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MICROPLANKTON OF THE GULF OF MEXICO AND THE CARIBBEAN SEA

by  
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## FOREWORD

The study reported herein was initiated in May 1964 as part of a program to study the biological productivity off Panama City, Florida, through a two-year grant from the Department of Health, Education and Welfare, National Institutes of Health. The author of this report has not confined himself, however, to the study of the plankton samples collected off Panama City, but has extended his sphere of interest to include samples from other regions of the Gulf of Mexico, as well as the Caribbean Sea. Part of this study was completed while the author was a visiting scientist in the department of Oceanography, Texas A&M University. Upon return to his post as Director, Estacion Hidrobiologica de Puerto Quequen, Argentina, he devoted considerable time to finishing the analysis of the samples which he took with him to Argentina. It should be noted that this study, which is based on about 200 plankton samples, represents the most comprehensive analysis of the microplankton of the Gulf of Mexico which has appeared to date. For instance, before the initiation of this study, the number of dinoflagellates reported from the Gulf was surprisingly low--about 76 species. In this investigation, the author reports no less than 258 species of dinoflagellates and 110 species of tintinnids, the great majority of which were never reported before from the Gulf of Mexico. There is no doubt that the author has made a very valuable contribution to our knowledge of the biology of one of the least known bodies of waters bordering the United States.

Sayed Z. El-Sayed  
Project Supervisor

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# MICROPLANKTON OF THE GULF OF MEXICO AND THE CARIBBEAN SEA

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## ABSTRACT

This paper deals with a study of the microplankton collected in about 200 samples during eight cruises in the Gulf of Mexico and one in the Caribbean Sea in 1964 and 1965. Two hundred and fifty-eight species of dinoflagellates and 110 species of tintinnids were identified, the majority of which were reported for the first time in the Gulf of Mexico. The diatom species together with a general description of the zooplankton are also included.

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1. This study was supported by a grant from the Department of Health, Education and Welfare, National Institutes of Health, while the author was a visiting scientist in the Department of Oceanography at Texas A&M University.
  2. Present address: Director, Estacion Hidrobiologica de Puerto Quequen, Argentina.

## INTRODUCTION

In conjunction with a study of the biological productivity of the Gulf of Mexico (El-Sayed, in preparation), phytoplankton samples were collected during several cruises made in 1964 and 1965. These samples were intended to augment our understanding of the productivity data collected and to increase our knowledge of the species composition of the poorly-known microplankton of the Gulf of Mexico.

The present report deals with a general description of the composition of the microplankton taken during nine cruises in the Gulf of Mexico and one in the Caribbean Sea. Since these cruises were made at various seasons, this presented an excellent opportunity to study the seasonal variation in species composition and relative abundance of the microplankton in the areas investigated.

## HISTORICAL REVIEW

Summaries of plankton studies in the Gulf of Mexico up to 1954, were included in several contributions to the volume "Gulf of Mexico, Its Origin, Waters and Marine Life," (Fish and Wildlife Service, Fishery Bulletin 89, 1954), which served as an excellent medium to inventory our knowledge of the Gulf up till that time. In it several authors have called attention to the paucity of our knowledge of the plankton of the Gulf of Mexico. With regard to the

microplankton, the state of our knowledge of these organisms in the Gulf was succinctly summarized by H. W. Graham in the above-mentioned Bulletin by stating "... the Gulf of Mexico is almost a terra incognita in respect to our knowledge of the dinoflagellate plankton. Very few oceanographical expeditions have included the Gulf in their itinerary, and those that visited the Gulf have not reported on any dinoflagellate collection."

However, during the past twenty years a few papers were published which dealt with the dinoflagellates of the Gulf. Galtsoff (1948) pointed out that the "red tides" were produced by dinoflagellates. In the same year Davis (1948) demonstrated that this phenomenon is caused by a new species of naked dinoflagellate, Gymnodinium brevis. Gunter, Davis and Smith (1948) attributed mass mortality of marine animals in the Gulf to G. breve.

Davis (1950) later published a paper in which he listed ten species of dinoflagellates: Ceratium candelabrum, C. furca, C. fusus, C. macroceros, C. tripos, Ceratocorys horrida, Gymnodinium breve, Noctiluca scintillans, Pyrocystis fusiformis, and P. noctiluca (now P. pseudonociluca). Davis also mentioned, without specific determination, the following genera: Dinophysis, Peridinium, and Prorocentrum. Davis and Williams (1950) reported two of the above-mentioned Ceratia, together with Gonyaulax spinifera and the genera:

Prorocentrum, Dinophysis, Peridinium and Gymnodinium.

King (1950) reported the following species from the west coast of Florida: Gonyaulax triacantha, Gonyaulax sp., Polykrikos (schwartzii?), Cochlodinium virescens? Gymnodinium nelsoni?, G. simplex, G. rhomboides, Ceratium furca, C. fusus, C. extensum, C. tripos, C. macroceros, C. triehoceros, Dinophysis caudata, and Peridinium sp.

Connell and Cross (1950) reported the genus Gonyaulax as being the causative agent of red tides.

Gunter (1951) mentioned Gonyaulax catenaria (sic), which is probably the species described by Howell (1953) as G. monilata.

Graham (1954), in his above-mentioned report on the dinoflagellates of the Gulf of Mexico, indicated that Howell had identified several species not yet reported in the Gulf: Ceratium carriense, C. horridum, C. falcatum, C. praelongum, Pyrocystis hamulus, Pyrophacus horologicum, Amphisolenia sp., Ornithocercus quadratus and Oxyrrhis marina.

By far, the most complete inventory to date is the one by Lackey and Hynes (1955). They reported 52 species of which 17 belong to naked dinoflagellates. Of the 52 species reported, the following 40 were new to the Gulf of Mexico: Amphidinium fusiformis, A. herdmani, C. longipes, Cochlodinium achromaticum,

C. archimedes, Diplopeltopsis minor, Diplopsalis lenticula,  
Exuviaella lima, E. marina, Gonyaulax digitale, G. polygonatum,  
G. scrippsae, Gymnodinium aeruginosum, G. fusca, G. hyalinum,  
G. minor, G. pellucidum, G. splendens, G. variable, Gyrodinium  
lachryma, Minuscula bipes, Oxytoxum gladiolus, Peridiniopsis  
asymmetrica, Peridinium cerasus, P. divergens, P. mite, P.  
pentagonum, P. punctulatum, P. quadridens, P. roseum,  
P. tabulatum, P. trochoideum, P. umbonatum, Phalacroma rotundatum,  
Podolampas bipes, P. palmipes, Polykrikos lebourae, Prorocentrum  
gracile, P. micans and P. triangulatum. They also reported the  
genus Massartia."

Curl (1959) identified, for the first time, the genus Exuviaella  
coupressa, Oxytoxum scolopax, Podolampas elegans, Ceratium  
gibberum, C. pentagonum, and C. pulchellum. In total, he listed  
8 genera and 17 species.

Although Simmons and Thomas (1961) dealt primarily with a  
study of the ecology and productivity of the phytoplankton off the  
Mississippi Delta, they reported the following species: Hypodinium  
sphericum Kelbs (obviously a misspelling for Hypodinium sphaericum  
Klebs), together with some other genera and species. The genera,  
Glenodinium, Hemidinium, and Gloeodinium were reported for the  
first time in the Gulf of Mexico.

All in all the species of dinoflagellates reported by the various authors in the Gulf of Mexico add up to 78 species. Of these, a large number belong to the naked forms (about 26 species) which indicate the coastal nature of the samples studied. To these should be added the following genera, with no specific determination:

Goniodoma, Glenodinium, Amphisolenia, Hemidinium, Gloeodinium and Massartia.

As to the tintinnids, the state of our knowledge of these organisms in the Gulf is even more appalling! Davis (1950) listed the following genera: Amphorella (recently changed to Amphorides), Craterella (now changed to Ascampbelliella), Favella, Helicostomella, Proplectella, Stenosemella, Tintinnopsis, and Tintinnus (the last one was changed in 1939 to Eutintinnus).

Borror (1962) mentioned the following Tintinnids: Amphorides, Salpingella sp., Tintinnus sp., Tintinnopsis sp., T. beroidea, Codonellopsis sp., Stenosemella sp., Helicostomella sp., Ascampbelliella sp., Favella sp., and Proplectella sp. Borror's list is almost the same as that of Davis's except for his addition of Salpingella sp., and Tintinnopsis beroidea. However, Lackey and Hynes (1955) reported a more important list consisting of the following 33 species: Amphorella brandti, Amphorellopsis sp., Codonella cratera, C. lusitanica, Coxliella ampla, Craterella obscura, Favella campanula,

F. composita, F. panamensis, Helicostomella kiliensis, H. subulata,  
Leprotintinnus neriticus, Metacylis joergensenii, M. mereschowskii,  
M. vitreoides, Parafavella sp., Rhabdonella torta, R. valdestriata,  
Stenosemella nivalis, Tintinnidium primitivum, Tintinnopsis beroidea,  
T. buetschlii, T. cylindrata, T. dadayi, P. lata, T. minuta, T.  
mortenseni, T. platensis, Tintinnus angustatus, T. apertus, T. parvula,  
T. pectinis, T. tubulosus.

However, the following corrections should be made in the above-given list. Helicostomella kiliensis is a synonym of H. subulata and Tintinnopsis mortenseni is a subspecies of T. buetschlii. Therefore, the number of species given by Lackey and Hynes is reduced to 31. Further, a few of the above-given names have changed, thus Amphorella became Amphorides and the species brandtii is a synonym of A. amphora. Condonella lusitanica ought to be listed as Condonellopsis lusitanica. The genus Craterella was changed to Ascampbelliella and Tintinnus was changed to Eutintinnus and Tintinnopsis platensis was changed to Stylicauda platensis. Favella compositan is a synonym of F. azorica.

Hopkins (unpublished Ph. D. dissertation) identified 13 species of tintinnids in the plankton collected in St. Andrew Bay System, Florida.

## MATERIALS AND METHODS

The materials on which this study is based were taken in plankton hauls made during nine cruises in the Gulf of Mexico and one in the Caribbean Sea. The cruise number, dates and areas investigated are given in Table 1. The stations occupied during these cruises are shown in Figure 1 and 2. For the most part the material collected came from monthly NEG (North East Gulf) survey cruises. However, a few of the cruises listed in Table 1 (i. e., Cruises I, VII, VIII) were not restricted to the northeastern Gulf of Mexico, but had a wider coverage. During Cruises VII and VIII the samples collected were taken in conjunction with hydrographical surveys of the Gulf of Mexico; unfortunately, however, sufficient time was not allowed for adequate sampling during these cruises. During Cruise VII, for instance, water samples were obtained by a plastic bucket and the contents of several buckets were poured into the phytoplankton net. This admittedly inadequate sampling was reflected in the scarcity of the number of organisms collected during this cruise.

All the samples examined, except those of Cruise VII, were taken in vertical and horizontal hauls made with a plankton net (mesh size 35  $\mu$ ) with a mouth opening of 22 cm in diameter. The phytoplankton samples were preserved with 10% formalin for later identification at Texas A&M. Of the total 200 samples studied,



Table 1. Cruise number, dates, and areas investigated in the Gulf of Mexico and Caribbean Sea

<u>Cruise No.</u>	<u>Date</u>	<u>Areas Investigated</u>
I	May 24-27, 1964	Northeast Gulf of Mexico
II	June 29-July 3, 1964	" " "
III	August 3-7, 1964	" " "
IV	August 31-September 4, 1964	" " "
V	September 16-28, 1964	Off NE South America & Caribbean Sea
VI	December 10, 1964-January 5, 1965	Northeast Gulf of Mexico
VII	February 3-14, 1965	Gulf of Mexico
VIII	February 23-March 1, 1965	Northeast Gulf; Gulf of Mexico
VIIIA	March 3, 1965	Off Panama City, Florida
IX	March 23-31, 1965	Northeast Gulf; Gulf of Mexico



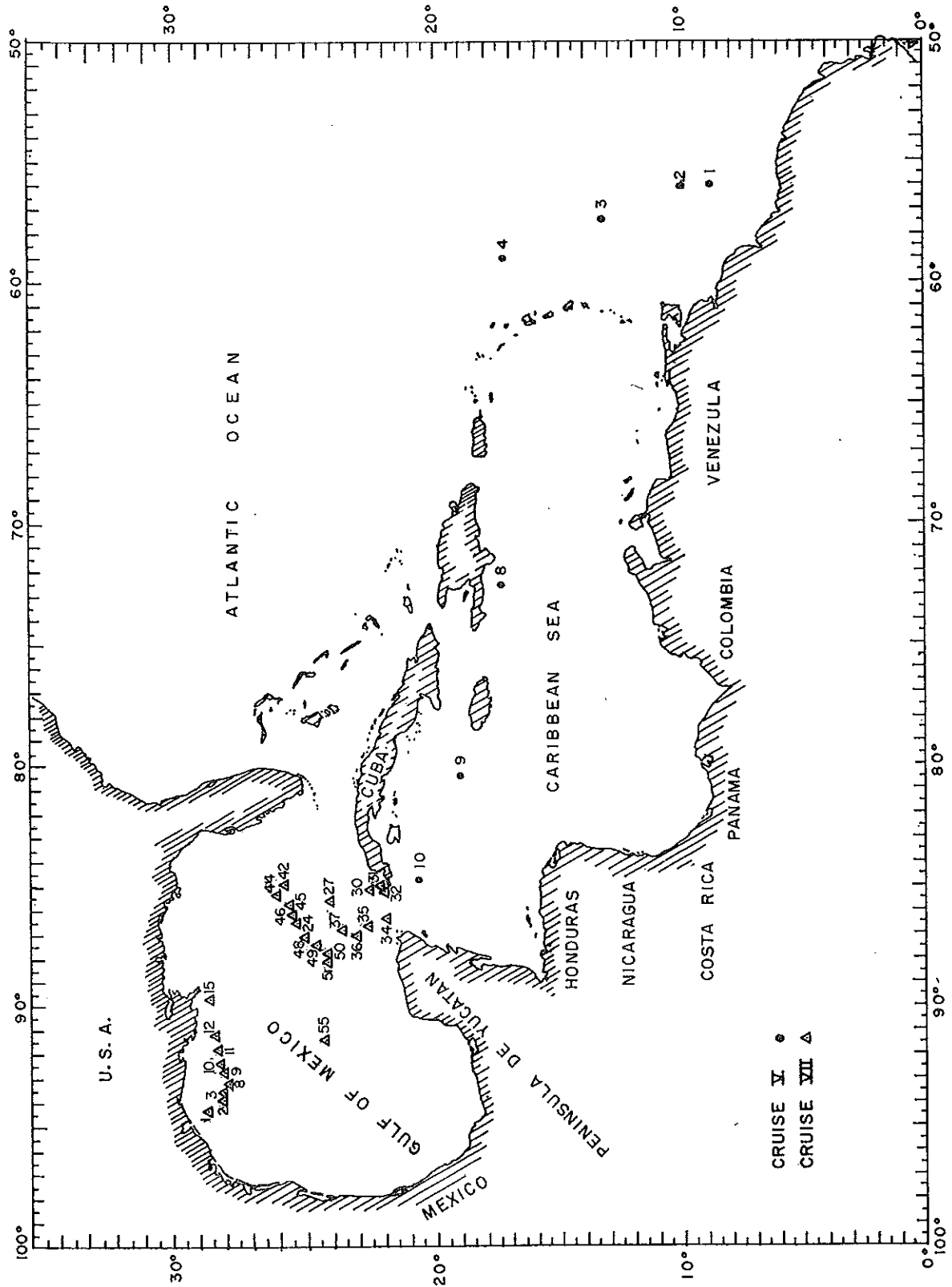


Figure 2. Positions of stations occupied during Cruises V and VII

only a few were damaged due to bad preservation. The identification of the dinoflagellates occasionally required isolation of individuals, measuring, treating them with hypochloride and determining their plate pattern. The tintinnids required special study of their structures and variations. Organisms other than dinoflagellates, silicoflagellates and tintinnids are reported here primarily to give a general picture of the composition of the plankton in the samples collected.

The relative abundance of the planktonic organisms was arrived at after a general assessment of the contribution of each species was made in several aliquots of each of the samples collected. The following abbreviations will be used to designate their relative abundance: (a) abundant, (ra) relatively abundant, (m) medium, (f) few, (r) rare, (vr) very rare, and (er) exceedingly rare. The dominant and subdominant are indicated by (d) and (sd), respectively.

### RESULTS

The distribution and relative abundance of the dinoflagellates and tintinnids collected during Cruises I-IV were reported by Balech (in press). Further examination of the microplankton samples collected during these cruises enabled us to extend the number of the species identified beyond those hitherto reported by Balech.

Two hundred and fifty-eight species of dinoflagellates and 110 species of tintinnids were identified in the plankton samples collected during this investigation. These are alphabetically listed below. Those marked with an asterisk were already reported by other authors.

- Acanthogonyaulax spinifera (Murray & Whitting) Graham 1942  
Amphidoma acuminata Stein, 1883  
Amphisolenia bidentata Schroder, 1900  
A. bifurcata Murray & Whitting, 1849  
A. globifera Stein, 1883  
A. lemmermanni Kofoid, 1907  
A. palaeotheroides Kofoid, 1907  
A. rectangulata Kofoid, 1907  
A. schauislandi Lemmermann, 1899  
A. schroderi Kofoid, 1907  
A. thrinax Schutt, 1893  
Blepharocysta splendormaris Ehrenberg, 1873  
Centrodinium sp.  
Ceratium arietinum Cleve 1900 (including C. a. gracilentum Jorgensen, 1920)  
C. azoricum Cleve, 1900  
C. belone Cleve, 1900  
C. breve (Ostenfeld & Schmidt) Schroder, 1906  
C. bigelowi Kofoid, 1907  
\* C. candelabrum (Ehrenberg) Stein, 1883  
\* C. carriense Gourret, 1883  
C. coarctatum Pavillard, 1905  
C. concilians Jorgensen, 1920  
C. contortum (Gourret) Cleve, 1900  
C. contrarium (Gourret) Pavillard, 1905  
C. declinatum Karsten, 1907  
C. deflexum (Kofoid) Jorgensen, 1911  
C. digitatum Schutt, 1895  
C. euarcuratum Jorgensen, 1920  
\* C. extensum (Gourret) Cleve, 1901  
C. falcatifforme Jorgensen, 1920  
\* C. falcatum (Kofoid) Jorgensen, 1920  
\* C. furca (Ehrenberg) Claparede & Lachmann, 1859  
\* C. fusus (Ehrenberg) Dujardin, 1841  
C. f. seta (Ehrenberg) Jorgensen, 1911  
C. geniculatum (Lemmermann) Cleve, 1901  
\* C. gibberum Gourret, 1883  
C. gravidum Gourret, 1883  
C. hexacanthum Gourret, 1883  
\* C. horridum Gran, 1902  
C. h. molle (Kofoid) Jorgensen, 1920  
C. incisum (Karsten) Jorgensen, 1911  
C. inflatum (Kofoid) Jorgensen, 1911  
C. japonicum Schroder, 1906  
C. karsteni Pavillard, 1907  
C. kofoidi Jorgensen, 1911

- C. lanceolatum Kofoid, 1907  
C. limulus Gourret, 1883  
C. longirostrum Gourret, 1883  
C. longissimum (Schroder) Kofoid, 1907  
C. lunula Schimper, 1900  
\* C. macroceros gallicum (Kofoid) Jorgensen, 1911  
\* C. massiliense (Gourret) Jorgensen, 1911  
C. pavillardi Jorgensen, 1911  
\* C. pentagonum tenerum Jorgensen, 1920  
C. p. subrobustum Jorgensen, 1920  
C. platycorne Daday, 1888  
\* C. praelongum (Lemmermann) Kofoid, 1907  
\* C. pulbellum Schroder, 1906  
C. ranipes Cleve, 1900  
C. recurvum Jorgensen, 1911  
C. reflexum Cleve, 1900  
C. schroteri Schroder, 1906  
C. strictum (Okamura & Nishikawa) Kofoid, 1907  
C. sumatranum (Karsten) Jorgensen, 1911  
C. symmetricum Pavillard, 1905  
C. tenue (Ostenfeld & Schmidt) Jorgensen, 1911  
C. teres Kofoid, 1907  
\* C. trichoceros (Ehrenberg) Kofoid, 1908  
\* C. tripos (O. F. Muller) Nitzsch, 1817  
C. t. semipulchellum (Jorgensen, 1920) Peters, 1932  
C. vultur Cleve, 1900  
Ceratocorys armata (Schutt) Kofoid, 1910  
C. bipes (Cleve) Kofoid, 1910  
\* C. horrida Stein, 1883  
C. reticulata Graham, 1942  
Citharistes apsteini Schutt, 1895  
Cladopyxis brachiolata Stein, 1883  
C. hemibrachiata Balech, 1964  
Dinophysis brevisulcus Tai & Skogsberg, 1934  
D. caudata S. Kent, 1881  
D. diegensis Kofoid, 1907  
D. exigua Kofoid & Skogsberg, 1928  
D. expulsa Kofoid & Michener, 1911  
D. fortii Pavillard, 1923  
D. hastata Stein, 1883  
D. monacantha Kofoid & Skogsberg, 1928  
D. odiosa (Pavillard) Tai & Skogsberg, 1934  
D. pusilla Jorgensen, 1923  
D. recurva Kofoid & Skogsberg, 1928  
D. rotundata Claparede & Lachmann, 1859  
D. schroederi Pavillard, 1909  
D. schuetti Murray & Whitting, 1899  
D. similis Kofoid & Skogsberg, 1928

- D. simplex Balech, 1962  
D. sphaerica Stein, 1883  
D. swezyi Kofoid & Skogsberg, 1928  
\* D. tripos Gourret, 1883  
D. uracantha Stein, 1883  
\* Diplopelta asymmetrica (Mangin, 1911) nov. comb.  
D. sphaerica (Mangin, 1911) nov. comb.  
Diplopsalis lebourae (Nie, 1943) nov. comb.  
\* Diplopsalis sp. cf. D. lenticula Bergh, 1882  
\* Diplopsalopsis minor (Paulsen) Pavillard, 1913  
Diplopsalopsis sp. cf. D. orbiculares (Paulsen) Meunier, 1910  
D. ovata (Abe, 1941) nov. comb.  
Dolichodinium lineatum (Kofoid & Michener) Kofoid & Adamson, 1933  
Exuviaella sp.  
\* Goniodoma polyedricum (Pouchet) Jorgensen, 1899  
G. sphaericum Murray and Whitting, 1899  
Gonyaulax birostris Stein, 1883  
G. diegensis Kofoid, 1911  
\* G. digitale (Pouchet) Kofoid, 1911  
G. fragilis (Schutt) Kofoid, 1911  
G. fusiformis Graham, 1942  
G. kofoidi Pavillard, 1909  
G. milneri (Murray & Whitting) Kofoid, 1911  
G. monacantha Pavillard, 1916  
G. pacifica Kofoid, 1907  
G. polyedra Stein, 1883  
G. polygramma Stein, 1883  
\* G. scrippsae Kofoid, 1911  
G. sphaeroidea Kofoid, 1911  
Gonyaulax sp. cf. G. tamarensis excavata Braarud, 1945  
G. turbynei Murray & Whitting, 1899  
\* G. spinifera (Claparede & Lachmann) Diessing, 1866  
Gymnaster pentasterias Schutt, 1895  
Gymnodinium sp. cf. G. multistriatum Kofoid & Swezy, 1921  
G. pseudonociluca Pouchet, 1885  
Gymnodinium sp. cf. G. translucens Kofoid & Swezy, 1921  
Heterodinium agassizi Kofoid, 1907  
H. globosum Kofoid, 1907  
H. hindmarchii (Murray & Whitting) Kofoid, 1906  
H. leiorhynchum (Murray & Whitting) Kofoid, 1906  
H. mediocre (Kofoid) Kofoid & Adamson, 1933  
H. mediterraneum Pavillard, 1932  
H. milneri (Murray & Whitting) Kofoid, 1906  
H. murrayi Kofoid, 1906  
H. pavillardi Kofoid & Adamson, 1933  
H. ridgenae Kofoid, 1906  
H. scrippsi Kofoid, 1906  
H. whittingae Kofoid, 1906



- Heteroschisma inaequale Kofoid & Skogsberg, 1928  
H. longialata (Gaarder) Balech, 1966  
Histioneis biremis Stein, 1883  
H. cymbalaria Stein, 1883  
H. dolon Murray & Whitting, 1899  
H. helenae Murray & Whitting, 1899  
H. hippoperoides Kofoid & Michener, 1911  
H. jorgenseni Schiller, 1928  
H. milneri Murray & Whitting, 1899  
H. panda Kofoid, & Michener, 1911  
Kofoidinium velelloides Pavillard, 1928  
Metaphalacroma skogsbergi Tai, 1930  
Murrayella splendida Rampi, 1941  
\* Noctiluca scintillans (Macartney) Kofoid & Swezy, 1921  
Ornithocercus carolinae Kofoid, 1907  
O. cristatus Matzenauer, 1933  
O. francescae (Murray & Whitting) Balech, 1962  
O. heteroporus Kofoid, 1907  
O. magnificus Stein, 1883  
O. orbiculatus Kofoid & Michener, 1911  
\* O. quadratus Schutt, 1900  
O. steinii Schutt, 1900  
O. thurnii (Schmidt) Kofoid & Skogsberg, 1928  
Oxytoxum carinatum Gaarder, 1954  
O. constrictum (Stein) Butschli, 1885  
C. cristatum Kofoid, 1907  
O. elegans, Pavillard, 1916  
O. gigas Kofoid, 1907  
O. latum Gaarder, 1954  
O. milneri Murray & Whitting, 1899  
Oxytoxum sp. cf. O. parvum Schiller, 1937  
\* O. scolopax Stein, 1883  
O. turbo Kofoid, 1907  
Palaeophalacroma uncinatus Schiller, 1928  
Parahistioneis paraformis Kofoid & Skogsberg, 1928  
Peridinium abei Paulsen, 1930  
Peridinium biconicum Dangeard, 1927  
P. brintoni Balech, 1962  
P. brochi Kofoid & Swezy, 1921  
P. claudicans Paulsen, 1907  
P. conicum (Gran) Ostenfeld & Schmidt, 1900  
P. crassipes, Kofoid 1907  
\* P. depressum Bailey, 1855  
\* P. divergens Ehrenberg, 1840  
P. elegans Cleve, 1900  
P. excentricum Paulsen, 1907  
P. fatulipes Kofoid, 1907  
P. globulus Stein, 1883

- P. grande Kofoid, 1907  
P. inclinatum Balech, 1964  
P. inflatum Okamura 1912  
P. latidorsale (Dangeard) Balech, 1951  
P. latispinum Mangin, 1926  
P. latissimum Kofoid, 1907  
P. longipes Karsten, 1907  
P. mediterraneum (Kofoid) Balech, 1964  
P. minutum Kofoid, 1907  
\* P. mite Pavillard, 1916  
P. obtusum Karsten, 1906  
P. oceanicum Vanhoffen, 1897  
P. oceanicum oblongum (Aurivillius) Broch, 1906  
P. oviforme Dangeard 1927  
P. ovum Schiller, 1911  
P. patens Dangeard 1927  
P. pedunculatum Schutt, 1895  
P. pellucidum (Bergh) Schutt, 1895  
\* P. pentagonum Gran, 1902  
\* P. punctulatum Paulsen, 1907  
P. quarnerense Schroder, 1910  
P. quinquecorne Abe, 1927  
P. simulum Paulsen, 1930  
P. solidicorne Mangin, 1926  
P. sphaeroides Dangeard, 1927  
P. steinii Jorgensen, 1899  
P. subinerme Paulsen, 1904  
P. subpyriforme Dangeard, 1927  
P. subsphaericum Balech, 1959  
P. tenuissimum Kofoid, 1907  
P. tristylum Stein, 1883  
P. venustum Matzenauer, 1933  
P. wiesneri Schiller, 1911  
Phalacroma apicatum Kofoid & Skogsberg, 1928  
P. argus Stein, 1883  
P. circumsutum Karsten, 1907  
P. cuneus Schutt, 1895  
P. doryphorum Stein, 1883  
P. elongatum Jorgensen, 1923  
P. limbatum Kofoid & Michener, 1928  
P. hindmarchii Murray & Whitting, 1899  
P. mitra Schutt, 1895  
P. mucronatum Kofoid & Skogsberg, 1928  
P. operculoides Schutt, 1895  
P. ovum Schutt, 1895  
P. rapa Stein, 1883  
\* P. rotundatum (Claparede & Lachmann) Kofoid & Michener, 1911  
\* Podolampas bipes Stein, 1883

- \* P. elegans Schutt, 1895
- \* P. palmipes Stein, 1883
- P. spinifer Okamura, 1912
- P. reticulata Kofoid, 1907
- \* Prorocentrum gracile Schutt, 1895
- P. maximum (Gourret) Schiller, 1933
- \* P. micans Ehrenberg, 1833
- P. triestinum Schiller, 1918
- Protoceratium reticulatum (Claparede & Lachmann) Butschli, 1885
- P. spinulosum (Murray & Whitting) Schiller, 1937
- Pseudophalacroma nasutum (Stein) Jorgensen, 1923
- \* Pyrocystis fusiformis (Wyville Thomson) Murray, 1885
- \* P. hamulus Cleve, 1900
- Pyrocystis lunula Schutt, 1896
- \* P. pseudonociluca (W. Thomson) Murray, 1885
- P. robusta Kofoid, 1907
- Pyrodinium sp.
- \* Pyrophacus horologicum Stein 1883
- Scrippsiella sweeneyae Balech 1959
- Spiraulax jollifei (Murray & Whitting) Kofoid, 1911
- Triposolenia bicornis Kofoid, 1906
- T. truncata Kofoid, 1906

#### TINTINNIDS

- Acanthostomella lata Kofoid & Campbell, 1929
- A. minutissima Kofoid & Campbell, 1929
- A. obtusa Kofoid & Campbell, 1929
- \* Amphorides amphora (Claparede & Lachmann) Strand, 1928
- A. minor (Jorgensen) Strand, 1928
- A. quadrilineata (Claparede & Lachmann) Strand, 1928
- Amplectella sp.
- Ascampbelliella armilla (Kofoid & Campbell) Corliss, 1960
- A. protuberans (Kofoid & Campbell) Corliss, 1960
- A. urceolata (Ostenfeld) Corliss, 1960
- Brandtiella palliata (Brandt) Kofoid & Campbell, 1929
- Canthariella brevis Kofoid & Campbell, 1929
- Climacocylis scalaria (Brandt) Jorgensen, 1924
- C. scalaroides Kofoid & Campbell, 1929
- Codonaria cistellula (Fol) Kofoid & Campbell, 1929
- Codonella amphorella Biedermann, 1893
- C. apicata Kofoid & Campbell, 1929
- C. aspera Kofoid & Campbell, 1929
- C. galea Haeckel, 1873
- C. olla Kofoid & Campbell, 1929
- Codonellopsis contracta Kofoid & Campbell, 1929
- C. ecaudata (Brandt) Kofoid & Campbell, 1929

- C. orthoceras (Haeckel) Jorgensen, 1924  
C. pusilla (Cleve) Kofoid & Campbell, 1929  
C. schabi (Brandt) Kofoid & Campbell, 1929  
Coxliella declivis Kofoid & Campbell, 1929  
C. fasciata (Kofoid) Brandt 1907  
C. laciniosa (Brandt) Brandt 1907  
C. longa (Brandt) Kofoid & Campbell, 1929  
Coxliella sp.  
Cyttarocylis acutiformis Kofoid & Campbell, 1929  
C. cassis (Haeckel) Fol, 1881  
C. eucecryphalus (Haeckel) Kofoid, 1912  
Dadayiella cuspis Kofoid & Campbell, 1929  
D. ganymedes (Entz, Sr.) Kofoid & Campbell, 1929  
D. pachytoecus (Jorgensen) Kofoid & Campbell, 1929  
Dictyocysta elegans lepida (Ehrenberg) Balech, 1959  
D. extensa Kofoid & Campbell, 1929  
D. muelleri (Imhof) Jorgensen, 1924  
D. pacifica Kofoid & Campbell, 1929  
Epiplocylis labiosa Kofoid & Campbell, 1929  
E. undella (Ostenfeld & Schmidt) Jorgensen, 1924  
Epiplocyloides ralumensis (Brandt) Hada, 1938  
E. reticulata (Ostenfeld & Schmidt) Hada, 1938  
E. reticulata acuta (Kofoid & Campbell) Hada, 1938  
Eutintinnus apertus Kofoid & Campbell (1929), 1939  
E. birictus Kofoid & Campbell (1929), 1939  
E. colligatus Kofoid & Campbell (1929), 1939  
\* E. fraknoi (Dady) Kofoid & Campbell, 1939  
E. latus (Jorgensen) Kofoid & Campbell, 1939  
E. lususundae (Entz, Sr.) Kofoid & Campbell, 1939  
\* E. medius Kofoid & Campbell (1929), 1939  
E. perminutus Kofoid & Campbell (1929), 1939  
\* E. pinguis Kofoid & Campbell (1929), 1939  
E. similis Balech 1962  
E. stramentus Kofoid & Campbell (1929), 1939  
E. tenue Kofoid & Campbell (1929), 1939  
E. tubulosus (Ostenfeld) Kofoid & Campbell, 1939  
Favella azorica (Cleve) Jorgensen, 1924  
\* F. panamensis Kofoid & Campbell, 1929  
\* F. taraikaensis Hada, 1932  
Helicostomella longa (Brandt) Kofoid & Campbell, 1929  
Metacylis mereschkowskii Kofoid & Campbell, 1929  
Odonthophorella serrulata Kofoid & Campbell, 1929  
Ormosella breslaui Kofoid & Campbell, 1929  
Parundella aciculifera (Jorgensen) Kofoid & Campbell, 1939  
P. aculeata Jorgensen, 1924  
P. caudata (Ostenfeld) Kofoid & Campbell, 1929  
P. inflata Kofoid & Campbell, 1929  
P. longa Jorgensen, 1924

- P. praetenuis Kofoid & Campbell, 1929  
Petalotricha ampulla (Fol) Kent, 1882  
Poroecus apicatus Kofoid & Campbell, 1929  
P. curtus Kofoid & Campbell, 1929  
Proplectella claparedei (Entz, Sr.) Kofoid & Campbell, 1929  
P. parva Kofoid & Campbell, 1929  
Proplectella subcaudata (Jorgensen) Kofoid & Campbell, 1929  
  
Protorhabdonella curta (Cleve) Jorgensen, 1924  
P. mira Kofoid & Campbell, 1929  
P. simplex (Cleve) Jorgensen, 1924  
Rhabdonella amor (Cleve) Brandt, 1907  
R. cornucopia Kofoid & Campbell, 1929  
R. elegans Jorgensen, 1924  
R. henseni (Brandt) Brandt, 1907  
R. indica (Laackmann) Kofoid & Campbell, 1929  
Rhabdonellopsis apophysata (Cleve) Kofoid & Campbell, 1929  
R. triton (Zacharias) Kofoid & Campbell, 1929  
Rhabdosella cuneolata Kofoid & Campbell (1929), 1939  
Salpingella acuminata (Claparede & Lachmann) Jorgensen, 1924  
S. faurei Kofoid & Campbell, 1929  
S. glockentoeegeri (Brandt) Jorgensen, 1924  
S. jugosa Kofoid & Campbell, 1929  
Steenstrupiella gracilis (Jorgensen) Kofoid & Campbell, 1929  
S. steenstrupii (Blaparede & Lachmann) Kofoid & Campbell, 1929  
Stenosemella ventricosa (Claparede & Lachmann) Jorgensen, 1924  
\* Stylicauda platensis (da Cunha & Fonseca) Balech, 1951  
\* Tintinnopsis beroidea Stein, 1867  
\* T. buetschlii Daday, 1887  
T. corniger Hada, 1964  
Tintinnopsis sp. cf. T. directa Hada, 1932  
T. gracilis Kofoid & Campbell, 1929  
\* T. kofoidi Hada, 1932  
T. lata Meunier, 1910  
\* T. radix (Imhof) Brandt, 1907  
T. tocantinensis Kofoid & Campbell, 1929  
Undella pistillum Kofoid & Campbell, 1929  
Xystonella lanceolata (Brandt) Brandt, 1907  
X. longicauda (Brandt) Laackmann, 1909  
X. treforti (Daday) Laackmann, 1909  
Xystonellopsis cymatica (Brandt) Jorgensen, 1924  
X. dahli (Brandt) Kofoid & Campbell, 1929  
X. dicymatica (Brandt) Kofoid & Campbell, 1929  
X. heros (Cleve) Kofoid & Campbell, 1929  
X. paradoxa (Cleve) Jorgensen, 1924

Although the number of the dinoflagellates and tintinnids listed above far exceed those recorded by previous investigators, it should be noted, however, that this list is by no means an exhaustive one. Many a genera of dinoflagellates are badly in need of a precise taxonomic review. This is especially true for Peridinium, Gonyaulax and most of the Dinophysoidea and Gymnodinoidea. In the light of this, and taking into account of the limitation of time, it should be pointed out that the above-given figures should be regarded as very conservative indeed.

The following species cited by other investigators have not been found during this study; among the dinoflagellates: Amphidinium fusiformis, A. herdman, Cochlodinium achromaticum, C. virescens, C. archimedes, Gymnodinium aeruginosum, G. breve, G. fusca, G. hyalinum, G. minor, G. nelsoni, G. pellucidum, G. simplex, G. rhomboides, G. variable, Gyrodinium lachryma, Massartia sp., Polykrikos lebourae, P. schwartzi, Ceratium longipes, Exuviaella lima, E. marina, Gonyaulax monilata, G. polygonatum, G. triacantha, minuscula bipes, Oxytoxum gladiolus, Peridinium cerasus, P. quadridens, P. roseum, P. tabulatum, P. trochoideum, P. umbonatum, and Prorocentrum triangulatum. Among the tintinnids: Codonella cratera, Codonellopsis lusitanica, Coxiella ampla, Craterella obscura (most probably is Epiplocyloides reticulata), Favella campanulá,

Leprotintinnus neriticus, Helicostomella subulata, Metacylis jorgensenii, Metacylis vitreoides, Parafavella sp., Rhabdonella torta, Rh. valdestriata, Stenosemella nivalis, Tintinnidium primitivum, Tintinnopsis cylindrata, T. dadayi (probably our T. sp. cf. T. directa), T. minuta, Eutintinnus angustatus, E. parvula and E. pectinis.

Several of the above mentioned species are <sup>from</sup> fresh or brackish water.

However, thanks to the efforts of Dr. Sammy Ray, a study of Gymnodinium breve and Gonyaulax monilata, both maintained in culture at the Texas A&M Marine Laboratory, was made possible. The original individuals were taken in plankton samples off Galveston, Texas.

Further, Dr. T. Hopkins was kind enough to send to the author plankton samples in order to verify the identification of some tintinnids which were neither encountered in the present study, nor studied by previous authors. These are Codonellopsis obesa Balech, Tintinnopsis brandti (Nordqvist) Levander, and Tintinnidium mucicola (Claparede and Lachmann) Daday. The habitat of the last mentioned species is probably limited to brackish and fresh waters.

Based on this investigation, the author would like to propose some new combinations:

Diplopelta asymmetrica should replace Peridiniopsis asymmetrica Menquin, (1911) in "Sur le Peridiniopsis asymmetrica et le

Peridinium paulseni, " (Comptes Rendus de l'Academic des Sciences, Paris, 1911, p. 644, Fig. 1). As the type species of Peridiniopsis, P. borgei, has been transferred to Glenodinium, and P. borgei is not congeneric with P. asymmetrica, the last-mentioned has to be placed under another genus. I am utilizing here as a generic name, that of Diplopelta used by Jørgensen as a subgenus of Peridiniopsis.

Mangin (ibid.) described a variety sphaerica, almost spherical, which was named Diplopsalopsis globula by Abé (1941). I agree with Abé in considering it as a separate species, but it was decided to keep Mangin's name which has priority. I have also included it in the genus Diplopelta (with six precingular plates) instead of Diplopsalopsis, with seven precingulars. The "variety" sphaerica was mentioned by Mangin (loc. cit. p. 646), but he did not give any figure. Abé (1941) on the other hand, carefully described it in (Studies on the Protozoan Fauna of Shimoda Bay. The Diplopsalis group, pp. 132-134, Fig. 20 (sub-Diplopsalopsis globula).

Diplopsalis lenticula var. lebourii Nie which appeared in (Dinoflagellata of the Hainan Region VI. On the genus Diplopsalis pp. 11-13, Fig. 14-19) is raised to specific rank; being clearly different from Diplopsalis lenticula by its form, size, plate pattern and sulcal list. The name lebourii is corrected to lebourae.

Diplopsalopsis orbicularis var. ovata Abé' (loc. cit. p. 143, Figs. 40-45) shows enough differences to warrant a specific rank.



CRUISE I

Station 3.      30°02.0'N, 86°03.0'W.    Date: May 24, 1964

Plankton of medium density, dominated by zooplankters.

ZOOPLANKTON (ra): Copepods, nauplii, the cladocera Penilia avirostris, a few larvae of macruran crustacea and larvae cypris, amphipods (vr), Oikopleuridae (ra), small pteropods (ra), some gastropods and pelecypods, larvae of polychaeta, brachiopod larvae, "ova hispida", plutei (vr).

DIATOMS (scarce): Chaetoceros sp., Navicula sp., Biddulphia sinensis.

DINOFLAGELLATA: Ceratium tripos, C. massiliense, C. hexacanthum, C. seta?, Gonyaulax digitale, Diplopelta asymmetrica (r), Peridinium depressum, Goniodoma polyedricum.

Station 6.      30°09'2 N, 86 55'5 W.    Date: May 24, 1964.

Plankton of medium density.

ZOOPLANKTON: Copepods, copepod eggs and larvae cypris, cirripedia nauplii Evadne (vr), Penilia avirostris (vr), Amphipods (vr), veligers of gastropods (ra), veligers of pelecypods, pteropods (ra), ova hispida, larvae of polychaete (r), Sagitta hispida, Sagitta sp., Doliolum sp., some small meduase and siphonophors, plutei, Oikopleura sp. Pseudoplankton relatively abundant, formed by benthonic foraminifera and pollen of conifers.

DIATOMS (rather scarce): Coscinodiscus sp., Asteromphalus sp., Melosira sulcata, Melosira sp., Guinardia flaccida, Guinardia sp., Leptocylindrus danicus, Rhizosolenia alata f. indica, R. robusta, R. castracanei, R. debyana, Chaetoceros coarctatum, Ch. compressum, Ch. affine, Ch. peruvianum, Biddulphia sinensis, Eucampia zoodiacus, Hemiaulus hauckii, Tropidoneis sp., Pleurosigma sp., Fragilaria sp., Campylodiscus sp., Navicula sp., Thalassiothrix sp.

DINOFLAGELLATA: Pyrocystis pseudonoctiluca, Kofoidinium velleloides, Ceratium fusus, C. extensum, C. furca, C. candelabrum, C. Kofoidi, C. hexacanthum, C. deflexum, C. massiliense, C. karsteni, C. macroceros gallicum, C. contortum, Goniodoma polyedricum, G. sphaericum, Gonyaulax digitale, G. polygramma, Peridinium latissimum, P. "divergens", P. oviforme, P. depressum, P. cf. ovatum, Blepharocysta splendormaris, Podolampas palmipes, P. spinifer, Pyrophacus horologicum, Diplopelta asymmetrica, Phalacroma argus, Dinophysis caudata, Ornithocercus steini.

TINTINNIDS: Amphorides amphora, Eutintinnus medius.

Station 7. 29°53.0'N, 86°55.0'W. Date: May 24, 1964.

Plankton relatively abundant. The Phytoplankton is dominated by Gonyaulax digitale.

ZOOPLANKTON: Copepods, nauplii, Penilia avirostris, Lucifer sp., a few polychaete larvae, some Oikopleuridae, some Pteropods and gastropods, Sagitta enflata, Sagitta sp., some Sticholonche zancea and some other radiolaria.

DIATOMS: Stephanopyxis palmeriana, Dactyliosolen mediterraneus, Actinoptychus sp., Asteromphalus sp., Schroderella delicatula, Leptocylindrus danicus, Coscinodiscus sp., Rhizosolenia alata f. indica, R. imbricata, R. styliformis/latissima, R. calcaravis, Chaetoceros affine, Ch. compressum, Ch. densus, Ch. lorenzianum, Ch. coarctatum, Biddulphia sinensis, Hemiaulus membranaceus, H. hauckii, Thalassiothrix mediterranea, Th. frauenfeldi, Amphora sp., Pleurosigma sp..

DINOFLLAGELLATES: Pyrocystis pseudonociluca, Ceratium pavillardii, C. tripos, C. horridum molle, C. massiliense, C. hexacanthum, C. platycorne, C. coarctatum, C. concilians, C. contortum, C. carriense, C. trichoceros (er), C. pentagonum subrobustum (er), C. teres, C. furca, C. fusus, Peridinium elegans, P. "oviforme", P. "divergens", P. depressum, P. pentagonum, P. brochi, P. latissimum, P. claudicans, P. cf. crassipes, Gonyaulax digitale (a), G. fragilis (vr), Podolampas palmipes, Goniodoma polyedricum, Pyrophacus horologicum, Oxytoxum cristatum, Phalacroma ovum, Dinophysis swezyi, D. caudata, D. schuetti, Ornithocercus magnificus.

TINTINNIDS: Tintinnopsis radix, T. corniger, Codonella apicata, Climacocylis scalaroides, Ascampbelliella urceolata, Salpingella acuminata, Eutintinnus tenue, E. medius.

Station 8. 29°39.5'N, 86°55.5'W. Date: May 24, 1964.

Plankton relatively abundant, especially the dinoflagellates Gonyaulax digitale and Peridinium brochi.

ZOOPLANKTON: Copepods, nauplii, Penilia avirostris, some Ostracods, Evadne sp., Sagitta sp., Oikopleuridae, Plutei (vr), some radiolaria, including Sticholonche zancea and a few Globigerina.

DIATOMS: Gossleriella sp. (vr), Thalassiosira sp. (f), Coscinodiscus sp., Guinardia flaccida, Rhizosolenia alata f. indica, Rh. styli-  
formis v. latissima, R. bergonii, Bacteriastrum sp., Chaetoceros  
densum, Ch. diversum, Ch. constrictum (?), Ch. atlanticum, Ch.  
compressum, Ch. laeve?, Ch. coarctatum, Ch. affine, Hemiaulus  
hauckii, H. membranaceus, Thalassiothrix sp., Pleurosigma sp.

DINOFLAGELLATES: Pyrocystis pseudonociluca, P. robusta, Ceratium  
tripos, C. platycorne, C. contortum, C. contrarium, C. horridum  
molle, C. kofoidi, C. massiliense, C. trichoceros, C. ranipes,  
C. longirostrum, S. strictum, C. fusus seta, Peridinium latissimum,  
P. brochi, P. cf. divergens, P. "oviforme", P. longipes, P.  
globulus, Gonyaulax digitale, G. fragilis (r), G. pacifica (vr),  
Podolampas elegans, Phalacroma cf. parvulum.

TINTINNIDS: Tintinnopsis corniger, Codonaria cistellula, Xystonella  
treforforti, Xystonellopsis cymatica, X. heros, Amphorides  
quadrilineata, A. amphora, Eutintinnus medius, E. fraknoi (er),  
E. tenue, Salpingella acuminata, S. glockentoegeri.

Station 9. 29° 21.6'N, 87° 30.6'W. Date: May 25, 1964.

Plankton relatively abundant, dominated by phytoplankton.

ZOOPLANKTON: Copepods (f), nauplii, some Ostracods, Podon (er),  
Evadne sp., (er), some polychaete larvae, a few Sagitta sp.,  
Gastropods, Pteropods, Copelata (Fritillaridae and Oikopleuridae),  
some Radiolaria and Globigerina.

DIATOMS: Coscinodiscus sp. sp. (ra), Thalassiosira sp., Gossleriella  
sp. (er), Planktoniella sol (r), Asteromphalus sp. (r), Actinoptychus  
sp. (f), Dactyliosolen mediterraneus, Guinardia flaccida, Lepto-  
cylindrus danicus, Rhizosolenia alata f. indica, R. a. f. gracillima,  
R. bergonii, R. cylindrus, R. calcar-avis, R. setigera, R. stolter-  
fothii, Bacteriastrum sp., Chaetoceros compressum, Ch. affine,  
Ch. messanense, Ch. coarctatum, Ch. atlanticum, Ch. (Phaeoceros)  
sp., Ch. peruvianum, Ch. sp., Hemiaulus hauckii, H. sinensis,  
Hemidiscus cuneiformis, Biddulphia sinensis, B. mobilensis (vr),  
Navicula sp., Thalassionema nitzschioides, Thalassiothrix sp.

DINOFLAGELLATES: Pyrocystis pseudonociluca, P. fusiformis, P.  
hamulus, P. robusta, P. sp., Kofoidinium velelloides, Ceratium  
gravidum, C. fusus seta, C. incisum, C. longirostrum, C. inflatum,  
C. praelongum, C. furca, C. pentagonum tenerum, C. p. sub-  
robustum, C. belone, C. candelabrum, C. coarctatum, C. contra-  
rium, C. hexacanthum, C. contortum, C. tripos, C. karsteni, C.

tenue, C. massiliense, C. declinatum, C. trichoceros, C. concilians, C. gibberum (er), C. horridum molle, C. ranipes, C. macroceros gallicum (er), C. carriense (er), C. arietinum (vr), Pseudophalacroma uncinatum, Peridinium "oviforme", P. depressum, P. pentagonum, P. pedunculatum, P. brochi, P. "divergens", P. grande, P. punctulatum, P. oceanicum, P. longipes, P. elegans, P. inclinatum, P. quarnerense, P. grani spirale, Gonyaulax digitale (a), G. pacifica (r), Diplopelta asymmetrica, D. sphaerica (er), Blepharocysta splendor-maris, Podolampas palmipes, P. elegans, Oxytoxum elegans, Oxytoxum sp., Pyrophacus horologicum, Goniodoma polyedricum, Spiraulax jollifei, Ceratocorys horrida, C. bipes, Ornithocercus splendidus, O. quadratus, O. magnificus, Phalacroma argus, Ph. mitra, Ph. cuneus, Ph. mucronatum, Ph. ovum, Dinophysis caudata, D. shroederi, D. hastata, D. schuetti, D. sp., Amphisolenia bidentata, Triposolenia bicornis, Heteroschisma longialata.

TINTINNIDS: Cyttarocylis eucecryphalus (ra), Dictyocysta elegans lepida, Tintinnopsis radix, T. sp., Stylicauda platensis, Coxiella fasciata, Protorhabdonella simplex, Xystonella treforti, Xystonellopsis cymatica, X. heros, Eutintinnus medius, E. fraknoi, E. similis, Amphorides amphora, A. quadrilineata, Proplectella sp., Salpingella glockentoegei, Parundella aculeta, P. inflata.

Station 10. 28° 53.0'N, 87° 32.0'W. Date: May 25, 1964.

Plankton of medium density, dominated by phytoplankton.

ZOOPLANKTON: Copepods, nauplii, Sagitta (f), a few Gastropods, a bipinnaria larva, some Copelata (Oikopluridae and Fritillaria).

DIATOMS: Asteromphalus sp., Coscinodiscus sp., Planktoniella sol (vr), Guinardia flaccida (m), Rhizosolenia setigera, R. stouterfothii, R. calcaravis, R. imbricata (vr), R. alata/indica (vr), Bacteriastrum sp., Chaetoceros compressum, C. affine, C. lacinosum, C. messanense, C. atlanticum, C. costatum, C. sp., Hemidiscus cuneiformis, Ditylum brightwellii, Hemiaulus hauckii, Thalassiothrix sp., Thalassionema nitzschioides.

DINOFLAGELLATES: Pyrocystis hamulus, Ceratium fusus seta, C. incisum, C. pentagonum tenerum, C. p. subrobustum, C. furca, C. teres, C. macroceros gallicum, C. coarctatum, C. contrarium, C. horridum molle, C. pulchellum, C. declinatum, C. euarcuratum,

C. trichoceros, C. hexacanthum, Peridinium divergens, P. depressum, P. globulus, Peridinium sp., Gonyaulax digitale, G. pacifica, G. polygramma, Goniodoma polyedricum, Spiraulax jollifei, Blepharocysta splendormaris, P. elegans, Pyrophacus horologicum, Heterodinium murrayi, H. pavillardi, Ceratocorys horrida, Protoceratium sp., Oxytoxum gigas, Amphisolenia bidentata (f), Triposolenia bicornis (er), Ornithocercus quadratus, O. steini, Phalacroma rapa, Ph. argus, Dinophysis schroederi.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Codonaria cistellula, Codonella apicata, Codonellopsis ecaudata, C. orthoceras, Dictyocysta elegans lepida, D. extensa, Cyttarocylis eucecryphalus, Rhabdonellopsis apophysata, Protrhabdonella simplex, Xystonella treforti, Xystonellopsis heros, Steenstrupiella steenstrupii, Proplectella claparedei, Proplectella sp., Parundella aculeata, P. inflata, Eutintinnus tenue, E. fraknoi, E. medius, Salpingella acuminata.

Station 11. 28°36.7'N, 87°30.4'W. Date: May 25, 1964

Plankton of medium density.

ZOOPLANKTON: Copepods, nauplii, Evadne sp. (er), Fritillaria, Oikopleuridae, Doliolum sp., Sagitta sp., small medusae (vr), Diphyes.

DIATOMS: Planktoniella sol (r), Gossleriella sp., Stephanopyxis palmeriana, Asteromphalus sp., Leptocylindrus danicus, Guinardia flaccida, Rhizosolenia alata, R. setigera, R. bergonii, R. cylindrus, Chaetoceros compressum, C. affine, C. atlanticum, C. messanense, C. decipiens, C. peruvianum, C. coarctatum, C. (Phaeoceros) sp., C. dadayi, Bacteriastrum elongatum, Hemiaulus membranaceus, Hemidiscus cuneiformis, Ceratulina bergonii, Corethron hystrix.

DINOFLAGELLATES: Pyrocystis fusiformis, P. hamulus, P. pseudonoc-tiluca, Kofoidinium velelloides, Ceratium fusus seta, C. extensum, C. longirostrum, C. inflatum, C. gravidum, C. praelongum, C. teres, C. candelabrum, C. furca, C. pentagonum tenerum, C. p. subrobustum, C. inflatum, C. massiliense, C. contrarium, C. declinatum, C. tripos, C. concilians, C. macroceros gallicum, C. platycorne, C. coarctatum, C. karsteni, C. hexacanthum, C. pulchellum, C. contortum, C. ranipes, C. tenue, C. horridum?,

C. lunula, C. gibberum (er), Peridinium grande, P. oceanicum oblongum, P. "divergens", P. inflatum, P. brochi, P. fatulipes, P. quarnerense, P. elegans, P. conicum, Peridinium sp., Gonyaulax pacifica (ra), G. polygramma, G. fragilis, Gonyaulax sp., G. birostris, G. sphaeroidea, Acanthogonyaulax spinifera, Spiraulax jollifei, Goniodoma polyedricum, Centrodinium sp., Pyrophacus horologicum, Blepharocysta splendormaris, Podolampas bipes, P. elegans, P. palmipes, P. spinifer, P. reticulata, Oxytoxum milneri, O. cristatum, Oxytoxum sp., Ceratocorys horrida, Heterodinium mediterraneum, Ornithocercus quadratus, O. thurnii, O. magnificus, O. steinii, O. francescae, Phalacroma argus, P. mitra, P. hindmarchii, P. limbatum?, Dinophysis schroederi, D. schuetti, D. expulsa, D. odiosa, Amphisolenia bidentata.

SILICOFLAGELLATES: Dictyocha fibula, D. octonaria.

TINTINNIDS: Tintinnopsis radix, T. buetschlii, T. sp., Codonaria cistellula, Codonella galea, C. aspera (er), C. apicata, Codonellopsis orthoceras, C. ecaudata, Poroecus curtus, Dictyocysta elegans lepida, D. extensa, D. muelleri, Cyttarocylis eucecrophalus, Epiplocylis undella, Epiplocyloides ralumensis, E. reticulata acuta, Rhabdonella apophysata, Protorhabdonella simplex, Xystonella treforti, Xystonellopsis heros (ra), X. dicymatica, X. paradoxa, Parundella praetenuis, P. aculeata, Proplectella claparedel, Steenstrupiella steenstrupii, Ascampbelliella urceolata (vr), Eutintinnus fraknoi, E. tenue, E. medius, E. apertus, Salpingella glockentoegeri.

Station 12. 29° 22. 0'N, 86° 38. 7'W. Date: May 26, 1964.

Plankton scarce.

ZOOPLANKTON: Some copepods, a few small Oikopleuridae and Radiolaria.

DIATOMS: Rhizosolenia imbricata, R. setigera, R. alata f. indica, Chaetoceros affines, Chaetoceros sp., Dactyliosolen mediterraneus, Thalassiosira sp., Hemiaulus hauckii, Thalassiothrix sp.

DINOFLAGELLATES: Ceratium declinatum, C. furca, C. fusus, C. massiliense, Gonyaulax digitale, Peridinium brochi.

TINTINNIDS: Eutintinnus fraknoi.

Station 13. 28°45.0'N 86°19.4'W. Date: May 26, 1964.

Plankton relatively abundant, dominated by copepods.

ZOOPLANKTON: Copepods, nauplii, Evadne sp., polychaete larvae, some very young Sagitta sp., small pteropods, Oikopleuridae and Radiolaria.

DIATOMS: Coscinodiscus sp. sp., Gossleriella sp., Thalassiosira sp., Guinardia flaccida, Rhizosolenia alata/alata, R. a.f.indica, R. cylindrus, R. castracanei, R. stolterfothii, R. calcaravis, R. bergonii, Bacteriastrum elongatum, B. comosum, Chaetoceros affine, C. coarctatum, C. atlanticum, C. peruvianum, C. messanense, C. lacinosum, Chaetoceros sp., Lithodesmium undulatum, Thalassiothrix sp., Hemiaulus hauckii.

DINOFLAGELLATES: Ceratium fusus, C. longirostrum, C. pentagonum tenerum, C. massiliense, C. contrarium, C. coarctatum, C. trichoceros, C. contortum, C. arietinum gracilentum, C. horridum molle, C. symmetricum, C. hexacanthum, C. tripos tripos, C. t. semipulchellum, C. macroceros gallicum, C. carriense, Peridinium brochi, P. depressum, P. "divergens", P. "oviforme", Peridinium sp., Gonyaulax digitale, Spiraulax jollifei, Goniodoma polyedricum, Ceratocorys horrida, Cladopyxis hemibrachiata, Blepharocysta splendormaris, Dinophysis hastata, D. caudata, Phalacroma argus, Pyrocystis fusiformis.

TINTINNIDS: Tintinnopsis radix, Codonaria cistellula, Codonella cuspidata?, Cyttarocylis eucecryphalus, Dictyocysta muelleri, Xystonella treforti, Xystonellopsis heros, Proplectella sp., Eutintinnus medius, E. tenue, Salpingella glockentoegeri.

Station 14. 28°12.0'N, 86°53.5'W. Date: May 27, 1964.

Plankton of medium density.

ZOOPLANKTON: Copepods, nauplii, Evadne sp. (f), Euphausidae, crustacean eggs, Oikopleuridae and Fritillaria sp., Sagitta sp., veligers of Gastropods, Bippinaria larvae (vr), some Siphonophores and polychaetes, Radiolaria.

DIATOMS: Planktoniella sol (m), Gossleriella sp. (vr), Coscinodiscus sp. (r), Leptocylindrus danicus, Rhizosolenia alata/gracillima, R. hebetata/semispina, R. styliformis, R. styliformis latissima, R. cylindrus, R. stolterfothii, R. dichæta? (er), R. bergonii (vr),

Chaetoeros affine (ra), C. messanense, C. peruvianum, C. atlanticum, C. lorenzianum, Ditylum brightwellii, Hemiaulus membranaceus, H. sinensis, Biddulphia sinensis, Ceratulina bergonii, Streptotheca thamensis, Pleurosigma sp.

DINOFLAGELLATES: Pyrocystis pseudonociluca, Ceratium extensum, C. fusus seta, C. gravidum, C. praelongum, C. teres, C. candelabrum, C. furca, C. pentagonum tenerum, C. macroceros gallicum, C. massiliense, C. contrarium, C. declinatum, C. tenue, C. karsteni, C. contortum, C. coarctatum, C. tripos semipulchellum, C. pulchellum, C. arietinum, C. hexacanthum, C. ranipes, Peridinium divergens, P. longipes, P. brochi, P. pedunculatum, P. globulus, P. oceanicum, P. crassipes, P. grande, P. elegans, P. fatulipes, Gonyaulax polygramma, G. fragilis, G. pacifica, Acanthogonyaulax spinifera, Goniodoma polyedricum, G. sphaericum, Centrodinium sp., Heterodinium pavillardii, H. ridgenae, Heterodinium sp., Oxytoxum sp., Pyrophacus horologicum, Blepharocysta splendormaris, Podolampas elegans, P. palmipes, Ceratocorys horrida (ra), C. bipes, Phalacroma argus, Ph. mitra, Ph. rapa, Ph. cuneus, Dinophysis schuetti, D. schroederi, D. uracantha, Heteroschisma longialata, Amphisolenia bidentata.

SILICOFLAGELLATES: Dictyocha octonaria.

TINTINNIDS: Tintinnopsis corniger, Codonella acuta, Poroecus curtus, Cyttarocylis eucecryphalus, Dictyocysta elegans lepida, D. muelleri, Protorhabdonella simplex, Rhabdonellopsis apophysata, Xystonella treforti, Xystonellopsis heros, X. dicymatica, Parundella aculeata, Proplectella subcaudata (er), Steenstrupiella steenstrupii, Eutintinnus medius, E. pinguis, Salpingella glockentoegeri, S. acuminata.

Station 15. 28°23.3'N, 87°53.5'W. Date: May 27, 1964.

Plankton, especially phytoplankton, rather abundant.

ZOOPLANKTON: Copepods, nauplii, some Ostracods, Pteropods, Polychaete larvae, Oikopleuridae. Protozooplankton represented by some Globigerina and radiolaria (including Sticholonche zanclea).

DIATOMS: Stephanopyxis palmeriana, Thalassiosira subtilis (ra), Gosleriella (r), Asteromphalus sp. (r), Cerataulina bergonii (a), Leptocylindrus danicus, Rhizosolenia bergonii, R. stolterfothii, R. alata, R. cylindrus, R. debyana, Bacteriastrum, sp., Chaetoceros compressum, C. densum, C. pseudocurvisetum?



C. decipiens, C. (Phaeoceros) sp., C. lorenzianum, C. dadayi,  
C. peruvianum, C. tortissimum, Streptotheca thamensis, Thal-  
ssiiothrix sp., Nitzschia sp., Pseudoeunotia doliolus.

DINOFLAGELLATES: Pyrocystis pseudonociluca, P. lunula, Pyrocystis  
sp., Kofoidinium velelloides, Ceratium praelongum, C. falcati-  
forme, C. extensum, C. teres, C. candelabrum, C. pentagonum  
tenerum, C. horridum molle, C. declinatum, C. contortum, C.  
tripos, C. limulus, C. massiliense, C. contrarium, C. macro-  
ceros gallicum, C. arietinum, C. ranipes, C. trichoceros, C.  
sumatranum, C. gibberum, Peridinium "divergens", P. quarnerense,  
P. pedunculatum, P. oceanicum oblongum, P. venustum, P.  
grande, P. crassipes?, P. depressum, P. solidicorne, P.  
claudicans, P. pellucidum, P. longipes, P. sp., Gonyaulax  
diegensis, G. pacifica, G. digitale, G. fragilis, Protoceratium  
sp., Diplopelta asymmetrica, Spiraulax jollifei, Oxytoxum  
scolopax, O. cristatum (f), Oxytoxum sp., Ceratocorys horrida,  
C. armata, C. bipes, Heterodinium pavillardii, H. milneri, H.  
whittingae, H. murrayi, H. ridgenae, Blepharocysta splendormaris,  
Podolampas palmipes, P. spinifer, Ornithocercus quadratus, O.  
steinii, Phalacroma doryphorum, Ph. mitra, P. argus, P. hindmarchi,  
P. rapa, Phalacroma sp., Dinophysis caudata, D. schroederi, D.  
rotundata?, Amphisolenia bidentata, A. globifera.

TINTINNIDS: Codonaria cistellula, Codonella galea, Dictyocysta  
extensa, D. elegans lepida, Cyttarocylis eucecryphalus, Epiplo-  
cyloides reticulata, Protorhabdonella simplex, Rhabdonellopsis  
apophysata, Xystonella treforti, Xystonellopsis cymatica, X. heros,  
Parundella aculeata, Amphorides quadrilineata, Odonthophorella  
serrulata, Proplectella claparedi, Proplectella sp., Eutintinnus  
apertus, E. tenue, E. fraknoi, E. similis, Rhabdosella cuneolata?,  
Salpingella acuminata, S. glockentoegeri, S. jugosa.

Station 16. 29°09.9'N, 88°12.0'W. Date: May 27, 1964.

Plankton rather abundant, dominated by diatoms.

ZOOPLANKTON: Copepod nauplii, few adults, Copelata scarce, some  
small, immature Sagitta sp., some larvae of polychaete.

DIATOMS (ra): Stephanopysis palmeriana, Skeletonema costatum,  
Thalassiosira sp., Planktoniella sol (r), a few small Coscino-  
discus sp., Gossleriella sp. (vr), Asteromphalus sp., Guinardia  
flaccida, Rhizosolenia stolterfothii, R. calcaravis, R. setigera,  
R. imbricata, R. alata (including var. indica), R. bergonii,  
Bacteriastrium delicatulum, Chaetoceros (dominant genus),

Chaetoceros affine, C. peruvianum, C. costatum, C. tortissimum?,  
C. decipiens, C. compressum, C. pseudocurvisetum, C. lorenzi-  
anum, C. pendulum, Biddulphia sinensis, B. mobiliensis, Litho-  
desmium undulatum, Dactyliosolen mediterraneus, Ceratulina  
bergonii, Thalassionema nitzschioides, Asterionella japonica,  
Eucampia zoodiacus, Thalassiothrix sp., Pleurosigma sp.

DINOFLLAGELLATES: Pyrocystis fusiformis, Ceratium fusus, C. teres,  
C. furca, C. pentagonum tenerum, C. p. subrobustum, C. kofoidi,  
C. tripos, C. concilians, C. declinatum, C. contortum, C.  
pulchellum, C. macroceros gallicum, C. lunula megaceros, C.  
trichoceros, C. contrarium, C. ranipes, C. hexacanthum, C.  
horridum molle, C. arietinum, Peridinium brochi, P. cf. divergens,  
P. "oviforme", P. oceanicum oblongum, P. globulus, P. claudicans,  
P. sp., Diplopelta asymmetrica, Gonyaulax fragilis, Gonyaulax  
sp., (very small), Goniodoma polyedricum, Pyrophacus horologicum,  
Ceratocorys horrida, Blepharocysta splendormaris, Podolampas  
palmipes, P. elegans, P. bipes, Oxytoxum milneri, Prorocentrum  
micans (vr), Exuviaella sp., Heteroschisma inaequalis, Dinophysis  
shroederi, D. caudata, Dinophysis sp., Phalacroma sp., Orni-  
thocercus quadratus, Amphisolenia bidentata.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Tintinnopsis radix, Poroecus curtus, Codonaria cistellula,  
Codonellopsis ecaudata, Dictycysta elegans lepida, D. extensa,  
Cyttarocylis eucecryphalus, Epilocylis undella (er), Epilocyloides  
ralumensis, Protorhabdonella simplex, Rhabdonellopsis apophysata,  
Xystonella treforti, Parundella inflata, P. aculeata, P. praetenus,  
Proplectella sp., P. claparedi, Amphorides quadrilineata, Dadayiella  
ganymedes, Xystonellopsis heros, Ascampbelliella urceolata (ra),  
Eutintinnus medius?, Salpingella glockentoegeri.

CRUISE II

Station III. Surface sample. 29°54.3'N, 86°01.4'W. Date: June 29, 1964.

Plankton rather abundant, dominated by Rhizosolenia alata/<sup>f</sup>gracillima.

ZOOPLANKTON: Copepods, nauplii, Copelata Oikopleuridae (ra),  
Gastropods (ra), Pelecypods, Pteropods, some Radiolaria.

DIATOMS: Rhizosolenia alata/<sup>f</sup>gracillima (a), R. a/<sup>f</sup>indica (f),  
Guinardia flaccida.

DINOFLAGELLATES: Ceratium tripos, C. extensum, Gonyaulax polyedra  
(f), Gonyaulax sp., Peridinium cf. divergens, Diplopelta asymmetrica,  
Blepharocysta splendormaris (f), Dinophysis caudata (f).

TINTINNIDS: Amphorides amphora, Eutintinnus medius.

Station III. Vertical haul.

Plankton rather abundant, dominated by Rhizosolenia alata/<sup>f</sup>gracillima.

ZOOPLANKTON: Copepods and nauplii rather scarce, Sagitta enflata,  
Oikopleuridae (m), some Pteropods, some Polychaete larvae, a  
pluteus (of an Ophiuroidea?), Radiolaria, especially Acantho-  
metridae, significantly more abundant than in the surface sample.

DIATOMS: Rhizosolenia alata/<sup>f</sup>gracillima (a), Rh. a/<sup>f</sup>indica (f), Rh.  
calcaravis (f), R. robusta (r), R. castracanei (er), Guinardia  
flaccida, Hemiaulus hauckii.

DINOFLAGELLATES: Pyrocystis pseudonociluca, Ceratium massiliense,  
C. tripos, C. trichoceros, C. macroceros gallicum, C. pentagonum  
tenerum (er), Peridinium cf. divergens, Gonyaulax (more abundant than  
in surface haul): G. polygramma, G. spinifer, Gonyaulax sp.,  
Ornithocercus quadratus, O. steini, Dinophysis lenticula? D.  
caudata, Phalacroma sp. (very small).

TINTINNIDS: Dictyocysta elegans lepida (ra), Rhabdonellopsis  
apophysata, Epilocytilis undella, Dadayiella ganymedes, Amphorides  
amphora, Proplectella claparedei, Eutintinnus medius.

Station IV. Surface sample. 29°22.0'N, 86°38.7'W. Date: June 29, 1964.

Plankton abundant, dominated by blue-green algae.

ZOOPLANKTON: Copepods, nauplii, some Euphausidae, some zoea larvae, Polychaete larvae, Rotifers (f), Sagitta serratodentata, a small medusa, mollusca larvae and postlarvae rather scarce (Gastropods and Pelecypods); some Pteropods, Oikopleuridae and Salpa (vr), a few Sticholonche.

DIATOMS (very scarce): Rhizosolenia alata f. gracillima, Coscinodiscus sp., Hemiaulus hauckii, Thalassiothrix sp.

DINOFLAGELLATES: Pyrocystis pseudonoctiluca, Ceratium tripos (m), C. contortum, C. massiliense, C. trichoceros, C. candelabrum, C. furca, C. extensum, Protoceratium sp., Peridinium cf. crassipes, P. cf. divergens, P. "oviforme", P. brochi, P. pedunculatum, P. minutum (ra), P. sp., P. elegans, P. fatulipes, Gonyaulax polygramma, G. fragilis, G. milneri, Spiraulax jollifei, Goniodoma polyedricum, G. sphaericum, Ceratocorys horrida, Pyrophacus horologicum, Amphidoma sp., Oxytoxum constrictum, Blepharocysta splendormaris (a), Ornithocercus quadratus, Phalacroma rotundatum? P. ovum, Phalacroma sp., Dinophysis caudata, D. hastata, D. rotundata. (In the whole the Dinoflagellata are abundant).

TINTINNIDS: Dictyocysta elegans lepida (f), Codonellopsis orthoceras, C. ecaudata, Protorhabdonella simplex, Rhabdonellopsis apophysata?, Epiplocytilis undella, Ascampbelliella urceolata, Proplectella claparedei, Amphorides amphora (all the species but Dictyocysta are very rare or extremely rare).

#### Station IV. Vertical haul.

Plankton very poor. Blue-green algae scarce.

ZOOPLANKTON: A few copepods, nauplii, Oikopleura sp., and very small Fritillaria. A few Sticholonche zanclea (Radiolaria).

DIATOMS: Gossleriella sp. (vr), Rhizosolenia alata f. gracillima (very thin), R. cylindrus, R. calcaravis, Dactyliosolen mediterraneus, Chaetoceros messanense, Ch. lorenziannum? Hemiaulus membranceus, H. hauckii, H. sinensis.

DINOFLAGELLATES: Gymnodinium sp., Ceratium fusus, C. extensum, C. teres, C. tripos, C. pulchellum, C. declinatum, C. coarctatum, C. euarctatum, C. trichoceros, C. massiliense, Murrayella splendida, Centrodinium sp., Peridinium elegans, P. inflatum, Protoceratium sp., Pyrophacus horologicum, Cladopyxis hemibrachiata (er), C. brachiolata (er), Diplopelta asymmetrica?, Oxytoxum scolopax, Blepharocysta splendormaris, Podolampas spinier, Gonyaulax polygramma, Gonyaulax sp., Ornithocercus thurnii, O. magnificus, Phalacroma pulchellum, P. elongatum, Dinophysis sphaerica, Amphisolenia bidentata.

SILICOFLAGELLATES: Dictyocha fibula.

COCCOLITHOPHORIDS: Scyphosphaera sp.

TINTINNIDS: Tintinnopsis radix, Tintinnopsis sp., Codonellopsis orthoceras, Dictyocysta elegans lepida, Protorhabdonella simplex, Rhabdonellopsis apophysata, Xystonellopsis heros, Amphorides minor, Proplectella claparedel.

Station V. Surface sample. 29°28.1'N, 86°46.2'W. Date: July 2, 1964.

Zooplankton abundant, phytoplankton poor.

ZOOPLANKTON: Copepods, nauplii and eggs of copepods, zoea (a), stomatopod pseudozoea, Lucifer sp. (d), a few Ostracods, veligers of Gastropods and Pelecypods, some Oikopleuridae, Sagitta sp. and Spionidae larvae.

BLUE-GREEN ALGAE: Skujaella sp. (m).

DINOFLAGELLATES: Ceratium furca (ra), C. teres, C. tripos, C. fusus, Gonyaulax polygramma, Peridinium minutum, P. pedunculatum, Blepharocysta splendormaris, Pyrophacus horologicum.

Station V. Vertical haul.

Very poor although much more diversified than the surface sample. Zooplankton and phytoplankton are about even.

ZOOPLANKTON: Some copepods and nauplii, Oikopleuridae and Fritillaria, Gastropods, very young Sagitta sp., a few polychaete larvae. Among the Protozoa a few and small Globigerina sp. and Sticholonche zanclea.

BLUE-GREEN ALGAE: Scarce filaments.

DIATOMS (very scarce): Dactyliosolen mediterraneus, Rhizosolenia cylindrus, Rh. bergonii, Chaetcoeros atlanticum, C. dadayi, Chaetoceros sp., Hemiaulus sinensis, Thalassiothrix sp.

DINOFLAGELLATES: Ceratium fusus, C. praelongum, C. teres, C. furca, C. contortum, C. tenue, C. contrarium, C. trichoceros, C. lunula, C. declinatum, Peridinium divergens, P. minutum, P. sp., Gonyaulax kofoidi, G. spinifera, G. cf. tamarensis, Gonyaulax sp., Goniodoma sphaericum, Diplopelta asymmetrica, Ceratocorys reticulata, Podolampas spinifer, Pyrophacus horologicum, Heterodinium sp., Oxytoxum sp., Dinophysis schuetti, Phalacroma sp., Amphisolenia bidentata, Triposolenia bicornis.

TINTINNIDS: Codonella galea, Codonellopsis ecaudata, Dictyocysta elegans lepida, Climacocylis scalaria, Xystonella treforti, X. lanceolata, Proplectella claparedei, P. subcaudata, Ascampbelliella urceolata, Amphorides quadrilineata, Eutintinnus apertus, Salpingella glockentoegeri.

Station VI. Surface sample. 30°07.8'N, 86°26.0'W. Date: July 1, 1964.

Completely dominated by the diatom Rhizosolenia alata f. gracillima.

ZOOPLANKTON: (rather scarce): Copepods, nauplii, Sagitta enflata, Sagitta sp., a few Pteropods and veligers of Gastropods. Some Oikopleuridae, Radiolaria, Globigerina and fish eggs.

DIATOMS: Coscinodiscus sp., Guinardia flaccida, Rhizosolenia alata f. gracillima (d), R. calcar-avis, R. robusta.

DINOFLAGELLATES: C. tripos, C. massiliense, C. trichoceros, Peridinium cf. divergens, Peridinium sp. sp., Gonyaulax polygramma, some very small Gonyaulax?, Diplopelta asymmetrica, Podolampas palmipes, Blepharocysta splendormaris, Gymnodinium cf. translucens.

TINTINNIDS: Stylicauda platensis, Eutintinnus medius.

Station VI. Vertical haul.

Plankton poor, dominated by Rhizosolenia alata f. gracillima.

ZOOPLANKTON: A few copepods, nauplii and Oikopleuridae.

DIATOMS: Guinardia flaccida, Rhizosolenia alata f. gracillima (d), R. a. f. indica, R. calcar-avis, R. robusta, Chaetoceros lorenzianum, C. peruvianum, C. coarctatum, Hemiaulus hauckii.

DINOFLAGELLATES: Ceratium teres, C. furca, C. tripos, C. trichoceros, C. macroceros gallicum, C. hexacanthum, C. massiliense, Gonyaulax polygramma, Gonyaulax sp., Peridinium cf. divergens, P. grande, Goniodoma polyedricum, Oxytoxum scolopax, Podolampas palmipes, Blepharocysta splendormaris, Phalacroma cf. parvulum, P. rapa, P. doryphorum, Dinophysis caudata.

TINTINNIDS: Stylicauda platensis, Dictyocysta elegans lepida (ra), Epilocyloides reticulata, Amphorides amphora, A. minor, Undella pistillum, Proplectella claparedei, Eutintinnus medius.

Station VIII. Surface sample. 30°09.2'N, 86°55.5'W. Date: July 2, 1964.

Plankton rather poor, dominated by Rhizosolenia alata<sup>f.</sup>/gracillima.

ZOOPLANKTON: Some copepods, nauplii, pteropods, small Oikopleuridae, Radiolaria (r), some benthonic foraminifera.

BLUE-GREEN ALGAE: Scarce filaments.

DIATOMS: Coscinodiscus sp. (r), Rhizosolenia alata<sup>f.</sup>/gracillima (d), R. a.f. indica (r), R. calcaravis (vr).

DINOFLLAGELLATES: Ceratium furca (f), C. tripos (ra), C. massillense, Gonyaulax polygramma (vr), Gonyaulax sp., Goniodoma sphaericum (r), Blepharocysta splendormaris (ra).

TINTINNIDS: Tintinnopsis radix (er), Eutintinnus medius (er).

Station VIII. Vertical tow.

ZOOPLANKTON: Copepods, nauplii, copepods eggs, zoea (r), Mysidacea (er), Conchoecia sp. (ra), Oikopleuridae, some Sagitta tenuis (very young), Sagitta hispida, S. enflata (er), Polychaeta (vr), a few Gastropod veligers, Pteropods (vr), Pelecypods (vr), Pluteus (er), medusa (vr), Sticholonche zanclea (radiolaria), "ova hispida", a fish larva and some benthic foraminifers.

DIATOMS: Stephanopyxis palmeriana, Asteromphalus sp., Melosira sp., Actinoptychus sp., Rhizosolenia alata<sup>f.</sup>/gracillima (m), R. a.f. indica (er), R. robusta (r), R. calcaravis (vr), R. bergonii (er), R. acuminata (r), R. stolterfothii (er), R. castracanei (er), R. imbricata (er), Bacteriastrum delicatulum (f), Chaetoceros decipiens (r), C. affine (vr), C. peruvianum (vr), C. diversum (er), C. didymum (er), Hemiaulus hauckii (f), H. membranaceus (vr), H. sinensis (vr), Navicula sp., (r), Gyrosigma sp. (vr), Pleurosigma sp. (vr), Tropidoneis sp. (er).

DINOFLLAGELLATES: Gymnodinium cf. translucens (vr), G. cf. multistriatum (r), Pyrocystis pseudonoctiluca (r), P. fusiformis (er), Ceratium fusus seta, C. teres, C. furca, C. tripos, C. hexacanthum (r), C. trichoceros (vr), C. massillense (r), C. extensum (er), C. contrarium (er), Gonyaulax polygramma (ra), G. spinifer (er), Goniodoma polyedricum (vr), Peridinium cf. divergens (f), P. depressum (er), P. punctulatum (er), Blepharocysta splendormaris, Podolampas Palmipes (er), Gymnaster pentasterias (er), Oxytoxum gigas (er), Diplopelta asymmetrica (er), Dinophysis caudata, Phalacroma cf. parvulum, P. argus (er), Prorocentrum triestinum (er), Exuviaella sp. (er).

COCCOLITHOPHORES: A few individuals.

TINTINNIDS: Stylicauda platensis (f), Codonellopsis pusilla? (f), C. ecaudata (vr), Dictyocysta elegans lepida (f), Protorhabdonella simplex (vr), P. curta (vr), Dadayiella ganymedes (vr), Ascampbelliella urceolata (r), Acanthostomella obtusa (ev), Proplectella claparedi (r), Eutintinnus medius (vr), Epilocyloides reticulata (er), Amphorides amphora (vr), Salpingella acuminata (er).

Undoubtedly the relative abundance of the species collected in this station is due to the fact that several samples were taken at different times: 1400, 1500, 1700, 1900, 2100, 2400, 0100, 0200 and 0300 h.; the richest samples were those taken during the first four hours.

Station D3. Surface haul. 29° 40.1'N, 86° 18.0'W. Date: June 29, 1964.

Plankton abundant, dominated by Rhizosolenia alata<sup>f</sup>/gracillima.

ZOOPLANKTON: Copepods, nauplii, some amphipods, Podon sp. (vr), Pteropods (ra), veligers of pelecypods (ra), and gastropods (f), some polychaetes, Sagitta enflata, S. tenue, Sagitta sp., some radiolaria.

BLUE-GREEN ALGAE: A few filaments.

DIATOMS: Rhizosolenia alata<sup>f</sup>/gracillima (a), R. calcaravis, R. robusta, Hemiaulus hauckii.

DINOFLAGELLATES: Ceratium extensum (ra), C. teres (ra), C. tripos, C. trichoceros, C. massiliense, C. macroceros gallicum, Goniodoma polyedricum (vr), Blepharocysta splendormaris, Dinophysis caudata, Phalacroma cf. parvulum, Gymnodinium cf. costatum.

TINTINNIDS: Dictyocysta elegans lepida.

Station D3. Vertical haul.

Plankton scarce.

ZOOPLANKTON: Some copepods and nauplii. Penilia avirostris (er), amphipods (er), some Pteropods, a few Oikopleuridae and Fritillaria sp.

DIATOMS: Stephanopyxis palmeriana, Rhizosolenia alata<sup>f</sup>/gracillima (rather scarce), R. calcaravis (r), Hemiaulus membranaceus, Hemiaulus hauckii.



DINOFLAGELLATES: Gymnodinium cf. costatum, C. tripos (r), C. massiliense (r), C. contrarium (er), Goniodoma polyedricum (r), Peridinium sp. (vr), Phalacroma parvulum (r).

TINTINNIDS: Climacocylis scalaroides marshallae, Eutintinnus fraknoi.

Station A13. Surface haul. 29°10.0'N, 86°52.5'W. Date: June 29, 1964.

Plankton rather abundant, dominated by zooplankton.

ZOOPLANKTON: Copepods, nauplii, copepods eggs (a), Evadne sp., rotifers, some small Salpidae, some siphonophores, gastropod veliger larvae, some polychaete larvae, Pteropods, Sagitta enflata, S. tenuis?

BLUE-GREEN ALGAE: Some filaments.

DIATOMS: Rhizosolenia alata<sup>f</sup>, gracillima (rather scarce), R. calcaravis (vr), Bacteriastrum sp. (r), Hemiaulus hauckii, H. membranaceus.

DINOFLAGELLATES: Ceratium seta, C. strictum, C. extensum, C. longirostrum, C. furca, C. teres, C. belone, C. pentagonum tenerum, C. tripos, C. t. semipulchellum, C. trichoceros, C. massiliense, C. contortum, Peridinium brochi, P. inflatum, P. cf. crassipes, P. pedunculatum, P. fatulipes, P. elegans, P. "divergens", P. "oviforme", Gonyaulax polygramma, G. fragilis, G. birostris, Gonyaulax sp., Goniodoma polyedricum (er), G. sphaericum (er), Ceratocorys horrida, Pyrophacus horologicum, Blepharocysta splendor-maris (ra), Podolampas palmipes (er), P. reticulata (er), Oxytoxum scolopax, O. milneri, Dinophysis caudata, D. schuetti, D. rotundata, Phalacroma doryphorum, Prorocentrum gracile, Exuviaella sp., Pyrocystis pseudonociluca.

TINTINNIDS: Codonaria cistellula, Protorhabdonella simplex, Epilocylis undella, Rhabdonellopsis apophysata, Amphorides amphora, Proplectella sp., Eutintinnus similis.

Station A13. Vertical haul.

Plankton rather poor but highly diversified.

ZOOPLANKTON: Copepods, nauplii, a few Lucifer sp. and Conchoecia sp., some Gastropodos, Salpidae, Sagitta sp. and Copelata (Oikopleuridae and Fritillaridae).

BLUE-GREEN ALGAE: Some filaments.

DIATOMS: Stephanopyxis palmeriana, Planktoniella sp., very small (vr), Gossleriella sp., a few Coscinodiscus sp., Asteromphalus sp., Rhizosolenia calcaravis, R. alata, R. gracillima (rather scarce), R. bergonii, R. castracanei, R. cylindrus, Chaetoceros sp., C. pendulum, C. messanense, C. affine, C. dadayi, Hamidiscus cuneiformis, Hemiaulus hauckii, H. membranaceus, Nitzschia seriata?, Thalassiothrix sp.

DINOFLAGELLATES: Pyrocystis hamulus, P. fusiformis, P. pseudonoctiluca, Pyrocystis sp., Kofoidinium veilleloides, Exuviaella sp., Ceratium fusus, C. f. seta, C. extensum, C. bigelowi, C. candelabrum, C. pentagonum tenerum, C. furca, C. tripos, C. pulchellum, C. carriense, C. contrarium, C. sumatranum, C. contortum, C. lunula, C. tenue, C. arietinum, C. gibberum, C. karsteni, C. trichoceros (ra), C. declinatum, Peridinium oceanicum, P. minutum, P. "oviforme", P. cf. divergens, P. brochi, P. grande, Gonyaulax polygramma, G. fusiformis, Gonyaulax sp., Podolampas elegans, P. bipes, P. palmipes, Blepharocysta splendormaris, Oxytoxum sp., cristatum, Oxytoxum sp., Murrayella splendida, Heterodinium ridgenae, Ceratocorys horrida, Pyrophacus horologicum, Cladopyxis hemibrachiata (er), Dinophysis schuetti, D. hastata, D. odiosa, Phalacroma expulsus, P. argus, P. doryphorum, Heteroschima longialata, Triposolenia bicornis, Parahistioneis sp., Ornithocercus magnificus.

SILICOFLAGELLATES: Dictyocha fibula (er).

TINTINNIDS: Poroecus curtus, Dictyocysta elegans lepida, Codonellopsis ecaudata, C. orthoceras, Codonella apicata, Protorhabdonella simplex, Cyttarocylis eucecryphalus, Epilocylis labiosa, E. undella, Epilocyloides reticulata, Climacocylis scalaroides, Xystonella treforti, Xystonellopsis cymatica, X. dicymatica, Rhabdonellopsis apophysata, Parundella aculeta, P. inflata, P. longa, Dadayiella ganymedes, Proplectella claparedei, P. subcaudata, Proplectella sp., Ascampbelliella urceolata, A. armilla (er), Amphorides amphora, A. minor, Steenstrupiella steenstrupii, Eutintinnus tenue, E. fraknoi, E. apertus, Salpingella acuminata, S. glockentoegeri.

Station A15. Surface. 28° 54.4'N, 87° 10.4'W. Date: June 30, 1964.

Plankton of medium density, rather poor.

ZOOPLANKTON: Nauplii (ra), Copepods, some Ostracods, Evadne sp. some Rotifers, Sagitta sp. (vr), Gastropods and Pteropods scarce, Polychaetes (vr), Cyphonautes larva (er), the radiolaria Sticholonche zanclea (ra), some Globigerina sp.

BLUE-GREEN ALGAE: Some filaments.

DIATOMS (Scarce): Melosira sp. (vr), Hemiaulus membranaceus, H. Hauckii, Chaetoceros coarctatum (f), Rhizosolenia robusta (er).

DINOFLAGELLATES: Pyrocystis pseudonociluca, Exuviaella sp., Ceratium fusus seta, C. extensum, C. longirostrum, C. inflatum, C. furca, C. teres, C. contortum (ra), C. massiliense, C. tripos, C. concilians, C. trichoceros, C. candelabrum (vr), C. hexacanthum (er), Peridinium "divergens", P. brochi, P. depressum, P. elegans (f), P. "oviforme", P. pedunculatum, P. grande (er), P. fatulipes (er), Peridinium sp., Gonyaulax fragilis, G. polygramma, G. milneri, Gonyaulax sp., Goniodoma polyedricum (ra), Spiraulax jollifei, Ceratocorys horrida, Pyrophacus horologicum, Blepharocysta splendormaris (ra), Podolampas bipes (r), P. reticulata (r), Phalacroma rapa, P. doryphorum, Dinophysis rotundata, D. caudata (er), D. expulsa (er), Ornithocercus magnificus, O. thurni.

TINTINNIDS: Codonellopsis ecaudata, Epilocylis undella, Protorhabdonella simplex, Rhabdonellopsis apophysata, Eutintinnus similis.

Station A15. Vertical tow.

Plankton very poor.

ZOOPLANKTON: Copepods, nauplii, ostracods (vr), a small amphipod, Euphausiidae (er), Sagitta sp. (very young), Oikopleuridae (vr), polychaete larvae (vr), some undetermined eggs. Among the protists: some radiolaria, including Sticholonche zancea and foraminifera, a few Coccolithophorids.

DIATOMS (Very scarce): Asteromphalus sp., Gossleriella sp. (er), Rhizosolenia bergonii, R. alata f indica, Bacteriastrum sp., Chaetoceros sp., C. densum, Hemiaulus hauckii, H. membranaceus, Hemidiscus sp.

DINOFLAGELLATES: Pyrocystis hamulus, Kofoidinium velelloides, Exuviaella sp., Ceratium extensum, C. fusus, C. teres, C. pentagonum subrobustum, C. p. tenerum, C. furca, C. candelabrum, C. massiliense, C. contortum, C. trichoceros, C. macroceros gallicum, C. declinatum, C. contrarium, C. coarctatum, C. tenue, C. ranipes, C. recurvum, C. euarquatum, C. pulchellum, Peridinium grande, P. "divergens", P. brochi, P. minutum, Peridinium sp., Diplopelta asymmetrica, Gonyaulax polygramma, G. kofoidi, Goniodoma polyedricum, Acanthogonyaulax spinifera (f), Spiraulax jollifei, Ceratocorys horrida, Pyrophacus horologicum, Oxytoxum gigas, Oxytoxum sp., Blepharocysta splendormaris, Podolampas elegans, P. reticulata, P. bipes, P. spinifer, P. palmipes, Heterodinium ridgenae, Phalacroma doryphorum, Dinophysis shroederi, D. caudata, Triposolenia bicornis.

TINTINNIDS: Codonellopsis orthoceras, Codonella apicata, Codonella aspera, Codonella galea, Poroecus curtus, Dictyocysta elegans lepida, Cyttarocylis eucecryphalus, Epilocylis undella, Epilocyloides ralumensis, Protorhabdonella simplex, Climacocylis scalaria, Xystonellopsis cymatica, X. dicymatica, X. heros, Brandtiella palliata, Parundella aculeata, P. praetenuis, Steenstrupiella steenstrupii, Proplectella claparedei, P. parva, Ascampbelliella urceolata.

Station T3. Surface haul. 29° 52.0'N, 86° 34.0'W. Date: July 2, 1964.

Plankton rather abundant, dominated by Rhizosolenia alata f. gracillima.

ZOOPLANKTON: Some small copepods, nauplii, ostracods (r), some copepods eggs, gastropods (r), Oikopleuridae (r). The most abundant zooplankters are the nauplii.

BLUE-GREEN ALGAE: Some filaments.

DIATOMS: Rhizosolenia alata f. gracillima (a), R. calcar-avis, R. bergonii, a very few Bacteriastrum sp., Chaetoceros affine.

DINOFLLAGELLATES: Exuviaella sp., Ceratium extensum, C. fusus, C. tripos, C. trichoceros (vr), Pyrophacus horologicum (very small, r), Gonyaulax polygramma (r), G. fragilis (vr), Gonyaulax sp. (r), Blepharocysta splendormaris.

Station T3. Vertical haul.

Plankton very poor.

ZOOPLANKTON: Nauplii, copepods, a few ostracods, some pteropods and gastropods, Oikopleuridae, Fritillaria, Sagitta sp. (r), Plutei (vr), radiolaria (r), foraminifers (r).

BLUE-GREEN ALGAE: A few filaments.

DIATOMS: Some small Asteromphalus sp. and Planktoniella sol, Dactyliosolen mediterraneus, Rhizosolenia alata f. gracillima, R. a. f. indica, R. calcar-avis, R. robusta, R. bergonii? (vr), Guinardia flaccida, Bacteriastrum sp., Chaetoceros peruvianum, C. lorenzianum, C. affine, C. dadayi, Hemiaulus membranaceus.

DINOFLAGELLATES: Pyrocystis pseudonociluca, Gymnodinium cf. multistriatum, Ceratium extensum, C. tripos, C. contrarium, C. macroceros gallicum, C. ranipes, C. trichoceros, C. horridum var. ?, Centrodinium sp., Gonyaulax polygramma, G. cf. tamarensis, G. pacifica, Peridinium cf. divergens, Goniodoma polyedricum, Ceratocorys horrida, Heterodinium sp., a few very small Pyrophacus horologicum, Oxytoxum constrictum, Phalacroma rotundatum, P. parvulum, Dinophysis caudata (er).

TINTINNIDS: Codonellopsis ecaudata, Poroecus curtis, Dictyocysta elegans lepida (ra), Epiplocyloides reticulata, Ascampbelliella urceolata, Amphorides amphora, Proplectella claparedel, Proplectella sp., Eutintinnus medius, E. apertus, E. fraknoi, Daturella stramonium.

Station T15. Surface haul. 29° 53.9'N, 86° 55.5'W. Date: July 2, 1964.

Plankton rather abundant, dominated by Rhizosolenia alata/<sup>f.</sup>gracillima.

ZOOPLANKTON: Some copepods, nauplii (r), some pelecypods, Oikopleuridae, Sagitta sp. (vr), foraminifera rather abundant mostly benthonic.

BLUE-GREEN ALGAE: Rather scarce.

DIATOMS: A few Coscinodiscus sp., Rhizosolenia alata/<sup>f.</sup>gracillima (a).

DINOFLAGELLATES: Gymnodinium sp., Ceratium fusus, C. extensum, C. tripos, C. trichoceros, Peridinium sp. sp. (ra), P. punctulatum, Gonyaulax sp. sp., Blepharocysta splendormaris, Pyrophacus horologicum, Phalacroma parvulum.

Station T15. Vertical haul.

Plankton rather poor.

ZOOPLANKTON: Nauplii, copepods (f), a few Conchoecia sp. (Ostracod), Oikopleuridae (f), Sagitta sp., immature (r), Radiolaria (r).

DIATOMS: Some small Coscinodiscus sp., Asterolampra sp., Planktoniella sol, (vr), Asteromphalus sp., Guinardia flaccida, Dactyliosolen mediterraneus, Rhizosolenia alata/<sup>f.</sup>gracillima, R. calcaravis, R. acuminata, Hemiaulus hauckii (vr), Chaetoceros messanensis, C. peruvianum.

DINOFLAGELLATES: Ceratium extensum, C. furca (er), C. pentagonum tenerum, C. trichoceros, C. massiliense, C. tripos, C. coarctatum, C. declinatum, C. hexacanthum, C. tenue, Peridinium crassipes, P. depressum, P. quarnerense, P. divergens, Diplopelta asymmetrica, Gonyaulax polygramma, G. pacifica, G. cf. tamarensis, Gonyaulax sp., Goniodoma polyedricum, Ceratocorys horrida, Oxytoxum sp., Podolampas palmipes, Blepharocysta splendormaris (vr), Gymanaster pentasterias, Heteroschisma longialata, Phalacroma parvulum, P. mucronatum, Amphisolenia bidentata.

TINTINNIDS: Tintinnopsis radix, Codonellopsis pusilla, Prooecus curtus, Dictyocysta elegans lepida, Cyttarocylis eucecryphalus, Epiplocyloides reticulata, Protorhabdonella simplex, Proplectella sp., P. claparedei, Amphorides amphora, A. minor, Ascampbelliella urceolata, Parundella praetenuis, Eutintinnus medius, Salpingella acuminata.

Station T18. Surface haul. 29° 31. 0'N, 87° 06'. 7'W. Date: July 2, 1964.

Plankton medium density. The most important elements are the blue-green algae, Lucifer, sp; copepods and nauplii.

ZOOPLANKTON: Copepods, nauplii, Lucifer sp., Gastropod veligers (ra), some Oikopleuridae and Polychaetes a few Sagitta sp., a fish egg, the radiolaria Sticholonche zanclea (r).

DIATOMS (Scarce): Stephanopyxis palmeriana, Coscinodiscus sp., Dactyliosolen mediterraneus, Chaetoceros dadayi (f), Hemiaulus hauckii, Thalassionema nitzschioides, Asterionella sp., Amphiprora sp., Nitzschia cf. closterium.

DINOFLAGELLATES: Pyrocystis fusiformis, P. hamulus, Ceratium fusus seta, C. furca, C. tripos, C. massiliense, Gonyaulax spinifera, G. polyedra (er), Spiraulax jollifei (er), Peridinium minutum, P. elegans, P. pedunculatum, Peridinium sp., Ceratocorys horrida, Blepharocysta splendormaris (r), Pyrophacus horologicum, Dinophysis rotundata, Amphisolenia bidentata.

TINTINNIDS: Tintinnopsis cf. directa, Tintinnopsis sp., Codonellopsis orthoceras, Epiplocyloides reticulata, Protorhabdonella simplex (ra), P. curta (ra) Rhabdonella cornucopia (f), Rhabdonellopsis apophysata, Climacocylis scalaroides, C. scalaria, Dadayiella ganymedes, Amphorides quadrilineata, Proplectella claparedei, Ascampbelliella urceolata, Eutintinnus medius, E. similis, E. frankoii, Eutintinnus sp.

Station T18. Vertical haul.

This Plankton haul is similar to the surface sample, but poorer. Blue-green algae scarce.

ZOOPLANKTON: Nauplii, copepods, a few small ostracods, a zoea, some Oikopleuridae, a Doliolum sp., polychaete larvae (r), gastropods (f), a medusa, Sagitta sp., (r), the radiolaria Sticholonche zancea.

DIATOMS (Scarce): Planktoniella sol (r), Coscinodiscus sp., small (vr), Dactyliosolen antarcticum, Rhizosolenia imbricata f. schrubsolei, Bacteriastrum sp., Chaetoceros dadayi (f), C. peruvianum (r), C. coarctatum (vr), Hemiaulus hauckii (r), Thalassionema nitzschioides.

DINOFLLAGELLATES: Pyrocystis robusta, P. hamulus, Exuviaella sp., Ceratium extensum, C. fusus, C. inflatum, C. candelabrum, C. furca, C. teres, C. contortum, C. pulchellum, C. tripos, C. trichoceros, C. massiliense, C. declinatum, C. contrarium, C. coarctatum, Peridinium pedunculatum, P. grande, P. minutum, P. brochi, Peridinium sp. sp., Diplopelta asymmetrica, Gonyaulax sp., Goniodoma polyedricum (er), Murrayella splendida, Ceratocorys horrida, Oxytoxum constrictum, Oxytoxum sp., Elepharocysta splendormaris, Podolampas bipes, P. spinifer, Pyrophacus horologicum, Ornithocercus magnificus, Amphisolenia bidentata, Phalacroma cuneus, P. parvulum.

TINTINNIDS: Tintinnopsis radix, T. cf. directa, Codonellopsis orthoceras, Poroecus curtus, Protorhabdonella curta, P. simplex, Xystonella lanceolata clavata, Epiplocylis undella, Parundella aculeata, Steenstrupiella steenstrupii, Amphorides amphora, A. quadrilineata, Ascampbelliella ureceolata, Eutintinnus apertus.

CRUISE III

Station VIII. Vertical haul, 100-0 m. 30° 09. 2'N, 86° 55. 5'W. Date: August 7, 1964.

Plankton poor, with some detritus.

ZOOPLANKTON: Some copepods, nauplii, ostracoda, calyptopsis larvae of Euphausiidae, Sagitta tenuis, a few larvae of polychetes; and gastropods. Pteropods (r), Oikopleuridae (r).

DIATOMS: Asteromphalus sp., Coscinodiscus sp. (r), Skeletonema costatum, Guinardia flaccida, Rhizosolenia imbricata/schrubsolei, R. stolterfothii, R. calcaravis, R. robusta, R. alata/indica, R. setigera, Bacteriastrum sp., Chaetoceros compressum, C. lorenzianum, C. decipiens, C. peruvianum, C. cf. laeve, Corethron hystrix, Ceratulina bergonii, Hemiaulus hauckii, Thalassiothrix mediterranea?, Nitzschia bilobata?, Navicula distans?

DINOFLAGELLATES: Ceratium furca, C. trichoceros, C. massiliense, Pyrophacus horologicum, Podolampas palmipes (er), Blepharocysta splendormaris (vr), Exuviaella sp. (vr), Dinophysis caudata (r), D. monacantha (er), Phalacroma sp., Amphisolenia bidentata.

SILICOFLAGELLATES: Dictyocha fibula (f).

TINTINNIDS: Stylicauda platensis, Dictyocysta extensa, D. elegans lepida, Protorhabdonella curta, Dadayiella ganymedes, Steenstrupiella steens-trupi, Rhabdosella cuneolata (m).

Station IX. Surface. 29° 30. 8'N, 86° 55. 5'W. Date: August 6, 1964.

Plankton abundant, dominated by blue-green algae.

ZOOPLANKTON: Copepods (ra), nauplii, amphipods (vr), a "cypris" larva, a few polyachete larvae, some pteropods, some larvae of gastropods and pelecypods, Sagitta enflata (vr), Oikopleuridae.

BLUE-GREEN ALGAE: Skujaella sp. (d) and some others.

DIATOMS (Scarce): Rhizosolenia alata/<sup>f.</sup>gracillima, Hemiaulus hauckii, Guinardia flaccida.

DINOFLAGELLATES: Ceratium extensum (ra), C. furca (ra), C. tripos, C. trichoceros, Peridinium cf. divergens, P. brochi, P. oblongum, P. subinermis, Peridinium sp., Gonyaulax fragilis, G. polygramma, Gonyaulax sp. sp., Diplopelta asymmetrica, Pyrophacus horologicum,



small (ra), Oxytoxum sp., Blepharocysta splendormaris (f), Dinophysis caudata, Ornithocercus magnificus (vr), Prorocentridae relatively abundant, represented by Exuviaella sp. and Prorocentrum gracile.

TINTINNIDS: Codonellopsis orthoceras (er), Dictyocysta elegans lepida (vr), Eutintinnus tenue (er), Eutintinnus sp. (vr), Amphorides amphora (m, the only tintinnids of a certain importance).

Station IX. Vertical haul, 120-0 m.

of  
Plankton/medium density.

ZOOPLANKTON: Copepods, nauplii, a few ostracods, some small medusae, some polychaete larvae, a bipinnaria larva, a cyphonautes larva, some gastropod veligers, Sagitta sp., a few Oikopleuridae, Globigerina sp. (r).

BLUE-GREEN ALGAE: Skujaella sp., rather scarce.

DIATOMS: Stephanopyxis palmeriana, Thalassiosira sp., a few Planktoniella sol, Skeletonema costatum, Guinardia flaccida, Dactyliosolen antarcticum, Rhizosolenia alata, R. gracillima, R. stolterfothii, R. setigera, R. bergonii (vr), R. cylindrus (vr), Chaetoceros affine, C. messanense, C. cf. laeve, C. compressum, C. lorenzianum, C. debile (er), Hemiaulus hauckii, Biddulphia mobiliensis (er), Lithodesmium undulatum (ra), Asterionella japonica, Streptothecha thamensis.

DINOFLLAGELLATES: Kofoidinium veilleoides, Pyrocystis pseudonoctiluca (ra), P. fusiformis, P. hamulus, Prorocentrum gracile, Exuviaella, Ceratium extensum, C. fusus, C. praelongum, C. gravidum, C. furca, C. pentagonum tenerum (vr), C. p. subrobustum (er), C. tripos, C. teres, C. lunula (vr), C. declinatum, C. coarctatum (vr), C. massiliense (vr), C. macroceros gallicum (r), C. trichoceros (f), C. pulchellum (er), C. hexacanthum (er), C. tenue, Peridinium brochi, P. oceanicum oblongum, P. grande, P. cf. divergens, P. simulum, P. elegans, P. depressum, P. brintoni, P. mediterraneum, P. pellucidum, P. subsphaericum, P. patens?, P. spheroides, Diplopelta asymmetrica, Diplopsalis cf. lenticula, Diplopsalopsis ovata, Gonyaulax pacifica, G. fragilis, G. spinifer, G. turbynei, Acanthogonyaulax spinifer, Pyrophacus horologicum, Oxytoxum cristatum, C. constrictum, Oxytoxum sp., Ceratocorys horrida, C. bipes, Blepharocysta splendormaris, Podolampas spinifer, P. palmipes, Heterodinium ridgenae, H. milneri, Histioneis sp., Ornithocercus magnificus, O. thurni, O. steini, Dinophysis caudata, D. hastata, Dinophysis expulsa, Phalacroma hindmarchi, P. mucronatum, P. ovum?, P. apicatum, Amphisolenia bidentata (ra).

TINTINNIDS: Tintinnopsis radix, T. sp., Codonellopsis ecaudata, C. orthoceras, Dictyocysta elegans lepida, D. extensa, Epiplocyilis undella, Epiplocyloides reticulata, E. ralumensis, Protorhabdonella simplex, P. curta, Rhabdonella elegans, R. cornucopia, Rhabdonellopsis apophysata, Climacocyilis scalaria, Cyttarocyilis eucryphalus, Favella panamensis, Xystonella treforti, X. longicauda, Xystonellopsis dahli (ra), X. heros, X. dicymatica, Parundella aculeata, P. inflata, Proplectella claparedei, P. subcaudata, Proplectella sp., Ascampbelliella urceolata, Acanthostomella lata, A. minutissima, Dadayiella ganymedes, D. pachytoecus, Steens-trupiella gracilis, Amphorides amphora, A. minor, Rhabdosella cuneolata?, Daturella stramonium, Eutintinnus medius, E. fraknoi, E. similis, E. tenue, Eutintinnus sp., Salpingella glockentoegeri.

Station X. Surface haul. 29°28.4'N, 85°29.7'W. Date: August 4, 1964.

Plankton/<sup>of</sup>medium density, dominated by zooplankton, especially gastropods.

ZOOPLANKTON: Copepods, nauplii, a few Evadne, zoea larvae (r), Gastropods (a), some pelecypods larvae, Sagitta inflata, Sagitta sp., Oikopleuridae (ra), polychaetes larvae, siphonophors (r), Branchiostoma sp. (er).

BLUE-GREEN ALGAE: A few filaments.

DIATOMS: Coscinodiscus sp., Guinardia flaccida, Rhizosolenia calcaravis, R. alata/indica, R. robusta, Basteriastrum sp., Chaetoceros lorenzianum, C. affine, C. cf. laeve, C. lacinosum, Hemiaulus membranaceus, H. sinensis, Thalassionema nitzschioides, Thalassiothrix sp. Dactyliosolen antarcticus.

DINOFLAGELLATES: Ceratium extensum, C. furca (ra), C. tripos, C. trichoceros, Peridinium pellucidum?, P. subinermis?, P. brochi, P. oceanicum oblongum, P. claudicans, a small Gonyaulax (r), Diplopelta asymmetrica, Blepharocysta splendormaris (ra), Podolampas palmipes (er), Exuviaella sp., Prorocentrum gracile, Dinophysis caudata.

TINTINNIDS: Favella panamensis, Amphorides amphora.

Station X. Vertical haul, 60-0m.

Plankton rather poor, dominated by diatoms, especially Chaetoceros curvisetum and Ceratulina bergonii.

ZOOPLANKTON: Nauplii, copepods (r), malacostraca larvae (r), zoea (vr), Evadne sp., (vr), amphipods (vr), a "cypris" larva, polychaete larvae,

small, immature *Sagitta* sp., small meduase (vr), a brachiopod larva, gastropod and pelecypod larvae (vr). Fish egg (er).

DIATOMS: *Stephanopyxis palmeriana*, *Melosira sulcata* (vr), *Rhizosolenia alata*, *R. indica*, *R. robusta*, *R. imbricata*, *R. schrubsolei* (vr), *R. calcaravis* (er), *R. bergonii* (vr), *R. stolterfothii*, *Chaetoeros curvisetum*, *C. lorenzianum*, *C. pseudocurvisetum* (er), *C. (Phaecoeros) sp.*, *C. peruvianum* (er), *C. didymum* (er), *C. compressum* (er), *Lithodesmium undulatum*, *Ceratulina bergonii*, *Biddulphia sinensis*, *Streptotheca thamensis*, *Hemiaulus hauckii*, *H. membranaceus* (er), *Nitzschia longissima?*, *N. paradoxa* (vr), *N. cf. closterium*, *Navicula* sp., *Thalassionema nitzschioides*, *Bellerocha* sp. *Triceratium* sp.

DINOFLAGELLATES: *Ceratium extensum* (vr), *C. fusus* (vr), *C. furca* (f), *C. trichoceros* (r), *Peridinium brochi*, *P. pentagonum*, *P. cf. divergens*, *P. crassipes*, *P. claudicans*, *P. latissimum*, *Peridinium* sp., *Gonyaulax* sp., *G. diegensis* (vr), *Ceratocorys horrida* (er), *Dinophysis caudata* (r), *Exuviaella* sp., *Gymnodinium* cf. *multistriatum*.

SILICOFLAGELLATES: *Dictyocha fibula* (er).

TINTINNIDS: *Tintinnopsis tocaninensis* (er), *Stylicauda platensis* (f), *Helicostomella longa* (vr), *Dadayiella ganymedes* (er), *Eutintinnus tubulosus* (er), *Salpingella glockentoegei* (er).

Station XI. Surface haul. 28°45.0'N, 86°19.4'W. Date: August 4, 1964.

Plankton of medium density.

ZOOPLANKTON: Copepods, nauplii, copepods eggs, *Sagitta* sp., some small medusae, polychaete larvae (f), some pteropods, gastropod larvae (vr), Oikopleuridae (ra).

BLUE-GREEN ALGAE: A certain amount of *Skujaella* sp., and some others.

DIATOMS: (Very Scarce): *Coscinodiscus crenulatus?* (er), *Rhizosolenia alata* f. *gracillima* (f).

DINOFLAGELLATES: *Ceratium furca* (f), *C. teres*, *C. contortum*, *C. massiliense* (the *Ceratia*, excepting *C. furca* are rare or extremely rare), *Peridinium* sp., *P. brochi*, *P. divergens*, *Diplopelta asymmetrica* (ra), *Gonyaulax* sp., *Ceratocorys horrida*, *Pyrophacus horologicum*, *Goniodoma polyedricum* (vr), *Blepharocysta splendormaris*, *Pseudophalacroma nasutum* (er), *Dinophysis exigua?* (ra), *D. caudata* (vr), *D. brevisulcus*, *Ornithocercus magnificus* (er), *Exuviaella* sp., *Prorocentrum gracile*.

TINTINNIDS: Protorhabdonella simplex (er), Epilocyloides reticulata (er), Coxiella sp. (vr), Cyttarocyliis eucecryphalus (r), Parundella inflata (er), Ascampbelliella urceolata, Amphorides amphora, Proplectella claparedei, Eutintinnus medius?, E. tubulosus.

Station XI. Vertical haul.

Plankton/<sup>of</sup> density medium to rather poor.

ZOOPLANKTON: Copepods, nauplii, Conchoecia sp. (er), some unidentified ostracods, a few small medusae, some very young Sagitta sp., Pteropods (r), Gastropods (vr), Oikopleuridae, Sticholonche zanclea and some other radiolaria.

BLUE-GREEN ALGAE: Filaments not very abundant.

DIATOMS: A few Coscinodiscus sp., Asteromphalus sp., Stephanopyxis palmeriana, Planktoniella sol, Dactyliosolen mediterranea, Guinardia flaccida, Rhizosolenia alata/indica, R. alata, R. setigera, R. cylindrus, R. imbricata schrubsolei, Streptotheca thamensis, Chaetoceros sp., C. affine, C. messanense, C. constrictum, Biddulphia sinensis (vr).

DINOFLLAGELLATES: Pyrocystis pseudonoctiluca, P. sp. cf. fusiformis, P. robusta, Kofoidinium velelloides, Exuviaella sp. prorocentrum gracile, Ceratium falcatum, C. fusus, C. teres, C. pentagonum tenerum, C. kofoidi, C. candelabrum, C. trichoceros, C. tenue, C. azoricum, C. contortum, C. declinatum angusticorne, C. arietinum, C. coarctatum, C. lunula (er), C. macroceros gallicum, C. massiliense, C. hexacanthum, Goniodoma polyedricum, G. sphaericum, Gonyaulax polygramma, G. birostris, Gonyaulax sp., Peridinium inflatum, P. quarerense, P. cf. crassipes, P. cf. divergens, P. depressum, P. grande, P. latispinum, P. brochi, Diplopelta asymmetrica, Podolampas palmipes, P. spinifer, P. reticulata, P. elegans, Blepharocysta splendormaris, Pyrophacus horologicum, Oxytoxum carinatum, O. constrictum, Oxytoxum sp., Murrayella splendida, Ceratocorys horrida, C. reticulata, Cladopyxis brachiolata, C. hemibrachiata, Ornithocercus magnificus, Histioneis, sp., Dinophysis odiosa, D. swezyi, D. schuetti, D. caudata (er), D. pusilla, D. simplex, Phalacroma ovum, P. mucronatum, P. argus, Pseudophalacroma nasutum, Heteroschisma longialata, Amphisolenia bidentata, Triposolenia bicornis.

TINTINNIDS: Tintinnopsis sp., T. corniger, Codonaria cistellula, Codonellopsis orthoceras, Dictycysta elegans lepida, D. extensa, Poroecus curtus, Rhabdonella elegans (er), Protorhabdonella simplex, P. curta, Epilocyliis mucronata, E. undella, Epilocyloides ralumensis, E. reticulata acuta, Cyttarocyliis eucecryphalus, Climacocyliis scalaroides,

Rhabdonellopsis apophysata, Xystonella treforti, Xystonellopsis heros, X. dicymatica, Xystonellopsis sp., Parundella inflata, P. aculeata, Proplectella claparedei, P. subcaudata, Undella pistillum, Amphorides minor, A. amphora, Rhabdosella cuneolata? (f), Brandtiella palliata (er), Steenstrupiella gracilis, S. steenstrupii, Acanthostomella lata, Ascampbelliella urceolata, Eutintinnus fraknoi, E. latus, Salpingella glockentoegei (p).

COCCOLITHOPHORIDS: Discosphaera sp.

SILICOFLAGELLATES: Dictyocha fibula.

Station Al3. Surface haul. 29°10.0'N, 86°52.5'W. Date: August 3, 1964.

Plankton abundant, dominated by blue-green algae.

ZOOPLANKTON: Copepods, nauplii, a few amphipods, polyachetes (f), some very young Sagitta sp., gastropods and pteropods, Oikopleuridae (f), Salpidae (r), Globigerina sp. (r).

BLUE-GREEN ALGAE: Skujaella sp. (va).

DINOFLAGELLATES: Pyrocystis pseudonocilluca, Ceratium fusus, C. furca, C. pentagonum tenerum, P. teres, C. tripos, C. massiliense, C. contortum, C. karsteni, Peridinium pedunculatum, P. quarnerense, P. cf. crassipes, P. brochi, Peridinium sp., Diplopelta asymmetrica (a), Scrippsiella sweeneyae, Gonyaulax polygramma, Gonyaulax sp. sp., Pyrophacus horologicum, Ceratocorys horrida, Dinophysis caudata, D. exigua, Prorocentrum gracile, Exuviaella sp.

TINTINNIDS: Rhabdonellopsis apophysata, Eutintinnus stramentus, E. tenue, Eutintinnus sp.

Station Al3. Vertical haul, 275-0 m.

Plankton of medium density.

ZOOPLANKTON: Copepods, nauplii, ostracods, Sagitta sp., a few small medusae, Oikopleuridae and Salpidae.

BLUE-GREEN ALGAE: Skujaella sp. (ra).

DIATOMS: Planktoniella sol, Coscinodiscus sp. sp., Stephanopyxis palmeriana, Thalassiosira subtilis, Rhizosolenia alata (r), R. styliformis latissima, Chaetoceros densus, C. atlanticum, Hemiaulus membranaceus, H. hauckii (vr).

DINOFLAGELLATES: Kofoidinium velelloides, Pyrocystis pseudonoctiluca, P. robusta, Pyrocystis sp., Prorocentrum gracile?, Exuviaella sp., Ceratium fusus, C. inflatum, C. teres, C. pentagonum tenerum, C. gravidum, C. trichoceros, C. contrarium, C. macroceros gallicum, C. vultur, C. karsteni, C. platycorne, C. declinatum, C. tenue, C. coarctatum, C. arietinum, C. pulchellum, C. ranipes (er), C. carriense (er), C. azoricum (er), C. hexacanthum (er), Peridinium grande, P. pedunculatum, P. conicum, P. fatulipes, P. cf. crassipes, Peridinium sp., Diplopelta asymmetrica, Gonyaulax pacifica, G. birostris, G. polygramma, G. milneri, G. polyedra (vr), Gonyaulax sp., Podolampas bipes, P. palmipes, P. spinifer, P. elegans, Blepharocysta splendormaris, Goniodoma polyedricum, Ceratocorys horrida, Cladopyxis hemibrachiata, Protoceratium spinulosum?, Centrodinium sp., Oxytoxum sp., O. scolopax, Pyrophacus horologicum steini, Heteroschisma longialata, Ornithocercus quadratus (vr), O. splendidus (er), O. magnificus (er), O. thurnii (er), Dinophysis hastata, D. caudata, D. schuetti, D. uracantha, D. expulsa, Phalacroma cuneus, P. circumsutum, P. mucronatum, Amphisolenia bidentata, A. globifera, A. palaetheroides.

COCCOLITHOPHORIDS: Discosphaera tubifer and some others.

SILICOFLAGELLATES: Dictyocha fibula (vr).

Station D11. Surface haul. 29°23.8'N, 86°16.1'W. Date: August 3, 1964

Plankton of medium density, dominated by zooplankton.

ZOOPLANKTON: Copepods, nauplii, megalops larvae, zoeae, copepod eggs, amphipods, a few small medusae, gastropod and pelecypod larvae, pteropods (ra), Doliolum sp.

DIATOMS (Very scarce): Rhizosolenia calcar-avis (vr), R. robusta (er), Guinardia flaccida, Hemiaulus hauckii, Nitzschia closterium.

BLUE-GREEN ALGAE: A few filaments.

DINOFLAGELLATES: Ceratium extensum, C. furca, C. tripos, C. concilians, C. massiliense, Peridinium cf. crassipes, P. pedunculatum, P. inflatum, Peridinium sp. sp., Gonyaulax sp., G. fragilis, G. spinifer, G. polyedra, Goniodoma polyedricum, Blepharocysta splendormaris, Oxytoxum constrictum, Dinophysis caudata, Dinophysis sp., Ornithocercus magnificus.

TINTINNIDS: Protorhabdonella curta (vr), Eutintinnus tubulosus (er).

Station D11. Vertical tow, 150-0 m.

Plankton medium to rather poor.

ZOOPLANKTON: Copepods, nauplii, zoeae, ostracods, a few medusae, a pluteus (of spatangidae?), polychaeta larvae, gastropod veligers, pteropods, Sagitta enflata, Oikopleuridae, an Amphioxus.

BLUE-GREEN ALGAE: Scarce.

DIATOMS (Scarce): Coscinodiscus sp., Planktoniella sp., Stephanopyxis palmeriana, Asteromphalus sp., Dactyliosolen mediterraneum, Guinardia flaccida (vr), Corethron hystrix (er), Rhizosolenia alata (r), R. a. f. gracillima (r), R. cylindrus (er), R. bergonii (vr), R. stolterfothii (vr), Chaetoceros densum, C. lorenzianum, C. peruvianum, C. dadayi (all the Chaetoceros very rare), Hemiaulus hauckii, Climacodium sp., Thalassionema nitzschioides.

DINOFLLAGELLATES: Kofoidinium velloides, Ceratium fusus, C. extensum, C. furca, C. pentagonum tenerum, C. semipulchellum, C. macroceros gallicum, C. trichoceros, C. tenue tenuissimum, C. coarctatum (er), Peridinium grande, P. divergens, Peridinium sp., Gonyaulax digitale, Diplopleta asymmetrica, Podolampas palmipes, Pyrophacus horologicum, Ceratocorys horrida, Oxytoxum constrictum, Oxytoxum sp., Amphisolentia bidentata (r), Phalacroma parvulum, Dinophysis caudata (vr).

TINTINNIDS: Tintinnopsis sp., Codonaria cistellula, Codonellopsis ecaudata, Protorhabdonella curta (r), Cyttarocylis eucecryphalus, Climacocylis scalaroides, Epilocylis undella, Xystonella treforti, Amphorides minor, Proplectella claparedei, Undella pistillum, Acanthostomella minutissima, Rhabdosella cuneolata?, Eutintinnus medius, E. fraknoi, E. tenue, E. apertus.

Station T3. Surface haul. 29° 52.0'N, 86° 34.0'W. Date: August 5, 1964

Plankton rather abundant.

ZOOPLANKTON: Nauplii, copepods, copepod eggs, Lucifer sp., Medusae (ra), pteropods (a), some larvae of gastropods and pelecypods, Sagitta sp., Oikopleuridae, Globigerina sp. (vr), a fish larva.

DIATOMS: Rhizosolenia alata f. gracillima (r), Hemiaulus hauckii (r), Nitzschia sp. (r).

BLUE-GREEN ALGAE: Rather abundant.

DINOFLAGELLATES: Exuviaella sp., Prorocentrum gracile, Ceratium extensum, C. furca, C. teres, C. tripos (ra), C. massiliense, Peridinium cf. crassipes, P. pedunculatum, P. depressum, P. brochi, Peridinium sp., Gonyaulax polygramma, Gonyaulax sp., Diplopelta asymmetrica (ra), Blepharocysta splendormaris (a), Pyrophacus horologicum, Dinophysis caudata, Phalacroma operculoides? (er), P. mucronatum, Phalacroma sp.

TINTINNIDS: Amphorides amphora (vr), Ascampbelliella urceolata (vr), Eutintinnus tenue (er).

Station T3. Vertical haul (210-0 m.)

Plankton of medium density, dominated by zooplankton.

ZOOPLANKTON: Nauplii, copepods, ostracods, amphipods, Sagitta enflata, polychaete larvae, Oikopleuridae. The radiolarian Sticholonche zanclea (er).

BLUE-GREEN ALGAE: (Rather scarce): Nonetheless they are the most important phytoplankters.

DIATOMS: Stephanopyxis palmeriana, Coscinodiscus sp., Leptocylindrus danicus, Guinardia flaccida, Rhizosolenia alata, R. a. gracillima, R. stolterfothii, Chaetoceros messanense, C. peruvianum, C. laeve?, C. compressum (er), Hemiaulus hauckii, Thalassionema nitzschioides.

DINOFLAGELLATES: Kofoidinium velelloides, Pyrocystis fusiformis, Exuviaella sp., Prorocentrum gracile, Ceratium extensum, C. fusus, C. furca, C. teres, C. tripos, C. trichoceros, C. tenue, C. macroceros gallicum (er), C. declinatum (vr), C. coarctatum (er), C. vultur (er), Peridinium cf. divergens, P. pellucidum, P. grande, Peridinium sp. Diplopelta asymmetrica, Gonyaulax polygramma, G. birostris, G. pacifica, G. sp., Ceratocorys horrida, Podolampas spinifer (vr), P. bipes (er), P. palmipes (er), Blepharocysta splendor maris, Pyrophacus horologicum, Dinophysis hastata, D. caudata, Dinophysis sp., Phalacroma sp., P. argus, Amphisolenia bidentata (ra).

SILICOFLAGELLATES: Dictyocha fibula (f).

TINTINNIDS: Tintinnopsis corniger, Codonellopsis pusilla, C. orthoceras, Dictyocysta elegans lepida, Protorhabdonella simplex, Climacocylis scalaroides, Xystonella longicauda (er), Xystonellopsis heros, Epiplocytilis undella, Epiplocytilis reticulata, Daturella stramonium, Parundella aculeata (er), Rhabdosella cuneolata?, Acanthostomella minutissima, Amphorides amphora, A. minor, A. quadrilineata, Steenstrupiella steenstrupii (er), Eutintinnus birictus, E. fraknoi, E. tubulosus, E. medius, E. tenue, Eutintinnus sp., Salpingella glockentoegeri.



CRUISE IV

Station II. Vertical haul (15-0 m). 30° 07. 2' N, 85° 46. 5' W. Date: August 31, 1964.

Plankton abundant, completely dominated by diatoms; the most important genera include: Guinardia, Rhizosolenia, Eucampia, Chaetoceros, Thalassiosira, Skeletonema and Leptocylindrus.

ZOOPLANKTON (Almost absent): A few copepods and nauplii.

DIATOMS: Guinardia flaccida (a), Stephanopyxis palmeriana (ra), Melosira sulcata, Skeletonema costatum (a), Leptocylindrus danicus (a), Asterolampra sp., Thalassiosira sp. (ra), T. subtilis (ra), Coscinodiscus sp., Rhizosolenia imbricata (a), R. acuminata (ra), R. setigera (a), R. stolterfothii (a), R. alata, R. gracillima, R. calcar-avis, R. styliformis latissima, Bacteriastrum sp., Chaetoceros compressum (ra), C. tortissimum, C. pseudocurvisetum, C. affine, C. peruvianum, C. messanense, C. costatum (vr), C. coarctatum (vr), Corethron hystrix, Ceratulina bergonii, Streptotheca thamensis (r), Lithodesmium undulatum, Hemiaulus hauckii, H. sinensis, H. membranaceus, Eucampia cornuta (a), Lauderia sp., Bellerochea sp., Nitzschia seriata?, N. longissima, Nitzschia sp., Fragilaria sp., Asterionella sp., Pleurosigma sp., Gyrosigma sp.

DINOFLAGELLATES: Ceratium furca (er), C. tripos (er), Peridinium conicum, P. oceanicum, P. depressum, P. biconicum, P. oblongum, P. punctulatum, P. obtusum, Diplopelta asymmetrica (ra), Goniodoma polyedricum (er), Pyrophacus horologicum, Exuviaella sp., Prorocentrum gracile, Phalacroma sp., Dinophysis caudata.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Codonellopsis ecaudata, C. pusilla, Stylicauda platensis (r), Favella panamensis, Helicostomella longa, Dadayiella ganymedes (the only tintinnid of relative abundance), Amphorides amphora, Rhabdosella cuneolata? Ascampbelliella urceolata (er), Eutintinnus tenue (er).

Station III. Vertical haul. 29° 54. 3' N, 86° 01. 4' W. Date: August 31, 1964.

Plankton rather poor.

ZOOPLANKTON: Copepods and nauplii scarce, Gastropods (vr), some unidentified eggs.

DIATOMS: Leptocylindrus danicus (d), Skeletonema costatum (f), Guinardia flaccida, Coscinodiscus sp., Planktoniella sp. (vr), Rhizosolenia alata/gracillima, R. setigera, R. bergonii (r), R. styliformis/latissima (er), R. calcar-avis (vr), R. alata/indica, R. imbricata/schrubsolei, Chaetoceros pendulum, C. coarctatum (er), C. lorenzianum, C. peruvianum, C. (Phaeoceros) sp., C. didymum, C. messanense, Thalassiothrix frauenfeldi, Eucampia cornuta, Hemiaulus hauckii, H. membranaceus, Ceratulina bergonii, Climacodium sp.

DINOFLAGELLATES: Ceratium furca, C. trichoceros, C. hexacanthum, C. massiliense, Peridinium cf. divergens, P. oceanicum, P. grande, Gonyaulax fragilis, Gonyaulax sp., Diplopeltopsis minor (f), Pyrophacus horologicum, Ceratocorys horrida, Oxytoxum elegans, Dinophysis caudata, D. sp. cf. uracantha, Phalacroma sp., Ornithocercus magnificus, Amphisolenia bidentata.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Rhabdonellopsis triton, Ascampbelliella urceolata, Dadayiella ganymedes, Amphorides amphora, Undella pistillum, Rhabdosella cuneolata?, Eutintinnus tenue, E. fraknoi.

Station IV. Vertical haul (50-0 m). 29° 22.0'N, 86° 38.7'W. Date: August 31, 1964.

Plankton very poor.

ZOOPLANKTON: Copepods (r), nauplii (vr).

BLUE-GREEN ALGAE: Filaments very scarce.

DIATOMS: Leptocylindrus danicus (r), Rhizosolenia alata/gracillima (vr), R. calcar-avis (er), Thalassionema nitzschioides (er).

DINOFLAGELLATES: Ceratium furca (vr), C. trichoceros (vr), Gonyaulax polygramma (r), Gonyaulax sp., Peridinium cf. divergens (vr), Podolampas palmipes, Blepharocysta splendormaris, Exuviaella sp.

TINTINNIDS: Epilocylis undella, Proplectella claparedel.

Station V. Vertical haul (100-0 m). 29° 28.1'N, 86° 46.2'W. Date: September 2, 1964.

Plankton of medium density.

ZOOPLANKTON: Nauplii (ra), copepods, ostracods, amphipods (vr), pteropods, gastropod and pelecypod veligers, a few polychaete larvae, Sagitta sp., Rotifers, Oikopleuridae and Fritillaria sp., Euglypha sp. (protozoa).

BLUE-GREEN ALGAE: Filaments rather scarce.

DIATOMS: Stephanopyxis palmeriana, a few small Coscinodiscus sp., Planktoniella sol, Asteromphalus heptactis, Dactyliosolen mediterraneus, Rhizosolenia debeyana, R. alata f. gracillima, R. a. f. indica, R. hebetata, Chaetoceros compressum (vr), C. atlanticum (er), Hemimaulus hauckii, H. membranaceus, Thalassiothrix mediterranea.

COCCOLITHOPHORES: A few cells.

DINOFLLAGELLATES: Pyrocystis pseudonoctiluca, P. fusiformis, Ceratium praelongum, C. inflatum, C. extensum, C. furca (ra), C. pentagonum tenerum, C. teres, C. kofoidi, C. massiliense, C. coarctatum, C. declinatum, C. trichoceros, C. tenue, C. contrarium, C. tripos, Peridinium pedunculatum, P. cf. crassipes, P. grande, P. conicum, P. brochi, P. simulum, P. cf. oviforme, Diplopelta asymmetrica, Diplopsalis lenticula? Protoceratium sp., Podolampas palmipes, P. elegans, P. spinifer (er), Blepharocysta splendormaris, Palaeophalacroma uncinatum, Pyrophacus horologicum, Scrippsiella sweeneyae, Gonyaulax polygramma, G. pacifica, Gonyaulax sp., Ceratocorys horrida, Oxytoxum constrictum (r), O. turbo (er), Oxytoxum sp., Dinophysis caudata, D. pusilla (r), Phalacroma rapa, P. doryphorum, P. cuneus (er), P. operculoides, Phalacroma sp., Ornithocercus magnificus, Amphisolenia palaeotheroides.

TINTINNIDS: Codonaria cistellula, Coxiella sp. cf. longa, Dictyocysta elegans lepidia, D. extensa, Protorhabdonella simplex, P. curta, Rhabdonella indica, R. cornucopia, Cyttarocylis eucecryphalus, C. acutiformis, Epiplocylis undella, Epiplocyloides ralumensis, E. reticulata, Parundella inflata, Proplectella subcaudata, P. claparedel, Climacocylis scalaroides marshallae, Xystonellopsis cymatica, X. heros (er), Amphorides amphora, Ascampbelliella urceolata, A. armilla, Acanthostomella armilla (f), A. lata (er), Dadayiella ganymedes, Rhabdosella cuneolata?, Eutintinnus tubulosus, E. fraknoi, E. medius, E. pinguis, E. birictus, E. stramentus, Salpingella glocken-toegeri.

Station VI. Surface haul. 30°07.8'N, 86°26.0'W. Date: September 2, 1964.

Plankton of medium density, dominated by Rhizosolenia alata f. gracillima.

ZOOPLANKTON: Copepods, nauplii, Evadne sp., Sagitta sp. some plutei, pteropods, some pelecypod and gastropod veligers, Oikopleuridae.

BLUE-GREEN ALGAE: Skujaella sp., not very abundant.

DIATOMS: Coscinodiscus sp. (f), Leptocylindrus danicus (subdominant), Guinardia flaccida, Rhizosolenia alata<sup>f</sup>/gracillima (a), R. a.<sup>f</sup>/indica, R. calcar avis, R. robusta, Bacteriastrum sp., Chaetoceros compressum, C. lorenzianum, C. coarctatum (all the Chaetoceros vr), Hemiaulus hauckii, H. membranaceus.

DINOFLAGELLATES: Ceratium extensum, C. fusus, C. tripos, C. trichoceros, C. massiliense, Peridinium sp., P. oblongum, P. cf. divergens, Diplopelta asymmetrica, Blepharocysta splendormaris (ra), Pyrophacus horologicum, Pyrodinium sp., Dinophysis sp.

TINTINNIDS: Eutintinnus apertus, Eutintinnus sp.

Station VII. Vertical haul. 30°02.9'N, 86°12.2'W. Date: September 2, 1964.

Plankton poor.

ZOOPLANKTON: Copepods, nauplii, Evadne sp., ostracods, veligers of gastropods and pteropods (r), pteropods (vr), Sagitta sp., a few small medusae, Oikopleuridae (r), Euglypha sp. (vr).

BLUE-GREEN ALGAE: Scarce filaments.

DIATOMS: Leptocylindrus danicus (d), Guinardia flaccida, Rhizosolenia alata gracillima, R. a. indica, R. calcar avis, R. stolterfothii, R. imbricata, R. styliformis<sup>f</sup>/latissima, Hemiaulus hauckii, Thalassiothrix mediterranea.

DINOFLAGELLATES: Pyrocystis pseudonociluca, Pyrocystis sp., Exuviaella sp., Ceratium fusus, C. extensum, C. furca, C. contrarium, C. massiliense, C. trichoceros, C. tripos (vr), Gonyaulax sp., G. polygramma (vr), Peridinium conicum, P. brochi, P. cf. crassipes, Peridinium pedunculatum, Podolampas palmipes, Pyrophacus horologicum, Exuviaella sp., Ceratocorys horrida, Phalacroma sp., Ornithocercus magnificus.

TINTINNIDS: Rhabdonella indica, Rhabdonellopsis apophysata, Ascampbelliella urceolata (er), Rhabdosella cuneolata?, Eutintinnus tenue, T. tubulosus.

Station VIII. Surface haul. 30°09.2'N, 86°55.5'W. Date: September 3, 1964.

Plankton rather poor, dominated by Rhizosolenia alata<sup>f</sup>/gracillima.

ZOOPLANKTON: Copepods, nauplii, some plutei, Sagitta sp., polychaete larvae (vr), Gastropod veligers (r), Oikopleuridae, some fish eggs. A few Globigerina sp.

DIATOMS: Rhizosolenia alata<sup>f</sup>/gracillima (a), R. imbricata, R. calcar-avis, Guinardia flaccida, Leptocylindrus danicus, Hemiaulus hauckii, Thalassionema nitzschioides, Thalassiothrix sp.

DINOFLAGELLATES: Ceratium fusus, C. furca, C. teres, C. tripos atlanticus, C. t. semipulchellum, C. trichoceros (p), Gonyaulax polygramma (f), Peridinium cf. crassipes, P. abei, P. conicum, P. simulum, P. oceanicum, Peridinium sp., Diplopelta asymmetrica, Diplopeltopsis minor, Blepharocysta splendormaris (m), Podolampas palmipes, Pyrophacus horologicum, Phalacroma mitra.

TINTINNIDS: Eutintinnus tenue.

Station IX. Surface haul. 29° 30.8'N, 86° 55.5W. Date: September 2, 1964.

Plankton poor, dominated by copepods; phytoplankton very poor.

ZOOPLANKTON: Copepods, nauplii, copepod eggs, Sagitta sp., Oikopleura sp. (r).

BLUE-GREEN ALGAE: Scarce filaments of Skujaella sp.

DIATOMS: Coscinodiscus sp. (vr), Rhizosolenia alata<sup>f</sup>/gracillima (r), Hemiaulus hauckii (r).

DINOFLAGELLATES: Ceratium furca (r), C. massiliense (r), C. tripos (vr), Peridinium sp. (r), Gonyaulax sp. (vr), Blepharocysta splendormaris (f), Dinophysis sp. (er).

TINTINNIDS: Eutintinnus similis (er).

Station X. Surface haul. 29° 28.4'N, 85° 29.7'W. Date: September 1, 1964.

Plankton abundant dominated by Leptocylindrus danicus; Rhizosolenia alata f. gracillima is subdominant.

ZOOPLANKTON (Very scarce): Copepods (f), nauplii (f), Evadne sp. (vr).

DIATOMS: Rhizosolenia alata gracillima (a), R. calcar-avis, R. setigera, R. stolterfothii, R. imbricata, R. bergonii (r), Leptocylindrus danicus (a), Guinardia flaccida (ra), Coscinodiscus lineatus (vr), Shroderella

delicatula, Bacteriastrium sp. (r), Chaetoceros peruvianum, C. didymum anglica (ra), C. compressum, C. cf. laciniosa, C. tortissimum (vr), C. affine, C. coarctatum, Hemiaulus membranaceus, H. hauckii, H. sinensis, Eucampia cornuta (r), Thalassiothrix mediterranea, Thalassionema nitzschioides.

DINOFLAGELLATES: Exuviaella sp., Ceratium fusus, C. furca, C. massiliense, C. trichoceros, C. tripos, C. contortum (er), Peridinium conicum, Peridinium sp., P. brochi, P. oceanicum oblongum (er), Podolampas reticulata (er), Pyrophacus horologicum (r), Dinophysis sp. (vr).

TINTINNIDS: Coxiella sp. (er), Helicostomella longa (vr).

Station A13. Surface haul. 29°10.0'N, 86°52.5'W. Date: August 31, 1964.

Plankton of medium density (partly destroyed because of poor preservation) dominated by copepods.

ZOOPLANKTON: Copepods (a), nauplii (a), gastropods (ra).

DIATOMS: Rhizosolenia alata<sup>f</sup>/gracillima (vr), Hemiaulus hauckii (vr), Thalassiothrix sp. (vr).

DINOFLAGELLATES: Exuviaella sp. (this is the only dinoflagellate of certain abundance), Diplopelta asymmetrica, Peridinium sp. (vr), Ceratocorys horrida (er).

TINTINNIDS: Epilpocyloides reticulata (vr).

Station D1. Surface haul. 29°49.5'N, 86°06.9'W. Date: August 31, 1964

Plankton of medium density, dominated by copepods; phytoplankton extremely poor.

ZOOPLANKTON: Copepods (a), nauplii (a), some rotifers, and unidentified malacostraca.

DIATOMS: Hemiaulus hauckii (r).

DINOFLAGELLATES: Exuviaella sp., Blepharocysta splendormaris, Peridinium cf. crassipes, Peridinium sp.

TINTINNIDS: Epilpocyloides reticulata, Eutintinnus similis.

Station D2. Surface haul. 29°44.5'N, 86°12.6'W. Date: August 31, 1964.

Plankton abundant, dominated by Rhizosolenia alata<sup>f.</sup>/gracillima; R. castracanei is subdominant.

ZOOPLANKTON: Copepods, nauplii, Evadne sp., Pteropods (r), gastropod veligers (f).

Station D13. Vertical haul (20-0 m). 29°39.2'N, 85°38.0'W. Date: September 1, 1964.

Plankton relatively abundant, dominated by Leptocylindrus.

ZOOPLANKTON (Scarce): Some copepods, nauplii and Oikopleurida.

DIATOMS: Leptocylindrus danicus (a), Coscinodiscus sp. Guinardia flaccida, Dactyliosolen antarcticus, Rhizosolenia alata<sup>f.</sup>/gracillima, R. calcar-avis, Bacteriastrum sp., Chaetoceros peruvianum, C. affine, Thalassiothrix sp., cf. delicatula, Nitzschia seriata, Thalassionema nitzschioides.

DINOFLAGELLATES: Exuviaella sp., Ceratium furca, C. tripos, C. trichoceros, C. massiliense, Peridinium simulum, P. cf. divergens, P. brochi, Peridinium sp. sp., Podolampas palmipes, Pyrophacus horologicum.

TINTINNIDS: Rhabdonella elegans, Amphorides amphora.

Station D22. Surface haul. 29°00.6'N, 86°01.9'W. Date: September 1, 1964.

Plankton exceedingly poor.

ZOOPLANKTON: Some copepods and nauplii. Oikopleuridae (vr).

DINOFLAGELLATES: Exuviaella sp.

Station T1. Vertical haul (50-0 m). 30.00.0'N, 86°30.0'W. Date: September 2, 1964.

Plankton rather poor but diversified.

ZOOPLANKTON: Copepods, nauplii, Evadne sp., Lucifer sp. (r), Medusae (ra), Sagitta sp., polychaete larvae (vr), Oikopleuridae (r) and Salpidae (er), Sticholonche zanclea (radiolaria) (r).

BLUE-GREEN ALGAE: Rather scarce filaments.

DIATOMS: Leptocylindrus danicus (ra), Dactyliosolen antarcticus, Rhizosolenia alata/gracillima, R. calcar-avis, R. bergonii, R. styliformis latissima (er), Chaetoceros peruvianum, C. lorenzianum, C. coarctatum, C. didymum (er), C. tortissimum (er), Hemiaulus hauckii (vr), H. sinensis (vr), H. membranaceus (vr), Eucampia cornuta (vr), Thalassiothrix sp., Thalassionema nitzschioides.

DINOFLAGELLATES: Pyrocystis pseudonociluca, Pyrocystis sp., Exuviaella sp., Ceratium fusus, C. falcatum, C. inflatum, C. teres (er), C. furca, C. trichoceros, C. massiliense, C. macroceros gallicum (er), Peridinium brochi, P. grande, P. cf. crassipes, Peridinium sp., Gonyaulax fragilis, G. birostris, Gonyaulax sp. sp., Podolampas spinifer, P. palmipes (er), Blepharocysta splendormaris, Pyrophacus horologicum, Ceratocorys horrida, Dinophysis rotundata, D. hastata, D. caudata, Ornithocercus magnificus (er).

TINTINNIDS: Protorhabdonella simplex, Rhabdonella amor (r), Rhabdonellopsis apophysata, Epiplocylis undella, Epiplocyloides reticulata, Ascampbelliella urceolata, Steenstrupiella steenstrupii, Amphorides amphora, Eutintinnus medius, E. tubulosus.

Station T3. Surface haul. 29° 52.0'N, 86° 34.0'W. Date: September 2, 1964.

Plankton poor.

ZOOPLANKTON: Copepods, nauplii, ostracods, Euphausidae (vr), Evadne sp. (vr), zoea and megalops larvae, some medusae, polychaete, pteropods and gastropod larvae, Sagitta enflata, a few small foraminifera, Oikopleuridae.

BLUE-GREEN ALGAE: A few filaments.

DIATOMS: Guinardia flaccida, Rhizosolenia alata/gracillima, R. calcar-avis, R. castracanei, R. styliformis (r), R. imbricata (vr), Chaetoceros constrictum, C. lorenzianum, C. peruvianum, C. compressum (vr), Hemiaulus membranaceus, H. hauckii, Bacteriastrum sp., Asterionella sp., Thalassiothrix sp.

DINOFLAGELLATES: Ceratium fusus, C. inflatum, C. furca, C. teres (er), C. massiliense, Peridinium sp., Diplopelta asymmetrica, Blepharocysta splendormaris, Gonyaulax polyedra.

TINTINNIDS: Protorhabdonella curta (er).



Station T5. Surface haul. 29°39.5'N, 86°40.2'W. Date: September 2, 1964.

Plankton of medium density, dominated by zooplankton.

ZOOPLANKTON: Copepods, nauplii, copepod eggs, ostracods, megalops larvae of a brachiura, pteropods (vr), some gastropod and pelecypod larvae, a few siphonophores, Sagitta sp., polychaete larvae (vr), Oikopleura sp.

BLUE-GREEN ALGAE: Skujaella sp. is the most important phytoplankton.

DIATOMS: Coscinodiscus sp. (f), Planktoniella sol (vr), Ethmodiscus sp., Guinardia flaccida, Leptocylindrus danicus, Rhizosolenia imbricata, R. alata, R. calcar avis, Chaetoceros peruvianum, Hemiaulus membranaceus, H. hauckii.

DINOFLAGELLATES: Ceratium fusus, C. extensum, C. furca, C. teres, C. massiliense, C. trichoceros, C. contortum, C. coarctatum (vr), C. tripos, Peridinium cf. divergens, P. conicum, P. pedunculatum, Peridinium sp., Gonyaulax polygramma, G. polyedra (vr), Diplopelta asymmetrica, Blepharocysta splendormaris, Pyrophacus horologicum, Exuviaella sp., Dinophysis sp. cf. D. rotundata (vr).

Station T12. Vertical haul. 30°12.3'N, 86°55.5'W. September 3, 1964.

Plankton very poor. The dominant (Rhizosolenia alata<sup>f.</sup>/gracillima) is also poor.

ZOOPLANKTON (Very scarce): A few copepods and nauplii, some pteropods and small gastropod veligers, polychaete larvae (r), Oikopleuridae (vr).

DIATOMS: Skeletonema costatum (r), some small Coscinodiscus sp., Asteromphalus sp., Leptocylindrus danicus, Guinardia flaccida, Dactyliosolen antarcticus, Rhizosolenia alata<sup>f.</sup>/gracillima (m), R. alata, R. acuminata, R. stolterfothii, R. styliformis latissima (er), R. calcar avis, R. imbricata (er), Chaetoceros messanense, C. lorenzianum, C. laeve, C. compressum (er), C. peruvianum (vr), Hemiaulus hauckii, H. membranaceus, Thalassionema nitzschioides, Thalassiothrix mediterraneus.

DINOFLAGELLATES: Peridinium sp. sp. (small), Gonyaulax fragilis, Goniodoma polyedricum (er), Pyrophacus horologicum, Dinophysis cf. rotundata (vr).

TINTINNIDS: Codonellopsis ecaudata?, Undella pistillum (r).

Station T14. Surface haul. 30°00.9'N, 86°55.5'W. Date: September 3, 1964.

Plankton of medium density, dominated by Rhizosolenia alata<sup>f.</sup>/gracillima.

ZOOPLANKTON: Copepods, nauplii, furcilia stage of Euphausidae, pteropods (r), some gastropod and pelecypod veligers, Oikopleuridae.

DIATOMS: Rhizosolenia alata<sup>f.</sup>/gracillima (a), R. calcar-avis, Guinardia flaccida (r), Hemiaulus membranaceus (r), H. hauckii (r).

DINOFLAGELLATES: Gymnodinium sp. (er), Exuviaella sp., Ceratium fusus, C. extensum, C. furca, C. massiliense, C. trichoceros, C. tripos, Peridinium venustum, P. conicum, P. cf. crassipes, P. simulum (f), P. brochi, Peridinium sp., Diplopelta asymmetrica, Diplopsalis sp., Gonyaulax polygramma, Gonyaulax sp., Podolampas palmipes (er), Blepharocysta splendormaris, Pyrophacus horologicum (ra), Oxytoxum sp., C. constrictum, Dinophysis sp. (vr), D. caudata (er).

TINTINNIDS: Epilocyloides reticulata (er).

Station T17. Vertical haul. 29°47.9'N, 86°55.5'W. Date: September 3, 1964.

Plankton, although poor, is very diversified.

ZOOPLANKTON: Copepods, nauplii, some ostracods and euphausids, a few pteropods and gastropod veligers, small medusae (vr), polychaete larvae (vr), Sagitta enflata, Sagitta sp.. Among the protozoa there are some radiolaria and a few foraminifera. Oikopleuridae and Fritillaria are present.

BLUE-GREEN ALGAE: Although rather scarce, nonetheless they constitute the most important phytoplankters.

DIATOMS (Scarce): Planktoniella sol, Dactyliosolen mediterraneus, Rhizosolenia cylindrus, R. calcar-avis, R. styliformis/latissima, R. bergonii, R. acuminata, R. alata/gracillima, Chaetoceros atlanticum, C. affine, C. coarctatum, C. tortissimum, C. decipiens (er), C. peruvianum (er), Hemiaulus hauckii, H. membranaceus, Ceratulina bergonii, Nitzschia closterium.

DINOFLAGELLATES: Pyrocystis fusiformis, P. robusta, Ceratium fusus, C. extensum, C. strictum, C. furca, C. teres, C. pentagonum tenerum, C. trichoceros, C. tripos, C. coarctatum, C. carriense, C. contortum, C. macroceros gallicum, C. tenue, C. massiliense, C. hexacanthum, C. azoricum (er), C. euarquatum (er), Peridinium steini, P. sphaericum,

P. cf. divergens, P. elegans, P. grande, P. abei, P. simulum, P. brintoni, P. mediterraneum, Diplopsalopsis orbicularis ovata?, Gonyaulax fragilis, G. pacifica, G. birostris, G. milneri, Gonyaulax sp., Heterodinium milneri, Podolampas spinifer, P. palmipes, P. bipes, P. reticulata, Blepharocysta splendormaris, Ceratocorys horrida, C. reticulata, Oxytoxum constrictum, Pyrophacus horologicum, Palaeophalacroma unicinctum, Oxytoxum latum?, Phalacroma rapa, P. doryphorum, P. cuneus, Dinophysis recurva?, D. hastata, D. schuetti, Dinophysis sp., Ornithocercus steini, O. magnificus, O. quadratus.

TINTINNIDS: Codonaria apicata, Coxiella sp., Coxiella laciniosa (er), Dictyocysta elegans lepida, D. extensa, Protorhabdonella curta, P. simplex, Rhabdonella indica, R. elegans, R. cornucopia, Poroecus apicatus, Rhabdonellopsis apophysata, Climacocylis scalaria, Climacocylis scalaroides marshallae, Epilocylis undella, Epilocyloides ralumensis, E. reticulata, Cyttarocylis eucecryphalus, C. acutiformis, Dadayiella ganymedes, D. cuspis, Xystonella treforti, Xystonellopsis dicymatica, X. heros, Brandtiella palliata, Rhabdosella cuneolata?, Ascampbelliella urceolata, Steenstrupiella steenstrupii, Parundella inflata, Amphorides minor, Proplectella subcaudata, P. claparedei, Eutintinnus similis, E. fraknoi, E. tubulosus, E. stramentus, Salpingella sp.

COCCOLITHOPHORES: A few cells.

Station T27. Surface haul. 29°27.9'N, 87°17.4'W. Date: September 4, 1964.

Plankton very poor.

ZOOPLANKTON: Copepods (f), nauplii (f), Evadne sp. (vr), medusae (vr), polychaete larvae (r), Oikopleuridae (ra).

BLUE-GREEN ALGAE: A few filaments of Skujaella sp.

DIATOMS: Leptocylindrus danicus, Dactyliosolen antarcticus, Guinardia flaccida, Hemiaulus hauckii, H. membranaceus, Rhizosolenia alata f. gracillima, R. hebetata, semispina, R. calcar-avis, Bacteriastrum sp., Chaetoceros peruvianum (ra), C. didymum, C. lorenzianum, C. coarctatum, Thalassiothrix mediterranea.

DINOFLAGELLATES: Ceratium fusus, C. extensum, C. furca, C. trichoceros, C. tripos semipulchellum, C. massiliense, Peridinium subinermis?, P. brochi, Peridinium sp., Podolampas palmipes, Blepharocysta splendormaris, Pyrophacus horologicum (vr).

CRUISE V

Station 1. Horizontal haul. 8° 58' 0N, 56° 00' W. Date: September 16 1964

Plankton abundant.

ZOOPLANKTON: Copepods, nauplii, Podon sp., a few Evadne sp., Sticholonche zancelea (a), other radiolaria rather abundant: Hymeniastrum, Theocorys, Theoconus, etc.

BLUE-GREEN ALGAE: Rather scarce.

DIATOMS: Asterolampra marylandica (m), Coscinodiscus sp., (ra), Actinocyclus sp., Asteromphalus sp., Rhizosolenia cylindrus (a), R. hebetata, R. debeyana, R. styliformis (er), Bacteriastrum sp., Chaetoceros peruvianum, C. affine, C. lorenzianum, C. compressum, Hemiaulus membranaceus (a), H. hauckii, Glimacodium frauenfeldianum, Navicula sp., Dimerogramma sp.?, Navicula sp.

DINOFLAGELLATES: Ceratium furca, C. tripos (there is a certain amount of Ceratia plates), Diplopelta asymmetrica (r), Diplopsalis cf. lenticula, Peridinium oceanicum, Peridinium sp. cf. P. crassipes (ra), P. solidicorne (ra), P. pedunculatum, P. globulus, P. steini, Peridinium sp., Goniodoma polyedricum (m), Spiraulax jollifoi (r), Pyrophacus horologicum (ra), Podolampas bipes, P. palmipes, P. elegans, Blepharocysta splendormaris, Ceratocorys horrida, Phalacroma mitra, Phalacroma sp. cf. P. cuneus, Ornithocercus magnificus (r).

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Codonaria cistellula, Codonella amphorella, Rhabdonella henseni (a), R. indica, Rhabdonellopsis triton (ra), Xystonella treforti, Climacocylis scalaria, C. scalaroides, Amphorides amphora (a), Proplectella hadai (er), Steenstrupiella gracilis, Eutintinnus stramentus (ra), E. medius (ra), E. tenue (ra), E. fraknoi, E. perminutus, E. colligatus, Salpingella sp. (er).

Station 1. Vertical haul.

Plankton of medium abundance.

ZOOPLANKTON: Copepods, nauplii, Mysidaceae (vr), Ostracods (vr), a small medusa, rare siphonophores, Sagitta enflata (vr), Oikopleuridae (r).

BLUE-GREEN ALGAE: Rather scarce.

DIATOMS: Coscinodiscus sp. sp. (f), Asterolampra marylandica (re), Planktoniella sol (vr), Hemidiscus cuneiformis (vr), Ditylum brightwellii, Rhizosolenia cylindrus (ra), R. hebetata, R. castracanei, Bacteriastrum sp. (ra), Chaetoceros breve?, C. densum, C. compressum, C. lorenzianum, Hemiaulus membranaceus, H. hauckii, Climacodium frauenfeldianum (vr), Navicula sp., Dimerogramma sp. ?

DINOFLLAGELLATES: Pyrocystis pseudonociluca (ra), P. fusiformis, P. hamulus, Pyrocystis sp., Ceratium furca, C. pentagonum tenerum, C. candelabrum, C. macroceros gallicum, C. hexacanthum, C. vultur, C. schmitti, C. euarcuratum, C. carriense, C. tenue, C. gibberum (er), C. karsteni (er), Peridinium oceanicum, P. crassipes, P. "oviforme", P. cf. divergens, P. grande, P. globulus, P. solidicorne, P. quinquecorne, Peridinium sp. sp., Diplopelta asymmetrica, Goniodoma polyedricum, Gonyaulax polygramma, G. birostris, Blepharocysta splendormaris, Podolampas bipes, P. elegans, P. spinifer, P. reticulata, Ceratocorys horrida, Heterodinium sp., Pyrophacus horologicum, Phalacroma argus, P. mitra, P. doryphorum, P. sp. cf. P. ovum, Phalacroma sp., Dinophysis hastata, D. sp., Ornithocercus magnificus, O. thurni, O. steini, O. splendidus, O. quadratus, O. cristata, Amphisolenia schauislandi, Histioneis, sp.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Codonaria cistellula, Codonella amphorella, Condonellopsis orthoceras, Dictyocysta elegans lepida, Cyttarocyllis acutiformis, Protorhabdonella curta (vr), Rhabdonella amor, R. henseni, R. cornucopia, Rhabdonellopsis apophysata, Epiplocyloides reticulata, Xystonella treforti, Petalotricha ampulla, Climacocyllis scalaroides, C. scalaria, Amphorides amphora, A. quadrilineata, Brandtiella palliata (er), Odonthophorella serrulata, Steenstrupiella steenstrupii (er), Ascampbelliella protuberans?, A. urceolata, Eutintinnus similis, E. fraknoi, E. tenue, E. stramentus.

Station 2b. Vertical haul, 220-0m. 9° 52. 5'N, 56° 23. 0'W. Date: September 16, 1964

Plankton rather abundant.

ZOOPLANKTON: Copepods, nauplii, a few medusae, polychaete larvae (vr), Sagitta sp., some pteropods and gastropods, Oikopleuridae, a few foraminifera radiolaria (ra), especially Sticholonche zanclea.

DIATOMS: Asterolampra marylandica, Hemidiscus cuneiformis, Rhizosolenia calcar-avis, R. cylindrus (ra), R. acuminata, R. castracanei, R. debeyana, R. styliformis/latissima, R. hebetata, R. alata (er), R. robusta (vr), Bacteriastrum sp., Chaetoceros dadayi, C. tetrastichon, C. decipiens, C. messanense, C. densum, C. compressum, C. lorenzianum, C. peruvianum, Hemiaulus hauckii, H. sinensis (ra), H. membranaceus, Climacodium frauenfeldianum, Dimerogramma sp. ? (ra).

DINOFLAGELLATES: Pyrocystis pseudonociluca, P. hamulus, Ceratium teres, C. candelabrum, C. pentagonum subrobustum, C. teres, C. fusus, C. macroceros gallicum, C. gibberum, C. trichoceros, C. hexacanthum, C. contrarium, C. karsteni, C. tenue, Peridinium oceanicum, P. "oviforme" (f), P. globulus (ra), P. longipes (vr), P. solidicorne, P. sp. cf. crassipes, P. grande, Peridinium sp., Diplopelta asymmetrica, Goniodoma polyedricum, Gonyaulax kofoidi, G. milneri, Ceratocorys horrida, Heterodinium mediterraneum, Podolampas palmipes, P. bipes, P. spinifer (er), Oxytoxum cf. gracile, Oxytoxum sp., Pyrophacus horologicum (r), Dinophysis odiosa (er), Phalacroma hindmarchi, P. doryphorum, P. rapa, Phalacroma sp., Ornithocercus magnificus, O. splendidus (vr), Amphisolenia globifera, Histioneis sp.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Codonella amphorella, C. aspera, Codonaria cistellula, Dictyocysta elegans lepida, Coxiella laciniosa, Cyttarocylis acutiformis, Petalotricha ampulla, Rhabdonella henseni, R. indica (vr), R. cornucopia, Protorhabdonella simplex, Rhabdonellopsis apophysata, Xystonella treforti, Climacocylis scalaroides, Epilocylis undella, E. labiosa, Epilocyloides reticulata, Proplectella claparedi, P. perpusilla, Amphorides amphora, A. quadrilineata, Eutintinnus apertus, E. medius, E. tenue, E. fraknoi, E. pinguis, E. colligatus, Rhabdosella cuneolata?

Station 2c. Vertical haul, 240-0 m. 9° 53.0N, 56° 21.0'W. Date: September 17, 1964.

Plankton abundant and varied, dominated by Rhizosolenia.

ZOOPLANKTON: Copepods, nauplii, a few gastropods, pelecypods (r), a few medusae and siphonophors, Sagitta enflata, polychaete larvae, some small Salpidae, Oikopleuridae (ra), Fritillaridae, radiolaria, including Sticholonche zanclea (ra).

BLUE-GREEN ALGAE: Some filaments.

DIATOMS: Ethmodiscus sp., Coscinodiscus sp. (f), Stephanopyxis sp., Planktoniella sol (vr), Rhizosolenia hebetata, R. stolterfothii, R. castracanei, R. acuminata, R. cylindrus, R. calcar-avis, R. robusta (er), Bacteriastrum sp., Chaetoceros lorenzianum, C. compressum, C. tetrastichon, C. decipiens, C. diversum, C. peruvianum, C. densum, C. (Phaeoceros) sp., C. messanense (er), C. affine, C. dadayi, Hemiaulus hauckii, H. membranaceus (ra), H. sinensis, Climacodium frauenfeldianum (ra), Hemidiscus cuneiformis, Acnanthes sp. (ra), Dimerogramma sp. ? (ra), Navicula sp.

DINOFLAGELLATES: Pyrocystis pseudonociluca, P. fusiformis, P. hamulus, Pyrocystis sp., Ceratium pentagonum tenerum, C. furca, C. teres (vr), C. candelabrum, C. incisum (er), C. inflatum, C. extensum, C. strictum, C. fusus, C. trichoceros, C. macroceros gallicum, C. breve, C. massiliense (vr), C. contrarium, C. hexacanthum, C. tenue (er), C. horridum molle (er), C. vultur, C. carriense (ceratia in general scarce), Peridinium longipes, P. globulus (ra), P. sp. cf. P. crassipes, P. solidicorne, P. oceanicum, P. "oviforme", P. grande, Podolampas elegans, P. palmipes, P. bipes, P. spinifer, Goniodoma polyedricum, Gonyaulax polygramma, G. pacifica (er), G. birostris (er), G. kofoidi, G. fusiformis, Gonyaulax sp., Spiraulax jollifei (er), Ceratocorys horrida, Heterodinium scrippsi, Pyrophacus horologicum, Oxytoxum carinatum, O. scolopax, Dinophysis schuetti, D. simplex, Phalacroma mitra, P. doryphorum, P. cuneus, P. hindmarchi, P. argus, Ornithocercus magnificus, O. orbiculatus, O. thurnii, Citharistes apsteini, Amphisolenia globifera.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Codonaria cistellula, Codonella amphorella, C. aspera, C. olla, Codonellopsis orthoceras, Dictyocysta elegans lepida, D. muelleri, Protorhabdonella simplex, P. curta, Rhabdonella henseni, R. indica, R. cornucopia, Rhabdonellopsis apophysata, Xystonella treforti, Xystonellopsis cymatica, Climacocylis scalaria, C. scalaroides, Epilocylis undella, Epilocyloides ralumensis, Petalotricha ampulla, Dadayiella ganymedes, D. cuspis, Steenstrupiella steenstrupii, Proplectella claparedi, P. globosa?, Ascampbelliella lata, Amphorides amphora (f), A. quadrilineata (vr), Eutintinnus lususundae, E. similis, E. stramentus, E. medius, E. tenue (ra), E. apertus, E. fraknoi, E. pinguis, Rhabdosella cuneolata?, Salpingella jugosa, S. glocken-toegeri, S. acuminata.

Station 2d. Vertical haul, 230-0 m. 9°55.0'N, 56°18.5'W. Date: September 17, 1964.

Plankton very poor, with some detritus.

ZOOPLANKTON: Copepods (r), a few nauplii, polychaete (er), Sticholonche zanclea and some other radiolaria (m), a few Globigerina sp.

DIATOMS: Asterolampra marylandica, Rhizosolenia alata<sup>f.</sup>/gracillima, R. acuminata, R. hebetata hiemalis, R. cylindrus, Chaetoceros didymum, C. compressum (vr), C. (Phaeoceros) sp., Hemiaulus hauckii (r), H. membranaceus (r), Climacodium sp., Thalassiothrix sp.

DINOFLAGELLATES: Ceratium teres, C. pentagonum tenerum, C. furca, C. massiliense, C. tripos semipulchellum, C. trichoceros, C. hexacanthum, Peridinium globulus (ra), Peridinium sp. sp., Gonyaulax polygramma, Podolampas elegans, Ceratocorys horrida.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Petalotricha ampulla, Rhabdonella henseni, Rhabdonellopsis apophysata (ra), Climacocyllis scalaria, C. scalaroides marshallae (ra), Parundella inflata, Amphorides amphora, Eutintinnus medius, E. tenue, E. stramentus, Dadayiella cuspis.

Station 2f. Vertical haul, 240-0 m.

Plankton of medium density, quite similar in composition to station 2c above. Among the dinoflagellates, besides those given in 2c are: Ceratium praelongum (er), and Heterodinium laticinctum (vr). The tintinnids, besides those found in station 2c are: Coxiella declivis? and Ascampbelliella armilla. Another interesting ciliate is Zoothamnium sp.

Station 2g. Vertical haul, 220-0 m. 10°16.0'N, 56°19.0'W. Date: September 17, 1964.

Plankton abundant, the dominant elements include: Rhizosolenia and Blue-Green Algae.

ZOOPLANKTON: Copepods, nauplii, a few euphausiids, Sagitta sp., sponiid larvae (vr), pteropods, gastropod veligers. Sticholonche zanclea and some other radiolaria (m). Zoothamnium sp.

BLUE-GREEN ALGAE: Abundant.



DIATOMS: Planktoniella sol (r), Coscinodiscus sp. (r), Asterolampra marylandica, Rhizosolenia alata, R. hebetata, R. cylindrus, R. debeyana, R. calcar-avis, R. castracanei, R. acuminata, Bacteriastrum sp., Chaetoceros lorenzianum, C. decipiens, C. breve?, C. affine, C. coarctatum (er), C. peruvianum (vr), Hemiaulus membranaceus, H. hauckii, Climacodium frauenfeldianum, Dimerogramma sp. ?, Nitschia closterium (ra),

CHRYSOPHYCEAE: Phaeocystis sp. (r).

DINOFLAGELLATES: Pyrocystis sp. P. hamulus, P. pseudonoctiluca, Prorocentrum sp., Ceratium digitatum, C. pentagonum subrobustum, C. candelabrum, C. kofoldi (er), C. extensum, C. macroceros gallicum, C. karsteni, C. trichoceros, C. massiliense, C. platycorne, C. tenue, C. euarquatum, C. hexacanthum, C. contrarium, C. carriense, C. pulchellum (er), C. arietinum, C. declinatum, Peridinium oceanicum, P. globulus, P. cf. divergens, P. cf. pedunculatum, P. grande, P. brochi, P. "oviforme", P. solidicorne, Podolampas palmipes, P. bipes, P. elegans, P. spinifer, Goniodoma polyedricum, Gonyaulax pacifica, P. polygramma, G. fragilis, G. birostris, G. fusiformis, G. kofoldi, G. turbynei, Oxytoxum sp., O. carinatum, O. elegans, Cladopyxis hemibrachiata, C. brachiolata, Protoceratium sp., Heterodinium ridgenae, H. mediocre, Ornithocercus magnificus, O. quadratus, Dinophysis hastata, Phalacroma doryphorum, P. cuneus, P. rapa, Phalacroma sp., Amphisolenia bidentata, Histioneis helenae, Histioneis sp.

COCCOLITHOPHORES: Scyphosphaera sp. (vr).

SILICOFLAGELLATES: Dictyocha speculum.

TINTINNIDS: Codonaria cistellula, Codonella amphorella, C. aspera, Codonellopsis orthoceras, Coxiella declivis, Dictyocysta elegans lepida, D. extensa, Petalotricha ampulla, Rhabdonella henseni, R. amor (er), R. indica, Protorhabdonella simplex, P. curta (er), Rhabdonellopsis apophysata, Xystonella treforti, Climacocylis scalaroides, Xystonellopsis paradoxa, X. hastata, Epilocylis undella, E. labiosa, Epilocylloides reticulata, Cyttarocylis acutiformis (er), Parundella inflata, Ascampbelliella urceolata (vr), Acanthostomella obtusa, Dadayiella ganymedes, Proplectella claparedei, P. perpusilla, Amphorides amphora, A. quadrilineata, Eutintinnus tenue, C. fraknoi, E. stramentus, E. medius, Rhabdosella cuneolata?, Salpingella jugosa, S. acuminata.

Station 21. Vertical haul, 210-0 m. 10°10.0'N, 56°18.0'W. Date: September 18, 1964.

Plankton of medium density.

ZOOPLANKTON: Rather abundant, especially the copepods. Copepods, nauplii, a few ostracods and Lucifer sp., Sagitta enflata, pteropods (vr), gastropod veligers (ra), a few siphonophores, Oikopleuridae, Fritillaridae, fish larvae (vr), some radiolaria including Sticholonche; some Foraminifers.

BLUE-GREEN ALGAE: Rather abundant.

DIATOMS: Planktoniella sol (r), Rhizosolenia cylindrus (ra), R. hebetata, R. castracanei, Chaetoceros dadayi, C. lorenzianum, C. peruvianum, Hemiaulus membranaceus (ra), Climacodium frauenfeldianum, Hemidiscus cuneiformis (vr), Navicula sp.

DINOFLAGELLATES: Pyrocystis pseudonociluca, P. hamulus, P. fusiformis, Ceratium gravidum, C. digitatum, C. candelabrum, C. pentagonum tenerum, C. teres (vr), C. extensum, C. fusus seta, C. declinatum, C. euarquatum, C. gibberum, C. tenue, C. arietinum, C. macroceros gallicum, C. carriense, C. karsteni (er), C. vultur (r), C. contortum, C. lunula, C. coarctatum, C. azoricum, C. pulchellum, C. ranipes, C. limulus, Peridinium grande, P. oceanicum, P. sp. cf. crassipes, P. "divergens", P. longipes, P. solidicorne, P. mite?, P. brintoni, Podolampas reticulata, P. palmipes, P. bipes, P. elegans, P. spinifer, Blepharocysta splendormaris, Heterodinium mediterraneum, Goniodoma polyedricum, Gonyaulax polygramma, G. milneri, G. pacifica, G. fusiformis, G. kofoidi, Spiraulax jollifei, Ceratocorys reticulata, C. horrida, Protoceratium sp., Pyrophacus horologicum, Oxytoxum scolopax, O. carinatum, O. constrictum, Murrayella splendida, Dinophysis schuetti?, D. simplex, Phalacroma rapa, P. cuneus, P. doryphorum?, P. sp. cf. P. pugilunculus, P. ovum, Ornithocercus cristatus, O. thurni, O. magnificus, O. quadratus, O. orbicularis, Citaristhes regius, Histioneis milneri, Amphisolenia bifurcata, A. bidentata, Heteroschisma longialata.

SILICOFLAGELLATES: Dictyocha fibula (r).

COCCOLITHOPHORES: Scyphosphaera (vr).

TINTINNIDS: Tintinnopsis sp., T. radix, Codonella aspera, C. amphorella, Codonellopsis orthoceras, Coxliella longa, Dictycysta elegans lepidi, Epiplocytlis undella, E. labiosa (m), Epiplocyloides reticulata acuta,

Protorhabdonella curta (f), Rhabdonella amor, R. henseni, R. cornucopia, R. indica, Rhabdonellopsis apophysata, Xystonella treforti, Xystonellopsis cymatica, Climacocyclus scalaria, C. scalaroides, Parundella inflata, Ascampbelliella armilla, Proplectella claparedel, Proplectella sp., Petalotricha ampulla, Amphorides quadrilineata, A. amphora, Brandtiella palliata, Eutintinnus tenue, E. fraknoi, E. apertus, Salpingella acuminata, S. jugosa, Rhabdosella cuneolata?

Station 2j. Vertical haul, 210-0 m. 10°16.0'N, 56°18.0'W. Date: September 18, 1964.

Plankton rather abundant.

ZOOPLANKTON: Copepods, nauplii, ostracods (r), Sagitta sp., Tomopteris sp., pteropods (vr), gastropod veligers (ra), Fritilearidae, Oikopleuridae, a fish larva, some foraminifera, radiolaria, including Sticholonche zanclea(m).

BLUE-GREEN ALGAE: A few filaments.

DIATOMS: Coscinodiscus sp., Ethmodiscus sp., Asterolampra marylandica, Planktoniella sol, Gossleriella sp., Rhizosolenia cylindrus (ra), R. hebetata, R. castracanei, R. calcar-avis (er), R. acuminata (er), Bacteriastrum sp., Chaetoceros lorenzianum, C. messanense, C. dadayi, C. peruvianum, C. densus, C. pendulum, C. tetrastichon, C. coarctatum, Hemiaulus membranaceus, H. hauckii, Climacodium frauenfeldianum, Navicula sp.

DINOFLAGELLATES: Pyrocystis pseudonoctiluca, P. lunula?, P. hamulus, P. fusiformis, Ceratium gravidum, C. praelongum, C. digitatum, C. candelabrum, C. teres, C. furca (er), C. extensum, C. tenue, C. macroceros gallicum, C. trichoceros, C. schmitti, C. tripos, C. t. semipulchellum (er), C. hexacanthum, C. contrarium, C. vultur, C. sumatranum, C. lunula, C. arietinum, C. euarquatum, C. azoricum (er), C. massiliense (er), C. carriense (er), C. gibberum (er), C. karsteni (vr), C. contortum (vr), C. declinatum, Peridinium oceanicum, P. longipes, P. "oviforme", P. solidicorne, P. grande, P. divergens, Gonyaulax polygramma, G. pacifica, G. kofoldi, Gonyaulax sp., Spiraulax sp., Goniodoma sp., Murrayella splendida, Podolampas elegans, P. palmipes, P. spinifer, P. bipes, P. reticulata, Blepharocysta splendormaris, Protoceratium reticulatum, Ceratocorys horrida, Oxytoxum carinatum, Heterodinium sp., Ptychodiscus noctiluca?, Histioneis milneri, Histioneis sp., Dinophysis hastata, D. schuetti, Phalacroma doryphorum, P. hindmarchi, P. rapa, P. ovum, P. cf. pugiunculus, P. mitra, P. cuneus, Phalacroma sp., Ornithocercus magnificus, O. thurni, O. splendidus, Amphisolenia bidentata, A. schauislandi, Prorocentrum rostratum.

SILICOFLAGELLATES: Dictyocha fibula (vr).

COCCOLITHOPHORES: Scyphosphaera sp.

TINTINNIDS: Codonaria cistellula, Codonella amphorella, C. aspera, Codonellopsis orthoceras, Coxiella longa, Dictyocysta elegans lepidi, Cyttarocylis acutiformis, C. cassis?, Epiplocylis undella, Epiplocyloides reticulara, E. r. acuta, Protorhabdonella simplex, Rhabdonella amor, R. elegans, R. cornucopia, Rhabdonellopsis apophysata, Xystonella treforti, Xystonellopsis paradoxa, Parundella inflata, P. aculeata, Proplectella claparedi, P. sp., Climacocylis scalaroides, Ascampbelliella urceolata, Amphorides amphora, A. quadrilineata, Eutintinnus stramentus, E. tenue, E. fraknoi, E. tubulosus, E. apertus, E. colligatus, Salpingella glockentoegeri.

Station 3. Surface haul. 13°14.0'N, 57°29.0'W. Date: September 19, 1964.

Plankton of medium density, dominated by Radiolaria; tintinnids also abundant.

ZOOPLANKTON: Copepods, nauplii, radiolaria (a), including Sticholonche zanclea (ra), Globigerina sp. (ra), Oikopleuridae.

BLUE-GREEN ALGAE: Few filaments.

DIATOMS: Scarce: Coscinodiscus sp. (vr), Bacteriastrum sp., Chaetoceros peruvianum (vr), C. coarctatum (er), Hemiaulus membranaceus (the only diatom relatively important), Hemidiscus cuneiformis (r), Nitzschia cf. closterium (m).

DINOFLAGELLATES: Pyrocystis pseudonociluca, Exuviaella sp., Ceratium teres, C. pentagonum tenerum, C. candelabrum, C. furca (vr), C. inflatum, C. massiliense (the most abundant), C. contortum, C. hexacanthum, C. declinatum, C. schmitti, C. karsteni, C. breve, C. sumatranum, C. gibberum (er), C. limulus, C. pulchellum (er), Peridinium sp. cf. crassipes, P. solidicorne, Gonyaulax polygramma (ra), G. milneri (er), Spiraulax jollifei, Goniodoma polyedricum, Podolampas spinifer, (f), P. bipes (vr), P. palmipes (vr), Pyrophacus horologicum (a), Oxytoxum longiceps, Ceratocorys horrida, Cladopyxis hemibrachiata (vr), Heterodinium mediterraneum, Dinophysis odiosa, D. hastata, Phalacroma rapa, Amphisolenia bidentata (vr).

TINTINNIDS: Dictyocysta elegans lepidi, Protorhabdonella simplex (er), Rhabdonella elegans (a), R. indica (ra), R. amor, Rhabdonellopsis apophysata (a), Epiplocylis undella (ra), E. labiosa (f), Proplectella hadai, Climacocylis scalaroides (vr), Dadayiella ganymedes (er), Amphorides amphora, Steenstrupiella gracilis, Eutintinnus medius, E. colligatus, (ra), E. stramentus.

Station 4. Vertical haul, 210-0 m. 17°13.0'N, 59°00.0'W. Date: September 20, 1964.

Plankton of medium density; detritus relatively abundant.

ZOOPLANKTON: Copepods, nauplii (more abundant than adults), Conchoecia sp. (ostracod), Sagitta enflata, a few gastropod veligers, a bipinnaria larva, Oikopleurida, Fritillaridae, Globigerina sp., radiolaria, including scarce Sticholonche zancelea.

BLUE-GREEN ALGAE: Skujaella sp., abundant.

DIATOMS: Very Scarce: Planktoniella sol (vr), Gossleriella sp. (r), Chaetoceros messanense (er), C. lorenzianum (vr), C. dadayi (vr), C. peruvianum (vr), Bacteriastrium sp., Hemiaulus hauckii, H. membranaceus, Climacodium frauenfeldianum.

DINOFLAGELLATES: Pyrocystis lunula, P. hamulus, Ceratium praelongum, C. pentagonum tenerum, C. teres, C. candelabrum, C. inflatum, C. fusus, C. extensum, C. declinatum (a), C. massiliense, C. euarcuratum, C. horridum molle, C. contrarium, C. contortum, C. karsteni, C. tenue, C. sumatranum, C. recurvum, C. breve, C. macroceros gallicum, C. gibberum, C. limulus, C. pulchellum (er), C. carriense, Peridinium cf. divergens, P. brochi, P. elegans (er), P. longipes (er), P. minutum? (r), Peridinium sp., Diplopelta asymmetrica, Diplopsalopsis sp., Gonyaulax kofoidi, G. milneri, G. birostris, G. fusiformis (er), G. polygramma, G. pacifica, Gonyaulax sp., Spiraulax jollifoi, Goniodoma polyedricum, Blepharocysta splendormaris, Podolampas spinifer, P. palmipes, P. bipes, P. elegans (vr), P. reticulata (er), Murrayella splendida, Pyrophacus horologicum, Cladopyxis hemibrachiata, Protoceratium sp., Dinophysis hastata, Phalacroma rapa, P. cf. pugiunculus, Phalacroma sp., Ornithocercus magnificus (m), O. quadratus, O. carolinae, O. orbiculatus, O. thurni, Amphisolenia bidentata, Citharistes apsteini.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Tintinnopsis corniger, Codonella apicata, C. aspera, C. amphorella, C. olla, Codonaria cistellula, Dictyocysta extensa (er), D. elegans lepida (er), Rhabdonella elegans (a), R. indica (m), Rhabdonellopsis apophysata (a), Xystonella treforti, Xystonellopsis cymatica, X. dicymatica, Climacocylis scalaroides (ra), C. scalaria, Epiplocylis undella, E. labiosa, Epiplocyloides reticulata, Petalotricha ampulla, Ascampbelliella acuta?, Parundella inflata, Proplectella sp., Steenstrupiella gracilis, Amphorides amphora, A. quadrilineata, A. minor (er), Dadayiella ganymedes, Eutintinnus medius, E. colligatus, E. apertus, E. fraknoi, E. stramentus, E. pinguis.

Station 8. Surface haul. 17°26.0'N, 72°38.0'W. Date: September 24, 1964.

Plankton of medium density. The most important phytoplankters are the Ceratia, especially C. massiliense, C. contortum, and the blue-green algae.

ZOOPLANKTON: Copepods, nauplii, Sagitta sp., pteropods, gastropod, a few polychaetes, Globigerina sp., radiolaria (including Sticholonche zancelea and Collozoum sp.), Oikopleuridae, a fish egg.

BLUE-GREEN ALGAE: Of medium abundance.

DIATOMS: Scarce: Ethmodiscus sp., Rhizosolenia hebetata, Bacteriastrum sp., Chaetoceros peruvianum, Hemiaulus hauckii, H. membranaceus, Hemidiscus cuneiformis, Navicula sp.

DINOFLAGELLATES: Pyrocystic pseudonociluca, P. hamulus, Ceratium geniculatum, C. teres, C. pentagonum tenerum, C. furca, C. candelabrum, C. falcatum, C. extensum, C. strictum, C. massiliense (a), C. contortum (a), C. declinatum, C. gibberum, C. concilians (er), C. karsteni, C. tripos, C. trichoceros, C. hexacanthum, C. japonicum, C. sumatranum, Peridinium sp. cf. P. crassipes, P. solidicorne, P. grande, Goniodoma polyedricum, Gonyaulax fragilis, G. milneri, G. polygramma, G. birostris, G. fusiformis, Spiraulax jollifei, Podolampas spinifer, P. bipes, P. reticulata, Blepharocysta splendor-maris, Ceratocorys horrida, Murrayella splendida (er), Cladopyxis hemibrachiata, Pyrophacus horologicum, Dinophysis hastata, Phalacroma doryphorum, P. rapa (vr), P. sp. cf. P. pugunculus, P. argus (er), Ornithocercus magnificus (ra), O. Steini, O. quadratus, O. heteroporus, O. thurni, Histioneis biremis (er).

TINTINNIDS: Protorhabdonella simplex, Rhabdonella spiralis (or elegans?) (ra), R. amor, R. indica, Rhabdonellopsis apophysata, Dictyocysta elegans lepida, Epiplocylis undella, Proplectella perpusilla, Steens-trupiella gracilis, Amphorides amphora, Eutintinnus similis, E. colligatus, E. macilentus, E. medius, E. tenue.

Station 8. Vertical haul, 215-0 m.

ZOOPLANKTON: Abundant: Copepods, nauplii, Sagitta hexaptera, S. sp., Pterosagitta draco, polychaete larvae, gastropod veligers (ra) pteropods, Oikopleuridae, radiolaria including Sticholonche zancelea (vr), some other radiolaria.

BLUE-GREEN ALGAE: Rather scarce.

DIATOMS: Very scarce: Asterolampra marylandica, Planktoniella sol, Dactyliosolen mediterraneus, Rhizosolenia hebetata, R. bergonii, R. calcar-avis, R. alata f. gracillima, Bacteriastrum sp., Chaetoceros pendulum, C. tetrastichon, C. peruvianum, C. dadayi, Hemiaulus hauckii, H. membranaceus, Climacodium frauenfeldianum, Hemidiscus cuneiformis.

DINOFLAGELLATES: Pyrocystis hamulus (vr), P. pseudonociluca (r), P. lunula (er), P. fusiformis (vr), Ceratium gravidum, C. praelongum, C. incisum, C. digitatum, C. pentagonum tenerum, C. p. subrobustum (vr), C. furca, C. teres, C. candelabrum, C. belone, C. strictum, C. fusus seta, C. inflatum, C. extensum, C. karsteni, C. declinatum, C. contortum, C. trichoceros, C. breve, C. massiliense, C. gibberum, C. macroceros gallicum, C. hexacanthum, C. lunula, C. ranipes, C. pulchellum, C. tenue, C. carriense, C. euarquatatum, C. lunula, C. recurvum, C. sumatranum, Peridinium grande, P. longipes, P. elegans, P. pedunculatum, P. solidicorne, P. brintoni, P. ovum, P. "oviforme", P. oceanicum, P. brochi (er), Gonyaulax polygramma, P. milneri (er), G. fragilis, G. birostris (vr), G. pacifica (er), Spiraulax jollifei (r), Goniodoma polyedricum (r), Protoceratium sp., Podolampas reticulata (ra), P. bipes (f), P. elegans (r), P. spinifer (vr), P. palmipes (vr), Blepharocysta splendormaris (vr), Ceratocorys horrida (vr), Pyrophacus horologicum, P. h. steini (both ra), Oxytoxum cristatum, Cladopyxis hemibranchiata, C. brachiolata, Palaeophalacroma uncinatus (vr), Heterodinium milneri, H. leiorhynchum, H. pavillardi, H. agassizi, Dinophysis schuetti, D. odiosa, D. expulsa, D. tripos, D. simplex, Phalacroma doryphorum (a), P. rapa, P. cf. pugiunculus (m), P. mitra (r), P. cuneus (r), P. cirmsutum, P. argus, P. hindmarchi, Ornithocercus (a), O. magnificus (a), O. quadratus, O. thurni, O. splendidus, O. steini (vr), O. francescae, O. heteroporus, Histonella biremis, H. helenae, H. milneri, Citharistes apsteini, Triposolenia depressa, Heteroschisma inaequale.

SILICOFLAGELLATES: Dictyocha fibula (f).

TINTINNIDS: Tintinnopsis sp. (vr), Codonaria cistellula, Codonella amphorella (f), C. apicata (r), C. aspera (er), Codonellopsis orthoceras (ra), C. ecaudata (r), Dictyocysta elegans lepida, D. extensa, Epiplocytilis undella (m), E. labiosa (r), Epiplocyloides reticulata, E. ralumensis, Cyrtarocytilis acutiformis (er), C. eucecryphalus (er), Protorhabdonella simplex (m), P. curta (vr), Rhabdonella amor (ra), R. henseni, R. indica (m), R. cornucopia (f), R. elegans (f), Rhabdonellopsis triton, R. apophysata, Xystonellopsis dicymatica, X. paradoxa, X. dahli, Climacocytilis scalaria, C. scalaroides, Petalotricha ampulla, Parundella praetenuis, P. aculeata (er), Undella turgida (vr), Proplectella sp., P. claparedei, P. perpusilla, P. hadai (er), Brandtiella palliata (f),



Amphorides amphora, A. quadrilineata, Steenstrupiella steenstrupii, robusta, S. gracilis, Ascampbelliella minutissima, A. urceolata (er), Eutintinnus tenue, E. colligatus, E. pinguis, E. medius, E. stramentus.

Station 9. Surface haul. 19°01.0'N, 80°26.0'W. Date: September 27, 1964.

Plankton rather abundant and varied; dominated by blue-green algae.

ZOOPLANKTON: nauplii, adult copepods conspicuously few (most of them are Corycaeus sp.), a few Sagitta sp., gastropod veligers, Oikopleuridae, radiolaria and foraminifera scarce.

BLUE-GREEN ALGAE: Abundant.

DIATOMS: Very scarce: Asterolampra marylandica (f), Rhizosolenia hebetata (r), R. castracanei (r), R. debeyana (v), R. imbricata f. schrubsolei (er), Bacteriastrium sp., Chaetoceros lorenzianum, C. tetrastichon, C. dadayi, Hemiaulus membranaceus (f), H. hauckii (r), Hemidiscus cuneiformis (m).

DINOFLAGELLATES: Pyrocystis pseudonociluca (ra), P. fusiformis (vr), P. robusta, P. hamulus, Ceratium teres, C. candelabrum (r), C. extensum, C. massiliense, C. trichoceros (m), C. macroceros gallicum, C. declinatum (m), C. tenue, C. contortum, C. karsteni (er), C. limulus, C. pulchellum, C. contrarium (vr), C. vultur, C. japonicum (vr), Peridinium sp., P. cf. sinaicum, P. pedunculatum, P. minutum, P. elegans, Goniodoma polyedricum, G. sphaericum, Gonyaulax fragilis, G. polygramma (ra), G. milneri, Spiraulax jollifei, Ceratocorys horrida, C. armata, Murrayella splendida, Cladopyxis hemibrachiata, Blepharocysta splendormaris, Podolampas bipes, P. palmipes, P. elegans, Phalacroma rapa, P. cf. pugiunculus (vr), Dinophysis schuetti, Ornithocercus magnificus, O. steini, O. thurni.

TINTINNIDS: Codonellopsis ecaudata, Dictyocysta elegans lepida, Petalotricha ampulla, Rhabdonella elegans (a), R. amor, Rhabdonellopsis triton, Xystonella treforti (er), Epiplocytilis undella (m), E. labiosa (r), Epiplocytiloides reticulata (r), Proplectella hadai (f), P. claparedei (vr), Dadayiella ganymedes, Amphorides amphora, A. quadrilineata, Eutintinnus colligatus, E. tenue, E. medius, E. apertus, E. perminutus.

Station 9. Vertical haul.

Plankton rather poor.

ZOOPLANKTON: Nauplii, copepods (vr), Conchoecia sp. (vr), Sagitta sp., a few larvae of asteroida and polychaetes, pteropods (r), gastropod veligers (r), Oikopleuridae, Fritillaridae, Foraminifera scarce.



BLUE-GREEN ALGAE: Of medium abundance.

DIATOMS: Rather scarce: Asterolampra marylandica (vr), Planktoniella sol (r), Gossleriella sp. (er), Ethmodiscus sp. (er), Ditylum brightwellii, Rhizosolenia hebetata (vr), R. cylindrus (vr), R. styliformis/lattissima (er), R. castracanei (er), Bacteriastrum sp. (r), Chaetoceros lorenzianum, C. tetrastichon (r), C. pendulum (er), Chaetoceros (Phaeoceros) sp., Hemiaulus membranaceus, H. hauckii, Hemidiscus cuneiformis.

DINOFLAGELLATES: Pyrocystis fusiformis (ra), P. robusta (ra), P. pseudonoc-tiluca (vr), Kofoldinium veilleoides, Ceratium geniculatum, C. furca (er), C. teres, C. pentagonum tenerum, C. candelabrum (f), C. extensum (f), C. longirostrum (er), C. karsteni (ra), C. declinatum (ra), C. tenue, C. massillense (m), C. limulus (f), C. hexacanthum (er), C. euarctatum (r), C. contortum (f), C. macroceros gallicum (r), C. coarctatum (vr), C. gibberum (er), C. recurvum (r), C. sumatranum (vr), C. japonicum (er), Peridinium crassipes?, P. grande, P. pedunculatum, Peridinium sp., Podolampas reticulata (f), P. bipes (m), P. palmipes (vr), P. elegans (er), Blepharocysta splendormaris, Goniodoma polyedricum (f), Gonyaulax pacifica, G. birostris, G. polygramma, G. kofoldi, Gonyaulax sp., Heterodinium doma (er), Spiraulax jollifei (vr), Murrayella splendida (er), Cladopyxis hemibrachiata (vr), Ceratocorys horrida, Pyrophacus horologicum, Palaeophalacroma uncinatus (er), Dinophysis hastata, D. schuetti, D. caudata (er), Phalacroma rapa, P. doryphorum, P. cuneus, P. sp. cf. P. cf. pugiunculus (er), Ornithocercus (ra), O. magnificus, O. quadratus, O. thurni, O. steini, O. heteroporus, Histonella milneri, H. elongata, Triposolenia bicornis.

SILICOFLAGELLATES: Dictyocha fibula.

COCCOLITHOPHORES: Scyphosphaera sp.

TINTINNIDS: Tintinnopsis sp., T. corniger, Codonella amphorella, C. aspera, C. apicata, Codonellopsis ecaudata, C. orthoceras, Coxiella longa, Protorhabdonella simplex, Rhabdonella elegans, R. henseni, R. longi, Protorhabdonella simplex, Rhabdonella elegans, Xystonella treforti, Xystonellopsis heros, Climacocylis scalaria (f), Parundella praetenuis, Proplectella sp., P. claparedi (vr), Undella hemisphaerica, U. hadal, Epillocylis undella, E. labiosa, Epillocyloides reticulata, Dadayiella ganymedes (vr), Steenstrupiella gracilis, Amphorides amphora (vr), A. quadrilineata (er), Petalotricha ampulla (f), Brandtiella palliata (f), Ormosella breslaueri (er).

Station 10. Surface haul. 20° 45.0'N, 84° 45.0'W. Date: September 28, 1964.

Plankton abundant, dominated by blue-green algae.

ZOOPLANKTON: Nauplii (m), adult copepods scarce, gastropod veligers (m), pteropods (vr), polychaete larvae (r), Oikopleuridae (vr), some radiolaria and foraminifera.

BLUE-GREEN ALGAE: Skujaella sp. (a).

DIATOMS: Very scarce: Ethmodiscus sp. (r), Asterolampra marylandica (vr), Chaetoceros tetrastichon, C. dadayi, Hemiaulus membranaceus, H. hauckii, some small Navicula sp. and Nitzschia closterium.

DINOFLAGELLATES: Pyrocystis pseudonociluca (ra), Pyrocystis sp., Ceratium teres, C. furca, C. candelabrum, C. strictum, C. massiliense, C. karsteni, C. contortum, C. declinatum, C. trichoceros, S. sumatranum, Peridinium minutum (ra), P. pedunculatum, Diplopelta asymmetrica, Goniodoma polyedricum, Gonyaulax polygramma, G. fragilis, G. milneri, Gonyaulax sp., Spiraulax jollifei, Pyrophacus horologicum, Ceratorys horrida, Oxytoxum sp., Blepharocysta splendormaris, Ornithocercus magnificus (ra), Phalacroma rapa (m), P. sp. cf. P. puglunculus, Amphisolenia globifera.

TINTINNIDS: Codonella apicata, Codonellopsis ecaudata (vr), Coxliella sp. (er), Epilocylis undella, Epilocyloides reticulata, Rhabdonella elegans (a), Rhabdonellopsis apophysata (a), Amphorides amphora, Steenstrupiella gracilis, Proplectella sp. (er), P. claparedel (er), Eutintinnus stramentus, E. medius, E. colligatus (er), P. perminutus, E. similis.

Station 10. Vertical haul, 200-0 m.

Plankton rather abundant.

ZOOPLANKTON: Copepods, nauplii, a few gastropod veligers, Fritillaridae, Oikopleuridae, Doliolidae, some radiolaria and foraminifera.

BLUE-GREEN ALGAE: Skujaella sp. (m).

DIATOMS: Scarce: Gossleriella sp., Rhizosolenia acuminata, R. styliformis f. latissima, R. castracanei, Chaetoceros dadayi, C. tetrastichon, C. coarctatum, C. pendulum, Bacteriastrium sp., Hemiaulus hauckii, H. membranaceus, Hemidiscus cuneiformis.

DINOFLAGELLATES: Pyrocystis fusiformis, P. pseudonoctiluca, P. robusta, P. hamulus, Kofoidinium sp. (er), Ceratium candelabrum, C. pentagonum tenerum, C. strictum, C. trichoceros, C. massiliense, C. declinatum, C. macroceros gallicum, C. hexacanthum, C. karsteni, C. tenue tenuissimum, C. azoricum (er), C. coarctatum, C. recurvum, C. sumatranum, Peridinium cf. divergens, P. grande, Peridinium sp., Podolampas palmipes, P. elegans, P. spinifer, Gonyaulax sp., G. polygramma, G. pacifica, G. kofoidi, Goniodoma polyedricum, G. sphaericum, Spiraulax jollifei, Murrayella splendida, Oxytoxum sp., Amphidoma acuminata, Ceratocorys horrida, Cladopyxis hemibrachiata, Heterodinium agassizi, Ornithocercus thurni, O. magnificus, O. quadratus, O. steini, Phalacroma doryphorum, P. rapa, P. circumsutum, Amphisolenia bifurcata, A. palaeotheroides.

COCCOLITHOPHORES: Scyphosphaera sp.

TINTINNIDS: Codonella amphorella, C. aspera, Codonellopsis orthoceras, C. ecaudata, Dictycysta elegans lepida, Epiplocylis undella, E. labiosa, Epiplocyloides reticulata, Petalotricha ampulla, Protorhabdonella simplex, Rhabdonella amor, R. indica, R. spiralis?, Rhabdonellopsis apophysata, (r), Xystonella treforti (er), Xystonellopsis cymatica, X. heros (f), Parundella praetenuis, Undella hemispherica, Proplectella sp., P. claparedei, Climacocylis scalaria, Brandtiella palliata, Eutintinnus tenue, Salpingella acuminata.

The following species, collected during this cruise, were not previously reported from the Gulf of Mexico:

DINOFLAGELLATES: Citharistes regius Stein, 1883; Heterodinium doma (Murray & Whitting) Kofoid, 1906; Heterodinium laticinctum Kofoid, 1907; Histioneis elongata Kofoid & Michener, 1911; Oxytoxum cf. gracile Schiller, 1937; O. longiceps Schiller, 1937; Peridinium quinquecome Abe 1927; Phalacroma cf. pugiunculus Jorgensen, 1923; Ptychodiscus noctiluca Stein, 1883?

TINTINNIDS: Ascampbelliella acuta Kofoid & Campbell, 1929?; Proplectella hadai Balech, 1962; Proplectella perpusilla Kofoid & Campbell, 1929; Undella hemisphaerica Laackmann, 1909; Xystonellopsis hastata (Biedermann) Kofoid & Campbell, 1929.

CRUISE VI

Station I. Vertical haul. December 15, 1964. 30°00.6'N, 85°54.2'W.

Plankton of medium density, dominated by Chaetoceros.

ZOOPLANKTON: Scarce: A few copepods and nauplii, ostracods (vr), Sagitta sp. (vr), a few polychaetes, Oikopleuridae (r), some gastropod and pelecypod veligers, some pteropods, benthonic foraminifers (m).

DIATOMS: Chaetoceros didymum (d), C. affine, C. peruvianum, C. lorenzianum, C. compressum, C. tortissimum, C. curvisetum, Rhizosolenia styliformis/latissima, R. imbricata/schrubsolei, R. alata/indica, R. calcar-avis, R. robusta, R. acuminata, Guinardia flaccida, Stephanopyxis palmeriana, Schroderella delicatula, Coscinodiscus excentricus, Biddulphia mobiliensis, Triceratium sp., Paralia sp., Campylosira sp., Campylodiscus sp., Asterionella sp., Navicula sp., Pleurosigma sp., Gyrosigma sp., Thalassionema nitzschioides.

DINOFLAGELLATES: Ceratium fusus, C. furca, C. teres, C. pentagonum tenerum, C. kofoidi, C. tripos, C. massiliense, C. trichoceros (vr), Peridinium depressum (ra), P. conicum (f), P. latissimum (r), P. oceanicum oblongum (er), P. cf. crassipes, P. brochi, P. simulum, P. claudicans (vr), Diplopsalopsis sp., Podolampas palmipes, Gonyaulax sp., Dinophysis caudata, Phalacroma sp.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Codonellopsis orthoceras, C. schabi, Dictyocysta elegans lepida, Favella taraikaensis, Dadayiella ganymedes, Ascampbelliella urceolata, Eutintinnus tenue.

Station II. Surface haul. January 5, 1965. 30°07.2'N, 85°46.5'W.

Phytoplankton abundant dominated by Chaetoceros.

ZOOPLANKTON: Poor: Copepods and nauplii (r), some pteropods and pelecypods, a pluteus, a very young Sagitta sp., benthonic foraminifera.

DIATOMS: Include the same species of Chaetoceros found in Station I, also: Rhizosolenia alata, R. a./indica, R. robusta, R. calcar-avis, R. imbricata/schrubsolei, Stephanopyxis palmeriana, Skeletonema costatum, Guinardia flaccida, Schroderella delicatula, Biddulphia mobiliensis, B. sinensis, Coscinodiscus sp. sp., Gyrosigma sp. (ra), Surirella fastuosa, Triceratium sp., Amphiprora sp., Navicula sp. sp., Thalassiothrix frauenfeldii? (ra), Thalassionema nitzschioides.

DINOFLAGELLATES: Ceratium fusus, C. furca, Ceratium tripos, C. trichoceros (vr), Peridinium oceanicum oblongum, P. conicum, P. latissimum, P. globulus, P. brochi, P. depressum, P. simulum, Peridinium sp., P. venustum, Gonyaulax sp., G. polygramma, Diplopelta asymmetrica, Podolampas palmipes, Blepharocysta splendormaris (vr), Exuviaella sp., Dinophysis caudata.

SILICOFLAGELLATES: Small Dictyocha fibula (vr).

TINTINNIDS: Tintinnopsis kofoidi (er), Codonellopsis schabi (r), Dictyocysta elegans lepida (er), Stylicauda platensis, Favella tarai-kaensis, Ascampbelliella urceolata, some very long Amphorides amphora, Dadayiella ganymedes, Eutintinnus tenue.

Station II. Vertical tow.

Plankton of medium density, rather poor.

ZOOPLANKTON: Copepods, nauplii, Penilia avirostris (vr), a pluteus, pteropods (vr), a few pelecypod veligers, some foraminifera.

DIATOMS: Stephanopyxis palmeriana, Skeletonema costatum, Schroederella delicatula, Coscinodiscus sp. sp., Rhizosolenia alata f. indica, R. calcar-avis, Chaetoceros coarctatum (ra), C. larvae, C. affine, C. curvisetum, C. (Phaeoceros) sp., Hemiaulus membranaceus, H. sinensis, Biddulphia sinensis, Triceratium sp., Bacteriastrum sp., Lithodesmium undulatum (ra), Paralia sp., Campylosira sp., Gyrosigma sp., Thalassiothrix frauenfeldii.

DINOFLAGELLATES: Ceratium fusus, C. furca, C. tripos, C. Trichoceros, Peridinium conicum, P. claudicans, P. venustum, P. depressum, P. latissimum, P. oceanicum oblongum, P. obtusum, Diplopelta asymmetrica (m), Podolampas palmipes, Exuviaella sp., Dinophysis caudata, Amphisolenia bidentata.

TINTINNIDS: Stylicauda platensis, Amphorides amphora.

Station DI. Surface haul. 29°49.5'N, 86°06.9'W. Date: January 5, 1965.

Plankton rather poor.

ZOOPLANKTON: Copepods, nauplii, some euphausiids, pelecypod and gastropod veligers, Amphioxus, a fish egg.

DIATOMS: Rather scarce: Coscinodiscus sp., Hemidiscus cuneiformis, Stephanopyxis palmeriana, Schroderella delicatula (ra), Rhizosolenia alata/indica, R. schrubsolei, R. acuminata, Chaetoceros coarctatum, Eucampia zodiacus, Hemiaulus membranaceus, Biddulphia sinensis, Gyrosigma sp.

DINOFLAGELLATES: Pyrocystis fusiformis, P. pseudonociluca, P. robusta, Ceratium extensum, C. fusus, C. furca, C. pentagonum tenerum, C. candelabrum, C. arietinum, C. coarctatum, C. hexacanthum, C. massiliense, C. contortum, C. azoricum, C. breve, C. tripos, C. t. semipulchellum, C. karsteni, C. trichoceros, C. lunula, C. carriense, Peridinium venustum, P. depressum, P. oceanicum, P. globulus, P. divergens, P. pedunculatum, P. conicum, P. pentagonum, P. ovum, P. simulum, P. punctulatum, P. wisneri, Diplopelta asymmetrica, Podolampas palmipes, Goniodoma polyedricum, Pyrophacus horologium, Blepharocysta splendormaris, Ceratocorys horrida, Ornithocercus steini, O. magnificus, O. quadratus, O. orbiculatus, Dinophysis caudata, Amphisolenia palaeotheroides, A. bidentata, A. lemmermanni, A. rectangulata.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Codonellopsis schabi, Stylicauda platensis, Dictyocysta elegans lepida, Epiplocylis labiosa, Xystonella treforti, Xystonellopsis heros, X. dicymatica, Protorhabdonella simplex, Proplectella claparedi, P. parva, Eutintinnus tenue.

Station D1. Vertical haul.

Plankton of medium density, rather poor.

ZOOPLANKTON: Copepods, nauplii, ostracods (vr), pteropods, gastropod and pelecypod veligers, Sagitta enflata, a brachiopod larva, radiolaria and foraminifera (scarce).

DIATOMS: Stephanopyxis palmeriana, Leptocylindrus danicus, Schroderella delicatula, Guinardia flaccida, Rhizosolenia imbricata/schrubsolei, R. calcar-avis, R. alata, R. a.f.indica, R. stolterfothii, Chaetoceros coarctatum, C. affine, Paralia sp., Streptothea thamensis.

DINOFLAGELLATES: Pyrocystis pseudonociluca, P. fusiformis, P. robusta, Ceratium furca, C. massiliense, C. lunula, C. tripos, C. hexacanthum, C. tenue, C. contortum, C. karsteni, C. macroceros gallicum (er), C. carriense, C. azoricum, C. gibberum (er), Peridinium pentagonum,

P. depressum, P. globulus, P. conicum, P. simulum, Diplopelta asymmetrica (ra), Goniodoma polyedricum, Ceratocorys horrida, Spiraulax jollifei (er), Phalacroma apicatum, Dinophysis caudata, Amphisolenia lemmermanni, A. bidentata, A. truncata, Ornithocercus magnificus.

TINTINNIDS: Tintinnopsis radix, Stenosemella nucula, Rhabdonella elegans (er), Cyttarocyliis eucecryphalus, Epiplocyloides reticulata, Amphorides quadrilineata, Proplectella claparedei, Xystonella treforti, Eutintinnus tenue.

Station D4. Vertical haul, 100-0 m. January 5, 1965. . 29°34.1'N, 86°24.8'W.

Plankton abundant, dominated by diatoms, especially Chaetoceros.

ZOOPLANKTON: Copepods, nauplii, Conchoecia sp., gastropod and pelecypod larvae, pteropods, plutei, Sagitta enflata, Oikopleuridae, Fritillaria sp., some Globigerina sp.

DIATOMS: Coscinodiscus excentricus, Coscinodiscus sp., Asterolampra marylandica, Stephanopyxis palmeriana, Guinardia flaccida, Rhizosolenia alata/indica, R. hebetata, R. calcar-avis, R. imbricata schrubsolei, R. castracanei (vr), R. styliformis (vr), R. stolterfothii, R. robusta, Chaetoceros decipiens, C. peruvianum, C. messanense, C. compressum, C. lorenzianum, C. lacinosum?, Bacteriastrum sp., Ceratulina bergonii, Biddulphia mobiliensis, Dactyliosolen antarcticus, Eucampia cornuta, Hemiaulus sinensis, Climacodium frauenfeldianum, Nitzschia seriata, N. closterium.

DINOFLAGELLATES: Ceratium praelongum, C. fusus, C. pentagonum tenerum, C. kofoidi, C. furca, C. trichoceros, C. massiliense, C. contrarium, C. symmetricum, C. azoricum, C. tenue, C. declinatum, C. sumatranum, C. macroceros gallicum, C. tripos, Ceratium horridum molle, Peridinium brochi, P. claudicans, P. pentagonum, P. conicum, P. tenuissimum, Peridinium sp., Podolampas palmipes, P. elegans, Ceratocorys horrida, Dinophysis caudata, C. schuetti, Ornithocercus thurni, O. quadratus, O. orbiculatus, Amphisolenia bidentata.

SILICOFLAGELLATES: Dictyocha fibula (vr).

TINTINNIDS: Tintinnopsis corniger, Codonaria cistellula, Codonellopsis schabi, C. ecaudata, C. orthoceras, Poroecus curtus, Dictyocysta elegans lepida, D. muelleri, Epiplocyloides reticulata, Xystonella treforti, Ascampbelliella urceolata, Amphorides amphora, Rhabdosella cuneolata?, Eutintinnus tenue, E. stramentus, Salpingella glocken-toegeri.

Station D18. Vertical haul. 29°23.7'N, 85°35.1'W. Date: December 22, 1964.

Plankton abundant, dominated by Chaetoceros didymum. The genus Peridinium is also important; pelecypod veligers contribute largely to the bulk of the zooplankton.

ZOOPLANKTON: Copepods, nauplii, Podon sp., Evadne sp., a few plutei, polychaete larvae; pelecypod larvae (a).

DIATOMS: Stephanopyxis turris, Guinardia flaccida, Leptocylindrus danicus, Dactyliosolen antarcticus, Skeletonema costatum, Corethron hystrix (er), Rhizosolenia alata, R. a.<sup>1</sup>/indica, R. stolterfothii, R. hebetata, R. imbricata schrubsolei, R. calcar-avis, Chaetoceros didymum (d), C. compressum, C. tortissimum, C. affine, C. radicans, C. decipiens, C. debilae, C. breve?, C. lorenzianum (vr), C. sp. cf. subsecundum, Ceratulina bergonii, Eucampia zodiacus, Hemiaulus membranaceus (vr), Nitzschia closterium, N. seriata, Thalassionema nitzschioides, Thalassiothrix frauenfeldi.

DINOFLAGELLATES: Ceratium fusus, C. furca, C. tripos, Peridinium oceanicum oblongum (ra), P. depressum, P. obtusum, P. conicum, Peridinium sp., P. excentricum, P. simulum (vr), Diplopelta asymmetrica (ra), Podolampas palmipes, Gonyaulax polygramma (ra), Gonyaulax sp. (ra).

TINTINNIDS: Stylicauda platensis, Stenosemella ventricosa, Eutintinnus tenue (vr).



CRUISE VII

NOTE: The primary objective of this cruise was to make hydrographic observations in the areas studied. Very little effort was thus devoted to plankton collection. As a result, the plankton samples were generally poor. However, in view of the areas sampled and the time of the year this cruise was made, it was thought well to include the analysis of the plankton samples.

Station 1. 28°45.0'N, 94°24.0'W. Date: February 3, 1965.

Plankton extremely poor.

ZOOPLANKTON: A few copepods, ostracods and rotifers.

DIATOMS: Coscinodiscus sp., Chaetoceros compressum, C. affine, C. decipiens, Biddulphia mobiliensis, Paralia sp., Gyrosigma sp.

DINOFLAGELLATES: Ceratium furca, C. pentagonum tenerum, Peridinium brochi, P. depressum, P. venustum, P. conicum, Dinophysis caudata.

TINTINNIDS: Tintinnopsis kofoidi, T. gracilis, Codonellopsis schabi, Petalotricha sp.

Station 2. 28°22.0'N, 93°51.0'W. Date: February 4, 1965.

Plankton poor.

ZOOPLANKTON: Copepods, nauplii, ostracods, a fish egg, a few Globigerina.

DIATOMS: Corethron hystrix, Guinardia flaccida, Rhizosolenia alata<sup>f</sup>/indica, R. stouterfothii, R. calcar-avis, R. a.<sup>f</sup>/gracillima, Bacteriastrum sp., Chaetoceros decipiens, C. peruvianum, C. eibenii, C. compressum, C. messanense, C. coarctatum, Eucampia zodiacus, Hemiaulus hauckii, H. membranaceus, Triceratium sp., Navicula sp., Gyrosigma sp., Thalassiothrix frauenfeldi.

DINOFLAGELLATES: Pyrocystis fusiformis, Ceratium pentagonum tenerum, C. furca, C. kofoidi, C. fusus, C. extensum, C. strictum, C. tripos atlantica, C. t. semipulchellum, C. massiliense, C. hexacanthum, C. pavillardi, C. tenue, C. trichoceros, C. euarquatum, C. coarctatum, C. contortum, C. arietinum, Peridinium simulum, P. oceanicum, P. longipes, P. brochi, P. inclinatum, P. pedunculatum, P. conicum, P. pallidum?, P. latissimum, Gonyaulax birostris, G. fragilis, Dinophysis caudata, Amphisolenia bidentata.

TINTINNIDS: Tintinnopsis radix, T. gracilis, Codonellopsis schabi, C. ecaudata, Dictyocysta elegans lepida, Petalotricha sp., Amphorides minor, Xystonella treforti, Ascampbelliella urceolata, Salpingella acuminata.

Station 3. 28°22'N, 93°31'W. Date: February 4, 1965.

Plankton rather poor.

ZOOPLANKTON: Very scarce; represented by a few copepods and nauplii.

DIATOMS: Coscinodiscus sp., Leptocylindrus danicus, Guinardia flaccida, Rhizosolenia imbricata, Schrubsolei, R. alata, R. stolterfothii, R. calcar-avis, Bacteriastrium sp., Chaetoceros lorenzianum, C. decipiens, C. peruvianum, C. coarctatum, C. affine, C. curvisetum, C. compressum, Eucampia zodiacus, Hemiaulus hauckii, H. sinensis, Ceratulina bergonii, Gyrosigma sp., Navicula sp., Thalassiothrix sp., T. frauenfeldi.

DINOFLAGELLATES: Ceratium furca, C. fusus, C. massiliense, C. arietinum, C. coarctatum, Peridinium brochi, P. conicum, P. simulum, P. quarnerense, Ornithocercus steini, O. quadratus.

TINTINNIDS: Tintinnopsis kofoidi, T. radix? (parts), Epilpocylloides reticulata, Xystonella treforti, Protorhabdonella simplex, Ascampbelliella urceolata, Eutintinnus tenue.

Station 8. 27°55'N, 93°10'W. Date: February 5, 1965

Plankton relatively abundant.

ZOOPLANKTON: Very poor: Includes: nauplii (f), adult copepods (er).

DIATOMS: Coscinodiscus sp., Guinardia flaccida, Rhizosolenia stolterfothii, R. alata, R. calcar-avis, Bacteriastrium sp. (ra), Chaetoceros affine, C. decipiens, C. coarctatum, C. eibentii, C. peruvianum, C. pendulum, C. messanense, Eucampia zodiacus, Hemiaulus sinensis, H. membranaceus, Eucampia cornuta, Thalassiothrix frauenfeldi (ra).

DINOFLAGELLATES: Ceratium pentagonum tenerum, C. fusus, C. coarctatum, C. macroceros gallicum, C. trichoceros, C. contrarium, C. tenue, C. tripos semipulchellum, C. lunula, Peridinium cf. divergens, P. oceanicum, P. cf. pallidum, Diplopeltopsis sp.?, Gonyaulax fragilis, Podolampas palmipes, Oxytoxum scolopax, Pyrophacus horologicum.

TINTINNIDS: Tintinnopsis corniger, Poroecus curtus, Codonellopsis orthoceras, Dictyocysta elegans lepida, Protorhabdonella simplex, Cyttarocylis eucecryphalus, Epiplocyloides ralumensis, Xystonella treforti, Ascampbelliella urceolata, Acanthostomella minutissima, Eutintinnus tenue, Salpingella glockentoegeri.

Station 9. 28°02'N, 92°47'W. Date: February 5, 1965.

Plankton poor.

ZOOPLANKTON: Copepods, nauplii, a nematod.

DIATOMS: Coscinodiscus sp., Aulacodiscus sp., Guinardia flaccida, Chaetoceros eibenii, C. decipiens, C. affine, C. compressum, C. messanense, Bacteriastrum sp., Triceratium sp., Hemiaulus sinensis, Paralia sp., Gyrosigma sp., Thalassiothrix frauenfeldi.

DINOFLAGELLATES: Ceratium belone, C. pentagonum tenerum, C. longirostrum, fuscus, C. karsteni, C. trichoceros, C. contrarium, C. tenue, Peridinium sp., P. quarnerense, P. inflatum, P. punctulatum, Diplopelta sp., Goniodoma polyedricum, Podolampas bipes.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Tintinnopsis lata, T. gracilis, Codonellopsis orthoceras, Dictyocysta elegans lepida, Epiplocyloides reticulata, Cyttarocylis eucecryphalus, Protorhabdonella simplex, Ascampbelliella urceolata, Dadayiella ganymedes, Amphorides quadrilineata, A. minor, Eutintinnus tenue.

Station 10. 28°08'N, 92°24'W. Date: February 5, 1965.

Plankton rather abundant; zooplankton very poor.

DIATOMS: Relatively abundant: Coscinodiscus sp., Aulacodiscus sp., Guinardia flaccida, Rhizosolenia imbricata/schrubsolei, R. calcaravis, R. stolterfothii, Bacteriastrum sp. (a), Chaetoceros eibenii, C. messanense, C. decipiens, C. danicum, Chaetoceros sp. sp., Ceratulina bergonii, Eucampia zodiacus, Biddulphia sinensis, Pleurosigma sp., Gyrosigma sp., Thalassionema nitzschioides, Thalassiothrix frauenfeldi.

DINOFLAGELLATES: Prorocentrum sp., Ceratium furca, C. pentagonum tenerum, C. kofoldi, C. belone, C. teres, C. fuscus, C. extensum, C. trichoceros, C. coarctatum, C. ranipes, C. contortum, C.

massiliense, C. contrarium, C. macroceros gallicum, C. tenue, Peridinium inclinatum, P. conicum, P. longipes, P. pedunculatum, P. oceanicum, Peridinium sp., Gonyaulax birostris, Oxytoxum scolopax, Dinophysis caudata, Amphisolenia bidentata.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Tintinnopsis gracile, T. lata, T. kofoidi, Codonaria cistellula, Poroecus curtus, Dictyocysta elegans lepida (ra), D. muelleri, Epiplocyloides ralumensis, E. reticulata, Protorhabdonella simplex, Xystonella treforti, Ascampbelliella urceolata (ra), Acanthostomella minutissima, Proplectella claparedel, P. parva, Eutintinnus tenue, E. medius, Salpingella glockentoegeri, Steenstrupiella steenstrupii.

Station 11. 28°14'N, 91°48'W. Date: February 5, 1965.

Plankton poor.

ZOOPLANKTON: Copepods and nauplii very scarce, a nematod.

DIATOMS: Coscinodiscus sp., Aulacodiscus sp., Asterolampra sp., Guinardia flaccida, Chaetoceros decipiens (ra), C. peruvianum, C. coarctatum, C. eibenii, C. affine, C. messanense, Hemiaulus hauckii, H. membranaceus, Bacteriastrum sp., Thalassiothrix frauenfeldi (ra).

DINOFLAGELLATES: Ceratium furca, C. inflatum, C. falcatum, C. arientinum, C. carriense, C. tenue, C. gibberum, C. trichoceros, Peridinium brochi, P. punctulatum, P. latidorsale, P. oceanicum, P. conicum, Amphisolenia bidentata.

TINTINNIDS: Ascampbelliella urceolata, Amphorides amphora.

Station 12. 28°21'N, 91°13'W. Date: February 5, 1965.

Plankton very poor.

ZOOPLANKTON: Nauplii (f), adult copepods (r), gastropod and pelecypod veligers (vr), pteropods (r), a fish egg.

DIATOMS: Rhizosolenia alata, Bacteriastrum sp., Chaetoceros compressum, C. eibenii, C. decipiens, C. affine, Hemiaulus membranaceus, H. sinensis, Streptotheca thamensis, Eucampia cornuta, Navicula sp., Nitzschia seriata, Gyrosigma sp., Thalassiothrix frauenfeldi.

DINOFLAGELLATES: Ceratium furca, C. praelongum, C. trichoceros, C. contrarium, C. ranipes, C. coarctatum, Peridinium conicum, P. cf. divergens, P. brochi, Diplopelta asymmetrica, Ceratocorys horrida (er),

TINTINNIDS: Codonellopsis schabi (r), C. orthoceras (er), Epiplocyloides reticulata (er).

Station 14. 28°22'N, 90°15'W. Date: February 6, 1965.

Plankton poor.

ZOOPLANKTON: A few copepods and nauplii, Euglypha sp., Rotifers.

DIATOMS: Skeletonema costatum, Leptocylindrus danicus, Ditylum brightwelli, Guinardia flaccida, Coscinodiscus sp., Rhizosolenia alata, R. stolterfothii, R. calcar avis, Bacteriastrum sp., Chaetoceros (is the most abundant genus); C. decipiens, C. peruvianum, C. teres, C. messanense, C. eibenii, C. affine, C. curvisetum, C. compressum, Chaetoceros sp., C. (Phaeoceros) sp., Eucampia cornuta, Ceratulina bergonii, Streptotheca thamensis, Thalassiothrix frauenfeldi, Navicula sp., Nitzschia seriata.

DINOFLAGELLATES: Ceratium euarquatum, C. trichoeros, C. carriense, Peridinium brochi, P. inclinatum, P. quarnerense.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Tintinnopsis corniger, Climacocyliis scalaroides, Ascampbelliella urceolata, Steenstrupiella steenstrupii, Eutintinnus medius.

Station 15. 28°34'N, 89°41'W. Date: February 6, 1965.

Plankton very poor.

ZOOPLANKTON: Nauplii (r).

DIATOMS: Ditylum brightwelli, Bacteriastrum sp., Chaetoceros decipiens, C. lorenzianum, C. compressum, C. dictyocha, C. eibenii, C. danicum, C. pendulum, Hemiaulus hauckii, Thalassiothrix sp.

DINOFLAGELLATES: Ceratium coarctatum, C. limulus, Peridinium longipes, P. quarnerense.

TINTINNIDS: Proplectella parva, Steenstrupiella steenstrupii, Eutintinnus tenue.

Station 24. 25° 23'N, 86° 25'W. Date: February 8, 1965.

Plankton extremely poor.

ZOOPLANKTON: Copepods (r), a radiolaria.

BLUE-GREEN ALGAE: Filaments, very scarce.

DIATOMS: Bacteriastrum elongatum, Chaetoceros atlanticum, C. decipiens,  
Chaetoceros sp., Hemidiscus cuneiformis (f), Thalassiothrix sp. (r),  
Hemiaulus hauckii (er).

DINOFLAGELLATES: Ceratium teres, Gymnodinium sp.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Xystonella treforti, Proplectella sp.

Station 27. 23° 58'N, 85° 34'W. Date: February 9, 1965.

Plankton extremely poor.

ZOOPLANKTON: A copepod, a Fritillaria sp., a small Globigerina, a few radiolaria (including part of Sticholonche zancelea).

DIATOMS: Chaetoceros atlanticum, C. coarctatum.

DINOFLAGELLATES: Ceratium horridum (er), Ornithocercus magnificus (er).

TINTINNIDS: Xystonella treforti.

Station 30. 22° 31'N, 85° 04'W. Date: February 9, 1965

Plankton extremely poor.

ZOOPLANKTON: A nauplius, a Sticholonche zancelea, an auricularia larva.

DIATOMS: Thalassiosira sp. (vr), Guinardia flaccida, Rhizosolenia alata f.  
gracillima (vr), R. calcar-avis, Bacteriastrum elongatum (f), Chaeto-  
ceros compressum, C. coarctatum, C. curvisetum, C. peruvianum,  
Hemiaulus hauckii, H. sinensis, H. membranaceus, Thalassiothrix  
frauenfeldi.

DINOFLAGELLATES: Ceratium kofoldi, C. lanceolatum, C. fusus, C.  
horridum, C. tenue, a small Gonyaulax sp., Oxytoxum turbo.

COCCOLITHOPHORES: Scarce.

TINTINNIDS: Petalotricha ampulla, Xystonella treforti, Dadayiella ganymedes.

Station 31. 22°15'N, 84°59'W. Date: February 9, 1965

Plankton very poor.

ZOOPLANKTON: A few nauplii, Oikopleuridae, Fritillaria sp., Radiolaria (r).

DIATOMS: Chaetoceros affine, C. atlanticum, C. peruvianum, C. decipiens,  
C. tetrastichon, C. (Phaeoceros) sp., Rhizosolenia alata/gracillima,  
R. calcar-avis, Hemiaulus membranaceus, Hemidiscus cuneiformis,  
Thalassiothrix frauenfeldii, T. longissima?

DINOFLAGELLATES: Pyrocystis fusiformis, Ceratium teres, C. kofoldi,  
C. fusus, C. longirostrum, C. contortum, C. trichoceros, C. horridum,  
Peridinium pedunculatum, P. quarnerense, Gonyaulax sp., G. polyedra,  
G. monacantha?, Ceratocorys armata, Oxytoxum gigas, Ornithocercus  
thurnii.

COCCOLITHOPHORES: Rare.

TINTINNIDS: Codonellopsis ecaudata, Dictyocysta elegans lepida, Protor-  
habdonella simplex, Rhabdonella amor, R. indica, R. cornucopia (f),  
Epilpocyloides reticulata, Xystonella treforti, Steenstrupiella steens-  
trupii, Dadayiella ganymedes, Amphorides minor, Eutintinnus medius,  
E. apertus.

Station 32. 22°09'N, 85°12'W. Date: February 9, 1965

Plankton extremely poor.

ZOOPLANKTON: Copepods (vr), radiolaria (vr).

DINOFLAGELLATES: Gymnodinium sp., Ceratium digitatum, C. gibberum.

COCCOLITHOPHORES: Very scarce.

Station 34. 21°59'N, 86°15'W. Date: February 10, 1965

Plankton extremely poor.

ZOOPLANKTON: Nauplii (r), Fritillaria sp., very small (vr), some small foraminifera and radiolaria.

DIATOMS: Rhizosolenia alata<sup>f</sup>/gracillima, R. robusta, Bacteriastrum elongatum (f), Chaetoceros affine, C. tetrastichon, Thalassiothrix frauenfeldii.

DINOFLAGELLATES: Gymnodinium sp., Pyrocystis sp., Ceratium kofoidi, C. teres, C. pentagonum tenerum, C. fusus, C. macroceros gallicum, Ceratocorys armata.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Steenstrupiella steenstrupii, Rhabdonellopsis apophysata, Eutintinnus apertus, Salpingella glockentoegeri.

Station 35. 22°46'N, 86°33'W. Date: February 10, 1965

Plankton very poor.

ZOOPLANKTON: A few nauplii and copepods, a zoea larva, a "cypris" larva, Fritillaria sp. (vr).

DIATOMS: Guinardia flaccida, Leptocylindrus danicus, Rhizosolenia hebetata, R. fragilissima, Bacteriastrum elongatum, Chaetoceros sp. (very small), C. decipiens, C. peruvianum, C. affine, C. tetrastichon, C. debile, C. lorenzianum, C. socialis, Eucampia cornuta (er), Ceratulina bergonii, Striatella sp., Grammatophora marina?, Asterionella sp., Thalassionema nitzschioides, Thalassiothrix frauenfeldii.

DINOFLAGELLATES: Ceratium pentagonum tenerum, C. teres, C. fusus, C. massiliense, Peridinium cf. pyriforme, P. pellucidum?, P. oceanicum oblongum, Gonyaulax birostris.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Tintinnopsis beroidea, Codonellopsis ecaudata, Rhabdonella amor, R. henseni, R. cornucopia, Xystonella treforti, Epiplocyloides reticulata, Steenstrupiella steenstrupii, Dadayiella ganymedes, Eutintinnus tenue, E. apertus, E. tubulosus (f), E. stramentus.

Station 36. 23°23'N, 86°51'W. Date: February 10, 1965

Plankton extremely poor.

ZOOPLANKTON: Copepods and nauplii very scarce, Fritillaria sp. and Oikopleuridae.



DIATOMS: Chaetoceros decipiens, Ceratulina bergonii, Hemiaulus membra-naceus, H. hauckii, H. sinensis, Grammatophora marina?

DINOFLAGELLATES: Pyrocystis sp., Ceratium digitatum, C. teres, C. candelabrum, C. furca, C. fusus, C. extensum, C. strictum, C. longirostrum, C. trichoceros, C. macroceros gallicum, C. hexan-canthum, C. declinatum, Peridinium aff. crassipes, P. conicum, P. solidicorne, Diplopelta asymmetrica, Goniodoma polyedricum, Pyrophacus horologicum.

TINTINNIDS: Rhabdonella henseni, Rhabdonellopsis apophysata.

Station 37. 23°45'N, 86°43'W. Date: February 10, 1965

Plankton extremely poor.

ZOOPLANKTON: A few nauplii and small copepods, early larval stages of polychaete (vr), radiolaria, Fritillaria sp.

BLUE-GREEN ALGAE: Very scarce.

DIATOMS: Bacteriastrum elongatum, Chaetoceros atlanticum, C. tetrastichon, C. lorenzianum, Chaetoceros sp., Hemiaulus membranaceus, H. hauckii, Thalassiothrix frauenfeldii.

DINOFLAGELLATES: Ceratium furca, C. teres, C. extensum, C. macroceros gallicum, C. declinatum.

TINTINNIDS: Poroecus curtus, Rhabdonellopsis apophysata, Xystonella treforti, Steenstrupiella gracilis, Proplectella sp., P. claparedei, Eutintinnus tenue, E. apertus.

Station 42. 25°52'N, 84°50'W. Date: February 11, 1965

Plankton very poor.

ZOOPLANKTON: A few nauplii, Fritillaria sp. (vr).

DIATOMS: Bacteriastrum elongatum, Chaetoceros decipiens, C. anastomosans, C. cf. danicum, C. peruvianum, C. cinctum, Ceratulina bergonii, Hemi-aulus sinensis, Thalassiothrix frauenfeldii.

DINOFLAGELLATES: Ceratium teres, C. extensum, C. pulchellum, Peridinium steini, Diplopsalis asymmetrica?, Phalacroma sp., small (er) Ornitho-cercus magnificus.

TINTINNIDS: Tintinnopsis beroidea, Epilocyloides ralumensis, Rhabdonella cornucopia.

Station 44. 26°10'N, 85°25'W. Date: February 11, 1965

Plankton very poor.

ZOOPLANKTON: Nauplii (vr), a pteropod.

DIATOMS: Guinardia flaccida, Rhizosolenia cylindrus, R. calcar-avis, R. alata<sup>f</sup>/gracillima, R. stolterfothii, Chaetoceros compressum, C. decipiens, C. anastomosans, C. danicum, C. peruvianum, Chaetoceros sp., Hemiaulus hauckii, H. membranaceus, Ceratulina bergonii, Thalassiothrix frauenfeldii (most of the diatoms are represented by small, and especially narrow frustulae).

DINOFLAGELLATES: Ceratium pentagonum tenerum (er), C. teres (er), C. extensum (er), C. horridum (er), Peridinium steinii (er), P. pedunculatum (er), Gonyaulax sp. (er), Oxytoxum scolopax (er).

SILICOFLAGELLATES: Dictyocha fibula, (r).

TINTINNIDS: Dadayiella ganymedes (er), Steenstrupiella steenstrupii (er).

Station 45. 25°50'N, 85°53'W. Date: February 11, 1965

Plankton relatively abundant, dominated by small Chaetoceros.

ZOOPLANKTON: Calcanus sp., and some others/copepods scarce; some nauplii. A polychaete larva. Fritillaria sp. and Oikopleuridae.

DIATOMS: Leptocylindrus danicus, Rhizosolenia alata<sup>f</sup>/gracillima, R. a. f. indica, R. calcar avis, R. styliformis, Bacteriastrum sp., Chaetoceros decipiens, C. compressum, C. peruvianum, C. difficile, C. cf. lacinosum, C. affine<sup>v</sup>/willei, C. pendulum, C. coarctatum, Eucampia cornuta, Hemiaulus membranaceus, H. sinensis, Thalassionema nitzschoides, Thalassiothrix frauenfeldii.

DINOFLAGELLATES: Ceratium belone, C. teres, C. furca, C. pentagonum tenerum, C. kofoidi, C. strictum, C. trichoceros, C. contrarium, C. massiliense, Peridinium conicum, Peridinium sp., Gonyaulax sp., Gymnodinium cf. multistriatum (er).

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Poroecus curtus, Protorhabdonella simplex, Amphorides amphora, Steenstrupiella steenstrupii, Dadayiella ganymedes, Eutintinnus perminutus, E. stramentus, E. medius.

Station 46. 25° 30'N, 86° 14'W. Date: February 12, 1965

Plankton extremely poor.

ZOOPLANKTON: Gastropod veligers (vr), ostracods(er).

DIATOMS: Rhizosolenia stolterfothii, Bacteriastrum elongatum, Chaetoceros decipiens, C. affine, C. tetrastichon, C. compressum (all the species are extremely scarce).

DINOFLAGELLATES: Ceratium fusus (vr), C. massiliense (er).

TINTINNIDS: Protorhabdonella simplex, Rhabdonella cornucopia, Dadayiella ganymedes, Eutintinnus apertus.

Station 48. 25° 07'N, 87° 01'W. Date: February 12, 1965

Plankton relatively abundant.

DIATOMS: Leptocylindrus danicus, Guinardia flaccida, Rhizosolenia alata f. gracillima, R. calcar-avis, R. stolterfothii, Bacteriastrum elongatum, Chaetoceros affine/Willei, C. compressum, C. decipiens, C. peruvianum, C. curvisetum, C. pendulum, Ceratulina bergonii, Hemiaulus hauckii, H. membranaceus, Thalassiothrix frauenfeldii, Thalassionema nitzschioides, Grammatophora marina var?

DINOFLAGELLATES: Ceratium teres, C. pentagonum tenerum, C. furca, Peridinium latidorsale, Scrippsiella sweeneyae, Phalacroma doryphorum.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Protorhabdonella simplex, Rhabdonella cornucopia, Climacocylis scalaroides, Proplectella sp., Eutintinnus perminutus, E. pinguis, E. medius.

Station 49. 24° 44'N, 87° 27'W. Date: February 12, 1965

Plankton very poor.

ZOOPLANKTON: Nauplii (vr).

BLUE-GREEN ALGAE: Skujaella sp. (vr).

DIATOMS: Asterolampra sp., Rhizosolenia alata<sup>f.</sup>/gracillima, Chaetoceros decipiens, C. affine, Hemiaulus membranaceus, Thalassionema nitzschioides, Thalassiothrix sp.

DINOFLAGELLATES: Ceratium teres, C. trichoceros.

TINTINNIDS: Steenstrupiella steenstrupii, Eutintinnus tenue.

Station 50. 24°24'N, 87°43'W. Date: February 12, 1965

Plankton very poor.

ZOOPLANKTON: Nauplii (vr), a Sagitta sp.

DIATOMS: Chaetoceros sp., C. lorenzianum, C. peruvianum.

DINOFLAGELLATES: Ceratium teres, C. hexacanthum, C. tenue, C. macroceros gallicum.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Eutintinnus tenue.

Station 51. 24°24' N, 88°01'W. Date: February 12, 1965

Extremely poor.

ZOOPLANKTON: Copepods (vr), nauplius (er).

BLUE-GREEN ALGAE: (er)

DIATOMS: Rhizosolenia alata<sup>f.</sup>/gracillima (vr), Bacteriastrum elongatum (vr), Chaetoceros affine (vr), C. peruvianum (er).

DINOFLAGELLATES: Ceratium pentagonum tenerum (er), C. teres (er), Peridinium globulus (er), Oxytoxum scolopax (er).

Station 55. 24°22'N, 91°25'W. Date: February 13, 1965.

Plankton poor.

ZOOPLANKTON: Nauplii (f), gastropod veligers (f), Radiolaria (m).

DIATOMS: Rhizosolenia calcar-avis, Bacteriastrum elongatum, Chaetoceros tetrastichon, C. decipiens, C. peruvianum, C. affine, C. dadayii, Hemiaulus membranaceus, Ceratulina bergonii.

DINOFLAGELLATES: Ceratium pentagonum tenerum, C. furca, C. kofoidi, C. teres, Peridinium pedunculatum (ra), P. solidicorne, P. quarnerense, Goniodoma polyedricum, G. sphaericum, Gonyaulax polygramma, Blepharocysta splendormaris, Oxytoxum gigas.

TINTINNIDS: Codonella aspera, Dictyocysta elegans lepida (ra), Protorhabdonella simplex (r), Climacocylis scalaroides, Epilocytilis labiosa, Epilocyloides reticulata, Acanthostomella minutissima, Proplectella claparedei, Steenstrupiella steenstrupii, Amphorides amphora, Eutintinnus pinguis, E. tenue (ra), E. colligatus, E. apertus.

CRUISE VIII

Station 1. Surface. 28°22'N, 93°43'W. Date: February 23, 1965.

Plankton of medium density.

ZOOPLANKTON: Copepods and nauplii (ra), some gastropods; pteropods and pelecypods scarce; Sagitta enflata; some fish eggs; among the protozoa zoothamnium sp. (r), small Globigerina sp.

BLUE-GREEN ALGAE: Scarce filaments.

DIATOMS: Not very abundant; the most numerous species are: Guinardia flaccida, Thalassiosira subtilis and Streptotheca thamensis. Others include: Actinocyclus sp. (m), Coscinodiscus sp., Stephanopyxis palmeriana, Chaetoceros coarctatum, C. dictyota, Triceratium sp., Biddulphis sinensis (er), Hemiaulus membranaceus, Paralia sp., Thalassiothrix frauenfeldii.

DINOFLAGELLATES: Ceratium strictum (er), C. fusus (r), C. furca (m), C. pentagonum tenerum (ra), C. massiliense, C. lunula (r), C. hexacanthum (vr), C. tenue (vr), C. trichoceros, C. horridum (r), C. coarctatum (vr), C. declinatum (er), C. arietinum (er), C. tripos, semipulchellum (vr), C. macroceros gallicum (vr), Peridinium quarn-erense, P. longipes, P. latissimum, P. oceanicum oblongum, Diplopelta asymmetrica, Ornithocercus magnificus (vr), Dinophysis caudata, Amphisolenia thrinax, A. palaeotheroides, A. bidentata.

TINTINNIDS: Codonellopsis schabi, Codonella galea, Dictyocysta elegans lepida, Protorhabdonella simplex, Epiplocyloides reticulata, Proplectella claparedei, Brandtiella palliata, Eutintinnus tenue.

Station 2. 27°50'N, 93°13'W. Date: February 23, 1965.

Plankton of medium density.

ZOOPLANKTON: Copepods, nauplii, megalops larvae, ostracods, polychaete and bryozoa larvae, a few Sagitta sp., some Oikopleuridae and Fritillaria sp., some Globigerina sp. and radiolaria.

DIATOMS: (Rather abundant): Stephanopyxis palmeriana, Coscinodiscus sp., Asterolampra sp., Planktoniella sol (vr), Rhizosolenia calcar-avis, R. alata/indica, R. a/ gracillima, R. stolterfothii, Guinardia flaccida, Streptotheca thamensis, Chaetoceros messanense, C. affine, C. densum, C. decipiens, C. coarctatum, Eucampia cornuta, Ceratina bergonii, Hemiaulus sinensis, H. hauckii, H. membranaceus, Climacodium sp., Thalassiothrix frauenfeldii, Thalassionema nitzschioides.

DINOFLAGELLATES: Pyrocystis fusiformis, Ceratium sp. cf. lanceolatum, C. gravidum, C. strictum, C. fusus, C. extensum, C. bigelowi, C. pentagonum tenerum, C. teres, C. furca, C. kofoldi, C. belone, C. trichoceros, C. coarctatum, C. arietinum, C. tenue, C. macroceros gallicum, C. euarctatum, C. massiliense, C. ranipes, C. declinatum, C. gibberum, C. carriense, C. azoricum, Peridinium quarnerense, P. pedunculatum, P. longipes, P. latissimum, P. oceanicum, P. cf. crassipes, P. inclinatum, P. ovum, P. depressum (er), P. cf. oviforme (er), P. inflatum, P. globulus, P. subpyriforme (m), P. mite (r), Diplopelta asymmetrica, Gonyaulax polygramma, G. birostris (er), Gonyaulax sp., Acanthogonyaulax spinifera, Spiraulax jollifei, Podolampas spinifer (er), P. bipes (er), P. elegans, Ceratocorys horrida, C. armata, Heterodinium ridgenae, Pyrophacus horologicum, Phalacroma argus, P. ovum, Phalacroma sp., Dinophysis hastata, D. caudata (er), D. schuetti (er), Ornithocercus thurni (r), O. splendidus (er), O. magnificus (er), Histonels biremis, Heteroschisma inaequale (er), Amphisolenia bidentata (er).

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Codonaria cistellula, Codonella apicata, Codonellopsis schabi (er), C. orthoceras (r), Poroecus apicatus, Coxiella declivis, Dictyocysta elegans, D. muelleri, Epiplocyloides reticulata, Cyttarocylis eucecryphalus, C. acutiformis, Protorhabdonella simplex, Rhabdonella cornucopia, Xystonella longicauda, X. treforti, Xystonellopsis dicymatica, X. heros (er), Climacocylis scalaroides, Parundella inflata, P. aculeata, Brandtiella palliata, Ascampbelliella urceolata, Amphorides quadrilineata, A. minor, Steenstrupiella steenstrupii, Proplectella claparedi (ra), P. parva (er), Rhabdosella cuneolata?, Eutintinnus tenue, E. medius, E. frankoi, Salpingella glockentoegeri (ra).

Station 4. 26° 51'N, 92° 14'W. Date: February 24, 1965.

Plankton generally poor.

ZOOPLANKTON: Copepods and copepod nauplii, a few decapod larvae, bippinaria larvae, some Globigerina and radiolaria, unidentified eggs. There are also a certain amount of terrestrial material, especially conifer pollens and phanerogamic tissues.

DIATOMS (Scarce): Include: Asterolampra sp., Chaetoceros (Phaeoceros) sp., C. affine, C. messanense, C. decipiens, C. peruvianum, C. dadayi, Hemidiscus cuneiformis, (rare) Hemiaulus hauckii and H. membranaceus, Thalassiothrix sp. (the most abundant diatom).

DINOFLAGELLATES: Ceratium sp. (one individual very close to C. scapiforme Kofoid, a species generally not accepted and not even mentioned in Schiller's monograph), C. bigelowi, C. longirostrum, C. fusus, C. pentagonum tenerum, C. belone, C. euarcuatum, C. pulchellum, C. vultur, C. pavillardii, C. sumatranum, C. trichoceros, C. tenue, C. hexacanthum, C. arietinum, C. contrarium, C. coarctatum, C. carriense, C. gibberum, C. macroceros gallicum, C. contortum (vr), C. concilians, Peridinium sp., P. quamerense, Gonyaulax fusiformis, G. birostris, Gonyaulax sp., Goniodoma polyedricum, Ceratocorys horrida, C. armata, Podolampas elegans (vr), Blepharocysta splendormaris (er), Oxytoxum milneri, Dinophysis schuetti, D. expulsa, Phalacroma argus, Ornithocercus steini, O. quadratus.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Tintinnopsis corniger, Codonaria apicata, Codonella cistellula, Codonellopsis ecaudata, C. orthoceras, Dictyocysta elegans lepida, D. muelleri, D. extensa, Poroecus sp., Epiplocyloides reticulata, E. ralumensis, Cyttarocylis eucecryphalus, Rhabdonellopsis cornucopia (ra), Rhabdonellopsis apophysata (vr), Xystonella treforti (ra), X. longicauda (ra), Xystonellopsis dicymatica, X. heros, Climacocylis scalaria, Proplectella claparedei (ra), Eutintinnus apertus, E. similis (er), E. tenue, E. frankoi.

Station 14. 21°53'N, 87°26'W. Date: February 26, 1965.

Plankton rather poor; benthonic elements abundant.

ZOOPLANKTON: Pelecypod larvae (a), gastropod larvae, pteropods (ra), copepods, nauplii, ostracods, Sagitta sp.

DIATOMS: Stephanopyxis palmeriana, Guinardia flaccida, Thalassiosira subtilis, Aulacodiscus sp., Rhizosolenia imbricata/schrubsolei, R. stouterfothi, Chaetoceros coarctatum, C. (Phaeoceros) sp., Biddulphia reticulata, B. aurita obtusa, B. tuomeyi, Bellerochea malleus, Triceratium sp., Streptotheca thamensis, Paralia sp. (ra), Auliscus sp., Rhabdonema sp., Hemiaulus sinensis, Gyrosigma sp., Navicula sp., Nitzschia paradoxa, Fragilaria sp.

DINOFLAGELLATES: Ceratium extensum, C. longirostrum, C. furca, C. candelabrum, C. pentagonum subrobustum, C. p. tenerum, C. massiliense, C. gibberum, C. trichoceros, C. horridum, C. contortum, C. tripos atlanticum, C. t. semipulchellum, C. macroceros gallicum, C. lunula, C. hexacanthum, Peridinium solidicorne, P. oceanicum, Diplopelta asymmetrica (er).

TINTINNIDS: Stylicauda platensis, Eutintinnus tenue.

Station 15. 21° 39' N, 86° 49' W. Date: February 26, 1965.

Plankton rather poor; benthonic elements (foraminifera, sponge spicules, holothuroidea ossicles, sand, etc.) abundant.

ZOOPLANKTON: A few copepods, nauplii and ostracods (probably benthonic).

DIATOMS: Biddulphia pulchella, B. tuomeyi, B. aurita, Bellerochea sp., Asterionella formosa?, Paralia sp., Rhabdonema sp., Campylodiscus sp., Gyrosigma sp., Nitzschia sp.

DINOFLAGELLATES (Very scarce): Include: Ceratium furca, C. horridum, C. massiliense, C. tripos, C. gibberum, C. trichoceros, Peridinium brochi, P. pendunculatum.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS (Scarce): Include: Codonellopsis schabi, Dictyocysta elegans lepida, Stylicauda platensis, Epilocytilis labiosa, Metacytilis mere-schkowskii (ra).

Station 16. Surface haul. 21° 42' N, 86° 30' W. Date: February 26, 1965.

Plankton rather poor.

ZOOPLANKTON: Copepods, nauplii, some radiolaria, a fish egg.

DIATOMS: Rhizosolenia calcar-avis, R. alata<sup>f</sup>/gracillima (vr), Bacterlastrum elongatum, Bacterlastrum sp., Chaetoceros atlanticum, C. pendulum, C. coarctatum, C. tetrastichon, C. peruvianum, C. lorenzianum, Biddulphia pulchella, Hemiaulus hauckii, Hemidiscus cuneiformis.

DINOFLAGELLATES: Pyrocystis hamulus, Ceratium extensum, C. strictum, C. fusus, C. digitatum (er), C. furca, C. teres, C. candelabrum, C. pentagonum tenerum, C. gibberum, C. horridum molle, C. tenue, C. azoricum, C. declinatum, C. trichoceros, C. contrarium, C. macroceros gallicum, C. karsteni, C. massiliense, C. carriense, C. coarctatum, C. pavillardii, C. lunula (er), Peridinium solidicorne, P. quarnerense (f), P. elegans (er), P. "oviforme" (er), P. grande (er), P. tristylum (er), P. brochi (vr), P. wisneri (er), P. spheroides (r), Gonyaulax birostris, G. digitale, G. kofoidi (er), Diplopelta asymmetrica, Goniodoma polyedricum, Cladopyxis brachiolata, Ceratocorys horrida (r), Dinophysis schuetti (er), D. odiosa (er), Phalacroma cuneus, P. doryphorum, P. hindmarchi, P. argus (vr), P. ovum, Ornithocercus magnificus, O. thurni, O. quadratum, Amphisolenia palaeotheroides, A. bidentata, Histonella panda, H. biremis.



SILICOFLAGELLATES: Dictyocha fibula.

COCCOLITHOPHORES: Scyphosphaera sp.

TINTINNIDS: Tintinnopsis corniger, Codonella apicata, C. amphorella, Codonaria cistellula, Codonellopsis ecaudata, Coxliella laciniosa, Dictyocysta elegans lepida, D. extensa, Protorhabdonella simplex, Rhabdonella elegans, R. indica, Rhabdonellopsis apophysata, R. cornucopia, Favella azorica (er), Epiplocytilis labiosa, Epiplocytiloides reticulata, Xystonella treforti, Brandtiella palliata, Proplectella sp., Rhabdosella cuneolata?, Amphorides amphora, A. quadrilineata, Steenstrupiella steenstrupii, Eutintinnus apertus, E. tenue.

Station 17. 21° 49'N, 85° 59'W. Date: February 26, 1965.

Plankton generally poor.

ZOOPLANKTON: Copepods, nauplii, gastropods, pteropods, polychaete larvae, Oikopleuridae.

DIATOMS: Very scarce: Include: Guinardia flaccida, Rhizosolenia styli-formis, R. cylindrus, R. calcar-avis, Bacteriastrum elongatum, Bacteriastrum sp., Chaetoceros pendulum, C. dadayi, C. (Phaeoceros) sp., C. affine, C. atlanticum, Hemidiscus cuneiformis, Hemiaulus membranaceus, H. hauckii.

DINOFLAGELLATES: Pyrocystis fusiformis, Pyrocystis sp., Ceratium falcatiforme, C. extensum, C. fusus, C. digitatum, C. pentagonum tenerum, C. teres, C. declinatum, C. massiliense, C. contortum, C. tenue, C. gibberum, C. macroceros gallicum, C. carriense, C. concilians, C. hexacanthum, C. azoricum, C. tripos semipulchellum, C. lunula, C. horridum molle, C. contrarium, C. sumatranum, C. karsteni, C. ranipes, Peridinium elegans, Peridinium sp., Gonyaulax sp., G. polyedra (er), G. birostris, Goniodoma polyedricum, Diplopelta asymmetrica, Diplopelta sp., Pyrophacus horologicum steinii, Podolampas bipes, P. spinifer, P. elegans, Ceratocorys horrida, Phalacroma apicatum, P. argus, P. doryphorum, Ornithocercus magnificus, O. splendidus, O. steini, O. quadratus, O. thurni, Amphisolenia bidentata, Histioneis milneri.

TINTINNIDS: Tintinnopsis sp., Codonaria amphorella, Codonella apicata, Codonellopsis ecaudata, Dictyocysta extensa, Protorhabdonella simplex, Rhabdonella elegans, R. amor, Rhabdonellopsis cornucopia, R. apophysata, Epiplocytilis undella, E. labiosa, Rhabdosella cuneolata?, Epiplocytiloides reticulata, Proplectella sp., Steenstrupiella steenstrupi, Eutintinnus tenue, E. apertus, E. medius, E. stramentus.

Station 18. 21°47'N, 85°38'W. Date: February 26, 1965.

Plankton generally poor.

ZOOPLANKTON: Copepods, nauplii, gastropods (r), polychaete larvae, some small Fritillaria sp., Globigerina and radiolaria (Scarce).

DIATOMS: Scarce: Include: Coscinodiscus sp. (r), Rhizosolenia styliformis f. latissima (er), R. alata/gracillima (vr), R. cylindrus (er), R. hebetata (er), Bacteriastrium sp., Chaetoceros affine, C. decipiens, C. peruvianum, C. atlanticum, Hemiaulus membranaceus, H. hauckii, Ceratulina bergonii, Bellerochea sp. (er), Paralia sp. (r).

BLUE-GREEN ALGAE: Scarce filaments.

DINOFLAGELLATES: Pyrocystis hamulus, P. fusiformis, Ceratium fusus, C. extensum, C. praelongum, C. teres, C. azoricum, C. massiliense, C. limulus, C. contortum, C. trichoceros, C. arietinum, Peridinium longipes, Peridinium sp., Goniodoma polyedricum, Protoceratium sp., Phalacroma doryphorum, P. cuneus, Ornithocercus thurni, O. magnificus, Histioneis milneri.

COCCOLITHOPHORES: A few Scyphosphaera sp.

TINTINNIDS: Tintinnopsis corniger, Codonaria cistellula, Codonella apicata, C. aspera, Dictyocysta elegans lepida, Protorhabdonella simplex, Rhabdonella indica, R. elegans, Epilocylis labiosa, E. undella, Epilocyloides reticulata, Xystonella treforti, Steenstrupiella steenstrupii, Proplectella sp., P. claparedei, Eutintinnus tenue, Rhabdosella cuneolata?

Station 20. 22°46'N, 86°27'W. Date: February 27, 1965.

Plankton rather poor, dominated by Ceratia.

ZOOPLANKTON: Copepods, nauplii, Fritillaria sp., Oikopleuridae, Globigerina sp. (r).

DIATOMS: Thalassiosira subtilis (the only species of some importance), Guinardia flaccida, Schroderella delicatula (vr), Rhizosolenia alata f. indica (vr), Chaetoceros coarctatum (a fragment of a chain), Hemidiscus cuneiformis (vr), Hemiaulus hauckii (er), H. membranaceus (er).

DINOFLAGELLATES: Pyrocystis fusiformis, P. robusta, Pyrocystis sp., Ceratium gravidum (er), C. praelongum (er), C. incisum (er), C. inflatum (vr), C. falcatum (r), C. strictum (r), C. extensum (r), C. fusus (r), C. belone (er), C. candelabrum (m), C. pentagonum tenerum (m), C. p. subrobustum (er), C. furca (f), C. teres (er), C. trichoceros (ra), C. massiliense (ra), C. hexacanthum (f), C. contrarium (vr), C. gibberum (m), C. horridum (m), C. lunula (f), C. ranipes (f), C. contortum, C. tripos atlanticum, C. t. semipulchellum, C. declinatum, C. karsteni, C. macroceros gallicum, C. carriense, C. azoricum (m), C. tenue (f), C. euarquatatum (f), C. pavillardi, C. sumatranum (er), Peridinium (ra), P. pedunculatum, P. cf. crassipes, P. solidicorne, P. oceanicum oblongum, P. crassipes, P. simulum, P. ovum, P. "oviforme", P. spheroides, Peridinium grande, Diplopelta asymmetrica, Diplopsalis lebourae (er), Goniodoma polyedricum, Gonyaulax fragilis, G. turbynei, G. kofoidi, Podolampas bipes (er), Blepharocysta splendormaris (vr), Pyrophacus horologicum, Ceratocorys horrida (f), C. armata (vr), Dinophysis schuetti (r), D. caudata (er), Phalacroma cuneus, P. mitra, P. doryphorum, P. ovum (r), Phalacroma sp. (er), Ornithocercus quadratus (r), O. magnificus (vr), O. thurni, Amphisolenia bidentata (vr).

TINTINNIDS: Very scarce: Rhabdonella spiralis? Rhabdonellopsis cornucopia, Proplectella claparedi, Amphorides amphora, Eutintinnus tenue, E. fraknoi, E. similis, E. medius, E. colligatus.

Station 21. 23°17'N, 85°57'W. Date: February 27, 1965.

Plankton rather rich.

ZOOPLANKTON: Nauplii, copepods, gastropod and pelecypod veligers (f), several small medusae, Oikopleuridae; Radiolaria (ra), Globigerina sp. (r).

DIATOMS: Asterolampra sp., Gossleriella sp., Guinardia blavyana?, Rhizosolenia acuminata, Biddulphia sp., Isthmia enervis, Chaetoceros peruvianum, Hemidiscus sp., Rhabdonema sp., Synedra nitzschoides?, Nitzschia paradoxa.

DINOFLAGELLATES: Pyrocystis hamulus, P. pseudonociluca, P. fusiformis, Pyrocystis sp., Ceratium pentagonum tenerum, C. candelabrum, C. teres, C. furca, C. longirostrum, C. strictum, C. extensum, C. fusus, C. hexacanthum, C. trichoceros, C. tenue (ra), C. gibberum, C. contortum, C. azoricum, C. horridum (molle?), C. macroceros gallicum, C. massiliense, C. tripos semipulchellum, C. euarquatatum, C. declinatum, C. karsteni, C. japonicum, C. carriense, C. contrarium, C. pavillardi, C. lunula (er), C. coarctatum, Peridinium divergens,

P. inflatum, P. longipes, P. solidicorne, P. elegans, P. cf. crassipes, Gonyaulax fragilis, G. kofoidi, Gonyaulax sp., Spiraulax jollifei, Goniodoma polyedricum, G. sphaericum, Ceratocorys horrida, Pyrophacus horologicum, Podolampas elegans, P. bipes, Blepharocysta splendormaris, Dinophysis schuetti, Phalacroma rapa, P. doryphorum, Metaphalacroma skogsbergi, Ornithocercus thurni, O. magnificus, O. steini, Parahistioneis sp., Histioneis dolon, Amphisolenia schroederi.

SILICOFLAGELLATES: Dictyocha fibula.

COCCOLITHOPHORES: Scyphosphaera sp.

TINTINNIDS: Tintinnopsis corniger, Codonella amphorella, C. aspera, Codonaria cistellula, Codonellopsis ecaudata, Dictyocysta elegans lepada, D. extensa, Protorhabdonella simplex, P. curta (er), Rhabdonella elegans, R. amor, R. henseni, Rhabdonellopsis cornucopia, R. apophysata, Xystonella treforti, Epillocylis undella, E. labiosa, Epillocyloides reticulata, Climacocylis scalaroides (er), C. scalaria (er), Amphorides quadrilineata, Proplectella claparedel, Proplectella sp., Brandtiella palliata, Eutintinnus medius, E. pinguis (er), C. colligatus, E. tenue, Salpingella glockentoegeri.

Station 22. 23° 35' N, 86° 46' W. Date: February 28, 1965.

Plankton generally poor.

ZOOPLANKTON: Copepods, nauplii, some gastropod veligers and polychaete larvae, Sagitta enflata, Oikopleuridae.

DIATOMS: Extremely scarce: Thalassiothrix sp., Hemidiscus cuneiformis.

DINOFLAGELLATES: Kofoidinium velelloides, Pyrocystis (ra), P. robusta, P. fusiformis, P. hamulus, P. pseudonoctiluca (vr), Ceratium gravidum, C. pentagonum tenerum, C. furca, C. candelabrum, C. extensum, C. sp. cf. falcatum, C. fusus, C. massiliense, C. declinatum, C. contortum, C. hexacanthum, C. tenue, C. horridum, C. lunula, C. azoricum, C. limulus, C. coarctatum, C. tripos semipulchellum, C. ranipes, C. carriense, C. macroceros gallicum, C. gibberum, C. contrarium, C. pulchellum, C. karsteni, C. trichoceros, C. sumatranum, Peridinium elegans, P. grande, Peridinium sp., Gonyaulax sp., G. milneri, Goniodoma polyedricum, Podolampas bipes, Blepharocysta splendormaris, Cladopyxis hemibrachiata, Ceratocorys horrida, Murrayella splendida, Dinophysis hastata, D. schuetti, Phalacroma mitra, P. cuneus, Ornithocercus magnificus, O. quadratus, Histioneis helenae, Amphisolenia bidentata, A. palaeotheroides.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Codonella aspera, C. apicata, C. amphorella, Codonellopsis ecaudata, Dictycysta elegans lepida, D. extensa, Protorhabdonella simplex, Rhabdonella indica (ra), R. amor, R. elegans, R. henseni?, R. cornucopia, Rhabdonellopsis apophysata, Epilocylis undella, E. labiosa, Epilocyloides reticulata, Climacocylis scalaroides, Xystonella treforti, Petalotricha ampulla, Amphorides quadrilineata, Proplectella sp., P. claparedi, Steenstrupiella steenstrupii robusta, Brandtiella palliata (f), Eutintinnus fraknoi, E. tenue, E. medius, Rhabdosella cuneolata?

Station 23. 23°20'N, 87°15'W. Date: February 28, 1965.

Plankton medium to rather poor.

ZOOPLANKTON: Copepods, nauplii, Evadne sp. (er), Fritillaria sp.

DIATOMS: Less conspicuous: Melosira sp., Rhizosolenia stolterfothii, Chaetoceros lorenzianum, C. decipiens, Hemiaulus hauckii, H. membranaceus, Ceratulina bergonii, Streptotheca thamensis, Thalassiothrix frauenfeldii, Thalassiothrix sp.

DINOFLAGELLATES: Pyrocystis hamulus, P. fusiformis, Ceratium gravidum (er), C. digitatum, C. incisum, C. pentagonum tenerum, C. p. sub-robustum (er), C. belone, C. teres, C. furca, C. kofoldi, C. fusus, C. extensum, C. euarquatum, C. contortum, C. contrarium, C. massiliense, C. karsteni, C. macroceros gallicum, C. trichoceros, C. sumatranum, C. pavillardi, C. tenue, C. declinatum, C. pulchellum, C. tripos semipulchellum, C. gibberum, C. azoricum, C. lunula, C. coarctatum, C. limulus, Peridinium pedunculatum, P. fatulipes, P. oceanicum, P. globulus, P. solidicorne, P. brochi, P. grande, P. claudicans, P. longipes, P. steini, P. "oviforme", P. inclinatum, P. quarnerense, P. ovum (m), P. punctulatum (m), P. subsphaericum, Diplopelta asymmetrica, Gonyaulax sp., G. birostris (ra), G. fragilis, G. milneri, G. monacantha, G. turbynei, Goniodoma sphaericum, G. polyedricum, Spiraulax jollifei, Acanthogonyaulax spinifera, Protoceratium spinulosum, Protoceratium sp., Podolampas bipes, Blepharocysta splendormaris, Ceratocorys horrida (f), C. armata (er), Murrayella splendida, Ornithocercus quadratum, O. magnificus, O. heteroporus, O. thurni, O. francescae, O. cristatus, Phalacroma doryphorum, P. rapa (er), Dinophysis caudata (r), D. similis, D. expulsa.

SILICOFLAGELLATES: Dictyocha fibula.

COCCOLITHOPHORES: Scyphosphaera sp.

TINTINNIDS: Codonaria cistellula, Dictyocysta muelleri, D. elegans lepada, Protorhabdonella simplex, Rhabdonella elegans, R. henseni, R. amor, R. indica, R. cornucopia, Rhabdonellopsis apophysata, Coxliella fasciata, Climacocylis scalaroides, Epiplocylis labiosa, Epiplocylodes reticulata, Xystonella treforti, Xystonellopsis longicauda, Dadayiella ganymedes, Amphorides amphora, A. quadril-ineata, Steenstrupiella steenstrupii, Eutintinnus medius, E. tenue, E. colligatus, E. fraknoi, E. pinguis, E. latus, Rhabdosella cuneolata?

Station 25. 24°18'N, 88°26'W. Date: February 28, 1965.

Plankton generally poor.

ZOOPLANKTON: A few copepods and nauplii, some gastropod veligers, pteropods (vr), an holothuroid larva, some unidentified eggs, Fritillaria sp., radiolaria (m).

BLUE-GREEN ALGAE: Filaments very scarce.

DIATOMS: Asterolampra sp., Leptocylindrus danicus, Rhizosolenia alata f. gracillima (er), Chaetoceros dadayi, C. lorentianum, C. coarctatum.

DINOFLLAGELLATES: Ceratium praelongum, C. pentagonum tenerum, C. belone, C. teres, C. fusus, C. bigelowi, C. longirostrum, C. trichoceros, C. tenue (ra), C. massiliense, C. arietinum, C. pulchellum, C. coarctatum, C. hexacanthum, E. euarctatum, C. macroceros gallicum, C. lunula, C. ranipes, C. recurvum, C. concilians (er), C. azoricum, Peridinium brintoni (ra), P. grande, P. longipes (er), P. brochi (vr), P. globulus, Gonyaulax polygramma, G. milneri, G. monacantha, G. birostris, G. cf. tamarensis, Spiraulax jollifei, Goniodoma polyedricum, Blepharocysta splendormaris, Podolampas bipes, Protoceratium spinulosum, Ceratocorys horrida (f), C. reticulata (er), Oxytoxum elegans, O. sp. cf. milneri, Dinophysis caudata, D. recurva, Dinophysis sp., Phalacroma mitra, P. argus, P. ovum, Pseudophalacroma nasutum, Ornithocercus magnificus, O. quadratus.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Tintinnopsis corniger, Codonaria cistellula, Codonella apicata, Dictyocysta elegans lepada, D. muelleri, D. extensa, Protorhabdonella simplex, Rhabdonella amor, R. indica, Rhabdonellopsis cornucopia, Rhabdonellopsis apophysata, Xystonella longicauda (ra),

X. treforti, Epilocyloides reticulata, E. ralumensis, Dadayiella ganymedes, Ascampbelliella urceolata, Amphorides quadrilineata, Proplectella claparedei, P. parva, Eutintinnus apertus, E. stramentus, E. tenue, E. fraknoi, Rhabdosella cuneolata?, Salpingella acuminata.

Station 26. 24° 49' N, 89° 03' W. Date: March 1, 1965.

Plankton very poor.

ZOOPLANKTON: A few copepods and nauplii; ostracods very scarce, Fritillaria (vr), radiolaria (p).

DIATOMS: Scarce: Asteroplampa sp., Rhizosolenia robusta (er), Chaetoceros pendulum, C. decipiens, C. peruvianum, C. coarctatum, C. affine, Bacteriastrum sp., Hemiaulus membranaceus, H. hauckii, Hemidiscus cuneiformis, Thalassiothrix frauenfeldii

DINOFLAGELLATES: Ceratium schroetteri, C. incisum, C. belone, C. pentagonum tenerum, C. extensum, C. strictum, C. fusus, C. bigelowi, C. inflatum, C. euarctatum (ra), C. contrarium, C. trichoceros, C. azoricum (er), C. tenue (m), C. ranipes (er), C. arietinum (f), C. macroceros gallicum, C. coarctatum, C. karsteni, C. massiliense, C. pulchellum, C. pavillardi (er), C. carriense, Peridinium pedunculatum, P. grande, Peridinium sp., Gonyaulax birostris (f), Gonyaulax sp., Spiraulax jolliffei, Heterodinium hindmarchi, Podolampas elegans, Blepharocysta splendormaris, Ceratocorys armata, C. horrida, Pyrophacus horologicum, Oxytoxum sp., Phalacroma cuneus, Parahistioneis sp., Amphisolenia lemmermanni, A. bifurcata, A. thrinax.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Codonaria cistellula, Codonellopsis orthoceras, Coxiella fasciata, Poroecus curtus, P. apiculatus, P. annulatus, Dictyocysta muelleri, D. elegans lepida, Cyttarocyllis eucecryphalus, C. acutiformis, Protorhabdonella simplex, Rhabdonella indica, R. cornucopia, Rhabdonellopsis apophysata, Epilocyloides reticulata, E. ralumensis, Xystonella treforti (ra), X. longicauda, Xystonellopsis heros (er), Proplectella claparedei, P. subcaudata (vr), Proplectella sp., Dadayiella ganymedes, Steenstrupiella steenstrupii, Amphorides minor, Eutintinnus tenue (f), E. birictus (er), Rhabdosella cuneolata?

Station 27. 25° 35' N, 89° 55' W. Date: March 1, 1965.

Plankton generally poor.

ZOOPLANKTON: Copepods, nauplii, a few gastropods, larva of holothuria and larva of bryozoa. Oikopleuridae and Fritillaria sp. A colony of Zoothamnium sp. . Some radiolaria and foraminifera.

BLUE-GREEN ALGAE: Very scarce.

DIATOMS: Scarce: Coscinodiscus sp. , Guinardia sp. ? , Ditylum brightwellii, Rhizosolenia stolterfothii (vr), R. imbricata/Schrubsolei (vr), Chaetoceros affine, C. messanense, C. coarctatum, C. compressum, Bacteri- astrum sp. , Ceratulina bergonii, Hemiaulus sinensis (er), Eucampia zoodiacus (er), Thalassithrix frauenfeldii.

DINOFLAGELLATES: Pyrocystis lunula, Pyrocystis sp. , Ceratium praelongum, C. pentagonum tenerum, C. p. subrobustum, C. candelabrum, C. belone, C. kofoidi, C. furca, C. extensum, C. fusus, C. longirostrum, C. contrarium, C. trichoceros, C. sumatranum, C. tenue, E. arietinum, C. declinatum, C. limulus, C. contortum, C. karsteni, C. ranipes, C. massiliense, C. coarctatum, C. euarquatum, C. carriense, C. macroceros gallicum, C. pulchellum, C. tripos semipulchellum, Peridinium grande, Peridinium sp. , Diplopelta asymmetrica?, Gony- aulax sp. sp. , Oxytoxum elegans, Oxytoxum sp. , Goniodoma polye- dricum, Spiraulax jollifei, Blepharocysta splendormaris, Ceratocorys horrida, Pyrophacus horologicum, Dinophysis caudata (er), Phalacroma sp. , P. cuneus, Ornithocercus magnificus.

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Poroecus apiculatus, p. curtus, Dictyocysta elegans lepida, D. muelleri, Protorhabdonella simplex, Rhabdonella cornucopia, Epiplocyloides reticulata, E. ralumensis, Cyttarocylis eucecryphalus, Climacocylis scalaroides (er), Xystonella longicauda, X. treforti, Proplectella claparedei, Eutintinnus tenue (m), E. birictus (er), E. fraknoi (er), E. colligatus (er).

Station 28. 26° 23' N, 90° 44' W. Date: March 1, 1965.

Plankton of medium density; rather rich in diatoms.

ZOOPLANKTON: Nauplii more abundant than adult copepods, a pluteus, a tornaria larva, a few Fritillaria and Oikopleuridae.



DIATOMS: Stephanopyxis palmeriana, Skeletonema costatum, Guinardia flaccida, Leptocylindrus danicus, Schroderella delicatula, Gosslerella sp., Dactyliosolen mediterraneus, Rhizosolenia calcar-avis, R. hebetata, R. a. gracillima, R. bergonii, R. robusta, Bacteriastrum elongatum, Chaetoceros lacinosum, C. peruvianum, C. affine, C. (Phaeoceros) sp., C. messanense, C. compressum, C. decipiens, C. atlanticum, C. debile, C. pendulum, Eucampia cornuta, Hemiaulus membranaceus, H. sinensis, Ceratulina bergonii, Hemidiscus cuneiformis, Thalassiothrix frauenfeldii? (d), Thalassionema nitzschioides.

DINOFLAGELLATES: Gymnodinium pseudonociluca, Noctiluca scintillans, Kofoidinium velelloides, Pyrocystis hamulus, Pyrocystis sp., P. fusiformis, Ceratium gravidum, C. pentagonum tenerum, C. p. subrobustum, C. candelabrum, C. teres, C. kofoidi, C. furca, C. belone (er), C. fusus, C. falcatum, C. falcatifforme (er), C. tenue (ra), C. trichoceros, C. contrarium, C. arietinum, C. contortum, C. karsteni, C. azoricum, C. pulchellum, C. carriense, C. concilians, C. longissimum (er), Peridinium grande, P. brochi, P. inflatum, P. quarnerense, P. globulus, P. pedunculatum, P. brintoni, P. inclinatum (vr), P. spheroides, P. ovum, P. "oviforme", Peridinium sp., Goniodoma polyedricum, Gonyaulax birostris, G. polygramma, G. digitale, G. monacantha, Gonyaulax sp., Ceratocorys horrida, C. bipes (er), C. armata (er), Podolampas elegans, P. bipes, P. spinifer, P. palmipes, Blepharocysta splendormaris, Oxytoxum milneri, O. scolopax, O. constrictum, Dolichodinium lineatum, Heterodinium leiorhynchum, H. milneri, Dinophysis hastata, D. schuetti, Phalacroma argus, Ornithocercus thurni, O. quadratus, O. magnificus, Parahistioneis sp., Amphisolenia thrinax, A. lemmermanni.

SILICOFLAGELLATES: Dictyocha fibula.

COCCOLITHOPHORES: Scyphosphaera sp. and some others.

TINTINNIDS: Tintinnopsis corniger, T. lata, Codonella apicata, C. olla, Codonaria cistellula, Coxliella fasciata, Dictyocysta elegans lepida, D. muelleri, Poroecus apiculatus, P. curtus, Epilocylis undella, Epilocylloides ralumensis, Protorhabdonella simplex, P. mira, Rhabdonella cornucopia, Rhabdonellopsis apophysata, Xystonella treforti, Xystonellopsis dicymatica, Parundella inflata, Proplectella claparedei, P. parva, Amphorides quadrilineata, A. amphora, A. minor, Steenstrupiella steenstrupii, S. s. robusta, Ascampbelliella urceolata, Dadayiella ganymedes, Acathostomella minutissima, Eutintinnus tenue, E. medius, Rhabdosella cuneolata?.

CRUISE VIII A

Station I. Surface haul. March 3, 1965. 30°00.6'N, 85°54.2'W.

Plankton dominated by pelecypod veligers.

ZOOPLANKTON: Copepods and nauplii (scarce), pelecypod veligers (a), gastropod veligers, pteropods.

DIATOMS: Stephanopyxis palmeriana, some small Coscinodiscus sp., Guinardia sp.?, Rhizosolenia (ra); R. calcar-avis, R. imbricata v. schrubsolei, R. acuminata, R. alata, R. a<sup>f</sup>/indica, R. a<sup>f</sup>/gracillima, R. bergonii, Chaetoceros messanense (vr), Chaetoceros sp. (vr), Eucampia zodiacus, Hemiaulus membranaceus.

DINOFLAGELLATES: Peridinium depressum (ra), P. conicum (m), P. punctulatum, P. sp. cf. punctulatum, Diplopelta asymmetrica (ra), Gonyaulax diegensis, Dinophysis caudata.

Station I. Vertical haul.

In general this sample has the same composition as the surface haul except that the mollusks are lesser. Rhizosolenia are abundant. Also present Paralia sp. (f), Surirella sp. (er), Hemiaulus sinensis (er) and Biddulphia mobiliensis (vr).

Station III. Surface haul. March 3, 1965. 29°54.3'N, 86°01.4'W.

Plankton abundant, dominated by Rhizosolenia.

ZOOPLANKTON: Nauplii (m), adult copepods rather scarce, some pteropods.

DIATOMS: Stephanopyxis palmeriana, Coscinodiscus sp. (r), Rhizosolenia imbricata/schrubsolei (d), R. calcar-avis (m), R. alata/indica, R. stolterfothii, R. bergonii (r), Chaetoceros lorenzianum, C. messanense, C. tortissimum, Hemiaulus membranaceus, H. hauckii, Eucampia zodiacus.

DINOFLAGELLATES: Kofoidinium velelloides, Pyrocystis pseudonociluca, Ceratium fusus (r), C. furca (ra), C. tripos (m), C. massiliense (f), Gonyaulax diegensis (a), Peridinium brochi, P. latissimum, P. cf. punctulatum, P. depressum (vr), Diplopelta asymmetrica (f), Dinophysis sp. (m), D. caudata.

TINTINNIDS: Ascampbelliella urceolata.

Station III. Vertical haul.

Plankton of medium density, dominated by Rhizosolenia.

ZOOPLANKTON: Nauplii, copepods (f), Conchoecia sp. (r), some pteropods, gastropod veligers (vr), polychaete larvae (vr), a few Sagitta sp.

DIATOMS: Stephanopyxis palmeriana, Guinardia flaccida, Corethron hystrix (er), Rhizosolenia imbricata/schrubsolei (d), R. calcar-avis (ra), R. alata/gracillima, R. a./indica, R. stolterfothii, R. bergonii (vr), R. robusta (r), Chaetoceros tortissimum, C. affine, C. coarctatum (er), Hemiaulus membranaceus, Eucampia zodiacus, Biddulphia sinensis, Paralia sp., Thalassiothrix mediterranea.

DINOFLAGELLATES: Pyrocystis pseudonociluca, P. pyriforme, Ceratium furca (vr), C. massiliense (er), Peridinium depressum, P. punctulatum, P. crassipes, P. latissimum, P. oblongum, Gonyaulax diegensis, Amphisolenia bidentata.

TINTINNIDS: Ascampbelliella urceolata.

Station VIII. Surface haul. March 4, 1965. 30° 09.2'N, 86° 55.5'W.

ZOOPLANKTON: Abundant; copepods, nauplii, euphausiids, some polychaete larvae, gastropods, Oikopleuridae (a).

DIATOMS: Stephanopyxis palmeriana, Skeletonema costatum, Thalassiosira subtilis, Guinardia flaccida, Guinardia sp. ?, Rhizosolenia imbricata v. schrubsolei (ra), R. alata/indica, R. a./gracillima, R. robusta, Chaetoceros sp., Biddulphia mobiliensis, Ceratulina bergonii, Melosira sp., Asterionella japonica, Navicula sp., Thalassiothrix frauenfeldii, Gyrosigma sp.

DINOFLAGELLATES: Ceratium furca (f), C. tripos (vr), C. massiliense (vr), Gonyaulax sp. (vr), G. diegensis (r), Dinophysis caudata (r), D. fortii (er).

TINTINNIDS: Protorhabdonella simplex (er), Ascampbelliella urceolata (m), Amphorides amphora (er).

Station VIII. Vertical tow.

Plankton generally poor.

ZOOPLANKTON: A few copepods and nauplii, gastropod and pelecypod veligers, some unidentified eggs, Oikopleuridae.

DIATOMS: Stephanopyxis palmeriana, S. turris, Skeletonema costatum, Melosira sp., Guinardia flaccida, Leptocylindrus danicus, Thalassiosira subtilis, Rhizosolenia imbricata Yschrubsolei, R. alata Indica, R. a. gracillima, R. robusta, R. stolterfothii, R. bergonii (vr), Bacteri- astrum sp., Chaetoceros didymum, C. messanense, C. diversum, C. decipiens, Hemiaulus membranaceus, H. sinensis, Biddulphia mobilensis, Eucampia cornuta, E. zoodiacus, Asterionella japonica, Thalassionema nitzschioides, Thalassiothrix frauenfeldii, R. mediterraneus.

DINOFLAGELLATES: Noctiluca scintillans, Ceratium pentagonum tenerum (r), C. furca (vr), Peridinium sp., P. brochi, Diplopelta (?) sp., Gonyaulax sp., Dinophysis caudata (er).

TINTINNIDS: Epiplocyloides reticulata (er), Ascampbelliella urceolata (r), Amphorides amphora (er).

Station IX. Surface haul. March 3, 1965. 29° 30.8'N, 86° 55.5'W.

ZOOPLANKTON: Rather abundant: Euphausiids (ra), Copepods, nauplii, a few siphonophores, Sagitta sp., gastropods and pteropods (scarce), polychaetes (vr), Oikopleuridae (ra), Doliolidae, Globigerina (f).

BLUE-GREEN ALGAE: Scarce.

DIATOMS: Guinardia sp. ? (ra), Guinardia flaccida, Melosira sp.

DINOFLAGELLATES: Pyrocystis pseudonoclituca, Noctiluca scintillans, Kofoidinium velloides, Ceratium kofoidi (f), C. pentagonum tenerum (r), C. teres (r), C. candelabrum (vr), C. fusus (m), C. coarctatum (m), C. contrarium (r), C. massiliense (r), C. horridum molle (vr), C. tripos (vr), C. arietinum (er), Peridinium pedunculatum, P. brochi (m), P. oceanicum (vr), Peridinium sp., Diplopelta sp., Gonyaulax birostris, Spiraulax jollifel, Goniodoma polyedricum, Ceratocorys horrida, Dinophysis caudata, Exuviaella sp. (r).

TINTINNIDS: Codonaria cistellula, Codonella galea, Codonellopsis ortho- ceras, Dictyocysta elegans lepida, Epiplocyloides ralumensis, E. reticulata, Ascampbelliella urceolata, Proplectella parva.

Station IX. Vertical haul.

Plankton generally poor.

ZOOPLANKTON: Copepods, nauplii and euphausiids rather scarce. A few medusae, gastropod and pelecypod larvae (r), a pluteus, Oikopleuridae (r).

DIATOMS: Guinardia (?) sp., Melosira sp., Ceratulina bergonii, Chaetoceros sp.

DINOFLAGELLATES: Noctiluca scintillans (er), Pyrocystis fusiformis (er), Pyrocystis sp., Ceratium pentagonum tenerum (er), Peridinium brochi (vr), P. divergens, P. steini (?), Diplopelta sp., Exuviaella sp. (f).

Station D3. Surface haul. March 3, 1965. 29°40.1'N, 86°18.0'W.

Plankton very poor.

ZOOPLANKTON: Copepods and nauplii (r), a polychaete larva, oikopleuridae (r).

BLUE-GREEN ALGAE: Rare.

DIATOMS: Stephanopyxis palmeriana (vr), Coscinodiscus sp. (f), Guinardia (?) sp., (f), Rhizosolenia alata/gracillima (r), Gyrosigma sp. (vr), Thalassiothrix frauenfeldii (vr).

DINOFLAGELLATES: Prorocentrum sp. (er), Exuviaella sp. (vr), Ceratium pentagonum tenerum (er), C. furca (er), C. hexacanthum (er), Peridinium oceanicum oblongum (vr), P. brochi (f), Diplopelta asymmetrica (m), Goniodoma polyedricum, Dinophysis caudata, Phalacroma sp.

TINTINNIDS: Cyttarocylis eucecryphalus.

Station D3. Vertical haul.

Plankton rather poor, however, more abundant than in surface haul.

ZOOPLANKTON: Copepods, nauplii, ostracods (vr), Tomopteris sp., (er), Oikopleuridae.

BLUE-GREEN ALGAE: Scarce.

DIATOMS: Stephanopyxis palmeriana, Melosira sp., Guinardia (?) sp. (ra), Guinardia flaccida, Dactyliosolen mediterraneus, Rhizosolenia alata f. gracillima, R. a./indica, R. imbricata/schrubsolei, Chaetoceros sp., C. messanense, Navicula sp., Gyrosigma sp., Thalassiothrix mediterranea, Thalassionema nitzschioides, Asterionella japonica (vr), Nitzschia closterium.

DINOFLAGELLATES: Pyrocystis pseudonoctiluca, Noctiluca scintillans, Ceratium furca, Peridinium sp., P. pedunculatum (er), Exuviaella sp. (r).

TINTINNIDS: Dictyocysta elegans lepida (er), Coxliella fasciata, Cyttarocylis eucecryphalus, Parundella caudata (vr), Ascampbelliella urceolata, Amphorides minor.

Station A13. Surface haul. March 3, 1965. 29°10.0'N, 86°52.5'W.

Plankton very abundant, mostly copepods.

ZOOPLANKTON: Copepods (d), nauplii, a few ostracods, Sagitta sp., polychaete larvae (f), bryozoa larvae (vr), Oikopleuridae, some Radiolaria.

BLUE-GREEN ALGAE: Scarce.

DIATOMS: Stephanopyxis palmeriana, S. turris, Skeletonema costatum, Thalassiosira sp., Melosira sp., Guinardia (?) sp., Leptocylindrus danicus, Rhizosolenia alata/indica (vr), Asterionella japonica (ra), Thalassiothrix frauenfeldi, Thalassionema nitzschioides.

DINOFLAGELLATES: Ceratium praelongum, C. pentagonum tenerum, C. p. subrobustum (r), C. candelabrum (er), C. furca, C. kofoldi, C. teres, C. lineatum (er), C. fusus, C. contortum, C. limulus, C. tripos, C. horridum (er), C. gibberum (vr), C. coarctatum (vr), Peridinium latissimum, P. depressum, P. conicum, P. simulum, P. oceanicum oblongum, P. brochi, P. inflatum, Gonyaulax sp., G. birostris, G. diegensis, Goniodoma polyedricum (vr), Ceratocorys horrida (er), Dinophysis caudata (r), D. fortii (er), Phalacroma parvulum (er), Exuviaella sp., Prorocentrum micans (vr), Prorocentrum sp. (r), Pyrocystis pseudonociluca, P. fusiformis (er), Noctiluca scintillans (er).

SILICOFLAGELLATES: Dictyocha fibula.

TINTINNIDS: Cyttarocylis eucecryphalus, Rhabdonellopsis apophysata (er).

Station A13. Vertical haul.

Plankton rather poor.

ZOOPLANKTON: Copepods, nauplii, Sagitta enflata, Sagitta sp., Oikopleuridae.

DIATOMS: Stephanopyxis palmeriana, Skeletonema costatum, Thalassiosira sp., Planktoniella sol (vr), Guinardia (?) sp., Dactyliosolen mediterraneus, Rhizosolenia imbricata (vr), R. setigera (vr), R. stolterfothii (vr), Chaetoceros didymum, Hemidiscus cuneiformis, Asterionella japonica (ra), Thalassiothrix frauenfeldi, T. mediterranea, Thalassionema nitzschioides, Nitzschia closterium.

DINOFLAGELLATES: Pyrocystis pseudonociluca, Ceratium furca, C. kofoidi,  
C. teres, C. fusus, C. arietinum, C. contrarium, C. massiliense,  
Peridinium simulum, P. conicum, P. pedunculatum, Diplopelta (?) sp.,  
Podolampas palmipes, P. spinifer, P. elegans, Exuviaella sp., Dino-  
physis sp. (er), D. simplex (er), D. caudata (vr), Heteroschisma  
longialata (er), Triposolenia bicornis.

COCCOLITHOPHORES: Present.

SILICOFLAGELLATES: Dictyocha octonaria (er).

TINTINNIDS: Codonaria cistellula, Poroecus curtus, Protorhabdonella  
simplex, Dictyocysta elegans lepida, Parundella inflata, Ascamp-  
belliella urceolata, Amphorides minor, Salpingella acuminata, S.  
glockentoegei, S. faurei.

CRUISE IX

Station II. Surface. March 29, 1965. 30°07.2'N, 85°46.5'W.

Plankton relatively abundant, dominated by Dinophysis caudata.

ZOOPLANKTON: Copepods and nauplii (m), some cirripedia nauplii, pelecypod veligers (a), Oikopleuridae (vr).

DIATOMS: Scarce: Coscinodiscus sp., Stephanopyxis palmeriana (vr), Rhizosolenia alata/gracillima (r), R. imbricata schrubsolei (vr), Bacteriastrium sp., Chaetoceros decipiens, C. affine, C. diversum, Biddulphia sinensis (r), Hemiaulus membranaceus (p), Thalassiothrix frauenfeldii (the only diatom which is relatively abundant), Thalassiothrix sp.

DINOFLAGELLATES: Exuviaella sp. (m), Prorocentrum micans (vr), Prorocentrum sp. (vr), Ceratium fusus, C. furca, Ceratium tripos (abundant, subdominant), C. azoricum (vr), C. massiliense (f), Peridinium depressum (a), P. punctulatum (ra), P. brochi, P. oblongum, P. inflatum, P. cf. crassipes, P. conicum, P. simulum (vr), Diplopelta asymmetrica (ra), Gonyaulax diegensis, G. polygramma, Gonyaulax sp. (vr), Pyrophacus horologicum (r), Blepharocysta splendormaris (f), Dinophysis caudata (d), Dinophysis sp.

Station II. Vertical haul.

Plankton generally poor.

ZOOPLANKTON: Some copepods and nauplii (including cirripedia nauplii), polychaetes larvae rare, Sagitta sp., Oikopleuridae, Euglypha sp.

DIATOMS: Stephanopyxis palmeriana, Skeletonema costatum (r), Guinardia flaccida (vr), Leptocylindrus danicus, Rhizosolenia calcar-avis, R. alata/indica, R. imbricata/schrubsolei, R. robusta (er), Chaetoceros affine, C. coarctatum, C. lorenzianum, C. decipiens, C. diversum (vr), C. compressum (er), Biddulphia sinensis, Thalassiothrix sp., Thalassionema nitzschoides.

DINOFLAGELLATES: Pyrocystis pseudonociluca, Exuviaella sp., Ceratium furca, C. fusus, C. tripos, C. massiliense, Peridinium depressum, P. oceanicum oblongum, P. inflatum, P. latissimum, P. brochi, P. simulum (er), Diplopelta asymmetrica, Dinophysis caudata.



Station III. Surface haul. March 24, 1965. 29° 54. 3'N, 86° 01. 4'W.

Plankton rather poor.

ZOOPLANKTON: Copepods, copepod eggs and nauplii, Sagitta sp.

DIATOMS: Stephanopyxis palmeriana, Coscinodiscus sp., Guinardia flaccida, Rhizosolenia imbricata/schrubsolei (ra), R. alata/indica, R. a./gracillima, R. calcar avis, Chaetoceros tortissimum, Hemaulus hauckii, H. membranaceus, Thalassiothrix frauenfeldii.

DINOFLAGELLATES: Pyrocystis pseudonociluca (ra), Ceratium furca (a), C. fusus, C. pentagonum tenerum, C. tripos (d), Peridinium brochi, P. oceanicum, P. venustum, P. depressum, P. simulum, P. crassipes, P. cf. crassipes, P. conicum, Gonyaulax polygramma (a), Diplopelta asymmetrica (ra), Podolampas elegans, P. palmipes, Blepharocysta splendormaris, Prorocentrum micans, P. gracile, Exuviaella sp., Dinophysis caudata (ra), D. tripos (er), D. similis (er), Phalacroma sp. (ra).

Station III. Vertical haul. 29° 54. 3'N, 86° 01. 4'W. Date: March 24, 1965.

Plankton very poor.

ZOOPLANKTON: Copepods, nauplii, some very primitive polychaete larvae, Oikopleuridae.

DIATOMS: Stephanopyxis turris, S. palmeriana, Skeletonema costatum, Coscinodiscus sp. (r), Rhizosolenia imbricata/schrubsolei, R. alata, R. a. f. indica, R. stolterfothii, R. calcar avis, R. hebetata (er), R. bergonii (er), Chaetoceros lorenzianum, C. peruvianum (vr), Eucampia zodiacus, Asterionella japonica, Pleurosigma sp., Thalassionema nitzschioides.

DINOFLAGELLATES: Exuviaella sp., Ceratium furca, C. tripos, C. massiliense, Peridinium brochi, P. excentricum, P. depressum, P. cf. crassipes, P. oceanicum oblongum, Gonyaulax polygramma, Blepharocysta splendormaris, Podolampas palmipes (vr), Phalacroma sp., Dinophysis caudata.

Station III. Surface haul. March 29, 1965.

ZOOPLANKTON: Abundant: Copepods, nauplii, Sagitta sp., pteropods, pelecypod veligers, Doliolum sp., siphonophores (vr).

BLUE-GREEN ALGAE: Scarce.

DIATOMS: Coscinodiscus sp. (vr).

DINOFLAGELLATES: Gymnodinium cf. multistriatum (er), G. pseudonociluca (er), Ceratium furca (f), C. tripos (f), Exuviaella sp. (ra), Prorocentrum sp. (vr), Peridinium depressum, P. conicum, P. brochi, P. oceanicum oblongum, P. crassipes, Diplopelta asymmetrica (ra), Gonyaulax polygramma (m), Dinophysis caudata (m), D. similis (vr).

Station III. Vertical haul, 30-0 m. March 29, 1965.

Plankton rather poor, dominated by dinoflagellates, especially Dinophysis caudata and Ceratium tripos. This sample is significantly different from the surface haul.

ZOOPLANKTON: Copepods, nauplii, Sagitta sp., pelecypod larvae (m), Gastropod larvae (vr).

DIATOMS: Rhizosolenia imbricata/schrubsolei (vr), R. calcar avis (er), Ceratulina bergonii, Thalassionema nitzschioides.

DINOFLAGELLATES: Ceratium furca, C. tripos (subdominant), C. massiliense, C. fusus, Peridinium oceanicum oblongum, P. obtusum (er), P. brochi (a), P. conicum, P. punctulatum, P. cf. crassipes, P. pentagonum, P. depressum, P. simulum (vr), Diplopelta asymmetrica (m), Exuviaella sp., Prorocentrum sp., P. micans, Dinophysis caudata (d).

TINTINNIDS: Stenosemella ventricosa (er), Ascampbelliella urceolata (er).

Station V. Surface haul. March 23, 1965. 29°28.1'N, 86°46.2'W.

Plankton poor, dominated by copepods and nauplii.

ZOOPLANKTON: Copepods, nauplii, an amphipod, Oikopleuridae (r).

BLUE-GREEN ALGAE: Scarce.

DIATOMS: Stephanopyxis palmeriana (vr), skeletonema costatum (f), Guinardia sp. ? (f), Coscinodiscus sp. (r), Rhizosolenia alata f. gracillima (vr), Hemiaulus membranaceus (vr), Hemidiscus cuneiformis (vr), Thalassionema nitzschioides (vr).

DINOFLAGELLATES: Pyrocystis pseudonoctiluca (r), P. fusiformis (r), Ceratium tripos (f), Peridinium oceanicum oblongum (f), P. conicum (f), P. simulum (vr), P. depressum (vr), P. brochi (vr), Ceratocorys horrida (vr), Gonyaulax birostris (er), Diplopelta asymmetrica (f), Pyrophacus horologicum (er), Goniodoma polyedricum (vr), Exuviaella sp. (f), Proocentrum sp. (er), Dinophysis caudata (f), D. tripos (er), Phalacroma rapa (er), Ornithocercus quadratus (er).

TINTINNIDS: Tintinnopsis corniger, Codonellopsis orthoceras (er), Epilocyloides ralumensis (er), E. reticulata (er), Amphorides minor (vr), Proplectella parva (er), Eutintinnus similis (er), E. tenue (er).

Station VI. Surface haul. March 23, 1965. 30°07.8'N, 86°26.0'W.

Plankton very badly preserved.

ZOOPLANKTON: Copepods (fragments).

DIATOMS: Stephanopyxis (turris?) is the most abundant diatom, S. palmeriana, Skeletonema costatum, Schroederella delicatula, Rhizosolenia calcar-avis, R. alata/indica, R. stolterfothii, Chaetoceros sp., Biddulphia mobiliensis, B. sinensis, Hemiaulus sinensis, Thalassiothrix frauenfeldi, Thalassionema nitzschioides.

DINOFLAGELLATES: Exuviaella sp., Diplopelta asymmetrica, Peridinium punctulatum, Peridinium sp., Gonyaulax polygramma (vr), Dinophysis caudata.

Station VI. Vertical haul. March 23, 1965. 30°07.8'N, 86°26.0'W

Plankton rather poor.

ZOOPLANKTON: Copepods and a few nauplii.

DIATOMS: Stephanopyxis turris (a), S. palmeriana (r), Skeletonema costatum (m), Coscinodiscus sp., Schroederella delicatula, Rhizosolenia calcar-avis, R. stolterfothii, R. imbricata/schrubsolei, R. alata/indica, Chaetoceros lorenzianum, C. didymum, Hemidiscus sinensis, Eucampia oodiacus, Asterionella japonica (vr), Gyrosigma sp., Pleurosigma sp., Nitzschia seriata (a), Nitzschia sp. (a), Thalassionema nitzschioides (ra), Thalassiothrix frauenfeldi (ra), T. mediterranea.

DINOFLAGELLATES: Exuviaella sp. (a), Ceratium furca, C. massiliense, C. tripos, Peridinium oceanicum oblongum, P. conicum, P. excentricum, P. punctulatum, Diplopelta asymmetrica, Gonyaulax polygramma, Dinophysis caudata.

TINTINNIDS: Tintinnopsis gracilis (er), Ascampelliella urceolata (er).

Station VI. Vertical haul, 37-0 m. March 29, 1965.

Plankton poor.

ZOOPLANKTON: Copepods, nauplii, Sagitta sp., immature (vr), Oikopleuridae.

DIATOMS: Stephanopyxis turris (ra), S. palmeriana, Melosira moniliformis, Guinardia flaccida, Rhizosolenia imbricata/schrubsolei (a), R. calcaravis (ra), R. alata/indica, R. robusta, Bacteriastrum sp., Chaetoceros aff., C. affine/willei, C. lorenzianum, C. peruvianum (vr), Eucampia zodiacus, Biddulphia mobiliensis, B. sinensis, Thalassiosira rotula?, Thalassiothrix mediterranea (d), Thalassionema nitzschioides (sd), Pleurosigma sp., Asterionella japonica (r).

DINOFLAGELLATES: Prorocentrum sp., Exuviaella sp., Ceratium tripos, Peridinium brochi, P. punctulatum, P. excentricum (f), Diplopelta asymmetrica, Gonyaulax monacantha?, Dinophysis caudata.

Station VI. Surface haul. March 29, 1965. 30° 07.8'N, 86° 26.0'W.

Plankton rather poor, phytoplankton very scarce.

ZOOPLANKTON: Copepods, nauplii, copepod eggs, some rotifers, pelecypod and gastropod veligers, pteropods (r), Oikopleurida (ra).

DIATOMS: Rhizosolenia alata/indica, R. imbricata/schrubsolei.

DINOFLAGELLATES: Pyrocystis pseudonociluca, Ceratium furca (r), P. divergens (r), P. inflatum (vr), P. brochi (f), P. cf. crassipes (er), P. conicum (vr), P. depressum (er), Diplopelta asymmetrica (f), Gonyaulax polygramma (m), Goniodoma polyedricum (vr), Scrippsiella sweeneyae (r), Exuviaella sp. (ra), Prorocentrum sp. (r), Dinophysis caudata (m), D. fortii (er).

TINTINNIDS: Ascampelliella urceolata (er).

Station VII. Surface haul. March 29, 1965. 30°02.9'N, 86°12.2'W.

Phytoplankton poor, zooplankton abundant.

ZOOPLANKTON: Copepods, nauplii, copepod eggs, some medusae, small pteropods, pelecypod veligers, Oikopleuridae, Doliolum (a).

DIATOMS: Very scarce: A few small Coscinodiscus sp., Rhizosolenia alata/indica, Chaetoceros lorenzianum.

DINOFLAGELLATES: Exuviaella sp., Prorocentrum sp., Ceratium furca, C. kofoidi, Peridinium depressum, P. brochi, P. simulum, P. oceanicum oblongum, P. crassipes, Peridinium sp., Gonyaulax sp. (m), Diplopelta asymmetrica (vr), Dinophysis caudata, D. similis.

Station VII. Vertical haul.

Plankton medium to rather poor.

ZOOPLANKTON: Copepods, nauplii, Conchoecia sp., a brachiopod larva, pelecypod veligers (ra), pteropods (m), Sagitta enflata, Oikopleuridae, benthonic foraminifera.

BLUE-GREEN ALGAE: A few filaments.

DIATOMS: Very scarce: Coscinodiscus sp., Guinardia flaccida, Rhizosolenia calcar-avis, Chaetoceros affine, Paralia sp., Thalassiothrix sp.

DINOFLAGELLATES: Exuviaella sp. (ra), Prorocentrum sp. (r), Ceratium furca, C. pentagonum tenerum, C. fusus, C. tripos (ra), C. gibberum (vr), Peridinium brochi (ra), P. oceanicum oblongum, P. depressum, P. simulum, P. inflatum, Peridinium conicum, Peridinium sp. cf. P. crassipes, Diplopelta asymmetrica (ra), Gonyaulax (ra), G. polygramma, Gonyaulax sp., Blepharocysta splendormaris, Dinophysis caudata (ra), Phalacroma sp. (vr).

TINTINNIDS: Tintinnopsis gracilis (er).

Station VIII. Surface haul, March 23, 1965. 30°09.2'N, 86°55.5'W.

Plankton rather poor, badly preserved.

ZOOPLANKTON: Copepods, nauplii.

DIATOMS: Stephanopyxis turris (d), S. palmeriana, Schroderella sp. ?,  
Rhizosolenia alata/gracillima (vr), R. alata/indica (r), R. setigera,  
Chaetoceros affine (vr), Chaetoceros sp. (vr), Eucampia zoodiacus  
Biddulphia sinensis, Thalassiothrix sp. (ra), Fragilaria sp.

DINOFLAGELLATES: Peridinium conicum, P. oceanicum oblongum, Diplopelta  
asymmetrica (ra), Exuviaella sp. (ra), Dinophysis caudata (ra).

TINTINNIDS: Ascampbelliella urceolata (vr).

Station VIII. Vertical haul.

Plankton rather poor.

ZOOPLANKTON: Copepods, nauplii, some polychaete segments, a few  
foraminifera.

DIATOMS: Stephanopyxis turris, S. palmeriana, Skeletonema costatum,  
Coscinodiscus sp., Guinardia flaccida, Rhizosolenia calcar avis, R.  
alata/indica, R. imbricata/Schrubsolei, Chaetoceros lorenzianum, C.  
compressum, C. curvisetum, Biddulphia mobiliensis, B. sinensis,  
Lithodesmium undulatum, Asterionella japonica, Thalassiothrix frauen-  
feldii, Thalassionema nitzschioides, Paralia sp., Pleurosigma sp.

DINOFLAGELLATES: Exuviaella sp. (m), Proocentrum sp. (vr), Ceratium  
furca (er), C. tripos (er), C. trichoceros (er), Diplopelta asymmetrica  
(f), Dinophysis caudata, Phalacroma sp.

TINTINNIDS: Tintinnopsis gracilis, Favella taraikaensis.

Station IX. Surface haul. March 23, 1965. 29° 30.8'N, 86.55.5'W.

Plankton of medium density, dominated by Skeletonema.

ZOOPLANKTON: Some copepods and nauplii.

BLUE-GREEN ALGAE: Scarce.

DIATOMS: Skeletonema costatum (a, d), Coscinodiscus sp., Guinardia  
flaccida, Chaetoceros sp., Thalassionema nitzschioides (m).

DINOFLAGELLATES: Exuviaella sp. (f), Ceratium furca, C. pentagonum  
tenerum, C. tripos, C. coarctatum, C. karsteni, C. gibberum (er),  
Peridinium conicum (m), P. oceanicum oblongum (r), P. simulum (vr),  
P. punctulatum?, Peridinium sp., Diplopelta asymmetrica, Goniodoma  
polyedricum, Ceratocorys horrida, C. armata, Dinophysis caudata.

TINTINNIDS: Favella taraikaensis (vr), Dictyocysta elegans lepida (m),  
Eutintinnus tenue (er).

Station IX. Vertical haul.

Plankton rather poor, dominated by zooplankton.

ZOOPLANKTON: Copepods, nauplii, Ostracods (vr), polychaetes (vr).

DIATOMS: Skeletonema costatum (very reduced in number, compared with the surface sample), Coscinodiscus sp., Hemiaulus hauckii, Stephanopyxis palmeriana, Rhizosolenia hebetata, Hemidiscus cuneiformis.

DINOFLAGELLATES: Pyrocystis fusiformis, Exuviaella sp., Ceratium pentagonum tenerum, C. belone, C. trichoceros, C. lunula, C. contrarium, C. arietinum, Peridinium brochi, P. conicum, P. pedunculatum, P. simulum, P. punctulatum, Ceratocorys horrida, Dinophysis schuetti, D. caudata.

TINTINNIDS: Codonaria cistellula, Eutintinnus medius.

Station XI. Surface haul. March 30, 1965. 28°45.0'N, 86°19.4'W

Plankton rather poor, dominated by zooplankton.

ZOOPLANKTON: Copepods, nauplii, ostracods, a few small medusae, Sagitta sp., polychaetes (vr), pteropods, gastropod veligers, Oikopleuridae, Doliolum sp.

DIATOMS: Rhizosolenia styliformis/<sup>f</sup>latissima (er), Chaetoceros coarctatum (er).

DINOFLAGELLATES: Pyrocystis fusiformis, P. pseudonociluca, Ceratium furca, C. kofoldi (er), C. pentagonum tenerum, C. fusus, C. extensum (er), C. tripos, Peridinium conicum (a), P. brochi (ra), P. simulum, P. oceanicum oblongum, P. pedunculatum, P. depressum (vr), P. pentagon (er), Diplopelta asymmetrica, Goniodoma sphaericum, G. polyedricum (r), Gonyaulax sp., Spiraulax jollifei (er), Exuviaella sp. (f), Dinophysis caudata (m), D. fortii (er), D. diegensis (er).

Station XI. Vertical haul.

Plankton very poor.

ZOOPLANKTON: Copepods, nauplii, polychaete (er), Oikopleuridae, Sticholonche zanclea (radiolaria).

DIATOMS: Skeletonema costatum (f), Stephanopyxis palmeriana, Rhizosolenia setigera, Chaetoceros (Phaeoceros) sp., C. affine, Thalassionema nitzschoides.

DINOFLAGELLATES: Ceratium kofoidi, C. pentagonum tenerum, C. euarcuatum, Peridinium brochi, P. inflatum, Scrippsiella sweeneyae, Dinophysis caudata.

TINTINNIDS: Parundella inflata, Ascampbelliella urceolata, Amphorides minor, Eutintinnus tenue.

Station XII. Surface haul. March 30, 1965. 28° 57.3'N, 86° 25.6'W.

Plankton of medium density.

ZOOPLANKTON: Copepods, nauplii, Sagitta sp., pteropods (r), gastropods (r), Oikopleuridae (a), Doliolum sp. (vr), Euglypha sp. (f).

BLUE-GREEN ALGAE: Filaments present.

DIATOMS: Chaetoceros coarctatum (vr), Hemiaulus membranaceus (r).

DINOFLAGELLATES: Ceratium pentagonum tenerum (ra), C. furca, C. cande-  
labrum (er), C. fusus (r), C. tripos, C. t. semipulchellum (vr),  
C. gibberum (vr), C. contortum (vr), C. massiliense (vr), C. declinatum  
(vr), C. trichoceros (vr), Peridinium oblongum, P. brochi, P. peduncu-  
latum, P. depressum, P. steini, P. inflatum, P. conicum, Scrippsiella  
sweeneyae (m), Ceratocorys horrida (r), Gonyaulax monacantha (m),  
Goniodoma polyedricum (r), Exuviaella sp. (p), Prorocentrum sp.  
(vr), Dinophysis caudata, D. diegensis, D. fortii, Dinophysis sp.

TINTINNIDS: Parundella inflata, Amphorides minor.

Station XII. Vertical haul.

Plankton rather poor.

ZOOPLANKTON: Copepods, nauplii, pteropods (f), gastropod veligers (r), a few polychaete larvae, an asteroid larva, Sagitta sp., very young (r), Oikopleuridae (m), Fritillaria sp. (vr), some ascidian eggs. (?)



BLUE-GREEN ALGAE: Very scarce.

DIATOMS: Very scarce: Guinardia flaccida, Rhizosolenia setigera, R. cylindrus, Chaetoceros messanense, Hemiaulus membranaceus.

DINOFLAGELLATES: Pyrocystis pseudonociluca (f), Kofoidinium velelloides (vr), Ceratium gravidum, C. furca, E. arletinum, C. coarctatum, C. massiliense, C. euarctatum, Peridinium brochi, P. pedunculatum, P. inflatum, P. conicum, Diplopelta asymmetrica, Goniodoma polyedricum, Gonyaulax sp., Ceratocorys horrida, Podolampas palmipes, Pyrophacus horologicum, Oxytoxum sp. cf. O. parvum, Exuviaella sp., Phalacroma cuneus, Dinophysis caudata, Dinophysis sp., Ornithocercus quadratus, O. steini.

COCCOLITHOPHORES: Few.

TINTINNIDS: Poroecus curtus, Dictyocysta elegans lepida, Cyttarocylis eucecryphalus, Parundella inflata, Ascampbelliella urceolata, Amphorides minor, Xystonellopsis dicymatica, Eutintinnus tenue.

Station T16. Surface haul. March 23, 1965. 29°41.2'N 87°06.7'W.

Plankton rather poor, not well preserved.

ZOOPLANKTON: Copepods, nauplii.

BLUE - GREEN ALGAE: Few filaments.

DIATOMS: Very scarce: Guinardia flaccida, Hemidiscus cuneiformis.

DINOFLAGELLATES: Pyrocystis fusiformis, P. pseudonociluca, Ceratium pentagonum tenerum, C. tripos, C. t. semipulchellum, C. coarctatum, C. massiliense, Peridinium oceanicum oblongum, P. conicum, P. depressum, Diplopelta asymmetrica, Goniodoma polyedricum, Pyrophacus horologicum, some plates of Ceratocorys horrida, Exuviaella sp. (m), Prorocentrum sp. (er), Phalacroma argus, Dinophysis caudata, Ornithocercus quadratus, Amphisolenia bidentata.

TINTINNIDS: Dictyocysta elegans lepida (r), Cyttarocylis eucecryphalus (vr), Ascampbelliella urceolata (m), Eutintinnus fraknoi.

Station T16. Vertical haul.

Plankton poor.

ZOOPLANKTON: Copepods, nauplii.

DIATOMS: Coscinodiscus sp. (vr).

DINOFLAGELLATES: Ceratium furca, C. pentagonum subrobustum, C. coarctatum, C. arietinum, C. tripos, C. lunula, Peridinium brochi, P. oceanicum oblongum, Peridinium sp. cf. P. obtusum, Diplopelta asymmetrica, Podolampas bipes, P. elegans, Exuviaella sp. (m), Prorocentrum sp. (vr), Dinophysis caudata.

TINTINNIDS: Parundella inflata.

Station D3. Surface haul. March 23, 1965. 29°40.1N, 86°18.0'W.

Plankton abundant, dominated by the zooplankton.

ZOOPLANKTON: Copepods (a), nauplii (a), copepod eggs, Conchoecia sp.

DIATOMS: Scarce: Stephanopyxis turris, S. palmeriana, Skeletonema costatum, Coscinodiscus sp., Guinardia flaccida, Rhizosolenia stolterfothi, R. alata indica.

DINOFLAGELLATES: Ceratium furca, Peridinium oceanicum oblongum, P. conicum, P. simulum, P. depressum (vr), Peridinium aff. punctulatum, Diplopelta asymmetrica (ra), Prorocentrum sp. (ra), Exuviaella sp., Gonyaulax sp. (m), Dinophysis caudata.

Station D3. Vertical haul.

Plankton rather poor; diatoms are more abundant in this vertical haul than in the surface sample.

ZOOPLANKTON: Nauplii (m), adult copepods (f).

DIATOMS: Skeletonema costatum (m), Stephanopyxis turris, S. palmeriana, Thalassiosira sp., Coscinodiscus sp., Leptocylindrus danicus, Guinardia flaccida, Rhizosolenia imbricata, schrubsolei, R. stolterfothi, R. alata, indica?, R. setigera, R. robusta, Chaetoceros lorenzianum, C. difficile, Chaetoceros sp., Lithodesmium undulatum, Hemiaulus sinensis, Thalassionema nitzschioides, Asterionella japonica.

DINOFLAGELLATES: Ceratium furca (f), C. pentagonum tenerum (r), C. candelabrum (er), C. teres (er), C. tripos (vr), Peridinium claudicans, P. oceanicum oblongum, P. conicum (vr), P. obtusum, P. simulum, Diplopelta asymmetrica, Gonyaulax polygramma, Exuviaella sp., Prorocentrum sp., Dinophysis caudata (f), Phalacroma sp. (vr).

Station D3. Surface haul. March 30, 1965. 29°40.1N, 86°18.0'W.

Plankton poor.

ZOOPLANKTON: Nauplii (ra), copepods, Conchoecia (vr), Euphausia sp. (vr), a few medusae, gastropods (scarce), pteropods and pelecypods, Oikopleuridae (f), Doliolidae (Doliopsis?, ra).

BLUE-GREEN ALGAE: Rather scarce.

DIATOMS: Very scarce: Stephanopyxis palmeriana (vr), Coscinodiscus sp. (er).

DINOFLAGELLATES: Ceratium furca (r), C. belone (er), C. tripos (r), Peridinium conicum (ra), P. depressum, P. simulum (m), P. punctulatum, P. oceanicum oblongum, P. inflatum, P. brochi, Diplopelta asymmetrica (m), Exuviaella sp. (ra), Prorocentrum sp. (f), Goniodoma polyedricum, Gonyaulax polygramma, Gonyaulax sp., Dinophysis caudata (f), Dinophysis sp. (f), Ornithocercus magnificus (er).

TINTINNIDS: Eutintinnus medius (er).

Station D3. Vertical haul.

Plankton poor, great amount of detritus. The only plankters of certain importance are the diatoms.

DIATOMS: Stephanopyxis turris, S. palmeriana, Coscinodiscus sp., Rhizosolenia imbricata schrubsolei, R. acuminata, R. robusta, R. alata indica, R. setigera, Chaetoceros affine, Navicula sp., Thalassiothrix mediterranea.

DINOFLAGELLATES: Scrippsiella sweeneya, Exuviaella sp.

Station D5. Surface haul. March 30, 1965. 29°31.5'N, 86°27.7'W.

Plankton poor.

ZOOPLANKTON: Nauplii, a few adult copepods, pteropods, a bryozoa larva, some unidentified eggs, Oikopleuridae (vr).

BLUE-GREEN ALGAE: Scarce.

DIATOMS: Hemiaulus membranaceus (er).

DINOFLAGELLATES: Kofoidinium velelloides, Pyrocystis pseudonoctiluca, Ceratium furca, C. tripos, C. karsteni, C. contortum, Peridinium conicum, P. brochi, P. oceanicum, P. depressum, P. pellucidum?, P. simulum, P. quarnerense, Diplopelta asymmetrica, Gonyaulax sp., Goniodoma polyedricum, Ceratocorys horrida (er), Exuviaella sp., Dinophysis caudata, Dinophysis sp. (er).

TINTINNIDS: Salpingella glockentoegeri.

Station D5. Vertical haul.

Plankton very poor.

ZOOPLANKTON: Copepods, nauplii, a few medusae, a polychaete larva, some rotifers, Oikopleuridae, Fritillaria sp., Doliolidae.

BLUE-GREEN ALGAE: Scarce.

DIATOMS: Skeletonema costatum (m), Guinardia flaccida (vr), Chaetoceros tortissimum (vr), Thalassionema nitzschioides (vr), Thalassiothrix mediterranea (r).

DINOFLAGELLATES: Pyrocystis fusiformis, Ceratium furca (vr), C. tripos (er), C. contrarium (er), Peridinium conicum, P. oceanicum oblongum, P. brochi, P. simulum, P. cf. pellucidum, Gonyaulax sp., Goniodoma polyedricum, Ceratocorys horrida, Exuviaella sp., Dinophysis caudata, Dinophysis tripos (er), Phalacroma argus.

TINTINNIDS: Amphorides quadrilineata, Eutintinnus tenue.

Station D11. Surface haul. March 30, 1965. 29°23.8'N, 86°16.1'W.

Plankton rather poor.

ZOOPLANKTON: Copepods and nauplii (not very abundant; adults scarce), bryozoa larvae (vr), gastropod veligers (m), pteropods (f), a few small medusae and Oikopleuridae.

BLUE-GREEN ALGAE: Not very scarce.

DINOFLAGELLATES: Ceratium pentagonum tenerum, C. furca, Peridinium brochi, P. inflatum, P. depressum, P. conicum, P. simulum, P. cf. crassipes, Gonyaulax polygramma, Goniodoma polyedricum, Diplopelta asymmetrica, Exuviaella sp. (m), Prorocentrum sp. (f), Ornithocercus magnificus, Dinophysis fortii, Dinophysis caudata (m).

Station D11. Vertical haul.

Plankton very poor.

ZOOPLANKTON: Copepods and nauplii scarce, Oikopleuridae (r), Globigerina sp. (er), a rotifer.

BLUE-GREEN ALGAE: Rare

DIATOMS: Stephanopyxis turris (vr), Guinardia flaccida (er), Chaetoceros decipiens? (er), Thalassionema nitzschioides (vr).

DINOFLAGELLATES: Peridinium simulum (er).

TINTINNIDS: Ascampbelliella urceolata (er).

Station D17. Surface haul. March 30, 1965. 29°09.0'N, 86°12.5'W.

Plankton rather poor.

ZOOPLANKTON: Copepods, nauplii, pteropods (ra), Gastropods (vr), immature Sagitta sp. (r), polychaete larvae (vr), Oikopleuridae (ra).

BLUE-GREEN ALGAE: Medium density.

DIATOMS: Chaetoceros coarctatum (vr).

DINOFLAGELLATES: Pyrocystis fusiformis, P. pseudonociluca, Ceratium furca, (ra), C. pentagonum tenerum (m), C. gibberum (f), C. karsteni (vr), C. contortum (vr), C. declinatum (r), C. tripos (f), C. t. semipulchellum (r), C. trichoceros (er), C. lunula (er), C. symmetricum (er), C. azoricum (er), Peridinium conicum (a), P. brochi, P. oceanicum oblongum, P. simulum, P. steini, P. depressum, P. pellucidum, P. pentagonum, P. "oviforme", P. punctulatum, P. ovum, Ceratocorys horrida (r, most of them deformed), Goniodoma polyedricum (f), G. sphaericum (f), Diplopelta asymmetrica (r), Gonyaulax polygramma, G. fragilis (r), Spiraulax tollifei (er), Scrippsiella sweeneyae (f), Pyrophacus horologicum (er), Exuviaella sp. (ra), Prorocentrum gracile, P. micans, P. scutellum, Dinophysis caudata (f), D. fortii (r), D. recurva (r).

TINTINNIDS: Epiplocyloides reticulata acuta (er).

Station D17. Vertical haul.

Plankton poor.

ZOOPLANKTON: Nauplii, copepods, a few polychaete larvae and young Sagitta sp., Oikopleuridae (r), Sticholonche zanclea.

DIATOMS: Rather scarce: Skeletonema costatum (the only relatively abundant species), Guinardia flaccida, Leptocylindrus danicus, Lithodesmium undulatum.

DINOFLAGELLATES: Ceratium incisum, C. furca, C. pentagonum tenerum, C. coarctatum, C. lunula, C. tripos, Peridinium cf. divergens, P. brochi, P. inflatum, P. conicum, P. oceanicum oblongum, P. depressum, P. quarnerense, Diplopelta asymmetrica, Scrippsiella sweeneyae (vr), Goniodoma polyedricum, Gonyaulax fragilis, Gonyaulax sp., Ceratocorys horrida (er), Exuviaella sp. (m), Prorocentrum sp. (vr).

TINTINNIDS: Dictyocysta elegans lepida, Protorhabdonella simplex, Xystonellopsis cymatica, Proplectella parva, Eutintinnus tenue.

Station D18. Surface haul. March 31, 1965. 29°23.7'N, 85°35.1'W.

Plankton rather poor; the most important elements are the copepods and the dinoflagellates.

ZOOPLANKTON: Copepods, nauplii, Euphausia sp., pteropods, gastropod and pelecypod larvae, Sagitta sp.

DIATOMS: Stephanopyxis palmeriana, Coscinodiscus sp., Guinardia flaccida, Rhizosolenia imbricata vschrubsolei, R. calcar-avis, R. stolterfothii, R. bergonii (r), R. robusta (er), Bacteriastrium sp., Hemiaulus sinensis, H. membranaceus, Thalassionema nitzschioides, Thalassiothrix mediterranea.

DINOFLAGELLATES: Pyrocystis pseudonociluca (ra), Noctiluca scintillans, Kofoidinium velloides, Ceratium furca (m), C. fusus, C. tripos (a), C. massiliense, C. trichoceros (vr), Peridinium brochi, P. depressum, P. simulum, Diplopelta asymmetrica, Gonyaulax sp., Exuviaella sp., Prorocentrum sp. (r), Dinophysis caudata (ra), Phalacroma sp.

Station D18. Vertical haul.

Plankton more abundant than in the surface haul; detritus.

ZOOPLANKTON: Copepods and nauplii scarce, a few Sagitta sp., pelecypod veligers, some nematods and foraminifera.

DIATOMS: Stephanopyxis turris (ra), S. palmeriana, Skeletonema costatum, Coscinodiscus sp., Thalassiosira sp., Leptocylindrus danicus, Rhizosolenia imbricata/Schrubsolei (the most abundant diatom), R. calcaravis, R. stolterfothii, R. bergonii, Chaetoceros curvisteum, C. affine, Bacteriastrum sp., Guinardia flaccida, Biddulphia sinensis, B. mobiliensis, Hemiaulus sinensis, H. membranaceus, Thalassionema nitzschioides, Thalassiothrix mediterranea, Eucampia zoodiacus, Gyrosigma sp. (ra), Navicula sp. sp., Asterionella japonica (ra), Paralia sp.

DINOFLLAGELLATES: Ceratium furca, C. tripos, Peridinium brochi, P. inflatum, P. punctulatum, P. excentricum, P. divergens, Diplopelta asymmetrica (r), Gonyaulax sp. (r), Prorocentrum sp. (vr), Exuviaella sp. (r), Dinophysis caudata (f), Dinophysis sp. (vr).

Station D20. Surface haul. March 31, 1965. 29°14.2'N, 85°46.3'W.

ZOOPLANKTON: Abundant: Copepods, nauplii, copepod eggs, Conchoecia, Sagitta enflata (ra), Sagitta sp., pteropods, gastropod veligers, a small medusa, cyphonaute larvae (r), Doliolum sp., Oikopleuridae.

BLUE-GREEN ALGAE: A few filaments.

DINOFLLAGELLATES: Ceratium furca (vr), C. tripos (er), Peridinium brochi (m), P. depressum (f), P. conicum (vr), P. oceanicum oblongum (vr), Goniodoma polyedricum (m), Diplopelta asymmetrica (ra), Gonyaulax monacantha (m), Exuviaella sp. (f), Prorocentrum sp. (r), Dinophysis caudata (ra), D. fortii (r), Phalacroma sp. (vr).

Station D20. Vertical haul.

Plankton very poor.

ZOOPLANKTON: Some copepods and nauplii, polychaete larvae, Oikopleuridae, benthonic foraminifera.

BLUE-GREEN ALGAE: A few filaments.

DIATOMS: Thalassiosira sp., T. subtilis, Rhizosolenia imbricata/Schrubsolei, R. a. indica, R. robusta, Chaetoceros decipiens, Biddulphia mobiliensis, Hemiaulus sinensis.

DINOFLLAGELLATES: Pyrocystis pseudonociluca, Ceratium furca (r), C. pentagonum tenerum (er), Peridinium brochi, P. conicum, P. simulum, Diplopelta asymmetrica, Gonyaulax sp., Exuviaella sp. (f), Prorocentrum sp. (r), Phalacroma sp. (e. r.), Dinophysis caudata (m).

Station D22. Surface haul. March 30, 1965. 29°00.6'N, 86°01.9'W.

Plankton rather poor, dominated by copepods.

ZOOPLANKTON: Adult copepods (a), nauplii (f), some ostracods, a cypris larva, a tornaria larva, some Oikopleuridae, polychaetes (vr), gastropod and pelecypod veligers.

BLUE-GREEN ALGAE: Rather scarce.

DINOFLAGELLATES: Pyrocystis fusiformis (er), Ceratium candelabrum, C. furca, C. tripos, C. concilians, Peridinium conicum (ra), P. brochi, P. depressum, P. oceanicum oblongum, P. simulum, P. pedunculatum, P. cf. pellucidum, Diplopelta asymmetrica, Gonyaulax monacantha, Goniodoma polyedricum, G. sphaericum, Ceratocorys horrida (er), Dinophysis caudata (m).

TINTINNIDS: Rhabdonella elegans (er).

Station D22. Vertical haul.

Plankton very poor.

ZOOPLANKTON: Nauplii, adult copepods (r), copepod eggs, Oikopleuridae (vr).

BLUE-GREEN ALGAE: Scarce.

DIATOMS: Very Scarce: Skeletonema costatum (vr), Coscinodiscus sp. (er), Pleurosigma sp. (er).

DINOFLAGELLATES: Exuviaella sp., Ceratium furca, C. fusus, C. coarctatum, C. tripos, Peridinium obtusum?, P. inflatum, P. brochi, P. conicum, P. simulum, Diplopelta asymmetrica, Goniodoma polyedricum, Dinophysis caudata, Dinophysis sp.

Station T2. Surface haul. March 30, 1965. 29°45.9'N, 86°25.8'W.

Plankton rather poor.

ZOOPLANKTON: Copepods, nauplii, copepod eggs, bryozoa larvae, some gastropod and pelecypod veligers, pteropods, polychaete larvae (er), Oikopleuridae (f).



BLUE-GREEN ALGAE: Rather abundant.

DIATOMS: Scarce: Rhizosolenia alata<sup>f</sup>, gracillima, R. imbricata<sup>v</sup>, Schrubsolei,  
Ceratulina bergonii.

DINOFLAGELLATES: Ceratium furca, C. pentagonum tenerum, C. gibberum,  
C. tripos, Peridinium brochi, P. conicum, P. depressum, P. simulum,  
P. oceanicum oblongum, Gonyaulax polygramma, Gonyaulax sp.,  
Diplopelta assymetrica, Goniodoma polyedricum, Spiraulax jollifei,  
Ceratocorys horrida, Exuviaella sp. (r), Prorocentrum sp. (vr), Dino-  
physis sp., D. caudata.

Station T2. Vertical haul.

Plankton very poor.

ZOOPLANKTON: Copepods and nauplii scarce, a polychaete larva, Oikopleuri-  
dae (er).

DIATOMS: Very scarce: Stephanopyxis palmeriana, Biddulphia mobiliensis,  
Thalassiothrix mediterranea.

BLUE-GREEN ALGAE: Rather scarce: nonetheless they are the most  
important phytoplankters.

DINOFLAGELLATES: Ceratium pentagonum tenerum, C. tripos, Peridinium  
conicum, P. brochi, P. simulum, P. depressum, Diplopelta asymmetrica,  
Gonyaulax sp. (r), Goniodoma polyedricum, Dinophysis caudata, Phala-  
croma sp.

Station T3. Surface haul. March 23, 1965. 29° 52. 0'N, 86° 34. 0'W.

Plankton abundant; badly preserved.

ZOOPLANKTON: Copepods and nauplii.

DIATOMS: Guinardia flaccida

DINOFLAGELLATES: Peridinium conicum (ra), P. oceanicum oblongum, P.  
depressum, P. punctulatum, Diplopelta asymmetrica (ra), Goniodoma  
polyedricum, Spiraulax jollifei, some plates of Ceratocorys horrida,  
Exuviaella sp., Prorocentrum sp., Dinophysis caudata, Phalacroma  
argus, Phalacroma sp.

TINTINNIDS: Ascampbelliella urceolata (er), Codononellopsis ecaudata (er).

Station T3. Vertical haul.

Plankton poor; badly preserved; mostly copepods and nauplii. Ostracods (vr), Sagitta sp. (er) also present.

DIATOMS: Very scarce: Coscinodiscus sp. (vr), Thalassiothrix sp. (f).

DINOFLAGELLATES: Peridinium conicum (r), Diplopelta asymmetrica (vr).

Station T3. Surface haul. March 30, 1965. 29° 52.0'N, 86° 34.0'W.

Plankton poor; the most abundant organism is Exuviaella.

ZOOPLANKTON: Copepods, nauplii, Oikopleuridae (r).

BLUE-GREEN ALGAE: Very scarce.

DINOFLAGELLATES: Exuviaella sp. (a), Prorocentrum sp. (r), Ceratium furca, C. pentagonum tenerum, C. kofoidi, C. belone, C. fusus, C. tripos, C. azoricum, C. massiliense, C. concilians, C. trichoceros, Peridinium conicum (ra), P. depressum, P. brochi (ra), P. oceanicum oblongum, P. inflatum, P. simulum, P. pedunculatum, P. claudicans, Goniodoma polyedricum, Gonyaulax polygramma, Spiraulax jollifei, Diplopelta sp., Pyrophacus horologicum (very small), Ceratocorys horrida, Dinophysis caudata, D. fortii (er), D. similis?

TINTINNIDS: Ascampbelliella urceolata, Eutintinnus fraknoli.

Station T15. Surface haul. March 23, 1965. 29° 53.9'N, 86° 55.5'W.

Plankton rather abundant; poorly preserved. Remains of copepods and nauplii. Copepod eggs. Parts of Oikopleuridae.

DIATOMS: Guinardia flaccida (er), Nitzschia closterium (vr).

DINOFLAGELLATES: Pyrocystis fusiformis, Ceratium furca, parts of Ceratium tripos and C. trichoceros, Peridinium oblongum, P. depressum, P. conicum, Diplopelta asymmetrica (ra), Goniodoma polyedricum, Ceratocorys horrida, a few Exuviaella sp., Dinophysis sp., D. caudata (f), Phalacroma ovum (er), Ornithocercus steini (er).

TINTINNIDS: Epilocylis labiosa, Eutintinnus tenue.

Station T15. Vertical haul.

Plankton extremely poor, some detritus; benthonic foraminifera.

DIATOMS: Coscinodiscus sp. (er).

DINOFLAGELLATES: Diplopelta asymmetrica (er).

Station A13. Surface haul. March 23, 1965. 29°10.0'N, 86°52.5'W.

Plankton of medium density, not well preserved. Skeletonema is the dominant organism.

ZOOPLANKTON: Rather abundant: Copepods and nauplii.

BLUE-GREEN ALGAE: Rather scarce.

DIATOMS: Skeletonema costatum (a), Coscinodiscus sp., Rhizosolenia alata, Thalassionema nitzschioides.

DINOFLAGELLATES: Noctiluca scintillans (er), Ceratium pentagonum tenerum (vr), C. tripos (r), C. contortum (er), C. massiliense (vr), Peridinium conicum (ra), P. brochi, P. depressum (vr), P. oceanicum oblongum (r), P. obtusum (f), P. cf. crassipes (vr), P. pedunculatum (vr), P. claudicans (r), Diplopelta asymmetrica (f), Goniodoma polyedricum (r), Scrippsiella sweeneyae (vr), Podolampas palmipes (r), Gonyaulax biros-tris (er), Exuviaella sp. (vr), Prorocentrum sp. (f), Dinophysis caudata (f), D. similis? (vr), Ornithocercus quadratus (er).

TINTINNIDS: Tintinnopsis kofoidi (vr), Favella taraikaensis (r), Dictyocysta elegans lepida (er), Protorhabdonella curta (er), Eutintinnus tenue (er).

Station A13. Vertical haul.

Plankton very poor, dominated by Skeletonema.

ZOOPLANKTON: Copepods and nauplii very scarce.

BLUE-GREEN ALGAE: Very scarce.

DIATOMS: Skeletonema costatum (ra), Coscinodiscus sp. (vr), Guinardia sp? (r), Hemiaulus sinensis (r), Asterionella japonica (er).

DINOFLAGELLATES: Noctiluca scintillans (er), Pyrocystis fusiformis (vr), Exuviaella sp. (m), Ceratium praelongum (er), C. furca (vr), C. lunula (er), C. gibberum (er), C. trichoceros (er), C. massiliense (er), Peridinium conicum (m), P. brochi (vr), P. oceanicum oblongum (r), Scrippsiella sweeneyae (vr), Pyrophacus horologicum (er), Ceratocorys horrida (er), Exuviaella sp. (m), Dinophysis caudata (vr), Phalacroma sp. (er).

TINTINNIDS: Tintinnopsis kofoidi (er), Favella taraikaensis (f), Dictyocysta elegans lepida (er), Ascampbelliella urceolata (er).

## DISCUSSION

The results of Cruises I, II, III and IV (discussed in a paper by Balech, in press) allowed us to draw tentative conclusions which can be summarized as follows: During Cruise I, the plankton collected at stations 9 and 17 were typical of oceanic warm water. Of the plankton samples studied those of stations 9 and 14 were more interrelated than the others. It was interesting to note that the plankton composition of station 13 had very little resemblance to the western stations occupied during this cruise. During Cruise III, on the other hand, station 13, was found to be related to the western stations.

During Cruises II and IV, oceanic waters advanced to the shores following an axis close to meridean  $87^{\circ}\text{W}$ . This was clearly demonstrated by some typical oceanic species which reached the shallow water at station VIII. The latter station, however, showed little or no oceanic influence during Cruise III. It would seem, therefore, that the oceanic waters have drifted somewhat to the east, probably following a northeastern axis. In all likelihood, the oceanic influence was more widely spread, although less penetrating shoreward.

In Cruise V, it was more unfortunate that Hurricane Hilda interfered with our plans of taking samples in the Gulf of Mexico.

This would have offered us an excellent opportunity to compare the plankton of the Gulf with that of the Caribbean Sea. The samples collected in the latter region were rather rich and varied; the radiolarians and tintinnids were markedly abundant. On the whole, the plankton, from both the Caribbean Sea and the Gulf of Mexico were not strikingly different in composition. The species which appeared to be exclusive to the Caribbean Sea were very few, and numerically they were not abundant, except, perhaps, for Phalacroma cf.

pugiunculus which was rather abundant in the Caribbean samples. However, it should be mentioned that the tintinnid, Codonella amphorella which was relatively abundant in the Caribbean Sea, we found in the Gulf of Mexico only at four stations during Cruise VIII, i. e. stations 16, 17, 21 and 22; all are located close to the Yucatan Strait.

Cruise VI, a rather short cruise, was dominated by the following ubiquitous diatoms: Chaetoceros, Stephanopyxis and Schroderella. Other important species in this cruise include: Guinardia flaccida and Rhizosolenia alata f. indica. Among the dinoflagellates Diplopelta asymnetrica was relatively abundant. It would seem that the area investigated during this cruise was invaded by oceanic waters. This was especially evident at station D<sub>1</sub>, which despite its shallowness (30 fathoms), its plankton

content has many tropical oceanic species, e. g., Ceratium hexacanthum, C. contortum, C. trichoceros, C. karsteni, C. lunula, C. carriense, Ceratocorys horrida, and the two genera Ornithoceros and Amphisolenia. It is worth mentioning here the high percentage of "shade species" taken in surface samples at Station D. This would strongly suggest some form of upwelling or some other vertical mixing phenomenon. Among the 'shade' organisms encountered are the followings: Amphisolenia, Ceratium hexacanthum, C. arietinum, C. coarctatum, C. lunula, Xystonellopsis heros and others.

It is interesting to note that Favella panamensis found in previous cruises was replaced Favella taraikaensis. Also encountered in this cruise (VII) for the first time is Tintinnopsis kofoldi. This is in excellent agreement with Hopkins's findings (loc. cit.) where he found both Favella taraikaensis and Tintinnopsis kofoldi predominantly during the cooler months.

Despite the inadequacy of sampling during Cruise VII, it is clear from the examination of the plankton samples collected that the diatoms chaetoceraceae (Bacteriastrum and Chaetoceros) were abundant at several stations. Another important constituent was the diatom Thalassiothrix. Also during this cruise we noted the presence of Tintinnopsis kofoldi; Favella taraikaensis, on the other hand, was absent.

The plankton collected during Cruise VIII strongly indicates that most of the area investigated was under the influence of some kind of vertical mixing. This could, in part, be attributed to stormy weather or to localized areas of upwelling. The effect of the former could be depicted by the abundance of benthic elements e. g. , sand particles, spicules, benthic diatoms and foraminifera at most of the stations occupied, particularly at stations 17, 23, 26 and 28. Station 15, being in shallow waters, reflected the neritic nature of its plankton; on the other hand, plankton of station 16 clearly shows the dominance of the oceanic element.

Interestingly, stations 2, 4 and 5, particularly the latter two stations, show great affinity in plankton composition to stations 23 through 28, especially stations 25 - 28. On the other hand, the plankton collected at stations 16 - 22 have a slightly different composition.

On the whole, the most important diatoms collected during this cruise are: Guinardia flaccida, Thalassiothrix, and to some extent Thalassiosira subtilis. Another important element in the plankton during this cruise is the coccolithophorids, notwithstanding the poor retention quality of the net used for collecting these types of organisms.

The dinoflagellates also contributed to the bulk of the phytoplankton samples collected e. g., Ceratium trichoceros, C. massiliense, Peridinium sp. sp., etc. As to the tintinnids, the following species were relatively the most abundant: Poroecus, Codonaria cistellula, and Rhabdonella cornucopia. Plankton samples collected at station 16 contained a few loricae of Metacylis mereschkowskii and Favella azorica. Neither of them was found in any other sample taken in the Gulf of Mexico.

Cruise IX was noted for the scarcity of its diatom population which were represented by: Skeletonema costatum, Stephanopyxis turris, Rhizosolenia imbricata schrubsolei, Thalassiothrix sp., and Thalassionema nitzschioides; the latter species was found in only two samples.

The dinoflagellates on the other hand, were far more abundant than the diatoms. The preponderant species of dinoflagellates were the followings: Exuviaella sp., Dinophysis caudata, Ceratium tripos, Peridinium brochi, Peridinium conicum and Diplopelta asymmetrica. All these species were ubiquitous and were especially frequent in neritic waters. Throughout this cruise, most of the stations sampled showed a neritic physiognomy. This was also the case in station V despite its location in relatively deep waters (200 fathoms). Even the presence of such species as: Gonyaulax birostris, Ceratocorys



horrida, Epilocyloides reticulata and Proplectella parva could not mask the neritic character. At station IX, located near station V, the vertical haul taken at the former station showed more oceanic species than at the latter. Oceanic species were represented by: Ceratium belone, C. trichoceros, C. lunula, Dinophysis schuetti and Codonaria cistellula.

The composition of the plankton taken in surface samples at stations XI and XII reflect some degree of vertical mixing. It is interesting to note here that surface water samples collected at Station A13 showed plankton of neritic character. On the other hand, in the vertical tow, the character of the plankton was more of the oceanic than the neritic type.

Toward the end of this cruise, some stations were re-occupied in order to gain some information of the variability of the plankton during a short period (one week or less). Station III occupied on March 24, showed a small diatom population. However, the same station on March 29 was practically devoid of diatoms; the dinoflagellates were also very few. On both occasions the samples collected were noted for the absence of tintinnids and the relative abundance of Diplopelta asymmetrica and Dinophysis caudata. It is possible, however, that this decrease in phytoplankton population could be attributed to zooplankton grazing. It should be noted also,

that the samples collected at Station III on March 29, were the only two samples where a significant difference between surface and vertical hauls was noted. The plankton collected on March 29 at station VI was conspicuously poorer than that collected on March 23. On the other hand, the poor dinoflagellate population in surface plankton haul of March 23 could be attributed to bad preservation technique in the field.

At station D3 the plankton collected in the two March samples was not so strikingly different, although the plankton density showed the same trend as the other stations i. e., a lower content of the diatom and dinoflagellate populations in the latter part of March than at the beginning of the month. In both samples, the diatoms were more abundant in the vertical than in surface tows.

On the whole, the area surveyed during Cruise IX is noted for its remarkable homogeneity; its plankton is of neritic nature without any manifest indication of mixing due either to horizontal currents or to any process of vertical mixing.

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