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A SURVEY OF AIRBORNE POLLEN IN JERUSALEM[1]

By

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Two pollen surveys were carried out in Jerusalem, one in 1953–1954 and one in 1955–1956. Although *Gutmann* compiled lists of allergenic pollen in Palestine, and *Kessler* made pollen surveys of Tel Aviv, no survey of airborne pollen has been published from Jerusalem. The first of the two surveys here was carried out from March, 1953 to March, 1954, the second from 25th October, 1955 to 5th October, 1956. The fact that a period of about 3 weeks in October, 1956 is not accounted for is a draw-back as far as autumn flowering trees are concerned.

FLORA AND VEGETATION OF JERUSALEM

The country is situated at the junction of three geographical regions differing in climate and vegetation. The Mediterranean region receives an annual amount of 400–1000 mm. of precipitation. Its vegetation is characterized by Maquis, a thicket of high shrubs in which the oak, *Quercus calliprinos*, is the most common species. On clearings or on more rocky situations dwarf-shrubs associations form what is called the Batha. Among these associations that of the Thorny Burnet (*Pote-*

[1] This paper is based on surveys published previously (Ref. Nos. 21 and 6) by the authors together with Mr. *Y. Parag* and Mrs. *A. Rahat*, and was supported by a grant from the Hadassah Medical Organization.

rium spinosum) plays a prominent role. On the Eastern and Southern edges of the Mediterranean parts of the country narrow strips of the steppical Irano-Turanian region form transition to the desertic Saharo-Sindian region. The Irona-Turanian parts of the country receive 400–200 mm. annual rain and are characterized by extreme annual and diurnal variation of temperature. The vegetation cover does not exceed dwarf-shrub habit. The Saharo-Sindian parts of the country receive very scant average amounts of rain (200–50 mm.), which in addition vary considerably from one year to another. Temperatures are somewhat higher than in the Irano-Turanian region, but have a smaller variation range.

Jerusalem is situated about 800 m. above sea level on the eastern border of the Mediterranean territory of the country and close to the Irano-Turanian territory. Natural vegetation comprises scattered fragments of Maquis (the *Quercus calliprinos – Pistacia palaestina* association) and much more extensive areas of Batha (dwarf-shrub associations with predominance of *Poterium spinosum,* (Thorny burnet) as well as rock vegetation. Olive groves are rather extensive in the city and its surroundings. Various trees are grown for ornament, the most prominent being *Cupressus, Pinus halepensis, Ceratonia siliqua, Ailanthus glandulosa,* etc. (Cypress, pine, carob tree and tree of heaven). Waste places with ruderal plants are numerous, and walls are often covered with plants, such as *Parietaria judaica* and *Hyoscyamus aureus*. Grasses belong mainly to the *Batha* association, irrigated crops being almost non-existent near Jerusalem.

METHODS AND SITES OF OBSERVATION

Pollen catches were made at two stations in Jerusalem for each survey. Station A was on the roof of a 20 m. high house close to the Old City walls. The house is surrounded by commercial buildings, but a small municipal garden, mostly of mulberry trees is just in front of the house, and the Russian Compound with its olive and pine trees, is less than 200 m.

away. Station B was on the roof of a 12 m. high house in the residential quarter of Rehavia, on the western outskirts of the city, bordering on olive groves and open spaces of natural vegetation. Various trees are grown for ornament near the houses. The two stations are about 1½ km. apart (see sketch map, Figure 1).

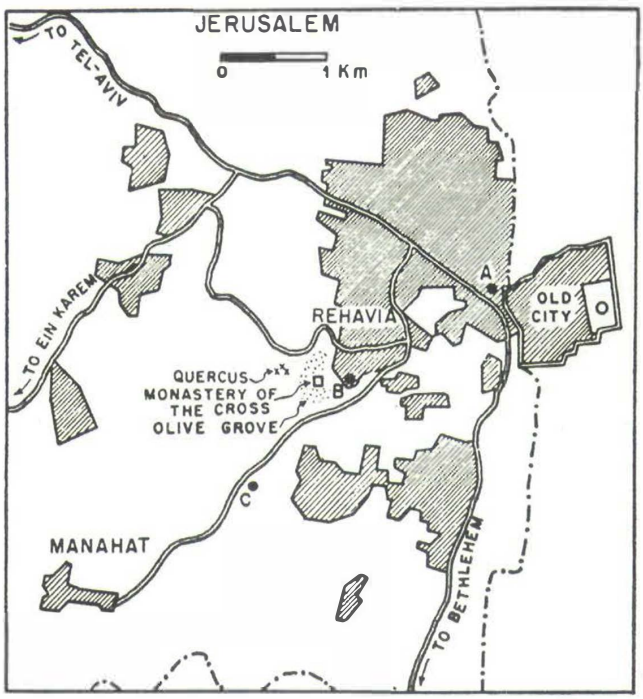

Fig. 1.

Station C, used in the second survey instead of Station B of the first survey, was on the roof of a two-storey building in the Rassco quarter in the western outskirts of Jerusalem, about 1 km. south-west of Station B.

Slides were exposed on a standard collector used by the U.S. Academy of Allergy (*Vaughan* & *Black* 1948). The slides were coated with glycerine jelly (1½ : 1) stained with basic

fuchsin (*Wodehouse* 1935) and exposed, with several exceptions, every 48 hours. In 1953–1954 the vaseline method was used and a drop of Calberla's solution was applied before covering with the coverglass (*Vaughan* & *Black* 1948). Identification of the pollen was carried out with the aid of *Wodehouse* (1935) and *Erdtman* (1943, 1952), but mainly by comparison with pollen taken from plants collected in Jerusalem during the observation years and mounted in glycerine jelly as above. The quantities of pollen counted were calculated per cm^2 daily.

RESULTS

The following plants were recognized among the pollen types:

A. *Main pollen contributors:*

1. *Grasses*. The total pollen quantities are considerably lower than those of Cupressus or Pinus. The main season of grass pollen in 1953 was from the beginning of April to the middle of May. Smaller quantities were found almost throughout the year. In 1956 catches were registered from January to August, the highest amounts occurring in April and May. A similar peak was noted in 1953. The catches of Station A were higher than those of Station C, the reverse of the position in 1953.

No attempt was made to identify species or even genera, since, as is well known, most grasses have very similar pollen and the differences in size exhibited by different species overlap to a great extent.

Some remarks may be added on the grasses common in or near Jerusalem. *Cynodon dactylon,* which *Gutmann* (1950) considers the most important of this country, is rather scarce in Jerusalem in natural habitats, but is grown in lawns as in other parts of the country. It flowers mainly during the summer months but cases of hay fever are concentrated in the spring season. The most common grasses of the Batha around Jerusalem are *Avena sterilis* (Oat), *Hordeum bulbosum, H.*

spontaneum (Barley), *Oryzopsis holciformis, O. miliacea, Dactylis glomerata* (Orchard grass), *Poa bulbosa* (meadow grass), *Bromus spp.* Common road-side grasses are *Hordeum murinum* (Barley grass) and *Lolium perenne* (English rye grass).

The grasses are definitely the most important cause of hay fever in Jerusalem.

2. *Olea europaea.* Olive trees are grown in and near Jerusalem. The flowering season of the olive is short, it starts and ends rather abruptly. Considerable pollen amounts were found in both stations from the beginning of April to the middle of June, 1956. In 1953 no olive pollen was found in April, but the May catches were perceptibly higher. The olive tree is the second most important cause of hay fever in Jerusalem. See also *Kessler* (1958) for its importance in the Tel Aviv region. Some difference in the peak of the curve was noted in both surveys at the two stations (Figs. 2 and 3). Since the olive tree is known to be entomophilous, the high pollen amounts found on the slides suggest that it is wind-pollinated at the later stage of the anthesis of each flower when the pollen becomes dry.

3. *Cupressus.* This genus is the foremost both in pollen quantities and in the length of pollen production. Three species of this genus are grown near houses: *C. sempervirens* (*var. horizontalis* and *var. pyramidalis*), *C. macrocarpa* and *C. arizonica. C. sempervirens* is the most common. Large amounts of Cupressus pollen were found in March–April 1953 and in January–March 1954. Small pollen quantities appeared also from May till October. No case of allergy to cupressus pollen was found.

In 1956 the annual totals were lower than in 1953.

4. *Pinus.* Pine pollen was second in abundance. It appeared in March and April 1953, the flowering time of the main pine species—*Pinus halepensis.* Small amounts of pine pollen were also found on the slides in May, June, and July, presumably from pollen deposits scattered by wind. In 1956 the peak was in March. Although several patients are definite in their

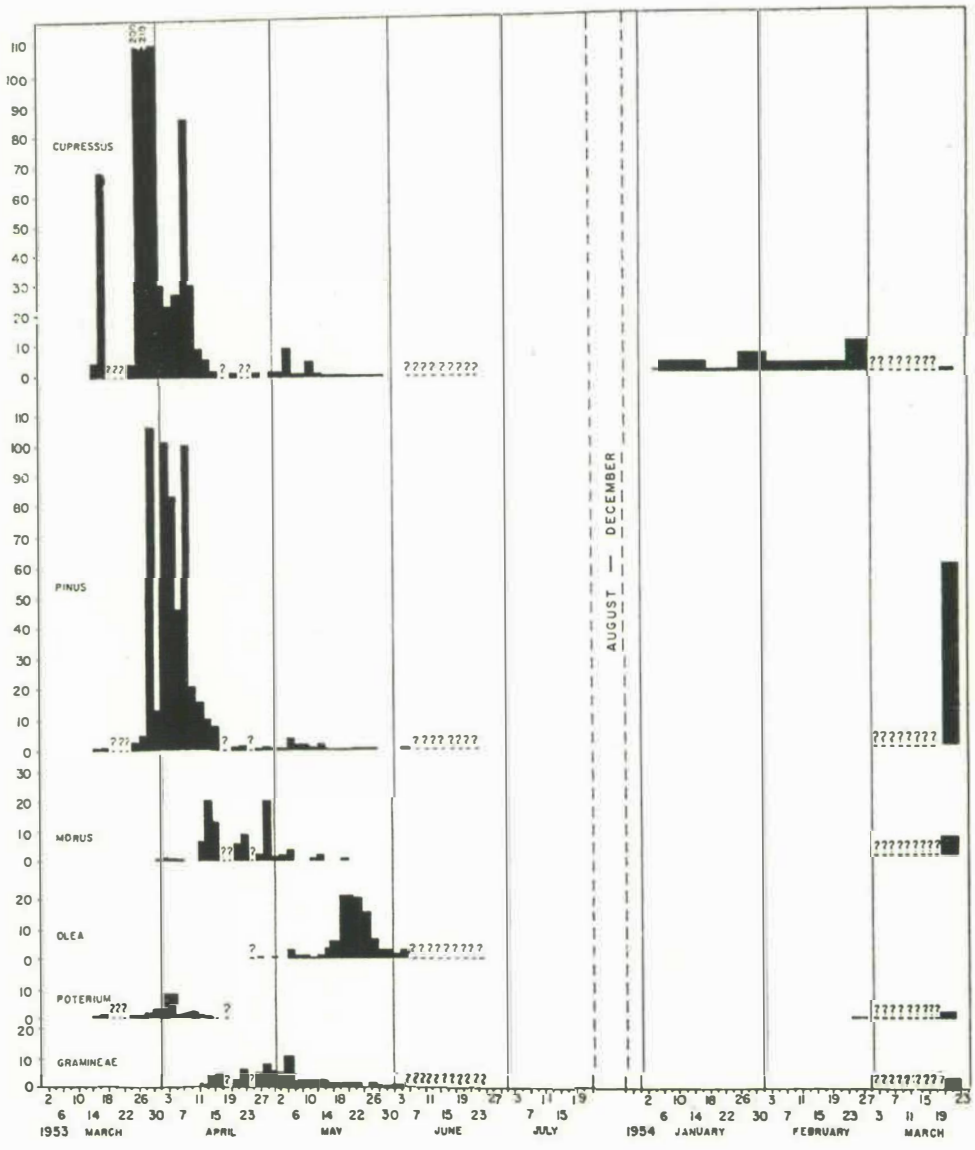

Fig. 2.

Graph of pollen catch in Station A once in two days during the period 6. III. 1953—23. III. 1954, calculated for day/cm². Question marks indicate days when no slides were exposed.

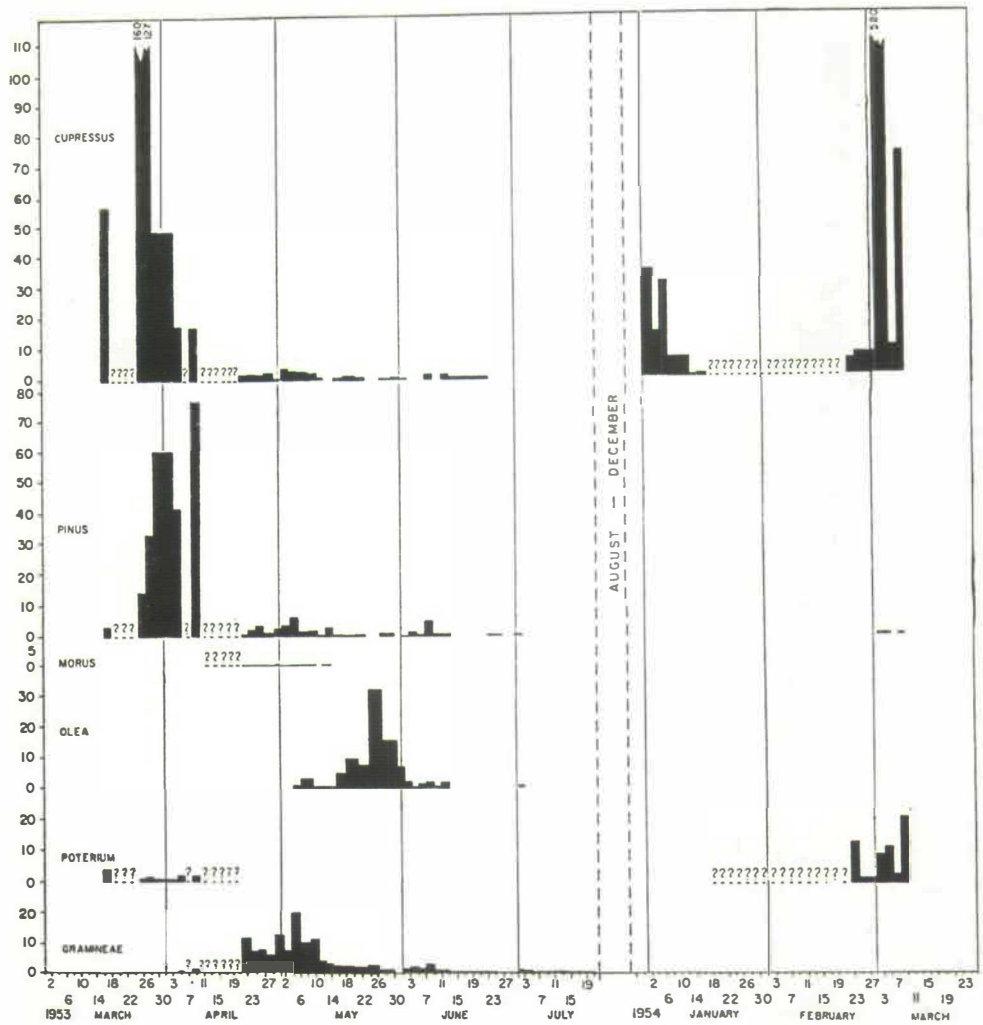

Fig. 3.

Graph of pollen catch at Station B once in two days during the period 16. III. 1953—10. III. 1954, calculated for day/cm². Question marks indicate days when no slides were exposed.

belief that pine pollen is the cause of their distress, no case has been proven to date.[1]

5. *Morus nigra.* Mulberry trees are grown in various parts of the city, the majority being female. A group of male trees growing close to the site of Station A caused rather large pollen deposits to be recorded in this station during April and the first half of May, 1953. The scant Morus pollen found in Stations B and C indicates that its deposition area is rather limited. In 1956 the time of collection was in the first half of April, and the total was much lower.

6. *Poterium spinosum* (*Rosaceae*). This is the main component of the Batha (dwarf-shrub) association *Poterietum spinosi.* Its male flowers produce fair quantities of anemophilous pollen, which is however also collected by bees. The flowering season is from February to the end of April. The pollen amounts recorded at Station B, which is close to the Batha area, are significantly higher than those recorded at Station A. In 1956 is was found from the middle of January to the very end of March. The maximum was in the second half of February whilst in 1954 the maximum was in March.

Being an East-Mediterranean species, *Poterium spinosum* has not as yet been recorded as a contributor to airborne pollen, and its allergenic value is still to be found out.

B. *Plants which contributed small pollen amounts.*

(a) *Trees.*

7. *Ceratonia siliqua.* (*St. John's bread tree or carob tree*). Some pollen of the Carob tree appeared on the slides from October to the middle of November, 1953. In November, 1955 only a few pollen grains were found at Station C and none at Station A. However, it is possible that some pollen could have been collected during October, both in 1955 and

[1] After the writing of this paper was finished, 3 patients suspected of allergy to pinus pollen were tested with proper controls. Two were negative, but one reacted strongly positive to an intranasal test. One of the patients negative to the test, was free of symptoms during the pollen season, after a course of desentitisation with pinus pollen.

1956 when no catches have been made. The small quantities found despite the common occurrence of male trees in the town indicate that they are not wind-pollinated.

8. *Casuarina cunninghamiana* is grown mainly as an avenue tree. Its pollen deposits, though small, are characteristic of the autumn season (September to October, at Station B till December) in 1953. In 1955–1956 small quantities of Casuarina pollen were found from October to January. Here again, the more complete data in October might have increased the registered amounts.

9. *Quercus calliprinos*. Though several trees of this oak species grow about ½ km from Station B, only traces of its pollen were recorded in 1953. This, despite the anemophilous habit of the species. In 1956 somewhat larger pollen catches were registered. In each of the two stations (A and C) there was an annual total of 15.5 pollen grains per 1 cm^2, the catches being scattered from the beginning of April to the end of May. This period corresponds to the flowering time of this oak, the only species in the vicinity of Jerusalem.

10. *Pistacia* (*Anacardiaceae*). Several large trees of *Pistacia atlantica* grow close to Station A, and shrubs of *P. palaestina* grow near the oak trees mentioned above. Despite the fact that these plants are known as windpollinated, almost no pollen of this genus was recorded in 1953. In 1956 none was found.

11. *Schinus molle* (*Anacardiaceae*) is common near houses as an ornamental tree. A few pollen grains were recorded in the summer of 1953. The tree is insect-pollinated. None was found in 1956.

12. *Eucalyptus rostrata* is somewhat less common than the last. Some pollen grains of this insect-pollinated tree were recorded from May to August, 1953. In 1956 small quantities were registered in April at both stations. In 1953 somewhat higher amounts were found.

There were catches in 1956 of two trees not recorded in 1954: *Ailanthus glandulosa* and *Prunus sp.* There is a large plantation of Prunus trees, mainly plums, in the valley below Station C.

Apart from *Ailanthus glandulosa* (*Tas* (1956)) no certain cases of allergy were found to any of the trees 7–12.

(b) *Shrubs and Herbs.*

1. *Cruciferae.* Pollen identified only as to family was found in appreciable amounts in April 1956 at Station C. There are large cabbage plots in the nearby valley. A common wild plant of the Cruciferae family, growing in abundance in April and May, is *Hirschfeldia incana,* an annual confined mainly to roadsides. It flowers later than most crucifers of the wild flora, which mainly blossom in February and March.

2. *Umbelliferae.* Pollen of this family was registered mainly from April to July. Umbelliferous plants flower rather late in the season. Among those common around Jerusalem in late spring and early summer are: *Daucus maximus, Colladonia anisoptera, Peucedanum spreitzenhoferi* and *Foeniculum piperitum.* The last species, the commonest among the plants mentioned, grows profusely on gravelly and disturbed soil around the town.

3. *Compositae.* Pollen from this family apparently belonged to several species. In 1953–1954 small pollen amounts were registered almost all year through. Very small catches were registered from October to December, 1955 and somewhat larger ones in the main flowering season from March to May, 1956. Two common species, *Inula viscosa* and *Varthemia iphionoides*, both emitting a heavy odour, blossom in autumn near Jerusalem.

The allergenic species of Ambrosia and Artemisia, well known in the United States, do not grow in this part of the world. *Ambrosia maritima* growing on heavy soils on the Coastal Plain, does not occur in Jerusalem. *Artemisia monosperma* is very common on the sands of the coast.

4. *Labiatae.* Some pollen of this mainly entomophilous family was collected in April–June 1953 at Station B and in May 1956 at Station C. *Salvia judaica* and *Phlomis viscosa* are representative plants growing near the site in considerable amounts and flowering in late spring.

TABLE I

Monthly totals and annual totals of pollen grains referred to 1 cm².

	Station	1953										1954			
		March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	January	Febr.	March	Total
No. of days of observation	A	12	25	31	6	25	25	24	31	13	17	31	28	–	
	B	9	17	31	30	31	31	30	31	21	15	17	6	9	
Cupressus	A	1142	444	46	2	2		1				80	117		1834
	B	835	235	38	15	4	3	4	6		1	233	30	1687	3091
Pinus	A	258	781	26	3	2		1							1071
	B	285	444	47	25	3	4	1	2	1		1	1	3	817
Morus nigra	A		156	18											174
	B		2	4											6
Casuarina	A							14	11						25
	B							8	5	2	1				16
Olea europaea	A			204	8										212
	B			243	22										265
Ceratonia	A								5	1					6
	B								7	2					9
Poterium spinosum	A	15	45										3		63
	B	16	12										29	93	150
Gramineae	A		64	70	4	4	3	2	2	2			1		152
	B		87	170	28	1	3	2	1		1	1			304
Pistacia	A		0.5	0.4											0.9
	B														
Quercus calliprinos	A		0.7												0.7
	B													0.6	0.6
Schinus molle	A					4	1.4								5.4
	B		0.7		2	2.4		0.5							5.6

Eucalyptus	A			0.5	2	3.4	0.3								6.2
	B														
Parietaria	A														
	B			5.1											5.1
Chenopodium	A		0.2	2.3		0.4	0.6		0.5	1.8		0.5			6.3
	B		0.5	1.3	0.3	1.8				0.3				0.6	5.3
Amaranthus	A					1.3					0.3				1.6
	B		0.2						*0.8*						1
Polygonum	A					1.1									1.1
	B		0.7												0.7
Hyoscyamus aureus	A		1.6	2.5	0.5	0.4	0.9	0.4	1	0.4					7.7
	B		0.7	1.9	2.6	0.9	2.3	0.7				0.7			9.8
Nicotiana glauca	A							0.8		0.8					1.6
	B							0.2							0.2
Umbelliferae	A		0.5	0.9			0.9		1						3.3
	B		1.1	1.9	1.3	0.6			1	0.2		0.4			6.5
Leguminosae	A		0.5	0.2		0.4	0.3								1.4
	B														
Labiatae	B		1.1	1.6	0.6										3.3
Compositae	A	1	1.8	3.4		0.4		1.4	1						9
	B		0.5	4.6	3.2	0.3	2.3	0.2		0.5		0.4		1.6	13.6
Type X (un-	A			23											23
identified)	B		5	57											62
Unidentified	A	2	4.2	1.8	0.5	0.6	0.6	2.4	2.5		0.7	0.5			15.8
	B		4.5	2.6	2	2	3.4	0.9	2.2	2		0.5		4.2	24.3
Total	A	1418	1500	399	20	20	8	23	24	6	1	81	121		3621
	B	1136	795	578	102	26	18	18	25	8	3	237	60	1790	4796

A = station A. B = station B.

TABLE II

Monthly and annual totals of pollen grains referred to 1 cm².

Pollen contributor	Station	1955			1956									1.X-5.X	Annual total
		X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX		
1. *Cupressus*	A				3.5	575	31	7.5	–						617
	C				43.5	1089	54	12.4	0.4						1149.3
2. *Pinus halepensis*	A		0.4	0.4	0.4	2.2	393	16.4	11.5	2.6					426.9
	C		0.4	–	–	6.2	921	85	14.6	3.1					1030.3
3. *Morus*	A							54.6							54.6
	C							6.7							6.7
4. *Casuarina*	A	2.6	0.8	7.5	–										10.9
	C	2.2	0.4	3.1	3.5										9.2
5. *Olea europaea*	A							15	88	2.2					105.2
	C							4.4	177	7.1					188.5
6. *Ceratonia siliqua*	A		–												–
	C		0.4												0.4
7. *Poterium spinosum*	A				5.3	66.6	15.5	1.7							89.1
	C				2.2	41.7	8.0	–							51.9
8. Gramineae	A				–	4.8	7.5	118.0	84	2.2	4	2.6			223.5
	C				0.4	0.4	4.8	85.3	51.5	3.1	1.3	0.8			147.6
9. *Quercus calliprinos*	A							7.1	8.4						15.5
	C							8	7.5						15.5
10. *Eucalyptus*	A							0.4							0.4
	C							1.3							1.3
11. *Ailanthus glandulosa*	A							0.8							0.8
	C							8.0							8.0
12. *Prunus*	A							1.7							1.7
	C							2.2							2.2

13. *Parietaria judaica*	A		1.7	–		0.8		0.4						2.9
	C		0.8	0.4		0.8		1.3		0.4				3.7
14. *Chenopodium*	A							1.7	32.4	65.7	5.3			105.1
	C	1.7						1.3	8.0	8.0	1.3			20.3
15. *Amaranthus*	A		3.1			0.8								3.9
	C		–			0.4								0.4
16. *Polygonum*	A	0.4	0.4	–				0.8						1.6
equisetiforme	C		0.8	0.4				–	1.3	1.7	1.3			5.5
17. *Hyoscyamus aureus*	A								–					–
	C								0.4					0.4
18. Cruciferae	A							2.6	1.3					3.9
	C							71.5	0.4					71.9
19. Umbelliferae	A							8	16	0.8	0.4			22.2
	C							0.8	8.4	1.7	–			10.9
20. Labiatae	A								–					–
	C								0.4					0.4
21. Compositae	A	–	0.4	0.4			–	3.1	3.1					7.0
	C	0.4	–	–			1.3	–	3.5					5.2
22. *Anemonecoronaria*	A							0.4						0.4
	C							0.4						0.4
23. *Plantago*	A		0.4					1.7						2.1
	C		–					2.6						2.6
24. *Lilium*	A									0.4				0.4
	C									–				–
25. Unidentified	A	0.4	0.8	0.8	1.3	1.3	3.1	8.4	6.4	3.1		0.4	0.8	26.8
	C	–	–	–	1.7	0.4	2.2	9.7	16.4	3.5		–	–	33.9

A = station A. C = station C.

5. *Hyoscyamus aureus* (*Solanaceae*). Common on walls througout the city. An entomophilous plant flowering mainly in spring. In 1953 pollen was recorded from April to November at Station A and from April to September at Station B. In 1956 it was found only in May at Station C.

6. *Nicotiana glauca* (*Solanaceae*). This adventitious small tree or shrub is common in waste places and on walls. It is pollinated by insects. Single pollen grains were found on the slides in 1953. None was found in 1956.

7. *Parietaria judaica* (*Urticaceae*) is a common species covering shady walls. Despite its anemophilous pollen, only few pollen grains were found in May 1953. In 1955–1956 it was found from November to June. *Alemany Vall* (1956 a, b) found many cases of allergy to pollen of this species in Barcelona.

8. *Chenopodiaceae.* The common ruderal species, *Chenopodium murale* and *Chenopodium vulvaria,* flower in spring and *Atriplex rosea* in summer. Despite their anemophilous habit, only scattered pollen grains were recorded in 1953. In 1956 pollen from apparently more than one species was found from April to July in quantities much exceeding those of 1953. The maximum was in May and June.

9. *Amaranthaceae. Amaranthus blitoides* is a summer annual, common in waste places and near roadsides. Other Amaranthus species are scarce owing to lack of irrigated crops. Several pollen grains of this family were recorded in 1953 and in 1955–1956.

10. *Polygonum equisetiforme* is a common plant of waste places in Jerusalem. In 1953 only a few pollen grains were found. In the second survey it was found from October to December and from April to July, that is, from the end of the flowering season in 1955 through the main part of the 1956 flowering season. The flowering period of *P. equisetiforme* is very long, being interrupted only during the cold months.

11. The pollen catches of *Anemone coronaria, Lilium* (apparently from *L. candidum* grown for ornament in Jerusalem) and *Plantago sp.* (Plantain) seem to be accidental. Unidentified pollens were found throughout both surveys.

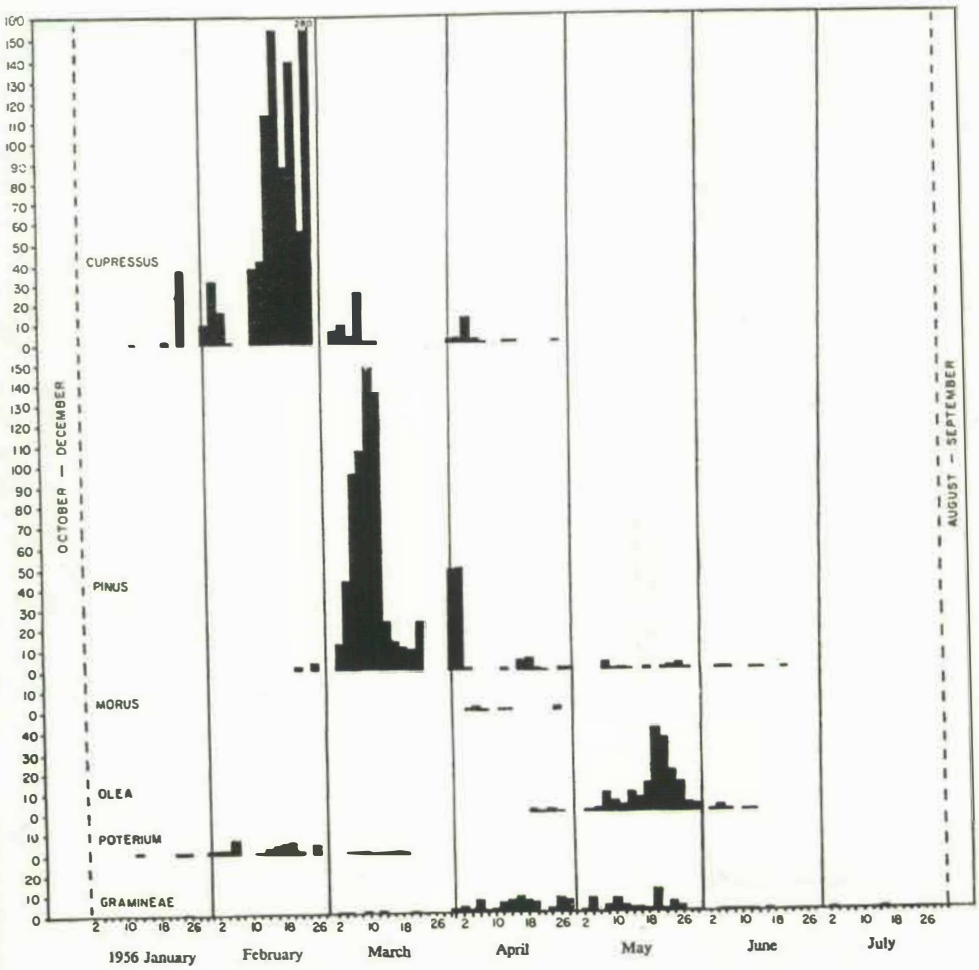

Fig. 4.
Graph of pollen catches at Station A once in two days during the period 25. X. 1955—5. X. 1956 calculated for day/cm².

The results of the pollen counts and identifications are summarized in Tables I and II, in which monthly and total amounts are recorded for each of the stations. Figures 2–5 show diagrammatically the variation in the pollen amounts for the main pollen contributors during the observation periods.

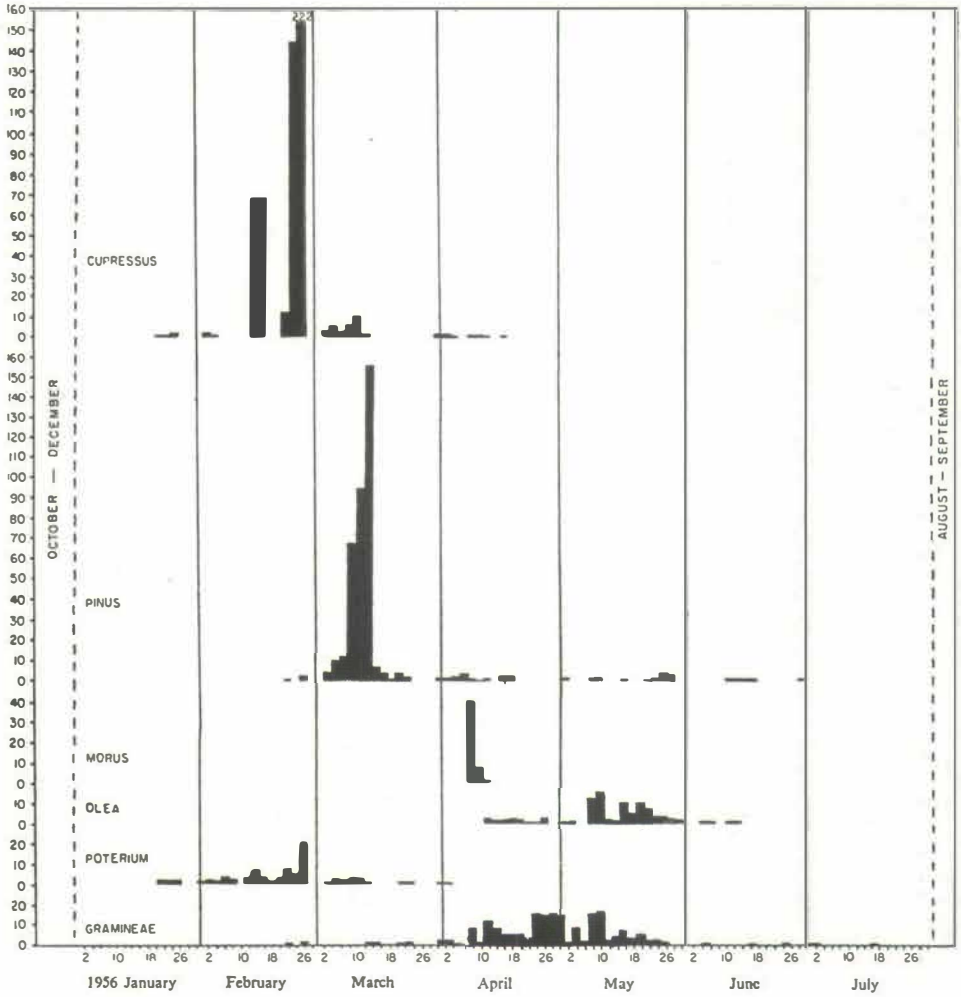

Fig. 5.
Graph of pollen catches at Station C once in two days during the period 25. X. 1955—5. X. 1956 calculated for day/cm².

DISCUSSION

Seasonal variation.

Two seasons of pollen deposition could be distinguished: (a) Spring (March to May and the beginning of June) with

large pollen amounts and many contributing species. This season was preceded by a short winter season (January–February) characterized by Cupressus pollen. (b) Autumn, which was much poorer in every respect. The trees contributing were Casuarina and Ceratonia. Otherwise, during the summer and the first winter months (June to December) only negligible amounts of pollen were found. The hay fever season is restricted to the first mentioned period.

The period of pollen deposition varied in length for different species. Cupressus pollen had a long deposition period, conforming to its long flowering season. The pine has a rather short but very intensive pollen season. Pine pollen also appeared on the slides long after the close of the flowering time, apparently from places where pollen accumulated in spring. The long season of grass pollen is mainly due to the succession of flowering of different grass species. The olive tree, *Poterium spinosum* and the mulberry tree have each a short season dispersion, starting with large pollen quantities and ending suddenly.

The second period of observation, October 25, 1955 to October 5, 1956, comprises the whole of one annual vegetative cycle. This period has the advantage over the first one, which was from March 1953 until the end of March 1954, and comprised the end of one season and the beginning of the other, i.e. two incomplete flowering seasons. The difference in periods of observation makes direct comparison of results somewhat difficult.

Nevertheless, the general picture remained the same, with only minor changes. The main pollen contributors remained Cupressus, Pinus, grasses and Olea europaea. Some Chenopods, *Poterium spinosum* and *Morus* constituted the second main group of pollen sources. Chenopods pollen appeared in considerably higher amounts than in the first investigation, especially in Station A.

A comparison of the annual total catches from the main pollen contributors in both surveys is given in Table III. Since the month March, in which large pollen amounts are collected,

appears twice in the first report (1953 and 1954) the March 1954 totals were deducted to make the data more comparable.

Table III shows that the pollen amounts collected in 1955–1956 were much lower than those of 1953–1954. Since the method of registration adopted in both reports was identical, the differences are probably due to the changed meteorological conditions.

TABLE III

Comparison of the annual total of pollen grains referred to 1 cm².

Pollen contributor	Station	March 1953 to Febr. 1954	Station	Oct. 1955 to Oct. 1956
Cupressus	A	1834	A	617
	B	1404	C	1149
Pinus	A	1071	A	427
	B	814	C	1030
Morus nigra	A	174	A	55
	B	6	C	7
Casuarina	A	25	A	11
	B	16	C	9
Olea europaea	A	212	A	105
	B	265	C	189
Ceratonia siliqua	A	6	A	–
	B	9	C	0.4
Poterium spinosum	A	63	A	89
	B	57	C	52
Gramineae	A	152	A	223
	B	304	C	148

Comparison of rainfall amounts is given in Table IV.[1] The annual rainfall totals do not help explain the decline in pollen amounts in 1956. However, when one compares the separate and combined rainfalls of February and March during the years concerned, it is seen that February 1956 was extremely

[1] The data were kindly supplied by Dr. *J. Lorch* and by the Israel Meteorological Service.

dry (and warm), and even the combined rainfall of February and March was much lower in 1956 than in 1953. In February 1956 ten days of low humidity were registered in Jerusalem, as against five similar days in February 1953. Since the flowering season of the trees listed in Table III is confined mainly to the months of February, March and April, the assumption seems justified that the amount of pollen liberated by these trees depends mainly on rainfall and humidity of the air during February and March.

The difference in pollen amounts was less prominent with the grasses.

TABLE IV

Rainfall in 1952–53, 1953–54 and 1955–56.

a. Monthly amounts in mm (Rainy days in parantheses).

	X	XI	XII	I	II	III	IV	V	Total
1952–53	6	16	19	95	136	223	2	–	497
	(2)	(4)	(7)	(10)	(12)	(19)	(2)		
1953–54	drops	169	135	58	133	20	22	drops	537
		(12)	(13)	(9)	(13)	(6)	(4)		
1955–56	1	156	70	134	38	151	4	1	555
	(3)	(10)	(11)	(13)	(9)	(13)	(5)		
Average of many years									480

b. Rainfall during main flowering season of trees.

	II	III	II + III	I + II + III	Total
1953	136	223	359	454	497
1954	133	20	153	211	537
1956	38	151	189	323	555

Kessler (1953, 1954, 1958) reported a five year pollen survey in Tel Aviv, situated on the coast. The Tel Aviv vegetation in general is quite different from that of Jerusalem, and this includes the wild grasses. It is therefore noteworthy that the pollen curves of both localities ary very similar.

Liebeskind from Haifa (1960) in a study, based on skin tests on 421 patients from the Northern part of the country

found the most frequent allergens Gramineae, Olea and Artemisia, in this order.

From a practical point of view, the most important pollen in the Jerusalem area is the grass pollen. Also of importance, though to a smaller degree, is the pollen of the olive tree. Sporadic cases of allergy to *Ailanthus glandulosa* were encountered (*Tas* 1956). In a small group of patients, the offending pollen was not determined.

Ragweed species (*Ambrosia elatior, A. trifida*) and sagebrush (*Artemisia tridentata*) do not occur in this part of the world.

SUMMARY

The results are given of a pollen survey of Jerusalem, by the gravity slide method. The years examined were 1953–1954 (March to March) and 1955–1956 (October to October).

The main pollen contributors vere: (a) *Cupressus, Pinus, Poterium spinosum* (February–April) and (b) grasses, olive tree and mulberry tree (April–May). The grasses and the olive tree are the most important allergens, and are responsible for the overwhelming majority of cases of pollen allergy seen in Jerusalem.

In the Spring of 1956 fewer pollens were found than in the spring of 1953 and 1954, apparently due to the lower rainfall in 1956.

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