LICHENS FROM THE THERON MOUNTAINS

By D. C. Lindsay *and* D. Brook

Abstract. Ten species are recorded in the first known collection of lichens from the Theron Mountains, and their distribution is noted in connection with various ecological factors. The composition of the flora in relation to other areas of Antarctica is briefly discussed.

The Theron Mountains, which form the southern margin of a lobe of the Filchner Ice Shelf, are a north-east to south-west-trending escarpment attaining a maximum elevation of 1,138 m. at Mount Faraway (lat. 79°12′S., long. 28°49′W.). The mountains are formed of a sequence of sub-horizontal sediments intruded by a number of dolerite sills (Stephenson, 1966), the latter forming sub-vertical cliffs while the sediments are often masked by steep talus slopes. The localities mentioned in the text are shown in Fig. 1.

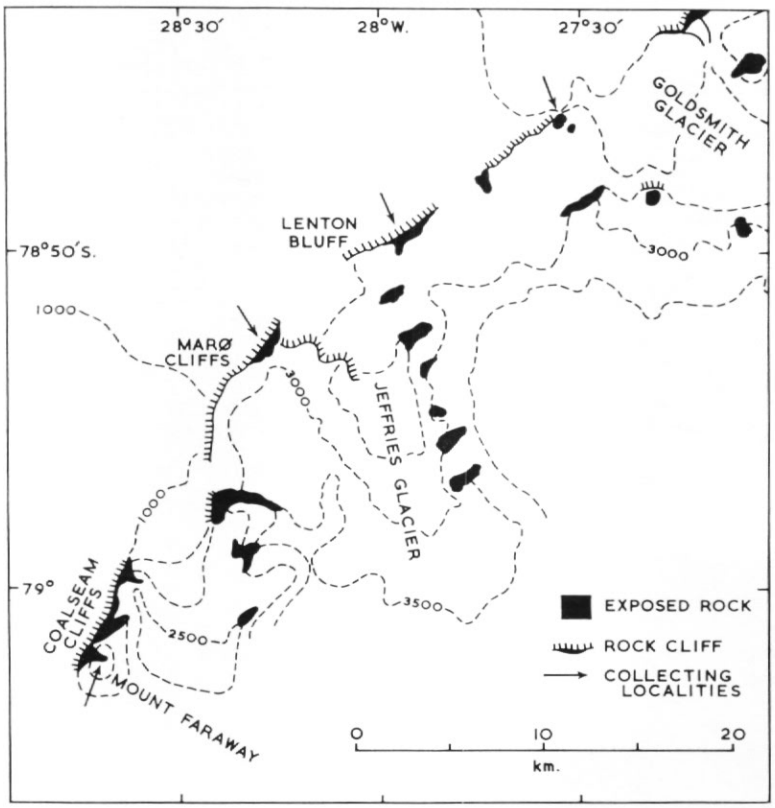

Fig. 1. Map of the central area of the Theron Mountains, showing collecting localities (arrowed). The form lines are in feet.

Plant Collections

This paper presents an account of the lichens collected by D. Brook and A. Johnston in 1966–67 and by D. Brook in late 1967 during topographical and geological surveys undertaken from the British Antarctic Survey station at Halley Bay. Details of the bryophyte and algal material will be published later. The majority of the specimens were collected from Marø Cliffs, with some from Mount Faraway, the south-western end of Lenton Bluff and rock

outcrops on the southern margin of Goldsmith Glacier (Fig. 1). Plant growth was noted at several other localities, notably Coalseam Cliffs and Tailend Nunatak, but no specimens were obtained.

The present collections, which comprise one numerical series, are part of the herbarium of the British Antarctic Survey at present housed in the Department of Botany, University of Birmingham. They constitute the first known species of plants from the Theron Mountains.

Despite the high latitude of the Theron Mountains, the lichen specimens are not in any way depauperate or eroded, and in most cases they are comparable in size with specimens of the same species from the South Orkney Islands. For all of the species, the Theron Mountains are their southernmost known localities.

The following is a list of the lichens identified, and their distribution is summarized in Table I.

TABLE I. LICHEN RECORDS FOR THE THERON MOUNTAINS

Species	*Goldsmith Glacier*	*Lenton Bluff*	*Marø Cliffs*	*Mount Faraway*
Lecanora aspidophora	+		+	
L. rubina var. *melanophthalma*			+	
Omphalodiscus antarcticus	+	+	+	
O. decussatus			+	
Physcia sp.	+	+	+	
Pyrenodesmia cf. *crawsonii*	+		+	
Stereocaulon vesuvianum				+
? *Toninia* sp.			+	
Xanthoria candelaria	+	+	+	+
X. elegans	+	+	+	+

+ Present.

Lecanora aspidophora Vain.
Brook and Johnston 11.

Lecanora rubina (Vill.) Ach. var. *melanophthalma* (Ram.) Zahlbr.
Brook and Johnston 24.

Omphalodiscus antarcticus (Frey and Lamb) Llano
Brook and Johnston 2, 8a, 20a, 21a.
The specimen from Marø Cliffs is the best developed, being 10 cm. in diameter. All the other specimens are 3–6 cm. in diameter.

Omphalodiscus decussatus (Vill.) Schol.
Brook and Johnston 4a.
There was only one thallus of this widespread species, indistinguishable morphologically from specimens from the South Orkney Islands.

Physcia sp.
Brook and Johnston 7, 19, 23.
This species is represented in the collection by several small non-sorediate thalli growing over rock or *Xanthoria elegans*.

Pyrenodesmia cf. *mawsonii* Dodge
Brook and Johnston 15.
The small granular thallus is sterile and epiphytic on a bryophyte.

Stereocaulon vesuvianum Pers.
Brook and Johnston 12.
This collection contains numerous well-developed podetia, up to 2 cm. tall. It is the southernmost known record for the genus as well as the species.

? *Toninia* sp.
Brook and Johnston 4b.
A few fragments of a minutely squamulose thallus may be referable to this genus. Apothecia were present, but no asci or ascospores could be found in sections.

Xanthoria candelaria (L.) Th. Fr.
Brook and Johnston 6, 9.
The thallus in this species is not strictly comparable with specimens from the Antarctic Peninsula, being found as small pulvinate cushions up to 3 mm. in diameter, unlike specimens from the South Orkney Islands which have a more open growth habit and are 10 mm. tall.

Xanthoria elegans (Link) Th. Fr.
Brook and Johnston 3, 10, 17, 18.
This appears to be the most widely distributed lichen in the Theron Mountains, possibly because its bright pigmentation attracted attention in contrast to the other dull-coloured species.

Distribution of Lichens

The main geomorphological feature of the Theron Mountains is its escarpment formed of alternating cliffs and talus slopes at the summit of which small exposures of bare rock, with a thin mantle of frost-shattered debris, extend for a few metres before being covered by snow. Other rock outcrops are sporadic and relatively insignificant, most occurrences of lichens being observed along the front of the scarp.

There is a marked difference between the climate on top of the cliffs and that of the scarp front which Wornham (1969) has already briefly noted. Air flow in front of the scarp is channelled down the main drainage glacier and there is an almost perpetual north-east wind of at least 10 kt. (5·2 m./sec.) in this area during the summer. At the same time the top of the cliffs usually has calm conditions or an east wind of *c.* 5 kt. (2·7 m./sec.). The size and frequency of sastrugi in front of the cliffs in early summer provide an indication that the winter air flow is roughly similar to that during the summer. This air stream is thought to have a considerable influence on the distribution of lichens, which were generally found either in cracks or on rock ledges and faces with a south-westerly aspect, as it was noted in the field that they were definitely not exposed to the prevailing north-easterly wind. A few crustose species collected were noted as being confined to crevices and very sheltered localities.

Most occurrences of lichens were on dolerite rather than on sediments and near the summit of the scarp rather than on the north-west-facing cliffs. The sedimentary rocks are much more susceptible to frost-shattering than the dolerite and so the latter would provide a more stable substratum than the former. This would be true especially of the cliff front, where the sedimentary rocks are very rapidly eroded, resulting in steep unstable screes. Possibly, the lower albedo of the dolerite is also of importance with respect to lichen colonization, in that dolerite surfaces are noticeably warmer than those of sedimentary rocks when exposed to the strong summer radiation.

Though in most localities there is no lack of water during the summer months, since melt is considerable and results in fast-flowing streams and large deep melt pools, availability of water was not noted as a factor of importance influencing the growth or distribution of lichens. Similarly, little correlation was observed between bird-nesting sites, mainly snow petrels (*Pagodroma nivea*), and lichen distribution, as lichens were found on rocks both adjacent to and some distance from the bird rookeries.

The main factor influencing lichen distribution in the Theron Mountains appears, therefore, to be the north-easterly air stream with hydrophily, nitrophily and nitrophoby as subordinate factors. It is possible also that micro-climatological differences caused by the greater absorption of radiation by dolerite than by sediments may have some effect.

Composition of Flora

Several of the species recorded are circumpolar in their distribution in the Antarctic, e.g. the two species of *Omphalodiscus* are known from numerous localities around Antarctica (Llano, 1950; Lindsay, 1969). It is surprising therefore that species with similar distribution patterns, such as *Usnea antarctica* Du Rietz, *Usnea sulphurea* (Koenig) Th. Fr. and *Alectoria minuscula* (Nyl. ex Arnold) Degel., were not observed in the Theron Mountains. However, both *Omphalodiscus antarcticus* and *O. decussatus* reach their southernmost limits here (Lindsay, 1969), so that it is possible that the Theron Mountains lie south of the southernmost limits of distribution of the species of *Alectoria* and *Usnea*.

The collections made in the Theron Mountains, though not comprising a large number of species, show that the lichen flora of this region is similar to that of other Antarctic mountain ranges, such as those of western Dronning Maud Land (Bowra and others, 1966; Lindsay, 1971) and Mac.Robertson Land (Filson, 1966). However, the absence of species of *Usnea* and *Alectoria* is unexpected and it may only be explained by the Theron Mountains lying south of their distribution range.

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