What a thousand year-old moss plant can tell

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The past is the key to the future. Knowing the landscape history helps to understand recent behaviour of habitats and can give prospects to future development. The past is manifested in a number of media and to go back in time, we just need to read the signs and decode the contained information.

A wetland, which has constantly accumulated dead plant material (peat) due to water saturation and lack of oxygen, can tell its own history through its peat layer. In there one finds a vast variety of plant remains like fruits, seeds, leaves, cuticles, buds, anthers, rhizomes, twigs, wood, bark but also sporangia and megaspores from cryptogams as well as various animal remains – everything preserved for thousands of years. If these particles are larger than 0.5 mm and can be seen by the naked eye, they are called macro fossils. The vegetation of a site integrates the overall conditions, like water table, nutrient status, pH and light availability, meaning that one can infer from the macro fossil assemblage the former vegetation and thus the former conditions of the site. For that purpose, indicator species with a small optimum range of habitat conditions are of great help.
The study system is boreo-nemoral rich fens, a threatened wetland type with a large floristic biodiversity. The study sites are three wetlands in the province of Uppland, where drainage for forestry in the 1950ies had changed the peat and the vegetation drastically. In 2003 the sites were rewetted by ditch blocking. Older vegetation data are incomplete or not available raising the questions, how the pre-drainage conditions really were and if the sites could be classified as rich fens. To answer this, the macro fossil assemblages of nine peat cores (three per site) were analyzed with special emphasis on bryophytes (brown and peat mosses). To investigate the effect of drainage on the peat layer, the cores were also analyzed for degree of peat decomposition, using three different methods.

Under undisturbed conditions one would expect more highly decomposed peat in deeper layers, firstly because it is older and has had more time to break down, and secondly has a heavy layer of younger peat lying on top of it, which amplifies decay. In several cores the pattern was upside down with more decomposed peat at the surface, which is probably caused by aeration of the peat after drainage. The macro fossil analysis resulted in a quite large number of identified species and estimations of their proportions. Brown mosses were definitely worth paying extra attention to, since they are generally well-preserved and are reliable indicators. Several characteristic species (brown mosses, peat mosses) in the peat of all three mires indicate with high certainty that the sites were rich fens in the past. This information can support argumentations in restoration projects, when it comes to the question, why to drown for example a forest. With some restrictions the macro fossil analysis is of high value for paleoecological research. Without requiring high-tech methods it provides much information about the local vegetation history and makes a virtual journey into the past possible.

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