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Inoceramus mihoensis n. sp. and Its Significance*

By

Tatsuro MATSUMOTO

Introduction

Since the publication of "A Monograph of the Cretaceous *Inoceramus* of Japan" (NAGAO and MATSUMOTO, 1939-1940) new material has been obtained for both stratigraphic and palaeontological studies. Therefore supplementary work is necessary. Apart from the revision of the hitherto known species, that will need much space, there are several new forms which require full description. In this paper I define one of them and give remarks on its systematic and stratigraphic significance.

Description

Inoceramus mihoensis n. sp.

Pl. 21, figs. 1a, b, 2a, b, 3a, b, c, 4

1940. *Inoceramus* sp. aff. *I. yabei* NAGAO and MATSUMOTO p. 1, pl. ii, fig. 8a, b only.

Material.—Holotype GK**. H358, right valve, from loc. N134f, near Hagoromo-bashi, Miho, zone Mh5 (*mihoensis* zone), mid-valley of the Naibuchi, South Saghalien (T. M. Coll.). Paratypes GK. H359, left valve and a deformed right valve, from loc. N134f, zone Mh5; GK. H361, right valve, N134h, Mh5; H369, left valve, N138d, Mh5; GK. H371, right valve, N135c, Mh5; many other specimens from the same zone (Mh5) in the Naibuchi valley (all T. M. Coll.) have been dealt with. Several other specimens from loc. Ik1407p, Ik959, Ik1414b, and Ik1134 *mihoensis* zone in the Ikushumbetsu valley in T. M.'s Coll. (GK.) and many others obtained from the same zone in the Ashibetsu valley in T. M. & N. KANBE's Coll. (Geological Survey of Japan) have been examined too. I. G. P. S. 57824 is another example of the present species.

Diagnosis.—The shell is of moderate size and sometimes fairly large, slightly inequivalve, somewhat inequilateral and moderately convex. The left valve is

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** GK.=Department of Geology, Kyushu University.
BM.=British Museum (Natural History).
I. G. P. S.=Institute of Geology & Palaeontology, Tohoku University, Sendai.

more convex than the right and has a prominent and incurved umbo. The convexity of the valve is rather regular in the main part but there is an abrupt change of convexity at a point in relatively early growth-stage; sometimes there is another change in relatively late growth-stage. The convexity is sometimes modified by secondary deformation.

The height of the shell is slightly larger than the length. The hinge-line is moderately long and forms more than a right angle with the anterior margin, which is nearly straight and as long as the hinge-line. The ventral and posterior margins are broadly rounded. The antero-ventral margin is subangular; the angle at the postero-dorsal margin is slightly larger than a right angle. Thus the shell is rather fan-shaped in outline. The anterior part is steep and slightly concave; a narrow area in the postero-dorsal part is flattened and passes gradually to the convex main part of the valve, without forming distinct ear.

The concentric ribs are low but rather sharp at the top, being ripple like in cross-section. They are fairly crowded in the relatively early part of the shell and become distant in the late part; the change in the spacing of the ribs takes place sometimes fairly early but in some other cases rather late in growth-stage, varying between individuals. In addition to the major concentric folds minor concentric striae are developed on the surface of the shell; those on the top of the major folds are distinct. Elevations that correspond to the concentric lines are very faint or scarcely discernible, so that there are few concentric rings. In some well preserved specimens very weak radial riblets are developed in a portion of the internal mould of the shell.

*Dimensions**.—

Specimens	h	l	th	H	L
GK. H 358	93.5	Ca88	Ca24	102.3	98.5
GK. H 259			32	97	87.5
GK. H 371	157.0				

Comparisons.— The present species is allied to *Inoceramus inconstans* WOODS (1912, p. 285, pl. li, figs. 1-4; text figs. 39, 42-49) from the Upper Chalk of England. The specific distinction is justified, because the typical form** of the British species as defined by WOODS is much more inequilateral, extending obliquely towards the postero-ventral end, more convex and geniculate and has longer hinge-line and more narrowly rounded postero-ventral margin than ours.

As WOODS himself has admitted, *Inoceramus inconstans* WOODS is very variable. In fact it is, in my opinion, too comprehensive and may require revision. As I am not well acquainted with the British specimens I do not deal with the subject in this paper. However, on examining some specimens on the occasion of my visit to England, I found a few specimens that deviate to some extent from the typical form of *I. constans* and closely resembles *I. mihoensis*. The examples are BM.

* The abbreviation of the dimensions is same as that defined on the previous occasion (NAGAO and MATSUMOTO 1939, p. 258).

** WOODS designated syntypic specimens, BM. Nos. 5878, 4765, L 20955, as types.

L31284 (? Upper Turonian *planus* zone, "Martin and Earl's Pit near Rochester. Kent") and another one in the Drawer 4. 1.5 [BM.] without record of collection. The restored illustration of Woods's (1911) text fig. 39 (p. 284) (Norwich Museum, No. 3296, zone of *Holaster planus*) again shows similarity to *I. mihoensis*. These specimens are not, however, identical with *I. mihoensis* and may be still referable to *I. inconstans*. Anyhow the fact indicates close affinity between the two species in question.

Occurrence.—Very common in the zone Mh5 in the Naibuchi Valley, South Saghalien. The zone is situated above the zone of *Inoceramus uwajimensis* (Mh4) and below that of *Inoceramus amakusensis* (Mh6). In the corresponding horizon in Hokkaido the species are not rare. The zone is conventionally placed in the uppermost part of the Lower Urakawan [Paleourakawan]. From the available evidence it is rather difficult to determine whether the zone in question is correlated with the uppermost Coniacian or lowest Santonian in the international scale.

Discussions

As has been described above *Inoceramus mihoensis* n. sp. is evidently allied to *Inoceramus inconstans* Woods. While the former is short-ranged in Japan and Saghalien, the latter is very persistent, ranging from the upper part of the *lata* zone to the *mucronata* zone in England (Woods 1912).

Now the very variable *I. inconstans* has been considered as giving rise to many other species, as Woods (1912b) has already pointed out. On examining the British material I agree with him in regarding *I. balticus* Böhm of the Upper Senonian as a direct descendant of *I. inconstans*. Although *I. inconstans* itself is not found in our province, *I. balticus* occurs in the Lower Hetonaian (approximately Campanian) of Southwest Japan. In fact *I. balticus* is widespread and Japan may be on the edge of the distribution of that species.

On the other hand the flat "variety" of *I. inconstans* Woods may have given rise to such a form as *I. expansus* Baily (1855, p. 462, pl. xiii, fig. 5), the original of which is in the Santonian of Southeast Africa. Through the study of the types at the British Museum (Natural History), I have noticed close similarity between *I. expansus* Baily and *I. ezoensis* Yokoyama (1890, p. 175, pl. xviii, figs. 6, 7; Nagao and Matsumoto 1940, p. 16, pl. vii, fig. 1 (?); pl. x, fig. 3; pl. xi, fig. 3 (?)). The latter species is commonly found in the upper part of the Urakawan (approximately Santonian) in Hokkaido and Saghalien.

Although I was once inclined to connect *Inoceramus amakusensis* Nagao and Matsumoto (1940, p. 13, pl. iii, fig. 6; pl. iv, figs. 1, 3, 4; pl. v, fig. 1), a zonal index of the Neourakawan (Santonian), directly with *Inoceramus incertus* Jimbo (1894, p. 43, pl. viii, fig. 7; Nagao and Matsumoto 1940, p. 10, pl. iii, figs. 1–5; pl. x, fig. 2) of the Neogyliakian (approximately Turonian), it now seems more reasonable and natural to ascribe the immediate ancestor of *I. amakusensis* to *I. mihoensis* of the late Paleourakawan. In fact *I. amakusensis* is very similar to *I. mihoensis* in the early part of the valve, while the adult *I. amakusensis* is characterized by much

larger, higher and more flattened shell. In this respect *I. amakusensis* and *I. expansus-I. ezoensis* are in parallel.

I have not sufficient evidence to decide the ancestor of *I. inconstans* but it could be sought in such a form as *Inoceramus latus* SOWERBY (=*I. labiatus* var. *latus in* WOODS 1911, p. 284, text figs. 38, 40) of the Turonian. In this connection it should be noted that *I. incertus* JIMBO in our Neogyliakian (Turonian) is very closely allied to *I. latus*.

To sum up, taking into consideration all these relations as well as the morphological resemblance and stratigraphic occurrence, *I. mihoensis* is best regarded as a lateral offshoot, perhaps localized in the Northern Pacific area*, from the main stock of the group of *I. inconstans*. The species was relatively short-ranged and in the succeeding stage *I. amakusensis* took its place, being distributed characteristically in the Neourakawan.

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* We have still to examine the Western American forms in comparison with ours. Without seeing the specimens, I cannot make clear conclusion.

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T. MATSUMOTO

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Plate

Plate 21

Inoceramus mihoensis n. sp.

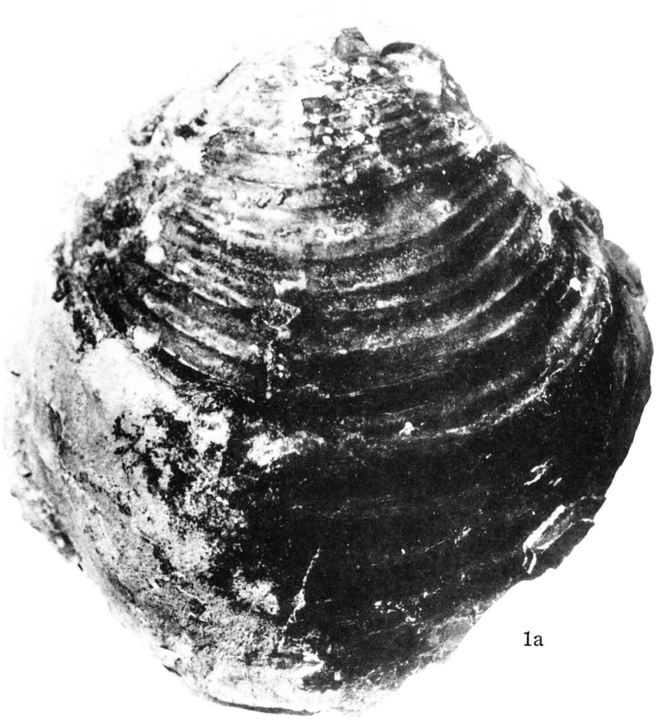
Fig. 1. Right valve, lateral (a) and anterior (b) views, natural size. Holotype, GK. H358, loc. N134f, near Hagoromo-bashi, Miho, zone Mh5, Miho group in the mid-valley of the Naibuchi, South Saghalien (T. M. Coll.).

Fig. 2. Left valve, lateral (a) and anterior (b) views of a paratype and a fragment of another specimen (umbonal view in fig. 2b), natural size. GK. H359, the same locality and horizon as the holotype. (T. M. Coll.).

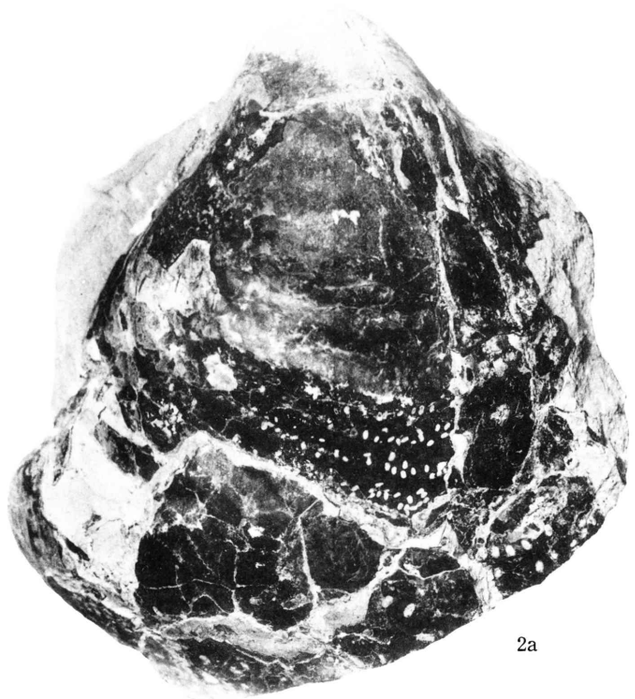
Fig. 3. Right valve, lateral (a), posterior (b) and anterior (c) views, ×3/4. An example, GK. H361, from loc. N134h, near Hagoromo-bashi, Miho, zone Mh5, Miho group in the mid-valley of the Naibuchi, South Saghalien (T. M. Coll.).

Fig. 4. A small, probably immature, example of the right valve, natural size. GK. H901 from Ik1414, the Kami-ichi-no-sawa, a tributary of the Ikushumbetsu, zone of ***I. mihoensis***, Ishikari Province, Hokkaido (T. M. Coll.).

Photos by T. MATSUMOTO and I. OBATA.



1a



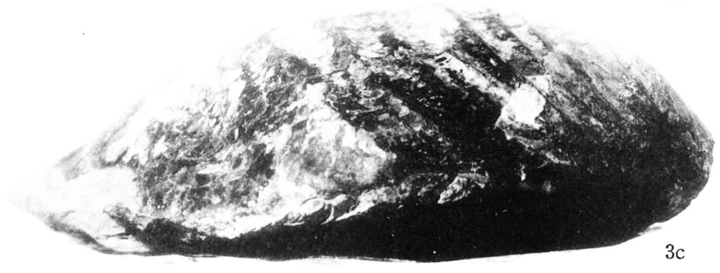
2a

3a

1b

2b

4



3c

3b

T. Matsumoto: *Inoceramus mihoensis* n. sp.