

# ACTINIARIA

## FROM DEPTHS EXCEEDING 6000 METERS

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WITH 1 PLATE

As it may be a long time before all the Actinaria collected by the Galathea Expedition can be worked up, only the species taken at depths of about 6000 meters and deeper down will be treated. Unfortunately, the specimens are not too well preserved. They are usually strongly contracted, and the internal organs are often broken and pressed together which makes the examination difficult. Perhaps, it would have been preferable if more samples had been preserved in formalin which may give better results than samples fixed in alcohol, which was generally used.

### List of Stations and the names of species of each.

#### Station

418. 10°13'N 126°43'E, clay with stones, 10190 m.  
*Galatheanthemum hadale*
419. 10°19'N 126°39'E, clay, 10160-10210 m.  
*Galatheanthemum hadale*
435. 10°20'N 126°41'E, 9790 m.  
*Galatheanthemum hadale*
466. 10°21'S 110°12'E, clay, 7130-7160 m.  
*Paraedwardsia lemchei*
495. 5°26'S 130°58'E, clay, 7290-7250 m.  
*Daontesia mielchei*
649. 35°16'S 178°40'W, clay, 8210-8300 m.  
*Galatheanthemum profundale*,  
*Bathydactylus kroghi*
650. 32°20,5'S 176°54'W, clay with pumice, 6620 m.  
*Galatheanthemum profundale*
651. 32°10,5'S 177°14'W, clay, 6960-7000 m.  
*Galatheanthemum profundale*
653. 32°09'S 176°35'W. 6140-6160 m.  
*Galatheanthemum profundale*
654. 32°10'S 175°54'W, pumice, 5850 m.  
*Galatheanthemum profundale*
656. 35°20'S 178°55'W, 7630 m.  
*Galatheanthemum profundale*

#### Station

658. 35°51'S 178°31'W, sand with clay and stones, 6660-6720 m.

*Galatheanthemum profundale*,  
*Hadalanthus knudseni*,  
and an unnamed species.

### FAM. EDWARDSIIDAE

#### *Paraedwardsia lemchei* n. sp.

Textfig. 1.

The numerous specimens are very badly preserved. The aboral end is physa-like, but whether it is distinctly separated from the scapulus is difficult to decide, because the ectoderm of the whole column is lost. There are, however, apparently, no papillae on the aboral end, and, therefore, it is probable that a physa is present. The scapus is provided with numerous small papillae, clearly visible when the column is contracted. There are definitely no nemathy-bomes. The uppermost part of the column forms a scapulus. The rather long tentacles seem to be 14-16 in number; their arrangement is difficult to make out, but apparently there is no great difference in length between the inner and outer tentacles. The mesogloea of the lateral parts of the actinopharynx is very thick. The retractors of the 8 perfect mesenteries are diffuse, but of rather varying appearance. In figure 1a I have drawn a retractor. The mesogloea of the parietal muscles is very thick, usually thicker than that figured in fig. 1b.

The nematocysts of the tentacles are partly 35-50.8 × (3.5)-4.2 μ, basitrichs, partly 49.3-52.2 × 5.6-7 μ, microbasic *p*-mastigophors (possibly belonging to the actinopharynx); those of the actinopharynx partly 35-49.3 × (3.5)-4.2 μ, basitrichs, partly 43.7-49.3 × 5.6-6.3 μ, microbasic *p*-mastigophors, partly 35.2-42.3 × about 4.2 μ, partly 2.6-3.5 μ, both basi-

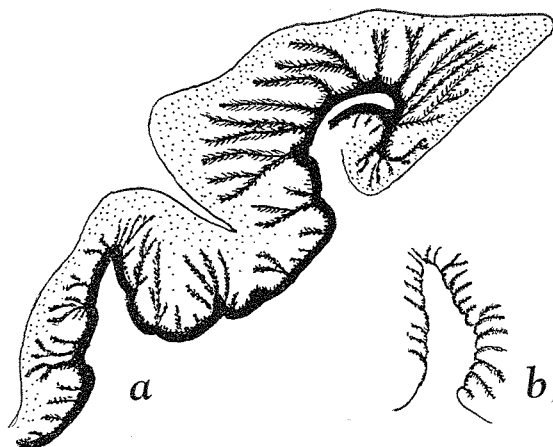


Fig. 1. *Paraedwardsia lemchei*. a, retractor of a mesentery. b, parietal muscle.

trichs (the examination is difficult owing to the poor preservation of the internal organs).

Size in very contracted state: Length up to 2 cm, outer tentacles up to 1.3 cm.

Type locality: Galathea St. 466. The type, 20 mm long, is preserved in the Zoological Museum of Copenhagen.

Occurrence: St. 466, numerous specimens.

Remarks: This species is nearly related to *Paraedwardsia abyssorum* from a depth of 5010-5600 m in the Atlantic, but there are several differences, e.g. in the appearance of the retractors and basilar muscles of the mesenteries. On the whole, the present species seems to be more robust than *abyssorum*. I have referred both species to *Paraedwardsia* though I have not seen any tenaculi, but the numerous mesogloal papillae indicate that such may have been present.

This species is named in honour of Dr. HENNING LEMCHE, Zoologist of the Expedition.

#### FAM. GALATHEANTHEMIDAE nov. fam.

Athenaria the proximal end of which shows a varying shape. Body divisible into scapus and scapulus. Scapus forming a tube into which the animal may withdraw the upper part of the body. Sphincter very strong, mesogloal. The retractors of the mesenteries weak, diffuse.

#### *Galatheanthemum* nov. gen.

Body very elongate, divisible into scapus and scapulus, the former with a very strong cuticle, the outer part of which has been more or less detached

from the inner part, forming a tubus into which the animal may withdraw the upper part of the body. Aboral end of the body round or flattened, in the former case considerably narrower than the upper part of the body. Sphincter strong, mesogloal. Tentacles few, short in comparison with the length of the animal, their longitudinal muscles ectodermal as also the radial muscles of the oral disc. Two siphonoglyphs and two pairs of directives. Six pairs of mesenteries perfect. Mesenteries hexamerously, regularly arranged except for the last cycle which is unilaterally developed. Retractors weak, diffuse, sometimes very weak. Parietal muscles forming coarse folds on a very thickened mesogloea. The mesenteries of the two first cycles fertile. Dioecius. Cnidom: Spirocysts, basitrichs, microbasic *p*-mastigophors.

#### *Galatheanthemum profundale* n. sp.

Textfigs. 2-3. Pl. 1, fig. 2-9.

The body is very long, rather broad in the uppermost part, in the aboral end narrower, sometimes very narrow. The scapus is provided with a cuticle. In the smallest individuals, in size from a few millimeters, the cuticle is not present, certainly usually lost; in the others it is very strong and forms, especially in larger individuals, two layers, the inner sometimes lighter than the outer black-brown one. In larger individuals the outer cuticle is, at least in the greater part of the body, free from the inner cuticle, forming a tube into which the animal can retract its upper part. Sometimes the detachment of the cuticle has occurred periodically so that there are two to four tubes as stuck one into another. The animal is, however, still attached to the primary substratum. The schematic figure 2a shows an animal with four tubes (the soft part is dotted), and the figures 4-6, Pl. 1, specimens with different numbers of tubes. In a "colony" two specimens, the one considerably smaller than the other, are surrounded by a common second tube formed by the larger animal (pl. 1, fig. 4). The smaller specimen undoubtedly have attached itself to the larger one after that its tubes had been developed. Fig. 3 shows a specimen on which a *Scalpellum* is attached in a similar way. The aboral end shows a varying appearance. It is rounded and thin if there is a hole, as in pumice, in which the animal can fasten itself (Pl. 1, fig. 2), otherwise it extends and assumes a more or less irregular appearance or forms a round disc on the underside of which a polished cake of clay a little wider than the disc is attached (pl. 1, figs. 7, 9). The body is

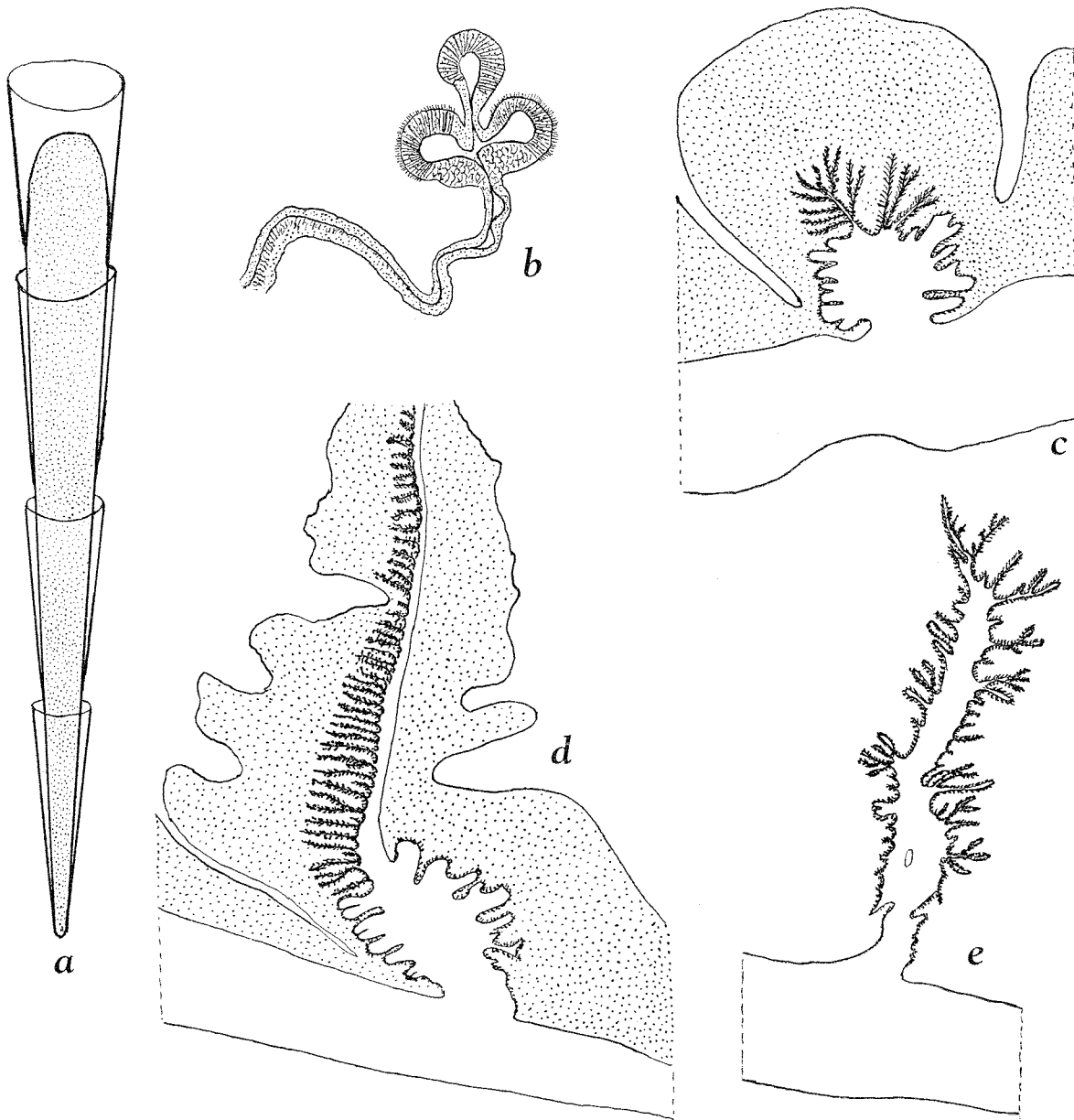


Fig. 2. *Galatheanthemum profundale*. a, schematic figure. b, mesentery of first circle, with filament. c, mesentery of third circle. d-e, mesentery of first circle, in the fertile region and the basal part respectively.

somewhat furrowed in its upper part, indicating the insertions of the mesenteries.

The sphincter is very strong in a sectioned specimen about 0.9 cm long, broad in its upper part, alveolar, but in its lowest thin part with a slight tendency to be reticular. It is completely separated from the endodermal muscles of the column. The tentacles are rather short, about 36 in number. The longitudinal muscles are ectodermal as also the radial muscles of the oral disc. There are two siphonoglyphs and 2 pairs of directives. The mesenteries number about 36. Six pairs are perfect and the arrangement is typically 6+6+6, but one specimen

had 6+6+7 pairs. The mesenteries of the last cycle is as a rule developed only on one side of the mesenteries of the second cycle. There is about the same number of mesenteries distally as proximally. In a specimen (length 9.5 cm) with 38 mesenteries in the upper part there are 36 mesenteries present 1.5 cm from the aboral end. The two first cycles of mesenteries are fertile. The retractors of the mesenteries of the two first cycles are diffuse, weak, and in the fertile region set close to the parietal muscle (fig. 2d) where they are strongest. Inwards the folds of the muscles diminish in size. The parietal muscles show coarse and few folds on a thick stem of the

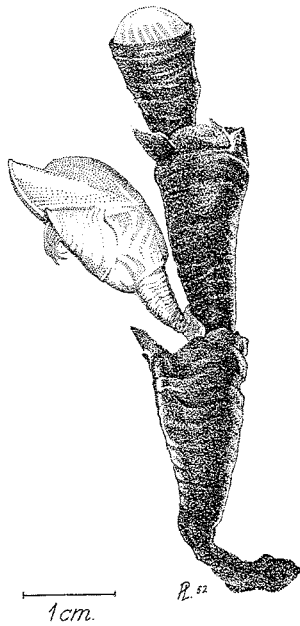


Fig. 3. *Galatheanthemum profundale* from St. 658, with an attached *Scalpellum*. (Poul Larsson del.)

mesogloea (fig. 2*d*). In the lower part of the mesenteries the retractors fuse with the parietal muscles (fig. 2*e*, showing a mesentery of the first cycle). The mesenteries of the third cycle recall the parietal muscles of the other mesenteries, but are on the inside provided with thinner folds, sometimes a little stronger than those which I have drawn in figure 2*c*. The filaments are very well developed on the mesenteries of the two first cycles in the region of the ciliated tract (fig. 2*b*).

The nematocysts of the scapus are partly  $22.6-28.2 \times 4.5-5 \mu$ , partly  $10-11.3 \times 2.2-2.8 \mu$ , both basitrichs; those of the tentacles  $17-24 \times 3-4 \mu$ , sparse, basitrichs; those of the actinopharynx partly  $22.6-29.6 \times$  about  $4.2 \mu$ , microbasic *p*-mastigophors, partly  $22.5-29.6 \times 3.5-4.2 \mu$ , very numerous, partly  $13.4-19.7 \times 2.8-3.5 \mu$ , both basitrichs; those of the filaments partly  $22.6-26.8 \times 3.5-4.2 \mu$ , microbasic *p*-mastigophors, partly  $12-17.6 \times 2.2-2.8 \mu$ , basitrichs. The spirocysts of the tentacles are extraordinarily numerous, up to about  $70 \times 7 \mu$ .

Size: The sectioned type-specimen was 9.5 cm long and 1.2 cm broad in its upper part, but at the base only 0.2 cm. The animals can, however, be a few cm longer.

Type-locality: Galathea St. 658. Type preserved in the Zoological Museum of Copenhagen.

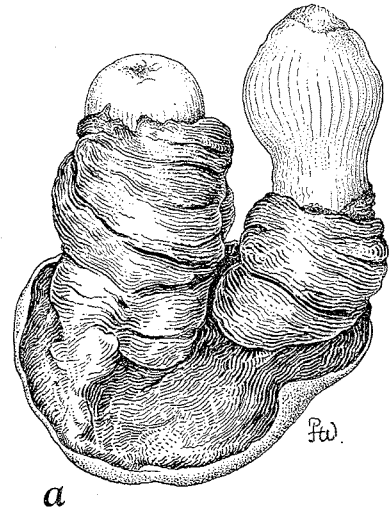
Occurrence: St. 649, 4 large and 4 small specimens. St. 650, about 30 specimens, most of them small. St. 651, 13 small specimens. St. 653, 16 small

specimens. St. 654, 11 small specimens. St. 658, about 40 large and medium-sized specimens and many large tubes. Also several tubes from the other stations.

***Galatheanthemum hadale* n. sp.**

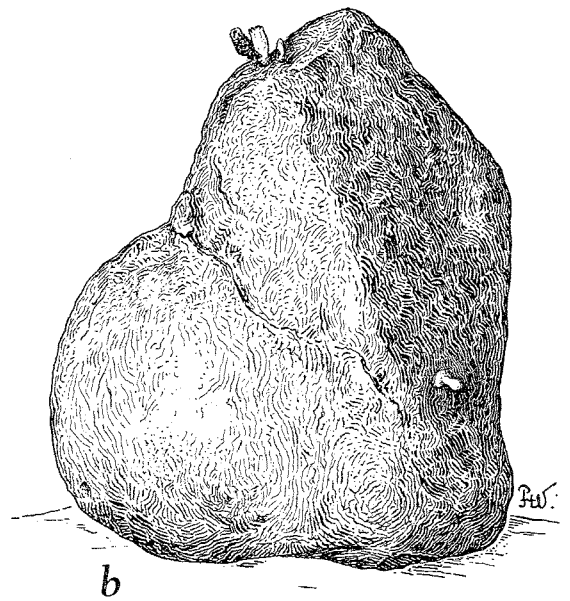
Textfig. 4.

This species does not by far attain the size of the geno-type. The body is elongate, cylindrical, but expands considerably at the base and forms a circular plate, as a rule attached to a polished cake of clay somewhat broader than the disc (see *G. profund-*



a

1 cm



b

10 cm

Fig. 4. *Galatheanthemum hadale*. a, the type. b, a stone from St. 418 with three small specimens. (Poul H. Winther del.)

*dale*). The scapus is provided with a rough, thick cuticle, but it is difficult to decide whether this cuticle forms similar tubes as in the type-species, since it is very wrinkled and closed round the lower half of the column (see fig. 4a). As far as I can see, however, the animal forms a single tube here. The sphincter is mesogloeal, typically reticular, almost as in *Stomphia coccinea*. The tentacles are rather short and probably 48 in number. The pairs of mesenteries are 24 (6 + 6 + 12) in 3 examined specimens, among them 2 pairs of directives. Only the 6 first pairs are perfect. The retractors are in the fertile region much weaker than in the geno-type, and form no distinct pennons. The longitudinal muscles seem to be best developed in their uppermost part where they form a rather broad band over almost the whole mesentery. Since the muscles are not well preserved I can not give any figure of them. The parietal muscles are of the same appearance as those of *profundale* as also the mesenteries of the third cycle. The two first cycles of mesenteries are fertile. The nematocysts of the scapus seem to be absent, or, if present, very rare; those of the tentacles are  $19.7-28 \times 2.8 \mu$ , rare, basitrichs; those of the actinopharynx partly  $28.2-35.2 \times 4.2 \mu$ , microbasic *p*-mastigophors, partly  $19.7-28.2 \times$  about  $2.8 \mu$ , basitrichs; those of the filaments partly  $24-28.2 \times 3-5.5 \mu$ , microbasic *p*-mastigophors, partly  $22.6-26.8 \times 3-4.2 \mu$ , basitrichs. Spirocysts of the tentacles very numerous, up to  $78 \times 7 \mu$ .

Size: One of the largest samples is 2 cm long and 0.7 cm broad in the upper part, at the base 1.5 cm.

Type-locality: Galathea St. 418. The type (fig. 4a) is preserved in the Zoological Museum of Copenhagen.

Occurrence: St. 418, 5 larger and 15 small specimens. St. 419, 4 larger and 14 small specimens. St. 435, 1 large and 1 small specimen.

## FAM. ACTINOSTOLIDAE

### *Hadalanthus* nov. gen.

Column more or less cylindrical, divisible into scapus and scapulus. Scapus with numerous papillae forming weak tenaculi, scapulus ridged. Sphincter strong or very strong, mesogloeal. Tentacles rather long, not numerous, up to about 70, their longitudinal muscles ectodermal as also the radial muscles of oral disc. Two well developed siphonoglyphs and two pairs of directives. Six pairs of mesenteries perfect. Retractors strong, diffuse, below the acti-

nopharynx curved to the exocoels in the nondirectives, towards the endocoels in the directives. Parietobasilar muscles weak. Same number of mesenteries distally and proximally.

Dioecious. At least the two first cycles of mesenteries fertile. Cnidom: Spirocysts, basitrichs, microbasic *p*-mastigophors.

It is with some hesitation that I have proposed this new genus since the type-species in some respects agrees with the genus *Daontesia*. I have, however, not found any acontia in the species and I therefore refer the genus preliminary to the Actinostolidae. In this family a genus, *Tealidium*, has mesogloeal papillae (tenaculi?) on the column, but as it has a stinging battery at the base of the outer tentacles and quite a different appearance our genus cannot be identical with it.

### *Hadalanthus knudseni* n. sp.

Textfig. 5.

The three specimens are as to the habitus in comparatively good condition, but the inner organs are not too well preserved. The column is divisible into scapus and scapulus. The scapus is provided with numerous papillae forming tenaculi which are dis-

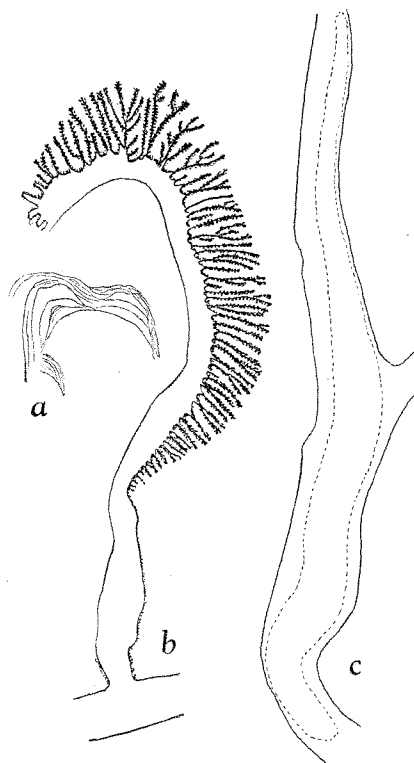


Fig. 5. *Hadalanthus knudseni*. a, cuticle of a tenaculum. b, section of a directive mesentery. c, the extension of the sphincter, the dotted line.

tinctly visible in the smallest specimen and visible in the others too, but owing to the bad preservation I cannot decide whether the ectoderm cells are chitinized. The scapulus is short and distinctly ridged. The sphincter is mesogloecal, about 0.5 cm long, occupying a great part of the mesogloea (fig. 5c) and completely separated from the endodermal muscles of the body, gradually diminishing in size downwards, in structure principally reticular. The tentacles are rather long, the largest individual has about 70 tentacles, the medium-sized about 48; their longitudinal muscles are ectodermal as also the strong radial muscles of the oral disc. Two well developed symmetrically set siphonoglyphs are present. As far as I can see, only 6 pairs of mesenteries are perfect, among them 2 pairs of directives, (fig. 5b). The number of mesenteries is the same proximally and distally. The retractors of the mesentery are diffuse, strong, also present on the mesenteries of the third cycle. Whether pennons are present on the incomplete cycle of the mesenteries of the fourth cycle in the largest specimen I cannot decide. The retractors are curved towards the exocoels in the non-directives, towards the endocoels in the directives, the folds are rather high and branched. The parietobasilar muscles are weak, the basilar muscles distinct. At least the two first cycles of mesenteries are fertile. The nematocysts of the column are  $24-32 \times 2.8-3.5 \mu$ , basitrichs; those of the tentacles partly  $38-43 \times 2.8-3.5 \mu$ , partly  $48-53.6 \times 5 \mu$ , both basitrichs, partly  $39.5-50.8 \times 5 \mu$ , microbasic *p*-mastigophors; those of the filaments partly  $19.7-24 \times 3 \mu$ , basitrichs, partly  $23-48 \times 4.5 \mu$ , microbasic *p*-mastigophors. Spirocysts of tentacles up to about  $50 \times 5.6 \mu$ .

Size of the best preserved specimen (the type): Height and breadth about 3 cm, length of the tentacles up to 1.8 cm. Height of the smallest specimen 1.5 cm, breadth 1 cm.

Type-locality: Galathea St. 658. The type is preserved in the Zoological Museum of Copenhagen.

Occurrence: St. 658, 3 specimens.

Remarks: This species is named in honour of Professor MARTIN KNUDSEN, member of the Galathea Committee.

***Bathydactylus kroghi* n. sp.**

Textfig. 6. Pl. 1, fig. 1.

The body is cylindrical, rather elongate; the pedal disc often somewhat invaginated and often broader than the upper part of the body. The column is

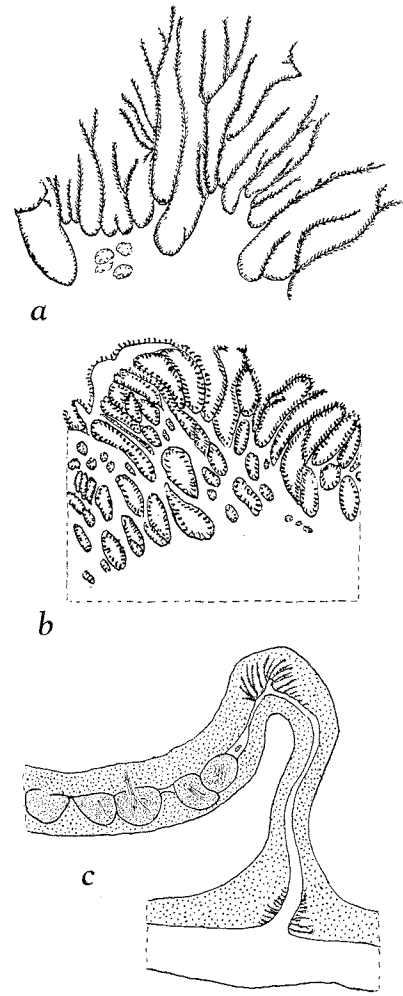


Fig. 6. *Bathydactylus kroghi*. a, section of longitudinal muscle of inner tentacle. b, section of oral disc. c, section of mesentery of second circle in the fertile region.

divisible into scapus and scapulus, the former distinctly furrowed at the insertions of the mesenteries. As all ectoderm of the column is lost it is not possible to decide whether the scapus has been provided with a cuticle. The scapulus forms a more or less distinct wall, on the lower edge of which small tubercles are present. The sphincter is very strong, mesogloecal, completely separated from the endodermal muscles of the column, broad in its upper part, diminishing downwards, alveolar-reticular with coarse mesogloecal meshes. The tentacles are 24 in number, the inner ones are plump and many times larger than the outer ones. The longitudinal muscles, especially of the inner tentacles, are strong, ectodermal; rarely some muscles are enclosed in the mesogloea (fig. 6a). The oral disc is radially ridged, its radial muscles are ecto-mesogloecal, usually stronger on the ridges (fig. 6b). There are two very broad siphonoglyphs and two pairs of directives.

The pairs of mesenteries are 24 (6 + 6 + 12), the last cycle present only at the base of the body. There are thus more mesenteries proximally than distally. Only 6 pairs of mesenteries are perfect, 12 pairs, incl. the directives, are fertile. The species is dioecious. The retractors of the 12 first pairs of mesenteries are weak and of uniform appearance. At the column is a parietal muscle forming fairly many folds in the reproductive region but few folds towards the base of the body. I have in figure 6c drawn part of a mesentery of the second cycle in the fertile region. As far as I can see there are basilar muscles here, at least on the one side of the mesenteries, but they are very weak and sometimes indistinct. The nematocysts of the tentacles are  $15.5-22 \times 3-3.5 \mu$ , basitrichs; those of the actinopharynx partly  $28.2-39.5 \times 4.2-5.6 \mu$ , microbasic *p*-mastigophors, partly  $28.2-33.8 \times 3.5 \mu$ , basitrichs; those of the filaments partly  $28.2-38 \times 5.6-6.3 \mu$ , microbasic *p*-mastigophors, partly  $15.5-2.8 \mu$ , basitrichs, rare. The spirocysts of the tentacles are up to  $62 \times 5 \mu$ .

Size of the largest specimen (the type): Length 3 cm, breadth 2 cm.

Type-locality: Galathea St. 649. The type is preserved in the Zoological Museum of Copenhagen.

Occurrence: St. 649.12 specimens.

Remarks: I have with some hesitation referred the specimens to the genus *Bathydactylus*, of which hitherto only one species is known, taken in a single, small specimen in the Antarctic at a depth of 4635 m. This species, *valdiviae*, has many characters in common with *kroghi*, as for instance the appearance of the body-wall and of the tentacles, the weak muscles of the mesenteries, the presence of more mesenteries proximally than distally etc., but there are also some minor differences. If we include *kroghi* in the genus *Bathydactylus* the diagnosis of this genus must be slightly amended.

This species is named in honour of Professor AUGUST KROGH, Vice-President of the Galathea Committee.

## FAM. BATHYPHELLIIDAE

### *Daontesia mielchei* n. sp.

Textfig. 7.

The habitus of the single specimen recalls very much that of *Daontesia praelonga* (CARLGREN 1942, Pl. III fig. 1) from a depth of 1341-1960 m in the North Atlantic. The long scapulus is provided with numerous very closely set tenaculi of similar appearance

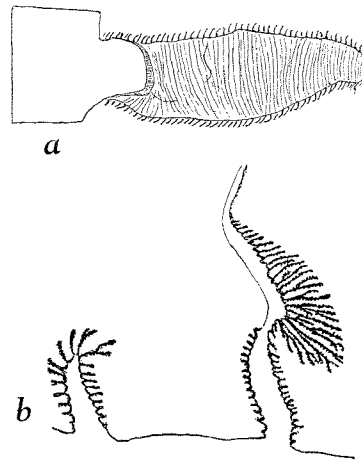


Fig. 7. *Daontesia mielchei*. a, tenaculum. b, section of a mesentery of third order and of part of mesentery of first order.

as those of *praelonga* (fig. 7a). The short scapulus is longitudinally sulcate. The sphincter is mesogloea, very strong. In its upper part it diminishes gradually in size; downwards it becomes alveolar-reticular, but the mesogloea between the muscle meshes is rather thick. There are 48 tentacles, hexamerously arranged, their longitudinal muscles are ectodermal. The interior of the animal is not well preserved. In the upper part 24 pairs of mesenteries are present, among these 2 pairs of directives, at the base 48 pairs. The mesenteries of the first and second orders incl. the directives are fertile. The retractors of the stronger mesenteries are diffuse, set near the column and considerably weaker than in *praelonga*. The mesogloea of the mesenteries of the third and fourth cycles is very thick. The figure 7b shows a section of a part of a mesentery of the first order and a mesentery of the third.

The nematocysts of the scapulus are  $17-19.7 \times 3-4 \mu$ , basitrichs, scarce; those of the tentacles, if present, very rare; those of the actinopharynx partly  $22.6-31 \times$  about  $3-4 \mu$ , basitrichs, partly  $22.6-31 \times 3.5-5.6 \mu$ , microbasic *p*-mastigophors; those of the filaments partly  $25.5-21 \times 3 (3.5) \mu$ , basitrichs, partly  $25.9-31 \times 3-4.2 \mu$ , microbasic *p*-mastigophors; those of the acontia  $32.4-42.3 \times 3-3.5 \mu$ , basitrichs. (The species probably is provided with acontia; though such could not be isolated; but I have examined the lower part of a mesentery where the acontia, if present, are situated and found here rather numerous basitrichs differing in size from those in the filaments). The spirocysts of the tentacles are large, up to about  $70 \times 5.6 \mu$ .

Size in contracted condition: Length 3 cm, diameter of the pedal disc 2 cm, that of the upper part 1.5 cm.

Type-locality: Galathea St. 495. The type, the only specimen known, is preserved in the Zoological Museum of Copenhagen.

Remarks: The species is nearly related to *D. praelonga*, but the appearance of the sphincter and the size of the nematocysts are different, and cinctides are apparently absent in our species, which has more mesenteries at the base than in the upper part of the body. I have re-examined *praelonga* as to the number of mesenteries at the limbus. Unfortunately the base of the largest specimen, smaller than the present one, is badly preserved, but one specimen (length 16 mm) had 48 mesenteries at the base. This difference may be of little importance, perhaps the specimen was not fullgrown.

This species is named in honour of Mr. HAKON MIELCHE, in charge of the Information Service of the Expedition.

#### An unidentified species

At St. 658 13 strongly flattened actinarians are collected besides *Hadalanthus*. They are in a poor condition and somewhat macerated. The pedal disc is very broad, but the column low. In the largest specimen the diameter of the pedal disc is 5-5.5 cm, the height of the column 2-2.5 cm. There is apparently no sphincter. The tentacles are rather numerous, and their longitudinal muscles are ectodermal. There are two well developed siphonoglyphs. There are apparently many perfect mesenteries; in a smaller specimen I counted about 36. The specimens seem to be fertile. Probably the specimens should be referred to a new genus, but owing to their macerated condition I have given up naming them.

#### Remarks

The examination of the Actinaria from the Galathea-Expedition shows that they occur in the

greatest depths of the oceans in rather great numbers both as regards number of species and number of specimens. Reproduction must take place in these depths, as evidenced by the presence of well developed fertile organs, especially testes, as also by the multitude of young individuals. Three of the species treated here can be referred to previously known genera from the Atlantic and Antarctic, the others are representatives of two new genera. Of these the genus *Galatheanthemum* is very interesting, not only by the great adaptation of its proximal end to the substratum, but especially by its power to form a tubus by detachment of the outer part of the very strong cuticle from the inner part in the greater length of the scapus, a detachment which can be repeated during the growth of the animal, so that the cuticle appears as two or more tubes inserted into each other. Into this tube the animal can retract the uppermost part of its body. Something similar has never been observed in any actinarian before.

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