

The Utility of Nymphaeaceae Sclereids in Paleoenvironmental Research

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As entomophilous plants, water lilies (*Nymphaea*) and spatterdocks (*Nuphar*) have low pollen production, thus can be under represented in the sediment record. These macrophytes produce distinctly shaped sclerenchyma tissue referred to as stone-cells, trichosclereids, astrosclereid or simply sclereids. This study examines the utility of using sclereids from common species from the Nymphaeaceae Family as an alternative proxy to their pollen. Histological studies of fresh tissues of *Nymphaea odorata* and *Nuphar lutea* revealed that each has distinct sclereids and that there has been confusion in the application of terminological used to designate their morphology. Some paleoecological reports have referred to Nymphaeaceae sclereids as trichosclereids, but our histological studies show that the cells are more appropriately classified as polyramous, astrosclereids, librosclereids and rhizosclereids. We also determined if palynological processing affects sclereid morphology or the efficiency of their retrieval. Tissues from both species were treated using HCL, KOH, acetolysis and HF and found that only the sclereids from *N. lutea* survived chemical treatments in a detectable form. Our study shows that sclereids from *N. lutea* can be a useful indicator of its presence while the chance of observing sclereids from *N. odorata* in pollen preparations is very low, severely limiting the utility of the latter as a paleoecological indicator. Another limitation to using sclereids as a proxy is that they originate from plant tissues, which require extended acetolysis treatments for; if they aren't released from this matrix they stay hidden inside the tissue. Thus extended acetolysis treatments may be required to release sclereids from peat. Finally, we examined sclereid abundance in sediments from a slough in the Florida Everglades to determine if abundance of Nymphaeaceae sclereids correlates with Nymphaeaceae pollen and we find no significant correlation. Additional analyses are required to determine if empirical relationships exist amongst plant populations, pollen, sclereids and environmental conditions. A clear report of chemical treatments used and processing times are critical to verify results of studies utilizing sclereids.