

Notes on the forest growth of Washington Territory. Geo. Engelmann

Pinus contorta is found on near & some of the other islands & on Harris out Lake the outlet of which is a tributary of Klamath River. A grove of pines, I believe of *P. ponderosa*, is found on the high quality pines, but these pines generally are of some occurrence ~~throughout~~ west of the range.

With the exception of some small & scattered prairies such as those round the Fort Vancouver on the Columbia, between the Cowlitz river & Olympic, between Misqually & Stillacoom, & other isolated spots of like character, the whole of Washington Territory west of the dividing ridge of the Cascade range ~~is~~ is covered with forest, and for the most part consisting of coniferous trees. Conspicuous among them are ~~the~~ *Abies Douglasii* or "Yellow fir" as it is commonly termed, & ~~the~~ *Thuja gigantea*, or "Oregon Cedar". ~~These in fact~~ The former constitutes certainly one half and I think two thirds of the whole. With them are associated *Abies Newzealandica*, or "Spruce"; the "White Fir" *Abies ^{grandis} ~~grandis~~ ~~Obba~~* and the "Hemlock," *Abies ~~of~~ ~~Canada~~ ~~ensis~~*. These may be considered component parts of the general forest, though the last three are more local in their distribution than the others. Of the other evergreens, the "Yew", occurs chiefly in the river bottoms & or along the banks of the Sound, seldom in the heart of the forest, & almost ~~always~~ is more abundant. The white Pine (*Pinus Monticola*) ^{is found} ~~occurs~~, though in no great numbers, ~~occ~~ in the mountains of the Coast range ^{back of} ~~from~~ Hood's Canal & the Straits of Fuca. The Juniper is rarely seen, and the woody Cypress I have never met with. ^[See page 3] Of deciduous trees, the "white maple" *Acer macrophyllum* attains a large size on the benches lining some of the rivers; the alder, ~~only occurring in the~~ ^{growing} ~~neighborhood of fresh water, attains either series or spruce~~ forms groves or thickets, and attains a height of 60 feet or more & a diameter of 20 inches. The cottonwood is abundant - in fact the prevalent tree, on the overflowed grounds of the rivers, & attains a great size & height

Of the willows there is a considerable variety, ~~and~~ most of them being of small size. Ash is abundant in the swampy lands, & is I believe confined entirely to the region between the coast & Cascade Range, I have certainly never seen it east of the latter. The birch makes its first appearance about the latitude of the straits of Fuca, ~~but~~ ^{about the straits of Fuca} ~~is~~ ^{Quercus Garryana} ~~found~~ ^{is almost the only} on the prairie back of Stillacoom, and in the neighborhood of Victoria, but of course is entirely local.

^{dogwood} Of the smaller growth, the vine maple, (Acer circinatum) the Cornus Nuttallii, the strawberry tree (Arbutus Menziesii),

Among the shrubs, ^{several species of} Spiraea ^{occur} every where; the Rhododendron occasionally, especially in the woods around Port Townsend; the manzanita (Arctostaphylos tomentosa) occurs there also, the only place in which I have noticed it east of the Cascade range. In 1853 I saw it on the Calumet river ~~at~~ near the foot of Mt St Helens.

^{thorn} Crab apple (Pyrus rivularis) forming dense thickets in the ash swamps. ^{the mountain ash} (Pyrus Americana). ^{several species of} Gaultheria Shallon or Sallal - Salmon berry (Rubus Nutkanus); Ribes; two of Berberis; Elder (Sambucus)

the bark of the fir tree contains layers of a corky texture interspersed with woody fibre -

Did not see Arbutus Menziesii east of Cascades -

Amelanchier Canadensis

at Chitoweyock lake in the Cascade Mts. ~~at~~ the parallel
 the limit of the growth of underbrush in the forest, appear-
 ed to be about 3000 feet above the sea level, though this
 may be accidental - on the streams, it certainly ascended
 higher. The actual line of vegetation, like that of snow
 is too irregular & dependent upon local circumstan-
 ces to be defined. Grass & flowering plants were noticed
 as high as 3000 feet. The limit of forest growth was
 here under 6000 feet, at which ~~high~~ elevation the trees
 were stunted down to low bushes. ~~The fir grows~~ ~~Abies gran-~~
~~dis~~ The balsam fir & pine reached the greatest altitude,
Abies Douglasii & Thuja ^{gigantea} growing out some distance
 below. ~~Abies~~ ~~Douglasii~~ was found at the lake. (2800 feet)

Mr. Custer, one of the ~~surveys~~ topographers of
 the party, whose ~~expeditions~~ gave him an excellent op-
 portunity for judging, came to the conclusion that the
 line where the timber ceases is remarkably uniform through-
 out the whole range & that the disappearance is very rapid,
 the trees maintaining quite a large size, though not so great
 an altitude, to within a short distance of the point where
 they dwindle down to mere shrubs. This was confirmed by
 my own observations. The Thuja is the first to disappear,
 then the yellow fir (Abies Douglasii) The Hemlock reaches
 about the same or a somewhat greater altitude than this
 last. The Balsam fir attains the greatest elevation.

Underbrush extended to only ~~one~~ ^{two} or 200 feet above the
 lake, although the same shrubs, in spots exposed to the
 sun, reach an altitude equal to that of the forest.

Pinus Monticola first seen at the Lake - a very large one.
 Aug. 4. ~~Just~~ at Camp Chuchchemum, ~~at~~ (day 2000 to 4500 feet)
 first noticed Picea Amabilis, its cones having now attained
 a feeble size. Thence on to the summit this & Picea gran-
dis, with the hemlock, most abundant - The Cottonwood
 also retains a fair size. A straggling alder, at this
 altitude, procumbent, abundant - it is here called "black

alder," and is a common nuisance on the mountain sides, its branches, extending downward, greatly impeding the climber.

The timber on the summit was accidentally burned off before my arrival. Descending to our first camp below it (alt. 11) the timber in the bottom was very thick, but not of great diameter. ~~The~~ Picea Amabilis & P. grandis were common, with ~~some~~ what I supposed to be a variety of the latter, the leaves here double on the stem. Also the Hemlock, & Abies Menziesii. Here also first saw ~~the~~ Cupressus Nutkensis, of which the men said a large number grew on the burnt summit. [See p. 1
Nov 24]

In this valley the trees 150 & 175 feet in height.

The wood of Picea Amabilis is yellowish white & apparently of good quality. The bark of ~~a~~ trees 2 feet in diameter averages $\frac{3}{8}$ inch thick, with large & large scales than in A. Menziesii, & very little striated.

(Cupressus ~~the~~ Nutkensis?)
The supposed Cypress had the wood of fine grain, the heart of a dark color, & with a very disagreeable odor. The bark thin, ~~peels~~ exfoliating entirely in thin woody strips like the hickory, inner bark white & peeling readily in strips. The leaves similar to those of the common thuja. Specimens of the fruit were forwarded to Dr. Torrey.

The bark of the Hemlock seemed much more deeply striated than on the other side of the ^[? mountains] but it is difficult to give general description of these trees as individuals differ much with the locality.

Pinus monticola. sparsim. A. Douglasii did not occur so high on the east side of the range. It appeared to set in at about $\frac{1}{2}$ feet.

A shrub ~~(?)~~ Ceanothus, now common & in flower. Aug. 8. From here ascended to summit of the range to the south of the pass. The change of character very striking. It was covered with open glades separated by groves of balsam fir, and blooming with flowering plants.

* The "hickoryberry" here alluded to is doubtless *Gaultheria Myrsinites*,
which is peculiar to the the Pacific States & of which *G. procumbens*, which has
not been found west of the R. Mountains.

Besides these more particularly Alpine, ^{many} ~~most~~ of those which at an earlier season were found in the lower country, were now here in blossom, such as lupin, ~~chrysan-~~
~~themum~~, scarlet Castilleja &c. The elevation was ft.
 & ~~the~~ ^{the} Pinus Picea grandis, the most common tree, still maintained a fair height. One clump of Pinus contorta, 50 or 60 feet high & 10 or 20 inches in diameter, was noticed on the side of the river -

Aug 10. Thuja & Q. Douglasii appeared perhaps half way between the forks of trail & the first Creek - alt - feet. The Cypress disappeared before reaching them. The Thuja in the ~~low~~ bottom were very fine, and descending to the Maquit river (alt. - feet) they formed a ~~very~~ dense forest, as on the coast side -

In the Maquit valley, the soil of which on the terraces is very poor yellow fir & Pinus contorta in thickets prevail. Here I first noticed ~~the~~ ~~the~~ ~~the~~ for the first time in the whole territory, the chickaberry, so common in New England. In other parts of the valley, where the soil was better, Pinus monticola became common - Cotton wood & willow ^{grow} also along the stream. Paper birch & black & white alders also occur.

East of the Maquit river, the mountains, elevated from 5000 to 6500 feet, are much more open - ~~timber on~~ the summits grassy & timber being chiefly in the bottoms, or on their northern slopes. At 6000 feet it is much stunted & almost entirely Picea grandis ^{conite} & Pinus contorta with some Abies Murrayi. Pinus contorta grows to the height of 50 feet, seldom with a diameter of 12 inches. The bark of this tree is very thin & covered with small scales, the hairs about 2 inches long, 2 in a sheath - rather a yellowish green, cones adherent for years

[Where does this come in?]

Abies Douglasii. grows only on dry ground; that is, ground that is never overflowed, and in that respect differs from A. Menziesii. In fact it is a test of some importance in ascertaining the height to which the streams rise.

A. menziesii on the other hand prefers a damp soil. It attains its greatest size on the coast. I have seen it in situations even where the two occasionally meet it. The bark of this tree is reddish, ^{thin &} not striated like ~~that of~~ A. Douglasii, but exfoliating in scales. I had supposed these to be two varieties of A. Menziesii, one inhabiting the coast, the other the mountain & interior region I fancied I detected a difference in the foliage but Dr. Newbery says it is the same tree, with only the differences produced by situation. It reaches an altitude of 6000 feet on the parallel, nearly if not quite as great as the Balsam fir.

The Bark of A. Douglasii becomes very thick in old trees, so much as to be used for firewood. It is deeply but irregularly striated, longitudinally.

A fir which on the coast we call white fir, Dr. Newbery says is the ^{Picea} Amabilis & not Alba. The bark of this is white & comparatively smooth. The twigs have the peculiarity of growing verticillate & as they fall off give to the bark the appearance of being divided into sections. This is the poorest lumber we have being what is called "brash". It also decays rapidly.

The wood of A. Douglasii is that which is used so

extensively on the west coast, both for timber and boards. It is strong & durable, but unfortunately shrinks and swells. In Spain it is unsurpassed & great numbers are exported to Europe. It has alternate hard & soft layers.

The Spruce (P. Menziesii) is inferior to the above, but is also much used & is valuable for many purposes.

The Thuja is but little affected by elevation, at least up to ^{4000 or perhaps even} 5000 feet provided it can find moist-ure. Very large trees were noticed far up in the Cascade Range, where ~~the~~ swamps exist or along the borders of streams. Its wood is extensively used for fencing, weatherboards, inside work generally & shingles. It splits readily & very true.

Aug. 27th near Ft. Pasayten It was not until reaching the mouth of the Chuchuwantun, that the Abies Douglasii became common. The Cottonwood & Aspen then too set in, with the black alder, here taller upright & attaining ~~some~~ several inches in diameter. Alt. feet

Columbia Pine (Pinus ponderosa). This I first noticed going eastward, about the mouth of the Pasayten South fork. Its universal habitat is the gravelly or sandy terraces along the river. Abies Menziesii here attains a large size Pseudotsuga still the prevalent one - Abies Douglasii frequent.

Black Alder is very common in the bottoms.

Amelanchier Canadensis (Ribes Americanum) Service berry, Red-twig-Dogwood with white berries which the Indians eat, & Mountain ash here ^{only} quite a shrub occur - very little underbrush however in the pine woods.

The red raspberry of New England was on the west fork of Pasayten - rare in Washington Territory -

Among other shrubs not mentioned, the aromatic black currant, ~~apparently identical with~~ ^{it resembling} that of our gardens, - another black currant without bloom, with a small leaf, the fruit hanging not in racemes but in irregular bunches & more like a gooseberry than a currant, & ~~the~~ red currant. The red flowering currant was not seen west of the divide. The Bear berry continues here and a species of Ceanothus ~~capitata~~, the branches lying on the ground. The red currant has a small glaucous leaf, fruit dry & sweetish.

In crossing the range between the Pasayten & Nais muleok, about the same elevation as the last 6500 feet, the mountain was much more timbered, though the forest was an open one - Picea grandis & Pinus contorta as usual, fern which depended long locks of the black moss, (Evernia), from which the Indians make ~~the~~ a paste which they eat in winter. This was so abundant as to give a funeral look to the woods.

Another characteristic was that a species of willow grew far up on the mountain side, ~~among~~ where there was not the most remote appearance of moisture -

On reaching the Haisaultoh (alt. of Cache . . . feet) Yellow fir (A. Dougl.) again appears of good size though not in forest - but scattered like the Pinus Rouseana. The P. contorta in dense thickets, Juniperus Spencei & Picea Grevi also common. Black Alder, some Cottonwoods - and the Aspen very common along the streams - The hemlock seems to have run out as I saw - but one on the mountain, a few stunted Juniperus on the creek -

The common fireweed of New England, ^(Erechtites hieracifolium) common on both sides the Mts. - also the lupine which on the Haisaultoh Mts reaches ^{occurs at} the height of 6000 feet - or more -

Sept 21 Descending the valley P. contorta became the common - Pinus Rouseana was found on the river terraces, always in open woods & never in thick forest - That also is a good tree character of A. Dougl. here, but it is usually a local one with that tree whereas it is indicated with the large Pine - On the hill sides A. Dougl. now begins to form much of the forest -

Measured a P. Rouseana diam. wood 30 in. (heart 23) outside of bark 46. 90 rings in heart, 120 in sap wood. The sap rings smaller toward the outside - heart reddish, Sap deep yellow bark externally light brick red - about 30 layers - wood in alternate hard & soft layers. The bark opens in broad plates by irregular longitudinal fissures - The ^{structure} ~~formation~~ is very remarkable, the scales of which it is composed being ~~plated one~~ of varied forms, plated one on another with bevelled edges & fitting like a Chinese puzzle. The upper and under ones are also fastened by projections & indentations to match -

Reaching the Hailkamen the Antennaria becomes somewhat plenty on the bare hill sides. also Purshia tridentata.

x There were no specimens of *Pachli* in the Collections
from Oregon to Wash. Ter that I examined.

J. L.

Mr Leister who came down the Similkameen reports that when he crossed from the Kagit to the head of that river the S.W. sides were bare of timber, the N.E. clothed. The timber ^{was} balsam fir (Picea grandis) to the first fork, no Thuja or A. Douglasii after passing the divide. The Pinus ponderosa commenced at Camp des Femmes.

R. Douglasii?

Among the shrubs in the valley of the Similkameen not before noticed was the sumac ^(Rhus glabra), a species of plum, the poison oak ^(Rhus Toxicodendron) and a willow with very long narrow leaves. This last however, ^{sometimes} assumes the size of a tree. Cottonwood also occurs along the river but trees of any kind are scarce from here to the Okinakanne.

The sumac, with its crimson foliage (Oct 1st) brought to mind the autumnal tints of the Atlantic, ^{? woods} which, excepting yellow, as seen in the Cottonwood, maple & Larch &c are rare or rather wanting in the forest & shrubs of the Pacific? side

* Cactuses were here so abundant as to be a nuisance to both man & animals. A single quite large juniper alone near the mouth of the river.

The Larch, which further south, on the Cascade Range shows itself at once as a prevalent tree on the eastern slope of the Cascade Range, does not at this latitude appear until reaching the Okinakanne River. It now accompanies the Pinus ponderosa on the tundra & the yellow fir on the hill sides - The spruce still occurs though not in quantity - Aspens are abundant in the bottoms.

On the Okinakanne Pine & Larch prevalent. Yellow fir less so. Cottonwood Aspen & Yellow Birch, the latter only occasional. Descending the river, Pinus contorta again found in thick woods. & up the gulches of some small streams, Thuja.

(Oct 22)

Ascending the Columbia River from Fort Colville to the 49th Parallel, the timber on the ^{lower} ~~traces~~ was say 3/4 Pinus ponderosa & 1/4 Larch - with some Abies Douglasii on the upper traces, the larch & fir exclude the Pine. The ~~former~~ Larch, now in its yellow leaf, as well as the cottonwood, afford an agreeable diversity to the sombre monotony of the ordinary vegetation. The ~~lines~~ of some of the highest traces are often thus clearly marked out by the ~~yellow~~ lines of yellow larch trees.

The Pinus ponderosa, Red Pine or Columbia Pine, takes a good finish, & is used in preference to the larch for lumber for houses as well as for boats.

The Custer who crossed from Camp Statapostin to the Columbia along the parallel, found the timber & underbrush both dense at the general level of 6000 feet.

The "black birch" of the Columbia River is said to be a strong and valuable timber for wagons & such purposes. The "poplar" (aspen) excellent for bodies.

The Larch is good timber and would be valuable for ships. It is full of 'pin knots' which injures it for ~~timber~~ sawed lumber. ~~Fields~~ The yellow fir is not as good here as on the coast.

Quality of Timber around Fort Colville, Upper Columbia

Pinus ponderosa - a better wood for lumber than any of the firs, but not as good as the P. monticola. It finishes well is a strong timber & would be good for spars.

runs from 2 to 5 feet diameter & 150 to 200 feet high don't cleave well - as the grain is apt to run round the tree.

~~Abies Douglasii~~
Abies Douglasii:
Red fir or yellow fir, does not grow as large or clear as on the coast. Size 2 to 3 feet - height 100 to 150 feet

Larix occidentalis.

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Larch or Tamarack. ^{the Larch of} Is softer than ~~that~~ at the east, has no strength, but cleaves well, is straight-grained but brittle, in falling it breaks up. The wood is yellowish. It does very well for shingles & weather boarding, as it seems to last where strength is not required & is not affected by weather - does not warp or shrink & would do for deck plank - size 2 to 3 feet diameter - height 200 feet - after passing 3 feet the top generally dies, though larger trees are sometimes seen. It requires a deeper soil than the fir -

The Muja around here is not as abundant or large as on the coast, or again in the river bottoms toward the Rocky Mountains.

Abies ~~concolor~~

White Spruce, Red Spruce called by both names in reference to bark or wood. Not very plenty, grows large 3 feet diameter 200 ft high, straight grained & strong, wood white, bark dark colored & scaly - found on good soil & moist localities - makes good shingles & spars & flooring, is free from knots is tougher than the fir & more even in texture.

Populus monilifera

Cottonwood, not very abundant - valuable,

Populus tremuloides

Poplar (Aspen) Common in the bottoms - of no great value except for such purposes as sleigh & wagon bodies & generally as bass wood is used for in the States ~~to~~ 1 to 2 feet diam 50 to 100 high

Betula occidentalis

Black Birch, (not a paper bark) woody bark, good wagon timber, habitat low rich bottoms, rarely 10 in diam. 50 feet high. rather scarce

Alnus Oregonia & viridi

Alder Black and White or "Spotted" both kinds. don't differ much in wood - 12 to 20 inches diam & 20 to 40 feet high. good for charcoal.

(On the coast the white alder grows much higher)

Acer macrophyllum

White Maple - scarce - & does not attain a large size - say 6 or 8 in diam. The strongest wood here.

Heracleum lanatum. - Umbelliferae

A plant of the ~~Angelic~~ family (Aiyote) is cooked by the Colville Indians & the slices applied to parts affected by rheumatism. It is first sliced & then baked. For ulcers they scrape & apply it raw - also use it as a horse liniment.

From Ft Colville en route to Spokane River - On the open hill sides & ~~up~~ dry terraces, P. ~~fluorescens~~ & larch - On the hills larch, ~~the~~ fir ^{Douglas}, P. ~~contorta~~ in the thick woods.

March 30. A liliaceous plant with yellow flower, root in grains first in bloom to day Kaii-hek (Pud.ville) Sint. Koo-lee-na, Colville - grows as large as an onion. Edible

April 1. Spokane R. Bitu root just coming up. A small blue flower in the pine woods - Varieties of Artemisia on the Spokane -

Between Spokane & Clark's Fork woods

A great deal of the ^{Ceanothus} ~~Sparganium~~ forms the chief underbrush.

Clark's Fork. ^{Pines} ~~Handrova~~, Larch, Yellow fir, Cottonwood. Some of large size.

April 18. Yellow skunk cabbage in bloom here - In season a fortnight or three weeks later than on the Spokane. A yellow lily ^(probably a small flowered variety of Lilius Pennsylvanicus) in bloom. - Also a tillium

April 26. Strawberry in bloom, Cottonwood do. Handrova budding - Larch putting out, Willows in bloom.

April 30 Arbutus Menziesii ^{or Bearberry} in bloom.

May 10 a small maple ^{(Acer} ~~(?)~~ ^{circinatum)} in bloom & beginning to leaf out. ~~See~~ Ground barberry ^(Berberis Aquifolium) in bloom. Alder coming into leaf.

May 12 Swamp maple ~~is~~ in bloom - also larch & birch. a vine with blue flowers.

Clarke's Fork between Linyakwatum & the lake. Above
 forest level consists of P. ponderosa, P. contorta, Larch, Douglas's
 fir, with, more rarely, Thuja & white fir - Thuja &
Abies Murrayi occasionally in the bottom - Balsam Poplar
 (?) in the low ground - Swamp maple - White birch
 on the terraces - Fir, larch, & P. contorta on the moun-
 tains. A few Hemlocks in the thick woods back from
 the river - Some white pine (P. monticola) Aspen ab-
 undant in the creeks.

May 22nd Kamas in bloom.

The timber is very thick over the whole country except
 a few meadows (overflowed during freshets) on the river.
 but it is, ~~of~~ owing to the poverty of the soil of small
 comparative diameter. The undergrowth aspen,
 alder, willows, Hawthorn hazel - The horrida ~~sp. var.~~ in wet
 places in the woods. The white pine is now the
 finest tree in the woods reaching a great height,
 perfectly symmetrical & with a thin dark colored
 bark, covered with small very regular scales, which
~~adds to or perhaps produces the idea of~~ Hemlock
 also becomes common.

On Pack river between the Clarke's Fork & the Kootenay
 there is a superb wood of these trees (P. monticola)

Kootenay River, Chelenta Crossing. The same pines, firs
 & larch on the hills, Thuja in the bottom. The quality
 of this last as timber is very inferior here to that on
 the coast. It is rarely sound. The P. ponderosa is by far
 the best. The birch here reaches a diameter of 24 to
 30 inches (paper birch). The Indians use the bark
 of this & also of the Spruce, for canoes. Alder com-
 mon also. The Columbia pine as usual on the
 terraces only - always open & free from underbrush

Swice berry, & Spiraea, hazel ~~is~~ is common as
underbrush - Hawthorn in the bottoms

Along within the great bend of the Kootenay & upon the
Mooyie river ~~Hemlock~~ Pinus contorta, still the same
tall slender tree, Yellow fir, larch, hemlock & balsam
fir continue. Pinus ponderosa does not occur -
Mudgnawth, Spiraea, ^[Philadelphus] sericea, Swice berry & ~~Ceanothus~~
with small willows in the bottoms.

Pinus contorta covers considerable tracts to the exclusion
of everything else. Birch, alder & vine maple with
thick underbrush on the Mooyie - also black alder &
red dogwood - Some thuja -

Striking the Kootenay again about 49.30 found Purshia
tridentata, aspen, black alder, black birch &c - Same fruit
trees - All along the river, about high water mark,
as I noticed on the Columbia between Cold Mt Shep
and Colville, grow a line of Junipers, the seeds
of which have doubtless been brought down by the
fishery. It seemed to differ somewhat from the
common kind -

Saw no ~~artemisia~~ ^{Sage bush (Artemisia)} north of the Spokane River -
The aspen & two kinds of willow, one the narrow leaved
one noticed on the Milkamen, from thickets on the
Kootenay - the other the common river willow. Clematis
very common, apparently same as in the ^{Eastern} States. Choke
cherry - a shrub (~~Figus~~) along the river with glaucous
leaves. Some of the smaller Artemisias near Kootenay
East (Camp) but no Sage bush or greasewood. Purshia
quite common.

Coming from the Kootenay, to the Flathead near the 49th Par
 allel, the same ^{? habit} conduct is noticeable in the trees. The Pinus
Banksiana extends up the pass as far as the open trances
 or to an altitude of \quad feet - estimated (Camp Sept. 9)
 & then runs out. Larch, & yellow fir (Abies Douglasii) continue on
A. Menziesii however predominates over either. Pinus contorta
 abundant & a few P. Monticola.

Balsam poplar (?) Black & White birch, the latter not
 large but very tall, black alder, mountain willow, Acer
cinnabarinum & dogwood. Service berry, Hawthorn, two
 species of Ceanothus, Mt. Ash & bear berry.

Ascending the pass P. contorta becomes predominant -
 with a diameter of 10 or 20 inches & 80 to 100^{ft} high.
 Counted the rings on one of 10 inches, they amounted to
 60, the outermost being smaller & within half an inch
 of the exterior bark. Its early growth was rapid
 the interior rings being $\frac{1}{4}$ & some were $\frac{1}{3}$ inch in
 thickness.

Sept 13. Beyond this camp (alt. \quad ft) balsam fir
 the prevalent tree - A. grandis, still accompanied by
 larches, P. contorta & P. Monticola.

On the summit, high about 6000 feet, timber was
 mostly balsam fir, A. Menziesii, P. contorta & some young
 5 leaved pines, species not distinguished - probably P. Monticola.
~~but I suspect the other trees reach higher altitudes on the~~
~~It was stunted here, but grew at greater altitudes.~~
~~surrounding mountains, the pass being very bare and~~
~~sterile, such as A. Douglasii, A. Menziesii & larch.~~

In the valley of the creek descending (Camp Sept 14 -
 alt. \quad feet) Picea grandis & Pinus contorta prevail
A. Menziesii, A. Douglasii, less abundant, P. Monticola & A. Douglasii
 The P. grandis at the foot of the summit reaches 150
 feet in height with a diameter of 10 or 20 in.
P. contorta of 12 in - 80 - 100 feet - smaller ones of
 8 in. 50 - 60 feet - this last the common size in thickets.

The mountains as elsewhere more densely timbered on their northern slopes.

Descending the valley of this creek, still P. contorta & A. Douglasii Picea grandis, spruce & larch - saw no Thuja, P. ponderosa or P. monticola

Crossing the Flathead R. & ascending the Kishewau to the summit of the main chain of Rocky Mts, timbered chiefly P. ponderosa, mostly deadened by fire. The ~~low~~ mountain sides here were covered with bunches of a plant with leaves like a coarse grass, dark green, roots like the Calamus - flower purple. ^{It is Cerophyllum tenax} On the water side Pinus contorta - Picea grandis, & Larch - gradually stunted, as the situation is exposed. ~~On the~~ The Elevation 6000 feet - On the N.W. side they run up 500 feet higher & the stunting seems more due to exposure than to actual elevation.

Some timber extended down the east side, suddenly ceasing as we emerged from the pass on to the great plains - Along Bow river & lake & on some parts of the creek where we descended quantities of dead cottonwood poplar & aspen, very gnarled. At the upper lake found the Pine considered new by Capt Blakiston. It turns out to be P. flexilis. (Elevation of Lakes not determined) - Willow, aspen, poplar, service berry & some stunted A. Douglasii which thus crosses the Rocky Mts.

P. flexilis 5 hairs in a sheath - 3 or 4 cones together, about 4 inches long - nuts without wings - ripen every two years - bark more succulent than ⁱⁿ P. contorta & resembling that of a young Picea amabilis - All these stunted - one much resembled an oak - foliage very open & sparse, but with thick heads.

On return descended the Kootenay to Chelintu, instead of going by the Morje - Towards the crossing the timber becomes larger, some fine strugas, a Douglas^s Spruce & Pinus Aonderosa - Noticed also the single leaved balsam fir - P. Cantata, Vine maple - The deciduous trees were now (Oct. 13) in their yellow leaf.