

STUDIES ON HAY FEVER

*With special regard to pollinosis due to
parietaria officinalis*¹

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INTRODUCTION

The problem of Pollinosis, a morbid condition known since Bostock made his reports to the London Medical Society, 130 years ago, assumes a particular interest for three main and equally important reasons.

Firstly because of the high and increasing incidence of the disease.

Secondly because a better knowledge of the not yet fully understood basic features of this typically allergic disease, (the antigenic property of pollen, the immunological chemistry of the skin-sensitizing antibodies and the reactivity of the tissues) could furnish not only an interpretation of the various clinical and immunological aspects of the disease, but also clarify the pathogenic mechanisms of such other diseases now considered to be of allergic origin.

Lastly because the important problems concerning the diagnosis, the etiology and the specific treatment of pollinosis (now accessible to further researches) apply to many other allergic conditions commonly encountered in allergological practice.

I shall here confine myself to the development of some of the clinical and practical aspects of pollinosis.

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SKIN REACTIONS -
GENERAL CONSIDERATIONS

As far as the diagnosis is concerned, skin tests undoubtedly constitute not only the best known but also the most important diagnostic procedure. I will dwell on this subject as seen from a more general point a view.

Although skin tests have been known for about 40 years and are the most commonly used procedure to establish the etiology of pollinosis and of other allergic diseases, their value is still today subject to great differences of opinion.

This has probably contributed to the creation of a certain scepticism in the mind of the general practitioner. We believe that such differences of opinion are primarily derived from the fact that many problems of the skin tests are still under discussion, while others, such as those concerning the criteria to be followed in the interpretation of positive results, have not yet found a general diffusion, though they have often and authoritatively been stated.

I will, therefore, once more emphasize those of particular interest.

1) — In every clinical case it seems to me to be necessary to establish the route by which the etiological agent reaches the body, both in its preparatory function and when producing an attack. A knowledge of the probable route by which the allergen is introduced gives us an orientation not only regarding the choice of the tests to be used in a given case, but also clarifies the results the tests produce.

Indeed when the route is by *inhalation* skin tests (by scratch test or by intradermal injection) done with various exogenous allergens, are in the great majority of cases immunologically positive (with positive passive transfer) and are etiologically significant with regard to the allergic syndrome.

When the route is by *ingestion* of food or drugs, on the other hand, the same skin tests are frequently negative. This makes it necessary to revert to dietary elimination tests .

When the route is by *injection* these skin tests frequently yield positive results.

When the route is by *contact*, scratch test and intradermal injection are, as is well known, invariably negative while significantly positive results can only be obtained with patch tests.

This particular behaviour is probably due to differences in the immune response of different individuals, according to the mode of introduction of the allergen, in analogy to what has been amply demonstrated to occur with bacterial antigens. Concerning the respiratory introduction it may be recalled that the quantity of antibodies present in nasal polyps may be greater than in the serum (*Berdal*) and that *Strömme* has histologically shown an increased number of plasma-cells to be present in the nasal mucosa of guinea-pigs exposed to the inhalation of pollens, a phenomenon presumably related to the production of antibodies.

It should also be remembered that in choosing the most suitable tests the nature of the etiological agent must be taken into consideration. Indeed, it is known that simple chemical substances, when used in scratch test and intradermal injection, usually yield negative results, while when applied by contact the reaction is positive. They thus behave in exactly the opposite way to protein allergens.

It must however be pointed out—and this emphasizes the importance of route of introduction—that simple chemical substances, capable of producing oculo-rhinitic and asthmatic symptoms when inhaled, very often produce positive skin tests and a positive passive transfer (*Kern*, 1939, Phthalic acid anhydride; *Saunders*, 1943, Arsenobenzol; *Feinberg & Watrous*, 1945, Chloramine; *Johnston & Coll.*, 1951; our personal observations).

A still unsettled and at present much discussed problem is whether intradermal injection or scratch (or prick) test should be systematically adopted for diagnosis of allergic diseases.

While I do not wish to enlarge upon this problem, my personal view is that the advantages and disadvantages of

both methods are almost equal and that, rather than the intrinsic value of either method, it is the technique used and the critical evaluation of the results achieved, that matter.

It is in that direction that further study will improve our knowledge.

It seems to me that the right attitude to take—and it is the one we follow with most satisfactory results, it also having been recommended by outstanding authorities (as *Vaughan, Tuft, Peshkin* and others)—is to combine the two methods, making full use of the harmlessness and simplicity of the scratch test and the greater sensitivity of intradermal injections.

A fundamentally important phase in diagnostic procedure is the interpretation based on a strict and critical evaluation of the results of skin tests, be they positive or negative.

We must accept the fact that the doubts which some authors still harbour regarding the reliability of skin tests originate from an inexact interpretation of these tests which leads to an inexact etiological diagnosis and hence, obviously, to an inadequate therapeutic approach.

Let us try to group the positive reactions into a few basic categories according to how they are produced. In suggesting such a classification it is important that we bear in mind a consideration to which I have already called attention elsewhere, namely whether or not the reactions observed are etiologically significant for the actual disease. (table I).

If we exclude the non-specific or false reactions, we are left with the question as to whether the serologically positive skin reactions are etiologically significant as regards the syndrome presented by the patient or whether they have no such significance. In the latter case we may be dealing with; (i) (*postclinical sensitization*, i.e. cutaneous sensitizations persisting after the disappearance of clinical manifestations (ii) *Preclinical or potential sensitization* i.e.; a cutaneous sensitization which will be followed by clinical manifestations. (iii) *Latent sensitization* (*Salén & Juhlin-Dannfelt* and *Spoujitch*) i.e. a cutaneous sensitization persisting without clinical mani-

TABLE I
Positive skin reactions.

<i>Non Specific</i> (or false positive reactions)	{	Due to individual peculiarities	Abnormal irritability of the skin: e.g. factitious urticaria.
	}	Due to the extracts used	Intradermal injection of too concentrated solutions presence of irritant substances; excessive doses.
<i>Immunologically Specific</i>	{	Due to postclinical sensitization	<i>Without etiological significance</i> as regards the actual disease. <i>Etiologically significant</i> as regards the actual disease.
		Due to preclinical or potential sensitization	
		Due to latent sensitization	
		Due to group sensitivity	
	}	Due to clinical sensitization	

festations. (iv) *Group sensitivity* i.e. skin sensitivity towards substances with which the patient may never have been in contact but which are biochemically allied with the allergen which produced the original sensitivity.

These various possibilities which we encounter daily in clinical practice show how necessary it is to bring the patient's symptomatology into a clear etiological relationship to any positive skin reactions, just as this should always be done with any kind of laboratory test.

Clinical control must be made subject to a very careful history-taking and may require those tests which *Herxheimer* has long ago called to our attention.

SKIN TESTS IN POLLINOSIS - GENERAL OBSERVATIONS

Bearing such general considerations in mind, we can say that positive skin tests encountered in pollinosis, though requiring evaluation along the lines just discussed, may in the great majority of cases be considered indicative of clinical allergy, as it usually corresponds to a typically seasonal symptomatology induced by the exposure to the pollen of those plants which give a positive skin reaction.

I may be permitted to give some figures obtained from the results of skin tests made in 2219 cases of pollinosis which I have personally observed during the years 1933 to 1955.

In this group of patients, coming from different parts of the Italian mainland and from various islands, an intensive study of skin sensitivity, in most cases by scratch test was conducted, not only with about 70 pollen families but also with single species in these families. Moreover, in each case other sensitivities towards exogenous and alimentary allergens other than pollens, were tested.

Fig. 1 shows the skin-positivity towards the various families in order of frequency. The percentages are calculated on the number of positive skin reactions to a single family regardless of the fact that frequently positive tests towards several families was found in the same individual

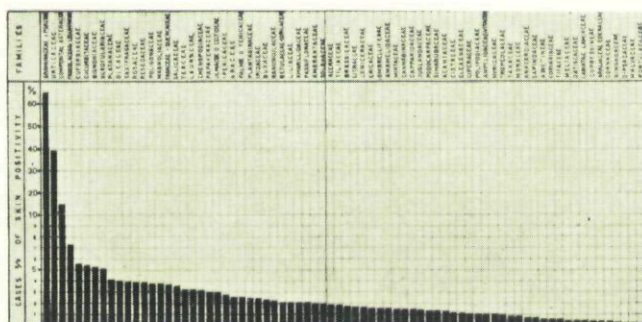


Fig. 1.

Positive skin tests were common in some families and these in order of decreasing frequency are as follows: Graminaceae (65.07 %), Urticaceae (39.61 %), Compositae (14.67 %). The families which produced positive tests in slightly more than 5 % of the cases only, were the following: Leguminosae, Euphorbiaceae, Cucurbitaceae, Strophulariaceae. Besides these, there are many other families with an even smaller percentage.

The pollens that commonly produce positive skin tests belong to the anemophilous group and this is the most representative group in the atmosphere of Italy. It should be stressed that we found, though rarely, positive skin-tests for the pollens of entomophilous plants. Some species produce pollens in large amount (e.g. Compositae), because either from the particular condition of distribution of flora in Italy or from the peculiar ways of exposure to these pollens which is related to work at the flowering season, or for professional reasons: florists etc.

So far as species within one family producing a positive skin reaction, I shall discuss only the more important data concerning the Graminaceae, the Urticaceae and the Compositae. These are shown in Fig. 2—in per cent and in decreasing order of frequency.

Among the Graminaceae those species which are most widely diffused are most frequently involved (*Vulpia ligu-*

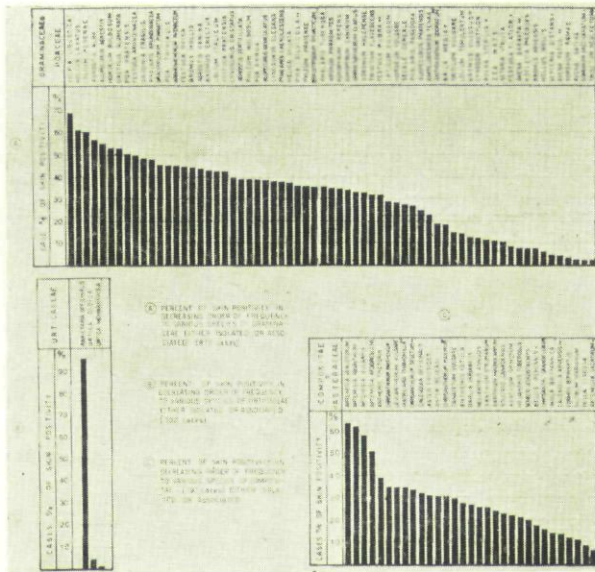


Fig. 2.

stica, *Holcus lanatus*, *Lilium perenne*, *Agrostis alba*, in decreasing order of frequency). This shows that although some species show a positive skin reaction in a large number of cases, for instance *Vulpia ligustica* in 68.7 %, no species of Gramineae is positive in all cases, thus no single species can be taken as representative of the family for purposes of diagnosis or specific treatment.

Among the Compositae, the Artemisiae take the first place. The other species follow in a gradually decreasing order of frequency.

In the case of the Urticaceae the position is quite different from that of Gramineae and the Compositae. Here there is an impressively high frequency of positive reactions towards *Parietaria officinalis*, either isolated or associated, namely 96.6 % of the cases, as compared with the other two species tested.

This marked difference in their ability to produce positive skin tests between the species of the Gramineae and the

Compositae on the one hand and of those of the Urticaceae on the other, leads us to suspect that while in the former two there exists, apart from the species-specific antigen, a common family antigen, as *Augustin* has shown to be the case for many Graminaceae, in the case of the Urticaceae there is perhaps a particularly active antigen which is independent of the other species and is specific for *Parietaria officinalis*. This is confirmed by the frequency of constitutional reactions arising during desensitization.

The results of our observations justify the claim that positive skin tests to a single species is more common than is generally believed, as although we have limited ourselves to the three families mentioned we encountered this phenomenon in 589 persons out of 2219 which is 26.5 %. In 560 that is the vast majority of these cases, the reaction was towards *Parietaria officinalis*.

Moreover 10 % of the 2219 cases of pollinosis examined were skin positive to other inhaled or alimentary allergens.

POLLINOSIS DUE TO *PARIETARIA* *OFFICINALIS*

The data we have referred to show that the new and outstanding feature of Italian pollinosis is the high incidence of pollinosis due to *Parietaria officinalis*, which is particularly common in the South and on the Island¹.

In this connection it is interesting to recall the first reported case of *Parietaria* pollinosis in 1927. An old country doctor in Cascina, near Pisa, told Prof. Frugoni that every time he fed his chickens he got sneezing, rhinitis and asthma. When the chicken-feed was examined it was found to be made up mostly of *Parietaria officinalis*. When skin tests and passive transfer had been done a sensitization towards this herb was demonstrated for the first time.

¹ The most used, common tuscan names for *Parietaria officinalis* are: *Parietaria*, "Spaccapietra", *Vetriola*. In England it is named *Pellitory of Walls*.

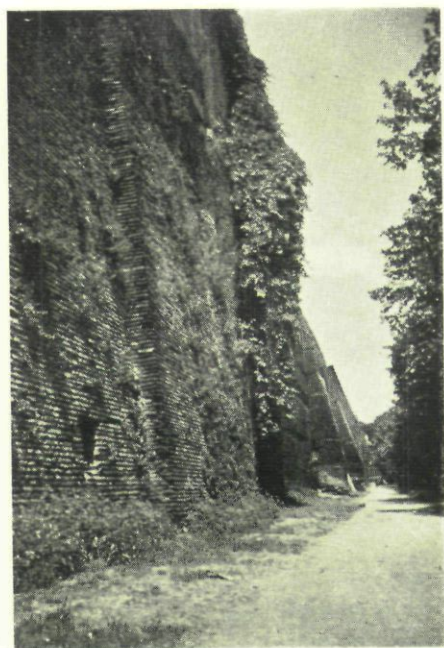
*Fig. 3.**Fig. 4.*



Fig. 5.



Fig. 6.

Parietaria officinalis, belonging to the family of the Urticaceae is a perennial widely distributed in Italy, growing particularly on walls and rocks Fig. 3, 4, 5. It has also been found in Southern and Western Europe, in the Near East, North Africa, Madeira and the Canary Island Fig. 6. Some botanists, *Hegy* and *Boswell* for instance, state that *Parietaria* is also present in the flora of Northern Europe such as in that of Southern England, Holland, Sweden and Denmark.

Aerobiological investigation has shown that the pollen of *Parietaria officinalis* is present all the year round, with a particularly high concentration during the flowering period, in the air of all places in which the plant occurs (Alemany Vall 1956; Barcelona; Ferrari Padua; Volterrani Turin).

Williams and Hyde state that the differentiation of pollen of *Parietaria* from that of *Urtica dioica* is practically impossible.

For the Italian flora Mameli-Calvino has suggested the following criteria for identifying *Parietaria officinalis*.

Size: The pollen of *Parietaria* (Fig. 7) measured in water is 18–20–24 microns while that of *Urtica dioica*, is always less, ranging from 14 to 16 microns.

Pores: The pollen of *Parietaria* has 3 (rarely 4) pores while that of *Urtica* has 5–6 and rarely 4.

Di Nardo and *Navazio* were able to separate the allergenically active components of *Parietaria* by partition paper chro-

² – Species of *Parietaria* of Italian Flora.

Section Euparietaria.

- Parietaria officinalis* L. – common on ruins, walls, bushes, woods
 „ „ var. *erecta* (M. et K.) Istria, Peninsula, Islands
 „ „ var. *judaica* (L.) especially on rocks and walls.

- Parietaria Lusitanica* L. – common on walls, ruins, fissures of rocks
 „ „ var. *Filiformis* (Ten.) Capri, Ischia, Sicily

- Parietaria Cretica* L. Small Islands south to Sicily (Levanzo, Favignana, Maretimo) and in Linosa, Lampedusa, Pantelleria. On walls, ruins and rocks.

Section Helxine.

- Parietaria Soleirolii* Spr. (*Helxine Soleirolii* Reg.) Sardinia, Corsica, Capraia etc. Damp, shady places.



Fig. 7.

matography. They found a yellowish band consisting of the natural yellow pigments, four ninhydrin positive bands, one of ketonic bodies and a very broad one due to reducing substances.

Skin tests with the eluates, obtained from the previously identified zones were performed in patients sensitive to *Parietaria officinalis*.

The results show that the material obtained from the ninhydrin band is the most active with regard to skin sensitivity, however, the other fractions also show some allergenic activity, though to a lesser degree.

While in Italy, after the first observations, a considerable number of cases was reported (Serafini 1950, 1952), this form of pollinosis is unknown in the United States where the plant does not belong to the flora and has only rarely been reported from other countries, such as from Spain Barcelona Alemany Vall, 1947-49-56, and in Baleari Isles, Lopez Ruiz Azagra, 1953. In May 1956 Panzani described, the first, 12 cases of pollinosis due to *Parietaria* in France. Scimone (1956) recently reported some cases in individuals from Turkey.

Among 2219 persons suffering from pollinosis examined (all from Middle-Southern Italy and Italian Islands), we can actually report a positive skin reaction to *Parietaria officinalis*, 944 times and in each case this was clinically significant, as it corresponded to the patient's symptomatology.

This pollinosis differs in three important ways from that produced by the Gramineae. The first is the frequency of isolated sensitization, that is, the absence of sensitization to the pollen of the other species of the family (529 out of 944 cases). This phenomenon is exceptional in the case of the Gramineae. The second is the high incidence of bronchial asthma which reaches 67.5 % and is thus far higher than found in Gramineal pollinosis where it is only 40 %. The third is the length of the period of suffering which may be Spring to Summer or Spring to Autumn and sometimes even multiseasonal, while the Gramineal pollinosis is generally limited to Spring. The prolongation of symptomatology is undoubtedly due not only to the multiseasonal flowering of *Parietaria officinalis* which is phytophenologically classified as "continual flowering", but also to the fact that the pollen is thrown into the air at the moment of anthesis by a kind of propulsive explosion of the elastic filaments of the anthers which greatly facilitates its diffusion, even in a perfectly calm atmosphere.

As *Mameli-Calvino* points out, the asthmogenic character and the frequency of sensitization only to the pollen of *Parietaria* can be attributed to various causes of which the most important are (i). The size of the pollen which has a diameter of 16 to 18 microns and thus facilitates a wide contact of each individual granule with the surface of the mucosa. (ii). The fact that the pollen of *Parietaria officinalis* is always accompanied by many bits of rough silicized hair from the flower and the leaves (fig. 8) (iii). The fact that the pollen is hydrophilous and very rapidly absorbs water.

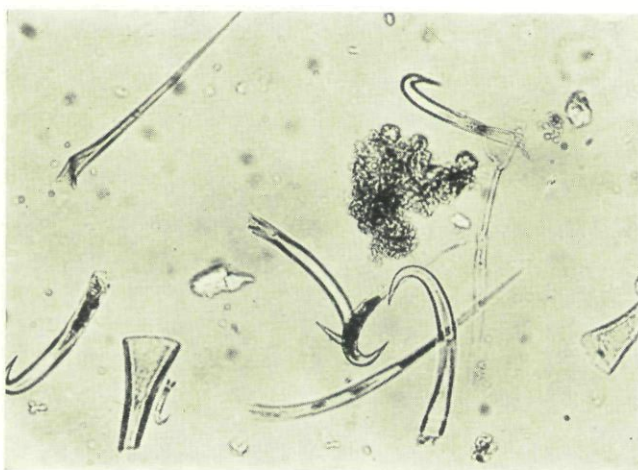


Fig. 8.

VARIATIONS OF SKIN REACTIONS IN TIME

I will now dwell briefly on a final problem, that of the changes in skin reaction with the passage of time. I investigated this question in collaboration with Dr. *Di Nardo* (1956) in a group of patients that had 2 to 23 years ago had a positive skin reactions with exactly the same technique as previously employed, namely scarification and by the same person and using the same allergens.

The table shows that in 56 % of the cases the skin reactions remain unchanged and are thus independent of variations of the clinical course. This is in accordance with the data

TABLE II
Variations of skin reactions in time.

	No. of patient	Percent
Unchanged	59	56.2
Increased	30	28.5
Decreased	12	11.4
Qualitative variations	4	3.9

given by *Tuft* and *Peshkin* who claim that skin reactions persist unchanged for years, particularly in inhalation allergies. The same results were recently obtained by *Ogilvie* who found that out of 204 cases examined with regard to skin reactions and clinical symptomatology for a period varying from 2 to 17 years, 114, (and thus more than 50 %) showed no change whatsoever. That skin reactions also persist in alimentary allergies has been shown by *Tuft & Heck* in 1954.

28.5 % of our cases there was an increase in skin sensitization. Most of these patients showed a clinical deterioration.

In 11.40 % the number of positive reactions had decreased. This was, in some cases, due to clinical improvement and may to some extent be the result of treatment by specific hypsensitization which we usually adopt.

A small percentage of 3.9 showed qualitative changes which are difficult to classify. It was felt that could not be included in any of the other groups.

Thus a positive reaction to inhaled allergens usually persists for years, yet frequently there is a change in the sense of either an increase or a decrease in the number of positive reactions due to various factors.

FLOWERING SEASONS AND CLINICAL FORMS OF POLLINOSIS IN ITALY

Having discussed the skin reactions of pollinosis there remain the interesting problems of seasonal flowering and the clinical states it produces.

In Italy we can distinguish several waves of diffusion of individual pollens (Fig. 9).

The first wave occurs during a period immediately preceding Spring. It consists of arboreal pollens and is very slight.

A second wave appears during Spring and consists of the Gramineae pollens which are the most abundant in our flora.

A third wave appears during Summer-Autumn and is produced by the Compositae. At the beginning of this wave the

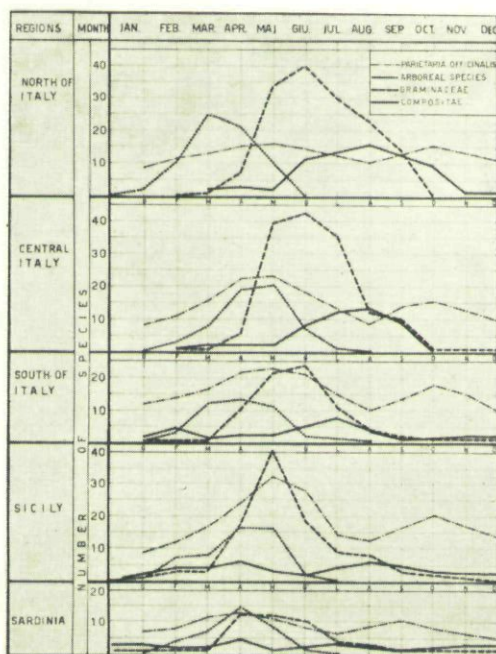


Fig. 9.

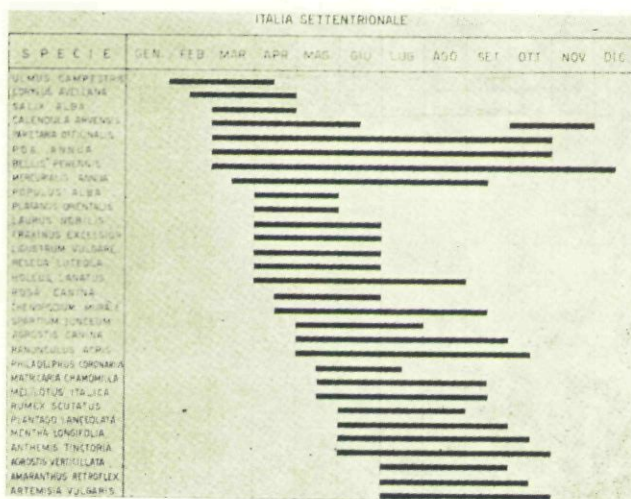
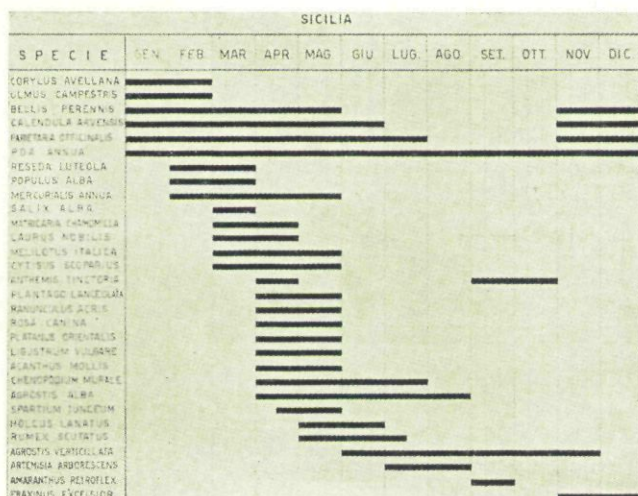
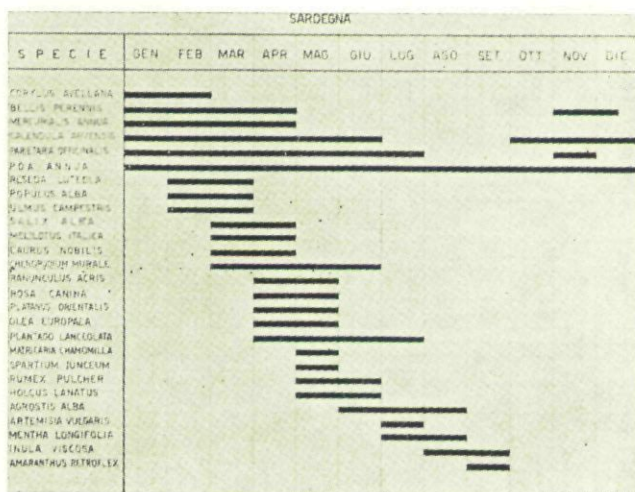


Fig. 10.

From Serafini, U., Gola, G.: "La pollinosi", Vallecchi Ed., Firenze, 1952.

Fig. 13.¹Fig. 14.¹

¹ From Serafini, U., Gola, G.: "La pollinosi", Vallecchi Ed., Firenze, 1952.

TABLE III

Clinical forms	Frequency ¹	Etiological factors
Seasonally isolated +++	±	Arboreal plants (Salicaceae, Fagaceae, Betulaceae, Ulmaceae)
	+++	Graminaceae, Parietaria
	+	Graminaceae, Parietaria
	±	Compositae
	+	Trees, Graminaceae
	++	Graminaceae, Parietaria
	++	Parietaria, Graminaceae
	+	Compositae
	±	Parietaria, Graminaceae
Pre-Spring form		
Spring form		
Summer form		
Autumnal form		
Pre-Spring-Spring form		
Spring-Summer form		
Spring-Autumn form		
Summer-Autumn form		
Multiseasonal form		

+++ very frequent.
 ++ frequent.
 + rare.
 ± exceptional.

second flowering of the Graminaceae also contributes pollens of that family.

In Italy *Gola*, the Botanist of Padua, has established the period in which the main species, capable of producing pollinosis, flower. These results are shown in the calendar of flowering (Fig. 10) compiled separately for Northern, Central and Southern Italy as well as for Sicily and Sardinia. It shows the duration of flowering of those species which can spontaneously produce pollinosis.

According to the period in which the symptoms appear, I have classified the clinical forms of pollinosis, particularly found in South and Central Italy, into seasonal isolated and seasonally non-isolated forms at the same time giving the pollens which may be held responsible (table III). Obviously I have limited this enquiry to patients sensitive to one family only of which there were 346 and have borne in mind the most important features of the calendar of flowering of the various plants.

Among the seasonally isolated forms the most common is the *Spring form* and among the non-isolated the *Spring-Summer* and the *Spring-Autumn form*, all of which are produced by the Graminaceae and *Parietaria officinalis*.

The seasons of flowering of the pollen bearing plants are, with such modifications as may be determined by climate and flora, much the same as those described by *Duchaine* (1954) for Belgium, by *Hansen* (1940) for Germany, by *Hyde, Hyde & Williams* for Great Britain, by *Jimenez Diaz* (1933), *Surinyach et al.* and *Alemaný-Vall* for Spain.

The most outstanding distinctive feature of the Italian and European forms as compared with those of the United States, is, as is wellknown, the frequency with which pollinosis due to Ambrosiaceae with an exclusively Autumnal incidence is prevalent in North America. On the other hand in Italy the particular form of Autumnal pollinosis due to Compositae is extremely rare. By and large the other forms are rather similar on both continents. In fact, just as in Italy and in the rest of Europe, the arboreal pre-Spring forms are rare; this is also

the case in North America. In both Continents moreover the Spring-Summer types are very common.

In conclusion, it would appear that though pollinosis was the first disease to be recognized as allergic, it still poses many interesting problems of a biological nature, particularly regarding the modern field of immunological chemistry and also from a practical etiological and hence therapeutic point of view.

It cannot be sufficiently emphasized how important it is for close collaboration between allergologist and botanist for further clarification of our etiological problems.

SUMMARY

Some of the clinical aspects of pollinosis are discussed. When dealing with skin reactions in general, the importance is emphasized of the presumed route of introduction of the allergens which in each case makes it possible to choose the most suitable tests and to interpret their results.

The interpretation of positive results are distinguished as specific (immunological) with etiological significance from those without etiological significance.

The results of skin tests done on 2219 cases of pollinosis are reported. Skin reactions were most often present in the Gramineae, Urticaceae and Compositae. Regarding the species in these families, the very frequent reaction to *Parietaria officinalis* (Urticaceae) was noted. This seemed to be of particular significance when compared with the causes of pollinosis in other countries.

Parietaria officinalis is a perennial, wide-spread, particularly in Italy, growing on walls and rocks. It also occurs in Southern and Eastern Europe, in the Near East in Northern Africa, Madeira and the Canary Islands. The author found 944 persons having a clinically significant positive skin test to *Parietaria officinalis*. This pollinosis differs from those of the Gramineae in three important points. (i) The frequency

a close collaboration between allergologist and botanist for nosis due to graminaceae. (ii) The incidence of bronchial asthma (67.5 %), markedly higher to that occurring in graminaceal pollinosis (40 %). (iii) The long period of symptoms (Spring-Autumn and Spring-Summer), while in graminaceal pollinosis this is generally limited to Spring only.

A study of the variations of skin reactions in time (2 to 23 years) showed that out of 105 patients 56.2 % remained unchanged, 28.5 % had increased, 11.4 % decreased and 3.9 % showed qualitative changes.

Finally the seasons of flowering and the clinical forms of pollinosis in Italy are described. There are distinguished the seasonally isolated, the most common from being in Spring, and the non-isolated forms of which the most common are the Spring-Summer and the Spring-Autumn forms, all of which are caused by the Graminaceae and *Parietaria officinalis*. Some distinctive characteristics of Italian forms are compared with those of other countries.

REFERENCES

- Alemaný Fall, R.*: Polinosis. III° Congreso Nacional de Alergia, Canarias 1954. Editorial Paz Montalvo, Madrid.
- Sensitivity to the “*Parietaria*” (Wallpellitory) in mediterranean Countries. Atti III° Congr. Europeo Allergologia p. 460, Ed. Pensiero Scientifico, 1956.
- Alemaný Fall, R., Planas, J. & Pares, R.*: Fiebre del heno por la *Parietaria officinalis* en Barcelona. Anales de Med. y Cic. 24, 3, 1949.
- Augustin, R.*: Chemical, Biochemical and Immunologic advances in allergy with special reference to pollens and their standardization. Quart. Rev. Allergy and Applied Immunol. 9, 504, 1955.
- Berdal, P.*: Serological investigations on the edema fluid from nasal polyps; a preliminary report. J. Allergy 23, 11, 1952.
- Bostock, J.*: Case of periodical affection of the eyes and chest. Med. Chir. Tr. London 10, 161, 1819.
- Of the “catarrhus aestivus” or summer catarrh (London G. Woodfall) Reprinted from “Med. Chir. Tr.” London 14, 437, 1828.
- Boswell, J. T.*: English Botany, Vol. VIII, London 1868.
- Dal Bo, S.*: Le facteur allergologique et le facteur infectieuse dans le déterminisme des affections nasales chroniques et à recidives. Acta Allergol. 8, 44, 1951.

- Di Nardo, U. & Navazio, F.*: Risultati preliminari sull'analisi cromatografica su carta di estratti crudi di polline di *Parietaria officinalis*, *Folia Allergologica* 2, 153, 1955.
- Duchaine, F.*: Etudes sur le pollinose en Belgique. *Bruxelles Méd.* 34, 267, 1956.
- Feinberg, S. M. & Watrous, R. M.*: Atopy to simple chemical compounds sulfone chloramides. *J. Allergy* 16, 209, 1945.
- Ferrari, E.*: Analisi pollinica dell'atmosfera di Trento e dell'Orto Botanico di Padova. *Acta Pontificia et Academiae Scientiarum* 9, 194, 1940.
- Frugoni, C. & Ancona, G.*: Asma bronchiale—U.T.E.T., 1927 Torino.
- Frugoni, C. & Serafini, U.*: Etat actuel de la question de l'asthme en Italie. Rapport du 2° Congrès International de l'Asthme, Le Mont Dore, L'expansion Scientifique Française, ed. 1950.
- Gola, G.*: in Serafini, U. & Gola, G.: La pollinosi. Vallecchi Ed. Firenze, 1952.
- Hansen, K.*: Das Heufieber oder die Pollenallergie. In Berger W. & Hansen, K.: Allergie. Georg Thieme Verlag, Leipzig, 1940.
- Hegy, G.*: Illustrierte Flora von Mittel-Europa. Vol. III. J. F. Lehmann's Verlag, Monaco, 1912.
- Herxheimer, H.*: Bronchial obstruction induced by allergens histamine and acetyl-beta-methylcholine chloride. *Internat. Arch. Allergy a. Applied Immunol.* 2, 40, 1951.
- Herxheimer, H., Mc Inroy, P., Sutton, K. H., Utidjan, H. L. & Utidjan, H. M.*: The evaluation of skin tests in respiratory allergy. *Acta Allergologica* 7, 380, 1954.
- Hyde, H. A.*: Grass pollen in Great Britain. *Acta Allergologica*, 5, 98, 1952.
- Hyde, H. A. & Williams, D. A.*: The Cardiff Asthma research unit and its work. The Medical Press, 230, 5958, 1953.
- Jimenez Diaz, C.*: El asma y otras enfermedades alergicas. Ed. España, Madrid 1932.
- Etat actuel de la question de l'asthme en Espagne. In "L'Asthme", Rapports du 2e Congrès International de l'Asthme. Le Mont-Dore, "L'Expansion scientifique française". 1950.
- Johnston, T. G. & al.*: Bronchial asthma, urticaria and allergic rhinitis from tannic acid. *J. Allergy* 22, 494, 1951.
- Kern, R. A.*: Asthma and allergic rhinitis due to sensitization to phthalic anhydride. *J. Allergy* 10, 164, 1939.
- López Ruiz de Azagra Manuel*: Alergopatía mediterránea — Sensibilización a "Parietaria Officinalis". *Alergologia* 3, 897, 1953.
- Mameli Calvino, E.*: I pollini delle graminacee e urticacee come agenti etiologici di pollinosi. Quaderni dell'Allergia 9, 247, 1951.
- Ogilvie, A. G.*: Changes in skin response in asthma. *Brit Med. J.* 1, 370, 1954.
- Palatini, A.*: Ricerca sistematica delle sensibilità specifiche in casi di pollinosi primaverile nelle Lona di Milano. Quaderni dell'allergia 9, 160, 1951.
- Panzani, R.*: L'asthme pollinique à la Parietaire de France Presse Méd. 64, 908, 1956.

- Peshkin, M. M.*: Pitfalls of the skin tests in allergy J.A.M.A. 157, 820, 1955.
- Interpretation of allergy tests Premier Congrès International d'Allergie. Zürich 1951 C. R., S. Karger, Basel 1952, p. 691.
- Sangiorgi, P.*: Osservazioni sulla pollinosi in Lombardia dell'ultimo triennio - Quaderni dell'allergia - 1, 174, 1935; 2, 12, 1936.
- Salén, E. B.*: Valeur des cuti et des intradermo réactions dans le diagnostic des états allergiques - Acta Allergol. 3 suppl. I°, 5, 1950.
- The diagnostic and clinical importance of skin test. Acta Allergol. 1, 127, 1948.
- Salén, E. B. & Juhlin-Dannfelt, C.*: Über das Vorkommen von sogen latenter Allergie. Acta Med. Scand. 86, 505, 1935.
- Saunders, T. S.*: Respiratory Allergy from the Arsphenamines J. Allergy 14, 76, 1943.
- Scimone, L.*: Pollinosi da parietaria officinalis in Turchia Atti III° Congr. Europeo di Allergologia Vol. I°, 539. Ed. Pensiero Scientifico, Roma, 1956.
- Scimone, V.*: Le Pollinosi-Clin. Med. It. 52, 28, 1931.
- Serafini, U.*: La Pollinosi. Atti del I° Congresso Italiano di Allergia. Firenze 1950; Vallecchi Ed. 1952.
- Serafini, U. & Di Nardo, U.*: Modificazioni nel tempo della reattività cutanea specifica. Atti del III° Congresso Europeo di Allergologia Vol. I° p. 541, 1956.
- Spoujitch, V. & Spoujitch, I.*: Importance de l'allergie latente, sous-clinique. Sem. d. Hop. de Paris 56, 2860, 1956.
- Stromme, O.*: Studies on the histopathology of pollinosis Thromsen & Co. ed. Oslo, 1952.
- Surinyach, R., Montserrat, P. & Font, R.*: Epidemiologia de la polinosis en Barcelona. Anales de Medicina (Seccion Medicina) 42, 36, 1956.
- Tuft, L.*: Critical evaluation of skin tests in allergy diagnosis. J. Allergy 14, 355, 1943.
- Clinical Allergy. Second edition, Lea & Febiger, Philadelphia, 1949.
- Tuft, L. & Heck, M. V.*: Studies in sensitization as applied to skin test reactions. J. Allergy 25, 340, 1954.
- Vaughan, W. T.*: Practice of Allergy. London, Henry Kimpton 1948.
- Interpretation of borderline allergic reactions. J. Lab. & Clin. Med. 14, 433, 1929.
- Volterrani, O.*: Aspetti etiologici e clinici della pollinosi in Torino e zone limitrofe. Minerva Med. II°, 995, 1956.
- Williams, D. A.*: Discussion on paper of Alemany Vall. III° European Congress of Allergology. II° Vol. Ed. Pensiero Scientifico, Roma, 1957.

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