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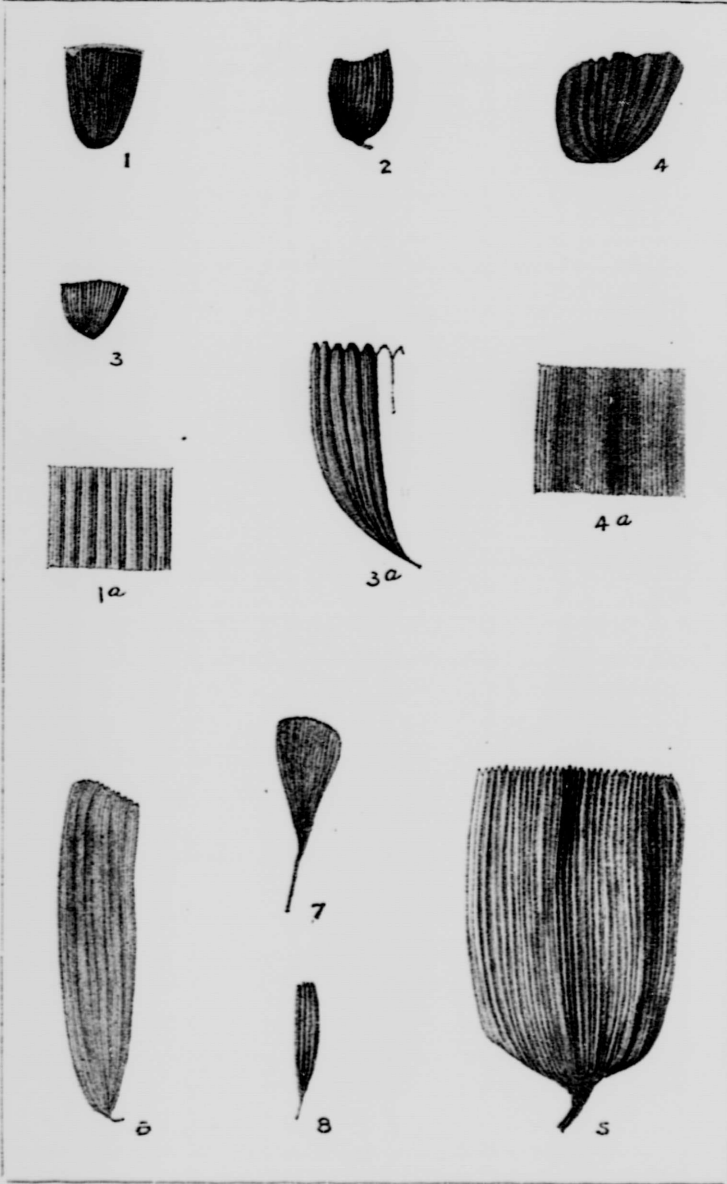
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TO ILLUSTRATED PAPER BY DAVID WHITE ON SPECIES OF WHITTLESEYA.

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THE OTTAWA NATURALIST.

VOL. XV.

OTTAWA, JULY, 1901.

No. 5.

THE EXTINCTION OF THE ELK IN ONTARIO.

By L. H. SMITH, Strathroy, Ont.

(Read before the London Ornithological Section of the Entomological Society of Ontario.)

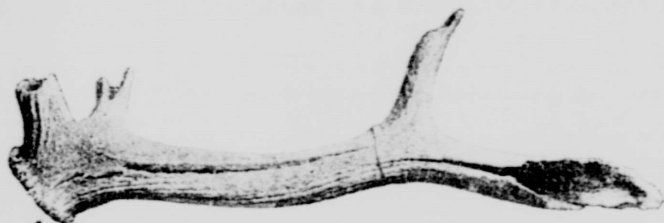
That the Wapiti (*Cervus canadensis*), commonly called "Elk," once roamed in numbers in the southern part of Ontario which lies between Lakes Huron and Erie, I have positive evidence, but as to what time they lived here or when or by what means their extinction was brought about, I have been able to glean very little information.

The extinction of some animals of our fauna is easily accounted for; the wolf, the bear, the common red deer and the wild turkey were all indigenous to our forest; their death-warrant was signed when the first settler, with his axe, felled the first tree making the little clearance to erect his primitive log shanty. Naturalists do not agree on the cause of the disappearance of the passenger pigeon, which used to be with us in countless millions. I am of the opinion that clearing the forest, and thus destroying its great natural food supply, was the cause. The animals I have named were all here when the first settlers came to the country, but the great elk was not.

The first settlers came into the township of Adelaide in 1832. There were no elk here then, and I have never been able to glean any information from them about this great deer, although I have spoken to many. The most interesting information I have been able to get of this animal is from an Indian on the Kettle Point Reserve, in the county of Lambton. He was an intelligent man and acted as interpreter. He was an elderly man when I spoke to him, perhaps between 60 and 70 years of age. He knows nothing

of the elk himself, but his father used to tell him stories of shooting them in that part of the country when he was young. Figured out at the time, I thought it was quite 100 years ago when this great deer roamed in these parts.

I have an interesting collection of elk antlers; one, a perfect specimen, measures forty inches in length and has seven points, one only of which is broken off. Another, a broken one, a cut of which accompanies this sketch, must have belonged to a large animal. This piece is thirty inches long and measures thirteen inches in circumference where it joined the skull. I have several small pieces, all of which were found in this neighborhood and in the adjoining county, Lambton. From the state of decay all are in, I can quite believe it is more than a century since they fell from the heads of the animals to which they belonged.



The most perfect specimen I know of, belongs to Mr. George Wilson, of Strathroy. This set of antlers is in a perfect state of preservation and must have been carried by a noble animal. Each antler measures fifty-five inches in length; one has seven points and the other six. The longest point is eighteen inches. The greatest spread is thirty-four inches, and the weight when found was 35 pounds. Mr. Wilson obtained this grand set on his farm, lot 15 in the 12th concession in the township of Lobo, about seventeen years ago, and now has it mounted, in good shape, in his hall, where it makes a fine ornament.

This set of antlers was found in a boggy spring where Mr. Wilson had bored for water, of which he obtained a bountiful supply. Some time subsequently his sons, while digging a little ditch to carry off the surplus water, came on the horns. They also found bones which were part of the skeleton, and, as the

antlers were still fast to a part of the skull, it was evident that the animal to which they belonged died there.

How this Elk skeleton came there would be a question for thinking naturalists to solve. Mr. Wilson is of the opinion that it might have been driven by wolves and have mired there. Perhaps the most reasonable theory is that it either died a natural death or was killed on that spot by a pack of these blood-thirsty brutes.

How these great deer became extinct here will, perhaps, ever remain, to naturalists, a hidden secret. The Indian did not annihilate it because they never killed to extermination. If disease overtook them, as it sometimes does the great white hare of the far north, it is only reasonable to think that others would have come to replace the dead, or the few, if any, left would have increased again. We are quite in the dark concerning them. What we do know, is that this grandest of North American deer once roamed here, but it was before the white man came.

ENTOMOLOGICAL NOTE.

THE PAINTED LADY BUTTERFLY.—An interesting occurrence of a butterfly suddenly appearing in numbers sufficient to attract general attention has taken place this spring throughout Manitoba and the Northwest Territories, where this insect, *Parameis Cardui*, has been extremely abundant. Caterpillars produced from eggs laid by the females have appeared in thousands, and naturally have caused much anxiety among those growing crops of any kind. The food plant of this butterfly in Canada is chiefly the Canada Thistle, but it also feeds on other plants. Owing to the scarcity of their natural food, the larvæ had to take to a new plant, viz., the Blue Bur (*Echinosperrnum Lapyula*). A. G.

THE CANADIAN SPECIES OF THE GENUS WHITTLESEYA AND THEIR SYSTEMATIC RELATIONS.

By DAVID WHITE.

SOURCES AND SUPPOSED AGE OF THE MATERIALS.

The discovery of the genus *Whittleseya* in the Upper Palæozoic of Nova Scotia was announced by Dr. H. M. Ami, of the Geological Survey of Canada, in the August number of this journal for 1900. This well marked Palæozoic plant type has been found only within a very limited vertical range, and it has hitherto been regarded as characteristic of a stage in the Meso-carboniferous of North America. The occurrence, therefore, of the genus in the shales of the Riversdale formation, concerning the age of which there is at present great difference of opinion, is a matter of palæontological importance and interest. Through the courtesy of Dr. Ami and of Dr. G. M. Dawson, the late Director of the Survey, a series of the specimens forming the basis of the former's notes has been placed in the writer's hands for study and comparison with the types from the Allegheny region.

The material from Nova Scotia includes a number of specimens collected by Dr. Ami in 1896, from the banks of the Harrington river near the boundary between Cumberland and Colchester counties, and at West Bay shore, Parrsboro', Cumberland county. The fossils are said to have been gathered from the Riversdale formation, a sequence reported to be several thousands of feet in thickness of sandstones and shales which, on account of their stratigraphic position and relation to the metamorphism in the region, are regarded by the stratigraphical geologists¹ who have investigated the structure and extent of the Palæozoic formations of this region as of undoubtedly Middle Devonian age.

On the other hand, palæontologists, though differing somewhat as to the stage of the fossils, are entirely agreed that the rocks are Carboniferous. According to the evidence of the Batrachia, Crustacea and Lamellibranchiata examined by Sir William Dawson, Professors T. R. Jones and Henry Woodward,

¹ Hugh Fletcher, Ann. Rept. Geol. Surv. Canada, 1886, vol. II, p. 64P; also Trans. Nova Scotia Inst. Sci., vol. X, 1900, p. 242; also R. W. Ells, Ann. Rept. Geol. Surv. Canada, vol. I, 1885, p. 51E.

and by Dr. Ami, the conclusion is reached that the formation is safely within the Carboniferous. Dr. Ami, who has not only critically reviewed all the faunal evidence but who has also studied the structure and position of the beds in the field, refers the Riversdale formation to the Eo-Carboniferous, and places it at the base of the Lower Carboniferous.¹

Palæobotanists have been disposed to refer this formation to a still higher stage. Specimens from Harrington River examined by Sir William Dawson, were referred by him to the Millstone Grit. Later, in December of 1897, a small collection from these beds was inspected by the writer and recognized by him as indicating a position in the Carboniferous not far from the dividing line between the Upper and Lower Carboniferous, *i.e.*, in the region of the Millstone Grit or the Pottsville of the Appalachian trough. A little later a collection was submitted to Mr. Robert Kidston, of Sterling, Scotland, who arrived, absolutely independently, at nearly the same conclusion, suggesting that the plants might be even so late as the Lower Coal Measures. Both Mr. Kidston and the writer recognized the approximate contemporaneity of the Riversdale plant beds with the "fern ledges" of the Lancaster formation at St. John. Both regions furnish species of *Asterophyllites*, *Calamites*, *Sphenopteris*, *Aneimites*, *Neuropteris*, *Alethopteris*, *Cordaites* and *Cardiocarpon*, which, after continued study of the Carboniferous floras of the Appalachian trough, I find to be characteristic of that stage. I therefore do not hesitate, on the evidence of the fossil plants, to regard the Harrington River plant beds as representing a level at or not far below the Pottsville.

In addition to the specimens from the Riversdale formation of Nova Scotia the *Whittleseya* material in hand for description includes a single specimen from the "fern ledges," Lancaster formation, at St. John, New Brunswick. On examining one of the specimens of *Neuropteris Selwyni*, labelled by Sir William Dawson and now in the collection of McGill University, a small outcropping plant fragment was observed whose nerves suggested those of *Whittleseya*. The removal of the rock from the remaining portion of the specimen brought to light a new and very interest-

¹ Trans. Nova Scotia Inst. Sci., vol. X, 1900, pp. 167-178.

ing species, *Whittleseya Dawsoniana*, whose description, through the courtesy of Professor Penhallow of the University, I am enabled to include in this paper. The "fern ledges" have been, and are still, regarded by most Canadian geologists as Middle Devonian.¹ The composition of this flora is essentially that of the Pottsville of the Allegheny region, to which most of the Lancaster ferns are common. In fact, the fossil flora of the "fern ledges" appears to be representative of the Pottsville (Millstone Grit in part) of the United States. The more exact distribution of the species seems clearly to indicate, as I have elsewhere remarked,² the reference of a portion at least of the "fern ledges" to the Upper or Sewanee division of the Pottsville.

The discovery of *Whittleseya* at once in the Riversdale of Nova Scotia and in the Lancaster formation of New Brunswick not only tends to confirm the conclusion as to the approximate contemporaneity of these formations, a relation that has long been accepted by most geologists, with the exception of the late Sir William Dawson, but it is also corroborative of the correlation of both of these formations with the Pottsville.³

¹ Sir William Dawson, Fossil Plants of the Devonian and Upper Silurian formations of Canada; Geol. Surv. Canada, 1871. L. W. Bailey, Observations on the Geology of Southern New Brunswick, 1865, pp. 54-76. Hugh Fletcher, Geological Nomenclature in Nova Scotia, Trans. Nova Scotia Inst. Sci., vol. X, 1900, p. 235.

² 20th Ann. Rept. U. S. Geol. Survey, Pt. 2, 1900, p. 917.

³ The Pottsville ("Pottsville conglomerate") in the type section in the Southern Anthracite field of Eastern Pennsylvania covers the interval, including a basal transition, between the marine Lower Carboniferous and the Lower Productive Coal Measures. Its lower portion contains a flora apparently corresponding to the Ostrau-Waldenberg zone of Europe, included by many palaeontologists within the top of the Lower Carboniferous. The upper portion includes the plants of the Millstone Grit and of the Lower Coal Measures of the Old World. Mr. Kidston's reference of the St. John Flora to the Lower Coal Measures corresponds perhaps exactly to my correlation of the plant beds with the upper portion of the Pottsville, since, as he has pointed out (Proc. Roy. Phys. Soc. Edinburgh, vol. XII, 1894, p. 225), the Millstone Grit flora of Europe is essentially the same as that of the Lower Coal Measures, from which in many cases the Millstone Grit seems not to have been entirely stratigraphically distinguished.

DESCRIPTION OF THE SPECIES.

Whittleseya, Newberry, 1853.

The genus *Whittleseya*, established by Newberry¹ in 1853, embraces a type of narrowly petiolate leaves, more or less flabelliform in plan, whose nervation is composed of broad and thick, closely or even densely arranged, fascicles or bands of nerves originating chiefly from a marginal strand on either side of the base and sometimes forking, not far above the point of origin, before passing upward, longitudinally parallel, to the generally truncate apex, where the nerves of each band or fascicle abruptly converge in a more or less distinct crenulation or tooth.

The leaves may be oblong, squarrose, triangular, cuneate or linear. They are always narrowed, sometimes so abruptly as to give an almost round-truncate profile, at the base. The petiole is usually long, and often filamentose. The lateral borders are in most instances nearly parallel, and the distal border is frequently acutely dentate. In the more cuneate forms the basal marginal nerves are less developed, the nerve fascicles radiating more directly from the summit of the petiole. In some species, and circumstantially in others, the vascular bands coalesce and are so densely arranged in the thick leaf substance as to be hardly separable. In most species the thickened central portions of the bands produce low costæ, though the bands are not wholly distinct from one another below the teeth; or, in many examples in which the teeth or corrugations are obscure, they may not be distinguished, unless topographically, for a portion of their length. The bands sometimes divide once near the base. Above the base they continue nearly parallel to the lateral margins of the leaves. Frequently the lateral margins are very slightly infolded near the apex.

The branchlets or possibly the stems of this type, as shown in specimens of *Whittleseya microphylla*, are slender, rarely dividing at a rather wide angle, apparently naked at some distance below the apices, and probably woody as indicated by the rather densely carbonaceous residue. The leaves, still attached to the

¹ Annals of Science, vol. 1, No. 10, Cleveland, 1852, p. 116.

terminal portions of the branches, were sustained by apparently lax, often extremely slender petioles, sometimes several times as long as the blade of the leaf. No precise correlation has yet been made between the *Whittleseyæ* and any of the types of Palæozoic fruits, one or more genera of which are usually found associated in the same beds.

The species already attributed to this genus are : *Whittleseyæ elegans*,¹ *W. crassifolia*,² *W. undulata*,³ *W. microphylla*,⁴ *W. Campbells*,⁵ and *W. Lescuriana*.⁶ To these are now added three species from Nova Scotia and New Brunswick, as follows :

***Whittleseyæ desiderata*, n. sp.**

Pl. VII, Figs. 1, 2, 1a.

Leaves of moderate thickness, oblong, slightly cuneate, 9 mm.-14 mm. in length above the petiole, 6 mm.-10 mm. broad near the truncate apex, slightly rounded at the distal angles, rapidly contracted in the lower one fourth to form a round-obtuse or obtuse base; apex crenulo-denticulate, often obtusely denticulate, with short, rounded teeth; vascular bands or costæ 18-24 in number, often low-rounded, usually distinct, confluent and generally once-forked at a narrow angle at the base, the outer two or three on either side blending in a marginal band; petiole relatively broad at the top, the length and mode of attachment being unknown.

The species here described is one of the smaller of the genus, of which, however, it shows well the distinctive characters. As is usual in this group, especially in the type, *Whittleseyæ elegans*, the

¹ Newberry, Ann. Sci., vol. 1, Cleveland, 1853, p. 116, figs. 1, 2. Lesquereux, Coal Flora, vol. II, p. 523, pl. IV, f. 1, 1a.

² Lesquereux, Coal Flora, Atlas, 1879, p. 2, pl. IV, f. 2 (*W. integrifolia*, op. cit., vol. II, p. 524.)

³ Lesquereux, op. cit., vol. II, p. 525, pl. IV, f. 3.

⁴ Lesquereux, op. cit., vol. III, p. 843. Lesley, Dict. Foss. Pa., vol. III, p. 1256, text-figs.

⁵ D. White, 20th Ann. Rept. U. S. Geol. Survey, Pt. II, 1900, p. 867.

⁶ Loc. cit., p. 867.

vascular bands become more distinct and separate as they approach the teeth. In the middle of the leaf they are often more diffuse, though they are generally recognizable down to near their points of origin.

The normal aspect of *Whittleseya desiderata* is shown in Pl. VII, Fig. 1, an enlargement of whose vascular bands is presented in Fig. 1a. In this example the origin of the bands is easily traceable. The original of Fig. 2 is slightly warped or deformed in the matrix, which gives the apex an unduly contracted form. It is notable, however, that in this specimen, as is often the case in *W. undulata* and *W. Campbellei*, the bands on the extreme borders are slightly infolded near the apex, so that one or two of the teeth at each corner are sometimes overlapped and slightly inward inclined. In this specimen is also indicated a trace of a petiole, which would appear to be filamentose, as in *W. microphylla* Lx. *Whittleseya desiderata* is distinguished from *W. Dawsoniana* by its proportionately smaller and more elongated form, and especially by the narrow and more numerous vascular bands. The latter, by their number and proximity, suggest *W. microphylla*, but they are neither so dense nor so far blended as in the species last named. In *W. microphylla*,¹ although the dimensions are very similar, the bands are often difficult of distinction, while the distal margin appears more or less obscurely crenulate. One of the specimens, from West Bay Shore, Parrsboro', Nova Scotia, collected by Dr. Ami in 1899, is somewhat narrower than the two examples figured, though belonging to the same species. Another example, from Harrington River, Station A5 of Dr. Ami's collections, presents, apparently as the result of lateral deformation, a somewhat cuneate form strikingly similar to that of *Whittleseya microphylla*, with which it agrees in size. The same shale fragment contains a normal example to which a part of the petiole is still attached.

Localities.—Harrington River beds, Harrington River, Colchester Co., N. S., Stations A5 and B5; collected by Dr. Ami, 1898. Also on the Harrington River in Cumberland Co., N. S., Station A7; collected by Dr. Ami in 1898. West Bay Shore, Parrsboro, Cumberland Co., N. S.; collected by Dr. Ami in 1899.

The specimens are in the collections of the Geological Survey of Canada.

¹ Pl. vii, Fig. 7.

Whittleseya brevifolia, n. sp.

Pl. VII, Fig. 3, 3a.

Leaf very small and very short, fan-shaped, very broadly triangular, less than one cm. in length, and nearly as broad or broader than long at the apex, truncate or slightly truncate at the top, and gently convex laterally; vascular bands narrow, about 20 or 25 in number, forking once near the base, or derived simply from the marginal nerve, slightly arched near the lateral margins, crowded, somewhat obscure in the middle portion, more distinct near the apex where each band contracts within the limits of a very small, short, obtuse tooth.

The salient features of this species are the somewhat diminutive size, the extremely broadly triangular form and the compactness of the narrow vascular bands. As shown in the illustration, Fig. 3, the lateral margins, perhaps slightly mechanically contracted in this instance, form nearly a right angle at the base. The characters of the vascular bands and of the teeth are shown in Fig. 3a. The specimen figured is but 7 mm. in length, exclusive of the petiole, and 8 mm. in breadth at the apex.

Although the species is represented by but a single example in the collection, it appears to be specifically distinct from *Whittleseya desiderata* by reason of the abbreviated triangular form and the narrow bands. It is possible, however, that a series of intermediate phases may be discovered, which will prove this form to lie within the limits of individual variation in the leaves of the latter species. In the absence of such forms it cannot at present be safely included in the same species. As compared with *Whittleseya microphylla*, the only other distinctly cuneate species, the leaf in hand differs by its very short form, the more distinct costae and the well defined teeth.

Locality.—Harrington River beds, Harrington River, Colchester Co., N.S.; Station A12 of Dr. Ami's 1898 collections.

The type is in the collections of the Geological Survey of Canada.

Whittleseya Dawsoniana, n. sp.

Pl. VII, Figs. 4, 4a.

Leaf very small, short, squarrose, broader than long, truncate at the apex, round-truncate at the base, thick; nerve bands very broad, 1.5 mm.-1.75 mm. in width, about 10 or 12 in number, parallel to the lateral borders, apparently undivided, and forming very broad and very low flat costæ which are contiguous or slightly confluent in the interior of the leaf, each band terminating in a short, broad, tooth.

While examining one of the specimens from St. John, N.B., labelled by Sir William Dawson as *Neuropteris Selwyni*, loaned from the collections of McGill University through the courtesy of Prof. D. P. Penhallow, the writer observed on the same fragment of shale a small portion of a leaf showing vascular bands similar to those of *Whittleseya*. On carefully removing the matrix from the remaining portion of the fossil, the specimen was found not only to belong to *Whittleseya*, but to represent a new species of that genus. This leaf, which is illustrated in Pl. VII, Fig. 4, is about 13 mm. long above the petiole, and about 17 mm. in width at the top, which is slightly wider than the lower portion. The specimen, which is slightly deformed and a little crumpled at the base so as not to reveal the petiole, is well marked by the very low, broad, and flat ribs, whose terminations in the apparently short, obtuse teeth, are very obscurely seen along a portion of the distal border. The characters of the teeth are hardly positively determined.

The species is named in memory of Sir William Dawson, Canada's most distinguished palæobotanist and one of the great palæontologists of the world. It is recognized among other broad-leaved species of the genus by its small size, relatively great breadth and proportionately very broad bands. Further, the teeth along the distal margin appear to be shorter and more obtuse than in *Whittleseya elegans*, while the form of the leaf is not elongate as in *W. undulata*, whose teeth are also short.

The species described above is associated on the same shale fragment with *Alethopteris* and a fragment of *Neuropteris* (labelled *Neuropteris Selwyni*) apparently indistinguishable from a plant

from the upper Pottsville of the Appalachian province described in manuscript by the writer as a variety of *Neuropteris Schlehani* Stur.

Locality.—"Fern ledges," Lancaster formation, near St John, New Brunswick.

The type of the species is with No. 73 (391) in the collections of the Geological Department of McGill University, Montreal, Canada.

RELATIONS AND SYSTEMATIC POSITION OF THE SPECIES.

The species of *Whittleseya* from Nova Scotia and New Brunswick are closely allied to the southern representatives of the same genus. The *Whittleseya desiderata* has the aspect of a diminutive *W. elegans* Newb., an example of which, from the type bed and vicinity, is, for comparison, shown in Pl. VII, Fig. 5. In the small species the teeth are less acute, while the bands are more confluent, more carinate, and less ribbon-like than in the Ohio plant. In respect to the nervation, the former species agrees perhaps more nearly with the material from the roof of the Sewanee coal of Tennessee placed by Lesquereux in *W. undulata*. The compactness of the fascicles also approaches the nervation of *W. microphylla* (Pl. vii, Fig. 7.) In fact, the longer Riversdale species appears, while ranging most closely to *W. elegans* and *W. undulata*, to stand on the side toward the cuneate *W. microphylla*.

The *Whittleseya brevifolia*, though nearest to *W. desiderata*, suggests by both its form and nervation a position between the latter and the *W. microphylla*, an example of which, from the Type locality,¹ is illustrated in Fig 7.

Whittleseya Dawsoniana, on the other hand, is by far most closely bound to *W. elegans*, from the Sharon coal (Upper Pottsville) of Ohio, though its proportionately broader ribs and less

¹ Near Fayetteville, Arkansas, in the "coal bearing shale," a formation representing a part of the Upper Pottsville, not far from the Sharon coal, in the Appalachian trough. The species is also present in the Breathitt formation of Kentucky, and the Upper Lykens division of the Pottsville in the Pennsylvania Anthracite region.

pointed teeth are comparable to the Sewanee form of *W. undulata*. It is worthy of note in this connection that the collections from the Upper Lykens division at the Lincoln mines in the Southern Anthracite coal fields of Pennsylvania contain a *Whittleseyia* form¹ whose narrowest leaves are so similar in size and character to that described above from St. John as to suggest slight doubt as to the validity of a specific separation for the Pennsylvania type, although the other associated leaves of the same plant are proportionately very much broader and somewhat longer.

From the foregoing it will be seen that the *Whittleseyia* thus far discovered in the Riversdale and Lancaster formations pertain to the group with numerous more compact nerve fascicles and broader proportions, in general characteristic of the Upper Pottsville, rather than to the linear group,² with comparatively few bands and large teeth, which prevails in the lower portions of the Pottsville in the Appalachian province.

The genus *Whittleseyia* is regarded by most palaeobotanists as a gymnospermous type, although some difference of opinion exists as to its position among the gymnosperms. As originally published by Dr. Newberry,³ it was described as perhaps pinnate, and compared with various genera, not all gymnospermic, without suggestion of a definite relationship with any family. By Lesquerieux,⁴ and Sir William Dawson,⁵ it was referred to the *Næggerathiaceæ*, a family typified by *Næggerathia*. The latter genus, the original species of which resembles *Archæopteris*, is now generally considered as most closely allied to the Cycads, though some writers have classed it among the ferns. Schenck,⁶ in 1884, placed the *Whittleseyia* in the *Dolerophylleæ*, whose type genus *Dolerophyllum* was put by Dawson in the *Næggerathiaceæ*.

Almost simultaneously, in 1885, in two important palaeobotanical works published by Saporta,⁷ and Renault,⁸ *Whittleseyia*

¹ *Whittleseyia elegans* Newb., var. *minor* D. W., 20th Ann. Rept. U. S. Geol. Surv., Pt. II, 1900, pp. 788, 904.

² *Whittleseyia Campbellsii* D. W., op. cit., p. 905, pl. CXL, figs. 9-11; and *Whittleseyia Lescuriana* D. W., op. cit., p. 867 (description not yet published.)

³ Annals of Science, vol. 1, Cleveland, 1853, p. 116.

⁴ Coal Flora, vol. II, 1880, p. 523. Principles of Palaeozoic Palaeobotany, 1883, p. 97.

⁵ Can. Rec. Sci., vol. IV, No. 1, 1890, pp. 26, 27.

⁶ In Zittel's Handb. d. Palaeont., vol. II, p. 253.

⁷ Évol. rég. vég., Phanérog., vol. I, p. 144.

⁸ Cours Bot. Foss., vol. IV, p. 69.

was referred to the *Salisburiaceæ*, in which it was ranged with *Dicranophyllum*, *Rhipidopsis*, *Trichopitys*, *Ginkgophyllum*, and *Baiera*, the earlier relatives of the living genus *Ginkgo*. This reference, which was accepted by Schenck,¹ appears to find favour with most foreign palæobotanists² who have more recently considered the relationship of the American genus, though Solms-Laubach,³ regards it as based on too slender evidence.

In the absence of any precise knowledge of the florescence or fruits of *Whittleseya*, any systematic reference of the genus is based almost wholly on the characters and analogies of the leaves, and must therefore be regarded as hypothetical and tentative. Yet the development and the nervation of the leaf are such as practically to exclude a comparison with any Cryptogamic type, and to at once suggest a gymnospermic nature. Further, the analogies between the leaf structure of *Whittleseya* and those of *Ginkgo*, and more particularly with the more ancient forms of that type, are so striking as to compel a comparison with both the living and the fossil representatives of the Ginkgoales. These analogies are illustrated by the almost identical characters of the nervation and distal border of the leaf in *Whittleseya microphylla* and in the recent *Ginkgo*. Among some of the additional Appalachian Pottsville material, which will probably receive special attention in a later paper, are several fragments which appear to indicate a probably spiral arrangement of the leaves, the latter forming, in *W. microphylla*, very loose tufts at the ends of the twigs.

There are also two conditions which favour a direct relationship of the American type to the Ginkgoales: First, there is the extraordinary antiquity of the genus *Ginkgo* which is clearly identified in the older Mesozoic, while its antecedents or closer relatives, *Baiera* and *Ginkgophyllum*, are present in the Permo-Carboniferous, in which are also found a number of the immediately allied types. In this connection it will be of interest for the reader to compare the *Whittleseya* with the group illustrations of *Ginkgo*

¹ Die foss. Pflanzenreste, 1888, p. 166.

² See Zeiller, Élem. de paléobot., 1900, p. 251. Also see Seward and Gowan, in Annals Bot., vol. XIV, 1900, p. 135.

³ Fossil Botany, 1891, p. 66.

relatives and *Ginkgo* leaves given by Saporta,¹ Ward,² Seward and Gowan,³ and Zeiller.⁴ The other circumstance, lending some minor colour of probability as to the relationship, is the occurrence, in especial abundance in the beds containing *Whittleseya* of numerous types of gymnospermic fruits, some of which represent genera closely analogous in structural characters to those of the living "maiden-hair tree," *Ginkgo biloba*. In the judgment of the writer the *Whittleseya* are the oldest representatives of the Ginkgoales stock that have yet been discovered. The fruits of this type are probably included in some of the American species of *Rhabdocarpus*, or possibly in *Cardiocarpon*. The plant from the Upper Coal Measures of Baie de Chaleur described by Dawson⁵ as *Næggerathia dispar*, although fragmentary and very incomplete, appears by its petiolate development, the basi-marginal nerves, and the banding of the parallel, longitudinal nervation to be also referable to the same stock, if not to the same genus. The *Næggerathia dispar* may perhaps, without too great an assumption, be regarded as a connecting link between the earlier Whittleseyas and the later *Saportea* of Fontaine and I. C. White,⁶ from the Dunkard or supposed Permian of the Appalachian trough. *Saportea*⁷ through its allied genera, *Baiera*, and *Ginkgophyllum*, may perhaps be safely regarded as belonging to the *Ginkgo* stock, while the two genera last named are not only closely related, but one of them is perhaps antecedent to the genus *Ginkgo*, which is unquestionably present with characteristic flowers and fruits in the earlier Mesozoic. During this epoch *Ginkgo*, which in the world of to-day is

¹ Évol. règ. vég., Phanérog., vol. I, 1885, pp. 142-146.

² Science, vol. V, 1885, p. 496.

³ Annals of Botany, vol. XIV, 1900, pp. 109-154.

⁴ Éléments de Paléobotanique, 1900, pp. 248-253.

⁵ Quart. Jour. Geol. Soc. London, vol. XXII, 1866, p. 153, Pl. XIII, fig. 91.

⁶ Permian Flora, pp. 99, 101, 102, pl. XXXVIII. figs. 1-4.

⁷ *Saportea*, F. and W., aptedates and is quite distinct from *Saportia*, a genus of Tertiary Algæ, named by Squinabol in 1891, Contr. Fl. Foss. Terz. Liguria, pt. 1, p. xx.

not definitely known in a wild state,¹ appears to have enjoyed a world-wide distribution including all continents and extending from California to India, from Greenland to Argentina, and from Tasmania to Spitzbergen.

Smithsonian Institution, Washington, 2 May, 1901.

Plate VII.—Canadian types.

- Figures 1 and 2.—*Whittleseyia desiderata*, D. W., Fig. 1a, enlargement (x4) to show the vascular bands of the leaf.
Harrington River, N. S.; Riversdale formation.
- Figure 3.—*Whittleseyia brevifolia*, D. W., Fig. 3a, detail showing the nervation (x4)
Harrington River, N. S.; Riversdale formation.
- Figure 4.—*Whittleseyia Dawsoniana*, D. W., Fig. 4a, enlargement (x4) to show the vascular bands.
St. John, N. B.; Lancaster formation.
Appalachian types.
- Figure 5.—*Whittleseyia elegans*, Newb., showing the average form and proportions.
Roof of Sharon coal, Akron, Ohio; upper part of Pottsville.
- Figure 6.—*Whittleseyia undulata*, Lx., slightly narrower than the normal form labelled by Lesquereux with this name.
Roof of Pratt coal, Dolomite, Ala.; Pratt group, Upper Pottsville.
- Figure 7.—*Whittleseyia microphylla*, Lx.
Near Fayetteville, Ark.; Coal-bearing shale, Upper Pottsville.
- Figure 8.—*Whittleseyia Campbelli*, D. W.
Lincoln Mines, Southern Anthracite field, Pa.;
Lower Lykens division, Pottsville.

SOME NEW CANADIAN GENTIANAS.²

By THEO. HOLM.

GENTIANA MACOUNII.—Annual or sometimes biennial, glabrous except the calyx: stem strict, quadrangular, 5 to 30 cm. high, branched from the base: lowest leaves spatulate or oblong lanceolate, the upper linear-lanceolate, acute: peduncles long and stout, 1-flowered: calyx purplish-green, unequally cleft to near the middle, 4-lobed, the longer lobes lanceolate, the shorter ovate with broad membranaceous margins, all acuminate and carinate. scaberulous with minute short papillæ, especially along the keels: corolla deep bluish, 1½ to 3 cm. long, cleft to about ⅓ of its length, 4-lobed, the lobes very veiny, slightly spreading, broad and

¹ The sole survivor of the genus *Ginkgo*, the Ginkgo tree (*G. biloba*), also known as the "Maidenhair tree" on account of the resemblance of its leaves to the Maidenhair fern (*Adiantum*), is the sacred tree of the temple gardens of Japan and China, whence it has been introduced by horticulturists into Europe and America.

² These descriptions of new species, formerly supposed to represent *Gentiana serrata*, Gunn., have been extracted from a very valuable paper by Mr. Holm on "Some Canadian species of *Gentiana*: section *Crossopetalæ*, Fréel.", with four plates, received too late for publication in this number of THE OTTAWA NATURALIST. The complete paper will appear in an early number of this journal.

Mr. Holm also proposes *G. serrata*, var. *grandis*, and var. *holopetala*, Gray, as species, viz.: *G. grandis* (Gray Synopt. Flora, p. 117), Holm, and *G. holopetala* (Gray ibid.), Holm.—EDITOR.

fringed along the sides, but merely denticulate across the summit; nectariferous glands 4 at the base of the corolla-lobes: stamens 4 with broadly winged filaments, these ciliate in the middle: anthers at first introrse: pistil fusiform, stipitate with short but distinct style: stigma roundish: mature capsule shorter than the corolla: seeds rough with numerous long papillæ.

Prairies, gravelly soil and margins of marshes. The Geological Survey specimens are from Lees Creek at Cardston, Alberta; Red Deer, Alberta; along the Bow River to Banff, Rocky Mountains, where it is very abundant; Waterton Lake, Lat. $49^{\circ} 05'$; and Fort Pitt, Saskatchewan.

GENTIANA PROCERA.—Annual, glabrous except the calyx: stem erect, angled, 25 to about 50 cm. high, branched above: lowest leaves spatulate or oblong-lanceolate, obtuse, the upper linear-lanceolate, acute: branches 1—3-flowered with 2 or 3 pair of leaves: calyx $1\frac{1}{2}$ to 3 cm. long, unequally cleft to the middle or a little above, 4-lobed, the longer lobes linear-lanceolate, the shorter much broader with membranaceous margins, all acuminate and carinate, scabrous: corolla, deep blue, 2 to 5 cm. long, 4-lobed, the lobes very veiny, roundish with many long fringes along the sides and dentate across the summit: nectariferous glands as in *G. Macounii*: stamens 4, the filaments naked, otherwise as in the preceding species; ovary shortly stipitate with short style and a roundish, somewhat lobed stigma: mature capsule much shorter than the corolla: seeds with long papillæ.

Represented in the Herbarium of the Geological Survey of Canada by specimens from near Sarnia, Ont. (*C. K. Dodge*); Lake Huron (*Dr. Richardson*); Stony Mtn., Man. (*John Macoun*); and in the Gray Herbarium of Harvard University from Goat Island Niagara Falls; shore of Lake Superior, Charlevoix, Mich.; and Minnesota.

GENTIANA NESOPHILA.—Annual, glabrous: stem erect, angled, 6 to 9 cm. high, much branched from near the root: leaves glaucous, densely crowded and forming a rosette, roundish or obovate, tapering into the petioles, the cauline spatulate or lanceolate, obtuse: peduncles sometimes as many as 12, stout, 1-flowered with 2 or 3 pair of leaves: calyx glaucous and wholly glabrous, about $1\frac{1}{2}$ cm. long, unequally cleft to near middle, 4-lobed, the longer lobes narrow and keeled, the shorter much broader with membranaceous margins, but not carinate: corolla pale bluish in dried specimens, 2 to $2\frac{1}{2}$ cm. long, 4-lobed, the lobes roundish with a very few lateral teeth, but no fringes, erosely denticulate across the summit: nectariferous glands 4: stamens 4, with winged filaments: ovary shortly stipitate, the style distinct, with a roundish stigma: mature capsule shorter than the corolla: seeds with short, obtuse papillæ.

Known only from near Salt Lake, Anticosti, Quebec, where it was collected by Prof. John Macoun on low, moist ground; in flower August, 1883.

COMPARATIVE RECORDS OF ARRIVAL OF BIRDS.

	Windsor, Ont.	London, Ont.	Toronto, Ont.	Ottawa, Ont.
Cliff Swallow, <i>Petrochelidon lunifrons</i>				May 10
Olive-backed Thrush, <i>Turdus ustulatus swainsonii</i>		April 22		" 16
Loon, <i>Uria lomba</i>	May 26	May 13	April 22	
Duck Hawk, <i>Falco peregrinus anatum</i>		April 22	April 25	
Brown Thrasher, <i>Harporhynchus rufus</i>			" 25	May 4
Broad-winged Hawk, <i>Buteo latissimus</i>		April 27	" 25	April 28
Chimney Swift, <i>Chaetura pelagica</i>		" 27		May 2
Bank Swallow, <i>Clivicola riparia</i>		" 28		" 10
Greater Yellow Legs, <i>Totanus melanoleucus</i>		" 28		
Gray-checked Thrush, <i>Turdus aliciae</i>		" 28		
Rough-winged Swallow, <i>Stelgidopteryx serripennis</i>			April 28	
Water Thrush, <i>Seiurus noveboracensis</i>		April 28		
Myrtle Warbler, <i>Dendroica coronata</i>		" 29	May 16	
Yellow Warbler, <i>Dendroica aestiva</i>		" 29	" 2	May 10
Magnolia Warbler, <i>Dendroica maculosa</i>		" 29	" 7	" 9
Whip-poor-will, <i>Antrostomus vociferus</i>		" 30	" 11	" 18
Catbird, <i>Galeoscoptes carolinensis</i>		" 30	April 30	" 8
Scarlet Tanager, <i>Piranga erythronotus</i>		" 30	May 9	" 16
Least Flycatcher, <i>Empidonax minimus</i>	May 19	" 30	" 9	" 19
Warbling Vireo, <i>Vireo gilvus</i>		May 1	" 11	" 7
Black and White Warbler, <i>Minotilta varia</i>		" 1	" 15	" 9
Pied-billed Grebe, <i>Podilymbus podiceps</i>		" 2	" 2	" 10
Yellow-throated Vireo, <i>Vireo flavifrons</i>		" 2	May 11	
Bobolink, <i>Dolichonyx oryzivorus</i>		" 2	" 10	May 16
Kingbird, <i>Tyrannus tyrannus</i>		" 2	" 11	" 11
White-crowned Sparrow, <i>Zonotrichia leucophrys</i>		" 2	May 11	" 11
Ruby-throated Humming-bird, <i>Trochilus colubris</i>	June 6	" 2	" 11	" 21
Pine Warbler, <i>Dendroica vigorsii</i>		" 2	" 2	" 5

Parula Warbler, <i>Compsoliptis americana</i>	May 6.....	May 2 ..
Red-headed Woodpecker, <i>Melanerpes erythrocephalus</i>	" 3.....	" 10 ..
Maryland Yellow-throat, <i>Geothlypis trichas</i>	" 4.....	" 5 ..
Nashville Warbler, <i>Hemithroptila ruficapilla</i>	" 4.....	" 12 ..
Crested Flycatcher, <i>Myiarchus crinitus</i>	" 4.....	" 7 ..
House Wren, <i>Troglodytes aedon</i>	" 4.....	" 19 ..
Baltimore Oriole, <i>Icterus galbula</i>	" 4.....	April 25
Palm Warbler, <i>Dendroica palmarum</i>	" 4.....	May 11
Blue-gray Gnatcatcher, <i>Poliptila cerulea</i>	" 5.....	" 10 ..
Black-throated Green Warbler, <i>Dendroica virens</i>	" 5.....	May 19
Wood Thrush, <i>Turdus mustelinus</i>	" 8.....	April 25
Wilson's Thrush, <i>Turdus fuscescens</i>	" 8.....	" 23 ..
Wood Pewee, <i>Contopus virens</i>	" 8.....	May 15.
Lincoln's Sparrow, <i>Melospiza lincolni</i>	May 6.....	" 11 ..
Chestnut-sided Warbler, <i>Dendroica pennsylvanica</i>	" 6.....	" 11 ..
Blue-headed Vireo, <i>Vireo solitarius</i>	" 6.....	May 4
Rose-throated Grosbeak, <i>Habia ludoviciana</i>	" 6.....	" 8 ..
Oven-bird, <i>Seiurus aurocapillus</i>	" 6.....	April 28
Black-breasted Blue Warbler, <i>Dendroica cerulescens</i>	" 8.....	May 18
American Redstart, <i>Setophaga rutilla</i>	" 8.....	May 9
Blackburnian Warbler, <i>Dendroica blackburnie</i>	May 10.....	" 16 ..
Cerulean Warbler, <i>Dendroica cerulea</i>	" 10.....	" 11 ..
Orchard Oriole, <i>Icterus spurius</i>	" 10.....	" 12 ..
Red-eyed Vireo, <i>Vireo olivaceus</i>	" 10.....	" 10 ..
Cape May Warbler, <i>Dendroica tigrina</i>	" 10.....	May 11
Yellow-billed Cuckoo, <i>Coccyzus americanus</i>	" 10.....	" 11 ..
Red-backed Sandpiper, <i>Tringa alpina pacifica</i>	May 11.....	May 12
Tennessee Warbler, <i>Helminthophila peregrina</i>	May 13.....	May 12
	" 16.....	May 12

ORNITHOLOGICAL NOTES. By W. T. MACOUN.

The local bird notes for this month are held over in order that the above table of records may be published. This table gives the dates of arrival of fifty-six species of birds, most of which were observed at London, Toronto and Ottawa, and as the majority of them were probably noticed soon after their arrival the comparison of records is interesting. A similar table giving the dates of arrival of fifty-one other species was published in the June number, with the names of the observers. This month the London notes were, at the request of Mr. W. E. Saunders, furnished by Mr. J. E. Keays.

CORRESPONDENCE.

To the Acting-Editor of THE OTTAWA NATURALIST :

Having been asked by several members of the Ottawa Field-Naturalists' Club why I did not reply to the bitter attack made upon my "Synopsis of the Geology of Canada," published with the sanction of the Editor, and without any opportunity on my part of replying thereto in the same May number of THE OTTAWA NATURALIST, I desire to state that whilst I did feel strongly inclined to reply to it in the same strain, and point out the errors and mistakes it contains as well as the evident motives for the words of the writer, who signs himself "H. F." [who, by-the-by, from his initials, is evidently not even a member of the Club, yet, was allowed to use our official organ as a medium] and attacks one who, in the course of his geological researches in the field and studies in the department has been compelled to state what he believes to be the truth regarding the geological age of certain strata in Nova Scotia and New Brunswick about which a great deal has been written by a certain writer whose initials are also "H. F." and presumably refer to the same person. These writings, as well as that of "R. W. E." in the January issue of THE OTTAWA NATURALIST for 1900, and an unsigned article in a local journal, all bearing on the same subject and evidently inspired from the same quarter, may be placed along with that "very large mass of geological writing of the present time which is utterly worthless for any of the higher purposes of science, which might quite safely and profitably, both as regards time and temper, be left unread." I do not wish to enter into any personal controversy as that bitter attack would seem to lead. I merely desire to point out facts and natural conclusions that we can draw from them. I had much rather not had to write this letter intended for the members of the Club, who are certainly entitled to consideration in the matter.

After over twenty years' experience in chronological geology in Canada, I have brought out my "synopsis" in the interests of geology in Canada and in accordance with the facts which I have examined for myself during nearly two decades in the Geological Survey Department—not with any preconceived notions or ideas to bolster up, nor yet with any vain theories of mine to uphold.

I do not hesitate to stand by the position I have taken in my "Synopsis" as regards points in nomenclature. As regards nicety of diction and literary skill, I do not claim any.

Sincerely yours,

(Sgd.) H. M. AML.

Ottawa, June 22nd, 1901.

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