

New Species of Recent and Fossil West American Aspidobranth Gastropods

BY

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(Plate 24; 1 Text figure)

FIVE NEW SPECIES have been noticed during my dissertation work on western North American aspidobranth gastropods. They are here described in order to include them in the dissertation. Monographic treatment of the aspidobranth groups is part of a larger project of reviewing the western North American prosobranth gastropods, ranging from central Baja California to Alaska. The groups covered in the dissertation are to be included in the final review which is now in preparation.

A replacement name is presented here for a common species of *Tegula* along the coast of southern California, which has long been misidentified as *Tegula ligulata* (MENKE, 1850).

Type material of the new species will be distributed to the U.S. National Museum, the Los Angeles County Museum, and the Stanford University Paleontological Type Collection. Additional paratypes will be sent to the California Academy of Sciences; Museum of Paleontology, University of California at Berkeley; Santa Barbara Museum of Natural History; and the San Diego Museum of Natural History.

I gratefully acknowledge the guidance of Professor Myra Keen, Curator of Malacology in the Department of Geology, and Professor Rolf Bolin in the Department of Biological Sciences of Stanford University, who have directed my dissertation work. This investigation was supported (in part) by a predoctoral fellowship, number 18,613, from the Division of General Medical Sciences, U.S. Public Health Service.

Lirularia bicostata McLEAN, spec. nov.

(Plate 24, figures 1 and 2)

Description of Holotype: Shell small for genus, whorls four, suture distinct, base and umbilicus rounded; aperture only slightly oblique, circular in cross section; peritreme complete but not detached from base; inner and outer lip simple. Spiral sculpture of a single carina at

shoulder on third whorl; on penultimate whorl two prominent raised cords at shoulder and periphery; deep channel at suture. Base bearing two prominent broad cords, two cords of lesser magnitude within slope of umbilicus. Axial sculpture of fine incremental lines, not raised in regular sequence. Color light-brown mottled, white and dark brown areas on main spiral cords. Height 2.4 mm, diameter, 2.3 mm.

Type Material: Holotype, U.S. National Museum, cat. no. 636089. Paratype, Stanford University Paleontological Type Collection, cat. no. 9749. Four additional paratypes (all juvenile), Los Angeles County Museum, cat. no. 1134.

Type Locality: Off north side of Middle Coronado Island, Baja California, Mexico, 45 feet under *Macrocystis* kelp, screened from gravel. J. H. McLean, collector, August 10, 1963.

Additional Localities: South Coronado Island [S. S. Berry Collection, cat. no. 15231, 1 specimen]; Guadalupe Island, Baja California [California Academy of Sciences, locality nos. 24044 (8 specimens), 32819 (3 specimens)].

Discussion: The six specimens comprising the type lot are similarly sculptured and are uniformly light colored. The single specimen in the Berry Collection is gray brown. Specimens from Guadalupe Island (which were recognized in lots of *Lirularia acuticostata* CARPENTER, 1864) are variably colored, with yellow, pink, brown and white mottling. These shells show less prominent development of the spiral sculpture and the basal sculpture is obsolete in some of the specimens, but this is also observed in juvenile shells of the typical lot.

Lirularia bicostata, with its reduced number of spiral cords, is similar only to *L. aresta* (BERRY, 1941), a species described from the Early Pleistocene Lomita Formation of San Pedro, California, but now known to be living in California at depths of 50 to 100 fathoms off Point Loma, San Diego County, and off Point Pinos, Monterey County. In *L. aresta* the peripheral carina is covered by successive

whorls, but in *L. bicostata* it is exposed. *Lirularia aresta* has a greater number of basal cords than does *L. bicostata*. The aperture of *L. bicostata* is the least oblique of the known species in the genus. This feature is somewhat exaggerated in the figure of the holotype because the lip is slightly broken. *Lirularia bicostata* is the smallest known species in the genus; all specimens observed are less than 2.5 mm high.

Lirularia bicostata should be prevalent in sublittoral zones along the outer coast of Baja California at least as far south as Cedros Island.

The specific name is a Latin adjective meaning "double ribbed," referring to the two prominent spiral cords.

Solariella micraulax McLEAN, spec. nov.

(Plate 24, figures 3 and 4)

Description of Holotype: Shell of medium size for genus, whorls five, rounded, rapidly inflating; suture distinct, periphery rounded; base slightly convex, sloping evenly into broad umbilicus which penetrates nearly to spire. Aperture circular in cross section, not strongly oblique; inner and outer lip simple, peritreme nearly complete. Spiral sculpture on penultimate whorl of 23 narrow, raised, rounded cords with broader interspaces, approximately 100 cords on final whorl; cords present deep with umbilicus. Axial sculpture of minute raised growth lines passing over spiral cords, most prominent over first four cords below suture. Color brownish above periphery, base and umbilical area cream colored, interior iridescence of pink and green. Operculum multispiral, of 9 whorls, radially striate. Height 7 mm, diameter 8 mm.

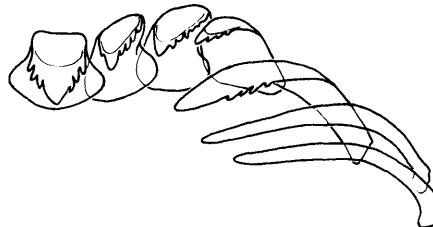
Holotype: U.S. National Museum, cat. no. 210530.

Type Locality: Off Alaska Peninsula, vicinity of Shumagin Islands, U.S. Fisheries Commission sta. no. 2848, 55° 10' N. lat., 160° 18' W. long., 110 fathoms, green mud. July 31, 1888.

Additional Locality: "Captain's Bay, Unalaska, Aleutian Island, 16 fathoms, rocky, west of Pinnacles" [U.S. National Museum, cat. no. 219235, height 4.5 mm, diameter 6.2 mm].

Discussion: The two specimens from which this species is known had been unidentified in the collection of the U.S. National Museum. On the basis of the shell I had considered the species to be a *Margarites*. The dried soft parts were present in the shell of the holotype, making it possible to extract and mount the radula (Text figure 1).

The radula is typical of *Solariella*; the rachidian tooth is prominently cusped, lateral teeth are cusped only on the outer edge, and the marginal teeth are greatly reduced in number. Radulae of four other species of west American *Solariella* follow the same pattern, some having two rather



Text figure 1: Radula from holotype of *Solariella micraulax* McLEAN, spec. nov. Only the first three marginal teeth are shown.

than three laterals. The same four species of *Solariella* also have a radially striate operculum similar to that of *S. micraulax*.

From all other species of *Solariella* known from the North Pacific, *S. micraulax* differs in lacking prominent axial sculpture. Only a trace of axial sculpture is suggested by the prominent growth lines passing over the first four spiral cords adjacent to the suture. *Solariella nuda* DALL, 1896, (which has the typical radula) lacks axial sculpture in the mature shell, but the juvenile shell has a definite cancellate sculpture. *Solariella micraulax* most resembles *Margarites (Pupillaria) vorticiferus* (DALL, 1873). In the synonymy of *M. vorticiferus* I include *M. sharpii* (PILSBRY, 1898), *M. ecarinatus* DALL, 1919, and *M. avenosooki* MACGINITIE, 1959. *Solariella micraulax* is smaller than *M. vorticiferus*, is not as inflated, has a less oblique aperture, and has spiral sculpture deep within the umbilicus. The latter feature is lacking in *M. vorticiferus* and other species of *Margarites (Pupillaria)*.

Solariella micraulax may prove to be not uncommon in Alaska at depths greater than 100 fathoms. Dredging with fine meshed equipment has not been extensive at such depths. Shallower water dredging in Alaska has been more extensive, consequently the record of the hypotype from 16 fathoms may be exceptional.

The hypotype specimen differs markedly from the holotype in possessing a smaller number of spiral cords: six

Explanation of Plate 24

Figures 1 and 2: *Lirularia bicostata* McLEAN, spec. nov. Holotype. (x 13). Figures 3 and 4: *Solariella micraulax* McLEAN, spec. nov. Holotype. (x 4). Figures 5 and 6: *Tegula (Agathistoma) mendella* McLEAN, spec. nov. Holotype. (x 1.5). Figures 7 and 8: *Homalopoma berryi* McLEAN, spec. nov. Holotype. (x 9). Figures 9 and 10: *Macrarenne diegensis* McLEAN, spec. nov. Holotype. (x 1.5). Figure 11: Paratype of *Macrarenne diegensis*. Intermediate growth stage. (x 3). Figures 12 through 14: Paratype of *Macrarenne diegensis*. Juvenile. (x 5).

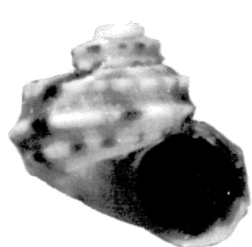


Figure 1

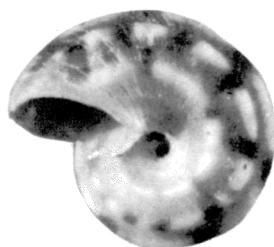


Figure 2

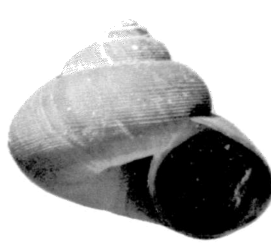


Figure 3



Figure 4

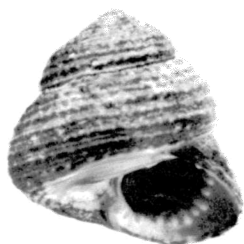


Figure 5

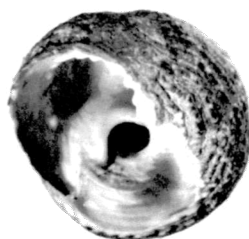


Figure 6

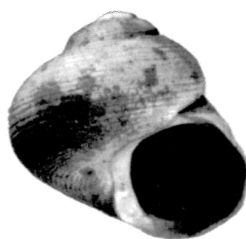


Figure 7

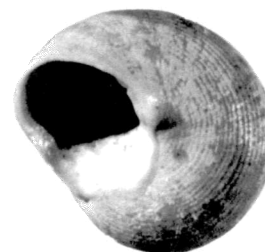


Figure 8

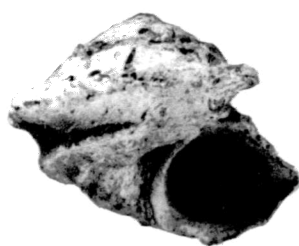


Figure 9

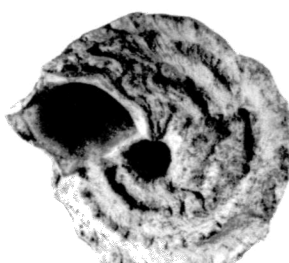


Figure 10

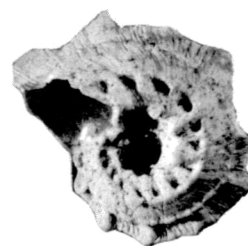


Figure 11

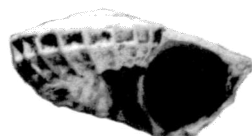


Figure 12



Figure 13



Figure 14

on the penultimate whorl and approximately 40 on the final whorl, including the cords within the umbilicus. The basal cords of the hypotype are numerous and fine, more closely resembling those of the holotype.

The specific name is a noun derived from Greek, meaning "small furrows," with reference to the characteristic spiral sculpture.

Tegula (Agathistoma) mendella McLEAN, spec. nov.
(Plate 24, figures 5 and 6)

Tegula ligulata (MENKE).—of authors, not *Trochus ligulatus* MENKE, 1850, p. 173.

Omphalius fuscescens (PHILIPPI).—of authors, not *Trochus fuscescens* PHILIPPI, 1844, p. 92, pl. 3, fig. 8.

Description of Holotype: Shell large for subgenus, whorls six, suture moderately impressed, periphery rounded; base nearly flat, broadly umbilicate, three denticles at base of columella; aperture oblique, nearly circular in cross section. Spiral sculpture of nodular cords, three prominent cords on third whorl, increasing to eight cords of unequal strength on penultimate whorl, 14 major cords on final whorl and base. Spiral cords nodular in oblique series, corresponding to line of growth; minute spiral threading on and between major cords and basal cords. Ten non-nacreous cords within aperture, terminating in white denticles within lip, less prominent on roof of aperture. Axial sculpture of fine growth lines. Base eroded adjacent to aperture. Operculum multispiral, of about 18 whorls. Color brownish, darker and lighter areas on main cords, columellar area white, whitish nacre within aperture. Height 21.5 mm, diameter, 21 mm.

Type material: Holotype U.S. National Museum, cat. no. 636090. Paratypes, Los Angeles County Museum, cat. no. 1135; Stanford University Paleontological Type Collection, cat. no. 9750. Additional paratypes to be distributed.

Type Locality: Mission Bay, San Diego, California, on rocks of south breakwater inside bay entrance, at low tide and to a depth of 10 feet. J. H. McLean, collector, April 27 and December 11, 1962.

Additional Localities: *Tegula mendella* is a common species in the intertidal zone and the immediate subtidal zone in southern California. DALL (1921, p. 75) recorded *T. "ligulata"* from Monterey to Acapulco, Mexico. The lot from Monterey (U.S. National Museum, cat. no. 14845) is the Californian species but no doubt represents a locality error. Los Angeles County is the northernmost locality known for the species. The southernmost locality record in the National Museum collection is Magdalena Bay, Baja California (cat. no. 24779).

Discussion: It is unfortunate that the name of a well-known species must be changed, but no other course is possible because *Tegula ligulata* (MENKE) has been misidentified. The type locality of *T. ligulata* is Mazatlan, Sinaloa, Mexico. The presence of the Californian species has not been verified at Mazatlan, but I have collected there a species of *Tegula (Agathistoma)* more closely answering the original Latin description than does the Californian species. CARPENTER (1857, p. 235) redescribed *T. ligulata* in a way that accords with my material from Mazatlan, and I believe that there is no question concerning the identity of *T. ligulata*. Both *T. ligulata* and *T. mendella* are non-carinate on the periphery and non-green umbilicate. *Tegula ligulata* is uniformly smaller, angulate at the base, shows six rather than three raised cords on the third whorl, bears a heavy rugosity below the suture on the fourth and subsequent whorls, and has a non-eroded base.

CARPENTER cited the Californian species in 1864 (p. 652): "*Omphalius fuscescens* PHIL. Almost identical with *ligulatus*, Maz. Cat. no. 293." PHILIPPI's species was described from Chile. His name cannot apply, because the original description and figure call for a shell with nearly flattened whorls, which is not characteristic of the Californian species. In the Mazatlan Catalogue, CARPENTER (1857, p. 235) tentatively listed in the synonymy of *T. ligulata* two species described without locality by A. ADAMS: *Phorcus californicus* and *P. liratus* A. ADAMS [original description: ADAMS, 1853, p. 157]. These two forms apparently remain unrecognized, but cannot refer to the species in question because both descriptions call for shells showing green coloration on the columella, a characteristic of some species of *Tegula (Agathistoma)*, but never observed in *T. ligulata* or *T. mendella*. CARPENTER (1857a, p. 224) also mentioned a manuscript name of Nuttall, "*Trochus luridus*," under *Omphalius fuscescens* PHILIPPI. This name could be validated now, but this seems unwise because the name first appeared in Jay's Catalogue (JAY, 1839, p. 71) with the locality "Fayal," an island in the Azores. Thus I have been unable to find an available name for the Californian species.

The name *Tegula mendella* is derived from the Latin noun *menda* (f.), scar, plus the diminutive *-ella*, meaning "little," with reference to the frequently eroded base, a feature not observed in related species.

Macrarenne diegensis McLEAN, spec. nov.
(Plate 24, figures 9 through 14)

Description of Holotype (mature shell): Shell of average size for genus, whorls 4, with strong projecting peripheral keel; suture distinct, umbilicus narrow; aperture oblique,

circular in cross section, peritreme complete. Spiral sculpture of a peripheral carina, producing distinct keel; two faint spiral cords on tabulate surface above keel; broad concave area between keel and first basal carina. Second basal carina subtends base of aperture; a third basal carination borders umbilicus, a fourth faint cord within umbilicus. No axial sculpture on final whorl of mature shell other than raised growth lines. Color chalky white. Height 20 mm, diameter 25 mm.

Description of Juvenile (based on paratype material): Juvenile shell *Cyclostrema*-like; upper surface nearly flat, with two close-spaced spiral cords. Base with four spiral cords rather than three as in adult, crossed by approximately 17 axial ribs, producing definite cancellate sculpture. Axial ribs indistinct on upper surface, but producing stellate projections at extremity of keel. Shells of diameter greater than eight mm exhibit a gradual loss of the second basal keel, while between the third basal keel (second keel of adult) and the umbilical keel, the cancellation becomes more prominent and deep pits are formed (figure 11). All traces of the pitted sculpture are lost in the mature shell.

Type Material: Holotype, Los Angeles County Museum, cat. no. 1136; paratypes, cat. no. 1137. Paratypes, Stanford University Paleontological Type Collection cat. no. 9751. Additional paratypes to be distributed. Only two of the original specimens are mature, the holotype and a paratype 13 mm high. Other specimens are fragmentary or juvenile.

Type Locality: Pliocene, San Diego Formation, Los Angeles County Museum, invertebrate paleontology locality no. 305, 2400 feet E. and 1350 feet S. of the NW corner of Sec. 8, T. 19 S., R. 2 W., San Bernardino Base and Meridian (USGS topogr. map, San Ysidro quad., ed. 1843). George P. Kanakoff, collector.

Discussion: *Macrarena diegensis* is known only from the Pliocene of San Diego. It is related to *M. coronadensis* STOHLER, 1959, and to *M. californica* (DALL, 1908). *Macrarena californica* retains no basal cords in the adult shell, while *M. coronadensis* retains axial sculpture and the first basal cord is as prominent as the peripheral cord. All three of these species evidently pass through similar growth stages. The *Cyclostrema*-like stage of *M. californica* is nearly identical to that of *M. diegensis*. The intermediate pitted stage of *M. californica* is represented by the holotype of *M. pacis* (DALL, 1908), which falls into the synonymy of *M. californica*. The *Cyclostrema*-like stage of *M. coronadensis* is unknown, but I have collected the intermediate pitted stage.

The specific name refers to the type locality, the San Diego Formation.

***Homalopoma berryi* McLEAN, spec. nov.**

(Plate 24, figures 7 and 8)

Leptothyra bacula (CARPENTER).—of ARNOLD, 1907, p. 446, pl. 57, fig. 3.

Homalopoma baculum (CARPENTER).—of WOODRING, 1946, p. 64 ["*bacula*"].

Description of Holotype: Shell small for genus, whorls four, rounded, suture distinct; periphery and base rounded, no umbilical depression. Aperture oblique, circular in cross section. Outer lip simple, columella broad, with low tubercle at base. Heavy callus on base adjacent to aper-
7 2221

ture. Spiral sculpture of 15 evenly spaced incised lines on penultimate whorl, about 30 such lines on final whorl and base. Basal sculpture identical to body sculpture. No axial sculpture. Color pink, columellar area white. Height 3.5 mm, diameter, 3.8 mm.

Type Material: Holotype, Los Angeles County Museum, cat. no. 1138; paratypes, cat. no. 1139. Paratypes, Stanford University Paleontological Type Collection, cat. no. 9752. Additional paratypes to be distributed.

Type locality: Lower Pleistocene, Timm's Point Formation, San Pedro, California. Los Angeles County Museum, invertebrate paleontology locality no. 62, on bluff above railroad tracks, below Pacific Boulevard, and east of 22nd Street. G. P. Kanakoff, collector.

Additional Locality: Lower Pleistocene, Santa Barbara Formation, Bath-House Cliff, Santa Barbara, California (ARNOLD, 1907).

Discussion: *Homalopoma berryi* has previously been confused with the living *H. baculum* (CARPENTER, 1864), although the two species are not closely related. Mature specimens of *H. berryi* are smaller than large specimens of *H. baculum*, the shell is thinner than that of *H. baculum*, the suture is more impressed, and the spiral lines are distinct on the body whorl and not obsolete as in *H. baculum*. Living specimens of *H. baculum* generally have brownish shells and occur strictly in the intertidal zone, while *H. berryi* has a pink shell and apparently lived in sublittoral zones, judging from the deeper-water character of other species known from the Timm's Point and Santa Barbara formations.

WOODRING (1946, p. 64) undoubtedly was discussing *H. berryi* when he commented: "*H. bacula*, smaller than *H. carpenteri* and sculptured with finer spirals, occurs in all the [Lower Pleistocene] units except the Palos Verdes sand. As in *H. carpenteri*, the rosy color is preserved on many fossils." *Homalopoma baculum* has been reported from Late Pleistocene units and terrace deposits in California, but these records apparently refer to the true *H.*

baculum. There is no evidence that *H. berryi* occurred later than the Early Pleistocene.

The species is dedicated to Dr. S. Stillman Berry of Redlands, California, who has described a number of Early Pleistocene species from California.

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{Editor's note: The following correction was received from the author after corrected galley proofs had been returned and after pages had been set up. It was, unfortunately, too late to alter the text on page 131, but we are pleased to be able to include this statement at the end of Mr. McLean's article.}

Tegula eiseni E. K. Jordan, 1936
prior to *Tegula mendella* McLean, 1964.

by JAMES H. McLEAN

In the present number of *The Veliger* I described *Tegula (Agathistoma) mendella* McLEAN, 1964, p. 132, pl. 24, figures 5 and 6), a replacement name for *Tegula ligulata* of authors, not of MENKE, 1850. While this paper was in press I discovered that I had overlooked an available name for the species. *Tegula eiseni* E. K. JORDAN, 1936 (p. 162, pl. 17, figures 3, 4, and 5) was described as a Pleistocene fossil from Magdalena Bay, Lower California. The holotype (California Academy of Sciences, Type Collection, cat. no. 5487) is a juvenile specimen, 5.8 mm in height and 7.8 mm in diameter. The description and figure clearly represent the California species. *Tegula mendella* must consequently be regarded as an objective synonym of *Tegula (Agathistoma) eiseni* E. K. JORDAN.

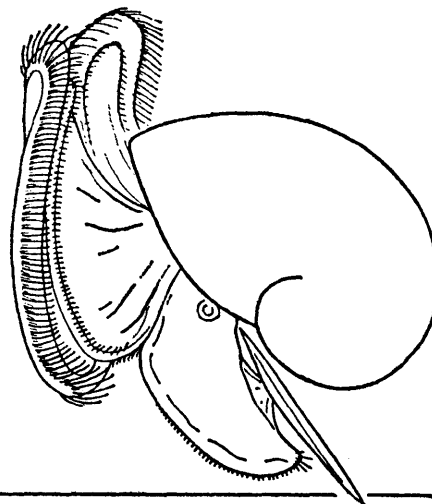
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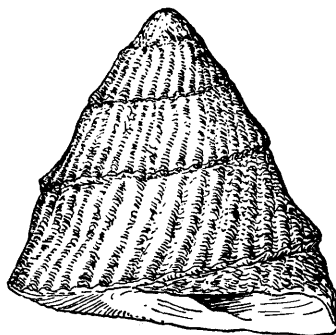
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Note: The various taxa above species are indicated by the use of different type styles as shown by the following examples:

ORDER, Suborder, **DIVISION**, Subdivision, SECTION,
SUPERFAMILY, FAMILY, Subfamily, *Genus*, (*Subgenus*).
New Taxa

THE VELIGER is open to original papers pertaining to any problem concerned with mollusks from the Pacific Region.

This is meant to make facilities available for publication of articles from a wide field of endeavor. Papers dealing with ecological, morphological, anatomical, physiological, distributional, taxonomic, etc. aspects of marine, fresh water or terrestrial mollusks from any region bordering on or situated within the Pacific Ocean, will be considered. Even topics only indirectly concerned with mollusks may be acceptable.

It is the editorial policy to preserve the individualistic writing style of the author; therefore any editorial changes in a manuscript will be submitted to the author for his approval, before going to press.

Short articles containing descriptions of new species or lesser taxa will be given preferential treatment in the speed of publication provided that arrangements have been made by the author for depositing the holotype with a recognized public Museum. Museum numbers of the type specimens must be included in the manuscript. Type localities must be defined as accurately as possible, with geographical longitudes and latitudes added.

Short original papers, not exceeding 500 words, will be published in the column "NOTES & NEWS"; in this column will also appear notices of meetings of the American Malacological Union, as well as news items which are deemed of interest to our subscribers in general. Articles on "METHODS & TECHNIQUES" will be considered for publication in another column, provided that the information is complete and techniques and methods are capable of duplication by anyone carefully following the description given. Such articles should be mainly original and deal with collecting, preparing, maintaining, studying, photographing, etc., of mollusks or other invertebrates. A third column, entitled "INFORMATION DESK," will contain articles dealing with any problem pertaining to collecting, identifying, etc., in short, problems encountered by our readers. In contrast to other contributions, articles in this column do not necessarily contain new and original materials. Questions to the editor, which can be answered in this column, are invited. The column "BOOKS, PERIODICALS, PAMPHLETS" will attempt to bring reviews of new publications to the attention of our readers. Also, new timely articles may be listed by title only, if this is deemed expedient.

Manuscripts should be typed in final form on a high grade white paper, 8½" by 11", double spaced and accompanied by a carbon copy.

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