SHORT NOTES

NOTES ON ANTARCTIC BRYOPHYTES: VI. THE GENUS *Dicranoweisia* ON SIGNY ISLAND, SOUTH ORKNEY ISLANDS

By B. G. BELL*

ABSTRACT. The identity of two species of *Dicranoweisia*, *D. grimmiaceae* (C. Muell.) Broth. and *D. antarctica* (C. Muell.) Kindb. on Signy Island, South Orkney Islands, is established but that of a third, *D.* cf. *immersa*, remains uncertain. The history of their nomenclature is discussed and a key to separate the species is provided, as are details of all specimens examined.

DURING the course of a recent investigation into the reproductive behaviour of mosses on Signy Island, South Orkney Islands, Webb (1973, table I) reported three species of *Dicranoweisia*, i.e. *D. grimmiaceae* (C. Muell.) Broth., *D.* cf. *immersa* Broth. and *D. mackayi* (Broth. et Dix.) Broth. A revision of the material cited by Webb has confirmed the identity of *D. grimmiaceae* but, as shown below, that referred to *D. mackayi* is, in fact, *D. antarctica* (C. Muell.) Kindb. The identity of the third species remains problematical.

The species examined, with the exception of type material obtained on loan from other herbaria, are all from the British Antarctic Survey's bryophyte herbarium (AAS), at present housed with the Institute of Terrestrial Ecology's collections. Herbaria holding duplicates are indicated by the contractions recommended by Holmgren and Keuken (1974).

Key to species

1. Leaves little altered when dry, capsules immersed .. .. ***Dicranoweisia*** cf. ***immersa***
   Leaves crisped when dry, capsules exserted 2
2. Leaves straight, cells on adaxial surface of nerve in and just below subula short, irregularly quadrate or rectangular, peristome teeth smooth .. .. ***Dicranoweisia grimmiaceae***
   Leaves falcate, cells on adaxial surface of nerve in and just below subula elongate, regularly rectangular throughout, peristome teeth weakly to strongly papillose .. .. ***Dicranoweisia antarctica***

Dicranoweisia antarctica (C. Muell.) Kindb.

The nomenclatural history of *D. antarctica* is complex. Hooker and Wilson (1844) considered material collected by J. D. Hooker on Hermit and Campbell Islands to be similar to *Weisia crispula* Ludw. As this was a well-known European species described by Hedwig (1801), who gave Ludwig as the collector, this is presumably the source of the incorrect citation which was repeated in the *Handbook of the New Zealand flora* (Hooker and Wilson, 1867). Many of the specimens collected by J. D. Hooker during the 1839–43 Antarctic expedition, including those from Hermit and Campbell Islands, were sent to C. Müller, who considered those ascribed to *Weisia crispula* by Hooker and Wilson more appropriately placed in the genus *Blindia* and described them as *Blindia antarctica* C. Muell. citing *Weisia crispula* Wils. *in sched.* (Müller, 1848). Mitten (1869) cited both *Weisia crispula* Wils. and *Blindia antarctica* C. Muell. when re-describing the material as *Dicranum antarcticum* Mitt. and the following year Jaeger (1870) used the name *Weisia antarctica* Wils. *in sched.*, citing *Blindia antarctica* C. Muell., *Weisia crispula* Hook. et Wils. and *Dicranum antarcticum* Mitt. as synonyms. Finally, Kindberg (1888) listed the species as *Dicranoweisia antarctica* Wils. although Paris (1895) later published the combination *Dicranoweisia antarctica* (C. Muell.) Par. citing *Blindia antarctica* C. Muell., *Dicranum antarcticum* Mitt. and *Weisia crispula* H. f. et W. as synonyms. Although Kindberg (1888) used an incorrect citation, Wilson never having published the species as *D. antarctica*, he was the first to consider this taxon to be a *Dicranoweisia*

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and, as Müller (1848) first validly published the species using the specific epithet *antarctica*, it is correct for the full citation to be (C. Muell.) Kindb.

D. antarctica has been reported from other localities in South America (Herzog, 1939, 1954) and is known from Campbell Island (Hooker and Wilson, 1844, as *Weisia crispula*) but, in spite of its specific epithet, it has not previously been recorded from within the Antarctic botanical zone as understood by Greene (1968).

The specimens cited by Müller (1848) and by Hooker and Wilson (1844) (Hooker 126, BM, *Weissia crispula* Ludw., *Blindia antarctica* C. Müller, Hermite Island, Cape Horn. Antarct. Exp. 1839–43. J. D. H.; Hooker 25, BM, *W. crispula* var., *Blindia antarctica* C. Müller. Campbells Island. Antart. Exp. 1839–43. J.D.H.) have been examined and the Signy Island material agrees with them in all essential respects.

D. antarctica is an uncommon species on Signy Island, being restricted to rock surfaces with a plentiful water supply, and moist gravel. The falcate leaf arrangement and regularly elongate rectangular cells which cover the adaxial surface of the nerve in the vegetative leaves (Fig. 1a) are important distinguishing features. Specimens are frequently found with sporophytes and the presence of peristome teeth which are sparingly to abundantly finely papillose is in marked contrast to the smooth teeth of *D. grimmiaceae*.

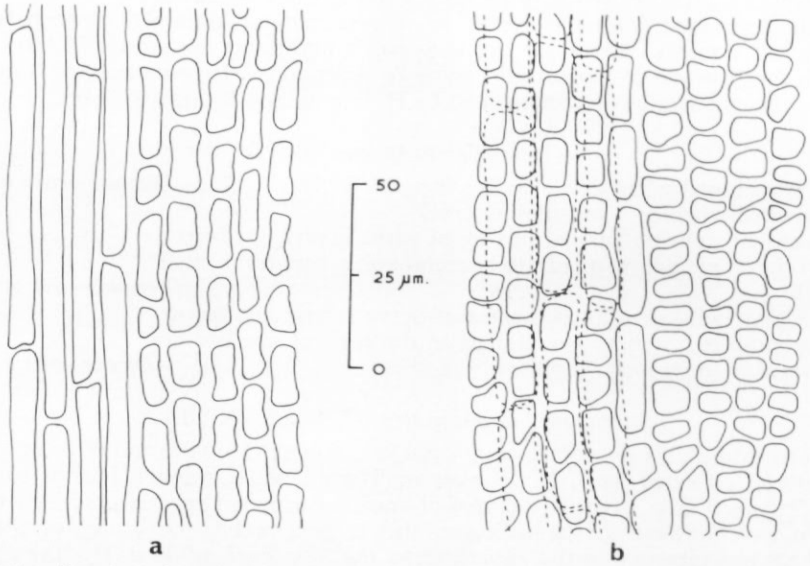

Fig. 1. Adaxial surface view of portion of nerve and lamina from vegetative leaves of *Dicranoweisia antarctica* (a) and *D. grimmiaceae* (b).

Webb (1973) referred the Signy Island material of *D. antarctica* to *D. mackayi* (Broth. et Dix.) Broth., a species first described by Brotherus and Dixon (Dixon, 1912) from New Zealand, but an examination of the type specimen of *D. mackayi* (British Antarctic Exped. Ref. No. 130, BM, *Dicranum mackayi* Broth. et Dix. sp. nov. Nuns Veil Mt. Mt. Cook district, South I., New Zealand. Alt. 6,000 ft. Dec. 1907. Coll. Dr. Mackay) shows clearly, as suggested by Sainsbury (1945, 1948, 1955), that *D. mackayi* and *D. antarctica* are synonymous, the type specimen being merely a shorter form of *D. antarctica* with the leaves tending to be falcate.

Specimens examined

North of lake to the north of Jane Peak, Webb 2 (BM, CHR), Webb 11 (AAS), Webb 18 (BM, SGO), Webb 21 (AAS), Webb 26 (BM), Webb 100 (AAS, LE), Webb 113a (BM),

Webb 122 (AAS); south of lake to the north of Jane Peak, R. Smith 599 (AAS, BA, B, H, MEL, MSC, NY, O, PC, PRE, S-PA, TNS).

Dicranoweisia grimmiaceae (C. Muell.) Broth.

This species was first described from South Georgia by Müller (1890) as *Blindia grimmiaceae* C. Muell. and subsequently transferred to *Dicranoweisia* by Brotherus (1901). From an examination of the type specimen (Will sub. no. 7, HBG, *Blindia grimiaceae* C. Muell. n. sp. Am Ausgange des Brockenthales in kleinen Polstern. Südpolarexpeditionen. 23.i.83.) there is no doubt that the material from Signy Island should be referred to this taxon. *Dicranoweisia grimmiaceae* is also known (Cardot, 1908; Bartram, 1957) from a number of additional localities in the Antarctic botanical zone.

D. grimmiaceae is a compact cushion-forming species characterized in the field, when dry, by the crisped nature of the subulate leaves and, under the microscope, by the short irregularly quadrate or rectangular cells which cover the adaxial surface of the nerve in and just below the subula (Fig. 1b). It is the commonest species of the genus on the island, growing on rock or in crevices, and it is frequently found with sporophytes. The capsule provides a further distinctive feature as the peristome teeth are quite smooth, unlike those of *D. antarctica* which are sparingly to abundantly finely papillose.

Specimens examined

Between Starfish Cove and The Wallows, R. Smith 474 (AAS); Three Lakes Valley, R. Smith 536 (BM, H); cove opposite Thule Islands, Longton 1169 (BM, BA, CHR, NY, O, PC, PRE, S-PA); Factory Cove, Holdgate 43 (AAS, BA), Longton 836 (AAS, TNS), Longton 847 (AAS), Longton 1163 (AAS), R. Smith 7 (AAS), R. Smith 473 (BM, B), Webb 3 (AAS), Webb 4 (BM), Webb 23 (AAS), Webb 24 (BM), Webb 35 (AAS), Webb 82 (AAS), Webb 93 (BM, S-PA), Webb 102 (BM); hill between Factory Cove and Paal Harbour, Holdgate 131 (AAS, LE, MEL); Berntsen Point, Taylor 360 (BM, B, PC), Taylor 365 (AAS, BA, CHR, LE, MEL, MSC, NY, O, PRE, SGO), Webb 40 (BM); Observation Bluff, Holdgate 73 (BM, B), Holdgate 109a (AAS, CHR, H), Holdgate 114a (BM, SGO), R. Smith 13 (AAS), Webb 94 (AAS); Polynesia Point, Holdgate 664a (AAS, B, MSC, NY, O, PC, PRE, S-PA); Paal Harbour, Holdgate 751b (AAS), Holdgate 754b (BM), Holdgate 757a (AAS, BA, H, TNS), R. Smith 667 (AAS); Foca Point, Longton 836 (AAS, TNS). *Inadequately localized.* Webb 74 (AAS), Webb 75 (BM).

Dicranoweisia cf. *immersa* Broth.

Only a single specimen of this taxon has been collected on Signy Island and until more is obtained to enable a thorough examination its taxonomic status must remain uncertain. Indeed, having examined the type specimen of *D. immersa* (E. Worth s.n., H, *Dicranoweisia immersa* Broth., Kerguelen, Felswand an der Südseite des Magnetberges), which was first described by Brotherus (1906), it is doubtful whether the Signy Island specimen should be referred to this taxon as it differs in some essential respects, i.e. the vegetative leaves are straight when dry unlike the strongly crisped leaves of the Iles Kerguelen specimen and the nerve is narrower and more distinct. It can, however, be distinguished readily from the remaining two species by the characters given in the key and by the presence of elongate rectangular, as distinct from quadrate, border cells in the upper margin of the leaf.

Specimen examined

Bluff south of Factory Cove, R. Smith 689 (AAS).

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A RECORD OF *Mytilus edulis* L. FROM SOUTH GEORGIA

By R. RALPH,* J. GARREY H. MAXWELL, INIGO EVERSON *and* J. HALL

ABSTRACT. The finding of a live *Mytilus edulis* at South Georgia is described; as far as we know this is the first record of this species from the Antarctic.

THE lamellibranch family Mytilidae is well represented in sub-Antarctic waters by several species of the typical mussel type (Powell, 1960). However, the only representatives of the family that have been recorded from south of the Antarctic Convergence are two minute deep-water species that have been ascribed to the genus *Dacrydium*, although Powell (1965) suggested that this designation is probably incorrect. The absence of the more characteristic mytilids, the mussels, from the Antarctic is somewhat surprising as they are well represented in the Arctic (Nicol, 1967; Stephenson and Stephenson, 1972).

In February 1974, a large live mussel was taken from the base of one of the jetty piles at King Edward Point, South Georgia. It has been identified as *Mytilus edulis* using the characters described by Soot-Ryen (1955). The shape, colour and thickness of the shell of *M. edulis* are very variable, probably depending greatly on the conditions in which an individual animal is growing. The specimen from South Georgia is of the brown high-shelled form, again described by Soot-Ryen (1955). This form has been named as *M. galloprovincialis* Lamarck from the Mediterranean and *M. diegensis* Coe in California. As Soot-Ryen pointed out, such forms are recorded in all areas where *M. edulis* is found and their exact taxonomic position is not clear.

The animal from South Georgia is 8·3 cm. long and has a shell height of 4·9 cm. It has the general appearance of having grown rapidly; the periostracum is glossy and there is no sign of abrasion. Associated with the animal in the clump of byssus threads were several specimens of the nestling bivalve *Hiatella solida* and many colonies of the ascidian *Synoicum georgianum*.

The nearest population of *M. edulis* to South Georgia is in the Falkland Islands, 1,330 km. to the west. This population has been given subspecific status as *M. edulis chilensis* by Soot-Ryen (1959) even though it cannot be separated from *M. edulis* on conchological grounds. Dell (1964) has followed this classification with the rider that the whole problem of the relationships of geographical populations of *M. edulis* needs further study. The prevailing West Wind Drift could be a powerful agent in the transfer of species from the Falkland Islands to South Georgia but there is the temperature barrier of the Antarctic Convergence. Some species have undoubtedly been transferred, e.g. the lamellibranch *Gaimardia trapesina trapesina*. This species lives attached to kelp, and large pieces of detached kelp are commonly seen during ship journeys from the Falkland Islands to South Georgia. *G. t. trapesina* has suppressed the pelagic larval stage and a single mature female may contain several thousand young individuals, an important factor in its potential dispersal across large areas of open sea.

For other lamellibranchs with a planktonic larva, including *M. edulis*, dispersal over fairly small sea areas may be difficult. Thorson (1961) pointed out that most lamellibranchs have a larval life of less than 5 weeks and, among invertebrates generally, are the group most unfit for long-distance dispersal as larvae. It is most probable that the specimen from King Edward Point was transported there by ship from the Falkland Islands. In recent years, ships of the British Antarctic Survey and Royal Naval ice-patrol ships have made regular voyages from Port Stanley, Falkland Islands, to King Edward Point. The passage takes 3–4 days; *M. edulis* could settle on ships in Port Stanley, where there is a large population, and could fall off at South Georgia. In the years from the beginning of the century to the late 1950's many more crossings, possibly thousands, were made by ships connected with the South Georgia whaling industry. Many *M. edulis* must have been carried and it seems surprising that the species has not established itself, around the whaling stations at least. The temperature regime at South Georgia is similar to that experienced by *M. edulis* in parts of its northern range, i.e. Greenland

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and the White Sea. Certainly the individual collected by us had grown well and, judging from the animals associated with it, had been living at South Georgia for several seasons.

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AN ABNORMAL GROWTH FORM OF *Usnea antarctica* Du Rietz

By D. C. LINDSAY*

ABSTRACT. A specimen of *Usnea antarctica* Du Rietz 67 cm. in length was found growing on a boulder on Nelson Island, South Shetland Islands, in January 1966.

AN abnormal growth form of *Usnea antarctica* Du Rietz was gathered during a botanical survey of the South Shetland Islands during the 1965–66 austral summer (Lindsay, 1971). A specimen 67 cm. in length was collected from extensive stands of this species growing on south-facing boulders about 15 m. a.s.l. and about 40 m. from the shore, near Harmony Point, Nelson Island (lat. 62°19′S., long. 59°11′W.) in January 1966.

From a distance this specimen was noticeable because of its long pendant thallus compared with the shrubby erect habit of the surrounding population. Its mode of branching was atypical, being acute with the branches lying more or less parallel, and with considerable intervals between nodes. Variegation was restricted to the ultimate 10 cm. of the branch tips. Soralia were sparse but otherwise the plant was normal.

The length attained by this specimen was remarkable since very few fruticose lichens exceed 25 cm. in length. The corticolous *Ramalina reticulata* (Noedh.) Kremp. may reach 200 cm. in length on the western coast of North America (Howe, 1914), while in Minnesota, the corticolous *Usnea longissima* Ach. may attain 150 cm. (Fink, 1910). However, there appear to be no records of saxicolous species of *Usnea* reaching lengths of 30 cm. or more. In the Antarctic, both Lamb (1964) and Smith (1972) have noted that exceptionally large thalli of *Usnea antarctica* reach 15 cm.; other species such as *U. fasciata* Torr. and *U. sulphurea* (Koenig) Th. Fr. reach lengths of only 12 and 4 cm., respectively (Lamb, 1964).

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Using the growth-rate data determined for *Usnea antarctica* on Signy Island (Lindsay, 1973), it may be speculated that this specimen was *c.* 2,230 yr. old, assuming a linear growth rate. However, the growth rate of the specimen was almost certainly anomalous and probably faster than that of the surrounding population.

Despite subsequent searches in the South Shetland and South Orkney Islands, no other plant approaching the length of this specimen was encountered. Although the specimen was collected, it was unfortunately lost during transit in the South Shetland Islands.

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SEDIMENTARY ROCKS FROM CHARCOT ISLAND

By C. M. BELL

ABSTRACT. Sedimentary rocks on Charcot Island suggest a 150 km. westward extension of the (?) Carboniferous sequence of Alexander Island.

SEVEN specimens of fine-grained sandstone and mudstone were collected from Marion Nunataks (lat. 69°54′S., long. 75°15′W.) in northern Charcot Island (Fig. 1) by a party of British Antarctic Survey glaciologists during January 1975. These rocks are the first to be collected from Charcot Island and are of particular geological significance as they give an indication of the rock types comprising the continental shelf west of Alexander Island.

The finely laminated sandstones are poorly sorted with angular to sub-angular clasts. A matrix consisting entirely of alteration minerals including sericite, epidote and chlorite comprises up to 15 per cent of the rocks. Mineral grains are compacted and weakly orientated by tectonic stress and the rocks are cut by abundant planes of crushing and shearing. Quartz is the commonest mineral and forms between 40 and 50 per cent of the sandstones. Most quartz grains are monocrystalline and strained. The majority of the plagioclase crystals, which comprise up to 30 per cent of the sandstones, are extensively altered and replaced by sericite but a few retain relics of polysynthetic twinning indicating an oligoclase composition. A few grains of microcline together with bent flakes of muscovite and biotite are also present. Rock fragments are rare and difficult to identify due to the fine grain-size, and the only clearly recognizable rock clasts are of quartz-muscovite-schist. Heavy minerals are relatively abundant and include some well-rounded grains of sphene and zircon. Other heavy minerals are garnet, iron ore, pyroxene, hornblende, tourmaline, epidote and apatite.

These sediments are poorly sorted arkosic arenites and mudstones, probably derived from a metamorphic and plutonic terrain. There is no evidence of a volcanic component in the source area. The field relationships and sedimentary structures of these rocks are not known and consequently the provenance and the environment of deposition are also unknown.

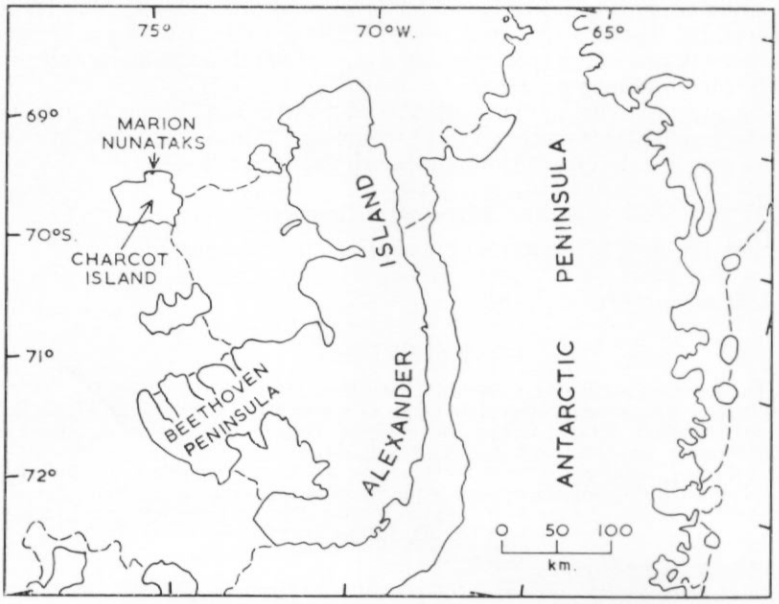

Fig. 1. Sketch map showing the location of Charcot Island.

The stratigraphy of Alexander Island has recently been summarized by Bell (1975). Two sedimentary successions have sandstones petrologically comparable with those of Charcot Island: an older, metamorphosed sequence of (?) Carboniferous age occupying large areas in the north, south and central parts of Alexander Island, and the younger (Upper Jurassic–Lower Cretaceous) Fossil Bluff Formation which crops out along the south-eastern coast.

The degree of compaction and crushing, together with the geographical location, suggests that the Charcot Island sediments form part of the older (?) Carboniferous sequence. A similarly isolated occurrence of sediments on Beethoven Peninsula (Fig. 1; Bell, 1973) indicates that the sediments of the (?) Carboniferous sequence form much of the continental shelf west of Alexander Island.

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SOUTH GEORGIAN MICROLICHENS: II. A NEW SPECIES OF *Microglaena* Körb.

By D. C. LINDSAY*

ABSTRACT. *Microglaena austrogeorgica* D. C. Lindsay is described as a new species. A key to the species of the genus so far known from the Antarctic and sub-Antarctic is provided.

THE lichen genus *Microglaena* Körb. is represented by five species in the Antarctic and sub-Antarctic regions. Two species, *M. kerguelana* (Nyl. ex Cromb.) Zahlbr. and *M. mawsonii* C. W. Dodge, are known from the Iles Kerguelen–Heard Island region (Dodge, 1948); *M. antarctica* M. Lamb occurs in the Antarctic Peninsula region (Lamb, 1948) and one provisionally named *M. austrocinerascens* by the present author is known from the Prince Edward Islands. A full description of the latter species will appear later in an account of the lichens of the Prince Edward Islands. The fifth species, from South Georgia, is quite distinct from the other four and is therefore described as new.

Microglaena austrogeorgica D. C. Lindsay, **sp. nov.**

Thallus crustaceus, uniformis, sparse rimosus, tenuis (*c.* 100 μm. crassus), pallide fuscus, opacus, epruinosus, reagentibus immutatibus. Hypothallus, isidia et soredia desunt. Pseudothecia atra, singulatim verrucis thallinis 0·25 mm. latis insidentia, *c.* 0·2 mm. diametro, thallo obducta, ostiolo punctiformi, depresso. Pseudoparaphyses persistentes, filiformes, ramosae-connexae, 0·5 μm. crassae. Asci clavati, bitunicatae, *c.* 140 μm. longae et 40 μm. latae. Sporae 2, 4, 6 vel 8nae in asco, incoloratae, multilocellatae, 28–30 μm. longae et 15–17 μm. latae. Sporae plasmaque ascorum iodo rubrofulvescentes.

Holotypus. Ad saxa, Zenker Ridge, inter Moraine Fjord et Hestesletten, Insula Georgia Australis. Alt. 25 m. G.R. 133 121. Leg. R. I. L. Smith, 19.ii.1971, R. Smith No. 1703 (AAS).

Thallus crustose, effuse, continuous, sparsely rimose, especially around bases of pseudothecia which then appear circumcised, light brown, thin (about 100 μm. thick), K–, C–, I–, P–. Hypothallus, isidia and soredia not seen. Pseudothecia black, occurring singly in verrucae delimited by cracks, about 0·2 mm. in diameter, partially enveloped by thallus, black, matt or shining, dimidiate; ostiole apical, depressed. Pseudoparaphyses persistent, filiform, anastomosing, 0·5 μm. in diameter. Asci clavate, bitunicate, up to 140 μm. long and 40 μm. broad. Ascospores 2, 4, 6 or 8 per ascus, hyaline, ellipsoid, multilocellate, 28–30 μm. by 15–17 μm. Contents of pseudothecia I + reddish brown.

Holotype. On stone on dry, sparsely vegetated moraine, close to breeding colonies of Dominican gulls and Antarctic terns, Zenker Ridge, between Moraine Fjord and Hestesletten, South Georgia. Alt. 25 m. Grid ref. 133 121. Leg. R. I. L. Smith, 19.ii.1971, R. Smith No. 1703 (AAS).

This species is distinguished from the other Antarctic and sub-Antarctic species of *Microglaena* by the combination of light brown thallus and medium-sized spores. It is separated from the Antarctic endemic *M. antarctica* by the darker thallus and shorter ascospores. The two species in the Iles Kerguelen–Heard Island region, *M. kerguelana* and *M. mawsonii*, have much darker thalli and shorter and longer spores, respectively. The species from the Prince Edward Islands, *M. austrocinerascens*, differs in its grey thallus and smaller spores.

The five species of *Microglaena* may be separated by means of the following key:

1. Thallus white to grey 2
   Thallus brown to olive 3

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2. Ascospores consistently 8nae, 20 by 10 μm.; thallus grey .. *M. austrocinerascens*
   Ascospores usually 4–7nae, 42–90 by 13–35 μm.; thallus white .. .. *M. antarctica*
3. Pseudothecia 0·4 mm. in diameter; ascospores 16–25 by 7–10 μm. .. *M. kerguelana*
   Pseudothecia 0·2–0·25 mm. in diameter; ascospores larger than 25 by 10 μm. .. 4
4. Ascospores consistently 8nae, 36–40 by 12–14 μm.; thallus olive .. *M. mawsonii*
   Ascospores 2, 4, 6 or 8nae, 28–30 by 15–17 μm.; thallus light brown .. *M. austrogeorgica*

It is now becoming apparent that there is a distinct endemic element in the South Georgian microlichen flora represented, for example, by *Antarctomia subcorallinoides* D. C. Lindsay, *Arthopyrenia praetermissa* D. C. Lindsay, *Microglaena austrogeorgica* D. C. Lindsay and *Rinodina convoluta* D. C. Lindsay. As pointed out previously (Lindsay, 1973), certain phytogeographical barriers appear to exist between the South Orkney and South Shetland Islands and the Antarctic Peninsula on the one hand and South Georgia on the other. Further studies on the microlichen floras of these regions may indicate the nature and extent of these barriers.

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