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Studies on the Cenozoic Plants of Hokkaidô and Karahuto

VI. On the Tertiary *Platanus* from Hokkaidô and Karahuto*

By

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With 6 Plates

(Contribution from the Department of Geology and Mineralogy, Faculty of Science, Hokkaidô Imperial University, Sapporo. No. 313).

More than 40 species of fossil and living *Platanus* (Buttonwood) are known in the world. The oldest fossil record is from the Cretaceous, comprising more than 15 species. It flourished also in Palaeogene time, and more than 15 species have been described from various parts of the world, although the Neogene species of this genus are very meagrely represented in the world.

The number of living species of *Platanus* is 6, namely, *orientalis* L., *occidentalis* L., *racemosa* NUTT., *Lindeniana* MART. and GAL., *Wrighti* WATS. and *acerifolia* AIT. Of these, the distribution of *orientalis* is confined to the Himalayan-Mediterranean region, and to North and Central America, *occidentalis*, *racemosa*, *Lindeniana* and *Wrighti* to the New World, while the last named one, *acerifolia*, is widely cultivated. *Platanus* is now quite extinct in the European continent, though its fossil records are not rare.

In Eastern Asia also, *Platanus* can not be found in wild state. But the fossil evidences represented by leaf impressions appear to be not so much rare in the region. Some *Platanus*-like leaf impressions lately acquired from the *Nilssonia* Bed of the Hakobuti Sand-

*) S. ÔISHI and K. HUZIOKA: Studies on the Cenozoic Plants of Hokkaidô and Karahuto. VI. On the Tertiary *Platanus* from Hokkaidô and Karahuto (Preliminary Note). Journ. Geol. Soc. Japan, vol. XLVIII, no. 574, 1941, pp. 351-353.

stone (Upper Cretaceous) of Hokkaidô and having been stored in our Department may be the oldest representative of this genus in Japan, possibly in Eastern Asia, but the specimens are too imperfect to make a statement based on them. In the Palaeogene, *Platanus* may have attained its maximum development in Eastern Asia, and its fossil occurrence is by no means rare in the Palaeogene deposits. It is certain that the development of this plant diminished more or less abruptly at the end of the Palaeogene. Scantiness of fossil record of the Neogene species of this genus in Japan, as well as in other continents, proves this view.

The present writers tentatively classified ever known species of *Platanus*, living and fossil, into following four groups, based on the foliar characters:

- 1) *racemosa* group: Leaf deeply plurilobed as *P. racemosa*. Tertiary-Recent: *P. racemosa* NUTT., *P. Wrighti* S. WATS., *P. paucidentata* DORF., *P. nobilis* NEWB., etc.
- 2) *orientalis-occidentalis-aceroides* group: Leaf shallowly trilobate as *P. occidentalis*. Majority of the fossils belong to this group. Cretaceous-Tertiary-Recent (Chiefly in Tertiary): *P. occidentalis* L., *P. orientalis* L., *P. aceroides* GOEPPERT, *P. pseudoccidentalis* HOL., *P. shirleyensis* BERRY, *P. Kummellii* BERRY, *P. dissecta* LESQ., *P. ripleyensis* BERRY, *P. asplaeformis* BERRY, *P. Haydenii* NEWB., *P. cissooides* LESQ., *P. cordata* KNOWL., *P. obtusifolia* LESQ., *P. latior subintegrifolium* (LESQ.), *P. latior grandidentata* (LESQ.), *P. latibasalis* HOLLICK, etc.
- 3) *Guillelmae* group: Leaf not lobate or obsoletely lobate as *P. Guillelmae*. It is somewhat difficult to distinguish from 2). Cretaceous and Tertiary (more in Cretaceous): *P. Newberryana* HEER, *P. Velenovskyana* KRYSHI., *P. rhomboidea* (LESQ.), *P. platanoidea* (LESQ.), *P. latior integrifolia* (LESQ.), *P. Raynoldii* NEWB., *P. montana* KNOWLT., *P. aquehongensis* HOL., *P. Heeri* LESQ., *P. marginata* (LESQ.), *P. septentrionalis* HOLLICK, etc.
- 4) *basilobata* group: Leaf peltate as *P. basilobata*. Eocene-Miocene: *P. basilobata* WARD, *P. Condoni* KNOWT., *P. appendiculata* LESQ., *P. sachalinensis* ENDÔ, *P. Mabutii* ÔISHI and HUZIOKA, etc.

Of these four groups, the foliar characters in 2) and 3) appear to merge from one to another in many cases, it is especially so in *P. aceroides* and *P. Guillelmae*.

Fossil *Platanus* from Hokkaidô and Karahuto which the present writers were able to discriminate are the following 4 species:

Platanus aceroides GOEPPERT

P. Guillelmae GOEPPERT

Cfr. *P. aceroides latifolia* KNOWLTON

P. Mabutii sp. nov.

P. aceroides and *P. Guillelmae* are rather common and occur in association in many cases. Specimen identified as Cfr. *P. aceroides latifolia* KNOW. is unfortunately imperfect, but is closely allied to *P. aceroides latifolia* described by KNOWLTON. However, the description, was reserved for a while untill better specimens are available. *P. Mabutii* is characteristic in having peltate blade.

Seeing as a whole, fossil *Platanus* from Hokkaidô and Karahuto are mostly concentrated in its occurrence in the Palaeogene deposits, as is the case in Europe and North America. It denotes that the development of this genus has reached its climax in its evolutionary history in the Palaeogene time. As it has been noted in the foregoing lines of the present paper, some *Platanus*-like leaves have been acquired from the *Nilssonina* Beds of the Hakobuti Sandstones (Upper Cretaceous), but the specimens are too imperfect to be described; this is only one fossil record of this genus in the Cretaceous rocks in Japan. *Platanus* is rare also in the Neogene deposits of the Japanese Islands. *P. Guillelmae* from the Kayanuma coal-mine (Kunnui Series, Kawabataian; Miocene) in Hokkaidô is the youngest representative of this genus in Japan. The junior writer recently discriminated a *Platanus* resembling *P. Guillelmae* from the *Engelhardtia* Beds (Miocene) of Tyôsen. No Pliocene and Pleistocene species of *Platanus* has been known from Eastern Asia. Repeatedly saying, in Eastern Asia, the development of *Platanus* was poor in the Cretaceous, it reached its maximum development in the Isikarian and Urahoroian, while suddenly diminished in the Kawabataian being represented by a single species which is in very rare occurrence. Thus *Platanus* entirely disappeared from the Asiatic continent since the Pliocene.

The geological history of *Platanus* in European and American continents differs somewhat from that in Eastern Asia. In Europe

where there is a single living species, *P. occidentalis* in the mediterranean region, *Platanus* is rather well developed in Oligocene and Miocene while in North American continent fossil *Platanus* are known from the deposits between Cretaceous and Pleistocene, with all of the five living species of this genus. That is to say, *Platanus* which flourished in Cretaceous and Older Tertiary throughout the greater part of the northern Hemisphere disappeared first from Eastern Asia at the close of the Miocene, then mostly from Europe probably at the beginning of the Pliocene, and lastly from America in the Pleistocene, in the last named continent the fossil species being replaced by the living species, although *P. occidentalis* only has been recorded from the Pleistocene deposits.

In the following is shown the geographical and geological distributions of the fossil *Platanus* from Hokkaidô (H) and Karahuto (K) described in this paper*:

Table showing the species and distribution of *Platanus* from Hokkaidô (H) and Karahuto (K).

	Isikarian		Urahoroian		Kawabataian
	Low.	Up.	Low.	Up.	
<i>P. aceroides</i> GOEPPERT	H?	HK	H?	H	—
Cfr. <i>P. aceroides latifolia</i> KN.	—	H	—	—	—
<i>P. Guillelmae</i> GOEPPERT	—	HK	—	H	H
<i>P. Mabutii</i> sp. nov.	—	K	—	H	—

Description of the Species

Platanus aceroides-Group

(Fossil leaves similar to the modern *P. occidentalis* L. and *P. orientalis* L.)

Platanus aceroides GOEPPERT

Pl. XV(I); Pl. XVI(II); Pl. XVII(III), Fig. 1.

The specimens in the following lists are described as *Platanus aceroides* and are considered to belong to a single specific type:

1855. GOEPPERT: Die tertiäre Flora von Schosnitz in Schlesien, p. 21, pl. IX, figs. 1-3.

* Besides four species described in this note, there is a specimen named by ENDÔ as *P. sachalinensis*. See, p. 113, of this note.

1855. HEER: Flora tertiaria Helvetiae. Bd. II, p. 71, pl. LXXXVII; pl. LXXXVIII, figs. 5-15.
1868. HEER: Flora fossilis arctica, Bd. I, p. 111, pl. XII, figs. 1-8; pl. XLVII, fig. 3.
1868. HEER: Ibid., Bd. II, p. 159, pl. XXXII, figs. 1, 2.
1871. HEER: Ibid., Abth. 4. Die miocene Flora und Fauna Spitzbergens. p. 57, pl. XI, fig. 2.
1877. HEER: Ibid., Bd. IV, Abth. 1 Beiträge zur fossilen Flora Spitzbergens, p. 76, pl. XVII, figs. 1-3; pl. XXXI, fig. 3.
1878. LESQUEREUX: Contributions to the Fossil Flora of the Western Territories. II. Tertiary Flora, p. 184, pl. XXV, figs. 4-6.
1883. HEER: Flora fossilis arctica, Bd. VII, Abth. 2, p. 96, pl. XC, figs. 1-5; pl. XCVII, fig. 7.
1906. MENZEL: Ueber die Flora der Senftenberger Braunkohlen Ablagerungen. Abh. Preuss. Geol. L.-A., N.F., Ht. 46, p. 75.
1917. MEYER in KRÄUSEL: Die Pflanzen des schlesischen Tertiärs. Jahrb. Preuss. Geol. L.-A., Bd. XXXVIII, p. 164, pl. XV, figs. 1, 2; pl. XVI, figs. 13, 14.
1917. KNOWLTON: Fossil Floras of the Vermejo and Raton Formations of Colorado and New Mexico. U.S.G.S. Prof. Paper 101, p. 321, pl. LXIII, fig. 4; pl. XCVII, figs. 2, 3.
1918. BEERY: Fossil Plants from the Late Tertiary of Oklahoma. U.S. Nat. Mus. Proc., Vol. LIV, p. 630, pl. XCIV, fig. 3; pl. XCV, fig. 5.
1919. KRÄUSEL: Nachträge zur Tertiärflora Schlesiens. III. Ueber einige Originale GOEPPERTS und neuere Funde. Jahrb. Preuss. Geol. L.-A., Bd. XL, p. 408, pl. VI, fig. 3.
1931. HAHLOV: The Tertiary Flora of Tomsk District. Bull. Geol. Pros. Ser. West-Siberia, Vol. XI, p. 54, figs. 13, 30.
1931. ENDO: Cenozoic Plants. IWANAMI's Geolog. and Palaeont. Series, p. 8.
1934. WEYLAND: Beiträge zur Kenntnis der rheinischen Tertiärflora. I. Floren aus den Kieseloolith- und Braunkohlenschichten der niederrheinischen Bucht. Abh. Preuss. Geol. L.-A., N.F., Ht. 161, p. 85.
1933. CHANEY and SANBORN: The Goshen Flora of West Central Oregon. Carnegie Inst. Washington, Publ. No. 439, p. 78, pl. XXV, fig. 6.
1937. SANBORN: The Comstock Flora of West Central Oregon. Ibid., No. 465, p. 21, pl. VI, fig. 10.
1937. ENDO: Fossil *Platanus* from Eastern Asia. Tôkyô Hakubutsugaku-Zassi, Vol. XXXV, No. 60, pp. 368-392, figs. 2, 5.
1938. CHANEY and ELLIAS: Late Tertiary Floras from the High Plains. Carnegie Inst. Washington, Publ. No. 476, p. 41, pl. VII, fig. 12.

The following species are considered to be synonymous:

1855. *Platanus Oeynhausiana* GOEPPERT: Die tertiäre Flora von Schossnitz in Schlesien, p. 20, pl. X, figs. 1-4.

1855. *Platanus rugosa* GOEPPERT: Ibid., p. 21, pl. XI, figs. 3-4.

1935. *Platanophyllum* sp. cfr. *P. aceroides* SEWARD and CONWAY: Fossil Plants from Kingiktok and Kadalunguak, West Greenland. Med. om Grønland, Vol. XCIII, No. 5, p. 23, pl. III, fig. 28.

A considerable number of specimens of this species are at our disposal. Some may be being described below to each locality:

1. Specimens from the Syakubetu Bed of the Urahoro Series, Prov. Kusiro, Hokkaidô.

Rather rare, but a typical *aceroides* type.

2. Specimens from the *Woodwardia* Sandstone of the Isikari Series, Prov. Isikari, Hokkaidô. Pl. XVI(II), fig. 1.

Leaf considerably large, rectangular in outline, truncate or broadly cordate at the base.

3. Specimens from the Asibetu coal-bearing Beds of the Isikari Series, Prov. Isikari, Hokkaidô.

Leaf small, shallowly lobate and crenulated at the margin. This marginal character is rather rare in *Platanus*; in this point it resembles *P. cissifolius* figured by LESQUEREUX.

4. Specimens from the Naibuti coal-bearing Beds of the Naibuti Series, Karahuto. Pl. XV(I); Pl. XVII(III), fig. 1.

Many specimens are examined. Leaf considerably variable in shape. Dominant is the typical *aceroides* type as shown in the figures. One in Pl. XV(I) is very large, with strong veins and cordate at the base. Another one in Pl. XVIII(III), fig. 1 is a typical *aceroides* type.

5. Specimens from the Uryû coal-bearing Beds of the Uryû Series, Prov. Isikari, Hokkaidô. Pl. XVI(II), fig. 2.

A specimen similar to that from the Naibuti coal-bearing beds as shown in Pl. XV(I).

6. Specimens from the Obirasibe coal-bearing Beds (Uryû Series), Prov. Tesio, Hokkaidô.

A typical specimen of *aceroides* type and some fragments.

Remarks: All of the specimens mentioned above are those belonging to typical *aceroides*-group, but there are also some less typical forms which are sometimes devoid of marginal crenulation or provided with less developed lobes. All these types are included in *P. aceroides*.

In Japan, especially in Hokkaidô and Karahuto, *P. aceroides* occurs only from the pre-Kawabataian depoists, and none has been recorded from the Neogene. Thus it is interesting to note that this species occurs in Europe from the rocks earlier than the Miocene, while in North America it is known even from the rocks as young as the Pliocene. This shows that the extinction of this species began first in Asia at the close of the Palaeogene then shifted westwards as far as America through European continent where it disappeared at the end of the Miocene.

Localities:

Hokkaidô. Upper Part of the Urahoroian (Syakubetu Bed); Hokuyô coal-mine, Prov. Kusiro (Coll. H. HIRANO).

Upper Part of the Isikarian.

Asibetu coal-bearing Beds of the Isikari Series; Kami-Asibetu, Asibetu-mura, Sorati-gun, Prov. Isikari (Coll. T. ÔSIMA).

Woodwardia Sandstone of the Isikari Series; Kami-Sunagawa coal-mine district (Colls. S. ÔISHI, T. SIMOGAWARA and K. HUZIOKA), Bibai coal-mine district (Coll. K. HUZIOKA), Ikusyunbetu coal-field (Colls. R. SAITÔ, Y. HATTORI and K. HUZIOKA) and Yûbari coal-field (Colls. K. ÔTATUME and K. HUZIOKA); all Prov. Isikari.

Uryû coal-bearing Beds of the Uryû Series; Syôwa coal-mine district, Uryû-gun, Prov. Isikari (Coll. S. TOKUDA) Obirasibe coal-mine, Rumoe-gun, Prov. Tesio (Coll. S. ÔISHI).

Karahuto. Naibuti coal-bearing Beds of the Naibuti Series (Isikarian); Upper course of the River Kita-Nayosi, Nayosi-gun (Coll. K. HUZIOKA); Tinnai coal-mine, Kusyunnai-gun (Coll. K. HUZIOKA); upper course of the River Manui, Sakaehama-gun (Colls. K. HUZIOKA and S. SAKAKIBARA); Kawakami coal-mine, Toyohara-gun (Coll. S. ÔISHI); Minami-Nayosi coal-mine, Honto-gun (Colls. K. HUZIOKA and H. ÔTU).

- 北海道. 石狩統: 芦別夾炭層—石狩國空知郡芦別村上芦別. 羊齒砂岩層—石狩國空知郡上砂川炭礦地方, 美唄炭礦地方及び幾春別炭田; 夕張郡夕張炭田
 浦幌統: 尺別層—釧路國北陽炭礦
 雨龍統: 雨龍夾炭層—石狩國雨龍郡沼田村昭和炭礦地方. 天鹽國留萌郡小平炭礦.
 樺太. 内淵統: 内淵夾炭層—一名好郡北名好川上流, 久春内郡珍内炭礦, 榮濱郡眞縫川上流, 豊原郡川上炭礦, 本斗郡南名好炭礦.

Platanus Guillelmae-Group

(Fossil leaves similar to *P. Guillelmae*; leaves non or obsoletely lobate with cuneate base).

Platanus Guillelmae GOEPPERT

Pl. XVII (III), Figs. 2, 3; Pl. XVIII (IV), Figs. 2, 3.

All the specimens listed below are described under the name *P. Guillelmae* and are considered to be specifically all identical.

1855. GOEPPERT: Tertiäre Flora von Schossnitz in Schlesien, p. 21, pl. XI, figs. 1, 2; pl. XII, fig. 5.
 1871. HEER: Flora fossilis arctica. Bd. II, Abth. 4, p. 473, pl. XLVII; pl. XLVIII; pl. XLIX, figs. 4b-d, 6b.
 1878. HEER: Ibid., Bd. IV, Abth. 2, Fossilen Flora Sibiriens und des Amurlandes. V. Beiträge zur miocene Pflanzen aus dem Amurlande und der Mandschurei, p. 40, pl. IX, figs. 14-16; pl. X, figs. 1-4; pl. XI, fig. 1; pl. XIII, figs. 5, 6.
 1878. LESQUEREUX: Contributions to the Fossil Flora of the Western Territories. II. Tertiray Flora, p. 183, pl. XXV, figs. 1-3.
 1883. HEER: Flora fossilis arctica. Bd. VII, Abth. 2, p. 96, pl. XCVII, fig. 6; pl. XCVIII, fig. 12; pl. XCIX, fig. 1; pl. CIII, fig. 4.
 1898. KNOWLTON: Fossil Flora of the Yellowstone National Park. U.S.G.S. Mon. XXXII, pt. 2, p. 727, pl. XCVI, fig. 1; pl. XCVII, fig. 5.
 1918. KNOWLTON: Fossil Floras of the Vermejo and Raton Formations of Colorado and New Mexico. U.S.G.S. Prof. Paper 101, p. 322, XCIII, fig. 1; p. 323, pl. XCVI, fig. 6; pl. XCVII, fig. 1; pl. XCVIII, fig. 2 (as *P. Guillelmae Heerii*).
 1931. ENDÔ: Cenozoic Plants. IWANAMI's Geol. and Palaeont. Series, p. 8.
 1937. ENDÔ: Fossil Platanus from Eastern Asia. Tôkyô Hakubutugaku-zasshi, Vol. XXXV, No. 60, p. 388, fig. 4.

Localities of *P. aceroides* outside Hokkaidô and Karahuto are as follows (after ENDÔ, 1937, op cit.):

1. Amakusa Simo-zima, Kyûsyû.
2. Fu-shun coal-mine, Manchoukuo.

The present writers are dealt with the specimens derived from the following localities:

1. Specimens from the Syakubetu Bed of the Urahoro Series, Prov. Kusiro. Pl. XVII(III), fig. 2; Pl. XVIII(IV), fig. 3.

Leaf characterised by the downward decurrence of the lamina to the sides of the petiole, thus being cuneate at the base. This is the most characteristic form of this species.

2. Specimens from the Naibuti coal-bearing Beds of the Naibuti Series, Karahuto. Pl. XVI(II), fig. 3.

A somewhat imperfect specimen, but is almost identical with the preceding one, differing slightly in having finer marginal serration and slightly deeper sinus.

3. Specimens from the *Woodwardia* Sandstone of the Isikari Series, Hokkaidô.

A number of specimens are examined, but they are unsatisfactorily preserved to deserve illustration. ENDO¹⁾ figured a specimen from the *Woodwardia* Sandstone of the Yûbari coal-mine, Hokkaidô; it shows that the leaf is almost unlobed, only having acute dents at the outer margin, in this specimen the basal decurrence of the lamina is less prominent as usually the case in this species.

4. Specimens from the Kayanuma coal-bearing Bed of the Kunnui Series, Prov. Siribesi, Hokkaidô. Plate XVIII(IV), fig. 2.

A single imperfect specimen preserved only lower portion of a leaf. This is the youngest record of this species in Japan.

Remarks: Specimens of *Guillelmae*-group are rather variable in leaf form, and they often merge gradually towards *aceroides*-group being connected by a series of intermediate forms. KRÄUSEL and MEYER²⁾ who examined the type specimens of GOEPPERT considered that *Guillelmae* and *aceroides* are conspecific, and some European writers followed them. HEER and some American writers consider them to be specifically distinct. In dealing with the Japanese specimens, especially those from Hokkaidô and Karahuto, the present writers rather inclined to a consideration which in favour of HEER and American authors, although the present writers yet recognise

1) S. ENDÔ: Fossil *Platanus* from Eastern Asia. Op. cit.

2) F. MEYER in KRÄUSEL: Die Pflanzen des schlesischen Tertiärs. Jahrb. Preuss. Geol. L.-A., Bd. XXXVIII, 1917, p. 164.

that the leaf form of these two groups are very closely related to each other.

In Hokkaidô and Karahuto, *P. Guillelmae* occurs from the rocks series between Isikarian to the Kawabataian, but the occurrence is not so common. In Europe and North America, this species occurs also from the rocks as young as the Miocene, though its occurrence is mostly concentrated in Palaeogene rocks.

Localities:

Hokkaidô. *Woodwarda* Sandstone of the Isikari Series (Upper Part of the Isikari Series); Bibai coal-mine district (Coll. K. HUZIOKA); Ikusumbetu coal-field (Colls. R. SAITÔ, Y. HATTORI and K. HUZIOKA); Yûbari coal-fields (Colls. K. ÔTATUME and K. HUZIOKA); all Prov. Isikari.

Syakubetu Bed of the Urahoro Series (Upper Part the Urahoroian); Hokuyô coal-mine, Kusiro Prov. (Coll. H. HIRANO).

Kayanuma coal-bearing Beds of the Kunnui Series (Kawabataian; Kayanuma coal-mine, Huruu-gun, prov. Siribesi (Coll. K. HUZIOKA).

Karahuto. Naibuti coal-bearing Bed of the Naibuti Series (Isikarian); Kawakami coal-mine, Toyohara-gun (Coll. S. ÔISHI); Minami-Nayosi coal-mine, Honto-gun (Colls. K. HUZIOKA and H. ÔTU).

北海道. 石狩統: 羊齒砂岩層—石狩國空知郡美唄炭礦地方, 幾春別炭田 及び 夕張郡夕張炭田

浦幌統: 尺別層—釧路國北陽炭礦地方

訓縫統: 茅沼夾炭層—後志國古宇郡茅沼炭礦

樺太. 内淵統: 内淵夾炭層—豊原郡川上炭礦, 本斗郡南名好炭礦

Localities of *P. Guillelmae* in Eastern Asia outside Hokkaidô and Karahuto are as follows:

1. Kamiogawa-mura, Iwaki-gun, Hukusima pref.
2. Agoti coal-mine, N. Kankyô Dô, Tyôsen.
3. Fu-shun coal-mine, Manchoukuo.
4. Simonowa, western East-Siberia.
5. Kokangen, N. Kankyô Dô, Tyôsen. (cfr.).

(1-3, after ENDÔ, 1937, op. cit.; 4 after HEER, 1878, op. cit.; 5 after HUZIOKA, 1943.).

***Platanus basilobata*-Group**

(Base perfoliate as *P. basilobata*, hanging lamina simple or lobate).

***Platanus Mabutii* sp. nov.**

Pl. XVIII(IV), fig. 1; Pl. XIX(V); Pl. XX(VI) (all type specimen).

General description; Leaf large, peltate; lamina broadly cardioid in outline; apex unknown; basal free portion of the lamina about 5 mm. in breadth; margin crenate or broadly dentate; primary veins 3 in number, rigid and strong, sometimes taking zigzag course, secondary and tertiary veins are of usual *Platanus* type.

Pl. XX(VI) is the best specimen of this species. As it is clearly seen in the figure, the leaf is considerably large and somewhat oblong laterally. The figured specimen is an impression of the lower side of leaf, and the peltate character at the basal portion of the blade is clearly seen. Other specimens in Pl. XVIII(IV), fig. 1 and Pl. XIX(V) differ slightly from the preceding in that the blade is somewhat higher in proportion to its breadth and the base is broadly cordate instead of being nearly straight in the preceding specimen. The writers first inclined to separate these two types specifically to each other, but now, decided tentatively to group them into a single specific type.

Remarks: ENDÔ¹⁾ once illustrated and described a leaf derived from the Naibuti coal-bearing bed as a new species, *P. sachalinensis*, it is distinctly peltate but imperfect all round the margin. It is not improbable that the specimens described here as *P. Mabutii* are specifically identical with *P. sachalinensis*, the two having common character in respect to the peltate leaf. This probability may further be strengthened from the fact that ENDÔ's specimen has been derived from the Naibuti coal-bearing bed of Konotoro* of Karahuto as is the case in our specimen in Pl. XX(VI), which was found from the same coal-bearing bed of the Kawakami coal-mine. Thus the present writers first inclined even to identify our specimens to *P. sachalinensis*. After a considerable hesitation, however, they decided to give our specimens a new specific name from the view point, that *sachali-*

1) S. ENDÔ: Fossil *Platanus* from Eastern Asia. Op. cit., 1937, p. 367, Text fig. 1.

*) 小能登呂 (列丹川筋).

nensis was based on too imperfect specimen to compare with it well preserved and nearly complete specimen.

The present new species may be comparable to *P. rectinervis* HOLLICK¹⁾ from the Yukon River of Alaska. In general form the two seem to be almost specifically identical. Unfortunately the Alaskan specimen is imperfect in its basal portion and it is not clear whether the specimen had peltate base as in our specimens or not.

Localities: Penanrupesipe near Syoro, Siranuka-mura, Siranuka-gun, Prov. Kusiuro (Coll. S. MABUTI); Sakaé coal-mine and its environs, Sitakara-mura, Akan-gun, Prov. Kusiuro (Coll. K. HUZIOKA); all Syakubetu Bed of the Urahoro Series (Upper Part of the Urahoroian). Kawakami coal-mine, Toyohara-gun, Karahuto; Naibuti coal-bearing Bed of the Naibuti Series (Coll. S. ÔISHI).

北海道釧路國白糠郡白糠村庶路 ペナアンルベシベ、阿寒郡舌辛村榮炭礦及其附近 (浦幌統尺別層)

樺太豊原郡川上炭礦一内淵統内淵夾炭層

1) A. HOLLICK: The Tertiary Floras of Alaska. U.S.G.S., Prof. Paper 182, 1936, p. 123, pl. LXIX.

EXPLANATION OF THE PLATES

(The figures are of natural size)

The specimens are in the Department of Geology and Mineralogy,
Faculty of Science, Hokkaidô Imperial University, Sapporo.

Plate XV(I)

Platanus aceroides GOEPPERT. Loc. Kawakami coal-mine, Karahuto; Naibuti coal-bearing Bed of the Naibuti Series.

Plate XVI(II)

Platanus aceroides GOEPPERT. Locs. Fig. 1; Yûbari coal-mine, Hokkaidô; *Woodwardia* Sandstone of the Isikari Series. Fig. 2; Sasaki-zawa near Syôwa coal-mine, Hokkaidô; Uryû coal-bearing Bed of the Uryû Series.

Plate XVII(III)

Fig. 1. *Platanus aceroides* GOEPPERT. Loc. Tinnai coal-mine, Karahuto; Naibuti coal-bearing Bed of the Naibuti Series.

Fig. 2. *Platanus Guillelmae* GOEPPERT. Loc. Hokuyô coal-mine, Prov. Kusi-
ro,

Fig. 3. *Platanus Guillelmae* GOEPPERT. Loc. Minami-Nayosi coal-mine, Karahuto; Naibuti coal-bearing Bed of the Naibuti Series.

Plate XVIII(IV)

Fig. 1. *Platanus Mabutii* sp. nov. Loc. Environs of Sakaé coal-mine, Prov. Kusi-
ro, Hokkaidô; Syakubetu Bed of the Urahoro Series.

Fig. 2. *Platanus Guillelmae* GOEPPERT. Loc. Kayanuma coal-mine, Prov. Siro-
besi, Hokkaidô; Kayanuma coal-bearing Bed of the Kunnui Series.

Fig. 3. *Platanus Guillelmae* GOEPPERT. Loc. Hokuyô coal-mine, Prov. Kusi-
ro, Hokkaidô; Syakubetu Bed of the Urahoro Series.

Plate XIX(V)

Platanus Mabutii sp. nov. Locs. Fig. 1; Penaanrupesipe near Syoro, Prov. Kusi-
ro, Hokkaidô; Fig. 2; Sakaé coal-mine, Prov. Kusi-
ro, Hokkaidô; both Syakubetu Bed of the Urahoro Series.

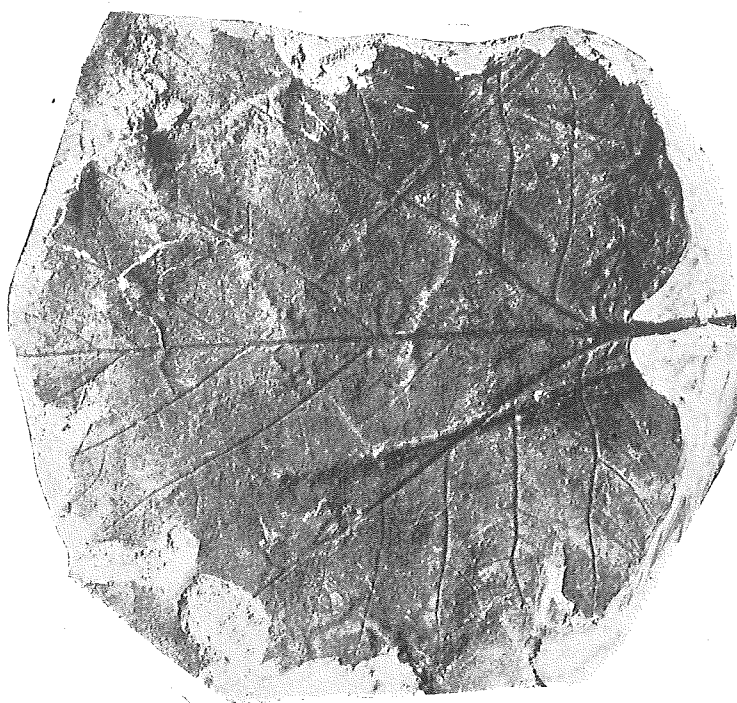
Plate XX(VI)

Platanus Mabutii sp. nov. Loc. Kawakami coal-mine, Karahuto; Naibuti coal-bearing Bed of the Naibuti Series.

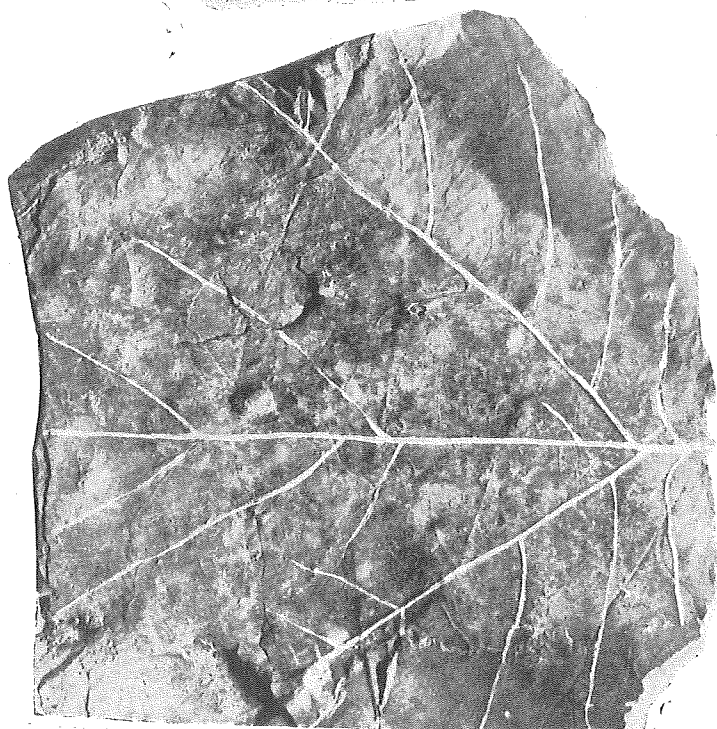


Kumano photo.

S. Ôishi and K. Huzioka : Tertiary Platanius from Hokkaidô and Karahuto.



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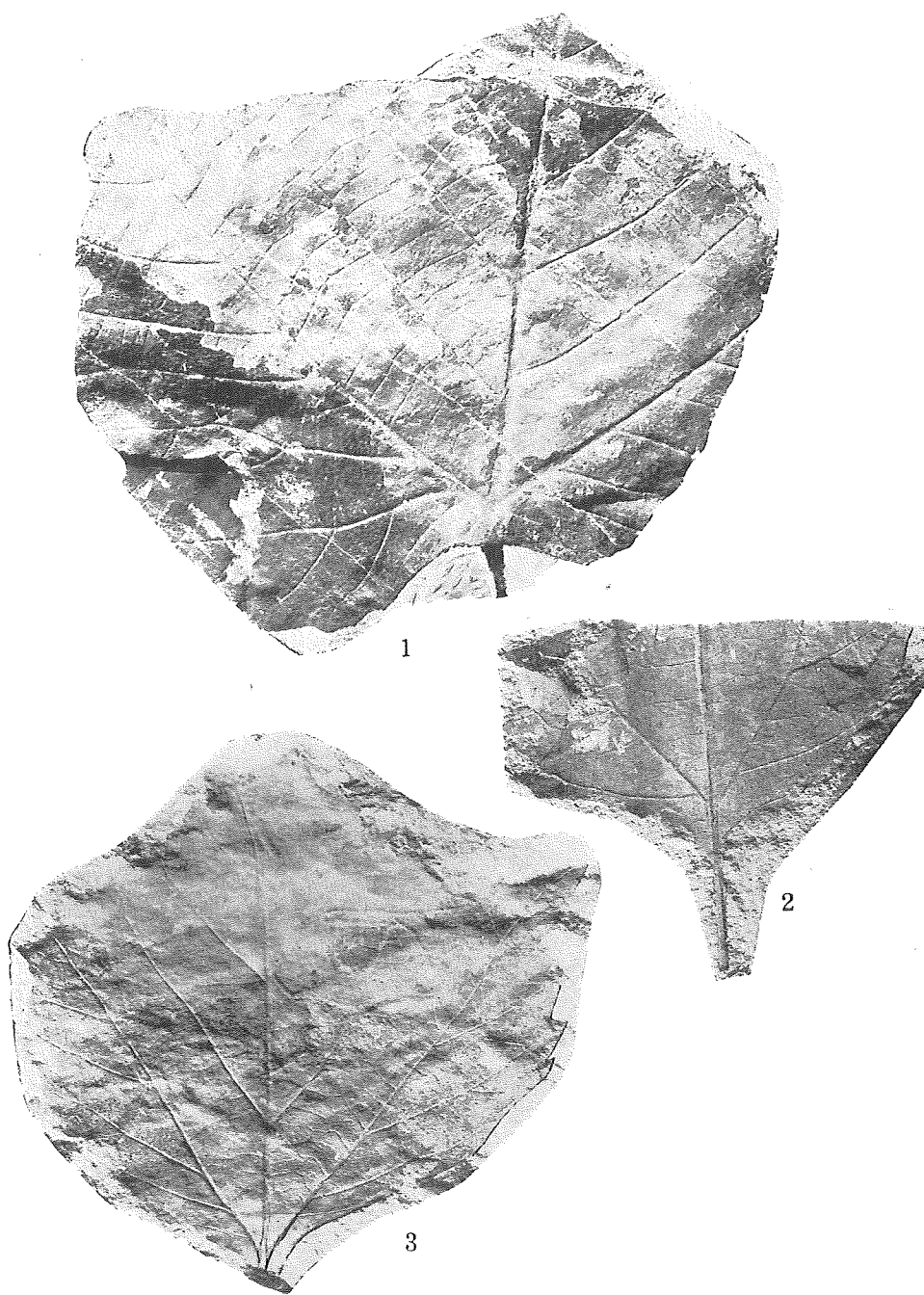
Kumano photo.

S. Ôishi and K. Huzioka: Tertiary Platanus from Hokkaidô and Karahuto.



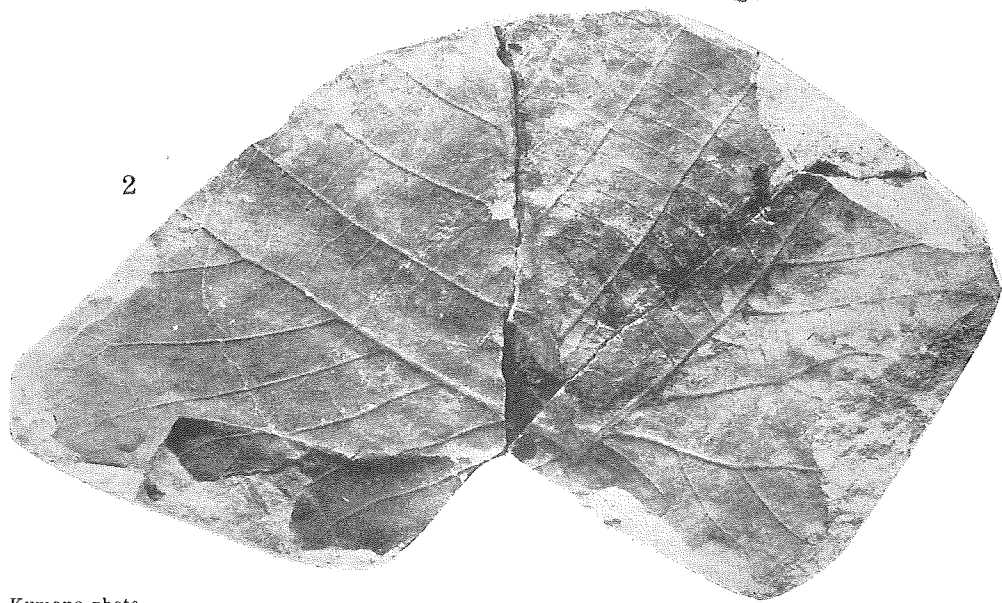
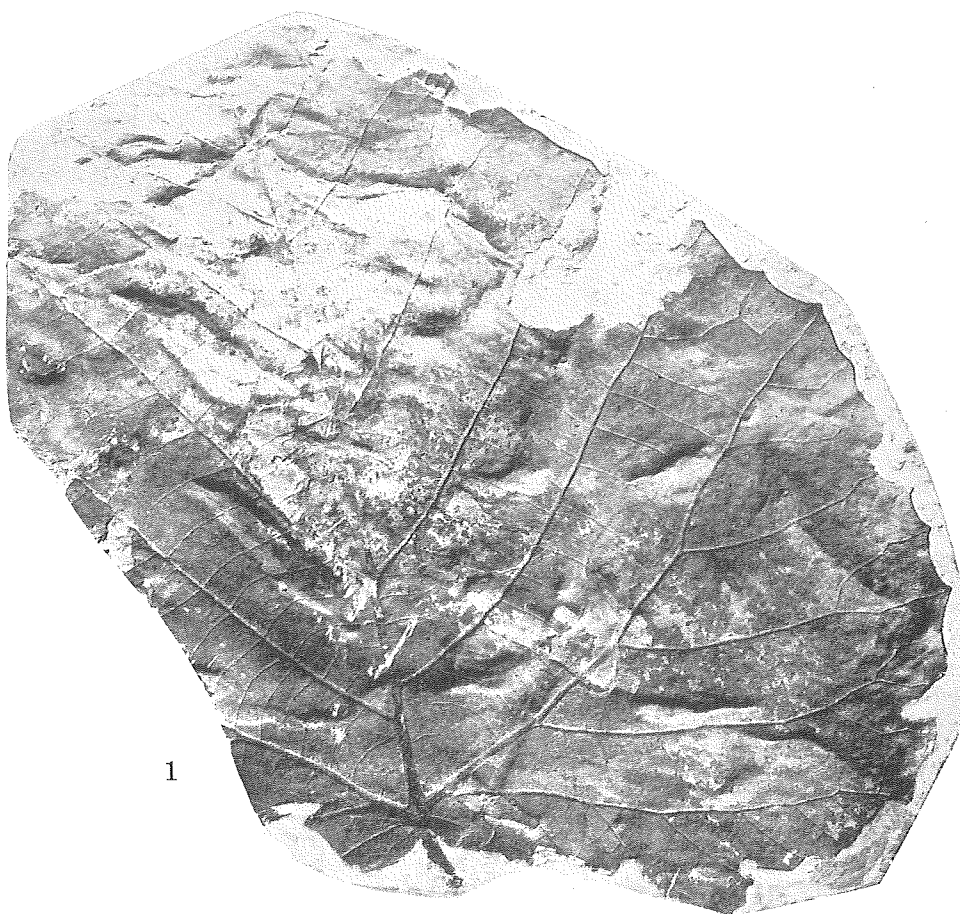
Kumano photo.

S. Ôishi and K. Huzioka: Tertiary Platanus from Hokkaidô and Karahuto.



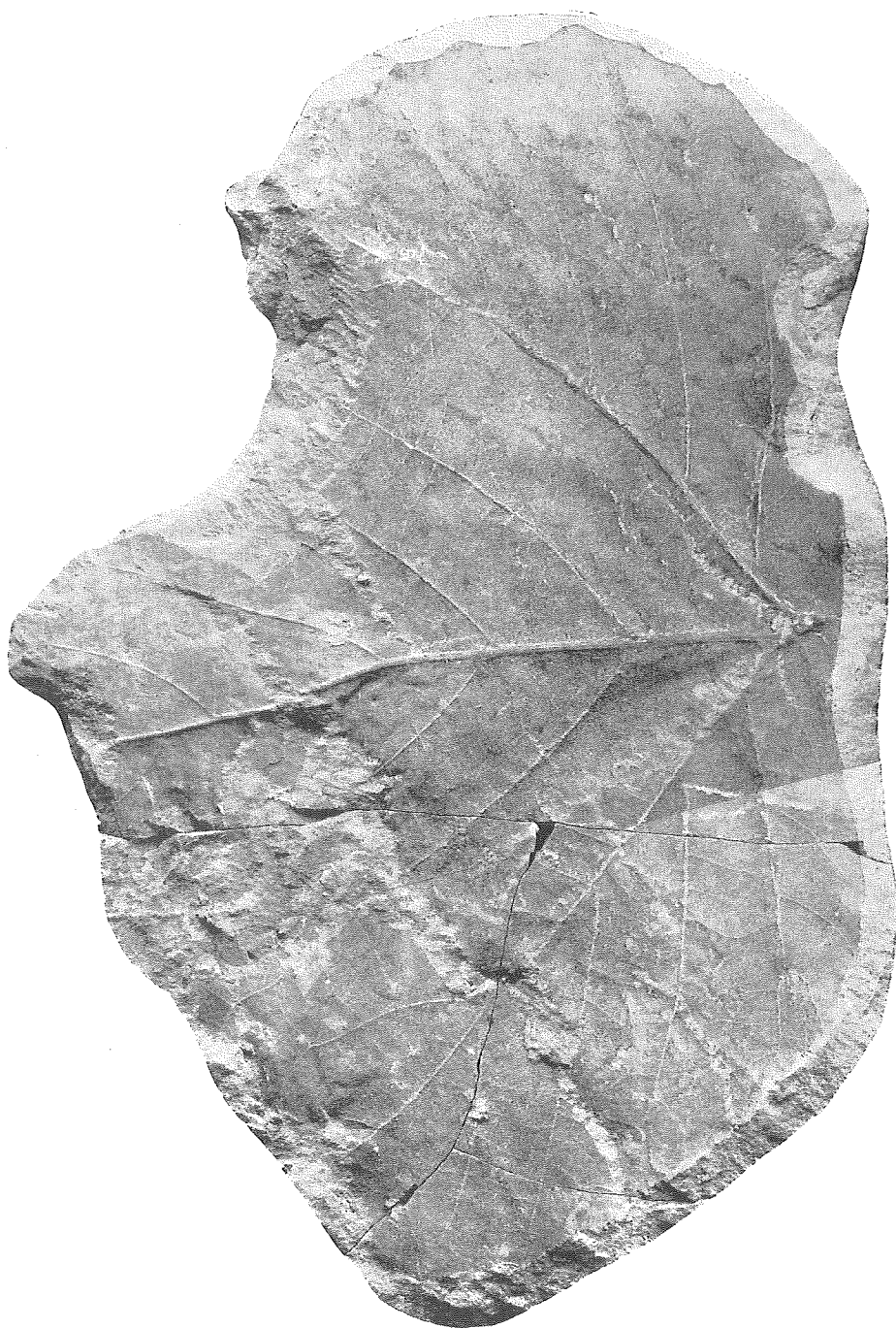
Kumano photo.

S. Ôishi and K. Huzioka: Tertiary Platanus from Hokkaidô and Karahuto.



Kumano photo.

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Kumano photo.

S. Ôishi and K. Huzioka: Tertiary Platanus from Hokkaidô and Karahuto.