STUDIES IN ANTARCTIC LICHENS 6: FURTHER NOTES ON UMBILICARIA

by

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ABSTRACT

Filson, Rex B. Studies in Antarctic lichens 6: further notes on Umbilicaria. Muelleria 6:35-347 (1987).—Five species of Umbilicaria are enumerated for Continental Antarctica, South Shetland Islands, South Orkney Islands and the off-shore islands of the Antarctic continent (Fig. 1): U. aprina Nyl., U. cristata Dodge & Baker, U. decussata (Vill.) Zahlbr., U. propagulifera (Vainio) Llano and U. rufidula Hue. A key to species is given and a full description and distribution map of each species is provided. U. antarctica Frey & Lamb and U. dillenii Tuck. var. solida Frey are placed in synonymy under U. rufidula Hue; U. saviczii Llano and Gyrophora koroitkevici Golukova are placed in synonymy under U. aprina and Dermatiscum mawsonii Dodge is placed in synonymy under U. decussata. The validity of all other taxa within the Umbilicariaceae described from the region is discussed.

INTRODUCTION

This paper is a continuation of a series of papers on the lichens of Antarctica (Filson 1974a,b; Filson 1975 a,b,c).

In a paper enumerating the lichens collected on the Windmill Islands, Wilkes Land, (Filson 1974b) I accepted two species of Umbilicaria; U. cristata Dodge & Baker, a species with a few tufts of rhizines on the lower surface, and U. decussata (Vill.) Zahlbr., a species without rhizines below. In a further paper (Filson 1975b) I discussed the possibility of two rhizinate species being present on the Antarctic Continent, one, U. antarctica Frey & Lamb, occurring along the Antarctic Peninsula region in western Antarctica and the other, U. aprina Nyl., occurring in eastern Antarctica. Since writing those papers I have had the opportunity of examining all of the Umbilicaria collection from Antarctica housed in the British Museum (Natural History) together with several other modern collections (see acknowledgements). I now consider that there are five species of Umbilicaria in the area under discussion and have found that nomenclatural changes are required.

BRIEF SUMMARY OF PREVIOUS WORK


In his account Dodge placed U. dillenii Vainio, U. rufidula Hue and U. dillenii var. solida Frey within the taxon Omphalodiscus antarcticus. He proposed O. bakeri as a new name for Umbilicaria rugosa Dodge & Baker, which he reported as a later homonym of Gyrophora rugosa Hook. However, I cannot find where the

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epithet rugosa has been used in combination with Omphalodiscus and therefore O. bakeri is nomenclaturally superfluous and illegitimate (ICBN, Art. 63).


Lindsay (1969) enumerated five species of Umbilicaria for the Peninsula region of Antarctica (Fig.1.), these being Omphalodiscus antarcticus (Frey & Lamb) Llano, O. decussatus (Vill.) Schol., O. spongiosus (Dodge & Baker) Llano, Umbilicaria propagulifera (Vain.) Llano and U. cristata Dodge & Baker. In a later paper (Lindsay 1972) he cited two species from Vestfjella, U. aprina Nyl. and U. decussata, with the note that U. aprina appeared very similar to U. spongiosa.

Ovstedal (1983, a & b, 1986) also reported U. aprina and U. decussata from the mountains of Dronning Maud Land (Fig.1).


Poelt (1974) has suggested that the genus Dermatiscum be placed in a family of its own the Dermatisceae, as its affinities lie with the Physciaceae rather than the Umbilicariaceae. The species Dermatiscum harissoni Dodge was described (Dodge 1948) from a “single fragmented collection, separated from other lichens, on dead mosses. It is evidently old and weathered, which may account for the browning of the medullary tissue. The species is somewhat aberrant in the genus in being attached to the substrate by abundant single brown hyphae, rather than by a central hapteron and by much slenderer hyphae throughout the thallus but its algae are clearly Trentepohlioid . . .”.

TAXONOMIC CRITERIA AND ASSESSMENT OF SPECIMENS

The above brief summary shows that most authors have divided this family into a number of genera. However generic divisions within the Umbilicariaceae based on apothecium morphology alone leads to unnatural groupings and the maintenance of one single genus is supported by ontogenetical studies (Henssen 1970). The presence of “Brutkörner” or “thallospores” are considered as being conidia of the mycobiont and are characteristic of species (Hassenhüttl and Poelt 1978).

Selected specimens from each of the four species were examined by thin layer chromatography which proved to be of little use in the separation of species.

Fertile specimens are very rare in Antarctica. The only fertile specimens which I have seen, have been collected in the Peninsula region in eastern Antarctica and in the Antarctic Islands just to the north. It would appear that these are the only regions where climatic conditions are suitable for a thallus to produce fruiting bodies.
I have examined over 350 complete specimens, mostly still attached to the substrate. In addition, there are many packets of fragments in herbaria, with a multitude of names. I have assigned them by virtue of their undersurface, or nature of the rhizines, to the species named in this paper. None appear to me to have any special characters which would warrant their segregation as distinct species. A complete list of specimens examined is available from the National Herbarium of Victoria (MEL).

**TAXONOMY**

**Key to Species of Umbilicaria in the Antarctic**

1. Undersurface with rhizines
2. Rhizines dense, sometimes with a bare patch around the umbilicus, simple, dichotomous or strap-like
   3. Upper surface smooth to lightly ridged; margins sometimes rolled under, never subvertical, ragged and torn; underside black; thallospores always thick and conspicuous ... *U. rufidula*
   4. Rhizines irregularly branched many times; thallospores thick and conspicuous ... *U. propagulifera*
3. Upper surface granulose, wrinkled to deeply ridged; margins flexuose, often subvertical; underside pale pinkish-brown to sooty-brown to black; thallospores often inconspicuous, but sometimes thick and conspicuous ... *U. aprina*
2. Rhizines sparse, sometimes only marginal, simple to much branched
   4. Rhizines simple or several times dichotomously branched; thallospores sparse and inconspicuous ... *U. cristata*
1. Undersurface erhizinate ... *U. decussata*


**Umbilicaria saviczii** Llano, Bryologist 69: 110 (1966). Type: “Antarctica. Princess Astrid Coast. Novolazarevskaya, 70° 46' S, 11° 50' E, Meyer 6.” (Llano, p.111 says “US — holotype” however a search at that herbarium (Hale, pers. comm.) and at ABSL (Wetmore, pers. comm.) where the major part of the Llano herbarium has been deposited, has failed to locate the type specimen).


**Thallus** foliose, thick, leathery, monophyllous, deeply incised, often appearing polyphyllous, very variable in size and shape from small rosulate thalli, less than 1 cm diam., to large foliose thalli to 10 cm diam.; margins flexuose, often subvertical, at times bordered with a white necrotic zone; sometimes several thalli growing together in tightly compressed colonies; upper surface light buff to mummy-brown, grey to almost black, dull, pruinos or sometimes covered with a thick necrotic layer, granulose, indistinctly cracked, wrinkled to reticulately rugose and often paler above the umbo, fading to the margins; lower surface pale pinkish-brown to sooty-brown to black; thallospores farinose, inconspicuous on paler thalli but thick and conspicuous on those with a black undersurface; rhizines moderate to dense, thinning to a narrow bare zone around the umbilicus, simple to sparingly branched, occasionally fasciculate, cylindrical to strap-like, variously coloured, mostly lighter than the undersurface of the thallus, sometimes grading from dark at the base to light at the tips, rarely evenly dark coloured; thallospores thick on darker rhizines absent on lighter. *Apothecia* not seen.

**Distribution:** Fig. 3a.

**Discussion:**
Lindsay (1972) first reported the presence of this species on the Antarctic continent. He suggested that it appeared similar to *Umbilicaria spongiosa* Dodge & Baker, an observation confirmed by Filson (1975b).

I have discussed the type specimen of *Umbilicaria spongiosa* and *U. antarctica* var. *subvirginis* elsewhere (Filson 1975b).

The holotype specimen of *Gyrophora korotkevicii* consists of two complete thalli and three thalline fragments. The thalli are small, to 20 mm diam.; upper surface smooth, pale buff; lower surface pale pinkish-brown at the margins, becoming sooty-brown towards the centre; rhizines concolourous to paler than the lower surface, sparingly branched. In all respects they agree with the typical “young,
smooth thallus form” of *U. aprina*. These specimens were possibly growing in a sheltered site.

In the protologue, *U. saviczii* is said to differ from the “virginis — crustulosus — spodochrous complex” by the “parti-coloured lower surface and the highly branched rhizines”. Species of this complex were not reported from the Antarctic (Llano 1950), however the description of *U. saviczii* agrees well with specimens of *U. aprina* found on Continental Antarctica.


*Thallus* foliose, monophyllous, to 10 mm diam.; margins smooth, flexuose, crenate, incised, bare or thickly beset with rhizines; upper surface dull, grey-brown, smooth, rugulose and occasionally pruinoise over the umbilicus; lower surface dirty white to pinkish-brown, thinly covered with thallospores; thallospores thicker in the marginal rhizinate zone; rhizines black, mostly well developed, to 2 mm long, simple to many times dichotomously branched, bare or thinly covered with thallospores. *Apothecia* and *pycnidia* not seen.

**Distribution:** Fig. 3b.

**Discussion:**

*Umbilicaria cristata* is a very small species characterised by the long, dichotomously branched, marginal rhizines. Unfortunately I have not been able to borrow the type. However, there is a specimen in the National Herbarium of Victoria determined by Dodge and cited in his BANZARE report (Dodge 1948) as *U. cristata* (A.A.E. 60-2). This specimen consists of several fragments of more than one thallus with branched rhizines and one almost complete erhizinate thallus. The latter can be referred to *U. decussata*. Llano (1950) keys out the “Antarctic species” of *Umbilicaria* separately from the others in the Western Hemisphere but does not give any clear distinction between *U. cristata* and *U. propagulifera*. He stated: “This species [*U. cristata*] has been recorded from two widely separated localities in the Antarctic; it may well be circumpolar. It is quite distinct, morphologically from *U. propagulifera* Vain. but both of these species are known only sterile. Both appear to be somewhat similar to *U. cylindrica* but there is no proof that they may be referable to that species.”

Under *U. propagulifera* Llano wrote that “Sterile Umbilicariaceae with rhizinate margins are usually conferrable to *U. cylindrica* as Vainio apparently did with this material [Gyrophora cylindrica var. propagulifera]. However, when compared with the many varieties of *U. cylindrica*, it may be seen that Vainio’s variety exhibits strong dissimilarities.” Again Llano does not say what dissimilarities, nor does he give any further discussion or reasons why he considers them to be distinct species.

I have examined additional material from “summit 706 m” east of Swinhoe Peak, South Georgia. These specimens clearly illustrate the difference between the rhizines and thallospores of this species and *U. propagulifera*.


excursion, no 226 altitude 380 mètres, et no 227, altitude 75 mètres, no 228, le 15 janvier 1909.”. **LECTOTYPE** (here chosen): “2° exped. antarct. française 1908-1910 no 227 pour partie.” (PC!).


**Omphalodiscus decussatus** var. tortuosus Llano, J. Wash. Acad. Sci. 46: 185 (1956). **TYPE**: “Antarctica: MacRobertson Land, A.N.A.R.E. Base Mawson (lat. 67° 36' 21"S., longe 62° 52' 48"E.). Leg. R.O. Summers, January 1955.”. **HOLOTYPE** (n.v.) (Llano p.185, does not state where the holotype material of this species has been lodged. A search of US (Hale, pers. comm.) and ABSL (Wetmore, pers. comm.) has failed to locate any type material, nor is there any specimen by this name amongst those collected by R.O. Summers held in MEL).


**Thallus** foliose, monoplyllous, sometimes several thalli grow together giving the appearance of being polypllyllous, variable in size, (5-)c.15(-50) mm diam; margins smooth, sometimes laciniate, varying in colour from light grey-olive, brown, grey to almost black; upper surface dull, areolate, pruinose, smooth to rugulose and deeply folded; rugi elevated into a fine reticulate pattern or broadly compressed into strongly formed ridges; lower surface dull, varying from pale pinkish-buff to brown to sooty-black, sometimes a mottling of several shades; erhirizate. *Apothecia*
rare, laminal, mostly towards the margins of the thallus, to 0.8 mm diam., sessile or shortly stipitate, constricted below, marginate; margins prominent, smooth to crenulate; disk black, gyrose sometimes fissured in the centre; hymenium to 50 µm tall, pale brown; subhymenium brown; hypothecium dark brown; asci 30-33 x 12-16 µm ascospores 8 per ascus, simple, hyaline, ellipsoid, 8-9 x 5-6 µm.

**Distribution:** Fig. 3c.

**Discussion:** _Umbilicaria decussata_ is a ubiquitous lichen. Its variable thallus has given reason to many authors for erecting new taxa. The antarctic environment has provided the most diversity with seven segregates from _U. decussata_ being described as new. Dodge (1973) cites these seven as present in Antarctica but does not accept that _U. decussata_ occurs there. This species is very common in Australia where numerous forms, including many of these segregates, may occur on a single rock. I find it impossible to accept that there is any difference between the specimens growing in Australia and those in Antarctica.

Unfortunately the type specimens of _Umbilicaria rugosa_, _U. cerebriformis_, _U. pateriformis_, _U. hunteri_ and _U. subcerebriformis_ have not been available for study. However three of these names are represented in the National Herbarium of Victoria by specimens which have been determined by Dodge and are cited in his BANZARE report (Dodge 1948). They are:
1. **_Umbilicaria hunteri_** Dodge (Hunter 11-2). In discussing this specimen Dodge (1948: 148) says “Hunter 11-2 seems to be a young thallus of this species, the cortices being much thinner than the measurements given above, the thallus is smooth, tawny olive when moist and the medulla has the same structure as the other specimens cited.” This specimen consists of a single, small, pale brown thallus. It is consistent with similar smooth pale brown thalli which are considered to be underdeveloped forms of _U. decussata_ growing in sheltered habitats. I have observed these forms in the Australian alps and in north Greenland and I can see no reason to separate them from _U. decussata_.
2. **_Umbilicaria cerebriformis_** Dodge & Baker (A.A.E. 28-1). This specimen, determined as _Charcotia cerebriformis_ (Dodge & Baker) Dodge and so cited in the BANZARE report, consists of fragments of several small, rugulose thalli. No apothecia of _Scutula_ were present on any of the fragments, but there is one small developing apothecium which has the appearance of a young apothecium of _U. decussata_.
3. **_Umbilicaria subcerebriformis_** Dodge (A.A.E. 104-2). This specimen consists of fragments of several small thalli. They are mainly pale whitish-brown to brown fragments which are consistent with _U. decussata_ growing under adverse conditions.

_Umbilicaria rugosa_ Dodge & Baker and _U. pateriformis_ Dodge & Baker are separated from _U. decussata_ in the key given by Dodge & Baker (1938) by the colour of the upper surface. Although I have not seen specimens of _U. rugosa_ and _U. pateriformis_, I do not consider that surface colour is a valid criterion on which to differentiate species. From my own observations, colour varies according to the habitat and degree of exposure.

The type of _Dermatiscum mawsoni_ Dodge is cited as “King George V Land, Cape Denison, B.A.N.Z.A.R.E. 536.” and at the end of the protologue Dodge says “On rocks with _Umbilicaria rugosa_ and _Lecanora exsulans_. King George V Land, Cape Denison, B.A.N.Z.A.R.E. 536-16, 536-17, 536-19.”. The collection number 536 occurs throughout the B.A.N.Z.A.R.E. report with other sub-numbers representing other species so it appears that this number alone cannot represent

* terminology according to Frey 1936, Fig. 1.
the holotype collection. Only one collection, 536-16, is represented in the B.A.N.Z.A.R.E. collection at the State Herbarium of South Australia (AD). It is annotated by Dodge "Dermatiscum Mawsoni, Umbilicaria rugosa, Lecanora eusulas." So it seems pertinent to select the lectotype from this collection. Unfortunately the enclosed thalli are crushed to fragments — all of which appear to be *U. decussata*. I examined several of the larger fragments but could not detect the alga *Trentepohlia* or any filamentous algal threads in them. There are one or two almost complete thalli 7-8 mm diameter which resemble the protologue of *D. mawsoni* which I have selected as lectotype.

Ovstadal (1983a) examined the lower surface of the type material of *Umbilicaria leiocarpa* var. *nana* by Scanning Electron Microscope. He concluded that it was not possible to distinguish between the sample which he examined and young specimens of *U. decussata*.

One specimen collected on "Operation Tabarin No. 2505" at Scar Hills, Hope Bay, Trinity Peninsula, East Graham Land, on 25.ix.1945 by I.M. Lamb, is unusually rugose on the upper surface. This specimen is sterile and has the appearance of *U. hyperborea* (Ach.) Hoffm. Lamb in his notes on the specimen says "This unusually rugose form was seen only in this one place." In the absence of more material I prefer to include it as a rugose form of *U. decussata* rather than include it as the only collection of *U. hyperborea* from the Antarctic Continent.


*Thallus* foliose, polyphyllous, rarely monophyllous, to 5(-10) cm diam., often several thalli grow together to form rosettes; margins smooth, flexuose, crenate to incised, thickly setet with branched rhizines; upper surface dull, pruinose, grey-brown to grey to almost black, usually darker centrally shading to the margins, smooth, cracking with age, occasionally perforations develop along the cracks and rhizines grow from forming tufts on the upper surface, older specimens show some obscure reticulate ridging; lower surface pale pinkish-brown to dark brown, with a sparse to well-developed covering of rhizines; rhizines irregularly branched, rarely simple, dark brown to black, thickly covered with thallospores. *Apothecia* to 1 mm diam., at first plane, becoming gyroset, stipitate; *ascospores* not seen.

**Distribution:** Fig. 3d.

**Discussion:**

*Umbilicaria propagulifera* is common in eastern Antarctica and has been located at a few localities in the west. However it is an easily overlooked species and could have a wider range.

I have chosen the specimen in BR as lectotype merely because although small, it is larger than the islectotype. Both specimens have obvious thallospores on the rhizines and lower surface.

I first considered this material should be referred to *U. cylindrica* a cosmopolitan species which is very common in alpine areas of Australia. However *U. propagulifera* has been shown (Topham et al. 1982, Seaward et al. 1983) to differ from *U. cylindrica* by the presence of thallospores on the lower surface and rhizines.
Only one fertile specimen has been seen in the collections from the Antarctic, “Dry habitat, north facing rock slopes, Galindez Island. 16. xii.1935 British Graham Land “Penola” Expedition 1934-37” (BM). This specimen has two apothecia, one plane, very immature and the other showing a few gyri, however neither were sectioned. The external appearance of the apothecia resemble those found on *U. propagulifera* from Australia.


*Thallus* foliose, thick, brittle when dry, monophyllous, to 15 cm diam.; margins flexuose, sometimes revolute, lacerated and torn, sometimes appearing ragged; upper surface dull, pale creamy-buff to reddish-brown to brownish-grey, smooth, undulate to mildly wrinkled, sometimes with small perforations, through which rhizines project from the lower surface; lower surface black, thallospores thick and conspicuous; rhizines moderate to dense, thinning to a bare zone around the umbilicus (in old specimens the lower surface may be almost bare with only a zone of short stunted rhizines around the margins), simple or sparingly branched to strap-like; thallospores farinose, often thickly covering the whole rhizine but occasionally towards the tips they become bare, when dry the rhizines are mostly black but occasionally they are brownish-buff or buff with a ginger tinge. *Apothecia* rare, laminal, towards the margins of the upper surface, to 1.5 mm diam., sessile, constricted below sometimes with several rhizines emerging from the lower cortex; margin prominent, smooth to flexuose; disk black, smooth or with central sterile column; hymenium to 60 μm tall; subhymenium pale brown; hypothecium dark brown; asci 35-45 x 13-18 μm; paraphyses septate, branched, only slightly expanded at the apices; ascospores simple, hyaline, ellipsoid, 10-15 x 6-7 μm.

**Discussion:** Fig. 3e.

Hue (1915a; 1915b) prepared and published two papers almost at the same time, causing a difficult nomenclatural problem. In his report (1915a) of the lichens brought back from the second French Antarctic Expedition, he published on page 52 a good description of a new species under the name *Umbilicaria rufidula*. The description was from specimens parasitised by the fungus *Scutula*, and Hue mistakenly accepted the apothecia of this *Scutula* as those of the new species. These apothecia are 0.1-0.2 mm diam., black, immarginate, hemispheric; asci 25-37 x 13-23 μm; ascospores two-celled, hyaline, slightly pointed at each end 13-14 x 5-7 μm.
Fig. 2. a-c, Scutula sp., a — section through an apothecium; b — ascus; c — mature ascospores. d-f, Umbilicaria rufidula, d — section through an apothecium; e — a mature ascus; f — ascospores. a-c from the lectotype of U. rufidula; d-f from Lindsay 1190.
(Fig. 2 a-c). Subsequently he must have realised that the ascospores were not those of an *Umbilicaria* because on a later page, p. 185 of the same publication, he retained *U. rufidula* in the Umbilicariaceae but placed it in a new genus *Charcotia*, as *C. rufidula*. However in doing this, he gave no description of the new genus but merely stated "Charcotia Hue, Loco citato" “39. *Charcotia rufidula* Hue; Umbilicaria rufidula Hue”, the “39" being a reference back to the species number placed against *Umbilicaria rufidula* on page 52.

*Charcotia* cannot be considered as validly published in the above report as it lacked a generic description (article 41.1, ICBN). Whether *Umbilicaria rufidula* is validly published in the report is questionable, although an adequate description on pages 52-54 accompanied the name. If the major part of Hue's report (including p. 52) and the final portion (including p. 185), which contained amendments to the earlier text, were published simultaneously then I believe that *Umbilicaria rufidula* Hue is not validly published as Hue himself did not accept this name in the publication (article 34.1a, ICBN). If, however, it could be shown that the report was published in parts and that p. 52 was issued before p. 185 then the name *Umbilicaria rufidula* Hue would be valid. Information given in the next paragraph indicates that text may have been typeset and proofed in stages but the printing layout of the publication supports the view that all pages of the finished publication appeared simultaneously and I have no evidence of any issue in parts.

Hue's second paper (1915b) appeared in the Bulletin Société botanique de France. On page 17 of this he published the "Genus CHARCOTIA Hue; gen. nov." giving a generic description and under this citing "CH. RUFIDULA Hue; Umbilicaria rufidula Hue, loc. citat., p. 52". There is no statement of what "loc. citat." refers to, but from the page number 52 it is evident that Hue was referring to his report (1915a). He must therefore have had at least the page proofs of the report, or of portion of it, in hand at the time that he described *Charcotia* validly in the Bulletin. The citation above shows that *Charcotia rufidula* Hue was also validly published (article 32.1 c, ICBN) in this Bulletin paper.

Because the epithet *rufidula* was validly published in 1915, whether as *Charcotia* in Hue (1915b) or improbably as *Umbilicaria* in Hue (1915a), it predates all other valid epithets for this taxon and must have priority. I have therefore made a new combination to ensure that the epithet is unquestionably validated within *Umbilicaria*.

In the protologue of this species Hue placed under *U. rufidula* not only certain collections from the second expedition but also the specimens which he had incorrectly identified as *U. dillenii* Tuck. in his earlier paper (Hue 1908) enumerating the lichens of the First French Antarctic Expedition. I have therefore chosen the lectotype from the specimens collected on the First French Antarctic Expedition. The lectotype collection, from the Booth-Wandel Island in Marguerite Bay, consists of fragments of two thalli. One is large, typical, mummy-brown in colour, lightly parasitised with *Scutula*. I have chosen this thallus as lectotype. The other thallus is at a later stage of development, being pale and weathered and more fragmented and, although referable to *U. rufidula*, differs too much from the lectotype to be considered an isolecotype.

I have discussed the type specimen of *U. antarctica* elsewhere (Filson 1975b). The lectotype specimen of *U. dillenii* var. *solida* Frey consists of two small fragments. This material was retained by Frey but the rest of the specimen probably was destroyed in Berlin in 1943 (Pilger 1953). The fragments are from a typical smooth-surfaced, mummy-brown thallus. The smallest fragment is lightly perforated with a few rhizines showing through to the upper surface.

Lindsay (1969) says that "no fertile material was found in the collections. Many thalli from the South Orkney and South Shetland Islands were parasitised by a species of *Scutula*". However Lindsay 1190 and 1282 were both abundantly fertile with apothecia of *Umbilicaria* (Fig. 2 d-f).
Fig. 3. Known distribution of: a — Umbilicaria aprina; b — Umbilicaria cristata; c — Umbilicaria decussata; d — Umbilicaria propagulifera; e — Umbilicaria rufidula in the Antarctic.

ACKNOWLEDGEMENTS

I would like to thank the Herbarium Horti Botanici Brusellensis, Belgium (BR), the Turku University Herbarium, Finland (TUR), the Instituti Botanici Academiae Science Urss, Leningrad, USSR (LE), the Herbier Cryptogamique Museum National D'Histoire Naturelle, Paris, France (PC), the Botanisches Institut der Universitat, Bern, Switzerland (BERN), the British Museum (Natural History),
London, England (BM) and Dr Carroll Dodge for the loan of type specimens. I am also grateful to the National Science Museum, Tokyo, Japan (TNS); the British Museum (Natural History), London, and the British Antarctic Survey, Cambridge, England (BAS), for the loan of modern collections.

I would especially like to thank Dr Hj. Eichler for assistance with the nomenclatural problems associated with Umbilicaria rufidula and Helen I. Aston for fruitful discussions on the manuscript.

I would also like to thank Klaus Ammann for making available manuscript notes by Eduard Frey on Umbilicaria solida, Ron Lewis Smith for manuscript notes by I. MacKenzie Lamb on his studies of Antarctic Umbilicaria species and Denis Lamy for attempting to clarify the situation concerning Hue's papers on Umbilicaria rufidula.

REFERENCES


Manuscript received 29 September 1986.