

## NOTEWORTHY INDIANA PHANEROGAMS. BY STANLEY COULTER.

The ruling of the directors of the Survey that no form should be admitted to the catalogue of the flora of the State unless verified by actual specimens has led me as far as possible to secure first exceptional forms of limited range, in the hope that by a publication of the data concerning them the attention of collectors might be directed to them, and our knowledge of their distribution within the State be increased. The most notable collection of these exceptional forms that has come into the possession of the Survey was that received from Rev. E. J. Hill, of Englewood, Ill., embracing 163 species. All of the specimens were of extreme interest, and many of them represented the sole record for the State. The following notes are based very largely upon this collection, and most of the forms represent a southern extension of northern forms. It should be remembered, however, that, until we have a full knowledge of the isotherms of our country, statements as to "southern limit" and "northern limit" are merely terms of convenience, and do not necessarily involve any real extension of range.

A fuller knowledge of natural drainage systems, of prevailing winds at varying seasons and of numerous other physical conditions is necessary before we can properly undertake a definite limitation of the range of any plant form. In a limited area, in which there is a definite organization of work, it is possible to determine many of these conditions and by their record add much to the ease with which some of the problems of geographical distribution may be solved.

Another feature emphasized by this paper is the extreme importance of long-continued collections in the same region. The work of Mr. Hill in Lake County covers a period of twenty years and has resulted not only in the addition of many new forms to the State flora but in a thorough botanical knowledge of that portion of the State. The work of Mr. Van Gorder in Noble County, extending through ten years, has shown similar results. Many problems which present themselves can only be solved by work of this kind. The tendency of collectors in the past work of the State has been to cover large areas, rather than to study closely some definite regions. Closer attention should be given by all collectors throughout the State to mass distribution, as distinguished from the station at which the collection is made, and also to the collection of fruiting specimens.

A somewhat careful study of our State flora leads me to believe that many forms may be added if a more careful study is made of our marsh and lake forms and of those groups which are of difficult discrimination. Special studies should also be made during the coming season of definitely characterized regions, as, for

example, of the flora of lime stone cliffs, of clay soils, of sand hills, etc. The work needed is not so much a collection of plants as a collection of *facts* verified by plants.

In the following notes I have not in all cases referred to Mr. Bradner's list of the plants of Steuben County, because I have had no opportunity to examine his collections. The references, save as indicated in the notes, are to material in the possession of the Survey. A large number of interesting forms of *Cyperaceæ* and *Gramineæ* have been omitted, because our knowledge of the distribution of these forms in the State is too scant to justify any conclusions concerning them.

*Cardamine pratensis* L. This rare Northern plant, which was included in the State catalogue, but of which no specimen had been preserved, is now definitely reported with verifying specimens from two localities. Wet banks of Calumet River, Miller's, Lake Co., June 6, 1893 (E. J. Hill); Section 5, York Tp., Noble Co., May 28, 1894 (W. B. Van Gorder). Mr. Van Gorder sent me specimens of this plant last June, at which time I determined it to be *C. pratensis* L., a determination which was later confirmed by a careful comparison with the material in the Gray Herbarium at Harvard University. Under date of November 6, 1895, Mr. Van Gorder writes as follows:

"*Cardamine pratensis* L. grows plentifully on a tract of wet land, three or four acres, in section 5, York Tp., Noble Co. This tract is a part of the Elkhart River flat. I had seen the plant for several years, and at a distance thought it *C. rhomboidea* DC. This last spring it was dry enough, and passing the place I determined to know for sure. It flowers from May 15 to June 10. The specimen sent you was collected May 28."

The manual range of the plant is, "Wet places and bogs, Vt. to N. J., Wis., and northward; rare."

The following local references which I was able to collate while at the Gray Herbarium during the past summer may serve to show the interest which attaches to this plant as a member of the Indiana flora:

*State (Indiana) Catalogue, etc.* Lake Co. P. 3.

*Flora of Michigan.* Wheeler, C. F., and Smith, E. F. "Bogs." Rare S., frequent in C. and common N. P. 14.

*Flora of Minnesota.* Warren Upham. Lake Superior to sources of Mississippi. North. (Houghton.) P. 24.

*Flora of Nebraska.* Samuel Aughey. Includes without note. P. 6.

*Flora of Iowa.* J. C. Arthur. Does not include.

*Preliminary Catalogue of Anthophyta and Pteridophyta, etc.* Torrey Botanical Club.—Includes without note.

*Catalogue of Plants of New Jersey.* N. L. Britton.—Cedar swamp at New Durham. Rare. P. 8.

*Catalogue of Native and Naturalized Plants of the City of Buffalo and Its Vicinity.* David F. Day.—Rare. S. E. portion of Buffalo, near West Seneca. P. 18.

*Flora of Cook Co., Ill., and Part of Lake Co., Ind.* Higley, Wm. K., and Raddin, Chas. S.—Calumet River, near Miller's, Ind.—Rare. April. (Bastin and Hill.) P. 9. This reference is evidently based upon the collection of Mr. Hill cited *supra*.

*Plants of Illinois.* H. N. Patterson.—Does not include.

*Flora Peoriana* (Ill.). Frederick Brendel.—Does not include.

*Higher Seed Plants of Minnesota Valley.* Conway Macmillan.—Does not include.

*Catalogue of Canadian Plants.* John Macoun.—“Wet, swampy meadows, Labrador; St. Patrick, Charlotte Co., N. B.; vicinity of Prescott Junction, three miles south of Ottawa; wet meadows and swamps, Hastings Co., Ont.; Whiskey Island; Georgian Bay; Hudson's Bay; throughout Arctic America and Greenland.”

*Manual and Instructions for Arctic Expedition, 1895.* Hooker, on arctic plants, p. 203, says: “The most arctic plants of general distribution that are found far north in all the arctic areas are the following; all inhabit the Parry Islands or Spitzbergen or both.” A list of fifty-three plants is given, including *Cardamine pratensis* L.

On page 226, the range of this form is given as “from Mackenzie's River to Baffin's Bay. Throughout Arctic Greenland.”

In same volume, page 244, the following note concerning this form is given by James Taylor: “*Cardamine pratensis* L. Flowers June-July. East side Disco Island. Altitude, 200 feet. North lat., 69° 10'; W. long., 54° 30'.”

In the various catalogues of the New England States it is usually included with the statement, “chiefly found in the northern part.”

From these citations it will be seen that the Indiana stations mark the southern-central limit of this true arctic form, which in all probability found its way southward during the glacial period.

*Arabis lyrata* L. “Dry, sandy ground, Miller's, Ind., June 6, 1893.” (E. J. Hill.) Reported also from Laporte County, presumably upon authority of Dr. Barnes, and included in Bradner's flora of Steuben County. The form in general is a northern one in its mass distribution, although extending south along the mountains as far as Kentucky. Its local distribution will probably be found to

be limited to the northern portions of the State, and its occurrence there can only be expected in exceptionally favorable localities.

*Hudsonia tomentosa* Nutt. "Sand hills, Miller's, Ind., June 20, 1893." (E. J. Hill.) This striking form has as yet its only station as indicated. It is so unlike the ordinary phanerogam of Indiana that it could scarcely have escaped notice if it was of any wide distribution. The range of the plant is "sandy shores, Maine to Md., and along the Great Lakes to Minn., rarely on streams inland." It is therefore probable that its distribution in Indiana is extremely restricted.

*Lechea thymifolia* Michx. "Sandy ground, Tolleston, Ind. Flowers collected Sept. 16, 1882; fruit, Oct. 1, 1881." This is the only record for the species, and if the determination holds good, is a rather peculiar extension of range. The assigned range is "dry grounds near the coast, E. Mass. to Fla." The reference is apparently accurate, but on account of the well-known difficulty of discrimination between the species of this genus, I am unable to feel absolutely certain in the absence of authenticated specimens for comparison. The authority of Mr. Hill, however, is sufficient to retain the plant in the State list until opportunity occurs for comparison with forms from the east.

*Arenaria Michauxii* Hook. f. "Dry sands, Clark, Ind., June 13, 1893." (E. J. Hill.) There seems to be no special reason why this species should not be found generally distributed throughout the State, although as yet this is the only station recorded. The known range of the plant easily includes Indiana, and it should be looked for throughout the State.

*Arenaria lateriflora* L. "Dry woods, Miller's, Ind., June 20, 1893." (E. J. Hill.) This species was reported by Dr. A. J. Phinney in his list of plants of the region covering Jay, Delaware, Randolph and Wayne counties. He, however, secured no verifying specimen. The Lake County collection, however, serves under the rules of the State to give the species a place in the flora of Indiana. It is probable that the plant will be found to occur only in the eastern and northern counties of the State, its general range being northward.

*Hypericum Kalbrianum* L. "Wetish sands, Tolleston, Ind. Flowers collected June 29, 1880; fruit, September 3, 1880." (E. J. Hill.) Also collected at Laporte by Dr. C. R. Barnes. This species is evidently limited to the northwestern counties of the State and will probably not be found much beyond the lake region. The assigned range is Niagara Falls and northern lakes.

*Linum sulcatum* Riddell. "Dry, sandy soil, Pine Station, Ind., July 28, 1875." (E. J. Hill.) So far as I am able to determine, this is the only station

in the State for this species. Its general range, "E. Mass. to Minn., and south-westward," would indicate, perhaps, a more general distribution since it has made its appearance within our boundaries.

*Nemopanthes fascicularis* Raf. "Wet ground, Miller's, Ind. Flowers collected April 29 and May 11, 1882; leaves and fruit July 4, 1882." (E. J. Hill); Steuben County (E. Bradner). Although not included in the lists of Mr. Van Gorder, I have received from him this summer material of this species collected in Noble County. The manual range of the plant was extended upon the collection of Mr. Hill, and from the later reports it is fair to infer that its occurrence is limited to perhaps the northern tier of counties.

*Lathyrus maritimus* Bigel. "Shores of Lake Michigan, Whiting, Ind., July 15, 1875." (E. J. Hill.) A species inhabiting the seashore from Oregon and New Jersey to the Arctic Ocean, and also found on the Great Lakes. The range in Indiana can evidently be but slightly extended, if at all.

*Rosa Englemanni* Watson. "Flowers collected, East Chicago, Ind., June 5, 1890; fruit collected in damp thickets at Pine Station, Ind., Aug. 25, 1891. Four feet to eight feet high." (E. J. Hill). The specimen furnished the survey seems clearly referable to this species, though showing a decided increase in size. The plant is normally from "three to four feet high, or less." Its range is given as "Whisky Island, Lake Huron, shores of Lake Superior, and west to the Red River valley, and in the mountains from N. Montana and N. Idaho to Colorado." Its appearance in Indiana is of extreme interest and adds a new station for the species.

*Heuchera hispida* Pursh. "Sandy, open grounds, Tolleston, Ind., June 20, 1893." (E. J. Hill.) This is an additional station for this species which was formerly reported only from Vigo County by W. S. Blatchley. It may be assumed that the form will be found in favored localities throughout the State. (Saxifragaceae in Indiana, Proc. Ind. Acad. of Sci. 1894, p. 105.)

*Sambucus racemosa* L. "Open woods, Porter, Ind., May 17, 1890; fruit, Otis, Ind., May 21, 1881" (E. J. Hill); "common at least in eastern part of Noble County" (Van Gorder); Steuben County (Bradner); Putnam County (MacDougal); Jefferson County (J. M. Coulter); Clarke County (Baird and Taylor). This species is northern in its mass distribution and is more rarely found southward. In leaf, fruit and bark characters, it at times runs perilously close to *S. Canadensis* L. I have found the color of the pith to be by far the most satisfactory means of discrimination between the two forms. Although the assigned range includes Indiana, my own experience leads me, in the absence of verifying specimens from

other localities, to limit the distribution of the species to the northern portion of the State.

*Linnaea borealis* Gronov. "Moist, pine woods, Pine Station, Ind., June 7, 1884." (E. J. Hill.) This is the recorded southern limit for this definitely northern form. Its occurrence so far south is worthy of note. It must be remembered, however, in this extension of ranges that limits are marked by parallels of latitude, when the proper method would be a consideration of isothermal lines.

*Galium boreale* L. "Sandy prairies, Sheffield, Ind., July 6, 1875" (E. J. Hill); "rather common, Noble County" (W. B. Van Gorder). The distribution of this species seems fairly well made out for Indiana, being confined to the northern counties which represent in a general way its southern limits. It is a form that can not be readily mistaken for any other members of the genus, being definitely marked by its bright white flowers.

*Liatrix cylindracea* Michx. "Dry sands. Lake County, Ind., September 4, 1893. (E. J. Hill.) The Indiana stations for this plant, so far as reported, in addition to that in Lake County, are St. Joseph County (C. R. Barnes); Gibson and Posey counties (J. Schneck). These widely separated stations indicate at least the probability of its occurrence throughout the State in favorable localities. The manual range reads: "Dry, open places, Niagara Falls to Minn. and Mo." The St. Joseph County record is verified by specimens in the Purdue Herbarium. The inclusion of the Gibson and Posey County station is upon the authority of Dr. J. Schneck, of Mt. Carmel, Ill.

*Solidago humilis* Pursh. "Sand hills, near Lake Michigan, Miller's, Ind., September 12, 1893. Sometimes 3 feet high." (E. J. Hill.) This is a distinctly northern form, and one which shows in its very considerable increase in size the effect of its new range. In its normal range, "Rocky banks, W. Vt., along the Great Lakes, and northward," it is a low plant from 6 to 12 inches high. At the base of the White Mountains a form is reported, by Gray, as occurring, having a "stout stem, 1-2 feet high." Variety *Gillmanni* Gray, is larger (2 feet high), but in addition to differences in inflorescence, is sharply separated from the species by its "laciniately toothed leaves." The species is undoubtedly a member of the State flora, and the Lake County station is to be added to the other exceptional stations recorded, "islands in the Susquehanna, near Lancaster, and at the Falls of the Potomac."

*Solidago uliginosa* Nutt. "Peat bogs. Pine Station, Ind., Sept. 11, 1890." (E. J. Hill.) This plant, which is northern in its mass distribution, has its southern limit, so far as reported, in the northern tier of counties of Indiana. Additional stations are. St. Joseph County (C. R. Barnes) and Noble County (W.

B. Van Gorder). Specimens have been examined from all three localities. The recorded range of the plant is "Peat bogs, Maine to Penn., Minn., and northward."

*Brachycheta cordata* Torr. and Gray. Among the forms that have come into the Indiana flora from the South the above is one of the most interesting. Its station is in Jefferson County, especially at Clifty Falls. The station is one of the remarkable ones in the State, because of the number of rare forms there found, *Sullivantia Ohionis* Torr. and Gray, being perhaps the most noteworthy if we except *Brachycheta*.

The manual range of the plant is as follows: "Wooded hills, S. Ind. and E. Ky. to N. Ga." In the Synoptical Flora, p. 161, the range is given as follows: "Open woods, etc., W. North Car. and E. Ky. to upper part of Ga." The plant was apparently first collected by Rafinesque, by whom it was described as *Solidago sphaecolata*, Raf. Ann. Nat. (1820), p. 14.

In Short's Supplement to the Catalogue of the Plants of Kentucky it is described as *Solidago cordata* Short.

In DeCandolle's Prodrômus, V. 313, it appears as *Brachyris ovatifolia* DC., with the range "in agro Kentuckensi ad ripas fluminum legit, cl. Rafinesque. \* \* Species, distinctissima."

Additional localities are as follows:

*Flora of West Virginia.* C. F. Millsbaugh. P. 382.—"Fayette County, near Nuttalsburg, plentiful."

*Flora of Southern United States.* A. W. Chapman, 2d edition. P. 213, entered as *Solidago cordata* Short. "Mountains of Georgia and North Carolina and northward."

*Botany of Southern States.* John Darby. P. 370—"North Carolina and Northern Georgia."

*A Sketch of Botany of South Carolina and Georgia.* Stephen Elliott. Vol. II (1824), which includes *Solidago*, does not distinguish the form.

*Tennessee Flora.* August Göttinger (1887). P. 51—Records as occurring over the whole State.

The specimens in the Gray Herbarium only include four sheets, all being from the South. They are as follows:

*Solidago cordata* (n. sp.) Short. Cliffs of Kentucky River. C. W. Short, M. D., Lexington, Ky. This is the type specimen of *Brachycheta cordata* Torr. and Gray.

*Solidago cordata* Short, Wilkes County, North Carolina, M. A. Curtis; Table Mountain, North Carolina, M. A. Curtis. Both of these have received the label *Brachycheta cordata* in the handwriting of Dr. Gray.

*Solidago cordata* Short. French Broad River, 1843. No collector's name.

*Brachycheta cordata* Torr. and Gray. Curtiss, North American Plants, No. 1298; Bluffs of Cumberland River, near Nashville, Tenn. Legit A. Gattinger.

An examination of the above data shows that this form can be reasonably expected in the southwestern counties of the State. It is easily mistaken for a *Solidago*, which genus it resembles closely in head and flower, except in the papus. It perhaps should be looked for in collections among the *Solidagos*.

*Aster polyphyllus* Willd. "Grassy borders of low thickets, Whiting, Ind. September 29, 1892." (E. J. Hill.) The range of this species being "northern Vermont to Wisconsin, and southward," it is a little remarkable that this is its only record for the State. It is possible that it has been mistaken for *A. ericoides* L., which it resembles in many particulars. The extreme variability of this latter form renders such an error a natural one. It is probable that *A. polyphyllus* is more widely distributed throughout the State than the single recorded station would indicate.

*Aster umbellatus* Mill. "Moist grounds, Pine Station, Ind. September 4, 1893." (E. J. Hill.) This form, "common, especially northward," is only recorded from four counties of the State. Additional stations are as follows: Jefferson County (C. R. Barnes); Clark County (Baird and Taylor); Jay County (Dr. Phinney). The Jefferson County reference has its authentication in specimens in the Purdue Herbarium; the Clark and Jay County stations rest upon the authority of the collectors. The plant may be confidently looked for in the northern counties of the State, and many new stations should be added as a result of the work of the ensuing season.

*Aster ptarmicoides* Torr. and Gray. "Dry sands, Pine Station, Ind." (E. J. Hill.) This form, occurring on "dry rocks, western New England to Minnesota, along the Great Lakes, and northward," is another species that has entered the State from the north. The Lake County station is the natural one for the State. In the fall of 1894, Messrs. Conner and Laben collected this species at Happy Hollow, Tippecanoe County. I withheld judgment upon the determination, until I was able to examine the type specimens in the Gray Herbarium. There is no question that *A. ptarmicoides* occurs in Tippecanoe. The station in which it is found is so secluded as to preclude the probability of its recent introduction. The range of the species must therefore be extended somewhat.

*Echinacea angustifolia* DC. "By Michigan Southern and Lake Shore Railroad, Durham, Ind. In a prairie. July 4, 1892." (E. J. Hill.) So far as I am able to find, this is the only record for this species in the State. The form has evidently entered our flora from the west, its recorded range being "Plains from Ill. and Wis. southwestward." It is easily distinguishable from *E. purpurea* Moench, and should be looked for carefully in the western counties of the State.

*Artemisia Canadensis* Michx. "Shores of Lake Michigan, Lake Co., Sept. 4, 1893." (E. J. Hill.) This northern form has its only recorded station for Indiana in the above reference. Its range is "Northern New Eng. to the great lakes, Minn., and northward." It is closely allied to *A. caudata* Michx., which also has its sole Indiana station in Lake Co. No specimen of this latter form, however, has as yet been obtained by the Survey. *A. caudata* having a range "Mich. to Minn., and southward," should be found, at least, in the northern counties of the State. Both species are separated from the other *Artemisias* by their *dissected leaves* and should be readily recognized.

*Cnicus Pitcheri* Torr. "Sandy shores of Lake Michigan, Pine Station, Ind., June 21, 1891." (E. J. Hill.) This well-marked species has this as its only station in the State, so far as the records indicate. Its range, "Sandy shores of Lakes Michigan, Huron and Superior," would indicate but a slight probability of any material increase in its distribution. It would probably be found in Laporte County in the region of Michigan City, if careful search were made. With its cream-colored flowers and white woolly covering it is an extremely attractive form and could scarcely be mistaken for any other species of the genus.

*Cnicus pumilus* Torr. "Pine barrens. Lake County, Ind., July 4, 1891." (E. J. Hill.) This form is labeled *Cnicus Hillii* W. M. Canby. I am unable, however, to see any reason why the form should not be referred to *C. pumilus* Torr., and in the absence of Mr. Canby's original description I have so referred the specimen sent to the Survey. Certain variations from the type seem to me easily referable to geographical causes, and not of sufficient importance to necessitate the establishment of a new species. The range of the plant, "Dry fields, N. Eng., near the coast. to Penn.," seems to me to furnish the only argument against the reference. It is possible that more abundant material may lead to a different conclusion. The reported occurrence of *Cnicus pumilus* in Dearborn County (S. H. Collins) is not authenticated by specimens, and is in all probability an error in determination. The extension of the range of a coast plant to the Great Lakes could be easily accounted for, but its extension to Dearborn County without intervening stations would be difficult of explanation.

*Prenanthes racemosa* Michx. "Open, grassy land, East Chicago, Ind., Oct. 5, 1892." (E. J. Hill.) Noble County (W. B. Van Gorder). The range of this species in Indiana seems to be limited to the northern tier of counties. The form is found in "plains, N. Maine to N. J. and northward," though extending also into Missouri. It is easily distinguished from the other species of the genus found in the State by its heads being in crowded clusters, and could scarcely have escaped the attention of collectors had it been of any general distribution.

*Pyrola chlorantha* Swartz. "Sandy woods, Whiting, Ind., May 25, 1878." (E. J. Hill.) A northern form, ranging from Labrador to Minnesota, northward and westward, with the single record from Indiana as indicated. The specimens in the possession of the Survey are, so far as known, the only ones from the Indiana station in the herbaria of the State.

*Trientalis Americana* Pursh. "Damp woods, Miller's, Ind., May 11, 1878." (E. J. Hill.) "In tamarack marshes in moss near the roots of trees. Very common in some places. Noble County." (W. B. Van Gorder.) The mass distribution of this species is decidedly northern, its southern limit being the northern tier of counties in Indiana, save where it extends southward along the mountains. It will probably be found in all of the northern counties, but need scarcely be expected farther south.

*Menyanthes trifoliata* L. "Bogs and peat marshes, Pine Station, Ind. May 13, 1876." (E. J. Hill.) "Moist shores of lakes—very common at Pleasant Lake, Noble Tp., Noble Co." (W. B. Van Gorder.) While the sixth edition of Gray's Manual includes Indiana in the range of this species, its authenticated distribution is confined to the stations mentioned. It probably occurs throughout the northern portion of the State in favorable localities.

*Convolvulus arvensis* L. "By railroad, Pine Station, Ind. July 28, 1875. Rare." (E. J. Hill.) Also reported from Jay, Delaware, Wayne and Randolph Counties (Phinney), and Dearborn Co. (Collins). This adventive species, heretofore restricted to North Atlantic States, has evidently made lodgment in Indiana. I am inclined to think the Dearborn County reference somewhat doubtful, judging from the general range of the plant and taking into consideration the means of distribution to which the presence of this intruder is evidently due. I believe its range in the State will be found limited to the northern and central counties.

*Stachys hyssopifolia* Michx. "Wet, sandy banks, Laporte, Ind. July 22, 1875." (E. J. Hill.) Also collected at Laporte by C. R. Barnes. The State catalogue notes the plant as occurring from "Marion Co. and northward." The Marion County reference was doubtless based upon the authority of the late Dr. H. E. Copeland, who was an exceedingly keen observer, but who, unfortunately, left

no verifying specimens. It is scarcely possible that this can be the only station for the plant, since its range fairly covers the State.

*Utricularia resupinata* B. D. Greene. "Sandy margins of ponds, Whiting, Lake County, Ind., Aug. 16, 1883." (E. J. Hill.) This collection, upon which is based the extension of the range of this form in the 6th Edition of Gray's Manual (p. 735 c.), is only one of the many evidences of the critical work done by Rev. E. J. Hill and proof of the value of a long continued study of a single area. This same form was sent me last summer by W. B. Van Gorder from north shore of Bear Lake, Noble County, thus extending its local distribution.

*Utricularia purpurea* Walt. "Shallow ponds, Pine Station, Lake County, Sept. 13, 1879." (E. J. Hill.) This is another form shown by Mr. Hill to be a member of the State flora. This station for the plant is somewhat remarkable because it is so far inland. While the range is "ponds, Maine to Florida," it is limited by the additional statement, *usually near the coast*.

*Utricularia gibba* L. "Sandy, wet margins of ponds, Pine Station, Lake County, Sept. 13, 1879." (E. J. Hill.) While this plant would be naturally expected within our range, it has been but rarely collected in the State. The specimens furnished by Mr. Hill being the only ones I have seen from Indiana. It is especially desirable that close observations should be made in favorable localities in order that the distribution of these forms within the State may be determined.

*Corispermum hyssopifolium* L. "Dry, sandy ground, Pine Station, Ind., Sept. 4, 1893" (E. J. Hill.) The only reported station for this species. No great extension of its range throughout the State need be expected, since in our range it seems confined to the beaches of the Great Lakes, although farther west and south it is not so restricted. The form is presumably from the west, judging from available data.

*Salsola Kali* L., var. *Tragus*. This plant has undoubtedly obtained a sufficient foothold in the State to be included in its flora. It is, however, very doubtful if its spread will be sufficiently rapid to give it rank among our worst weeds. The plant is definitely reported from Clarke, Lake County, by E. J. Hill, and from Avilla, Noble County, by W. B. Van Gorder. Both collections are labelled "along railroad," indicating very clearly the method of introduction into our State flora. An examination of both specimens leads me to question the reference of the Lake County specimen. It does not agree in many particulars with the Noble County specimen, which latter is very plainly the typical variety *Tragus*, and so far as I am able to judge agrees more nearly with *Salsola Kali*. The extension of the range—"sandy seashore, New England to Georgia"—by the addition of "and along shores of Great Lakes" is a very natural one, but is apparently

incorrect because of the label, "along railroad." So far as I am able to learn, the plant has not spread with the rapidity to be expected from the variety *Tragus*. In view of the accuracy of Mr. Hill in all of his determinations, the Lake County station is admitted, with the suggestion that the plant in that particular locality needs a much closer study.

The Noble County plant is unmistakable, not only in its characters, but in its habits of growth. From facts ascertained through the work of Supt. Van Gorder, it is safe to say that if the Russian thistle spreads throughout Indiana it will be from the Noble County station as a center. The plant has been carefully watched since its first appearance in 1893, and efforts made to prevent its spread, though with no very great success, as the following letter indicates:

BRIMFIELD, IND., NOV. 3, 1895.

Mr. W. B. Van Gorder, Knightstown, Ind.:

DEAR SIR—In reply to yours of some time ago, will say that the Russian thistle came up again this year worse than last year. It was not cut soon enough, which, of course, scattered the seeds. I have not heard of it any place else yet. \* \* \* \*

J. E. NISWANDER.

In the last map issued by the United States Department of Agriculture, showing the distribution of the Russian Thistle, a location is given in south-central Indiana. The map is, however, so small that I have not been able to locate the station, nor have I been able to discover upon what authority it was added.

In my opinion there are not more than two stations for the Russian Thistle in the State. Of these, that in Noble County alone seems to threaten any great spread of the pest. While the plant should be carefully watched, its general character as to periods of flowering and maturation of seed, taken in connection with the fact that though known to exist in Indiana since 1892, it has yet made no marked advance, would indicate that the danger from its introduction has been overestimated.

*Polygonum tenue* Michx. "Sand hills, Pine Station, Ind., July 28, 1875." (E. J. Hill.) Tippecanoe County, 1893. (Stanley Coulter.) This species has perhaps a more general distribution throughout the State than the references would indicate. Its normal range easily includes our territory, yet so far as I know no other stations are recorded. In a study of the genus *Polygonum* made recently I examined all of the collections in the State, and it is certainly not found in them from any other localities. The species is sufficiently characteristic to be easily separated from the more common forms, and could scarcely be confused with any other species, if we except *P. ramosissimum* Michx., from which it is readily distinguished by the character of the achenes.

*Polygonella articulata* Meissn. "Sand hills, Miller's, Ind., October 1, 1881. Flowers white or rose-colored." (E. J. Hill.) This seems to be the only authenticated station for this species. Mr. Van Gorder includes it in his list of plants of Noble County, published in pamphlet form in 1884, but excludes it from list published in 1887 in Eighteenth Report of the State Geologist. I infer from this that its inclusion in the first list was an error. Baird and Taylor also include it in their "Flora of Clark County," but as they made no collections the record is necessarily a doubtful one, with the probability against the accuracy of the determination. The assigned range is: "Dry, sandy soil; on the coast from Maine to New Jersey, and along the Great Lakes." It can be readily seen that its distribution in Indiana is in all probability limited to the northwestern counties.

*Shepherdia Canadensis* Nutt. "Sand ridges, usually near sloughs. Pine Station, Lake County, May 13 and 27, 1876." (E. J. Hill.) This attractive shrub has perhaps its southern station in this record. Its reported range is from "Vermont and New York to Michigan, Minnesota and north and westward." It is worthy of notice, perhaps, that in Indiana it occurs "near sloughs," while in other regions it is found chiefly on rocky or gravelly banks.

*Euphorbia polygonifolia* L. "Sandy shores of Lake Michigan, Lake County, Indiana, September 4, 1893." (E. J. Hill.) The range of this species is probably limited to the shores of Lake Michigan, at least so far as Indiana is concerned. While in general appearance it might be easily confused with other species, it is characterized by having seeds larger than those of any other species in section *Anisophyllum*.

*Myrica asplenifolia* Endl. "Sand hills, Miller's, Indiana. Flowers collected April 29 and May 30, 1882; fruit, July 4." (E. J. Hill.) This is the only locality for the State and it was upon this collection that the range of the species was extended in the sixth edition of Gray's Manual to include Indiana.

*Betula papyrifera* Marshall. "Sandy soil, Pine Station, Ind. Flowers collected May 13, 1876; fruit, September 3, 1876. Trees ten to thirty feet high." (E. J. Hill.) The material furnished the Survey was somewhat scant, but seemed sufficient to verify the determination. The petioles were shorter, perhaps, than in the normal form, but this seemed the only deviation from type in the leaf characters. The reduction in size from a tree fifty to seventy-five feet high in the normal range, to that indicated above, is the most marked feature in this extension of range. The form also occurs in northern Illinois, but I have no data at hand which indicate whether or not a similar reduction in size occurs. The species, as is well known, is northern in its general range.

*Pinus Banksiana* Lambert. "Sand barrens, Lake County, Ind., May 13, 1876." (E. J. Hill.) This is the only record for the gray or northern scrub pine in the State. The specimens sent the Survey establish the species as a member of the State flora beyond question. The inclusion is an extension of the reported range from Southern Michigan to Northern Indiana. It is a fact that in all probability more new forms will be added to the State flora by a careful study of our forest trees than from any other group of plants, if we except, perhaps, the water plants. For various reasons forest forms have received less attention and are more poorly represented in existing herbaria than any other. It is especially urged that during the ensuing season specimens of all forest trees be furnished the Survey by those interested in the work.

*Orchidaceæ.* Our knowledge of the occurrence and distribution of the various orchids of the State has been very greatly increased during the past year, a fact due largely to the labors of Messrs. Hill and Van Gorder. Both of these gentlemen have studied definite regions for years and have placed the Survey under many obligations for their careful and courteous responses to the many requests for information. I have asked Miss Alida M. Cunningham to collate the facts at hand, which she has done under the title "*Distribution of Orchidaceæ in Indiana*," and reference is hereby made to that article (These Proc., p. —). I wish also, in this connection, to express the thanks of the botanical division of the Biological Survey to Miss Cunningham for the patient and efficient work she has done in the study and comparison of critical forms, which has done much to expedite the work of the division and has added greatly to the value of its final report.

*Tripelidia glutinosa* Willd. "Moist sands. Pine Station, Ind., July 28, 1875. (E. J. Hill.) The State Catalogue refers this species to the "northern tier of counties." This, however, is the only station in the state from which I have been able to secure herbarium specimens. It is included in the Flora of Noble County by W. B. Van Gorder (18th report of State Geologist, p. 66,) as growing in "moist grounds along the Elkhart river in Orange township, and is represented in Mr. Van Gorder's private herbarium. I know of no other stations in which the species occurs. The recorded range of the plant is "moist grounds, Maine to Minnesota, and northward; also south in the Alleghanies.

*Triglochin maritima* L. "Wet sands, border of slough, East Chicago, June 13, 1893." (E. J. Hill.) This species has been added to the state flora through the close work of Mr. Hill, who has recorded the only station for Indiana. The species is easily distinguished from the other members of the genus by its fruit of six carpels. The assigned range of the plant is, "salt marshes along the coast, Labrador to N. J., and in saline, boggy or wet places across the continent."

*Potamogeton*. Any systematist who has undertaken a study of this genus, will at once appreciate the fact that the value of specific determinations is largely increased if they have received the sanction of a specialist in the group. Mr. Hill's forms of this genus have undergone the scrutiny of the late Dr. Thomas Morong and may be added with confidence to the state flora. It is therefore with very great diffidence that I venture to question the determination of one or two of the sheets sent the Survey. The question is not of the original determination, but the suggestion is made that in the distribution there has been a confusion of forms. The most noteworthy species of this genus are the following:

*P. pulcher* Tuckerm. "Shallow ponds, Pine Station, Lake Co., June 21, 1884." (E. J. Hill.) From an examination of many specimens, I am led to believe that this form as received by the Survey should be referred to *P. amplifolius* Tuckerm, because of leaf and fruit characters. The range of the two forms is practically the same and it is possible that they may be found associated, and become mixed in distribution. The size of the fruit is perhaps the most apparent distinction between the two forms. In addition to *P. pulcher* Tuckerm, *P. amplifolius* Tuckerm is also without doubt a member of the state flora.

*P. praelongus* Wulf. Cedar Lake, Lake Co., Ind., Feb. 27, 1882. (E. J. Hill.) This well marked form should be more generally found in the northern counties of the State. The region is fairly within the range of the plant and the conditions for its occurrence are good. It has, however, been reported from no other locality, so far as I have knowledge.

*P. Robbinsii* Oakes. "Cedar Lake, Lake Co., Ind., June 30, 1886." (E. J. Hill.) This is another interesting northern form added to the Indiana flora as a result of Mr. Hill's indefatigable work. (Man. 6th edn. 735c.)

In the specimen sent the Survey by Mr. Hill, both fruit and flowers are absent. From this specimen standing alone, I would refer the form to *P. marinus* L., since the leaf and stem characters do not conform to the description of *P. Robbinsii*. My very high appreciation, however, of the skill and acuteness of Mr. Hill lead me to include the form *P. Robbinsii* Oakes, and also to add the species *P. marinus* L.

I am inclined to believe that a more careful study of the plants of our marsh and lake regions would result in the extension of the range of many forms in this and allied groups.

*Eriocaulon septangulare* Withering. "Sandy borders of ponds, Laporte, Ind., July 22, 1875. Scapes 6-8 striate." (E. J. Hill.) The addition of Indiana to the assigned range of this plant in the 6th edition of Gray's Manual was based

upon the collection of Mr. Hill. During the last summer Mr. Van Gorder collected it in Noble County, and Mr. Bradner includes in catalogue of the Flora of Steuben County (17th Report of State Geologist, p. 156), with the statement, "badly named, as the scape frequently has eight striae." The Hill collection is of the normal size from 2-6 inches high, while that of Van Gorder shows specimens from 1-2 feet high, having been submersed.

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DISTRIBUTION OF THE ORCHIDACEÆ IN INDIANA. By Alida M. Cunningham.

The family of Orchidaceæ, as shown by the reports and specimens examined, is represented in the State by twelve genera and thirty-seven species.

*Microstylis monophyllos* Lindl., according to the 6th edition of Gray's Manual, is found growing in cold swamps in northern Indiana. It is also reported from the "Knob" region by Dr. J. M. Coulter. No specimen was examined.

*Microstylis ophioglossoides* Nutt., has been reported from Monroe by W. S. Blatchley, whose determination is verified by specimens in the DePauw Herbarium. One specimen of this species has been reported from Noble by W. B. Van Gorder and has been examined.

*Liparis liliifolia* Richard, occurs in the southern and central portions of the State. It is reported as rare in Franklin by O. M. Meyncke, but common in rich, shady woods in Gibson and Posey by Dr. Schneck. No specimens of this form have been examined.

*Liparis Laselii* Richard, grows in extreme northern counties. Specimens from Lake by E. J. Hill and from Noble by W. B. Van Gorder were studied. Mr. Van Gorder states that it is very rare in that region and grows in tamarack marshes.

*Aplectrum hiemale* Nutt., is reported from the following counties: Clark, Jefferson and Franklin in the southeast; Gibson and Posey in the southwest; Putnam in the central; Noble and Steuben in the north. The State catalogue includes the species, referring it to Tippecanoe, but gives no authority for its inclusion. Specimens from Clark and Noble were the only ones studied.

*Corallorhiza* is represented in the State by three species—*innata*, *odontorhiza* and *multiflora*.

*C. innata* R. Brown. No Indiana specimen of this species was examined. It is reported, however, from the "knob" region by Dr. Clapp.