THE TESTATE RHIZOPOD FAUNA OF *DREPANOCLADUS* MOSS CARPET NEAR ROTHERA STATION, ADELAIDE ISLAND

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INTRODUCTION

The Eighth Antarctic Treaty Consultative Meeting, 1975, made recommendations (VIII-11 and VIII-13) concerning the protection of the Antarctic environment and the desirability of minimizing Man's impact upon it (HMSO, 1977). Pursuant of these recommendations and the Agreed Measures for the Conservation of Antarctic Fauna and Flora, the British Antarctic Survey conducted a biological survey of Rothera Point, Adelaide Island (67° 34′ S, 68° 08′ W), in January 1976 before building a new station there. Detailed studies on components of the natural biota were also initiated in order to monitor long-term changes in the environment which might occur as a result of human activity there.

The vegetation of Rothera Point is predominantly open communities of lichens with infrequent *Andreaea* moss cushions (Fenton, 1976). Continuous moss carpet occurs only as two small patches of pure *Drepanocladus uncinatus* separated by a rocky ridge 40 m high. The patches were located within two designated study sites (Site 1 and Site 2) for future monitoring. Site 1 is an exposed area on the west side of the ridge, less than 100 m from Rothera station, containing *c.* 30 m² of *Drepanocladus* moss carpet intermittently flushed by a melt-water stream. Site 2 is a sheltered gully on the east side of the ridge, 250 m from Rothera station. The area of moss carpet is only 10 m² and is drier than Site 1.

As part of the environmental monitoring programme, these two sites were examined for testate rhizopods before and after the establishment of the new Rothera station. Testate rhizopods are the dominant heterotrophic life form in moss peats in the maritime Antarctic (Davis, 1981), and so may serve as useful indicators of changes in the whole community. The 0–3 cm horizon of *Drepanocladus* moss carpet at the study sites was sampled in January 1976, then again in March 1980, the season following the completion of building. On this occasion, snow cover prevented access to Site 2, so sampling was repeated in March 1981. A final sampling was done in January 1984. Samples were analysed for testate rhizopod fauna by the direct count method (Couteaux, 1967; Smith, 1978). Quantitative counts were used to estimate the live populations at the time of sampling. Observations on empty tests or recognizable fragments were also used to construct the species lists.

RESULTS AND DISCUSSION

Ten species of testate rhizopod were identified in all, as shown in Table 1. *Difflugia lucida* and *Assulina muscorum* were the most abundant. The species assemblage resembles that recorded for moss peats on South Georgia (Smith and Headland, 1983) and for northern temperate montane soils, where there is abundant moisture, but which are exposed to extreme fluctuations of temperature (Couteaux, 1976). A small difflugid species, observed in Site 2 in 1984, is a new record for the Antarctic. It appears to be identical with *Difflugia mica* Frenzel. This species was first described from Argentina and later from several northern temperate sites (Ogden, 1983).

Table I. Species of testate rhizopods identified in *Drepanocladus* moss carpet on Rothera Point.

Date of sampling	*Site 1*	*Site 2*
30 January 1976	*Nebela lageniformis* *Difflugia lucida* *Phryganella acropodia* *Trigonopyxis arcula* *Assulina muscorum* *Corythion dubium*	*Centropyxis aerophila* *Difflugia lucida*
29 March 1980	*Phryganella acropodia* *Assulina muscorum*	Not sampled
8 March 1981	*Nebela wailesi* *Assulina muscorum*	None detected
19 January 1984	*Difflugia lucida* *Assulina muscorum* *Corythion dubium*	*Difflugia mica* *Phryganella acropodia* *Assulina muscorum*

Table II. Estimated numbers of testate rhizopods in *Drepanocladus* moss carpet on Rothera Point.

	Numbers per g fresh weight	
Date of sampling	*Site* 1	*Site* 2
30 January 1976	290 ± 60	60 ± 30
29 March 1980	140 ± 40	Not sampled
8 March 1981	50 ± 30	None detected
19 January 1984	250 ± 70	150 ± 70

The observed species richness is low; this is consistent with the previously elucidated trend of increasing faunal pauperization with increasing latitude and climatic severity in the southern hemisphere (Smith, 1982). The numbers, shown in Table II, are very low compared with those observed during the summer in moss habitats on South Georgia and Signy Island (Smith, 1973; Smith and Headland, 1983). However similarly low numbers have been observed in *Drepanocladus* moss carpet in the South Orkney Islands and Elephant Island (Smith, 1972, 1974). More species may be present which are below the threshold of detection by the method used (*c.* 50 g^{-1}). Thus the species lists (Table I) are probably incomplete. Accordingly a faunal difference between Sites 1 and 2 cannot be established with certainty. The results suggest that Site 1 may have greater species richness and larger populations than Site 2; it is possible that this difference is associated with the greater moisture content at Site 1 (Fenton, 1976).

No trend in either species composition or numbers with time is discernible at either site over the period 1976–84. Given the influences of fluctuations in the natural environment and random sampling error, detection of any such trend would require a number of replicate determinations beyond logistic feasibility. A possible directional change in the numbers of heterotrophic bacteria in these sites has been noted by Wynn-Williams (1985), who observed increases up to 300-fold in bacterial counts made in February 1981 over those made in February 1976. These observations suggested that the microflora might have been influenced by a distribution of nutrients or bacterial contaminants from Rothera station. A comparison of *Chromobacterium*

counts between February 1977 and March 1981 (Wynn-Williams, 1983) did not show any significant change.

It appears therefore that there is no evidence of the proximity of Rothera station having an adverse effect on the heterotrophic organisms inhabiting the *Drepanocladus* moss carpet. However, the patches are small in area and contain testate rhizopod species whose low numbers suggest that they are existing under conditions close to their limits of tolerance. The continued viability of the heterotroph communities of these moss patches depends upon the exercise of care to avoid physical damage to or chemical pollution of the *Drepanocladus* moss carpet and upon the maintenance of the hydrological regime of the locality. It may be concluded that observation of the Code of Conduct (Annex to Recommendations VIII–11 of the Eighth Antarctic Treaty Consultative Meeting), during the building of extensions to Rothera station in 1986 and 1987, should provide adequate protection for the terrestrial microbiota of Rothera Point. However their habitats are sensitive to disturbance and continuing vigilance is essential for their conservation.

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