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Phenological Patterns of Northern New England Seaweeds[1, 2]

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Abstract

Each of the three major groups of seaweeds within the Gulf of Maine exhibits pronounced seasonal differences in species richness with summer maxima and winter minima. By contrast, widely different reproductive strategies occur, depending upon the specific taxa and environmental conditions. Some species exhibit conspicuous patterns of sporophytic or gametophytic dominance as well as pronounced variability of sex ratios. Several representative reproductive, growth and longevity patterns are compared, emphasizing diverse hydrographic, physical and historical factors. Cold temperate species dominate open coastal sites, while warm temperate or mixed floras are most conspicuous in estuarine habitats. Several disjunct populations occur north of Cape Cod, Massachusetts, particularly within estuarine habitats; some of these taxa may be relics of an earlier hypsithermal or warm period.

Introduction

The Gulf of Maine, which extends from Cape Cod, Massachusetts to Cape Sable, Nova Scotia, has a distinctive northern flora compared with that to the south (*cf.* Chapman 1964, Coleman and Mathieson 1974, 1975, Hoek 1975, 1982, Setchell 1922, Stephenson and Stephenson 1949, Taylor 1957). The Gulf, which encompasses the New Hampshire coastal zone (Figs 1 and 2), is a partially enclosed sea (only 30% is fully exposed) with enormous irregularities including bays and tidal rivers, an abundance of rocky substrata, strong tides and a wide range of hydrographic conditions (*cf.* Mathieson *et al.*, in press). The extreme winter conditions within the area have discouraged many investigators, and until recently there has been a paucity of information regarding the winter-early spring vegetation and seasonal reproductive periodicities, particularly within the subtidal (*cf.* Mathieson, Hehre and Reynolds 1981, Mathieson and Penniman 1986 a, b).

Since 1965 a variety of floristic, phenological and autecological investigations have been conducted by phycologists at the University of New Hampshire. Mathieson and Hehre (1986) and Mathieson and Penniman (1986 a, b, in press) give a synopsis of these studies, which have attempted to provide a broad baseline of knowledge regarding the species composition, biogeographical components and major phenological patterns of New Hampshire seaweeds, with these being representative of the Gulf of Maine. Such information will be increasingly valuable in the future, because of the many conflicting needs and uses that may diminish and/or alter these valuable resources and habitats (*cf.* Hardwick-Witman and Mathieson 1983, 1986). In the present account a summary of these conspicuous floristic patterns is given based upon the work of myself and several colleagues (past and present). In addition, a synopsis of the interactive patterns of growth and reproduction is summarized for several species, as well as an assessment of the plasticity of phenological patterns in different habitats and with different biogeographical components (Table I).

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