

UNIONIDÆ FROM THE MIOCENE OF BURMA. BY E. VREDENBURG, *Geological Survey of India* AND B. PRASHAD, D.S.C., *Zoological Survey of India*. (with Plate 12, figs. 3-13).

IN the present communication, we deal with certain freshwater fossil Unionidæ from Burma, specimens of which were some years ago for the first time forwarded for identification, to the Geological Survey of India by Mr. Macrorie. They were obtained from the Irrawadi Series amongst strata which are probably of uppermost miocene (pontian) age at Chaunggyauk ($19^{\circ} 42'$, $95^{\circ} 24'$). Latterly the locality was visited by Rao Bahadur Sethu Rama Rau, of the Geological Survey of India, who observed the same fossils both at this place and at Didokpin, about six miles north-west of Chaunggyauk, where the same fossiliferous bed reappears.

At Chaunggyauk, the fossiliferous bed also contains in great abundance a large Melaniid which Dr. Annandale regards as a variety of the living *Acrostoma variabile* (Benson), one of the commonest and most characteristic species amongst the freshwater gastropods of Burma.

As the Chaunggyauk specimens include the first fossil Unionidæ that have as yet been recorded from Burma, we have thought it desirable to describe them in order to facilitate future work on this interesting group of Indian Mollusca. We have further been led to this decision by the excellent condition of preservation of the fossils and of their sculpture, as also of the hinge-teeth of one of the forms.

Apart from some imperfectly known occurrences in the sub-Himalayan Siwaliks recorded by Forbes (in Falconer's Palæontological Memoirs, Vol. I, p. 389), the only pre-quatertiary geological formations that have so far yielded specimens of Unionidæ in India, are the Intertrappeans, of uppermost cretaceous age, in the Peninsula¹ and the lower miocene Bugti-beds of Baluchistan.² In neither case do the fossils resemble the Burmese specimens, but the exact

¹ See Hislop, *Quart. Journ. Geol. Soc., London*, XVI, pp. 174-176, pl. VI, figs. 24 a-c and Pl. VII, figs. 26, 27 a-c; 28, and the references cited therein (1860).

² Blanford, *Mem. Geol. Surv. Ind.*, XX, pp. 132-136, Pl. I, figs. 8, 9, 10-13, Pl. II, figs. 1-3, Pl. III, figs. 1-4 (1883).

generic position of the Peninsular and Baluchistan fossils needs revision in the light of the extensive work of Simpson¹ and others on the living Indian Unionidæ.

The Burmese fossils are referable to two species of the genera *Indonaia* Prashad² and *Parreyssia* Conrad³. Both these genera are represented in India and Burma by a fair number of living species. The two fossil species, although allied to some of the living forms, appear to be new, and are here described as *Indonaia glyptica* and *Parreyssia latouchei*. Their exact relationships are discussed in the remarks at the end of the descriptions of the species.

INDONAIA GLYPTICA sp. nov.

Pl. XII, figs. 3—9.

Description.—Shell of small dimensions, thick, inflated, very inequilateral, posteriorly elongate and with a very narrow posterior wing. Umbonal region very anteriorly situated, high, somewhat compressed. In addition to numerous concentric ridges or folds, which alone remain visible when the outer surface is somewhat weathered, the valves of well preserved specimens are almost entirely covered with two interfering sets of steeply oblique crowded narrow ribs, producing a characteristic criss-cross pattern, such as is often observed in the Unionidæ. The posterior wing carries a third set of oblique markings disposed differently from the two other sets. Anterior end narrowed and rounded. Base line nearly straight, curving up sharply posteriorly somewhat behind the middle to form the nearly pointed posterior end. The hinge is preserved in some otherwise incomplete fragments and the following description is drawn from these specimens: in the right valve the pseudocardinal is single, thick, roughly triangular, with a distinctly rugose appearance; the lateral appears as a slightly arched lamellar ridge. In the left valve, the pseudocardinal is more massive and distinctly divided into two parts, an anterior, nearly smooth, thin one, and a posterior, rather deeply ridged, more massive posterior tooth; the lateral, in this valve, also appears to be single. The muscle-scars are circular to ovoid and deeply impressed.

¹ Simpson, Descriptive Catalogue Naiades, Detroit, Michigan (1914). 2

² Prashad, *Rec. Ind. Mus.*, XV, pp. 146—148, fig. 2 (1918).

³ Conrad, *Proc. Acad. Nat. Sci.* Philadelphia, VI, p. 267 (1853) and Preston, *Faun. Brit. Ind. Freshw. Moll.* p. 154 (1915).

Dimensions.—Amongst the specimens at present available, the largest dimensions are those of a single left valve which measures 46×28 mm. This size is quite exceptional, none of the other specimens exceeding 39 mm. in length. Amongst the specimens with united valves exhibiting the shape of the shell in a good state of preservation, the largest shell gave the following measurements: length 39 mm. height 24 mm. thickness 17 mm. The dimensions of the specimen shown in fig. 4 are: length 31 mm. height 18 mm. thickness 12 mm. The separate valve represented in fig. 9, whose shape is somewhat more elongate, measures 35 mm. in length and 19 mm. in height.

Remarks.—The above-described species is closely related to *Indonaiia crispata* (Gould), which has a wide range in Burma, Siam and Cambodia. The sculpture of the fossil is, however, much finer, and the shape of the shell different. Moreover, the shell is much thicker in the fossil species than in *Indonaiia crispata*.

PARREYSSIA LATOUCHEI sp. nov.

Pl. XII, figs. 10—13.

Description.—Shell of medium size, moderately elongate, rather inflated, approximately triangular in lateral outline, with a very pronounced ridge separating off a narrow posterior wing. This ridge extends from the anteriorly situated umbo to the pronounced posterior lower angle, above which the marginal outline exhibits two more very obtuse angular bends corresponding with the terminations of two very obscure keels or swellings that occupy the narrow surface of the posterior wing. From the anterior part of the hinge to the posterior angle, the anterior and inferior margin of the valves forms a continuously convex curve, except for an exceedingly shallow sinus just in front of the posterior angle. An extremely shallow depression of the surface of the valves borders the posterior ridge from this sinus to the umbo. Posteriorly to the umbo, the external ligament occupies a narrow, elongate, deeply sunken escutcheon, the surface of attachment being bordered internally by a narrow prominent ridge.

The valves bear concentric ridges or furrows at irregular intervals, representing successive periods of growth, and are otherwise unornamented, except in the umbonal region, which faintly exhibits the characteristic corrugated lattice frequently seen in the *Unionidæ*;

this feature being especially distinct in well-preserved juvenile specimens.

Dimensions.—The following are the measurements of the figured specimen which appears to be full-grown and which has the valves united :

	mm.
Length	44
Height	32
Thickness	22

Comparison with other species.—The nearest allies to this fossil appear to be certain recent species from the Indian and Indo-Malay regions, such as the common species of Bengal, *Parreyssia favidens* (Benson),¹ and *Parreyssia tavoyensis* (Gould),² from Tenasserim and Burma. The similarity in shape between *P. latouchei* and *P. favidens* is very close, but the fossil species has the anterior region still shorter than the recent one. *P. tavoyensis* is practically identical in shape, but has the posterior wing less distinctly marked off and the umbonal region and some part of the valves decorated with very definite criss-cross ridges, which are only feebly developed in the fossil specimens. The two species are probably very closely related.

The explanation of Plate XII will be found on page 369.

¹ Preston, *op. cit.*, p. 158, and Simpson, *op. cit.*, pp. 1109, 1110.

² Preston, *op. cit.*, p. 166, and Simpson, *op. cit.*, p. 1114.



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Photographs by R.C. Mandal.

Photographs, Survey of India Office, Calcutta, 1923.