A CYCADEAN TRUNK FROM URYU DISTRICT, HOKKAIDO, JAPAN

By

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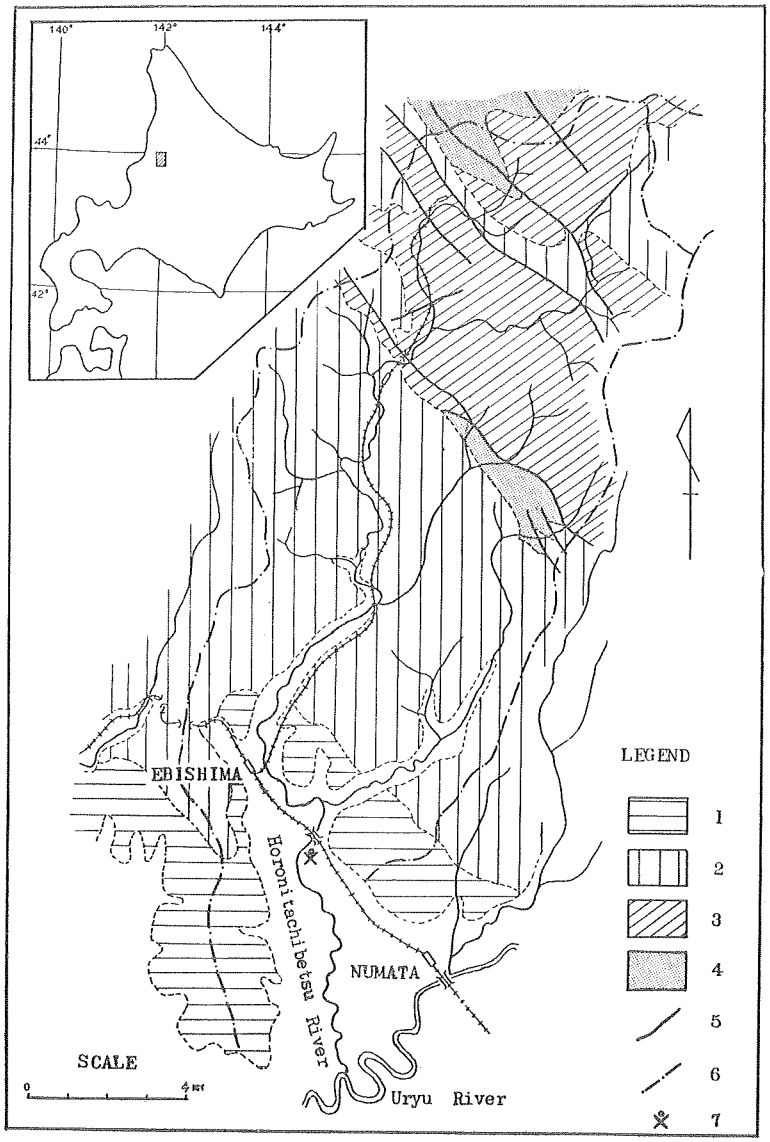
The first occurrence of a Cycadean trunk in Japan was reported by A. KRYSHTOFOVICH (1920) from the neighbourhood of Takikawa-machi, Sorachi district, Hokkaidô. Since then, several specimens have been reported from various localities from Kyûshû to Saghalin. These Cycadean trunks from Japan and Saghalin were found in the Late Cretaceous, though most of the European and American fossil trunks were from the Early Cretaceous—Jurassic sediments. Furthermore, a remarkable feature of the Japanese Cycadean trunks is the absence of any fertile-shoots among the leaf-bases, while many of the European and American specimens generally exhibit on a single stem numerous flowers borne at the ends of short lateral branches which project hardly at all beyond the general level of the armour of persistent leaf-bases.

The present material was found from the terrace deposits along the Tachibetsu river near Numata-machi, Uryû district, Hokkaidô by A. NAKAYAMA, who is living there (Text-fig. 1). It is evidently a boulder transported by river-flow from the upper course of the Tachibetsu river. The present material is so silicified that it is in excellent preservation. As described below, it doubtlessly belongs to the genus *Cycadeoidea* in view of the arrangement of leaf-base vascular bundles. Accordingly, the present Cycadean trunk is evidently derived from the Cretaceous sediments distributed in Uryû district.

The three species of *Cycadeoidea* are known from Hokkaidô up to present: *Cycadeoidea nipponica* ENDO from the upper course of the Sanushibe riber, Noborikawa, Hobetsu district; *C. Oishii* ENDO from the upper course of the Yûbari river, Yûbari district; and *C. ezoana* KRYSHTOFOVICH from Takikawa-machi, Sorachi district. Most of these specimens were found as river boulders, and so where the rocks originally stored their fossils is not known certainly. Only a few materials of Cycadean trunks in Japan were actually found by geologists in their original position. However, in view of the sediments distributed in the area where the fossil trunks were found, the *Cycadeoidea*-bearing formation in Japan has generally been accepted to belong to the upper Cretaceous, and to be



Text-Fig. 1. Geologic map around the fossil locality.
1. Pliocene sediments 2. Miocene sediments 3. Eocene-Oligocene sediments 4. Late Cretaceous sediments 5. Fault 6. Watershed 7. Locality of the present fossil

Latest Senonian in age. Among the above-noted three species, *C. nipponica* was considred to be actually enbedded in the sandstone of the Hakobuchi group.

In the catchment area of the Tachibetsu river extending towards the upper course of the river from the locality where the fossil was found, the Late Cretaceous sediments overlain unconformably by the Palaeogene coal-bearing formation present limited small distribution. Furthermore, these two sediments are covered with a considerable clino-unconformity by Neogene sediments. As to which sediments originally stored the material under study, the following two considerations are possible: 1) it was stored in the Late Cretaceous sediments, or 2) deriving out of the Cretaceous sediments as a result of post-Cretaceous erosion, the fossil trunk was deposited again in the Tertiary sediments. In the catchment area of the Tachibetsu river, the Cretaceous sediments belong to the Upper Yezo group. According to K. TANAKA's oral communication, the uppermost of the group in this area is considered to be probably contemporaneous to the lowermost part of the Hakobuchi group distributed in the Ishikari coal field. From the latter, many marine fossils such as *Canadoceras kossmati* (YABE), *Gaudryceras tenuiliratum* var. *substriata* MATSUMOTO, *Inoceramus schmidti* MICHAEL, *I. orientalis* SOKOLOW, etc. have been found. Accordingly, if the fossil was stored in rocks according to consideration, 1) above, it must probably be Palaeohetonaian in age. At the same time, due to its co-existence with marine fossils, the present fossil trunk is considered to have been driftwood carried into the depositional basin. On the other hand, the lower half of the Neogene sediments in this area consists mainly of thickly-developed alternation of conglomerate and sanstone. In the Uryû district a pre-Neogene and post-Palaeogene orogenic movement and considerable erosion are generally accepted to have occurred. Accordingly, if the present fossil was contained as a boulder in the Tertiaty sediments, it was probably supplied from the Late Cretaceous (Hetonaian stage) rocks* to the basal part of the Horoshin formation being of Middle Miocene age.

As far as can be ascertained at present, it cannot be stated whether one of the above-noted two sediments contained the fossil trunk. However, whichever of the two sediments contained the fossil, there is no

* Most of the Hetonaian sediments, excluding the lowermost of them, is not distributed in the Uryû district. However, most of the Cycadean trunks in Hokkaidô were found from the Neohetonaian formations. Accordingly, it is considered that the Neohetonaian sediments including the present fossil might have been deposited in this district at that time, and subsequently eroded out.

difference in the significance of the fact that the present trunk of *Cycadeoidea* is Late Cretaceous in age. As described below, the present material is entirely similar to *Cycadeoidea ezoana* in the arrangement of leaf bases and vascular bundles, and in other characters. KRYSHTOFOVICH's material was found in the down-stream area of Tachibetsu river, and so it may has probably been stored in the formation of the same horizon as that of the present fossil.

The writer wishes to express a courteous thank to Prof. Y. SASA of Hokkaidô University for his valuable suggestion in this study. Acknowledgement is also due to Mr. K. TANAKA of Geological Survey of Japan for his kind information on the Cretaceous of Hokkaidô.

Description of Species

Cycadeoidea ezoana KRYSHTOFOVICH
(Pl. I; Pl. II, Figs. 1–4.)

1920: *Cycadeoidea ezoana*, KRYSHTOFOVICH: Jour. Geol. Soc. Tokyo vol. 27, No. 325, p. 5, Pl. 19, Figs. 1–4.

Description:

Trunk slightly compressed, broadly cylindrical in form, about 28 cm. in height; about 24 cm. in longer diameter and about 13 cm. in shorter diameter, due evidently to the compression after deposition; terminal vegetative bud decayed out; no branched; leaf scars spirally arranged around the trunk in quincunxes; the more distinct spiral rows, running from right to left, are making angles of about 60 to 65 degrees with the axis of trunk; the other indistinct rows, running from left to right are making angles of 55 to 60 degrees; leaf scars rhombic in shape, and their longer diagonal nearly perpendicular to the axis of trunk; upper corner of the scars are just as sharp as the lower one, not arcuate; sides of the rhombs concave, longer diagonal 2.0 to 2.3 cm. and shorter diagonal 1.2 to 1.5 cm. long; petiole-bases sourrounded by a dense mat of ramentum, and the both combined a thick armour; the vascular bundles of petiole-base arranged in forming a series of collateral strands following the outline of the petiole-bases with U-shaped invagination in the middle of the the upper face.

Remarks:

The present material is evidently identical to the genus *Cycadeoidea* by the arrangement and internal structure of the petiole-base vascular bundles, and also by the external features of trunk.

One of the characteristic features in *Cycadeoidea* is the arrangement of the vascular bundles in its petiole-base. As seen in a tangential section of the leaf-base (Pl. II, Figs. 1, 2), the pattern of their arrangement shows a heart-like form with a U-shaped involution on the upper side. While, the pattern of the living *Cycas* shows generally a omega-form. Namely, the arrangements of the petiole-base vascular bundles in *Cycadeoidea* is simpler and more Fern-like than in the majority of the living Cycads, as already described by SEWARD (1917). These vascular bundles in the petiole-base consist mainly of centrifugal xylem and medullary-ray tissue; a group of centripetal trachids is usually recognizable internal to the protoxylem; the structure is of the mesarch type with a variable amount of centripetal xylem, and agrees generally with that in the living Cycads.

The persistent leaf-bases are covered with ramental scales which form a dense interfoliar packing. The ramenta are formed from the epidermal cells which consist, as seen in Fig. 4 of Pl. II, of spindle-like scales 2 or 3 cells broad in the middle. In the living Cycads these ramenta are longly hairy in form, and the scale-form of the ramenta in *Cycadeoidea* shows one of the Fern-like characters. In the leaf-bases of the present material there are a considerable development of periderm at the surface.

Among the trunks of *Cycadeoidea* in East Asia, the present material is closely similar to *Cycadeoidea sakhalinensis* ENDO in the external and internal characters which was described from the Late Cretaceous sediments in Naibuchi district of South Saghaline (ENDO, 1953; Pl. 1). Especially, the internal structure and arrangement of the petiole-base vascular bundles between these two species are closely similar each other. However, the external features of trunks between these two species are somewhat different: in the arrangement of petiole-bases on the trunks of *C. ezoana* is more distinct in the spiral series ascending from left to right than that from right to left, and on the contrary, in *C. sakhalinensis* the spiral series ascending from right to left of distinct.

Recently, another Cycadean trunk was again recovered in the neighbourhood of the locality of the present trunk, and it is similar to the present materials in the external features. This material has also no fertile shoots as in the all Cycadean trunks which has been found hitherto in Japan.

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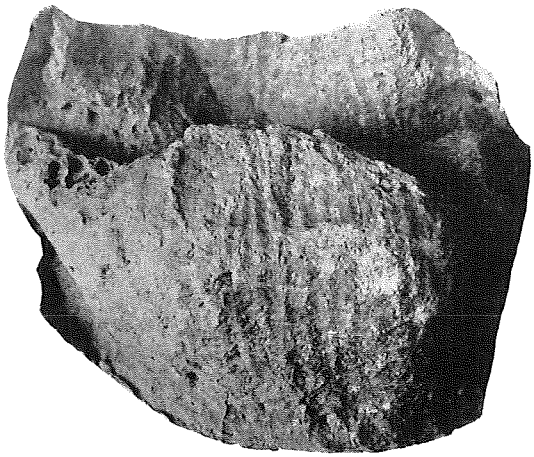
Explanation of Plate I

Explanation of plate I

Cycadeoidea ezoana KRYSHTOFOVICH, ca. ×3/5.
(occurred near Numata Town, Uryū province, Hokkaidō, Japan)



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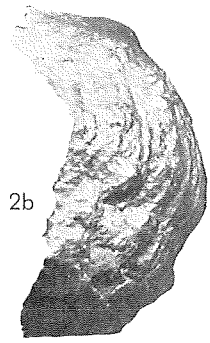

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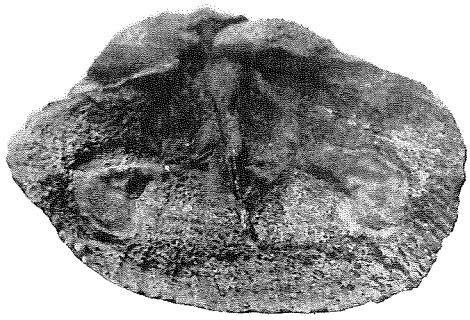

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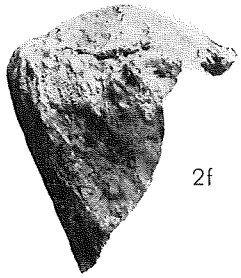

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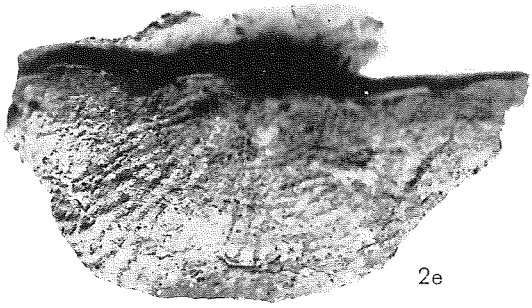

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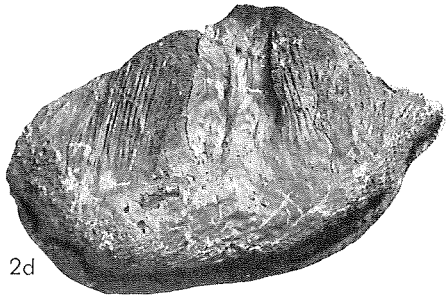


2d

K. NAKAMURA Photo.

Explanation of Plate II

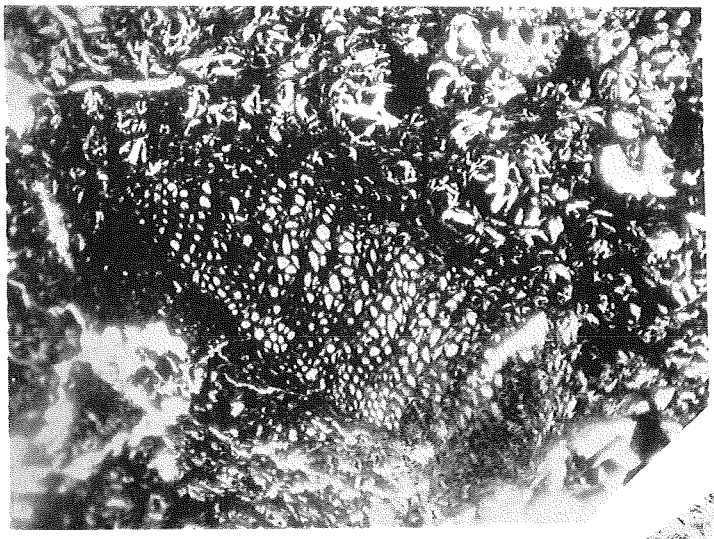
Explanation of plate II

Fig. 1. Schematic arrangement of leaf-base and vascular bundles (in section). ×1

Fig. 2. Armour in tangential section cut through a plane at 1.5 cm outside cortex. ×2.25

Fig. 3. Vascular bundle of petiole-base (in transverse section). ca. ×60

Fig. 4. Periderms and ramenta (enlarged figure of A-portion in Fig. 1) ca. ×30



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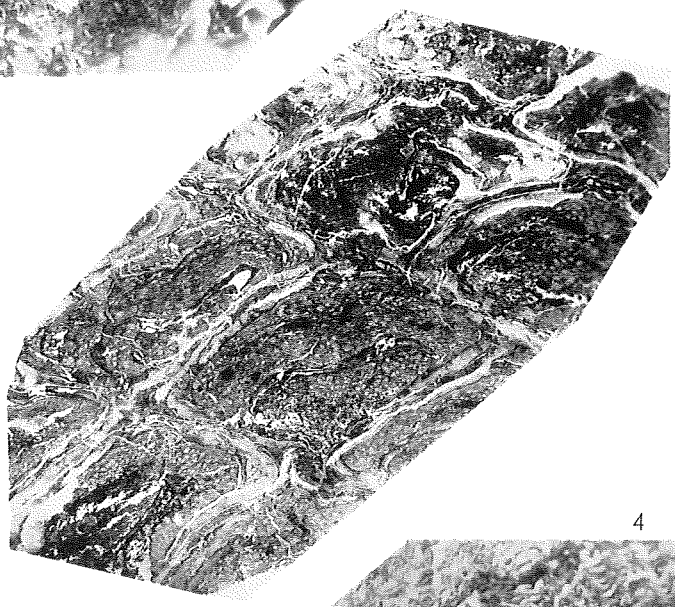

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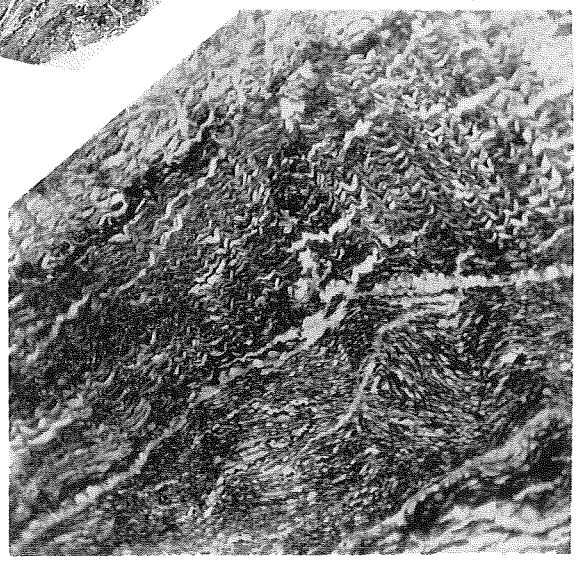

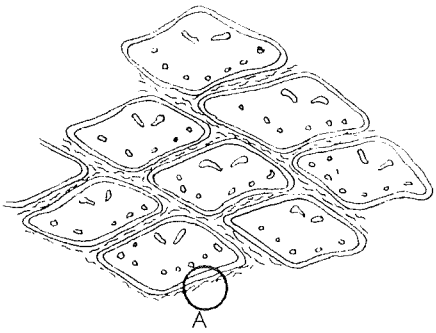

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TANAI Photo.