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REPORT ON A TREE TRUNK AND ASSOCIATED LIGNITIC DÉBRIS EXCAVATED IN MANHATTAN ISLAND

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The following paper deals with the results of an examination of a section, about a foot in length, of a tree trunk and associated lignitic débris, stated to have been found at a depth of about 45 feet below Hudson River high-tide level, in an excavation made for the foundation of the New York Telephone Company's Building at Barclay, Vesey, and Washington Streets (Manhattan), New York City, and collected March 17, 1924, by Dr. Chester A. Reeds of The American Museum of Natural History.

1. THE TREE TRUNK—The exterior is conspicuously lobed and furrowed longitudinally (*i.e.* vertically), with a rather loose flaky or shreddy bark, that varies in thickness from .06 to .25 inch, being thickest in the furrows. The outer layers are largely black, generally darker than the inner parts, and present the appearance of lignite.

A horizontal or cross section is irregularly ovoid in outline, with a maximum length, through the center of growth, of 6.75 inches (=line from A to B, fig. 2), and a maximum width, at right angles to the line of maximum length, of 5.25 inches (=line from C to D).

The center of growth is eccentrically located, at a distance of 2.5 inches from the exterior of the smaller end, and at 3 inches and 2 inches, respectively, from the exterior of either side, measured at right angles to the line of maximum length (=line from E to F).

The number of growth rings, counted along the line of maximum distance from the center of growth to the exterior, was 192; but the rings in proximity to the center and exterior are indistinctly defined, and the actual total number is probably slightly in excess of the number counted. If we assume that these represent rings of annual growth, the tree was approximately 200 years old at the time it was destroyed, and it was evidently a tree of very slow growth.

Several more or less well-defined years of maximum growth may be discerned, at intervals of 20, 17, 17, 10, and 17 years—represented, respectively, by the 100th, 120th, 137th, 154th, 164th, and 181st ring;

and one period of thirteen years of abnormally slow growth is indicated, between the 80th and the 100th ring, where the rings are so closely approximated that the thirteen, even where they measure widest, are compacted into a zone .2 inch in width. Evidently, during this period of thirteen consecutive years, the growth of the tree was almost at a standstill.

The wood, necessarily, is very close-grained, although soft, and there is no discernible differentiation between sap and heart wood. It is sound and free from decay throughout, uniformly reddish-brown in color, and takes a fine polish.

Examination of the wood under the microscope showed it to be coniferous and referable to the Juniperaceæ, which includes the genera *Cupressus* (Cypress), *Chamæcyparis* (White Cedar), *Sabina* (Red Cedar), *Juniperus* (Juniper), etc., and further critical examination resulted in tentatively identifying it as a *Juniperus*. In order, if possible, to arrive at a consensus of opinion, specimens were sent to Dr. F. H. Knowlton at the U. S. National Museum, to Prof. C. D. Howe at the University of Toronto, to Prof. E. C. Jeffrey at Harvard University, and to Prof. S. J. Record at Yale University, with the request that an examination be made and the genus determined, if possible. Doctor Knowlton replied: "As near as I can get at it, your specimen is a *Juniperus* and, in all reasonable probability, is *Juniperus communis*—at least it agrees well with Penhallow's description." Professor Howe's reply was less positive, but he stated that "Dr. [J. H.] White thinks it is a *Juniperus* but may be a *Chamæcyparis*. . . He suggests that you send a sample to Professor E. C. Jeffrey of Harvard University." Professor Jeffrey replied: "The material which you sent me is obviously a *Juniperus* and belonged to a large-leaved species, judging from the rather loose texture of the wood. The diagnosis *Juniperus communis* to my mind is highly probable." Professor Record stated definitely that "the specimen of wood . . . is *Juniperus communis*."

In view of these independent examinations and identifications, I am of the opinion that we may safely regard the wood as representing the genus *Juniperus*, and probably the existing species *J. communis* Linnæus.

2. THE LIGNITIC DÉBRIS.—This material, which was said to have formed a bed or layer about 18 inches in thickness, is composed of black, thoroughly lignitized remains of plants, including wood, bark, and finer fragments, prominent among which are parts of the stems of an *Equisetum* (Horsetail rush), resembling *E. hyemale* Linnæus.



Fig. 1. Photograph of that portion of a trunk of *Juniperus communis* collected by Dr. Chester A. Reeds, March 17, 1924, forty-five feet below high-tide level, at site of New York Telephone Building.

The tree was about ten feet long, in a prostrate position when found. It was sawed into blocks on the site and samples distributed.

APPENDIX

Juniperus communis, as an element in the existing flora of the earth, is, relatively, not very abundant, although widely distributed, especially if both the arborescent and the shrubby forms are regarded as included in one and the same species. It is essentially of boreal and north-temperate distribution, ranging from Greenland to Alaska and from Kamchatka through the northern part of the Eurasian continent, ex-

tending southward mostly in mountainous and hilly regions. The shrubby form is, apparently, the most abundant and is the prevailing form northward. The species is described by Sargent¹ as "a shrub . . . or occasionally tree-like and from twenty to thirty feet in height, with a short eccentric irregularly lobed trunk rarely a foot in diameter." Other authorities describe it as normally a shrub but occasionally a small tree. The hilly region of southern Illinois appears to be the region where it reaches its maximum size.

In our vicinity I have neither seen nor heard of the arborescent form, and there are only a few records of stations for the shrubby form. Apparently there is no record of its occurrence on Manhattan Island, or in Westchester County, or on the opposite bank of the Hudson River, in New Jersey. One individual specimen was recorded as growing at New Dorp, Staten Island, by Hollick and Britton,² many years ago; and several individual specimens and small clumps, widely scattered (at Glen Cove, Cold Spring, Hyde Park, Brentwood, and Selden), have been recorded on Long Island. The Staten Island specimen was destroyed, but the species still exists on Long Island.³ Incidentally it is interesting to note that these stations for the species, on Staten Island and Long Island, are the only ones recorded from anywhere within the limits of the coastal plain region, as far as I am aware.

Remains of *Juniperus communis*, although recognized in connection with Quaternary deposits in Europe, have not heretofore been found in America under conditions that might indicate that it was an element in a flora that antedated the one now in existence; but seeds provisionally identified as those of *J. virginiana* Linnæus (= *Sabina virginiana* (Linnæus) Antoine) were reported by Berry,⁴ from the Pleistocene of New Jersey; and wood of the same species, from the Pleistocene of the Don Valley, Toronto, Canada, was identified by Penhallow.⁵

From a consideration of the conditions under which our specimen was found, we are warranted in assuming that it represents an element in a flora that was in existence in this region when the land stood considerably higher above sea level than at the present time, and that it was exterminated by environmental changes. We may also infer, from the

¹Sargent, C. S., 1896, 'The Silva of North America,' X, p. 76.

²Hollick, Arthur, and Britton, N. L., 1879, 'The Flora of Richmond County, New York, etc.'

³Davis, W. T., 1917, '*Juniperus communis* on Long Island and Staten Island,' *Torreyia*, XVII, pp. 99-100, Fig. 1, June.

⁴Berry, E. W., 1910, 'Seeds of a *Juniperus* closely resembling those of this species [*virginiana*] occur, near Long Branch, N. J.' *Torreyia*, X, p. 264, December.

⁵Penhallow, D. P., 1907, 'Material not petrified, but remarkably well preserved in its natural state and exhibiting the characteristic odor when cut.' 'A Manual of the North American Gymnosperms,' p. 246.

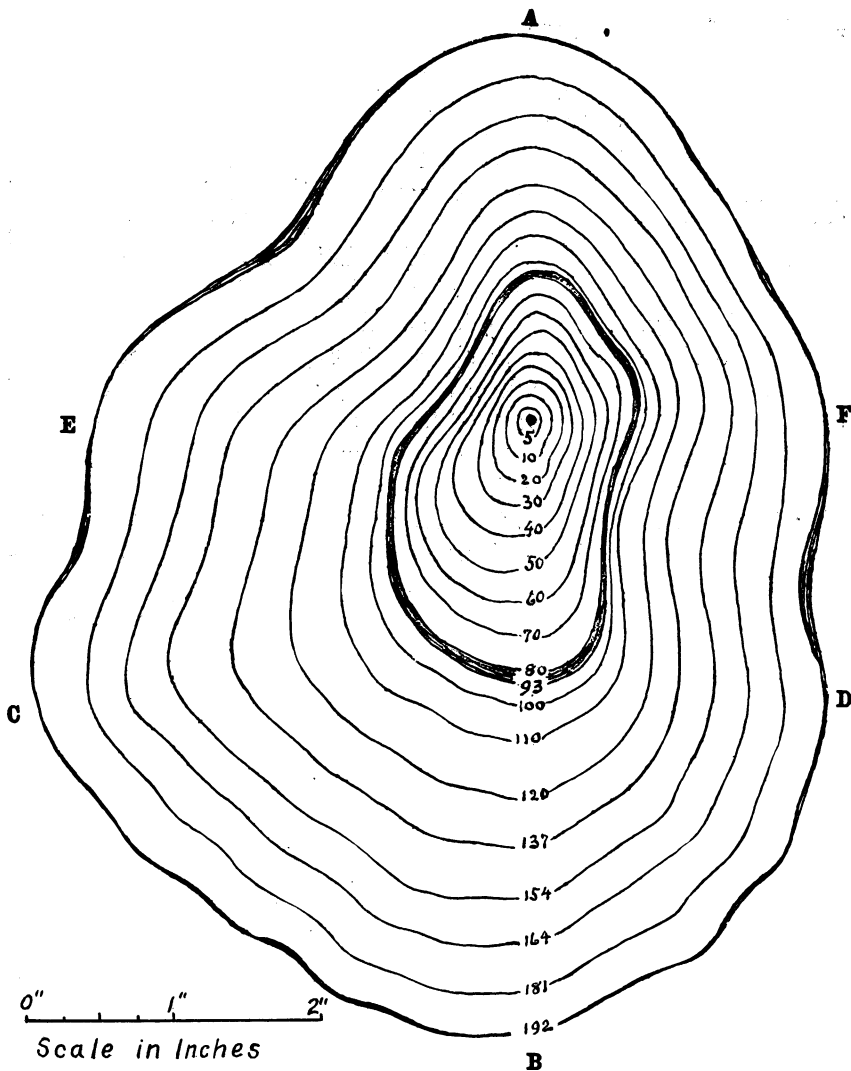


Fig. 2.—Sketch of cross section of tree trunk, showing shape, dimensions, eccentricity, and approximate position and disposition of certain of the growth rings.

Measurement from A to B = 6.75 inches.

Measurement from C to D = 5.25 inches.

Measurement from E to F = 5 inches.

Total number of rings counted = 192.

The rings numbered 100, 120, 137, 154, 164, and 181 represent well-defined rings of maximum growth. They occur at intervals represented, respectively, by the notations 20, 17, 17, 10, and 17.

The shaded band, between ring No. 80 and ring No. 93, represents a thirteen-year period of minimum growth.

condition of the wood, and the fact that it belongs not only to a genus but also to a species now in existence in the immediate vicinity, that it was living here in recent geologic time—possibly during one of the interglacial stages of the Pleistocene.

Finally it may be pertinent to refer to a communication by Katherine Van W. Palmer,¹ on "Marine Pleistocene Fossils from New York City," in which are mentioned shells and plant remains found September 30, 1922, in the excavation made for the foundation of the Federal Reserve Bank, Maiden Lane, Nassau, Liberty and William Streets (Manhattan), New York City. The shells, identified as *Venus mercenaria antiqua* Verrill, and *Alectrion (Ilyanassa) obsoleta* Say, served to indicate the Pleistocene age of the deposit in which they were imbedded—a layer of hardpan, gravel, and boulders, 60 feet below high-tide level, and about 100 feet below the street level. Accompanying the shells was a piece of wood, listed as "*Chamæcyparis* (cypress or white cedar) or *Thuja* (arborvitæ)"; but, unfortunately, the authority for the identification of the wood is not given, and there is no description of its appearance, condition, or characters.

¹Science, 1923, Vol. LVII, pp. 585-586, May 18.