

A Preliminary Study of Benthic Diatoms in Contrasting Lake Environments

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Summary. Eleven of the 17 freshwater lakes from Signy Island, South Orkney Islands, Antarctica were sampled by snorkel divers. A list of diatom taxa identified from benthic samples is presented. Most freshwater taxa listed were rare and only a few taxa were observed abundantly in many lakes. Assemblage composition varied between three broad lake categories: (1) proglacial; (2) oligotrophic; and (3) mesotrophic lakes. Assemblage composition also changed with lake depth in the larger lakes. A second, more detailed study was undertaken on an oligotrophic and a mesotrophic lake. No seasonal trends could be identified. The limitation of the methods used are discussed, and spatial and temporal variability in Antarctic lakes is considered.

1 Introduction

Large numbers of inland water bodies occur in Antarctica, particularly in ice-free areas and it would appear that benthic vegetation is a common feature of such systems (Priddle 1985). The freshwater algae have been described from South Georgia (Carlson 1913), South Orkneys (Fritsch 1912), the Antarctic Peninsula (Corte 1962; Parker et al. 1972), and many areas of the Antarctic Continent (Baker 1967; Opalinski 1972a, b; Wharton et al. 1983). Most work on freshwater Antarctic diatoms has focused on taxonomy (Reinsch 1890, Fukushima 1965, 1966; Kobayashi 1963a, b, 1965).

The present chapter represents some of the preliminary results of an ecological study of benthic diatoms inhabiting several freshwater lakes at Signy Island (60° 43' S, 45° 38' W). Initially a qualitative examination of 54 samples from 11 of the 17 different lakes was undertaken to identify the species present and to give a rough estimate of the dominant taxa present within the lakes examined. The assemblage structure of the epiphytic diatoms associated with filamentous mat-

forming algae was then studied in oligotrophic Sombre Lake and mesotrophic Light Lake in more detail. Three sites in each lake were sampled at 4–6 week intervals from January 1986 to March 1987. The results presented show a preliminary list of the taxa identified, how composition within the mats of the lakes differed, and seasonal changes within both lakes are considered.

2 Materials and Methods

2.1 Study Area

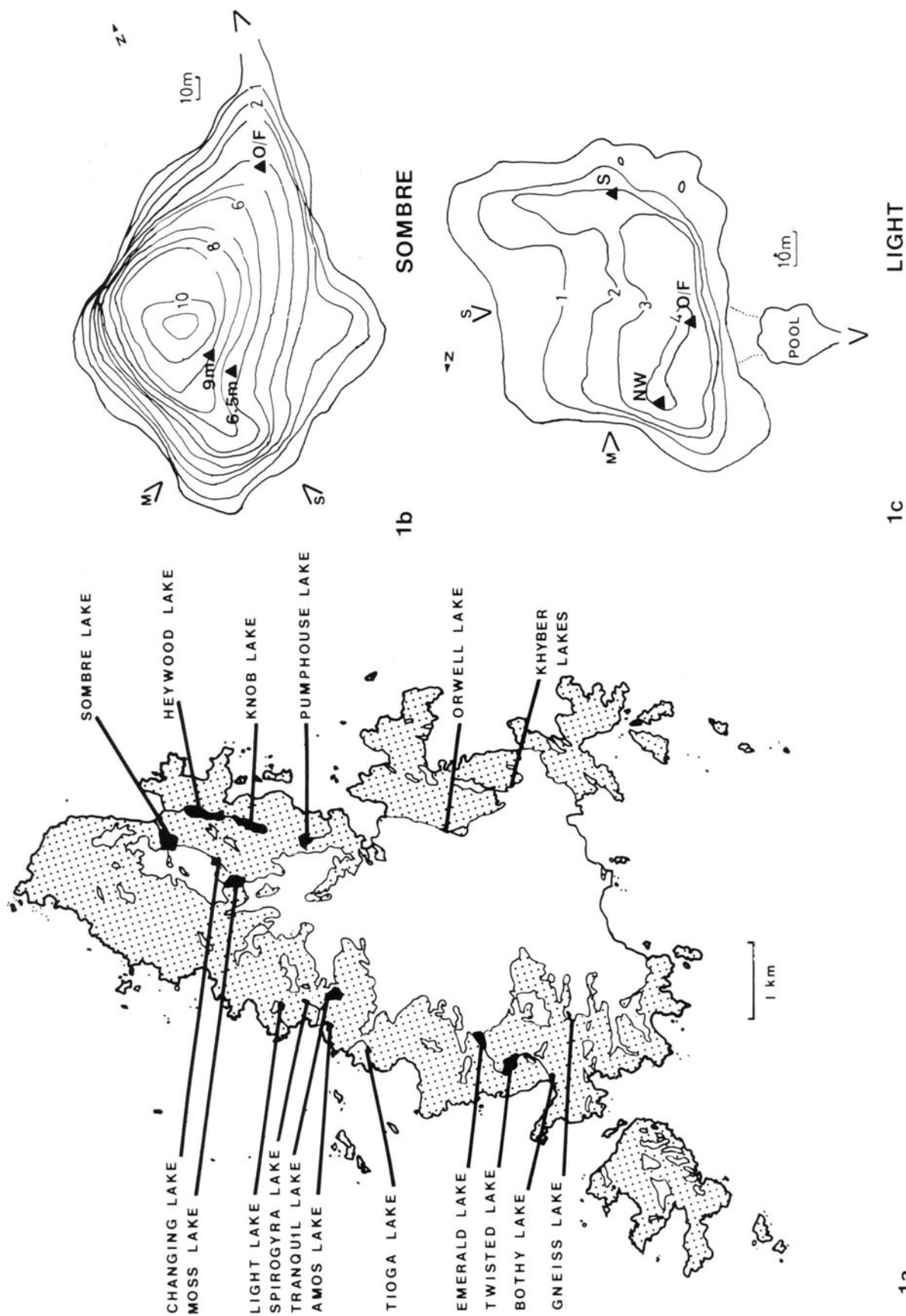
Information about the main lakes of Signy Island is given in Heywood et al. (1980). The Khyber lakes have emerged with ice recession over the past 5–10 years and are considered to be proglacial. Such lakes vary in size according to levels of meltwater, but are of uniformly low nutrient content within the water column (Priddle and Heywood 1980). Sombre Lake and Moss Lake are typical oligotrophic systems with well-established cyanobacterial mats and benthic moss communities, while Heywood Lake and Bothy Lake represent nutrient enriched mesotrophic lakes with more developed phytoplankton communities. The 11 lakes sampled represent a wide range of environmental conditions, but all are ice-covered for at least 8 months each year. The location of all lakes is shown in Fig. 1a.

Sombre Lake and Light Lake (Fig. 1b, c) were chosen to represent two contrasting (oligotrophic and mesotrophic respectively) lakes not only for their differing water chemistry, but also due to their differences in surface area and bathymetry.

2.2 Collection of Mats for Initial Qualitative Analysis

Snorkel divers sampled the 11 lakes taking grab samples over a period of 3 months (February to April 1985) when the lakes were ice-free. All samples con-

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1a

Fig. 1. a Map of Signy Island showing location of the 11 lakes studied. Bathymetric maps of b Sombre Lake, c Light Lake. Arrows indicate direction of water flow; S = Inflow stream; M = meltwater direct from snow slope; O/F = outflow site; S = south site; NW = northwest site