

# ATMOSPHERIC POLLEN AND SPORE STUDIES AT COLUMBUS, OHIO DURING 1957<sup>1</sup>

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During a previous investigation largely concerning atmospheric ragweed pollen (*Ambrosia* spp.) in the Columbus, Ohio, area, it became apparent that a relatively complex annual incidence of pollen and spores occurred in the local atmosphere (Gilbert, 1950). It was hoped at that time that a study could soon be made concerning the annual incidence of these items, and such an opportunity arose early in 1957 through the cooperation of allergists of the Division of Allergy, Ohio State University Department of Medicine, whose financial contributions to The Ohio State University Development Fund enabled this study.

## METHODS

Pollen and spore counts were made by the standard gravity slide method recommended by the Committee on the Standardization of Pollen Counting Techniques of the American Academy of Allergy (1946). A standard sampling device was mounted approximately five ft above the roof of the Botany and Zoology building, and slides coated with a petrolatum jelly-mineral oil mixture were exposed for a period of 24 hr, beginning at 0800 E.S.T.  $\pm$  one hr.

Slides were prepared for observation by staining with a mixture of 50 cm<sup>3</sup> glycerine, 100 cm<sup>3</sup> 70 percent alcohol, and 2 drops of a saturated aqueous solution of safranin O. A 22 x 50 mm cover slip was applied, and pollen grains and spores within an area of 2.5 cm<sup>2</sup> were counted.

Exposure of slides was begun on February 15, 1957, and the initial counts concerned pollen grains only. The counting of spores was initiated on April 21.

## RESULTS

The results in number of pollen grains and spores per cm<sup>2</sup>/day are graphically presented in figures 1, 2, and 3. A number of additional types of pollen grains were collected; however, since their deposition rarely exceeded five gr/cm<sup>2</sup>, they are not graphically presented. Spores other than *Alternaria* spp. were not differentiated in the counting because of the great difficulties encountered in rapid identification.

## DISCUSSION

1. The maximum daily collection of a given type of pollen was that of *Populus* and was 1510 pollen gr/cm<sup>2</sup>. A number of relatively large cottonwood trees occur in the near vicinity of the Botany and Zoology building. The maximum collection of *Populus* grains occurred on April 21, a day characterized by clear skies, relatively high temperatures, and light wind. Appreciable amounts of *Populus* pollen were collected over a period lasting only six days.

2. Maximum collection of spores, including *Alternaria*, was on September 3, and was 1637 spores/cm<sup>2</sup>.

3. The local ragweed pollen season began during the first week of August and appears to have reached its peak during the first week of September, following which the incidence markedly diminished, and by October 1 few such pollen grains were in the local atmosphere. However, as early as the latter part of June,

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occasional appreciable quantities of apparently fresh ragweed pollen were collected, and are believed to indicate pollen transport into the local atmosphere from distant areas by southerly winds. Also, sporadic collection of a few, evidently old, ragweed pollen grains occurred on gusty days throughout the winter, spring, and summer seasons.

4. The maximum collection of *Ulmus* pollen occurred on March 24, and was 775 gr/cm<sup>2</sup>. On the following day, a freezing rain occurred during the morning hours, and a cold front passage accompanied by heavy showers occurred in the afternoon. This weather resulted in a clearing of the local atmosphere of pollen grains, not only of elm but of all other types of pollen grains in the atmosphere at that time, which included *Taxus*, *Acer*, *Juniperus*, and *Corylus*.

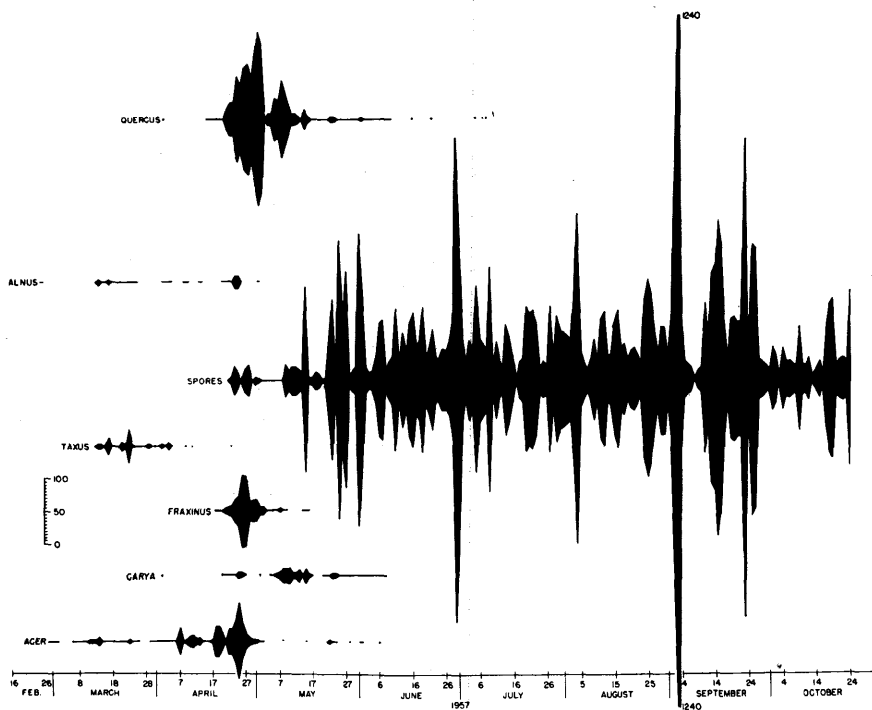


FIGURE 1. Atmospheric incidence of pollen grains and spores at Columbus, Ohio, during 1957, number per cm<sup>2</sup> of slide surface per day.

5. On the morning of May 2, a cold air mass entered the central Ohio area and persisted for several days. During this period relatively few pollen grains or spores were collected.

6. Twenty-eight types of pollen grains were sufficiently abundant in the local atmosphere during 1957 to result in a collection density equal to or greater than five pollen gr/cm<sup>2</sup>/day.

7. Scattered showers which occurred during the afternoon and evening of September 7 (near peak ragweed pollen season) cleared the local atmosphere of pollen grains to the extent that during the following day extremely few spores and only one pollen grain were on the 2.5 cm<sup>2</sup> of slide surface observed.

8. The first killing frosts occurred on October 11, 12, and 13, and appear to have had a direct effect upon the concentration of atmospheric *Alternaria* spores which diminished considerably during the period of the frost.

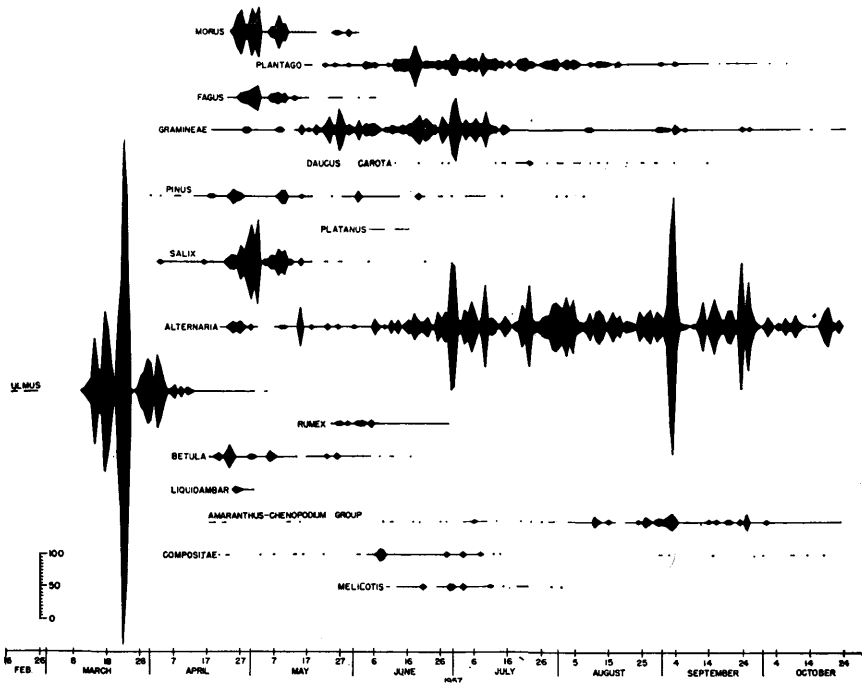


FIGURE 2. Atmospheric incidence of pollen grains and spores at Columbus, Ohio, during 1957, number per  $\text{cm}^2$  of slide surface per day.

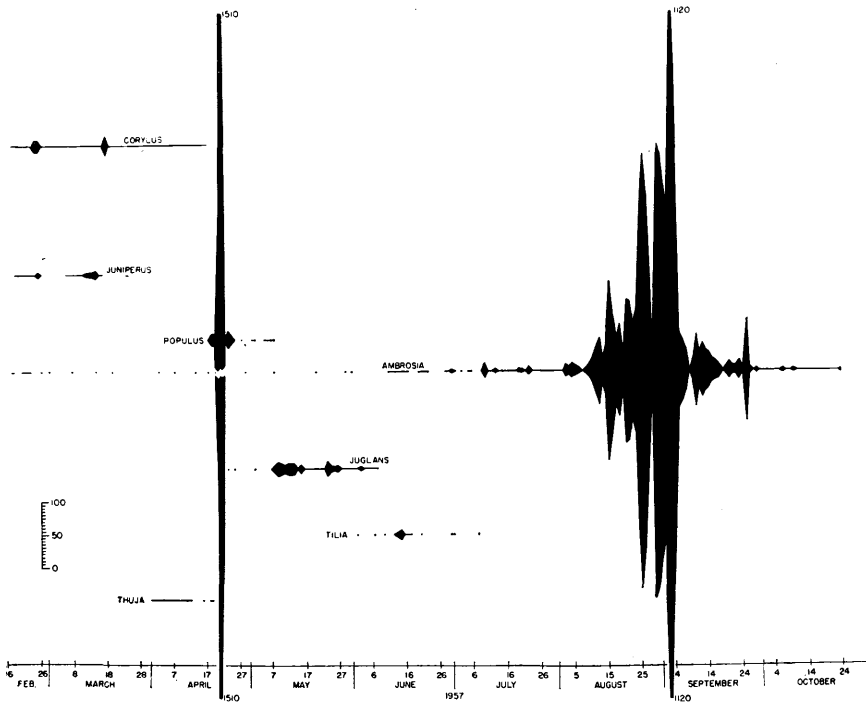


FIGURE 3. Atmospheric incidence of pollen grains and spores at Columbus, Ohio, during 1957, number per  $\text{cm}^2$  of slide surface per day.

9. Additional types of pollen grains and spores collected during the course of investigation include: *Taraxacum* (Dandelion), *Magnolia* (Magnolia), *Tsuga* (Hemlock), *Aesculus* (Buckeye), *Picea* (Spruce), *Celtis* (Hackberry), *Carex* (Sedge), *Equisetum* (Horsetail), *Castanea* (Chestnut), *Urtica* (Nettle), *Ligustrum* (Privet), and *Typha* (Cat-tail). The source of Chestnut pollen was evidently one Chestnut tree present in the nearby Botanic Garden.

10. The biweekly distribution of the number of major types of pollen grains present in the local atmosphere during 1957 was as follows:

Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.	
1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
0	5	6	9	10	21	18	18	19	14	10	7	7	6	6	6	5	4	3	1

#### ACKNOWLEDGMENTS

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#### REFERENCES

- Committee on the Standardization of Pollen Counting Techniques, American Academy of Allergy, 1946. Preliminary report. *Jour. Allergy* 17: 178-179.  
 Gilbert, G. E. 1950. Volumetric and gravity slide tests for airborne ragweed and oak pollen grains at Columbus, Ohio. *Ohio Jour. Sci.* 50: 60-70.