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.

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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*

R. Brown, *A. nilotica* DeCaisne, *A. filiculoides* Lamarck, *A. microphylla* Kaulfuss, *A. caroliniana* Willdenow, and *A. mexicana* Presl has a distinctive perine structure suitable for species recognition. One California population examined, thought to be *A. filiculoides*, had a perine structure unlike any of the 6 recognised species. Its perine partially resembled that of *A. filiculoides* var. *rubra* (R. Br.) Strasburger distally and that of *A. microphylla* laterally, as well as having some unique structural features. *A. mexicana* and *A. caroliniana*, recently considered by some as the same species, have distinctly different perine structures, and on this basis, both taxa seem as deserving of species status as do *A. filiculoides* and *A. microphylla*. The authors are grateful to Drs Diara, Kaplan, Kulasooriya, Rains, Talley, Warne and Watanabe for providing collections of sporulating *Azolla*.

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Perispore morphology in the Aspleniaceae

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Perispore morphology in the Aspleniaceae is reviewed, and the following conclusions derived.

1. Similar perispore patterns have evolved independently in several groups within the family.
2. Perispore patterns change gradually by minor modifications of the perispore layers.
3. There are no sharp boundaries between perisporal-'types'.
4. Perispore patterns in the 'satellite' genera are not different from patterns within *Asplenium sensu stricto*.
5. Perispore characters used with care and together with other characters may prove to be important in tracing phylogenetic relationships within this family.

Perispore morphology in New Guinea Aspleniaceae

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An investigation was conducted using the SEM into the perispore morphology of 60 species of *Asplenium* and 5 species of *Diplora*, to assess its value in constructing