

OCCASIONAL PAPERS OF THE MUSEUM OF
ZOOLOGY
THE UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN

TWO NEW PLEUROCERID SNAILS FROM EASTERN MEXICO

BY FRED G. THOMPSON

WHEN Pilsbry (1910) described the genus *Lithasiopsis* and two species, *L. hinkleyi* and *L. mexicana*, from eastern México, he based his description on material collected by Anson A. Hinkley in the Río Pánuco drainage system. Superficially, these snails are very similar to those of the genus *Lithasia* (= *Pleurocera* [Morrison, 1954: 362]), but they differ in having a paleomelanian operculum, a unique feature in New World genera of the subfamily Pleurocerinae to which both genera belong. *Lithasiopsis* is further distinguished from *Lithasia* in having a thick parietal callus, another unusual character among North American genera, but one which is constantly present in the Middle American genus *Pachychilus*. On the basis of the nature of the radula, however, *Lithasiopsis* is readily separated from the subfamily Potadominae, to which *Pachychilus* belong, and placed in the Pleurocerinae, the subfamily to which all other North American pleurocerids are assigned. The radular teeth of the Potadominae resemble those of the Pleurocerinae, but the presence of "Troschel lines" adds to the complexity of the individual teeth and the cusps are blunt and rounded.

After the original description, *Lithasiopsis* went unmentioned in the literature until Goodrich (1942: 6) suggested that, on the basis of the paleomelanian operculum and the thick parietal callus, it might be more closely related to *Pachychilus* than to any other North American genus. Morrison (1954: 365) went a step further, disregarding the characters of the radula, features which Pilsbry and Bequaert (1927: 272-74) and Goodrich (1936: 16-17) considered fundamental and synonymized *Lithasiopsis* with *Pachychilus*. Subsequent to Morrison's proposal Pilsbry (1956: 31) continued to follow the classification that he had established previously, an arrangement which I accept.

In spite of the disagreements concerning the generic affinities of *Lithasiopsis*, nothing new was added to our knowledge of this genus and no additional material was reported for nearly half a century.

In 1950-51, during an ecological study in the Gómez Farías region of Tamaulipas, Reznat M. Darnell collected several lots of freshwater mollusks. Among these collections, which were made in the Río Sabinas, a tributary of the Río Tamesí, were two very distinct and undescribed species of *Lithasiopsis*. In January, 1958, William E. Duellman and Richard E. Etheridge obtained additional specimens at one of Darnell's localities of one of them.

Lithasiopsis crassa, new species

(Fig. 1a, c-f; Pl. I, Figs. a-f)

HOLOTYPE.—UMMZ 195103: Storm's Ranch, Río Sabinas, Pano Ayucle, 5 mi. NE of Gómez Farías, Tamaulipas, México; collected January 13, 1958, by William E. Duellman and Richard E. Etheridge.

PARATYPES.—UMMZ 195104 (31): same locality as the holotype; collected by Reznat M. Darnell, May 29, 1951. UMMZ 195106 (19): Río Sabinas, above La Unión, NE of Gómez Farías, Tamaulipas; collected by Reznat M. Darnell, May 27, 1951.

SPECIMENS EXAMINED.—UMMZ 195105 (± 1000): same locality as the holotype. UMMZ 195107 (13); Nacimiento del Río Sabinas, 10 mi. N of Gómez Farías, Tamaulipas.

DESCRIPTION OF THE HOLOTYPE.—Shell thick, heavy, ovate-turrate, spire acute, conic, decollate, slightly concave, almost straight-sided; about $7\frac{1}{2}$ whorls remaining, rapidly increasing in size; first 5 whorls flattened; remaining whorls weakly convex; whorls smooth, crossed by fine, unequal growth lines; periostracum thin; aperture ovate, acutely angulate above and forming a shallow sinus, rounded below; outer lip moderately thick and acute, slightly advanced below and near the suture, retracted a little near the columella, lip continuous with the columella; columella thick, concave, expanded and reflected; parietal wall evenly covered with a thick white callus.

Measurements (mm): Height of shell, 13.9; height of aperture, 6.8; width of shell, 8.6.

Operculum (Fig. 1a) paucispiral subovate, nearly circular 2.5 mm. long by 2.4 mm. wide, leathery, thin, dark reddish brown; apex rounded; nucleus sunken, eccentric, lying in the columellar half, about one-third the distance from the base to the apex; about $2\frac{1}{2}$ whorls are evident; spiral line loosely coiled; growth lines fine but distinct; area of attachment on the columellar side, dull, bounded below and on the lower outside by a raised, brown chord, which originates on the nucleus and continues along the spiral line to the columellar edge; except for the area of attachment, the rest of the inside is glassy.

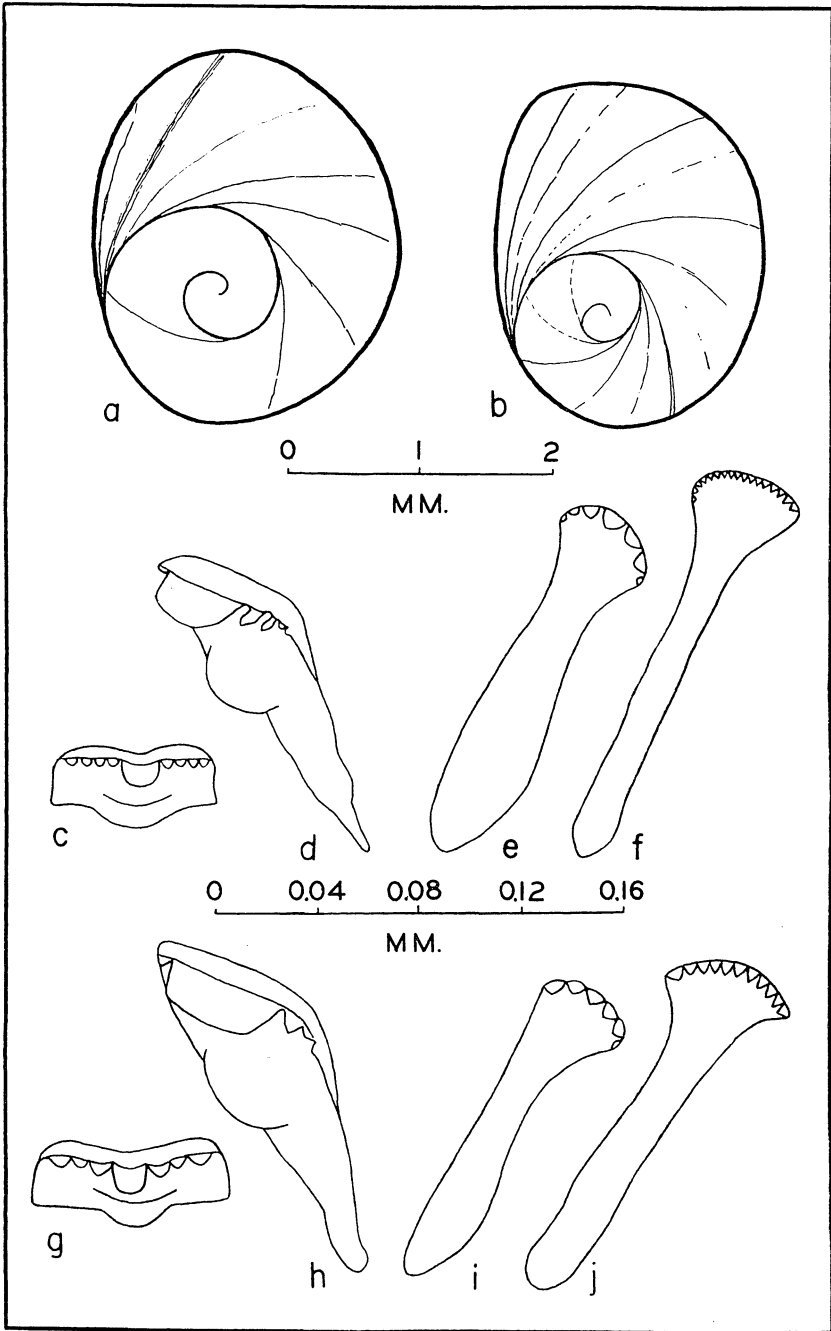


FIG. 1. a-b, Operculum. (a) *Lithasiopsis crassa*, paratype; (b) *L. darnelli*, paratype. c-j, Radular teeth. c-f, *L. crassa*: (c) central; (d) lateral; (e) inner marginal; and (f) outer marginal. g-j, *L. darnelli*: (g) central; (h) lateral; (i) inner marginal; and (j) outer marginal.

The periostracum of the shell is uniform olive-yellow.

VARIATION.—The extent of variation in the height and width of adult shells is considerable; specimens vary from elongate-turrate to squat and globose, with a short, pointed, concave spire. This variation does not appear to be correlated with position in the stream or with geographic location. The color of the periostracum ranges from the olive-yellow (in the type) to a dark burnt umber. Olive-yellow appears to be typical for most of the immature specimens. Adult shells are often coated with deposits of calcium carbonate or iron salts which tend to obscure the basic ground color.

Measurements (mm.) of paratypes: height of shell, 10.0–13.0, (av.=11.4); height of aperture, 5.4–6.5 (av.=6.0); width of shell, 6.5–8.3 (av.=7.7); height of aperture divided by width of shell .77–.92 (av.=.85).

Lithasiopsis darnelli, new species

(Fig. 1b, g–j; Pl. I, Figs. g–l)

HOLOTYPE.—UMMZ 195098: Río Sabinas, above La Unión, NE of Gómez Farías, Tamaulipas, México; collected May 23, 1951, by Rezneat M. Darnell.

PARATYPES.—UMMZ 195099 (234): same data as the holotype.

SPECIMENS EXAMINED.—UMMZ 195100 (24): Nacimiento del Río Sabinas, 10 mi. N of Gómez Farías. UMMZ 195102 (24): Rancho Pico del Oro, Río Sabinas, E of Gómez Farías. UMMZ 195101 (3): Río Sabinas at the Pan American Highway, Tamaulipas, México.

DESCRIPTION OF HOLOTYPE.—Spire conic, slightly concave; shell thin, light, about $7\frac{1}{4}$ whorls; embryonic whorls $1\frac{1}{4}$, smooth, or slightly pitted, body whorl and penultimate whorl slightly rounded, earlier whorls nearly flat so that upper half of spire is flat-sided; whorls bearing numerous acute, spiral cords, which are narrower than their intervals; a single cord originates on last of embryonic whorls, and on each succeeding whorl additional cords appear until there are 6 on the penultimate whorl, and 19 on the body whorl; the cords in turn are crossed by fine, but distinct, growth wrinkles; occasionally the growth wrinkles become strong enough to form plications; suture moderately impressed; lip thin, sharp, lying at an angle nearly parallel to the longitudinal axis of the shell, continuous with the columella; aperture ovate, wide, acutely angulate above and forming a sinus, bluntly pointed below, slightly canaliculate, parietal callus thin; columella reflected, round, narrow.

Measurements (mm.): Height of shell, 12.0; height of aperture, 5.0; width of shell 6.0.

Operculum (Fig. 1*b*) paucispiral, ovate, nearly circular, 2.4 mm. long and 2.2 mm. wide, leathery, thin, brown; apex bluntly pointed, ZOOLOGY-58473-Galley 2-

columellar margin nearly straight; nucleus sunken, eccentric, lying in the columellar half, about two-fifths of the distance from the base to the apex; spiral line fine, indistinct, about $2\frac{3}{4}$ whorls appear to be present, growth lines generally fine, indistinct, with occasional heavier lines evident; area of attachment on the columellar side, dull, bounded below and on the outside by a low ridge which originates on the nucleus and extends up to the columellar side of the apex; remainder of inside glassy, but with fine granules.

The color of the shell is snuff-brown, becoming lighter high on the spire and again near the lip. The embryonic whorls are cinnamon-buff. On the upper 5 whorls, due to wearing of the periostracum, the cords are much lighter than their intervals. On the body whorl the periostracum is continuous across the cords and no difference of color occurs. The interior of the aperture and the columella are pearl-white, along the edge of the inside of the lip is a narrow brown zone which is continuous with the color of the exterior surface of the shell.

VARIATION.—In most of the paratypes the apex of the spire has been broken off. The number of remaining whorls varies from $4\frac{1}{2}$ – $7\frac{3}{4}$ (av.=6). The cords on the penultimate whorl number from 6 to 10 (av.=7.2). The cords on the body whorl near the lip vary from 13 to 21 (av.=16.8). Occasional individuals lack the cords on the last whorl, or even over most of the shell, except that the cords may be slightly indicated on the first few whorls. Eight out of 262 specimens lacked complete cording. Although contour of the whorls is generally very similar to that of the type, many specimens have whorls that are flattened to form a straight spire and a few have rounded whorls. The parietal callus is not always a thin indistinct structure but may be a thickened shield over the preceding whorl.

Measurements (mm.) of the shell are quite variable: Height of shell, 10.8–15.8 (av.=12.2); height of aperture, 4.8–6.5 (av.=5.7); width of shell, 5.9–8.2 (av.=6.9); height of aperture divided by width of shell .76–.90 (av.=.82).

RADULA OF LITHASIOPSIS

Except for the marginal teeth, the radula of *Lithasiopsis* is rather uniform in character throughout the genus and differs little from that

of other North American pleurocerids. Examination of the radula of the four known species revealed some variations that Pilsbry (1910) did not mention. In view of this omission, the radula of *Lithasiopsis* is described as a unit.

The central tooth (Fig. 1 *c, g*) is symmetrical and slightly variable in shape. In newly formed teeth, it has folds and humps on the upper surface which correspond with the cusps; in older ones, it is evenly rounded above. The number of cusps varies. The central cusp is enlarged, the lateral cusps are much smaller, and in all four species of *Lithasiopsis*, 3 to 4 on each side. In *L. darnelli* the lateral cusps are proportionally larger than they are in *L. crassa*.

The lateral tooth (Fig. 1 *d, h*) is the most constant in form of all the teeth; Pilsbry's (1910) description and illustration of it are misleading. Actually, the shaft is long and triangular and near the center is a large bulge that extends considerably beyond the inner margin. The outer and the dorsal margins are recurved to form a cup. In the center of the dorsal margin there is a large central cusp, which is bounded on the inner margin by two minor cusps that rapidly decrease in size toward the inner margin (not illustrated in my figures). Lateral to the central cusp are 2 to 3 additional minor cusps which likewise decrease in size toward the outer margin. *L. crassa* has three lateral cusps, which are elongate and sharply pointed; the other three species have only two.

The inner marginal tooth (Fig. 1 *e, i*) is shorter and stockier than the outer marginal. It is expanded near the base, then narrows progressively toward the distal end, which is even more expanded than is the basal end. The distal end bears 6 to 7 large cusps.

The outer marginal tooth (Fig. 1 *f, j*) is relatively long and slender. Its shaft is nearly equal in width throughout its length. At the distal end the tooth is rapidly expanded, becoming fan-shaped, and bears 9 to 18 cusps.

DISCUSSION

Several features of the shell distinguish *Lithasiopsis crassa* from the other three members of the genus. In this species the shell is thicker, heavier, and also has a thicker parietal callus. The straight, or concave, spire and the rounded base of the aperture, formed by the continuation of the lip with the columella, separate *L. crassa* from *L. hinkleyi* and *L. mexicana*. *L. crassa* is much more robust than *L. darnelli* and has a smooth shell, whereas that of the latter is multicarinate. *L. darnelli*

is readily recognized by the raised spiral cords on the shell; this character also occurs sporadically in *L. hinkleyi*, it is true, but in that species the cords are confined to the shoulder of the whorls and they are generally most prominent on the earlier ones. The long, slender, conic or concave shell also distinguishes *L. darnelli* from the other three; in the shape of the aperture, however, this species is very similar to that of *L. crassa*.

The nature of the operculum also aids in separating the species of *Lithasiopsis*. In *L. crassa* it is nearly circular and has a somewhat central nucleus; in *L. darnelli* it is more ovate, with the nucleus set closer to the margin; and in both *L. hinkleyi* and *L. mexicana* it is more elongate-ovate and the nuclei are set closer to the margin than in either of the preceding species.

On the basis of the characters of the shell and, to a lesser extent, of the operculum the species of *Lithasiopsis* can be arranged into two groups; one confined to the Río Pánuco system, the other to the Río Sabinas drainage of the Río Tamesí system. In the two species from the Pánuco system (*L. hinkleyi* and *L. mexicana*) the shape of the juvenile shell is soon lost and the whorls are added rather loosely; the direction of the suture is irregular and lumpy knobs and indentations occur along it; the aperture is variable in shape and extends high onto the preceding whorl so that the parietal wall tends to be convex; the lip is always thin, sharp, and discontinuous with the columella.

In the two species from the Río Sabinas drainage (*L. crassa* and *L. darnelli*) the manner of coiling of the whorls is more regular, the shape of the juvenile shell is retained throughout maturity, and the sculpture is rather regular. There is little variation in the shape of the aperture; the lip is relatively thick and continuous with the columella so that the base of the aperture is evenly rounded.

Characteristic differences occur in the marginal teeth which help to separate the four species of *Lithasiopsis*. The two species of the Sabinas drainage have more cusps on the outer marginals than do the two in the Pánuco system. *L. mexicana* (4 radulae examined) has 10 to 12 cusps on the outer marginals and *L. hinkleyi* (4) has 9 to 11 cusps. No distinction can be made between these two species on the basis of the inner marginals. Both have 7 cusps (5, according to Pilsbry, 1910: 47). *L. darnelli* (5 radulae) has a range of 11 to 14 cusps on the outer marginals, usually 11 to 12. *L. crassa* (5) possesses 13 to 17 cusps on the outer marginals, typically 15 to 16. The structure of the inner marginals further distinguishes *darnelli* and *crassa* from each other; *L. darnelli* has 6 cusps, occasionally 7, and *L. crassa* has 7 cusps.

The taxonomic significance of these radular differences is as yet uncertain. Goodrich (1936: 16-17) found little intergeneric variation in structure of radular teeth among North American pleurocerids. That which occurred in his material was restricted to the number of cusps on the central and marginal teeth. In a few species of *Goniobasis* (= *Oxytrema* [Morrison, 1954: 359-60]) he noted greater variation between different populations of a given species than between different species of the same genus.

The species of *Lithasiopsis* may be grouped biogeographically, that is, according to the separate drainage systems they occupy. The two which inhabit the Río Pánuco system, *L. hinkleyi* and *L. mexicana*, are closely related and share several characters. The two which live only in the Río Tamesí system, *L. crassa* and *L. darnelli*, are obviously related to each other but still have clear-cut differences.

Both *L. crassa* and *L. darnelli* have been taken together and occupy the same habitat. Above La Unión and at Nacimiento del Río Sabinas they were abundant in the main current of the stream, crawling on a limestone bottom. Only *L. crassa* was found at Storm's Ranch; it occurred in great numbers on boulders in riffles of the Río Sabinas.

ACKNOWLEDGEMENTS

For the use of material in the Museum of Zoology and for assistance I am grateful to Dr. Henry van der Schalie. I wish to thank William L. Brudon, artist, Museum of Zoology, who provided the photographs (Pl. I).

LITERATURE CITED

GOODRICH, CALVIN

1936 *Goniobasis* of the Coosa River, Alabama. Misc. Publ. Mus. Zool. Univ. Mich., 31: 1-60, Pl. 1, Figs. 1-27.

1942 The Pleuroceridae of the Atlantic Coastal Plain. Occ. Papers Mus. Zool. Univ. Mich., 456: 1-6.

MORRISON, J. P. E.

1954 The Relationships of the Old and New World Melanians. Proc. U. S. Nat. Mus., 103: 357-94, Pl. 11, Figs. 1-19.

PILSBRY, HENRY A.

1910 A New Mexican Genus of Pleuroceridae. Proc. Malac. Soc. London, 9: 47-50, Figs. 1-4.

1956 Inland Mollusca of Northern Mexico—III. Polygyridae and Potadominae. Proc. Acad. Nat. Sci. Phila., 108: 19-40, Figs. 1-4, Pls. 2-4.

PILSBRY, HENRY A., and JOSEPH BEQUAERT

1927 The Aquatic Mollusks of the Belgian Congo. Bull. Amer. Mus. Nat. Hist., 53: 69-602, Pls. 10-77.

Accepted for publication October 9, 1958

PLATE

PLATE I

Lithasiopsis crassa, new species

Figs. *a-e*. Paratypes.

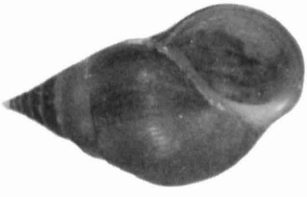
Fig. *f*. Holotype.

Lithasiopsis darnelli, new species

Figs. *g-k*. Paratypes.

Fig. *l*. Holotype.

PLATE I



f



e



d



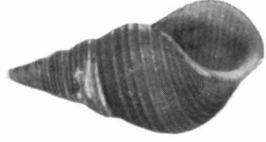
c



b



a



l



k



j



i



h



g

