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THE PLEURO CERID GENUS *EURYCAELON*

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Eurycaelon Lea

Eurycaelon Lea, Proc. Acad. Nat. Sci., Phila., XVI, 1864, p. 3; Journ. Acad. Nat. Sci., Phila., VI, 1866, p. 150; Obs. Gen. Unio, XI, 1867, p. 106; Tryon, Smithson. Misc. Coll., No. 253, 1873, pp. xxx, 341; Walker, Misc. Pub. Mus. Zool., Univ. Mich., 1918, pp. 34, 36, 149; Goodrich, Nautilus, XLIII, 1929, p. 12.

THE two members of this genus have the general appearance of large specimens of *Anculosa*, and possibly they are derived from the same ancestral stock. They are distinguished in shell characters by large apertures, nodulous shoulders, and a flexion of the columella though these two last features are sometimes modified or suppressed. The radulae also have distinctive phases, later to be described.

In the 1864 description of *Goniobasis umbonata*, the two types of which are in fact distorted *Anculosae*, Lea wrote: "This is the fourth species of a natural group which I have described and which have a large ear-shaped aperture,—viz., *Melania* (*Goniobasis*) *basalis*, *midas*, *gibberosa* and now *umbonata*. If they be not entitled to a generic place, they may at least be considered a subgenus, for which I propose the name of *Eurycaelon*, from *Eurus amplus* and *Κοιλον*

cavitas,—the aperture being larger than in the Melanidae generally. All the species of *Eurycaelon* have a callus on the columella above, but not below, as in *Lithasia*, and the base is more or less angular, which is not the case with *Anculosa*. Those which we have considered varieties of *Anculosa praerosa* Say, which have an angular base, properly belong, I think, to *Eurycaelon* as well also *Anthonyi* Redfield, *turbinata* and *tintinnabulum* (nobis), and some others. When the soft parts of the four species mentioned first shall be examined, they will, I think, be found to differ from *Goniobasis*, *Trypanostoma*, and *Lithasia*, to which genera they seem nearest allied. The operculum of the only one I have seen, *gibberosa*,—is the same as *Goniobasis* and the Melanidae generally.”

With unimportant changes, this description was reprinted in 1866 and 1867 under the heading of *Eurycaelon umbonatum*.

Tryon condenses the quotation from Lea and adds to the description, “Shell generally obovate, longitudinally humped or angled; columella truncate below. The genus may be placed between the *Lithasiae* and *Goniobases*.” He throws out *tintinnabulum* as an inadvertent mistake on the part of Dr. Lea. In his later treatment of *Eurycaelon*, he places the genus between *Goniobasis* and *Schizostoma*. Eleven species are recognized, namely, *E. midas* Lea, *leai* Tryon, *gratiosa* Lea, *lachryma* Anthony, *lepida* Lea, *proteus* Lea, *gibberosa* Lea, *nubila* Lea, *umbonatum* Lea, *anthonyi* Budd, Redfield, and *crassa* Haldeman. Before his monograph went to press, Tryon introduced the footnote: “I am now inclined to consider these shells to be distorted *Goniobases* and *Anculosae*, and in none of them can I find generic characters. They might with advantage to science be relegated to those genera. April, 1873.”

Walker (1918, p. 149) republishes the Pilsbry and Rhoads rearrangement of the family Pleuroceridae in which *Eurycaelon* is ignored and suggests that “the typical group, of which *anthonyi* and *crassa* are leading terms form a very

distinct group, which seems entitled to recognition." Earlier in the same work (p. 36), Dr. Walker designates *Anculosa anthonyi* as the type of *Eurycaelon*.

In the colonies that show the generic characteristics most distinctly, adult and young individuals alike have a flexion of the columella. Perhaps the term "columellar notch" would be more descriptive. The columella, curving over a deepset umbilicus, twists upon itself until its edge stands nearly parallel with the outer lip and not, as is usual in the Pleuroceridae, at right angles to it. The notch, sometimes not striking to the eye, is always quite apparent when the shell is looked at from the base.

In a paper on the *Pleurocerid Fauna of the Falls of the Ohio*, (1929), I compared the characters of *Anculosa* and *Eurycaelon* and this might, with one slight change, be reprinted here to advantage.

	<i>Anculosa</i>	<i>Eurycaelon</i>
Columella	spreads broadly over umbilicus	much narrower than in <i>A. praerosa</i>
Shoulder	usually smooth	usually lumpy
Outer lip	sinuous in most species	sinuous or straight
Basal angle of columella	raised to plane of shell	usually with a depression beneath

Eurycaelon is confined to the Tennessee River system, the lower parts of the French Broad, Clinch, and Powell rivers being the uppermost limits of the range and Muscle Shoals the farthest down-river locality known. Tryon reports that specimens of *E. anthonyi* from West Georgia are in the Gould collection. I can only venture the opinion that Gould's correspondent took his shells in the Tennessee River near where it almost touches the Georgia boundary line and thought that in fact he was in Georgia. As a guess, this does not rank high, but the point is that *Eurycaelon*—as it is known and is here restricted—is to be found only within the borders of Tennessee and Alabama.

Professor Haldeman spoke of *E. crassa* being found in quiet water. Commenting upon this, Tryon said, "This is certainly an unexpected habit in a species so ponderous and it may be doubted whether the species habitually seeks such stations." I have collected *E. anthonyi* in three streams. The water in each place was slow-moving at the season, which was late summer, but probably each one of these streams is subject to swift, heavy, and eroding floods every year.

Eurycaelon anthonyi (Budd, Redfield)

Plate 1, figs. 1-4, 7

Anculosa anthonyi Budd, Redfield, Ann. Lye. Nat. Hist. N. Y., VI, 1854, p. 130, pl. 1, fig. 6.

Anculotus anthonyi Budd, Redfield, Reeve, Monog. Anc., 1860, pl. 2, fig. 17.

Leptoxis anthonyi Budd, Redfield, Binney, Check List Shells of N. A., 1860, No. 341; Brot, Cat. Systém. la Famille des Melaniéns, 1862, p. 23.

Eurycaelon anthonyi Budd, Redfield, Lea, Journ. Acad. Nat. Sci. Phila., VI, 1866, p. 150; Obs. Gen. Unio, XI, 1867, p. 106; Tryon, Smithson. Misc. Coll., No. 253, 1873, p. 347; Lewis, Geol. Survey of Ala., 1876, p. 80; Walker, Misc. Pub. Mus. Zool., Univ. Mich., 1918, pp. 36, 149.

Anculosa turbinata Lea, Proc. Acad. Nat. Sci., Phila., XIII, 1861, p. 54; Journ. Acad. Nat. Sci., Phila., V, 1862, p. 254, pl. 35, fig. 60; Obs. Gen. Unio, IX, 1863, p. 76, pl. 36, fig. 60.

Eurycaelon turbinata Lea, Journ. Acad. Nat. Sci., Phila., VI, 1866, p. 150; Obs. Gen. Unio, XI, 1867, p. 106; Tryon, Smithson. Misc. Coll., No. 253, 1873, p. 349.

Eurycaelon crassa Haldeman, Hinkley, Nautilus, XX, 1906, p. 42.

Melania cristata Anthony, Ann. Nat. Hist. N. Y., VI, 1854, p. 108, pl. 6, fig. 8; Binney, Check List, 1860, No. 77; Reeve, Monog. Melania, 1861, sp. 413; Brot, Cat. Systém. la Famille des Melaniéns, 1862, p. 32.

Goniobasis cristata Anthony, Tryon, Smithson. Misc. Coll., No. 253, 1873, p. 217, fig. 434, not figs. 431, 432, and 433.

This, the commoner of the two species of *Eurycaelon*, is also the more robust. The heaviest and the largest specimens that I have seen were taken from the Tennessee River at Bridgeport, Alabama. The locality in which the shells run smallest in size is in the Tennessee River at Knoxville. Creek forms near Bridgeport are nearly as large as those taken in the river.

The species usually is marked by the presence of low, irregular tubercles at the top of the body whorl. These are particularly prominent in the case of specimens from Knoxville and the Little Tennessee River. In the Little Sequatchie River there is a race that is nearly smooth, the shells suggesting the heavy and broad *Anculosae*. It might seem as if nodes were formed as the animal extended the shell, a depression occurring where a new deposit is made beyond the callus at the top of the columella and bulging again over a fresh secretion on the columella. Specimens were found, however, wherein the nodes were seen to be hollow and which would, in the natural order of events doubtless, have been filled with the shell material. In the Sequatchie River, Little Sequatchie River, and Battle Creek forms, the shoulders are sloping and are seldom nodulous.

Of the 182 specimens examined, 92 had color bands and 60 were without them. The most common formula was four nearly equidistant bands, the next commonest one of three bands, one above the periphery and two below it. Twelve variations in banding were observed, seven of them being modifications of the four-band formula. The greatest variation in this regard was among shells taken in Battle Creek, Marion County, Tennessee. In the Little Sequatchie River lot, only two specimens out of fifteen had bands and these were nearly obsolete. The banding of the Knoxville and Bridgeport *Eurycaelon* was about the same.

Lea erected a species, *turbinata*, upon the strength of three specimens of *E. anthonyi* which were top-shaped. Such shells occur probably in every colony. I find them in material from the French Broad, the Tennessee, the Sequatchie and Little Sequatchie rivers, and also Battle Creek. This form is mostly among the young, which also are keeled at the periphery. Lea gave North Alabama and Tuscaloosa as localities for *E. turbinata*. The mistake about Tuscaloosa seems to come from the fact that shells were sent to Lea by Dr. Budd of that city. Lea made the same kind of error in other instances.

Tryon's Figure 662, representing *Leptoxis pisum* Haldeman, looks like a young *E. anthonyi*, but Tryon made *pisum* a synonym of *E. crassa*. It is to be hoped that Tryon is right, for if he is not and *pisum* is the same as *E. anthonyi* then the latter name, a familiar one, will have to be discarded as the victim of the law of priority. There are two uncertainties about *L. pisum*. Haldeman did not mention tubercles in describing the species and these are especially a characteristic of *E. crassa*. Yet he did not do so in writing of *crassa* itself. The other uncertainty develops from Tryon's custom of illustrating not types or even, in cases, quite typical specimens, but such as he considered better specimens. So the Figure 662 aforementioned may be of a shell unlike Haldeman's own.

A very young *E. anthonyi*, only 5 mm. in altitude, has two very stout keels at the periphery, the shell in growing following the depression between the keels. The upper whorls are carinate. The embryo shell is smooth, consisting of about one and one-half whorls. The base is nearly flat, with a raised line upon it close to the axis. The aperture is nearly round and has two bands of color within it. No pearly substance has yet been deposited on the columella, which is raised to a sharp edge.

A young shell of *E. anthonyi* was sent to Mr. W. J. Clench of the Museum of Comparative Zoology for comparison with the type of *Melania cristata* in the Anthony collection. He found the forms to be identical. As juvenile *Eurycaelon* was not known until Mr. A. A. Hinkley collected it in quantity in 1894, forty years after the description of *cristata*, there is sound excuse for Anthony's error with his one example.

I have been able to find only one operculum of *E. anthonyi* which is not black and worn. This belonged to a very young shell. The spiral lines are broad, deeply sunk, and located on the base, not upon or close to the left margin as is usual with the Pleuroceridae. I have no way of telling now whether this is normal.

Hinkley speaks of finding *E. crassa* Haldeman in the Tennessee River at Florence, Alabama, one shell only being taken.

He continues, "When at this place in 1894 this form was found in all sizes, with three wide bands and the carina of the young shells remarkably developed. Pilsbry says this is *E. anthonyi*." I have seen in the Walker collection some of the 1894 specimens. They are *E. anthonyi*. My notion is that Hinkley was unfamiliar with the true *E. crassa*, long a rarity, and used the name that he thought had alone the right to recognition.

The known localities for *E. anthonyi* are: French Broad River, near its mouth; Tennessee River, Knoxville, and Loudon, Tennessee; Bridgeport and Florence, Alabama; Sequatchie River, Jasper, Marion County, Tennessee; Little Sequatchie River, Sequatchie, Marion County, Tennessee; Battle Creek, Ketchall, Marion County, Tennessee; Little Tennessee River, probably near its junction with the main Tennessee River.

Measurements:

19½ mm.	x 14 mm.	Knoxville
17½	x 14½	"
22½	x 16¼	Loudon
21½	x 16½	"
27½	x 20	Bridgeport
25	x 19	"

Eurycaelon crassa (Haldeman)

Plate 1, figs. 5, 6

Anculosa crassa Haldeman, Monog. Limniades, No. 4, 1841, p. 3 of cover.

Anculotus crassus Haldeman, Jay, Cat., 4th edit., 1852, p. 276; Reeve, Monog. Anc., 1860, pl. 2, fig. 14.

Leptoxis crassa Haldeman, Monog. Leptoxis, Chenu's Ill. Conchyl., 1843-53, p. 2, pl. 1, fig. 19-23; H. & A. Adams, Genera, I, 1854, p. 307; Binney, Check List, 1860, No. 350; Brot, Cat. Systém. la Famille des Melaniéns, 1862, p. 24.

Eurycaelon crassa (Haldeman), Tryon, Smithson. Misc. Coll., No. 253, 1873, p. 348; Lewis, Geol. Survey of Ala., 1876, p. 80; Walker, Misc. Pub. Mus. Zool., Univ. Mich., 1918, p. 149.

Leptoxis pisum Haldeman, Monog. Leptoxis, Chenu's Ill. Conchyl., 1843-53, p. 4, pl. 3, fig. 82; H. & A. Adams, Genera, 1854, p. 307;

Binney, Check List, 1860, p. 378; Brot, Cat. Systém. la Famille des Melaniéns, 1862, p. 25.

This species is very much shouldered, the tubercles are high and prominent. In instances the depressions between the nodes are below the surface of the whorl. The spire is higher than in *anthonyi*, the color of the shell is a lighter brown and the columella is not so heavy. In all the specimens that I have seen the sinus has an outward flare. Young are as in *E. anthonyi*. The largest shell measured is 20 mm. altitude by 14 mm. diameter, comparing with the largest measured *E. anthonyi*, 27½ mm. by 20 mm.

The type locality is Clinch River, Tennessee, with an interrogation mark by the author. This locality, after more than eighty years, has been found to be correct. The species was collected in that river by Messrs. Clench and Remington during the University of Michigan expedition of 1924 and also by them in the Powell River, near where it joins the Clinch. A single shell of the Aldrich collection, now in the Alabama Museum of Natural History, can quite definitely be put down as *E. crassa*. It is labelled as from the Tennessee River in Alabama. It seems likely that the locality given is an error since the two species of *Eurycaelon* are apparently clearly set apart geographically and have not been taken together. The places where this shell has been collected are: Powell River, Agee, Tennessee; Clinch River, Moore's Ferry, and Edgemoor, Anderson County; Arbor Run and mouth of Emory River, Roane County, all in Tennessee. Moore's Ferry is about twenty miles below the mouth of Powell River at Agee. Probably the species occurs in the intervening reaches and at least for a short distance in the Clinch above Agee. As known, however, *E. crassa* inhabits less than one hundred miles of river.

RADULA

Plate 1, Figs. 8-11

The radulae of *Eurycaelon* are large for the Pleuroceridae, one that I have measured being 14 mm. long. The central

tooth is oblong, small, and seemingly degenerate. The fold has a central triangular cusp which, in instances, extends below the lower margin of the tooth. Side cusps are frequently absent, but they sometimes number three to four to the pair. The lateral tooth in its natural position in the ribbon is triangular in shape and with a broad, cleaver-like fold which has one to three dentations at the "elbow." Figure 11 shows a lateral tooth of *E. anthonyi* with the reflected portion folded back and flattened. The marginals, inner and outer, are alike in shape and in number of cusps. These cusps number five or six.

The apparently degenerate centrals resemble those of *Anculosa* as do also the cleaver-like laterals. But there is a sharp distinction between the two genera in the matter of marginal teeth. In the case of *Anculosa*, and all other genera of Pleuroceridae except *Eurycaelon*, the inner marginal teeth have a few broad cusps, the outer marginals many small cusps of equal size and shape. The description here given of the radula fits both that of *E. anthonyi* and *crassa* except that in the one ribbon of *crassa* that I have been enabled to examine the fold of the laterals has no dentations. Considering how much the radulae vary in this family it would be rash to say that this is a constant character.

The radular formula of average specimens of *Eurycaelon* may thus be written: (5-6) + (5-6) + (0-3) + [(0-4) + 1 + (0-4)] + (0-3) + (5-6) + (5-6).

PLATE 1

Eurycaelon

(All figures of shells are natural size)

Fig. 1. *E. anthonyi* (Budd, Redfield). Tennessee River, Bridgeport, Jackson Co., Alabama. (Cat. No. 37855).

Fig. 2. *E. anthonyi* (Budd, Redfield). Battle Creek, Ketchall, Marion Co., Tennessee. (Cat. No. 37859).

Fig. 3. *E. anthonyi* (Budd, Redfield). Sequatchie River, Jasper, Marion Co., Tennessee. (Cat. No. 37857).

Fig. 4. *E. anthonyi* (Budd, Redfield). Juvenile. Tennessee River, Bridgeport, Jackson Co., Alabama. (Cat. No. 19799).

Figs. 5 and 6. *E. crassa* (Haldeman). Front and side views. Powell River, Agee, Campbell Co., Tennessee.

Fig. 7. *E. anthonyi* (Budd, Redfield). Side view. Tennessee River, Knoxville, Knox Co., Tennessee. (Cat. No. 37851).

Fig. 8. *E. anthonyi* (Budd, Redfield). Central tooth.

Fig. 9. *E. anthonyi* (Budd, Redfield). Marginal tooth. Outer and inner marginals alike in this genus.

Figs. 10 and 11. *E. anthonyi* (Budd, Redfield). Lateral tooth. In fig. 11, the tooth is folded back and flattened.

Figures of the shells were drawn by Dr. Theodore Case, those of the radulae by Mr. Henry Vander Schalie.

EURYCAELON

PLATE I



1



2



3



5



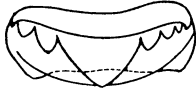
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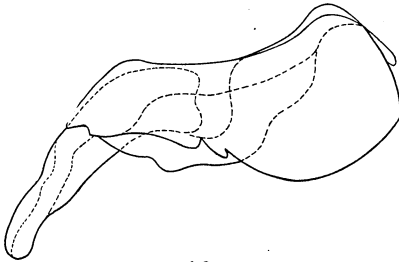
7



8



9



10



11

