OPISTHOBRANCHIA FROM BRAZIL

by ERNESTO MARCUS

(with 30 plates)

Together with Mrs. EVELINE DU BOIS-REYMOND MARCUS I have passed from sand-dwelling to other marine Euthyneura, conventionally called Opisthobranchia. While our modern bibliography is rather complete, thanks to many Colleagues who kindly helped us with separate copies, that of the first half of the past century as well as Trinchese's (see Eliot's note, 1910b, p. 189) is hopelessly incomplete. Papers from the classic period of investigation of marine Euthyneura, connected with the names of Alder & Hancock, Bergh, Eliot, and Vayssière, were obtained gradually during the elaboration of this study Therefore they were considered unequally and we hope to supply present bibliographic gaps in future publications. Especially the "Malacclogische Untersuchungen" of Bergh were only received after the completion of the present Ms. through Dr. Sebastian Adam Gerlach-Kiel, who kindly photocopied them for us. To Dr. Erich Schulz we are indepted for a photocopy of Rang's monograph of the Aplysiae with the plates primorously reproduced in colours. This precious gift is of great value for our studies on this family

The material was obtained in the upper littoral chiefly of the State of São Paulo. One of our colecting trips was supported by a grant from the National Research Council (Conselho Nacional de Pesquisas) in Rio de Janeiro.

The animals were narcotized after Pantin (1948, p. 6, "Narcotics" b) and fixed with "Susa" (ibid., p. 8). For the preservation of shells and spicules alcohol 90% was used. The reproductive organs and other anatomical details were mostly reconstructed from transverse sections; sometimes animals were also dissected.

The following list of the species treated in this paper aims at a rapid, moderately modern orientation, not at the establishment of taxonomically equivalente units. Cephalaspidea and Anaspidea, f. ex., are separated as independent orders by Odhner (1939, p. 4), while all Doridacea are united in one suborder (ibid., p. 25)

Tectibranchia (Pleurocoela)

Cephalaspidea, Bullariidae: *Bulla striata* Brug.
Cephalaspidea, Aglaiidae: *Chelidonura evelinae*, sp. n.
Anaspidea, Aplysiidae, Notarchinae: *Bursatella leachii lacinulata* Gould
Anaspidea, Aplysiidae, Notarchinae: *Bursatella leachii pleii* (Rang)
Anaspidea, Aplysiidae, Dolabriferinae: *Phyllaplysia engeli*, sp. n.

Sacoglossa, Elysiacea

Hermaeidae: *Hermaea coirala*, sp. n.
Elysiidae: *Elysia canguzua*, sp. n.
Elysiidae: *Elysia serca*, sp. n.
Elysiidae: *Elysia chitwa*, sp. n.

Notaspidea, Pleurobranchacea

Pleurobranchidae: *Berthella agassizii* (MacFarl.)

Nudibranchia, Doridacea, Eudoridacea, Cryptobranchia, Dorididae

Glossodoridinae: *Cadlina rumia*, sp. n.
Glossodoridinae: *Glossodoris neona*, sp. n.
Doridinae: *Doris verrucosa* Cuv.
Doridinae: *Doris bovena*, sp. n.
Doridinae: *Siraius ilo*, g. n., sp. n.
Discodoridinae: *Peltodoris greeleyi* MacFarl.
Discodoridinae: *Thordisa diuda*, sp. n.
Discodoridinae: *Discodoris evelinae*, sp. n.
Discodoridinae: *Discodoris pusae*, sp. n.
Discodoridinae: *Taringa telopia*, g. n., sp. n.
Centrodoridinae: *Awuka spazzola*, g. n., sp. n.

Nudibranchia, Doridacea, Eudoridacea, Phanerobranchia

Nonsuctoria, Polyceridae: *Polycera odhneri*, sp. n.
Suctoria, Goniodorididae: *Goniodoris mimula*, sp. n.
Suctoria, Corambidae: *Corambella carambola*, sp. n.

Nudibranchia, Dendronotacea

Dotonidae: *Doto uva*, sp. n.
Dotonidae: *Doto pita*, sp. n.

Nudibranchia, Arminacea, Pachygnatha

Antiopellidae: *Janolus comis*, sp. n.

Nudibranchia, Eolidacea, Acleioprocta

Cuthonidae: *Catriona coerulea* (Mtg.)
Cuthonidae: *Piseinotecus divae*, g. n., sp. n.

Nudibranchia, Eolidacea, Cleioprocta

Facelinidae, Facelininae: *Phidiana selenkai* Bergh
Facelinidae, Favorininae: *Favorinus auritulus*, sp. n.
Aeolidiidae: *Spurilla neapolitana braziliana* MacFarl.

Bulla striata Bruguière (Fig. 1-7)

The systematically important characters are described in the following for a population collected on an about 6 km. long tract of the beach. Some young living animals are included (Fig. 1)

The profile of young and adult shells (Fig. 1, 2) is characterized by a nearly straight right and a convex left border The shell is distinctly narrower above than below, the greatest breadth lies a little below the middle. The outer border stands out over the apex that has a deeply sunken spire. The high and narrow aperture widens to a broad oval below the middle of the shell. The outer lip is sharp and in the pauses of growth thickened. The columella is not quite straight and ends approached to the left side. There are 8 whorls in adult shells.

Besides the lines of growth, the distinctness and breadth of which varies widely, there are fine longitudinal striae and spiral lines inside the apical cavity. The number of the latter, 0-8, is not correlated with the size of the shells. The transverse apical (posterior) striae on the surface of the last formed whorl are rarely as distinct as in Hoffmann's figure (1934, f. 254 D) Sometimes they are vestigial, and in many cases absent. The corresponding striae of the inferior or anterior part are constant, as Si (1931, p. 31) stressed.

The colour of the shells is creamy, light brown or dark grayish yellow indistinctly mottled with all shades from light brown to black. The inner surface and the inner lip are white. The fleshy parts of adult animals are dark yellowish gray to black, those of young snails light gray

Greatest diameter and total length (Aguayo & Jaume 1944, p. 45, t. 7, f. 2, 4) were measured in 150 shells, the length of which varied from 14 to 37,8 mm. The latter, our largest shell, has a greatest diameter of 21,6 mm. Its proportion between diameter and length is 1:1,75. This corresponds approximately to the medium proportion between diameter and length in our population, 1:1,70. The variation of this proportion in the present material ranges from 1:1,53 to 1:1,90. The proportions of 10 shells from the brazilian coast about 350 km. farther southwest (Gofferjé 1950, p. 221, 251) lie within these limits, though their absolute measurements are considerably smaller.

The Figures 5-7 show the larval shell of an about 30 mm. long specimen (Fig. 2), from the eighth whorl of which it was freed. The larval spire is directed downwards. The angle between the axis of the helicoid larval shell and that of the adult one is about 45° The larval shell is transparent and colourless. Its diameter is 0,22 mm. and its height 0,2 mm. The number of whorls is about 1,7 The initial chamber that is slightly elevated likens that of *Diaphana hyalina* (Thorson 1946, fig. 147A; after Lemche 1948, p. 74 = *Diaphana minuta* Brown 1827) and that of *Philine aperta* (Thorson, fig. 150 H). The last part of the outer whorl partly overlaps the initial chamber and the first whorl.

The radulae of the present material (Fig. 3) contain 26-27 series of plates. The median plate has a small central denticle and 5-7 larger ones on each side. The first lateral or intermediate plate has a big central denticle and 2-5 smaller lateral ones on each side. The following lateral plate has 6-8 denticles on its outer side. The third or marginal plate is small and has no denticles.

Various aspects of the three plates of the gizzard are drawn in Fig. 4.

Occurrence: Island of São Sebastião, many hundreds of shells on the beach in november 1953 and april 1954, partly empty, partly still containing the dried soft parts. Five young living specimens with 2,7 to 6 mm. long shells among algae on boulders in the littoral, 4 in november and one in april.

Discussion of Bulla striata Brug.

The characters of the shell and the radula of the present material agree in general lines with Vayssière's description of mediterranean specimens of *B. striata* (1885, p. 14-17). In the brazilian snails, however, the rhachidian plate is proportionally bigger than in those from Naples (Vayssière, l. c.). Therefore the name *striata* is here applied with a slight reserve, in as much as even the name of the mediterranean species seems to be not entirely settled (Pruvot-Fol 1933, p. 92, note 3). One can certainly not unite our animals with *B. occidentalis* (A. Adams) after Locard's discrimination between the latter and *striata* (1897, p. 51-52)

Zoogeographically *B. occidentalis* appears more probable to occur on the coast of Brazil than the mediterranean and east atlantic *striata*. But even a distribution of one species on both sides of the Atlantic can not be rejected for a Tectibranch, the distinct larval shell of which, with regular whorls, indicates a pelagic larval life (Thorson 1946, p. 246; Lemche 1948, p. 25-26) During their pelagic life Tectibranch larvae feed and grow vigorously (Thorson, p. 436) Both authors (Thorson, p. 466-467; Lemche, p. 11) explain with good reasons "that deep-water specimens in the north Atlantic originate from drift-larvae which have been carried from the shallow-watered coast areas to the deep-sea, where, in lack of a suitable substratum, they have postponed their metamorphosis and continued their mid water life", until they finally are forced to metamorphose. It is doubtful whether the larvae produced by adult animals in the deep-sea find sufficient food (Lemche, l. c.), but one can suppose that some of them reach the surface by vertical currents and are able to continue transatlantic spreading of the species.

The reproductive organs and the range of variation of the radulae in *Bulla* are not sufficiently known for systematic purposes. Perhaps the protoconch can furnish systematic criteria. A future more detailed examination should also consider *B. rubiginosa* (Gould 1852, p. 221; 1856, t. 15 f. 266 a. b) Ihering (1915, p. 138) unites this species with *striata*, Lange de Morretes (1949, p. 113) and Gofferjé (1950, p. 251) maintain it separated. The brief original description of *rubiginosa* does not afford distinctive characters from *striata*. In Gould's figure the proportion between diameter (18,5 mm.) and length (32 mm.) of the shell is 1:1,70, like the average of our *striata*.

Dall & Simpson (1901, p. 363) called the distinction between the west-indian *B. amygdala* (Dillwyn) and the mediterranean *striata* "faint and somewhat inconstant" In *amygdala* the "revolving lines at the vertex" that are regular in *striata* occur only occasionally, as in our brazilian material. After Kobelt (1896, p. 85) the distinction between *striata* and *amygdala* is even arbitrary This is proved by his lists of synonyms, which contain "amygdala Adams in Sowerby, Thesaurus II, t. 122 f. 63" and "amygdala in Reeve, Conch. Icon., Bulla spec. 7" under *B. striata* (p. 84) as well as under *B. amygdala* (p. 86). Among Kobelt's figures those of *amygdala* from "Rio" and " Botafogo", and those of *tenuicula* Menke (=*amygdala*) from Puerto Cabello (Venezuela) fit with our material. In a popular, though evidently good book (Webb 1936, p. 18) the "spotted bubble shell" from Florida is called *Bulla striata* as well as that from Malta (p. 127)

For the present material I continue to use the specific name that d'Orbigny (1837, p. 212-13), Ihering (1897, p. 169; 1915, p. 138), Dall (1901: see MacFarland 1909, p. 8) and Haas (1953, p. 204) apply to the common *Bulla* of the brazilian coast.

As even european malacologists, f. ex. Vayssière (1901a, p. 288; 1913, p. 163) and Nobre (1938-40, p. 95), do not quite agree on the distribution of *B. striata* Brug., the total range of this species can not yet be registered with certainty. It seems to be vastly distributed in temperate an warm waters of the Atlantic. Ihering (1915, p. 138) indicated *B. striata* from Venezuela to the south of Brazil (Rio Grande do Sul) and further represented in the Post-Pampean of Uruguay.

Chelidonura evelinae, sp. nov. (Fig. 8-19)

Living animals attain 40 mm. in length and 7 mm. in breadth with closed parapodial lobes. The preserved slugs are 9-22 mm. long, 3-7 mm. broad and the biggest 5,5 mm. high. The head shield extends nearly to the middle of the body, where its blunt end in slightly contracted animals overlaps the anterior border of the mantle shield. The shape of the two "posterior wings", the mantle lobes, varies on the right and left side and in different individuals. In one slug one point was doubled (Fig. 13) The anterior border of the foot is concave in the middle, the posterior evenly rounded.

The general effect of the colour is dark brown with whitish spots, similar to the algae (Padina), between which the slugs live. The dorsal colour pattern is composed of dark brown and golden yellow longitudinal stripes that dilate to spots. The latter are powdered with white in living animals. The brown stripes have become blackish in the preserved material. They are irregular on the sides and the sole. The borders of the parapodia have no light spots, their inner sides are light grey stippled with black. The two shields are marked with a symmetrical pattern of light spots, the posterior rims of both shields are whitish. A row of metallic blue spots bordered with black accompanies the margins of the parapodia, the posterior border of the foot, the slit between the posterior mantle lobes and the anterior part of the head shield. The number of blue spots increases with age.

The head shield curls a little over the front where it continues with two pairs of folds. The inner folds, to the sides of the mouth slit, appear in dorsal view as tufted knobs (k); the likewise ciliated outer ones (j) are the slightly protruding antero-lateral corners of the frontal shield. The groove between the inner and cuther fold can be more or less closed.

Under the curled lateral border of the head shield lies the Hanccck's organ that by no means has "nearly disappeared" as Hoffmann (1935, p. 608) deduced from Bergh (1900, p. 215), but is as distinct as that drawn by Baba (1949, p. 22, f. 1, c) Five to six lateral folds are visible without sectioning and the Hancock's organ extends forward to the front. There it is almost contiguous with the outer folds. These and the knobs, the so called "Fühlerorgane" (Hoffmann 1935, p. 588) differ from the Hancock's organ both in sensorial terminations and innervation. In the Hancock's organ the sensorial terminations lie under the cuticula and the ciliated cells are not connected with nerves (Merton 1920, t. 34, f. 19). In the organs on the head, the knobs and the outer folds, clusters of sensory cells terminate with tufts of cilia. These are put forth or retracted in the living slugs (Fig. 11) Each group of about 50-100 sensory cells lies at the base of an epidermal tubule that can be withdrawn by muscle fibres. The eversion is probably performed by pressure of the body cavity.

The nerves of Hancock's organ are characterized by the accompanying small nerve cells, and their dorsal cerebral origin and ramification agrees with that of the labial and tentacular nerve, c 3 and c 4 of Hoffmann's terminology (1936, p. 679: *Philine;* p. 692: *Aglaia*) However the fibres of the "Fühlerorgane" of each side unite and enter the cerebral ganglion of the corresponding side as a nerve that is thicker than the optic nerve but thinner than the Hancock's nerves. Its cerebral origin lies immediately in front of the root of the cerebro-buccal connective. That is the position of the nervus fossae sensoris capitis in *Philine aperta* (l. c., p. 678) and so one may consider Guiart's four sensory pits (Hoffmann 1935, p. 592) of *Philine* as homologous with the 2 outer folds and 2 knobs of *Chelidonura*.

The two small black eyes lie behind the anterior border of the head shield, a little nearer to each other than the sensory knobs.

The central nervous system agrees with that of Bergh's species (1900, p. 216, t. 19 f. 10-11) The cerebral commissure is short, shorter than the diameter of each cerebral ganglion. The pedal commissure is long in correspondence to the large pharynx. The latter is so long that the nerve ring lies neither in front of the pharynx nor behind it but over its anterior fourth. The buccal ganglia are located in the fold between pharynx and oesophagus. In accordance with Bergh (1900, p. 216) we found 80 micra as greatest diameter of a nerve cell. This cell belongs to the right pedal ganglion, but there are almost as big ones also in the supra-intestinal ganglion like in *Aglaia* (Guiart 1901, p. 134)

The shell is approximately semilunar, broadened on the left side and strongly calcified in variable extension. Also the shape of the shell differs in the two studied individuals (Fig. 9, 10) The decalcified shell of our biggest slug is 5 mm. long and 5 mm. broad. On the inner side lies the brown larval shell, 0,13 mm. in diameter and composed of 1,5 sinistral whorls. The shell chamber opens with a minute ciliated canal behind the anus and on the left side as in *Aglaia* (Hoffmann 1933, f. 178, ma. po.), but laterally, not ventrally Under the apex of the shell, but beside the shell cavity, originates the columellar muscle that runs forward along the floor of the body cavity and inserts on the pharynx.

The anterior limit of the mantle cavity hits the genital papilla. The foremost organ on the dorsal wall of the cavity is the osphradium, a pad of ciliated and sensory cells. The fibres of the latter are connected with the underlying osphradial ganglion. Backwards follows the long gill that originates on the right side of the roof, between genital and anal papilla, and extends between the two hinder mantle lobes. The upper and the under surface of the gill are covered with folds. The kidney debouches between the origin of the gill and the anal papilla. As "hintere Mantelranddrüse" (Hoffmann 1934, p. 454-59) we consider a brownish, ovoid and circumscript gland that lies close behind the anal papilla on the roof of the pallial cavity (Fig. 16) High cells containing refractive secretion and ciliated cells compose the walls of the acini that are united by a muscular coat and open with a common duct into the mantle cavity. Behind this gland there is a short and narrow coecum of Hoffmann's type b (1933, p. 299). The dorsal and the ventral ciliated stripe (z) that begin in this coecum continue on to the posterior mantle lobes. The dorsal stripe goes to the right and the ventral to the left lobe.

In the angle where the lobes separate lies a loose, blue staining gland, 0,2 mm. in diameter, evidently homologous with the posterior glandular field of *Philine aperta* (Hoffmann 1934, p. 462)

The mouth is perpendicular (Fig. 8, m), not transversal as in Bergh's species (1900, p. 214), and lies in a pit flanked by thickened borders. A mighty cluster of buccal glands is located ventrally around the oral tube that widens in transverse direction and then enters the pharynx with a narrow passage. A preserved slug of 13 mm. body length had a 3 mm. long pharynx with 0,4 mm. thick wall composed chiefly of radial fibres interspaced with 24 groups of annular bundles. The outer and inner longitudinal muscles are thin. The salivary glands are very short.

The morphologically correct term for the following portion of the alimentary tract (Fig. 15) is oesophagus, not stomach (Bergh 1900, p. 218), because it does not communicate with the liver. The oesophagus begins with a dilated part, as in *Aglaia* (Guiart 1901, f. 47), and continues tubular The wide section of the oesophagus has longitudinal folds on its floor and a small dorsal and a ventral diverticle. It functions as a crop like in other carnivores that engulph their prey whole. Two Turbellaria, a Cylindrostomid and a Polyclad, and a monostyliferous Nemertean were found in the "crop" of one sectioned slug. The folds continue into the tubular part of the oesophagus that connects the "crop" with the stomach.

The stomach is lined with a low epithelium that forms numerous thin and high folds and contrasts sharply against the large liver cells. The shape of the stomach is very irregular, it has many diverticles. The liver is a compact organ with rounded and smooth outline. Its acini communicate with the stomach by numerous orifices, in one transverse section eight such were counted. The gut leaves the stomach behind its middle, runs forward on the right side to the anterior border of the liver, curves backwards over the mid-line and opens into the pallial cavity from the back. The anal papilla lies in the hind part of this cavity

The prey within the "crop" was so well preserved that it could be easily identified, while the faeces in the gut are completely digested and rubbed.

The reproductive organs (Fig. 18) are similar to but not quite like those of *Aglaia* (Guiart 1901, p. 148, f. 89) The male germ cells originate in the same follicles as the female ones, but their development precedes that of the latter. The spermoviduct (hermaphrodite duct) with a wide lumen runs winding forward and continues with a narrower portion. This part communicates by a short canal with a vesicle that contains sperms and corresponds to the spermatocyst of *Aplysia* (Eales 1921, p. 60, 66 t. 6 f. 18,20, spct.). At the point where the "stalk" of the spermatocyst originates, a branch of the spermoviduct enters the female gland mass that consists of the more ental albumen and the more ectal mucus gland. Another branch of the hermaphrodite duct, Bergh's male branch (1900, p. 219), that is wider than the narrower portion of the spermoviduct runs along the under surface of the gland mass to the genital vestibulum. This branch (v) is separated from the gland mass only by a fold. Its lumen is lined with cilia. It represents the united spermatic and vaginal (copulatory) duct (Eales 1921, p. 65) The mucus gland is coiled like in *Aglaia*. The oviduct runs along this coil to the centre, and then turns and runs out again. The ducts that go in and out appear distinctly separate in dissected slugs, but the microtomized mucus gland shows only one tube with an internal fold between the ways out and in. The disposition of ciliated and mucilaginous cells in the transversely sectioned mucus gland is shown in Fig. 19. Many outlets of short ramified tubes that belong to the albumen gland, and irregular clusters of the mucus gland, open into the ental (proximal) end of the oviduct where its spiral loop begins. Its opening into the vestibulum is united with that of the sperm-vaginal duct. A long duct leads forward from the vestibulum to a spherical seminal vesicle that we call spermatheca following Odhner (1926, f. 7 on p. 11) From the genital pore the seminal groove runs along the basis of the right parapodium to the head shield, where it enters the penis under the antero-lateral corner The penis is a ciliated, musculous, unarmed tube that is folded in the preserved slugs. The long racemous prostate, the occurrence of which was denied by Bergh (1900, p. 220), can not be confounded with the buccal glands (gl) in the present species, because these are symmetrical and do not reach so far backwards.

Occurrence: Island of São Sebastião under stones with algae, chiefly Padina, in the upper littoral; 9 specimens in november and december 1953, six in april 1954. In *Aglaia depicta* (Bergh 1893, p. 128, note) setae of Polychaeta were found piercing the body and sticking in the kidney Such a seta was also seen in sections of one of our slugs sheathed by renal cells and resembling a hair in its follicle.

Discussion of Chelidonura evelinae

The name of the genus is used following Bergh (1900, p. 212) and Thiele (1931, p. 395). Eight species of *Chelidonura* were registered by Bergh (1907, p. 29). Two of them, *Navarchus inermis* (Cooper 1863; Bergh 1894, p. 214) and *N. aenigmaticus* Bergh (1894, p. 217), both from the west coast of North America, were later on (Thiele, l. c.) separated from *Chelidonura* again by reason of their short rhinophores, and called *Navanax* Pilsbry (see Pilsbry 1895-96, p. 57). *Doridium pilsbryi* Eliot 1899 and *D. obscurum* Bergh 1901 that are listed as *Chelidonura* in the Siboga Report (Bergh 1905, p. 43), are in 1907 (p. 28, 29) indicated as *Doridium* Meckel 1809, to-day *Aglaia* Renier 1804 (for name see O'Donoghue 1929, p. 10-11) Risbec (1928; 1951, p. 134) ascribes *obscura* to *Chelidonura, pilsbryi* to *Aglaia* (ibid., p. 128)

The known species and varieties of *Chelidonura* are:

1) *Ch. hirundinina* (Quoy & Gaimard 1832)
2) *Ch. adamsi* Angas (1867, p. 116; Allan 1941)
3) *Ch. plebeia* Bergh 1900.
4) *Ch. hirundinina* var. *elegans* Bergh 1900.
5) *Ch. varians* Eliot 1903.
6) *Ch. hirundinina* var. *punctata* Eliot 1903.
7) *Ch. philinopsis* Eliot 1903.
8) *Ch. velutina* Bergh 1905.
9) *Ch. amoena* Bergh 1905.

10) *Ch. perparava* (Risbec 1928; 1951, p. 134).
11) *Ch. fulvipunctata* Baba (1938a, p. 3)
12) *Ch. inornata* Baba (1949, p. 22, 124).
13) *Ch. pallida* Risbec (1951, p. 129)
14) *Ch. africana* Pruvot-Fol (1953, p. 31)

Besides the last species and an uncertain *Chelidonura* from Madeira with crimson ticks (Bergh 1900, p. 213, note 1) all others have been found in the Indopacific. All known species differ by their colour pattern from *Ch. evelinae*, the first west atlantic member of the Genus.

Bursatella leachii lacinulata Gould (Fig. 20-25)

Bursatella lacinulata Gould 1852, p. 223-24; 1856, t. 16, f. 269, 269a.
Bursatella leachii lacinulata Eales & Engel 1935, p. 301-02.

The slug of Fig. 20 was 12 cm. long. 6,5 cm. broad and about 5 cm. high alive. The colour was as Gould described it, pale green or more exactly grayish-greenish yellow, closely covered with minute black dots, which give it a bronze hue. The sole is lighter grayish yellow and has also black dots. These are preserved in formalin, while the ground colour became paler. The melanophores are disposed in loose series and frequently, not always, in concentric circles around the smallest papillae, the minute filiform type of Eales & Engel (1935, p. 283)

Many villi of this type were omitted in the drawing that would have become confused with all of them. All appendages are of the same colour as the body Our biggest animal is much more "woolly" than that figured by Gould. As in the type of *B. leachii* and the south african subspecies (Eales & Engel 1935, p. 289, 290) a very strong arborescent villus grows in the middle of the head just between the tentacles and the rhinophores. The large papillae are more numerous in the posterior than in the anterior half of the body, they are up to 15 mm. long (Fig. 23).

The frontal tentacles are beset with more appendages than the rhinophores. The latter are a little shorter than the tentacles but not thicker The buccal tentacles (Fig. 22, b) are smooth.

The foot is as broad as the body The sole is flat and sharply limited. The produced border of the foot separates the sole from the parapodia that extend dorsalwards. Small villi are scattered along this flange, but rather smaller and less numerous than on the remaining parts of the parapodia. The anterior margin of the foot is bilabiate on its entire breadth, and the upper lip is cleft by a median furrow. The tail is short, broadly triangular

The smooth fibrous margin around the dorsal slit of the type specimen (l. c., p. 285) is not developed in our slug, where the border itself is papillose. The anterior part of the pallial cavity where the genital duct opens and the seminal groove begins, and the posterior or anal part are externally separated by the overlapping borders of the parapodia. Rüppel & Leuckart's figure (Hoffmann 1933, f. 17 D) that seems to be from the living animal gives the natural aspect better than Blainville's (Eales & Engel 1935, f. 1 C) with narrow neck, broadly open dorsal slit and everted ctenidium. This animal had evidently when preserved contracted the body in antero-dorsal direction and dilated it transversely. Our living slug showed maximal opening of the dorsal slit when it evacuated the volumous gray faeces.

In a 7 cm. long slug the penis and its spines as well as the pigmented sheath and the collar are similar to those in *B. leachii pleii* (Fig. 28). On the concave side of the collar there is only one spine.

The mandibles are 3,4 mm. long. 1,7 mm. broad, triangular and slightly curved. The thick-walled honey-comb like cells of the inner side pass gradually into the rods that are directed outwards and cover one another The length of the rods varies, their free ends are obtuse, irregulary rounded. The radula of the one examined specimen had the formula 40 $\times$ 41.1.41. The plates (Fig. 25) are similar to those of *B. leachii africana* (Engel 1926, p. 180; 1927, p. 100; Eales & Engel 1935, f. 5). The first lateral plate of several succeeding series on one side has no denticles, while that on the other has the typical four.

Occurrence: Island of São Sebastião, two specimens (one alive, one dead) in november 1953, and a living one in april 1954. The slugs were found on the beach entangled in Gracilaria cervicornis (Turner), kindly determined by Dr. Aylthon Brandão Joly. These algae show the same pale yellowish green colour and shape as the villi of the slug. Kept in a large dish with sea water the slug fed on them. Radula and mandibles were prepared from an 8 cm. long animal. Two further slugs were seen in the collection of the Oceanographic Institute (São Paulo), one from Cananéia, 200 km. southwest of Santos, and the other from southern Rio Grande do Sul, about 32° S.

Further distribution: Harbour of Rio de Janeiro (Gould).

Bursatella leachii pleii (Rang) (Fig. 26-30)

Aclesia Pleii Rang 1828, p. 70 t. 21
Aclesia Pleii Bergh 1902, p. 352-357 t. 28 f. 40-43, t. 29 f. 1-13
Bursatella leachii pleii Eales & Engel 1935, p. 292 f. 9.

Of our two preserved slugs one was 7, the other 7,2 cm. long. The corresponding measurements of breadth were 2,8 and 3,5 cm. and those of height 2,0 and 2,8 cm. The colour is a slaty gray with a black pattern and pinkish middle-sized villi. The longer appendages are dark gray, not pink. The pattern is made up of dots, part of which coalesce forming larger spots and rings as in leopards. Eye-like spots are not developed. Dense big spots occur on the appendages of the head (Fig. 26), the frontal tentacles, rhinophores and the arborescent villus in the middle of the head, and on the long villi of the body. Rings are specially developed on the anterior part of the head and between the villi.

Smaller size of the appendages and their contraction make these slugs appear much less woolly than subspecies *lacinulata*. The big type of filaments is small in *pleii;* the middle-sized are minute, and the small ones are only warts or merely areas consisting of very fine dots in the pattern. Behind the dorsal slit the villi are more numerous than in front of it, like in the preceding subspecies.

The frontal tentacles are longer than the rhinophores and bear a few villi like these. The buccal tentacles are smooth and grooved on their underside.

The sole is lighter than the rest of the body, because it has nearly no black pattern. It is evidently somewhat contracted, as its breadth is 2,5 cm. in both specimens. The flange of the pedal margin described for Blainville's type specimen of *leachii* (Eales & Engel 1935, p. 284) with its overhanging simple papillae is distinct, as on the whole *leachii leachii* and *leachii pleii* are very similar (ibid., p. 292, 301). The anterior border of the foot is bilabiate, but in both specimens without the median furrow of the upper lip. The tail is a little longer than in *lacinulata*.

The border of the dorsal slit is beset with filaments, and the overlapping borders of the parapodia separate the anterior and posterior part of the pallial cavity

The pharynx is 7 mm. long, the salivary glands are long and tubular as in other Anaspidea. The mandibles and radula agree with those of *lacinulata;* the formula is 34 $\times$ 32.1.32.

The penial sheath ("praeputium") is strongly folded longitudinally, unarmed, and has pigment spots. The margin of the collar bears large thorns. Part of these is located on the inner, concave, surface of the collar, that forms the outside of the penis in everted condition (Engel 1927, p. 104), and many on its convex underside, the side that is hidden in the retracted position (Eales & Engel 1935, p. 286)

Occurrence: Cananéia, 200 km. S. W of Santos, 2 specimens gathered by Dr. Peter Kaiser-Hamburg, in december 1953. Two slugs in the collection of the Oceanographic Institute (São Paulo), one from Cananéia and one from the bay of Santos, Ilha Porchat.

Further distribution: Rio de Janeiro (Bergh); West Indies and Florida (Rang; Pilsbry 1896, p. 148)

Discussion of Bursatella leachii pleii (Rang)

The spines of the collar of our material approach those on Bergh's figure (1902, t. 28 f. 40), not Eales & Engel's from the West Indies that has no spines on the concave side. Eales and Engel (p. 302) deny the occurrence of such spines. They are however present in our material, perhaps due to the state of contraction. Our smooth *pleii* looks quite different from the woolly *la-*

cinulata, but Engel (1926, p. 180-181; 1927, p. 100-101) found this character extremely variable in his ample material of ***Bursatella** leachii africana*.

Phyllaplysia engeli, spec. nov. (Fig. 29-37)

The length of the biggest live slug was 11 mm.; preserved it measured 9 mm. One preserved specimen from Recife was 10 mm. long, 5 mm. broad, and 2 mm. high. The smallest individuals were about 2 and 3 mm. long alive. These have only primordials of reproductive organs. A middle-sized transversely sectioned slug was not completely mature.

The dorsal slit of the animals of 7 mm. body-length lies 4 mm. from the anterior border and is 1 mm. long. Sometimes the back bears up to 0,2 mm. long papillae that are completely wanting in other specimens. The colour of the back is rusty brown with a greenish hue. Around the margin there are numerous small yellow dots. In the papillose specimens the larger papillae are yellow and surrounded by big pink spots, 20-30 of which occur on the back and on the basis of each tentacle in variable and irregular distribution. These spots resemble colonies of Lithothamnion, their red colour is bound to a firm substance, and they are visible even in balsam mounts as gray circles. In sections the yellow papillae show to be gland-free, while the rest of the dorsal surface is crowded with volumous cyanophil glands. Such are wanting in the epidermis of the foot.

The solid rhinophores, that are trimmed with three yellow transverse ribbons in some animals, are split at their tips. The eyes lie in their bases. The tentacles (y) are broad, rounded and grooved at their outer end. The oral lobules (a) beside the mouth are small. The anterior margin of the foot is simple, not bilabiate as in *Ph. lafonti* and *plana* (Engel 1936, p. 200; Eales 1944, p. 10) The border of the foot joins that of the notum with a sharp edge; there is no tail. The seminal groove (g) begins within the parapodial cavity (terminology of Bergh, see Hoffmann 1933, p. 255), the opening of which is 8-shaped, narrowed by lobules of the parapodia. The right parapodium overlaps the left.

The jaws are beset with cones, the pointed cusps of which are smooth and curved (Fig. 32) The palatal rods (Fig. 34) are widened basally and in part furrowed, those of the middle differ slightly from the lateral ones, but on the whole they are rather uniform. The radula has the formula 32 × 19.1.19. The rhachidian plate (Fig. 33) has a deeply excavated base and long slender legs. These make it four times the width of the anterior border, that is pointed in the middle. The cusp bears 3 teeth, the central one a little longer than the others. The first lateral plate is similar to the corresponding one of *Phyllaplysia plana* Eales (1944, f. 11 D) It has 5 teeth, a small one on the inner side, then 2 large, blunt, almost square edged ones and 2 smaller, external ones, the outer of which is tiny In *Ph. plana* the 2 outer denticles are equal. In the second lateral plate the small innermost and outermost teeth are absent, so that only the 2 large blunt teeth and 1 smaller outer one remain. The 3rd to 12th lateral plates have each 3 teeth, the central of which is biggest. The 13th and 14th plate show the two-pronged type characteristic of the Dolabriferinae (l. c., p. 11) The 15th and 16th plate are blunt-topped without denticles.

The gizzard contains two sets, each composed of four thick, pyramidical teeth and about 12 smaller ones with a very fine, curved tip in front of them. The 2 mm. long penis (Fig. 35) bears about 7 and its collar (l) at least 3 spines that are 90 micra long and 60 micra thick at their base. The spines insert on warts and are similar to those of *Ph. lafonti* (Engel 1936, p. 202 f. 1 h, m), whereas those of *Ph. plana* Eales (1944, p. 11 f. 11 E) are different. The sections show that the slug is protandrous.

Occurrence: Island of São Sebastião, 19 slugs in june and november 1953 and april 1954, among algae (Padina and others) on stones in the upper littoral. Ubatuba, on the northeastern coast of the State of São Paulo, 30 animals in december 1954 in the same biotope. Recife, State of Pernambuco, 4 specimens from Padina, january 1955 (Dr. Sebastian Gerlach-Kiel leg.).

The species is named in honour of Professor Dr. HENDRIK ENGEL — Amsterdam.

Discussion of Phyllaplysia engeli

The present state of knowledge of the genus *Phyllaplysia* P. Fischer 1872 is based on the following papers: Eales & Engel (1935, p. 280), Engel (1936), the discussion of the synonyms of *Petalifera petalifera* (Rang 1828) by Engel & Hummelinck (1936, p. 44 etc.), and Eales (1944, p. 10) For the sequence in the comparison of the new species with the previously described ones and the older litterature I refer to Engel's revision (1936)

Ph. lafonti (P. Fischer 1870), the type of the genus (Fischer 1887, p. 569), has tuberculated tentacles and a bilabiate anterior border of the foot. The colour is green, sometimes paler (Fischer 1872), sometimes more brilliant (Crosse 1875) with more or less distinct white or gray spots surrounded by violet dots. The rhinophores have 4-5 pale violet transverse zones. The innermost lateral plate of the radula does not differ from the following ones and has the same broad median tooth flanked by a smaller denticle on each side.

Ph. paulini Mazzarelli 1895, that Nobre (1938-40, p. 109) writes *paulinoi*, is light green with white longitudinal lines. The rhachidian plate of the radula (Mazzarelli 1901, f. 4) has two denticles on each side of the central tooth. The innermost lateral plate (ibid., f. 5) has one strong tooth on the inner side of the median lobe and one smaller denticle on its outer side.

Ph. brongniartii (Blainville 1825), the specific name of which was justified by Engel (1934, p. 86-88) has a puncher-shaped hind end ("espèce allongée à queue subulée") and a quite smooth back. It is like the two following species, not sufficiently known.

Ph. ornata (Deshayes 1853) was considered as a distinct species by Fischer (1872, p. 297) due to its dark green colour with pale yellow spots. After Engel (1936, p. 205) it is very similar to *lafonti*. The generic position is highly probable, but not absolutely certain, as the absence of a shell was not expressly mentioned.

Ph. depressa (Cantraine 1835) If this species is a *Phyllaplysia*, it is "sans doute *lafonti*" (Engel 1936, p. 206). But as the absence of a shell is not known, it remains doubtful.

Ph. viridis (Bergh 1905) The back bears branched appendages, and the border of the body is separate from that of the foot.

Ph. varicolor (Bergh 1905) is 38 mm. alive, mottled grayish and red-brown, with white dots. The lateral plates of the radula have a split central tooth and lateral denticles. The back was described as smooth, but perhaps there are also ramified processes like in *viridis* (Engel 1936, p. 210)

Ph. plana Eales (1944, p. 10) differs from *Ph. engeli* by the regular arrangement of its markings, each with an eye-like central spot, the shape of the rhachidian plate of the radula (l. c., f. 11 D) and that of the male spines. These occur only on the penial collar, the penis itself is unarmed.

Hermaea coirala, spec. nov. (Fig. 38-44)

The two slender slugs were 6 and 9 mm. long alive, preserved the bigger one was 6 mm. long, including the 2 mm. long tail. The body is very transparent with black eyes and brown liver cells as only coloured elements.

The head is arched in front and this roundness resembles a frontal velum (Hoffmann 1933, p. 241) The rhinophores are rolled up and grooved on the whole length of their outer side. The outer flap is shorter than the inner Labial tentacles are not developed, not even in vestiges. The eyes are subepidermal and lie in the cutis (id. 1934, p. 391) as in other species of *Hermaea* (id. 1935, p. 626) The foot is broadest at its anterior end where it forms lateral angles. Farther backward it is narrower than the body It ends on the tip of the long pointed tail. The entire foot contains blue staining glands.

An irregular row of 15-20 cerata, the length of which attains 2 mm., extends on either side of the dorsal mid line. Generally a large ceras and a quite small one alternate. The cerata are club-shaped with a knobbed surface, neither cylindrical nor flat, and their greatest diameter lies over the middle. The hepatic diverticle in the ceras is ramified at right angles, and a boss of the surface corresponds to the tip of each branch. There are many volumous globose gland cells in the cerata, heaped in the knobs. The contents of these glands stain partly blue, partly pink. They resemble the glands of *Doto*, that Hecht (1895, p. 600) considered as defensive.

The anus lies in front of the heart on a papilla in the dorsal mid line. The two genital openings are located just behind the brain on the right side.

The radula consists of about 25 plates, the 5 oldest, smallest of which are curled up in the saccus. The plates (Fig. 42) are up to 67 micra long, of which the hooked basis occupies almost one third. The tooth is straight and has smooth borders. The saccus stands out over the ventral surface of the pharyngeal bulb.

The volumous buccal glands (Fig. 43, y) are similar to those of *Ercolania siottii* Trinchese (1872, t. 7, f. 7), but much more numerous and with multiple outlets. Salivary glands do not exist, to judge from the one complete series of transverse sections. From the pharyngeal bulb (b) a long and thin ciliated oesophagus (e) that has only few muscles runs backwards. Without forming a diverticle it opens from the dorsal side into the thin walled stomach (x). This is a long and wide sac that begins on the level of the saccus and extends backwards beyond the anal papilla (i) The longitudinal folds of the stomach that Fretter (1940, p. 193) describes for *Hermaea dendritica* (Ald. & Hanc.) appear in the present species only behind the level of the cardia. They continue into the bifurcation that establishes the stomato-hepatic communication. From the anterior end of the stomach two tubes (c) run along the sides of the pharyngeal bulb and terminate near the anterior end of the latter. The right and left liver (l) are simple tubes that extend under the whole corresponding row of cerata and are each connected with one branch of the bifurcated hind end of the stomach. Behind these branches each liver sends diverticles towards the dorsal mid line that do not touch each other The intestine (i) is very short, like in other Sacoglossa with the anus far in front, and contains glands as described from *Hermaea dendritica* (Fretter 1940, p. 193, 195)

The kidney is a flat sac that begins immediately behind the anal papilla; the renal pore lies 50 micra behind the latter Also the heart it situated behind the end gut, dorsally to the kidney

Male and female germ cells originate in the same follicle (Fig. 44, z) The former develop chiefly in the centre of the follicle, the latter on its walls. The ampulla (a) is volumous. Ectally to the branching of the spermoviduct (h) into a female and a male duct the latter is covered with clusters of small pink staining glands (r). This prostatic part of the efferent duct (d) bears a short diverticle (k) which likens that of *Ercolania siottii* Trinchese (1872, t. 12, f. 1, u) The penis (p) is an unarmed tube tucked into the male atrium (v) Behind the male pore (m) the female aperture (q) is situated. The oviduct (o) comes from the intricately folded mucus gland (g) that extends far backwards. Still farther behind lie the scattered small acini of the albumen gland (n) that empty into the mucus gland with a long common duct. No diverticles of the albumen glands enter the cerata. Near the branching of the hermaphrodite duct a volumous vesicle with a long canal, probably the spermatheca (t), communicates with the female or vaginal duct. The latter continues as uterine duct (w), receives the outlet of a smaller vesicle, probably the spermatocyst (s), and leads to the mucus gland (g) into which it opens together with the albumen duct (u)

Occurrence: Island of São Sebastião, among algae (Padina and others) growing on stones in the upper littoral. Two specimens in december 1953.

Discussion of Hermaea coirala

After Fischer (1887, p. 542) and O'Donoghue (1929a, p. 739) the type of *Hermaea* Lovén 1844 is *Doris bifida* Montagu 1815, after Thiele (1931, p. 414) it is *H. dendritica*, a triaulic species with diverticles of the albumen gland in the cerata (Trinchese 1872, p. 91) If Thiele's system is adopted, the present species must be ascribed to *Physopneumon* A. Costa 1864, although the vestigial labial tentacles of this genus are not developed. However, Fischer, Vayssière, Nobre (1938-40, p. 76) and Pruvot-Fol (1951, p. 69) consider the type of *Physopneumon, Ph. carneum* A. Costa, as a synonym of *Hermaea bifida,* and Thiele himself is doubtful with regard to the generic independence of *Physopneumon*. Therefore I describe the new species as *Hermaea*.

The cerata of *Hermaea* (including *Physopneumon*) are narrow, cylindrical, fusiform or foliaceous (Trinchese 1870, p. 52; Vayssière 1913, p. 233; Thiele, l. c.). Inflated, conical cerata like those of *H. coirala* are exceptional in *Hermaea,* perhaps the "branchiae dilated, shaped much like trefoil or the ace of clubs" of *Hermaea cruciata* Gould (1870, p. 253; Verrill 1873, p. 667) can be compared with the cerata of *coirala*. It seems that the rhinophores of *H. cruciata* contain liver diverticles. In any case the description of *H. cruciata* is not sufficient to apply its name to a slug found about 7 thousand kilometers farther south.

Hermaea capensis Macnae (1954a, p. 59) is a true *Hermaea* as each ceras contains a branch of the albumen gland besides a branch of the digestive gland.

Heart, kidney and reproductive organs of *H. coirala* agree well with Thiele's diagnosis of *Physopneumon*, apart from the prostate that is clustered, not ovoid. The pharynx is like in other Sacoglossa (Hoffmann 1938, p. 950-52, 960-61), though the only series of sections does not show striped pharyngeal muscles that Pruvot-Fol (1929, p. 378) indicates for all Sacoglossa. The oesophagus and the stomach of *H. coirala* differ from what is typical in the Sacoglossa, because the former has no diverticle (Hoffmann 1938, p. 1087) and the latter is elongated parallel to the longitudinal extension of the slug (ibid., p. 1104)

Elysia canguzua, spec. nov. (Fig. 45-48, 60-65)

The largest preserved animals are 6 mm. long and 1,2 mm. broad, the living ones much more slender, about 1 mm. broad and 9 mm. long. The colour is green, due to the branchings of the liver that are disposed in chiefly longitudinal direction. Bright red dots are probably cutaneous glands. There are also groups of brilliant blue spots, perhaps another type of gland cells. The distribution of the black pigment is shown in Fig. 61. It is dense inside the rhinophorial fold (Fig. 47), so that the rhinophores appear gray in dorsal view. Coarse granules of pigment lie in the outer border of the rhinophores and form a transverse arc on each side of the head. A small amount of black pigment occurs in the shoulder fold that is the dorso-lateral continuation of the transverse pedal furrow In some specimens the border of the parapodia has a black line.

The rhinophores are very long and rabbit's ear-like, their fold does not attain the basis. The parapodia begin behind the pericardial hump. They are triangular, rather thin and reach the hind end of the tail. The vessels on the inner side of these flaps are paired, parallel, principal trunks with few short lateral branchings.

The radula of the biggest of the available slugs has 20 functioning plates (Fig. 48) The largest are 80 micra long, have a more or less pointed cusp, slightly marked lateral crests and a very finely serrulate medial crest.

The anus lies dorso-laterally in the shoulder fold and beneath it the single female opening (Fig. 60, q) The male vestibulum (v) opens immediately behind the right rhinophore (i) The penis (p) is small and provided with cyanophilous glands (r) The efferent duct (e) is not dilated before it enters the penis, contrary to *Elysia viridis* (Mont.) (Fig. 57, x) Of the vaginal organs only a spermatheca (t) is developed, the vagina is a short rudimentary caecum (u) without spermatocyst.

Occurrence: Island of São Sebastião, 3 specimens among algae of the upper littoral, june 1953. 20 on Codium in the tidal surf in april 1954. The slug fed on this alga.

Discussion of Elysia canguzua

The species resembles the common colour type of *E. viridis* (Montagu). Pruvot-Fol (1946, p. 31) says that a dark violet tip of the rhinophores and border of the upper lip are a characteristic of *E. viridis* from the french coasts, but she had new caledonian material that likens *viridis* in other respects without such colour marks. The general colour of this species varies very much, probably according to the different algae on which the slugs feed (Pruvot-Fol 1953, p. 41). Hecht found exceptionally big animals in an unusual habitat (1895, p. 559).

The figures of Fischer (1887, f. 303 on p. 545), Vayssière (1888, t. 7 f. 115) and Pruvot-Fol (1926, f. 19 F 1, on p. 260) of the radular plate of *E. viridis* are compatible with *E. canguzua,* though the lateral crests are less marked in the present species.

Our sections however make it evident, that the separation of the species of *Elysia* can not continue on the basis of colour, thickness and extension of the parapodia, form of the head, and radula. The analysis of the reproductive organs emphasized by R. Bergh and in our days principally by N. Hj. Odhner is indispensable. Comparison of the diagrams (Fig. 57 and 60) shows, that the new species does not even correspond to the triaulic type that is indicated for *Elysia* and related genera (Vayssière 1913, p. 239; Thiele 1931, p. 414; Pruvot-Fol 1946, p. 29, 30)

We have not yet seen Pelseneer's paper that after Si (1931, p. 135) contains the most complete anatomy of the reproductive organs of *Elysia viridis* (Mont.) From Risbec (1925, p. 309) we know that the vaginal opening only develops in adult animals. In all our three species of *Elysia* the follicles of the ovotestis contain volumous ovocytes, and the female glands, simplified in the diagrams, are fully developed. As our three species have alien sperm in their female organs, they are adult. Risbec (1928, f. 93, 95, 97; 1953, f. 121-24) figures the reproductive organs of three different species of Elysiidae. All have only one female opening, so that the separate vaginal aperture of *E. viridis* proves not to be the rule in *Elysia*.

Elysia serca, spec. nov. (Fig. 49-52, 59)

The biggest slugs were 8 mm. long and 1,2 mm. broad when gliding, the preserved ones are not more than 3,5 mm. long and 1,2 mm. broad. The living slugs were nearly cylindrical, preserved the biggest is about 1 mm. high. Not only contraction but also loss of water may be accountable for the decrease of size in the preserved animals. Although the body is quite smooth, the outer surface of the parapodia appears a little uneven in transverse sections. The living slugs found on Phaeophyceae are brownish with a reddish violet area between the parapodia behind the region of the heart. The brown colour comes from the diverticles of the liver that shine through the transparent epidermis. Probably the reddish field corresponds to a glandular cushion of the female duct. There are 3 large white spots, one in front of the heart and two in the middle of the free border of the parapodia. The generally cyanophilous epidermic glands stipple the body with small white dots. Some 30 specimens from Ulva were of quite different aspect. They were narrower and light green with darker green alimentary organs. They have the same 3 large white spots and white stipples as the brownish slugs and a black line along the margin of the parapodia that may also occur in the brownish animals. Radula and sexual organs are the same in the two colour-forms.

Like *E. canguzua* the slugs preserved with "Susa" and kept in alcohol lost their colour. Only the black pigment subsists in the eyes, on the outer border and the inner side of the rhinophores, on the sides of the head in a fold between mouth and rhinophore and on the margin of the parapodia.

The shape of the body corresponds to the general type of *Elysia*. In a drawing of a living slug the parapodia meet in the dorsal mid line, and the breadth is one fifth of the body length, while it is one third in the preserved animals (Fig. 49) where the parapodia are half open, rather contracted in dorso-ventral direction, and correspondingly thick and short. Like in *E. viridis* they are anteriorly well set off from the body; posteriorly they end before the pointed tip of the narrow tail. Up to 8 vessels come from the inner border of the parapodia on each side, but their number varies, some of them may unite, and they are not developed symmetrically. The anterior ones run directly to the pericardial hump where they enter the atrium, the posterior ones open into two parallel main vessels.

The rhinophores are of the same type as those of *E. canguzua*, but somewhat smaller The ventral fold extends over the whole length of the rhinophores.

The plates of the radula (Fig. 52), 20 or more of which are in function, are up to 0,13 mm. long. Their median crest is roughly serrulate with about 33 denticles, each 2,7 micra broad; the lateral crests are sharp and angulated.

The anus and the genital apertures lie as in *E. canguzua*. The male organ (Fig. 59, p) is long; it contains a ciliated and musculous ejaculatory duct surrounded by a middle layer of spongy tissue enclosed by an outer muscle coat. The whole organ lies tucked into the vestibulum (v), so that the tip of the penis is directed inward. Like in the preceding species there is no ectal vesicle developed in the efferent duct (e), that occurs in *E. viridis* (Fig. 57, x) The prostate and the albumen glands form each a pair of long tubes along the sides of the body cavity. These glands are distinctly separate from one another in *E. serca* and the two other studied species of *Elysia*, although they were omitted in the diagrams. The spermatocyst (s) is volumous and in broad connection with the female duct. A special vaginal opening does not exist.

Occurrence: Island of São Sebastião, 8 brownish specimens among algae of the upper littoral; june 1953 Ubatuba, northeastern littoral of the State of São Paulo, 6 brown slugs from Phaeophyceae and 30 green ones from Ulva; december 1954.

Discussion of Elysia serca

The purple region between the anterior ends of the parapodia of *E. picta* Verrill (1901, p. 30) from the Bermudas resembles the corresponding area in *E. serca*. But the remaining bright colour pattern of *E. picta* differs too much from that of *E. serca* to unite both species. It is obvious that an extense comparison of the present species with others, the reproductive organs of which are not known, cannot lead to definitive results. Among the here treated species *E. serca* is well characterized by the connections between the female accessory glands, the volumous spermatocyst and the very long penis.

Elysia chitwa, spec. nov. (Fig. 53-56, 58)

The preserved slugs are about 2 mm. long, 1 mm. broad and about 0,8 mm. high. Alive they were considerably longer and thinner The green diverticles of the liver and red dots produce a general aspect similar to *E. canguzua*. Black pigment occurs in form of coarse granules in the shoulder furrow, on the outer border of the rhinophores, and between mouth and rhinophores. Small melanophores are scattered over the dorsal surface and the parapodia (Fig. 53).

The latter are thick in the preserved slug, limited indistinctly, and unite in the dorsal mid line. The pericardial hump is feebly developed, superficial parapodial vessels do not appear The tail is blunt or at most slightly pointed.

The rhinophores of the preserved animals are short stumps or entirely retracted under folds.

The radular plates (Fig. 56) are up to 0,042 mm. long; 16 of them are in function. Only in one specimen a very fine roughness of the median crest was recognized with immersion, so that the plate belongs rather to the smooth than to the serrulate type.

The penis (Fig. 58, p) is similar to that of *E. serca,* but a little shorter and more slender A dilatation of the efferent duct (e) at the base of the penis, as in *E. viridis* (Fig. 57, x), does not occur The short vagina (b) and the oviduct (o) have a common opening (q). A long uterine duct (w) unites the vaginal opening of the spermatheca (t) with the oviduct (o) A second seminal vesicle, a spermatocyst, is not developed.

Occurrence: Island of São Sebastião, 7 specimens among algae of the upper littoral; november 1952 and june 1953.

Discussion of Elysia chitwa

Small rhinophores are recorded from two westatlantic species of the genus, *E. flava* Verrill (1901, p. 30) from the Bermudas, and *E.* (*Elysiella*) *verrilli* Thiele (1931, p. 415), a small species from the north american coast. The last species is Bergh's *Elysiella catula* (1886, p. 17-20), the colour of which differs widely from that of *Placobranchus catulus* Gould (1870, p. 256; Verrill 1873, p. 480, 668; Miner 1950, p. 674) I can not find sufficient agreement with *chitwa* in either of the corresponding descriptions to identify the new species with one of them.

The long uterine duct (w) and the combination of a small though functioning vagina (b) with a single seminal vesicle (t) characterize *E. chitwa* among the species the diagrams of which are drawn in Fig. 58-60.

Recently Macnae (1954a, p. 53-59) described two south african species of *Elysia,* one of them (*punctata* Kelaart var. *rubropunctata*) with separate vaginal and oviducal opening, the second (*halimedae*) yellow green with blue spots and radula plates with serrulate median and lateral crests.

The absence of specimens of *Elysia* in november and december 1953, when we searched for them carefully during 3 weeks, was striking. Mia Larsen (1925, p. 49, 52) noted a similar periodicity of *E. viridis* (Mont.) in the Dröbak Sound (Oslofjord)

Berthella agassizii (MacFarland) (Fig. 66-77)

Pleurobranchus agassizii MacFarland 1909, p. 59-64 f. 43-57
Bouvieria agassizi Engel 1927, p. 110 f. 26a-c

The biggest of the living specimens was 25 mm. long and 12 mm. broad. After preservation it measured 13 mm. in length, the smallest 2,7 mm. The width of the former is 10,5 mm., the length of its foot 10 mm. and its breadth 6 mm. The body is broadly oval in outline, the notum somewhat arched, the foot flat. The fleshy mantle extends over the flanks and the foot of the living snails (Fig. 66), in preserved specimens also over the velum; its free edge is smooth, about 3 mm. broad, and in the preserved individuals more compact and a little contracted at the hind end. The notum of our biggest slug is slightly reticulate, that of the smaller ones plain.

As in many other Pleurobranchids the notum is gelatinous and somewhat transparent, especially over the shell. Young slugs are whitish-grayish, in older ones the notum is dirty red like wine jelly. The rhinophores appear like powdered with fine rust-coloured pigment. The sole has a superficial bluish green colour In the fixing liquids the colour disappears except a light brown texture in the notum of the biggest specimen, and also the colour of the sole is somewhat resistant.

The smooth shell (Fig. 67, 68) is transparent in the living animal, pearly white in preserved ones. In our largest specimen it is 6 mm. in length and 3 mm. in width. The lateral borders are nearly parallel, the anterior outline is round, the posterior almost straight. The spire is very small. The lines of growth are distinct.

The foot is smooth, truncately rounded in front, more pointed behind. Its anterior margin is bilabiate (Fig. 69) As in the other species of the genus there is no pedal gland.

The trapezoidal velum is 4,5 mm. wide and 3 mm. long in the biggest preserved animal. The anterior border is smooth and straight, the outer angles are slightly rounded, and the lateral margins have a deep longitudinal furrow (Fig. 72, t), so that they appear like frontal tentacles. The rhinophores are directed forwards, their widened bases are continuous (Fig. 70), and their external margins rolled up in such a manner that the lower one overlaps the upper Basally both margins of the rhinophores form considerable free flaps that continue rolled up, the lower one (f) around the upper (g). The high epithelium of this region forms a thick, sometimes folded pad (Fig. 72) Its rich innervation (n) evidences its sensorial, after Guiart (1901, p. 138) probably olfactory function. It has some likeness with the organ of Hancock (Hoffmann 1935, p. 597, 603) Also in the tentacular furrow (t) there is a sensorial thickening of the epithelium (e)

The gill is completely concealed by the mantle (Fig. 69). It measures one half of the body length in the largest snail, one third in the smallest. The rhachis is smooth, the plume bipinnate with 12-14 pinnules on each side arranged alternately The posterior half of the ctenidium is free from the body wall, as the branchial membrane (q) inserts at the level of the sixth or seventh pinnule.

The anal opening (c) lies before the middle of the gill, viz. above the fourth pinnule. In the preserved, contracted animals the genital papilla is contiguous with the base of the gill. The male pore (w) is located in the centre surrounded by a fold, and the female openings (d) close behind it. Above the fold is the prebranchial opening (p), the orifice of Bourne's gland. The renal pore (i) lies immediately beneath the beginning of the ctenidium. In a transverse section of a young specimen of 2,7 mm. length the male orifice lies at 1,1 mm., that of Bourne's gland and the vagina at 1,2 mm., the oviducal opening and the renal pore at 1,3 mm., and the anus at 1,7 mm.

The form of the mandibles is shown in Fig. 73. They are light yellow in front becoming paler behind. In the largest slug they are 1,2 mm. long and 0,875 mm. broad. Their platelets (Fig. 74) stand in 24-36 longitudinal and 48-78 transverse rows. The smaller numbers refer to a specimen of 6 mm. length, the bigger to one of 13 mm. The anterior border of the free surface of the platelets is pointed and bears 3-6 denticles on each side. The basal surface has a median slit in its anterior half; the anterior border is round, the posterior truncate, and there is a stout process on each side. The free surface of a platelet from the middle of the mandible is about 33 micra long and 14 micra broad; the basis measures 30 micra in length and 20 in breadth, inclusive of the processes.

The length of the colourless radula (Fig. 75) is 1,54 mm., its breadth 1,2 mm. The formula is 44-49 $\times$ 42-52.0.42-52 for the small and the large specimen respectively. The shape of the plates is drawn in Fig. 76 and 77 Plates from the middle of a row measure 25 micra in total length and are 5 micra broad; the hook is about 14 micra high.

The brilliant white, 1,5 mm. broad egg ribbon is an archimedean spiral (Costello 1938, p. 328) of 35 mm. in diameter

Occurrence: Island of São Sebastião, under stones in the tidal zone; 6 specimens in june, and 10 in november 1953.

Further distribution: Coast of Alagoas, Brazil; Caribbean Sea. Curaçao.

Discussion of Berthella agassizii (MacFarl.)

The present system and nomenclature of the Pleurobranchidae were established by Odhner (1926, p. 19-24; 1939, p. 15-20)

MacFarland (1909, p. 60) and Engel (l. c.) indicated the anal opening as situated over the insertion of the branchial membrane, while the anus in the present material lies farther in front, as described above. This difference is of certain weight (Odhner 1939, p. 19), and the identification of our slugs with those of MacFarland can perhaps not be maintained in future. But as all other characters of our specimens agree with *agassizii,* we prefer to unite them provisionally with the older brazilian species.

B. aurantiaca (Risso) that Engel (l. c.) approached to *agassizii* is different in colour, has a rounder and bigger shell in spite of equal body size, more numerous series of radula plates, and more plates per series (see Vayssière 1913, p. 220).

Cadlina rumia, spec. nov. (Fig. 78-89)

Living slugs are up to 13 mm. long and 5 mm. broad. In alcohol the breadth of the sole is 1,8 mm. In transverse sections the body is 3,5 mm., the foot 1,4 mm., and the mantle brim 0,9 mm. broad. The body is anteriorly rounded, posteriorly attenuated; the foot can project behind the body

The animals are white and semitransparent. The rhinophores are brown, and the gills contain some yellow pigment. There is a row of 12-20 light yellow circular spots on the sides and the hind border of the notum. These spots are globular glands (Fig. 89) to the surface of which foreign particles stick. These pluricellular holocrinous glands correspond to the more numerous of *Geitodoris patagonica* Odhner (1926, f. 59 on p. 81) and *Discodoris pusae* (Fig. 154). The smaller glands of *Cadlina falklandica* Odhner (1926, f. 42 on p. 60) occur also in the present species, where they exist in great number on all surfaces and specially on the anterior border of the foot.

The skin is slightly warty The warts are of different size, those of the middle and the borders are smaller than the intermediate ones. The pits of rhinophores and gills have smooth borders. Large spicules shine through the skin. Most of them are monaxons up to 0,85 mm. long and 50 micra thick. Some of them have a rough surface. The marginal spicules have nearly all 2-5 points on the outer end (Fig. 80) The rhinophores contain irregular four and six-rayed spicules (Fig. 82); also in the gills spicules with several points occur

The tentacles are broad, triangular and grooved on the outer side. The rhinophores have about 9 perfoliations. The 8 unipinnate gills that are the rule have sometimes not each its individual basis. The number of bases is 5-8. Volumous clusters of branchial glands accompany the bases. The anterior border of the foot is bilabiate and entire, not notched. The cerebral ganglia contain distinct secretory nerve cells in their dorsal sector, as such were described in other Opisthobranchia by Scharrer (1935)

Most of the denticles of the inner lips (Fig. 83-85) have two cusps of equal size that form a right angle with the shaft. Where the series of these denticles increase in number and are irregular, also three and four cusps occur Rods with 3-4 straight points of different length substitute the denticles on the borders of the labial disc. The radula formula is 74 $\times$ 21.1.21. The central or rhachidian plate (Fig. 86, m) has 6-8 parallel teeth, two or one of which are a little longer than the rest. The first lateral plates have two inner denticles followed by a big tooth and six outer denticles. In the second and third lateral plates only the strong tooth and the 6 outer denticles are developed. From the fourth plate outwards the plates become longer and narrower They have one longer inner tooth and the number of their outer teeth decreases from six to three towards the border. The salivary glands are long, thin tubes. The stomach is small but free, on its anterior border, below the quite dorsal pylorus, lies the caecum. The gut contains shells of Foraminifera.

The ovotestis consists of few volumous follicles that are male and female separate (Fig. 87, x). The male duct is very long. It begins with a densely coiled prostatic part that is distinctly set off from the following, 7,62 mm. long, musculous portion. The efferent duct runs within a muscular sheath and is provided with cuticular hooks in its 3,06 mm. long ectal part. The genital opening is located in the first third of the body.

Also the vagina is several millimeters long. It is lined with a cuticle forming longitudinal folds and surrounded by an enormous layer of musculature but without any epithelium. Entally the vaginal muscle mantle diminishes. The duct (stalk) of the spermatheca is histologically set off from the vagina by its ciliated epithelium of high cells. The greatest diameter of the spermatheca is more than 0,6 mm. Where its duct and the vagina meet, the small winding and ciliated uterine duct originates, that leads to a spermatocyst of about 0,4 mm. breadth. The latter communicates with the female gland mass through a very short continuation of the uterine duct. The disposition of the seminal vesicles corresponds to the semiserial type that is the most common in *Cadlina*.

Occurrence: Island of São Sebastião, under stones in the tidal zone. Nine specimens in november and december 1953.

Discussion of Cadlina rumia

We apply with Odhner the name *Cadlina* Bergh 1878, although *Echinochila* Mörch 1869 (Pruvot-Fol 1951, p. 26; 1953, p. 75) seems to be an older synonym. *Acanthochila* Mörch 1868 (Thiele 1931, p. 431) was already pre-occupied at the time of its introduction. In the following list one or several characters of every species are mentioned in order to evidence the specific peculiarity of *C. rumia*.

1) *C. laevis* (Linné 1767) = *obvelata* (Müll.) = *repanda* (Ald. & Hanc.). Up to 30 mm. long, 5 tripinnate gills.
2) *C. glabra* (Friele & Hansen 1876) Notum quite smooth, 5 tripinnate gills, half row of radula 44 plates.
3) *C. clarae* Ihering (1879, p. 52), Eliot (1906b, p. 144), Pruvot-Fol (1953, p. 76) This species is discussed at the end of the list.
4) *C. pacifica* Bergh (1880a, p. 120) Pits of rhinophores and branchiae with tuberculated borders, 9 tripinnate gills, half row of radula 33 plates.
5) *C. scabriuscula* (Bergh 1890, p. 160) Odhner 1926, p. 56. Nine branchiae. Half row of radula 25-30 plates, rhachidian plate distinctly lower than the adjacent lateral ones.
6) *C. juvenca* (Bergh 1898, p. 531) Odhner 1926, p. 56. Six gills, half row of radula 50-54 plates.
7) *C. marginata* MacFarland (1905, p. 43). O'Donoghue 1927, p. 86. Pits of rhinophores and gills with tuberculated borders, upper lip of anterior margin of foot notched, half row of radula 47 plates.
8) *C. flavomaculata* MacFarland (1905, p. 43) O'Donoghue 1927, p. 85. Border of rhinophore sheaths slightly tuberculated, 10-11 gills. Armed portion of efferent duct short, bluntly conical; muscular and glandular part of this duct indistinctly set off from one another.
9) *C. kerguelensis* Thiele (1912, p. 250) Rhachidian plate of radula (t. 19 f. 23) strikingly small, much lower than the first lateral plates.
10) *C. sparsa* (Odhner 1921; 1926, p. 56). The original description of this species was not available. As the details given in 1926 do not mention disjunctive characters, we can not separate the species from Juan Fernandez from ours.
11) *C. berghi* Odhner (1926, p. 57). Twelve gills, half row of radula 31 plates, vaginal disposition of seminal vesicles.

12) *C. magellanica* Odhner (1926, p. 58) Borders of rhinophorial and branchial pits crenulate, genital orifice in the second third of the body
13) *C. falklandica* Odhner (1926, p. 60) Pits of rhinophores and branchiae crenulate, 8 bipinnate gills.
14) *C. laevigata* Odhner (1926, p. 62) Upper lip of anterior pedal border notched, 11 bipinnate gills.
15) *C. affinis* Odhner (1934, p. 251). Efferent duct unarmed, seminal vesicles vaginal, uterine duct forms a part of the vagina.
16) *C. japonica* Baba (1949, p. 57, 146) Body 25-65 mm. long. Six tripinnate gills, half row of radula 50-110 plates.
17) *C. sagamiensis* Baba (1949, p. 58, 147). Body 40-50 mm. long. Five tripinnate gills, half row of radula 110-115 plates.
18) *C. excavata* Pruvot-Fol (1951, p. 26) Foot as broad as notum. The latter with two successive concavities in the mid line.

C. clarae Iher. is the species that *C. rumia* is most difficult to separate from. The efferent duct was described as unarmed, but this may be a character of juvenile specimens (Eliot, l. c.; Odhner 1926, p. 56) The distribution of the feebly yellowish spots in *C. clarae* differs from that of the light yellow ones of *C. rumia,* that are more numerous and do not extend in front of the rhinophores. Also the shape of the rhachidian plate of *clarae* (l. c., t. 3 f. 20) does not agree with that of *rumia*. The labial denticles of *clarae* have two cusps of very different length. Besides the first also the second and third lateral plates of Eliot's *clarae* have inner denticles, and the foot of his certainly young slug is notched in front. In Pruvot-Fol's *clarae* (l. c.) the first and second lateral plates are denticulated on both sides. As this "très petit Doridien" has strong pointed hooks of the efferent duct, its identification with Ihering's species is not certain.

The length of the prostatic portion seems to be of systematic value, as *C. scabriuscula* (Bergh), f. ex., has this part shorter than the following muscular one, while the 23 mm. long *C. berghi* Odhner has it unrolled 30-40 mm. long.

Since Thiele (1912, p. 250) *Cadlina* is sometimes called a bipolar genus, but as it was verified at Lat. 24° 44'N., near the Straits of Florida, at 23° 49'S. in the littoral of the island of São Sebastião, and at the Cape Verde Islands (15° N.), one can at most state that *Cadlina* was not yet found in the tropical Indic and the Red Sea.

Glossodoris neona, spec. nov. (Fig. 90-101)

The living slugs measured 15 and 16 mm. in length, and 3 and 4 mm. in breadth. The soft body is longish, has parallel borders and a prominent brim of the notum. Apart from this edge cross sections of the body are nearly circular. The foot stands rather far out from the notum when the slug moves.

The ground colour is a bright light blue, nearly fluorescent, as described by Risbec (1928, p. 138) for the marginal band of *G. flammulata* (Bergh) Rhinophores, gills, and the pointed tip of the foot are red violet. The back of the notum is trimmed with a bright eosin red border that is fluorescent too. Lines and spots of the same colour form an irregular pattern on the notum (black in Fig. 90 and 98) The underside of the notum, the sides of the body and the sole are light blue without spots. A stripe in the mid line of the prominent hind end of the foot is also bright red. There are about six darker blue areas on each side of the notum. These are due to dense accumulations of gland cells in the cutis. Sections (Fig. 100) show that outlines of these accumulations (l) are lobate and not connected with the epidermis.

The notum is smooth. The spicules (Fig. 91-93) are of two types, monaxons and spherules with rough surface, like eggs of Tardigrades. The needles are up to 0,27 mm. long and 50 micra thick, rounded on their ends, and bossed; those in the rhinophores are smooth, very thin, and no more than 0,12 mm. long. The spherules measure up to 62 $\times$ 55 micra and are lodged on the dorsal side of the foot.

The tentacles are pointed; the rhinophores have about 18 perfoliations and a short shaft. The gills are nine unipinnate plumes. The foot widens in front and forms distinct outer angles; the border is simple, not furrowed.

The lips are armed with a grasping ring (Fig. 94) that is interrupted on the dorsal side and constituted of bifid hooklets, the bases of which touch one another The radula formula is 42 × 29. 1.29. The rhachidian plate (Fig. 95, m) is a low triangle with a small and smooth cusp. The first lateral plate has 5 small denticles on each side of the main cusp and besides one stronger innermost denticle. The following lateral plates have gradually increasing hooks with about 8 and up to 11 denticles on the outer side of their cusp. The latter shortens from the 20th plate outwards, so that the marginal plates end with a dentate concavity similar to a cockle shell.

The salivary glands (Fig. 101, r) are rather short. The oesophagus (n) enters a central cavity of the liver (h) that represents the stomach as in *G. zebra* (Heilprin 1889, p. 327). The caecum (c) and the pylorus lie near one another on the left side. The folded intestine (i) begins with a pyloric diverticle (d) and runs forward on the left side, where it attains the level of the inner mouth. Then the gut passes backwards to the right side. The anus (w) is located between the gills.

The ovotestis lies over the liver, first the male and farther dorsally the female follicles. The hermaphrodite duct bifurcates immediately behind the ampulla (Fig. 96, a) The epithelium of the ental part of the efferent duct is glandular (p), and this "tubular prostate" is long and coiled. Then follows a muscular middle part (b) that is simple and continues distally (e) as a twisted tube within a coat of muscles. The efferent duct is acrembolic and opens into the tubular vestibulum (y).

The vagina (Fig. 97, v) begins near the male pore and receives the uterine duct (u) in its distal part. Farther entally the vagina is a winding tube that enters the spacious spermatheca (t) and communicates immediately before this entrance with the folded spermatocyst (s) There is no vestibular gland. The outer opening of the nidamental duct or oviduct (o) lies far apart from the vaginal and male aperture, but the atrial (vestibular) pore (z) is in common for the three genital ways.

Occurrence: Island of São Sebastião, two specimens beneath stones in the tidal zone, november 1953. Ubatuba, northeastern littoral of the State of São Paulo, 1 slug under a stone in november 1954

Discussion of Glossodoris neona

It is certainly recommendable to follow Odhner (1932, p. 31-32; 1934, p. 251) who separates *Glossodoris* Ehrbg. with hook-shaped radula plates from *Chromodoris* Ald. & Hanc. with mainly bifid ones. Even then both genera will include a great many species each. It seems that these must be distinguished principally by the combination of colour and pattern, and the details of the radula. The vestibular gland of some species (Odhner 1934, p. 250-251) is a valuable systematic character of the genital organs. Also the origin of the uterine duct, f. ex., ental in *G. amoena* (Odhner 1934, f. 15), in the middle of the vagina in *G. punctilucens* (id. 1932, f. 5), and ectal in the present species (Fig. 97), may prove to be useful. The colour must be considered together with the design. *G. neona* belongs to the extensive "famille bleue" (Pruvot-Fol 1953, p. 72), and its labial armature, radula (Vayssière 1919, f. 48, 49), and salivary glands (id. 1901, p. 36) are even similar to *G. luteo-rosea* (Rapp), but the pattern is quite different. On the other hand the pattern of *G. zebrina* (Alder & Hancock 1866, p. 123) likens that of *G. neona,* but the ground colour of the species from the Indic is white.

A certain number of species, to which also *G. neona* belongs, has "blasenartige Drüsenbildungen am Mantelgebräme" Bergh (1890, p. 168) It is true that Bergh's figure (t. 3 f. 13) looks very unlike our sections (Fig. 100) Notwithstanding I think that the "series of small glandular swellings round the mantle margin" (Odhner 1934, p. 249) of *G. amoena* (Cheeseman), that Eliot (1907, p. 345) described as "a row of round bodies", are the same as Bergh's "Drüsenbildungen" and our accumulations of spherical glands. Risbec observed such in various Glossodoridinae (and Cadlinellinae): 1928, p. 139, 155, 163, 167, 168; 1953 f. 43B, p. 92, and stated that the irritated slugs expel the contents from these areas. Also the "arborescenses, arborisations et chapelets" that are freed from the surface of the notum (id. 1928, p. 129) and were described as opaque white, dark brown (p. 133), or of fatty aspect

(p. 157), are probably the same structures, although they figure among the pigment cells in Hoffmann's synopsis (1935, f. 398 H, J)

Apart from a rather odd note of Ihering (1915, p. 143, note 1) it seems that no record of *Glossodoris* (or *Chromodoris*) for Brazil has been published, though these genera are typical warm water forms. We compared *G. neona* with the species from the western Atlantic mentioned by Heilprin (1889, p. 327), Bergh (1892, p. 138-139), and White (1952, p. 113-118). The description of *Chromodoris gonatophora* Bergh was not available, but as there is no rhachidian plate in this species (Bergh 1890, p. 160 note 2), it cannot be identical with the present one. For comparison with *G. neona* the records of *Glossodoris* (and *Chromodoris*) from South Africa (Bergh 1907, p. 55-58; Barnard 1927, p. 180-184), West Africa (Pruvot-Fol 1953, p. 72-75), Cape Verde (Eliot 1906b, p. 146), Canary Islands (Odhner 1932), Azores (Bergh 1899, p. 17), and the Mediterranean (Ihering 1879; Vayssière 1901, 1913, 1919; Pruvot-Fol 1951, p. 20-25) were read in detail. The further litterature was treated rapidly and only as far as available, and no description of any species was found to agree with *G. neona*.

Doris verrucosa Cuvier (Fig. 102-108)

The single slug was 22 mm. long alive and 11 mm. broad. Preserved its length is 18 mm., the breadth 11 mm., and the height 5 mm. The brim of the notum is about 3 mm. broad. The body is not depressed, its anterior and posterior ends are rounded and the sides parallel. The pointed hind end of the foot projects beyond the notum in the living slug. The sole of the preserved animal is 15,5 mm. long and 6 mm. broad; its lateral borders are somewhat undulated.

The colour is yellowish gray, the back and the gills are darker The dark pigment is specially localized in the smooth, vesiculous papillae that do not touch one another Those on the borders are all small, while there are bigger papillae, up to 1,5 mm. in diameter, in the middle. These are intermingled with very small ones. The largest spicules are about 0,5 mm. long and 40 micra thick.

The tentacles (Fig. 107) are scale-shaped and have an outer furrow The shaft of the rhinophores is rather long, the club bears about 10 perfoliations. The rhinophorial pits have one small papilla on their anterior and one on the posterior border and big ones on the right and left side (Fig. 108) The margin of the branchial cavity (Fig. 103) is beset with 7 big, sausage-shaped papillae alternating with 7 small tubercles. There are 15 unipinnate gills. The anterior border of the foot is transversely grooved. A longitudinal fold begins in the middle of the upper lip and continues on the sole where it ends in a shallow transverse fold (Fig. 107).

The cuticle of the labial disc is colourless and smooth, though slightly pearled. The hamate radula plates have no denticles; their formula is: 32 × 45.0.45. The inner (80 micra) and marginal plates are smallest and their size increases gradually to 0,14 mm. in the 20.-30.plate. The outermost plates (Fig. 104) are reduced rather more in the basal plate than in the hook. The very wide and folded oesophagus (Fig. 105, o) enters the stomach behind on the right side (j) The stomach (k) is strongly muscular and contains tissues of sponges with their spicules and pieces of algae. The hepatic ducts unite to a main duct that opens (w) far behind into the ventral stomach wall. The principal hepatic duct receives a canal that continues as caecum (c). The lobes of the liver (n) the cells of which are known as secretory, digestive and extrusive in function (Forrest 1953, p. 228) contain big bits of sponge with spicules. The pylorus lies quite in front on the left side. The gut (i) begins with a large S-shaped loop under the stomach. This first part of the intestine is uncommonly wide, folded, nearly sac-like, so that it is difficult to distinguish from the also wide, farther ventral oesophagus. The following narrower part of the gut curves backwards on the right side of the stomach and runs to the anal papilla (r) in the centre of the gills (b).

The ovotestis has separate male and female follicles that are intermingled. The ampulla (Fig. 106, a) forms a loop and enters the female gland mass (g) The male branch emerges from the mucus gland as prostatic duct (p) that is of the same diameter along its whole, considerable length. The ectal part of the efferent duct (e) runs winding within a muscle mantle (q) that is united with the duct by connective tissue and does not represent a fast sheath separate from the duct. The latter is acrembolic and stands a little out (y) into the male atrium. This atrium, as well as the outer opening of vagina (v) and oviduct (x) are lined by a high villous epithelium. The gonopore is located at the end of the first fourth of the body

The vagina (v) is broad and musculous in its outer part, but soon becomes much thinner The seminal vesicles are vaginal. The innermost is the spermatheca (t) About 0,3 mm. farther outward the spermatocyst (s) opens into the vagina with a short canal, and much farther ectally the uterine duct (u) goes out from the vagina and runs to the mucus gland.

Occurrence: Island of São Sebastião, one specimen under a stone in the tidal zone, november 1953.

Further distribution of *Doris verrucosa*: East Atlantic, from the coast of England and Ireland to the Mediterranean and southward to South Africa; West Atlantic, from South Carolina and Florida to middle (Rio de Janeiro) and southern (Sta. Catharina) Brazil.

Discussion of Doris verrucosa Cuv.

Thiele's figure (1931, f. 533) based on Alder & Hancock's *Doris bilamellata* L. (1854, Fam. 1 t. 11 f. 1) is not *D. verrucosa,* as Eliot (1910b, p. 147) thought, but *Onchidoris fusca* (Müll.) (White 1938, p. 14) Therefore Hoffmann's copy of Hancock & Embleton's drawing of the alimentary tract of "*D. verrucosa*" (1939, p. 1108 f. 765 C) cannot be compared with our reconstruction (Fig. 105) For the determination of our material we used Eliot (1910b), p. 96) and the description of Vayssière (1901, p. 13). His *Archidoris tuberculata* is *Doris verrucosa* Cuv. (Eliot 1906a, p. 337, note; Misuri 1917, p. 69-70; Pruvot-Fol 1951, p. 7; 1953, p. 65) The anterior margin of the foot in *D. verrucosa* is entire after Vayssière's figure (1901, t. 3 f. 4) copied by Hoffmann (1933, f. 123 C), while Bergh's material from Florida (1890, p. 161) has a transverse furrow like the present specimen. The character "Fuss ganzrandig" (Thiele 1931, p. 434) in the diagnosis of *Doris* (*Staurodoris*) must be understood as "not notched" *D. nobilis* Odhner 1907 (see Odhner 1926a, p. 20) has an entire anterior border of the foot, but in *D. sticta* Ired. & O'Donogh. (= *maculata* Garstang 1895, p. 167; see Odhner 1939, p. 34) and *D. atypica* (Eliot 1906b, p. 134) it is transversely grooved. In *D. verrucosa* var. *mollis* (Eliot 1906a, p. 338) "slight traces of a groove occur" *D. bovena* (Fig. 111) has it generally entire, but sometimes the upper or under lip is indistinctly indented. Among the species of the Indic, the exclusion of which by Thiele (l. c.) contrasts with the opinions of Eliot (1906a, p. 337) and Bergh (1907, p. 45-46), *D. rusticata* Alder & Hancock (1866, p. 120; Eliot 1906, p. 652) and *D. depressa* (Eliot 1903a, p. 363), have a grooved and notched (Alder & Hancock, l. c.) anterior margin of the foot. After all it is recommendable not to overestimate the in fact peculiar character of the propodium in the present specimen, until more live material is available.

In the collection of the "Museu Paulista" there is a jar with 77 specimens of *D. verrucosa* from São Sebastião in alcohol. These yellowish slugs are strongly contracted, up to ca. 20 mm. long, 14 mm. broad, and 10 mm. high. Their dorsal papillae are 1,5-2,0 mm. in diameter The adult specimens have 6-9 sausage-shaped appendages around the branchial cavity. The sole is so much shrunk in most specimens, that the propodium is hardly recognizable. A longitudinal notch is seen in many cases, but the only not shrunk slug has an entire, not notched anterior border with a transverse furrow.

It is strange that Bergh (1892, p. 128) included *Staurodoris pseudoverrucosa* Ihering (1886, p. 233) in the synonymy of *Doris verrucosa*, although Ihering described the branchiae as bipinnate and one of Bergh's generic characteres of *Doris* (*Staurodoris*) is: "branchia e foliis sat numerosis simpliciter pinnatis formata" *D. pustulata* Abraham 1877 has tripinnate gills after Basedow & Hedley (1905, p. 151). Therefore it seems, that unipinnate gills must be deleted from the diagnosis of the genus. If one handles Doridids with retracted gills, one must cut the entire tuft of them out and then separate the single branchiae from one another.

Also the crenulation of rhinophorial and branchial margins is not a safe generic character (Odhner 1926a, p. 20), as is shown by *D. pseudoverrucosa* (l. c.) and *D. bovena* (Fig. 113, 114)

The study of the reproductive organs is indispensable to define a species as belonging to *Doris* (*Staurodoris*) The external features agree to a high degree with those of *Archidoris* Bergh 1878. The chief difference is the thickened prostatic duct of *Doris* against an efferent duct in *Archidoris* "being a thin canal throughout" (Odhner 1926a, p. 20). The muscular part of the male duct is uniform till to its external opening in *Doris*, while an outermost musculous penis sheath contrasts with a thin inner duct in *Archidoris*.

Austrodoris Odhner (1926, p. 67; 1934, p. 255) has a muscular coat of the efferent duct similar to that of *Doris*, but no prostatic part. Moreover it has thick, short salivary glands.

Anisodoris Bergh (1898, p. 508) agrees with *Archidoris* in the limit between penis sheath and efferent duct, but differs by a prostate set off from the duct.

Certainly these characters as well as the topography of the seminal vesicles are difficult to verify in small preserved animals (Pruvot-Fol 1933, p. 120; 1937, p. 47), but with the microtome series of sections can be obtained, also of alcohol material, and its organization understood by reconstruction.

Doris bovena, spec. nov. (Fig. 109-118)

The largest living slug was 10 mm. long and 4 mm. broad. Big preserved specimens measure 9 × 6 and 8 × 7 mm. The body is broadly ovoid, rounded anteriorly and posteriorly in the same curve. The foot has a broad, almost straight anterior border and a pointed caudal end; the sole is 2,5-3 mm. broad in a preserved slug with 5 mm. wide notum.

The colour is opaque orange, equal to that of the sponges on which the slugs feed. Rhinophores and gills are somewhat darker The notum papillae (Fig. 115) are warts without the smaller prominences described for *Doris atypica* (Eliot 1906b, p. 134)

They are of different size, the bigger and smaller ones irregularly distributed. The bunches of spicules in the warts (y) do not project over the skin, contrary to those of *D. aspera* (Risbec 1928, f. 20 on p. 102; 1953, p. 38) Spicules occur also in the rhinophores and gills, and all are monaxons up to 0,8 mm. in length and 35 micra in diameter

The barrel-shaped tentacles (Fig. 111) are grooved on their outer side. Sometimes both are united by a fold (Fig. 112) The rhinophores have 9-11 perfoliations. The rhinophorial pits (Fig. 113, x) are surrounded by 8-10 papillae, while the border of the branchial cavity is smooth. There are 8-12 unipinnate gills with a dense wreath of glands around their bases. Mucus glands (z) occur on the notum (Fig. 115) and especially numerous and large ones (Fig. 118, f) on the lateral borders of the foot, as Thiele (1897, p. 650) observed such in a "*Doris*" The anterior border of the foot is bilabiate and generally entire. Sometimes the middle of the upper or under lip is indistinctly indented, possibly by muscular contraction.

The thick labial cuticle is smooth and colourless. The radula formula is 26-30 × 30-35.0.30-35. All plates are hook-shaped. Their height increases from the innermost (20 micra) outwards (45 micra). The 3 last plates are smaller, the outermost (Fig. 116) even rudimentary. The salivary glands (Fig. 117, r) are long, ribbon-shaped. The oesophagus (j) contains longitudinal folds and extends far backwards where it enters the stomach (e) from the right side. Near the entrance of the oesophagus the hepatic lobes (l) debouch with a single opening into the stomach, and the caecum (c) communicates with the liver The caecum begins as a narrow tube and widens entally, it is very long and attains the level of the hind end of the radula in front. Also the stomach is long and extended forwards to the level of the pharynx (q). The intestine (i) goes out from the foremost part of the stomach. The anus (k) lies in the centre of the circle of gills. The stomach contains tissues and spicules of sponges and Bryozoa Ctenostomata of the genus *Nolella,* as well as some Foraminifera.

The ovotestis (Fig. 118, o) lies over the liver It has dorsal male and more ventral female follicles. The spacious ampulla (a) is lobed and extends far to the front. The male duct begins with a convolute prostatic part (p) and continues with the musculous portion (d). In a sectioned slug that had copulated, and the male organs of which are retrograding, it was surprising to see the windings of the prostatic duct agglomerated. Possibly such a shortened, nearly compact prostatic duct might be taken for a prostate set off from the efferent duct. The muscle layer around the ectal part of the duct does not leave a free space, nevertheless it permits the duct a winding course. The muscular coat is uniform from the end of the prostatic part to the short papilla that projects into the copulatory atrium (m), and the verge seems to be everted by acremboly.

The narrow vagina (v) begins in the copulatory atrium near the opening of the efferent duct. Entally the vagina widens, loses its muscles and becomes ciliated. Into this portion open the two seminal vesicles, one smaller stalked (s) and a larger curved one (t) After copulation the smaller vesicle contained well preserved sperms and is therefore considered as spermatocyst, the larger as bursa copulatrix or spermatheca. The thin uterine duct (u) leaves the ciliated part of the vagina between the seminal vesicles. It enters the female gland mass that opens into the atrium of oviposition (n) without a special oviduct.

Occurrence: Island of São Sebastião, under stones in the upper littoral, 12 specimens in november and december 1953.

Discussion of Doris bovena

Ihering (1886, p. 230-31) united *Staurodoris januarii* Bergh from Rio de Janeiro with *Doris verrucosa* Cuv. from Sta. Catharina and Bergh (1892, p. 128; 1907, p. 45) accepted this synonymy Therefore *Doris bovena* must be compared chiefly with *D. verrucosa* that is generally considered as a species with a very wide range of variation. Nevertheless it can by no means comprehend *D. bovena.* Size, colour and sculpture, including that of the rhinophorial and branchial pits, the number of gills and radula plates, the localization of the largest plates, and details of the alimentary tract, specially length of caecum and course and diameter of the beginning of the gut, are different in *verrucosa* and *bovena*. The reproductive organs, though they agree in the principles, as: prostatic duct, muscular efferent duct, not sheath, and vaginal seminal vesicles show specific differences, f .ex. bifurcation of the ampulla outside the mucus gland (*bovena*) and inside (*verrucosa*), and origin of the uterine duct between the seminal vesicles (*bovena*), and ectally to them (*verrucosa*)

Nor does *D. bovena* agree with any of the other species of *Doris* (*Staurodoris*)

Siraius, gen. nov.

Dorididae, probably Doridinae, with hook-shaped lateral and pectinate marginal plates of the radula. Tentacles short, thick, and grooved. Salivary glands short and broad. Prostatic part of efferent duct tubular, muscular part acrembolic, unarmed; no verge. Seminal vesicles vaginal.

Type of the genus: *Siraius ilo*, spec. nov.

Although the new species is represented by only one slug, it can not be classified without introducing a new genus. The marginal (outer lateral) plates are pectinate also in the young series of the radula and neither worn nor deformed or atrophied (Pruvot-Fol 1951, p. 15) None of the genera that unite such plates with unarmed lips and male organ in Risbec's simplified system of the Dorididae (1928, p. 74) can receive the present species, as all belong to subfamilies with well developed prostate. *Siraius ilo* can be placed only in a subfamily without prostate.

Etiodoris ladislavii Ihering (1886, p. 234) from Brazil has tentacles, salivary glands and marginal plates like the new species, but 4-5 tripinnate gills against 22 unipinnate ones in *Siraius ilo*. Of the reproductive organs only the absence of a genital armature is known for *E. ladislavii*. Bergh (1892, p. 132) united *Etiodoris* with *Thordisa*, that belongs to the Discodoridinae with volumous prostate, and Ihering (1915, p. 142) accepted this synonymy

Two genera of the Glossodoridinae, *Actinocyclus* (*Sphaerodoris*) and *Hallaxa*, have no prostate and have pectinate plates, but these are not restricted to the margins of the radula. Moreover they have labial hooks, no tentacles, and further characters incompatible with the new species.

It seems that *Siraius* suits better with the Doridinae Odhner (1926, p. 54), in the original diagnosis of which a misprint reads "Kleine Glans" (small glans) instead of "Keine Glans" (no glans) After the description of the hook-shaped plates must be added "marginal ones sometimes pectinate" Thiele (1931, p. 434) includes *Echinodoris* with dentate plates in the Doridinae. There are almost no tentacles in this genus, and the efferent duct bears hooks. Also in *Alloiodoris* of the Doridinae occur plates with denticles, but not pectinate ones, and the ectal part of the efferent duct is armed.

The prostatic part of the efferent duct of *Siraius ilo* and also the musculous one suits with *Doris,* while the short and broad salivary glands liken the common type (Odhner 1934, p. 269) in *Austrodoris*.

The characters of the gills and the labial cuticle were not mentioned in the diagnosis of *Siraius*. Unipinnate gills have no generic value even in *Doris* (see discussion of *Doris verrucosa*), and *Austrodoris* comprises species with gills of very different types (*crenulata, macmurdensis, nivium*) The labial cuticle of a single specimen is significant only if it is armed or completely smooth and thin. In the present case, however, it has pits, and these might be the rest of a worn off armature.

Siraius ilo, spec. nov. (Fig. 119-125)

The living slug was depressed, broad and flat, 25 mm. long and 11 mm. broad. Preserved the animal has 17 mm. length, 11 mm. breadth and 5 mm. height. The length of its foot is 14,5 mm., its width 6 mm. The notum brim is 2,5 mm. broad. The pointed posterior end of the sole attains the hind border of the notum.

The fundamental colour of the body is grayish yellow. The warts that cover the notum are darker The rhinophores are grayish yellow, the gills light yellow. The flat warts are of different size and do not touch one another The smallest are 0,1 mm. in diameter, the biggest 0,6-0,7 mm. The height of middle sized warts is 0,25 mm. The monaxonous spicules form thick bundles in the warts, but do not project from them. These spicules are smaller than those in the other parts of the cutis that attain 1 mm. in length and constitute a dense layer. Also shaft and club of the rhinophores as well as the foot contain spicules.

The short and thick tentacles are barrel-shaped and grooved on their outer side. The rhinophores lie 3 mm. behind the anterior border, the gills 4 mm. before the posterior end. There are about 15 perfoliations of the rhinophorial club. The warts around the rhinophorial pit make its border ragged. The margin of the branchial cavity is smooth, because the surrounding warts are very small. The 22 gills (Fig. 125, b) are unipinnate; the two antero-median ones are united at their base; the postero-median ones are advanced into the circle. The anterior border of the foot is transversely grooved, the upper lip is entire, the under lip slightly indented; the lateral borders are straight.

The labial cuticle has neither hooks nor rods but hexagonal markings. The radula formula is 37 $\times$ 3.44.0.44.3. The innermost lateral plate is especially small (45 micra) and has a very small hook (Fig. 122) The size of the following plates increases rapidly so that the 14th already is 0,11 mm. high. Farther outwards the plates continue lengthening to the 42nd that measures 0,17 mm. The last hook-shaped plates diminish rapidly, the 44th is 90 micra. The marginal plates (Fig. 123) are flat hooks with brushy edge. The innermost is 75, the 2nd 56 and the outermost 45 micra high. The salivary glands (Fig. 125, j) are short and broad. The wide oesophagus (e) enters the stomach (w) behind and on the right side. The stomach is folded, muscular and in the present specimen empty. The liver opens into the stomach near the entrance of the oesophagus, and also a ciliated, thin walled caecum (h) lies in the cardiac region. A second, muscular, likewise ciliated diverticle (k) is located beside the pylorus on the left side of the anterior border of the stomach. This caecum corresponds to that of other Doridids that prepares the faecal masses (Millot 1937, p. 212; Forrest 1953, p. 229-30). The intestine (i) is dorso-median; the anal papilla (c) lies in the centre of the gills (b)

Male and female follicles of the ovotestis are separate. The present slug is in female phase, male follicles are rare and compressed. The ampulla (Fig. 124, a) is free, not embedded in the female gland mass; the ciliated long male duct (d) begins epithelial and becomes glandular farther ectally This winding prostatic part (p) is a little broader than the following muscular part (q). The layer of muscles is thin, and not separated from the ciliated duct by a free space. The folded ectal part of the acrembolic efferent duct with its muscle coat opens into the likewise folded vestibulum (m) without projecting into the latter The genital pore (r) lies 5 mm. behind the anterior border of the body.

The vagina (v) begins near the opening of the efferent duct. It is a thin walled tube with a folded epithelium that produces a star-shaped lumen in tranverse section. The spermatheca (t) lined with a very high epithelium opens into the vagina by a short duct. Farther entally the vagina dilates and receives the duct of the spermatocyst (s). The latter contains well preserved sperms, the heads of which are fastened to the wall. A short uterine duct (u) leads the spermatozoa to the female gland mass (g). The albumen gland lies in the centre of the mucus gland. The multiple ducts of the female glands unite constituting the oviduct (o) that opens beside the efferent duct.

Occurrence: Island of São Sebastião, one specimen under a stone in the tidal zone; december 1953.

Peltodoris greeleyi MacFarl. (Fig. 126-132)

Peltodoris greeleyi MacFarland 1909, p. 84-88 f. 77-82

Alive the length is up to 8 mm., the breadth 3,5 mm.. The body is moderately convex, the foot stands out a little behind when the slugs are in locomotion. Preserved the body is “equally rounded in front and behind, the general shape being oblong elliptical, with the wide, rather fleshy mantle edges projecting well beyond the foot” (MacFarland, l. c.).

The ground colour is orange. Rusty marks form rings around the pits of rhinophores and gills, two longitudinal stripes run between these rings, and spots are distributed over the notum. The branchiae are brown.

Caryophyllidia (Hoffmann 1935, p. 592) of equal size and shape make the notum velvety Such papillae (Fig. 129) with spicules accompany also the borders of the rhinophorial and branchial grooves, and spicules occur in rhinophores, gills and all parts of the cutis. The spicules of the papillae are individually covered with skin, not united by a common web. As was described by MacFarland (p. 85), the axis of the papillae is supported by stouter spicules and the central knob surrounded by thinner ones, and some obliquely placed and slightly angulated ones continue along the entire caryophyllidium. The length of the spicules in the papillae is 0,1 mm., in the foot 0,5 mm., the diameter is 6 and 21 micra respectively.

A semilunar broad labial field appears in some of the preserved specimens (Fig. 128) due to eversion of the oral tube. The small tentacles are pointed and flattened dorso-ventrally. The rhinophores have about 8 perfoliations. The border of their pits is beset with papillae but not lobate. The 12 gills are unipinnate and equidistant from one another, disposed in a continuous circle around the anal papilla. The anterior pedal border is bilabiate, the upper lip more or less distinctly notched or smooth. The hind end of the foot is rounded triangular

The cuticle of the buccal tube is smooth. It has a hexagonal pattern in one of the present specimens. The plates of the radula (Fig. 130) have all flat hooks without denticles and are of different size like in other species of *Peltodoris* (Bergh 1881, p. 229; Eliot 1910, p. 420). The innermost plate in the smallest, 17 micra high. Then their length increases outwards, where the third from the end is the biggest, 84 micra long. The two outermost are smaller and their hooks frequently reduced, the height of the last is 45 micra. The formula is 43 $\times$ 32-38.0.32-38.

The salivary glands are short, each consists of a cluster of acini with a short and narrow common duct. The stomach is free and folded and receives the oesophagus in the middle of its ventral wall, while the gut leaves it near its anterior border A typical caecum debouches into the left stomach wall, immediately behind the entrance of the oesophagus. Ectally to the pylorus the intestine curves as usually to the right side and backwards.

The male and female follicles of the ovotestis (h) are separate. Their communication with the hermaphrodite ampulla (a) was simplified in the diagram (Fig. 131), where also the ducts are shortened and straightened, and ampulla and ovotestis diminished.

Immediately after leaving the ampulla the male and female branch (d) separate. The latter enters the female gland mass (m) The former pierces a very volumous lobate prostate (p) Farther ectally the efferent duct is surrounded by a musculous sheath (r) This penial portion projects into the male vestibulum (q) with a short cylindrical papilla. A glans differentiated from the efferent duct is not developed, only a smooth cuticle distinguishes the free papilla from the ental part. Near the inner end of the male vestibulum lies a genital ganglion like in *Peltodoris atromaculata* (Misuri 1917, t. 9, f. 130, gn)

The outlet of the female gland mass, viz. nidamental or oviduct (o), the male vestibulum or atrium (q), and the vagina (v) have separate, though neighbouring, apertures. The long unarmed vagina leads to an ample oblong spermatheca (t) Near the vaginal opening the uterine duct (u) leaves the spermatheca with an independent orifice. This duct receives the duct of the spermatocyst (s) and joins the female gland mass (m) So the disposition of the seminal vesicle corresponds to the serial type (Odhner 1926, p. 51).

Occurrence: Island of São Sebastião, 4 specimens under stones in the tidal zone, november 1953, one in april 1954.

Further distribution: Coast of Alagoas, Brazil

Discussion of Peltodoris greeleyi MacFarl.

Although MacFarland's specimen is more than twice the size of ours and has more perfoliations of the rhinophores and more plates of the radula, the details of the plates, the skin, gills, and reproductive organs agree so closely, that a specific separation would be artificial.

Perhaps the passage "lobo antico semilunari" in Mörch's description (1863) of *Doris* (*Dendrodoris*) *crucis* Oersted, to-day *Peltodoris crucis* (Mörch), refers to an everted oral tube, as occurs in some of our preserved slugs. *Spongiodoris rigida* Pruvot-Fol (1933, p. 131-32) has a true frontal velum and no tentacles.

The topography of oesophagus and intestine in relation to the stomach as described by MacFarland (p. 86) does not agree exactly with our statement, but this difference is of no systematic weight. The absence of the caecum ("bile cyst") is another point of discordance between MacFarland's and our specimens.

Whether the sheathed part of the efferent duct, probably the "glans penis" of MacFarland's text, can be everted by pleurembolv (Fig. 132) is unknown; in this case the cuticularization of the turning point, the "papilla" of our description, would solidify the base of the everted verge. The so-called penis of MacFarland's slug cannot be evaluated, because there is no figure. If he had before him the second or third stage of pleurembolic evagination, his description might correspond to our material.

Since MacFarland's synopsis of *Peltodoris* (p. 83-84) only *P. noumeae* Risbec (1937, p. 159; 1953, p. 40) was described. In this species the posterior gills are simply pinnate, the others bipinnate.

Thordisa diuda, spec. nov. (Fig. 133-140)

The only available animal is preserved 9 mm. long, 4 mm. broad and 2,3 mm. high. Its form is ovoid, anterior and posterior border are equally curved (Fig. 133) The pointed end of the foot projects from the notum when the slug is gliding. The breadth of the notal brim is 1 mm., that of the sole 2 mm.

The notum is olivaceous with white dust over the warts and tubercles. The pigment forms an even layer in the cutis where it lies principally between the epidermis and the spicules. The foot is orange in its anterior, white in its posterior part. The upper part of the gills is light the lower is dark due to pigment.

The notum is beset with conical tubercles that are longer than broad and of different length (Fig. 136). They are quite different from those surrounded by filaments as in *Th. villosa* (Alder & Hancock 1866, p. 119; Eliot 1903, p. 368), *tristis* Bergh (1905, p. 121) and *hilaris* Bergh (1905, p. 122) The longest tubercles are 0,5 mm. high in the preserved slug and lie in the middle, but for the rest big and small ones are mixed. The spicules are abundant and project from the tubercles, mainly in their basal portions.

In the living slug the tentacles were pointed conical knobs (Fig. 134), in the preserved animals they show as round buttons (Fig. 137, j) each on a disc beside the mouth (k) The two discs are grown together with the ventral side of the head; the buttons contain erythrophilous gland cells. The rhinophores have about 12 perfoliations, their pits are flanked by a bigger papilla on either side. The notum tubercles become smaller around the branchial pit. There are six tripinnate gills. The anterior border of the foot is transversely grooved but entire, not notched. Numerous cyanophilous glands are developed on the upper side of the foot.

The strong labial cuticle is smooth. The radula formula is 33 × 7.27.0.27 7 The first lateral plate is very small (19 micra), the following increase gradually (Fig. 138): the 26th is about 0,15 mm. long. The pectinate marginal plates (Fig. 139) have a strong cusp like Risbec's variety (1953, f. 19 F) of *Th. hilaris* Bergh and long bristles. Their length diminishes from the inner to the outer side. The stomach is free; its dorsal wall has longitudinal ridges. Beside the dorso-central caecum lies the pylorus that begins with a bulbous dilatation. The intestine curves to the right side and ends with the anal papilla in the middle of the gills. The liver contains pigment cells.

The male and female follicles of the ovotestis are separate. The ampulla (Fig. 140, a) is long. The very volumous prostate (p) is massive, externally entire, internally subdivided into numerous follicles. The following part of the efferent duct (e) is a tube with thin muscles, the star-shaped lumen of which is produced by the different height of its epithelial cells. Farther outwards the epithelium becomes lower, the muscles thicken, and the diameter of the efferent duct diminishes. A small pleurembolic penial papilla (q) projects into the vestibulum. Beside the opening of the male duct the vagina (v) begins with a strong sphincter (y) Farther inward there is a vaginal gland (x) with erythrophilous secretion. The oblong spermatheca (t) extends to the left and a little to the dorsal side. The uterine duct (u) begins near the entrance of the vagina into the spermatheca, so that the latter has only one duct. The long, winding uterine duct enters a dilatation (r) of the female branch (o) that emerges from the ampulla. This dilatation lies embedded in the gland mass (m, w) and receives also the short duct of the spermatocyst (c) The sperms contained in the spermatocyst stick with their heads to the wall. The topography of the seminal vesicles corresponds to the semiserial type. The common oviduct (nidamental duct, n) opens into a vestibular (atrial) diverticle that is separate from that of verge and vagina. The outer opening (z) however, the genital pore, is in common for the three ways and lies at the end of the first third of the body

Occurrence: Island of São Sebastião, one specimen under a stone in the tidal zone, december 1953.

Discussion of Thordisa diuda

The diagnosis of the genus as given by Bergh (1884, p. 106) is certainly insufficient. Pectinate marginal plates must be present in a species classifiable as *Thordisa* (Bergh 1892, p. 132-33; Thiele 1931, p. 436). Therefore species without such plates, f. ex. *clandestina* Bergh (1884, p. 106), *crosslandi* Eliot (1903, p. 368; 1906, p. 656; 1910, p. 421; White 1951, f. 19 C), *stellata* Eliot (1903, p. 368), and *maculosa* Bergh (1905, p. 123), should be excluded from the genus. Nearly from its beginning *Thordisa* was not well settled: *Th. carinata* Bergh 1890 figures as doubtful two years after its description (Bergh 1892, p. 133), and later on is mentioned as one of the two sure species of *Thordisa* (Bergh 1905, p. 121) Eliot (1906, p. 657) considered "soft, elongate papillae" of the notum as generically more important than pectinate marginal plates.

A variety of *Th. hilaris* Bergh (Risbec 1953, p. 55), *Th.* (?) *souriei* Pruvot-Fol (1953, p. 66), and *Th.* (?) *dubia* Bergh (1894, p. 178), have lateral denticles on the hook-shaped plates of the radula and therewith differ from the type of *Thordisa*, *Th. maculigera* Bergh with smooth hooks (Hoffmann 1938, f. 702 B) The species from Dakar (*souriei*) and from Rio de Janeiro (*dubia*) have digitiform tentacles that also differ from the tentacles of the typical species (ibid., f. 605 D)

Another species that is difficult to retain in *Thordisa* is *Th. parva* Baba (1938a, p. 15) Its tentacles are digitiform, there are about 11 simply pinnate gills, and the marginal plates, though split into about 4 cusps, are not pectinate. A notch in the anterior lip of the foot, as in *parva*, also occurs in *Th. burnupi* Eliot (1910a, p. 223)

Although the descriptions of the species from the Indic and Western Pacific, as far as available, were also compared with *Th.*

diuda, it seems necessary to mention distinguishing characters only for the species from Brazil, South and West Africa, and the Mediterranean Sea.

Th. ladislavii Ihering (1886, p. 234) has hemispherical, smooth warts on the notum, an outer tentacular furrow, and 4 marginal plates.

Th. dubia Bergh (1894, p. 178) has denticles on the hook-shaped plates. This species is also mentioned in the discussions of our *Discodoris pusae* and *Taringa telopia*.

Th. punctulifera Bergh (1907, p. 50) is white with black spots. It has much more (50) lateral and less (3) marginal plates.

Th. souriei Pruvot-Fol (1953, p. 66) has hooks with denticles.

Th. filix Pruvot-Fol (1951, p. 15) has a spiral gland opening into the verge.

Th. aurea Pruvot-Fol (1951, p. 17) is yellow, has small tubercles, and the anterior border of the foot is slightly notched.

Discodoris evelinae, spec. nov. (Fig. 141-150)

The biggest slug was 10 cm. long alive, the smaller one 4 cm. The larger animal is preserved 6 cm. long, 4 cm. broad, and 1,8 cm. high. The breadth of its sole is nearly 2 cm., the brim of the notum 1 cm. When handled, the smaller slug broke off portions of its mantle brim. Such autotomy occurs also in other species of *Discodoris* (Alder & Hancock 1866, p. 119; Bergh 1884, p. 92; 1899, p. 11; Eliot 1908, p. 111; 1910, p. 422; Pruvot-Fol 1951, p. 13; 1953, p. 76) The body is little depressed and equally rounded in front and behind. The foot was not seen to project beyond the notum.

The colour of the living slugs was olivaceous brown with darker blotches on the back and lighter with large dark spots below. The perfoliations of the rhinophores are darker than the shaft that has small white warts. The gills are different dark in the two specimens. The notum of the preserved slugs (Fig. 145, n) has a net of brown pigment around the white tubercles. The underside of the notum (j) is white with few dark spots up to 2 mm. in diameter The chromatophores of these extend through the cutis and attain the muscle fibres, which they accompany so that the spots appear checkered. The foot (f) is dark due to dense spots of very different size.

Mamillate warts or tubercles with more or less conical tips cover the notum. Their size is very different, and the bigger and smaller ones are irregularly distributed. Only those near the borders of the notum and around the branchial cavity are all small. The biggest warts attain 0,7 mm. in diameter Some few spicules project a little from the tubercles.

The spicules (Fig. 146) are up to 0,65 mm. long and 30 micra thick. Those of the papillae are smaller and form bundles of parallel needles. All spicules are monaxons, mostly pointed, rarely obtuse and as a rule of the same type on both ends. They may be a little curved and rough on one or both ends.

The conical tentacles (Fig. 143) are short. The rhinophores (Fig. 142) were 6-7 mm. long alive. The upper half of them bears 25-30 thin perfoliations, the lower is the shaft dotted with minute white warts. Small papillae of the common type of the notum surround the rhinophorial pits. The branchial cavity is somewhat transversely oval and has a smooth border, the papillae of the notum gradually diminish in size, the more they approach the gills. The six tripinnate branchiae form a plume of 35 mm. diameter The anterior border of the foot is bilabiate, the upper lip deeply notched; the sole is rounded behind, not pointed.

The two plates (Fig. 147) of the labial armature consist of yellow rodlets up to 40 micra long and 6 micra thick. They are often subdivided transversely due to their gradual growth. The radula formula is 35 $\times$ 77-80.0.77-80. All plates are hamate without denticles (Fig. 148), the innermost and outermost plates are smaller (0,12 mm.) than those in between (0,3 mm.) A longitudinal serpentine fold runs along the rhachis between the alternating rows of plates. The salivary glands form broad ribbons. The oesophagus enters the very spacious stomach from the ventral side. The stomach contains spicules of sponges, algae and sand grains. The pylorus is wide, and the intestine begins with coils. The anal papilla lies in the centre of the gills.

The hermaphrodite gland (ovotestis, Fig. 149, h) is situated over the liver and on both sides of it. The strongly winding ampulla (a) is ventral and runs to the right side where it bifurcates. The oviduct (o) enters the mucus gland (m), the spermatic duct (e) the middle of the prostate (q). The greater diameter of this gland extends in transverse direction. The efferent duct (e) leaves the prostate in the middle of its anterior surface. This thin and winding duct enters a musculous verge (p) that is 3 mm. long and bears 0,18 mm. long conical cuticular hooks (Fig. 150) The male atrium (vestibulum, "praeputium", r) is wide. The genital pore lies at the end of the first fourth of the body

The albumen gland (g) is located in the anterior border of the volumous mucus gland (m) that opens with the oviduct (o). Between the latter and the male vestibulum (r) begins the unarmed, not cuticularized broad and musculous vagina (v) that debouches into the end of the longish spermatheca (t). Immediately beside this entrance begins the thin uterine duct (u) that is winding and rather long and receives the duct of the spermatocyst (s). The topography of these seminal vesicles must be defined as serial. The spermatocyst is cucumber-shaped and doubled upon itself. There is a certain distance between the opening of the spermatocyst duct into the uterine duct and the debouchure of the latter into the mucus gland.

Occurrence: Island of São Sebastião, two specimens under a stone a little below low water-line, november 1953.

Discussion of Discodoris evelinae

MacFarland (1909, p. 66-82) studied two specimens belonging to different species of *Discodoris* from the coast of Alagoas (Brazil) thoroughly The first, *D. branneri,* has cuticular hooks on the verge, like *D. evelinae,* minute cylindro-conical papillae on the notum, short slender papillae on the border of the rhinophorial pits, and 45-48 plates in one half row of the radula. Also the general shape of the reproductive organs of *branneri* (l. c., f. 65) differs from our Fig. 149, though the principles are the same. It is difficult to judge whether these differences, f. ex. those referring to "praeputium" and "glans" are perhaps due to contraction of vestibular muscles. Others, as the size of the "nidamental-albumen gland complex" and the prostate are certainly characters changing with the successive phases of male and female maturation.

The length of MacFarland's second species, *D. voniheringi,* is 20 mm., its width 14,5 mm. The tentacles are long, slender, finger--like; dark pigment is concentrated on the stalk of the rhinophores, the gills are bipinnate and their cavity has lobules and tubercles on its border The labial armature consists of a divided median and two lateral plates, and the half row of the radula has 46-50 plates. Contrary to *D. branneri* the reproductive organs are as a whole similar to those of *D. evelinae*. However the verge has no hooks and the spermoviduct bifurcates within the female gland mass, so that the male duct (spermatic or efferent duct) emerges from the latter.

Eliot (1910, p. 422) does not say why he doubts the generic position of *D. voniheringi*. May be that he did not consider "up to 2 micra high granulations of the labial plates" (MacFarland 1909, p. 75) as compatible with the definition of the genus. MacFarland himself (p. 71-72) questioned the generic position of *D. branneri* due to the penial hooks. In fact the publications on *Discodoris* contain the passage "penis unarmed" or "no genital armature" with regularity, f. ex., Bergh (1884, p. 92), Eales (1938, p. 100), Eliot (1906b, p. 135), Thiele (1931, p. 437), and Vayssière (1902, p. 232; 1913, p. 319).

Resuming the principal features of *D. branneri* and *D. evelinae,* viz. labial rodlets, uniform hamate radula plates without denticles, well developed prostate gland, pleurembolic verge with cuticular hooks, semiserial seminal vesicles, and unarmed vagina, it becomes evident that no genus of the Doridids can receive these species without modification of the generic diagnosis. They are Discodoridinae. *Carminodoris* (for bibliography see Bergh 1905, p. 111 and Risbec 1953, p. 47) was taken in consideration by MacFarland (1909, p. 72), but in this genus there is an acrembolic efferent duct (vas deferens) with hooks (Odhner 1926, p. 54) This type is farther remote from a pleurembolic verge with hooks than the latter from an unarmed true penis. One might perhaps rather reckon *D. branneri* and *D. evelinae* among *Audura*. But as the type of this genus, *A. maima* Bergh, has a very different radula (Hoffmann 1938, f. 702 D), it is certainly better to amplify the diagnosis of *Discodoris* a little for these two species with an armed verge.

Discodoris pusae, spec. nov. (Fig. 151-165)

The animals are arched dorsally and attain a length of 35 mm. and a breadth of 20 mm. in life. The corresponding measurements of the biggest preserved specimen are 27 and 18 mm. If the slug is at rest, the foot is hidden under the notum; during locomotion it stands out. The colour is light orange with brown blotches of pigment irregularly distributed on the notum. Quite superficial, light granules give the living slug a whitish hue. The underside is lighter than the back and without spots.

The notum has a 5 mm. broad brim in a preserved specimen of 15 mm. total breadth and is covered with warts of different size and irregular disposition. There are volumous cutaneous glands (Fig. 154) between the knobs likening those of *Geitodoris patagonica* Odhner (1926, f. 59). In some specimens dark pigment lies around these glands in the subcutaneous tissue. The number of glands is approximately equal to that of the biggest tubercles. The border of the branchial cavity is smooth with a circle of slightly larger tubercles around it, that of the rhinophorial grooves lobulate with two bigger and various smaller lobules.

The skin is leathery and feels like a sponge because of the spicules. These are two-pointed monaxons up to 0,9 mm. long (Fig. 165). They are often a little curved, and their surface is not always quite smooth. The spicules are arranged around the orifices of the glands, and between these are dense groups of smaller needles in the warts. The spicules are numerous in the rhinophores and in their sheaths.

The grooves of the rhinophores have lobulated borders. The shaft is rather long and smooth, the clubs have 15-20 slanting perfoliations. The short tentacles with broad basis and pointed tip are not grooved; they belong rather to the finger-shaped than to the lobe-like type. The eight tri- to quadripinnate gills have white tips and lie on the limit between the third and last quarter of the body length. The anterior border of the foot is bilabiate and strongly notched in the middle. This notch is wanting in one specimen. The posterior end of the foot is pointed. In living and preserved specimens the foot is about one third the breadth of the notum.

The colourless cuticle of the lips bears 20-50 micra high and 8 micra thick rodlets, each composed of about 12 discs of secretion (Fig. 155, 156). These rods are disposed in irregular quincunx and arise from roundish basal pits. The oldest animal showed only the cuticle with these basal pits. The formula of the radula is 21-25 × 8-12.27.0.27.8-12. As in *Geitodoris patagonica* (l. c., f. 60) the transverse series of both sides alternate; the innermost plates nearly touch or even overlap in the narrow rhachidian line (Fig. 162). The lateral plates are hook-shaped. The first has sometimes a small denticle on its inner side (Fig. 151); it is 0,18 mm. long, and the size increases in the following (Fig. 163) From the 12th to the 24th the length is 0,21 mm. and diminishes outwards to the 27th that is 0,15 mm. high. This transitional plate is spoon-shaped. The 8-12 marginal plates are very thin lamellae with long, soft, pointed blades (Fig. 164) and diminish from 0,2 to 0,09 mm. Their outer edge is smooth, but especially in the older series it is often worn and therefore irregularly serrate. This has nothing to do with marginal denticles.

The dorsal side of the pharynx is covered by the flat, broad blood gland (Fig. 157, b). The salivary glands (j) are short tubes of irregular width with thin ducts. There are numerous basophil glands in the dorsal folds of the oesophagus. The latter runs over the spermatheca, then it becomes extremely narrow and continues as a capillary tube between the liver lobes. It debouches on the left side into the stomach, the epithelium of which is high and ciliated on the dorsal side. The ventral and lateral walls of the stomach are not distinctly set off from the liver The pylorus is dorsal and leads to a wide gut with longitudinal folds. Short behind the pylorus lies an equally folded caecum ("gall bladder") on the left side, that projects over the surface of the liver

From the ampulla (Fig. 158, u) the male duct runs to the prostate (q) that lies on the ventral side of the body The prostate is 1,7 mm. long, 2,4 mm. broad, and occupies the whole breadth between the retractors of the pharynx (Fig. 160, r) The efferent duct ("vas deferens") that leaves the prostate begins wide (g) and with high epithelium. In its further winding course the epithelium becomes lower (e) and the muscular coat increases. In the distal, functionally penial part, about 0,5 mm. in length, the duct lies free in a sheath of chiefly longitudinal muscles. This sheath is similar to that of *Austrodoris* (Odhner 1926, p. 67) The epithelial tube is surrounded by inner annular, longitudinal and outer annular muscle fibres. The tip of the duct (p) protrudes into the vestibulum ("praeputium") without a constriction or dilatation and ends with a rounded papilla as long as it is broad (Fig. 159).

The animals are distinctly protandrous. Only in quite adult specimens the size of the albumen and mucus gland (n) is equal or superior to that of the prostate. The uterine duct (x) leaves the gland mass and forms a small dilatation, the fecundation chamber of Pohl's terminology (1905, p. 438). The following enlargement, the spermatocyst (s) is spherical and connected with the spermatheca (t) in a serial type. The uterine duct continues with a winding long and thin portion and opens into the spermatheca through its anterior wall. The volumous spermatheca lies immediately behind the pharynx. About 0,1 mm. apart from the opening of the uterine duct the vagina (w) enters the spermatheca. The vaginal epithelium is folded. Farther outwards than the vestibular opening of the vagina lies that of the oviduct (k) Into the female vestibulum opens a sausage-shaped gland (y) that has a long duct with about 5 cuticular tubular spines (Fig. 161). These spines are developed only in the largest specimens.

Occurrence: Island of São Sebastião, under stones in shallow water; 4 specimens in june and 4 in november 1953; 4 in april 1954.

Discussion of Discodoris pusae

The type of the genus *Geitodoris* Bergh (1892, p. 130) is *Doris complanata* Verrill (1880; 1881, p. 386) The absence of a prostate in this species belongs to the diagnosis of the genus (Bergh 1892, l. c.; 1894, p. 162) and therefore it is unadmittable to include the present species with its well developed prostate in *Geitodoris*.

The efferent duct of the central american *G. immunda* Bergh (1894, p. 167) is prostatic, but a compact gland does not exist. There is certainly no more than a gradual difference between a prostatic part of the efferent duct and a lobate prostate (Odhner 1926, p. 49) Adding this consideration to the radula, the vestibular gland, the absence of a free stomach and *Geitodoris patogonica*-like cutaneous glands of the present species, its separation from *Geitodoris* may appear artificial. *G. immunda* however is not qualified for further amplifying the conceit of *Geitodoris*, because its outer radula plates are finely serrate (Bergh 1894, t. 5, f. 9-12). Also the outer plates of the caribbean *G. mollina* Bergh (1905; Odhner 1926, p. 80) are dentated.

Geitodoris - like marginal plates occur also in *Carryodoris joubini* Vayssière (1919, p. 67), a species with reticulate labial cuticle and dentate fifth to seventh lateral plates. Odhner (1926, p. 80) thinks that it may belong to *Geitodoris*. Also *Aporodoris millegrana* var. *mediterranea* Ihering, (1886, p. 238) seems to be related with *Geitodoris*, though its lips are unarmed.

The marginal plates of *Doris millegrana* Alder & Hancock (1855, t. 46 Suppl. f. 3), the type of *Aporodoris* Ihering 1886, are provided with fine denticles. Therefore the genus was approached to *Thordisa* (Bergh 1892, p. 132) and a species with *Thordisa*-like marginal plates described as perhaps belonging to *Aporodoris* (id. 1905, p. 94) Prof. Dr. Nils Hj. Odhner-Stockholm kindly informed me by letter that *Thordisa? dubia* Bergh 1894 is identical with *Aporodoris millegrana* (Ald. & Hanc.) All this shows that the "variety" *mediterranea* Ih. with lamellar marginal plates does not suit to *millegrana*.

A *Geitcdoris* - like differentiated radula is known from *Discodoris rubens* Vayssière (1919, p. 65 t. 6 f. 43), *Discodoris heathi* MacFarland (1905, p. 39), and possibly *D. fulva* O'Donoghue (1924, p. 25) The generic position of the last is uncertain, as its reproductive organs were not recorded. Vestibular glands not described in detail occur in *D. marmorata* (Bergh), the generic position of which was defined by Odhner (1926, p. 65, 79), and *D. indecora* Bergh (Vayssière 1901, t. 7 f. 1, 2; Eliot 1906b, p. 137; Pruvot-Fol 1951, p. 13, 14) The latter two species differ from the present one by absence of lamellar marginal plates. The stomach of *D. indecora* is very small and merely a dilatation of the digestive tract (Eliot, l. c.). Therefore the inconspicuous stomach of *D. pusae* does not hinder its incorporation in *Discodoris* with as a rule a volumous free stomach. Also *Austrodoris* and *Anisodoris* comprise species with and without stomach. The taxonomic significance of the stomach has been diminished by Odhner (1926, p. 52) The species of *Discodoris* recorded for the Western Atlantic (White 1952, p. 113) have no vestibular gland.

Odhner (p. 49) stressed the importance of a penial glans, as such occurs in *Discodoris*. The present species has no distinct glans differentiated from the efferent duct, but only a short termination of the latter protruding into the vestibulum. This apparent contrast disappears if one consults the litterature. The species described as *Discodoris morphaea* Bergh (1884, p. 93; after Eliot 1910, p. 421-23: = *D. fragilis* Ald. & Hanc.) has a male vestibulum ("praeputium" or "penis" Bergh t. 3 f. 13, f) like the present species and "the opening of the spermatic duct" (the efferent duct of our terminology) "lies above at the bottom of the cavity" (p. 98)

The stratified structure of the labial rodlets in *D. pusae* was also described for *Discodoris edwardsi* Vayssière (1902, p. 233 t. 9 f. 7) and *Platydoris argus* Vayssière (1919, p. 69-71) The latter species can not belong to *Platydoris* Bergh 1877 (=*Argus*), a genus without labial armature, but may be a *Geitodoris* or a *Discodoris*, due to the marginal plates of its radula.

Taringa, gen. nov.

Notum with papillae stiffened by spicules. Oral tentacles triangular, flattened. Branchiae tripinnate. Anterior border of foot bilabiate. Margins of rhinophorial grooves and branchial cavity lobed. Lips unarmed. Radula without central plate, with denticulated lateral and setose marginal plates. Salivary glands lobate, not tubular. Stomach free, caecum small. Prostate well developed. Penis with smooth cuticle; male part of vestibulum with cuticular hooks. Seminal vesicles semiserial.

Type of the genus: *Taringa telopia, spec. nov.*

Thordisa (?) *dubia* Bergh, *Th.* (?) *souriei* Pruvot-Fol and Risbec's variety of *Th. hilaris* Bergh were already mentioned in the discussion of *Thordisa diuda* as species with denticles on the lateral plates and pectinate marginal ones. None of them belongs to *Taringa,* because they have no genital armature.

However it seems possible that the penial cuticle and the vestibular hooks of *Taringa telopia* occur in *Thordisa* (?) *dubia* too, but were not seen in Bergh's dissected material. These characters were recognizable only in our histological sections. Moreover the genital armature is known sometimes only to develop in quite adult animals (Odhner 1926, p. 56) If the cuticular elements of our species were found also in *Thordisa dubia, Taringa telopia* may reveal itself a synonym of *Aporodoris millegrana* (Ald. & Hanc.) to which *Th. dubia* belongs (letter from Prof. Dr. N. Hj. Odhner of december 7, 1953). It is true that Alder & Hancock's *millegrana* has smooth lateral radula plates (1855, t. 46 f. 3, App. p. I-II)

Audura Bergh 1878 is perhaps a related genus, as its radula is similar (Hoffmann 1938, f. 702 D), and "spine-shaped structures occur on the verge" (Thiele 1931, p. 437), but it has labial rodlets and bipinnate gills.

Taringa telopia, spec. nov. (Fig. 166-179)

The animals are moderately convex; the notum covers the foot when the slugs are at rest, not while they are gliding. Length and breadth of the living specimens attain 30 and 12 mm., the corresponding measurements after fixation are 22 and 10 mm. The notum brim is 3 mm. broad. The colour is very different. Even of three slugs on the same stone one was light yellow, one orange with brown patches, and one dark yellowish brown. Another was gray with black spots and powdered with fine white granules, specially on the papillae around the branchial and rhinophorial grooves. Still others are grayish yellow with fine black specks, or bright orange. The foot is light yellow.

The dorsal papillae (Fig. 169-172) are relatively uniform caryophyllidia that are biggest on the sides of the notum, smaller on its borders and in the middle. Also the papillae of the margins of the rhinophore pits and the branchial cavity are small. The bigger papillae are less numerous, the smaller ones more crowded. They consist of a peg-shaped basis supported by 6-20 internal spicules (y) of different length, the outer ends of which radiate around its distal knob. The spicules are individually covered with skin from the tip to the point where they leave the papilla like in *Jorunna tomentosa* (Cuv.) (Labbé 1933, p. 215), not united by a web as in *Rostanga rufescens* Ired. & O'Don. or *Acanthodoris pilosa* (O. F. Müll.) The basis of the papilla contains solid connective tissue that is very loose in the upper half. The cupola of the papilla is covered with epidermal cells, the central ones of which are ciliated, the lateral ones of glandular character (Fig. 170, g) The center of the cupola is occupied by subepithelial sensory cells (Merton 1920, p. 461; Marcus 1953, p. 170-71) that are connected with nerve fibres (z) Smooth muscles insert at the bases of the spicules, and the contraction of these fibres must be responsible for the change of shape evidenced by the different aspect of the papillae even in the preserved material.

The spicules are up to 0 5 mm. long, two-pointed and frequently curved monaxons. They occur also in the foot. Contrary to *Thordisa dubia* the clubs of the rhinophores and the margins of their grooves are provided with spicules; the clubs have 15 (*dubia* 25) perfoliations. There are about 8 lobules around the border of the rhinophore groove. In one 9 mm. long specimen the bases of the rhinophores were united, and five of the perfoliations involve the common shaft, while the separate distal halves have each four folioles of their own, and each two distal knobs. The tentacles are flattened and smooth; their pointed tips are directed obliquely forward. The border of the cavity of the 6 tripinnate gills shows about 20 lobules. The foot is 16 mm. long and 6 broad in the biggest preserved slug. Its hind end is pointed, the anterior border bilabiate with a median notch that extends over the upper and lower "lip" in some specimens, only over the upper in others.

The cuticle of the oral cavity is colourless and smooth. The radula formula is: 32 $\times$ 4-5.40.0.40.4-5. The lateral plates (Fig. 174) are hooks with high bases. The first plate has 2 tiny inner and 2 big outer denticles (Fig. 173) The following plates have only external denticles increasing in number outwards up to 8 or 9. The marginal plates are leaf-shaped and bordered with bristles (Fig. 176) that become worn and less numerous in the older series of the radula (Fig. 175). The length of the plates is, in micra: the 1st 60, the following ones increasing up to the 21st: 125. Approximately the same to the 37th; the 38th: 140, the 39th 125, the 40th 93. The marginal plates, from the 41st: 81, decreasing to the 45th: 42

The blood gland is without particularities. The salivary glands are strongly folded sacs, 0,75 mm. in length, 0,9 mm. in height and both together about 1 mm. broad. The oesophagus enters the hind part of the stomach through the ventral wall of the latter The stomach, an ample organ, lies a little to the left of the mid-line. Its epithelium is folded and villous. Behind the entrance of the oesophagus the branched hepatic sacs communicate with the ventral wall of the stomach. The very small caecum lies on the left side. It goes out from the liver, the surface of which it does not reach, as in *Thordisa dubia* Bergh. The pylorus, also on the left side, lies in the posterior half of the stomach, though still in front of the cardia. The gut runs to the anterior end of the stomach and turns backwards as a free dorsal tube a little to the right of the mid-line towards the anus. The longitudinal folds of the intestinal epithelium make the lumen of the gut star-shaped. Dorso-ventrally the inner organs are disposed in the following sequence: kidney, male follicles of the ovotestis, female follicles, and liver

The male duct leaves the ampulla (u) and enters the voluminous prostate (q) that consists of two histologically very different parts. The efferent duct of the diagram (Fig. 177, e) was drawn longer than it ought to be to avoid the superposition of organs. It is wide in its ental part and narrows as it bends down towards the penis (p) The duct is musculous, but not free in a special sheath. The penis or glans in Bergh's terminology is approximately bell-shaped and coated with a smooth cuticle (Fig.

178) On the level of the penis 30-40 cuticular hooks project from the walls of the vestibulum. The basis of these is 25-30 micra broad, their height is the same (Fig. 179)

The female accessory glands (n) are lobate. The oblong spermatocyst (s) contains the spermatozoa fixed with their heads to the wall. The uterine duct (x) joins the vagina (w) short before the spermathecal opening of the latter The big spermatheca (t) is spherical. The vagina is lined with a folded epithelium. It enters the male or copulatory vestibulum (v), while the female vestibulum that receives the oviduct (k) lies a little farther ventrally.

Occurrence: Island of São Sebastião, under stones in the tidal zone, 38 specimens in june, september and november 1953.

The slugs were often found in twos on the same stone, generally pairs of very different colours and sizes, f. ex., one 22 mm. long and 10 mm. broad specimen together with one of 10 and 5 mm. One egg string was seen. It formed one and a half winding of a spiral of 25-27 mm. diameter The ribbon was 3 mm. broad and the eggs light yellow.

At 25°C. the heart of a slug beat 130 times per minute. One specimen was found to have three tentacles.

Awuka, gen. nov.

Notum convex with papillae bearing long spicules. Anterior border of foot bilabiate, the upper lip divided by a deep median notch into nearly independent halves. Lips armed with rodlets. Radula without central plate, with a small number of hook-shaped lateral plates, the first with a minute denticle, the following ones smooth, the outer ones shorter and slender, with one or more prongs. Stomach embedded in the liver Prostatic part of efferent duct volumous, though not lobed. Penis with a cuticular stylet. Vagina unarmed; seminal vesicles serial

Type of the genus: *Awuka spazzola*, spec. nov.

As the reproductive organs are of main importance for the natural system of the Dorididae, *Awuka* must probably be attributed to the subfamily Centrodoridinae Bergh (1892, p. 135) that includes two genera with male stylet, *Jorunna* and *Centrodoris*. Odhner re-established this subfamily (1939, p. 26, 36). The mentioned genera have no rodlets on the lips, and their radular hooks have simple cusps. The split tips of the marginal plates in *Awuka* certainly resemble those of *Rostanga*, the labial armature, gills and prostate of which constitute further relations with *Awuka*. But *Rostanga* has no stylet, and the general type of the radula is far different from the present one.

The radula plates of *Centrodoris* are not as uniform as Bergh described them; the innermost is thinner than the others and bears a denticle or projection on the base (Eliot 1910, p. 425) Similar radular elements as in *Awuka spazzola*, although in different arrangement, occur in *Discodoris* (?) *lutescens* Bergh (1905, p. 107) that certainly does not belong to *Discodoris* (Eliot 1910, p. 421).

Awuka spazzola, spec. nov. (Fig. 180-192)

The largest preserved slug was 9,5 mm. long and 4 mm. broad. Living it had been about 10 mm. long, 5 mm. broad, and 4 mm. high. The notum is very high and covers the entire foot, except while gliding. This animal is of a grayish white with irregular round, pale violet blotches and the black eyes visible between the rhinophores. The smaller slugs were quite light yellow or ivory The dorsal papillae are very slender caryophyllidia that are of almost equal size over the whole notum. Their length is 0,15 mm. in the 4 mm. long slug, and 0,3 mm. in the largest. They are very densely set and produce a fur-like aspect. Their peg-shaped basis is supported by numerous monaxonous spicules, 6-8 of which project over the central knob. The spicules are covered with epithelium but not webbed. The structure of these caryophyllidia is similar to that described of *Taringa telopia* (Fig. 170) The borders of the rhinophorial and branchial pits are smooth and beset with caryophyllidia.

The length of the spicules is 0,09-0,17 mm. They are chiefly situated in the papillae, but some occur also overall in the subcutaneous tissue, the rhinophores, and the gills.

The clubs of the rhinophores have 9 perfoliations. In the living slugs the folioles show brown spots. The finger-shaped, pointed tentacles are bent outwards. The gills of the large slug were unfolded and are 10 simply pinnate branchiae. In sections of a smaller specimen one can count 9 gills. Numerous glands with high cells and big nuclei are united to several balls (Fig. 191, h) in the intervals between the gills. They are the branchial glands of Hecht (1895, p. 603-4 t. 5 f. 71-72; Hoffmann 1940, p. 48) Hecht had found them chiefly in phanerobranchiate species and ascribed them defensive character

The hind end of the foot is round, the anterior border bilabiate. The lower lip is entire, the upper so deeply notched, that both halves seem nearly independent. They underlie the tentacles.

The cuticle of the oral cavity bears two triangular areas of rodlets (Fig. 186) that arise from more or less hexagonal pits. They measure about 6 micra in diameter and 20 in length.

The radula formula is 16 $\times$ 5.12-14 0.12-14.5. The lateral plates are regular hooks (Fig. 187), only the first has a small denticle on its inner side (Fig. 188) The marginal five (Fig. 190) are very thin, and the outermost three of them have two or more prongs. In a 5 mm. long animal the size of the plates increases (in micra) from the first to the fifth: 35, 52, 65, 75, 80, continues 80 to the tenth, and diminishes from the eleventh to the seventeenth: 75, 60, 45, 40, 36, 31, 20.

There is no free stomach, but a caecum on the left side reaches the surface of the liver The gut has a smooth epithelium in the most part of its course and runs a little to the right. Near the anus it becomes folded (Fig. 191, i)

The male duct, immediately after leaving the ampulla (Fig. 192, u), has a high glandular epithelium and forms a winding though not lobed prostate (q). From this a short simple efferent duct (e) leads to a strongly muscular part, the penis (r), that ends at the vestibulum (w) Its epithelial lining is continued into a thin, cuticular, tubuliform stylet (p) that is 0,42 mm. long in the largest slug, with a diameter of 15 micra. From the female gland mass (n) the uterine duct (x) passes to the spermatocyst (s) and runs to the spermatheca (t), where it unites with the vagina. The latter (v) is a thin, winding canal that projects into the vestibulum with a long epithelial tube. Beside it lies the opening (o) of the oviduct or nidamental canal (k) The male and female vestibulum are lined with a high, glandular epithelium. There is only one vestibular pore (a) in the small and young specimens, while the developing genital papilla separates the three openings in the adult slug.

Occurrence: Island of São Sebastião, three specimens under stones in the tidal zone in june and november 1953, four in april 1954.

Polycera odhneri, spec. nov. (Fig. 193-202)

The largest specimen was about 10 mm. long, when gliding at the surface film of the water (Fig. 194) In the preserved state the maximum length was 7 mm, the breadth 2 mm., and the height 3 mm. The colour of the living slugs was yellowish gray with irregular black spots and dotted with brick-red and yellow on the sides and on the back, rhinophores, and branchiae. The only inner organ recognizable through this dense colour pattern is the orange liver

The velum has 4 slender, digitiform processes in front of the rhinophores, but one specimen had 6 irregular ones. The pallial ridge that encloses the rhinophores is prominent already in the smallest present specimen (0,7 mm. preserved; Fig. 195) In the larger slugs it consists of an irregular row of slightly bulbous papillae. On the flanks between the pallial ridge and the foot there are small scattered tubercles. The tail is crested.

The 3-6 gills are uni- and bipinnate. Branchial glands were found in the sections. The rhinophores have from 2 to 11 lamellae and a conspicuous distal knob. The oral tentacles are distinct lobes. The narrow foot has projecting margins; its frontal end has blunt corners and is transversely grooved. The genital aperture lies half way between rhinophores and gills. The spicules are up to 0,2 mm. long, similar to those figured by Hoffmann (1935, f. 403) and lie chiefly in the foot, some on the sides and in the rhinophores, none on the back.

The jaws (Fig. 202) consist of strong yellow plates, the inner borders of which are little crenulate, and transparent wing-like expansions. These are broader and shorter than in *P. quadrilineata* (O. F. Müll.)

The radula (Fig. 198) is 0,6 mm. long, 0,1 mm. broad with the formula 10 $\times$ 3-4.2.0.2.3-4. The two inner lateral plates (Fig. 199) are hamate. The first lateral is distinctly smaller and thinner than the second, and its spur lies over the middle. The stout second lateral bears its spur near the base. The four scale shaped outer laterals decrease in size towards the margins; the fourth is sometimes wanting (Fig. 198)

From behind the pylorus a long and wide caecum (Fig. 201, c) extends forward along the left side. The caecum of *P. quadrilineata* (O. F. Müll.) and *P. elegans* (Bergh) is short and pyriform (Bergh 1880, p. 608; 1894a, p. 5) In the present species it has folded and ciliated walls, while the stomach is not histologically differentiated from the liver

The genital organs were studied in two young specimens in male phase. There is a peculiar tube (Fig. 200, z) between the prostatic (q) and the muscular part (p) of the efferent duct (e). In none of the previous species of *Polycera* such an organ was described. The wall of this tube has the aspect of a young, not yet differentiated, epithelium. The shape of the prostate as merely a widened part of the efferent duct is possibly a juvenile character of the sectioned specimens. The musculous or penial portion of the male duct is separated from an outer muscle sheath by a cavity (b), as was observed and well described in *P. quadrilineata* (O. F. Müll.) by Pohl (1905, p. 437) The male copulatory organ terminates with a very narrow papilla armed with cuticular hooks. This papilla projects into the vestibulum (v) and is separated from the more ental part of the efferent duct by a strong sphincter

A similar sphincter (n) closes the outer opening of the wide vagina (w) The spermatheca (t) is nearly spherical, 0,28 mm. long, 0,28 mm. broad and 0,18 mm. high. Globular spermathecae occur also in *P. elegans* (Bergh), *P. atra* MacFarl., *P. messinensis* Odh. (Odhner 1941, p. 9-10), and *P. maculata* Pruvot-Fol (1951,

p. 31). The arrangement of the seminal vesicles (s, t) corresponds to the semiserial type.

Occurrence: Among algae from boulders and under stones in the littoral of the Island of São Sebastião; 10 specimens in june and 4 in november 1953; 16 in april 1954. Ubatuba, same biotope, 6 slugs in november 1954.

The species is named in honour of Professor Dr. NILS HJALMAR ODHNER — Stockholm.

Discussion of Polycera odhneri

Odhner (1941) restricts the Polyceridae to the Phanerobranchia Nonsuctoria with simple papillae on the small frontal velum and a reduced number of differentiated radular plates. The Notodoridinae of Thiele (1931, p. 423) and the Hexabranchidae are separate families. Thiele's Polycerinae without processes, *Gymnodoris* Stimps. and *Nembrotha* Bergh, are separated as Gymnodorididae, and those with ramose or compound processes as Triophidae. *Polycera* (?) *funerea* Pruvot-Fol (1930, p. 230) possibly belongs to the latter *Palio* Gray, that Thiele considered as independent genus, and *Greilada* Bergh (1894a), that is not mentioned in Thiele's Handbuch, are subgenera (sectiones) in Odhner's synopsis of the Polyceridae.

Polycera japonica Baba (1949, p. 39, 134) as well as the present species belong to the subgenus *Polycera,* as they have extrabranchial papillae (against *Greilada*), that are simple (against *Palio*) *P. japonica* has about 10 velar processes and mammiform papillae on the back. *P. maculata* Pruvot-Fol (1951, p. 31) has a bilobate velum, the processes of which cross in the mid-line. *P. odhneri* belongs to Odhner's group I B with extrabranchial processes smaller than the frontal ones, and differs from *P. atra* MacFarland 1905 by the papillae on the pallial ridge, from *P. picta* Risbec 1928 and *P. risbeci* Odhner 1941 (= *pruvotae* Risbec 1953, p. 102) by the long velar processes.

The only *Polycera* from the atlantic coast of South America, *Polycera marplatensis* Franceschi 1928, was described as a variety of *P. quadrilineata* (O. F. Müll.) Odhner (1941, p. 14, 16) considers it as an independent species of the group I A. It differs from *odhneri* by size, colour, extrabranchial processes that are longer than the six velar ones, and 9 simple gills.

Goniodoris mimula, spec. nov. (Fig. 203-208)

The larger obtained slug was 7 mm. long, 2,7 mm. broad, and about 2 mm. high alive. Its rather opaque body showed only a slight reddish hue and a superficial net of dark red pigment, over that minute very light yellow dots were powdered in various density. The total impression of this colour pattern made the animal very similar to the algae (Padina spec.) on which it was found. Only the fine yellow pigment is preserved in the sections, that also show cyanophil mucus glands and scattered ciliated cells in the epidermis. The eyes lie in the body-cavity, near the cerebral ganglia, as was already described for Goniodoris (Hoffmann 1935, p. 626)

The long tentacles are united basally (Fig. 204) and form a kind of narrow velum with a median suture. The pallial ridge or mantle brim involves the rhinophores and is interrupted behind in the mid line. The dorsal surface within the ridge and the flanks between the latter and the foot are smooth, neither granulated nor carinate. Only on the tail behind the ridge there is a short median crest.

The foot is broad and slightly pointed at the hind end. Its anterior border has thick glands, pink in the sections. The lateral borders of the foot have blue staining glands. The spicules are prickly monaxons of about 0,4 mm. length.

The rhinophores were 1,5 mm. long in the living slug and have about 7 perfoliations. The seven tripinnate gills, the length of which varies, are disposed in a circle. The genital aperture lies on the right side behind the level of the base of the rhinophore.

The labial armature is composed of small rods that are rounded prisms with convex surface. The spacious crop seems not to be stalked. The globular salivary glands are small. There are about 25 series of radular plates with the formula 1.1.0.1.1, characteristic of the genus. Both plates (Fig. 206) the big inner and the small outer one are pointed ending hooks. The big plate has a crest on its inner side, but no denticles on this crest.

The oesophagus begins wide and folded, then it narrows very much and runs backwards as a thin tube. The stomach is directed forward and contains high cuticular ridges (Fig. 207) similar to those that Forrest (1953, p. 234) described for *Goniodoris castanea*. The gut leaves the anterior end of the stomach, its first part is folded and the rest narrow. The anus lies in the centre of the gills and a little farther forward; also dorso-median and within the circle of the gills is the renal pore. The ciliated renopericardial duct is long.

The ovariotestis is located below heart and kidney and above the liver. The male follicles (Fig. 208, k) are few in number, larger and farther dorsal and behind than the much more numerous female ones (o). The ampulla (a) lies far in front, spermatheca (t) and spermatocyst (s) are far behind and united by a short though distinct duct. There is a sphincter (w) in the middle of the vagina (v) and another very strong one (x) at the outlet of the oviduct (n). Except the communication between spermatheca and spermatocyst all genital canals, not only the efferent duct (d), are long and winding; they are simplified in Fig. 208. The male duct has no prostate, its outer penial portion runs within a muscle sheath, from which the duct is separated by a cavity like in *Polycera*. Cuticular penial spines occur as in other species of *Goniodoris*.

Occurrence: Island of São Sebastião, one specimen among algae (Padina sp.) growing on stones in the upper littoral, december 1953; one in april 1954.

Discussion of Goniodoris mimula

To the genus *Goniodoris* Forbes & Goodsir 1839 two subgenera *Lophodoris* G. O. Sars 1878 and *Goniodorella* Pruvot-Fol 1933 are ascribed. In *L. danielsseni* the mantle covers the head and is united with the tentacles (Odhner 1922, f. 9; 1939, p. 28) In *G. savignyella* Pruvot-Fol (1933, p. 117) the tail is very long, and there are two pairs of appendages, small conical ones before the rhinophores and strong club-shaped ones behind the gills. None of these characters occurs in the present species, that belongs to the true *Goniodoris*.

The papers of Alder & Hancock (1866, p. 131-32), Bergh (1879, p. 365-68), Vayssière (1901, p. 74-76; 1913, p. 352-53), Eliot (1907, p. 349), Risbec (1928, p. 174-79; 1953, p. 95-97); Nobre (1931, p. 45-46; 1938-40, p. 57-59), Hoffmann (1940, f. 34), and Baba (1949, p. 139) were consulted, so that the present species could be compared with most of the others of the genus. Crosse's species of *Goniodoris* (1872, p. 73; 1872a, p. 153; 1875a, p. 311-18) belong to *Glossodoris* (Bergh 1892, p. 140-41) and other genera (Risbec 1928, p. 63, 71; 1953, p. 78-80) The description of one species from Bombay (Winckworth 1946) was not available.

Goniodoris ovata Barnard 1934 was collected in Simons Bay, South Africa, from the bottom of a ship. As this kind of occurrence was observed several times in *Goniodoris* (Eliot 1910b, p. 157; Pruvot-Fol 1933, p. 100 note 5), *G. ovata* as well as the atlantic and mediterranean species need comparison with *G. mimula*. *G. ovata* has much shorter rhinophores in proportion to the tentacles than *mimula*, and its body is much broader *G. nodosa* (Mont.) has 13 gills. Moreover its back is crested like that of *G. castanea* Ald & Hanc. and *G. barroisi* Vayss. All these species are sculptured, viz. *nodosa* with a scarce dorsal granulation, *castanea* with numerous lateral tubercles, and *barroisi* with dorsal and lateral ones. The shape of the radula of *G. barroisi* is similar to that of *mimula*, but the crest of the inner pleural plate bears denticles in *barroisi*, while it is smooth in *mimula*, even when examined with highest power

Corambella carambola, spec. nov. (Fig. 209-217)

The largest of the present specimens was living 6 mm. long, 4 mm. in broadest diameter, and 3,5 mm. high, that is strongly arched (Fig. 210). The measurements of the preserved slug were 5,5 mm., 3,5 mm. and 2,7 mm. The broad notum that covers head and foot completely has an entire, not notched margin. It is thick and fleshy, truncate in front and narrowed behind. The foot (d) is emarginate anteriorly, and the posterior end is pointed, entire, not notched.

The notum (Fig. 209) is transparent, whitish, with irregularly scattered brown to black spherical spots, 0,03-0,2 mm. in diameter, lying in different levels of the skin. The smallest spots are single finely branched chromatophores, the big ones are composed of several or many cells. The foot is white, and so are the gills. The rhinophores are quite transparent. The liver shows through the integument. There are no spicules. The integument is covered with a thin cuticle, that in the sectioned slug has a great likeness with one of the figures that MacFarland & O'Donoghue (1929, t. 1 f. 4) give for *Corambe pacifica*.

The small head is entirely concealed by the notum. The velum unites the tentacles in their whole length. The external surface of the tentacles is furrowed. The lanceolate rhinophores are retractile into pits surrounded by high smooth borders. Their structure (Fig. 211) corresponds to that in *Corambe pacifica* MacFarland & O'Donoghue (1929, p. 10 t. 1 f. 2), viz. a central axis, pointed at the tip, bears two expansions on its back, and these expansions are involved in a membrane that is fastened to the anterior surface. This membrane forms a kind of cylindrical veil around the sides of the rhinophores and is open on the back. The eyes lie deep in the body cavity at some distance from the cerebral ganglia.

The genital apertures lie on the right side on a small papilla in the groove between notum and foot, approximately on the level of the rhinophore. The anus is dorso-median and is located between notum and foot (Fig. 212).

Immediately behind the anus lies the renal pore. A short nephroduct comes from the kidney, a broad flat sac in the posterior half of the body cavity The gut runs in a ventral concavity of this sac and is on each side accompanied by a renal tube that communicates in front and behind with the renal sac. The left anterior end of the latter is much longer than the right that continues into a short reno-pericardial tube.

Like in *Corambe sargassicola* Bergh (1871, p. 1293) there are two plate-like gills (Fig. 212) on each side of the anal opening, one of them farther behind and outward, the other farther in front and inward. Each gill bears 9-10 very broad lamellae on each side. The aspect of the total gill makes it probable, that the lamellae are arranged alternately on the sides of the broadly foliaceous shaft of the gill, but the transverse sections show neither this position nor the opposite one with clearness. It is strange to note how considerably the appearance of the total gills differs from that of the sections. The branchiae of *Corambella carambola* can be understood like those of *Polycera* (Hoffmann 1940, f. 38 B) with very much shortened height. The antero-posterior direction of the rhachis as well as the lamellae inserted on it are extraordinarily elongated. Moreover the hind end of the outer (posterior) gill is curled. There are two branchial glands on each side of the body. Two strong bundles of muscles run between anus and gills (Fig. 212, k) and evidently produce the respiratory movements mentioned by several authors (f. ex. Balch 1899, p. 153; MacFarland & O'Donoghue 1929, p. 11).

The mouth cavity is lined with a thickened cuticle. The muscular crop (Fig. 213, j) is globular and united with the pharyngeal bulb by a short duct. The small salivary glands are hidden by the central nervous system. The radula has the formula 40-45 $\times$ 5.1.0.1.5 The shape of the big inner lateral plate, that is 75 micra high, differs considerably from that of *Corambella depressa* Balch (1899), but possibly the latter was strongly compressed and twisted. The inner surface of the hook bears 8-12 denticles. Figs. 214-216 show the aspect of the big lateral plate in different positions. The 4 following laterals are also hamate and have solid bases, but are considerably smaller The fifth plate, the outer lateral or marginal plate, has no hook, it is minute and rudimentary.

The ciliated wall of the oesophagus is thin, the lumen ample. The oesophagus opens into the anterior part of the stomach. The latter has a backward directed and folded caecum and receives numerous hepatic ducts from the ramified liver Muscular septa between the liver lobes as in *Corambe pacifica* are not developed. The gut leaves the stomach on its most anterior point and contains debris of Bryozoa. The sustaining subepithelial membrane of the tentacles of the Bryozoa (Marcus 1934, p. 535) is not digested.

Male (Fig. 217, x) and female (y) follicles of the ovotestis are separate, the former are less numerous and central. The ampulla (a) has a thick wall. The spermoviduct (hermaphrodite duct, h) receives the uterine duct (w) that comes from the spermatocyst (s) and the spermatheca (t) Far in front, quite near the external opening (q) of the oviduct (o), the spermoviduct divides. The female branch enters the mucus gland (g), and the male or efferent duct (e) runs far backwards attaining the level of the spermatheca. Then it curves forward again, an its epithelium becomes glandular (r) A separate prostate is not developed. The minute unarmed penis (p) opens at the apex of the genital papilla. Immediately behind and over the male pore (m) lies the vaginal pore (z) The vagina (v) extends to the spermatheca located far behind. The uterine duct leaves the spermatheca and runs forward to the nearly unstalked spermatocyst. Farther in front the uterine duct unites with the spermoviduct at the point where the latter divides into a male and a female branch. The albumen glands (n) are situated behind the mucus gland mass, into which they empty through two very long ducts (u). These openings lie in front of the entrance of the female branch into the mucus gland. The outlet of the latter, the oviduct, is short (about 0,2 mm. long) and opens on the ventral basis of the genital papilla.

Occurrence: Island of São Sebastião, on algae (Padina) growing on stones in the upper littoral. Two specimens in november 1953. Ubatuba, one specimen, december 1954 Like *Corambe pacifica* (O'Donoghue 1926, p. 12; MacFarland & O'Donoghue 1929, p. 8) *Corambella carambola* feeds on Bryozoa that are numerous on these Padina.

Discussion of Corambella *carambola*

Corambella Balch 1899 differs from *Corambe* Bergh 1869 only by the absence of the posterior notch in the notum. In the type of *Corambe, C. sargassicola* Bergh, the foot as well as the notum is notched (1871, p. 1294 t. 12 f. 1), in *C. testudinaria* H. Fischer (1889) and *C. pacifica* MacFarland & O'Donoghue (1929) only the notum. The description of the rhinophores (Balch 1899, p. 151), not the figure (t. 1 f. 14), shows that these organs are probably alike in *Corambella depressa* and *Corambe*, although

Thiele (1931, p. 430) and Hoffmann (1933, p. 210) consider Balch's drawing as decisive.

Balch's figure of the gills of *Corambella depressa* (f. 13) is sketchy, he describes them (p. 152) as "a set of simple overlapping plates on each side" The branchiae of *Corambe testudinaria* and *C. pacifica* show specific differences (MacFarland & O'Donoghue 1929, p. 20), but their type is the same and corresponds to what Thiele (1931, p. 429) and Hoffmann (1940, p. 50) indicate for the family Corambidae. Bergh's description (p. 1295) and figures (t. 11 f. 24, t. 12 f. 1) of the branchiae of *C. sargassicola* agree with the aspect of the total gills of *Corambella carambola* and make it impossible to unite, as Vayssière presumed (1913, p. 363), *Corambe testudinaria* with *C. sargassicola*.

Corambella depressa differs by colour and left-sided genital papilla from *C. carambola*. Even if the genital papilla is an anomaly or a misinterpretation, *C. depressa* and its radula is not sufficiently well described for identification with material of so remote origin. There is at least one further species of the Corambidae without notch in the posterior border of the notum, *Doridella obscura* Verrill (1873, p. 307, 400-01, 664 t. 25 f. 173 a, b; 1882, p. 547) *Doridella* can not be a synonym of *Corambe*, as Thiele (1931, p. 430) thought, but *D. obscura* is most probably identical with *Corambella depressa*. Only Verrill's contradictory description of the branchiae, on the left (p. 401) or on the right side (p. 664) makes it difficult to adopt the name *Doridella* for *Corambella*. *Corambe batava* Kerbert 1886 (Benthem Jutting 1922, p. 400-401 f. 5-6) "belongs perhaps to *Corambella* Balch, as the notaeum is not sinuated behind" (Engel 1936a, p. 106-107), but Benthem Jutting lists it as *Corambe batava* (1947, p. 64) The radula of *batava* differs in details from that of *Corambella carambola*.

Corambella baratariae Harry 1953 differs from our species by colour pattern, round hind end of foot, three pairs of branchial glands, and shape of the 5 outer lateral plates of the radula.

Doto uva, spec. nov. (Fig. 218-222)

The length of the living slug (Fig. 218) was 4,5 mm., the height of the body 0,6 mm., and that of the largest cerata 1,1 mm.

The preserved specimen was 2 mm. long. The velum is slightly expanded, the tail pointed, of medium size, 0,9 mm. long alive.

The body is white with light orange viscera shining through, which appear pink in the cerata. The tubercles of the latter are white with ramified spots of black pigment. This lies in the subepithelial connective tissue around the glands (Fig. 221, d), that Hecht (1895, p. 600) considered as defensive ("Wehrdrüsen" Hoffmann 1934, p. 413) Larger black spots occur in the connective tissue in the middle of the back and the head and form a ring around the sheaths of the rhinophores. The clubs of the rhinophores are smooth, as is the border of their sheaths; the latter are elongated in front forming beaks half as long as the rhinophores (Fig. 219).

There are 5 pairs of cerata that diminish in size backward. The fourth right ceras of the present animal (Fig. 218) is smaller and, as sections reveal, in regeneration. The cerata are clustery and ovoid, without a subcylindrical top. They bear 4 circlets of semiglobular tubercles, 6-7 in each circlet, almost touching one another One tubercle lies on the tip of each ceras.

There is a distinct gill (Fig. 220, k) on the inner side of the large cerata. This branchial thickening contains a blood sinus (Fig. 221, b) (Hecht 1895, p. 677) with a sphincter of its own (s) corresponding to the accessory hearts described by Dreyer (1910, p. 377) The genital orifice is lateral on the level of the first right ceras. Dorsolaterally behind this ceras lies the anus on a rather high papilla (Fig. 220, a)

The masticatory border of the jaw is smooth as in the other species of the genus. The radula formula is 86 × 0.1.0 The central plate in horseshoe-shaped, as usual, as high as broad (18 micra), and has 2-3 denticles on each side of the median cusp (Fig. 222)

Occurrence: Island of São Sebastião, among algae on boulders in the littoral; 1 specimen in june, 1953.

Discussion of Doto uva

Thanks to Odhner (1936, p. 1119-21) a key of 22 species of *Doto* is available. *D. uva* belongs to group I: "papillar tubercles with dark spots or subapical rings", subgroup B: "papillae in 4-5 pairs", section 1: "papillae globose with distinct tubercles in 4 rows". The three species hitherto known with these characters have the "margin of rhinophore sheath even or slightly crenulate", so that *D. uva* is distinguished by its prolonged anterior border of the rhinophorial sheath. A similar expansion occurs in *D. obscura* Eliot (1906b, p. 152) that has 7 pairs of cerata (Odhner's key: I A 4), and adult animals are very dark, almost black. A small expansion of the rhinophorial sheath is also figured for *Doto floridicola* Simroth (1888, p. 219) by Pruvot-Fol (1951, t. 3 f. 22) Simroth's specimen had no expanded sheath. The radula of *D. floridicola* is not known, so that Eliot (1906a, p. 356; 1909, p. 19) questions its generic position and validity. As Odhner (1934, p. 301) stresses the importance of the colour for discrimination between the species of the genus *Doto, D. uva* is almost certainly different from the brilliant carmine *floridicola*.

Of the species of *Doto* described after the publication of Odhner's key *D. bella* Baba (1938, p. 132) belongs to group I too. As the papillae are in 7 pairs, it comes under subgroup A and seems to be nearest *D. africana* Eliot (1904, p. 285), though it is certainly different. *Doto purpurea* Baba (1949, p. 172) is a further species of group I. It has 4 pairs of elongate cerata (subgroup B, section 2) and is characterized by 2 digitiform processes on the anterior margin of the rhinophore sheaths.

Doto pita, spec. nov. (Fig. 223-225)

The live animals were up to 5 mm. long, preserved they are 2 mm. in length and 0,5 mm. high with 0,7-0,8 mm. long cerata. The pointed tail is 0,4 mm. long in preserved specimens. The velum is inconspicuous.

The colour of the body and the cerata is yellowish gray beneath the white epidermis, with brownish spots on the back. The tubercles of the cerata have small light tips (Fig. 224)

The clubs of the rhinophores are smooth, the funnel-shaped margin of the short sheaths is even. The cerata are in 4-5 pairs and without distinct branchial thickenings. Their shape is somewhat jaggy, the greatest width lies above the middle, the tip is conical. Each ceras bears a few irregularly scattered, small tubercles, that do not form circlets.

The position of the genital and anal opening is as in the preceding species; the anal papilla is lower

The border of the jaw is smooth, the radula formula 66 × 0.1.0. The plate is oblong, 15 micra high and 12 micra broad, with 3-4 denticles on each side of the median cusp (Fig. 225)

Occurrence: Island of São Sebastião, on algae in the littoral; 4 specimens in june and 4 in november 1953; 5 in april 1954.

Discussion of Doto pita

The species has neither dark apical marks on the tubercles of the cerata (group I of Odhner's key, 1936) nor elongate and pointed tubercles (group III) It agrees rather well with group II that has no distinct gills, although the number of its cerata is smaller than that of any other species of this group. After its rhinophore sheaths with smooth margins *Doto pita* belongs to subgroup B. The number of cerata as well as that of the tubercles distinguishes the new species from those united in II B.

One of the species described after the publication of Odhner's key, *Doto rosacea* Baba (1949, p. 172), belongs to group III, where subgroup B, section 2 (no distinct gills) evidently contains the most similar species, however all with less cerata and more circlets of tubercles than *D. rosacea*.

Janolus comis, spec. nov. (Fig. 226-236)

Living animals attain 9 mm. length; preserved they are up to 5 mm. long, 1 mm. broad, and 0,8 mm. high. The head is flattened anteriorly, and the body tapers into a long and pointed tail. The dorsal surface is almost plane, the flanks are nearly vertical, and the undulating brim of the foot stands out over them, so that the transverse section likens that of *J. cristatus* (Hoffmann 1934, f. 230). The slugs are transparent, light brown with small dark browns stipples on body and rhinophores. Over the heart there is a bigger dark spot (Fig. 228). The brown liver enters the cerata, but does not reach their tip.

The cerata stand all around the notum, also in front and behind. Ventrally to their insertions there is a band of subepidermal vesiculous cells, wanting in a younger specimen. In many of the present slugs the cerata form a single row and are of medium size; the longer cerata (up to 3 mm.) have fallen off. If more numerous cerata are present (Fig. 226), their disposition is irregular Full grown cerata have a narrow base, attain their maximum breadth below the middle, and taper towards the narrow cylindrical upper end (Fig. 234) In transverse section they are round. Their tip generally has a knob, and the surface is strewn with more or less prominent papillae.

The genital papilla that bears two openings lies at the end of the first quarter The renal pore (Fig. 228, n) that was verified in sections lies ventrally to the series of cerata, 0,15 mm. behind the genital opening in a specimen of 1,5 mm. body length. This position corresponds to Bergh's (1873, p. 600) and Trinchese's (quoted from Misuri 1917, p. 41-42) observations in *J. cristatus,* while the nephroproct of *J. capensis* was indicated as lying behind the basis of the anal papilla (Bergh 1907, p. 91) The chimney-like anal papilla lies short before the hind border of the notum that is marked by the row of cerata. The anal gland known from *Janolus cristatus* (Chiaje) and *Proctonotus mucroniferus* Ald. & Hanc. (Hecht 1895, p. 601; Misuri 1917, p. 41; and others) does not occur in the present species.

The foot is straight in front with a slight median notch. Its anterior corners are prolonged and fuse with a small folded velum. Dorsally to this the short conical tentacles flank the broad disc around the perpendicular mouth opening (Fig. 229)

The rhinophores stand close beside one another a little behind the anterior row of cerata. They are club-shaped and surrounded by broad papillae or papillary folioles that are more proeminent on the sides and behind than on the anterior surface; especially on the back there are high single papillae (Fig. 231-233) The inter-rhinophorial crest is about twice as long as the diameter of the basis of a rhinophores and forms three or four little folds. Its epithelium is ciliated. To the sides behind the bases of the rhinophores lie the small eyes (Fig. 230)

The enormous horny yellow jaws occupy one fourth of the entire body length, 0,6 mm. in a total mount of a 2,4 mm. long slug. The are roughly triangular with several intricate ridges near the hinge, two of which flank the rhinophorial crest (Fig. 230) The masticatory borders have two broad and round, very strong lobes that are not dentated (Fig. 235) The most similar mandible that I have found in the litterature is that of *J. capensis* Bergh (1907, t. 7 f. 9-10, 12-13).

The radula (Fig. 236) consists of about 16 rows of plates with the formula 12-20.1.12-20. The rhachis plate is broad with a median tooth and 4 small denticles on both sides. The lateral plates have a strong hook that reaches beyond the base and some fine denticles on the inner side visible only with high power The first lateral plate is very small, the following are bigger and diminish again in size outwards.

With high power (immersion) the basis of the 0,55 mm. long penis shows cuticular hooks in sections.

Occurrence: Island of São Sebastião, among algae on boulders of the littoral; 8 specimens in june and 5 in november 1953; 6 in april 1954. Ten slugs in Ubatuba, in the northeastern littoral of the State of São Paulo, in the same biotope, december 1954.

Discussion of Janolus comis

Together with the Madrellidae and Dironidae the Antiopellidae constitute the superfamily Pachygnatha of the suborder Arminacea (Odhner 1939, p. 48) The two genera with a crest between the rhinophores, *Antiopella* Hoyle 1902 (previously *Antiopa* Alder & Hancock 1855, *Janus* Vérany 1844) and *Janolus* Bergh 1884 are now united under the second name, but this union is probably not definitive (O'Donoghue 1924, p. 14-15; Pruvot-Fol 1951, p. 52).

Of the species mentioned by Bergh (1891, p. 41-42) *Janus sanguineus* Angas (1864, p. 63-64) belongs to *Madrella* (Eliot 1906a, p. 373; Baba 1949, p. 164). As is shown by the figures of Hoffmann (1933, f. 129 A, 143 B) and Misuri (1917, f. 71) the perfoliation of the rhinophores in *J. hyalinus* (Ald. & Hanc.) and *J. cristatus* (Chiaje) does not agree with that of the new species. O'Donoghue (1924, p. 17) called the rhinophores of *J. hyalinus* "simple" Labbé (1931, p. 444) described big animals of a variety to *J hyalinus* with "rhinophores un peu mamelonés", but also these terms do not fit for *J. comis*. With regard to the tuberculate cerata, the ridge-like denticles of the radular plates (Eliot 1906a, p. 374), and the smooth masticatory border, our species shows relations to *hyalinus*, but the rhinophores and the radular formula, 11-13.1.11-13, are different, and the cerata not flattened. The maximum formula of *J. flagellatus* Eliot (1906a, p. 375), 20.1.20, agrees with *comis*, but *flagellatus* has plates without denticulation, distinctly vertical perfoliations of the rhinophores, and a long penial flagellum; it is called an uncertain species (Eliot 1910b, p. 165)

J. cristatus and the allied *J. fuscus* O'Donoghue (1924, p. 16 t. 2 f. 18-20), both with denticulate masticatory border and smooth cerata, are of the "*Antiopella*"-type, while *J. comis* is a true *Janolus*. Also *J. novozealandicus* (Eliot 1907, p. 331) is nearer to *cristatus* (*Antiopella*) than to *hyalinus* (*Janolus*) It its 15 mm. long, 6 mm. broad, has the radula 23 × 37 1.37, a purplish stripe along the back, and instead of the black spot above the heart that occurs in the present species, a lozange-shaped, light coloured area.

The type of *Janolus*, *J. australis* Bergh (1884, p. 19), a large animal (3,2 cm. preserved), differs from the brazilian species by about 40 broad leaves on either side of the rhinophores, smooth radular plates, and higher jaws. *J. capensis* Bergh (1907, p. 90), also a big slug (up to 4 cm. alive), differs by its colours (Barnard 1927, t. 20 f. 6-7), 18-20 rather stout transverse rhinophorial lamellae, and evidently smooth radular plates, the cusps of which are more distinctly bent than in *J. comis*.

The descriptions of *J. coeruleopictus* Cockerell & Eliot (1905; Zool. Rec., v. 42), after O'Donoghue (1924, p. 19) identical with *J. barberensis* (Cooper 1863), and *J. indicus* (Eliot 1909; Zool. Rec., v. 46), where not available to me.

Catriona coerulea (Montagu) (Fig. 237-243)

Amphorina coerulea (Mtg.) Bergh 1883, p. 57-61 t. 4 f. 18; 1891, p. 34. Vayssière 1888, p. 60-65 t. 1 f. 5, 5a, t. 5 f. 65-70;

1913, p. 277; 1928, Amphorina coerulea. Eliot 1906a, p. 364; 1910b, p. 129. Hoffmann 1926, p. 18.

Cratena coerulea (Mtg.) Thiele 1931, p. 456. White 1938, p. 15, 17 Odhner 1939, p. 68.

Trinchesia coerulea (Mtg.) Pruvot-Fol 1951, p. 65 t. 4 f. 7, 24; 1953, p. 52 t. 3 f. 57

The single animal we have seen was 7 mm. long alive; the tip of the tail was wanting. The measurements of the preserved slug are: length 3 mm., height 1 mm., breadth 0,8 mm. The colour is a golden yellow with a white patch on the head and one over the heart; the fcct is orange. The cerata appear grayish blue; their golden yellow tip (Fig. 238, y) is limited by a distinct slanting line against the rest of the papilla where the liver shines through with dark granules in part of its cells (g). A dorso-median stripe (b) one each ceras is light blue.

The length of the cerata in the living slug is 1,2 mm., the diameter 0,2 mm., the corresponding measurements in the preserved animal are 0,8 and 0,26 mm. The cnidosacs are 0,1-0,2 mm. long. The cerata constitute one anterior and one posterior group (Fig. 237), each containing 4 rows. Each anterior group comprises about 25 cerata, each posterior 12. The tip of one ceras is doubled, as happens frequently in Eolidacea.

The male pore (Fig. 242, d) lies above the female aperture (e) and in front of the first row of cerata. The anus is dorsal on the right side between the hindmost branch of the right liver and the foremost right branch of the left liver

The tentacles were 1,4 mm. long in the living slug, the smooth rhinophores 1,8 mm., and both 0,2 mm. in diameter In the preserved animal they are much shorter and thicker The anterior border of the foot is rounded, the angles are slightly expanded. The foot decreases in breadth backwards.

The mandibles are very strong, their masticatory borders (Fig. 239) bear one row of 6-8 knobby teeth well separated from one another. The radula formula is 34 $\times$ 0.1.0; the number of denticles on both sides of the median cusp varies between 4 and 5, but without relation between age of plates and number of denticles (Fig. 240) Also the sequence in the size of these denticles is irregular, not like described by Vayssière who found those flanking the median cusp smallest. Even the size of the cusp surpasses that of the denticles widely in some plates, while it is the same in others. The hinges of the plates are profound.

Male and female follicles of the ovotestis are separate. The efferent duct has a glandular (prostatic) part (q) and a curved stylet (u) on the long and thick penial papilla (p) The sections of the reproductive organs are not sufficiently complete to allow for a reconstruction, so that presence of absence of a penial gland could not be verified. The volumous female gland mass (f) and the spermatheca (t) are like these organs in Odhner's figures (1939, f. 40, 41)

Occurrence: Island of São Sebastião, among algae on boulders in the tidal zone; one specimen in december 1953.

Further distribution: East Atlantic from the Swedish, German, and British coasts southward to the Mediterranean including the Adriatic; Atlantic coast of Morocco. Certainly the species belongs to the Norwegian fauna too (Odhner 1939, p. 68)

Discussion of Catriona coerulea (Mtg.)

There is a blue ring in the middle of the cerata of the East Atlantic specimens, not a vertical stripe as in the present slug. A single specimen is insufficient to evaluate the taxonomic significance of this character that is variable (Eliot 1910b, p. 130) The small size of our slug may be the reason for its much shorter radula than that of the european animals, and the 4-5 denticles instead of 6, rarely 5, in the East Atlantic material. The verge that Vayssière (1888, p. 62, 64) and Eliot (1910b, p. 130) described as long and straight with a slightly curved end resembles in our specimen that of Bergh's material from Trieste (1883, f. 18a).

Amphorina Quatrefages 1844 is a synonym of *Eubranchus* Forbes 1838 (= *Galvina* Alder & Hancock 1855) The type of *Amphorina, A alberti* Quatr., was discussed by Bergh (Beitr. Aeolid. V, 1878, p. 830), O'Donoghue (1929a, p. 749) and Pruvot-Fol (1951, p. 66). It is an acleioproctic species with triseriate radula. Later on Bergh (1886, p. 37) followed Trinchese who thought to re-describe Quatrefages' species and applied the name

Amphorina to species with uniseriate radula. Trinchese's *Amphorina alberti* was not that of Quatrefages, but an acleioproctic slug with uniseriate radula. It is either a separate species of *Catriona*, *C. genovae* O'Donoghue (1929a, p. 744) or a synonym of *Catriona foliata* (Forbes & Goodsir 1839) (Pruvot-Fol 1951, p. 65).

Bergh (1864) selected a cleioproct species with unarmed verge, *Doris peregrina* Gm. as type of his genus *Cratena*. He had not seen Gmelin's species; the *Cratena* that he studied are acleioproctic and their verge bears a stylet. The name of the genus must accompany the type and thus designates a group of species which belong to the Facelinidae Favorininae, and are congeneric with *Cratena peregrina* (Gmelin 1791) The acleioproctic species that had been called *Cratena* became *Catriona* Winckworth 1941 (see Odhner 1944, p. 22).

Pruvot-Fol (1948, p. 276) tried to avoid the separation between the name and the conceit of *Cratena*. She proposed to ignore the selection of the inappropriate type, as it had not been published in a congress-language. But it appeared also in german (Bergh 1870, p. 2-3)

Fischer (1887, p. 540), Bergh (1891, p. 34), and Pruvot-Fol (1948, p. 277) mention *Trinchesia* Ihering (1879a, p. 137, note) as a name that would correspond to *Catriona*. Macnae (1954, p. 3, note) is not of this opinion. The characterization of *Trinchesia* is vague: "similar to *Galvina*", that is *Eubranchus*, "but with uniseriate radula and armed verge" Ihering did not indicate any species that belongs to *Trinchesia*.

Piseinotecus, gen. nov.

Acleiproct Eolidacea with uniseriate short radula with strong median cusp; one row of denticles on masticatory process; smooth rhinophores a little longer than tentacles; anterior foot corners projecting; 4-5 tufts of 1-5 cerata with cnidosacs on each side of body; right liver and left-sided partner form one duct each; male and female apertures separated though neighbouring.

Type of the genus: *Piseinotecus divae*, spec. nov.

The new genus belongs to the Cuthonidae Odhner (1939, p. 53), a name that is more appropriate (Macnae 1954, p. 3) than

Tergipedidae Thiele (1931, p. 454) From this family *Hervia* Bergh 1871 must be excluded, as the type, *H. modesta* Bergh, is cleioprcct (1874, p. 410) and belongs to *Facelina* Alder & Hancock 1855 (Odhner in Macnae 1954, p. 8-9) None of Thiele's remaining 13 Cuthonid genera can include the present species, although cerata in small groups, not rows, occur (*Ennoia, Myja*), as well as produced anterior angles of the foot (*Dunga*) Just as little *Piseinotecus* can be ascribed to one of the genera of the Cuthonidae described after the publication of Thiele's Manual, viz. *Cratenopsis* Lemche (1935, p. 131); *Globiferina* Risbec (1937, p. 136; 1953, p. 157); *Noumeaella* Risbec (1937, p. 163; 1953, p. 158), the acleioprcct condition of which is uncertain; *Xenocratena* Odhner (1940, p. 1); *Indocratena* Odhner (1940, p. 8), that was introduced for *Pteraeolidia annulata* Eliot (1910, p. 417 t. 25 f. 13); and *Subcuthona* Baba (1949, p. 100, 176) The latter genus together with *Tergipes, Embletonia,* and the present belongs to the Tergipedinae Odhner (1939, p. 75)

Piseinotecus divae, spec. nov. (Fig. 244-248)

The available animals are slender slugs with blunt head and long, pointed tail. The biggest was 5 mm. long alive and 3 mm. preserved. The breadth is about 0,6 mm., the height up to 0,6 mm.; the foot, that has a median fold in the preserved specimens (Fig. 246) is 0,3 mm. broad. The body is grayish white with a greenish gray liver shining through. The cerata ar up to 1,2 mm. high, spindle-shaped or more inflated, and united to bundles on very short common stalks. There are 5 bundles on the left and 4 on the right side. The number of papillae per bundle diminishes from 4-5 in the foremost to one in the hinder The cnidosacs measure one sixth to one fifth of the length of the ceras in the long, one third in the small cerata.

The genital openings are separate, the male pore (Fig. 246, c) lies in front of the first bundle of appendages, the female aperture (j) beneath this bundle, 70 micra behind the male.

The anus (Fig. 247, b) is located between the first and second right bundle on a low, dorso-lateral papilla. The renal pore, that was not seen with certainty in the sections, is evidently very near to the anal opening. A cyanophil cutaneous gland, 40 micra in diameter, opens about 20 micra behind the anus.

The eyes have black pigment and lie very near to the brain. The pharynx (w) is spherical, the salivary glands (v) are short sacs. The smooth rhinophores (x) are longer than the tentacles (y); in the preserved animal the measurements are 0,7 and 0,4 mm. The foot that is separated from the body by a constriction is anteriorly rounded and produced on each side into a 0,2 mm. long tentacular process (z)

The jaws are very thin and provided with one series of delicate denticles on their masticatory borders (Fig. 244). The radula formula is 12 $\times$ 0.1.0. The plate is horseshoe-shaped, 56 micra high, with 32 micra long legs and 19 micra long cusp. Up to 12 small denticles (6 micra) stand on the sides of the cusp (Fig. 245)

Male and female germ cells lie together in the volumous follicles of the ovotestis (Fig. 248, o) The ampulla is situated far in front. The distal part of the efferent duct runs within a bulb formed by its ental erythrophilous (q) and ectal cyanophilous (r) glandular epithelium. A 0,1 mm. long and 70 micra thick papilla, the penis (p), projects into the male atrium (m)

The hermaphrodite duct (h) bifurcates short behind the ampulla into the male branch or efferent duct (e) and female branch or oviduct (inner part of oviduct, d) The latter opens into the female gland mass (g), as does the spermatheca (s) The gland mass communicates by several orifices with the outer part of the oviduct (nidamental duct, f) The state of the ovotestis and the female gland mass as well as the sperm in the spermatheca show that the animal is fully developed.

Occurrence: Among algae grown on boulders in the littoral of the Island of São Sebastião; 8 specimens in december 1953.

Phidiana selenkai Bergh (Fig. 249-258)

Phidiana Selencae Bergh 1878, p. 560-563 t. 6 f. 10-18.

The one preserved slug is 14 mm. long. The length of the pointed tail cannot be measured exactly, because it is curled; it may be computed at 2,75 mm. The breadth of the body is 4,5 mm., the height 6 mm. without the cerata, the longest of which measure 4,5 mm. The greatest breadth lies on the level of the border of the cerata. The foot (f) is narrower, its anterior border crescent shaped, bilabiate, without prominent corners or widening.

The general colour of the recently preserved slug was a light orange, stronger in the tentacles, pale on the flanks and on the foot. The cerata are white at the tips, farther down the olive-coloured nodular hepatic diverticles turn them grayish brown. The uppermost parts of the liver tubes in the cerata are quite black (Fig. 251, p) The liver branches inside the notum are colourless.

The cerata (Fig. 250, c) are set in about 17 rows on each side. These are dense and somewhat irregular, so that the disposition of the cerata is rather in five areas, viz. the anterior right (66 cerata), anterior left (47), posterior left-sided of left liver (71), anterior right-sided of left liver (47), and posterior right-sided (post-anal) branches of left liver (20). There is a connecting canal (Fig. 250, q) between the right liver and the anterior right-sided branches of the left liver (Odhner 1939, f. 34, 38, c) indicated by 3 small cerata. The innermost cerata are the thickest and longest, while at the borders there are thin and short ones, that show the end of each row most clearly (Fig. 249) The total number is about 245; they are a little more numerous on the right than on the left side of the body In the biggest cerata the cnidosac (Fig. 251, s) is about 0,45 mm. long, and the winding canal (k) that connects it with the liver diverticle (h) 0,4 mm. The medial field of the notum is as broad as each of the lateral, cerata-bearing ones.

The stout and wrinkled tentacles (t) are very big, 3,5 mm. long and 0,5 mm. in diameter near the base, where they touch one another. The rhinophores (Fig. 252, r) are much smaller, about 1 mm. long and 1 mm. thick. They are perfoliate with 10 complete folds and 10 intercalary ones on the posterior side. The large eyes lie far below the epidermis; the neurilemma is not pigmented.

The pharynx is flanked by the smooth and colourless mandibles (Fig. 253), the masticatory processes of which (Fig. 254) have a single row of 20-25 small, 12-20 micra high denticles. The radula has 15 plates of the so-called horseshoe type with a prominent cusp. The latter is beset with 2-5 small denticles on each side. The margins of the plate bear 3-6 bigger teeth each. The number of denticles varies independently of their age; the last, youngest plate has very few. Neither are the denticles symmetrical on both sides of all plates (Fig. 255, 256)

The alimentary tract is visible in the clarified slug due to its contents of dark debris that are intermingled with sand grains. The outermost part of the gut as well as the stomach is empty. The intestine leaves the stomach in the midline. It winds around the genital gland mass, forms a ventral loop to the left side, and rises to the back, where it opens (Fig. 250, a) behind the anterior branches of the left liver The nephropore (n) lies on a small papilla in the interhepatic space.

The volumous genital mass extends to the left side of the slug. The large penis (Fig. 257) is visible in the clarified animal. It is 1,7 mm. long and 0,75 mm. in diameter. Its tip is bent backwards and bears a black hook, 0,1 mm. long and 50 micra wide at its base (Fig. 258). The cusp of this hook bends towards the side opposite to the outer opening. This detail differs from the penial hook of the original specimen of *selenkai*, and of *brevicauda* Engel (1925, f. 6), but it is probably not a character of taxonomic value. The genital openings (g) lie in front of the interhepatic space. The male pore lies on the genital papilla, that of the oviduct is a slit in front of the papilla.

Occurrence: Bay of Santos, São Vicente; one specimen in the tidal zone, september, 21, 1953.

Further distribution: Rio de Janeiro. As the species was dedicated to Professor Emil Selenka, the name must be *selenkai*.

Discussion of Phidiana selenkai Bergh

Some differences between the present slug and that of Bergh, viz. the number of rows of cerata and of rhinophorial perfoliations, can be explained by the greater size of the original specimen (preserved 22 mm.) The narrower middle field of the notum, the not widened anterior end of the foot, and the absence of pigment in the neurilemma justify our classification, although it is highly probable that the Caribbean *Ph. lynceus* Bergh 1867 and *Ph. brevicauda* Engel 1925 are conspecific with *selenkai*. *Ph. exigua* Bergh 1898 from Chile has the anus much farther in front. The other South American species, *Phidiana patagonica* (d'Orbigny 1837), *inca* (d'Orbigny 1837), and *attenuata* (Gould 1852) can be distinguished from the *lynceus-selenkai-brevicauda*-group by various characters indicated in Engel's key (1925, p. 70-72.

Engel (l. c., p. 55-72) has discussed the genus *Phidiana* as thoroughly as it is possible with the available descriptions and specimens. He claims more material for the definitive establishment of the synonymy, and I follow his authority

The radula of *Phidiana obscura* (Risbec 1928, f. 79; 1953, f. 101) has no prominent median cusp of the radula plate.

Favorinus auritulus, spec. nov. (Fig. 259-269)

The living slugs are 3-12 mm. long (Fig. 263-264) The greatest length of preserved animals is 8,5 mm; their breadth is 1,8 mm. and they are 1,8 mm. high, without the cerata. The body is blunt in front and tapers towards the long, pointed tail. The slugs are more or less transparent white with the liver shining through in different colours. It may be almost colourless or pink or grayish or dark brown. The latter is the most frequent colouring. The dark pigment of the liver is not dissolved by the preserving liquids. The cnidosacs in the tips of the cerata are always colourless white. The rhinophores have dark brown epithelial pigment from the base to varying height up to the upper end of the bulbous region; their tips are milky white. So are also the tips of the tentacles.

The smooth cerata are round in transverse section, carrot-shaped with pointed tips and roundish bases, and slightly curved. Generally the dorso-median cerata are the longest, they are 3 mm. long in preserved animals. They are disposed in 2-6 groups, the two first of which are arched, without a distinct difference of the number in the anterior and posterior limb of the arch. In the largest specimens there are 8-15 cerata in the first group, in the second 6-11. In the hinder groups the cerata stand in simple rows and decrease from 3-5 in the third and fourth to 1-2 in the sixth. The cnidosacs of small specimens occupy about one third of the entire length of the ceras, in big slugs they take only one fifteenth. Their height is about 0,1 mm. in both cases. Hoffmann cites similar observations (1939, p. 1182).

The male and female genital ducts open together, they are only separated by a fold immediately inside the aperture (Fig. 267, g) The latter lies a little ventrally to the first arch of cerata. The anus (Fig. 260, a) lies on a papilla in the angle of the second arch, the nephropore between first and second arch.

The foot is separated from the body by a prominent, sharp border that is continued into the long and slender tail. In several specimens this is blunt, it had probably been bitten off and was in regeneration. The anterior margin of the foot is a little thickened and has a distinct median groove that continues into the front angles. These are pointed and almost half as long as the tentacles.

The rhinophores stand close together In the living slug they are 3 mm. long, preserved 2,5 mm. They have 3 basal bulbs that are approximately as long as the diameter of the rhinophore. The plain tip is as long or a little longer than one of the bulbs. In the youngest animals the rhinophores are smooth without bulbs that appear gradually with increasing size.

The frontal tentacles are nearly as long as the rhinophores, but in the living slug a little thinner. By fixation they contract more than the rhinophores. Ventrally to the tentacles on either side of the mouth opening is a knob; these are both involved by the semicircular, narrow velum.

The jaws (Fig. 261) are of the typical shape for *Favorinus* with a masticatory process longer than half the jaw plate and beset with 3-4 rows of denticles (Fig. 262). Those in the outermost row are the biggest and about 85 in number

The radula consists of 14-18 spur-shaped plates, the tiny lateral denticles of which were drawn with immersion (Fig. 268, 269) With lower power they are not visible. The paired legs of the plate are a little longer (0,08 mm.) than the cusp (0,06 mm.).

The verge (Fig. 267, p) is much longer than that of *F. branchialis* (Bergh 1883, t. 6 f. 10-11; Odhner 1939, f. 47) In the latter the free papilla of the ductus efferens (vas deferens of the authors) appears as long as it is broad, while it is five times the diameter in the present species.

Occurrence: In june 1953 this species was the most frequent Opisthobranch among the algae on the boulders of the littoral at the Island of São Sebastião, where we caught 32 slugs of various ages; in november 1953 9 specimens were found, some of them under stones; in april 1954 we obtained 13 animals from algae.

Discussion of Favorinus auritulus

The subfamily name Rizzoliinae Odhner 1939 must be dropped and Favorininae, Bergh's denomination (1891) in Thiele's corrected form (1931), used again, as *Rizzolia* Trinchese 1877 had been established with the same type as *Cratena* Bergh 1864 and is a synonym of the latter (Winckworth 1941; Macnae 1954, p. 3)

Bergh (1891, p. 36-37) listed three valid species of *Favorinus, albus* (Ald. & Hanc.), *branchialis* (O. F. Müll.), and *versicolor* A. Costa. The first two, still separated by Hoffmann (1926, p. 20-21) are now united (Löyning 1922, p. 81-83; 1927, p. 253; Odhner 1939, p. 78) *F. versicolor* with strong folds at the base of the rhinophores and yellow radula is, after Labbé (1929, p. 394), a variety of *branchialis*. The shape of the rhinophores of the latter is variable (Labbé; Odhner); they may be plain or annulate, and have a subapical bulb or not. As far as I know the bibliography, slugs with three successive rhinophorial bulbs, as occur in *auritulus,* have not been described of *branchialis*.

Eliot (1906b, p. 158) re-described *Favorinus carneus* (Alder & Hancock 1855, p. 50), that Bergh (1891, l. c.) had listed as doubtful species. After Eliot, *carneus* is perhaps identical with *F. versicolor* A. Costa (1866). For our comparison it is important to consider a *Favorinus* from the subtropical Atlantic (Cape Verde Islands) with two bulbs on the rhinophores. But as the bulbs are very near the tip of the rhinophores (Eliot t. 14 f. 13), I dare not identify *F. auritulus* with *F. carneus*. The verge of *F. versicolor*

(Bergh 1883, p. 40, 43) is as short as that of *branchialis* and therewith different from that of our species.

Two rhinophorial bulbs occur also in *F. japonicus* Baba (1949, p. 177) that has more or less minutely nodulose cerata. The three strong annulations of the rhinophores in *Eolis nodulosa* Kelaart (Eliot 1906, p. 686 t. 45 f. 7) resemble those of our *Favorinus*, but the rhinophores in Kelaart's species are much shorter The "espèce inconnue (*Favorinus?*)" of Pruvot-Fol (1951, t. 1 f. 9) has a certain likeness to *F. auritulus*.

Easily distinguishable from *F. auritulus* are *F. perfoliatus* Baba (1949, p. 102, 177) with perfoliated, and *F. horridus* Macnae (1954, p. 19) with smooth rhinophores. Also the rhinophores of *Hervia serrata* Baba (1949, p. 105, 179) are smooth. This species has a *Favorinus*-like radula (Odhner in Macnae 1954, p. 9), but a single row of denticles on the masticatory edge of the jaw like *Cratena*.

Spurilla neapolitana (Chiaje) var. braziliana MacFarl.
(Fig. 270-285)

Spurilla braziliana MacFarland 1909, p. 91-99 f. 83-96

The length of the living slugs is from 2 to 35 mm., preserved they are 1,5-20 mm. The body is truncate in front with a pointed tail, the length of which varies widely in our material. The tail of MacFarland's single specimen (1909, t. 17 f. 91) had very probably been damaged and was in regeneration.

The proportion of breadth to length in the present 31 preserved slugs varies from 1:2 to 1:4,3, in the living animals it was 1:6 to 1:8. The proportion of height (without cerata) to length is 1:2 to 1:5 in preserved specimens.

The colour is orange with a brown liver On the back there is a pattern of light spots (Fig. 276). Such spots occur also in the epidermis of the cerata. The tips of the latter that contain the cnidosacs are light. The youngest specimens (Fig. 271), up to 8 mm. living (5 mm. preserved), are not orange coloured but transparent, and the fine ramifications of the liver can be followed into the perfoliations of the rhinophores and into the tentacles (Pruvot-Fol 1951, p. 55 t. 3 f. 19).

The cerata are keeled on the medial side; they are thickest near the basis, coned towards the tip, and curved simply, not S-shaped. They assume the latter aspect when the slugs are narcotized. The dorso-median cerata are longest, up to 8 mm. in life (Fig. 277) They are disposed in about 8 groups, of which the two to five foremost are arched. The first has 11-14, the second 11-16 cerata, and the cerata decrease in number to 2 in the eighth. The biggest measured cnidosac is 0,5 mm. long.

The genital opening (Fig. 272, g) lies under the first arch and occurs in preserved animals from 5 mm. upwards. The anus (a) lies in the angle of the second arch on a small papilla. The renal opening (n) lies also within this arch, near the anterior limb. In preserved specimens the nephroproct shows as a white knot or pit.

The foot has a broad undulate brim. Its thickened anterior border contains a transverse groove (Fig. 278) that reaches into the short lateral corners. These are pointed but not tentacle-shaped, therefore of the typical form of *Spurilla* (Pruvot-Fol 1953, p. 55) The rhinophores stand close beside one another and are up to 3 mm. in life. They are perfoliated, and between the 11 entire leaves of full grown slugs (Fig. 273) there is an equal number of smaller ones inserted irregularly on the posterior side (Fig. 274) In the middle of the anterior side the lamellae are interrupted. The stout frontal tentacles on both sides of the mouth are up to 4 mm. long alive. The mouth is transverse. In preserved, not or not sufficiently narcotized slugs a fleshy muzzle is everted (Fig. 278).

The pharyngeal bulb suits to MacFarland's description (1909, p. 93), except that it is only 1,5 mm. long. The mandibles are 1,5 mm. long and 0,8 mm. broad. They are more or less oval in outline (Fig. 275) with a depressed dorsal margin and re-enforced, yellow ventral rims that meet in front and form the hinge. As MacFarland stated (p. 94) when he compared his specimen with *neapolitana* the right or left side of the crest and groove varies. Also the shape of the hinge is different in the 5 examined pairs of jaws and is not always so distinct that it can be compared with MacFarland's figures (f. 94, 95) The present specimens have very delicate masticatory processes that are smooth, not crenulate. They are completely coalesced with the ventral border of the jaws and not limited against the cuticular lining of the mouth cavity Therefore the term "process" is not adequate, and probably the strong yellow ventral borders of the jaw plates act as masticatory organs.

The radula of middle-sized slugs consists of 11-18 pectinate plates that are strongly arched and emarginate. They increase in breadth from 0,17 mm. to 0,33 mm. in one specimen. The plates have a strong, yellow transverse crest along their whole middle from one end to the other. Some of the plates have nearly equal denticles (Fig. 282) In others a bilobed aspect is produced by longer lateral denticles (Fig. 283), and in a third type (Fig. 284) by lateral broadening of the plate itself, like in *Sp. inornata* (A. Costa) (see Engel 1925, p. 50, 54) The central denticle is broader than any of the others and bears a fine cusp on its tip (Fig. 281) The slender lateral teeth are rather unequal in breadth. Those flanking the median tooth are very small, the eighth to fifteenth are the biggest, then they diminish towards the sides. The number of denticles increases from the oldest plate to the largest. There are 15-19 on either side in the former and 30-38 in the latter The increase is as irregular as in the examples given by MacFarland (p. 94-95) for *braziliana* and *neapolitana*. The position of the central cusp is sometimes nearer to the left side (19.1.28), sometimes nearer to the right (38.1.35) in the same radula. In our largest specimen the youngest plate is 0,48 mm. broad and has 28.1.38 denticles. The youngest slug, 2 mm. alive and 1,2 mm. preserved, has a radula of 9 plates from 10 to 27 micra in breadth. The first plates (Fig. 279) are different from the definitive shape (Fig. 280); they are juvenile (Hoffmann 1938, p. 1038-39), not typically praeradular (Pruvot-Fol 1926)

The long winding tubular salivary glands correspond to MacFarland's figures (1909, t. 16 f. 86, 87)

The gonad has from 6 to 10 follicles. The distal genital organs liken those of *Berghia norvegica* Odhner (1939, f. 59) A short unarmed penial papilla protrudes into the shallow male vestibulum. The volumous curved spermatheca that is twice as long as broad inserts entally on the female duct.

The heart of an adult slug beats 96 times per minute at 24°C. On november 18 two egg strings (Fig. 285) were found on a stone together with two adult slugs. Each spawn contained about 7500 eggs. The larvae hatched november 24. They had small, cup-shaped shells without any trace of whorls as in type A (Thorson 1946, p. 268) Egg strings were also seen in april 1954.

Occurrence: Island of São Sebastião, in the tidal zone. Six specimens from 2-8 mm. alive among algae in november, 25 from 8-35 mm. under stones, in june and november 1953; 10 in april 1954.

Distribution of var. *braziliana*: Brazil, coast of Alagoas. *Sp. neapolitana* (typical): Sargasso Sea; Cape Verde and Canary Islands; French Atlantic coast, Arcachon; Mediterranean including the Adriatic. *Sp. neapolitana* var. *mograbina* Pruvot-Fol (1953, p. 55): coast of Morocco.

Discussion of Spurilla neapolitana var. braziliana

Odhner's Facelinidae and Aeolidiidae (1939, p. 53) are clearly distinguished by their radulae. The position of the anus in the second group of cerata (Facelinidae) and behind it (Aeolidiidae) does not apply to all species. *Aeolidiella japonica* (Eliot) and *A. takanosimensis* Baba (1949, p. 111, 183) have a facelinidan position of the anus. Notwithstanding they are Aeolidiidae with pectinate radula.

The position of the renal pore, that is after Odhner (l. c.) abanal in the Facelinidae and Aeolidiidae, adanal in the Spurillidae, proves, beyond the norwegian fauna systematically less useful than could be expected. *Pteraeolidia semperi* (Bergh), f. ex., is a Facelinid with adanal nephroproct (Baba 1949, f. 151 on p. 110), and *Aeolidiella drusilla* Bergh (1900, p. 233) as well as *A. takanosimensis* Baba (1949, f. 154 on p. 112) are Aeolidiids with adanal nephropores. In *Baeolidia* that belongs to the Spurillidae, *B. fusiformis* Baba (1949, f. 158 on p. 113) has an adanal, typically spurillidan opening of the kidney, *B. japonica* (ibid., f. 156) an abanal one. We have studied *Berghia coerulescens* (Laur.) from the coast of São Paulo. In this species the distance between anus and nephroproct varies from 0,1 to 0,3 mm. in slugs of equal size. Also *Spurilla neapolitana braziliana* reveals that the two families of Cleioprocta with pectinate radula plate, the Aeolidiidae and Spurillidae, can not be separated on the base of the position of their renal aperture.

The present species shows a considerable amount of variation with regard to the topographic relations between anus and renal pore. The latter may lie closely adanal or be separated from the anus by the whole breadth of the second arch or even be located in front of the anterior limb of this arch, in the space between the first and the second group of cerata. This abanal position was described and drawn for *Spurilla gabriellae* Vannucci (1952, p. 285 f. 2, c) As this character proves to be not specific, and *Sp. gabriellae* in all other details does not exceed the range of variation of *Sp. neapolitana braziliana,* it becomes a synonym of MacFarland's form.

Engel (1925, p. 46-49) has thoroughly discussed *Spurilla neapolitana* (Chiaje), *sargassicola* (Bergh), *inornata* (A. Costa) and *braziliana* MacFarl. His exposition shows that *sargassicola* was already considered as a synonym of *neapolitana* three years before MacFarland's publication. The contrast between the membranous, transparent jaws of the former and the horny, yellow jaws of the latter was evidently not judged to be of specific importance by the contemporaneous authorities (Cuénot, Bergh) As the same difference exists between MacFarland's *braziliana* and our material, it indeed proves insignificant for the taxonomy of the species of *Spurilla*. Further our material reveals that lateral widenings of the radula plate are not sufficient for a specific separation of *Sp. inornata* (A. Costa 1866), as Engel thought (1925, p. 18) Evidently Vayssière is right (1913, p. 300) when he considers this species as identical with *neapolitana*. Engel accepts *Sp. braziliana* at most as a variety of *neapolitana,* characterized by smaller jaws (MacFarland 1909, p. 93) and perhaps a different proportion between breadth and length of the body. The first character is corroborated by the present material, the second is in our specimens equal to the mediterranean *neapolitana*.

RESUMO

O trabalho precedente contém as descrições de 32 espécies e subespécies de Gastropoda Euthyneura marinhos, convencionalmente chamados de Opisthobranchia, provindos da costa do Estado de São Paulo, principalmente da Ilha de São Sebastião. São novas 23 espécies; uma das já conhecidas, *Catriona coerulea* (Mtg.), ainda não foi assinalada no Brasil. Três espécies das Dorididae não se enquadram nos gêneros até agora descritos desta família, de maneira que obrigaram à introdução de 3 gêneros novos. Deu-se o mesmo com uma espécie das Cuthonidae (Eolidacea, Acleioprocta) As 3 espécies das Elysiidae são diáulicas, mas, foi, depois da conclusão do manuscrito presente, também encontrada outra, triáulica. A côr de *Elysia serca* depende das algas verdes e pardas (Chlorophyceae e Phaeophyceae) sôbre as quais vive. O número dos Doridacea Cryptobranchia é relativamente grande, pois perfazem 34,4% do material presente. Parece assim confirmar-se a observação de preponderarem, nos mares quentes, os Doridacea; nos frios, os Eolidacea (Bergh 1870, p. 1) Risbec, porém, que trabalhou na Nova Caledônia na mesma latitude de São Paulo, mostrou (1928, p. 318) a riqueza dos mares quentes também em Eolidacea, cuja descoberta apenas é mais difícil que a dos Doridacea. No nosso caso, a desproporção entre os dois grupos deve-se, provàvelmente, à circunstância de termos colecionado, com maior intensidade, em certo biótopo da ilha de São Sebastião especialmente rico em esponjas o alimento principal das Dorididae.

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ALICE PRUVOT-FOL, Opisthobranches of the "Faune de France", fasc. 58, 1954, was only obtained after the present paper had gone to print.

PLATES

PLATE 1

Figures 1-7: *Bulla striata* (Brug.)

Fig. 1 — Living young snail.
Fig. 2 — Opened shell.
Fig. 3 — Two half rows of radula plates.
Fig. 4 — Different aspects of gizzard plates.
Fig. 5 — Larval shell prepared from adult shell, seen from top of latter
Fig. 6 — Same, side view.
Fig. 7 — Same, seen from below.

Figures 8-19: *Chelidonura evelinae,* sp n.

Fig. 8 — Frontal view of preserved animal.

c — head shield. fo — foot. j — outer folds of head shield. k — inner folds of same. l — thickened border of mouth. m — mouth. y — parapodium.

Fig. 9 — Under side of shell.
Fig. 10 — Decalcified shell of other specimen.
Fig. 11 — Sensory tuft of living slug, everted and retracted.
Fig. 12 — One group of sensory cells with their terminations.

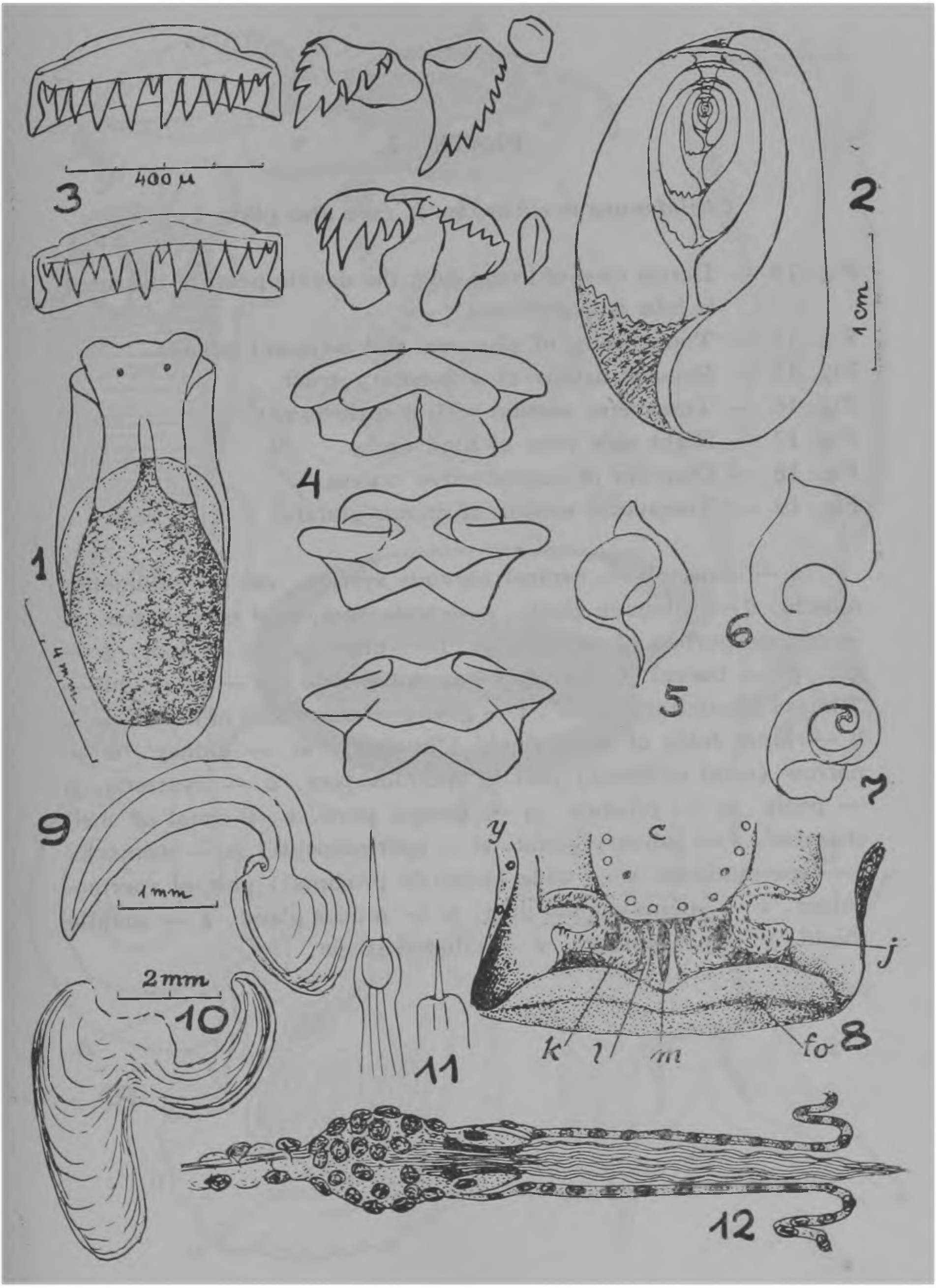
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PLATE 2

Chelidonura evelinae, sp. n. (see also plate 1)

Fig. 13 — Dorsal view of living slug; the double point of the mantle lobe is exceptional.
Fig. 14 — Topography of pharynx and adjacent organs.
Fig. 15 — Reconstruction of alimentary tract.
Fig. 16 — Transverse section with mantle cavity
Fig. 17 — Right side view of hind end.
Fig. 18 — Diagram of reproductive organs.
Fig. 19 — Transverse section of mucus gland.

a — anus. b — central nervous system. cm — columellar muscle. d — albumen gland. e — wide portion of oesophagus. ei — narrow portion of oesophagus. f — pharynx. fo — foot. g — gill. gl — buccal glands. gr — sperm groove. h — liver hi — "hintere Mantelranddrüse" i — gut. j — outer fold of head shield. k — inner folds of head shield ("knobs") ki — kidney. n — narrow (ectal or distal) part of spermoviduct. o — ovotestis. p — penis. pr — prostate. q — genital pore. r — canal of shell chamber s — salivary gland. si — spermatocyst. st — stomach. t — spermatheca. u — wide (ental or proximal) part of spermoviduct. v — sperm-vaginal duct. w — mucus gland. x — mantle shield. y — parapodium. z — ciliated stripe.

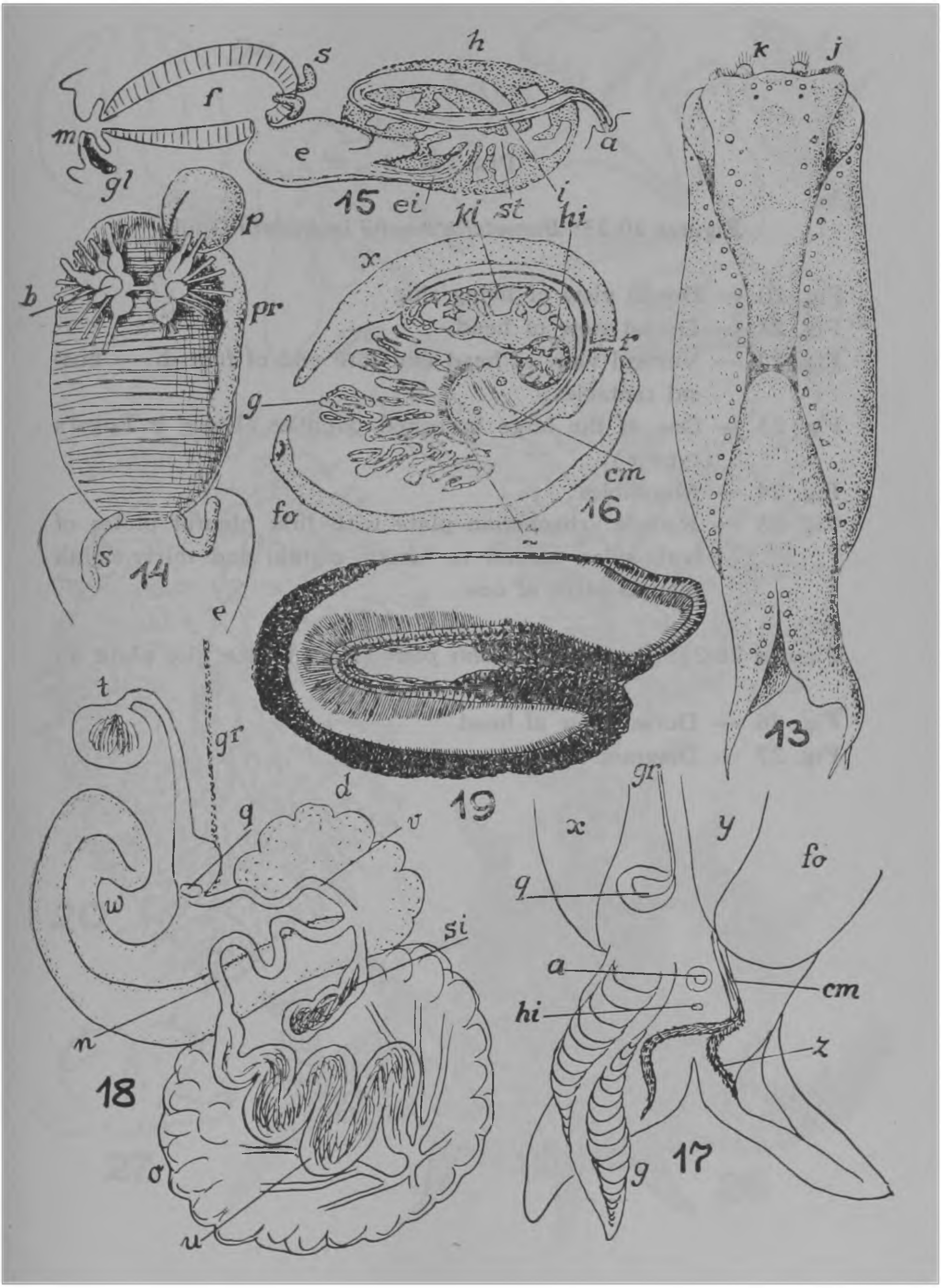
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PLATE 3

Figures 20-25: *Bursatella leachii lacinulata* Gould

Fig. 20 — Dorsal view of living slug.
Fig. 21 — Dorsal view of head.
Fig. 22 — Ventral view of head and fore end of foot; b — buccal tentacles.
Fig. 23 — One of the large branched papillae (Eales & Engel's type c).
Fig. 24 — Mandibles.
Fig. 25 — Radula: rhachidian plate with first pleural plates of both sides, second to fourth, eighth, and thirty-eighth pleural plate of one.

Figures 26-27: *Bursatella leachii pleii* (Rang) (see also plate 4)

Fig. 26 — Dorsal view of head.
Fig. 27 — Diagram of same.

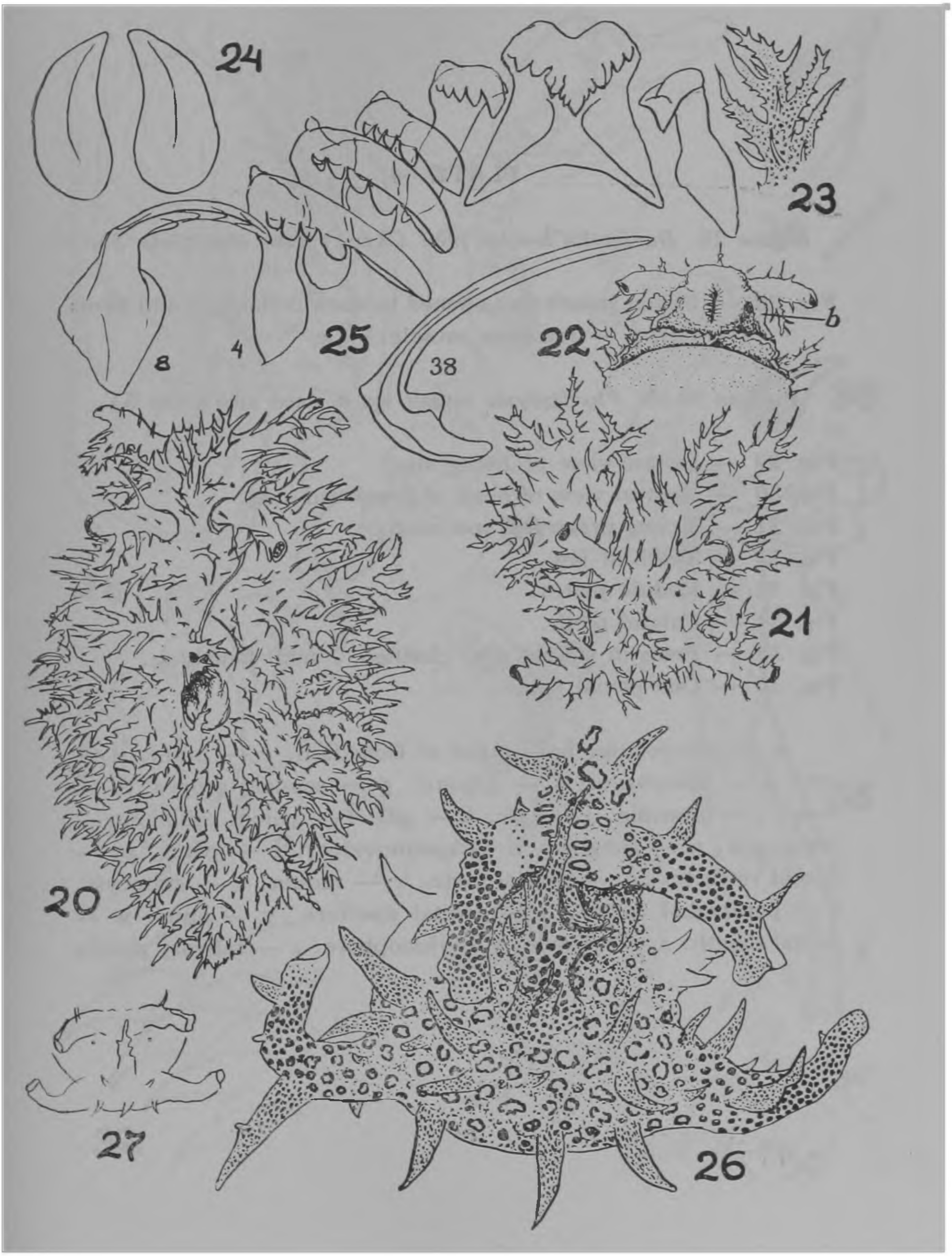
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PLATE 4

Figure 28: *Bursatella leachii pleii* (Rang) (see also plate 3)

Fig. 28 — Penial sheath (p) opened to show collar (c) and penis (h); r — retractor muscle.

Figures 29-36: *Phyllaplysia engeli*, sp. n. (see also plate 5)

Fig. 29 — Dorsal view of living slug.
Fig. 30 — Ventral view of head of preserved slug.
Fig. 31 — Young preserved specimen.
Fig. 32 — Teeth of jaw.
Fig. 33 — Radula plates.
Fig. 34 — Palatal teeth.
Fig. 35 — Penis in stained and clarified, 7 mm. long slug.
Fig. 36 — One penial spine.

a —oral lobule. b — gland of Bohadsch. c — brain. d — eye. e — oesophagus. f — gizzard. g — seminal groove. h — liver i — intestine. j — jaw k — gill. l — penial collar m — dorsal slit. n — ganglion. o — spermoviduct. p — penis. pr — penial retractor q — palatal teeth. r — radula. s — statocyst. t — parapodial cavity u — genital aperture. v — anus. w — penial sheath. x — tentacle. y — rhinophore. z — salivary glands.

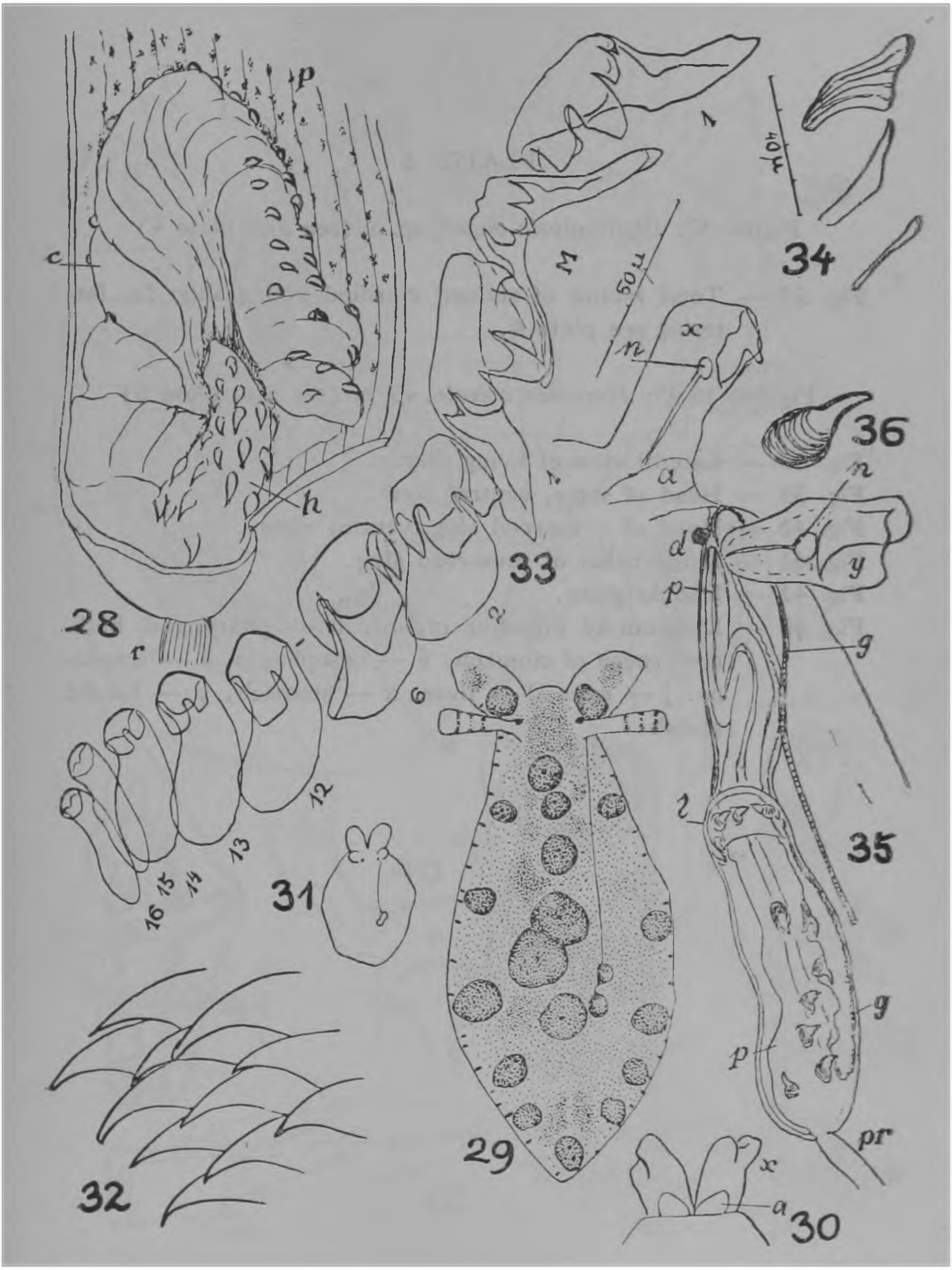
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PLATE 5

Figure 37: *Phyllaplysia engeli*, sp. n. (see also plate 4)

Fig. 37 — Total mount of stained clarified young slug; for lettering see plate 4.

Figures 38-43: *Hermaea coirala*, sp. n. (see also plate 6)

Fig. 38 — Lateral view of living slug.
Fig. 39 — Head of same, ventral view.
Fig. 40 — Head of preserved slug, ventral view.
Fig. 41 — Large ceras of preserved slug.
Fig. 42 — Radula plate.
Fig. 43 — Diagram of digestive organs. b — pharyngeal bulb. c — caeca of stomach. e — oesophagus. i — intestine. j — anus. l — liver. x — stomach. y — buccal glands.

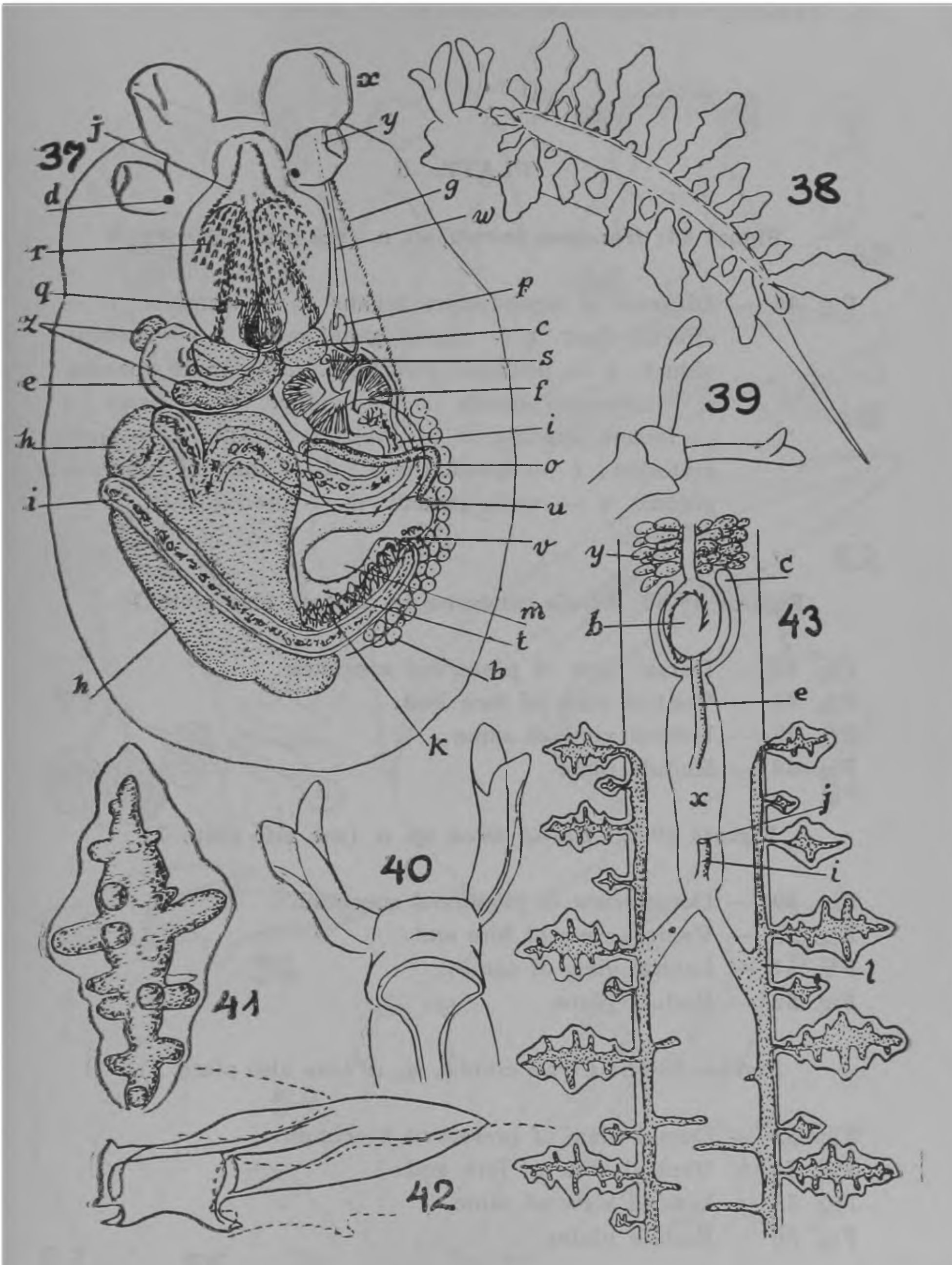
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PLATE 6

Figure 44: *Hermaea coirala*, sp. n. (see also plate 5)

Fig. 44 — Diagram of reproductive organs. a — ampulla. d — efferent duct. g — mucus gland mass. h — spermoviduct. k — prostatic diverticle. m — male opening. n — albumen glands. o — oviduct. p — penis. q — female opening. r — prostatic glands. s — spermatocyst. t — spermatheca. u — duct of albumen glands. v — male atrium. w — uterine duct. z — ovotestis.

Figures 45-48: *Elysia canguzua*, sp. n. (see also plate 7)

Fig. 45 — Dorsal view of preserved specimen.
Fig. 46 — Ventral view of fore end.
Fig. 47 — Lateral view of same.
Fig. 48 — Radula plate.

Figures 49-52: *Elysia serca*, sp. n. (see also plate 7)

Fig. 49 — Dorsal view of preserved specimen.
Fig. 50 — Ventral view of fore end.
Fig. 51 — Lateral view of same.
Fig. 52 — Radula plate.

Figures 53-56: *Elysia chitwa*, sp. n. (see also plate 7)

Fig. 53 — Dorsal view of preserved specimen.
Fig. 54 — Ventral view of fore end.
Fig. 55 — Lateral view of same.
Fig. 56 — Radula plates.

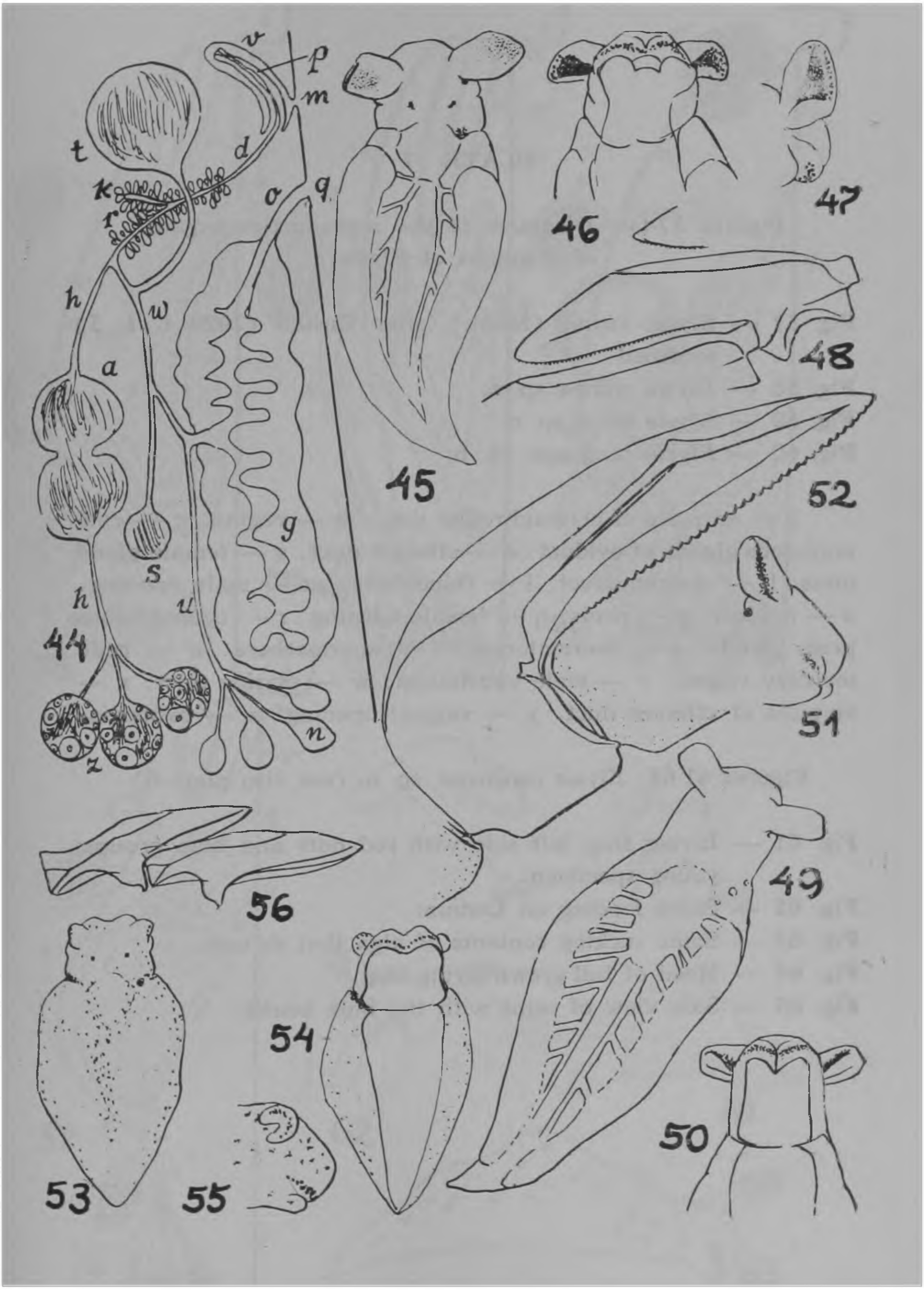
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PLATE 7

Figures 57-60: Diagrams of the reproductive organs of 4 species of *Elysia*

Fig. 57 — *Elysia viridis* (Mont.), after Russell (1929 t. 1, 5) modified.
Fig. 58 — *Elysia chitwa*, sp. n.
Fig. 59 — *Elysia serca*, sp. n.
Fig. 60 — *Elysia canguzua*, sp. n.

a — ampulla of hermaphrodite duct. b — vagina. c — cyanophilous glands of oviduct. e — efferent duct. g — female gland mass. h — spermoviduct. i — rhinophore. m — male opening. o — oviduct. p — penis. q — female opening. r — cyanophilous penis glands. s — spermatocyst. t — spermatheca. u — rudimentary vagina. v — male vestibulum. w — uterine duct. x — ampulla of efferent duct. y — vaginal opening. z — ovotestis.

Figures 61-65: *Elysia canguzua*, sp. n. (see also plate 6)

Fig. 61 — Living slug, left side with red dots and blue groups; young specimen.
Fig. 62 — Same feeding on Codium.
Fig. 63 — Same sucking contents of alga that shrinks.
Fig. 64 — Head of full grown living slug.
Fig. 65 — Side view of same with the blue marks.

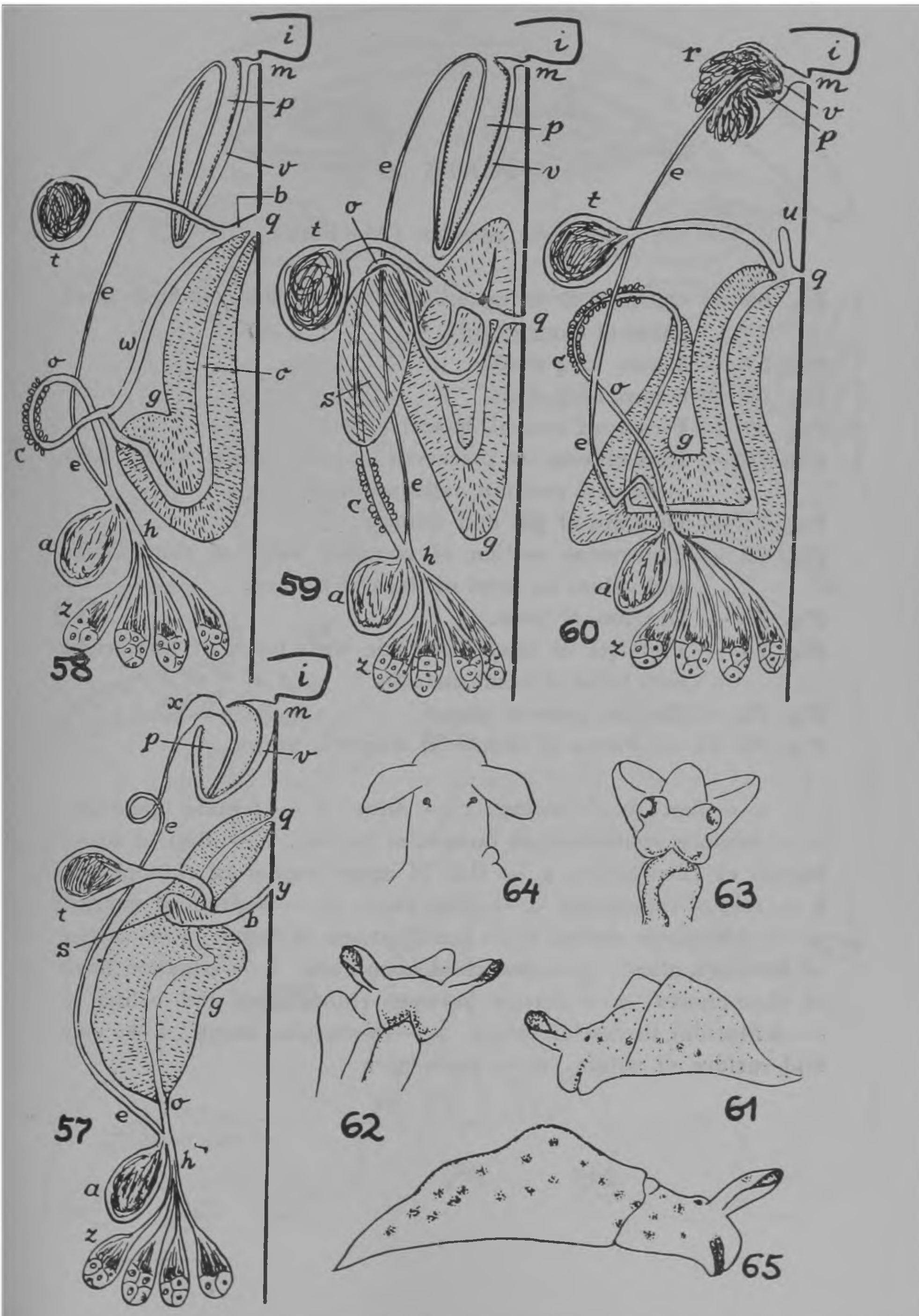
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PLATE 8

Berthella agassizii (MacFarl.)

Fig. 66 — Outlines of living animal, dorsal view. Dotted line: phase of contraction.
Fig. 67 — 3 mm. long shell.
Fig. 68 — 6 mm. long shell.
Fig. 69 — Preserved animal, lateral view.
Fig. 70 — Rhinophores of preserved animal, dorsal view. Left in natural position, right unrolled.
Fig. 71 — Diagram of gill and orifices.
Fig. 72 — Transverse section of common basis of rhinophores and velum on level of flaps of former
Fig. 73 — Outlines of jaws.
Fig. 74 — Platelets of jaw. Left side with focus of free, right with focus of basal surface.
Fig. 75 — Radula, general aspect.
Fig. 76, 77 — Plates of radula in different views.

a — foot. b — notum. c — anus. d — female openings. e — sensory epithelium of tentacular furrow. f — flap of lower border or rhinophore. g — flap of upper border of rhinophore. h — fold of rhinophore. i — renal pore. m — position of mouth. n — rhinophore nerve. o — ramifications of same. p — orifice of Bourne's gland. q — branchial membrane. r — common basis of rhinophores. s — furrow between rhinophores and velum. t — tentacular furrow of velum. u — tentacular nerve. v — ventral surface of velum. w — male pore.

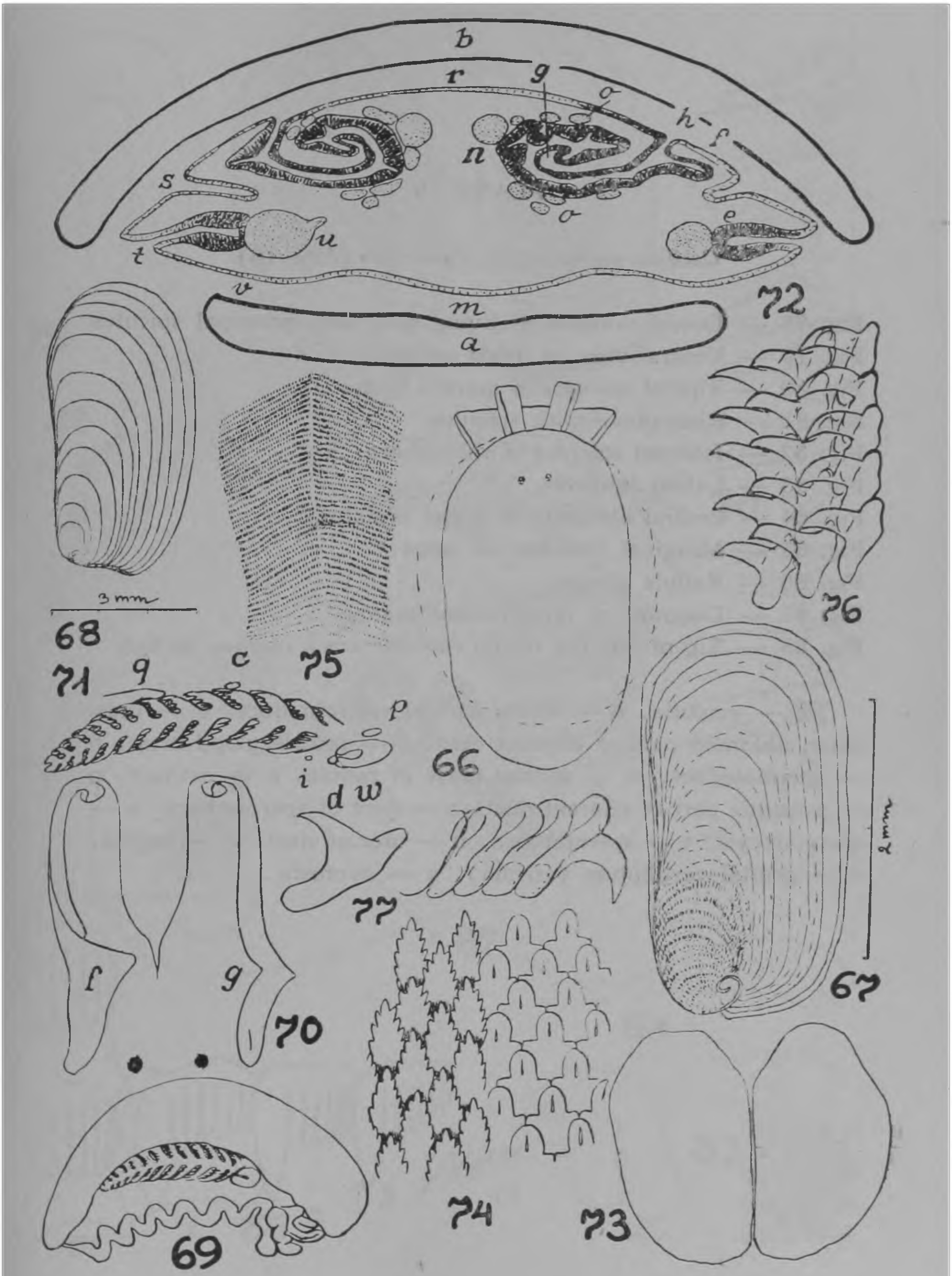
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PLATE 9

Cadlina rumia, sp. n. (see also plate 10)

Fig. 78 — Dorsal outlines of living slug with principal spicules.
Fig. 79 — Ventral view of living animal.
Fig. 80 — Tips of spicules of mantle brim.
Fig. 81 — Rhinophore with spicules.
Fig. 82 — Isolated spicules of rhinophore.
Fig. 83 — Labial denticles.
Fig. 84 — Central elements of labial armature.
Fig. 85 — Marginal elements of same.
Fig. 86 — Radula plates.
Fig. 87 — Diagram of reproductive organs.
Fig. 88 — Tip of efferent duct (vas deferens), oblique section.

a — ampulla. d — spiny part of efferent duct. e — muscular, unarmed part of efferent duct. f — female gland mass. h — spermoviduct. m — central plate of radula. o — oviduct. p — prostatic part of efferent duct. r — duct of spermatheca. s — spermatocyst. t — spermatheca. u — uterine duct. v — vagina. w — genital vestibulum (atrium) x — ovotestis.

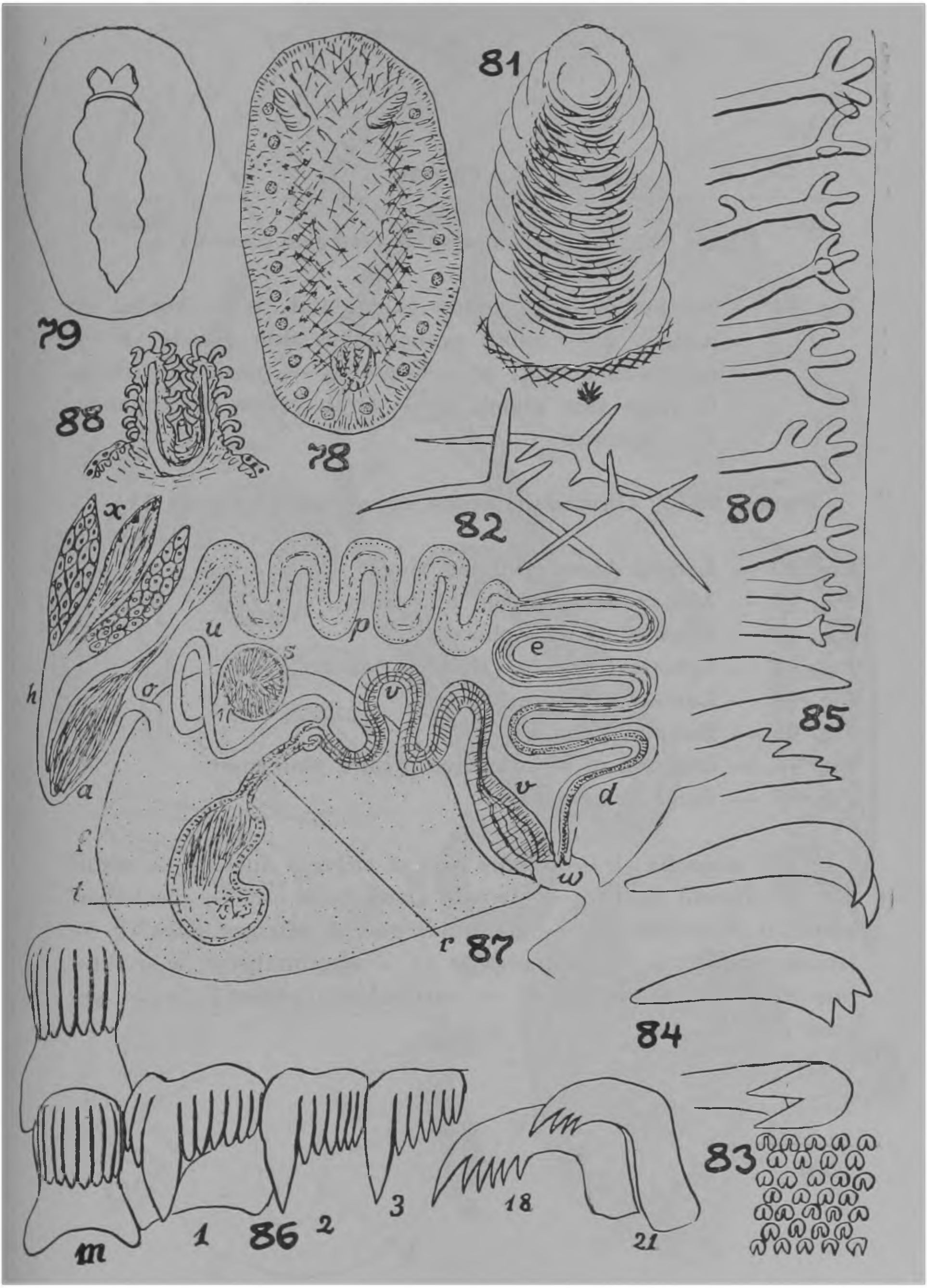

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PLATE 10

Figure 89: *Cadlina rumia,* sp. n. (see also plate 9)

Fig. 89 — Section of large yellow skin gland. b — border of notum. g — small cyanophilous skin glands. k — papilla of notum. n — nerve. q — particles sticking to large skin gland. y — large yellow skin gland. z — spicules.

Figures 90-97: *Glossodoris neona,* sp. n. (see also plate 11)

Fig. 90 — Lateral view of living slug.
Fig. 91 — Monaxonous spicule of notum.
Fig. 92 — Spicules of rhinophore.
Fig. 93 — Spherical spicule (Risbec's "oursin")
Fig. 94 — Labial armature.
Fig. 95 — Radula.
Fig. 96 — Diagram of reproductive organs, male part.
Fig. 97 — Same, female part.

a — ampulla. b — middle part of efferent duct. e — distal part of efferent duct. g — female gland mass. m — rhachidian plate. o — oviduct. p — glandular part of efferent duct. q — female branch. s — spermatocyst. t — spermatheca. u — uterine duct. v — vagina. y — vestibulum (atrium) z — genital pore.

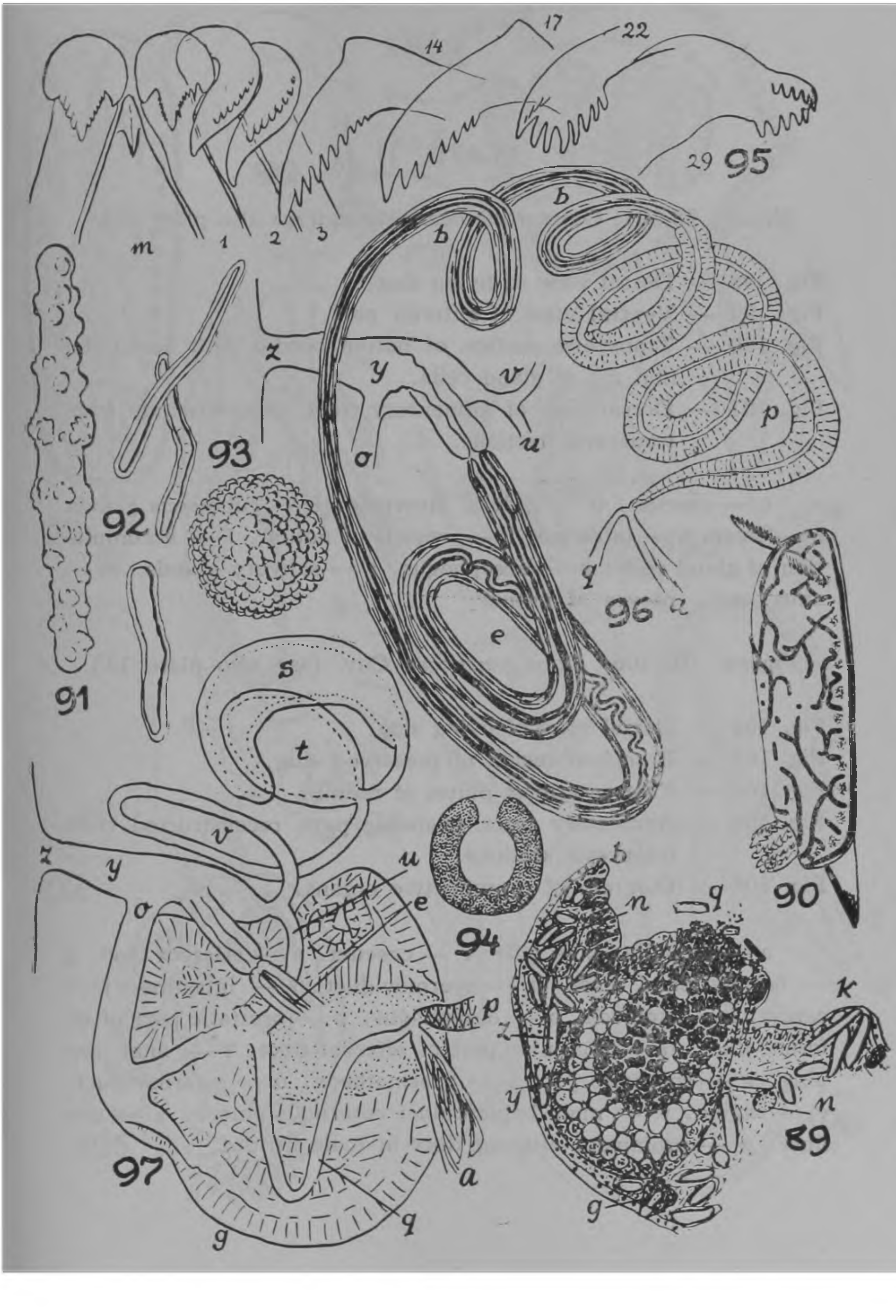
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PLATE 11

Figures 98-101: *Glossodoris neona*, sp. n. (see also plate 10)

Fig. 98 — Dorsal view of living slug.
Fig. 99 — Ventral view of anterior part.
Fig. 100 — Transverse section of notum border with accumulation (l) of gland cells.
Fig. 101 — Dorsal view of alimentary tract; reconstruction from transverse sections.

c — caecum. d — pyloric diverticle. f — cutaneous glands. h — liver i — intestine. k — vessels of notum. l — accumulation of gland cells. n — eosophagus. r — salivary glands. w — anus. x — nerves of notum.

Figures 102-106: *Doris verrucosa* Cuv. (see also plate 12)

Fig. 102 — Dorsal view of living slug.
Fig. 103 — Branchial region of preserved slug.
Fig. 104 — Five outermost plates of radula.
Fig. 105 — Alimentary tract, posterior part; reconstructed from transverse sections.
Fig. 106 — Diagram of reproductive organs.

a — ampulla. b — gills. c — caecum. e — efferent duct. g — female gland mass. h — spermoviduct. i — intestine. j — cardia. k — stomach. o — oesophagus. p — prostatic part of efferent duct. q — muscular part of efferent duct. r — anal opening. s — spermatocyst. t — spermatheca. u — uterine duct. v — vagina. w — main hepatic duct entering stomach. x — oviduct. y — prominent efferent duct in male atrium.

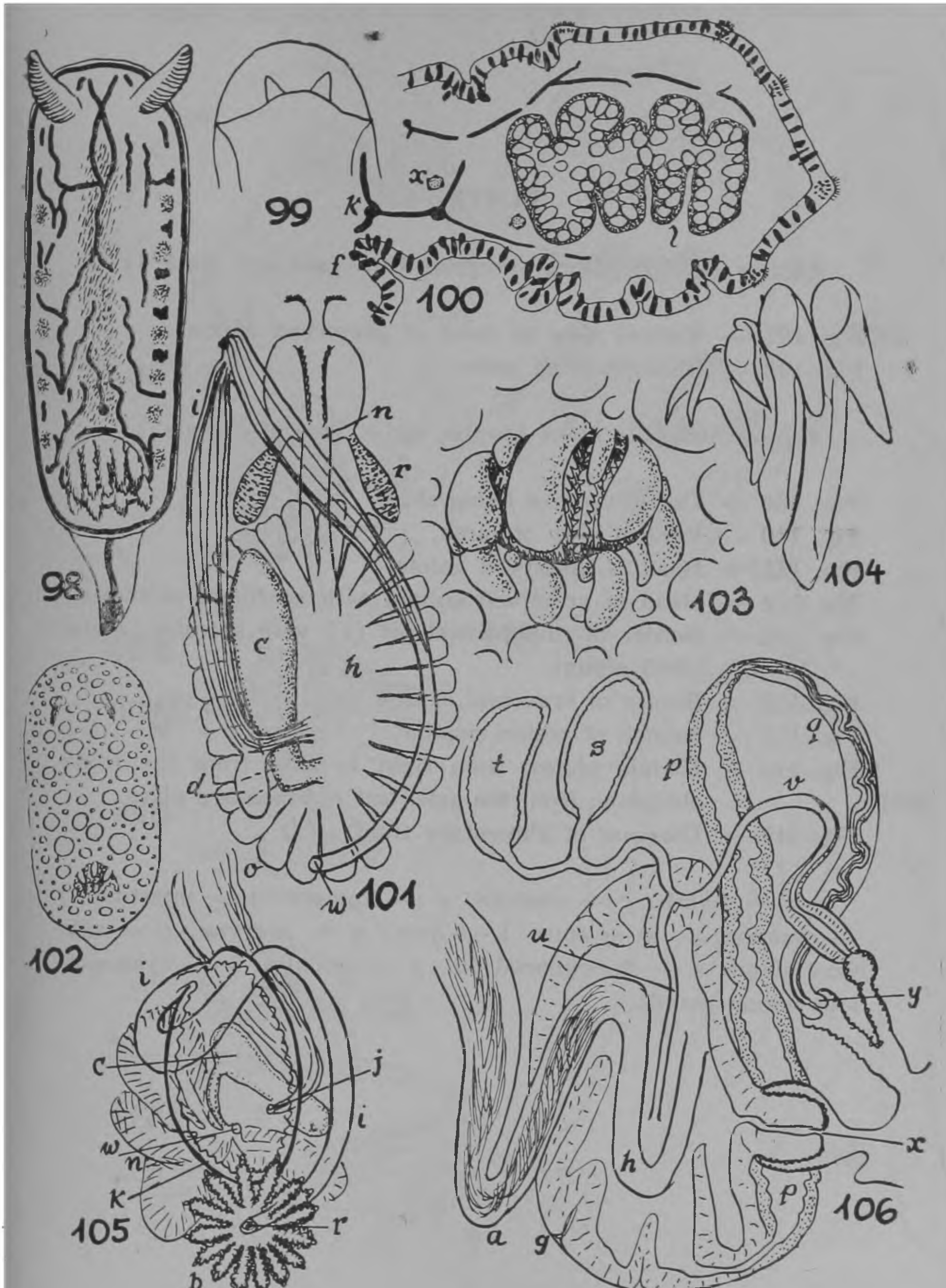
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PLATE 12

Figures 107-108: *Doris verrucosa* Cuv. (see also plate 11)

Fig. 107 — Ventral view of head of preserved animal.
Fig. 108 — Rhinophore of same.

Figures 109-117: *Doris bovena*, sp. n. (see also plate 13)

Fig. 109 — Dorsal view of living slug.
Fig. 110 — Ventral view of same.
Fig. 111 — Head of preserved animal.
Fig. 112 — Head of preserved animal with confluent tentacles.
Fig. 113 — Border of rhinophorial pit (x) with spicules in clarified notum.
Fig. 114 — Border of branchial cavity
Fig. 115 — Section of notum papilla.
Fig. 116 — Radula plates; from right to left: from the front, obliquely, from the side, last rudimentary plate.
Fig. 117 — Diagram of alimentary tract.

b — mouth. c — caecum. e — stomach. i — intestine. j — oesophagus. k — anus. l — liver. q — pharynx. r — salivary gland. x — rhinophorial pit. y — spicules. z — cyanophilous notum glands.

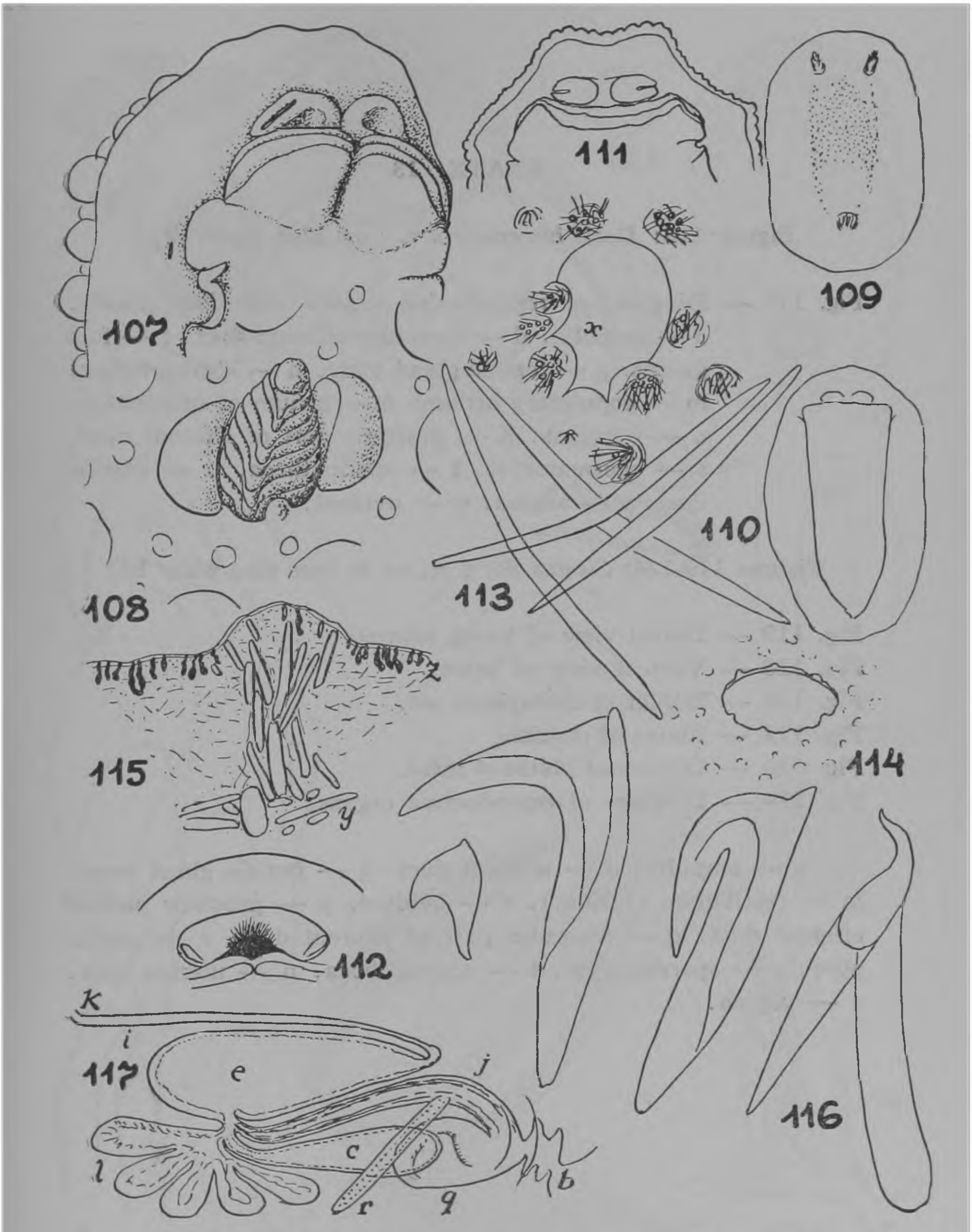
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PLATE 13

Figure 118: *Doris bovena,* sp. n. (see also plate 12)

Fig. 118 — Diagram of reproductive organs with foot glands. a — ampulla. d — muscular efferent duct. f — foot glands. g — female gland mass. h — spermoviduct. m — copulatory atrium. n — atrium of oviposition. o — ovotestis. p — prostatic part of efferent duct. s — spermatocyst. t — spermatheca. u — uterine duct. v — vagina. w — oviduct.

Figures 119-124: *Siraius ilo,* g. n., sp. n. (see also plate 14)

Fig. 119 — Dorsal view of living animal.
Fig. 120 — Ventral view of same.
Fig. 121 — Border of rhinophore pit.
Fig. 122 — Plates of radula.
Fig. 123 — Outermost plates of same.
Fig. 124 — Diagram of reproductive organs.

a — ampulla. d — efferent duct. g — female gland mass. m — vestibulum (atrium). o — oviduct. p — prostatic part of efferent duct. q — muscular part of efferent duct. r — genital pore. s — spermatocyst. t — spermatheca. u — uterine duct. v — vagina.

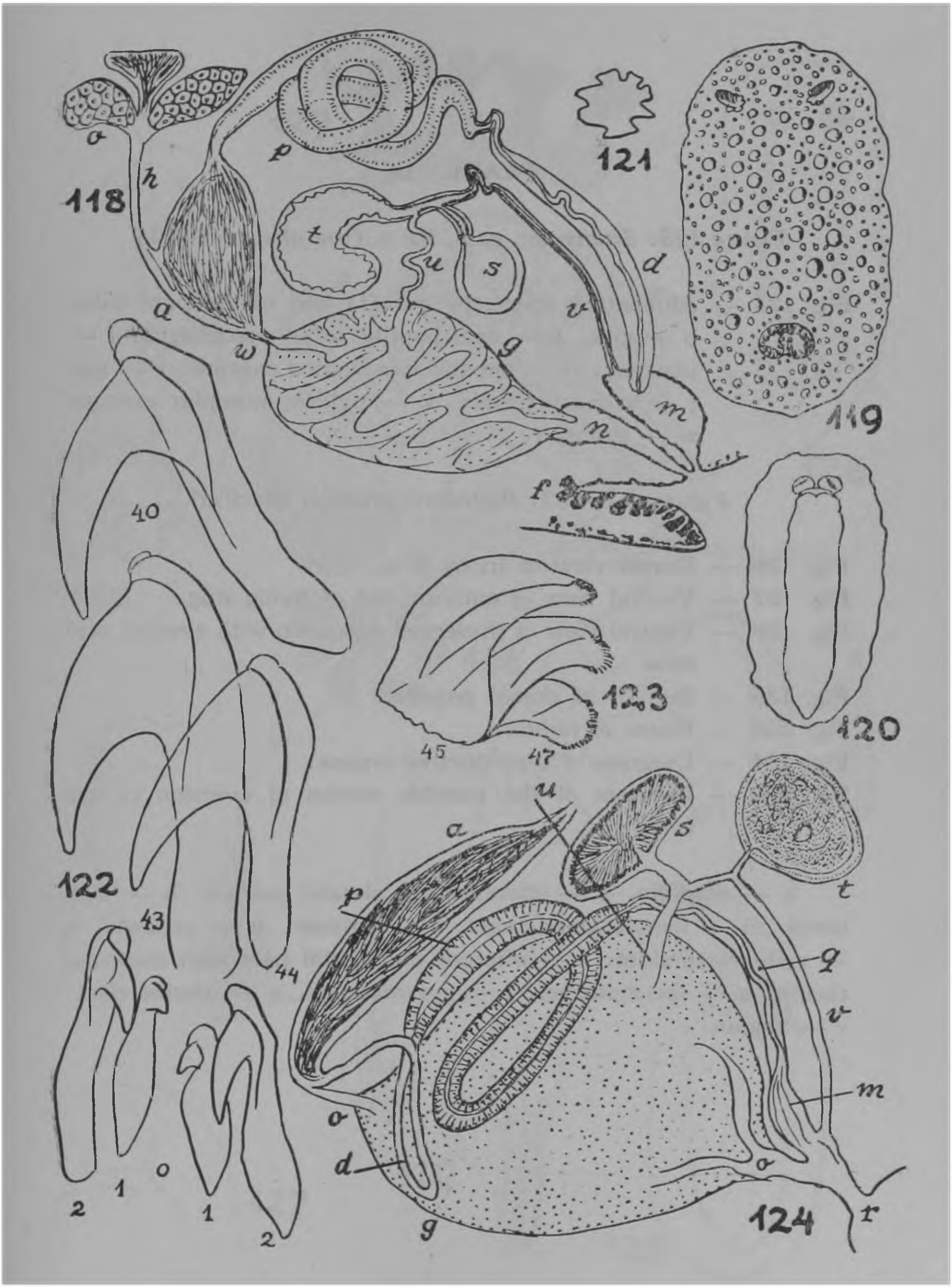
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PLATE 14

Figure 125: *Siraius ilo,* g. n., sp. n. (see also plate 13)

Fig. 125 — Alimentary tract; the gut (i) laid to the right side. b — gills. c — anal papilla. e — oesophagus. f — pharynx. h — hepatic thin walled caecum. i — gut. j — salivary glands. k — pyloric muscular caecum. w — stomach.

Figures 126-132: *Peltodoris greeleyi* MacFarl.

Fig. 126 — Dorsal view of living slug.
Fig. 127 — Ventral view of anterior end of living slug.
Fig. 128 — Ventral view of preserved specimen with everted oral tube.
Fig. 129 — Section of dorsal papillae.
Fig. 130 — Plates of radula.
Fig. 131 — Diagram of reproductive organs.
Fig. 132 — Diagram of the possible modes of eversion of the verge.

a — ampulla. d — efferent duct, slender portion. h — ovotestis. m — female gland mass. o — oviduct. p — prostate. q — male vestibulum. r — efferent duct, ectal part with muscular sheath. s — spermatocyst. t — spermatheca. u — uterine duct. v — vagina.

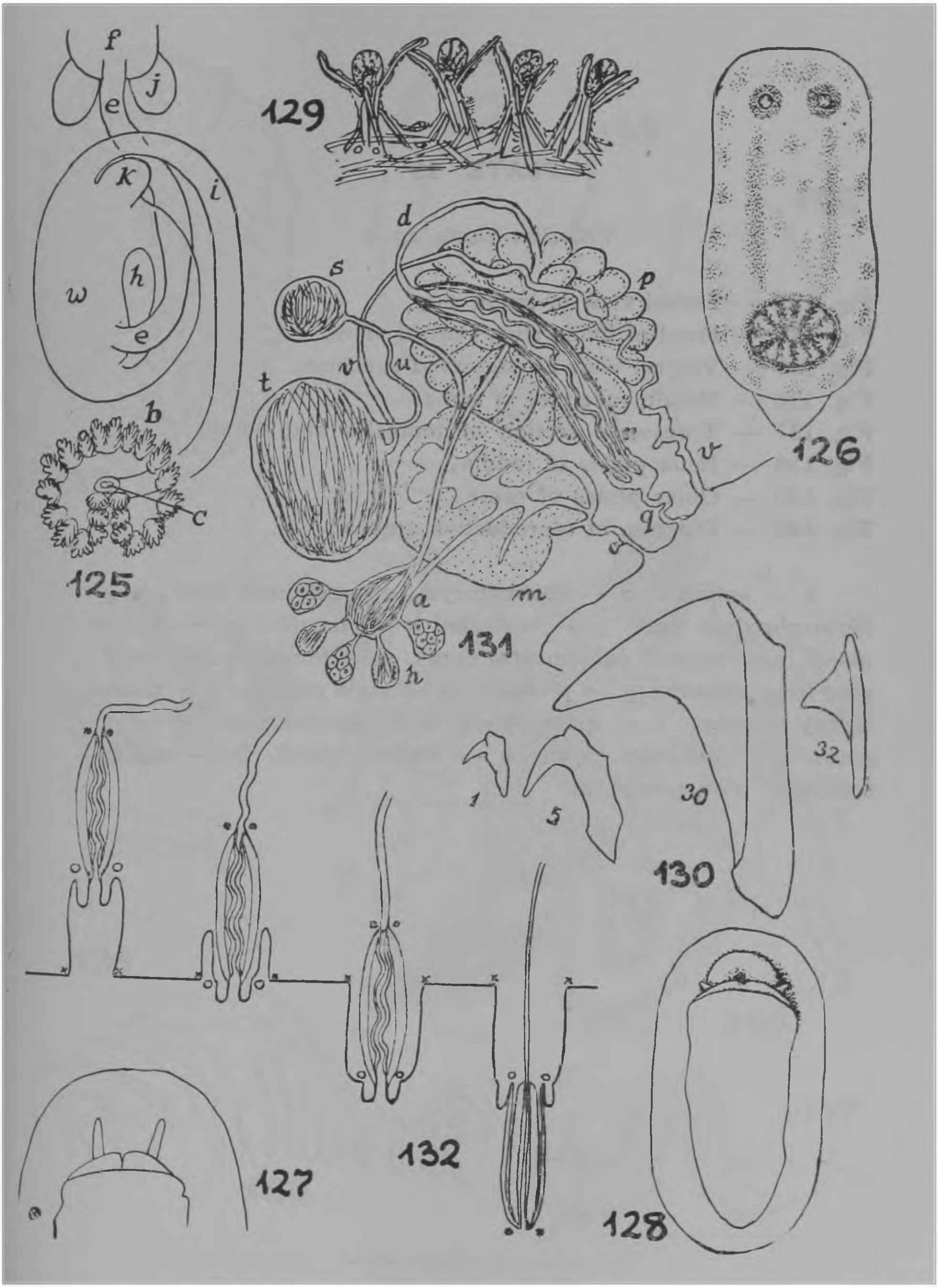
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PLATE 15

Thordisa diuda, sp. n.

Fig. 133 — Dorsal view of living slug.
Fig. 134 — Head of living slug, ventral view.
Fig. 135 — Ventral view of preserved specimen.
Fig. 136 — Notum tubercles of same.
Fig. 137 — Transverse section of tentacles and mouth.
Fig. 138 — Inner plates of radula.
Fig. 139 — Outer plates of same.
Fig. 140 — Diagram of reproductive organs.

a — ampulla. c — spermatocyst. e — efferent duct. h — hermaphroditic duct. j — tentacle. k — mouth. m — mucus gland. n — oviduct (nidamental duct). o — female branch emerging from ampulla. p — prostate. q — male papilla. r — fecundatory chamber t — spermatheca. u — uterine duct. v — vagina. w — albumen gland. x — vaginal gland. y — vaginal sphincter z — gonopore.

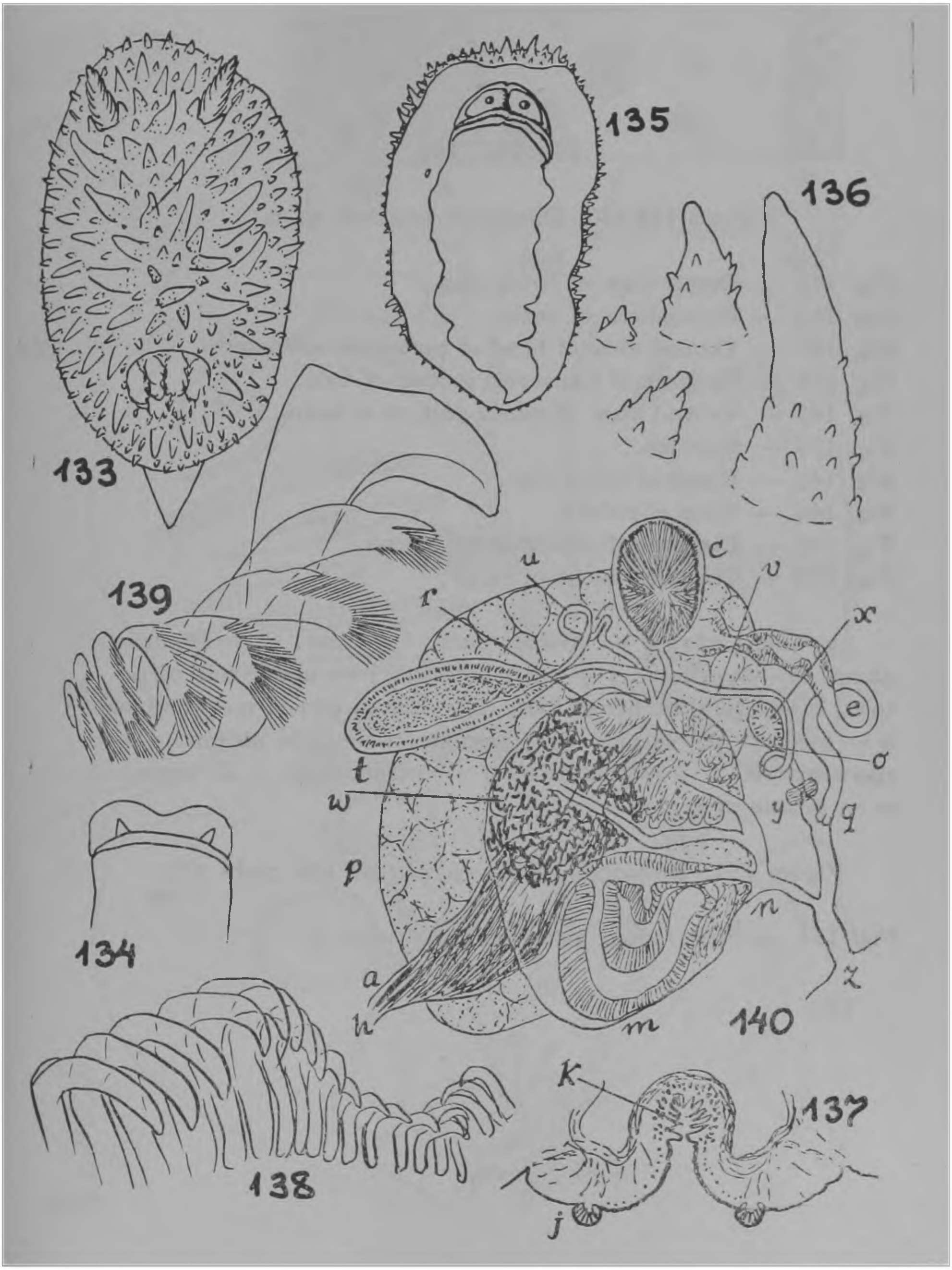
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PLATE 16

Figures 141-150: *Discodoris evelinae,* sp. n.

Fig. 141 — Dorsal view of living slug.
Fig. 142 — Rhinophore of same.
Fig. 143 — Ventral view of head of preserved specimen.
Fig. 144 — Diagram of transverse section of foot.
Fig. 145 — Ventral view of colour pattern of same.
Fig. 146 — Spicules.
Fig. 147 — Plates of labial disc.
Fig. 148 — Plate of radula.
Fig. 149 — Diagram of reproductive organs.
Fig. 150 — Cuticular hooks of verge.

a — ampulla. e — efferent duct. f — foot. g — albumen gland. h — ovotestis. i — spermoviduct. j — under side of notum. k — lateral border of foot. m — mucus gland. n — notum. o — oviduct. p — penis. q — prostate. r — male atrium. s — spermatocyst. t — spermatheca. u — uterine duct. v — vagina. w — muscle of verge.

Figure 151: *Discodoris pusae,* sp. n. (see also plate 17)

Fig. 151 — First radula plates with denticles.

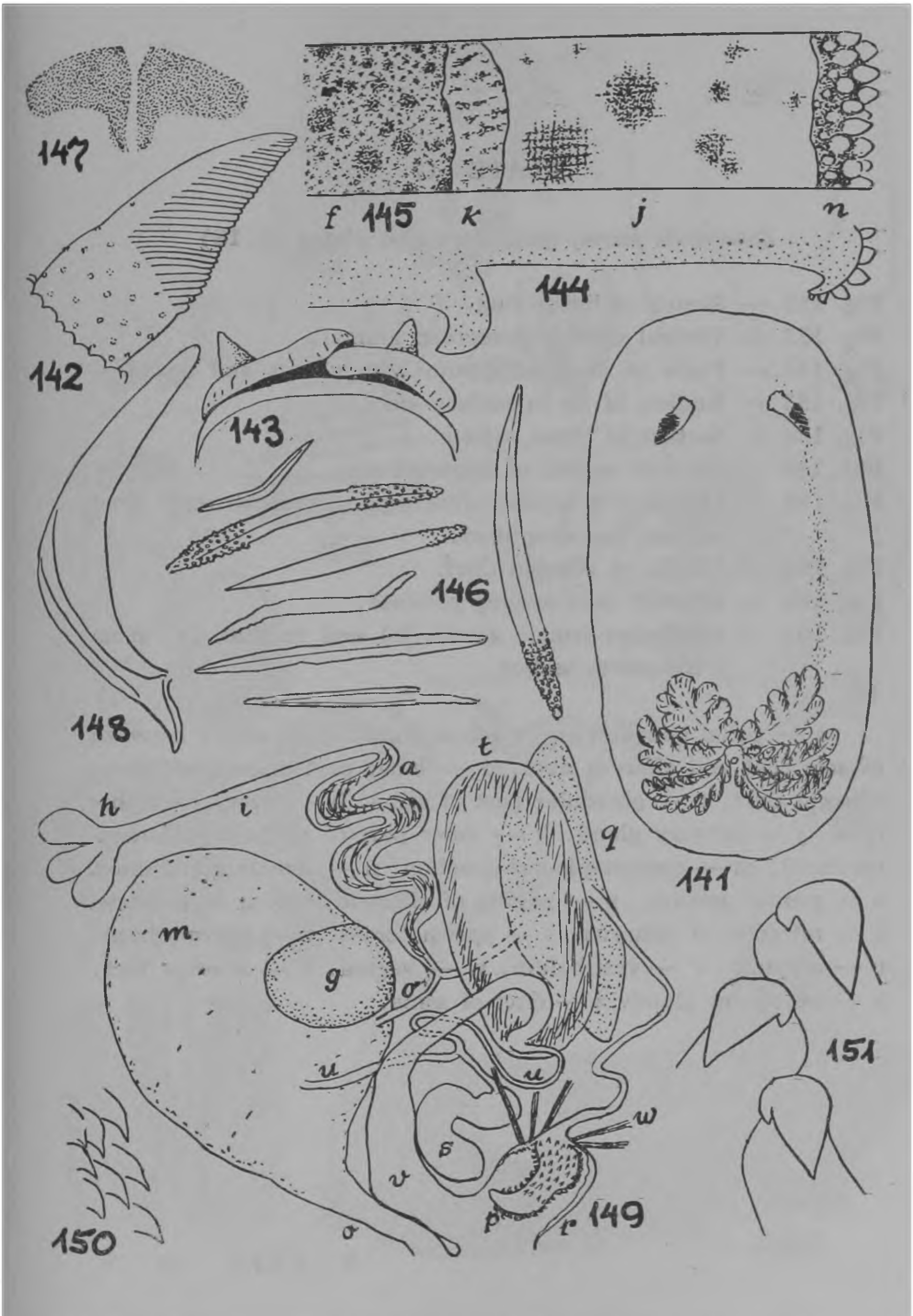
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PLATE 17

Discodoris pusae, sp. n. (see also plates 16, 18)

Fig. 152 — Sketch of living slug.
Fig. 153 — Ventral view of preserved animal.
Fig. 154 — Piece of clarified notum with glands and spicules.
Fig. 155 — Rodlets of lip in surface view
Fig. 156 — Section of three rodlets.
Fig. 157 — Anterior organs of dissected slug.
Fig. 158 — Diagram of reproductive organs, reconstructed from sections and simplified.
Fig. 159 — Papilla of efferent duct.
Fig. 160 — Efferent duct leaving prostate.
Fig. 161 — Vestibular female gland (y) and its duct (z) from a transverse section.

a — pedal ganglion. b — blood gland. c — cavity between muscle coat and efferent duct. d — inner part of oviduct. e — efferent duct. g — glandular part of same. h — liver. i — pharynx. j — salivary gland. k — outer part of oviduct (nidamental duct). m — cerebro-pleural ganglion. n — female gland mass. o — genital opening. p — papilla of efferent duct. q — prostate. r — retractor of pharynx. s — spermatocyst. t — spermatheca. u — ampulla. v — vestibulum. w — vagina. x — uterine duct. y — vestibular gland. z — duct of same.

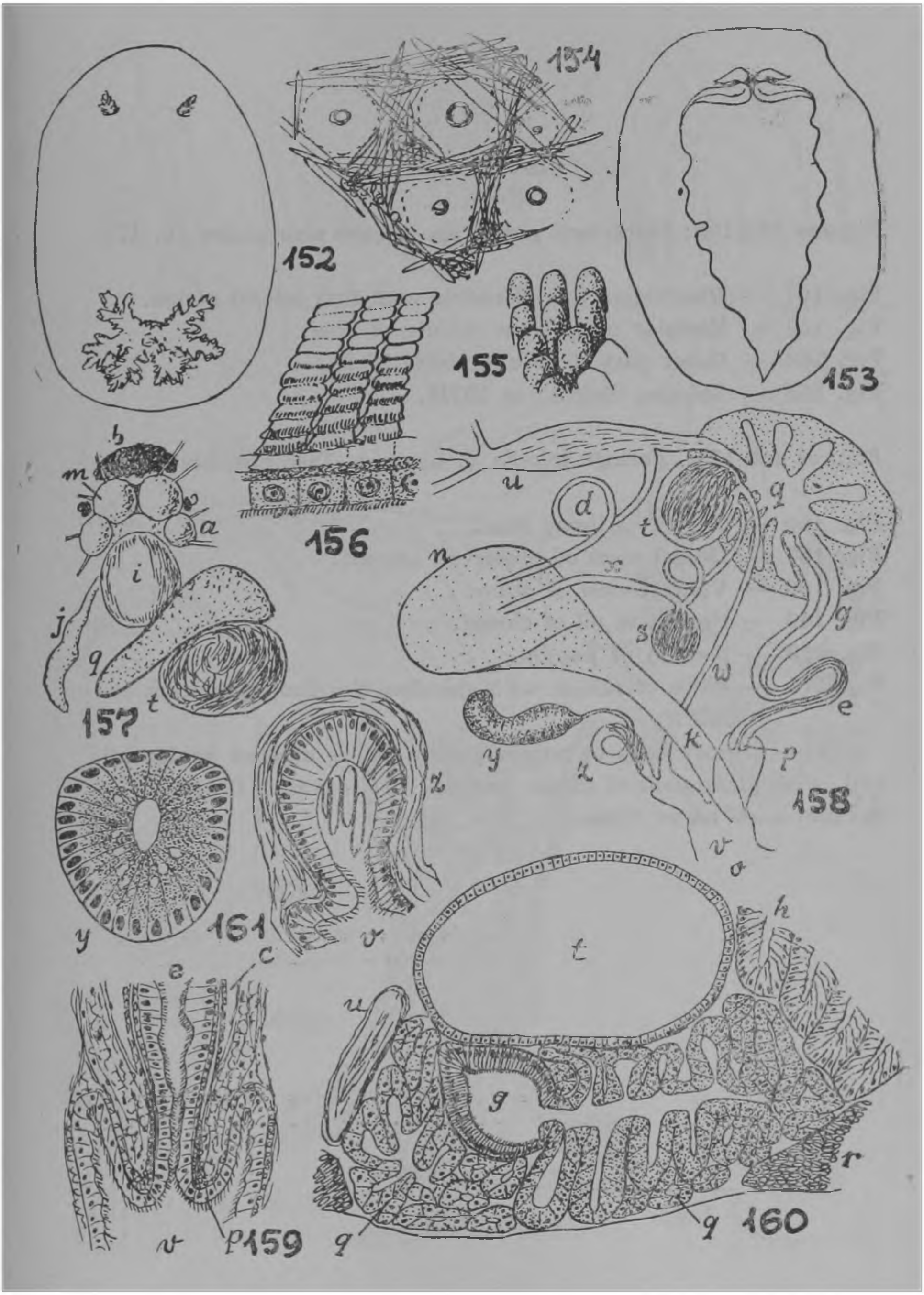
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PLATE 18

Figures 162-165: *Discodoris pusae,* sp. n. (see also plates 16, 17)

Fig. 162 — Rhachidian line of radula with first lateral plates.
Fig. 163 — Radular plate from middle of row.
Fig. 164 — Outer part of radula, plates 23-39.
Fig. 165 — Spicules cleaned in KOH.

Figures 166-171: *Taringa telopia,* g. n., sp. n. (see also plate 19)

Fig. 166 — Sketch of living slug.
Fig. 167 — Dorsal view of preserved animal.
Fig. 168 — Ventral view of same.
Fig. 169 — Papilla in oil of cloves.
Fig. 170 — Section of papilla.
Fig. 171 — Piece of notum with spicules, clarified, seen from inside.

a — sensory cells of notum papilla. c — ciliated epidermal cell. g — gland cells of notum papilla. m — muscle fibres. y — spicule. z — nerve fibres.

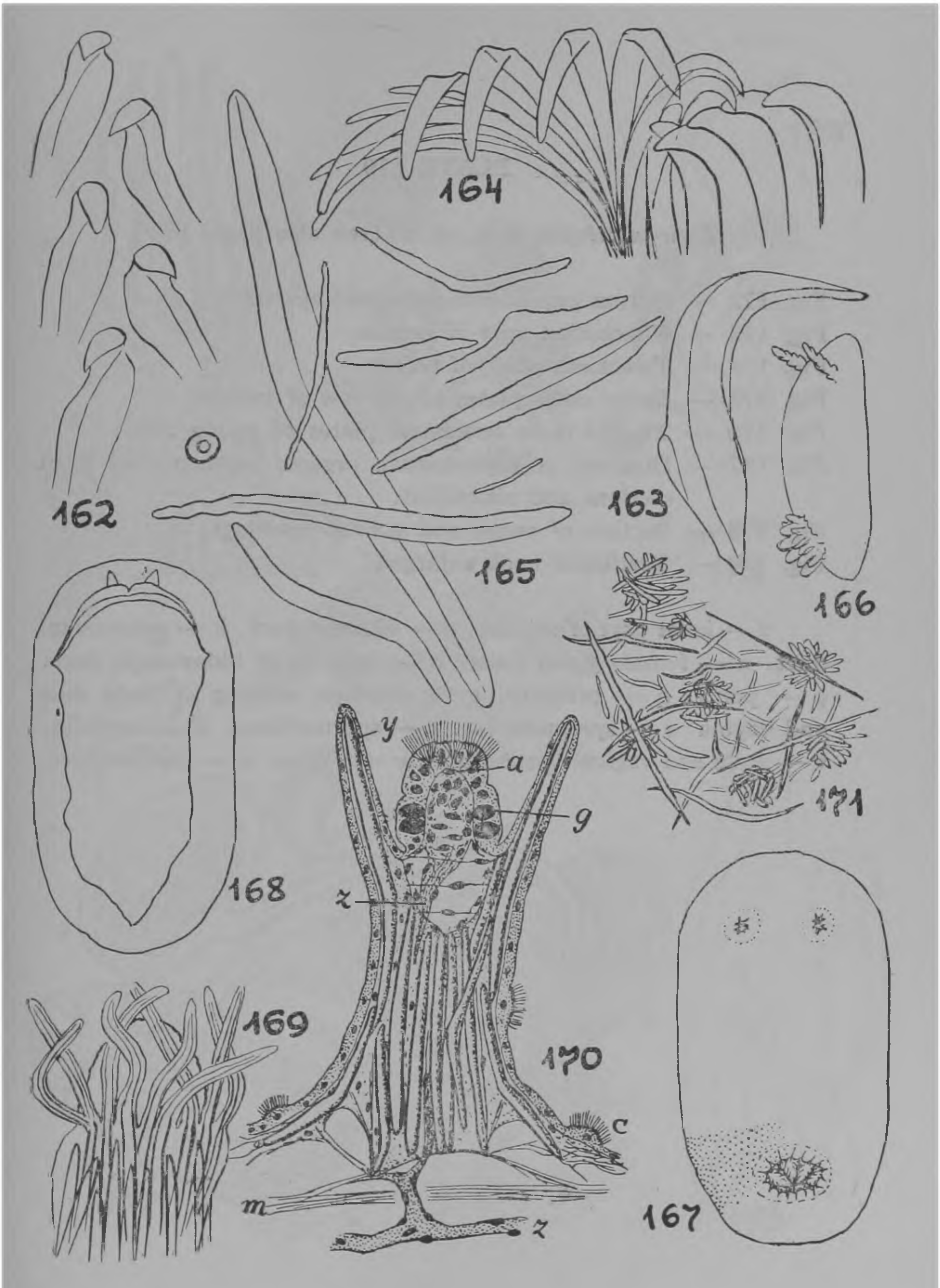
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PLATE 19

Taringa telopia, g. n., sp. n. (see also plate 18)

Fig. 172 — Notum papillae of preserved specimen.
Fig. 173 — Rhachidian part of radula.
Fig. 174 — Twentieth plate of radula.
Fig. 175 — Seven outer plates of old row of radula.
Fig. 176 — Tips of three outermost plates of young row.
Fig. 177 — Diagram of reproductive organs, reconstructed from sections and simplified.
Fig. 178 — Section of verge and genital openings.
Fig. 179 — Vestibular hook enlarged.

d — inner part of oviduct. e — efferent duct. k — nidamental duct. n — female gland mass. o — opening of nidamental duct. p — penis. q — prostate. r — common opening of male duct and vagina. s — spermatocyst. t — spermatheca. u — ampulla. v — male and vaginal vestibulum. w — vagina. x — uterine duct.

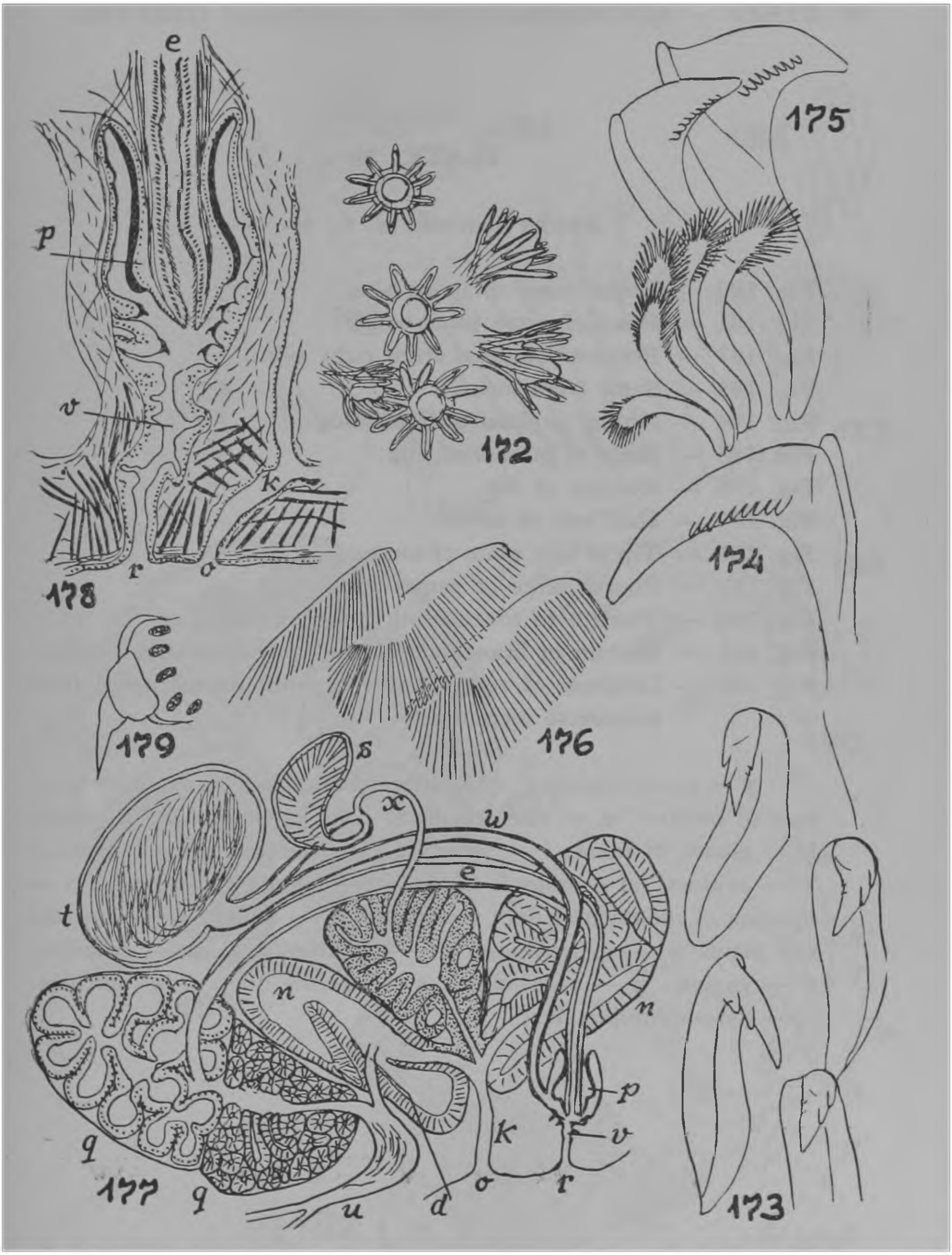
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PLATE 20

Awuka spazzola, g. n., sp. n.

Fig. 180 — Dorsal view of living slug.
Fig. 181 — Head of same from below
Fig. 182 — Preserved animal from right side.
Fig. 183 — Same from below
Fig. 184 — Notum papillae of living slug.
Fig. 185 — Same of preserved slug.
Fig. 186 — Rodlets of lip.
Fig. 187 — Half row of radula.
Fig. 188 — Tip of first plate of same.
Fig. 189 — Fourth plate of same.
Fig. 190 — Twelfth to seventeenth plate of same.
Fig. 191 — Bottom of branchial groove from transverse section.
Fig. 192 — Diagram of reproductive organs, reconstructed from transverse sections.

a — genital opening. c — afferent branchial sinus. d — inner part of oviduct. e — efferent duct. f — pedal glands. g — gill. h — glands of same. i — intestine. j — efferent branchial sinus. k — oviduct. m — muscle fibres. n — female gland mass. o — opening of nidamental duct (oviduct). p — stylet. q — prostate. r— penis. s — spermatocyst. t — spermatheca. u — ampulla. v — vagina. w — vestibulum. x — uterine duct. y — spicules. z — hermaphrodite duct.

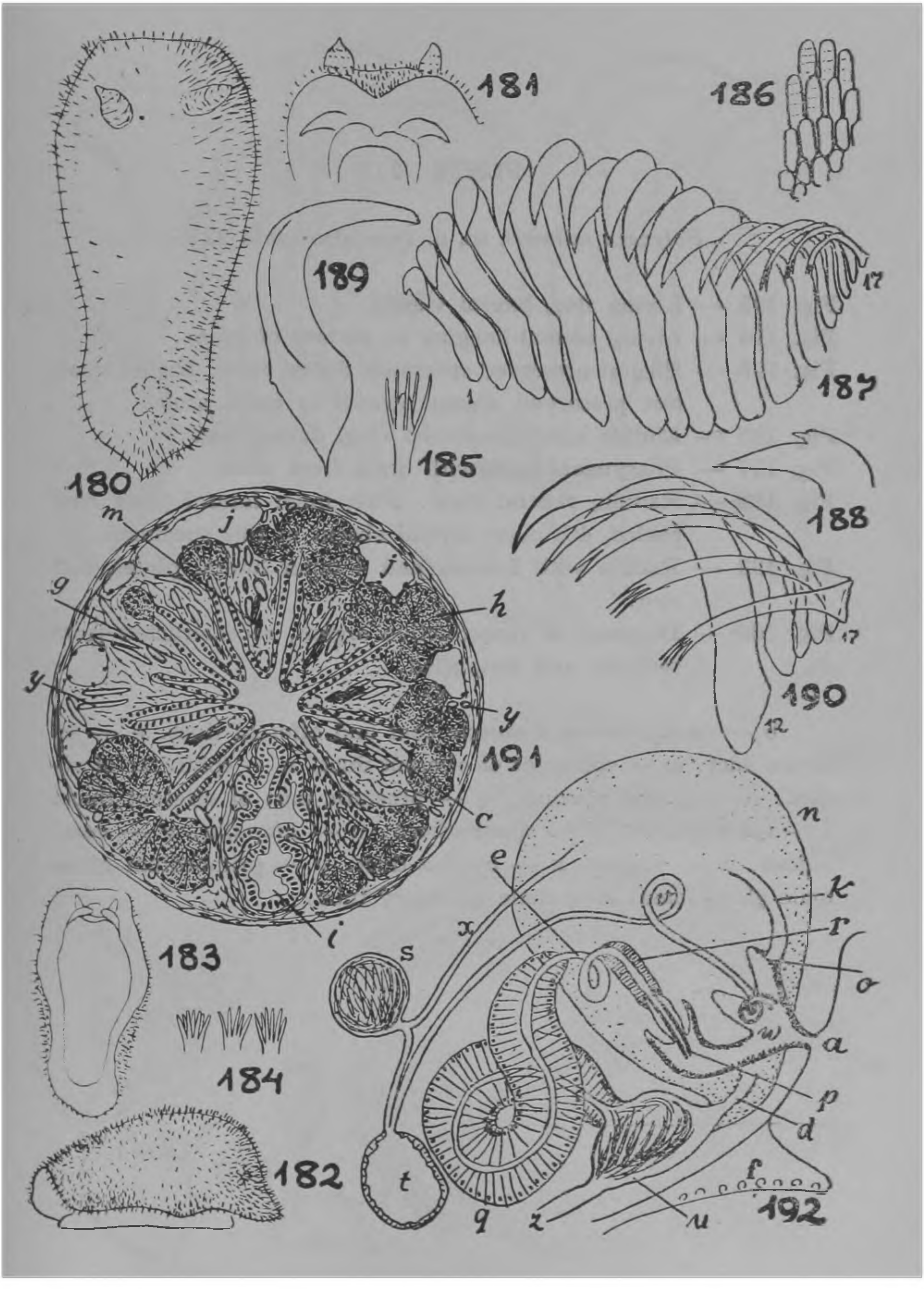
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PLATE 21

Polycera odhneri, sp. n. (see also plate 22)

Fig. 193 — Living slug, lateral view.
Fig. 194 — Living animal hanging on surface of water
Fig. 195 — Biggest preserved specimen, dorsal view. Right: smallest preserved animal drawn to same scale.
Fig. 196 — Middle sized preserved slug, dorsal view.
Fig. 197 — Pharyngeal bulb with brain from front.
Fig. 189 — Radula, ventral view. First inner lateral plate concealed, 4th outer lateral absent in this specimen.
Fig. 199 — Radula with 2 inner and 4 outer lateral plates, half row.
Fig. 200 — Diagram of reproductive organs, reconstructed from sections and simplified.

b — cavity between muscle coat and efferent duct. e — efferent duct. m — sphincter of efferent duct. n — sphincter of vagina. o — genital opening. q — prostatic part of efferent duct. s — spermatocyst. t — spermatheca. u — ampulla. v — vestibulum. w — vagina. x — uterine duct. y — primordium of female gland mass. z — male accessory tube.

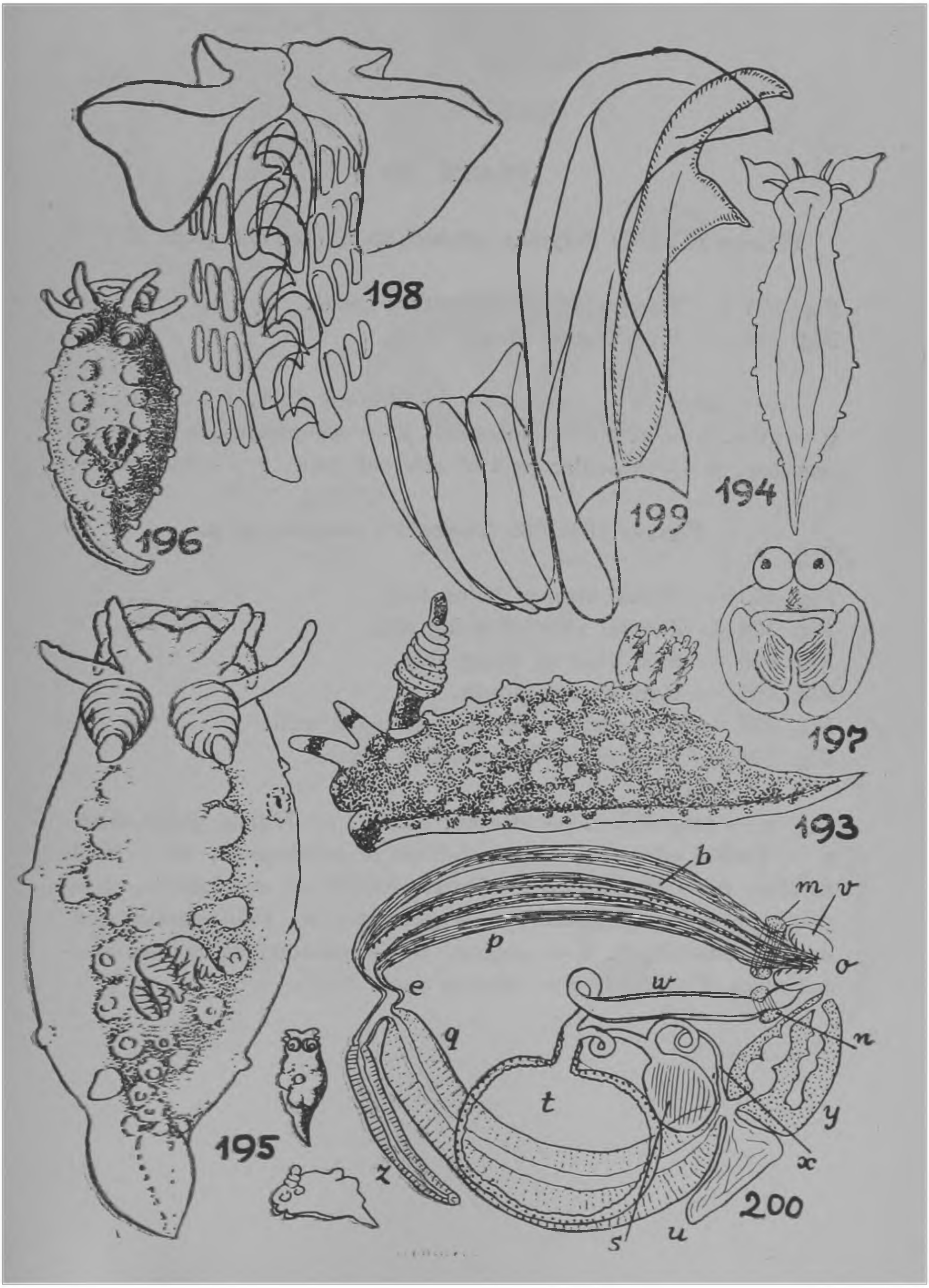
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PLATE 22

Figures 201-202: *Polycera odhneri,* sp. n. (see also plate 21)

Fig. 201 — Topography of alimentary canal.
Fig. 202 — Jaws, frontal view.

a — anus. c — caecum. e — efferent duct. f — pharynx. g — gills. h — liver. i — intestine. k — oesophagus. o — genital opening. p — muscular part of efferent duct. r — rhinophore.

Figures 203-208: *Goniodoris mimula,* sp. n.

Fig. 203 — Dorsal view of living slug.
Fig. 204 — Frontal view of living slug.
Fig. 205 — Side view of living slug.
Fig. 206 — Half row of radula.
Fig. 207 — Transverse section of stomach wall.
Fig. 208 — Diagram of reproductive organs.

a — ampulla. d — efferent duct. f — female gland mass. g — genital pore. k — male follicle of ovariotestis. m — male atrium. n — oviduct. o — female follicle of ovariotestis. p — penis. q — female atrium. s — spermatocyst. t — spermatheca. u — spermoviduct. v — vagina. w — sphincter of vagina. x — sphincter of oviduct. y — uterine duct.

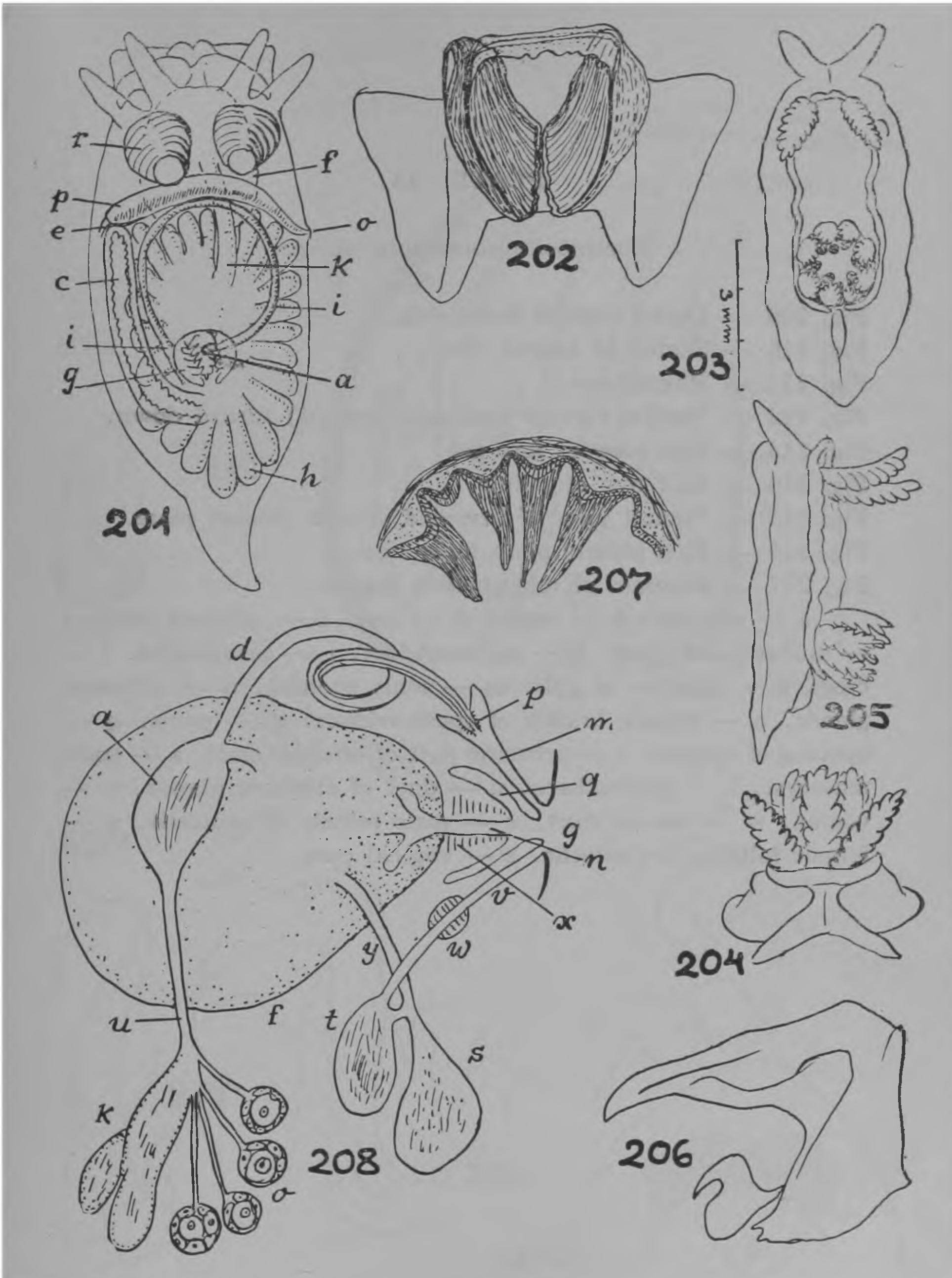
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PLATE 23

Corambella carambola, sp. n.

Fig. 209 — Dorsal view of living slug.
Fig. 210 — Sketch of lateral view.
Fig. 211 — Rhinophore.
Fig. 212 — Ventral view of hind end, foot (d) turned down.
Fig. 213 — Side view of fore gut.
Fig. 214 — Half row of radula.
Fig. 215 — Frontal view of first and second pleural plate.
Fig. 216 — First pleural plate, inner side.
Fig. 217 — Diagram of reproductive organs.

a — ampulla. b — brain. d — foot. e — efferent duct. g — mucus gland mass. h — spermoviduct. i — oesophagus. j — crop. k — muscles of gills. m — male opening. n — albumen glands. o — female branch of spermoviduct. p — penis. q — opening of oviduct. r — prostatic part of efferent duct. s — spermatocyst. t — spermatheca. u — duct of albumen glands. v — vagina. w — uterine duct. x — male follicle of ovotestis. y — female follicles of ovotestis. z — vaginal pore.

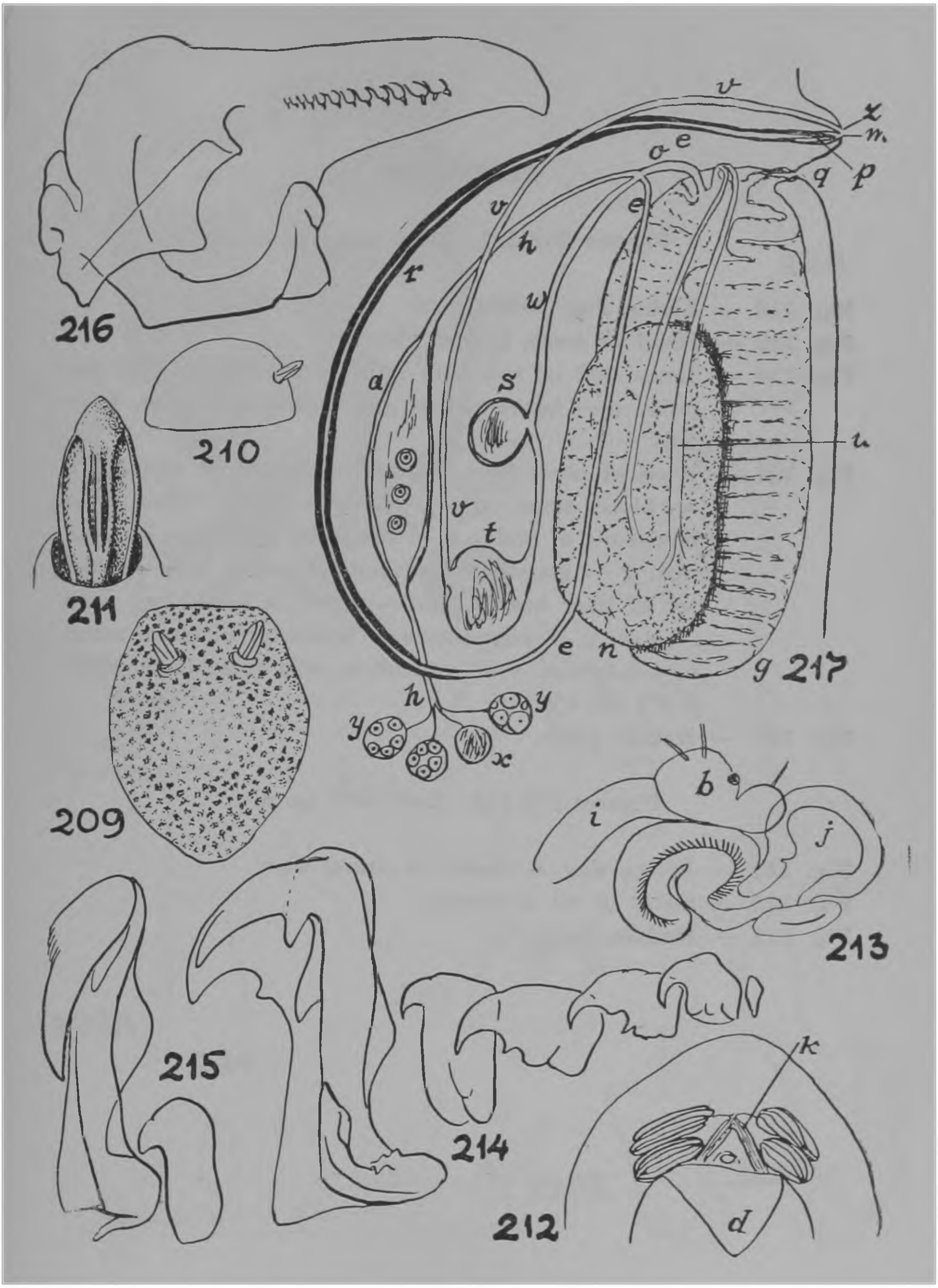
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PLATE 24

Figures 218-222: *Doto uva*, sp. n.

Fig. 218 — Living slug, lateral view.
Fig. 219 — Head of same, frontal view.
Fig. 220 — Inner side of two first right cerata. a — anal papilla. c — bases of first and second left ceras. k — gill.
Fig. 221 — Basis of ceras from transverse section of animal. b — blood sinus. d — defensive gland cells. e — epidermis of body f — branchial epidermis over sinus. g — glandular epidermis of ceras. h — sphincter of liver branch. m — liver n — kidney with crystal. p — pigment. s — sphincter of blood sinus. t — tubercle. v — vesiculous cells (see Hecht 1895, t. 3 f. 19, x)
Fig. 122 — Radula plate.

Figures 223-225: *Doto pita*, sp. n.

Fig. 223 — Living slug, A dorsal, B lateral view.
Fig. 224 — Ceras in oil of cloves.
Fig. 225 — Radula plate.

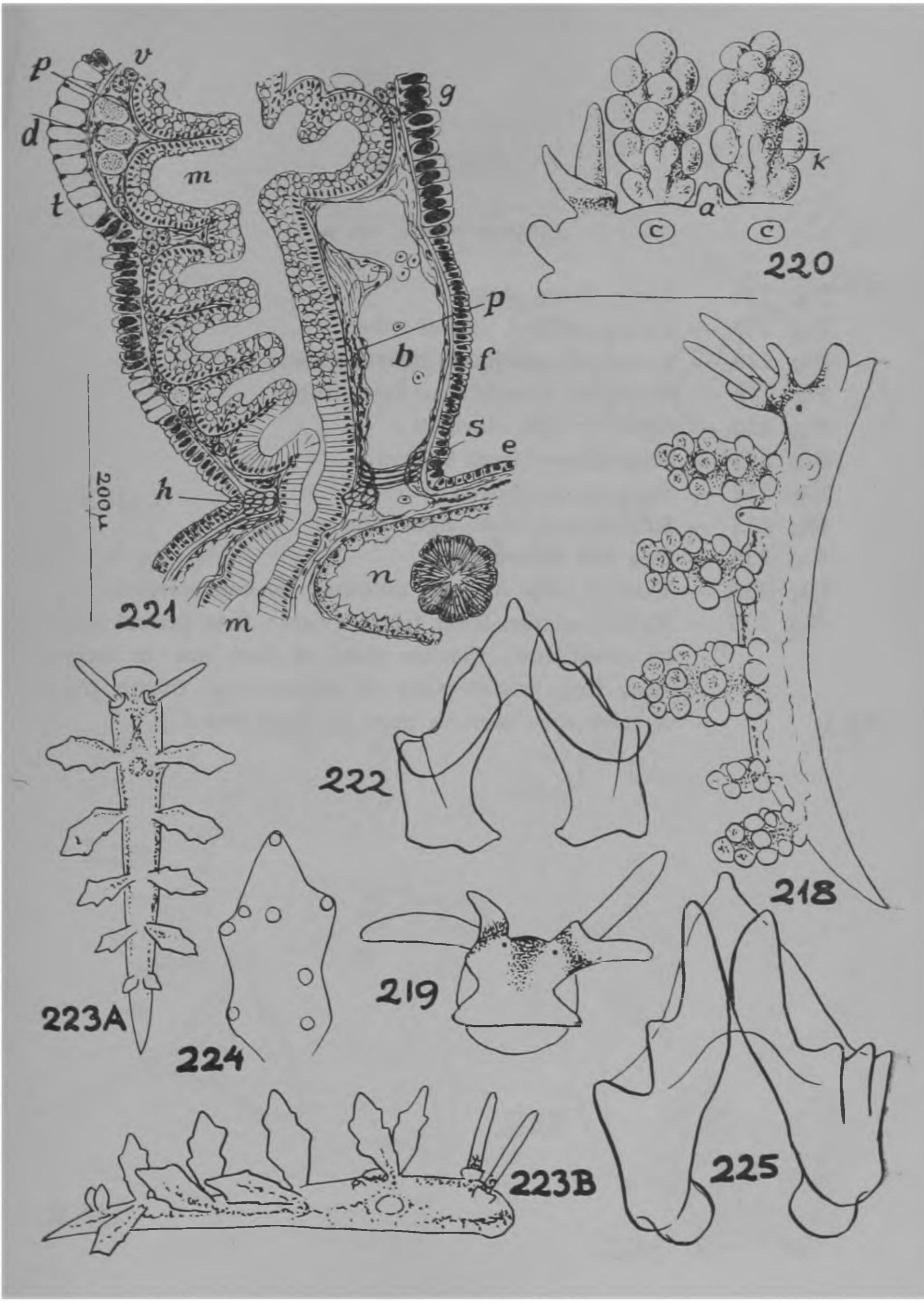

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PLATE 25

Janolus comis, sp. n.

Fig. 226 — Large living slug.
Fig. 227 — Living animal, dorsal view.
Fig. 228 — Preserved specimen, lateral view.
Fig. 229 — Preserved animal seen from front.
Fig. 230 — Anterior end, clarified.
Fig. 231 — Rhinophores from behind.
Fig. 232 — Same from above.
Fig. 233 — Rhinophore from right side.
Fig. 234 — One full grown ceras.
Fig. 235 — Ventral view of jaws unfolded by compression.
Fig. 236 — Radula plates, from left to right: first lateral plate of oldest row; rhachis plate of first row in lateral view; first lateral plate of second row; fourth plate of third row; seventh plate of third row.

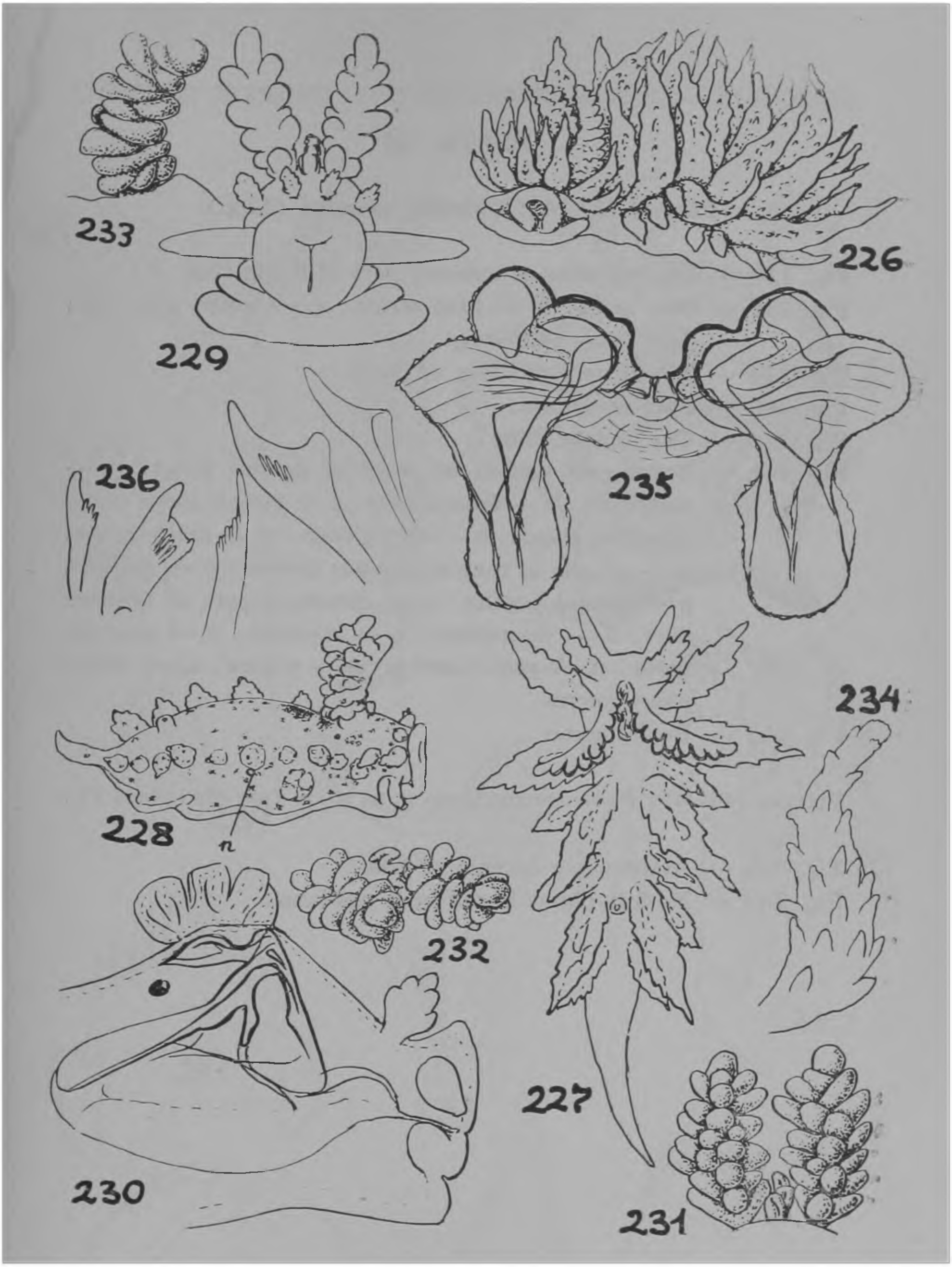
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PLATE 26

Figures 237-243: *Catriona coerulea* (Mtg.)

Fig. 237 — Ventral view of anterior part of living slug.
Fig. 238 — One ceras. b — blue stripe. g — green part with liver y — yellow tip.
Fig. 239 — Masticatory borders of jaws.
Fig. 240 — Part of radula.
Fig. 241 — One radula plate.
Fig. 242 — Transverse section on level of genital pores. d — male pore. e — female pore. f — female gland mass. h —foot glands. k — skin glands. m — male atrium. n — ganglia of central nervous system. o — oviduct. p — penial papilla. q — prostatic part of efferent duct. r — rhinophore. s — stomach. t — spermatheca. u — penial stylet. v — vagina. x — rhinophore nerves.
Fig. 243 — Penial stylet.

Figures 244-245: *Piseinotecus divae*, g. n., sp. n. (see also plate 27)

Fig. 244 — Masticatory borders of jaws.
Fig. 245 — Radula plates in different positions.

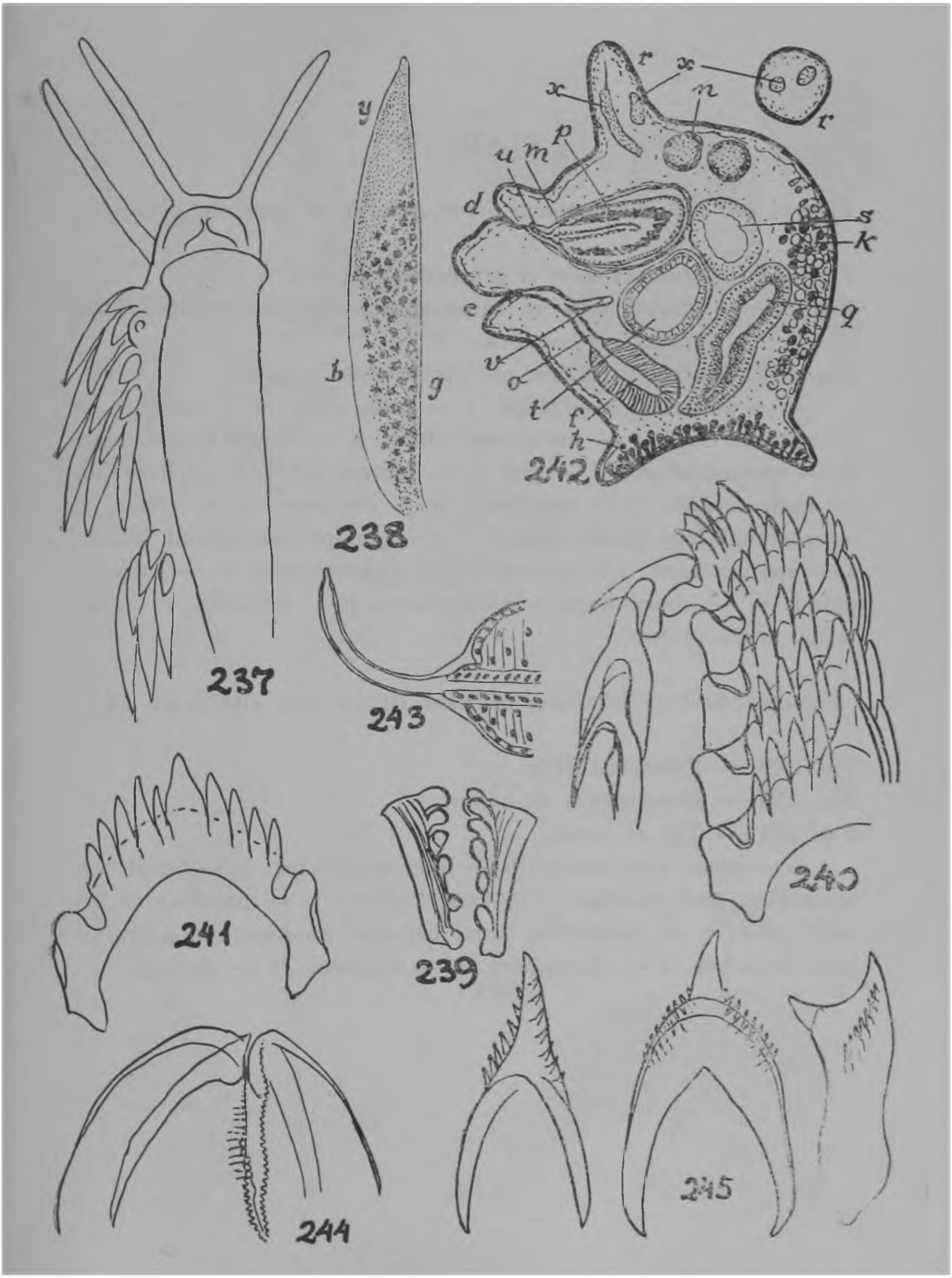
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PLATE 27

Figures 246-248: *Piseinotecus divae,* g. n., sp. n. (see also plate 26)

Fig. 246 — Ventral view of preserved slug.
Fig. 247 — Dorsal view of same with liver reconstructed from transverse sections.
Fig. 248 — Reconstruction of reproductive organs.

a — ampulla. b — anus. c — male pore. d — oviduct. e — efferent duct. f — nidamental duct. g — female gland mass. h — spermoviduct. i — gut. j — female pore. k — liver m — male atrium. n — cnidosac. o — ovotestis. p — penis. q — eosinophilous penial gland. r — cyanophilous penial gland. s — spermatheca. t — stomach. u — oesophagus. v — salivary gland. w — pharynx. x — rhinophore. y — tentacle. z — anterior angle of foot.

Figures 249-251: *Phidiana selenkai* Bergh (see also plate 28)

Fig. 249 — Preserved slug.
Fig. 250 — Distribution of cerata.
Fig. 251 — Tip of ceras.

a — anus. c — cerata. h — liver diverticles. k — canal between liver and cnidosac. n — nephropore. p — pigment of hepatic cells. q — connecting canal between anterior and posterior liver branches. r — rhinophore. s — cnidosac. t — tentacle.

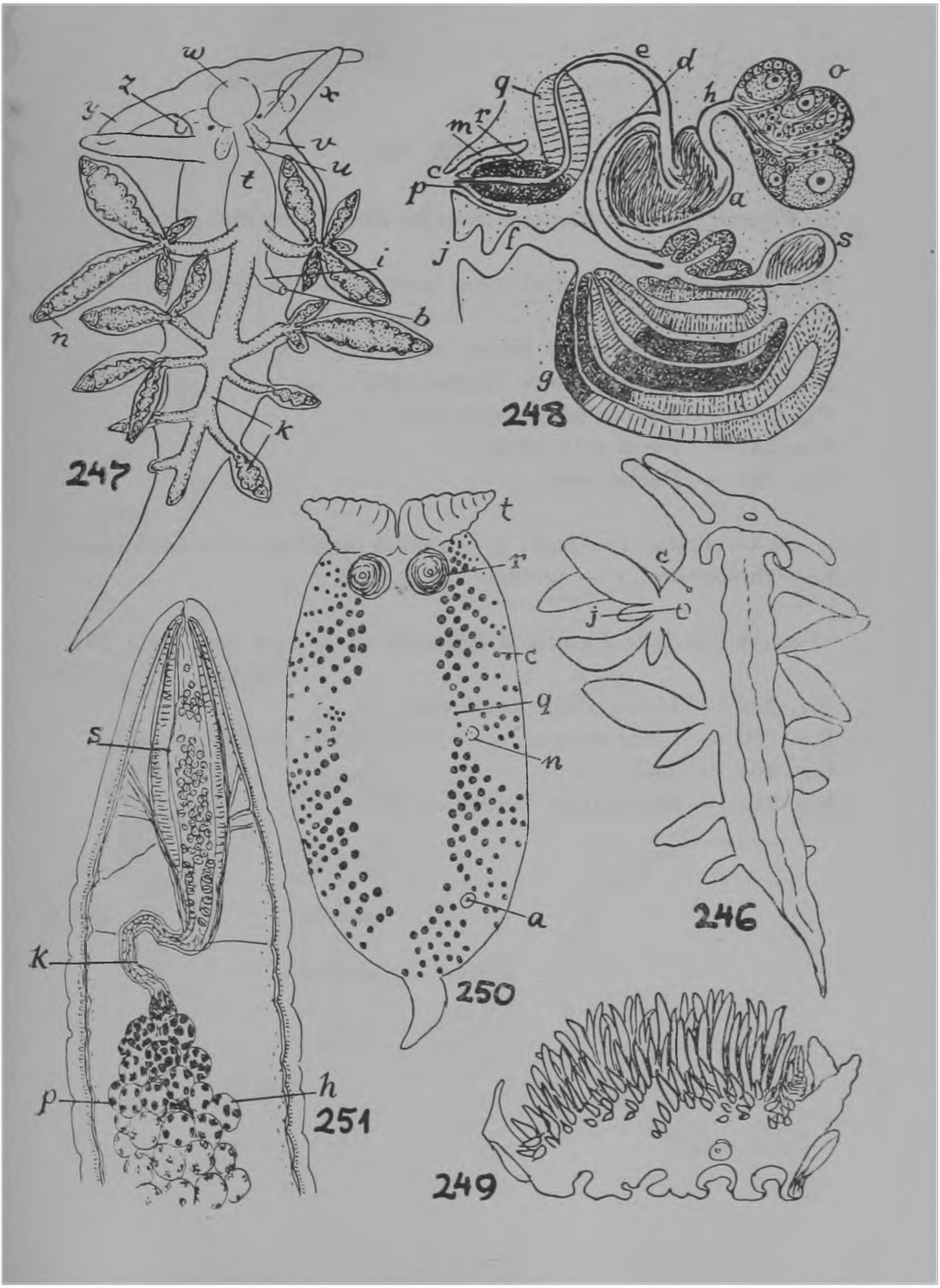
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PLATE 28

Figures 252-258: *Phidiana selenkai* Bergh (see also plate 27)

Fig. 252 — Dextroventral view; part of cerata removed.
Fig. 253 — Jaw.
Fig. 254 — Masticatory border of jaws.
Fig. 255 — Radula plates, frontal view.
Fig. 256 — Radula plates, side view.
Fig. 257 — Penis with hook.
Fig. 258 — Penial hook.

c — cerata. f — foot. g — genital opening. n — nephropore r — rhinophore. t — tentacle.

Figures 259-262: *Favorinus auritulus*, sp. n. (see also plate 29)

Fig. 259 — Living slug, dorsal view.
Fig. 260 — Liver system. a — anus. g — genital opening.
Fig. 261 — Jaw.
Fig. 262 — Masticatory border of jaw.

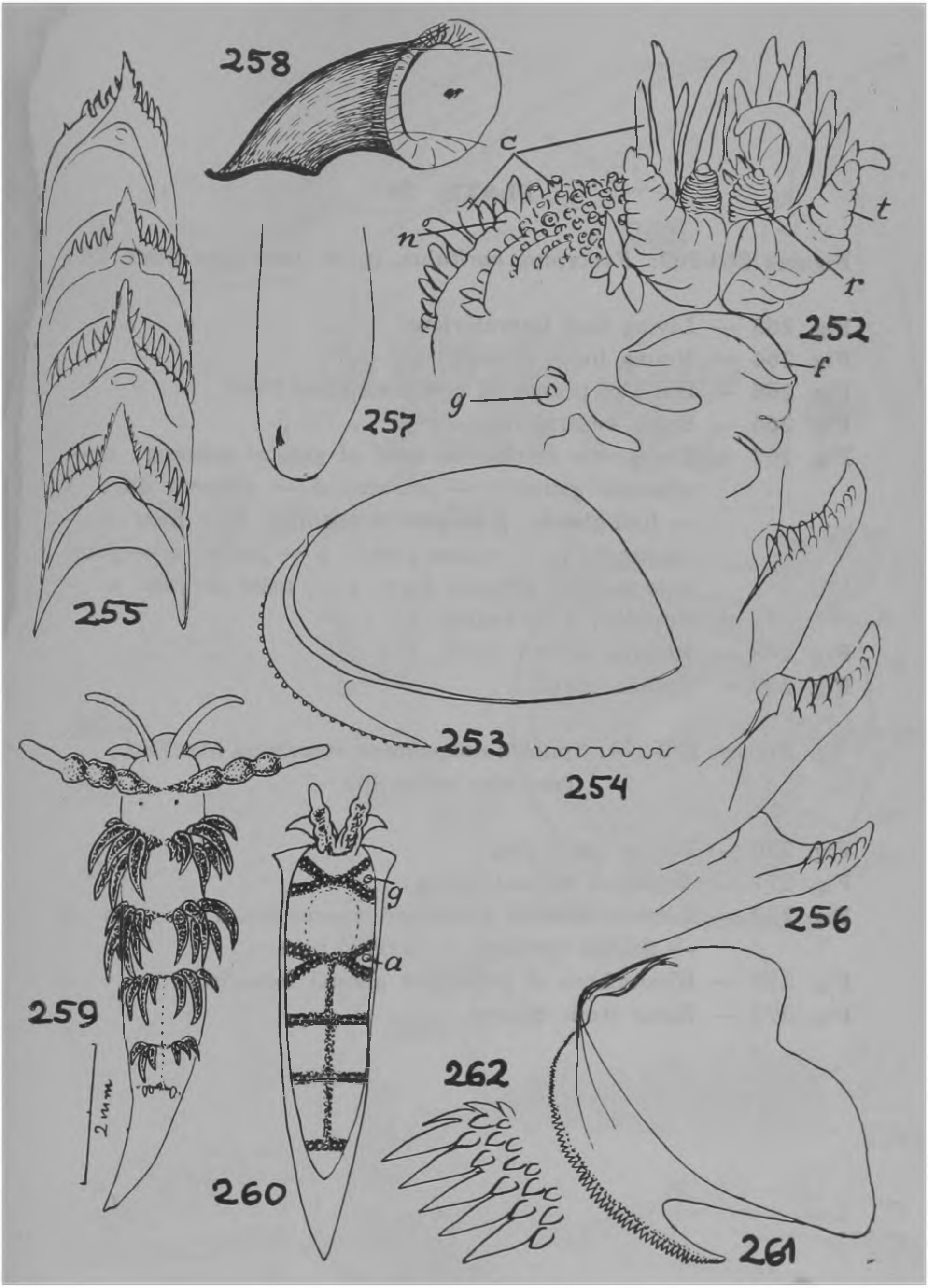
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PLATE 29

Figures 263-269: *Favorinus auritulus*, sp. n. (see also plate 28)

Fig. 263 — Living slug, lateral view.
Fig. 264 — Young living animal.
Fig. 265 — Head of preserved specimen from front.
Fig. 266 — Same, ventral view.
Fig. 267 — Transverse section on level of genital opening. a — albumen gland. c — cerata. d — efferent duct. f — foot glands. g — genital opening. h — liver i — stomach. m — mucus gland. p — penis. q — prostatic part of efferent duct. r — male atrium. u — ampulla. v — vagina.
Fig. 268 — Radula, lateral view.
Fig. 269 — Radula plate.

Figures 270-274: *Spurilla neapolitana braziliana* MacFarl. (see also plate 30)

Fig. 270 — Living adult slug.
Fig. 271 — Youngest animal, living.
Fig. 272 — Lateral view of preserved specimen. a — anus. g — genital opening. r — renal pore.
Fig. 273 — Rhinophore of preserved animal from front.
Fig. 274 — Same from behind.

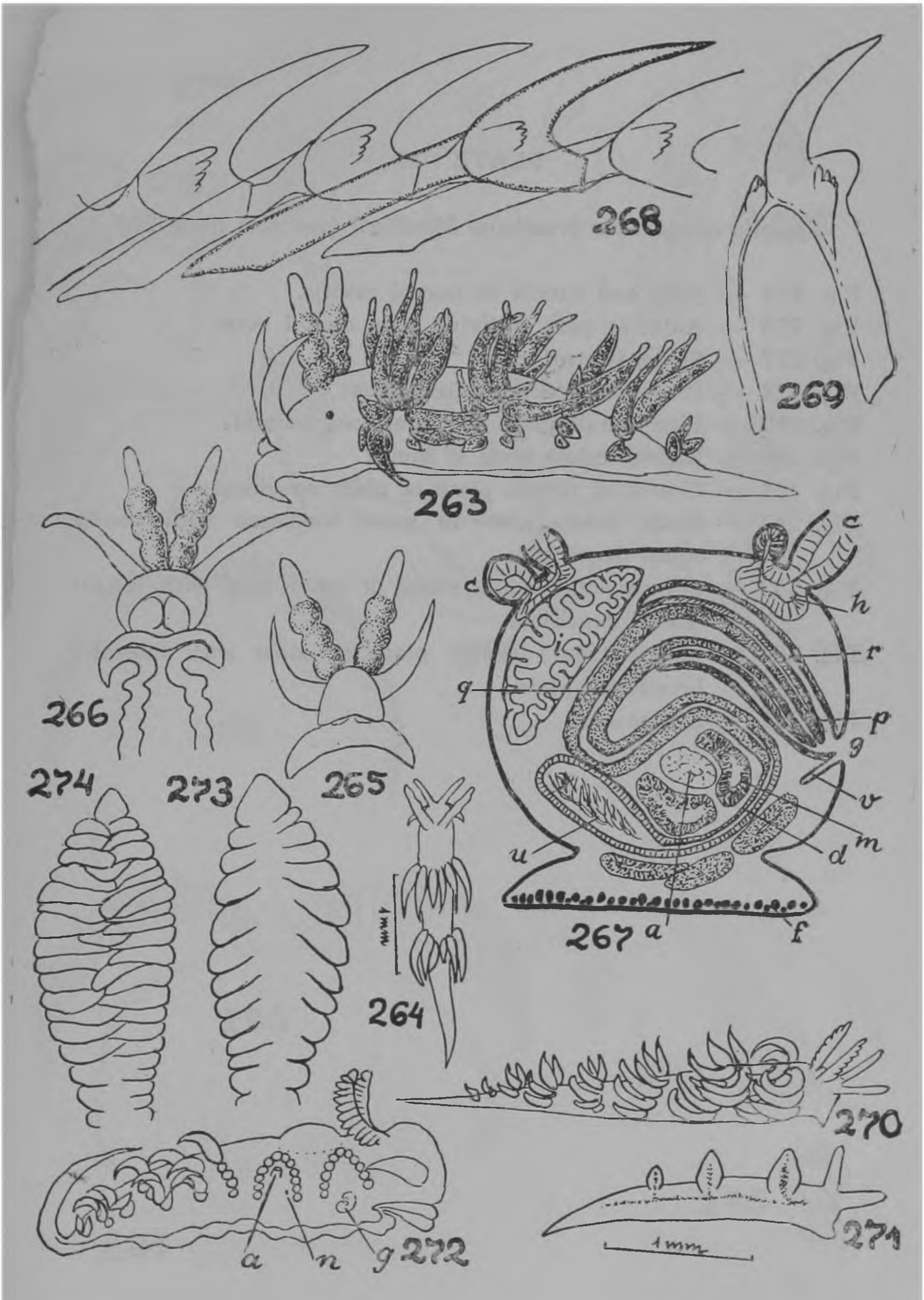
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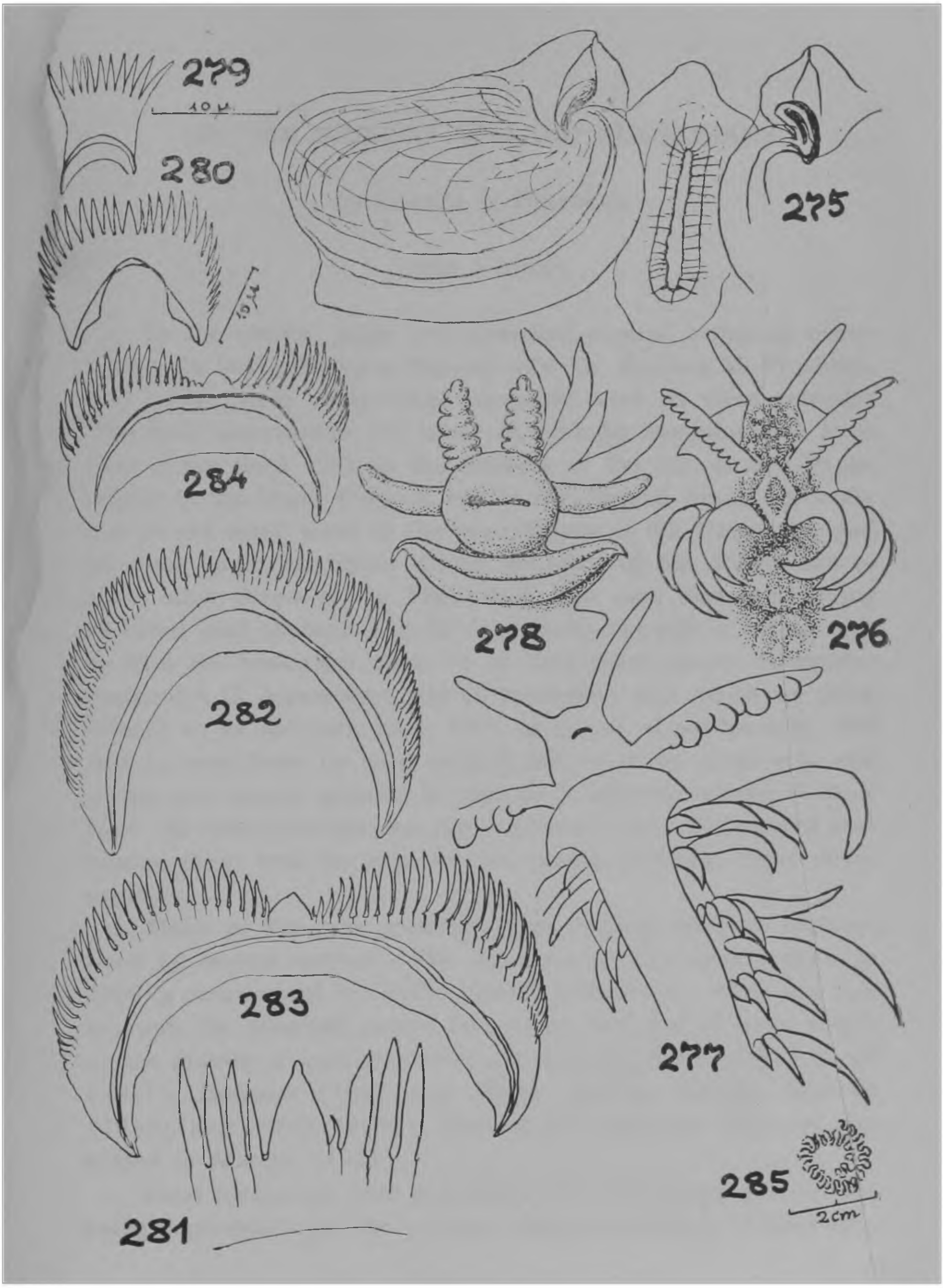
PLATE 30

Spurilla neapolitana braziliana MacFarl. (see also plate 29)

Fig. 275 — Jaws and cuticle of buccal cavity
Fig. 276 — Anterior part of living slug, dorsal view
Fig. 277 — Same, ventral view.
Fig. 278 — Preserved specimen from front.
Fig. 279 — First radula plate of 2 mm. long animal.
Fig. 280 — Eighth radula plate of same.
Fig. 281 — Centre of radula plate of older specimen.
Fig. 282 — Sixth radula plate of same specimen with nearly equal denticles.
Fig. 283 — Seventeenth radula plate of other slug with longer lateral denticles.
Fig. 284 — Oldest (first) radula plate of same with laterally broadened plate.
Fig. 285 — Egg mass.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