A PRELIMINARY SURVEY OF PLANT DISTRIBUTION IN OHIO.*

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The following data are presented as a preliminary basis for field work in determining the natural plant areas of Ohio. It is hoped that the botanists of the State will begin active study of local conditions with a view to determine natural or transition boundaries as well as cataloging local associations. The distribution lists are based on herbarium material and more than 15 years of sporadic botanizing in the state. Of course, distribution at present indicates to a considerable extent merely the distribution of enthusiastic botanists and their favorite collecting grounds. Nevertheless, enough has been done to indicate in a rough way the general character of our plant geography.

The kind of data most important in indicating characteristic areas are as follows:—

1. Meteorological data.
2. Geology, including the nature of the surface rock and soil.
3. Physiography and topography.
4. The actual distribution of characteristic species of plants and to some extent of animals.

In Ohio, the following important maps may be studied in this connection:—

Meteorology.
By Otto E. Jennings in Ohio Naturalist 3: 339-345, 403-409, 1903. Maps I-XII.

Geology.

Topography.
The maps of the topographic survey, not yet completed. Various geological reports.

The eastern half of Ohio is a part of the Alleghany Plateau. The western half belongs to the great interior plain. In Ohio, the Alleghany Plateau consists of a northern glaciated region and a southern non-glaciated region. The latter apparently again divides into an eastern and western plant area.

The interior plain consists of a southern glaciated calcareous region up to the Ohio River—Lake Erie water shed, and north of this of the very flat Great Black Swamp region and its margin. The northwestern corner apparently has a characteristic flora differing in many respects from the Black swamp area, and is probably to be regarded as a distinct region mostly beyond our borders.

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The region of Sandusky Bay and the islands is peculiar in many respects, being a meeting place of many species. The Sandusky area is apparently a biological island containing numerous species heretofore not discovered in any other part of the state. The Sugar Grove area also contains a number of unusual isolated species but is not so sharply defined as the Sandusky Bay area.

Important Geographic Boundaries in Ohio.

There is a general transition belt between the eastern and western portions of the state, situated between the eastern limit of the Ohio Shale on the one hand and the glacial boundary and the limit of the higher hill country on the other. See Map I. The lake shore may also be considered as a more or less distinct plant area, but such details are not considered in this paper.
According to Merriam, the northeastern part of Ohio belongs to the Transition Zone and all the rest of the state to the Upper Austral Zone.

In map I are indicated some of the more important physiographic lines in Ohio as follows:

a-a, Western boundary of the Alleghany Plateau, following closely the eastern limit of the Ohio Shale.
b-b, The terminal moraine or glacial boundary.
c-c, Lake Erie Ohio River divide.
d-d, North-west beach of glacial Lake Erie; the country beyond this is deeply covered with drift underlain with shale.
e, Edge of the higher hill country.

According to all the data available and the lists of plants given below, Ohio apparently falls into four general regions or areas and for a preliminary survey seven natural plant regions may be recognized. These areas will at present not receive final, distinctive phytogeographic names but be indicated simply by their physiographic character or their geographic position as follows: (See Map II.)

I. Glaciated Alleghany Plateau, belonging to the "Transition Zone."

II. Non-glaciated Alleghany Plateau, eastern division, including most of the Muskingum river basin, and the counties to the east.

III. Non-glaciated Alleghany Plateau, western division, containing the highland between the Muskingum and Scioto.

IV. The Miami Area, mainly a glaciated calareous region.

V. The Great Black Swamp Area and contiguous country.

VI. The Williams County Area.

VII. Sandusky Bay and Lake Erie Islands Area.

The seven areas may be briefly delimited and characterized as follows:

I. The Glaciated Alleghany Plateau has its southern boundary in the terminal moraine and its western boundary at or a little beyond the limits of the Appalachian highland which approaches the eastern line of the Ohio Shale. As stated this area is recognized as a part of the Transition Zone of Merriam. Interesting plants found in this part of the state are:

- Pinus strobus
- Calla palustris
- Xyris flexuosa
- Lysias orbiculata
- Pyrola secunda
- Andromeda polifolia
Others are named in the list given below of "Northeastern and northern plants having a north-eastern distribution in Ohio."

II. The Eastern Division of the non-glaciated Alleghany Plateau extends eastward from an undetermined transition line west of the Muskingum valley. This area apparently lacks the white pine and tamarack present to the north and also the pitch pine and sorrel tree of the rougher highland to the west. The scrub pine is also apparently absent except on the western edge. Isolated localities have Juniperus virginiana and Tsuga canadensis.

III. The Western Division of the non-glaciated Alleghany Plateau included in this area has its western boundary following closely the eastern limit of the Ohio Shale in southern Ohio and the terminal glacial moraine. It is a rugged hilly upland cut by
numerous deep ravines. Pine barrens, mostly consisting of Pinus virginiana are frequent. The distribution of the more important Ohio species, which are mostly if not entirely confined to this area and are rather generally distributed in a considerable part of it are as follows:

Distribution of Nine Species in the Western Part of the Non-glaciated Alleghany Plateau.

Rather Generally Distributed in a Considerable Part of the Area.

Pinus rigida
Pinus virginiana. Extends somewhat beyond.
Aristida dichotoma.
Stylosanthes biflora.
Betula nigra.
Oxydendrum arboreum.
Dasystoma laevigata.
Salvia lyrata.
Solidago erect.
Selanginella rupestris. Gaultheria procumbens. Its southern extension in the State.
Manfreda virginica. Chionanthus virginicus.
Magnolia tripetala. Anisostichus capreolata.
Viola hirsutula. Lobelia puberula.
Viola pedata. Coreopsis major.
Silene rotundifolia. Chrysopsis mariana.
Sullivantia sullivantii. Ionactis linariifolius.
Quercus marilandica. Eupatorium rotundifolium.
Quercus triloba. Eupatorium aromaticum.
Azalea lutea. Rhododendron maximum.
Epigaea repens. Its southern extension in Ohio.

IV. The Miami Area is a glaciated area mainly calcareous. It is drained by the big and little Miami rivers and small tributaries of the Scioto and Ohio. The Ohio-Erie divide may be taken as its northern boundary. Juniperus virginiana is its only conifer with the exception of a few isolated records of hemlock, except in the eastern part where Thuja occidentalis occurs in isolated groups, from Franklin county southward to Adams county. The arborvitae is not known to be native of any other part of the state. Juniperus virginiana, which is the only conifer of general distribution in the central deciduous forest region and the prairie of the United States, is rather common especially toward the southwest. A number of southwestern plants occurring in this area are listed below.

V. The Great Black Swamp Area is a great level tract, including most of northwestern Ohio except the extreme corner. It is drained mainly by the Maumee and Sandusky Rivers. The typical black swamp is characterized by the entire absence of conifers except Larix laricina which occurs on its margins. Originally there were a number of edaphic prairies in this region like the "Big Spring Prairie" in Hancock, Seneca and Wyandot counties.

VI. The Williams County Area may be bounded in Ohio by the ancient Lake Erie beach, extending in a southwesterly direction. It includes also a small part of Fulton and Defiance counties. The surface is generally rolling with marshes and waterbasins, often without natural drainage, presenting the usual features of moraine districts. There are a number of tamarack bogs with the accompanying vegetation. This characteristic area extends westward into Indiana and northward into Michigan and is probably the southern part of the Ann Arbor flora quite distinct from the contiguous Maumee flora.

VII. The Sandusky Bay and Lake Erie Islands Area is a distinctive region where eastern, western, and northern plants meet. In many respects it is an island where isolated species of
plants and animals are common. There are numerous peculiar plant associations on sand hills and prairies and on the lime-stone islands to the north and west of Sandusky Bay. Of interest are fields of Opuntia near Sandusky, the Melibonias of Margaretta Ridge, and the prairie plants south of Lakeside. Stipa spartea is abundant on Cedar Point and such plants as Bearberry (Uva-ursi) and Prunus pumila are represented by a few individuals. The flora of the entire region is probably strongly influenced by the climatic conditions of the Bay. A list of distinctive species is given below.

Northern Plants With Northern Distribution in Ohio.

Botrychium simplex.
Botrychium neglectum.
Matteuccia struthiopteris.
Equisetum variegatum.
Equisetum sylvaticum.
Lycopodium obscurum.
Larix laricina.
Juniperus communis.
Juniperus sibirica.
Taxus canadensis.
Sagittaria cuneata.
Potamogeton amphifolius.
Potamogeton friesi.
Potamogeton robinsonii.
Vallisneria spiralis.
Sparganium simplex.
Cyperus schweinitzii.
Eleocharis ovata.
Scirpus torreyi.
Carex sartwellii.
Carex sicata.
Carex setacea.
Carex diandra.
Carex disperma.
Carex trisperma.
Carex straminea.
Carex communis.
Carex pedunculata.
Carex richardsonii.
Carex aurea.
Carex gracillima.
Carex arctata.
Carex virensens.
Carex buxbaumii.
Carex lacustris.
Carex atherodes.
Carex oederi.
Carex monile.
Carex retrorsa.
Carex lupuliformis.
Panicularia grandis.
Poa debilis.
Koeleria cristata.
Triplasis purpurea.

Beckmannia eruciformis.
Sporobolus cryptandrus.
Calamagrostis canadensis.
Ammophila arenaria.
Lilium philadelphicum.
Vagnerea trifolia.
Juncus alpinus.
Juncus articulatus.
Juncus scirpoides.
Pogonia ophioglossoides.
Coptis trifolia.
Anemone cylindrica.
Actaea rubra.
Sarracenia purpurea.
Capnoides aureum.
Arabis brachycarpa.
Cakile edentula.
Robertiella robertiana.
Chamaesyce polygonifolia.
Hibiscus moscheutos.
Hypericum kalmianum.
Hypericum ellipticum.
Hypericum boreale.
Hypericum majus.
Hypericum canadense.
Tracaulon arifolium.
Persicaria careyi.
Potentilla paradoxa.
Rubus neglectus.
Sorbus scopulina.
Prunus pumila.
Lathyrus maritimus.
Lathyrus ochroleucus.
Lepargyraea canadensis.
Nemophthorus mucronata.
Comptonia peregrina.
Populus balsamifera.
Salix lucida.
Salix adenophylla.
Salix candida.
Salix petiolaris.
Salix bebbiana.
Salix humilis.
Northeastern and Northern Plants Having a Northeastern Distribution in Ohio.

Botrychium lanceolatum.  
Botrychium intermediurn.  
Phegopteris dryopteris.  
Dryopteris clintoniana.  
Dryopteris dilatata.  
Isoletes braunii.  
Isoetes foveolata.  
Lycopodium inundatum.  
Lycopodium clavatum.  
Selaginella apus.  
Pinus strobus.  
Scheuchzeria palustris.  
Potamogeton ephedrus.  
Potamogeton praelongus.  
Potamogeton obtusifolius.  
Calla palustris.  
Erhophorum viridicarinatum.  
Carex deweyana.  
Carex alata.  
Carex flexuosa.  
Carex flava.  
Panicularia canadensis.  
Panicularia torreyana.  
Danthonia compressa.  
Deschampsia flexuosa.  
Miliurn effusum.  
Panicum xanthophysum.  
Lilium umbellatum.  
Trillium undulatum.  
Clintonia borealis.  
Xyris flexuosa.  
Limnorchis hyperborea.  
Lysias orbiculata.  
Lysias hookeriana.

The Plants Having a General Distribution East and South of the State Which Should Have a Southeastern Distribution in Ohio.

Andropogon virginicus.  
Acalypha ostryaefolia.  
Ilex opaca.  
Kalmia latifolia.  
Scutellaria integrifolia.  

Utricularia intermedia.  
Myosotis laxa.  
Lithospermum carolinense.  
Aralia nudicaulis.  
Panax trifolium.  
Galium boreale.  
Viburnum pubescens.  
Campanula rotundifolia.  
Megalodonta beckii.  
Anaphalis margaritacea.  
Antennaria neodioica.  
Solidago hispida.  
Solidago arguta.  
Aster ptarmicoides.  
Hieracium canadense.

Ibidium strictum  
Ibidium plantagineum.  
Trollius laxus.  
Aconitum nolvercoracense.  
Cardamine pratensis.  
Lechea stricta.  
Viola rotundifolia.  
Blitum capitatum.  
Comarum palustre.  
Dalibarda repens.  
Almus incana.  
Grossularia oxyacanthoides.  
Hottonia inflata.  
Pyrola secunda.  
Hypopitys lanuginosa.  
Ledum groenlandicum.  
Azalea viscosa.  
Andromeda polifolia.  
Chiogenes hispidula.  
Menyanthes trifoliata.  
Aralia hispida.  
Conoselium chinense.  
Hydrocotyle americana.  
Cynoxylon canadense.  
Viburnum dentatum.  
Viburnum cassinoides.  
Viburnum alnifolium.  
Lonicera canadensis.  
Lonicera oblongifolia.  
Linnaea americana.  
Solidago squarrosa.  
Aster phlogifolius.  
Doellingeria infirma.
Eastern Plants Having Mostly an Eastern Distribution in Ohio.

Asplenium pinnatifidum.
Asplenium montanum.
Lycopodium complanatum.
Tsuga canadensis.
Clintonia umbellulata.
Cardamine rotundifolia.
Dentaria diphylla.
Linum virginianum.
Viola hastata.
Silene caroliniana.
Rubus odoratus.
Spiraea tomentosa.

Plants Mainly South of the State and Which Should Have a Rather General Southern Distribution in Ohio.

Asplenium resiliens.
Woodia obtusa.
Pinus rigida.
Pinus virginiana.
Aristida dichotoma.
 Panicum bicknellii.
Panicum implicatum.
Panicum boscii.
Manfreda virginica.
Corallorrhiza wisteriana.
Mangolia tripetala.
Delphinium tricorne.
Viorna viorna.
Stylophorum diphylum.
Phyllanthus carolinensis.
Hypericum virgatum.
Viola pedata.
Passiflora lutea.
Sagina decumbens.
Alsine pubera.
Silene rotundifolia.
Amaranthus spinosus.
Porteranthus stipulatus.
Chamaecrista nictitans.
Psoralea onobrychis.
Stylotypium biflorum.
Rhamnus lanceolata.
Rhamnus caroliniana.
Ampelopsis cordata.

Plants of the Southwestern and Western U. S. Which Should Have a Southwestern Ohio Distribution. Such a distribution is at present indicated by specimens.

Polypodium polypodioides.
Hordium nodosum.
Tradescantia pilosa.
Ranunculus micranthus.
 Arenaria patula.
Trifolium stoloniferum.
Lavauxia triloba.
Cuscuta indecora.

Chrysosplenium americanum.
Castanea dentata.
Betula lenta.
Betula lutea.
Kneiffia pumila.
Chimaphila maculata.
Epigaea repens.
Polycodium stamineum.
Galium pilosum.
Vernonia noveboracensis.
Hieracium paniculatum.
Hieracium venosum.

Aesculus octandra.
Liquidambar styraciflua.
Quercus stellata.
Quercus marilandica.
Quercus triloba.
Betula nigra.
Hydrangea arborescens.
Phoradendron flavesens.
Oxydendrum arboreum.
Diospyros virginiana.
Ipomoea lacunosa.
Chionanthus virginica.
Gentiana villosa.
Gonolobus laevis.
Vincetoxicum obliquum.
Anisostichus capreolata.
Trichostema dichotomum.
Scutellaria serrata.
Stachys cordata.
Aralia spinosa.
Houstania purpurea.
Viburnum scabrellum.
Lobelia puberula.
Lobelia leptostachys.
Coneopsis major.
Antennaria solitaria.
Elephantopus carolinianus.
Mesadenia reniformis.
Lactuca villosa.
Plants From the West Which Should Show a General Western Distribution.

- Zanthoxylum americanum
- Gymnocladus dioica
- Valeriana pauciflora

Plants of Distinctly Northwestern Distribution and Which Apparently Have Advanced Into Ohio From the West.

- Stipa spartea
- Chamaesyce serpens

Plants Known Only From the Sandusky Bay Region, Many of Which May Have a Wider Distribution in the State.

- Botrychium simplex
- Juniperus sibirica
- Sagittaria cuneata
- Potamogeton hillii
- Potamogeton friesi
- Potamogeton interruptus
- Sparganium simplex
- Wolffia punctata
- Eleocharis ovata
- Rynchospora cymosa
- Mariscus mariscoides
- Scleria triglomerata
- Scleria pauciflora
- Carex sartwellii
- Carex siccata
- Carex setacea
- Carex disperma
- Carex richardsonii
- Carex atherodes
- Carex oederi
- Melica nitens
- Panicularia pallida
- Poa debilis
- Koeleria cristata
- Ammophila arenaria
- Stipa spartea
- Panicum agrostoides
- Panicum philadelphicum
- Lilium superbum
- Juncus balticus
- Juncus scirpoides
- Capnoisae areum
- Arabis brachycarpa
- Linum medium

Interesting Plants in the Licking, Fairfield, Hocking County Area.

- Selaginella rupestris
- Wolffiella floridiana
- Poa autumnalis
- Stenanthium robustum
- Ilidium beckii
- Viola hirsutia
- Meibomia maulandica
- Epilobium stricturn
- Hypopitys americana

- Azalea lutea
- Rhododendron maximum
- Phlox stolonifera
- Phacelia dubia
- Utricularia minor
- Eupatorium rotundifolium
- Eupatorium aromaticum
- Lactuca sagittifolia