
On the Conifers of Japan

Masters Maxwell Tylden

Title: On the Conifers of Japan

Author: Masters Maxwell Tylden

This is an exact replica of a book. The book reprint was manually improved by a team of professionals, as opposed to automatic/OCR processes used by some companies. However, the book may still have imperfections such as missing pages, poor pictures, errant marks, etc. that were a part of the original text. We appreciate your understanding of the imperfections which can not be improved, and hope you will enjoy reading this book.





Forstry
Fudie
5-28-29
19763

(c)

reverse the direction of rotation and also reverse the direction in which you look along the axis, the direction of twist is not altered.

I suppose myself to have shown:—

(1) That Linnæus's original definition of right-hand twist is exceedingly good, and contains no surplusage.

(2) That in observing contortion it makes no difference whether you imagine yourself within or without the spire, so long as you do not turn yourself round or stand upon your head.

(3) That all botanists are agreed which is a right-hand twist, viz. the clock-hand way.

(4) That the differences in describing the contortion of a corolla-bud arise from some botanists regarding it from the base, others from the tip.

(5) That it is a pure matter of convention whether we reckon the axis of growth of the flower as positive or negative; but that this is the only point of convention remaining to be settled.

(6) That it does not much matter which way it is settled; but that it is of the greatest importance to all botanic describers that it should be settled, definitely and finally, one way or the other.

1-17-34

On the Conifers of Japan.

By MAXWELL T. J. MASTERS, M.D., F.R.S. & L.S.

Forstry
SH
386
.m424

[Read December 2, 1880.]

(PLATES XIX. & XX.)

THE object of the following paper is to give a complete list of the Conifers of Japan known up to the present time, together with incidental remarks on their structure, affinities, synonymy, and geographical distribution. The list was originally drawn up as a guide to the identification of the numerous and well-preserved specimens of Conifers brought from Yesso and various parts of Japan by Mr. Maries, and which were kindly placed in my hands for determination by Messrs. Veitch. The study of these specimens necessitated reference to other Japanese collections, to the Coniferous plants of North-east Asia generally, and, to some extent, to those of the coast of North-west America. In carrying on these investigations, I have had the advantage of studying the collections at Kew (both living and dried), those at the British Museum, those in the museum of Messrs. Veitch (including the original

9/16/33
R.

types brought home by the late Mr. John Gould Veitch), as well as living specimens in their nurseries and in various other horticultural establishments. The library at Kew has also been of great service to me in referring to the numerous publications relating to the subject in hand.

In drawing up the list, I have followed the arrangement of the genera adopted by Mr. Bentham in Benth. et Hook. 'Genera Plantarum,' vol. iii. p. 420 (1880). As to the species, I have followed the publications of Murray, Parlatore, Engelmann, and other authors; but I have personally examined all those native to Japan, except in the case of some genera (as *Juniperus* and *Podocarpus*), wherein, from lack of material, I have been constrained to depend chiefly on the labours of others.

The tabular list at pp. 483-485 comprises, in the first column, an enumeration of all the species known to inhabit the Japanese islands, inclusive of Yesso. The succeeding columns are intended to show the distribution of the Japanese Conifers in adjacent countries, as well as to indicate the existence and geographical distribution of nearly allied or "representative species." The columns relating to the mainland of North-east Asia and to the islands of Sachalin and Yesso contain, it is believed, a complete enumeration of the species so far as they are known. In the remaining columns only such species are entered as may be considered representative, very nearly related, or analogous to the Japanese species, or which have some special interest to warrant their introduction. Separate lists are given for the Kurile Islands and for those of Sachalin and Yesso, for the purpose of showing the relation of the Coniferous flora of Japan proper to that of North-east Asia and that of North-west America, between which countries and Japan these islands are situated. These lists must, of course, be looked on as approximately correct only; for, doubtless, much yet remains to be learnt of the floras of these regions.

The authorities specially referred to for indications as to the geographical distribution of particular species have been:—Parlatore in DeCandolle's 'Prodromus,' xvi. sect. 2, 1868; DeCandolle's 'Géographie Botanique;' Tchihatchef's French translation of Grisebach's 'Vegetation der Erde,' enriched as it is by notes of the translator and of M. Fournier; Beinling's memoir 'Ueber die Geographische Verbreitung der Coniferen;' Hildebrand's paper entitled "Die Verbreitung der Coniferen in der Jetztzeit und in den früheren geologischen Perioden," and other general works.

For the Conifers of the Arctic regions, of Siberia, of the north-east coasts of Asia, and the adjacent islands I have consulted Ledebour's 'Flora Rossica,' and Hooker on the Distribution of Arctic plants, Trans. Linn. Soc. vol. xxiii. (paper read June 21, 1860). For species found in Manchuria and Amuria I have turned to Trautvetter and Meyer's enumeration in Middendorff's 'Reise,' to Maximowicz's 'Primit. Flor. Amur.' (1859) p. 260, to Regel's 'Flora Ussuriensis' (1862), to Schmidt's 'Reise im Amurland und auf Sachalin.' For China I have depended on the publications of Bunge (Enum. Plant. Chin.), Ruprecht (Sertum Tian-schanicum), Fortune, &c. For the Conifers of Russian America I have trusted to the publications of Ledebour, to Bongard's 'Observations sur la végétation de l'île de Sitka,' Seemann's 'Botany of the Herald,' Rothrock's 'Sketch of the Flora of Alaska.' For North-western America I have referred especially to Hooker's 'Flora Boreali-Americana' and Engelmann's "Monograph of Conifers" in the 'Botany of California'*

In the detailed enumeration of the species (p. 485 *et seq.*), the authorities for the names adopted and for the synonyms are cited in full, as also in cases where an illustration is given; but those publications in which no original description is given, but merely a transcript from some other source, are not expressly mentioned, the citation of the author's name alone being in such case sufficient.

The Conifers recorded as native to Japan, inclusive of Yesso, admit of being grouped in 13 genera, of which one only is peculiar to Japan, viz. *Sciadopitys*. Two genera are peculiar to Japan and China, viz. *Cryptomeria* and *Cephalotaxus* (unless the Sumatran *C. sumatrana*, a doubtful species, be included). *Ginkgo*, a Chinese genus, is supposed not to be native in Japan, though often cultivated. *Podocarpus* has representatives both in Japan and China; and its species are widely dispersed in tropical and subtropical regions. *Tsuga* and *Torreya* have each of them species in Japan and on both sides of the North-American continent. Several Japanese genera occur also in the Himalaya Mountains. The other genera which have Japanese representatives are widely distributed, especially in the northern hemisphere.

The 13 genera recorded in Japan comprise 41 species, exclusive of varieties and doubtful natives, thus distributed:—*Thuja* (in-

* Veitch's very useful 'Manual of the Coniferae' was issued only as this sheet was passing through the press; hence I have not been able to cite it as frequently as otherwise I should have done.—June 1881.

cluding *Thuyopsis*, *Biota*, and *Chamæcyparis* or *Retinospora*) has three species peculiar to Japan, including *T. japonica* or *Standishii*; *Juniperus* is represented by five species—three peculiar to Japan, two others common to Japan and China; *Cryptomeria* occurs both in Japan and in China; neither *Taxodium* nor *Sequoia* is found in Japan. *Cephalotaxus* is represented in Japan by three endemic species; a fourth occurs in China. One species of Yew (*Taxus tardiva*) is peculiar to Japan; another is common to that country and China. *Torreya* has one Japanese species; others are found in China, Florida, and California—widely separated regions. *Ginkgo* has been already alluded to. *Podocarpus* has three Japanese species; and others occur in China. *Cunninghamia* is exclusively Chinese, and *Sciadopitys* Japanese. *Pinus* has four species in Japan; but none are peculiar—China, North-east Asia, and in one case Europe even affording them a home. Of *Picea* (Spruce Firs) there are five species in Japan, three of which are peculiar; one is found in Corea also, and the others on the mainland of Temperate East Asia. *Tsuga* has two species peculiar to Japan. The Silver Firs (*Abies*) have three endemic species in Japan, and others common to Japan and North-east Asia. *Larix* has one species endemic to Japan and Yesso.

It may therefore be said that there are 41 species of Conifers in Japan, of which no fewer than 22 are supposed to be endemic; but this estimate will no doubt be diminished as our knowledge of the flora of adjacent regions increases.

Seven or eight species are common to Japan and China, the total in China amounting to about 20 species. Nine or ten species are common to Japan and the mainland of North-east Asia, the total number of species recorded from Manchuria and Amuria being 15. Only one species or variety (*Pinus Cembra*, var. *pumila*) is recorded as common to Japan, North Asia, and America, either on the Atlantic or Pacific sides. In Sachalin only 3 species are as yet recorded, all of which occur also in Japan. From Arctic Asia 6 species are known, none of which extends into Japan. In Siberia 14 species are enumerated, only one or two of which are found in Japan. The few species yet known from the Kurile Islands are also met with in Japan. Six species are known to inhabit Kamtschatka, of which *Pinus koraiensis* occurs also in Japan. The remaining species are of the Siberian group. On the other hand, all the species hitherto found in Corea occur also in Japan. The Conifers of the outlying islands

of Loo Choo, Hong Kong, and Bonin are, as might have been expected, of Chinese rather than of Japanese affinity. There is also a large number of species in America, the Himalayas, and Europe; but, with the one exception mentioned, none is common to these regions as well as to Japan.

For various reasons, the figures just given may not be strictly accurate; they are liable to alteration as our knowledge increases, and according to the views entertained by particular botanists as to the identification and limitation of species; but for our present purpose they are sufficiently correct, as it is not likely that the proportions which those figures represent will be materially changed.

Although the species may not be absolutely identical, yet Pines, Larches, Silver Firs, Spruce Firs, Junipers, Yews are represented in each of the geographical districts mentioned. The Hemlock Spruces (*Tsuga*) of Japan have representatives on both sides of the American continent, as well as in the Himalaya. The dwarf Cypresses of Japan (*Thuya* § *Chamæcyparis*) have also representatives on both sides of the American continent; while *Thuya japonica* is so like the *T. gigantea* of the North-west American region that it has been mistaken for it. *Thuya orientalis*, too, may be said to have its American representative in *Thuya occidentalis*. *Picea ajanensis* of the North-east Asiatic regions has, from its similarity, been confused with the *Picea sitchensis* or *Menziesii* of North-west America. *Juniperus nipponica* is almost identical with *J. nana* from Sitka. The curious distribution of the species of *Torreya* has been already referred to.

The large number of endemic species with one endemic genus, leads to the inference that Japan may have formed a special centre whence Conifers have migrated elsewhere. This view seems more probable than the assumption that Japan has received any but a small proportion of its Conifers from elsewhere. Numerically, as might be expected, the alliance is greatest between Japan and China and the mainland to the north of the latter empire. The approximation to the American flora, especially to that of the east side of that continent, is numerically extremely small; indeed there is not a single Conifer common to Eastern America and Japan. But when representative species are taken into account, the relation is shown to be closer, though still less than that (illustrated by other orders of flowering plants) pointed out by Dr. Asa Gray. In his well-known essay on the Botany of

Japan*, Dr. Gray calls special attention to the analogies between the floras of the Eastern United States and that of Japan. From his address to the American Association the following list of Conifers is taken, from among the numerous other plants, showing the analogy of the American and Japanese floras :—

| <i>Atlantic.</i> | <i>Pacific.</i> | <i>Japan and N.E. Asia.</i> |
|---------------------------|-----------------|-----------------------------|
| PINUS. | | |
| resinosa. | | densiflora. |
| Strobilus. | monticola. | excelsa. |
| TSUGA. | | |
| canadensis. | Mertensiana. | Sieboldii and diversifolia. |
| THUYA. | | |
| occidentalis. | gigantea &c. | japonica. |
| TAXODIUM. | | |
| distichum. | | heterophyllum. |
| CUPRESSUS (Chamæcyparis). | | |
| thuyoides. | nutkaensis. | pisifera and obtusa. |
| TAXUS. | | |
| canadensis. | brevifolia. | cuspidata. |
| TORREYA. | | |
| taxifolia. | californica. | nucifera and grandis. |

Dr. Gray concludes (and he is supported by Oliver and others) that a very peculiar analogy exists between the floras of Tertiary Central Europe and the recent floras of the Eastern American States and Japan. It is supposed that, at some period of the Tertiary epoch, N.E. Asia was united to the north-western part of America, probably along the line now occupied by the Aleutian Islands. Assuming the former existence of land-communication between the three continents in the extreme north, the prevalence of a relatively warm climate, as indicated by the fossil plants found in arctic regions, then it is supposed that on the access of the Glacial Period, plants were driven southwards in various directions, according to local circumstances not as yet fully determined. In this way it is suggested that some plants found a refuge in Asia, some in Eastern, and some in Western America†. The presence of northern types in Japan may be accounted for on such a supposition. But, in addition, there is a large proportion of species which appear to be endemic in Japan, and of which we have no traces northwards. These are so numerous in the case

* A. Gray, Botany of Japan, U.S. Exploring Expedition, p. 433 (1858); also Address to the American Association for the Advancement of Science, Dubuque (1872). Hooker, Flora of N.E. Asia and N.E. America. Gardeners' Chronicle, Aug. 17, 1878, p. 216.

† Murray, 'Geographical Distribution of Mammals' (1866), p. 47.

of the Conifers as to lead to the conclusion before expressed, that Japan must for these plants be taken as a centre of dispersal. That there has been a migration from the polar regions southward is admitted on all sides; and that many species have been stopped in their southward course by the increasing temperature, is illustrated by the distribution of the Conifers in Japan. Some species, as I learn from Mr. Maries, occur in the lowlands of Yesso and on the mountains of the central island, as if the climate of the more southern lowlands were too hot for them, or offered such advantages to other species that the Conifers were crowded out by the more vigorous growth of their competitors. On the other hand, tropical or subtropical types, such as *Podocarpus*, are not able to extend far to the north.

Not a single species is common to Europe and Eastern America. If, however, we look to the genera, we find them, as has already been said, with the exception of the one or two supposed endemic Japanese genera, belting the globe and represented in every part of the northern hemisphere. A certain number of representative species have also been pointed out; and the "representation" must necessarily be closer between some species than between others. This relative closeness of affinity may, in the absence of more direct evidence, afford a clue to the direction in which migration has taken place. Adverting, therefore, to the list of representative Conifers spoken of by Dr. Gray, it will be seen that the representative species of Japan and of Western North America are more closely allied than those of Japan and of Eastern North America: compare, for instance, *Picea ajanensis* and *Thuja japonica* (Japan) and *P. sitkensis* and *T. gigantea* (N. W. America). Moreover the number of representative species in relation to those of Japan is greater, though only slightly so, on the western than on the eastern side of the American continent. The facts are too few to base safe inferences on; but it is at least a reasonable conjecture that Japan did not receive its special Coniferous flora from the north, because so few of the arctic species or of those from Northern Asia or Northern America are found in Japan. *Abies alba* and the Oregon and British-Columbian species, none of which occurs in Japan, are instances in point. Moreover, forms which were common in the arctic regions (and, indeed, in various parts of what is now temperate Europe) in the Miocene epoch, and which exist now in a living state in America under conditions which are not dissimilar to those which may be

met with in Japan, nevertheless have not hitherto been discovered in any part of Japan—e. g. *Sequoia*. It is also at least possible, assuming Japan to have been a distinct centre, that at some time migration may have taken place principally westward to Asia, and to a less extent eastward to the Pacific side of America.

With reference to the fossil species of this order, it behoves me to speak with great diffidence, inasmuch as I have made no special study of them. Judging, however, from the great range of variation in existing species, and the stages of growth they pass through, it would seem that the data upon which the student of fossil plants has often to deal must be peculiarly unsafe as guides to the discrimination of species in this order. Where the different stages or forms of growth exist, as they sometimes do, on the same tree or shrub, as in the Chinese Juniper, there is no difficulty about the matter; but this fortunate state of things is the exception rather than the rule. Take, for instance, the numerous Japanese forms of the *Retinospora*-group. These forms belong to different genera, are widely different one from another and from the perfect tree; and for the most part they preserve their characters without change, at least under cultivation. The consequence is that they are taken as so many distinct species by those who have not had the opportunity of seeing the passage from the one to the other. The student of fossil plants, meeting with analogous isolated forms, would be almost certain to enumerate them all as separate and distinct species; the evidence before him would not suggest any other course. The instance of *Abies bifida* and *A. firma* is another case in point. The two stages represented by those names are so different, the internal anatomical structure of the leaves and the arrangement of the resin-canals so very distinct, that they have been considered as belonging to separate species. Large cultivated specimens in our nurseries are so different that they are, with very good reason, sold as separate species; and the workmen accustomed to handle them, and whose appreciation of the points of difference between forms is often much keener than that of the professed botanist, are apt to express the greatest astonishment when told that *A. bifida* and *A. firma* are one and the same. The evidence in support of this statement is given under the head of *A. firma*. Such cases (and they are not infrequent in Conifers) should make descriptive botanists pause before establishing new species.

Whatever caution may be deemed necessary as to the interpre-

tation to be put on the fossilized remnants of plants, so far as their specific identity is concerned, there is no reason to doubt the existence of representatives of many existing genera in various epochs of the world's history. *Glyptostrobus*, *Taxodium*, *Sequoia*, and *Ginkgo* may be specially mentioned, on account of their existence in high northern latitudes where they can no longer grow, their wide distribution in former times, and the very important inferences that have been drawn from these circumstances. It is noteworthy that neither *Taxodium* nor *Sequoia* has hitherto been found in a living state in Japan*.

Before leaving the subject of the distribution of Japanese Conifers, a word may be said as to the occurrence of certain trees (often of peculiar organization) in the immediate vicinity of the temples in Japan, China, Tibet, &c. In some of these cases the trees are not known in a wild state, the aboriginal stocks being either extinct or lurking in some of the all but unknown districts of the Chinese empire, Tibet, or Central Asia. Among such may be mentioned, as worthy the attention of the students of Buddhist lore, *Cupressus funebris* (China, Sikkim), *Abies Fortunei* (China), *Abies Kämpferi* (China), *Cryptomeria japonica*, *Sciadopitys verticillata*, *Ginkgo biloba*, and certain species of *Pinus*.

Mention has already been made of the various forms under which one and the same species occur. Carrière has called these transitional or immature forms "larval" stages; and I have alluded to them under the head of Stasimorphy in my 'Vegetable Teratology.' In many cases the appearances depend simply on greater or less energy of growth at particular times. Arrest and progress of growth in more or less regular alternation and intermittence will generally account for the diversity in form and arrangement of the leaves. The tufted leaves of the Pines and

* See Heer, 'Catalogue of North-Greenland Miocene Plants' (1866); also 'Ueber einige fossile Pflanzen von Vancouver und britisch Columbien,' 'Die mioäne Flora und Fauna Spitzbergens,' 'Primit. Flor. fossilis Sachalinensis' (1878), "Zur Geschichte der Ginkgoartigen Bäume" in Engler's Bot. Jahrb. i. (1880), p. 1, and 'Flora fossilis arctica,' Asa Gray, Address, *op. cit.*; Hildebrand, "Verbreitung der Conif. in der Jetztzeit und in den früheren geologischen Perioden" (1861), Verhandl. d. natur. Ver. für Rheinland und Westphal., neue Folge, viii. (this memoir gives a complete list of the existing and fossil species of Conifers known at the time of publication, together with indications of their geographical distribution); F. Schmidt, 'Die mioäne Flora von Sachalin,' 1880; Engler, 'Versuch einer Entwicklungsgeschichte der Pflanzenwelt, &c. (1879); J. Starkie Gardner in 'Nature,' 1881, *passim*.