

The Occurrence of Allergen Carrying Airborne Particles in Relation to the Degree of Human Civilization

Humans can become allergic to almost every biological substance, particularly by contact through the respiratory tract. This process of allergic sensitization can take place if certain quantities of these allergenic substances, which are present in the environmental air, for longer periods of time, carried by airborne particles (Fig. 1). Allergen transport by particles is an effective

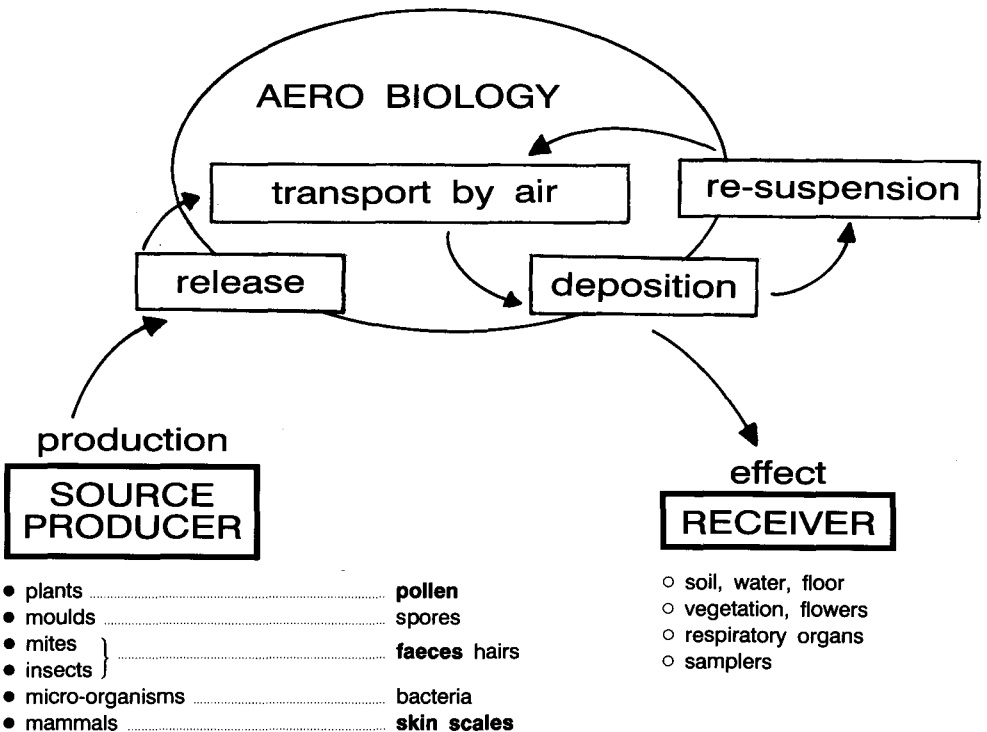


Fig. 1. Pathways in aerobiology.

means of distribution, and also of deposition of the allergens in the respiratory organs, (Fig. 2) through inhalation of the environmental air. The most important allergen carriers, responsible for the great majority of the allergic diseases of the respiratory tract, are pollen, the waste products of mites, and animal skin scales. Almost all of these allergen carrying particles are abundant in man's environment as a result of human activities. This will be illustrated with a number of examples.

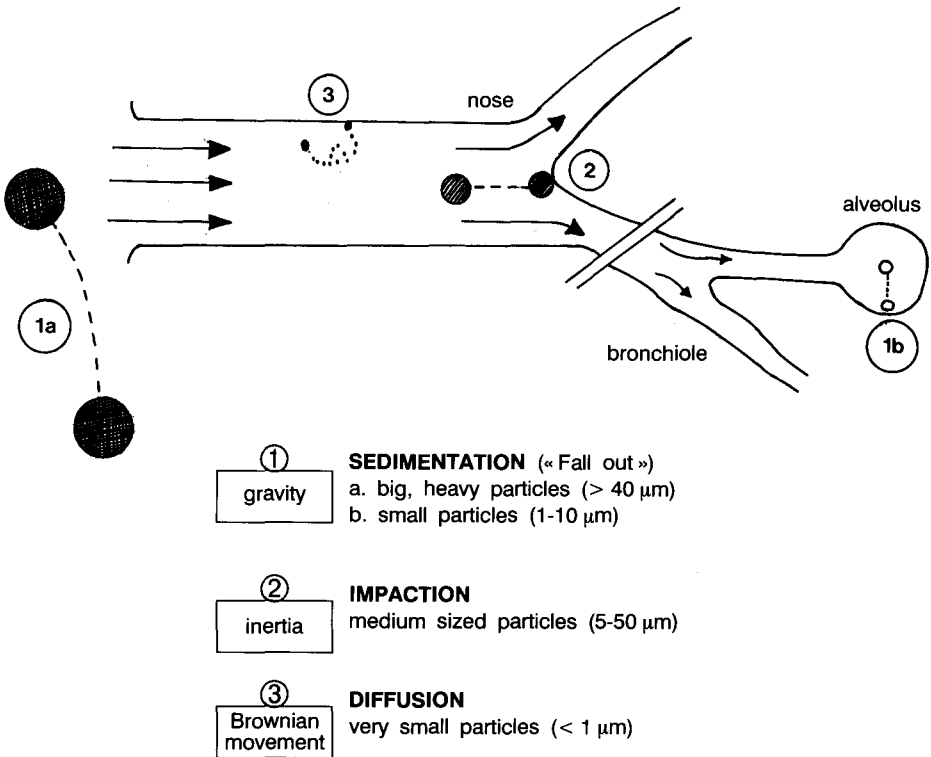


Fig. 2. Mechanisms of deposition.

Pollen

Over the past three centuries large areas of Europe have been deforested for cultural, industrial or agricultural reasons. These activities occasioned the establishment of extensive areas covered with weeds, herbs, and wild grasses. Grasses, in particular, are producers of windborne pollen with strong, sensitizing properties. Pollinosis and hay fever were first described as new diseases in the mid 19th century (Blackley, 1873 ; Emmanuel, 1988).

In North America, ragweed (*Ambrosia*) is a typical pioneer plant, one of the first to grow on bare and disturbed soils. It is normally crowded out

after some time by more stable vegetation types. However, the wide-spread use of herbicides, to protect and promote the growth of corn, wheat, soy, potatoes, etc. is creating large areas of bare and disturbed soils on which ragweed has a privileged position as an almost permanent pioneer (Carson, 1962).

Mites

House-dust mites (*Dermatophagoides* spp.) occur all over the world in the beds and furniture of humans who live in houses. They are producers of strong allergens, primarily excreted with their faeces, and house-dust allergy is seen in almost all human populations (Platts-Mills *et al.*, 1988). However, in some isolated populations where people still live under primitive conditions of civilization, mite numbers are low, as is the prevalence of allergic sensitization to mites (Turner *et al.*, 1988). As soon as habits of so-called civilized behaviour are introduced, such as wearing clothes, sleeping in beds and sitting on chairs, man is creating in his human nest the ideal conditions for house-dust mites.

Storage mites, like the flour mite (*Acarus siro*), the Copra mite (*Tyrophagus putrescentiae*), or the Hay mite (*Lepidoglyphus destructor*), were originally common dwellers in the nests of birds and small mammals, living on the organic *debris* and waste food in the nests. Ever since man has been building up stocks of stored food, these mites have become real pests and people handling the stored food products can easily become allergic to these mites (van Hage-Hamsten *et al.*, 1987).

Animal skin scales

Allergy to the skin scales of animals is most widespread among city people who keep dogs, cats, (Pauli *et al.*, 1986) and other animals as pets, or who ride horses for sport or leisure. Similarly, many of my colleagues, biologists working with laboratory animals such as rats or guinea pigs, have become allergic to these animals (Longbottom, 1984).

Conclusion

The examples of the very common allergic sensitizations described above illustrate the fact that just those human activities which affect man's own environment, very often introduce organisms which produce allergen carrying particles which, in turn, affect his own health.

REFERENCES

- BLACKLEY, Ch., 1873, *Experimental Researches of the Causes and Nature of Catarrhus aestivus*, Ballière, Tindall and Cox, London.
- CARSON, R., 1962, *Silent Spring*, Houghton Mifflin Company, New York.
- EMMANUEL, M.B., 1988, *Hay Fever, a Post-industrial Revolution Epidemy : a History of its Growth during the 19th Century*, in *Clin. Allergy*, 18, p. 295-304.
- HAGE-HAMSTEN, M., VAN JOHANSSON, S.G.O., ZETTERSTROM, O., 1987, *Predominance of Mite Allergy over Allergy to Pollen and Animal Dander in a Farming Population*, in *Clin. Allergy*, 17, p. 417-423.
- LONGBOTTOM, J.L., 1984, *Occupational Allergy due to Animal Allergens*, in *Clin. Immunol. Allergy*, 4, p. 19-36.
- PAULI, G., BESSOT, J.C., FRAISSE, Ph., 1986, *Aspects cliniques, prévention et traitement des allergies aux chats et aux chiens*, in *Rev. franç. Allerg.*, 26, p. 79-84.
- PLATTS-MILLS, T.A.E., WECK, A.L. de et al., 1988, *Dust Mite Allergens and Asthma : a Worldwide Problem*, in *Bull. WHO*, 66, p. 769-780.
- TURNER, K.J., STEWART, G.A., WOODCOCK, A.J., GREEN, W., ALPERS, M.P., 1988, *Relationship between Mite Densities and the Prevalence of Asthma : Comparative Studies in two Populations in the Eastern Highlands of Papua New Guinea*, in *Clin. Allergy*, 18, p. 331-340.