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Field Ecology of the Brown Alga *Phaeostrophion irregulare* Setchell *et* Gardner*

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Abstract

The distribution, seasonal growth and reproduction of *in situ* populations of *Phaeostrophion irregulare* were studied at Glacier Point, British Columbia in relation to a variety of environmental factors. The plant is restricted to sandy areas where large fluctuations of sand occur annually. Typically *P. irregulare* is buried four to six months per year, and its growth and reproduction are limited to periods of sand subsidence. Competition with other plants probably accounts for the restriction of *P. irregulare* to sandy areas, as it will grow in rocky areas if other algae are eliminated. The period of maximum growth (Febr. to April) is associated with a corresponding increase in light intensity and water temperature. After April, growth in non-tide pool populations decreases much more rapidly than growth of tide pool populations, because of increased desiccation during daylight hours.

The morphology of laminate plants of *Phaeostrophion irregulare* is extremely variable and the range of variability at Glacier Point overlaps with that described for *P. australe* from California. The latter plant is considered to be a growth form and a taxonomic synonym of *P. irregulare*. Distributional evidence also supports this conclusion, as there is no marked geographical discontinuity between the two plants.

Phaeostrophion irregulare exhibits a sporadic open-coastal distribution from Point Conception, California to Khantaak Island, near Yakutat, Alaska. Temperature is probably the primary factor controlling its geographical distribution, with salinity being regionally signifcant. Even so, local conditions (i.e. the presence or absence of sand) are of major significance in determining the regional distribution of the plant.

Introduction

Until recently little has been known of the distribution or ecology of the marine brown alga *Phaeostrophion irregulare* S. *et* G. (Fig. 1), which belongs to the order Dictyosiphonales and family Punctariaceae. Setchell and Gardner (1924) first described the monotypic genus *Phaeostrophion* (*P. irregulare*) from specimens collected at Bolinas, California (N. L. Gardner #4582) and they also reported (1924, 1925) a single collection from Cape Arago, Oregon (N. L. Gardner #2673). Few other collections of the plant have been made, and *P. irregulare* is only recorded from the Pacific Coast of North America. Sanborn and Doty (1944) recorded *P. irregulare* at Lighthouse Reef near Cape Arago, Oregon. Doty (1947) recorded it as being locally abundant around the margins of sandy tide pools at mean lower low water, southwards of Seal Rock, Oregon, and described the development of its blades. Dawson (1958) described a second species, *Phaeostrophion australe*, from Point Conception (Government Point), California. He states that structurally and reproductively the two plants are much alike, but that *P. australe* is much smaller than *P. irregulare*. He also suggests that there is a marked geographic discontinuity between the two species, for *P. irregulare* is not known south of Bolinas, California.

The sporadic distribution of *Phaeostrophion irregulare* on the Pacific Coast and in British Columbia, and the occurrence of several populations locally at Glacier Point, British Columbia encouraged the writer to make a detailed study of the factors responsible for its distribution and growth. A combination of laboratory and field investigations were conducted during 1961–1964 to determine the major factors influencing its growth and reproduction (Mathieson 1965). In the present paper the field ecology of *P. irregulare* at Glacier Point is described, as well as the geographical distribution of the plant on the Pacific Coast of North America. Experimental ecological investigations of *P. irregulare* are described in two other accounts (Mathieson 1982a, b).

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