

New England Botanical Club – Minutes of the 1016th Meeting

7 April 2006

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The 789th meeting of the New England Botanical Club, being the 1016th since its original organization, was held on Friday, April 7, 2006, in the Lecture Room of the Fairchild Biochemistry Building, Divinity Avenue, Cambridge, MA. There were 70 members and guests in attendance. It was announced that the May meeting will be at the Garden-in-the-Woods. President Karen Searcy announced two new councilors, Pat Swain and George Newman, and that there are open committee positions if anyone is interested. The committees are listed on the website. Refreshment assistance is especially needed.

Former President Paul Somers announced the evening's speaker, Dr. Robbin Moran of the New York Botanical Garden. Dr. Moran spent the evening regaling us with stories about "Helpful and Harmful Ferns." He began his presentation by comparing the number of human uses for ferns to seed plants. Compared to seed plants, ferns are used much less, in part because there are many fewer species (11,000 as compared to 250,000), but also because ferns lack alkaloids such as caffeine and codeine that are very useful for humans.

The first species mentioned was *Azolla* or mosquito fern, the world's smallest fern. *Azolla* is critically important economically in Southeast Asia where it has fertilized rice paddies for centuries. Farmers inoculate their fields in the spring, then lower the water level and mix the fern into the mud. As it decomposes it provides a rich source of nitrogen. Chambers within the leaves contain cyanobacteria that fix atmospheric nitrogen. Young leaves produce glove-shaped hairs that form pockets and pull *Anabaena* bacteria down into the leaf, trapping it.

The shapes of fern fiddleheads have provided artistic inspiration to humans, most notably in the scroll of the fiddle or violin. This scroll is based on a stylized *Asplenium scolopendrium* or hart's tongue fern. This kind of spiral, called a logarithmic or equiangular spiral, is unique in that it has the same shape whether large or small. Edible fiddleheads in the northeastern United States are from the ostrich fern, *Matteucia struthiopteris*, which is common in gardens and on floodplains in New England. Its sterile fronds look like ostrich plumes. Robbin digressed for a minute to describe how fiddleheads are best eaten (remove scales, blanch for three minutes, and then lightly saute' for 3-4 minutes!). Fiddleheads are the largest export crop of New Brunswick, Canada!

Ferns are extremely important as a national symbol in New Zealand, both to the native Maori culture and current New Zealanders. Dr. Moran showed many examples of fern shapes used as a common design motif on products – even the sports teams use a fern as their logo. The national plant is the silver tree fern or ponga (*Cyathea dealbata*). Tree ferns are particularly interesting because of how they become tree sized despite a lack of secondary growth. They have two main methods to support their stems: First, they develop hard sclerenchyma tissue that forms sheaths around the vascular bundles and periphery of the stem. Second, they develop a cap of dense thick roots called a root mantle. These roots support the main stem, enabling it to grow tall in the absence of secondary growth. These root mantles can be harvested and are used in many products from planters to sculpture. They are an important form of art in Vanuatu, a southwest Pacific island archipelago, where they are carved for parties that are held when individuals move up in society. Horticulturalists also use root mantles to grow epiphytes such as orchids. In tropical forests, many fern epiphytes grow on the root mantles, and some species are entirely restricted to them.

Dr. Moran then mentioned the Hartford or climbing fern, *Lygodium palmatum*, the first plant to be protected by law in the U.S. *Lygodium* has indeterminate growth of the leaves, so the leaves are able to become the largest of any plant. What looks like a leaf on the plant is actually just a pinnule. This genus is used in Thailand for weaving beautiful baskets. In the U.S. the most notorious member of the genus is *Lygodium microphyllum*, which is a major weed in Florida. It smothers native plants on the ground and by climbing up trees and also serving as a wick for wildfires that then run up trees and kill them.

The Australian water fern, nardoo (*Marsilea drummondii*), caused the dramatic demise of the first Australian expedition that attempted to cross the interior in search of natural resources. Its sporocarp is eaten by Aborigines as a dilute soup, which they spooned into their mouths using mussel shells. Expedition members made cakes out of it instead, and then almost all proceeded to die a slow death from beriberi disease. Recent research has demonstrated that the sporocarps contain thiaminase which destroys vitamin B1. Aborigines ate a dilute product, which decreased the activity of the thiaminase, with a mussel shell that prevented an organic cofactor from binding with the thiaminase and enabled them to survive.

The next fern profiled was *Salvinia molesta*, a species related to *Azolla*, which is a serious pest in the Gulf states, forming thick masses up to one meter deep in waterways. It has unique "egg beater" hairs on leaf surfaces that enable water to bead up and roll off. This species was controlled in the Old World by a successful biological control (a weevil); however, this method has not been successful in the southeastern United States.

The final fern mentioned was bracken, *Pteridium aquilinum*, the only fern with recurved margins on sterile leaves (normally the recurved margins protect the sporangia on fertile leaves). Its fiddleheads are eaten in many places in the world, but have recently been associated with stomach cancer. Dr. Moran referred to this species as the Lucretia Borgia of the fern world (she was a famous Renaissance poisoner). The species not only contains carcinogens, but also causes thiamine poisoning (bracken staggers in cows), has tanins that are hard to digest, releases cyanogenic compounds when eaten by insects, and has ecdysones that promote premature molting insects.

Robbin ended the entertaining evening with a "flare" – he lit spores from *Lycopodium* (the only non-fern group discussed) on fire to demonstrate how flammable they are! The spores are filled with volatile storage oils, which is why they are flammable. In the early days of photography, the spores were an ingredient in flash powder. Apothecaries used to roll pills in *Lycopodium* spores to prevent the pills from sticking.