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OCCUPATIONAL ALLERGY IN MEDICO-ALLERGIC DISEASES *

By

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The fundamental cause of the various types of clinical allergy is still an unsolved problem. We know that certain factors play a rôle, but we know little as to why one baker develops flour asthma, whilst his colleague of the same age, who has been working with flour for exactly the same period, and perhaps under just the same circumstances, does not develop asthma.

Heredity plays a part—especially if it is bilateral—but this can by no means always explain the occurrence of the clinical allergy. The exposure to allergens plays a part, but this does not afford a definitive explanation either. Still, there can hardly be any doubt that a hereditary predisposition in conjunction with intensive exposure is of essential importance to the development of allergic symptoms—and thus allergy and occupation meet and justify the establishment of a nosological group termed occupational allergy.

Through a legislative work, which of course, but in a way also unfortunately, has been adapted to the social measures, social-hygienic possibilities and financial conditions of the individual country, the concept of occupational allergy has become identical in many countries with allergic disease entitling the patient to compensation. From the point of view of research this is unfortunate, as it will be rather arbitrary what one coun-

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try considers entitled to compensation and what another country refuses to recognize.

Add to this that laws aim at the interests of the public in general, but may in some cases act unjustly to individual persons, who may be fully entitled to plead occupational damage, in cases where the physician has no legal authority to take his case to court for compensation.

From a medical viewpoint and from the angle of the allergologist it is therefore necessary to sever the concept of occupational allergy from the rules of compensation as prescribed by law, and quite dispassionately to establish the criteria on which the diagnosis has to be made. But even though we disengage ourselves from the precarious, financial problems implied by the diagnosis of occupational allergy, the limitation is difficult, especially because house-dust allergy is revealed to an increasing extent as the cause of the disease. It is quite evident that house dust is the cause of the disease in many housemaids and housewives, and that this type of allergy can be considered the actual cause of the disease in a number of cases. If, however, we are to establish criteria for the concept of occupational allergy, one of these must be that the patient has not to any reasonable extent been in contact with the allergen concerned except for a limited period before the onset of the disease; and who can claim that he is not always, or has not always, to a varying degree, been exposed to the influence of house dust? Without having an eye to statutory provisions and questions of compensation, it can therefore be said that dust allergy can only seldom be classed with the concept of occupational allergy. Only if the dust contains such components as are specific in the trade concerned, for instance, mahogany dust in the case of a joiner, or lycopodium in that of a pharmacist, can dust be considered an occupational allergic factor. Similarly, feather allergy in a Danish hospital nurse, who has been sleeping under an eiderdown all her life (in Denmark everybody sleeps under an eiderdown), cannot be considered occupational allergy, although the nurse can claim that she is getting attacks when she is making the beds during her

work at hospital. On the other hand, penicillin allergy in a nurse may be regarded as occupational allergy in certain circumstances.

For these and other reasons it is difficult to establish criteria for the concept of occupational allergy. Most definitions in textbooks reflect the legal recognition of diseases as occupational in the country concerned, but, as already mentioned, this has little to do with reality. If it is desired to elucidate what allergic diseases are occupational and to investigate how high the incidence of these is in the total number of allergic diseases, one must establish one's own criteria. We have considered that it would be reasonable and practical to assume the following three criteria for medico-allergic diseases of occupational causation:

- (1) The allergic disease must not have been present prior to the work that is considered injurious.
- (2) The symptoms must *chiefly* appear during work and *always* be most pronounced at the place of work.
- (3) The patient's condition must improve materially when he is off duty for prolonged periods, for instance, during holidays.

The last criterion mentions explicitly the words "prolonged periods", as experience shows that a single day off is not always sufficient to improve an occupational disease.

Of medico-allergic diseases this investigation only comprises bronchial asthma, vasomotor rhinitis, and Quincke's circumscribed (angioneurotic) oedema. Hay-fever has not been included—no doubt the possibility cannot be excluded that hay-fever in farmers may be of occupational origin, but a distinction between sporadic and occupational origin is impossible in these cases. Other diseases of rare occurrence have also been excluded, and this applies to foodstuff allergy, too. This leaves the three groups: Asthma, vasomotor rhinitis, and Quincke's oedema.

In the course of the years 1944 to 1956, both inclusive, the Allergy Clinic at the Medical Outpatients' Department, Rigs-

hospitalet, Copenhagen, has examined a total of 4,348 allergics suffering from bronchial asthma, vasomotor rhinitis, and Quincke's oedema. We think that with the criteria mentioned above we can describe 281 (or 6.5 per cent) of these patients as sufferers of occupational allergy. It is evident that this figure is a *minimum figure*; many patients do not seek medical advice for their disease, but simply put up with it.

The number of patients in the three groups of diseases appears from Table I:

TABLE I
Number of Patients with Allergic Asthma, Vasomotor Rhinitis and Quincke's Oedema, Examined During the Years 1944-56, and the Number of Occupational Cases in these Groups.

	Number of cases	Of these occupational
Bronchial asthma	3347	207 = 6.2 %
Vasomotor rhinitis	818	64 = 7.8 %
Oedema Quincke	183	10 = 5.5 %
Total	4348	281 = 6.5 %

When the three groups are examined separately, it appears that both in the asthma group and in that of vasomotor rhinitis flour is one of the most frequent causes of occupational allergy. However, when flour allergy is so predominant in our series of cases, it is something of an artificial product. From 1944 to 1952 the Allergy Clinic took quite a special interest in flour allergy, and directly asked both bakers and millers to appear for examination; further, we undertook systematic investigations on flour allergy in bakeries. The results of these investigations have been published by M. Schwartz (1947), Castberg & Mygind Sørensen (1948), and in Ejnar Gadborg's thesis on flour allergy (1956). The interest which the Allergy Clinic took in flour allergic problems during these years is reflected in the present series, and, as already mentioned, gives a certain skewness in the distribution, as all other

patients in the series appeared spontaneously at the clinic. With this reservation with regard to the incidence of flour allergy, all other influencing factors have, however, been excluded, so that the series must be said to be representative of the spontaneous distribution in the other domains.

The 207 cases of occupational asthma are distributed thus:

TABLE II
*List of Pathogenesis in 207 Patients with Occupational Origin of
Bronchial Asthma.*

Flour allergy	67	Bakers 55, millers 5, grocers 5, worker at bakery 1, laboratory assistant 1
Corn and thrashing dust	20	Farmers 9, grocers 2, bakers 2, millers 2, workmen 5
Animal hairs	85	Farmers 72, veterinary surgeon 1, worker at tannery 1, transport workers 2, upholsterer 1, furriers 2, dressmakers 4, carrier 1
Textiles { wool, cotton, silk	10	Weavers 3, workmen 3, dressmakers 3, hosier 1
Hemp and flax	2	Employed at ropeworks 1, sack sewer 1
Coffee	5	Grocers 3, workmen 2
Wood dust	3	Joiners 2, workman 1
Chemicals etc.	5	Laboratory assistant (insulin) 1, employed at chemical works 3, tanner (paraphenylenediamin) 1
Antibiotics	2	Nurse 1, laboratory assistant 1
Cosmetics	1	Actress 1
Seed dust	2	Laboratory assistant (soya) 1, storeman (seed) 1
Gum arabic	1	Workman 1
Bakelite dust	2	Workman 1, shop foreman 1
Lycopodium	1	Pharmacist 1
Enzyme	1	Dairy-man (trypsin) 1
Total	207	

The 64 cases of occupational vasomotor rhinitis are distributed as illustrated in Table III. Here again flour is the predominant allergen. It should be mentioned that neither in

TABLE III
List of Pathogenesis in 64 Patients with Occupational Origin of Vasomotor Rhinitis.

Flour	48	Bakers 48
Nuts	1	Baker 1
Animal hairs	3	Farmers 2, veterinary surgeon 1
Textiles	1	Textile worker 1
Coffee	2	Grocers 2
Wood dust	5	Joiners 5
Chemicals	1	Laboratory assistant 1
Antibiotics	2	Nurse 1, working with penicillin at a chemical factory 1
Dust of chemist's shop	1	Pharmacist 1
Total	64	

flour-asthma nor in flour-rhinitis the present material has revealed allergy to chemicals added to the flour, the so-called flour-improvers. These substances (persulfates, bromides, etc.) relatively often sensitize the skin and thus give rise to eczema, but practically never affect the mucous membranes.

The 10 cases of occupational Quincke's oedema are distributed as shown in Table IV:

TABLE IV
List of Pathogenesis in 10 Patients with Occupational Origin of Circumscribed Oedema.

Corn and thrashing dust	1	Farmer 1
Brewer's yeast	1	Brewery worker 1
Coffee	1	Assistant at coffee shop 1
Antibiotics	6	Nurses 6
Shell-fish	1	Cook apprentice
Total	10	

In previous publications (1950, 1953, 1958), Bruun stressed drug allergy as an essential factor in the aetiology of Quincke's oedema. It is quite interesting to see that this fact

is also reflected in the present series. Out of 10 cases of Quincke's oedema of occupational origin, 6 were due to antibiotics in nurses, namely 4 caused by penicillin and 2 by streptomycin.

The complete tabulation of the occupational occurrence of the various allergens as cause of disease in the three mentioned groups appears from Table V:

TABLE V
Schematic List of Allergic Causes in 281 Patients with Occupational, Medico-Allergic Diseases.

	Astma	Vaso-motor rhinitis	Oedema Quincke	Total
Flour	67	48	0	115
Corn and thrashing dust	20	0	1	21
Nuts	0	1	0	1
Animal hairs	85	3	0	88
Textiles	10	1	0	11
Hemp and flax	2	0	0	2
Brewer's yeast	0	0	1	1
Coffee	5	2	1	8
Wood dust	3	5	0	8
Chemicals	5	1	0	6
Antibiotics	2	2	6	10
Cosmetics	1	0	0	1
Seed dust	2	0	0	2
Gum arabic	1	0	0	1
Lycopodium and dust at chemist's shop	1	1	0	2
Bakelite dust	2	0	0	2
Enzymes	1	0	0	1
Shell-fish	0	0	1	1
Total	207	64	10	281

With regard to the sex-incidence, it is not to be wondered at that a series of occupational allergy shows a pronounced male predominance: The present series includes only 33 women, whereas it contains 248 men.

TABLE VI
Therapeutic Measures in 281 Patients with Occupational Allergy.

	Number of patients	Effect of hyposensitization			
		Excellent	Fair	None	Unknown
<i>Asthma:</i>					
Change of occupation	16				
Hyposensitization	191	47	51	52	41
<i>Vasomotor rhinitis:</i>					
Change of occupation	1				
Hyposensitization	63	16	18	18	11
<i>Oedema Quincke:</i>					
Change of occupation	1				
Hyposensitization	9	2	2	1	4
Total	281	65	71	71	56

With regard to the length and duration of the period of sensitization, great differences seem to be in evidence. Some allergens apparently sensitize very easily; this applies, for instance, to coffee dust, where the period of sensitization has been very short in several cases (from weeks to months; Bruun, 1957), whereas it is well known that the period of sensitization in the case of flour is very long. On the average it takes from 8 to 11 years before a baker develops baker's coryza, and about 16 years before he gets baker's asthma (Gadborg, Schwartz). With regard to shell-fish allergy of occupational origin (M. Schwartz, 1944) and drug allergy (Bruun), the period of sensitization is generally short.

The treatment of occupational allergic diseases is extremely difficult. Specific hyposensitization is often required, and is here put to by far the most difficult test. One thing at least should not be lost sight of: The effect of specific hyposensitization must not be evaluated from what may be obtained with this method of treatment in occupational allergy. In spontaneously developing allergy to the allergens of everyday life the

specific hyposensitization has good possibilities, but in occupational allergy, where the exposure to allergens in the daily routine may be extremely massive, it is often difficult to obtain satisfactory results. The best thing is if the patient can be persuaded to change occupation. In occupational allergy, hyposensitization is always only the next best solution, but nevertheless may prove effective in some cases.

SUMMARY

From 1944 to 1956 4,348 allergic patients suffering from bronchial asthma, vasomotor rhinitis or Quincke's oedema were examined at the Allergy Clinic, Copenhagen. With the authors' criteria 281 patients (or 6.5 per cent) were suffering from occupational allergy. This figure must be considered as a minimum figure.

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