The vegetation of Round Island (Straits of Mackinac), Michigan

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The Butler University Botanical Studies journal was published by the Botany Department of Butler University, Indianapolis, Indiana, from 1929 to 1964. The scientific journal featured original papers primarily on plant ecology, taxonomy, and microbiology.

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Butler University
Botanical Studies
(1929-1964)

Edited by
Ray C. Friesner
The *Butler University Botanical Studies* journal was published by the Botany Department of Butler University, Indianapolis, Indiana, from 1929 to 1964. The scientific journal featured original papers primarily on plant ecology, taxonomy, and microbiology. The papers contain valuable historical studies, especially floristic surveys that document Indiana’s vegetation in past decades. Authors were Butler faculty, current and former master’s degree students and undergraduates, and other Indiana botanists. The journal was started by Stanley Cain, noted conservation biologist, and edited through most of its years of production by Ray C. Friesner, Butler’s first botanist and founder of the department in 1919. The journal was distributed to learned societies and libraries through exchange.

During the years of the journal’s publication, the Butler University Botany Department had an active program of research and student training. 201 bachelor’s degrees and 75 master’s degrees in Botany were conferred during this period. Thirty-five of these graduates went on to earn doctorates at other institutions.

The Botany Department attracted many notable faculty members and students. Distinguished faculty, in addition to Cain and Friesner, included John E. Potzger, a forest ecologist and palynologist, Willard Nelson Clute, co-founder of the American Fern Society, Marion T. Hall, former director of the Morton Arboretum, C. Mervin Palmer, Rex Webster, and John Pelton. Some of the former undergraduate and master’s students who made active contributions to the fields of botany and ecology include Dwight. W. Billings, Fay Kenoyer Daily, William A. Daily, Rexford Daudenmire, Francis Hueber, Frank McCormick, Scott McCoy, Robert Petty, Potzger, Helene Starcs, and Theodore Sperry. Cain, Daubenmire, Potzger, and Billings served as Presidents of the Ecological Society of America.

Requests for use of materials, especially figures and tables for use in ecology text books, from the *Butler University Botanical Studies* continue to be granted. For more information, visit www.butler.edu/herbarium.
The vegetation of Round Island was studied briefly during the summers of 1935 and 1936 while an extensive survey was in progress on Mackinac Island (5). Round Island is 0.5 miles southeast of Mackinac, separated from it by the Straits of Mackinac. It comprises several hundred acres of land surface (1.5 by 0.75 mile) most of which consists of a thin layer of soil over a limestone substratum. The central part of the island is considerably higher above lake level than the outer rim, but perhaps not exceeding 50 feet. Several ancient beaches are in evidence along the shore but they are not so extensive as on Mackinac. The present beach is wide and strewn with abundant granite and quartzite boulders. The peninsula-like northern tip is evidently subjected to extreme wave action, hence has a sparse vegetation.1

CULTURAL INFLUENCES

While Round Island is uninhabited except for the keeper of the lighthouse and his family, it has not been spared the destructive influence of civilized man. The entire central hardwoods stand was cut for firewood by citizens of neighboring islands, as the small stem sizes and abundance of trees in table II well reflect. The coniferous forest fared better in the past in this respect than the hardwoods.

OBSERVATIONS

The distributional features of the forest are almost a counterpart of those found on Mackinac, viz. an outer belt of coniferous forest composed primarily of *Picea glauca*, *Abies balsamea* and *Thuja occidentalis* surrounding a central stand of northern hardwoods. *Thuja* has highest abundance of all species in the peripheral zone, except at a rather low lying upper beach along the northern shore.

1 Sincere appreciation is expressed to Mr. C. R. Nennert of Indianapolis for assistance given in the field work.
Here *Pinus resinosa*, *P. strobus*, associated with *Abies balsamea* are chief contenders for control in the crown cover. A large number of woody species participates in the association of the coniferous forest, i.e. 18 (table I) over against 8 in the broadleaved forest (table II). It is a striking feature that *Abies* is the only conifer represented among the tree species constituting the broadleaved forest.

Along the wide rock beach, reproduction of woody species is prolific. In a sample quadrat, five by ten meters, was found the following representation: *Picea glauca* 62 (7 stems one to two inches DBH.), *Thuja occidentalis* 21 (3 stems one to two inches DBH.), *Pinus strobus* 2, *Larix laricina* 13, *Abies balsamea* 4, *Populus tacamahaca* 1, *Hypericum kalmianum* 56, *Prunus pumila* 1, *Shepherdia canadensis* 6, *Potentilla fruticosa* 12, a total of 180 stems.

Three samples of surface soil along the shore gave a range in pH of 6.72 to 8.21 which, also, is similar to the soil on Mackinac Island. The representative sample plot on reproduction in bare areas further bears out that succession is short, or perhaps it were better to say, is wanting, for the seedlings of the dominants become established immediately. The 84 species of plants, involving 29 families, collected during two days in the month of August are perhaps less than half the total number present during the various seasonal aspects.

**LIST OF SPECIES**

*Aceraceae*: *Acer pensylvanicum* L., 7306.*  

*Ostrya virginiana* (Mill.) K. Koch, 7305.

*Campanulaceae*: *Campanula rotundifolia* L., 6537.

*Caprifoliaceae*: *Virburnum trilobum* Marsh, 7306a.


*Cyperaceae*: *Scirpus validus* Vahl., 7261.

*Elaeagnaceae*: *Shepherdia canadensis* (L.) Nutt., 7258.

*Ericaceae*: *Arctostaphylos uva-ursi* var. *coactilis* Fern., 7262.

*Fagaceae*: *Fagus grandifolia* Ehrh., 7304.

*The numbers refer to the author’s field collection records.*
DISCUSSION

Vegetation on the smaller islands in the Great Lakes, located within the center of the lake forest climax region, shows plainly the stress between the replaced boreal forest and the recently invading northern hardwoods. The more rigorous microclimate along the periphery of islands limits invasion and replacement of forest complexes by the broadleaved southern species to the more pro-
tected central parts of small land masses, as Mackinac (5) and Round Island demonstrate. This sharp segregation into the two associations along sharply defined limits, with the absence of the intermediate pine association, becomes more modified on larger islands, as shown by Darlington (2) for Beaver Island. Here one finds distribution of forest types with merging characteristics like those of the mainland of Michigan, i.e. pine constituting the chief forest cover on sandy soil, northern hardwoods, associated with Tsuga, dominating in habitats where soil is clay or loam; while Abies, Picea, Larix, and Thuja express the more hydrophytic bog and swamp habitats, as described in detail by Gates (3, 4) for the Douglas Lake region.

This makes it difficult at times to define the climax status of an area, for two climax formations on small islands are sharply separated along narrow geographical lines. However, the author agrees with Cooper (1) that Acer saccharum demands climax control whenever it occurs, as is well shown by the central section of Round Island (table II), and the peripheral association of conifers must be considered post-climax. The two forest types are much more sharply separated on Round Island than on Mackinac (5). In the latter location conifers constitute 25% of the trees in the broadleaved forest while on Round Island only Abies has a small representation in the seedling stem sizes (table II). The writer is, however, now more firmly convinced than in 1941 (5) that Acer-Fagus is the climatic climax and conifers are post-climax for Mackinac also, in spite of the fact that Fagus and Acer there are suffering from rigors of the climate, and that conifers still occupy a prominent place under the poorly developed crown cover of the northern hardwoods association.

On Round Island as well as on Mackinac we are without doubt dealing with calciphilous ecotypes of certain phenotypes, for Thuja, Picea glauca, Abies balsamea, Larix laricina, Potentilla fruticosa reproduce readily in alkaline soil, while on the mainland of lower Michigan they are typical bog species (See Gates, 4). The general alkalinity of soil is also shown by the total absence of shrubby ericads and Pinus banksiana.

For the final determination as to whether the coniferous or broad-leaved forest expresses microclimatic control one must perhaps consult pollen records as to great successional tendencies during past
ages. The record from Douglas Lake by Wilson and Potzger (6),
30 miles south of the Straits, shows an early undisputed dominance
by *Picea glauca* and *Abies* which was in turn replaced by *Pinus*, and
this again gave way to broadleaved complex, so that we must define
maple or beech-maple as climax for Round Island with coniferous
forest as post-climax, the latter maintained by the more rigorous
microclimate along the periphery of the island habitat.

SUMMARY

1. Presented in this paper are data of an ecological survey of the
   forest on Round Island, Michigan.
2. The central part of the island is controlled by northern hard­
   woods, primarily by an *Acer* consociatio. Il, and the periphery by
   spruce-fir-arbor vitae.
3. A partial list of species (84) constituting the vegetation is
given, and while it is fairly complete for woody species, the record
favors the summer phase of the herbaceous plants.
4. The soil along the exposed beach is highly alkaline.
5. Ericads are represented only by *Arctostaphylos*.
6. Tree species in the central hardwoods area with highest F. I.
   are: *Acer saccharum*, 100; *Betula papyrifera*, 40; *Populus tacama­
hacca*, 40; *Abies balsamea*, 60.
7. Tree species with highest F. I. in the fringing belt 'of conifers
   are: *Thuja occidentalis*, 92; *Abies balsamea*, 92; *Picea glauca*, 85;
   *Betula papyrifera*, 46; *Amelanchier canadensis*, 61.
8. Species with greatest abundance in the hardwoods are: *Acer
   saccharum*, *Populus tacamahacca*, *Betula papyrifera*, *Abies balsamea*.
9. The association of species is more simple in the hardwoods
   than in the coniferous forest.
10. It is concluded that hardwoods are climax for Round Island
    and coniferous forest post-climax, maintained by a more rigorous
    microclimate along the periphery of islands.

LITERATURE CITED

1. Cooper, W. S. The climax forest of Isle Royale, Lake Superior, and its
2. Darlington, Henry Townsend. Some vegetational aspects of Beaver
25: 31-37. 1940.


### TABLE I

Abundance by size classes and F. I. of woody species participating in the forest complex of the northern hardwoods in the central part of Round Island, Michigan. Based on five 100-square-meter quadrats.

<table>
<thead>
<tr>
<th>Species</th>
<th>Below 1 inch</th>
<th>1-2 inches</th>
<th>3-5 inches</th>
<th>6-10 inches</th>
<th>11-15 inches</th>
<th>16-20 inches</th>
<th>Total stems over 1 in.</th>
<th>F. I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abies balsamea</td>
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<td></td>
<td></td>
<td>4</td>
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<td>Acer saccharum</td>
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<td>18</td>
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<td></td>
<td></td>
<td>48</td>
<td>100</td>
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<td>6</td>
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<td>Populus taeamahaeccia</td>
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### TABLE II

Abundance by size classes and F. I. of woody plants participating in the forest along the outer rim of Round Island, Michigan. Based on 13 100-square-meter quadrats.

<table>
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<th>Species</th>
<th>Below 1 inch</th>
<th>1-2 inches</th>
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<th>6-10 inches</th>
<th>11-15 inches</th>
<th>16-20 inches</th>
<th>Total stems over 1 in.</th>
<th>F. I.</th>
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<tr>
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<td>43</td>
<td>40</td>
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<td>92</td>
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<td>Picea glauca</td>
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<td>13</td>
<td>2</td>
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<td>47</td>
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<td>Thuja occidentalis</td>
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