

Shunji WATARI & Makoto NISHIDA*: *A Juniperoxylon*
from the Tertiary of Hokkaido**

亙理俊次・西田 誠*: 北海道産ビャクシン属型硅化木**

(Plate IV)

A well-preserved petrified wood collected from the Tertiary of Hokkaido was kindly sent us by Dr. Eijiro Yakushiji, Professor of the Toho University, in 1968. The specimen has been deposited in our laboratory and registered as no. 368401. We have identified it as the secondary wood of a member of *Juniperoxylon* as described below. This is a new finding of a fossil wood belonging to the Juniperaceae from Japan and its adjacent lands.

***Juniperoxylon breviparenchymatosum* sp. nov.**

Material. The specimen no. 368401 (Holotype) is a fragment of the secondary wood, black in colour, 5 cm in height, 15 cm and 6 cm in long and short diameters respectively and well-preserved.

Description. Growth rings clearly visible. Transition from the early wood to the late wood gradual. Wood consists of tracheids, rays and wood parenchyma. No resin canal is found. Tracheids regularly arranged in radial rows, somewhat radially elongated rectangular in shape in the cross section of the early wood, 32–45 μ and 35–58 μ in tangential and radial diameters respectively, and tangentially elongated in the late wood, 11–15 μ and 30–35 μ in radial and tangential widths respectively. Bordered pits on radial walls of early wood tracheids circular, separately arranged in one or two rows, and if in two rows, pits are arranged oppositely. Pits on tangential walls sparsely present. Rims of Sanio not visible. Wood parenchyma abundant, scattered throughout the wood, but rather more

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abundant in the late wood than in the early wood, and short in the vertical length, 40-120 μ in length and 44-60 μ in tangential and radial widths. The ratio of length to width of wood parenchyma is 0.8-2.5. Horizontal walls are usually smooth or sometimes irregularly thickened. Rays all parenchymatous, generally uniseriate and rarely biseriate in part, 1-14, usually 2-8 cells high, and run at intervals of 2-15, 7.0 in an average, rows of tracheids. Ray cells ovoid, rectangular or vertically elongated rectangular in shape in tangential section, and 26-32 μ and 20-26 μ in vertical and horizontal widths respectively. Horizontal walls of ray cells smooth or rarely pitted and tangential walls show ladder like or network or irregular nodular thickenings. Pits on radial walls half bordered, taxodioid or sometimes glyptostroboid, roundly ovoid in shape, 8-11 μ in long diameter, and with narrow border. Two to six pits arranged in one to two horizontal rows in a cross field in the early wood and one to two in the late wood, and if two, arranged in a vertical row.

Horizon. Tertiary: Eocene.

Locality. Shin-futamata, Tsunoda-mura, Sorachi-gun, Hokkaido.

Affinity. Important anatomical features in considering the affinity of the present coniferous wood may be summarized as follows: The presence

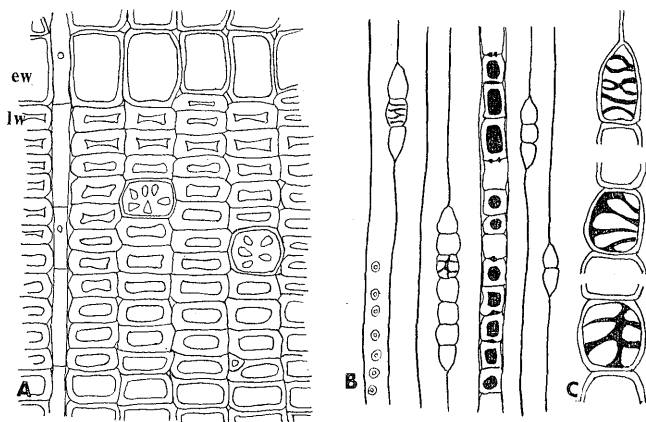


Fig. 1. Cross (A) and tangential (B and C) sections of *Juniperoxylon breviparenchymatosum* sp. nov. Horizontal walls of ray cells are smooth or slightly pitted. Horizontal walls of wood parenchyma are slightly nodular or smooth, and tangential walls have ladder like or network thickening (C). ew: early wood, lw: late wood.

of scattered parenchyma, and extreme shortness of the vertical length of parenchyma cells, rays which are rarely biseriata in part and consisted only of parenchyma, occurrence of the taxodioid or glyptostroboid half-bordered pits in cross fields, and, especially, the presence of nodular thickenings on the tangential walls of ray cells. The last feature apparently suggests that the present specimen seems to belong to *Juniperoxylon*. The wood of recent *Juniperus* exhibits cupressoid half-bordered pits in the cross field and almost always uniseriate rays. Therefore the present species is distinguished clearly from all members of recent *Juniperus* in Japan and its adjacent lands. Moreover any recent species of *Juniperus* which bears such short wood parenchyma cells as those of the present species has never been known so far. Some species of *Libocedrus*, for instance, *L. decurrens* Torrey of North America and *L. formosana* Florin of Formosa and Yunnan, China show also nodular thickenings on the tangential walls of ray cells. But they differ from the present species in having lower rays, cupressoid pits in the cross field, and longer wood parenchyma cells. We would like to suggest that Chilean *Fitzroya cupressoides* Johnston would rather resembles the present species, for the former, except for the height of rays and the vertical length of wood parenchyma cells, is similar to the latter in having 2-6 taxodioid half-bordered pits in the cross field instead of cupressoid pits

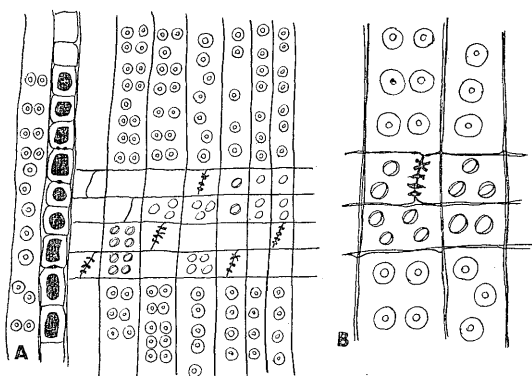


Fig. 2. Radial sections of *Juniperoxylon breviparenchymatosum* sp. nov. Showing vertically short wood parenchyma, thickening on horizontal walls of wood parenchyma and on tangential walls of ray cells (in A). Glyptostroboid pits in the cross fields are drawn in B.

which are seen in the species of *Juniperus*. We have several information about *Juniperoxylon*. All the species described in the genus are confirmed the presence of Rims of Sanio which are not visible in the present specimen. The present specimen differs from *Juniperoxylon pachyderma* from the Tertiary of Silesia (Goepfert 1850, Kräusel 1919), and of Turow, Poland (Kostyniuk 1967), *J. lusaticum* from the Tertiary of Turow, Poland (Kostyniuk 1967), and *J. glyptostroboides* from the Tertiary of Turow, Poland (Kostyniuk 1967) in having lower rays which are less than 15 cells high, and rarely pitted or smooth horizontal walls of ray cells, instead of higher rays up to 30 cells high and densely or moderately pitted horizontal walls.

Table 1. Comparison of three related species of *Juniperoxylon*.

Species Characters	<i>J. breviparen- chymatosum</i>	<i>J. silesiacum</i>	<i>J. Lignieri</i>
Ray tracheids	absent	absent	present
Bordered pits of tracheids	separately and oppositely arranged	separately and oppositely arranged	sometimes contiguously and alternately arranged
Height of rays	usually 2-8, up to 15 cells high	usually 2-4, up to 15 cells high	1-6, up to 10 cells high
Ray cells			
Indenture	absent	frequently present	?
Horizontal walls	smooth or rarely pitted	smooth or rarely pitted	moderately pitted
Cross field	1-6 taxodioid or glyptostroboid pits	1-6 taxodioid pits	1-4 glyptostroboid pits
Rims of Sanio	not visible	visible	visible
Wood parenchyma			
Horizontal wall	smooth or slightly nodular	nodular or slightly nodular	nodular
Vertical length	40-120 μ	75-200 μ	45-120 μ

of ray cells in the latter. *J. turoviense* from the Tertiary of Turow, Poland (Kostyniuk 1967) resembles the present specimen in general feature, but it differs from the latter in having sporadic ray tracheids. *J. Lignieri* from the Tertiary near Paris, France (Grambast 1955) is distinguished also from the present specimen in frequent occurrence of ray tracheids, though the general anatomical status of both specimens, except for the arrangement of bordered pits on tracheids, are similar to each other (see Table 1). The present specimen also closely resembles *J. silesiacum* from the Tertiary of Silesia, Poland (Kräusel 1919) and of Süd Limburg, Germany (Kräusel and Schönfeld 1924) in many characters, except for the absence of indenture and short length of wood parenchyma cells (see Table 1).

As above mentioned, the present specimen is distinguished from all species of *Juniperoxylon* which have been reported so far, and would be, hence, a new species of this genus.

Cited literature

- Goeppert, H. R. (1850) Monographie der fossilen Coniferen, mit Berücksichtigung der Lebenden. Leiden. Grambast, L. (1955) Un *Juniperoxylon* particulier dans l'Éocène Inférieur du bassin de Paris. Arch. Mus. Nation. Hist. Natur. Ser. 7, 3: 1-23. Kostyniuk, M. (1967) Coniferous stumps from the brown coal deposit of Turow near Bogatynia, SW Poland. Prece Muz. Ziemi Nr. 10: 3-96. Kräusel, R. (1919) Die Pflanzenreste des Schlesischen Tertiärs. Jb. Preuss. Geol. Landesanst. f. 1917, 38, II. Berlin. Kräusel, R. und G. Schönfeld (1924) Fossile Holzzer aus der Braunkohle von Süd-Limburg. Abhandl. Senckenberg. Naturforsch. Gesell. 38(3): 253-289.

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日本および近隣諸邦からはまだビャクシン科に属すると思われる 材化石は発見されていない。1968年、東邦大学の薬師寺英次郎教授から北海道空知郡角田村新二股の河床より得られた黒色の硅化木の破片をいただいた。同所は上部白堊紀と古第三紀の地層があるが、硅化木の石質からみて古第三紀のものであることはまちがいないと思う。この硅化木は放射組織の細胞の切線壁に梯子状または網目状の肥厚が見られるのでビャクシン属に近縁の *Juniperoxylon* に属するものである。ビャクシン科に属する材化石としては本邦最初の記録である。ヨーロッパの第三紀からはすでに数種の *Juniperoxylon* が知られているが、そのうちで、本種はポーランドやドイツから報告され

ている *J. silesiacum* とフランスの *J. Lignieri* によく似ており、特に木部柔組織細胞が短いことなど、後者と非常によく似ている。しかし *J. Lignieri* には時に放射組織仮道管が見られるので本種と区別できる。*J. silesiacum* は放射組織がやや低いこと、しばしば放射組織細胞に *indenture* があること、木部柔組織細胞がやや長いことなどの点で本種とちがっている (表 1 を見よ)。本邦および近隣産のビャクシン属には本種に似たものはない。木部柔組織細胞が短い (長さは幅の 0.8~2.5 倍) ものは現生のビャクシン属にはないようである。したがって本種は *Juniperoxylon* の一新種であると思う。オニヒバ属 *Libocedrus* の中にも、オニヒバ *L. decurrens* やショウナンボク *L. formosana* など、放射組織細胞の切線壁に肥厚が現れる種があるが、放射組織の高さ、木部柔組織細胞の長さなどで本種とちがっている。むしろ、それらの相違を除外すれば直交分野の半有縁孔がヒノキ型 *cupressoid* よりもスマスギ型 *taxodioid* である点、チリ産の *Fitzroya cupressoides* が本種に近いように思われる。

貴重な資料を提供して下さった薬師寺英次郎教授に感謝の意を表する。

Explanation of Plate IV

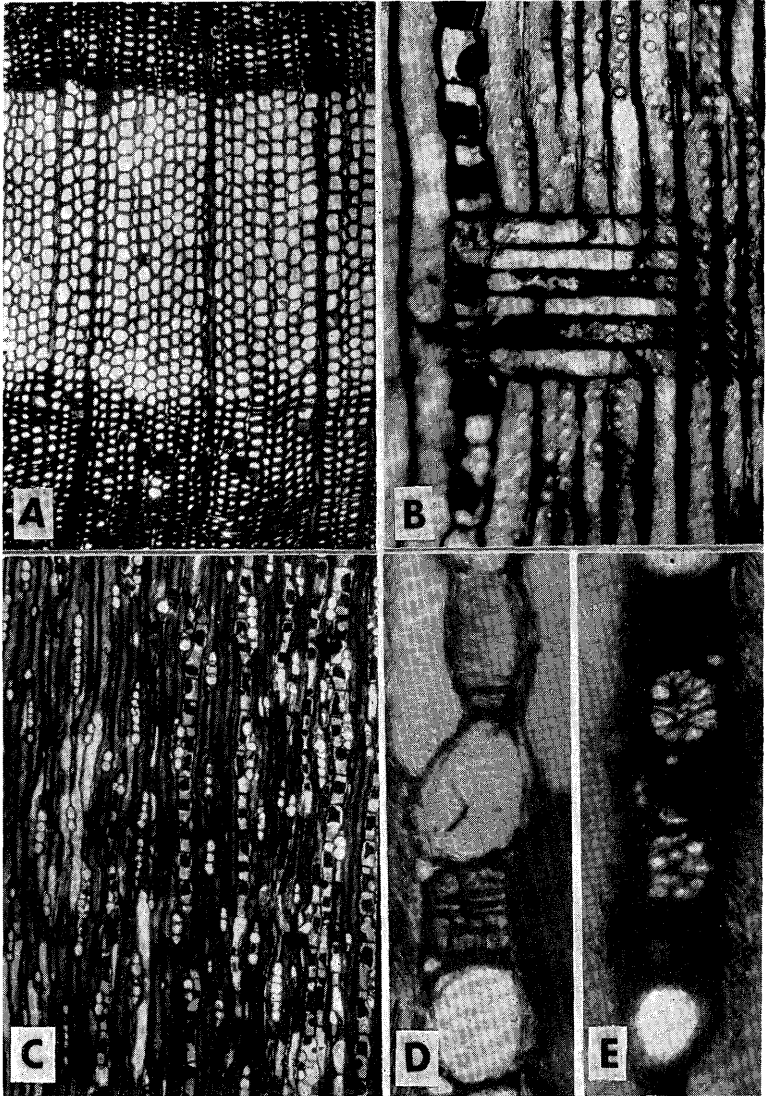
Juniperoxylon breviparenchymatosum sp. nov. Cross (A), radial (B) and tangential (C-E) sections of secondary wood. Ladder like and network thickenings are seen in D and E respectively.

ONotes on ferns of the Bonin Islands (Hiroshi ITO) 伊藤 洋: 小笠原諸島のシダについての知見

The Bonin Islands are situated in the Pacific Ocean about 1,000 km south of the main islands of Japan. The count of the pteridophytes native in the islands made by the author recently (in "Iden" 23(8): 35-41, 1969) based on the materials kept in the herbarium of University of Tokyo, was 77 species in all, of which 26 (34%) were endemic. In 1972 he made a trip there to re-examine the ferns in wild condition, and refreshed his knowledge. Some of the endemic species lose their status as follows.

Gonocormus bonincola (Nakai) Tagawa in Journ. Jap. Bot. 26: 186. 1951. ...*Trichomanes bonincola* Nakai in Bot. Mag. Tokyo 40: 262. 1926, characterized by the sublucid frond, shorter segments, and broader cells, is identical with widespread species *G. minutus* (Blume) v. d. Bosch, Hym. Jav. 7, pl. 3, 1861.

Crepidomanes acuto-obtusum (Hayata) K. Iwatsuki in Acta Phytotax. Geobot. 17: 71. 1958, ...*Trichomanes acuto-obtusum* Hayata Icon. Pl. Formos.



S. WATARI & M. NISHIDA: *Juniperoxylon*