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## Results of the Puritan-American Museum of Natural History Expedition to Western Mexico 17. The Recent Mollusks: Gastropoda, Cypraeacea

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### INTRODUCTION

The present paper continues a study of the marine mollusks collected in west Mexican waters during the course of the expedition. The first report considered the family Conidae (Emerson and Old, 1962); the present report covers the superfamily Cypraeacea. Specimens were taken by shore and intertidal collecting, by skin diving, and by dredging from a small skiff and from the schooner "Puritan." Dredging operations were restricted to depths no greater than 50 fathoms. The itinerary and descriptions of the collecting stations were recorded in the general account of the expedition (Emerson, 1958).

The present collection includes 16 of the 26 species of Cypraeacea

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recognized by Keen (1958) in the Panamic faunal province and three other species, namely: *Trivia* (*Cleotrivia*) *fusca* (Sowerby, 1832), *Trivia* (*Pusula*) *myrae* Campbell (1961), and *Trivia* (*Pusula*) *rubescens* (Gray, 1833). The known geographic and benthonic ranges are extended for some of these species, and an attempt was made to determine for the west Mexican region the modern and fossil distribution of the species represented in the present collection.

Although the west American species of the family Cypraeidae have received the attention of many students, additional material must be obtained from critical areas and studied before the validity of some of the named polytypic forms in the genus *Cypraea* can be determined. Considerable work remains to be done on the specific level in the subfamily Triviinae, especially in the genus *Neosimnia*.

The following abbreviations have been used to designate institutions listed in this paper:

A.M.N.H., the American Museum of Natural History  
 A.N.S.P., Academy of Natural Sciences of Philadelphia  
 U.S.N.M., United States National Museum

#### ACKNOWLEDGMENTS

We are indebted to a number of people for their valued assistance and generous coöperation. Mr. E. P. Chace of the San Diego Museum of Natural History, Drs. R. Tucker Abbott and Robert Robertson of the Academy of Natural Sciences of Philadelphia, Dr. Harald A. Rehder of the United States National Museum, and Dr. William J. Clench of the Museum of Comparative Zoölogy of Harvard College permitted access to the collections of their respective institutions or provided specimens on loan. Dr. G. Bruce Campbell of Lynwood, California, examined some of the specimens of *Trivia*. Mrs. H. E. Coomans of New York City, Mrs. Faye B. Howard and Mr. Gale G. Sphon of Santa Barbara, California, have given locality data from specimens in their private collections. Dr. H. E. Coomans of the American Museum of Natural History assisted us in various ways.

### SYSTEMATIC ACCOUNT

#### SUPERFAMILY CYPRAEACEA

#### FAMILY CYPRAEIDAE

#### GENUS *CYPRAEA* LINNÉ, 1758

TYPE SPECIES: *Cypraea tigris* Linné, 1758, Recent, Indo-Pacific, by subsequent designation of Montfort, 1810.

SUBGENUS *EROSARIA* TROSCHEL, 1863

TYPE SPECIES: *Cypraea erosa* Linné, 1758, Recent, Indo-Pacific, by subsequent designation of Jousseaume, 1884.

*Cypraea (Erosaria) albuginosa* Gray, 1825

## Figures 1-4

*Cypraea albuginosa* "Mawe" GRAY, 1825, Zool. Jour., London, vol. 1, p. 510. INGRAM, 1951, Bull. Amer. Paleont., vol. 33, pp. 141, 142, pl. 23, figs. 13, 14.

[?] *Erosaria albuginosa nariaeformis* SCHILDER, 1930, Zool. Anz., vol. 92, p. 76.

*Erosaria (Ravitrona) albuginosa albuginosa* GRAY, SCHILDER AND SCHILDER, 1938, Proc. Malacol. Soc. London, vol. 23, p. 133; 1952, Mém. Inst. Roy. Sci. Nat. Belgique, ser. 2, pt. 45, p. 75.

*Cypraea (Erosaria) albuginosa* GRAY, KEEN, 1958, Sea shells of tropical west America, p. 328, fig. 281.

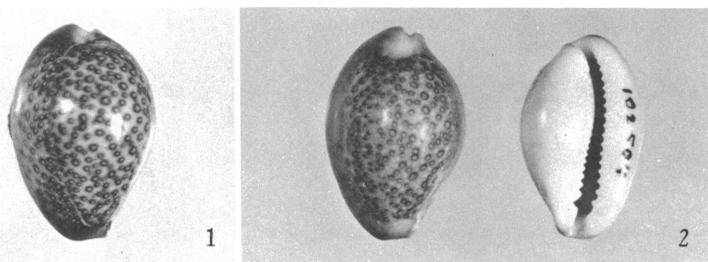


FIG. 1. *Cypraea (Erosaria) albuginosa* Gray, Puerto Balleto, María Madre Island, Tres Mariás Islands, Mexico, shore collecting (Station 27; A.M.N.H. No. 74127).  $\times 1$ .

FIG. 2. Two specimens of *Cypraea (Erosaria) albuginosa* Gray, James Island, Galapagos Islands (U.S.N.M. No. 102504). *Left*: Dorsal view. *Right*: Apertural view. This is apparently the form named *nariaeformis* by Schilder (1930a).  $\times 1$ .

RANGE: Angel de la Guarda Island, Baja California, in the Gulf of California (A.N.S.P.) and south to the Tres Mariás Islands, Nayarit, Mexico (Strong and Hanna, 1930); Clipperton Island (Hertlein and Allison, 1960); Cocos Island, Costa Rica (U.S.N.M.); James Island, Galapagos Islands (U.S.N.M.).

COLLECTING STATIONS: *Baja California, Gulf coast*: Off Pulpito Point, skin diving, one live specimen (Station 147); islet between San Carlos Bay and Point San Telmo, shore collecting, one fresh beach specimen (Station 122); Amortajada Bay, San José Island, shore collecting, one beach specimen (Station 113); Espíritu Santo Island, shore collecting, three beach specimens (Station 92); Ceralvo Island, skin diving, one dead

specimen (Station 90). *Tres Marias Islands, Nayarit*: San Juanito Island, shore collecting, one beach specimen (Station 36); Puerto Balleto, María Madre Island, shore collecting, one live specimen and eight beach specimens (Station 36); Puerto Balleto, María Madre Island, shore collecting, one live specimen and eight beach specimens (Station 27); Puerto Balleto, María Madre Island, shore collecting, four live and eight beach specimens (Station 34); María Magdalena Island, shore collecting, three beach specimens (Station 48); María Magdalena Island, skiff dredge, one live specimen (Station 53); María Magdalena Island, skiff dredge,

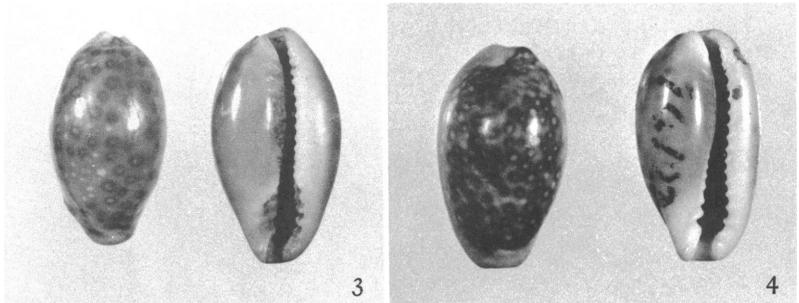


FIG. 3. Two specimens of *Cypraea (Erosaria) albuginosa* Gray, Off María Magdalena Island, Tres Marias Islands, Mexico, "Puritan" dredge, 7-8 fathoms (Station 58; A.M.N.H. No. 74725). *Left*: Dorsal view. *Right*: Apertural view. Approximately  $\times 2$ .

FIG. 4. Two specimens of *Cypraea (Erosaria) albuginosa* Gray, Puerto Balleto, María Madre Island, Tres Marias Islands, Mexico, shore collecting (Station 27; A.M.N.H. No. 74127). *Left*: Dorsal view. *Right*: Apertural view. Although these were found on the beach with the larger form (fig. 1), they apparently were washed up on the beach from deeper water (see text).  $\times 2$ .

one live specimen (Station 57); María Magdalena Island, skiff dredge, two live specimens (Station 58); Yellow Bluff, Cleofas Island, shore collecting, two beach specimens (Station 65).

REMARKS: In the series of *C. albuginosa albuginosa* from Puerto Balleto, María Madre Island (Station 34), is a specimen which measures 32 mm. in length. This is considerably larger than any specimens from west Mexico or Clipperton Island previously present in the collection of the American Museum of Natural History.

Although there are too few specimens in the present collection from which to draw definite conclusions, it may be noted that specimens dredged from the skiff are consistently smaller in size than the specimens collected from the intertidal zone (figs. 3, 4). They are also darker colored

than are the live-collected or the fresh specimens taken in the intertidal zone. The dredged shells have the dorsum colored a rich chocolate brown. They were taken in 1–3 fathoms (Station 53), 4–6 fathoms (Station 57), and 7–8 fathoms (Station 58). These specimens may constitute a dwarf ecological form analogous to that occurring in *Cypraea semiplota* Mighels, 1845, and in other species of Hawaiian *Cypraea*.

Although only two specimens of Schilder's (1930a) southern race, *nariaeformis*, were available to us for examination, it is notable that Ingram (1951), after examining long series of these specimens, commented that he had "not been able to find any characteristics which would indicate that *C. albuginosa*, s.s. [*sic*] can be divided into subspecies." The specimens from the Galapagos Islands (fig. 2) in the United States National Museum appear to be typical *albuginosa*.

This species is recorded from the Pleistocene of Santa Inez Bay, on the Gulf coast of Baja California (Hertlein, 1957), and "Recent fossils" are reported from "Marguer" Bay, Carmen Island, Baja California, and from San Pedro, Sonora (Ingram, 1951), in the Gulf of California area.

#### SUBGENUS *BASILITRONA* IREDALE, 1930

TYPE SPECIES: *Cypraea isabella* Linné, 1758, Recent, Indo-Pacific, by original designation.

#### *Cypraea (Basilitrona) isabellamexicana* Stearns, 1893

Figures 7–9

*Cypraea (Luponia) controversa* "Gray" STEARNS, 1879, Proc. Acad. Nat. Sci. Philadelphia, for 1878, p. 399. Not Gray, 1824.

*Cypraea (Luponia) isabella-mexicana* STEARNS, 1893, Proc. U. S. Natl. Mus., vol. 16, pp. 348, 349, pl. 50, figs. 3, 4; 1894, *ibid.*, vol. 17, p. 189.

*Cypraeorbis (Cypraeorbis) isabella* var. *isabelloides* SCHILDER, 1924, Arch. Naturgesch., vol. 90, no. 4, pp. 196, 197.

*Luria (Basilitrona) controversa mexicana* [*sic*] Stearns, SCHILDER AND SCHILDER, 1938, Proc. Malacol. Soc. London, vol. 23, p. 176.

*Cypraea isabella mexicana* [*sic*] Stearns, INGRAM, 1951, Bull. Amer. Paleont., vol. 33, pp. 151, 152, pl. 24.

*Luria (Basilitrona) mexicana* [*sic*] Stearns, SCHILDER AND SCHILDER, 1952, Mém. Inst. Roy. Sci. Nat. Belgique, ser. 2, pt. 45, pp. 182, 183. KEEN, 1959–1960, Minutes Conchol. Club Southern California, no. 194, p. 19. BURCH, 1959–1960, Minutes Conchol. Club Southern California, no. 194, p. 20.

*Cypraea (Luria) isabella-mexicana* Stearns, KEEN, 1958, Sea shells of tropical west America, p. 328, fig. 282; 1960, *op. cit.*, rev. ed., p. 328, fig. 282.

*Cypraea (Luria) isabellamexicana* [*sic*] Stearns, SHASKY, 1961, Veliger, vol. 3, pp. 111, 112.

RANGE: Guaymas, Sonora, Mexico (Shasky, 1961) to Cape San Lucas,

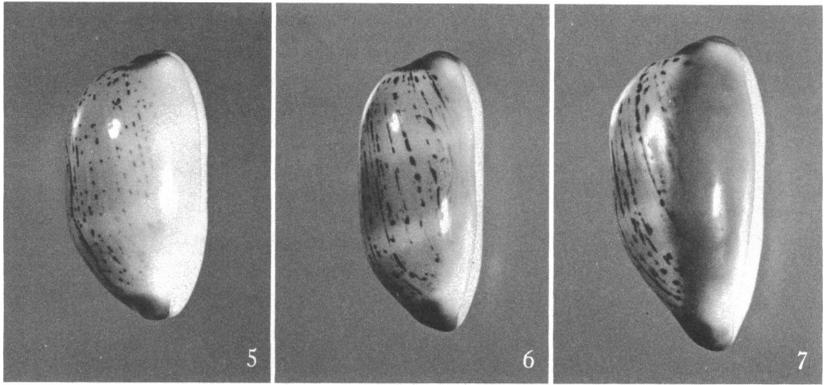


FIG. 5. *Cypraea (Basilitrona) isabella isabella* Linné, Madagascar (ex D. J. Steward collection, A.M.N.H. No. 23453). Side view of the typical race, showing the white margin. The terminal spots are bright orange. Approximately  $\times 1$ .

FIG. 6. *Cypraea (Basilitrona) isabella controversa* Gray, Nanakuli, Oahu, Hawaii (ex C. M. Burgess collection, A.M.N.H. No. 91836). Side view of the Hawaiian race, showing the characteristic cylindrical shape. The orange terminal spots are overlain by brown blotches. Approximately  $\times 1$ .

FIG. 7. *Cypraea (Basilitrona) isabellamexicana* Stearns, Puerto Balleto, María Madre Island, Tres Mariás Islands, Mexico, shore collecting (Station 27; A.M.N.H. No. 74156). Side view of fresh specimen, showing fulvous brown marginal coloration. Approximately  $\times 1$ .

Baja California (Stearns, 1893), in the Gulf of California, and the following islands off Mexico: Socorro Island (A.N.S.P.), Clarion Island (U.S.N.M.), Tres Mariás Islands, Revillagigedo Islands, and Clipperton Island (Hertlein, 1937), Cocos Island, Costa Rica (U.S.N.M.).

COLLECTING STATIONS: *Baja California, Gulf coast*: Cerralvo Island, skin diving, one dead specimen (Station 90). *Tres Mariás Islands, Nayarit*: San Juanito Island, shore collecting, five beach specimens (Station 36); Puerto Balleto, María Madre Island, shore collecting, 30 beach specimens, including three fresh specimens (Station 27); María Madre Island, shore collecting, one beach specimen (Station 48); Cleofas Island, shore collecting, three beach specimens (Station 65).

REMARKS: The taxon "*Cypraea (Luponia) isabella-mexicana*" was considered by Stearns (1893) to be distinct from the Indo-Pacific analogue, *Cypraea isabella* Linné. This species, as well as the rest of the *C. isabella* complex, has, however, undergone several taxonomic revisions in the last 30 years. Schilder and Schilder in 1938 divided *Luria (Basilitrona) isabella* Linné, 1758, into four races. At that time, they considered *L. (B.) controversa* Gray, 1824, to be a full species and recognized *mexicana* [sic]

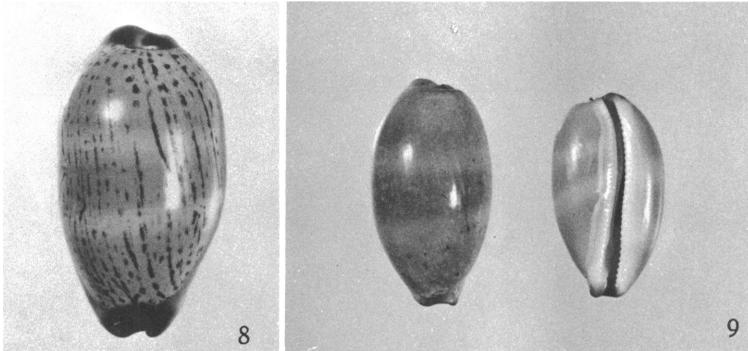


FIG. 8. *Cypraea (Basilitrona) isabellamexicana* Stearns. Dorsal view of specimen illustrated in figure 7. Approximately  $\times 1$ .

FIG. 9. Two specimens of *Cypraea (Basilitrona) isabellamexicana* Stearns, Chatham Bay, Cocos Island, Costa Rica (U.S.N.M. No. 568104). *Left*: Dorsal view of subadult specimen. *Right*: Apertural view of subadult specimen. These are apparently the form named *isabelloides* by Schilder (1924). Approximately  $\times 1$ .

Stearns, 1893, as a race of *controversa*. Later, the Schilders (1952, p. 183), listed *controversa* as a race of *L. (B.) isabella* Linné. At the same time they raised *L. (B.) mexicana* [*sic*] to specific level.

The shells of the present species apparently consistently differ from those of the named Indo-Pacific races of *C. isabella* Linné by having brownish fulvous margins and produced extremities, whereas *C. isabella* has white margins and less produced extremities (figs. 5–8). We are following Keen (1958, p. 282) in considering *Cypraea isabellamexicana* Stearns (1893) to be a distinct species.<sup>1</sup> Specimens of this species were recently taken in the Gulf of California at La Paz (Keen, 1959–1960; Burch, 1959–1960), Ceralvo Island, Baja California (Puritan expedition), and Guaymas, Sonora (Shasty, 1961).

*Cypraeorbis isabella* var. *isabelloides* (Schilder, 1924, 1927) was said to occur at Cocos Island [?Costa Rica]. Six specimens from Cocos Island, Costa Rica, in the United States National Museum appear to be typical *C. isabellamexicana* (see fig. 9). It is notable that Schilder and Schilder (1938) did not mention *isabelloides* in their later discussions of the *isabella* complex, but cited *mexicana* [*sic*] from Cocos Island, Costa Rica.

Records of *Cypraea isabella* Linné reported by Hertlein (1937) and

<sup>1</sup> According to Article 26a of the International Code of Zoological Nomenclature (Stoll *et al.*, 1961), the component words of an originally proposed compound name are to be united without a hyphen, and the name is to be treated as originally published in that form.

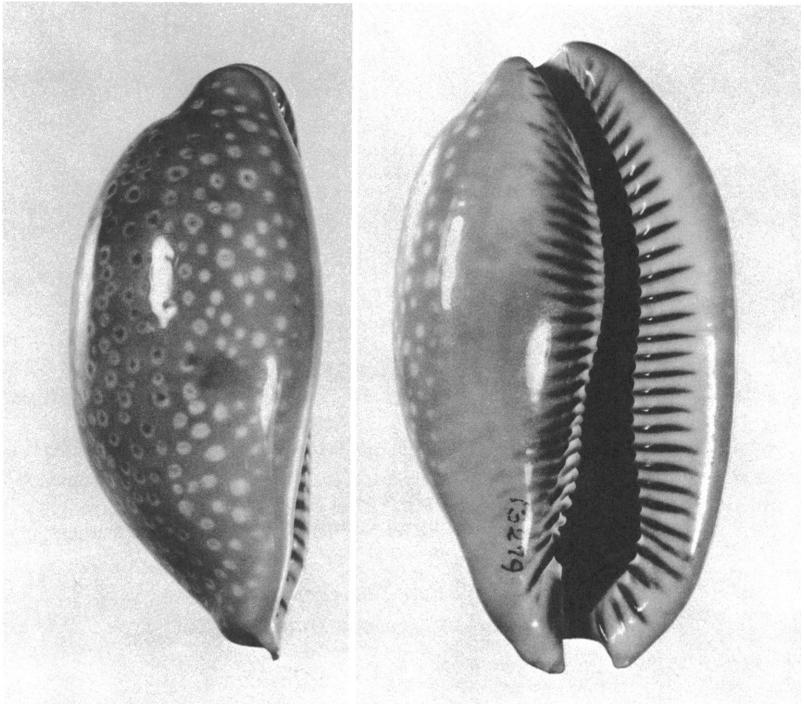


FIG. 10. *Cypraea (Macrocypraea) cervinetta* Kiener, Mazatlán, Sinaloa, Mexico (ex William Haines collection; A.M.N.H. No. 13279). *Left*: Side view of specimen, showing the small spots. This individual is unusual in that some of the dorsal spots are ocellated. *Right*: Apertural view. Note that the anterior portion of the aperture is widely flared. Approximately  $\times 1$ .

Hertlein and Emerson (1953) from Clipperton Island are referable to *Cypraea isabellamexicana* Stearns (1893). (See Summers in Hertlein and Allison, 1960.) No occurrences in the fossil record were noted for this species.

SUBGENUS *MACROCYPRAEA* SCHILDER, 1930

TYPE SPECIES: *Cypraea exanthema* Linné, 1767 [= *Cypraea zebra* Linné, 1758], Recent, western Atlantic, by original designation.

*Cypraea (Macrocypraea) cervinetta* Kiener, 1843

Figure 10

*Cypraea cervinetta* KIENER, 1843, Spécies général et iconographie des coquilles

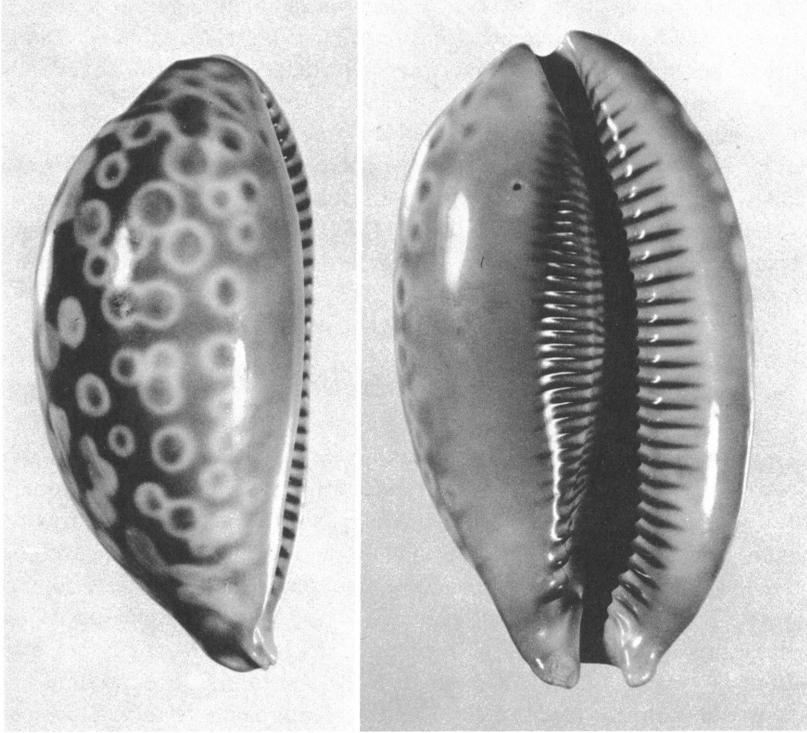


FIG. 11. *Cypraea (Macrocypraea) zebra* Linné, Malmok, Aruba, Netherlands Antilles (ex Lucy Coomans, A.M.N.H. No. 97779). *Left*: Side view of specimen, showing the large, ocellated, marginal spots. This specimen is unusual in the extreme development of ocellated spots extending upward from the margins. *Right*: Apertural view of specimen. Note the small drilled hole, apparently bored by an octopus, on the upper part of the columellar side. Approximately  $\times 1$ .

vivantes, genre Porcelaine, vol. "1," pp. 74, 75, pl. 6, figs. 1, 2. INGRAM, 1951, Bull. Amer. Paleont., vol. 33, pp. 145, 146, pl. 22, figs. 3, "4" [2].

*Trona (Macrocypraea) cervinetta* Kiener, SCHILDER AND SCHILDER, 1938, Proc. Malacol. Soc. London, vol. 23, p. 179; 1952, Mém. Inst. Roy. Sci. Nat. Belgique, ser. 2, pt. 45, pp. 192, 193.

RANGE: Margarita Island, west coast of Baja California (Ingram, 1951) to Punta Peñasco, Sonora, Mexico (Faye Howard!), in the Gulf of California, and south to Paita, Peru, and the Galapagos Islands (Dall, 1909b).

COLLECTING STATIONS: *Sonora*: Tiburón Island, shore collecting, one beach fragment (Station 157); San Carlos Bay, skin diving, one dead specimen (Station 155). *Tres Marias Islands, Nayarit*: María Madre

Island, shore collecting, six beach specimens, including four subadults and one bulla-stage juvenile (Station 27); María Magdalena Island, shore collecting, one beach specimen (Station 48); María Magdalena Island, shore collecting, one beach specimen (Station 52); Cleofas Island, shore collecting, one subadult, beach specimen (Station 65).

REMARKS: This species proved to be scarce, as only a few beach specimens were obtained. A fragment from Tiburón Island, consisting of the basal part of a large shell, measures 106.9 mm. in length. The largest specimen previously in the collection of the American Museum of Natural History measures 105.5 mm.

Although this species has been confused with the west Atlantic *C. zebra* Linné, 1758 (= *C. exanthema* Linné, 1767), they are readily distinguishable. *Cypraea cervinetta* has produced extremities, a reduced fossula, and the aperture is widely flared anteriorly (fig. 10). The teeth of *cervinetta* are usually yellow-brown in color and are produced somewhat farther across the columella. The four grayish transverse bands on the dorsum of the subadult shell are commonly visible, and the mature shell is covered by tiny white dots, whereas *zebra* has large spots. *Cypraea cervinetta* lacks the ocellated marginal spots that are characteristic of *zebra* (figs. 10, 11). According to Schilder and Schilder (1938, p. 179) the present species has a discontinuous distribution, with populations ranging from La Paz, Baja California (actually Punta Peñasco, Sonora), to the Gulf of Panama and with populations in northern Peru and the Galapagos Islands. However, they could not detect racial differences between the isolated populations.

No records were noted for the present species in the fossil record of western Mexico.

#### SUBGENUS *PSEUDOZONARIA* SCHILDER, 1927

TYPE SPECIES: *Cypraea arabicula* Lamarck, 1811, Recent, eastern Pacific, by original designation.

*Cypraea (Pseudozonaria) arabicula* Lamarck, 1811

#### Figure 12

- Cypraea arabicula* LAMARCK, 1811, Ann. Mus. Hist. Nat. Paris, vol. 16, for 1810, p. 100. INGRAM, 1951, Bull. Amer. Paleont., vol. 33, pp. 143-145, pl. 23, figs. 7, 8.  
*Zonaria (Pseudozonaria) arabicula* Lamarck, SCHILDER AND SCHILDER, 1938, Proc. Malacol. Soc. London, vol. 23, p. 145.  
*Cypraea (Pseudozonaria) arabicula* Gray, KEEN, 1958, Sea shells of tropical west America, pp. 328, 329, fig. 284.

RANGE: San Hipolito Point, west coast of Baja California (Jordan,

1924), to San Pedro Bay, Sonora, Mexico (Emerson and Puffer, 1957), in the Gulf of California, and south to Paita, Peru, and the Galapagos Islands (Hertlein and Strong, 1955a).

COLLECTING STATIONS: *Tres Marias Islands, Nayarit*: Puerto Balleto, María Madre Island, shore collecting, 14 beach specimens (Station 27); Puerto Balleto, María Madre Island, shore collecting, eight beach specimens (Station 34); off Arroyo Honcho, María Madre Island, "Puritan" dredge, 14–15 fathoms (Station 72); María Magdalena Island, shore

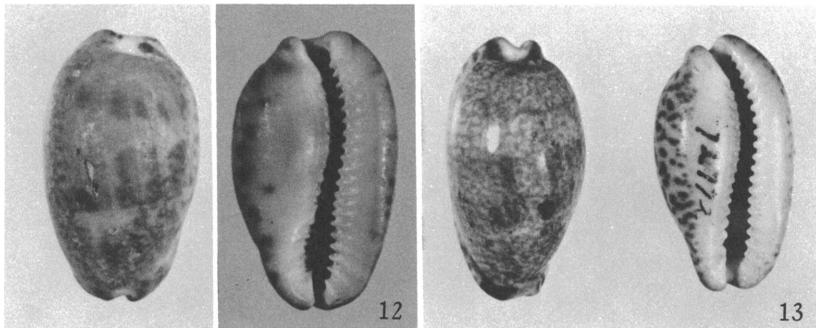


FIG. 12. *Cypraea (Pseudozonaria) arabicula* Lamarck, Puerto Balleto, María Madre Island, Tres Marias Islands, Mexico, shore collecting (Station 27; A.M.N.H. No. 74114). *Left*: Dorsal view. *Right*: Apertural view. Approximately  $\times 2$ .

FIG. 13. Two specimens of *Cypraea (Pseudozonaria) nigropunctata* Gray. Villamil Settlement, Albermarle Island, Galapagos Islands (*ex* C. R. de Sola, A.M.N.H. No. 72772). *Left*: Dorsal view. *Right*: Apertural view. Approximately  $\times 1.25$ .

collecting, five beach specimens (Station 48); Yellow Bluff, Cleofas Island, shore collecting, three beach specimens (Station 65).

REMARKS: In the series collected on the beach at Puerto Balleto, María Madre Island (Station 27), is a small, narrow specimen measuring 18 mm. in length. Uniquely, this specimen has a rather straight right side, and the left margin is uncalloused, while the right is slightly calloused and has a weak keel. The well-developed dentition and fossular denticles indicate that it is a fully matured individual (fig. 12). At first glance it is reminiscent of *C. nigropunctata* Gray from the Galapagos Islands (see fig. 13).

A fresh specimen brought up from 14–15 fathoms by the "Puritan" dredge (Station 27) measures only 17.5 mm. in length. This pyriform, adult shell is the smallest of nearly 100 other specimens measured in the collection of the American Museum of Natural History.

This species is recorded from the Pleistocene of Baja California at Turtle Bay (Chace, 1956) and Magdalena Bay (Jordan, 1936) on the west coast and at San Carlos Bay (Emerson *in* Squires, 1959) on the Gulf coast, from the Pleistocene of Oaxaca (Palmer and Hertlein, 1936), and from the Tres Mariás Islands (Hertlein, 1934); Ingram (1951) reports "Recent fossils" [?Pleistocene] from San Pedro, Sonora.

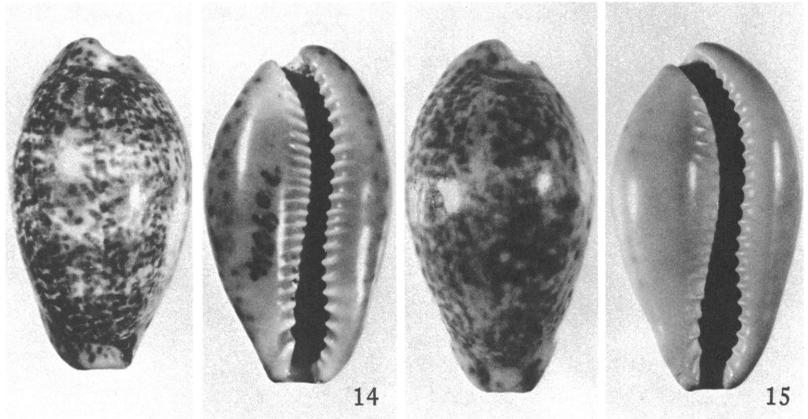


FIG. 14. *Cypraea* (*Zonaria*) *annettae annettae* Dall, Red Bluff, Tiburón Island, Sonora, Mexico, shore collecting (Station 157; A.M.N.H. No. 76904). *Left*: Dorsal view. *Right*: Apertural view.  $\times 1$ .

FIG. 15. *Cypraea* (*Zonaria*) *annettae aequinoctialis* Schilder, Mancora, Peru (*ex* H. A. Pilsbry; A.N.S.P. No. 234869) *Left*: Dorsal view. *Right*: Apertural view.  $\times 1$ .

#### SUBGENUS *ZONARIA* JOUSSEAUME, 1884

TYPE SPECIES: *Cypraea zonata* Chemnitz [= *Cypraea zonaria* Gmelin, 1791], Recent, west Africa, by original designation.

#### *Cypraea* (*Zonaria*) *annettae annettae* Dall, 1909

##### Figure 14

*Cypraea sowerbyi* KIENER, 1845, *Spécies général et iconographie des coquilles vivantes, genre Porcelaine*, vol. "1," p. 38, pl. 7, fig. 5. Not Gray, "1832," *ex* MS, nor Anton, 1839.

*Cypraea annettae* DALL, 1909, *Nautilus*, vol. 22, p. 125. INGRAM, 1951, *Bull. Amer. Paleont.*, vol. 33, pp. 142, 143, pl. 23, figs. 9, 10, in part, excluding references to *Zonaria annettae aequinoctialis* Schilder, 1933.

*Zonaria* (*Zonaria*) *annettae annettae* Dall, SCHILDER AND SCHILDER, 1938, *Proc. Malacol. Soc. London*, vol. 23, pp. 143, 144; 1952, *Mém. Inst. Roy. Sci. Nat. Belgique*, ser. 2, pt. 45, p. 111.

*Cypraea* (*Zonaria*) *annettae* Dall, KEEN, 1958, Sea shells of tropical west America, p. 330, fig. 287.

RANGE: San Ignacio Lagoon, Baja California, west coast (Ingram, 1951), to Punta Peñasco, Sonora, Mexico (Lowe, 1935), in the Gulf of California, and south to Mazatlán, Sinaloa, Mexico (Keen, 1958).

COLLECTING STATIONS: *Baja California, Gulf coast*: Espiritu Santo Island, shore collecting, two beach specimens (Station 92); Amortajada Bay, San José Island, shore collecting, one beach specimen (Station 113); San Marcos Island, shore collecting, 10 beach specimens (Station 149);

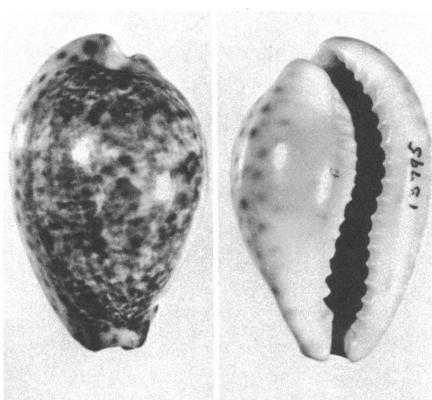


FIG. 16. *Cypraea* (*Zonaria*) *annettae aequinoctialis* Schilder, "Gulf of California" (ex William Haines, A.M.N.H. No. 13755a). *Left*: Dorsal view. *Right*: Apertural view. This specimen was mixed with five typical specimens of the nominate subspecies.  $\times 1$ .

South San Lorenzo Island, shore collecting, 14 beach specimens (Station 166); Angel de la Guarda Island, shore collecting, two beach specimens (Station 169); Mejia Island, shore collecting, one beach specimen (Station 171); Gonzaga Bay, skin diving, 1–3.25 fathoms, three specimens (Station 175); Gonzaga Bay, shore collecting, three beach specimens (Station 176); San Luis Island, shore collecting, five beach specimens (Station 181). *Sonora*: Off San Carlos Bay, skin diving, 1–2.5 fathoms, four dead specimens (Station 155); Tiburón Island, shore collecting, seven beach specimens (Station 157).

REMARKS: Schilder and Schilder (1938) considered *Cypraea aequinoctialis* (Schilder, 1933) to be a subspecies of *annettae* that occurred in Ecuador and Peru. Subsequently, however, Schilder (1958) concluded that the southern populations actually represent a valid species. The slight dif-

ferences between the northern and southern populations (figs. 14, 15) would seemingly warrant only subspecific recognition for the southern form. It should be noted that Keen (1958) questionably records *C. annettae aequinoctialis* from Panama.

This species is recorded from the Pleistocene of Baja California at the following localities, west coast: Turtle Bay (Chace, 1956) and Magdalena Bay (Dall, 1918; Jordan, 1936); Gulf coast: Carmen Island, Coronados Island, Punta Chivato, Concepción Bay (Durham, 1950), San Carlos Bay (Emerson *in* Squires, 1959), Santa Rosalía district (Grant and Gale, 1931), and Ceralvo Island (Emerson, 1960) and from Sonora at Punta Peñasco (Hertlein and Emerson, 1956). Ingram (1951) reports "Recent fossils" [?Pleistocene] of this species from the area of Guaymas, Sonora, and from Point Escondido and Loreto on the Gulf coast of Baja California. It also is reported from the Pliocene of Marquer Bay, Carmen Island (Durham, 1950).

#### FAMILY ERATOIDAE

#### SUBFAMILY ERATOINAE

#### GENUS *ERATO* RISSO, 1826

TYPE SPECIES: *Erato cypraeola* [= *Voluta cypraeola* Brocchi, 1814], Miocene and Pliocene of Italy, by monotypy.

#### SUBGENUS *HESPERERATO* SCHILDER, 1932

TYPE SPECIES: *Erato (Hespererato) vitellina* (Hinds), 1844, Recent, eastern Pacific, by original designation.

#### *Erato (Hespererato) columbella* Menke, 1847

*Erato columbella* MENKE, 1847, Zeitschr. für Malakozool., vol. 4, p. 183. TRYON, *in* Tryon and Pilsbry, 1882, Manual of conchology, ser. 1, vol. 5, p. 10, pl. 4, fig. 8.

*Erato leucophaea* GOULD, 1853, Boston Jour. Nat. Hist., vol. 6, p. 386, pl. 14, fig. 20.

*Erato (Hespererato) columbella columbella* Menke, SCHILDER, 1932, Fossilium catalogus, I: Animalia, pt. 55, p. 84.

*Erato (Hespererato) columbella* Menke, KEEN, 1958, Sea shells of tropical west America, p. 331, fig. 289.

RANGE: Monterey Bay, California (Dall, 1921), to Punta Peñasco, Sonora, Mexico (Keen, 1947), in the Gulf of California, and south to Panama Bay, Panama (Dall, 1921).

COLLECTING STATIONS: *Baja California*: Off Coronados Island, "Puritan" dredge, 40–50 fathoms, two dead specimens (Station 145); off Puerto Escondido, "Puritan" dredge, 18–20 fathoms, one dead specimen (Station 138); Los Frailes Bay, "Puritan" dredge, 20–40 fathoms, three dead specimens (Station 89).

REMARKS: This species was reported from Pleistocene deposits on the west coast of Baja California at Punta Descanso (Valentine, 1957) and at San Quintin Bay (Jordan, 1926). It is also recorded from the Pleistocene of California.

*Erato (Hespererato) scabriuscula* "Gray" Sowerby, 1832

"*Erato scabriuscula*" GRAY, MS, Descriptive catalogue of shells, p. 16, fig. 45 "June, 1832."

*Erato scabriuscula* G. B. SOWERBY, I, in G. B. Sowerby, II, 1832 [?October 26], The conchological illustrations, *Cypraea* pl. 16, fig. 45.

*Marginella cypraeola* G. B. SOWERBY, I, in Broderip and G. B. Sowerby, I, 1832, Proc. Zool. Soc. London, for 1832, p. 57. Not Borson, 1820.

*Marginella granum* KIENER, 1843, Spécies général et iconographie des coquilles vivantes, genre Marginelle, vol. "3," p. 17, pl. 8, fig. 33. Not Philippi, 1849.

*Erato (Eratopsis) scabriuscula* "Gray," TRYON, in Tryon and Pilsbry, 1882, Manual of conchology, ser. 1, vol. 5, p. 11, fig. 56.

*Erato (Hespererato) scabriuscula* Sowerby, KEEN, 1958, Sea shells of tropical west America, p. 331, fig. 291.

RANGE: Cape San Lucas, Baja California, Mexico, to Peru (Dall, 1909b).

COLLECTING STATION: *Tres Martas Islands, Nayarit*: Off Maria Madre Island, "Puritan" dredge, 14–15 fathoms, two dead specimens (Station 72).

REMARKS: The numerous minute granules ornamenting the surface serve to characterize this species.

SUBFAMILY TRIVIINAE

GENUS *TRIVIA* "GRAY" BRODERIP, 1837<sup>1</sup>

<sup>1</sup> Although Gray (1847) credits *Trivia* to "Gray, 1832, Z. Jour.," we could not find *Trivia* cited in this work and assume that he refers to his proof sheets, "Descriptive catalogue of shells" (Gray, MS., p. 13). Olsson and Harbison (1953) recently accepted the validity of the taxa proposed in the proof sheets and therefore credit *Trivia*, *Luponia*, and several specific names in the Triviidae (see Shaw, 1909) to "Gray, June, 1832." They contend that some of the proof sheets were distributed by Gray and thus were available to workers as a publication. However, Sherborn (1909, 1922), Shaw (1909), and Woodward (1915) have demonstrated conclusively, in the opinion of the present writers, that Gray's manuscript was not published in the accepted sense, and the mere distribution of proof sheets does not

TYPE SPECIES: *Cypraea europaea* Montagu, 1808 [= *Cypraea monacha* Da Costa, 1778], Recent, eastern Atlantic, by subsequent designation of Gray (1847, p. 142). Not Koch, 1850.

SUBGENUS *NIVERIA* JOUSSEAUME, 1884

TYPE SPECIES: *Cypraea nivea* "Gray" G. B. Sowerby, I, in G. B. Sowerby, II, 1832 [= *Trivia nix* Schilder, 1922], not Gray, 1824, nor Wood, 1828, Recent, western Atlantic, by original designation.

*Trivia (Niveria) pacifica* "Gray" (Sowerby), 1832

"*Trivia pacificus*" [sic] GRAY, MS, Descriptive catalogue of shells, p. 15, fig. 39, "June, 1832."

*Cypraea pacifica* G. B. SOWERBY, I, in G. B. Sowerby, II, 1832 [November 9], The conchological illustrations, *Cypraea* pl. 7, fig. 39\* [sic]. GRAY, 1833 [January 14], Proc. Zool. Soc. London, p. 185. Not Ostergaard, 1920.

*Cypraea (Trivia) pacifica* "Gray," ROBERTS, in Tryon and Pilsbry, 1885, Manual of conchology, ser. 1, vol. 7, p. 201, pl. 21, figs. 3, 4.

*Trivia (Niveria) pacifica* (Sowerby), KEEN, 1958, Sea shells of tropical west America, p. 332, fig. 295.

RANGE: Pescadero Point, west coast of Baja California (U.S.N.M.), to Cape Pulmo (U.S.N.M.) in the Gulf of California, and south to Mancora, Peru (A.N.S.P.), and the Galapagos Islands (Hertlein and Strong, 1955b).

COLLECTING STATION: *Tres Marias Islands, Nayarit*: Off María Magdalena Island, skiff dredge, 4-6 fathoms, one living specimen (Station 57).

REMARKS: Schilder (1932a, p. 95) considers *T. affinis* Sowerby (1880) [not Marrat, 1867] to be a synonym of this species.

SUBGENUS *CLEOTRIVIA* IREDALE, 1930

TYPE SPECIES: *Cypraea pilula* (Kiener), 1843, Recent, Indo-Pacific, by original designation.

*Trivia (Cleotrivia) fusca* Sowerby, 1832

Figure 17

"*Tri.[via] fusca*" GRAY, MS, Descriptive catalogue of shells, p. 15, fig. 37, "June, 1832."

*Cypraea fusca* G. B. SOWERBY, I, in G. B. Sowerby, II, 1832 [September 28],

The conchological illustrations, *Cypraea* pl. 6, fig. 37.

*Pusula (Cleotrivia) occidentalis*, SCHILDER, 1931, Zool. Anz., vol. 96, p. 72, fig. 6. Not Schilder, 1922.

*Pusula (Cleotrivia) fusca* Sowerby, SCHILDER, 1932, Fossilium catalogus, I: Animalia, pt. 55, p. 98.

RANGE: Baja California, Mexico, to the Galapagos Islands (Schilder, 1932a).

COLLECTING STATIONS: *Tres Mariás Islands, Nayarit*: Off María Madre Island, "Puritan" dredge, 22–24 fathoms, one dead specimen (Station 59); off María Magdalena Island, "Puritan" dredge, 28 fathoms, one dead specimen (Station 67).

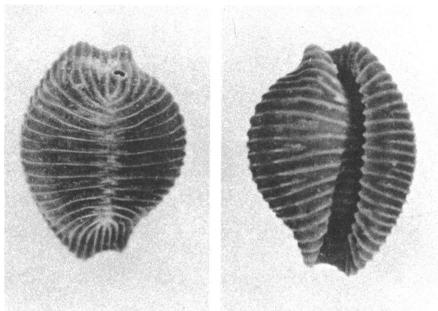


FIG. 17. *Trivia (Cleotrivia) fusca* (Sowerby), off Low Point, east side of María Madre Island, Tres Mariás Islands, Mexico, "Puritan" dredge, 22–24 fathoms (Station 59; A.M.N.H. No. 74760). *Left*: Dorsal view. *Right*: Apertural view. Courtesy of Dr. G. B. Campbell. Approximately  $\times 4$ .

REMARKS: Although we have not examined the type of this taxon, we are following Schilder (1932a) in recognizing the validity of this species, which was originally described from "Galapagos and Bay of Guyaquil. Mus. Cuming." A series of specimens in the collection of the American Museum of Natural History from the Gulf of California and the Galapagos Islands appear to be this species, and two specimens collected by the "Puritan" expedition off the Tres Mariás Islands apparently are referable to it. (See fig. 17.)

Apparently Howard and Sphon (1960) based *Trivia (Pusula) elsiae* on juvenile specimens that lack dorsal ribs. A similar specimen lacking dorsal ribs is present in the collection of the American Museum of Natural History and is mixed with specimens that we have identified as *Trivia fusca*. The identity of the adult stage of *Trivia elsiae* remains a question; it may be the present species or one of the other tiny *Trivia*.

This may be the species that Strong and Hanna (1930, p. 21) referred to "*Trivia pulla* Gaskoin" in their list of mollusks from the Tres Marias Islands. Hertlein and Strong (1955b) recently reported the present species from Albermarle Island, Galapagos.

SUBGENUS *PUSULA* JOUSSEAUME, 1884

TYPE SPECIES: *Cypraea radians* Lamarck, 1811, Recent, western Atlantic, by subsequent designation of Roberts (in Tryon and Pilsbry, 1885, p. 161, for "*Pustula* Jous.").

*Trivia (Pusula) californiana* (Gray), 1827

*Cypraea californiana* GRAY, 1827 [December 31], Zool. Jour., vol. 3, pp. 365, 366. "*Trivia californica*" [sic] GRAY, MS, Descriptive catalogue of shells, p. 16, fig. 42, "June, 1832."

*Cypraea californica* "Gray," G. B. SOWERBY, I, in G. B. Sowerby, II, 1832 [November 9], The conchological illustrations, *Cypraea* pl. 7, fig. 42.

*Cypraea (Trivia) californiana* (Gray), KEEN, 1958, Sea shells of tropical west America, p. 332, fig. 296.

RANGE: Crescent City, California (Dall, 1921), to Punta Peñasco, Sonora (Lowe, 1935), in the Gulf of California, and south to Acapulco, Guerrero, Mexico (Keen, 1958).

COLLECTING STATION: *Baja California, Gulf coast*: Puerto Refugio, Angel de la Guarda Island, "Puritan" dredge, 17–19 fathoms, one fresh specimen (Station 173).

REMARKS: Some records of this species from the Gulf of California are probably referable to *Trivia (Pusula) myrae* Campbell (1961) or to another of the smaller Panamic *Trivia*.

This species is cited from the Pleistocene of the following localities along the west coast of Baja California: Punta Descanso (Valentine, 1957), Punta Cabras (Addicott and Emerson, 1959), Punta Baja (Emerson and Addicott, 1958), San Quintin Bay (Orcutt, 1921; Jordan, 1926), and Cedros Island (Hertlein, 1934). It also is known from the Pleistocene of California.

*Trivia (Pusula) myrae* Campbell, 1961

*Trivia (Pusula) myrae* CAMPBELL, 1961, Veliger, vol. 4, p. 25, pl. 5, figs. 1–3.

RANGE: Off Punta Final, south of Gonzaga Bay, Baja California (Campbell, 1961), to off Puerto Escondido, Baja California ("Puritan" expedition), in the Gulf of California.

COLLECTING STATIONS: *Baja California, Gulf coast*: Off Coronados Island, "Puritan" dredge, 13–16.5 fathoms, three dead specimens (Station 144); off Puerto Escondido, "Puritan" dredge, 18–20 fathoms, one dead specimen (Station 138).

REMARKS: This species was described on the basis of specimens from three localities along the eastern shore of the Gulf of California, namely, off Loreto (type locality), off Monserrate Island, and off Punta Final, Baja California (Campbell, 1961). The present specimens, which were identified by G. Bruce Campbell, extend the known range within the Gulf southward to off Puerto Escondido, Baja California.



FIG. 18. *Trivia (Pusula) rubescens* (Gray), off west side of Coronados Island, Baja California, Mexico, "Puritan" dredge, 13–16.5 fathoms (Station 144; A.M.N.H. No. 76636), dorsal view. Courtesy of Dr. G. B. Campbell. Approximately  $\times 3$ .

*Trivia (Pusula) rubescens* (Gray), 1833

Figure 18

*Cypraea rubescens* GRAY, 1833 [January 14], Proc. Zool. Soc. London, for 1832, p. 185.

*Cypraea rubescens* Gray, REEVE, 1846, Conchologia iconica, vol. 3, *Cypraea* pl. 25, fig. 141.

*Cypraea (Trivia) rubescens* Gray, G. B. SOWERBY, II, 1880, Thesaurus conchyliorum, vol. 4, p. 50, *Cypraea* pl. 36, figs. 506, 507, and *Cypraea* pl. 37, fig. 520.

*Trivia rubescens* Gray, ROBERTS, in Tryon and Pilsbry, 1885, Manual of conchology, ser. 1, vol. 7, p. 204, pl. 23, figs. 42, 43.

RANGE: Gulf of California, Mexico, to Panama and the Galapagos Islands (Dall, 1909b).

COLLECTING STATION: *Baja California, Gulf coast*: Off Coronados Island, "Puritan" dredge, 13–16.5 fathoms, one living specimen (Station 144).

REMARKS: Although material from the Gulf of California has not been referred to this taxon in recent years, a small, subadult specimen (fig. 18) in the "Puritan" collection appears to be this species, which was stated to have been collected by Hugh Cuming in the Galapagos Islands (Gray, 1833). The American Museum of Natural History also possesses several

specimens from the type locality that are "typical" *rubescens*, if we assume that Reeve's (1846, pl. 25, fig. 141) illustration of a specimen from the "Galapagos Islands . . . Cuming" represents this species. We have not seen the type specimen, and Gray (1833) did not illustrate his species.

Hidalgo (1907) and Schilder (1932a) placed *Cypraea rubescens* "Gray" Sowerby (1832), which is cited from the "Pacific Ocean," Cuming cabinet, in the synonymy of *Trivia rubescens* Gray, 1833. Although their allocation may be correct, we have not examined the type specimen of *rubescens*, and Sowerby's (1832, pl. 6, fig. 31) illustration cannot be referred by us with certainty to the present species. The name *rubescens* is not available for this species, as this name was employed earlier by Gmelin (1791) and Costa (1829) for other species of *Cypraea*, *vide* Schilder (1932a).

*Trivia (Pusula) sanguinea* "Gray" (Sowerby), 1832

"*Trivia sanguinea*" GRAY, MS, Descriptive catalogue of shells, p. 14, fig. 32, "June, 1832."

*Cypraea sanguinea* G. B. SOWERBY, I, in G. B. Sowerby, II, 1832 [November 2], The conchological illustrations, *Cypraea* pl. 6, fig. 32.

*Cypraea (Trivia) sanguinea* "Gray," ROBERTS, in Tryon and Pilsbry, 1885, Manual of conchology, ser. 1, vol. 7, p. 203, pl. 22, figs. 21, 22.

*Trivia (Pusula) sanguinea* (Sowerby), KEEN, 1958, Sea shells of tropical west America, p. 332, fig. 298.

RANGE: ?Catalina, California; ?Magdalena Bay, Baja California (Dall, 1921); La Paz, Baja California (A.M.N.H.), to Guaymas, Sonora, Mexico (G. B. Campbell collection), in the Gulf of California, and south to Mancora, Peru (A.N.S.P.).

COLLECTING STATIONS: *Sinaloa*: Off Cape Vigia, Mazatlán, skin diving, one dead specimen (Station 77). *Tres Marias Islands, Nayarit*: Puerto Balleto, María Madre Island, shore collecting, 38 beach specimens (Station 27); Puerto Balleto, María Madre Island, shore collecting, one beach specimen (Station 34).

REMARKS: This species is reported from the Pliocene of Carmen Island, off the Gulf coast of Baja California (Hanna and Hertlein, 1927) and from the Pleistocene of Magdalena Bay, on the west coast of Baja California (Jordan, 1936).

Schilder (1932a, p. 98) refers a number of taxa, including *galapagensis* Melvill (1900), "*lathyrus* Kiener 1843, 1845" [not *lathyrus* "Dufresne" Blainville (1826)], "*fusca* Gaskoin 1846" [not *fusca* "Gray" G. B. Sowerby, I (1832)], and *rubescens* C. B. Adams (1852a, 1852b) [not *rubescens* Gray, 1833] to the synonymy of this species.

Two small specimens in the present collection, one from off Angel de la

Guarda Island (Station 173) and one from off Tiburón Island (Station 159), superficially resemble this species, and may be an extreme variant of it or represent a new species. Bruce Campbell (*in litt.*) reports taking this form elsewhere in the Gulf of California. Until the species from the southern part of the Panamic faunal province become better known, we hesitate to propose a new name for these specimens.

*Trivia (Pusula) solandri* "Gray" (Sowerby), 1832

"*Trivia solandri*" GRAY, MS, Descriptive catalogue of shells, p. 16, fig. 43, "June 18, 1832."

*Cypraea solandri* G. B. SOWERBY, I, in G. B. Sowerby, II, 1832 [November 2], The conchological illustrations, *Cypraea* pl. 7, fig. 43.

*Trivia solandri* "Gray," ROBERTS, in Tryon and Pilsbry, 1885, Manual of conchology, ser. 1, vol. 7, p. 202, pl. 22, figs. 15, 16.

*Trivia (Pusula) solandri* (Sowerby), KEEN, 1958, Sea shells of tropical west America, p. 332, fig. 299.

RANGE: Catalina Island, California (Dall, 1921), to Punta Peñasco, Baja California, Mexico (Lowe, 1935), in the Gulf of California, and south to Panama (Dall, 1921); ?Peru (Dall, 1909b).

COLLECTING STATIONS: *Baja California, Gulf coast*: Espíritu Santo Island, shore collecting, four beach specimens (Station 92); San Lorenzo Reef, San Lorenzo channel, skin diving, 2 fathoms, one living specimen (Station 93); San Francisco Island, shore collecting, one beach specimen (Station 109); Coronados Island, shore collecting, four beach specimens (Station 143); San Marcos Island, shore collecting, seven beach specimens (Station 149); Mejia Island, off Angel de la Guarda Island, shore collecting, one beach specimen (Station 171); Puerto Refugio, Angel de la Guarda Island, shore collecting, five beach specimens (Station 174). *Sonora*: Tiburón Island, shore collecting, three beach specimens (Station 157).

REMARKS: The present species can be easily distinguished from *Trivia radians* Lamarck, a similar but larger species that occurs in this region, by the number of teeth present on the outer lip. In *Trivia solandri*, the teeth are twice as numerous as the ribs, while in *Trivia radians*, the number of teeth do not exceed the number of ribs (Strong, 1945).

In addition to several reports of this species from the Pleistocene of southern California, the following fossil occurrences were noted for west Mexican localities: Pleistocene of Baja California, west coast: Magdalena Bay (Jordan, 1936); Gulf coast: Santa Inez Bay, Punta Pulpito (Hertlein, 1957); Coronados Island and Concepción Bay (Durham, 1950); Carmen Island (Hertlein, 1957). Pliocene of Baja California, Gulf coast: Marquer Bay, Carmen Island (Durham, 1950).

GENUS *JENNERIA* JOUSSEAUME, 1884

TYPE SPECIES: *Cypraea pustulata* Solander, 1786, Recent, eastern Pacific, by original designation.

*Jenneria pustulata* (Solander), 1786

*Cypraea pustulata* SOLANDER, in Humphrey, 1786, A catalogue of the Portland Museum, p. 106, refers to Lister's illustration, pl. 710, fig. 62 (1770). LAMARCK, 1811, Ann. Mus. Hist. Nat. Paris, vol. 16, p. 101.

*Pustularia* (?) *pustulata* (Solander), INGRAM, 1951, Bull. Amer. Paleont., vol. 33, pp. 163, 164, pl. 23, figs. 15, 16.

*Jenneria pustulata* (Solander), KEEN, 1958, Sea shells of tropical west America, p. 333, fig. 300.

RANGE: Puertocitos, Baja California, Mexico (Shasky, 1959), in the Gulf of California, and south to Tonchique, Ecuador (A.N.S.P.), and the Galapagos Islands (Keen, 1958).

COLLECTING STATIONS: *Baja California, Gulf coast*: Espíritu Santo Island, shore collecting, one beach specimen (Station 92); San Francisco Island, shore collecting, one beach specimen (Station 109); San Marcos Island, shore collecting, one beach specimen (Station 149). *Tres Marias Islands, Nayarit*: Puerto Balleto, María Madre Island, shore collecting, one living specimen, one beach specimen (Station 27); María Madre Island, two fresh, beach specimens (Station 34).

REMARKS: Systematic placement of this monotypic genus remains questionable (see Keen, 1958, p. 333).

This distinctive species is reported from the Pleistocene of Oaxaca, Mexico (Palmer and Hertlein, 1936).

GENUS *CYPHOMA* RÖDING, 1798

TYPE SPECIES: *Ovula gibbosa* (Linné) [= *Bulla gibbosa* Linné, 1758], Recent, western Atlantic, by subsequent designation of Herrmannsen, 1847.

*Cyphoma emarginatum* (Sowerby), 1830

*Ovula emarginata* G. B. SOWERBY, I, in Broderip and G. B. Sowerby, I, 1830, Species conchyliorum, vol. 1, pt. 1, p. 7, figs. 54, 55. KIENER, 1843-1844, Spécies général et iconographie des coquilles vivantes, genre Ovule, vol. "1," pp. 18, 19, pl. 3, fig. 2.

*Ovula* (*Cyphoma*) *emarginata* Sowerby, TRYON, in Tryon and Pilsbry, 1885, Manual of conchology, ser. 1, vol. 7, p. 251, pl. 3, figs. 83, 84.

*Cyphoma emarginatum* (Sowerby), KEEN, 1958, Sea shells of tropical west America, p. 334, fig. 301.

RANGE: Off Magdalena Island, west coast of Baja California ("Puritan" collection), to Mazatlán, Sinaloa, Mexico, and south to Negritos, Peru (Olsson, 1924).

COLLECTING STATIONS: *Baja California, west coast*: Off Red Point, Magdalena Island, Baja California, Mexico, "Puritan" dredge, 22 fathoms, one living specimen (Station 17). *Sinaloa*: Off Cape Vigia, Mazatlán, skin diving, 0.5–1.5 fathoms, one living specimen (Station 77).

REMARKS: One juvenile specimen of this species was dredged from the ocean side of Magdalena Island, Baja California. This is a major northern extension of range, from Mazatlán, Sinaloa (Keen, 1958).

Unlike its western Atlantic analogue, *Cyphoma gibbosum* (Linné, 1758), this species appears to be uncommon.

#### GENUS *NEOSIMNIA* FISCHER, 1884

TYPE SPECIES: *Bulla spelta* Linné, 1758, Recent, Mediterranean, by monotypy.

#### *Neosimnia avena* (Sowerby), 1832

*Ovulum avena* G. B. SOWERBY, I, in G. B. Sowerby, II, 1832 [November 9], The conchological illustrations, Cypraeadae [*sic*], pl. 8, fig. 59.

*Ovula (Neosimnia) avena* SOWERBY, TRYON, in Tryon and Pilsbry, 1885, Manual of conchology, ser. 1, vol. 7, p. 255, in part, pl. 5, fig. 51 only.

*Neosimnia avena* SOWERBY, SCHILDER, 1932, Proc. Malacol. Soc. London, vol. 20, p. 54. KEEN, 1958, Sea shells of tropical west America, p. 334, fig. 303, in part, left fig. only.

RANGE: Bahía de Adair, Sonora, Mexico (A.N.S.P.), Gulf of California to Panama (Keen, 1958).

COLLECTING STATION: *Sinaloa*: Off Cape Vigia, Mazatlán, skin diving, 0.5–1.5 fathoms, one living specimen (Station 77).

REMARKS: Schilder (1932a, 1932b) suggested that *Neosimnia neglecta* (Reeve, 1865) [not *Ovula neglecta* C. B. Adams, 1852a, 1852b] and *vidleri* (Sowerby, 1881) might be this species. Abbott (1954) questionably referred *similis* Sowerby [G. B., II, 1849a, 1849b] to this species. The biological identity of these variable forms probably will have to be established on the basis of their host relationships, rather than primarily on conchological characters.

#### *Neosimnia aequalis* (Sowerby), 1832

*Ovulum aequale* G. B. SOWERBY, I, in G. B. Sowerby, II, 1832 [November 9], The conchological illustrations, Cypraeadae [*sic*], pl. 8, fig. 61.

*Ovula (Neosimnia) uniplicata* var. *variabilis* "Adams," TRYON, in Tryon and Pilsbry, 1885, Manual of conchology, ser. 1, vol. 7, pp. 254, 255, in part, pl. 5, fig. 46 only. Not C. B. Adams, 1852a, 1852b.

*Neosimnia aequalis* (Sowerby), KEEN, 1958, Sea shells of tropical west America, p. 334, fig. 302.

RANGE: Southern California to Ecuador (Keen, 1958).

COLLECTING STATION: *Sinaloa*: Off Cape Vigia, Mazatlán, skin diving, 0.5–1.5 fathoms, two living specimens and one dead specimen (Station 77).

REMARKS: Schilder (1932a, 1932b) placed *Neosimnia californica* (Reeve, 1865) in the synonymy of this species. (See remarks for the previous species.)

### *Neosimnia inflexa* (Sowerby), 1832

*Ovulum inflexum* G. B. SOWERBY, I, in G. B. Sowerby, II, 1832 [November 9], The conchological illustrations, Cypraeadae [*sic*], pl. 8, fig. 60.

*Ovula variabilis* C. B. ADAMS, 1852, Ann. Lyc. Nat. Hist., New York, vol. 5, p. 255; 1852, Catalogue of shells collected at Panama, p. 31. TURNER, 1956, Occas. Papers on Mollusks, vol. 2, no. 20, pp. 96, 97, pl. 6, fig. 2.

*Ovula (Neosimnia) uniplicata* var. *variabilis* "Adams," TRYON, in Tryon and Pilsbry, 1885, Manual of conchology, ser. 1, vol. 7, pp. 254, 255, in part, pl. 5, figs. 44 and 49 only.

*Neosimnia inflexa* Sowerby, SCHILDER, 1932, Proc. Malacol. Soc. London, vol. 20, p. 55. KEEN, 1958, Sea shells of tropical west America, p. 334, fig. 304.

RANGE: Abrejos Point (latitude 26° 42' N.), west coast, Baja California (A.M.N.H.), to Pulpito Point, Baja California ("Puritan" expedition), in the Gulf of California, and south to Panama (Keen, 1958).

COLLECTING STATIONS: *Baja California, Gulf coast*: Off Pulpito Point, skin diving, 0.5–2 fathoms, one living specimen (Station 147); Puerto Escondido, skin diving, 0–1 fathom, one living specimen (Station 136). *Sinaloa*: Off Cape Vigia, Mazatlán, skin diving, 0.5–1.5 fathoms, two living specimens (Station 77). *Tres Martas Islands, Nayarit*: Off San Juanito Island, skiff dredge, 9–11 fathoms, two living specimens (Station 38).

REMARKS: The exterior is sculptured in some specimens with numerous microscopic incised lines.

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