**Buellia subfrigida** sp. nov. (Lichens, Buelliaceae) from Lützow-Holm Bay Area and Prince Olav Coast, East Antarctica—The Asexual Sorediate Species Forming a Species Pair with *B. frigida* DAR.B.

Masakane INOUE*

**Abstract:** *Buellia subfrigida* growing on rocks in seasonally inundated habitats at the Lützow-Holm Bay area and the Prince Olav Coast of East Antarctica is described as new. Except for the presence of sorediate thallus, it is morphologically and chemically similar to *B. frigida* which is widely distributed in the continental Antarctic. Both species may form a "species pair"; *B. subfrigida* seems to be derived from sexual *B. frigida* by the acquisition of "asexual propagules" soredia. Descriptions including taxonomic and chemical data are provided.

The Prince Olav Coast and the Lützow-Holm Bay area (Syowa Station area; 68°08'–69°54'S lat., 38°15'–42°42'E long.) are situated in East Antarctica. This area belonging to the continental antarctic zone (HOLDGATE, 1964) is characterized by lower precipitation and lower relative humidity especially during the austral summer. Neither phanerogams nor liverworts are known here.

*Buellia frigida* DAR.B., 4 unidentified *Buellias* and *B. pycnogonoides* DAR.B. have been reported from this area by KASHIWADANI (1970) and INOUE (1991, 1993) respectively.

*Buellia* is one of the largest lichen genera in the Antarctic and a large number of species had been reported by many authors (*Buellia*, as far as my present knowledge goes, is represented even in the continental Antarctic by 44 species, though most of

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*秋田大学教育学部．Biological Institute, College of Education, Akita University, 1, Tegatagakuencho 1-chome, Akita 010.

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which might be superfluous synonyms). \textsc{lamb} (1968) in his indispensable work of reference on the Antarctic \textit{Buellia}, especially on the subantarctic and the maritime antarctic taxa, recognized 22 species with 2 varieties and 4 forms and simultaneously reduced 32 species with 2 varieties and a form as synonyms. However, there may be more undescribed species as well as superfluous names in the Antarctic as the fact that \textsc{lamb} (1968) proposed 3 new species shows.

In this paper I will describe \textit{Buellia subfrigida} as a new species. It forms a species pair with non-sorediate \textit{B. frigida} which is one of the well known representatives in the continental Antarctic.

Thin-layer chromatographic (TLC) methods for identification of lichen substances have been employed. The TLC-techniques given by \textsc{culberson} and \textsc{kristinsson} (1970) were used with slight modifications: I have analyzed acetone extracts of all specimens treated in two solvent systems (solvent A: a mixture of 180 ml of benzene, 45 ml of dioxane, and 5 ml of acetic acid; solvent B: a mixture of 100 ml of \textit{n}-hexane, 80 ml of ethyl ether, and 20 ml of formic acid) using Merck’s silica-gel-precoated TLC plates (DC-Fertigplatten Kieselgel 60 F254, 10 cm long). \textsc{asahina’s} standard microcrystal methods were used for recognizing norstictic acid (\textsc{asahina}, 1938).

\textit{Buellia subfrigida} \textsc{m. inoue}, sp. nov.


Thallus thick to medium, forming +/- orbicular patches up to 5-7 cm wide, whitish- or ash-gray or gray, sorediate; soralia rotundate, concave or often only with a minute projection at the juvenile stage, then becoming convex and swollen with soredia, reaching 0.8 mm wide; areolae contiguous, bullate or bullate-verrucose in inner part of thallus, lobate-effigurate at periphery; effigurate margin black or whitish, consisting of contiguous, often branching lobes. Hypothallus indistinct. Apothecia not developed.

Chemical substances: norstictic acid and an unidentified minor constituent (+/-) (chemical race I), or no colorless substances demonstrated in TLC (chemical race II).

Habitat: on rocks in seasonally inundated sites

Typus: Antarctica, Lützow-Holm Bay area, Søya Coast, Skallevikshalmen, ca. 90 m alt., on rock, leg. \textsc{m. inoue} 18077, 1. X. 1986, —holotype in \textsc{nipr} (Herbarium, National Institute of Polar Research).

This species is apparently closely related to \textit{Buellia frigida} \textsc{darb.}, which is widespread in the continental Antarctic and is the commonest lichen in the Syowa Station area, since these two species have a similar thallus forming +/- orbicular patches with distinctly lobate-effigurate periphery and have the same chemistry. Norstictic acid and an unidentified minor substance (+/-) are demonstrated in some specimens of these two species (Fig. 1) and they are deficient in some other specimens of the species.

\textsc{lamb} (1968) correctly stated that \textit{B. frigida} is the only species of the genus having a thallus with distinctly lobate-effigurate periphery in the Antarctic. \textit{B.}
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Fig. 1. Chromatograms of *Buella* species in solvent systems A and B comparing with norstictic acid, etc. 1. *Buella subfrigida*; 2. *B. frigida* (*M. INOUE no. 18734*); 3. *divaricatic acid* (pure sample supplied by Prof. Emer. S. *SHIBATA* of Tokyo University); norstictic acid (*Lecidea lactea: M. INOUE no. 11574*).

*subfrigida* has a similar lobate-effigurate thallus and the same chemistry as in *B. frigida* and can be distinguished from the latter only by the presence of soredia (Fig. 2). It can be considered as the sorediate or secondary counterpart of *B. frigida*, which is regarded as the primary non-sorediate morphotype according to the “species-pair” hypothesis proposed by *POELT* (1970). As far as I observed in the field, a habitat of *B. subfrigida* is restricted to rocks in the seasonally inundated sites. Even *B. frigida*, which has a wide ecological amplitude growing in various habitats of the Syowa Station area as *INOUE* (1989) mentioned, could hardly be seen in such kind of habitat. I suppose *B. subfrigida* has been derived from primary “sexual” *B. frigida* by the acquisition of “asexual propagules” soredia and has adapted to the seasonally inundated habitat.

*FILSON* (1974) described *Buella soredians* R. *FILSON* from the Antarctica (Clarke
Peninsula, Wilkes Land) stating that “first sorediose Buellia recorded from the Antarctic Continent”. Unfortunately, however, I did not have a chance to see the type, but the original description as well as accurate drawings of B. soredians does not agree with the present species because the thallus is composed of squamules up to 1.5 mm diam. with eroded concave soralia in B. soredians.

In some degree the external feature especially the sorediate thallus of this species is reminiscent of some species of Pertusaria, especially of subgenus Lecanorastrum (Müll. Arg.) Erichs. But as Oshio (1968: 82) pointed out in his work on Japanese...
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*Pertusaria*, the young soralia of *Pertusaria* are convex and filled with soredia, the old ones being concave and often crateriform. On the contrary, the younger areolae of *B. subfrigida* are with concave soralia or often free and the older ones convex and swollen with soredia.

Representative specimens examined. PRINCE OLAV COAST: Cape Hinode (18497). LÜTZOW-HOLM BAY AREA: Sôya Coast; Langhovde (17100, 17238, 17600, 17978, 18021), Breidvågnipa (18755), Skallen (19643), Skallevikhalsen (18077, 18085, 18124), Rundvåghetta (18932, 18957), Padda (18427).

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**References**


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