

Journal of the Minnesota Academy of Science

Volume 3 | Number 1

Article 13

1886

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John B. Leiberg

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Recommended Citation

Leiberg, J. B. (1886). Notes on the Forest Region of Northern Idaho. *Journal of the Minnesota Academy of Science*, Vol. 3 No. 1, 88-95.

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dashing water upon them and then pounding them with stone hammers. Ashes and charcoal are found in great abundance in and around these old diggings.

This ancient people explored the Lake Superior region, as well as the mining region that extends across the northern part of Minnesota. A great many, if not all the valuable mines had been prospected and doubtless worked by them. The northern part of Minnesota does not seem to have been densely populated. Their largest settlements were near the most available points for securing a sufficient food supply with which to work the mines and transport such material out of the country as a half civilized people could make available for their wants.

January 6, 1885.

[*Paper M.*]

NOTES ON THE FOREST REGION OF NORTHERN IDAHO.

—By *John B. Leiberg.*

[Read, April 7, 1885.]

During the spring and summer of 1884, the writer made a trip through northern Idaho, and thence on horseback from Spokane Falls, W. T., to Jamestown, Dakota. You are all aware of the great excitement attending the alleged discovery of gold in some of the affluents of the north fork of the Cœur d'Alene river about this time. The journey was undertaken mainly with the view of ascertaining what, if any, were the prospects of mineral wealth in this region. For want of time and other facilities, it was not possible to make systematic or extensive collections of the very interesting and somewhat peculiar flora met with, and the following notes deal mainly with the arboreal vegetation, that being the most conspicuous and impressive feature of the flora of this portion of Idaho.

The mountain system of northern Idaho is mostly made up of the Cœur d'Alene range with its western spurs and branches, which commences at the southern end of lake Pend d'Oreille and runs thence in a southerly direction for two hundred and fifty or three hundred miles, finally losing itself in the main range of the Rockies. Its southern portion is called the Bitter Root mountains

and the crest of the range forms the boundary line between Idaho and Montana.

Though not abounding in lofty peaks and summits, yet at not a few points does it reach the line of perpetual snow, which by the way, is far higher on the Pacific side of the Rockies than on the Atlantic side. But what it lacks in lofty grandeur is more than compensated for in the indescribable ruggedness of its contour. It has been stated that no mountain chain within the United States is so difficult of access and exploration as the Cœur d'Alenes; and a little experience in threading one's way through its dense forests and labyrinthine spurs gives a strong color of truth to this assertion.

I started from Lewiston, Idaho, in April. Though so early in the spring, the season was quite far advanced and everywhere the hillsides and valleys were covered with a profusion of flowers, giving the country in many places the appearance of a huge flower-garden. For some miles the road, a narrow Indian trail, led through the Nez Perces Indian reservation, along the Clearwater, a tributary of the Columbia river system. The country here is generally treeless, intersected by deep, narrow gorges running in all directions.

Now and then, some attempts at Indian agriculture were seen, rather sorry-looking, to be sure, yet still showing a desire on the part of their owners to adopt white men's ways; probably more prompted by necessity than any great desire to work.

After following the Clearwater for fifteen miles, the trail turned northward and ran up the valley of one of the numerous mountain streams which rise in the Cœur d'Alenes. The flora here was new and strange, but occasionally an eastern species, or species belonging to genera common in the east, would appear and remind one of home and civilization. In place of *Anemone patens*, var. *Nuttalliana*, that covers our hillsides in early spring, the slopes there abounded with *Anemone occidentalis*, Watson. *Sisyrinchium angustifolium*, Miller, was replaced by *S. grandiflorum*, Dougl., this plant in places covering acres in extent and presenting a most gorgeous sight. Several species of *Pencedanum* were common, some of these as *P. farinosum*, Geyer, furnishing from their farinaceous roots an important article of diet for the Indians. A number of species of *Castilleia*, among others *C. coccinea*, common in our state, were noted. Many species of *Delphinium*, *Zygadenus*,

Claytonia, Brodiaea, etc., added variety to the flora. For the first thirty or forty miles along this stream, the arboreal vegetation was rather scanty, composed mostly of straggling trees of *Pinus ponderosa*, *Juniperus occidentalis*, Watson, *Populus trichocarpa*, Torr. & Gray, and an occasional clump of *Sambucus racemosa*.

As the outlying spurs of the Cœur d'Alenes were reached, where the rain-fall is more abundant, large bodies of timber of a much more stately appearance became frequent. The geological formations also commenced to undergo a change. The valley through which the trail ran had hitherto been narrow and hemmed in by high walls of lava, often over a thousand feet in height. As the head-waters of the stream were gained, the bluffs gradually decreased in height and gave way to large plateaus, densely covered with a magnificent growth of *Pinus ponderosa*, and intersected here and there by high rugged hills of granite, micaceous schists, and other rocks.

Of the numerous varieties of conifers on the Pacific slope at this latitude, none form forests of such pleasing aspect as *Pinus ponderosa*, Douglas. The tree does not attain any great height as compared with other members of the Pine family, though often of considerable diameter. Its usual habitat is on top of high ridges, and on the level plateaus, provided the soil is rather dry. Unlike other conifers which have a large spread of root, but no depth, the *P. ponderosa* sends its strong roots deep into the soil. In consequence of this habit, it is rare to see a tree of this kind uprooted. On the plateaus this species forms park-like forests, the trees growing at distances varying from twenty to fifty feet apart, the ground free from underbrush, and covered with a luxuriant growth of grass. It furnishes a considerable portion of the lumber sawn throughout northern Idaho. The wood is yellow in color, heavy and coarse in texture, and somewhat resinous.

Among the conifers composing the forests where the *Pinus ponderosa* does not flourish, the following species were the most noticeable:

Abies concolor, Lindley and Gordon, a fir of little value as a timber tree, having a soft, very tough, ill-smelling wood. The tree is rather low, and would not be conspicuous, were it not for the dense, almost impenetrable thickets it forms, by reason of the lower portion of the trunk being closely covered with long dead

branches, very hard and sharply pointed, extending in all directions, remind one of the quills of the porcupine.

Abies nobilis, Lindl., and *Abies grandis*, Lindl., were common firs, forming the greater part of the forest at certain elevations, growing very tall but of no great thickness.

The largest fir, and with the exception of *Thuja gigantea*, Nutt., the largest tree seen, was *Pseudotsuga, Douglasii*, Carr. Usually the trees of this species grew scattered, but occasionally they formed large groves. These trees were of truly magnificent proportions, their trunks standing like huge pillars, straight as arrows, and perfectly cylindrical, free from branches, and towering from 250 to 300 feet in height, where they terminate in a short crown of branches. Many of these trees possessed a peculiar mode of growth. Starting from the ground with an enormous trunk, sometimes twenty feet in diameter, at from three to six feet from its base, it would divide into two or three perfect trunks, equal in height and size. It is safe to assume that nowhere in the temperate zone can be found so great quantity of timber on an acre of ground as in forests composed of this tree.

Pinus Lambertiana, Dougl., the so-called sugar pine, was a marked feature in the forest growth at two to three thousand feet elevation. The wood of this tree more nearly resembles our *Pinus Strobus*, L., or white pine, than any other of the Pacific slope. It grows to a great height, the trunk seldom exceeding four or five feet in diameter. This species of pine is usually the first to cover districts swept by forest fires, at this elevation. The young growth in such places is almost wholly made up of this species, and as close together as canes in a cane-brake.

Marshy places were generally covered with *Pinus contorta*, Dougl., a tree of no value either for fuel or timber, and of an unsightly appearance by reason of its branches being covered by a multitude of small, black, persistent cones.

In the valleys occasional groves of *Thuja gigantea*, Nutt., were seen, of which the wood closely resembles its eastern relative. The size, however, is very much greater, a diameter of ten feet at the base, being quite common. Two other species of conifers, *Picea Sitchensis*, Carr., and var. *pendula*, and doubtfully *Picea pungens*, Engelmann, complete the list of the more noticeable members of this family.

The only hard-wood tree (with deciduous leaves) seen was *Acer circinatum*, Push, and that only attaining a low bushy form.

The country west of the summit of the Cœur d'Alenes, and extending nearly to the plains of the Columbia, is almost wholly composed of steep, rocky ridges and a multitude of deep narrow canyons or ravines, at the bottom of which, during the melting of the snows in April and May, a small and rapid stream winds its way. The sides of these canyons, though very steep, are usually covered with deep rich soil, supporting an enormous forest growth. Along the larger streams are occasional pieces of meadow land, on which grasses and flowers flourish luxuriantly, but the valleys are generally as heavily timbered as the hillsides. The bottom of the smaller canyons are dark, gloomy places, hidden by the tall pines and spruces from the rays of the sun, and choked up by fallen timbers. Through these woods it is a very difficult matter to make one's way. The fallen timber lies everywhere in prodigious quantities, and the living forest stands as thick as the trees can grow. Only by constant use of the axe is it possible to get through.

To give an idea of the enormous amount of fallen timber I will mention that one morning I counted within a radius of fifty feet from my camp one hundred and thirty-five fallen trees, varying from one to six feet in diameter, and from fifty to two hundred and fifty feet in length, and this was not an exceptional place. Notwithstanding this great quantity of fallen timber, the living forest at this point was not appreciably less dense than the average.

The intense silence and gloom in these forests is remarkable. Scarcely a sign of life, except an occasional woodpecker hammering on the standing dead trunks of the tall pines, and the ants removing the decayed logs. It is quite different, however, in the few open places. Here life is in abundance. Herds of deer and elk are quietly grazing, birds of many species flutter about everywhere. In the spring strange contrasts are seen in such places. In one part of the meadow high snow drifts are rapidly disappearing under the influence of a hot sun. Gay flowers are blooming up to the very edge of the retreating drifts, and among them hover numbers of humming birds, while swarms of butterflies alight on the traveler, regardless of danger.

The timber belt, to which the foregoing remarks apply, has a width at the latitude of Spokane Falls of about two hundred and fifty miles. Toward the north it extends far into British America and westward to the Pacific ocean. From Cœur d'Alene lake to the Bitter Root river, along the old Mullan military road, the timber consists mainly of the varieties enumerated. It is everywhere, except where fires have ravaged it, as close and dense as described above, and of an excellent quality in an economical point of view. When the pine forests of Minnesota and Wisconsin are exhausted, attention will be turned to these vast depots of supply, in which the lumberman's axe has, as yet, made no inroads.

After crossing the Bitter Root river, the climate becomes drier, the mountain range to the west intercepting a large amount of the moisture brought by the winds from the Pacific. This dryness is prejudicial to such an excessive development of forest growth as is found on the Pacific side of the range. In consequence a large number of conifers common there are absent here, and the rest are greatly diminished in size.

The most common species furnishing merchantable lumber from this point eastward is, *Pinus ponderosa*, the other varieties of pines and firs being of little value. After crossing the summit of the Rockies along the parallel of the Northern Pacific, the forest growth dwindles rapidly, and is mainly confined to the water-courses and the sides of a few of the outlying ranges. The last conifers observed while traveling eastward were near Glendive, Montana, where, in the hilly country to the east, a few pines find a precarious existence.

Before leaving this subject, I would like to call attention to the possibility of successfully introducing *Pinus ponderosa* as a tree of cultivation in the dry prairie region of Dakota and Minnesota. This tree appears to be able to live and flourish in a greater variety of soil, and under greater changes of temperature and moisture, than any other pine native of the northern United States. It is found growing sometimes in deep rich soil, sometimes in gravelly or rocky places; in localities where but little winter prevails, and again where the temperature often descends to forty or fifty degrees below zero. Its only marked preference seems to be for dry places. In wet or swampy districts it is not found. Unlike the other pines, its roots penetrate deeply into the ground, and it is not easily uprooted by wind. This last quality is one to be

especially commended in a prairie country where strong winds are the rule and calms the exception. It would be a valuable addition to the trees of the northwest, and there is no reason why its cultivation should not be attended with success.

The soil throughout northern Idaho, is a deep rich loam of wonderful fertility. Pine forests in the east are usually associated with a gravelly or sandy soil, but it is not so here. The amount of land fit for agricultural purposes is very limited. Lumbering and mining will be the chief resources of this part of the territory in years to come.

The temperature throughout this region is much milder than in a corresponding latitude farther eastward. The winters are short with heavy snow-falls. The ground in the woods apparently does not freeze, as no trace of frost could be found under the snow drifts. The valleys in the mountain region are sometimes in early summer subject to severe frosts of sufficient intensity to cover the vegetation with a thick coating of ice. In Minnesota such a frost would kill plant life; but here, for some unknown reason, it does not injure it in the least. The summer is very warm. Winds have no chance in such a broken, heavily timbered country to cool the air, and an unbroken calm usually prevails day after day.

The precipitation of moisture is very great; much the larger portion falls during the winter as snow. Indians living there, claim that a depth of ten feet is not uncommon in the mountains. It begins to disappear in February and is nearly gone in April, yet in particularly shady places I have found snow banks two or three feet deep in June. The rain-fall in the summer is rather scanty, sometimes none at all.

It is in such seasons that enormous wanton, or I may say criminal, destruction of forest takes place. Thousands of acres of valuable pine land are thus despoiled. All that remains are great heaps of charred logs. Even the soil suffers from the intense heat generated, so that years must elapse before it can regain its former fertility.

As the mineral resources of this region in the future will doubtless be its most important feature, it may not be amiss to say a few words concerning them here. Little is as yet known in regard to the extent of the mineral bearing rocks. The dense forests and the great ruggedness of the country render prospecting

and exploration extremely difficult, demanding much time and labor. The southern portion of the range has been proven to be well mineralized, and the northern portion will be found to be no less so. Enormous veins of rich magnetite and hæmatite iron ore were found, also extensive outcroppings of galena, carrying considerable quantities of silver. Copper, doubtless exists, probably also platinum and at least the *color* of gold can be found in nearly every ravine throughout the range. Reports of quartz veins carrying free gold were numerous during the Cœur d' Alene excitement, and they doubtless exist in many places.

The country rock over large areas consists of red slates, the strata of which in some places are tilted even to the vertical, for long distances, and in other places are bent and twisted in every conceivable direction. The indications are very favorable for the supposition that gold is disseminated through these red slates. Support of this theory is found in the fact that quite a number of paying placers have been discovered in ravines traversing this formation.

Until the Cœur d' Alene excitement of the last year, the country was virtually a *terra incognita*. Then suddenly there was a great influx of men, allured by the glittering tales scattered broadcast over the land. Most of them went in there without any definite plans or the requisite knowledge and experience, entertaining the wild hope of suddenly acquiring immense riches. Of course they were disappointed in the vast majority of cases. Most of them went in without any capital whatever, and were soon compelled to leave in the best way they could. The best way, and in fact the only way, was on foot. For a while every trail leading out from the mines was crowded with small squads of half-starved men, eager to reach civilization and a "square meal" once more.

Mining is an occupation that demands skill and knowledge of the highest order, also capital and patience. With these requisites, success in this region is almost sure in the end.