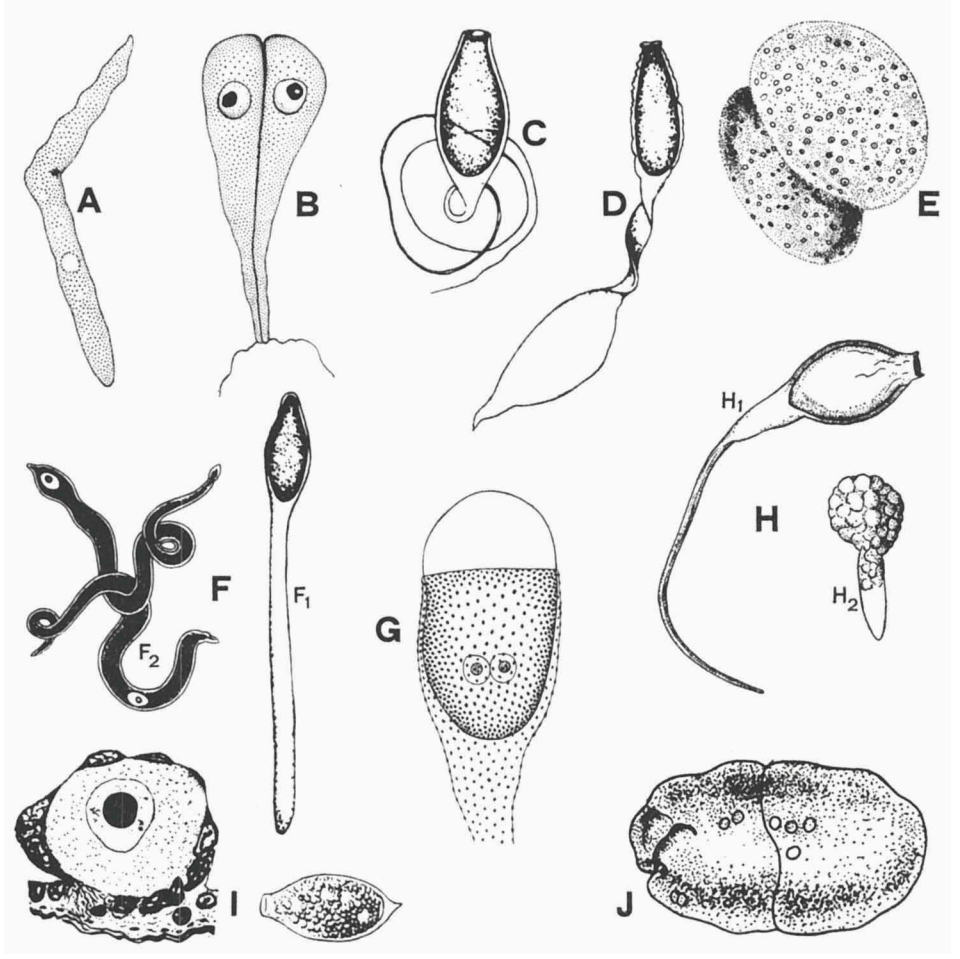


Fig. 1. A, *Urospora synaptae,* vermiform gregarin, freeliving in coelomic fluid (redrawn after Cuénot, 1912). B, *Urospora chiridotae,* two conjugating specimens (redrawn after Dogiel, 1906). C, *Urospora echinocardii,* spore (from Reichenow, 1940). D, *Lithocystis foliacea,* spore (from Reichenow, 1940). E, *Urospora neapolitana,* encysted associates (redrawn after Pixell-Goodrich, 1915). F, *Lithocystis schneideri.* F_1, spore (from Reichenow, 1940); F_2, vermiform stage (redrawn after Légèr, 1897). G, *Lithocystis minchinii,* adults attached to the coelomic epithelium (redrawn after Woodcock, 1906). H, *Lithocystis microspora.* H_1, spore; H_2, zygote (redrawn after Pixell-Goodrich, 1915). I, *Lithocystis brachycercus* (from Kudo, 1966). J, *Cystobia irregularis,* specimen from blood vessel (redrawn after Minchin, 1893).

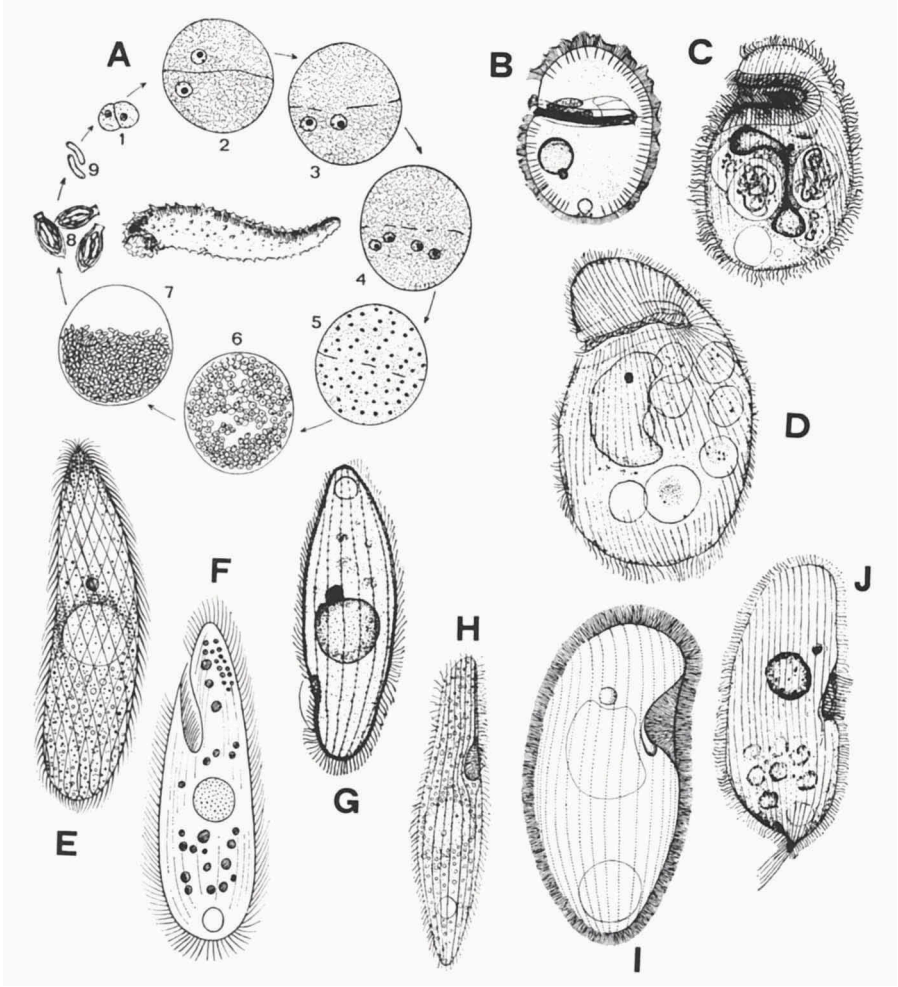


Fig. 2. A, *Cystobia stichopi*, life cycle. 1 and 2, association of two gamonts; 3 and 4, first stages of gamogony; 5, nuclear multiplication; 6, gametocyst with sporoblasts; 7, gametocyst with sporocysts; 8, sporozoites (from Lützen, 1968). B, *Lechriopyla mystax* (from Lynch, 1930). C, *Plagiopyla minuta* (from Powers, 1933a). D, *Plagiopyla nyctotherus* (from Poljanskij & Golikova, 1959). E, *Orchitophrya stellarum* (from Cépède, 1910). F, *Anophrys echini* (from di Mauro, 1904). G, *Anophrys dogieli* (from Poljanskij & Golikova, 1959). H, *Madsenia indomita* (from Holger Madsen, 1931). I, *Colpidium echini* (redrawn after Russo, 1914). J, *Cryptochilum echini* (from Powers, 1933).

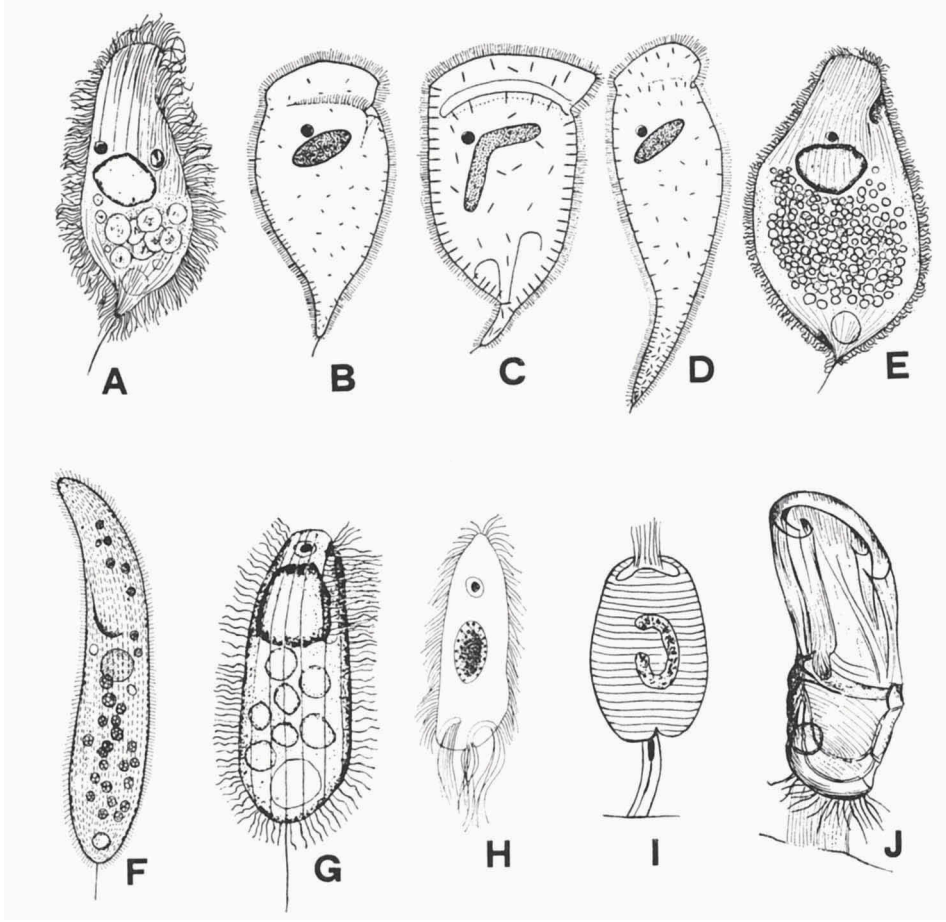


Fig. 3. A, *Tanystomium gracile* (from Powers, 1933a). B, *Entorhipidium echini* (from Lynch, 1929). C, *Entorhipidium pilatum* (from Lynch, 1929). D, *Entorhipidium tenue* (from Lynch, 1929). E, *Entodiscus borealis* (from Powers, 1933a). F, *Philaster digitiformis* (redrawn after Fabre-Domergue, 1885). G, *Cyclidium stercoris* (from Powers, 1933a). H, *Boveria subcylindrica* (redrawn after Stevens, 1904). I, *Rhabdostyla amphiurae* (redrawn after Kahl, 1935). J, *Hemispeiropsis antedonis* (redrawn after König, 1894).

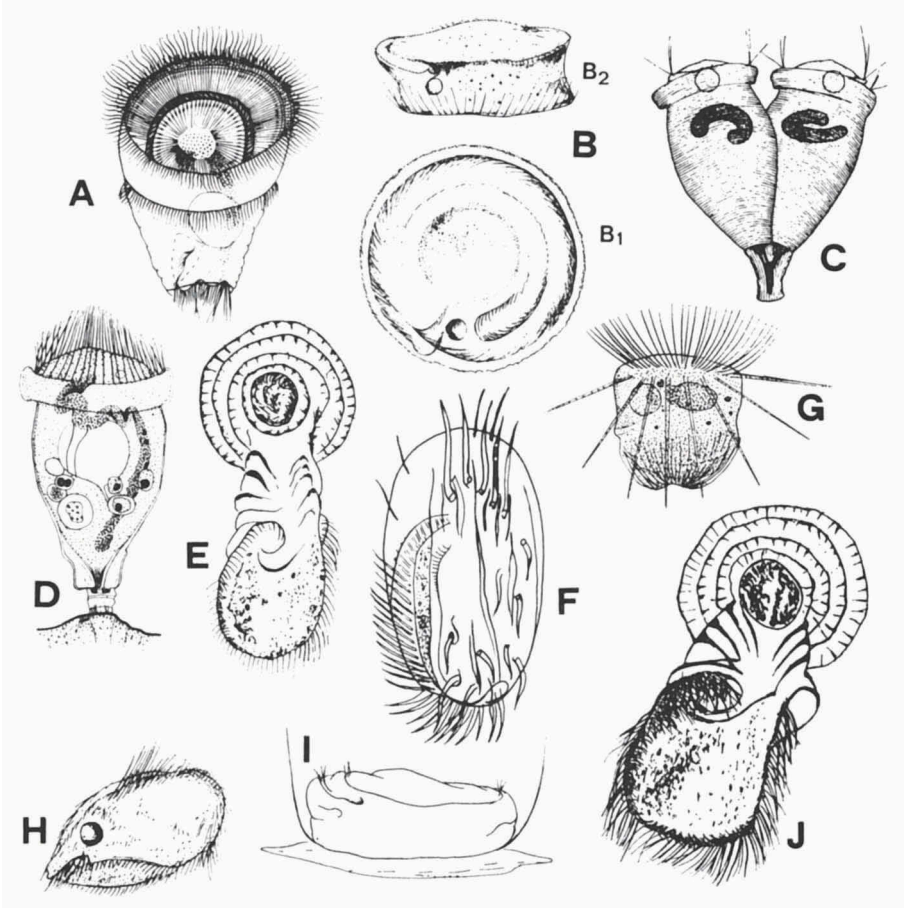


Fig. 4. A, *Urceolaria synaptae* (redrawn after Cosmovici, 1914). B, *Cyclochaeta ophiothricis*. B_1, superior view; B_2, lateral view. (Redrawn after Fabre-Domergue, 1888). C, *Zoothamnium vermicola* (from Precht, 1936). D, *Rhabdostyla arenaria* (redrawn after Cuénot, 1912). E, *Licnophora macfarlandi* (redrawn after Kahl, 1934). F, *Euplotes balteatus* (redrawn after Kahl, 1934). G, *Cyclochaeta asterisci* (redrawn after Gruber, 1884). H, *Hemispeira asteriasi* (redrawn after Fabre-Domergue, 1888). I, *Cyclochaeta astericola* (redrawn after Precht, 1936). J, *Licnophora auerbachii* (redrawn after Kahl, 1934).

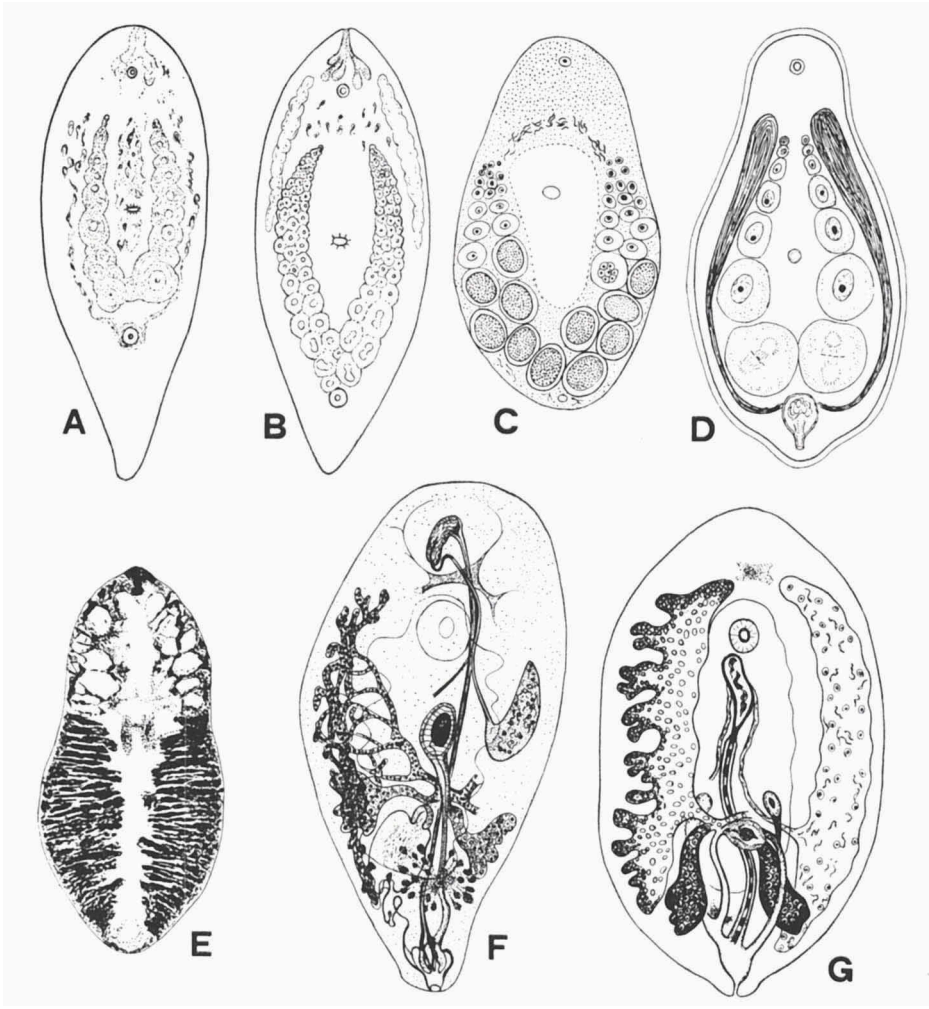


Fig. 5. A, *Avagina incola* (redrawn after Westblad, 1948). B, *Avagina glandulifera* (redrawn after Westblad, 1953). C, *Avagina vivipara* (redrawn after Hickman, 1956). D, *Faerlea echinocardii* (redrawn after Dörjes, 1972). E, *Meara stichopi* (redrawn after Westblad, 1949). F, *Wahlia macrostylifera* (redrawn after Westblad, 1930). G, *Anoplodiopsis gracilis* (redrawn after Westblad, 1953).

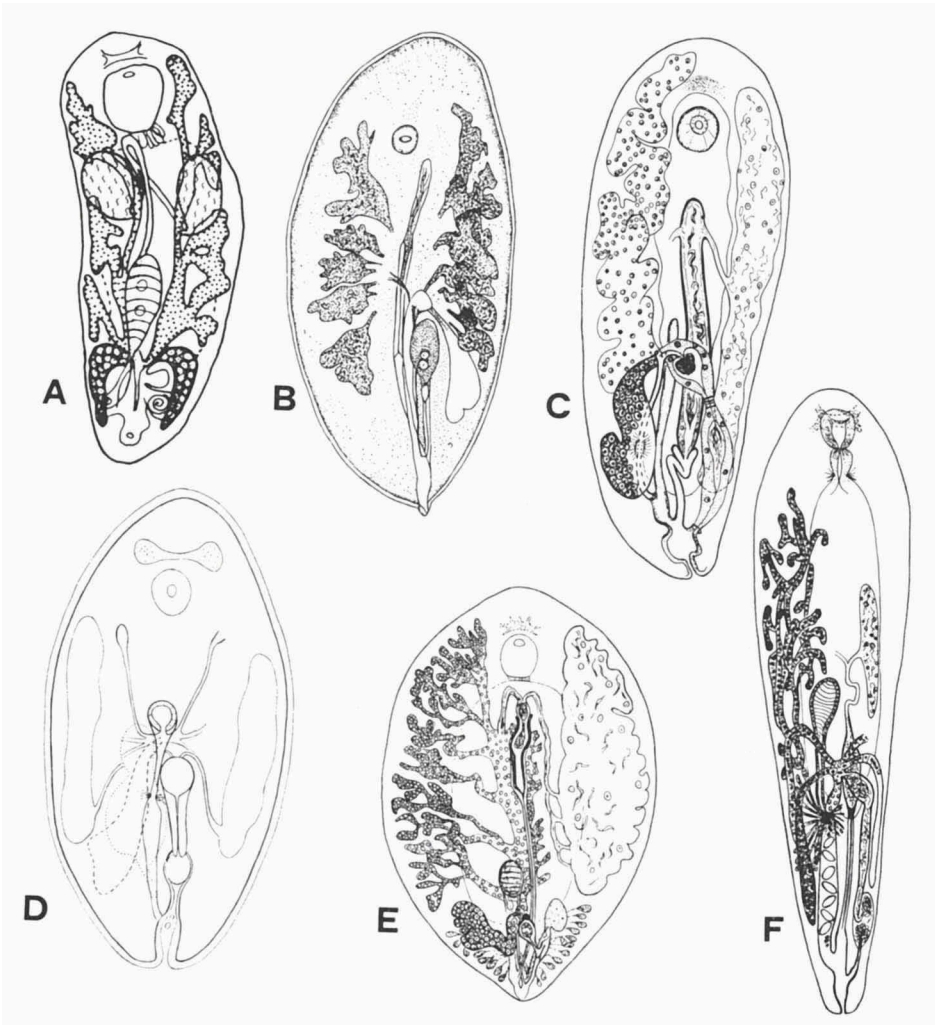
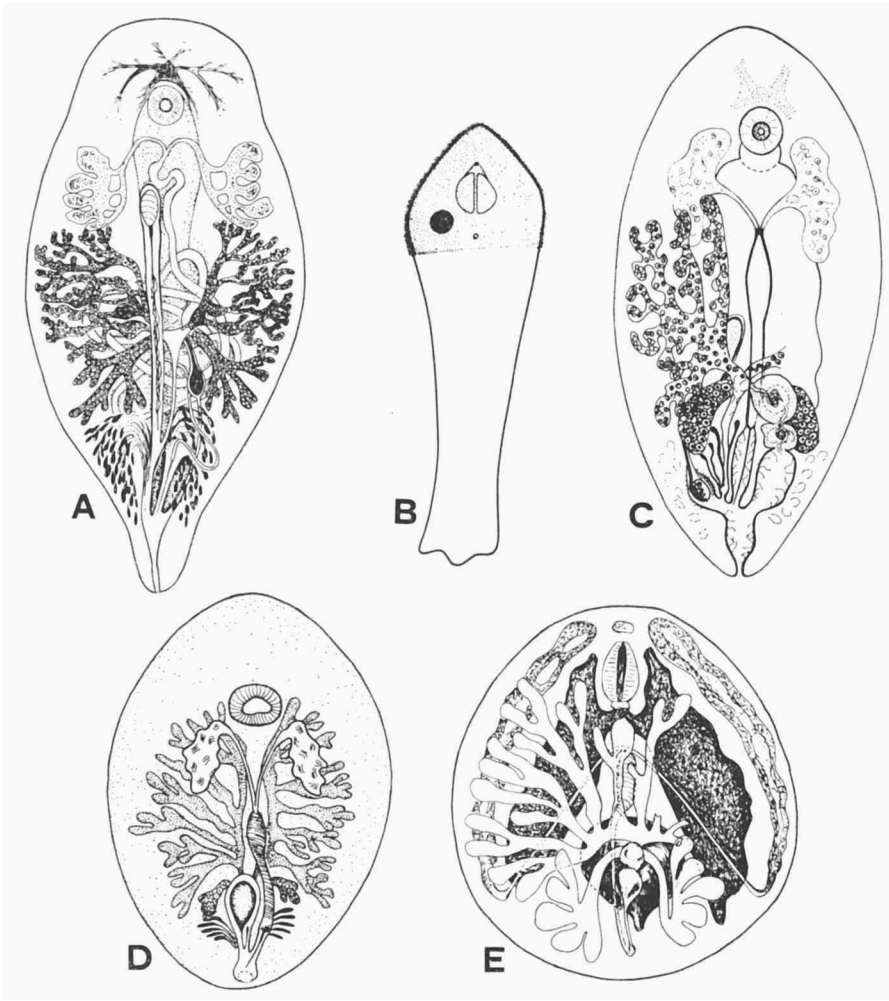


Fig. 6. A, *Umagilla forskalensis* (from Stunkard & Corliss, 1951). B, *Anoplodium gracile* (redrawn after Wahl, 1906). C, *Anoplodium tubiferum* (redrawn after Westblad, 1953). D, *Anoplodium stichopi* (redrawn after Bock, 1926). E, *Anoplodiera voluta* (redrawn after Westblad, 1930). F, *Ozametra elegans* (redrawn after Westblad, 1953).



Fg. 7. A, *Syndesmis echinorum* (redrawn after Russo, 1895). B, *Triloborhynchus astropectinis* (from Bashiruddin & Karling, 1970). C, *Marcusella atriovillosa* (redrawn after Westblad, 1953). D, *Marcusella pallida* (redrawn after Hickman, 1956). E, *Desmote vorax* (redrawn after Beklemišev, 1916).

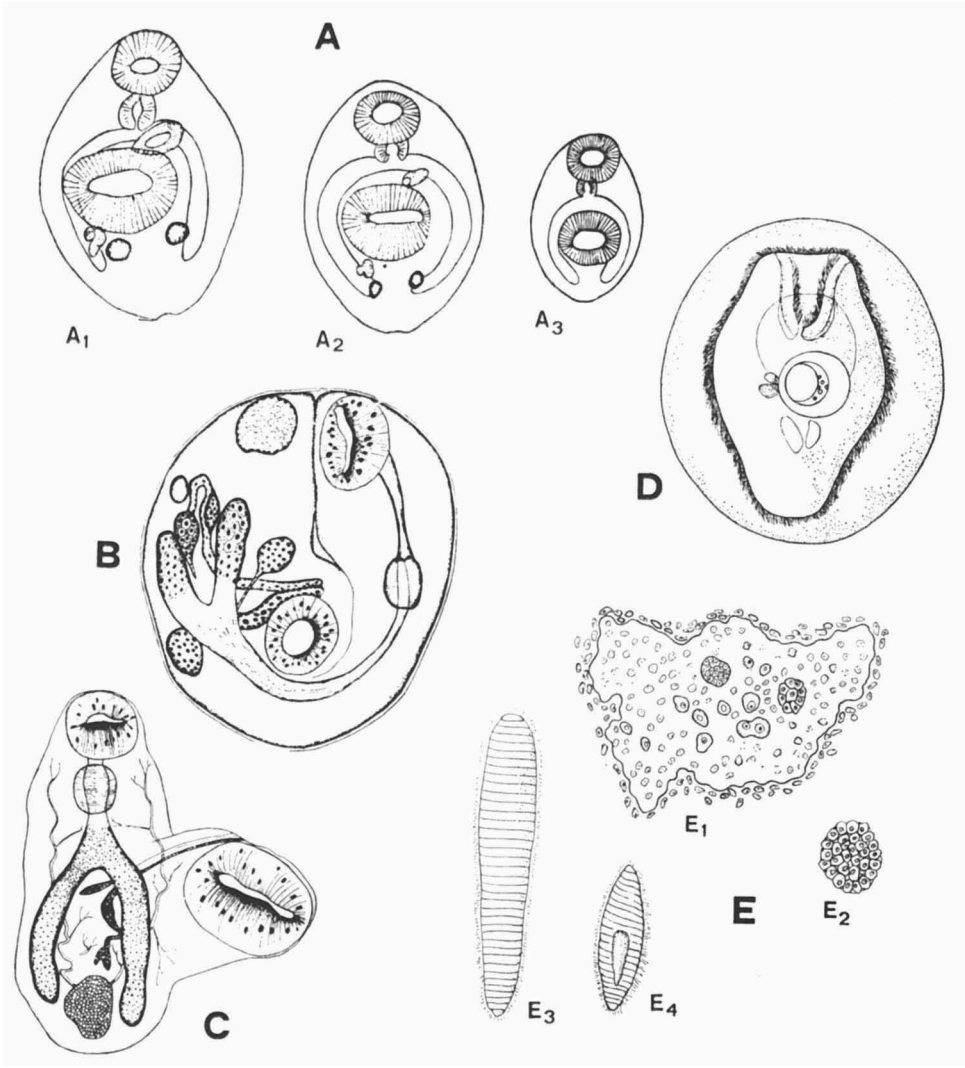


Fig. 8. A, *Fellodistomum fellis*. A_1, adult; A_2, metacercaria; A_3, cercaria. (From Čubrik, 1952). B, *Zoogonus mirus*, metacercaria (from Timon-David, 1934). C, *Metacercaria psammechini* (from Timon-David, 1934). D, *Nidrosia ophiurae*, embryo (redrawn after Mortensen, 1933). E, *Rhopalura ophiocomae*. E_1, male plasmodium; E_2, morula; E_3, free living female; E_4, free living male. (Redrawn after Cheng, 1964).

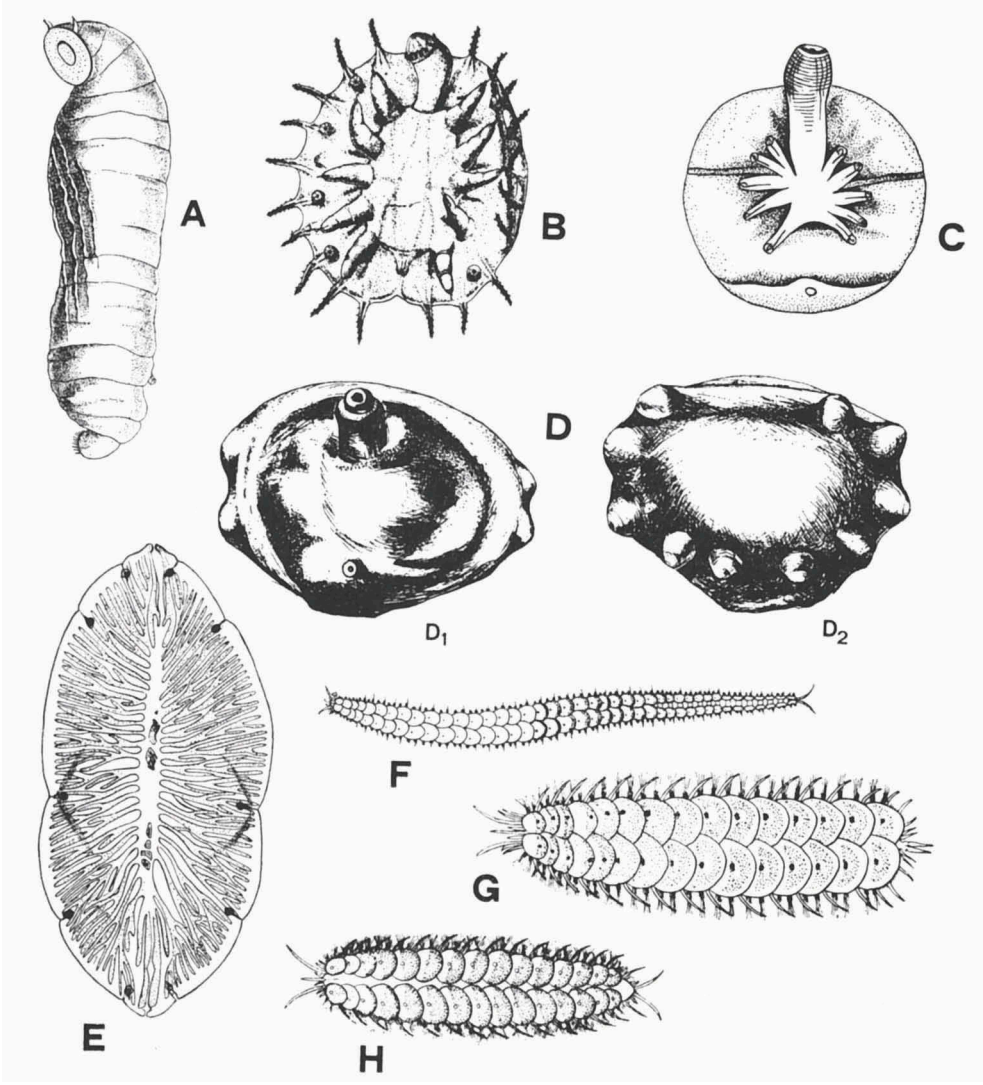


Fig. 9. A, *Zelinkiella synaptae* (redrawn after Zelinka, 1888). B, *Myzostomum cirriferum,* ventral side (from Izquierdo, 1934). C, *Myzostomum parasiticum* (redrawn after Schmidt, 1857). D, *Pulvinomyzostomum pulvinar.* D_1, dorsal view; D_2, ventral view. (Redrawn after von Graff, 1884). E, *Protomyzostomum sagamiense* (redrawn after Okada, 1922). F, *Acholoe squamosa* (from Nicol, 1953). G, *Harmothoe lunulata* (from Nicol, 1953). H, *Malmgrenia castanea* (from Nicol, 1953).

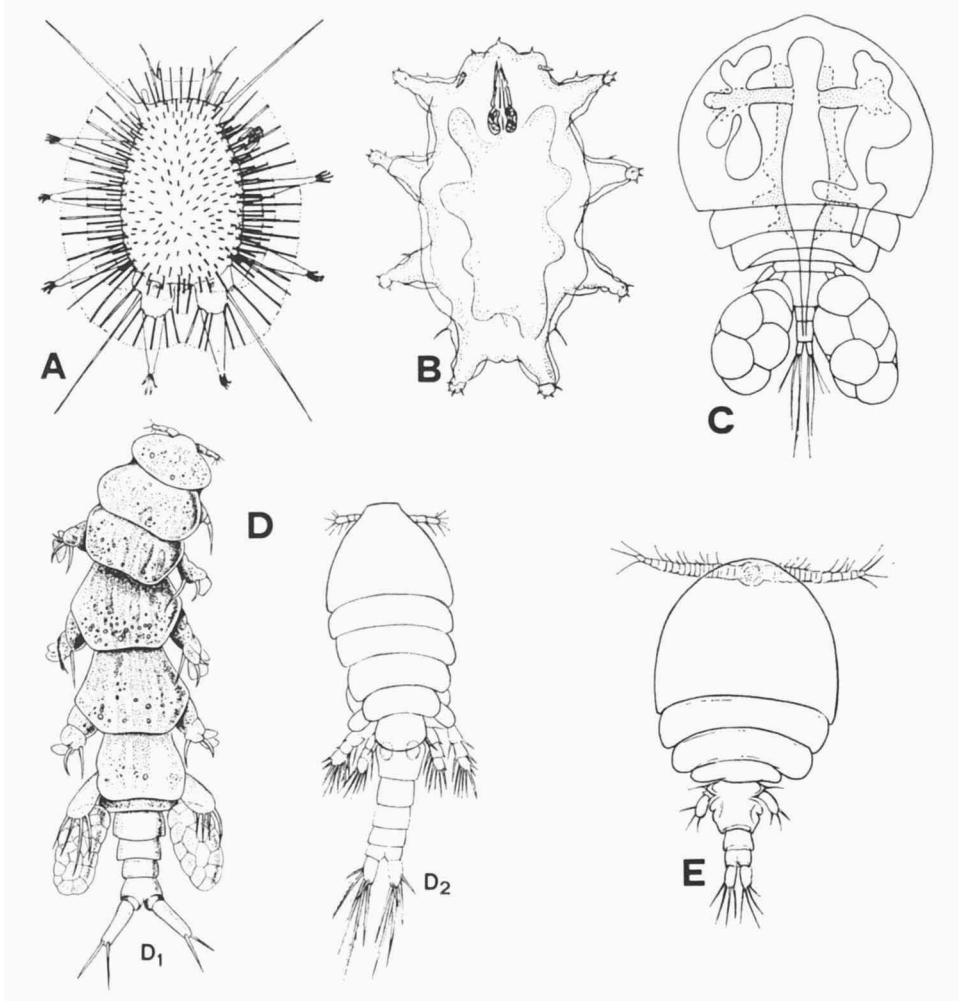


Fig. 10. A, *Actinarctus doryphorus* (from Marcus, 1936). B, *Tetrakentron synaptae* (from Cuénot, 1892). C, *Asterocheres lilljeborgi*, female (from Röttger et al., 1972). D, *Enterognathus comatulae*. D_1, male; D_2, female. (Redrawn after Giesbrecht, 1900). E, *Asterocheres minutus*, female (from Claus, 1889).

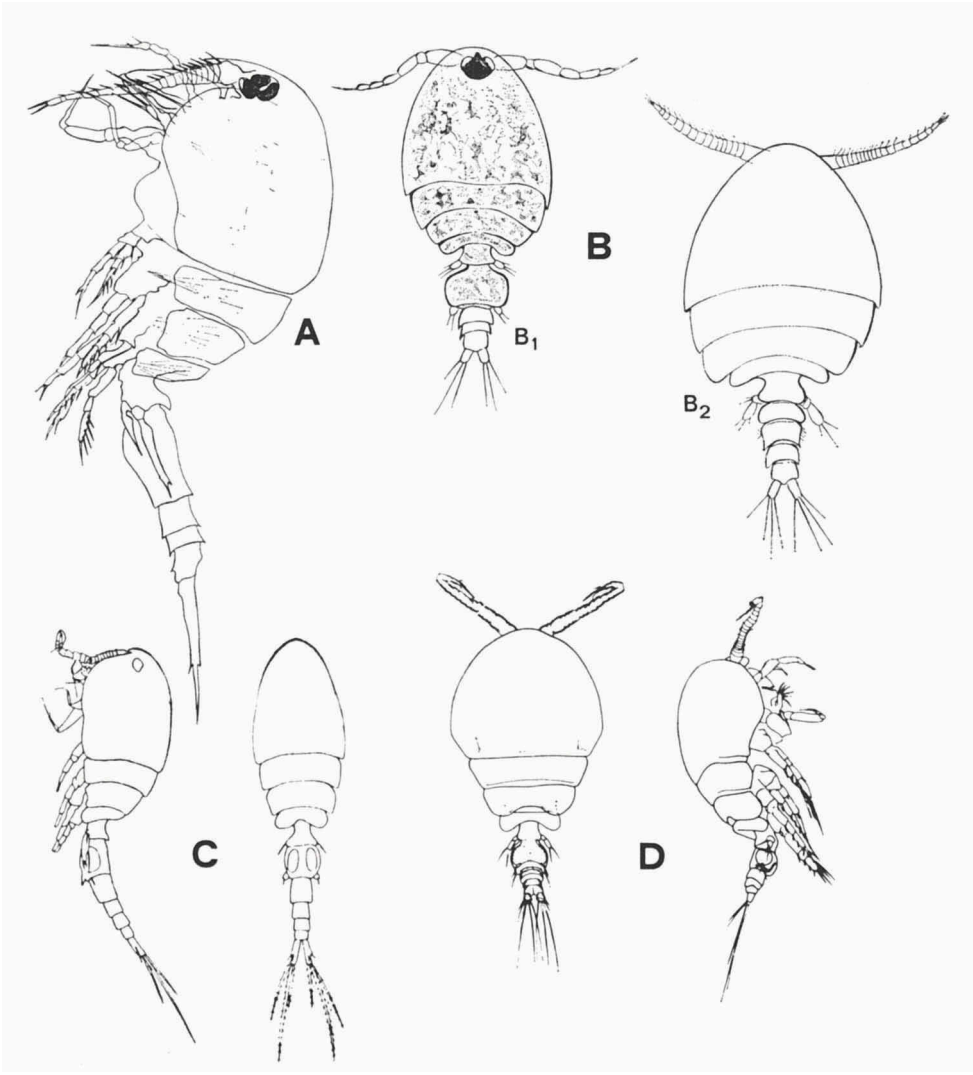


Fig. 11. A, *Collocheres gracilicauda* (redrawn after Rosoll, 1888). B, *Asterocheres violaceus*. B_1, male; B_2, female. (Redrawn after Claus, 1889). C, *Collocheres elegans*, dorsal view and side view (from Grainger, 1950). D, *Scottomyzon gibberum*, dorsal view and side view, male (from Röttger, 1969).

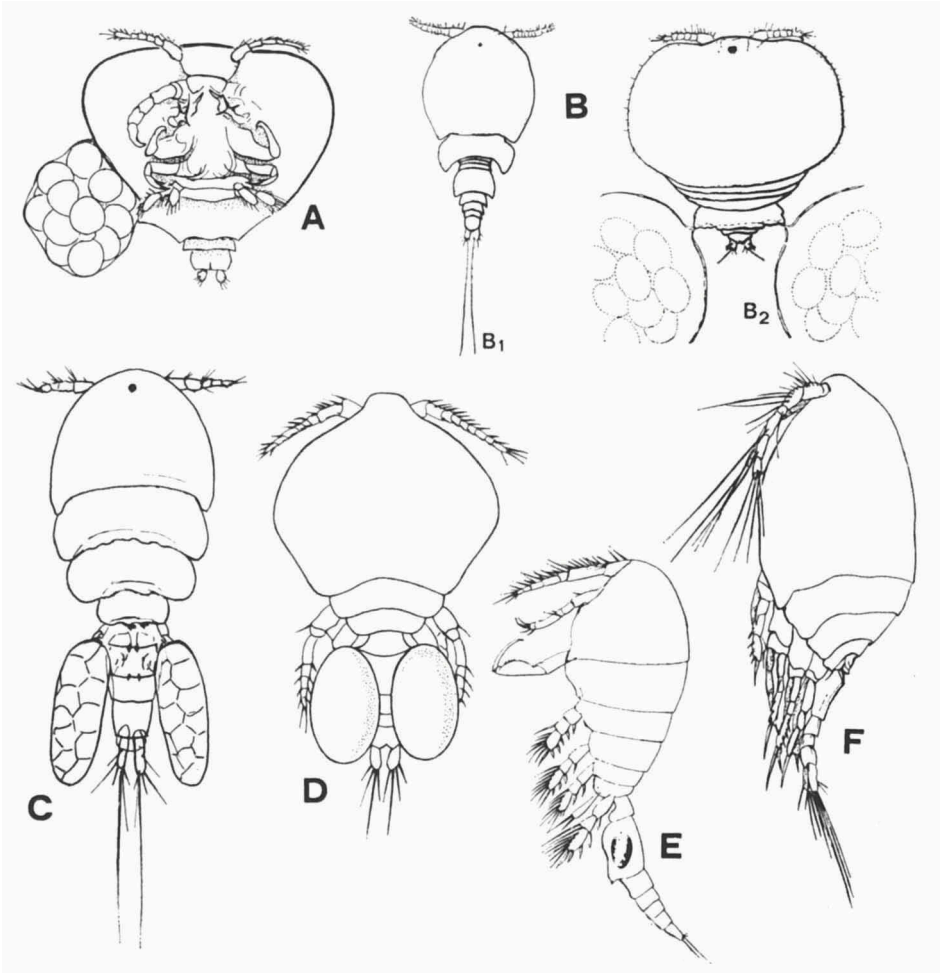


Fig. 12. A, *Cancerilla neozelanica,* female (redrawn after Stephensen, 1927). B, *Cancerilla tubulata.* B1, male; B2, female. (From Carton, 1968a). C, *Presynaptiphilus acrocnidae,* female (redrawn after Bocquet & Stock, 1964). D, *Parartotrogus richardi,* female (redrawn after Scott & Scott, 1893a). E, *Pseudanthessius liber* (from Brady, 1880). F, *Pseudanthessius sauvagei* (redrawn after Canu, 1892).

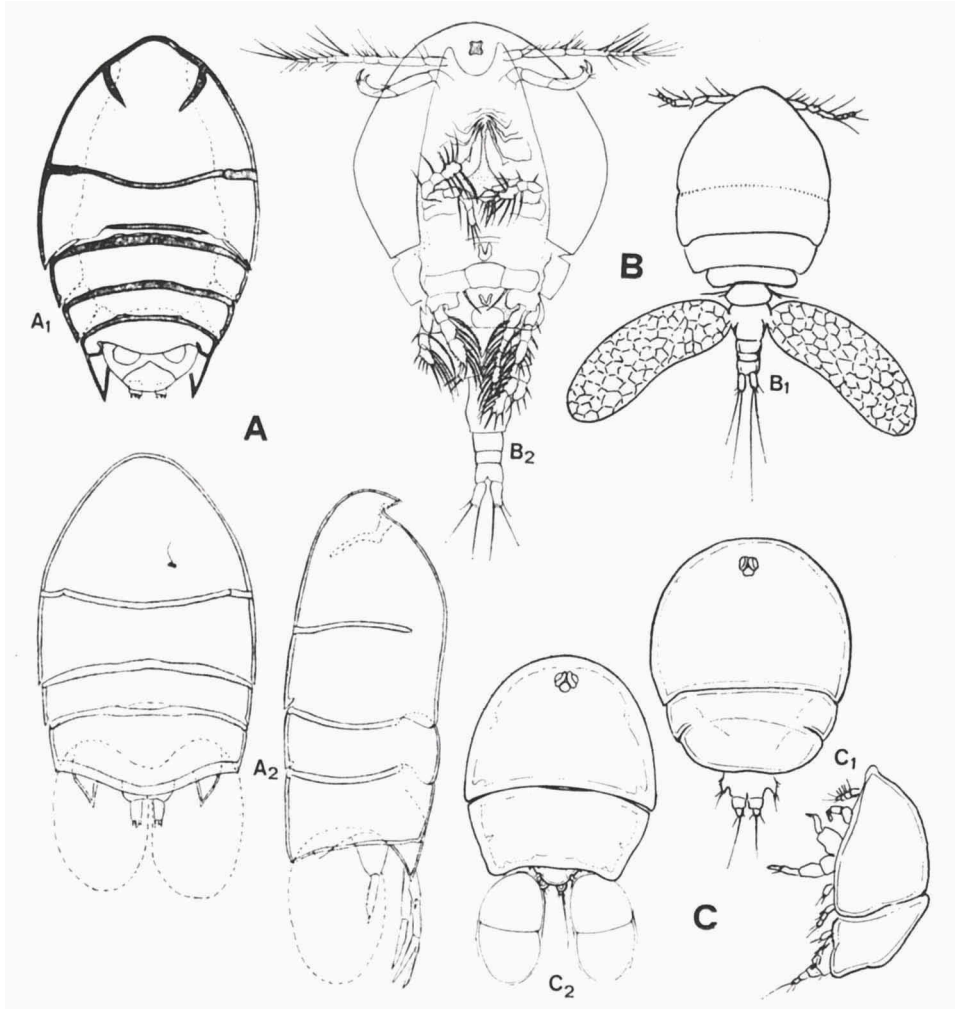


Fig. 13. A, *Micropontius ovoides*. A_1, male; A_2, female. (From Gooding, 1957). B, *Stellicola clausi*. B_1, female (redrawn after Bocquet, 1952); B_2, male. (Redrawn after Rosoll, 1888). C, *Nanaspis ninae*. C_1, male, dorsal view, and side view; C_2, female. (From Bresciani & Lützen, 1962).

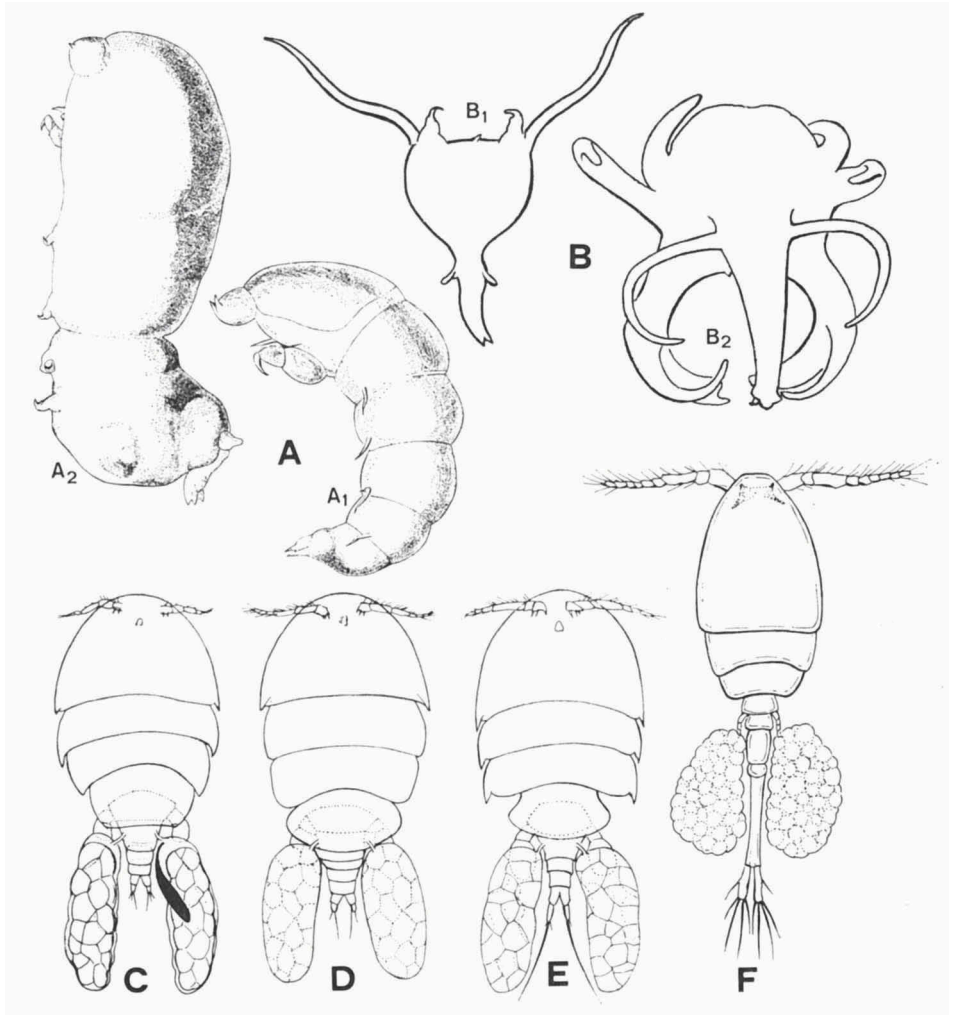


Fig. 14. A, *Chordeuma obesum.* A_1, adult male; A_2, adult female. (Redrawn after Jungersen, 1914). B, *Philichthys amphiurae.* B_1, dwarf male; B_2, female. (Redrawn after Hérouard, 1906). C, *Synaptiphilus cantacuzenei,* female (redrawn after Bocquet & Stock, 1957). D, *Synaptiphilus luteus,* female (redrawn after Bocquet & Stock, 1967). E, *Synaptiphilus tridens,* female (redrawn after Bocquet & Stock 1957). F, *Thespesiopsyllus paradoxus,* female (redrawn after Bresciani & Lützen, 1962).

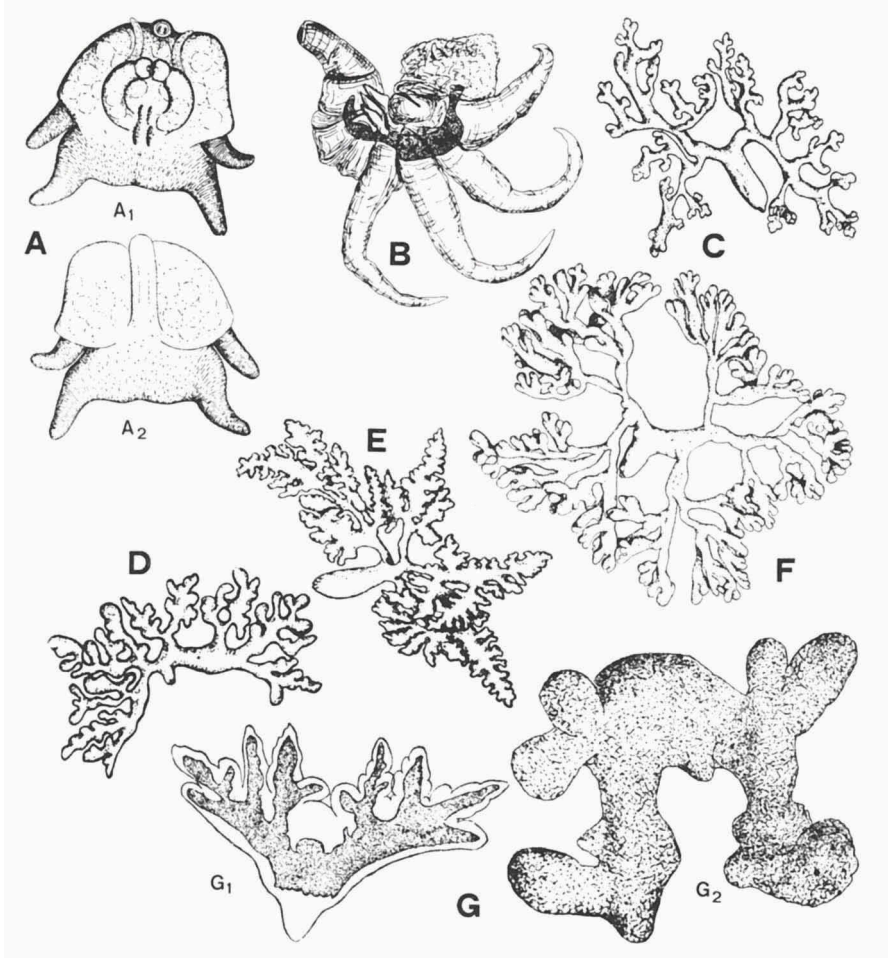


Fig. 15. A, *Parachordeumium tetraceros.* A1, ventral view; A2, dorsal view. (From le Calvez, 1938). B, *Ulophysema oeresundense,* adult specimen (from Brattström, 1947). C, *Dendrogaster rimskykorsakowi* (from Wagin, 1950). D, *Dendrogaster dichotomus* (from Wagin, 1964). E, *Dendrogaster dogieli* (from Wagin, 1950). F, *Dendrogaster murmanensis* (from Wagin, 1950). G, *Dendrogaster astericola.* G1, young specimen; G2, old specimen. (From Knipovič, 1891).

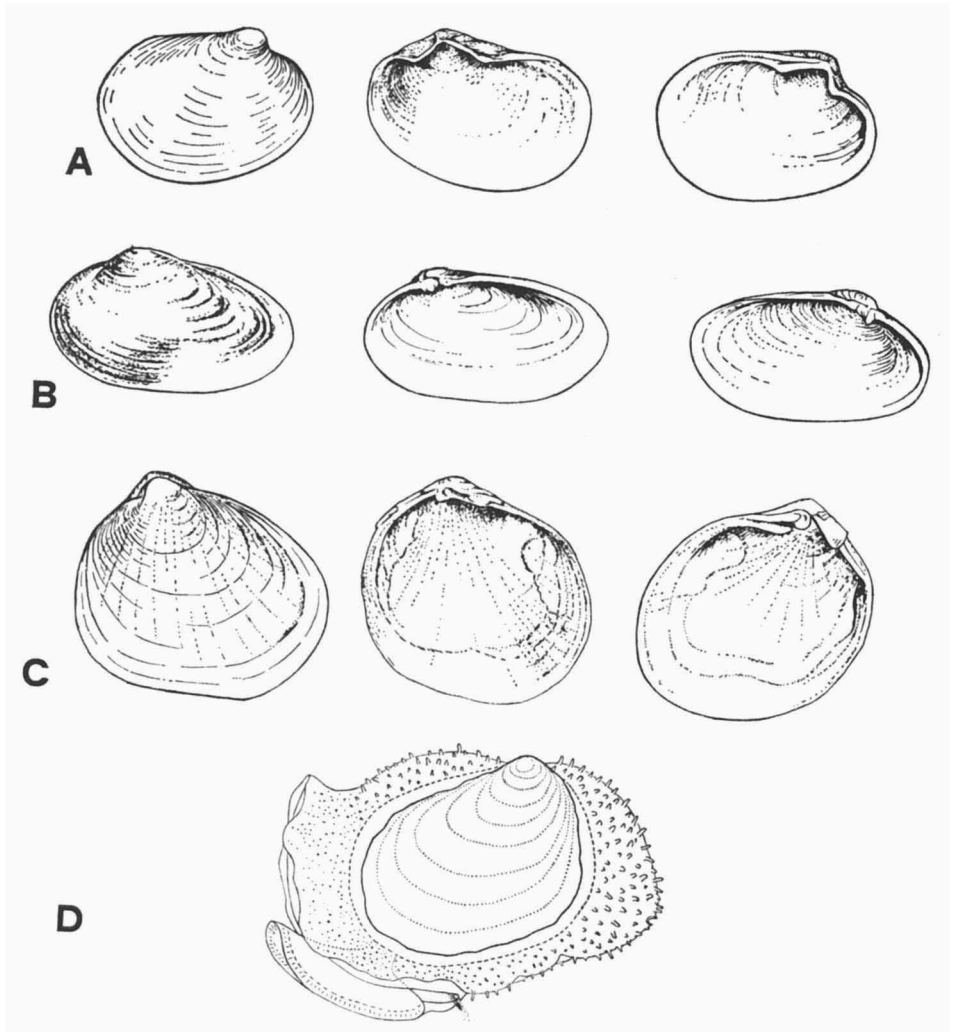


Fig. 16. A, *Mysella bidentata* (redrawn after Tebble, 1966). B, *Montacuta ferruginosa* (redrawn after Tebble, 1966). C, *Montacuta substriata* (redrawn after Tebble, 1966). D, *Devonia perrieri* (redrawn after Popham, 1940).

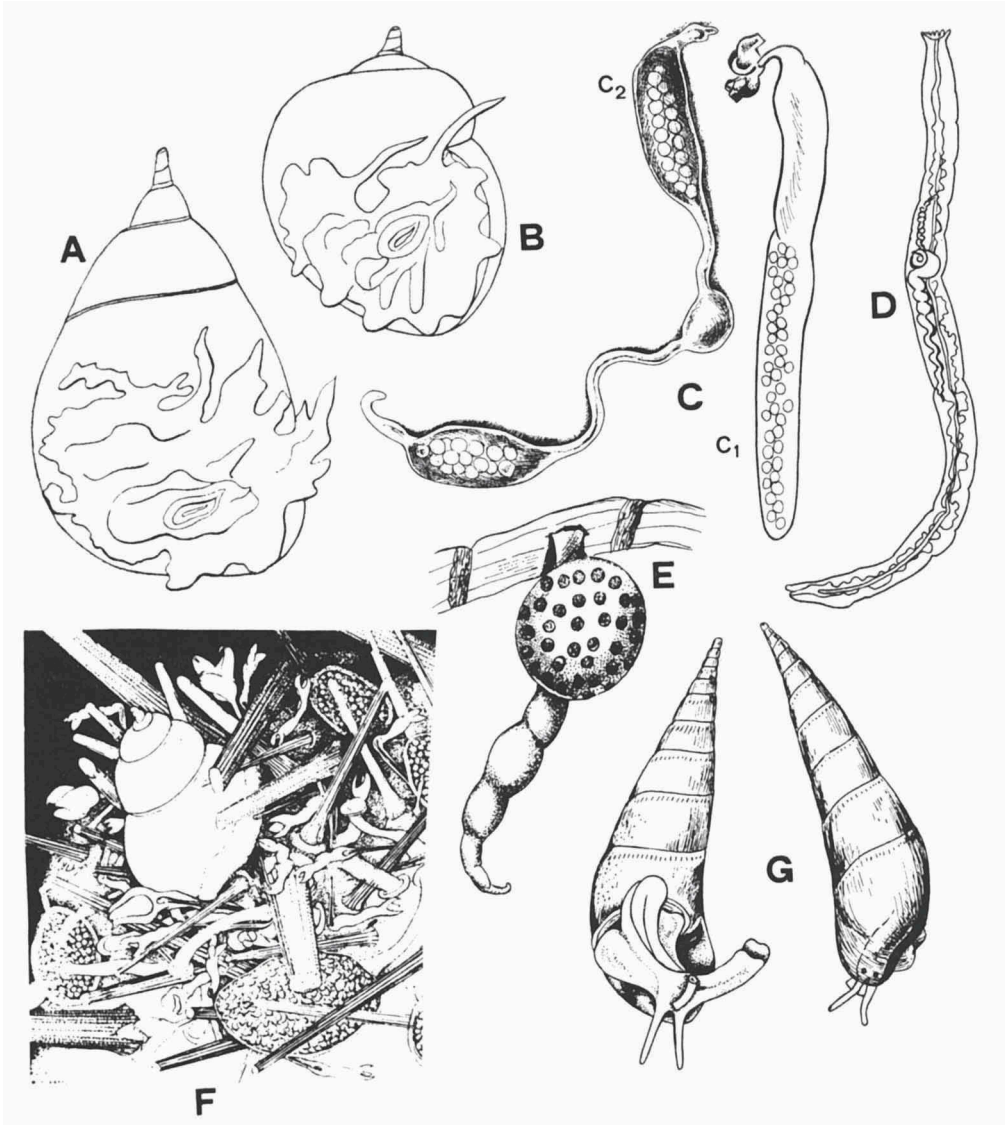


Fig. 17. A, *Pelsenecria profunda* (from Koehler & Vaney, 1908). B, *Pelseneeria media* (from Koehler & Vaney, 1908). C, *Enteroxenos oestergreni*. C_1, sexually ripe specimen; C_2, old specimen. (Redrawn after Bonnevie, 1902). D, *Entoconcha mirabilis* (redrawn after Vaney, 1913). E, *Entocolax ludwigi*, fixed at the skin of the host (redrawn after Voigt, 1888). F, *Pelseneeria stylifera* (from Ankel, 1938). G, *Balcis devians* (redrawn after Fretter, 1955).