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Remarks on Some Eastern Pacific Muricid Gastropods

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INTRODUCTION

On the basis of the data presented in the present paper, *Murex centrifuga* Hinds (1844a), a long misunderstood and therefore neglected species, is shown to be a senior synonym of *Pterynotus* (*Pteropurpura*) *swansonii* Hertlein and Strong (1951) and is placed in the genus *Pterynotus* (*sensu lato*). *Centrifuga* Grant and Gale is accepted as a subgenus of *Pterynotus* to include species closely allied to *Murex centrifuga*. *Calcitrapessa* Berry (1959), a taxon originally proposed as a genus to include *Murex* (*Chicoreus*) *leeanus* Dall (1890), is reduced to subgeneric rank and is tentatively placed in the genus *Pterynotus*. A Recent specimen of *Centrifuga inezana* Durham (1950) is compared with the lectotype of *Murex pinniger* Broderip (1833); the two taxa are referred to the genus *Pterynotus*, subgenus *Purpurellus*.

I am indebted to the following people for the loan of pertinent specimens or other courtesies: Dr. R. Tucker Abbott of the Academy of Natural Sciences of Philadelphia, Mr. Emery P. Chace of the San Diego Natural History Museum, Mr. S. P. Dance of the British Museum (Natural History), Mr. Anthony D'Attilio of New York City, Dr. Leo George Hertlein of the California Academy of Sciences, Dr. Harald A. Rehder of the United States National Museum, and Dr. John D. Soule of the University of Southern California.

Institutional abbreviations used in the present paper are as follows:

¹ The American Museum of Natural History.

A.M.N.H., the American Museum of Natural History

B.M., British Museum (Natural History)

C.A.S., California Academy of Sciences

S.D.N.H.M., San Diego Natural History Museum

U.S.N.M., United States National Museum

GENERIC PLACEMENT AND IDENTITY OF *MUREX* *CENTRIFUGA* HINDS

Murex centrifuga was described by Hinds (1844a, 1844b) from material collected during the voyage of H.M.S. "Sulphur," 1835-1842, off the "West coast of Veragua [Panama] on a sandy floor, in fifty-two fathoms." For 100 years no additional records were cited in the literature. Hinds's original figures were copied, and the type locality was repeated, by subsequent workers, including Reeve (1845), Sowerby (1880), Tryon (1880), and Smith (1944). In 1945, Strong extended the known range from Panama to "West Columbia" [Costa Rica] on the basis of specimens collected by the "Zaca" Expedition (1937-1938) off Judas Point, Costa Rica. Keen (1958) reproduced Hinds's figure and cited the range to be the Gulf of California to West Colombia.

Among the interesting mollusks recently obtained by shrimp fishermen operating out of Guaymas, Sonora, Mexico, was a species of *Pterynotus*. Through the kindness of Mrs. John Q. Burch specimens were examined by the writer. These have proved to be referable to *Pterynotus swansoni* Hertlein and Strong (1951), which was based on specimens from the Gulf of California. As the juvenile specimens procured from the Mexican fishermen resembled Hinds's illustration of *Murex centrifuga*, a critical comparison of the two taxa was undertaken.

At my request, Mr. S. P. Dance searched the molluscan collections of the British Museum (Natural History) for the type specimens of *Murex centrifuga*. Although the figured specimen was not found, two specimens were located, one in the Hugh Cuming collection and the other in the Lombe Taylor collection (B.M. No. 79.2.26.102). Both lots are labeled "West coast of Veragua." The more complete, smaller specimen from the Taylor collection was examined and can only be questionably referred to this species. It is a juvenile specimen, yellowish white in color, with two or more nuclear whorls and five postnuclear whorls. The surface is not well preserved, and fine spiral striations are retained only on the back of the prominent varices. The outer lip is narrower and more curved than in Hinds's figured specimen. The specimen examined measures 21 mm. in length and 13 mm. in maximum diameter. Mr. Dance has informed me that a drawing is

inserted between the published figures of *Murex centrifuga* (Hinds, 1844b, pl. 3, figs. 7, 8) on the plate proof in his possession. This unpublished drawing may have been based on these juvenile specimens, but, according to Mr. Dance, it is not a good representation of either specimen. Mr. Dance suggests that Hinds may have rejected the drawing for this reason, or may have decided that it did not represent a specimen of this species.

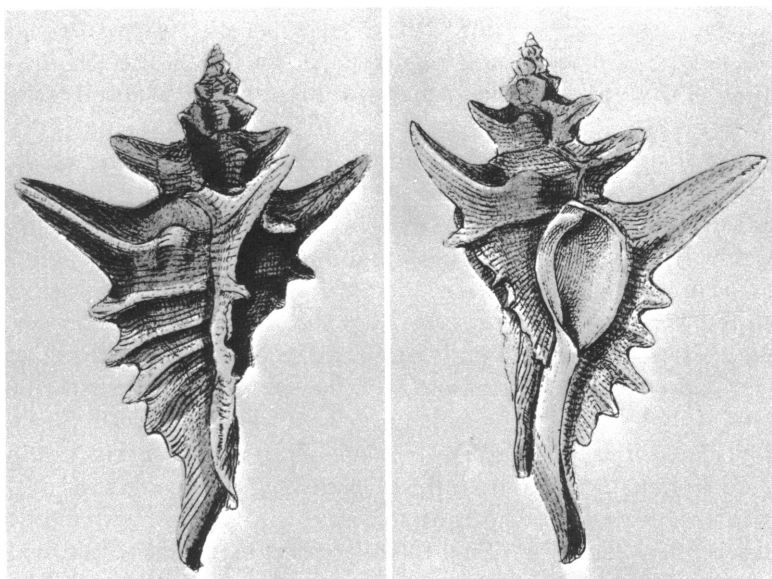


FIG. 1. Original figures of *Murex centrifuga* Hinds. After Hinds (1844b, pl. 3, fig. 7, left, and fig. 8, right). $\times 2$.

Among material obtained by Mr. Anthony D'Attilio from the John Calvert collection was a specimen accompanied by a label reading "*M. centrifuga* Hinds. West coast of Veragua. Moll. Sulphur. P. 3. fig. 7, 8. CE/E/r Reeve. Spec'm of above plate." The specimen, although not now complete, agrees well with Hinds's original figures. It is 3 mm. shorter than the illustration, but the distal portion of the siphonal canal appears to be shortened by breakage (cf. figs. 1 and 2).

Mr. S. P. Dance of the British Museum (Natural History) kindly examined the label and offered the following comments: "There is no doubt in my mind that you have the type. The handwriting on this label occurs on a number of others we have, accompanying several of the 'Sulphur' types and the same abbreviations are common to your

label and ours. The paper ink and style are identical throughout. The handwriting appears to be that of G. B. Sowerby, II." Mr. Dance suggested that John Calvert had probably purchased the specimen from H. Harvey, a dealer who earlier had obtained part of the collection of Sir Edward Belcher from Crewe Hanley. The Calvert collection was recently offered for sale in New York, and parts were sold to a number of collectors.

On the basis of Mr. Dance's collaboration and the likeness of the specimen to the original figures, the Calvert specimen is here designated the lectotype of *Murex centrifuga* and has been deposited in the collection of mollusks of the American Museum of Natural History (A.M.N.H. No. 79903).

Pterynotis (Pteropurpura) swansoni Hertlein and Strong (1951, p. 85, pl. 2, figs. 8, 12) was described from material dredged by the "Zaca" from three stations in the Gulf of California. The holotype possesses seven postnuclear whorls and measures 59 mm. in length and 49 mm. in maximum diameter. In addition to the larger size, it differs from the lectotype of *Murex centrifuga* (fig. 2) in the following apparently gerontic characters: the varices of the body whorl terminate in longer, more recurved digitations, and the spinose margin of the outer lip and siphonal canal is extended to form a wider shelf, as is shown by the specimen illustrated in figure 5. The series of this species available for study demonstrates that the degree of development of the recurved spines and the width of the outer lip vary somewhat in mature specimens (figs. 3-5). Thus the differences between the lectotype of *Murex centrifuga* and the type of *Pterynotus swansoni* apparently reflect the gerontic characters of a later ontogenetic stage within the same species. The close similarity of immature specimens collected from near the geographically widely separated type localities of the two taxa also serves to suggest conspecificity. It is concluded therefore that *Pterynotus swansoni* was based on mature specimens of *Murex centrifuga* and should be referred to the synonymy of the latter.

This conclusion had been suggested by Berry (1959), but was refuted by Keen (1959) on the basis of the material available to them for study. Furthermore, Berry (1959) referred *Murex centrifuga* and other three-winged eastern Pacific muricids to the "genus" *Pteropurpura* Jousseaume, 1880. However, the type species by original designation of this taxon is *Murex macropterus* Deshayes (1839), a species based on a specimen said to be 43 mm. in height, with the anterior surface of the outer lip sculptured with numerous crenulate imbrications. Unfortunately the species was described from an unknown

locality. Subsequently, the specimen was illustrated by Deshayes (1841) without locality data, and the figure has been copied by Sowerby (1880) and by Tryon (1880). Reeve (1845) figured another specimen from a private British collection, and Sowerby (1880) later mentioned the presence of a specimen in the British Museum.¹ The identity of this species has caused considerable speculation, and the name has been referred to forms from several faunal provinces. Tryon (1880) compared it to the west African species *Murex lingua* Dillwyn, 1817. Dall (1889) cited it from the western Atlantic, but Clench and Farfante (1945) re-

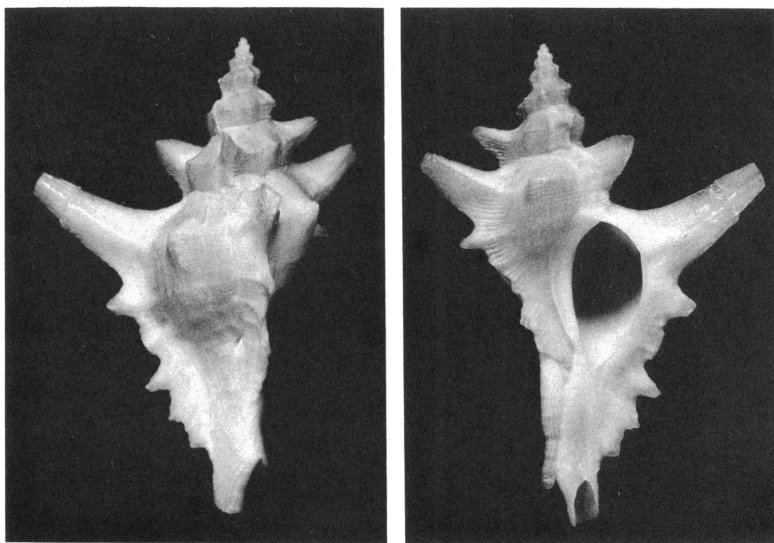


FIG. 2. Lectotype of *Murex centrifuga* Hinds [= *Pterynotis (Centrifuga) centrifuga* (Hinds)], A.M.N.H. No. 79903. $\times 2$.

ferred Dall's material to a new species. Other workers, including Sowerby (1880), have suggested that the species was from Japan. The name was recently applied to the genus *Ocenebra*, and the species was questionably reported from Japanese waters by Kuroda and Habe (1952). Admittedly, the original figure superficially resembles some

¹ Mr. Dance has informed me (*in litt.*) that there is at the present time one specimen labeled *Murex macropterus* Deshayes in the collections of the British Museum. This specimen lacks locality data but is from the Hugh Cuming collection. My examination of the specimen shows it to be an eastern Pacific species, *Pterynotis (Centrifuga) carpenteri* (Dall, 1899). The label does not indicate the person who originally identified the specimen or the collector.

Japanese species, namely, *Ocenebra* (*Ocinebrellus*) *modesta* Fulton (1936) and "*Ceratostoma* (*Pteropurpura*) *vespertilio*," Kuroda MS (Kira, 1955). Actually, however, the figured specimens of *Murex macropterus* more closely resemble certain growth forms of the *Murex trialatus-rhyssus* complex from the eastern Pacific (see Abbott, 1954, pp. 205–206) but cannot be referred to any of these species with certainty.

Until the identity of the type species of *Pteropurpura* can be unquestionably determined, it seems advisable to use *Centrifuga* as a subgenus in the genus *Pterynotus* Swainson (1833) for the trivariolate species from the western Atlantic, eastern Pacific, and western Pacific that have been previously referred to *Pteropurpura*.

An annotated synonymy of *Murex centrifuga* Hinds is given below.

Pterynotus (*Centrifuga*) *centrifuga* Hinds, 1844

Murex centrifuga HINDS, 1844, Proc. Zool. Soc. London, for 1843, pp. 126, 127, west coast of Veragua, 52 fathoms [Veragus Province, Panama]. HINDS, 1844, The zoology of the voyage of H.M.S. Sulphur, Mollusca, p. 8, pl. 3, figs. 7, 8. REEVE, 1845, Conchologia iconica, vol. 3, *Murex*, sp. 130, pl. 28, fig. 130. SOWERBY, II, 1880, Thesaurus conchyliorum, vol. 4, *Murex*, sp. 110, pl. 390, fig. 101.

Murex (*Cerostoma*) *centrifuga* Hinds, TRYON, 1880, Manual of conchology, ser. 1, vol. 2, p. 113, pl. 34, fig. 377.

Alipurpura centrifuga (Hinds) M. SMITH, 1944, Panamic marine shells, p. 24, fig. 284.

Purpura (*Centrifuga*) *centrifuga* (Hinds), GRANT AND GALE, 1931, Mem. San Diego Soc. Nat. Hist., vol. 1, pp. 706, 707.

Centrifuga centrifuga (Hinds) STRONG, 1945, Min. Conchol. Club Southern California, no. 51, p. 42, Panama to "West Columbia." KEEN, 1958, Sea shells of tropical west America, p. 352, fig. 337, Gulf of California to West Colombia.

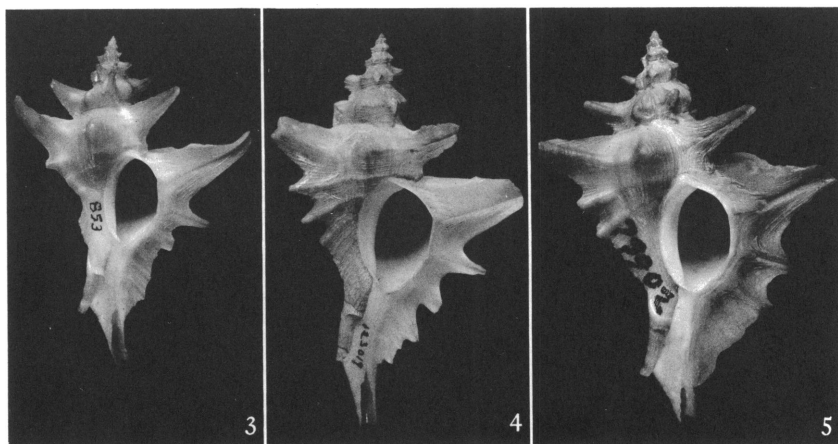
Pterynotus (*Pteropurpura*) *swansoni* HERTLEIN AND STRONG, 1951, Zoologica, New York, vol. 36, p. 85, pl. 2, figs. 8, 12, Arena Bank, Gulf of California and Santa Inez Bay, Baja California, Mexico, in 35–40 fathoms.

Pterynotus swansoni Hertlein and Strong, KEEN, 1958, Sea shells of tropical west America, p. 358, fig. 350, southern part of the Gulf of California, in 35 to 45 fathoms.

DISTRIBUTION: Magdalena Bay, Baja California, and Gulf of California, Mexico, to Panama.

MATERIAL EXAMINED: Magdalena Bay, Baja California, Mexico, latitude 24° 32' N., longitude 111° 59' W., 12 fathoms, "Albatross" station 2831, U.S.N.M. No. 96523, one juvenile; off Baja California, Mexico, latitude 24° 38' N., longitude 112° 17' W., "Albatross" station 2833, U.S.N.M. No. 96524, one juvenile; Santa Inez Bay, Baja California, Mexico, latitude 26° 51' 20" N., longitude 111° 48' 45" W., C.A.S. No. 17731, one juvenile; off Guaymas, Sonora, Mexico, 60

fathoms, shrimp fishermen, A. D'Attilio collection, two mature specimens; 40 fathoms off Guaymas lighthouse, Sonora, Mexico, shrimp fishermen, A.M.N.H. No. 79902, one mature specimen; off La Paz, Baja California, Mexico, shrimp fishermen, A. D'Attilio collection, one juvenile; off Judas Point, Costa Rica, "Zaca" station 214-D-1-4, 42 to 61 fathoms, A.M.N.H. No. 80103, four juveniles, and S.D.N.H.M. No. 4002, two juveniles; Gulf of Panama, 153 fathoms, "Albatross" station 3391, U.S.N.M. No. 123019, one mature specimen; off Veragus, Panama, A.M.N.H. No. 79903, lectotype.



FIGS. 3-5. Various growth forms of *Peterynotis (Centrifuga) centrifuga* (Hinds). 3. Specimen from off La Paz, Baja California, Mexico, D'Attilio collection. 4. Specimen from Gulf of Panama, United States Fish Commission station 3391, 153 fathoms, U.S.N.M. No. 123019. 5. Specimen from off lighthouse, Guaymas, Sonora, Mexico, 40 fathoms, A.M.N.H. No. 79902. Approximately $\times 1$.

The type specimen of *Pterynotus swansoni* (Hertlein and Strong, 1951, pl. 2, figs. 8, 12) was dredged by the "Zaca" at station 136-D-22, Arena Bank, Gulf of California, Mexico, latitude $23^{\circ} 28' 30''$ N., longitude $109^{\circ} 25' 00''$ W., in 45 fathoms, mud. A second specimen was dredged at station 142-D-3, in Santa Inez Bay, Gulf of California, latitude $27^{\circ} 04' 00''$ N., longitude $111^{\circ} 54' 00''$ W., in 40 fathoms, sand and weed. These specimens, together with the specimen listed above from Santa Inez Bay, Baja California, Mexico, comprise the type lot and are deposited in the California Academy of Natural Sciences collections.

GENERIC PLACEMENT OF *MUREX LEEANUS* DALL

Grant and Gale (1931) erected *Centrifuga* as a subgenus of *Purpura* Martyn and referred *Murex centrifuga* Hinds and *Murex leeanus* Dall to the taxon. The group was distinguished from *Purpura* (*sensu stricto*) of Martyn (1784) by the possession of "three long, rather stout, round-tipped spines on each whorl instead . . . of three frill-like varices." Although the description obviously refers to *Murex leeanus*, Grant and Gale unfortunately designated *Murex centrifuga* as the type species on the erroneous belief that the two species belonged to the same species group. *Centrifuga* Grant and Gale (1931) therefore is not available for *Murex leeanus*.

The systematic placement of *Murex leeanus* has long been a problem. Dall (1890) compared it with *Murex centrifuga* but pointed out the differences in the varical processes. He stated that the radular characters were typically muricoid and the soft parts externally resembled those of *Murex* (*Bolinus*) *brandaris* Linné. Stearns (1893) followed Dall in placing this species in the subgenus *Chicoreus*.

Grant and Gale (1931) pointed out the general similarity of *M. leeanus* to *Austrotrophon catalinensis* (Oldroyd) but considered the species to be more closely related to *Purpura* of Martyn. Strong *et alii* (1933) believed *M. leeanus* to be closer to *Trophon* than either *Murex* or *Purpura* and gave *Centrifuga* full generic standing. Keen (1958) also recognized *Centrifuga* as a genus and included *Murex leeanus* Dall in this taxon. Keen (1959) later reduced *Centrifuga* to the status of a subgenus and referred the taxon to *Pterynotus* (*sensu lato*).

In the original draft of the present manuscript a new subgenus was proposed to include *Murex leeanus* Dall. However, the recent hasty erection by Berry (1959) of *Calcitrapessa* as a genus, with this species as the type, precludes the need for a new taxon for this apparently unique form.

Largely on the basis of Dall's (1890) description of the anatomy and the radular characters of the type species, *Calcitrapessa* is provisionally placed in the trivariolate genus *Pterynotus* Swainson (1833). When soft parts of *Murex centrifuga* become available for study, this species should be compared with related groups also possessing a purpuroid operculum, including *Austrotrophon* Dall (1902).

An annotated synonymy of *Murex* (*Chicoreus*) *leeanus* is given below.

SUBGENUS *CALCITRAPESSA* BERRY, 1959

DIAGNOSIS: Shell of moderate size, *Trophon*-like, each whorl with

three long, pointed, solid spines with a central groove on anterior face; siphonal canal long, closed; operculum with apical nucleus and purpuroid markings.

TYPE SPECIES, BY ORIGINAL DESIGNATION: *Murex (Chicoreus) leeanus* Dall, 1890.

Pterynotus (Calcitrapessa) leeanus (Dall, 1890)

Murex (Chicoreus) leeanus DALL, 1890, Proc. U. S. Natl. Mus., vol. 12, p. 329, pl. 7, fig. 1. ARNOLD, 1903, Mem. California Acad. Sci., vol. 13, p. 243, pl. 8, fig. 1.

Chicoreus leeanus Dall, STEARNS, 1893, Proc. U. S. Natl. Mus., vol. 16, p. 346.

Purpura (Centrifuga) leeana (Dall) GRANT AND GALE, 1931, Mem. San Diego Soc. Nat. Hist., vol. 1, p. 707. WILLETT, 1937, Trans. San Diego Soc. Nat. Hist., vol. 8, p. 397, pl. 26, fig. 2.

Centrifuga leeana (Dall) STRONG, HANNA, AND HERTLEIN, 1933, Proc. California Acad. Sci., ser. 4, vol. 21, p. 120, pl. 5, fig. 11. VALENTINE, 1956, Trans. San Diego Soc. Nat. Hist., vol. 12, p. 198. KEEN, 1958, Sea shells of tropical west America, p. 336, fig. 337a.

FOSSIL RECORDS: Late Pleistocene, Palos Verdes sand, Los Angeles County, California: Lumber Yard and Crawfish Georges, San Pedro (Arnold, 1903); Playa del Rey (Willett, 1937); Potrero Canyon, Pacific Palisades (Valentine, 1956).

RECENT RECORDS: Offshore islands and west coast of Baja California, and in the Gulf of California: Guadalupe Island (Grant and Gale, 1931; Strong, 1945); Scammon Lagoon (Strong, Hanna, and Hertlein, 1933, and S.D.N.H.M., Fred Baker collection); off Cedros Island, "Albatross" station 2838, in 44 fathoms, type (Dall, 1890); "Zaca" station 126-D-10, latitude 28° 22' N., longitude 115° 10' W., in 60 fathoms (A.M.N.H. collection); "Zaca" station 126-D-11, latitude 28° 21' N., longitude 115° 11' W., in 44 fathoms (A.M.H.H. collection); "Zaca" station 126-D-3, latitude 28° 07' N., longitude 115° 09' W., in 40 fathoms (A.M.N.H. collection and S.D.N.H.M. collection); San Ignacio Lagoon (Stearns, 1893; Strong, Hanna, and Hertlein, 1933, and S.D.N.H.M., Capt. G. D. Porter collector); "Orca" station, between Cape San Lucas and San José Island, dredged (S.D.N.H.M. collection); "Orca" station off east side of Angel de la Guarda Island, in 50 to 58 fathoms (S.D.N.H.M. collection).

Known from late Pleistocene deposits of the Los Angeles basin in southern California, this species was previously reported to range at the present time only along western Baja California. The "Orca," however, obtained six specimens from two dredge hauls from stations well within the Gulf of California, in 1952.

IDENTITY AND GENERIC PLACEMENT OF
CENTRIFUGA INEZANA DURHAM

Centrifuga inezana was described by Durham (1950) on the basis of a water-worn specimen collected from Pleistocene deposits near Punta Santa Inez, on the east coast of Baja California, Mexico. A badly worn Recent specimen was later recognized among beach drift collected by Durham at San Marcos Island, Baja California (Emerson and Puffer, 1957). Additional Recent specimens have subsequently been reported

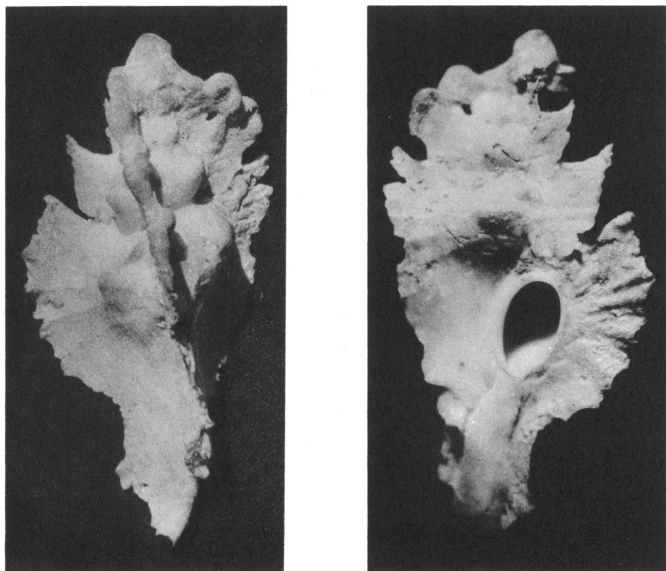


FIG. 6. Recent specimen of *Pterynotis (Purpurellus) inezana* (Durham), from off Cabo Haro, Guaymas, Sonora, Mexico, 35–45 fathoms, Shasky collection. Approximately $\times 1$.

from the region of Guaymas, Sonora, Mexico. Berry (1959) mentioned two poorly preserved specimens from Cochore Beach, and Shasky (1959) records three fresh specimens taken by shrimp fishermen trawling in 30 to 40 fathoms off Cabo Haro.

Through the courtesy of Dr. Shasky, I had an opportunity to examine one of the fresh specimens. Although the specimen is badly incrustated, it serves to refute the suggestion, based on the poorly preserved material then available for study, made by Emerson and Puffer (1957) and Keen (1958) that Durham's species might be referable to *Pterynotus swansoni* [= *P. centrifuga* (Hinds)]. Shasky's specimen

(fig. 6) measures 70 mm. in length and is approximately 32 mm. in width. The white surface is colored with small brownish streaks at the base of the larger foliations. The specimen resembles *Pterynotus* (*Purpurellus*) *gambiensis* (Reeve) from west Africa but has a proportionally shorter shell, with wider, less digitate foliations.



FIG. 7. Lectotype of *Pterynotis* (*Purpurellus*) *pinniger* (Broderip), Hugh Cuming collection, British Museum. $\times 2$.

Keen (1959) and Berry (1959) have recently suggested that this species may have a close affinity with *Murex pinniger*, a species described by Broderip (1833) from material collected by Hugh Cuming at Xipixapi, "West Columbia" [Ecuador]. *Murex pinniger* was briefly described without an illustration and was subsequently figured by Reeve (1845). The figure was later copied by Sowerby (1880) and Tryon (1880).

According to Mr. Dance (*in litt.*), there are two specimens labeled *Murex pinniger* in the Cuming collection of the British Museum; neither of these specimens matches Broderip's original measurements or appears to be the specimen figured by Reeve. Both, however, are from the type locality and are considered to be type material in the absence of designated types. The smaller specimen, here designated the lectotype of *Pterynotus (Purpurellus) pinniger* (Broderip, 1833), measures 53 mm. in length and 25 mm. in width (fig. 7). In general appearance, the lectotype closely resembles *Pterynotus (Purpurellus) gambiensis* but differs in having shorter, more delicate, and less digitate foliations. The brownish stains are confined to the base of the foliations, whereas in *P. gambiensis* the reddish stains are more widely distributed. The whitish surface of both species has a slight tinge of purple.

Although I do not hesitate to place Durham's *inezana* in the subgenus *Purpurellus*, better preserved specimens of the *inezana-pinniger* complex from the Gulf of California must be recovered before a final decision can be reached on the specific identity or distinctness of these closely related forms. Thus far, none of the specimens obtained from the Gulf of California possesses the extreme interruption developed in the varical fringe between the body whorl and the canal that apparently characterizes *pinniger* (cf. figs. 6 and 7).

An annotated synonymy of *Centrifuga inezana* is given below.

Pterynotus (Purpurellus) inezana (Durham, 1950)

Centrifuga inezana DURHAM, 1950, Mem. Geol. Soc. Amer., no. 43, pp. 113-114. KEEN, 1958, Sea shells of tropical west America, p. 358. BERRY, 1959, Leaflets Malacol., vol. 1, no. 18, p. 114.

Pterynotus (Pteropurpura) inezana Durham, EMERSON AND PUFFER, 1957, Amer. Mus. Novitates, no. 1825, p. 46.

Pterynotus inezana Durham, SHASKY, 1959, Minutes Conchol. Club Southern California, no. 186, p. 17.

FOSSIL RECORD: Pleistocene: Santa Inez Bay, Baja California, Mexico (Durham, 1950).

RECENT RECORDS: San Marcos Island, Baja California, to Guaymas, Sonora, Mexico: San Marcos Island, Baja California (Emerson and Puffer, 1957); near Empalme, Sonora (Berry, 1959); off Cabo Haro, Guaymas, Sonora (Shasky, 1959).

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