THE DISTRIBUTION OF WILD CONIFERS IN THE INDIAN EMPIRE

BY

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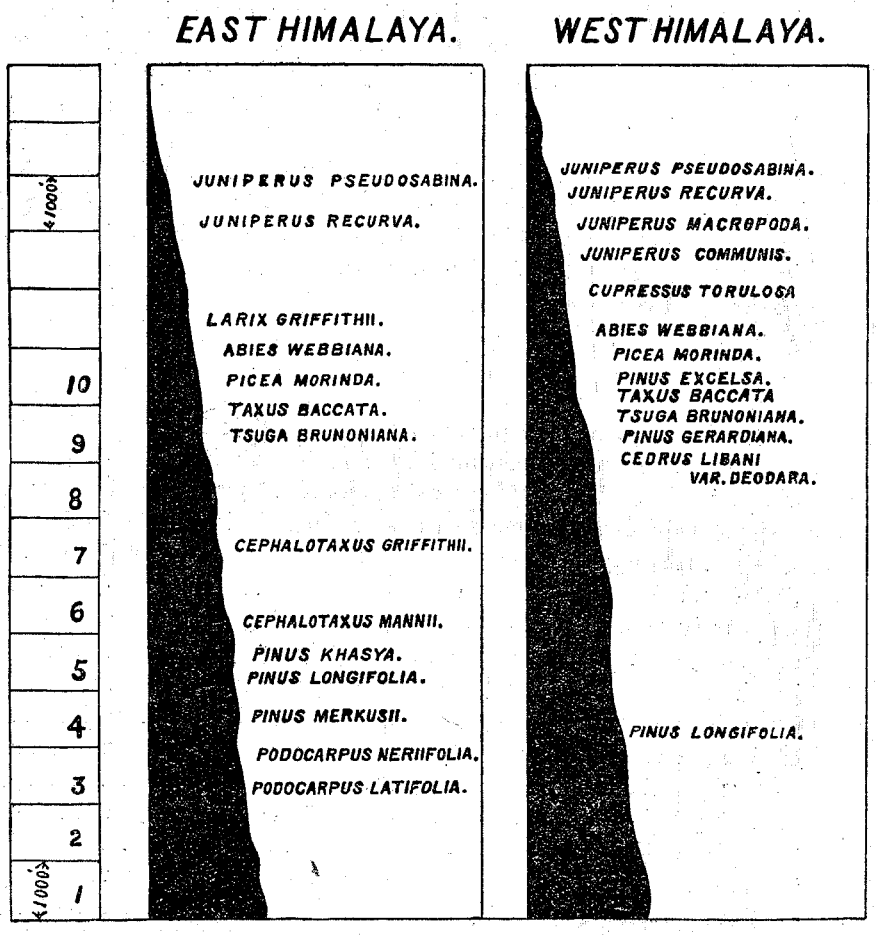
The study of the 'Distribution of Wild Conifers' in the Indian Empire has been undertaken at the suggestion of Dr. Birbal Sahni, Professor of Botany, Lucknow University, to whom I offer my grateful thanks. The present paper on living Conifers forms more or less a counterpart of Dr. Sahni's account of the Fossil Conifers in this country as described in his paper on the "Revision of Indian Fossil Plants" Part I "Coniferales" (Memoirs—Geological Survey of India Palæontologia Indica—New Series—Vol. XI, 1928). It is expected that these two papers may throw some light on the problem of the early history of the Indian Conifers and their distribution in the Indian Empire.

The distribution of wild conifers in the Indian Empire is mostly confined to the Western and the Eastern Himalayas including the hills of Northern Burma. The number of species is not very large but the Himalayan Conifers are well represented both in the Western and the Eastern Ranges, although predominating in the North-Western Mountains. J. D. Hooker in his Flora of British India enumerates thirteen genera and twenty-five species of which twenty-three species are considered wild. Of these twenty-three species, *Agathis loranthifolia* Salisb, and *Dacrydium elatum* Wall., are natives of the Malay Peninsula.

The following list of the species together with the localities, names of original collectors and dates of collections as far as available, has been compiled from the notes on the sheets of the Herbarium specimens of Conifers, collected from the different parts of India, Burma and Ceylon. These species have been described by J. D. Hooker under Coniferæ in the Flora of British India, Vol. V, pp. 643–653 (1890). The species considered wild in this paper are those which are mentioned as such by Hooker and other earlier writers, and not marked "Cultivated" on the sheets of the Herbarium of the Royal Botanic Garden, Calcutta. The accompanying map (Plate I) illustrates the

range of distribution of the wild conifers in India. Some of the common wild conifers growing in different parts of the Indian Empire have been graphically represented thus :—



General Distribution.

Although present state of our knowledge of the Floras of Nepal, Bhootan, Burma and Chino-Tibetan frontiers in the East and Northern Persia, Afghanistan and Baluchistan in the west does not allow us to make a detailed survey of the distribution of conifers in and about the Himalayas, I think it would not be out of place to discuss here the general trend of distribution of Indian conifers as far as the Herbarium material and literature permit. The range of distribution of the wild conifers as far as the records of the Herbarium sheets show tallies

mainly with the notes available in the literature. From the data at my disposal one is led to draw the following conclusions regarding the occurrence of the individual species of the Indian conifers in their natural habitats. *Cupressus torulosa* appears to be the only wild Indian cypress mainly confined to the outer ranges of the North-Western Himalaya extending up to Central Nepal (as reported by Don from Webb's collection) and perhaps slightly beyond in its original wild state of growth ascending from [1] (5,000) to 13,600 feet. Its occurrence is distinctly noticed between 6,000 to 9,000 feet. The presence of this species in the Western Himalaya and then in W. Szechuan, China where it is said to be common, suggests its extension beyond Nepal across Bhootan to the Chino-Tibetan borders, although, Hooker limits, its extension up to Nepal. The gap between Nepal and the Western boundary of Szechuan appears to be due to our insufficient knowledge of the flora of this important part of the land. It ascends from 5,000 to (14,000 feet), being abundant between 10,000 and 13,000 feet. *Juniperus communis* spreads mostly over the North-Western Himalayan ranges from Afghanistan to Kumaon from 5,500 to 14,000 feet in altitude. Kumaon may be considered the eastern limit of its wide range of distribution from Northern and Central Europe and the Coastal regions of the Mediterranean Sea, through Asia Minor to the North-Western Himalaya. Its occurrence has also been noted in the United States and Canada. *Juniperus pseudo-sabina* and *Juniperus recurva* are purely natives of the Himalayas occurring in higher altitudes ascending from (7,500) to 15,000 feet *Juniperus pseudo-sabina*, which is taken by some as synonymous to *Juniperus Wallichiana*, reaches a little higher elevation up to 15,000 feet, being fairly common like that of *Juniperus recurva* between 9,000 and 13,000 feet. Dallimore and Jackson consider *Juniperus recurva* " a native of the Eastern Himalaya occurring in " Sikkim and Bhootan, and *Juniperus pseudo-sabina* " a native of the Himalaya from the Indus to Bhootan ". But records in the Calcutta Herbarium show that both the species are uniformly distributed forming evidently mixed association in the eastern and the western Himalayas, the latter only attaining a little higher elevation than the former. *Juniperus macropoda* is mainly an inhabitant of the Western Himalaya and abundant in Afghanistan and Baluchistan extending up to Persia. Its predominant growth is observed between 8,000 and 12,000 feet, though some record it from an elevation of (5,000) feet. It very rarely ascends, as Kurz' specimen shows, as high as 19,000 feet, in Werangpap Teedong Valley. *Cephalotaxas Mannii* is confined only to the Khasia hills, Assam, between 3,000 and 6,500 feet, while

[1] The altitudes in brackets are taken from literature.

Cephalotaxas Griffithii predominates over the Mishmi hills, Upper Assam and passes into the Burmese hill ranges. This species occurs evidently in higher altitudes than *Cephalotaxas Mannii*, ascending from 3,000 feet to 8,000 feet; whereas *Cephalotaxas Mannii* extends from 3,000 to 6,500 feet only. Parkinson considers *C. Mannii*, a native of Burma. But there is no record to confirm this view. The distribution of *Taxus baccata* in the Himalayan ranges may be considered as the eastern spur of its great belt of distribution spreading over the British Isles, Europe, Northern Persia and Algeria, and finally entering the Himalayan ranges of Afghanistan, Bhootan, Assam and Upper Burma. In the Himalayas it extends uniformly both over the Western and the Eastern mountain ranges ascending from 5,000 to 12,000 ft., exhibiting its dominance in between 6,000 and 12,000 ft. Dallimore and Jackson mention Bhootan as its eastern limit of extension, but the sheets of this herbarium illustrate its access further into the Chin Hills and Ruby mines in Upper Burma, and perhaps still further, up to Chino-Tibetan borders. Of the two typical species of Indian *Podocarpus*, *Podocarpus latifolia* may be considered to be originally growing on the lower hill-forests of South India, Assam and Burma. This is the only Peninsular Indian Conifer growing in the Anamalais, Coimbatore. *Podocarpus nerifolia* has a wider range of distribution ascending up to 5,000 ft., growing abundantly in the lower hill-forests of the Central Himalaya, East Himalaya, East Bengal, (Chittagong Hill Forests), Assam, the Andaman Islands, South Burma and Malay Peninsula extending down to the Sunda Islands. Its record from China suggests its northern limit of extension, if the Chinese specimens prove definitely to be wild. Its extension so far north raises the problem how has it crossed the Burmese, Siamese and Chino-Tibetan borders, and whether our further knowledge of the flora of this important area might reveal its presence in the Eastern ranges of Tibetan Burmese and Siamese hills as well. *Podocarpus cupressina* appears to be a Malayan conifer which has gradually spread over the hill forests of Burma. *Pinus excelsa* is evidently a North-West Himalayan species ranging from an elevation of 5,000 to 12,000 ft. It is abundant between 6,000 and 12,000 ft., although, sometimes ascending up to 12,500 ft., where it often forms a constituent of the conifer forests. Its occurrence in the Central Himalaya, Sikkim and Chumbi Valley might be a later introduction. Dallimore and Jackson remark, however, that it extends "eastward to Nepal". J. D. Hooker on the contrary is of opinion that it is "absent in Central and N.-W. Kumaon and in Sikkim". I confirm Hooker's view from the data at my disposal. Hooker's suggestion of its doubtful occurrence in

Macedonia may be supported by the tendency of this species predominating in the North-Western ranges of the Himalayas, especially over the outer ranges extending to the Kafiristan in Afghanistan. Further, the existence of this species in Greece hints at its fairly long belt of distribution from Southern Europe through Persia to the Himalayas. But this fact can neither be definitely established from the data at present available, nor definite reason be adduced to the cause of this disconnected distribution in Macedonia and then in the N.-W. Himalaya, due again to our want of sufficient knowledge of this large tract of the country lying across the N.-Western Himalaya to the European border. *Pinus longifolia* is mainly confined to the lower hill ranges, descending to the valleys of the western and the eastern Himalayas, where it extends up to Bhootan. It ascends up to 6,000 ft., but it is abundant in its wild state of growth in between 1,000 ft. and 3,000 ft. On the North-West it is said to form an extensive association between 1,500 and 6,500 ft., rarely reaching up to 7,500 ft., and above. This pine has adapted itself to grow in the plains and some of the magnificent trees are frequently found growing in the gardens of Northern India where climatic conditions are more favourable. But good specimens of fairly large size are observed to grow as low as nearly the sea-level. Thus in the Royal Botanic Garden, Calcutta, where this species had been first planted as early as 1794 or earlier, a fairly large number of trees of good size is still found growing there. (See plate II). *Pinus Khasya*—the well known Khasya pine—is exclusively a native of the Eastern spur of the Eastern Himalayan ranges spreading over the Khasya, the Jaintia and the Naga Hills and extending to the hills or Upper Burma and the Shan Hills, where it appears to gain predominance in growth. It ascends from an elevation of 2,000 to 6,500 ft., rarely 7,000 ft., and above. Its occurrence in the Philippines, if it is in its wild state there, suggests perhaps a touch of Malayan element in it. *Pinus Gerardiana* is chiefly a species of the North-western flank of the Himalayas extending from the Punjab Himalaya to Afghanistan and Baluchistan ranging from an altitude of (5,000) to 10,000 ft., sometimes ascending 11,000 ft., rarely 12,000 ft., and above. *Pinus Merkusii*, the Tenasserim pine, as its name suggests, is a Southern Burmese species spreading over low hills and extending to Cochin China, the Malay islands and the Philippines. It is said to be one of the most common conifers of Siam and occurs from an elevation of (500) to 2,000 ft., rarely 3,500 ft., and above. *Cedrus Libani* var. *Deodara—(Cedrus Deodara* of *Loudon)* is evidently a native of the North-West Himalayan ranges and occurs extensively, between elevations of (3,500) and 8,000 ft., sometimes

reaching 10,000 ft., rarely ascending 12,000 ft. It extends to Afghanistan as well. Brandis considers Kumaon and Nepal specimens of this Conifer cultivated. *Picea Morinda* (to this is included *Picea morindoides* of Rehder) spreads over the mountains of the Western and the Eastern Himalayas extending from near Afghanistan, Chitral, Hazara, Kumaon, Simla, Nepal to Sikkim. Its altitudinal range is from (6,000) to 12,000 ft., and rarely above. It is very likely that the species has penetrated into the hill ranges of Bhootan and beyond into the far eastern spurs of the Himalayan ranges. But this demands exploration in the hills of Bhootan and mountains of Northern Burma, although, Griffith's specimen of *Picea morindoides* from Bhootan (as noted by Dallimore and Jackson) substantiates uniform continuity of distribution of *Picea Morinda* from Chitral and beyond in the west, to Bhootan and beyond in the east. Its association with *Tsuga Brunoniana* also suggests continuity of distribution of one and the same species in the west and the east Himalayas. The occurrence of *Abies spinulosa—(Picea morindoides)* in Bhootan, as reported by Griffith, again confirms the suggestion of uniformity of distribution in the west and the east Himalayas. *Tsuga Brunoniana* forms an important constituent of the conifer forests extending over the mountains from Kumaon, Nepal to Sikkim, where it is said to be abundant in the inner ranges. It is common between elevations of 6,000 to 10,000 ft., below silver fir forests sometimes ascending slightly higher (10,500 ft.). *Abies Webbiana* is indigenous to both the western and the eastern Himalayan ranges extending from Afghanistan to Sikkim ascending from (7,000) to 12,000 ft., though sometimes rising up to 13,000–14,000 ft., in altitude. *Larix Griffithii* is confined to the Eastern Himalaya, growing profusely from Nepal to Bhootan between elevations of 8,000 and 12,000 ft., attaining in Sikkim and Tibet slightly higher altitude.

The occurrence of *Abies*, *Pinus excelsa*, *Juniperus recurva*, *Cupressus torulosa* in the North Burma Hills in recent years is evidently due to these species extending beyond their limit of Eastern border of distribution or might have been introduced later. The presence of *Tsuga yunnansis* in the Burmese borderlands, as recently discovered by Parkinson from Chimali pass Pahluka, 8,000 to 12,000 ft., is due to this Yunan and S. W. Szechuen species crossing the Chino-Tibetan frontiers. The presence of *Libocedrus Potaninii* in the forest across Burmese borderlands is due again to this S. W. Chinese species descending further southwards. Griffith's record of *Cupressus pendula* in Bhootan is evidently a cultivated form, as *C. pendula* is a synonym of the well known Chinese species *Thuja orientalis* var. *pendula*. As regards wild confers of Ceylon there is no definite records available to

prove which species of conifers are indigenous to the island. Although there are at present fifty species of conifers under cultivation, it is doubtful if there is one purely native of Ceylon. Out of a dozen of Marquand's record of conifers collected by Captain F. Kingdon Ward from the Eastern Himalaya and Tibet in 1924, only four species—*Pinus excelsa*, *Tsuga Brunoniana*, *Abies Webbiana* and *Larix Griffithii* are wild, the rest appear to be introduced in Tibet.

Ludwig Rudolph in his Atlas der Pflanzen Geographie über Alle theile der Erde Berlin (1864) shows the distribution of Tannen (Abies) in the N.-W. Himalaya and Fichten (Pines) in the Eastern Himalaya. In the world's distribution of Conifer forests—as delineated in the American Maps recently published—the Conifer formation appears to be somewhat isolated, except one more or less continuous belt running along the subarctic and temperate zones. The presence of Conifers in the Central Europe, Mediterranean regions and a few in the mountains of Northern Persia, then in the Himalayan ranges, China, Japan and Siam hills suggests a rather long somewhat uniform belt of Conifers in the subtropical zone, gaining predominance in the W. Himalaya. The distribution of Conifers in Asia confirms this view to a certain extent as the temperate Himalayan belt of Conifers has been considered as the fifth of the five lines of distribution of conifers suggested by Pilger. This line runs along the high temperate mountain regions of the Western and the Eastern Himalayas, Eastern Tibetan borders and the high mountain ranges of the Burmese Himalayas, Chino Tibetan frontiers, Yunan and Szechuan, finally passing unto the Chinese and Japanese Hill ranges. Further investigations in the unexplored regions may elucidate this hypothesis.

I offer my sincere thanks to the Forest Officers of the different provinces of the Indian Empire, particularly to Mr. R. N. Parker, Forest Botanist, Dehra Dun, and Mr. C. E. Parkinson, Forest Botanist, Rangoon, Burma, for their kind co-operation in the preparation of this paper.

List of Wild Conifers in the Indian Empire noting the localities of their distribution. The list is arranged according to Hooker's Flora of British India (Coniferae) Vol. V, pp. 643–653, 1890.

Order **Coniferae**

Genus No. 1. CUPRESSUS *Linn.* * *G. P. 6.*
Species No. 1. CUPRESSUS TORULOSA *Don.*

* G. P. refers to Bentham and Hooker's Genera Plantatum, Vol. III, pp. 420–442, 1883.

Area of general distribution :—

N. W. Frontier Province ; N. W. Himalya ; the Punjab ; Kashmir ; [1] Central Himalaya; Assam (probably cultivated) ; Wallichian sheet [2] 6046.

Area of detailed distribution :—

Quetta Burial Ground at the foot of the Mountains, Julalabad, Afgan, Griffith ; near the Farra Rud, Afghanistan, T. Walter Irvine, 1905 ; District Hazara, Kagrin valley, 13,600 feet, Inayet, 1896 ; Afghanistan, Griffith, 1863–64 ; N.-W. Himalaya, District Chamba (Pangi), Sural Valley above Chabi Got, 12,500 feet, Harsukh, 1899 ; Pangi, Dr. Stoliczka ; Chamba State, J. H. Lace, 1898 ; District Janarsai, 9,000 feet, J. F. Duthie, 1894 ; Dewangari Hills Ter, 1855 ; Lokanda Marama Limestone, Dr. Brandis ; Mussourie, 6,500 feet, W. T. Saxton, 1915 ; Mussourie, George King, 1869 ; Falconer, 1865 ; Jemmai, J. S. Gamble, 8,000 feet, 1898 ; Elysium Hill, Simla, 6,500 feet J. S. Gamble, 1877 ; Kulu, 1882 ; Chenab Valley, Madagraon, 10,000 feet, 1881 ; Simla, 7,000 to 8,000 feet, Hooker f. and Thomson ; Boolyar 8,000 feet, T. W. Forster, 1894 ; Bhagirathi, banks of rivers 6,500 feet, Dr. Schlich, 1883 ; Central Himalaya, W. S. Webb ; Cuma above Naini Tal, 1866 ; Assam, Manipur, Political Agent, 1914 ; Manipur S. N. Bal (probably cultivated) ; Wallichian sheet 6046A, 6046B, Eastern Kumaon and Himalaya, W. S. Webb.

J. D. Hooker limits the distribution of this species up to Chamba from Nepal, but its occurrence in the outer Himalayan ranges in the west, as noted by Dallimore and Jackson, suggests its extension beyond Chamba, Hazara and Afghanistan and our sheets here confirm this view.

Species No. 2. CUPRESSUS SEMPERVIRENS *Linn.*

Area of general distribution :—

Afganistan, North-West India, Wallichian sheet 6046C, 6041D.

Area of detailed distribution :—

Afganistan, Griffith Herbarium, Lemann, 1852 ; Northern division Dr. Cleghorn, (Planted) ; Poona, 1890 (cultivated) ; N. Bengal, Purnea,

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[1] The whole of the Himalayan ranges including the hills of the Northern Burma is divided into the eastern and the Western Himalayas. The Central Himalaya merges into the ranges of mountains where the Eastern and the Western spurs meet at the centre, in and about Western Nepal.

[2] Among the localities of the Willichian sheet numbers, only those which have special reference in the volume of Wallichian sheets have been noted in detail. The localities of the numbers which have general distribution in the Himalayas have not been repeated in the list of detailed distribution.

Cultivated, Kurz, 1868 ; old Agartolah, Tippera Hills, 5,000 to 8,000 feet, P. M. Debbarman, 1914 (planted) ; Burma, Maymyo, plateau, 3,500 feet, C. G. B. Dawkins ; Sadon, 4,500 feet. Lady Cuffe 1915, (Hooker mentions this as cultivated). [This is an introduced species which has acclimatized itself in the North-West India earlier than 1852.]

Species No. 3. CUPRESSUS FUNEBRIS *Endl.*

Area of general distribution :—

Nepal ; Sikkim ; Bhootan.

Area of detailed distribution :—

Dehra Dun, 2,200 feet, J. S. Gamble, 1894 (cultivated) ; Sikkim, Yaksum, 4,500 feet, T. Anderson, 1862 ; Tista River, between Darjeeling sub-division and border point of Sikkim, Dr. Schlich, 1873 ; Sikkim, 5,000 feet, Hooker f., and Thomson, Sikkim Himalaya, Dobdie Monastery, Toukson, G. Watt, 1887 (cultivated) ; East Himalaya-Griffith, 1861–1862. [This species is also, according to Hooker, grown near Buddhist temples in Nepal, Sikkim and Bhootan. This species, a native of Central China, was introduced, and established itself in this country before 1860.]

Species No. 4. CUPRESSUS LUSITANICA, *Mill.* var. *Benthamii.*

Area of general distribution :—

N.-W. Himalaya.

Area of detailed distribution :—

N.-W. Himalaya, Kaulagarh Tea Estate, Dehra Dun, R. N. Parker, 1922, (probably cultivated). This is a native of Mexico, introduced in this country in early days.

Species No. 5. CUPRESSUS CASHMIRIANA *Royle.*

Area of general distribution :—

East Himalaya.

Area of detailed distribution :—

East Himalaya, W. E. Smith, cultivated in N. Italy and supposed to be identical with the Bhootan specimens collected by Griffith at Dewangiri.

Species No. 6. CUPRESSUS SP. (unidentified).

Area of general distribution :—

N.-W. Himalaya.

Area of detailed distribution :—

Dist. Chamba, Pangi Sahaul Road, near Salgraon, 9,000 ft. ; Harsukh—1899, (may or may not be cultivated).

Genus No. 2. JUNIPERUS LINN. *G. P. 7.*

Species No. 1. JUNIPERUS COMMUNIS STATE *Linn.*

Area of general distribution :—

Afghanistan N.-W. Himalaya ; Wallichian sheet 6044.

Area of detailed distribution :—

Afghanistan, Ballad; Gilgit expedition, Hindukush, Dr. Giles, received through Mr. Duthie, 1887; Kashmir, Suknullah, Dua's valley, 11,000 ft. to 12,000 ft.; Kashmir, above Doyen, Dist. Astor and Karachu valley (1891), 12,000 ft. to 13,000 ft., J. F. Duthie, 1892; N.-W. Himalaya, Chamba (Pangi), Ajog forest, 8,500 ft., Harsukh, 1889; Tola Kumaon-Himalaya, 11,500 ft., R. Strachey and J. E. Winterbottom; Kuti, Kumaon, 11,000 ft., S. R. Kashyap, 1926, Var. *Alpina*, Millum, Kumaon, R. Strachey and J. E. Winterbottom, 1848; Chamba State, N. W. Himalaya above Kilar, 10,000 to 12,000 ft., J. H. Lace, 1896; N.-W. Himalaya, Tehri Garhwal, Chensil range, 11,000 ft., J. F. Duthie, 1894; Jambatai, Chitral, 10,660 ft., Surg. Lt. Harriss, 1895; N.-W. Himalaya, Hazara, Kagun valley, 13,600 ft., Inayet, 1896; Pangi (Lahoul), Chamba State, 10,000 ft., J. H. Lace, 1897; Exalpibus Himalayana, Dr. W. S. Webb; Himalayas, George King (cultivated), 1869; N.-W. Himalaya, Kibar dogri, 9,000 ft., J. H. Lace, 1890; W. Himalaya, 5,000 to 11,000 ft., Hook. f. and Thomson; Parbanee 9,000 to 9,500 ft., Dr. Brandis, 1864; N.-W. Himalaya, Roghie, Dr. Brandis; Lahoul, 10,000 ft. to 12,000 ft., R. W. Heyde, 1877; Kashmir, Kangan, Sind valley, 5,500 ft., G. A. Gammie, 1891. Wallichian sheet 6044–1824, Neetee, W. S. Webb, East Srinagar up to Kumaon India orientalis, Dr. Wallich. 1869.

Species No. 2. JUNIPERUS PSEUDO-SABINA *Fisch. and Mey.*

Area of general distribution :—

N.-W. Himalaya; Tibet; Nepal; Sikkim; Chumbi; Bhootan; Wallichian sheet 6041A, B. C.

Area of detailed distribution :—

Chamba, Pangi, Near Triloknath, 8,000 to 12,000 ft., J. H. Lace, 1897; Kashmir Himalaya, Kilane, Kumaon, 11,500 ft., R. Strachey and J. W. Winterbottom, 1848; Kuti, Kumaon, 13,000 ft., S. R. Kashyap, 1926; Srinagar, Robert Brown; Tehri Garhwal, Gangotri, 12,000 ft. to 13,000 ft., J. F. Duthie, 1881; Chamba-Comm. Robert Ellis, 1880; W. Tibet, Gode in Hasara (Belli or little Tibet Chumbi, Neepan and Kashmir, J. E. Winterbottom, 1847; Nepal, Dr. J. Scully; Sikkim—Himalaya, King's collector, 1888; Sikkim, 10,000 to 15,000 ft., Teumthang, G. King, 1885; Toumrachen Chu, 12,500 ft., Smith and Cave 1909; Sikkim, 12,000 ft., W. Wallich, 1870; Ratong, Sikkim, 1857; Tongri, Sikkim Tougpong 13,000 ft., G. Watt. 1881; Tongri, T. Anderson, 1862; Phalloot, Sikkim, 13,000 ft., S. Kurz; Tey lep Pau 13,000 ft., J. S. Gamble, 1880; Sikkim subalpine, 10,000 to 15,000 ft., Hook. f. and Thomson; West of Jongri, 12,500 ft., G. A. Gammie; Chumbi-Kimpau, 1877; Chumbi State, Kukti pass, J. H. Lace, 1897; Rashorg

valley, 10,000 ft., Tolling Hills, Dr. Brandis; Bhootan, Dr. King's collector, 1888; Bhootan hills, H. Hamilton; Kishtwar—Subalpine, Hook. f. and Thomson; Himalaya Tarlaria confines W. S. Webb, Srinagar, Gosiathan, Wallichian sheet 6041.

J. D. Hooker reduces *J. Wallichina* to *J. pseudo-sabina*, but Dallimore and Jackson, who consider Hooker as the author of *J. pseudo-sabina* and not Fischer and Meyer, have reduced *J. pseudo-sabina* to *J. Wallichiana* Hooker f.

Species No. 3. JUNIPERUS RECURVA *Ham.*

Area of general distribution :—

N.-W. Himalaya; Chitral; Tibet; Nepal; Sikkim: Chumbi; Bhootan; Wallichian sheet 6042 A.B.

Area of detailed distribution :—

N.-W. Himalaya, Chitral Relief Expedition, Lawari Pass, 10,500 ft., Brig. Genl. Gatacre D. S. O., 1895; Hazara, Siran Valley, Inayet, 1896; Kashmir, J. F. Duthie, 1893, var. *Squamata*, Parlatore, Wallichian sheet 6043 C., Alpine Himalaya; Srinagar, R. Brown; N.-W. Himalaya, Dr. Stoliczka; Horang, Dr. Brandis, 10,000 ft., J. F. Duthie; N.-W. India, H. B. Royle; Tehri Garhwal, Kidarkanta, 10,000 ft., to 11,000 ft. J. T. D. 1879; Intul 12,000 ft., Dr. Schlich, 1883; [1] N.-W. Himalaya, Lahaul, 10,000 to 12,000 ft., Heyde; Chitral Expedition, Bundai, 9,600 ft., Surg. Lt. Harriss, 1895; Lawripass, Chitral Expedition, 10,500 ft., Brig. Genl. Gatacre, 1895; Sutlej valley, S. R. Kashyap, 1923; Samada, Central Tibet, on the road to Gyantse, 14,100 ft. Way to Kupup 13,000 ft., S. R. Kashyap, 1929; Pindaree glacier, Kumaon, 12,500 ft., Sunder dunga 12,000 ft., Kumaon, Niti, 11,500 ft. Garhwal, R. Strachey and J. E. Winterbottom, 12,000 ft., 1848; Tolu Kumaon—11,500 ft., R. Strachey and J. E. Winterbottom, 12,000 ft., 1848; Margraon, J. H. Lace, 1897; Yatung, S. R. Kashyap, 1930; Khambajong Tibet Frontier Commission, Kajor. F. E. Younghusband, 1903; Nepal, Dr. J. Scully; East Himalaya and Gasaithan, Wallich, 1824; Sikkim Himalaya Yeumtong (Lachung valley), 13,000 ft., Sibu valley, 12,000 ft., G. A. Gammie, 1892; Guatong, 11,000 ft., W. Wallich, 1874; Sikkim, 10,000 to 12,000 ft., Hook. f. and Thomson; Dr. King's collector, 1887; Singalelah, Darjeeling, 10,000 ft., C. B. Clarke, 1870; East Himalaya, Griffith, 1861–62; Bhootan, Sergea mountain, summit of ledge towards Rydams, 10,000 ft., ascent of hill to Rydam 9,500 ft. to 10,000 ft. Wallichian sheet 6042 A.B. 6043 ex Himalaya, 1824.

J. squamata, Ham. is taken as an independent species by Dallimore and Jackson. According to Clinton and Baker this species

[1] Dr. Schlich's collection is supposed to be a variety, var. *squamata* Parlat.

differs from *J. recurva* in having stouter and broader leaves and smaller and slightly different kinds of fruits. Its occurrence, as two separate species—*J. recurva* and *J. squamata* in Nepal has been recorded by D. Don as well.

Species No. 4. JUNIPERUS MACROPODA *Boiss.*

Area of general distribution :—

Afghanistan ; Baluchistan ; N.-W. Himalaya ; Chitral; Trans-Indus Himalaya; West Tibet ; Assam ; Wallichian sheet 604/A.

Area of detailed distribution :—

Rawai and Hazara, Afghan ; Quetta, 1909 ; Ghushki, 8,000 ft., J. H. Lace, 1886 ; Rarang, 10,000 ft., J. H. Lace, 1890 ; Milum, Kumaon, 11,500 ft., R. Strachey and J. E. Winterbottom, 1848 ; Kashmir, 6,700 ft., T. Thomson ; Chamba, Punjab, 10,000 ft., A. Pengelly 1887 ; Simla, Nilany, 10,000 ft. to 11,000 ft. up to 12,000 ft.; Dr. Schlich, 1883 ; N. W. Himalaya ; Talling Hills and Chargo, Dr. Brandis, Drankar, 12,000 to 14,000 ft., Dr. Stoliczka ; Werangpap Teedong valley; 19,000 ft., S. Kurz ; Kashmir, 11,000 to 12,000 ft., Astor, 8,000 ft., 1892 ; J. F. Duthie, 1892 ; Jeolikota, Kumaon, N. Gill, 1913 ; Lahul, Jispa, S. R. Kashyap, 1919 ; Chitral Relief Expedition 11,000 ft., Surg., Lt. Harriss, 1895 ; Ba—N. W. Tibet, 8,000 ft., T. Thomson ; Tibet, 5,000 to 15,000 ft., T. Thomson ; Manipur, Assam, Political Agent, 1914 ; (probably introduced in Assam, as *Pinus Khasya* is evidently the only conifer found growing wild in the Naga Hills and Manipur area).

Genus No. 3. CEPALOTAXUS, *Sieb. & Zucc. G. P. 12.*

Species No. 1. CEPHALOTAXUS MANNII *Hook. f.*

Area of general distribution :—

Khasia Hills ; Assam.

Area of detailed distribution :—

Khasia Hills, 5,000 to 6,000 ft., Muplong, and Lankhla woods, 3,000 ft., G. Mann, 1885 ; Shillong, Jowai Road, Dr. Prain, 1892 ; Bernardungo, 6,500 ft., J. W. Oliver, 1892 ; Themokidima Forest, Assam, 5,000 ft., G. Watt, 1895.

Species No. 2. CEPHALOTAXUS GRIFFITHII *Hook. f.*

Area of general distribution :—

Assam ; Burma.

Area of detailed distribution :—

East Bengal, 5,000 ft., Griffith ; Duphla hills, J. L. Lister, 1874 ; Above Konoma, South East of outpost about 8,000 ft., Dr. Prain, 1886 ; Naga Hills, High range of hills, near the sources of Kapila river, North Cachar, Capt. Bewar, 1857 ; Manipur, G. Watt, 1881–82 ; Saunta-

thonlon, Burma, 3,000 to 4,000 ft., A. Rodger, 1916; Upper Burma, J. T. W. Leslie, 6,000 ft., 1890; Burma, Ruby mines, J. W. Oliver, 6,500 ft.

Dallimore and Jackson, however, mention that this species occurs in Mishmi Hills, Upper Assam, at an elevation of 6,000 ft. Griffith's "East Bengal" evidently refers to Eastern Himalaya including Assam. *Species* No. 3. CEPHALOTAXUS BACCATA, Linn, as noted on one of the sheets of the Genus *Cephalotaxus* has been collected from Mongnai, Southern Shan States, by W. H. Craddock in 1900 and mentioned on the sheet "found in wild state" appears to be a form of *C. Griffithii*. I have not been able to trace this specific name in the literature available in Calcutta.

Genus No. 4. TAXUS *Tournef. G. P. 13.*

Species No. 1. TAXUS BACCATA, *Linn.*

Area of general distribution :—

Afghanistan; N.-W. Himalaya; Nepal; Sikkim; East Himalaya and Assam: Upper Burma; Wallichian sheet 6054 A, B, C, D, E. 484, 6,055.

Area of detailed distribution :—

Afghan., 1857; W. Himalaya-Hazara dist., 5,000 ft., and above, Inayet, 1899; North-West Frontier Province Janusar, Deoban 9,000 ft., F. W. Forster, 1894; Temperate west Himalaya, Hook. f. and Thomson, 1877; Jawnsar divs., Mundali dist., Simla, Hirasingh, N.-W. Himalaya, J. K. Knowles, 1920; Kumaon, 8,500 ft., Jegeswar, 1848; below Baling, Kumaon, 10,000 ft., S. R. Kashyap, 1926; Simla, 9,000 ft., Gamble; N.-W. Himalaya, Tehri Forest above Deota, 8,900 ft., J. F. Duthie, 1895; Chamba State, Kalai Forest, J. H. Lace, 8,000 ft., 1899; Urni Forest, 9,500 ft., J. H. Lace, 1890; Chamba Robert Ellis, 1880; Mulluk and S. of Bhabel, 9,000 to 12,000 ft., Dr. Stoliczka; Nachar Forest, Bursahir, Dr. Brandis; 8,000 ft., Nepal, Wallich, 1821; Webb, R. B. and others, 1822, 1824; Sikkim, Kurz, Hook. f. and Thomson, 7,000 to 10,000 ft., H. D. Hooker; Sangloo, Sikkim, 8,000 to 10,000 ft., T. Anderson, 1862; Tangloo, C. G. Roger, 1899; East Himalaya, Griffith, (Griffith notes *Taxus sp.*, from Bhootan collection as well) 1861; Khasia Hills, Assam, in the *Quercus Rhododendron* wood, Muplang, H. G. Carter, 1920; Temperate region, 5,000 to 6,000 ft., Hook. f. and Thomson; Khasi hills and Brahmaputra plains, Kurz; Wallichian sheet, Khasia Hills, 1850; Khasia and Jaintia Hills, 5,000 ft., Nungbiai, G. Mann, 1855; Japoo, Manipur, 1882; Japoo, Manipur, 8,000 ft., G. Watt, 1881–82; 7,000 ft., Manipur, G. Watt, 1882; Chin Hills, Upper Burma, C. R. Dun, 1895; Burma, Ruby mines, 6,500 ft., T. W. Oliver.

Genus No. 5. PODOCARPUS *L. Herit. G. P. 21.*

Species No. 1. PODOCARPUS LATIFOLIA *Wall.*

Area of general distribution :—

Assam ; Burma ; S. India ; Wallichian sheet 6050.

Area of detailed distribution :—

Assam, G. Mann, 1893 ; East Bengal, Griffith, 1863–64 ; Mt. Sillet, De Silva ; Barakres 2,500 ft., Kanjilal, 1914 ; King's collector 1893 ; Shillong, G. Mann, 1887 ; Tavoy, Burma, 1925 ; Pegu-Burma, Kurz ; Moulmain, Falconer, 1849; South India, C. A. Barbar, 1908 ; Anamalais, S. Coimbatore 4,000 ft., C. C. Wilson, C. E. C. Fischer ; Wallichian sheet 6050.

Dallimore and Jackson consider *P. latifolia Wallich* as a synonym of *P. Wallichianus C. Presl.*

Species No. 2. PODOCARPUS NERIIFOLIA, *Don.*

Area of general distribution :—

Central Himalaya ; East Himalaya ; East Bengal ; Assam ; Andamans ; Burma ; Malaya Peninsula ; Wallichian sheet 6052 A, B & C.

Area of detailed distribution :—

Nepal, Dr. Wallich, 1889 ; Bhootan, Debrapur, 1864 ; East Himalaya, Sikkim, 3,000 ft., T. Thomson, S. Kurz ; Gangtak, Riboo and Rhomoo ; East Bengal, Griffith, 1863–64 ; Assam, Abor Expedition, above Balek, 2,300 ft., I. H. Burkill, 1911–12 ; Khasia Mt., Oldham ; Khasia, 2,000 to 3,000 ft., Hook. f. and Thomson ; Khasia Hills, Sylhet, Jaintia Hills, 5,000 ft., G. Mann, 1886 ; Assam, Nambur Forest, G. Mann, 1891 ; Chittagong Hill Tracts, J. S. Gamble, 1880 ; J. S. Lister, 1876 ; Andamans, King's Collector, 1884 and 1890 ; South Andaman, S. Kurz ; Burma, Maymyo, Maung Kan, 1924 ; Tenasserim, G. Gallatly, 1877 ; Wallichian sheet 6052 A, B, C, Nepal, Singapore, Calcutta Botanic Garden, 1822.

Species No. 3. * PODOCARPUS CUPRESSINA *Br.*

Area of general distribution :—

Burma ; Malay Peninsula.

Area of detailed distribution :—

Hupung Valley, Burma, J. Wallace, 1856.

Species No. 4. PODOCARPUS WALLICHIANUS *C. Presl.*

Area of general distribution :—

Malay Peninsula ; Wallichian sheet 6057.

Area of detailed distribution :—

Penang, Wallich, 1822 ; Perak, Scortechini ; Goping Kinta, L. Wray, 1883 ; Bakit saga, State of Johor, 1890.

This species is nothing but different forms of *P. latifolia* Wallich and I agree with Dallimore and Jackson in reducing *P. latifolia* of Wallich to *P. Wallichianus*.

Genus No. 6. PINUS *Linn. G. P. 26.*

Species No. 1. PINUS EXCELSA *Wall.*

Area of general distribution :—

Afghanistan ; N.-W. Himalaya ; Chitral ; Nepal ; Chumbi ; Wallichian sheet 6059 A, B, C, 2670, 307, 1821–1824.

Area of detailed distribution :—

Afghan ; N.-W. Province, Boolyar, T. W. Forster, 1895 ; Jehru, N.-W. Province, 8,000 ft., J. S. Gamble, 1891, Junswar, 7,500 ft., J. S. Gamble, 1894 ; Junswar, 8,000 ft., J. F. Duthie, 1898 ; N.-W. Himalaya, Dr. Stolickza ; Dr. Brandis ; Bashahr, N.-W. Himalaya, Bahli, 7,500 ft., J. H. Lace, 1890 ; Naldehra, N.-W. Himalaya, J. S. Gamble, 1878 ; Simla, J. S. Gamble, 1877 ; Kashmir, 5,000 to 11,500 ft., Hook. f. and Thomson ; Chamba, N.-W. India, Robert Ellis, 1880 ; Mussourie, G. King, 1869 ; Tehri Garhwal, Lambatach, 7,000 ft., J. F. Duthie, 1897 ; Chitral Expedition, Surg. Lt. Harriss, 1895 ; Murree Hills, Upper Topa, 6,800 ft., T. A. Sprague, 1910 ; Sikkim, cultivated, 6,000 to 10,000 ft. J. D. Hooker ; Chumbi, J. W. Edgar and Dingboo, 1877 ; East Himalaya, Griffith ; Assam, Col. Jenkins (perhaps introduced). [There is no Herbarium sheets from Nepal available here, but David Don reports its occurrence from Nepal basing evidently on Hamilton and Webb's collection of this species. Marquand records this species from Kingdon Ward's collection of E. Himalaya and Tibet, from Tsang-Po Gorge 2,100 to 2,400 m.]

Species No. 2. PINUS LONGIFOLIA *Roxb.*

Area of general distribution :—

N.-W. Himalaya ; Wallichian sheet 6065 A and B, 1861.

Area of detailed distribution :—

N.-W. Himalaya, G. King and Brandis ; Murree Hills, Lower Topa, T. A. Sprague, 1918 ; Nurpur-Kangra Dist., I. H. Burkill, 1902 ; Jaru, Simla, 6,000 ft., J. S. Gamble, 1877 ; Sikkim, J. D. Hooker ; Bhootan, W. sheet Nepal, Horto. Botanico, Calcuttensis (evidently cultivated) 1861.

Species No. 3. PINUS KHASYA *Royle.*

Area of general distribution :—

Khasia Hills ; Assam ; Burma ; Wallichian sheet 37499 A. 6064 A.

Area of detailed distribution :—

Khasia and Jaintia Hills, Mann ; East Himalaya, Rungeet, 2,000 ft., G. H. Cave ; Assam, Jenkins ; Shillong, 5,000 ft. C. B. Clarke, 1885 ;

Kohima, Naga Hills, Dr. D. Prain, 1886; East Bengal, George Watt 1881–82; Inle Lake, Southern Shan States, Burma, N. Annandale, 1917; Upper Burma, C. R. Dun, 1895: Nut-toung Mts., Burma, Cross, 1861; Burma, Dr. Brandis; Upper Burma, Ruby Mines, Abdul Huk, 1891; Burma, 4,500 ft., J. M. D. Mackenzie, 1915; Koni, Upper Burma, J. C. Prazer; Burma, Pegu, Broke Ridge, S. Kurz.

Species No. 4. PINUS GERARDIANA *Wall.*

Area of general distribution :—

Baluchistan; N.-W. Himalaya; Chitral; Wallichian Sheet 6064.

Area of detailed distribution :—

British Baluchistan, Barsukh (Afghan) 1897; Bashahr, N.-W. Himalaya, Kilbato Sholta, 6,000 ft., J. H. Lace, 1891; Gilgit, Dr. G. M. Giles, 1885; Astor valley, 8,000 ft., J. F. Duthie, 1892; Punjab, Himalaya, Pangee, Dr. D. D. Cunningham, 1884; Kunawar, 6,000 to 10,000 ft., Hook. f. and T. Thomson; Dr. Stoliczka; Chitral Expedition, 10,000 ft., Surg. Lt. Harriss, 1895.

Boissier records in his Flora Orientalis Aitchinson's collection of this species from "Hariab et Kost Affgheniae orientalis 7,000 to 11,000 ft."

Species No. 5. PINUS MERKUSII *Jungh. and De Vriese.*

Area of general distribution :—

Burma (Upper Tenasserim); Malaya; Siam.

Area of detailed distribution :—

Burma, Morgui Dist. Maungook peak, 3,500 ft., Gilbert Rogers, 1910 Amherst Dist., Thaungyin valley, J. H. Lace, 1909; Shan States, 1,700 to 5,000 ft., J. H. Apbin, 1887; Martaban, Thoungyen, Dr. Brandis.

Pinus montana Dursi, cultivated in Nepal; *P. Laricio Poir.*, introduced in Simla and N.-W. Himalaya and cultivated there, collected in 1919; *P. Pinaster*, Soland, grown in the Government orchards, Ranikhet, U. P. Wallichian sheet—7278, Nepal; *P. sylvestris* introduced and cultivated in Ranikhet—U. P. 1920; in South India and Ootacamund in 1857 and 1858. The above species of *Pinus* have more or less adapted themselves to the climatic and edaphic conditions of this country.

Genus No. 7. CEDRUS *Laudon. G. P. 27.*

Species No. 1. CEDRUS LIBANI *Barrel., var.* DEODARA *Hook. f.*

Area of general distribution :—

N.-W. Himalaya; Gilgit; Kumaon; Wallichian sheet 23286 D, 6060 A, B, 1821.

Area of detailed distribution :—

Afghan, Strachey, 1857; N.-W. Himalaya, Hazara, 4,500 to 9,000 ft., Stewart; Junswar Division, 8,000 ft. J. F. Duthie, 1894,

J. W. Forster, Dr. Brandis; Pangee, Dr. Stoliczka; Chitral Relief Expedition, 7,000 ft., Surg. Lt. Harriss, 1895; Dalhousie, 7,000 ft., C. B. Clarke; Simla, T. Thomson, 7,000 to 8,000 ft., Dr. Schlich; Dehra Dun, U. P., Mundali, 8,000 ft., B. R. Bade, 1909; Deoban, 8,500 ft., A. V. Kesaviengar, 1908; Kumaon, Garhwal, 1857; (Tehri Garhwal) 10,000 ft., Duthie; Nepal, cultivated, 1884; cultivated in Khasia hills, 4,000 to 6,000 ft., Aitchinson's collection of this species from the mountains of Dist. Kuram Affghaniæ orientalis 7,500 to 10,000 ft., as noted by Bossier may also be mentioned here. Wallichian sheet Nos. 6060 A, Kumaon, R. B., Nepal 1821.

This variety of Barrelier's C. Libani has been raised by Loudon to the rank of the species *Cedrus Deodara* Loudon—as held by Dallimore and Jackson; and they have sufficient justification in considering C. Libani, Barrelier; (Cedar of Lebanon) as a separate species.

Genus No. 8. PICEA, *Link. G. P. 28.*

Species No. 1. PICEA MORINDA *Link.*

Area of general distribution :—

N.-W. Himalaya; Sikkim; Wallichian sheet 6063.

Area of detailed distribution :—

Baklidhar, J. H. Lace, 1891; N.-W. Himalaya, Dr. Brandis; Nirrkhamla, Dr. Schlich, 1883; W. Himalaya, 7,000 to 9,000 ft., T. Thomson; Hazara, Kagaon valley, 9,000 to 5,000 ft., Inayet 1896; Chamba State, Gothan ridge, 8,000 ft., J. H. Lace, 1898; Jaunsar, 8,000 ft., J. F. Duthie 1893; Chitral Expedition, Guger, 10,000 ft.; Surg. Lt. Harriss, 1895; Simla, J. S. Gamble, 1877; Kumaon, N. Gill, 1913; Mussourie, G. King; Imperial Forest College, Dehra Dun—U. P., Mundali, 8,000 ft., B. R. Bade, 1909; N.-W. Himalaya, Droban, Dr. Brandis; Sikkim, Lachung 9,000 ft., G. A. Gammie, 1892; Lachen, 10,000 ft., King's collector, 1885; Yeumthong, 12,000 ft., G. H. Cave, 1915; King 1875-76; (*Picea morindoides* Rehder), Zemu valley, 8,500 ft., Smith and Cave, 1909; Sikkim, 8,000 to 10,000 ft., J. D. Hooker, 1885; Chumbi, 12,000 ft., J. S. Gamble, 1880; Ha-ulong-pg-ong, King's collector, 1884; Chumbi Phari, Dungboo, 1879.

Griffith reports the occurrence of *Abies spinulosa*, which is synonymous to *Picea Morinda* Rehder, in Bhootan. Rehder's *Picea morindoides* is evidently, as Dallimore and Jackson remark, perhaps with reference to Troup and other authorities, a "more tender form than *P. Morinda*". This may be due to edaphic and climatic variations as considerable variations are noticed among the Herbarium specimens. Hooker's *Picea Morinda* must have included these tender forms as well, and I doubt how far the separation of these tender forms of *P. Morinda* raising them to the rank of a species is justified. I have, therefore, considered (after Hooker) *P. Morinda* as the only species

including this tender form (*Picea morindoides*), which is predominant in the Sikkim Himalayas. Evidently on this ground the sheet identified as *P. morindoides* collected by Smith and Cave from Zemu valley has been kept in the bundle of *P. Morinda*. There is, however, following remarks on one of the sheets marked *Picea Edgeri* "*Picea morindoides*—flat-leaved spruce—Chumbi valley. Griffith—Bhootan, Hooker—Lachen, Hooker—Yetung. Question is, does *Picea Morinda* occur at all in Sikkim or E. Himalayas. We have no specimen of Kew of it from them."

Genus No. 9. TSUGA *Carriere. G. P. 29.*

Species No. 1. TSUGA BRUNONIANA *Carr.*

Area of general distribution :—

N.-W. Himalaya; Nepal; Sikkim; Chumbi Bhootan; Wallichian sheet 6055, 6061, 1824.

Area of detailed distribution :—

N.-W. Himalaya; Kumaon, Shosa Kali valley, Inayet, 1900; Kumaon, 10,000 ft., J. F. Duthie, 1884; Nepal. Dr. J. S. Scully; Wallichian sheet 6061, Nepal 1824, Sebu valley—Sikkim, 10,000 ft., G. A. Gammie, 1892; Jemu valley, 9,000 ft., Smith and Cave, 1909; Zeumthong, 11,000 ft., G. H. Cave, 1915; Sikkim 8,000 to 10,000 ft., J. D. Hooker; Phalloot descent, 11,000 ft., S. Kurz; Lachung, 1883; Chumbi and Phari, Rinchingong, Dunboo, 1878; Chumbi, Neempen; Ta-ssie-chen-loom, Chumbi, King's collector, 1884; East Himalaya, Griffith, 1861–62.

Marquand records this species from Kingdon Ward's collection of E. Himalaya and Tibet in Tsangpo Gorge forest above Gompo Ne.

Engler in his 2nd Edition of Naturlichen, Pflanzen Familien, 2 Auflage, 13 band, P. 186, 1926, remarks that *Tsuga Brunoniana* occurs in the inner ranges of the mountains of the Eastern Himalaya from Nepal to Bhootan. Hooker, however, mentions that it is wild in the Temperate Himalaya from Kumaon to Bhootan, between 8,000 to 10,500 ft. The localities noted on the sheets of the Herbarium specimens available in the Calcutta Herbarium confirm Hooker's statement. Don's *Pinus dumosa* occurring in Nepal is a synonym of *Tsuga Brunoniana*, so also *Pinus Brunoniana* of Wallich.

Genus No. 10. ABIES *Juss. G. P. 31.*

Species No. 1. ABIES WEBBIANA *Lindley.*

Area of general distribution :—

Afghanistan, Trans-Indus-Himalaya; N.-W. Himalaya; Nepal; Sikkim; Assam; Wallichian sheet 6063, 6056, 1824, 6058A, 6060 A. H.

Area of detailed distribution :—

Afghanistan, Griffith, 1852; Bashahr, Baklidhar, 9,000 ft., J. H. Lace, 1891; N.-W. Himalaya, Mussourie, G. King, 1869; N.-W

Himalaya and Kumaon, Hazara, Dr. Brandis; Chamba, N.-W. India C. R. Ellis, 1880; (var. *Pindrow*) below Bahing Kumaon, 10,000 ft., S. R. Kashyap, 1926; N.-W. Himalaya, S. Kurz; Royle, Deoban, N.-W. Himalaya, Dr. Brandis; 9,000 to 12,000 ft., T. Thomson; Dehra Dun, U. P. Deoban, 8,500 ft., A. V. Kesaviengar, 1908; Above Dwali, 9,500 ft., Kumaon, R. Strachey and J. E. Winterbottom; Kathi Pap, 9,000 ft., R. Strachey and J. E. Winterbottom; Junsai 8,000 ft., J. S. Gamble, 1895; Tehri Garhwal, 13,000 ft., J. S. Gamble, 1893; N.-E. Himalaya, Kumaon, T. Anderson, 9,000 ft., 1857; Nepal, Dr. J. Scully; Wallichian sheet, 6058 A, Gosiathan, 1821; Sikkim, G. A. Gammie, 1892; Sandakphu, G. A. Gammie; Sikkim, 10,000 to 12,000 ft., J. D. Hooker; Phalloot, 10,000 ft., 1887; Sikkim, S. Kurz, 1868; Dungboo, 1878; Watt, 1881; King's collector 1882 and 1884; Thumku, 12,000 ft., King's collector, 1885 Assam, Jenkins.

Marquand records this species from Kingdon Ward's collection of E. Himalaya and Tibet. Tsang-Po Gorge, 3,000 to 3,400 ft., 1928.

Genus No. 11. LARIX *Miller, G. P. 32.*

Species No. 1. LARIX GRIFFITHII *Hk. f. & Th.*

Area of general distribution :—

Nepal; Sikkim and Bhootan.

Area of detailed distribution :—

Sikkim, Jemu valley, 9,000 ft., Smith and Cave 1909; Sikkim, Lachung, 10,000 ft., Smith and Cave 1909; 9,000 to 12,000 ft. G. A. Gammie, 1891; Dr. Cunningham, 1889; Lachen, 10,000 ft., King's collector, 1885; Yeumthang, 11,000 ft., G. H. Cave, 1915; 11,000 ft., J. D. Hooker; Chumbi, Dungboo 1877, 1878, 1879; East Himalaya, Griffith; Jutse to Phari, S. R. Kashyap, 1929; Below Chumpithang and Yatung S. R. Kashyap, 1930.

Marquand records this species from Kingdon Ward's collection of E. Himalaya and Tibet, Tsang-Po valley, Tibet, 3,400 to 4,000 m. 1928.

Hooker notes that this species is confined to Eastern Nepal, Sikkim and Bhootan, altitude 8,000 to 12,000 ft. Pilger in the new edition of Pflanzen Familien reports its presence at as low as 2,700 m. It appears from the sheets available in this herbarium that there is no record from Burma. Mr. C. E. Parkinson considers this too as a native of Burma. I have not yet received any Burmese specimen to confirm Parkinson's statement. Its occurrence might be due to its extension in the Burmese hill ranges in later years.

Genus No. 12. *DACRYDIUM *Soland. G. P. 17.*

Species No. 1 *DACRYDIUM ELATUM *Wall.*

Area of general distribution :—

Malay Peninsula; Sumatra; Java; Fiji; Singapore; Wallichian sheet 6045.

Area of detailed distribution :—

On Mount Ophir, Malacca, A. C. Maingay, 1867; Penang, Dr. Stoliczka planted in the garden on top of Penang Hill, G. King, 1879; Fiji island, Dr. Suman 1860; Gunong Tahan, Pahang, L. Wray and H. C. Robinson, 1905; Gunong, Bubu Larut, 4,500 ft., L. Wray 1890; Penang, Dr. Wallich; Singapore, Sir R. Schomburgh 1859; *D. falciforme* Pilg., Malay Peninsula. Kurz records its doubtful occurrence in Tennaserim. D. Beccari Paul, Malay Peninsula; Wallichian sheet 6045, Penang Jack and Wallich 1819, 1822, Is. Phillippines, Wallich 1824.

Genus No. 13. *AGATHIS *Salisb. G. P. 23.*

Species No. 1. *AGATHIS LORANTHIFOLIA *Salisb.*

Area of general distribution :—

Malay Peninsula; Wallichian sheet 6037 A.

Area of detailed distribution :—

Waterfall Hill Larut Perak, 2,500 ft., G. Wray; Government Hill, Penang, A. C. Maingay, 1867; Royal Botanic Garden, (cultivated) 1915; Botanic Garden, Calcutta, 1834; Collected from Hort. Bot. Cal., in 1861; Perak, Malay Peninsula, Scortechini, Kunstler 1882, King's collector 1882. **A flamescens*, Gungong, Pahang, 5,000 to 6,000 ft. Malay Peninsula, L. Wray and H. C. Robinson, 1905.

* The genera marked with an asterisk are not strictly Indian but they have been mentioned to indicate the type of Conifers extending down towards the Malay Peninsula and beyond.

Summary.

The wild conifers of the Indian Empire are confined to the Western and Eastern Himalayas. Hooker enumerates thirteen genera and twenty-five species of which twenty-three are wild. Of these again *Agathis loranthifolia* and *Dacrydium elatum* are wild in the Malay Peninsula. A list noting the actual places of occurrence from which the plants have been collected, as far as can be ascertained from the sheets of the Herbarium specimens of the Royal Botanic Garden, Calcutta, has been supplied. The collection of the conifers dates as early as 1812.

A short note has been added on the distribution of each of the individual wild Indian species of conifers as much as could be gathered from the data available. But this statement requires further confirmation by explorations in the little known regions of Persia, Afghanistan, Baluchistan, Nepal, Sikkim, Bhootan, Tibet, Northern Burma and the most interesting spot from the standpoint of distribution of Floras—namely—the frontiers of Tibet, S. China, Yunnan, Szechuan, Northern Siam and Northern French Indo-China. But it may be remarked that generally speaking *Podocarpus neriifolia* and *Pinus Merkusii* have more

of Malayan element than Indian. *Juniperus communis* on the other hand forms perhaps an easterly link of the great belt of distribution of this species from Central and Southern Europe to Persia ending in the Western Himalaya. *Taxus baccata* has also a rather uniform range of long distribution from Europe through Persia to Himalaya ending in the Chino Tibetan border lands. The rest of the Indian species are indigenous to India, and are mainly confined to the Himalayan ranges in their wild state of growth forming frequently mixed associations with one or several species of Conifers.

List of Literature Consulted.

AITCHISON, J. E. T.—Catalogue of the plants of the Punjab and Sindh, London, 1869.

BENTHAM, G. and HOOKER, J. D.—Genera Plantarum, Vol. 3, pp. 420–442, London, 1847.

BLUME, C. L.—Rumphia, Vol. 3. t. 173, Lugdeneei, 1837.

BOISSIER, E.—Flora Orientalis, Vol. 5, pp, 705–711, Lugdeneei, 1881.

BOURDILLON, T. F.—The Forest Trees of Travancore, 1908.

BRANDIS, D.—Indian Trees, pp. 688–697, London, 1906.

BROWN, R.—A monograph of the Coniferous Thuja L. and of the North American species of the genus Libocedrus, 1847.

BURN-MURDOCH, A. H.—Trees and timbers of Malay Peninsula, Singapore, 1911.

BURKILL, I. H.—A working list of the flowering plants of Baluchistan pp. 86, Calcutta, 1909.

CLINTON-BAKER, H. and JACKSON, A. B.—Illustrations of Conifers, Vols. 1–3, Hertford, 1909–1913.

COLLET, C. S. H.—Flora Simlensis, Calcutta and Simla, 1902.

COOKE, T.—The Flora of the Presidency of Bombay, Vol. II, London, 1908.

COULTER, J. H. and CHAMBERLAIN, CH. J.—A morphology of Gymnosperms, Chicago, 1917.

COWAN, A. M. and COWAN, J. M.—The trees of Northern Bengal including shrubs, woody climbers, bamboos, palms and tree ferns, Calcutta, 1929.

DALLIMORE, W. and JACKSON, A. B.—A handbook of Coniferae including Ginkgoaceae, London, 1923.

DON, D.—Prodromus Florae Nepalensis, London, 1825.

ENDILCHER, S.—Synopsis Coniferarum, Sangalli, 1847.

ENGELMAN, G.—Revision of the genus Pinus;—Trans. St. Louis. Acad. Soc. Vol. 4, St. Louis, 1830.

ENGLER, A.—Coniferae;—Syllabus der Pflan. Fam., pp. 67–69, Berlin, 1898 and pp. 104–108, Berlin, 1919.

ENGLER, A. and GILG., E.—Gymnospermae—Die. Natürl. Pflan. Fam. Aufl. 2, Band 13, Leipzig, 1926.

FLORIN, R.—"Untersuchungen zur stammesgeschichte der Coniferales und Cordaitales", Erster-Tiel, Kungl. Sven. Vet. Handl. Tredje Serien, Bd. 10, No. 1, Stockholm, 1931.

FOXWORTHY, F. W.—Commercial timber trees of Malay Peninsula, Singapore, 1927.

FOXWORTHY, F. W.—Philippine Gymnosperms – Phil. Journ. Science. Bot. Vol. 4. No. 3, Manila, 1911.

FRITSCH, F. E.—The use of anatomical characters for systematic purposes, New. Phyt. Vol. 2, London, 1902.

GAMBLE, J. S.— A manual of Indian Timbers, London, 1901.

GHOSE, S. L.—A contribution of the morphology of Agathis Ovata (Moore) W. B. Journ. Ind. Bot. Soc. Vol. 4, 1924.

GRIFFITH, W.—Notulae ad Plantas Asiaticas (Posthumous papers) Pt., I–IV. Calcutta, 1847–54.

HARLOW, W. M.—The identification of the Pines of the United States, natives and introduced by needle structure, Bull. of the New York State College of Forestry, Vol. VI. No. 2a, 1931.

HEMSLEY, W. B.—The Flora of Tibet or High Asia, Jour. of the Linn. Soc. Bot. Vol. XXXV. London, pp. 124–265. 1902.

HENRY, A.—A new genus of Coniferae (Fokiena Henry et Thomas) Gard. Chro. Ser. 3., Vol. 49, London, 1911.

HOOKER, J. D.—Coniferae—Flora Brit. Ind. Vol. 5, London, 1890.

HOOKER, W. and J. D.—Icones Plantarum, Vol. 6. 1843, Vol. 11, 1867–71 and Vol. 19, London, 1889.

HOOKER, J. D., DARWIN, C. R., JACKSON, D.—Index Kewensis, Tom. 1–2. 1845 with suppl. 1–7, London, 1886–1925.

KANJILAL, U.—Forest Flora of the Siwalik and Jaunsar Forest Divisions of the United Provinces of Agra and Oudh, Calcutta, 1912.

KASHYAP, S. R.—Some aspects of the Alpine vegetation of the Himalaya and Tibet, (Presidential address) Botany of the 19th Indian Science Congress, 1932.

KIRKWOOD, J. E.—Forest distribution in the Northern Rocky mountain, Montana, 1922.

KURZ., S.—Forest Flora of Brit. Burma., Vol. 2, Calcutta, 1877.

MADDEN, E.—Observation on Himalayan Coniferae, etc. Journ. Agri-Hort. Soc. India, Vol. 7, Calcutta, 1850.

MARQUAND, C. V. B.—The botanical collections made by Captain Kingdon Ward in the Eastern Himalaya and Tibet in 1924–25, Jour. of the Linn. Soc. Bot. Vol. XLVIII, No. 321, London, 1929.

MASTERS, M. T.—A general view of the genus Cupressus—Journ. Lin. Soc. Bot. London. Vol. 31, 1895.

MASTERS, M. T.—Some features of interest in the order of Conifers, London, 1891.

MASTERS, M. T.—A general view of the genus Pinus—Journ. Lin. Soc. Bot. London, Vol. 35. 1901–1904.

MATSMURA. J.—Coniferae—Index. Plant. Japonicarum, Vol. 2. Tokyo, 1900.

MOLISCH, H.—Pflanzenphysiologie als Theori der Gartneri, Jena, 1916.

PARKER, R. N.—The cultivation of Conifers in Northern India—Indian Forester, Vol. 50 and 51. Allahabad, 1924 and 1925.

PARKINSON, C. E.—A forest flora of the Andaman Islands, Simla, 1923.

PARSONS, T. H.—An alphabetical list of Plants. Royal Bot. Garden, Peradeniya, Colombo, 1926.

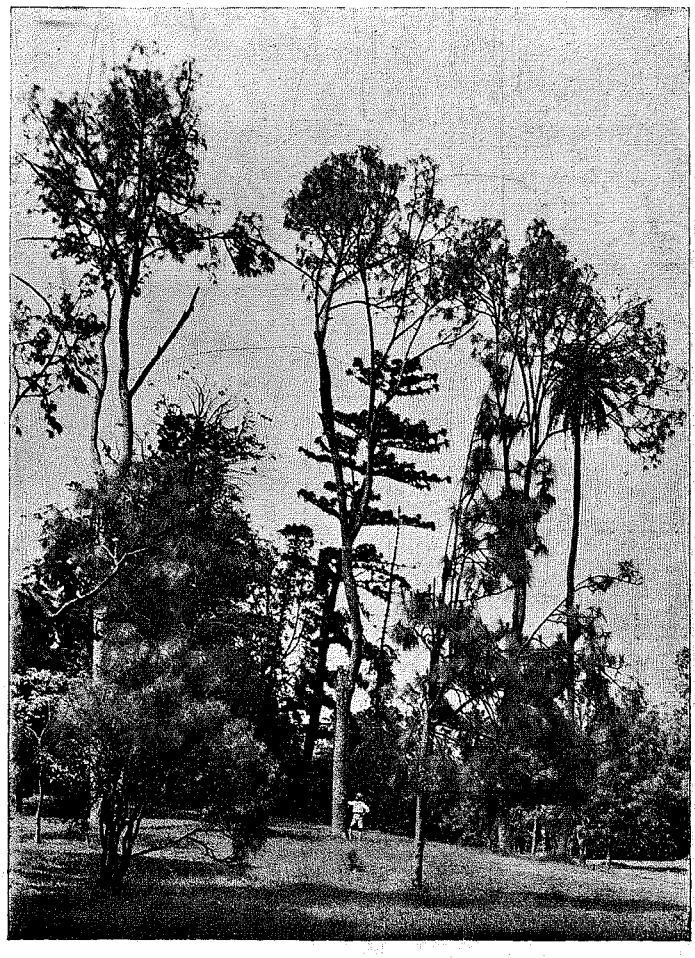
PILGER, R.—Taxaceae—Engler, A.—Das. Pflanzenreich. IV, 5, Heft. 18, Leipzig, 1903.

RIDLEY, H. N.—The Flora of the Malay Peninsula, Vol. V, London, 1925.

ROXBURGH, W.—Flora indica—Clarke's edition, Calcutta, 1874.

SAHNI, B.—Revision of the Indian Fossil Plants, Pt. 1. Coniferales (a impressions and incrustations) Mem. G. S. India, New Series, Vol. XI, Calcutta, 1928.

SAXTON, W. T.—The classification of Conifers—New Phyt. Vol. XII, London, 1913.



A group of Conifers cultivated in the Royal Botanic Garden, Calcutta *Pinus longifolia* in the fore-ground. *Araucaria cunninghamii*, *A. Cookii* and *A. Bidwillii* in the back-ground.

STAPF, O.—Index Londonensis, Tom. 1–6. London, 1929–1931.

TROUP, R. S.—The Silviculture of Indian Timber Trees, Vol. III, Oxford, 1921.

VEITCH, J.—A manual of Coniferae, Chelsea, S. W., 1881.

WALLICH, N.—Plantæ Asit. Rariores, Vols. 1–3, London, 1830–1832.

Explanations of Plates.

PLATE I.

[1] Map of the Indian Empire illustrating roughly the generic distribution of wild Conifers in the Indian Empire.

PLATE II.

Group of *Pinus longifolia* as cultivated in the Royal Botanic Garden, Calcutta. Some of the taller specimens are said to have been planted as early as 1794 by William Roxburgh, the then Superintendent of the Hon'ble East India Company's Garden by which name the Royal Botanic Garden, Calcutta, was known at that time.

HERBARIUM
ROYAL BOTANIC GARDEN, CALCUTTA,
14th October, 1931.

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[1] **Explanatory Note of the Map (Plate I).**

In this map only the generic distribution of wild Conifers has roughly been shown. The predominance of the Conifers both in the number of different species and in the number of individuals is observed more in the Western Himalaya especially along Kumaon and Garhwal ranges of mountains extending up to Tibet and Central Nepal. To plot all the genera illustrating their specific distribution as well in this part near the Central Himalaya is a difficult task, as most of the species run along more or less in the same line varying more or less in elevations. The altitudinal variations as well as variations in the local distribution has been maintained as far as possible. Moreover, different species of one genus has different range of distribution as noticed in *Cupressus*, *Juniperus* and *Pinus*. Attempts have, therefore, been made to represent in a general way the distribution of these different species of each of the genera as much as can be managed in the space available.