in serious dystocia to avoid the maternal and foetal morbidity often reported.

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SOCIAL ASPECTS OF ALLERGY

BY

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Only very recently has proper attention been paid to the environmental factors, in occupations and in home surroundings, which are concerned in the onset and course of disease. Apart from the so-called occupational diseases, the environmental factor is more or less in the foreground in a number of conditions—e.g., certain groups of malignant growth or infections like pulmonary tuberculosis—and it is particularly evident in the group of conditions now classified as allergic diseases. My own observations are based on the examination of more than 1,000 cases of bronchial asthma and other allergic complaints during the last 14 years. Of these, 522 are asthmatics observed in Germany from 1928 to 1932, 365 of them employees seen under the German national insurance scheme; and 489 were cases observed in England since 1934. Of the latter 268 were hospital patients—103 seen at the Westminster Hospital up to 1938, and 165 examined since 1938 at various (17) L.C.C. hospitals.*

Asthma and Other Allergic Conditions in Occupations and Military Service

Most frequent, and of the greatest clinical and social importance, are the allergic complaints of the respiratory tract (bronchial asthma, rhinitis including certain forms of sinusitis, and polyp) and those of the skin (eczema, dermatitis, urticaria, and Quincke's oedema). Rarer and perhaps less well studied are alimentary diseases such as spastic colitis and other spastic conditions of the digestive tract or bile ducts, migraine, and a number of others. In the Services serum sickness and allergy to prophylactic or therapeutic inoculations have to be considered as possible complications.

In all allergic conditions intrinsic (often constitutional) and extrinsic (mostly allergic) factors play their part. Their role is of varying importance not only in each of the conditions and in every patient but also because they change in the same patient at various periods of life.

As the *intrinsic*, predisposing, constitutional factor—endocrine, metabolic, or anatomical—is often inherited, allergic

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complaints run in families in more than 50% of the cases, according to my observations, and frequently follow the patient during a long period of his life. He may suffer either from one or from more than one of these conditions at varying periods. Allergy is itself a normal body reaction and defence mechanism like immunity, and actually represents the state short of and antecedent to immunity in which increased sensitivity precedes the greater resistance provided by the immunity. Only when this sensitivity remains and becomes a feature of definite clinical illness are we entitled to speak of the condition as "allergic disease."

The *extrinsic* factors—the allergic irritants—are incorporated (1) by inhalation (aerogenous), (2) by ingestion (enterogenous), (3) by touch through the skin (dermatogenous), or (4) by parenteral inoculation. Intrinsic allergic irritation may be caused by resorption of bacterial proteins from focal infections, bronchiectasis, or tuberculous infections. On the other hand, there are definite extrinsic irritations which do not act as allergens but as auxiliary predisposing factors—e.g., SO₂ gases in the air in certain industrial areas. It is still doubtful whether urticaria acts as an allergen or in the same way as the SO₂, preparing the mucous membranes for an irritability to allergens.

Allergens are mostly of protein nature, but definite chemical compounds are known to become allergens through the formation of protein compounds in the body, as in the case of group-specific chemical antigens (Landsteiner). The allergen does not always produce clinical signs at the place of entry (reflex or trigger area)—e.g., it may be ingested and cause urticaria in the skin or asthma in the respiratory tract. The allergy often starts with a sensitivity to *one* allergen or to a few allergens that spreads to others if not treated. A patient may have a seasonal hay-fever at first and then become sensitive to moulds or dust: the monovalent allergy becomes polyvalent.

Sutherland (1942a, 1942b) recently stated that the "extrinsic" cases of asthma are suitable for military service and can be easily cured by desensitization. These were obviously cases in the monovalent phase of the condition. The "intrinsic" cases are in his opinion not fit for military service. These are the cases in which the threshold of parasympathetic irritability has been lowered by a longer duration of the allergic condition or in which constitutional factors or focal infections are in the foreground. I (Fraenkel, 1934a, 1934b) have reported that, contrary to an old belief, asthma and tuberculosis of the lungs do not exclude each other: a form of active tuberculosis appeared "masked as asthma" in 4% of my asthma cases. In 16% of my asthma cases an old or productive pulmonary lesion was found.

I have stated previously (Fraenkel, 1937a, 1940) that *prognosis* in asthma depends on the following factors: (1) whether organic changes complicate the condition as a contributing cause of or as a sequel to the asthma—e.g., bronchiectasis, chest deformity, pulmonary tuberculosis or other infections, emphysema, or heart failure; (2) whether the family or personal history reveals a preponderance of constitutional factors; and (3) whether the allergen is easily avoidable or can be immunized against by a course of desensitization. *Mutatis mutandis*, this applies to prognosis in other allergic conditions. House allergens are the most common, but in England the damp climate is responsible for sensitivity to moulds in more than 50% of asthmatics (Fraenkel, 1938, 1939), and, by infection of the respiratory tract, for frequent bacterial sensitivity to the germs of the common cold. In many instances I have isolated the same types of mould from the patient's house allergens and from his sputum and used them for skin tests and desensitization. The moulds most often found positive in skin tests were sporotrichum, cladosporium, penicillium, aspergillus, mucor, and monilia types, and they are probably responsible for the intolerance to certain rooms, houses, or localities experienced by many asthmatics.

Clinical Investigation

This conception makes it necessary in every case to take a very careful history, which comprises a special inquiry into family and personal allergy, and also into occupational and personal aspects of the patient's life apart from the ordinary medical history. Investigation into all signs of parasympathetic irritability, local and blood eosinophilia (polyps, nasal secretion,

sputum, or mucus in stools), and a full clinical examination including radiographs of chest, nasal sinus, and antrum, are preliminaries to the specific examination for allergy by exposure and elimination tests. These include scratch, intracutaneous, or mucous membrane tests for the allergens as suggested by the history, or the use of allergen-free rooms, a diet, or filter apparatus (allergen-free bags or masks) (Fraenkel, 1937b, 1937c). These methods can be employed for diagnostic, prophylactic, and therapeutic purposes.

Certification of Cases for Fitness in Occupations or Services

It is evident that cases without organic complications and without a family or personal history of other allergic complaints are the most readily adjusted to industry, particularly those in which one or only a few easily avoidable allergic factors can be established, and eliminated—e.g., urticaria after strawberries or lobster, or rhinitis caused by a fur coat or collar. Next come those in which definite allergy is established by history and specific tests and is improved or "cured" by desensitization—e.g., pollen rhinitis or asthma. Where the allergen is difficult to avoid, as in common food (egg, milk, wheat), climatic or house allergens, moulds, etc., this is the method of choice. These subjects are probably fit for most occupations and for the Services. On the other hand a man with fur sensitivity should not work as a furrier, or a man with sensitivity to wool in the tailoring trade. A man with pollen allergy may be well or be cured in the Navy and yet be unfit for the Army. Patients sensitive to horse-hair or horse dandruff would be unfit for the old cavalry but not for the mechanized tank regiment. Organic complications such as bronchiectasis or heart failure in asthma or the asthma type of tuberculosis make the patients unfit for all but light occupations. Pollen allergy or the mould allergy in tomato-growers due to *Cladosporium fulvum* Cooke may be a contraindication to gardening. Sensitivity to certain drugs like salicylates or ipecacuanha contraindicates a job as a chemist. A person who has shown signs of allergy should be tested before being taken into trades in which the danger of allergic irritation exists. This can be done by skin-scratch or intracutaneous tests in such instances as fur sensitivity or allergy to wool in the tailoring trade, or by Jadassohn's patch test in cases of skin sensitivity to chemical irritants occurring in many industries. Allergy to grain dust, to feathers, or to horse dandruff may be a contraindication to employment on farms, and allergy to flour for millers and bakers. The same person may remain well and fit in another occupation.

These occupational factors in allergy are definitely of less influence than house allergens, house dust, feathers, or mattress contents or moulds cultured from them, because of our closer and longer contact with the latter; they, however, are by no means unimportant. Ancona and Frugoni have reported a type of asthma observed in all farmers, millers, or bakers who came into contact with grain infested by a tine-producing species of an acarid type—*Pediculoides ventricosus*. The allergen worked like an obligate contaminating germ in 100% of those exposed, and the asthma cases would certainly be "accidents" of occupation in the proper sense of the term. The same applies, in my opinion, to a great number of allergic cases in which the occupational exposure is responsible for the onset of an allergic complaint as proved by the history and by specific tests. I have mentioned such instances in millers, bakers, and farmers who are sensitive to flour, in farriers, farmers, and horsemen who are allergic to horse-hair or horse dandruff, and in gardeners or fruiterers with allergy to the cladosporium mould on decaying tomato plants. There are, further, furriers or tailors or carpet-makers with allergy to fur or wool or to the dyestuff ursoil used in the trade. Lead asthma is well known, as is the asthma due to salicylates or ipecacuanha occurring in chemists. There are also skin irritations, eczema, and dermatitis due to certain types of wood.

The degree of sensitivity of the patient is often decisive. Mayer reported a case of eczema in a workman who got it by contact with a friend who had worked with phenylhydrazine; and another case in which a man became sensitive to ursoil when, on the way to his work, he passed by a workshop where this was used. Sometimes a solvent is responsible for a substance becoming allergenic that was innocuous in a different medium.

Compensation Claims

Under the law compensation is paid to workmen only when the occupation and the substance come under the Workmen's Compensation Act, and this applies to but a small number of the actual occupational allergic diseases. A workman in a chemical factory may be entitled to compensation in case of lead asthma or toluidine dermatitis. A tailor with asthma due to wool or fur would not obtain compensation, but he might in case of ursoil dermatitis or asthma. A chemist would not be entitled to claim for ipecacuanha asthma or asthma due to salicylates, which I have observed to develop into pulmonary tuberculosis in one case under constant medical supervision. Sometimes a small impurity or a change of a manufacturing process is responsible for the allergy. The present law allows compensation claims for ladies who are allergic and get an eczema from a fur coat or collar dyed with ursoil, which I think rather unfair to the salesman.

These examples show that both jurisdiction and legislation are not abreast of present-day knowledge of allergic diseases. In many trades, too, protective measures could be improved, thus providing greater safety for the working population and avoiding considerable expense.

Suggested Protective Measures

1. Allergic diseases are of essential social importance owing to their long duration, especially in the most active periods of life, and to their connexion with the environmental factors in home surroundings and in occupations. In many cases they are responsible for recurring inability to work, leading often to invalidity or, as with the complications of bronchial asthma, even to death.
2. Legislation, jurisdiction, and public welfare should be adapted to our present-day knowledge of allergic diseases, and many more centres for diagnosis, prevention, and treatment should be provided, with staffs trained in the clinical and laboratory side of the problem, and with all the necessary equipment, as in the U.S.A.
3. These centres should be available to doctors for the investigation of their private and panel patients, to the military and civil authorities, and to the industrial and health organizations.
4. They should deal with examinations for certificates for fitness in certain occupations or for the Services, with compensation claims, and with cases in which legal expert advice is required.
5. Their investigations must be based on a careful history which takes into account the constitutional and environmental factors, and on an examination which includes x-ray findings, eosinophil counts, and the specific methods of elimination and exposure tests, apart from the routine examination.
6. These methods must include skin and mucous membrane tests, elimination by diet or allergen-free rooms or apparatus, etc., and the use of preventive or curative desensitization, besides treatment of dispositional or auxiliary factors.
7. The centres could protect a great number of patients from premature invalidity or even death, and in other cases considerably shorten the periods of actual illness and thus save man- and woman-power and expense. They would also greatly contribute to teaching and research in allergy.

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L. Stein and E. Wertheimer (*J. Endocrinol.*, 1941, 2, 418) state that adrenalectomy causes an intense though transient increase in the rate of loss of hair in rats. Along with this there are secondary symptoms ranging in severity from dandruff to extensive ulcer formations. Similar symptoms were observed in medullectomized rats. It was found that an acid extract of adrenal medulla could inhibit this loss of hair, which could also be brought about by a synthetic *l*-adrenaline.