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A PLIOCENE *MYA*-BED IN HOKKAIDO: A PALEOECOLOGICAL NOTE

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(With 1 plate)

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The upper division of the Tertiary formation exposed along rivulet Okuyokunnai in the Yûbetsu coal mine region northwest of Kushiro city, eastern Hokkaido, is the lower part of the Honbetsu series. There one may see a succession of beds of tuffs, tuffaceous sandstones, shales and sandstones, intercalating pyroclastic conglomerate in the lower part. That succession measures about 300 m in thickness, its upper limit being unknown. The series clino-unconformably overlies the Atsunai series. The Honbetsu series exposed here is fossiliferous at several horizons, yielding a number of molluscan shells, for which reason the series is generally considered late Pliocene in age. It is believed to correspond to the Takikawa series of the Ishikari region to the west beyond the Hidaka range.

Of the shell beds exposed there are a few characterized by *Pectens* below, and some that are rich in *Mya cuneiformis* (BÖHM) above, according to M. MATSUI, assistant in the Department of Geology and Mineralogy. According to his observations these *Mya*-beds are found at horizons a few meters apart from one another. In one of them, about 1 m thick, which the present writer happened to come across in the summer of 1951, and which most probably is the highest of them if there are more than one similar beds at all, many shells of *Mya cuneiformis* (BÖHM) were noticed standing almost upright with their siphonal ends pointing upward in a slightly inclined bed of tuffaceous

sandstone. This *Mya*-bed contains several other shells. They are, as far as known, *Yoldia hobetsuensis* UOZUMI (MS), *Yoldia* sp., *Pecten* sp., *Thyasira bisecta* (CONRAD), *Cardium californiense* DESHAYES, *Lucina acutilineata* (CONRAD), *Macoma* sp. *Mya* sp. aff. *urusikuboana* NOMURA, *Neptunea* cf. *modestus* KURODA, and *Turritella fortilirata* SOWERBY, beside a *Linthia*. For this list the writer is indebted to S. UOZUMI, post-graduate student in our Department. These fossils are rather sparsely embedded, and all in the form of inner molds tinted yellowish brown with iron rust. Among these fossils *Mya cuneiformis* is by far the most frequent; all the others are very few in number except *Yoldia hobetsuensis* which is fairly common. Many of these molluscan shells except most of *Mya cuneiformis* are seen to lie flat in the fossiliferous tuffaceous sandstone.

From these observations it may well be said that here is an example of the burial of a coastal shoal water flat with *Mya cuneiformis* living in burrows in the bottom where some other shells, either dead or alive, were lying flat or partly buried. It seems that the death of the molluscs was caused by the sudden fall of volcanic ash and pumice lapilli which formed the richly pumiceous tuffaceous layer above the *Mya*-bed though the boundary between them is not distinct.

In one of his early papers on the "Flachseebeobachtungen zur Paläontologie und Geologie", RICHTER referred to the occurrence of *Mya arenaria* L. on the tidal zone of the North Sea¹⁾. There, living individuals of *Mya arenaria* found in the "Stockwerk" or the masses of *Mya* beneath the *Cardium*-Stockwerk about 30–40 cm thick, being unable to move otherwise than vertically burrowing down, keep communication with the surface of the sea bottom by means of narrow vents for siphons. On the surface of this sea bottom, or, sometimes a few centimeters below, *Cardium*, *Litorina* and other forms are moving about in great abundance. Such a superposition, RICHTER explains, is often preserved under the covering of sand, but when the site is swept away by waves or ice *Mya arenaria* are killed and the shells are exposed

1) Senckenbergiana, vol. 4, fasc. 5, pp. 133, 134, pl. 3 and explanation thereof, November, 1922.

keeping their original upright posture.

RICHTER's paper cited is concerned with the problem of the nature of the contemporaneous organic accumulation in sediments. In the case described above he points out that the *Mya*-fauna is found in a bed older than itself, and it is younger than even the overlying bed. The suffocation of *Mya arenaria* in this case is ascribed to the covering by sand.

In the case of *Mya cuneiformis* in Hokkaido, the death of these shells may also be due to suffocation caused by the accumulation of sediments in the way RICHTER observed at North Sea shore. But it is not likely that there is a surface suggesting an unconformity between the *Mya*-bed and the overlying pumiceous bed in the exposure examined at Okuyokunnai. By assuming that there was an ash-fall over the shoal water area, possibly an estuary, which covered the surface of the bottom where *Mya cuneiformis* faunule was living, the case may be easily accounted for.

Whether the other *Mya*-beds reported to be found at horizons a few meters apart are of the same mode of origin is not clear: observed data and information are not sufficient. If these other *Mya*-beds show the same features as the one described in this note, it may be needful to conclude that the formation of *Mya*-bed as here assumed took place in repetition. Before that can be concluded, however, it is necessary to extend observations with care.

The *Mya*-bed dealt with in this note differs from what may be expected from the expression "shell bed" in preserving rather few fossils in kind and number. But it is not a mere heap of shells accumulated by wave or wind—a shell conglomerate so to say. The mode of occurrence of the *Mya* shells in the bed shows the physical environment or the ecological condition under which the *Mya*-bed was being formed.

In passing the present writer would like to refer to a note by K. TAN on an unusual occurrence of *Siliqua* shells, as a record of

a similar example²⁾. He saw numerous specimens of a species of *Siliqua*, possibly *S. intoshiana* YOKOYAMA, preserved in a mudstone bed forming a part of the Pliocene formation developed around Chikutô, Shinchiku Prefecture, Taiwan. The fauna in the mudstone consists almost exclusively of the *Siliqua*, and the shells were seen buried vertically to the bedding plane with anterior ends below, not a single specimen having been found lying flat as far as his observation went. No more details are available, nor a picture given, but it is beyond all question that this occurrence represents a burial of a shallow muddy bottom which was the habitat of the *Siliqua* colony.

There may be, no doubt, many such occurrences hitherto observed by geologists and paleontologists at various places in our country. In reality the writer has heard more than once similar occurrences in the Japanese Cenozoic spoken of. This note is intended to arouse among observers in terests on such phenomena that are apt to be neglected.

(May 20, 1952)

While the proofs of the foregoing part of this paper were being corrected, a recent record of the *in-situ* occurrence of *Volsella* and *Pinna* in the Jurassic Tetori series at a certain exposure in Gifu Prefecture came under the writer's notice. (MAEDA, Shirô, 1952:—"A Stratigraphical Study on the Tetori Series in the Upper Shiokawa District in Gifu Pref": Jour- Geol. Soc. Japan, vol. 58, pp. 145-153, 6 textfigs.). According to MAEDA, shells of *Volsella* and *Pinna* are found buried in the Mitarai beds consisting of acidic tuff and tuffaceous shale, with apices downward, and longer axes almost perpendicular to bedding planes: the shells are found at distances of about 60-180 cm. It seems there is not what is usually called a shell bed, and the shells have a little vertical range of distribution. (February 4, 1953.)

2) TAN, Keinosuke: An Observation on the Ecology of Fossils (Japanese). Taiwan Tigaku Kizi, vol. 3, pp. 118-119, November, 1932.

Explanation of Plate

1 5

Plate 15

Figure 1. An exposure of the *Mya*-bed in the Upper Pliocene Honbetsu series in the neighborhood of the Yûbetsu colliery, Kushiro.

It is well known that the thin shells of such burrowing molluscs as *Mya* are very easily lost on fossilization, so that only the hollow external molds are left in the rock*: the picture shows just such a mode of occurrence. The inner molds also are not seldom found: see figure 2.

Figure 2. A specimen, an inner mold, of *Mya cuneiformis* (BÖHM), in natural size. The lower margin of the picture represents the edge of the bedding plane.

* DEECKE, W.: Paläontologische Betrachtungen, II. Ueber Zweischaler. Beilage-Band 35, Neues Jahrb. f. Min., &c., pp. 352-3, 1913.

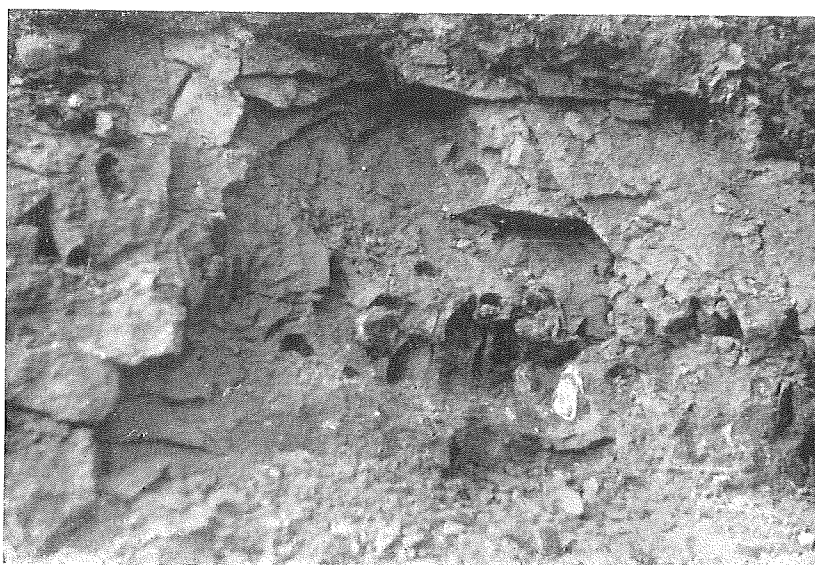


Fig. 1

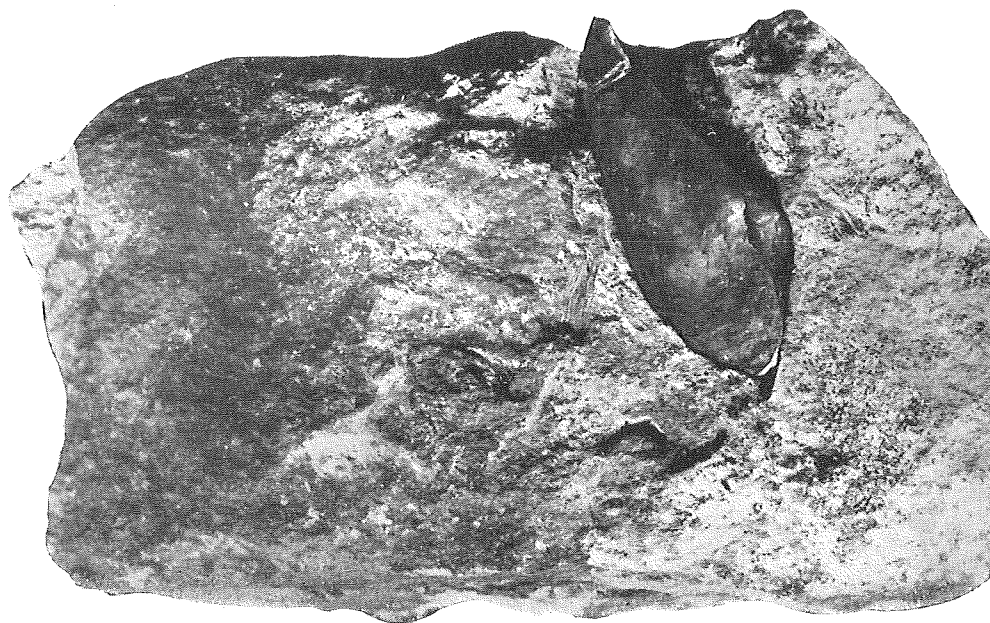


Fig. 2

HAYASAKA: *Mya*-Bed in Hokkaido

KUMANO Photo