

PROCEEDINGS
OF THE
CALIFORNIA ACADEMY OF SCIENCES
FOURTH SERIES

VOL. XVII, No. 6, pp. 187-203, plate 10

JUNE 22, 1928

VI
WEST AMERICAN MOLLUSCA OF THE GENUS
PHASIANELLA

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The expedition of the California Academy of Sciences in 1925 to the Revillagigedo and Tres Marias Islands, visited Cape San Lucas. A few hours intensive collecting by G. Dallas Hanna and Eric Knight Jordan resulted in the securing of a large amount of valuable material, including good series of specimens from the type locality of four species of *Phasianella*. These specimens and the large number from other western localities which have accumulated in the various collections in California, make possible a fairly complete review of the various species in the genus found on the west coast of America. Existing data on the group are scattered through a number of publications and there has been a good deal of confusion and uncertainty in regard to the identity of the different species.

The first species to be described was *Littorina umbilicata* d'Orbigny, 1840,¹ from "Arica" and "Cobija," "Bolivia" and "Peru." *Phasianella perforata* Philippi, 1848,² from Peru

¹ Voyage Amer. Mérid., Vol. 5, 1840, p. 394, pl. 76, figs. 1-3.

² Zeitschr. für Mal., 1848, p. 164.

came next. This was followed by *Turbo phasianella* C. B. Adams, 1852,³ from Panama, and *Phasianella compta* Gould, 1855,⁴ from San Diego. In his "Mazatlan Catalogue," Carpenter, 1857,⁵ described under the name *P. perforata* Phil., 12 specimens from that locality, and *P. compta* Gould is listed on the strength of "one very dead shell and some fragments." In the same connection Carpenter also described *P. var. striulata*, based on two dead shells, "one very slender, the other of ordinary form," but later he stated⁶ that these were *Turbo phasianella* C. B. Adams. Reeve⁷ also described a shell from Mazatlan as *P. perforata* Phil., but Dall⁸ has pointed out that the true *P. perforata* Phil. is a South American shell and not the *P. perforata* of Carpenter and Reeve.

Mr. John Xantus de Vessey collected extensively at Cape San Lucas in 1860 and 1861, and the first series, mainly beach worn shells, was presented to the Smithsonian Institution. Carpenter described about 50 new species from this material in 1864⁹, including under the subgenus *Eucosmia* four species of *Phasianella*, as follows: *P. variegata*, "rare, dead"; *P. substriata*, "very rare"; *P. punctata*, "one specimen"; and *P. cyclostoma*, "one specimen." Dall in 1908¹⁰ stated that *P. punctata* Cpr. (not Risso) may take the name *P. carpenteri*, and *P. variegata* Cpr. (not Lamarck) may take the name *P. typica*.

Carpenter in 1865 published a "Diagnosis of New Forms of Mollusca from the West Coast of North America first collected by Col. E. Jewett."¹¹ In this he made the following statement in regard to *Phasianella*; "*P. compta*, with a large

³ Panama Shells, 1852, No. 282.

⁴ U. S. House of Representatives Doc. 129, 33d Congress, 1st Sess., 1855 p. 25; Pacific R. R. Repts., Vol. 5, pl. 11, figs. 25, 26.

⁵ Catalogue of Mazatlan Shells Collected by Frederick Reigen, 1857, p. 224.

⁶ Ann. Mag. Nat. Hist., Vol. 13, 1864, p. 475.

⁷ Conch. Icon., pl. 6, fig. 17.

⁸ Proc. U. S. Nat. Mus., Vol. 34, 1908, p. 255; Proc. U. S. Nat. Mus., Vol. 37, 1909, p. 238.

⁹ Ann. Mag. Nat. Hist., Vol. 13, 1864, p. 475.

¹⁰ Proc. U. S. Nat. Mus., Vol. 34, 1908, p. 255.

¹¹ Ann. Mag. Nat. Hist., Vol. 13, 1865, p. 180.

proportion of the small shells of the genus, is included under *P. pullus* in Mr. Reeve's monograph. In so difficult a tribe, it is judged better to name the distinct forms, and those from separate localities, until more is known." He then described three species from southern California as follows: *P.* (? *compta* var.) *pulloides*, *P.* (? *compta* var.) *punctulata*, and *P.* (? *compta* var.) *elatio*r.

Tryon's Manual of Conchology treats *P. compta* Gould as a variable species for which a general description is given. Four figures are included and the descriptions of Carpenter's three California species are quoted as varieties. Dall in 1908¹² gave the name *P. compta* var. *producta* to the first form figured by Tryon¹³ and added a few words of description. Packard in his "Molluscan Fauna from San Francisco Bay," 1918,¹⁴ listed *P. pulloides* Cpr. as the only species from that locality but quoted Tryon's description of *P. compta* Gould for it. For the various forms from Lower California and the Gulf, Tryon's Manual of Conchology quoted Carpenter's descriptions without figures or notes.

Dall in 1897¹⁵ added another species to the list, *P. (Eulithidium) lurida* Dall from Vancouver Island. Finally in his "Summary of the Marine Shell-bearing Mollusks of the Northwest Coast of America"¹⁶ he listed the following; *P. (Tricola) compta* Gould, ranging from Monterey to the Gulf of California, with varieties *punctulata* Carpenter and *producta* Dall; *P. (Tricola) pulloides* Carpenter, ranging from Monterey to Lower California, with variety *elatio*r Carpenter; *P. (Eulithidium) typica* Dall, ranging from San Luis Obispo, California, to Cape San Lucas; *P. (Eulithidium) substriata* Carpenter, ranging from Catalina Island to Panama; and *P. (Eulithidium) lurida* Dall, ranging from Vancouver Island to Mendocino County, California.

¹² Proc. U. S. Nat. Mus., Vol. 34, 1908, p. 256.

¹³ Tryon's Man. of Conch., Vol. 10, pl. 39, fig. 69.

¹⁴ University of California Publications in Zoology, Vol. 14, No. 2, 1918, p. 310.

¹⁵ Bull. Nat. Hist. Soc. Brit. Col., No. 2, 1897, p. 15.

¹⁶ U. S. Nat. Mus. Bulletin 112, 1921, p. 171.

During the preparation of this review, in addition to examining the material belonging to the Academy, the writer has examined the specimens in the collection at Leland Stanford Junior University under the charge of Mrs. Ida S. Oldroyd, and those in the collections of Dr. Fred Baker of San Diego and Dr. S. Stillman Berry of Redlands. These, together with the large number of specimens from southern California in the collection of the writer, made several thousand in all, including specimens from a large number of localities from Puget Sound to the Gulf of California. It was found in several cases that more than one name was being applied to the same species and vice versa. A comparison of the original description and figure with material from the type locality has made it possible to redefine most of the species, resulting in a number of changes in nomenclature and geographic range. One undescribed species was found, represented by specimens in all the collections.

The specific characters are not marked, the principal differences being in size, shape, presence or absence of spiral striations, and shape of inner lip and umbilicus. The opercula also show some slight differences. Each of the species has a color combination and pattern which, with slight variations, is distinctive for a majority of the specimens. However, in nearly all cases, occasional specimens will depart so far from this pattern that it is of little value in separating or defining the species. Full descriptions have been prepared for all the species represented in the various collections. Representative specimens have been figured on the accompanying plate and the specimens themselves deposited in the collection of type material of the California Academy of Sciences, where they bear the numbers indicated.

In addition to the collectors whose names have been mentioned the writer wishes to acknowledge his indebtedness to Dr. G. Dallas Hanna, Curator of Paleontology in the California Academy of Sciences, for advice and assistance in the

preparation of the manuscript and for the photographs used in the preparation of the plates.¹⁷ In Tryon's Manual of Conchology the genus is divided into subgenera, based on the character of the radula. No attempt has been made in the present study to determine the characters of this organ, and the species are grouped in two subgenera as in the papers to which reference has been made. The species of *Phasianella* recognized from the west coast follow.

1. *Phasianella* (*Tricola*) *compta* Gould

Plate 10, figure 1

Phasianella compta GOULD, H. Rep. Doc. 129, Prelim. Rep., 1855, p. 25; Pacific R. R. Repts., Vol. 5, 1857, pl. 11, figs. 25, 26. TRYON Man. Conch., Vol. 10, 1888, p. 173 (part), pl. 39, fig. 69. OLDROYD, Stanford Univ. Publ. Univ. Ser. Geol. Sci. Vol. 2, 1927, pt. 3, p. 161.

Phasianella compta producta DALL, Proc. U. S. Nat. Mus., Vol. 34, 1908, p. 256; U. S. Nat. Mus., Bull. 112, 1921, p. 172.

Shell ovate-conic, rather solid, smooth and polished; whorls five, moderately rounded, oblique, separated by a distinct suture; surface with many fine, close-spaced, oblique spiral color lines of alternating ashy white and olive green which are lightened and darkened so as to form wide-spaced irregular longitudinal bands, sometimes with a row of ill-defined alternate light and dark spots on the periphery of the body whorl; aperture nearly circular, outer lip thin, with a narrow band at the edge, colored as on the surface of the shell, interior bluish white; inner lip enameled, white, the enamel spreading nearly or quite over the umbilical region and extending over the parietal wall to the posterior angle of the aperture. Operculum calcareous; outer surface convex, white, darkening toward the edges; central portion smooth, edges microscopically wrinkled.

The specimen figured came from Mugu Bay, Ventura Co., California, and measures, height 9.2, diameter 5.8 mm. This

¹⁷ The photographs were made with emulsions sensitive to all colors; proper filters were used so that the prints represent the true black and white values of the colors of the objects. (G. D. H.)

is the largest and the most uniformly olivaceous of the west coast species. It is found living in colonies on the marsh grass of the tidal flats. The species is represented only in the collections from Mugu, San Pedro, Anaheim, Newport, and San Diego bays in southern California.

2. *Phasianella (Tricola) pulloides* Carpenter

Plate 10, figures 5, 6, 7

- Phasianella* (? *compta* var.) *pulloides* CARPENTER, Ann. Mag. Nat. Hist., Vol. 15, 1865, p. 180. OLDROYD, Stanford Univ. Publ. Univ. Ser. Geol. Sci. Vol. 2, pt. 3, 1927, p. 162.
- Phasianella* (? *compta* var.) *punctulata* CARPENTER, Ann. Mag. Nat. Hist., Vol. 15, 1865, p. 180.
- Phasianella* (? *compta* var.) *elatior* CARPENTER, Ann. Mag. Nat. Hist., Vol. 15, 1865, p. 180.
- Eucosmia punctata* CARPENTER (not RISSO) Ann. Mag. Nat. Hist., Vol. 13, 1864, p. 475; Suppl. Rep. Brit. Assoc., 1864, p. 618.
- Phasianella compta* GOULD, TRYON Man. Conch., Vol. 10, 1888, p. 173 (part), pl. 39, figs. 70, 71, 72.
- Phasianella carpenteri* DALL, Proc. U. S. Nat. Mus., Vol. 34, 1908, p. 255.
- Phasianella pulloides* CARPENTER, PACKARD, Univ. of Cal. Publ. in Zool., Vol. 14, No. 2, 1918, p. 310.
- Tricola pulloidea* CARPENTER, DALL, U. S. Nat. Mus., Bull. 112, 1921, p. 172.

Shell ovate-conical, quite solid, smooth and very highly polished, with a porcelaneous surface; whorls five, moderately rounded, oblique, separated by a distinct suture; color and color-pattern very variable, usually clouded longitudinally with white, yellow, pink, purple or drab in varying combinations, sometimes almost unicolor or more or less distinctly spotted, often showing faintly the oblique spiral lines as in *P. compta* Gould but uniformly smaller and more porcelaneous; aperture somewhat oval, outer lip thin, inside showing colors of outer surface; inner lip white, enameled, the enamel spreading nearly or quite over umbilical region and extending over parietal wall to posterior angle of aperture. Operculum calcareous, outer surface convex, white, sometimes slightly darkened near outer edge, which is very finely subspirally ridged.

The specimen figured from Point Fermin, near San Pedro, California, measures, height 6.0, diameter 3.3 mm. and is an

adult shell. The specimen figured from Cape San Lucas measures, height 4.5, diameter 2.8 mm. and the specimen figured from Point Dume, California, measures height 2.3, diameter 1.8 mm. Due to the tendency in the older shells for the body whorl to grow increasingly obliquely downward they appear more elongate than the younger. In a limited number of specimens several distinct forms could be picked out but in the thousand or more examined no points of constant difference could be found. Carpenter's *punctulata* seems to have been a large spotted specimen and his *elator* a small maculated one. *P. carpenteri* Dall (*Eucosmia punctata* Cpr.) belongs here. It was described as follows: "Much larger, more elongate and narrower than *E. variegata* and more like a *Phasianella*, the greater part densely punctate with brown, umbilicus small." The specimens in the Academy's Cape San Lucas material answering this description can not be distinguished from the California shells. The description of *P. compta* Gould in Tryon's Manual of Conchology is more in accord with this species than with Gould's original description or figure.

The range of the species as shown by the specimens examined is from Puget Sound to Cape San Lucas. Young shells are sometimes found in large numbers on sea lettuce and the smaller sea weeds of the tide pools along the southern California coast. The adults seem to stay in deeper water and are more rarely found.

3. *Phasianella* (*Tricola*) *perforata* Philippi

Plate 10, figure 14

Phasianella perforata PHILIPPI, Zeit. f. Mal., 1848, p. 164; TRYON, Man. Conch. Vol. 10, 1888, p. 172 (part) pl. 39a, fig. 12.

Phasianella (*Tricola*) *perforata* PHILIPPI, DALL, Proc. U. S. Nat. Mus., Vol. 37, 1909, p. 238.

This species was described by Philippi as follows:¹⁸

"Oblongonoid, perforate, white, subtessellated with oblique, purplish lines; suture and periphery ornamented with large maculations of white and purple; whorls deeply convex, the last subangulated; aperture oblong-ovate, equal to the spire."

¹⁸ Translation from Tryon, Man. Conch. Vol. 10, 1888, p. 172.



Considering the variations found in other species in the genus there is little in this description or in the figure given by Tryon by means of which the shell could be placed. Dall gives the type locality as Paita, Peru, which seems to be the only locality from which it has been reported.

4. *Phasianella* (*Eulithidium*) *typica* (Dall)

Plate 10, figures 12, 13

Eulithidium typicum DALL, Proc. U. S. Nat. Mus., Vol. 34, 1908, p. 255.

Eucosmia variegata CARPENTER (not LAMARCK), Ann. Mag. Nat. Hist., Vol. 13, 1864, p. 474; Suppl. Rep. Brit. Assoc., 1864, p. 618.

Phasianella substriata CARPENTER, TRYON, Man. Conch., Vol. 10, 1888, p. 177.

Eulithidium typicum DALL, (part), U. S. Nat. Mus., Bull. 112, 1921, p. 172.

Phasianella typica DALL, OLDROYD, Stanford Univ. Publ. Univ. Ser. Geol. Sci., Vol. 2, pt. 3, 1927, p. 162; (text, not pl. 91, fig. 9; see *P. rubri-lineata*).

Shell turbinata, rather thin, of five well rounded, moderately elevated whorls, separated by a distinct suture; surface smooth except for microscopic curved lines of growth, very bright and highly polished, variously spotted, maculated and striped with rose, brown and white; aperture nearly circular, slightly produced anteriorly, outer lip thin, interior showing colors of outer surface more or less distinctly; inner lip white, thin and sharp, more or less reflected over the deep umbilical groove, beyond which a thin layer of callus extends to posterior angle of aperture. Operculum calcareous, outer surface convex, bluish white, inner half smooth, outer half with sharp subspiral grooves.

The specimen figured from Cape San Lucas is the single one out of 81, all young, in the Academy's material from that locality which contained the operculum. It measures, height 2.1, diameter 1.7 mm. The adult figured was one of 25 dead shells from Magdalena Bay in the Baker collection. It measures, height 5.5, diameter 3.6 mm. This shell differs from all forms of *P. pulloides* Carpenter, with which it is most apt to be confused, in the more turbinata shape, sharper inner lip, and more distinct umbilical groove. In a number of cases the

name has been applied to California shells belonging to other species. It was found only in the collections from the two localities noted.

5. *Phasianella* (*Eulithidium*) *substriata* (Carpenter)

Plate 10, figure 11

Eucosmia substriata CARPENTER, Ann. Mag. Nat. Hist., Vol. 13, 1864, p. 474; Suppl. Rep. Brit. Assoc., 1864, p. 618.

Phasianella substriata CARPENTER, TRYON, Man. Conch., Vol. 10, 1888, p. 177 (part). OLDROYD, Stanford Univ. Publ. Univ. Ser. Geol. Sci., Vol. 2, pt. 3, 1927, p. 163.

Eulithidium substriatum CARPENTER, DALL, U. S. Nat. Mus., Bull. 112, 1921, p. 172.

Shell turbinate, thin, of four well-rounded, moderately elevated whorls, separated by a distinct suture; surface rather dull, with irregular microscopic lines of growth and a variable number of more or less prominent, rather wide-spaced spiral striations over the entire surface; color generally whitish or yellowish, with rather sparse spots and maculations of white, yellow, brown or red, which sometimes spread out covering much or all of the surface; aperture nearly circular, outer lip thin, interior showing colors of outer surface; inner lip thin, sharp, erect, extending as a thin layer of callus to the posterior angle of the aperture; umbilicus wide and deep. Operculum calcareous, the outer surface convex, bluish white, sometimes darkening toward edge, with fine, sharp, subspiral ridges over outer two-thirds.

The specimen figured was dredged in 10 fms. off Reef Point, Orange County, California, and measures, height 2.7, diameter 2.3 mm. The Academy's material from Cape San Lucas contained 477 specimens which are referred to this species, of which only two small ones contained the operculum. As stated by Carpenter, this species and the young of *P. typica* Dall, are very similar in shape; however, the presence of the spiral striations, smaller size in the adult, generally lighter colors and larger umbilicus, make them easily separable.

Living shells have been dredged in considerable numbers just outside the kelp line off Reef Point and Point Vincent in southern California. Additional specimens from San Diego and San Jose Island, Gulf of California, were examined.

6. *Phasianella* (*Eulithidium*) *cyclostoma* (Carpenter)

Plate 10, figures 2, 3, 4

Eucosmia cyclostoma CARPENTER, Ann. Mag. Nat. Hist., Vol. 13, 1864, p. 474;
Suppl. Rep. Brit. Assoc., 1864, p. 618.

Phasianella cyclostoma CARPENTER, TRYON, Man. Conch., Vol. 10, 1888, p. 177.

Eulithidium cyclostoma CARPENTER, DALL, Proc. U. S. Nat. Mus., Vol. 34,
1908, p. 255.

The following is a translation of Carpenter's description of this species:

"Shell small, very obtuse, wide, regular, valvate, outline of spire scarcely convex; pale cinerous, densely punctate or maculate with brownish olive, apex pale, mammillated; whorls normally 3, very convex, with deep sutures; aperture scarcely indented parietally; umbilicus large, subspiral. Long. .05, long. spir. .025, lat. .05 poll., div. 90°. Curiously like a small depressed *Valvata obtusa*, but with the texture of *Phasianella*."

In the Academy's material from Cape San Lucas there were a number of young shells answering this description and others evidently the same in adult form. In all, 39 specimens were found which are referred to this species. These shells look in many ways like small pathologic specimens of *P. typica* Dall, the last whorl in some of the larger shells showing a strong tendency to separate from the upper whorls. However, the expanded shouldered whorl seems to be a constant character. No similar shells were found in the collections from other localities. The following is a description of the species based on these specimens:

Shell minute, turbate, thin, smooth and bright; whorls four, apex flattened, the succeeding whorls becoming rapidly larger and more elevated with a distinct rounded shoulder, periphery of body whorl slightly angulated, suture deep; apex white or dull colored, the succeeding whorls variously spotted and maculated with white, rose and varying shades of brown, the pattern and color combination often entirely different on the later and earlier whorls; aperture nearly circular, outer lip thin, somewhat expanded in the younger shells, the interior showing the colors of the outer surface; inner lip thin, sharp, erect; umbilicus large. The character of the operculum is unknown.

The adult figured came from Cape San Lucas and measures, height 3.1, diameter 2.5 mm. The young measures, height 1.2, diameter 1.0 mm.

7. *Phasianella* (*Eulithidium*) *rubrilineata* Strong, new species

Plate 10, figures 8, 9, 10

Phasianella typica DALL, OLDROYD, Stanford Univ. Publ. Univ. Ser. Geol. Sci. Vol. 2, pt. 3, 1927, pl. 91, fig. 9; (not text, p. 162; see *P. typica*).¹⁹

Shell minute, depressed turbinate, smooth, except for microscopic lines of growth; whorls four, apex flattened, the succeeding whorls rapidly enlarging and well rounded; body whorl somewhat oblique; first two whorls whitish, third whorl clouded with white and brown or rose, often showing a few more or less distinct spiral lines of color, body whorl with alternating oblique spiral lines of rose and white which grow narrower and closer spaced from the suture to the base, upper portion of the whorl often with large white blotches; aperture large, nearly circular, outer lip thin, somewhat flaring, the inner surface showing the color lines very distinctly; inner lip slightly flattened, umbilical groove broad, longitudinally striated. Operculum calcareous, outer surface convex, white, darkening toward the outer edge, which is microscopically subspirally striated. Height 2.1, diameter 1.9 mm.

Holotype: No. 2741, Mus. Calif. Acad. Sci., collected by A. M. Strong, from Point Loma, San Diego County, California, *paratype*: No. 2742, from Todos Santos Bay, Lower California, Henry Hemphill collection; *paratype*: No. 2743, from Point Fermin, San Pedro, California.

Specimens of this species were found in all the collections examined. Three specimens, No. 3310 in the Hemphill collection at the Academy, from Todos Santos Bay, Lower California, were marked "*Phasianella rubrilineata* Cpr. Types."

¹⁹ Carpenter's name of *Eucosmia variegata* from Cape San Lucas was preoccupied and Dall renamed the species *P. typica*, but the type remains as established by Carpenter. Carpenter stated that the Cape San Lucas shells were dead and that the operculum was unknown. The shell figured by Mrs. Oldroyd as the type of *P. typica* Dall is a living shell containing the operculum, quite different from anything in the Academy's material from Cape San Lucas and does not fit Carpenter's description of *E. variegata*. It is the same as the shell in the Henry Hemphill collection from Todos Santos Bay labeled "*P. rubrilineata* Cpr. Types."

As all three were dead shells a living specimen is picked for the type but the name, which does not seem to have been published, is retained. In the older collections the specimens of this species are usually labeled *P. cyclostoma* Carpenter, but they have more recently been identified as *P. typica* Dall. They differ from those species in the Cape San Lucas material in being smaller, more depressed, with a proportionately larger aperture and a distinctly different color pattern. They are easily distinguished from the young of *P. pulloides* Carpenter of the same size by the more prominent umbilicus, larger aperture and different color pattern.

Living specimens have been collected along the southern California coast from the smaller sea weeds in the tide pools, and dead shells are quite plentiful in the dredgings outside the kelp line. Additional localities from which specimens have been examined are Catalina Island, San Clemente Island, Point Vincent and Point Fermin in southern California and South Coronado and San Martin islands in Lower California.

8. *Phasianella* (*Eulithidium*) *mazatlanica* Strong, new name

Plate 10, figure 15

Phasianella perforata Philippi of Carpenter, Mazatlan Catalogue, 1857, p. 224, No. 283.—REEVE, Conch. Icon., Vol. 13, pl. 6, fig. 17. Not *Phasianella perforata* PHILIPPI, Zeit. f. Malak., 1848, p. 164.

Carpenter described this species as follows:

"This beautiful shell closely resembles the W. Indian species. Like many of its congeners, it has parallel diagonal lines of colour; and is also variously and most beautifully stained with red and brown. The first whorl of the five is discoidal. It is characterized by extremely minute wrinkling over the whole surface, only discernible under the microscope, when quite fresh. The umbilicus is very large when young, and sharply keeled; when adult, it is often nearly filled up by the callous labrum. Operculum radiately wrinkled over a large part of the outer surface; within, spire produced, sharply keeled. The largest specimen measures long. .13, lat. .12 in., div. 70°. The smallest sp. long. .032, lat. .037, div. 90°."

Dall²⁰ in pointing out that the Mazatlan shell was not *P. perforata* Philippi did not suggest a name for the species. No specimens answering this description were found in the collec-

²⁰ Proc. U. S. Nat. Mus., Vol. 34, 1908, p. 255; Proc. U. S. Nat. Mus., Vol. 37, 1909, p. 238.

tions. The microscopic wrinkling over the entire surface and the partly filled umbilicus in the adult should serve as distinguishing characteristics. The figure reproduced herewith is copied from Tryon²¹ which in turn was taken from Reeve.

9. *Phasianella (Eulithidium) lurida* Dall

Phasianella lurida DALL, Bull. Nat. Hist. Soc. Brit. Col., No. 2, 1897, p. 15, pl. 1, fig. 11.—OLDROYD, Publ. Puget Sound Biol. Station, Vol. 4, 1924, p. 168, pl. 44, fig. 11.—OLDROYD, Stanford Univ. Publ. Univ. Ser. Geol. Sci., Vol. 2, pt. 3, 1927, p. 163.

Dall's description of this species is as follows:

"Shell small, solid, turbinata, of 4 whorls, of a lurid purple color, slightly paler on the base and apex; whorls rounded, sculptured only by feeble lines of growth, polished; sutures distinct; base rounded with feeble spiral striations; aperture rounded; peritreme sharp-edged, smooth within, the lips united over the body by a wash of callus; umbilical region imperforate. Most of the specimens are marked with whitish dots, which I believe to be due to sessile Polyzoa, which are apt to leave such marks when removed. Height 3.75, diameter 3 mm."

A few specimens in the collection at Stanford University from Crescent City, California, and from Puget Sound are referred to this species but they do not furnish sufficient material for a more comprehensive description. None of them shows the white dots which are very prominent in the figure of the type and some of them show distinct but rather faint maculations of rose. The largest specimen from Puget Sound is fully twice the size of the type and has one more whorl. In several of the specimens the operculum is clouded with rose.

10. *Phasianella (Eulithidium) phasianella* (C. B. Adams)

Plate 10, figures 18, 19

Turbo phasianella C. B. ADAMS, Panama Shells, 1852, No. 282.

Phasianella ? *perforata* var. *striolata* CARPENTER, Mazatlan Catalogue, 1857, p. 225, No. 283b; Ann. Mag. Nat. Hist., Vol. 13, 1864, p. 474.

Phasianella phasianella C. B. ADAMS, TRYON, Man. Conch., Vol. 10, 1888, p. 178.

Adams described this species as follows:

²¹ Man. Conch., Vol. 10, 1888, pl. 38, fig. 62.

"Shell ovate-conoid, color various, mostly red or brown, sometimes uniform, frequently in dark flamules on a light ground, sometimes with spiral, darker stripes or series of spots; surface covered with spiral striæ; apex subacute; spire conoid, with the outline moderately curvilinear, whorls 5, convex, with a distinct suture; aperture broad, ovate, sub-effuse, labrum thin; umbilicus very small. Mean divergence about 64° , alt. .16, diam. .11 inches."

Among specimens of *Phasianella* collected at Santa Elena, Ecuador, by John Mark Reed, are some which answer in every way to this description but in the entire lot there is much variation. Color and color-pattern are fully as variable as in *P. pulloides* Carpenter, and the larger shells show the same tendency to appear more elongate than the smaller. In many of the specimens the spaces between the deep, close-set spiral striæ appear granulated by the intersection with strong growth lines. Others are smooth with fine spiral striæ which in a few cases only appear on the base and close to the suture. In some of the older shells the small umbilicus is entirely covered by enamel. In all the operculum is lustrous, clouded with varying shades of brown, sometimes almost black, the central smooth portion considerably elevated, the edge with close set radial ridges. In spite of the variations the entire lot would appear to belong to a single species.

The larger of the two specimens figured from Santa Elena, Ecuador, measures, length 6.4 mm., diameter 4 mm., and the smaller, length 4 mm., diameter 3.1 mm. They differ from *P. substriata* Carpenter, the striated species from the California and Lower California coast, in the larger size, generally brighter colors, smaller umbilicus, and darker operculum. Carpenter's record from Mazatlan needs verification.

11. *Phasianella* (*Eulithidium*) *umbilicata* (d'Orbigny)

Plate 10, figures 16, 17

Littorina umbilicata D'ORBIGNY, Voyage, Amer. Mérid., Vol. 5, pt. 3, 1840, p. 394, pl. 76, figs. 1-3.

Phasianella minima PHILIPPI, Reise durch die Wueste Atacama, 1860, p. 186; Isla Blanca.—TRYON, Man. Conch., Vol. 10, 1888, p. 178; Vol. 9, pl. 46, fig. 24.—DALL, Proc. U. S. Nat. Mus., Vol. 37, 1909, p. 238.

Not *Phasianella umbilicata* D'ORBIGNY, in Moll. Cuba, Vol. 2, 1842, p. 77, pl. 19, figs. 32, 34.

d'Orbigny described this as a new species, very common on the coast of "Arica" and "Cobija," "Bolivia" and "Peru." The following is a translation of his French description:

"Ovate, globose, thin, glossy, marked only by oblique, inconspicuous striæ; umbilicus a chink, continuous on the columella; spire very short, obtuse, composed of three slightly convex whorls, the last being very large in proportion to the others; aperture oval with thin lip; columella heavy; color black or blue black. Length 1.5 mm.; diameter 1.3 mm."

The species is apparently not represented in any western collection; therefore, d'Orbigny's original figures 1 and 2 are copied herewith; his figure 3 was merely a natural size drawing, showing no specific characters. His drawings are colored purple and not black or blue black as given in his description.

d'Orbigny used the name *umbilicata* for two species of *Phasianella* as shown above; one came from the west coast of South America and the other from the West Indies. Much uncertainty has attended the dates of publication of the two works in which the names appeared. Philippi, considering that the Cuban report appeared first, renamed the South American shell *minima* and his name was accepted by Tryon and Dall. Through the researches of Sherborn & Woodward,²² however, it is learned that that part of the Voyage, Amer. Mérid. containing this species (pp. 377-408) was issued in 1840. Troschel²³ referred to the Littorinidæ portion of the work in 1841. Woodward²⁴ has given the date of issue of that portion of de la Sagra's work containing d'Orbigny's Mollusca as 1842.²⁵ From this data it appears that the West Indian shell bears a homonymous name.

²² Sherborn & Woodward, Ann. & Mag. Nat. Hist., Ser. 7, Vol. 7, 1901, p. 389.

²³ Troschel in Wiegmann's Archiv f. Naturgeschichte, 1841, p. 261.

²⁴ Woodward, Cat. Library, Brit. Mus., Vol. 4, 1913, p. 1780.

²⁵ See also Archiv f. Naturg., 1843, p. 116, where a reference to the work appears.

PLATE 10

- Fig. 1. *Phasianella (Tricola) compta* GOULD. Plesiotype, No. 2734 (C. A. S.), from Mugu Bay, Ventura County, California; height 9.2; diameter, 5.8 mm.; p. 191.
- Figs. 2, 3, 4. *Phasianella (Eulithidium) cyclostoma* (Carpenter). Plesiotypes, Nos. 2735-2737 (C. A. S.), from Cape San Lucas, Lower California; height, 2.8 mm.; diameter, 2.6 mm.; height, 1.2 mm.; diameter, 1.0 mm.; and height, 3.1 mm.; diameter, 2.5 mm., respectively.; p. 196.
- Fig. 5. *Phasianella (Tricola) pulloides* (Carpenter). Plesiotype, No. 2738 (C. A. S.) from Cape San Lucas, Lower California; height, 4.5 mm.; diameter, 2.8 mm.; p. 192.
- Fig. 6. *Phasianella (Tricola) pulloides* (Carpenter). Plesiotype, No. 2739, (C. A. S.) from Point Fermin, San Pedro, California; height, 6.0 mm.; diameter, 3.3 mm.; p. 192.
- Fig. 7. *Phasianella (Tricola) pulloides* (Carpenter). Plesiotype, No. 2740, (C. A. S.) from Point Dume, California; height, 2.3 mm.; diameter, 1.8 mm.; p. 192.
- Fig. 8. *Phasianella (Eulithidium) rubrilineata* STRONG, n. sp. Holotype, No. 2741 (C. A. S.) from Point Loma, San Diego County, California; height, 2.1 mm.; diameter, 1.9 mm.; p. 197.
- Fig. 9. *Phasianella (Eulithidium) rubrilineata* STRONG, n. sp. Paratype, No. 2742, (C. A. S.) from Todos Santos Bay, Lower California; one of Hemphill's original specimens studied by Carpenter; height, 2.3 mm.; diameter, 2.1 mm.; p. 197.
- Fig. 10. *Phasianella (Eulithidium) rubrilineata* STRONG, n. sp. Paratype, No. 2743 (C. A. S.) from Point Fermin, San Pedro, California; height, 2.1 mm.; diameter, 2.0 mm.; p. 197.
- Fig. 11. *Phasianella (Eulithidium) substriata* (Carpenter). Plesiotype, No. 2744 (C. A. S.) from Reef Point, Orange County, California; 10 fathoms; height, 2.7 mm.; diameter, 2.3 mm.; p. 195.
- Fig. 12. *Phasianella (Eulithidium) typica* (Dall). Plesiotype, No. 2745 (C. A. S.) from Magdalena Bay, Lower California; height, 5.5 mm.; diameter, 3.6 mm.; p. 194.
- Fig. 13. *Phasianella (Eulithidium) typica* (Dall). Plesiotype, No. 2746 (C. A. S.) from Cape San Lucas, Lower California; height, 2.1 mm.; diameter, 1.7 mm.; p. 194.
- Fig. 14. *Phasianella (Tricola) perforata* PHILIPPI. After Tryon, Man. Conch. Vol. 10, 1888, pl. 39a, fig. 12; p. 193.
- Fig. 15. *Phasianella (Eulithidium) mazatlanica* STRONG, new name. After Tryon, Man. Conch. Vol. 10, 1888, pl. 38, fig. 62; Tryon's figure was copied from Reeve, Conch. Icon., Vol. 13, pl. 6, fig. 17.; p. 198.
- Figs. 16, 17. *Phasianella (Eulithidium) umbilicata* (d'Orbigny). After d'Orbigny, Voy. Amer. Merid. Vol. 5, pt. 3, 1840, pl. 76, figs. 1, 2. d'Orbigny's fig. 3 was a drawing of the shell, natural size, and showed no specific characters; p. 200.
- Fig. 18. *Phasianella (Eulithidium) phasianella* (C. B. Adams). Plesiotype, No. 2892, (C. A. S.) from Santa Elena, Ecuador; height, 6.4 mm.; diameter, 4 mm.; p. 199.
- Fig. 19. *Phasianella (Eulithidium) phasianella* (C. B. Adams). Plesiotype, No. 2893, (C. A. S.) from Santa Elena Ecuador; height, 4 mm.; diameter, 3.1 mm.; p. 199.

