ON SOME OPISTHOBRANCHS FROM CANANÉIA, BRAZIL

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RESUMO Dez espécies de Cananéia e uma de Ubatuba foram colecionadas. Duas das espécies são novas para a ciência: **Coryphella verta** e **Catriona oba**. **Elysia serca** é comparada com **E. clena** Marcus (1970, p. 49). Os gêneros **Cuthona, Trinchesia,** e **Catriona** são discutidos.

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ABSTRACT Ten species from Cananéia and one from Ubatuba were collected. Two of the species are new for science: **Coryphella verta** and **Catriona oba. Elysia serca** is compared with **Elysia clena** Marcus (1970, p. 49). The genera **Cuthona, Trinchesia, and Catriona** are discussed.

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Introduction

The present paper reports the results of collecting, chiefly at Cananéia (25° S, 47° 50' W) in July and December 1968 and January 1969, during my stays with Mrs. Nanna and Dr. Victor Sadowsky, Head of the Research Base of the Oceanographic Institute of the University of São Paulo. To my dear hosts I am grateful for all the kind assistance they gave me. Also Dr. Edmundo Nonato and Mrs. Aydée Nonato received me most cordially at the Research Base of Ubatuba (23° 27' S, 45° 06' W). I thank Dr. Tagea K. S. Björnberg and Lic. Erika Schlenz for helping me to pick the slugs from their substratum. Dr. Liliana Forneris and Dr. Walter

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Narchi brought specimens from Ubatuba and from the Bay of Santos, respectively. Mr. Julio Cardoso, Cananéia, provided many well-chosen tufts of substratum.

The following list contains only species to which I have something to remark or recent new finding places to add; those already known from Cananéia, or occurring both to the north and to the south, are omitted.

List of species

Cephalaspidea

1. *Acteon cumingii* A. Adams, 1854.
2. *Aglaja unsa* Marcus, 1969.
3. *Haminoea elegans* (Gray, 1850).

Ascoglossa

4. *Elysia serca* Marcus, 1955. Figs. 7-8.

Doridoidea

5. *Awuka spazzola* Marcus, 1955.
6. *Doridella carambola* (Marcus, 1955).

Dendronotacea

7. *Miesea evelinae* (Marcus, 1957).

Eolidoidea

8. *Coryphella verta,* spec. nov. Figs. 9-15.
9. *Catriona perca* Marcus, 1958. Figs. 24, 25.
10. *Catriona oba,* spec. nov. Figs. 16-23.
11. *Tenellia pallida* (Alder and Hancock, 1855).

Acteon cumingii A. Adams, 1854

Reference. — Pilsbry, 1895, p. 162, pl. 19, figs. 16, 17.
Material. — Near Ubatuba ,May 1968 (L. Forneris), one living specimen with reddish shell, 14 mm long.

Further distribution. — From Florida to Rio de Janeiro.
Remark. — This is the southernmost finding of *A. cumingii*.

2. *Aglaja unsa* Marcus, 1969 Figures 1-2

Reference. — Marcus, 1969, p. 1, figs. 1-3
Material. — Cananéia, 3-5 m, shelly sand and mud, July 1968, 8 specimens.
Further distribution. — Off Ubatuba.
Remarks. — The present animals were up to 7 mm long alive, ivory with a pattern of melanophores which leaves the borders of the shields and parapodia free. These borders are white, not light blue as in the original population. The Hancock's organs consist of several transverse brown folds between the head and the foot. All 8 specimens have a well developed, 2 mm-long flagellum on the left side of the mantle shield (Fig. 1). Preserved the snails measure 2.5 mm. The calcareous shell (Fig. 2) is crescent-shaped, about 1 mm in diameter, and has a thickened columella.

The male atrium has a length of 1.5 mm, preserved; the penial papilla is beset with a number of spiny warts as in the previous specimens.

3. *Haminoea elegans* (Gray, 1850)

References. — Marcus, 1967, p. 599 (references); 1970.
Material. — Cananéia, July 1968, one empty shell, 4.5 mm long.
Further distribution. — Florida to Brazil, São Paulo; Mauretania (Marche-Marchad, 1958, p. 39).
Remark. — Cananéia seems to be the hitherto southernmost locality.

4. *Elysia serca* Marcus, 1955 Figures 7-8

References. — Marcus, 1955, p. 11, figs. 49-52; 1957, p. 413, 415, fig. 45; Hosoe, 1956.
Material. — Cananéia, from algal growth on a boat in estuary, January 1969, one 1.5 mm-specimen. Ubatuba, tidal zone, among algae, March 1969, 9 specimens.
Remarks. — The colours of the young slug from Cananéia are slight-

ly different from those previously described. There are no melanophores (Hosoe, 1956, p. 6) but orange red gland cells (Fig. 7) instead of white spots. The specimens from Ubatuba have the same colours as the original material.

The radula (Fig. 8) contains 27 teeth, 4 incipient ones, 16 in the upper, and 7 in the lower limb, the largest of which, n.os 16-25, bear a median row of denticles on the cutting edge. The small *Elysia clena*. Marcus (1970, figs. 80, 89-90) from Curaçao and Barbados (Figs. 3-6) is very similar to E. *serca*. In both the reproductive organs are alike. The radula of *E. clena* (Figs. 5, 6) has up to 51 teeth, 22 of which in the ascus. It differs from that of *E. serca* (Fig. 8) in that the 27 smaller teeth, up to 55 μ long, have fine denticles, while the larger ones have a quite smooth cutting edge. In *E. serca* only the large teeth, from 45 to 150 μ long, have strong denticles (1955, fig. 52).

The radula of *Elysia catulus* (Gould, 1870) is similar to that of *E. serca* and E. *clena*. It has no denticles (Bergh, 1886, p. 19). According to Bergh (p. 17) the dorsal vessels of *E. catulus* (l. c., pl. 3, fig. 15) differ from those of the other species of *Elysia*. The mentioned figure shows an unpaired, median, backward, ramified vessel, while there is a pair of ramified vessels in *serca* (1955, fig. 49) and *E. clena*. (1970, fig. 80). The systematic value of the vascular ridges was stressed recently (Marcus, 1970).

5. *Awuka spazzola* Marcus, 1955

Reference. — Marcus, 1964, p. 199.

Material. — Cananéia, under stone in the tidal zone of the lagoon, December 1968, one specimen.

Remark. — This is the hitherto southernmost finding of the species.

6. *Doridella carambola* (Marcus, 1955)

References. — Marcus, 1951, p. 163 (*Corambella carambola*); Franz, 1967 ,p. 75 (*Doridella c.*).

Material. — Cananéia, July and December 1968; 15 specimens on Hydrozoa.

Further distribution. — Coast of São Paulo, Brazil.

7. *Miesea evelinae* (Marcus, 1957)

References. — Marcus, 1957, p. 466 (*Embletonia e.*); 1961, p. 148 (*Miesea e.*).

Material. — Cananéia ,from algal growth on a boat in estuary, January 1969, 20 specimens.

Further distribution. — Beaufort, N. C., Brazil, from Ubatuba to Santos.

Remark. — This is the southernmost locality.

8. *Coryphella verta,* spec. nov. Figures 9-15

Material. — Cananéia, on *Eudendrium* in front of the Base, July 1968, 4 specimens.

Description. — The living slugs were up to 11 mm long and 3 mm high, preserved, 7.5 and 2.3 mm, respectively, tapering from the heart to the pointed tail. The rhinophores, 2.5 mm long, and tentacles, 1.5 mm in length, are smooth, slightly wrinkled in preserved state. The angles of the foot are 1.5 mm long in life. The cerata stand in about 6 longitudinal groups on either side on a ridge. The longest cerata measure 3 mm. The slugs are whitish with opaque transverse bands on the rhinophores, and longitudinal stripes on the tentacles which unite forming a triangle between the rhinophores (Fig. 10). There are some white spots on the cerata over the knobby diverticulum of the brown digestive gland.

In the longitudinal groups of cerata the smallest stand on the ridge (Fig. 9), the biggest towards the middle of the back. The swollen tips are pointed and contain cnidosacs about 200 μ long. In the cells of the cnidosacs lie relatively small numbers of nematocysts, 7 μ long, and here and there in the lumen a single larger one, 32 μ in length (Fig. 13). Entally to the cnidosac, in the uppermost cells of the digestive diverticulum, there are vacuoles with more numerous small nematocysts. A little stretch of liver tissue extends beyond the basal sphincter of the sac. The right and left anterior liver branches are single, with 20 and 13 cerata respectively. The main stem of the posterior left digestive gland runs below the light

orange follicles of the ovotestis and gives off 5 pairs of ducts to the groups of cerata. The 5 right (and left) posterior groups bear 12 (10), 10 (9), 7 (8), 5 (7), and 6 (6) cerata.

The anus lies under the first posterior right group of the left liver below the notal ridge, the genital opening under the anterior right group.

The masticatory border of the jaws is beset with a broad band of denticles, the outermost of which are biggest and irregular (Fig. 12). The radula (Fig. 11) has 15 rows. The rhachidian tooth is higher than broad, with 4-6 denticles on either side of the median one, all denticles of almost equal size. On the concave side of the pointed laterals there are 4-8, most frequently 6, long and pointed denticles. The base of the laterals is incised.

The follicles of the ovotestis lie dorsally to the main liver duct, clasped by the branches to the groups of cerata. The male cells generally lie in the centre, the female ones near the wall, sometimes in separate loculi. The ductules leaving the follicles unite, and the resulting hermaphrodite duct (Fig. 14, h) winds, distended by sperm as a storing ampulla (a). The following spermoviduct (s) is strongly ciliated and divides into the short prostatic male duct (q) and the equally short oviduct (o), which enters the female gland mass (m) near its outer end. The glands of the tubular prostatic section are coated by a layer of muscle fibres, and the duct is lined with a flat, ciliated epithelium. It pierces the penial bulb (p), evaginated in all the present specimens. The outermost cells of the epithelium bear long cilia and contain eosinophilous granules. Between the muscular wall of the penial bulb and the seminal duct there are insunk gland cells (MacFarland, 1966, p. 122, pl. 66, figs. 13, 20). Between the male and the nidamental aperture a narrow vagina leads to the spermatheca (b), filled with masses of unorientated sperm.

Discussion. — This second Middle West Atlantic species of *Coryphella* differs from *C. dushia* Marcus, 1963 (p. 41, fig. 54) by number and shape of the radular teeth. From *C. falklandica* Eliot, 1907, it is distinguished by the dorsal course of the main liver duct in that species (Odhner, 1944, text fig. 17). A ventral liver duct occurs

also in *C. islandica* Odhner (1937, fig. 1), *C. pricei* and *C. fischeri* MacFarland (1966, p. 314-315, 316-317). The duct is embedded in the ovotestis in *C. sarsi* Friele, 1902 (Odhner, 1929, p. 7) and in *C. piunca* Marcus, 1961, as observed in sections. The radula of *C. verta* is similar to that of *C. athadona* Bergh, 1875 (Baba, 1935, p. 352, text fig. 15) but, in *athadona* the fore end of the foot is rounded, without projecting angles.

The egg strings (Fig. 15) are deposited on the *Eudendrium* in dense serpentines. Their diameter is about 200 μ, and the egg capsules lie in an irregular row. The embryonic shells are 100 μ in length.

9. *Catriona perca* Marcus, 1958 Figures 24-25

References. — Marcus, 1958, p. 45; Edmunds, 1964, p. 4; 1966, p. 52.

Material. — Cananéia ,on *Tubularia,* July 1968, 10 specimens.

Further distribution. — Jamaica.

Discussion of *Cuthona, Trinchesia,* and *Catriona.* The attempt to assign our species of *Catriona* (1957, p. 459; 1958, p. 45; 1960b, p. 177; 1960a, p. 918; 1961b, p. 52; 1965, p. 279) to the right genus forces me to discuss the question of the genera *Cuthona. Trinchesia,* and *Catriona.* I find this to be a hopeless task. Baba (1961, p. 367) following Marcus (1957, p. 461) considers the penial stylet as distinguishing *Catriona* from *Cuthona,* while Burn (letter of 11. IV. 1969) takes the stylet as "of specific value only", and is "willing to synonymize a number of genera with *Cuthona* (among others *Trinchesia*), accepting *Catriona* as a valid genus with the *C. maua/tema* type of radula, whether or not the jaws have bristles, and the penis a stylet or not".

On the other hand Edmunds (1968, p. 207) says that "the shape of the radular tooth will prove to be a good character for *Catriona* ... and species with intermediate teeth are at present unknown". However, Schmekel (1969) finds the length of the central cusp varying in one and the same species from animal to animal. It may be longer, of equal length with, or shorter than the lateral denticles. Between Edmunds' own figures (1964), fig. 2A of *C. perca* (see Fig. 25) ("*Trinchesia* type") and fig. 2B of *C. maua*

("*Catriona* type") his fig. 4 of *C. tina* seems to me to be a perfect intermediate type of radular tooth.

The 6 species with bristles on the cutting edge of the jaw (Edmunds, 1968, p. 207) certainly belong together and contain the genotype of *Catriona, C. aurantia* Alder and Hancock, 1842. *Catriona perca* (Fig. 24) has rough denticles on the cutting edge, which might be considered as an intermediate type between smooth denticles and bristles. *C. lonca* Marcus (1965, p. 279) was re-examined; it has denticles, not bristles.

As long as the genotype of *Cuthona, C. nana* Alder and Hancock, 1842, and a great number of species in this group, are not known for their cutting edge, some even not for penial stylet and radula, I am afraid we must desist from dividing even the "well-known" European species, or synonymizing them, and must continue with the "unfashionable" (letter of P. W. Hummelinck-Utrecht) morphology, and give as complete descriptions as possible of all our species.

10. *Catriona oba,* spec. nov. Figures 16-23

Material. — Cananéia, in tufts of *Tubularia,* July 1968, 12 specimens. *Description.* — The living animals were up to 12 mm long. Preserved they measure 5-6 mm, including the long, slender tail. In life the smooth rhinophores are 1.5 mm, the tentacles 1.2 mm, and the cerata up to 1.9 mm long. The foot is rounded anteriorly.

The general body colour is whitish; The inner side of the tentacles is opaque white, and the rhinophores have a white upper half and a red streak on the outer side of the lower half. Two opaque white longitudinal stripes along the back are continued onto the cerata (Fig. 17).

The smooth diverticula of the digestive gland in the cerata are pink, the transparent cnidosacs are up to 180 μ long. The yellow gonads give the whole animal a yellowish hue. There are 2-3 rows of cerata in the anterior liver branches, and 4-5 in the posterior ones, a total of 6-8 rows on either side (Fig. 16). The maximum of cerata, situated on the first posterior right row, was 6. The

total number of cerata was 28 to 46, that is, 14-25 cerata on either side, e. g., 4, 3, 5; 4, 3, 2, 2, 2 cerata on the right, and 2, 3, 1; 6, 3, 4, 2, 2, on the left side. Sections of the cerata show nematocysts contained also in the cells of the liver branch under the cnidosac, like those described by Edmunds (1966, p. 50, fig. 10) in *C. maua.*

The jaw plates (Fig. 19) are very delicate, and I had to "sacrifice" (Bergh, 1900, p. 214) 9 specimens to obtain a certain idea of the structure of the pharynx. Schmekel (1969) did not succeed to describe the jaws of her *Trinchesia miniostriata.* In serial sections (Fig. 18) the cuticular jaw plates (j) cover the outer surface of the muscles, and an inner sheet (i) coats the pharyngeal cavity and enters the radular pocket (r). On the surface of this layer there are two fields of slight cuticular bosses (Fig. 19). The smooth cutting edges are reduced and were not found in the isolated jaws.

The radula (Figs. 20, 21) has up to 53 teeth. The preradular tooth, if retained, is very long and narrow, 52 μ long and 6 μ broad. The second tooth is 18 μ long, the third 5 μ in antero-posterior direction, the following ones measure 4 μ, and then gradually increase to 20 μ. The length of the median cusp varies; it appears shorter, equal to, or longer than the lateral denticles, certainly in part due to its position on the slide. The irregular lateral denticles are up to 7. There are always one or more small secondary ones between the median cusp and the two largest lateral ones.

The ovotestis consists of a number of female loculi around one central male part which also stores the sperm, as an ampulla (Fig. 22, a). The short spermoviduct divides into a prostatic male duct (q) and the oviduct (o) which enters the female gland mass (m). From the prostatic section a thin tube winds into the penial papilla (p) and receives the outlet of a long accessory gland (g). The papilla ends with a cuticular stylet (Fig. 23), 50 μ long and 28 μ wide at its ental opening. The spermatheca (b) has an independent opening above the male and female apertures. The wide female atrium (w) is provided with long cilia.

Discussion. — The present species is very similar to *Catriona tina* Marcus, 1957, p. 459, from the same locality. It differs by the

smooth cutting edge of the jaw, the numbers of cerata and teeth, as well as by the preradular tooth. Moreover, *C. tina* has 3-4 male follicles (ib., p. 461), though it is much smaller, 3-4.5 mm alive than *oba.*

In July 1968 the tufts of *Tubularia* were abundant in the lagoon of Cananéia, and with them the eolids. In December and in January 1969 I searched in vain for the hydroids and the slugs. The same phenomenon was observed by Dr. Jorge Petersen at São Sebastião. It is known to permanent collectors (e. g., Risbec, 1953, p. 9) "Les espèces sont trouvées tout à fait sporadiquement et à des années d'intervalle".

11. *Tenellia pallida* (Alder and Hancock, 1855)

References. — Marcus, 1960b, p. 180 (synonymy); 1964: p. 2; Steinberg, 1960, p. 49 (*Tenellia* sp.); 1963, p. 72 (*T. pallida*); Baba, 1963, p. 337.

Material. — Cananéia, on *Tubularia,* July 1968, 6 specimens. Bay of Santos, on *Anguinella palmata,* November 1968 (W. Narchi) one specimen.

Further distribuition. — European coasts from Lofoten and Finland to the Mediterranean; Brazil, São Paulo; California (Steinberg, 1. c.); Japan (Baba, 1. c.).

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Plate 1

Figures 1-2: *Aglaja unsa* Marcus

Fig. 1 — Living snail.
Fig. 2 — Shell.

Figures 3-6: *Elysia clena* Marcus

Fig. 3 — Preserved slug, 2.1 mm long, from Barbados.
Fig. 4 — Melanophores.
Fig. 5 — denticulate tooth, 55 μ long, from ascus.
Fig. 6 — Largest teeth, 85 μ long.

Figures 7-8: *Elysia serca* Marcus

Fig. 7 — Living slug with orange-red glands.
Fig. 8 — Radula.

Figs. 1-8

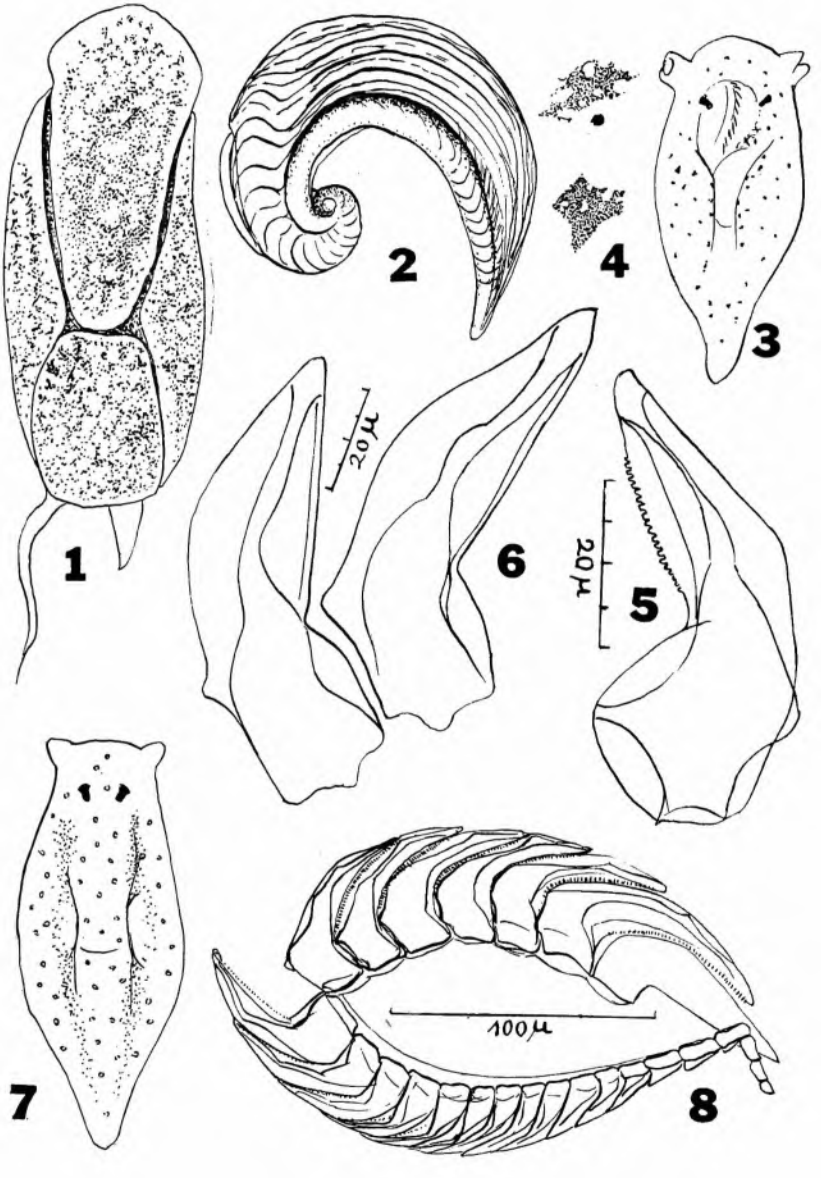


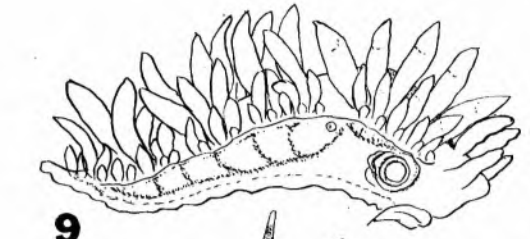
Plate 2

Coryphella verta, spec. nov.

Fig. 9 — Sketch of living slug.
Fig. 10 — Anterior part of living slug.
Fig. 11 — Radular teeth.
Fig. 12 — Denticles of cutting edge of jaw.
Fig. 13 — Transverse section of ceras.
Fig. 14 — Diagram of reproductive organs.
Fig. 15 — Egg string.

a — ampulla. b — spermatheca. h — hermaphrodite duct. m — female gland mass. o — oviduct. p — penis. q — prostatic part of male duct. s — spermoviduct.

Figs. 9-13



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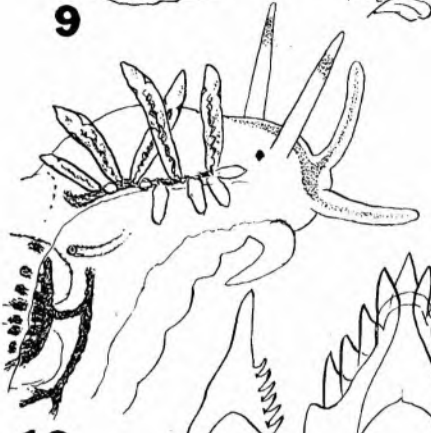

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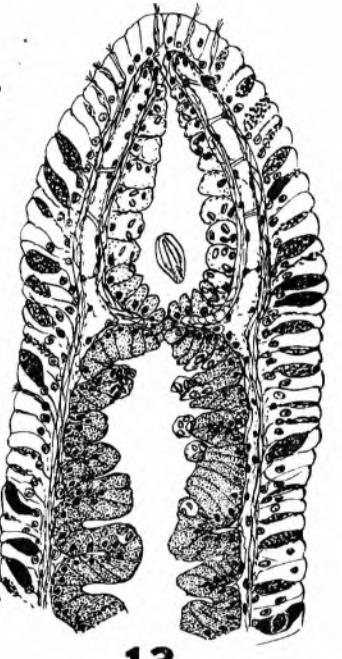

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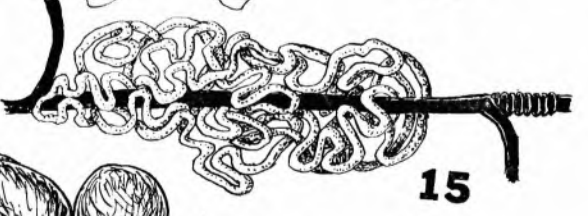

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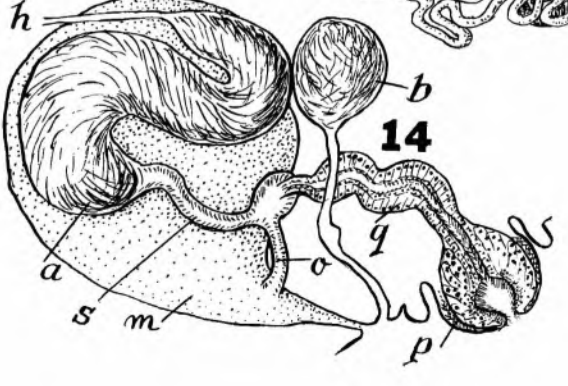

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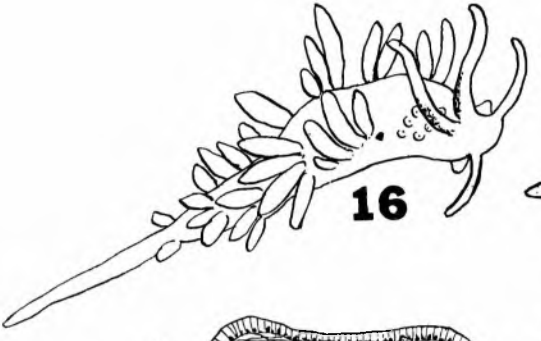
Plate 3

Catriona oba, spec. nov.

Fig. 16 — Living slug.
Fig. 17 — Anterior end of living slug.
Fig. 18 — Transverse section on level of buccal mass.
Fig. 19 — Jaw plates.
Fig. 20 — Preradula.

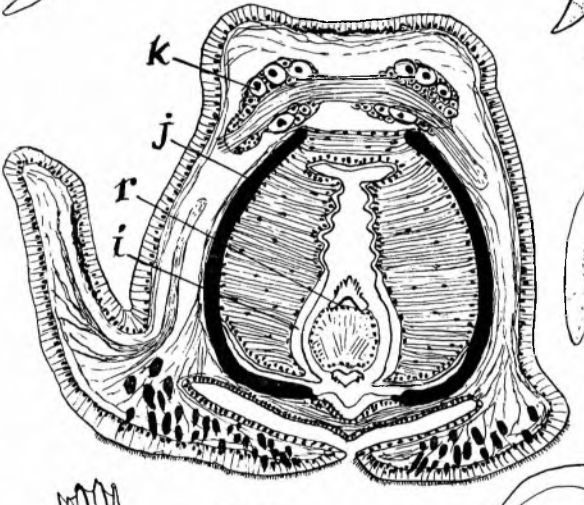
i — inner sheet of pharyngeal cuticula. j — jaw plate.
k — cerebral ganglion. r — radula.

Figs. 16-20

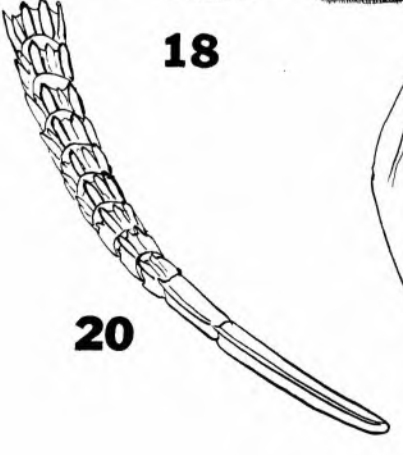


16

17



18



20

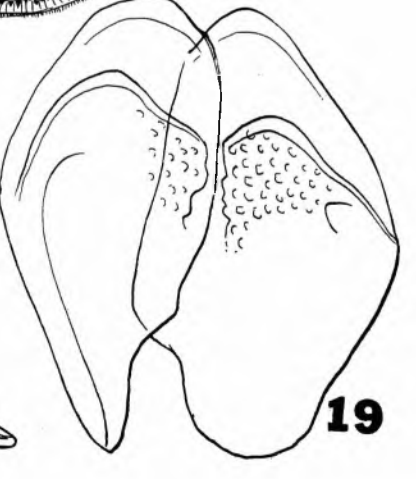


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Plate 4

Figures 21-23: *Catriona oba,* spec. nov.

Fig. 21 — Radular teeth.
Fig. 22 — Diagram of reproductive organs.
Fig. 23 — Penial stylet.

a — ampulla. b — spermatheca. f — female loculi of ovotestis. g — accessory gland of penis. m — female gland mass. o — oviduct. p — penis. q — prostatic part of male duct. w — female atrium.

Figures 24-25: *Catriona perca* Marcus

Fig. 24 — Denticles of cutting edge of jaw.
Fig. 25 — Radular tooth.

Figs. 21-25