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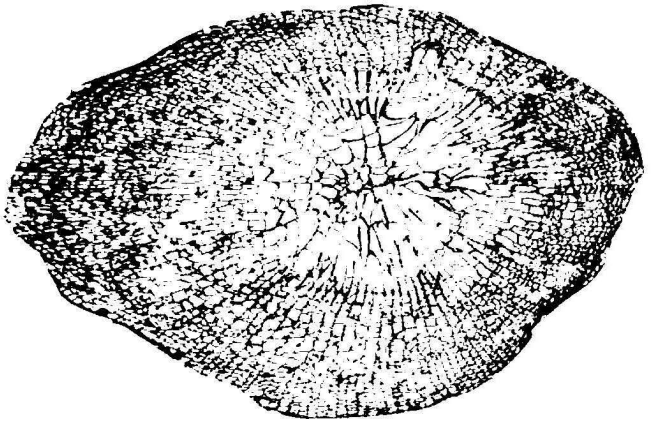

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TRANSACTIONS

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519. A CRETACEOUS *SALVINIA* FROM THE HASHIMA IS. (GUNKAN-JIMA), OUTSIDE OF THE NAGASAKI HARBOUR, WEST KYÛSHÛ, JAPAN*

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長崎港外端島，三ツ瀬層（上部白亜系）産の *Salvinia mitsusense*（新種）：長崎港外高島炭田端島坑の海面下 970 m にある三ツ瀬採鉱坑道において 1963 年暮に採集した *Salvinia* の新種記載である。採鉱坑道に露出している三ツ瀬層は日隈四郎 (1963) によると，紫色の頁岩層が厚く発達し，従来の "赤崎層" の下部にあたる。この部分に日隈が 1962 年に発見した *Inoceramus* cfr. *amakusensis* を含むシルト質灰色岩層があって，その中に筆者は黄鉄鉱化した *Equisetum* sp. の茎と一緒に本種を認めた。三ツ瀬層は上記 *Inoceramus* の産出や 1962 年に高島二子竪坑の略同層準岩層から *Trachodon* の骨片が発見されている等から九州の白亜紀層に対比すれば天草島姫ノ浦層群に相当する。

白亜紀層産 *Salvinia* としては本邦最初のものであって，東亜では満州本溪湖産に次ぐものである。

松尾秀邦

I. Introduction

Cretaceous *Salvinia* was collected by the writer from the Mitsuse Prospecting Pit of the Hashima Colliery, when he visited the locality of the Palaeogene Takashima Flora there, guided by Mr. K. ARIMATSU of the Coal Mining Department of the Mitsubishi Co. in December, 1963. This island is known by the production of the best anthracite in our country—the Hashima-tan.

Hashima Island about 19 km SW of the Nagasaki Harbour in Kyûshû, a distance of about one hour by a small ship. This island looks from a distance as if it were floating like a warship, and is popularly known by the name of "Gunkan-jima" in Japanese that is, warship island. It is about 480 m long and 140 m wide being about 0.064 km² in area, with about 5,200 people living there, proving themselves to be very valuable source of labour and other services for the Coal Mining Department of the Mitsubishi Co.

In the Takashima Coal-field including two collieries, namely the Hashima and the Futago, the Palaeogene Takashima Flora is well preserved, but the occurrence of the Cretaceous plant fossils has not been known; consequently the occurrence of Cretaceous *Salvinia*, the small, floating aquatic fern species has not been expected there. It was a surprise to us to hear the discovery, by Mr. S. HINOKUMA of the Mitsubishi Co., of a bone of the *Trachodon* sp. at a point in the level of 917 m under sea in the Futago-tateko (Main shaft) of the Futago colliery in Takashima Is, about 4.5 km NE of Hashima Is.: it was found in April, 1962. This discovery suggested

* Received June 30, 1966; read January, 24, 1965 at Tokyo.

S. HINOKUMA the possibility of the occurrence of Cretaceous also in the Mitsuse Prospecting Pit in Hashima colliery: he has been successful to find the evidence of the Cretaceous in a molluscan shell from the grey sandy shale layer at its pit-wall. This molluscan shell was identified by Prof. T. MATSUMOTO of the Kyûshû University with *Inoceramus* cfr. *amakusensis* NAGAO et MATSUMOTO.

The writer, visiting the locality of this Cretaceous evidence, could collect a number of pyritized stems of *Equisetum* sp. as well as many pieces of Salvinian pinnulets, from the same horizon as that of *Inoceramus*.

Before writing this report, the writer whishes to express his appreciation to the members of the Coal Mining Department of the Mitsubishi Co., especially to Mr. S. HINOKUMA of the Futago colliery, and Mr. K. ARIMATSU of the Hashima colliery, for their kindness shown to him in every way in the field. And, last but not the least, the writer's thanks are due to Dr. I. HAYASAKA for his kind criticism of the work and reading the manuscripts.

II. Geological Notes of the Mitsuse Formation

The Mitsuse Formation was established by S. HINOKUMA in 1963, and was considered to belong to the lower part of the so-called "Akasaki Formation", which has been believed to conformably underlie the Futagojima Formation, yielding some Palaeogene brackish molluscan shells. It unconformably overlies the fundamental rock including the Palaeozoic Schists. Thus, the so-called "Akasaki Formation" has been regarded to be the Palaeogene and Pre-Tertiary in age. The new evidece consisting of a saurian bone and a pelecypod shell *Inoceramus*, points to its being of the Mesozoic age, however. (See Fig. 1).

A saurian bone of Futago colliery was identified with *Nipponosaurus* by Prof. F. TAKAI of the University of Tokyo; he considered that it was a humeral bone belonging to *Trachodon* (*Nipponosaurus*) sp., which was found at Kawakami colliery (Sinegorsk,—35 km NW of Yuzhno-Sachalinsk) in Sachalin Island.

On a shell of *Inoceramus* of Hashima colliery, Prof. T. MATSUMOTO is of opinion that is must be *I.* cfr. *amakusensis* from the Himenoura Group (Upper Cretaceous) in Amakusa Island, Western Kyûshû. Therefore, the so-called "Akasaki Formation" in part, at least, represents the Upper Cretaceous. It is why S. HINOKUMA proposed to separated this formation into two formations: the lower part, the Mitsuse Formation which corresponds to a part of the Upper Cretaceous Himenoura Group in Amakusa Islands, and the other, the Kôyagi Formation, corresponding to the lower Palaeogene formation of the northern Kyûshû.

The Cretaceous *Salvinia* was found in the grey silty shale layer containing many pyritized nodules, which, in all probability, is lower in horizon than the *Inoceramus*-bearing grey sandy shale layer, which is characterized by containing many pebbly or cobbly calcareous nodules.

At Takashima Island the writer collected some pyritized stems of *Equisetum* sp. from the same horizon of the *Salvinia*-bearing sandy shale layer exposed at the pit-wall of the lowest horizontal of the main pit, together with the pyritized pebbles, similar to the above mentioned nodules of the Mitsuse Formation.

From these facts, it is suggested that the *Salvinia* fragments and the *Equisetum* stems were grown in a bitumineous bog

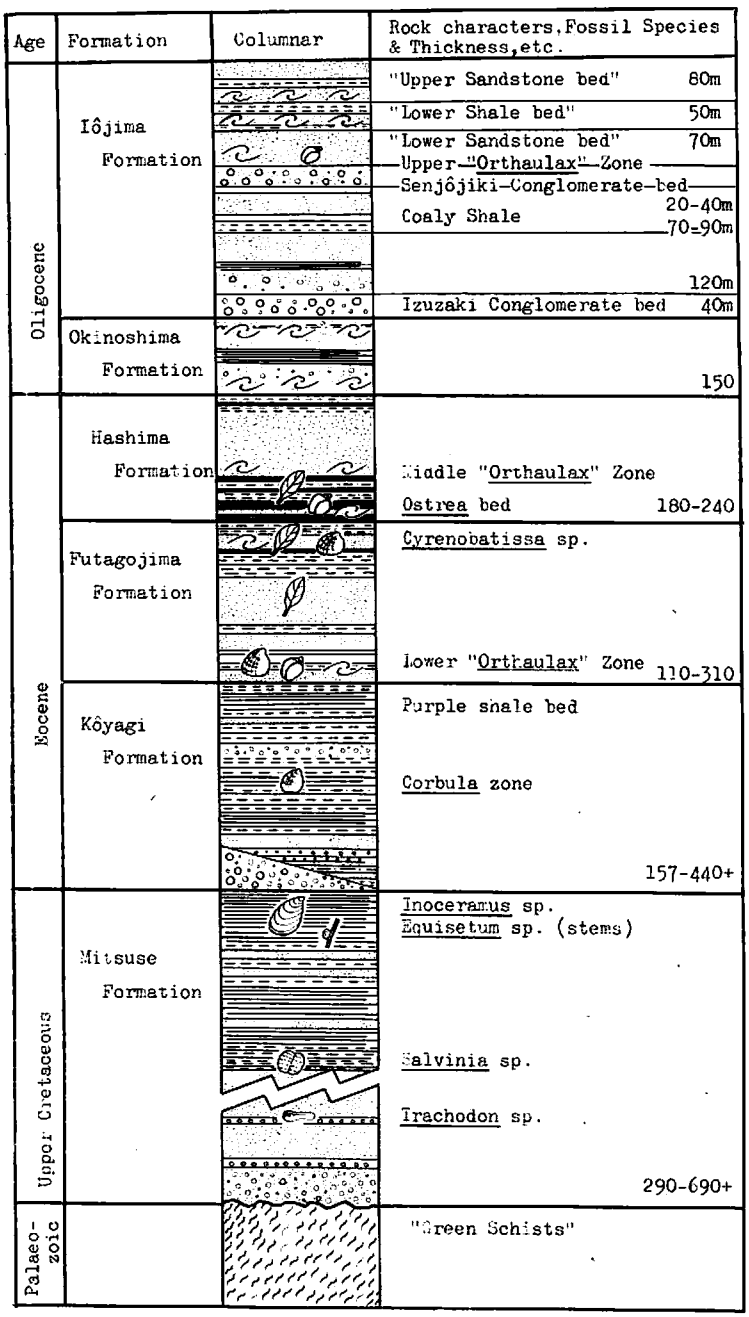

Fig. 1. Columnar Section of the Takashima Coal-Field.
(Make up for S. HINOKUMA, 1963).

in the upper Cretaceous age, when the area concerned was surrounded by such a natural environment.

The examination of all the fossils collected, indicates that the formation containing them may correspond to the Himenoura Group, belonging to the Urakawan Series in the Japanese Cretaceous profile.

III. Note of the New Species of *Salvinia*

Although the materials at the writer's disposal are all incomplete fragments, the Salvinian leaf impressions show that they are striate and punctate, and elliptical and equilateral in outline.

In Japan and neighbour countries, fossil Salvinians have only been known from the Palaeogen and Neogene strata, with the exception of *Salvinia* sp. indet., reported by H. YABE and S. ENDÔ in 1927, from the Honkeiko (Pen-hsi-hu) Group in South Manchuria. However, as there had not been record of *Salvinia* in Pre-Tertiary formations up to that time, the authors in doubt as to the Geological age of the Honkeiko Group, and assumed that the Honkeiko Group can not be older than the later Cretaceous. As the new discovery in Kyûshû is of the later Cretaceous age, it may more easily accepted the possibility of the lower Cretaceous occurrence of *Salvinia* in Honkeiko. Then the latter is the oldest record of the genus in Eastern Asia, and the one reported here from Hashima is the second oldest so far known from Eastern Asia.

The writer is inclined to propose a new species named *Salvinia mitsusense*,* after the name of the prospecting-pit of Hashima colliery.

* "Mitsuse" means "three sunken rocks", 5 km SW of Hashima Island.

IV. Description of the New Species

Family Salviniaceae

Salvinia mitsusense new species

Pl. 5, figs. 1-3. Text-fig. 4.

Description: Laminae lack apex and base; striate punctate characters, margin entire; 11.4 mm in length and 6.2 mm in width. Midnerve rather thick and distinct; lateral nerves 16 in number, form an archeid at angle of 60°. Archeid fine but distinctly impressed, commonly, forming 4-5 regular hexagonal or pentagonal meshes. Impressions of tubercles or spines rather lage, usually one to each mesh.

Discussion: On the genus *Salvinia*, K.K. SHAPARENKO (1956) described in detail and arrived at a conclusion that the genus should be separated into two groups, recent and fossil: the former including eight species, and the latter twelve, ranging from the younger Cretaceous to the Pleistocene in the world. In Japan and in the neighbouring territories, he recognized the existence of two recent species, namely, *S. cuculata* and *S. natans*. The former species is found in Southern Asia and the other is rather widely distribution from Japan to Europe. As to the Japanese fossil species of *S. natans* (he includes *S. natanella*, *S. kryshtofovichana*, *S. sunschae*, *S. natans* form *fossilis* in his description), he regarded that the range in the geological horizon from the Eocene to Oligocene.

On the other hand, the Japanese Palaeo-phytologists described three species, i. e., *S. natans fossilis*, *S. formosa* and *S. pseudoformosa* from the Neogene strata.

When S. OISHI and K. HUZIOKA (1941 and 1943) described those species from Hokkaido and Karahuto (Sachalin), they also referred to many other localities in Japan (1941; 194). Among those localities, the writer has become aware of Nakanoshima, the specimen, where from was described by R. FLORIN in 1919, named *Salvinia formosa* HEER.

Nakanoshima is located at NE 300 m from the Hashima Island. According to the note of T. NAGAO (1927-29; 10), FLORIN's specimen had been probably derived from the "Goma-goshaku Bed" in the Takashima Group of Eocene age. The "Goma-goshaku Bed" contains a plant bed and molluscan layer, which are interbedded at a little above the Goma-goshaku seam. When the writer collected many warm temperate broad leaves from this plant bed in 1962, except *Glyptostrobus* sp., *Nelumbo* sp. and *Osmunda lignitum* GIEBEL which had been already made known by T. NAGAO in 1926; he also collected some Salvinian leaves in the debris of the abandoned mine between the "Banto-so" and "Goma-so". These specimens are imperfect in preservation, but they are enough to make them recognized that they resemble *Salvinia formosa* of the Neogene age.

On the other hand, K. K. SHAPARENKO, revising FLORIN's *S. formosa* from the Nakanoshima, remarked that it should be similar to, or identical with *S. kryshtofovichiana*. In fact, *S. kryshtofovichiana* shows a characteristic feature of *S. natans* in general of the modern species. But the Gomagoshaku specimen does show closer affinity to *S. formosa* than to *S. natans*.

S. OISHI and K. HUZIOKA, in their work discussing *S. natans fossilis* from the Karahuto (Sachalin) and *S. formosa* from Hokkoido (1942; 67-68), they observed as follows;

"—, the present writers described with illustrations two types of Kawabataian Salvinia, namely, *S. natans* ALL. *fossilis* OISHI and HUZIOKA from Karahuto and *S. formosa* HEER from Hokkaido. The former is a type morphologically similar to the living *S. natans* differing only in having more crowded spines on the surface of floating leaves: the latter shows a very similar morphological characters with the type specimen of HEER from Switzerland as well as so many specimens described and figured from various parts of the world under the name *S. formosa* HR. This is the reason why the present writers identified the specimens from Hokkaido to *S. formosa*, except that in our specimens the minute surface features, which are rather obscure in HEER's specimens especially those in respect to the tubercles, are very clearly observed as already shown in the text-figure in our second contribution above referred to. —FLORIN mentioned on *S. formosa* derived from the type locality of Schrotzburg in Switzerland and described that there were hair-bases (tubercles) arranged in two rows as were clearly shown in his figure. This is certainly a valuable contribution made by FLORIN, but unfortunately the examination of the surface feature was made on the specimens derived from the type-locality, but not on the type-specimen itself. It is indeed probable or even possible that the specimens which now FLORIN examined represent the same species with HEER's type-specimen, but at the same time there is also a probability that they may represent a distinct species of *Salvinia* grown together with HEER's *S. formosa*. As FLORIN's figures show, it is doubtless that his specimens agree essentially with HEER's type-specimen in many morphological features except that in the type-specimen the minute surface features as FLORIN pointed out are obscure. Therefore, if it may be provisionally admitted that HEER's type-specimens exhibit really the same characters coincide in all respects with those in FLORIN's specimens, then the specimens which the present writers described and figured from Hokkaido as *S. formosa* HR. in which the tubercles or hair-bases are ar-

ranged in single row should represent a species distinct from *S. formosa* in the sence of FLORIN. Therefore, at the present case, the present writers wish with provisionally to follow FLORIN in treating his specimens to be identical with the type-specimen of *S. formosa* by HEER, and to call the specimens from Hokkaido in question *pseudoformosa*. The several specimens hitherto described by many authors as *S. formosa* need reexamination.—"

The Goma-so species is similar to OISHI and HUZIOKA's *S. formosa*. The Hashima species resembles it, so that the writer considers that *S. mitsusense* to be ancestral form from which the Palaeogene and Neogene species of Japan possibly had been derived.

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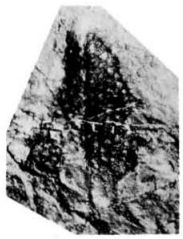
Explanation of Plate 5

Salvinia mitsusense, new species

Locality: Mitsuse Prospecting-Pit, Hashima Colliery, Takashima Coal-Field, Nagasaki Prefecture, Kyûshû, Japan.

Fig. 1. Reg. No. DGLAKZ-14241-1 (×2).
Fig. 2. Holotype: Reg. No. DGLAKZ-14231-2 (×2).
Fig. 3. Reg. No. DGLAKZ-14241-3 (×2).
Fig. 4. Upper surface of the new species.
Fig. 5. Marginal part of the upper surface.
Fig. 6. Undersurface of the new species.



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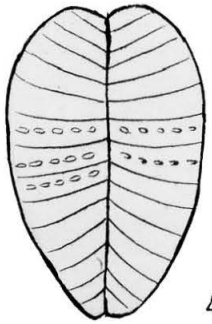

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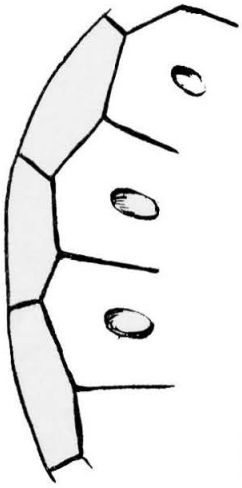

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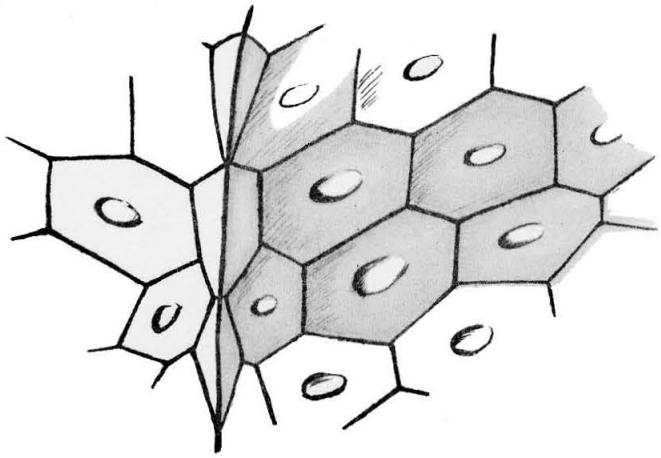

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Akasaki	赤　崎	Honkeiko (Pen-hsi-hu)	本溪湖
Amakusa Island	天草島	Kawakami (Sinegorsk)	川　上
Futagojima	二子島	Mitsuse	三ッ瀬
Futago Tateko	二子竪坑	Nakanoshima	中之島
Goma-goshaku	胡麻五尺	Takashima Island	高　島
Hashima Island	端　島	Urakawa	浦　河
Himenoura	姫ノ浦		

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520. ON THE HAMAMELIDACEAE FROM THE PALAEOGENE OF HOKKAIDO, JAPAN*

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北海道古第三系産のマンサク科について： この科に属する植物は被子植物の中でも比較的古い型と考えられているが，実際に現生種は隔離分布や極限された分布を示すものが少なくない。しかし，化石としては北半球の第三系，ことに新第三系から広く発見されている。筆者は北海道の石狩および釧路炭田の含炭古第三系から，マンサク科に属する *Corylopsis*・*Disanthus*・*Hamamelis*・*Liquidambar* および *Parrotia* の5属5種を認め，ここに記載をした。

棚 井 敏 雅

Introduction

The family Hamamelidaceae includes 23 genera and about 150 species in the world, and the living species is now distributed in the old tropics and warm temperate regions. Most of them are characteristic in modern distribution: they are mostly distributed in limited areas. Considering the modern and past distribution, the Hamamelidaceae includes many of relict genera. This family has been considered to be one of the older types in the evolution of Angiosperms by many authors (GOBI, 1916; TAKHTAJAN, 1954; others), on the basis of anatomical structure of woods, and flower structure. The fossils belonging to the Hamamelidaceae have been widely recorded through the Tertiary of the northern hemisphere, even back to the Upper Cretaceous; especially several genera such as *Corylopsis*, *Distylium*, *Fothergilla*, *Hamamelis*, *Liquidambar*, and *Parrotia* are common. Of these genera *Liquidambar* and *Parrotia* have been most widely and commonly found in the Middle Tertiary of Eurasia and North America. In Japan the fossils belonging to the Hamamelidaceae are abundant in the Neogene (MIKI, 1941; TANAI, 1961).

The Palaeogene sediments including many valuable coals are widely distributed in Hokkaido, and contain a number of well-preserved plant fossils in several of stratigraphic horizons. The author has investigated these Palaeogene plants during recent several years, and here describes on the representative fossils of the Hamamelidaceae.

* Received July 12, 1966; read Jan. 25, 1966 at Sendai.

Acknowledgements

The author wishes to express his great appreciation to Dr. Kazuo HUZIOKA, Professor of mining geology at Akita University, for his valuable suggestion to identify fossils and for his permission to study some of his collection. Deep appreciation is due to Dr. Toshio SHIMOKAWARA, Chief geologist of Hokkaido

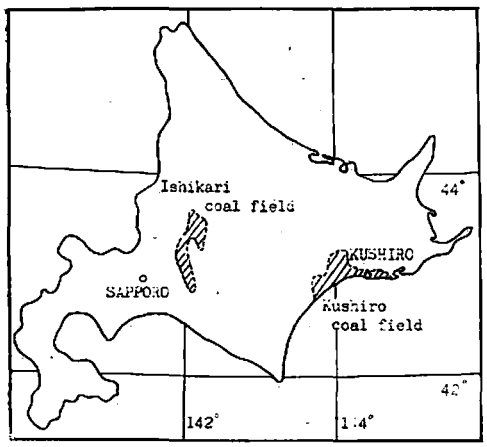


Fig. 1. Map showing fossil localities.

Colliery and Steamship Co., for his kind permission to offer several specimens.

Fossils and their stratigraphic distribution

Palaeogene fossils of the Hamamelidaceae are found from the Ishikari and Kushiro coal fields (Fig. 1): they are *Corylopsis ishikariensis* sp. nov., *Disanthus nipponicus* sp. nov., *Hamamelis kushiroensis* sp. nov., *Liquidambar miosinica* HU et CHANEY and *Parrotia fagifolia* (GOEPPERT) HEER. Of these genera *Disanthus* and *Corylopsis* are the first occurrence in the Tertiary of East Asia, though other three have been commonly found in the Neogene. The genus *Disanthus* is monotypic, and its living species, *D. cercidifolius* MAXIM., is confined to Japan and central China. *D. cercidifloius* in Japan are living isolatedly with small extent in Honshu and Shikoku. The genus *Parrotia* is also monotypic; its living species, *P. persica* C. A. MEYER is distributed only in the coastal region of the Caspian Sea, northern Iran. The genus *Corylopsis* is confined to East Asia and Himalaya region, and 4 living species are distributed in central and southern Japan. On the one hand, both *Liquidambar* and *Hamamelis* are separately distributed in East Asia and eastern North America each; they are a part of the so-called East Asiatic-North American alliance which was widely distributed during Middle Tertiary time in the northern hemisphere, and is now restricted to East Asia (mainly to Japan and China including Formosa) and North America.

Table 1. Stratigraphic distribution of the Hamamelidacean plants in the Ishikari and Kushiro coal fields.

fossil-bearing formation / fossil species	Ishikari					Kushiro		
	Nc	Yc	Bc	Ic	Ac	Hc	Yb	Sb
Corylopsis ishikariensis	———							
Disanthus nipponica		———	- - - - -	———		———		
Hamamelis kushiroensis		———	- - - - -	———		———		
Liquidambar miosinica	———	———	- - - - -	———	- - ? - -	———	———	
Parrotia fagifolia		———						

Nc: Noborikawa formation Yc: Yubari formation Bc: Bibai formation
Ic: Ikushumbetsu formation Ac: Ashibetsu formation
Hc: Harutori formation Yb: Yubetsu formation Sb: Shakubetsu formation

In the Ishikari coal field situated in central Hokkaido, the Eocene-Oligocene Ishikari group comprises 5 coal-bearing formations, from which a number of plant fossils occur. In the Kushiro coal field situated in southeastern Hokkaido, the Oligocene Urahoro group comprises 3 coal-bearing formations including many plant fossils. The Urahoro group has been correlated to the upper half of the Ishikari group on the basis of marine molluscs and plant fossils. Of the above-noted 5 species of the Hamamelidaceae, *Liquidambar miosinica* is found through the Ishikari and Urahoro groups, especially common in the Yubari and Ikushumbetsu formations of the Ishikari coal field. It is frequently represented not only by leaves but fruits. *Disanthus nipponicus* represented by leaves is usually found in the Ikushumbetsu and the Harutori formations, and is rare in the Yubari formation. Other three species show rather rare occurrence in the Palaeogene of Hokkaido. These five species are distributed stratigraphically in the Ishikari and Urahoro groups as shown in Table 1.

Descriptions of species

Corylopsis ishikariensis sp. nov.

Pl. 6, fig. 1

Description:—Leaf ovate, 2.4 cm. long (estimated), 1.6 cm. wide, palmately 3-veined from the base; base obliquely cordate; apex unknown; midrib stout, nearly straight, bearing 4 or 5 (estimated) subopposite secondaries at angles of 20 to 25 degrees; a pair of lateral primaries forming angles of degrees with midrib; 5 or 6 abaxial secondary branches given off from lateral primaries, curving near the margin, ending in marginal teeth; lateral primary and secondary veins gently curving up, entering marginal teeth; tertiary veins slender, irregularly percurrent; margin dentate with aristate teeth; texture subcoriaceous; petiole stout, 4 mm. long.

Remarks:—A single leaf from the Kamui coal mine, though somewhat incomplete, is referred to *Corylopsis* in its venation and marginal character. It is closely similar to leaves of the modern *C. pauciflora* SIEB. et ZUCC., which is distributed in central Honshu, Japan. A single incomplete leaf referred to *Corylopsis* cf. *pauciflora* was described from the Sarmatian flora of Ungarn, Hungary (ANDREANSZKY, 1959), but differs in venation character. No fossil leaves of *Corylopsis* are similar to *C. ishikariensis* in Japan. Our fossil leaf resembles in general appearance to *Tilia remotiserrata* OISHI et HUZIOKA from the Estoru coal mine southern Saghalien (OISHI et HUZIOKA, 1943), but differs in marginal teeth.

Occurrence:—Kamui coal mine, Utashinai City (Noborikawa formation), collected by H. HONDA.

Collection:—H. U. M. P. Holotype no. 25861.

Disanthus nipponicus sp. nov.

Pl. 6, figs. 3, 7

Description:—Leaves cordate, 5 to 7 cm. long and 7.6 to 10 cm. wide: apex obtuse, sometimes slightly emarginate; base broadly cordate; palmately 5-veined from the base; midvein stout, somewhat flexuose, bearing 3 or 4 subopposite secondaries at angles of 40 to 45 degrees, then gently curved up and approaching to the margin, where they branch and form prominent marginal loops; inner pair of lateral primaries forming an angle of 40 to 45 degrees with the midvein, bearing 3 to 4 abaxial secondary branches, which curved up near the

margin and from marginal loops; outer pair of secondaries somewhat slender, forming an angle of 75 to 90 degrees with the midvein, gently curving up, with about 5 abaxial branches, which form prominent loops within the margin; tertiary veins forming a large, irregular, quadrangular meshes, enclosing a coarse network of quarternary veins; areolation fine; margin entire, sometimes shallowly lobed on one side; texture thin; petiole medium, unknown in length.

Remarks:—These well-preserved leaves are similar to those of *Cercis*, *Phytocrene* and *Disanthus* in their general appearance. They are most closely similar to leaves of the modern *D. cercidifolius* Maxim. in shape and venation, which is rarely living in Honshu and Shikoku, Japan, and in central China. *D. nipponicus* is closely similar to *Cercis miochinensis* HU et CHANEY from the middle Miocene Shanwang Flora of China (HU et CHANEY, 1938), and *C. endoi* K. SUZUKI from the Upper Miocene Fujitoge flora of northeastern Honshu (K. SUZUKI, 1958), but these leaves of *Cercis* have apparently a small elongation of apex which is usually observed in the modern leaves of *Cercis*. Another similar species is *Phytocaene sordida* (LESX.) MACG. from a Middle Eocene flora of the central Sierra Nevada, the western United States (MACGINTIE, 1941), but differs in marginal character.

Occurrence:—Higure-zawa, Ikushumbetsu, Mikasa City (Ikushumbetsu formation), collected by Y. NOZAKI and K. KATO; Taiheiyo coal mine, Kushiro City (Harutori formation), collected by T. TANAI.

Collection:—H. U. M. P. Holotype no. 25865; Hokkaido Coll. Steamship Co. G. S. hypotype no. 501.

Hamamelis kushiroensis new species

Pl. 6, figs. 5, 6

Description:—Leaves ovate to oval, 3-plinerved, somewhat inequilateral, 6.5 to 12 cm. long (estimated), 4.5 to 6 cm. wide; apex missing; base somewhat asymmetrical, slightly cordate; midrib slender, somewhat flexuose; secondary veins 6 or 7 pairs, opposite to subopposite, diverging at angles of 30 to 40 degrees, nearly parallel, slightly curving up, craspedodrome; several branches from basal secondaries diverging abaxially, curving up along the margin forming marginal loops with the tertiaries, a few branches from other secondaries sometimes given off near the margin, looping along the margin or ending in marginal teeth; tertiaries distinct, percurrent, nearly perpendicular to the secondaries; nervilles thin, finely reticulate; margin irregularly undulate-dentate, with cuspidate teeth; texture firm; petiole missing.

Remarks:—These leaves, though incomplete, are referred to *Hamamelis* in margin and venation character, and are closely similar to those of the modern *H. japonica* SIEB. et ZUCC., which is widely distributed from Hokkaido to Kyushu. *H. kushiroensis* is distinguishable in shape and venation from *H. protojaponica* TANAI et N. SUZUKI recently described from the Late Tertiary flora of northeastern Hokkaido (TANAI et N. SUZUKI, 1965). Another similar species *H. miomollis* HU et CHANEY from the Miocene Shanwang flora of China (HU et CHANEY, 1938), but the Chinese species is suborbicular in shape.

Occurrence:—Shimizusawa coal mine, Yubari City (Yubari formation), collected by M. KOBAYASHI; Takinosawa, Bibai City (Ikushumbetsu formation), collected

by T. TANAI; Taiheiyo coal mine, Kushiro City (Harutori formation), collected by T. TANAI.

Collection:—H. U. M. P. Holotype no. 25863; hypotype no. 25864.

Liquidambar miosinica HU et CHANEY

Pl. 7, figs. 2-6

1938. *Liquidambar miosinca* HU et CHANEY. *Palaeont. Sinica, new ser. A*, no. 1, p. 46, pl. 23, figs. 1, 2.

1920. *Liquidambar europaeum* AL. BRAUN, FLORIN. *Kgl. Sv. Vet.-Akad. Handl.* vol. 61, p. 20, pl. 3, fig. 5.

1932. *Liquidambar europaeum* AL. BRAUN, TO ENDO et MORITA. *Sci. Rep. Tohoku Imp. Univ. ser. 2*, vol. 15, no. 2, p. 51, pl. 3, fig. 9.

1963. *Liquidambar miosinica* HU et CHANEY, TANAI et SUZUKI. *Tertiary floras of Japan, I. Miocene floras*. p. 128, pl. 23, figs. 6, 8, 11 (see synonymy).

Remarks:—Fossil leaves referred to *Liquidambar* are commonly found from the Palaeogene of Hokkaido, especially from the Ishikari group. These leaves are mostly three-lobed, and are rarely five-lobed. Three-lobed leaves are highly variable in basal form from broadly rounded to cordate, in shape of lobes from deltoid with acute tip to elongate-acute with acuminate tip, and in the extending angles of lateral primaries. Such leaf characters closely match their variation displayed by *L. miosinica*, which is one of the common plants in the Neogene of Japan. Palaeogene *Liquidambar* have farther abundant leaves with deltoid lobes than of Neogene leaves. However, Palaeogene leaves are, as a rule, indistinguishable from *L. miosinica*, which is closely similar to the modern *L. formosana* HANCE living in Formosa and China.

The 5-lobed leaves from Japan have been usually referred to *L. europaeum* AL. BRAUN, but they should be referred to *L. miosinica*, as already disucussed by the writer (TANAI et N. SUZUKI, 1963). *L. europaeum* AL. BRAUN from the European Tertiary and *L. pachyphyllum* KNOWLTON from the North American Tertiary are represented mostly by 5-lobed leaves, and rarely by 3-lobed leaves; these two species are closely similar to the modern *L. styraciflua* LIN.

Explanation of Plate 6

(All natural size unless otherwisw stated)

Fig. 1. *Corylopsis ishikariensis* TANAI sp. nov., from the Noborikawa formation, the Kamui coal mine, Ishikari (×1.5). H. U. M. P. holotype No. 25861.

Fig. 2. *Corylopsis pauciflora* SIEB. et ZUCC., the living leaf for comparison of fig. 1.

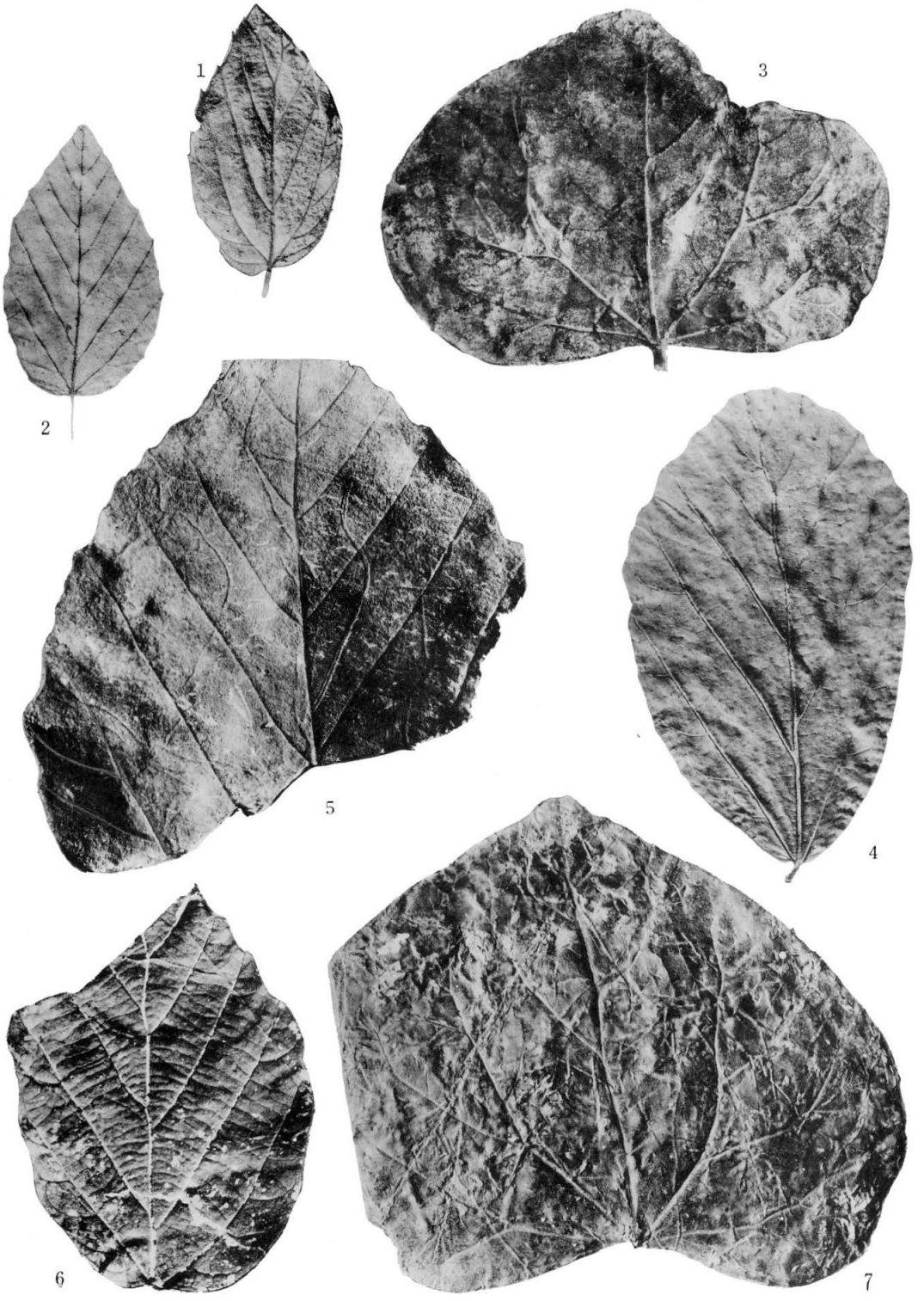
Fig. 3. *Disanthus nipponicus* TANAI sp. nov., from the Ikushumbetsu formation, Higurezawa, Ikushimbetsu, Ishikari. Hokkaido Coll. Steamship Co. G. S. hypotype No. 501.

Fig. 4. *Parrotia persica* C. A. MEYER, the living leaf for comparison of pl. 2, fig. 1.

Fig. 5. *Hamamelis kushiroensis* TANAI sp. nov., from the Harutori formation, Taiheiyo coal mine, Kusoiro. H. U. M. P. hypotype No. 25864.

Fig. 6. *Hamamelis kushiroensis* TANAI sp. nov., from the Harutori formation, Taiheiyo coal mine, Kushiro. H. U. M. P. holotype No. 25863.

Fig. 7. *Disanthus nipponicus* TANAI sp. nov., from the Ikushumbetsu formation, Higurezawa, Ikushumbetsu, Ishikari. H. U. M. P. holotype No. 25862.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living in the southeastern United States.

Occurrence:—Yubetsu coal mine, Akanmachi, Akan-gun (Yubetsu formation), collected by T. TANAI; Taiheiyo coal mine, Kushiro City (Harutori formation), collected by T. TANAI; Shimizusawa coal mine, Yubari City (Yubari formation), collected by M. KOBAYASHI; Kotakino-sawa, Ikushumbetsu, Mikasa City (Ikushumbetsu formation), collected by T. SHIMOKAWARA.

Collection:—Hypotype H. U. M. P. nos. 25865, 25866.

Parrotia fagifolia (GOEPPERT) HEER

Pl. 7, fig. 1

1859. *Parrotia fagifolia* (GOEPPERT) HEER. *Flora tert. helv.* vol. 3, p. 306.

1955. *Parrotia fagifolia* (GOEPPART) HEER, HUZIOKA. *Illust. Cat. Fos. Fukui Pref.* no. 6, p. 6, pl. 2, fig. 1.

1963. *Parrotia fagifolia* (GOEPPERT) HEER, TANAI et SUZUKI. *Tertiary Floras of Japan, I. Miocene floras*, p. 129, pl. 19, fig. 5, pl. 20, figs. 1-3. (see synonymy and discussion).

Remarks:—Several incomplete leaves from the Yubari formation are referred to *Parrotia fagifolia*, which is one of the representative species in the Middle Miocene of Japan. As already discussed by the writer (TANAI et N. SUZUKI, 1963), *P. fagifolia* is closely similar to the modern *P. persica* C. A. MEYER of northern Iran. Recently TRALAU (1963) compared such fossil leaves from the European Tertiary with living leaves of *Hamamelis*, *Parrotia* and *Fothergilla*, and assigned these fossils to cf. *P. persica*. However, current practice favors their reference to *P. fagifolia* rather than to a modern species.

Occurrence:—Shimizusawa coal mine, Yubari City (Yubari formation), collected by M. KOBAYASHI.

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Soc. Japan, Spec. Pap. no. 10, pp. 1–117.

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Akan-machi	阿寒町	Ikushumbetsu	幾春別	Shakubetsu	尺別
Ashibetsu	芦別	Kamui	神威	Shimizusawa	清水沢
Bibai	美唄	Kotakinosawa	小滝ノ沢	Takinosawa	滝ノ沢
Harutori	春採	Mikasa	三笠	Yubari	夕張
Higurezawa	日暮沢	Noborikawa	登川	Yubetsu	雄別

Explanation of Plate 7

(all natural size)

Fig. 1. *Parrotia fagifolia* (GOEPPERT) HEER, from the Yubari formation, the Shimizusawa coal mine, Ishikari. Stored at Department of Mining Geology, Akita University.

Fig. 2–4. *Liquidambar miosinica* HU et CHANEY, from the Yubari formation, Shimizusawa coal mine, Ishikari. Stored at Department of Mining Geology, Akita University.

Fig. 5. *Liquidambar miosinica* HU et CHANEY, from the Yubetsu formation, Yubetsu coal mine, Kushiro. H. U. M. P. hypotype No. 25865.

Fig. 6. *Liquidambar miosinica* HU et CHANEY, from the Ikushumbetsu formation, Kotakinosawa, Ikushumbetsu, Ishikari. H. U. M. P. hypotype No. 25866.


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Trans. Proc. Palaeont. Soc. Japan, N.S., No. 66, pp. 63–72, pl. 8. June 30, 1967

521. LOWER CRETACEOUS AMMONITES FROM THE MIYAKO GROUP
PART 1
VALDEDORSELLA FROM THE MIYAKO GROUP*

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宮古層群産の古白亜紀アンモナイト・その 1, 宮古層群産 *Valdedorsella*: 岩手県の宮古層群に産するアンモナイトのうち, *Valdedorsella* 属 3 種の記載を行い, その産出層準を明示した。今までテーチス地域からのみ報告されていた *V. akuschaensis* や *V. getulina* が, 宮古層群から発見された。これによって, 環太平洋地域の他地区からも, これらの発見が期待されるだろう, これらの産出化石から, 平井賀層ならびに田野畑層の少くとも上部の時代は, おそらく, 西欧でいう Clansayes に対比される可能性が示唆されよう。　　小　畠　郁　生

Introduction

Ten cephalopod species from the Miyako Group were described by SHIMIZU (1931), in connexion with the correlation of the marine Lower Cretaceous deposits in Japan. He ascribed the Miyako Group to Lower Aptian to Middle Albian on the basis of his study of ammonites. Since SHIMIZU's work few works have been accomplished for the Lower Cretaceous ammonites from Japan in comparison with the remarkable advances in the study of the Upper Cretaceous ammonites. Meanwhile the knowledge of the Lower Cretaceous ammonites in certain countries has recently been much improved. In particular CASEY (1961) has recently presented an admirably fine scheme of zones in the Lower Greensand, publishing a magnificent monograph on the Ammonoidea since 1960.

At the suggestion of Professor MATSUMOTO I have been engaged in the study of ammonites from the Lower Cretaceous Miyako Group, while Dr. HAYAMI has been so in the study of bivalves. Dr. HANAI has generously offered all the specimens of his valuable collection at my disposal, and freely given me the stratigraphic information. Thus, the localities of the specimens are denoted in this paper by the abbreviation Hn., which indicates a locality number in HANAI's stratigraphic work (1949, 1953). In addition I myself did field work there to see the stratigraphic sequences and to collect fossils. The present part contains descriptions of the species belonging to the genus *Valdedorsella*, a desmoceratid ammonite.

I wish to record here my cordial thanks to Dr. Tetsuro HANAI and Dr. Itaru HAYAMI, who rendered their active cooperation to me in the field work and in various other ways. Thanks are also due to Professor Kotora HATAI of Tohoku University, who has provided the specimens kept in the University on

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loan for the present study. I desire to express my sincere thanks to Professor Tatsuro MATSUMOTO of Kyushu University, who has encouraged me during the course of this study, shared his precious time with me in fruitful discussion, and furthermore made a critical review of the first draft. Thanks are extended to Dr. Hiroshi OZAKI and Miss Reiko FUSEJIMA for their help in various ways. Mr. Koichi TOISHI photographed the specimens. Financial support was defrayed by the Ministry of Education as the Grant in Aid for Scientific Researches.

Systematic Descriptions

Order Ammonoidea

Superfamily Desmoceratacea

Family Desmoceratidae

Subfamily Eodesmoceratinae

Genus *Valdedorsella*
BREISTROFFER, 1947

Type species.—*Desmoceras akuschaense* ANTHULA, 1899 (designated by BREISTROFFER, 1947).

Diagnosis.—The shell is small and narrowly to moderately umbilicate. The whorl is inflated and coronate to oval, being much depressed to nearly as high as broad. The venter is broadly rounded. Constrictions are distinct, nearly straight or slightly flexuous on sides, and very gently projected on the venter. Behind the constrictions there is a prominent rounded rib. Fine ribs, riblets or rather lirae occur between constrictions. They are rather crowded, simple or bifurcated, with occasional shorter ones, more or less prorsiradiate but is less projected on the venter than the constrictions. In some species the shell is very faintly ornamented. The suture is rather simple. E is narrow and deep. L is nearly as deep as E, and more or less asymmetrically trifid. Umbilical lobes are much smaller than E and L. The first and second lateral saddles are more or less asymmetrically bifid.

Remarks.—This genus was proposed by BREISTROFFER (1947, p. 60) with a brief description of diagnosis. The genus varies to some extent in compression and involution of whorls and in the curvature and strength of ornaments.

There is much to be done for proper understanding of the natural history of *Valdedorsella*. There may be three or more main branches within *Valdedorsella*, as demonstrated in MATSUMOTO's table* (1960): (1) *Eodesmoceras* → *V. crassidorsatum* group → *V. neumayri* group, (2) *Eodesmoceras*→*V. crassidorsatum* group→*Desmoceras* (s. s.), (3) *Eodesmoceras*—*V. crassidorsatum* group→ *Valdedorsella* (s. s.) → *Melchiorites*, (4) *Eodesmoceras*→*V. crassidorsatum* group →*Valdedorsella* (s. s.)→*Pseudohaploceras*. However, until more material is obtained at home and abroad and the whole picture of the genus can be figured out, it is not advisable to subdivide *Valdedorsella* into subgenera or to separate other new genera from *Valdedorsella*.

WRIGHT (1957, p. L363) included *Valdedorsella* in Puzosiinae. In the present paper the genus is transferred from Puzosiinae to Eodesmoceratinae, because *Valdedorsella* is morphologically more primitive, and occurs earlier than the genera belonging to Puzosiinae. It is allied to *Eodesmoceras*, as will be mentioned later. Thus, in regard to the

* Distributed for his lecture at the celebration of the 25th anniversary of the Palaeontological Society of Japan.

systematic position of *Valdedorsella*, I would agree with MATSUMOTO'S view (1954, p. 106). In the Lower Cretaceous age the distinction of the branches in Eodesmoceratinae was not great enough for separation of subfamilies, but they can be grouped together in one subfamily with *Eodesmoceras* as its representative. In other words, the main stock of the Neocomian to Aptian Desmoceratidae is still primitive, very flexible and not differentiated enough to form distinct groups, except for a lateral offshoot, Beudanticeratinae.

Valdedorsella akuschaensis (ANTHULA)

Pl. 8, figs. 1, 4; Text-fig. 1.

1899. *Desmoceras akuschaense* ANTHULA, *Beit. Paläont. Geol. Öst.-Ung.*, 12, Heft 2, p. 104 [50], pl. 8 [7], fig. 3a-c.
1947. *Valdedorsella akuschaense*, BREISTROFFER, *Trav. Lab. géol. Grenoble*, vol. 22, p. 7, 19, 60, listed.
1962. *Valdedorsella akuschaensis* var. *madagascariensis* COLLIGNON, *Atlas Fossiles caract. Mad.* ix (Aptien), p. 33, fig. 979.

Typology. — ANTHULA established *D. akuschaense* on three syntypes, of which the illustrated and measured one (ANTHULA, 1899, pl. 8, fig. 3a-c) is designated here as the lectotype. The type specimens are, according to ANTHULA, "aus den Aptien-Geoden des Akuscha Thales Daghestan, Kaukasus". Their repository is the University Museum of Vienna (a letter from PERGAMENT, March 30, 1966).

Material.—NSM. 6068 from loc. Hn. 0018; NSM. 6069 from loc. Hn. 0220 (Coll. I. OBATA). A comparable specimen of immature stage, NSM. 6072 from loc. Hn. 0650 (Coll. I. OBATA).

Description.—The Japanese specimens are very small. Involution of whorl is rather moderate and umbilicus is moderate in width (see measurements); coronate section is fairly wider than high, with a broadly rounded venter. Distinct constrictions are rather frequent (5 per whorl), nearly straight and slightly oblique on the sides but show very weak flexuosity in the ventrolateral area, thus widely projected forward on the venter, forming a chevron. They have a minor parabolic rib ahead and a major rounded, parabolic rib behind. Walls of the constrictions are fairly steep on the internal mould.

There are numerous (13 to 19) fine ribs between the constrictions. Some of them start from the umbilical edge and bifurcate a little below the midflank. Some

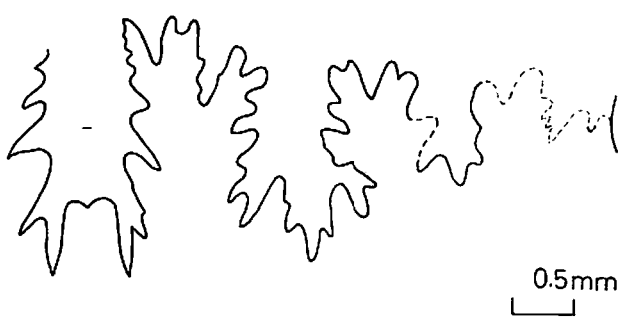

Fig. 1. *Valdedorsella akuschaensis* (ANTHULA). Suture, at whorl-height=3.1 mm., of the specimen, NSM. 6068, from loc. Hn. 0018, southern sea-cliff of Hiraiga, Iwate Prefecture.

are single and some others are intercalatory. The forward projection on the venter and the sinuosity on the flank are comparatively remarkable in a few ribs preceding the parabolic ones. The constriction, with a major parabolic rib, cuts a few ribs behind it. In NSM. 6072, ribs begin to appear at 2.7 mm. in height. Suture-lines are relatively simple. E is narrow and deep. L is nearly as deep as E, but is broader than E at the base, showing asymmetrically trifid lobules. Umbilical lobes are much smaller than E or L. The first lateral saddle is broader than E and L at the top, and is asymmetrically bifid. The second lateral saddle is much lower than the first.

Measurements.—

Specimen	Diameter	Umbilicus	Height	Breadth	B/H
NSM. 6068	14.3(1)	4.8(0.33)	5.7(0.40)	7.3(0.51)	1.28
NSM. 6072	9.3(1)	2.9(0.31)	3.5(0.38)	5.2(0.56)	1.49
For comparison:					
V. akuschaensis [ANTHULA, 1899, p. 104 [50]]					
	37(1)	11 (0.29)	15 (0.41)	20 (0.54)	1.33
V. akuschaensis var. *madagascariensis* [COLLIGNON, 1962, p. 33]					
	45 (1)	11 (0.24)	22 (0.49)	25 (0.56)	1.14

Remarks.—The illustrated specimen, NSM. 6068, which is wholly septate, has denser ribs (*i.e.*, 8 to 10 between two constrictions in ANTHULA's specimen) and a wider umbilicus than the lectotype from Caucasus (ANTHULA, 1899, p. 104 [50], pl. 8 [7], fig. 3a-c). The former has about 80 ribs per whorl, much more than 65 for the latter. NSM. 6072, the smallest specimen among ours (max. diam. *c.* 11.8 mm.), is similar to NSM. 6068 in the rib density, but has a narrower umbilicus than the latter, approaching somewhat to ANTHULA's specimen. A larger deformed specimen (*c.* 18 mm. in diameter), NSM. 6069, which is wholly septate, has the same rib density as that of ANTHULA's specimen. An exact comparison of sutures between the Japanese and Caucasian specimens is difficult because of dissimilar size. Thus, as far as our present knowledge goes, the minor differences between the specimens from Caucasus and Japan do not seem significant enough for specific distinction, but, without examining more specimens from the two regions, we cannot justify subspecific separation.

In *V. akuschaensis* var. *madagascariensis* COLLIGNON from the "Clansayesian" of Madagascar, the whorl is more compressed and the umbilicus is narrower than in the Caucasian specimen, as COLLIGNON has already mentioned (1962, p. 33, pl. ccxxix, fig. 979). The Japanese specimen, NSM. 6068, shows the widest umbilicus among the three groups of specimens but is closer to the Caucasian lectotype than to the Madagascar specimen, although an exact comparison is difficult because of the different sizes of the described specimens. In less dense ribs and narrower umbilicus, an illustrated specimen from the Clansayesian of Allan (Drôme) (JACOB, 1905, p. 402, pl. 12, fig. 1) is more akin to the lectotype from Caucasus than to the Japanese specimens.

Affinities.—*Valdedorsella akuschaensis* (ANTHULA) is allied to, but much more compressed, more widely umbilicate, and more distinctly ornamented than, *V. getulina* (COQUAND) described below. *V. hourcqi* COLLIGNON (1937, p. 18, fig. 12,

pl. 2, figs. 6-7) from the "Gargasien" of Madagascar has a more depressed whorl, a narrower umbilicus and broader saddles than *V. akuschaensis*. The mode of ribbing and constriction is also different between the two species.

Occurrence. — Loc. Hn. 0018, the calcareous sandstone at Tokuzo, southern sea-cliff of Hiraiga, Tanohata village, where the described specimen, NSM. 6068, was obtained along with *Cucullaea acuticarinata* NAGAO, *C. transversa* NAGAO, *Glycymeris* (*Hanaia*) *densilineata* NAGAO, and many other molluscan shells. In addition to this species *Hypophylloceras* sp., *Ptychoceras* sp., *Melchiorites yabei* (SHIMIZU), and *Hypacanthoplites* sp. occur sporadically in the bed. It is about 3 m below the prolific layer of *Hypacanthoplites* sp. and belongs to the lower part of the Hiraiga formation.

Loc. Hn. 0220, the dark gray, fine sandy shale at Kofunare, northern sea-cliff of Hiraiga, Tanohata village. In addition to this species, *Hypacanthoplites* sp., *Pseudohaploceras* (?) sp., and silesitid occur sporadically in the bed. The bed belongs to the upper part of the Tanohata formation.

Loc. Hn. 0650, a concretion in the calcareous sandstone containing *Orbitolina*, at southern extremity of the Aketo coast, north of Raga, Tanohata village. Together with this species, *Valdedorsella* cf. *getulina* (COQUAND), *Hypophylloceras* sp., *Diadochoceras* sp., *Hulenites* sp., *Pictetia* sp., *Ptychoceras* sp., and other uncoiled ammonites are sporadically contained in the same concretion. The bed belongs to the upper part of the "*Orbitolina* Sandstone".

All the above localities are in Shimohei County, Iwate Prefecture. From the above-listed assemblage of species and other facts the fossiliferous bed at these localities are referred to Upper Aptian.

Valdedorsella getulina (COQUAND)

Pl. 8, fig. 2; Text-fig. 2.

1880. *Ammonites Getulinus* COQUAND, Études suppl., p. 18 (Heinz, pl. 2).
1907. *Puzosia Getulina* COQUAND, PERVINQUIÈRE, *Carte Géol. Tunisie*, p. 151, pl. 6, fig. 16.
1920. *Puzosia Getulina*, FALLOT, *Trab. del. Mus. Nac. de Cienc. Nat. de Madrid, Serie Geol.*, 26, p. 45–46, pl. 2, figs. 7-10.
1947. *Valdedorsella* cf. *getulina*, BREISTROFFER, *Trav. Lab. géol. Grenoble*, vol. 22, p. 19, listed.
1962. *Valdedorsella getulina*, COLLIGNON, *Atlas Fossiles caracter. Madag.* ix, Aptien, p. 33, fig. 977.

Material. — NSM. 6070 from loc. Hn. 4151 (Coll. I. OBATA). A comparable specimen, NSM. 6073 from loc. Hn. 0650 (Coll. I. OBATA).

Description.—The specimen is very small. It has a broadly rounded venter, showing a much depressed whorl-section. The maximum breadth is between the umbilical shoulders. The umbilicus is deep and fairly narrow, with a subrounded umbilical shoulder. There are at least 5 strong constrictions which are prorsiradiate in the lateral area and bent forward on the venter. Each constriction is posteriorly bordered by a rounded rib which is low on the flanks and fairly prominent on the venter. There are lirae on the venter between the constrictions. The lirae are less projected than the constrictions. In the younger part the surface is almost smooth.

The suture line is rather simple. The first and the second saddles are rather slender, bifid, and are slightly asymmetric. L is asymmetrically trifid and is as large as E. The auxiliary elements descend fairly rapidly to the umbilicus.

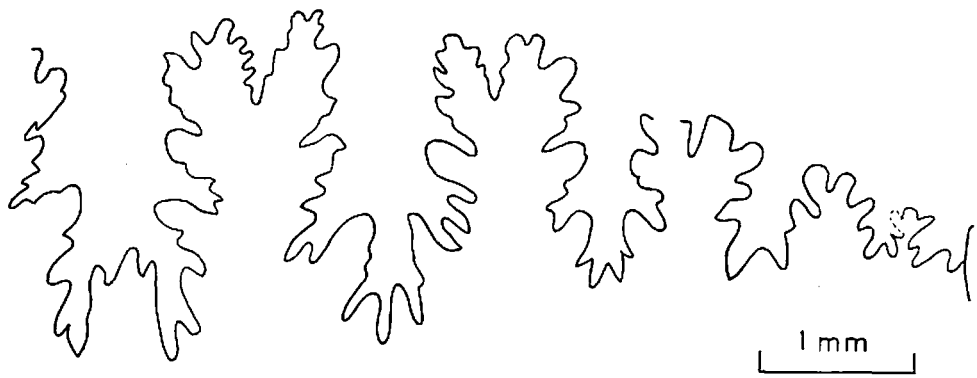

Fig. 2. *Valdedorsella getulina* (COQUAND). Suture, at whorl-height=5.3 mm., of the specimen, NSM. 6070, from loc. Hn. 4151, Matsushima, Iwate Prefecture.

The observed suture in the Japanese specimen is thus similar to that of *V. getulina* from North Africa (PERVINQUIÈRE, 1907, p. 151) and Madagascar (COLLIGNON, 1962, p. 33).

Measurements.—

Specimen	Diameter	Umbilicus	Height	Breadth	B/H
NSM. 6070	13.2(1)	2.8(0.21)	5.7(0.43)	9.8(0.74)	1.72
For comparison:					
Specimen from Madagascar [COLLIGNON, 1962, ix, p. 33]					
	13 (1)	3 (0.23)	6 (0.46)	10 (0.77)	1.67
Specimen from Majorca [FALLOT, 1920, p. 45]					
	12 (1)	2 (0.16)	5 (0.42)	8.6(0.72)	1.72
Specimen from Tunisia [PERVINQUIÈRE, 1907, p. 151]					
	14 (1)	4.5(0.32)	6.3(0.45)	9 (0.64)	1.43
Specimen from Tunisia [FALLOT, 1920, p. 45]					
	27.5(1)	8 (0.29)	11 (0.40)	18 (0.65)	1.64
Specimen from Algeria [FALLOT, 1920, p. 45]					
	11 (1)	3 (0.27)	5 (0.45)	8.5(0.77)	1.70
	15 (1)	4.5(0.30)	6.1(0.41)	10.4(0.69)	1.70
V. (?) *whiteavsi* [IMLAY, 1960, p. 100]					
	11.5(1)	2 (0.17)	6.5(0.57)	8.5(0.74)	1.31

Remarks.—FALLOT (1920, p. 45), dealing with the specimens from Majorca and North Africa, already remarked some variability of the present species in the outline of the cross section and the width of umbilicus in proportion to diameter. The present study likewise shows that there are minor differences in these points (see measurements) and also in the details of the suture among the specimens from North Africa, Majorca, Madagascar and Japan, as mentioned above. They do not seem, however, to be significant enough for subspecific distinction, so far as the available material is concerned.

Affinities. — *V. getulina* (COQUAND) from the uppermost Aptian is closely allied to *V.* (?) *whiteavesi* from the Lower Albian of Alaska (IMLAY, 1960, p. 100,

pl. 11, figs. 20-23, 25-28), in the small size, the outline of rounded cross section, weak ornaments, and the general feature of sutures. The latter species shows, however, a more compressed whorl and more asymmetric sutures than the former. *V. hourcqi* COLLIGNON (1937, p. 122 [18], pl. 17 [2], figs. 6, 6a, b; 7, 7a, b) from the Upper Aptian ("Gargasian") of Madagascar has a less depressed whorl, stronger ribbing, much broader saddles, and nearly straight, instead of forward bent, constrictions. *V. akuschaensis* (ANTHULA) (1899, p. 104 [50], pl. 8, fig. 3a-c) from the 'Aptian-Geoden' of Caucasus has a more compressed whorl and more distinct ribbing than *V. getulina*. An example of *V. akuschaensis* from Miyako as described above is nearly equal in size to the specimen of *V. getulina* but has a more compressed section and distinct ribbing.

Occurrence.—Loc. Hn. 4151, a calcareous concretion of the upper fossiliferous bed at Matsushima, southeast of Omoto village, the upper part of the Hiraiga formation; Uppermost Aptian. In addition to this species, *Diadochoceras nodosocostatiforme* (SHIMIZU), *Melchiorites yabei* (SHIMIZU), *Hypophylloceras* sp., and *Hamites* sp. occur in the same concretion.

Loc. Hn. 0650, the *Orbitolina*-bearing calcareous sandstone exposed at the southern extremity of the Aketo coast, north of Raga, Tanohata village. This is in the upper part of the "*Orbitolina* Sandstone". The associated species in the same concretion, already mentioned in the preceding page under the heading of *Valdedorsella akuschaensis* (ANTHULA), indicate Uppermost Aptian.

The above localities are both in Shimohei County, Iwate Prefecture.

Valdedorsella sp.

Pl. 8, fig. 3a-d; Text-fig. 3.

Material.—NSM. 6071 from the calcareous sandstone boulder at Tokuzo, possibly derived from loc. Hn. 0016 (OBATA Coll.).

Description.—The specimen is very small. It has a broadly rounded venter, showing a slightly depressed whorl section. The maximum breadth is probably in the lower part of the whorl, although the character is apparently modified by secondary deformation on one side. The umbilicus is very narrow and is rather shallow with subrounded umbilical shoulder. There are at least 5 distinct constrictions per whorl. They are prosiradiate on the inner half of the flank,

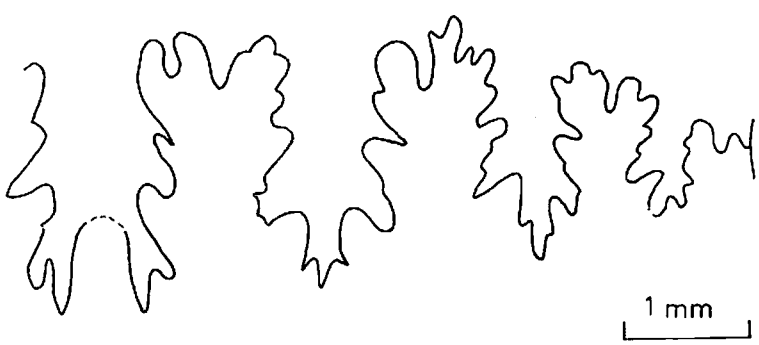

Fig. 3. *Valdedorsella* sp. Suture, at whorl-height=5.3 mm., of the specimen, NSM. 6071, from loc. Hn. 0016, southern sea-cliff of Hiraiga, Iwate Prefecture.

nearly rectiradiate on the outer half, and very widely projected on the venter, forming a flexuous curvature in lateral view. Each constriction is posteriorly bordered by a low rounded rib which is fairly prominent on the venter but weakened on the flanks. Several lirae occur between the constrictions on the outer shell. They are less projected on the venter than the constrictions, and on the flanks they are nearly rectiradiate, so that the lirae are cut by the constrictions and their posteriorly associated ribs.

The suture line is relatively simple. The saddles are relatively slender, bifid, and are slightly asymmetric. E is divided by a rather high foliole, showing a pair of narrow lobules at the base. L is rather narrow, trifid, and as deep as E. The other lobes are asymmetrically trifid.

Measurements.—

Specimen	Diameter	Umbilicus	Height	Breadth	B/H
NSM. 6071	*c.* 16.1(1)	*c.* 1.3(0.08)	*c.* 8.2(0.51)	*c.* 9.0(0.56)	1.09

Remarks.—In the described specimen the living chamber is preserved on the last half whorl. Whether the specimen represents an adult shell or is still immature is uncertain.

Affinities.—The present specimen may represent a species which is somewhat similar to *Valdedorsella getulina* and *V. akuschaensis* in cross-section, ornament, and suture. However, a detailed comparison with *Valdedorsella getulina* reveals that it is more compressed and is narrowly umbilicated, and, furthermore, less inflated on the flank than the former. This species has less distinct ornament, more involute and less inflate section than *V. akuschaensis*. The suture-line of immature stage in the present species is simpler than that of *V. getulina* of nearly the same size, thus resembling the suture of *Eodesmoceras*.

Occurrence.—The described specimen was found in a calcareous sandstone boulder at Tokuzo, possibly derived from loc. IIn. 0016 of the lower part of the Hiraiga formation, southern sea-cliff of Hiraiga, Tanohata village, Shimohei County, Iwate Prefecture. The rock matrix of the specimen includes many fragmentary crinoids.

Concluding Remarks

As a summarized result I list below the species of the genus *Valdedorsella* from the Miyako Group which have been described above. The stratigraphic position of each species is indicated in parentheses.

(1) *Valdedorsella akuschaensis* (ANTHULA)
(Upper part of the Tanohata formation; lower part of the Hiraiga formation; upper part of the "*Orbitolina* Sandstone")

(2) *Valdedorsella getulina* (COQUAND)
(Upper part of the Hiraiga formation; upper part of the "*Orbitolina* Sandstone")

(3) *Valdedorsella* sp.
(Lower part of the Hiraiga formation)

As MATSUMOTO (1954, 1960) has suggested, *Valdedorsella* seems to occupy a critical position in the evolutional history of the Desmoceratidae. A few species of *Valdedorsella* are closely allied to *Desmoceras* (s. s.) (*i.e.*, the *latidorsatum* group of Albian-Cenomanian): Inflated, fairly involute and less ornamented species (*e. g.*, *V. getulina*) seems to be

such an example (MATSUMOTO, 1954, p. 106-107).

However, the present paper is not an adequate place for making further discussion on the origin of Kossmaticeratidae, Desmoceratinae or Puzosiinae, since the available material is insufficient.

Valdedorsella akuschaensis is reported from the Clansayes of France, Caucasus, Algeria, Maroc, Egypt, and Madagascar. Thus, the species is regarded as an important index of the Clansayes age in the Tethys region (JACOB, 1905; BREISTROFFER, 1947). *Valdedorsella getulina* is reported from the Upper Aptian of Tunisia, Algeria, Majorca, and Madagascar. The discovery of the described two species from the Miyako Group is an interesting fact. They might be expected in other areas of the Circum-Pacific province.

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Aketo	明戸	Hiraiga	平井賀
Matsushima	松島	Miyako	宮古
Omoto	小本	Raga	羅賀
Shimohei	下閉伊	Tanohata	田野畑

Explanation of Plate 8

Two lateral (a, c.) views and ventral (b) and frontal (d) view (×2) of each specimen are shown. All the figured specimens were collected by I. OBATA from the Miyako Group, Shimohei County, Iwate Prefecture.

Fig. 1. *Valdedorsella akuschaensis* (ANTHULA)
NSM. 6068, from the calcareous sandstone of loc. Hn. 0018, which is 3 m below the prolific bed of *Hypacanthoplites subcornuerianus* at Tokuzo, southern sea-cliff of Hiraiga, lower part of Hiraiga formation, Tanohata village.

Fig. 2. *Valdedorsella getulina* (COQUAND)
NSM. 6070, from loc. Hn. 4151, the upper fossiliferous bed at Matsushima, upper part of Hiraiga formation, southeast of Omoto village.

Fig. 3. *Valdedorsella* sp.
NSM. 6071, from the calcareous sandstone, boulder at Tokuzo, possibly derived from loc. Hn. 0016, southern sea-cliff of Hiraiga, lower part of Hiraiga formation, Tanohata village.

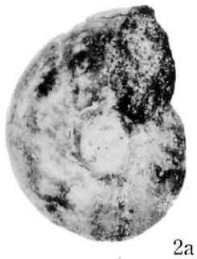
Fig. 4. *Valdedorsella akuschaensis* (ANTHULA)
NSM. 6069, from loc. Hn. 0220, Kofunare, northern sea-cliff of Hiraiga, upper part of Tanohata formation, Tanohata village.


1a


1b


1c


1d


2a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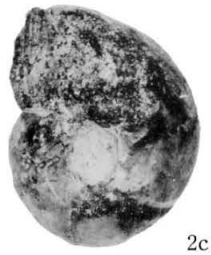
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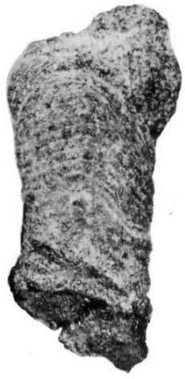
3a


3b


3c


3d


4a


4b


4c


4d

Trans. Proc. Palaeont. Soc. Japan, N.S., No. 66, pp. 73-82, pl. 9, June 30, 1967

522. SOME LOWER CRETACEOUS BIVALVES FROM THE SHIMANTOGAWA GROUP OF SOUTH SHIKOKU*

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四国南部の四万十川層群から産した古白亜紀二枚貝群：　高知県須崎市北方の仏像構造線に沿って分布する堂ガ奈路層から *Neithea* (1 新種を含む), *Plicatula*, *Amphidonte*, *Pterotrigonia* よりなる海棲二枚貝が発見されたので報告する。これらの化石の多くはこれまでに日本各地の宮古統および最近発見された台湾の Aptian 層の二枚貝群に共通または近縁である。本層分布地域からはかって *Myophorella* が報告されたことがあり，ジュラ紀後期を暗示するとも考えられたが，今回の発見により，当地域における四万十川層群最下部（堂ガ奈路層）の時代は，甲藤 (1961) が推察した通り，宮古世主部 (Aptian または Albian) であろうと結論される。　速水　格・川沢啓三

Introduction

Fossils are generally rare in the Shimantogawa [=Shimanto] group, which is enormously thick and occupies the extensive area of the southern subzone of the Outer Zone of Southwest Japan. In Shikoku, especially Kochi and Ehime Prefectures, however, fossil molluscs are fairly common at some limited places and offer important biostratigraphical data, as were described by MATSUMOTO, KIMURA and KATTO (1952), KOBAYASHI (1956), KATTO and OZAKI (1956), NAGAI, NAKANO, YOSHIDA and OHTSUKA (1962), KATTO and HATTORI (1964) and NAKAI and HADA (1966).

What is the basement of the Shimantogawa group is still an unsolved problem. Some stratigraphers have considered that Jurassic sediments are represented in the Shimantogawa group as well as Cretaceous, chiefly because some lenticular limestone bodies of this group are lithologically similar to those of the Upper Jurassic Torinosu group of the Chichibu belt (TAMURA, 1961; etc.). So far as the molluscan fossils are concerned, however, there is scarce positive evidence for the existence of pre-Aptian sediments in the Shimantogawa group of Shikoku.

KURATA (1941, p. 8) reported the occurrence of a trigoniid from a sandstone of the "Torinosu series" at Ochiaidani [Loc. 1 in this paper], west of Soda-yama [="Kuwata-yama" in KOBAYASHI, 1956], Aso village [now northern part of Susaki City], Takaoka County, Kochi Prefecture. The trigoniid was preliminary compared by KURATA with *Trigonia pocilliformis*,

* Received Sept. 26, 1966; read Jan. 21, 1967.

which is now referred to *Pterotrigonia s. str.* and ranges from the Upper Neocomian to the Albian. Subsequently KOBAYASHI (1956) described the plaster casts of KURATA's specimens under the name of *Myophorella* (*Promyophorella*) *obsoleta* KOBAYASHI and TAMURA. Because this species was originally reported from the Kogoshio formation of south Kitakami (Miyagi Prefecture), KOBAYASHI suggested an upper Kimmeridgian (or a lower Tithonian) age for this sandstone. Although this species was subsequently known to have survived until Berriasian (SATO, 1958; HAYAMI, SUGITA and NAGUMO, 1960), the genus *Myophorella* is believed to have become extinct in Japan immediately after Berriasian in relation to a more or less conspicuous mass extinction (HAYAMI, 1965b, 1966).

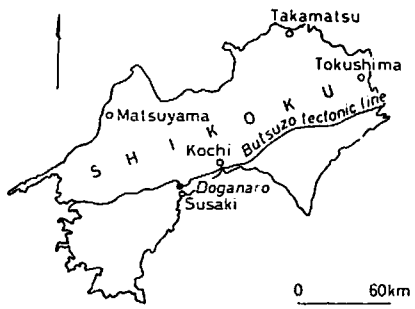

Fig. 1. Index map.

The trigoniid-bearing sandstone is evidently situated in the distributed area of the Doganaro formation, which exposes in a belt on the south of the Butsuzo tectonic line and was considered by KATTO (1956, 1961) to constitute the earliest sediments of the Shimantogawa group in Kochi Prefecture. The occurrence of *Myophorella* (*Promyophorella*) *obsoleta* from the Shimantogawa group is convertible, because it disagrees with KATTO's interpretation, in which this group is assigned to the

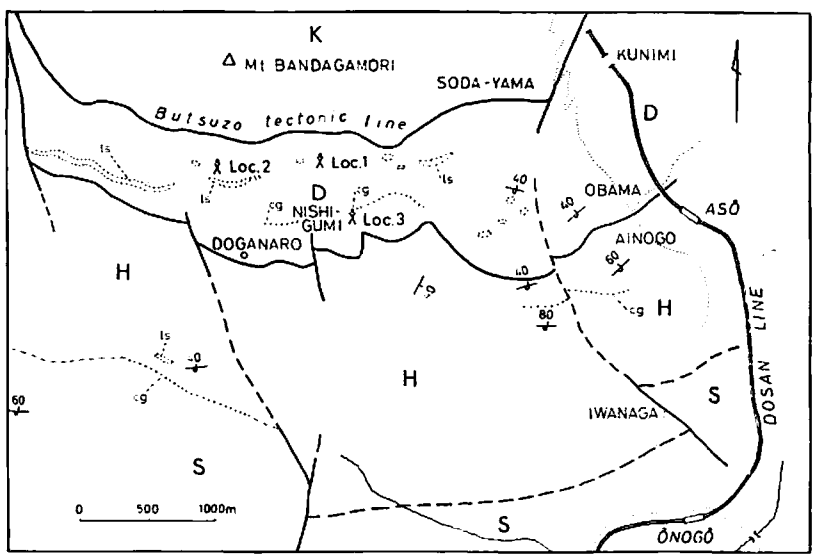

Fig. 2. Map showing the distribution of the Doganaro formation and the localities of the fossils.

K: Kokuzosan group (=Sambosan group); D: Doganaro formation
H: Hayama formation; S: Susaki formation.

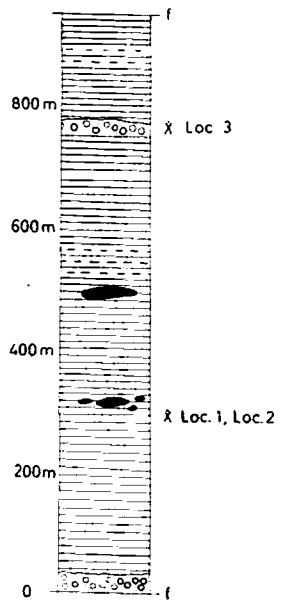

Fig. 3. Idealized columnar section of the Doganaro formation.

Miyakoan—Hetonaian series. KATTO (1961) listed some Cretaceous fossils from the Doganaro formation, but they remain undescribed.

So far as one of us (I. H.) examined the plaster casts which are now preserved in the Museum of the University of Tokyo, the specimens in question are rather fragmentary but may actually belong to *Pterotrigonia* instead of *Myophorella*. The concentric lines on the area are apparently too weak for *Myophorella* (*Promyophorella*). Therefore, we do not regard the trigoniid as an evidence for presence of Jurassic strata in the Shimanto terrain.

Recently Mr. Y. TAKEMOTO, now a student of Kochi University, and one of us (K. K.) collected several specimens of marine bivalves from the Doganaro formation at Kakureyashiki (Loc. 2 in Fig. 2) [33°25′40″N, 133°15′40″E], north of Doganaro, Susaki City. The locality is situated about 800 m west of Ochiaidani (Loc. 1). Judging from the subequatorial distribution of strata in this area, the present fossil bed must be comparable with the above-mentioned "*Myophorella*"-bearing sandstone in the stratigraphic position (see Figs. 2 and 3).

Some of the present collections were once sent to Prof. Jiro KATTO of the Kochi University and further to Prof. Koichiro ICHIKAWA of the Osaka City University for identification, but later they kindly transferred them to one of us (I. H.).

Although the material is not always sufficient both in quality and quantity to know the detailed specific characters, the present faunule appears to be important for the consideration of the age of the lower limit of the Shimantogawa group in Shikoku. As the result of our palaeontological study the following species were identified:

Neithea (*Neithea*) *matsumotoi* HAYAMI
Neithea (*Neithella* ?) *kochiensis* sp. nov.
Plicatula sp. indet.
Amphidonte (*Amphidonte*) *subhaliotoidea* (NAGAO)
Pterotrigonia (*Pterotrigonia*) *hokkaidoana* (YEHARA)

In the present paper these bivalves are described and the faunal significance is discussed. For the systematic description I. HAYAMI is responsible, and for other statements two of us are so.

At the outset we express our sincere thanks to Prof. Tatsuro MATSUMOTO of the Kyushu University for his kind advice and supervision of this manuscript and also to Prof. Koichiro ICHIKAWA of the Osaka City University and Prof. Jiro KATTO of the Kochi University for their kindness in putting a part of the present material at our disposal. Acknowledgements are also due to Mr. Yoshiharu TAKEMOTO, a student of the Kochi Uinversity, for the privilege of

describing his collection and to Prof. Emeritus Teiichi KOBAYASHI and Dr. Yasuhide IWASAKI of the University of Tokyo for their permission of the examination of the collection of the university.

Systematic description

(by Itaru HAYAMI)

Class Bivalvia

Order Pteriida

Family Pectinidae

Genus *Neithea* DROUET, 1825

Subgenus *Neithea s. str.*

Neithea (Neithea) matsumotoi HAYAMI

Pl. 9, fig. 2

1965. *Neithea (Neithea) matsumotoi* HAYAMI, *Mem. Fac. Sci., Kyushu Univ., Ser. D.* Vol. 15. No. 2, p. 297, pl. 41, figs. 1-7.

Material.—An incomplete internal mould of right valve (GH.K6807) is concerned with the description below.

Description.—Right valve small, subequilateral, higher than long, moderately inflated (GH.K6807, right in mould, 13.5 mm. long, 15.5 mm. high, 5.0 mm thick); umbo submesial, prominent; antero- and postero-dorsal margins of the flank a little concave; ventral margin frilled in accordance to the radial plications; apical angle approximately 75 degrees; primary ribs six in number, persistent, strongly plicated, roof-shaped in transverse section; interspaces more or less flattened, marked respectively with three-five fine secondary riblets; both lateral areas also ornamented with several riblets of similar strength; anterior auricle probably much larger than the posterior. Left valve unknown.

Observations and comparison.—The present specimen is slightly suffered from secondary deformation, and the auricular and ventral parts are incompletely preserved. The test is completely eroded away, but the characteristic ornamentation is clearly impressed on the internal mould. Judging from the ornamentation and other characters of right valve, it belongs undoubtedly to the group of *Neithea quinquecostata*, which was defined recently (HAYAMI, 1965a). Furthermore, it seems to be referable to *Neithea (Neithea) matsumotoi* HAYAMI, 1965, which was originally proposed on the specimens from the upper Miyakon (=Albian) Yatsushiro formation of Kyushu. Although it is somewhat smaller than the normal adult specimens from the Yatsushiro formation, all the essential characters of right valve, especially the surface ornamentation, are quite identical.

Occurrence.—Fine sandy shale of the Doganaro formation at Loc. 2, Kakureyashiki, north of Doganaro, Susaki City. KAWASAWA coll.

Subgenus *Neithella* HAYAMI, 1965

Neithea (Neithella ?) kochiensis sp. nov.

Pl. 9, fig. 1

Material.—The holotype (GK.H6808) is an incomplete internal mould of right valve from the Dogarano formation of Kakureyashiki (Loc. 2).

Diagnosis.—Large-sized species of *Neithea* characterized by the right valve with six persistent, round topped, comparatively narrow primary ribs, wide, flattened and finely striated interspaces, and obtuse and subequal auricles.

Description.—Right valve large, triangular, subequilateral, higher than long, moderately inflated (holotype, GK.H6808, right in. mould, 72.5 mm. long, 78.5 mm. high, 20.0 mm. thick); umbo submesial,

pointed; antero- and postero-dorsal margins of flank a little concave; ventral margin digitated in accordance to the primary ribs; apical angle approximately 80 degrees; primary ribs six in number, persistent, highly elevated, round-topped, comparatively narrow; interspaces wide, flattened, marked with numerous fine radial striae, although secondary riblets are absent at all; both lateral areas narrow, provided with still finer striae; auricles comparatively small, apparently subequal, obtusely truncated; hinge-line unusually short. Left valve unknown.

Observations and comparisons.—The present species is now represented only by an incomplete right internal mould. The test is completely eroded away, and the postero-ventral peripheral area broken off. The auricles, the outline of which appears to be nearly completely shown, are obtusely truncated and comparatively small for the genus. Consequently the hinge-line is unusually short for *Neithea*.

In view of the only weakly striated interspaces it must be related to the group of *Neithea wrightii* for which I proposed subgenus *Neithella* (HAYAMI, 1965a). All the known species of *Neithella* are, however, by far smaller than the present species. Moreover, many species of *Neithella* have comparatively large and anteriorly projected byssal auricle and occasionally effaced or somewhat weakened 1st and 6th primary ribs. Because the present species does not show such a tendency, its subgeneric reference is by no means certain.

Some specimens of "*Neithea atava*" from the Lower Cretaceous of France (D'ORBIGNY, 1847, pl. 442, figs. 1-3; COSSMANN, 1907, pl. 5, fig. 19), Mexico (ALENCASTER, 1956, pl. 2, figs. 5-7) and Trinidad (COX, 1954, pl. 64, figs. 1, 4) have comparable dimensions with the present specimen. As pointed out previously (HAYAMI, 1965a, p. 308), they may belong to a distinct species from the specimens of *Neithea atava* (RÖMER) from the Lower Greensand of England (WOODS, 1902), which certainly belong to *Neithea* (*Neithella*). A species represented by such large specimens of "*N. atava*", though there have been different understandings about its diagnosis, possesses three—five distinct secondary riblets on each interspace of primaries, being more closely related to the group of *Neithea gibbosa* than to *Neithella*. In the large dimensions and flattened interspaces the present new species may recall *Neithea* (*Neithea*) *kanmerai* HAYAMI, 1965, from the Lower Miyakoan (=Aptian) of southwest Japan and some other species belonging to the group of *Neithea gibbosa*. However, the secondary riblets on each interspace, which are never effaced and typically three in number in the group of *N. gibbosa*, are absent at all in the present species. It appears somewhat similar to *Neithea sexangularis* (D'ORBIGNY, 1847) in the mode of surface striae, but differs evidently from the original figures of that species in the more flattened interspaces and the more sharply pointed umbo.

Occurrence.—Fine sandstone of the Doganaro formation of Kakureyashiki (Loc. 2), north of Doganaro, Susaki City. TAKEMOTO coll.

Family Plicatulidae

Genus *Plicatula* LAMARCK, 1801

Plicatula sp. indet.

Pl. 9, figs. 3, 4

Compare.—

1966. *Plicatula* sp., HAYAMI *in* MATSUMOTO, HAYAMI and HASHIMOTO, *Petrol. Geol. Taiwan*, Vol. 4, p. 12, pl. 2, fig. 1.

The present species is represented by two specimens: one is a right internal mould (GK.H6809, 25.5 mm. long, 20.5+ mm. high, 4.5 mm. thick), and the other is a right external mould (GK.H6810, 20.5 mm. long, 21.0 mm. high, ca. 2.0 mm. thick). In addition, similar specimens were collected from two different localities in the distributed area of the Doganaro formation. The shell morphology may be fairly variable as usually so in many species of *Plicatula*, but the posteriorly curved outline and irregularly plicated weak radial plications may characterize the present species. Two strong crural teeth of *Plicatula*-type are observed in the intermould (GK.H6809). The present species must be closely related to, if not identical with, *Plicatula* sp., which was recently found from the buried Aptian of west Taiwan (MATSUMOTO, HAYAMI and HASHIMOTO, 1966) in view of the similar outline and radial plications.

Occurrence.—Fine sandy shale of the Doganaro formation at Loc. 2, Kakureyashiki, north of Doganaro, Susaki City. Similar specimens were collected from the conglomeratic sandstone of the same formation at Loc. 3, Nishigumi, and from the sandstone of the same formation at Loc. 1, Ochiaidani, the same city. KAWASAWA coll.

Family Ostreidae

Genus *Amphidonte*

FISCHER DE WALDHEIM, 1829

Subgenus *Amphidonte s. str.*

Amphidonte (*Amphidonte*) *subhaliotoidea*

(NAGAO)

Pl. 9, fig. 5

1934. *Exogyra subhaliotoidea* NAGAO, *Jour. Fac. Sci., Hokkaido Imp. Univ., Ser. 4*, Vol. 2, No. 3, p. 203, pl. 30, figs. 1–4.

1965. *Amphidonta* (*Amphidonta*) *subhaliotoidea*, HAYAMI, *Mem. Fac. Sci., Kyushu Univ., Ser. D*, Vol. 15, No. 2, p. 343, pl. 50, figs. 6–9, pl. 51, figs. 1, 2. [sic]

1966. *Amphidonte* (*Amphidonte*) *subhaliotoidea*, HAYAMI, *Ibid., Ser. D*, Vol. 17, No. 3, p. 248 (postscript).

In the present collection this species is represented by an internal mould of left valve (GK.H6811, 26.5 mm. long, 44.0 mm. high, 12.5+mm. thick). The test is completely eroded away, and the postero-ventral part is broken. The *Haliotis*-like outline with posteriorly placed planispiral umbo, fine internal crenulation along the ventral margin and moderately wide attachment area and the absence of any radial plications indicate that the present specimen belong to *Amphidonte* (*s. str.*). In view of every essential internal character it is probably conspecific with *Amphidonte* (*Amphidonte*) *subhaliotoidea* (NAGAO, 1934) from the Miyako group of Iwate Prefecture.

Besides, there are two smaller specimens of *Amphidonte* (*s. s.*), which are impressed on the internal mould of the holotye of *Neithea* (*Neithella* ?) *kochiensis* sp. nov. (GK.H6808, pl. 9, fig. 1). They are undoubtedly the remain of attached shell to the pectinid. In the mode of umbonal coiling and the absence of radial ornamentation they are likewise similar to *A.* (*A.*) *subhaliotoidea*, although specifically indeterminable.

Occurrence.—Fine sandy shale of the Doganaro formation at Loc. 2, Kakureyashiki, north of Doganaro, Susaki City. Kawasawa coll. Similar specimens from a fine sandstone at the same locality. TAKEMOTO coll.

Order Trigoniida

Family Trigoniidae

Genus *Pterotrigonia* VAN HOEPEN, 1929

Subgenus *Pterotrigonia s. str.*

Pterotrigonia (Pterotrigonia) hokkaidoana (YEHARA)

Pl. 9, figs. 6-9

1915. *Trigonia hokkaidoana* YEHARA, *Sci. Rept. Tohoku Imp. Univ., Ser. 2*, Vol. 2, No. 2, p. 39, pl. 1, figs. 1-4, 6-9 (? non fig. 5).
1915. *Trigonia kotoi* YEHARA, *Ibid., Ser. 2*, Vol. 2, No. 2, p. 40, pl. 1, fig. 10.
1923. *Trigonia hokkaidoana*, YEHARA, *Jour. Geol. Soc. Tokyo*, Vol. 30, p. 5, pl. 7, figs. 3-5.
1923. *Trigonia hokkaidoana*, YEHARA, *Japan. Jour. Geol. Geogr.*, Vol. 2, No. 3, p. 70, pl. 11, figs. 9, 10, pl. 12, fig. 5.
1925. *Trigonia pocilliformis* var. *sachalinensis* YABE and NAGAO, *Sci. Rept. Tohoku Imp. Univ.*, Ser. 2, Vol. 7, No. 4, p. 118, pl. 28, figs. 5, 6.
1926. *Trigonia hokkaidoana* ?, YABE and NAGAO, *Ibid.*, Ser. 2, Vol. 9, No. 2, p. 46, pl. 14, fig. 3.
1927. *Trigonia hokkaidoana*, YABE, *Ibid.*, Ser. 2, Vol. 11, No. 1, pl. 4, figs. 6a, b.
1931. *Trigonia hokkaidoana*, YEHARA, *Iwanami Lecture Series, Geol. Palaeont., Trigoniae from Japan*, p. 15, text-fig.
1931. *Trigonia kotoi*, YEHARA, *Ibid.*, p. 15.
1934. *Trigonia hokkaidoana*, NAGAO, *Jour. Fac. Sci., Hokkaido Imp. Univ.*, Ser. 4, Vol. 2, No. 3, p. 205.
1954. *Pterotrigonia hokkaidoana*, KOBAYASHI, *Japan. Jour. Geol. Geogr.* Vol. 25, Nos. 1-2, p. 76.
1954. *Pterotrigonia kotoi*, KOBAYASHI, *Ibid.*, Vol. 25, Nos. 1-2, p. 77.
1957. *Pterotrigonia hokkaidoana*, KOBAYASHI and NAKANO, *Ibid.*, Vol. 28, No. 4, p. 229, pl. 16, fig. 4.
1958. *Pterotrigonia hokkaidoana*, KOBAYASHI and NAKANO, *Ibid.*, Vol. 29, Nos. 1-3, p. 148, pl. 11, figs. 9-11.
?1964. *Pterotrigonia* cf. *hokkaidoana*, MATOBA, *Trans. Proc. Pal. Soc. Japan, N.S.*, No. 55, p. 259, pl. 37, figs. 1-3.
1964. *Pterotrigonia hokkaidoana*, MATOBA, *Ibid.*, No. 55, p. 259, pl. 37, figs. 4, 5.

Five specimens (GK.H6812-6816) in the present collection are generally characterized by the relatively tall outline and widely spaced, tuberculated, oblique costae of *Pterotrigonia*-type on the flank. The original outline may be well preserved in a right internal mould (GK.H 6812, 36.0 mm. long, 29.0 mm. high, 9.5 mm. thick), and the test with tuberculated costae is partly preserved in a left valve (GK.H6813, 28.5+mm. long, 29.0 mm. high, 8.5 mm. thick).

In many characters the present specimens resemble closely the lectotype of *Pterotrigonia (Pterotrigonia) hokkaidoana* (YEHARA) which was illustrated by YEHARA (1915, pl. 1, fig. 1) and designated by KOBAYASHI and NAKANO (1957, p. 230). The adult individuals of *P. (P.) hokkaidoana* from the Miyako group, as represented by the lectotype and many other specimens, attain larger size than the present ones, but in other characteristics, especially the ratio of length/height, the prominence of umbo and the interval of oblique costae on the flank they are hardly distinguishable.

P. (P.) hokkaidoana itself seems to be closely related to *Pterotrigonia (Pterotrigonia) pocilliformis* (YOKOYAMA, 1891) which has been reported from the Lower Cretaceous of many areas of Japan. The former is typically distinguishable from the latter by the more trigonal and taller outline and the more prominent umbo. According to NAKANO (1959) and some others, however, the two species are sometimes coexistent in one formation or even in one fossil bed, and the stratigraphic ranges overlap greatly each other. Furthermore, specimens of an intermediate outline are not rare. Even at the type locality of *P. (P.) hokkaidoana*, i.e. the Hiraiga formation at Hiraiga, Tanohata village, Iwate Prefecture, some specimens showing relatively low

and crescentic outline are more similar to *P.* (*P.*) *pocilliformis* than to the typical individuals of *P.* (*P.*) *hokkaidoana* belonging to the same population. Except for the type localities of the two species, the specific identification of the specimens having an intermediate outline is not always easy, much less secondary deformed specimens. It is not impossible that *P.* (*P.*) *hokkaidoana* is actually nothing but an ecological or geographical variety of *P.* (*P.*) *pocilliformis*. Anyhow, more adequate conclusion on the relationship between the two nominal species would be obtained by a further detailed quantitative study of populations.

Trigonia kotoi YEHARA, 1915, from the Miyako group is here regarded as a synonym of *P.* (*P.*) *hokkaidoana*. The holotype (by monotypy) of *T. kotoi* [IGPS cat. no. 4351] is actually a deformed and incomplete specimen, so that the outline is apparently more crescentic than that of the latter species. The area of this specimen is much narrower than in the lectotype of *P.* (*P.*) *hokkaidoana*, but its breadth, as noted by YEHARA (1915, p. 39), varies to a great extent in one population of the latter species from the Miyako group.

Occurrence.—Fine sandy shale of the Doganaro formation at Loc. 2, Kakureyashiki, noth of Doganaro, Susaki City. KAWASAWA coll.

Concluding remarks

The newly discovered marine faunule from the Doganaro formation in the type area is composed of five species of bivalves as described above. The species of *Neithea* seem to be important for the age consideration, because the genus is a diagnostic group in the Cretaceous. The genus *Neithea* ranges from the Valanginian to the Maastrichtian in western Europe and Africa, but, as noted before (HAYAMI, 1965a), its occurrence is restricted almost to the Lower Cretaous in the Pacific region. In Japan all the hitherto known species of *Neithea* have been found from the Aritan (upper Neocomian+lower Aptian) and the Miyakoan proper (upper Aptian+Albian), and there is no known species ranging up to the uppermost Miyakoan (lower lower Cenomanian). The occurrence of *Neithea* (*Neithea*) *matsumotoi* indicates a Miyakoan age, because this species has been known only from the upper Miyakoan (=Albian) Yatsushiro formation of Kyushu and a similar species occurs from the buried Aptian of Taiwan. The *Plicatula* sp. is also similar to the specimens from the Aptian of Taiwan. *Amphidonte* (*Amphidonte*) *subhaliotoidea* has been known only from Aptian—Albian Miyako group of Iwate Prefecture. *Pterotrigonia* (*Pterotrigonia*) *hokkaidoana* is actually a long ranging species, but has been commonly found from the Miyakoan proper in the outer zone of Southwest Japan.

Although we cannot make a good interpretation at present about the occurrence of *Myophorella* (*Promyophorella*) *obsoleta* reported by KOBAYASHI (1956) from the distributed area of the Doganaro formation, the specimens may be actually juvenalia of *Pterotrigonia* (*Pterotrigonia*) *hokkaidoana* or *Pterotrigonia* (*Pterotrigonia*) *pocilliformis*. Anyhow, it is now firmly concluded that the Doganaro formation, the lowest subdivision of the Shimantogawa group in Kochi Prefecture, is at least in part assignable to the Miyakoan proper (Aptian—Albian). The present palaeontological evidence agrees well with KATTO's (1961) interpretation, in which the Shimantogawa group of Kochi Prefecture ranges from the Miyakoan to Hetonaian. Taking the occurrence of *Cheloniceras* (*s. str.*) from the

so-called "Torinosu group" in Ehime Prefecture (NAKAI and HADA, 1966) into consideration, it is presumable that Jurassic sediments are scarcely or not at all represented in the Shimanto terrain of Shikoku.

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Doganaro	堂ガ奈路	Ochiaidani	落合谷
Kakureyashiki	隠れ屋敷	Sodayama	桑田山
Nishigumi	西組	Susaki	須崎

Explanation of Plate 9

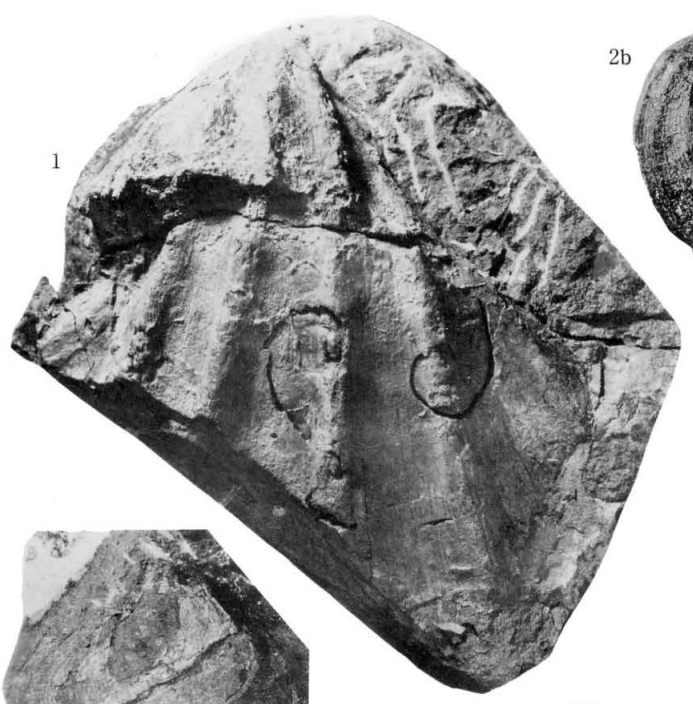
Neithea (*Neithella*?) *kochiensis* sp. nov. ..... p. 85
Fig. 1. Right internal mould (GK. H6808), holotype, ×1. Loc. 2, Kakureyashiki (TAKEMOTO coll.)

Neithea (*Neithea*) *matsumotoi* HAYAMI ..... p. 85
Fig. 2. Right internal mould (GK. H6807), ×2. Loc. ditto. (KAWASAWA coll.) 2a: lateral view; 2b: anterior view.

Plicatula sp. indet. ..... p. 86
Fig. 3. Right internal mould (GK. H6809), ×1.5. Loc. ditto. (KAWASAWA coll.)
Fig. 4. Right external mould (GK. H6810), ×1.5. Loc. ditto. (KAWASAWA coll.)

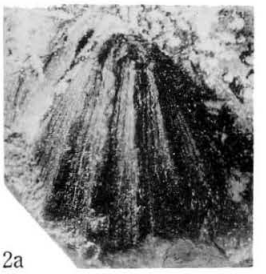
Amphidonte (*Amphidonte*) *subhaliotoidea* (NAGAO) ..... p. 87
Fig. 5. Left internal mould (GK. H6811), ×1.5. Loc. ditto. (KAWASAWA coll.)

Pterotrigonia (*Pterotrigonia*) *hokkaidoana* (YEHARA) ..... p. 88
Fig. 6. Right internal mould (GK. H6812), ×1.5. Loc. ditto. (KAWASAWA coll.)
Fig. 7. Left valve (GK. H6813), ×1.5. Loc. ditto. (KAWASAWA coll.)
Fig. 8. Internal mould of conjoined valves (GK. H6814), ×1.5. Loc. ditto. (KAWASAWA coll.)
Fig. 9. Internal moulds of two right valves (upper: GK. H6815; lower: GK. H6816), ×1.5. Loc. ditto. (KAWASAWA coll.)
All specimens are kept in the Department of Geology, Kyushu University.



1

2b



2a

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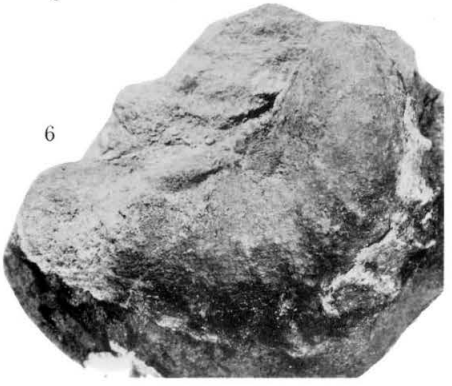
3

8

5



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523. ON THE FOSSIL EQUINE TEETH FROM KUZUU, TOCHIGI PREFECTURE AND TOKYO CITY*

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栃木県葛生及び東京都産馬の歯の化石：　野間達郎が栃木県葛生大叫附近で得た哺乳類化石中に馬の下顎右側第一大臼歯一個があった。これは中国江西省広豊産現棲小馬の下顎右側第一大臼歯にかなりよく似ている。江西馬の頭骨は蒙古馬のそれとよく似ているが，額骨突起後部外縁に切込のない点及び後頭部に近い両側の外縁が直線的に走っている点が，比較した四頭の蒙古馬の頭骨とは異っている。これは単なる変異かも知れないが，江西馬を蒙古馬と決定するわけにもいかぬので，本化石は暫く *Equus* sp. とした。東京都台東区蔵前の地下六米より得た化石の上顎左側第一大臼歯は，蒙古馬，北海道土産馬のそれに似ているが，北海道土産馬が蒙古馬の変種或は品種である事が立証されぬ限り本化石は蒙古馬と決定するわけにもいかぬので暫く *Equus* sp. とした。地質時代は二者共に洪積世或は下部沖積世である。永沢譲次

Introduction

The first occurrence of a fossil equine tooth from Kuzuu, Tochigi Prefecture, Japan dates back to about twenty years ago, when the writer found a lower third molar in the fossil mammlian collections of Kuzuu, obtained by Mr. Tatuo NOMA.

Later, in 1954 the writer again found another tooth belonging to a pony in the fossil mammlian collections obtained from Ogano, Kuzuu by the same collector. This tooth is described in this paper.

The latter specimen is an isolated lower right molar tooth, probably a first molar, yellowish brown in colour and fossilized.

Considering from the state of fossilization, it may probably be of Upper Pleistocene or not younger than Older Holocene in age. Unfortunately, the exact horizon of the specimen is unknown.

Another fossil specimen described in this paper is a single upper left first molar tooth belonging to *Equus* and was obtained by the same collector from the older Holocene or Pleistocene beds at Kuramae, Tokyo City about ten years ago.

The specimen was found during the digging of the subway of Tokyo.

The important features for determination of the species, are the size of the teeth, the relation of the length of the cheek-teeth to their breadth, and the condition of the enamel folding.

* Received August 31, 1966; read June 18, 1966, at Tokyo.

Acknowledgements

During the course of this study the writer has received support from the following gentlemen to whom he takes

this opportunity to express his deep gratitude. Mr. Tatuo NOMA of the Natural and Cultural Garden at Inokashira, Tokyo City, for his kind offer of the materials and informations; Mrs. Shoichi HONZAWA, Asao SHINOHARA of the Zootechnical and Experimental Station at Nishinasuno, Tochigi Prefecture, the Ministry of Agriculture and Forestry, Mrs. Goro ENDO, Akitune AWADA of the Ueno Zoological Garden, Professor Yukio SATO, Assistant Professor Dr. Masayuki DAIGO of the Nippon Verterinary and Zootechnical College, Tokyo, Dr. Yoshinori IMAIZUMI of the Ueno National Science Museum, Assistant Professor Dr. Koushi MOCHIZUKI of the Department of Zootechny of Tokyo University and Mr. Keiji KIRYU of the Research Institute for race-horse health of the Nippon Central Race-horse Club, for permission to study their specimens and for the necessary photographs.

The writer also thanks Professor Kotora HATAI of the Institute of Geology and Paleontology, Tohoku University at Sendai for his reading of the manuscript.

Description

Order Ungulata

Family Equidae

Genus *Equus* L.

Equus sp.

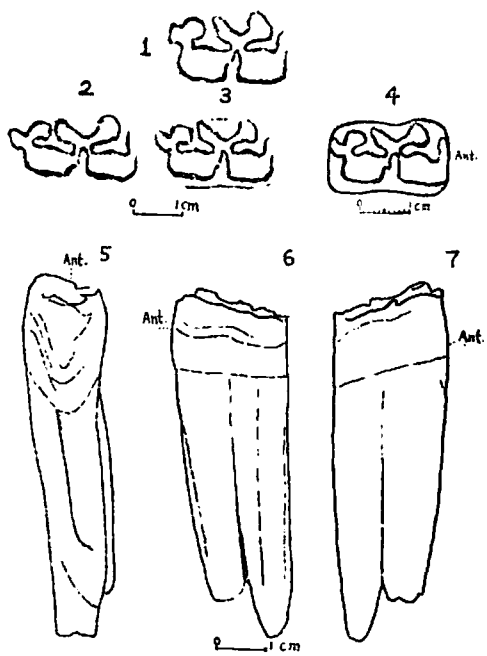
Pl. 10, figs. 5-6, Text-figs. 4-7

Specimen:—An isolated lower right first molar tooth, in Mr. T. NOMA's collection.

Locality:—Fissure deposits ? of Ogano at Kuzuu, Tochigi Prefecture, Japan.

Horizon:—Exact horizon unknown; probably Upper Pleistocene or not younger than Older Holocene.

Measurements:—Maximum length of grinding surface 23.5 mm, maximum breadth of griding surface of anterior lobe 13.0 mm, and that of posterior lobe 12.0 mm, all exclusive of cement; maximum breadth of posterior lobe, inclusive of cement 15.3 mm; length from the anterior border of metaconid to the posterior border of metastylid 12.7 mm; length from upper surface of crown to distal portion of posterior root 67.0 mm; maximum breadth of enamel layer in grinding surface 1.0 mm.



Text-fig. 1. Enamel pattern on grinding surface of the lower right first molar of the so-called Kiso horse from Kiso, Nagano Prefecture. 2. Ditto of a Recent pony, No. 1 from Cheju Isl., Korea. 3. Ditto of a Recent pony from Kwangfeng, Kiangsi, China. 4. Ditto of the specimen from Kuzuu, Tochigi Prefecture. 5. Posterior view of ditto. 6. Inner side of ditto. 7. Outer side of ditto.

Description:—Specimen refered to lower right first molar tooth, nearly complete, moderately worn and small in size; crown rather elongated anteroposteriorly; in upper view, metastylid narrow bar-like and metaconid of a comparatively long bar and roundish triangular in outline at its anterior part; anterior and outer corner of protoconid projected outwards; enamel inlet lacking in outer wall of hypoconid; position of metaconid bar situated internally, interval between metaconid and protoconid distinct; entoconid and talonid rather small, outer wall of talonid not particularly projected outwards; space between metaconid and paraconid rather large; a feeble, small but clear enamel spur projected from anterior side of hypoconid into valley at outside of tooth.

Comparison:—The present specimen is similar to *Hemionus* in size, but differs from the latter in having a narrower and bar-like metastylid and a metaconid composed of a comparatively long, narrow bar and a roundish triangle instead of a triangular to roundish metastylid and roundish metaconid without a bar, as figured by M. BOULE & T. TEILHARD DE CHALDIN (1928), W. O. DIETRICH (1959) and W. C. PEI WEN-CHUNG and others (1958).

Further, the shape of the talonid of this specimen differs from that of *Hemionus*.

In the present specimen, the clear development of a little spur from the anterior wall of the hypoconid into the valley at the outside of the tooth and the surface inclined towards the outside of tooth are the same as those of mongolian horses, but in *Hemionus* of the same age, the development of the spur is traceable and the grinding surface of the teeth is flat in general.

A Recent *Asinus* from Shantung, China, Mule from England and Zebra from Africa can be distinguished from present one by their broad leaf-like metastylyds and large roundish metaconids of their lower first molar teeth and this form also differs from a Thoroughbred and an Anglo-Arab, by the sizes and shapes of the enamel foldings of their teeth.

The lower first molar of the fossil pony, *E. przewalskii* POL. subsp. from the Pleistocene beds of Dokantin, Korea is distinguished from the present one by the broader metastylid and the different shape of the talonid, although the sizes are equal to one another.

Judging by the illustrations given by T. SHIKAMA and Y. ONUKI, *E. nipponicus* SHIKAMA and ONUKI (=Prof. MATUMOTO's *E. hemionus*) from the Pleistocene beds of northern Japan, is characterized by its broad leaf-like or triangular metastylid.

In 1951, H. KAJI reported on a semi fossil left mandible of a pony with six teeth which he collected from the river cliff west of Iizuka-machi north of Kana-machi, Katushika-ku, Tokyo City.

This pony was found with fragments of the Yayoi type potteries which are dated at approximately between 1500 and 2000 years B. P.. The lower first molar tooth of the pony resembles, in size and enamel pattern of grinding surface, the present specimen except for the shrinkage of the anterior outer part of the protoconid, the lack of the bar and the hugeness of the roundish triangular part of the metaconid.

The dimensions and enamel pattern of the lower first molar tooth of KAJI's pony can be considered to be almost identical with those of a Recent pony descended from ancient times in Hokkaido.

Excepting for the Ass and Mule, the

recent ponies domesticated since ancient times in Japan, Korea and eastern China have not been completly explained whether they are merely the forms derived from the mongolian horse or separate species, but those of Japan and Korea appear to have relation with the mongolian horse.

With regard to the horses now living in Cheju Island, Korea and the so-called

Table 1. Measurements of the tooth of the Ogano specimen compared with M_1 of the mongolian, other oriental and mixed horses. (in mm)

Specimen & localities	Maximum length	Transverse diameter of metaconid-protoconid, Transverse diameter of metastylid-hypoconid	Anteroposterior length of metaconid-metastylid
Present specimen	23.5	13.0, 12.0	12.7
A pony from Kwangfeng, Kiangsi, China	23.5	13.5, 13.0	12.5
Cheju Isl., No. 1	23.5	13.5, 12.7	12.7
Miyako Isl., No. 1	21.5	13.5, 12.0	12.0
Miyako Isl., No. 2	22.0	13.5, 13.0	12.5
Mongolia, Pangchiang, No. 1763	25.0	14.0, 14.0	13.0
Mongolia, Pangchiang, No. 1762	25.0	14.0, 13.0	13.0
Yamanashi Prefecture	23.0	14.3, 13.0	12.0
Kiso, Nagano Prefecture	25.5	15.0, 15.0	13.0
Tokara Isls. off Kyûshû	18.0	12.0, 10.0	—
Hokkaido, No. 1	23.5	15.2, 13.7	14.0
Hokkaido, No. 2	26.0	16.5, 14.5	14.0
Thorough bred	28.0	15.0, 14.8	14.5
Anglo-Arab	26.0	15.0, 14.0	14.0

All values except for a pony from Tokara Isls. were measured on the grinding surface (exclusive of cement) of the lower right molars and maximum length, along the direction of tooth rows.

Kiso horses of Japan, it is presumed from the ancient records that the former was mixed by the blood of the mongolian horse and the latter by the Arab blood in the past.

Although, this specimen resembles in size and pattern of enamel folding the molar teeth of the recent ponies descended from those of ancient times in Japan, it may be closely related in these points to the recent ponies from Kwangfeng, Kiangsi in South China, Cheju Island in South Korea, and the Recent and fossil mongolian horses, especially to the pony from Kwangfeng, South China (Table 1).

The size and the enamel pattern of the grinding surface of both the Kwangfeng and present specimen almost coincide with each other except for the presence of a minute enamel inlet at the middle point of the outer wall of the hypoconid and in the thinness of the dentine in the former.

But, generally speaking, it happens that a minute enamel inlet on the outer wall of the hypoconid disappears on the teeth of the same species in *Equus*.

The enamel wall facing outwards on the metaconid of the lower first molars in the horses from Cheju Island, Miyako Island, Yamanashi Prefecture, Kiso in Nagano Prefecture, Hokkaido, and also probably the ones from the Tokara Isls. in southern Japan is linear in upper view, but those of the mongolian horse, Recent and fossil, the Kwangfeng pony and the present specimen drow a sharp line between the bar and roundish triangle.

The above nature of the enamel fold in the metaconid is the important characteristic which distinguish the present specimen from the former group and refer it to the mongolian horse or Kwangfeng pony.

It will be known from Table 2, that considering from the comparisons between length and breadth in each upper cheek teeth, the above mentioned horses except for the Thoroughbred and Anglo-Arab have intimate relation with one another, namely: Except for P^2 and M^3, the breadth is larger than the length in most of their upper cheek teeth.

The above nature coincides with the fact that except for P^2 and M^3, the breadth usually exceeds the length in the upper cheek teeth of the horses that were refered to the mongolian horse from the Pleistocene beds of China and except for M^1, this is the contrary in *Hemionus*.

Furthermore, the enamel patterns of the grinding surfaces of their molar teeth and the principal morphological characters of the skulls of these horses mentioned above are similar to that of the mongolian horse, though there are some differences in detail.

At any rate, the present specimen most resembles the lower right first molar of the Kwangfeng horse and the skull of the Kwangfeng horse most resembles that of the mongolian horse except for the lacking of a sinus on the posterior part of the processus zygomaticus and in upper view, the marginal crest of the posterior part of the head shows a linear outline.

But, as the mere inspection of only the skull of the Kwangfeng horse can not decide the question whether it belongs to a mongolian horse, no specific name can be proposed to this specimen at the present time.

Conclusions

It is especially interesting that a pony from the deposits of the Pleistocene or Older Holocene in Japan is a species

Table 2. Measurements of skulls, and comparisons between length and breadth in upper molars, of mongolian horses and other oriental ponies (in cm).

Specimens & localities	Maximum length of skull	Cranial breadth	Cranial height	Length from P^2 to M^3	Length from P_2 to M_3	Comparison between length and breadth in upper cheek teeth					
						P^2	P^3	P^4	M^1	M^2	M^3
A pony from Kwangfeng, China	41.8	10.2	9.9	14.9 r	15.1 l	B<L r	B<L	B=L	B>L	B=L	B<L
Cheju Isl., No. 7	44.5	10.3	10.0	13.5 r	14.0 l	B<L r	B=L	B>L	B>L	B>L	B<L
Cheju Isl., No. 19	45.0	10.3	10.4	13.3 r	13.1 l	B<L l	B>L	B>L	B>L	B>L	B<L
Miyako Isl., No. 1	48.6	9.9	12.3	14.1 r	14.0 r	B<L r	B=L	B>L	B>L	B>L	B<L
Mongolia, No. 1765	54.8	10.6	10·3	16.1 r	—	B<L l	B<L	B=L	B>L	B<L	B<L
Mongolia, No. 1762	56.2	11.1	10.8	16.3 l	16.4 r	B<L l	B=L	B>L	B>L	B>L	B<L
Kiso, Nagano Prefecture				16.9 l	16.4 r	B<L l	B<L	B>L	B>L	B<L	B<L
Yamanashi Prefecture	57.8	11.1	11.4	16.8 l	15.5 l	B<L r	B<L	B=L	B>L	B>L	B<L
Tokara Isls.						B<L r	B=L	B>L	B>L	B>L	B<L

Teeth were measured on grinding surface; r....right side, l....left side.

allied to or the same as the one now living in the eastern part of China.

Equus sp.

Pl. 10, figs. 8-10

Specimen:—An isolated upper left first molar tooth collected by Mr. T. NOMA.

Locality:—Fossiliferous beds at 6 m below the ground surface at Kuramae, Daito-ku, Tokyo City, Japan; obtained during the construction of the Tokyo Subway.

Horizon:—Older Holocene or Pleistocene.

Measurements:—Maximum length of grinding surface 22.5 mm, maximum breadth of grinding surface 26.3 mm and direct length of protocon in grinding surface 11.3; maximum thickness of enamel layer 1.15 mm; length from highest point of upper surface of crown to distal portion of anterior outer root 44.6 mm; maximum length of anterior outer root 25 mm.

Description:—Specimen refered to M^1 by its composite morphological characters. It of old age and slightly fossillized, surface of roots sticking a little to tongue.

Specimen exceedingly worn, and especially on central part of anterior lobe and adjacent to, on same part of posterior lobe and inner wall of crown more worn than on outer wall, so grinding surface shows an inward inclination; large enamel inlet and small one on anterior wall of crown and two small inlets on its posterior wall; two small enamel islets, measure 3 mm and 1.2 mm respectively, in each elongate diameters in central part of crown surface; crown moderate in size and its outline rectangular in upper view; breadth exceeding length; enamel dark bluish white in colour with minute wrinkles, dentine brown and root dark brown; roots four in number and two of inner side united into one; protocon elongated anteroposterialy.

Comparison:—Based only on an isolated tooth which is much worn, it is difficult to distinguish whether the specimen belongs to *Hemionus*.

But, the characteristics are the breadth much exceeds the length, the outer wall of the paracon is considerably concave, the posterior border of the protocon does not cross the line which passes the mesostyl and is parallel to the anterior and posterior walls of the crown, and by wearing the grinding surface inclines much towards the inner side of the crown.

By these characteristics, the specimen is distinguishable from *Hemionus*.

The outlines or characteristics of the enamel folds in the anterior, posterior and inner walls of the crown coincide with those of the upper left first molar tooth, worn to the same degree, of a recent pony (No. 19) from Cheju Island of Korea, already described (Pl. 8, fig. 7).

Conclusions

As far as the comparison of the available parts are concerned, this specimen is not different from the upper left first molars of the mongolian horses and a horse descended from ancieent times in Hokkaido, Japan.

But, as the horse descended from ancient times in Hokkaido is not proved to be a variety or a race of the mongolian horse, no specific name can be proposed for this specimen at the present time (Table 3).

Table 3. Measurements of the tooth of the Daito-ku specimen compared with M^1 of the mongolian and other oriental ponies (in mm)

Specimen & localities	Maximum length	Maximum breadth	Length of protocon
1. Present specimen, left	22.5	26.3	11.3
2. Mongolian horse, Pangchiang, No. 1763, left	24.0	24.7	10.5
3. Mongolian horse, No. 1762, left	23.5	25.0	13.0
4. A pony, Kwangfeng, Kiangsi, China, left	21.0	23.0	11.2
5. Yamanashi Prefecture, right	24.5	25.5	13.0
6. Cheju Isl., No. 7, right	20.0	23.0	11.0
7. Cheju Isl., No. 19, left	18.5	23.0	10.0
8. Miyako Isl., Loochoo Isls., right	21.3	24.0	10.0
9. Okinawa Isl., left	26.0	22.0	10.0
10. Kiso, Nagano Prefecture, left	25.5	26.0	13.0
11. Tokara Isls. off Kyushu left	18.0	24.0	—
12. Hokkaido, No. 1, left	22.0	25.5	11.0
13. Hokkaido, No. 2, left	25.5	25.0	11.2

Nos. 2, 3 and 5 are stored in the Ueno National Science Museum, Nos. 4, 6, 7, 9 12 and 13 in the Zootechnical and Experimental Station at Nishinasuno, No. 8 in the Nippon Verterinary and Zootechnical College, Tokyo, No. 10 in Department of Zootechny of Tokyo University and No. 11 in the Research Institute for race-horse health of the Nippon Central Horse-race Club in Tokyo.

Explanation of Plate 10

Fig. 1. Profile of the cranium of a pony from Kwangfeng, Kiangsi, China. ×ca. 0.2.
Fig. 2. Profile of the lower jaw of the same specimen. ×ca. 0.2.
Fig. 3. Upper view of ditto. ×ca. 0.2.
Fig. 4. Palatal view of ditto. ×ca. 0.2.
Fig. 5. Crown view of the fossil specimen from Ogano, Kuzuu. ×1.
Fig. 6. Inner side of ditto. ×1.
Fig. 7. Crown view of upper left first molar of a Recent pony, No. 19 from Cheju Island, Korea. ×1.
Fig. 8. Crown view of the fossil specimen from Kuramae, Daito-ku, Tokyo City. ×1.
Fig. 9. Outer side of ditto. ×1.
Fig. 10. Anterior side of ditto. ×1.

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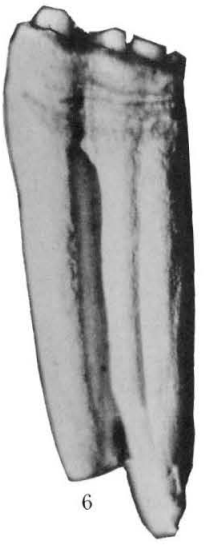

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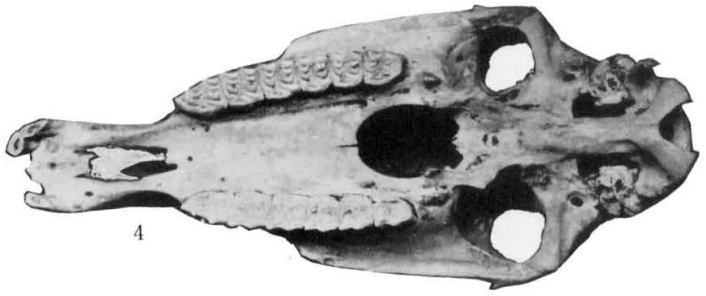

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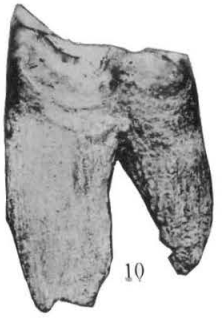

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Cheju Island	済州島	Kiso	木曾	Ogano	大叶
Daito-ku	台東区	Kuramae	蔵前	Pangchiang	滂江
Dokantin	潼関鎮	Kuzuu	葛生	Sendai	仙台
Hokkaido	北海道	Kwangfeng	広豊	Shantung	山東
Iizuka-machi	飯塚町	Miyako	宮戸	Tochigi	栃木
Inokashira	井の頭	Musashino	武蔵野	Ueno	上野
Kanamachi	金町	Nagano	長野	Yamanashi	山梨
Katushika-ku	葛飾区	Nishinasuno	西那須野	Yayoi	弥生
Kiangsi	江西	Okinawa	沖縄		

News

◎ 古生物学研究連絡委員会付置，古生物学長期研究計画小委員会の委員は，学術会議，関係研連，学会などの推せんにより，次のように決定した（順不同・敬称略）。
原　寛，渡辺武男，波部忠重，前川文夫，小林貞一，橋本　亘，高井冬二，花井哲郎，早坂一郎，菅野三郎，尾崎　博，鹿間時夫，浅野　清，市川浩一郎，金谷太郎，小西健二，松本達郎，湊　正雄，首藤次男，棚井敏雅。

◎ 古生物学長期研究計画小委員会の第1回委員会は，4月24日に開催され，次のようなことが討議された。
1. 古生物学研究と教育の組織について。各大学その他の研究機関にアンケートを出して，その現状と将来計画に関する調査を行う。
2. 野外研究費々目の新設をはかるよう，地質学その他の分野と共同して努力する。
3. 文献の蒐集・Monograph の出版・学術交流などの諸計画については，それぞれ担当の組織もあることでそれを通じて解決をはかる。

なお委員長として高井冬二君が選出され，幹事として橋本　亘・花井哲郎・菅野三郎の諸君が指名された。第2回会合は10月13日に，名古屋大学で開かれる予定。

◎ 古生物学研究連絡委員会付置，古生物総合研究所小委員会の新委員は，学術会議，関係研連その他の推せんにより次のように決定した（順不同・敬称略）。
原　寛，新野　弘，木越邦彦，植村定次郎，須田昭義，大山　桂，前川文夫，市川浩一郎，井尻正二，大森昌衛，本庄　丕，湊　正雄，渡辺武男，亀井節夫，吉川虎雄，鈴木　尚，飯塚　広，尾崎　博，小林　勇，浅野　清，金谷太郎，小林貞一，鹿間時夫，首藤次男，高井冬二，鳥山隆三，中沢圭二，橋本　亘。

◎ 古生物学総合研究所小委員会の委員改選後第1回の委員会は4月24日に開かれ，小委員会の運営および活動方針について大要次のようなことが討議された。
1. 小委員会の任務は古生物学研究所設立の具体化を進めることにあり，関連諸分野の与論の反映に留意しつつ運営する。
2. 研究所の内容や運営の基本方針などについての討議を初めに行う必要がある。
3. 既設および計画が進行中の共同利用研究所を参考にしながら活動を進める。
4. 研究所の性格や内容について広く周知徹底するよう努力する。　その他

なお委員長として浅野清君が選出され，幹事として金谷太郎，大森昌衛両君が指名された。

◎ 第3回 European Malacological Congress が，1968年9月3日より6日まで，ウイーンで開催される。出席希望の方は，Dr. Oliver E. PAGET, Museum of Natural History, Burgring 7, A-1014, Vienna, Austria あて，本年8月31日までに申込まれたい。

［訂　正］

前号（No. 65）学会記事で会員野上裕生君が退会者の内に含まれていましたが，誤りですので削除いたします。

例　会　通　知

	開　催　地	開　催　日	講演申込締切日
第97回　例　会	国立科学博物館	1967年9月23日	1967年8月10日
第98回　例　会	東　北　大　学	1967年11月3, 4日	1967年10月　1　日
1968年総会・年会	九　州　大　学	1968年1月26, 27日	1967年12月　1　日

第98回例会（東北大，地質古生物）；シンポジウム，東南アジアに関する地質・古生物。（世話人：浅野清・小高民夫）当シンポジウムに参加希望される方は，要旨印刷の関係で1200字以内の講演要旨（邦文，但し図表は認めない）を講演申込締切日までに，世話人あて提出下さい。

1968年年会（九州大，地質）；シンポジウム，炭酸塩堆積物（岩）の岩相と生相。（世話人：勘米良亀齢・小西健二）

◎ 本会誌の出版費の一部は文部省研究成果刊行費による。

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