Marine Phytoplankton Collected at Wake Island

by

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INTRODUCTION

Wake Island is a triangular shaped atoll, located along the northern extent of the equatorial current in the central Pacific (19°16'N. lat., 166°39'E. long.). It is composed of the low lying islets of Peale, Wake and Wilkes, which enclose a shallow lagoon of approximately 6 km^2. These islets are separated by shallow channels and allow free entry of oceanic surface plankton into the lagoon.

JOHNSON (1954) discussed the plankton composition in the Bikini Lagoon of the northern Marshall Island complex, located approximately 630 km south of Wake Island. Using net collections, he found a sparse standing crop of phytoplankton that was dominated by *Rhizosolenia* sp. and several dinoflagellates. MATSUYA (1937) made net collections during March and April 1935, from the surface to 20 m of depth in the Iwayama Bay of the Palao Islands, and found an average plankton count of 2509 individuals/l. Using a coarser net, MOTODA (1941) collected at the same stations and had counts that ranged from 75—200 individuals/l. The predominant phytoplankters in these samples were *Ceratium* sp., *Nitzschia* sp., and *Chaetoceros* sp. MOTODA (1940) considered the waters off the coast of the Palao Islands low in plankton. The plankton observed by AIKAWA (1936) in the tropical island waters of Formosa and the Philippines were oceanic and rich in dinoflagellates and blue-green algae. The plankton of the tropical waters in the open Pacific are described by MARSHALL (1933) and GRAHAM (1941) as extremely sparse. However, the water bottle samples of HASLE (1959) and the net collections of RAMPI (1952) from the equatorial Pacific indicate a wide variety of phytoplankters present. RAMPI noted a preponderance of dinoflagellates,

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whereas the collection procedures of HASLE allowed for the enumeration of larger numbers of coccolithophores and diatoms. Many of these nannoplankters were too small to be retained in the nets used by the investigators mentioned above.

METHODS

Frautschy water bottle samples were collected just below the surface at five stations on 15 September 1965. A 500 ml volume was placed in polyethylene containers and preserved immediately with a neutralized formalin solution. These samples were returned to the Laboratory where a settling and siphoning procedure was used to obtain a concentrated volume (<40 ml) of the phytoplankters. Five 0.1 ml portions of the concentrate were placed in a Palmer-Maloney counting cell and examined with an AO Spencer phase contrast microscope (10x ocular and 45x dark phase objective, NAO. 68). The phytoplankters were recorded as number of cells/l. Station locations:

W-1 located seaward approximately 15 meters off the northeast coast of the Peale islet.

W-2 located approximately 50 meters seaward from the south eastern tip of Wake islet, off Peacock Point, and along the outer fringe of barrier reef.

W-3 located on the seaward side of the channel separating the Wilkes and Wake islets, along the southwest margin of Wilkes.

W-4 along the northeast margin of the lagoon off Flipper Point of Peale islet.

W-5 the lagoon side of Wake islet, near the mid-point of southwestern margin, 20 meters into the lagoon.

RESULTS AND DISCUSSION

The data from each of the five stations indicated low concentrations of phytoplankters with considerable diversity of species (Table I). Twenty-six diatoms, 4 pyrrophyceans, and 2 coccolithophores were identified in the samples. The water temperatures ranged from 27.2°C (W-1) to 27.7°C (W-5). The phytoplankton counts were from 2840 to 6768 cells/l at stations W-4 and W-1 respectively. *Rhizosolenia alata*, *R. calcar-avis*, *Navicula marina*, *Nitzschia longissima*, *Chaetoceros socialis*, *Grammatophora marina*, and *Planktoniella sol* were the most common diatoms. *R. robusta*, *Amphiprora striolata*, *Plagiogramma vanheurckii*, *Amphora ovalis*, *Mastogloia lata*, *Lauderia borealis*, and

TABLE I

Concentrations of phytoplankton in numbers per liter from five stations at Wake Island on 15 September 1965.

Species	Stations				
	W-1	W-2	W-3	W-4	W-5
I. Bacillariophyceae					
Amphiprora striolata GRUNOW	—	—	—	80	—
Amphora ovalis KÜTZING	—	—	—	—	288
Chaetoceros sp. EHRENBERG	—	—	120	—	—
C. atlanticus CLEVE	—	240	—	720	—
C. decipiens CLEVE	288	—	—	—	—
C. socialis LAUDER	1440	840	—	280	288
Eucampia zoodiacus EHRENBERG	—	—	—	40	144
Fragillaria crotonensis KITTON	288	720	—	—	—
Grammatophora marina (LYNG.) KÜTZING	144	480	240	280	576
Lauderia borealis GRAN	—	—	—	40	—
Mastogloia lata HUST.	—	—	—	—	288
Navicula sp. BORY	144	—	120	—	—
N. marina RALFS	144	240	—	40	1440
Nitzschia longissima (BRÉB.) RALFS	288	480	120	40	—
N. seriata CLEVE	—	240	—	—	—
Plagiogramma vanheurckii GRUNOW	—	—	—	120	—
Planktoniella sol (WALL.) SCHÜTT	576	840	1200	—	—
Rhizosolenia alata BRIGHTWELL	576	480	480	720	288
R. bergonii H. PERAGALLO	—	120	—	280	—
R. calcar avis M. SCHULTZE	144	120	120	80	144
R. robusta NORMAN	—	—	—	40	—
R. setigera BRIGHTWELL	288	—	120	—	144
R. styliformis BRIGHTWELL	144	—	—	—	—
Synedra sp. EHRENBERG	—	—	—	—	288
Thalassiothrix frauenfeldii GRUNOW	288	—	—	—	—
T. longissima CLEVE & GRUNOW	—	120	—	—	—
II. Coccolithophoridaceae					
Coccolithus huxleyi (LOHMANN) KAMPTNER	288	480	—	40	—
Rhabdosphaera stylifer LOHMANN	1152	840	480	—	288
III. Pyrrophyta					
Ceratium breve (OST. A. SCHMIDT) SCHRÖDER	144	—	120	—	144
C. fusus (EHBG.) CLAP. LACHMANN	144	—	—	—	—
Exuviaella sp. CIENKOWSKY	288	240	—	—	—
Prorocentrum sp. EHRENBERG	—	—	—	40	—
Totals	6768	6480	3120	2840	4320

Synedra sp. were found only in the lagoon. *Coccolithus huxleyi* and *Rhabdosphaera stylifer* were the only coccolithophores found in the samples, with the dinophyceans rare. A filamentous cyanophycean was noted at stations W-2 and W-4, but was not included in Table I.

These phytoplankton concentrations are higher than the net collections of MATSUYA (1937) and MOTODA (1941) in Iwagama Bay and represent a greater variety of species than mentioned by JOHNSON (1954) in Bikini Lagoon. The numbers fell far below the surface phytoplankton numbers reported in the equatorial Pacific by HASLE (1959). HASLE found a vertical range in diatoms between the surface and 24 m of 44,000 to 6000 cells/l (station 1), with *Nitzschia* ap. composing more than 90% of the total count.

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SUMARIO

Fitoplancton marino recogido en las inmediaciones de Wake Island.

Muestras de aqua embotellada fueron obtenidas en tres diferentes estaciones a lo largo de la costa de Wake Island y en dos estaciones en la laguna situada dentro de los límites de diche archipiélago. Veintiseis diatomeas, cuatro pyrrophytos y dos cocolitoforos fueron identificados pero el conteo de fitoplancton fue bajo, oscilando entre 2840 y 6768 células por litro. Estas muestras contenían mayor cantidad ed fitoplancton que las obtenidas en la laguna Bikini (JOHNSON, 1954), situada a 630 kilómetros al sur de Wake Island, pero contenian menor cantidad que las obtenidas en mar abierto en la zona ecuatorial del Pacífico (RAMPI, 1952; HASLE, 1959).

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