

which being based on insufficient material, will, as said above, perhaps have the effect that another name must be attached to the boreal species of the genus *Bathylagus* discussed in this paper.

On the cruises of the "Dana" in the Atlantic as well as in other seas different postlarval fish have been taken which on account of their great likeness as regards the shape of the eyes etc. will certainly appear to be referable to this widely distributed group of deep-sea fishes.

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Vlaams Instituut voor de Zee
Flanders Marine Institute

29989

On the Classification of the Molpadids.

Preliminary notice.

By

S. G. Heding.

The study of the Molpadids in the Zoological Museum of Copenhagen, and especially of those collected by the Danish "Ingolf" Expedition, has shown that the classification of this group as proposed by Clark in 1908 (The Apodous Holothurians) cannot be regarded as quite natural. Already in 1910 Herouard (Sur les Molpadides de Norwège) pointed out that Clark's genus *Molpadia* ought to be divided into at least two, *Trochostoma* and *Molpadia* (= *Ankyroderma* Dan. & Kor.), and in 1914 Sluiter (Die von Dr. Kampen gesamm. Holothurien pag. 25) doubted the possibility of separating Clark's genera *Molpadia* and *Caudina*.

Also the placing of the genera *Gephyrothuria* and *Himasthlephora* has afforded much difficulty. Originally the genus *Gephyrothuria* was placed close to *Psychropotes* by Koehler & Vaney ("Investigator" Holothurians I pag. 78). In 1908 Clark placed this aberrant form as a separate genus of the family *Molpadiidae* and in 1923 Herouard referred it to the *Synallactineae* (Holothurians pag. 30). In 1930 Deichmann (East Atlantic Holothurians pag. 202) again refers both these genera (*Gephyrothuria* and *Himasthlephora*), in regarding them as synonyms, to the *Molpadiidae*. The study of the literature as well as of a new form from the North Atlantic (*Molpadiodemas acaudum* Heding¹⁾), has led me to the supposition that these forms most reasonably may be placed close to the Molpadids, though they cannot be

¹⁾ The description of this species as well as that of the other new species mentioned in this paper will appear in the "Report on the Holothurians of the Danish Ingolf Expedition I" to appear probably in 1932.

referred to the same order, but must form a separate order *Gephyrothurioidea*.

Both the *Gephyrothurioidea* and the *Molpadioidea* are most reasonably to be placed rather close to the *Synallactineae*, with which they agree pretty well in many characters.

The classification of Molpadids here proposed is mainly based upon anatomical characters, and the shape of the calcareous deposits is only used for separating some genera which in other characters are rather alike. As the characters of the water-vascular system and of the longitudinal muscles are used as the main basis of the classification the present system would seem better to express the natural affinity between the different forms, than the older systems which are based mainly upon the shape of the deposits and the relative length of the caudal appendage.

I. *Gephyrothurioidea*.

Holothurians of rather different size. Body not tapering into or supplied with any caudal appendage. Tentacles 15—20. Tubefeet present in the shape of either whiplash-like appendices or of small pedicel-like rudimentary ones, or of both shapes. Longitudinal muscles unpaired. Respiratory trees present.

A) *Gephyrothuria* Koehler & Vaney 1905.

Small apedate holothurians with whiplash-like appendices on the dorsal side of body. Respiratory trees present. Calcareous deposits unknown, probably absent.

1. *alcocki* Koehler & Vaney 1905¹⁾.
2. *europaeensis* Herouard 1923.

B) *Himasthlephora* Clark 1908.

Small apedate holothurians with both whiplash-like and pedicel-like appendices. Caudal appendage absent. Respiratory trees present. Calcareous deposits unknown, probably absent.

1. *glauca* Clark 1908.

¹⁾ The first of the species enumerated under each genus is the genotype of the genus.

C) *Molpadiodemas* n. g.

Large apedate holothurians with small pedicel-like appendages. No whiplash-like ones. Caudal appendage absent. Respiratory trees present, single. Tentacles 20. (Stone-canal absent?).

1. *acaudum* Heding 1932.

II. *Molpadioidea*.

Rather stout holothurians with the body usually tapering into a more or less distinct caudal appendage. Tube feet absent. Respiratory trees present. Tentacles 15 (in *Ceraplectana* only 10) and except in the family *Eupyrgidae* supplied with tentacle-ampullae. An axial-organ? often present.

In 1908 Clark suggests that the *Molpadioidea* does not contain more than a single family. The differences in the arrangement of the stone-canal, in the shape of the calcareous ring, and in that of the calcareous deposits are, however, too great for allowing to regard the old genera *Molpadia* and *Caudina* as belonging to the same family. As our present knowledge of the genus *Eupyrgus* as well as that of the new genus *Paratrochostoma* is too insufficient for placing them in any of the two here proposed families, and as they differ in important characters from both these families, I find it more correct to maintain Semper's family *Eupyrgidae* for these two genera. Whether Clark's genus *Ceraplectana* should form a separate family or it may be referred to one of the others cannot be decided from our rather unsatisfactory knowledge of it.

A. *Molpadiidae* Johs. Müller.

Trochostomidae Østergren 1907.

Molpadids with tentacle-ampullae and with the water-vascular system in connection with the body-cavity (through a well developed madreporite) and also opening to the outside (through a distinct pore-canal which opens close behind the gonoporus). Longitudinal muscles paired, and without any real retractor.

In 1908 Clark referred all the then known species of the family *Molpadiidae* as characterized above, to the genus *Molpadia* Cuv. There are, however, so marked characters in the shape of the calcareous ring and of the deposits of the body-wall, that it is possible to separate

at least five genera. Contrary to Clark's opinion, the presence or absence of anchors and rosettes of racquet-shaped plates are regarded as characters of generic value. Firstly the presence or absence of anchors and rosettes are in strong correlation with differences in the shape of the calcareous ring, and secondly Clark's opinion, that only anchors and rosettes are transformed into phosphatic bodies, cannot hold good, as — according to my observations — in many species also the tables may be transformed into phosphatic bodies

a) *Molpadia* Cuvier 1817.

- Ankyroderma* part. Ludwig 1890 & 92.
 — — Perrier 1902.
 — — Koehler & Vaney 1905.
Molpadia — Clark 1908.
 — — Mortensen 1927.
 — — Deichmann 1930.
 non:
Molpadia Johs. Müller 1850.
 — Semper 1868.
 — Hutton 1872.

Posterior prolongations of radials rather long, faintly bifid and all of nearly the same size. Muscular processes usually perforated or deeply notched (in the side) for the passage of the radial nerves. Exterior side of calcareous ring deeply sculptured for the insertion of the tentacle-muscles and for the passage of the tentacle-ampullae. Deposits of body-wall: tables, anchors and rosettes of racquet-shaped plates and large fusiform or fenestrated plates. Those of the caudal appendage small and fusiform.

Several of the species belonging to this genus are by Clark and Deichmann regarded as synonyms of *musculus*¹⁾ Risso, but the study of several of them shows that the specific variation of this species is not so large as supposed by the named authors. The new species *diploa* Heding and *capensis* Heding differ from *musculus* in having

¹⁾ In 1920 Clark proposed to replace the name *musculus* Risso with *holothurioides* Cuvier. In this he is neither followed by Herouard, Mortensen nor by Deichmann, and also the present author thinks it quite wrong to change the name of this species without stronger reasons, than those produced by Clark.

the muscular processes of the calcareous ring not perforated, and as their calcareous deposits also differ somewhat from those of the other species, they most likely represent a separate genus or perhaps rather a sub-genus.

1. *musculus* Risso 1826 (Baldelli) 1914.
2. *maroccana* (Perrier) 1902.
3. *loricata* (Perrier) 1902.
4. *acuta* (Koehler & Vaney) 1905.
5. *undulata* (Koehler & Vaney) 1905.
6. *intermedia* (Koehler & Vaney) 1905.
7. *agassizii* (Theel) 1886.
8. *danielsseni* (Theel) 1886.
9. *spinosa* (Ludwig) 1894.
10. *perforata* (Sluiter) 1901.

Subgenus: *Paramolpadia* n. subg.

11. *diploa* Heding 1932.
12. *capensis* Heding 1932.

b) *Ankyroderma* Danielsen & Koren 1879.

Posterior prolongations of radials rather long, faintly bifid and all of nearly the same size. Muscular processes neither perforated nor notched for the nerves. Exterior side of calcareous ring deeply sculptured for the insertion of the tentacle-muscles and the tentacular ampullae. Deposits of body-wall: tables and anchors and rosettes of racquet-shaped plates. Fusiform bodies absent except in the caudal appendage.

The species belonging to this genus form a rather natural group which is, in several characters, rather like *Trochostoma* but the presence of anchors and racquet-shaped plates, as well as the shape of the calcareous ring, form good characters for separating the two genera.

1. *jeffreysii* Danielsen & Koren 1879.
2. *affine* Danielssen & Koren 1879.
3. *roretzii* (v. Marenzeller) 1877.
4. *contortum* Koehler & Vaney 1905.
5. *simile* Theel 1886.
6. *dispar* Sluiter 1901.

7. *clarki* (Ohshima) 1915.
8. *diomediae* Mitsukuri 1912.

c) *Pseudomolpadia* n. g.

Ankyroderma-like molpadids which have the anchors either united with a single fenestrated plate, or supplied with more than two arms.

The species included in this genus differ so much from the two other genera with anchors in the body-wall, that they cannot reasonably be united with any of them. Probably future examinations will show that they do not belong to the same genus, but for the present it may be the better course to include them in a single genus.

1. *brevicaudata* (Koehler & Vaney) 1905.
2. *marenzelleri* (Theel) 1886.
3. *tridens* (Sluiter) 1901.
4. *inflata* (Augustin) 1914.

d) *Haplodactyla* Grube 1840.

Posterior prolongations of radials varying, the ventral ones being usually somewhat shorter than the dorsal. Muscular processes perforated for the nerves. Exterior side of calcareous ring faintly sculptured, and without canals for the tentacle-ampullae. Deposits in the body-wall are small tables and large fusiform or three-armed bodies. Anchors and rosettes of racquet-shaped plates are absent.

The name *Haplodactyla* is used here only provisionally. The name has been used in various senses; but as the type-specimen has been lost, and the original description of *Haplodactyla mediterranea* Grube is quite insufficient, it will be necessary to have material from the type-locality examined before we can state definitely in which sense the name has to be used.

1. *mediterranea* Grube 1840.
2. *violacea* (Studer) 1876 (Theel) 1886.
3. *asaphes* Heding 1932.
4. *intermedia* (Ludwig) 1894.

e) *Trochostoma* Danielsen & Koren 1878.

Ventral and dorsal pieces of calcareous ring very different in shape, in the sculpturation, and in the length of the posterior prolong-

ations, the ventral ones of which are the shortest and the midventral often nearly rudimentary. Muscular processes not perforated. Sculpturation of exterior side of calcareous ring rather faint, though traces of canals for the tentacle-ampullae may be present. Deposits in body-wall either tables or irregular rods. Fusiform bodies, anchors and rosettes of racquet-shaped bodies absent. Deposits of caudal appendage often small fusiform bodies.

This genus seems to form a well limited group, though future studies probably may result in the division of it into two or three subgenera.

1. *thomsoni* Danielsen & Koren 1878.
2. *boreale* (Sars) 1859.
3. *arcticum* (v. Marenzeller) 1877.
4. *antarcticum* Theel 1886.
5. *parvum* Theel 1886.
6. *granulatum* Ludwig 1894.
7. *scabrum* Sluiter 1901.
8. *andamanense* Walter 1891 Koehler & Vaney 1905.
- 8a. var. *spinosum* Koehler & Vaney 1905.
9. *elongatum* Koehler & Vaney 1905.
10. *amorphum* (Clark) 1908.
11. *concolor* Koehler & Vaney 1905.
12. *blakei* Theel 1886.
13. *ooliticum* (Pourtales) 1851.
14. *infestum* (Ohshima) 1915.
15. *bathybium* (Clark) 1920.
16. *productamense* (Clark) 1909.

B. *Eupyrgidae* Semper 1868.

Molpadids with 15 tentacles and unpaired longitudinal muscles. Tentacle ampullae absent. Stone-canal long and fastened to the body-wall by a pore-canal, which in *Eupyrgus* is exceedingly thin and terminates anteriorly of the gonoporus, and in *Paratrochostoma* is well developed and opens posteriorly of the gonoporus. Muscular processes of calcareous ring perforated. No real retractors present.

The two genera here united in the family *Eupyrgidae* are in several characters, the shape of the calcareous deposits and the placing of the pore-canal, so different that it is only with some hesitation that

they are united. For the present, however, the unpaired longitudinal muscles and the absence of tentacular ampullae make it practical to unite them.

If my supposition is right, that the molpadids originate from *Synalactidae*-like forms, it may be reasonable to regard *Paratrochostoma* as a primitive form of the *Molpadiidae* and *Eupyrgus* as a primitive form of the *Caudinidae*. The nearly rudimentary pore-canal and the short, thick stone-canal in *Eupyrgus* indicate a beginning disappearance of the pore-canal and of the connection of the stone-canal with the body-wall.

For the present it may be the most reasonable course, however, to maintain Semper's family for these two genera, and to place it between the two families *Molpadiidae* and *Caudinidae*.

a) *Eupyrgus* Lütken 1857.

Radial pieces of calcareous ring with no or with very faint posterior projections. "Anal teeth" often (always?) present. Pore-canal long and thin, fastened to the body-wall anteriorly to the gonoporus. Deposits resembling those of *Caudina*, being irregularly perforated tables with a spiny spire composed of three separate rods.

1. *scaber* Lütken 1857.
2. *pacificus* Østergren 1905.

b) *Paratrochostoma* n. g.

Radial pieces of calcareous ring with well developed posterior projections. "Anal teeth" absent. Pore-canal short and thick, opening with a distinct pore posteriorly to the gonoporus. Calcareous deposits resembling those of *Trochostoma*, being small tables, perforated by usually three to four holes, and with a long smooth spire supplied with a few teeth on the end.

1. *spiniferum* Heding 1932.

C. *Caudinidae* n. fam.

Molpadiidae Østergren 1907.

Molpadids with 15 tentacles. Tentacle-ampullae present. Stone-canal short and only opening into the body-cavity (through the usually rather large madreporite). Longitudinal muscles paired and often (in

Pseudocaudina) supplied with distinct retractors. Caudal appendage more or less well developed (it is totally absent in *Acaudina* Clark).

a) *Caudina* Stimpson 1853.

Tentacles with two pairs of digits. Caudal appendage long and slender. Retractor-muscles absent. Deposits normally tables with spiny spires, "cup"-shaped bodies may often be found among the tables.

1. *arenata* (Gould) 1841.
2. *albicans* (Theel).
- 2a. var. *mediterranea* (Baldelli) 1914.
3. *demissa* (Clark) 1909.
4. *fusiformis* (Augustin) 1908.
5. *californica* Ludwig 1894.
6. *ludwigi* Ohshima 1915.
- ?7. *similis* (Augustin) 1908.
- ?8. *planerpatura* Clark 1908.

b) *Pseudocaudina* n. g.

Molpadia Johs. Müller 1850.

- Semper 1868.
- Hutton 1872.

Tentacles with two pairs of digits. Caudal appendage usually long and slender. Retractor-muscles more or less well developed. Deposits not tables but "cups" (buttons), perforated plates or irregular rods.

1. *chilensis* (Johs. Müller) 1850.
2. *australis* (Semper) 1868.
3. *coriacea* (Hutton) 1872.
4. *ransonetti* (v. Marenzeller) 1881.
5. *obesacauda* (Clark) 1908.
6. *contractacauda* (Clark) 1908.
- ?7. *pigmentosa* (Perrier) 1904.

c) *Aphelodactyla* Clark 1908.

Haplodactyla Selenka 1867.

- Semper 1868.
- Sluiter 1880 & 1888.

Tentacles 15, without digits. Ampullae present. Body gradually tapering into the short caudal appendage. Radials with short but marked posterior projections. Calcareous deposits irregular bodies and small perforated plates. They are usually absent in the body-wall, but then often to be found close to the caudal appendage. No real retractors present.

1. *molpadioides* (Semper) 1868.
2. *punctata* (Sluiter) 1888.
3. *australis* (Semper) 1868.
4. *pellucida* (Semper) 1868.
5. *hyaloides* (Sluiter) 1880.

d) *Acaudina* Clark 1908.

Tentacles with only one pair of digits. Caudal appendage totally absent and body not tapering toward the anus. Retractor-muscles present. Calcareous deposits small stellate perforated plates.

1. *demissa* (Sluiter) 1901.

Incerta sedis.

Genus *Ceraplectana* Clark 1908.

Molpadids with 10 unbranched and horny tentacles, provided with normal ampullae. Body tapering posteriorly into a well-developed caudal appendage. Calcareous ring with ten pieces, the five radial ones with a rather short, faintly bifid posterior projection, and with only one anterior process. This, the muscular process, is, according to Clark's figure (Apod. Holoth. Pl. XIII, fig. 7), perforated for the radial nerves. Respiratory tree single but branching, into two branches. Calcareous deposits irregularly formed tables and fusiform bodies.

1. *trachyderma* Clark 1908.

15.—5.—1931.

On some new Fishes of the Family Gonostomatidae. Preliminary note.

By

Anton Fr. Bruun.

(From The Carlsberg Foundation's Oceanographical Expedition round the World 1928—30 under the Leadership of Professor Johannes Schmidt).

(Plate VIII).

A preliminary survey of the rich collections of fishes belonging to the Family *Gonostomatidae*, brought home by the "Dana"-Expedition 1928—30 from its circumnavigation of the world has revealed a number of species new to science, 3 of which, all belonging to the Subfamily *Maurolicinae*, will shortly be described in the following. — The author is indebted to the Leader of the Expedition for being entrusted with the publication of this material.

Of the *Maurolicinae* only 3 genera have been known until now viz. *Maurolicus* Cocco 1838, *Valenciennellus* Goode & Bean 1895 and *Argyripnus* Gilbert & Cramer 1896, although a lot of material has been brought forward during recent years. It is all the more interesting to note that two of the species, here described as new, differ so much from the three mentioned genera that they must be regarded as representatives of two new genera *Danaphos* and *Thorophos*.

In accordance with this the key to the identification of the genera of this subfamily given by Norman (1930) has to be somewhat extended; furthermore the diagnosis of the genus *Valenciennellus* has to be modified a little, as it does not seem justifiable to base a new genus upon the third new species, whose differences from *Valenciennellus tripunctulatus* (Esmark) can only be regarded as specific.

Before giving the descriptions of the new species the following key to the identification of the 5 genera of the subfamily may be proposed; the abbreviations given in brackets are explained on page 291.