Phytoplankton Organisms Collected During the First Indian Antarctic Expedition

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ABSTRACT

28 species belonging to 23 genera were recorded as components of the phytoplankton population collected during the First Indian Antarctic Expedition. Diatoms were represented by 27 species belonging to 20 genera and were distinctly the abundant forms at stations near the ice edge. Dinoflagellates and silicoflagellates were poorly represented. Away from ice edge the coccolithophores appeared in large numbers, however, most of the individual cells were too small and ill-defined for species identification.

INTRODUCTION

The outstanding importance of phytoplankton as the first link in the primary food chain is well documented. Studies on the qualitative characteristics of phytoplankton have received tremendous attention because of their relative importance as indicators of movements of water mass, ecological conditions, fertility etc. (Gran 1912, Allen 1941 and Braarud *et al.,*. 1953).

These series of samples were collected during the First Indian Expedition to Antarctica in December 1981. A total of 22 samples covering 13 stations have been collected between 72°S and 40°S on the route between the landing site at Antarctica and Mauritius (Fig. 1). Since Heron Tranter nets were used (vertical haul, 200-0m) for these collections, only a qualitative analysis of the phytoplankton forms could be possible. The species identifications were carried out with the help of the following literature : Van Heurck (1896); Lebour (1930); Subrahmanyan (1946); Motoda (1966); Desikachary (1979). In the case of coccohthophores, identifications could not be made as they were too small and ill-defined.

The list of species of phytoplankton observed is presented in Table - 1. From the Table, it is evident that proliferation of phytoplankton is confined mostly to stations close to ice edge. The relative abundance of diatom population as compared to dinoflagellates and coccelithophores can possibly be attributed to the high nutrient content of these waters (Sen Gupta, Personal communication). Smayda (1963) has also reported that diatom abundance primarily reflected high nutrient concentrations. However, Wimpenny (1966) explains that diatom abundance as compared to coccolithophores in the polar seas may be due to the lower temperatures which favour the precipitation of silica of the diatom cell wall, whereas with calcium carbonate, which forms the cell wall of coccolithophores it is just the opposite. Perhaps this may also explain the comparatively larger forms of diatoms observed in these polar waters as compared to tropical forms of which *Rhizosolenia* which extended to a considerable size of 1.2 mm along the longitudinal axis and *Coscinodiscus* which attained a diameter of 0.45 mm, deserve special mention.

Rhizosolenia spp. appeared in large numbers in the collections made at stations near the ice edge. At station G-2 which was closest to the ice edge, there was a very conspicuous mixed diatom bloom, which mainly comprised of species of *Fragilaria* and *Rhizosolenia.* Ivanov (1959) has also observed massive proliferation of diatoms at stations close to the ice edge in the southern seas which he attributes to the . increased content of biogenic substances.

Phytoplankton numbers showed a steady decline at stations farther from the ice edge. Station G-12 however, showed a considerable increase in the number of forms as compared to other adjacent stations located away from the ice edge. Perhaps, this is due to the location of station G-12 in the Antarctic Convergence, where the cooler southern and the wanner tropical waters meet and form frontal boundaries. Such areas have been reported to be the sites of active phytoplankton blooms (Pingree *et al*., 1975).

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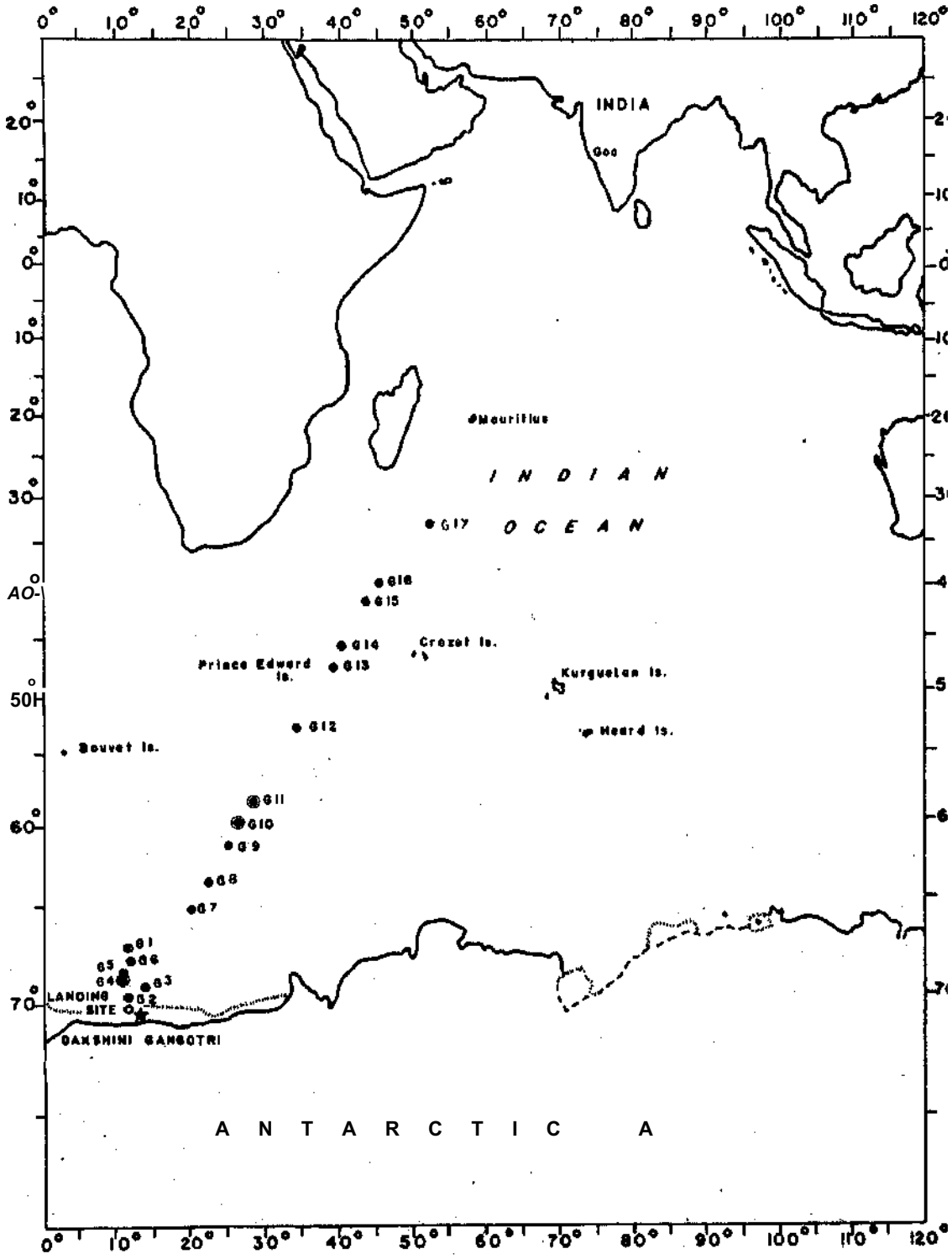

.Fig.: 1 Sampling stations G1-G16

• denotes stations where phytoplankton collections have been made;

◉ denotes stations where phytoplankton collections have not been made.

TABLE 1

List of species of phytoplankton observed

Species	Stations												
	G-1	G-2	G-3	G-4	G-6	G-7	G-8	G-9	G-12	G-13	G-14	G-15	G-16
DIATOMS:													
Achnanihes longipes					+								
Asteromphalus spp.									+				
Chaetoceros curvisetus		+											
Chaetoceros eibenii									+				
Chaetoceros peruvianus		+		+									
Chaetoceros spp.	+	+		+		+	+			+	+		+
Climacodium spp.		+											
Corethron criophilum		+											
Corethron spp.				+	+				+			+	+
Coscinodiscus centralis		+											
Coscinodiscus curvatulus		+											
Coscinodiscus granii		+											
Coscinodiscus spp.		+							+				
Dactyliosolen antarcticus									+			+	
Eucampia zodiacus		+											
Eucampia spp.		+											
Fragilaria cylindrus									+	+			
Fragilaria crotonensis													
Fragilaria nana													
Fragilaria striatula													
Fragilaria spp.		+											
Guinardia flaccida													
Hemidiscus ovalis													
Lauderia glacialis													
Leptocylindrus danicus													
Leptocylindrus spp.													
Licmophora lyngbyei													
Navicula vanhocffeni													
Navicula spp.									+		+	+	
Nitzschia seriata				+					+				
Nitzschia spp.							+		+				
Pleurosigma spp.			+					+					
Rhizosolenia calcar-avis		+											+
Rhizosolenia hebetataf. semispina	+	+	+	+		+	+	+	+		+		
Rhizosolenia obtusa		+		+			+		+				
Rhizosolenia styliformis	+												
Rhizosolenia spp.					+			+					
Thalassiothrix frauenfeldii		+											
Thalassiosira spp.		+											
Unidentified pennate form									+				
DINOFLAGELLATES:													
Peridinium spp.		+											
Phalocroma spp.													
COCCOLITHOPHORES:											+		
Unidentified form							+						
SILICOFLAGELLATES:												+ '	+
Dictyocha naicula		+											
Unidentified form					+		+					+	+

\+ Present

Collections were not made from stations G-5, G-10 and G-ll

At station G-14, G-15 and G-16, coccolithophores were predominant over other forms. A similar feature in the distribution of these forms was observed by Karsten (1907), Marshall (1933) and Hart (1934), who attributed this to the tolerance of coccolithophores to lower levels of nutrients.

While the information gathered by this study is brief, it renders important indications concerning the relative abundance of phytoplankton in the frigid seas as compared to the warmer seas. It gives positive evidence that even though production of ocean pasturage in the tropics may be more by continuous production in moderate abundance all through the year, production in the polar seas is a significant contribution to the ocean pasturage because of its luxuriant and intensive growth in the favourable season, which helps in sustaining rich euphausiid (krill) population.

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