ABSTRACTS OF POSTER DEMONSTRATIONS

A. SPORE ARCHITECTURE AND DEVELOPMENT

Tapetum of *Psilotum nudum* (L.) Beauv.

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The tapetum of *P. nudum* consists of a plasmodial component and a cellular, parietal layer, the cells of which are often enlarged. This layer develops a sporopollenin-containing, acetolysis-resistant membrane on the inner tangential wall.

The plasmodial component exists and undergoes changes in its structure over long periods of time. Initially, large numbers of spore-mother cells are found in plasmodial chambers but after meiosis a re-organisation occurs so that individual tetrads become surrounded by the plasmodium. During later stages of spore-wall development, the plasmodium infiltrates between the spores so that mature spores are individually enclosed. Nuclei associated with the plasmodium are still evident during final stages of spore-wall development.

Structures (2 μm diameter) termed spheroids are also situated in individual chambers in the plasmodium. They exhibit a layered structure which parallels that of the spore-wall, at least from the middle exospore outwards.

SEM studies of the formation of the tapetal membrane supplement the TEM observations describing the formation of a structured basal layer from which rounded nodules of a more homogeneous nature project into the loculus. Distinctive 'two-toned' vesicles, so-called by virtue of their staining properties, have been observed in the cellular, parietal layer during the development of this membrane which persists in the dehisced sporangium.

The tapetum, far from being a simple, autolysing tissue supplying a source of nutrients for the developing spores, may have a much more important role in the formation of the spore-wall and in the functioning of the sporangium during sporogenesis.

Spore wall formation in Polypodiaceae

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The Polypodiaceae show much variation in sporoderm sculpture. At first, wall formation is similar in all species; in later stages, the wall may become variously

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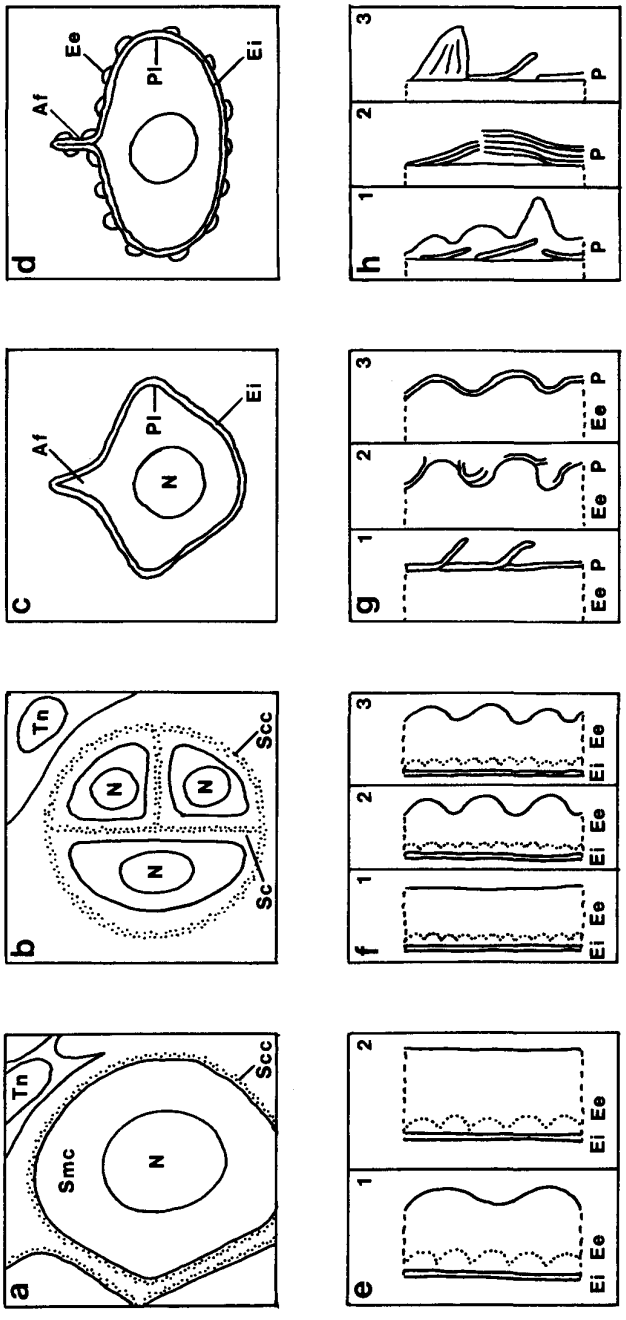

Figure 1. Spore wall formation in the Polypodiaceae (see text for details).

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differentiated. Spore wall formation has been studied in three species: *Drynaria sparsisora* (Desv.) Moore, *Belvisia mucronata* (Fée) Copel. and *Microgramma ciliata* (Willd.) Copel. Eight stages are illustrated (see Fig. 1).

(a) Spore mother cell (Smc). Prior to meiosis, each Smc becomes more and more rounded in shape, while tapetal nuclei (Tn) migrate to the space between Smc's. Each Smc is surrounded by a dark granular sporocyte coat (Scc).

(b) Young tetraspore. After meiosis, each young spore is surrounded by a thin plasmalemma only. Tetrads are still surrounded by the sporocyte coat (Scc). A spore coat (Sc) divides the tetrad into four compartments.

(c) The inner exospore layer (Ei). Spore wall formation starts with the deposition of a smooth thin layer against the plasmalemma. At the same time, the apertural fold (Af) forms, which later develops into the aperture.

(d) The outer exospore layer (Ee). 1, The first part of the Ee is deposited in irregular lumps.

(e) The outer exospore layer (Ee). 2, At this stage, interspecific differences begin to show. In *D. sparsisora* (Fig. e, 1) most of the Ee is deposited in the same pattern as the first lumps. In *B. mucronata* (Fig. e, 2) the exospore surface becomes smooth. In *M. ciliata*, this stage has not yet been found.

(f) The mature exospore. Its outer surface shows some conspicuous interspecific differences. In *D. sparsisora* (Fig. f, 1) it is quite smooth, in *B. mucronata* (Fig. f, 2) and in *M. ciliata* (Fig. f, 3) the exospore surface is sculptured.

(g) Perispore formation. This starts with the deposition of double lamellae. The tapetal residue forms groups of angular blobs in which lamellae may be visible, indicating a tapetal origin of the perispore (P).

(h) The mature perispore. In *D. sparsisora* (Fig. h, 1), the surface pattern of the mature perispore is verrucose with groups of small echinae. In *B. mucronata* (Fig. h, 2), it is very thin, existing of several layers of lamellae. In *M. ciliata* (Fig. h, 3), it is similar, with small echinae attached to it.

This study is part of the Research on Polypodiaceae Project as conducted in Leiden, Utrecht and Kalyani.

Comparative perine architecture in extant *Azolla* species

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Species recognition in the genus *Azolla* Lamarck is based on differences in the structure of the megaspore apparatus. Of principal importance are the number of floats in the supraspore and the architecture of the perine covering the megaspore. This study has used SEM to examine the perine structure of the 6 extant species currently recognised in this genus. More than 50 collections of sporulating material have been examined. Our survey suggests that each of the 6 extant species, *A. pinnata*