PROCEEDINGS

OF THE

UNITED STATES NATIONAL MUSEUM,

1888.

NEW SPECIES OF FOSSIL WOOD (ARAUCARIOXYLON ARIZONICUM) FROM ARIZONA AND NEW MEXICO.

BY F. H. KNOWLTON, ASS'T CURATOR, FOSSIL PLANTS.

(With Plate I.)

The material which furnished the basis of the following observations was selected from the large fossil trunks that have been on exhibition for several years past at the main entrance of the U. S. National Museum. These trees came originally from Arizona and New Mexico, in the vicinity of Fort Wingate. Their presence here is due to a suggestion made by General W. T. Sherman, while on a tour across the continent in the fall of 1878, to Lieut.-Col. P. T. Swaine, Fifteenth U. S. Infantry, then in command of the post of Fort Wingate, N. Mex. Acting upon this suggestion, an expedition was organized by Colonel Swaine early in the spring of 1879 for the purpose of procuring suitable specimens for the Smithsonian Institution. The outfit, in command of Second Lieut. J. T. C. Hegewald, consisted of a sergeant and twelve soldiers of the Fifteenth U. S. Infantry, with heavy wagons, suitable for hauling stone.

Following is an account of the expedition, as given by Lieutenant Hegewald:*

We made the usual drives, stopping at a forage agency each night, until we arrived at Navajo Springs, Ariz.

At Navajoe Springs we left the road, cutting diagonally across the country about 20 miles, arriving at Bear Spring, near the head of Lithodendron in the evening. We had to cross several arroyos, but, being in the dry season, we had nothing to fear from water or marshy soil. The country traversed was desolate and barren, sage-brush and piñon trees abounding, good grazing and water being very scarce. Here and

*Proc. U. S. Nat. Mus., v, 1882, pp. 1, 2.

there mountain peaks stood out in bold relief like great sign-posts to guide the t v-eler on his way. The water, when found, was in small quantities and alkaline.

Camping at Bear Spring, I turned the mules out to graze and left the men to e-pare an early dinner while I rode down the valley to examine the thousands of sp i-mens that lay scattered on each side of the valley along the slopes, which were perh s 50 feet high, the valley of the Lithodendron, at its widest part, being scarcely ha a mile. Along the slopes no vegetation whatever was to be seen, wood being v y scarce. The soil was composed of clay and sand mostly, and these petrifactio s, broken into millions of pieces, lay scattered all adown these slopes. Some of e large fossil trees were well preserved, though the action of heat and cold had brok n most of them in sections from 2 to 10 feet long, and some of these must have been -mense trees. Measuring the exposed parts of several, they varied from 150 to 200 f t in length, and from 2 to 4½ feet in diameter, the centers often containing most beauti l quartz crystals.

I encountered considerable difficulty in trying to procure two specimens answeri g to the General's description, and which I thought would please. After finding t larger of the two fossils sent, I could find no mate, the remainder being of a differe species, and the exposed part broken in segments too short to answer. Finally I co cluded to unearth part of the same specimen, which entered the ground at an ang of about twenty degrees.

Bringing back men and teams, I dug along some 30 feet, finding the second da specimen, which made a good match, and which saw the light, perhaps, for the fir time for ages, though both were parts of the same tree. This was on the right ban of Lithodendron, 1¼ miles from Bear Spring. I got both fossils loaded on the wagon and camped at the spring that night.

In Colonel Swaine's letter, which probably accompanied the spec mens, the following additional information concerning these is given:

Only one of the two specimens obtained from the Lithodendron by Lieutenan Hegewald was forwarded to Washington. This is the large dark-colored one. I the place of the second one brought in from the locality of the Lithodendron a bette specimen was found on the mesa to the north of and adjacent to Fort Wingate, abou 2 miles from the flag-staff. This is the smaller and lighter-colored one.

From this it would appear that only two specimens were sent to Wash ington, but as there are two which, being darker colored, answer wel the description of those obtained at Lithodendron, and another lighte one, which is probably the one from the vicinity of Fort Wingate, w may suppose that it was afterwards decided to send all three specimens. Certain it is that there are three here now.

The light colored one, which presumably came from Fort Wingate, N. Mex., is about 11 feet long, and has a diameter at the larger end of 2½ feet. and at the smaller end of about 2 feet. The segment under consideration came evidently from near the base of the trunk, as the large end is broken off just at the point where it begins to enlarge and spread out into the roots. The whole trunk has been subjected to con-siderable pressure, as is shown by the fact that it is slightly elliptical in cross section. This is further confirmed by the microscopical examina-tion which shows the cells to be slightly compressed. It is perfectly silicified and exteriorly is light gray in color. The interior is very dark, nearly black, due to the presence of iron.

*Proc. U. S. Nat. Mus., v, 1882, p. 3.

The two remaining specimens, which probably came from Lithodendron, in Arizona, are black throughout. The larger is about 8 feet in length and decidedly elliptical in cross-section, the larger end measuring 20½ inches in long and 13½ inches in short diameter, the smaller end 17 inches in long and 12 inches in short diameter. The smaller specimen is 6 feet 4 inches long, and is also considerably compressed, the long and short diameter of the large end being respectively 24 by 15 inches and of the small end 17 by 12 inches.

In regard to the geological horizon to which these fossils belong, Maj. J. W. Powell, who has recently visited this section of the country, inclines to regard them as of Jurassic age. Other evidence points to their Cretaceous age, but until further and more definite knowledge is obtained these views must be regarded as uncertain.

A microscopical examination shows the internal structure of all to have been tolerably well preserved, the cells having suffered but little from the pressure to which the trunks had been subjected. They all belong to the genus *Araucarioxylon*, and probably are of the same species. The two from Lithodendron are absolutely identical in structure, but the one from Fort Wingate, as it lacks some of the essential characters, is referred provisionally to the same species. More abundant material may clear up all doubtful points.

The only material that has been examined microscopically from this part of the country, so far as I am able to learn, was that collected by Dr. Baldwin Möllhausen, a German traveler, in the valley of Rio Seco, New Mexico, about the year 1854. These specimens were submitted to Dr. H. R. Göppert, of Berlin, who reported upon them in Möllhausen's "Reise vom Mississippi nach den Küsten der Südsee," p. 492. Among these specimens Göppert detected a new species, which, in honor of the discoverer, he named *Araucarites Möllhausianus*, but did not indicate any of the characters upon which it was founded, nor can I find that it was ever subsequently described. The specimens belonging to the National Museum represent an undescribed species of *Araucarioxylon* (*Araucarites* Presl.), which may possibly be the *Araucarites Möllhausianus* of Göppert, but it is manifestly impossible to decide this, except by an examination of the original specimen which Göppert says (*l. c.*) is deposited in the mineralogical cabinet of the University of Berlin. I have consequently decided to describe these species as new under the following name:

Araucarioxylon arizonicum, n. sp.

Araucarites möllhausianus? Göpp., in Möllhausen's "Reise," p. 492.

Diagnosis.—Annual ring not apparent to the naked eye, but under the microscope observed to be present, the yearly growths being separated by a layer of 2–5 tangentially compressed cells; tracheïds with moderately thick walls, which are provided on the radial sides with a single row of large contiguous pores or rarely with two rows of alternating pores, and on the tangential sides with numerous, separated,

perfectly round, small pores; medullary rays numerous, composed single series of 1–22 short, superimposed cells; resin ducts (Pl. I, figs. 1–5.)

Transverse section.—The cells in this section are observed to l indicated above, moderately thick walled, and to be separated by intercellular spaces. The largest cells observed have a diamet .055mm and the smallest of about .020mm, the average being about .0

Radial section.—As seen in this section the tracheïds are observ be long, and to be provided with numerous pores. These pore bordered pits are usually arranged in a single linear series, and ber from 40 to 80 or more on each cell. (Fig. 4.) Usually they t each other slightly, but sometimes, as indicated in Plate I, figu they become a trifle compressed by actual contact. When these pore arranged in two series, as illustrated in Plate I, figure 5, they alte and are slightly, if at all, angled by mutual pressure. The pore rather large, the average diameter for the outer circle being a .02mm, that for the inner .0040mm.

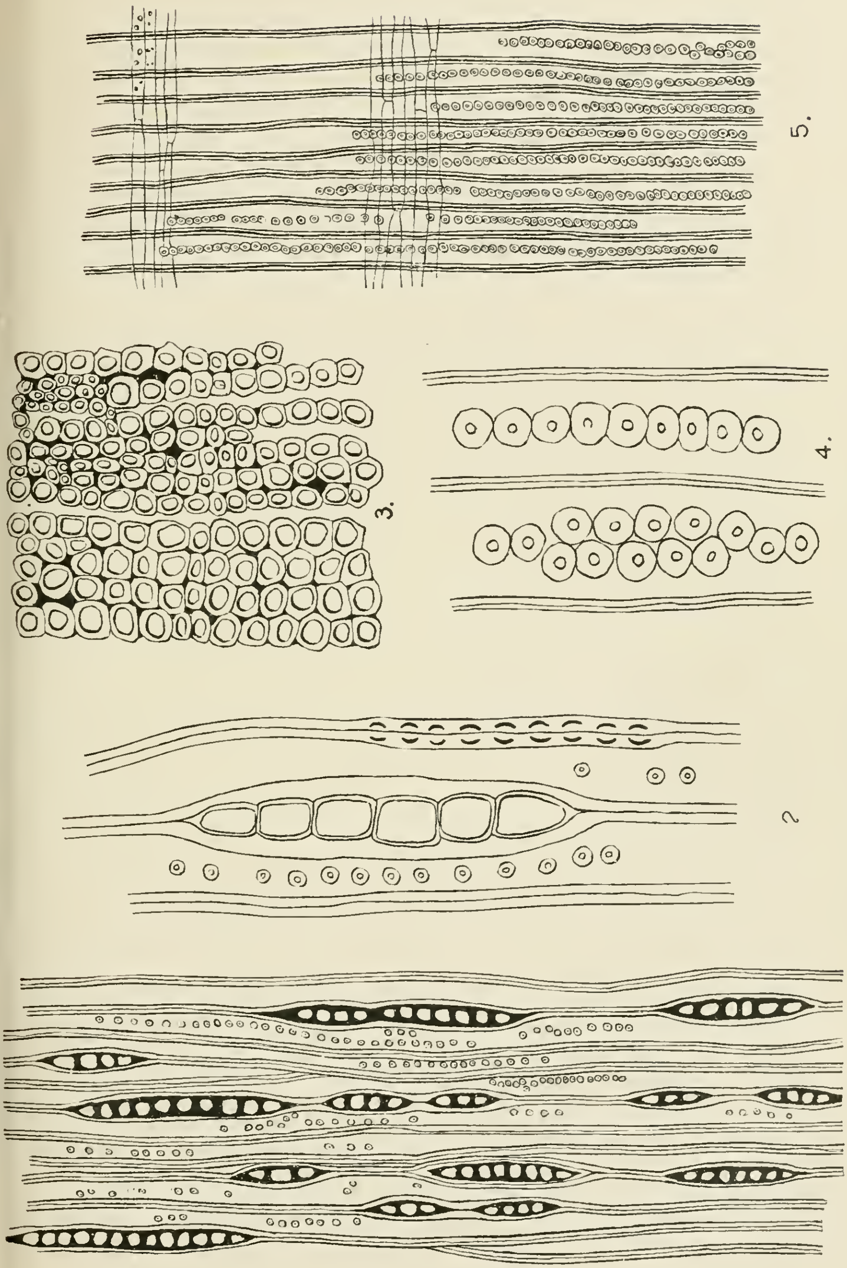
The medullary rays are composed of short, thin-walled cells, w in some instances, seem to have been provided with small oval p They are difficult of demonstration, and it is possible that the gran contents of the cells may give the appearance of exterior marking.

Tangential section.—This section demonstrates the presence of p or bordered pits on the tangential walls, a circumstance of infreq occurrence in the genus *Araucarioxylon*. They are much smaller t the pores on the radial walls, and are in a single or rarely in two se The pores are always separated from each other, sometimes widely The diameter of the outer circle is about .0075mm, and that of the i is about .0027mm.

The medullary rays are numerous and range in height from 1 t cells. It is possible that in some rare cases they may be in two se but this is certainly not commonly the case.

No resin ducts have been detected in any of the sections, their sence being a well-known character of the genus.

An examination of the literature of the subject shows relationship tween this and several described species. Thus *Araucarioxylon A deanum* (Göpp.), Kraus (see Göppert, Monog. d. foss. Conif. p. 235, XLV, figs. 6, 7, and Foss. Fl. d. perm. Form. p. 256, Pl. LVII, figs. 1 a well-known species from the Permian of Silesia, very much resemb it, yet there are minor points of difference in the histological eleme as well as the great difference in the geological and geographical p tion. So also with *A. vogesiacum* Kraus, *A. Thuringicum* Kraus, *A. ginianum* Knowlton, MS., and others.



Araucarioxylon Arizonicum. New species of fossil wood. (Page 3.)

SCRIPTION OF TWO NEW SPECIES OF FOSSIL CONIFEROUS WOOD FROM IOWA AND MONTANA.

BY F. H. KNOWLTON, ASS'T CURATOR, FOSSIL PLANTS.

(With Plates II, III.)

he material upon which the following observations are based was t by the Rev. E. M. Glasgow, of Estherville, Iowa, to Mr. W. J. McGee, he U. S. Geological Survey, and by him sent to the U. S. National seum for examination. The specimens are eight in number and are y small fragments, the larger being but 6cm in length and 4cm in meter.

efore passing to the description of the species it may be well to speak fly of the arguments in favor of conferring generic and specific es upon woods of this character. It has been objected to on the und that the characters available for the satisfactory identification enera or species are so vague and imperfect that it is not worth while onfer names upon such material. As an example of this view may cited Sir William Dawson's recent paper, "Note on Fossil Woods other Plant Remains, from the Cretaceous and Laramie Formations he Western Territories of Canada,"* in which no specific names or criptions are given, and the genera are compared to a few typical liv- genera.

Now, all students who have given their attention to the investigation he internal structure of fossil plants are willing to admit that their alled genera and species are not as definitely circumscribed nor as rly characterized as they could be if living, but it does not seem t they are on this account any the less valuable as furnishing marks stratigraphic identification or data for the elucidation of problems of elopment. The objects of this study are twofold: First, to supply o supplement a history of the evolution of the vegetable kingdom, l, second, to give assistance to the stratigraphic geologist. And in ier case, if the facts obtained are to be made use of, the specimens died must be described and named, in order that subsequent workers y be able to recognize and speak intelligibly of the results attained. The further objection to naming or describing woods, that they are bably already named from other parts, such as leaves or fruits of same plant, is even less defensible than the first, for it is manifestly ossible, except in rare instances, to correlate all parts of a fossil nt. It would, of course, be desirable to know the complete life-history ny species, but until all the organs are found in actual contact it is safe to assume identity, and it is also seemingly undesirable to ect one series of data to the exclusion of the other.

* Trans. Roy. Soc. Canada, Sec. iv, 1887, pp. 31–37.