New England Botanical Club – Minutes of the 982nd Meeting

1 November 2002 Neal W. Anderson, Recording Secretary

The 755th meeting of the New England Botanical Club, being the 982nd since its original organization, met on Friday, November 1, 2002, in the Lecture Hall of the Fairchild (Biochemistry) Building, Harvard University, Cambridge, MA, with 31 members and guests present. After announcements and "gossip," Vice President Art Gilman introduced Dr. Dorothy J. Allard, who spoke to the organization on "A New Epiphytic Species of *Pedicularis* from Nepal: Description and Demography."

An enjoyable evening was spent in vicariously traveling to Nepal to the King Mahendra Trust for Nature Conservation where Dorothy had collected data on the influence of grazing on the vegetation of the sub-alpine fir forest zone as part of her doctoral research. The Annapurna Conservation Area is in central Nepal along its northern edge, but south of the crest of the Himalayas. Fir forests occur from 2900 – 3500 m in elevation here but are not continuous. The fir–rhododendron forest zone where the *Pedicularis* was found has a full exposure to the summer monsoon with a high precipitation during the growing season while being snow covered from December through March. Orographically induced circulation patterns cause cloud forest conditions in this region, resulting in the highest recorded rainfall in Nepal (6000 mm/year). Local villagers from lower elevations make openings in the forest for grazing livestock during the summer months.

The overstory trees were *Abies spectabilis* with an understory of two *Rhododendron* species, *R. campanulatum* and *R. barbatum.* A number of other deciduous species form a scattered mid-story. The largest firs had diameters approaching 2.5 m. The cloud forest conditions promoted a luxuriant growth of epiphytes where vascular species were growing with their roots under and inside a layer of bryophytes.

While climbing trees to collect epiphytes, Dr. Allard encountered a species of *Pedicularis* apparently growing as an epiphyte on the trunks of *Abies* trees. When identifying species following their collection in 1995, Dr. Allard was unable to identify the species. Additionally, she was unable to find the plant in study sites to the east or west of this area, suggesting that there may only be one isolated population of it. Contacting Dr. Robert Mill at the Royal Botanic Gardens in Edinburgh, he confirmed that no known epiphytic species of *Pedicularis* exist and agreed to describe the species if it was really a new species and if flowering material were available.

The genus *Pedicularis*, a member of the Scrophulariaceae, has a center of distribution in SW China and ranges throughout the northern hemisphere, commonly in montane and alpine areas. Some 600 species are known. All known species are hemi-parasitic where the roots attach to the roots of other plants by means of haustoria. Their flowers are thought to have co-evolved with their pollinators, commonly bumblebees. The typical flower has a tube and an upper lip called the galea and a lower lip, the labellum, facing outward from the inflorescence axis. When flowers were finally collected on a subsequent expedition to the area, the unidentified species had its entire corolla rotated so that the galea faces inward toward the axis of the inflorescence.

In 2001, Dr. Allard collected not only the plant in flower, but also surveyed and mapped its locations, conducted pollination studies, and studied its flower development. Additionally, she sent flowering material to Dr. Mill. In a letter to her he said, "I spent all weekend looking at the new *Pedicularis*. I am absolutely convinced that it is new to science; it has completely bizarre floral morphology that I have never seen in other *Pedicularis*. I spent a couple of hours last night playing origami with paper floral cutouts to try and work out how it had evolved from a 'typical' *Pedicularis* flower." The species was named *Pedicularis dendrothauma*, which means "wonder of the trees." It was placed in a new series, Abietophilae within the section Phanerantha of the genus.

Demographic studies showed that *P. dendrothauma* grows on trees and on dead wood, rarely on other substrates. While the species has a strong dependence on *Abies*, both living and dead, it also grows on *Rhododendron.* It was observed to grow as far as 35 m above the ground. (Dorothy is courageous in using single-line rope climbing techniques!) As leaf length and number increased, so did the likelihood of flowering. Plants with the longest leaf length >20 cm have a 40% flowering rate with 1 to 4 stalks per plant. Studies showed that the plants are probably perennial. They seem not to be self-pollinated but no pollinators were detected during 90 hours of observation. Their dispersal presents a problem: it is obvious that plants in lower layers developed from seeds falling from higher plants, but how do the seeds get up there in the first place? The seeds have no structure that would provide for upward movement, like wings or elaisomes.

Additionally, while haustoria were found on the roots of *P. dendrothauma*, their presence doesn't prove that the plant is hemi-parasitic. Are these haustorial structures functional or vestigial? Could the plant be parasitic on mosses?

The population viability is another set of questions. Is the population stable? Is it subject to or a consequence of herbivory? Clearly more study is needed in fitting this novel *Pedicularis* into our understanding of this genus.