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Palaeontological Society of Japan

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報　告 Transactions

Trans. Palaeont. Soc. Japan, No. 17, Art. 98, 1940. Jour. Geol. Soc. Japan, Vol. 47, No. 556, 1940.

97. *A Preliminary Note on the Fossils from Hiraga-gun, Akita Prefecture, Northeast Honsyû, Japan.*

By

Kotora M. HATAI and Syôzô NISIYAMA

(Read October 7th; received October 14th, 1939)

The stratigraphy of the region lying on the east and west of the Waga mountains was worked out by K. MURAYAMA,[1] who gives the following succession of the rocks there developed, namely:—

East of the Waga Mountains	West of the Waga Mountains (Mahirudake Mountains and in the Waga Basin)
Kawasiri tuff beds	
	Kanazawa tuff and shale beds
	Sannai shale beds
..... unconformity	..... unconformity .....
Sasama beds	
	Kurosawa sandy shale beds
Tunatori sandstone and shale beds	
Araya sandstone beds	Hanayama sandstone beds
.... unconformity	
	Yosizawa sand and gravel Beds

The fossils collected by the writers are from the west of the Waga mountains, a region whose precise stratigraphic details were given by K. MURAYAMA as follows:—

Kawasiri tuff beds:—Several hundred meters of green tuff, tuff breccia, intercalating thin layers of conglomeratic and sandy tuff, tuffaceous shale and sandstone. The beds cover unconformably the Palaeozoic formation and biotite-granite and hornblende-biotite-granite. The beds carry numerous auriferous and cupriferous quartz veins and other metallic ore deposits. Abundant silicified wood and a few marine shells are found in the beds.

Kanazawa tuff and shale beds:—Alternating beds of green tuff, tuffaceous shale and sandstone with a little of conglomerate. *Thyasira* and an Echinoid are collected from the beds.

1) K. MURAYAMA:—Explanatory Text of the Geological Map of Japan, Scale 1:75,000, Zone 9, Xol. 111, Sheet 32, Yokote. Imp. Geol. Surv. Japan, 1937 (Japanese with summary in English).

Sannai shale beds :—Is composed of hard shale intercalating with some tuff and sandstone.

Kurosawa sandy shale beds :—Basal conglomerate, 2 to 10 meters, is followed by black tuffaceous sandstone with conglomeratic layers. Above it occurs an alternation of tuffaceous sandstone and shale, about 100 meters in total, superposed by thick sandy shale with some grey shale which consists of the greater part of the beds. On the top is tuffaceous and nodular sandstone. A marine fossil, *Thyasira bisecta* CONRAD var. *nipponica* YABE et NOMURA is characteristic of the beds.

Hanayama sandstone beds :—Largely of loose sandstone and conglomerate, with a minor amount of shale. Locally thin seams of lignite or coal are embedded.

Yosizawa sandstone and gravel beds :—Unconsolidated sand and gravel in alternation, overlying unconformably the Hanayama sandstone beds in the Waga Basin.

Younger deposits consist of gravel, sand and clay which from the low terraces along the rivers. The whole complex, from the Kawasiri tuff beds up to the Yosizawa sand and gravel beds apparently belong to the Neogene in age.

In regard to the entire Tertiary system dealt with by K. MURAYAMA, the following interesting remarks are given in his work, namely:—

Tertiary rocks that grouped here as the Kawasiri Tuff Beds, probably of early Miocene age, construct a greater part of the Ou Mountain System which, in the mapped area, consists of two mountain masses, the Waga Mountains on the east and the Mahirudake Mountains on the west, separated by a lowland, the Waga Basin. The Kawasiri beds may be correlated with the Kosaka and Furokura Tuff Beds known in the Kosaka and Hanawa sheet-map areas further north. In the southern part of the Mahirudake Mountains the Kawasiri tuff beds are succeeded by another younger series, probably of Middle Miocene age, which comprises two rock-groups, the Kanazawa Tuff and Shale Beds and the Sannai Shale Beds. This Miocene series seems to be equivalent to the Ogasima Series in the oil-fields of Akita.

Resting unconformably upon the above mentioned rocks are Pliocene formations which comprise strikingly different lightological types in the eastern and western flanks of the Waga Mountains, although these seem collectively to be almost contemporaneous in age. In the former region, the Pliocene is classified into the Sasama Beds, Tunatori Sandstone and Shale Beds and Araya Sandstone Beds and in the latter, into Kurosawa Sandy Shale Beds and Hanayama Sandstone Beds. These may correspond to the Yuri Series and the Sibikawa Sandstone in the oil-regions of Akita. In the Waga Basin, the Pliocene beds are covered by the Yosizawa Sand and Graval Beds which are thought to be Uppermost Pliocene in age.

As to correlation[1] of the above stated Neogene deposits with other regions within Northeast Honsyû, Japan another short article will be published, while the present one will deal only with the few fossils collected by the writers on the one hand and with a few more or less interesting features observed in the field on the other.

Before going further, the writers wish to acknowledge their warmest thanks to Prof. H. YABE of the Institute of Geology and Palaeontology, Tôhoku Imperial

1) In regard to correlation of geographically isolated geological formations, the readers are refered to an article submitted to the 6th Pan-Pacific Science Congress held in California, 1939, in which correlation of the more important geological formations (Tertiary) of Japan are fully dealt with.

University, where the present work was undertaken, for kindly submitting this article for publication. Thanks are also due to the Saito Ho-on Kai Foundation in Sendai, for the grant-in-aid, which has made possible the trip to various regions within Northeast Honsyû, Japan.

The fossils collected by the writers are from two localities; one is a well exposed cliff built of rather hard tuffaceous sandy shale of light grey color, below the primary school at Kurosawa in Sannai-mura, and is mapped by K. MURAYAMA as belonging to his Hanayama sandstone beds; the other locality is a small river cliff in the upper course of the Kurosawa-gawa near Kami-Kurosawa also in Sannai-mura, and is mapped as the Kurosawa sandy shale beds. The fossils collected are very few in number, as shown below.

Cardium (*Clinocardium*) species indet.	Kurosawa	
Lucina (*Myrtea*) *acutilineata* CONRAD	Kurosawa	Kami-Kurosawa
Macoma tokyoensis MAKIYAMA	Kurosawa	Kami-Kurosawa
Macoma incongrua (v. MARTENS)	Kurosawa	
Mya cuneiformis (BÖHM)		Kami-Kurosawa
Serripes laperousi (DESHAYES)	Kurosawa	
Tellina species indet.	Kurosawa	Kami-Kurosawa
Natica janthostoma DESHAYES	Kurosawa	Kami-Kurosawa

Although the number of fossils are very few at both localities, it is interesting to notice that *Serripes laperousi* (DESHAYES) is very common at Kurosawa while *Mya cuneiformis* (BÖHM) is most common at Kami-Kurosawa. Further, all of the specimens of *Lucina acutilineata* CONRAD which have been collected or observed at the localities, are very small in size, irregardless of the fact that the seas at the time when the fossils once lived were cool; a climatic condition quite favorable to *Lucina acutilineata*.

Juding f.om lithological characters of the two localities, that of Kurosawa is hardly distinguishable from the light grey to yellowish, rather hard tuffaceous sandy shale of the Kuzusawa beds[1] near Aterazawa in Yamagata-ken. The Kuzusawa beds near Aterazawa in Yamagata-ken is also characterized by having large numbers of *Serripes laperousi* (DESHAYES) in addition to *Turritella saishuensis* YOKOYAMA, *Buccinum* and others. The locality of Kami-Kurosawa which consists of rather compact, ashy-grey tuffaceous sandy shale, much resembles the fossiliferous parts of the Wakimoto[2] sandy shales beds on the Oga Peninsula in Akita-ken as well as the Hanezawa[3] sandy shale beds near Sinzyô in Yamagata-ken, and

1) E. MURAKOSI :—The Geology and Topography of the Upper Course of the Sagaegawa, Nisi-Murayama-gun, Yamagata-ken. Graduation Thesis of Inst. Geol. Pal., Tôhoku Imp. Univ., (in Japanese), 1936.

2) S. NOMURA and K. HATAI: A Note Concerning Data on the Bathymetric Range of Certain Marine Animals and Remarks on the Geology of the Neogene Formations in Northeast Honsyû, Japan, and Their Depth of Sedimentation as Indicated by the Fossil Fauna. Saito Ho-on Kai Mus., Res. Bull., No. 10, p. 317, 1936.

3) Y. IIZUKA: On the Geology of the Yamagata Oi-Fields. Jour. Geol. Soc. Tokyo, Vol. 37 (Supplement to No. 447), 1930 (in Japanese). S. NOMURA and N. ZINBO :—List of the Neogene Mollusca Collected from the Vicinity of the Town Sinzyô, Mogami-gun. Saito Ho-on Kai Mus., Res. Bull. No. 13, 1937.

also similar rocks with fossils are developed along the upper course of the Nikkogawa[1] in Yamagata-ken.

From the foregoing statements it appears that the lower part of the Hanayama sandstone beds of K. MURAYAMA should better be placed in a part of the Kurosawa sandy shale beds, particularly from the view point of fossil-content and lithological characters as will be stated in full elsewhere.[2] Consequently, it follows that the Kurosawa sandy shale beds plus a part of the Hanayama sandstone beds is an equivalent of the Wakimoto sandy shale beds of the Oga Peninsula, and that the Yosizawa sand and gravel beds may roughly correspond to the Sibikawa sandstone beds of the Oga Peninsula. Further correlation will be given elsewhere.

秋田縣和賀郡産化石二・三に就きて (摘要)

畑井小虎・西山省三

秋田縣和賀郡山内村黒澤及上黒澤に發達せる第三紀層中に産する化石に就き本論文に於て述べたり。
化石並に地層は秋田・山形兩縣下に於ける分布並に層位的關係よりして下部鮮新統なること明らかとなれり。
尙詳細報告は準備中なり。

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1) S. NOMURA:—On Some Neogene Fossils from along the Upper Course of the Nikkô-gawa, Akumi-gun, Yamagata-ken, Northeast Honsyû, Japan. Saito Ho-on Kai Mus., Res. Bull., No. 13, 1937.

2) A full account of the Tertiary Deposits of the Japanese Islands is now in preparation.

Trans. Palaeont. Soc. Japan. No. 17, Art. 97, 1940: Jour. Geol. Soc. Japan, Vol. 47, No. 556, 1940.

98. *On the Occurrence of Taxodioxylon albertense (PENHALLOW) in the Senonian of Karahuto (Japanese Saghalien)*

By

Misaburo SHIMAKURA

(Read October 7th, 1939, Received October 14th, 1939)

A number of fossil wood from Kawakami Coal Mine, Toyohara-gun, Karahuto (Japanese Saghalien) is stored in the Department of Geology and Mineralogy, Hokkaidô Imperial University, Sapporo. It is interesting that there is a wood specimen belonging to *Taxodioxylon albertense* (PENHALLOW) SHIMAKURA among these materials.

General structure of this specimen is:

Growth rings wide, boundaries distinct. Bordered pits on radial walls of early wood tracheids circular or oval, arranged in one or two rows, opposite and laterally contacted when in two rows, with circular or oval pit-apertures; crassulae distinct (Fig. 1). Tangential bordered pits of late wood tracheids small, circular, scattered, few in number; with oval or lenticular pit-apertures; often contacted and compressed bordered pits present in both ends of tracheids. Rays very high, often reach 70–80 cells high, 1–2 cells wide (Fig. 2); ray cells all parenchymatous, irregular in size and shape, ray pits on lateral walls large, circular, half-bordered, one, rarely 2–3, per field; with oval or oblong, oblique pit-

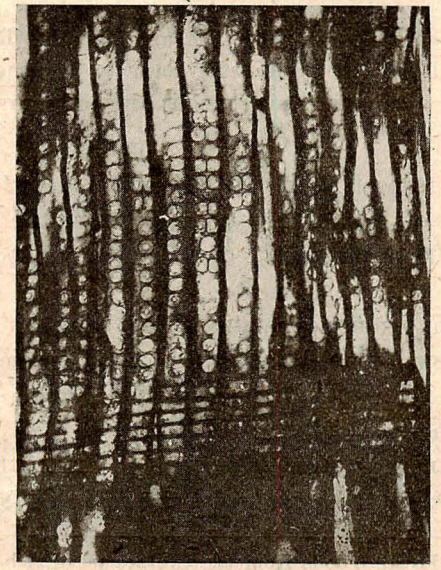

Fig. 1. Radial section of the Wood, showing Bordered pits on the tracheids and rays.

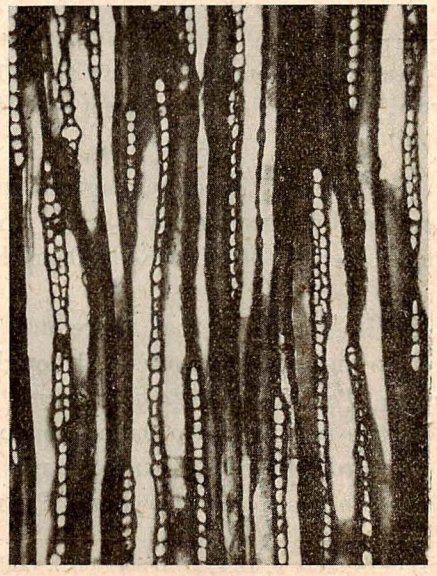

Fig. 2. Tangential section of the Wood, showing biseriate rays.

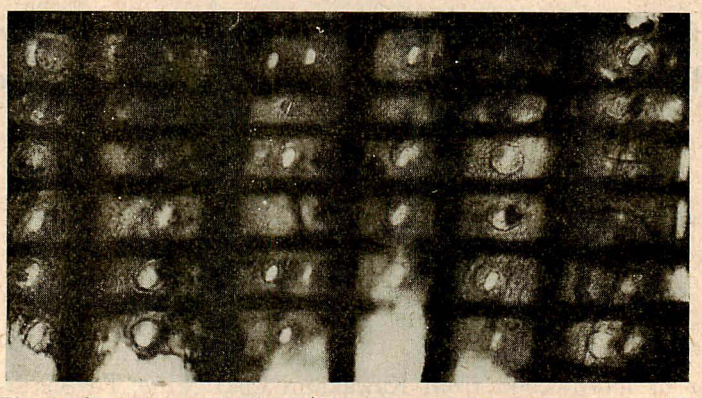

Fig. 3. Radial section of the Wood, showing Ray-pits in the fields.

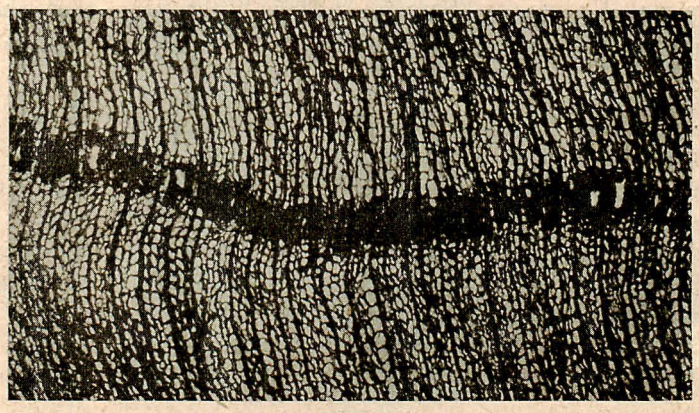

Fig. 4. Transverse section of the Wood, showing traumatic resin canals.

apertures (Fig. 3); tangential and horizontal walls of ray cells thin and smooth. Resin cells scattered throughout growth-ring; horizontal walls of resin cells seem to be smooth. Normal resin canal always absent; while vertical traumatic resin canals distinctly present (Fig. 4).

The present specimen agrees in every respect with *Taxodioxylon albertense* described by PENHALLOW[1] under the name of *Sequoia Albertensis* from the Edmonton Series of the Red Dear River, 100 miles west of Gleichen, Alberta, Canada.

It is doubtless that there are some phylogenetic relationships between this wood species and *Sequoia*. Although KRÄUSEL[2] thought that this wood species is near to *Taxodioxylon sequoianum* (MERCKL.) GOTHAN, the essential difference between the two is in the lateral pitting on the ray cells.

According to KNOWLTON and PENHALLOW, *Picea albertensis* PENHALLOW, *Cupressinoxylon macrocarpoides* PENHALLOW, and *Sequoia reichenbachii* (GEINITZ)

1) PENHALLOW, D. P.: Report on a Collection of Fossil Woods from the Cretaceous of Alberta. Ottawa Naturalist, Vol. XXIV, No. 4, 1908.

2) KRÄUSEL, R.: Die fossilen Koniferenhölzer. Palaeontogr., Bd. LXII, 1919.

HEER accompany *Taxodioxylon albertense* (PENHALLOW) in the Cretaceous of Alberta district. In Kawakami Coal Mine, the present writer[1] found the following species:

Cladophlebis frigida (HEER)
? *Nilssonia* sp.
Nipponophyllum sp. nov.
Brachyphyllum vulgare (STOPES et FUJII)
Brachyphyllum sp.
Brachyoxylon sp.
Cedroxylon cf. *Yendoi* STOPES et FUJII
Piceophyllum sp.
Piceoxylon sp.
? *Prepinus* sp.
Phyllocladoxylon aff. *Gothanni* (STOPES)
Podocarpoxylon sp.
? *Sciadopitytes* sp.
Cryptomeriopsis antiqua STOPES et FUJII
Paracupressinoxylon cryptomerioides SHIMAKURA
Geinitzia sp. (aff. *Sequoia reichenbachii* HEER)
Strobilites sp.
Carpolites sp. nov.

The second record of *Taxodioxylon albertense* (PENHALLOW) was published in 1937 by the writer.[2] It is two specimens collected from the Senonian (the Hutaba Group of the Urakawa Series), one from Oriki Mineral spring and the other from the south bank of the Asamigawa, Hirono-mura, Hutaba-gun, Hukusima-ken, Northeast Japan. The occurrence[3] of this species in the Senonian of Karahuto may indicate its wide distribution in the East Asia in that time.

Finally the writer wishes to express his sincere thanks to Prof. H. YABE of the Tôhoku Imperial University for his kind guidance, and also to Prof. T. NAGAO of the Hokkaido Imperial University for his kind offer the specimens for study.

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1) SHIMAKURA, M.: Preliminary Report on Some Cretaceous Plants from Karahuto. Trans. Palaeont. Soc. Jap., No. 23, 1936.

2) SHIMAKURA, M.: Notes on Fossil Woods, V. (In Japanese). Journ. Geol. Soc. Jap., Vol. XLIV, No. 527, 1937. SHIMAKURA, M.: Studies on Fossil Woods from Japan and Adjacent Lands. Contribution II. The Cretaceous Woods from Japan, Saghalien, and Manchukuo. Sci. Rep. Tôhoku Imp. Univ., Ser. 2, (Geol.), Vol. XIX, No. 1, 1937.

3) SHIMAKURA, M.: The Past Distribution and Origin of Coniferous Plants in Japan. Jubilee Public. Commemoration of Prof. H. YABE's 60th Birthday, 1939.

樺太セノニアン産 *Taxodioxylon albertense* (PENHALLOW) に就いて (摘要)

島倉巳三郎

長尾教授の好意により北海道帝國大學理學部地質學鑛物學教室所藏南樺太豐原郡川上炭坑産の化石木を研究せる結果その中に *Taxodioxylon albertense* に同定出來るものを見出した。このものは先に筆者が福島縣双葉郡廣野村のセノニアン層から報告せるものと全く同一種であつて，共に PENHALLOW によつてカナダの Alberta 地方の白堊紀層から曾て報告せられたものと區別し難い。

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99. Notes on Heterophyllia and Hexaphyllia

By

Hisakatsu YABE and Toshio SUGIYAMA

(Read October 7th ; received October 14th, 1939)

In the fifteenth Meeting of the Palaeontological Society of Japan held June 17, this year at the Geological Institute, Tokyo Imperial University, the present writers reported on a new discovery of some fossil corals belonging to the genera *Hexaphyllia* and *Heterophyllia* in a Lower Carboniferous Limestone of Hikoroiti-mura, Kesen-gun, Iwate-ken in the Kitakami Mountainland[1]. At that time two new species were distinguished of *Hexaphyllia*, but only mere mention of the occurrence of *Heterophyllia* could be given, owing to its scanty material. Subsequently better specimens of the latter genus were found in the same material and a careful examination of them has not only revealed that there is a new species, but further, what is more important is that the material brought forth good evidence confirmatory to the close relationship of the two genera, and moreover, that they are not in harmony with the view of their being hexacorals or tetracorals in ordinary sense. The present note is devoted to the description of the new species of *Hexaphyllia* and a consideration on the systematic position of the two genera as indicated by the arrangement of septa.

The genus *Heterophyllia* was first erected by F. M'COY[2] in 1849 on *H. grandis* M'COY and *H. ornata* M'COY ; the original generic diagnosis runs as follows:

"Stem elongate, subcylindrical, irregularly fluted longitudinally : *horizontal section*, few, distant lamellae destitute of any order of arrangement, but irregularly branching and coalescing in their passage from the thin solid external walls towards some indefinite point near the center, where the few main lamellae irregularly anastomose : *vertical section*, showing about the middle an irregularly flexuous line (the edge of one or two of the rediating ve.tical lamellae), from which on each side a row of thin, distant, sigmoidally curved plates extend obliquely upwards and outwards, forming a row of large rhomboidal cells on each side."

In 1869, P. M. DUNCAN[3] extended the genus *Heterophyllia* to include his new

1) H. YABE and T. SUGIYAMA : Discovery of *Hexaphyllia* in the Lower Carboniferous of Japan. Trans. Pal. Soc. Japan, No. 16, Art. 91, pp. 85-88, pl. 13, 1939.

2) F. M'COY : On Some New Genera and Species of Palaeozoic Corals and Foraminifera. Ann. Mag. Nat. Hist., Ser. 2, Vol. III, p. 126, 1849.

3) P. M. DUNCAN : On the Genera *Heterophyllia*, *Battersbyia Palaeocyclus*, and *Asterosmilia* ; the Anatomy of Their Species, and Their Position in the Classification of the Sclerodermic Zoantharia. Phil. Trans. Roy. Soc., London, Vol. 157, pp. 644-648, 1867.

species *m'coyi*, *lyelli* and *mirabilis*, aside from *sedgwicki*, *granulata* and *angulata* which are closely allied to the previously known species (*Het. grandis* and *ornata*), and distinguished two groups of species; in the first three species coralla are small and constant in bearing only 6 septa: these species were correctly transfered by later authors to an allied genus *Hexaphyllia* STUCKENBERG, 1904[1] with the genotype *Hex. prismatica* STUCKENBERG from the Lower Carboniferous of Central Russia. It is hence quite natural that the generic diagnosis of *Heterophyllia* given by DUNCAN[2] differs from that of M'COY. The members of the other group of DUNCAN being left in *Heterophyllia*, its confine is now almost reduced to the original one.

Heterophyllia, in this revised sense, has only those species reported from the Lower Carboniferous of Scotland, and it is by the present discovery of a new species of it in the Kitakami Mountainland that it to the first time has been found to have had its geographical distribution outside of Scotland, and extended to the Far East; it is particularly interesting that the genus occurs in association with *Hexaphyllia* in the contemporaneous deposits in Japan as in Scotland.

Heterophyllia kitakamiensis, sp. nov.

Pl. 4 (1), Figs. 1-7

Corallum (or corallites) cyindrical, somewhat attenuated posteriorly calical and basal parts not preserved, oblong in cross section, slightly arcuate, over 30 mm long, up to 2.5 mm broad; wall 0.15 mm thick, consists of thin primordial wall and rather thick stereozone, the latter composed of, under high magnification, numerous concentric layers arranged as in *Hexaphyllia elegans* YABE and SUGIYAMA and *Hex. japonica* YABE and SUGIYAMA. Septa 13; two opposite, septa, presumably cardinal (c) and counter (c') septa, meeting at the center of corallum. lying on a medial plane and dividing it symmetrically into two bilateral parts, alar septa (*a*) as large as cardinal and counter septa, strongly converged towards cardinal side, united by their inner margins to cardinal septa at or near the center of corallum; other septa strictly confined in counter quadrants, 9 in number in the type specimen, comprising 5 in right side and 4 in left side. Tabulae few, distant, either ascending close to wall or nerrly horizontal (Pl. 4 (1), Figs. 6 a, 6 a' 6 b, 6 b'). Outer surface more or less costulated along the inner margin of septa; otherwise smooth.

Remarks: At present having no evidence of colony building, the coral in question is considered as forming simple corallum. It agrees well with *Heterophyllia* in every feature and especially is similar to *Het. angulata* and *Het. sedgwicki* in the general outline of corallum and in the arrangement of septa; but the two foreign forms are larger, bear a greater number of septa and tabulae.

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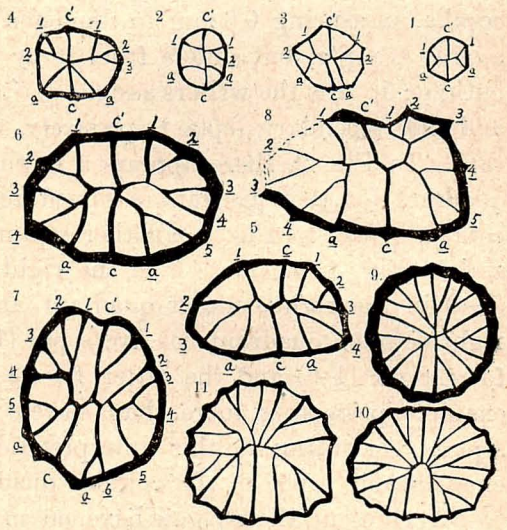
1) A. STUCKENBERG: Anthozoen und Bryozoen des unteren Kohlenkalkes von Central Russland. Mém. Com. Géol. Russie, n. s. No. 14, p. 72. 1904.

2) P. M. DUNCAN: l. c. "The corallum is simple, long and slender. The gemmation takes place around the calicular margin, and is extracalicular. The septa are either irregular in number and arrangement, or else are six in number and regular. The costae are well developed, and may be trabecular, spined, and flexuous. The wall is thick, there is no epitheca, and the endotheca is dissepimental."

Besides the typical examples of *Het. kitakamiensis* there are several coralla in transverse section which diverge from the typical examples in certain respects, namely, subquadratic outline, prominent costa-like ridges, and slender septa; these are for a while distinguished as *Het.* sp. nov., cfr. *kitakamiensis* (Text-fig. 1, (8); Pl. 4 (1), Figs. 8, 9).

Localities and geological horizons; Pass between Higuti-zawa in Kawauti and Onimaru in Ômori (Reg. No. 63272, holotype, and 63279), Yuba-zawa in Sakamoto-zawa (Reg. No. 65280), both in Hikoroiti-mura, Kesen-gun, Iwate-ken. Lower Carboniferous Onimaru Series; found in limestone in association with *Lithotrotion irregulare* (PHILLIPS), *Syringopora* spp., *Hexaphyllia japonica* YABE and SUGIYAMA, *Hex. elegans* YABE and SUGIYAMA, *Ozawainella*, *Endothyra*. *Het.* cf. *kitakamiensis* is from the first locality.



Text-fig. 1. Sketches of *Heterophyllia*
1-7. *Heterophyllia kitakamiensis*, sp. nov., shown in Pl. 4 (1), Figs. 1-7.
8. *Heterophyllia* cf. *kitakamiensis*, sp. nov., shown in Pl. 4 (1), Fig. 8.
9. *Heterophyllia granulata* DUNCAN, ×ca. 1.8
10. *Heterophyllia sedgwicki* DUNCAN, ×ca. 2
11. *Heterophyllia angulata* DUNCAN, ×ca. 2

Manner of Increase of Septa in Number

In the former paper dealing with the Japanese species of *Hexaphyllia* the writers[1] referred to the particular mode of thickening of the stereozone of wall, namely, each of its lamellae which are parallel to the primordial wall bend abruptly backwards or outwards in approaching the proximal end of septa. The very same feature is visible also in *Hexaphyllia kitakamiensis* and *Het.* cf. *kitakamiensis*. In these two genera, the enlargement of corallum takes place along the proximal end of septa; in *Heterophyllia* with more than 6 septa, the points of most vigorous growth of wall increase in number with new addition of septa.

While *Hexaphyllia* possesses only 6 septa throughout its individual life (except the youngest stage, of which nothing is known to the writers), *Heterophyllia* in advanced stages of growth is always provided with more than 6 septa and it is now found that there is a young stage with 6 septa only, which are arranged similarly as in *Hexaphyllia* (Text-fig. 1, (1); Pl. 4 (1). Fig. 1).

There are numerous young coralla or younger parts of the mature coralla of the Japanese species of *Heterophyllia*, in transverse section, which serve for deciphering the manner of addition of new septa in the genus; the following inter-

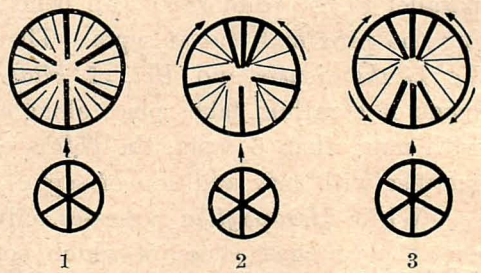
1) H. YABE and T. SUGIYAMA: l. c.

pretation is proposed in harmony as possible with that now current as to the septa of tetracoralls and hexacoralls.

Some of the most typical ones observed are selected for illustration in the annexed Text-figures 1 (1–7). Fig. 1 represents one of the youngest or smallest coralla, measuring 0.6 mm in diameter; it is quite similar to *Hexaphyllia* in possessing 6 septa, but differs from it by thinner stereozone of the wall and angular outline; in this the writers assume $\underline{c}$, $\underline{c}'$, $\underline{a}$, $\underline{a}$ and $\underline{1}$, $\underline{1}$ to be the cardinal, counter, alar and first secondary septa respectively, the last two appearing in the counter quadrant. In Fig. 2, there appears a septum $\underline{2}$ between $\underline{1}$ and a in the right counter quadrant (or the quadrant assumed to correspond to counter quadrant of tetracorals). Next in Fig. 3, another septum $\underline{2}$ appears in the left counter quadrant, and in Fig. 4 one more $\underline{3}$ in the right. In Fig. 5, there are already four septa ($\underline{1}$–$\underline{4}$) in the right counter quadrant and three ($\underline{1}$–$\underline{3}$) in the left. In Fig. 6, the right counter quadrant has five septa ($\underline{1}$–$\underline{5}$) and the left four ($\underline{1}$–$\underline{4}$); in Fig. 7, the former six ($\underline{1}$–$\underline{6}$) and the latter five ($\underline{1}$–$\underline{5}$). In the Japanese species, there is no example possessing more than eleven septa aside the cardinal, counter and alar septa. According to this interpretation, the younger septa appear successively close to alar septa in the counter quadrants and none in the cardinal.

At present the writers have no material of *Heterophyllia* from Scotland for comparative study, but can find good illustrations of Scottish forms in several papers consulted[1]. These figures show that all the species surpass the Japanese form in number of septa, though only by a few, and at the same time that the former do not essentially differ from the latter in general plan of the arrangement of septa which makes it very probable that in these species the succession of septa also follows the same rule as observed in the Japanese, though it is not excluded that some of the septa, especially smaller ones, may belong to a different cycles than others or may be different nature, as the exosepta of the Hexacoralla are.

Accepting the view of six primary septa in all corals—Hexacorals, Tetracorals and those now in concern—every corallum can be considered as being divided into six sextants. These sextants are all equivalent in hexacorals younger septa appearing symmetrically in regular cycles in each of them. In tetracorals, two sextants adjacent to the counter septa are suppressed and younger septa are added only in the two other pairs of sextants, where the addition of septa takes place always one-sidedly. In *Heterophyllia* and *Hexaphyllia*, on the other hand, four sextants—two



Text-fig. 2. Scheme of orthogenetic septal arrangement of Hexacorals, Tetracorals and Heterophyllidae.
1. Hexacorals
2. Tetracorals
3. Heterophyllidae

1) Beside those already cited, to mention at this place is. H. A. NICHOLSON and R. LYDEKKER: Manual of Palaeontology, 3rd Ed., Vol. I, p. 271, 1889.

adjacent to the cardinal septum and two to the counter—are suppressed and new septa appear only in two intermediate sextants; further they are related nearer to the Tetracoralla than to the Hexacoralla in the arrangement of new septa in the two sextants, always being one-sided and never symmetrical as in hexacorals.

In his paper of 1887, DUNCAN[1] discussed the systematic position of *Heterophyllia*, including also *Hexaphyllia* of the present day in his conception, and eventually brought them under Hexacoralla and especially included them in the Family Astraeidae, erecting a new subfamily Palastracacea for them. Later, F. ROEMER[2] recognized their affinity to tetracorals, and in consequence raised the subfamily to the family Palastraeidae in transfering it to the Tetracoralla, in his Lethaea Palaeozoica, 1880. M. NEUMAYR also sustained ROEMER's view after a lengthy discussion in his "Die Stämme des Tierreiches, I, 1889.[3] STUCKENBERG,[4] founder of the genus *Hexaphyllia*, however, simply followed DUNCAN in 1904, as to the systematic position of this genus, without any particular comment. In later editions of K. v. ZITTEL: "Grundzüge der Palaeontologie,"[5] *Heterophyllia*, *Hexaphyllia* and *Battersbyia* are all placed in the Cyathophyllidae. Very recently W. G. SANFORD[6] in his through revision of the families of the Tetracoralla, threw *Heterophyllia* and *Hexaphyllia*, together with *Battersbyia*, aside in his "Unresolved genera."

The writers have shown above that *Heterophyllia* and *Hexaphyllia* are quite different from hexacorals, in spite of their having in common six primary septa; likewise they can not be included in tetracoralls in the ordinary sense. Certainly they need their own family, distinct from any other coral families, for which Heterophyllidae is here proposed on the typical genus *Heterophyllia*, to substitute Palastraeacae of DUNCAN and Palastraeidae of ROEMER, as the older names are in disharmony with the International Rule of Zoological Nomenclature.

As to the systematic possition of the family Heterophyllidae, the writers now bear in mind an idea as the following scheme shows:

Hexacoralla
Tetracoralla
  Dycoelia—including the single family Heterophyllidae.
  Tetracoelia—including all other families hitherto assigned to the Tetracoralla.

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1) P. M. DUNCAN: l. c., p. 650.
2) F. ROEMER: Lethaea Palaeozoica, I, p. 412, 1880.
3) M. NEUMAYR: Die Stämme des Thierreiches, I, p. 275, 1889.
4) A. STUCKENBERG: l. c.
5) K. A. von ZITTEL: Grundzüge der Palaeontologie Invertebrata, p. 108, 1924.
6) W. G. SANFORD: A Review of the Families of Tetracorals. Part II, Amer. Jour. Sci. Vol. 237, No. 6, p. 416, 1939.

Explanation of Plate 4 (1)

1-7. *Heterophyllia kitakamiensis*, sp. nov.
1. Cross section, 0.6 mm broad; ×20
2. Ditto, 0.7 mm broad; ×20
3. Ditto, 0.9 mm broad; ×20
4. Ditto, 1.1 mm broad; ×20
5. Ditto, 2.2 mm broad; ×20
6a. Ditto, 2.5 mm broad; ×20
6a′ Microstructure of wall and septa of the specimen shown in 6a; ×ca. 20
6b Longitudinal section of the specimen shown in 6a; ×20
6b′ Microstructure of wall and septa of the specimen shown in 6b; ×ca. 20
7. Cross section, 2.1 mm broad; ×20

8, 9. *Heterophyllia* of *kitakamiensis*, sp. nov.
8. Cross section, 2.8 mm broad; ×20
9. Ditto, 2.3 mm broad; ×20

10a, 10b. Microstructure of wall and septa of *Hexaphyllia elegans* YABE and SUGIYAMA ×ca. 15
10a Cross section
10b Longitudinal section

Heterophyllia 並に *Hexaphyllia* に就いて (摘要)

矢部長克・杉山敏郎

筆者等は前回の本會席上に於いて岩手縣氣仙郡日頃市村の下部石炭紀の石灰岩から *Hexaphyllia* の 2 新種を報告し, 同時に *Heterophyllia* の共産するを指摘したが, 其後研究を續けた結果其 *Heterophyllia* も 1 新種なることを確め得た。是等兩屬は日本種を合せ合計 6 種づゝ世界から知られ, 殊に日本が *Heterophyllia* の第 2 の産地である。幸ひ日本産此兩屬の種は何れも保存良く, 內部構造を充分伺ひ得たのみならず, *Heterophyllia* に於いては幼期から成熟期に至る間の縱隔壁の變化並に配列の順序を窺ふことが出來た。此の結果によると是等兩屬は互に密接なる關係を示し, 六射珊瑚並に四射珊瑚中の何れの旣存の科にも入れられない性質を示してゐる。從つて是等兩屬を包含する 1 新科 Heterophylli'ae を此處に提唱する。

旣に知られた如く六射珊瑚では縱隔壁が 6 ケ所に一樣に而も放射狀に現はれるが, 四射珊瑚では 4 ケ所に限られてゐる。Heterophyllidae では更に 2 ケ所に限られるのみならず, 縱隔壁が左右對稱に配列される事並に骨格の內部構造等は四射珊瑚に近緣である。從つて四射珊瑚を新に *Tetracoelia* と *Dycoelia* とに新に 2 分し Heterophyllidae を後者に入れるが最も妥當である。


6 b


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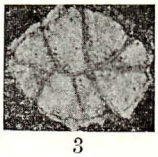
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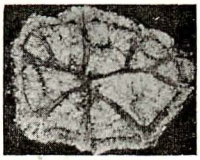
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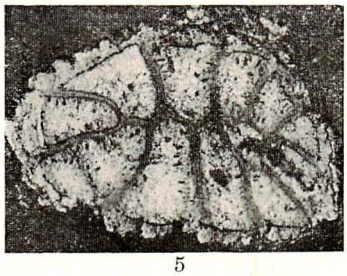
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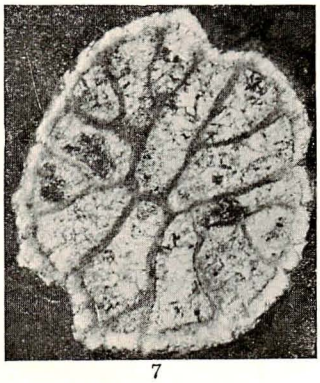
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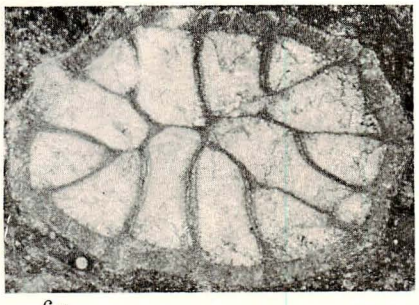
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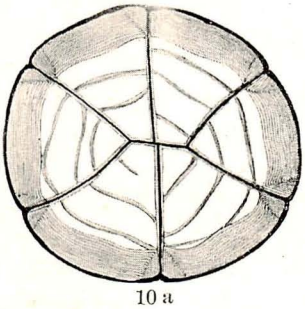
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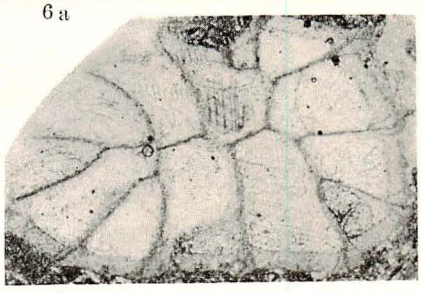
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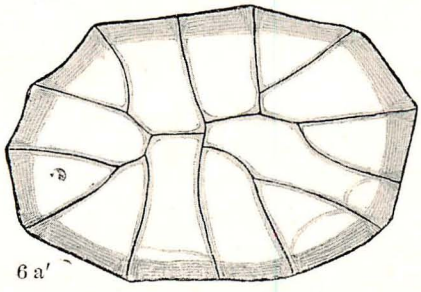
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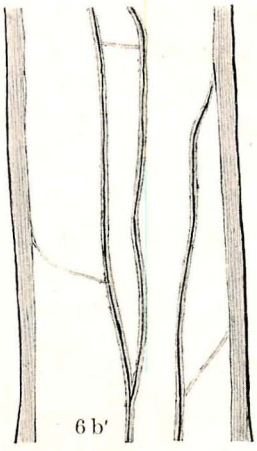
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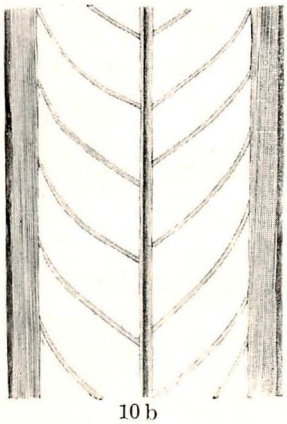
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100. On the Mode of Occurrence of Glycymeris matumoriensis NOMURA and HATAI, in the Nanakita District, Rikuzen

By

Kotora M. HATAI and Manziro NAKAMURA

(Read October 7th; received October 14th, 1939)

In a recent article, S. NOMURA and K. HATAI[1] recorded from the Miocene rocks of the Nanakita District in the north of Sendai City, Rikuzen Province, Honsyû, a very interesting shell, which they named *Glycymeris matumoriensis*. In their report it was stated that this particular species occurs at Matumori (the type locality), Isikura and Kumagai, being particularly abundant at the first locality and frequent in the others. Since their publication, the writers have been engaged in the field study of the Nanakita District, and although the work is yet in progress, the writers have found, they believes, interesting data in the field which throws additional light on the mode of occurrence of this species.

Here the writers wish to thank Prof. H. YABE of the Institute of Geology and Palaeontology, Tôhoku Imperial University, Sendai, where the present work was done, for so kindly premitting and also for generously submitting this article for publication.

In the Nanakita District, specimens of *Glycymeris* are so abundant in a particularly horizon of considerable distribution within the District, that the writers were lead to distinguish it as a separate zone, to which the name *Glycymeris*-zone (shown in the accompanying plate) is given. The stratigraphical position of this *Glycymeris*-zone will be given at a future opportunity.

The *Glycymeris*-zone has a rather uniform thickness of about 1 meter throughout nearly the whole of the central part of the Nanakita District, and is important as a good key-bed. The numerous specimens of *Glycymeris* in this particular zone nearly all are referable to *Glycymeris matumoriensis* Nomura and Hatai.

Nearly all of the specimens of *Glycymeris* as can be observed in the field occur with their convex-side up, and very rarely down, as is normal. Isolated valves are most common, while intact valves and distorted ones are rare; some occur only as moulds or coasts. The specimens are fairly uniform in both horizontal and vertical distribution. The lacality of Matumori represents the upper sandstone to the conglomerate horizons, while the localities of Kokuda and Kumagai reveal only the conglomerate and lower sandstone horizons. Among these three important fossil localities and different rock-facies, *Glycymeris* occurs most

1) S. NOMURA and K. HATAI: A List of the Miocene Mollusca and Brachiopoda Collected from the Region Lying North of the Nakakita River in the Vicinity of Sendai, Rikuzen Province, Japan. Saito Ho-on Kai Mus., Res. Bull., No. 13, p. 123, pl. 17, figs. 1-6, 1937.

abundantly in the conglomerate facies, and about equally in the other rock-facies.

In association with *Glycymeris matumoriensis* NOMURA and HATAI, are found several interestig molluscs as, *Pecten kaneharai* YOKOYAMA, *P. kimurai* YOKOYAMA, *P. cosibensis* YOKOYAMA, *P. paraplebejus* NOMURA and HATAI, *P. akihoensis* MATSUMOTO, and others. This fauna certainly points to the Miocene age of the *Glycymeris*-zone.

In the east valley of Kumagai, the *Glycymeris*-zone consists of conglomeratic sandstone, comprising pebbles which are well water-worn, rather uniformly arranged and measuring about 1–3 cm in general size, although large pebbles measure as much as 7 cm. The pebbles are larger above and smaller below where the general size is about 5 mm to 1 cm. The only fossils recognizable here are *Glycymeris matumoriensis* and *Dosinia kaneharai* YOKOYAMA, the former being most common. The cementing material of the conglomeratic sandstone consists of tuffaceous sand more or less calcareous.

The small exposures along the road-cutting a little north of Kumagai, exhibits the *Glycymeris*-zone with pebbles larger than the foregoing locality, the large ones measuring about 10–18 cm. Here the largest pebbles are found in the upper and lower parts of the zone, while in the middle the pebbles are small, and their arrangement is irregular. Mould specimens of *Pecten kimurai* YOKOYAMA, *P. kaneharai* YOKOYAMA, *Dosinia kaneharai* YOKOYAMA, a species of *Spisula*, a species of *Venus*, besides those of *Glycymeris* are recognizable; here *Glycymeris* is rare, while *Pecten* and *Dosinia* predominate. The cementing material consists of tuffaceous sand which is at places more or less calcareous.

At Ono, the *Glycymeris*-zone is well exposed, and although *Glycymeris* is not the predominating fossil, Pectens are unusually abundant. The conglomerate at this place is very compact, being cemented by tuffaceous sand which is more or less calcareous. The large pebbles measure about 5–8 cm, while the largest are about 20–30 cm; these are well water worn. The pebbles at this place are larger at the base as well as at the top, while the middle part consists of smaller ones. Unlike the other places, here pebbles of pumice are fairly common. No gastropods were found, but besides the predominating Pectens and some of *Glycymeris*, *Mytilus crassitesta* LISCHKE was found.

In all of these three localities, it is interesting to notice that the fossils generally occur as moulds or casts, and that no gastropods were observed to occur. Also the fossils are either parallel to the dip of the beds or a little oblique to the angle of dip. From the facts, that fragments of shells are very rare, that the mould specimens still exhibit the minutest detail of sculpture, that the cementing material is rather calcareous at places, and that, the *Glycymeris*-zone varies in both lithic-nature and faunal facies at places, it can be inferred that, 1) the fossils were originally embedded in complete state (with their shells), 2) the shells of the fossils were lost by secondary action (chemical), as the shells were dissolved, 3) water-worn shells are very rare, thus showing that wave action may not have been strong, and, 4) that the change in both lithic-nature and faunal facies within

the same beds according to locality, may be explained from observations of the recent shores (particularly of large bays as Mutu Bay in Aomori Prefecture).

Judging from the fact that the *Glycymeris*-zone has but a slght thickness and that the overlying sandstone is cross-bedded and gradually merges into the alternation of sandstone, shale and tuff, it appears that deposition was one of a shallow sea. Further evidence for this statement is upheld by the fact that large size shells of *Glycymeris* do not flourish in deep waters of the present seas.

Glycymeris matumoriensis NOMURA and HATAI, 1933

Pl. 5 (2), Figs. 1–7, 9.

1937. *Glycymeris matumoriensis* NOMURA and HATAI: A List of the Miocene Mollusca and Brachiopoda Collected from the Region Lying North of the Nanakita River in the Vicinity of Sendai, Rikuzen Province, Japan. Saito Ho-on Kai Mus., Res. Bull. No. 13, 123–125, pl. 17. figs. 1–6.

Original description :—

"Shell moderate in size, subcircular or more or less roundly trigonal in outline, nearly equilateral, strongly convex; test thick and heavy; anterior and posterior extremities almost equally rounded; base regularly semi-circular in curvature; dorsal margin subequal, strong, or a trifile convex, forming at beak an angle of about 120°–130°; beaks almost central in position, small, rather obtuse, approximate, slightly oblique; surface provided with narrow and shallow impressed radial grooves which are marked on central part, becoming obsolete toward either side of disc: interspaces between grooves flattened, much wider than grooves, ornamented by two or three fine radial grooves on their back; growth lines rather distinct, somewhat fimbriated, some being larger than others; hinge-line considerably arched: area high and broad, trigonal in outline, marked by about ten or more radiating grooves; teeth rather small, about ten on each side of area, of which two or three central ones are generally oblitereated; muscular impression inacesible in all specimens at hand, but judging from exposed parts, they were possibly well defined; inner margin rather finely crenulated; length ca. 60, height 58, depth ca. 20 mm (left valve)."

The specimens collected by the writers from Matumori, Kokuda and Naraki, give the following dimension (in mm):—

Length	49	53	48	43	—	42	34.7	48.5	62	—
Height	47	47	47	ca. 42	56	38	32.5	47	—	56
Depth	16.5	20	19	15	28	15	10.4	ca. 15	—	19

The specimens show but little variation in the outline of the valves, being subcircular in the majority of the specimens. In the depth of the valves also only slight variation can be noticed, some being less convex than others. The difference in the strength of the radial grooves may be due to the different degrees of wear of the outer shell. The muscular impressions are well defined.

As already stated by S. NOMURA and K. HATAI, this species "apparently belongs to the group of *Glycymeris yessoensis* (SOWERBY), a common recent as well as fossil species in Japan, from which it is distinguished, in possessing a more circular outline of shell, more inflated disc and higher ligamental area with fewer

teeth. *G. crassa* KURODA[1] from Sinano province is closely related to the present species, but may be distinguished by having a greater number of ligamental grooves. KURODA's species, according to his description, is said to have six grooves instead of ten or more as in the present one." *Glycymeris k-suzukii* OINOMIKADO, recently published by T. OINOMIKADO[2] from the Miocene rocks in the vicinity of Takasaki City in Gunma-ken, is also related to *G. matumoriensis* NOMURA and HATAI, in the outline of the shell and general characters, but is distinguishable from the present one by the more inflated test and broader shell.

Explanation of Plate 5 (2)

Figs. 1–7, 9. *Glycymeris matumoriensis* NOMURA and HATAI (natural size). Showing the general outline of the valve, convexity and interior of a valve.

Fig. 8. The *Glycymeris*-zone (G) overlying with unconformity a sandstone bed.

陸前國七北田地方に於ける *Glycymeris matumori nsis* の産出狀態に就いて (摘要)

畑井小虎・中村萬次郎

仙臺北方七北田地方に發達せる中新統中 *Glycymeris* の帶をなして廣く分布せる礫岩あり。之は筆者等の *Glycymeris* 帶と呼ぶものなり。

該帶中最も多く產する化石は *Glycymeris matumoriensis* NOMURA and HATAI にして, その形大型にして, 恰も圓形をなし, 厚き殼を有す。

地層中に含まるゝ狀態は normal なり。卽ち convex side を上方に向けるもの多く, convex side を下方に向けるもの前者に比し少し。概して地層の傾斜面に對し平行或は少しく斜に位置す。

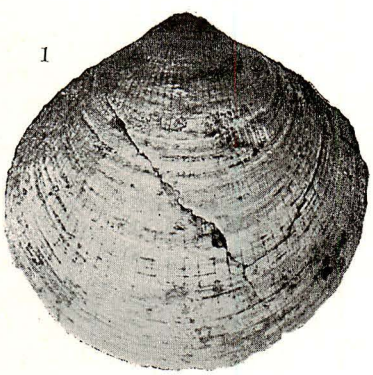
他の介化石も同樣摩滅を受けたるもの, 或は破片となりたるもの甚だ稀にして, 總じて堅牢なるもの多し。

礫岩中の礫は多くの場合大きさの一樣なるもの配列し, 其の間に頗る大なるもの挿入することあるも極めて少し。固結物は砂にして, 二次的變化により生じたる石灰物質を以て凝固し, 場所により凝灰質なる部分もあり。

中新統中 *Glycymeris* 帶と名付けられたるもの殆んどなく, 鮮新統又は更新統にては時々觀らるゝものあり。介殼の厚さ, 大いさ, 量及層位上より判斷するに該帶は恐らく淺海に於て形成せられしものと思惟す。

1) T. KURODA in HONMA: Geology of Central Sinano (in Japanese), Pt. Fossil Mollusca, p. 29, pl. 12, figs. 90, 91, 1931.

2) T. OINOMIKADO: Neogene Shells from the Vicinity of the City of Takasaki, Gunma-ken, Japan, Trans. Pal. Soc. Japan, No. 69, p. 673, pl. 20, figs. 1-3, 1938.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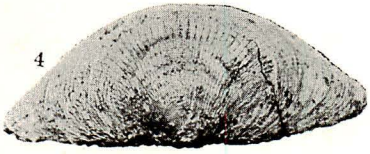
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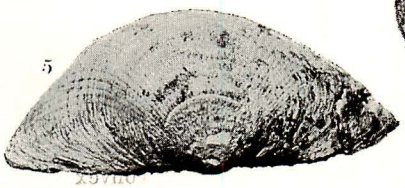
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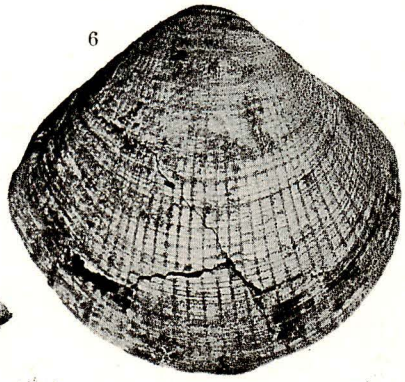
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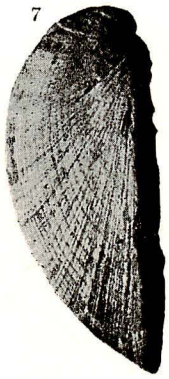
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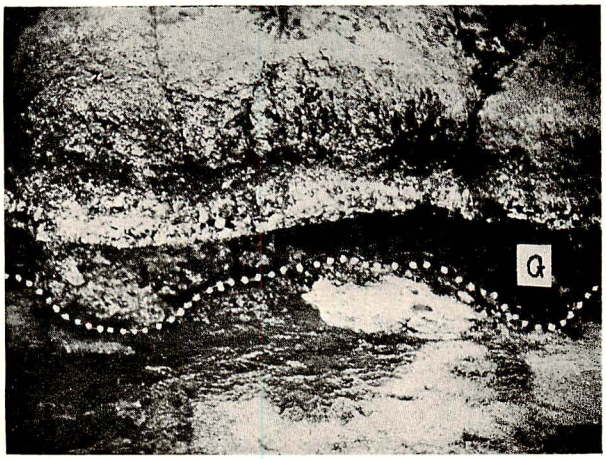


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SINOZAKI photo.

Reprinted from Jour. Geol. Soc. Japan, Vol. XLVII, No. 558, March 20th, 1940.

101. A Note on Camarophoria "purdoni" from the Permian of Timor

By

Ichirô HAYASAKA and Sôha GAN

(Received November 20th, 1939; Read February 24th, 1940)

I.

The species *Camarophoria "purdoni"* of Timor described by BROILI[1] seems to include a few heterogeneous types that may perhaps be other species. GRABAU separated the smallest types (Figs. 19–23) from the larger and more characteristic ones as specifically distinct, and identified with what he described as *C. superstes* (VERNEUIL) from the Permian of Mongolia. This far, GRABAU's opinion has to be followed.

According to our observations upon the specimens collected about a decade ago by the senior writer of this note, there is quite a wide range of variations in the form of the shells and the number of the plications on the shell surface; of the latter those on the lateral parts of the shell are very indistinct as a whole. In several of the specimens there is only one plication in the median depression of the ventral valve, corresponding to which a pair of plications develop on the median fold of the opposite. The largest number of the plications observed in the ventral median depression is 6. Of the total of about ten dozen specimens more than one half are rather well preserved and allow detailed observations regarding the development of plications. They are divided into groups according to the number of plications developed in the median depression of the ventral valve, as follows.

1—plication	group	:	4	individuals
2— "	"	:	14	"
3— "	"	:	15	"
4— "	"	:	32	"
5— "	"	:	7	"
6— "	"	:	3	"

Thus, the 4-plication group seems to be the most frequent, which fact has been represented also by the illustrations of BROILI. GRABAU defined his Mon-

1) BROILI:—Die permischen Brachiopoden von Timor, p. 55. (1916)

golian species *C. purdoniformis* to develop 3 plications on the median fold of the dorsal valve and 2 on each lateral part all coming into existence almost simultaneously: on either side of the median three one additional plication is developed in a later stage of growth of the shell, thus the median plications numbering five altogether. At this stage there must be four median plications in the median depression to correspond to the five of the opposite.

This far concerning the specimen No. 390 (Fig. 1, pl. VI.) of GRABAU. The second specimen which is more imperfect than the other (No. 391: Fig. 2, pl. VI) has 4 strong plications in the median fold of the ventral valve. In this specimen the lateral plications are much more distinct than the other specimen. In no case the lateral plications are distinctly developed in our Timorese specimens that have less than 5 plications in the ventral median depression. Lateral plications are, in reality, very faint and hardly recognized, in general, in the specimens with 1 to 4 median plications. More than that, the lateral plications, when developed, are always dicidedly weaker than the median ones, and usually appear considerably later than the latter.

Thus GRABAU's indentification of his Mongolian species with the Timorese one does not seems to be agreed to by us. Not to speak of the smaller size of the specimens, the mode of development of plications is judged to be quite different in the Mongolian and Timorese fossils. The latter is characterized by its non-plicate tendency of the lateral shell parts. In this respect it appears to differ from *C. purdoni* DAVIDSON of India as was originally described and pictured by the author (Fig. 1). Although BROILI says that he has made a comparative study of the Timorese and Indian specimens in order to identify these fossils, the 6-plicated specimens that develop lateral plication differ from DAVIDSON's specimen in that the lateral plications are only very faintly represented (Fig. 2). We should like to propose a new specific name for the Timorese species, namely, *C. timorensis.* This is based on the specimens represented by the figures 7–14, 16, 17, and possibly also 18 in BROILI's monograph: at our disposal there are about ten dozen or specimens, as stated elsewhere.

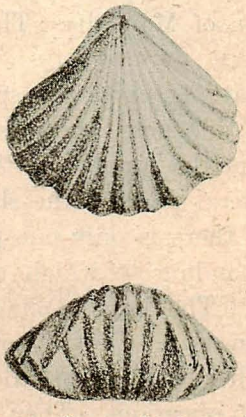

Fig. 1. *Camarophoria purdoni* DAVIDSON, reproduced from the original illustrations of DAVIDSON.

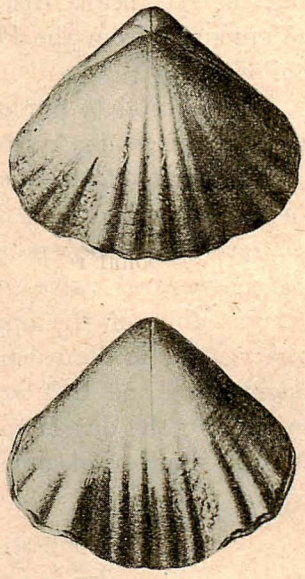

Fig. 2. A typical example of *Camarophoria purdoni* BROILI (non DAVIDSON), reproduced from BROILI's monograph to compare with the original figure of DAVIDSON (Fig. 1).

The chief characteristics of the new species are given below.

II.

Camarophoria timorensis, sp. nov.

1916. *C. purdoni*, BROILI :—Die permischen Brachiopoden von Timor, p. 55, pl. 11, figs. 7–14, 16, 17, and 18(?).

1928. *C. purdoni*, HAMLET :—Permische Brachiopoden, Lamellibranchiaten und Gastropoden von Timor, p. 37, pl. IX, figs. 5-8.

The shell is quite variable in form and also in size, but the majority of specimens are wider than long. The measurements of about a dozen specimens, larger and smaller, give the length-width ratio ranging between 1:1.04 and 1:2.1. If we take the length-width ratio of dorsal valves only, as to correspond to GRABAU's measurements, it varies between 1:18 and 1:1.51. This shows that the shell, as a whole, is much more transverse than *C. purdoniformis* GRABAU. A larger specimen measures about 38 and 39.5 mm, in length and width respectively, and smaller ones are 23:28, 25:30, etc.

As to the height of the shells the following measurements represent the average value: a specimen which is 36 mm long and 39 mm wide is 26 mm high: another specimen measures 34×36×23 mm in length, width and height respectively; the ratios being 1:1.08:0.72 and 1:1.06:0.68, respectively.

The ventral or pedicle valve is less inflated than the branchial valve, but owing to the very strong development of the median fold on the latter, corresponding to a medien depression on the former, thus forming a very deep sinus in the anterior commissure, the outline of the shell is often quite deceptive. The development of plications on the median fold and in the median depression that begin not quite a half way from the beak to the anterior margin, gives to shells a trilobate apearance, the lateral parts being only very faintly plicate, or sometimes even almost nonplicate: thus the median and lateral parts are quite strongly contrasted. In this point, the present species differs from *C. purdoni* DAVIDSON[1] with which it was regarded by BROILI as identical.

The umbonal region of the ventral valve is quite wide and semicircularly convex along the longitudinal axis, but the beak is very abruptly pointed and curved up over the umbon a region of the opposite valve, deltidial plates not being observed, eventually. Pseudo-area is not developed. Concentric sculptural element is hardly recognized except in a specimen or two in which very faint but rather closely set growth lines are observed (Figs. 6 and 7, Pl. 9 (3)). In a few other, multi-plicate specimens growth lines are represented by imbricating lamellae along the anterior border.

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1) DAVIDSON :—On Some Carbon. Brachiopoda collected in India by A. Fleming, etc. Q. J. Geol. Soc. London, 18, p. 30, pl. 2, fig. 4. (1816).

WAAGEN :—Palaeontologia Indica ser. XIII, Salt Range Fossils vol. 1, Productus Limestone Fossils, p. 437, pl. 32, figs. 1–7. (1887).

DIENER :—Pal. Indica, ser. XV, Himalayan Fossils vol. 1, part 3, The Permocarboniferous Fauna of Chitichun, No. 1, p. 71, pl. XII, figs. 6, 8, 9. (1897).

DIENER :—Ditto vol. I, part 2, Anthracolithic Fossils of Kashmir and Spiti, p. 79, pl. VII, fig. 4, (*C.* cf. *Purdoni*). (1899).

DIENER :—Ditto vol. III, part 4, Anthracolithic Fossils of the Shan States, p. 40, pl. VI, fig. 1 (*C.* cf. *Purdoni*). (1911).

In the original description (1861) DAVIDSON says that "the surface of each valve is ornamented with from eighteen to twenty-two angular ribs of which from seven to eight occupy the fold and from six to seven the sinus."

The variation in number of plications and the mode of their multiplication will be considered below, as it has been observed with a particular interest. The plications are all quite rounded at the top and are separated by grooves not wider than, or at times almost as wide as, the alternating plications.

III.

The ribs or plications in the median depression as well as on the median fold are more or less angular and more prominent if compared with those on the lateral parts when they are developed there. The ribs are formed at a distance, not seldon at halfway from the beak to the anterior margin, but where there are more than one, they do not necessarily appear contemporaneously. They increase their width and height quite conspicuously toward the anterior border. They also increase in number by means of adding on the outer side of the pre-existing: in the case of the plications within the median depression of the ventral valve, this has been observed to be as in the following diagram.

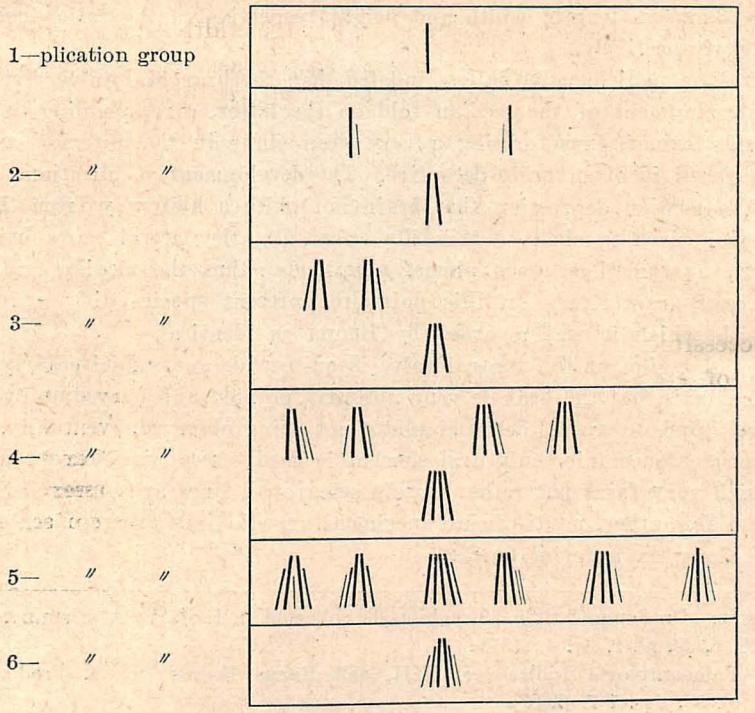


Fig. 3. Development of plications observed in the median depression of ventral valves.

From this diagram we can recognize two cases for the origin of the 2-plication form: namely, in one case, one plication is added to the plication of the 1-plication type either on its right or left, and in the other case, the two plications come into existence almost at the same time, at a distance from the beak. The latter case seems to correspond what has been described by GRABAU about the Mongolian specimen with three dorsal median plications. The interpretation may

be either that the second case is derived from the first, the intervening stages not being represented in our collection, or that the two types of the bi-plicate forms are primarily of different habit. Observations on many individuals with 3 or more median plications seem to suggest the validity of the first postulation.

The development of additional plication or plications takes place on the outer side of the median plication bundle, so to say, in the majority of cases: not seldom two new ribs are added on one side of the median bundle, but more commonly, when two plications are added, one develops on each side. In one specimen, a short, thin rib is added between the first pair of the median plications.

Taking all the observations into consideration, it does not seem that there is any rule or law for the development of ribs on the shell surface. Although there must naturaly be a limit within which irregularities can take place, the development and multiplication of ribs seem to be quite fitful.

Between the number of plications and the size of the shells, the relation, if there really exists any, seems to be rather inversive. An average 1-plication individual measures, $33.5 \times 35.5 \times 23$ mm, in length, width and height, respectively, and a 4-plication specimen of the average size measure $30.5 \times 35.5 \times 20$ mm, while a 5-plication shell of a larger size is $31.5 \times 35.5 \times 23$. The formation of plications may be due to the instinctive efforts of the animal to extend the body surface exposed to surroundings. Consequently, the development of numerous plications may be useful to supplement the retardation in the growth of the shell as a whole.

By cutting and polishing a number of specimens, inner structures have been examined, but owing to the unfavorable fossilization in most cases, datails have not been accessible to us. The characterestic features so far made known by Broili have of course been observed, but they need not be recapitulated in this note.

Explanation of Plate 9(3)

Camarophoria timorensis Hayasaka and Gan

(All figures are in natural size. a, ventral; b, dorsal and c, lateral views.)

Fig. 1. A 1-plication specimen.
Fig. 2. A 2- " "
Fig. 3. A 3- " "
Fig. 4. A 4- " "
Fig. 5. Another 5-plication specimen.
Fig. 6. A 5-plication specimen.
Fig. 7: Another 5-plication specimen.

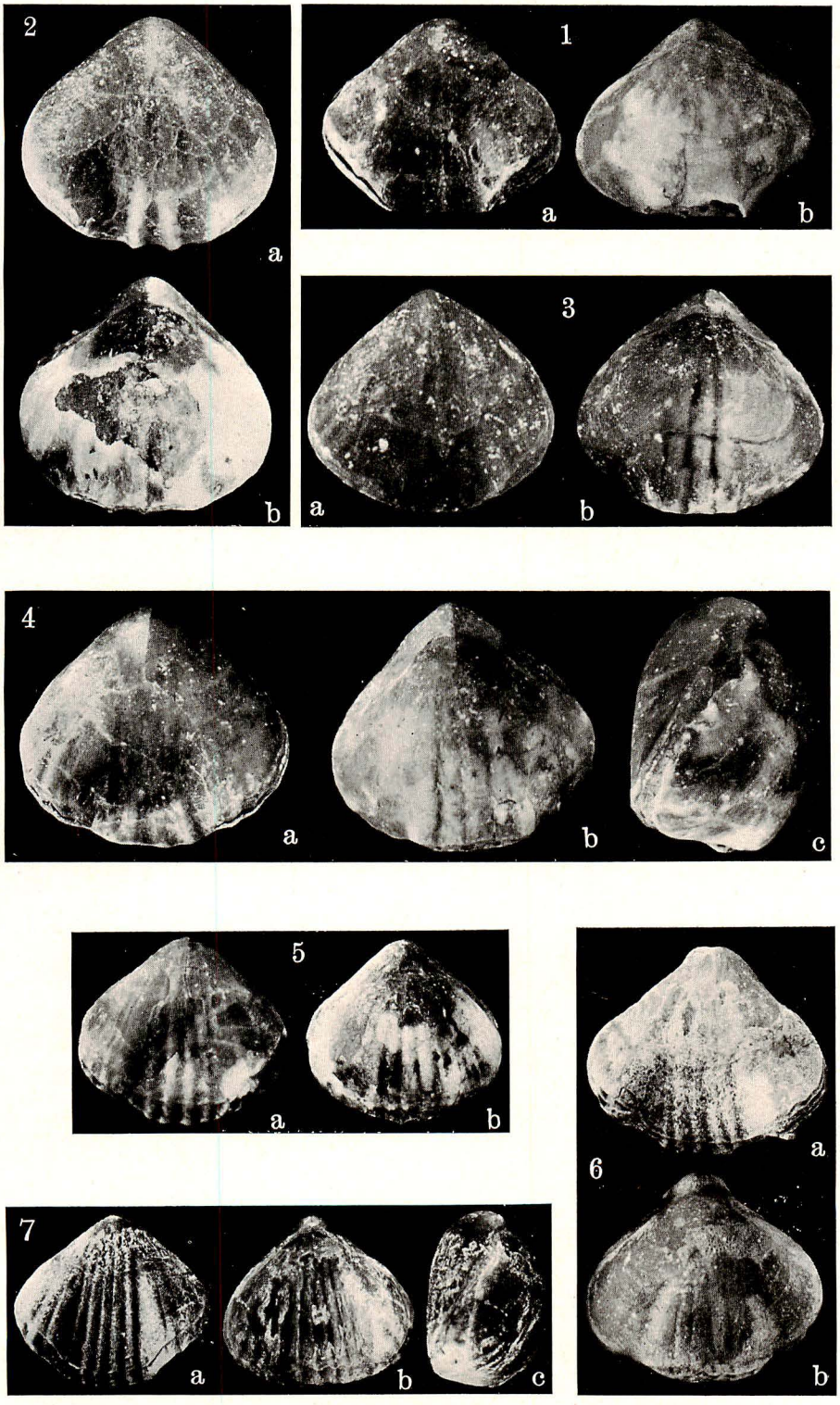
All the specimens are from Besleo. It is very difficult to photographically represent the details of the mode of multiplication of plications either in the median depression or

on the median fold. Note the orimental indication of the lateral plications in the specimens represented by the figures 5 and 7: other forms are only very faintly plicated, if not non-plicate.

チモール島二疊系産 *Camarophoria "purdoni"* に就いて（摘要）

早坂一郎・顔　滄波

チモール島産の *C. "purdoni"* が研究結果 DAVIDSON の該種に屬さざる事明かとなり，之に對し新名 *Camarophoria timorensis* を與ふ。


2
a
b
1
a
b
3
a
b
4
a
b
c
5
a
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7
a
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c

102. Turridae の屬名改訂に關する 2, 3 の事項

槇　山　次　郎

（昭和 14 年 12 月 16 日講演並に受理）

「Turridae に就て 2, 3 の觀察」と題し日本古生物學會第 17 回例會に公表した意見の中で學名命名上に關係する事項だけを此處に簡略に記す事とした。本科の分類は困難で紛糾してゐるので全般的な整理は今のところ公表するを得ぬ。此調査は東照宮三百年祭記念會の援助による研究の一部であつて，目下續行中の結緣寺階化石研究の或一節である。

我國で從來 *Asthenotoma* として知れてゐた貝は *Tomopleura* Casey, 1904 である。*Tomopleura* のタイプは *Pleurotoma nivea* Philippi, 1851 で Cossmann, 1906 の定むるものである。この名は一般にはあまり使はれず，たゞ Melvill, 1917 (Proc. Mal. Soc., Vol. 19, p. 146.) 1 人が引用した。Dall, 1918 (Proc. U. S. Nat. Mus., Vol. 54, p. 332) の意見ではタイプは屬 *Teres* の種であるといふ。しかるに Casey は *P. makimonos* Jousseaume, 1883 を本種と同一群に分類してゐるので，我々は彼の意圖を充分に察知し得る。Hedley, 1922 は此等を皆 *Asthenotoma* Harris and Burrows, 1891 として扱ひ，此仕方が我國に傳つて來たのである。*Asthenotoma* は實は *Oligotoma* Bellardi, 1875 が異物同名である爲に代つて提出された名稱であるから，法律により其タイプは必然 *Peurotoma meneghinii* Mayer, 1868 である。Bellardi が後に提供した例の中に *P. basteroti* Desmoulins, 1842 があり，之を Cossmann がタイプと選んだのである。この選び方は明かに無效で *Asthenotoma* のタイプは ipso facto に *Oligotoma* のタイプに一致し Bellardi の定めたものでなければならぬ。卽ち *Asthenotoma* は *Tomopleura* とは別のもので兩者の區別は貝の形質上に於ても明白である。*Tomopleura* 所屬の例は *T. nivea*, *T. makimonos*, の他に *T. vertebrata* (Smith, 1879), *T. niponica* (Smith, 1879), *T. yokoyamai* (Makiyama, 1927) *T. subdifficilis* (Makiyama, 1927), *T. quantoana* (Yokoyama, 1920) がある。なほ此他に日本產に 2, 3 種がある見込である。

次に日本產の化石に多く *Clavatula* として知れてゐるものは其新亞屬 *Paradrillia* に一括するを要する。タイプは *Drillia dainichiensis* Yokoyama, 1923 とする。*Clavatula* Lamarck, 1801 のタイプである *C. coronata* Lamarck (Monotype) は西阿產の物であつて日本產の物と可なり異る。*Paradrillia* は大平印度洋產の *clavatula* に類似したる形の種を併合する。*Trachelochetus* Cossmann, 1889 に比すれば貝が細く塔高く，肩角に著明な數帶があり，その前方では縱刻は 2 分し橫刻と交會して格子形の彫刻を形成する。また其個體發達に於て相異する所がある。詳細は追つて發表する。

古くより *Drillia* s.s. として知られたる種類を *Inquisitor* Hedtey, 1918 にあててゐた。近頃は *C lavus* Montfort, 1810 を持つて來てゐる人がある。そもそも *Drillia* を廢棄した理由は其タイプである *D. umbilicata* Gray, 1838 (Cossmann, 1898 選定) が *Clavatula* にすぎないといふ認定に基いてゐる。しかるに其個體發達に於いて，また齒舌の型式に於いて本種は *Clavatula* でない。日本產の *Drillia* は大形のものは多くは亞屬 *Clathrodrilla* Dall, 1918 に屬する。*D. jeffreysii* とか，*D. pseudoprincipalis* とかは之が例である。小形で彫刻の不明なものは概ね亞屬 *Cymatosyrinx* Dall, 1889 に屬する。古い屬名 *Drillia* はかくの如く復活する。けれども *Drillia* として

記錄しある種にして *Turricula* や *Clavatula* 其他のものがあるから古い學名を吟味なしに再用してはならない。

Nomenclatural Notes on Some Genera of Turridae.

(Résumé)

By

Jiro MAKIYAMA

Tomopleura. *Tomopleura* CASEY, 1904, *Pleurotoma nivea* as its type is valid and takes place *Asthenotoma* of the Japonic fauna.

Paradrillia. A new subgenus of *Clavatula*. Type: *Drillia dainichiensis* YOKOYAMA, 1923. Different from *Trachelochetus* in having a slender spire and well-marked special bands near the shoulder, in front of which axials bifurcate, and making a cancellate ornament with spirals.

Drillia. This old name is valid for the type *D. umbilicata* GRAY, 1838 is not a species of *Clavatula*. *Inquisitor* and *Clavus* which have been used for such species as *Drillia jeffreysii* will be aken place be *Drillia*.

Reprinted from Jour. Geol. Soc. Japan, Vol. XLVII, No. 559, April 20th, 1940

103. 滿洲國錦州省羊山より發見されたる中生代恐龍の足痕化石

矢部長克・稻井　豐・鹿間時夫

（昭和 14 年 12 月 16 日講演，昭和 15 年 2 月 14 日受理）

昭和 14 年夏滿洲鑛業開發株式會社の佐藤晉三氏より東北帝國大學地質學古生物學教室に寄贈されたる足痕化石は，同氏が同會社の戸塚好雄氏等と同年錦州省及び熱河省に地質調査をされし際，錦州省羊山附近四家子にて得られしものなり。礫質砂岩上に印せられたる足痕は恐らく恐龍類のものと思はれ，地層は同氏等によれば恐らく白堊系ならんと云ふ。此の種の足痕は北米・歐洲等に良く知られ其等と比較考察するに，鳥類乃至恐龍類以外の爬蟲類とは考へられず，小形の三指型肢所有者として肉食性恐龍類たる Theropoda 乃至小形の Iguanodon 類が最も有望なる主なり。三疊系所產の Theropoda には稍々類するものあれど，多くの白堊系の恐龍足痕は著しく大形にて區別さる。諸種の點を考慮の上，筆者等は此の足痕の主に對して *Jeholosauripus s-satoi* と假に命名せり。*Jeholosauripus* の生態的特徵・個體差・年齡差・尾痕等に關しては將來より充分なる材料の蒐集を俟ちて發表せんとす。詳細は帝國學士院記事第 16 卷に發表せり。終に本材料を提供されし佐藤晉三氏及び同年夏稻井・鹿間兩名の調査に際し種々便宜を與へられし同會社の佐藤才止・安藤昌三郎兩氏の御厚情に對し深甚なる感謝の意を表す。

Dinosaurian Footprints found near Yangshan, Chinchou, Manchoukuo

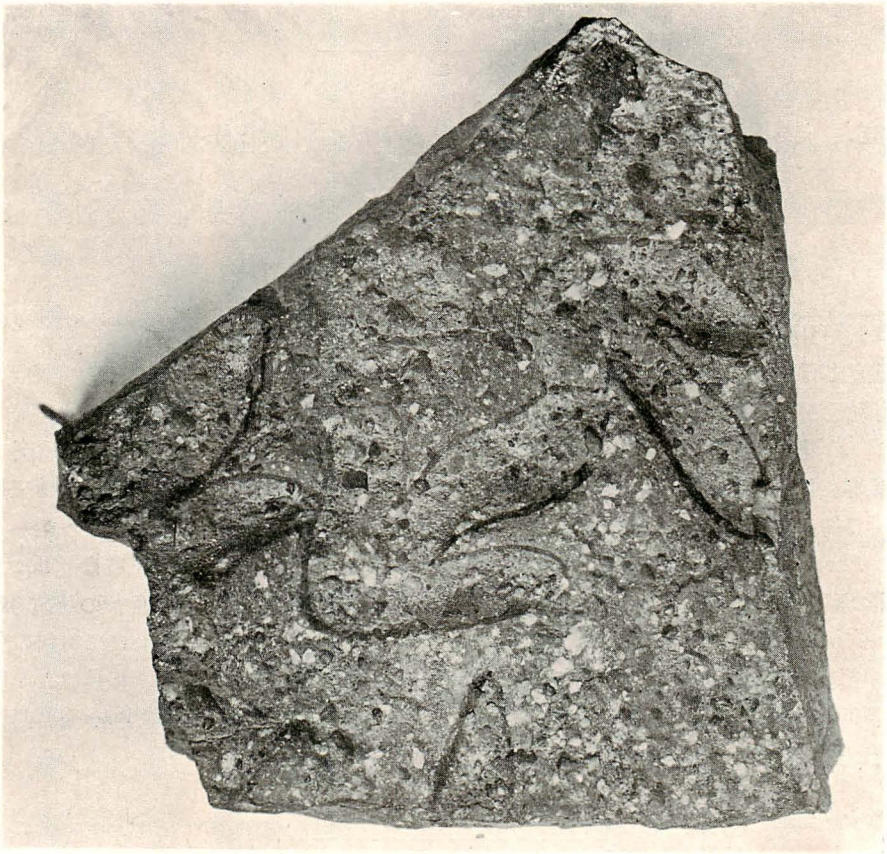
(Résumé)

By

Hisakatsu Yabe, Yutaka Inai and Tokio Shikama

Four apparently tridactyle footprints impressed on two coarse-grained sandstone plates were collected by Mr. S. Satô's party of geological explorers of the Mansyû Kôgyô Kaihatu Kaisya at Ssuchiatzu near Yangshan, lying south of Choyang in Chinchou. The sandstone is presumably Cretaceous in age. The best one is here photographed (somewhat reduced, about 0.7 of natural size).

For the convenience of future reference, the footprints are to be distinguished under the name *Jeholosauripus s-satoi*; some details are to be given in the forthcoming number of the Proceedings of the Imperial Academy, Vol. XVI.



Jeholosauripus s-satoi, new dinosaurian footprints (×0.7)

104. 福島市附近より發見せる象齒化石と其の產出地層

小　林　　學

（昭和 15 年 2 月 24 日講演，3 月 1 日受理）

福島市外渡利村附近に最近灌漑用水道工事が行はれてゐる。其の工事中昨年 4 月下旬渡利村小倉寺附近の洪積層中より象齒化石が出土した。依つて其の種類及び出土地層の研究調査を行つた。其の概略を報告する。

1. 象　齒　化　石

此の象齒が發掘された時は略完全に近かつたかも知れぬが保存惡くぼろぼろになり易く，筆者の手許に到着した時には稜數 3 と數個の破片とで，其の他の大部分が失はれてゐた。

咀嚼面側面觀にてはやゝ凹面をなし，下顎齒なるものと考へられるも左右いづれの側なりや決定しかねる。3 稜條の咀嚼面の長さ 35 mm，その咀嚼面の最大の幅 63 mm，齒冠の底面より咀嚼面迄の最大の高さ 85 mm である。咀嚼面はあまり削磨進まず，齒冠の底面に於いては明瞭に loxodont sinus を認め，前後の loxodont sinus 間にはあまり隔りがない。琺瑯質の厚さは 2 mm より 2.5 mm で，それに粗なる波狀褶襞を認む。1 稜條の厚さは 16 mm（稜率 5.6）。殘存稜の最前方のものよ

第 1 圖　本邦に於ける *Palaeoloxodon namadicus naumanni* (Makiyama) 產地分布圖
- ⊙ 最新世前期とされたものの產地
- ● 最新世後期・末期とされたものの產地
- × *Palaeoloxodon aomoriensis* (Tokunaga and Takai) の產地
- ■ 新產地

り第 1 稜, 次を第 2 稜, 其の次を第 3 稜となす。第 1 稜は他の第 2,3 稜より離れ, その咀嚼面は中央にて狹くなり長楕圓形をなす其の稜の最大の幅は 73 mm, 前面にては loxodont plica は中部より下方で次第に明らかになる。第 2 稜は第 3 稜と共に連續し, その咀嚼面に於いて琺瑯質は 4 個の環狀に分離するも, 中部より下方では loxodont plica が明瞭で齒冠の底面では 1 つの長楕圓形の環狀に變化する。以上の事より *Palaeoloxodon namadicus naumanni* (MAKIYAMA) で, 卽ち槇山博士[1]の最近の *Elephas namadicus naumanni* MAKIYAMA であると思はれる。

第 1 圖は本邦に於ける *Palaeoloxodon namadicus naumanni* (MAKIYAMA) 産地の分布圖である。高井學士[2]に依つて ⊙ は最新前期とされたもの, ● は後期・末期とされたもの, × は *Palaeoloxodon aomoriensis* の産地で, ■ は此の度の發見地點である。此を見ると瀨戸內海より關東地方が其の大部分で, 東北地方では秋田縣産のみが從來知られてゐた處のものである。此の度更に阿武隈山地西北邊に産出した事は日本海方面のみならず太平洋方面にも分布してゐた事を示すものとして興味がある。

2. *Palaeoloxodon namadicus naumanni* (MAKIYAMA) の産出地層（福島層）

Palaeoloxodon namadicus naumanni (MAKIYAMA) の産出した地層を福島層と呼びたい。以下同地層の觀察した事項を述べる。觀察地點 (1), (2), (3), (4), (5), (6), (7) は第 2 圖及び第 3 圖の番號に夫々一致してゐる。

(1) 地點　福島市小倉寺淨水場近く最近出來た水道トンネルの入口附近に洪積層の基底が見られる。基底は花崗岩の上に細粒礫層, 其の上に砂質粘土層が見られる。多少西方に傾くも 5 度をこさない。此等の地層は長石・黑雲母を多量に含み, 又埋木を含有する。此の地層を (a) 層とする。その厚さ 0.8 m, 此の層の上に 0.4 m の厚さの輕石層がくる, これを (b) 層とする。此の輕石粒の大きさは 3 cm 位のものが多い。斑晶として斜長石・普通輝石を含有し, 安山岩質のものである。此の層は直ぐ尖滅し, その上にくる粗粒の砂層 (c 層) 中にレンズ狀に存在する。此の上に 2 cm 位の礫を含む約 1 m 位の灰色粘土層 (d 層) が重なる。此の地層に含まれる礫は大部分花崗岩質のものである。此の地層は風化せざる處では灰色なるも次第に褐色に變化する。龜裂狀の節理が發達する。此の上に 10 cm 位の濃赤褐色の砂層を隔てゝ 2 m 以上の赤褐色砂層 (e 層) が重なる。砂は石英・黑雲母を多量に含む。此の砂層は上部では細粒となり, 粘土層 (f 層) に移化する。その厚さ 2 m をこす。

(2) 地點　(1) 地點の d 層卽ち灰色粘土層以上が觀察される。卽ち崖の最下部に層理の明かな灰色粘土層があり, その上に赤褐色粘土層が重なる。此の中に 2 cm 位の花崗岩・安山岩の礫を含む。

(3) 地點　崖の基底に花崗岩が露出し, 其の上に直徑 3 m 位の圓礫と其の上に花崗岩より運搬された砂層 (約 3 m) が來る。これは (1) 地點の (e), (f) 層に該當するものと思はれる。

(4) 地點　崖の基底に輕石を含む安山岩の礫層がある。此の地層は (1) 地點の (b) 層に該當する。此の上に礫を含む砂質粘土層が來る。これは (1) の (c) 層に相當するものと思はれる。この地層より象齒化石が出土した。發掘した人夫の言ふ處によると, 「長さ 3 m 幅 10 cm 位の黑褐色の

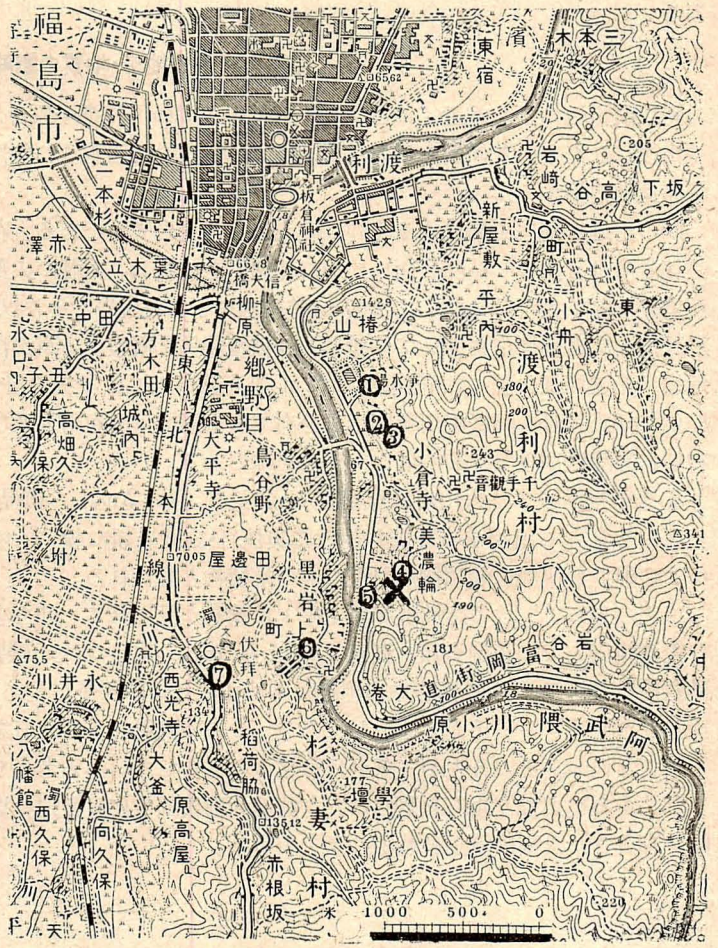
1) J. MAKIYAMA: Japonic Proboscidea Sci. Mem. Kyoto Univ. (1938).
2) 高井冬二: 本邦に於ける新生代哺乳動物, 地質學雜誌, 第 45 卷, 昭和 13 年 (1938).

帶狀のものの一端近くに，灰白色の此の齒が存在した」と。此の位置は筆者が調査した際には不幸コンクリートで閉されてゐて確かめる事が不可能であつた。

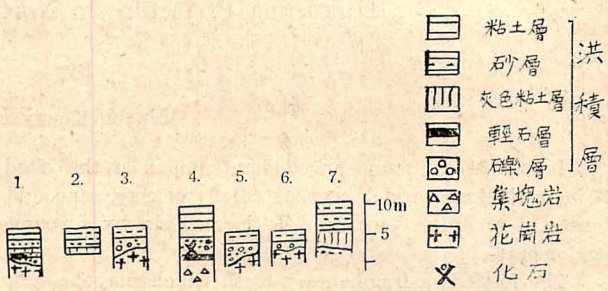
(5) 地點　崖の右端に花崗岩が露出し，不整合面は左方即ち北方に急傾斜し，その上に約 3 m の礫層がくる。礫の大きさ 2 cm より 10 cm 位が多い。礫は大部分灰色の輕石質安山岩と花崗岩とである。此の層は (1) 地點の (a), (b) 層に相當するものであり，この上に粘土層・砂質粘土層が重なる。

(6) 地點　阿武隈川の左岸黒岩上ノ町では花崗岩質岩石の上に礫層・僞層の發達してゐる礫質砂層が順に重なる。それら全體の厚さ 6 m をこす。

(7) 地點　杉妻村伏拜の國道東側に於いては最下部に礫質砂層（(1) 地點の (c) 層に相當するものと思はれる）が發達し，その厚さ 0.8 m 礫は花崗岩・安山岩で黒雲母の砂が多い。其の上に粘土層（(1) 地點の (d) 層に相當する）があり，その厚さ 4 m，處により黄褐色・灰色・黒色を呈し，塊狀の節理發達する。埋木，黒雲母を多量に含む。此の粘土層の上部には灰色縞狀の粘土層が重なるが處により尖滅著しい。此の上に 3 m 以上の僞層の著しい礫質砂層が重なる（(1) 地點の (e), (f) 層に相當する）。此の層の底には 10 cm 位の厚さの濃黄褐色の粘土質砂層の部分がある。



第 2 圖　福島市附近 *Palaeoloxodon namadicus naumanni* の産地 (1), (2), (3), (4), (5), (6), (7) 洪積層觀察地點



第 3 圖　福島市附近洪積層（福島層）柱狀斷面圖
1, 2, 3, 4, 5, 6, 7 は第 2 圖の番號に夫々概當す

以上福島層の 7 地點の崖に於ける觀察を略述したが大部分が砂層・粘土層で潟湖の堆積物と思はれる。これらの地層は阿武隈川河畔に發達してゐる更に新しい礫層・粘土層に依つて被覆されて

ゐる。

3. 福島市南方の地形・地質の概略

阿武隈山地の西北端近くに位する十萬劫山（429 m）は準平原を思はしめる様な高原で，それに續く山稜はなだらかな傾斜を示し，椿山（142.9 m）附近迄現はれ急傾斜を示して，阿武隈川を隔てて福島盆地に接する。

此の附近の基底を構成するものは花崗岩と集塊岩層とである。花崗岩は主として山麓に分布し，集塊岩層は可成著しい凹凸面に於いて花崗岩を被覆し，山體の大部分を構成する。卽ち椿山は周圍西南側を除く大部分に於いて 100 m 等高線以下に花崗岩，それ以上には集塊岩・熔岩が分布する。辨天山西側富岡街道に於いて明瞭にこの被覆關係を觀察する事が出來る。淨水場附近より小倉寺附近迄は先述同樣山麓には花崗岩，100 m 等高線以上には集塊岩層が分布する。美濃輪・黑岩附近に於いては集塊岩は阿武隈川現河床に分布するも兩側岸大卷附近及び黑岩上ノ町附近には花崗岩が分布し，集塊岩は堆積以前の著しい谷を思はしめる。

集塊岩を構成する火山岩は紫蘇輝石・斜長石（$Ab_{35}An_{65}$）の斑晶を有する安山岩類である。此の集塊岩を北方に追跡すると梁川附近の集塊岩・玄武岩類に續くものゝ樣である。これに誤りなければこの附近の集塊岩類は梁川貝層以前の堆積物と思はれる。

以上の岩石より成る阿武隈高原上處々に礫層が見られる。卽ち小倉寺より中山に通ずる峠附近及び美濃輪南方では花崗岩類の圓礫 2 m より 10 cm 位迄の大小礫點在し，前者に於いては數 m の砂礫層を認める。此の西方中山附近にも可成著しい砂礫層が認められる。此等礫層は 180 m 等高線附近に發達する段丘面を構成してゐる。この砂礫層と象齒化石を產出した福島層との層位關係は明瞭でないが，そのうちの一部分は移化するものでないかと考へせしめる。

擱筆するにあたり化石を贈られた加藤繁太郎氏及び化石鑑定の指導を御願ひした鹿間學士，又文獻を惠與された槇山博士に感謝の意を表する。

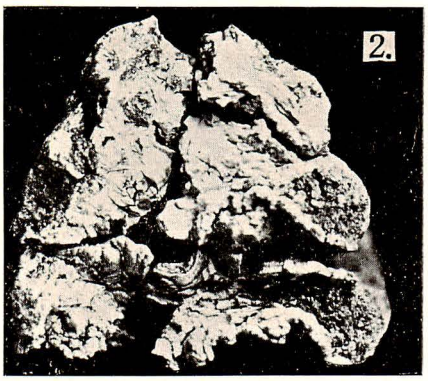
On a Fossil Elephant found at Ogurazi near Hukusima City, Hukusima Prefecture in North Japan (Résumé)

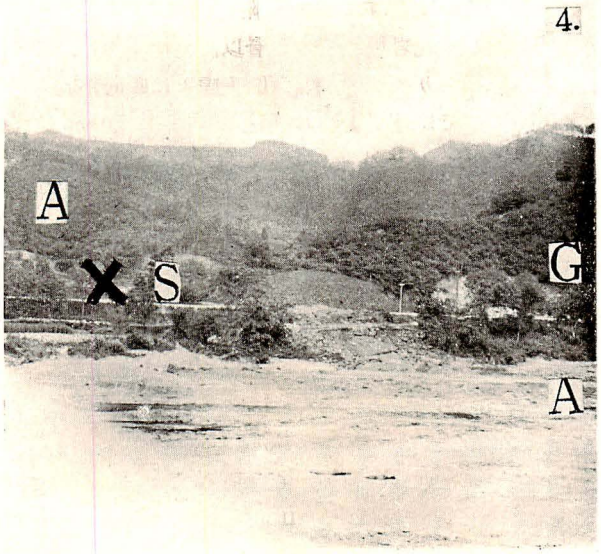
By

Manabu KOBAYASI

In last May I found an elephant remain at the cited locality in a Pleistocene deposit of 15 to 20 m in thickness which consists chiefly of clay, sand and gravel in alternation with intercalations of lenses of andesitic purmice. It is overlain by a younger formation and underlain by the Tertiary agglomerate.

The fossil is a fragmentary tooth which may be referred to *Palaeoloxodon namadicus naumanni* (MAKIYAMA). The specimen in which three chirolites are preserved is 48 mm long, 73 mm broad and 85 mm high. The grinding surface is concave. On a side of the chirolites there is a distinct loxodont plica at the middle. The enamel layers measure 2 to 2.5 mm in thickness.





Palaeoloxodon namadicus naumanni (MAKIYAMA)

第 1 圖　　齒冠面　　實物の約 $\frac{1}{5}$ 大

第 2 圖　　齒冠の底面實物の約 $\frac{1}{5}$ 大

第 3 圖　　側面　　實物の約 $\frac{3}{4}$ 大

第 4 圖　　産地附近（福島市外渡利村小倉寺）

X：發見地點　　G：花崗岩　　A：集塊岩　　S：砂質粘土層

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Constitution of the Palaeontological Society of Japan.

Article 1. The Society shall be known as the Palaeontological Society of Japan. It forms a section of the Geological Society of Japan.

Article 2. The object of the Society is the promotion of palaeontology and related sciences.

Article 3. This Society to execute the scheme outlined under Article 2, shall hold annual meetings and discussions.

Article 4. Proceedings of the Society and articles for publication shall be published through the Journal of the Geological Society of Japan. Separates and circulations will be sent to members of the Palaeontological Society who are not members of the Geological Society of Japan.

Article 5. The annual dues of this Society is two dollars for the foreign members of the Society.

Article 6. This Society shall hold the following executives. President one person, Councillors several persons.

Article 7. The President and Councillors shall be elected annually. The President and Councillors shall be elected from the Society body by vote of its members. All elections shall be ballot.

All communications relating to this Journal should be addressed to the

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