New England Botanical Club - Minutes of the 1002nd Meeting
3 December 2004
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The 775thmeeting of the New England Botanical Club, being the 1002nd since its original organization, was held on Friday, December 3, 2004, in the Lecture Room of the Fairchild Biochemistry Building, Divinity Avenue, Cambridge MA. There were 38 members and guests in attendance.

Following gossip and announcements, NEBC Vice President Karen Searcy introduced the night's speaker, Jesse Bellemare. Karen first met Jesse when he was a high school student interested in botany; he later attended UMass Amherst for his undergraduate degree. He completed his Master's work at Harvard Forest, and is currently a Ph.D. candidate at Cornell University. In 2003 Jesse was a recipient of the NEBC Graduate Student Award.

The talk, titled "Environmental and Historical Controls on the Distribution and Variation of Rich Mesic Forests in Western Massachusetts," began with an introduction to the life history of forest herbs. The typical herb found in the forest understory is slow-growing and long-lived. They are typically adapted to a relatively stable environment, making them vulnerable to new types of disturbance or to an increase in the level of disturbance**.** Many species spread vegetatively in clumps, and have a low level of seed production and dispersal compared to other plants. Common modes of seed dispersal in forest plants include: myrmecochory (ants**;** e.g.**,** *Asarum canadense*), barochory (gravity**;** e.g.**,** *Carex plantaginea*), endozoochory (internally by animals**;** e.g.**,** *Actaea alba*), or anemochory (wind**;** e.g.**,** *Aster divaricatus*).

Jesse pointed out that from an evolutionary perspective, human disturbance is a relatively new addition to the landscape. Though much of the forested land in Massachusetts was cleared in the 18th and 19th century for use as pasture and arable land, that percentage dropped significantly by the late 19th century. The modern forest is a mosaic of stands with varying land-use histories. Jesse's research focused on rich mesic forest (RMF) in western Massachusetts. These forests are characterized by soil with circumneutral pH and high cation concentrations, often associated with calcareous bedrock. The canopy of RMF is often dominated by *Acer saccharum*; the herb layer is species-rich and populated by many spring ephemerals. Indicator species include *Dicentra cucullaria* (Dutchman's breeches), *Actaea alba* (doll's eyes), and *Caulophyllum thalictroides* (blue cohosh).

More than 60 research plots were established in both primary and secondary *Acer saccharum*-dominated forest stands. Species composition and environmental factors were assessed in each plot. With regards to soil characteristics, bulk density and percent of silt and sand varied little between primary and secondary forests. Soils in new secondary forest did have higher aluminum concentrations, while calcium concentrations were highest in primary forest; soil pH did not differ significantly among primary and secondary forests. Jesse used diagrams from a detrended correspondence analysis ordination to represent relationships between species composition and environmental and historical factors. Most primary forest plots clustered together at one end of the graph, while 20th century secondary forest plots clustered at the other end, an indication that each group shared a unique set of plant species.. The 19th century secondary forest plots were grouped between the two with some overlap, a result of the greater variation in species composition found in plots from that age class.

Analysis of herb layer species distributions revealed that there were a number of species associated with primary forest and that herbaceous species richness tended to be higher in primary forest. The understory herb species were also analyzed for trends in seed dispersal mode in relation to distribution in primary and secondary forests. There were 9 anemochores, 6 barochores, 6 endozoochores, and 6 myrmecochores. He found a significant difference in the Colonization Ability Index (CAI) of these four dispersal types, with anemochores having the highest CAI, followed by endozoochores, myrmecochores and barochores. In general, species with limited seed dispersal, such as the infertile hybrid *Cardamine* x*maxima*, had a pattern of higher frequency in primary forest plots. Some species that are considered indicators of RMF, such as *Caulophyllum thalictroides* and *Actaea alba*, were quite common in the primary forest plots, but were also found in more than 50% of the secondary forest plots, possibly because they are endozoochores. There was also a suite of species widespread in all forest types, including *Polystichum acrostichoides* (Christmas fern), *Arisaema triphyllum* (Jack in the pulpit)**,** and *Aster divaricatus* (white wood aster).

There were some 19th century secondary forest sites that exhibited species composition similar to that of primary forest; this was likely caused by the proximity of these secondary forest plots to bedrock outcrops. These outcrops appear to have functioned as small-scale refugia for some forest plant species during agricultural use of the surrounding landscape. Following abandonment in the late 19th and early 20th centuries, forest plant populations have slowly expanded from these refugia.

Jesse concluded by noting that forest clearance and agricultural land-use is a severe and novel form of disturbance in the forests of this region and many forest plant species are maladapted to recover from this large-scale disturbance. In RMF, seed dispersal mode is a key factor affecting recolonization patterns of forest herb species. Due in large part to seed dispersal limitation, it is likely that the impacts of past human disturbance on species composition of secondary forests will persist for many decades to come.