ILLUSTRATIONS OF CONIFERS.

PRINTED BY
SIMSON & Co. Ltd.,
HERTFORD.

CUPRESSUS FORMOSENSIS

ILLUSTRATIONS

OF

CONIFERS

By H. CLINTON-BAKER.

VOLUME III.

HERTFORD. PRIVATELY PRINTED. MCMXIII.

PREFACE.

Since the publication of my two volumes on conifers I have been persuaded by various friends to continue the work, which will include practically all the genus Coniferæ. I have described and figured from authentic specimens all the known cypresses and junipers which were omitted in the previous volumes. Various rare conifers are included which are not found in the British Isles, as well as new introductions, including Pseudotsuga macrocarpa, Pinus Nelsoni, the new Chinese genus Fokienia Hodginsii, and Cupressus formosensis. I have also figured Cunninghamia Konishii and Taiwania cryptomerioides which have not yet been introduced. Having sufficient illustrations for this volume, I have omitted many genera, including Widdringtonia, Araucaria, Podocarpus, and the Australian and New Zealand species, which I hope to describe in a fourth volume.

My thanks are due to many friends both in England and abroad for the specimens illustrated, to Dr. A. Henry and Mr. A. B. Jackson for their assistance, also to Dr. O. Stapf and Dr. A. B. Rendle for permission to photograph specimens at Kew and the British Museum (Natural History). I am also indebted to Mr. A. R. Firth, H.B.M. Consul at Tamsui, for the illustrations of Formosan conifers and the frontispiece.

H. CLINTON-BAKER.

Bayfordbury, 1913.

CONTENTS.

JUNIPERUS.

Evergreen shrubs or trees belonging to the division Cupressineæ of the order Coniferæ. Bark usually thin and scaling in longitudinal strips. Leaves on young plants always spreading and acicular; on adult plants either acicular or appressed and scale-like.

Flowers monœcious or diœcious. Staminate flowers composed of numerous stamens on a central axis, with ovate or peltate scale-like connectives, each bearing 2 to 6 globose pollen-sacs. Pistillate flowers surrounded at the base by minute scale-like bracts, which persist unchanged under the fruit; composed of three to eight opposite or ternate pointed scales, bearing either at their base or alternate with them one to two ovules.

Fruit a succulent berry-like indehiscent strobile, composed of three to eight fleshy scales united together, covered by a membranous epidermis; ripening in the first, second, or rarely in the third year. Seeds variable in number (one to twelve) and in shape; usually free, but in one species coalesced.

The genus comprises about thirty-five species, distributed over the northern hemisphere from the Arctic circle to Mexico and the West Indies, Azores and Canary Islands, Northern Africa, Abyssinia, and the mountains of East Tropical Africa, Himalayas, China and Formosa.

KEY TO JUNIPERUS.

I.

LEAVES ALWAYS ACICULAR, SPREADING IN WHORLS OF THREE, JOINTED AT THE BASE, LINEAR, RIGID, USUALLY SHARP-POINTED.

† Leaves not decurrent on the branchlets. Staminate flowers, solitary in the axils of the upper leaves. Fruit composed of three or six scales, marked at the apex by three radiating lines or furrows. Seeds normally three, free.

A.—*Leaves with one white stomatic band above.*

J. communis, Linnæus. Leaves $\frac{2}{3}$ to $\frac{3}{3}$ inch long, slightly concave above, without any trace of a green midrib near the base (except in rare cases). Fruit about $\frac{1}{4}$ inch in diameter. In var. *nana*, leaves shorter, $\frac{1}{6}$ to $\frac{1}{3}$ inch long.

J. nipponica, Maxim. Resembling var. *nana* of *Juniperus communis*, but with leaves markedly curved, deeply grooved above, and fruit without tubercles.

J. rigida, Siebold and Zuccarini. Leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch long, very slender, deeply concave above, with the margins inflexed, forming a narrow median groove. Fruit about $\frac{1}{4}$ inch in diameter.

J. litoralis, Maxim. Like *J. rigida* in foliage, but with leaves densely imbricated and larger; glaucous fruit, $\frac{1}{3}$ to $\frac{1}{2}$ inch in diameter.

B.—*Leaves with two white stomatic bands above.*

* Shrubs with leaves spreading horizontally outwards (except in *J. taxifolia*) from branchlets which are usually not pendulous.

J. Oxycedrus, Linnæus. Leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch long, gradually tapering from the middle to the sharp-pointed acuminate apex; upper surface with a conspicuous midrib, about half the width of the white bands, which are equal in width to the marginal green bands.

J. taxifolia, Hook. and Arn. Leaves about $\frac{1}{2}$ inch long, obtuse. Upper surface with a midrib much narrower than the white bands, which are equal to or narrower than the marginal green bands.

J. macrocarpa, Sibthorp and Smith. Leaves $\frac{3}{4}$ to 1 inch long, tapering from the base to the sharp-pointed acuminate apex; upper surface with a conspicuous midrib, less than half the width of the white bands, which are broader than the marginal green bands.

J brevifolia, Antoine. Leaves oval-linear, very short, $\frac{1}{4}$ to $\frac{1}{3}$ inch long, with a rounded or acute and not acuminate apex; upper surface with a conspicuous midrib, and white bands broader than the green bands.

** Trees with leaves directed towards the apices of the pendulous branchlets.

J. Cedrus, Webb and Berthelot. Leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch long, with a conspicuous midrib above, about half the width of the white bands, which are equal in width to the marginal green bands.

J. formosana, Hayata. Leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch long; upper surface with a midrib much narrower than the white bands, which are broader than the marginal green bands.

†† Leaves decurrent on the branchlets. Staminate flowers 3 to 6 in a head on a scaly stalk. Fruit much larger than in the other sections, composed of 6 or 9 ternate scales. Seeds consolidated into a thick, globose, 3-celled bony mass.

J. drupacea, Labillardière. Leaves $\frac{1}{2}$ to $\frac{7}{8}$ inch long, widely spreading, rigid, sharp-pointed; upper surface with a broad green midrib, deeply furrowed near the base and two broad white bands.

II.

LEAVES ON ADULT PLANTS ALWAYS ACICULAR, NEVER JOINTED AT THE BASE.

J. recurva, Buchanan-Hamilton. A tree with curved or pendulous branchlets. Leaves in threes, loosely appressed, $\frac{1}{8}$ to $\frac{1}{4}$ inch long, sharp-pointed, greyish-green on the dorsal surface, which is channelled in the middle line near the base.

J. squamata, Buchanan-Hamilton. A prostrate shrub. Leaves in threes, appressed or spreading, broader and shorter than in *J. recurva*, $\frac{1}{8}$ inch long, green on the dorsal surface, which is channelled from the base to near the apex.

J. procumbens, Siebold, is similar to *J. squamata*, but has larger leaves, which like the branchlets are glaucous in tint.

III.

LEAVES ON ADULT TREES ALL SCALE-LIKE AND APPRESSED, OR WITH ACICULAR FOLIAGE ON OCCASIONAL BRANCHES.

* Leaves minutely denticulate on margins.

(*a*) *Fruit large, usually about* $\frac{3}{5}$ *to* $\frac{1}{2}$ *inch in diameter* (1).

† Seeds 1 to 3 in each fruit.

J. californica, Carrière. Branchlets stout, $\frac{1}{15}$ to $\frac{1}{10}$ inch in diameter. Leaves in threes. Fruit reddish, ellipsoid, glaucous, with dry fibrous flesh. Seeds 1 to 2.

J. mexicana, Schlechtendal. Branchlets slender, $\frac{1}{25}$ to $\frac{1}{30}$ inch in diameter. Leaves in pairs. Fruit reddish, depressed, globose, glaucous, with dry fibruos flesh. Seeds 1 to 3.

J. Wallichiana, J. D. Hooker. Ultimate branchlets $\frac{1}{16}$ inch in diameter. Fruit blue, ovoid, with one large seed.

†† Seeds 3 to 12 in each fruit.

J. phœnicea, Linnæus. Ultimate branchlets $\frac{1}{25}$ inch in diameter; leaves closely appressed, ovate, blunt, with an inconspicuous depression on the back. Fruit globose or pyriform, yellow or reddish-brown, with fibrous yellow flesh. Seeds 3 to 9.

J. flaccida, Schlechtendal. Tree with long pendulous branchlets, $\frac{1}{30}$ inch in diameter. Leaves ovate, lanceolate, slightly spreading, $\frac{1}{12}$ inch long, sharp-pointed with resin-glands on the back. Fruit globose, reddish-brown. Seeds 6 to 12.

J. pachyphlœa, Torrey. Tree with thick bark divided into small square plates, unique in the genus. Ultimate branches quadrangular, $\frac{1}{25}$ inch in diameter. Leaves appressed, rhombic, with a depressed oval gland, often exuding resin. Acicular leaves often present.Fruit reddish-brown, tuberculate on the surface. Seeds 4.

(*b*) *Fruit smaller, about* $\frac{1}{4}$ *inch long.*

J. occidentalis, Hooker. Branchlets terete, about $\frac{1}{20}$ inch in diameter. Leaves in threes. Fruit bluish-black, pulpy.

J. tetragona, Schlechtendal. Branchlets distinctly four-angled, $\frac{1}{20}$ inch in diameter. Leaves in pairs. Fruit bluish-black, pulpy.

(1) In *J. phœnicea* the fruits are sometimes smaller.

** Leaves entire in margin.

(*a*) *Fruit ⅛ to ½ inch long.*

† Imbricated leaves acute or sub-acute.

J. thurifera, Linnæus. Branchlets more or less regulary pinnate; ultimate divisions $\frac{1}{30}$ inch in diameter. Leaves ovate appressed, free at their acute or acuminate tips with a conspicuous glandular depression on the back. Acicular foliage often present. Fruit blue. Seeds 2 to 4.

J. excelsa, Bierberstein. Branchlets more or less radially arranged, slender, $\frac{1}{30}$ inch in diameter. Leaves ovate-triangular, free at their acute or sub-acute tips, marked on the back with a depressed gland.

(*b*) *Fruit ⅛ to ¼ inch in diameter* (1).

J. virginiana, Linnæus. A tree. Ultimate branchlets very slender, $\frac{1}{30}$ inch in diameter, terete. Leaves appressed, ovate, acute or acuminate, often with a small oval depression on the back. Acicular foliage usually present. Fruit bluish, ⅛ to ¼ inch in diameter. Seeds 1 to 2.

J. Sabina, Linnæus. A shrub, similar in foliage to *J. virginiana*, with an unpleasant smell when rubbed, and the peduncle of the fruit curved, not straight as in the latter species.

J. barbadensis, Linnæus. Like *J. virginiana*, but with more slender branchlets and smaller fruits.

J. scopulorum, Sargent. Closely allied to *J. virginiana*, but distinguished by its somewhat larger fruits, ripening in the second year. The branchlets are also somewhat shorter and stouter, and the foliage usually glaucous or yellowish-green.

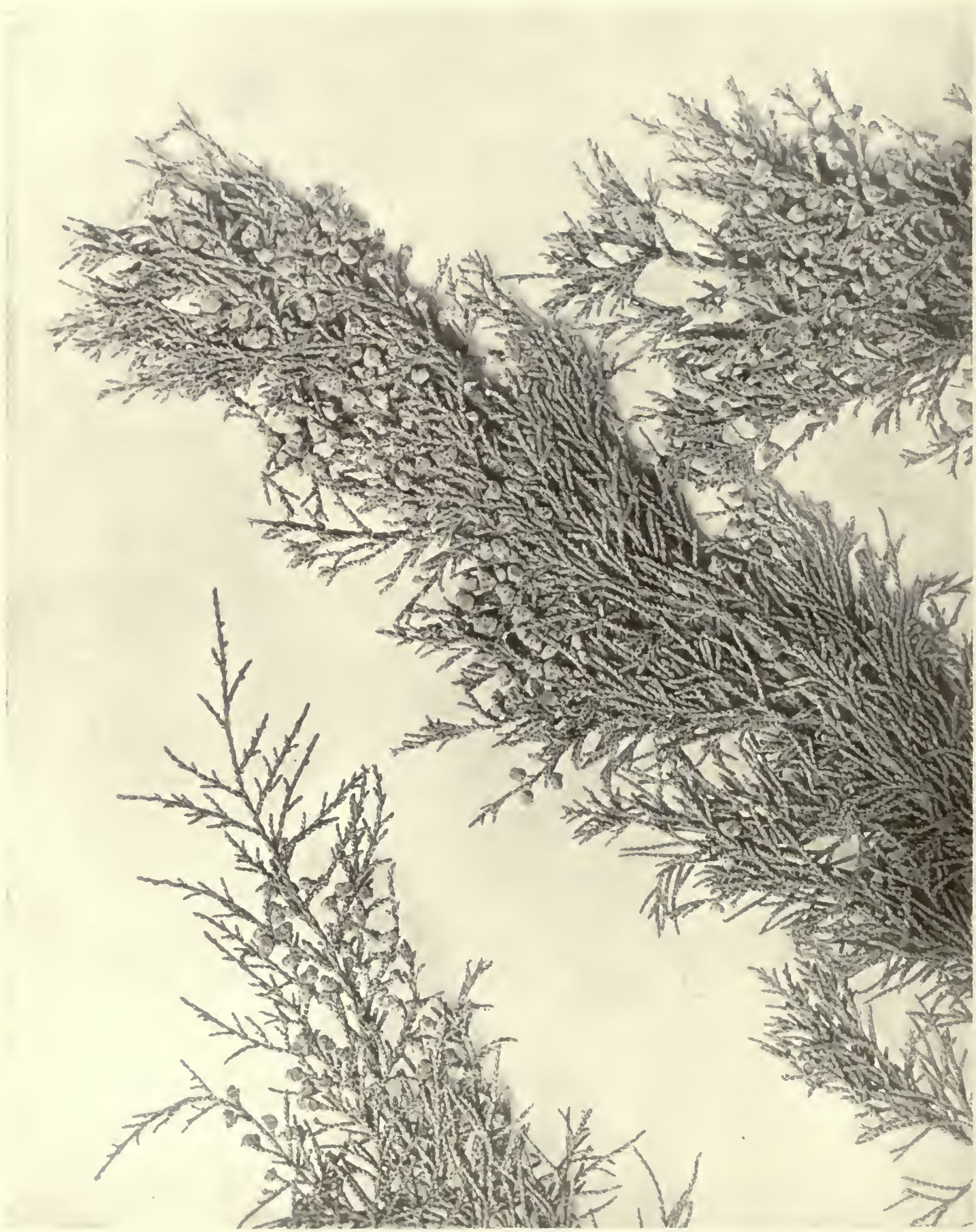
J. procera, Hochstetter. Similar to *J. excelsa* in foliage but with much smaller fruits ⅓ to ¼ inch in diameter. Seeds 2 to 3.

J. bermudiana, Linnæus. Foliage glaucous. Ultimate branchlets $\frac{1}{20}$ to $\frac{1}{12}$ inch in diameter, quadranglar. Leaves closely appressed, ovate, obtuse at the incurved apex, with a conspicuous dorsal furrow. Acicular foliage usually present. Fruit ¼ inch in diameter. Seeds 2.

†† Imbricated leaves obtuse.

J. chinensis, Linnæus. Ultimate branchlets terete, $\frac{1}{25}$ inch in diameter, marked with white crosses due to the pale margins of the leaves, which are compressed, rhombic, obtuse, with an inconspicuous gland. Acicular foliage usually present. Fruit with a white mealy bloom, sub-globose and widest at the summit. Seeds 2 to 3.

(1) The fruits of *J. scopulorum* are sometimes slightly larger.



JUNIPERUS BARBADENSIS

JUNIPERUS BARBADENSIS (*Linnæus*).

Sp. Pl. 1039 (1753).
Trees of Great Britain and Ireland, Vol. VI. p. 1437 (1912).

A tree attaining 50 feet in height and 6 feet in girth. Branches and branchlets pendulous. Adult foliage similar to that of *J. virginiana*, but branchlets more slender and leaves smaller, acuminate, conspicuously marked on the back by an oblong or linear oil gland.

Flowers diœcious. Fruit ripening in the first year, sub-globose, smaller than that of *J. virginiana*, $\frac{1}{8}$ to $\frac{1}{6}$ inch in diameter, glaucous. Seeds, one or two, ovoid, pointed, ridged.

Juniperus barbadensis, which was formerly considered to be a southern variety of *J. virginiana*, occurs in inundated coastal river swamps from Southern Georgia southward to the Indian River, Florida; and on the west coast of Florida from Charlotte Harbour to the Appalachicola River, often forming thickets under the shade of larger trees. It is often planted in the cities and towns near the coasts from Florida to Western Louisiana, and is now said to be naturalised on the Gulf Coast. This Juniper also occurs in the West Indies, in San Domingo, Antigua and the mountains of Jamaica.

The illustration represents a specimen collected at Cinchona, Jamaica, by Mr. W. Harris, Superintendent of the Hope Gardens, at the request of Captain L. Clinton-Baker, R.N.

JUNIPERUS BERMUDIANA *(Linnæus).*

Sp. Pl. 1039 (1753).
Gardener's Chronicle, Vol. XIX. 656 (1883) with fig.
Veitch's Man. Conif. ed. 2, p. 166 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1434 (1912).

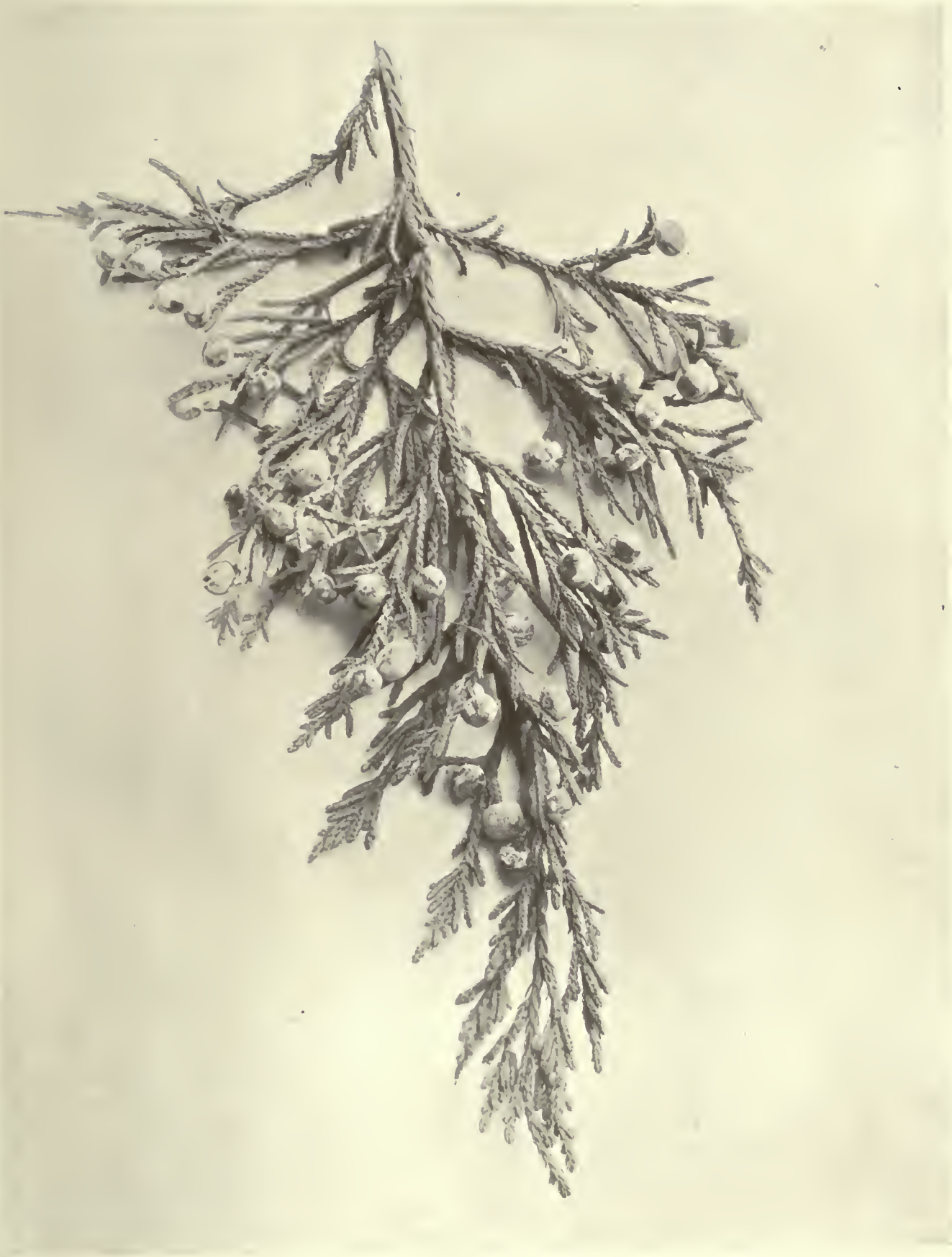
A tree attaining in the Bermudas 50 feet in height, with dark red bark and spreading branches. Foliage of two kinds: on adult trees, scale-like; ultimate branchlets quadrangular, about $\frac{1}{20}$ inch in diameter with closely imbricated leaves in four ranks, about $\frac{1}{12}$ inch long, ovate, obtuse at the narrow incurved apex, greyish-green or glaucous on the back, which is often marked with a longitudinal furrow; leaves on older branchlets in four ranks, or ternate in six ranks, those on the main axes always ternate, up to $\frac{1}{7}$ inch long, becoming acuminate at the apex. Juvenile foliage occasionally present on some branches on old trees in alternate whorls of three, about $\frac{1}{3}$ inch long, acicular, slightly spreading, upper surface whitened with a raised midrib; lower surface greyish-green, furrowed.

Flowers diœcious. Fruit ripening in the first year, sub-globose, about $\frac{1}{4}$ inch in diameter, dark-brown, very glaucous, with 6 to 8 scales, each marked by a depression with a minute mucro. Seeds 2 to 3, shining chestnut-brown, ovoid, furrowed.

Juniperus bermudiana is confined to the Bermuda Islands, where it is the only indigenous exogenous tree; and thrives both on the dry limestone hills and in the brackish swamps. The wood was formerly much used in ship-building and in the construction of furniture.

The Bermuda juniper was first cultivated in England about 1684, but it is not hardy in this climate. The only specimen growing in the open air in England, which we know of, is a shrub at Bicton about 2 feet high.

The illustration represents a native specimen collected by Capt. L. Clinton-Baker, R.N.



JUNIPERUS BERMUDIANA

JUNIPERUS BREVIFOLIA

JUNIPERUS BREVIFOLIA *(Antoine).*

Cupress. Gattung. p. 16, tt. 20-22 (1857).
Veitch's Man. Conif. ed. 2. p. 180 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1413 (1912).

A small tree in the Azores with a stem often 3 to 4 feet in girth. Branchlets numerous, short, densely clothed with foliage. Leaves all acicular, in alternate whorls of three, very short and broad, $\frac{1}{4}$ to $\frac{1}{3}$ inch long, about $\frac{1}{12}$ inch wide, oval-linear, jointed and swollen at the slightly narrowed base, widest about the middle whence they taper to a rounded or acute apex; upper surface with a narrow green midrib not extending to the apex, on each side of which is a broad white stomatic furrow bounded by an external green band; lower surface green with a prominent midrib; margin entire.

Flowers dicecious. Fruit sub-globose, $\frac{1}{3}$ inch in diameter, on short scaly stalks, dark reddish-brown when mature; scales three, separated at the apex by three radiating prominent lines, and each marked by a minute mucro. Seeds three, ovoid, triquetrous; outer surface longitudinally furrowed, not separated from the inner surface by a winged margin as in *J. Oxycedrus.*

This species is very distinct on account of its short glaucous leaves. Its seeds are also different from those of the allied species.

Juniperus brevifolia is limited to the Azores, where it occurs on the islands of Corvo, Flores, Fayal, San Miguel and Pico, ascending to 5,000 feet and rarely descending below 1,000 feet. It is locally known as *Cedro.* Formally it appears to have been a tree of considerable size, as large logs have been found deeply buried under the secondary volcanic debris in the Grotto do Enferno of the large crater known as Caldeira des Sette Cidades. A slab of this which was reported to have been excavated from a depth of 100 metres was presented to the Kew Museum by Dr. Gocze.

This Juniper has not yet been introduced into English gardens. The illustration represents a native specimen photographed at the British Museum Herbarium.

JUNIPERUS CALIFORNICA *(Carrière)*.

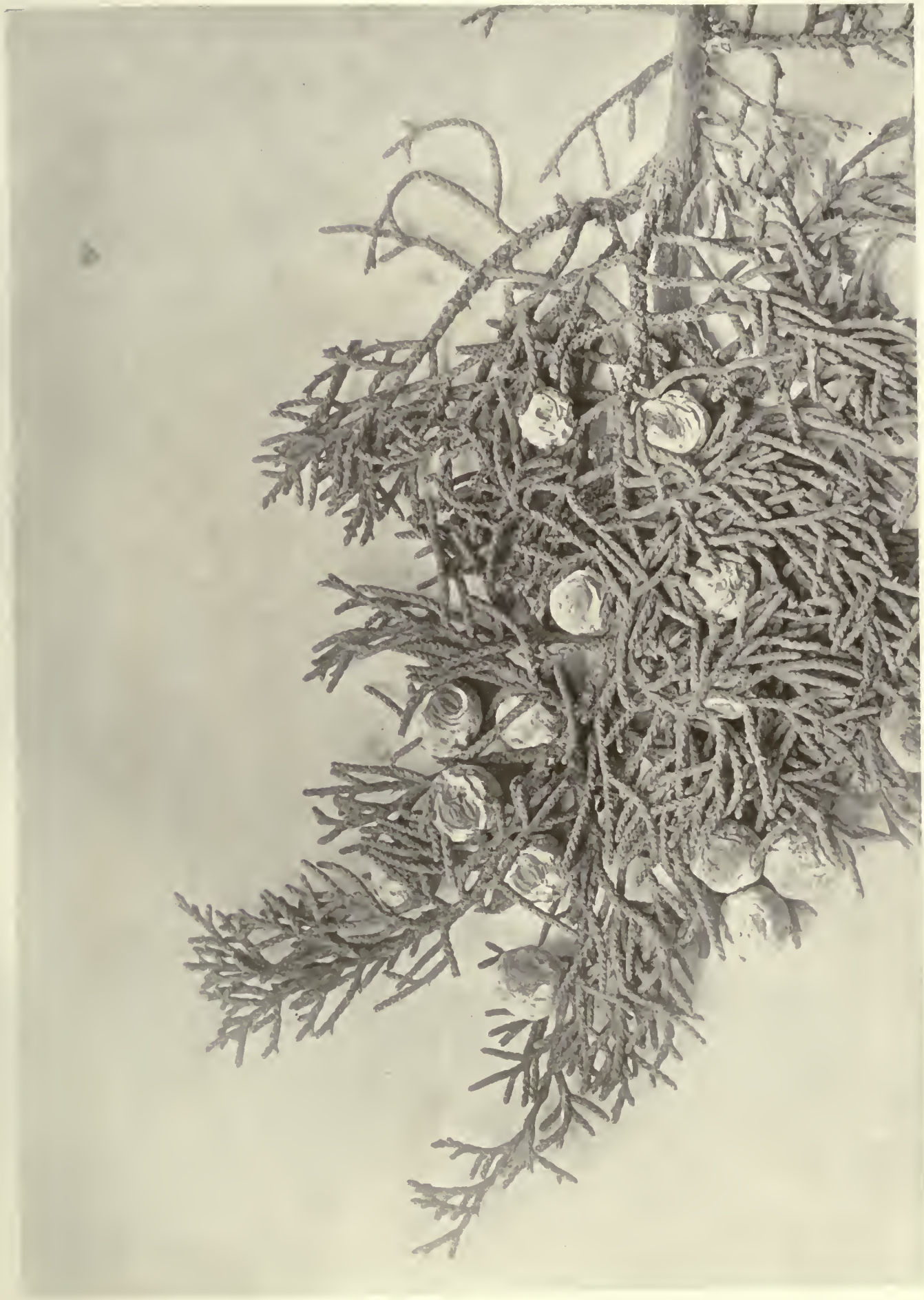
Rev. Hort. p. 352 (1854) with fig.
Veitch's Man. Conif. ed. 2, p. 167 (1900).

A small tree, 20 to 40 feet high, with an unsymmetrical trunk, or a shrub with many stout irregular usually contorted stems, forming a broad open head. Bark of trunk thin, divided into long loose thin scales, ashy-grey on the outer surface, and persisting for many years. Leaves usually in threes, closely appressed, short and thick, rounded at the tip, $\frac{1}{16}$ to $\frac{1}{12}$ inch long, conspicuously glandular on the back, minutely denticulate on the margin.

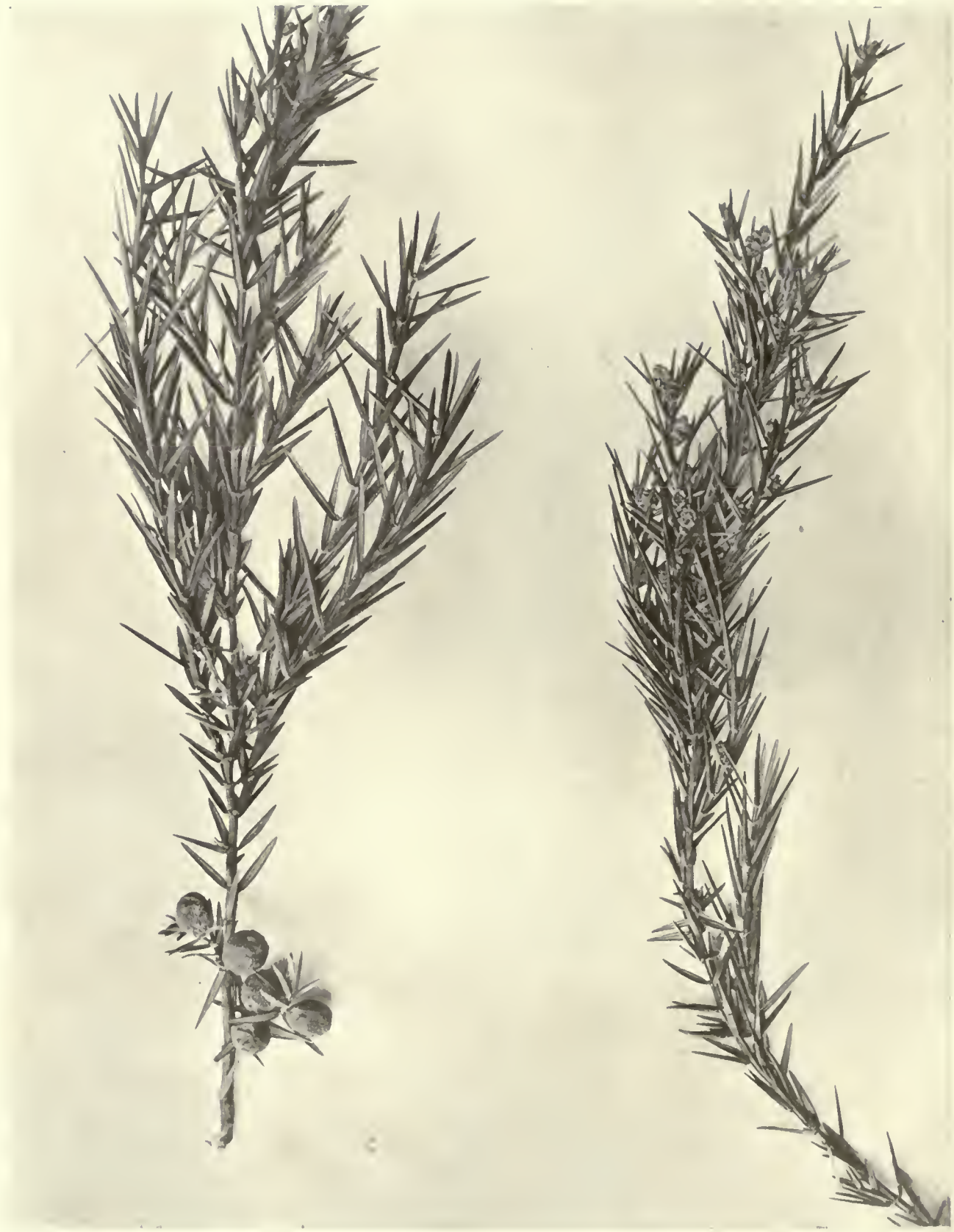
Fruit globose or oval, about $\frac{1}{3}$ to $\frac{1}{2}$ inch long, reddish-brown in colour, covered with a thick glaucous bloom; flesh resinous, containing one or two large pitted seeds.

Juniperus californica is the common species of the coast mountains of California, occurring chiefly south of San Francisco. It is also found on the western foothills and on the dry slopes of the Sierra Nevada. This Juniper was introduced about 1853 by Wm. Lobb, who sent seeds to Veitch's nursery at Exeter. It is not now known to be in cultivation in England.

The illustration is from a photograph kindly sent by Professor Sargent from the Arnold Arboretum.



JUNIPERUS CALIFORNICA



JUNIPERUS CEDRUS

JUNIPERUS CEDRUS (*Webb and Berthelot*).

Phytogr. Canar. III. p. 277, t. 217 (1836-50).
Veitch's Man. Conif. ed. 2, p. 180 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1414 (1912).

A tree attaining a maximum height of 100 feet in the Canary Islands. Branches slender, pendulous. Branchlets numerous, short, glaucous, angular. Leaves in whorls of three, rigid, erect, spreading, linear-lanceolate, closely set on the branchlets, slightly concave, very glaucous, from $\frac{1}{6}$ to $\frac{1}{2}$ inch long and about a line broad.

Flowers dicecious. Fruit globular, $\frac{1}{3}$ inch in diameter, covered with a glaucous bloom, reddish-brown when mature.

Juniperus Cedrus was formerly abundant in the sub-alpine districts and higher valleys of the Canaries but is now very scarce owing to the destruction of the trees for their valuable timber. In Teneriffe it has been ruthlessly cut down and is now almost extinct, only a few stunted specimens remaining in inaccessible places in the Cañadas around the Peak. It has disappeared from the Islands of Grand Canary and Gomera, but large trees are still to be found in the island of Palma, growing on the inaccessible walls of the crater, and on isolated rocks, at about 7,000 ft. elevation. It is said to be the quickest growing of all the Junipers. A tree in the garden of Dr. Perez, at Orotava, Teneriffe, about 1,200 feet above sea-level, which was planted in 1906, when 7 feet 8 inches high, attained a height of 18 feet in five years. The seed of this tree like that of many other Junipers is very difficult to germinate owing to the thick seed-coat.

The specimen illustrated was collected by Dr. Perez in Teneriffe.

JUNIPERUS COMMUNIS *(Linnæus)*. Common Juniper.

Sp. Pl. p. 1040 (1753).
Veitch's Man. Conif. ed. 2, *p.* 170 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1400 (1912).

A shrub or small tree, rarely attaining a height of 40 feet. Bark reddish-brown, scaling off in papery shreds. Young branchlets slender, triquetrous, with three ridges between the whorls of leaves. Buds about $\frac{1}{8}$ inch long, with a few loose ovate acuminate scales. Leaves all acicular, persistent for three years, sessile, spreading, variable in length, $\frac{2}{5}$ to $\frac{3}{5}$ inch long, linear-subulate, gradually tapering from near the swollen base to the slender spine-like apex; upper surface concave with usually a single continuous broad white band of stomata; lower surface bluntly keeled.

Flowers dicœcious, rarely monœcious. Staminate flowers solitary, cylindrical, $\frac{1}{5}$ inch long, yellow; stamens in five or six whorls. Pistillate flowers solitary, green, $\frac{1}{12}$ inch long. Fruit ripening in the second or third year, green when young, bluish or black when ripe, slightly glaucous, globose or slightly longer than broad, $\frac{1}{3}$ inch in diameter. Seeds two or three, elongated ovoid, triquetrous, with depressions on the sides for resin-glands.

Numerous varieties, based on the length and breadth of the leaves and the size and shape of the fruit, have been described.

Juniperus communis is more widely distributed than any other tree or shrub. It is common throughout Northern and Central Europe, and also occurs in the mountains of the countries bordering on the Mediterranean. It is also found in Asia Minor, the Caucasus, Persia, Afghanistan, the Western Himalayas, the United States and Canada. On many chalk hills in the south of England the Juniper (which is one of our three indigenous conifers) is a conspicuous feature of the vegetation, but it never attains the size of a timber tree in Great Britain.

The berries were at one time employed for medicinal purposes and they are still used for flavouring gin. An essential oil is also distilled from them.

The illustration represents a Bayfordbury specimen.

1.—JUNIPERUS RIGIDA 2.—JUNIPERUS COMMUNIS 3.—JUNIPERUS PHŒNICEA 4.—JUNIPERUS THURIFERA

JUNIPERUS THURIFERA (*Linnæus*).

Sp. Pl. 1039 (1753).
Veitch's Man. Conif. ed. 2, p. 191 (1900).
Trees of Great Britain and Ireland Vol. VI. p. 1427 (1912).

A tree attaining in Spain a height of 30 to 40 feet. Leaves dimorphic. Adult foliage with the flattened branchlet-systems pinnately-divided mostly in one plane; young branchlets quadrangular, about $\frac{1}{20}$ inch in diameter; leaves in opposite pairs in four ranks, appressed but free at their acuminate apices, ovate, about $\frac{1}{16}$ inch long, marked on the back with a glandular depression. Juvenile foliage often present on adult trees; leaves in opposite pairs, spreading, acicular, decurrent, $\frac{1}{12}$ to $\frac{1}{4}$ inch long, whitened on the upper surface.

Flowers dicecious. Fruit on short scaly stalks, ripening in the second year, sub-globose, about $\frac{1}{3}$ inch in diameter, dark blue and slightly glaucous when ripe, composed of six scales, the upper four scales mucronate. Seeds two, three, or four, ovate, shining brown, $\frac{1}{5}$ inch long, with two or three resin-pits at the base.

Juniperus thurifera occurs wild in South-eastern France, Spain, Portugal, Sardinia, Morocco and Algeria. It is common on the mountains of Central and Southern Spain, occasionally forming pure open woods.

This species was cultivated by Miller in 1752, but is rare now in England, apparently only thriving in warm and sheltered situations.

The photograph represents a specimen from a tree at Bayfordbury. It was planted in 1841 and is now 32 feet high.

JUNIPERUS RIGIDA (*Siebold and Zuccarini*).

Fl. Jap. II. 56, t. 125 (1844).
Veitch's Man. Conif. ed. 2, p. 188 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1408 (1912).

A spreading bush or small tree, attaining in Japan 20 to 30 feet in height. Bark thin and scaly. Young branches triquetrous with three projecting ridges, becoming terete and scaly in the fourth year. Leaves all acicular, persistent several years, spreading in whorls of three, linear-subulate, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, about $\frac{1}{25}$ inch broad, tapering from the middle to the very sharp apex, swollen and jointed at the base; upper surface deeply concave with the margins inflexed, the narrow median groove whitened with a stomatic band scarcely so wide as the green margins; lower surface green, prominently keeled, without glands. Buds ovoid, minute, with sharp-pointed scales, which persist brown and withered at the ends of the branchlets of the second year.

Flowers diœcious. Fruit ripening in the second year, globose, about $\frac{1}{4}$ inch in diameter, with six bracts in two whorls at the base, on a very short stalk, smooth, purplish brown, composed of three glaucous scales, each with a minute mucro near the top. Seeds two or three in each berry, angled, marked near the base with three or four deep pits containing resin.

Juniperus rigida, which was introduced into England in 1861 by J. Gould Veitch, is generally distributed at low elevations in Central Japan on dry gravel soil, and is much cultivated by the Japanese in temple gardens; it has also been found in Manchuria and Korea.

The illustration represents a branch from Highnam Court, Gloucester.

JUNIPERUS PHŒNICEA (*Linnæus*).

Sp. Pl. p. 1040 (1753).
Veitch's Man. Conif. ed. 2, p. 182 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1424 (1912).

A shrub or tree attaining about 20 feet in height. Leaves on young plants and rarely on isolated branches of adult trees, acicular, spreading in whorls of three, decurrent, about $\frac{1}{4}$ inch long, with two lines of stomata on both the upper and lower surfaces. On adult trees branchlet systems two- to three-pinnate; ultimate branches terete; leaves scale-like, either in four ranks in opposite pairs, or in six ranks in alternating whorls of three, appressed, ovate, rhombic, about $\frac{1}{25}$ inch long, blunt at the apex, serrulate in the margin, furrowed on the back.

Flowers monœcious or rarely diœcious. Fruit very variable in size and shape; globose or sub-globose, $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter; ripening in the second year, on short scaly stalks; shining yellow or reddish-brown, composed of 6 to 8 scales with no distinct lines of separation, and each marked by a minute or obsolete mucro. Seeds 3 to 9, shining brown, embedded in fibrous yellow flesh, triangular, furrowed, with two or three depressions for glands.

Juniperus phœnicea grows in arid situations on rocky hills and is widely distributed throughout the Mediterranean region. It ascends in the Riviera to 4,500 feet. In Algeria where it is often the only arborescent vegetation it ascends to 6,000 feet. In the Canary Isles it attains a great age and an enormous size, one of the largest trees there being reputed to be 1,000 years old.

Aiton states that *Juniperus phœnicea* was first cultivated in Britain in 1683 by James Sutherland, Curator of the Edinburgh Botanic Garden. It is now rare in this country.

The illustration represents a specimen from a tree at Highnam Court, Gloucester.

JUNIPERUS DRUPACEA (*Labillardière*).

Icon. Pl. Syr. II. 14, t. 8 (1791).
Gardeners' Chronicle, 1854, pp. 387 and 455, with fig.
,, ,, Vol. XIX. p. 519 (1896), with fig.
Veitch's Man. Conif. ed. 2, p. 173 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1417 (1912).

A tree attaining about 60 feet in height, broadly pyramidal in a wild state, but in cultivation assuming a columnar habit. Young branchlets triangular, with three prominent ridges and three grooves, due to the decurrent bases of the leaves. Older branchlets terete and smooth, with a brown scaly bark. Buds about $\frac{1}{8}$ inch long, surrounded by minute sharp-pointed scales.

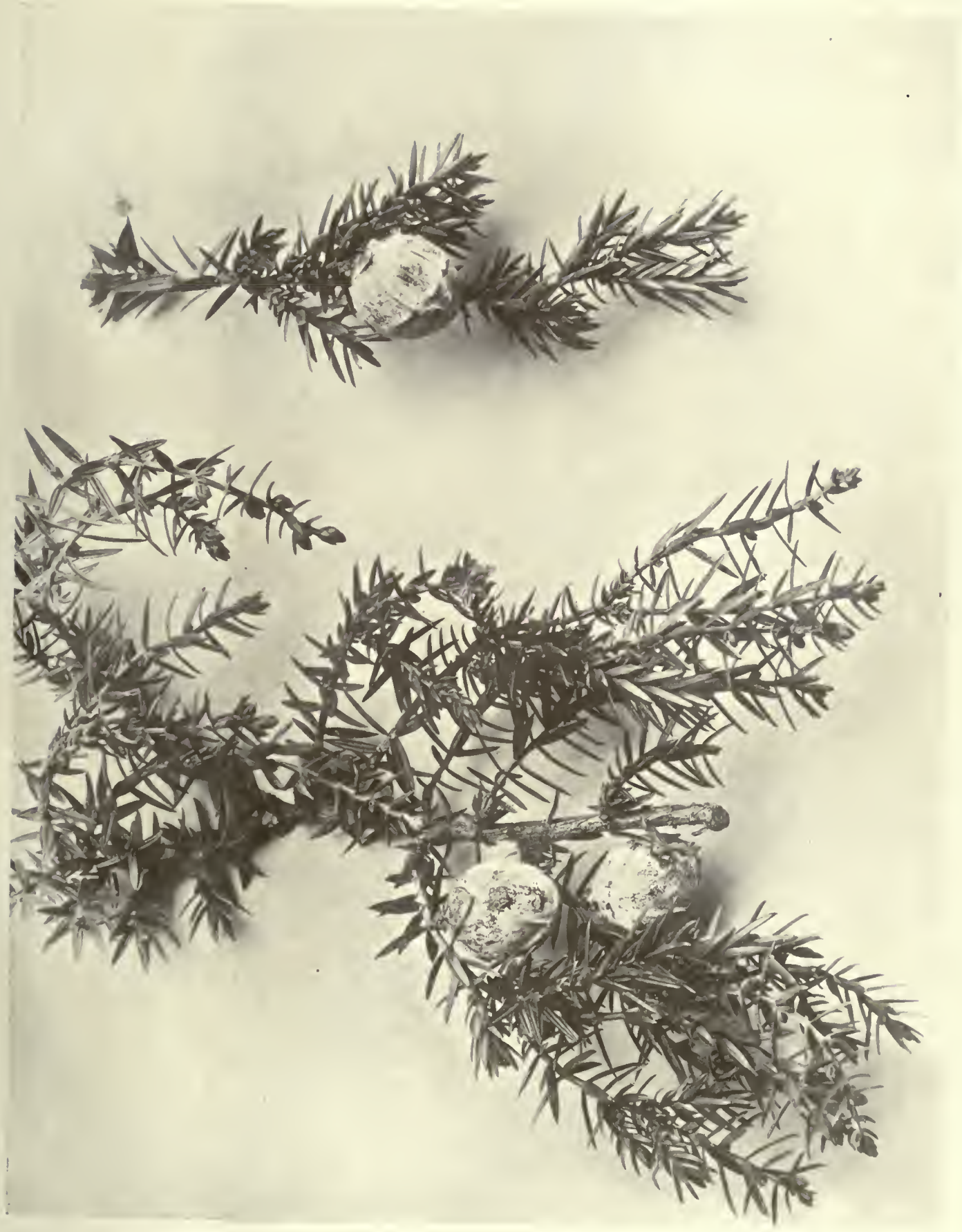
Leaves all acicular, spreading in whorls of three, $\frac{1}{2}$ to $\frac{7}{8}$ inch long, $\frac{1}{16}$ to $\frac{1}{5}$ inch broad, jointed at the base, decurrent, linear-lanceolate, ending in a sharp cartilaginous point; lower surface prominently keeled; upper surface concave, with a broad green midrib which is furrowed near the base, and two white stomatic bands.

Flowers dioecious; staminate flowers 5 or 6 in a head, axillary, on a short scaly stalk; stamens 9 to 12 in each flower.

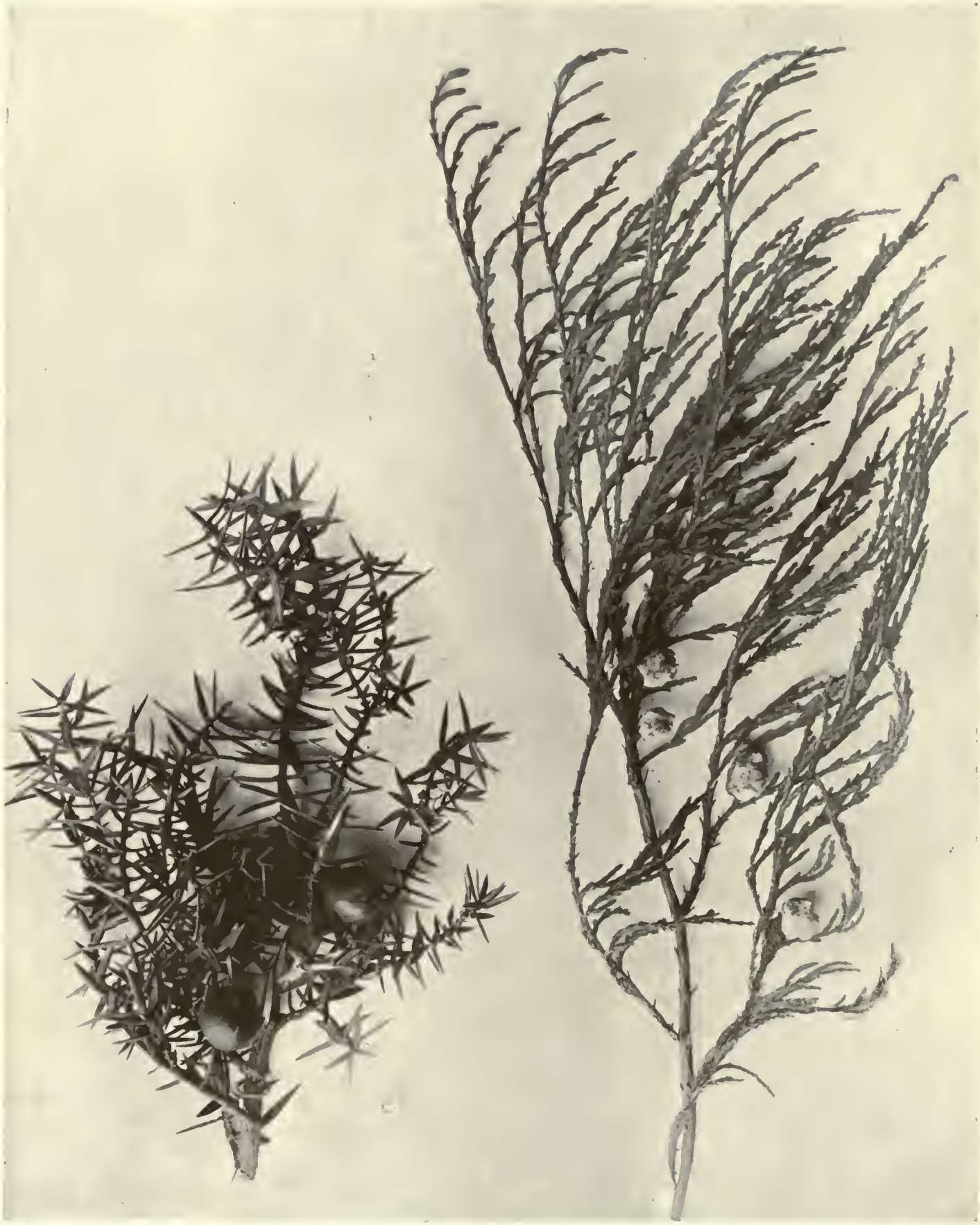
Fruit ripening in the second year, the largest in the genus, $\frac{3}{4}$ to 1 inch in diameter, on a short scaly stalk, ovoid or nearly spherical, brown or bluish with a glaucous bloom, usually composed of nine fleshy scales which are often mucronate at the apex, enclosing a bony stone with three cells, each containing a minute kernel.

Juniperus drupacea is a native of the mountains of Asia Minor, Syria and Greece. It grows at elevations of 1,600 to 5,600 feet, either forming pure woods or mixed with other conifers. It was probably introduced into cultivation about 1854, but so far as is known has never produced fruit in England, where all the trees in cultivation are believed to be males.

The illustration shows a specimen sent by M. Pardé from France where several female trees are known in cultivation.



JUNIPERUS DRUPACEA



JUNIPERUS MACROCARPA

JUNIPERUS FLACCIDA

JUNIPERUS FLACCIDA (*Schlechtendal*).

Linnæa, Vol. XII. p. 495 (1838).
Veitch's Man. Conif. ed. 2, p. 177 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1426 (1912).

A tree attaining 30 to 40 feet in height, with brown scaly bark. Branches widely spreading with long pendulous branchlets. Adult foliage: leaves in opposite pairs, slightly spreading, ovate-lanceolate, about $\frac{1}{12}$ inch long, decurrent, ending in a sharp point, rounded on the back with a sunken resinous-gland. Juvenile foliage appearing on the ends of some branchlets of adult trees, acicular, spreading in whorls of three, decurrent, about $\frac{1}{4}$ inch long, tapering to a very sharp point; upper surface concave with inflexed margins and two narrow lines of stomata, lower surface marked near the base with a gland which often secretes resin.

Flowers monœcious. Fruit ripening in the second year, on a short scaly stalk, four- to six-bracteate at the base; sub-globose, about $\frac{1}{4}$ inch in diameter, reddish-brown, with a glaucous bloom, and marked on the surface with minute tubercles; composed of six to eight opposite scales, each indicated by a reflexed mucro. Seeds six to twelve, several often aborted.

Juniperus flaccida grows wild on the Chisos Mountains in Texas, and is common in North-Eastern Mexico at elevations of 6,000 to 8,000 feet. It was introduced in 1838 by Hartweg, but it appears to be rather tender for the climate of most parts of England; and the only fine specimen known is at Bicton where there is a tree 40 feet high.

The specimen illustrated was sent by M. Pardé from Angers, France.

JUNIPERUS MACROCARPA (*Sibthorp and Smith*).

Fl. Græc. Prod. II. p. 263 (1813).
Veitch's Man. Conif. ed. 2, p. 181 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1412 (1912).

This juniper is closely allied to *J. Oxycedrus*, to which some botanists have united it as a sub-species. It differs in the longer and broader leaves, $\frac{3}{4}$ to 1 inch long, about $\frac{1}{12}$ inch broad, which gradually taper from the base to the acuminate sharp-pointed apex. Fruit larger than in *J. Oxycedrus*, glaucous blue, turning purplish-brown after ripening, about $\frac{1}{2}$ inch broad and $\frac{5}{8}$ inch long on a stalk less than $\frac{1}{8}$ inch long. Seeds like those of *J. Oxycedrus* but larger. The fruits are either globose, or tapering to the base, when it is known as var. *ellipsoidea* (Neilrich).

Juniperus macrocarpa has a similar distribution to that of *J. Oxycedrus*, extending throughout the Mediterranean region from Spain to Syria; and is also found in Bulgaria. Its habitats are in sandy places near the sea; while *J. Oxycedrus* usually occurs in higher situations inland.

Juniperus macrocarpa was introduced into England about 1838 by Strangways, but it is not suited to the climate.

The illustration represents a specimen kindly sent by M. Pardé.

JUNIPERUS FORMOSANA

JUNIPERUS FORMOSANA *(Hayata).*

Journ. Coll. Sci. Tokyo. XXV. art. 19, p. 209, pl. 38 (1908).
Trees of Great Britain and Ireland, Vol. VI. p. 1415 (1912).
J. OBLONGA PENDULA, Knight and Perry, *Syn. Conif.* p. 11 (1850).
J. TAXIFOLIA, Masters, *Journ. Roy. Hort. Soc.* XIV. 215 (1892).
Veitch's Man. Conif. ed. 2, p. 191 (1900).

A tree in China attaining a height of 40 feet often pendulous in habit. Branchlets triquetrous with three narrow ridges. Leaves all acicular, spreading, in whorls of three, linear-subulate, about $\frac{1}{2}$ to $\frac{3}{4}$ inch long, jointed and swollen at the base, ending in a sharp, spine-like point; lower surface convex, keeled; upper surface concave, with two broad white stomatic bands, separated by a very narrow green or glaucous midrib, and becoming confluent at the apex.

Fruit globose, $\frac{1}{4}$ to $\frac{1}{3}$ inch in diameter, on a short scaly stalk, ripening in the second year, shining dark reddish-brown when ripe with three deep radial furrows at the summit, showing the separation of the fruit into three scales. Seeds three, elongated-ovate, triquetrous, mucronate at the apex, with several circular resin-pits at the base and three or four larger oval pits above.

Juniperus formosana is widely spread throughout the mountains of China where it is also cultivated in temple grounds, being known as the "Tze Poh" or "Prickly Cypress." It has lately been found on Mt. Morrison and the adjacent ranges in Formosa, between 8,000 and 13,000 feet altitude.

This species which is usually known in cultivation as *J. oblonga pendula* was probably one of the plants sent home by Fortune in 1844. It is rare in cultivation. There is a small specimen at Bayfordbury which was planted in 1845.

The specimen illustrated is from a tree at Glasnevin, which bore fruit in 1911.

JUNIPERUS LITORALIS (*Maximowicz*).

Bull. Acad. Petersb. XII. p. 230 (1868).
Trees of Great Britain and Ireland, Vol. VI. p. 1422 (1912).

A prostrate shrub, with brownish bark. Branches thick, with densely crowded erect branchlets.

Leaves crowded on the branchlets, densely imbricated, about ½ inch long, acicular, glaucous green, curved, tapering to a very sharp point; deeply grooved above, with one band of stomata in the groove; convex below.

Fruit covered with glaucous bloom, globose, ⅓ to ½ inch in diameter. Seeds three, ovoid, triquetrous.

Juniperus litoralis is allied to *J. rigida*, but differs from that species in its crowded leaves and its larger and conspicuously glaucous fruit. It occurs wild in the maritime regions of Japan, where it is generally distributed. It is unknown in cultivation in England, and is quite distinct from the commonly cultivated *Juniperus procumbens*, which is often erroneously named *J. litoralis*.

The photograph illustrates a type specimen collected by Maximowicz at Hakodate, Japan, in 1861, and preserved in the Herbarium of the British Museum.

JUNIPERUS LITORALIS

JUNIPERUS MEXICANA

JUNIPERUS MEXICANA *(Schlechtendal).*

Linnæa, Vol. V. p. 77 (1830).
Veitch's Man. Conif. ed. 2, p. 168 (1900).

A shrub or small tree rarely exceeding 20 feet in height. Bark with persistent long narrow slightly attached scales. Leaves of the ultimate branchlets scale-like, appressed, in opposite pairs, in four ranks, slender, acute or acuminate, $\frac{1}{15}$ to $\frac{1}{10}$ inch long, minutely and irregularly denticulate, glandular on the back. Leaves on vigorous young shoots, acicular, $\frac{1}{4}$ to $\frac{1}{2}$ inch long. Fruit globose or ovoid, $\frac{1}{3}$ to $\frac{1}{2}$ inch long, brownish, covered with a bluish bloom; flesh fibrous, containing one or two (rarely three) seeds, similar to those of *J. californica.*

Juniperus mexicana is a native of the mountains of Mexico, where it ascends the high peaks, forming the limit of arborescent vegetation.

This species has not yet been introduced into cultivation in England.

The illustration represents an authentic specimen collected by Hartweg in Mexico and photographed at the Kew Herbarium.

JUNIPERUS NIPPONICA (*Maximowicz*).

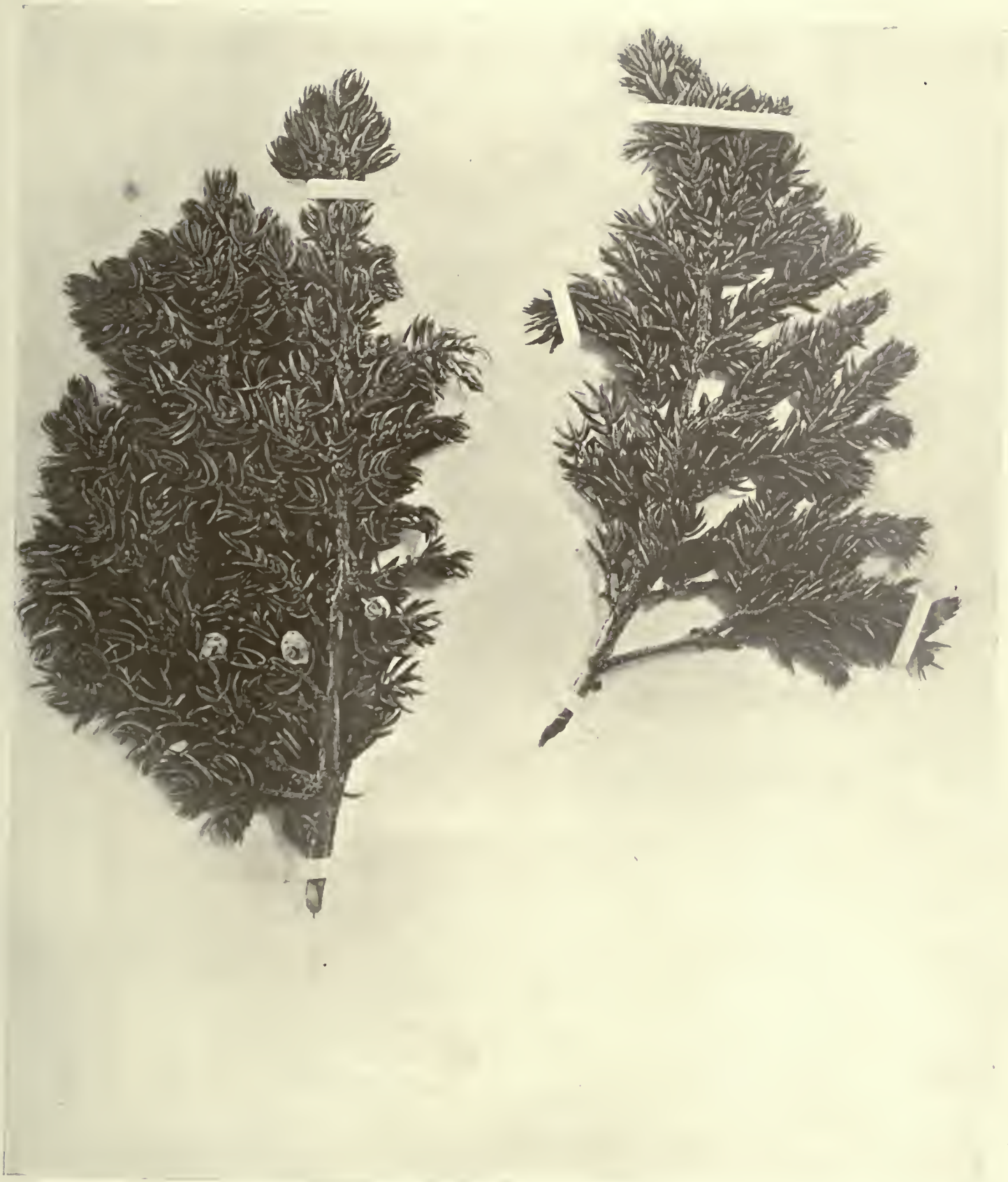
Bull. Acad. Petersb. XII. *p.* 230 (1868).
Trees of Great Britain and Ireland, Vol. VI, p. 1422 (1912).

A shrub with rigid branches. Branchlets pendent at the apex, with prominent pulvini and yellowish-green crowded leaves. Leaves ternate, densely imbricated, linear, curved, prickly, about ¼ inch long; deeply and narrowly grooved above, with an inconspicuous band of stomata in the groove; obtusely keeled below.

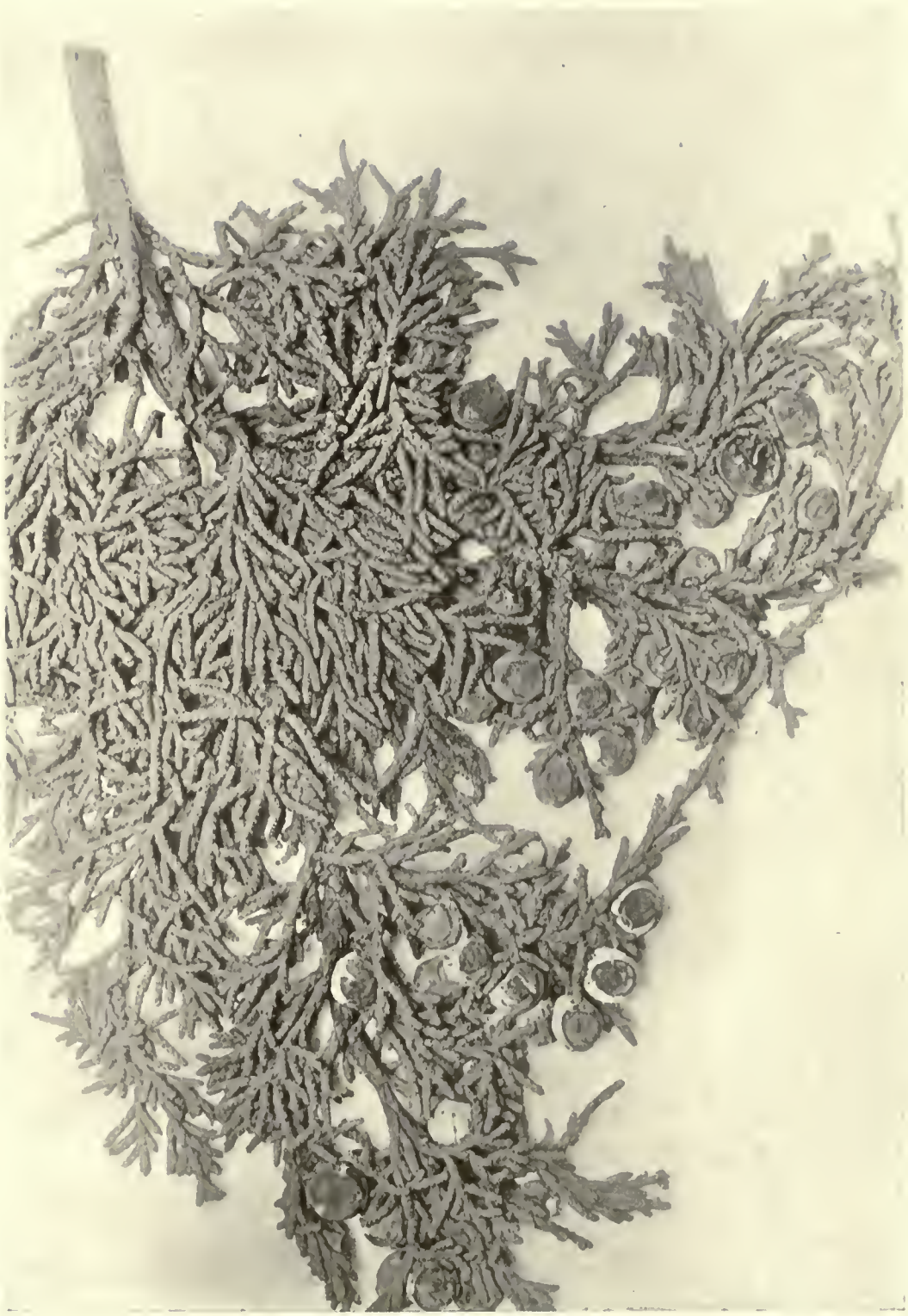
Fruit bluish, glaucous, ⅕ inch in diameter, containing one ovoid seed, which has two dorsal resin pits.

Juniperus nipponica is peculiar to Japan, occurring in alpine regions in the central island of Hondo. It superficially resembles *J. communis* var. *nana*, but is easily distinguished by its deeply sulcate leaves and non-tubercled fruits containing only one seed. It is unknown in cultivation in England.

The illustration represents an authentic specimen from the herbarium of Maximowicz, collected in the province of Senano, Japan, by Tschonoski, and preserved in the British Museum.



JUNIPERUS NIPPONICA



JUNIPERUS OCCIDENTALIS

JUNIPERUS OCCIDENTALIS *(W. J. Hooker).*

Fl. Bor. Amer. II. p. 166 (1840).
Veitch's Man. Conif. ed. 2, p. 178 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1399 (1912).

A tree attaining in North America a height of 20 to 60 feet, with a tall straight stem, 9 feet in girth. Bark sealy, about $\frac{1}{2}$ inch thick, bright cinnamon-red. Ultimate branchlets stout. Leaves arranged in six ranks, three in a whorl, closely appressed, acute or acuminate, grey-green, $\frac{1}{8}$ inch long, rounded, and conspicuously glandular on the back.

Fruit sub-globose or oblong, $\frac{1}{4}$ to $\frac{1}{3}$ inch long, bluish-black, with a glaucous bloom; flesh thin and dry, filled with large resin-glands. Seeds, two or three, ovate, acute, deeply grooved or pitted on the back, about $\frac{1}{8}$ inch long.

Juniperus occidentalis occurs on the mountain slopes and high prairies in Western North America from Washington and Idaho, also up to 10,000 feet in the Sierra Nevada mountains of California, where it attains immense age and a large girth. It is in cultivation at Dawyck, Peeblesshire.

The illustration is from a photograph taken at the Arnold Arboretum, and kindly sent by Professor Sargent.

JUNIPERUS OXYCEDRUS (*Linnæus*).

Sp. Pl. 1038 (1753).
Veitch's Man. Conif. ed. 2, p. 179 (1900).
Trees of Great Britain and Ireland Vol. VI. p. 1409 (1912).

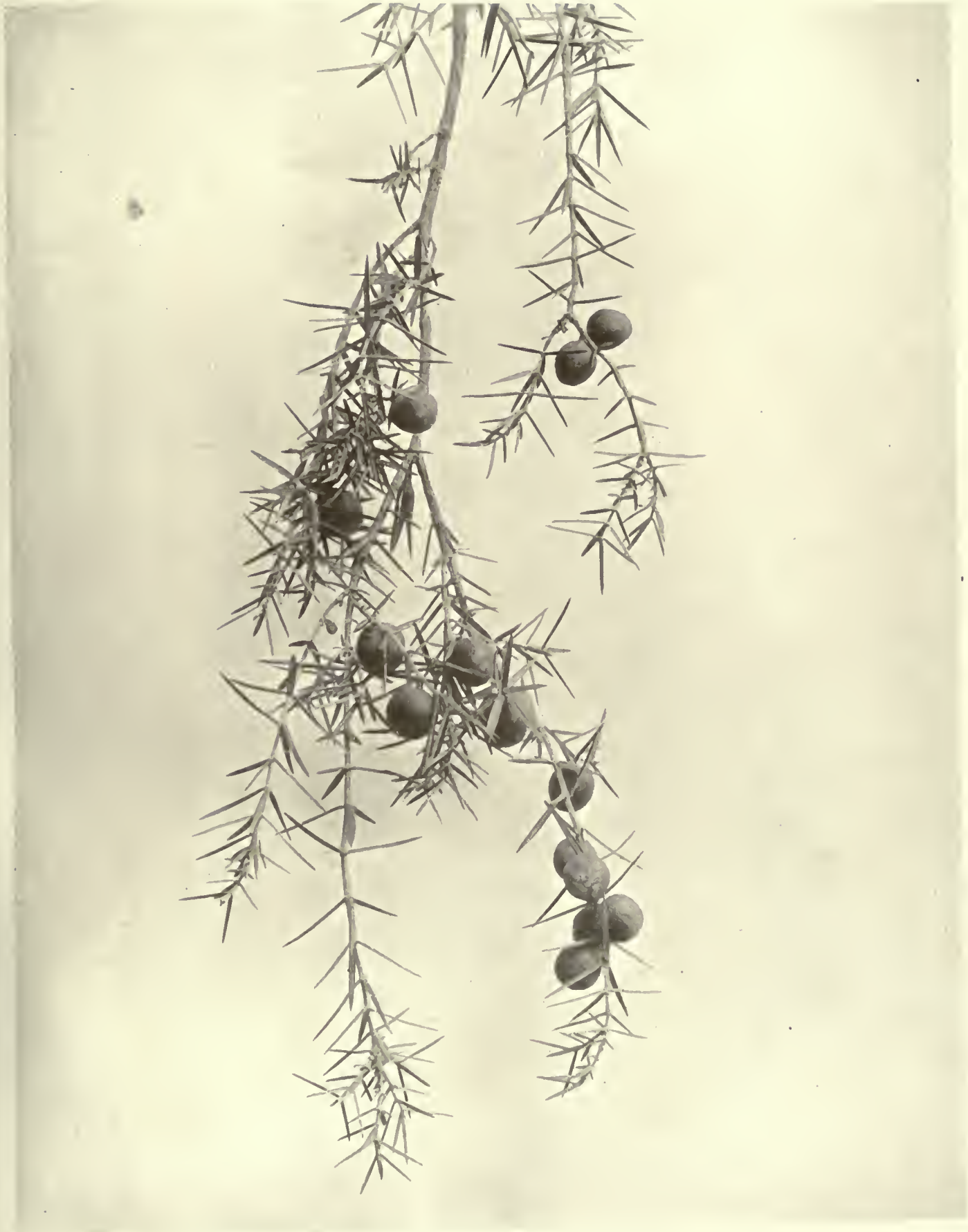
A shrub or small tree occasionally attaining a height of 30 feet and a girth of 10 to 12 feet. Branchlets angled. Leaves acicular, in alternate whorls of three, spreading, linear, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, tapering to an acuminate point, swollen and jointed at the base, entire in margin; upper surface with a narrow green midrib, on each side of which is a white stomatic furrow, bounded externally by a green band; lower surface green, convex, keeled.

Flowers diœcious. Staminate flowers solitary in the axil of a leaf, two or three in each whorl, sessile, ovoid, about $\frac{1}{5}$ inch long. Fruit ripening in the second year, solitary in the axils, on short stalks about $\frac{1}{16}$ inch long, globose, $\frac{3}{8}$ to $\frac{1}{2}$ inch in diameter, shining reddish brown when ripe, occasionally glaucous, composed of three to six scales each indicated by a minute mucro, the apex of the fruit having three radiating lines. Seeds normally three, reddish brown, oblong, triquetrous, with two resin glands at the base and two sharp lateral ridges.

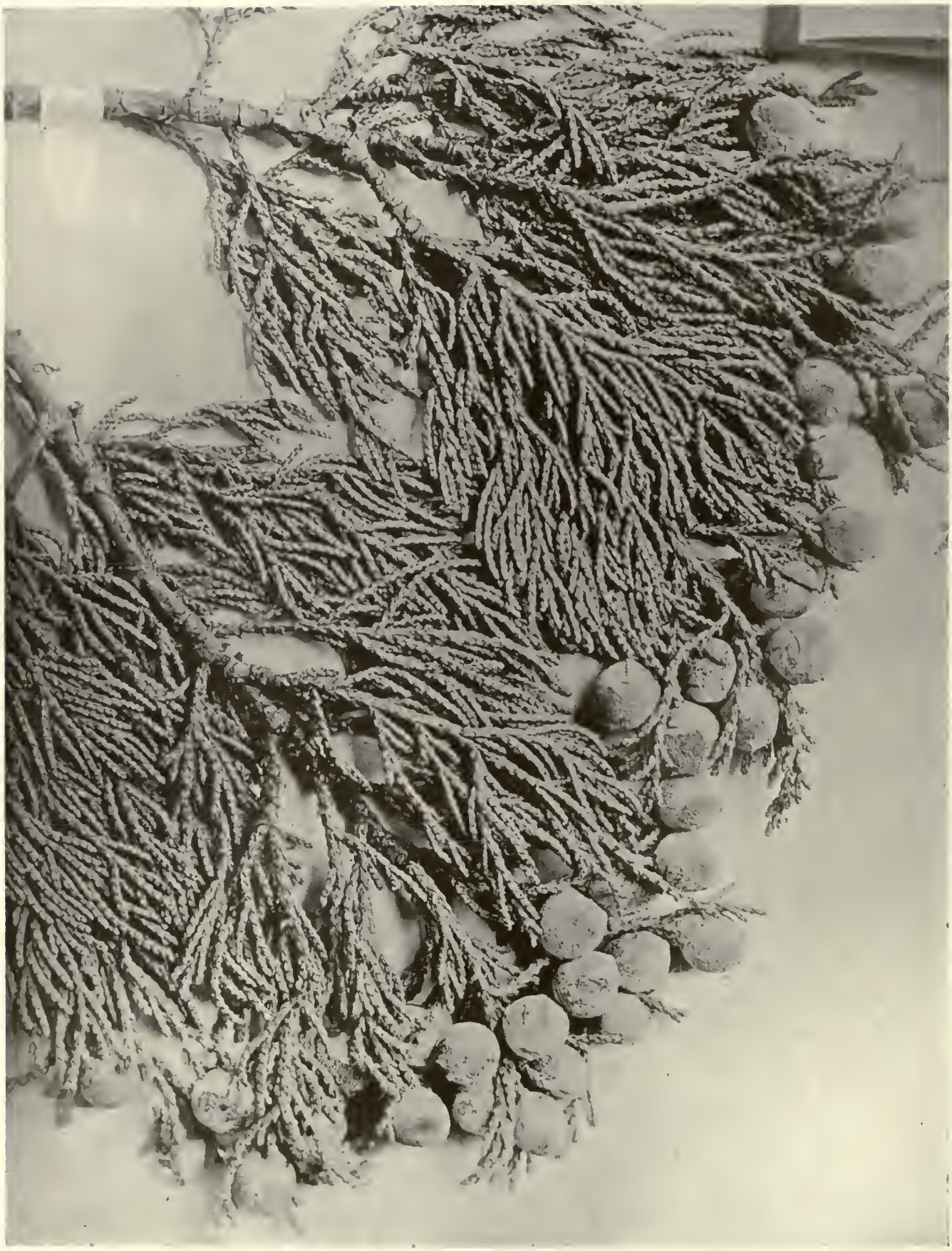
Juniperus Oxycedrus is very variable in the wild state; and several varieties have been described. It is widely distributed throughout the Mediterranean region extending eastwards through Syria, Western Asia Minor, the South Coast of the Crimea, and the Caucasus to Armenia and Northern Persia.

In England it was in cultivation as early as 1739, but is now rarely seen.

The illustration represents a specimen sent by Prof. Flahault from Montpellier.



JUNIPERUS OXYCEDRUS



JUNIPERUS PACHYPHLŒA

JUNIPERUS PACHYPHLÆA (*Torrey*).

Pacific R. R. Rep. IV. pt. 4, p. 142 (1858).
Veitch's Man. Conif. ed. 2. p. 181 (1900).
Trees of Great Britain and Ireland Vol. VI. p. 1429 (1912).

A tree attaining in America 60 feet in height and 15 feet in girth. Bark unlike all other junipers, ¾ to 4 inch thick, deeply divided into small square scaly plates. Branchlets slender, angled, becoming terete and scaly after the fall of the leaves. Leaves dimorphic; on young or vigorous branchlets acicular, spreading in three or in opposite pairs ⅛ to ¼ inch long, tipped with slender cartilaginous points; upper surface concave, whitened; lower surface greyish-green, keeled. Adult foliage; branchlets quadrangular; leaves scale-like, in opposite pairs, imbricated, closely appressed, about $\frac{1}{16}$ inch long, ovate, obtuse, toothed in margin, with a depressed resin-gland on the back. Leaves on the older branchlets tipped with a sharp point. The juvenile leaves gradually pass into the adult foliage.

Flowers diœcious. Fruit ripening in the second year, sub-globose, nearly ½ inch in diameter, sub-sessile, ebracteate, reddish-brown, covered with a glaucous bloom, tuberculate on the surface, with six to eight mucronate scales. Seeds four, angled, shining brown.

Juniperus pachyphlœa grows wild on arid mountain slopes at 4,000 to 6,000 feet elevation from South-Western Texas westward along the desert ranges of New Mexico and Arizona, and southwards into Mexico. It was discovered in 1851 by Dr. S. W. Woodhouse in Eastern New Mexico.

The date of introduction into cultivation is uncertain. The only specimen known to exist in England, which is growing at Kew, is 20 feet high, but has not yet produced flowers.

The illustration is from a photograph kindly sent by Prof. C. Sargent from the Arnold Arboretum.

JUNIPERUS PROCERA (*Hochstetter*).

Endlicher, Syn. Conif. p. 26 (1847).
Veitch's Man. Conif. ed. 2, p. 177 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1399 (1912).

A large tree, attaining in British East Africa a height of 80 to 100 feet, with a tall straight trunk, occasionally 35 feet in girth.

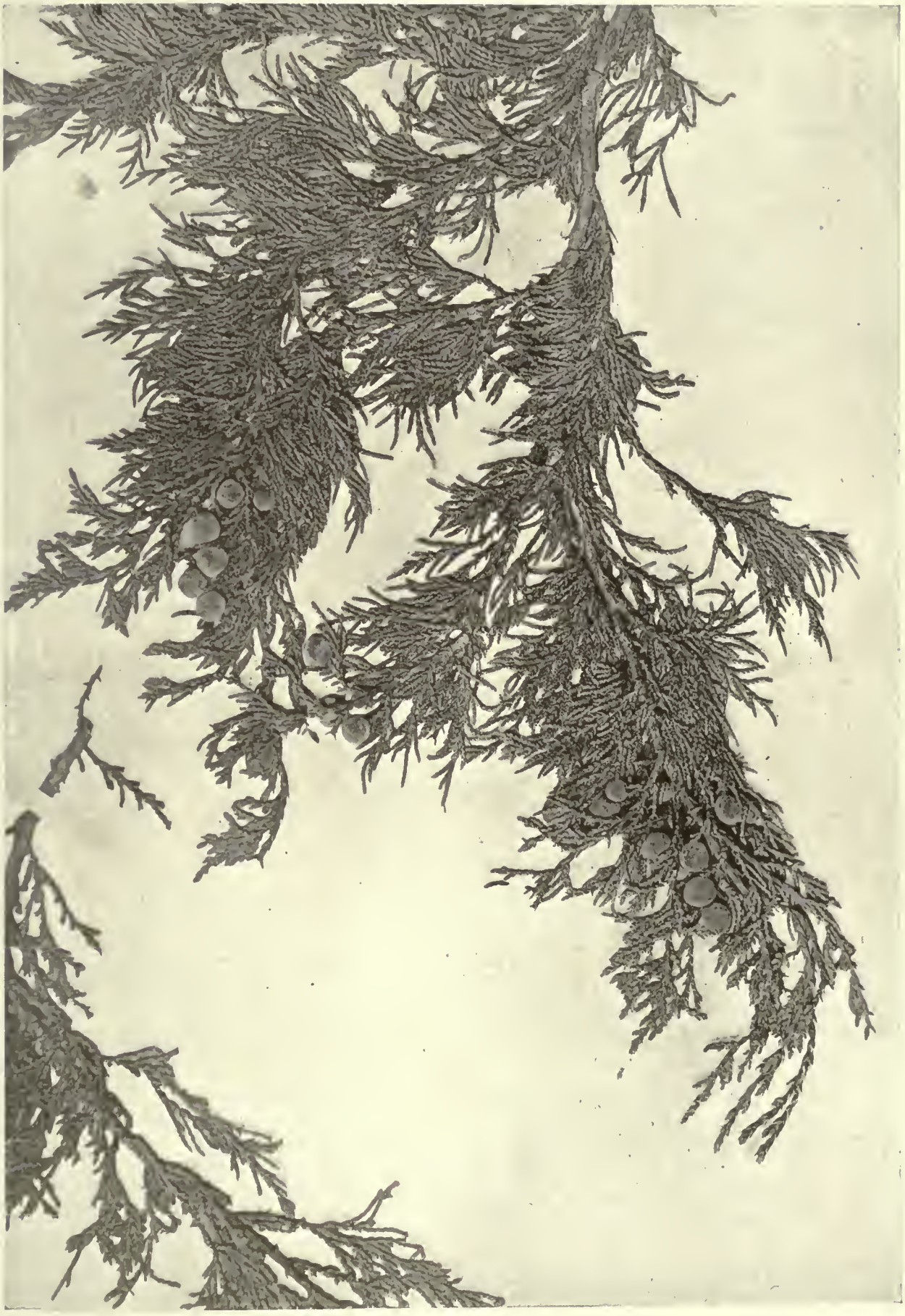
Branchlets irregularly pinnate, the ultimate divisions more or less quadrangular, slender, about $\frac{1}{30}$ inch in diameter. Leaves on the main divisions lanceolate, acuminate, sharp-pointed; appressed, about $\frac{1}{6}$ inch long; on the secondary branchlets smaller and shorter; on the ultimate divisions minute and scale-like, decussate, imbricate, ovate-lanceolate, acute or sub-acute, convex on the back, which has often an oblong glandular pit. Acicular leaves in threes or in pairs, rarely present on adult trees.

Fruit globose, conspicuously glaucous, $\frac{1}{5}$ inch in diameter, with two or three ovate seeds.

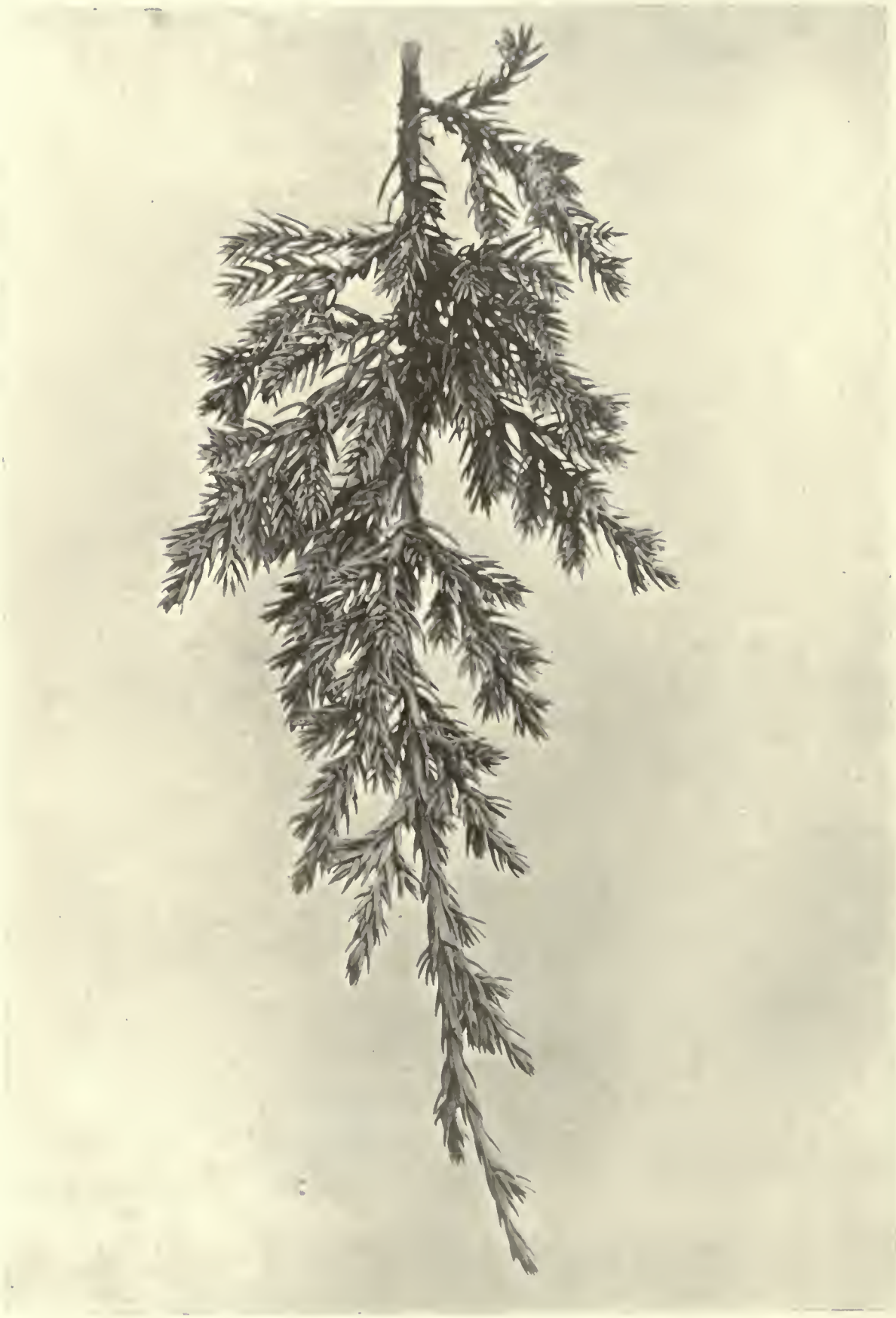
Juniperus procera has been considered to be a variety of *J. excelsa* by some authorities, but differs in its smaller fruit, and is a tropical tree with quite a different distribution. In British East Africa, where it is known as Cedar, it is found in the drier forests, mainly between 7,000 and 8,000 feet altitude, but often as low as 5,500 feet. It is wide-spread on the equatorial highlands of Africa and in Abyssinia. Its timber is of great value, being scarcely distinguishable from that of the American *Juniperus virginiana*, which is used in the manufacture of lead pencils. It attains larger dimensions than any other juniper. Mr. D. E. Hutchins in his report on the forests of British East Africa describes and figures a giant specimen in the Kenia forest, with a clean bole of 65 feet in height, and 12 feet in diameter, and a total height of about 110 feet.

Juniperus procera is occasionally cultivated under glass in botanic gardens in England.

The illustration is from a type specimen in the British Museum which was collected in Abyssinia by Schimper, through whom this juniper first became known to botanists.



JUNIPERUS PROCERA



JUNIPERUS PROCUMBENS

JUNIPERUS PROCUMBENS (*Siebold*).

Ann. Soc. Hort. Pays-Bas, 1844, p. 31.
Trees of Great Britain and Ireland, Vol. VI. p. 1422 (1912).

A prostrate shrub resembling *J. squamata* in habit, but differing in the branchlets being glaucous white on the edges of the pulvini. Leaves longer than in that species; their free part $\frac{1}{3}$ inch long, tapering to an acuminate spine-like apex; upper surface concave and covered except along the margins with a white stomatic band, divided except near the apex by a green midrib; lower surface convex, bluish, spotted with white, furrowed. Fruit not seen.

According to Siebold this shrub occurred wild in the mountains of Japan, where it was also cultivated in gardens and temple woods.

Juniperus procumbens is said to have been introduced into the Botanic Gardens at St. Petersburg in 1864, but does not appear to have been known in England until recently, when it has been largely imported from Japan. It is occasionally mistaken for *J. litoralis*, a totally different plant, which also occurs in Japan.

The illustration represents a specimen from the rock garden at Bayfordbury.

JUNIPERUS SABINA (*Linnæus*) Savin.

Sp. Pl. 1039 (1753).
Veitch's Man. Conif. ed. 2, p. 189 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1443 (1912).

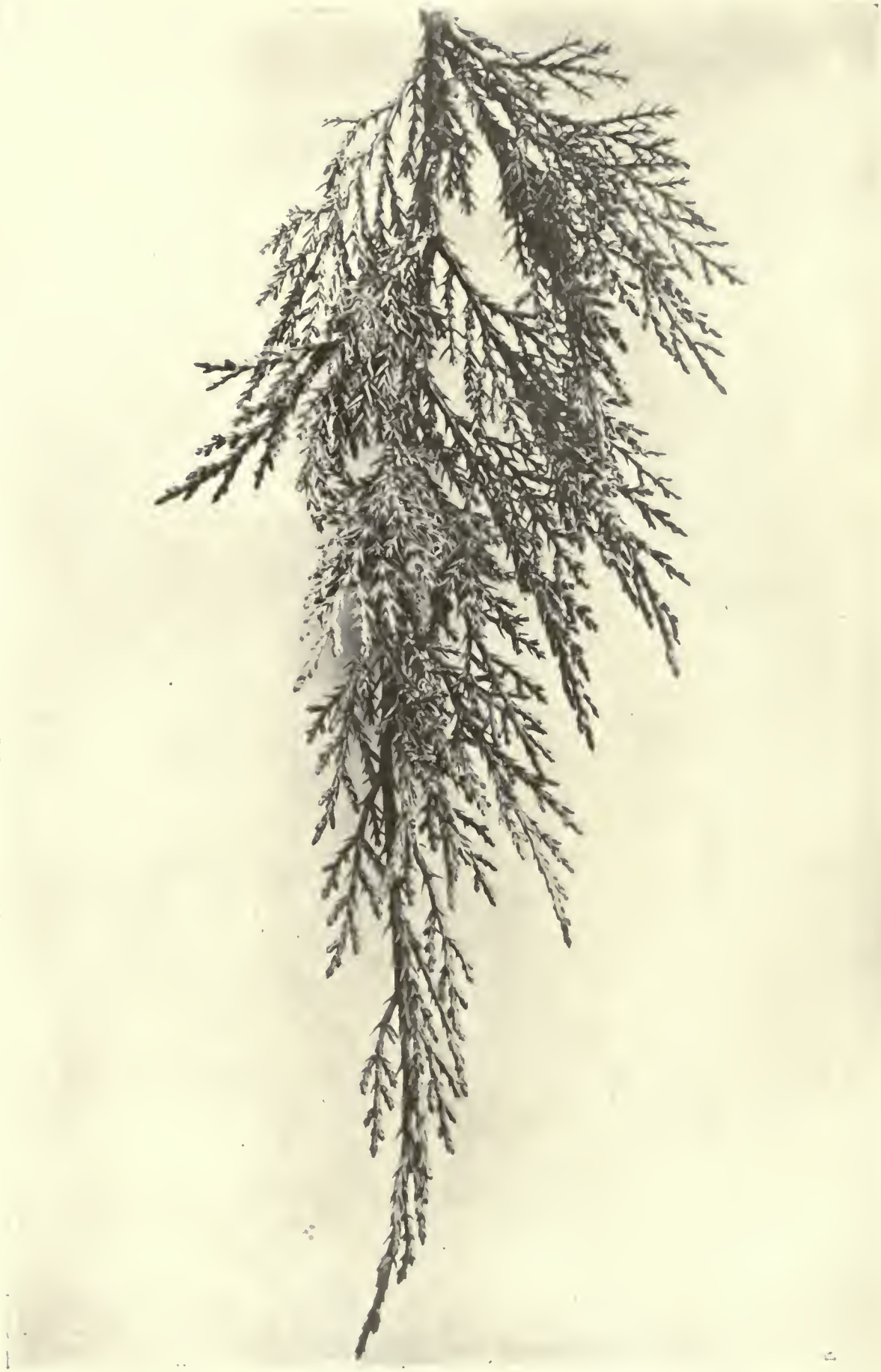
A shrub attaining about 15 feet in height, the foliage emitting a disagreeable odour when rubbed, and having an acid taste. Ultimate branchlets very slender, quadrangular, clothed with four ranks of scale-like leaves in opposite pairs which are imbricated, appressed, ovate, acute or blunt at the apex, about $\frac{1}{20}$ inch long, entire in margin, rounded on the back which usually bears a resin gland; leaves on older branchlets more elongated, about $\frac{1}{8}$ inch long, acuminate, becoming brown and withered in the third and fourth year. Juvenile foliage appearing on young plants and on isolated branches of adult shrubs; acicular, slightly spreading, in opposite pairs, about $\frac{1}{6}$ inch long, acuminate at the apex; upper surface glaucous, with a prominent midrib; lower surface green, convex, with a depressed gland.

Flowers monœcious or diœcious. Fruit ripening in the autumn of the first year or in the following spring, borne on the ends of short scaly recurved branchlets; irregularly globose or ovoid, about $\frac{1}{5}$ inch in diameter, brownish blue, glaucous, compressed, composed of four to six mucronate scales. Seeds one to three, ovoid, triquetrous, furrowed.

In a wild state *Juniperus Sabina* grows usually on limestone, but is occasionally seen on other formations. It has a wide distribution occurring in Central and Southern Europe, the Caucasus and North America. It is usually found in extensive thickets on dry sunny mountain slopes.

The Savin has been known in English cultivation since 1548 and is now common in gardens. The young shoots are used in medicine and yield a volatile oil which possesses extremely active properties.

JUNIPERUS SABINA



JUNIPERUS SABINA VAR. PROSTRATA

JUNIPERUS SABINA (*Linnæus*), VAR. PROSTRATA (*Loudon*).

Arb. et Frut. Brit. Vol. IV. 2499 (1838).
Trees of Great Britain and Ireland, Vol. VI. p. 1444 (1912).

A low prostrate shrub bearing only acicular glaucous foliage in cultivation. Leaves in their free part $\frac{1}{6}$ inch long, spreading, the glaucous bloom appearing on the dorsal surface near the base; ventral surface whitened; branchlets of the second and third year bright reddish brown. Fruit not seen on cultivated shrubs. This variety is probably of American origin, and is said to have been first introduced by Loddiges who called it *J. hudsonica* in his catalogue of 1836. It has the characteristic odour of the Savin; and is not uncommon in cultivation being often seen in rock gardens.

The specimen illustrated is from the Bayfordbury collection.

JUNIPERUS SCOPULORUM (*Sargent*).

Garden and Forest, Vol. X. p. 420, fig. 54 (1897).
Trees of Great Britain and Ireland, Vol. VI. p. 1436 (1912).

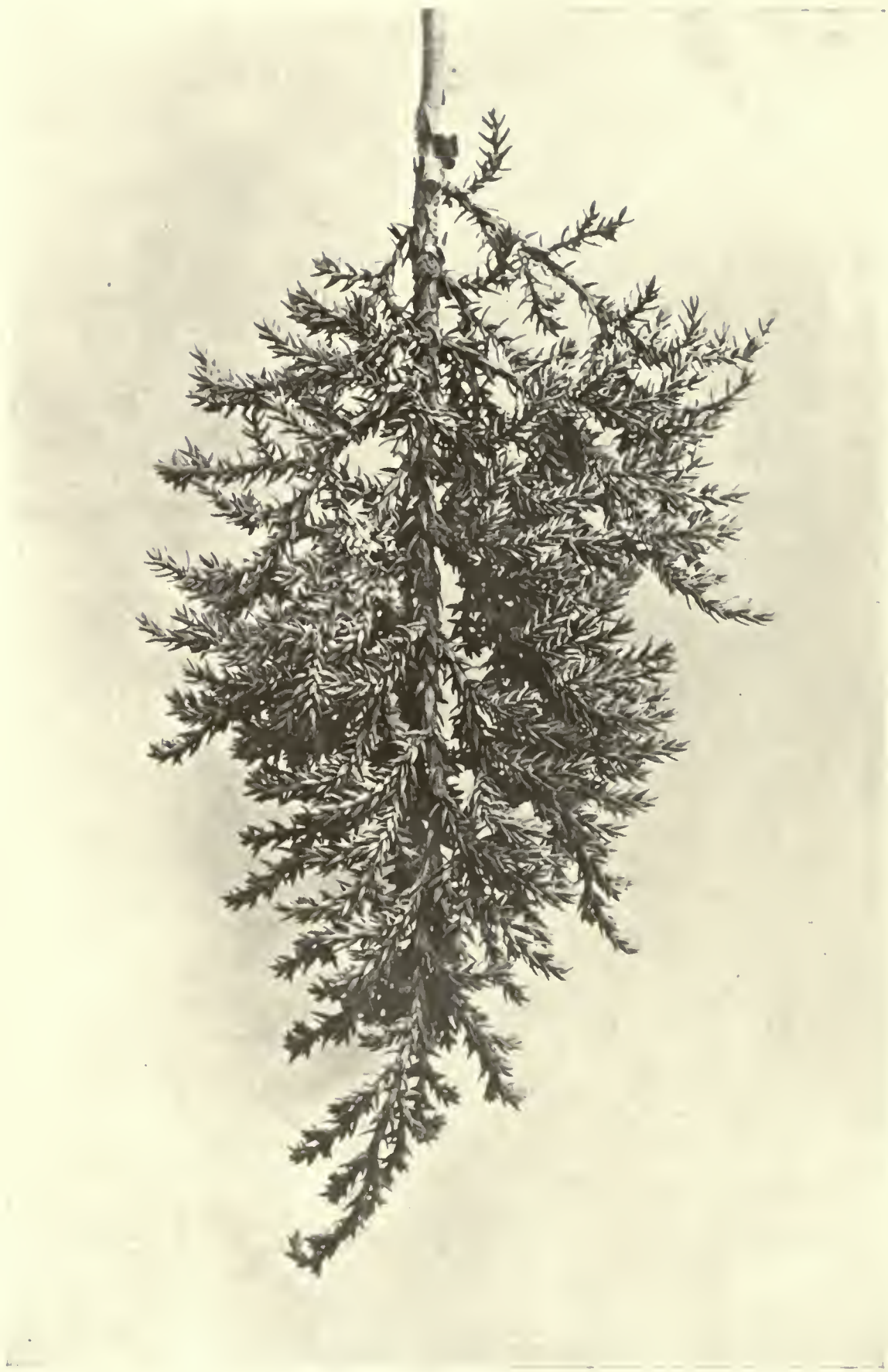
A tree about 40 feet high and 9 feet in girth, often divided near the base into several stems. Adult foliage very similar to *J. virginiana*, but with stouter branchlets and leaves marked on the back by a conspicuous glandular pit. Fruit ripening in the second year, globose, $\frac{1}{4}$ inch in diameter, light blue, glaucous. Seeds two, triquetrous, reddish brown, prominently angled, with a longitudinal groove.

This juniper was formerly regarded as the western form of *J. virginiana*, but is now considered by American botanists to be a distinct species. It differs from *J. virginiana* in the slightly larger fruits, which ripen in the second year.

Juniperus scopulorum grows on dry rocky ridges, and except near the coast, usually at over 5,000 feet elevation, from the eastern foothills of the Rocky Mountains from Alberta to Texas, westward to the coast of British Columbia on Vancouver Island, and in Washington, and to Eastern Oregon, Nevada and Northern Arizona. It is probably the tree which is occasionally cultivated as *J. fragrans*, a name which appears in Knight and Perry, *Syn. Conif.* p. 13 (1850).

The illustration is from a photograph sent by Prof. Sargent from the Arnold Arboretum.

JUNIPERUS SCOPULORUM



JUNIPERUS SQUAMATA

JUNIPERUS SQUAMATA (*Buchanan-Hamilton*).

Lambert, Genus Pinus II, 17 (1824).
Trees of Great Britain and Ireland, Vol. VI. p. 1420 (1912).

A shrub with decumbent stems from which arise numerous short erect branches. Young branchlets green with three grooves. Leaves all acicular, densely imbricated in whorls of three, appressed or slightly spreading, decurrent on the branchlets, the free part $\frac{1}{6}$ inch long, curved, tapering to the sharply pointed apex; upper surface concave, whitened, usually with a faint midrib; lower surface convex, green, furrowed. Older branchlets stout, reddish-brown, covered with persistent reddish-brown acicular leaves.

Fruit ellipsoid, becoming black when ripe in the second year, $\frac{1}{4}$ to $\frac{1}{3}$ inch long and somewhat less in diameter, composed of three to six mucronate scales. Seed solitary, ovoid, ridged, with three or four depressions below the middle for resin glands.

Juniperus squamata is allied to *J. recurva*, differing from it in its habit and in having stouter and broader needles; the fruit is also smaller and of a different shape. It occurs throughout Afghanistan, the Himalayas, the mountains of China and Formosa, and in Sikkim is said to grow at an altitude of 15,000 feet. It was introduced into England about 1836 and is sometimes cultivated in rockeries under the name of *J. pseudosabina*.

The specimen illustrated was grown at Bayfordbury.

JUNIPERUS TAXIFOLIA (*Hooker and Arnott*).

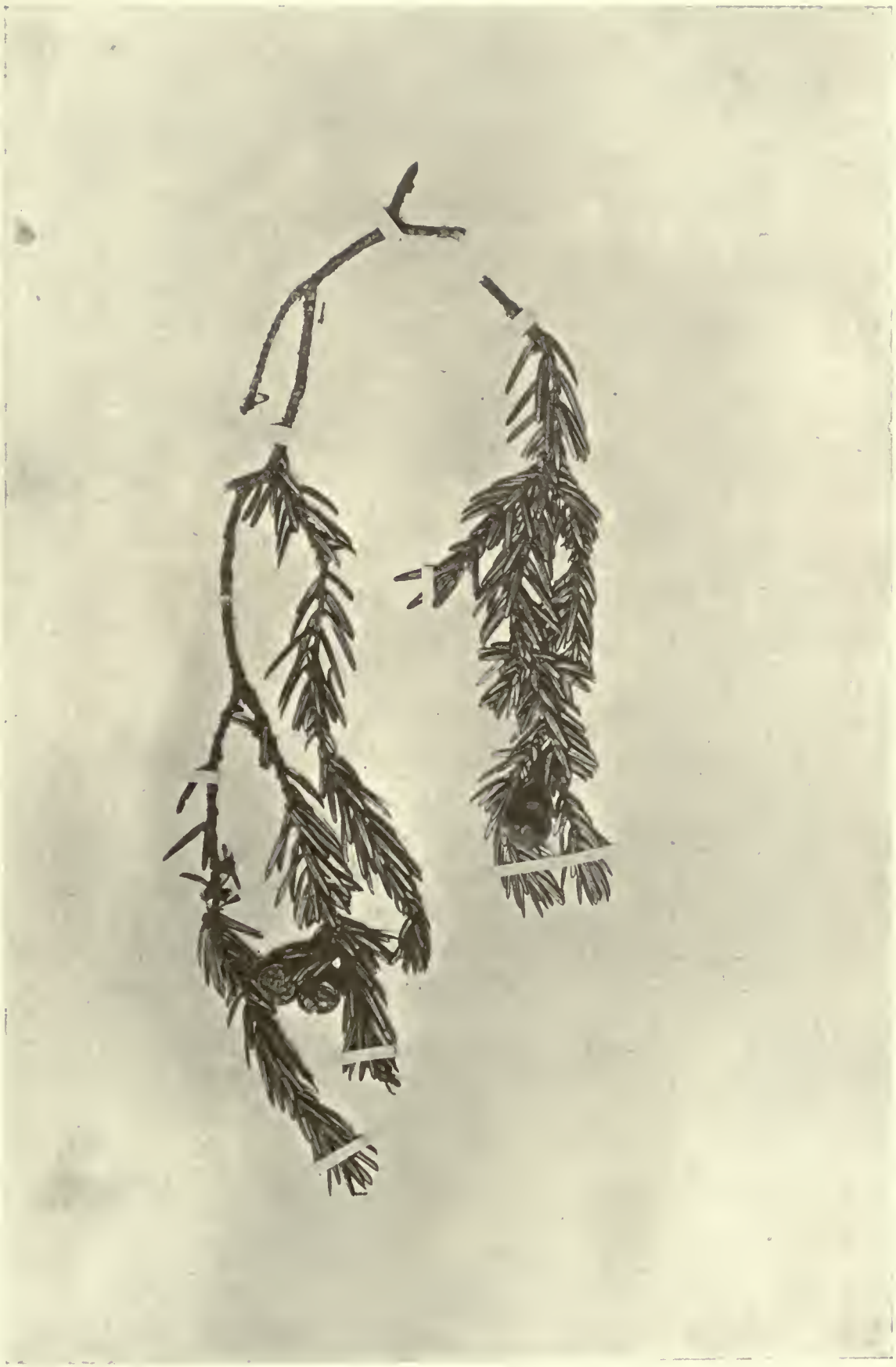
Bot. Capt. Beechey's Voyage, p. 271 (1830-1841).
Hayata, in Journ. Linn. Soc. Bot. XXXIX. p. 89 (1909).
Trees of Great Britain and Ireland, Vol. VI. p. 1416 (1912).

A shrub about 10 feet high, with a more or less twisted trunk. Branches horizontal, spreading, with pendulous branchlets. Young branchlets triquetrous, narrowly winged, glabrous. Leaves linear, about $\frac{1}{2}$ inch long, $\frac{1}{20}$ to $\frac{1}{15}$ inch broad, obtuse at the apex, jointed at the base, erect, with two broad bands of stomata on the upper surface, keeled below.

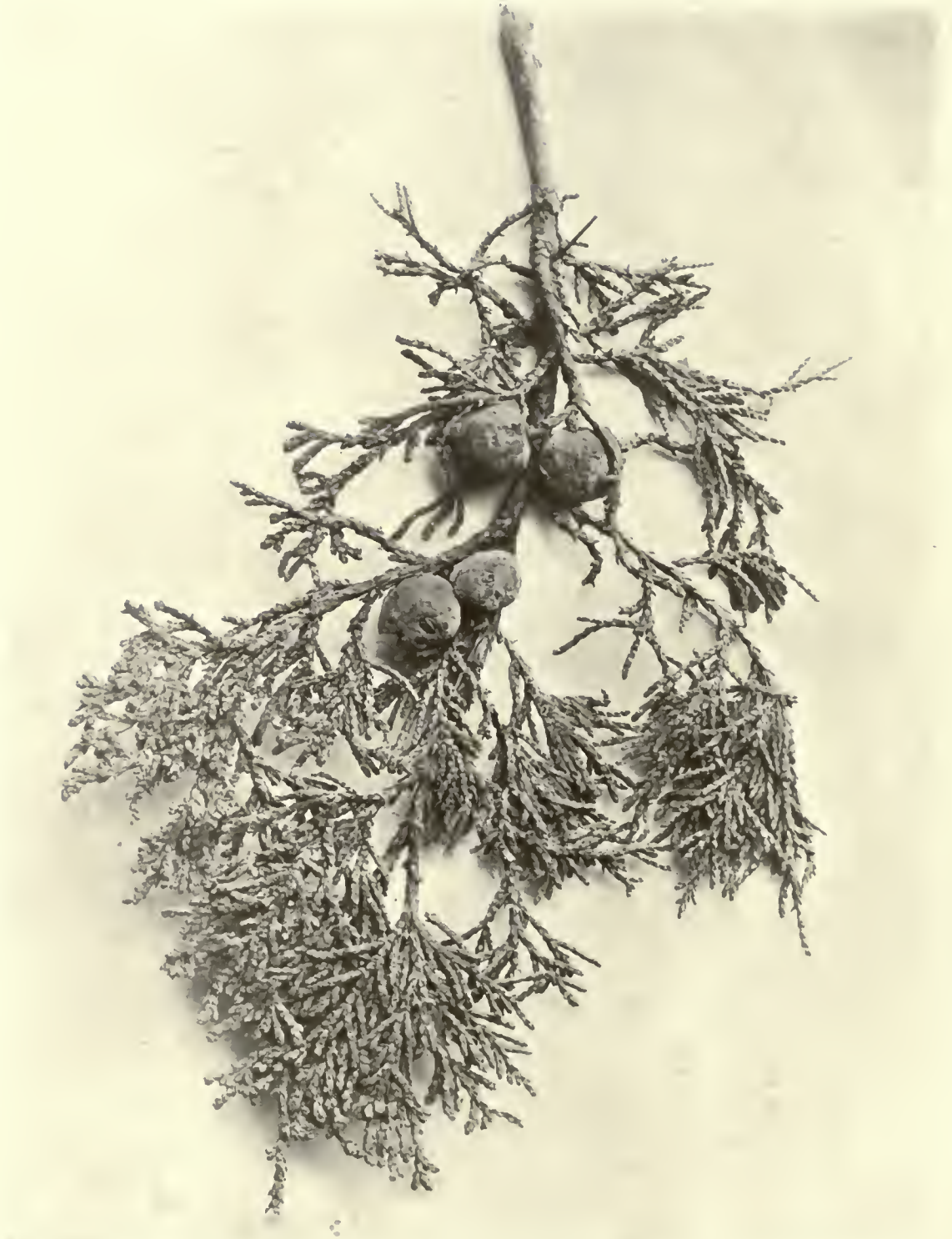
Fruit about $\frac{1}{4}$ inch in diameter, globose. Seeds three, erect, trigonous, with two or three resin-glands.

Juniperus taxifolia has been much confused with *J. formosana* (Hayata), but may be easily distinguished from that species by its obtuse leaves. It is peculiar to the Loo Choo and Bonin Islands, and is unknown in cultivation.

The illustration represents a specimen, collected by Dr. Hayata, in the Bonin Islands, and preserved in the British Museum Herbarium.



JUNIPERUS TAXIFOLIA



JUNIPERUS TETRAGONA

JUNIPERUS TETRAGONA (*Schlechtendal*).

Linnæa, Vol. XII., p. 495 (1838).
Veitch's Man. Conif. ed. 2, p. 179 (1900).

Usually a low bush or a small tree 20 to 30 feet high, occasionally attaining a height of 100 feet, with a trunk about 3 feet in girth.

Branchlets thick, quadrangular. Leaves in pairs, closely appressed, strongly keeled on the back, obtuse or acute, about $\frac{1}{16}$ inch long, minutely denticulate on the margins. Acicular leaves $\frac{1}{4}$ to $\frac{1}{2}$ inch long.

Fruit globular, bluish black, $\frac{1}{4}$ inch in diameter. Seeds three to five, angular, more or less grooved or pitted.

Juniperus tetragona resembles *J. occidentalis*, and is best distinguished from that species by its quadrangular branchlets. It is more southern in its distribution, being found on low limestone hills in Western and Southern Texas, whence it spreads southwards into Mexico. At high altitudes it becomes shrubby in habit.

The illustration represents a native specimen collected in Mexico by Mons. F. Nicolas.

JUNIPERUS WALLICHIANA *(J. D. Hooker).*

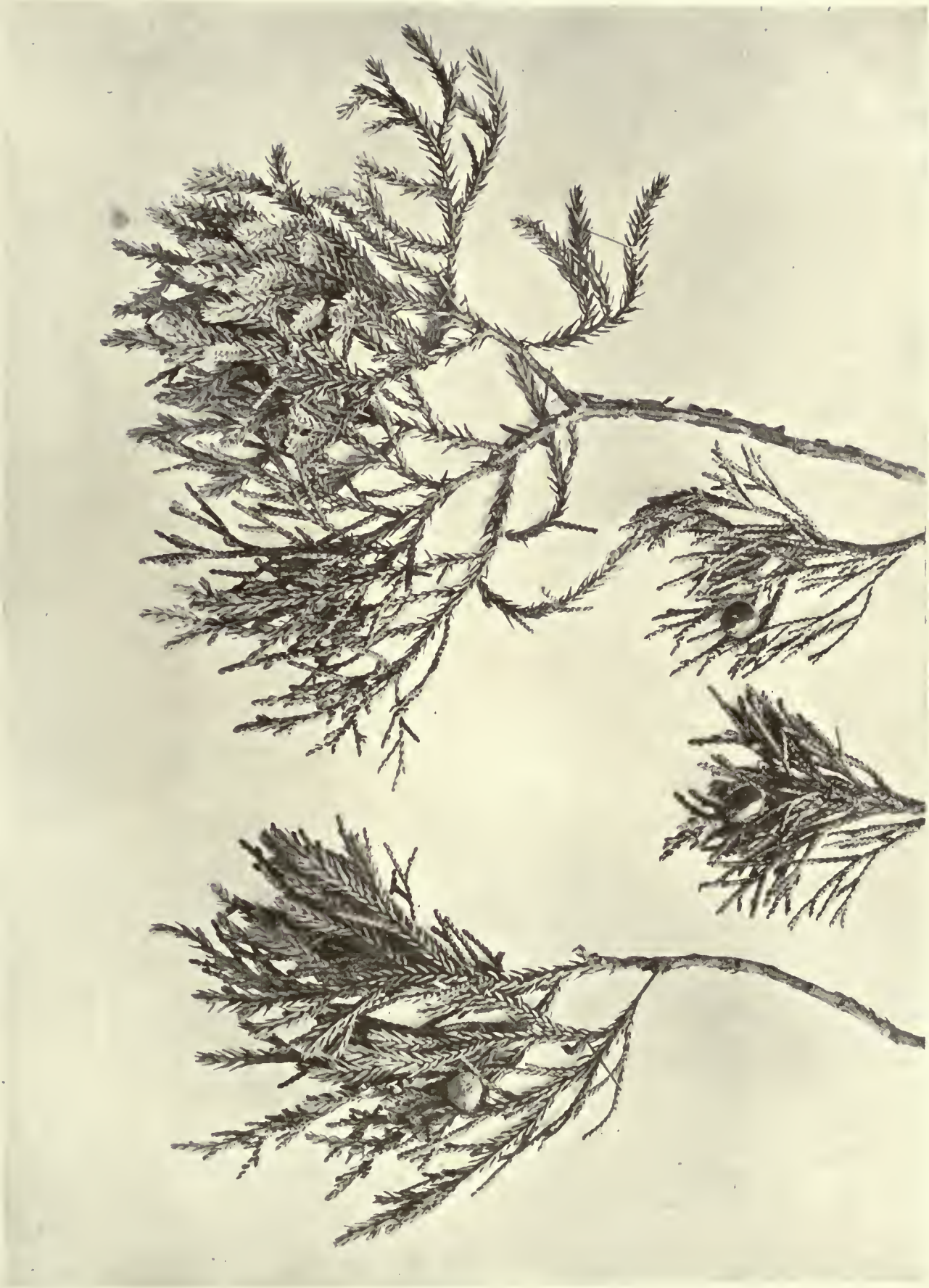
De Candolle, Prod. Vol. XVI. 2, p. 482 (1868).
Veitch's Man. Conif. ed. 2, p. 184 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1423 (1912).

A tree attaining in the Himalayas 60 feet in height. Leaves dimorphic. Adult foliage with the ultimate branchlets quadrangular, about $\frac{1}{20}$ inch in diameter and densely covered with scale-like leaves, which are arranged in four ranks in decussately opposite pairs, closely appressed, narrowly ovate, about $\frac{1}{16}$ inch long, tapering to an acute apex, bright green with a whitish margin, furrowed on the back. Leaves on the main axes larger, up to $\frac{1}{4}$ inch long, tipped with acuminate points. Juvenile foliage often preponderating on adult trees; leaves acicular, in threes, decurrent, densely clothing the branchlet in successive whorls, slightly spreading, about $\frac{1}{6}$ inch long, sharply mucronate, whitened on the upper surface, furrowed on the back.

Flowers diœcious. Fruit ripening in the second year, on the ends of short curved branchlets, ovoid, $\frac{2}{3}$ inch long, $\frac{1}{3}$ inch broad near the base, blue when mature, with minute mucros above, indicating the 3 to 5 component scales. Seed solitary, $\frac{1}{4}$ inch long, ovoid, compressed, with two or three depressions for resin-glands on each surface.

Juniperus Wallichiana is a native of the Himalayas from the Indus to Bhutan between 9,000 and 15,000 feet elevation, becoming shrubby in the western part of its range. It was introduced in 1849, when Sir J. D. Hooker sent seeds from India to Kew, and is very rare in cultivation.

The specimen illustrated is from a tree at Leonardslee, Sussex, which was about 20 feet high in 1911.



JUNIPERUS WALLICHIANA

PINUS ALBICAULIS

PINUS ALBICAULIS (*Engelmann*).

Trans. St. Louis Acad. II. 209 (1863).
Veitch's Man. Conif. ed. 2, p. 310 (1900).
Trees of Great Britain and Ireland, Vol. V. p. 1048 (1910).

A tree attaining in western North America a maximum height of 100 feet, but usually only 15 to 20 feet high with a stem 12 to 18 inches in diameter; becoming a low shrub at high elevations. Bark of young stems white or pale grey, smooth and thin; on old trunks scaling off in small plates.

Young branchlets reddish-brown, with a scattered minute stiff pubescence. Leaves in fives, similar to those of *P. flexilis*, persisting five to eight years, stout, rigid, slightly incurved, densely crowded on the branchlets, 2 to 3 inches long, entire in margin, marked on each surface with white lines of stomata.

Cones sub-terminal, sessile, spreading, ovoid, 1½ to 3 inches long, dark purple when growing, light brown when mature: scales much thickened, very brittle at the base, ¾ inch long, ⅝ inch broad, many undeveloped and infertile. Seed ⅓ to ½ inch long, ovoid; wing rudimentary or absent.

Pinus albicaulis is allied to *P. flexilis*, but has different cones; and in a barren state may be distinguished by its pubescent branchlets. It is more alpine in its distribution, forming the timber line on many mountain ranges in North-West America at altitudes ranging from 5,000 to 12,000 feet.

The cones of *Pinus albicaulis* resemble those of *P. Cembra* in never opening. The seeds are distributed by squirrels and mountain crows which break the scales and carry off the seed.

The species was discovered on the mountains rising above the valley of the lower Fraser River near Fort Hope in 1851, by John Jeffrey who sent seeds from Mount Shasta, California, but none of these appear to have survived. There are young plants in cultivation at Kew.

The illustration shows a native specimen collected by Mr. F. R. S. Balfour.

PINUS BALFOURIANA (*Balfour*). FOXTAIL PINE.

Oregon Exped. Report, p. 1, t. 3, f. 1 (1853).
Gardeners' Chronicle, Vol. V. p. 332 (1876) with fig.
Veitch's Man. Conif. ed. 2, p. 313 (1900).
Trees of Great Britain and Ireland, Vol. V. p. 1054 (1910).

A tree attaining in California a height of 30 to 90 feet with a girth of 6 to 15 feet. Bark of young stems thin, smooth and whitish, becoming on old trunks $\frac{3}{4}$ inch thick, dark reddish-brown and much fissured. Young branchlets stout, yellowish-brown, covered with a minute pubescence. Buds ovoid, about $\frac{1}{4}$ inch long, with closely appressed scales.

Leaves in fives, densely crowded on the branchlets, incurved, rigid, about $1\frac{1}{2}$ inches long, sharp-pointed, entire in margin, shining green on the back, white with lines of stomata on the inner surfaces; sheath membranous, splitting into five segments, which become reflexed and form a rosette around the base of the leaf cluster.

Cones sub-terminal, spreading, sessile, cylindric-conic, $3\frac{1}{2}$ to 5 inches long: scales narrow, elongated; apophysis convex, rhomboidal, transversely keeled, with a minute incurved prickle. Seed about $\frac{1}{3}$ inch long; with a narrow wing, about 1 inch long.

As a native tree *Pinus Balfouriana* is confined to the mountains of California, occurring at elevations of 5,000 to 12,000 feet, and attaining its largest size in the southern Sierra Nevada. It was discovered on Scott Mountain in 1852 by Jeffrey. It is rare in cultivation.

The photograph represents a native specimen from the Museum at Kew.

PINUS BALFOURIANA

PINUS FUNEBRIS

PINUS FUNEBRIS *(Komarov).*

Flora Manshuriæ, Vol. I. p. 177 (1901).
Trees of Great Britain and Ireland, Vol. V. p. 1144 (1910).

This pine resembles in stature *P. sylvestris*, but has ashy-grey coloured bark. Branchlets light brown, shining, glabrous. Buds ovoid, light brown, short-pointed, with appressed scales. Leaves in pairs, slender, 2½ to 4 inches long, differing from those of *P. Thunbergii* in having marginal resin-canals.

Cones similar in size to those of *P. Thunbergii*, but differing in the greyish apophyses of the scales, each of which has an elevated umbo, ending in a short inflexed point. Seeds shining dark brown, with short broad wings.

Pinus funebris, which has a wide distribution in the mountains of northern Korea, and in the Manchurian provinces, S. Ussuri, Kirin, and Mukden, has been long confused with *P. Thunbergii* (Vol. I. p. 55). It is often planted in Korea and Manchuria and in the vicinity of Peking, around temples and tombs. It is unknown in cultivation in England.

The illustration shows a specimen obtained from Manchuria by Dr. A. Henry.

PINUS GREGGII *(Engelmann).*

PINUS PATULA VAR. MACROCARPA (*Masters*).

D. C. Prod. Vol. XVI. pt. 2, p. 396 (1868).
Shaw, Pines of Mexico, p. 28 (1909) with figs.
Gardeners' Chron. Vol. IX. p. 435 (1891) with fig.

A tree 30 to 45 feet high, with smooth grey bark. Young shoots glabrous, glaucous. Leaves short, erect, bright green, in clusters of threes, $2\frac{3}{4}$ to 4 inches long, with median resin-canals.

Young cones sub-terminal, pedunculate, single or aggregate, their scales armed with a small and usually deciduous prickle. Mature cones conical, $3\frac{1}{2}$ to 5 inches long, reflexed, oblique, persistent; apophysis swollen, unevenly developed, lustrous, ochre yellow. The cones just before ripening change from green to shining reddish-brown, not unlike the colour of a dry cone of *P. halepensis*.

Pinus Greggii occurs wild on the north-eastern Sierras of Mexico near Saltillo, Coahuila, at an altitude of 7,500 feet. It has been much confused with *P. patula* (figured Vol. I. p. 41) but differs from that species in its short erect leaves and smooth grey bark.

At Leonardslee, Sussex, a young tree which was obtained from Pallanza is now about 9 feet high, and has stood 20 degrees of frost without injury.

The illustration represents a specimen obtained from the Botanical Gardens, Naples.

PINUS GREGGII

PINUS INSULARIS

PINUS INSULARIS (*Endlicher*).

Syn. Conif. p. 157 (1847).

A tree attaining in the Philippine Islands a height of 80 feet. Buds about ½ inch long, cylindric, covered with chestnut-brown linear-lanceolate scales. Leaves crowded on the branchlets, in threes, slender, 6 to 8 inches long, serrulate, ending in a cartilaginous point; sheaths persistent, ½ inch long or more at first, but soon becoming torn or lacerate.

Cones in twos or threes, erect when young, horizontal or slightly pendulous when mature, ovoid-conic, about 2 to 3 inches long; apophysis of each scale rhomboid with a transversely keeled umbo.

Pinus insularis is only found in the Philippine Islands, where it occurs in Northern Luzon on exposed dry ridges at over 5,000 feet elevation. It has not been introduced into cultivation.

The specimen figured was obtained from Mount Tapula, in the province of Zambales, Luzon, by Messrs. M. L. Merrill and M. Curran.

PINUS KHASYA (*J. D. Hooker*).

Fl. Brit. India, Vol. V. p. 652 (1888).

A tree attaining in Burma a height of 100 to 150 feet with a girth of 10 feet or more. Bark thick and deeply fissured. Leaves in threes, slender, 6 to 10 inches long, with serrulate margins, sharp points, and marginal resin-canals; leaf-sheaths persistent, $\frac{1}{2}$ to $\frac{3}{4}$ inch long. Cones solitary in pairs or threes, ovoid, 2 to 3 inches long and about 2 inches in diameter; scales thickened at the apex and transversely keeled. Seed with a long oblong wing.

Pinus Khasya occurs wild in the Khasi Hills, Chittagong and Shan States in Burma, at 2,500 to 7,000 feet altitude, often forming extensive forests. The timber is used locally for building purposes and the tree yields good turpentine.

Pinus Khasya is closely allied to *Pinus insularis*, which occurs in the Philippine Islands and may be a geographical variety. In the Khasi Hills *Pinus Khasya* is only a small tree, but Hooker records trees 200 feet high in Burma.

The specimen illustrated was sent from Burma by Major O. Clinton-Baker in 1911.

PINUS KHASYA

PINUS LONGIFOLIA

PINUS LONGIFOLIA (*Roxburgh*).

Fl. Ind. Vol. III. 651 (1832).
Veitch's Man. Conif. ed. 2, p. 341 (1900).

A tree attaining in the Himalayas a height of over 100 feet with a girth of about 12 feet. Bark 1 to 2 inches thick, divided into large plates by deep fissures. Leaves in threes, with persistent fimbriate sheaths, pendulous, slender, tri-quetrous, 9 to 12 inches long, and serrulate in margin.

Cones ovoid-conic on short stalks, spreading or recurved, solitary or in whorls of two to five, 4 to 8 inches long by 3 to 5 inches in diameter; scales 1 to 2 inches long by $\frac{2}{3}$ inch broad, with a thick pyramidal and somewhat recurved beak. Seeds with an unequal-sided wing, $\frac{3}{4}$ to 1 inch long.

Pinus longifolia is found in the outer Himalayan ranges from the Indus to Bhotan at an altitude of 1,500 to 7,500 feet, often forming extensive forests. It was introduced in 1801, and is occasionally cultivated under glass.

The specimen figured was obtained from the Botanic Gardens, Naples, in 1910.

PINUS MASSONIANA (*Lambert*).

Genus Pinus, ed. I. p. 17 t. 12 (1803).

A tree attaining in South China a height of 30 to 80 feet with a girth of 6 feet. Bark reddish, resembling that of *Pinus sylvestris*. Branchlets glabrous. Leaves in pairs, slender, 6 to 8 inches long, with finely serrate margins.

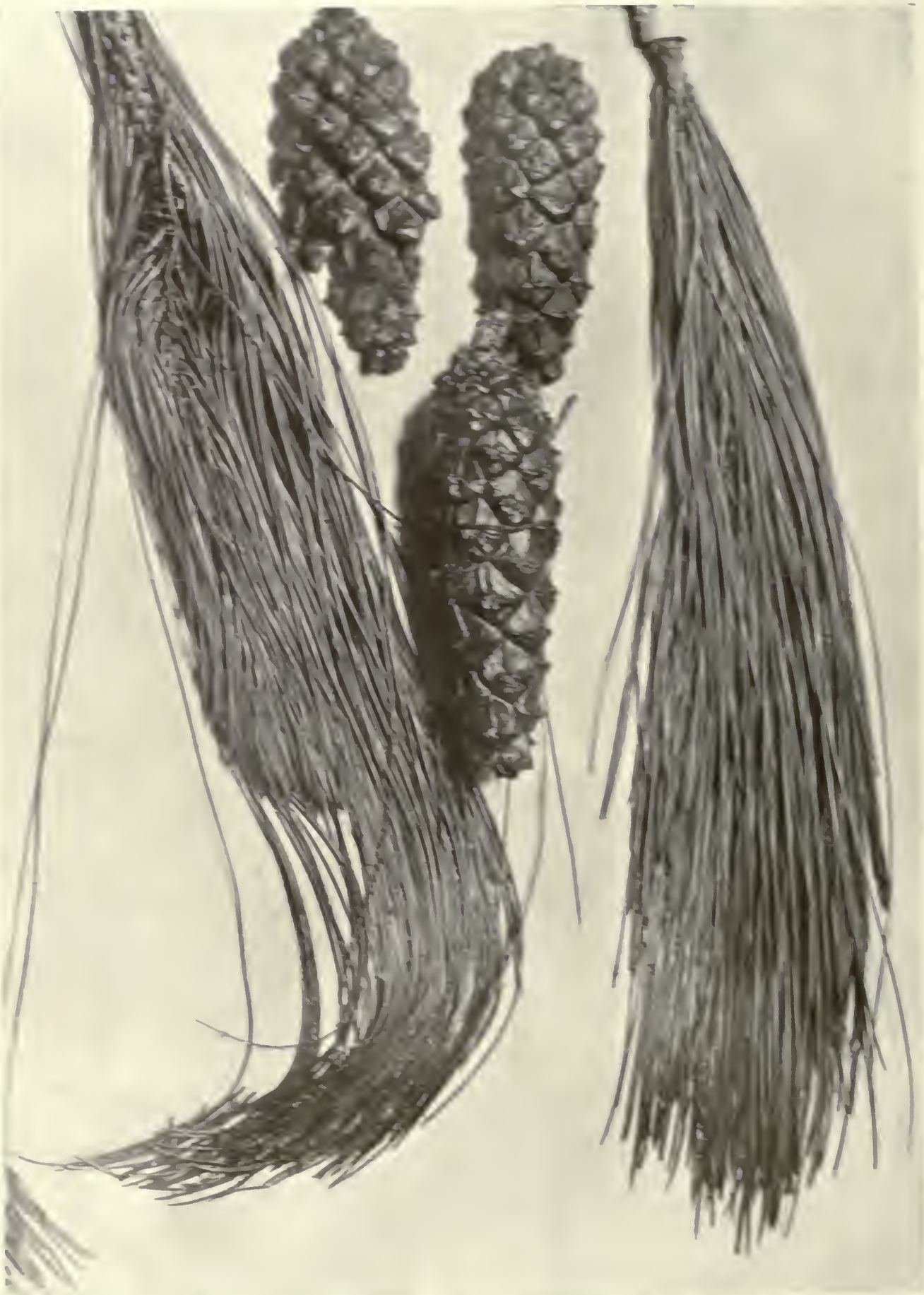
Staminate catkins in dense spikes, with broadly lanceolate and very pointed brown scales. Cones ovoid, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, the scales thickened at the summit, hexagonal or rhomboid with a transverse ridge and a slightly raised umbo; seed dark brown, $\frac{1}{5}$ inch long, with a narrow wing, $\frac{1}{2}$ inch long.

Pinus Massoniana is a native of Southern China, and has been largely planted in Hong Kong for afforestation purposes, where it thrives well on poor soil. The timber is largely used for firewood. It is not in cultivation in the British Isles.

The specimen figured by Lambert is in the British Museum herbarium, having been brought by Mr. Francis Masson from the Cape of Good Hope, where the tree had been raised from seed sent from China.

The specimen illustrated was sent from Hong Kong by Mr. W. J. Tutcher of the Botanical and Forestry Department.

PINUS MASSONIANA



PINUS MERKUSII

PINUS MERKUSII *(Junghn and De Vries).*

Plant. Ind. Bat. Or. 5, t. 2. (1845).
Hooker, Fl. Brit. India, V. p. 652 (1868).
Gamble, Manual Indian Timbers, 710 (1902).
Brandis, Indian Trees, 601 (1906).

A tree attaining in Burma a height of 50 to 60 feet, and in Sumatra 60 to 100 feet, with a trunk occasionally 15 feet in girth. Bark thick and rough. Branches forming a flat umbrella-like crown, resembling that of *Pinus Pinea.*

Leaves in twos, slender, serrulate, semi-terete in section, 8 to 10 inches long, with a persistent fimbriate sheath about ½ inch long.

Cones ovoid-oblong, about three inches long; scales with a thickened, 4- to 5-angled, pyramidal apophysis, which is transversely ridged.

Pinus Merkusii occurs in Burma in the hill-forests of the Shan States, Martaban and Tenasserim, between 500 and 3,500 feet altitude; and also in Sumatra, Cochin China, and the Philippine Islands. It is unknown in cultivation in England.

The illustration represents a native specimen from Burma, photographed in the Kew Herbarium.

PINUS NELSONI (*Shaw*).

Gardeners' Chronicle, Series 3, Vol. XXXVI. p. 122 (1904), with fig.
,, ,, ,, Vol. XXXVII. p. 306 (1905), with fig.
Shaw, Pines of Mexico, p. 8 (1909), with figs.

A small tree, rarely exceeding in Mexico 25 feet in height and 2½ feet in girth. Bark grey, smooth. Branches long, slender and supple, persisting in dense masses, so that the tree always has the appearance of a large bush. Branchlets long and slender, glaucous when young, with greyish-green and sparse foliage.

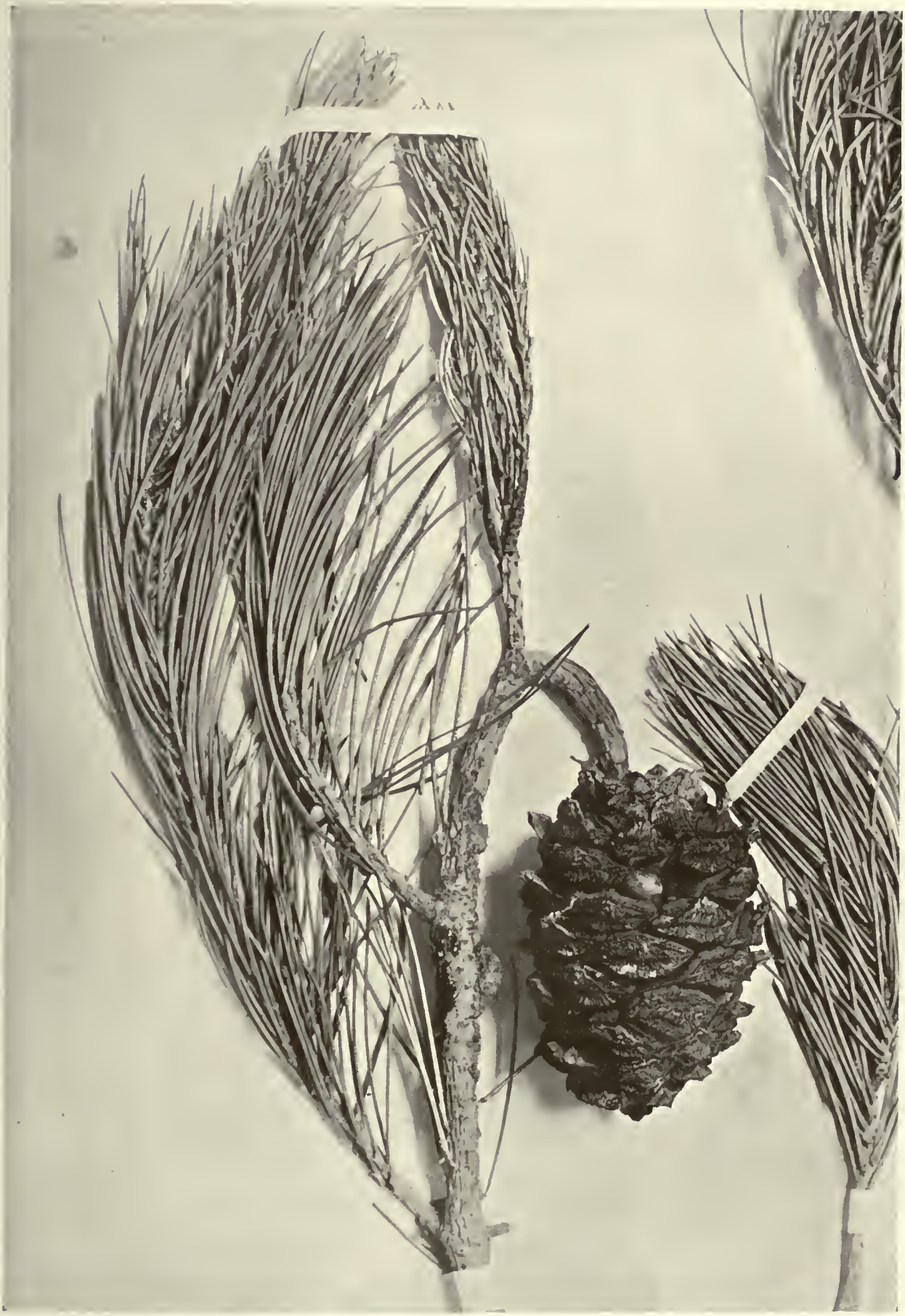
Leaves with persistent sheaths, in fascicles of threes but adhering together, so that at first sight there appears to be only one leaf in each sheath, 2½ to 3½ inches long, serrate.

Cones 3 to 5 inches long, on long stout curved stalks; cylindrical, opening at maturity, remaining on the tree till the third year; leaving on the branch a few basal scales and the stalk when they fall; apophysis of the scale, deep orange red, elevated in the middle as a sharp transverse ridge, and culminating in a dark indefinite umbo. Seed large and wingless, pale ochre yellow when fresh.

This species occurs in great abundance over a limited area, and associated with *P. cembroides*, on the lower slopes of the Sierras in North-eastern Mexico.

Pinus Nelsoni is easily distinguished from all the other pines by its remarkable cones and the adherent leaves in the sheath, a character that is reproduced on seedlings raised at the Arnold Arboretum. The seeds are greedily eaten by macaws, and are exposed for sale in the markets of Mexico. Seedlings were raised for the first time in Europe at Bayfordbury in 1911.

The illustration figured is a native specimen from Nuevo Leon in the Herbarium at Kew.



PINUS NELSONI

PINUS TROPICALIS

PINUS TROPICALIS (*Morelet*).

Pinus Tethrocarpa *(Shaw)*.

Sargent, Trees and Shrubs, p. 149 (1903).
Gardeners' Chronicle, Vol. XXXVI. p. 98 (1904).

A tree attaining a height of 50 to 60 feet with a girth of 6 feet. Bark greyish, tinged with red, irregularly broken into large oblong plates, with small closely appressed scales. Branches ascending and forming an open rounded crown. Branchlets $\frac{1}{2}$ to 1 inch thick, covered with the crowded prominent bases of the primary leaves. Leaves in twos, rarely in threes, rigid, serrate, 4 to 8 inches long.

Mature cones shortly stalked, growing nearly at right angles to the branch, $2\frac{1}{2}$ to 3 inches long and about half as wide, rounded at the base, tapering to the narrow apex; orange-brown in colour, usually early deciduous; apophysis of the scale slightly corrugated from the margin inwards, and transversely keeled with a small spineless umbo.

Pinus tropicalis has a restricted distribution. It occurs in the western province of Pinar del Rio, Cuba, and on the neighbouring Isle of Pines, and is also found on the mainland in Florida.

The specimen figured was obtained by Mr. Louis Bosanquet from Fruitland Park, Florida.

CUPRESSUS ARIZONICA (*Greene*).

Gardeners' Chronicle, Vol X. p. 364 (1891).
Veitch's Man. Conif. ed. 2, p. 201 (1900).
Trees of Great Britain and Ireland, Vol. V. p. 1183 (1910).

A tree attaining in Arizona a height of 70 feet with a girth of 12 feet. Bark reddish-brown, separating into long persistent flakes. Branches smooth, purplish-brown, often glaucous. Branchlets irregularly disposed, bi-pinnate; the ultimate divisions quadrangular. Leaves grayish or glaucous, in four ranks, appressed, ovate-acute, $\frac{1}{12}$ to $\frac{1}{20}$ inch long, marked on the back with a glandular resinous pit.

Cones shortly stalked, globose, $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter, glaucous; scales 6 to 8 with prominent processes. Seeds eight to ten on each scale with a few inconspicuous resin-vesicles.

This species is probably a northern form of *C. lusitanica;* but is readily distinguished by its greyish foliage, and the pits on the leaves exuding a whitish resin.

Cupressus arizonica, which occurs wild in the mountains of Arizona and in northern Mexico, was discovered in 1880 by Greene near Clifton in eastern Arizona forming pure forests of considerable extent at 5,000 to 6,000 feet altitude. It was introduced into England in 1882 from the Arnold Arboretum.

CUPRESSUS ARIZONICA

CUPRESSUS MACNABIANA

CUPRESSUS TORULOSA

CUPRESSUS MACNABIANA (*Murray*).

Gardeners' Chronicle, p. 420 (1855).
" " Vol. IX. new series, p. 403 with fig. (1890).
Veitch's Man. Conif. ed. 2, p. 213 (1900).
Trees of Great Britain and Ireland, Vol. V. p. 1174 (1910).

A small wide-branching tree, attaining in California a maximum height of 40 feet with a girth of 4 feet. Bark thin, reddish-brown, scaly. Branchlet systems irregularly arranged, tri-pinnate; ultimate divisions tetragonal, compressed. Leaves $\frac{1}{20}$ inch long, appressed, ovate, obtuse, marked on the back with a shining resinous gland.

Cones erect, stalked, $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter, reddish-brown; scales 6 to 8 with prominent triangular processes. Seeds numerous, dark brown, $\frac{1}{8}$ inch long, with resin-vesicles.

It is distinguished by its bright or yellowish green foliage and conspicuously glandular leaves.

Cupressus Macnabiana, which is a native of the hilly and mountainous regions in California, was discovered by Jeffrey in the Sierra Nevada in 1853; and introduced into cultivation in England about a year later by Lobb, who sent seeds to Messrs. Veitch. It is now very rare in cultivation.

The specimen illustrated is from a tree 25 feet high at Brickendon Grange, Herts.

CUPRESSUS TORULOSA (*Don*).

Veitch's Man. Conif. ed. 2, p. 233 (1900).
Trees of Great Britain and Ireland, Vol. V. p. 1158 (1910).

A tree attaining in the Himalayas 150 feet in height and 37 feet in girth. Bark $\frac{1}{2}$ inch thick, brown, exfoliating in long narrow strips. Branches horizontal or ascending, ultimately pendulous, forming a broad pyramidal crown. Branchlet systems alternate, flattened, two- or three-pinnate. Ultimate divisions often curved, quadrangular, $\frac{1}{24}$ inch in diameter. Leaves uniform in four ranks, closely appressed, $\frac{1}{16}$ inch long, ovate, obtuse, frequently with an obscure glandular depression on the back.

Young cones green, often with a plum coloured tinge; ripening in the second year, and becoming dark-brown; on short recurved stalks, globose or ellipsoid, $\frac{1}{2}$ inch in diameter; scales 8 to 10, with the centre of the outer surface depressed, and bearing a small triangular and often recurved process. Seeds six to eight on each scale, pale brown, $\frac{1}{8}$ inch long, winged.

Cupressus torulosa is a native of the outer ranges of the western Himalayas from Chamba to Nepal, between 5,500 and 9,000 feet elevation, and is the only cypress known to occur wild in India. It was apparently discovered by Buchanan-Hamilton in Nepal in 1802-3, seeds being first sent to Europe by Dr. Wallich in 1824. It is rare in cultivation in the British Isles.

CUPRESSUS CASHMERIANA

CUPRESSUS CASHMERIANA (*Royle*).

Trees of Great Britain and Ireland, Vol. V. p. 1161 (1910).

A tree of moderate dimensions, with the bark divided into long narrow scaly ridges. Branches ascending, with pendulous branchlets, which are 4 to 5 feet long, forming a tree of pyramidal outline. Branchlet systems long and pendulous, twice or thrice pinnate, flattened, with the ultimate divisions compressed. Leaves glaucous, the lateral pair conduplicate; the facial pair flattened, with a longitudinal furrow, about $\frac{1}{8}$ inch long, lanceolate, acuminate, spreading at the tips.

Cones $\frac{1}{2}$ inch in diameter, greenish-yellow when young, dark brown when mature; scales ten, each with a central depression and an acute triangular reflexed process. Seeds numerous, winged.

Cupressus cashmeriana, which is the most beautiful of all the cypresses, is probably a form of *Cupressus torulosa* with juvenile acicular foliage. It is not known in the wild state. A solitary example was seen in cultivation by Griffith in Bhutan; and Hooker collected specimens from cultivated trees in Sikkim. According to Carrière, it was introduced into Europe from Tibet in 1862.

In the Temperate House at Kew there is a tree 30 feet high which bears fruit. In northern Italy there are some good specimens, the best being at Isola Madre, Lake Maggiore, which is about 60 feet high and produces fruit freely, from which seedlings have been raised at Colesborne. It has also been propagated from cuttings by Fratelli Rovelli of Pallanza. The photograph illustrates a fruiting branchlet of this tree.

CUPRESSUS FORMOSENSIS *(Henry).*

GIANT CYPRESS OF FORMOSA.

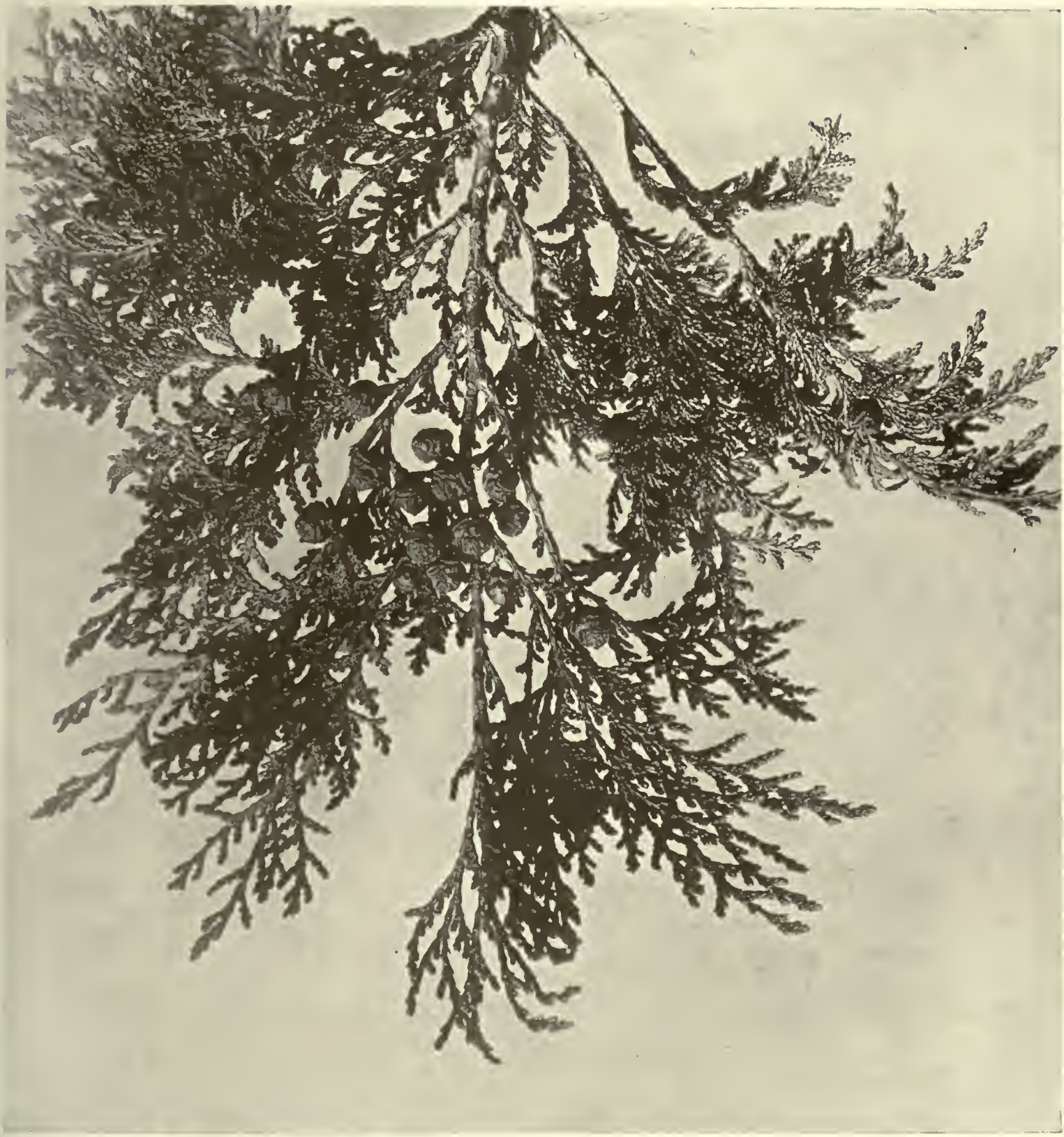
Trees of Great Britain and Ireland, Vol. V. p. 1149 (1910).
Gardeners' Chronicle, Vol. LI. p. 132 (1912).

This cypress occurs in Formosa where it attains enormous dimensions. It has the flattened branchlet-systems characteristic of the section *Chamæcyparis*, and is closely allied to *Cupressus pisifera* of Japan, having the front and back leaves of the branchlet equal in length to the lateral leaves. Ultimate branchlets flattened, $\frac{1}{16}$ inch wide. Leaves appressed but free at the incurved and shortly mucronate apex; lateral leaves conduplicate, as long as the facial leaves; facial leaves ovate, $\frac{1}{16}$ inch long, flattened, either keeled (as towards the apex of the branchlet), or depressed in the centre, with a longitudinal obscure gland. Foliage dull green on both surfaces, or covered more or less on the lower surface with an irregularly diffused whitish bloom.

Cones ripening in the first year, ellipsoid, $\frac{1}{3}$ inch in diameter; scales 10 or 11, with the outer surface wrinkled, brownish, depressed in the centre, bearing a conspicuous quadrangular bract. Seeds, two on each scale, brown, oval, with narrow wings, and conspicuous resin-vesicles.

Cupressus pisifera differs in having the foliage bright green on the upper surface, and is marked on the lower surface with well-defined white patches in hollows, the leaves being more distinctly acuminate, with longer mucros. It has also a globose cone with broader seed wings.

Cupressus formosensis is peculiar to the island of Formosa, where it forms almost pure forests with *Cupressus obtusa*, *forma formosana* at an altitude of 6,000 to 8,600 feet. Some idea of the size of this giant cypress may be gained from the frontispiece, which represents a tree 125 feet in height with a girth of 67 feet, growing on Mount Morrison. This illustration is from a photograph kindly taken by Mr. A. R. Firth, H.M.B. Consul at Tamsui. A tree, 195 feet in



CUPRESSUS FORMOSENSIS

height with a girth of 60 feet, is recorded by Dr. Hofmann growing near Goten at 8,000 feet elevation.

In 1910 Captain L. Clinton-Baker, R.N., received a specimen through the aid of Mr. Firth, which is now about 4 feet high and growing vigorously at Bayfordbury.

In 1911 a small quantity of seed was sent by Dr. Shirasawa to Bayfordbury, which was distributed to various gardens in England, Ireland, the Continent, North America and New Zealand. Seedlings sown at Bayfordbury in March, 1911, were in April, 1912, 7 inches high and very vigorous.

The specimen figured was obtained through the kindness of Mr. Firth.

CUPRESSUS FUNEBRIS (*Endlicher*).

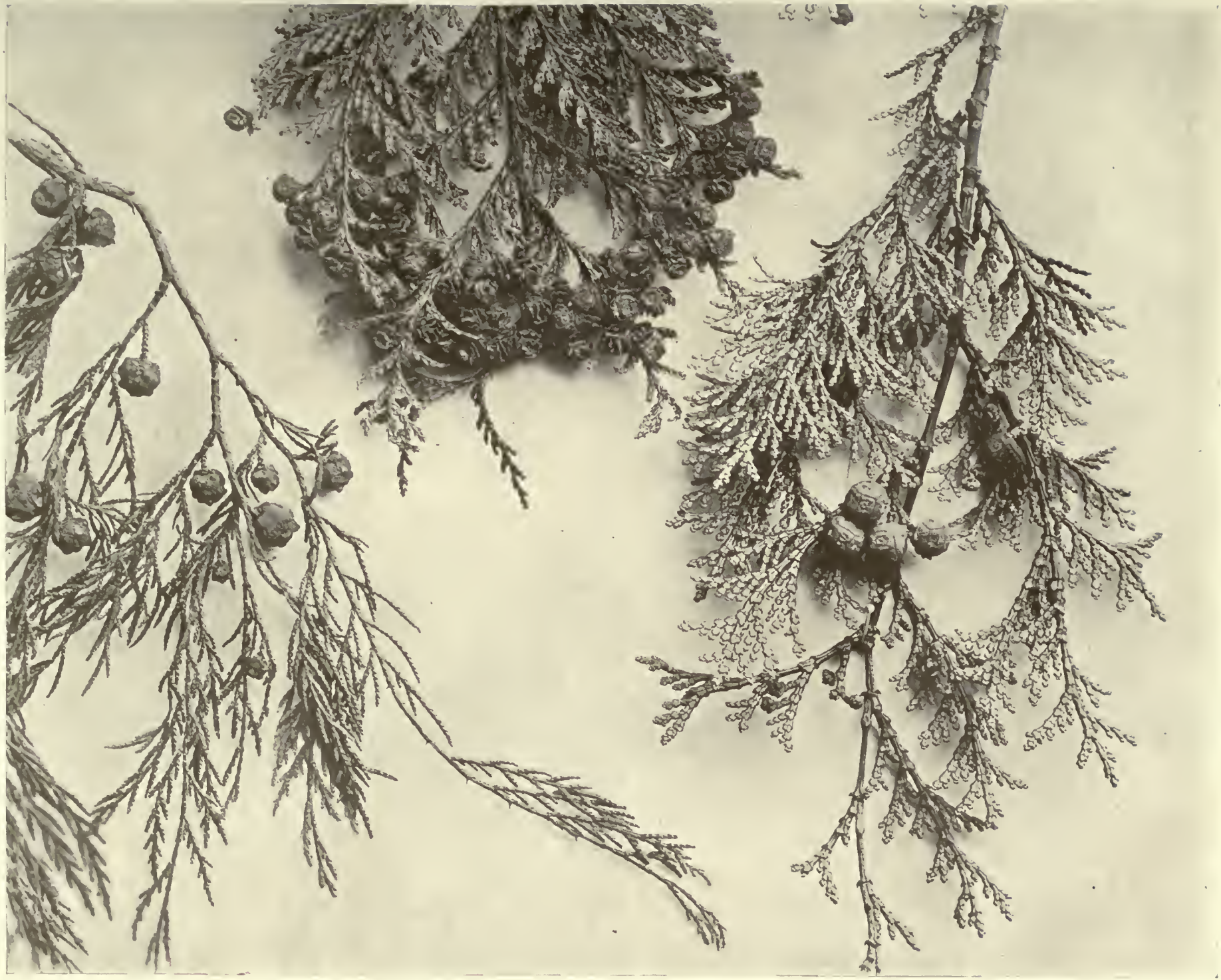
Veitch's Man. Conif. ed. 2, p. 203 (1900).
Trees of Great Britain and Ireland, Vol. V. p. 1162 (1910).

A tree attaining in China 70 feet in height and 6 feet in girth. Bark brown and smooth. Branches ascending and horizontal, ending in long pendulous reddish-brown terete slender branchlets. Branchlet systems, alternate, flattened, bi-pinnate; ultimate divisions compressed, $\frac{1}{20}$ inch wide, $\frac{1}{50}$ inch thick. Leaves of two kinds; lateral pairs conduplicate; facial pairs flattened, ovate, keeled or furrowed; all appressed, free and mucronate at the apex, greyish-green.

Cones globose, $\frac{1}{3}$ to $\frac{1}{2}$ inch in diameter, on slender and often curved stalks, ripening in the second year, dark brown; scales eight, each with a minute ovate process. Seeds three to five on each scale, $\frac{1}{8}$ inch long, shining reddish-brown, with scattered resin-vesicles and narrow wings.

Cupressus funebris is a native of Central China occurring in mountainous districts at elevations usually below 3,000 feet. It was discovered by Sir George Staunton, Secretary to Lord Macartney's Embassy to China, in 1793 in the Vale of Tombs near Lake Sihoo in the Hangchow prefecture of Chekiang, where it was planted in quantity round the graves.

The date of introduction into English cultivation is uncertain. Fortune sent cones to Standish in 1848 from which plants were raised at Bagshot. The species is not hardy except in the south-west of England and in Ireland. There are two small specimens at Bayfordbury.



CUPRESSUS FUNEBRIS CUPRESSUS PISIFERA CUPRESSUS OBTUSA

CUPRESSUS PISIFERA (*Koch*). Sawara Cypress.

Chamæcyparis Pisifera (*Siebold and Zuccarini*).

Veitch's Man. Conif. ed. 2, p. 224 (1900).
Trees of Great Britain and Ireland, Vol. V. p. 1190 (1910).
Gardeners' Chronicle, Vol. V. p. 235 (1876).

A tree attaining in Japan 120 feet in height and 12 feet in girth. Bark reddish-brown, scaling off in longitudinal flakes. Ultimate branchlets flattened. Leaves appressed with spreading mucronate tips; lateral pair conduplicate, acute; facial pair flattened, ovate-acuminate, obscurely glandular. Foliage shining green above, marked below with conspicuous white patches. Leaves on the main axes equal, in four ranks, $\frac{1}{8}$ to $\frac{1}{5}$ inch long, with spreading acuminate points.

Cones on short scaly branchlets, globose, $\frac{1}{4}$ inch in diameter, dark brown when mature; scales usually ten, depressed in the centre with a minute point. Seeds one or two on each scale, brown, ovate, with prominent resin-vesicles and broad lateral wings.

Cupressus pisifera, which is indigenous in the central and southern parts of the main island of Japan at an elevation of 2,000 to 5,000 feet, was introduced into England in 1861 by J. Gould Veitch. It is now common in cultivation.

The following well marked varieties occur:—

Var. squarrosa (Masters). *Retinispora squarrosa* (Siebold and Zuccarini). Usually a shrub with glaucous, silvery foliage; leaves soft in texture, in opposite decussate pairs or in fours, decurrent on the branchlet, sessile, linear, acicular, flattened, $\frac{1}{4}$ inch long. This is a variety in which the juvenile foliage is retained indefinitely. It is cultivated in Japan, where it is said to occur also as a wild tree; and was introduced into Europe in 1843.

Var. plumosa (Masters). *Retinispora plumosa* (Veitch). A dense shrub or small tree, usually of conical habit. Branchlet systems crowded, more or less overlapping, bi-pinnate, with the pinnæ in one plane. Leaves crowded in decussate pairs, $\frac{1}{6}$ inch long, subulate, ending in a sharp cartilaginous point, concave from side to side, and whitened on the inner surface. This was introduced from Japan by J. Gould Veitch in 1861.

Var. filifera (Masters). *Retinispora filifera* (Standish). A shrub or small tree with spreading branches and long pendulous branchlets, undivided for the greater part of their length and terminating towards the end in bi-pinnate divisions. Leaves in decussate pairs, subulate, sharp-pointed, about $\frac{1}{8}$ inch long, decurrent, white on their inner surface.

CUPRESSUS OBTUSA (*Koch*). Hinoki Cypress.

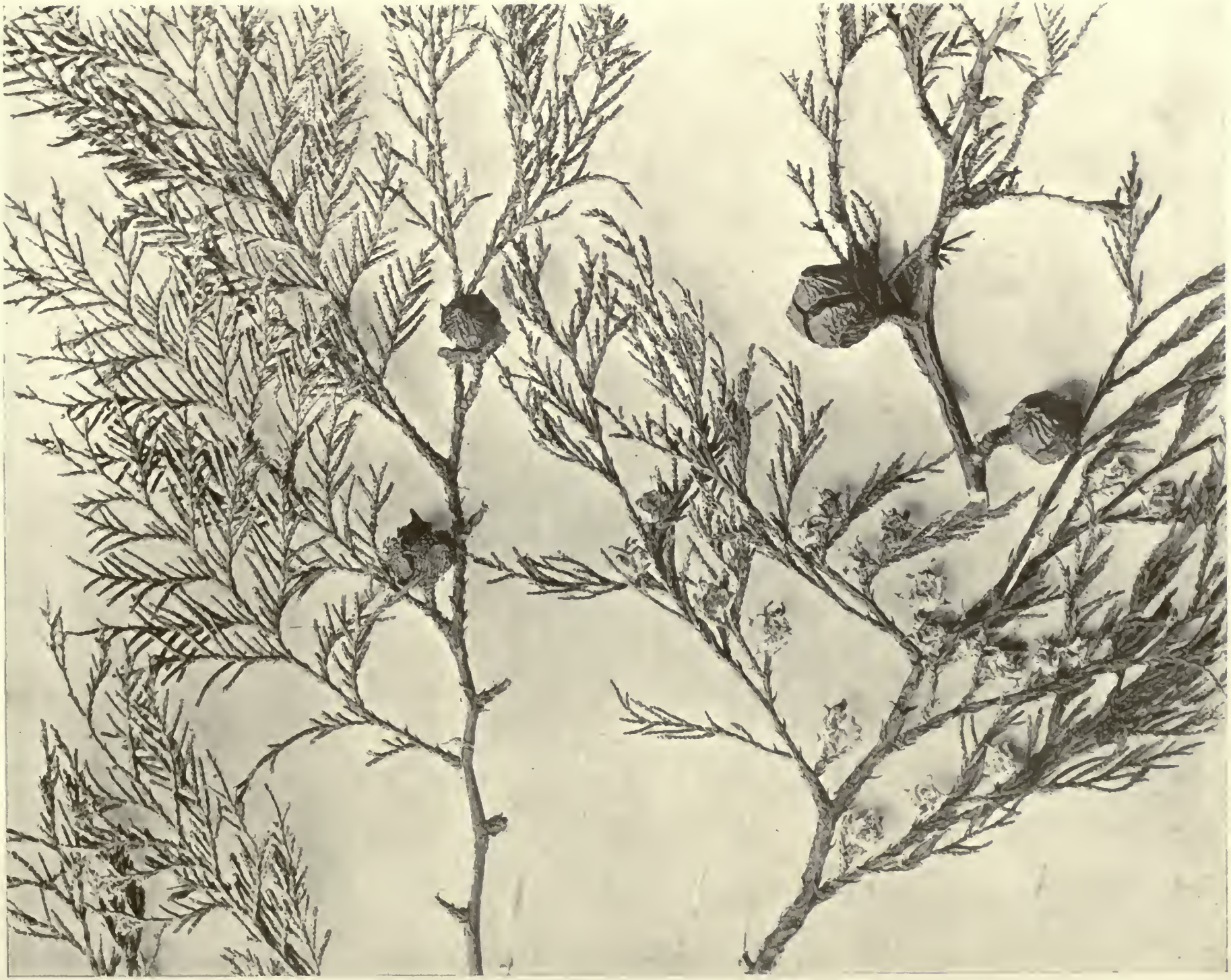
Chamæcyparis obtusa (*Siebold and Zuccarini*).

Veitch's Man. Conif. ed. 2 p. 220 (1900).
Trees of Great Britain and Ireland, Vol. V. p. 1185 (1910).

A tree attaining in Japan 120 feet in height and 12 feet in girth. Bark reddish-brown, scaling off in long thin strips. Branches close-set, spreading. Branchlets flattened, tri-pinnate. Leaves appressed; lateral pair conduplicate, $\frac{1}{12}$ inch long, obtuse; facial pair much smaller, $\frac{1}{24}$ inch long, flattened, rhomboid, often keeled, with a scarcely acute apex. Foliage dark green above, marked below with conspicuous X-shaped white markings formed by a coating of wax. Leaves on the main axes oblong, unequal; the lateral $\frac{1}{4}$ inch long; the facial $\frac{1}{8}$ inch long, with spreading obtuse points.

Cones on short scaly branchlets, $\frac{1}{3}$ inch in diameter, orange-brown when ripe; scales 8 to 10, the outer surface depressed, with a minute process in the centre of the depression. Seeds two to five on each scale, $\frac{1}{8}$ inch long, brown, narrowly winged, with conspicuous resin-vesicles.

Cupressus obtusa is indigenous in southern and central Japan at an elevation of 2,000 to 5,000 feet. It is largely planted for its valuable timber which is very durable and is used for all building and joinery purposes. It has a strong aromatic smell. This cypress was introduced into cultivation in 1861 by J. Gould Veitch. There are numerous varieties in cultivation.



CUPRESSUS LUSITANICA VAR. BENTHAMI

CUPRESSUS LUSITANICA

CUPRESSUS LUSITANICA (*Miller*). Mexican Cypress.

"Cedar of Goa."

Gardeners' Chronicle, Vol. X. p. 761 (1891) with fig.
Veitch's Man. Conif. ed. 2, p. 210 (1900).
Trees of Great Britain and Ireland, Vol. V. p. 1176 (1910).

A tree varying greatly in habit, attaining in Mexico and Portugal 100 feet in height and 12 feet in girth. Bark reddish-brown with longitudinal fissures. Branches wide-spreading, usually pendulous. Branchlet systems alternate, not flattened, bi-pinnate; ultimate divisions quadrangular, $\frac{1}{16}$ inch wide, $\frac{1}{20}$ inch thick. Leaves in four ranks, $\frac{1}{16}$ inch long, appressed, ovate-acuminate, often mucronate, occasionally pitted.

Cones about $\frac{1}{2}$ inch in diameter when mature, covered with a glaucous bloom, the points of the scales spreading and reflexed. Seeds eight to ten on each scale, $\frac{1}{6}$ inch long, winged, with resin-vesicles.

Cupressus lusitanica is a native of Mexico where it is widely distributed and occurs at altitudes ranging between 4,000 and 8,000 feet; and also extends into the high mountains of Guatemala. It has been for a long time cultivated in Portugal, where its head-quarters are in the forest of Busaco: trees 60 to 100 feet high were seen by Mr. Elwes in 1909.

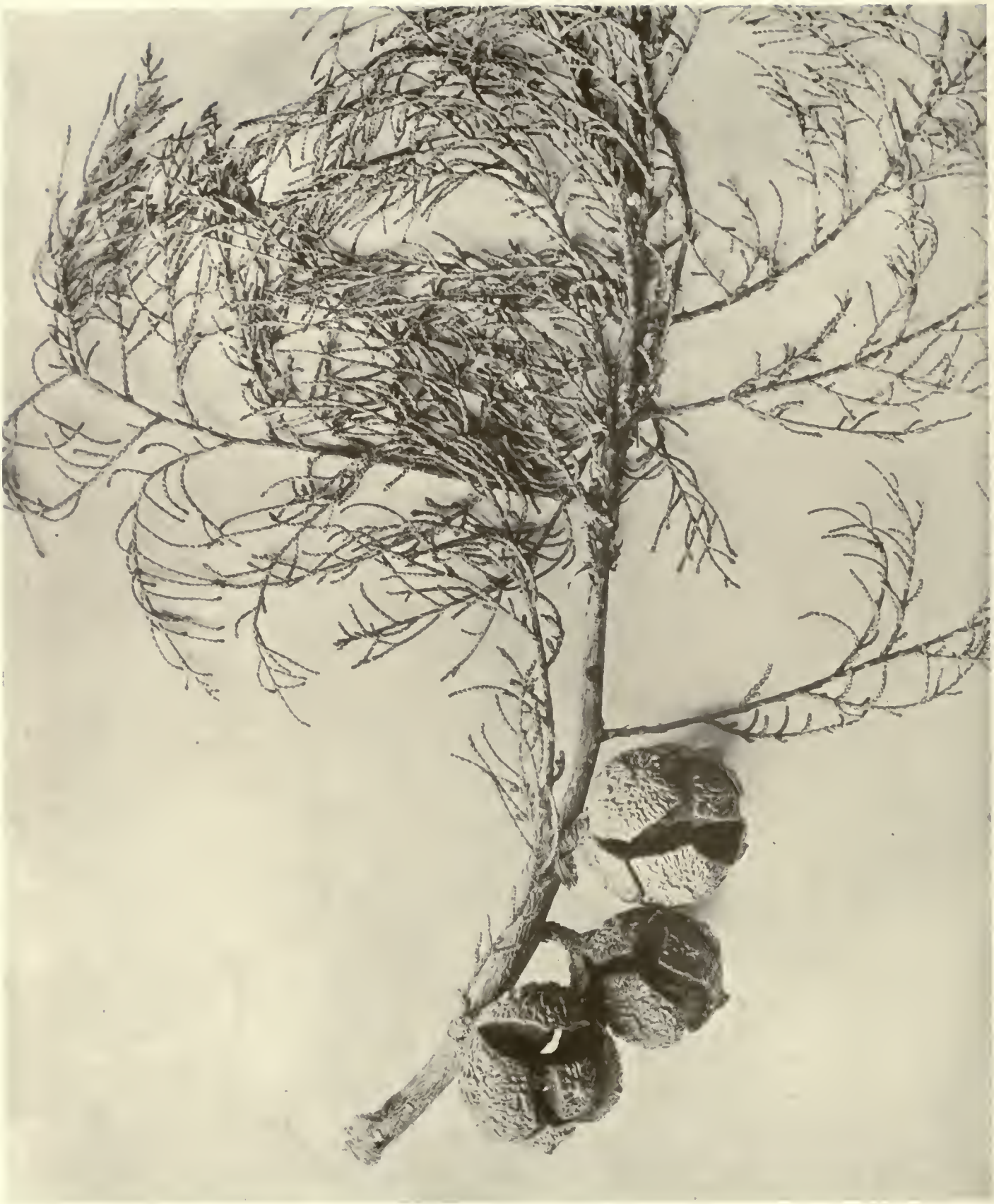
This cypress was introduced into English cultivation a few years previous to 1682, when it was growing in the Chelsea and Fulham Gardens.

CUPRESSUS LUSITANICA (*Miller*) VAR. BENTHAMI (*Carrière*).

C. Knightiana (*Knight and Perry*), *Syn. Conif.* 20 (1850).
Gardeners' Chronicle, Vol. XVI. p. 668 (1894).
Veitch's Man. Conif. ed. 2, p. 201 (1900).
Trees of Great Britain and Ireland, Vol. V. p. 1177 (1910).

A tree in Mexico of narrow pyramidal habit with regular branches. Branchlet systems more or less regularly pinnate in one plane. Ultimate divisions more flattened and compressed than in the type, $\frac{1}{16}$ inch wide, $\frac{1}{32}$ inch thick. Leaves: lateral pair narrow, conduplicate, with acuminate free mucronate tips; facial pair flattened, ovate-acuminate; all usually marked with a central circular glandular depression. Bark, cones and seeds as in the type.

Cupressus lusitanica var. *Benthami* occurs in the wild state in Mexico; and was introduced according to Loudon under the name *C. thurifera* in 1838, when there was a plant a few inches high in the Horticultural Society's Garden at Chiswick. It thrives in the milder parts of the British Isles.



CUPRESSUS MACROCARPA VAR. GUADALUPENSIS

CUPRESSUS MACROCARPA (*Hartweg*), VAR. GUADALUPENSIS (*Masters*).

CUPRESSUS GUADALUPENSIS (*Watson*).

Journ. Linn. Soc. (*Bot.*) Vol. XXXI. p. 343 (1896).
Trees of Great Britain and Ireland, Vol. V. p. 1166 (1911).
Proc. Amer. Acad. Vol. XIV. 1879, p. 300, as a species.

This cypress is a native of Guadalupe Island, Lower California, where it attains 40 feet in height and 6 to 15 feet in girth. Bark very smooth. Branches drooping, with slender branchlets; foliage glaucous; leaves acute, obscurely glandular on the back. Cones globose, one inch or more in diameter, composed of 6 to 8 very thick and strongly bossed scales. Seeds numerous, three lines or more in diameter. It is distinguished from typical *C. macrocarpa* by its very smooth bark, slender branchlets and more glaucous foliage.

Watson considered this tree distinct and described it as a separate species; but it is usually regarded as a geographical form or variety of *C. macrocarpa*. (Vol. II. p. 72).

The specimen illustrated was obtained from a tree at Antibes, France.

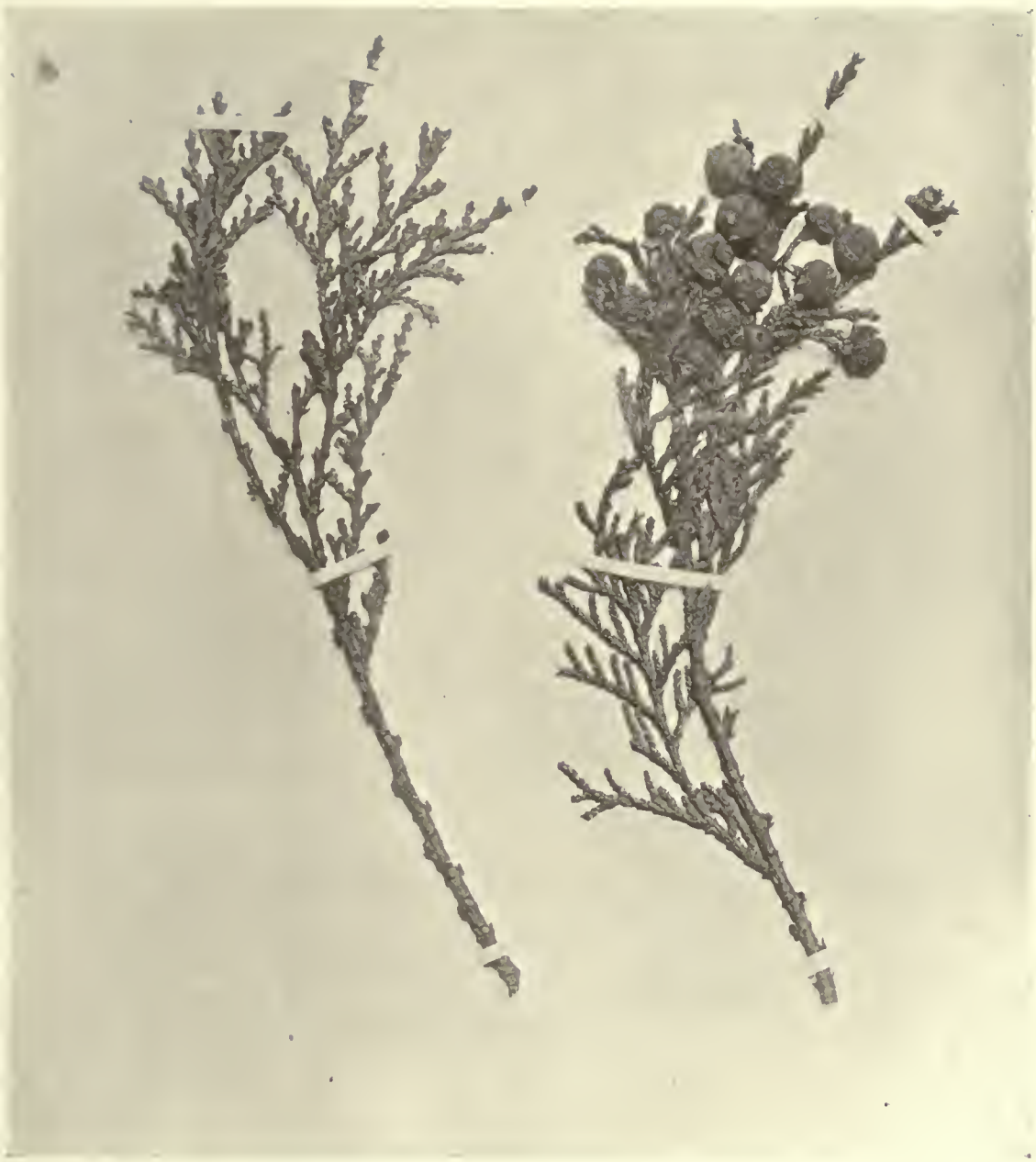
CUPRESSUS OBTUSA (*Koch*), Forma formosana (*Hayata*).

Gardeners' Chronicle, Vol. XLIII. p. 194 (1908).
Trees of Great Britain and Ireland, Vol. V. p. 1188 (1910).

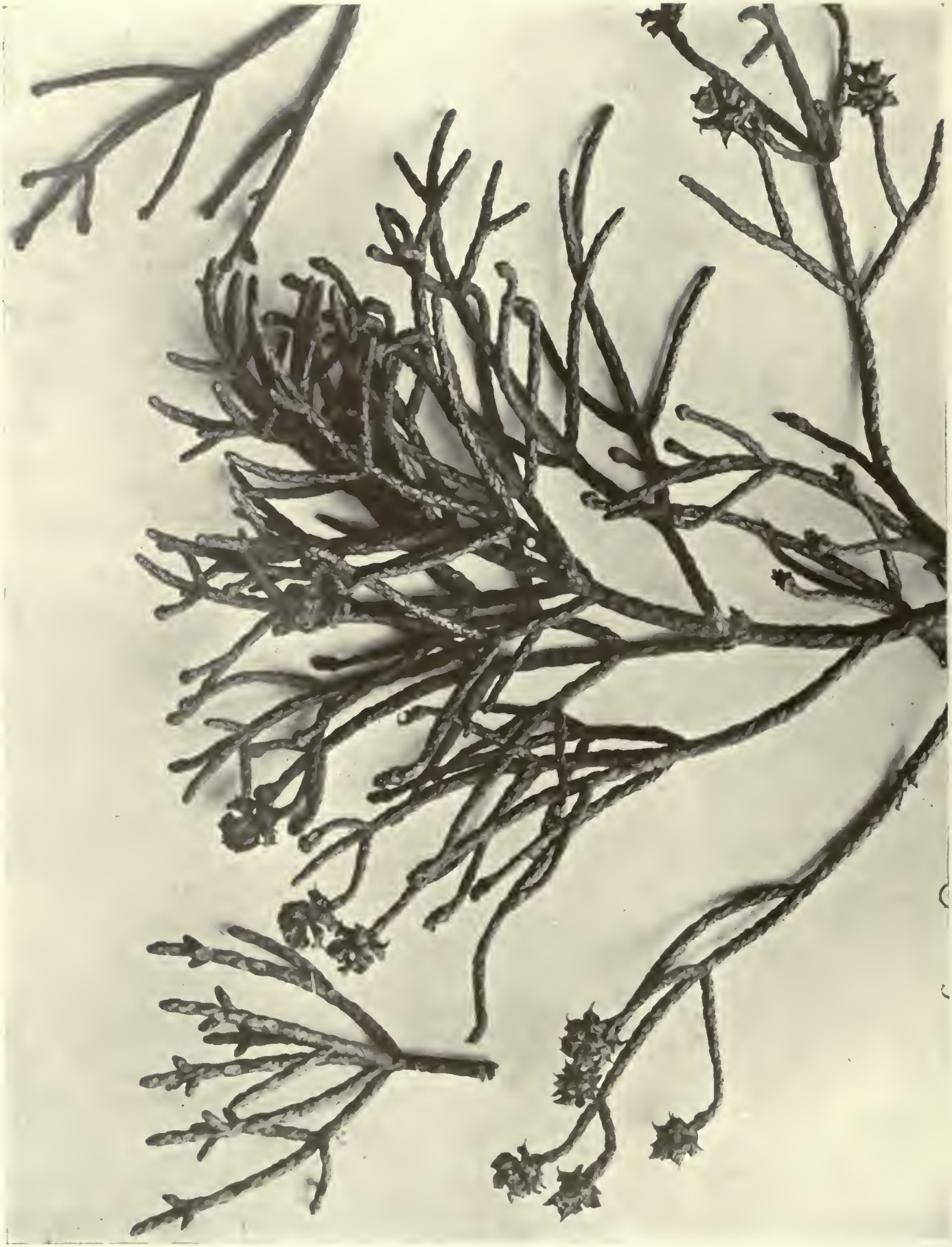
This tree, according to Hayata, attains a height of 130 feet in the mountains of Formosa, where it is associated with *Cupressus formosensis*. It differs from the typical Japanese form in having smaller leaves, cones and seeds. The ripe cones are about $\frac{1}{4}$ inch in diameter, while the seeds, including the wings, average only $\frac{1}{12}$ inch across.

The Formosan variety of *C. obtusa* was introduced in 1910, when seed was sent to Bayfordbury by Capt. Matsumura, Imp. Jap. Navy; one seedling only was raised, which had attained 10 inches in height in October, 1911.

The illustration is from a specimen collected by Mr. Firth, H.B.M. Vice-Consul at Tamsui, Formosa.



CUPRESSUS OBTUSA FORMA FORMOSANA



ATHROTAXIS CUPRESSOIDES

ATHROTAXIS CUPRESSOIDES (*Don*).

Trans. Linn. Soc. Vol. XVIII. p. 173 (1839) with fig.
Gardeners' Chronicle, Vol. XXIV. p. 273 (1885) with fig.
Veitch's Man. Conif. ed. 2, p. 261 (1900).
Baker and Smith, Pines of Australia, p. 313 (1910).
Trees of Great Britain and Ireland, Vol. VI. p. 1452 (1912).

A tree attaining in Tasmania a height of 25 to 50 feet with a girth of 4 to 5 feet. Bark reddish-brown, peeling off in ribbon-like shreds. Branchlets pseudo-opposite or alternate, densely clothed with scale-like leaves, which appear to be in opposite decussate pairs, but are really spirally arranged, closely appressed, obtuse, thick and keeled, about $\frac{1}{8}$ inch long, with a denticulate and translucent margin.

Staminate flowers similar to those of *A. selaginoides*. Cones terminal, about $\frac{1}{2}$ inch in diameter, smaller than in the other species, spherical, composed of 10 to 12 scales, less than $\frac{1}{4}$ inch long, with a triangular recurved process on the middle of the expanded lamina.

Athrotaxis cupressoides is found wild in Tasmania on the Western Mountains near Lake St. Clair. It was introduced into cultivation about 1857 by Mr. W. Archer, but is rare in cultivation.

The specimen illustrated was obtained from Tremough, Cornwall.

ATHROTAXIS LAXIFOLIA (*W. J. Hooker*).

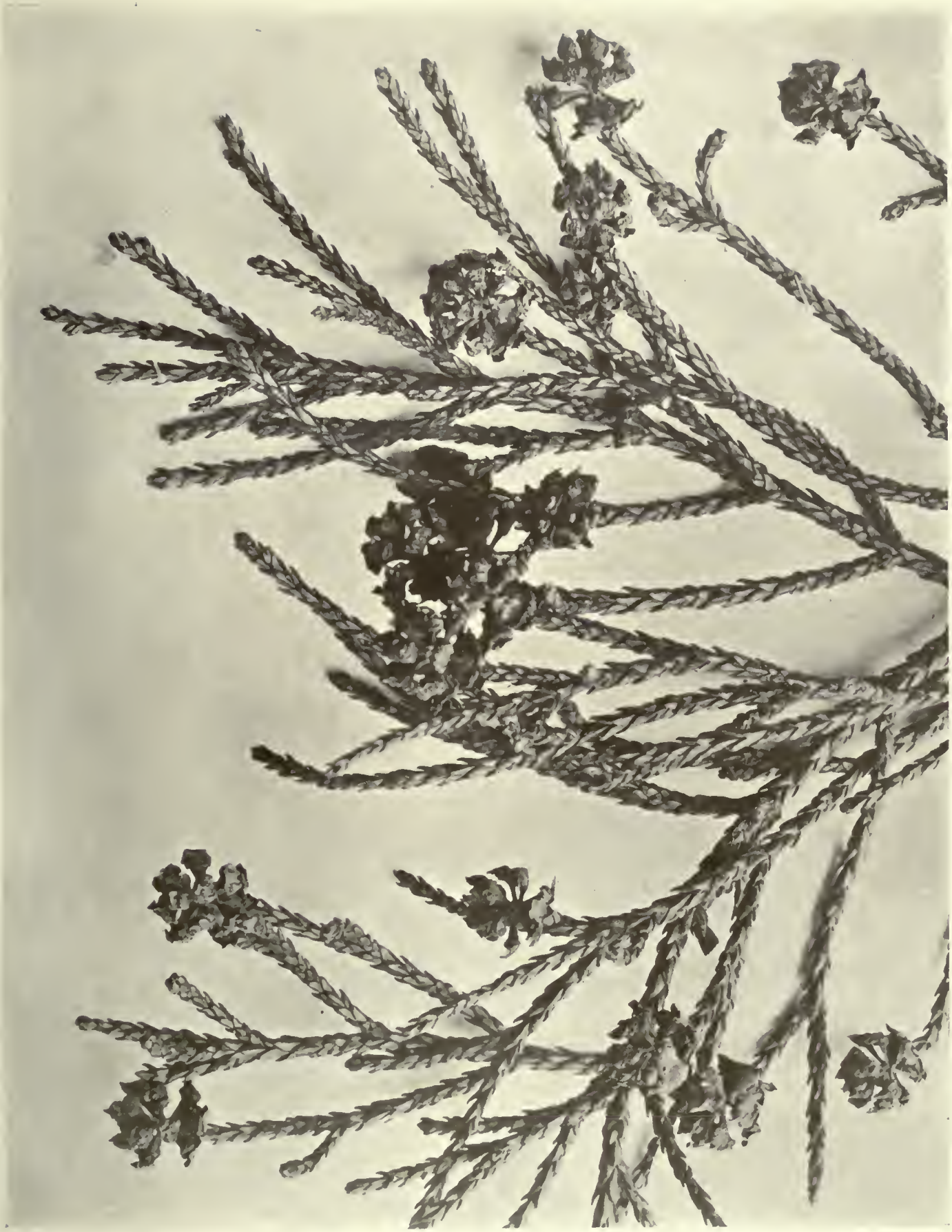
Icon. Pl. t. 573 (1843).
Gardeners' Chronicle, Vol. IX. Series 3, p. 144 (1891) with fig.
" " Vol. IV. " " p. 544 (1888) " "
Veitch's Man. Conif. ed. 2, p. 261 (1900).
Baker and Smith, Pines of Australia, p. 313 (1910).
Trees of Great Britain and Ireland, Vol. VI. p. 1451 (1912).

A tree attaining in Tasmania 25 to 40 feet in height, with a slender trunk covered with a reddish-brown bark, which peels off in longitudinal shreds. Leaves spirally arranged, closely imbricated, slightly spreading, about $\frac{1}{4}$ inch long, obtuse or acute at the incurved apex; outer surface keeled and with two lateral stomatic depressions near the base; inner surface concave and with two longitudinal white stomatic bands; margin entire, translucent.

Staminate flowers like those of *A. selaginoides*. Cones terminal, about $\frac{3}{4}$ inch in diameter, spherical in shape; scales 15 to 20 with a slender cuneate claw, and a thickened oval extended lamina, bearing on the back a large ovate acute process.

Athrotaxis laxifolia occurs on the summits of the Western Mountains of Tasmania at about 4,000 feet elevation. It was introduced by the late Mr. W. Archer, of Cheshunt, about the year 1857, and is cultivated as far north as Durris in Kincardineshire, where it has produced good seed, from which seedlings were raised which are now growing at Bayfordbury.

The illustration represents a specimen from Tremough, Cornwall.



ATHROTAXIS LAXIFOLIA

ATHROTAXIS SELAGINOIDES

ATHROTAXIS SELAGINOIDES (*Don*). "KING WILLIAM PINE."

Trans. Linn. Soc., Vol. XVIII. p. 172. t. 14 (1839).
Gardeners' Chronicle, Vol. IV. series 3, p. 544 (1888), with fig.
Veitch's Man. Conif. ed. 2, p. 262 (1900).
Baker and Smith, Pines of Australia, p. 303 (1910).
Trees of Great Britain and Ireland, Vol. VI. p. 1450 (1912).

A tree attaining in Tasmania a maximum height of 100 feet and a girth of 9 feet, generally unbranched for about three-quarters of its height and with a dense irregular crown of branches. Bark reddish-brown and fibrous, exfoliating in longitudinal shreds. Leaves spirally arranged, about ½ inch long, loosely imbricated, incurved, thick, rigid, subulate, inner surface with two glaucous stomatic bands from base to apex; outer surface convex, keeled, with two stomatic depressions near the base; margin entire, opaque.

Flowers monœcious, terminal. Staminate flowers small, solitary, with crowded imbricated stamens. Cones terminal, nearly globose, composed of 20 to 24 scales, with a narrow cuneate base, and an oval or ovate expanded inflexed lamina which terminates in a triangular thin process.

Athrotaxis selaginoides occurs wild in the Western Mountains, Tasmania, at an altitude of 1,000 to 2,000 feet. It was introduced about the year 1857 by Mr. W. Archer of Cheshunt, but is rare in cultivation.

The specimen illustrated was obtained from Glasnevin.

TORREYA CALIFORNICA (*Torrey*).

New York Journ. Pharm. III. p. 49 (1854).
Gardeners' Chronicle, Vol. XXIV. p. 553 (1885) with fig.
,, ,, ,, V. ser. 3, p. 800 (1889) ,, ,,
Veitch's Man. Conif. ed. 2, 117 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1465 (1912).

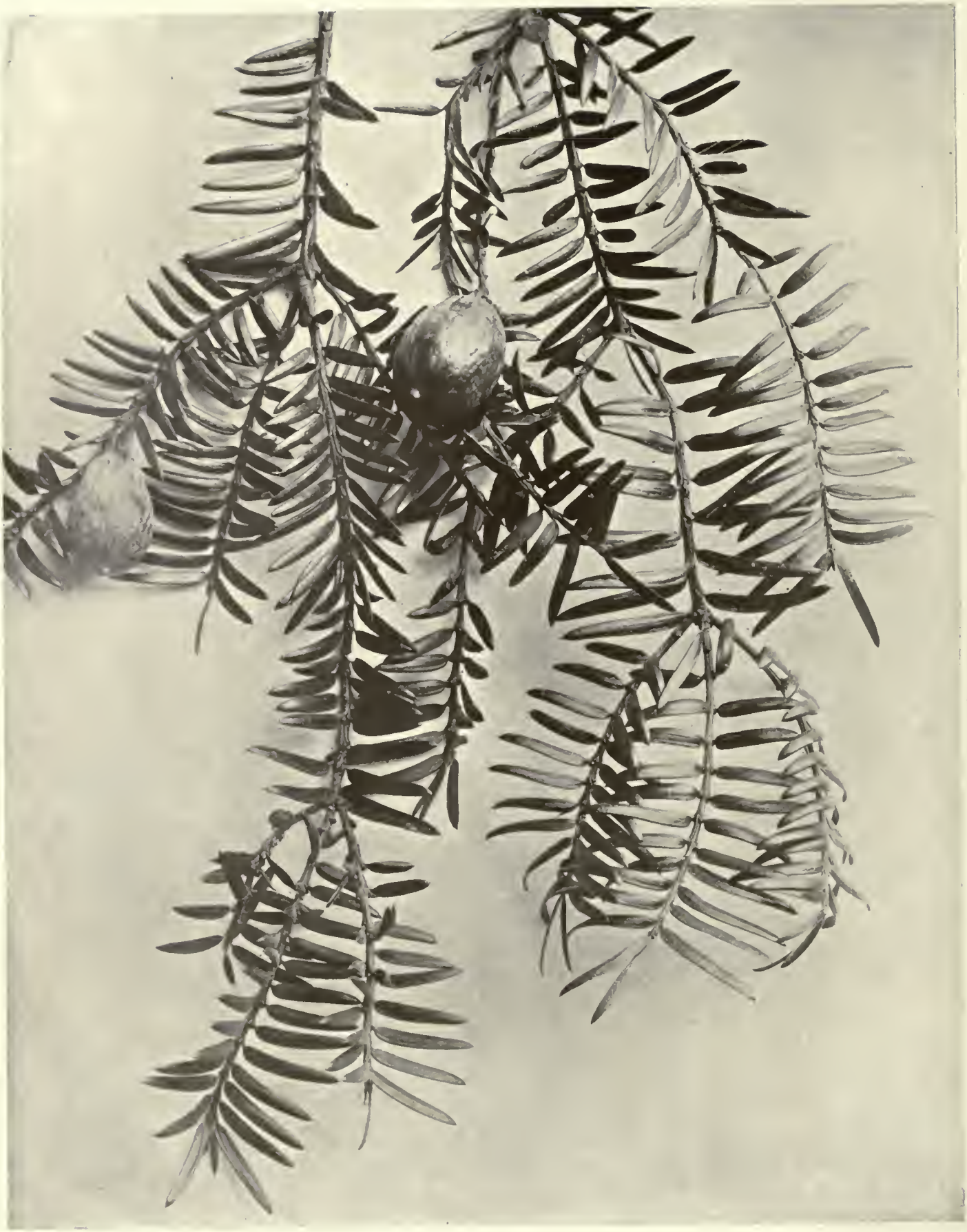
A tree attaining in California a height of 50 to 100 feet with a girth of 3 to 9 feet. Branches spreading, branchlets opposite. Buds prismatic, acute, with closely imbricated brown scales. Leaves evergreen, spirally arranged, but spreading laterally in two ranks, rigid, linear, with spiny points, 1½ to 3 inches long, curved or straight, dark shining green above, paler beneath, with a longitudinal depressed white stomatic band on each side of the midrib.

Staminate flowers globose, about ⅓ inch in diameter, in the axils of the leaves of the terminal shoots. Fruit solitary, ellipsoid or obovoid, 1 to 1½ inches long, green, more or less streaked with purple; flesh thin and resinous, the inner woody shell slightly furrowed.

Torreya californica, which was introduced into cultivation in Great Britain in 1851, occurs wild on the borders of mountain streams in California, at an altitude of 3,000 to 5,000 feet, but is nowhere common.

The specimen illustrated was obtained from Orton Longueville.

TORREYA CALIFORNICA



TORREYA GRANDIS

TORREYA GRANDIS (*Fortune*).

Gardeners' Chronicle, 1857, p. 788.
„ „ 1858, p. 588.
„ „ 1860, p. 170.
„ „ 1884, p. 681, with fig.
Gordon's Pinetum, p. 326 (1858).
Trees of Great Britain and Ireland, Vol. VI. p. 1464 (1912).

An evergreen tree attaining in China, according to Fortune, a height of 60 to 80 feet. Young shoots green, glabrous. Buds ovoid, $\frac{1}{10}$ inch long, with broad rounded shining scales. Leaves without a disagreeable or pungent odour, spreading at right angles to the stem in a two-ranked arrangement, about $\frac{3}{4}$ inch long, linear, dark green and shining above, paler below with two stomatic bands in narrow furrows on each side of the midrib. Fruit ellipsoid, about one inch long, with a reddish-brown shell.

Torreya grandis was discovered by Fortune in the mountains of Chekiang, on the east coast of China, in 1855. It is closely allied to the Japanese *T. nucifera*, but differs in its leaves, which are shorter, straighter, more crowded, and with acute and not acuminate points. It is now rare in cultivation in England.

The specimen illustrated was kindly forwarded by M. Allard, from Angers, France.

TORREYA NUCIFERA (*Siebold and Zuccarini*).

Abh. Akad. Muenchen, III., pt. IV. p. 284 (1846).
Fl. Jap. II. p. 64 t. 129 (1870).
Veitch's Man. Conif. ed. 2, p. 119 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1463 (1912).

A tree attaining in Japan 20 to 80 feet in height and 12 to 15 feet in girth; bark red. Branchlets opposite, green when young, changing to reddish-brown in the second year. Terminal buds prismatic, with light-brown membranous scales. Leaves spirally placed on the branchlets, but thrown by the twisting of their bases into a pectinate arrangement, linear, acute, $\frac{3}{4}$ to $1\frac{1}{4}$ inch long, terminating in a sharp spine, rigid, more or less curved, shining above; lower surface with a deeply depressed stomatic band on each side of the midrib.

Staminate flowers about $\frac{1}{3}$ inch long. Fruit variable in size and shape, similar to that of *T. californica*.

Torreya nucifera occurs wild in the southern islands of Japan and in the forests of southern and central Hondo, where it sometimes attains a height of 80 feet. It was described by Kaempfer in 1712, and according to Aiton was introduced into cultivation in England in 1764, but is rarely seen except in botanic gardens.

The specimen illustrated was sent by M. Allard, from Angers, France.

TORREYA NUCIFERA

TORREYA TAXIFOLIA

TORREYA TAXIFOLIA (*Arnott*). Stinking Cedar.

Arn. Nat. Hist. I. 130 (1838), with fig.
Gardeners' Chronicle, Vol. IV, New Series, p. 291 (1875).
Veitch's Man. Conif. ed. 2, p. 119 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1466 (1912).

A tree attaining in Florida a height of 40 feet, and a girth of 3 to 6 feet. Branches spreading, slightly pendulous, forming an open pyramidal head. Bark about $\frac{1}{2}$ inch thick, irregularly fissured and scaly. Young branchlets bright green and glabrous, becoming dark yellowish-red when older. Buds ovoid, $\frac{1}{5}$ to $\frac{1}{4}$ inch long, with ovate sharp-pointed shining scales.

Leaves linear, spreading at right angles to the branchlet in a two-ranked arrangement, linear, nearly straight, 1 to $1\frac{1}{4}$ inch long, sharp-pointed, dark green and shining above, rounded at the base, shortly stalked; lower surface with two pale stomatic bands in shallow grooves. The foliage has a very disagreeable smell.

Staminate flowers sub-globose, $\frac{1}{4}$ inch long, crowded in the axils of the upper leaves. Fruit globose or ovoid, about $1\frac{1}{2}$ inch long, dark purple, with a thin light brown shell.

Torreya taxifolia is only known as a wild tree in the region bordering the Appalachicola river in Gadsden County, Florida, where it grows on limestone soil and in river swamps. It was discovered by Mr. H. C. Croom in 1833. It is not in cultivation in the British Isles.

The illustration represents a specimen collected in Florida, in 1900, by Mr. A. H. Curtiss, and photographed at the British Museum Herbarium.

CEPHALOTAXUS DRUPACEA (*Siebold and Zuccarini*).

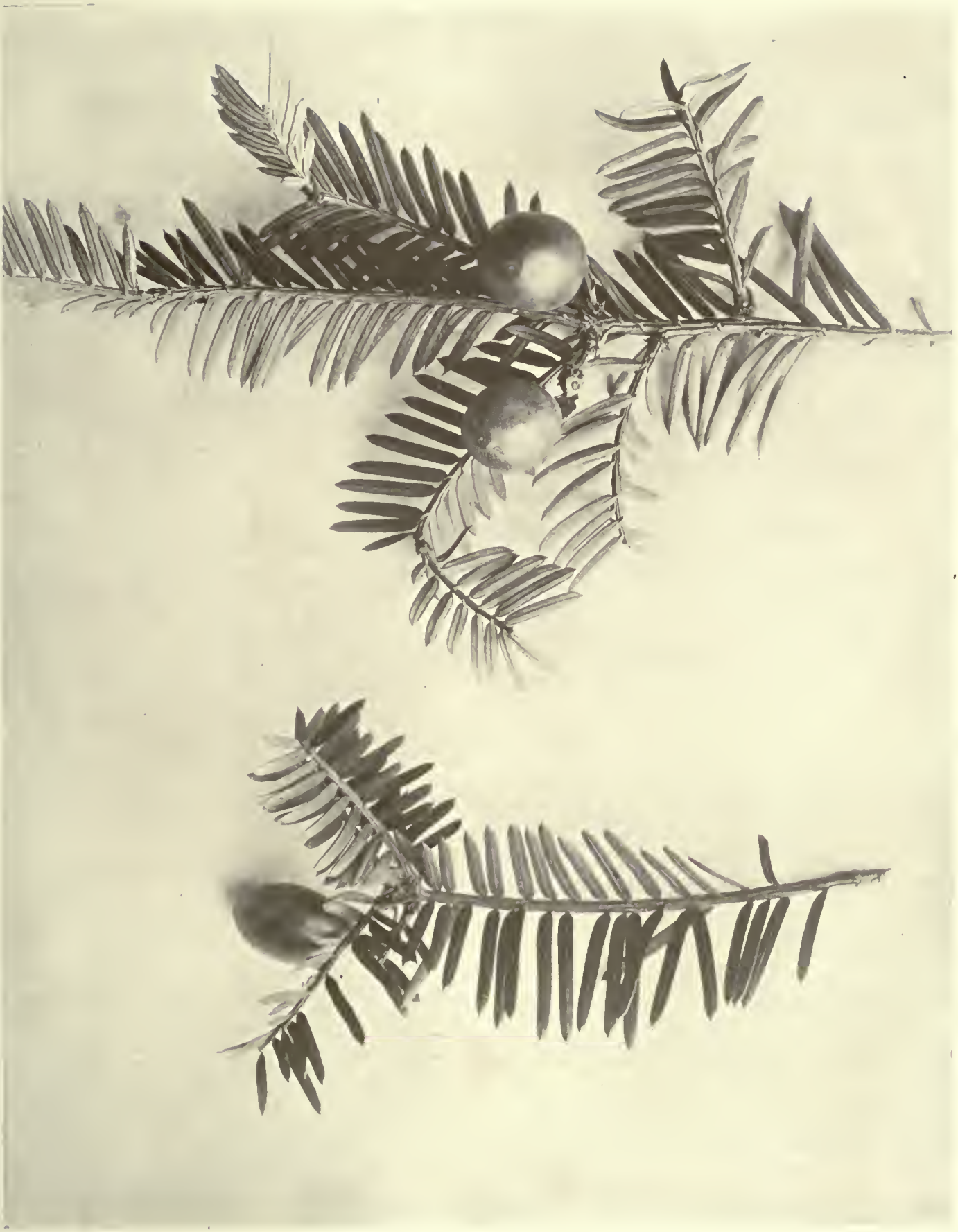
Fl. Jap. Fam. Nat., Vol. II. p. 108 (1846).
Gardeners' Chronicle, Vol. XXI. p. 113 (1884) with fig.
Veitch's Man. Conif. ed. 2, p. 112 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1469 (1912).

A small tree with spreading branches, attaining in the mountains of Japan and Central China a height of 20 to 40 feet. In cultivation it is usually shrubby in habit scarcely exceeding 10 feet in height. Branchlets shining green, prominently grooved. Buds small, about $\frac{1}{10}$ inch long, green, with ovate-lanceolate, imbricate scales.

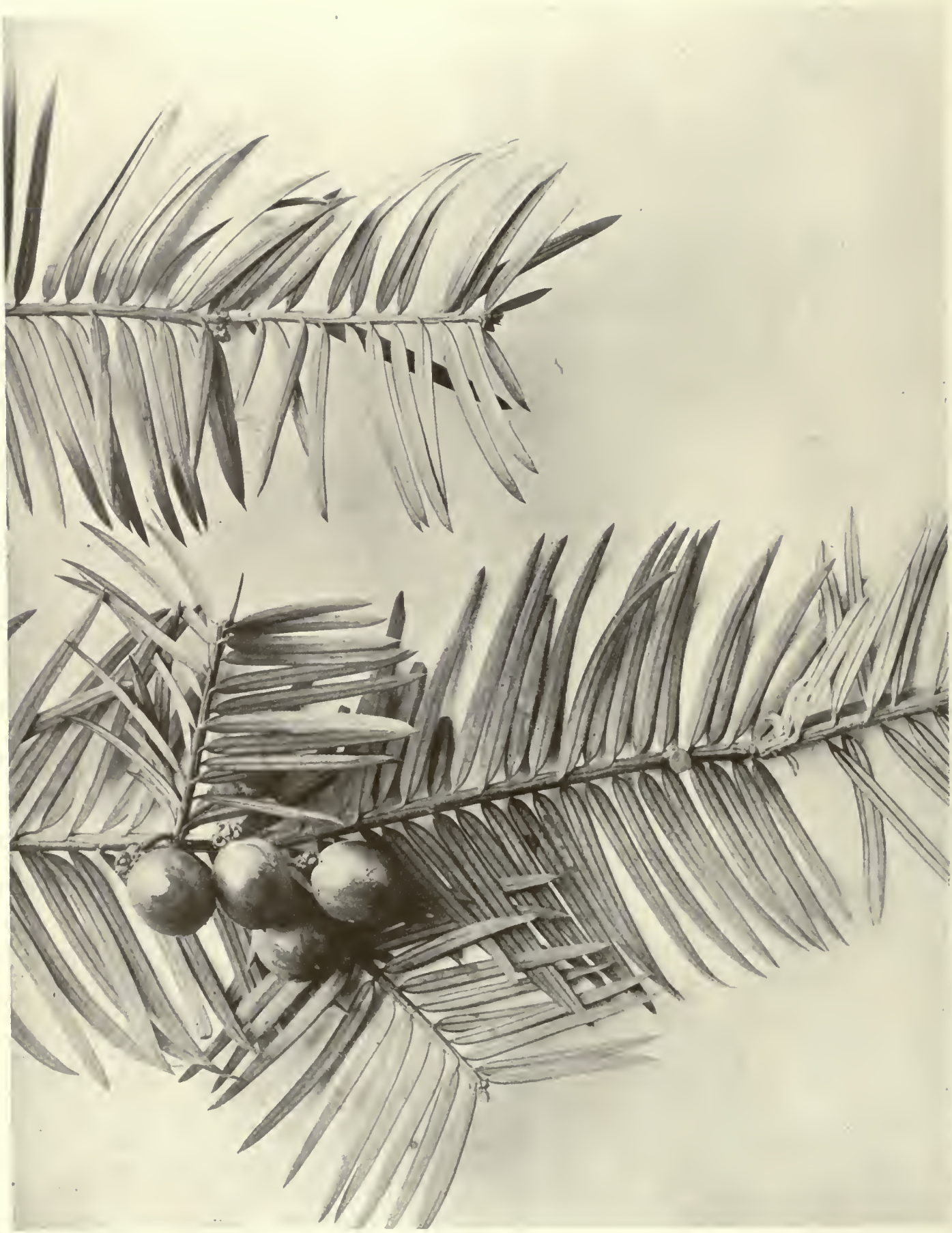
Leaves about 1 to $1\frac{1}{2}$ inch long, shortly stalked, linear-lanceolate, abruptly pointed, curving upwards and outwards in a pectinate arrangement, dark green and lustrous above; paler beneath with lines of stomata forming broad bands on either side of the midrib. Staminate flowers $\frac{1}{3}$ inch in diameter, in pairs along the underside of shoots of the preceding year. Fruit pyriform, 1 inch long by $\frac{3}{4}$ inch in diameter at the broadest part, chestnut-brown when ripe.

Cephalotaxus drupacea, which was introduced into cultivation at Leyden about 1829 by Siebold, is wild in the mountains of Japan, where it is widely distributed at altitudes ranging between 1,000 and 3,000 feet. It also occurs in Central China.

The photograph represents a specimen obtained from Kew Gardens.



CEPHALOTAXUS DRUPACEA



CEPHALOTAXUS FORTUNEI

CEPHALOTAXUS FORTUNI (*W. J. Hooker*).

Botanical Magazine, t. 4499 (1850).
Gardeners' Chronicle, Vol. XXI. *p.* 114 (1884) *with fig.*
Veitch's Man. Conif. ed. 2, p. 113 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1470 (1912).

A tree attaining in Central China a height of 40 feet; usually in cultivation an irregularly branched shrub seldom exceeding 20 feet in height. Branchlets green, furrowed. Buds ovoid, with ovate-lanceolate, imbricate scales. Leaves pectinate, spreading outwards in two lateral sets, 2 to 3 inches long, linear, gradually acuminate, tapering at the base into a short twisted petiole, curved at the sharp point, dark shining green above; pale below, with two broad bands of stomata on either side of the midrib.

Male flowers globose, $\frac{1}{5}$ inch in diameter, on a short scaly stalk, arranged in pairs in the axils of leaves. Fruit drupe-like, fleshy, ovoid, an inch or more in length and about $\frac{3}{4}$ inch in diameter, olive green when ripe.

Cephalotaxus Fortuni was introduced in 1848 by Robert Fortune who discovered it in the province of Chekiang.

The specimen illustrated was obtained from the Arboretum at Kew.

CEPHALOTAXUS PEDUNCULATA (*Siebold and Zuccarini*).

Fl. Jap., Fam. Nat. II. 108 (1846).
Gardeners' Chronicle, Vol. XXI. p. 113 (1884).
Veitchs' Man. Conif. ed. 2, p. 114 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1471 (1912).

A large shrub with spreading branches. Branchlets green, furrowed. Buds cylindric-conic with imbricated scales. Leaves spirally disposed in two lateral sets, forming a V-shaped arrangement on the upper side of the branchlet, pointing upwards and outward, linear, sub-sessile, dark shining green above; pale below with two broad bands of stomata on either side of the midrib, shortly acuminate or mucronate, unequal in length, about 2 inches long, generally shorter than those of *C. Fortuni* and less acuminate.

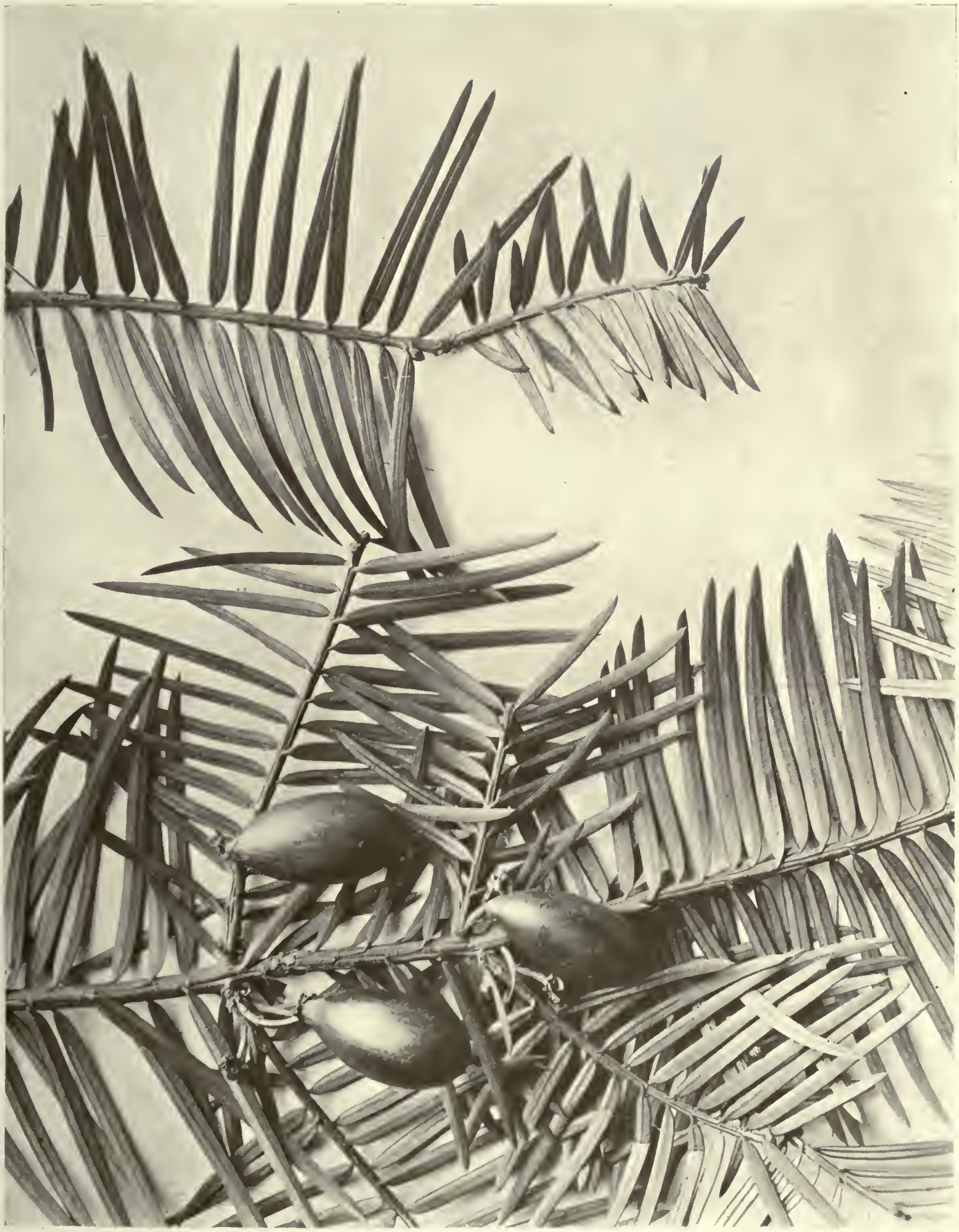
Staminate flowers on peduncles about $\frac{1}{2}$ inch long; peduncles and flower-heads with ovate bracts. Fruit drupe-like, fleshy, ellipsoid, about 1 inch long.

Var. *fastigiata* (Carrière) is a remarkable form of columnar habit, with upright branches and spreading radially-arranged leaves which are of a darker green colour than in the typical form.

Cephalotaxus pedunculata is intermediate in character between *C. drupacea* and *C. Fortuni*, and is probably a hybrid between them. It is clearly distinct in its pedunculate male flowers. The foliage is of a paler green than *C. drupacea* but darker than *C. Fortuni*.

This species has been long cultivated in Japan, where it was introduced from Korea or China. It was brought into the Botanic Gardens at Leyden by Dr. Siebold with *C. drupacea*. In this country it has been known as a garden plant since 1837, and was formerly cultivated under the name of *Taxus Harringtonia*.

The illustration represents a specimen obtained from the Arboretum at Kew.



CEPHALOTAXUS PEDUNCULATA

PICEA COMPLANATA

PICEA COMPLANATA (*Masters*).

Gardeners' Chronicle, Vol. XXXIX. p. 146 (1906) with figs.

A tree attaining in China a height of 40 to 100 feet. Branchlets pubescent, yellowish, with prominent pulvini. Buds ovoid-conic, covered with dark brown shining leathery scales. Leaves ½ inch long, linear, acute, not apiculate, flattened, with the midrib prominent above and beneath, silvery white on the upper surface.

Cones 4 to 5 inches long, oblong-cylindric; scales broadly obovate with a cuneate base, upper border truncate or rounded, denticulate. Seeds with a ferruginous membranous oblong wing.

Picea complanata was discovered in 1905 by Mr. E. H. Wilson during his expedition in Western Szechuan, China, and introduced into cultivation in the same year. It forms forests at altitudes of 5,000 to 8,000 feet.

This species is allied to *P. spinulosa*, but differs from it in its leaves and cone scales. Two young specimens were planted at Bayfordbury in 1911.

The illustration is a reproduction of a specimen kindly lent by Messrs. Veitch.

PICEA MAXIMOWICZII (*Regel*).

Ind. Sem. Hort. Petrop. 33 (1865).
Gardeners' Chronicle, Vol. XIII. p. 363 (1880).
Trees of Great Britain and Ireland, Vol. VI. p. 1374 (1912).

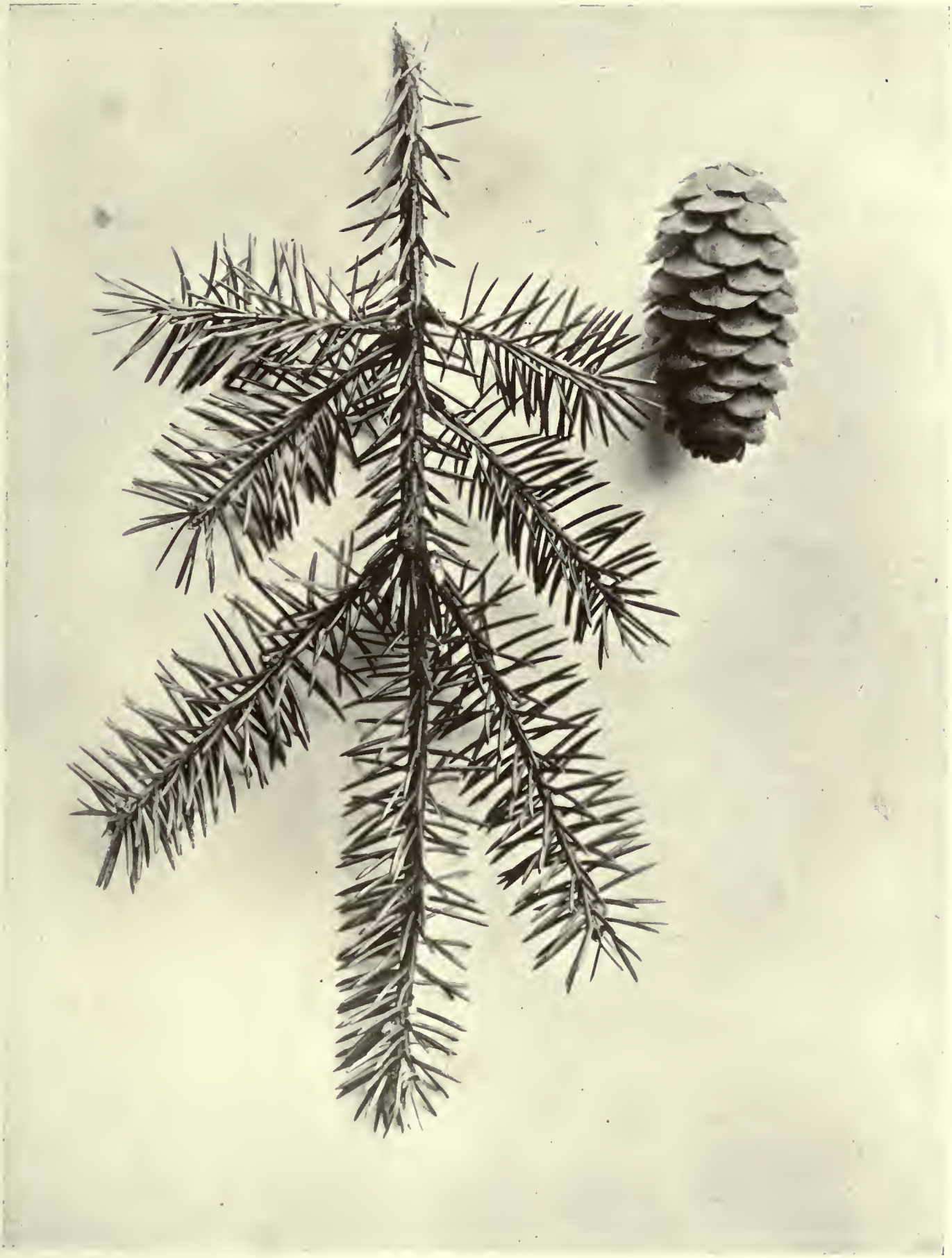
A small tree attaining about 40 feet in height. Branchlets reddish-brown, glabrous. Buds broadly ovoid, about $\frac{1}{8}$ inch long, with resinous scales. Leaves radially spreading at right angles to the branchlet, quadrangular in section, about $\frac{1}{2}$ inch long; dark-green, shining on the edges, with lines of stomata on all four surfaces, and tipped with a short blunt point.

Cones cylindrical but tapering at both ends, 2 inches long; scales numerous, concave, with a rounded entire bevelled upper margin.

This species was discovered in 1864 on Mount Fujiyama in Japan by Tschonoski, a Japanese in the employment of Maximowicz. Some of the original specimens are in the herbaria at Kew and the British Museum. It has not since been found by the Japanese.

It was first raised in St. Petersburg from seed sent in 1865 from the original locality by Tschonoski.

There is a young specimen at Bayfordbury. The illustration figured is a branch and cone grown at Grignon, France, and kindly sent by Mons. R. Hickel.



PICEA MAXIMOWICZII

ABIES CEPHALONICA VAR. APPOLINIS

ABIES CEPHALONICA *(Loudon).* VAR. APOLLINIS *(Beissner).*

Nadelholzkunde, p. 440 (1891).
Veitch's Man. Conif. ed. 2, p. 498 (1900).
Trees of Great Britain and Ireland, Vol. IV. p. 740 (1909).

This variety differs from the type figured in Vol. II. p. 9 in the arrangement and shape of the leaves. On lateral branches the radial arrangement is imperfect, most of the leaves standing crowded on the upper side of the branchlet with their apices directed upwards, those in the middle line straight and vertical, those on the sides curved and bending upwards; on the lower side of the branchlet, a few leaves are directed downwards and forwards. Leaves thicker and broader than in the type, about $1\frac{1}{4}$ inch long, by $\frac{1}{16}$ to $\frac{1}{12}$ inch broad, with acute and not acuminate points.

This fir is intermediate between *A. pectinata* and *A. cephalonica.* Murray in a note in "Proceedings of Royal Horticultural Society," 1863, p. 141, considered it a distinct species; but the differences noted by him in the broader bracts of the cone and the wider wing of the seed are trifling and inconstant.

In a wild state it occurs on the mountains in the mainland of Greece.

The specimen figured is from a tree at Poles, Ware, which was 70 feet high and coned profusely in 1911.

ABIES WEBBIANA (*Lindley*). VAR. BREVIFOLIA (*Henry*).

Trees of Great Britain and Ireland, Vol. IV. p. 751 (1909).

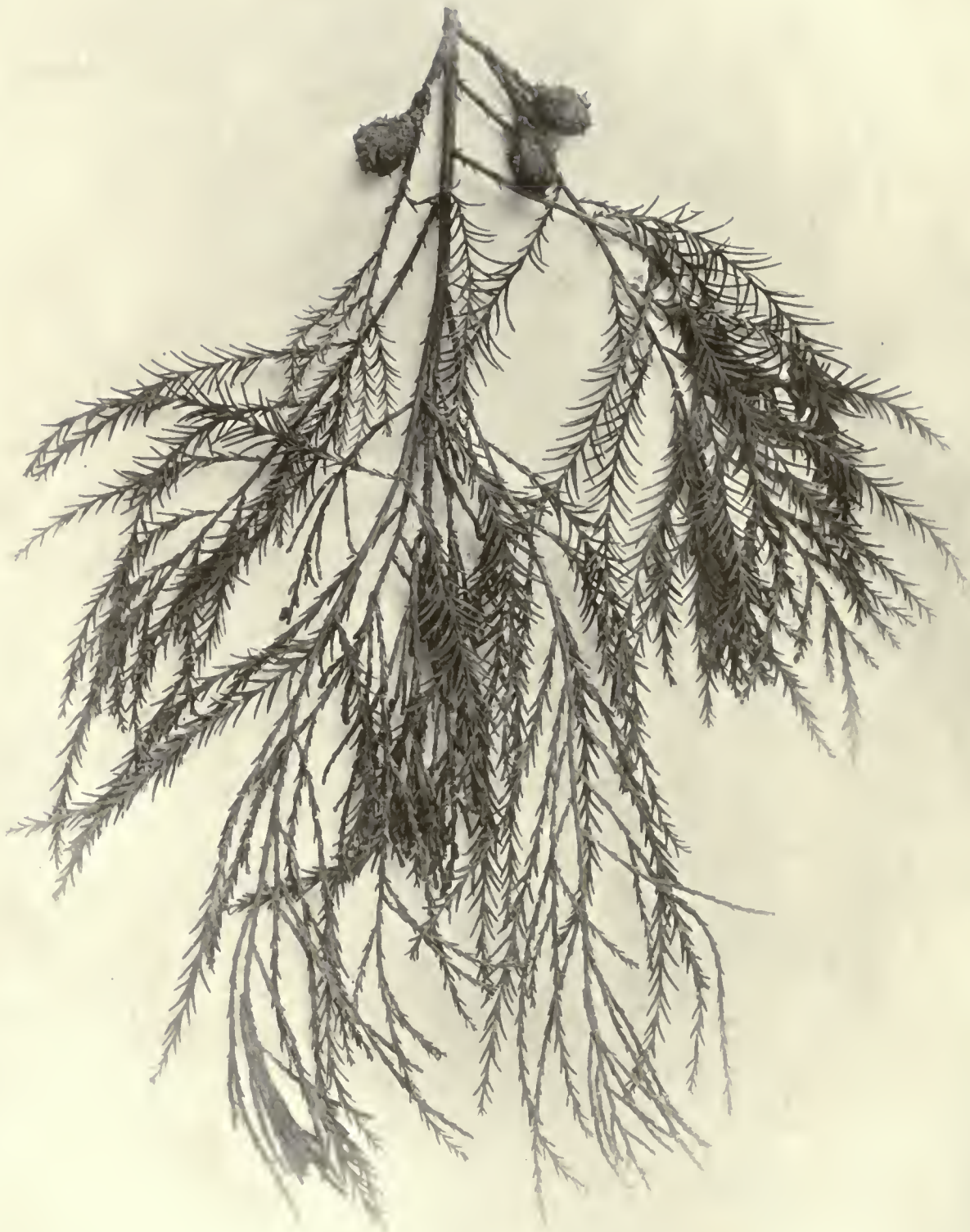
This differs from the typical form described in Vol. II. p. 29, in having much shorter leaves, $\frac{3}{4}$ to 1 inch long, greyish and not silvery-white beneath. Cones also smaller, averaging $3\frac{1}{2}$ inches long and $1\frac{3}{4}$ inch in diameter, very dark blue or almost black in colour.

This variety, though remarkably distinct in appearance, agrees with the typical form in the large resinous buds, in the arrangement of the leaves, and in the peculiar furrowed branchlets with reddish-brown pubescence confined to the furrows.

Abies Webbiana, var. *brevifolia*, is a native of the western Himalayas, where it grows at high altitudes. It was also collected by Sir George Watt on the Chor Mountain near Simla. It is rare in cultivation; but there are trees at Glasnevin and Kilmacurragh in Ireland, which were raised from seed sent from the Himalayas in 1879; and three or four specimens in different places in England, the age and origin of which are not recorded.

The specimen figured is from a tree growing at Beauport, Sussex.

ABIES WEBBIANA VAR. BREVIFOLIA



GLYPTOSTROBUS HETEROPHYLLUS

GLYPTOSTROBUS HETEROPHYLLUS (*Endlicher*).

Syn. Conif. p. 70 (1847).
Veitch's Man. Conif. ed. 2, p. 286 (1900).
Trees of Great Britain and Ireland, Vol. I. p. 172 (1906).

A small tree with deciduous foliage and branchlets like *Taxodium*. Leaves of two forms: on the ordinary branchlets spreading, arranged in three rows, acicular, decurrent, $\frac{1}{5}$ to $\frac{2}{5}$ inch long; on fruiting branchlets closely imbricated, scale-like, concave internally, and keeled externally.

Cones pear-shaped, about $\frac{1}{2}$ inch long, formed of numerous elongated scales, each of which is 5- to 7-lobed at the summit, and coalesced below with the bract, the tip of the latter projecting as a recurved point from the middle of the scale. Seeds two on each scale, oblong, compressed, prolonged at the base into a flattened lancet-shaped wing.

Glyptostrobus heterophyllus is a native of the province of Canton in Southern China where it occurs along the banks of rivers and streams. It first became known to science through Lord Macartney's mission in China (1792-1795); and is supposed to have been introduced in 1804 to Kew, where there is a specimen in the Temperate House.

The genus *Glyptostrobus* is allied to *Taxodium* but differs in the structure of the cone-scale and seed. The photograph represents a native specimen.

TETRACLINIS ARTICULATA (*Masters*).

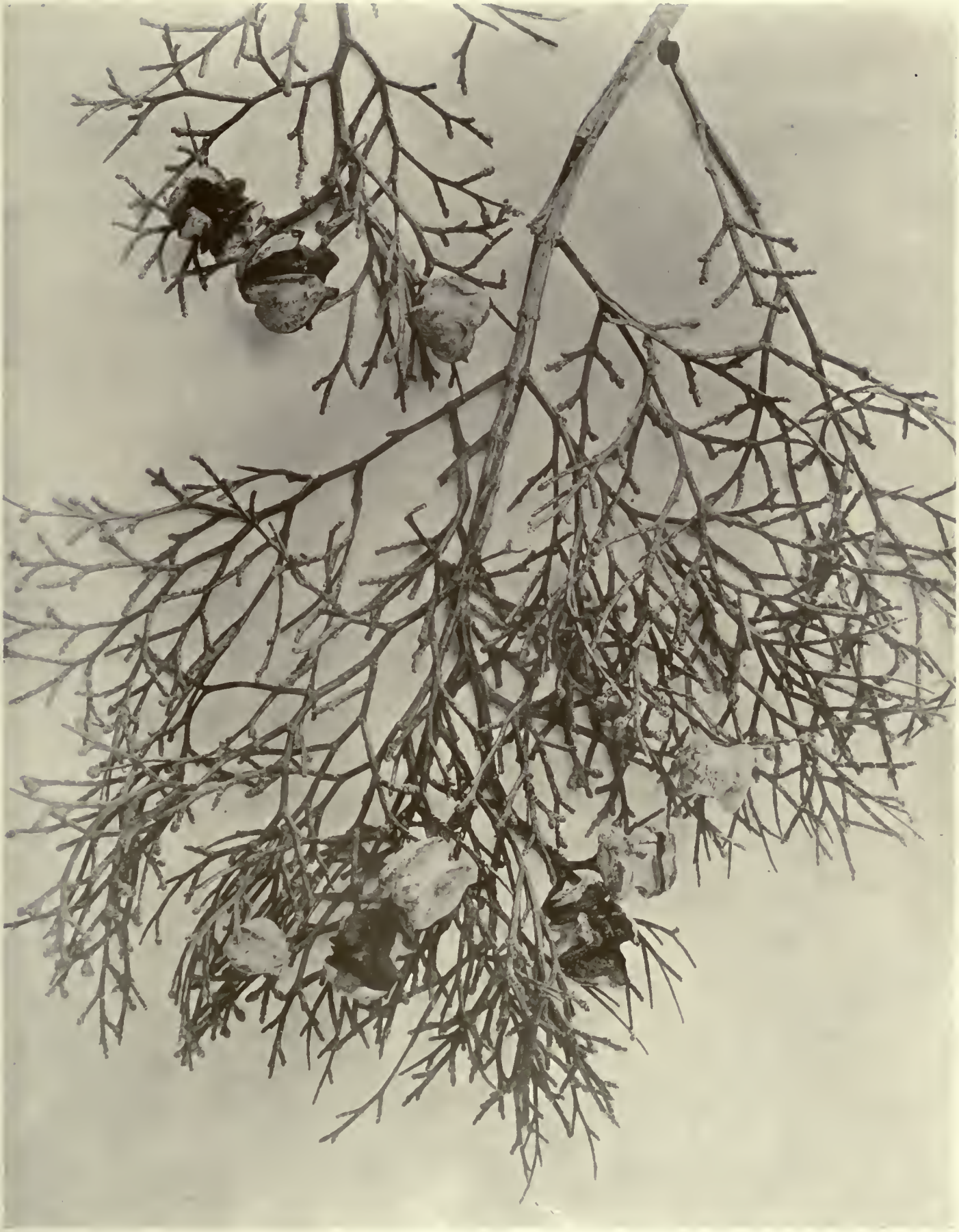
CALLITRIS QUADRIVALVIS (*Ventenat*).

Journ. Linn. Soc. Bot. Vol. XXX. p. 14 (1893).

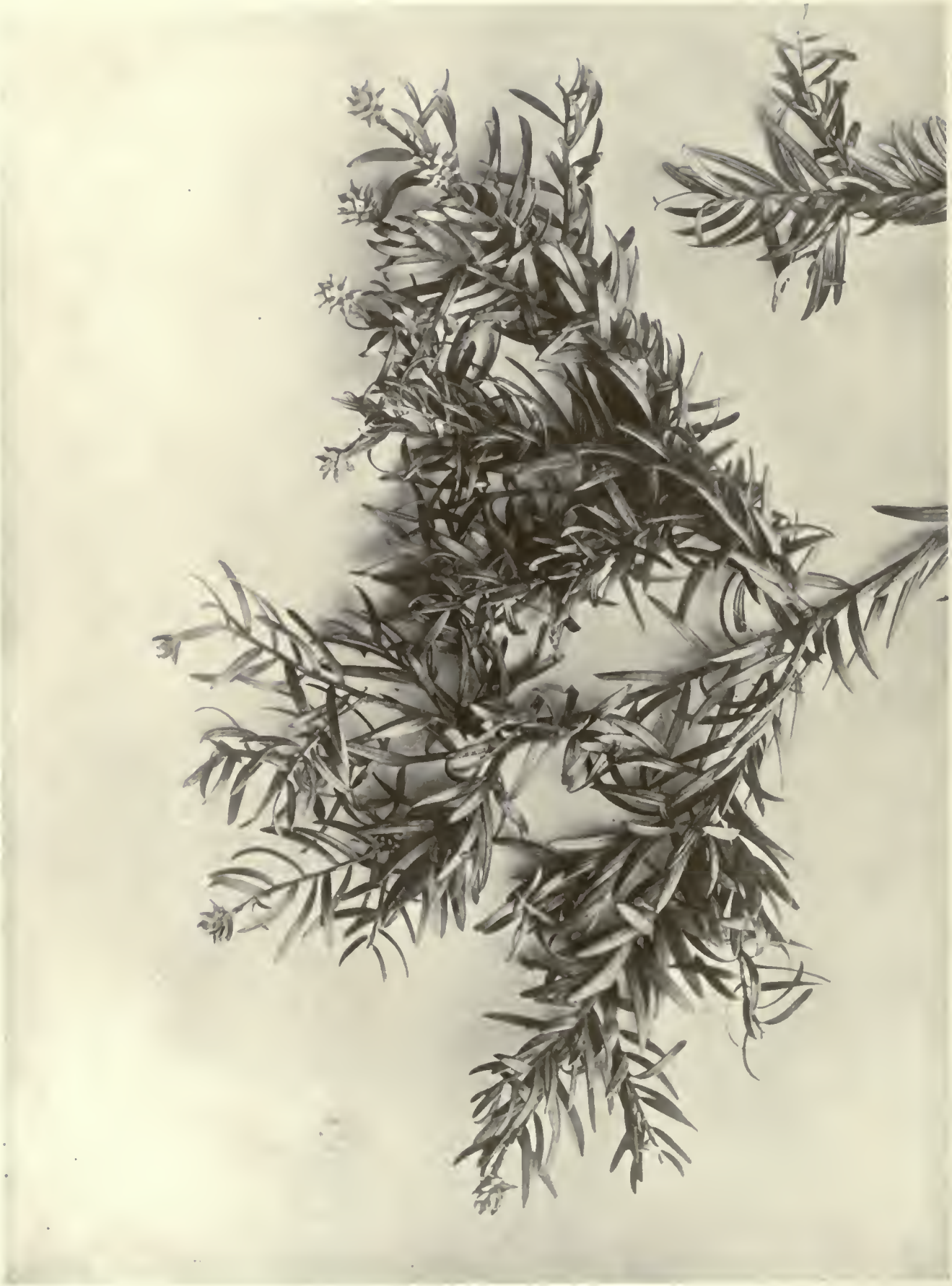
A small tree of pyramidal habit attaining a height of 30 feet. Branches spreading with numerous flattened, jointed, conspicuously striate, pale-green branchlets. Leaves decurrent on the branchlets, arranged in four ranks, decussate; small and scale-like at the apex, which is free, triangular, appressed, acute or mucronate. Cones quadrangular, about $\frac{3}{4}$ inch long, consisting of four woody scales in opposite pairs, heart-shaped, hollowed longitudinally on their outer surface, convex on the inner surface. Seeds six, ovate with two broad wings.

Tetraclinis articulata is a native of Morocco and Algeria, where it was discovered by Desfontaines. It was introduced into England in 1815.

The specimen illustrated was obtained from La Mortola, Italy.



TETRACLINIS ARTICULATA



SAXEGOTHŒA CONSPICUA

SAXEGOTHÆA CONSPICUA (*Lindley*).

Journ. Hort. Soc. Lond. VI. p. 258 (1851).
Gardeners' Chronicle, Vol. II. series 3, p. 684 (1887).
" " Vol. V. " " p. 782 (1889).
Veitch's Man. Conif. ed. 2, p. 158 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1458 (1912).

A small tree of yew-like aspect attaining in Chile a height of 30 to 40 feet. Bark greyish-brown, scaling like that of a plane tree. Leaves persisting several years, spirally arranged, but thrown into two ranks on lateral branches, linear or oblong-lanceolate, mucronate, $\frac{1}{2}$ to 1 inch long, dark-green above with the midrib slightly raised, marked with two glaucous stomatic bands beneath.

Flowers monœcious, the staminate flowers solitary in the axils of the leaves near the end of the branchlet. Pistillate flowers solitary, terminal. Ripe fruit forming a globose cone, $\frac{1}{3}$ to $\frac{1}{2}$ inch in diameter, with fleshy scales, coalescing at the base and free at the apex, containing 6 to 12 seeds, which are set free by the separation of the fertile scales.

Saxegothœa conspicua was discovered in southern Chile in 1846 by Wm. Lobb, the well-known collector, who introduced it into cultivation during the following year. It is rare in cultivation in the British Isles and a few only of the original plants survive.

The illustration represents a specimen obtained from one of these at Strete Ralegh, Exeter.

ACTINOSTROBUS PYRAMIDALIS (*Miquel*).

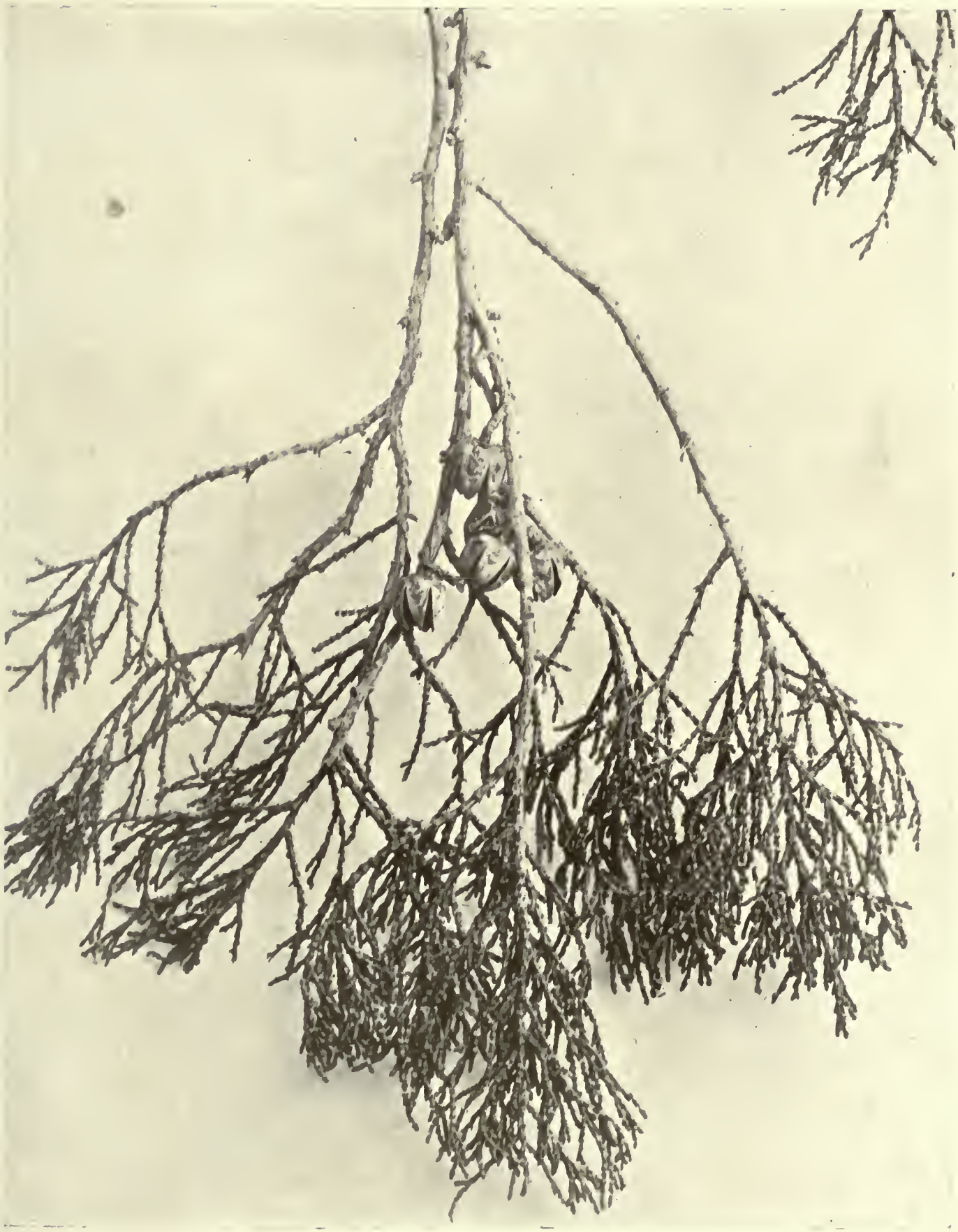
Pl. Preiss. I. p. 644 (1847).
Baker and Smith, Pines of Australia, p. 291 (1910).

A shrub of pyramidal habit with rigid fastigiate branches and branchlets. Leaves in whorls of three, decurrent, $\frac{1}{8}$ inch long, with rigid, acute or acuminate, free and spreading tips.

Male catkins $\frac{1}{6}$ inch long, the stamens in whorls of three, in six vertical rows. Cones $\frac{1}{2}$ inch in diameter on short stalks, surrounded at the base by closely appressed imbricated sterile scales; globose or ovoid, consisting of six inner valvate scales, each bearing one or two three-winged seeds.

The genus *Actinostrobus* is closely allied to *Callitris*, the imbricate sterile scales at the base of the cone forming one of the best distinguishing characters. It is only found in a wild state in Western Australia, the recorded localities being King George's Sound, Swan River and Murchison River. It has not yet been grown in the open air in England.

The illustration represents a specimen obtained from Antibes, France, by Dr. A. Henry.



ACTINOSTROBUS PYRAMIDALIS

TAIWANIA CRYPTOMERIOIDES

TAIWANIA CRYPTOMERIOIDES (*Hayata*).

Journ. Linn. Soc. (*Bot.*). Vol. XXXVII. p. 330 (1906) with fig.
Masters in Journ. Linn. Soc. (*Bot.*) XXXVII. 424 (1906).
Hayata in Toyko Bot. Mag. XXI. pp. 21-28, plate 1 (1909).

An evergreen tree attaining in Formosa a height of about 190 feet with a trunk 20 feet or more in girth, bare of branches for about 60 feet from the ground, with dense foliage and spreading branches, having a conical or cylindrical form. Adult leaves imbricated, thick and coriaceous, triangular, acute, keeled on the back, adnate to the branchlets for half their length, about $\frac{1}{5}$ inch long, with an incurved acute apex; leaves of young trees narrowly linear-falcate, laterally compressed, keeled above and below.

Cones cylindric, $\frac{1}{2}$ inch long, with numerous spirally imbricated rounded scales, each with a minute bract at the base. Seeds, two on each scale, oblong, flattened, girt with a broad lateral wing.

Taiwania cryptomerioides was discovered by Mr. N. Konishi in 1904 on the western slope of Mount Morrison, Formosa, at 6,000-8,000 feet altitude. It resembles *Cryptomeria* in habit, and grows at a high elevation with other conifers such as *Picea*, *Abies*, and *Cupressus*, where the climate is cool throughout the year.

It is not in cultivation.

The illustration represents a specimen obtained by Mr. Firth, Vice-Consul at Tamsui, Formosa, at the request of Captain L. Clinton-Baker, R.N.

TAXODIUM DISTICHUM, Var. mucronatum (*Henry*).

Taxodium Mucronatum (*Tenore*).

Trees of Great Britain and Ireland, Vol. I. p. 175 (1907).

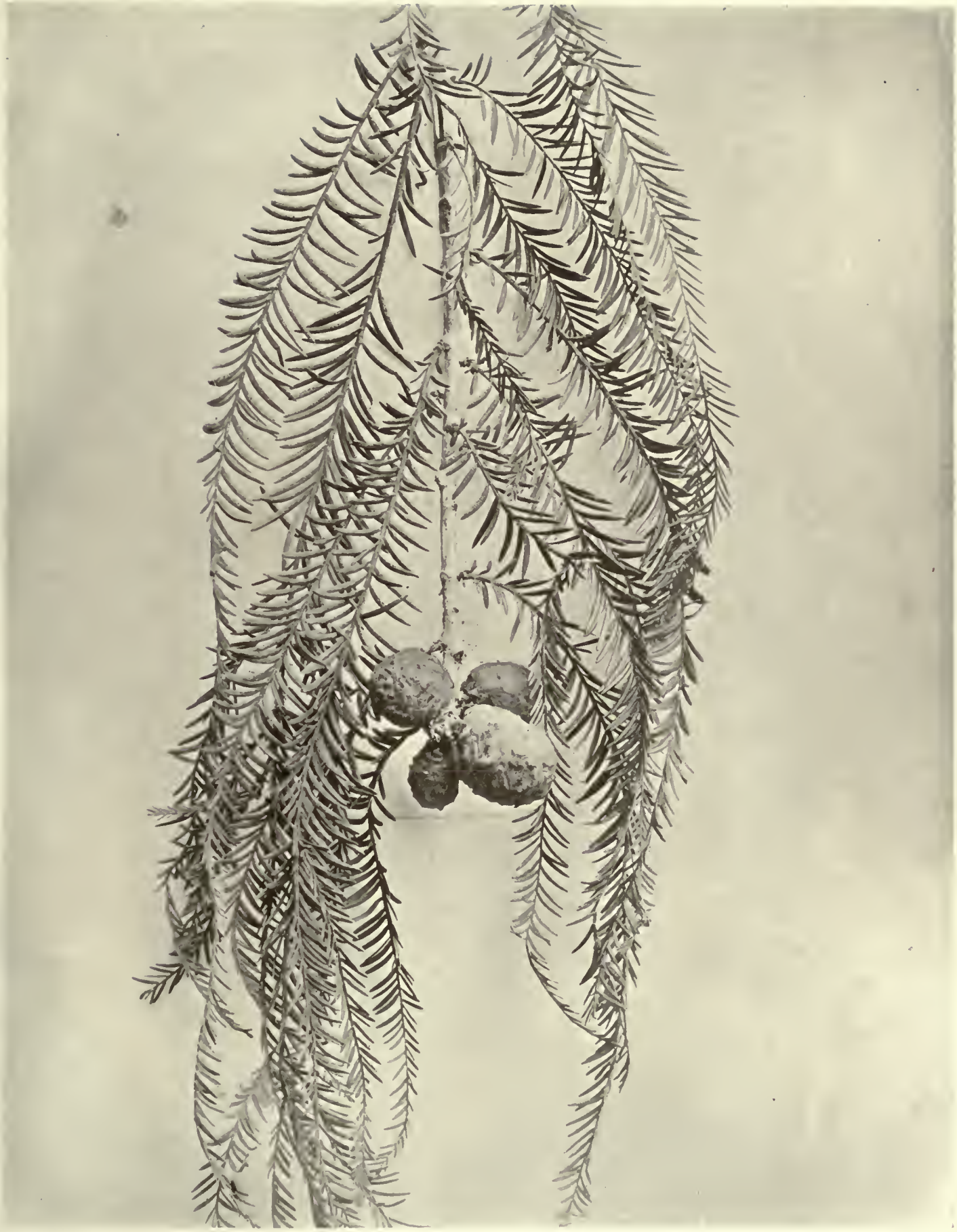
This variety which was described as a species by Tenore is apparently only a geographical form differing from the type (Vol. II. p. 70) in the more persistent foliage, which generally lasts two years on the tree, and in the time of flowering which is autumn. The leaves are usually shorter, lighter green in colour and blunter at the apex. The panicles of male flowers are generally more elongated than those of the United States tree.

It occurs in Mexico, but specimens of the typical form found at high elevations in Texas resemble it in foliage; and the panicles of flowers in some Florida specimens are as large as any occurring on Mexican trees. Sargent, who has seen the tree in Mexico, was unable to distinguish it by either foliage or habit from the type.

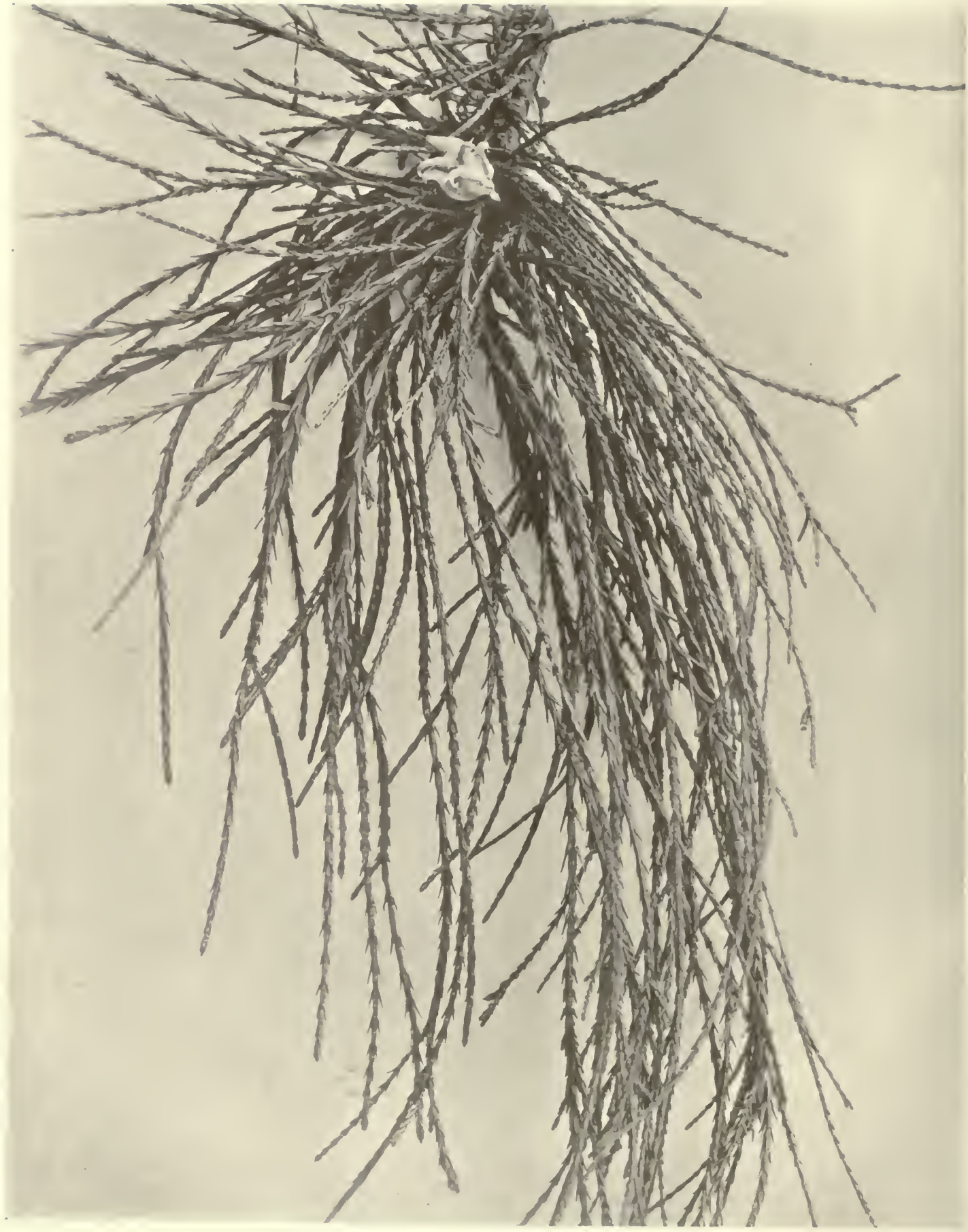
There are extensive forests of *Taxodium* in Mexico, and some isolated examples of very old and enormous trees are known to exist. The most famous of these is one near the city of Oaxaca, which is reported to have a girth of no less than 198 feet at about six feet from the ground and a height of over 100 feet.

Taxodium mucronatum was first described from a specimen growing in the Botanic Garden at Naples; and is said to have been introduced into Europe in 1838.

The illustration represents a specimen obtained from this tree.



TAXODIUM DISTICHUM VAR. MUCRONATUM



THUYA ORIENTALIS VAR. PENDULA

THUYA ORIENTALIS, VAR. PENDULA (*Masters*).

Journ. R. Hort. Soc. Vol. XIV. p. 252 (1892).
Veitch's Man. Conif. ed. 2, p. 250 (1900).
Trees of Great Britain and Ireland, Vol. I. p. 197 (1906).

A distinct variety of the Chinese Arbor Vitæ, which is quite different from the type of that species figured in Vol. I. p. 71. It is shrubby in habit with numerous long flexile whip-like branchlets, which are unbranched or only slightly branched, produced in irregular fascicles of 5 to 20 or more at irregular intervals along the branches. Leaves distantly placed in four rows in decussate pairs, broadly decurrent at the base and long acuminate at the apex, spreading from the slender pendent branchlets at an acute angle. Cones like those of the type.

This variety was discovered by Thunberg in Japan, and specimens were collected near Yokohama by Maximowicz. It was also collected by Fortune in China, and has been raised in Europe. A specimen at Kew of a plant raised from seed of this variety, is ordinary *Thuya orientalis*, this was sent from the Botanic Garden at Turin by Mr. Hanbury in 1869.

The specimen illustrated was obtained from Poles, Ware.

CRYPTOMERIA JAPONICA. Var. elegans (*Masters*).

Journ. Linn. Soc. Bot. Vol. XVIII. p. 497 (1881).
Veitch's Man. Conif. ed. 2, p. 264 (1900).
Trees of Great Britain and Ireland, Vol. I. p. 130 (1906).

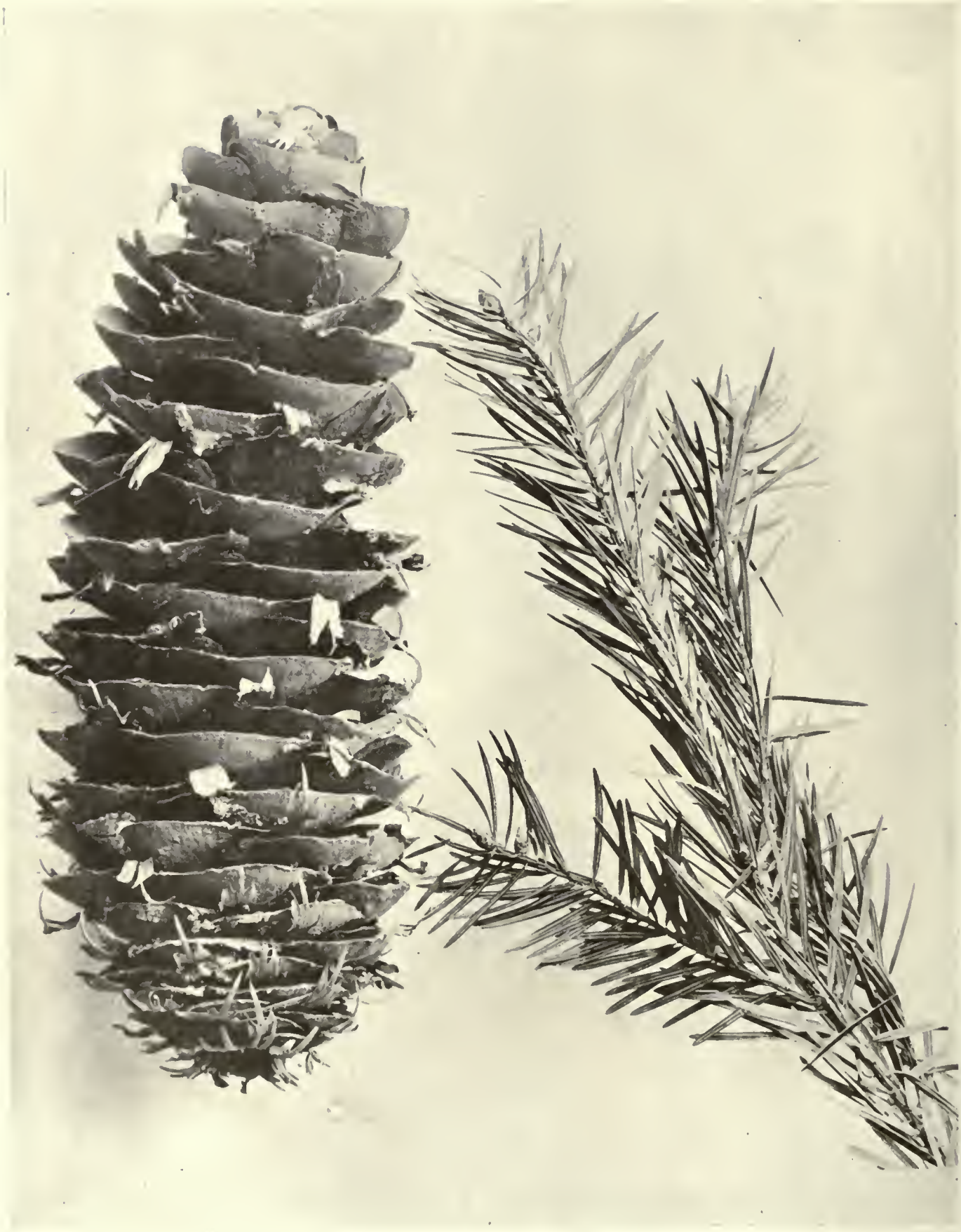
This variety is bushy in habit and smaller than the ordinary form figured in Vol. II. p. 69. The juvenile foliage which is retained throughout the life of the tree bears the same relation to the type as *Retinispora squarrosa* does to *Cupressus pisifera*.

Branches short, horizontal; branchlets decurved at the tip. Leaves spirally arranged and decurrent on the branchlets, linear, flattened, spreading or curving downwards, sharp pointed, grooved on both surfaces, light green in colour, changing in late autumn and winter to a reddish-bronze colour. Cones like those of the type.

This very distinct form is known in Japan as *to-sugi*, meaning *Chinese Cryptomeria*, and is said to have been introduced from China. It was introduced into England in 1861 by John Gould Veitch from Japan.

The specimen illustrated was grown at Bayfordbury.

CRYPTOMERIA JAPONICA VAR. ELEGANS



PSEUDOTSUGA MACROCARPA

PSEUDOTSUGA MACROCARPA (*Mayr*).

Veitch's Man. Conif. ed. 2, p. 478 (1900).
Trees of Great Britain and Ireland, Vol. IV. p. 812 (1909).

A tree attaining in California a height of 50 to 80 feet with a girth of 9 to 12 feet. It differs from *Pseudotsuga Douglasii* in the following characters. Branchlets covered with a short stiff white pubescence. Leaves ¾ to 1 inch long, resembling those of *P. Douglasii*, except that they are distinctly curved. Cones large, 4½ to 7 inches long; scales 1½ to 2 inches wide, thick, very concave, puberulous on the outer surface; bracts only slightly exserted, short, narrow, with broad midribs produced into short flattened flexible tips. Seeds ½ inch long, dark brown or nearly black and shining above, pale brown below; wing ½ inch long.

Pseudotsuga macrocarpa is a characteristic feature of the scanty forests covering the lower slopes of the mountains of Southern California at 3,000 to 5,000 feet elevation. It was discovered in 1858; but was unknown in cultivation in Europe until seedlings were raised at Bayfordbury in 1910.

The illustration represents a native specimen from Ballard, Santa Barbara, California, collected by Mr. Edgar B. Davidson and forwarded by Miss Alice Eastwood.

LARIX POTANINI (*Batalin*). Chinese Larch.

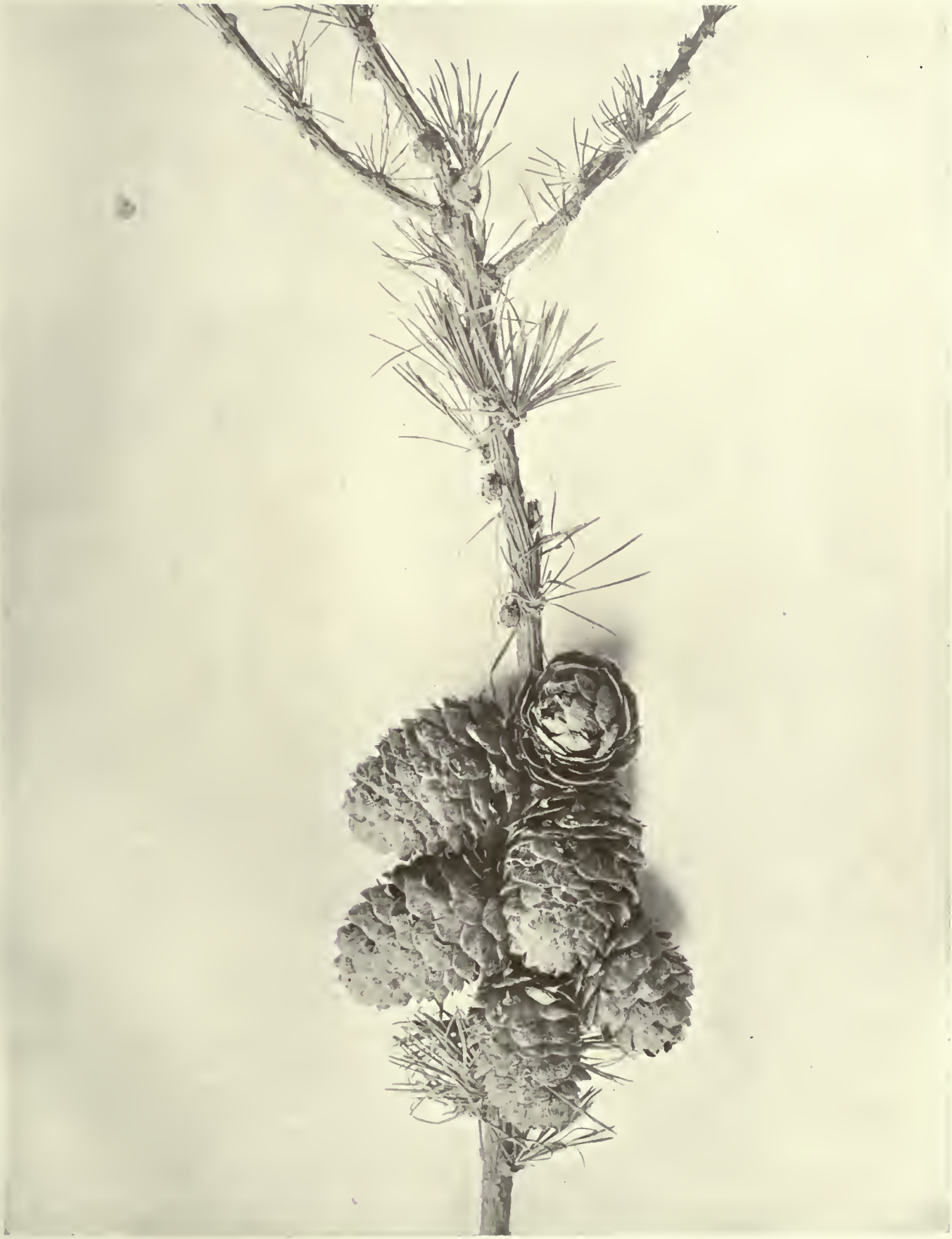
Act. Hort. Petrop. XIII. p. 385 (1894).
Gardeners' Chronicle, Vol. XXXIX. p. 178 (1906) with fig.
Trees of Great Britain and Ireland, Vol. II. p. 391 (1907).

A tree attaining in western China a height of 70 feet with a girth of 6 feet. Young branchlets bright yellow with a scattered pubescence. Buds ovoid. Leaves slender, about one inch long, sharply pointed, keeled and with two bands of stomata, each of two lines, on both the upper and lower surfaces.

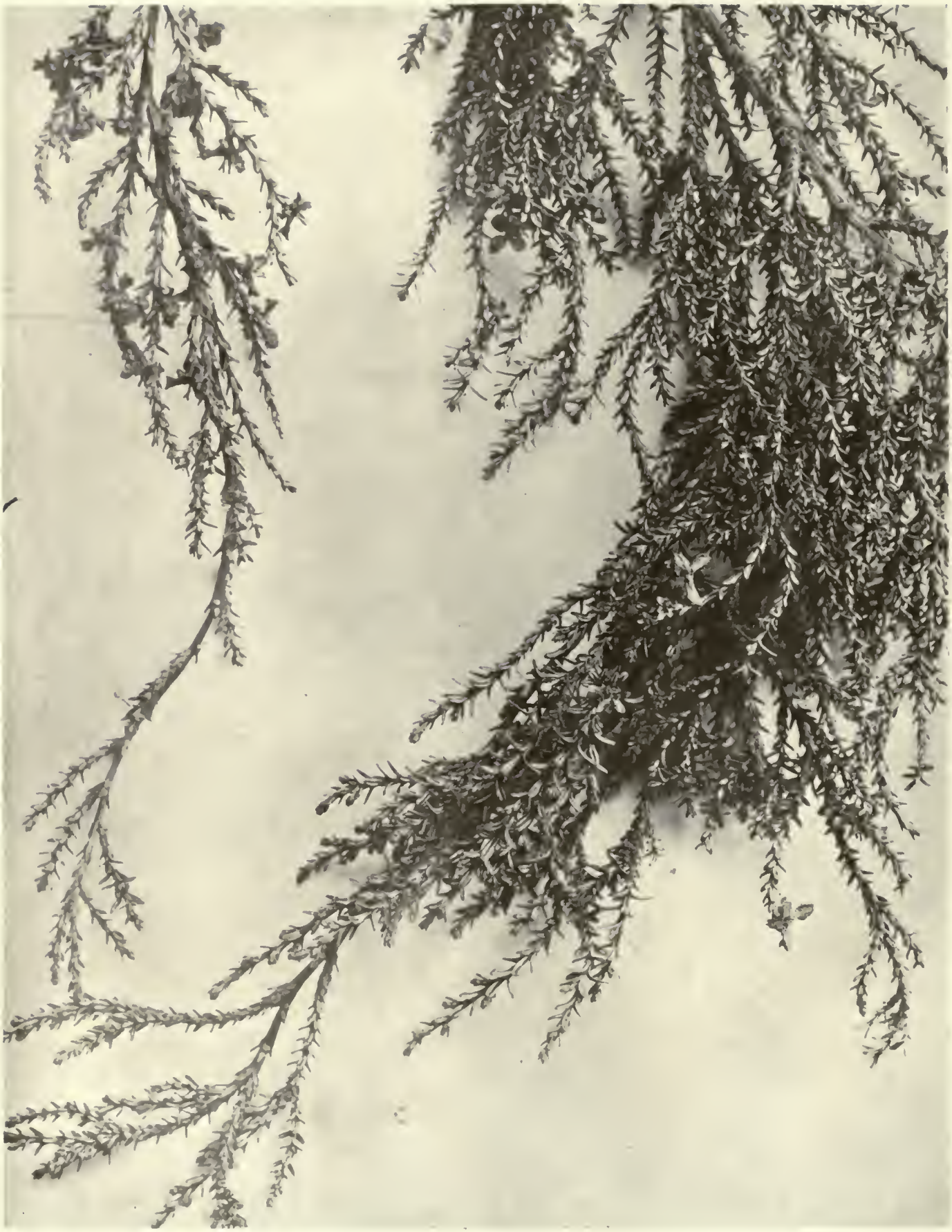
Staminate flowers $\frac{1}{4}$ inch long, shortly stalked; pistillate flowers ovoid, narrow and rounded at the apex. Cones cylindrical, $1\frac{3}{4}$ inch long, with scales and bracts pointing upwards and outwards; scales about $\frac{1}{3}$ inch long, reddish-brown, pubescent on the lower part of the outer surface; with a rounded or truncate, entire, slightly inflexed upper margin; bract extending beyond the scale.

Larix Potanini is a native of western China where it was found by Potanin, Prince Henry of Orleans, Pratt and Wilson in the neighbourhood of the Szechuan-Thibetan frontier near Tachienlu at 7,500 to 11,000 feet altitude.

The specimen illustrated, which was collected by Mr. E. H. Wilson, was kindly lent by Messrs. Veitch. Young trees were planted at Bayfordbury in 1910.



Larix Potanini



FITZROYA PATAGONICA

FITZROYA PATAGONICA (*J. D. Hooker*).

Journ. Hort. Soc., London, Vol. VI., 264 (1851).
Botanical Magazine, t. 4616 (1851).
Veitch's Man. Conif. ed. 2, p. 198 (1900).
Trees of Great Britain and Ireland, Vol. VI. p. 1454 (1912).

A tree attaining in Chile a height of 80 to 160 feet, with deeply furrowed fibrous bark peeling off in narrow ribbons.

Branchlets flexible. Leaves persistent several years, in alternating whorls of threes, decurrent on the branchlets, narrowly ovate-oblong or spathulate, mucronate; upper surface concave and with two narrow white stomatic depressions; lower surface keeled, and also with two narrow white stomatic depressions often extending from the base to the apex.

Flowers usually dicœcious, occasionally monœcious. Cones on short lateral shoots of the preceding year, globose, composed of six woody scales in two alternating whorls, each with a prominent umbo, the three upper scales fertile, each bearing two to five winged seeds.

Fitzroya patagonica, which occurs as a wild tree on the western slope of the Andes of southern Chile, where it often forms extensive and nearly pure woods in marshy situations, was introduced into cultivation in 1849 by William Lobb.

The illustration represents a specimen growing at Highnam Court, Gloucester.

THUJOPSIS DOLABRATA (*Siebold and Zuccarini*).

THUYA DOLABRATA (*Linnæus*).

Fl. Jap. II. 34, tt. 119, 120 (1870).
Gardeners' Chronicle XVIII. p. 556 (1882) with fig.
Veitch's Man. Conif. ed. 2, p. 236 (1900).
Trees of Great Britain and Ireland, Vol. II. p. 202 (1907).

A tree attaining in Japan a height of 40 to 100 feet, with reddish bark scaling off in longitudinal shreds. Branches in false whorls or scattered, giving off secondary branches, which terminate in flattened, frondose, tripinnate branchlet-systems disposed in horizontal planes.

Leaves persisting several years, in four ranks, in decussate pairs, coriaceous; ventral and dorsal leaves flattened, ovate or spathulate; lateral leaves carinate, more or less spreading, with an acute incurved apex; foliage green on the upper side of the branchlets, with conspicuous white stomatic depressions below.

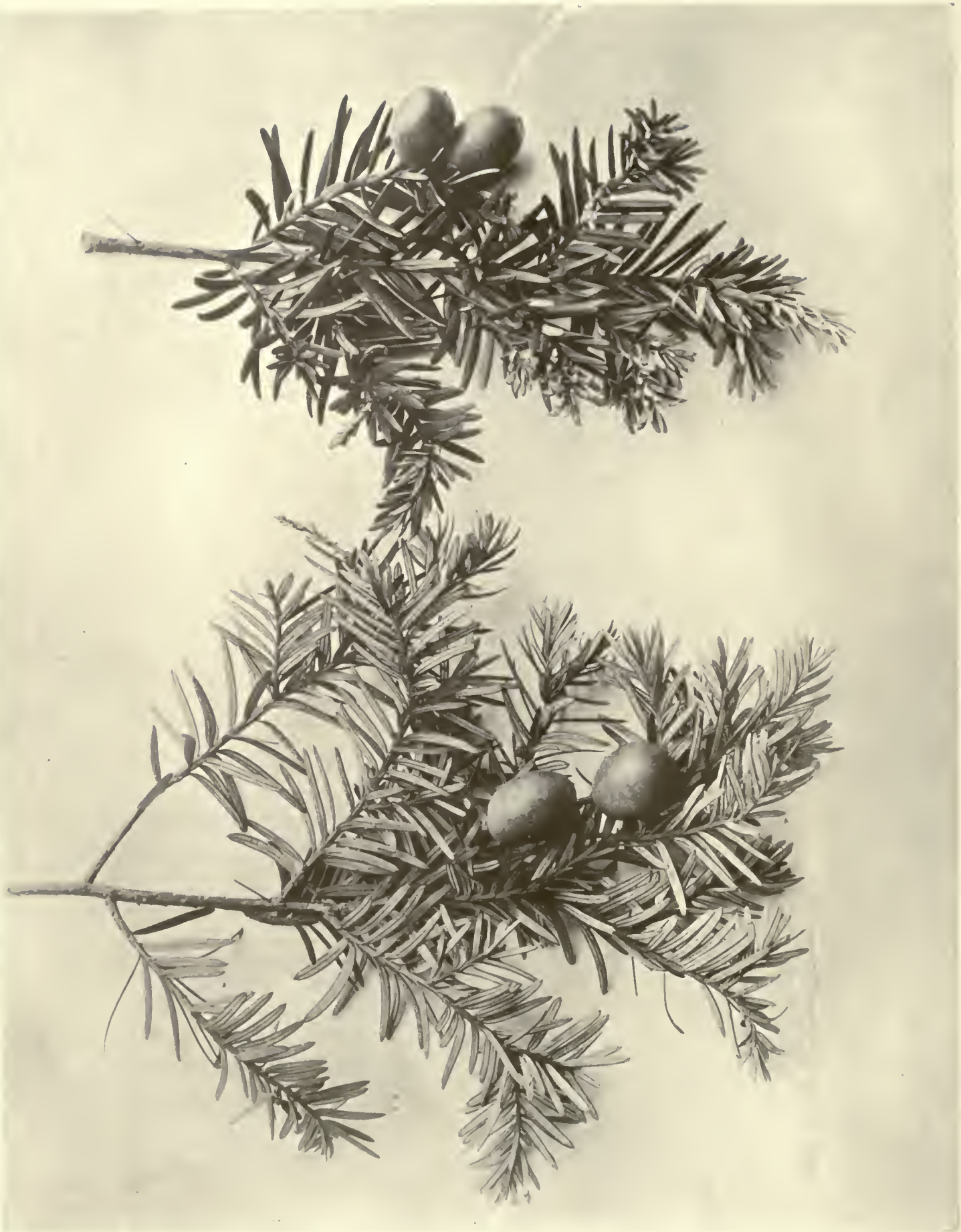
Flowers monœcious; the staminate flowers on separate lateral branchlets, cylindric, $\frac{1}{4}$ inch long, with six decussate pairs of stamens. Cones globular or broadly ovoid, $\frac{1}{2}$ inch in diameter, composed of 8 to 10 woody scales in decussate pairs, thickened at the apex. Seeds winged, 3 to 5 on each scale.

Thujopsis dolabrata was discovered by Kaempfer in Japan, where it occurs in a wild state north of about latitude 35°. In the southern part of this area it is a mountain tree only, ascending to an altitude of 6,000 feet.

A plant was introduced into England by T. Lobb in 1853 but this specimen died. In 1861 supplies of seed were sent from Japan by J. G. Veitch and Fortune, from which plants were raised and generally distributed.

The specimen figured was obtained from Ullapool, Scotland.

THUJOPSIS DOLABRATA



PRUMNOPITYS ELEGANS

PRUMNOPITYS ELEGANS (*Philippi*).

Podocarpus Andinus (*Pöppig*).

Linnæa XXX. p. 731 (1859-60).
Gardeners' Chronicle, 1863, p. 6.
Veitch's Man. Conif. ed. 2, p. 155 (1900) with figs.

A tree attaining in South America a height of 40 to 50 feet, with dark brown bark. In cultivation it is usually a shrub of dense habit with a pyramidal outline. Branchlets alternate or sub-opposite. Leaves persistent several years, spirally inserted but thrown into a pectinate arrangement; linear, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, straight or falcate, mucronate, dark green above, paler with two broad glaucous bands of stomata below.

Staminate flowers in terminal and axillary racemes, cylindric, obtuse. Fruit resembling a wild damson in size, shape and colour; solitary and sessile, or pseudo-terminal on short slender branchlets which have minute scales. Seed enclosed in a hard shell surrounded by a fleshy pericarp.

Prumnopitys elegans, which is allied to *Podocarpus* (but the peduncle and fruit scale do not become fleshy as in that genus) is a native of the Andes of Southern Chile where it is found at an altitude of 4,500 to 6,000 feet. It was introduced into England in 1860 by Richard Pearce.

The specimen illustrated was obtained from Eastnor Castle, Ledbury.

CUNNINGHAMIA KONISHII (*Hayata*).

Gardeners' Chronicle, Vol. XLIII. p. 194 (1908).

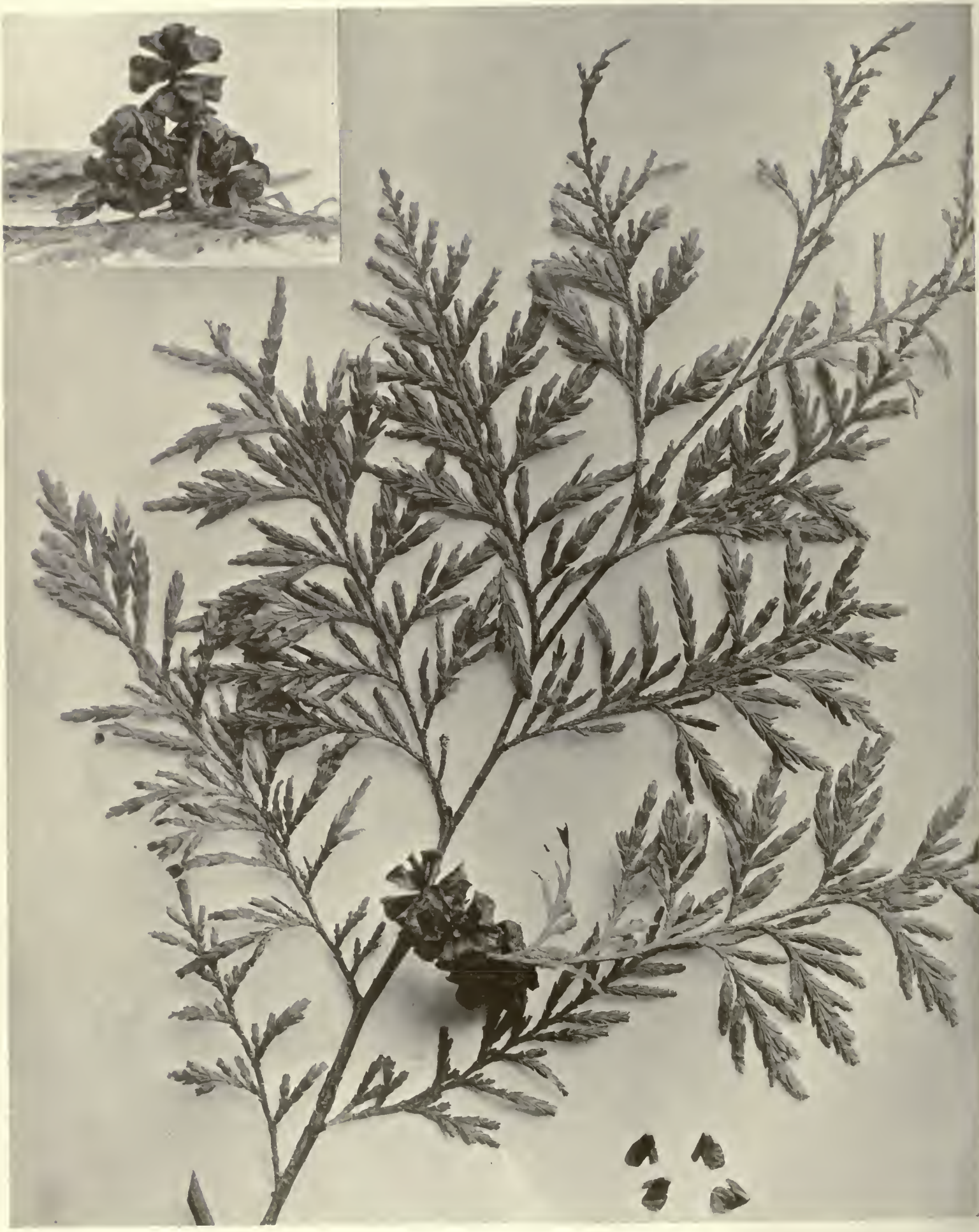
A tree attaining in the mountains of Formosa 100 feet in height and 20 feet in girth. Bark reddish-brown. Leaves spirally arranged, linear, falcate, pointed at the apex, twisted at the base, about ½ to ¾ inch long, coriaceous in texture, greyish-green, with two broad bands, each composed of many stomatic lines on both surfaces. Cones ovoid, ¾ to 1 inch long with rounded scales, the upper margin of which ends in a sharp mucro.

Cunninghamia Konishii was named after its discoverer, Mr. N. Konishi who found it on Mount Randai, Formosa, at 7,000 feet feet altitude, in 1907. In habit it is intermediate between *Cunninghamia sinensis* and *Taiwania*. It differs however from *C. sinensis* in having stomata on both leaf surfaces; in the smaller cones, and also in the arrangement and shape of the leaves, which persist for eight years instead of five. The timber is similar to that of *Cupressus*, and has a very characteristic odour.

It is not in cultivation.

The illustration represents a specimen obtained by Mr. Firth, Vice-Consul at Tamsui, Formosa, at the request of Capt. L. Clinton-Baker, R.N.

CUNNINGHAMIA KONISHII



FOKIENIA HODGINSII

FOKIENIA HODGINSII (*A. Henry and H. H. Thomas*).

Gardeners' Chronicle, Vol. XLIX. p. 66 (1911) with figs.
" " " " " 84 (1911) " "
Cupressus Hodginsii (*Dunn*) *Journ. Linn. Soc.* (*Bot.*), Vol. XXXVIII. p. 367 (1908).
" " *Trees of Great Britain and Ireland*, Vol. V. p. 1150 (1910).

A tree attaining in China 40 feet in height and 3 feet in girth. Foliage arranged in flattened branchlet systems, tri-pinnate, the pinnæ disposed in one plane. Leaves in four ranks, the lateral pair in each rank being different from the facial pair and differing markedly on young and old trees

Leaves on young plants larger than those on adult trees, about $\frac{1}{3}$ inch long with spine-like points; lateral leaves triangular, flat, longer than the facial leaves, with which they are connate, and conspicuously white with stomata below; facial leaves oblanceolate, shorter and much narrower than the lateral leaves, the ventral leaf with a raised midrib on each side of which is a narrow band of stomata.

Leaves on adult trees arising in whorls of four at the same level; the lateral and facial pairs about $\frac{1}{12}$ inch in length, acute or sub-acute; lateral leaves conduplicate, embracing the facial leaves, and with white stomatic depressions on their ventral surfaces; facial leaves oblanceolate, with a broad triangular apex. On older branches the internodes elongate, the leaves arising at different levels in opposite decussate pairs; lateral pair oblong, with the trianglar apex spreading outwards and tipped with an incurved point; the facial pair similar but with the apex appressed.

Staminate flowers not seen. Young female cones terminal, composed of six to eight pairs of opposite decussate, bluntly pointed, rounded scales; ovules two on each scale, flask-shaped. Mature cones ripening in the second year, on short scaly stalks, globose, about 1 inch long and $\frac{7}{8}$ inch wide when open; scales 12 to 16, woody, peltate, clavate or cuneate in shape, expanded externally into a wrinkled oblong striated apophysis, which is concave and mucronate. Seeds two on each fertile scale, about $\frac{1}{6}$ inch long, triquetrous or tetrahedral, pointed at the distal end, flattened at the base with two large resin-vesicles underneath the seed coat

on the upper and lower surfaces; wings two, lateral, very unequal in size.

The foliage resembles that of *Libocedrus macrolepis* in general appearance; but in the young foliage of the latter plant the lateral leaves are plainly conduplicate, embracing the facial pair; while in *Fokienia* the lateral leaves are flat. In *Libocedrus macrolepis* the arrangement on the older branchlets is quite different, the oblong leaves arising in whorls of four at the same level.

This new conifer was discovered in 1908 by Capt. Hodgins of S.S. "Haiyang," who found it in eastern China, in the province of Fokien, in the Yung-fu district (N. lat. 26°; E. long. 119° 15′) at a few hundred feet above sea level on the northern slope of a valley about 20 miles from the sea. Only three clumps were seen containing about 18 trees. It also occurs near Yenping in the interior of the same province at 2,000 feet altitude.

In February, 1909, Capt. L. Clinton-Baker, R.N., received two small trees from the discoverer which were sent to England in charge of Commander Osborn of H.M.S. "Hawke." One of these trees is now in cultivation at Bayfordbury and the other was presented to Kew[1] in May, 1911.

The illustration represents a native specimen collected by Capt. Hodgins.

[1] "Kew Bulletin," 1911, p. 328.

INDEX.

INDEX—CONTINUED.

INDEX—CONTINUED.