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MARINE EUTHYNEURAN GASTROPODA FROM ENIWETOK ATOLL, WESTERN PACIFIC[1]

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ABSTRACT

This study is based on a collection of marine euthyneuran mollusks made by the second author at Eniwetok Atoll, Marshall Islands, during February-April, 1960. Seventeen species were collected, of which 5 are described in this paper as new species. The new species are: ***Haminoea musetta***, ***H. linda***, *Chromodoris* ***briqua***, ***Herviella mietta*** and ***Onchidella evelinae***. Of the other 12 species, the distribution of 7 of them extends eastward from the western Indian Ocean (2 also occur in the Red Sea) to Eniwetok or farther east; 2 species are circumtropical or circumsubtropical; 2 species are known only from the western Pacific; and 1 species occurs from Eniwetok westwards into the eastern Indian Ocean. The relative uniformity of the western Indopacific reef fauna is indicated by the fact that 9 (or over 50%) of our species are known to range from the western edge of the Indian Ocean to the western or central Pacific. The genus ***Herviella*** seems to be confined to the western Pacific. The notogaeic occurrence of an ***Onchidella*** with a ventral recurrent limb of the kidney and a cuticular stylet in the diverticulum of the penial pouch is remarkable.

Eniwetok Atoll comprises a group of some 30-odd coral islands in the western Pacific. Eniwetok is one of several such atolls which make up the Marshall Islands of Micronesia. During the months of February-April, 1960, the second author and Dr. William H. Heard collected mollusks on 4 islands of Eniwetok Atoll. The present report is based on the 17 species of euthyneuran gastropods collected at that time. All specimens, except representative series sent to the University of Hawaii and the University of São Paulo, are now in the collections of the Museum of Zoology, University of Michigan.

Grateful acknowledgement is made to the United States Atomic Energy Commission for supporting the study of the second author at Eniwetok by providing travel funds, logistical support and use of the facilities of the Eniwetok Marine Biological Laboratory. The cooperation of the U. S. A. E. C. Eniwetok Field Office, Task Group 7.1, and Holmes and Narver, Inc., greatly facilitated the field collecting. A note of gratitude is due to Dr. I. Eugene Wallen, U.S.A.E.C., Dr. Robert W. Hiatt, University of Hawaii, and Prof. Henry van der Schalie, University of Michigan, for promoting these studies, and to Dr. William H. Heard, Florida State University, for assistance while at Eniwetok. Acknowledgement is also due Mrs. Eveline du Bois-Reymond Marcus for assistance to the senior author and for preparing the illustrations.

MATERIALS AND METHODS

The animals reported on here were

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collected from various localities on 4 islands of Eniwetok Atoll: 'Eniwetok I., Parry I., Japtan I. and Annaianni I. Most of the specimens were anesthetized before being fixed and preserved. A number of different anesthetizing reagents were used: chlorotone, chloral hydrate, menthol, magnesium chloride, nembutal and propylene phenoxetol. Three different fluids were used for fixing the specimens: Bouin's fluid, AFA (alcohol-formalin-acetic acid) and 10% neutralized formalin. The animals were preserved in either 5% formalin, 1% propylene phenoxetol or 70% ethanol.

The most satisfactory technique for preserving nudibranchs was a modification of the method of Hanna (1955). The living animals were frozen in sea water in a freezer; the ice was then melted with 10% formalin and the animals were transferred to 1% propylene phenoxetol.

Sketches and color photographs were made of the living animals, accompanied by notes of external characters, colors, measurements, etc.

SYSTEMATICS AND DISTRIBUTION

A systematic list of species of Euthyneura collected at Eniwetok during the field study are listed below. The species are treated individually in consecutive order in the section following the list.

Cephalaspidea, Philinacea, Smaragdinellidae
1. *Smaragdinella calyculata* (Broderip and Sowerby, 1829)
2. *Lathophthalmus smaragdinus* (Rüppell and F. S. Leuckart, 1828)

Cephalaspidea, Bullacea, Atyidae
3. *Haminoea musetta*, new species
4. *Haminoea linda*, new species
5. *Lamprohaminoea cymbalum* (Quoy and Gaimard, 1833)

Anaspidea, Aplysiidae, Dolabriferinae
6. *Dolabrifera dolabrifera* (Rang, 1828)

Anaspidea, Aplysiidae, Notarchinae
7. *Stylocheilus longicauda* (Quoy and Gaimard, 1824)

Doridoidea, Eudoridacea, Cryptobranchia, Doridiidae, Chromodoridinae
8. *Chromodoris fidelis* (Kelaart, 1859)
9. *Chromodoris briqua*, new species
10. *Hypselodoris hilaris* (Bergh, 1890)

Doridoidea, Eudoridacea, Phanerobranchia, Nonsuctoria, Gymnodorididae
11. *Gymnodoris bicolor* (Alder and Hancock, 1864)

Doridoidea, Porostomata, Dendrodorididae
12. *Dendrodoris nigra* (Stimpson, 1855)
13. *Dendrodoris erubescens* (Bergh, 1905)

Eolidoidea, Cleioprocta, Favorinidae, Favorininae
14. *Herviella claror* Burn, 1963
15. *Herviella mietta*, new species

Soleolifera, Onchidiacea, Onchidiidae
16. *Onchidella evelinae*, new species

Basommatophora, Siphonariacea, Siphonariidae
17. *Siphonaria* (*Sacculosiphonaria*) *guamensis* (Quoy and Gaimard, 1833)

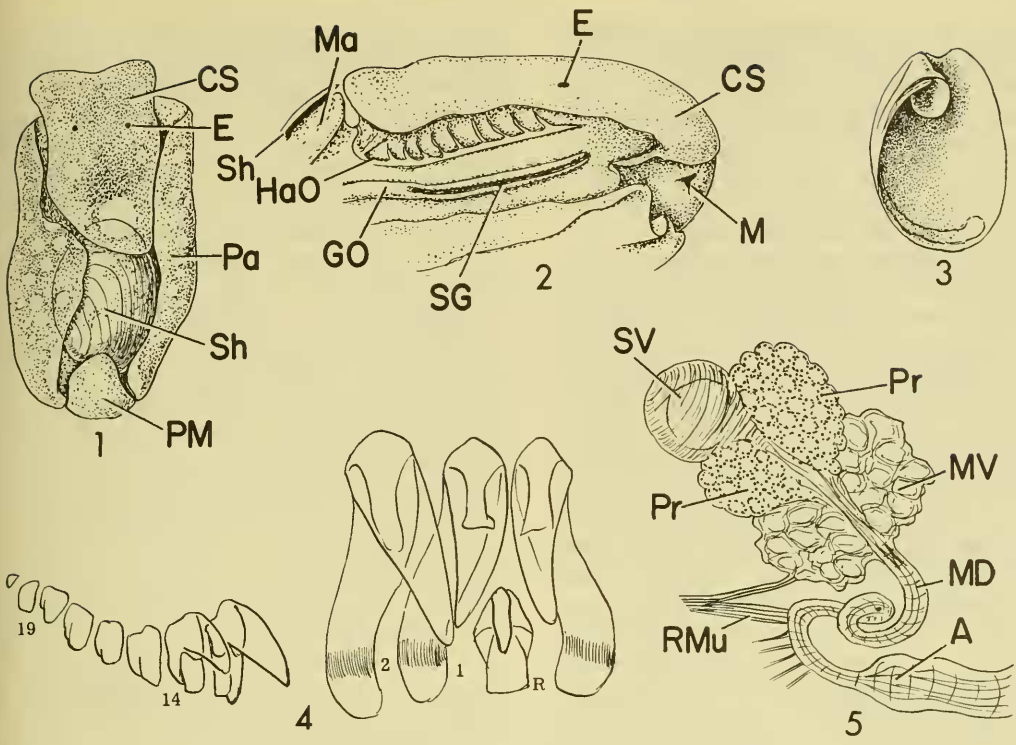
1. *Smaragdinella calyculata* (Broderip and Sowerby, 1829)

(Figs. 1-5)

Pilsbry, 1895, p 258 (***viridis***), pl. 33, figs. 42, 45-53 (***viridis*** and ***glauca***); Bergh, 1901, p 228, pl. 19, figs. 39-45 (***viridis***); Habe, 1952, p 144, 146, pl. 20, fig. 7, pl. 21, fig. 26.

Occurrence: In lagoon at north end of Eniwetok Island.

Further distribution: Southern Indian Ocean, Reunion and Mauritius; Java (Adam and Leloup, 1938, p 199); middle Japan, Seven Islands off Izu; southern Japan, Shikoku Island, Amami and Ryukyu Groups; Mariana Islands, Guam; Hawaiian Islands; Pitcairn Island;



FIGS. 1-5. *Smaragdinella calyculata*. Fig. 1. Living animal dorsal view, drawn from Kodachrome transparency. Fig. 2. Right side view of anterior part. Fig. 3. Inner side of shell. Fig. 4. Radular teeth. Fig. 5. Male genital structures; A, atrium; CS, cephalic shield; E, eye; GO, genital opening; HaO, Hancock's organ; M, mouth; MD, male duct; MV, muscular vesicle; Pa, parapodia; PM, posterior mantle lobe; Pr, prostate; RMu, retractor muscle; SG, seminal groove; Sh, shell; SV, seminal vesicle.

Easter Island (Odhner, 1921), p 248; not Dall, 1908, as Odhner's asterisk indicates).

The shell is mainly external, solid, the one measured was 6 mm long, 3.8 mm broad. The shell's apex is concealed. The outer lip of the aperture is angular posteriorly without a thickening in the shell examined. The columellar border runs out into a cup-shaped process projecting forward into the aperture. In living animals the shell is diaphanous yellow; in preserved animals it is opaque white, green on the inner side and with a transparent periostracum.

A large snail was 14 mm long and 8.5 mm broad when crawling; 4 preserved specimens measured 11, 9.5, 7.5 and 6 mm in length. The body in life is pale green with many opaque white spots and a somewhat smaller number of scattered small black spots. White spots occur in patches along the colorless edge of the foot and on the posterior lobe of the mantle. White marks occur on the parapodia and also on the cephalic shield, where they are less numerous. The small black eyes (Fig. 1, E) are situated farther from the mid-line than from the sides. There is an opaque white oval area at the hind end of the cephalic shield (CS), followed by many rather uniformly spaced black spots which show through the shell (Sh). These spots are larger than the ones previously mentioned. Farther backward growth lines of the shell can be seen between the parapodia (Pa).

The cephalic shield is nearly straight in front. In living animals it extends to the middle of the body and ends with a blunt point. In preserved specimens

the posterior terminus of the cephalic shield is slightly bilobed and located near the anterior border of the shell. Hancock's organ has only dorsal pinnae and it lies under the cephalic shield, dorsal to the seminal groove (Fig. 2, SG). The end of the foot does not extend beyond the visceral hump.

The jaw elements are rod-shaped. The radula (Fig. 4) is light yellow, consisting of 30 rows with 19, rarely 20, teeth per half-row. The rhachidian plate is 47 micra high, more slender than in Habe's (1952) figure (pl. 21, fig. 26), with a central cusp, but without lateral denticles, so that it agrees with Habe's figure and differs from Bergh's (1901) *S. glauca* (p 240, pl. 19, figs. 47, 48). The lateral plates have long, hook-shaped cusps. The 5-6 outermost lateral plates lack cusps. The cusp of the innermost lateral tooth measured 57 micra in length; the cusp of the next lateral tooth measured 65 micra. The length of the cusps increased to 72 micra in the middle of the row and decreased outward. The bases of the 8 outer teeth are broad; the bases of the 5-6 inner ones have basal striae, as also occur in several species of *Haminoea*. The gizzard plates are conchinous, black in front, ivory behind, with a median crest and many ridges on either side.

The common genital opening (Fig. 2, GO) is located far in front, in front of the posterior end of the cephalic shield (CS). The seminal groove (SG) is straight, its aperture at the level of the anterior end of Hancock's organ (HaO) as in *Haminoea*. The male atrium (Fig. 5, A) is wide, with a folded epithelium and a muscular wall. The male duct (MD) has a terminal seminal vesicle (SV), a bilobed prostate (Pr), and a second muscular vesicle (MV). One bundle of the retractor muscle (RMu) inserts on this vesicle; some fibers insert on the loop of the male duct and on its straight section between loop and atrium.

Discussion of *Smaragdinella calyculata*

Pilsbry (1895, p 259) and Pruvot-Fol (1934, p 24) consider *S. viridis*, now known as *S. calyculata*, and *S. glauca*, whose type-specimens are lost, as one and the same species. If this is correct, the shape of the inner process of the shell, like a lancet in Zilch's specimen (1959, fig. 144), like a cup in Risbec's material from New Caledonia (1951, fig. VII, 3), is systematically insignificant. In fact, shells such as those drawn by Pilsbry (1893-95, pl. 33, fig. 47), Thiele, (1931, fig. 487), and Habe (1952, fig. 7) are intergrades between the mentioned extremes. Bergh's diagnoses of *S. viridis* and *S. glauca*, which he separates, do not reveal palpable differences; his description of the male organ is incomplete. Risbec's figure of the living animal (pl. 8, fig. 9) hardly represents a *Smaragdinella*. In his anatomical record only the size of the lateral gizzard plates is a little smaller than the central one, and the shape of the latter disagrees with what is known of *S. calyculata*. If Risbec's animal is another species, it must be renamed; he published it as *Smaragdinella viridis*, n. sp.

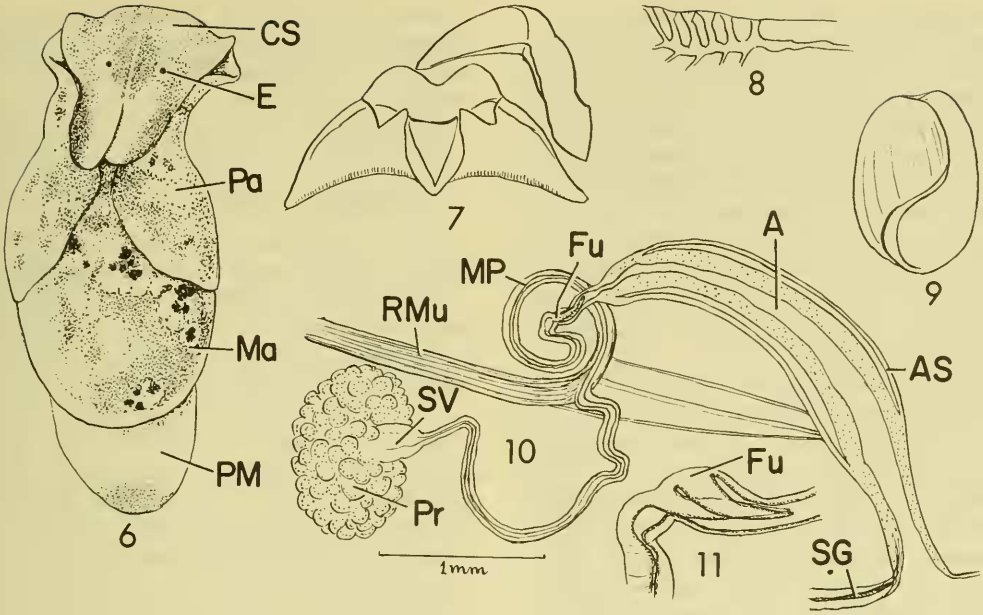
2. *Lathophthalmus smaragdinus* (Rüppel and F. S. Leuckart, 1828)

Marcus, 1960a, p 884-890, figs. 14-21 (bibliography and description).

Occurrence: Very abundant at Eniwetok Atoll during March, 1960. Collected at the south end of Parry Island, under stones on seaward tide flat; March 15, 1960.

Further distribution: Indo-West Pacific Ocean, from the Red Sea to southern Ryukyu and Fiji Islands.

The living animals measure up to 35 mm in length when extended. Two preserved specimens measured 19 x 8.5 and 16 x 7 mm. Correspondingly, their cephalic shields were 6 x 5 and 3.8 x 3 mm. The Hancock's organ had 15 leaves in the larger of the 2 animals, and 20 leaves in the smaller one. The position of the eyes in relation to the Hancock's organ is the same in both specimens. The mantle foramen which leaves part of the shell free is the best distinguishing



FIGS. 6-11. *Haminoea musetta*, n. sp. Fig. 6. Living snail, drawn from Kodachrome transparency dorsal view. Fig. 7. Radula, central and first lateral teeth. Fig. 8. Right Hancock's organ. Fig. 9. Shell. Fig. 10. Diagram of male genital structures. Fig. 11. Detail of penial papilla; A, atrium; AS, atrial sheath; CS, cephalic shield; E, eye; Fu, fundus of atrium; Ma, mantle under shell; MP, male duct; Pa, parapodia; PM, posterior mantle lobe; Pr, prostate; RMu, retractor muscle; SG, seminal groove; SV, seminal vesicle.

character of *Lathophthalmus*, Pruvot-Fol, 1931 (p 748) separating it from *Phanerophthalmus* A. Adams, 1850; but the distinction is not easy (Pruvot-Fol, 1934, p 30).

3. *Haminoea musetta*, new species

(Figs. 6-11)

Occurrence: North (collection A) and middle (collection B) parts of Parry Island on seaward tide flats; March 25 and April 2, 1960.

Shells (collection A): 8-9 mm high, 5-6 mm wide; greatest breadth about in the middle of the shell or slightly anterior of the middle; (collection B): 6.5-7.2 x 4.3-5.5 mm, greatest breadth in the middle of the shell. Ratios of diameter to height are 1:1.31 to 1:1.50. Shell shape (Fig. 9) swollen, ovoid. Shell with 1 1/2 whorls, rather fragile, shining, slightly narrowed posteriorly. The axial growth lines are more or less distinct; the spiral striae are extremely fine. The outer lip of the shell is convex and well-curved. It covers the apex slightly, rising to the right of the sunken spire. The apex may have a small perforation (collection A) or it may be imperforate (collection B). The columella is deeply concave, its base reflected. The columellar callus is separated from the body whorl by a furrow; its enamel layer extends farther posteriorly in the smallest shell of collection A than in the largest one of collection B.

Living snails measure up to 15 mm when crawling (Fig. 6); a preserved extended animal of collection A measured 11 mm; specimens of collection B were all retracted into their shells. Colors in life (collection A): ground color very pale green; mantle (Ma) speckled with dark green and black spots, and green ones with black centers, and a few blank areas without pigment showing

through the shell. On the cephalic shield (CS) and the parapodia (Pa) the spots are confluent, producing a mottled aspect. In collection B the green spots are less numerous, and the cephalic shield and parapodia are spotted like the rest of the animal, not mottled as on the specimens of collection A. White spots occur everywhere on the animals in clusters, which show through the shell. There are also a number of brown spots, except under the center of the dorsal part of the shell.

The cephalic shield is slightly notched in front, with two long flaps behind; the parapodia in living specimens reach half the length of the shell; in preserved snails (collection A) they are relatively longer. Hancock's organ (Fig. 8) is pinnate, the dorsal pinnae being longer than the ventral ones. The ends of the dorsal pinnae are often covered by a fold.

The jaws are semicircular with prismatic rodlets which are about 50-100 micra high and 10 x 18 micra in diameter. The radula contains 25-35 rows of teeth with 9-10 laterals per half-row. The rhachidian tooth (Fig. 7) is smooth with a rough base and strong median and short lateral cusps. The lateral teeth are all without denticles; the cusps are longest in the middle of each half-row. The gizzard plates are brown with 17 smooth ridges.

Like in all *Haminoeas*, the male aperture is at the anterior end of the right Hancock's organ, where the cutaneous seminal groove (Fig. 10, SG) enters the male atrium (A). In the present species the latter is a long, muscular tube within a thin sheath (AS). The fundus of the atrium (Fu) has 2 pointed epithelial, not cuticularized, lobes (Fig. 11). The male duct (MP) begins with a small vesicle, then continues as a narrow and winding tube without any spines. The penial retractor muscle (RMu) inserts near the middle of the male duct. The succeeding coils of the duct lead into a slightly lobed, nearly globular, prostrate gland (Pr). The walls of the prostate are glandular; its lumen (SV) frequently (collection B) contains sperm masses. There is no separate seminal vesicle. The female organs are systematically insignificant.

The name of this species is derived from "musette" = cornemuse, bagpipe.

Discussion of *Haminoea musetta*

The slight differences between the shells and the colors of the soft parts of collection A and B are taxonomically insignificant, because the labial armature, the radula, and the male copulatory organs of the 2 collections are similar.

In classifying the *Haminoea* of the present collection we went through the same difficulties as Pilsbry (1921, p 368) and Macnae (1962, p 187). The shell of *H. musetta* is similar to that of the type species of *Haloa*, *H. crocata* Pease, (1860a, b, p 19, 432). Pilsbry (1921, p 367) introduced *Haloa* as a section of *Haminoea;* Zilch (1959, p 42) called it a subgenus; and Habe (1952, p 148) considered it as a genus. Habe indicated that the first lateral tooth in *Haloa* had 2 cusps (actually an inner denticle in addition to the cusp). Since Habe (p 150) considered *Vitrohaminoea*, without such denticle, as a subgenus of *Haloa*, the denticle cannot be a generic character. Therefore, we have to compare *H. musetta* with other Indo-West Pacific species without giving any consideration to the radula.

The species with a shell most similar to *Haminoea musetta* is that of *H. nigropunctata* Pease, 1868 (Pilsbry, 1895, p 365), but its soft parts differ by the longer and more pointed flaps of the cephalic shield and the "rather posterior" parapodia. Only black pigment spots were described for *H. nigropunctata*. *H. binotata* Pilsbry, 1895 (1896, p 231) has a much less developed callus (Habe, 1952, pl. 21, fig. 30) than *H. musetta* and, in addition, peculiar color marks on the shell. In its variety *H. b. japonica* Pilsbry, 1895 (1896, p 232), today given specific rank (Habe, 1961, p 11), the columellar callus is adnate to the body whorl. This character does not agree

with the original diagnosis of *Haloa*.

Pilsbry's (1895, p 363, pl. 40, fig. 3) first specimen of *Haminoea crocata* had a "moderately concave" columella. Later (1921, p 367, text fig. 6) he described and figured a deeply concave columella, such as occurs in *H. musetta*. The outer lip rising at the apex is shown in both of Pilsbry's figures, and it is described indirectly in his text. This elevation of the outer lip distinguishes *H. crocata* and also *H. callosa* Preston, 1908 (p 189) from *H. musetta*. Moreover, the base of the columella is straight in the figure of *H. callosa* (pl. 15, fig. 31). Probably Pease's description of the body color of *H. crocata* as "cinereous, pellucid" and hence without any spots, is not systematically significant, because Pease described preserved material, and the pigment spots of *Haminoea* fade out in the preserving liquids in contrast to those of several other opisthobranchs. In any case, the dark green color "with large orange hieroglyphs" and the characteristic shape of the foot of specimens that Ostergaard called *H. crocata* (1955, p 112) show that it actually belongs to *H. simillima* Pease, 1868 (Pilsbry, 1895, p 366; Eliot, 1906b, p 310).

The shell of *Haminoea galba* Pease (1860 a, b, p 20, 432) is considered to be hardly distinguishable from that of *H. crocata*. It is, however, "perceptibly less swollen" (Pilsbry, 1921, p 368) and therefore different from that of *H. musetta*. The columella of *H. galba* bears a fold in Sowerby's figure (1868, fig. 23), reproduced by Pilsbry (1895, pl. 40, fig. 1); in *H. musetta* the columella has no fold.

The epithelial lobes in the fundus of the male atrium of *H. musetta* which correspond to a penial papilla, "glans" (Bergh) or "mamelon" (Guiart, 1901, p 145) may be compared with some earlier descriptions, namely those of Bergh (1900, p 162; 1901, p 227, 229, 233), Si (1931, p 56), and Marcus (1958b, p 37; 1961, p 6).

4. *Haminoea linda*, new species

(Figs. 12-16)

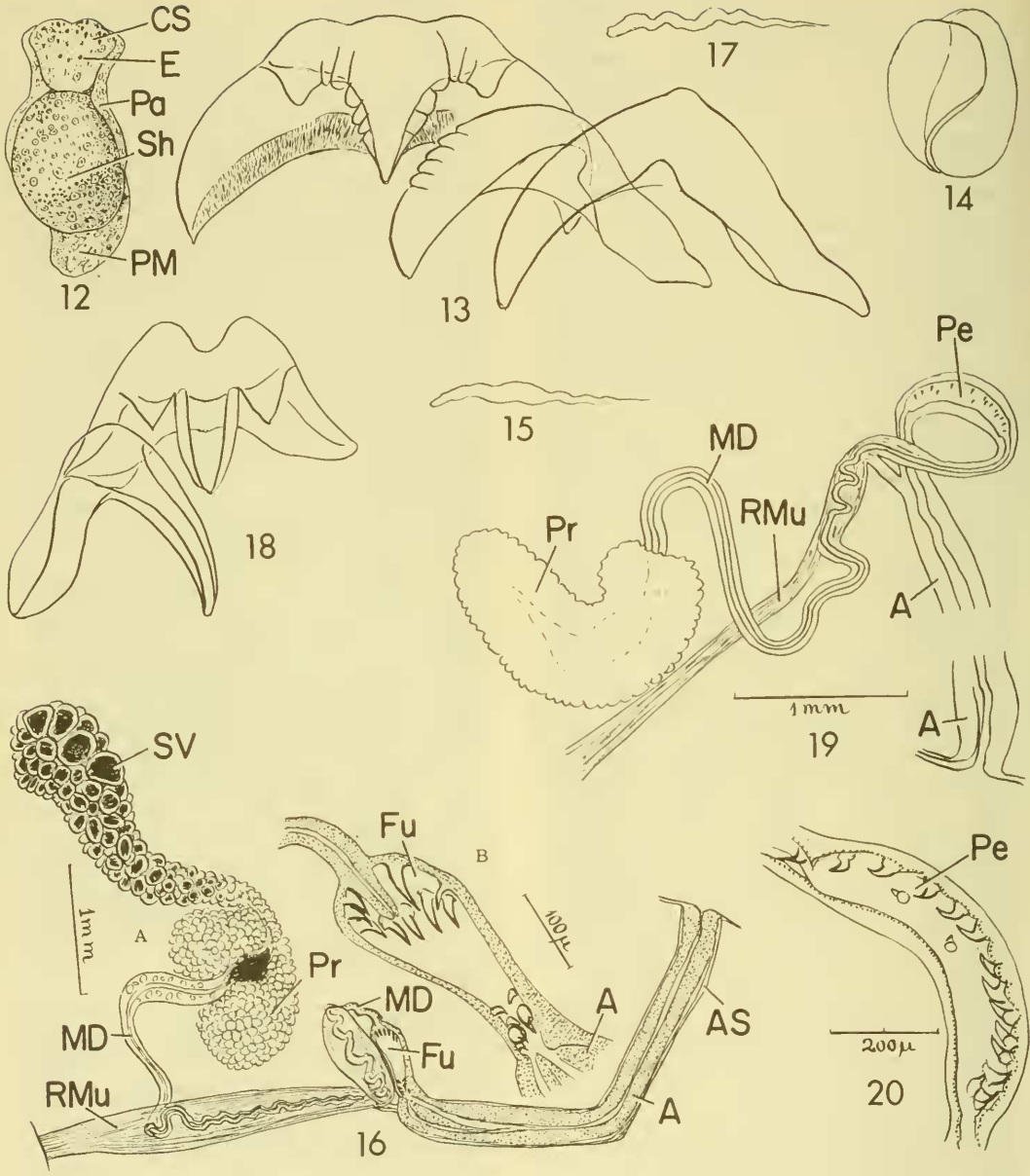
Occurrence: Parry Island, in sand, in about 2 m depth, in lagoon, about 17 m from shore; March 31, 1960.

Shell 10 mm high, 7.5 mm wide; greatest breadth in the middle. The ratio of the shell diameter to the shell height is 1:1.33. The shell (Fig. 14) is swollen, ovoid, with 1 1/2 whorls, very fragile, whitish, slightly shining, narrowed anteriorly and posteriorly. Under a magnifying lens fine growth lines can be seen, but no spiral striae. The outer lip is a little convex, covering the minutely perforate apex. The columella is deeply concave, its base reflected but adnate to the body whorl. The very low, broad callus extends to the apex.

The length of a measured crawling snail was about 17 mm; one of the larger preserved animals measured 11 mm in length. The ground color of the animal is pale green with small orange and maroon spots. On the cephalic shield and parapodia the larger orange spots are bordered with white. Very large white spots with orange centers occur under the shell. Confluent white patches occur on the tail. The foot is spotted much the same way as the cephalic shield and parapodia. The various pigment spots are of rather diverse size and density.

The cephalic shield of *Haminoea linda* is slightly notched in front, bilobed behind. The parapodia cover somewhat less than one-half the length of the shell. Hancock's organ (Fig. 15) is only a simple ridge, hence different from that known in other species of *Haminoea* (Guiart, 1901, p 104-105; Hoffmann, 1935, p 608).

The jaws are weak, their rodlets soft, and measure 4-5 micra in diameter. The radula contains about 25 rows, each row with 8 teeth per half-row. The rhachidian tooth (Fig. 13) is tripartite



FIGS. 12-16. *Haminoea linda*, n. sp. FIGS. 17-20. *Lamprohaminoea cymbalum*. Fig. 12. Living snail of *H. linda*, drawn from Kodachrome transparency, dorsal view. Fig. 13. Radula, central, 1st and 2nd lateral teeth. Fig. 14. Shell. Fig. 15. Right Hancock's organ. Fig. 16A. Diagram of male genital structures. B. Detail of penis. Fig. 17. Right Hancock's organ of *L. cymbalum*. Fig. 18. Radula, central and 1st lateral teeth. Fig. 19. Diagram of male copulatory organ; 1 mm of atrium omitted. Fig. 20. Detail of penis; A, atrium; AS, atrial sheath; CS, cephalic shield; E, eye; Fu, fundus of atrium; MD, male duct; Pa, parapodia; Pe, penis; PM, posterior mantle lobe; Pr, prostate; RMu, retractor muscle; Sh, shell; SV, seminal vesicle.

in front, its base is roughened, and its median cusp has lateral denticles. The lateral cusps of the rhachidian tooth are broad, blunt, smaller than the median cusp. The first lateral tooth has about 5 denticles on its inner side, which is quite uncommon in *Haminoea*. The remaining lateral teeth resemble those found in other species of the genus. The gizzard plates are greenish-brown with 17 smooth ridges.

The male atrium (Fig. 16A) in *Haminoea linda* is a long muscular tube (A) with a thin sheath (AS). The seminal groove becomes a narrow closed tube at the fundus of the atrium. The duct forms a short, conical dilatation with 6 cuticular spines at the entrance into this dilatation and 9 longer ones at its fundus (Fig. 16B (Fu)). Farther inward the duct (MD) continues as a narrow tube for a short way, then becomes embedded in fibers of the penial retractor muscle (RMu) and bends again toward the fundus of the atrium. Some fibers of the penial retractor muscle connect the duct and the atrium. The duct is also surrounded by the penial retractor muscle in its succeeding inward course, emerging from the muscle near its middle. The following free section of the duct is lined by a high, vacuolated epithelium. The duct opens into an acinous, nearly globose prostate gland (Pr), which is united entally with a clustery seminal vesicle (SV).

The name of this species is the female form of "lindo" = pretty (Portuguese).

Discussion of *Haminoea linda*

The color pattern of the new species is similar to that of *Haminoea ovalis* Pease, 1868 (Pilsbry, 1895, p 365, pl. 40, fig. 94; pl. 43, figs. 9-10, 17), and *H. aperta* Pease, 1868. However, the shell of *H. ovalis* is shorter, and that of *H. aperta* is longer. The shells of *H. vitrea* (A. Adams, 1850) (see Pilsbry, 1895, pl. 40, fig. 83) and of *H. rotundata* (Pilsbry, 1895, pl. 41, fig. 16) approach that of *H. linda*, but their radulae are quite different (Habe, 1952, pl. 21, figs. 28, 24).

In addition to the radula, the male copulatory organ of *Haminoea linda* also differs considerably from the corresponding structures known in other species of *Haminoea*. The Hancock's organ of *H. linda* is similar to that of *Lamprohaminoea cymbalum* (Fig. 17).

5. *Lamprohaminoea cymbalum* (Quoy and Gaimard, 1833)

(Figs. 17-20)

Pilsbry, 1895, p 367, pl. 40, figs. 6, 7; Bergh, 1901, p 230-231, pl. 19, figs. 6-8; Pruvot-Fol, 1934, p 25; Habe, 1952, p 151, pl. 20, fig. 15; Zilch, 1959, p 43, fig. 141.

Occurrence: Reef on South end of Parry Island. Part of our specimens were collected by Prof. H. van der Schalie.

Further distribution: Kerimba Islands, northern Mozambique; Reunion; Mauritius; Port Lincoln, South Australia; Nagasaki, southern Japan; Guam, Mariana Islands (original locality); New Caledonia.

The height of our shells measured up to 12 mm and the greatest breadth, slightly anterior to the middle part of the shell, was 7.2 mm. The shell has 1 1/2 whorls, is subglobose, fragile, pellucid, white and narrowed posteriorly. Growth lines are distinct in some shells, but may not be developed in others. The aperture is wide in front, narrowed behind. The outer lip is slightly convex, overtops the apex, rising from the center of the sunken spire. The columella is deeply concave; its basal callus forms a narrow reflection over the inner lip.

The length of preserved, well anesthetized adult animals is about 18 mm, their breadth 9 mm. Their color in life is bright green with bright orange spots. The mantle of preserved snails when removed from their shells shows large light spots and small brown and orange ones. The cephalic shield is

notched in front, bilobed behind. The parapodia are scarcely half as long as the shell. Hancock's organ (Fig. 17) is a simple undulated ridge, as in the preceding species.

The jaws of *Lamprohaminoea cymbalum* consist of rodlets which measure 6 micra in diameter. The radula studied (Fig. 18) comprises 36 rows and 14 lateral teeth per half-row. The rhachidian tooth is high, with a smooth base and a long median cusp flanked by two smaller ones. The lateral teeth are rather uniform; all lateral teeth, including the first lateral, lack denticles on their cusps. The cusp is longest in the middle of the half-row. The gizzard plates are chestnut brown, with 17 smooth ridges.

The atrium in *Lamprohaminoea cymbalum* (Fig. 19, A) is long, muscular and without a special sheath. The fibers of the penial retractor muscle (RMu) insert on the inner end of the atrium. Entally to the atrium the male duct has a spiny, strongly muscular section (Fig. 20, Pe) and farther inward a smooth, thin-walled section (MD). For a part of its course this thin section is embedded in the retractor fibers (RMu); it opens into the prostatic gland (Pr). The prostate gland is sausage-shaped, entirely glandular, undivided and without a separate seminal vesicle.

Discussion of *Lamprohaminoea cymbalum*

This species approaches *Haminoea linda* in the similarity of its simple Hancock's organ and the absence of a penial papilla. Both species have a spinous loop in the male duct. In *H. elegans* there are many rows of spines on the penial papilla (Marcus, 1958b, figs. 18-20).

6. *Dolabrifera dolabrifera* (Rang, 1828)

Marcus, 1963, p 10 (bibliography).

Occurrence: Under rock on seaward tide flat at the north end of Parry Island, March 25, 1960.

Further distribution: Circumtropical and circumsubtropical, but not yet recorded from the American Pacific coast.

According to Engel's revision (1936, p 29-43) only *Dolabrifera nicaraguana* Pilsbry, 1896 (p 124) from the west coast of Central America and *D. variegata* (Risbec, 1928b, p 54) from New Caledonia are valid species of the genus besides *D. dolabrifera*. Pruvot-Fol (1954, p 13) considers the subequal prongs of the lateral radular teeth of her material from Tahiti, Society Islands, a distinction separating it from *D. dolabrifera*, but Eales (1944, p 7-8, fig. 9A) shows similar characters to occur also in *D. dolabrifera*. Farran's (1905) *maillardi* Deshayes, 1863, whose name Pruvot-Fol uses, was united with *D. dolabrifera* by Engel (p 39).

The shell and male copulatory organ of the material from Eniwetok agree with *D. dolabrifera*, and the lateral teeth of the radula have subequal prongs.

7. *Stylocheilus longicauda* (Quoy and Gaimard, 1824)

Engel, 1927, p 105-107, figs. 17-25; 1936, p 55-72, figs. 24-43; Marcus, 1963, p 11-15, figs. 10-21.

Occurrence: In tide flats of Eniwetok Island, March 4, 1960.

Further distribution: Circumtropical; not yet recorded from the west coast of America.

Preserved specimens measure about 35 mm in length. Living animals exhibit long tails and arborescent papillae. They are brownish with fine dark longitudinal striae, white spots, and a few blue ocelli. This color pattern and the spines of the penis are characteristic of *Stylocheilus longicauda*.

8. *Chromodoris fidelis* (Kelaart, 1859)

(Fig. 21)

Doris fidelis Kelaart, 1859, p 295.
Chromodoris flammulata Bergh, 1905, p 151-152, pl. 4, fig. 9, pl. 16, figs. 16-19; Risbec, 1928a, p 137, fig. 35, pl. 8, fig. 8.
Chromodoris lactea Bergh, 1905, p 159-160, pl. 16, figs. 40-43.
Chromodoris fidelis Eliot, 1906a, p 642-643, pl. 42, fig. 2; 1909, p 91-92.
Glossodoris fidelis Risbec, 1953, p 66; Baba, 1953, p 208, figs. 4, 6, H-I.

Occurrence: Under rock at about 3 m depth on lagoon side near shore of Eniwetok Island; collected by Mr. Richard Willis, March 27, 1960.

Further distribution: Ceylon (original locality); Malay Archipelago, East coast of Sumbawa and Kwandang Bay, North coast of Celebes; Seto, Kii Peninsula, Japan; New Caledonia.

The living animal extends to 30 mm, and at such a length has a width of 6 mm. The broad fore end is nearly straight. The short triangular tail protrudes from under the mantle. The border of the mantle is slightly wavy; its front and sides are somwhat broader than the body.

The notum and underside of *Chromodoris fidelis* are pale creamy white. The edge of the back is yellow with about 20 maroon projections of different lengths entering the creamy notum. The maroon projections are edged by a fine thread of opaque white.

The tentacles are short and digitiform. The rhinophores are about 4 mm high, with 15-16 dark orange lamellae which are lighter toward the tip of the rhinophore. The stalks of the rhinophores are rather transparent, but opaque whitish on the inside. There are 5 unipinnate, whitish gills, the front one shorter than the others.

The foot of *Chromodoris fidelis* has acute lateral angles in front; it is widened in the posterior third, lanceolate behind.

The labial armature consists of short, bifid and bent rods which stand in rows. The radula contains 45 rows with 42 teeth in the half-row. The rhachis is naked, without thickenings or false plates.

The eggs in the spawn show dark yellow caps directed towards the beginning of the egg string on larger light yellow spheres.

Discussion of *Chromodoris fidelis*

The synonymy given above is that presumed by Eliot (1909) and maintained in Pruvot-Fol's (1951, p 103, 104, 114) revision. The unusual appearance of the labial armature occurs in Eliot's material from the original locality and in our material from Eniwetok. This character has not been mentioned by Bergh, Risbec or Baba. Eliot's material from Ceylon had traces of triangular thickenings on the rhachis. In *C. flammulata* the rhachis is naked as it is in our material. In *C. lactea* and in Baba's specimens there is a small, though distinct, rhachidian tooth. Risbec did not describe the rhachis. Pruvot-Fol (1951, p 77-78) considers the presence or absence of radular elements on the rhachis as systematically insignificant; therefore, her synonymy was adopted here, though with some doubt.

Doris preciosa Kelaart, 1858 (year according to O'Donoghue, 1933, p 226) is systematically near *Chromodoris fidelis*. The rhinophores and gills of *C. preciosa* are red or black (Eliot, 1909, p 92) and evidently the color of these organs varies also in *C. fidelis*. They were described as black or dark violet, but are dark orange in our material. *C. lata* Risbec, 1928, which, as Pruvot-Fol indicates, approaches *C. fidelis* in characters, is maintained as a distinct species by Risbec (1953, p 74).

9. *Chromodoris briqua*, new species

(Figs. 22-24)

Occurrence: Eniwetok Atoll; collected by Mr. Richard Willis, March 27, 1960.

The animal is broadly elliptic, evenly rounded in front and behind (Fig. 24). Length of living, but not crawling, slug is about 32 mm, its breadth 16 mm. The free mantle border is 4 mm broad on either side, covering the head and hind

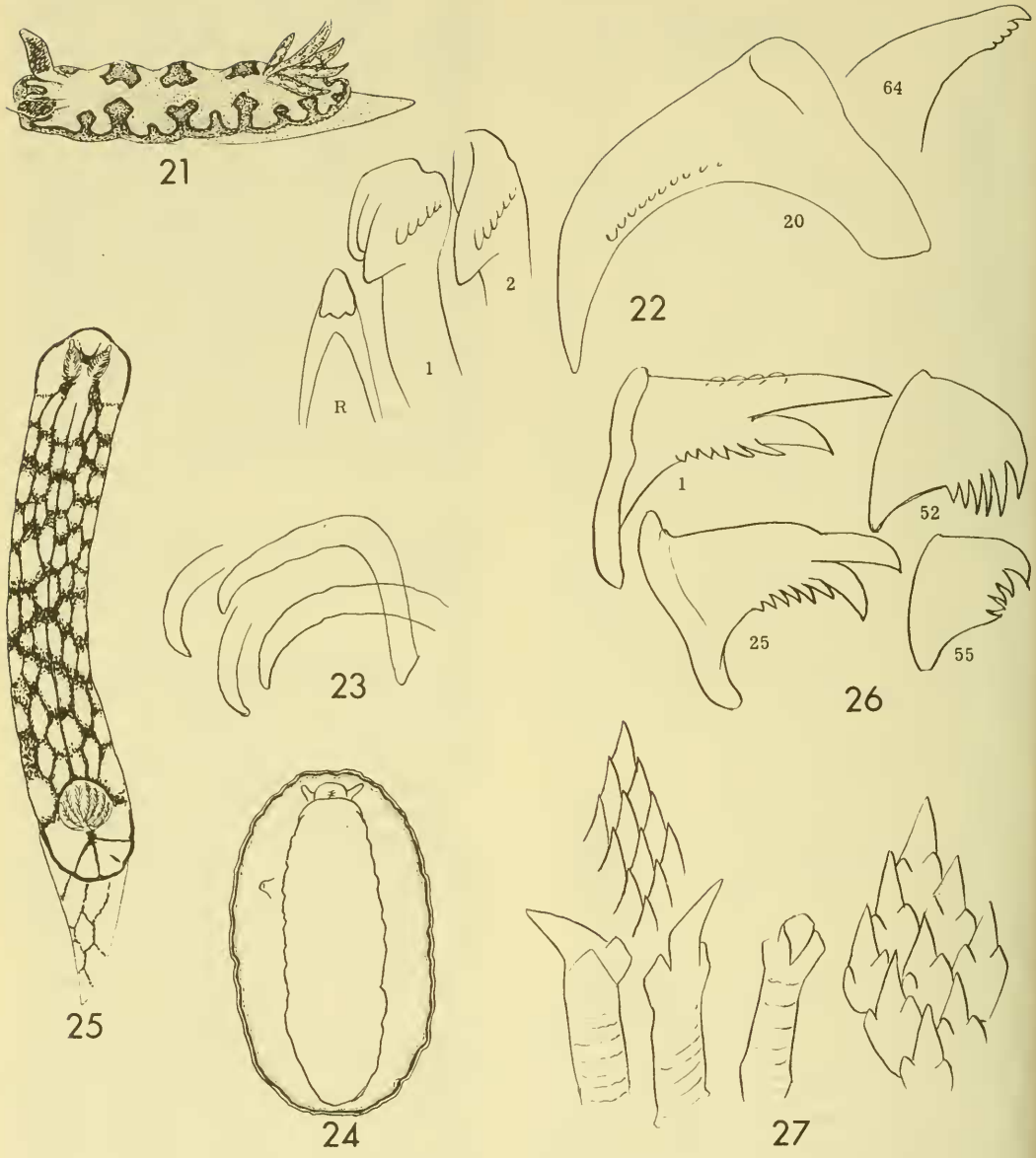


FIG. 21. *Chromodoris fidelis*. FIGS. 22-24. *Chromodoris briqua*, n. sp. FIGS. 25-27. *Hypselodoris hilaris*. Fig. 21. *C. fidelis*, living snail drawn from Kodachrome transparency, side view. Fig. 22. Radular teeth of *C. briqua*. Fig. 23. Labial rods. Fig. 24. Ventral view, from living animal. Fig. 25. Dorsal view of crawling slug of *H. hilaris*, drawn from Kodachrome transparency. Fig. 26. Radular teeth. Fig. 27. Labial armature.

end of the foot when the animal is at rest. The outline of the mantle is slightly fringed, the undulation more pronounced in the preserved specimen.

The notum is smooth, without spicules in the animal put directly into 70% ethyl alcohol. The general color of the living animal is yellowish-orange (actually a

yellow background with red spots). The notal margin has a narrow outer, light blue stripe accompanied by a broader inner, deep purple one. The underside of the mantle and the sole are yellow; in addition to the blue and purple lines noted above, the underside of the mantle has a third, narrow, innermost maroon one.

The tentacles are orange, digitiform; the rhinophores maroon, speckled with white, their 28-30 lamellae disposed horizontally in the preserved specimen. There are about 10 unipinnate gills, on one side of which are some secondary, probably regenerated, plumes. The anterior border of the branchial pocket is raised; the color of its membrane and center is yellow. The gill leaves are maroon ringed with white. The anal papilla has 4 rings of white spots.

The foot is evenly rounded in front and behind in the living quiescent slug; in the preserved specimen a blunt tail protrudes from under the mantle. The anterior pedal border is transversely grooved, without a notch. The lateral pedal corners are rounded, not expanded.

The labial cuticle of *Chromodoris briqua* has a dorsally interrupted grasping ring constituted of dark red curved rods (Fig. 23) with a simple, exceptionally bifid, tip. The radula (Fig. 22) has 54 rows, each row with a rhachidian tooth and 63-64 teeth per half-row. The central tooth is rather strong, 50 micra high, with a broadly triangular, wavy edged cusp measuring 13 micra. The innermost lateral tooth is about 80 micra high, its short cusp having 2 broad inner and 5 small outer denticles. The second lateral tooth is a little higher and with a longer cusp and without inner denticles. The cusp grows successively longer on the outer lateral teeth and bears up to 8 outer denticles. The height of the base attains 104 micra in the 12th lateral tooth. High, hook-shaped lateral teeth continue outwards; the outermost 10 teeth decrease in height and length of cusp, becoming laminar with a denticulate edge.

The gonad appears as a cap on the front of the intestinal gland; its ampulla is distended by sperm. The male duct has a proximal, much convoluted, soft prostatic part and a straighter distal one. It appears silky, due to its muscular sheath. The spherical spermatheca and the pyriform spermatocyst are attached to one another at the proximal end of the vagina. Near this point the fertilizing (uterine) duct leaves the vagina. The male and vaginal apertures are united on the genital papilla, with the nidamental opening immediately behind it. A vestibular gland, an organ not constantly occuring in *Chromodoris* (see Odhner, 1934, p 250-251) was not found.

Between the epidermis and the body-wall musculature are soft white and red spherules, probably glands, and a white, fibrous network.

The name of the species is derived from "brique" = brick.

Discussion of *Chromodoris briqua*

The specimen was compared with all species of Pruvot-Fol's revision (1951) and with the Indo-Pacific ones later described by Baba (1953), Burn (1957; 1961; 1962), Farmer (1963), Gohar and Aboul-Ela (1957), Pruvot-Fol (1954) and Risbec (1956).

The Chromodoridinae have either a naked rhachis, a thickening of the cuticle, or a dwarf central tooth with or without a cusp. *Chromodoris briqua* has a dwarf central tooth with a cusp. Species in which the rhachidian tooth is of normal or nearly normal height, and has a projecting cusp (genera *Cadlinella*, *Lissodoris* and *Risbecia;* see Odhner, 1934, p 247-249), and those species in which the cups of the rhachidian tooth is split into subequal denticles, are now excluded from the genus *Chromodoris* (Pruvot-Fol, 1951, p 77). However, a subfamiliar separation between a projecting cusp (in Cadlinellinae) and a subdivided one (in Chromodoridinae) is not recommendable (Marcus, 1959, p 33). The difference between an entire cusp (*C. amoena* Cheeseman, see Odhner, 1934, text fig.

14) and a denticulate one (*C. juvenca* Bergh, 1898, pl. 31, fig. 7) is reduced by the wavy edge of the rhachidian cusp in *C. briqua*.

The presence or absence of a tooth-like structure on the rhachis is in many cases a specific character. A contrary conclusion may be inferred from White's discussion (1951, p 244) of *C. runcinata* Bergh, but actually she slipped into O'Donoghue's description (1929, p 820) of *C. inornata* Pease. There are only a few species of *Chromodoris* with a dwarf, cusp-bearing rhachidian tooth and we will mention several examples: *C. alderi* Collingwood, 1881; *C. amoena* Cheeseman, 1886; and *C. aureopurpurea* Collingwood, 1881, and refer to Baba (1949, text figs. 52, 54) and Odhner (1934, fig. 14) for their radulae. Bergh (1892, p 1110) united *C. alderi* with *C. reticulata* (Pease, 1866). He was followed by Eliot (1904, p 386), Farran (1905, p 341), Baba (1933, p 169), and Allan (1947, p 444), though not by Pruvot-Fol (1951, species nos. 11 and 168).

The combination of the radula with the labial armature and the broad mantle having a bicolored border warrant a specific distinction for *Chromodoris briqua*. According to Haefelfinger (1959) the color marks seem to be even more specific than is frequently assumed. The above-mentioned subcutaneous spherules also occur in other Chromodoridinae (Pruvot-Fol, 1954, p 25-26).

10. *Hypselodoris hilaris* (Bergh, 1890)

(Figs. 25-27)

Chromodoris hilaris Bergh, 1890, p 935-937, pl. 86, figs. 11-15; C. h. var. Eliot, 1904, p 396.

Chromodoris lineata Eliot, 1904, p 396-397, pl. 24, fig. 7.

Glossodoris hilaris Baba, 1953, p 210-211, figs. 5, 6, J-K; Risbec, 1956, p 9.

Occurrence: Eniwetok Atoll, Annai-anni Island, in water about 2 m deep, on the edge of a large stone in lagoon about 7 m from shore.

Further distribution: Zanzibar; Bay of Suot, Nhatrang, Vietnam; Ambon (original locality); Seto, Kii Peninsula, Japan.

The animal (Fig. 25) measures 40 mm in length and 5 mm in width when stretched out and crawling. It is rounded and sometimes broadly expanded in front, pointed behind. The free border of the mantle is a little broader than the foot; it covers the head of the crawling slug, leaving the tapering tail free.

The color is white with 5 reddish-purple longitudinal lines on the notum and one around the margin. These lines are united by irregular transverse connections. In the living and the preserved specimen the white areas between the dark meshes are a little raised. The color markings of the head, tail, and the post-branchial area are shown in Fig. 25. The notum contains small papillae which are probably outlets of glands. As in many Chromodoridinae (see Marcus, 1955, p 126), there are 3 rows of light glands on the hyponotum. There is a lavender band on the edge of the foot which shows through in ventral view.

The tentacles of *Hypselodoris hilaris* are digitiform and white with lavender bases. The same lavender pigment occurs along the anterior border of the foot. The rhinophores are 4 mm high, with 15 lamellae, and deep orange in color, except at the tips, where they are white. In front of the rhinophores, where the eyespots show through, the pigment is lighter. There are 10 unipinnate gills; their afferent (inner) sides are white, their efferent (outer) sides are orange.

The foot has a transversely grooved anterior border, without a notch. The lateral angles of the foot are marked, though not projecting.

The labial cuticle (Fig. 27) is strengthened in 2 lateral areas which are connected by a thinner median zone, that bears simple scale-like platelets. The same type of platelets occur also

on the low marginal parts of the thickened areas. The tips of the central rods are subdivided into a long cusp and 2 smaller ones, one of which is stronger than the other. The radula (Fig. 26) comprises about 72 rows, with about 55 teeth per half-row. The rhachis is naked. Most of the teeth are bicuspidate, with the upper cusp longer than the lower one. The innermost tooth of each half-row has up to 4 inner and 6 outer denticles. The other teeth have only outer denticles. About 5 of the marginal teeth are laminar and have a single cusp followed by some denticles.

Discussion of *Hypselodoris hilaris*

The present material differs from *Chromodoris briqua* in having more color marks on the tail and stronger connections between the longitudinal lines of the notum. The type has only 4 longitudinal lines on the notum, 2 on either side of the middle.

Eliot's above-mentioned *Chromodoris lineata* (1904) is *H. hilaris* (Baba, 1953). Later, Eliot (1910, p 430) pointed out the resemblance of *Doris magnifica* Quoy and Gaimard, 1832, and *D. lineata* Eydoux and Souleyet, 1841, to *H. hilaris*. The former is identical with *Chromodoris quadricolor* (Rüppell and F. S. Leuckart, 1828) (see Pruvot-Fol, 1934, p 71-72). The 5 violet lines on the back of *C. lineata* are raised (see Barnard, 1927, p 183). The labial armature and the radulae of the original specimens were not described. Therefore, the name *lineata* cannot replace *hilaris*.

Pruvot-Fol (1951, p 84) thinks that *Chromodoris alderi* Collingwood, 1881, might be the full-grown stage of *H. hilaris*, but *C. alderi* has unicuspidate radular teeth, hence is a *Chromodoris* as defined by Odhner (1957), not a *Hypselodoris*.

11. *Gymnodoris bicolor* (Alder and Hancock, 1864)

Trevelyana bicolor Alder and Hancock, 1864, p 440, pl. 29, figs. 11, 12.

Gymnodoris bicolor Macnae, 1958, p 358-359 (full synonymy; add:

Trevelyana bicolor ? Eliot, 1904, p 89, pl. 4, figs. 1a-c).

Occurrences: (1) Under stone on the seaward tide flat at the central part of Parry Island; March 23, 1960; (2) on north end of Japtan Island, March 28, 1960.

Further distribution: Inhaca, Delagoa Bay, Mozambique; Zanzibar; Ceylon; near Madras (original locality); Vietnam; Japan, from Sagami Bay to southern Kyushu; Palau Islands; New Caledonia; Samoa (Eliot, 1899, p 520).

One of the larger specimens was 15 mm long and 4 mm broad when crawling, stretching out at times to 19 x 3 mm. The back is orange or yellow with tiny bump-like or spike-like papillae which have orange tips. Subepidermal yellow glands also occur on the back. The frontal veil is broadly rounded, its edge has a dozen short languettes of different sizes. The tail is pointed.

The tentacles are short but extensible and are inserted on the oral disc which is connected with the anterior border of the foot. The rhinophores have about 15 lamellae and are yellow with orange tips. There are black eyespots between the posterior borders of the rhinophorial pockets. One specimen had coalesced rhinophores (see also Hoffmann, 1933, p 216-217). The genital papilla is at the level of the anterior border of the branchial pocket. There are 10 gills, the anterior ones slightly larger than those flanking the anus.

Our specimens of *Gymnodoris bicolor* had no labial plates. The radula of the examined specimen had 20 rows of teeth with about 25 teeth per half-row. The rhachis was naked. The innermost lateral tooth is brown, bigger than the following colorless teeth. The cusp of the second tooth is a short sharp point rising from a wide base as figured by Bergh (1877, pl. 56, figs. 19-23) and Baba (1949, text fig. 35). The bases of the following teeth are narrower than the

base of the second, but they are also strong. Their cusps are long, nearly straight and slightly curved at the tip. A few outermost teeth are smaller.

The smaller slug (from Parry Island) was observed biting the larger one (from Japtan Island) in the genital region. The latter specimen was preserved with everted penis. Risbec (1928a, p 188-189, text fig. 57 bis) interpreted an identical observation of the same species as an attempt of the animal in the female phase to squeeze sperm out of the gonad of the slug in the male phase. Risbec found non-synchronous development of oögenesis and spermatogenesis as well as simultaneous hermaphroditism in *Gymnodoris bicolor*.

Discussion of *Gymnodoris bicolor*

The only originally described species of *Gymnodoris* Stimpson (1855, p 379) had 9 gills. It is certainly a *Trevelyana* Kelaart, 1858, as understood by Alder and Hancock (1864) and Bergh (1877; 1905). The types of the closely related genera, *Nembrotha* Bergh, 1877, p 450; *Paliolla* Burn, 1958, p 7; and *Tambja* Burn, 1962, p 98, have fewer gills. Vayssière (1912, p 8) suggested a subgeneric separation of *Trevelyana striata* Eliot, (1908, p 100) and Risbec (1928a, p 193) separated this species from *Gymnodoris* by its color marks as *Analogium*, a genus with 10 gills. Macnae (1958, p 355) doubted whether Risbec's genus was necessary.

Stimpson's species, *Gymnodoris maculata*, from the Ryukyu Islands cannot be defined without knowledge of its radula. Therefore, the substitution of *Gymnodoris* for *Trevelyana* (O'Donoghue, 1929, p 733) is debatable. But since the most recent publications (Risbec, 1956; Macnae, 1958; Baba, 1960a; Burn, 1962) all use *Gymnodoris*, their example is followed here.

12. *Dendrodoris nigra* (Stimpson, 1855)

Doris nigra Stimpson, 1855, p 380.
Doridopsis nigra Alder and Hancock, 1864, p 128, pl. 31, figs. 13-16.
Doridopsis arborescens Collingwood, 1881, p 134-135, pl. 10, figs. 15-17.
Doriopsis nigra + ***nigra*** var. + ***nigra*** var. ***luteopunctata*** Bergh, 1905, p 169-172, pl. 2, figs. 13-14.
Dendrodoris nigra Baba, 1935, p 348-349, text fig. 12, pl. 6, fig. 2; 1949, p 69, 154-155, pl. 26, figs. 98-99.

Occurrences: (1) Central part of Parry Island; and (2) under stones at the north end of Japtan Island. A total of 13 specimens were collected from March 23 until April 8, 1960.

Further distribution: Indo-West Pacific Ocean from the Red Sea, Zanzibar, and Mozambique to the Abrolhos Islands, West Australia; Sydney (*D. melaena* Allan, 1932, p 98; name corrected by hand in the copy received in 1954 from Mrs. Allan), and Japan (from the Ryukyu Islands to Mutsu Bay, Lat. 40° 52' N). Also from the Gilbert Islands (material of the U. S. Nat. Mus., seen by E. Marcus) and New Caledonia.

Length of the animal is 8-35 mm. The color of the notum is black with white spots occurring singly or in clusters. There is an inner red and an outer black border in some specimens. The tips of the rhinophores are white, the border of the foot reddish. The anal papilla is in the mid-line, a little behind the circle of gills.

A spiral egg-ribbon, faint yellow, 2 mm high, 10 mm in diameter, was spawned by a 25 mm-long slug.

13. *Dendrodoris erubescens* (Bergh, 1905)

Doriopsis erubescens Bergh, 1905, p 173-174, pl. 3, fig. 15.
Dendrodoris communis Risbec, 1928a, p 67-69, text fig. 7, pl. A2 (p 114), pl. 1, fig. 6.
Dendrodoris erubescens Risbec, 1953, p 22-23, figs. 2 d-i, fig. 4; 1956, p 26-27.

Occurrence: Japtan Island, under

rock, seaward tide flat, 1 specimen, collected by Dr. William H. Heard on March 8, 1960.

Further distribution: Vietnam; Salajar Island, Flores Sea (original locality); New Caledonia.

This is a small species, our specimen measuring 8.5 mm in length. The notum is pale pink, the central area darker, more orange. There are about 10 raised spots on the notum, which were colored orange with white centers. The anal papilla completes the circle of gills, which comprises 2 branchial buds and 6 brownish gills. The gills are unipinnate, although one of them is beginning to develope secondary pinnules.

D. erubescens is similar to *D. rubra* (Kelaart, 1858) which ranges from the Red Sea to Japan and is mentioned in most reports from the Indian Ocean, e.g. by Alder and Hancock (1864, p 126, pl. 31, figs. 1-2); frequently *D. rubra* is described and figured as somewhat spotted. Since Bergh (1905, p 176), as well as Risbec (1956, p 22), both of whom failed to refer to this similarity in color, classified *D. rubra* as well as *D. erubescens*, these two species are probably distinct.

14. *Herviella claror* Burn, 1963

(Figs. 28-30)

Burn, 1963, p 18-19, figs. 11-15.

Occurrence: North end of Eniwetok Island on the lagoon side, under submerged rocks in about 10 cm of water at low tide. The 3 specimens were collected by Dr. William H. Heard, April 2-12, 1960.

Further distribution: Woody Head, north of Clarence River Heads, northern New South Wales.

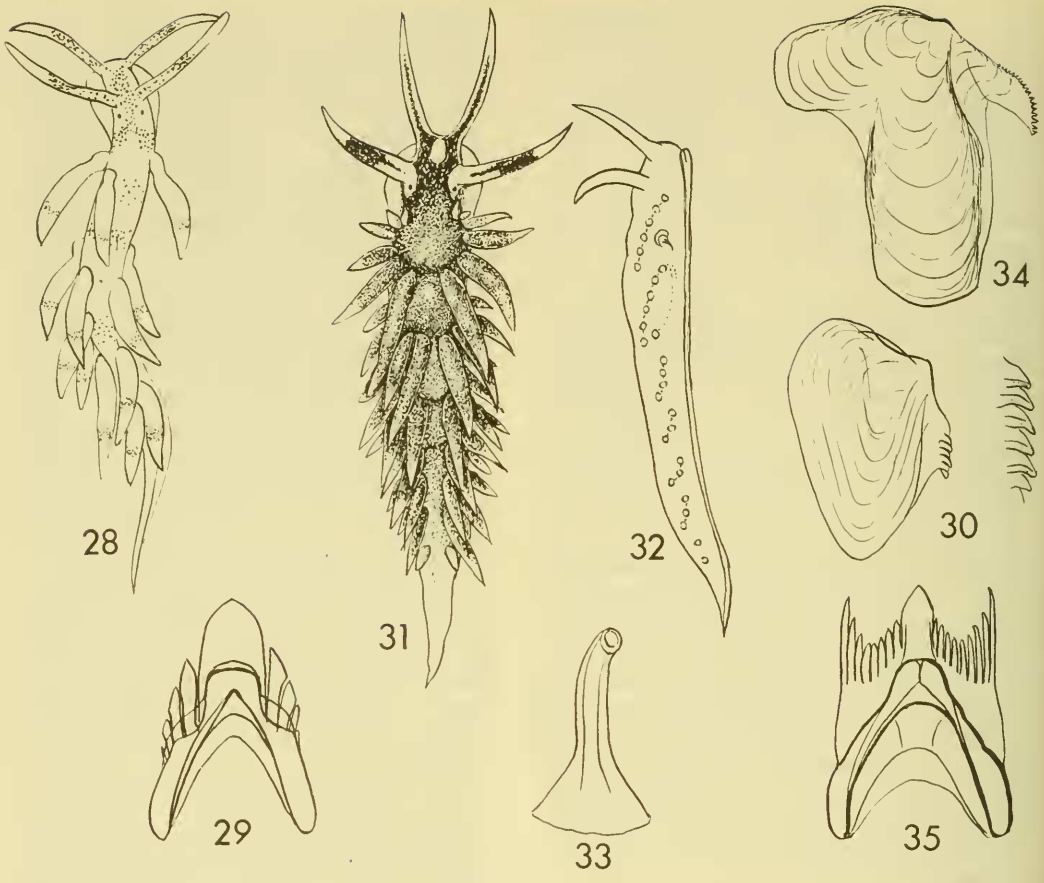
The length of the adult living animal is about 8 mm. The body is slender, ending in a long pointed tail (Fig. 28). The general color is light yellow; the back is speckled with single large melanophores. There are white transverse bands between the rows of cerata. The rhinophores and the basal 2/3 of the tentacles are speckled with black; the tips of the tentacles have opaque white granules. The cerata are white with an orange ring in the upper third. The yellowish-gray diverticula of the intestinal gland shine through the cerata.

The tentacles and rhinophores of *Herviella claror* are smooth, of about equal length. The foot is rounded in front, bilabiate, broader than the head. The cerata are fusiform, forming 4 rows, the foremost of which belong to the right and the left anterior "liver." The rows contain 3, 4, 2 and 2 cerata, respectively, from front to rear. The genital aperture is under the first row of cerata, the anus close behind the second row.

The jaw (Fig. 30) is oval in shape and horn-colored. The masticatory process is short with 6 big, inclined denticles. There are 11 horseshoe-shaped radular teeth; each has a broad median cusp and 3-4 strong denticles on either side (Fig. 29).

Discussion of *Herviella claror*

The type species of *Herviella* Baba, 1949 (p 107, 180), is *H. yatsui* (Baba, 1930; 1937, p 328, pl. 2, fig. 2) from the Pacific coasts of middle and southern Japan. Other species are *H. affinis* Baba (1960b, p 81) from the Sea of Japan (Toyama Bay) and the Pacific coast (Osaka Bay) of Japan, *H. exigua* (Risbec, 1928a, p 245; 1953, p 134) from New Caledonia, and *H. claror* Burn, 1963, from the east coast of Australia (29° 20' S). *H. exigua* differs from the other species by lateral denticles of equal length on the radular tooth. *H. yatsui* and *H. affinis* have more slender cerata than the Australian *H. claror* and the Eniwetok specimens; the proportion of length to breadth of their jaws is 5:4 against 7:4 in *H. claror* including our specimens from Eniwetok. The number of denticles on the masticatory process is 7-12 in *H. yatsui* and 12 in *H. affinis* in contrast to 6 in *H. claror*, including



FIGS. 28-30. *Herviella claror*. FIGS. 31-35. *Herviella mietta*, n. sp. Fig. 28. Living slug of *H. claror*, drawn from Kodachrome transparency, dorsal view. Fig. 29. Radular tooth. Fig. 30. Jaw and masticatory denticles. Fig. 31. Dorsal view of living slug of *H. mietta*, n. sp., drawn from Kodachrome transparency and from living animal. Fig. 32. Right rows of cerata. Fig. 33. Penial stylet. Fig. 34. Jaw. Fig. 35. Radular tooth.

our specimens. Therefore, the identification of the species from Eniwetok with the geographically most distant one is unavoidable.

15. *Herviella mietta*, new species

(Figs. 31-35)

Occurrence: North end of Eniwetok Island on the lagoon side, in about 10 cm of water at low tide, under submerged rocks (13 specimens), and Annaianni Island (3 specimens collected by Dr. William H. Heard; April 2-12, 1960).

Living animals measure 7-11 mm. Their bodies are slender with pointed tails (Fig. 31). Two color types are represented in our material. The first type is light and transparent, the back is covered with white granules, the head has a black pattern, there is a black band on the rhinophores, some black pigment on the tentacles, and the yellow diverticula of the intestinal gland may be seen in the cerata (which also have white cnidosacs and, in their basal third, brown pigment). The second color type is dark, the back and the upper part of the sides of the foot are black, the rest of the foot and sole are white,

the tentacles have a narrow black longitudinal stripe, there is a black band on the rhinophores, there are light halos around the eyes and between the tentacles, and the cerata are black, with a white cnidosac and the yellow intestinal gland showing through.

The smooth tentacles of *Herviella mietta* are 1/3 of the body length. The rhinophores are also smooth and a little shorter. The foot is rounded in front and bilabiate. The cerata are long and fusiform, thinner than those of *H. claror*, caducous, and arranged in 5-6 rows on each side (Fig. 32). The first ceras of each row is the smallest. The hindmost cerata of one row cover the foremost cerata of the following row. All rows of cerata are slightly curved, although not arched in a horseshoe shape. The first row (with 5-6 cerata) on either side represents the anterior liver. The posterior liver branches have 6-3 cerata. The genital opening is under the first row and the anus is at the end of the second row. In 1 specimen the brown penial stylet (Fig. 33) projected from the genital aperture. This stylet measured 84 micra in length.

The jaw is dark, long and expanded dorsally (Fig. 34). The masticatory process bears 18 smooth denticles, the hindmost of which is the largest. The radular teeth (Fig. 35) are horseshoe-shaped, 18 in number, with very strong central cusps flanked on either side by 8-9 thin, pointed denticles. The denticles first decrease and then increase in length. The tips of the longest, outermost denticles curve slightly inward.

The name of this species is derived from "miette" = trifle, crumb.

Discussion of *Herviella mietta*

The jaw resembles that of *Caloria* (Facelinidae) or of *Dondice* (Favorinidae, Facalaninae) and the radular teeth, whose long lateral denticles are somewhat similar to those of the pectinate tooth of *Cerberilla*, are quite peculiar characters of the new species. It belongs to those Favorinidae which have single rows of cerata on the liver branches, i.e., to the Favorininae (Marcus, 1958a, p 59). Among the genera of this subfamily (Marcus, 1960a, p 922, 924) only *Cratena* Bergh, 1864 (according to Lemche, 1964, *Rizzolia*), or *Herviella* Baba, 1949, can perhaps receive the present species. Its simple anterior liver branches and the armed penis show that it is better included in *Herviella* than in *Cratena*, as defined by Macnae (1954, p 29).

From the lateral view of the radular tooth of *Herviella yatsui* (Baba, 1949, text fig. 146B) it seems that in that species also the outermost denticle is longer than the inner ones. Moreover, the general color of *H. yatsui* is also extremely variable (Baba, 1937, pl. 2, fig. 2; 1949, pl. 47, figs. 159-161).

16. *Onchidella evelinae*, new species

(Figs. 36-39)

Occurrence: In cracks in coral slabs above water line (at low tide) on the lagoon side at the north end of Eniwetok Island, April 5, 1960.

The average length of the adult living slugs (Fig. 36) is 6 mm, their breadth 4 mm. In a preserved animal 4 mm long the sole is 2.5 mm broad; the hyponotum of one side measures 1 mm. The mantle is strewn with little raised warts, which coalesce in part and contain glands. Small nodules can be seen between the warts. The general color of the notum is yellowish, with the underlying dark greenish intestinal gland showing through the central part. The border of the notum is lightly colored. There is dark pigment particularly around the bases of the warts, but their tops have very little or no pigment. There are 16-20 pigment-free marginal papillae. The hyponotum and sole are whitish, the latter with dark pigment in one specimen. The hyponotal line is 0.6 mm from the edge. Between the edge and the hyponotal line are small glandular papillae. The skin between the hyponotal line and the sole

is smooth.

The opening of the mantle cavity is covered by the tip of the foot. The female aperture is located to the right of the mantle cavity opening. The distance of the pneumostome from the border is about 1/4 of the breadth of the hyponotum.

The peritoneum is not pigmented. The jaw of a preserved 4 mm specimen is 0.2 mm broad, yellowish, and shaped like that of other species, e.g., *Onchidella patelloides* figured by Wissel (1904, fig. 77). The radula comprises 50-60 rows with 40-48 teeth per half-row (Fig. 38). The rhachidian tooth is tricuspid, its median cusp the largest. The innermost pleural tooth measured 16 micra high; the one following it is 26 micra high. The other pleural teeth are all nearly the same size, decreasing gradually toward the outside of the radula. The terminations of the mesocones are pointed; the points are worn in the oldest 1/3 of the radula. The intestine is like that of Plate's (1893, p 121) 4th type, but the descending limb is still farther to the right than that in *O. celtica* (pl. 8, fig. 32). A sectioned slug, about 3 mm in length after preservation, has a smooth lung. The right and left halves of the kidney are symmetrical, without lamellae. The recurrent limb of the kidney runs ventrally to the right half.

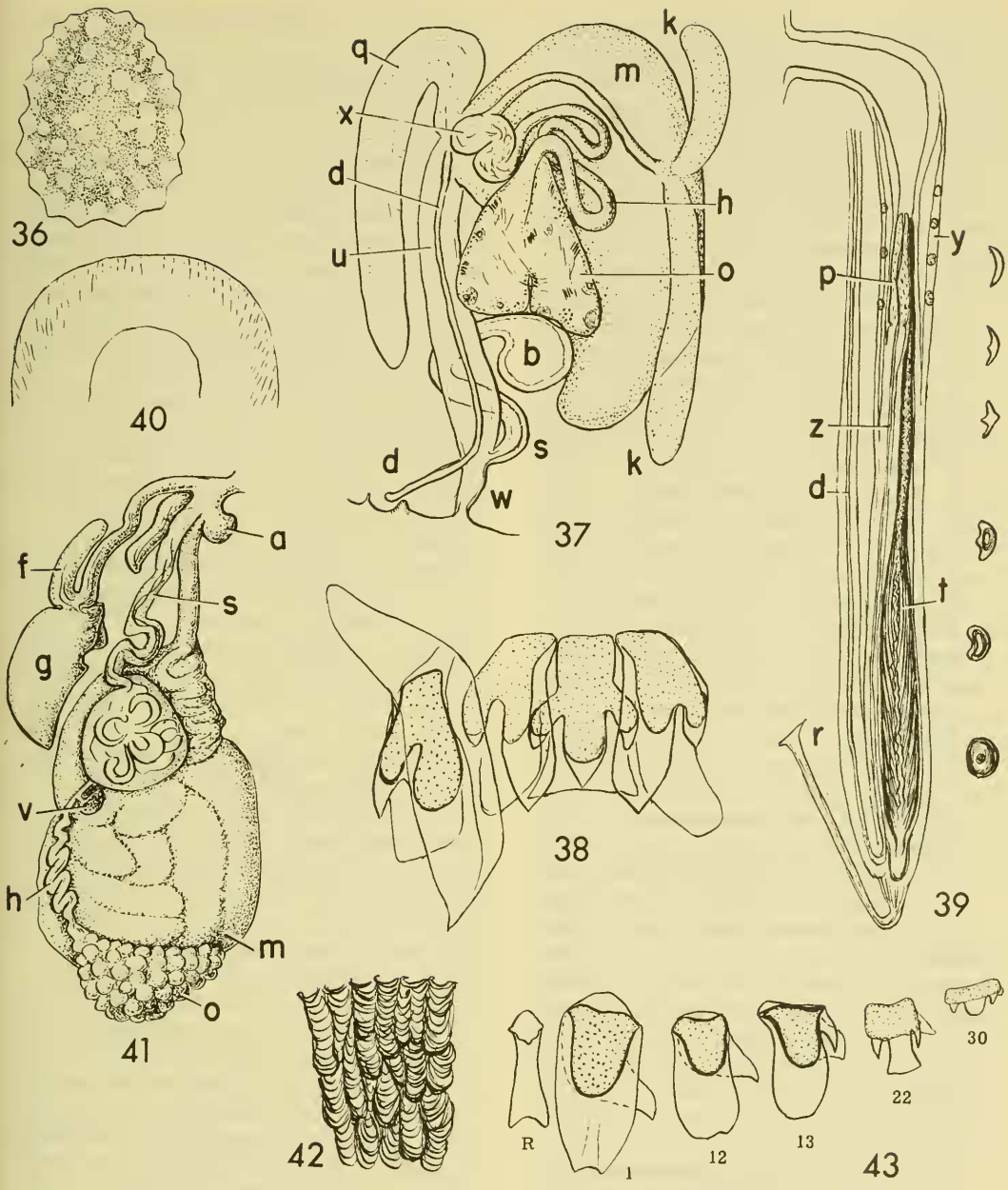
The above sectioned animal was in the male phase (Fig. 37). Sperms were present in the ovotestis (o) and ampulla (x) of the hermaphrodite duct (h). There is no caecum (see Fretter, 1943, p 699) in this species. The albumen glands (k) and the mucus gland (m) are still small. The vesicle of the bursa (b) is spherical, its duct (s) long and winding. The lining of the vagina (w) is folded. The ectal section of the vagina is not widened in comparison with the oviduct (u). The prostate (q) is large, nearly cylindrical and its lumen smooth, not folded.

The efferent duct approaches the skin to the right of the female aperture. It then courses forward along the right side of the body. Under the right tentacle the duct curves backward into the body cavity, descending straight (d) along the penis (Fig. 39). The wall of the duct is muscular; its rather thick layer of connective tissue contains vesicular cells. The penis of a 4 mm slug measured 2 mm in length and 0.1 mm in diameter. The penial retractor muscle (r) is about 0.6 mm and inserts at the fundus of the penial pouch. It originates a little behind the pericardium (in Fig. 39 the retractor is bent forward to save space). The penial pouch contains the efferent duct (z), which ends on the long (0.17 mm in length) muscular papilla (p), and a long diverticulum. The epithelium of the diverticulum produces a solid cuticular structure (t). This stylet, about 1.2 mm in length and 80 micra in diameter near its inner end, is cylindrical, lamellate below, and becomes semilunar in transverse section farther in front. Its axial thickenings and flat shape at the level of the penial papilla are shown in transverse sections in Fig. 39. Conspicuous vesicular cells can be seen in the conjunctive tissue in the ectal third of the penial pouch (y).

The species is named for Mrs. Eveline du Bois-Reymond Marcus.

Discussion of *Onchidella evelinae*

Following a recent record (Solem, 1959, p 37), Taylor and Sohl (1962, p 13) indicate one family of the Onchidiacea with 6 genera and subgenera, but actually there are 2 families with a total of 15 genera and subgenera (Marcus, 1960a, p 876). The present species is defined as belonging to the Onchidellidae and to *Onchidella* Gray, 1850, by the position of the male opening to the right of the right tentacle, and the hyponotal line, respectively. Hoffmann (1929, p269) subdivided *Onchidella* into *Onchidella* and *Occidentella* according to the position of the recurrent renal limb, ventral to the kidney in the first and dorsal to it in the second subgenus. Two notogaeic species, *O. obscura* (Plate, 1893), a



FIGS. 36-39. *Onchidella evelinae*, n. sp. FIGS. 40-43. *Siphonaria guamensis*. Fig. 36. Dorsal view of living slug of *O. evelinae*, drawn from Kodachrome transparency. Fig. 37. Diagram of reproductive organs, ventral view. Fig. 38. Radular teeth. Fig. 39. Male copulatory organ and sections of stylet; b, bursa; d, efferent duct; h, hermaphrodite duct; k, albumen gland; m, female gland mass; o, ovotestis; p, penial papilla; q, prostate; r, retractor; s, spermathecal duct; t, cuticular stylet; u, oviduct; w, vagina; x, ampulla; y, penial pouch; z, efferent duct within penis. Fig. 40. Jaw of *S. guamensis*. Fig. 41. Reproductive organs. Fig. 42. Elements of jaw. Fig. 43. Radular teeth; a, atrial thickening; f, flagellum; g, gland of epiphallus; h, hermaphrodite duct; m, female gland mass; o, ovotestis; s, spermathecal duct; v, seminal vesicle.

synonym of *nigricans* (Quoy and Gaimard, 1833), and *O. reticulata* (Semper, 1882) have a dorsal recurrent limb (Plate, 1893, p 132, 205, 208), and therefore Hoffmann (l.c.) called *Occidentella* an Australian group. The dorsal limb distinguishes them from *O. evelinae*, a typical *Onchidella*. Of 2 other West Pacific species, *O. patelloides* (Quoy and Gaimard, 1833) and *O. flavescens* (Wissel, 1904), the anatomy of the kidney is not known. The first differs from *O. evelinae* by its black peritoneum (Hoffmann, 1928, p 90), and the second by its narrow sole (Wissel, 1904, p 668), whose breadth is equal to that of the hyponotum of one side. In his record of *O. maculata* (Plate, 1893) from New Guinea, Labbé (1934, p 78) did not give details of the kidney. If his specimen really was *O. maculata*, previously known from the coast of Southwest Africa, it would have a ventral recurrent renal limb, like *O. evelinae*. But in Labbé's and Plate's *maculata* the unarmed penis contains calcareous concretions, absent in *O. evelinae* which has a cuticular stylet.

The male copulatory organ furnishes the principal elements for the specific classification of *Onchidella*, hence specimens in the mature male phase should be examined. On the other hand, it is advisable to section small slugs with incompletely developed female glands. In big animals these are the bulkiest organs of the genital system, and often render the reconstruction difficult. The absence of folds in the lung (Marcus, 1956, p 79) of small specimens cannot be used for differentiating species.

17. *Siphonaria* (*Sacculosiphonaria*) *guamensis* Quoy and Gaimard, 1833

(Figs. 40-43)

Hubendick, 1945, p 25-27, fig. 33; 1946, p 41, pl. 6, figs. 30-32.

Occurrence: South end of Parry Island, on rocks in the intertidal zone of the lagoon.

Further distribution: Billiton, Java Sea; Guam, Mariana Islands (original locality).

The shells of this species measure up to 12 mm in length, 9.1 mm in width, and 5 mm in height. The shells are rather symmetrical. The apex is behind the middle, very slightly recurved, and worn in our specimens. There are 20-26 principal ribs, low, slightly undulating, with a secondary rib sometimes between the two principal ones.

Our specimens exhibit considerable variation in size. In all shells the ribs are white, their interspaces dark gray. The apex is light in many of these specimens, and the remaining parts of the surface are darker. Four of the shells, however, have a dark apex and quite light borders; 3 are more or less uniformly dark, except for the ribs. The body appears grayish when preserved in formalin, not yellow as in Hubendick's (1945) material. The siphon cannot be seen from the back.

The jaw (Figs. 40, 42) is semicircular; its scaly elements are renewed from time to time. The radula (Fig. 43) comprises about 110 rows, the older of which are procoelous, the younger ones straight. The basal plate of the rhachidian tooth is relatively broad and terminates concavely or is nearly split. Its short cusp is simple. There are up to 36 teeth per half-row. The innermost has the usual strong socket and a long cusp and is bifid at its tip. The length of these points varies; frequently the inner one is a little longer. The basal plate is asymmetrical, prolonged outward. The other lateral teeth are similar and decrease gradually in size toward the outside of the radula. An ectocone appears on the 13-15th tooth, and an entocone appears on the 19th. The 2 mesocones coalesce, forming a rectangular plate in the outer half of the half-row. The outermost or marginal teeth are low and simplified.

The kidney is similar to Hubendick's

(1945, p 35, fig. 61) B-type. The reproductive organs (Fig. 41) are like those shown by Hubendick (1945, fig. 33). Minor differences are a thickening of the genital atrium (a) near the entrance of the spermathecal duct (s), a slightly longer, curved flagellum (f), and a more bulky epiphallus gland (g). The black seminal vesicle (v), not yet recorded for *S. guamensis*, lies at the entrance of the hermaphroditic duct (h) into the female gland mass (m), as in the other species of *Siphonaria* (Hubendick, 1945, p 11). The receptacle and the filiform part of the spermatophore are easily distinguishable from one another; the latter has no barbs.

Discussion of *Siphonaria guamensis*

The shape of the radular teeth and their number are of restricted value in the systematics of *Siphonaria*. The kidney of the present species is exceptional in the subgenus *Sacculosiphonaria*, the other known species of which have the C-type (Hubendick, 1945, p 35; 1946, p 41-42). The reproductive organs are, together with the general characters of the shell, decisive for the classification in this subgenus. The jaw of *S. guamensis* differs widely from that of *S. cochleariformis* (Hubendick, 1945, fig. 86) of the same subgenus.

LITERATURE CITED

ADAM, W. and LELOUP, E., 1938, Prosobranchia et Opisthobranchia. Mem. Mus. Nat. Hist. Nat. Belg. Hors série, 2(18): 1-209, pls. 1-8.

ALDER, J. and HANCOCK, A., 1864, Notice on a collection of nudibranchiate Mollusca made in India by Walter Elliot, Esq., with descriptions of several new genera and species. Trans. zool. Soc., 5(3): 113-148, Pls. 28-33.

ALLAN, J. K., 1932, Australian nudibranchs. Austral. Zoologist, 7(2): 87-105, pls. 4-5.

_____, 1947, Nudibranchia from the Clarence River Heads, North Coast, New South Wales. Rec Austral. Mus., 21(8): 433-463, pls. 41-43.

BABA, K., 1930, Studies on Japanese Nudibranchs. (3). A. Phyllidiidae. B. Aeolididae. Venus, Jap. J. Malacol., 2(3): 117-125, pl. 4.

_____, 1933, Preliminary note on the Nudibranchia collected in the vicinity of the Amakusa biological laboratory. Annot. Zool. Japon., 14: 165-179.

_____, 1935, Nudibranchia of Mutsu Bay. Sci. Repts. Tohoku Univ., ser. 4, biol., 10: 331-360, pls. 5-7.

_____, 1937, Opisthobranchia of Japan (II). J. Dept. Agr. Kyushu Imp. Univ. Fukuoka, 5(7): 289-344, pls. 1-2.

_____, 1949, Opisthobranchia of Sagami Bay. 4+2+194+7 p, 50 pls. Tokyo, Iwanami Shoten.

_____, 1953, Three new species and two new records of the genus *Glossodoris* from Japan. Publ. Seto marine biol. Laborat., 3(2): 205-211.

_____, 1960a, The genera *Gymnodoris* and *Nembrotha* from Japan. Publ. Seto marine biol. Laborat., 8(1): 71-74, pl. 1.

_____, 1960b, The genus *Herviella* and a new species, *H. affinis*, from Japan. Publ. Seto marine biol. Laborat., 8(2): 303-305.

BARNARD, K. H., 1927, South African nudibranch Mollusca, with descriptions of new species, and a note on some specimens from Tristan d' Acunha. Ann. South African Mus., 25 (art. 6): 171-215, pls. 19-20.

BERGH, R., 1877, Malacologische Untersuchungen, Heft 11. In: SEMPER, C., Reisen im Archipel der Philippinen. Wissenschaft. Resultate, 2. Theil, 2: 429-494, pls. 54-57.

_____, 1890, Die Nudibranchien des Sunda-Meeres. Malacologische Untersuchungen, Heft 17. In: SEMPER, C., Reisen im Archipel der Philippinen. Wissenschaftl. Resultate, 2. Theil, 3: 873-991, pls. 85-89.

_____, 1892, Malacologische Untersuchungen, Heft 18. System der nudibranchiaten Gasteropoden. In:

SEMPER, C., Reisen im Archipel der Philippinen. Wissenschaftl. Resultate, 2. Theil, 3: 995-1165.

_____, 1898, Die Opisthobranchier der Sammlung Plate. Zool. Jb., Suppl. 4 (Fauna Chilensis, 1): 481-582, pls. 28-33.

_____, 1900, Malacologische Untersuchungen, 5. In: SEMPER, C., Reisen im Archipel der Philippinen. Wissenschaftliche Resultate, 7,4. Abt., Abschn. 1. Liefrg.: 159-208, pls. 13-16.

_____, 1901, Malacologische Untersuchungen, 5. In: SEMPER, C., Reisen im Archipel der Philippinen. Wissenschaftl. Resultate, 7, 4, Abt., 3. Abschn. (Bullacea), Liefrg. 1 & 2: 209-312, pls. 17-24.

_____, 1905, Die Opisthobranchiata der Siboga Expedition. Siboga Exped., 50: 1-248, pls. 1-20.

BURN, R., 1957, On some Opisthobranchia from Victoria. J. malacol. Soc. Australia, 1: 11-29, pls. 1-3.

_____, 1958, Further Victorian Opisthobranchia. J. malacol. Soc. Australia, 2: 20-36, pls. 6-7.

_____, 1951, A new doridid nudibranch from Torquay, Victoria. The Veliger, 4(2): 55-56, pl. 15.

_____, 1962, Notes on a collection of Nudibranchia (Gastropoda: Doridoidae and Dendrodorididae) from South Australia with remarks on the species of Basedow and Hedley, 1905. Mem. Nat. Mus. Melbourne, 25: 149-171, pl. 1.

_____, 1963, Descriptions of Australian Eolidacea (1. The genera *Catriona* and *Herviella*). J. malacol. Soc. Australia, 7: 12-20.

COLLINGWOOD, C., 1881, On some new species of nudibranchiate Mollusca from the eastern seas. Trans. Linn. Soc. Lond. Zool., 2(2): 123-140, pls. 9-10.

DALL, W. H., 1908, Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California. XIV. The Mollusca and Brachiopoda. Bull. Mus. comp. Zool., Harvard, 43(6): 205-487, pls. 1-22.

EALES, N. B., 1944, Aplysiids from the Indian Ocean, with a review of the family Aplysiidae. Proc. malacol. Soc. Lond., 26(1): 1-22.

ELIOT, C. N. E., 1899, Notes on tectibranchs and naked molluscs from Samoa. Proc. Acad. nat. Sci. Philadelphia, 1899: 512-523, pl. 19.

_____, 1904, On some nudibranchs from East Africa and Zanzibar, parts 4 and 5. Proc. zool. Soc. Lond., 1904 (1): 380-406, pls. 23-24; 1904(2): 83-105, pls. 3-4.

_____, 1906a, On the nudibranchs of Southern India and Ceylon. Proc. zool. Soc. Lond. 1906: 636-691, 999-1008, pls. 42-47.

_____, 1906b, Nudibranchs and tectibranchs from the Indo-Pacific: II. J. Conchol., 11: 298-315, pl. 5.

_____, 1908, Notes on a collection of nudibranchs from the Red Sea. J. Linn. Soc. Lond. Zool., 31(204): 86-122.

_____, 1909, Notes on a collection of nudibranchs from Ceylon. Spolia zeylan., 6(23): 79-95.

_____, 1910, Nudibranchs collected by Mr. Stanley Gardiner from the Indian Ocean in H. M. S. Sealark. Trans. Linn. Soc. Lond. Zool., 2. ser., 13(3): 411-438, pl. 25.

ENGEL, H., 1927, Westindische opisthobranchiate Mollusken. II. Bijdr. Dierk., 25: 83-122.

_____, 1936, (unter Mitwirkung von P. WAGENAAR HUMMELINCK), Über westindische Aplysiidae und Verwandte anderer Gebiete. Capita Zoologica, 8(1): 1-75.

FARMER, W. M., 1963, Two new opisthobranch mollusks from Baja California. Trans. San Diego Soc. nat. Hist., 13 (6): 81-84, pl. 1.

FARRAN, G. P., 1905, Report on the opisthobranchiate Mollusca. In: HERDMAN, W. A., Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar.

London, 3, suppl. rept. 21: 329-364, pls. 1-6.

FRETTER, V., 1943, Studies in the functional morphology and embryology of *Onchidella celtica*. J. Marine biol. Assoc. United Kingdom, n. ser., 25(4): 685-720.

GOHAR, H. A. F. and ABOUL-ELA, I. A., 1957, The development of three chromodorids with the description of a new species. Publ. Marine biol. Stat. Al-Ghardaqa, Red Sea, 9: 203-228, pls. 1-5.

GUIART, J., 1901, Contributions à l'étude des gastéropodes opisthobranches et en particulier des céphalaspides. Mém. Soc. zool. France, 14: 5-219, pls. 1-7.

HABE, T., 1952, Atyidae in Japan. In: Tokubei Kuroda, illustr. catal. Japan. shells, 20: 137-152, pls. 20-21.

_____, 1961, Fauna of shell-bearing mollusks of the sea around the Shirikishinai marine station. Part 2. Gastropoda. In: Fauna and Flora around Shirikishinai Marine Stat., 3: 1-11, pls. 1-5.

HAEFELFINGER, H.-R., 1959, Remarques sur le développement du dessin de quelques Glossodoridiens. Rev. suisse Zool., 66(2): 309-315.

HANNA, G. D., 1955, Preparation of Nudibranchiata. Nautilus, 68(3): 105-106.

HOFFMANN, H., 1928, Zur Kenntnis der Oncidiiden. I. Zool. Jb. Syst., 55: 29-118, pls. 2-4.

_____, 1929, Zur Kenntnis der Oncididen. II. Zool. Jb. Syst., 57: 253-302, 1 map.

_____, 1932-40, Opisthobranchia. Bronn's Klassen..., 3: Mollusca: Abt. II: Gastropoda; Buch 3. Teil I: XI + 1247 p, 1 pl. Teil II: 90 p. Leipzig, Akadem. Verlagsges.

HUBENDICK, B., 1945, Phylogenie und Tiergeographie der Siphonariidae. Zool. Bidr. Uppsala, 24(1947): 1-216.

_____, 1946, Systematic monograph of the Patelliformia. Kgl. Svenska Akad. Handl., ser. 3, 23(5): 1-93, pls. 1-6.

KELAART, E. F., 1859, Descriptions of new and little-known species of Ceylonese nudibranchiate mollusks. Ann. Mag. nat. Hist., ser. 3, 3: 291-304, 488-496.

LABBÉ, A., 1934, Opisthobranches et silicodermes (Oncidiadés). Res. Sci. Voy. Indes Orient. Néerld. Mém. Mus. Roy. Hist. Nat. Belg., hors ser., 2(14): 1-83, pl. 1.

LEMCHE, H., 1964, Proposed suppression under the plenary powers of the generic name *Cratena* Bergh, in order to validate the generic name *Rizzolia* Trinchese, 1877 (Class Gastropoda). Z. N. (S.) 1105. Bull. zool. Nomencl., 21(1): 50-51.

MACNAE, W., 1954, On some eolidacean nudibranchiate molluscs from South Africa. Ann. Natal Mus., 13 (1): 1-50, pls. 1-2.

_____, 1958, The families Polyceridae and Goniodorididae in Southern Africa. Trans. Soc. South Africa, 35(4): 341-372, pls. 17-18.

_____, 1962, Tectibranch molluscs from Southern Africa. Ann. Natal Mus., 15(16): 183-199.

MARCUS, E., 1955, Opisthobranchia from Brazil. Bol. Fac. Filos. Cienc. Univ. S. Paulo, Zoologia, 20: 89-262, pls. 1-30.

_____, 1958a, On western Atlantic opisthobranchiate gastropods. Amer. Mus. Novit., 1906: 1-82.

_____, 1958b, Notes on Opisthobranchia. Bol. Inst. Oceanogr. S. Paulo, 7(1-2): 31-79, pls. 1-8.

_____, 1959, Lamellariacea und Opisthobranchia. Lunds Univ. Aarskr., N. F., Avd. 2, 55(9): 1-135.

_____, 1961, Opisthobranch mollusks from California. The Veliger, 3 (Suppl. 1): 1-85, pls. 1-10.

MARCUS, EV. and ER., 1956, Zwei atlantische Onchidellen. Kieler Meeresforsch., 12(1): 76-84, pls. 23-25.

_____, 1960a, Opisthobranchia aus dem Roten Meer und von den Malediven. Akad. Wiss. Lit. Mainz, Math.-Nat. Kl., 1959(12): 871-934.

_____, 1960b, On *Siphonaria hispida*. Bol. Fac. Filos. Cienc. Univ. S. Paulo, Zoologia, 23: 107-140, pls. 1-4.

_____, 1963, Opisthobranchs from the Lesser Antilles. Studies on the Fauna of Curaçao and other Caribbean islands, 19: 1-76.

ODHNER, N. H., 1921, Mollusca of Juan Fernandez and Easter Island. In: C. SKOTTSBERG, The natural history of Juan Fernandez and Easter Island, 3(2): 219-254, pls. 8-9.

_____, 1934, The Nudibranchiata. Brit. Antarct. Terra Nova Exped., Zoology 7(5): 229-309, pls. 1-3.

_____, 1957, *Chromodoris* contra *Glossodoris*. A systematic-nomenclatorial controversy. Proc. malacol. Soc. Lond., 32(6): 250-253.

O'DONOGHUE, C. H., 1929, Report on the Opisthobranchiata. Res. Cambridge Exped. Suez Canal 1924. Trans. Soc. Zool. Lond., 22(6): 713-841.

_____, 1933, Kelaart's work on the Nudibranchiata of Ceylon. Proc. malacol. Soc. Lond., 20(4): 221-226, pl. 19.

OSTERGAARD, J. M., 1955, Some opisthobranchiate Mollusca from Hawaii. Pacific Science, 9: 110-136, pls. 1-2.

PEASE, W. H., 1860a, Description of new species of Mollusca from the Sandwich Islands in the collection of Hugh Cuming. Proc. zool. Soc. Lond., 28: 18-36.

_____, 1860b, Descriptions of forty-seven new species of shells from the Sandwich Islands in the collection of Hugh Cuming. Proc. zool. Soc. Lond., 28: 431-438.

PILSBRY, H. A., 1893-95, Manual of Conchology, 15: 436 p, 61 pls.

_____, 1895-96, Manual of Conchology, 16: VII + 262p, 75 pls.

_____, 1921, Marine mollusks of Hawaii XIV, XV. Proc. Acad. nat. Sci. Philadelphia, 72: 360-382.

PLATE, L., 1893, Studien über opisthopneumone Lungenschnecken. II. Die Oncidiiden. Zool. Jb. Anat., 7(1): 93-234, pls. 7-12.

PRESTON, H. B., 1908, Description of new species of land, marine and freshwater shells from the Andaman islands. Rec. Ind. Mus., 2(2): 187-210, pls. 14-17.

PRUVOT-FOL, A., 1931, Notes de systématique sur les Opisthobranches (suite). Bull. Mus. Hist. Natur. Paris, sér. 2, 3(8): 746-755.

_____, 1934, Les Opisthobranches de Quoy et Gaimard. Arch. Mus. Hist. natur. Paris, sér. 6, 11: 13-92, pl. 1.

_____, 1951, Révision du Genre *Glossodoris* Ehrenberg. J. Conchyliol., 91: 76-164.

_____, 1954, Étude d'une petite collection d'Opisthobranches d'Océanie Française. J. Conchyliol., 94: 3-30.

RISBEC, J., 1928a, Contribution à l'étude des Nudibranches Néo-Calédoniens. Faune Colon. Franç., 2: 1-328, pls. A-D, 1-12.

_____, 1928b, Étude anatomique des Gastéropodes Tectibranches de la presqu'île de Nouméa avec description de cinq espèces nouvelles. Arch. Mus. Hist. natur. Paris, sér. 6, 3: 37-68.

_____, 1951, Notes sur les Tectibranches de Nouvelle-Calédonie. J. Soc. Océanistes, 7(7): 123-158, pl. 8.

_____, 1953, Mollusques Nudibranches de la Nouvelle-Calédonie. Faune de l'Union Franç., 15: 1-189.

_____, 1956, Nudibranches du Viet-Nam. Arch. Mus. Hist. natur. Paris, sér. 7, 4: 5-34, pls. 1-22.

SEMPER, C., 1880; 1882, Dritte Familie: Onchidiidae. In: SEMPER, C., Reisen im Archipel der Philippinen. II. Theil, 3(5): 251-264, pls. 19-20, 22-23; 3(6): 265-290, pl. 21.

SI, T., 1931, Contribution à l'étude des Mollusques Opisthobranches de la côte Provençale. Thèse du Laborat. Zool. Fac. Sci. Lyon et Stat. Marit. Biol. Tamaris, 221 p, 8 pls. Trévoux (Rhône).

SOLEM, A., 1959, Systematics of the land and fresh-water Mollusca of the New Hebrides. Fieldiana, Zoology: 43: 1-238, pls. 1-34.

SOWERBY, G. B., 1868, *Haminea* in: REEVE, LOVELL, Conchologia

Iconica, 16, 5 pls.
STIMPSON, W., 1855, Descriptions of some of the new marine Invertebrata from the Chinese and Japanese Seas. Proc. Acad. nat. Sci. Philadelphia, 7. (10): 375-384; Nudibranchiata: 388-389.
TAYLOR, D. W. and SOHL, N. F., 1962, An outline of gastropod classification. Malacologia, 1(1): 7-32.
VAYSSIÈRE, A., 1912, Recherches zoologiques et anatomiques sur les Opisthobranches de la Mer Rouge et du Golfe d'Aden, 2me partie (suite et fin). Ann. Fac. Sci. Marseille, 20 (1911, Suppl.): 5-158, pls. 1-11.
WHITE, K. M., 1951, On a collection of molluscs, mainly nudibranchs from the Red Sea. Proc. malacol. Soc. Lond., 28(6): 241-253.
WISSEL, C. v., 1904, Pacifische Chitonen der Sammlungen von Schauinsland und Thilenius nebst einem Anhang über neuseeländische Species der Gattung *Oncidiella*. Zool. Jb. Syst., 20(6): 591-676, pls. 21-25.
ZILCH, A., 1959-60, Gastropoda, Teil 2, Euthyneura. In: Schindewolf, Handb. d. Paläozool., 6: XII + 834 p, 2515 text-figs. Berlin-Nikolassee, Gebr. Borntraeger.

ZUSAMMENFASSUNG

EUTHYNEURE MEERESGASTROPODEN VOM ENIWETOK ATOLL, WESTPAZIFIK

Die Arbeit beruht auf einer Sammlung euthyneurer Meeresschnecken des zweiten Verfassers vom Eniwetok Atoll, Marshall Inseln. Vom Februar bis April 1960 wurden 17 Arten gesammelt, von denen 5 als neue Arten in dieser Arbeit beschrieben werden. Die neuen Arten sind: *Haminoea musetta, H. linda, Chromodoris briqua, Herviella mietta* und *Onchidella evelinae*. Von den übrigen 12 Arten erstreckt sich die Verbreitung von 7 vom westlichen Indischen Ozean (2 kommen auch im Roten Meer vor) ostwärts bis Eniwetok oder noch weiter nach Osten; 2 Arten sind zirkumtropisch oder zirkumsubtropisch, 2 Arten kennt man nur aus dem Westpazifik, und 1 Art ist von Eniwetok westwärts bis in den östlichen Indischen Ozean verbreitet. Eine gewisse Einförmigkeit der indowestpazifischen Riff-Fauna zeigt sich darin, dass 9 (oder mehr als 50%) unserer Arten von der westlichen Grenze des Indischen Ozeans bis zum westlichen oder zentralen Pazifik vorkommen. Die Gattung *Herviella* scheint auf den Westpazifik beschränkt zu sein. Das notogäische Vorkommen einer *Onchidella* mit ventral vom Hauptteil gelegenem rückläufigem Nierenschenkel ist bemerkenswert, wie auch das kutikulare Stilett in einem Blindsack der Penis-Scheide.

RESUMEN

GASTROPODOS EUTINEUROS MARINOS DEL ATOLL ENIWETOK, PACIFICO OCCIDENTAL

Este estudio se basa en una colección de Eutineuros marinos hecha por el segundo autor en el Atoll Eniwetok, Islas Marshall, durante febrero-abril de 1960. Se colectaron 17 especies, de las cuales las cinco siguientes se describen como nuevas: *Haminoea musetta, H. linda, Chromodoris briqua, Herviella mietta*, y *Onchidella evelinae*. De las otras 12 especies, 7 extienden su distribución hacia el este desde el Océano Indico occidental (2 también aparecen en el Mar Rojo) a Eniwetok o más hacia el este; 2 especies son circumtropicales o circumsubtropicales; 2 se conocen del Pacífico occidental solamente; y 1 se distribuye desde Eniwetok hacia el oeste, dentro del Océano Indico oriental. La relativa uniformidad de la fauna de los arrecifes del Indopacífico occidental, está indicada por el hecho de que 9 (más del 50%) de nuestras especies se conocen distribuidas desde el márgen oriental del Océano

Indico al Pacífico occidental o central. La presencia notogeica de una *Onchidella* con un limbo ventral recurrente del riñón y un estilete cuticular en el divertículo de la cámara penial es müy notable.

RESUMO

EUTINEUROS GASTRÓPODOS MARINHOS DO ATOLL ENIWETOK, PACÍFICO OCIDENTAL

O presente estudo baseia-se numa coleção de moluscos marinhos eutineuros feita pelo segundo autor no atoll de Eniwetok, nas Ilhas de Marshall, em fevereiro-abril de 1960. Foram coletadas 17 espécies das quais 5 são descritas como novas no presente trabalho. As novas espécies são: *Haminoea musetta, H. linda, Chromodoris briqua, Herviella mietta, Onchidella evelinae.* Das 12 espécies restantes, a distribuição de 7 estende-se do Indico ocidental (2 ocorrem também no Mar Vermelho) até Eniwetok ou mais para o leste; 2 espécies são circumtropicais ou circumsubtropicais; 2 espécies conhecem-se sòmente do Pacífico ocidental, e 1 espécie ocorre de Eniwetok para o oeste, até ao Indico oriental. Certa uniformidade da fauna dos recifes do Indico e Pacífico ocidental depreende-se do fato de se conhecerem 9 (mais que 50%) das nossas espécies como ocorrentes das costas ocidentais do Oceano Indico até ao Pacífico ocidental ou central. A ocorrência, na Notogea, de uma *Onchidella* com ramo renal recorrente ventral é estranha; a espécie tem estilete cuticular num divertículo da bolsa penial, incomum no gênero.