REPORT ON FIBRES.

CLASS IV. SUB-CLASS (E).

THE JURY CONSISTED OF THE FOLLOWING GENTLEMEN:—

MR. D. F. MACLEOD, C.B.,
MR. WIGHTMAN,
DR. CLEGHORN,
MR. E. A. PRINSEP,
MR. COATES,
SIRDAR NIHAL SINGH,
MR. J. MACNABB,
SOHAN LAL.

REPORTER—MR. C. A. D. GORDON.

[THE Report of this Jury was to have been drawn up by the late MR. C. A. D. GORDON. Owing to his lamented decease the entire report was left incomplete, and all that I have been able to recover are some notes on the various fibrous classes which had been arranged previously.

The notes contain no account whatever of cotton and flax: these I have supplied as well as possible from a few fragmentary papers. The awards of the Jury I have obtained from the official list.—P. B.]

A very large and varied collection of fibrous substances has been contributed from parts of the Punjab, the Saháranpúr Garden, and from Dera Dhún. Many of these are known and are habitually cultivated; others are obscure, and have been brought under notice for the first time. The value of the collection is enhanced by the accompaniment of ropes, mats, paper, cordage, &c., prepared at the different jails of the province.

The classification followed by ROYLE in his standard work, "The Fibrous Plants of India," London, 1855, appears to be the simplest, and is here followed.

GRASSES.

Saccharum munja is used for making "bán" ropes, the most common cordage in the bazar. Three sorts are exhibited from the Hissar and Múltán divisions. Excellent twine is made of this fibre, and sold at 4 seers per rupee in Jhung. The upper sheath, "munj," is beaten with mallets, and twisted into excellent rope, which is used for rigging boats; it is extensively employed as a light towing-rope on all the Punjab rivers, and is in nearly as universal use as coir is on the sea board, but must be kept constantly moist, and is therefore well suited for Persian wheels and well ropes. The refuse yields a paper stuff, employed in some of the Punjab jails.

Other species of *Saccharum*, *S. officinale*, *S. sara*, and *S. spontaneum*, are used for thatching, forming chair bottoms, and yield writing pens and arrows.

"Dab or" "panni" (*Eragrostis cynosuroides*), made into ropes.

"Kaskas" (*Andropogon muricatum*), the fibrous roots, are made into tatties, which yield an agreeable odor.

"Bagar" (*Andropogon*———?), a coil of string for lacing *charpais*, is sent from Hushiyarpúr, and grass shoes from Mandi; the fibre is very durable. The bridges over the Tonse, between Simla and Mussoorie, is made of this very tenacious grass.

"Parali" (*Oryza sativa*), rice straw, and *Triticum aestivum*, wheat straw, are extensively employed by the hill tribes for snow shoes. Price 2 annas per pair.

Arundo karka, "naltúra," culms used in making baskets.

SEDGES.

"Múth" (*Carex indica*), is used to form those parts of the snow shoes in Pangi and Lahaul, which are most liable to be torn—it grows at a great altitude. *Eriophorum comosum* (babúr) is much used in the outer Himálaya for making rope.

BULRUSH.

"Dib," "ríri" (*Typha angustifolia*), or elephant grass, is used for making mats, ropes and baskets; the manufacture may be witnessed in Anarkallee bazar.

LILIACEOUS.

Of fibres derived from Liliaceous plants, there were only two exhibitors—Dr. Jameson of Saháranpúr, and Dr. Hutchinson of Dehra Dhún—the samples are unquestionably very good, possessing cleanness, color and strength, and to both the exhibitors they may award a medal.

The plants were *Agave Americana*, *Aloe indica*, *Sanseviera zeylanica* (marúl), and other species.

Dr. Hutchinson has furnished the accompanying Memorandum describing the process adopted in the Dehra Jail, where these fibres are dyed of good colors, and serviceable doormats and canvas are prepared from their colored fibres at very reasonable prices.

"I give you a short account of the mode of preparing the fibre. The *first leaf* of the aloe (not subjected to any preliminary retting) is passed *once* through a pair of rollers (those employed in expressing juice from sugar-cane suit very well); by this the leaf is crushed, but not so as to injure the fibre. The leaf in this state has all its vegetable matter removed by what I call a hand-stripper (my own invention); this little machine consists simply of two iron plates, the edges of which are applied accurately the one to the other. The leaf is inserted between the edges, and the upper plate being closed on the lower, the leaf is pulled through. In this way all the cellular tissue is removed, and the fibre alone remains; it requires a little washing to separate coloring matter and gummy secretions.

"The cost of the hand-stripper should not exceed from 8 annas to 1 rupee, so that it is within the reach of every native, and the rollers are in every village ready at hand. The cost of the fibre ought to be 2 annas a seer; 6 men ought easily to separate in one day 9 seers of fibre. The aloe ought to be extensively cultivated; it makes the best of hedges and its fibre for rope, matting, &c., is invaluable. If desired I will send one of my hand-strippers, the machine is so light it would cost but little to send it."

PALMS.

In the Punjab, only two palms occur—the "date of commerce," chiefly in the Múltán

division, but introduced; and the dwarf-palm in the Trans-Indus districts—both of these trees are turned to account in many ways.

Of the economic uses of the date palm in Muzaffargarh, the jury have received the following note from W. COLDSTREAM, ESQ., C.S:—

"The reticulum of this palm, called "kabál," is used for pack-saddles for oxen, and in the manufacture of ropes (kabál-ki-rassi). This rope is used for many agricultural purposes, but not usually for wells. The rope made from the fibre of the leaf, both the stalk and pinnæ, is more frequently used for well purposes. It is called "búttr," or "pattah-ki-rassi;" and of the dwarf palm, "mzáre" (*Chamærops Ritchiana*). DR. J. L. STEWART has given this information in his account of the Flora of Peshawur Valley (Journal Asiatic Society of Bengal, No. 3, for 1863). "Very large quantities of it are brought (to Peshawur) from places about four miles off (where it is gregarious and covers extensive tracts), for the manufacture of mats, ropes and sandals, &c. The mossy looking rete lying inside the base of the petiole is used as tinder, for which it answers admirably." It has been found by DR. STEWART in the Salt Range, and is abundant in the central and western portions from 2,000 feet up to 5,000 feet; it is there called patha, kalyún or kílú. DR. BELLEW, in his work on Affghánistan (page 106), says: "The delicate white embryo leaves in the centre of the plant have a sweet and astringent taste, and are in great repute, and of common use, as a domestic remedy in cases of diarrhœa and dysentery, and that where more are to be found, they are used as a purgative medicine, but chiefly for horses and cattle.

FLAX.

The cultivation of flax for the sake of its fibre in the Punjab dates from shortly after the English occupation. Formerly, indeed, the natives seem to have had some notion of the value of the fibre: but the only use they made of it was in the manufacture of a kind of twine, called "*táti*," which the inhabitants of the country about Sealkot employed in stringing their charpoys. The difficulty of the operations required in the production of good fibre, is sufficient to account for the negligence with which the natives treated this product.

The Indian Flax Company (Limited) began operations in Sealkot in 1860. The Company at present merely confines itself to preparing the fibre for export to Europe. The flax grown is raised from imported seed, and is much superior to the plant of the country. It is estimated that the fibre would sell in the English market for from £50 to £75 per ton. Every season's produce is reported to be becoming more valuable. The Company has great difficulties to contend with in importing the seed in a sound state: the long sea voyage has a most deleterious effect on it, unless the greatest precautions are taken. The plant acclimatises itself, and the Company expects this year* to have fully 1200 maunds of good acclimatised seed. The demand for fibre in Ireland is £4,000,000 annually, and seed to nearly to that amount; and the Punjab flax, already approved at home, will find a ready and remunerative market.

The samples exhibited by the Company were pronounced to be superior to those which gained the medal at the International Exhibition of 1862. The collection consisted of—

1. Newly imported Riga seed.
2. Ditto acclimatised, 2nd year.
3. Ditto ditto, 3rd year.

1. Flax straw, green, this season's growth.
2. Ditto dried, produce of imported seed.
3. Ditto produce of acclimatised seed, 2nd year.

* This was in 1864.

4. Flax straw ditto, of acclimatised seed, 3rd year.
5. Flax steeped.
6. Flax straw steeped and partly cleaned.
7. Flax cleaned, and bundled for export.
8. White flax, worth in England from £80 to £90 a ton.
9. Date flax, worth from £90 to £100.
10. Tow or refuse, worth Rs. 2 to 3 a maund, for making paper or coarse cloth.
11. A piece of linen made at Belfast with Indian flax.

[A hiatus occurs here in the remarks, which I endeavor to supply.]

The fibres in the foregoing notes are derived from plants of *endogenous* structure: the next series are of *exogenous* form.

In *endogenous* plants, the fibres of the leaves are parallel to each other, and hence can be separated for conversion into fibres, as in the leaves of the aloe; but in exogenous plants the venation is reticulated, and when these plants yield fibre, it is from the stems, where the fibres lie parallel, as inside the bark.

In annual stems, there is a central shaft of pith, and round it a layer of wood-like matter, called boon or shove, over this in fibre-yielding plants there is a layer of cellular tissue in the form of elongated cells or fibres, these are called "*bast.*" Outside is the skin or cuticle. In trees the bast is just inside the newest formed bark, such is the case with the bast or fibre of *Grewia, Hibiscus*, mulberry, and the roots of the "palás."

The most important of our fibres are the flax, the san *(Crotolaria juncea)*, and the "sankokra" *(Hibiscus cannabinus)*, and hemp *(Cannabis sativa)*.

The "mádar" fibre is also of great excellency, but is not in use as yet.

All these yield fibre from the stems: two others remain, cotton and the follicles of the "mádar" plant, which yield a floss, not to be confounded with the silky fibre of the stem, which is much superior to it.

An account of the progress of flax cultivation in Sealkot, and the Company's operations, has been given in detail in the preceding pages. A prize was awarded for these flaxes.

The next best fibre to flax was adjudged to be the prepared Himálayan nettle fibre; some samples were very rudely prepared however, and even the best inferior to the Ootacamund fibre, some specimens of which were exhibited for comparison: the Agri-Horticultural Society had offered a prize of Rs. 250 for a nettle fibre; a two seer sample being sent as a *bonâ fide* representative of a quantity of not less than 100 maunds; no competition was made, and the prize was not awarded. All the samples were small. Another fibre, much admired, was that of the "sankokra" *(Hibiscus cannabinus)*, its long glossy fibres make it very suitable for ropes, matting, &c., but its strength was somewhat inferior to "san."

The "san" (*Crotolaria juncea*) was exhibited from almost every district, and but little difference was noticeable. Some Himálayan hemp was sent: the remarkable strength of this fibre is noted by Dr. Royle. Equal weights and lengths of fibres being taken—Petersburgh clean hemp broke with 160 lbs., while Kangra hemp bore 400 lbs. without breaking.

A large number of fibres were exhibited as curiosities—the downy substance from the back of the leaves of *Onoseris lanuginosa*; the fine fibres from the stalk of the lotus and madár" floss. Among these may be also specially mentioned the variety of san, called *Crotalaria burrhea.* Although it grows in many places, it is treated as useless throughout the Western Provinces, Trans and Cis-Indus, from Peshawur to Múltán, and appears only to be used in places where the cultivated *Crotalaria* san is not much grown, as in Shahpúr, Jhung and Dera Ghází Khán. It is generally called *khip*—it gives out a strong smell when bruised—very like that of the common broom of Britain in similar circumstances: when uncropped by animals, it is a crouching half-shrubby plant of four to five feet high,

with pretty yellow flowers, and has no small branches on the upper part of its stem and branches.

The jury are glad to have it in their power to publish an illustration of this interesting plant from a sketch by W. GOLDSTREAM, ESQ., C.S.

Another species of coarse sunn is the "jhijjan."

It may be now useful to collect together in a tabular form the fibre-yielding plants of the Punjab.

The number of fibre-yielding plants found along the base of the western Himálaya is certainly not under forty species.

English or Vernacular name.	Botanical name.	Uses.
"*Khas*," "dab," "niala," "nal," ..	*Andropogon schœnanthus, A. muricatum, Poa cynosuroides, Arundinaria utilis, Arundo carka,*	Used for making ropes, mats, baskets, paper, &c.
Babúr, ..	*Eriophorum cannabinum,* ..	Rope bridges of the Himálayas.
Múnja, ..	*Saccharum munja,* ..	Twine for many purposes, ropes for Persian wheels, a paper material.
Sar or sarkara, ..	*S. spontaneum,* ..	Ditto ditto.
Dib, ..	*Typha elephantina,* ..	Very extensively used for tatties and mats.
Marúl, ..	*Sanseviera zeylanica,* ..	Bowstring hemp. Rare, as are also the two following Liliaceous plants.
Great aloe, ..	*Agave Americana,* ..	
Adam's needle, ..	*Yucca gloriosa,* ..	
Plantain, ..	*Musa paradisiaca,* ..	Not abundant in the Punjab.
Dwarf palm, ..	*Chamærops Ritchiana,* ..	Shoes, ropes, matting.
Date palm, ..	*Phœnix silvestris,* ..	Ropes, matting.
Bichú, Himálayan nettle, ..	*Urtica heterophylla,* ..	
	U. reticulata, ..	
Paya, ..	*Bohmeria nivea,* ..	Grass cloth of China.
Sihárú, ..	*B. salicifolia,* ..	Rope.
	Forskahlia tenacissima, ..	
Bhang, hemp, ..	*Cannabis indica,* ..	Fibre and canvas.
Nettle tree, ..	*Celtis Australis,* ..	Well ropes and snow shoes.
Nigi, ..	*Daphne oleoides,* ..	Ropes and paper stuff.
Ak or madár, ..	*Calotropis gigantea,* ..	Fibre for textile fabrics.
Jeti, ..	*Marsdenia tenacissima,* ..	Used for string and bowstrings.
	Periploca aphylla, ..	Used at the Attock bridge-of-boats.
	Dæmia extensa, ..	
Kip, ..	*Leptadenia Jacquemontii,* ..	Yields the kib fibre of Sind: well ropes are made of it.
Kaffi, ..	*Onoseris lanuginosa,* ..	A coarse cloth is made from the woolly down covering, the under side of the leaves.
Lasúra, ..	*Cordia latifolia,* ..	Ropes.
Dák or chichra, ..	*Butea frondosa,* ..	
	Desmodium, ..	Paper stuff used in Tibet and Rawalpindi.
Málun, ..	*Bauhinia racemosa,* ..	Ropes and matches.
	B. Vahlii, ..	
San, ..	*Crotalaria juncea,* ..	Fibre ropes, gunny bags.
	C. burrhea, ..	
Kikári, ..	*Acacia farnesiana,* ..	Bark has been used as a paper stuff.
Dáman, ..	*Grewia oppositifolia,* ..	Ropes.
Alsi, ..	*Linum usitatissimum,* ..	Flax.
Kapás, ..	*Gossypium indicum,* ..	Country cotton.
	G. barbadense, ..	Introduced cotton from America.
	G. acuminatum, ..	
Sankokra, ..	*Hibiscus cannabinus,* ..	Hemp-like *Hibiscus.*
China Rose, ..	*H. mutabilis,* ..	
Rozelle, ..	*H. sabdariffa,* ..	
Bera patua, ..	*Abroma augusta,* ..	Strong white fibre.

Of cottons there were a large number exhibited. There was native cotton cleaned and uncleaned; some of it rather good, some very bad, being mixed with bits of seed and bits of the pod or calix, which are very difficult to detach.

And next was cotton grown from acclimatized or imported seed. Several districts sent specimens of great excellence; but in the majority of them, the cotton was picked from an experimental plot in a Government Garden, or elsewhere, where it had received the utmost care: there was not a single sample which exhibited the fair results of a cultivation for a large area.

The natives are singularly unwilling to use good seed, even if it is given them: a few people have had the sense to do so, but speaking of things generally, it may be fairly stated that there is no demand for good New Orleans and other seed, and the people do not care to cultivate in the slightest degree: if they do cultivate, they cannot clean it, or make use of the cotton.

The very finest cotton was exhibited from Muzaffargarh, from the Government Garden. A prize was awarded to this.

The cottons of Jálandhar, Shahpúr, Gujrát, Sealkot, Rohtak and Deraját, deserve special mention; Sealkot, Gujrát and Rohtak, appeared to be the places were the fine cotton was produced, more as a real *crop* than a mere experimental plant.

Many of the samples of cotton were so broken in cleaning, that it was difficult to judge of their length of fibre.

CLASS IV. SUB-CLASS (F). WOODS AND TIMBERS.

BEFORE entering on the enumeration and classification of the woods of the Punjab, it is proper to say a few words relative to the source of production of these woods. A collection of specimens may be highly interesting in a botanical point of view, and highly interesting as showing what woods are at hand for the fancy woodworker, the inlayer, and the cabinet-maker. But the main economic value of these timbers (apart from considerations of strength, durability, texture and color) will depend on the quantity in which they can be produced for buildings, for railways, and the many purposes for which timber is indispensible. Nor is the supply of timber for building and furniture-making purposes all that we have to consider. In a country destitute (or for all practical purposes, destitute) of coal, the supply of fuel, both for the manufactories of the province, its railways and steam flotillas, as well as its domestic consumption, is another important item in the consideration of our timber resources.

It will be interesting, therefore, not only to enumerate the woods that are, or may be, grown within the boundaries of the province, but to indicate in a general sketch the places of production, and the extent to which these localities are capable of yielding a supply; at the same time warning the reader that I have neither the space nor the knowledge requisite for a full account. I regret this the less, as there are before the public, reports, the result of personal and local experience and long familiarity with the subject, from which details of every kind may be gathered.*

As we have observed throughout the various classes of products, that the districts of the plains, the *sub*montane districts, and the *intra*montane districts, furnish the most distinctive characters in soil, products, language and dress, so we find it pre-eminently the case of forest produce. Our wood resources may thus be classified as—

1*st.* The intramontane forests, by which are meant those vast expanses of wooded hill-side and valley, to be found in the interior of the Himálaya—some within our own territory, and some beyond them. The most accessible of these are situated (up to a certain distance inland), along the valleys of the great rivers of the Punjab, the Rávi, the Beás, the Sutlej and the Chandra Bhagá or Chenab, and the Jhilam, Indus, and Kunhár of Kághán.

2*nd.* Those submontane forests which clothe the sides of the lowest Hills or inferior Himálayan range fronting the plains, and skirt the bases of them; and

3*rd.* The wood resources of the plains—which consist—

(*a*) Of the ordinary wood growth of the country where there are "topes," clumps, and even groves of trees, but nothing like a regular forest; these are, however, as subject to conservancy rules as the regular forests are, and the resources of the country in this department are capable of extension and preservation by attention to Arboriculture.

(*b*). The jungles, "rakhs," or grazing grounds, or "thal" districts, of greater or less extent in the various districts, and some of them chiefly valuable for the grazing they yield to large herds of cattle, who pay the "tirni" or grazing tax to Government.—Others for

* *See* DR. CLEGHORN'S Forest Report of 1864; The report on the Basahir Deodar Forests, by DRS. BRANDIS and STEWART; and the admirable reports of DR. STEWART on the Rávi and Chenab Forests; and on the Fuel Resources of the Punjab; and the Kalesar and Kachi tracts.

the quantity of root-stocks and stunted growths of "jhand" (*Prosopis*), &c., which afford for a time, at least, supplies of fuel. In this section must also be included the tracts which are now being artificially planted, and the plantations along canals and road sides.

(*c*). And, lastly, the few groves or jungles, consisting generally of aggregations of particular kinds of trees—which exist in some parts of the plains, and stand at present as the remains of forests that were once of vast extent, and if they could only be restored would be of immense value. Such are the "dhák" jungles in Thanesar, which once covered a large area; the "sál" patches in Hushyarpúr, the Kalesar forest of Ambálah, and the "Kachí" forests on the banks of the Indus—and others perhaps might be added.

It will be well to take a brief survey of each of these sources of wood, before noticing the species that are produced by them.

1.—*Intramontane Forests*.—Our knowledge of these is to some extent limited: the vast net-work of mountains forming the Himálayan series, presents a surface so varied and so difficult of access, that it is impossible to lay down on a map *all* the tracts of primeval forest that may exist. Our knowledge is principally derived from the travels of those who, following the valleys of the great rivers, as inlets into the mountain fastnesses, have observed and recorded what they witnessed.

For practical purposes it is to be remembered that forests are only specially noteworthy, when they exist where there is a possibility of floating their timber on the great rivers, or their tributaries, or when very easy carriage to such places of launching is possible; hence forest observations and surveys are usually confined to the river valleys.

To attempt, in a general sketch, any description of these scenes would be impossible. But the reader interested on the subject, will find notices in Hooker's and other Himálayan Journals, in the works of Royle, Cunningham, Gerard, Hutton and Burnes; while specially devoted to the subject are portions of the various Forest Reports, which describe the aspect of the forests in the various valleys of the great rivers and other Himálayan localities. Of the whole gigantic network of mountains forming the Himálayas, a sketch of which has already been given at page 123 of this volume,—the physical features, are of course, extraordinarily varied. In many parts, for miles round, not a tree is to be seen; dreary wastes of snowy glaciers of vast dimensions, rocky peaks and tracts covered with boulders and rocky fragments, are the characteristics; in other parts we have beautifully wooded valleys, the hilly sides of which are clothed with every variety of form and tint of foliage, while in other regions we have dense forests of the stately deodar, or some of the less valuable pines, less valuable as timber, but not the less majestic in the beauty of their growth and situation.

As before remarked, however, it is not sufficient merely to have dense forests growing. In the first place, as carriage by human labor, or by cattle and carts to the plains, is quite out of the question; consequently, those forests only can be utilized (except of course locally), which are so situated, that the trees when felled can be easily placed in the flood of a river, and so be washed down to the plains; consequently, the workable forests are situated either where a "slide," or cleared passage down the steep face of the mountain, conveys the logs, tumbling and rolling, down to the stream below; or else where there is a very easy method of conveying the logs to the water's edge. All other forests, however extensive that are situated in such places as would not admit of the removal of the timber, are practically useless. If we look at any map, such as that which accompanies Dr. Cleghorn's report, we see at once that the available forests are all marked along the hills which overhang the valleys of the various great rivers, this partly depending on the elevational limits of growth of trees.

I am speaking, of course, in this sketch, simply of the forests of the Western Himálaya, which belong to the Punjab territories.

Felling for Government commenced on the Rávi in 1861. Previous to that, and as early as 1839,* attempts were made to contract with the Chamba authorities to deliver cut wood, but these failed. Felling commenced on the Chenáb from 1854; but notwithstanding this commencement, I may observe that the system of *forest conservancy* as at present in force is of very recent establishment. In former years, indeed, the subject of Himálayan forests was not left unnoticed; in 1851, MAJOR LONGDEN was deputed by the MARQUIS OF DALHOUSIE to explore the forests of Bushahir and Chamba, and various other travellers have made observations from time to time. But it was not till 1861, that DR. CLEGHORN was deputed to examine generally the forests of the Western Himálaya, and to institute a system of conservancy. Early in 1864, DR. J. L. STEWART was appointed Conservator of Forests; on each of the rivers having forests, Deputy Conservators were located, who superintended the forests generally, and the cutting and sale of the timber. Under these officers again are Assistant Conservators, who have the necessary staff of officials, workmen, and "tárús," who see to the logs, and launch those that are stranded, and clear obstructions of logs which frequently occur in the narrow and more rocky parts of the river courses through the mountains. The wood floated down is ultimately formed into rafts, according to the nature of the stream, at the first practicable locality: sometimes the streams are so narrow that they can only form small rafts of these logs, called "jhúnda;" but on the great rivers, as soon as the hilly country is passed, and the river widens out, the logs are formed into huge rafts, and are thus floated down to the depôts, at Wazírabad on the Chenáb, and others. The logs are marked by being deeply cut with a hatchet, or else branded, which latter practice is becoming common in Government timber. The Government mark is the "double pentacle," on the Rávi; a double triangle on the Chenáb; J. D. on the Jhilam, &c., &c.; other traders have different marks. A whole series of these will be found delineated at page 129 of CLEGHORN'S report. Some traders fraudulently cut off each others marks and affix their own, so that when the logs reach the plains they may claim them: the forest officers have of course to be on the watch against such practices, as well as to increase the number of logs which reach their destination, by re-launching those that have become stranded, clearing "jams," as when a mass of logs have become entangled across stream, and so forth. Formerly the Government charged fixed rates for deodar and other timber sold at the depôts, subsequently those rates were abolished, and purchasers made their own bargains with the officer in charge. The prevent system pursued, is, that of contract or bargain, but with certain fixed *minimum* rates. These rates have recently been much raised, and very properly so, as the former rates were in some cases actually under cost price, and much below the market value. In the intramontane tracts, the state of growth and preservation is various. There are tracts which, as proved by photographs, the trees are so thick that the most unsparing denudation would be positively beneficial; while there are other tracts which are already bare, and on which the timber has been wasted in a manner that is most reprehensible. A picture of wasteful cutting is thus given in a report on the state of Busáhir, written not many years ago. Conveniently situated, with the Sutlej at hand as a means of transport, it is not surprising that the hill-sides once

* Sec. 60, DR. STEWART'S Rávi Forest Report. Supplement "Punjab Gazette," of Sept. 20th, 1866.

ON THE DOKNAI RIVER—CHAMBA STATE.

richly clothed with gigantic deodars should be coveted as sources of timber, to a province whose daily increasing railway and public works are perpetually raising the demand for timber. Several merchants accordingly went up, and having entered into very loose and easy arrangements with the native authorities, commenced the most wasteful cutting: trees were felled in hundreds and flung down the rocky hill side on the chance of their reaching the river below, and floating away. Much of the timber thus cut was broken and split by the rocks over which it passed in its descent, and finally it was calculated that not more than one-tenth of the timber cut ever reached the river, so that nine-tenths of magnificent deodars, were left to decay on the precipitous hill side, whence no power could recover or utilize them! This is perhaps an extreme case, but others are not wanting. In many other places devastation by fire is almost equal in its effects. In the Kághán glen forest tracts are to be met with, where 50 per cent. of the trees are scorched and burned. Some natives carelessly barked the tree, or cut into it for resin, and the next comer, lighting a fire under it and against the trunk, the tree was soon a ruin. I have seen splendid trees 25 feet or more in girth and 150 feet high, utterly hollowed out at the base by fire. But the consumption of wood, even in a legitimate method has been so great, as to cause anxiety for the future.

"There is no more momentous question in the Punjab," wrote DR. CLEGHORN, the Conservator of Forests in 1863,* "than the careful husbandry of the portions of forests which remain at the disposal of Government. They have all acquired an increased value from the advancing prosperity of the country, and the approach of railways. Heavy drains are being made upon them, and the remaining woods must be preserved and turned to account as much as possible. This can only be effected by the reservation of tracts as Government domains, and the working of mature trees by skilled persons to meet the annual demands."

When a judicious clearing is effected in some parts, it appears actually beneficial, and there are already in the ground the seeds of new forests, which only require space, light and air to induce growth. Even in Bashahir, in the forests described, COLONEL LAWRENCE writes: "Where the old trees stood, the ground when opened out to the sun and the breeze, is soon covered with innumerable seedlings;" but the time that these must take to come to the growth of timber is considerable, a forest hastily destroyed will not restore itself in a day.

It is now time very briefly to describe the characteristics of the forests tracts.

Beginning with the most eastern portion of the Punjab territories, we have the valleys of the Gírí, Tonse, and Pábar rivers, which flow into the Jumna. These valleys adjoin the district Garhwal, in which deodar forests are in abundance: in the valleys themselves, there appear to be detached forests of deodar, and some of "kail" (*P. excelsa*), while lower down, there are forests of "chil" (*P. longifolia*), or "sulli" as it is called in Garhwal.

These rivers are all rapid in their course, and have rocky beds: the angles they flow in are often considerable, and they are generally practicable only for logs of sleeper or other short lengths.

The Tonse river is under the Garhwal and Dehra Dún authorities: the Pábar and the Gírí run through Bashahir and Sirmúr, respectively: there is but little deodar in the upper valleys, and the streams, as before remarked, are rapid, and the volume of water scanty.

The first great river that next claims our attention, progressing westward, is the Sutlej. It is on the forests of this river, especially those of Bashahir, that the fearful waste described in the foregoing paragraphs has occurred: but besides this, the forests have been

* Financial Commissioner's Office, No. 114, 21st Nov., 1863.

considerably denuded in a more lawful manner, at any rate the forests of Suket, Mandi, Komarsen and Bhaji, which overlook the Sutlej, have been of late years cleared away within three miles of the river. The interior hills of Bashahir are still covered with the finest forests of deodars: at Nachar, in this territory, the size of the trees is immense. The photographs of MESSRS. SHEPHERD AND BOURNE has made many readers familiar with some of these trees: one great one, which divides into two trunks afterwards, is 36 feet in circumference.* Many cedars may be seen over 20 feet in girth and from 100 to 150 feet high.

The Sutlej river is very furious and has a rocky bed: but on the whole the difficulties of floating timber are not insuperable: rafts cannot be constructed above Biláspúr. The timber depôt on this river is Rúpar, in the Ludhiana district. Accounts vary much as to the quantity of logs which are safely floated down. DR. CLEGHORN considers that one-third or one-fourth of the logs felled in the basin of the Sutlej become available for public works within 2 or 3 years after they are felled. Besides deodar, these forests contain the *Pinus excelsa* and the *Abies smithiana*, and *Picea webbiana*, the latter are not used. Oaks are also abundant, but oak logs do not readily float, and require to be lashed to other pine logs or supported by bamboos, so do not as yet pay for export by water.

There is a large feeder of the Sutlej, called the Baspa, which, up to a certain point in its course, is practicable for timber, and it seems that there is a prospect of a good supply of deodar from the forests overhanging it.

THE BEAS river rises in a sacred pool, called "Vyás Rikhi" in the Rotang pass, at the head of the Kúlú valley. The scenery of the river valley is very beautiful, and is unlike that of the Chenáb or Sutlej. "The river is fringed with trees, and studded with green islands. There is a good riding path close along the bank which does not exist upon any other river in the Punjab." The deodar forests are, however, smaller in extent than those of Bashahir, and the trees of a less size. Some deodar tracts also extend along the tributaries of the Beás, especially on the Parbati, which is the most considerable stream, being at the point of junction almost as large as the Beás itself. Besides deodar in the Upper Beás valley, "kail" (*P. excelsa*), elm, maple, oak and walnut are abundant. On the Parbati box occurs; also olive and the twisted cypress (*C. torulosa*) are found in small quantity. A large forest of "chíl" is also met with lower down on the Parbati. There are many tributaries down most of which chil, oak, and also hill bamboos are procurable.

The forest revenue in Kangra and Kullú has been as follows:—

Years.	Income.	Cost of establishment.	Years.	Income.	Cost of establishment.
1858-59	4,538 6 9	84 0 0	1861-62	6,152 2 4	2,280 0 0
1859-60	6,026 0 11	84 0 0	1862-63	7,012 1 1	2,580 0 0
1860-61	5,276 6 1	1,128 0 0			

A native of Sultanpúr thus estimated to DR. CLEGHORN the cost of felling and transporting 100 deodar trees from Kúlú to the plains:—

* To any reader who wishes to study the subject of the growth of the deodar, should read the elaborate report by DRS. BRANDIS and STEWART, and CAPT. WOOD, on the Deodar Forests of Bashahir (No. 3 of the Reprints of Government of India Records, in P. W. Department, 1865.) This report also contains an excellent map, showing the forests of Bashahir and Kanawár.

		Rs.
24	Wood-cutters, at 4 annas for 8 days, ...	50
100	Coolies, at 4 annas for 12 days, launching logs, ...	300
20	Tárús* for 5 months, at 5 annas, ...	500
Catching logs, at Nadaon, ...		100
		950
	Sundries and Contingencies, ..	150
		1,100

There are considerable obstacles to the transport of timber on the Beás, from the islands and shallows on which the logs are very apt to strand, but the same injury does not happen to the logs as when they strike against the rocky masses that often obstruct the bed of the Rávi.

The timber depôt of this river is at Hari-ki-ghát, where it joins the Sutlej. The river begins to rise in April and falls towards the end of August; the working season for the forests is somewhat earlier than in the Sutlej.

The Ravi is the smallest and most rapid of the Punjab rivers. It rises in British territory, the talúka of Bara Bungáhal; its course in the hills is for 130 miles, and the average fall for this portion is 115 feet per mile. Near the head there is not much timber, a good deal having been felled in past times, and the rest consists of trees immature or inconveniently situated.

The principal tributaries are the Budhil, the Túná, the Seul and the Siáwa. On the first is situated Barmawar, at which place there are a few fine deodars. Formerly these were preserved as sacred, but now forest operations are allowed, trees being reserved near the temples.

The Seul presents great difficulties, as its feeders on which the forests occur, have all of them narrow and rocky beds: one of these, the Tisa Nullah, runs at the bottom of a narrow gorge or chasm, a section of which will be found at page 111 of Dr. Cleghorn's Report. In 1851, Major Longden reported that 5,000 logs might be exported annually from the forests of this valley, but the forests are scattered and separated from each other by deep ravines. The Seul valley itself is open and highly cultivated. The Siáwa falls into the Rávi above Basauli. Deodar may be brought down from the Jammú territories; the Maharajah cuts the trees himself, each villager being required to fell one to three a man in certain localities, and as a rule only sells to merchants when the logs are in the river.

The reader who wishes to understand the whole subject of our forest arrangements with the Chamba state, and on which our Rávi and Chenáb timber operations are so much dependent, should consult Dr. Cleghorn's Report, at p. 115, *et seq.* The Rávi and Chenáb agencies are now united. The forests on the Rávi are divided into four working districts. The whole number of available trees in the Upper Rávi was estimated at 3,900; and undersized trees, 8,500. Dr. Stewart estimates† the total of first class deodars (over 6 feet in girth) still remaining on workable places, at 5,900; those on difficult ground, at 3,625; and those on such ground that without conversion on the spot removal would be impossible, at 2,900. It is evident that a considerable portion of the latter will never be available.

"The trees yield on an average four logs, each containing 25 cubic feet. The cost of

* Who are provided with mashaks or inflated skins and poles, &c., to look after the logs in the stream, clearing them off when locked together, and setting them afloat when stranded.

† *See* page 423 Supplement to "Punjab Gazette" of 20th Sept., 1866.

cutting and carriage to the river is about one rupee per log. Mr. Smithe calculates that after paying five rupees for seignorage per tree to the Rajah, and allowing for breakage, losses and sundry expenses, deodar logs may be landed at Madhopúr at 4 annas a cubic foot; but to me this seems doubtful. * * * The chief obstacle to such a rate is the heavy loss from the appropriation of timber by native merchants and others, who live by an illicit trade in wood. The Chamba forests require rest, and it would be for the interest of the Rajah to reduce the felling to an annual average of 5,000 trees, including every species of useful timber. * * * The forests, at the present rate of felling, will not yield *mature* trees for more than five years."

The duties of the Agency for the Rávi have been hitherto conducted at Madhopúr, where there are powerful saw-mills.

In 1863 the value of the timber received was Rs. 88,963.

The Chenab is next to the Sutlej, the largest and longest of the rivers. In physical features the valley of this river resembles that of the Sutlej. Both rivers rise in arid regions, and flow between lofty ranges of mountains, generally rocky and precipitous, but often finely wooded.

The river offers remarkable facilities for the transport of timber, and above Aknúr, "tárus" are hardly needed to disengage logs.

The deodar tract in the perganah of Pangi, extends in all about 80 miles (exclusive of the deodar preserving tract below that in Kashmír territory). The deodar grows on both banks of the river, but more abundantly on the left, and the forests are more extensive and uniformly composed of deodar than those on the Rávi. In many places the trees grow close to the water.

The Pangi timber is admitted to be somewhat inferior to the Rávi. Captain (now Lieut.-Col.) Dyas, in testing both timbers in bars of dimensions 18 × 1½ × 1½ inches, found the breaking weight of Chenáb deodar to be 1,348 lbs., that of Rávi 1,821; the weight in lbs. per cubic foot being 28·62 and 35·75, respectively.

The working season in this river begins about the end of April, and ceases by the middle of October, before the snow falls and the passes get closed up. The snow melts in May, and the Rávi acquires its largest volume in July and August.

The work-people are assembled by "mukadams," or mates of gangs, who receive small advances at the beginning of the season, and give security for fulfilling their engagements. All accounts are adjusted at the end of the season before leaving the forest. In 1861, the number of "tárus" employed was 850; in 1863, it was 1,897; these were divided into gangs, and distributed over 80 miles of river on both banks. The "galls" or slides* used on the Chenáb in 1862 were 53 in number. The largest number is of first class galls, where the breakage in launching is not above 5 per cent. On the Rávi the greatest number was of third glass galls, where the breakage was 15 per cent. Longer logs are brought down by this river then any other: the trees are never felled of a less growth than 9 feet.

The Pangi Agency Office for the plains was at Sealkot, but now at Wazírábad.

Besides deodar, other trees occur in this river. Up to Kylang in Lahaul the pencil cedar (*Juniperus excelsa*) is found; also at Darwas, the *Pinus gerardiana*. Besides these, walnut, ash, maple, bird cherry (*Prunus padus*), birch and elm may be mentioned. The forests cannot now supply more than 2,000 first class trees annually, although the cuttings in 1862-63, amounted to 10,000 trees.

* To convey the timber down into the water.

From this agency the number of cubic feet of wood sold to all departments amounted to 5,38,871, and during the first six months of 1863-64, it had reached 3,52,840. The rates of timber were formerly paid, and varied at from 4 cubic feet per rupee in the shortest lengths (12 feet and under) to 1·5 cubic feet per rupee for the longest, 40 to 50 feet; but these rates have recently been doubled. In 1863, there were at the beginning of the year, 19,023 logs at the depôt, 39,598 came in during the year, total 58,621; representing a value of Rs. 2,04,503.

The Jhilam. A large portion of the course of this river is through the foreign territory of Kashmír, flowing out from the valley through the Pir Panjál range, at the Baramúla pass, and first touching British territory at Pattan.

The Kashmír Government monopolizes the timber trade, and the only kind of wood (besides some chíl from the Púnch, a small tributary) sent down is the deodar, which is despatched as soon as the snow melts, and is collected and sold at Jhilam.

It is calculated that the average supply, exclusive of British timber from Kaghán, is about 2,000 logs, and some of the timber is 50 feet in length. The British forests, which can be described in connection with this river, are those of Kaghán, through which the river Nainsúkh or Kunhár passes, and the forests of Házárá, including Murree. The principal deodar tract along the Kaghán valley is on the western or left bank slope from the village Páras up to Narang, the deodars being mingled with the *P. excelsa.** The trees are much smaller than on the great rivers. Dr. Cleghorn considers that the valley can yield as a *maximum* 1,000 trees a year. Of the seignorage, part is taken by the Sayads, or the Swatí proprietors. The Kunhár is a very difficult river for timber passage.

Major Adams, in his report (1860) on the Forests in the Hazára district, describes the transport of timber by the stream: the incidents he relates are not uncommon during the passage of mountain timber.

Speaking of the Kaghán forests, he says: "Except in the three frontier valleys the valuable timber grows in situations where the difficulty of transport renders it useless to any but the people of the country. The slopes of the Kaghán mountains from the village of Páras upwards, are covered with magnificient deodar and biar trees, and the rapid stream of the Kunhár (also called the Nainsúkh) affords, at certain seasons, the means of transporting timber to Jhilam in pieces of moderate length, the experiment has been tried with only partial success by Major Robertson. On that occasion a considerable number of logs were lost. The stream foaming between its rocky sides rushes along at an immense velocity. If a log becomes fixed among the rocks, other logs are quickly driven and piled upon it by the violence of the stream, and thus a barrier is formed which impedes the progress of the whole float, and unless the barrier is formed sufficiently near the bank to allow of men disentangling the mass, nothing but a rise of the river will avail to set the mass in motion again."

The results of Major Robertson's attempts were, that 1,800 logs were put into the river—150 passed Balakót and 900 were landed at Dangalli: the remaining 600 having been appropriated as waif timber by the Maharaja of Kashmir. The snow on the Kaghán heights melts in March, and the river acquires volume in April; the full flood lasts from May till July.

Besides deodar, biár (*P. excelsa*), chíl, ash, olive, hazel, walnut, maple, and hill túm are procurable.

* It is remarkable both on the upper parts of this river and the Kishnganga that the deodar, which begins to be here out of its proper latitude, prefers the sunny side of the glen, unlike its habit on the rivers eastward.

The Hazára forests should more properly come in with the second class of forests sub-montane, or situated in the lower hills; but geographically being connected with Kaghán it seems advisable to place a notice of the produce consecutively with that of Kaghán. These forests have not yet been brought regularly under forest management, as the forests on the great rivers have.*

MAJOR ADAMS, in his last report, wrote as follows:—

"Direct supervision is now exercised only over those tracts which are valuable, because they produce superior timber or offer facilities for its transport to the markets. For the protection of the more inaccessable and less valuable forests, the land-owners and chiefs had been made responsible. During 1859 tax was paid on 1,422 trees, during 1860 on 3,564: one-half the whole amount realized has been paid to the land-owners. In 1860 the trees taxed were as follows:—

"Deodar (*Cedrus deodara*), ...	1,193	Kangar (*Pistacia integerrima*), ..	4
Biár (*Pinus excelsa*), ...	918	Various kinds, ...	1,133
Chír (*Pinus longifolia*), ...	188		
Walnut, ...	21	Total, ...	3,564"
Wild olive,†	107		

The most valuable forests are those on the range extending from Mochpúrah to the Chumla Peak in the ilakas of Tunnah, Nara and Bakot. Next to these comes the forests of the Thandiani, Dunna and Bírangalli ranges, including Maira, Namli and Phulkot. The forest of Tarnawái, though little resorted to, owing to the want of the means of transport, abounds with magnificient "biár" and oak, and could perhaps be opened up at little cost. The forests of Nurhhúr, Khanpúr, Sherawán and Márí produce chiefly "chír," and are of less importance.

There is one advantage, in an economic point of view, connected with the forests of the lower ranges, that should not be passed over. I allude to the increasing value which small growth, branches, and thinnings have, where carriage is easy and the distance short; in the great interior forests, it does not pay to take anything but huge logs,—the massive trunks of the timber felled, the branches lopped off, and all the slender growth, are of necessity abandoned to waste. It is not the case with the lower forests, and such thinnings and branches are sold as fire-wood, and to the charcoal burner, while the leafy boughs of some trees are valuable enough as cattle fodder.

At Murree Sanatarium the forests are all preserved, and the Assistant Commissioner has an establishment to look after them. The rules about cutting will be found in DR. CLEGHORN'S report, at page 200. Around Murree the *Picea Webbiana* and the *Pinus excelsa* are abundant; as also maple, and various other woods of smaller size. The best of these Hazára and Rawalpindi forests are to be put in charge of the Forest Department.

The last of the Punjab rivers to be mentioned is the Indus, and its tributaries, the Swat and Kábul rivers. All the forests on the Upper Indus are beyond our control, and even inspection: a few scattered notices are here and there to be found in works such as BURNES' Kábul, &c.

"The valley was once famous for timber, from the days of ALEXANDER till within twenty-

* They will be, however, immediately. Government has already taken up the felling in the Kaghán glen. A Special Assistant Conservator is on the spot.

† I believe this is "bankau" (not "wild olive," which the words *might* mean, but an oak, the identification has not yet been satisfactorily made).

Abstract Produce of the Hazara Forests.

Years.	NAMES OF TREES.																														Establishment.	Fines.	Receipts.	Expenditure.	Profit.	Number of trees cut.
	Dídr.	Bídr.	Cheel. Trees.	Cheel. Saplings.	Ash.	Toon.	Kangrar.	Walnut.	Drawi.	Dáman.	Barungi.	Mulberry.	Palúdar (*Picea Webbiana.*)	Horse-chestnut.	Phuláh.	Rírj.	Kau, olive.	Lúni.	Kahi.	Kandar.	Birmi.	Amlók.	Bhalkarir.	Bankan.	Kalakát.	Sirín.	Willow.	Palách.							
1865-66, ..	55	1,354	746	113	15	...	3	16	27	..	2	1	225	45	187	70	254	81	208	240	84	6	67	836	1,100	61	284	33			1,392	292	5,074	1,459	3,614	6,107
1864-65, ..	2,411	1,115	716	9	18	3	1	13	5	..	112	4	697	78	8	38	38	17	156	..	561	6	141	862	3,659	33	10	15			1,090	742	8,973	1,118	7,855	10,726
1863-64, ..	127	721	346	..	10	1	..	2	2	..	12	6	50	40	2	5	71	6	33	..	22	15	101	433	38	16	2	5			936	263	3,408	938	2,470	2,061
1862-63, ..	1,758	806	406	16	7	..	3	29	16	4	1	..	13	24	4	1	118	8	28	..	7	7	194	345	10	37	..	..			935	122	5,665	950	4,715	4,107
1861-62 (4 months),	1,024	204	107	24	..	..	2	..	1	..	..	..	2	5	4	2	1	..	250	..	..	..	7	1	..	..	..	..			312	5	1,346	322	1,024	1,634
1861, ..	1,622	848	132	..	3	..	4	..	..	..	3	..	..	36	2	..	190	..	..	..	..	3	2,530								700	185	2,106	743	1,363	5,373
1860, ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			552	343	1,443	550	793	3,564
1859, ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			564	153	1,009	564	445	1,760
1858, ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			837	..	641	975	..	..
Grand Total, ..	6,997	5,048	2,453	162	53	4	13	60	51	4	127	11	987	228	127	116	672	112	675	240	674	37	..	..	..	..	..	..			7,318	..	29,665	7,619	..	..

two years of the present date. Forests of sissoo extended on either side of the river, and on the numerous islands from Torbela to Attock. These were wastefully felled during the Sikh rule, and the remaining trees bordering its banks were swept away in the terrible flood of 1841."*

The difficulties of the timber trade consist in the varied interests and savage habits of the wild tribes which occupy the territories on either side: beyond Amb, for instance, no native of the plains can go: but the Shaikzadas of Ziyarat, from the sanctity with which popular superstition invests them can go up and get wood: they have to pass various independent Pathán Settlements, which lie between Derband and the forests. The timber is floated down to Derband, where it is stopped, and a toll levied of 8 annas a log. Merchants come up here and purchase the wood, which they take on in rafts.

The Swat river has been described from the narrative of a native by CAPTAIN RAVERTY:† The lower hills are covered with grass, but there are no forests, the higher ranges have deodar, the edible pine, olive and plane. "The timber trade," says DR. CLEGHORN, "on this river appears to be nearly monopolized by Papa Mea, head of the Kákhakhel Sayads. His people (also are very sacred) go where they please up the three rivers. He has a large depôt at Hashtnagar, in British territory, near the confluence of the Swat and Kábul rivers."

It appears that the "Akhúnd" has interfered to induce "the faithful" to abstain from the wood trade, because it benefited only the infidels, and led to quarrelling among themselves.

At present wood is felled at *Tal Patrak*, a district of Bajáwar, under Ghazan Khán of Dír.‡

Timber that reaches Peshawur is mostly brought down from the Kábul river, and its affluent the Kuner or Kaure. The lower part of the Kábul valley towards Khaibar is woodless; but above Jalálábád, there are pines and conifers in abundance. There are also "balút" (*Quercus ilex*) and olive available; also *P. gerardiana* and *A. smithiana*. The lawlessness of the inhabitants makes exploration in these tracts next to impossible. Our information is principally derived from the notes of GRIFFITHS, who accompanied the army in 1838-39, from Sindh through Quetta and Kandahár to Ghazni and Kábul.

Large wood is only brought down the rivers by special demand; lengths of 28 and 30 feet have been obtained.

THE SECOND CLASS OF FOREST LANDS are the hill sides of the inferior Himálaya, where access to the plains is comparatively much easier. To this class may be referred the forests skirting the Sirmúr and Simla territory on the lower hills, the forests bordering on the Hushyarpúr districts, such as those of Lohárá, Nairí, &c., in Kangra of Jasrota, and other forests throughout the district, and thence onward along the inferior range of the Himálaya, where there are at intervals forest tracts of greater or less extent and value, which are in the foreign territories of Chamba and Jammú. The forests of this series end, as far as territorial distinctions are concerned, with the forests of Hazára (the north-western angle of the province), a district which is enclosed, or nearly so, by the outer range of hills, is actually full of hills more or less covered with forest.

But although we have this very submontane wooded localities, it is only here and there that they constitute anything like a forest, as before mentioned.

In describing the geography of the Himálaya, the regular succession of Siwáliks,—forest

* For a graphic account of this flood, see Journal Hort. Society, XVII., 230.

† A. Soc. 1862, p. 227. I take the quotation from DR. CLEGHORN'S Report.

‡ This is from DR. BELLEW, quoted by CLEGHORN at p. 212.

tract, tarai, &c., which forms so conspicuous a feature of the Central and Eastern Himálaya, is quite wanting in our Punjab Western Himálaya. The only submontane districts that can be here described as containing forest, are Házárá, which I have already alluded to, Rawalpindi, Kangra, Hushyarpúr, and part of Ambálah at Kalesar.

Following the same plan as when delineating the forests on the great rivers, I begin at the most eastern portion of the Punjab territories. The finest submontane forest tract that demands our attention is the remnant of a once far more extensive tract of "sál" at Kalesar, in the Ambálah district. This tract has been visited by Dr. J. L. Stewart, and minutely reported on by him. As the report (which appeared in the "Punjab Gazette") may not be accessible to all, I will present a brief outline of the leading characteristics.

"The forest is on the extreme north-east corner of the district, in a fork of the Siwáliks, on the right bank of the Jumna, opposite the Khárá head of the Eastern Jumna Canal, and about 3 miles above the head of the Western Jumna Canal at Haturkhúnd. The bay between the northern and southern branches of the Siwáliks in which the forest lies, is bounded on the east by the Jumna. Beyond the northern fork lies the Kyárda Dún, belonging to Náhun (the water-shed of that fork being the boundary), while to the south of the southern branch stretches the open plain of the Ambálah district.

"The extreme length of this bay from the Jumna on the east, to the angle where the two forks unite on the west, is about 13 miles, and its breadth about from one to two miles. The whole area is 14,553 acres, of which at the time of settlement (1855 ?) there were 576 cultivated. The cultivated area had in 1863 decreased to 189 acres, owing to depopulation caused by famine and sickness."

This tract seems to have been leased out for several years to a Eurasian, who cut and cleared off a great deal more wood than was proper. At last, in 1857, the lease was cancelled and cutting green wood prohibited. In the course of 1863, 2,664 acres were demarcated, as belonging to the village Kalesar, and 11,889 acres as forest land, the forest tract is divided into two unequal portions by a dry water-course. To the south of this, the "sál" is scattered in clumps and patches mixed with other trees. On the southern side and up to the southern enclosing ridge, the forest is more compact, and consists of small "sál" trees covering from 4,500 to 5,000 acres. The trees are small, and very few being 3 feet and even 4 feet in girth; the greater number are mere saplings. The estimated number of trees is about 16,50,000 in the compact portion, and 35,00,000 in the scattered tract.

The forest might be cut considerable for ballis or poles for roofing and other purposes: like many tracts of this description the forest is malarious.

The other trees are as follows:—I mention these because it will show what trees are found in this portion of the Punjab as distinct from the west.

Máljan, elephant creeper (*Bauhinia racemosa*).

Chál (*Conocarpus latifolia*): this tree yields a gum.

Sain (*Pentaptera tomentosa*).

Bahera (*Terminalia belerica*), (a few large trees).

Kaim (*Nauclea parviflora*), a few; and only one of *N. cordifolia* (haldu) was seen, though the tree is abundant to the east of the Jumna.

Sandan (*Ougeinia dalbergoides*).

Gausam (*Sleichera trijuga*).

Tendu (*Diospyros tomentosa*).

In the Kangra district the lower hills are well wooded; and both in this district and

Hushyarpúr, there are occasional tracts, or more correctly speaking, clumps, of "sál" (*Shorea robusta*).

With regard to the patches of "sál" in Kangra and Hushyarpúr, writes DR. CLEGHORN,* it may be mentioned as an interesting fact in botanical geography that the tree here attains its western limit, and has not been seen across the Rávi. The clumps of indigenous growth at Andreta in Kangra, and Rajaura in Hushyarpúr, with perhaps others, should be preserved with the greatest care. The known forests of Kangra and Hushyarpúr are principally of "chíl," which is used in quantities for charcoal and also cut for poles. In Kangra, at most accessible places, the "chíl" has been greatly cut away; but besides "chíl" there are a great variety of other trees; some of which may be mentioned in the following list. (Proceedings of Forest Department, February 1867, from Commissioner Jálandhar, No. 173, 25th October, 1864).

The Commissioner writes:—

"I have been engaged for some time past in an attempt to classify the several trees which are to be found in the Kangra district. I have divided them into three classes—A, B, C, and these again into other sub-divisions. Those in class A are considered best for building and have the highest commercial value; in class B are those which are of less value; and in class C, shrubs and trees have been entered which are of little use except for fuel."

CLASS A.†

Akhrot, walnut (*Juglans regia*).—This is not a forest tree, but cultivated by zemindars on their own estates. The trunk of a very old tree is about from 15 to 18 feet; wood hard, light and strong, of a dark brown color, beautifully veined, and receives a high polish; used principally for cabinet-making purposes and for gun-stocks; not subject to worms, nor liable to warp; a good timber tree, and bears a fruit in much esteem.—BALFOUR, *page* 138.

Amb, mango (*Mangifera indica*).—This tree attains its full size in 60 years, when it yields good timber; the length of trunk to the first branch 10 feet, and girth 6 or 7 feet.‡ Its wood is of a whitish color, soft and light, subject to worms, and decays if exposed to water. The tree bears fruit in 8 or 10 years, and the fruit is much prized.—*Mentioned at page* 160 *of* BALFOUR; *and page* 34 *of Roorkee Proceeding Papers on Gwalior Timber.*

Bán, oak (*Quercus incana*).—This tree attains its full size in 100 years, and a very old tree yields a log or trunk to first branch from 16 to 20 feet in length (?), and 6 feet in circumference; wood is of a red color, hard, tough and heavy, coarse grained, liable to warp and to decay if exposed to wet; useful for building purposes; leaves given as fodder to cattle.—BALFOUR, *page* 205; *and* MR. BARNES' *Kangra Settlement Report, para.* 147.

Banní.—Resembles the bán, except that the wood is of a white color, but it is applied to the same purposes as the bán. It is also a smaller tree.

Chamba.—This seems identical with the *Michelia champaca, in* BALFOUR, *page* 186. It is mentioned in *para.* 153 *of* MR. BARNES' *Kangra Settlement Report.* It attains full growth

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* Letter to the Financial Commissioner, November 1863.

† This list has been slightly corrected from the original, according to notes made by DR. STEWART.—B. P.

‡ This would be a very large tree.

in about 40 years (some say 25), when it is useful for timber. Average length of trunk 20 feet, and average circumference 6 feet; grows straight, and has a yellow sweet-scented flower, the seeds of which, being also fragrant and oily, are bruised and rubbed over the body as a perfume. The wood of the tree is fine grained, of a yellow color, hard, of moderate gravity, not subject to worms, nor liable to warp; yields good timber. The flowers are offered at the shrines of the Hindú divinities.

Chál *(Canocarpus latifolia)*.—The same as the "chitta" or white dhaon; wood white, hard, tough, liable to bend; yields small timber fit only for zemindars' houses; held in great request for ploughs, on account of its durability. Leaves used for dyeing leather. The gum from the tree is extensively employed in printing on cloth: the leaves of this tree are long and narrow, and the color of the fruit when ripe is yellowish; the bark is white.

Chíl *(Pinus longifolia)*.—Attains full size in 80 years; grows to a great height; the trunk to the first branch being 20 feet, and girth 8 feet. Its wood is light yellow, easily worked, and light; used for timber for building purposes and for boats. The resin called "ganda baroza" or "khardalla," exudes from this tree, and is used for coating timber to prevent decay from the action of water, and also as a medicine; it also forms a material in the manufacture of glass bangles or rings worn by native women. The heart wood, which is very oily is used for making torches.—Balfour, *page* 189; Mr. Barnes' *Kangra Settlement Report, para.* 143.

Chirndú or darindhú *(Elœodendron dichotomum ?)*.—A small tree; wood white, soft and brittle; used for fuel and the small wood-work in zemindars' houses.

Chilla *(Cascaria tomentosa.)*—A small tree; wood white, soft and brittle; used by zemindars in the small wood-work of their houses. Bears a yellow bitter fruit, the seed of which is used to poison fish.

Dhaoñ *(Grislea tomentosa)*.—There are two species of this tree, the white and the black, distinguished by the color of the bark and fruit and the shape of the leaves. The bark of this tree is black, the color of the fruit when ripe is black, and the leaves are round like those of the "shísham. Its wood is light yellow, hard, smooth and tough; yields good material for ploughs, attains its full size in about 30 years. The length of trunk 4 feet to 7 feet, and girth 3 feet. Is a smaller tree than the white dhaon or "chál."

Devidyár *(Cupressus torulosa)*.—Rare—found in Kúlú and elsewhere. Attains a considerable height. Its wood is white, strong, scented, fine grained, heavy and well adapted for for building purposes. The wood being rubbed on a stone with a little water, forms a paste, which is applied to the temples as a remedy for headache. This tree is mentioned *in para.* 146 *of* Mr. Barnes' *Kangra Settlement Report; and at page* 93 *of* Balfour.

Dódan, rheta *(Sapindus detergens)*.—This is the soap-berry tree; attains a height of 20 feet, with a circumference of 4 feet; wood white, soft, weak and used for no purpose. The rheta or soap nut is in great request, as it is used for washing the head and for cleaning woollen stuffs.—Balfour, *page* 214.

Dúr *(Cedrela serrata ?)*.—Wood light, soft and white; yields all necessary timber for building purposes; but is liable to warp, and decays fast if exposed to water.

Gúñ, horse chestnut *(Pavia indica)*.—Grows to a very great size and strength; wood soft and strong, of a white color, veined, fine grained; polishes well; used for building and cabinet-making purposes.—Balfour, *page* 185.

Harar or har *(Terminalia chebula)*.—Grows to a fair height, the length of trunk being 10 feet, and circumference 6 feet; wood hard, heavy, of a yellowish color; used for agricultural implements, but not for building purposes. Attains full size in 30 years. In

9 or 10 years it bears fruit which sells at a high price, and is much used medicinally as a tonic; it is also used for dyeing.—Balfour, *page* 250; *and* Mr. Barnes' *Kangra Settlement Report, para.* 150.

Jáman (*Sizygium jambolanum*).—This tree attains a good size, the length of trunk to first branch being 10 feet, and the circumference 6 feet. It attains full size in 40 years; wood hard and brittle, heart-wood tough, of a dark red color, liable to warp a little; not subject to worms; used by zemindars for agricultnral implements, and produces good timber. There is another species resembling this tree, called "kathamman," a smaller tree bearing smaller fruit, and shorter leaves.—Balfour, *page* 113; *Roorkee Proceeding Papers on Gwalior Timber, page* 32.

Kail or kalai (*Pinus excelsa*).—*Mentioned at page* 189 *of* Balfour; *and in para.* 146 *of* Mr. Barnes' *Kangra Settlement Report.*

Khair (*Acacia catechu*).—Attains full size in 50 years; length of trunk 8 feet, and circumference 3 feet. A small tree, wood of a deep red color, heavy, close-grained, brittle, strong; polishes well; resists attack of insects; used by zemindars for agricultural implements, for which it is excellently adapted, such as the shafts of the plough, cotton machines, sugar-mills and pestles for husking grain. The wood of full-sized tree yields good but small timber for building purposes. The catechu or kath is extracted from heart-wood of ripe trees.—Mr. Barnes' *Kangra Seltlement Report, para.* 152; Balfour, *page* 34; *and Roorkee Proceeding Papers on Gwalior Timber, page* 18.

Kiláwa (*Wrightea mollissima*).—Grows to the height of 15 feet; wood light yellow, soft and white, not very durable, fine grained; polishes well; used chiefly for combs, and also for agricultural implements.

Khareo (*Quercus semicarpifolia.*)—Wood white, and heavy; subject to insects and liable to warp: used for making charcoal, and by zemindars for ordinary house-building purposes; produces also good and large timber.—Mr. Barnes' *Kangra Settlement Report, para.* 14; *and* Balfour, *page* 204.

Kinnú (*Diospyros tomentosa*).—Attains full size in 60 years. Length of trunk to first branch 8 or 10 feet, and girth 4 feet. A variety of the ebony; wood of young trees white, and of the old black, which is termed "abnús;" sap-wood soft, heart-wood, when it becomes black, is extremely hard; used by zemindars for ploughs, and for the wood-work of their houses. Bears an edible fruit.

Khirk (*Celtis caucasica*).—Grows to a good height; wood white, light, soft and weak; seldom used for any purpose. Insects attack it.

Kikar (*Acacia arabica*).—Attains full size in 20 years. Length of trunk to first branch 10 feet, and girth 6 feet.* A good sized tree; thorny; sap-wood white, heart-wood of a dark color, hard, strong and durable: used for carts and mills. Bark used as a dye by tanners, and spirit distillers use it for increasing the strength of liquor. The leaves are much prized by goats and sheep.—Balfour, *page* 25.

Knor (*Pavia indica*).—See gûû of this list.—Balfour, *page* 185.

Kelú (*Cedrus deodara*).—A tree of fast growth, and a native of Kúlú; but it is also found in the Boonghalla forests. Grows to a great height. Its wood is fragrant, of a reddish yellow color, highly resinous and inflammable; very durable; yields valuable timber; it is also not subject to warp. A thin oil exudes from the roots of the tree which is held in

* Trees of this size are very rare.

much esteem as a cure for sores; it is also rubbed over inflated skins to preserve them. The wood is also used for flambeaux.—*The tree is mentioned at page* 75 *and* 189 *of* BALFOUR; *and in para.* 146 *of* MR. BARNES' *Kangra Settlement Report.*

Kakar, kakar singhí, kakrú (*Pistacia integerrima*).—Found chiefly on zemindars' lands. In some localities this tree attains a great height, and has a good girth. In the Goleir ilaka it yields fine broad planks and beams from 15 to 20 feet long, the price of a full sized tree being Rs. 7 or 8. Its wood is light-red, somewhat resembling the toon, hard fine grained, veined; polishes well; is well adapted for cabinet-making purposes. The gall is used medicinally.—*Mentioned in* MR. BARNES' *Kangra Settlement Report, para.* 153—*vide* Rhus, *page* 208, BALFOUR.

Karál or kachnár (*Bauhinia variegeta*).—Grows to a good size, the trunk to the first branch being 10 or 12 feet, and girth 6 feet. Its wood is light-red, soft, subject to rapid decay and to worms; used by zemindars in the wood-work of their houses. The flowers are used as an article of food, and the leaves as fodder for cattle.

Kathamman.—A smaller species of the "jáman," from which it differs in the size and shape of its leaves and fruit. A decoction of the bark is used as gargle for sore mouths.

Karham or kadham (*Nauclea parvifolia*).—A tree of good size. Its wood is light, white and soft, not strong, and subject to worms; used by zemindars for the wood-work of their houses and for agricultural implements; leaves useful as fodder for cattle.—BALFOUR, *page* 178; *and Roorkee Proceeding Papers on Gwalior Timber, page* 30.

Lasúra (*Cordia latifolia* ?).—A tree of moderate size, the length of trunk to first branch being 10 feet, and girth 3 or 4 feet. Its wood is white and soft; is of little use except for fuel. Leaves used as fodder for cattle, and as plates or trenchers. Fruit edible and in great request. Only planted.—BALFOUR, *page* 87.

Mowa (*Bassia latifolia*).—Attains full size in 80 years. Grows to a good height, the trunk of old tree being 10 feet, and girth 6 feet. Its wood is of a cinnamon color, hard, close grained, heavy and durable; produces good timber for building purposes. An oil is expressed from the seed, which is used for lamps and in food, and also for adulterating ghí. A spirituous liquor is distilled from its flowers. Not common and only planted.—BALFOUR, *page* 45; MR. BARNES' *Kangra Settlement Report, para.* 149; *Roorkee Proceeding Papers on Gwalior Timber, page* 19.

Mandar (*Acer cultratum* and *A. sterculiaceum*).—Attains a good size. Wood white, elastic, heavy, close grained; used for ploughs, cot frames and jhampan poles.—BALFOUR, *page* 27.

Putájan (*Putranjiva Roxburghii*).—A tree of moderate size, the length of trunk to first branch 12 feet, and girth 5 feet. Wood white, hard, not very heavy, strong and durable, close grained, used for zemindars' houses and agricultural implements. Leaves used as fodder, and the fruit used by Brahmins as necklaces.

Phulahí (*Acacia modesta*).—A thorny tree, which does not grow to a very great height. Wood of the young tree white, of the old dark colored, especially the heart-wood, tough and durable; used for cart wheels and sugar mills. The branches of the tree are used for fences. Length of tree to first branch 5 feet, and girth 3 or 4 feet.

Púná (*Ehretia seorrata*).—A small tree. Its wood is white, hard, heavy, strong, durable; used by zemindars for their houses and implements. Leaves given as fodder to cattle. Wood not much valued.

Padam or pajjá; cherry (*Prunus padus* or *Cerasus puddum*).—Grows to no very great height; wood reddish, soft, light, subject to worms, splits if exposed to the sun, coarse

grained; used by zemindars for ordinary house-building and for agricultural implements; bears a bitter fruit.

Raban (———— *?*).—A tree of moderate size; wood white, soft, light; used by zemindars for their houses and implements. Bark used medicinally; leaves used for fodder.

Rakál (*Taxus baccata*).—Few found in Kúlú.

Sál or saral (*Shorea robusta*).—Found in the Indretta and Jaswán forests. A tree of fast growth, attaining its full size in 12 years, when it becomes useful. Grows straight, and to a fair height, length of trunk to first branch being 15 to 18 feet, and girth about 3½ feet. Its wood is light-brown, hard and brittle, of good grain and durable; used in house-building.—*Mentioned at page* 218 *of* Balfour; *and para.* 151 *of* Mr. Barnes' *Kangra Settlement Report; page* 22 *of Roorkee Proceeding Papers on Gwalior Timber.*

Siríñ or sarés (*Acacia speciosa*).—Attains full size in 50 years; grows to a great height; length of trunk to first branch 12 feet, and girth 6 feet. Sap-wood white, and heart-wood of old trees of a dark color, heavy and strong; used as building timber, and by zemindars for mills and boats. It is considered unlucky to employ this wood in house-building.—Mr. Barnes' *Kangra Settlement Report, para.* 152; Balfour, *page* 26; *Roorkee Proceeding Papers on Gwalior Timber, page* 27.

Shísham or tálí (*Dalbergia sissoo*).—Attains full size and becomes useful in 50 years. Trunk of the tree to the first branch 10 feet in length (some say 20 feet), and circumference 4, 5 or 6 feet; wood in old tree dark bay, veined, hard and of great durability; well adapted for all articles of furniture, and also as timber for building purposes.—*Mentioned at page* 96 *of* Balfour; *para.* 151 *of* Mr. Barnes' *Kangra Settlement Report; and page* 30 *of Roorkee Proceeding Papers on Gwalior Timber.*

Shamshád (*Buxus sempervirens*).—A lofty tree; wood white, hard, coarse grained, sound; used by the poor in their houses, and of great commercial value. Never grows very large —not common.—Balfour, *page* 62.

Summa (*Glochidion sp.*—— *?*).—An insignificant tree; wood worthless except for fuel. Bark used by tanners.

Sannan (*Ougeinia dalbergoides*).—The trunk of this tree to the first branch is 6 feet, and girth 2½ feet; wood in ripe trees of a dark bay, like the sissoo, hard veined, polishes well; used chiefly for cot posts and legs, also for combs, and in all small work; not liable to warp, nor subject to worms. Found in forests of slow growth; attains full size and becomes useful in 30 years.

Tún (*Cedrela toona.*)—A fast growing tree (planted on zemindars' estates) attaining size in 20 years (some say 30 years), when it becomes useful.* Length of trunk to first branch 10 feet (some say 20 feet), and girth 6 feet. Its wood is dense, red, hard, close grained, capable of high polish; not subject to worms, nor liable to warp; durable; used chiefly for cabinet-making purposes and for door leaves and frames. The flowers are used by zemindars and dyers for dyeing the light yellow color, called "basantí." In Jaswán the old trees are known to have fetched from Rs. 25 to Rs. 100 a tree.—*Mentioned at page* 74 *of* Balfour; *para.* 151 *of* Mr. Barnes' *Kangra Settlement Report; and page* 36 *of Roorkee Proceeding Papers on Gwalior Timber.*

Tút or krún, mulberry (*Morus serrata*).—A tree of fast growth, attaining its full size in 20 years, when it becomes useful. Length of trunk to first branch 8 feet (some say 15 feet), and girth 5 feet. There are several species of this tree, of which that called the "krún,"

* May reach 4 feet girth in 20 years.

growing in the hills, is the best. The quality of this timber depends a great deal upon the locality in which it is grown; the timber of trees in the higher altitudes is good, that in the valleys is not valuable. The wood is yellow, tough, but liable to bend, and readily attacked by worms. It is used by zemindars for ordinary house-building, and for ploughs; it is also used for legs and posts of cots, troughs and toys. It bears a sweet edible fruit. The tree is not found in forests, but here and there on zemindars' estates.

Arjan (*Terminalia glabra* or *T. arjuna*).—It reaches a very large size; the length of trunk to first branch 20 feet, and girth 8 feet. Attains full size in 50 years. Sap-wood white, heart-wood dark colored, heavy, strong, splits on exposure to the sun, and liable to attack of white ants. A valuable timber tree. The bark is used as a cure for wounds and sores.

Class B.

Amal, or aoñla, or ámla (*Phylanthus emblica.* The *Emblic myrobolan*).—Bears an astringent fruit, which is made into pickles and preserves; the wood is brittle, and is only used in door frames and for small "kurrees." The fruit forms one of the ingredients for making ink.—*Roorkee Proceeding Papers on Gwalior Timber, page* 32; Balfour, *page* 187.

Ber, jujube tree (*Zyphus, jujuba*).—Attains full size in 40 years; length of trunk to first branch 10 feet, and girth 4 or 5 feet. Bears a sweet and palatable fruit; wood pretty hard, red, strong and durable; used for agricultural implements, and is a good building timber.—*Roorkee Proceeding Papers on Gwalior Timber, page* 25; *and* Balfour, *page* 271.

Baherá (*Terminalia belerica*).—Grows to a great size, the length of trunk to first branch being 20 feet, and girth 6 feet; attains full size in 60 years. Has a spreading head. Its wood is light yellow, coarse grained, readily attacked by worms and white ants. Although useful as building timber, the people consider it unlucky to employ it. Fruit astringent, used medicinally, and for dyeing leather, and forms one of the ingredients for making ink. This tree is extensively cultivated for the sake of its dense foliage, as the leaves are considered the best and most nutritious of all fodder for cattle, particularly for milk cows.

Bil (*Ægle marmelos*).—Bears a fruit possessing medicinal virtue; wood white and strong, seldom used, the tree being held in veneration by Hindús, who place the leaves on the shrine of Siwa and other divinities. The pulp surrounding the seeds is used in lime cement. The tree is thorny.—Balfour, *pages* 28 *and* 89.

Bhúj (*Betula bhojpatra*).—A small tree; wood unsound and worthless except for fuel. The bark is used for chattas (rude umbrellas), and for covering tubes of húkas (native smoking pipes), and being of a sacred character, it is burnt on the funeral pile. Hindoo pilgrims visiting the shrine of Amrnath in Kashmír divest themselves of their ordinary clothes before entering the shrine, covering their bodies with the bhojpatra.—Balfour, *page* 49.

Bráh, brás (*Rhodedendron arboreum*).—Bears a bright red flower; wood soft, used for charcoal and in zemindars' buildings.

Bar or banyan tree (*Ficus indica*).—A great tree, whose branches spread out far and wide, dropping roots, which, striking into the earth, eventually become trees as large as the mother tree. The wood is chiefly used in oil presses. Bears a fig not edible.—Mr. Barnes' *Kangra Settlement Report, para.* 157; Balfour, *page* 117.

Barthua (*Hymenodictyon excelsum ?*).—A small tree. Wood white, soft and light, used by the zemindars for the small wood-work of their houses, and for yokes of ploughs, and also for scabbards of weapons; leaves used as fodder.

Dhâman or biyúl (*Grewia oppositifolia*).—Attains full size in 15 years; of a moderate size. Length of trunk to first branch being 6 feet, and girth 2 feet; wood straw-colored, soft, elastic, durable. Well adapted for handles of axes, and all other tools, for cot-frames and "bainghís" (poles used by kahárs for slinging weights to be carried). The fibre forms a rope (not strong or durable) for fastening cattle, and for other common purposes.—BALFOUR, *page* 126; MR. BARNES' *Settlement Report, para.* 15; *Roorkee Proceeding Papers on Gwalior Timber, page* 20.

Drek or bakain (*Melia azadirach*).—A tree of ordinary size. Its wood is reddish, soft, brittle and weak, used in the dwellings of the poor.—BALFOUR, *page* 164.

Japhlota or ratanjot (*Jatropha curcas*).—Wood useless. The seed is a strong purgative. The tree is not commonly cultivated, as cattle die from eating the fruit, known as jamálgota in Hindústán. However, the jamalgota usually sold is *Croton tiglium*, not this.—MR. BARNES' *Kangra Settlement Report, para.* 154.

Kainth (*Pyrus variolosa*).—A wild fruit tree, known as the wild medlar; wood hard, used for agricultural implements.—MR. BARNES' *Kangra Settlement Report, para.* 158.

Kaimal (*Rottlera tinctoria*).—A tree of moderate size. Length of the trunk to first branch 5 feet, and girth 1 foot; wood of an earthy color, and of inferior quality; used by zemindars. The flowers yield a powder of a dirty red color, which is used as a medicine, known as "kamela," for expelling worms. In Shakespear's Oordoo Dictionary, this is spelt kamúd, and is described as "the name of dyeing drug, being the dust from the outside of the capsules of the *Rottlera tinctoria:* said to be also a purgative medicine and aphrodisiac."

Kemal (*Odina wodier*).—Grows to the height of 15 feet and more, with a good girth; wood of old tree is red, the outer wood is alone subject to worms; used for door frames and putaos.

Keor (*Holarrhena antidysenterica*).—Mentioned by MR. BARNES in para. 154 of his *Kangra Settlement Report*, and at page 130 of BALFOUR. A shrub; wood white, light, unsound. Bears a white flower, the seeds of which, called "indarjau," are used medicinally.

Khajúr (*Phœnix sylvestris*).—Grows straight and very tall, length of trunk being 50 feet, and girth 2 feet; attains full size in 40 years. Its wood is used for water conduits, and by zemindars for temporary bridges; leaves extensively employed for matting for floors. Its fruit, the date, is in much esteem.—BALFOUR, *page* 187.

Kángú (*Flacourtia sapida*).—A soft wood tree, used for ploughs, and produces small timber for zemindars' houses. Native combs are also made from this wood.

Kúrmrú (*Albizzia odoratissima*).—Grows to about 20 feet, and of good girth. A fair timber tree; wood rather soft.

Oí or Wilayiti sirris (*Acacia stipulata, A. Kangraensis of* JAMESON).—Grows to the height of about 25 feet. Wood of the old tree brownish, soft, brittle, light. Not ordinarily used as a timber for large buildings, but employed by zemindars in their buildings.

Paláh, or palás or dhák (*Butea frondosa*).—Grows large but generally gnarled; length of trunk to first branch 10 or 12 feet, and girth 4 feet. Attains full size in 40 years. Its wood is white, very fibrous, strong and durable; used chiefly as fuel, for which it is eminently adapted, and owing to its power of resisting the action of water, it is used as "nímchaks" or curbs which support the masonry of wells. The red gum which exudes from the bark, and called "kamar kas," is an article of commerce, being valuable as a native medicine. The flowers, called "kesú," give a yellow dye, known as "basantí." The leaves are used as trenchers. BALFOUR, *page* 61; *and Roorkee Proceeding Papers on Gwalior Timber, page* 37.

Pípal (*Ficus religiosa*).—Attains a great size, length of trunk to the first branch being

10 feet, and circumference 10 feet. Its wood is red, readily attacked by white ants, and fit for nothing but fuel. The tree affords great shade, and is held in veneration by Hindús. —Mr. Barnes' *Kangra Settlement, para.* 157; *Roorkee Proceeding Papers on Gwalior Timber, page* 34.

Réh (*Abies smithiana*).—Grows like the "kelú," which it resembles in appearance, except that its leaves grow droopingly. Wood white, soft, light, unsound. Not valuable as building timber, but in Bungahal, the people use the wood as shingles to cover their houses.—Mr. Barnes' *Kangra Settlement Report, para.* 145; *and* Balfour, *page* 189.

Rauńs (*Cotoneaster sp. var*).—A small tree; the wood used for walking sticks.

Sarú (sarv), (*Cupressus sempervirens*).—An ornamental tree in gardens.—Balfour *page* 92.

Sembal, cotton tree (*Bombax heptaphyllum*).—Grows very tall and straight. Length of trunk to first branch 80 feet, and girth 12 feet. Attains its full size in 60 years. Wood white, light, but not strong, and brittle, used for boxes and doors, and water conduits; white ants readily attack the wood. The cotton is used for stuffing pillows, but is in no request, and seldom gathered in these hills. Leaves used as fodder. The roots of young trees produce the "safed músli," which is used to make a cooling beverage. Scabbards are made of this wood.—Balfour, *page* 53; Mr. Barnes' *Kangra Settlement Report, para.* 157; *Roorkee Proceeding Papers on Gwalior Timber, page* 35.

Tos (*Picea Webbiana*).—Grows like the "reh," and its uses are the same.—Balfour, *page* 189; Mr. Barnes' *Kangra Settlement Report, para.* 145.

Amáltás, or kanyár or kyár (*Cassia fistula*).—Wood useless. Bark used by tanners in dyeing leather. Fruit used medicinally.

Class C.

Aíhlan or elan (*Andromeda ovalifolia*).—Useless except for firewood; goats and sheep die from eating its leaves.

Badarín? (*Ficus glomerata?* P.B.)—Bears a fruit which is brought to no use. The tree resembles the "pípal;" and its wood, which is soft, is not used for either agricultural or building purposes.

Beter, bethar or pethri (*Juniperus squamata, J. communis.*)—A fuel wood. Found at very high altitudes where forests disappear.

Dagúran?—A shrub. The wood is used as fuel, and the leaves are given to buffaloes as fodder.

Dháoń chota (*Grislea tomentosa*).—An underwood, which grows 4 or 5 feet high, used for fuel and by abkárs, or liquor distillers, for fermenting liquor.

Gándla (*Bergera Kœnigii*).—A shrub. Wood used as useful, and the leaves to foment bruises or hurts.

Garnah (*Carissa diffusa*).—A thorny shrub, bearing a small black edible fruit; native combs are made from the wood, which is also used in fences. The wood of a very old tree turns quite black, and acquires a strong fragrance, and is considered as a valuable medicine, and sold at a high price, under the name of "agar;" goats and sheep eat the leaves.

Hísú, girna or hírú (*Capparis sp*————).—A shrub, with thorns in the shape of fish hooks; and smaller and fewer than those in "garna," which it much resembles. Roots used for sores; goats and sheep eat the leaves.

Jarerí (*Zizyphus nummularia?*)—A throny shrub, used for fences.

Kasmal (*Berberis sp. var*).—The barberry tree. Wood yellow and useless except for fences. "Rasaut," which is used among natives for sore-eyes, is extracted from the roots. —BARNES' *Kangra Settlement Report, para.* 158.

Kainthí (*Indigofera arborea, &c.*).—A shrub, with useless wood fit only for fuel. The blossoms are used in food by the natives.

Umbára (*Spondias mangifera*).—Grows to the height of 10 or 15 feet, of pretty good girth. Wood very soft and brittle; not used as timber; produces sour fruit used in pickles; leaves sour, used as "chutnee" or acid sauce.

Pansra (*Colebrokia oppositifolia*).—A shrub; wood used as fuel, and the leaves as fodder for cattle.

Paliyára (*Erythrina stricta*).—Wood used for fuel and for scabbards of weapons. Bears a bright red flower.

Phagúra (*Ficus caricoides*).—Produces a kind of edible fig. Wood used for fuel and agricultural purposes.

Rúmbal, gúlar (*Ficus glomerata*).—Grows as high as, and resembles, the "peepul;" wood useless except for fuel. Bears a large but useless insipid fruit.

Angúr, or wild grape, called maljar (*Vitis racemosa*).—Used by zemindars as "bunds" or ties for their fences.

Besides these, in an earlier list in the Financial Commissioner's Office, are given

Dahèo (*Artocarpus integrifolia*).
Vúná (*Viburnum fœteus*).
Batkar (*Celtis caucasica*).
Barna (*Cratæra religiosa*).
Kumbí (*Careya arborea*).
Rárá (*Randia dumetorum*).
Karak (*Celtis tetrandra*).
Girthan (*Fluggea leucopyrus*).

The Hushyarpúr forests are still utilized; also the Mahan and Santha forests of Kangra. In Hushyarpúr the principal tracts are the Lohára and Panjál: the trees are principally cut for "balis" (bullies or poles) which are sold at 2 to 3 Rs. per hundred, according to the thickness of the wood, which varies from 6 to 10 inches, and the length varies from 10 to 18 feet. A great number are taken down to the plains to Amritsar: they cost after paying all expenses, about Rs. 40 per hundred. The best months for cutting are September to January: if cut between February and August decay is rapid.

Larger trees are paid for at Rs. 5 per tree, and floated down the Beás from Dehrá. The Hushyarpúr revenue (gross) in 1862-63 amounted to Rs. 8,452-2-6, Rs. 2,242-7-4 being derived from "chil," and 6,209-11-2 from bamboo.

In the Siwálik ranges of the Hushyarpúr district, there are, in Punjab territory, two bamboo jungles, at Bindraban and Karampúr. These are preserved, and are only allowed to be cut by traders furnished with regular passes, to be obtained at the tahsil. The price of the best bamboos is 3 Rs. per hundred, and the charge for cutting 8 annas.*

The only other district which I can here mention having a submontane growth of woods, in which forest operations and conservancy are carried on, is Rawalpindi.

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* DR. CLEGHORN'S Report, p. 77. A number of the best forests in Hushyarpúr and Kangra, are now in charge of the F. D.

"There are considerable tracts of waste," says DR. CLEGHORN, "land partly hill and partly ravine, not producing lofty trees, but yielding a large amount of fuel, on which sissoo might be raised, and existing species be reproduced." The principal trees are "chír" (*P. longifolia*), *Quercus incana*, mulberry, tún, and its congener "drawa" (*Cedrela serrata*), sissoo, olive, phulábi (*Acacia modesta* and *Vitex*).

No one is allowed to cut but by express permission, an official being sent with the applicant to mark the very trees required. Fir trees are charged at Rs. 3 and 4. Valuable wood, as "kangar" (*Pistacia interigerrima*) and "tún," at Rs. 5 to 10 even. The principal of the forest tracts are on low hilly ranges, such as that running from Shaldetta to the Jhilam river, Kharí Múrth mountain, and the range beyond Fatih Jang and Malikpúr, &c. The total area of the lands is given at 71,009 acres. In the Rakh Topi, which is close to Rawalpindi, much has been done by opening up pathways, sowing seed broadcast, &c., to improve and conserve the forest. A list of the rates of seignorage is given at p. 205 of DR. CLEGHORN'S Report.

I now come to the last of our divisions, viz., the forests actually in the plains, and the attempts that has been from time to time made at Arboriculture generally.

There is scarcely a tract of country which deserves the name of a forest, but extensive waste land or "rakhs" often contain stunted growths of various kinds of trees, valuable as fuel; in others stumps and roots of the "jhand" (*P. spicigera*), and other shrubs are dug out in immense quantities, and serve for railway fuel.

One tract, however, which may be called a forest, deserves mention separately, and that is the Kachhi tract, on the banks of the Indus, in the Leia perganah. This tract has been described by MR. COWAN, being subsequently visited by DR. CLEGHORN, and has been fully reported by DR. J. L. STEWART.

"The Kachhi is the low land on the left bank of the Indus, commencing at Marí, opposite to Kálábágh, and extending in one form or other, I apprehend, to the sea. In the lower portions, as you are doubtless aware, bábúl, in some parts predominates. Tamarisk more or less exists everywhere; and jhand, karíl, with other shrubs or trees adapted for fire-wood, are largely scattered over the entire area of most portions, in greater or less density. In the upper portion, however, appertaining to the Míyánwallí tahsil, the shísham (*Dalbergia sissoo*) greatly predominates, and appears to spring up spontaneously wherever the soil deposited by the river is left undisturbed, for a distance of at least 30 to 40 miles below Kálábágh.

"I cannot explain, with any confidence the reasons of this difference, but presume that it is owing, partly to the deposit of the river at that part immediately on its immerging from the hills being more richly charged with a tenacious soil suitable for the growth of sissoo, than in the lower portions of its course, and partly to its meeting in the hills with sissoo forests, from whence it brings down the seeds, depositing them as soon as it enters the plains.

"I have recently myself traversed a portion of this Kachhi. I was not able to visit the forest properly so called, but I met with numerous self-sown sissoo trees in the area of almost every village.

"They are for the most part scattered about as single trees, or in groups of two or three amongst the fields, or rather between them—the people are not allowed to cut them without special permission, and some of them are very fine growth and considerable girth.

"The forest which commences south at the village of Bakkra, and extends along the low alluvial land to a distance of 14 or 15 miles (its extreme northern limit being the village

of Fatihkhánwala) seems to have been of spontaneous growth. During the Sikh rule few people inhabited that part of the country, and those few were not possessed of large herds of cattle; consequently, as the Kachhi land became more thickly populated, flocks and herds increased to the detriment of the young trees, while the old trees were annually destroyed by the inundations, which for the last five years have been so excessive that numbers of trees are torn up by the roots, some of them being swept away with the current, and the rest are collected in the succeeding cold season and sold by auction.

"Some of the finest trees in the forest were felled when the Leia station was built, and a quantity of timber from the Kachhi forest was sent for the construction of the Attock bridge-of-boats; moreover, at one time the Leia authorities fixed the price of a shísham tree at 5 Rs. without restriction, and as may be imagined, the forest was considerably thinned thereby."

Dr. Stewart remarks* that there is no tradition on the spot and no reason to believe that the Leia forest (here always called Tálí) ever covered a larger space than it does now; though, no doubt, it was more compact. The floods of 1856 did great damage, and the unvarying price of Rs. 5 per tree led to all the finest being picked out.

"Kachhi" is a generic term for wet, or low alluvial land and islands lying along the course of the Indus. "Almost the whole of the forest worthy of being taken into account is situated on part of the series of low islands, among which meander the numerous and variable channels into which the Indus is divided for many miles below Márí and Kálábágh." At a mile and a half from Kálábágh there is on an island a considerable forest of young trees, which will become valuable. Patches of single trees of sissoo are seen all along. The true forest begins at Madatkhánwalla, it then extends with more or less compactness to Bakkra, 20 miles below. Míyáńwallí is nearly opposite the centre of the forest. The breadth over which the trees extends is seldom over 4 miles, and is frequently less; indeed, in many places, either there never was any forest, or it has been entirely cleared away.

Besides, over this tract of 80 square miles, there are a considerable number of trees on the main land at Rokia, 7 miles above Míyáńwallí. In 1865 a return of trees gave 32,895 full grown, and 4,551 smaller ones.

In the plains the "rakhs" next deserve attention. In some parts of Thanesar and adjacent districts, there are jungles, consisting principally of "dhak" (*Butea frondosa*); the trees are not good, but scraggy and stunted: the leaves are used by native shop-keepers and grocers to wrap up things in, and maunds of the leaves are brought in from the jungles for this purpose; a revenue is also derived from the flowers, which are gathered under the name of *gulkesú*, and form an orange dye: the sight of one of these jungles in April, all covered with these flame-colored blossoms is very imposing. The "dhak" yields a gum of great astringency, called "kamarkas."

In the first Report of the Punjab Administration, there is a description of "rakhs," which is so graphic, that I shall need no apology for extracting it in this place.

After describing the fertile soil and rich cultivation that marks the course of the Punjab rivers, and extends inwards towards the centre of each Doab, the writer goes on to say—

"Far different is the sad and strange scene which meets the eye in the centre of all the doabs.

* Report on the Kachhi Forest, page 2, sec. 6.

"There are interminable waste overgrown with grass and bushes, scantily threaded by sheep walks and footprints of cattle. The chief tenants of these parts are nomad pastoral tribes, who, knowing neither law nor property, collect herds of cattle, stolen from the agricultural districts. Here and there a hamlet stands alone in the wilderness, tenanted by a semi-barbarous population, the very aborigines of the land: around the homesteads there will be patches of good cultivation, and the soil is rich and repays irrigation, although the water be deep below the surface. But there are constantly recurring tokens to show that once this region was not inferior to the most favorable districts. Everywhere are seen ruined cities, villages, temples, tanks, wells and water-courses. Such are the changes which have passed over this country! But it would be an error to suppose that this region is merely an object of scientific or historical interest: it possesses a practical and appreciable importance. It is the only source from which the capital, the chief towns and cities, the great British cantonments, can be supplied with fire-wood. It yields an abundant supply of grass for all equestrian establishments. It sustains, with its inexhaustible pasturage, a noble breed* of cattle, buffaloes, sheep and goats. Its boundless grazing grounds supports the race of camels that mainly carry on the Kábul traffic. Portions of it will become the scene of gigantic undertakings, which will tax the skill and resources of the State; but which will ultimately yield an ample return for the outlay of the capital. Indeed the Punjab could ill spare its wastes, they are almost as important as the cultivated tracts."

Tracts of "rakh," or waste land, are to be met with, in portions of many districts, I have no return at hand of the "rakhs" of the whole province, but in the Lahore district there are no less than 86 such tracts, consisting of plots of uncultivated ground; the total area is 2,50,000 acres, but not all of this yields wood—a great deal is grazing ground, much of which is quite capable of being brought under cultivation. In Gujranwalla there are 62 rakhs, while in other districts there are none.† The income of "rakhs" for Lahore in 1860 was Rs. 30,058-1-5, and that of Gujranwalla Rs. 6,449-9-4, making a total of Rs. 36,507-10-9 for the Lahore division, after deducting expenses of establishment, &c., &c.; the net profit was Rs. 31,472-2-8. This will serve as a specimen for several divisions similarly situated, but the Gugaira and Jhung districts, bring in much larger incomes. In the Múltán division, but *excluding* the Jhung district, the total area of waste land amounts to 41,71,832 acres, of which the reserved tracts amount to 1,95,000 acres. These, however, are principally valuable as grazing grounds, and bring in a return as "tirni," grazing tax—these are foreign to our subject.

The great value of the wood-bearing rakhs consists in their being the source from which all the fuel for Railway consumption is to be taken. Not only is the upper growth of wood valuable in this way, but the roots that remain in the soil after the stunted growth has disappeared from the surface are equally capable of being utilized. Grubbing up the roots is however usually prohibited, as a fresh growth may be afterwards produced: it is only in clearly tracts for cultivation that the root stocks are removed. The best of these rakhs are now being reserved and demarcated for Government, and placed under the charge of proper officials. In some places plantations of kikar, shísham, &c., have been started, and a large proportion of them are now doing well. "If," writes Dr. Cleghorn, "the 'rakhs' in the Lahore, Amritsar, and other districts, be capable of irrigation, they should not in

* The bovine cattle form an exception. Though superior to the ordinary cattle of the Punjab, they are quite inferior to the Hindústání breed of Hansi and Hissar.

† Such as Sealkot and Gurdaspúr.

on this account be given up to cultivation, but suitable area of compact shape, and having (if possible) good soil, should be appropriated for the growth of timber trees. Sissoo, babul, seriss and jhand, grow well in the Punjab on lands liable to be submerged, or with a little irrigation, and other useful woods will doubtless be found to succeed.*

The Gugaira district contains more than 1,80,000 acres of jungle: DR. STEWART† thinks this under estimated.

The Gugaira district is nearly all of "bár" land, and is separated into various tracts having distinctive names; the central and highly elevated part is called "ganji bár" (lit. "bald"); it produces saline plants, which pasture camels, and some *Salvadora*: the strips lying on either side of the "bár" constitute the fuel-producing portion, the area of these extends to 250,000 acres, and is often covered with tamarisk, yielding 100 to 150 maunds of wood per acre; the reserved tracts amount to 30,000 acres, they contain the best *jhand* tracts.

The trees most commonly met with in "rakhs" are as follows:—

Jhand (kundi in Sindh), *Prosopis spicigera*. This is the best fuel wood, being heavy and compact, and burns slowly: when stacked it is liable to be attacked by white ants.

Phuláhí (*Acacia modesta*). Not found in the southern district.

Palás or dhák (*Butea frondosa*). In Amritsar, and also east, but not in the south.

Karíl (*Capparis aphylla*.) The leafless caper, it will burn while green and gives out great heat; but otherwise is not esteemed as a fuel plant.

Jál or váñr—(*Salvadora oleoides*). It is a bad fuel, quite useless for locomotives, but can be used for steamers. *Salvadora indica* also occurs in the south, it is called "kaura várí."

Tamarisk. Three species occur—farwá, farás, or ukhán. *Tamarix orientalis* grows easily and rapidly to a large tree, and is resinous and a good fuel, but emits a bad smell in burning.

The next species is the lai (*Tamarix indica*), a large shrub; and the next, chilchí (*T. dioica*), is a small shrub wood, for basket work, &c. It grows by the sides of rivers, &c.

Bhán (*Populus euphratica*). Abundant in the south. The wood is light, and while burning throws out sparks or burning flakes which endanger the steam-boats.

Mallán (*Zizyphus nummularia*). Is very common, but only used for fodder; it has no wood to speak of.

DR. STEWART gives in his list some other woods as rarer in "rakhs"—such as *Acacia arabica, A. Jacquemontii, A. eburnea* (babur), *D. sissoo, Z. jujuba*, and kangú (*Lycium Europeum*).

In conclusion, it remains to notice the trees that grow about the fields and villages, and the progress of Arboriculture.

The trees commonly seen, are the kíkar (*A. arabica*), the beri (*Z. jujuba*), the siras (*A. serissa*), the shísham (*D. sissoo*), the mulberry (*Morus indica, &c.*), and near wells the sohájna (*Hyperanthera moringa*). Trees are generally planted round the wells, and also on the borders of fields; round the villages, trees of these kinds are met with, as well as often large fig trees, banyan and pepul, under the shade of which the villagers gather to rest from their labors.

In Lahore, and in the Southern districts, clumps of *Elate sylvestris*, the wild palm, are met with, and produce a pleasing effect. Groves and topes of mangoe trees and jámun (*Sizygium*

* Memo. on "Rukhs" (1863), in Financial Commissioner's Office.

† In his Fuel Report, in letter No. 121, from DR. CLEGHORN to the Financial Commissioner, 17th Sept., 1864.

jambolanum) are not uncommon; in gardens, the willow (bedmushk) is grown for its flowers, from which willow flower water is made, and is highly esteemed by natives as a refrigerent; also orange and lemon and lime trees, pomegranate, peaches and fálsa (*Grewia asiatica*), and occasionally apples and pears, and plums. The large public gardens are principally filled with mangoe trees: the idea of a "garden" is almost synonymous with our idea of an "orchard."

To detail the various attempts that have been made to introduce foreign trees is not within the scope of this sketch, but a few that are more common may be noticed.

At Madhopúr, the *Casuarina* and the *Eucalyptus* have flourished wonderfully; the tún (*Cedrela toona*), a valuable tree, grows along the canals, and ought to be very largely cultivated. The *Eucalyptus* thrives well everywhere almost, but it frequently dies when young if it gets too much water during the rains; combined heat and great moisture it cannot stand. *Ailanthes excelsa*, that magnificent tree, bids fair to be introduced; as well as the carob bean (*Ceratonia siliqua*), and some of the Salt Range trees—*tecoma*, box, olive, &c., are being tried.

The principal places where tree planting can be carried on is along the canals, and along railroads, and ordinary high roads: this has been done extensively in the Punjab, and with the best results. It is quite the exception now to travel on a road (anywhere near the Grand Trunk, and in the well-watered districts) which is not lined with trees; a great part of the Bari Doab Canal is lined with trees.

Of course the districts vary much, according to their situation and climate. In the dry regions of the south, the desert is redeemed by the palm tree, the jál, the jhand and the tamarisk, which grow to a fine size in Muzaffargarh and other districts. In Jálandhar and other districts the scene is very different, there verdure is everywhere at hand: and in tracts like Bajwát in Sealkot, the country is almost a perpetual groove.

In concluding this sketch, I would warn the reader, that its object is only to describe in a very general manner the forests tracts of the Punjab, so as to show what is going on, and what are the characteristics of the province in this respect: any one who wishes to study the subject in detail, I would refer him to the original reports of Drs. Brandis, Cleghorn and Stewart, and the various papers in the Agri-Horticultural Society's Journal, from which I have collected the materials for this notice.

To an introductory sketch like the present, it belongs only briefly to notice the successive zones of vegetable production, which furnish the samples in the collection, and to account for that wide scope, which includes in one collection, the products of all regions, from the inmost fastnesses of the Himálaya, along the banks of mountain streams, where the deodar and the giant pines flourish, and thence descending to the submontane tracts of varied foliage, until we reach the plains, and find ourselves on the arid deserts of the south, where nothing save the wild palm, or the stunted caper, waves over the burning expanse of sand.

Every one of these varied regions is represented in the following list, and the vegetable forms that meet us in successive zones, seem as signs that point to localities, the possible homes of the products of other lands to be introduced, only asking for capital, for enterprise, and for resolution, to render back ten-fold the outlay first devoted to them.

In enumerating the woods of the Punjab, I have adopted a slightly different method for the sake of presenting the botanical products of this class at one glance, without breaking up the unity of the list by a reference to locality or territorial divisions; but in order that the

reader may not be at a loss to know to which district he may refer a given tree, a list is first given of the specimens contributed by various districts, and then follows a glossary describing the principal woods of the Punjab. The foundation of this is an excellent list, kindly furnished by Dr. Cleghorn, and containing some 137 species. This list I have amplified by adding many more species, *including any tree or shrub which was large enough to have any wood and to be useful for fuel or charcoal:* smaller plants than this have not been included. For the variety of native names and synonyms, I have greatly to thank Dr. Stewart, who communicated a number; of the others, several I have collected myself on various tours, others have been derived from books and papers—Jameson's list, Cleghorn's Report, Brandis' Basáhir Reports, Aitchinson's Jhelum, Stewart's Wazíristán; also his reports on the forests of the Chenáb, Ravi, and other rivers; from Royle, Hooker, Thomson, and many others.

Delhi.

Name of tree.	Locality.	Remarks.
Sál (*Shorea robusta*).	Delhi.	Sent by C. E. Campbell, Esq.
Sissú, white, Ditto, black, (*Dalbergia sisso*).		
Kíkar (*Acacia arabica*).		
Mulberry (*Morus alba*).		
Haldi, or zard chob (*Nauclea*).		
Mango (*Mangifera indica*).		
Wild fig (*Ficus caricoides*).		
Tún, hill, Ditto, canal, (*Cedrela toona*).		
Guava (*Psidium pyriferum*).		
Cotton tree (*Bombax heptaphyllum*).		
Tamarind (*Tamarindus indica*).		

Rohtak.

Kíkar (*Acacia arabica*).	Rohtak.	Sent by Liut.-Col. Voyle.
Ním-bhur or nim ber (*Zizyphus*).		
Bukhain (*Melia simpervirens*).		
Jhand (*Prosopis spicigera*).		
Jál (*Salvadora oleoides*).		
Khair (*Acacia catechu*).		
Beri (*Zizyphus jujuba*).		
Barnah (*Cretæva religiosa*).		
Tamarind (*Tamarindus indica*).		
Rahíra (*Tecoma undulata*).		
Hinggo (*Balanitis Ægyptiaca*).		
Sissú (*Dalbergia sisso*).		
Ním (*Melia azadirachta*).		
Farásh (*Tamarix orientalis*).		
Pípal (*Ficus religiosa*).		
Kaim (*Nauclea parviflora*).		
Mango (*Mangifera indica*).		

Name of tree.	Locality.	Remarks.
	ROHTAK—*(Continued)*.	
Jáman (*Sizygium jambolanum*). Mulberry, tút (*Morus*). Dhák (*Butea frondosa*).		Canal villages.
	SIRSAH.	
Sponge wood, "shola" (*Æschynomene paludosa*).		Sent by P. A. MINAS, ESQ.
	SIMLA.	
3 bamboo sticks.	Mahlog.	
Hill bamboo, nirgalli (*Arundinaria utilis*).	Kunyar.	
Box of 36 hill woods, viz. :—	Kotgarh.	MR. S. BERKELEY.
Kail (*Pinus excelsa*).		
Rái (*A. smithiana*).		
Spruce fir, pándrai (*Picea Webbiana*).		
Jamnú (*Prunus padus*).		
Brás (*Rhododendron arboreum*).		
Tung (*Rhus parviflora*).		
Titarí (*Rhus semialata*).		
Kakar (*Pistacia interigerrima*).		
Common oak, bán (*Quercus incana*).		
Báni (*Quercus annulata*).		
Mohru (*Quercus dilatata*).		
Alpine oak, kharsú (*Q. semicarpifolia*).		
Himalayan box, shamshád (*Buxus sempervirens*).		
Dogwood, kágshi (*Cornus macrophylla*).		
Hill mulberry, kímú (*Morus serrata*).		
Walnut (*Juglans regia*).		
Hill toon, dark (*Cedrela toona* var *serrata*).		
Sissú (*Dalbergia sissoo*).		
Yew, tuna (*Taxus baccata*).		
Himalayan chesnut, bankhor (*Pavia indica*).		
Bekul (*Prinsepia utilis*).		
Olive, zaitún (*Ocea Europæa*)		
Rawásh or rauns (*Cotoneaster obtusifolia*).		
Bird cherry, pacha or pája (*Prunus puddum*).		
Apricot, zard áru (*Prunus armeniaca*).		
Basúr.		
Wera.		
Nawir or Neúr, lewar (*Cupressus torulosa*).		
Bajwul.		
Pedu.		
Karandlú (*Acer lævigatum*).		
Katálat.		

Name of tree.	Locality.	Remarks.
SIMLA—(*Continued*).		
Shágul.	Kotgarh.	Mr. S. Berkeley.
Tálma or thalín (*Viburnum fœtens*).		
Kamúshal.		
Deodar, kelu (*Cedrus deodara*).	Simla district (24 woods used by the carpenters at Simla.)	Sent by Dr. Cleghorn
Lofty pine, kail (*P. excelsa*).		
Common oak, bán (*Quercus semicarpifolia*).		
Deru or mohru (*Q. incana*).		
Toon tree (*Cedrela toona*).		
Box (*Buxus sempervirens*).		
Mulberry, kímú (*Morus serrata*).		
Kakar (*Pistacia integerrima*).		
Tung (*Rhus cotinus* or *parviflora*).		
Walnut (*Juglans regia*).		
Wild pear (*Pyrus variolosa*).		
Cherry (*Padam*).		
Apricot (*Prunus armenica*).		
Maple (*Acer cultratum*).		
Ayár (*Andromeda ovalifolia*).		
Bráh (*Rhododendron arboreum*).		
Kaiphal (*Myrica sapida*).		
Kachnár (*Bauhinia*).		
Nettle tree, karak, bichwá (*Celtis Caucasica*).		
Tezbal (*Xanthoxylon hostile*).		
Berberry (*Lycium berberis*).		
Chuhi, *Acacia speciosa* (looks like *Boswellia*).		
Soapnut (*Sapindus acuminatus*).		
Hill bamboo (*Arundinaria utilis*).		
Rauns (*Cotoneaster obtusifolia*).		Used for making walking sticks in the Hills.
White thorn, gengáru (*Crataeva crenulata* or *C. oxycantha*).		
KANGRA.*		
Pencil cedar, "pratakpá" or "yuckpa" (Thibetan), (*Juniperus excelsa*).	Spiti.	
AMRITSAR.		
Báns (*Bambusa stricta*).	Wood obtained in the bazar, and in the district of Amritsar.	
Farwá (*Tamarix orientalis*).		
Ber (*Zizyphus*).		
Sembal (*Bombax heptaphyllum*).		
Rerú (*Acacia Jacquemontii*).		
Andal, pine?		
Cheel.		

* The other woods of Kangra and Jálandhar have already been given at page 538, *et seq.*

Name of tree.	Locality.	Remarks.
	AMRITSAR.	
Deodar. Thálí (*Dalbergia sissoo*). Toon. Ambárá (*Spondias mangifera*). Safeda (*Populus*). Kíkar, pahárí (*Acacia*). Arú (*Amygdalus*). Sembhálú (*Vitex*). Maidá (*Tetranthera*) Kamb, kadamb ? (*Nauclea*). Khatta (*Citrus medica*). Anár, pomegranate. Lobán. Khair (*Acacia catechu*). Kadamb (*Nauclea*). Khajúr (*Phœnix sylvestris*). Khiláwa or khilárá (*Wrightea mollissima*). Chikrí (*Buxus sempervirens*). Rárá (*Randia*). Kíkur (adantí), (*Parkinsonia*). Dákh (*Butea frondosa*). Almond tree, badám (*Amygdalus communis*). Walnut (*Juglans regia*). Kíkar (*A. arabica*). Karír (*Capparis aphylla*). Phulláh (*Acacia modesta*). Jand (*Prosopis spicigera*).	Woods obtained in the bazar, and in the district of Amritsar.	
	LAHORE.	
Nepál box (*Buxus nepalensis*).	Nepál and Kúlú.	The specimen was accompanied by a section smoothed for the engraver.
Lemon wood (*Citrus medica*). Orange wood (*C. aurantium*).		Grown in the Bádámí Bágh, Lahore.
	RAWALPINDI.	
Minassi. Kakar (*Pistacia intigerrima*). Kummuldai. Urvál, ardwal (*Rh. arboreum*). Sírí. Pear, "nakh." Tassí (*Bauhinia*). Laknáb. Bhehkar (*Prinsepia utilis*),	Murree Hills.	

Name of tree.	Locality.	Remarks.
	RAWALPINDI—(*Continued*).	
Akta (*Rubus?*)	Murree Hills.	
Kamela (*Rottlera*).		
Kakkar (*Pistacia?*)		
Sanatta (*Dodonæa*).		
Timbar (*Xanthoxylon hostile*).		
Medasak (*Tetranthera*).		
Pípal.		
Amlaha (*Emblica officinalis*).		
Garunda (*Carissa diffusa?*)		
Bankau (also written in original list, ban kahoo), (*Quercus annulata?*)*		
Kakohí (*Acacia Jacquemontii*), or for kákshi (*Cornus macrophylla*)?		
Khúkal.		
Phúlah (*Acacia modesta*).		
Rukan or ruknu (*Sizygium*).		
Kahí (*Ulmus*).		
Pussun.		
Príta.		
Kúlairí, kalíar, or kalírí (*Bauhinia racemosa.*)		
Yew, barmí (*Taxus baccata*).		
Kúnth.		
Bátí.		
Títar (*Rhus semialata?*)		
Guláb janglí (*Rosa Burmanniana*).		
Dhaik (*sic*), perhaps dhák (*Butea frondosa*).		
Apricot, hári.		
Wild plum, kálakát (*Prunus padus*).		
Horse chesnut, ban akhrot (*Pavia indica*).		
Barwallí.		
Bais (*Salix*).		
Pasarí, paser (*Parrotia Jacquemontiana*).		
Mulberry.		
Paon, pháun.		
Punra (*Ehretia serrata*).		
Sakí (*Cotoneaster*).		
Darúní (*Punica granata*).		
Chumáriya.		
Gwál bodála.		
Tangí (*Pyrus sp*——?)		
Shísham.		
Chír (*P. longifolia*).		
Barbery, samálú (*B. lycium*).		
Táví (*Grislea tomentosa*).		
Amánoí.		

* The Local list gives (*Vitex negundo*).

Name of tree.	Locality.	Remarks.
RAWALPINDI—(*Continued*).		
Jammú (*Sizygium jambolanum*). Cháhan. Tanda, dhatanda. Changhát, chamkát (*Desmodium tiliæfolium*). Chitra (*Staphylia emodi*). Walnut. Niberva. Peach, arú. Amlok (*Diospyros lotus*). Kutti (*Daphne oleoides*). Barungi, "ilex" (*Quercus dilatata*). Tánee, thalí (*Dalbergia*). Satarí (*Nussiessya ?*) Taikun. Bakarwand. Tríkadna (*Acer cultratum*). Butairí, or tílrí (*Rhus semialata*). Kandar (*Cornus macrophylla*). Drava (*Cedrela sp———?*) Iríñ, rín (*Quercus incana*). Sáfedah, poplar (*Populus alba*). Palúndar (*Picea Webbiana*). Batkar (*Celtis nepalensis ?*) Batánk, wild pear (*Pyrus variolosa*). Chát (*Æschynomene Ægyptiaca*). Bahaira (*sic*), specimen is bíar (*Pinus excelsa*). Phagwárí (*Ficus caricoides*). Palách, faláh (*Populus ciliata*). Shamshád, country box-wood (*Buxus sempervirens*).	LOCAL EXHIBITION COMMITTEE.	Murree Hills.
GUJRAT.		
Sisú. Kíkar. Siriss. Phullahi. Ber. Búkhain. Tút, mulberry. Lasora (*Cordia myxa*). Jáman (*Sizygium jambolanum*). Barna (*Cratæva religiosa*). Dhák. Pípal. Sohájna, horse radish tree (*Hyperanthera moringa*).		

Name of tree.	Locality.	Remarks.
	GUJRAT.—*(Continued).*	
Bed, willow (*Salix Babylonica*).		
Bor or bargat (*Ficus indica*).		
Khair (*A. catechu*).		
Pharwán (*Tamarix indica*).		
Sukchaina (*Pongamia glabra*).		
Rúmal,* rúbal (*Erythrina ?*)		
Khirni.		
Amla (*Emblica officinalis*).		
Cotton tree (*Bombax*).		
Kachnár (*Bauhinia variegata*).		
Jhand (*Prosopis spicigera*).		
Karír (*Capparis*).		
Wannah (*Salvadora oleoides*).		
Ajaurukh (*Acacia Jacquemontii*).		
	JHILAM.	
Sísú.	Jhilam.	
Siriss.		
Bukain.		
Banyan, bargad (*Ficus Indica*).		
Kamla (*Odina wodier*).	Tilla Mountain (Salt Range).	There is a specimen of the gum of the kamla of an amber brown color.
Kíkar.	Jhilam.	
Kakkar (*Rhus acuminata*).	Tilla Mountain.	Walking sticks are made of this wood.
Wild olive, kau (*Olea europæa*).	Jhilam.	
Ber.	Tilla Mountain.	
Phúlah (*Acacia modesta*).	Jhilam.	
Sohájna.	Tilla Mountain.	
Dhámun (*Grewia elastica*).		Wood used for buggy shafts (Local List). Wood esteemed useless as a timber (Local List).
Kíkar Wilayití (*Parkinsonia*).		
Mulberry, tût.	Jhilam.	
Kachnár.		
Lasúra.		
Dhák (*Butea frondosa*).		
Olive, kao (*Olea ferruginea*).		
Phuláhí (*Acacia modesta*).		
Lahúra (*Tecoma undulata*).		
Jalidhar (*Gymnosporia spinosa*).	Salt Range.	
Larga (*Rhus cotinus*).		
Sagghar (*Ehretia aspera*).		
Dhaman (*Grewia elastica*).		Bows and shafts are made of it (Local List).

* The specimens bracketed are both *the same*, though different names are assigned.

Name of tree.	Locality.	Remarks.
Shahpur.		
Wathaman (*Celtis caucasica*). Gargusa (*Acacia Jacquemontii*). Chikrí, box. Dhílá. Kahimal. Kangar (*Pistacia integerrima*). Phooloha (*sic*), (*Pongamia*).	Salt Range.	Used for agricultural implements. Wood looks like that of a *Ficus*.
Gugaira.		
Tamarisk, farás. Mulberry, tût. Siriss. Kíkar (*Vachellia farnesiana*), Wilayiti kíkar (*A. arabica* var. *Cupressiformis*). Bukain (*Melia sempervirens*). Sissú (*Dalbergia sissoo*). Babul (*Acacia Arabica*)—pahárí kikar *Parkinsonia*). Dák (*Butea frondosa*). Lasúra (*Cordia myxa*). Jhand (*Prosopis spicigera*). Pípal (*F. religiosa*). Bor (*Ficus indica*). Ber (*Zizyphus*). Wild caper, karíl. Pílú (*Salvadora oleoides*). Cotton tree, sembal. Horse radish tree, sohajná.		
Dera Ismail Khan.		
Kíkar. Mulberry, tût. Babul. Phuláhí. Sírín. Sissú. Ber. Mango, ám. Bukhain. Pine, chíl. Deodar. Bhán (*Populus Euphratica*) Olive. Lime, khatta (*Citrus*). Ditto, mitha (*Citrus*).		

Name of tree.	Locality.	Remarks.

DERA ISMAIL KHAN.—*(Continued).*

Jál (*Salvadora oleoides*).		
Madár (*Calotropis Hamiltonii*).		
Horse radish (*Hyperanthera pterygosperma*).		
Pomegranate, anár.		
Kagal? (*Tamarix orientale*).		
Lasúra (*Cordia myxa*).		
Kurinja (*Pongamia glabra*).		
Bainth, bed (*Salix Babylonica*).		
Súmala, sembal (*Bombax heptaphyllum*).		
Jaith (*Sesbania Ægyptiaca*).		
Gondí (*Cordia Rothii*).		
Chitarí (*Quercus ilex*).		
Gurgura (*Reptonia?*)		
Pullow (*sic*), (*Salvadora?*)		
Grape, angúr (*Vitis*).		
Kangur (*Sageretia?*)		
Alúcha (*Prunus domestica*).		
Gúrgará (*Reptonia buxifolia*).		
Karíl (*Capparis*).		
Mamání (*Sagentia Brandrethiana*).		
Bágh úna (*Rhus cotinus*).		
Sísam (*Dalbergia sissoo*).		
Poplar, sáfeda (*Populus alba*).		
Ber (*Zizyphus jujuba*).		
Pípal (*Ficus religiosa*).		
Mulberry, tút. (The specimen is a red wood, not tút.)	Kuhát.	
Peach, arú (*Amygdalus Persica*).		
Phúlláh (*Acacia modesta*).		
Kharweí, (*Cotoneaster*).		
Khubára (*Ehretia aspera*).		
Willow, bed majnún (*Salix*).		
Bar (*Ficus Indica*).		
Olive, kau (*Olea Europea*).		
Tághan (*Celtis Caucasica*).		
Jháú (*Tamarix dioica*).		
Jál (*Salvadora oleoides*).		
Charáí or jarí (*Quercus ilex*).		
Bukain or drek.		
Sharauní (*Flacourtia sepiaria?*). (May be *Pistacia integerrima?*)		
Wild olive, kau (*Olea Europea*).	Higher Hills.	
Mulberry, tút (*Morus lævigata and alba*).		
Sirín (*A. serissa*).		
Tálí (*Dalbergia sissoo*).		
Ber (*Zizyphus jujuba*).	Dera Ghází Khán.	
Mangoe (*Mangifera Indica*).		
Bukhain (*Melia sempervirens*).		
Pípal (*Ficus religiosa*).		

Name of tree.	Locality.	Remarks.
Dera Ghazi Khan.		
Kachnar (*Bauhinia variegata*). Jál (*Salvadora oleoides*). Karíl (*Capparis aphylla*). Bhán (*Populus Euphratica*). Kikar (*Acacia Arabica*). Ním (*Melia azadirachta*). Kunda (*Prosopis spicigera*). Tamarisk (*Tamarix gallica and orientalis*). Jámu (*Sizygium jambolanum*). Gondí (*Cordia Rothii*). Girdnallí (*Cassia fistula*).	Dera Ghází Khán.	Wood for making Persian wheels (Local List).
Peshawur.		
A table made entirely of Punjab woods, of which there are 132 specimens and 1863 pieces employed.		Capt. N. D. Garrett, R.H.A.
Hazara.		
Déár, deodar (*Cedrus deodara*). Biár (*Pinus excelsa*). Fir or chír (*P. longifolia*). Tun (*Cedrela toona*). Sám, ash (*Fraxinus floribunda*). Walnut (*Juglans regia*). Barúngi, oak (*Quercus dilatata*). Dhaman (*Grewia oppositifolia*). Kangar (*Pistacia integerrima*). Dráwa (*Cedrela toona* var. *serrata*). Sissú (*Dalbergia sissoo*). Oak, rín (*Quercus incana*). Mulberry, tút (*Morus lævigata*). Yew, birmí (*Taxus baccata*). Sirras (*A. serissa*). Butkarar (*Celtis Caucasica*). Bankau (*Quercus annulata* ?) Phúláh (*A. modesta*). Karhá (*Acacia odoratissima*). Ebony, amlok (*Diospyros lotus*). Kálakát (*Prunus padus* ?) Ber (*Zizyphus*). Cinamon (*Cocculus laurifolius*, or more probably *Cinnamomum albiflorum*). Paluddar (*Picea Webbiana*). Kau (*Olea Europea*). Horse chesnut, bankhor (*Pavia Indica*).	Hazara Forest.	For fuel. Used for furniture. For fuel. There is a specimen of the bark as a spice; it is well flavored like cassia, &c.

Name of tree.	Locality.	Remarks.
	HAZARA.—*(Continued).*	
Manú (*Ulmus campestris*). Khair (*Acacia catechu*). Kaíú (*Ulmus campestris* or *erosa*).	Hazara forest.	
	KAPURTHALLA.	
Sissu *(Dalbergia sissoo).* Palás *(Butea frondosa).*		
	CHAMBA.	
Pinyát (*Cratægus oxyacantha*). Wild pear, kaint (*Pyrus variolosa*). Chíl, fir (*Pinus longifolia*). Horned cherry, jamú (*Prunus padus*). Kanelú (*Ilex dipyrena*). Apple, chúí (*Pyrus*). Kílar (*Parretia Jaquemontii*). Khurg (*Celtis Caucasica*). Apricot, chír (*Armeniaca vulgaris*). Hazel (*Corylus lacera*). Rauns (*Cotoneaster obtusa*). Mundar (*Acer cultratum*). Crab ash, sandal (*Fraxinus xanthyloides*). Walnut (*Juglans regia*). Chínár (*Platanus orientalis*). Pencil cedar, devi diár (*Juniperus excelsa*). Olive kaú (*Olea Europea*). Peki *(Almus).* Edible pine, chilghoza (*Pinus Gerardiana*). Ráí (*Abies Smithiana*). Sunnú (*Fraxinus floribunda*). Tos (*Picea Webbiana*). Gúgú (*Pavia Indica*). Kilar, dyár (*Cedrus deodara*). Birch, búrj (*Betula bhojpatra*). Pear, naspátí (*Pyrus*). Wild pomegranate, anár (*Punica*). Kharak (*Celtis*). Paddam (*Prunus paddam*). Arna (*Amygdalus Persica*). Olive, kau (the specimen is like *Celtis*). Krún (*Morus serrata*). Budda, baida (*Salix*). Surja sanjad (*Elæagnus*). Pyák (*Alnus*). Soap nut, dodan (*Sapindus*). Gúñ, chesnut (*Pavia indica*). Titrí (*Rhus acuminata*). Pajja (*Cerasus*).	Chamba and Pangi.	Sent by RAJAH OF CHAMBA.

Name of tree.	Locality.	Remarks.
PATTIALA.		
Jáman (*Sizygium jambolanum*).		
Mulberry, tút (*Morus alba*).		
Bérí (*Z. vulgaris*).		
Tún (*Cedrela tuna*).		
Chíl (*Pinus longifolia*).		
Kelu (*Cedrus deodara*).		
Bans (*Bambusa stricta*).		
Am (*Mangifera indica*).		
Sisu, shísham (*Dalbergia sissoo*).		
Náwra (kismi tút), a kind of mulberry.		
Rasaunt (*Berberis sp———*).		
Walnut, akhrot (*Juglans regia*).		
Kíkar (*Acacia arabica*).		
Phulálií (*A. modesta*).		
Frás (*Tamarix orientalis*).		
Lasúrah (*Cordia myxa*).		
Ním (*M. azadirachta*).		
Pípal (*F. religiosa*).		
WOODS FROM THE SIMLA BAZAR.		
Sál (*Shorea robusta*).		Sent by DR. CLEGHORN.
Siriss (*Acacia speciosa*).		
Alpine oak, kharsu (*Quercus semacarpifolia*).		
Oak, bán (*Quercus incana*).		
Rái (*Abies Smithiana*).		
Himálayan spruce fir, moranda (*Picea Webbiana*).		
Sarv machla, leurí, twisted cypress (*Cupressus torulosa*).		

CLASSIFIED LIST OF WOODS, NATIVE OR GROWN IN THE PUNJAB.

[The uses and value of the fruit, flowers, leaves, fibre and bark of the trees, are not generally alluded to in the list, whose object is solely to enumerate the *woods* and trees, including also the shrubs which grow in the Punjab. The uses of the different parts will be found under their proper headings elsewhere.]

1809.—[1.] **Abelia triflora.**

Vern. Syn.—Chota bútí (Murree).
Adai pashtawar (Pashtú).

1810.—[2.] **Abies smithiana.** Himalayan spruce.

Vern. Syn.—Rai.
Raiyang (Kanáwar).
Re, ro, rau (Sutlej).
Kachan or kachal (Hazára).
Rág (Lahaul).
Ré (Pangi).
Kaulí (Pangí).
Rao (Pangí).
Tos or tosh* (Chambá).

In the Murree Hills (Mochpúra), banluddar, while *P. Webbiana* is called paluddar or palundar. The wood when under cover lasts pretty well, but is generally not much valued as it splits easily. It makes beautiful lathes. It grows plentifully at an elevation of 9 to 11,000 feet, and is often 100 feet high and 5 feet in diameter. This is sometimes called *Pinus Smithiana*. *Pinus morinda* and *P. khutrow* are mere varieties.† It is the least valued of all the Himálayan conifers.

1811. [3.] **Acacia arabica.**

Vern. Syn.—Bábul.
Kikar.

Wood dark brown, hard, tough and often crooked. It is most extensively used for agricultural implements, makes excellent tent pegs, and except box and olive it is the best wood for cog-wheels, teeth of machinery, and blocking tackle. The tree, of which there are two varieties, is common in the plains of the Punjab; it is of rapid growth, requires no water, and is worthy of cultivation. It produces a useful gum, and its pods are a favorite food of sheep and goats. The bark is used for tanning and gives a reddish tinge to the leather.

1812.—[4.] **A. cupressiformis.**

Vern. Syn.—Kábuli kikar.

Is a variety of No. 3, so called from the upward growth of its branches, somewhat assuming the cypress form. This variety is commoner in the Shahpúr district than the foregoing. In the Gujrát and Jhilam district it is abundant. The traveller along the Grand Trunk Road between Rawalpindi and Gujrát may see them in numbers in the Jhilam district.

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* Tos usually indicates *Picea Webbiana*, and rai *Abies:* in Chamba it is reversed.
† *See* SMITH and HOOKER'S "Introduction," p. 31.

1813.—[5.] **Adhatoda vasica.**

Vern. Syn.—Behikar.
Bhekar.

Though only a shrub, it is valuable, as yielding a good charcoal for gunpowder. Specimens of the wood may be got an inch in diameter. It is quite the characteristic plant of the Lower Hills.

1814.—[6] **Acacia catechu.** Catechu tree.

Vern. Syn.—Khair.

The timber of this tree is hard and tough, but small, and inferior to the last. Its growth is confined to the outer hills, bordering on the plains. The catechu of commerce, "kath," is obtained by boiling the chips. (*See* "Tanning Substances," Sub-class D.)*

1815.—[7]. **Acacia eburnea.**

Vern. Syn.—Kíkkarí.
Daddá (Salt Range).

1816.—[8.]. **Acacia elata.**

Vern. Syn.—Dún siris.
Baro.

The bark is white, the centre timber dark, close grained and heavy. Little of this wood is available. An excellent avenue tree of straight growth.

1817.—[9.]. **Acacia farnesiana.**

Vern. Syn.—Wiláyiti kikar.
Hanja (Pashtú.)

The wood resembles the bábul, but is very small. It exudes a good gum, the tree is introduced, not indigenous: a scent is extracted from the flowers in Europe.

1818.—[10.]. **Acacia julibrissin.**

Vern. Syn.—Shirin (Kanáwar).

1819.—[11.]. **Acacia leucophlæa.**

Vern. Syn.—Reru.
Gargúsa (Salt Range). | Kákohi (Hazára).

Grows in the rakhs of the Punjab; resembles the next species.

1820.—[12.]. **Acacia modesta.**†

Vern. Syn.—Phulahi or phuláh.
Pulosa (Pashtú).

The timber is hard and tough, but inferior to bábul; it is used for charcoal, ploughs and wheel-barrows. This is one of the characteristic trees of the Punjab, and grows readily in poor, sandy soils. It is an excellent hedge plant.

1821.—[13.]. **Acacia Jacquemontii.**

Vern. Syn.—Babúl.
Kikkari.

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* MAJOR MADDEN describes the process of manufacture in the Tarai, *vide* "Jour. As. Soc." June 1848, p. 565. DR. HOOKER also, *vide* "Him. Journals," I., p. 52.

† The Australian species *Acacia robusta* and *A. stricta* have been introduced at Madopúr from seeds obtained at Ootacamund.

A. speciosa, synonym of the following :—

1822.—[14.]. **Acacia sirissa.**

Vern. Syn.—Siriss.
Sirín (Punjabí).

The timber is dark brown and hard, but little used except as fuel. The siriss is a good avenue tree.

1823.—[15.]. **A. speciosa var. Mollis.** (*See* 23).

Vern. Syn.—Karhá (Hazára).

Timber good. It is met with occasionally as far as Chamba. Its bark is prized in tanning.

1824.—[16.] **Acacia stipulata.** *Acacia kangraensis* of JAMESON.

Ver. Syn.—Sirín. | Lasrín (on the Kíshngangá).
Oí (Kangra). |

Met with occasionally to the west of the Jumna. A fine tree, abounding in the Kangra valley.

1825.—[17]. **Acer cultratum and sterculiaceum.** Maple.

Vern. Syn.—Mandal, Maner* (Chamba). | Tí,án (Kanáwar).
Trekhan (Hazára). |

These trees are very common in the woods about Murree: they are called "trikudna" or "trikanna." Wood not much esteemed. The knots are used for ornamental cups, which sell high in Tartary. Elevation, 9,000 feet.

1826.—[18]. **Acer lævigatum.**

Vern. Syn.—Karádlu (Kotgarh).

1827.—[19]. **Acer sterculiaceum.**

Vern. Syn.—Lá,úr (Kanáwar); or by the Kashmírís "tilpatra."

These names having allusion to the incised "three-pointed" leaves.

1828.—[20]. **Acer caudatum.**

Vern. Syn.—Mandal (Kúlú). DR. CLEGHORN.

1829. [21].—**Adelia serrata.**

Vern. Syn.—Dhanyálí (Rajauri).

Has a dark green leaf, and is used for holly.

1830.—[22]. **Ægle marmelos.**

Vern. Syn.—Bel.
Bil.

The wood is hard and durable. The astringent pulp of the fruit is a valuable remedy in diarrhœa.

1831.—[23]. **Albizzia odoratissima.**

Vern. Syn.—Kurmrú.
Búṇá (Kághán).

Very like the *Acacia speciosa*.

* Report on Forests of Western Himálaya, p. 148. The wood is spelt "munner," in the place referred to.

1832.—[24]. **Alnus nepalensis.** Himálayan alder.

Vern. Syn.—Kunch or koish. | Nyú (Kanáwar).
Ghujbai (Pashtú); also gira; both species of *Alnus*. | Shrol (Hazára).
Piák (Pangi).

The timber of this tree is firm, hard and difficult to cut, of a pale, brownish-red color. It is used for gunpowder charcoal, but not for iron furnaces. The bark is useful in tanning. Other species noticed are *Alnus obtusifolia* and *A. nitida* (Sutlej); called "shrol" in Kaghán. In Chota Lahaul and on the Chenáb there are species of *Alnus*, called "piák" and "tsápú."

1833.—[25]. **Amygdalus persica.** Peach.

Vern. Syn.—Arú. | Rek (Kanáwar).
Ghurghushtai or mandala (Pashtú). | Chimnánú (Lahaul and the Chenáb).
Arna (?).

Wood good, but not available in quantity.

1834.—[26]. **Andromeda ovalifolia.** Common *Andromeda*.

Vern. Syn.—Elyán or ayár. | Ratankát (Kaghán).

Wood moderately hard, of a reddish brown color, used for charcoal. Bark soft. Leaves injurious to sheep and goats. The tree grows at an elevation of 7,000 feet.

1835.—[27]. **Armeniaca vulgaris.** Apricot.

Vern. Syn.—Jaldárú (corrupted from the Persian "zard árú" *i. e.*, yellow peach). | Hárí (Hazára).
Chúí. | Chír (Chamba).
Barzha (Kanáwar). | Cher (Chenáb).
Sárí.

It is called "chir" when wild, and "sárí" when grafted so as to bear fruit. Wood hard but rarely met with sound. It is used for doors in Chamba, and for making boards of books in Ladákh, which are often carved. Much esteemed in France for turning. The kernels yield an excellent oil. It flourishes at an elevation of from 7,000 to 13,000 feet. CUNNINGHAM (J. D.) says it does not ripen above Shalkar.

1836.—[28]. **Artocarpus integrifolia.** Jak tree.

Vern. Syn.—Dahu. | Barral (Hindústán).
Tí,ú (Hazára).

Excellent timber of a yellowish color. Very scarce in the Punjab. One fine tree is in the garden at Amb. It is to be seen also above Shahpúr on Rávi (STEWART).

1837. [29].—**Arundinaria utilis.** Hill-bamboo.

Vern. Syn.—Nirgali or ringál. | Spyúg (Kanáwar).

Used for wicker work, shepherds' pipes, mats, &c.

1838.—[30]. **A. falcata.**

Vern. Syn.—Garu.

The smallest bamboo, and the one which grows at the greatest heights.

1839.—[31]. **Azadirachta indica.**

Vern. Syn.—Nim (*Melia azadirach*).

Hard, heavy wood; only found in the East Punjab. The leaves are useful as an astringent, and the seeds afford a valuable bitter oil.

1840.—[32]. **Balanites Ægyptiaca.**

Vern. Syn.—Hinggo (Rohtak collection, 5015).

Used for fuel only: does not occur except in the eastern part of the province.

1841.—[33]. **Bambusa stricta,** and **B. arundinacea.**

In the Simla collection. "Nál bans" is the hollow stem, "maggar báns" the solid. The varied uses of this valuable plant are admirably described by MAJOR DRURY, some extracts from whose account follow:—

"Of it are made implements for weaving; the posts and frames of the roofs of huts; scaffoldings for buildings; portable stages for native processions; raised floors for granaries; stakes for nets in rivers; rafts, masts, yards, oars, spars, and boat decks. It is used for building bridges across creeks; for fences; as a lever for raising water for irrigation; and for flag-poles. Several agricultural implements are made of it; as are also hackeries or carts, doolies or litters and biers; the shafts of javelins or spears, bows and arrows, clubs and fishing rods. A joint of bamboo serves as a holder for pens, small instruments and tools. It is used as a case in which things of little bulk are sent to a distance; the eggs of silk-worms were brought in a bamboo cane from China to Constantinople, in the time of JUSTINIAN. A joint of bamboo answers the purpose of a bottle; and a section of it is a measure for solids and liquids in bazars. A piece of it is used as a blow-pipe, and as a tube in a distilling apparatus. A small bit of it split at one end serves as tongs to take up burning charcoal; and a thin slip of it is sharp enough to be used as a knife in shelling betel nuts, &c. Its surface is so hard that it answers the purpose of a whetstone, upon which the ryots sharpen their bill-hooks, sickles, &c. Cut into lengths and with the partitions knocked out, the stems form durable water-pipes, or by a little contrivance are made into excellent cases for holding rolls of papers; slit into strips they afford a most durable material for weaving into mats, baskets, window blinds, and even the sails of boats."

In the Punjab there are 4 species of bamboo, *B. stricta* being indigenous in the Salt Range.

1. Báns, the hollow large bamboo *(Bambusa arundinacea)*; cultivated in the lower Hills, &c.

2. Bar, solid bamboo of the Lower Hills, used for spear handles and sticks *(B. stricta)*.

3. The "nirgali" or small bamboo of the Hills, growing at elevations of from 5 to 8,000 feet *(Arundinaria utilis)*.

4. The "garu," or still smaller bamboo, growing at great elevations, probably up to 12,000 feet *(Arundinaria falcata)*.

1842.—[34]. **Bassia latifolia.**

Vern. Syn.—Mauwa.

A good and durable wood, but small, and not abundant in the Punjab. It is worthy of introduction as an avenue tree. A thick, fatty oil is obtained from the seed. The timber is hard and strong, and is in request for naves of wheels, carriages, &c. BARNES describes it as abundant in parts of the Núrpúr perganah of the Kangra district, where the two small talúkas of "Mau" derive their name from the prevalence of the tree. A spirit is distilled from the flowers, which are steeped in water and allowed to ferment. The flowers sell at 50 seers the rupee for this purpose.* The flowers are sweet-tasted, and are eaten raw. Jackals are particularly fond of them.

1843.—[35]. **Bauhinia acuminata.**

A very beautiful flowering shrub, it is easily distinguished from the others by having the apex of each lobe of its leaf pointed (hence its name) instead of round like the others.

1844.—[36]. **Bauhinia variegata (var. Purpurea).**

Vern. Syn.—Kairwál.

* Settlement Report of Kangra District, sec. 149.

Heart wood is of a dark color, and very hard, but too small to be of much use.

1845.—[37]. **Bauhinia variegata.**

Vern. Syn.—Kachnár. | Karár (Hushyarpúr).
Kuleri or kalár (Rawalpindí). | Kalyár or kalár (Hazára).
Kolá (Salt Range).

Very like the above.

1846.—[38]. **Bauhinia racemosa.** (*B. Vahlii*).

Vern. Syn.—Máljún.
Taur (Hill name).

This gigantic climber affords a strong rope fibre. The seeds are eaten. The huge seed vessels look like the soles of shoes or thick piéces of brown rough leather. When ripe they are placed over the embers of a fire till cooked, when they split open and the flat seeds are found inside: each seed has an envelope of bitter skin, which is removed; the remaining kernel is very palatable.

1847.—[39]. **Benthamia fragifera.**

Vern. Syn.—Tharnel.

The wood is small. Fruit edible, and is used as a preserve. Elevation, 6,000 feet.

1848.—[40]. **Berberis aristata, and other species.** Berberry.

Vern. Syn.—Rasaunt (Hindústání).
Kuraskai (Pashtú).

B. lycium grows at elevation 3,000 to 9,000 feet; and *B. aristata*, elevation 6,000 to 10,000 feet. In the Murree Hills this shrub is called "sambal" or "súmlú, or "sŭmlú" (Hazára): its fruit is dried for currants, "zirishk" (tursh), and its yellow juiced root and wood yield the extract called "ras," "rasaunt" or "raswal." Wood too small to be of much use, except for fire-wood.

1849.—[41]. **Betula bhojputra.** Birch.

Vern. Syn.—Burj.

At Pangi "bhúj," and over most of the Hills, except Basáhir, where it is called "bhojpatra;" "shák" or "shág" (Kanáwar); "tagpa" (Lahaul). Wood good: used for cups, common turnery, and for fuel by travellers in the higher ranges. It grows at elevations from 10,000 to 13,000 feet. The bark peels off in large sheets, and is used for umbrellas, for writing upon, and for the flexible tubes of húkas. Every consignment of the ornamental papier maché ware of Kashmír reaches the Punjab packed in wrappers of birch-bark. The houses in Kashmír are often roofed with it.

1850.—[42]. **Bignonia suaveolens.**

Vern. Syn.—Pádal or sammú.

Wood elastic and long grained: used for buggy shafts, plough yokes, &c., in Dehra Dhún and Kangra.

1851.—[43]. **Bignonia suberosa.**

Vern. Syn.—Akás ním (introduced only).

The wood is soft, and used for firewood, the bark very cork-like. It is a handsome tree, growing with great rapidity, and sending out numerous suckers, from which it may be easily raised.

1852.—[44]. **Bergera Kœnigii.**

Vern. Syn.—Gárdala (Kangra).
Gándla.

Bignonia undulata, *See* **Tecoma undulata.**

1853.—[45]. **Bignonia indica (Calosanthes Indica).**

Vern. Syn.—Tat palanga (Hushyarpúr).

Loose grained and bad wood, easily decaying.

1854.—[46]. **Bombax heptaphyllum.** Cotton tree.

Vern. Syn.—Sembal or semal.

The wood of this tree is soft, but stands well under water. It grows rapidly, and is occasionally found 30 to 40 feet in girth. The tree is sometimes called *Pentaphyllum*, when the lobes of the leaves are 5 instead of 7, but there is no difference in species, for these trees frequently carry both kinds of leaf. When the trees grow very large, their appearance is magnificent, the thick stem spreads out towards the base, at intervals into buttress-like projections, as if these had been added for the purpose of strengthening or supporting the main stem. In the spring season, the tree is covered with huge magnolia-shaped scarlet blossoms, and the seed vessel when ripe yields a short-stapled fluffy cotton, used only to stuff pillows. The young tree and branches have short flat thorns. The tree is the "shálmali" of Sanscrit authors. The young flower buds are cooked and eaten in some places.

1855.—[47]. **Boswellia glabra.**

Vern. Syn.—Salhi.

This tree is very rare to the west of the Jumna. It yields the odoriferous gum resin called "gúgal."

1856.—[48]. **Bignonia suaveolens.**

Vern. Syn.—Sammí.

Good wood, not common.

1857.—[49]. **Buddleia crispa.**

In Waziristán "spera wana" (Pashtú); called "dhúrú" about Chamba; and "chitta búti" (Murree, &c.)

1858.—[50] **Buchanania latifolia.**

Vern. Syn.—Chiraulí.
Dhan.

Common for some distance west of the Jumna, in the Lower Hills.

1859.—[51]. **Butea frondosa.**

Vern. Syn.—Dhák, palás.
Chichrá or chachrí (Rawalpindi).

The timber is tough but not durable, and is used extensively for fire-wood. Excepting stray specimens, it is not found south of Lahore or west of Rawalpindi. The flowers, "kesu," are used as a dye. The tree exudes an astringent gum, called East Indian kino (kamarkas). Large quantities of the leaves are brought into Lahore every day. They serve as dishes and plates, or as wrappers, in which the bunyas and sweetmeat sellers deliver their wares—as sugar, atta, curds, &c., &c. They sell at one or two pice per seer.

1860.—[52]. **Buxus sempervirens.** Box.

Vern. Syn.—Shamshád. | Papér (Jhilam).
Páprang or chikri (Kanáwar). | Páprí and pappar (Salt Range).

Wood hard, heavy, and nearly as compact as the box-wood of Europe. It grows at an elevation of 6,000 feet. Used in the Schools of Art throughout India for wood engraving. It is in demand for plugs for Minie rifle balls, and at the Medical Store at Sealkot it is turned into pill boxes; it is useful for trenails and wedges. The wood is liable to split in the hot weather, and should be seasoned, and stored under cover. Found in the valleys of Sutlej, Parbati, and near Dharmsalla, and in the Salt Range; sometimes attains a girth of 20 inches, or more.

"The Himálayan box appears to be identical with the tree common all over South Europe, from Gibraltar to Constantinople, and extending into Persia. It is found chiefly in valleys, at an elevation of from 3 to 6,000 feet. I have met with it from Mount Tira near Jhilam to Wangtú bridge on the Sutlej. It is variable in size, being generally 7 to 8 feet high, and the stem only a few inches thick, but attaining sometimes a height of 15 to 17 feet, as at Manikarn in Kúlú, and a girth of 22 inches as a maximum. The wood of the smaller trees is often the best for the turner and wood engraver. It is made into little boxes by the villagers for holding ghí, honey, snuff and tinder.

"The olive "zaitún," (and kau) which has also been tested for wood engraving at the Madras School of Arts, is another plant of the Mediterranean Flora, which range from the coast of the Levant to the Himálaya. It varies a good deal in the shape of its leaves and in the amount of ferruginescence, hence the synonyms *cuspidata* and *ferruginea*; but it does not appear to differ specifically from the *Olea Europea* (Mount of Olives), the emblem of peace and plenty. The finest specimens I have seen are in the Kaghán and Peshawur valleys, where the fruit resembles that of rocky sites in Palestine or Gibraltar. The wood is much used for combs and beads—and is found to answer for the teeth of wheels at the Madhopúr workshops."

1861.—[53]. **Cæsalpinia sepiaria.**

Vern. Syn.—Phalwaí (Hazára and Murree).
U'rn, urní (Kághán, &c.)

1862.—[54] **Calotropis procera.**

Vern. Syn.—Ak. | A'k (Hindústán)
Madár. | Spulmei (Pashtú).

Not a regular wood, but a specimen of sufficient size was sent for exhibition to warrant its insertion (*See* under "Fibres," &c.)

1863.—[55]. **Callicarpa incana.**

Vern. Syn.—Putharman (Murree Hills).

Common in low Hills: a shrub.

1864.—[56]. **Calligonum polygonoides.**

Vern. Syn.—Phog.

The wood is small. The flowers called phoglí are eaten.

1865.—[57]. **Capparis aphylla.** Leafless caper.

Vern. Syn.—Karíl. | Kírra (Pashtú)
Karír.

Yields a hard wood which is used for turning, and rafters in some places: white ants will not

touch it; it is also a good fire-wood, burning even when green. The fruit is eaten, both raw and preserved; and the young flower buds are preserved as a pickle—the fruit causes, when eaten largely, severe constipation.

1866.—[58]. **Capparis spinosa.** European caper.

Vern. Syn—Bassar (Kanáwar, along the Sutlej). Kebarra (Pashtú). Kaur, kerí (Salt Range).

Abundant in the Salt Range and Lower Himálayan formations and elsewhere on limestone soil. The wood is very small. It is probable that the carob tree (*Ceratonia siliqua*) would succeed well in places where *C. spinosa* grows. In the island of Malta, with dolomite limestone soil, both trees flourish profusely.

The *Ceratonia siliqua* has been tried at Madhopúr, and other places and succeeds fairly well: one tree in Lahore has given fruit, but most of the larger ones are males.

1867.—[59]. **Careya arborea.**

Vern. Syn.—Khúmbi.

Wood of little use. The tree is not often met with in the Punjab, either wild or cultivated; the bark serves as cordage, and is used for slow matches.

1868.—[60]. **Carissa diffusa.**

Vern. Syn.—Garna.
Garunda (Murree hills).

In Rawalpindi collections, Kangra, and passim. In the plains, to a little way from the outer Hills.

1869.—[61]. **Carissa edulis.**

Vern. Syn.—Karonda.

The wood of this shrub is only used as a fuel. It is common in Kangra, cultivated in the Plains, and the fruit is made into an excellent jelly. Elevation from 3,500 to 5,000 feet.

1870.—[62]. **Carpinus viminea.** Himalayan hornbeam.

Vern. Syn.—Chamkharak.

The wood is hard and heavy, and is esteemed by carpenters. The tree is rare in the Punjab, and is perhaps not found west of the Sutlej. Elevation, 5,500 feet.

1871.—[63]. **Casearia tomentosa.**

Vern. Syn.—Chílah (Kangra, &c.)

A large shrub: the seeds used for poisoning fish.

1872.—[64]. **Cassia fistula.**

Vern. Syn.—Kanyár or amaltás.
Girdnalli (Dera Ghází Khán).

The wood is small and often crooked. It is plentiful in the outer hills of the Punjab. The bark is used for tanning. The tree is very ornamental in the spring season from its beautiful drooping yellow flowers, which far surpass the English laburnum. Dr. Stewart* remarks that, "its timber is worthless, very brittle, and peculiarly liable to the attack of insects."

* Bijnore Forest and its Trees.

1873.—[65]. **Casuarina equisetifolia.** Beef-wood (introduced).

The timber is so hard and tough that it damages native tools. It is an excellent wood for piles and posts, bears a great strain, and is said to last well under water. This tree was introduced a few years ago from Arracan, and is now cultivated at Lahore, Jálandhar and Madhopúr, &c. It prefers a sandy soil, and is of straight and rapid growth. It is very well suited for canal and railway plantations. *Casuarina muricata* and *Casuarina torulosa*, have been introduced at Madhopúr and other places.

1874.—[66]. **Cedrela toona.** Toon tree.

Vern. Syn.—Tún.

This wood is hard and durable, of a reddish color, and is the best furniture wood in Northern India. The Jaswan Dhún was once famous for toon-wood, but few trees are left. It grows along the outer hills as far west as Hazára, and ought to be extensively planted on the banks of canals and water-courses. Elevation, 3,000 to 6,000 feet. It is not very easy to raise, but thrives afterwards in the Plains. It succeeds admirably at Delhi, and many other places.

1875.—[67]. **Cedrela toona, var. Serrata.** Hill toon.

Vern. Syn.—Darl or darli (on the Sutlej and Beás.
Dimri, drawa or dráb (Hazára).
Khishing or khanam (Kanáwar).
Der (Chenáb and Chota Lahaul).

Like some other open grained woods, it resists water well.

The wood is open grained, lighter in color and inferior to the last. It is common in the Murree Hills, where the real tún hardly grows at all, except in one or two places. The tree is easily distinguishable by the immense size of its serrated or pinnate leaves, which hang in graceful clusters like a palm tree. I measured an ordinary leaf, and found it 30 inches long, having 15 pairs of leaflets, opposite and flat, all except the 4 end leaflets, which are usually turned in a direction transverse to the rest. The tree is more distinguished by its long racemes of flowers.* This is the "túní" of the carpenters of the plains.

1876.—[68]. **Cedrus deodara.** Deodar or Himálayan cedar.

Vern. Syn.—Díár, paluddar (Hazára and Kaghán).
Palŭrr (Chilás).
Kelú, kelí, keorí (Kúllú and Béas).
Deodar, díár (Kashmír).
Kalain, kilaí (towards the Dhauládár range).
Kelú, kelí, kilár, dadá, díár, káloń (Chamba, Chenáb and Rávi).
Kelú, kiálí, kaiwal, kelmang (Basahír, Kanáwar, &c).
Gyam (Thibet).
Deodar or díár (Kamaon and Garhwál).
Nashtar† (Persian and Pashtú).

The most valuable wood of the Punjab Himálaya, very durable, and easily worked, of a yellowish color, straight grain, and fragrant with resin, which preserves it from insects. It grows at an elevation of from 6,000 to 8,000 feet. The deodar forests of Chamba and Basahir, and the Kashmír territory, are of great value. The tree often attains a height of 100

* Dr. Cleghorn.

† Nashtar is a Persian word, the only one in the language for all kinds of pines from the chil upwards. It is imported into the Pashtú language.

to 120, sometimes over 200 feet, and a girth of 20 to 25 feet; one large one having been measured of 42 feet in circumference close to the base. It is now supposed to be identical with the Cedar of Lebanon. *

Celastrus spinosa. *(See Gymnosporia).*

A mere shrub. Some parts of the Lower Hills. This and the following are now known to be the same as *Gymnosporia spinosa.*

1877.—[69]. **Celastrus parviflora.**

Vern. Syn.—Sur-aghzai (red thorn; in Pashtú).

1878.—[70]. **Celtis Caucasica.** Nettle tree.

Vern. Syn.—Karrak or kirki (Kangra). | Tághun or takpun (Pashtú).
Kar (Kanáwar). | Wathamman (Salt Range).
Kargam (Pangi). | Batkar (Murree Hills).
| Kúrg (Pangi, &c.)

The timber is rather soft and used for fire-wood. It is a large rapid growing tree, common in the hills. Its bark is used as cordage. There is a *Celtis*, called "nuni," in the Kangra valley.

1879.—[71]. **Celtis eriocarpa.**

Vern. Syn.—Koo.

The bark used for making shoes. Grows at 6,000 feet.

1880.—[72]. **Celtis Nepalensis.**

A sample of the wood (5262) from the Murree Hills, is in the Rawalpindi list, by the name of "batkar."

1881.—[73]. **Cerasus puddum (Prunus puddum).** Bird-cherry.

Vern. Syn.—Paddam.

Chumyárí (Murree Hills). | Amalgúch (Kaghán, STEWART).
| Pájá (Kotgarh).

Wood hard and close grained, of a reddish color, procurable 15 to 20 inches in circumference, occasionally used for furniture, and makes excellent pipe-sticks. It is found as far west as the Indus. The fruit is sold in Simla bazar. It grows at from 3,000 to 7,000 feet. The *Cerasus communis*, a congener of this, probably yields the "gílás," or Kashmír cherry, and the "árubálú" or Kábul cherry.

Cerasus cornuta (Prunus padus). Bird cherry.

Vern. Syn.—Jámuna.
Páras (Kaghán).

(See *Prunus padus*).

1882.—[74]. **Cinnamomum albiflorum.**

Vern. Syn.—Dárchíní.

* The principal alleged difference, viz., that the cones of the cedars are persistent, and those of the deodar deciduous, is founded on error. The difference between the resinous qualities, color, and hardness of Lebanon cedars grown in their native places and in England, appears quite as great as the difference between the Lebanon cedar and the deodar (*see* HOOKER and THOMSON'S "Introductory Essay," p. 31. Any one wishing to study the details of deodar growth in the hills, should study DR. STEWART'S "Chenab and Ravi Forest Report," published as a Supplement to "Punjab Gazette," 20th Sept., 1866, and DRS. BRANDIS and STEWART'S Report on the Deodar of Bahir Forests (1865).

A small quantity grows in Bakot, Hazárá. The wood is of a reddish color, and the bark pleasant flavored, and is in fact Cassia or Cinnamon (5440). The tree is rare in Chamba.

1883.—[75]. **Citrus aurantium.** Orange.

The timber is hard, but not available in quantity, as the tree is scarce, and so much valued for its fruit.

1884.—[76]. **Colebrookia oppositifolia.**

Vern. Syn.—Basoti (Kangra).

Abundant at lower heights, and the Himálaya, &c. Wood used for gunpowder charcoal.

1885.—[77]. **Conocarpus latifolius.**

Vern. Syn.—Dhao (Kangra, &c.) | Chál (Cis-Sutlej).
Kúládhán. |

Called "chál" towards the Jumna. Yields a good, hard, strong timber; makes fine buggy shafts, and scabbards for swords (JAMESON). It is common in the Kangra valley, but of small size; also in all the Lower Hills to some distance west of the Jumna.

1886.—[78]. **Cordia angustifolia (Subopositifolia).**

Vern. Syn.—Gondi.
Gondní.

A small tree. Wood tough; used for making carriage poles. Not uncommon: planted in the Plains.

1887.—[79]. **Cordia myxa.**

Vern. Syn.—Lasúra.

Wood soft but good for fuel. Common: planted in the Plains. The tree attains a considerable size in Kangra and Hushyarpúr.

1888.—[80]. **Cordia Macleodii.**

There is one tree of this in the province. It was introduced from Central India. Its wood approaches teak in its properties.

Cordia vestita. (See *Gynaion.*)

1889.—[81]. **Coriaria Nepalensis.**

Vern. Syn.—Gúch. | Kanide, padára (Rávi).
Tadrelú, balel (Kashmír). | Shere (Kanáwar).
Líchakhro, armúra, phaphar chor; &c. (Kangra). |

Wood of small size, very prettily grained.

1890.—[82]. **Cornus macrophylla.** Dog-wood.

Vern. Syn.—Haleo. | Kandrú (Kághán, &c.)
Kágshi (Sutlej valley CLEGHORN). | Shtá or shká (Kanáwar).
Kandar. | Harrú (Chenáb).

Wood hard but small, and not available. Grows at an elevation of 7,000. Its charcoal is used in making gunpowder.

1891.—[83]. **Cornus oblonga.**

Vern. Syn.—Bakár (Cis-Sutlej, Kalesara, &c.)

A small tree, occasionally in the outer hills in the east of the Punjab.

1892.—[84]. **Corylus lacera.** Hazel.

Vern. Syn.—Tángi, thangoli (Chenáb, &c.) | Geh (Kanáwar). | Urní (Kágháń). | Bankimu (Sutlej valley, Cleghorn).

Timber elastic but small; used in making rings for coolies, hoops, walking-sticks, &c. Elevation, 8,000 feet.

1893.—[85]. **Corylus colurna.**

Vern. Syn.—Jhanji (Kúlú).

A good sized tree. Called "sharoli" on the Parbati river (Cleghorn).

1894.—[86]. **Cotoneaster baccillaris.** Indian mountain ash.

Vern. Syn.—Rauńs. | Kharwé (Pashtú). | Lún or lúni (Murree Hills).

A hard, heavy, close-grained wood. Excellent for alpen-stocks, and seems suitable for turning. Elevation, 8,000 to 10,000 feet.

1895.—[87]. **C. rotundifolia.**

Vern. Syn.—Khiroba (Pashtú), Waziristán (Dr. Stewart).

1896.—[88]. **C. obtusa.**

Vern. Syn.—Síchú, jalidar (Salt Range).

1897.—[89]. **Cratægus crenulata.** Whitethorn.

Vern. Syn.—Gengáru.

Wood very strong, but small. Used for making sticks. Elevation, 3,000 to 7,000 feet.

1898.—[90]. **Cratægus oxyacantha.**

Vern. Syn.—Ghwardza (Pashtú).

Ban sinjli or sinjli (Kágháń). | Piṅgyàt or pinyát (Chenáb and Rávi).

Not uncommon in various parts of the Himálaya at 5 to 9,000 feet. Fruit not unpalatable.

1899.—[91]. **Cratæva religiosa.**

Vern. Syn.—Barna.

The wood is rather soft, and is used for carving models. The tree attains a large size in alluvial soil. The mucilage of the fruit furnishes a cement.

1900.—[92]. **Cupressus sempervirens.**

Vern. Syn.—Sarú (sarv).

The wood is remarkably durable, but the tree flourishes only when cultivated, in the Punjab.

1901.—[93]. **Cupressus torulosa.** Twisted cypress.

Vern. Syn.—Deodara (Kúlú and the Béas). | Devidiár (Chenáb and Rávi). | Leuri (east of Sutlej). | Ne,ur (in Kotgarh list). | Galla, gallain or kallian (Sutlej). | Súraí (Kamaon).

This tree produces a useful, yellowish, exceedingly fragrant wood, but it is scarce in the Punjab Himálaya, and also sparingly on the Rávi. It occurs near Simla, on the Parbati, in the Upper Beás valleys.* It has been found most valuable for roofing and other purposes at Nynee Tal. Its elevation is from 6,000 to 8,000 feet.

1902.—[94]. **Cydonia vulgaris.** Quince.

Vern. Syn.—Bhí or Bihí.

Grows in great abundance at Nagar in Kúlú (CLEGHORN); and not uncommonly elsewhere, cultivated. The seeds are used as a medicine, called *bíhí dána.*

1903.—[95]. **Dalbergia Ougeinensis (Ougeinia dalbergioides).**

Vern. Syn.—Sandan.

The wood is hard: used for wheels and helves of axes, but it is a small tree, and scarce in the Punjab. It occurs occasionally in the Lower Hills as far west as Rajaori, beyond the Chenab.

1904.—[96]. **Dalbergia robusta.**

Wood hard. This tree is not known to grow wild in the Punjab, but it is worthy of introduction.

1905.—[97]. **Dalbergia sissoo.** Sissú tree.

Vern. Syn.—Shísham or táli.

Shawa (Pashtú).

Shísham wood is hard, strong, tenacious and compact, and is the best hard-wood of the Punjab. Its great durability renders it one of the most valuable timbers in India. It is used for gun-carriages, furniture, agricultural implements, and is well suited for railway sleepers. It is a tree of great beauty and rapid growth, and is reared with facility, early attaining a good working condition of timber. It cannot be too extensively planted throughout the Punjab.

1906.—[98]. **Daphne oleoides.**

Vern. Syn.—Kuttí or kutilál (Murree Hills, Hazára, and elsewhere). | Zhíkak (Kanáwar). Laghunai (Pashtú).

Its chief value is for its bark (*See* under Fibres, Class IV., Sub-class E.)

The wood is hard and white. *D. cannabina* is another species, called niggi (Béas), jekú (Sutlej), sannarkat (Hazára and Kashmír).

1907.—[99]. **Desmodium tiliæfolium.**

Vern. Syn.—Chamkát (Murree Hills).

Kalanchi.

The bark is also a paper making material, and the tree grows to a larger size than the last-mentioned: the wood is close-grained, and a pale whitish yellow.

1908.—[100]. **Desmodium argenteum.**

Vern. Syn.—Múss (Kanáwar).

Chiefly on the Sutlej. Very strong temporarary ropes made from its bark.

1909.—[101]. **Desmodium sp———?**

Vern. Syn.—Múrb (Sutlej valley).

Brí and kathi (Kúlú), (CLEGHORN).

* CLEGHORN'S "Report on the Forests of the Western Himálaya," p. 74.

1910.—[102]. **Deutzia staminea.**

Vern. Syn.—Phul kanri (Hazára). | Sai (Chamba).
Phurilí (Kashmír). | Arúchí, deús (Bassáhir).

A small sized wood, white and close-grained.

1911.—[103]. **Diospyros lanceolata.** Hill ebony.

Vern. Syn.—Tendú or tindú.

Timber good, but scarce.

1912.—[104]. **Diospyros lotus.**

Vern. Syn.—Amlok or málok (Kaghán).

In parts of Hazára the male plant is called "gwalidar," and the female "amlok." Timber good, but only available in Hazára, where it is known and valued chiefly for its fruit, which is purple in color, and about the size of a pigeon's egg: it is eaten either fresh or dried.

1913.—[105]. **Diospyros montana.**

Vern. Syn.—Hírak or hirek (Hushyarpúr).

A small tree: not common in the Punjab.

1914.—[106]. **Diospyros tomentosa.** Hill ebony.

Vern. Syn.—Mitha tendú.

The wood is hard and heavy, of a dark brown or black color, but the tree is rare in the Punjab.

1915.—[107]. **Dodonæa Burmanniana.**

Vern. Syn.—Sanatta or santá, alyár (Rawalpindí, also Salt Range). | Mírandú (Kangra).
Ghuraskai or wuraskai (Pashtú).

The wood is very tough, of a white color, and is used for carving. Grows abundantly in the Lower Hills, and in the Plains when cultivated. It is a good hedge plant. There is another species of *Dodonæa*, with broad leaves, growing in the Badámí Bágh of Lahore.

1916.—[108]. **Ehretia aspera.**

Vern. Syn.—Chamror. | Lor (Pashtú).
Púna (Rawalpindí, Kághán, &c.) | Saggar, baddí kánder (Salt Range).

Yields a good but small timber. Not uncommon to Trans-Indus.

1917.—[109] **Ehretia serrata.**

Similar to the last, not uncommon in the lower Himálaya.

1918.—[110] **Eleagnus conferta.**

Vern. Syn.—Gehai or gawái, or rúl (Sutlej valley). | Sanjatá (Pashtú).
Rinsot (Kanáwar). | Kalkoli or kankol (Kaghán).

The wood is small, and somewhat resembles *Cratægus* in its qualities. The fruit is edible, and called "sanjad."

1919.—[111]. **Elæodendron Roxburghii.**

Vern. Syn.—Jamoa.

Rare in the Lower Hills west of the Jumna. The wood is not valued.

1920.—[112] **Emblica officinalis.**

Vern. Syn.—Aoňla.
Amlá.

The timber is hard, of a nut-brown color, and is good for making boxes. The fruit is very acid. Common wild in outer Hills, and cultivated occasionally in the Plains.

1921.—[113] **Erythrina stricta.** Coral tree.

Vern. Syn.—Dhol dák. | Anashtar (Plains).
Bartho (Hills).

The wood is white and soft: used for scabbards and for "chalnis," or sieves. Cultivated in the Plains and wild in outer Hills.

1922.—[114]. **Eriobotrya japonica.** Loquat.

Vern. Syn.—Lukát.

Cultivated only as a fruit tree in gardens.

Eugenia jambolana. *See* **Sizygium.**

1923.—[115]. **Euphorbia Royleana.**

Vern. Syn.—Chún.
Thóhr.

This grows much in the Lower Hills wild, and on the Plains as a hedge plant. It frequently attains to a considerable height. I have seen specimens from 20 to 30 feet high, and I believe still larger ones might be found. When old the stem contains a regular, though loose and fibrous wood; the wood has at its centre a formation of pith in parallel cells or layers. This central axis always retains the original pentagonal or hexagonal form, although the whole stem has lost it through age and growth. Dr. Henderson informs me that the leafless *Euphorbia* often has a stem 18 inches in diameter, and that it is used for fire-wood.

1924.—[116]. **Euonymus fimbriata, or E. Hamiltonii.**

Vern. Syn.—Síkhí (Murree, &c.). | Battal.
Barphulí (Kághán). | Pápar.

Wood hard and useful, and beautifully smooth and white.

1925.—[117]. **Eucalyptus.**

Several species have been introduced and are growing well in the Agri-Hort. Society's Garden: as yet they can be hardly called Punjab woods. There are a number of these trees growing at Madhopúr over 60 feet in height.

1926.—[118]. **Falconeria insignis.**

Vern. Syn.—Lodhar (Kangra).

1927.—[119]. **Feronia elephantum.** Wood apple.

Vern. Syn.—Kait.

Yields a strong, heavy wood, which is however not procurable in any quantity in the Punjab. A gum somewhat like gum arabic is obtained from the ripe fruit.

1928.—[120]. **Ficus caricoides.**

Vern. Syn.—Anjíri. | Kak or kok (Kanáwar).
Phagwárí. | Kuwári or puári (Kaghán).
Indzar (Pashtú.) | Phág (Kaghán).

A specimen of this wood (4999) was sent from the Delhi district. Common in the Himálaya, and fruit occasionally excellent.

1929.—[121]. **Ficus glomerata.**

Vern. Syn.—Gúlar (Hindustání). | Palák (Salt Range).
Rúmar or rúmal (Kangra).

Timber soft: called "glomerata" on account of the fruit, which gathers in clusters on the trunk at the branch joints.

1930.—[122]. **Ficus indica.** Banyán (this name is not used in Punjab).

Vern. Syn.—Bar or bargat.
Bór.

The wood of all the *Ficus* family is soft, and seldom used except for fire-wood. *Ficus indica* and *Ficus religiosa* are not allowed to be cut by villagers. The leaves afford valuable food for camels. The aerial roots were much used by the Sikhs for making slow matches for their matchlocks. The roots are beaten to separate the bark, and the fibres are twisted into a match and dried. The roots of *Acacia modesta* were similarly used, and elm bark in the Hills.

1931.—[123]. **Ficus oppositifolia.**

Vern. Syn.—Dhúra (Kangra, &c.)

1932.—[124]. **Ficus Roxburghii (macrophylla).**

Vern. Syn.—Timbal. | Phedu or ferú (in Chamba List).
Trimbal (Kangra). | Rumul (Kaghán).
Thossa.

The fruit is sold in the bazar of Simla, and has a pleasant flavor. The tree grows at a height of 5,000 feet.

1933.—[125]. **Ficus religiosa.**

Vern. Syn.—Pípal.

1934.—[126]. **Ficus venosa.**

Vern. Syn.—Pilkan (Hindústání).
Kahimmal (Salt Range).

Not uncommon: wild at low elevations in Hills.

1935.—[127]. **Flacourtia sapida.**

Vern. Syn.—Kangi. | Kuké (Murree Hills).
Kandai. | Kakú (Salt Range).

Common, chiefly in outer Hills.

1936.—[128]. **Flacourtia sepiaria.**

Vern. Syn.—Sharáwani (Dera Ismaíl Khán).
Dajkar, jidkar (Salt Range).

Its thorny branches make good fences. It is common in the Salt Range.

1937.—[129]. **Fothergilla involucrata (Parrotia Jacquemontiana).** Witch hazel.

Vern. Syn.—Kílar (Pangi). | Po (Kashmír).
Pasér or pasérí (Hazára), or pishor (Kághan, &c.) | Spilécha (Pashtú).
Shá (Kanáwar).

Wood hard and tough, used for pegs, and in-door work. The tree is common in Kashmír and

Chamba, but is of small size; it is used in Pangi, and wherever it grows, for the suspension twig bridges, called "jhúlas."

1938.—[130]. **Fraxinus floribunda.** Large ash.

Vern. Syn.—Sannan.
Sunnu, súm (Hazára and Kangar ?)

Is an excellent, strong, tough, elastic wood, like English ash. Only found in Hazára, especially in the Mochpúra and Thandíání ranges, and Pangi; and not abundant there.

1939.—[131]. **Fraxinus xanthoxyloides.** Crab ash.

Vern Syn.—Hanóch (Hazára).
Sargal (Pangi).
Thúm (Basáhír).
Hagai (Pashtú).
Kanóch (Kúlú), (Cleghorn).
Shillí and bará chur (Kishnganga river).
Núch (Kághán).

A good elastic wood of small size. Suited for staves, jampan poles, walking sticks, and for ploughs in Kághán. Grows at a height of 5 to 7,000 feet.

1940.—[132]. **Gardenia tetrasperma.**

Vern. Syn.—Kurkuní, túlikukar (Hazára).
Bandaru, pútkanda, dárú, bákshí (Kangra).
Jirndú (Rávi).
Bisindidi (Chenáb).

A mere shrub.

1941.—[133]. **Garruga pinnata.**

Vern. Syn.—Kharpat (*i. e.*, grass leaf).

The foliage is used as fodder. Its bark exudes a gum. The tree is not uncommon among the Lower Hills some distance west of the Jumna.

1942.—[134]. **Gleditschia triacanthos.**

Wood hard and dark. A fine thorny tree, introduced into the Punjab by the Agri-Horticultural Society.

1943.—[135]. **Gmelina arborea.**

Vern Syn.—Kúmhár.

The wood is light, of a pale yellow color, easily worked, and does not shrink or warp. It is very durable under water. It is used for picture frames, musical instruments, &c. The tree is not available in quantity west of the Sutlej, but is worthy of cultivation.

1944.—[136]. **Grewia Asiatica.**

Vern. Syn.—Fálsa.

Grows wild in the Kangra hills, and is cultivated in the plains. The fruit is edible, and much used to make sherbet as a cooling drink.

1945.—[137]. **Grewia betulæfolia.**

Vern. Syn.—Shikári mewa (Kúhat*).
Khírcha indzar (Pashtú).
Kanger (Salt Range).

A small shrub: common wild in Lower Hills, &c.

1946.—[138]. **Grewia elastica.**

Vern. Syn.—Dhamún.
Farrí, dháman, falwá (Salt Range).

* Stewart's "Notes on the Flora of Waziristan."

A strong, tough and durable timber: very good for buggy shafts. Elevation, 4,000 feet.

1947.—[139]. **Grewia oppositifolia.**

Vern. Syn.—Behul. | Pastawana (Pashtú).
Dhámnú. | Dámán (Kaghán), (Cleghorn).

The timber possesses similar properties with the last. It emits an offensive odor in burning; the bark is used as a fibre for ropes. The tree grows at an elevation of 5,000 feet. *G. elastica* is frequently confounded with this species.

1948.—[140]. **Grewia Rothii.**

Vern. Syn.—Battar, garges and níkí bekar (Salt Range). | *G. villosa*, jalidar, thamther, karkusrí. (Salt Range).

A small shrub: occasional in Lower Hills.

1949.—[141]. **Grislea tomentosa.**

Vern. Syn.—Dhau safaid.
Dháwí.

A specimen called "táwí" or "táaví," was sent from Murree Hills (8238). Common all over in low hills.

1950.—[142]. **Gymnospòria spinosa (Celastrus spinosus).**

Vern. Syn.—Jaliddhar.
Patákí, kander, phúphárí (Salt Range).

A specimen is included in the Shahpúr collection from the Salt Range (5316). It is made into walking sticks; and is common in most low hills.

1951.—[143]. **Gynaion vestitum (Cordia vestita).**

Vern. Syn.—Indak, karúk (Salt Range).

The wood is good and heavy, something like "kikar," but of small size; and in the Punjab is not much valued. It is used in making mill-wheels. The tree is not uncommon in the Lower Hills as far west as Rajauri.

1952.—[144]. **Helicteres isora.**

Vern. Syn.—Maror phallí.

Its seed vessel is curiously twisted or screwed up: also called "kupásí." It grows on the borders of the Jumna and in the Ambálah district. The seed is used in native medicine.

1953.—[145]. **Hippophae salicifolia.** Buckthorn.*

Vern. Syn.—Súrch (Sútlej valley). | Súts (Kanáwar).
Tserdkar† (white-thorn in Thibetán; it is called in books starbú). | Kálá bís (Kághán).

The wood of this thorny shrub is much valued as a fuel in the barren province of Lahaul. It grows at 10,000 feet above the sea level. The fruit has been tried preserved with sugar, but is not so used by natives. It is mentioned in Thibetan books on medicine as useful if boiled into

* The people in Kaghán confuse the willow, the *Hippophäe*, and tamarisk (*Myricaria*), and call all "bis."
† Communicated by the Rev. Mr Jaeschke, Moravian Missionary.

a syrup in diseases of the lungs, &c., &c. The branches are so much valued for dry hedges and for fuel, that they are considered as village property.

1954.—[146]. **Holarhena antidysenterica.**

Vern. Syn.—Kúra.
Kyúr (Kangra, &c.)

The timber is white and close-grained, and used by carvers. It is found in the Sutlej valley and in Kangra, but not further west.

1955.—[147]. **Hymenodictyon excelsa.**

Vern. Syn.—Barthoa (Hushyarpúr); thab?

Wood good: said to be used for scabbards and gun-stocks (?) The bark is intensely bitter, and possesses febrifugal properties.

Hyperanthera pterygosperma (See **Moringa**).

1956.—[148]. **Ilex dipyrena.** Wall.

Vern. Syn.—Kanelú (Chamba).

The wood is heavy, hard, and fine grained, much like common holly, and used for various purposes of carpentry.

1957.—[149]. **Indigofera arborea.**

Vern. Syn.—Káthí or kaintí.
Jand (Murree Hills).
Máthú (Chamba Hills).
Kástín (Kanáwar).
Dug-kentí (Kaghán), (Cleghorn).
Káskaí (Pashtú).

A shrub of no value as a timber tree. Elevation, 7,000 feet.

1958.—[150]. **Jatropha curcas.** Purging nut.

Vern. Syn.—Páharí arind.

Grows along the base of the Hills.

1959.—[151]—**Juglans regia.** Walnut.

Vern. Syn.—Akrót.
Ká (Sutlej Valley and Kanáwar).
Dún (Kashmírí).
Waghz (Pashtú).
Than, thaní (Chenáb district and Lahaul).

Produces a handsome, dark wood, much valued for furniture and gun-stocks. It is abundant in some parts of the Hills, but is generally cultivated and so much valued for its fruit, that little of the timber is available. Its elevation is from 7,000 to 9,000 feet.

1960.—[152].—**Juniperus excelsa. (J. arborea).** Pencil cedar.

Vern. Syn.—Leuri or suri (Sutlej).
Charai, chalai (Kaghán).
Devidear.
Dhúp* (Kághán).
Chilí (Chilás.)
Shúr, shurghú, or lewar or mewar (Kanáwar).
Shakpa (Chenáb in Lahaul).
Shúr, lewar (on Chenáb, &c.)
Dhúprí, chandan (Kamaon, &c.)

An excellent, hard, light wood, used for house and bridge building in Lahaul. Its strong fragrant odor keeps off insects. Fifty logs were brought down the Chenab† in 1862, and

* Is called because the twigs are burnt as a fumigatory for delirium in fever.
† "On this river it grows," says Dr. Cleghorn, "in considerable numbers from Tilaknath to Kyelang."

readily bought at Sealkot for cabinet purposes. This is positively stated by Dr. Cleghorn: but I am otherwise told that the timber is useless for such purposes. "It is the principal tree in the upper part of the Sutlej valley and in Lahaul. It forms small forests, especially on the southern slopes of the hills, at an elevation of from 9 to 12,000 feet. The tree seldom attains 30 feet in height and 6 feet in girth, but Thomson mentions one perhaps 40 feet high; and I measured one below the monastery at Kyelang 13 feet in girth."—Cleghorn. In Kághán, I have seen the tree much larger, one 14 feet, and one near Lulusar, 19 feet in girth. In Stewart's "Chenab Report," much larger sizes are mentioned, viz. 30 and 33½ feet; the trees were very stunted in height however, and had to contend with the heavy snow-falls. The bark is red, separating into laminæ like birch, and apparently a good material for brown paper. Jacquemont mentions, "that vessels are made of this wood for carrying milk and water in Kanáwar" (Voyages, II., 373).

1961.—[153].—**Juniperus communis.**

Vern. Syn.—Langshúr (Kanáwar at Purbni).
Pethra (Kághán).

1962.—[154]. **Juniperus squamosa.** The creeping juniper.

Vern. Syn.—Páma or talu. | Pethri (Kaghán).
Theli (Kanáwar). | Bethal, pethal (Chenáb, &c).
Harang (Pangi).

Used as fire-wood on the high passes. Grows at from 12,000 to 13,000 feet.

To distinguish *J. squamosa* from *J. communis*, remember that the plant with the long scales is *J. squamosa*, and that with short ones is *J. communis*.

1963.—[155]. **Kydia calycina.**

Vern. Syn.—Polá or pulá.

This tree grows rapidly in the outer valleys, but is not common west of the Sutlej. Its bark is used to clarify sugar (Jameson).

1964.—[156]. **Lagerstrœmia parviflora.**

Vern. Syn.—Adhwári.

The timber is hard and tough, but the tree does not grow west of the Sutlej.

1965.—[157]. **Lawsonia inermis.**

Vern. Syn.—Mehndi.

A mere shrub, makes a good hedge; the leaves are used in dyeing. (See under "Dyes") p. 451.

1966.—[158]. **Lonicera quinquelocularis.**

Vern. Syn.—Pathli (Chamba Hills). | Jarlangai (Pashtú).
Phút (Kághán, Murree, &c.).

A large shrub, very abundant throughout the Himálaya.

1967.—[159]. **Lycium Europæum (or L. Edgeworthii).**

Vern. Syn.—Kangi.

In the jungles of the central plain districts of the Punjab.

1968.—[160]. **Mangifera Indica.** Mango.

Vern. Syn.—Amb.
A'm.

The wood is open, yet durable if not exposed to wet; it is liable to be worm-eaten. It is much used for packing chests, and Bareilly chairs are generally made of this wood.

1969.—[161]. **Marlea begonifolia.**

Vern. Syn.—Chitpatra (Kaghán). | Padlú (Rávi).
Síálú (on the Wardwan, Kashmír). | Budánár, memoká (Kangra).

The *M. affinis* of some writers; quite an Eastern Himálayan species, but occasionally known in Kaghán and Kashmír.

Melia azadiracht. (See **Azadirachta indica**).

This tree is not common in the Punjab, as it requires moisture. In Hindústán it grows to a large size and yields a good wood. The leaves are also valued (*see* Drugs).

1970.—[162]. **Melia sempervirens.**

Vern. Syn.—Bakain.
Drek.

Very common in the Punjab, where it supplies the place of the "nîm." The wood is not bad.

1971.—[163]. **Michelia champaca.**

Vern. Syn.—Champa.

The wood is close-grained and handsomely marked, but the tree is very scarce, only known in the Punjab as a cultivated tree, and in the valleys of the Kangra district. (*See* Barnes' Settlement Report, p. 18).

1972.—[164]. **Mimosa rubicaulis.**

Vern. Syn.—Rál (Murree Hills, &c.)
Allá (Salt Range).

Always small, and of no value for its wood.

1973.—[165]. **Mimusops elengi.**

Vern. Syn.—Maulsirí.

Wood soft. Only cultivated in the Punjab; there are some fine specimens in the Amb garden.

1974.—[166]. **Mimusops kanki.**

Vern. Syn.—Khirni.

Also cultivated.

1975.—[167]. **Morus alba.**

Vern. Syn.—Tút.

1976.—[168]. **Morus lævigata.** Mulberry.

Vern. Syn.—Tût.

Grows both in the Hills and Plains.

1977.—[169]. **Morus sinensis.**

Vern. Syn.—Chín-ki-tût.

Imported from China, and yields the best food for silk-worms.

1978.—[170]. **Morus parvifolia.**

Vern Syn.—Karan or tût, or tútrí (Dr. Cleghorn.)

The wood of all old mulberry trees is hard and highly esteemed; it is used for furniture,

parts of boats, &c. Grows in the Hills at elevations varying from 4,000 to 7,000 feet. The leaves form a valuable fodder for cattle.

1979.—[171.]. **Morus serrata.**

Vern. Syn.—Kímú (Kangra).
Ansoá (Kanáwar).

A *Morus* like this is marked on the specimen "chamú ghar ká" (Kotgarh.)

1980.—[172.]. **Myrica sapida.** Box myrtle.

Vern. Syn.—Kaiphal.

The wood in grain is very like birch, but of a darker color. The tree is occasionally met with in the Hills from 4,000 to 6,000 feet, but the wood is not generally sold in the bazars. The ripe fruit is used for sherbets.

1981.—[173.]. **Myricaria sp——** ? *(M. germanica)*

Vern. Syn.—Hombú (Kanáwar).
Bis (Kaghán).

1982.—[174]. **Nauclea cordifolia.**

Vern. Syn.—Haldí or kaddam.

The wood is rather soft and of a yellow color. It suffers from being put in water. It is used for making slates for scholars in native schools.

1983.—[175]. **Nauclea parvifolia.**

Vern. Syn.—Khaim or phaldu. | Kalam or karam (Punjabí).

The wood of this species is rather superior to *N. cordifolia.* It is used for planking, packing boxes, &c. Both species are found in Hushyarpúr and Kangra, and might be suitable for sleepers if impregnated with mineral salt.

1984.—[176]. **Nerium odorum.**

Vern. Syn.—Kaner.
Gandehra (Kúlú, &c.)

A mere shrub; wood very poisonous.

1985.—[177]. **Nussiessya hypoleuca (Bœhmeria salicifolia).**

Vern. Syn.—Sihárú.

A shrub. A small specimen of the wood is in the collection. Elevation, 6,000 feet. (*See* "Fibres.")

1986.—[178]. **Nyctanthes arbortristis.**

Vern. Syn.—Karrí. | Kúrt (Kalesar, &c.)
Harsinghár.

Common in the Lower Hills as far west as the Rávi. It has rough scabrous leaves,* and the flowers yield a yellow dye for silk.

1987.—[179]. **Odina wodier.**

Vern. Syn.—Kemal or kyámal (Murree Hills). | Dúla (Shahpúr).
Jingan (Simla Hills, &c.) | Kamlai, kambal (Salt Range).

* CLEGHORN'S "Notes of the Vegetation of Sutlej Valley," p. 12.

1988.—[180]. **Olea Europea,** (L.); **Ferruginea** (ROYLE); **Cuspidata** (WALL). Olive.

Vern. Syn.—Kahú, kau. | Wí (Sutlej Valley).
Khwan or khowan (Trans-Indus). | Wili (Kanáwar).
Kán (Pangi, the Chenab, &c.)

The wood is strong, hard, heavy and compact, good for all mechanical purposes, but generally not obtainable of large size. In the Salt Range, however, specimens are not unfrequently met with having stems from 2 to 3 feet in diameter. It is used for the teeth of wheels in the Madhopúr workshops, for combs, tool handles, &c. It is found in the hills of the East Punjab, but is more common in the Salt Range, Hazára, and the valley of the Indus, from 3,000 to 5,000 feet, along with *Quercus ilex.*

Ougeinia dalbergioides. See *Dalbergia.*

1989.—[181]. **Paliurus aculeata.**

Vern. Syn.—Thúm (Kanáwar).

1990.—[182]. **Parkinsonia aculeata.**

Vern. Syn.—Wilaiti kikar.

The wood is only used for fuel, it makes good charcoal. It has been naturalized in the Punjab, and is planted for fences, for which it is well adapted.

Parrotia Jacquemontiana (see *Fothergilla involucrata*).

1991.—[183]. **Pavia indica.** Indian horse chestnut.

Vern. Syn.—Gúńh, gúah or júah (?)* (Kúlú). | Banákhrot (wild walnut).
Tonjaga (Pashtú). | Banakhor, bankhor.
Pú (Kanáwar). | Gúgaí (Chenáb, Lahaul, &c.)
Knór.

The wood is white and soft, sometimes used for furniture, and turns well in the lathe. The tree is abundant in Kúlú and other parts of the hills, from 6,000 to 8,000 and 9,000 feet. It is a beautiful tree, yielding a grateful shade; the seeds are eaten by the hill people in times of scarcity; but require long maceration in water first, as they are very acrid.

1992.—[184] **Pentaptera tomentosa (P. glabra.)**

Vern. Syn.—Sain or asun (arjan).

An excellent, hard and compact timber, well suited for building and railway purposes. It is found in Kangra in Sub-Himálayan forests, and is not uncommon as far west as the Rávi, but not of a large size. It is well suited for avenues and plantations in the east Punjab.

1993.—[185]. **Phœnix sylvestris.** Wild date.

Vern. Syn.—Khajúr.

Rafters are made from this in the Múltán division; also pillars and water troughs. It yields a rope fibre.

1994.—[186]. **Picea webbiana (Picea pindrow).** The silver fir—Webb's pine.

* *See* CLEGHORN'S Western Himálayan Forest Report, p. 80.

Vern. Syn.—Toŋs (from Sutlej to Jhilam).
Pandur (Kotgarh).
Palúdar (Hazára).
Rewan (Kaghán).
Pé (Lahaul).
Dhúnú (Pangi).
Sal (near Badrawar).
Rrei (Chilás).
Ríyál, túng, birré (Kashmír).
Bajúr (Pashtú).
Pan, span or krok (Kanáwar).
Budil.
Pindrau, pandrai, chilrau, chilrai, khatrau thanera (Sutlej Valley and Basahir).
Moranda, rághá, raisalla (Kamaon, &c.)

It grows at an elevation of from 8,000 to 11,000 feet. The timber is not so much valued as that of the other pines—but is used for shingles in roofing, being cleft, not sawn, into pieces. To non-botanical eyes there is a kind of resemblance between this tree and *A. smithiana*, in their straight growth and ragged style of foliage; but on closer inspection the difference is great—the *A. smithiana* has a tassel-like pendulous style of branch, unlike the crisp, ragged boughs of Webb's pine: the leaves of Smith's pine are green, those of Webb's besides being much shorter, are dark green and white underneath.

1995.—[187]. **Pinus excelsa.** Lofty pine.

Vern. Syn.—Kail or kahl (Sutlej).
Dárchil (Chamba).
Partal (Kaghán, Jhilam, Chamba, &c).
Andal (Chenáb).
Lhím tser, chítí (Kanáwar, Chamba, &c.)
Bí,ár (Hazára).
Limanza (Pashtú).
Pínní (Kafir).
Shom shing (Lahaul).
Yárí (Kashmír).*

It grows at an elevation of from 7,000 to 11,000 feet, and its name "excelsa" refers to the elevation at which it flourishes, not to its stature, which in general is nothing remarkable, though specimens occur of 120 feet in height. It does not, however, grow as high as deodar. THOMSON mentions seeing a stunted tree at 12,500 feet in the north-east side of the Runang Pass (Kanáwar). The wood is white, free from knots, and so resinous as to be used for flambeaux. It is the principal building material at Murree; as it retains its resin, it is stronger and superior to all the other pines, and is much esteemed for charcoal for smelting iron ore in Basahir.

1996.—[188].—**Pinus Gerardiana.** Gerard's Pine.

Vern. Syn.—Rí (Kanáwar).
Neóza or chilgoza.
Chirr (?)
Mirí and galgoja (Pangi).
Kashtí (Ráví).

This tree grows beyond the range of periodical rains far among the hills, at elevations from 5,000 to 10,500 feet, and is indicative of a dry climate. It does not attain a large size,† and the wood is not used. It does not occur in Kaghán. The nuts are much prized as an article of food, and sell about 2 annas per seer in the hills.

1997.—[189].—**Pinus longifolia.** Long-leaved pine.

Vern. Syn.—Chil or chír.
Nashtar or nakhtar (Pashtú).
Salla and sarl (Hindústání, and in the Himálaya beyond Punjab).

* MADDEN. Observations on Himálayan *Coniferæ*, J. A. H. S., Vol. IV., p. 224.

† DRS. BRANDIS and STEWART mention, that the largest specimen they saw in the Busahir forests had a girth of 9 feet, Report on the Deodar Forests of Busahir, sec. 25, p. 12.

It grows at elevations from 1,500 to 7,000 feet, never in thick dense forests: the trees require light for their growth. From the facility of obtaining this wood, and its lower price, little else is used in many places, and in the dry climate of the Punjab it is found to last better than in the N. W. Provinces or Bengal. There are two varieties known to traders—one with straight, the other with twisted, fibre; the former is much preferred, especially when required for planks. The bark is employed in the preparation of charcoal, and the resin for dressing sores. The tree is thus described by BARNES*:—

"Advancing into the interior, the cheel (*Pinus longifolia*) forms the usual decoration of the hills. It grows luxuriantly on the northern declivities, and is seldom or never found on the *southern aspect of a range.*† This pine appears to be very hardy and adapted to a great variety of climate. I have observed detached trees in the Joala Mookhee valley, at an elevation of only 1,600 feet above the sea, and the same species is found on the snowy range, as high as 7,000 feet. In hot and exposed situations, the growth is stunted, and the wood worth little or nothing. In sheltered localities, however, the forest consists almost entirely of erect well-shaped trees, some of which will yield beams 30 feet long, and planks upwards of 2 feet in width. The luxuriance and compactness of the timber increase with the elevation, up to 5,000 or 5,500 feet; and the climate of this region appears the best suited for its development; above and below this point, the tree gradually deteriorates."

1998.—[190].—**Pistacia integerrima.**

Vern. Syn.—Kakar or kakraïn (Kangra). | Kangar (Murree Hills).
Kakrangche (Kanáwar).
Sarawán (Pashtú). | Khangar or kakkar (Salt Range, &c.)

A fine, close-grained timber, universally prized for ornamental furniture. Samples have been sent to the Exhibition from all the hill districts between Simla and Peshawur. The tree is often referred to as *Rhus acuminata.* It grows at 5,000 feet.

1999.—[191]. **Pistacia terebinthus.**

Vern. Syn.—Shue (Pashtú).

2000.—[192]. **Platanus orientalis.** Oriental plane.

Vern. Syn.—Chinár. | Chintar (Pashtú).
Búná, bú,íñ and boniñ (Kashmír).

The wood is rather soft, but beautifully marked, and is suited for doors, furniture, turnery, &c. The tree has been introduced from Kashmír, and is an excellent avenue tree. It is not, however, indigenous to the Kashmír valley. It never seeds there, and is always propagated by cuttings. All the trees found in Kashmír are in gardens or along roads, and have been planted. Sometimes its bark is attacked by a disease, or kind of hypertrophy, which produces a substance like cork. DR. JOHNSTON, of Gujrát, writes:—"While at a Punie, in the Neshát Bágh, in May last, I was struck with the appearance of an unnatural growth on the stem of the Eastern plane; it resembled cork in appearance, color, consistence, elasticity, cut with the same gritty creak, made good bungs; in fact was, to all intents and purposes, cork.

"I soon determined that it was no fungoid growth, and after careful investigation came to the conclusion that it was a homogenous hypertrophy of a cell constituent in the epiphlœum or outer layer of the bark. The mass removed by me weighed upwards of two seers; I regret its loss on the down march from Kashmír."

* Settlement Report Kangra District, sec. 143.
† This is very questionable indeed.—B. P.

2001.—[193]. **Poinciana regia.**

Introduced, and grows well in the Badamí Bágh at Lahore. It is not useful for timber, but is valued for the excessive beauty of its feathery foliage, which is of the most vivid green, and contrasts strikingly, when the tree is in flower, with its gorgeous scarlet blossoms.

2002.—[194]. **Pongamia glabra.**

Vern. Syn.—Karanj (Urdu). | Paphri or sukchain.
Rárá (Kangra).

The wood is said to be light, but useful for common purposes. The tree is not uncommon in Hushyarpúr, but small. Oil is obtained from the seeds, and the leaves are sometimes used as manure.

2003.—[195]. **Populus alba.** White poplar, or Abile.

Vern. Syn.—Sofaida. | Frás (Kashmír).
Spérdor or speldá (Trans-Indus). | Mál (Kanáwar).
Channan and chanúní (Chenáb, &c.)

The wood of all the poplars is soft, white, easily worked, and suited for carving. *Populus alba* is cultivated Trans-Indus and in Kábul; the boxes in which the grapes are exported are made of it. The tree grows to a large size in Pangi, and is used for roofing in Ladákh and Lahaul.

2004.—[196]. **Populus balsamifera.**

Vern. Syn.—Yarpa (Lahaul) CLEGHORN.

2005.—[197]. **Populus ciliata.**

Vern. Syn.—Pahári pípal. | Fálsh or palách (Kashmír).
Bagnú (Kaghán). | Chalún (Kotgarh).
Krammal (Kánawar). | Pábe and chanún (Chenáb).
Phálja (Hazára and Murree).

Wood not valued. Grows at 6,000 feet above the sea level. The coma of the seeds is good for paper material, and is seen lying like snow on the ground in many places.

2006.—[198]. **Populus Euphratica.** Euphrates poplar.

Vern. Syn.—Labhán. | Bahán (Pashtú).
Bhán,

The timber is good, not very hard, white or yellow, suitable for turning. The tree grows on the banks of the Indus and Chenáb. The twigs are exported and sold at Lahore and elsewhere for tooth-brushes.

2007.—[199]. **Populus fastigiata.**

Vern. Syn.—Safeda (Kashmírí).
Do (Kanáwar).

In Kashmír it is called "frast." A sample was sent from Amritsar (5151). *Populus nigra* is almost the same thing: it is planted near villages. Lahaul (CLEGHORN).

2008.—[200]. **Premna arborea?**

Vern. Syn.—Phakra.

2009.—[201]. **Prinsepia utilis.**

Vern. Syn.—Bhekar or bhekul. | Garandu (Murree).
Bhekling (Kanáwar). | Chamba (Kaghán, &c.)

Sample (5049), Simla collection. Elevation from 4,000 to 8,000 feet. Grown to form hedges (CLEGHORN). Its seeds yield oil.

2010.—[202]. **Prosopis spicigera (Prosopis stephaniana).**

Vern. Syn.—Jhand. | Aghzakár (Pashtú).
Kandi (in Dera Ghází Khán and Sind). | Sé (Salt Range).

Yields the chief supply of fuel to the Punjab Railway, being a frequent tree in the rakhs.

2011.—[203]. **Prunus domestica.** Plum.

Vern. Syn.—Aru Bukhára.
Alúcha.

Cultivated, wood not generally sound, but handsome, resembling pear or cherry. It is used in turning.—Not available in quantity (cultivated).

2012.—[204]. **Prunus insitita.**

The bullace plum of Europe: is indigenous in Kashmír.

2013.—[205]. **Prunus padus.**

Vern. Syn.—Jamún. | Bart (Kaghán).
Kálákát. | Páras (Kaghán).
Krún (Kanáwar).

The bird cherry (*Cerasus cornuta*), 5438. Grows at Simla, and at an elevation of from 7,000 to 10,000 feet. I have seen the people in the Murree Hills eating the black berries of this tree. A species of *Prunus*, called "litsi," ripens its fruit in September in Lahaul; its fruit is described by CLEGHORN as being sweet, and something like a cherry.

Prunus Armeniaca (*See Armeniaca*).

Prunus puddum (*See Cerasus*).

2014.—[206]. **Psidium pyriferum.** Guava.

The wood is small but very hard, and is used for handles of tools, mallets, &c. It is only cultivated in the Punjab.

2015.—[207]. **Pterospermum acerifolium.**

Wood hard and small, not available west of the Sutlej. Doubtfully wild.

2016.—[208]. **Punica granatum.** Pomegranate.

Vern. Syn—Dárú (wild). | Darúní (Kaghán).
Dárim (Hills, Murree, &c.) | Anár (cultivated).

Only brush-wood for fuel. In gardens sometimes forming inner fences.

2017.—[209]. **Putranjiva Roxburghii.**

Vern. Syn.—Putájan or jíapota.

A close-grained, useful wood, but small, and not plentiful.

2018.—[210]. **Pyrus aucuparia.**

Vern. Syn.—Battal (Kaghán).

The tree closely resembles, if it is not identical with, the mountain ash, or "rowan" of England and Scotland.

2019.—[211]. **Pyrus baccata.** Crab-apple.

Vern. Syn.—Ban mehal (Kúlú).
Choda (Hazára).

Wood hard and tough. Fruit eaten.

2020.—[212]. **Pyrus communis.** Pear tree.

Vern. Syn.—Naspáti. | Tangi.
Nák.

Wood good for carving; procurable 6 to 10 inches in diameter, but rare.

2021.—[213]. **Pyrus kumaonensis.**

Vern. Syn.—Dodar (Murree Hills, Kaghán, &c., Cleghorn). | Chôtta (Kaghán).
Maul (Chenáb).

2022.—[214]. **Pyrus malus.** Apple tree.

Vern. Syn.—Seb or pálu. | Mánra (Pashtú).
Chú,í (Pangi name). | Chúng or chúnt (Pangi and Chenáb).

Cultivated on account of its fruit. Wood pretty hard and close, good for cog-wheels and gun-stocks, but inferior to the pear tree. The Kanáwar apples are inferior in flavor to those of Kashmír. Quantities of apples and pears are grown at Basauli, and exported to the plains. There are wild apples, called "shé," on the Chenáb; also another species of *Pyrus*, called "lirí," "liwar," or "baror."

2023.—[215]. **Pyrus variolosa.** Wild pear.

Vern. Syn.—Mehal or kainth. | Kenth or shegal (Kanáwar).
Sanjad. | Shogul (Chamba).
Batangi (Hazára and Murree Hills).

Wood brown, compact, used in Ladákh for boards of books and printing blocks. The fruit eaten, when over ripe and decaying, like the European medlar. The elevation is from 3,000 to 7,000 feet. There is a *Pyrus* in the Pangi collection, under the name of "kurgh."

2024.—[216]. **Quercus annulata.**

Vern. Syn.—Báni (Kotgarh).
Bankau (Hazára and other collections). | Baráno (Kaghán).

It is tough, close-grained, used for building purposes at Rawalpindi.

2025.—[217]. **Quercus dilatata.** (*Q. taxiflora* of some writers).

Vern. Syn.—Mohrú. | Kré,ú (Chamba Hills).
Barungí (Hazára). | Marghang (Kanáwar).
Bár (Murree Hills). | Chora (Kaghán).

The timber of all the oaks is good, hard, and so heavy that it will not float. *Quercus dilatata* appears to be the species most esteemed: it is very durable and tough, and at the same time elastic. In the Western Himálaya it is more rare than the other species, *Q. ilex* and *Q. incana*. Its elevation is from 6,000 to 9,000 feet. "It is seldom, however, seen," says Cleghorn* "below 6,000 or above 7,500."† The leaves of the young tree are covered with

* Report on Forests of Western Himálaya, p. 198.

† I have seen it, though small and stunted, at fully 8,000, if not more, on Dhain Kund in the Chamba Hills.

prickles, which gradually disappear in the older ones. The tree grows to a huge size, many specimens may be seen 12 feet in girth, and from 80 to 100 feet high. All the Himálayan species are evergreen, and the leaves of *Quercus dilatata* specially afford valuable nourishment in winter to sheep and goats.

2026.—[218]. **Quercus ilex.**

Vern. Syn.—Balút, Chúr (Kishngunga), Chora (Kaghán), Kori (Lower part of Kaghán valley), Bre (Kanáwar), Charí (Pashtú), Khárpalú cherai, Ghwara cherai, Barungi (Murree Hills), Irrí (Pangi, Chota Lahaul, &c.)

Cleghorn remarks that the name which belongs to *Q. dilatata* appears to be used for *Q. ilex* also. This species belongs to the Mediterranean flora, and the wood is hard, heavy and tough. It extends as far as Kanáwar, and finds there its extreme eastern limit. Mentioned by Drs. Brandis and Stewart as characteristic of Kanáwar. It is always a small rigid tree. The largest these officers met with was 6 feet 10 inches in girth, but had a clear stem 20 feet high. Elevation, 8,000 feet.

2027.—[219]. **Quercus incana.** Heavy oak.

Vern. Syn.—Bán, Ríñ or rínj (Hazárá), Vari (Salt Range), Banji, Sper cherai (white oak), (Pashtú).

The wood is coarse, but lasts well under cover, where it is not exposed. It is extensively used for fuel at the hill sanataria, where the tree grows abundantly. It grows from 3,500 to 8,000 feet.

2028.—[220]. **Quercus semacarpifolia.** Alpine oak.

Vern. Syn.—Kharsú, kharsúí (Kanáwar), Banchar (Hazárá), Khatau (Pangi, &c.), Kreú (Rávi).

The timber is much esteemed by natives, but as this species occurs near the upper limit of pine forests and is very heavy, it is seldom brought to market. Extensive forests exist on Hattú near Nagkanda. The tree is very tall and straight. Elevation, 9,000 to 11,000. "It seldom grows" says Cleghorn,* "below 8,000 feet, and ascends above the range of pines."

2029.—[221]. **Q. floribunda.**

Vern. Syn.—Barcha (Murree Hills).

Not common. Occasional at Murree: its timber is hard and much valued. Elevation, 9,000 feet.

2030.—[222]. **Randia (longispina ?)**

This wood is (6165) in the Amritsar collection, called "rára."

2031.—[223]. **Randia dumetorum.**

Vern. Syn.—Míndhal.

Common in the Lower Hills as far west as the Rávi.

* Report of Forests in W. Himálaya, p. 79.

2032.—[224]. **Reptonia buxifolia.**

Vern. Syn.—Gurgura, garar (Salt Range).

The wood is small, but hard, fine-grained and useful. It is common in the Trans-Indus districts. Exclusively a Punjab wood.

2033.—[225]. **Rhamnus virgatus (Persica ?)**

Vern. Syn.—Wurak (Pashtú). | Phipni (Kaghán).
Dadrú (Hazará and Murree).

Wood is very hard and heavy, of a red-brown color. It is small and scarce, but useful for ornamental purposes in the Punjab.

2034.—[226]. **Rhamnus purpureus.**

Vern. Syn.—Rárí, mimarári (Chenáb). | Chaterni (Sutlej).
Kúnjí túndhé, &c., (Ráví). | Tadrú (Jumna).

2035.—[227]. **Rhododendron arboreum.**

Vern. Syn.—Brás (Chamba Hills, &c.) | Chachiyon (Kangra Hills).
Barauńs. | Ardáwal (Hazára and Murree).

The wood is coarse, brittle and brown in color, and little used except for fuel. It is not obtainable of large size. It may be had, however, for posts, &c., as large as 6 inches in diameter. The flowers are sub-acid, and are made into jelly. The tree grows from 6,700 feet to 8,000 feet.

2036.—[228]. **Rhododendron campanulatum.** Alpine rhododendron.

Vern. Syn.—Chamresh or simbar. | Símrang (Kanáwar).

Grows at very high elevation, from 10,000 feet to 14,000 feet. The leaves of this species are very highly stimulant: they are used as snuff, under the name of Kashmírí patté. Wood small and crooked. An excellent fuel.

2037.—[229]. **R. lepidotum.**

Vern. Syn.—Tálsar.

Growing at a similar elevation, has the same properties (Cleghorn).*

2038.—[230]. **Rhus acuminata.**

Vern. Syn.—Húrkú (Kanáwar).

"Arkhar," is given by Stewart as the name of a *Rhus* in Kaghán; also in Pangi there is a *Rhus* called "arkhul" or "haláshí.

2039.—[231]. **Rhus cotinus.**

Vern. Syn.—Bághúna (Dera Ismaíl Khán). | Bán (Kaghán).
Túng (Kanáwar and Simla). | Pan (Murree and Hazára).
Largá (Shahpúr).

* Plants of the Sutlej Valley, p. 6.

Almost always small, but like the *Pistacia*, and some others of this family, is a zebra wood. Bark used for tanning.

2040.—[232]. **Rhus parviflora.**

Vern. Syn.—Túng.

Wood hard and yellow. It is small but excellent for turning. It grows at 5,000 feet.

2041.—[233]. **Rhus semialata (Rhus Buckiamela).**

Vern. Syn.—Hulúg. | Huláshing.
Titri. | Kashín (Kanáwar).

Not procurable in any quantity. Not so ornamental as other woods of this family. It grows like the others at 5,000 feet.

2042.—[234]. **Ricinus communis.** The castor oil plant.

Vern. Syn.—Arind, harind. | Harnaulí (Salts Range, &c.)
Bedanjír (Pers.)

There is a Sanscrit proverb, in the Hitopadesa, Book I., which says, "that where there are no trees, even the castor oil plant ranks as a forest tree." It grows, however, sufficiently large to produce specimens of wood, but is chiefly remarkable for the beauty of its large spreading leaves, and the value of its seeds, which yield castor oil.

2043.—[235] **Ribes nubicola, glacialis and grossularia.** Currant and gooseberry.

Grow at 11,000 and 10,000 feet, but the fruit is tasteless. Cleghorn mentions a small, sour woolly gooseberry, called "bílítsi" in Lahaul. To these species belong the "gwal dákh," or gooseberry of Kaghán, and the "rásta," or currant of Lahaul.

2044.—[236]. **Roylea elegans.**

Vern. Syn.—Kaur (Chamba).

A shrub.

2045.—[237]. **Rosa Brunoniana.**

Vern. Syn.—Phulyárí guláb. | Phúlwárí (Kishngunga, &c.)
Guláb ghuri (Pashtú).

A small sized wood; makes walking sticks. In Murree they call it "chal;" but this they also apply to the jasmine.

2046.—[238]. **Rosa Webbiana.**

Vern. Syn.—Ringyál (Kanáwar).
Kantyán (Kaghán).

2047.—[239]. **Rosa eglanteria.** Yellow Persian rose.

Finds its eastern limit in Lahaul. Cleghorn.

2048.—[240]. **Rosa macrophylla.**

Vern. Syn.——Phulyáñ or phulwár (Kaghán).

2049.—[241]. **Rottlera tinctoria.**

Vern. Syn.—Kamela.
Kambha[1].

Yields a soft wood, used for fuel. The stellate pubescence brushed off the fruit, is sold as a dye for silk at 18 rupees a maund; and as a drug, being powerfully vermifuge.

2050.—[242]. **Rubus fruticosa and R. flavus.** Yellow raspberry.

Vern. Syn.—Unsri (Sutlej valley).

Fruit used to make a preserve in the Hills: grows at an elevation of 5,000 to 7,000 feet.

2051.—[243]. **Rubus purpureus.** Himalayan raspberry.

Vern. Syn.—Akhi (Kúlú).

2052.—[244]. **Rubus lasiocarpus.**

Vern. Syn.—Pakána (Kaghán).

2053.—[245]. **Robinia macrophylla.**

Vern. Syn.—Ganj (Kalesar Forest, &c.)

A huge climber, common a little to the west of the Jumna.

2054.—[246]. **Sageretia oppositifolia.**

Vern. Syn.—Girtin.

Múmánraí (Pashtú).

Very common, but only useful as a fire-wood. The fruit (múmáni) is well known in the Peshawur bazar.

2055.—[247]. **Sageretia Brandrethiana.**

Vern. Syn.—Gangér. | Kohér (Salt Range).

Kunjar.

From the Dera Ismaíl Khan district.

2056.—[248]. **Salix Babylonica.** Weeping willow.

Vern. Syn.—Majnún.

Willa and khár willa, "big willow" (Pashtú).

Wood soft, smooth and white. The large wood is used for cricket bats, the small twigs for kiltas, baskets and rope bridges. Both this and *S. tetrasperma* are abundant at Peshawur and in the Hazára district.

2057.—[249]. **Salix alba.** White willow.

Vern. Syn.—Chung. | Búshan (Upper Chenab).

Madánú or shan (Kanáwar and Pangi).

The wood is most useful in Thibet and Spiti, and employed for boarding. The small twigs are used for basket work, and the leaves are highly valued in winter for food for sheep.

2058.—[250]. **Salix caprea (Ægyptiaca).**

Vern Syn.—Bedmushk (passim).

Khwagawalá (Pashtú).

Of very small size. Cultivated at Lahore.

2059.—[251]. **Salix tetrasperma.**

Vern. Syn.—Laili.

Bhúmtas.

2060.—[252]. **Salix sp.——?**

Vern. Syn.—Baddha (Pangi). | Shan (Kanáwar).

Bes, bais (Hazára).

2061.—[253]. **Salvadora oleoides.**

Vern. Syn—Jhál. Pílú. | Váṅr (Punjabí). Plewan (Pashtú).

Wood close-grained, much used for fuel. Very common in the Múltán division. Toothpicks are made from the roots of a species of *Salvadora*.

2062.—[254]. **Salvadora Persica.**

The wood is rather strong and compact. The leaves are eaten as a salad. It is believed by some to be the mustard tree of Scripture.

2063.—[255]. **Sapindus acuminatus.** Soap-nut.

Vern. Syn.—Dodhan or ritha.

The wood is heavy and useful, but not available, as the berries are much valued and sold in every bazar as a substitute for soap. It is planted as an avenue tree in Kangra valley, and in Chamba, where it is common.

2064.—[256]. **Schleichera trijuga.**

Vern. Syn.—Kússúmb.

An excellent, hard, heavy wood, used in making sugar-mills, pestles, &c. Only procurable on the eastern verge of the Punjab, but worthy of cultivation.

2065.—[257]. **Semecarpus anacardium.** Marking-nut tree.

Vern. Syn.—Bilawa. Bhiládar.

The timber is of little value. The acrid juice of the fruit is used as a medicine, and as a dye.

2066.—[258]. **Sesbania Ægyptiaca.**

Vern. Syn.—Jaint.

A very rapid growing shrub, suitable for hedges. Wood of no value.

Shorea robusta (*See* **Vatica**).

2067.—[259]. **Spiræa Lindleyana, S. hypoleuca, S. callosa, &c.**

Vern. Syn—Kjkri and karkni (Kaghán). Sarbashtai (Pashtú).

A hill shrub, with beautiful white flowers: resembles the English meadow-sweet, especially the species *S. Kamschadica*. Wood of no value.

2068.—[260]. **Sponia Wightii.**

Vern. Syn.—Kanghi.

Occasional to the west of the Jumna.

2069.—[261]. **Spondias mangifera.**

Vern. Syn.—Ambára (Amritsar).

2070.—[262]. **Staphylea emodi.**

Vern. Syn.—Nagdáoṅ. Már chob (Persian and Pashtú), "snake stick." | Kághaniya (Kanáwar). Chitra (Murree and Hazára.

Used for making sticks by the hill-people, who consider it a charm against snakes, hence its name of "nág-dáwan or dáman," snake subduer.

2071.—[263]. **Stillingia sebifera.** Tallow-tree of China.

Hard and durable wood, fitted for printing blocks, according to Dr. Jameson, who contributed the only specimen exhibited. This tree has now been successfully acclimatized, and its extended cultivation would be extremely advantageous from the quantity of tallow and oil extracted from the seeds.

2072.—[264]. **Symplocos paniculata.**

Vern. Syn.—Lodh.
Lodhar.

The wood is moderately hard, and used for posts. The bark is collected for sale as a dye.

2073.—[265]. **Syringa emodi.**

Vern. Syn—Shafar or rangchúl (Kanáwar).

Up to 10,000 feet.

2074.—[266]. **Symplocos racemosa.**

Very like *Symplocos paniculata.*

2075.—[267]. **Sizygium jambolanum.**

Vern. Syn.—Jáman.
Rúkhan.
Sumra; the wild tree (Hushyarpúr).
Katammal (Kangra).

The wood is not considered durable, but is used for posts and beams. A good shady avenue tree.

2076.—[268]. **Sterculia Roxburghii.**

Vern. Syn.—Gód-gadála.

Common to the west of the Jumna, and occasionally as far as Rajauri. A fibre is made from its bark.

2077.—[269]. **Sterculia villosa.**

Vern. Syn.—Gul-bodla (Hazára).
Gul-kundal (Jammú).
Massú (Salt Range).

2078.—[270]. **Tamarindus Indica.**

Vern. Syn.—Imli.

This valuable tree yields a hard, dark colored, durable and finely veined wood. Not indigenous in the Punjab—a few specimens exist in gardens.

2079.—[271]. **Tamarix dioica.**

Vern. Syn.—Lai.
Kachlaí (Leia).

2080.—[272]. **Tamarix Gallica.** (Syn.—*Indica*).

Vern. Syn.—Pilchi, koá, rúkh, laínyá (Salt Range).
Jhau.

Baskets made of the twigs.

2081.—[273]. **Tamarix orientalis.** Tamarisk.

Vern. Syn.—Farás.
Ukhán.
Ujhán.
Farwá.
Parwáñ.
Khwa or ghwa (Pashtú).
Ghaz (Persian).
Rúkh (Salt Range).

Wood of little value, emits an offensive odor when burnt. It is used for charcoal. It grows with rapidity, and is common in the saline tracts of the Punjab. Is known from *T. indica* by the bluish tinge of the leaf.

2082.—[274]. **Taxus baccata.** Common yew.

Vern. Syn.—Birmi (Hazára), where it is also called tung and tunní, badhar and sarrap (Pashtú). | Rakhál (Chamba and Béas). Sangal, postal (Kashmír). Yamdal (Kanáwar).

The timber is good, heavy and very durable, and takes a good polish. It is used for bows, buggy shafts and jampan poles. It is common near Murree, and in the valleys of the Sutlej and Béas. At an elevation of from 9,000 feet and also to 10,500. It alters its appearance and form of growth very much when it grows in the higher latitudes,* and when growing in deep forests. It is a large tree with naked trunk. It is often of great thickness, but seldom attains any great height; the thick trunk generally dwindles away or divides into branches at a few feet above the ground. On the skirts of the forests it is a lax almost prostrate bush, while on open slopes, it becomes a stout, dense and tabular branched tree.

2083.—[275]. **Tecoma undulata.**

Vern. Syn.—Rohira. Lahúrá. | Regdáwan (Pashtú).

Wood good but small, used for making charpais, spinning wheels and ploughs, in the Salt Range. The tree has beautiful orange colored flowers. This species has *large* lanceolate leaves; there is another *Tecoma*, which is called "lahúrí" in the Salt Range, and which grows side by side with it. This is distinguished by having very *small* lanceolate leaves. There is some doubt, however, as to whether these are in reality distinct species. Specimens of the latter may be seen in the Bádámi Bágh at Lahore.

2084.—[276]. **Tectona grandis.** Teak.

Vern. Syn.—Sagwán.

This fine tree has been introduced in various stations of the Punjab, but is liable to injury from frost. The qualities of its invaluable timber are well known. Its culture might be attempted wherever there is little frost.

2085.—[277]. **Terminalia belerica.**

Vern. Syn.—Bírha. Bahera. | Balela.

Wood white and soft, but not available, the fruit being eaten by the natives, and used as a medicine. It is a good avenue tree.

2086.—[278]. **Terminalia chebula.**

Vern. Syn.—Har. Halela.

Wood is hard and close-grained, but the fruit is highly valued, being used in tanning, dyeing and making ink. It grows at Holta, &c.

2087.—[279]. **Terminalia Arjuna.**

Vern. Syn.—Arjan.

* *See* SMITH and HOOKER'S Introduction to the Flora Indica. The whole passage about the variation of species is well worth attention, p. 30-33.

CLEGHORN gives *T. glabra* as "arjan," and says, the timber is used for railway sleepers.*

2088.—[280]. **Tetranthera Roxburghii.**

Vern. Syn.—Maidá.
Chándná.

No. 5155, &c., &c. The bark is called "maidasak" in native pharmacopæia.

2089.—[281]. **Trophis aspera.**

Vern. Syn.—Dahya.

The wood is good, but small and crooked. The scabrous leaves are used for polishing ivory.

2090.—[282]. **Ulmus campestris.** Elm (large leaved elm).

Vern. Syn.—Marál, maráli, mehan† (Kúlú). Mannú and Ká,in (Hazára). Marar (Murree Hills).

The wood is porous, but durable when constantly wet. It is, therefore, used for damp foundations. Grows to a large size in Kúlú and Chamba, and its range extends to the Mediterranean. "In the upper part of Kúlú," says DR. CLEGHORN, "there are many fine trees 30 feet in girth."

2091.—[283]. **Ulmus erosa.** Small leaved elm.

Vern. Syn.—Shko (Kanáwar).
Himbrah.

Grows at an elevation of from 6,000 to 9,000 feet. The wood is more open-grained than English elm, and is less esteemed than the last named.‡ I have seen a specimen at Berangalli in Hazara, 17½ feet in girth and over 100 feet high.

2092.—[284]. **Ulmus virgata.**

Vern. Syn.—Máldúng (Kanáwar).

At 9,000 feet (CLEGHORN).

2093.—[285]. **Ulmus integrifolia.**

Vern. Syn.—Kánjú.
Kachám (in the east of the Province).

The wood is strong, light colored, and adapted for general purposes.

2094.—[286]. **Vatica robusta.**

Vern. Syn.—Sál or sakhú (CLEGHORN).

This is the staple timber of Hindústán for building purposes. Its western limit is the Kangra Valley, where it is found of small size.§ The growth of this tree on canal banks is under trial, but the seeds will not germinate if kept many days; it is difficult to extend the plantations.

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* CLEGHORN. Report Forests of the W. Himalaya, p. 79. † *Ibid*, p. 81. ‡ *Ibid* p. 12.

§ There is a small clump of these trees on the eastern part of the Kangra valley, near Sujanpúr tira. A few also occur near Rajpura in Hushyarpúr, which is the western limit of its growth (CLEGHORN'S Report on Western Himalaya Forests, note to p. 81). The wood of these trees, as well as their size and growth, bear no comparison to the magnificent trees of Hindústán and Bengal.

2095.—[287.]. **Viburnum fœtens, V. continifolium, V. stellionatum.**

Vern. Syn.—Banna.
Aklu (Kaghán).
V. cotinifolium is marghwalwa (Pashtú).
Kalkut (Khagán).
Rich and Thálín (Kotgarh).
Aklu (STEWART).
Gúch or kúch (Kaghán).*
Ban kúch (*V. cotinifolium*).
Jalbágú (*V. stellionatum*) Kaghán.

Forming the underwood of forests in the Himálayan valleys. The wood is used chiefly for fire-wood. The berries of both *V. fœtens* and *V. cotinifolium* are edible.

2096.—[288]. **Vitex negundo.**

Vern. Syn.—Sembhálú (Hindustání).
Banna (Plains).
Bankahú (Hazára, &c.)
Marwandé (Pashtú in DR. STEWART'S Waziristán).
Marwa, mawá (Salt Range).

Banná is the hill name for *Viburnum*.

2097.—[289]. **Vitis vinifera.**

Vern. Syn.—Angúr.
Lanang (Kanáwar).

Grows in the hills also, at elevations from 7,000 to 9,000 feet.

2098.—[290]. **Wrightea mollissima.**

Vern. Syn.—Dúdhi.
Kiláwa (Kangra).

The timber is soft and light, and much used in ornamental carving. Samples were exhibited from Saháranpúr. This tree is very rare in the east of the Province.

2099.—[291]. **Wrightea tinctoria.**

The wood is white, close-grained, and used for turning.

2100.—[292]. **Xanthoxylum hostile.**

Vern. Syn.—Tezbal.
Timmal.
Timrú (Kanáwar).

Small timber, used for walking sticks and for pestles. It is strongly armed with prickles, hence the name "hostile." The aromatic fruit is used as a condiment.

2101.—[293]. **Zizyphus jujuba.**

Vern. Syn.—Ber.
Berrá (Pashtú).

Wood hard and durable, and when of a sufficient size, may be applied to many useful purposes. It is made into combs, charpais, clogs, and saddle trees; all these purposes indicate toughness.

2102.—[294]. **Zizyphus vulgaris.** Common jujube.

Vern. Syn.—Pitní or fitní (Kághán).
Ber.
Amni, amlaí, amrá, ímlá (Salt Range).

In many respects like the last. Both species are cultivated.

* This name is also given to *Coriaria nepalensis*.

2103.—[295]. **Zizyphus nummularia.**

Vern. Syn.—Malla. | Karkaṅrá (Pashtú).
Jar-berí(Hindustání). | Bírota (Salt Range).

Used for hedges, and the bark as a tanning substance.

2104.—[296]. **Zizyphus flexuosa.**

Vern. Syn.—Sinjlí (Kaghán).

REPORT ON TIMBER AND ORNAMENTAL WOODS.

CLASS IV. SUB-CLASS (F).

THE JURY WAS COMPOSED OF THE FOLLOWING GENTLEMEN:—

MR. TER ARRATOON,
LIEUT. J. CHALMERS, *Deputy Conservator of Forests, Rávi and Chenáb.*
DR. CLEGHORN, *Conservator of Forests,*
CAPTAIN DYAS,
MR. JOSEPH HARRISON, *Chief Engineer, Punjab Railways.*
CAPTAIN ARTHUR LANG,
KUNYHA LALL, *Executive Engineer,*
MR. MAY, *Punjab Railway, Supdt. Workshops,*
MELA RAM, *Contractor,*
DR. J. L. STEWART, *Conservator of Forests.*
COLONEL SIM, *Consulting Engineer,*
MR. WATSON, *Supdt. Workshops, Baree Doab Canal.*

REPORTER.—DR. CLEGHORN.

THE importance of this section of the Exhibition can scarcely be over-estimated in the comparatively woodless province of the Punjab, where the value of timber has always been great and is rapidly increasing. To illustrate the rise in price of this necessary commodity in eight years, the subjoined statement, obtained from the Firozpúr Arsenal is given:—

Name of wood.	Per cubic foot, running foot or number.	Rates prevailing in																					
		1857-58			1858-59			1859-60			1860-61			1861-62			1862-63			1863-64			
Deodar,	Per c. ft.,	0	12	0	0	12	0	0	12	0	0	12	0	0	12	0	0	0	0	0	12	0
Sál, 2nd size,	Do.,	1	8	0	1	13	0	1	13	0	1	13	0	1	13	0	1	13	0	1	13	0
Babúl,	Do.,	0	8	0	0	12	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0
Bamboos, 1st size,	Each,	1	0	0	1	0	0	1	0	0	4	0	0	4	0	0	4	0	0	4	0	0
Do., 2nd size,	Do.,	0	3	0	0	2	6	0	3	6	0	3	6	0	4	0	0	4	0	0	4	0
Do., small,	Do.,	0	1	0	0	1	0	0	1	0	0	1	0	0	1	6	0	3	0	0	3	0
Sál,	Per r. ft.,	0	0	0	0	0	0	0	7	0	0	7	0	0	7	0	0	7	0	0	7	0
Deal,	Do.,	0	1	10	0	1	10	0	3	0	0	3	0	0	4	0	0	4	0	0	4	0

With the object of obtaining as valuable a series of indigenous woods as possible, the following instructions were published by the Exhibition Committee.

Information required.—Exhibitors should furnish the *local* name and the dimensions which the trees attain in particular districts, measuring the girth *four* feet from the ground. The uses to which the several parts of the tree are applied should be mentioned.

Size, &c., of specimens.—A horizontal section of the tree with bark complete, and about 3 inches thick, shows the character of the entire timber. Bars $2\frac{1}{2}$ feet long and 2 inches square, cut from the sound wood, enables trials to be made of its strength.

Nomenclature.—When there is any doubt as to the tree, a small shoot bearing flowers, fruit, and full grown leaves should be pressed flat in a sheet of paper and marked with a corresponding number. Paper labels are unsafe, the specimens should have a number painted or cut into them.

The result is highly gratifying, as specimens of so many different North Indian woods have not been brought together since the well known collection of Dr. Wallich, made during his Botanical Mission to Nepál, subsequently deposited with the Society of Arts, London.

Twenty districts have contributed collections. Four native princes (the Maharajah of Kashmir, and the Rajahs of Kapurthalla, Pattiala and Chamba), and four private exhibitors (Dr. Brandis, Dr. Jameson, Dr. Cleghorn and Mr. Stephen Berkeley), have also contributed. The specimens sent are very numerous, covering four tables, and include all the important timbers of the province, with some very curious applications.

The largest and most instructive collection is that of Dr. Brandis, illustrating the forest resources of Burmah, by 112 samples, accompanied by a printed catalogue; there is also a series of specimens from the Central and North Western Provinces. For a duplicate set of the former series, Dr. Brandis received a medal in the London Exhibition of 1862. The specimens are all cut to size, well seasoned and the specific gravity carefully ascertained; in this respect they are most valuable.

The next collection which the Jury have to notice is that of Dr. Jameson. Consisting of 40 specimens grown in the Saharunpúr Garden, under his direction, a list of these is given below. The block of *Stillingia sebifera*, an introduced tree, is particularly interesting.

Acacia Arabica,
——— *elata*,
——— *modesta*,
——— *speciosa*,
Artocarpus integrifolia,
Bignonia suberosa,
Cassia fistula,
Casuarina muricata,
Cedrela toona,
Cordia myxa,
——— *lanceolata*,
Dalbergia sisso,
——— *robusta*,
Ehretia aspera,
Ficus elastica,
—— *Indica*,
—— *religiosa*,
Gmelina arborea,
Hibiscus tricuspis,
Mangifera Indica,
Melia azadirachta,
—— *sempervirens*,
Mimusops kauki,
Morus Indica,
Nauclea parvifolia,
Pinus longifolia,
Pongamia glabra,
Psidium pyriferum,
Pterospermum acerifolium,
Pyrus communis,
Salix Babylonica,
Shorea robusta,
Solanum giganteum,
Stillingia sebifera,
Syzygium jambolanum,
Tectona grandis,
Tetranthera monopetala,
Trophis aspera,
Wrightia mollissima,
Zizyphus vulgaris.

Though the Jury are precluded from offering rewards for specimens not the growth

of the Punjab, they have, as a special case, awarded medals and certificates to Drs. Brandis and Jameson; their collections are rich in new or little known timbers, and as some of them are found within the limits of the Province, the information elicited is of practical value.

The 3rd collection, in point of interest, is one showing the woods procurable in the Simla bazar, consisting of specimens in the form of bricks. Though not thoroughly seasoned, the specific gravity of many has been approximately ascertained. As information is defective regarding the woods of the Western Himálayas, and as accurate lists of the woods in local use at the different sanataria is a great *desideratum*, the Simla list is given below:—

Number.	English.	Vernacular.	Botanical.	Weight of cub. ft. in pounds.
1	Deodar, ..	Kelu, ..	*Cedrus deodara*, ..	37
2	Lofty pine, ..	Kail, ..	*Pinus excelsa*, ..	25
3	Common oak, ..	Bán, ..	*Quercus incana*, ..	55
4		Mohru, ..	——— *dilatata*, ..	68
5	Toon tree, ..	Tuna, ..	*Cedrela toona*, ..	37
6	Box, ..	Shamshád, ..	*Buxus sempervirens*, ..	69
7	Mulberry, ..	Kimú, ..	*Morus serrata*, ..	40
8		Kakar, ..	*Rhus integerrima*, ..	63
9	Toong, ..	Túng, ..	—— *parviflora*, ..	
10	Wild pear, ..	Kainth, ..	*Pyrus variolosa*, ..	52
11	Cherry, ..	Paddam, ..	*Cerasus puddum*, ..	64
12	Apricot, ..	Jaldáru, ..	*Armeniaca vulgaris*, ..	64
13	Walnut, ..	Akhrot, ..	*Juglans regia*, ..	33
14	Maple, ..	Karandlu, ..	*Acer oblongum*, ..	
15		Ayar or eliyun, ..	*Andromeda ovalifolia*, ..	35
16	Rhododendron, ..	Brás, ..	*Rhododendron arboreum*, ..	37
17		Kaiphul, ..	*Myrica sapida*, ..	54
18	Montain ebony, ..	Kachnár. ..	*Bauhinia variegata*, ..	
19	Nettle tree, ..	Karrak, ..	*Celtis Caucasica*, ..	47
20		Tezbal, ..	*Xanthoxylon hostila*, ..	52
21	Berberry, ..	Rasaut, ..	*Berberis sp*——. ..	67
22		Chuhi, ..	*Acacia speciosa*, ..	27
23	Soap-nut tree, ..	Ritha, ..	*Sapindus emarginatus*, ..	73
24	Hill bamboo, ..	Nirgali, ..	*Arundinaria utilis*, ..	
24		Rauńs, ..	*Cotoneaster baccillaris*, ..	
25	White thorn, ..	Gengáru, ..	*Cratægus crenulatas*, ..	
		Nagdáun, ..	*Staphylea emodi*, ..	

Mr. S. Berkeley's collection contains 36 well varnished specimens, with native names, most of which have been indentified. The specimens are very small, only about 2 inches square, and many of them are sapwood, but the collection deserves honorable mention, because it illustrates the wood resources of the Sutlej Valley near Kotgarh.

Regarding the local collections, which are instructive as showing the resources of each district, and sometimes contributing interesting facts connected with the Geographical distribution of species, it seems unnecessary to describe them *seriatim*, but the subjoined table showing the number of specimens from each district, aggregating about 1,000, will give an idea of the labors of the Jury.

Delhi, ...	13	Jálandhar (a large collection).	
Rohtak, ...	20	Kangra, ...	1
Sirsa, ...	1	Hushyarpúr, ...	10
Simla, ...	28	Amritsar, ...	38
Kotgarh, ...	36	Lahore, ...	3

Rawalpindí,	.. ..	80	
Gújrát,	.. ..	27	
Shahpúr,	.. ..	14	
Gugaira,	.. ..	17	
Muzaffargarh.			
Dera Ismaíl Khan,	.. ..	54	
Dera Ghází Khán,	.. .. ..	19	
Bunnoo,	.. ..	1	
Pesháwur,	.. ..	132	
Hazára,	.. ..	29	
From Native Chiefs.			
Chamba,	.. ..	46	
Pattiala,	.. ..	18	
Kapúrthalla,	.. ..	2	

The Jury would submit that a complete series of the woods exhibited would be most useful to Government, and should be deposited in the Lahore Museum for future reference.*

Hazára.—The collection from Hazára is worthy of special notice ; the size of the specimens, and the care with which the vernacular and botanical names have been attached, deserve high commendation.

The collection from Chamba is very instructive. It is believed that this is the first time that a series of the useful woods from the upper Chenáb has been exhibited. The specimens were all ticketed in the forest by Mr. J. A. Murray.

Shahpúr.—The collection from Shahpúr demands special commendation. Some of the specimens have been turned into cylinders of an ornamental character, showing well the texture of the wood. Cups carved from sissú wood are also exhibited.

Gújrat.—The contribution from the Gújrat illustrates well the building materials of the district. It consists partly of square blocks of sound heart-wood, showing the working qualities of the timber.

Dera Ismaíl Khán.—The collection from Dera Ismaíl Khán consists of 54 specimens. The local names have been given with care, á comparison of these with the Pashtú names of the adjoining districts, has enabled the Jury to identify some interesting specimens of little known woods from the Trans-Indus territory. The wood of "jallidhar" (*Celastrus spinosa*) not previously known to the Jury, has been sent from Dera Ismaíl Khán and Shahpúr.

Jálandhar.—The Jury have before them a large series from Hushyarpúr, Kangra and Kúlú. The specimens are cut to size, and well varnished, but the vernacular names have in some cases apparently been confused. The tract of country which the division embraces is known to be rich in woods, and our knowledge of the forests has been extended by recent inquiries.

Wood Engraving.—In connection with the proposed establishment of a School of Industrial Art in the Punjab, the Jury have directed their attention to the woods most suitable for the turner and wood-engraver. The varieties which appear best are as follows :—

Buxus sempervirens, Himalayan box.	*Bignonia suaveolens*,
Olea Europea, European olive.	*Capparis aphylla*, leafless caper.
Dodonœa Burmanniana,	*Citrus aurantium*, orange tree.

These are given in the order of supposed excellence. The box is superior to the others, and has been tried with success by the graver in Roorkee, Madras and Calcutta; several new habitats have lately been discovered in the Punjab, and it is found in the Sutlej Valley, Kúlú, Bara Banghal, near Rihlu, and on the Salt Range. Some facts regarding its distribution and properties were read before the Agri-Horticultural Society in July, 1863.

* A very large collection of nearly 300 Punjab species is now in the Museum, in double series ; one arranged by Natural orders, the other Alphabetically, for easy reference.—B. P.

The Jury think it right to mention here two tables of ornamental workmanship, the first was made by KIRPA SING, carpenter, under the directions of MR. GORDON, C.E., Amritsar, and is composed of different kinds of wood. This has received a reward under the section "Carved Furniture." The second table is exhibited by CAPT. GARRET, R.A., and is formed of 1863 pieces of different kinds of Punjab woods.

In examining the different collections, the Jury availed themselves of the practical experience and technical knowledge of MR. MAY and MR. WATSON, of the Railway and Baree Doab Canal, Workshops.

JURY AWARDS.

Medals.

1.	DR. BRANDIS, ...	For collection of woods.
2.	DR. JAMESON, ...	Ditto.
3.	LOCAL COMMITTEE, Hazára, ...	Ditto, Hazára.

Honorable Mention.

4.	MR. J. A. MURRAY, Chamba, ...	Ditto, Chamba.
5.	CAPT. ED. PASKE, Gújrat, ...	Ditto, Gújrat.
6.	MR. S. BERKELEY, Kotghar, ...	Ditto, Kotghar.
7.	LOCAL COMMITTEE, Dera Ismaíl Khán,	Ditto, Dera Ismaíl Khán.
8.	CAPT. DAVIES, Deputy Commissioner, and DR. HENDERSON, Shahpúr, ...	Ditto, Shahpúr.

H. CLEGHORN,
Reporter.

SUB-CLASS (G.) CHARCOALS.

In the absence of coal, all ore smelting and other processes are dependent on charcoal, as well as the goldsmiths, and various other ornamental and useful trades.

Several species of charcoal are produced according to the requirements of the users. The manufacture of gunpowder requires charcoal of particular kinds, generally yielded by woods of a hard close grain.

The charcoal of the "madár" root is esteemed by goldsmiths in the Punjab, and the stunted growths of *karíl*, *jánd* and *salvadora* in the district jungles, furnish sources of charcoal for other purposes.

The manufacture of "chíl" charcoal is extensively carried on where the border forests of "chíl" abound in Hushyarpúr and Kangra.

In the Hills the iron smelters employ almost exclusively the "chíl" charcoal, rejecting that made with the oak.

The manufacture of charcoal as practised by the native burners in the Hills is excessively rude and wasteful of material.

"There is great waste of valuable timber," writes Dr. Cleghorn, "in the manufacture of charcoal. With a view to remedy this evil, I held meetings of the charcoal burners at Simla and Dhurmsala, and showed them how to form a kiln and make charcoal more economically and of a better description than they had been accustomed to. The Chief Engineer proposes to issue a circular on this important matter, as only by repeated examples will the improved method, by which one-third less wood is required, be brought into general use. The charcoal burning must also be conducted out of the jungle to avoid the risk of fire to the surrounding forests."*

An excellent account of charcoal making, on good principles, and illustrated so as to explain the subject thoroughly, will be found at the end of Dr. Cleghorn's Forest Report, 1864, and also in the same author's "Forests of Southern India."

The specimens of charcoal were as follows:—

2105.—[5124]. Oak charcoal. Hills near Simla. Mr. Geo. Jephson.

2106.—[5125]. Oak charcoal. Second kind of oak (*Quercus incana* and *Quercus dilatata*). Simla.

2107. [5126]. Charcoal from chíl (fir). Simla.

2108.—[5136]. Charcoal of the chíl. Local Committee, Hushyarpúr.

Chíl is used for two purposes, for timber or for charcoal; it is but little cut for timber for export to other districts, on account of the cost of carriage. The traders who prepare charcoal in the Hushyarpúr district obtained wood from the Lohara, Panjal and Vairí forests: it can be as well supplied from the Siba and Jasrota forests of the Kangra district, but the traders do not burn in Kangra, as they say the cost of taking the charcoal from the Hills down to the Plains is too great; notwithstanding the fact that the price of a chíl tree in Kangra is from 1 to 6 rupees, while in the Hushyarpúr district, the rate is

*Dr. Cleghorn to Financial Commissioner, November, 1863.

uniform at 5 rupees per tree. The traders carry their charcoal to Amritsar, at which place, besides their ordinary trade, they supply the Railway Company. The company contracts at the rate of Rs. 131-4-0 per hundred maunds pucka of charcoal.

"I have ascertained," writes MR. BIRNIE BROWNE, "that the actual cost in the forests, after paying for the trees, &c., is Rs. 25, and the carriage from the forests to the road and from thence by camels to Amritsar is about Rs. 55, making a total of Rs. 80 per hundred maunds.

"The traders therefore have a clear profit on their contracts for every hundred maunds they supply. Charcoal could be taken down at much less cost by boats on the Béas, it could then be landed at Amritsar for from Rs. 60 to 70 per hundred maunds."

2109.—[5129]. Charcoal from the "khair" (*Acacia catechu*).

2110.—[5130]. Charcoal from the "mango."

2111.—[5131]. Charcoal from the "Gurnah" *(sic)*.

2112.—[5132]. Charcoal of the "thohr" *(Euphorbia antiquorum)*.

2113.—[5133]. Charcoal of "kíkar" *(Acacia)*. Hushyarpúr.

2114.—[5134]. Charcoal of "phúlâhi" *(A. modesta)*.

2115.—[5136]. Charcoal of "madár" *(Calotropis)*. Hushyarpúr.

2116.—[5136]. Charcoal of "amaltâs" *(Cassia fistula)*. Hushyarpúr.

2117.—[5137]. Charcoal of "dhá-wí" *(Grislea tomentosa)*. Hushyarpúr.

2118.—[5171-76]. A series of charcoals. LOCAL COMMITTEE, Amritsar.

From the karír *(Capparis)*.
„ kíkar *(Acacia)*.
„ phúlahí *(A. modesta)*.
„ jhand *(Prosopis spicigera)*.
„ chhichra (dhák), *(Butea frondosa)*.
„ chíl *(Pinus longifolia)*, (imported from the hills), *vide supra*.

2119.—[5187]. Is a sample of charcoal from Gujranwalla, burned from the "ak" or "madár."

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☞ H. Hindí. Hi. Hindústání. | Pji. Punjabí. P. Persian. | A. Arabic. Pshtu. Pashtú. | S. Sanskrit. Th. Thibetán.

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Dhúnú (Pangi), (*Picea Webbiana*, *Picea pindrow*), the silver fir,		588
Dhúp, incense, applied to many fragrant things, used for burning, *e. g.*, to the root of *Dolomæa macrocephala* to juniper or to benzoin,		386
——(Kaghán), (*Juniperus excelsa*, *J. arborea*) pencil cedar,	1960	583
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(Kangra, &c.), (*Ficus oppositifolia*),	1931	580
Dhúrú (Chamba), (*Buddleia crispa*),	1857	570

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a grass or reed (*Typha angustifolia*),	1781	514
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Do-hartha, a well with two wheels, *see* Domálá,		208
Domálá, a large well furnished with a double "harth" or Persian wheel,		207
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Ekátshá, the first spirit that passes over into the receiver in the distilling process, when this is distilled a second time, the result is called doátshá.		311
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