

# **A survey of lichens and certain other terrestrial biota in the Ellsworth Mountains region of Antarctica**

## **Ian Richardson**

Head of Biology, Freman College, Buntingford, Hertfordshire SG9 9BT

## **Amy Rogers**

Teacher of Science, Higham Lane School, Nuneaton, Warwickshire CV10 0BJ

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## **Abstract**

As part of the first Fuchs Foundation Antarctic expedition undertaken during November and December of 2007, a survey and collection of lichens and microfauna was made in the Ellsworth mountains. The Henderson glacier (79°47', 82°30') and Connell canyon (79°49', 83°03') regions were the principal sites of the survey. Several varieties of lichen were discovered, photographed, their locations recorded and samples collected and returned to the UK. This was the first recorded collection of lichens in this region of Antarctica. Twenty-three lichen samples were brought back to the UK for scientific classification and extraction of tardigrades.

In collaboration with scientists at the British Antarctic Survey in Cambridge; the identification of the lichen varieties and an analysis of the microfauna in the samples is in process.

## **Introduction**

As a member of the Fuchs Foundation Antarctic expedition, I chose the study of the microfauna of Antarctica. In particular, I was interested in exploring the incidence of members of the Tardigrada group, as earlier studies indicated many interesting aspects of their distribution. This was also chosen because this ubiquitous group provide a direct link with simple work that can be undertaken in the school Science laboratory and this was one of the original criteria for the selection of a suitable project.

The main source of guidance came from the work of S. J. McInnes and P. Convey at the British Antarctic Survey. Their recent paper on the microfauna of the Ellsworth region (1. Convey P, McInnes SJ - 2005) was the starting point for my own investigation. In addition I relied heavily on two reference works by Ian M. Kinchin (2) and D. O. Ovstedal and R. I. Lewis-Smith (3) for general guidance about tardigrades and lichens respectively.

Ian Richardson

I studied lichen species present in the Henderson Glacier and Connell canyon. I wanted to make the first recorded collection of lichens in this area in order to further our understanding of Antarctic lichens and their ecology. I designed my research project in consultation with Dr Peter Crittenden at the University of Nottingham. I wanted to identify suitable habitats for lichen species in the region and make observations about the distribution and variation of lichens in the region.

Amy Rogers

## Method and Materials

Exposed rock and tumbled boulders along the edges of the Henderson glacier (79°47', 82°30') and Connell Canyon (79°49', 83°03') in the Ellsworth mountain region were the principal sites of the investigation. Two samples were also collected at the top of the pass leading out of Connell canyon (79°52', 83°04') onto the Horseshoe glacier at the start of the return to the base at Patriot Hills (80°19', 81°15').

Searches for lichens were made by systematically exploring exposed rocks along the glacier edges in the areas of study. Presence or absence of lichens was recorded, even in areas where it was decided the lichen abundance was too small to sample. Samples were photographed and their GPS locations and altitudes logged before samples were lifted or prized from the substrate using a small chisel and/or a penknife. The former was occasionally assisted with a small geological hammer when this was felt to be desirable in retaining some of the underlying substrate. (See the "Samples" Appendix 1 and "Locations" Appendix 2). Gloves were worn during collection and the samples were not handled to reduce contamination. Lichen samples were only removed if there was sufficient quantity on the rock to enable a representative sample to be removed without significant damage to the organism.

Distribution of lichen was very sparse but widespread. The main factors appeared to be the need for the rock to be exposed but relatively sheltered. Even so, most rock showing all of these qualities had no lichens whatsoever. The nature of the rock itself may also have been significant, although this was hard to demonstrate with any certainty. Many samples (but not all) were found in recesses and crevices on vertical faces. However, the most productive site, a stretch of boulders along the Southern edge of Connell canyon, yielded many samples that sat on the horizontal upper surfaces of large boulders. This area may have been especially sheltered due to the presence of a high serac (about 100m) overhanging the glacier edge.

## Storage and Transfer

Samples were put into clean heavy-duty ziplock plastic bags and labelled with the date and a code identifying location. They were kept at ambient temperature outside the tent. (Usually between minus 8°C and minus 20°C. Minus 14°C being a typical daytime temperature). On return to Punta Arenas in Chile the samples were stored in a freezer at minus 20°C before being transported in an insulated cold bag, as hand luggage, during the journey to the UK. These would have slowly warmed to ambient temperature and remained at ambient temperature for about 48 hours before transfer to a freezer once more at minus 20°C. After about three weeks in my freezer (IR), they were transferred to freezers at the British Antarctic Survey in Cambridge for identification, characterisation and eventual transfer to the National Herbarium collection.

## Discussion and Conclusions

At this stage the actual identity of the lichens found is unconfirmed. A brick red crustose variety is certainly a *Xanthoria* and a bright yellow form is almost certainly *Candelariella flava*. Other black and grey crustose varieties and a black foliose form are not yet identified with confidence.

Anecdotal evidence was our starting point for the choice of the original site on the Henderson glacier (Many thanks to Simon Garrod; personal communication). From this starting point, we have been able to confirm the presence of at least four distinct varieties of lichen that are widespread in the area. Earlier studies suggest that about 50% of these samples are likely to show evidence of microfauna such as tardigrades and rotifers. A point of keen interest is whether or not nematodes are present as these have not been found in any samples collected deep inland so far(1).

### Appendix 1: Samples

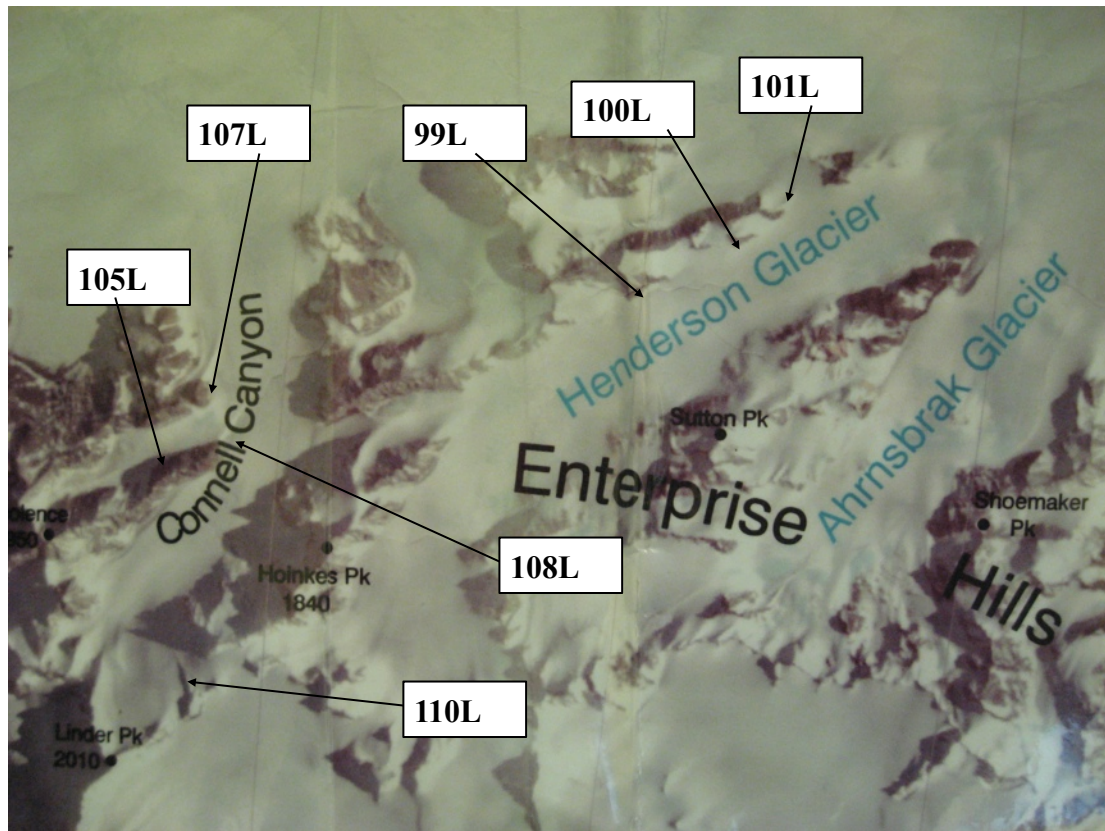
Sample No.	Location Identifier	Brief Description
1a	99L	Brick red, crustose.
1b	99L	Grey/white crustose.
1c	99L	Black/grey crustose.
2	99L	Grey/white crustose?
3	100L	Black foliose/crustose.
4	100L	Grey/black crustose with underlying substrate.
5	100L	Black “curly” foliose form on underlying substrate.
6	101L	Small yellow form. Crustose.
7	105L	Grey/white/black crustose.
8	107L	Greenish/grey fungoid form?
9	108L	Rock fragments with yellow form.
10	108L	Debris with grey crustose form adhering.
11	108L	Large white (fungus?) disc with black edge. Possibly fungal layer exposed from below missing rock flake?
12	108L	Rock flake and substantial black/white crustose.
13	108L	Yellow variety on shale “flakes”
14	108L	Orange form.
15	108L	Fragments of grey/black form.
16	108L	Rock flake with yellow variety.
17	108L	Substantial black/grey form on rock flake.

18	108L	Large rock fragment with substantial growth around edges, with evidence of algae of both red and green appearance.
19	110L	Grey crustose and red form on shale fragments.
20	110L	Black/white crustose form.

### **Appendix 2: Locations of Lichen Samples**

*(Note that 105L and 107L are approximate, but the map is probably more useful than the actual GPS in seeing where the specimens were collected)*

Date	Location	Altitude (m)	GPS
18/11/2007	99L	740	S: 79°47.459 W: 82°37.141
21/11/2007	100L	732	S: 79°46.639 W: 82°28.882
21/11/2007	101L	760	S: 79°47.037 W: 82°32.520
28/11/2007	105L	900 approx	S: 79°49 W: 83°02
28/11/2007	107L	900 approx	S: 79°49 W: 83°02
29/11/2007	108L	908	S: 79°49.436 W: 83°03.086
5/12/2007	110L	1562	S: 79°52.286 W: 83°04.934



## References

1. Convey P, McInnes SJ (2005) Exceptional tardigrade dominated ecosystems in Ellsworth Land, Antarctica. *Ecology*: Vol. 86, No. 2 pp. 519–527
2. Kinchin I. M. (1994) *The Biology of Tardigrades*. Portland Press
3. Ovstedal D. O., Lewis-Smith R. I. (2001) *Lichens of Antarctica and South Georgia*. Cambridge University Press