

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

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(With Plates II, III.)

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

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

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

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

The specimens in this collection have all proved to be coniferous and to belong to the genus *Cupressinoxylon*.* The first species I have named, in honor of the collector:

Cupressinoxylon Glasgowii, n. sp. Plate II, figs. 1-5.

Diagnosis.—Annual rings very sharply marked, 3 to $4\frac{1}{4}$ mm broad tracheids in the summer wood provided on the radial walls with one or two series of very large bordered pits; medullary rays numerous, of 10 to 30 superimposed cells in a single series, resin ducts moderate in number, of a chain of short cells.

Locality, Emmet County, Iowa. Horizon probably Cretaceous.

MICROSCOPIC ANALYSIS.

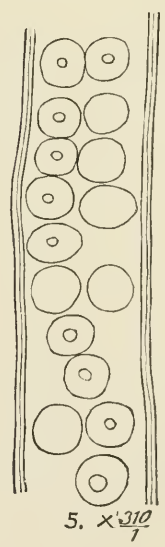
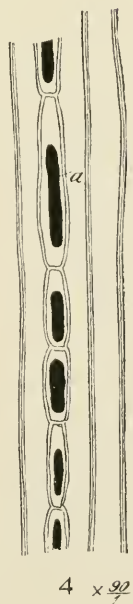
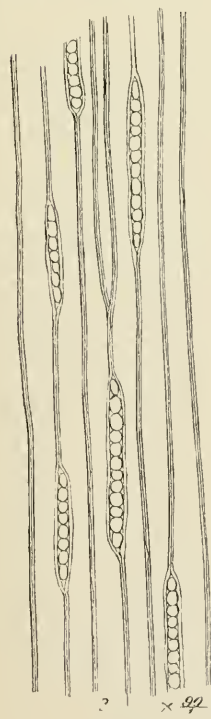
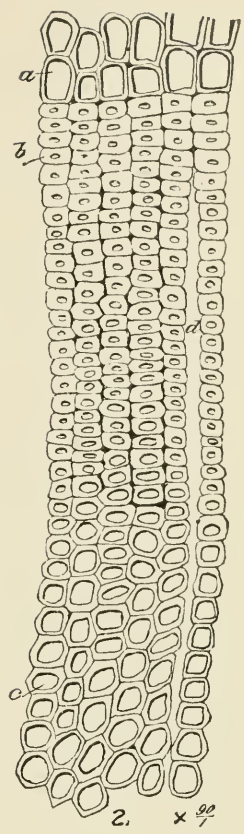
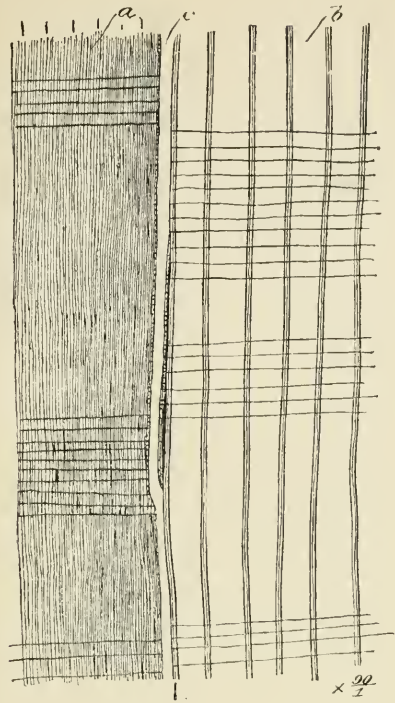
Transverse section.—The annual rings as observed in this section are very apparent to the naked eye, the actual ring or line of separation being a brown band nearly a millimeter in width, while the whole width of a ring, as stated above, is often more than 4 mm. Under the microscope the cells are shown to be arranged in strict radial rows, and the band above mentioned is found to consist of a layer of from 18 to 20 cells more or less completely lignified. In the outer layers of this lignified band of fall-wood the lumen of the cells is reduced to a minimum. The lumen is in the form of an ellipse of which the long diameter is less than .01 mm and the short diameter about .005 mm. In the immediate following layer of spring-wood the cells are very large and thin-walled, measuring .08 mm in long, and .05 mm in short, diameter. In the summer wood the cells become smaller and more nearly hexagonal in outline and pass abruptly into the band of fall-wood.

Radial section.—In this section, as in the transverse, the demarcation between fall and spring wood is very clearly marked (Pl. II, figs. 1, 4, 5.) The walls of the cells in the spring and summer wood are the ones provided with bordered pits, and in these they seem not to have been very abundant, or at least are not preserved in a manner capable of demonstration. These pits are usually arranged in two parallel rows, although in some cases there is but one row, when it occupies the center of the cell. The pits are large, and when in two rows take up nearly the entire width of the cell. The diameter of the outer circle in extreme cases fully .0250 mm, the average being about .0200 mm; the diameter of the inner circle is only .0025 to .0040 mm.

The medullary rays are observed to be numerous, with the individual cells very long. The individual cells are not, however, very high, and they are thin-walled. They have not been provided with bordered pits, or at least none are preserved.

The resin-ducts have been moderately numerous. They are composed of a chain of short thin walled cells from .15 mm to .25 mm in length, and

* Many authors write *Cupressoxylon*, but as I regard *Cupressinææ* as the root from which the word is formed I prefer to write *Cupressinoxylon*.



Cupressinoxylon Glasgowii. New species of fossil wood. (Pages 6, 8.)
 (Explanation of plate on page 8.)

are partially filled with a dark mass representing the resin. (Pl. II, fig. 4.)

Tangential section.—In this section the medullary rays are observed to be composed of a single series of cells which ranges from 3 to 30 in number. It is rare, however, to find them with as few as 3 or as many as 30 cells, the average number being from 8 to 15.

Bordered pits have not been observed in this section.

This beautiful species is one of the most clearly marked of any that has been described. It is apparently related with several that have been described from Russia, but it differs in important particulars from all. Thus it resembles the *Cupressinoxylon sequoianum* Mercklin,* which has the wings only one-half to 2^{mm} broad; sometimes three or four series of bordered pits, and 1–40 or more superimposed cells in the medullary rays. From *Cupressinoxylon sylvestre* Merckl.† it differs, as the latter has one, rarely two, rows of pits on the radial walls of the tracheids and the medullary rays, 2–15 cells high. *Cupressinoxylon anguineum* Merckl.‡ has the pits in one, or rarely in two, irregular series, and the rays are composed of only 2–18 superimposed cells.

The specimens are completely chalcedonized and stained a yellowish brown color. As to their age Mr. W. J. McGee informs me§ that “there is every probability that the Emmet County, Iowa, wood is from the Cretaceous, though it has been found in the drift, the Cretaceous strata from which it was originally derived having formerly extended over contiguous parts of Minnesota and been largely removed by glacial erosion during the Quaternary.” Specimens from Martin County, Minn., are indistinguishable from the Emmet County specimens.

Cupressinoxylon elongatum, n. sp. Plate III, figs. 1–4.

Diagnosis.—Annual rings apparent to the naked eye but faint, one-half to 6^{mm} broad; tracheids thick-walled, provided with two, rarely one, rows of bordered pits on radial walls; medullary rays numerous, composed of short thin-walled cells, arranged in a single series of from 1 to 44 superimposed cells; resin-ducts moderately abundant, composed of a chain of short cells.

Locality.—Tiger Buttes, Dawson County, Mont. Age, probably Laramie group.

MICROSCOPIC ANALYSIS.

Transverse section.—The layer of fall-wood separating the contiguous wings is narrow, consisting of only six to ten rows of flattened and thick-walled cells. The cells of the spring and summer wood are much larger and nearly rectangular in outline. Their radial diameter is as great as 105^{mm} in some cases, while the tangential diameter is only .035 to .04^{mm}.

* Palaeodendrologikon Rossicum, p. 65, Pl. XVII.

† *Op. cit.*, p. 58, Pl. XIII, figs. 1–6.

‡ *Op. cit.*, p. 57, Pl. XII.

§ *In litt.*, January 4, 1888.

The average size is of course much less, being about $.07^{\text{mm}}$ in long, and $.03$ to $.05^{\text{mm}}$ in short, diameter. The medullary rays are observed to be numerous. The largest cells are in contact with the medullary rays.

Radial section.—The wood cells or tracheïds appear broad and thick-walled in this section, and to be provided with two rows of very large pits which nearly touch in the center, and are in contact with the walls on the outside. The diameter of the outer circle is $.020^{\text{mm}}$, that of the inner $.0040$ to $.0060^{\text{mm}}$. They are rarely in a single row when they occupy the center of the cell.

The resin-ducts consist of a chain of short cells the contents of which are not preserved.

Medullary rays abundant; individual cells long, covering the width of six or eight tracheïds; thin-walled. They seem not to have been provided with pits or markings.

Tangential section.—Medullary rays in a single series, and rarely, of 1–44 superimposed cells. It is not common to find rays with less than 5 cells or more than 30, the average being about 10 to 25. No pits on the walls of the tracheïds.

The single specimen upon which this species is founded was collected by Mr. Glasgow from “a log 30 feet long in clayey soil.”* It is the ordinary silicified wood so common from this part of the country. Its age is, without doubt, Laramie, as it is not far from Glendive, from which come typical Laramie plants.

As in the case of the species first described, this species has affinities with forms already described from Russia and elsewhere, but the differences are such as to entitle it to specific distinction.

EXPLANATION OF PLATES.

PLATE II.

FIGS. 1–5. *Cupressinorylon Glasgovi*, n. sp. From Emmet County, Iowa.

FIG. 1. Radial section, $\times 90$. *a*, Dense fall-wood; *b*, large-celled spring-wood; *d* shows ready separation of spring and fall wood.

FIG. 2. Transverse section, $\times 90$. *a*, Spring-wood; *b*, fall-wood; *c*, summer-wood; *d*, single medullary ray.

FIG. 3. Tangential section, $\times 90$.

FIG. 4. Radial section through resin-duct. *a*, Resin in duct.

FIG. 5. Radial section, $\times 310$. Single tracheïd, showing arrangement of pits.

PLATE III.

FIGS. 1–4. *Cupressinorylon elongatum*, n. sp. From Tiger Buttes, Dawson County, Mont.

FIG. 1. Radial section, $\times 90$. *a*, Resin-duct.

FIG. 2. Tangential section, $\times 90$.

FIG. 3. Radial section, $\times 310$. Showing the arrangement of pits.

FIG. 4. Transverse section, $\times 90$. *a*, Cells of spring-wood; *b*, cells of summer-wood; *c*, cells of fall-wood; *e*, medullary ray.

* In letter of McGee, September 14, 1887.