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NOTES ON EASTERN AMERICAN ANCYLI.

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An attempt to determine the *Ancyli* of Michigan leads necessarily to a critical study of all the species described from the States east of the Mississippi. The following notes embody the results of the investigation, and are published in the hope of stimulating a more active interest in this most perplexing and little understood group.

The amount of material examined has been considerable. In addition to that in my own collection, which includes the Jas. Lewis, DeCamp and Lothrop collections, I have had the entire collections of Dr. V. Sterki, Dr. R. J. Kirkland, A. A. Hinkley, Jas. H. Ferriss and Geo. H. Clapp, and through the kindness of Dr. Pilsbry a suite of seventy-three trays from the collection of the Philadelphia Academy of Natural Sciences. I am also indebted to Dr. Pilsbry for examining the type of *Ancylus haldemani*, which corrected my previous conception of that species, and established the validity of the species described as *A. kirklandi*. I am also under obligations to Messrs. Frank C. Baker and Henry Hemphill for valuable material.

The lack of authentic examples of many of the rarer species has been a source of great embarrassment. But by process of elimination and careful study of the original descriptions, it is believed that in most cases the difficulty has been successfully overcome.

In studying the *Ancyli* well cleaned specimens are the prime requisite. They can then be easily separated in the two sections

characterized by the smooth or striate apex. In differentiating the species in these groups, the shape and contour of the shell are the main elements to be relied upon, the sculpture of the surface being an exceedingly variable factor, which, by itself, cannot in most cases be considered a specific character. As in all fresh-water forms, a very large degree of variation must be allowed for. But in spite of this, it is believed that nearly all the described species should be allowed to stand, and, although in certain instances it is not always possible to determine the exact specific relations of particular specimens, yet, as a rule, the lines between the different forms can be drawn with a reasonably satisfactory degree of certainty.

Bourguignat, in his "Notice sur le genre Ancylus," in 1853 (J. de C. IV., p. 63), divided the genus into two subgenera: *Ancylastrum*, with the apex inclined to the right, and *Velletia*, with the apex inclined to the left.

Clessin (1882), in the Conchlien Cabinet, considered these two groups to have only a sectional value. He also restricted *Ancylastrum* to the Eurasian species which group around *A. fluviatilis;* and with the exception of *A. fragilis* and *oregonensis*, which he referred to *Velletia*, and the large western *A. newberryi* and *patelloides*, which he placed in a new genus, *Lanx*, included all the North American species in a separate group, *Haldemania*, which he characterized as follows: "Shell conical, apex not bent backwards and only slightly removed from the centre-line of the shell, aperture round or oval. Type *A. obscurus* Hald."

Unfortunately *Haldemania* is preoccupied, having been used by Tryon in 1862 (Proc. P. A. N. S., 1862, p. 95) for the group of *Viviparidæ* now known as *Lioplax*, so that his very appropriate name cannot be retained.

As has already been shown (NAUTILUS, XVI., p. 85), the North American species included in Clessin's *Haldemania* are divided into two natural groups, characterized by the presence or absence of apical sculpture. These groups are, at least, of sectional value, and must be recognized.

Owing to the uncertainty which still prevails as to just what Haldeman's *obscurus* really is, and the consequent inability to say with accuracy to which group that species belongs, it does not appear desirable to retain *obscurus* as the type of either section. Whenever an examination of Haldeman's type shall definitely determine where

the species belongs, *Haldemania* can be written as a synonym of that group. Until this is done, the matter must rest in abeyance.

Leaving the position of the western species, which are outside the scope of this paper, for future consideration, I propose to divide the eastern American species of *Ancylus* into two sections, characterized as follows :

1st. *Lævapex*, sec. nov.

Shell usually depressed, apex obtuse or sub-acute, smooth. Type : *A. fuscus* Ads.

2. *Ferrissia*, sec. nov.

Shell usually elevated, apex acute, radially striate. Type : *A. rivularis* Say.

Section Lævapex.

This section includes all the larger species of *Ancylus*, which are characteristic of the lakes and slow-flowing streams of the northern States, the Mississippi Valley and Florida. They are usually found on the reeds, dead leaves and submerged timber in such localities, and are rarely, if at all, found on stones, dead shells, etc., in rapidly flowing streams, where they are replaced by the species of the section *Ferrissia*. With the exception of *A. diaphanus* and, possibly, *A. obscurus*, the species of this group seem to be wholly lacking in the mountain streams of the Appalachian region between the Ohio river and Florida.

I. Ancylus fuscus Adams (1840). Pl. I., figs. 1–9.

Adams' description calls for a large depressed, elliptical shell, moderately curved at the sides, with a moderately prominent, obtuse apex, slightly behind and to the right of the middle; $7\frac{3}{4}$ mm. long, $4\frac{1}{2}$ wide and $1\frac{1}{4}$ high. No mention is made of the outline of the slopes. Haldeman states that all these are rectilinear, while Gould describes the shell as regularly convex. None of these authors refer to the surface sculpture. But subsequent writers have assumed that the surface was smooth.

Specimens answering these requirements are common, and show that the species has an extensive range from Massachusetts west, at least, to the Mississippi Valley and south to New Orleans. I have not seen any specimens from Kentucky, Tennessee, the South Atlantic or the Gulf States east of Louisiana.

The very limited amount of material examined from Massachu-

setts, none of which is typical in size, does not show any considerable variation in the contours of the shell. But in the west, where it is an abundant species, there is considerable variation in this respect.

In 1896 (NAUTILUS, IX., p. 139), Dr. Pilsbry described a shell similar in shape, though narrower and higher, with the surface ornamented with " very fine, somewhat irregular, radial striæ, more distinct toward the periphery " as *A. eugraptus.*

The large amount of material examined has forced me to the conclusion that *eugraptus* is only a ribbed form of *fuscus.* In almost every considerable number of specimens, all the variations can be found from those with a smooth surface, through those with the surface more or less radially rippled, to those with the fine ribs of typical *eugraptus.* This variation in the sculpture is not confined to the western specimens. In two sets of *A. fuscus* from Winchester, Mass., in different collections, which, so far as shape and contour is concerned, are entirely typical, the surface varies from the typical smooth *fuscus* to examples with as well developed ribs as the majority of the western *eugraptus.* Nor are the western specimens of *eugraptus* uniformly higher and narrower than the typical eastern examples of *fuscus.* While, perhaps, they average higher than the eastern specimens, they vary insensibly from the depressed form of typical *fuscus* to elevated specimens higher than the typical *eugraptus*, so that I have not seen my way clear to separate the eastern from the western form on any substantial difference in shape.

Assuming the Massachusetts form to be typical *fuscus*, it may be described as a depressed, oval or slightly obovate shell, with the left side more arcuate than the right; anterior and right slopes straight, posterior and left slopes slightly convex ; apex very obtuse, not rising above the general outline of the shell, smooth, slightly behind and to the right of the middle. Translucent horn-color, shining. Surface with faint growth lines, otherwise smooth or with irregular and discontinuous transverse ripples which tend to form irregular radial riblets.

From central New York to the west there appears to be a much greater degree of variation. The shells tend to become narrower and more elevated, and with a greater convexity to the left slope. But throughout the peculiar, rounded, obtuse apex remains as a valuable specific characteristic in differentiating it from *A. kirklandi, diaphanus* and *obscurus.*

One peculiar form can, I think, be traced directly to the habitat of the animal. In nearly every lot of western shells are to be found a number of specimens, very narrow and elongated, with both of the lateral sides decidedly convex and with the sides nearly parallel. When placed on a flat surface the shell rests on the middle of the side and the ends are elevated and arched, giving a trough-shaped appearance to the shell, when placed apex downward. Now, *fuscus* is a dweller upon reeds and other aquatic vegetation. When it lives on the flat side of a reed or leaf it grows normal in shape and the peritreme touches the surface all the way around. But when it lives on a round reed such as *Scirpus lacustris*, which is narrower than the full grown shell, it adapts itself to its position and grows to fit the reed, the ends following the convex surface of its support and the sides lapping down around the reed itself.

The dimensions of the specimens figured are as follows:

Fig. 1. Length 5.5, width 4, alt. 1.25 mm.

Fig. 4. Length 7.25 width 4.5, alt. 1.75 mm.

Fig. 37. Length 8.25, width 4.5, alt. 3 mm.

Variable within the limits above specified, nevertheless, *A. fuscus* is a consistent and well defined species, which need not be confused with any of its allies. It differs from *A. kirklandi* by its more depressed and more regularly oval shape and more nearly central, more obtuse, less prominent and less eccentric apex; from *A. diaphanus* by its elongated, oval shape and more obtuse apex and from *A. obscurus* by its more depressed, less acute and more central apex and straight posterior outline.

Var. *eugraptus* Pilsbry (1896), Pl. I., figs. 10–15.

Typically slightly narrower and considerably higher than the typical *fuscus*, but subject to great variation in this respect. Figures 10–12 from New Orleans and 13–15 from Reeds L., Kent Co., Mich., represent the extremes. Surface with "very fine, somewhat irregular radial striæ, more distinct toward the periphery."

Type: length 6, width 4, alt. 1.8 mm.

Fig. 10. Length 7, width 4.75, alt. 1.8 mm.

Fig. 13. Length 7.25, width 4.25, alt. 2.25 mm.

II. Ancylus diaphanus Hald. (1841). Pl. II., figs. 13–18.

This is a well marked species and, in all the localities where the typical form is found, seems to be very constant in its characters and

subject to less variations than many of the other species. For this reason I hesitate to refer to it the more elliptical forms from the western States, which are usually referred to it, but which seem to me rather referable to *A. kirklandi*, and until a larger amount of material shall have demonstrated the identity of these shells with the typical form, prefer to restrict the species to the author's type, "distinguished by its circular and flattened form and central inconspicuous apex." As thus limited, it is found in the Delaware river at Easton, Pa., the Ohio river at Pittsburg and Edgeworth, Pa., the Illinois river, the Tennessee river at Knoxville, Tenn., and the Holston river, Tenn. The specimens from the last locality are those quoted without identification by Lewis in his paper "On the Shells of the Holston River" (A. J. of C., VI., p. 222), and later referred to "*haldemani?*" (Proc. P. A. N. S., 1872, p. 110). Haldeman's description, though brief, is quite to the point, and leaves little to be added. It may be said, however, that the apex is smooth, the surface smooth or delicately shagreened with fine transverse ripples, which in none of the specimens examined become sufficiently raised or connected to be called ribs; the anterior and left slopes are slightly convex, the posterior and right nearly straight; the left side is usually more arcuate than the right and often decidedly so, the general shape, however, even then remaining subcircular. There is some little variation in height as shown by the figures, and, in the more elevated examples, the shell is less circular, the anterior and left slopes become more decidedly convex and the apex rather less central, being, as it were, tipped backward by the more rapid growth and greater convexity of the anterior portion of the shell. The largest examples seen are from the Ohio river at Edgeworth, Pa., collected by Mr. George H. Clapp. Those from the Holston and Tennessee rivers are decidedly smaller, the example measured from the Holston being exactly typical in size.

Fig. 13. Length 7, width 5.5, alt. 2 mm.

Fig. 16. Length 7.5, width 5.5, alt. 2.5 mm.

Holston River. Length 5.5, width 4.5, alt. 2 mm.

Tennessee River. Length 5, width 4, alt. 2.

Explanation of Plate I.

All the figures are drawn on the same scale. The outline figures are transverse sections through the apex or point of greatest altitude.

Figs. 1–3. *A. fuscus* Ads., Winchester, Mass.
Figs. 4–6. *A. fuscus* Ads., Grand River, Kent Co., Mich.
Figs. 7–9. *A. fuscus* Ads., Black Lake, Ottawa Co., Mich.
Figs. 10–12. *A. fuscus eugraptus* Pils., New Orleans, La.
Figs. 13–15. *A. fuscus eugraptus* Pils., Reeds L., Kent Co., Mich.
Figs. 16–18. *A. obscurus* Hald., Volusia Co., Fla.
Figs. 19–21. *A. excentricus* Mor., Barton Creek, Travis Co., Tex.

(To be Continued.)

TWO NEW SPECIES OF EOCENE FOSSILS FROM THE LIGNITIC OF ALABAMA.

BY T. H. ALDRICH.

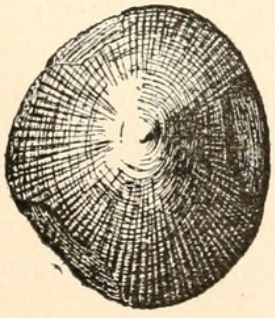
UMBRACULUM (EOSINICA) ELEVATUM n. sp. Fig. 1.

Shell small, outline ovate, depressed conic, substance rather thin, apex partially immersed, pointed backwards to the left. Surface of shell with numerous radiating folds, strongest at the margin, gradually becoming weaker and dying out some little distance from the apex, a few concentric striæ or growth lines showing one-fourth the distance down from the apex; interior smooth, polished, rather pearly, the apical point marked by a rounded pearly protuberance; interior margin fluted. Longest diameter, 18 mm., width 12 mm., height 5 mm.

Locality. Wood's Bluff, Ala., lignitic stage.

The type is in the State Museum. This shell resembles a limpet,

FIG. 1.



UMBRACULUM ELEVATUM.

FIG. 2.

GASTROCHÆNA STRIATULA.

and has some of the characters of *Tylodina* Raf., but I consider it an *Umbraculum* somewhat like *U. plicatulum* Martens from Cuba. The interior of our species is very different. It should be placed in a