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## THE NATURAL VEGETATION OF OHIO.

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### I. A MAP OF THE VIRGIN FOREST.

#### SOURCES UPON WHICH THE MAP IS BASED.

This map has been prepared by transcribing the species of bearing trees recorded by the original surveyors who traversed the Territory and State of Ohio before the destruction of the virgin forest by the hands of white men.

Surveying of Ohio was begun in July, 1786, (1) under The Geographer of the United States, Thomas Hutchins, employing for the first time his device of sections one mile square. This empirical device was hailed as a great American invention, although the State of Ohio has since been found to possess a curved surface in common with the rest of the earth. All corners which lay within the forest were located with reference to nearby trees, the species of which were noted. These corners becoming permanent, the net result of Hutchin's plan has been the preservation of a systematic record of such great biological value as to redeem its geometrical shortcomings.

Following the death of Hutchins, active surveying seems to have gone slowly until about 1796. The parcels into which the region was divided are shown in the sketch map, Fig. 1. The Virginia Military Bounty was never surveyed systematically, nor have records for the lower portion of the Symmes Purchase been at hand in usable form. Within the United States Military Bounty most townships were surveyed in part only. The portion of the Western Reserve between the Cuyahoga River and the west line of Lorain County was merely reconnoitered at the time of the first survey. The remainder of the Western Reserve, all of the Congress Lands, and the Seven Ranges were surveyed throughout, traverses in the Reserve being limited to township, rather than section lines as elsewhere. The records of the Western Reserve are still in manuscript form in the vaults of the Western Reserve Historical Society at Cleveland. They

form a document of great interest—sufficient, in fact, to have warranted the special publication of that part dealing with the “Firelands” (now Erie and Huron Counties) by the Firelands Pioneer of Norwalk. Records for the Ohio Company’s Pur-

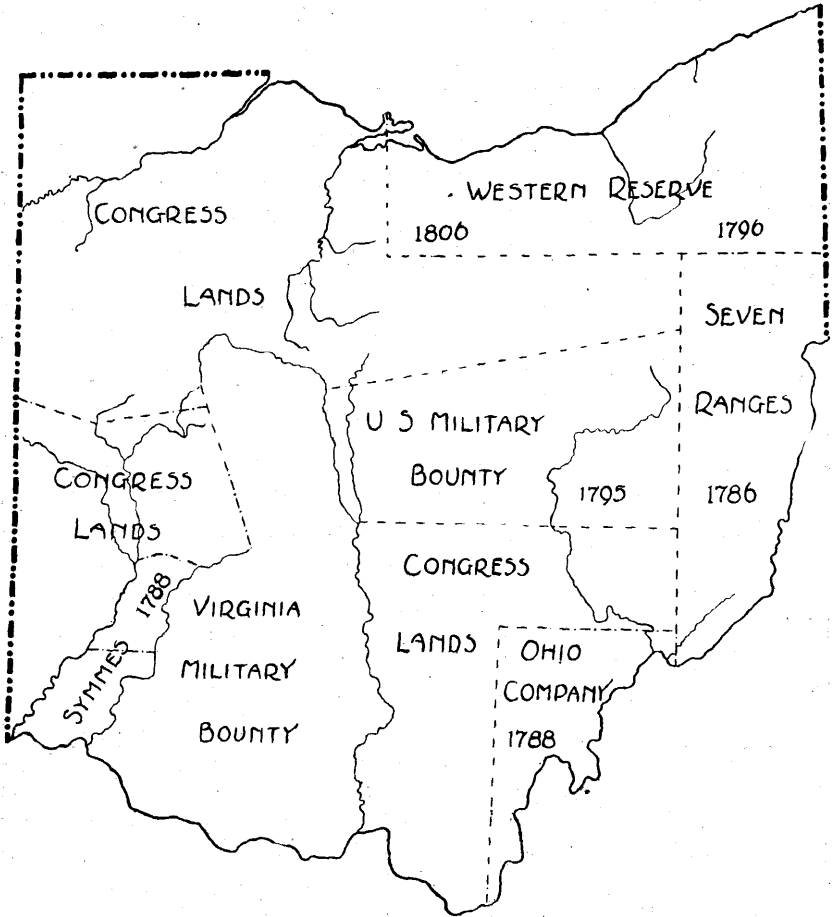


Fig. 1. Ohio Land Parcels.

chase are at Marietta. The remaining field notes are in the office of the Auditor of State at Columbus. Portions dealing with a given county are often copied and the copy filed in the county engineer’s office.

For those districts whose record is lacking or incomplete, it has fortunately been possible to secure considerable information

from county histories, the earlier volumes of the geological survey, journals of travelers, verbal descriptions and other historical sources. Throughout all of the state except the southern and eastern portions the writer has frequently had opportunities to check the historical record against the present field conditions. The technique employed in transcribing and interpreting data has been described earlier, (2).

The writer is indebted to the Trustees of the Emerson McMillan Research Fund of the Ohio Academy of Science, and to Chancellor Samuel Avery, of the University of Nebraska for financial assistance in meeting the expenses of field work. For escape from many errors of judgment he must thank his former colleagues in botany at Ohio State University. Mrs. Marjorie McCutcheon Sears and Miss Helen Nott have helped greatly in transcription, the latter securing data on the Ohio Company's Purchase made available through the courtesy of the librarian of Marietta College.

Many other individuals have been of more than casual service—Captain Henry, of the State Auditor's Office, and Curator Cathcart, of Cleveland, to mention two. Moreover, the ready encouragement of Professor Henry C. Cowles has been invaluable.

#### HOW TO READ THE MAP.

Townships have been selected as convenient units for this map. Some are five, some six miles square, but in any case an effort has been made to generalize the forest type within each township. With few exceptions most townships have been classified as fundamentally "Beech," "Oak," or "Ash"—or various combinations of these types. The sense in which these three terms are employed must be clearly understood. The data at hand are involved, and it is only by being somewhat arbitrary that one can bring them all to rest peaceably upon a map of the present scale. (Fig. 2).

*Beech*, represented by a vertical cross, or plus mark, in most cases consisted of beech and sugar maple. Upon certain old upland flats and thin-soiled patches known as "scalded" or "thin" beech land, the sugar was absent. In typical beech-sugar maple a sprinkling of white ash and red oak was the rule. Unless their numbers were very large, however, no signs for oak and ash have been added in such cases.

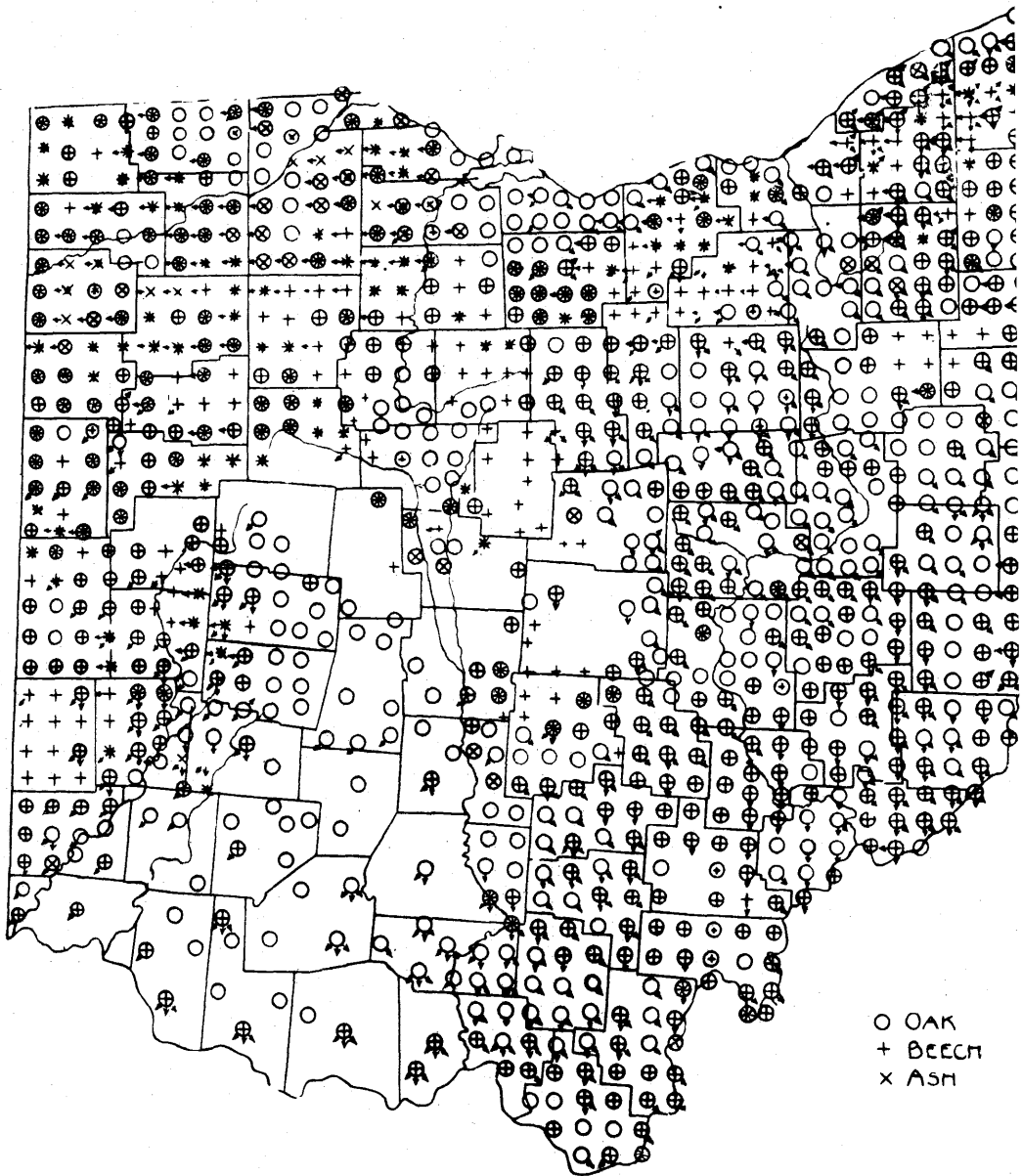


Fig. 2. Map of the Ohio Virgin Forest.

"Beech" designates pure stands of beech, also beech-maple with (often) more or less red oak and white ash.

"Oak" includes white oak, hickory, burr oak, black oak; also chestnut-chestnut oak.

"Ash" designates black ash—white ash, usually with elm, and often with red maple.

Arrows point toward the approximate present-day centers of distribution of species additional to the above. See text for further explanation of symbols.

*Oak* is represented by a circle. The most frequent grouping of oaks throughout the state was white oak, black oak, and hickory; with chestnut oak when chestnut was present; with burr oak (often scrubby) in many prairie habitats; with red oak in mixtures containing sugar maple and beech; and with other oaks chiefly in rather restricted conditions. At places, e. g. the lower Scioto valley, in mixtures with poplar, cherry, walnut, etc. "Oak" was mainly represented by hickory. This was unusual. The oak type, then, was primarily white oak—black oak—hickory with the qualifications above listed.

*Ash* is indicated by an X. Theoretically we should expect white ash to have been limited to the mesophytic beech-sugar maple association. Black ash on the other hand would be looked for principally in the colder and more youthful swamp forests. Actually, however, when much ash was present, black and white ash seem to have been so intermingled, along with elm and frequently soft maple, that the symbol for ash really indicates these four trees, in varying proportions.

Besides the trees designated by Oak, Ash, and Beech, other trees were found in significant numbers in many townships. To indicate these associated species arrows have been used upon the map.

Arrows pointing northeast indicate the presence of hemlock, white pine, or (as in southern Clarke County) arbor vitae. Some of the birches and alders found in Ohio ought to be included in this group, but unfortunately we cannot gather from the record whether northerly or southerly species were meant in any given case.

Arrows pointing southeast symbolize the following, easterly or southeasterly: chestnut, chestnut oak, scrub pine, and pitch pine.

Arrows pointing southward indicate one or more of these species: black cherry, cucumber magnolia, both gums (sweet gum or liquidamber and tupelo, pepperidge, sour or black gum—the latter being much more common), and tulip poplar.

Arrows pointing southwest indicate the presence of any of the following, to wit: buckeye (sweet and Ohio), dogwood, hackberry, sycamore, and black walnut. Of these the Ohio buckeye, sycamore and black walnut are perhaps more strictly southern than southwestern with respect to Ohio. Inasmuch, however, as all form a more or less coherent group whose center

of dispersal in Ohio is without question the southwestern corner of the state, the liberty taken is believed to be justified. (3).

Arrows pointing westward signify linden, ironwood, or cottonwood.

Treeless areas are not indicated upon the map, nor, generally, are such local details as restricted swamps. There were, for example, small stands of tamarack in Portage, Williams, and Defiance Counties which are not shown.

#### DISTRIBUTION OF THE CONSPICUOUS FOREST TREES.

Looking over the map as a whole it will be noted that Oak was the most ubiquitous type, with Beech second, and Ash distinctly third. All were found mixed more often than alone. The arrows pointing toward the range centers of associated species show a grouping, on the whole, such as one would normally expect.

The primary physiographic divisions of the state (4) are the Erie Plain and Alleghany Plateau, Glaciation, however, extended well beyond the plain into the plateau. The present drainage basin of Lake Erie does not coincide with the Erie Plain exactly, falling a little north of it at the West, and considerably south of it toward the East. A further important boundary seems to be that between the Carboniferous and Devonian, roughly making a vertical bisect of the state, turning east along the lake and a short distance west along the Ohio River. To the right of this line are mainly sandstones and shales, with some limestone, to the left of it mainly limestone and shales.

Summarizing, then, we get (Fig. 3):

AA—Erie Plain-Alleghany Plateau.

BB—Erie-Ohio Divide or Crestline.

CC—Carboniferous-Devonian Boundary.

DD—Glacial Boundary.

Certain facts with regard to the associated species (those indicated by arrows upon the map, Fig. 2) now become of interest.

Species from the West—ironwood, linden, cottonwood—were most common in the northwestern part of the state, within the Erie Plain, which here forms a broad shallow pass across Indiana and into the Mississippi Valley.

Southwestern species as we have here called them (buckeye, black walnut, hackberry, sycamore) were most numerous upon the glaciated Ohio Basin-Alleghany Plateau at the southwestern corner of the state. From that point they diverged eastward

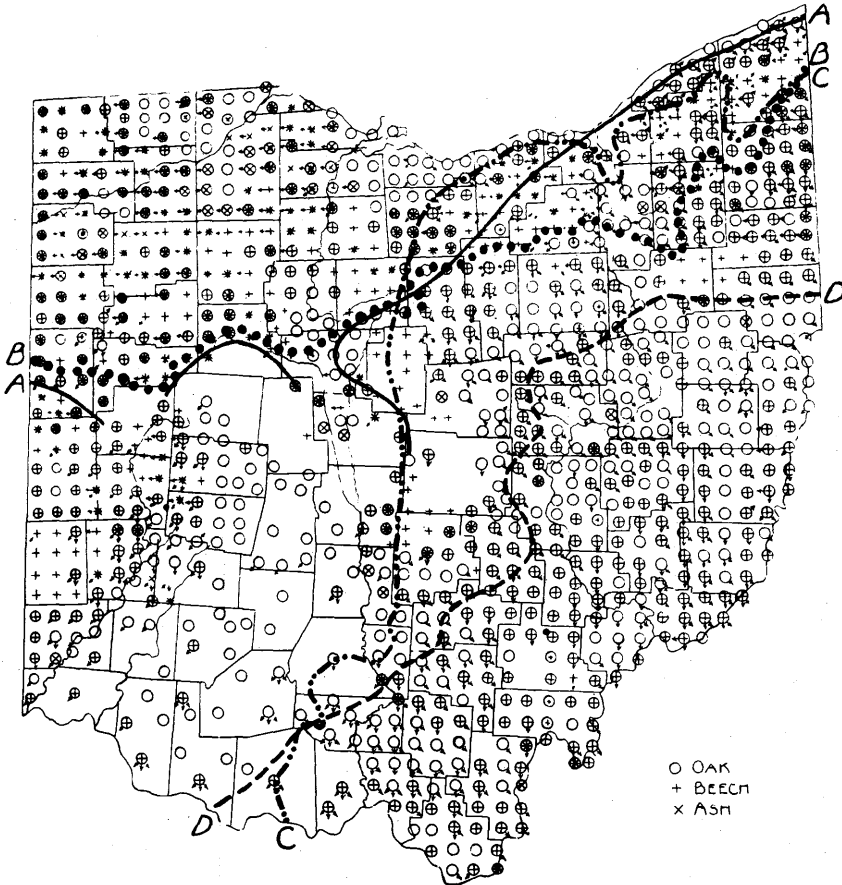


Fig. 3. Ohio Physiographic Boundaries.

A-A, Erie Plain-Alleghany Plateau; C-C, Carboniferous-Devonian Line;  
B-B, Lake Erie-Ohio River Divide; D-D, Glacial Limit.

and northward along the Upper Ohio and its great tributaries, the two Miamis and the Scioto. Obviously, at the southwestern corner of the state the Ohio Valley itself forms a pass southwestward toward the lower Mississippi region.



Southeastern and southern forms—chestnut, chestnut oak, pitch pine, scrub pine, and cucumber, tulip, gums, cherry—were all found principally east of the Devonian boundary upon Carboniferous substratum and were upon the whole decidedly more conspicuous upon the unglaciated area than elsewhere. There were indeed groves of chestnut in Wood and Butler counties, (Fig. 4), but upon sandy soil in both instances. It scarcely needs to be pointed out that the unglaciated Alleghany Plateau, extending as it does without interruption on into the southern and southeastern Appalachians, constitutes a pass in the sense of a continuity of habitat.

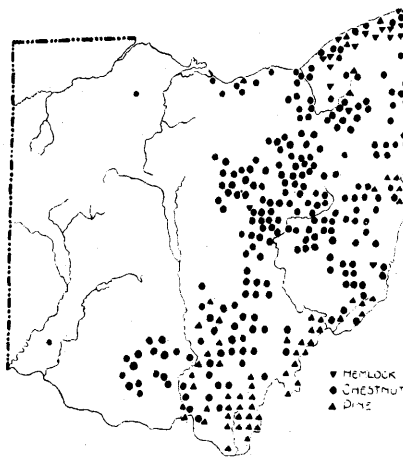


Fig. 4. Records of Hemlock, Chestnut and Pine in the Virgin Forest of Ohio.

Hemlock and white pine from the northeast were most abundant in the patch of glaciated Devonian at the northeast corner of the state (Fig. 4), but were found to some extent throughout the eastern half of the glaciated plateau lying north of the present Erie-Ohio Divide. They seem to have occupied rather deep and sheltered north-facing ravines which open out onto the lake. The arbor vitae swamp in southern Clarke County was an isolated outlier, comparable with the hemlock in Knox and Belmont counties.

Species from all directions—even a few from the southwest which had farthest to come—met and overlapped in a great focus or complex near the northeastern corner of Ohio. A

glance at the map, Fig. 3, shows clearly that here the physiographic boundaries approach most closely. It does not seem difficult to explain why the native forest here developed its greatest diversity.

Turning now from the various groups of associated species to the three characteristic groups, we note that:

Oak unmixed with Beech or Ash was found upon both glaciated and unglaciated areas;

Beech unmixed with Oak or Ash was practically limited to the glaciated region, while the unmixed Ash was still more restricted, being largely within the Erie Plain.

It will be recalled that the unglaciated area is a region of strong relief. Oak here occupied the exposed hilltops, with chestnut, chestnut oak, or pine. Beech was interspersed with southern mesophytes throughout the denser upland forests and in ravines. The virgin forest of the unglaciated region was not a homogeneous mixture, however, as Figs. 4 and 5 clearly show. The same conclusion has been reached by Schaffner (5) and Transeau (unpublished) working on different lines of evidence.

With respect to the glaciated region, certain broad general principles of distribution are recorded in Fig. 5. Here are shown the moraine system after Leverett (6) and the position of Beech and Oak. Mixtures of Beech and Oak have been omitted for the sake of clarity, as has Ash.

A comparison of Figs 3 and 5 makes it clear that Ash was most abundant upon certain broad intermorainal flats or depressions—i. e. of the ground moraine. This was especially true for the Erie Lobe (Black Swamp Region), although both the Scioto and Grand River Lobes show Ash similarly located.

Beech, it will be noted from Fig 5, was on the whole most abundant along the edges of the great glacial lobes. That is to say it occupied, if not always actual lateral moraines, at least the lateral regions of the ground and terminal moraines.

Oak, on the other hand, was found chiefly near the apex of each glacial arc, in that region where ground and terminal moraines intermingle. Such regions afford characteristic knob and kettle topography. The position of oak here was usually closely associated with swamp or wet prairie. It is important to remember, however, that oak did not occur in the actual depressions themselves. It grew upon the knobs which were elevated, often slightly, above the adjacent glacial puddles.

Oak was also found upon old beach dunes in Fulton and Lucas counties, upon limestone ridges near Sandusky Bay, eastward upon high exposed clay cliffs above Lake Erie, and elsewhere upon the tops of very high, exposed, although glaciated hills.

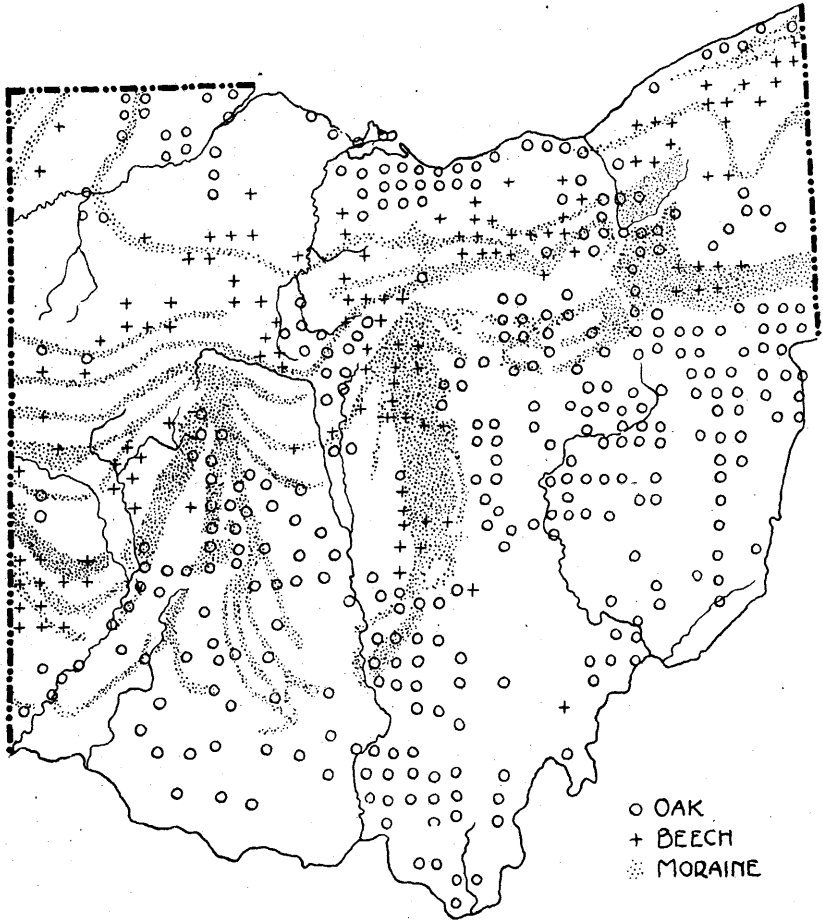


Fig. 5. Native Oak and Beech Forest in Relation to the Moraine System of Ohio.

#### SUMMARY AND CONCLUSIONS.

Deferring for the present the matter of plant succession we have the following general facts about the Ohio virgin forest.

1. The most characteristic species groups within the state were, first, Oak, (black oak—white oak—hickory, etc.); second,

Beech (beech—sugar maple, etc.); third, Ash (black ash—white ash—elm—maple, etc.). These groups were intermingled more often than not. Unmixed Beech was practically limited to the glaciated region. Ash was best developed within the Erie Plain.

2. The distribution of these characteristic species groups within the glaciated area was primarily correlated with the moraine system. Broadly speaking, Beech tended to appear along the sides, Ash upon the central ground, and Oak towards the central terminal region of the glacial lobes.

3. With these groups of species were associated others whose range centers lay outside of Ohio. By far the most widespread of these groups was the generally southerly one, comprising the Southeastern (chestnut, pine, etc.), Southern (cherry, gums, tulip, etc.), and Southwestern (buckeye, hackberry, etc.). A Western group (linden, cottonwood, etc.) was somewhat less extensive, while northerly groups—Northern (tamarack) and Northeastern (hemlock, white pine, etc.) were decidedly restricted.

3. The distribution of these associated species was correlated broadly with the fundamental physiographic boundaries within Ohio, i. e., Plateau-Plain, Crestline, Glacial Limit, and Carboniferous Escarpment.

4. The facts of distribution of species groups in the unglaciated area accord substantially with the recent, as yet unpublished, field studies of Transeau. He has correlated these facts with the surface geology.

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