Lichen Flora in and Around Maitri Region, Schirmacher Oasis, East Antarctica

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Abstract

The paper presents the general account of lichens occurring in and around Maitri station in Schirmacher Oasis, Central Dronning Maud Land, East Antarctica. A list of twenty three species of sixteen genera is enumerated.

Introduction

Lichens are the major floral elements of Antarctica among mosses, aigae and fungi as they are characterized by a high degree of adaptation on harsh environmental conditions.

According to Dodge (1974) there are 429 species of lichens in Antarctica, while the realistic estimate is 160 species (Lamb, 1970 and Hertel, 1988). The western peninsular Antarctic region has a large number of lichen species, probably due to more humid and warmer climatic conditions in comparison with the east where the climate is relatively dry and cold.

Schirmacher Oasis is free from snow/ice, and is a high polar rock desert near the shore of east Antarctica with a mean width of 1.6 km and a length of about 20 km. Solid bed-rock consists of metamorphic rocks. Fresh water lakes, ponds and pools cover an area of 3 sq km.

According to Hertel (1988), in Antarctica, crustose lichens can colonize extreme nival and polar habitat, far better than microscopically visible plants. Similarly in Schirmacher Oasis, the crustose form of lichens exhibits its dominance. Out of the 23 species collected from Maitri region, 17 are crustose forms while 4 are foliose and 2 species are fruticose.

Hertel (1988) enumerated major problems in identification of Antarctic lichens such as - lack of modem flora and monographs, non-availability of type collections as almost all collections have been made by non-lichenologists. These are frequently fragmentary, deformed by the harsh environmental conditions and often present as mixtures of several different species in the pockets.
Due to these problems most of the existing lichen collection from Antarctica are unstudied and undetermined. Thus more extensive collection of lichens from all ice free parts of Antarctica by experienced lichenologists is needed. This study will provide detailed account of lichen flora of Schirmacher Oasis. The present number of lichen species will be a record for carrying out environmental and geochemical studies in future as these plants are very sensitive to atmospheric pollution and microclimatic changes. Lichens are effective monitors of both, background and enhanced levels of radionuclides and heavy metals. The extent of air pollution in an area can be estimated by knowing the degree of declination of lichen species of that area.

Material and Methods

During the eleventh Indian expedition to Antarctica, lichenological studies were carried out in and around Maitri region. Almost all the rock outcrop areas, area around lakes and streams were explored for lichen collection. The Antarctic soil has very low humus content. Soil near the nest of Skua, a type of Antarctic eagle breeding in Antarctica, provides nitrogen-phosphorus nutrition for luxuriant moss and lichen growth both in dry and-moist areas, of rocks. About 150 samples of lichens were collected along with their substratum growing on rock surface, boulders, moraine and decaying moss tuft. These have been identified up to generic level on the basis of studies carried out on lichens by Filson (1974, 1975, 1986) and Seppelt (1986) around Australian stations in East Antarctica.

The specimens collected were studied morphologically and anatomically at the Indian station Maitri. For determination of species, colour test and thin layer chromatography (TLC) was performed at lichenology laboratory of NBRI, Lucknow and the final identification of the species have been done from literature. The specimens are preserved at herbarium of National Botanical Research Institute, Lucknow (LWG).

So far a single lichen *Acarospora* was reported from this region (Wafar and Untawale, 1983), The present account enumerates following 23 species of 16 genera of lichens occurring in this region.

Ecology and distribution of species

ACAROSPORACEAE

1. *Acarospora gwynii* Dodge & Rudolph. (Plate 3 Fig 1)

A yellow, squamulose areolate lichen, very commonly growing on moraine in the dry regions of Schirmacher Oasis. The lichen is generally absent in habitats very close to melt water.
### Lichen Flora in Around Maitri Region

<table>
<thead>
<tr>
<th>Genera</th>
<th>Species</th>
<th>Substrate</th>
<th>No.of species</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Acarospora</td>
<td>A.gwynnii A.williamsi</td>
<td>Moraine &amp; rock</td>
<td>2</td>
</tr>
<tr>
<td>2. Alectoria</td>
<td>A.minuscula</td>
<td>Rock in water &amp; cracks</td>
<td>1</td>
</tr>
<tr>
<td>3. Buellia</td>
<td>B.pallida B.grimmiae</td>
<td>Rocks</td>
<td>2</td>
</tr>
<tr>
<td>4. Caloplaca</td>
<td>C.isidioclada</td>
<td>Decaying mosses</td>
<td>1</td>
</tr>
<tr>
<td>5. Carbona</td>
<td>C.capsulata</td>
<td>Rocks</td>
<td>1</td>
</tr>
<tr>
<td>6. Lecidea</td>
<td>L.cancariformis L.siplei</td>
<td>Rocks</td>
<td>2</td>
</tr>
<tr>
<td>7. Lecanona</td>
<td>L.fuscobrunnea</td>
<td>Rocks</td>
<td>1</td>
</tr>
<tr>
<td>8. Lepraria</td>
<td>L.membranacea</td>
<td>Mosses</td>
<td>1</td>
</tr>
<tr>
<td>9. Pertusaria</td>
<td>P.species</td>
<td>Rocks</td>
<td>1</td>
</tr>
<tr>
<td>10. Physcia</td>
<td>P.caesia</td>
<td>Stones</td>
<td>1</td>
</tr>
<tr>
<td>11. Porpidia</td>
<td>P.species</td>
<td>Rocks</td>
<td>1</td>
</tr>
<tr>
<td>12. Rhizocarpon</td>
<td>R.flavum R.species</td>
<td>Rocks</td>
<td>2</td>
</tr>
<tr>
<td>13. Rinodina</td>
<td>R.oliaceobrunnea R.petermanii R.species</td>
<td>Mosses</td>
<td>3</td>
</tr>
<tr>
<td>14. Umbilicaria</td>
<td>U.aprina U.decussata</td>
<td>Rocks</td>
<td>2</td>
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<td>15. Xanthoria</td>
<td>X.elegans</td>
<td>Rocks</td>
<td>1</td>
</tr>
<tr>
<td>16. Polycaulina</td>
<td>P.murrayi</td>
<td>Rocks</td>
<td>1</td>
</tr>
</tbody>
</table>

**Total 23**

TLC: No chemical substance.

Specimens examined: Near Priyadarshini Lake (Zub Lake) 212602, north side of Priyadarshini Lake 212624, on way to Russian station Novolaz-arevskaya 212635, near Long Lake 212680, base of 'Trishul Hill' (the highest point in Schirmacher Oasis) 212684 around a lake towards ice shelf 212700/B, behind Flat Top 212740, NE of Maitri, along stream 212750, 'Shivling' near Veteheia nunatak 212757.
2. **Acarospora cfr Williamsi R.Filson**

    If is a more bullate sulphur yellow, areolate form crustose lichens growing-on rocks in moist and shady place.

    **TLC :** No chemical substance.

    **Specimens examined :** Around a lake before 'Trishul Hill' 212658.

**LECANORACEAE**

3. **Lecanora fuscobrunnea** Dodge ex Baker (Plate 3 Fig 2)

    The lichen with crowded mats of apothecia with pale yellow- dark brown disc, growing in rocks near top in sheltered position.

    **TLC :** Usnic acid and unknown yellow spot at RF class 5, value 0.48.

    **Specimens examined :** Around lake near Russian station Novolaz-arevskaya 212729/A.

4. **Carbonea capsulata** (Dodge & Baker) Hale (Plate 1 Figs 2a,b,c)

    Lichen thallus amorphous white mat with compressed areolate apothecia on the tops and sides of the stipes, grows on rocks in small depressions, well watered after melting of snow, along -with *Umbilicaria aprina*.

    **TLC :** Two UV+ ice-blue spots between Rf classes 3 & 4 and 4- 5.

    **Specimens examined :** Near Russian station along the lake 212641.

**LECIDEACEAE**

5. **Lecidea cancriformis** Dodge & Baker (Plate 1 Figs 3a & b) (Plate 3 Fig 3)

    A very commonly distributed endolithic lichen in Schirmacher Oasis with many black apothecia, growing in dry rocks, mostly on the opposite of wind facing side.

    **TLC :** Norslictic acid.

    **Specimens examined :** North of Priyadarshini Lake 212616, on way to Russian station, 2nd lake 212632, near 'Shivling'-nunatak 212638, around lake near 'Trishul Hill' 212684, north of stream flowing from lake near 'Trishul Hill' behind 'Trishul Hill 212718, around lake near Russian station 212729, behind Flat Top, around second lake 212741, NE of Maitri, along the stream 212749.
Fig 1: Habit of Buellia grimmiae R. Filson
Fig 2 a-c: Habit of Carborea capsulata (Dodge and Baker) Hale
Fig 3 a-b: Habit of Lecidea cancriformis Dodge and Baker
Fig 4 a-b: Habit of Lecidea siplei R. Filson
Fig 5: Habit of Rhizocarpon flavum Dodge and Baker
6. *Lecidea siplei* R.Filson (Plate 1 Figs 4a & b)

   Dark black apotheciate species, growing on mosses of moraine in moist places.

   TLC : No chemical substance.

   Specimens examined : near Priyadarshini Lake 212608, at the base of 'Trishul Hill' 212612, 212687.

7. *Porpidia* sp.

   Black apotheciate lichen, commonly growing on leeward side of dry rocks along with *Lecidea cancriformis* and *Buellia* species.

   TLC : No chemical substance.

   Specimens examined: Around lake, north of Maitri near ice-shelf 212699, near 'Shivling' 212606, behind Trishul Hill' 212719/A, 212719/B, 212720.

8. *Rhizocarpon flavum* Dodge & Baker (Plate 1 Fig 5)

   Yellow-black coloured lichen, very commonly growing on rocks in well watered area, in almost all the water rivulets in Schirmacher Oasis, along with *Umbilicaria decussate*.

   TLC : No chemical substance.

   Specimens examined : Around lake near 'Trishul Hill' 212653/A, behind Russian station 212659, north of Maitri near ice-shelf 212665, stream coming from lake 212713.


   White-black coloured lichee, less common than *R. flavum*, growing on rocks in well watered area.

   TLC : No chemical substance.

   Specimens examined : North of Priyadarshini Lake 212621, near 'Shivling' nunatak 212639, north of Maitri near ice-shelf 212665, 212670, extreme south of Maitri 212673, north of Maitri near Trishul Hill' 212713.

PERTUSARIACEAE

10. *Pertusaria* sp.

   White crustose, granular, verrucose lichen, collected only from one site on the back side of 'Trishul Hill', facing ice-shelf, growing on dry rocks along with *Umbilicaria aprim, Lecidea* and *Porpidia*. 
Lichen Flora in and Around Maitri Region...

TLC: No chemical substance.

Specimens examined: Near 'Trishul Hill', facing ice-shelf 212724.

**PHYSCIACEAE**

11. *Buellia grimmiae* R.Filson (Plate 1 Fig 1).

White crustose areolate, muscicolous lichen, growing on cushion of mosses in moist places near lakes.

TLC: Usnic acid.

Specimens examined: Base of 'Trishul Hill' 212683, north side of the lake near Dakshin Gangotri glacier 212695,

12. *Buellia pallida* Dodge & Baker (Plate 2 Fig J)

A crustose, saxicolous lichen species with flattened to substipitate areolate umbilicate thallus, forming an amorphous mat on the rocks in depressions in dry places.

TLC: No chemical substance.

Specimens examined: Near Priyadarshini Lake 212603, near Russian station along the lake 212643, around lake behind Russian station 212671.

13. *Physcia caesia* (Hoffm.) Hanipe

The peculiar white, foliose, lacinate species is fragile, heavily maculate in older parts, collected from boulders and dry stones, in water runnel it grows very luxuriantly.

TLC: No chemical substance.

Specimens examined: East of Maitri behind Flat Top, around 2nd lake 212743, area around lake near 'Trishul Hill' 212648.


It is another very commonly occurring lichen species of Schirmacher Oasis. It grows on decaying moss tuft along the ponds, lakes, along with *Umbilicaria aprina* and *Carbonea capsulata*.

TLC: No chemical substance.

Specimens examined: North of Priyadarshini Lake 212613, on way to Russian station 2nd lake 212630, lake near Russian station 212641, 212649, lake behind Russian station 212670, near nunatak 212709, before 'Trishul Hill', near stream 212711 around lake near Russian station 212733.
Fig 1: Habit of Buellia pallida Dodge and Baker
Fig 2P: Habit of Caloplaca isidioclada Zahlbr.
Fig 3: Habit of Rinodina petermannii (Hue) Derbishire
Fig 4: Habit of Umbilicaria aprina Nyl. (Upper side)
Fig 5: Habit of Umbilicaria aprina Nyl. (Lower side)
Fig 6: Habit of Umbilicaria decussata (Vill) Zahlbr. (Upper side)
Fig 7: Habit of Umbilicaria decussata (Vill) Zahlbr. (Lower side)
PLATE 3
(Scale = 1.0 mm)

Fig 1: Photograph of Acarospora gwynnii Dodge and Rudolph
Fig 2: Photograph of Lencanora fuscobrunna Dodge ex Baker
Fig 3: Photograph of Lecidea cancriformis Dodge and Baker
Fig 4: Photograph of Polycauliona murrayi Dodge
Fig 5: Photograph of Rinodina petennannii (Hue) Derbishire
15. *Rinodina petermannii* (Hue) Darbishire (Plate 2 Fig 3)  
(Plate 3 Fig 5)

It forms, black patches on the plane rock surface inside running water. Lobate thallus grows directly on rocks. It is also, commonly occurring species along with *Rhizocarpon* in almost all the melt-water runnels in Schirmacher Oasis.

TLC : No chemical substance.

Specimens examined: Near Priyadarshini Lake 212607, north of Priyadarshini Lake 212623, on way to Russian station near second lake 212629, base of 'Trishai Hill' 212692, 212710,


Black granular, verrucose lichen, growing on rock surface, mostly immersed in stream water.

TLC: No chemical substance.

Specimens examined: Near Priyadarshini Lake 212607, lake behind Russian station 212669, base of 'Trishul Hill' 212691.

**TELOSCHISTACEAE**

17. *Caloplaca isidioclada* Zahlbr. (Plate 2 Fig 2)

A dark yellow, isidiod lichen, epiphytic on decaying mosses in moist places.

TLC : No chemical substance.

Specimen examined: North of Priyadarshini Lake 212614.

An orange-red to deep red, lobate lichen, collected from only one site similar to *Physcia caesia*.

TLC : No chemical substance.

Specimens examined: East of Maitri behind Flat Top, around 2nd lake 212737.
UMBILICARIACEAE

19. *Umbilicaria aprina* Nyl. (Plate 2 Figs 4 & 5)

A most commonly occurring foliose lichen in the region, attached on rocks by a central umbilicus. It grows in mostly well watered sites on stones. The size of thallus varies from a few mm (in the area at the base of 'Trishui Hill') to about 16 cm in diameter (at the back of 'Trishul Hill' area, rock facing the ice-shelf).

TLC: Unknown triterpenoids.

Specimens examined: Near Priyadarshini Lake 212601, 212604, 212606 on way from Russian station, around 2nd lake 212633, near Russian station along the lake 212644, around lake near 'Trishui Hill' 212645, north of Maitri near ice-shelf 212663, lake near Russian station 212672, base of 'Trishui Hill' 212694, before 'Trishui Hill', along stream coming from lake 212714, behind 'Trishui Hill' 212721, NE of Maitri, along the stream 212751, 212752.

20. *U. decussate* (Vill.) Zahlbr. (Plate 2 Figs 6 & 7)

Less commonly occurring than *U. aprina*. Mostly growing in elevated and exposed places near 'Trishul Hill' and lakes near Russian station.

TLC: Unknown triterpinoids.

Specimens examined: Near Russian station, near lake 212640, around lake near 'Trishul Hill' 212646, behind Russian station 212661, at the base of 'Trishul Hill' 212689, before 'Trishul Hill', in stream coming from lake 212715.

USNEACEAE

21. *Alectoria minuscula* (Nyl. ex Arnold) Degel

A fruticose form of lichen growing in cracks between rocks, forms vermicoose masses with small filaments upto 0.2 ram.

TLC: No chemical substance.

Specimens examined: Lake behind Russian station 212666, on extreme south of Maitri 212674, 212678.
LICHENS IMPERFECTII

22. *Lepraria membranacea* (Dicks.) Lett.

Yellow, powdery lichen, very commonly growing on the mosses so all the moist places in Schirmacher Oasis.

TLC: No chemical substance.

Specimens examined: North of Priyadarshini Lake 212619, 212628, near 'Shivling' nunatak 212636, south of Maitri, behind Russian station 212662, north of Maitri near ice-shelf 212664, extreme south of Maitri 212675, base of 'Trishul Hill' 212682, lake near Dakshin Gangotri Glacier 212696, behind 'Trishul Hill' 212627, behind Flat Top-around 2nd lake 212736, NE of Maitri along the stream 212748.

23. *Polycauliona murrayi* Dodge (Plate 3 Fig 4)

A common fruticose lichen, forming erect tuft, with orange- black circular hapteron.

TLC : No chemical substance.

Specimen examined: Around north side of Maitri near ice-shelf 212700.

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References


