New England Botanical Club – Minutes of the 947th Meeting

9 April 1999 Prepared by Dr. Paul Somers, Recording Secretary

The 720th meeting of the New England Botanical Club, being the 947th since its original organization, met on Friday, April 9, 1999, in the main lecture hall at Harvard University's Geological Lecture Hall with 184 members and guests present.

President David Conant briefly reviewed details of the Club's symposium in celebration of the 100th anniversary of ***Rhodora*** entitled "The Dynamics of the New England Flora". He invited all to participate on Saturday, as well as in the cutting and consumption of cake and hors d'oeuvres following the evening's lecture. Michael Donoghue then introduced the "NEBC 1999 Distinguished Speaker," **Dr. Peter Raven**, Director of the Missouri Botanical Garden. Accomplishments and qualities mentioned included 1) his ability to organize and galvanize people around ideas and visions, 2) his authorship of the "*The Biology of Plants*" textbook, 3) his collaborative research on the Onagraceae as a model for systematic botany, 4) his leadership in coordinating the Flora of China project, and 5) his leadership in conservation of biological diversity, including serving on the President's Commission on Science and Technology and co-authoring a paper entitled "Teaming with Life," a statement on the need and mechanisms for preserving biodiversity.

Dr. Raven addressed the topic, "**Plant Conservation Globally and Locally**." He explained that his approach would be to paint the broadest picture possible of the current crisis in biological conservation around the world and why the crisis exits. His main objective was to stimulate our thinking about these issues and invite a dialog about strategies for combating the problem. Raven's broadest picture included a review of 3.8 billion years of biological evolution on the earth and the five major extinction events that have influenced its pathways to the present. The first three extinction events occurred when life was restricted to the marine world. He pointed out that terrestrial life began 430 million YBP, at a time equivalent to 90% of the way through the time-line of earth's existence. He emphasized the importance of cyanobacteria in making colonization of terrestrial habitats possible by changing the earth's atmosphere to an oxidizing one. The resulting increase in oxygen produced by their photosynthetic activities over 3 billion years made possible the production of a stratospheric ozone layer that allowed the ancestors of the four groups dominant on land at the present time (arthropods, fungi, terrestrial vertebrates, and plants) to colonize terrestrial habitats. The fourth great extinction event occurred at the end of the Permian about 280 YBP impacting the earth's first forests and early dinosaurs. In the following Mesozoic Era, dinosaurs and cycads flourished and angiosperms evolved, making life much more diverse than previously.

About 65 million YBP, at the end of the Cretaceous Period, the fifth great extinction occurred, presumably as the result of a large meteorite crashing into the earth off what is now the Yucatan Peninsula. The collision created an opaque cloud around the globe that impeded photosynthesis and, according to estimates by David Raup *et al.*, eliminated two-thirds of terrestrial species in a short period of time. At that point, Raven estimated loosely that the number of eucaryotic organisms remaining may have numbered between 500,000-700,000. It took approximately ten million years for life to recover, and the resulting evolutionary pathways led to the evolution of

most current groups of organisms. Today, according to a 1997 paper by Sir Robert May presented at the National Forum on Biodiversity at the National Academy of Sciences, the number of eucaryotic species can be estimated conservatively at about seven million. Of these, only about one in four has a valid name. In the tropics, the ratio is much less, around one in 20. Even for the described species of organisms our knowledge is extremely limited; many are known only from a single specimen at the bottom of a museum vial. No one can give a plausible estimate of the number of procaryotic organisms. One gram of soil in a Norwegian beech forest is estimated to have 5,500 species of bacteria, more than the total number of species recognized formally from the entire world, and how these figures relate to other ecosystems around the world, or to the total number of bacterial species, is unknown. Even more poorly known, Raven says, is the multitude of relationships that mediate the flow of energy through the globe's ecosystems and other aspects of their functioning.