4. FUNGI AS ALLERGENS

The animal body is continually exposed to contact with numerous microorganisms of many different species, including commensals which grow on its skin and mucous membranes, and saprophytes which grow in the soil and elsewhere. The blood and tissue fluids contain nutrients sufficient to sustain profuse growth of many of these species. However, the normal (non-immunised) body possesses a series of defence mechanisms that enables it generally to resist microbial invasion of its tissues and gives it a "natural immunity" or "innate resistance" towards most microorganisms. This resistance is a genetic endowment of an entire species with respect to a particular agent. The immunity is sometimes absolute, so that all individuals are entirely resistant and in other instances relative and varying in degree from one individual to another. In contrast to natural immunity or non-specific resistance, acquired immunity is specific in the sense that it protects against one particular pathogen or its toxic products. Acquired immunity may depend on the presence and amount of specific globulin molecules or **"antibody"** in the blood elicited in response to the stimulus of a foreign protein or other large molecular substance which is called the **"antigen"**; this is known as **"humoral"** immunity. Or it may result from an enhanced capacity of particular cells or tissues to counteract infection ; this is called **"cellular"** immunity. This latter form of immunity is often associated with the state of **"microbial hypersensitivity"** or **"infection allergy"**. Sensitisation to microbes or their products occurs in a variety of fungal, bacterial and viral infections. This microbial hypersensitivity develops in the course of a naturally acquired infection or an exposure and is not usually manifested until 1 to 2 weeks or sometimes longer, after the onset of infection or sensitization. The manifestations or the disease conditions affect principally the skin, the respiratory tract and the gastrointestinal tract.

1. **Dermatophytid** is a hypersensitivity reaction to an active focus of dermatophytosis elsewhere on the body, usually the feet. Fungi are present in the primary lesion but are not present in the lesions of dermatophytid. The hands are most often affected, but dermatophytid may occur on other areas of the body also.

2. **Candidid** is sterile, grouped, vesicular lesions resembling dermatophytid. They may be found beyond the limits of infected lesions. They probably represent localized dermal reaction to circulating candida antigens.

3. **Microbial eczema.** Sensitization to fungal cell substances is more common with some fungi of systemic mycoses and manifested as delayed hypersensitivity type. They are encountered in histoplasmosis, blastomycosis and coccidioidomycosis. Autosensitization, i.e., eruptions and urticaria, may represent sensitization to a combination of fungal substance (hapten) with body protein. Metastatic foci or eczematous, moist, crusted dermatitis may appear upon other parts of the body.

4. **Hay fever** is characterized by watery exudation from the mucous membranes of the upper respiratory tract and conjunctivae, the natural consequences of which include violent and often protracted sneezing, nasal discharge, and lacrimation. The allergen is some agent in the surrounding atmosphere which is

either inhaled or comes into direct contact with exposed mucous membranes; mold spores and plant pollens are most commonly incriminated, but house dust, and various other substances may also produce the symptoms of hay fever.

5. Asthma is a condition of recurrent or paroxysmal difficulty in breathing, with a wheezing or whistling respiration produced by obstruction of the smaller bronchioles. It is either allergic or nonallergic. The nonallergic type, sometimes called "intrinsic asthma", is produced by unknown factors within the subject. Allergic asthma may be caused by the same inhaled substances as hay fever, together with certain drugs and biologicals inhaled by laboratory workers. Various ingested foods may also incite asthma attacks, among them eggs, wheat and milk.

6. Coniosporiosis. A peculiar type of pneumonitis has been found in lumbermen in the northern forests of the U.S.A., who are exposed to the spores of Coniosporium corticale, which grow on the inner bark of dead maple logs. The primary inhalation causes no symptoms, but after repeated inhalation 10 to 20 per cent of the lumbermen develop a pneumonic reaction in their lungs with severe constitutional symptoms. This seems to be an example of an allergic pneumonia.

7. Farmer's lung. This disease has some but not all of the characteristics of coniosporiosis. There is no doubt that certain susceptible individuals become acutely ill with respiratory symptoms when they breathe moldy hay, straw or other agricultural products. After an initial attack the patient has a recurrence after each successive exposure to the same materials.

8. Bagasse disease of the lungs. In the process of extracting sugar cane, the juice is squeezed from the cane stalks leaving behind the pulp. This pulp was thought to be useless, a bagasse was piled near the pressing machine where it was attacked by molds and bacteria. In recent years much of this pulp is reprocessed into building materials and workmen who handle the moldy pulp breathe in dust heavily charged with molds and other organic materials. After a number of exposures, certain individuals develop acute illness which seem to be almost identical with those described for Farmer's lung.

9. Pulmonary infiltration with eosinophilia (Pulmonary eosinophilia or PIE syndrome). This syndrome is one of a group of allergic disorders, characterized by migratory multiple or solitary pulmonary infiltrates, eosinophilia in the peripheral blood and variable symptomatology. It is believed to represent an allergic response to a number of diseases including mycotic infections, bacterial infections, parasitic infestations or infections and certain of the collagen diseases.

10. Gastrointestinal allergy. Food allergy in which the alimentary tract constitutes the shock organ is called **"gastrointestinal allergy".** It is characterized by vomiting, cramps and diarrhoea following ingestion of the allergen. The symptoms result from strong contractions of the pylorus and intestinal muscles and from marked edema of the intestinal mucosa. Intestinal reactions may be attributed to unusual sensitivity of this organ or to exposure to the concentrated allergen. Common food allergens include strawberries, citrous fruits, fish and shellfish, eggs, tomatoes, taro and choco-

late. Fungal substances contaminated or incorporated in foodstuff may elicit this syndrome in sensitized individuals.

11. Allergy of the eyes. Fungal spores, pollens, foods, infections and many other substances may cause an allergy in the eyes.

12. Headaches. The head pain may occur from a great many disorders of which allergy is one. When it is due to allergy, a complete allergic study is needed. Anything less will probably result in failure.

Arthritis, weakness and fatigue of undiagnosed origin, recurrent fever, dizzy spells, itching of the rectum and female genital parts, and convulsions are usually due to conditions other than allergy. Allergy especially fungus spors however, is occasionally the sole cause of these disturbances. It is necessary to determine when a condition is likely to be allergic in origin and when such a study is unavoidable.

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