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POSSIBLE RELATIONSHIP BETWEEN SOME
ALLERGENS (POLLENS, MITES) AND CERTAIN
MICROORGANISMS (BACTERIA AND FUNGI)

*A Morphological Study using the Scanning
Electron-Microscope*

By

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In an earlier work Colldahl & Carlsson (1) studied the allergic reactions in mucous membrane (eye, nose) and skin provoked both by conventional pollen extracts and extracts derived from microorganisms cultivated from pollen. It was shown that different microorganisms can be cultivated from different pollens and that the media in which these microorganisms are grown contain active allergens. These allergens resemble those present in water extracts of pollen of the kind from which the microorganisms are grown, but are different from those of water extracts from other kinds of pollen. Against this background it is of interest to examine whether microorganisms can be observed on the surface of pollen. This might be accomplished by electron scanning microscopy, which by a magnification from 20,000 to 60,000 times gives up to 500 times greater depth of field than the light microscope.

Some investigations with the above mentioned technique on pollen (birch, timothy and pine) are reported here. These results throw new light on the microscopic appearance of the above mentioned allergens. Mites, being an important allergen of dust, were studied in the same way.

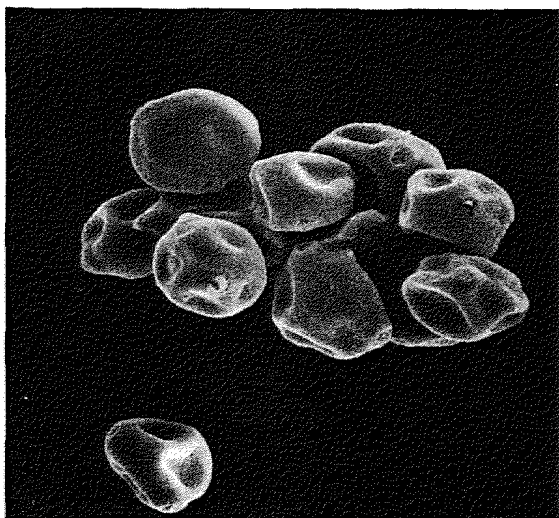


Fig. 1 A. Birch pollen grains $\times 500$.

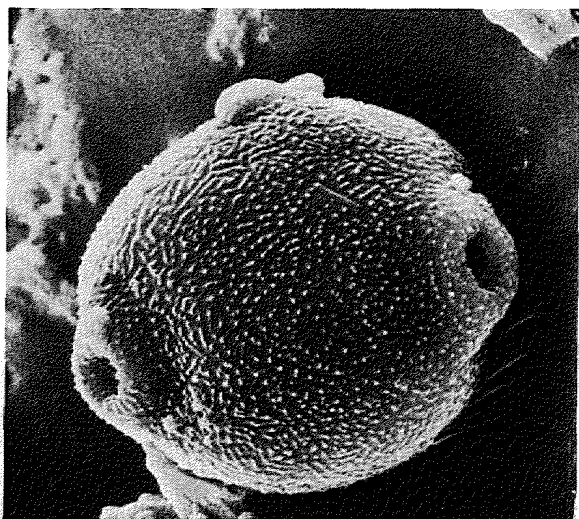


Fig. 1 B. A birch pollen grain $\times 2000$ with foreign organisms or particles.

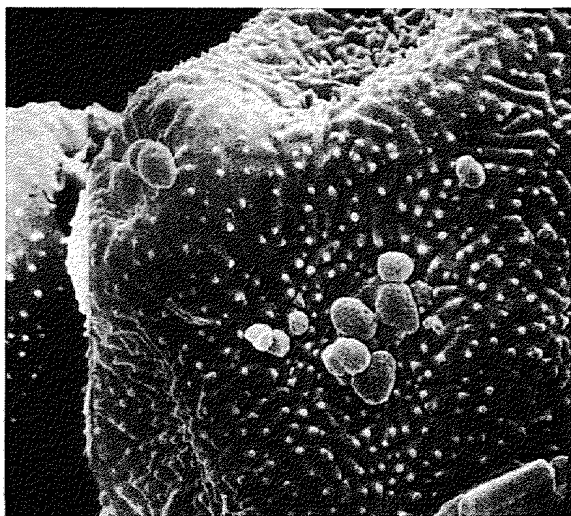


Fig. 1 C. A birch pollen grain $\times 3000$ with foreign organisms or particles.

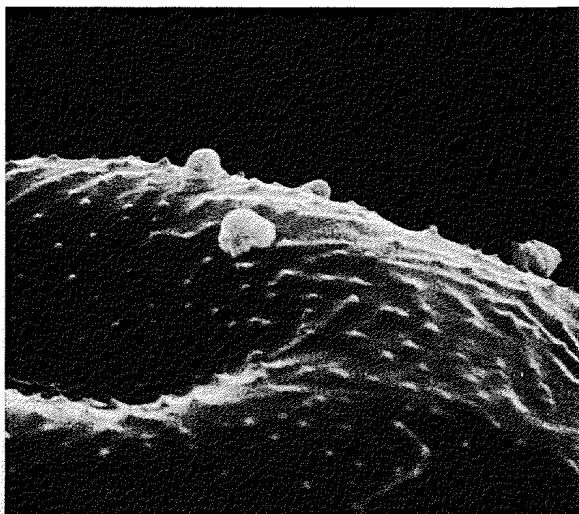


Fig. 1 D. A birch pollen grain $\times 8000$ with foreign organisms or particles.

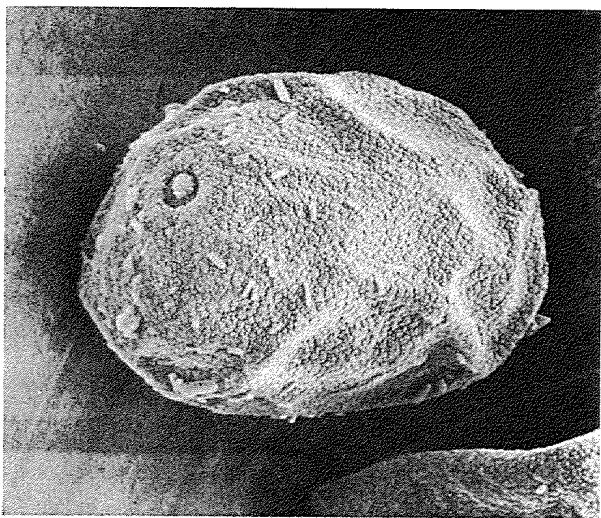


Fig. 2 A. A timothy pollen grain $\times 1600$ with foreign organisms and/or particles.

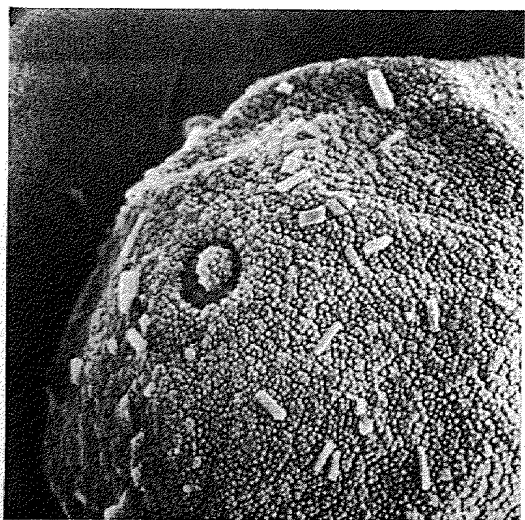


Fig. 2 B. A timothy pollen grain $\times 2300$ with foreign organisms and/or particles.

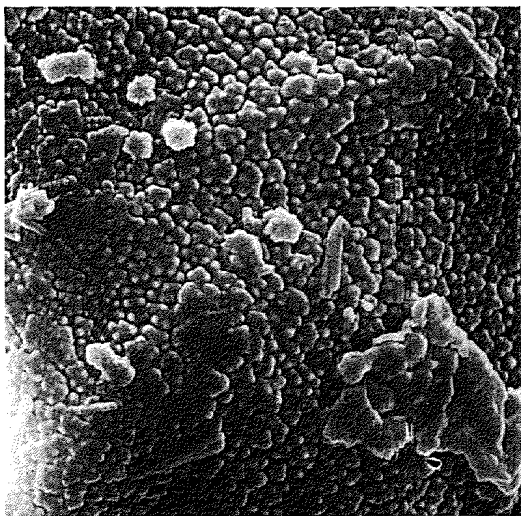


Fig. 2 C. A timothy pollen grain $\times 10000$ with foreign organisms and/or particles.

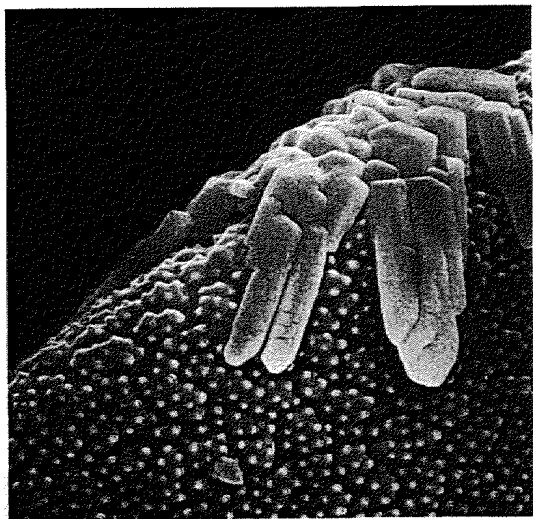


Fig. 2 D. A timothy pollen grain $\times 15000$ with foreign organisms and/or particles.

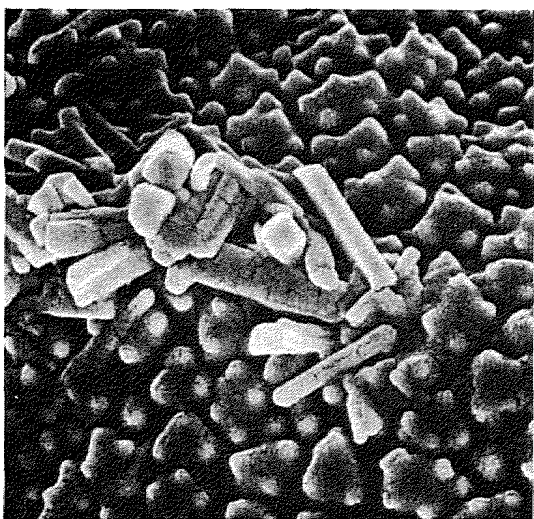


Fig. 2 E. A timothy pollen grain $\times 25000$ with foreign organisms and/or particles.

METHOD

The method used was published in 1972 (2). A Jeol Electron Scanning microscope was employed. The samples were placed in an evaporator (Jeol) to be coated with carbon and gold without previous fixation. The operating voltage ranged between 10 and 15 kv.

RESULTS

Figure 1 A-D shows birch pollen grains. Foreign particles are fixed to the surface. Some particles resemble *Cryptococci*, which earlier have been shown to produce a birch-like antigen when cultivated (1). Other particles resembling organisms, are also found (Fig. 5).

Figure 2 is timothy pollen. It is seen clearly that the surface is partially covered by foreign substance that do not belong to the pollen itself. Figure 3 shows pine pollen. We did not find any foreign substances on this kind of pollen, perhaps because

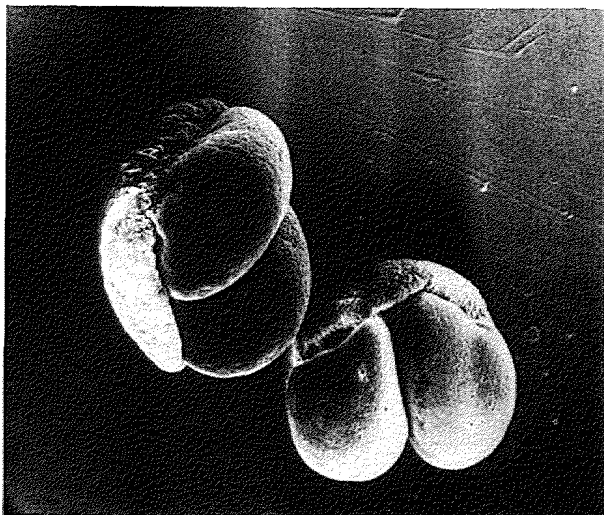


Fig. 3. Two pine pollen grains $\times 500$.

the surface is less sticky. Another reason why microorganisms are absent from this kind of pollen could be that the growth of microorganisms is inhibited owing to the presence of terpenes in pine pollen.

Figure 4 A shows a mite (*Dermatophagoides*). It is seen that the surface has beautifully arranged lists. Up to 12 spore-like particles can be counted on the photo.

In Figure 4 D (a greater magnification of 4 A) a cladosporium-like organism is clearly seen.

Figure 4 B shows that the wall of the spore has melted and is more or less firmly fixed to some antennae of the mite.

Figures 5 shows cryptococci (A) and micrococci (B) from a blood-agar plate in which pollen under circumstances as aseptic as possible was shaken down from a catkin. Figure 6 shows cladosporium spores that have not had any connection with mites. They were collected from the air in a Hirst spore trap.

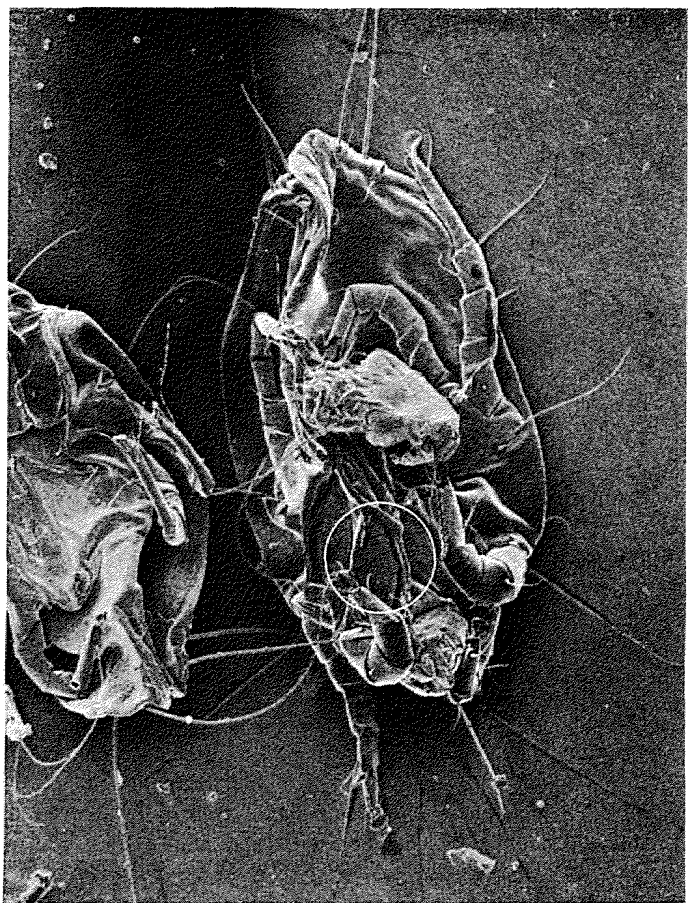


Fig. 4 A. A mite lying on its back $\times 250$. *Fig. 4 B-E* are magnifications from the area marked off in *A*.

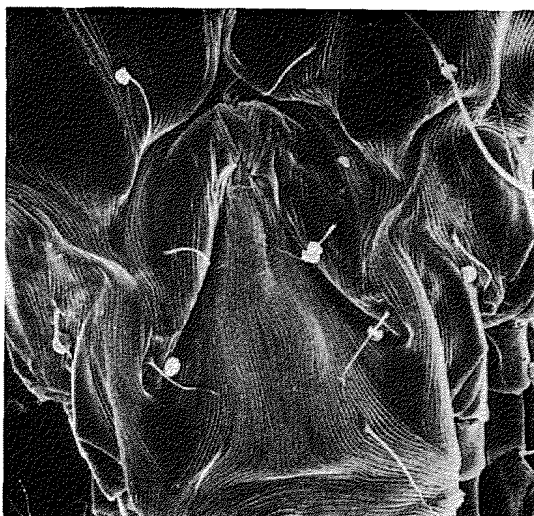


Fig. 4 B. A mite lying on its back $\times 600$.

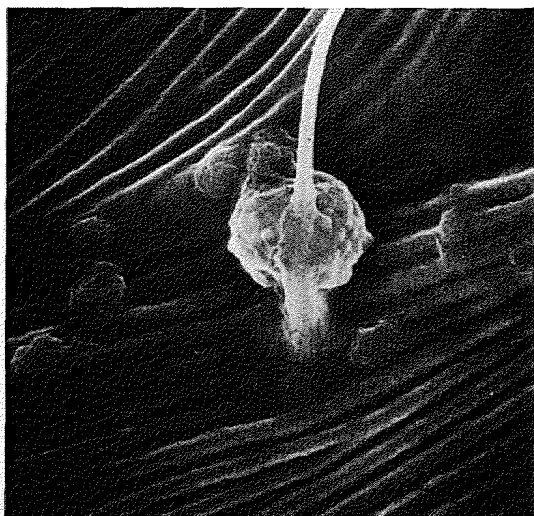


Fig. 4 C. A mite lying on its back $\times 2000$.

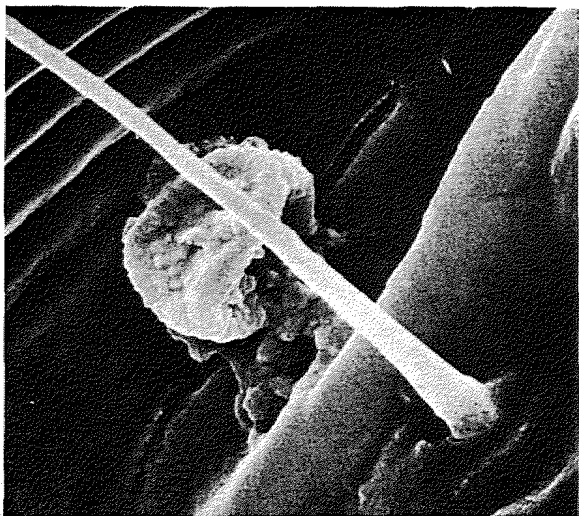


Fig. 4 D. A mite lying on its back $\times 3000$.

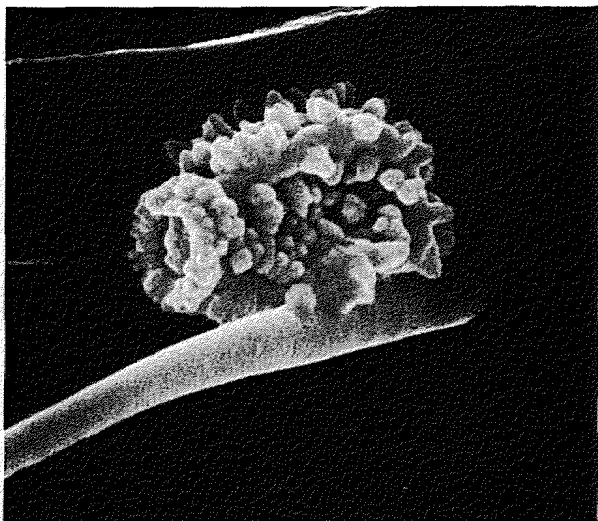


Fig. 4 E. A mite lying on its back $\times 4000$.

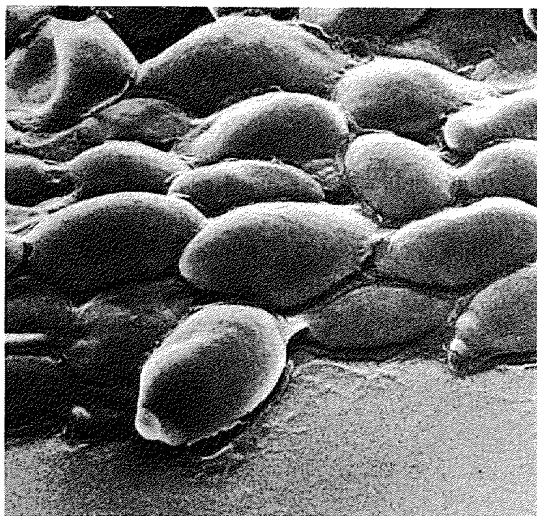


Fig. 5 A. Cryptococci from a blood agar plate $\times 4800$.

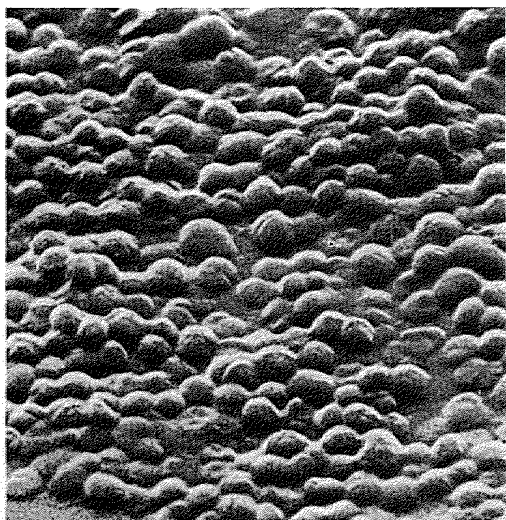


Fig. 5 B. Micrococci from a blood agar plate $\times 6000$.

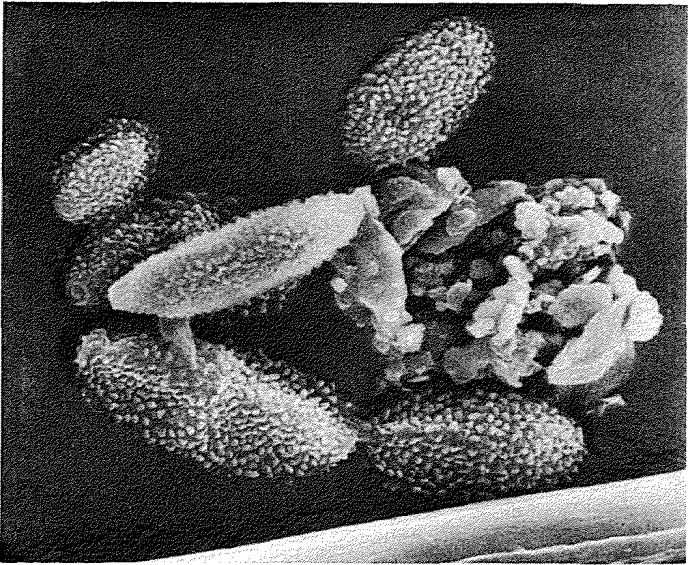


Fig. 6. Spores from cladosporium $\times 5000$.

DISCUSSION

The nature of antigens is complex. The findings in the present study support earlier findings showing that co-existent microorganisms are of importance in pollen allergens. It is possible that the foreign organisms present on mites may similarly have importance for the mite allergen.

The classification of the organisms fixed to pollens and mites is under investigation.

SUMMARY

The surfaces of birch- and timothy pollen carry foreign particles which look like microorganisms when studied with the scanning electron microscope. Mites also have particles fixed to the body (the antennae). These particles appear very

similar to cladosporium organisms. This observation supports the earlier findings that microorganisms are of importance in pollen antigens.

REFERENCES

- Colldahl, H. & Carlsson, G. (1968): Allergens in pollen. Allergic reactions in mucous membranes (Eye and Nose) and in the skin provoked by conventional pollen extracts and by extracts derived from microorganisms cultivated from pollen. *Acta Allergol.* 23, 387-395.
- Johannisson, E. M. D. & Nilsson, L. (1972): Scanning electron microscopic study of the human endometrium. *Fertility and Sterility* 23, 613.

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