Submicroscopic morphology of cell walls of tobacco pollen tubes after selective extraction of polysaccharides

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Nontreated tobacco pollen tubes show two wall layers, an outer layer of pecto-cellulosic nature (primary wall) and an inner one (secondary wall), which can strongly increase in thickness. At some distance of the tube tip, plugs are formed which close the lumen of the tube completely. Since the inner wall layer and the callose plugs look amorphous on electron microscopic photographs they are generally expected to consist exclusively of callose. EM-studies of pollen tubes treated with H_2O_2 /glacial acetic acid revealed cellulose microfibrils also in the inner thickened wall layer and possibly in the plugs too. Pollen tube walls from which only cellulose was removed by cuprammonium revealed fibrillar material in the outer wall layer and as inclusions in the inner wall layer and in fused vesicular-like structures of the cytoplasm. After chemical removal of all polysaccharides with the exception of pectin, both tube wall layers appeared to consist exclusively of fibrillar material. This can be removed by EDTA. We suggest that the fibrillar material represents pectin or modified pectin. Evidence for this suggestion is found in the existence of fibrillar polygalacturonic acid in cell walls of suspension cultures of plant cells and of whole plant tissues (summarized by Colvin and Leppard, 1973). We regard, therefore, the inner thickened tube wall layer as consisting of pectin, cellulose and callose. In the "callose" plugs callose probably predominates over the other polysaccharides.

REFERENCES

- Colvin J. R., Leppard G. G., 1973. In: Biogenesis of Plant Cell Wall Polysaccharides. Ed. F. Loewus, pp. 315-331. Academic Press, Inc. New York.