

Allergenic pollens in Bogota, Colombia, South America

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A preliminary study has been made in Bogota on the pollens belonging to families and genera reported to be allergenic. A monthly chart was kept in connection with a pollen census carried out in the center of Bogota. It was established that the most frequent families and possibly offending allergens were: (1) Gramineae sp. with a defined pollination in November, December, and part of January; (2) herbaceous plants and some weeds whose pollination is similar to the gramineae, but with an interval in June and August; and (3) trees of which the most frequent is the Acacia, which is used for ornamentation in Bogota. Its greatest pollination is in June, July, and part of August, with a recurrence in December. The allergenic capacities of some species considered endemic in the Sabana of Bogota remains to be proved. Past publications have erroneously tried to apply to the environment of Colombia studies of pollen incidence in other countries.

The special district of Bogota is located on the largest plateau on the Andes mountain range, at 8,300 feet above sea level, and covers an area of 1,754 sq. km. The average barometric pressure is 565 mm. Hg, with an average temperature of 56° F. and a relative humidity of 73 per cent.

Bogota has one hundred and ninety parks and green areas, the most important of which are: the National Park, which has a large wooded area, the University City, and the Park of the Independence located in the center of the city.

SCIENTIFIC ANTECEDENTS

This paper reports a 5 year incidence of pollen in Bogota, Colombia, supplementing data which have been collected in North America and less systematically

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Received for publication Aug. 2, 1965.

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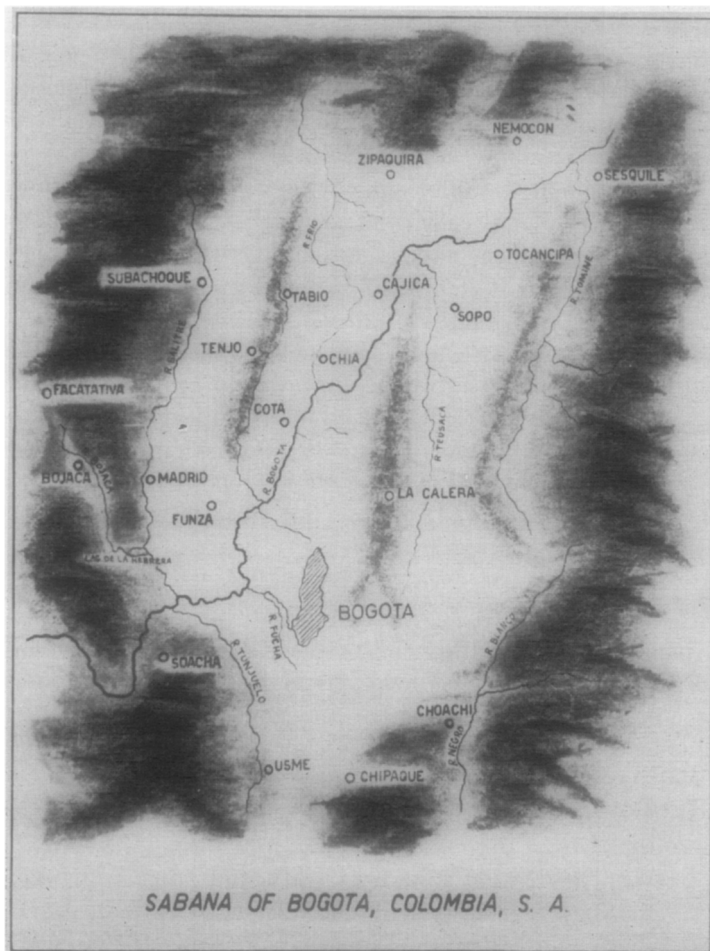


Fig. 1

in South America since Oren C. Durham's pioneering efforts.¹ In Colombia, the first person to write about pollens was Villaveces.² In 1947 in his thesis entitled "Allergy in General and in Ophthalmology," he referred to the pollens present in Bogota and considered the following pollens occurred most frequently: *Poa pratensis*, *Plantago lanceolata*, *Rumex crispus*, and *Eucalyptus* sp. In 1949, Cuervo³ published the same observations. Later, Naranjo⁴ remarked on the *Amaranthaceae* pollen in Cali. The latest study, which has not been published, is that of Van der Hammen,⁵ who, from 1958 until the middle of 1959, made weekly exposures of slides placed at altitudes of 2,560, 3,330 and 3,450 m., in four locations of the Sabana. In this manner, he obtained approximately 100 slides per location. The slides were analyzed and the results marked on an annual chart totaling all the grains of each species during the year and calculating the amount of each one in the weekly exposure.

MATERIALS AND METHODS

Since the main purpose of this study is to establish the frequency of allergenic pollens in Bogota, we have made use of the simplest method. Slides spread with Brandt's jelly⁶ over an area of 2 sq. cm. were exposed horizontally at an angle of 45 degrees, at an altitude of 15 m., and in the geographic center of the city.

A daily chart was kept simultaneously with the exposures. It showed temperature, relative humidity, wind velocity, and rain.⁷

Daily readings were taken, and an estimation was made of the number of pollen grains per square centimeter of exposed area. The pollen grains were classified in accordance with family group, genus, and species.

Our study started on Oct. 1, 1959, and ended Sept. 30, 1964. We examined the grains without any special procedure in order to avoid damage in the structure of the pollen. A daily check was made of humidity, expressed as the quantity of water per cubic millimeter, and also wind velocity, expressed in meters per second. These two factors most affected the deposit of pollen grains on the plate, as when rain increased and/or the wind velocity was greater, little or no pollen was found on the glass slide.

COMMENTARY

In accordance with the monthly charts, the following variations in relation to the different families and genera of pollens in Bogota could be noted:

Gramineae sp. (grasses): This is the anemophilous pollen with the greatest allergenic incidence in Bogota. Most frequent pollinations occur in November, December, and January. There is an intermediate pollination in August and September. During the remainder of the year the number of grains is slight, but more or less constant.

Acacia: Greatest pollination is in June, July, and August, reappearing again in December. This corresponds with the data reported by Van der Hammen.⁵

Alnus sp. (alder): Marked pollination occurs in August. It appears in smaller quantities in January and October, and is minimal during the rest of the year.

Rumex sp. (gold seal). The greatest number of these pollen grains was found toward the end of November, December, and part of January. It was minimal during the remainder of the year.

Quercus robur (oak): Quantities not greater than one pollen grain per square inch per exposure were found in March and April. During the rest of the year it was minimal or completely absent.

Populus (poplar): Small quantities were found in May and September.

Eucalyptus sp.: This is a common and abundant tree in the city, and it shows the greatest frequency of pollination in March and August.

Fraxinus sp. (ash tree): This ornamental tree in the Sabana of Bogota has a pollen incidence that is minimal, with a few grains appearing in August and September.

Juniperus (cedar): Some frequency of pollination in the months of greatest wind, February and April, was shown for this ornamental, imported tree.

Artemisia sp. (sagebrush): Pollination was occasionally found in our ex-

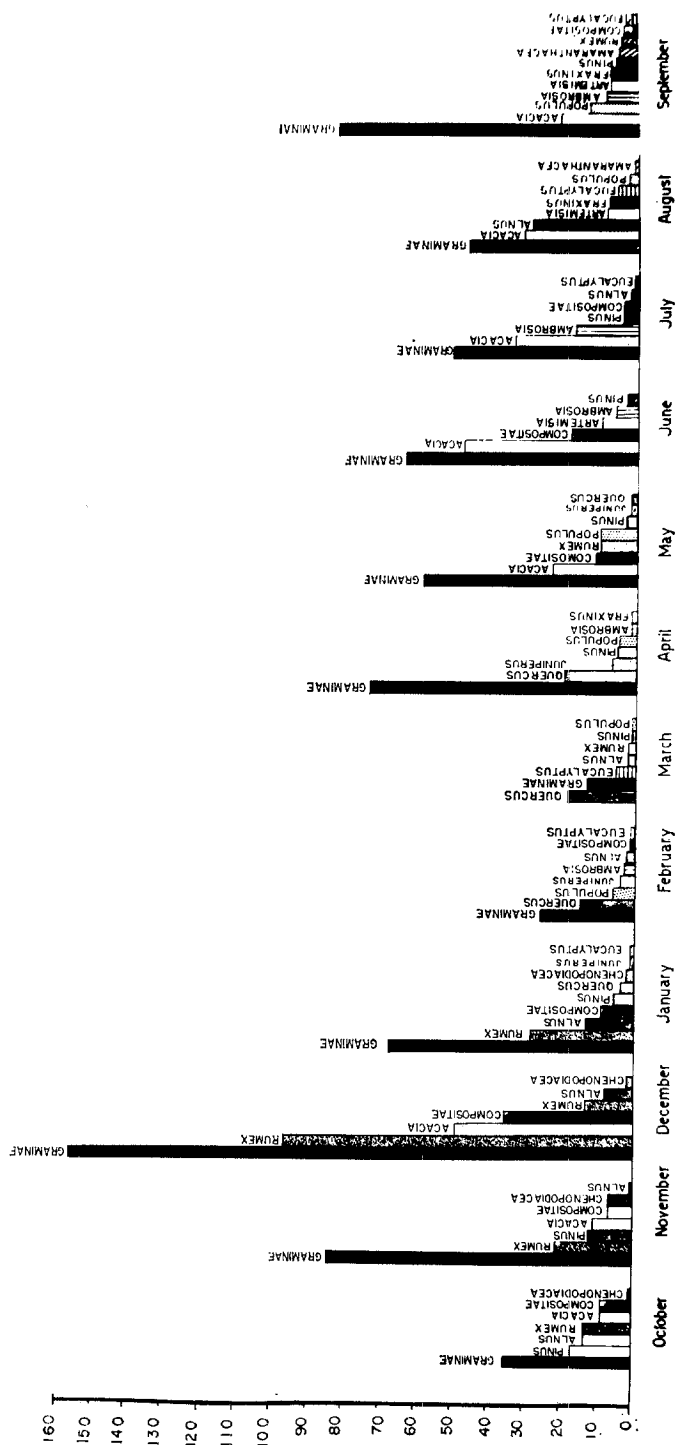


Fig. 2
Five-year averages of monthly pollen count in Bogota, Colombia, S. A., October, 1959, to September, 1964.

posures with the greatest number of grains in June and September. None was found for the rest of the year.

Chenopodium-Amaranthus (goosefoot-pigweed): Pollination occurred most frequently from September through November, however, its frequency is very low in our capital.

Compositae sp. (composite family): Greatest pollination was found in December and June. Its time of pollination is similar to the *Gramineae*. *Ambrosia* sp. (ragweed): This pollen is very rarely found in Bogota, however, small quantities of grains were found in July.

FACTOR ANALYSIS

From environmental and geographical facts we see that not only the requisites set forth by Thomen⁸ influence the daily readings of pollens in Bogota. We must also consider the flora peculiar to Colombia and the climatic conditions of our capital. These are important factors in places such as the Sabana, where there are no seasons—longitude 74° 5' E.G. and latitude 4° 31' north—but more or less marked periods of rain and high wind velocities which have a marked influence on atmospheric conditions.⁹ Take into consideration also the proximity of the Monserrate and Guadalupe Mountains; these mountains have a flora quite different from that found in the capital itself, for example, *Espeletia* sp. (*frailejon*), which we have already mentioned.

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