Striated Fibres in the Cytoplasm of the Imperfect Fungus
Pleiochaeta setosa (Kirchn.) Hughes

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Summary
Striated fibres with a 60–67 nm periodicity and a diameter of up to 110 nm are reported from the mycelium, conidiophores, immature conidia and germ tubes of the hyphomycetous fungus Pleiochaeta setosa. The fibres are compared with others reported in various cell types, and suggestions are made as to their possible form and function.

1. Introduction
During an electron microscope study of the plant pathogen Pleiochaeta setosa (Deuteromycotina, Hyphomycetes) unusual striated fibres were observed in the cytoplasm at various stages in its life cycle. Such structures have not been previously reported in higher fungi, although similar fibres have been found in association with centrioles and basal bodies in certain lower fungi, algae and cells of various animals.

2. Materials and Methods
An isolate of P. setosa from leaves of Russel Lupins was obtained from Dr. K. S. Milne, Massey University, Palmerston North, New Zealand, and maintained on potato agar (PA). To obtain dense sporulation in culture a concentrated spore suspension was poured onto the surface of PA plates and allowed to dry. The germinating inoculum was then covered with sterile cellophane and allowed to form a mycelial mat for 2–3 days at 24 °C. The cellophane was then stripped off and the plate cultures placed under a moist, sterile air stream flowing through each dish at approx. 300 ml/min for 8–10 hours by which time a “turf” of conidia was in the course of development.

Two fixation procedures were used in electron microscope preparations:
1. A mixture of 1% (v/v) glutaraldehyde and 0.5% (w/v) paraformaldehyde in 0.1 M sodium cacodylate at pH 7.2 at 4 °C for 20 minutes followed by post-fixation for 1 hour in 1% osmium tetroxide at room temperature;
2. A 1% aqueous potassium permanganate at 4 °C for 20 minutes.

The cold fixative was poured over the cultures which were then placed under vacuum for
5 minutes, cut into small blocks and fixed for a further 15 minutes at 4 °C. Material from both fixations was stained overnight in 0.5% aqueous uranyl acetate at 4 °C, dehydrated through a graded ethanol/water series and embedded in Spurr's medium (SPURR 1969). Sections were cut with a diamond knife on an LKB ultramicrotome, stained in lead citrate (REYNOLDS 1963) for 3–5 minutes and viewed with an AEI EM6M electron microscope.

Exogenously dormant conidia, which after harvesting had been stored on a "Millipore" filter for 20 days, were germinated in a malt extract (2%) and glucose (0.4%/0) solution for 2 hours at 24 °C. Fixation, embedding and sectioning was as above.

Rotational image reinforcement of electron micrographs of transverse sections of the striated fibres was carried out using the method described by MARKHAM et al. (1963) and ROBARDS (1968).

3. Results

Striated fibres were best preserved when fixed with aldehydes. In the vegetative mycelium they were mostly situated close to the hyphal wall and were present only in mycelium which was under and around actively sporulating areas (Fig. 1). In some hyphae less clearly defined fibres which were presumably only partially formed were observed surrounded by electron-transparent areas (Fig. 2).

The fibres were numerous, well formed and most obvious in conidiogenous cells, i.e., cells from which conidia are directly produced (see KENDRICK 1971, p. 258) (Fig. 3). Transverse sections of these cells showed up to 12 fibres in one section and Fig. 4 shows six in a portion of a conidiogenous cell. At high magnifications, transverse sections of fibres demonstrated a vague substructure. Rotational image reinforcement of transverse sections of fibres gave results (Fig. 5) which suggested that nine hollow tubes surrounded a central hollow core. In longitudinal section (Figs. 6 and 9) the fibres were seen to consist of both longitudinal fibres and transverse striations; the latter having a regularly repeating pattern of two, close, electron-dense bands, then three less

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Abbreviations: CpW = conidiophore wall, CW = conidium wall, G = glycogen-like material, GW = germ-tube wall, HW = hyphal wall, M = mitochondrion, Mu = mucilage, N = nucleus, P = plasma membrane, R = ribosome. → = striated fibre. All figures show aldehyde fixation except Fig. 11 which is KMnO₄

Fig. 1. Striated fibres in a hypha below an actively sporulating area of a culture. Note that fibres are located close to the hyphal wall. ×13,000
Fig. 2. A partially formed striated fibre in a hypha from a similar area to Fig. 1. Note the region of electron-transparent glycogen-like material surrounding the fibre. ×45,000
Fig. 3. A young conidiogenous cell arising from the surface of a culture which has been induced to sporulate. Striated fibres are shown in their typical form and location in conidiogenous cells. Note the mucilaginous layer. ×5,300
Fig. 4. Transverse section of a young conidiogenous cell showing 6 fibres scattered throughout the cytoplasm. The mucilaginous layer is also apparent in this section. ×16,000