

## PRESIDENT'S ADDRESS.

FLORA OF INDIANA: ON THE DISTRIBUTION OF THE FERNS,  
FERN ALLIES AND FLOWERING PLANTS.

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The origin of our flora has been comprehensively discussed by Gleason (1). A summary of the knowledge of the distribution of the plants existing in Indiana on the advent of the white man, shows that it is very incomplete. The acquisition of additional data is rendered difficult or impossible, because 90 per cent of our area has been cleared. The original distribution of any species in Indiana can now be approximated only. The composition of our flora a few centuries hence can be only conjectured. No doubt several of our native species have already disappeared, and many more are doomed to extinction, because destructive agencies such as the cow and hog, ax and plow, and the steam dredge are ever busy.

The number of foreign plants, becoming members of our flora, is steadily increasing. The first catalogue of the plants of Indiana (2), published in 1881, listed many introduced plants, of which I am regarding 126 as members of our flora. We now have 209 introduced plants which are members of our flora, an increase of 83 in 43 years.

It is doubtful if the botanical workers of the past hundred years have left us more than ten thousand specimens from which a record of the distribution of the plant life of the state can be made. These, with my own collection, are far too few when we consider the pace at which our flora is disappearing. Already the opportunity for obtaining data on the plant life of our prairie has gone. The opportunity for making a record of the original plant life of the barrens of Indiana has forever passed. The opportunity for acquiring a complete knowledge of the dune and lake flora is rapidly disappearing. When we motor over our improved highways among the fields of our alluvial bottoms, if we pause long enough to think, we will realize that the once virgin forest with its numerous native plants has disappeared forever.

The knowledge of the distribution of our plants pertains mostly to the localities of our enthusiastic botanists and their chosen collecting fields. No comprehensive published record of the plants of a restricted area within the state was made before 1871, when Young (3) published a catalogue of the plants of Jefferson County in which he listed 609 species. In 1875 this list was followed by another of the same county by J. M. Coulter (4) who listed 716 species. In 1876 Dr. J. Schneck (5) published a list of the plants of the lower Wabash Valley below the mouth of White River in which he listed 1,043 species. In 1878 Charles R. Barnes (6) published a list of the plants of Jefferson County in which he listed 687 species and 38 varieties. In 1878 Baird and Taylor (7) published a list of the plants of Clark County in which they listed 791

species and 25 varieties. In 1883 Dr. A. J. Phinney (8) published a flora of central-eastern Indiana in which he listed 720 species as occurring in Delaware County. In 1885-86 O. M. Meyneke (9) published a list of the plants of Franklin County in which he recorded 601 species and 28 varieties. In 1891 Higley and Raddin (10) published a flora of Cook County, Illinois, and a part of Lake County, Indiana, in which they listed 1,322 species. In 1892 E. Bradner (11) published a list of the plants of Steuben County in which he listed 729 species. In 1894 W. E. Van Gorder (12) published a flora of Noble County in which he listed 724 species. In 1887 W. S. Blatchley deposited in the library of Indiana University a manuscript copy of the flora of Monroe County in which he listed 681 species. In 1897 W. S. Blatchley (13) published a catalogue of the plants of Vigo County in which he listed 853 species. In 1902 Howard Walton Clark (14) published a list of the plants of Eagle Lake and vicinity in which he listed 578 species. In 1920 the same writer (15) published a flora of Lake Maxinkuckee and vicinity in which he listed 838 species. In 1924 Mrs. Eileen Whitehead Erlanson (16) published a list of plants collected by E. J. Grimes in which she listed 639 species from Putnam County. In addition to these, partial floras of several counties have been published, but none exceed 500 species. One of the most interesting and valuable lists of the plants of a small area is a manuscript list of the plants found within 20 miles of New Albany on the north side of the Ohio River, collected by Dr. A. Clapp. He compiled this list between 1836 and 1848 and it numbers 908 species. This is the only list we have which covers the barrens and "knobs" of Indiana. This list is in my library, and its accuracy and painstaking thoroughness justify its publication. It is to be noted that we have no list of the plants from the prairie areas of the state.

It is not the purpose of this paper to enter into a discussion of the many factors which influence the distribution of plants, or to postulate one or more factors which limit the distribution of the species of plants found in Indiana. My purpose is to assemble and record data which I hope will be helpful in making known the distribution of our flora. As is well known, the principal factors controlling the distribution of plants are soil, light, heat, moisture and other climatic agencies. Some data relative to these factors follow.

**Location of Indiana.** Indiana is located between 84° 49' and 88° 2' west longitude and 37° 47' and 41° 50' north latitude. Its extreme length from north to south is 275 miles, and its average width north of Madison is about 143 miles. It contains 36,045 square miles of land, 280 square miles of lakes and rivers, and 230 square miles of Lake Michigan.

**Topography.** The whole of the state was glaciated except about one-sixth which lies in the south central part. The unglaciated part is hilly. These hills have sloping sides and rarely have cliffs. The cliffs, except long the largest streams, are from 10 to 100 feet high. Most of the hills rise from 50 to 200 feet above their subtending basins, except along the principal rivers, where their height may be 400 feet and in one place 600 feet. The glaciated part is mostly level or un-

dulating, except in the northeastern part of the state, where there are a few hills, and along the southern glacial boundary, where it is more or less hilly. The northern third of the state contains many small and several large lakes. The western part has extensions of the western prairie.

**Soils.** Our soils may be classed as residual, alluvial and drift. The residual soil is found in the unglaciated part of the state, and was formed by the weathering of the rocks of the locality. Residual soils may be further divided into limestone, sandstone and knobstone soils. The sandstone soil is very limited, being restricted to a narrow strip of sandstone outcropping between Benton County and the southern part of Perry County, and to a few spots in the counties to the east and west of this strip. This soil and a somewhat similar soil on top of the "knobs" has several plants which are not found elsewhere in the state. Among these are *Polypodium virginianum*, *Thelypteris marginalis*, *Tsuga canadensis*, *Quercus Prinus*, *Kalmia latifolia* and *Solidago erecta*. It also supports many heaths which again appear in the silicious soil of the north. The drift soil covers the glaciated part of the state and varies from clay to black loam and fine sand, and contains our beds of peat. The peat and fine sands have some plants peculiar to them. The alluvial soil is confined to the lowlands of our streams. This soil contains no plants peculiar to it, except in the lower Wabash Valley, and here the soil in itself is not the limiting factor.

**Drainage.** About nine-tenths of Indiana drains southwestward into the Mississippi River through the Wabash, Ohio and Kankakee Rivers. The remainder drains into the St. Lawrence Basin through the St. Joseph, Calumet and Maumee rivers.

**Climate.** Indiana has a variable climate. All parts at times experience a temperature as low as 20° F. below zero, and in rare instances as low as 25° below zero, or a few degrees lower, in a few localities. Usually the period of extremely low temperature is for a few hours only. Temperatures as high as 100° above zero occur nearly every year in some places in the state. Rarely does it exceed 105°. The mean temperature for the state is about 52°. The daily range is usually less than 25°, being about 14 in winter and about 20 in summer. The dates of the last killing frosts are as follows: April 15 in the southwestern; April 20 in the southern; April 25 in the central; and May 5 in the northeastern part of the state. Sometimes killing frosts occur as late as June 1 in the northern part. The average date of the first killing frost in the northern half of the state is October 5; for the southern half October 15; and for the southwestern corner October 20. Rarely does a frost affect the whole of the state as early as September 20. The earliest killing frost recorded for the southern part is September 25. The growing season averages 160 days for the northern half and 180 days for the southern half, while the extreme southwestern part averages about 200 days. The average mean temperature is from about 49° along Lake Michigan to 56° in the extreme southwestern part. The average annual precipitation for the state is about 40 inches, that

of the northern part about 38 inches, and that of the southwestern part about 42 inches. The precipitation is fairly well distributed throughout the year, although a little more than half falls during the warmer six months. The average humidity of the air of the state is about 70 per cent during the day. The average number of hours of sunshine for the state is about 2,800; the minimum of 2,500 is in the northeastern part, and the maximum of 2,850 is in the southwestern part. In summer the sky is clear about 70 per cent of the time. The average wind velocity is about eight miles per hour, and a gale of 40 miles per hour is rare. In the summer the prevailing wind is from the southwest, and in the winter from the northwest.

**Life Zones.** The present knowledge of plant distribution shows that many plants, whose mass distribution lies outside of Indiana, have migrated into the state from different directions and have reached a limit of their distribution somewhere in Indiana. However, a more intensive study of the flora of Indiana and surrounding states may extend the range of some of these species beyond our borders. At present we can only approximate the plant zones of Indiana on account of the imperfect knowledge of our flora. I would draw the south line of the Transition Life Zone from Morocco, Newton County, southeastward to Cicott in Cass County, thence northeastward along Eel River to Fort Wayne and then eastward. The south line of the Upper Austral Zone I would begin near Terre Haute, Vigo County, and continue southeastward to Paoli, and thence eastward to Lawrenceburg. This gives the greater part of Indiana to the Upper Austral Zone. The size of this area has the same ratio to the entire area of the state that the number of plants found in this area has to the entire flora of the state. The number of species occurring in the Transitional Zone corresponds likewise to its area, and the number of species occurring in the Lower Austral Zone corresponds to its area.

#### BOTANICAL AREAS AND HABITATS.

The flora of Indiana as a whole is that of a mesophytic deciduous forest. Within it are several areas with distinctive floras. Their location and a discussion of them follow.

**Dunes Area.** The dunes area lies south of Lake Michigan and north of the Little Calumet River and the Michigan Central Railroad. It contains the dunes and sloughs along Lake Michigan. The soil of the dunes ranges from fine sands to a muck. This area has not less than 25 species that are peculiar to it. In addition to this area, there are miniature dunes along Pigeon River in Lagrange County, and sandy knolls with soil similar to that of the dunes in many of the northwestern counties. There are also stretches along the Tippecanoe River, and at the outlet of preglacial Lake Maumee south of Fort Wayne, with similar soils. All of these last named places have one or more plants typical of the dunes area.

It is to be noted that the following plants in the dunes area have taken on a pubescence sufficient to entitle them to varietal rank: *Prunus*



*virginiana* variety *demissa*, *Ptelea trifolia* variety *Deamiana*, and *Vitis vulpina* variety *syrticola*.

**Kankakee River Basin.** This is a large area, mostly low and level, containing several small prairies, old lake beds and sand hills. The soil is either fine sands, black sandy loam or muck. On the sandy ridges and sand hills, plants are found which are common to the dunes area. These are *Calamovilfa longifolia* and *Cyperus Schweinitzii* (Newton County), and *Aristida tuberosa* (Lake County). In the low ground are other dunes area plants, such as *Psilocarya scirpoides* (Newton), *Salix glaucophylla* (Pulaski), *Hypericum Kalmianum* (Pulaski and Starke), *Ludwigia sphaerocarpa* (Newton and Starke), and *Cornus Baileyi* (Starke). The plants peculiar to this area are the coastal species found here. They are as follows: *Styrax americana*, which is frequent in the low woods, bordering the river in Lake, Newton, Porter and Laporte counties, has not been found elsewhere in Indiana, except in Posey County near the mouth of the Wabash River. *Hypericum adpressum* was found in the sandy lowlands west of Wheatland in Jasper County, which is the only authentic record for Indiana. *Juncus dichotomus*,<sup>1</sup> which was found in this basin in Laporte County, is our only Indiana record. *Mikania scandens* is frequent along the river near Baum bridge between Jasper and Porter counties. It was found also by Blatchley a few miles northwest of this place. This species has also been reported for Putnam and Tippecanoe counties, and for the lower Wabash Valley, but we have no verifying specimens.

**Lake Area.** This area embraces all of northern Indiana, south to Fountain, Grant and Wells counties, except the two preceding areas. In this area are found our boreal plants. There are many distinctive plants in and around the lakes and in the marshes of this area, which are not found elsewhere in the state, except in boggy habitats which may be found south of this area.

**The Prairies.** The prairies of Indiana may be divided into two classes: the wet or marsh, and the bald or dry prairies. The wet prairies were of various sizes. The largest of these were located in Tipton, Clinton, Fountain, Daviess and Knox counties. The exact composition of their flora is not known. While no doubt they contained many marsh plants of the lake area, yet many of the relics along ditches which drain these areas, and the surrounding borders, are of a western and southwestern origin. The bald prairies were dry treeless areas, mostly on our western border, and no doubt had a vegetation similar to that of the western prairie of which they are a part. Some of these prairies are found as far eastward as Lagrange and Steuben counties. These interior treeless areas were sometimes locally known as barrens. It is to be regretted that we have no record of the spring flora and but a scant knowledge of the autumnal flora of our prairies. They are now all under cultivation. A knowledge of their flora must now be obtained from the plants growing along the roadsides and railroads passing through them, which probably have not preserved all the members of the original flora.

<sup>1</sup> Since writing above, determined by the Gray Herbarium as *J. Greenei* O. and T. (Mar. 25, 1925).

**The Lower Wabash Valley.** This is the alluvial bottom land along the Wabash River below Vincennes. These bottoms contain a number of plants of the south and southwest. Among these are *Muhlenbergia glabriflora*, *Leptochloa floribunda*, *Eragrostis hirsuta*, *Cyperus pseudo-vegetus*, *Carex gigantea*, *Aristolochia tomentosa*, *Cocculus carolinus*, *Vitis palmata*, *Hypericum virgatum*, *Ludwigia glandulosa*, and *Adelia acuminata*. The following species found here are also found for a short distance up the Ohio River: *Taxodium distichum*, *Hymenocallis occidentalis*, *Quercus lyrata*, *Calycocarpum Lyoni*, *Trachelospermum difforme*, and *Catalpa speciosa*.

**Unglaciated Area.** This area includes all of the unglaciated area except that part west of a line running north from Troy through Jasper to the White River. This does not include three outposts which are as follows: one on the east in Jefferson County, at Marble Hill; and two in the west, one in Spencer County, known as the Fisher "knobs", and the other in Warrick County, a few miles south of Elberfeld. Most of this area, except the bottoms of White, Muscatatuck, Blue and Patoka rivers, is characterized by high hills. This area is characterized by two species, *Quercus Prinus* and *Cunila origanoides*, which are found on the crest of the highest ridges throughout the area. *Pinus virginiana* is found on top of the "knobs" principally in Floyd and Clark counties. This area contains also a number of rare species not found outside of it, and because of their rare occurrence I am listing them and the counties in which I found them. The following are restricted to the ledges and upper parts of the ridges: *Cheilanthes lanosa* (limestone ledges, Perry), *Smilax Bona-nox* (Crawford, Harrison and Perry), *Hexaletris ophylla* (Harrison), *Galactia volubilis* (Floyd, Harrison and Perry), *Kalmia latifolia* (Clark, Crawford and Perry), *Vaccinium arboreum* (Harrison, Martin and Perry), *Gentiana puberula* (Harrison), *Houstonia angustifolia* (Harrison), *Eupatorium incarnatum* (Perry), *Solidago erecta* (Clark, Crawford, Floyd, Harrison, Perry and Washington), and *Sericocarpus linifolius* (Clark, Crawford, Floyd, Harrison and Perry). The following occur on the lower slopes and in the "flat woods" and are listed because they are restricted to this area. *Isoetes Englemanni* (Crawford, Harrison and Orange), *Panicum yadkinense* (Crawford and Perry), *Crotalaria sagittalis* (Perry), *Tragia macrocarpa* (Crawford, Harrison and Orange), *Rhamnus caroliniana* (Crawford and Harrison), *Passiflora incarnata* (Crawford and Perry), *Oxydendrum arboreum* (Perry), *Bunelia lycioides* (Perry), and *Gentiana villosa* (Harrison). There are quite a number of other species which are characteristic of this area, which are sometimes found outside of it, such as *Agave* and *Gillenia stipulata*.

**The "Flats".** This is the local name for a level area of the Illinoian drift, located principally in Clark, Jefferson, Jennings and Switzerland counties. The soil is a fine whitish clay which carries a large percentage of moisture and gets very hard when dry. This area is very level and has poor drainage, except where dissected by streams. The higher ground is called "high flats" and low ground "low flats". This area has no single species peculiar to it, but it has peculiar plant

associations. The principal woody species of the "low flats" are *Liquidambar*, *Acer rubrum*, *Quercus palustris*, *Carya ovata* and *laciniosa*, *Quercus bicolor* in the north part, *Quercus Michauxii* in the central part, and *Quercus falcata* in the southern part. A relief of from one to five feet changes the composition of the woody species to the "high flat" forest, of which *Fagus grandifolia*, *Quercus alba*, *Liquidambar*, *Nyssa sylvatica*, *Carya ovata*, *Liriodendron*, and *Fraxinus americana* are the principal species. *Paspalum circulare* and *Aristida gracilis* are common along roadsides, in meadows and fallow fields of this area. The flora of the "flats" has not been made a special study and much is yet to be learned of its floristic nature.

**The Barrens.** The so-called barrens of southern Indiana are restricted principally to Harrison County. Collett(17) discusses the origin of the barrens, and says they occupy the valley of a preglacial river which coursed from north to south through the county. He says that this valley was from 8 to 15 miles wide and from 200 to 300 feet deep. He further adds, "It was nearly a typical prairie, exhibiting a few gnarled and 'scotched' shrubs or stools, and covered with a luxuriant growth of tall prairie grass, herbs and vines." Very little is known of the flora of this area. J. M. Coulter(18) made a short botanical excursion there in 1877, and reported quite a number of species. He(19) also remarks, in discussing the Clapp herbarium, "From what are called the 'barrens' the largest display of Ericaceae and Orchidaceae was obtained that I have ever seen from any locality in Indiana." Additional interest is attached to this area on account of the prairie plants found there. Dr. Clapp, who collected there between 1836 and 1848, has left us the following list of plants collected there: *Chamaelirium luteum*, *Melanthium virginicum*, *Aletris farinosa*, *Agave virginica*, *Habenaria ciliaris*, *Habenaria flava*, *Humulus Lupulus*, *Spiraea tomentosa*, *Filipendula rubra*, *Cassia Chamaecrista*, *Baptisia leucantha*, *Polygala Senega*, *Ceanothus americanus*, *Eryngium yuccifolium*, *Polytaenia Nuttallii*, *Gentiana linearis*, *Gentiana quinquefolia*, *Frasera caroliniensis*, *Asclepias tuberosa*, *Veronica virginica*, *Gerardia auriculata*, *Buchnera americana*, *Lobelia Nuttallii*, *Lobelia spicata*, *Liatris scariosa*, *Solidago odora*, *Solidago rigida*, *Aster novae-angliae*, *Silphium terebinthinaceum*, *Brauneria purpurea* and *Prenanthes alba*. Dr. Short(20) in 1840 reported the following: *Aconitum uncinatum*, *Habenaria flava* and *Helianthemum canadense*. Since the work of these pioneer botanists, the original flora of these barrens has become practically extinct. The barrens have either come under cultivation or grown up to a thick stand of trees, principally black and white oak, many of which are about two feet in diameter.

**Cliffs and Ledges.** Indiana has numerous cliffs of various heights along her rivers and creeks, and a few not adjacent to streams. The vertical height of exposed rock ranges from a few feet to over a hundred. Most of the vertical cliffs are dry and have but few pockets of soil, consequently are bare of vegetation or nearly so. A few are kept moist by seepage, and it is on these in Clark, Jefferson and Jennings counties that *Sullivantia Sullivanti* is found. There are four species whose dis-

tribution is restricted to dry vertical cliffs. These are *Pellaea atropurpurea*, which I have collected in Crawford, Harrison, Jefferson, Lawrence, Orange and Perry counties; *Pellaea glabella* in Cass, Clark, Decatur, Jefferson, Jennings, Monroe and Warren counties; and *Lycopodium porophyllum* in Crawford and Martin counties. I have collected the following species on the sides of the cliffs and on the detached rocks at their bases: *Polypodium polypodioides* in Crawford, Martin and Perry counties, and saw it once in Posey County, growing on a live burr oak; *Asplenium Ruta-muraria* in Jefferson County; *Asplenium Trichomanes* in Crawford, Dubois, Martin, Parke, Perry and Putnam counties; *Camptosorus rhizophyllus* in Clark, Crawford, Decatur, Fountain, Gibson, Harrison, Jefferson, Jennings, Lawrence, Martin, Monroe, Montgomery, Owen, Parke, Perry, Ripley, Spencer, Warren, Washington and Wayne counties; *Heuchera macrorhiza* in Clark, Crawford and Harrison counties; *Heuchera parviflora* in Crawford and Perry counties. I have collected *Cheilanthes lanosa* in Perry County on the exposed ledges at the top of cliffs only; *Sedum telephioides* in Harrison County on the top and ledges near the top of high cliffs; *Melica nitens* in Clark and Harrison counties on the tops, ledges and in talus of high cliffs; and *Polypodium virginianum* mostly on the tops of cliffs, sometimes on ledges and detached rocks at the base of the cliffs in Clay, Crawford, Fountain, Martin, Montgomery, Owen, Parke, Perry, Putnam and Warren counties.

**Sink-holes and Artificial Pools.** In the unglaciated area we have numerous sink-holes, varying in area from a few square rods to an acre or more. Also in this area and eastward in the "flats", we have small artificial pools made for watering stock. I have never made a study of these habitats, but I am convinced that they offer a splendid opportunity for a study of plant migration. The sink-holes may or may not retain water throughout the year. I have never seen a sink-hole, surrounded by thick woods, of a larger area than about one-eighth of an acre, and none of them of this size contained aquatic plants. I attribute this to the fact that no free soil is washed into them to neutralize the bog character of the water which is caused by the decay of the vegetation blown into them. The sink-holes in cleared fields where fresh soil is continually washed into them, are surrounded by vegetation and usually contain some aquatic plants. It is to be noted that *Lophotocarpus calycinus* is common in the sink-holes and artificial pools from Monroe and Franklin counties southward. Plants found in these, which are rare in the state, are *Glyceria acutiflora* found in a pool in Harrison County, being the only Indiana record; *Sagittaria graminea* in a pool in Harrison County; and *Eleocharis nutata* in a sink-hole in Harrison County.

#### DIRECTION OF THE MASS DISTRIBUTION OF OUR FLORA.

The number of plants found in a state depends largely upon the intensity with which they are sought. For Indiana there have been 2,397 species reported, of which I exclude 417. Of those admitted, 209 species have been introduced into the state, leaving 1,771 native species.



Schaffner(21) reported for Ohio, 1,622 native species and 459 introduced species. Many of the plants introduced into Ohio have also been introduced into Indiana, but I have not regarded them as members of our flora. I have excluded 280 species from our flora that are native to the United States, because their ranges are beyond our area or because we have no verifying specimens. Of the 417 excluded species, 133 have been introduced, but are not regarded as yet established. I do not regard a plant as a member of our flora that has been reported but once or twice as an escape. All escapes should be reported, but should not be recognized as a part of our flora until they have shown their ability to persist. A great many of our garden plants were reported by the early botanists. In those days these escaped more readily than now, because the by-ways and waste places were not covered with grass and other vegetation as they are today. During the World War many European species were introduced in the cheap grass seed with which the country was flooded. I recall seeing a clover field in Lagrange County that was so full of *Viola arvensis* that I first thought the owner was growing this violet for some seed firm. The following year the field was planted to corn and the violet disappeared. Nearby I saw a field that was so blue with *Echium vulgare* that it hid the clover with which the field was planted. The next year this field was planted to corn and at the end of the season no trace of this species was to be found except a few plants along the roadside. This place was observed again this year and I did not see a single plant of this species. I admit this species to our flora because I have collected it in various parts of the state, in woods pastures and along railroads. We have some rather recently introduced plants which steadily gain ground and hold it. Prominent among these may be mentioned *Bromus japonicus*, *Bromus tectorum*, *Hordeum jubatum*, *Lepidium campestre*, *Melilotus alba*, *Lespedeza striata*, *Daucus Carota* and *Galinsoga ciliata*.

I have classified our flora on the basis of the direction from which the species migrated into the state. In making the tabulation I have counted a species as occurring throughout Indiana if it occurs in southern Michigan, in Indiana and south of Indiana in habitats similar to those occurring in Indiana. Quite a few of our boreal plants occur only in our lake region but appear again in the mountains south of Indiana. These have been tabulated as of northern distribution, and not as occurring throughout the state. Species have been regarded as southern if they do not extend northward into Michigan; western, if they do not occur as far east as Ohio; eastern, if they do not extend into Illinois; southeastern, if the mass distribution is southeastern and they do not extend beyond Indiana. Species in other directions have been tabulated likewise. Of the 1,771 native species, 1,062 are found throughout the state. The following are rare or local, but their range includes the entire state.<sup>1</sup>

\**Botrychium simplex*. A doubtful record for Lake County. No specimen seen.

<sup>1</sup>The nomenclature for the most part is that of Gray's Manual, 7th edition. All county records by Deam are vouched for by a specimen in the Deam herbarium.

\*I have accepted species as members of our flora without verifying specimens, if reported upon good authority, and if their range includes Indiana.

- Tripsacum dactyloides*. Lower Wabash Valley (Schneck). No specimen.  
*Glyceria Torreyana*. Central-eastern Ind. (Phinney); Noble (Van Gorder).  
*Pogonia verticillata*. Reported for Jefferson and Monroe; Clark (Deam).  
*Chrysoplemium americanum*. Marshall (Clark); Porter (Deam); St. Joseph (Nieuwl.).  
*Lespedeza Sturvei*. Posey (Deam).  
*Napaea dioica*. Carroll (J. M. Coulter); Tippecanoe (Cunningham); Parke and Tippecanoe (Deam).  
*Zizia cordata*. Harrison (Deam); Steuben (Bradner).  
*Buchnera americana*. Harrison (Clapp); Lake (Deam, and Babcock).

Plants with a northern range, which reach a southern limit in Indiana, number 293. Some of the rare ones are as follows:

- Equisetum variegatum*. Lake (Hill, and Deam).  
*Thuya occidentalis*. Lake (Hill, and Deam); Porter (Deam).  
*Panicum boreale*. Lake (Hill, and Umbach).  
*Panicum Liebergii*. Lagrange (Deam); Tippecanoe (Dorner).  
*Panicum scoparioides*. Lake (Umbach).  
*Panicum subvillosum*. Lake (Bebb).  
*Oryzopsis asperifolia*. Laporte (Deam).  
*Poa paludigenia*. Lagrange (Deam).  
*Scirpus pauciflorus*. Lagrange (Deam); Lake (Higley & Raddin).  
*Eriophorum callitrix*. Dekalb (Deam); Steuben (Bradner).  
*Carex Bebbii*. Marshall (Clark); Noble (Deam).  
*Carex chondrorhiza*. Kosciusko and Whitley (Deam).  
*Carex folliculata*. Laporte and Porter (Deam); Laporte (Smith).  
*Carex projecta*. Hendricks (Mrs. Chas. C. Deam); Marion (Deam).  
*Carex Richardsonii*. Lake (Higley & Raddin).  
*Carex trisperma*. Kosciusko, Lagrange and Porter (Deam).  
*Calla palustris*. Noble (VanGorder).  
*Juncus articulatus*. Lake (Hill).  
*Luzula saltuensis*. Putnam (MacDougal); St. Joseph (Nieuwland).  
*Smilicina trifolia*. Lake (Higley & Raddin).  
*Habenaria Hookeri*. Lake (Higley & Raddin); Noble (VanGorder).  
*Habenaria orbiculata*. Noble (VanGorder).  
*Nymphozanthus variegatus*. Lake (Shull); Lake and Noble (Deam).  
*Geum rivale*. Lagrange (Deam); Laporte (Hill); Noble (VanGorder).  
*Geranium Bicknellii*. Lake and Starke (Deam).  
*Ceanothus ovatus*. Lake (Hill). See Deam's Shrubs of Indiana, p. 199.  
*Myosotis laxa*. Porter (Hill and Deam).  
*Galium labradoricum*. Kosciusko, Lagrange, Laporte, Marshall, Noble, Porter (Deam).  
*Lonicera canadensis*. Laporte (Deam).  
*Gnaphalium decurrens*. St. Joseph (Deam); Steuben (Bradner).

The next greatest number of our plants come from the south. They number 270, and 25 of the rarest are here listed.

- Cheilanthes lanosa*. Perry (Deam).  
*Isoetes Engelmannii*. Crawford, Harrison and Orange (Deam).

*Paspalum laeviglume*. Knox (Deam).  
*Panicum yadkinense*. Crawford and Perry (Deam).  
*Leptochloa floribunda*. Posey (Deam).  
*Eragrostis capillaris*. Harrison (Deam).  
*Cyperus pseudovegetus*. Posey (Deam).  
*Scleria oligantha*. Crawford and Perry (Deam).  
*Carex picta*. Monroe (Blatchley); Brown, Bartholomew, Monroe, Lawrence, Morgan and Owen (Deam).  
*Hymenocallis occidentalis*. Posey and Spencer (Deam).  
*Hexalectris aphylla*. Crawford (Blatchley); (Harrison (Deam)).  
*Salix longipes*. Perry (Deam).  
*Leavenworthia uniflora*. Clark (Baird & Taylor, Barnes, and Deam).  
*Heuchera macrorhiza*. Clark, Crawford and Harrison (Deam).  
*Heuchera parviflora*. Crawford and Perry (Deam).  
*Crotalaria sagittalis*. Perry (Deam).  
*Passiflora incarnata*. Harrison and Perry (Deam); also seen in Crawford.  
*Rhexia mariana*. Spencer (Deam).  
*Jussiaea decurrens*. Floyd (Clapp); Posey & Spencer (Deam).  
*Oxydendrum arboreum*. Perry (Deam).  
*Vaccinium arboreum*. Harrison, Martin and Perry (Deam).  
*Bumelia lycioides*. Perry (Deam).  
*Spigelia marilandica*. Posey (Deam); Marion (?), probably an error.  
*Trachelospermum difforme*. Posey and Warrick (Deam).  
*Eupatorium incarnatum*. Perry (Deam).

We have 31 species whose distribution is to our southwest. Ten of the rarest of these are as follows:

*Aristida intermedia*. Lake (Deam, Hill, and Umbach).  
*Muhlenbergia glabriflora*. Posey (Deam).  
*Sporobolus canovirens*. Elkhart, Knox and Sullivan (Deam).  
*Cocculus carolinus*. Knox, Gibson and Posey (Deam, and Schenck); Perry (Deam); Posey (Ridway).  
*Calyocarpum Lyoni*. Perry, Posey and Spencer (Deam).  
*Vitis palmata*. Knox, Gibson, and Posey (Deam, and Schneck).  
*Eulopus americanus*. Lower Wabash Valley (Schneck); Vigo (Blatchley).  
*Polytaenia Nuttallii*. Floyd (Clapp); Jasper and Laporte (Deam).  
*Houstonia angustifolia*. Harrison (Deam).

Plants entering our area from the west number 56, and only about a dozen of them can be regarded as frequent to common in the area of the state in which they are found. I list ten of the rarest ones.

*Poa Wolfii*. Jay (Deam).  
*Cyperus acuminatus*. Crawford and Greene (Deam).  
*Eleocharis Wolfii*. Jefferson (Deam).  
*Rosa suffulta*. Tipton (Deam).  
*Bacopa rotundifolia*. Orange, Warrick and Washington (Deam).  
*Plantago Purshii*. Newton and Pulaski (Deam).

*Aster Drummondii*. Putnam (Grimes); Tippecanoe (Deam); Vigo (Blatchley).

*Aster furcatus*. Tippecanoe (Dorner); Warren (Deam); White (Heimlich).

*Iva ciliata*. Posey (Deam).

*Helianthus annuus*. Vermillion (Deam). Native here in a prairie habitat.

Plants with their mass distribution to the east of us number only 21. The following may be of interest.

*Sphenopholis nitida*. Eastern Indiana.

*Eleocharis Robbinsii*. Porter (Hill); Steuben (Deam).

*Carex alata*. Northern Indiana.

*Carex abscondita*. Southern Indiana.

*Carex styloflexa*. Eastern Indiana.

*Geum flavum*. Eastern Indiana.

*Rubus odoratus*. Morgan (Blatchley); Jackson, Lawrence and Morgan (Deam).

*Cassia marilandica*. Throughout, except the northwestern counties.

*Cornus Amomum*. Jefferson (Deam).

*Sericocarpus linifolius*. Clark, Crawford, Floyd, Harrison and Perry (Deam).

We have but two plants we can consider as southeastern. These are *Pinus virginiana* which is restricted almost entirely to the "knobs" of Clark and Floyd counties; and *Viola emarginata* from Laporte County. The violet record is based on my number 6,439, and was determined by Ezra Brainerd, but I believe it should be referred to some other species.

Plants assigned to the northeast number six and are as follows:

*Carex alopecoidea*, *Carex umbellata*, *Maianthemum canadense* (typical), *Betula populifolia*, *Polygonum Carey* and *Bartonia iodandra*.

The following are Atlantic Coast species which are found along or near Lake Michigan.

*Panicum albermarlense*. Porter (Hill).

*Panicum debile* (*P. auburne*). Porter (Hill).

*Panicum lucidulum*. Porter (Umbach).

*Panicum spretum*. Lake (Pepoon); Laporte (Hill); Porter (Umbach).

*Ammophila breviligulata*. Along the beach in all counties along the lake.

*Psilocarya nitens*. Porter (Hill, and Umbach).

*Psilocarya scirpoides*. Porter (Hill and Umbach); Laporte and Starke (Deam).

*Sclevia reticularis*. Porter (Deam, Hill, and Umbach); Laporte and Newton (Deam).

*Carex tonsa*. Lake, Laporte and Porter (Deam).

*Juncus Greenei*. Kankakee Valley in Laporte County (Deam).

*Juncus Greenii*. Lake (Hill).

*Polygonella articulata*. Dunes bordering the lake in all counties.

*Cakile edentula*. Beach along the lake in all counties.

*Euphorbia polygonifolia*. Beach along the lake in all counties.



I have placed the following five plants as coming from the northwest.

- Stipa spartea*. Northwestern Indiana.
- Maianthemum canadense* var. *interius*. Northwestern Indiana.
- Quercus ellipsoidalis*. Lake and Porter (Hill).
- Talium rugospermum*. Lake (Holzinger).
- Valeriana edulis*. Cass (Hessler); Marshall (Clark, Deam, and Hessler).

We have five endemics which are as follows:

*Quercus Deamii*. Wells (L. A. & E. B. Williamson). Known only from type tree.

(To preserve this tree, a small tract of land on which the tree stands was bought and presented to the state and dedicated to this tree.)

*Ranunculus cymbalistes*. Floyd (Deam). Known only from type locality.

*Rudbeckia Deamii*. Carroll (Deam). Known only from type locality.

*Viburnum pubescens* var. *Deamii*. Southeastern Indiana (Deam).

*Viburnum pubescens* var. *indianense*. Southern Indiana (Deam).

The last two no doubt have a much wider range to the south and east.

We have nine species introduced from the southern and western states. The following have become obnoxious weeds: *Hordeum pusillus*, and *Amaranthus blitoides*.

We have 200 species introduced from foreign countries. Many of these have become obnoxious weeds and are too well known to need discussion.

The following is a summary of the Indiana flora:

Plants found throughout the state.....	1,062
Plants from the north.....	293
Plants from the south.....	270
Plants from the west.....	56
Plants from the southwest.....	30
Plants from the east.....	21
Atlantic Coast species.....	21
Plants from the northeast.....	6
Plants from the northwest.....	5
Endemics .....	5
Plants from the southeast.....	2
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Total of native plants.....	1,771
Plants introduced from Europe.....	156
Plants introduced from Asia.....	17
Plants introduced from the tropics.....	15
Plants introduced that are Eurasian.....	12
Plants introduced from the southern and western states.....	9
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Total of introduced plants admitted to our flora.....	209
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Total of recognized plants for Indiana.....	1,980

Recognized plant varieties listed for Indiana, not included in the above .....	124
Native plants excluded.....	280
Introduced plants excluded.....	133
Cultigens excluded .....	4
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Total of excluded species.....	417

On account of the uncertainty of plant hybrids reported I am not listing them, nor the few plant forms reported. It is to be noted that 61 species of our flora are found only along Lake Michigan or near to it. Our flora will be continually increased by introduced plants. Many of the 124 varieties reported will be raised to the rank of species, and we possibly have 100 native species not yet discovered.

In conclusion I would make a plea for an immediate and intensive study of our flora. I would importune teachers of botany in our schools, colleges and universities to interest themselves in this work. In addition to the field work they themselves can do, they should influence students to make local collections and deposit them in our larger herbaria as material for compiling a history of our plant life. I would not push taxonomic botany ahead of other branches of botany, but morphology, physiology and cytology of plants can be studied a thousand years from now. On the other hand, a study of our plants and their distribution must be made soon or never.

Further I would urge, that the state purchase tracts in our botanical areas and preserve them as laboratories for the study of our native fauna and flora. I would especially urge that some lake, with its surrounding native flora, which should include a tamarack bog, be preserved. This should be done at once, because grazing and summer resorts have already destroyed much of our native lake flora. This generation has no idea how much these areas will be worth to scientific workers of the future, and we should present them these areas as a gratuity, if not from a sense of moral obligation. The total cost of such wild life laboratories would not equal the cost of a mile of concrete road, and their educational and economic value will more than justify the expense.

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