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A NEW WEST MEXICAN SUBGENUS AND NEW SPECIES OF MONTACUTIDAE (MOLLUSCA: PELECYPODA), WITH A LIST OF MOLLUSCA FROM BAHIA DE SAN QUINTIN

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Among the mollusks taken during an ecological survey of Bahía de San Quintín, Baja California — sent to me for determination by members of the Beaudette Foundation — I noticed a single specimen of an unusual bivalve. The shell superficially resembled a *Cardita*, save that it did not actually have radial ribs and there was no evident external ligament; within, the disjointed pallial line and the hinge implied relationship to the genus *Kellia* in Leptonacea. However, the resilifer was of remarkable size and unusual shape, and the internal ligament, partially detached, was so calcified as to resemble a lithodesma, hallmark of the Anomalodesmata; porcelanous, not nacreous, shell material could not justify such a placement. In the end, allocation to Leptonacea, family Montacutidae, seemed to be indicated, especially after I had had the privilege of studying material from Ecuador loaned to me by Dr. A. A. Olsson, which resolved some problems not completely covered in his discussion of the genus *Orobitella* (Olsson, 1961, pp. 235-238).

The most closely related genus seems to be *Orobitella* Dall, 1900, but so many points of difference are evident that the proposal of a new subgenus seems advisable. Most of the named species of *Orobitella* are quadrate, not trigonal, in outline, with a less strongly developed hinge. The genus is tropical American in distribution, ranging on the Atlantic side from late Tertiary to Recent in Florida and on the Pacific Coast from Pliocene to Recent in Peru, northward at least to California.

Family MONTACUTIDAE Clark, 1855

Genus *Orobitella* Dall, 1900

Trans. Wagner Free Inst. Sci., vol. 3, pt. 5, p. 1119.

TYPE (monotypy): *Montacuta* (*O.*) *floridana* Dall, 1899.

The type species, from West Florida, is large (to 16 mm. in length), inequilateral, the anterior end longer than the posterior, outline quadrate. As in all members of the family, there is a resiliary area under the beaks. The original figure (Dall, 1899, p. 893, pl. 87, fig. 10) shows this area as short. A tracing of the figure is given here (fig. 2). According to Dall's description, there is a cardinal tooth or hook in either valve in front of the resilium.

Olsson and Harbison (1953, p. 96) named a smaller subspecies of *O. floridana* (length 11 mm.), from the Florida Pliocene, and figured the hinge of the left valve, which shows a moderately wide plate obliquely cut by the resilifer, a triangular gap or boss being evident between resilifer and cardinal (fig. 3). Olsson (1961, pp. 235-238) has described and figured several forms from northern Peru that exhibit the same features. He has kindly loaned me specimens of these for study. Some specimens have a thin, radially shaggy periostracum, but most forms are smooth.

The ancestral stock of *Orobitella* probably is the Miocene *Neaeromya* Gabb, 1873 (Proc. Acad. Nat. Sci. Philadelphia for 1872, p. 274; type species by monotypy, *N. quadrata* Gabb, 1873). Because of Gabb's erroneous statement that the hinge bears lateral teeth, Dall was misled as to the affinities of *Neaeromya*. His subgenus *Orobitella* actually is closer to *Neaeromya* than to *Montacuta*, and if it is not now accorded generic rank should be made a subgenus of *Neaeromya*. In a re-study of Gabb's type specimens, Pilsbry (1921, p. 419, text-fig. 45) has shown that the hinge plate is smooth in *Neaeromya* except for one cardinal hook in the right valve. The lack of a tooth in the left valve thus separates it from *Orobitella*. Pilsbry's figures are reproduced here, in facsimile (figs. 1a-1d). *Neaeromya* is restricted to the Miocene of Jamaica, Santo Domingo [Dominican Republic], and Florida.

A possible European analogue of *Neaeromya* and *Orobitella* may be the Tertiary genus *Pleurodesma* Hörnes, 1859. It has a single laminar cardinal in either valve and an excavated resilifer under the beaks; the outline is trapezoidal to quadrate. Cossmann and Peyrot in 1909 erected a separate family for it and allocated it to Myacea, however. A restudy of specimens from the Miocene of France and Austria would be desirable. A South American genus somewhat similar in outline to *Orobitella* is *Diplodontina* Stempel, 1899 (Zool. Jahrb. Suppl. Bd. 5, Fauna Chilensis 2, p. 232), from Chile. As the figure of the hinge shows two cardinal teeth, this may belong in Kelliidae rather than in Montacutidae.

Olsson (1961, p. 236) considers that the shell described by Dall as *Sportella stearnsi*, from the Gulf of California (Dall, 1899, p. 885) is an

Orobitella, which seems plausible. This being granted, one must wonder whether other similar forms presently allocated to *Sportella* and *Pseudopythina* would not also qualify as *Orobitella* and thus extend the range of the genus northward to California or even, perhaps, to Alaska.

Subgenus *Isorobitella* Keen, subgen. nov.

TYPE SPECIES: *Orobitella (Isorobitella) singularis*, sp. nov.

DESCRIPTION: Ovate-trigonal, height and length nearly equal; shell material relatively sturdy, porcelanous, slightly translucent; periostracum well developed, larger than shell, free at margins and, in drying, overlapping the inner margin of shell, shaggy in texture, the tufts or bristles laid on in fine radial rows; excavation for resilium with a median ridge, margins slightly upturned; resilium of three layers, the outer and innermost non-calcified, the medial layer whitish, infiltrated with fibrous needles of calcite; adductor muscle scars conspicuous, ovate, large; pallial line wide, well removed from ventral margin, of irregular but nearly merging attachment scars.

REMARKS: The subgeneric name adds the prefix *isos*, from the Greek word for like, to *Orobitella*. Although Dall gave no derivation for *Orobitella*, it evidently is coined from *orobus*, name of a plant with a bean-shaped seed.

Isorobitella differs from *Orobitella* by having a differently-oriented resilium, which parallels the hinge margin, with a median ridge that is complete lacking either in the specimens kindly loaned to me by Dr. Olsson or in any of the figures yet published. In *Isorobitella* there is no gap between resilifer and cardinal. Attachment scars of the resilifer in *Orobitella* show only a single curve, whereas in *Isorobitella* they are doubly sinuous. Also, the shell is distinctly more convex in *Isorobitella*, at least in the single specimen available for comparison. The periostracum is heavier, larger, and more shaggy than in *Orobitella*; many specimens of the latter show no periostracum at all.

***Orobitella (Isorobitella) singularis* Keen, sp. nov.**

Figures 4 a-c, 5 a-b

HOLOTYPE: Stanford Univ. Paleo. Type Coll. no. 9518.

TYPE LOCALITY: Bahía de San Quintín, Baja California del Norte, Baja California, Mexico; mud flats on northeast part of bay. (West Coast of Lower California, approximately 30° 28' N. Lat., 115° 28' W. Long., 0.6 miles ESE of cannery, near benthic biological station no. 15). Collectors, J. L. Barnard and P. T. Beaudette, April, 1961.

DIMENSIONS OF HOLOTYPE: Length, 9.5 mm.; height, 8.8 mm.; diameter (both valves), 5.4 mm.

DESCRIPTION: Shell ovate-trigonal, umbones wide, beaks small, low; exterior surface covered by a shaggy brown periostracum regularly raised into shreds or tufts in about 60 fine radial rows, giving the illusion of radial sculpture; periostracum continued beyond shell margin, folding over

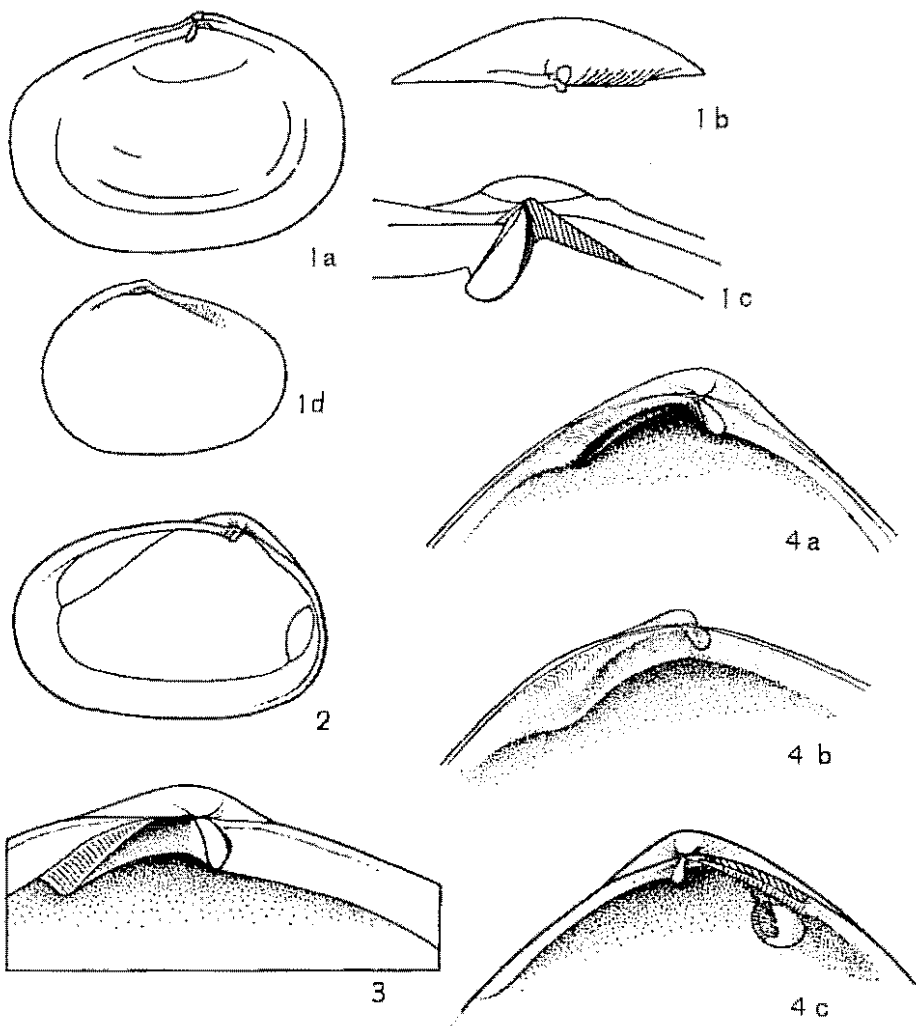


Fig. 1. *Neaeromya quadrata* Gabb. After Pilsbry, 1922, figs. 45 a-d. 1a, interior of holotype, right valve, x 7; 1b, dorsal view, holotype; 1c, enlarged view of hinge, x 20; 1d, interior of a smaller paratype, left valve, x 7. Length of holotype, 6.2 mm. Miocene, West Indies.

Fig. 2. *Orobitella (Orobitella) floridana* (Dall). After Dall, 1899, pl. 87, fig. 10 (modified tracing). Holotype, right valve, x 2.5. Length, 16 mm. Recent, western Florida.

Fig. 3. *O. (O.) floridana inflata* Olsson and Harbison, 1953. Tracing from original figure (pl. 9, fig. 6). Holotype, left valve, X 12. Length, 10.7 mm., height, 6.5 mm., diameter (one valve), 2.2 mm. Pliocene, Florida.

ventral margin in holotype; surface of the white shell apparently smooth except for growth lines, with a low angle at the boundary of central and anterior slopes; hinge with one peg-shaped cardinal lamina in either valve and no lateral teeth; ligament and resilium fused, long, internal, with three distinct layers, the outer (or upper) dark brown, the medial whitish (due to intercalated fibers or needles of calcitic material), the innermost thin, brown, nearly transparent, lodged in an excavation formed by the broadening of the hinge plate back of and below the beaks, apparently somewhat larger in the left valve than in the right and divided into two parallel parts by a median ridge, with one part facing the opposite valve, the other facing into the shell cavity; edges of the resilifer slightly raised or even somewhat laminar; muscle scars large, elliptical, the anterior scar longer, its inner edge and the continuing upper border of the pallial line ragged or irregular; pallial line well removed from ventral margin; inner margin of shell smooth.

DERIVATION OF NAME: The Latin adjective *singularis*, alone or solitary, seems an appropriate term for this bivalve, for which additional searching brought no further material to light.

REMARKS: With only a single specimen at hand, one cannot be certain of the degree to which observed features may represent individual variations. However, the consistency of hinge features in *Orobitella*, *s. s.*, lends strength to the conviction that the differences noted here are reasonably stable.

The literature on ligamental structures in the Heterodonta is scanty. Calcification of some part of it is not common but has been mentioned by Dall (1900, p. 1170), in discussion of Leptonacea, but he is careful to state that this does not form a lithodesma, which, of course, is correct. A ligamental capsule similar in structure to the one in *Isorobitella* is observable also in *Kellia laperousii* (Deshayes), from California, in family Kelliidae. The resemblance to a lithodesma is shown in fig. 4c, in a camera lucida drawing of the right valve of *O. (I.) singularis*, just as it appears, with the inner layer of calcified ligament, torn from its socket in the left valve when the shell was opened, showing as a rounded structure beneath the hinge, much in the position of a true lithodesma. However, in life this was a compressed sheet or mass of resilium in the now-empty cavity of the left dorsal margin; drying has caused it to curl, and the white medial layer takes on the appearance of a separate globular structure, the transparent conchiolin of the innermost layer not being evident.



Fig. 4. *Orbitella (Isorobitella) singularis* Keen, sp. nov. Holotype, Stanford Univ. Paleo. Type Coll. no. 9518. 4a, Hinge, left valve, x 10, normal orientation; 4b, same valve, tilted backward to show inner portion of resilifer and the medial ridge; 4c, hinge, right valve, showing outer and middle layers of ligament and the detached ligament from left valve hanging below hinge, simulating a lithodesma. x 10. Recent, W. Mexico.

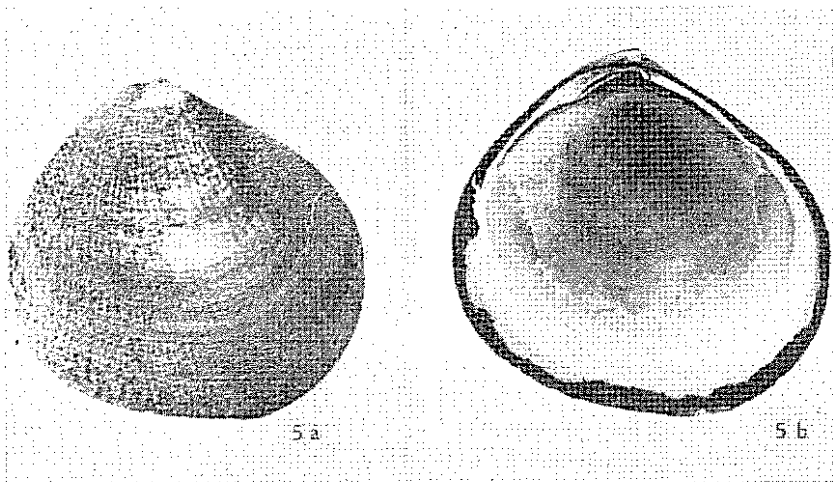


Fig. 5. *Orobittella (Isorobittella) singularis* Keen, sp. nov. Holotype, SU no. 9518. 5a, Exterior, right valve, x 5; 5b, interior, left valve, with radially tufted periostracum overlapping the valve margins as an irregular dark border. Length, 9.5 mm. Recent. San Quintin Bay, Baja California.

The material of which the shell is composed shows an unusual texture, also. Above the pallial line and muscle scars the inner shell layer is the normal whitish color, inconspicuously pitted, but those parts of the shell where the mantle and adductor muscles were attached has a glazed or translucent texture, of a bluish-gray color. Fortunately, the specimen was preserved in alcohol before drying. This leaves the tissues intact, and gross features can be seen. The ctenidium is well preserved, reticulate in form, with several plates.

One may speculate as to the function of the over-sized periostracum and the exaggeratedly large hinging apparatus (both ligament and musculature). May it be that in life the animal lies with the valves slightly open (as in some of the Galecommatids), and that the large hinge is needed to control this form of gape? The precise habitat remains to be discovered. In Britain members of the Montacutidae are commensal with Echinodermata, especially biscuit urchins. Commensalism is probable here, too. The sole specimen was found on a mud-flat when search was being made for certain Crustacea, but later search did not reveal it as being associated with them. The dominant molluscan associate at the site was *Cryptomya californica* Conrad.

A complete list of the Mollusca taken during the ecological survey of San Quintin Bay is given below.

LIVING MOLLUSCA COLLECTED DURING AN ECOLOGICAL
SURVEY OF BAHIA DE SAN QUINTIN

Intertidal collections (especially washings from algae) and hay-floor samples taken with an orange-peel grab are listed alphabetically here. Station numbers are indicated by italics, number of specimens in ordinary type. Data for the station records are being published separately by Dr. Barnard, who also will give further information as to ecology.

Mollusks are poorly represented in this bay, and most of the specimens are immature. For this reason, some identifications are open to question. Several of the minute bivalves could not be determined.

- Acmaea depicta* (Hinds) 81, 3.
Aeteocina carinata (Carpenter) 0, 12; 1, 13; 2, 12; 3, 6; 4, 7; 5, 1; 6, 1; 7, 2; 12, 9; 15, 10; 36, 1; 37, 1; 44, 6; 47, 3; 48, 4; 52, 1; 56, 1; 59, 15; 63, 4; 67, 5; 68, 14; 71, 3; 73, 2; 75, 2; 80, 5; 84, 11; 85, 1; 86, 2; 88, 9; 91, 2; 92, 3; 93, 1.
Aequipecten circularis aequisulcatus (Carpenter) 79, 1.
Assimineza compacta (Carpenter), [*Syncera* Auctt.] 176, 2.
Bittium quadrifilatum Carpenter 10, 1.
Brachidontes sp. 175, 1.
Chaetopleura gemma Pilsbry 181, 1.
Cooperella subdiaphana (Carpenter) 56, 1; 73, 1.
Crucibulum spinosum Sowerby 169, 2; 181, 21 [forma *tubiferum*].
Cryptomya californica Conrad (numerous in mud-flat probes).
Haminocia sp. 67, 8.
Hiatella arctica (Linnaeus) 252, 1; 163, 5; 175, 9; 179, 3.
Lasaea subviridis Dall 169, 55; 176, 5.
Leptopecten latiauratus (Conrad), var., approaching *L. tumbezensis* (Orbigny) 87, 1.
Lyonsia californica Conrad 38, 3; 44, 3; 48, 1; 65, 5; 69, 2; 73, 16; 77, 2.
Macoma yoldiformis Carpenter 65, 2; 69, 1.
Marginella californica Tomlin 164, 4; 166, 4; 181, 19.
Marginella pyriformis Carpenter 175, 1.
Marginella regularis Carpenter 166, 1; 175, 3; 181, 2.
Mitrella carinata (Hinds) 257, 1; 62, 3; 73, 1; 81, 2.
Modiolus sp., all juveniles 34, 3; 44, 5; 60, 1; 61, 12; 64, 1; 65, 1; 66, 1; 72, 3; 73, 1; 79, 3; 83, 1; 92, 1.
Odostomia (Menestho) fetella Dall and Bartsch 169, 3.
Odostomia sp. 48, 1.
Ostrea lurida Carpenter 181, 50+.
Parvilucina tenuisculpta (Carpenter) 48, 2; 261, 3.
Protothaca staminea (Conrad) Mudflat, 1.
Solen rosaceus Carpenter 14, 3; 17, 1; 21, 1; 23, 1; 36, 1; 64, 1; 65, 1; 69, 1; 78, 1; 90, 1; 94, 2.

- Tellina buttoni* (Dall) 39, 1; 44, 21; 48, 1; 54, 3; 56, 1; 60, 2; 65, 3; 72, 3; 73, 3; 77, 1; 83, 6; 92, 2; 93, 5.
- Terebra pedroana* Dall 59, 1.
- Trachycardium quadragenarium* (Conrad) 73, 1; 77, 1.
- Transennella tantilla* (Gould) 67, 50+; 71, 50+ [all dead but fresh shells].
- ?*Tricolia* sp. 62, 6.
- Turbonilla* sp. 38, 6; 47, 1.
- Nudibranchiata, 2 species 20, 2; 26, 1; 38, 6; 40, 1; 43, 12; 49, 1; 60, 1; 65, 2; 66, 1; 67, 2; 71, 3; 74, 1; 76, 2; 77, 5; 88, 1; 91, 1; 93, 1.
- Indeterminate (limpets, shells dissolved by preservative) 34, 1; 61, 3; 81, 1.
- Indeterminate (shells dissolved) 34, 1; 51, 1; 53, 2; 61, 3; 74, 4; 75, 1; 76, 1; 81, 1; 83, 3.

Acknowledgments

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References Cited

- Dall, W. H.,
1899. Synopsis of the Recent and Tertiary Leptonacoen of North America and the West Indies. Proc. U. S. Nat. Mus. 21: 873-897, pls. 87-88 (June).
1900. Tertiary Fauna of Florida. Trans. Wagner Free Inst. Sci. 3 (5): 949-1218, pls. (Dec.).
- Olsson, A. A. and Anne Harbison,
1953. Pliocene Mollusca of southern Florida. Acad. Nat. Sci. Philadelphia, Monog. 8, 457 pp., 65 pls. (Nov.).
- Olsson, A. A.,
1961. Mollusks of the Tropical Eastern Pacific. Panamic-Pacific Pelecypoda. Paleontological Research Institution, 574 pp., 86 pls. (Mar.).
- Pilsbry, H. A.,
1922. Revision of W. M. Gabb's Tertiary Mollusca of Santo Domingo. Proc. Acad. Nat. Sci. Philadelphia, 73 (2): 305-435, pls. 16-47 (Jan.).