

varying from pale strawcolor to blackish brown ; anterior slope longer than the posterior, rather conspicuously compressed and attenuate, with no circumscribed lunule ; posterior slope flattened, externally bordered by a sharp angle surmounted, as in *M. alata*, by an elevated thin keel ; the inner margins pout a little near the beaks, the middle of the flattened space has in each valve a single conspicuous rib ; the cordate space between these ribs are somewhat concave ; the spaces between the ribs and the keels are flat and from the distal ends of the ribs to these of the keels the valve margin show a wide lanceolate gap ; there is also a narrow anterior basal gap ; the hinge is normal ; the surface of the valve smooth except for lines of growth ; the pallial sinus short and angular ; the basal margin prominently arcuate and the middle of the shell inflated. Length 78, height 66, diameter 34 mm.

There is a constriction in front of the keel which varies in strength in different specimens. The shell is divided from *M. exoleta* by the presence of the keel, the latter possessing only an angle ; it differs from *M. alata* in its exaggerated arcuation, much higher beaks and anterior attenuation.

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#### STUDIES IN NAJADES.

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BY A. E. ORTMANN.

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(Continued from page 143, Vol. 28.)

EURYNIA (MICROMYA) PERPURPUREA (Lea) (See *Lampsilis perp.* Simpson, 1900, p. 558).

I collected, on Sept. 20, 1912, a number of males in Clinch River, at Richland, Tazewell Co., Va., and on Sept. 21, 1912, a single gravid female, with glochidia, at Raven, Tazewell Co., Va.

Anal separated from the supraanal by a rather short mantle connection, which is shorter than the anal. Inner edge of anal with very distinct crenulations. Branchial with papillae. In front of the branchial, the female has about 10 subcylindrica or subconical papillae of medium size, which are rather distant from each other, and of slightly variable size, and do not extend



quite to the middle of the mantle margin. In the male, these papillæ are also indicated, but very small and indistinct.

Palpi connected on the posterior margin at base only. Inner lamina of inner gills entirely connected with abdominal sac. Gills typically Lampsiline: the marsupium of the female is kidney-shaped, and located in the posterior half of the outer gill with a small non-marsupial part at the posterior end of the gill. The number of ovisacs in my specimen is 12.

Glochidia nearly subspatulate, considerably higher than long. Length: 0.21, Height: 0.27 mm.

Color of soft parts whitish. Mantle-margin blackish in the region of the anal and branchial, the blackish pigment extending forward along the base of the papillæ. Edge of marsupium broadly black.

Simpson places this species by the side of *E. trabalis* (Conrad). According to the anatomy this affinity is correct. Also the glochidia are similar. Although I have called them in *trabalis*, (l. c. p. 340) "subovate," they are almost subspatulate, as is clearly seen in the figure (pl. 20, f. 4).

*EURYNIA (MICROMYA) NEBULOSA* (Conrad) (See: *Lampsilis n.* Simpson, 1900, p. 553).

I collected a large number in North Fork Holston River, Saltville, Smyth Co., Va. (Sept. 17, 1912), and in Clinch River, at Cedar Bluff, Richland, and Raven, Tazewell Co., Va. (Sept. 20 and 21, 1912). The preserved gravid females all had glochidia.

Anal separated from the supraanal by a moderate mantle-connection, which is shorter than the anal. Inner edge of anal crenulated. Branchial with papillae. In front of the branchial, in the female, there are 6 to 10 rather large, conical papillae, somewhat irregular in size, and remote from each other: the largest are forward. These papillae do not quite reach the middle of the mantle margin. In the male, these papillae are also indicated, but very small.

Palpi connected at the posterior margins at base only.

Inner lamina of inner gills connected with abdominal sac. Gills lampsiline: the marsupium of the female is kidney-shaped,



and occupies the posterior half (or more) of the outer gill, with a small non-marsupial section at the posterior end. Ovisacs 10 to 17.

Glochidia almost subspatulate, higher than long; 4, length 0.22, height 0.29.

Color of soft parts whitish. Anal and branchial opening with black pigment, and this black color runs forward along the outer mantle edge in front of the branchial; on the inside of the inner edge there is a reddish-brown streak, and also the papillæ are reddish-brown. The marsupium has a broad black edge.

This species resembles much *E. iris* (Lea) in shell characters, and also the anatomy and the glochidia are very similar. The papillæ of the mantle edge are not quite as large as those of *E. iris*, and they are more variable in number and position. In *nebulosa* the largest and most distinct papillæ are in the anterior part, where three or four sometimes stand a little closer together.

The shell of some of my females is undistinguishable from *U. amoenus* Lea (Simpson, p. 555), and I think that *amoenus* is an additional synonym of *nebulosus* (Conrad).

**EURYNIA (MICROMYA) VANUXEMENSIS** (Lea) (See: Ortmann, 1912 pp. 342).

I collected a number of specimens on Sept. 17, 1912 in North Fork Holston River, Saltville, Smyth Co., Va. Among them were gravid females with glochidia.

Mantle connection between anal and supraanal moderately long, but shorter than the anal. And with distinct crenulations. Branchial with papillae.

Papillae in front of the branchial of the female as described previously. The largest papillae are well forward. In the male, the papillae are represented by mere crenulations. Palpi connected only at base of posterior margin.

Inner lamina of inner gills entirely connected with abdominal sac. Marsupium as described previously, minimum number of ovisacs 7, maximum 14. Edge of marsupium with brown or black pigment.

Shape of glochidia as figured (1. c. pl. 20, f. 6), but they should be called subspatulate. Length: 0.23, height: 0.30 mm;



my former measurements,  $0.22+0.28$ , do not differ much from this.

This species has a very characteristic shape, chiefly in the female, with the postbasal part greatly expanded and obliquely truncated. In old specimens, there is a more or less distinct "constriction" in the middle of this truncation, making the boundary between the branchial opening and the papillar part of the mantle edge in front of it. This constriction corresponds to that seen in the following species (*E. constricta*), and shows the close affinity of these two species. *E. vanuxemensis*, in its external aspect, is very similar to *E. constricta*, and when I found these specimens at Saltville, I recognized them at once as the representative form of *E. constricta* of the Roanoke and James Rivers, with which I was quite familiar. However, the character of the constriction, found rather regularly in old females of *constricta*, is not so well developed in *vanuxemensis*, and I have only a few old females of the latter, which show it distinctly.

EURYNIA (MICROMYA) CONSTRICTA (Conrad) (See: *Lampsilis c.* Simpson, 1900, p. 551).

Numerous specimens are at hand from the following localities: Calf Pasture River, Goshen (May 11, 1912), North River, Lexington and Buena Vista (June 7 and 8, 1912), all in Rockbridge Co., Va.; Jackson River, Covington, Allegheny Co. Va. (Aug. 11, 1911); Tinker Creek, Roanoke (June 10, 1912), Roanoke River (June 10, 1912) and Mason Creek, Salem (Aug. 13, 1911); these in the Roanoke drainage in Roanoke Co., Va. The specimens collected on August 13 were gravid with eggs and one had young glochidia; those collected in May and June had all glochidia, when gravid, and on all dates discharging individuals were found. Thus the breeding season begins in August and ends in June.

Supraanal separated from the anal by a moderately long mantle-connection, which is slightly shorter than either opening. Anal finely crenulated. Branchial with papillae. In the female, the inner mantle-edge in front of the branchial is very much like that of *vanuxemensis* and *arkansasensis*: it is somewhat lamellar and carries a number (10 to 12) of small, somewhat



distant and irregular papillae, of which the largest are placed more anteriorly, while the posterior ones are indistinct. A black streak of pigment is present. Also the male has this black pigment, but the papillae are obsolete.

Posterior margins of palpi connected at base. Inner lamina of inner gills entirely connected with abdominal sac. Marsupium with from 12 to 20 ovisacs. Edge of marsupium with black pigment. Holes at the edge were observed in discharging females.

Glochidia subspatulate, higher than long. Length: 0.21, height: 0.27 mm.

Except the black pigment on mantle edge in the posterior region, and on the edge of the marsupium, the color of the soft parts is whitish.

This species is closely allied to *E. vanuxemensis*. The papillae in front of the branchial are smaller and less crowded, and the black pigment is not so intense.

(To be concluded)

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#### NOTES ON OLIVA.

BY E. G. VANATTA.

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The Academy of Natural Sciences of Philadelphia having purchased the John Ford Collection of *Oliva*, the following notes may be useful to those interested in the genus.

#### OLIVA PERUNIANA Lam.

The typical form is illustrated in Reeve's Conch. Icon. vol. vi, pl. 9, f. 14 *d*; Tryon's Man. Conch. vol. v, pl. 18, f. 58.

Var. *fulgurata* Mart., Rve. Conch. Icon. pl. 9, f. 14 *b*.;

Tryon M. C. pl. 18, f. 56.

Var *livida* Johns.

The types are pale lilac with ivory-yellow streaks, A. N. S. P. Coll. No. 111726. Alt. 40, diam. 20 mm.

Habitat—unknown.

NAUTILUS vol. 24, p. 122; Tryon M. C. pl. 18, f. 55; Rve. C. I. pl. 9, f. 14 *a*.

Var. *castanea* "Ford" Johns.



Ortmann, Arnold E. 1915. "Studies in najades." *The Nautilus* 29, 63–67.

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