

POLLEN STATISTICS FOR TWO INDIANA BOGS

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INTRODUCTION

This is a report of findings from two bogs which reports are parts of a series of similar investigations by the author throughout Indiana and Michigan. The work is under the supervision of Professor G. D. Fuller of the department of botany of the University of Chicago.

LOCATION AND DESCRIPTION OF THE BOGS

The two bogs are both in northern Indiana and at approximately the same latitude. They are one hundred twenty miles apart. Both were drilled during the summer of 1932.

The Center Lake bog is located around the northwest end of Center Lake, one mile northwest of Angola, Steuben County, Indiana. The lake and bog are located in a glacial depression and are quite typical of the region. The peat deposit was described by A. E. Taylor (5). No detailed study was made of the present day flora of the bog, but the bog plants of the following genera were noted: *Sphagnum*, *Carex*, *Typha*, *Chamaedaphne*, *Rhus*, and *Larix*.

The Mineral Springs bog is located in the sand dunes of northwestern Indiana fifteen miles east of Gary and half a mile north of United States Highway No. 12. This bog developed in a depression between sand dunes of the post-Toleston age and is quite similar to other dune bogs. Taylor (5) describes the bogs of this region. The surface flora is similar to that at Center Lake except that, due to a recent ditching, considerably less *Sphagnum* was found.

METHODS

Collection. Samples of the deposited materials were collected by means of a Hiller Peat Borer. Two samples for microscopic examination were very carefully removed from the center of each core and placed in clean glass tubes. Larger samples for macroscopic examination were taken from each core and placed in soil boxes.

Preparation. The peat was prepared for microscopic examination following the method described by Voss (6) in which potassium hydroxide is used to loosen the fragments composing the peat. Potzger, J. E., in a paper presented before this section of the Academy in 1931, objected to the use of potassium hydroxide on peat on the basis that it would distort the pollen grains. No demonstrations or other evidence of the amount or character of the distortion was presented. It is reasonable to expect some distortion, but until a better method of loosening the pollen grains from the other material in the peat has been discovered, the method used seems to be the most advisable. To avoid contamination,

all of the materials were handled throughout the process of preparation with care approaching that used in bacterial culture work.

Examination and Identification. The pollen grains were identified by comparing them with a comprehensive collection of modern pollens. Sears' (3) work on pollen was helpful in identification. At least one hundred fifty pollen grains were identified and tabulated for each sample. Peat types were determined by comparison with type samples.

RESULTS

The results of the investigations are presented in the pollen diagrams and tabulated pollen percentages.

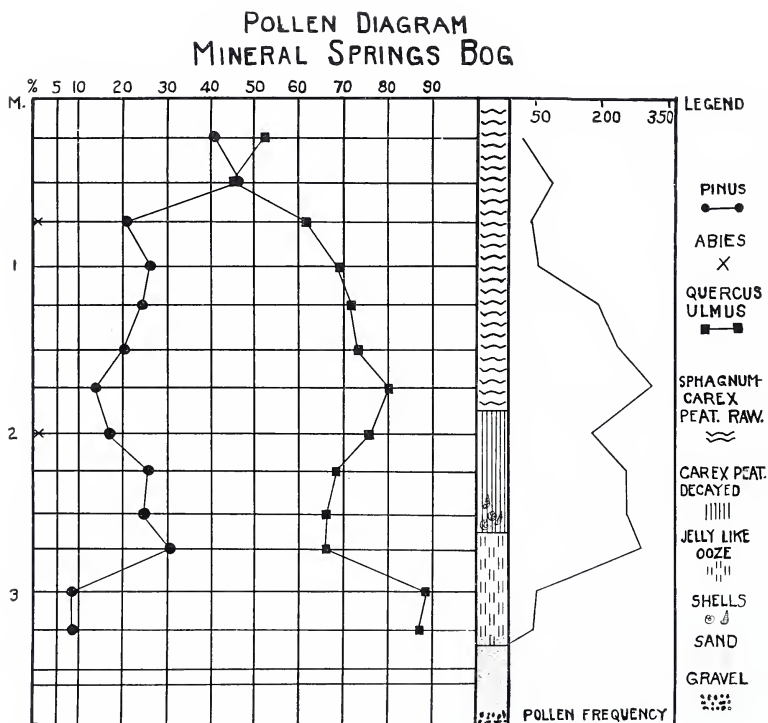


Fig. 1. Pollen diagram Mineral Springs bog.

Obviously only the more significant types of pollens could be represented on the pollen diagrams. *Salix*, *Larix*, *Corylus*, and *Alnus* are so general in their distribution that their pollen grains were omitted from the calculations as insignificant. Pollen frequency is the calculated number of pollen grains to be found on one square centimeter of the slide of that sample.

SIGNIFICANCE

Pollen Percentages. If the statement made by Auer (1), "The pollen content of the successive layers of the individual peat bogs is a

TABLE 1. Percentages of the Significant Tree Pollens Mineral Springs Bog

Depth M.	Abies	Pinus	Tsuga	Betula	Carpinus	Ostrya	Fagus	Fraxinus	Juglans	Liquidambar	Quercus	Ulmus	Quercus and Ulmus
.22		40.7	1.2	.6			2.5		1.9		50.3	2.5	52.8
.50		46.5	.6	3.3	.6		1.9		1.3		42.5	3.3	45.8
.72	.6	20.8	2.6	3.2					.6	.6	58.4	3.2	61.6
1.00		26.0	1.9	.6			1.3	.6			65.5	3.9	69.4
1.22		24.7		1.9			.6		1.2		67.9	3.8	71.7
1.50		20.5		1.9			2.5	.6		.6	64.0	9.0	73.0
1.72		14.0		2.6			1.3	.6	.6		78.8	1.3	80.1
2.00	.6	17.2					5.2	1.2			65.5	10.2	75.7
2.22		25.5	.6	1.8	.6		3.6	1.2			67.5	1.2	68.7
2.50		24.5		4.2			3.6	.6	.6	.6	63.5	2.4	65.9
2.72		30.1		1.2			1.9			.6	64.6	1.2	65.8
3.00		8.0		.6		.6	1.3		.6		84.5	4.0	88.5
3.22		8.5		.6			2.6		1.3		81.0	5.9	86.9

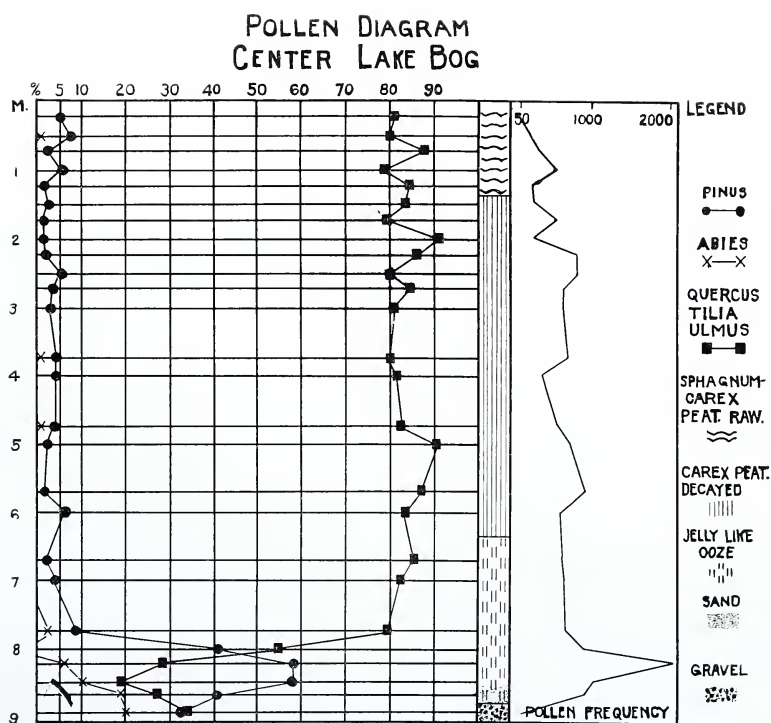


Fig. 2. Pollen diagram Center Lake bog.

TABLE 2. Percentages of the Significant Tree Pollens Center Lake Bog

Depth M.	Abies	Picea	Pinus	Tsuga	Betula	Carpinus	Ostrya	Fagus	Fraxinus	Juglans	Liquidambar	Quercus	Tilia	Ulmus	Quercus, Tilia and Ulmus
.22	.....	.....	5.1	1.2	2.5	.....	1.2	3.8	.....	4.5	.....	68.0	.....	13.0	81.0
.50	.6	.....	7.4	.....	4.0	.6	.6	5.2	1.1	.6	.....	73.9	.....	6.6	80.5
.72	.....	.....	2.6	.....	1.3	.....	.6	4.6	.6	2.0	.....	80.0	1.3	6.6	87.9
1.00	.....	.....	5.7	.6	3.8	.6	.6	5.2	3.2	1.2	.....	71.2	.....	7.6	78.9
1.22	.....	.6	1.3	.....	3.9	.....	.....	6.5	1.3	1.9	.....	78.0	1.9	4.6	84.5
1.50	.....	.....	2.5	.....	3.2	.6	1.2	3.8	1.2	2.5	.6	78.0	.6	5.2	83.8
1.72	.....	.....	1.3	.....	3.9	1.3	.6	7.8	2.6	1.9	.6	72.4	.....	7.2	79.6
2.00	.....	.....	1.2	.6	1.8	.6	.....	3.6	.6	.6	.....	80.0	.....	11.1	91.1
2.22	.....	.....	1.8	.....	1.2	.6	.6	8.7	.6	.6	.....	77.8	.....	8.1	85.9
2.50	.....	.....	5.3	.....	1.2	.....	.....	12.0	1.2	.....	.....	76.0	.....	4.1	80.1
2.72	.....	.....	3.4	.....	1.7	.....	2.6	4.6	.6	1.1	.6	77.2	1.1	6.3	84.6
3.00	.....	.....	3.1	.6	3.7	.....	.....	10.6	.6	.....	.....	76.0	.....	4.9	80.9
3.72	.5	.5	4.7	.5	.5	.....	.....	8.0	4.2	.5	.....	75.0	.....	5.3	80.3
4.00	.....	.....	4.6	.6	2.6	.....	2.6	5.3	2.0	.6	.....	70.0	.6	10.8	81.4
4.72	.6	.....	4.0	.....	1.1	.....	.....	8.6	1.7	.6	.....	72.0	.....	9.7	82.3
5.00	.....	.....	2.7	.5	.5	.....	.....	1.6	2.1	1.6	.....	77.0	.5	13.0	90.5
5.72	.....	.....	1.7	.....	2.3	.....	.6	5.2	1.2	1.2	.....	76.0	.6	10.4	87.0
6.00	.....	.....	6.1	.....	1.2	.....	.6	6.7	.6	1.2	.6	69.0	.....	14.6	83.6
6.72	.....	.....	2.2	.....	3.3	.....	1.7	6.7	.6	.....	.....	66.5	.6	19.5	85.6
7.00	.....	.....	4.1	.....	5.1	.....	.6	4.1	1.7	1.2	.....	71.0	.....	11.4	82.4
7.72	2.7	.....	9.1	.....	4.8	.....	.....	3.2	.....	.5	.....	65.0	1.6	12.8	79.4
8.00	.....	.....	40.5	.....	1.7	.....	.....	2.7	.....	.....	.....	41.0	1.5	12.6	55.1
8.22	5.8	.....	59.0	.....	6.4	.....	.....	.....	.6	.6	.....	18.0	.....	9.9	27.9
8.50	10.2	4.2	58.6	.6	3.6	.....	1.2	1.2	.6	.....	.....	14.6	.6	4.2	19.4
8.67	19.0	6.7	40.5	.....	6.1	.....	.....	.6	.....	.....	.....	21.5	.....	5.6	27.1
8.95	20.5	5.3	32.5	.....	5.9	.....	.....	1.3	.....	.6	.....	29.9	.....	3.9	33.8

direct indication of the comparative abundance of the different kinds of trees growing as the peat layers formed," is true, this investigation shows changes in the tree flora of the regions in which the bogs are located. The bottom deposits of the Mineral Springs bog contain a predominance of Quercus-Ulmus pollens. The later deposits show a marked increase in the Pinus pollens. In the Center Lake bog, the older deposits contain a high percentage of Abies pollen with the Pinus pollens practically equivalent to the Quercus-Tilia-Ulmus group. This situation gives way to a Pinus predominance which is followed by the Quercus-Tilia-Ulmus predominance which continues to the surface. The greater antiquity of the Center Lake bog is evident from the high percentage of Abies pollen in the bottom layers. This is typical for the majority of bogs in Wisconsin, Illinois, Michigan, southern Canada, and Ohio that have been investigated by Auer (1), Sears (4), Voss (6), and the author (2). The predominance of Quercus-Ulmus in the oldest layer of the Mineral Springs bog would indicate that deposition of material began there considerably later than in the Center Lake bog. This would be expected from the situation of the Mineral Springs bog within the Tolleston beach lines of Lake Chicago. The Center Lake bog is entirely outside the beach lines of Lake Chicago and hence in a much older area.

These studies may lead to a comparative statement as to the age of the sand dunes. The marked difference in the later deposits of the two bogs would seem to indicate that the immediate vicinity has considerable influence on the percentages of pollens in the deposited materials.

The primary conclusions drawn from most of the investigations in this field have been concerning climate changes inferred from changes in the flora indicated by the pollen grains found at the different levels. Doubtless most of these conclusions have been well founded. It is the belief of the author that broad interpretations of climate changes should be reserved for papers of greater scope than the present one.

Peat Types. The peat types indicate the character of the surface at the time of deposition. The material on the bottom was doubtless washed in from the surrounding terrain. The ooze represents deposition in the open deep water. The peats represent deposition in shallow water or from the underside of floating vegetation mats. The absence of sand layers in the Mineral Springs bog indicates that there have been no major dune movements near the bog since its inception. In this respect it differs from a Michigan dune bog investigated by the author (2).

Pollen Frequency. If a uniform procedure is followed in preparing the slides, the calculated pollen frequency will indicate the relative abundance of pollen at the various levels. The highest frequency in each bog is found in the deep-water deposited material. The full significance of pollen frequency and its relationship to pollen percentages and peat types has not yet been determined.

SUMMARY

1. The two bogs investigated exhibit striking differences.
2. The deposition of material in the dune bog probably began considerably later than that in the bog in the glacial depression.
3. The Center Lake bog indicates a forest succession in that region of first, *Abies-Pinus* and *Quercus*; second, *Pinus*; third, *Quercus-Tilia-Ulmus*.

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