

XI DESCRIPTION OF A NEW SPECIES OF  
*MARGARITANOPSIS* (UNIONIDAE) FROM  
THE SOUTHERN SHAN STATES, WITH  
NOTES ON *SOLENAIA SOLENIFORMIS*

By LT.-COL. H. H. GODWIN-AUSTEN, F.R.S.

(With Plate XV.)

Feddon and Theobald were the first to visit and collect mollusca in the Shan country in 1864, but they did not penetrate to the neighbourhood of the Inlé Lake which is not, as far as I can remember, mentioned in their Geological Reports. It was not until Colonel R. Woodthorpe, R.E., visited Fort Stedman in 1894 on his way to survey the Siam frontier that he obtained any shells from this piece of water or its neighbourhood. Among them is the remarkable large bivalve, which I have named after him, but never as yet had an opportunity of publishing. The animal has not yet been seen nor has that been described of its possible ally *Solenaia soleniformis*, Bs. of Cachar.<sup>1</sup>

I append the description of *Unio laosensis*, to which the Shan species comes nearest.

Genus *Margaritanopsis*, Haas, 1912.

Haas in Martini u. Chemnitz, *Syst. Conch. Cabinet*, Bd. IX (ii) 2, pp. 121-122, pl. xii, figs. 1-2 (1912). Laos Mountains, Cambodia, Siam. Mons. Mouhot. Diam. 0.9, length 1.2, breadth 3 inches.  
C. Torrey Simpson, *Des. Cat. Naiades*, p. 520 (1914).  
Sowerby, *Conch. Icon.*, XVI, pl. xlvii, f. 256 (1866).

Type, *Unio laosensis*, Lea.

It is thus described. "Shell elongated, arcuate, rather solid, not inflated, inequilateral; beaks slightly elevated, not full, thin sculpture consisting of ridges that nearly follow the growth lines, posterior ridge high. Very wide and rounded, anterior end of the shell rounded, posterior end a little wider, rounded or feebly pointed, surface with rude, concentric growth lines, epidermis brownish-green, or greenish-brown and subshining in young shells, brown or blackish and dull in old ones; left valve with two small stumpy pseudocardinals, the anterior one often almost obsolete, and two remote small laterals; right-valve with two pseudocardinals, the

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<sup>1</sup> Since this was written a description of the animal of *S. soleniformis* has been published by Dr. Ekendranath Ghosh in *Rec. Ind. Mus.* XV, pp. 109-122, pl. xvi (1918).—N. A.

hinder rudimentary and one lateral; laterals granular and showing traces of vertical striation, muscle scars well impressed, the anterior ones rough, the posterior elliptical; nacre whitish or purplish; thickened in front, generally showing small pits.

Laos Mountains, Cambodia: Siam: Burma."

**Margaritanopsis woodthorpi**, n. sp.

(Plate xv.)

*Locality*.—Fort Stedman, Shan States (*Woodthorpe*). Two specimens received.

Shell very elongate or broad, somewhat flattened, solid, umbones high, nearly level, inequilateral, posterior ridge straight, long. Anterior end of shell rounded, posterior end also, ventral margin pinched in or compressed with considerable convexity. Surface eroded on umbones, then smooth followed by strong lines of growth next and up to the margin, epidermis greyish-black (pl. xv, fig. 1). Left valve (pl. xv, fig. 2) with a solid projecting pyramidal cardinal tooth, having well defined layers of growth, with two long posterior lateral teeth or rather flanges, no anterior. Right valve (pl. xv, fig. 3) with a smaller projecting cardinal which fits and drops in in front of the left valve cardinal. One posterior flange. Anterior muscle scars well impressed, the adductor large, circular, protractor pedis small, anterior retractor above rather larger and deeper. Posterior muscle scar elliptical, smooth. Nacre pale cerulean blue and extremely smooth. Diameter 29.0, length 40.0, breadth 127 mm.

The figures of this shell are from the excellent photographs of my friend and neighbour Mr. J. S. Gladstone.

Dr. Annandale informs me, this subgenus was not found by him in Inlé Lake, Woodthorpe must, therefore, have obtained it in one of the larger streams that flow into the lake, and it may possibly have habits somewhat like those of *Solenaia* of Cachar. How far the anatomy will compare with that subgenus has to be ascertained. As to the extension west in the Salween basin of *Margaritanopsis* is also of interest. I found nothing like it in Manipur nor would it be likely to be found there. The streams of that valley are nearly all very sluggish, with discoloured water and muddy bottoms, as far as the Logtak lake. I do not know the country to the south of that, the subgenus might possibly occur there.

A few notes on the Genus *Solenaia* may be introduced here.

The exact locality in Cachar and the conditions in which *U. soleniformis* lives have been recently given me by Mr. F. Ede of Silchar. He says: "It is only possible to obtain this bivalve when the rivers are extremely low in the height of the dry or cold season. I found specimens in the Daleswari in Hailakandy between Katlicherra and Cookicherra, also (once only) on some rocks by diving in a very dry season, in the centre of the Barak River opposite the old pukka club in Silchar, but since then have only

found them in the Daleswari. They are much sought after, and esteemed as a great delicacy by the Uriya coolies in the tea gardens. My first specimen was obtained from a couple of Uriyas, who had been out with axes, splitting up the hard blue shale rock to obtain them. The rock in question is soft as rocks go, and is recent Tertiary, possibly Pliocene. The specimens found by me seem to prefer fairly rapid running water. Their borings are generally on the outside of curves or bends, where the current is fairly high. They seem to change about from hole to hole, descending as the river falls. I am not certain how they bore, but they periodically eject muddy water from their holes, of the colour of the rocks in which they live. I have seen them doing this in the cold weather, when the water in the river is quite clear. I think the specimens I found under the laterite rocks, in the centre of the Barak in Silchar, must have been casual specimens, swept down by some big flood." This is possible, that is to say if *U. soleniformis* occurs in the Barak and more likely in the Sonai from the south—they could not have been derived from the Daleswari, which joins the Soorma many miles below Silchar.

I know the Daleswari valley and ascended the river by boat to close up to the Looshai country (Sookpilal's of that time). I was fully occupied at a reconnaissance survey so had very little time for collecting and missed seeing this interesting species of *Unio*.

Mr. Ede feels certain that they make the holes they occupy. Some further examination of these holes is required to ascertain their depth, proximity, and section. The animal would lie with the inhaling and exhaling siphons pointing upwards, throwing out as he describes the dirty water in their bodies into the clear water of the river.

It would be interesting to know also how far up the Daleswari the species is to be found and still more to know its exact distribution in South Cachar, whether it is to be found in the Sonai and Barak. The Daleswari is of considerable length some 60 miles to Gootur Mukh. The embryonic forms of any colony would be carried down stream, but after attaching themselves to their hosts, such as species of Mahsir, they would at the proper season and rise of the rivers be carried far up into the hills and start their existence as *Unios* wherever the conditions were suitable: thus the range on this river may be very great.

#### ADDENDUM.

##### FURTHER NOTE ON THE BURROWS OF *SOLENAIA SOLENIFORMIS*.

By N. ANNANDALE, D.Sc., F.A.S.B.

As Col. Godwin Austen has referred to the burrows of *Solenaiia soleniformis*, I have added to his manuscript a note based on a specimen in the Indian Museum. This specimen is a block of friable sandstone 51.5 cm. long by 13 cm. broad by 17.5 cm. deep and contains four burrows in which the shells have been replaced.

It was presented many years ago by Mr. F. J. Ede and is labelled as being from a stream in Cachar. Two of the burrows completely penetrate the block, one is incomplete and one has been cut open in removing the mass. The entrance to all the burrows is oblique and each has been commenced at a point at which the surface was uneven or sloping. The calibre is even throughout and the cross-section is narrowly lanceolate with a distinct notch at both the broad and the narrow end. The height in a completed burrow is 89 mm. and the greatest breadth 46 mm., the depth of the lower notch about 8 mm. The inner surface is smooth except for a number of shallow but rather broad longitudinal grooves on the sides.

If the shell removed from the burrow be examined it will be found to resemble it closely in cross-section but to be a little smaller in all directions, and coarse longitudinal ridges on its surface will be noted corresponding roughly with the grooves on the wall. There is no possibility of the excavation having been made by the rotation of a body of the size and shape of the shell, and it is evident from a comparison of old and young specimens that the instrument used must be the anterior margin of the valves, which is worn and smoothed in old shells.

In young shells the anterior region differs considerably in shape from that in old shells and has distinctly the appearance of a cutting tool. The valves are strongly compressed, their margin is very sharp and the curvature is of a convenient type.

The foot<sup>1</sup> of *Solenaia* resembles that of *Physunio*<sup>2</sup> in shape but is considerably more elongate. As I have recently shown<sup>3</sup> the latter form makes its way through mud with the shell in a vertical position and with a swaying motion, by alternately protruding and retracting the foot, and I believe that *Solenaia* cuts its way into the rock in a similar manner. Having found a suitable spot where the surface is irregular or shelved, it applies the anterior end of its shell to the surface, and by alternately thrusting out and drawing in its foot moves the sharp margin up and down against the rock, thus cutting a groove into which it thrusts itself. The movement is probably complicated by a laterally swaying motion and the coarse ridges on the shell assist in enlarging the aperture. A great deal of the excavated matter must be taken into the mantle cavity and expelled in the manner indicated by Mr. Ede.

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<sup>1</sup> Ekendranath Ghosh, *Rec. Ind. Mus.* XV, p. 111, pl. xvi, fig. 2 (1918).

<sup>2</sup> *Id.*, *ibid.*, fig. 3. See also Bains Prashad, *Rec. Ind. Mus.* XIV, pl. xxii, fig. 1 (1918).

<sup>3</sup> Annandale, *Rec. Ind. Mus.* XIV, p. 141 (1918).

