

Ultrastructural aspects of the reduced free-floating hydrophyte species

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Aspects of the ultrastructural differentiation in the reduced free-floating hydrophyte species has been investigated. Plants of Lemnaceae exhibited highly reduced structural organization having only fronds, stolon, and roots. Fronds were major photosynthetic and vegetative reproductive organ during their growth. Daughter fronds were also chlorenchymatous and usually developed early on inside of the mother frond. They retained within foliage sheaths of the mother frond until separated. Stolon and roots originated from the same meristematic region of the frond, but they exhibited distinct polarity showing the stolon lateral growth and the root axial. Translucent stolon, connecting fronds, chloroplasts and numerous polymorphic mitochondria were surprisingly common. In most actively growing stolon cells, vacuoles were not formed and organelles were scattered throughout the diffuse cytoplasm. They also had rectangular-shaped supporting structures filled with reticulate fibrillar materials in some intercellular spaces. Vascular tissues were better developed in the stolon than roots. The root, although very short and thin, demonstrated complex organization with a conspicuous root cap. Dense cytoplasm with concentric RER, large nucleus with nucleolus, numerous mitochondria, and chloroplasts were noticeable features in the region protected by root caps. The root caps were consisted of three layers of vacuolated cells, but no statoliths were present. Structural reduction shown in the Lemnaceae is probably the highly efficient one that might lead to a successful adaptation of their small free-floating plants to a superficial aquatic environment.

Keywords: Free-floating reduced hydrophytes, Frond, Stolon, Root, Structural differentiation

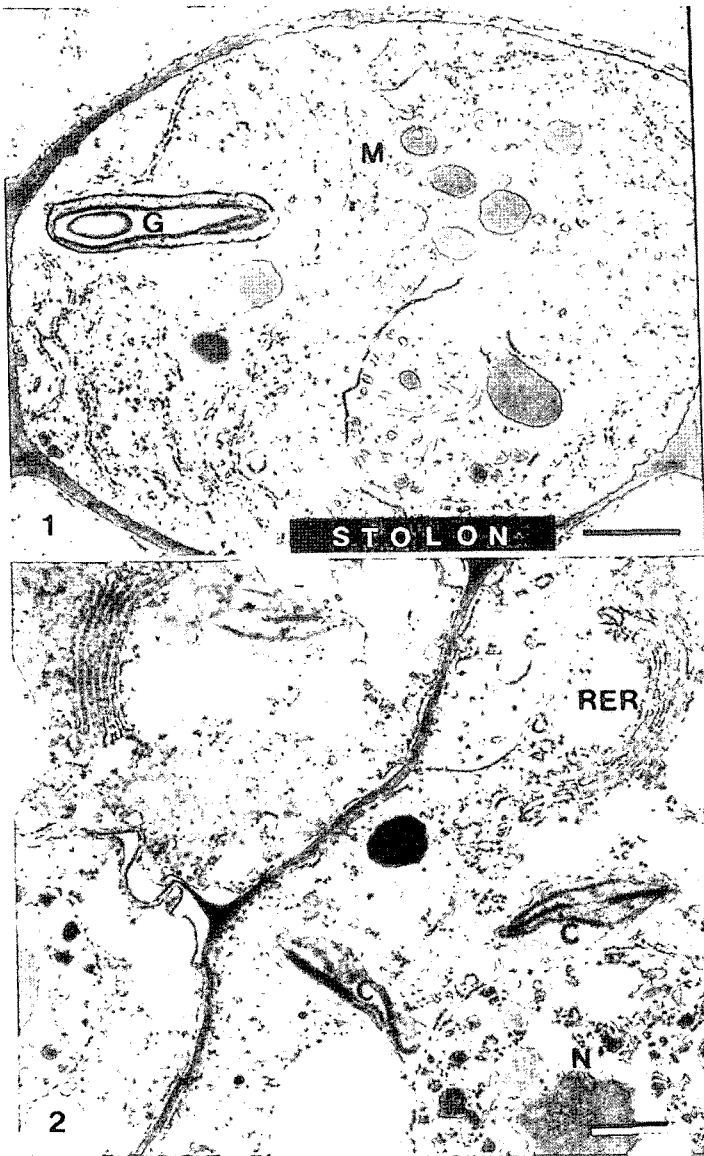


Figure 1. Diffuse cytoplasm, including a chloroplast, in the stolon cell. Note the lack of a vacuole in the cytoplasm. Scale bar = 1.0 μm .

Figure 2. Concentric RER, chloroplasts (C), and a large nucleus with nucleolus (N) in the root cell. Scale bar = 1.5 μm . Figures were from *Spirodela polyrhiza*.