

PHYTOPLANKTON OBSERVATIONS THROUGH FOURTEEN MONTHS
AT A TROPICAL OCEANIC STATION

A THESIS SUBMITTED TO THE GRADUATE DIVISION OF THE
UNIVERSITY OF HAWAII IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

IN OCEANOGRAPHY

SEPTEMBER 1971

By

Robert Glenn Muller

Thesis Committee

Robert O. Fournier, Chairman
John Caperon
Edward D. Stroup

ABSTRACT

Ninety-one samples were collected from ten depths during ten cruises to a tropical oceanic station and enumerated using the sedimentation technique. The environmental variables considered were: incident radiation, effective radiation, light intensity of the sample depth, cloud cover, wind speed, surface water temperature, mixed layer thickness, the change in the mixed layer thickness, and zooplankton abundance. Significant variations ($P < 0.01$) in cell counts were found for the three major phytoplankton groups: coccolithophorids, dinoflagellates, and diatoms. Only the diatoms correlated with any of the environmental variables.

The species composition was relatively uniform. Ninety-three taxa out of 171 identified occurred in at least 10 per cent of the samples with only 23 showing significant variations. Recurrent group analysis of the upper 150 meters identified six distinct groups of species, five of which had correlations with environmental variables. One group included 21 taxa, 17 of which were among the 23 that varied. Factor analysis identified four groups of species, two of which were correlated with environmental variables.

A shift in dominance from Umbellosphaera irregularis in the summer to Gephyrocapsa oceanica and Coccolithus

huxleyi in the winter was observed and ascribed to light variation.

Correlations suggested that advection and light variations were important to the phytoplankton at this station.