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AUTOTROPHIC ORGANISMS IN MATTRESS DUST IN THE NETHERLANDS

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Autotrophic organisms were found in house dust (mainly floordust) in the USA BERNSTEIN & SAFFERMAN 1970; HOLLAND et al. 1973, 1974; RICHARDSON et al. 1974). These authors reported algae in the dust in high enough quantities to warrant allergological studies. This paper is devoted to autotrophic organisms in mattress dust.

Direct examination of mattress dust collected in Nijmegen in September, 1974 showed algal filaments of 120 μm (Ulotrichales), in addition to diaspores of green and blue-green algae.

A pilot study was performed on dust collected in October and December 1974. The dust was suspended in Bristol solution (0.001 g dust/100 ml) according to AARONSON (1970). After about 10 weeks representatives of Hormogonales, Ulotrichales, Chlamydomonadaceae and Chlorococcales were observed.

To investigate seasonal abundance and possible role in the house-dust ecosystem, mattress-dust samples were taken at four-weekly intervals from 2 mattresses in Groesbeek (The Netherlands) from January 2, 1976 until September 30, 1977, with the aid of a vacuumcleaner (Hoover type 2907A), using disposable heat-sterilized paper bags. Three to four subsamples of 0.02 g were taken from each of the samples of the two mattresses. The subsamples were suspended in 1 ml TRIS buffer (pH 6.6) by handshaking (1 min) and mechanical vibration (10 min). Three aliquots of 0.1 ml were taken from all 6 to 8 subsamples and surface-inoculated on agar plates Chu no. 10 (AARONSON 1970). After 4 weeks incubation on the laboratorium bench the algal colonies were counted and identified microscopically. From the prothallia of ferns 10 specimens were transferred to potsoil. Two sporophytes could be reared (*fig. 1*).

The algae mainly belonged to the same taxa as were found in the pilot study. The most frequently isolated algae were coccoid species of the Clorococcales, *Hormidium flaccidum* A. Braun and *Stichococcus bacillaris* Nägeli of the Ulotrichales (identification by G. M. Lokhorst, Leiden), and *Chlamydomonas* sp. of the Chlamydomonadaceae (identification by G. van den Ende, Nijmegen). *Anabaena variabilis* Born. et Flah., *Microcoleus vaginatus* Gom., and *Schizo-*

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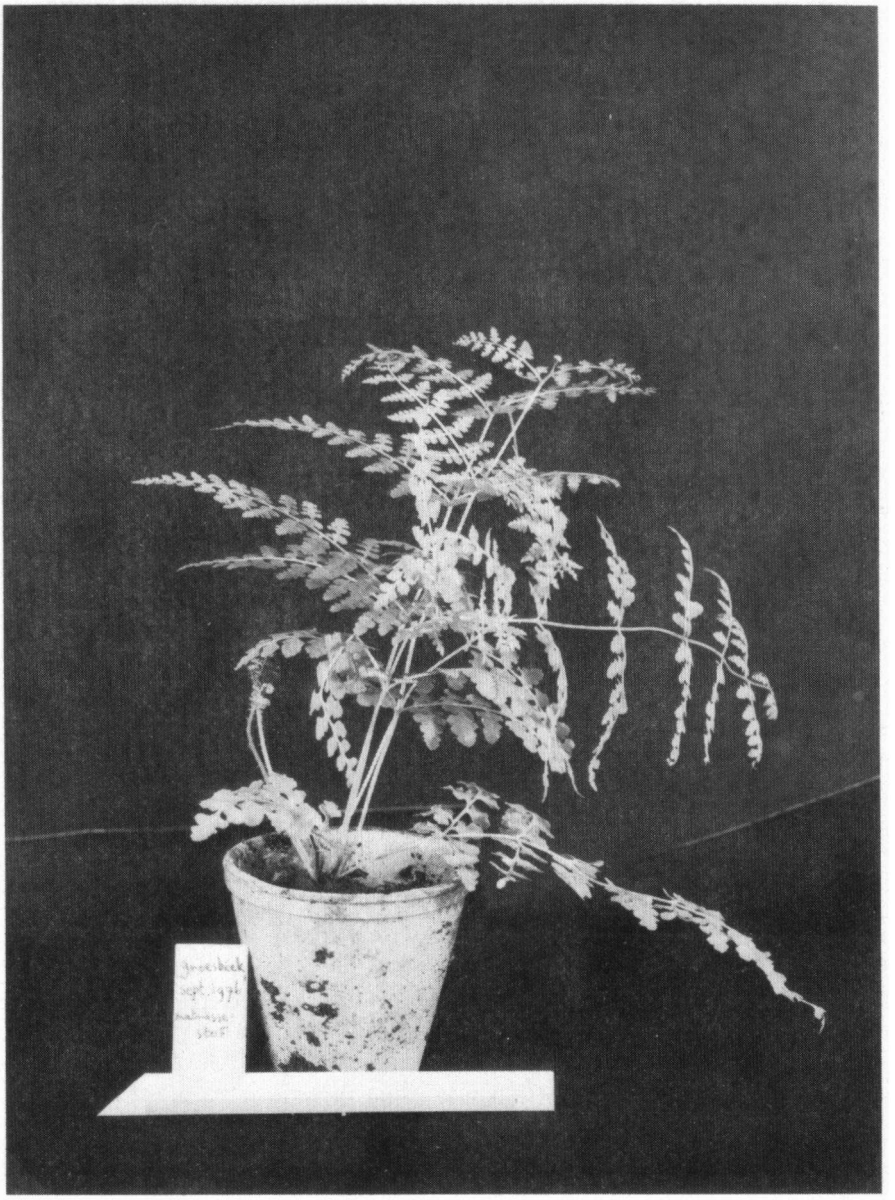

Fig. 1. Sporophyte of *Dennstaedtia*, grown from mattress dust, Groesbeek, The Netherlands (Photo: H. J. M. Spruyt, Nijmegen).

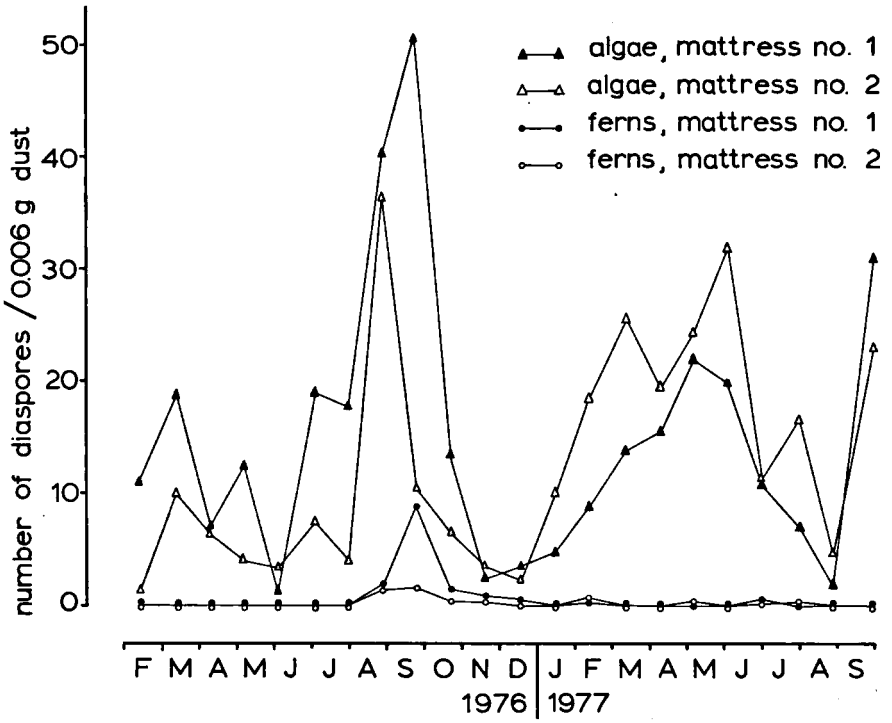

Fig. 2. Means of total algal and fern counts in dust from 2 mattresses (Groesbeek, The Netherlands).

thrix calcicola Gom. (Hormogonales) were also found (identification by P. J. G. Polderman, Nijmegen). Occasionally, coccoid representatives of the Chlorococcales were associated with bacterial colonies.

The total algal count showed seasonal fluctuations with peaks in August-September 1976 and May-June 1977. The mean number of algal diaspores per gram of dust per mattress varied from 2.2×10^2 in June and February 1976 to 8.4×10^3 in September 1976 (*fig. 2*).

The fern sporophytes belonged to *Dennstaedtia*, a genus known as a window plant (identification by G. J. de Joncheere, Leiden). In September 1976 there was a peak in the number of fern spores found (*fig. 2*). This was not so in 1977 since the window plant was removed.

Algae, moss and fern spores are common in the outdoor air in The Netherlands (VISCH-VAN OVEREEM 1972). There is no doubt that the fern we found did not thrive in mattress dust, and that the fluctuations in the fern-diaspore numbers found are a reflection of the spore production indoors by the window plant.

Algal counts from March to June 1977 were higher than those from the same months in 1976. Probably, the extremely dry spring and summer of 1976

(KNMI 1976) were less suitable for algal growth and dispersal. In July and August 1977, low numbers of algae were isolated. The house from which the mattresses were sampled, had been closed from June 17, 1977 until August 15, 1977. The reduced possibility of algal diaspores to invade the mattresses in this period may explain the lower number isolated.

REFERENCES

AARONSON, S. (1970): *Experimental microbial ecology*. Academic Press, New York and London, 236 pp.

BERNSTEIN, I. L. & R. S. SAFFERMAN (1970): Viable algae in house dust. *Nature* **227**: 851–852.

HOLLAND, R. D., P. L. WALNE, J. P. RICHARDSON & R. P. HORNSBY (1973): Viable algae from house dust: possible causal agents in human allergenicity. *J. Phycol.* **9** (suppl.): 11–12.

—, — & R. P. HORNSBY (1974): Selected algal extracts as possible allergenic agents in humans. *J. Phycol.* **10** (suppl.): 3–4.

Koninklijk Nederlands Meteorologisch Instituut (KNMI) (1976): *De droogte van 1976*. Publicatie nr. **154**, 33 pp.

RICHARDSON, J. P., R. D. HOLLAND & P. L. WALNE (1974): Studies on quantification of algal populations in house dust: possible relevance to human allergenicity. *J. Phycol.* **10** (suppl.): 19.

VISCH-VAN OVEREEM, M. A. (1972): Onderzoekingen naar groene organismen en protozoën in de atmosfeer. *Aerobiologie* pp. 54–57, Pudoc, Wageningen.