reduced incidence at 30 per cent is thought to reflect a more severe damage leading to cell death rather than to mutation. Further evidence to support the water reorientation hypothesis comes from work in which inositol has been shown to prevent X-ray and ultraviolet damage to semi-dried cells by apparently taking on the role of the bound water removed by desiccation[1], and desiccation alone to induce the prophage in lysogenic cells[6]. The latter finding strongly indicates that desiccation does affect the biological integrity of DNA.

In order to test the validity of the hypotheses presented, the desiccation sensitivity of some twenty mutants is now being determined. To date, the mutant cell appears to have either the same sensitivity or to be more sensitive than the parent cell. It will, however, be some time before all the strains have been examined, but if mutagenesis by desiccation can be substantiated it could be a useful tool in experimental genetics.

This work was supported by a grant from the Defence Research Board of Canada.

S. J. WEBB

Department of Bacteriology,
University of Saskatchewan,
Saskatoon, Canada.

1 Webb, S. J., *Bound Water in Biological Integrity* (Chas. C. Thomas, Illinois, 1965).
2 Webb, S. J., *Nature*, **203**, 374 (1964).
3 Langstroth, G. O., Diehl, C. H. H., and Winhold, J., *Canad. J. Res.*, **28**, 580 (1950).
4 Davis, B. D., and Mingioli, E. S., *J. Bact.*, **60**, 17 (1950).
5 Falk, M., Hartman, K. A., and Lord, R. C., *J. Amer. Chem. Soc.*, **85**, 387 (1963).
6 Webb, S. J., and Dumasia, M. D., *Canad. J. Microbiol.* (in the press).

Ectotrophic Mycorrhizae as Deterrents to Pathogenic Root Infections

MANY investigators have demonstrated the importance of ectotrophic mycorrhizae in the growth of trees. The role of these structures is physiological: mycorrhizae increase the absorbing surface area of roots; they exert a more selective ion absorption and accumulation, and they make very slightly soluble substances in soil available to their host. Another function has been postulated by Zak[1], who suggested that ectotrophic mycorrhizal roots may be less susceptible than non-mycorrhizal roots to infection by root pathogens. He proposed several mechanisms by which these structures could be resistant to pathogenic infections.

We have found evidence to support this hypothesis. Mycorrhizal and non-mycorrhizal roots attached to potted shortleaf pine (*Pinus echinata* Mill.) seedlings grown in finely divided shortleaf pine humus were enclosed in small glass cells and inoculated with zoospores (20,000/ml.) of *Phytophthora cinnamomi* Rands. After incubation for 10 days in a growth chamber the roots were examined histologically. Results indicated that mature mycorrhizae were resistant to infection, whereas non-mycorrhizal short roots and lateral root tips were highly susceptible (Table 1).

Table 1. INFECTION AFTER 10 DAYS BY *Phytophthora cinnamomi* OF ROOTS OF SHORTLEAF PINE SEEDLINGS GROWN IN HUMUS IN GREENHOUSE POT CULTURE

Series	Mycorrhizal roots		Non-mycorrhizal short roots		Non-mycorrhizal lateral root tips	
	No.	Per cent	No.	Per cent	No.	Per cent
Inoculated	58		27		12	
Infected		0		100		100
Non-inoculated	38		16		9	
Infected		0		0		0

Similar results were obtained using detached mycorrhizae on lateral root segments of shortleaf pine seedlings, and intact mycorrhizae synthesized aseptically with different mycorrhizal fungi on roots of seedlings of shortleaf and loblolly pine (*Pinus taeda* L.). We concluded that ectotrophic mycorrhizae on roots of shortleaf and loblolly pine are protective barriers to pathogenic infection by *P. cinnamomi*. In field conditions, one could expect trees with abundant development of mycorrhizae to have less susceptible root tissue exposed to *P. cinnamomi*, and perhaps other root pathogens, than trees with few or no mycorrhizae. This work is being extended and will be published in detail later.

D. H. MARX

Forestry Sciences Laboratory,
Southeastern Forest Experiment Station,
Athens, Georgia.

C. B. DAVEY

Department of Soil Science,
North Carolina State University,
Raleigh, North Carolina.

1 Zak, B., *Ann. Rev. Phytopath.*, **2**, 377 (1964).

PATHOLOGY

Aetiological Significance of Rod-shaped Bodies in Rheumatoid Synovia

IN recent years there has been renewed interest in the old rejected notion that rheumatoid arthritis may be caused by an infectious agent[1]. Highton *et al.*[2,3] have reported rod-shaped bodies in the synovial vessels of four out of seven rheumatoid patients and two out of six patients with Reiter's disease. No such bodies were found in seven normal or near-normal synovia. These authors have therefore suggested that "these intracellular rod-shaped inclusion bodies found in endothelial cells and pericytes of synovial blood vessels may be phases of an infective agent".

During the course of our investigations of the ultrastructure of normal and pathological synovia[4,5] we have frequently seen these rod-shaped bodies in vascular

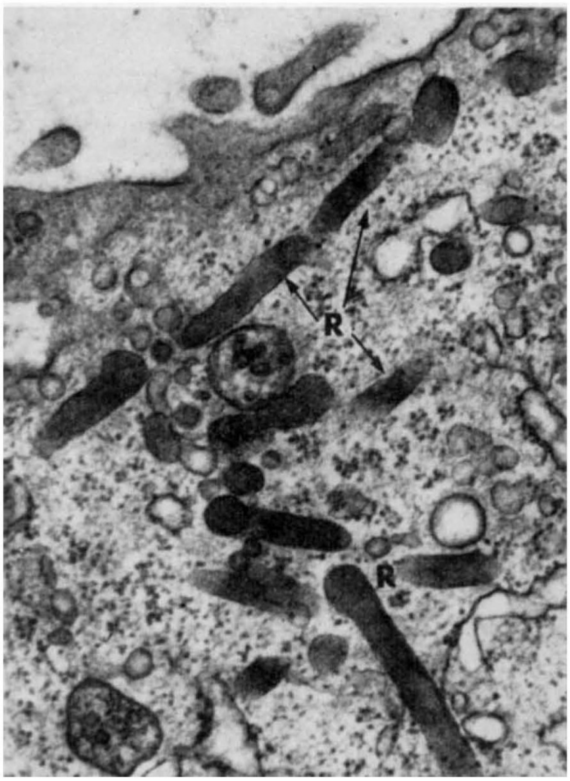

Fig. 1. Rod-shaped bodies (*R*) in synovial vascular endothelial cell from a case of traumatic arthritis. (× 48,000.)

© 1967 Nature Publishing Group