95. *Some New Unionidae from North China and Southern Mongolia.*

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During the summer of 1939–1941, the writer, as a member of the fourth section of the Tōa Kenkyūzyo, made geological studies in North China and Southern Mongolia, and collected some fossil mollusca from these regions. This paper is a report of these studies on the fossil mollusca thus collected.

Since the writer described some *Lamprotula* from the Shihtsun* gravel and sand beds¹⁾ exposed on the south of the town of Linfen, Shansi district, Pierre Leroy²⁾ made exhaustive studies of the fossil Unionidae, of China, and described some ten species of them from the Miocene–Pleistocene deposits of North China. Recently the writer found a new Unionidae among his collection just referred to, which will be described here. He will also propose new names for species formerly described by him.

The San-Kien-Ho basin, in Southern Mongolia, which the writer visited, consists, stratigraphically, of the Tatokow, Panchingtsun, Hwas-haoying, Haochiakow, Siashatzi, Nihowan, and the Shihchiali beds**, and the Sinian Proterozoic system and the Sankien Archean gneiss, in descending order. Although Pierre Leroy described three species of Unionidae from the deposits in the San-Kien-Ho basin, the writer was unable to obtain any of the species described by him, but he collected four other Unionidae from the Lower Part of the Nihowan beds. The Unionidae collected by Pierre Leroy³⁾ and the writer from the Upper Pliocene of San-Men***, Shihtsun, and San-Kien-Ho basin are

<i>Hyriopsis descendens</i> Odhner	San-Men	_____	_____
<i>Lepidodesma ponderosa</i> Odhner	San-Men	_____	_____
<i>Lamprotula pararochechouarti</i> Leroy	San-Men	Shihtsun	_____
<i>Lamprotula bieni</i> Leroy	San-Men	_____	_____
<i>Lamprotula licenti</i> Leroy	_____	Shihtsun	San-Kien-Ho
<i>Lamprotula antiqua</i> Odhner	San-Men	Shihtsun	_____
<i>Lamprotula antiqua undulata</i> Odhner	San-Men	Shihtsun	_____
<i>Cuneopsis ambiguus</i> Leroy	San-Men	_____	_____
<i>Cuneopsis barbouri</i> King	_____	_____	San-Kien-Ho
<i>Cuneopsis maximus</i> Odhner	San-Men?	Shihtsun	San-Kien-Ho?

1) Y. Otuka, Jap. Jour. Geol. Geogr. **17** (1940), pp. 83–89.

2) Pierre Leroy, Bull. Geol. Soc. China, **19** (1940), pp. 893–453.

* Shihtsun 史村.

** Tatokow 大渡口, Panchingtsun 板井村, Hwas-haoying 花梢營, Haochiakow 郝家口, Siashatzi 下沙咀, Nihowan 泥河灣, Shihchiali 石匣里, Sinian 震旦, Sankien 桑乾.

3) Pierre Leroy, Bull. Geol. Soc. China, **19** (1940).

*** San-Men (三門) is the type locality of the Sanmenian formation, the Upper Pliocene deposits of North China, along the Huang-Ho, South Shansi.

The Unionidae of the writer's Nihowan beds are

Lamprotula kusabi Otuka n. sp.

Lamprotula leai subsp.

Cuneopsis heudei nihowanensis Otuka n. sp.

Pseudodon pingi Otuka n. sp.

The fact written above suggests that there exist two entirely different fauna of the Unionidae in the Lower part of the so-called Nihowan beds, exposed in the San-Kan-Ho, or San-Kien-Ho, basin. The writer, however, regards these two fauna, namely Leroy's San-Kien-Ho fauna and the writer's Nihowan beds fauna, as quite different stratigraphic horizons, and believes the former to be Upper Pliocene, as stated by Pierre Leroy, while from palaeontological and stratigraphical view points, the latter may be Middle Neogene or pre-Upper Pliocene.

Description of species.

Lamprotula pararochechouarti Leroy¹⁾

The writer formerly reported this species as *L. caveata*²⁾, but from recent restudies of the specimens concludes that it is *L. pararochechouarti* Leroy. The shell of *Lamprotula rochechouartii* (Heude)³⁾ has less prominent umbo and less produced anterior margin. The *Lamprotula caveata* figured by I. Taki⁴⁾ may be *L. rochechouarti* (Heude); *Lamprotula caveata* (Heude)⁵⁾ having a quite different shell.

Lamprotula licenti Leroy⁶⁾

Leroy reported this species from the San-Kan-Ho deposits. *Lamprotula* sp. (1940)⁷⁾ from the writer's Shihtsun gravel and sand deposits, Shansi district, is identical with this species.

Lamprotula kusabi Otuka n. sp. (Fig. 6 and 7).

Shell elongate, thick, more or less large, very unequilateral, slightly unequivalved, slightly twisted in posterior part; anterior dorsal margin short vertical; posterior dorsal margin long, more or less straight; anterior margin gradually transits into rounded antero-ventral margin; ventral margin broadly arcuated but slightly sinuated in its central part; postero-ventral margin transits into postero-dorsal margin in a narrowly rounded angle; surface sculptured with concentric lines of growth in irregular lines, and with coarse tubercles; sculpture of tubercle becomes "W"-shaped near the umbonal part and becomes obsolete in the upper half of the shell surface; blunt ridge running from umbo to posterior corner; umbonal part of posterior area also sculptured with the posterior wing "V" of "W"; a weak line defining the obsolete lunule area is visible in well preserved specimens; a weak and broad depression runs from umbo to central part of ventral margin, which is obsolete near the umbonal part; hinge prominent, cardinal

1) Pierre Leroy, op. cit. (1940), pp. 415-418, figs. 10, 11.

2) Y. Otuka, Japanese Jour. Geol. Geogr., 17 p. 87, fig. 4, 5, 6, & 7 (Not of Heude).

3) R. P. Heude, Conchyliologie Fluviale de la Province de Nanking et de la Chine Central. 1 fasc. (1875), pl. 5, fig. 13.

4) Is. Taki, Suisandōsyokubutu Zusetu, p. 419.

5) R. P. Heude, op. cit., 3 fasc. (1877), pl. 24, fig. 53.

6) Pierre Leroy, op. cit. (1940), pp. 425-427, fig. 16.

7) Y. Otuka, op. cit. (1940), p. 88, figs. 16 & 17.

Fig. 1, a, 2. *Pseudodon pingi* Otuka. "a" shows the umbonal sculpture. (anterior-posterior 33 mm); fig. 3, 4, 5. *Cuneopsis heudei nihowanensis* Otuka (anterior-posterior 56 mm); fig. 6, 7. *Lamprotula kusabi* Otuka (anterior-posterior 122 mm).

teeth almost horizontal, posterior lateral teeth long, about 2/3 of posterior margin.

Dimension: Holotype: Anterior-posterior 122 mm; umbo-ventral margin 58.5 mm; width 27 mm (one valve).

Comparison: *Lamprotula bazini* (Heude)¹⁾ from the Lo river, Hou-Nan, is closely allied to this new species, but it has shorter shell and less prominent umbo than this new species.

Cuneopsis celtiformis (Heude)²⁾ is another shell allied to this new species, but the former has shells with small umbo and unsculptured surface. Umbo of *Lamprotula kusabi* is situated on the antero-dorsal corner of the outline of the shell.

Cuneopsis spocki Leroy³⁾ is also closely allied to this new species, although Leory's species has neither sculpture nor ornamentation.

Cuneopsis teilhardi Leroy⁴⁾ differs from *C. kusabi* in its less prominent umbo which, in the latter species, is small, but more pointed than the former species.

Occurrence: Loc. Kwodo No. 30; grey mud of the Lower Nihowan beds on a valley floor, SW of Liuchiashapu, San-Kien-Ho basin, Tsanan, Menchiang*, Inner Mongolia.

Lamprotula leai subsp.

Only two fragmental shells were collected. This species is closely allied to *L. leai* Gray⁵⁾ in its outline, but its cardinal tooth is short, but prominent.

Occurrence: Loc. Kwodo No. 30; grey mud of the Lower Nihowan beds on a valley floor, SW of Liuchiashapu, San-Kien-Ho basin, Tsanan, Menchiang, Inner Mongolia.

Cuneopsis heudei nihowanensis Otuka (Fig. 3, 4, 5).

Shell elongate-ovate, thick, very unequilateral, equivalved; postero-dorsal margin long, slightly arcuated, antero-dorsal margin short, rounded; postero-ventral margin an inclination of 45 degree, but at posterior corner they contact with each other at an angle of 80 degree; antero-ventral margin rounded, gradually transits into anterior margin; surface smooth, feebly sculptured with concentric lines of growth at irregular intervals, excepting near umbo. Posterior area long, narrow, defined by a ridge running from umbo to posterior corner; lunule short impressed; umbonal part, excepting in posterior area and lunulal parts, sculptured with "W"-shaped sculpture which, sooner or later, becomes obsolete; hinge well developed, posterior lateral long, more or less, straight; cardinal teeth prominent.

Dimension: Posterior-anterior 58.6 mm; umbo-ventral margin 34.5 mm; width (one valve) 13.0 mm.

Comparison: *Cuneopsis heudei* (Heude)⁶⁾ has longer and wider

1) Heude, op. cit., 2 fasc. (1877), pl. 9, fig. 20.

2) Heude, op. cit., 1 fasc., pl. 1, fig. 4; Jl. de Conch., **22** (1874), p. 113.

3) Leroy, op. cit., pp. 402-403, fig. 4.

4) Leroy, op. cit., pp. 403-404, fig. 5.

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5) Gray, in Griffith & Pidgeon, Anim. Kingd. **12** (1834), t. 21, f. 1.

6) Heude, op. cit., 1 fasc., pl. 1, fig. 3; Pl. de Conch., **22** (1874), p. 114.

shells than this new subspecies. Dimension of the former species are—Anterior-posterior 70 mm; umbo-ventral margin 35 mm; width (one valve) 11 mm.

Occurrence: Loc. Kwodo No. 30; Grey mud of the Lower part of the Nihowan beds on a valley floor, SW of Liuchiashaopu, San-Kien-Ho basin, Tsanan, Menchiang, Inner Mongolia.

Comparison: *Cuneopsis celtiformis* (Heude)¹⁾ is closely allied to this new subspecies, but the former has the shell medially compressed, which is longer and larger than the latter shell.

Cuneopsis capitatus (Heude)²⁾ is allied to this new subspecies, but it has a medially compressed shell, which is longer than the latter.

Cuneopsis barbouri King³⁾ is also an allied species, but it has a shell like *C. capitatus* (Heude).

Pseudodon pingi Otuka n. sp. (Fig. 1, 2, & 1a).

Shell more or less small, elliptical, longer than high, slightly unequilateral and equivalved; anterior dorsal margin slightly shorter than posterior, transits into anterior margin; posterior margin more or less arcuated, truncated by vertical posterior margin; posterior half of ventral margin straight, almost horizontal, forming right angles with vertical posterior margin; surface sculptured with concentric lines of growth at irregular intervals; a blunt but distinct ridge running from umbo to lower ventral corner of posterior margin, which divides the narrow posterior surface from the main surface; umbonal part sculptured with parallel "V" shaped furrows, of which right arm of "V" becomes narrow on the posterior area, the left arm of "V" of which is large on the main surface, so that the angle of "V" is situated on the ridge; the furrows become tuberculous at the angle of "V" on the ridge top; hinge is more or less distinct; cardinal tooth prominent, lateral teeth obsolete.

Dimension: Anterior-posterior 33 mm; umbo-ventral margin 22.2 mm; width (two valves closed) 16.5 mm.

Comparison: *Pseudodon* (*Chrysopseudodon*) *aureus* (Heude)⁴⁾, in outline, is allied to this new species, but it differs from the latter in its shell having more produced posterior margin and less prominent triangular cardinal tooth. Umbonal surface of the former species sculptured with wavy furrows.

Pseudodon (*Obovalis*) *loomisi* Stimpson⁵⁾ is another shell allied to this new species, but differing from the latter in having Λ furrows.

Occurrence: Loc. Kwodo No. 30; grey mud of the Lower part of Nihowan beds on a valley floor, SW of Liuchiashaopu, San-Kien-Ho basin, Tsanan, Menchiang, Inner Mongolia.

1) Heude, op. cit., 1 fasc., pl. 1, fig. 4.

2) Heude, op. cit., 1 fasc., pl. 2, fig. 5.

3) Leroy, op. cit., pp. 424-425, fig. 15.

4) Heude, op. cit., 9 fasc. (1885), pl. 72, fig. 140.

5) Stimpson, Proc. Acad. Nat. Sci., Philad., (1900), pp. 84-85, pl. 4, fig. 7.