

pressure. The absence of a top to the plant, and its consequent loss of periods of maximum and minimum oxidation, which are the real causes of the variation in the quantity of organic acids in the cell,<sup>5</sup> "may be the reason for the failure to produce the expected results. The time of periodicity of root pressure is constant in the same genus, but some species may show greater absolute pressure than others. This may be due to accidents in growth, etc. The fact of the periodicity of root pressure seems to be established beyond the possibility of a doubt, and capillarity and similar phenomena, as suggested by Prof. C. B. Clark<sup>7</sup> and others, can not account for the facts observed.

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NOTES ON THE FLORA OF THE LAKE REGION OF NORTHEASTERN INDIANA.

BY W. W. CHIPMAN.

A glance at any map of Indiana showing the lakes and marshes will convince one of their special abundance in the north part of the State; and many more will be observed in the northeastern counties than in the northwestern.

In the Fifteenth Report of the State Geologist of Indiana<sup>1</sup>, Dr. John M. Coulter divides the State into seven botanical regions, one of which he calls the "Lake Region." Included in this "Lake Region" are the sixteen northernmost counties of the State, with the exception of the very northwestern counties, Lake and Porter.

I would separate from his Lake Region some of the most northeastern counties, and claim for this territory sufficient peculiar conditions for plant growth to merit its being considered a distinct botanical region, and would call it "The Lake Region of Northeastern Indiana."

OUTLINE OF THE REGION.

A line drawn from the vicinity of Warsaw, Kosciusko County, north along the line of the C., C., C. & St. L. R. R. to its intersection with the northern boundary of the county, and from thence northeast through LaGrange, LaGrange County, to the northern boundary of the State; and a line drawn from the vicinity of Warsaw east along the line of the P., Ft. W. & C. R. R. to its intersection

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<sup>5</sup>Ward, Proceedings of Royal Soc., Vol. XLVII, pp. 393-443.

<sup>6</sup>Warbung, Untersuchungen, etc., pp. 77-92.

<sup>7</sup>Linnæan Soc. Journal.

<sup>1</sup>15th Rep. State Geologist Ind., p. 256.

with the eastern boundary of the county, and from thence northeast through Waterloo, DeKalb County, to the eastern boundary of the State, would enclose approximately this Lake Region of Northeastern Indiana.

I would not attempt to bound it by any invariable line. The characteristic conditions for plant growth found in the center of the region may at some places extend somewhat beyond the limits given, and at other places may not reach them.

The region includes, in general, all of Steuben County and Noble County, the northeast part of Kosciusko County, the southeast part of LaGrange County, and the extreme north part of Whitley County.

This part of the State has for some time appeared to me to present conditions for plant growth different even from the rest of the northern counties contained in Dr. Coulter's "Lake Region," and I am glad to have it proven by Dr. Dryer in his geological report of Steuben County<sup>2</sup> that this region as outlined above has separate and distinct geological features. After speaking of the drift left by the Saginaw ice and the Erie ice, and the confused mass of drift left by their union, he says<sup>3</sup>: "Such a belt or drift forms the Saginaw-Erie interlobate moraine, which in Indiana stretches across the counties of Steuben, LaGrange, Noble, Whitley and Kosciusko. Thus are the peculiarities of topography and soil in that region accounted for."

It is not claimed that plants characteristic of the region are not found in the neighborhood of lakes of northern Indiana outside of its limits.

The proportion of lakes and their characteristic surroundings *outside* of the Northeastern Indiana Lake Region, is so small when compared with such conditions *in* the region, that plants found *farthest from the lakes*, together with *others entirely foreign* will *predominate* in the *other northern* counties.

In a report in 1874, by G. M. Levette<sup>4</sup>, upon the geology of the northern tier of counties, including a greater part of the region under discussion and the most northern counties of Dr. Coulter's Lake Region, he says<sup>5</sup>: "On the eastern side of the district, the land originally timbered is largely in excess of prairies and openings, but, as we go west the proportion of prairie land increases." In the same report he says of Elkhart County<sup>6</sup>: "Only a small per cent. is covered with peat-bogs, lakes and marshes." Of St. Joseph County he says<sup>7</sup>: "Diversified with prairies, oak, openings, and rolling timber lands;" and<sup>7</sup>, "small tracts

<sup>2</sup> 17th Rep. State Geologist Ind., 1891.

<sup>3</sup> Idem, p. 132.

<sup>4</sup> 5th Rep. State Geologist, Ind., 1874.

<sup>5</sup> Idem, p. 432.

<sup>6</sup> Idem, p. 452.

<sup>7</sup> Idem, p. 457.

of low, marshy ground." Of LaPorte County<sup>8</sup>: "The central and southern parts are mostly prairie;" and only<sup>8</sup>, "small marshy spots and peat-bogs" to the north. Marshall County is spoken of in another report by W. H. Thompson<sup>9</sup> as mostly prairie and large tracts of barren land.

These references to *small* percentage of lakes, swamps and bogs from these northern counties not in the lake region under discussion, when compared with the continued references, everywhere, to the *large* percentage of such conditions in the northeast Indiana lake region, would seem to be sufficient authority for separating it from the "lake region," as formerly considered.

#### OUTLINE OF THE BOTANICAL WORK DONE IN THE REGION.

A Flora of Steuben County was published in 1892 by E. Bradner<sup>10</sup>, and a Flora of Noble County in 1893 by W. B. Van Gorder<sup>11</sup>. So far as I can ascertain, no geological report has ever been made for Kosciusko County, and no specimens of plants preserved, other than those in my herbarium.

In company with Prof. A. B. Crowe, of Ft. Wayne, and Thomas A. Davis, of Goshen, I made a short collecting trip through the lakes and marshes in the northeastern part of Kosciusko County, during the last of June and the first of July, 1894; and I have made collections in the more immediate vicinity of Warsaw since 1893.

During the summer of 1896 I spent several weeks in the study of the grasses and sedges of the immediate vicinity of Warsaw, under Dr. Stanley Coulter, but owing to rains and floods making it impossible to get to desirable low regions, and to the fact that I was limited to a part of each day by other work, I was able to collect and study but some forty species.

I may say that it is at the suggestion of Dr. Coulter that I attempt this paper.

The Floras of the two counties mentioned, and my own collections will be referred to as a basis for deductions, since the three counties thus covered will comprise the greater part of the region, and no reports of the botony of the other counties—only small parts of which are included in the region—have been made.

#### GENERAL PHYSIOGRAPHIC CONDITIONS.

The climate throughout the region is the same; there being only about forty miles difference in latitude and sixty miles in longitude. The general surface of the country is rolling, and almost hilly to the north, sloping in general to the

<sup>8</sup>Idem, p. 462.

<sup>9</sup>15th Rep. State Geologist Ind., p. 178.

<sup>10</sup>7th Rep. State Geologist Ind., 1891-2, p. 135.

<sup>11</sup>18th Rep. State Geologist Ind., 1893, p. 33.

southwest. About one-third of the region was originally covered with heavy timber, and the soil of this part is a clayey loam. The soil of the very small areas of prairie land is a sandy loam, and the swamps are filled with rich, black muck and peat many feet deep. This is the general distribution, but pure sand and clay are often found by themselves, over more or less extensive areas. Occasionally sand and muck are found in combination.

These different soils furnish sustenance for a flora of a widely varied species, while those thriving best in wet soil or growing in water will predominate.

#### LOCAL PHYSIOGRAPHIC CONDITIONS.

In the northern part of Steuben County, to the extreme northeast of the region, are localities of pure sand of rather extensive area, and lakes entirely surrounded by sand and lime deposits, around whose edges, and in whose bottoms, *scarcely any* vegetation is to be found. Sandy spots devoid of vegetation are occasionally found throughout the region, but of very limited extent. The Steuben County tracts are quite peculiar to their immediate vicinity, and perhaps should not be included. In none of the other counties do we find entire lakes so destitute of vegetation. I have counted over ten plants in Bradner's list<sup>12</sup> characteristic of a barren soil which are not found so far, or only occasionally, in the rest of the region. In general, there would seem to be the greatest prevalence of plants characteristic of lighter sandy soil in Steuben County, the greatest prevalence of plants indicative of a wet, peaty soil in Kosciusko County, and rather more of a mixture of the two in Noble County, between. But a very general uniformity of species will be found throughout the region, which will increase with closer study and more extended collecting.

#### PHYSIOGRAPHIC CHANGES.

1. *Low Swamps.* The lakes are for the most part surrounded by low lands or marshes, which show that the lakes were once of much greater extent. Soil is accumulating around these lakes by the growth and decay, from season to season, of the rank vegetation around the edges, and this process is continually diminishing the size of the lakes, forming large marshes, which are being drained by ditching and tiling. A great deal of valuable land has thus been reclaimed and successfully farmed.

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<sup>12</sup>17th Rep. State Geologist Ind., 1891-2, p. 135.

The result of this change is a decreasing area for water plants, but an increasing area for swamp plants, which area is again converted into cultivated dry land. While this is a slow process, and has not materially decreased the size of the lakes very lately, yet a great deal of swamp land which formerly was overflowed at periods of high water has been, within the past twenty years, so successfully drained as to make dry, tillable land. The amount of swamp land in Kosciusko County at present is not one-half what it was twenty years ago; but there was so much land of this character then, that the remainder, with the lakes added, is sufficient to designate this as a true lake region.

The same changes have taken place to a greater or less extent in all the other counties of the region.

But few species have, in all probability, been yet lost to this flora by these changes, but the abundance of many species must be greatly reduced.

By means of this system of drainage the land passes from the wettest swamp through all gradations to dry, solid land, and the plants growing on it change in a like manner.

I have in mind a certain swamp, which was an outlot of the city of Warsaw, Kosciusko County, in which grew, fifteen or sixteen years ago, great quantities of *Typha latifolia* L., *Sagittaria variabilis* Englem., *Cyperus strigosus* L., and such plants as grow in the wettest swamps. Open ditches were put through and the soil was gradually dried. These plants gradually disappeared, and such plants as *Lobelia siphilitica* L., *Lobelia cardinalis* L., *Lysimachia stricta* Ait., *Iris versicolor* L., and *Potentilla fruticosa* L., were noticed. As the ground further dried out, and these began to disappear, others were observed, such as *Parnassia Caroliniana* Michx., *Viola palmata* L., var *cucullata* Gray, *Viola Canadensis* L., and *Gerardia purpurea* L. Even these finally disappeared, until one can now only occasionally find a plant of *Viola palmata* L., var *cucullata* Gray, and such weeds as grow in a pasture lot—thistles, burdock, etc.

This land has, under my observation, undergone these complete transformations as regards its soil and plant life, and is only an example of numerous similar instances throughout the entire region.

The rich black muck soil thus formed and mixed with some sand and lime (which latter shows itself in places in marl deposits) produces plants of exceptional size, shows many specimens of rapid growth and unusual development, and affords much material for study along that line.

This reclaimed soil has proven specially adapted to the growth of celery, and Warsaw is becoming a large shipping point for celery of exceptionally fine quality.

2. *Tamarack Swamps.* Much of this peat or muck land was formerly covered with tamarack, *Larix Americana* Michx. The trees grew very near to one another and formed a very dense forest, often with an undergrowth of *Rhus venenata* DC., and *Betula pumila* L.

The tamarack has for the most part been cut down, and where standing, the trees are often dead. The drying of the soil takes away one essential condition to their growth.

In and near a few tamarack swamps still standing I collected the only specimens of *Betula pumila* L., I have seen in Kosciusko County. It is not reported from Noble County by Van Gorder<sup>13</sup>, but is from Steuben County, by Bradner<sup>14</sup>, so that it is probably found sparingly throughout the region and disappearing with the tamaracks.

About ten years ago I collected one specimen of *Cypripedium acaule* Ait., in the edge of a tamarack swamp in the vicinity of Warsaw, Kosciusko County.

In 1882 Dr. Coulter<sup>15</sup> lists it as found in a tamarack swamp in Noble County. Mr. Van Gorder gives reference to the "Editors of the Botanical Gazette, 1881," as his authority for listing it in his Noble County Flora<sup>13\*</sup>. It is not reported from Steuben County by Mr. Bradner<sup>14</sup>, and has not been seen in Kosciusko County since the specimen mentioned. The authors of the Lake County list<sup>16</sup> claim that as the *only* Indiana station, and mark it "local." The specimen has evidently been lost to this flora by absence of proper conditions for growth.

In connection with the decadence of tamarack swamps in this region, it has been observed that a great many of the plants listed by Dr. Jno. Coulter<sup>17</sup> as being characteristic plants of his "Lake Region" are not at present the characteristic plants of the "Lake Region of Northeastern Indiana." Of his list of twenty plants, *Betula pumila* L., *Toxifolia glutinosa* Willd., *Lilium superbum* L., *Ruellia ciliosa* Pursh., *Solidago stricta* Ait., *Ribes rubrum* L., *Potentilla argentea* L., and *Myriophyllum spicatum* L., are very rarely found; while *Cypripedium acaule* Ait., *Oralis acetasella* L., *Aster longifolius* Lam., and *Vaccinium Pennsylvanicum* Lam., have not been reported since that time. *Arabis lyrata* L., and *Lechea major* Michx., are only occasionally found. *Elodes campanulata* Pursh.,

<sup>13</sup> 18th Rep. State Geologist Ind., 1893, p. 33.

<sup>14</sup> 17th Rep. State Geologist Ind., 1891-92, p. 135.

<sup>15</sup> Bot. Gazette, V. Sup. I., 1882, Flora of Indiana.

<sup>16</sup> Higby, Wm. K., and Raddin, Chas. S., Flora of Cook Co., Ill., and a part of Lake Co., Ind. Bull. Chicago Acad. Sci. II.

<sup>17</sup> 15th Rep. State Geologist Ind., p. 259.

\*Mr. Van Gorder recently reports it personally found in Noble County, but it is by no means common.

*Maianthemum Canadense* Desf., and *Allium cernuum* Roth., are found more commonly, but not in such abundance as to be termed characteristic of the region. This only leaves two plants of the list which now remain as characteristic, viz.: *Lobelia Kalmii* L., and *Scutellaria galericulata* L.

It is true, of course, that Dr. Coulter's "Lake Region" covered more territory than the "Lake Region of Northeastern Indiana," but this latter was included, and formed a very considerable part of it, and the fact that only two of his list can now be called characteristic of our smaller Lake Region has its significance.

It must be that the entire north part of the State has undergone a noticeable change in conditions producing its characteristic plants, or that this northeastern part under consideration has alone changed, or that we have here conditions different from the remainder of the former Lake Region which were existent at that time. Most of Dr. Coulter's observations were along the line of the L. S. & M. S. R. R.—largely in St. Joseph County—and only touching our region in Noble County.

It is quite probable that the observations at that time did not extend so thoroughly in our region as in the districts to the north and west, where there was not such an abundance of lakes and pure lake forms.

The tamarack and associated swamp plants are more frequent in Dr. Coulter's list than our present lake plants and swamp plants free from tamarack surroundings. Our most common species of this latter class, now so abundant, can scarcely be of very recent introduction, and this would seem to show that our pure lake plants were not even then (1886) so abundant in the remainder of Coulter's Lake Region as in this part of it which we call the Lake Region of Northeastern Indiana, proving more conclusively the distinctiveness of this region. The gradual disappearance of the tamarack is no doubt general throughout northern Indiana, and the list referred to would not include so many characteristic plants for any northern county as when made, yet it would seem evident that the list never contained as many plants peculiar to our region as to the counties north and west of us, and that there always have been more pure lake forms in the counties included in the Northeastern Indiana Lake Region than in the remainder of northern Indiana. From the frequent references which will occur to Lake County as the only other station, or one of a few other stations, for a number of the plants peculiar to the Northeastern Indiana lake region, it may be inferred that Lake County as a whole is very similar to this region, and, with the intervening territory, should be included. When the lists of this region and the lists of Lake County are compared it will be found that there are many plants not in common.

A large part of Lake County is the sandy region—to which we have no parallel—left by the receding of Lake Michigan to its present bounds. There are in northwestern Lake County—the southeast part of the region covered by Higley and Raddin's catalogue—some lakes and marshes which present conditions similar somewhat to our own. These localities in Lake County have been so thoroughly examined that it is not strange to find some of our less frequent species also “very infrequent” there. Most of all the references made are to plants very rare or local in Lake County. Many of our common species would not be found in Lake County, and very many common Lake County species would not be found here at all. While Lake County offers similarities in a small part of its territory, the Lake region of Northeastern Indiana and the Lake County region, as a whole, are dissimilar.

NOTES IN GENERAL, UPON OCCURRENCE AND DISTRIBUTION OF RARE OR INTERESTING SPECIES.

Those who have published lists covering any part of Northeastern Indiana do not claim them to be complete, and doubtless new plants are yet to be observed. By comparing the partial catalogues referred to with my own collections I find a total of some nine hundred and fifty species reported from the “Lake Region of Northeastern Indiana.”

It is to be regretted that Mr. Bradner has not given in his catalogue<sup>18</sup> any notes as to abundance of species, or to distribution over the territory. With the exception of one or two instances it is impossible to tell whether a supposable rare plant is rarely or more commonly met with, or in what kind of soil, or under what conditions it is found. If scarce, whether it is recently noticed and just appearing, or whether formerly seen and just disappearing. With the geology of the county given by townships in the same volume, Mr. Van Gorder's reference<sup>19</sup> to scarcity or abundance, and to locality by townships, is very helpful.

It would seem that much more importance should be placed on these annotations than is often done. The helpfulness of richly annotated lists is double that of those with bare names of species.

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<sup>18</sup>17th Rep. State Geologist Ind. 1891-2, p. 135.

<sup>19</sup>18th Rep. State Geologist Ind. 1893, p. 33.

PLANTS NOT GIVEN IN COULTER'S LIST.<sup>20</sup>

During my collecting in Kosciusko County I have found seven plants not reported in Coulter's List. On the sandy, low shore of Chapman's Lake, Kosciusko County, I found, in 1894, *two specimens only* of *Epilobium Adenocaulon* Haussk. Although growing very near each other they have a very different aspect, and so far as I could judge from the manual description I had a specimen of *E. glandulosum* Lehm., which Trelease says<sup>21</sup> does not occur in the United States. The specimens were both sent to Dr. Trelease, and he writes me that they are both *E. adensecaulon*, much as they appear different; and that *E. adensecaulon* is very variable. So far as I can ascertain *E. adensecaulon* has never been found in Indiana with the exception of the two specimens I possess; and it is interesting to note that Beal & Wheeler<sup>22</sup> do not list it from Michigan farther south than Keewenaw County, the very northernmost county of the Upper Peninsula.

*Anychia Capillacea* DC., I have found in Kosciusko County in two places in quite abundance—on the east shore of Tippecanoe Lake in woods, and in a similar situation in Winona Park, Winona Lake. The manual<sup>23</sup> says, "More abundant northward," but it is not given by Beal & Wheeler, as found in Michigan, just north of us. Higley & Raddin<sup>24</sup> list it as found in Riverside, Ill., Cook County, but do not list it from Lake County, in their list of Cook County, Ill., and Lake County, Indiana, plants.

Specimens of *Bidens Beckii* Torr. were found by me in 1893 in the slow waters of the Tippecanoe River, near Warsaw, Kosciusko County. I could find no list of any section in Indiana containing this species, and reported the same to Dr. Jno. M. Coulter. Since then I have found it mentioned as rare in Lake County, and by Bradner from Steuben County.<sup>25</sup> I failed to find it elsewhere, nor could it be found in the same place the next year.

I found, in 1894, a few specimens of *Asclepias phytalocoides* Pursh. near Chapman's Lake, Kosciusko County. It is not in Coulter's list, but I have since

<sup>20</sup>Bot. Gazette V, Sup. I, 1882, Flora of Indiana. From which all future references to "Coulter's List" or to the "State Flora" are taken.

<sup>21</sup>Monograph Genus *Epilobium*, p. 100.

<sup>22</sup>Mich. Flora, 1892, W. J. Beal and C. F. Wheeler, Agricultural College, Mich. From this work all future references to Beal & Wheeler, or Michigan Flora, or to plants of Mich. are taken.

<sup>23</sup>Gray's Manual, 6th Edition. All references to Manual are Gray's 6th Ed.

<sup>24</sup>Bull. Chicago Acad. Sci., Vol. II, No. 1, 1891. From which all future references to Lake County are taken.

<sup>25</sup>17th Rept. State Geologist Ind., 1891-2, p. 135. From which all future references to "Bradner's List" or "Steuben Co." are taken.

found it reported from Lake County "rare," from Central Eastern Indiana<sup>26</sup> "rare," but more common in Noble County<sup>27</sup> and Steuben County than elsewhere, showing that this lake region must offer peculiar suitable conditions for its growth.

*Trifolium Lybridum* L. is fast becoming common in this flora, and is mixing so with *Trifolium repens* L., it seems quite impossible to find *T. repens* very often true to the type. It is reported from the other counties of this region as quite common, while to the northwest, in Lake County, it is listed as infrequent, as also in Beal & Wheeler's "Michigan Flora."

*Boutelona racemosa* Lag. I found this last summer (1896), on a hillside in Winona Park, Kosciusko County; very abundant in one plat about one rod square, but seen nowhere else. It is not listed by Troop in his "Grasses of Indiana,"<sup>28</sup> nor do I find it listed anywhere from Indiana except by Bradner, from Steuben County, in this region.

*Eleocharis quadrangulata* R. Br., is not listed by Dr. Coulter, but is marked "rare" in the Manual. This was found last summer (1896) in Winona Lake; quite abundant in one locality. It is reported from South Michigan as rare, and from Steuben County by Bradner. Outside of these two reports from this region, I find only one other report from Indiana, and that in the appendix to the Lake County list, *in one locality only*.

PLANTS IN COULTER'S LIST, BUT NEW TO OR RARE IN THIS REGION.

*Eleocharis avata* R. Br., though given in Coulter's List as common to the State, is not reported in any local list of the south part of the State at my command, and is "infrequent" in Michigan to the north, but I found a few specimens at Winona Lake, Kosciusko County, and it is reported from Steuben County, this region. This northeast part of Indiana would seem to be more suited to it than other parts of the State. It is "very infrequent" in Lake County.

*Hibiscus Moschentos* L. is only reported from the "knobs" in Coulter's list, and I can find no other report of it from this State than in Lake County. I found a large clump of it on the Tippecanoe River, Kosciusko County, in 1893.

In 1894 I found about six plants of *Parietaria Pennsylvanica* Muht., on a sandy shore of Turkey Lake, Kosciusko County. Coulter's list reports it only from the banks of the Ohio. I can find no other locality in the State from which it is reported, except from Lake County, and then marked "rare."

<sup>26</sup>12th Rept. State Geologist, 1882, "Flora of Central Eastern Indiana," A. J. Phinney, M. D., p. 196. From which all references to Cent. Eastern Ind. are taken.

<sup>27</sup>18th Rept. Ind. State Geologist, 1893, p. 33. From which all future references to "Noble Co." or "Van Gorder's List" are taken.

<sup>28</sup>Bull. 29 Ind. Agri. Expt. Sta., Lafayette, Purdue Univ., 1889. "Grasses of Indiana."—J. Troop.

I found in 1893, on waste ground, Kosciusko County, one specimen of *Ipomoea hederacea* Jacq., which is the only discovery of the species I can find north of Central Indiana, nor is it reported from Michigan, to the north.

A few specimens of *Myriophyllum heterophyllum* Michx., which I found in Boydston's Lake, Kosciusko County, are the only plants of the species I can find reported from the north part of the State, but from Steuben County, this region, and from Lake County.

I would add Kosciusko County as another locality, for four plants mentioned in Dr. Stanley Coulter's paper<sup>29</sup> before the Academy last year, as occurring at only one or two stations in the north part of the State.

They are *Liparis horseii* Richard., *Menyanthes trifoliata* L., *Aster umbellatus* Mill., and *Galium boreale* L. Other plants, not previously reported from the north part of the State, or if so, only from Lake County, could be stated as having been found in this Northeastern Indiana Lake Region.

#### SOME GENERAL OBSERVATIONS.

In this connection I would call attention to the listing of *Prunus Pennsylvanica* L. f., in a list of the common timber trees of seven counties in this immediate section.<sup>30</sup> Is this not a mistake? Should it not be *Prunus serotina* Ekoh.? *P. Pennsylvanica* is not in Coulter's list, and is not reported from this region by any list whatever other than this reference. It is marked "very rare" from Central Eastern Indiana, and also "rare along the lake shore," in Lake County. Beal & Wheeler say in "Michigan Flora," "Very abundant on sandy soil in the north half of the State, but less common southward, where *P. serotina* takes its place." *P. serotina* is surely the only wild cherry here which could be used for lumber (the only other tree of this genus found here—*P. Americana* Marshall—being too small), and should be substituted in the list referred to for *P. Pennsylvanica*.

I would also call attention to some species listed by Bradner & Van Gorder, which appear to me to be probable errors.

Mr. Van Gorder lists from Noble County, "*Hepatica acutiloba* DC., Liver leaf, common"; as does also Mr. Bradner, from Steuben County, and neither list *H. triloba* Chaix. In all my collecting in Kosciusko County I have never seen *H. acutiloba*, while *H. triloba* is one of our most common spring plants. I am well aware that the two species are apt to approach each other, and that transition forms are apt to be found, but am well acquainted with the two species, having been able to find at Crawfordsville, Indiana, with close searching for two

<sup>29</sup>Proc. Ind. Acad. Sci., 1895, p. 183.

<sup>30</sup>5th Rept. State Geologist Ind., 1873. Observations by G. M. Levette, p. 434.

seasons, nothing but *H. acutiloba*, and find nothing in Kosciusko County but *H. triloba*, the scapes of which seldom grow to the height of those of *acutiloba*.

It would seem strange that such an apparent difference should exist between counties of the same region, and I feel quite certain, since these lists report but one form, it must be *H. triloba*.

Mr. Bradner lists from Steuben County, "*Claytonia Caroliniana* Michx., Spring Beauty." Mr. Van Gorder reports from Noble County only *C. Virginica* L., and that is the only species reported from Kosciusko County.

It is not at all probable that *C. Caroliniana* is found so far south in this longitude. Beal & Wheeler say *Caroliniana* is not found in the south part of Michigan. It is reported from Lake County, where the conditions are more like those of Northern Michigan, and it seems very certain that the plants referred to in Mr. Bradner's list should be written *C. Virginica*.

Nowhere can I find *Viburnum nudum* L. reported outside the limits given in Gray's Manual, 6th edition, viz.: "From N. J. to Florida," except from Steuben County by Bradner, and if it be correct, is worthy of mention as an entirely new plant to this region.

Mr. Bradner also reports *Typha augustifolia* L. from Steuben County, which is very rare indeed, and deserves special notice.

I have not corresponded with either Mr. Van Gorder or Mr. Bradner, nor seen their collections, and draw the above conclusions wholly from general observation.

It is worthy of note that *Nelumbo lutea* Pers. is reported from Blue River Lake, Whitley County<sup>31</sup>—a part of this region. This is the only reported locality in Indiana, except Lake County, and the species is very rare in the Central States.

This region, as a whole, seems to possess a flora considerably different from that which it had a decade since; to have lost many of its northern forms, and to have gained some southern forms. Introduced species from the east and west have been brought in by the railroads. The climate is much milder than formerly, and the various conditions for plant growth materially changed. Until recently it has not had as much attention from botanists as other sections of the State.

A more careful study of the flora will surely develop interesting facts. There is much to be done along the line of cryptogamic botany. Surely the territory as outlined is worthy the designation of a separate and characteristic region, and will repay the more extended investigations of botanists.

<sup>31</sup> 17th Rept. State Geologist Ind., pp. 166.