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## NOTES ON CERTAIN MOLLUSCA OF SOUTHWESTERN ARKANSAS.

BY HENRY A. PILSBRY.

During February of this year, Mr. James H. Ferriss explored for land shells the western tier of counties in Arkansas, from about midway up the western boundary of the State to the southwestern corner. He also collected at Hardy, in the northeastern portion of the State, and in some northeastern counties of Texas. An account of the trip has been given by Mr. Ferriss,<sup>1</sup> with a catalogue of the species collected, accompanied by valuable notes on the localities and habits of the several forms. The following notes on a portion of the species may be regarded as supplemental to his article, which should be consulted for the full list.

*Helicina orbiculata tropica* (Jan.).

Denison, Tex.; Rocky Comfort and Lanesport, Ark.

*Polygyra leporina* (Gld.).

Horatio, Chapel Hill, Rocky Comfort and Hardy, Ark.; DeKalb and Mt. Pleasant, Tex. Nowhere in abundance.

This species has especial interest from its intermediate position between the sections *Stenotrema* and typical *Polygyra*. The structure of the basal lip clearly foreshadows what we find in *P. hirsuta uncifera* or *pitula*; while the form of the parietal lamella shows that the upper branch, which makes the parietal V-shaped in typical *Polygyra*, is merely a further development of the callous ridge which runs from the lamella to the outer end of the lip in such species as *P. stenotrema*.

*Polygyra dorfeuilliana* Lea.

Throughout the western counties of Arkansas, from Polk county south, and in the northeastern counties of Texas, this is an extremely abundant species, and the collection made by Mr. Ferriss contains hundreds of specimens. The very widely umbilicated form, with glossy base, var. *sampsoni*, did not occur, all the specimens being more or less ribbed beneath and varying within wide

<sup>1</sup> *Nautilus*, XIV, July, 1900.

limits in the size of the umbilicus. They are referable to what I called var. *percostata*, but not so strongly sculptured as the types, and in fact pretty well bridge the gap between "*percostata*" and typical *dorfeuilliana*.

Specimens were taken at the following localities:

Hardy, Sharp county, northeastern Arkansas. Typical *dorfeuilliana*, none of the several hundred specimens having the wide umbilicus of var. *sampsoni*. Diam.  $7\frac{1}{2}$ –9 mm.

Mena, Polk county, Ark. Small specimens, 7 down to 6 mm. diam.; and varying from the typical form with comma-shaped rimation to widely umbilicated, showing over a full whorl below; more or less ribbed there.

Hatton Gap, Polk county.  $6\frac{1}{2}$  to  $5\frac{2}{3}$  mm.; umbilicus moderate or ample.

Horatio, Chapel Hill, Gilham and Cove, Sevier county. Similar to the last.

Morris Ferry, Little River county, Ark. Similar to the preceding.

Ultima Thule, Sevier county. Diameter varying from 7 to  $8\frac{1}{2}$  mm.; umbilicus variable, as in the Mena specimens. In copious supply.

Rocky Comfort, Little River county, Ark. Similar to the preceding lot.

Denison, Tex. Similar to preceding.

It is rather peculiar that *Polygyra jacksoni* occurred during this trip only at Mena, Polk county, Ark. Possibly its southeastern limit does not reach the western counties of Arkansas below Polk.

***Polygyra oragini*** (Call).

Ultima Thule, Sevier county, in southwestern, and Mena, Polk county, in western Arkansas, typical specimens. Also taken at Hardy, Sharp county, in northeastern Arkansas.

***Polygyra inflecta*** (Say).

Mena, Rocky Cove and Hatton Gap, Polk county; Horatio, Sevier county; Morris Ferry, Little River county; all in southwestern Arkansas. Also at Little Rock in central and Hardy in northeastern Arkansas. Most of the specimens from Hatton Gap, Horatio and Hardy are small, often under 10 mm. diam. Those from Mena vary from 10 to 13 mm. This variation is merely individual.

***Polygyra binneyana* Pilsbry.**

The specimens collected fully confirm the specific characters of this fine snail. While rather variable, it does not approach any known species.

The largest examples sent were taken at Gilham, Sevier county, Ark., and measure alt. 14, diam. 26 mm.; the umbilicus is partially overhung by the lip. The smallest seen from this locality is 23 mm. in diameter. All have  $5\frac{1}{2}$  whorls. Entirely similar specimens come from Mena, in Polk county; but from the Chastat Mts., near Mena, the shells are smaller, alt. 10, diam.  $19\frac{1}{2}$ , and alt. 9, diam.  $17\frac{1}{2}$  mm.; the smaller ones have not quite 5 whorls. The size approaches that of *Polygyra kiowaensis arkansaensis*, but the aperture, lip and sculpture are as in the typical *binneyana*, and very unlike any form of *kiowaensis*.

***Polygyra albolabris alleni* (Wetherby).**

This Western subspecies extends from Iowa to southwestern Arkansas. About 1885 I "planted" about a quart of living specimens from Des Moines, Ia., on the island of Rock Island, in the Mississippi river, opposite Davenport, Ia., where the species did not exist before. It does not occur in the vicinity of Davenport, nor around Iowa City, Ia.

Ferriss' localities are Hardy, Sharp county; Mena, Polk county, and Little Rock, Ark. The specimens from Hardy are as small as var. *maritima*, 23-24 mm. diam., but in other characters are typical *alleni*. Those from Mena are large, up to 30 mm. diam.; and in some cases the umbilicus is partially open, in apparently mature shells.

A single dead shell from Little Rock is more solid than most *alleni*, with the basal lip broader, somewhat as in an undescribed form from northern Alabama; but I think it only an old *alleni*.

***Polygyra appressa* (Say).**

Finely developed specimens at Hardy, Sharp county, in north-eastern Arkansas. They measure 18 to 20 mm. diam. Most specimens have a small upper denticle on the lip (the mark of "var. *a*" of Say), but I regard this as a merely individual variation.

***Polygyra appressa perigrapta* Pils.**

Typical specimens were taken at Little Rock, Ark

*Polygyra thyroides* (Say).

The variations of this species in the Southwest are extremely perplexing. From the standpoint of the collector in the Ohio or the upper Mississippi valley, the shells are small; but they are as large as most Philadelphia specimens.

It is obvious from an inspection of Mr. Ferriss' shells that *bucculenta* Gld. is scarcely definable as a variety, although the globose, narrowly perforate *clausa*-like shells, such as one lot from Hardy, Ark., seem by themselves quite distinct. Many of the other shells, such as those from Denison and DeKalb, Tex., are practically intermediate; and I can find neither geographic nor conchological boundaries for *bucculenta* well enough defined to warrant its retention.

It remains to notice a small, rather depressed and decidedly reddish form, occurring at numerous localities in western Arkansas, and slightly unlike any *thyroides* I have seen from other localities. Specimens were sent from the following places:

Hardy, Sharp county, in northeastern Arkansas. Three forms collected: (a) *P. thyroides*, with flat lip, toothed parietal wall; alt.  $12\frac{1}{2}$ , diam. 20 mm., or somewhat smaller. (b) Similar but red, depressed and glossy, rather openly umbilicate; alt. 11, diam. 19; alt. 10, diam.  $16\frac{1}{2}$  mm. (c) Typical *bucculenta*, with globose shell, narrow umbilicus, light color and rather rounded lip; alt. 12, diam 17; alt.  $11\frac{1}{2}$ , diam. 16 mm. Rocky Comfort, Little River county. A form of *thyroides* with reduced or even imperforate umbilicus, the parietal tooth small or wanting; shape normal, and size as in lot "a" from Hardy. Also four specimens of the smaller, depressed, ruddy form mentioned above.

Cove, Polk county. Small and very narrowly umbilicated shells, diam. 15-17 mm., varying from yellowish-corneous to reddish. They are too depressed for *bucculenta*.

Ultima Thule, Sevier county. Similar to the shells from Cove; rich reddish.

Mena, Polk county. A single specimen of the small reddish form was taken; diam. barely 15 mm.

DeKalb, Bowie county, Tex. Specimens intermediate between *thyroides* and *bucculenta*.

Denison, Grayson county, Tex. Specimens less globose than typical *bucculenta*, but having the rounded (rather than flattened)

lip and narrow umbilicus of that form. They vary from 17 to 20 mm. diameter.

*Polygyra labrosa* (Bld.).

Little Rock, Ark.

*Polygyra stenotrema* ('Fér.' Pfr.).

Spur of Chastat Mts., near Mena, Ark.; Hardy, Ark. Size varying from 9 to 10 mm. diam.; form typical.

*Polygyra hirsuta uncifera* n. var.

Similar to *P. hirsuta* in general form; very densely hirsute throughout, the hairs short, silvery; *parietal lamella more sinuous, recurved in a hook at the outer end*; basal lip formed much as in var. *pilula*, the median sinus oblique, separating two irregular nodules, the edge of the lip projecting above the notch; outer lip bearing a conical tooth.

Alt.  $5\frac{1}{2}$ –6, diam. 8 mm. (types, Mena).

Alt. 4.7, diam. 7 mm. (Chastat Mts., near Mena).

Alt. 4, diam. 6 mm. (Chastat Mts., near Mena).

Mena and the adjacent Chastat Mts., Polk county, western Arkansas. Types in the collection of the Academy of Natural Sciences of Philadelphia and of James H. Ferriss.

An extraordinary form, in which the parietal lamella is hooked at the distal end, as in *P. maxillata*, and the basal lip is peculiarly modified. The "hook" is evidently homologous with the upper branch of the parietal fold in the typical *Polygyras*, and this form may fairly be regarded as to some extent a transition form, at least in this one character. The group of small *Polygyras* of the *plicata-dorfeuilliana* type have evident relationships with *Stenotrema*, having a similar internal "fulcrum," and some species being hairy.

In this connection it might be mentioned that the single West Coast species, *P. germana*, usually referred to the subgenus *Stenotrema*, is in my opinion much more closely allied to the *P. columbiana* group, and might better be grouped therewith. Binney, however, has pointed out its peculiarly intermediate character.

The varieties of *P. hirsuta* now known, *pilula*, *altispira* and *uncifera*, are remarkably distinct; no intergradation with the typical form has yet been observed in any of them. In fact, typical *hirsuta* is much closer to *P. stenotrema* than to the varieties mentioned.

The small series of var. *uncifera* collected by Ferriss show that it has a smaller form on high ground. This peculiarity has been noticed in other species, such as *P. hirsuta* and *P. monodon*, which may have a small and a large form on higher and lower ground respectively, in the same region.

***Polygyra monodon* (Rack.)**

This species was originally described from near Thunder Bay, Lake Huron. This is in Alpena county, Mich. The type, as well figured in the *Linnean Transactions*, was undoubtedly what became known later as "*Helix (Stenotrema) leai* Ward"—a small, widely umbilicated shell, which many collectors have considered to be a distinct species from the traditional *monodon*, and which is confined to the middle West, north of the Ohio river and west to Iowa.

This state of affairs renders a rearrangement of the nomenclature necessary. *H. leai* will be deleted from the roll of valid species, and its place usurped by *P. monodon*, which name will henceforth be used for the small, glossy, widely umbilicated shells formerly known as *leai*.

The larger, more hirsute form now universally known as *monodon* will become *P. monodon fraterna* (Say). This subspecies is far more widely distributed than the true *monodon*. It varies from as widely umbilicated as *monodon* to quite imperforate. The widely umbilicated forms are chiefly northern, especially in western New York.

In the Little Tennessee river valley the much-depressed, umbilicated subspecies *cineta* Lewis occurs.

In the Southwest, from western Arkansas and Louisiana to southern Texas, several ill-defined races occur. Var. *aliciae* is a small form, 8-9 mm. diam., with narrow umbilical chink, more or less globose contour and  $5\frac{1}{2}$  whorls. Var. *frierisoni* is larger, the size of well-developed northern *fraterna*, with 6 whorls and an umbilical chink. Both of these have the umbilical region deeply impressed. The propriety of separating them from var. *fraterna* or from one another is open to question, and requires more study; but it must be said that the series of some hundreds collected by Mr. Ferriss can be assorted without grave difficulty, and the two forms, *aliciae* and *frierisoni*, coexist in numerous localities, just as typical *monodon* ("*leai*") and *fraterna* do in the North.

However, I do not consider either of these varieties to have anything like the standing the several varieties of *P. hirsuta* have, and their discrimination may be an unnecessary refinement.

Then we have a third form of *monodon* which I shall call var. *imperforata*, collected by Mr. Ferriss at Mena, Cove and Rocky Comfort, Ark., apparently living with var. *friersoni*. It has  $5\frac{3}{4}$  whorls, an elevated spire, much less swollen, rather flattened base, which is *very little impressed or sunken in the centre*, is *imperforate*, and has scarcely a trace of the flange along the basal lip so prominent in fully adult *friersoni*. The pile is harsh to the touch, and the surface without lustre. Although I may have overdone the naming of *monodon* varieties, I do not see how to avoid distinguishing this race by name. It is by all odds the most distinct of the southwestern varieties, and apparently is confined to the rough, mountainous country. Types from Rocky Comfort, Ark.

The following forms of *monodon* were taken by Ferriss:

Mena, Polk county, Ark. Var. *imperforata* Pils. Rather globose, imperforate shells,  $8\frac{1}{2}$  to 10 mm. diam., remarkable for having the umbilical region very little impressed. Whorls  $5\frac{1}{2}$  to 6. Pile rather stiff.

Horatio, Sevier county, Ark. Var. *aliciae*. Two small specimens, diam. 8 mm., with narrow perforation and short, straight parietal tooth, as in typical *monodon*, though this may indicate immaturity;  $5\frac{1}{2}$  whorls. The spire is only moderately raised.

Ultima Thule, Sevier county, Ark. Small shells,  $8-8\frac{1}{2}$  mm. diam., with  $5\frac{1}{2}-5\frac{3}{4}$  whorls, the spire more or less conoid, umbilicus narrow, nearly closed, the umbilical region impressed. The specimens are referable to the form I called var. *aliciae*.

Cove, Polk county. Three of four specimens taken are the variety *imperforata*, with scarcely impressed umbilical region, mentioned from Mena. The other is an ordinary *friersoni* with partially open umbilicus.

Rocky Comfort, Little River county. Three forms occurred at this place: (a) Var. *imperforata*, the imperforate shells with elevated spire, scarcely impressed umbilical region and rather harsh pile mentioned above as occurring at Mena. (b) Small specimens such as those described above from Ultima Thule, referable to var. *aliciae*; 54 specimens. (c) Large specimens with deeply impressed umbilical region and 6 whorls, diam.  $9-10\frac{1}{2}$  mm., referable to var. *friersoni*.



DeKalb, Bowie county, northeast Texas. Var. *friersoni*, 5 specimens. Var. *aliciae*, 20 specimens.

Mt. Pleasant, Titus county, Tex. Var. *aliciae*, one specimen.

**Pupoides marginatus** (Say). (*Leucocheila fallax* Auct.).

Cerro Gordo, Sevier county, and Cove, Polk county, Ark.

**Bifidaria armifera** (Say).

DeKalb, Tex., and Hardy, Ark.

**Bifidaria contracta** Say.

Cove, Polk county, Ark.

**Vitrea simpsoni** (Pils.).

Hardy, Mena, Hatton's Gap and Morris Ferry, Ark. The first locality is further east than it has before been reported.

**Conulus chersinus trochulus** Reinh.

Cerro Gordo and Hatton's Gap, Ark.

**Gastrodonta demissa** (Binney).

Two southwestern races of this species have received names: var. *brittsi*, an imperforate form, and var. *lamellata*, which has an internal lamina, like *G. gularis*. It must freely be confessed that the abundant series collected by Mr. Ferriss show these forms to intergrade to a perplexing extent, and it is not easy to define them. Both toothed and toothless forms apparently come from the same log; although the fact remains that, except in this particular region, *demissa* is not toothed. Gastrodonta are, however, proverbially difficult to classify; they defy our neat, conventional arrangements of species and subspecies, and proclaim the eternal sway of variation. We name them as we can, and have trouble when the intermediate forms have not become extinct. At all events, the varieties of *demissa* I have erected should not be estimated too highly.

Mena, Polk county, Ark. 16 specimens of the *brittsi* type; the largest 9 mm. diam.; imperforate or barely perforate.

Thirty specimens of the *lamellata* type, the largest 8½ mm. diam.; narrowly perforate; lamella varying from well developed to a heavy callous lump.

Seventeen specimens with no lamella, 9½ mm. diam., 6 alt.; 7 whorls.

Hatton Gap, Polk county. 11 specimens of *lamellata*, the largest 8 mm. diam. Also 33 specimens of *demissa*, up to 9 mm. diam.; perforate.

Cove, Polk county. Both laminate and toothless specimens.

Ultima Thule, Sevier county. 17 specimens of the var. *brittsi*. These approach the typical *G. acerra* in general appearance, but are imperforate. Whorls 7; alt.  $8\frac{1}{2}$  to 9, diam.  $13\frac{1}{2}$  mm. The var. *lamellata* also occurred at Ultima Thule.

Horatio, Sevier county. Both the lamellate form and toothless *demissa* of all ages.

Chapel Hill, Sevier county. 26 var. *lamellata* and 18 *demissa*, the largest having 7 whorls, alt. 6, diam. 9.8 mm. All perforate.

Gilham, Sevier county. Both *lamellata* and *demissa*.

*Pyramidula alternata* (Say).

Mena, Polk county; Horatio, Sevier county; Rocky Comfort, Little River county, and Hardy, Sharp county, Ark. Specimens all rather strongly ribbed. The var. *rarinotata* occurred at Denison, Tex., further north than it has hitherto been noticed. The western Arkansas shells are the opposite of the middle Texas variety, being unusually dark and copiously maculated.

*Limnæa desidiosa* Say.

Hardy, Sharp county, Ark.

*Ancylus rivularis* Say.

*Ancylus haldemani* Bgt.

A few specimens of each from Hardy, Sharp county, Ark.

*Physa gyrina* Say.

Hardy, Sharp county, northeastern Arkansas.

*Thysa integra* Hald., var.

Hardy, Sharp county, Ark.; Mt. Pleasant, Titus county, Tex. The specimens are small, and of the variety with a dark-brown lip-rib.

*Pleurocera elevatum* (Say). Fig. 1, upper line.

Spring river, Hardy, Sharp county, northeastern Arkansas. Extremely variable, in color being yellow, banded, or almost black; and varying from nearly smooth to singly or doubly carinated above the sutures, the last whorl with a slight peripheral keel or two or three acute keels, as in the variety *lewisii* Lea. The specimens are unusually beautiful and wholly free from erosion.

***Pleurocera subulare* (Lea).**

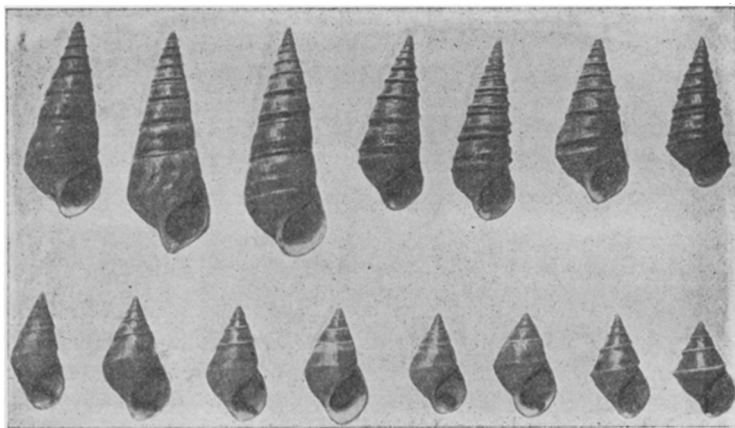
More slender and smoother than *elevatum*, with which it occurs at Hardy. Spring river flows into Black river, a tributary of the White river.

***Goniobasis plebeius* (Anth.).** Fig. 1, lower line.

Spring river, Hardy, Sharp county, northeastern Arkansas. The specimens show the usual variation from almost rounded through angulate to strongly keeled at the periphery; the unicolored examples of the carinated end of the series being indistinguishable from *G. cubicoides* (Anth.), which is a mere synonym. The carina, when present, may either project at the sutures or merely fill them, leaving an even surface. These variations of form occur in the young as well as in adult examples, some half-grown shells being almost rounded at the periphery.

Nearly all the specimens from Hardy are straw-colored, with a blackish band above the periphery and another in the middle of the basal slope; sometimes the upper band or both of them are absent; and in one or two shells the whole surface is dark save for the pale carina. The columella is usually dark-stained at the root, but occasionally white throughout. The apices are not eroded.

The series from Hardy is so interesting in its variations that I reproduce here photographs of the leading forms.



Upper line, *Pleurocera elevatum*. Lower line, *Goniobasis plebeius*.

The vast amount of variation among individuals living side by side, under absolutely identical external conditions, is an inexplicable characteristic of the *Pleurocerida*. This variation is generally in the line of retention by the shell of characters of extreme youth or immaturity (carination, costation or other sculptural feature) into mature life, or the early loss of sculpture, leaving a plain, rounded last whorl. This particular phase of variation stands on quite a different basis from that of *Io*, in which the ornate forms are farthest removed from the young stages, the spines of the later whorls being apparently a new and lately acquired character, which has not had time to become impressed upon the young.