THE MARINE COMMUNITIES OF A TIDAL INLET AT CAPE ANN, MASSACHUSETTS: A STUDY IN BIO-ECOLOGY

RALPH W. DEXTER
Department of Biology, Kent State University
Kent, Ohio

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INTRODUCTION

An ecological study of the marine communities inhabiting a tidal inlet was made over a period of five years to determine the nature of their organization and dynamics. Field studies were conducted during the summer months of the years 1933 through 1937 over an annual period of eleven weeks. Brief visits were made in December of 1933 and March of 1934 for an examination of winter conditions, and additional observations were made during the month of August in 1938 and 1940. The problem was confined for the most part to the communities of an inlet known as the Annisquam River, located at Cape Ann, Massachusetts. The viewpoint of bio-ecology, or synecology, prevailed throughout the study. All common plants and animals were considered together as interlocking components of one natural unit. Life history studies were confined to those phases concerned directly with interrelationships.

Community composition was studied in reference to the physiographic features of the habitats and to the tidal flow and ebb. The ecological processes which received especial attention were those of interrelationships between organisms (coactions), of rhythmical changes produced by tidal fluctuations, of seasonal and annual changes, and of physiographic succession.

Many studies have been published on the marine life of the littoral region. The earlier works were taxonomic or faunistic in nature. Faunistic surveys soon gave way to problems of zonation and distribution and their correlation with physical factors of the environment. It is only within recent years that marine communities have been analyzed as biotic units having sociological properties as well as physical relationships to the environment (Gislen 1930).

The writer is deeply indebted to Prof. Victor E. Shelford, under whose direction the problem was carried out, for guidance in conducting the field studies and in preparing the manuscript. He is also indebted to Prof. C. E. Gordon and Prof. H. E. Warfel for suggestions and aid in the early part of the survey; to the family of the Rev. Dr. J. W. Beardslee for field assistance, especially to the Rev. W. A. Beardslee for aid in conducting the dredging operations and for information on birds; to Mr. F. S. Speck for field assistance; to Mr. Carl Freiburg for information on fishes; to Dr. C. L. Kanatzar for plankton examinations; to Capt. John Alvord for use of his diving helmet; to Mr. G. H. Colman for loan of scientific apparatus; to the Rev. R. M. Barker for meteorological data; to the Gloucester Station, United States Fish and Wildlife Service, for hydrographic data; to the United States Army District Engineer Office at Boston for topographic maps and information; to the Massachusetts State Bureau of Marine Fisheries for information on work of the bureau at Cape Ann; to Mr. N. W. Montgomery for boat and field-base accommodations; to the members of the departments of zoology and botany, Massachusetts State College, who assisted with the identification of organisms; and to the following who corrected the nomenclature for the revised manuscript: Dr. W. L. Schmitt, annelids and crustaceans; Dr. W. J. Clench, mollusks; Dr. C. L. Hubbs, fishes.

REGION OF STUDY

Geography and Geology

Cape Ann is a promontory which lies at the northern extremity of Massachusetts Bay. It is approximately 23 miles northeast of Boston Harbor. The narrow inlet known as the Annisquam River cuts off

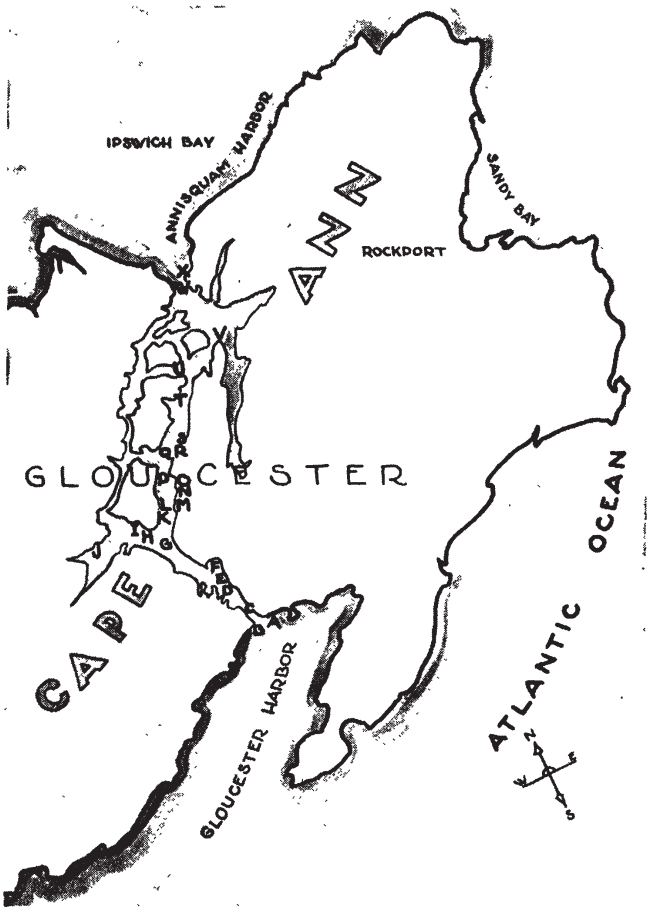

FIG. 1. Map of Cape Ann, Massachusetts. Letters indicate location of field stations.