New England Botanical Club – Minutes of the 968th Meeting

4 May 2001 Prepared by Don Hudson, Recording Secretary

The 741st meeting of the New England Botanical Club, Inc., being the 968th since the original organization, met in the Main Lecture Hall of the Biological Laboratories, Harvard University, and Cambridge, Massachusetts, on Friday, 4 May 2001. President Lisa Standley called the meeting to order at 6:53 PM with 33 members and guests present. There were no new members to introduce. The group was encouraged to look ahead to June 8-9 and the spring "away" meeting at Bennington College, VT. Saturday's field trip to nearby New York will focus on bryophytes especially. Pat Swain was pleased to announce three winners of this year's graduate student research award, Valérie Reeb of the University of Illinois of Chicago (studying lichen-forming Ascomycetes), Michael Moody of the University of Connecticut (studying *Myriophyllum*), and Rachel Williams of Michigan State University (studying *Pycnanthemum*).

Vice President Paul Somers reminded the group that Dr. Kerry Woods will be speaking at Bennington College on June 8th about old-growth forests of Michigan. He added that the fall "away" meeting would be held at the Waquoit Bay National Estuarine Research Reserve in Falmouth, Massachusetts, on the second Friday of the month, September 14th.

The business of the club concluded, Paul introduced Dr. Carl W. Grobe of Westfield State College, Westfield, MA, to speak to the club on "Seaweeds: The Underappreciated model systems." Carl grew up in coastal Maine where his interest in the intertidal ecosystem was nurtured. Undergraduate work at Connecticut College and later studies at the University of California at Davis cemented his life-long passion for seaweeds. Carl's work has extended from the Darling Center in Walpole, Maine, to the ice bound shores of Antarctica.

Dr. Grobe prepared the audience with a systematic review of the multicellular, macroscopic marine algae that we think of as seaweeds, including the reds (Rhodophyta), browns (Phaeophyta), and greens (Chlorophyta). Seaweeds provide much of the primary productivity of marine and estuarine ecosystems and provide niches and food for many marine and intertidal organisms. In addition, this group of photosynthetic organisms is playing an increasingly important role as a source of nutrients, vitamins, and raw materials for commerce. Studies of the evolutionary history of the seaweeds have provided insights into the primordial endosymbiotic relationship between photosynthetic bacteria and early phagocytic eukaryotes, which gave rise to photosynthetic eukaryotes and the higher plants. Carl reminded us as well of the specific characteristics of the Chlorophyta as source material for the ultimate emergence of plants on land. Carl thus painted the backdrop for his own studies of the physiology of the seaweeds.

Carl is particularly interested in the life of intertidal organisms, and he has chosen the seaweeds as a model system to investigate such things as the stresses induced by cycles of immersion and emersion and desiccation and hydration, as well as daily and seasonal fluctuations of temperature and wave action. Although seaweeds have simplified physiology, their biochemistry nevertheless is identical in many respects to that of higher plants. Thus, seaweeds are ideal candidates in Carl's estimation for studies involving responses to light at all wavelengths and the uptake of nutrients. Carl has studied most recently the interrelationship of nitrogen and light absorption, using the red alga *Porphyra* as his subject. As available nitrogen in the medium increases, photosynthesis (and subsequent growth) increases. In particular, when nitrogen is in short supply, the nitrogen seems to be shunted to the ultraviolet-absorbing pigments, which Carl attributes to a possible mechanism for enhanced protection of the seaweed. Carl has also noted a dose response. A high level of light to nitrogen-deprived thalli is "deadly." Oxygen metabolism in photosynthesizing plants includes a suite of enzymes to protect against free radical damage. Nitrogen-depleted algae see a drop-off of 70-75% activity of catalase and associated enzymes.

In related experiments with *Laminaria saccharina*, a kelp, Carl has measured decreased photosynthesis when ultraviolet (UV) light levels are increased in the presence of reduced levels of nitrogen. When protection from UV is provided, photosynthesis increases whether or not levels of nitrogen rise. Photosynthesis increases to maximum levels if nitrogen levels increase. Seaweeds examined from deep-water habitats reach plateaus of photosynthesis at lower light levels than does material taken from shallow water environments. Different populations of *Laminaria* develop tolerances as a function of their exposure to light and especially UV wavelengths.

Carl made a clear and unambiguous case for his chosen group as candidates for model studies of environmental effects on the health of higher plants and for biochemical studies in simplified systems.

The meeting adjourned to dessert and refreshments at 8:20 PM.