A General View of the Genus *CUPRESSUS*. By Dr. MAXWELL T. MASTERS, F.R.S., F.L.S., Corresponding Member of the Institute of France.

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IN previous communications to the Society I have endeavoured to give a summary account of the general morphology of the order Coniferae, so far as that is likely to be serviceable for purposes of classification. I have also given incidental notes concerning the structure and minute anatomy of several of the species*.

In this way the history and general characteristics of the genus *Cupressus* amongst others are briefly outlined in a paper read before the Society in December 1892†. In the present contribution I propose to pass in review the species of this genus. Those that are well known and clearly defined in recent monographs are passed over with the mere mention. Fuller details are given concerning those whose history, diagnosis, and synonymy are obscure and involved.

Reference is made to the literature of each species under its proper heading, work in this direction having been much facilitated by the publication of the 'Index Kewensis.'

The examination of the species has been made in the herbaria at Kew, in the Natural History Museum, and in the Museum at Paris. I am also indebted to the kindness of M. Poisson of Paris, Prof. Suringar of Leyden, and Dr. Urban of Berlin, for information on various specimens in the collections under their charge. Living specimens have been studied at Kew and elsewhere, and a large number have been furnished me from British, and especially from South European gardens. The Conifer Conference held under the auspices of the Royal Horticultural Society at Chiswick, in 1891, yielded numerous illustrations, and for others I am indebted to Mr. Moore of Glasnevin, Prof. Balfour of Edinburgh, Mr. Acton, the Marchese Hanbury of La Mortola, M. Maurice de Vilmorin of Paris, Prof. Henriques of Coimbra, and specially to M. Naudin of Antibes.

Characters.—The genus *Cupressus* is a well-marked one, easily recognizable among its allies by the scales of the cone, which form

* Journal of the Linnean Society, vol. xxvi. (1889).

† Ibid. vol. xxx. (1893).

a peltate expansion at the free end. All the developed scales of the cone are fertile, and each bears in its axil either numerous seeds or only two or three, as in the subgenus *Chamæcyparis*. The genus *Thuja*, which is the nearest ally and which has similar foliage, differs in the form of the cone-scales. The cones of *Thuja* are usually oblong, and the scales are also oblong, sometimes clavately thickened at the end but never peltate, and only certain of them are fertile. If the two genera had not been so long established and so generally adopted, it might have been well to have included them in one genus, together with *Libocedrus*, as in all probability all of these have diverged from a common stock. The confusion this would entail in practice would, however, be so great as to outweigh any advantage that would accrue from such an arrangement, theoretically preferable though it might be. The following scheme may serve to represent the near relationships of *Cupressus*:—

Although the generic characters are well-marked, the case is far otherwise in regard to the species. These are few in number, but so variable that it is difficult to find characters, or to draw up a description that shall apply to the individual plant in all cases.

Moreover, each individual plant is polymorphic, that is, it assumes different appearances at different periods of its growth (see fig. 1, p. 314). These "stages of growth" are usually transitory and their existence brief, but, occasionally, their duration is prolonged and they become more or less persistent. If the whole or the greater part of the plant be in the same stage of growth at the same time, the appearance is so different from that

characteristic of the plant, at some other period, that it is not to be wondered at that botanists, before they were cognizant of the actual history of the plant, considered these temporary stages of growth to be the marks of a distinct genus. The so-called genus

Fig. 1.

Young plant of *Cupressus*, showing primordial and, at the tip of the left-hand shoot, adult foliage.

Retinospora, for instance, was founded on plants exhibiting the characteristics of certain stages of growth of a few species of *Cupressus* of the section *Chamaecyparis*, or of species of *Juniperus*

and *Thuja*. This is proved by the existence, sometimes on the same tree, of intermediate forms, by the presence of cones characteristic of the species on the branches exhibiting various phases of growth, and by the fact that seedling plants as they grow into the adult condition are found to present, on the same plant, all those foliar characteristics which have been relied on to discriminate the so-called "species" of *Retinospora*.

Although I do not concur in all the conclusions mentioned in the following passage from M. Carrière's 'Traité,' yet I cite it to show how extremely variable these plants are, and what impression that variability has made in the mind of a good observer in the habit of watching the development of these plants from the seedling stage upwards:—"C'est ainsi que le type des *Cupressus Lusitanica*, *Lambertiana*, *Goweniana* et *Knightii*, très-différents, finissent, par la suite des semis qu'on fait de leurs graines, par se confondre tellement qu'il devient tout-à-fait impossible de rapporter les individus au type dont ils sortent. Ainsi du *C. Goweniana* il est sorti des plantes qui se confondent avec les *C. Hartwegii* et *Lambertiana*, qui sont vigoureux, odorants, à branches distantes, étalées, etc., etc. Du *C. Knightii* il est sorti des individus qui se confondent tout-à-fait avec ceux qui proviennent du *C. Lusitanica*. Mais un fait curieux et que je dois signaler est celui-ci: sur un pied de *C. Goweniana*, dont les strobiles étaient sphériques et très-réguliers, il y avait, soit sur les mêmes branches, soit sur les branches particulières, des strobiles sphériques et d'autres très-allongés."—*Traité Général des Conifères*, par E. A. Carrière, p. 173 (1867).

Habit and ramification.—In attempting to distinguish the species, recourse must be had to the mature condition of the tree and to the form and disposition of the permanent foliage. The outline of the herbaceous shoots (called "turiones" by some writers)*, and their method and degree of ramification supply suggestive indications. These herbaceous shoots or branch-systems, both in this genus and in *Thuja*, would repay careful comparative study†. Frequently they have but a limited duration, they shrivel, turn brown, and are cast off all in one piece, as a

* "Turiones, habitu conformes, experientia dissimiles. Nonnulli persistendo fiunt rami; per plurimi discedendo frondes proprie nuncupari possunt, uti folia simul et fructificationes ferentes."—L'HÉRITIER.

† See Sachs's Text-book, ed. Vines (1882), p. 209, also p. 509.

compound leaf would be, by the process known as “cladoptosis.” But in this case the individual leaves are not articulated and do not fall off.

In contour the herbaceous shoots vary from semicircular, fan-

Fig. 2.

Cupressus Lawsoniana var.—Branch system; ramification in one plane, branches bi-tripinnately divided, secondary divisions unbranched at the base.

shaped, oblong and lanceolate to linear. Their surface is flat, convex, as in *C. Nootkatensis*; scoop-like or concave in some forms of *C. Lawsoniana*. In direction they spread horizontally or at an angle, generally upwards, sometimes vertically, at other times downwards, as in the pendulous varieties.

The branching is all in one plane as in the section *Chamaecyparis*, or the branchlets are in two planes and more or less decussate. The ultimate branchlets are densely crowded when a shoot is produced in the axil of each lateral leaf, or they are "remote," as when a shoot is formed in the axil of only a few of the leaves, the remainder being destitute of buds. The shoots of the last order are more or less 4-cornered or rounded; they are all nearly of the same length, from the base to within a short distance of the apex of the axis from which they proceed (see figure of *C. Benthami* var. *Knightiana*, at p. 341), or they are manifestly unequal in length, some being much shorter than others. In some instances, as also in various species of *Thuya*, no branchlets are produced on one side of the shoot near the base. The branch-system becomes thus oblique at the base and often more or less falcate in outline. Space is thus left for the more free development of the adjoining shoot, as in the case of branchlets of the lime, elm, and other plants bearing alternate and oblique leaves. This mode of branching is shown in the annexed figure (fig. 2).

The general appearance or "habit" of the tree depends very much on the arrangement and direction of the branches as just described; but habit is of little value for differential purposes, as each species subjected to the same conditions may produce similar variations in habit*. Many of them have pendulous branches; in some certain of the shoots, "leaders," "extension shoots" as they are called, grow more rapidly than others, the leaves are more deeply conerescent and at wider distances apart. In other cases this disproportionate growth is less observable, the shoots are more nearly of the same length, and a compact rounded form is the result. The ordinary form of *Cupressus Lawsoniana* has, like the *Deodar*, long slender terminal shoots gracefully bending over at the tip; whilst other forms of the

* For details concerning the ramification of the Cupressineæ, see Journ. Linn. Soc. xxvii. p. 286.

same Cypress develop in the shape of little globes of foliage, with no one shoot more prominent than another.

Fig. 3.

Cupressus Lawsoniana, with pendulous branches.

Another noteworthy feature is the tendency to "fastigation," or an upward direction of the primary branches at an acute angle. This eventually results in the production of a shrub or tree of pyramidal, flame-shaped, or columnar habit, differences arising from the relative length of stem and branches. This tendency is, of course, not peculiar to Cypresses, but it is so frequent in them that the Common Cypress, *C. sempervirens*, is rarely seen in any other shape than that of a pyramidal tree. Similar forms occur in the case of *C. macrocarpa*, which in the wild state has spreading branches as illustrated by Sir Joseph Hooker's sketch (fig. 4), and *C. Lawsoniana*, the garden form of which, known as "erecta-viridis," is especially remarkable from this point of view (fig. 5, p. 320).

The differences in the mode of ramification have been relied on to furnish distinctions not only between species but between genera. Thus, the species of the section *Chamæcyparis*, the

Fig. 4.

Cupressus macrocarpa.—Form with spreading branches; from an original sketch made in California by Sir Joseph Hooker.

branchlets of which are mostly in one plane, have been called flat Cypresses, and generically distinguished from true Cypresses, in which the branching of the ultimate shoots is four-ranked. But these distinctions are not constant, as a flat-branched *Chamæcyparis* with dimorphic leaves sometimes produces four-sided shoots, which branch in a decussate manner, and which

bear leaves uniform in shape, like those of a true Cypress. An illustration of this may be cited in the case of *Cupressus obtusa* var. *lycopodioides*, commonly called *Retinospora lycopodioides* in

Fig. 5.

Cupressus Lawsoniana var. *erecta-viridis*, with fastigate branches.

gardens, whilst in the neighbouring genus *Thuya Bodmeri*, hort., furnishes a similar example.

Foliage.—The leaves of Cupresses are mostly four-ranked, tetrastichous, rarely, and only temporarily, tristichous, as in the seedling state. Sometimes all the leaves of the same order are uniform in shape; at other times, as in the section *Chamæcyparis*, the antero-posterior or facial leaves are flattened against the axis, whilst the lateral ones are more or less conduplicate.

In those species in which the leaves are uniform, the ultimate shoots are more or less distinctly four-cornered, and the

branching is decussate or in two planes, branchlets being produced alike from the axils of the median and from those of the lateral leaves. Where the lateral leaves are compressed, the branching is really or apparently in one plane, no branches as a rule proceeding from the axils of the facial leaves.

The foliage of a *Chamæcyparis* (*Retinospora*, hort.), like that of a *Thuja*, is thus often more complex than that of *Cupressus* proper. A species of the section *Chamæcyparis* has generally primordial, intermediate, and adult leaves; and, as has been stated, these sometimes all occur on different branches of the same tree at the same time, or one form of foliage may, temporarily at least, clothe the bush to the total or approximate exclusion of the others. Speaking generally, true Cupresses have but two forms of foliage, the primordial and the adult. The adult leaves correspond in general appearance to the intermediate leaves of *Chamæcyparis*. This raises a question whether the species of the section *Chamæcyparis* may not be higher developments of the Cupressineous type, for whilst a *Chamæcyparis* may revert (so far as its foliar characters are concerned) to a *Cupressus*, we do not find a true *Cupressus* assuming the adult foliage of a *Chamæcyparis*. The internal structure of the leaves of a *Chamæcyparis* is also more differentiated than in the true *Cupressus*.

That a physiological difference between the various kinds of foliage exists seems certain from the diversity of anatomical structure, and from the differences in growth. Cuttings bearing the primordial leaves "strike freely," as gardeners say, whilst cuttings taken from those branches bearing the adult form of foliage do not take root so readily, as if the vegetative energy were more or less arrested, in anticipation of the commencement of the reproductive stage. This notion, however, is not always borne out, for cones and male flowers are occasionally borne on the "squarrosa" form of *Cupressus pisifera* bearing "primordial" leaves, and also on the "plumosa" form, where the leaves are of an "intermediate" character.

It must be remembered also that the characters presented by the mode of ramification and by the foliage are not peculiar to *Cupressus*, but are present in all the Cupressineæ, which seem as if they all might have descended from a common stock closely allied to, if not the same as, that from which Lycopods and Selaginellas have been evolved.

Histology.—A section across the middle of one of the ultimate branchlets, including the lateral and sometimes, as in fig. 6, the median leaves also, often reveals the true shape of the leaf better than mere inspection of its surface. I have, therefore, added plans prepared by Mr. Worthington Smith, from camera-lucida drawings, taken from sections made by myself, or, under the direction of Mr. Houston, by the pupils of the technical laboratory of the Essex County Council.

Fig. 6.

Thuopsis dolabrata.—Section through lateral and median leaves and axis, $\times 20$.

The anatomical details may eventually be made use of for specific purposes. I have not ventured to do so at present, for, although I have examined the minute structure of the leaf in almost all the species, yet the leaves examined have been few in number, and they have necessarily been taken from one or two specimens only. To be of value the observations require to be repeated upon a large number of specimens in various stages of growth, and growing under diverse conditions. The anatomical structure of the leaves is less sharply differentiated than in *Pinus* or *Abies*, and is therefore not so suitable for taxonomic purposes as it is in the two genera named. In general terms the leaf-structure is as follows:—A cuticle covers the whole of the more exposed parts of the leaves, but is absent from those portions appressed to the branch and from the inner surface generally. The epidermal cells are very thick on their free walls except in the grooves and covered portions, where the epidermis is replaced by a growth of minute papules or epithelial hairs. Beneath the epidermis, on the outer or dorsal surface, is a layer of strengthening cells or hypoderm; sometimes this is continuous, at other times it is imperfect, being present only at the corners and exposed places. It usually consists of only a single

layer of cells. Within the hypoderm, we find palissade-parenchyma more or less well developed, and this is followed by layers of irregularly-shaped cells, which when more or less lengthened are horizontal, or at right-angles to the palissade-cells. It is rare that the section shows clearly the vascular bundle of the leaf, for if the section is thick it is obscure, if thin the tissues disintegrate and fall away, leaving a space; but the structure of the branchlet or axis from which the leaves proceed is usually well-defined, consisting of two, or of a ring of four, wedge-shaped (in section) masses of phloem and xylem, the latter directed towards the centre of the axis. Resin-canals are often found in the parenchyma of the leaf; but their number and relative position are not so constant as in the species of *Abies* and *Pinus*.

The structure of the flat cotyledons, of which there are two, is the same as that of the adult leaves, with the exception that there is no hypoderm. The vascular cylinder of the cotyledon has a well-marked endodermal layer, and an undivided vascular bundle. The stomata are mostly on the upper surface, next the axis.

The arrangement, size, and form of the cones offer good characters in many instances, but the large amount of inherent variability which these trees possess must never be lost sight of by the systematist. A similar remark applies to the form of the male catkins. In fact no one character can be relied on to determine a species of *Cupressus*, and the inferences to be drawn from the aggregate or sum of available characteristics require always to be carefully controlled by a consideration of the variation incidental to the growth of each individual plant, as well as of that peculiar to the species and constituting a variety.

How far these variable characters are physiological or the result of adaptation, and how far phylogenetic, it is impossible to say with accuracy. The difficulty is enhanced by the fact that in the earliest representatives of the genus with which we are acquainted the same variations existed. (See Renault, 'Cours de Botanique Fossile: Cupressineæ,' 1885, p. 121; J. Starkie Gardner, 'Mon. British Eocene Flora,' vol. ii. part 2, tab. 19.)

The anatomical structure of the cone-scale shows very distinctly its double nature: the vascular system of the bract and that of the scale being well developed, the latter having an inverse orientation of its elements. A vertical section of the axis shows that the vascular bundle for the bract, and that for the cone-scale are given off separately and independently. It is

difficult to reconcile these facts with Sachs's statement that there is no seminiferous scale * in the Cupressineæ.

Distribution.—Of some of the species the native locality still remains uncertain: thus the origin of *Cupressus lusitanica*, the largest and oldest trees of which exist in Portugal, but which are not considered to be true natives of that country, is not known. The habitat of the form known as *C. torulosa* var. *Corneyana*, is equally unknown. The Common Cypress in its horizontal form is only known wild on the mountains of Crete and Cyprus, and where the now commonly cultivated pyramidal form first appeared is not recorded.

Cypresses are found in the Palæarctic, Indo-Chinese, and Nearctic regions, and extend from the Eastern part of the Mediterranean basin through the Levant, Persia, and Afghanistan to the Himalayas, but mostly as cultivated trees. The Indian form of *C. sempervirens* (*Whitleyana*) is probably a native in W. Himalaya. *C. torulosa* is also wild in the Western Himalaya. *C. funebris* is cultivated in Tibet and Sikkim, but has recently been discovered wild in the mountains of Ichang.

In Japan two species of the subgenus *Chamæcyparis*, with numerous varieties, exist, *Cupressus pisifera* and *C. obtusa*.

In North-west America near the coast are also two species of the section *Chamæcyparis*, *Cupressus nootkatensis* and *C. Lawsoniana*; whilst in California and the mountains of Mexico and Guatemala there are several species, some, such as *C. macrocarpa*, being found on the Californian coast within a very restricted area. On the opposite side of the Continent, *C. Thyoides* extends from north to south.

Some of the insular forms are worthy of note as offering variation from the type growing on the mainland (see subsequent remarks on the Farallones Cypress, and on *C. guadeloupensis*, both apparently forms of *C. macrocarpa*).

The dry climate of Arizona seems also to have induced some modification in the type of *C. Benthami*, which variation Prof. Greene considers to be of specific value and calls in consequence *C. arizonica*.

In geological distribution they have been found in Pliocene and Miocene formations, but not at an earlier period than the Eocene.

* Sachs ex Goebel, 'Outlines of Classification and Special Morphology,' ed. Garnsey and Balfour, Oxford (1887), p. 329.

CUPRESSUS.

Linn. Gen. 1079 *ex* Tournefort, Instit. 358; Jussieu, Gen. 413; Richard, Conif. p. 142, t. 9; Endlicher, Synops. p. 55; Spach, Hist. Nat. Vég. Phan. xi. p. 323; Carrière, Traité, p. 114; Gordon, Pinetum, p. 56; Henk. et Hochst. Nadelholz, p. 230; Parlatore in DC. Prod. xvi. ii. p. 467; Benth. et Hook. Gen. Plant. iii. 427; Koch, Dendrologie, ii. ii. 145; Engelmann in Watson, Botany of California, ii. 113 (1880); Kent in Veitch, Manual, 225; Eichler in Engler u. Prantl, Die natürlichen Pflanzenfamilien (1889), ii. Teil, 1 Abteilung, p. 99; Beissner, Handbuch der Nadelholzkunde (1891), p. 99; Baillon, Hist. des Plantes (Conifères) (1892), p. 34.

Subgenus EUCUPRESSUS.

Strobili secundo anno maturescentes. Squamæ peltatæ lignosæ. Semina sub quavis squamâ fere plurima.—Ramuli ultimi tetrastichi vel distichi. Folia plerumque homomorpha.

1. *C. SEMPERVIRENS*, Linn. *Sp. Pl.* 1422, α et β (1753).

Arbor seu frutex coma effusa vel fastigiata densissime ramulosa; ramis teretibus fuscis vel rubris; foliis ramealibus dissitis longe concrescentibus late ovatis vel ovato-oblongis obtusis abrupte mucronatis, mucrone appresso vel patente; ramis herbaceis ovato-vel oblongo-lanceolatis raro suborbicularibus, planiusculis horizontalibus seu ascendentibus surde viridibus seu cinerascens, subregulariter distiche vel tetrastiche bi-tripinnatim ramulosis, ramulis ultimis strictis subæqualibus gracilibus pene 4-angulatis; foliis ultimis arcte imbricatis appressis parvis 1–2 mill. long., facialibus rhomboideis seu oblongo-rhomboideis obtusiusculis dorso convexiusculis, glandulâ impressâ notatis; amentis masculis in apices ramulorum solitariis terminalibus oblongis obtusis 2–3 mill. long. aurantiacis; squamis antheriferis suborbicularibus; strobilis aggregatis vel raro solitariis pedunculatis raro subsessilibus, magnitudine et formâ magnopere variantibus, subglobosis, vel oblongis obtusis, squamis 8–14 obscure 5-angulatis, dorso planiusculis, pyramidato-umbonatis vel umbilicatis, rugulosis seu leviusculis nitidis fusco-castaneis vel cinereis, bracteâ ad apicem liberâ mucronis instar nonnunquam obtusiuscula foliaceâ.

Cotyledones 2–3 patentia 10–15 mill. long. linearia-obtusa. Foliorum primordialium verticillus cotyledonibus arcte approxi-

matus. Folia primaria patentia linearia acuta basi conerescentia cotyledonibus dimidio breviora.

“Ubique culta et inde loci ubi spontanea crescit sæpe incerti” (*Boissier*). Spontanea videtur in montibus Sphacioticis Cretæ, alt. 2000–4000 ped., *Heldreich*!, *Raulin* 745 in herb. Paris!; in montibus Cypri silvas formans, *Sintenis* et *Rigo* 506 forma patens!

Per totam Mediterraneam culta. In herbariis exstant specimina in locis hic memoratis:—Hispania, *Porta et Rego*! *Boissier*! et alii; Lusitania, Dalmatia, *Porta*!; Tyrolia, *Porta*, *Hausmann*!; Lombardia, *Silbermann*!; insulis Melos Armenis et Rhodus, *Bourgeau*!; Dardanelles, *Sintenis*!, *Ascherson*!, *Bentham*!; Algeria, *Gandoger* 653!, *Gaillardot*!; e collibus Mersinæ Ciliciæ, *Balansa*!; ex Syria boreali, *Aucher Eloy* 5337! *Post*!, *Kotschy* 327!, *Hayne*!, *Haussknecht*!; a Libano ad 3500–5000 ped., *Boissier*!, *Kotschy* 327!; e Persia boreali, *Buhse*!, *Hohenacker*!, *Haussknecht*!; ex Arabia Petræa, *MacDonald*?!; ex Afghanistan, *Griffith* 1353! 5001! 4988! In Ind. bor. occ. Kishtwar, *T. Thomson*! In imp. Sinensi ad Shanghai, cult., *Maingay* 309! Subspontanea prope vicos. Prov. Yunnan, *Delavay*! In Ins. Teneriffe, *Bourgeau* 425! In ins. Azorensibus. In hortis ad Rancagua, Amer. merid. frigidior, *Bertero* 696!, cult.

Adsunt etiam specimina in herbario Linneano proprio n. 1074!, in herb. Mus. Britt. ex hortis Clifortiano et Chelseiensi!, et in herb. Paris, ex *Vaillant*, forma fastigiata nec non horizontalis.

C. sempervirens, α et β , *Linn. Sp.* 1422; *Loiseleur in Nouv. Duhamel* (1806), t. 3, n. 1; *Roxburgh, Flora Indica*, ed. *Carey*, iii. 653, ed. *Clarke*, 678; *Loudon, Arboretum*, p. 2464, f. 2465, et *Encycl.* (1842), 1073, fig. 1996; *Forbes in Pinet. Woburn.* 181 (1839); *Koch, Dendrologie*, ii. ii. p. 145 (1873); *Boissier, Flor. Orient.* v. p. 705 (1884); *J. D. Hooker, Flor. Brit. Ind.* v. 645 (1888); *Index Kewensis*, i. 671 (1893), nomen.

Juniperus oophora, *Kunze, MSS.?* in herb. *Mus. Brit.*

Icones ad formam typicam vel ad varietates ejusdem pertinentes:—*Andr. Matthioli Comm.* in lib. *Dioscoridis* (1558), p. 90; *Gerarde, Herball* (1597); *Pallas, Flor. Ross.* t. 53; *Gaertn. Carp.* t. 91; *Lamarck, Encycl.* 787; *Schk. Handbuch*, 310; *Watson, Dendrol.* ii. 155; *Reichenb. Flor. Germ.* ii. 534; *Nees, Gen.* 4, 10; *Duhamel, Traité* (1806), t. 3, n. 1; *Richard*,

Conif. t. 9; Pinetum Woburnense, 62 (horizontalis); Spach, Suites, 90; Loudon, Arboret. viii. tab.; Ann. Sc. Nat. sér. iv. xiv. p. 13; Baillon, Adansonia, vol. i. 2; Dict. Bot. ii. (1886), 302, et Hist. des Plantes, xii. 4; Willkomm, Forstl. Flora, ed. 2, fig. 33. 5; Beissner, Handbuch, p. 101, f. 26; Compend. Flor. Ital. t. 30. f. 1.

Fig. 7.

Cupressus sempervirens.—Herbaceous branch and foliage, real size.

Cupressus mas, *Caesalpinus de Plantis*, lib. iii. cap. 55.

C. ramos extra se spargens quæ mas Plinii, *Tournefort, Instit.* 587; *Linn. Hort. Cliffort.*

C. sempervirens, β , *Linn. Spec. Pl.* p. 1422 (1753).

C. sempervirens horizontalis, *Gordon, Pinetum*, p. 68 (1858), ed. ii. p. 96 (1875); *Parlatore in DC. Prod.* xvi. ii. 468; *Beissner, Handbuch* (1891), p. 102; *Kent in Veitch, Manual of the Coniferae* (1881), p. 236; *Hansen, Pinet. Danicum, in Journ. R. Hort. Soc.* xiv. (1892) p. 287.

C. horizontalis, *Miller, Dict.* ed. viii. n. 2 (1768), sphalmate 'horizontalibus;' specimina authentica *Milleri* in herbar. Mus. Brit. sunt asservata!; *Endlicher, Synops.* p. 56 (1847); *Carrière, Traité général des Conifères*, p. 115, ed. ii. (1867) p. 144; *Loisel. in Nouv. Duhamel*, iii. 6; *Knight, Syn. Conif.* 19; *Targioni-Tozzetti, Oss. Bot.* dec. iii. p. 54; *De Candolle, Flore Franç.* v. p. 336; *Henk. et Hochst. Nadelholz.* p. 230; *Forbes in Pinet. Woburn.* p. 185 (1839).

C. patula, *Spad. Xilog.* i. 193.

C. lugubris, *Salisbury, Prod.* 397.

C. Tournefortii, *Audub. Cat.* 1834, ex *Carrière*.

Var. FASTIGIATA ; coma pyramidalī, ramis ascendentibus.

Ubique culta, spontanea hucusque haud inventa nisi forte in Himalayæ montibus.

Cupressus femina, *Cæsalpinus de Plantis*, lib. iii. cap. 55, p. 134 (1583).

C. meta, in fastigium convoluta quæ femina Plinii, *Tournefort, Instit.* 587 (1700).

C. sempervirens, a, *Linn. Sp. Pl.* 1422 ; *Duhamel, Traité des Arbres* (1755), p. 6 ; *Miller, Gard. Dict.* ed. viii. (1768) n. 2 ; *Loisel. in Nouveau Duhamel*, iii. t. 1 (1806 ?) ; *Richard, Conif.* t. 9 ; *Reichb. Ic. Flor. Germ.* xi. 534 ; *Veitch, Manual* (1881), 236 ; *Hansen in Journ. R. Hort. Soc.* xiv. (1892), p. 287.

C. sempervirens stricta, *Aiton, Hort. Kew.* ed. i. iii. 372 ; *Loudon, Encyclop.* f. 1996.

C. fastigiata, *DC. Flor. Franç.* v. 336 ; *Forbes in Pinet. Woburn.* 186 (1839) ; *Grisebach, Spicileg. Flor. Rumel.* ii. 354 ; *Endlicher, Synopsis*, 57 (1847) ; *Carrière, Traité*, ed. i. p. 116, ed. ii. p. 146 ; *Willkomm, Forstl. Flor.* ed. ii. (1887) 246.

C. sempervirens a. fastigiata, *Beissner, Handbuch*, 1891, 102.

C. pyramidalis, *Targ.-Toz. Oss.* ii. 53.

C. conoidea, *Spad. Xilogr.* i. 189.

C. elongata, *Salisbury, Prod.* 397.

C. ex "Moreton Bay," *hort.*

Var. SPHÆROCARPA, *Parlatore in DC. Prodr.* xvi. ii. p. 469 ; strobilis globosis, squamis 10-12 convexis breviter mucronatis, mucrone obtusiusculo.

C. sphærocarpa, *Parlatore.*

Var. GLOBULIFERA, *Parlatore, l. c.* 469 ; strobilis globosis, squamis 8-10 convexis breviter mucronatis.

C. globulifera, *Parlatore.*

Hance, 8892 ! in *herb. Mus. Brit.*

Var. INDICA, *Parlatore, l. c.* 469 ; strobilis globosis, squamis sub 10 "convexis medio umbonatis et apice bractæe acutiusculo mucronatis."

In Himal. Occident. In Nepalia et Kooloo, Prov. Lahol,

Schlagintweit 3522! (foliis oblongis acutis), in montibus usque ad limites arborum spontanea.

Cupressus sempervirens indica, *Royle MSS.*

C. Roylei, *Carr. MSS.*

C. Whitleyana, *hort.*, ex *Carr. Traité*, p. 128; *Gordon, Pinet.* p. 72.

C. Doniana, *hort.*

C. australis, *Low ex Gord. Pinet. ed. II.* 1875, 103.

Var. *UMBILICATA*, *Parlatore, DC. in Prodr.* xvi. II. p. 469; strobilis subglobosis, squamis 10 dorso umbilicatis ibique in medio mucronatis, mucrone lato obtusissimo brevissimo.

C. umbilicata, *Parlatore, l. c.*

Hance in Mus. Brit. 8891, ex *hort. Bot. Florentiz.*

Var. *FLAGELLIFORMIS*, *Todaro*, ubi?; foliis oblongo-rhomboides; strobilis subglobosis, squamis convexis umbonatis, mucrone latissimo foliaceo.

Præter varietates supra nominatas exstant in hortis varietates seu formæ numerosissimæ. A cl. Carrière formæ sequentes enumerantur:—*C. retrofracta*, *expansa*, *orientalis*, *thuiæfolia*, *pendula*, *protuberans*, *variegata*, *Bregeoni*, *cereiiformis* (cfr. *Revue Horticole*, 1859, p. 166, c. ic.), *montrosa*, *contorta*, *Fortuselli*, *Fernandi*. De hisce et talibus varietatibus ita scripsit cl. Parlatore:—"Stirps ramorum et ramulorum directione, strobilorum et squamarum forma maxime ludibunda . . . Observaciones recentiores de strobilorum et squamarum nec non ramorum directionis variabilitate certum me fecerunt ab unica et tantum polymorpha specie omnes varietates provenire, nam in eadem arbore ramos partim fastigiatos et partim patulos, strobilos ovato-oblongos, oblongos et globosos nec non squamas nunc dorso convexas umbonatas et mucronatas nunc tantum convexas et vix aut ne vix mucronulatas, nunc rariter etiam umbilicatis mihi videre occurrit."—*Parlatore, l. c.* 469.

The common Cypress recognized from time immemorial exists under two principal forms, the one pyramidal and fastigate, the other spreading and Cedar-like. As will be seen by reference to the synonymy, some authors have taken the fastigate form as the type of the species and considered the horizontally branched form as a variety. Others have adopted the reverse view, whilst still others have considered the two forms to be distinct species. Against this last view may be adduced the fact that intermediate

forms are very common, even on the same tree; and individual plants are so very variable in habit and in fructification that it seems better to assume that there is but one species.

If so, it would appear from analogy with other fastigate forms, *e. g.* in the oak, that the fastigation is a variation from the normal spreading type. Planters have preferred the pyramidal form for their purpose, and hence that form is now much more frequently met with than the one with spreading branches. Indeed, the tree is now rarely met with in a wild state. It would be interesting to know whether the wild form found on mountains in the Levant and in the Himalayas is fastigate or not, for, obviously, the pyramidal form would be less liable to injury from the weight of snow than that with horizontal branches, and would be in so far better adapted to its environment. Pliny says, "The Cypress grows on the white mountains of Crete. On the very summit of these elevations, from which the snows never depart, we find the Cypress growing in great abundance, a thing that is truly marvellous, seeing that in other countries it will only grow in warm localities" (Bohn's translation *). In Ecclesiasticus, Chap. xxiv. v. 15, mention is made of the Cypress and its habitat on mountains. "I am set upon hill like a Cedar in Libanus and as Cypress tree upon the mountaines of Hermon" (cited from Robert Barker's "The Bible, that is the Holy Scriptures, 1615").

In Isaiah, XLIV. 14, the "Cypress" is mentioned as a timber tree: "He heweth him down Cedars, and taketh the Cypress and the Oak." But the writer of the article "Cypress" in Smith's Dictionary of the Bible asserts his inability to assign any definite rendering to the word *tirzah*, and hence the identity of the tree intended must still be considered as uncertain.

Numerous references to the Cypress as known to Latin authors, and the uses to which it was put, are given in Duhamel's 'Traité des Arbres et Arbustes qu'on cultive en France,' to which the reader may be referred for copious and interesting details on the history of the plant; as also to the English edition of Hehn's 'Wanderings of Plants and Animals from their first home,' ed. Stallybrass.

* Pliny, lib. xvi. cap. xxxiii. :—"...summisque jugis Cretæ], unde nives numquam absunt, plurima, quod miremur: alibi non nisi in tepore proveniens, et nutricem magnopere fastidians."

Humboldt considered the native home of the Cypress to be the mountains of Buseh west of Herat. Ritter agrees that the true home of the mountain Cypress lies to the west of the Valley of the Indus in the table-lands of Caboul and Afghanistan. "From this home the Cypress migrated westward in company with the Iranian worship of the sun. The Zends saw in the heavenward aspiring obelisk shape of the tree the image of the sacred flame . . . and all over Iran venerable specimens of it adorned the temples of fire, the courts of the palaces and the centre of the Medo-Persian shrubberies or 'paradises.' Following the path of the oldest Assyrio-Babylonian migrations, the Cypress very early arrived in the countries of the Aramæo-Canaanite tribes, the Lebanon and the island of Cyprus, which took its name from the tree, and there too became a holy tree in which a goddess of nature was present; the same shown to us in the Troad by Virgil, who describes her ancient deserted temple with the sacred Cypress, in this case calling the deity Ceres, while in another he calls her Diana." *

With reference to the original habitat of the Cypress in Afghanistan, the testimony of Aitchison is not very strong. In his note on the Products of Western Afghanistan and of North-eastern Persia †, he tells us that the native names are *saur*, *saro*, *sarun*, *sarwi*, and *sawu*; and continues: "A few of this occur cultivated in gardens at Herat; I fancy I saw some at Meshad. The only one I have noted in my Journal is a tree to the west of the fort of Sangun." In the same author's 'Botany of the Afghan Delimitation Commission' ‡ no mention whatever is made of any *Cupressus*. Roxburgh § says "the upright variety is a native of China and of the northern mountains of India and Persia. It does not thrive on the plains of Bengal."

2. CUPRESSUS LUSITANICA, *Miller, Dict.* ed. VIII. (1768) n. 3.

Arbor comâ effusâ modo densissime, modo laxiuscule ramosâ, ramis teretibus; foliis ramealibus deltoideo-ovatis subulatis; ramis herbaceis oblongo-lanceolatis bipinnatim ramulosis confertim seu laxiuscule tetrastiche ramulosis, ramulis tetragonis

* 'The Wanderings of Plants and Animals,' by Victor Hehn; edited by J. S. Stallybrass, p. 212.

† Aitchison in Trans. Bot. Soc. Edinb. xviii. (1891) p. 51.

‡ Trans. Linn. Soc. 2nd ser. Bot. vol. iii, (1887) p. 113.

§ 'Flora Indica,' ed. Clarke, p. 678.

curvatis vel strictis ; foliis ultimis laxiuscule appressis, facialibus oblongis obtusiusculis nonnunquam ovato-lanceolatis acutis ad margines excisis subcarinatis planiusculis glandulosis ; amentis subglobosis obscure 4-angulatis ; strobilis parvis (magn. cerasi parvi), longiuscule pedicellatis subglobosis cæsiis, squamis umbonatis, umbone in processum foliaceum planiusculum acutum vel obtusum sæpius deflexum protracto.

Folia primordialia tenuissima patentia lineari-subulata (herb. Paris).

Hujusce speciei elegantissimæ locus natalis ignotus. In Lusitaniâ, Hispaniâ, aliisque regionibus calidioribus culta et ex Goâ, ut dicitur, sed dubie, allata.

In herb. Miller in Mus. Brit. asservato specimen adest sub nom. *C. lusitanicæ*, nec non alia ex hortt. Chelsea, Herrenhausen (herb. Rœmer), et ex hort. Goodwood ducis Richmond. In herb. Paris specimina adsunt in herb. Vaillant et ex hortis Mons-peliensis, "la Malmaison."

In Lusitania ad Bussaco, *Henriques* !, *Winkler* !, *Shuttleworth* ! ; *Schulz*, herb. normale 1471 ! ; in Hispaniâ ad Granadam, *Willkomm* !, *Shuttleworth* !, *Porta* 121 ! ; in ins. Madeira, *Burchell* 609 !, *Mandon* ! ; Cordoba, *Hieronymus*. In Brasiliâ, teste *Eichler*. In Italiâ ad Neapolim, *Rabenhorst* ! Ex hortis Europæis, Indicis, Austro-Americanis, Capensibus, et Australiensibus, specimina numerosissima recentiora vidi.

Juniperus ex Goa, *Hermann*, *Hort. Lugd.-Bat. Cat.* p. 346 (1687).

Cedrus a Goa et Sabina Goensis, *Ray*, *Hist. Plant.* ii. pp. 1414 et 1798 (1688).

Cedrus ex Goa, *Sloane in epist. ad Raium Nor.* 11 (1684).

In herb. Sherard, Oxon. (fide commiss. Druce) exstant specimina quatuor hujusce speciei nn. 5839, 5838, 5843, et 5844, locis haud nominatis.

Icones :—Lambert, *Pinus*, ii. 49 ; Forbes in *Pinet. Woburn.* 62, sub nom. *C. lusitanicæ* ; L'Héritier, *Stirpes*, 15, t. 18 ; *Nouv. Duhamel*, iii. 3, sub nom. *C. pendulæ* ; *Gard. Chron. ser. III. x.* (1891), 761, sub nom. *C. glauca*.

C. lusitanica patula fructu minore, *Tournefort*, *Instit.* 587 ; *Loisel. in Nouv. Duhamel Arb.* i. p. 98.

C. lusitanica, *Miller*, *Dict.* ed. VIII. ; *Willd. Sp. Pl.* (1805) iv. 511 ; *Lambert, Pinus* (1803), 95, t. 42 ; *Aiton, Hort. Kew.* ed. II.

vol. v. (1813), p. 323; *Forbes, Pinetum Woburnense*, 187 (1839);
Loudon, Encycl. 1075, fig. 1998 (1842); *Tenore, Osserv. sopra*

Fig. 8.

Cupressus lusitanica.

alcuni Cipressi (Modena, 1853); *Carrière, Traité*, p. 119, ed. II.
 p. 155; *Gordon, Pinetum*, p. 63, ed. II. (1875) p. 89; *Veitch*,

Manual, 228; *Eichler in Mart. Flor. Brasil., Conif.* (1863) t. cxiii. ii.; *Masters in Journ. Roy. Hort. Soc.* xvii. (1894) p. 1 (ubi arboris hujusce jucundissimæ historia est elata); *Hansen in Journ. R. Hort. Soc.* xiv. (1892) p. 285.

Cupressus glauca, *Lam. Encycl.* ii. 243 (1786–1790); *Spreng. Syst.* iii. p. 889; *Brotero, Fl. Lusit.* i. 216 (1804); *Endlicher, Synops.* 58 (1847); *Parlatore in DC. Prod.* xvi. ii. 470; *Willkomm & Lange, Prod. Flor. Hispan.* (1861) i. 21; *Brandis, For. Flor.* 534; *Dalzell et Gibson, Bombay Fl. Suppl.* 83 (1861); *J. D. Hook. in Flor. Brit. Ind.* v. 645 (1890); *Masters in Gard. Chron.* ser. III. x. (1891), Dec. 26, p. 761, fig. 110; *Willkomm in Gartenflora* (March 1890); *Useful Plants of Bombay*, by J. C. Lisboa, *Bombay* (1886), p. 133.

An sit *C. sempervirentis* vel *C. torulosæ* varietas dubitat cl. Hookerus.

C. pendula, *L'Hérit. Stirp.* 15, t. 8 (1784); non *Thunb., nec Abel, nec Lamb.*; *Nouv. Duhamel*, tab. 2 (1806); *Aiton, Hort. Kew.* ed. i. (1789), iii. p. 373; *Persoon, Synopsis*, ii. (1807) p. 580; *C. Koch, Dendrologie*, ii. ii. (1873) p. 151.

C. Uhdeana, *Gordon, Pinet.* 71, excl. loc. fide *Parlatore, sed?*; *Carrière, Traité*, p. 128.

C. sinensis, hort.

The following names of garden-forms are referred to this species by *C. Koch, l. c.*:—*C. cinerea*, *C. capensis*, *variegata*, *goensis*, *sinensis*, *sinensis glauca*, *sinensis pendula*, *Libani glauca*, *mexicana glauca*. *Carrière* also considers the following Mexican trees to belong to this species, viz., *C. Benthami*, *C. Uhdeana*, and *C. Lindlei*, but this identification is open to doubt.

A summary of the history of this tree is given in a communication to the Royal Horticultural Society*. Although the Portuguese botanists do not consider it a native—there are no large trees known out of Portugal, and the species is not found wild in the neighbourhood of Goa,—it is possible that the Portuguese may have met with the plant in China and transferred it thence to Goa and the mother country. The tree, however, is as I am informed by Mr. Tutchet, not found in the neighbourhood of Macao.

A cross section through the adult leaves of the “Cedar of Goa” from Bussaco shows each leaf to have a semi-elliptical form, convex dorsally, more or less concave internally, and with the

* *Masters in Journ. Royal Hort. Soc.* vol. xvii. (1894) p. 1.

ends of the section corresponding to the margins acutely pointed. The epiderm is thickened on the outer surface. The hypoderm is continuous and most observable at the edges. The palissade is imperfect and the parenchyma is traversed by a resin-canal. The stomata have two elliptic guard-cells.

Similar sections across the leaves of the plants known as *pendula* or *pendula glauca* show a similar but not identical arrangement; the dorsal surface is more keeled, and the section is in consequence more triangular in outline. Beneath the thin epiderm is a layer of discontinuous hypoderm. There are only imperfect palissade-cells or none at all, these cells being replaced by loose cellular tissue traversed near the corner by a resin-canal. On the inner surface next the axis the epiderm is papular.

Fig. 9.

Section across the centre of two leaves of *C. lusitanica*, "Cedar of Goa."—The median leaves are cut across at the base.

Fig. 10.

Section across leaves of *C. pendula glauca*.

3. CUPRESSUS TORULOSA, *D. Don, Prod. Fl. Nepal.* 55 (1825).

Arbor comâ pyramidatâ, ligno-roseo; ramis assurgentibus teretibus; foliis ramealibus dissitis basi concrescentibus appressis deltoideis seu oblongis acutis; ramis herbaceis oblongo-lanceolatis planiusculis seu curvatis horizontalibus vel ascendentibus apice decurvis atro-viridibus subremote regulariter bipinnatim ramulosis, ramulis distichis remotiusculis subæqualibus vix teretibus subtetragonis, verberiformibus; foliis ultimis oblongo-rhomboides obtusiusculis convexis glandulosis, marginibus excisis, apice parum patentibus; amentis oblongis subtetragonis, squamis antheriferis late ovatis obtusis; strobilis pluribus aggregatis raro solitariis, subsessilibus magn. cerasi, squamis 8-10 umbonatis; bractea cum umbone protracto concrescente apice liberâ.

In Himalayæ regionibus occidentalibus centralibus temperatis inter 4500-8500 ped., *Wallich* 6046 B ! et 9947 !, *Jameson* !, *Jacquemont* !, *Royle* !; Bhotan, *Webb* !; Simla, *Hook. f. et Thoms.* !, *Thomson* 642 !; Chamba Kulu, alt. 7000 ped., *Edgeworth* 254 !; Nynee Tal, *Strachey et Winterbottom* !; Kumaon et Gurwhal, *Duthie* !, *Capt. Gerard* ! in herb. Mus. Brit. !, *Falconer* !

Icones:—Griffith, Ic. Plant. Asiat. t. 372; Murray, in Pinet. Brit. 201; Loudon, Arboret. f. 2329–31; Encycl. 1076, f. 1999–2001; Lambert, Pinus, ed. II. 113.

Endlicher, Synops. 58; Dalzell et Gibson, Bombay Flor. Suppl. 83; Parlature, in DC. Prodr. xvi. II. 469; Brandis, For. Flor. 1874, 533; Gamble, Mon. Ind. Timber, 410; Hook. Flor. Brit. Ind. v. (1888) p. 645; C. Koch, Dendrol. II. 159; Veitch, Manual, 239; Gordon, Pinetum, ed. II. 97; Carrière, Traité, p. 117, ed. II. p. 151; Forbes in Pinet. Woburn. 189.

Cupressus Tournefortii, Tenore in Mem. Soc. Ital. Scien. Modena, t. xxv. pars 2 (1853), tab. 1 a, haud Audibert.

Var. CORNEYANA.

A *C. torulosa* typica teste cl. Parlature, l. c. p. 470, differre videtur “ramis ramulisque omnino pendulis, glandulis foliorum vix conspicuis, strobilisque sæpius ovalibus haud umbonatis sed tantum apice bractæ adnatæ libero incurvo mucronatis et super mucronem tantum glaucis.” . . . “Strobili 15–20 mill. longi, 10–14 mill. lat. Specimina culta tantum vidi ideoque de patria ejusdem speciei respondere non possum.”

C. Corneyana, Gordon ex Knight and Perry, Conif. p. 20 (1850); Gordon, Pinet. ed. II. p. 80; Carrière, Traité, ed. I. p. 28; Parlature, l. c. p. 470.

C. torulosa, Corneyana, Carrière, Traité, ed. II. p. 121 (1867); Kent in Veitch, Manual, 239.

C. funebris, Karl Koch, Dendrologie, II. II. 160, haud Endl.

Strobilorum squamæ juventute valde umbonatæ, senescendis tamen planiusculæ obscure mucronatæ evadunt.

E Chinâ vel e Japoniâ ut existimant auctores allata, specimina indigena hucusque tamen haud offensa.

In hortis exstat varietas vegetior ramulis ultimis insigniter decurvatis cui nomen *C. torulosa majestica*, Gordon, Pinet. ed. II. 100 = *C. majestica*, Knight et Perry. A cl. Carrière varietates hortenses sequentes enumeratæ sunt:—*viridis*, *filiformis*, *Tournefortii* (Tenore non Audib.), *nana*, *juni-peroides*, *microcarpa*, *Smithiana*.

Dr. Jameson says (Journ. Horticult. Soc. 1853, p. 312) that this species is known to the natives as ‘Surroo’ or ‘Surin,’ and near Simla, where it occurs in the vicinity of temples,

it is styled 'Deodar,' the *Cedrus Deodara* being there known as 'Keloo.'

The plant figured under this name in Paxton's Flower Garden, i. 167, f. 105, and the figure of which is repeated in the 'Flore des Serres,' viii. 192, and in the 'Garden,' is doubtless *C. macrocarpa*.

4. CUPRESSUS FUNEBRIS, *Endlicher, Synopsis Conif.* 58 (1847).

Arbor comâ effusâ; ramis horizontalibus apice pendentibus, teretibus rubris; foliis ramealibus parvis appressis suborbicularibus mucronatis; ramis herbaceis angustis elongatis planiusculis pendulis subæqualiter bipinnatim ramulosis elegantissimis, ramulis remotiusculis tetrastichis gracilibus subæqualibus ancipitibus seu pene 4-angulatis; foliis parvis 1-2 mill. long. deltoideis acutis ad margines sinuatis læte viridibus glandulosis; amentis ovato-oblongis subtetragonis, squamis antheriferis ovato-orbicularibus; strobilis solitariis raro aggregatis breviter pedicellatis globosis diam. circa 1 cent., squamis 8 obscure pentagonis breviter umbonatis, bractea cum umbone conrescente apice liberâ; seminibus orbicularibus compressis alatis.

Folia primordialia quadrifariam verticillata basi cum axe conrescentia apice liberâ patentia lineari-subulata nervo medio utrinque prominente.

China, *Sir G. Staunton* in herb. Mus. Brit.! Indigena in China meridionali-occidentali prope fluv. Yang-tse-Kiang, *Faber* 991!; Su Tchuen dist., Tchen Keoa Tin, alt. 1200 met., native name Pee Chow, *Fargies* 1158 in herb. Paris! In montibus prope Nauto, Ichang, *Henry* 1070! 1898!; *Maries*! In Chinâ alibique ad busta et tumulos plantata, *Fortune* 45!, *Champion*!, *Urquart*! Colitur etiam in Sikkim, *Hook. fil.*!; in Bootan, *Griffith* 2613, 1! 3000, 1!; Singapore, *Ridley*!

"The Weeping Thuya" or "Lignum Vitæ," *Staunton, Embassy to China* (1792), ii. 445, t. 41; *Fortune in Gard. Chron.* (1850), 228; *J. D. Hooker, Himalayan Journals*, i. 315.

Cupressus funebris, *Endl. Synopsis.* 58; *Gordon, Pinetum*, ed. ii. 83; *Carrière, Traité*, 120, ed. ii. 161; *Knight and Perry, Synopsis.* 19; *Veitch, Manual*, 227; *Hook. f. Flor. Brit. Ind.* v. (1890) 646; *Parlatore in DC. Prodr.* xvi. ii. 471; *Brandis, For. Flor.* 534; *Gamble, Manual Indian Timbers*, 410; *Hansen in Journ. R. Hort. Soc.* xiv. (1862) p. 285.

Icones:—*Planchon* in *Flore des Serres*, vi. p. 90; *Lambert*,

Pinus, ed. II. p. 124, t. 66; Loudon, *Arboretum*. iv. 2479, f. 2332; Paxton, *Flower Garden*, i. 46, f. 31; Moore & Ayres, *Magazine Bot.* i. 276, f. 1, sub nom. *C. funebris*; Abel in Staunton Embassy, *l. c.* (1816); Loudon, *l. c.*, sub nom. *C. pendulæ*, haud Thunberg (1784) synonymiisque exclusis.

Cupressus amœna, C. Koch, in *Monatschrift f. Garten u. Pflanzenkunde*, i. 110 (1873), et in *Dendrologie*, ii. II. 164.

Fig. 11.

Fig. 12.

C. funebris.—Herbaceous branches, foliage, catkins, and cones, real size.

Fig. 11, cultivated specimen; fig. 12, natural specimen from Ichang.

A section across the leaves of *C. funebris* shows an elliptic outline generally curved outwards, convex dorsally, concave on the opposite side, and somewhat blunted at the two ends, generally more so than in the specimen figured. The epiderm is much thickened on the distal side, but there are no hypodermal cells except at the angles. The palissade-cells are well-marked, but the endodermal layer is not developed.

Fig. 13.

Section across leaf of
C. funebris, $\times 20$.

5. *CUPRESSUS BENTHAMII*, Endlicher, *Synopsis Conif.* (1847) p. 59.

Arbor coma effusa laxiuscule ramosa, ramis teretibus rubris; foliis ramealibus homomorphis oblongis vel deltoideis abrupte subulato-acuminatis acumine laxo appresso; ramis herbaceis foliis undique tectis ambitu late oblongis planiusculis ascendentibus late viridibus subregulariter bipinnatim ramulosis; ramulis

distichis raro tetrastichis decussatis, subtetragonis; foliis ultimis carnosulis 1 mill. et ultra long. facialibus deltoideis vel deltoideo-oblongis acutis vel obtusiusculis dorso convexis glandulâ notatis vel eglandulosis ad margines parum sinuatis; amentis masculis 4 mill. long., oblongis obtusis subtetragonis; squamis antheriferis suborbicularibus; strobilis aggregatis raro dissitis breve pedunculatis, 1-1½ cent. diam. globosis, rufescenti-fuscis, squamis rugulosis planiusculis umbonatis glaucis, bracteæ conrescentis apice libera subulato-mucronata subfoliacea.

Habitat in Mexici regione montana frigida, spec. authent. *Hartweg* n. 434! partim!, 437!; *Ruiz et Pavon* in herb. Mus. Brit.; *Schmidt* 971; *Liebmann*! In Orizaba ad Cocolapan, *Bourgeau* nn. 245, 254, et 3258!; Sierra Madre, *Seemann* 2000!, *Palmer* 1293!; Nevada de Toluca, 9000 ped., *Pringle* 4253, *Uhde* 69!; *Moricand* 1169!; *Schaffner*!; *Parry et Palmer* 1294!; *W. Murray*!; *Hahn* 362, 376!; *Virlet d'Aout* 862; *Berlandier*! ? In Nov. Mexico, *Fendler* 834! In Guatemalæ montibus, *Lehmann* 1591!; *Donnell Smith* 1891 et 3157!

Parlatore in DC. Prodr. xvi. ii. p. 472; Hemsley in Biol. Centr.-Amer. vol. iii. 1882-86, p. 183.

C. sempervirens mexicana, *Pavon* in herb. *Banks*!

C. thurifera, *Schlecht.* in *Linnæa*, xii. 423; *Benth.* *Plant. Hartweg* (1840), p. 57.

C. Coulteri, *Forbes* in *Pinet. Woburn.* (1839) p. 190, e seminibus in herb. Coulter per quindecim annos servatis producta. Nomen forsitan rectius delendum propter descriptionem nimis incompletam plantæ juvenilis. ? *C. Coulteri*, hort. Glasnevin!

C. Uhdeana, *Gordon* in herb.!

? *C. Ehrenbergii*, *Kunze* in *Linnæa*, xx. 16.

C. Karwinskyana, *Regel* in *Gartenflora*, 1857, p. 346, teste *Parlatore*.

C. excelsa, *Gordon*, MSS. *C. kewensis*, hort.

Var. *LINDLEYI*; ramulis ultimis longitudine subæqualibus, regulariter dispositis, curvatis tetragonis, foliis rhomboideo-lanceolatis; strobilis parvis globosis, squamis mucronatis.

In Mexico inter Anganguio et Tlalpujahua, *Hartweg* 437! spec. typicum; Barranca au dessus de Tacuhaya, *Bourgeau* 245!; *Parry et Palmer* 848!; *J. Ball*!

C. Lindleyi, *Klotzsch* in *Endlicher, Synops.* p. 59 (1847); *Parlatore*, l. c. p. 471.

Cupressus thurifera, *Lindley in Bot. Reg.* (1839), App. p. 64; *Benth. Plant. Hartweg*, p. 57, *haud H. B. et K.*
 ? *C. cornuta*, *Carrière in Revue Horticole*, 1866, f. 32.
Jeffrey 1481!

Var. *ARIZONICA*; foliis insigniter glaucis; strobilis globosis magnitudine cerasi magni, squamis irregulariter 4-5-angulatis planiusculis versus apicem parum umbonatis.

In montibus Arizonae, San Francisco dictis, *Greene*!; in mont. Santa Catalina, *Parry et Palmer* 848 partly!; Sierra Madre, *Lemmon* 1293!; Santa Rita, *Pringle*!; mont. Chiricahua, *Lemmon*!

Fig. 14.

C. Benthami, var. *arizonica*.—Foliage and section magnified, cones real size.

Cupressus arizonica, *Greene in Bulletin of the Torrey Botanical Club*, vol. ix. May 1882, p. 64; *Rusby in Bull. Torrey Bot. Club*, ix. 79; *Sereno Watson in Proc. Amer. Acad. Sci.* xviii. 1883, p. 157; *C. S. Sargent, Tenth Census Report*, 1884, p. 180, excl. syn.; *Lemmon, Third Report of the Californian State Board of Forestry*, 1890, p. 180; *Mast. in Gard. Chron.* ser. III. x. (1891), Sept. 26, p. 364.

Var. *KNIGHTIANA*.

C. Knightiana, *Knight & Perry, Gordon Pinetum*, 1858, p. 61; *Hansen in Journ. R. Hort. Soc.* vol. xiv. (1892), p. 284. *C. elegans*, hort.

"The origin of the species is unknown," *Knight & Perry, l. c.* Mexico, *Bourgeau*, 3258!

Specimina culta ex hort. Glasnevin pluribusque aliis observavi.

An species distincta? habitu formosa nisi in hortis vix

Fig. 15.

C. Benthami, var. *Knightiana*.—A. Herbaceous shoot of natural size, to show the regularity of its branching. B. A shoot of the second order, to show the approximately equal length of the branchlets of the third order, magnified 2 diams. C. Male inflorescence, magn. 4 diams. D. Imperfect anther from the inner side. E, F, G. Cones and cone-scales: these cones are imperfectly developed; generally they are considerably larger.

nota. Ab affinibus discrepat habitu regulari et præsertim conorum squamis valde pyramidatis, appendice foliaceo in medio squamæ et cum eâ fere omnino conrescente itaque inconspicuo.

Fig. 16.

Cupressus Benthami, var. *Lindleyi*.—Section across a pair of lateral leaves.
× 20.

The leaf-section of *C. Benthami* var. *Lindleyi* shows a sub-orbicular or ovate, very obtuse outline. The hypoderm is discontinuous, and the palissade well-marked.

In *C. Benthami* var. *arizonica* the outline of the section is semi-elliptic, very acute at the extremities, dorsally convex, flattened on the inner surface. The epidermis is very thick. The hypodermal layer is continuous, and the palissade well-marked, traversed by four-sided spiral vessels.

Fig. 17.

C. Benthami, var. *arizonica*.—Section across lateral and median leaves.

6. *CUPRESSUS MACROCARPA*, Hartweg in *Journ. Hort. Soc. Lond.* ii. (1847) p. 187, c. ic.

Arbor comâ effusâ horizontali vel pyramidatâ, ramis teretibus rubellis arcuatis; foliis ramealibus deltoideis acutis; ramis herbaceis oblongis acutis elongatis planiusculis subregulariter bipinnatim ramulosis; ramulis gracilibus subæqualibus subtetragonis; foliis vix 2 mill. long. facialibus crassiusculis deltoideo-oblongis obtusiusculis crebre eglandulosis seu glandulâ lineari præditis, apice parum patentibus; amentis masculis ovato-globosis; strobilis aggregatis breve pedunculatis majusculis oblongis obtusis vel subglobosis 2-3 cent. diam., squamis angulatis rugosis umbo-natis seu umbilicatis; seminibus triquetris dorso convexis anguste alatis.

Cotyledones 2 patentes lineares, foliorum primordialium duo primotina cotyledonibus approximata, sequentia tetrasticha decussata internodio sublevata.

In nemorosis Californiæ prope Monterey, *Hartweg* 1970!, *Pringle*!, *Gray and Hooker*!; ad Cypress Point, *Bolander*, "Pescadero Ranch et Carmelo Point," teste *Sargent*; San Diego, *Palmer* 460.

Bentham, Pl. *Hartweg*, p. 337 (1849); Gordon in Journ. Hort. Soc. London, iv. (1849) 296, c. ic., et in Gard. Chron. (1849) p. 679; Pinetum, ed. II. p. 91; Torrey, Mexic. Bound. Survey, 211; Parlatore in DC. Prod. xvi. II. p. 473; Engelmann in S. Watson, Bot. Californ. ii. p. 113; A. Murray in Lawson Pinet. Brit. ii. p. 195, t. 32; Veitch, Manual, p. 234; Lemmon, Third Report (1890), tt. 25, 26; Sargent, Tenth Census Report (1884), p. 279, ubi loci libellares plurimi proferuntur; J. D. Hooker in Gard. Chron. Feb. 7, 1885, p. 176, c. ic.; Sargent in Garden and Forest, June 20, 1894; Beissner, Handbuch, p. 103; Kew Index, i. p. 671.

C. Lambertiana, *Carrière*, *Traité*, ed. II. p. 166.

Ic. xylog.: Journ. Hort. Soc. Lond. iv. (1849) p. 297; Gard. Chron. (1849) p. 679; Revue Horticole (1870), 191.

C. Hartwegii, *Carrière*, *Traité*, ed. II. p. 168.

C. torulosa, *Lindley & Paxton*, *Flower Garden*, vol. i. (1850), p. 167, fig. 105; *Van Houtte*, *Flore des Serres*, vii. 192; *Garden*, Jan. 17 (1885), p. 39, *haud Don*.

C. Reinwardtii, *hort*.

Var. FASTIGIATA; comâ conicâ; ramis fastigiatis. *Knight & Perry*, *Synops.* 20.

C. Hartwegii fastigiata, *Carrière*, *l. c.*

Var. LAMBERTIANA; ramis patentibus; foliis appressis obtusis.

C. Lambertiana, *Carrière*, *Traité*, ed. II. p. 166.

Var. GUADALUPENSIS; comâ patulâ; ramis herbaceis oblongis subregulariter laxè pinnatim ramulosis, ramulis curvatis subtetragonis; foliis glaucis subeglandulosi; strobilis subglobosis.

Cupressus guadalupensis, *S. Watson* in *Proc. Amer. Acad.* (1879), xiv. p. 300; *Sargent*, *Tenth Census Report*, p. 180.

Ins. Guadalupe, Californ. merid., *Palmer* 92!; *Fran-ceschi*!

Fig. 18.

Cupressus macrocarpa, var. *guadalupensis*.

? Var. *FARALLONENSIS*; frutescens, foliis argenteis lineari-oblongis; strobilis subglobosis oblongis obtusis parvis (2 cm. long.), squamis oblongis obtusis vel subangulatis, bracteâ longe conerescente apice acuto tantum liberâ. Jam *C. Govenianæ* forma?

Insul. Farallonens., Californiæ?

The Farallones Cypress, *J. Ellis in herb. Kew.*

Var. *CRIPPSII*; foliis patentibus rigidis acutis argenteis.

This corresponds to the "plumosa" or intermediate stage of growth of *Cupressus* (*Retinospora*) *pisifera*.

The form found at Monterey by Hartweg is a flat-topped tree like a Cedar of Lebanon. Sir Joseph Hooker, *supra* (p. 343) *citat.*, also says that he saw only the spreading branched form at Monterey,

in a wild state, and never the pyramidal form. This latter, however, is the one almost exclusively cultivated in California.

Carrière maintains the distinction between *C. Hartwegii* and *C. Lambertiana* (Traité, ed. II. p. 167). According to him, *C. Hartwegii* has more numerous, shorter, more dense (*confuses*), and more upright branches than *C. Lambertiana*. Moreover, the branches and branchlets are more elongated and slender, its leaves more distant, spreading, acuminate, and mucronate; whilst in *C. Lambertiana* they are imbricate, adpressed, and obtuse. *C. Hartwegii* is more tender in cultivation, while *C. Lambertiana* supports frost without injury. The two extreme forms are distinguishable in British gardens; but the difference between them is not sufficient to warrant the formation of two species.

As to the Farallones variety above mentioned, there seems to be some doubt, as the islands, as I am told by Prof. Greene, are little better than barren rocks and only with difficulty accessible. The information given in a letter, dated Sept. 2, 1877, by Mr. John Ellis to Sir Joseph Hooker, and preserved in the Kew herbarium, runs as follows:—"Collected by a German on the Farallones Islands about 30 miles from the Golden Gate in the Pacific Ocean about seven years ago. It is a compact, upright, small tree, silvery in colour, and having a nearly round cone, and quite distinct in habit and colour from *C. macrocarpa*. The growth is more compact than the latter, and [it is] much slower in growth. The branching immediately from the ground. I have an impression that it is from *macrocarpa*, but the seeds from this variety all come true. I have called this variety, for want of a name, '*argentea*.' Seeds of all Cypresses here [are] more or less abortive." Mr. Ellis was the University Gardener at the time the letter was written. Prof. Sargent, *in litt.*, refers the plant to *C. Goveniana*.

Fig. 19.

Cross section of lateral leaves
of *C. macrocarpa*. $\times 20$.

Fig. 20.

Cross section of lateral leaves of
C. macrocarpa, var. *guadalupensis*.

The outline of a cross section of the lateral leaves of *macrocarpa* is suborbicular. The epidermis is sometimes raised into papular cells, and the palissade is imperfect.

7. *CUPRESSUS GOVENIANA*, *Gordon in Journ. Hort. Soc. Lond.* iv. (1849) p. 295, c. ic.

Arbor seu arbuscula comâ effusâ seu pyramidali, ramis terebibus rubris horizontaliter patentibus seu ascendentibus; foliis ramealibus longe concrescentibus appressis homomorphis deltoideis; ramis herbaceis ambitu oblongis angustis elongatis 1-2 pinnatim ramulosis, ramulis tetrastichis sæpe decussatis, gracilibus, laxiusculis brevibus tetragonis; foliis 1-2 mill. long. laxe imbricatis, facialibus ovato-oblongis obtusiusculis vel subacutis convexis glandulosis; amentis 2 mill. long. oblongis obtusis; strobilis aggregatis breviter pedunculatis 15 mill. diam. globosis, squamis leviusculis seu rugulosis medio breviter pyramidato umbonatis; bracteâ fere omnino cum umbone concrescente; seminibus oblongis obtusis anguste alatis.

Folia primordialia brevia subulata pungentia basi concrescentes apice libera patentia.

Fig. 21.

C. Goveniana.—Herbaceous shoot, foliage, and catkin.

California, prope Monterey in montibus primo detexit, *Hartweg* n. 1971! *Lobb* 10! "Humboldt County south along the coast, and through the coast-ranges into Lower California," *Sargent*!; St. Helena Cañon, *Pringle*!; Santa Lucia in montes, *Vasey*!; Santa Cruz, *Marcus Jones*, 2355!; loc. haud cit., *Kellogg & Harford*, 932!; Mendocino Plains, *Pringle*!

Gordon, Pinetum, ed. II. 83; *Benth.* Plant. *Hartweg* (1849), 337; *Torrey*, Mex. Bound. Survey, 211; *Parlatore* in DC. Prod. xvi. II. 471; *Engelmann* in *S. Watson*, Bot. Californ. II. 114;

Kent in Veitch, Manual, 230 (1881); Sargent, Tenth Census Report (1884), 179.

Ic. xylog. in Journ. Hort. Soc. iv. (1849) p. 295.

Cupressus californica, *Carrière, Traité*, ed. II. p. 164.

? *C. cornuta*, *Carrière in Rev. Hort.* 1866, p. 231, c. ic. xylog., an ad *C. Benthami* rectius referenda?

Varietates hortenses *glauca*, *Huberiana*, *gracilis*, *viridis*, *attenuata*?, Carr. ed. II. p. 171.

The outline of a cross section of the lateral leaves is suborbicular. Beneath the epiderm is a single layer of hypoderm. The palissade-cells are imperfectly developed, and the ground-tissue traversed by a resin-canal.

8. CUPRESSUS MACNABIANA, *A. Murray in Edinb. New Phil. Journ.* i. p. 293, tab. 11; et *Descript. Conif. Californ.* p. 12, t. 10.

Arbor mediocris confertim ramosissima, ramis teretibus fusco-purpureis deflexo assurgentibus; foliis ramealibus undique positis remotiusculis deltoideo-lanceolatis apice subpatulis; ramis herbaceis ambitu triangulari-oblongis tripinnatim ramulosis, ramulis gracilibus subancipitibus subtetragonis apice sursum curvatis; foliis ultimis imbricatis atro-viridibus circa 2 mill. long. facialibus oblongis subrhombeis obtusiusculis dorso insigniter convexis glandulâ orbiculari munitis apice sæpius gibbis; foliis lateralibus naviculari-conduplicatis; amentis circa 3 mill. long. oblongis obtusis v. subglobosis; strobilis aggregatis breve pedunculatis globosis, diam. 2 cent. rufo-brunneis, squamis angulatis rugulosis umbonatis; bracteâ oblongâ cum umbone conrescente, squamæ sub apice liberâ, obtusiusculâ, subfoliaceâ.

California, in montibus Shasta ad 5000 ped., *Jeffrey*, specimen authenticum!; Sierra Nevada, *Lobb* 398! 439!; *Brewer* 863!; *Pringle*. "Mountains south of Clear Lake, Lake County," *Sargent*.

Lindley in Gard. Chron. 1855, p. 420; Gordon, Pinetum, ed. II. p. 90; *Carrière*, in Revue Horticole, 1870, p. 155, c. ic.; *Parlatore* in DC. Prod. xvi. II. p. 473; *Engelmann*, in S. Watson, Bot. Californ. II. p. 114; Kent in Veitch Manual, p. 233; *Beissner*, Handbuch, p. 100.

Icones:—*Murray, loc. cit.*; *Carrière, loc. cit.*; Gard. Chron. (1891), March 28, p. 403, ic. *Carrière* repetit. (see fig. 23); *Florist & Pomologist* (1874), f. 88; *Revue Horticole* (1870), p. 155.

Cupressus nivalis, Lindley MSS.; *C. glandulosa*, W. Hook. MSS.; *C. Coulteri*, hort. Glasnevin, e seminibus per annos viginti et unum in herbario cl. Coulteri asservatis in horto Glasnevin genita. [Vix *C. Coulteri*, Forbes, Pinet. Woburn. (1839), p. 190.]

Fig. 23.

C. Macnabiana.—Foliage and cones (*Revue Horticole*).

Fig. 24.

Section across lateral leaves of *C. Macnabiana*.

In section the lateral leaves are ovate or suborbicular, with a thick epidermis raised into papules on the inner surface. There is no hypoderm, and the palissade is imperfectly developed.

9. *CUPRESSUS THURIFERA*, *Humb. Bonpl. et Kunth, Nov. Spec. et Gen.* ii. p. 3, ex *Parlatore in D.C. Prod.* xvi. II. 473.

"Arbor, ramis patentibus, inferioribus apice reflexis, ramulis subdistichis brevibus teretiusculis; foliis ramorum ternis subimbricatis, ramulorum decussatim oppositis quadrifariam imbricatis, omnibus oblongo-lanceolatis inferne adnatis superne patulis acuminatis mucronato-pungentibus dorso convexis et in sicco glandulâ depressâ lineari-oblongâ prope medium notatis; amentis masculis numerosis in ramulo recto longiusculo erectis oblongis obtusis; bracteis late ovato-rotundatis obtusiusculis dorso convexis; strobilis in ramulo brevi erectis vel subcernuis globosis (fuscis glaucescentibus); squamis 6, [peltatis] decussatim oppositis crassiusculis lignosis, prope medium apice bracteæ libero brevi obtusiusculo patenti-reflexo notatis leviusculis, nuculis in quavis squama 2-3 fere obovatis convexo-triquetris apteris."

In silvis Mexici prope Tasco et Tebuitotepec, alt. 5500 ped. *Humb. et Bonpl.* 3956!; Masatlan, *Humboldt*!; in Mexico, ? Michoacoa, *Uhde* n. 547; Oaxaca, *Uhde* n. 550!; ? in Sierra Madre, *Seemann*!

Juniperus thurifera, *Humboldt*!, in herb. Willd. n. 3956, et in herb. Paris! *Chamæcyparis thurifera*, *Endl.*! *Conif.* p. 62; *Carr. Conif.* p. 135; *Gord. Conif.* p. 50; "*Cedro*," Mexic. Strobili 10-13 mill. longi et fere ejusdem mensuræ lati.

"Species squamarum et nucularum pericarpio osseo alis destituto præditarum structurâ a *Chamæcypari* aliena et inter *Cupressos* adnumeranda (v. s.)."—*Parlatore, l. c.* p. 474.

Cupressus Uhdeana, *Gordon*, ad hanc speciem ab ipso auctore relata est vide *Gordon, Pinetum*, ed. II. (1875) p. 100; cfr. etiam ad *Cupressum Benthani*.

Adsunt etiam in Musæo Kewensi strobili a Botteri ad Orizabam lecti huic speciei forsân tribuendi (fig. 27, p. 351). Strobili subglobosi magnitudinæ fructûs *Pruni spinosæ*. Squamæ 6 sublignosæ haud peltatæ parum angulatæ dorso planiusculæ seu sulco longitudinali notatæ. Bracteæ nisi ad apicem extremum cum squamis conrescentes. Semina sub quâvis squamâ 2, subtrigono-ovoidea, fere aptera seu alâ angustissimâ præditâ. De hac specie etiam conferendum cum adnotatione cl. Lindlei 'Gardeners' Chronicle,' 1856, p. 772, sub nom. *Chamæcyparidis thurifera*.

I owe to the kindness of M. Poisson and the Director of the Herbarium at the Muséum d'Histoire Naturelle, Paris, the privilege of inspecting in the herbarium the specimens collected

by Humboldt. To Dr. Urban, of Berlin, I am likewise indebted for the opportunity of seeing fragments of foliage in the Berlin Herbarium. The branches are erecto-patent, branchlets elongate; leaves tetrastichous, spreading, deltoid, subulate, glaucous. The Paris cone measures 14 mm. in length by 13 mm. in

Fig. 25.

Foliage and cone of *Cupressus thurifera*, H. B. & K. Herb. Paris.

Fig. 26.

Foliage and seed of *C. thurifera*, H. B. & K., magn. Berlin.

breadth; it is subglobose or a little depressed at the apex; the constituent scales are woody, markedly peltate, 4-sided, convex, glaucous, tuberculate, and the bract is scarcely visible. The scales

are tightly adherent (valvate), and the whole cone resembles that of a true *Cupress* rather than that of a *Chamæcyparis*.

In its wingless seeds it seems to bear the same relation to *Cupressus* that *Biota* does to *Thuya*, and furnishes another indication that *Cupressus*, *Chamæcyparis*, *Thuya*, and *Biota* have all descended, relatively recently, from the same stock.

Fig. 27.

Cones of *Cupressus*, sp., from Botteri.

The cones collected by Botteri, just alluded to, have, in the dry state, their scales so widely separate that the cones resemble those of *Tetraclinis articulata*, and their peltate form is scarcely apparent. If, however, the cones be soaked in water, so as to restore the original form, a resemblance to Humboldt's *thurifera* becomes visible.

Subgenus CHAMÆCYPARIS.

Strobili sæpius parvi seu pisi magnitudine, primo anno maturescentes. Squamæ peltatim dilatatæ coriacesæ vel sublignosæ. Semina plq. 2, raro 3-4, sub quâvis squamâ. Ramuli ultimi sæpius distiche dispositi. Folia lateralìa plus minus conduplicata, folia medianà complanata.

Cupressi, sp., *Linn. Sp. Pl.* 1422; *C. Koch, Dendrologie*, ii. 11. 1873, p. 162, *et auct. var.*

Chamæcyparis, *Spach, Hist. Nat. Vég. Phan.* xi. 329; *Endlicher, Synopsis*, p. 60 (1847); *Carrière, Conif.* p. 132; *Gordon, Pinetum*, p. 48; *Parlatore, in DC. Prod.* xvi. 11. p. 463; *Beissner, Handbuch* (1891), p. 65; *Eichler in Engler u. Prantl, Die natürlichen Familien*, ii. Teil, 1 Abteilung (1889), 99; *Engelmann in S. Watson, Botany of California*, ii. (1880), 114.

Chamæpeuke, *Zucc. in Endl. Enchir. Bot.* p. 139.

Retinospora, *Sieb. et Zucc. Fl. Jap.* ii. p. 36, *et auct. (partim)*.

Thuya, sect. *Chamæcyparis*, *Benth. et Hook. Gen. Plant.* iii. 427; *Baillon, Hist. des Plantes, "Conifères,"* p. 35 (1892).

10. *CUPRESSUS THYOIDES*, Linn. *Spec. Pl.* ed. i. 1003, ed. ii. 1422; Aiton, *Hort. Kew.* iii. 372; Nouveau Duhamel, iii. 6; Loudon, *Arboretum*, iv. 2475. f. 2327; Forbes in *Pinet. Woburn.* 183, t. 61; Hook. *Fl. Bor.-Am.* ii. 165; A. Gray, *Manual*, ed. v. 473; C. Koch, *Dendrologie*, ii. ii. 162; Kent in Veitch, *Manual*, 238.

Cupressus nana Mariana, Pluk. *Mant.* 61, t. 345.

Chamæcyparis sphæroidea, Spach, *Hist. Vég. Phan.* xi. 331; Endlicher, *Synopsis*, 61; Knight, *Synops. Conif.* 20; Carrière, *Traité*, ed. ii. 122; Gordon, *Pinetum*, ed. ii. 71; Parlatores in *DC. Prod.* xvi. ii. 464; Sargent, in *Tenth Census Report* (1884), 177; Beissner, *Handbuch*, p. 65.

Thuya sphæroidea, Sprengel, *Syst.* iii. 889; Macoun, *Cat. Canadian Plants*, part 1 (1883), p. 461.

Thuya sphæroidalis, Richard, *Conif.* 45, t. 8. f. 2.

"Southern Maine, south near the coast of Florida and along the Gulf Coast to the valley of the Pearl River, Mississippi," Sargent, *l.c.*; Cape Breton Island, and Three Mile House, Halifax, N.S., Lawson ex Macoun; New Jersey, Torrey!, Michaux!

Species bene cognita, in Floris Americanis boreali-orientalibus omnibus satis descripta. Adest specimen hujusce speciei in herb. Linnæano. In hortis adsunt varietates plurimæ habitu, coloreque foliorum distinctæ nempe. "*Retinospora ericoides*," cfr. Beissner, *Handbuch*, p. 67 (forma foliis primordialibus demum violascentibus laxè patentibus prædita); *Retinospora leptoclada* alias *Chamæcyparis sphæroidea andeleyensis* (forma intermedia); *kewensis* alias *glauca*; *aurea*; *variegata*; *atrovirens*; *pyramidata*; *fastigiata*; *pendula*; *nana*; *pygmæa*; *Hoveyi* (forma ramulis fasciatis etc.).

11. *C. NOOTKATENSIS*, Lambert, *Pinus*, ed. ii. i. 18; Loudon, *Arboretum*, iv. 2480.

Cupressus nutkaensis, Hook. *Fl. Bor.-Am.* ii. 165; Gordon, *Pinetum*, 66, ed. ii. 94; Lawson, *Pinetum Brit.* ii. 199, t. 34. ff. 1-12; C. Koch, *Dendrologie*, ii. ii. 165; Kent in Veitch, *Manual*, 235.

Cupressus americana, Trautvetter, *Imag. Pl. Fl. Rossica*, 12, t. 7 (1844).

Chamæcyparis nutkaensis, Spach, *Hist. Vég. Phan.* xi. 333; Endlicher, *Synopsis*, 62; Ledebour, *Flora Rossica*, iii. 680; Carrière, *Traité*, 134, ed. ii. 127; Parlatores in *DC. Prod.* xvi. ii. 475; Sargent in *Tenth Census Report*, 178; Beissner, *Handbuch* (1891), p. 79, f. 15; *Revue Horticole*, 1869, p. 48.

Thuja excelsa, *Bongard in Mém. Acad. St. Pétersbourg*, sér. vi. ii. 164; *Macoun, Cat. Canad. Plants*, part 1 (1883), p. 461.

Thuyopsis borealis, *Carrière, Traité*, ed. i. 113.

Thuyopsis cupressoides, *Carrière, in Man. des Plantes*, iv. 324.

"Sitka, south along the islands and coast ranges of British Colombia and the Cascade Mountains of Washington territory and Oregon, to the valley of the Santian River, Oregon," *Sargent, l. c.*; *Bongard*! Mount Hood, *Pringle*!; *Howell*! Behind Banks Island, *Menzies*; Vancouver, *Dawson*, 2064. Sitka, *Mertens*!; British North America, *Richardson*, *Lemmon*!

Species in libris affatim descripta et in herbariis facile recognita. In hortis variat habitu coloreque unde formæ hortenses, *viridis, aurea, glauca, aureo-variegata, argenteo-variegata*, nec non *pendula, compacta, gracilis, nidiformis*, etc.—*Beissner, l. c.* p. 82. In hortis anglicis foliis deltoideo-subulatis sæpius gaudet. Specimina indigena folia imbricata oblonga obtusiuscula monstrant.

A cross section of the lateral leaves shows an ovate triangular outline, with epiderm, one layer of hypoderm, and ground-tissue with a resin-canal passing through it.

12. CUPRESSUS LAWSONIANA, *A. Murray in Edinb. New Phil. Journ.* new series, i. 292, t. 9; *Gard. Chron.* 1855, 372; *Bot. Mag.* t. 5581; *A. Murray in Lawson Pinet. Brit.* ii. 191, t. 31. ff. 1-13, *et in Journ. Linn. Soc. (Bot.)* xxvii. 312; *Kent in Veitch Manual*, 231; *Eichler in Monatsb. Akad. Berlin*, 1881, ff. 29-30.

Cupressus fragrans, *Kellogg in Proc. Calif. Acad.* i. 103.

C. attenuata, *Gordon, Pinetum*, ed. i. 57, ed. ii. 79.

C. Boursieri, *Carrière, Traité*, ed. ii. 125, *an Decaisne*?

C. nutkanus, *Torrey in Bot. U.S. Explor. Exped.* t. 16.

C. Bourgeauii, *hort., fide Gordon, Pinetum*, ed. ii. 79.

Chamæcyparis Lawsoniana, *Parlatore, Stud. Org. Conif.* 23, 29, t. 3, *et in DC. Prod.* xvi. ii. 464; *Gordon, Pinetum*, ed. ii. 85; *Engelmann in S. Watson, Bot. Californ.* ii. 155; *Sargent in Gard. Chron.* 1881, 8, *et Tenth Census Report*, 178; *Beissner, Handbuch* (1891), p. 70, fig. 17; *Lemmon in Third Biennial Report* (1890), t. 24, p. 177; *Wiener Gart. Zeitung*, 1885, p. 493.

California, *Murray*!; "Oregon, Coos Bay to the valley of the Rogue River, not extending more than thirty miles from the coast; California, valley of the Upper Sacramento River; Shasta County."—*Sargent, l. c.*; *herb. Hance* 22068; *Bridges* 289!

Species haud difficile recognoscenda et in libris bene descripta. Quoad habitum, foliorumque colorem miro modo variat. *Cupressus Lawsoniana erecta viridis*, hort. (vid. fig. 5, p. 320), est forma fastigiata foliis insigniter viridibus. Ramificationis modo diversæ sunt formæ quibus nomina sequentia propria in hortis sunt tributa,—*erecta*, *pyramidalis*, *monumentalis*, *robusta*, *pendula*,

Fig. 28.

Cupressus Lawsoniana.—Young cone, scales, and seeds.

filiformis, *intertexta*, *gracilis*, *laxa*, *crispa*, *tortuosa*, *compacta*, *minima*, *nana*, *prostrata*, aliæque. Colore foliorum distinguendæ formæ sequentes *glauca*, *aurea*, *lutea*, *lutescens*, *argentea*, *nivea*, *versicolor*, *argenteo-variegata*.

Formæ hæc ce juventute proprie definitæ, tamen in adolescentia sæpe diffugiunt et in arbore maturâ, inconspicuæ evadunt.

A cross section of a lateral leaf shows a cordate ovate subobtuse outline. The outer epiderm is thickly cuticularized, the hypoderm discontinuous in a single layer, the palissade-cells imperfect, and the parenchyma traversed by a resin-canal.

Fig. 29.

C. Lawsoniana, leaf-section.

Young's variety.

13. CUPRESSUS OBTUSA, *C. Koch, Dendrologie*, ii. ii. p. 168.

Retinospora obtusa, *Sieb. et Zucc. Fl. Jap.* ii. p. 38, t. 121; *Gordon, Pinetum*, ed. ii. 367; *Kent in Veitch, Manual*, 245, fig. 56; *Gard. Chron.* 1861, p. 264; *Mast. in Gard. Chron.* Feb. 19, 1876, p. 236; *Revue Horticole*, 1869, p. 97.

Thuya obtusa, *Mast. in Journ. Linn. Soc. (Bot.)* xviii. 491, c. ic.

Chamæcyparis obtusa, *Sieb. et Zucc. ex Endlicher, Synopsis*, 63; *Beissner, Handbuch*, p. 92, fig. 25; *Parlatore in DC. Prod.* xvi. ii. 466.

Japan, *Siebold*!; *Oldham* 354, 796, 797!; *Maximowicz, Iter*, 2!; *Fortune*!; *Veitch*!; *Hance* 8278!

Var. BREVIRAMEA.

Chamæcyparis breviramea, *Maximowicz in Bull. Acad. St. Pétersb.* x. (1866) p. 489; *Beissner, Handbuch*, p. 97.

Thuya obtusa, var. *breviramea*, *Mast. in Journ. Linn. Soc. (Bot.)* xviii. p. 494.

Retinospora filicoides, *hort.*; *Maximowicz ex Hance* 17936 in *Mus. Brit.*!

Var. PENDULA.

Chamæcyparis pendula, *Maximowicz, l. c.*

Ramuli elongati graciles complanati. Folia glanduligera, appressa oblonga ad apices deltoidea acuta.

Maximowicz! *Savatier*!

Homologiam præbet cum *Thuyá (Biota) orientali* var. *pendulá*.

Inter formas hortenses enumerantur varr. *erecta*, *magnifica*, *Keteleerii*, *pendula*, *nana*, *gracilis*, *pygmæa*, *filicoides* (*Journ. Linn. Soc. (Bot.)* xvii. 494, c. ic.), *Troubetzkoyana*, *tetragona-aurea*, *aurea*, *albo-spica*, *lycopodioides* (fasciata), aliæque habitu vel colore a typo divergentes et plerumque sub genere falso *Retinospora* "inclusæ.

Folia primordialia linearia patentia, folia intermedia homomorpha lineari-oblonga obtusa convexa; folia exoleta dimorpha, mediana plana ovato-oblonga obtusa, lateralia conduplicata.

14. C. PISIFERA, *C. Koch, Dendrologie*, ii. ii. 170.

Retinospora pisifera, *Sieb. et Zucc. Fl. Japon.* ii. t. 122;

Gordon, Pinetum, ed. II. 369; *Kent in Veitch Manual*, 241; *Mast. in Gard. Chron.* Feb. 19, 1876, p. 237.

Thuya pisifera, *Benth. et Hook., Mast. in Journ. Linn. Soc. (Bot.)* xviii. p. 489, c. ic.

Chamæcyparis pisifera, *Sieb. et Zucc. ex Endlicher, Synopsis*, 64; *Gard. Chron.* (1861), 265; *Parlatore in. DC. Prod.* xvi. II. 465; *Beissner, Handbuch* (1891), p. 83, fig. 20.

In Japoniâ, *Kämpfer*; *Siebold*!; *Oldham* 401!; *Zollinger* 157!; *Buerger*!; *Maximowicz*!; *Fortune*!; *Wright*!; *Veitch*!; *Savatier* 1194!; spontanée dans les montagnes, *Abbé Faurie* 3486!; spec. cult. 3488, 6330, 6331, 6333, 6334, 6335, *Abbé Faurie*!; in Imp. Sinensi, prov. Yunnan (cultâ), *Anderson*!, *Hance*!

Forma PLUMOSA; foliis lineari subulatis apice laxis. *Maximowicz*; *Hance* 14339! Forma intermedia=*Retinospora plumosa*, hort.

Forma PENDULA, *Maximowicz ex Hance* 15204!=*Retinospora filifera*, hort.; ramis gracilibus pendulis sparse ramosis foliisque homomorphis, patulis deltoideo-subulatis. *Vide Mast. in Journ. Linn. Soc. (Bot.)* xvii. 492, c. ic.

Forma SQUARROSA; foliis primordialibus laxè patentibus linearibus glaucis=*Retinospora squarrosa*, *Sieb. & Zucc.*

Foliorum color etiam variat unde formæ hortenses quibus nomina *alba*, *aurea*, *argentea*, *flavescens*, *aureo-variegata*, etc., etc.

The two preceding species, *C. obtusa* and *C. pisifera*, were placed by Bentham, together with other members of the section *Chamæcyparis*, in the genus *Thuya*, and in a previous communication I adopted the same arrangement. The shape of the cone-scales, the disposition of the ovules, and the form of the cone itself have, however, induced me to detach the species of *Chamæcyparis* from *Thuya* and to place them under *Cupressus*.

Chronological List of Authorities for Specific Names.
Those adopted are printed in roman, synonyms in italics.

-
1753, Linnæus, Sp. Plant. ed. i.	{	sempervirens.
Thyoides.
<i>disticha.</i>
1762, Linn. Sp. Plant. ed. ii. 1422		<i>juniperoides.</i>
1768, Miller, Gard. Dict. ed. viii.	{	lusitanica.
<i>horizontalis.</i>
<i>africana.</i>
1781, Linn. f. Suppl. 421		<i>japonica.</i>
1784, Thunberg, Flora Japonica		<i>pendula.</i>
1784, L'Héritier, Stirp. Nov. 15, t. 18		<i>pendula.</i>
1786, Forster fil., Florul. insul. austral.
Prodrom.		<i>columnaris.</i>
1796, Salisbury, Prod. Stirp.	{	<i>lugubris.</i>
<i>elongata.</i>
<i>læta.</i>
<i>humilis.</i>
<i>palustris.</i>
1798, Staunton—An authentic account of an
Embassy to the Emperor of China,
ed. ii. p. 446, tab. 41, "Weeping Thuya
or lignum vitæ"		[<i>funebnis</i> , <i>Endl.</i>]
1803, Lambert, Pinus, ed. i.		<i>nootkatensis.</i>
1807, Persoon, Synops. ii. 580	{	<i>patula.</i>
<i>australis.</i>
1808, Targioni-Tozzetti, Oss. Bot. dec. iii. ..	{	<i>pyramidalis.</i>
<i>Thuja.</i>
Id. ex Steudel, Nomencl. ed. ii.		<i>expansa.</i>
1815, Candolle, A. P. de, Flor. Frang. v. 336.		<i>fastigiata.</i>
1816, Willdenow, Hort. Berol. Supp.		<i>bacciformis.</i>
1817, Kunth in Humboldt & Bonpland, Nov.
Gen. et Spec. Plant. ii. 3	{	<i>thurifera.</i>
<i>sabinoides.</i>
1825, Don, David, Prod. Flor. Nep.		<i>torulosa.</i>
1826, Spadoni, Xilogr. p. 193	{	<i>patula.</i>
<i>conoidea.</i>
1830, Loudon, Hort. Brit. 388		<i>triquetra.</i>

1834, Audibert, Cat. ex Carrière	<i>Tournefortii.</i>
1838, Schlechtendal in Linnæa, xii. 493	<i>thurifera.</i>
1839, Forbes in Pinetum Woburnense	<i>articulata.</i>
<i>Fothergillii.</i>
<i>Coulteri.</i>
1842, London, Encycl. Trees	<i>nepalensis.</i>
1843, Gillies in Hook. Lond. Journ. Bot. ii.
199	<i>chilensis.</i>
1844, Trautvetter, Plant. Imag. Ross.	<i>americana.</i>
1847, Hartweg in Journ. Hort. Soc. Lond. ii.
187	<i>macrocarpa.</i>
1847, Endlicher, Synops. Conif. 59	<i>Benthami.</i>
<i>funeris.</i>
1847, Klotzsch in Endlicher, Synops. 59	<i>Lindleyi.</i>
1847, Kunze in Linnæa, xx. 16	<i>Ehrenbergii.</i>
1847, Griffith, Notul. iv. 26	<i>pendula.</i>
1849, Gordon in Journ. Hort. Soc. Lond. iv.
295, ic.	<i>Goveniana.</i>
1850, Knight and Perry, Synopsis	<i>majestica.</i>
<i>Corneyana.</i>
<i>flagelliformis.</i>
1852, Tenore, Ind. Sem. Neap.	<i>Tournefortii.</i>
1855, Carrière in Revue Horticole.	<i>Hartwegii.</i>
„ „ Traité, ed. I.	<i>californica.</i>
<i>Roylei.</i>
<i>excelsa.</i>
1856, Kellogg in Proc. Calif. Acad. 103	<i>fragrans.</i>
1857, Murray in Edinb. New Philos. Journ.;
and Descr. Conif. Californ. p. 12	<i>Lawsoniana.</i>
<i>Macnabiana.</i>
1857, Regel, Gartenflora, 346	<i>Karwinskiana.</i>
1858, Gordon, Pinetum, ed. I.	<i>aromatica.</i>
<i>attenuata.</i>
<i>sinensis.</i>
<i>squarrosa.</i>
<i>australis.</i>
1858 (?), Nuttall ex Gordon, Pinetum	<i>imbricata.</i>
1860, Parlatore, Ind. Sem. Hort. Florent., et
in Ann. Sc. Nat. sér. iv. xiii. 377	<i>umbilicata.</i>
<i>globulifera.</i>
<i>sphærocarpa.</i>
1862, Gordon, Supplement to Pinetum.	<i>bacciformis.</i>
1866, Carrière in Revue Horticole.	<i>Schomburgkii.</i>
<i>cornuta.</i>

1867, Carrière, Traité, ed. II.	lusitanica.
1873, C. Koch, Dendrol. ii. II. 170	{ pisifera.
	{ obtusa.
1873, C. Koch in Monatschr. i. 110	amœna.
1875, Gordon, Pinetum, ed. II.	{ Bourgeauii.
	{ Balfouriana.
1879, S. Watson in Proc. Amer. Acad. xiv. 300.	guadalupensis.
1882, Greene in Bull. Torrey Bot. Club, ix.	{ arizonica.
64	

SYNONYMIA.

- africana*, Miller, Gard. Dict. viii. n. 6. = Widdingtonia juniperoides, *teste*
Parlatore in DC. Prodr. xvi. II. 442.
americana, Catesby, ex Endl. Syn. Con. 68. = Taxodium distichum.
americana, Trautvetter, Plant. Imag. Ross. 12, t. 7.
= nootkatensis, *Lambert*.
amœna, C. Koch in Monatschrift Gart. Pflanz. i. 110, et in Dendrolog. ii.
= funebris.
Arbor vitæ, Targ.-Tozz. Oss. Bot. dec. iii. 71. = Thuya occidentalis.
aromatica, Gord. Pinet. 56. = Benthami.
articulata, Forbes, Pinet. Woburn. 191. = Tetraclinis articulata.
attenuata, Gord. Pinet. 57. = Lawsoniana.
australis, Low, ex Gord. Pinet. 72. = sempervirens.
australis, Persoon (? Desfontaines), Syn. ii. 580. = Callitris rhomboidea.
bacciformis, Knight ex Gord. Pinet. Suppl. 38. = Juniperus occidentalis.
bacciformis, Willd. Enum. Hort. Berol. Suppl. 64, *fide* Index Kew.
= Juniperus phœnicea.
Balfouriana, Lemoine ex Gord. Pinet. = (quid?)
Bourgeauii, hort. ex Gord. Pinet. ed. II. 79, *teste* Index Kew.
= Goveniana.
brasilensis, C. Koch, Dendrol. ii. II. 159. = thurifera, *fide* Index Kew.
breviramis, F. Muell. Sel. Pl. Indust. Cult. 64. = obtusa, var.
californica, Carrière, Traité, ed. I. = Goveniana.
cashmiriana, hort. = torulosa.
chilensis, Gillies, ex Hook. Lond. Journ. Bot. ii. (1843) 199.
= Libocedrus chilensis.
columnaris, Forst. fil. Flor. Insul. Aust. Prod. 67.
= Araucaria excelsa v. Cooki?
conoidea, Spadoni, Xilogr. i. 189. = sempervirens.
Corneyana, Knight & Perry, Synops. = torulosa, var.
cornuta, Carrière in Rev. Hortie. 1866 (250). = Goveniana.
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- Coulteri*, Forbes, Pinet. Woburn. 190. =? Benthami.
Cunninghami, hort. = Benthami.
Devoniana, hort. ex Beissner, Handbuch, 116. = Juniperus phœnicea.
disticha, Linn. Sp. Pl. 1003. = Taxodium distichum
in herb. Linn.
Drummondii, hort. = torulosa.
Ehrenbergii, Kunze, in Linnæa, xx. (1847) 16. = Benthami.
elongata, Salisbury, Prodr. 397. = sempervirens.
excelsa, Scott, ex Carr. Conif. 128. = Benthami.
expansa, Targ.-Tozz. ex Steud. Nomencl. ed. II. i. 455.
= sempervirens.
fastigiata, DC. Flor. Franç. v. 336. = sempervirens, var.
filiformis, hort. ex Parlatores, in DC. Prodr. xvi. II. 474.
= Thuja orientalis, var.
flagelliformis, Knight & Perry, Synop. 20. = torulosa.
Fothergilli, Forbes, Pinet. Woburn. 191. =? Tetraclinis articulata.
fragrans, Kellogg, in Proc. Calif. Acad. i. (1850) 103.
= Lawsoniana.
glandulosa, Hook. ex Gord. Pinet. 64. = Macnabiana.
glauca, La Marek, Encycl. ii. 243. = lusitanica, Miller.
globulifera, Parlatores, in Ann. Sc. Nat. sér. iv. xiii. (1860) 377.
= sempervirens, var.
guadalupensis, S. Watson, in Proc. Amer. Acad. xiv. (1879) 300.
= macrocarpa.
Hartwegii, Carrière, in Rev. Hort. (1855), 233. = macrocarpa
horizontalibus (sic), Miller, Gard. Dict. ed. 8, n. 2. = sempervirens.
Hugeli, hort. = sempervirens.
humilis, Salisb. Prodr. 398, teste Indice Kewensi. = Callitris arborea.
imbricata, Nuttall, ex Gord. Pinet. 307. = Taxodium distichum.
japonica, Linn. f. Suppl. 421. = Cryptomeria japonica.
juniperoides, Linn. Sp. Pl. ed. II. 1422. = Widdringtonia juniperoides.
Kampferi, hort. = Goveniana.
Karwinskiana, Regel, Gartenflora (1857), 346. = Benthami, var.
lata, Salisbury, Prodr. 397. = Taxodium distichum.
Lambertiana, hort. ex Carr. Traité, 124. = macrocarpa.
Lindlei, Klotzsch, ex Endlicher, Synops. = Benthami, var.
lugubris, Salisb. Prodr. 397. = sempervirens.
lusitanica, Carrière, Traité, ed. II. 155. = Benthami.
lusitanica, Lindl. ex Parlatores, in DC. Prodr. xvi. II. 472.
= Benthami, var.
macrostachya, hort. ex Parlatores, l. c. = Callitris Gunnii.
majestica, Knight & Perry, Synops. = torulosa, var.
mexicana, C. Koch, Dend. ii. II. 159. = thurifera.
Montezumæ, Humb. et Bonpl. ex Parlatores, l. c. = Taxodium mucronatum.
nepalensis, Loud. Encycl. Trees, 1118. = torulosa.

- nivea*, hort. = Goveniana.
nucifera, hort. ex Carr. Traité, ed. i. 151. = Glyptostrobus heterophyllus.
nutkanus, Torrey, in Bot. U.S. Expl. Exp. ii. t. 16. = Lawsoniana.
nootkatensis, Hook. Fl. Bor.-Am. ii. 165. = nootkatensis.
orientalis, hort. = sempervirens.
palustris, Salisb. Prodr. 398. = Thyoides.
patula, Pers. Synops. ii. 580. = Thuya orientalis.
patula, Spad. Xilogr. i. 193. = sempervirens.
pendens, F. Muell. Select Pl. Indust. Cult. 64. = obtusa.
pendula, Griffith, Notul. iv. 26. = torulosa.
pendula, L'Hérit. Stirp. Nov. 15, t. 18. = lusitanica.
pendula, Thunb. Fl. Jap. 265. = Thuya orientalis, forma.
pyramidalis, Targ.-Tozz. Oss. Bot. dec. iii.-v. 73. = sempervirens.
Reinwardtii, hort. ex Beissner, Handbuch, 103. = macrocarpa.
religiosa, hort. ex Carr. Traité, ed. ii. 144. = lusitanica.
Roylei, Carr. Traité, ed. i. 128. = sempervirens.
sabinoïdes, H. B. et K. Nov. Gen. et Sp. ii. 3. = Juniperus tetragona.
Schomburgkii, Van Houtte, ex Gord. Pinet. Suppl. 27.
 = thurifera.
sinensis, Lee, ex Gord. Pinet. 63. = lusitanica.
sinensis, hort. ex Beissner, l. c. 154. = Glyptostrobus heterophyllus.
Skinneri. = Benthami.
sphærocarpa, Parlature, in Ann. Sc. Nat. sér. iv. xiii. (1860) 378.
 = sempervirens, var.
squarrosa, Laws. ex Gord. Pinet. 296. = pisifera, forma.
stricta, Mill. ex Gord. l. c. 67. = sempervirens.
Tchugatskoy, hort. ex Parlature, in DC. Prod. xvi. ii. 474.
 = nootkatensis.
tetragona, Humb. et Bonpl. ex Carr. Traité, ed. ii. 33.
 = Juniperus tetragona.
tetragona, hort. ex Gord. Pinet. 71. = thurifera.
tetragona, hort. ex Carr. Traité, ed. ii. 155. = lusitanica.
thuiæfolia, Knight & Perry, ex Gord. Pinet. 69. = sempervirens.
thuiæformis, Parker, ex Gord. Pinet. Suppl. 26. = sempervirens.
thuiæoides, Low, ex Gord. l. c. = sempervirens.
thuoides, Pavon, ex Carr. Traité, ed. ii. 89. = Libocedrus chilensis.
thurifera, Lindley, Bot. Reg. (1839) Misc. 64. = Benthami, var. Lindleii.
thurifera, Schlechtendal, in Linnæa, xii. (1838) 493.
 = Benthami.
Thuya, Targ.-Tozz. Oss. Bot. dec. iii.-v. 72. = Thuya orientalis.
thyoides, Pav. ex Gord. Pinet. Suppl. 41. = Libocedrus chilensis.
Tournefortii, Audibert, Cat. (1834), ex Carrière, Traité, ed. i. 115.
 = sempervirens.
Tournefortii, Tenore, Ind. Sem. Neap. (1852). = torulosa.
triquetra, Loddiges, ex Loud. Hort. Brit. 388. = Tetraclinis articulata.

- Tschugatskoyi*, hort. =nootkatensis.
Uhdeana, Gordon. =? thurifera.
Uhdeana, Carr. Traité, ed. i. 129. =Benthami, part.
umbilicata, Parlature, Ind. Sem. Hort. Florent. (1860) 22.
 =sempervirens, var.

Sciadophytum sphærocoecum, herb. Mus. Brit. =Cupressus, sp.

Subgen. CHAMÆCYPARIS (Spach, Gen.).

- andelyensis*, hort. ex Gord. Pinet. ed. ii. 365. =Thyoides, forma.
atrovirens, hort. ex Beissner, Handbuch, 69. =Thyoides, forma.
Boursieri, Carr. Traité, ed. ii. 125. =Lawsoniana.
Boursieri, Decaisne, in Bull. Soc. Bot. France, i. (1854) 70.
 =Juniperus occidentalis.
breviramea, Maximowicz, in Bull. Acad. St. Pétersb. x. (1866) 489.
 =obtusula.
decussata, hort. ex Carr. Traité, ed. ii. 140. =Thuya orientalis, forma.
ericoides, Carr. l. c. 137, 141. =Thuya orientalis.
excelsa, Fisch. ex Carr. l. c. 127. =nootkatensis.
glauca, hort. ex Carr. l. c. ed. i. 141. =Thuya orientalis.
Keteleeri, Standish, ex Parlature, in DC. Prod. xvi. ii. 466.
 =obtusula.
kewensis, hort. ex Carr. Traité, ed. i. 133. =Thyoides.
Lawsoniana, Parlature, in Ann. Mus. Stor. Nat. Firenze, i. (1864) 181.
 =Lawsoniana.
leptoclada, Henk. et Hochst. Nadelholz. 257. =Thyoides, forma.
nana, hort. ex Parlature, in DC. Prod. xvi. ii. 464. =Thyoides.
nootkaensis, Carr., *nutkaensis*, Lindl. et Gord., *nutkatensis*, Spach.
 =nootkatensis.
obtusula, Sieb. et Zucc. in Endlicher, Synopsis. =obtusula.
pendula, Maximowicz, in Bull. Acad. Pétersb. x. (1866) 489.
 =obtusula, var.
pisifera, Sieb. et Zucc. in Endlicher, Synopsis, 64. =pisifera.
pseudo-squarrosa, Parlature, in DC. Prod. xvi. ii. 467.
 =Thyoides.
pumila, hort. ex Carr. Traité, ed. ii. 124. =Thyoides.
sphæroidea, Spach, Hist. Vég. Phan. xi. 331; *sphæroidalis*.
 =Thyoides.
squarrosa, hort. ex Carr. Traité, ed. i. 65. =Thyoides.
squarrosa, Sieb. et Zucc. in Endlicher, Synopsis, 65. =pisifera, forma.
thuiæformis, R. Smith, ex Gord. Pinet. ed. ii. 429. =obtusula, var.
thurifera, Endlicher, Synopsis, 62. =? Cupressus thurifera.
variegata, hort. ex Carr. Traité, ed. i. 133. =Thyoides.

RETINOSPORA, genus delendum.

<i>andelezensis</i> , Carr.	= <i>C. Thyoides</i> , forma.
<i>decurvata</i> , hort.	= <i>Thuia orientalis</i> .
<i>decussata</i> , hort. <i>fide</i> Beissner & Hochstetter.	= <i>Thuia orientalis</i> , forma.
<i>dubia</i> , Carr. <i>Traité</i> , ed. II. 141.	= <i>Thuia occidentalis</i> , forma.
<i>Ellwangeriana</i> , hort.	= <i>Thuia occidentalis</i> , forma.
<i>ericoides</i> , hort. ex Beissner.	= <i>Thuia orientalis</i> .
<i>ericoides</i> , Zucc. ex Beissner.	= <i>Cupressus Thyoides</i> .
<i>filicoides</i> , hort.	= <i>Cupressus obtusa</i> , forma.
<i>filifera</i> , Standish ex Gord. <i>Pinet.</i> ed. II. p. 364	= <i>Cupressus pisifera</i> , forma.
<i>flavescens</i> , hort. ex Beissner.	= <i>Thuia orientalis</i> , forma.
<i>glaucescens</i> , Hochst. ex Beissner.	= <i>Thuia occidentalis</i> , forma.
<i>juniperoides</i> , Carrière, <i>Traité</i> , ed. II. 140.	= <i>Thuia orientalis</i> , forma.
<i>Keteleerii</i> , hort. ex Beissner.	= <i>Cupressus obtusa</i> .
<i>leptoclada</i> , hort.	= <i>Cupressus Thyoides</i> , forma.
<i>leptoclada</i> , Zucc. ex Gord.	= <i>C. pisifera</i> , forma squarrosa.
<i>leptoclada</i> , Siebold.	= <i>C. pisifera</i> , forma squarrosa.
<i>lycopodioides</i> , Gordon.	= <i>Cupressus obtusa</i> , forma.
<i>meldensis</i> , hort.	= <i>Thuia orientalis</i> , forma.
<i>monstrosa</i> , hort.	= <i>Cupressus obtusa</i> , forma lycopodioides.
<i>Nobleana</i> , hort. ex Beissner.	= <i>Cupressus obtusa</i> , forma filicoides.
<i>obtusa</i> , Sieb. et Zucc.	= <i>Cupressus obtusa</i> .
<i>pisifera</i> , Sieb. et Zucc.	= <i>Cupressus pisifera</i> .
<i>plumosa</i> , hort.	= <i>Cupressus pisifera</i> .
<i>pseudosquarrosa</i> , hort.	= <i>Thyoides</i> .
<i>rigida</i> , hort.	= <i>Thuia orientalis</i> .
<i>squarrosa</i> , hort. nec Sieb. et Zucc.	= <i>Thuia orientalis</i> , forma.
<i>squarrosa</i> , Sieb. et Zucc. <i>Fl. Jap.</i> II. 40, t. 123.	= <i>Cupressus pisifera</i> , forma squarrosa.
<i>stricta</i> , hort.	= <i>pisiformis</i> , forma.
<i>tetragona aurea</i> , hort.	= <i>Cupressa obtusa</i> , forma.
<i>Troubetzkoyana</i> , hort.	= <i>Cupressus obtusa</i> , forma.

SPECIES INQUIRENDÆ.

Balfouriana, *Lemoine ex Gord. Pinet.* ed. II. 79 (descriptio manca).

Thuja dolabrata, *Linn.* = *Thuiopsis dolabrata*, *Sieb. et Zucc.*

Cupressum (*Chamæcyparim*) refert, squamis strobili autem apice clavato-dilatatis nec vere peltatis differt. Inter *Thuiam* et *Cupressum* quodam modo intermedia.