

Fig. 1. Topographic map of South Georgia, and its position on the Scotia Ridge relative to South America.

A SYNOPTIC FLORA OF SOUTH GEORGIAN MOSSES:

I. *Dendrologotrichum*, *Polytrichum* AND *Psilopilum*

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ABSTRACT. Previous work on the moss flora of South Georgia is reviewed and the aims and limitations of the present synoptic flora are considered. Descriptions are provided for all species of the Polytrichaceae known from South Georgia, i.e. one species of *Dendrologotrichum*, four of *Polytrichum* and two of *Psilopilum*; of these *Dendrologotrichum squamosum* (Hook. f. et Wils.) Card. had not been reported previously from the island. Each description is supported by illustrations, a synonymy list, short historical notes on taxonomy, a list of specimens examined with their location in world herbaria, and a map summarizing the known distribution on South Georgia. A noteworthy name change is that of *Psilopilum antarcticum* C. Muell. to *Psilopilum trichodon* (Hook. f. et Wils.) Mitt.

SOUTH GEORGIA (Fig. 1), an island, c. 170 km. long by c. 40 km. wide with a central spine of snow- and ice-covered mountains rising to c. 2,930 m., lies on the Scotia Ridge between lat. 53° 30' and 55° 00' S., and long. 35° 30' and 38° 30' W. Greene (1964b) has provided a description of its vascular flora as well as an account of the island's topography, geology, climate and vegetation, while Clapperton (1971) has given a detailed account of the geomorphology of Stromness and Cumberland Bays, areas on the north-east coast which support some of the best developed vegetation on the island. Greene included the island in the sub-Antarctic botanical zone and noted that its vascular flora has strong affinities with southern South America, but according to Cardot (1908), 42 of its moss species are endemic although Fuegian, circum-polar and cosmopolitan species are also represented.

EXTENT OF SURVEY

As no bryophyte specimens are known to have been collected during J. Cook's brief visit to Possession Bay in 1775 (Beaglehole, 1961), the first mosses reported from South Georgia are those collected by H. Will and E. Mosthaff during the German International Polar-Year Expedition of 1882-83 (Table I). The expedition's base was at Moltke Harbour, Royal Bay, and all of the specimens were collected in this area. Müller (1885, 1890), when reporting these collections, described 52 species, 51 being new to science, the types of which were deposited in Berlin (B). This material was destroyed during 1939-45 and only one specimen, *Campylopus nano-caudatus*, a *nomen nudum* is known to have survived (personal communication from W. Schultze-Motel). Fortunately, duplicates of 41 species are present in Hamburg (HBG) and Munich (M), and other isotypes are slowly being located in world herbaria, notably in the V. F. Brotherus Herbarium at Helsinki (H). In view of the importance of these specimens for the lecto-typification of Müller's species, they are enumerated in Table II. Of the species published by Müller (1890), only one, *Catharinea (Psilopilum) antarctica*, had been described previously. Of the remainder, *Blindia antarctico-crispula* appears to be a *nomen nudum*, while *Polytrichum austro-alpinum*, *Polytrichum strictum* var. *alpestre* and *Bartramia patens* were not reported from South Georgia by Müller.

C. J. F. Skottsberg made the next collection of bryophytes from the island during the Swedish South-Polar Expedition of 1901-03 (Table I) and the specimens were determined by Cardot, who published some results in a preliminary note (Cardot, 1906), but the full descriptions and illustrations of the new species, as well as an assessment of Müller's results, were retained for his major work "La flore bryologique des Terres Magellaniques, de la Géorgie du Sud et de l'Antarctide" (Cardot, 1908). Skottsberg re-visited South Georgia briefly in 1909 during the Swedish Magellan Expedition of 1907-09 and the mosses he collected were reported by Cardot and Brotherus (1923). Of three small collections studied by Dixon (1920, 1932, 1935), the majority of the specimens were obtained by T. Trøim (Table I), and were sent to Dixon by the Museum of the Royal Norwegian Society for Sciences and Letters at Trondheim (TRH). The herbaria listed in Table I are those believed to have the major holdings of each collection, no complete list of all duplicates being available.

TABLE I. DETAILS OF SOUTH GEORGIAN MOSS COLLECTIONS REPORTED IN THE LITERATURE

<i>Expedition</i>	<i>Collector</i>	<i>Localities visited</i>	<i>Total number of taxa</i>	<i>Number of taxa new to science</i>	<i>Herbaria with major holdings*</i>	<i>Publications</i>
German International Polar-Year Expedition, 1882-83	H. Will E. Mosthaff	Royal Bay	52 species	51 species	HBG, M, B	Müller, 1885, 1890
Swedish South-Polar Expedition, 1901-03	C. J. F. Skottsberg	Cumberland Bay, Royal Bay	82 species + 5 varieties	26 species + 3 varieties	S-PA, PC, BM, BA	Cardot, 1906, 1908
Swedish Magellan Expedition, 1907-09	C. J. F. Skottsberg	Cumberland Bay, Rosita Harbour	34 species + 5 varieties	5 species + 2 varieties	UPS, PC	Cardot and Brotherus, 1923
Unknown	Unknown but per J. Hamilton	Not stated	13 species	2 species	BM	Dixon, 1920
Norwegian whaling expedition	T. Trøim	Cumberland Bay, Barff Peninsula	15 species + 1 variety	2 species	BM	Dixon, 1932
Norwegian whaling expedition	T. Trøim	Cumberland Bay	16 species	2 species	BM	Dixon, 1935

* Contractions follow Lanjouw and Stafleu (1964).

TABLE II. MÜLLER-DETERMINED MATERIAL FROM THE GERMAN INTERNATIONAL POLAR-YEAR EXPEDITION OF 1882-83 IN HAMBURG, MUNICH AND HELSINKI

Species	Number of specimens		
	In Hamburg	In Munich	In Helsinki
<i>Listed in Müller (1890)</i>			
1. <i>Andreaea regularis</i>	1	2	—
2. <i>Andreaea viridis</i>	1	—	—
3. <i>Andreaea willii</i>	1	2	—
4. <i>Distichium austro-georgicum</i>	—	—	—
5. <i>Catharinea (Psilopilum) tapes</i>	1	1	1
6. <i>Catharinea (Psilopilum) antarctica</i>	2	1	3
7. <i>Polytrichum (Pogonatum) austro-georgicum</i>	—	3	1
8. <i>Polytrichum (Eupolytrichum) macroraphis</i>	3	2	1
9. <i>Polytrichum (Eupolytrichum) timmioides</i>	1	—	1
10. <i>Polytrichum (Eupolytrichum) plurirameum</i>	—	—	1
11. <i>Polytrichum (Eupolytrichum) nanocephalum</i>	—	—	—
12. <i>Mielichhoferia austro-georgica</i>	1	1	—
13. <i>Bryum (Eubryum) obliquum</i>	—	—	—
14. <i>Bryum (Areodictyum) lamprocarpum</i>	3	1	3
15. <i>Bryum (Senodictyum) inflexum</i>	—	—	—
16. <i>Bryum (Senodictyum) amplirete*</i>	—	—	—
17. <i>Bryum (Senodictyum) viridatum</i>	—	—	—
18. <i>Bryum (Senodictyum) pulvinatum</i>	—	—	—
19. <i>Dicranum (Onocophorus) austro-georgicum</i>	—	1	—
20. <i>Dicranum (Orthodicranum) tenui-cuspidatum</i>	2	2	1
21. <i>Blindia grimmiacea</i>	1	—	3
22. <i>Blindia brevipes</i>	2	—	—
23. <i>Blindia subinclinata</i>	3	—	2
24. <i>Blindia pallidifolia</i>	1	2	—
25. <i>Blindia dicranellacea</i>	1	—	—
26. <i>Conostomum rhynchostegium</i>	5	2	2
27. <i>Bartramia (Vaginella) leucolomacea</i>	2	1	—
28. <i>Bartramia (Vaginella) pycnoleos</i>	1	1	1
29. <i>Bartramia (Vaginella) subpatens</i>	2	1	1
30. <i>Bartramia (Vaginella) oreadella</i>	1	1	1

31. <i>Bartramia (Catenulæria) Willii</i>	—	—	—
32. <i>Bartramia (Philonotis) acicularis</i>	—	1	1
33. <i>Meesea austro-georgica</i>	—	1	—
34. <i>Barbula (Syntrichia) fontana</i>	—	1	—
35. <i>Barbula (Syntrichia) runcinata</i>	—	2	1
36. <i>Barbula (Syntrichia) filaris</i>	1	1	1
37. <i>Barbula (Syntrichia) leptosyntrichia</i>	—	—	3
38. <i>Barbula (Syntrichia) anacamptophylla</i>	—	—	—
39. <i>Willia grimmioides</i>	2	1	1
40. <i>Grimmia (Platystoma) urnulacea</i>	1	—	—
41. <i>Grimmia (Platystoma) occulta</i>	1	1	—
42. <i>Grimmia (Eugrimmia) syntrichiacea</i>	1	—	—
43. <i>Grimmia (Dryptodon) hyalino-cuspidata</i>	2	—	—
44. <i>Grimmia (Dryptodon) austro-patens</i>	—	1	—
45. <i>Grimmia (Rhacomitrium) Willii</i>	1	—	—
46. <i>Grimmia (Rhacomitrium) glacialis</i>	1	1	—
47. <i>Gümbelia (Eugümbelia) immerso-leucophaea</i>	3	1	—
48. <i>Hypnum (Brachythecium) georgico-glareosum</i>	2	1	—
49. <i>Hypnum (Drepanocladus) austro-stramineum</i>	—	1	—
<i>α gracillimum</i>	—	1	—
<i>β sub-fluitans</i>	—	1	—
50. <i>Hypnum (Drepanocladus) georgico-uncinatum</i>	1	1	—
51. <i>Hypnum (Drepanophyllaria) austro-fluviatile</i>	1	1	—
52. <i>Hypnum (Plagiothecium) georgico-antarcticum</i>	1	—	—
<i>Not listed in Müller (1890)</i>			
53. <i>Polytrichum austro-alpinum</i>	2	—	—
54. <i>Polytrichum strictum</i> var. <i>alpestre</i>	—	—	1
55. <i>Blindia antarctico-crispula</i>	—	2	—
56. <i>Bartramia patens</i>	—	—	3
	55	43	33

* An isotype of this species survives in the Haussknecht herbarium at Jena (personal communication from G. C. S. Clarke).

A check list of the bryophytes reported from South Georgia, based on a literature compilation, was provided by Steere (1961) and some additions and corrections to this list were supplied by Greene (1968a). Thus at the start of the present work 111 species of mosses and 22 varieties and forms had been reported from the island (Table III).

No other papers dealing primarily with the taxonomy of the island's flora are known, but the status of some of the species has been considered by Roivainen and Bartram (1937), Roivainen (1955), Clifford (1955), Greene (1968*b*), Matteri (1968), Schultze-Motel (1970) and van Zanten (1971). Distribution data for some species have been provided by Longton and Greene (1967) and Longton (1972), while Newton (1972) has recently given the first cytological account of some of the island's mosses.

The early expeditions surveyed only a small area of South Georgia and, although consistent efforts have been made during the last 10 years to extend the survey, the topography of the island and the stormy seas surrounding it make some areas more accessible than others, and this is reflected in the number and extent of existing moss collections. For example, substantial material is available from low-lying coastal parts of the north-east coast but the south-west coast is less well known (Fig. 2), some areas having been visited only briefly. Practically no collecting has been undertaken above 600 m. and, although the island's central spine is largely covered with permanent snow and ice, there are many exposed rock faces and ledges which may support a limited, specialized moss flora. At present, conspicuous species which are widespread around the island are well represented in the collections but the rarer or more critical species are still inadequately sampled. For these reasons an important part of the present work is an examination of those parts of the island either inadequately surveyed or not yet visited to determine the floristic richness and the distribution of its species.

BASIS OF FLORA

In view of the inadequacy of bryological survey on South Georgia, the absence of moss floras for the southern parts of South America and neighbouring Antarctic regions and the insufficient monographic treatments of Southern Hemisphere genera, establishing the identity and interrelationships of South Georgian material presents formidable problems. As has been pointed out elsewhere (Greene, 1964*a*), depauperation and/or sterility may mask the true identity of many specimens and the absence of special purpose collections makes the range of variability of many taxa difficult to assess. The taxonomic objectives of the present series have been limited, therefore, to establishing the number of taxa which occur on the island and to providing, by means of brief illustrated diagnoses, synoptic definitions of each. However, the growth form and the size range of leaves and cells, based on the histogram sampling method used by Greene and others (1970), is given for each species. Since it would be presumptuous on present knowledge to suggest interrelationships of the species, the latter are arranged in alphabetical order within genera which are grouped in families, for the most part according to the system proposed by Reimers (1954). The order in which genera are treated is purely arbitrary.

Nomenclatural investigation has been limited to the provision of legitimate names for the taxa as they occur on South Georgia, i.e. those which have been validly and effectively published without, in most cases, a consideration of all possible synonymy. It is recognized that this will not provide a stable nomenclature but the attainment of a more ambitious treatment is beyond the limits set by the level of morphological investigation since careful comparisons would require not only more detailed information on the variability of the South Georgian taxa but similar details of related Southern Hemisphere taxa.

Valentine and Löve (1958) have suggested that knowledge of a region's species passes through three phases, which they have called the exploratory phase, the systematic phase and the biosystematic phase. They have pointed out, rightly, that good systematic descriptions can only be provided for taxa which have been well studied over a period of time both in the field and the laboratory. Since descriptions of this sort can only be approached for a very small number of South Georgian species, it seems that the adoption of a synoptic treatment is that best suited to the present exploratory phase of investigation. This methodology will provide a means of identifying the island's moss flora as well as an introductory account of the morphological patterns represented by its taxa. For example, foliar bistratosity is well developed in many species but whether or not it is better represented than in Northern Hemisphere floras has yet to be established.

TABLE III. CHECK LIST OF SOUTH GEORGIAN MOSSES AT START OF PRESENT WORK

<i>Sphagnaceae</i>	<i>Tortula serrata</i> Dix.
<i>Sphagnum fimbriatum</i> Wils.	<i>Willia grimmioides</i> C. Muell.
<i>Andreaeaceae</i>	<i>Grimmiaceae</i>
<i>Andreaea alpina</i> Hedw.	<i>Grimmia celata</i> Card.
<i>Andreaea heterophylla</i> Card.	<i>Grimmia grisea</i> Card.
<i>Andreaea opaca</i> Card. ex Roth.	<i>Grimmia hyalino-cuspidata</i> C. Muell.
<i>Andreaea parallela</i> C. Muell.	var. <i>mutica</i> Card. et Broth.
var. <i>brevifolia</i> (Dus.) Card.	<i>Grimmia immerso-leucophaea</i> (C. Muell.) Par.
<i>Andreaea pumila</i> Card.	(<i>Guembelia immerso-leucophaea</i> C. Muell.)
<i>Andreaea regularis</i> C. Muell.	<i>Grimmia nordenskjöldii</i> Card.
<i>Andreaea squamata</i> C. Muell.	<i>Grimmia occulta</i> C. Muell.
<i>Andreaea subremotifolia</i> Dix.	<i>Grimmia syntrichiacea</i> C. Muell.
<i>Andreaea viridis</i> C. Muell.	<i>Grimmia urnulacea</i> C. Muell.
<i>Andreaea willii</i> C. Muell.	<i>Racomitrium austro-georgicum</i> Par.
<i>Ditrichaceae</i>	(<i>Grimmia austro-patens</i> C. Muell.)
<i>Ceratodon grossiretis</i> Card.	<i>Racomitrium heterostichoides</i> Card.
<i>Distichium austro-georgicum</i> C. Muell.	(<i>Grimmia glacialis</i> C. Muell.)
<i>Ditrichum hyalinocuspdatum</i> Card.	<i>Racomitrium lanuginosum</i> (Hedw.) Brid.
<i>Ditrichum perporodictyon</i> Dix.	(<i>Grimmia glacialis</i> C. Muell.)
<i>Pseudoditrichium austrogeorgicum</i> Card.	<i>Racomitrium nigritum</i> Jaeg.
<i>Seligeriaceae</i>	<i>Racomitrium pachydietyon</i> Card.
<i>Blindia capillifolia</i> Card.	<i>Racomitrium ptychophyllum</i> Mitt.
<i>Blindia dicranellacea</i> C. Muell.	<i>Racomitrium skottsbergii</i> Card. et Broth.
<i>Blindia praticola</i> Card. et Broth.	<i>Racomitrium striatipilum</i> Card.
<i>Blindia skottsbergii</i> Card.	<i>Racomitrium willii</i> (C. Muell.) Par.
f. <i>robusta</i> Card.	(<i>Grimmia willii</i> C. Muell.)
<i>Dicranaceae</i>	<i>Bryaceae</i>
<i>Dicranella hookeri</i> (C. Muell.) Card.	<i>Bryum cochlearifolium</i> Card. et Broth.
<i>Dicranoweisia brevipes</i> (C. Muell.) Card.	<i>Bryum lamprocarpum</i> C. Muell.
(<i>Blindia brevipes</i> C. Muell.)	<i>Bryum obliquum</i> C. Muell.
<i>Dicranoweisia grimmiaea</i> (C. Muell.) Broth.	<i>Bryum parvulum</i> Card.
(<i>Blindia grimmiaea</i> C. Muell.)	<i>Mielichhoferia austro-georgica</i> C. Muell.
f. <i>robusta</i> Card.	<i>Mniobryum alticaule</i> (C. Muell.) Broth.
<i>Dicranoweisia subinclinata</i> (C. Muell.) Broth.	(<i>Bryum amplirete</i> C. Muell.)
(<i>Blindia pallidifolia</i> C. Muell.)	<i>Mniobryum austro-albicans</i> (C. Muell.) Broth.
<i>Blindia subinclinata</i> C. Muell.)	<i>Pohlia cruda</i> (Hedw.) Lindb.
<i>Dicranum aciphyllum</i> Hook. f. et Wils.	(<i>Bryum viridatum</i> C. Muell.)
(<i>Campylopus muricatus</i> Dix.)	<i>Webera cruda</i> (Hedw.) Fuernr.)
<i>Dicranum austro-georgicum</i> C. Muell.	<i>Pohlia inflexa</i> (C. Muell.) Wijk et Marg.
<i>Dicranum laticostatum</i> Card.	(<i>Bryum inflexum</i> C. Muell.)
<i>Dicranum nordenskjöldii</i> Card.	<i>Pohlia nutans</i> (Hedw.) Lindb.
<i>Dicranum oleodictyon</i> Dix.	<i>Pohlia pulvinata</i> (C. Muell.) Broth.
<i>Dicranum tenui-cuspidatum</i> C. Muell.	(<i>Bryum pulvinatum</i> C. Muell.)
<i>Skottsbergia paradoxa</i> Card.	<i>Webera pulvinata</i> Kindb.)
<i>Verrucidens intermedius</i> Dix.	<i>Bartramiaceae</i>
<i>Pottiaceae</i>	<i>Bartramia diminutiva</i> C. Muell.
<i>Barbula pycnophylla</i> Card.	<i>Bartramia leucocolea</i> Card.
<i>Pottia austrogeorgica</i> Card.	var. <i>brevifolia</i> Card. et Broth.
var. <i>microphylla</i> Card. et Broth.	<i>Bartramia leucolomacea</i> C. Muell.
<i>Tortula filaris</i> (C. Muell.) Broth.	<i>Bartramia oreadella</i> C. Muell.
(<i>Barbula filaris</i> C. Muell.)	var. <i>microphylla</i> Card.
<i>Tortula fontana</i> (C. Muell.) Broth.	<i>Bartramia patens</i> Brid.
(<i>Barbula fontana</i> C. Muell.)	f. <i>austrogeorgica</i> (Par.) Card.
<i>Tortula fuscoviridis</i> Card.	(<i>Bartramia subpatens</i> C. Muell.)
<i>Tortula grossiretis</i> Card.	f. <i>chrysocolea</i> Card.
var. <i>atrata</i> Card.	f. <i>fragilifolia</i> Card.
<i>Tortula leptosyntrichia</i> (C. Muell.) Broth.	<i>Bartramia pycnocoleos</i> C. Muell.
(<i>Barbula anacamptophylla</i> C. Muell.)	<i>Breutelia graminicola</i> Broth.
<i>Barbula leptosyntrichia</i> C. Muell.)	<i>Conostomum australe</i> Sw.
<i>Tortula lingulaefolia</i> Card. et Broth.	(<i>Conostomum rhyncostegium</i> C. Muell.)
<i>Tortula monoica</i> Card.	<i>Exodokidium subsymmetricum</i> (Card.) Card.
<i>Tortula robusta</i> Hook. et Grev.	(<i>Bartramia subsymmetrica</i> Card.)
(<i>Barbula runcinata</i> C. Muell.)	<i>Philonotis acicularis</i> (C. Muell.) Kindb.
<i>Tortula rubra</i> Mitt. *)	(<i>Bartramia acicularis</i> C. Muell.)
	<i>Philonotis scabrifolia</i> (Hook. f. et Wils.)
	Braithw.
	(<i>Bartramia willii</i> C. Muell.)

Philonotis vagans (Hook. f. et Wils.) Mitt.
var. *inundata* Card.
Philonotis varians Card.

f. *georgico-uncinatum* (C. Muell.) Card.
(*Hypnum georgico-uncinatum* C. Muell.)
var. *subjulaceus* (Schimp.) Card. et Broth.
Sciariomium conspissatum (Hook. f. et Wils.)
Mitt.

Meesiaceae

Meesia austro-georgica C. Muell.

Orthotrichaceae

Amphidium cyathicarpum (Mont.) Broth.
Orthotrichum crassifolium Hook. f. et Wils.

Lepyrodontaceae

Lepyrodon lagurus (Hook.) Mitt.

Leskeaceae

Pseudoleskea antarctica Card.
Pseudoleskea calochroa Card.
Pseudoleskea platyphylla Card.
Pseudoleskea strictula Card.

Amblystegiaceae

Amblystegium austro-fluviatile (C. Muell.) Par.
(*Hypnum austro-fluviatile* C. Muell.)
Calliergon sarmentosum (Wahlenb.) Kindb.
(*Hypnum sarmentosum* Wahlenb.)
Drepanocladus austro-stramineus (C. Muell.)
Broth. ex Par.
(*Hypnum austro-stramineum* C. Muell.)
var. *gracillimus* (C. Muell.) Card. et Broth.
(*Hypnum austro-stramineum*
var. *gracillimum* C. Muell.)
var. *subfluitans* C. Muell.
(*Hypnum austro-stramineum*
var. *subfluitans* C. Muell.)
var. *tenuissimus* Card. et Broth.
Drepanocladus brachiatus (Mitt.) Dix.
Drepanocladus plicatus Dix.
Drepanocladus uncinatus (Hedw.) Warnst.
(*Hypnum uncinatum* Hedw.)

Synonyms are given in brackets.

List based on Steere (1961) and Greene (1968a).

* According to Greene (1964a).

Brachytheciaceae

Brachythecium georgico-glareosum (C. Muell.)
Par.
(*Hypnum georgico-glareosum* C. Muell.)
Brachythecium skottsbergii Card.
Brachythecium subpilosum (Hook. f. et Wils.)
Jaeg.
Brachythecium subplicatum (Hamp.) Jaeg.

Plagiotheciaceae

Plagiothecium georgico-antarcticum (C. Muell.)
Kindb.
(*Hypnum georgico-antarcticum* C. Muell.)

Polytrichaceae

Pogonatum alpinum (Hedw.) Roehl.
f. *austro-georgicum* (C. Muell.) Card.
(*Polytrichum austro-georgicum* C. Muell.)
f. *nanocephalum* (C. Muell.) Card.
(*Polytrichum nanocephalum* C. Muell.)
f. *plurirameum* (C. Muell.) Card.
(*Polytrichum plurirameum* C. Muell.)
f. *timmioides* (C. Muell.) Card.
(*Polytrichum timmioides* C. Muell.)
Polytrichum juniperinum Willd. ex Hedw.
Polytrichum piliferum Schreb. ex Hedw.
Polytrichum strictum Menz. ex Brid.
var. *alpestre* (Hoppe) Rabenh.
(*Polytrichum macroraphis* C. Muell.)
Psilopilum antarcticum (C. Muell.) Par.
(*Catharinea antarctica* C. Muell.)
Psilopilum tapes (C. Muell.) Par.
(*Catharinea tapes* C. Muell.)

SPECIMENS AND THEIR CITATION

The descriptions of taxa are based on a study of the large unidentified collections in the herbarium of the British Antarctic Survey (Table IV), currently housed in the Department of Botany, University of Birmingham, all of the collections from 1960–61 onwards having been specially made for this work. The mostly unidentified historical collections, obtained during the Discovery Investigations and Operation Tabarin, by W. J. L. Sladen while a member of the Falkland Islands Dependencies Survey, by W. N. Bonner while the Falkland Islands Government Sealing Inspector on South Georgia and by J. B. Cragg who travelled south with the Survey, have also been examined. In addition a small amount of identified, but unpublished, South Georgian material exists in some herbaria, e.g. specimens in the British Museum (Nat. Hist.) collected by G. H. Wilkins during the Shackleton–Rowett Antarctic Expedition of 1921–22 (Wilkins, 1925). The extent of the identified but unpublished material is unknown but, as appropriate, it will be included with the list of specimens examined. Greene (1972a) has described how the Survey's collections are catalogued and administered by means of the computer-based data bank associated with the Survey's herbarium, while an account of the latter will be found in Greene (1972b).

Details of types and other nomenclaturally important specimens are given in the text but a full listing of all specimens examined and their location in world herbaria is in the Appendix in an abbreviated form sufficient for specimen recovery, full collecting details being available from the data bank. However, the information for specimens with inadequate collecting data is given in full.

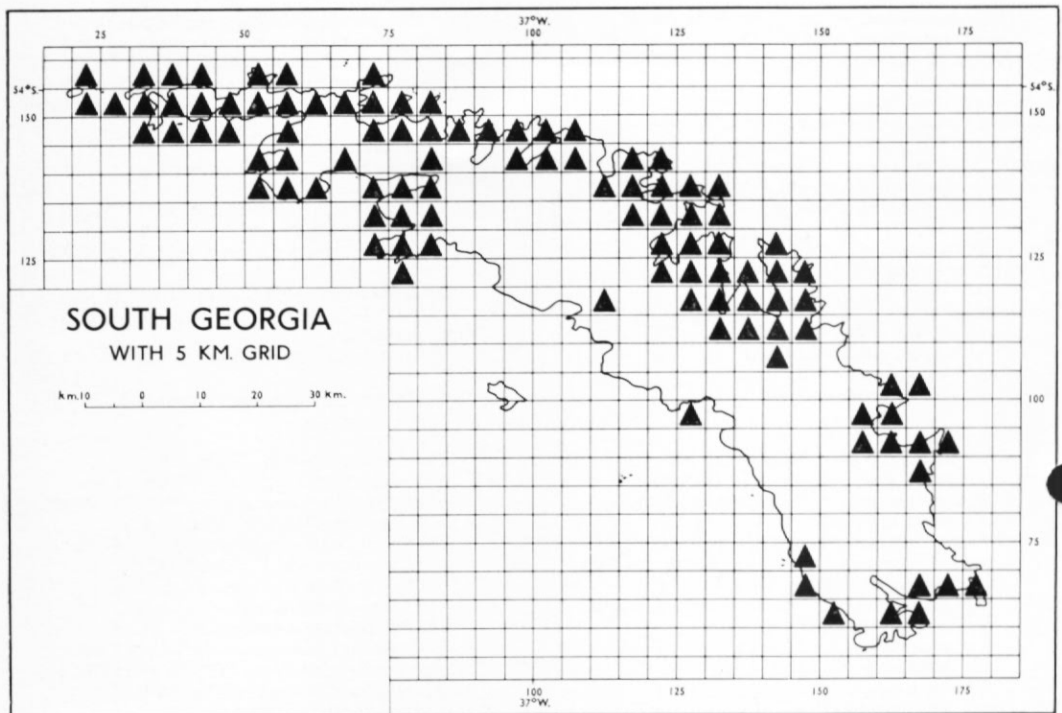


Fig. 2. All squares from which mosses have been collected, including those for which field records are available, up to the end of 1970-71 season.

In addition to the specimens examined, the Appendix includes reference to field records. The field-record system was introduced to record data about taxa which have been adequately defined and named, and for which reasonable collections are available; it was first used for mapping the distribution of South Georgian vascular species (Greene, 1964*b*). Where a species can be determined fully in the field, or following microscopic examination of a small voucher specimen which is later discarded, a record card is prepared with full collecting information, including the name of the determiner, and is incorporated into the data bank in the same way as records supported by permanent specimens. In this way the accumulation of unnecessary collections of readily identifiable material is avoided, conservation of the island's flora is assisted, and valuable information about distribution, habitat preferences, frequency of fruiting, etc. is obtained.

The distribution of species on South Georgia has been mapped using a 5 km. grid overlay on the 1 : 200,000 map of South Georgia (Directorate of Overseas Surveys, D.O.S. (Misc.) 372A, 1964, based on D.O.S. 610, South Georgia, 1958). A copy of this map will be found in Greene (1964*b*). A more recent map, drawn and printed by 42 Survey Engineer Regiment, reference No. 182/500/2/70, gives a more accurate representation of the Royal Bay area, and it is a combination of these two maps which has been used in the compilation of Fig. 2 and the species-distribution maps given in the text.

POLYTRICHACEAE

Three genera of this large cosmopolitan family occur on South Georgia, i.e. *Dendroliotrichum*, *Polytrichum* and *Psilopilum* and, as represented on the island, they may be separated as follows:

1. Leaves divided into broad sheathing base and narrow limb 2
- Leaves oblong, not separated into a sheathing base and narrow limb *Psilopilum*

TABLE IV. DETAILS OF SOUTH GEORGIAN MOSS COLLECTIONS AWAITING IDENTIFICATION UP TO THE END OF 1970-71

<i>Collection</i>	<i>Seasons</i>	<i>Approximate number of specimens</i>	<i>Localities visited</i>	<i>Herbaria with major holdings*</i>
Discovery Investigations	1926-27	30	Wilson and Undine Harbours	BM
Operation Tabarin	1943-44 1944-45	8	Unspecified	BM
W. J. L. Sladen	1948-49 1950-51	64	Stromness and Cumberland Bays	BM
F. I. D. S. Misc.	1953-54	1	Bay of Isles	AAS
W. N. Bonner	From 1955-56 to 1960-61	124	Bird Island, Bay of Isles, Cumberland and Royal Bays, Gold Harbour, Paradise Beach, Trollhul, Diaz Cove	AAS, BM
J. Smith	1956-57 1957-58	167	Bird Island, Stromness and Cumberland Bays, Barff Peninsula, Holmestrand	AAS
J. B. Cragg	1957-58	17	Stromness Bay	DHM
S. W. Greene	1960-61	2,197	Willis and Bird Islands, Elsehul, Right Whale Bay, Bay of Isles, Prince Olav Harbour, Stromness and Cumberland Bays, Barff Peninsula, Royal Bay, Larsen Harbour, Diaz Cove, Undine South Harbour, Holmestrand, Wilson and Johan Harbours	AAS
A. Cameron and P. Kennett	1961-62	9	Cumberland Bay, Gold Harbour	AAS
M. W. Holdgate	1961-62	3	Bay of Isles, Cumberland Bay	AAS
R. E. Longton	1963-64 1964-65	400	Fortuna, Stromness and Cumberland Bays, Barff Peninsula	AAS
T. Lynch	1964-65	6	Possession, Stromness and Cumberland Bays, Allardyce Range	AAS
R. I. L. Smith	1964-65 1969-70 1970-71	350	Willis and Bird Islands, Sörn and Bernt Islands, Church Bay, Bay of Isles, Antarctic Bay, Stromness and Cumberland Bays, Barff and Nuñez Peninsulas, Queen Maud, King Haakon and Cheapman Bays, Nilse Hullet, Samuel Islands, Elephant Cove, Wilson Harbour, Ice Fjord, Weddell Point, Schlieper Bay, Undine Harbour	AAS
G. C. S. Clarke and S. W. Greene	1967-68	719	Right Whale Bay, Bay of Isles, Sea Leopard Fjord, Prince Olav Harbour, Stromness and Cumberland Bays, Barff Peninsula, Royal, Cooper and Hamilton Bays, Drygalski Fjord.	AAS

* Contractions are those recommended by Lanjouw and Stafleu (1964) except that AAS is used for the British Antarctic Survey herbarium following Greene (1972b)

2. Leaf limb toothed, lamellae in surface view with paired border cells *Dendroligotrichum*
 Leaf limb entire or, if toothed, lamellae in surface view without paired
 border cells *Polytrichum*

Smith (1971), in his recent conspectus of the genera of the Polytrichaceae, has proposed re-grouping some of the species, in some cases into newly created genera. Since it is not yet certain that the adoption of these changes will provide a better-based classification or the hope of a more stable nomenclature, a more conservative treatment is followed here. Smith's proposals, where they relate to taxa which occur on South Georgia, are referred to in the appropriate parts of the text.

Dendroligotrichum (C. Muell.) Broth.

Only a single species of this austral genus of robust dendroid mosses with sheathing limbed leaves, which bear abundant lamellae on the single broad nerve, is known from South Georgia and in its habit alone it is readily distinct from all other species known from the island.

Dendroligotrichum squamosum (Hook. f. et Wils.) Card.

Shoots robust gregarious or forming loosely adhering turves 3–10 cm. tall, arising from and often attached to an underground creeping stem, bare below or with a terminal group of rhizoids, branching dendroid, the branches abundant and densely aggregated in the upper 2–3 cm. and at times bearing lateral branches. Leaves (of branches) 3·8–7·3 × (at base of limb) 0·4–0·9 (–1·5) mm., in limb lanceolate or triangular-lanceolate with margin of lamina upturned but not infolded over lamellae; (of stems) reduced to a papery sheath with little or no development of limb. Margin variably toothed, often coarsely so, from at or between base and mid leaf to point. Cells above 9·6–16 × 4·8–12·8 μm., rounded quadrate to shortly rectangular with rounded corners, bistratose, smooth. Border cells of lamellae smooth, many divided distally and paired in surface view. Remainder unknown on South Georgia. (Fig. 3.)

Habitat and distribution (Fig. 4)

A rare species known from only two localities on the south-west coast, in one forming loosely adhering turves amongst mosses on dry stony ground and in the other gregarious in moist *Tortula-Festuca* slopes. Altitude 5–75 m.

Notes

Although readily distinct in its branching, small plants of *D. squamosum* might be confused with well-branched shoots of *Polytrichum alpinum* but the presence of divided border cells on the lamellae, as well as the bistratose limb margin of the present species, should enable a ready separation.

Newton (1972) has reported a chromosome count of $n = 7$ from material collected in Shallop Cove, Queen Maud Bay.

Taxonomy

Dendroligotrichum squamosum has only recently been collected on South Georgia, making this the first description of it for the island. The species was described by Hooker and Wilson (1844) as *Polytrichum squamosum* and transferred to *Dendroligotrichum* by Cardot (1905). It may be noted that its transference to *Dendroligotrichum* is often attributed to Brotherus (1905) but, although he referred to the species in the context of *Dendroligotrichum* (p. 681), he failed to make the combination, no doubt as he regarded *D. squamosum* and *D. dendroides* to be one and the same. The type specimen (JDH No. 115 BM, Herb. Hookerianum, Hermite Island, Cape Horn, Antarct. Exp. 1839–1843) has been examined and exhibits clearly the dendroid habit, toothed lamellate leaves, bistratose margin and divided border cells, the characteristics shown by the South Georgian plants.

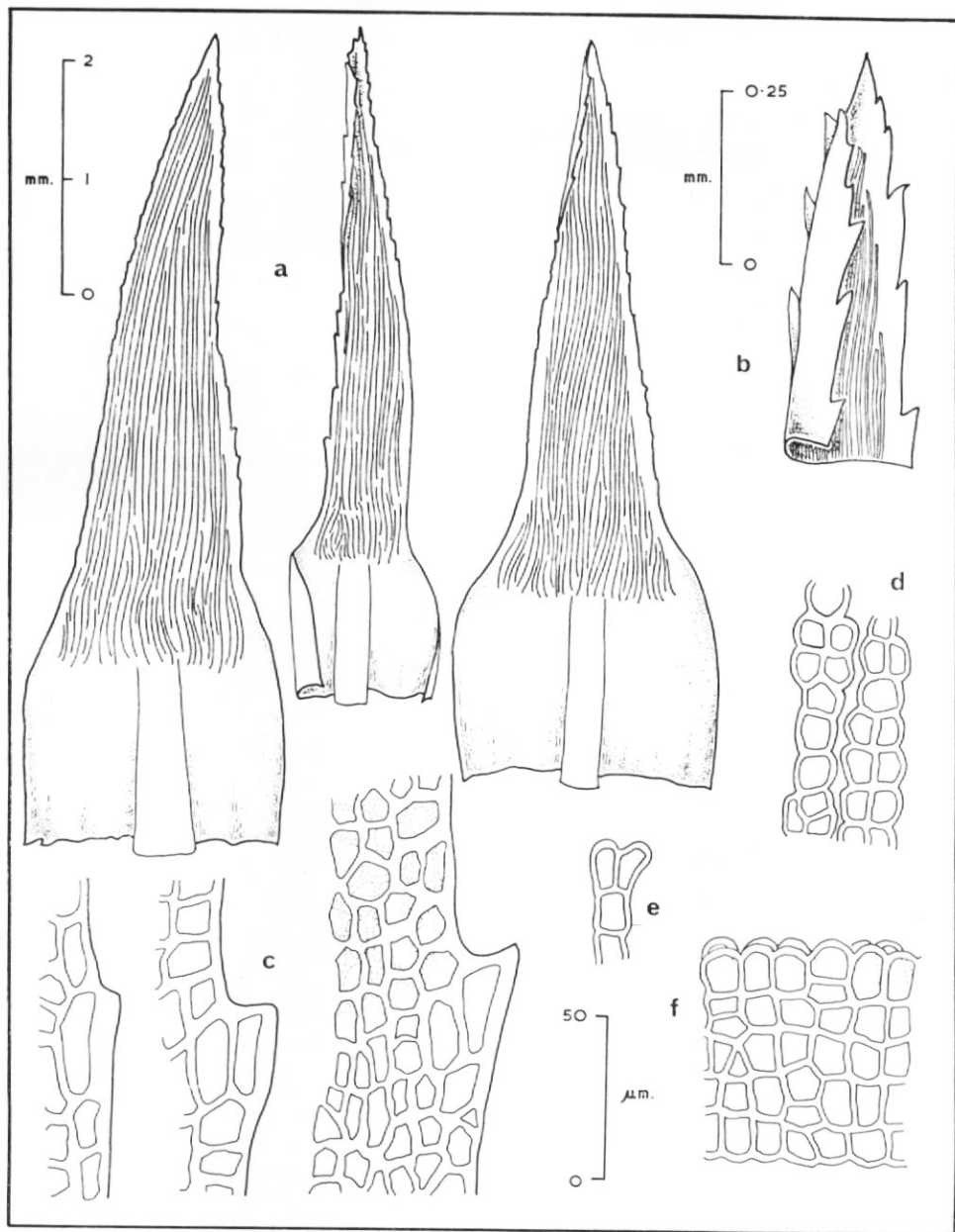


Fig. 3. *Dendroligotrichum squamosum*.

a. Leaves; b. Apex; c. Upper marginal cells and teeth with bistratose (pecked lines) only indicated in upper part of right-hand drawing; d. Surface view of two lamellae; e. End view of paired border cells of lamella; f. Side view of lamella.

Scales: left-hand for leaves, median for cells and lamellae, right-hand for apex.

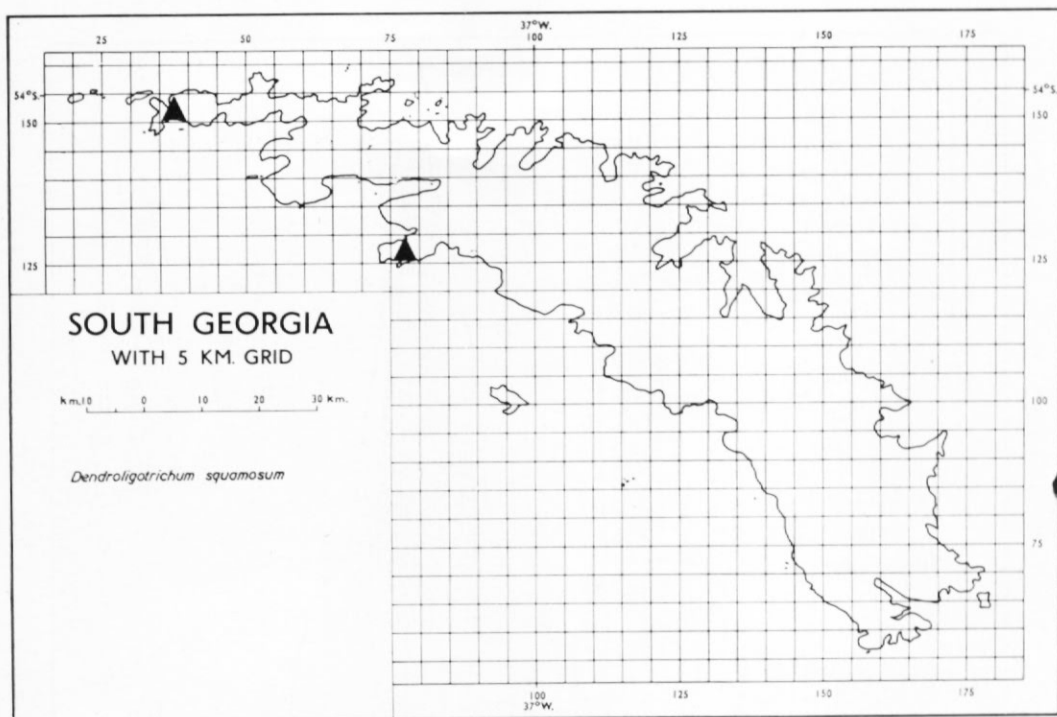


Fig. 4. The known distribution on South Georgia, by 5 km. squares, of *Dendroligotrichum squamosum* based on the specimens and field records given in the Appendix.

Polytrichum Hedw.

The four species of *Polytrichum* known from South Georgia are all robust turf-forming mosses with their leaves divided into two distinct regions, a basal clasping sheath and an upper, narrower spreading limb. There is a well-developed broad single nerve which bears on its upper (adaxial) surface longitudinally running non-segmented lamellae, the border cells of which are variously ornamented. The lamina cells are smooth and normally incrassate. The calyptra bears abundant long hairs, and the capsule is rounded or angled in section, with short non-hygroscopic peristome teeth, connected at their apices by an epiphragm.

Species of *Polytrichum* are only likely to be confused with species of *Psilopilum* or *Dendroligotrichum*. In *Psilopilum* the leaf lacks separate sheath and limb regions while the dendroid arrangement of branches in *Dendroligotrichum* is unique amongst the mosses known from South Georgia. Some very branched specimens of *Polytrichum alpinum* may approach *D. squamosum* in appearance, but the nature of the border cells of the lamellae will readily separate them.

Longton (1972) has provided an account of the reproductive behaviour of the species of *Polytrichum* on South Georgia. All of them are known to extend farther south along the Antarctic Peninsula and its offshore islands to Marguerite Bay (Greene and others, 1970).

The species on South Georgia may be separated as follows:

- | | |
|--|-----------------------------|
| 1. Leaf margin toothed in limb, not broadly infolded over lamellae;
border cells of lamellae papillose, but lacking projections | <i>P. alpinum</i> |
| Leaf margin entire in limb, broadly infolded over lamellae; border
cells of lamellae smooth, but with projections | 2 |
| 2. Leaf apex normally with long (> 1.0 mm.) flexuose hyaline hair point;
basal cells of sheath short and broad, usually < 5 : 1 | <i>P. piliferum</i> |

- Leaf apex normally with short (<0.6 mm.) stiff usually coloured hair point; basal cells of sheath long and narrow, usually >5:1 3
3. Turves very compact and densely matted with white rhizoids which extend high among the leaves; projection on border cells narrow, about half width of cell giving a broad and usually deep sinus between projections *P. alpestre*
- Turves loose but not matted as rhizoids do not extend high among the leaves; projection on border cells broad, more than half width of cell giving a narrow and usually shallow sinus between projections *P. juniperinum*

Polytrichum alpestre Hoppe

Syn. Polytrichum macroraphis C. Muell. *pro parte*.

Polytrichum strictum Banks.

Polytrichum strictum Banks var. *alpestre* (Hoppe) Rabenh.

Shoots robust forming dense tightly compacted turves due to matting by abundant whitish tomentum which extends high amongst the leaves, (1.8—) 4.1–7.5 (–11.2) cm. high, unbranched or with few erect branches. Leaves 1.9–5.0 (–6.8) × (in limb) 0.2–0.7 mm., in limb lanceolate or linear-lanceolate with lamina widely infolded over lamellae, tapering to short stout, usually toothed hair point 0.2–0.7 mm. long, formed by the excurrent nerve. Cells above 21.7–43.4 × 9.3–15.5 μm., rectangular, incrassate. Border cells of lamellae smooth, in side view typically with a wide and deep sinus between the projections which are approximately half the width of the cells. Dioecious. Capsules angular in section. (Fig. 5.)

Habitat and distribution (Fig. 6)

An abundant species on moist peat, particularly amongst *Poa flabellata* tussocks, less commonly in *Festuca erecta* grassland, on wet rocks and by river banks. Altitude 0–150 m.

Notes

A regularly fruiting species which may readily be distinguished by its compact turves tightly matted by the abundant whitish tomentum. At times it forms extensive peat banks particularly in areas which have been denuded of *Poa flabellata*. Depauperate plants with little tomentum could be confused with *Polytrichum juniperinum* and are best separated by the shape of the border cells of the lamellae and their associated sinus.

Newton (1972) has reported a chromosome count of $n = 7$ for material collected near Gull Lake, Cumberland Bay.

Taxonomy

Although first reported from South Georgia by Cardot (1906, 1908) as *P. strictum* Banks var. *alpestre* (Hoppe) Rabenh., for material obtained by Skottsberg, earlier specimens were collected during the German International Polar-Year Expedition of 1882–83 and named *P. macroraphis* by Müller (Will I *pro parte*, HBG, M; Will s.n. *pro parte* M) or *P. strictum* var. *alpestre* (Will s.n. H, Herb. V. F. Brotherus), the latter almost certainly a re-determination by Brotherus.

Polytrichum alpinum Hedw.

Syn. Pogonatum alpinum (Hedw.) Roehl.

Polytrichum austro-georgicum C. Muell.

Polytrichum macroraphis C. Muell. *pro parte*.

Polytrichum nanocephalum C. Muell. fide Cardot (1906, p. 25).

Polytrichum plurirameum C. Muell.

Polytrichum timmioides C. Muell.

Shoots robust forming lax to dense turves 1.2–7.2 (–11.1) cm. high, unbranched or with 1–4 erect branches from near base. Leaves 2.9–10.8 × (in limb) 0.3–1.1 mm., in limb lanceolate or linear-lanceolate with margin of lamina upturned but not infolded over lamellae.

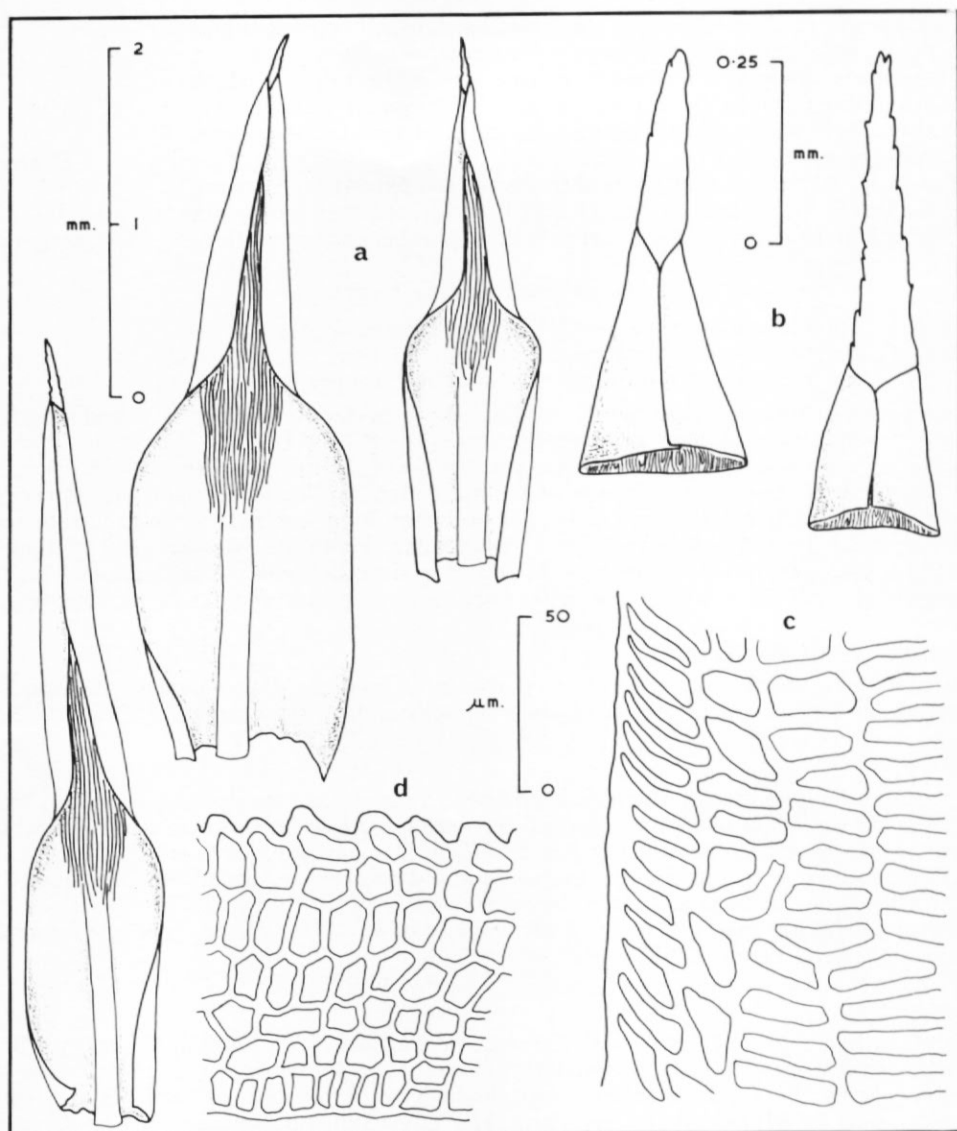


Fig. 5. *Polytrichum alpestre*.

a. Leaves; b. Apices; c. Upper cells and margin; d. Side view of lamella.

Scales: left-hand for leaves, median for cells and lamella, right-hand for apices.

Margin variably toothed, often coarsely so, from near or below mid leaf to point. Cells above $12.4\text{--}24.8 \times 9.3\text{--}21.7 \mu\text{m.}$, \pm isodiametric to shortly rectangular, incrassate. Border cells of lamellae papillose, round in transverse section. Dioecious. Capsules round in transverse section, rugose when old. (Fig. 7.)

Habitat and distribution (Fig. 8)

A common species of a wide range of habitats from dry to moist stony rocky or peaty ground, in open to closed habitats amongst *Poa flabellata* tussock or *Festuca erecta* grassland. Altitude 0–150 (–625) m.

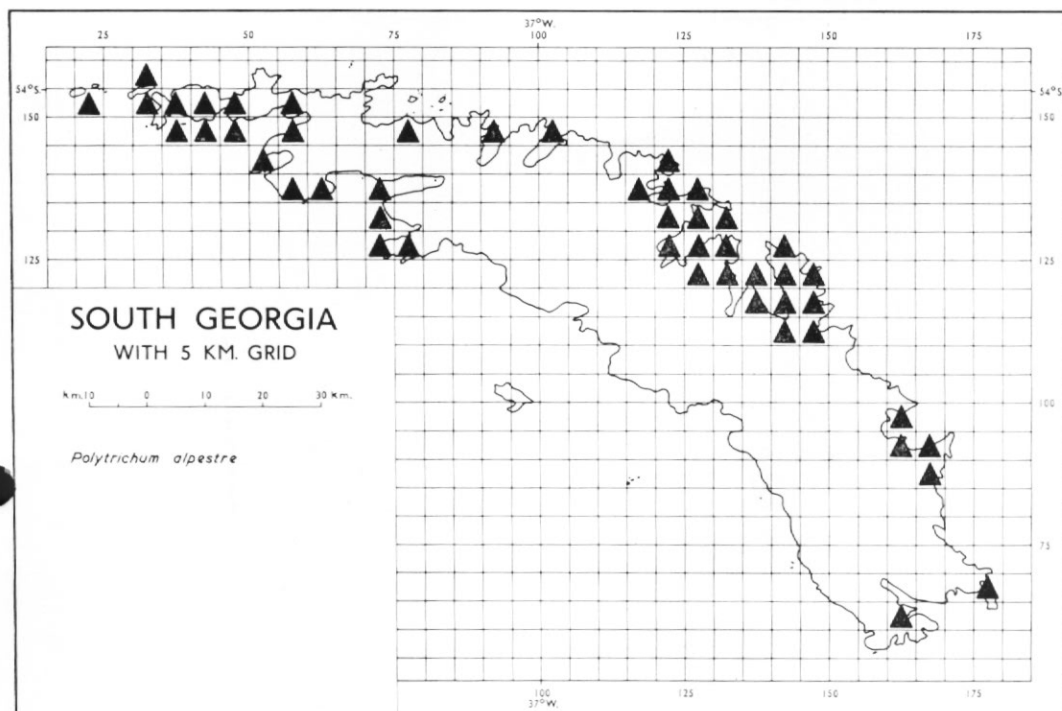


Fig. 6. The known distribution on South Georgia, by 5 km. squares, of *Polytrichum alpestre* based on the specimens and field records given in the Appendix.

Notes

P. alpinum is regularly seen in fruit. It is very variable in size, in the degree of branching and in the size and numbers of teeth along the limb, but the presence of these teeth, together with the papillose border cells of the lamellae, will readily distinguish it from the remaining species of *Polytrichum* and from both species of *Psilopilum*. *Dendroligotrichum squamosum* differs in its dendroid branching, bistratose leaf margin and the presence of divided terminal cells on the lamellae.

Taxonomy

All of the species cited above as synonyms of *Polytrichum alpinum*, apart from *Pogonatum alpinum* (Hedw.) Roehl., were described by Müller (1890) from material collected by H. Will during the German International Polar-Year Expedition of 1882–83 to South Georgia, and are thus the earliest reports of *Polytrichum alpinum* from the island. Duplicates of the types have been examined from the Hamburg, Munich and Helsinki herbaria as follows:

P. austro-georgicum is represented in Munich by three specimens each of which has slightly different collecting details (Will No. 1, Fundort Thal nördlich vom S.W.-Gletscher in der Nähe der alten Moräne, Süd-Georgien 7.v.83; Will No. 1, Fundort Whalerbay, Thal nördlich vom Ross-Gletscher, in der Nähe der alten Moräne, Süd-Georgien, 7.v.83; Will No. 1, Fundort Whalerbay, Süd-Georgien, 30.xi.1882). There is an additional specimen in Helsinki which is not a duplicate of any of the Munich specimens (Will s.n. H, Herb. V. F. Brotherus, Süd-Georgien, 10.ii.1883, *Polytrichastrum alpinum* (Hedw.) G. L. Smith det. T. Seki, 1972). The collecting details published by Müller (1890) show further slight variations, but these are not sufficient to cast doubt on the authenticity of the specimens, which show clearly the dentate leaf margin, papillose border cells and rounded capsules characteristic of *P. alpinum*.

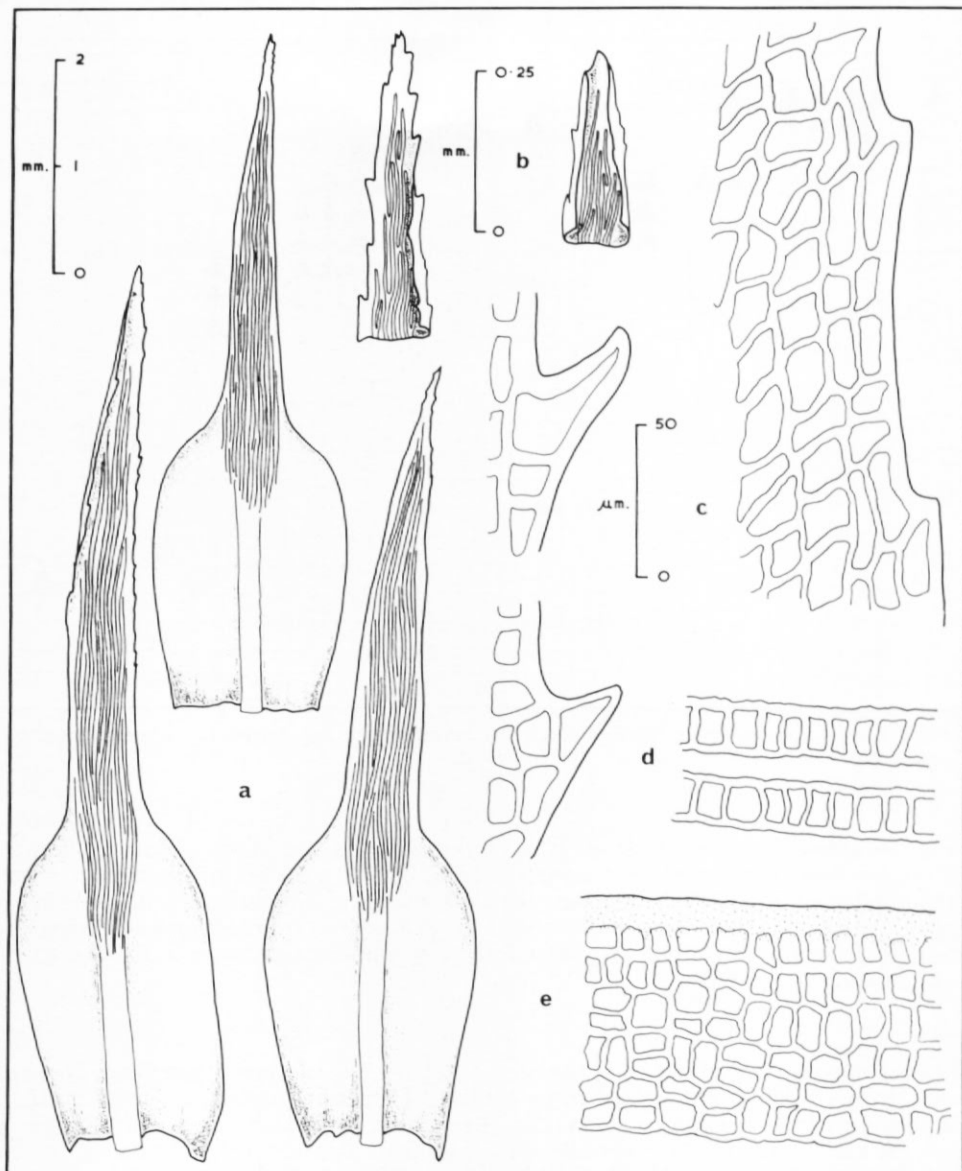


Fig. 7. *Polytrichum alpinum*.

a. Leaves; b. Apices; c. Upper marginal cells and teeth; d. Surface view of two lamellae; e. Side view of lamella with stipple indicating papillosity of border cells.

Scales: left-hand for leaves, median for apices, right-hand for cells and lamellae.

P. macroraphis is represented in Hamburg by three specimens (Will No. 1, Fundort Hochplateau bedeckt in fuschohem Schichten gross Strecken des steinigen Bodens auf Felsen, Süd-Georgien, 2.v.83, det. S. W. Greene ii.1969 as *Polytrichum alpinum* Hedw. with some intermixed *P. alpestre* Hoppe and *Dicranum aciphyllum*; Will No. 1, Fundort Thal nördlich vom SW-Gletscher, in der Nähe der alten Moräne, Süd-Georgien, 7.v.83, det. S. W. Greene ii.1969 as *Polytrichum alpinum* Hedw.; Will No. 1b, Fundort am Felsen oberhalb des Varia-

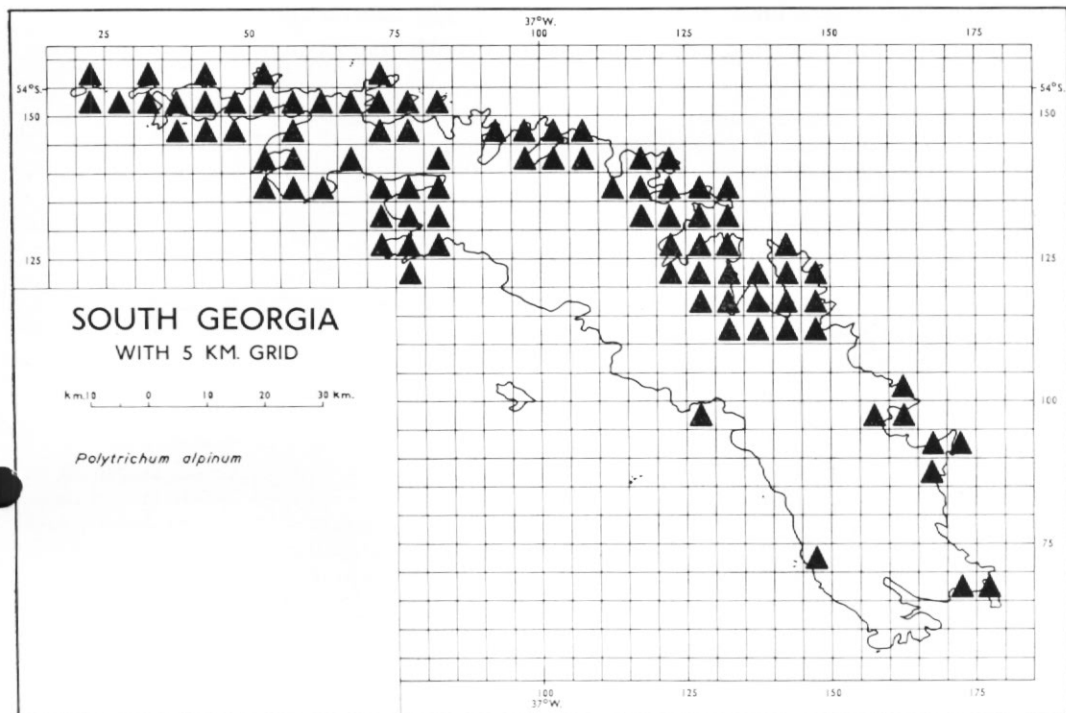


Fig. 8. The known distribution on South Georgia, by 5 km. squares, of *Polytrichum alpinum* based on the specimens and field records given in the Appendix.

tionshauses, Süd-Georgien, 21.x.1882, det. S. W. Greene ii.1969 as *Polytrichum alpinum* Hedw.) and in Munich by two specimens which bear identical collecting details to the Hamburg specimens from the "Hochplateau", except that one is *sine numero*. Both of the Munich specimens bear labels det. S. W. Greene ii.1969 as *Polytrichum alpestre* Hoppe with intermixed *P. alpinum* Hedw. Müller (1890) only referred to the specimen from the "Hochplateau". The *P. alpinum* and *P. alpestre* material in these five packets is quite typical of each species on South Georgia and shows clearly their respective diagnostic characters. The specimen in Helsinki named *P. macroraphis* (Will s.n. Herb. V. F. Brotherus) has proved to be *P. juniperinum* (*quod vide*).

No Müller-determined material of *P. nanocephalum* has been located but, in view of the following quotation from Cardot (1906), there need be little doubt about the status of the species. "L'examen d'échantillons originaux des *Polytrichum austro-georgicum*, *nanocephalum*, *timmioïdes* et *plurirameum* de C. Müller prouve bien que ces plantes ne sont que de simples formes du *Pogonatum alpinum*, qui est une espèce extrêmement variable. Le *P. austro-georgicum* diffère à peine de la var. *septentrionale* Brid." Notwithstanding this comment, Cardot (1908, p. 232) treated *P. nanocephalum* and the other taxa cited as forms of *Polytrichum alpinum*, but in the opinion of the author none of these forms merits nomenclatural recognition. Certainly, the Skottsberg specimen from Cumberland Bay, cited by Cardot (1908, p. 232) and examined by the author (Skottsberg 391, H. Herb. V. F. Brotherus), is in no way noteworthy except perhaps in that it falls towards the smaller end of the normal size range of *P. alpinum* on South Georgia.

No material of *P. plurirameum* is present in Hamburg or Munich but there is a fragmentary specimen in the Brotherus Herbarium which is accepted by the author as authentic (Will H. Herb. V. F. Brotherus, *Polytr. plurirameum* C. M., Südgeorgien, *Polytrichastrum alpinum* (Hedw.) G. L. Smith det. T. Seki, 1972). This specimen consists of six well-developed leaves

coarsely toothed to mid limb or below and falls easily within the normal leaf-size range of South Georgian material.

A single specimen of *P. timmioides* is preserved in Hamburg, the collecting details of which (Will I, Fundort, Hochplateau, Meist in dicht verfilzten fuschohem Schichten den steinigen Boden bedeckend, Süd-Georgien, 23.i.83) are slightly different to those published. Another specimen in Helsinki may be a duplicate of this gathering (Will s.n. H, Herb. V. F. Brotherus, Südgeorgien). There is no reason, however, to doubt the authenticity of these specimens which are typical well-grown *P. alpinum*.

Finally, it may be mentioned that two specimens in Hamburg (Table II) identified by Müller as *P. austro-alpinum* are simple misidentifications for *P. alpinum*.

According to Smith (1971) *Polytrichum alpinum*, together with other species of this genus not known from South Georgia, is better placed in the newly erected *Polytrichastrum* G. L. Smith, so that if this nomenclature were to be adopted the present species would become *Polytrichastrum alpinum* (Hedw.) G. L. Smith.

Polytrichum juniperinum Hedw.

Shoots robust forming dense but loosely adhering turves due to feeble development of tomentum which is confined to the basal part of the stems, 0.9–3.4 (–7.5) cm. high. Leaves 3.0–8.9 × (in limb) 0.3–1.1 mm., similar in shape and structure to those of *Polytrichum alpestre* but with a slightly longer hair point, 0.4–0.9 mm. long. Cells above 34.1–68.2 × 9.3–18.6 μm., rectangular, incrassate. Border cells of lamellae smooth, in side view typically with a narrow and shallow sinus between the projections which are greater than half the width of the cells. Dioecious. Capsules angular in section. (Fig. 9.)

Habitat and distribution (Fig. 10)

An uncommon moss of dry, less commonly moist, stony and peaty ground on screes, moraines, outwash fans or stream sides and also amongst *Festuca erecta* grassland. Altitude 0–150 (–300) m.

Notes

In its well-developed state this species is quite distinctive, but young or depauperate plants might be confused with small forms of *P. alpestre* from which they can best be distinguished by the nature of the projections on the border cells of the lamellae, and their associated sinus. *P. juniperinum* fruits regularly.

Taxonomy

The species has only once been reported from South Georgia, based on material collected by Skottsberg (Cardot, 1906, 1908), but an earlier specimen was obtained during the German International Polar-Year Expedition of 1882–83, and was misidentified as *P. macroraphis* (Will s.n. H, Herb. V. F. Brotherus). The status of *P. juniperinum* as a species distinct from *P. alpestre* has often been questioned but the author has no doubt that the South Georgian and Antarctic specimens (Greene and others, 1970) merit treatment as independent species.

Polytrichum piliferum Hedw.

Shoots robust forming loosely adhering turves with only feeble development of rhizoidal system, or gregarious, 0.5–2.5 (–4.0) cm. high. Leaves 1.8–4.6 (excluding hair point) × (in limb) 0.3–0.8 mm., similar in shape and structure to those of *Polytrichum alpestre* but with a stout flexuose denticulate, mostly hyaline, hair point 0.3–2.2 (–2.8) mm. long. Cells above 31.1–65.1 × 12.4–18.6 μm., rectangular, not to little incrassate. Border cells of lamellae smooth, in side view similar to *P. alpestre* but often with more sloping projections. Dioecious. Capsules angular in section. (Fig. 11.)

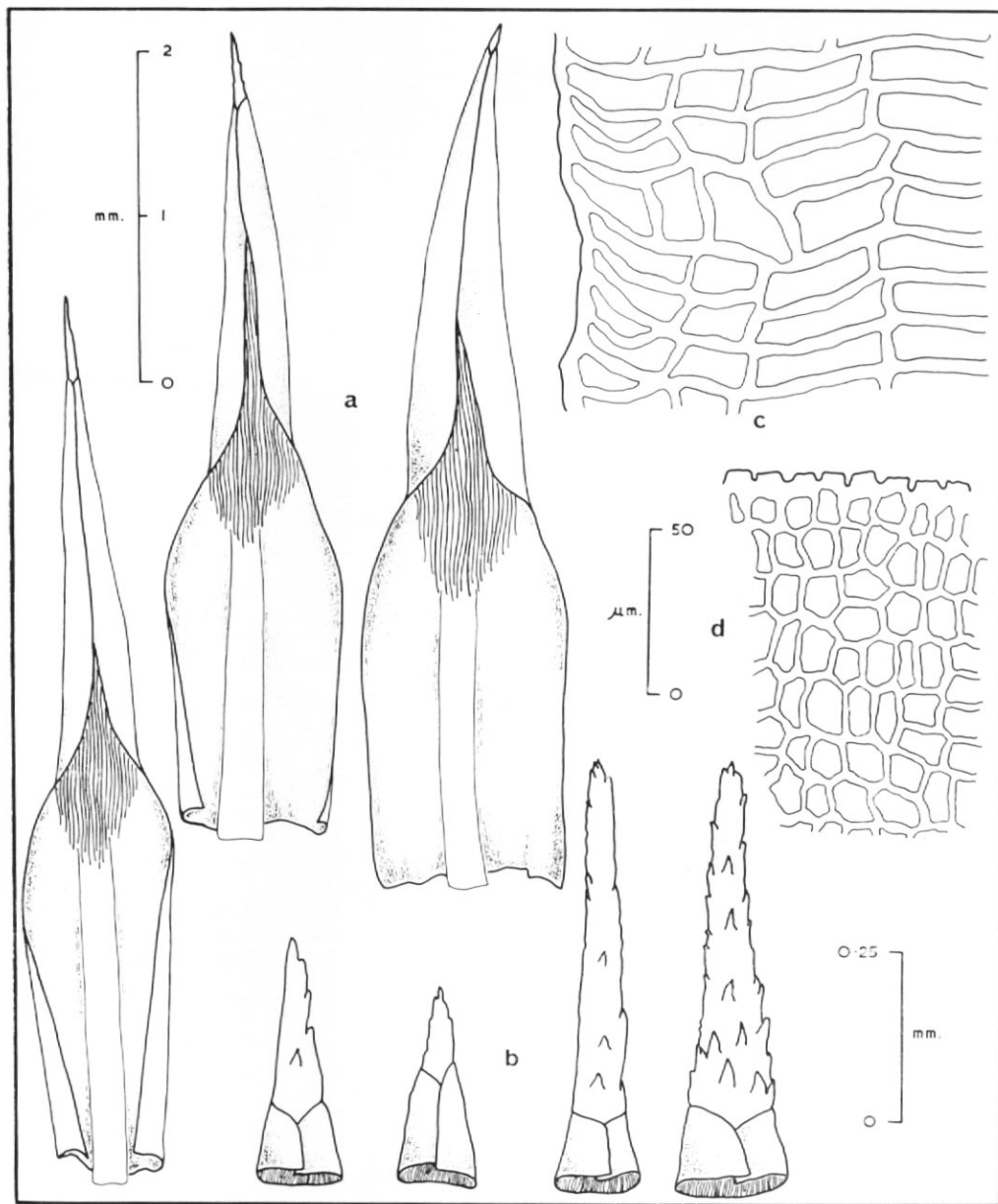


Fig. 9. *Polytrichum juniperinum*.

a. Leaves; b. Apices; c. Upper cells and margin; d. Side view of lamella.

Scales: left-hand for leaves, median for cells and lamella, right-hand for apices.

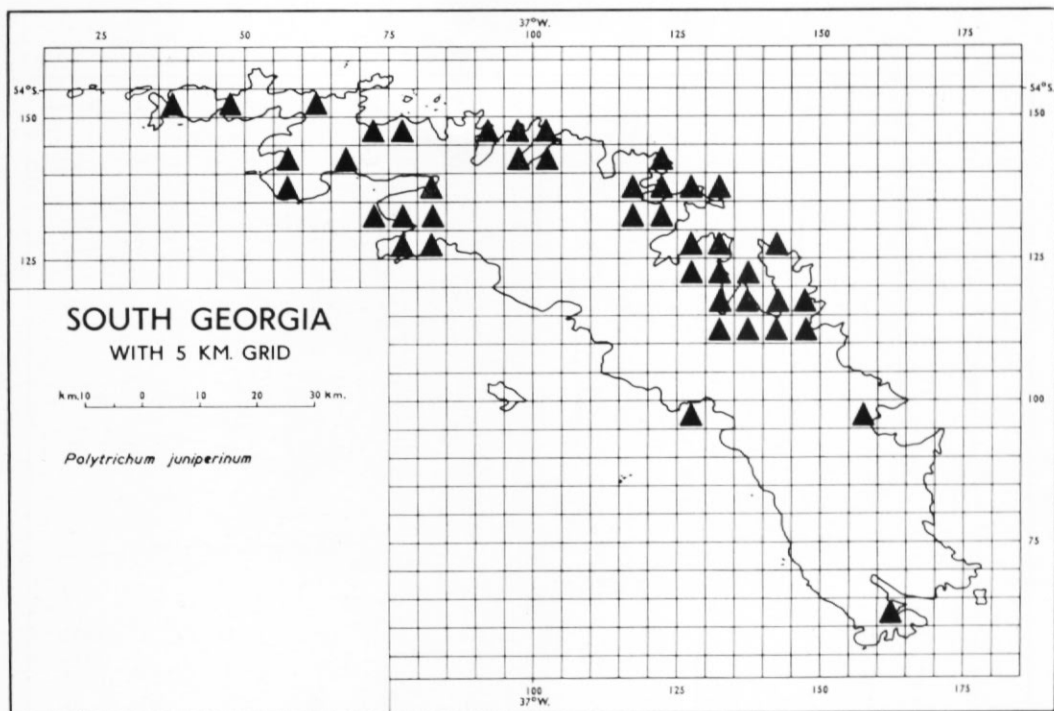


Fig. 10. The known distribution on South Georgia, by 5 km. squares, of *Polytrichum juniperinum* based on the specimens and field records given in the Appendix.

Habitat and distribution (Fig. 12)

An uncommon species of dry or moist, rock faces and crevices, stony ground, and scree slopes less commonly in *Festuca erecta* grassland. Altitude 0–300 (–625) m.

Notes

The presence of a long hair point readily distinguishes this species which is not likely to be confused with any other taxon. Apart from the poor development or absence of papillae at the base of the hair point, which is in marked contrast to their abundant development in Antarctic material (Greene and others, 1970), *Polytrichum piliferum* shows little morphological variation. This species is regularly seen fruiting.

Newton (1972) has reported a chromosome number of $n = 7$ for material from near Grytviken, Cumberland Bay.

Taxonomy

Like *P. juniperinum*, the species has been reported only once before based on material collected by Skottsberg (Cardot, 1906, 1908).

Psilopilum Brid.

Robust turf-forming mosses with non-limbed leaves bearing segmented lamellae running longitudinally along the upper surface of the broad single nerve, the border cells of the lamellae being smooth and lacking projections. The lamina cells are smooth and incrassate, the upper \pm isodiametric, the lower shortly to longly rectangular. Calyptra smooth. Capsule gibbous, laterally compressed, the peristome teeth short and non-hygroscopic, being connected at their apices by an epiphragm.

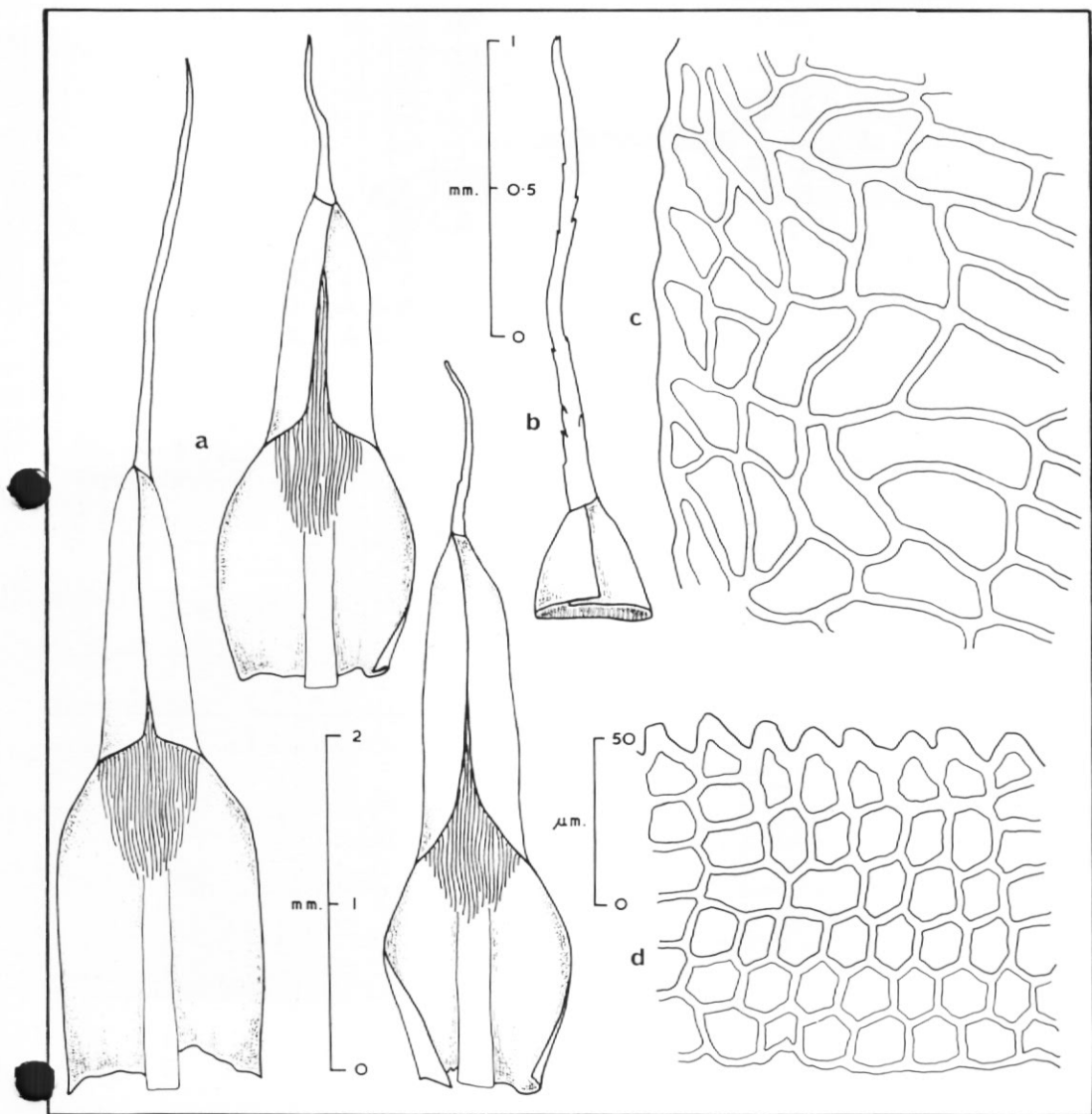


Fig. 11. *Polytrichum piliferum*.

a. Leaves; b. Apex; c. Upper cells and margin; d. Side view of lamella.

Scales: left-hand for leaves, median for apex, right-hand for cells and lamella.

The two species of *Psilopilum* known from South Georgia may be distinguished readily from the remainder of the island's mosses by the presence of segmented lamellae on the upper surface of the nerve. *P. tapes* is believed to reach the southern limits of its distribution on South Georgia, but *P. trichodon* extends to the South Shetland Islands (Greene and others, 1970, as *Psilopilum antarcticum*). Recently, Smith (1971) has proposed that the austral species of *Psilopilum*, including the two on South Georgia, should be placed in a new genus *Notoligotrichum* G. L. Smith when their citations would be *Notoligotrichum tapes* (C. Muell.) G. L. Smith and *Notoligotrichum trichodon* (Hook. f. et Wils.) G. L. Smith. A more conser-

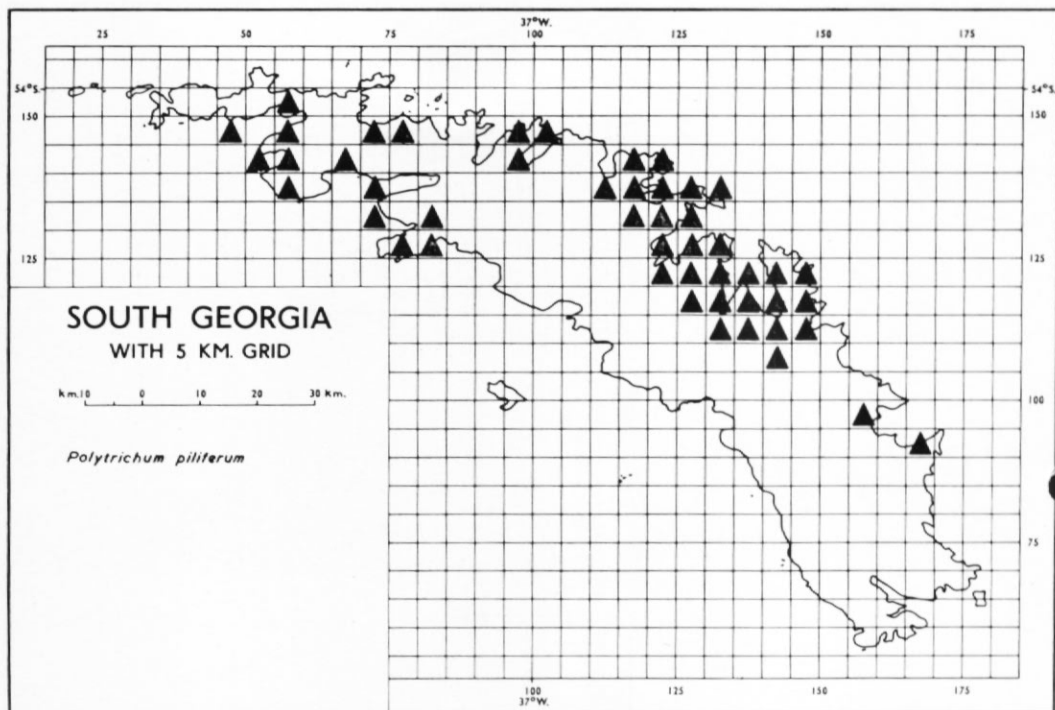


Fig. 12. The known distribution on South Georgia, by 5 km. squares, of *Polytrichum piliferum* based on the specimens and field records given in the Appendix.

vative approach is adopted here pending further evidence on the basis and composition of the new genus.

Longton (1972) has provided an account of the reproductive behaviour of the two species on South Georgia.

The two species may be distinguished from each other as follows:

Nerve broad, leaf apex apiculate	..	..	..	..	..	..	..	<i>P. trichodon</i>
Nerve narrow, leaf apex cucullate	..	..	..	..	..	..	..	<i>P. tapes</i>

Psilopilum tapes (C. Muell.) Par.

Syn. Catharinea tapes C. Muell.

Shoots robust forming tall loose tuves, sometimes scattered amongst other mosses, 1-7 (-15) cm. high. Leaves 2.6-5.1 × 1.2-2.2 mm., oblong from a broad sheathing base, tapering from above mid leaf to a cucullate apex lacking an apiculus. Nerve slender throughout with few lamellae on its upper surface. Cells above 12.8-40 × 12.8-38.4 μm., isodiametric, rounded to quadrate, sometimes irregularly and shortly rectangular, normally with pronounced corner thickenings. Dioecious. (Fig. 13.)

Habitat and distribution (Fig. 14)

An uncommon species of moist situations amongst *Deschampsia antarctica* swards, *Acaena decumbens* slopes and *Rostkovia magellanica* bogs and on banks of streams. Altitude 0-75 m.

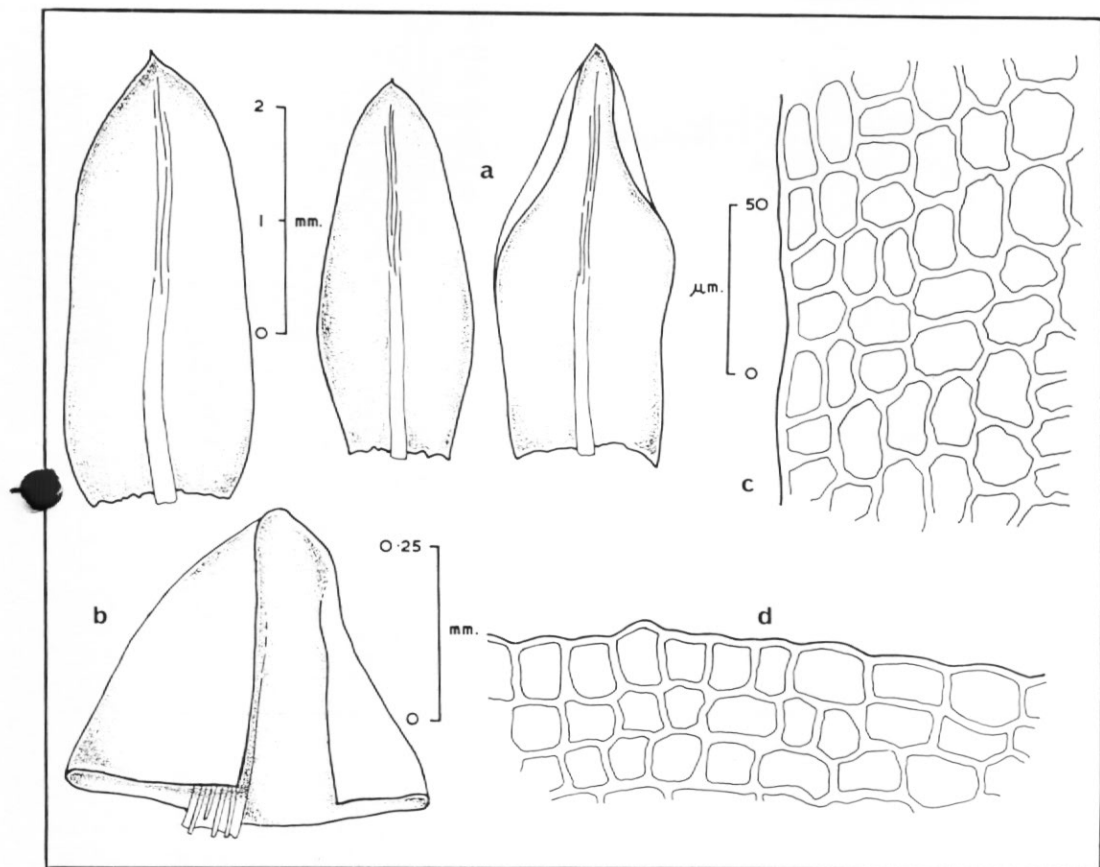


Fig. 13. *Psilopilum tapes*.

a. Leaves; b. Apex; c. Upper cells and margin; d. Side view of lamella.
Scales: left-hand for leaves, median for apex, right-hand for cells and lamella.

Notes

At first sight, *Psilopilum tapes* is more likely to be confused with a species of *Bryum* than with *P. trichodon* or any South Georgian species of *Polytrichum*. Under the microscope the segmented lamellae readily distinguish *P. tapes*, but owing to their delicate nature they can be difficult to see in surface view against the opaque nerve. The segments are, in fact, much longer than in *P. trichodon* but they often completely cut the lamellae into short lengths. *P. tapes* is rare in fruit.

Taxonomy

Psilopilum tapes was first described from South Georgia by Müller (1890) as *Catharinea tapes* from material collected during the German International Polar-Year Expedition of 1882–83. A duplicate from the original gathering is preserved in Hamburg and Munich, each specimen bearing virtually identical labels (Will No. 48, Fundort Background am Ausgange des Brocken thales grosse Flächen bedeckend, Süd-Georgien, 23.i.83) with the Hamburg specimen bearing in addition the words "Südpolar-expedition" but it may be noted that Müller (1890) added "in aquosis; sterilis" to the published details. A specimen in Helsinki (Will s.n. H, Herb. V. F. Brotherus, Südgeorgien, *Notoligotrichum tapes* (C. Muell.) G. L. Smith, isotype of *Catharinea tapes* C. Muell. sel. T. Seki, May 1972) is probably also a duplicate

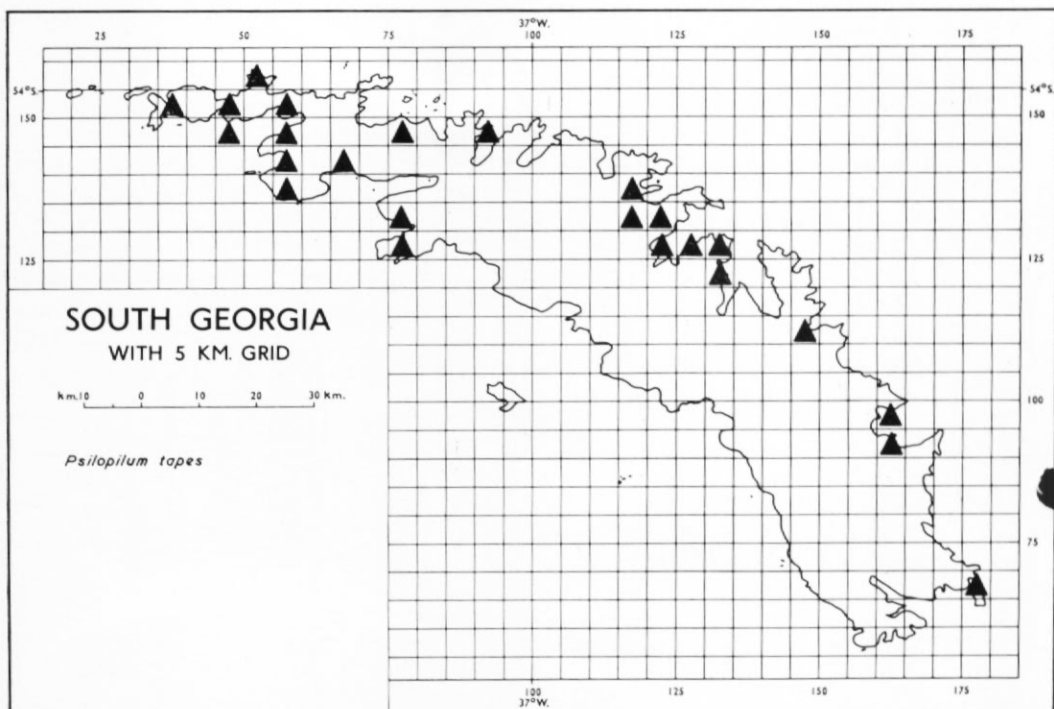


Fig. 14. The known distribution on South Georgia, by 5 km. squares, of *Psilopilum tapes* based on the specimens and field records given in the Appendix.

of the original gathering, as accepted by Seki. The Hamburg and Munich specimens are generous in size, but the Helsinki material consists of only a few leaves and a comal tuft but they all show the narrow nerve with few lamellae, the cucullate leaf apex and the isodiametric lamina cells with pronounced corner thickenings characteristic of the species. Two small specimens in Stockholm (Will s.n., Herb. P. Dusén, Austro Georgia, 23.i.1883, Com. C.M.; Will s.n., Herb. G. Roth, Syd-Georgien, 23.i.1883, det. C. Müller, 1889) are also probably isotypes of Will No. 48 and each shows clearly the distinguishing features of the species.

Psilopilum trichodon (Hook. f. et Wils.) Mitt.

Syn. *Catharinea antarctica* C. Muell.

Psilopilum antarcticum (C. Muell.) Par.

Shoots moderately robust forming dense, loosely adhering turves or cushions, 0.7–2.4 (–3.4) cm. high. Leaves (1.7–) 2.9–6.6 × 0.8–2.3 mm., oblong from a broad sheathing base, tapering from about mid leaf to an acute apex which is produced into a short channelled apiculus of variable length. Margin upturned, particularly towards the apex. Nerve broadening above and covered by abundant lamellae, the latter wavy in surface view and extending laterally on to lamina. Cells above 14.4–27.2 (–36.8) × 11.2–28.8 μm., mostly +isodiametric, sometimes shortly rectangular and broader than long. Dioecious. (Fig. 15.)

Habitat and distribution (Fig. 16)

Common on moist, less commonly dry, stony ground, scree slopes, moraines, rock ledges, and on peat particularly amongst tussock. Altitude 0–30 (–385) m.

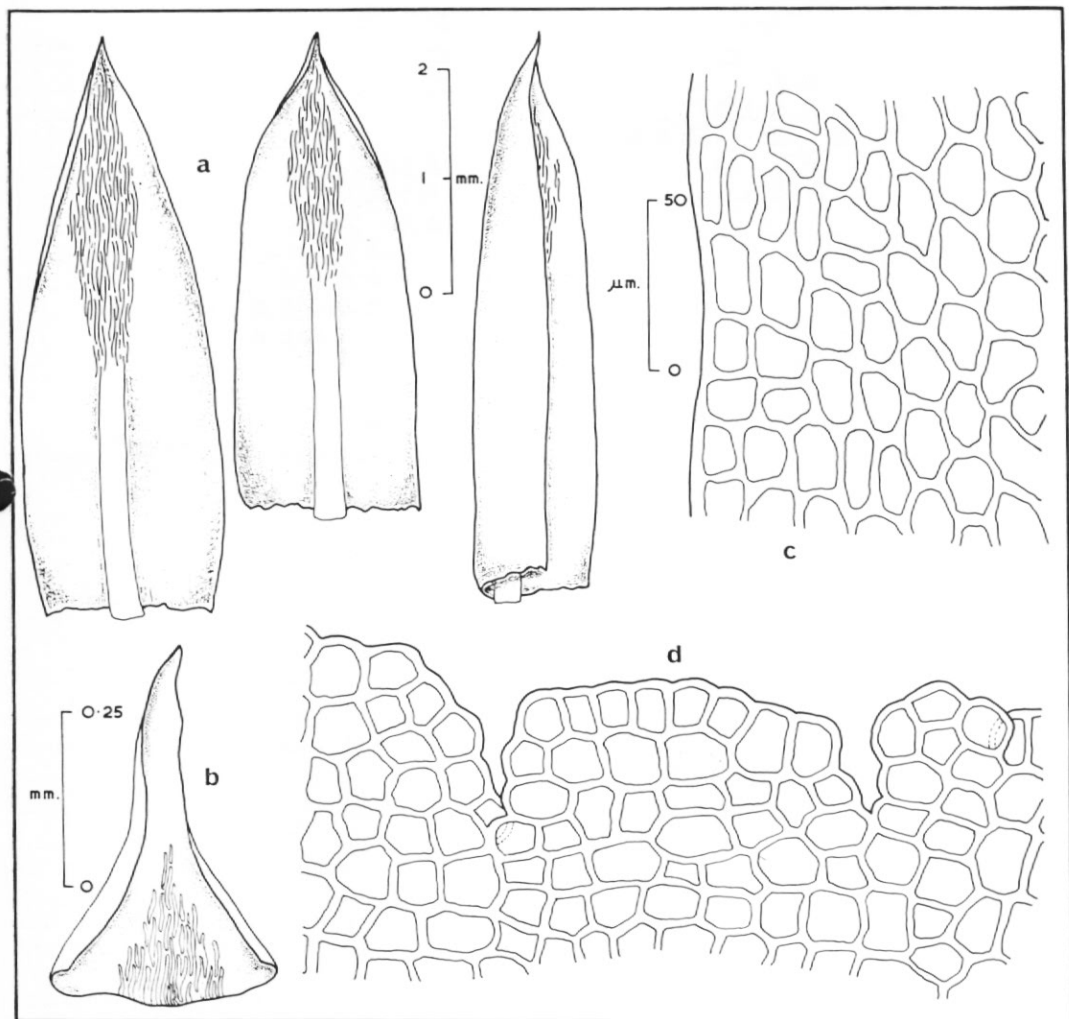


Fig. 15. *Psilopilum trichodon*.

a. Leaves; b. Apex; c. Upper cells and margin; d. Side view of lamella.

Scales: left-hand for apex, median for leaves, right-hand for cells and lamella.

Notes

A distinctive abundantly fruiting species which is unlikely to be confused with *P. tapes* or any species of *Polytrichum*, on account of the abundant shortly segmented wavy lamellae on the upper surface of the nerve.

Newton (1972) has reported a chromosome number of $n = 7$ for material from near Gull Lake, Cumberland Bay.

Taxonomy

The present species has long been known under the familiar name of *Psilopilum antarcticum*, Smith (1969) only recently drawing attention to the fact that Müller's species was identical to *Polytrichum trichodon*, which had been described by Hooker and Wilson (*in* Wilson, 1847) from Columbia. It was transferred to *Psilopilum* by Mitten (1869).

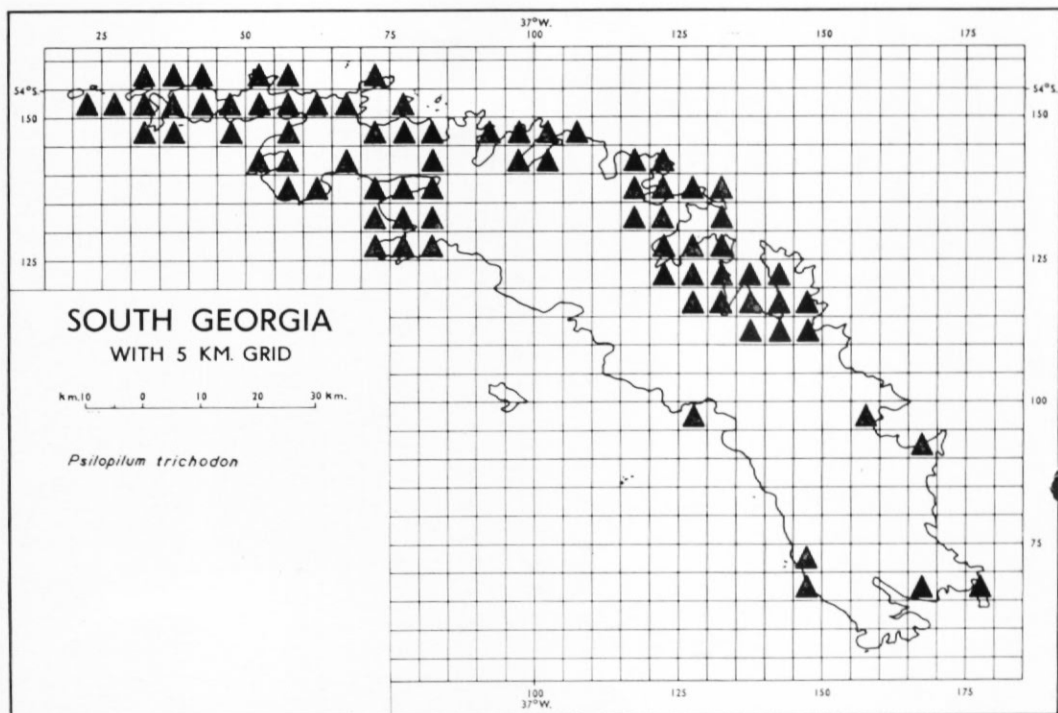


Fig. 16. The known distribution on South Georgia, by 5 km. squares, of *Psilopilum trichodon* based on the specimens and field records given in the Appendix.

The type collection of *Polytrichum trichodon* Hook. f. et Wils. (W. Purdie s.n. BM, Herb. W. Wilson 1874, near perpetual snow on volcanic ashes, Paramo of Ruiz, July 1846, L. J. Bot. v. 6, t. 10) has been examined as has an isotype of Müller's *Psilopilum antarcticum* from the Utrecht herbarium, details of which will be found in Greene and others (1970), and in the author's opinion Müller's species should be referred to the earlier *P. trichodon*: both specimens have the abundant shortly segmented wavy lamellae on the upper surface of the nerve with smooth border cells. Smith (1969) referred to an isotype of Purdie's plant in the herbarium of the New York Botanical Garden. The author has examined two specimens from this herbarium mounted on the same sheet which is annotated "These two specimens, labelled simply 'Wm. Purdie', are probably duplicates of the original collection of *Polytrichum trichodon* Hook f. et Wils., annotated 8.ix.1967 by Gary Lane Smith". Both labels are identical (Wm Purdie, NY, William Mitten herbarium [*Psilopilum trichodon* (Hook, f. et Wils.) Mitt.] [Andes Novae Granatenses: Paramo do Ruiz, prope nives aeternas.] [July 1846]), the information given within the square brackets being identical to that published by Mitten (1869, p. 607) and presumably was abstracted from that source. Although these details differ from those on the Purdie specimen in Wilson's herbarium, there is little doubt that the New York specimens are duplicates of the original particularly in view of the similarity of the non-polytrichoid associates in the three packets.

The earliest specimen of *Psilopilum trichodon* known from South Georgia was reported by Müller (1890) as *Catharinea antarctica*, later records of the species by Cardot (1908) and other authors being as *Psilopilum antarcticum*.

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APPENDIX

DETAILS OF THE SPECIMENS AND FIELD RECORDS FROM WHICH THE DISTRIBUTION FIGURES WERE COMPILED

The references to herbaria cited after each specimen follow those recommended by Lanjou and Stafleu (1964) except that AAS has been used for specimens in the British Antarctic Survey herbarium, at present housed in the Department of Botany, University of Birmingham, and INACH has been used for the herbarium of the Instituto Antártico Chileno, Triana 849, Santiago de Chile. The six figures before the specimens or field records refer to the 5 km. squares of the distribution maps, eastings being cited before northings.

Field records have only been cited for those squares from which no permanent specimens exist, their numbers indicating their file order in the data bank associated with the Survey's herbarium. Field records were provided by the following people: T. V. Callaghan, 1967-68; C. M. Clapperton, 1967-68; G. C. S. Clarke, 1967-68; J. A. Edwards, 1969-70; D. M. Greene, 1967-68; S. W. Greene, 1967-68; R. E. Longton, 1963-64; R. I. L. Smith, 1969-70; D. W. H. Walton, 1969-70; E. P. Wright, 1969-70.

A print-out from the data bank of the collecting details for the specimens cited in this Appendix is available on request from the Botanical Section of the British Antarctic Survey.

Dendrologotrichum squamosum (Hook. f. et Wils.) Card.

- 035 150 BAS Misc. 40 (AAS).
075 125 R. Smith 1222 (AAS, BA, CHR, LE, NY).

Polytrichum alpestre Hoppe

- 020 150 Field record 3330.
030 150 Greene 1997a (AAS, CHR). 030 155 Field record 2897. 035 145 Field record 3234. 035 150 Greene 483a (BA, BM), Greene 511 (AAS, LE, MEL). 040 145 Field record 3346. 040 150 Field record 3445. 045 145 Field record 3306. 045 150 Field record 3302.
050 140 Field record 2865. 055 135 Field record 2790. 055 145 Field record 2880. 055 150 Field record 1044. 060 135 Field record 2870. 070 125 Field record 2883. 070 130 Field record 2839. 070 135 Field record 2844.
075 125 Field record 2856. 075 145 Field record 3254. 090 145 Greene 1702 (BM, NY).
100 145 Field record 3279. 115 135 Greene 1390 (AAS, INACH, NY, PC, PRE, S-PA, TNS), Greene 3156 (BA, BM, CHR, LE, MEL), Greene 3271a (BM, INACH), Longton 2342 (AAS, B, BM, H, MSC), J. Smith M132 (AAS). 120 125 Field record 3625. 120 130 Longton 2341 (AAS, H, MSC). 120 135 Greene 3373 (AAS, INACH, PC, PRE), Greene 3408 (AAS, BM, S-PA, TNS), Sladen JB19/18 (BM). 120 140 Sladen JB17/1 (BM).
125 120 Field record 1077. 125 125 Greene 1572 (AAS, INACH, PC, PRE, S-PA, TNS). 125 130 Longton 2343 (B, BM, H). 125 135 Field record 1090. 130 120 BAS Misc. 10 (AAS), Bonner 255 (BA, BM, CHR), Greene 128b (AAS, CHR, MEL, PRE), Longton 2340 (B, BM, H, MSC), Longton 2350 (AAS, B, MSC), Longton 2351 (AAS, B, H), Longton 2352 (AAS, B, BM, H, MSC), Longton 2354 (AAS), J. Smith M65 (AAS). 130 125 Greene 164 (AAS, CHR, LE, NY, PRE, S-PA, TNS), Greene 1931 (BA, BM, INACH, LE, MEL, NY, PC), Longton 2349 (BM, H, MSC), Skottsberg 394 (S-PA, as *P. strictum* var. *alpestre*), Trøim 8a (BM, as *P. alpinum*), Trøim 114 (BM, as *P. strictum*), Trøim 138 (BM, as *P. strictum* var. *alpestre*). 130 130 Field record 1379. 135 115 Field record 1394. 135 120 Longton 2353 (AAS). 140 110 Longton 2344 (B, BM, MSC). 140 115 Field record 3627. 140 120 Greene 581 (AAS, BA, CHR, LE, MEL), Greene 990 (BM, NY, PC, S-PA, TNS), Longton 2346 (AAS, H, MSC). 140 125 Field record 3635. 145 110 Longton 2347 (BM, H, MSC). 145 115 Greene 806 (AAS, BA, LE, MEL), Longton 2345 (AAS, B, H). 145 120 Longton 2348 (AAS, B, H), Olstad 22 (BM, as *P. macroraphis*, *P. strictum* var. *alpestre*).

- 160 060 Greene 2458 (AAS, TNS). 160 090 Field record 1424. 160 095 Greene 2316 (BM, INACH, NY, PC, PRE, S-PA), Will 1 *pro parte* (HBG, M, as *P. macroraphis*), Will s.n. *pro parte* (M, as *P. macroraphis*). 165 085 Cameron and Kennett 6 (AAS, BM, INACH, NY). 165 090 Field record 1431.
175 065 Field record 1443.

Inadequately localized

On snow-covered rocks, South Georgia, iii.1916, Dixon s.n. (BM); Cumberland Bay, South Georgia, 9.1.1922, Wilkins 3 (BM, as *P. strictum* var. *alpestre*); South Georgia, Cumberland Bay, Moraine Fjord, 20.ix.1902, Skottsberg 380 *pro parte* (S-PA, as *P. strictum* var. *alpestre*); South Georgia, Cumberland Bay, prope May Harbour, 14.v.1902, Skottsberg 395 (S-PA, as *P. strictum* var. *alpestre*); Alt. 40 m., Cumberland Bay, South Georgia, 15.xi.1931, Troim 37 (BM, as *P. strictum* var. *alpestre*); Géorgie du Sud: Cumberland Bay, 1902, Skottsberg 394 (H, Herb. V.F. Brotherus as *P. strictum* forma voisine de la var. *alpestre*, *P. juniperinum* s.l., det. T. Seki, 1972); Süd-Georgien, 24.ii.1883, Will s.n. (H, Herb. V.F. Brotherus as *P. strictum* var. *alpestre*).

Polytrichum alpinum Hedw.

- 010 150 Field record 3326. 020 155 Field record 3321.
025 150 Field record 3230. 030 150 Greene 243 (AAS, CHR, LE, NY), Greene 267 (BM), Greene 318 (BM, PC), Greene 385 (AAS), J. Smith M152a (AAS, S-PA), J. Smith M166 (AAS), 030 155 Field record 2899. 035 145 Field record 3235. 035 150 Greene 473 (BM, TNS), Greene 510 (AAS), Greene 1119 (BM, INACH, MEL). 040 145 Field record 3348. 040 150 Field record 3379. 040 155 Field record 3289. 045 145 Field record 3295. 045 150 Field record 3301.
050 135 Field record 3103. 050 140 Field record 2864. 050 150 Field record 1040. 050 155 Field record 3501. 055 135 Field record 2791. 055 140 Disc. Invest. D1 (BM), Greene 1131 (AAS), Greene 1132 (BA, BM). 055 145 Field record 2878. 055 150 Field record 2806. 060 135 Field record 2869. 060 150 Field record 2833. 065 140 Field record 2819. 065 150 Field record 1049. 070 125 Field record 2882. 070 130 Field record 2837. 070 135 Field record 2845. 070 145 Bonner 171 (AAS, BA, CHR, MEL, PRE, S-PA, TNS), Bonner 179 (AAS, PRE), Greene 1182 (AAS), Greene 1210 (BA, BM), Greene 1254 (BM, MEL, PC), Greene 1330 (BM, INACH, S-PA, TNS). 070 150 Field record 1050. 070 155 Greene 616 (AAS).
075 120 Field record 2860. 075 125 Field record 2857. 075 130 Field record 2874. 075 135 Field record 2889. 075 145 Holdgate 402 (AAS, INACH, NY, PC, PRE). 075 150 Field record 1052. 080 125 Greene 2685 (BM, LE, MEL), J. Smith M121 (AAS). 080 130 Field record 2814. 080 135 Field record 2960. 080 140 Field record 2803. 080 150 Field record 3265. 090 145 Greene 1703 (AAS, BA, CHR), Greene 1721 (BM, CHR). 095 140 Field record 3317. 095 145 Field record 3264.
100 140 Field record 3453. 100 145 Field record 3274. 105 140 Field record 3359. 105 145 Field record 3353. 110 135 Longton 2357 (BM, H, TUR). 115 130 Greene 3011 (AAS, BA), Greene 3076 (BM). 115 135 Cragg D12a (DHM), Greene 1401 (BM, NY), Greene 1437 (BM, PC, PRE), Greene 3155 (AAS, INACH, S-PA, TNS), Longton 2321 (AAS, H, TUR), Longton 2326 (AAS, H, MSC, TUR), Longton 2329 (AAS, B, TUR), Longton 2336 (BM, H, TUR), J. Smith M131 (AAS, LE, MEL). 115 140 Field record 1058. 120 120 Field record 1061. 120 125 Longton 2355 (AAS, B, H, TUR). 120 130 Longton 2323 (B, BM, TUR), Longton 2356 (AAS, B, MSC, TUR). 120 135 Greene 3407 (AAS, BA), Longton 2331 (AAS, MSC, TUR), Sladen JB19/1 (BM, CHR). 120 140 Longton 2334 (AAS, B, H, TUR), Longton 2335 (BM, H, MSC, TUR), Longton 2373 (AAS, B, H, TUR), Sladen JB27/1 (BM).
125 095 Greene 2562 (AAS, LE), Greene 2564 (BM, MEL, NY). 125 115 Field record 3244. 125 120 Greene 1525 (AAS). 125 125 Greene 1585 (BM, PRE), Longton 2370 (B, BM, MSC, TUR), Longton 2371 (AAS, H, MSC, TUR). 125 130 Longton 2330 (BM, TUR), Skottsberg 391 (S-PA, as *Pogonatum alpinum* forma, *P. nanocephalum*), Skottsberg 392 (S-PA, 2 specimens as *Pogonatum alpinum*). 125 135 Field record 1088. 130 110 Field record 1094. 130 115 J. Smith M13 (AAS), J. Smith M16 (BM), J. Smith M30a (AAS). 130 120 Bonner 256 (BA, BM, LE, MEL), Bonner 262a (BM), Bonner 284 (BM), Clarke and Greene CG455 (AAS, BA, INACH, MEL, PC, PRE, S-PA, TNS), Clarke and Greene CG456 (BM, CHR, INACH, LE, NY, PRE), Clarke and Greene CG457 (AAS, BA, CHR, LE, MEL, NY, S-PA, TNS), Greene 163 (AAS, CHR, S-PA, TNS), Greene 795 (BM), Greene 2070 (BM, NY, PC), Greene 3518 (BM, H, MSC, O), Greene 3583 (AAS, INACH, PRE, S-PA), Longton 2319 (BM, TUR), Longton 2369 (AAS, TUR), Sladen JB18/6 (BM), J. Smith M1a (BM), J. Smith M43 (AAS, PC), J. Smith M62 (AAS), J. Smith M139 (BM, INACH, PRE), J. Smith M145 (AAS). 130 125 Bonner 234 (BM), Bonner 266 (BM), Bonner 272 (BM), Cameron and Kennett 17a (BM), Greene 110 (AAS), Greene 1930 (BM, INACH, MEL, NY, TNS), Greene 2892 (AAS, LE), Longton 2368 (AAS, MSC, TUR), Skottsberg 393 (S-PA, as *Pogonatum alpinum*), J. Smith M2a (AAS), J. Smith M52 (BM, PC), J. Smith M68e (AAS). 130 130 Field record 1378. 130 135 Field record 1382. 135 110 Field record 1387. 135 115 Field record 1391. 135 120 Field record 1401. 140 110 Longton 2359 (AAS, TUR), Longton 2360 (BM, TUR), Longton 2361 (BM, TUR). 140 115 Longton 2358 (AAS, TUR), Longton 2363 (BM, MSC, TUR). 140 120 Greene 582 (AAS, INACH, PC, TNS), Greene 928 (AAS, BA, CHR), Greene 929 (BM, LE, NY, PRE, S-PA). 140 125 Longton 2366 (BM, MSC, TUR), Longton 2367 (AAS, B, TUR). 145 070 Bonner 197 (AAS), J. Smith M111a (AAS). 145 110 Longton 2364 (AAS, B, H, TUR),

- Longton 2365 (AAS, B, BM, H, MSC, TUR). 145 115 Greene 807 (AAS), Greene 892 (BM), Longton 2362 (BM, TUR), 145 120 Field record 3658.
- 155 095 Greene 2110 (AAS, CHR), Longton 2372 (AAS, B, MSC, TUR). 160 095 Will I *pro parte* (HBG, M, as *Polytrichum macroraphis*), Will 1b (HBG, as *Polytrichum macroraphis*), Will s.n. *pro parte* (M, as *Polytrichum macroraphis*), Will 1 (HBG, as *Polytrichum timmioides*). 160 100 Greene 2434 (BA, BM). 165 085 Bonner 192 (AAS). 165 090 Field record 1430. 170 065 Field record 1436. 170 090 Field record 1443.
- 175 065 Field record 1442.

Inadequately localized

Growing between rocks, partly decaying probably due to superabundance of moisture, Cumberland Bay, South Georgia, Alt. 200 ft., 16.i.1922, Wilkins 11 (BM); Syd-Georgien, 1883, Mosthaff s.n. (S-PA); Thal nördlich vom SW-Gletscher, in der Nähe der alten Moräne Süd-Georgien, 7.v.83, Will 1 (HBG, 2 specimens as *Polytrichum austro-alpinum* and *P. macroraphis*); Whalerbay, Süd-Georgien, 30.xi.82, Will 1 (HBG, as *Polytrichum austro-alpinum*), Südgeorgien, Will s.n. (H, Herb. V.F. Brotherus as *Polytr. plurirameum*, *Polytrichastrum alpinum* det. T. Seki, 1972); Südgeorgien, Will s.n. (H, Herb. V.F. Brotherus as *Polytr. timmioides*); Géorgie du Sud: Cumberland Bay, 1902, Skottsberg 391 (H, Herb. V.F. Brotherus as *Pogonatum alpinum* forma, *Pol. nanocephalum*, *Polytrichastrum alpinum* det. T. Seki, 1972); Süd-Georgien, Whalerbay, Thal nördlich vom Ross-Gletscher, in der Nähe der alten Moräne, 7.v.83, Will 1 (M, as *Polytrichum austro-georgicum*); Whalerbay, Süd-Georgien, 30.xi.1882, Will s.n. (M, as *Polytrichum austro-georgicum*); Süd-Georgien, 7.v.1883, Will 1 (M, as *Polytrichum austro-georgicum*); Géorgie du Sud, Cumberland Bay, 1902, Skottsberg 383 (H, Herb. V.F. Brotherus as *Pogonatum alpinum* forma, *Pol. austro-georgicum*, *Polytrichastrum alpinum* det. T. Seki, 1972); Géorgie du Sud, Royal Bay, 1902, Skottsberg 379 (H, Herb. V.F. Brotherus as *Pogonatum alpinum* forma, *Pol. austro-georgicum*, *Polytrichastrum alpinum* det. T. Seki, 1972); Géorgie du Sud, Cumberland Bay, 1902, Skottsberg 392 (H, Herb. V.F. Brotherus as *Pogonatum alpinum*, *Polytrichastrum alpinum* det. T. Seki, 1972); Süd-Georgien, 10.ii.1883, Will s.n. (H, Herb. V.F. Brotherus as *Polytrichum alpinum* var. *austro-georgicum*, *Polytrichastrum alpinum* det. T. Seki, 1972).

Polytrichum juniperinum Hedw.

- 035 150 Disc. Invest. D5 (BM). 045 150 Field record 3341.
- 055 135 Field record 2793. 055 140 Field record 2830. 060 150 Field record 2834. 065 140 Field record 2820. 070 130 Field record 2841. 070 145 Greene 1211 (AAS, BA, CHR).
- 075 125 Field record 2858. 075 130 Field record 2783. 075 145 Field record 2912. 080 125 Greene 2728 (AAS, LE), J. Smith M102 (AAS). 080 130 Field record 2813. 080 135 Field record 2802. 090 145 Greene 1670 (BM, MEL, NY). 095 140 Field record 3318. 095 145 Field record 3267.
- 100 140 Field record 3467. 100 145 Field record 3275. 115 130 Greene 3106 (AAS), Longton 2378 (B, BM, MSC). 115 135 Greene 1400 (AAS, PC, PRE, TNS), Greene 3225 (BM, PRE), Longton 2374 (AAS, H), Longton 2375 (AAS, B, MSC), Longton 2380 (AAS, H, MSC), Longton 2381 (B, BM, H, MSC). 120 130 Greene 2947 (AAS). 120 135 Longton 2376 (B, BM, H), Longton 2379 (B, BM, H, MSC). 120 140 Longton 2377 (AAS, H, MSC).
- 125 095 Greene 2563 (BM). 125 120 Field record 1076. 125 125 Field record 1084. 125 135 Field record 1089. 130 110 Field record 1095. 130 115 J. Smith M34b (AAS), J. Smith M36 (BM). 130 120 Bonner 262b (BM), Clarke and Greene CG284 (AAS), Clarke and Greene CG442 (BM, PC, PRE), Greene 1519 (BA, BM, CHR, LE), Greene 2071 (AAS, MEL, NY), J. Smith M63 (AAS), J. Smith M144 (BM). 130 125 Greene 98 (AAS), Greene 122 (BM), Greene 1824 (AAS, S-PA), Greene 1932b (BM), Greene 2916 (AAS, O). 130 135 Field record 1383. 135 110 Field record 1388. 135 115 Field record 1398. 135 120 Bonner 241 (BM). 140 110 Longton 2383 (AAS). 140 115 Longton 2382 (B, BM, H), Longton 2384 (BM, MSC). 140 125 Field record 3668. 145 110 Greene 880 (AAS, INACH, PC, S-PA), Longton 2386 (BM, H, MSC). 145 115 Longton 2385 (AAS, B, H).
- 155 095 Greene 2111 (AAS). 160 060 Greene 2821 (BM, TNS).

Inadequately localized

Austro-Georgia, Will s.n. (H, Herb. V.F. Brotherus as *P. macroraphis*, *P. juniperinum* s.l. T. Seki, 1972); Cumberland Bay, Moraine Fiord, 20.v.1902, Skottsberg 396 (S-PA, *Polytrichum juniperinum* forma ad var. *alpinum* accedens).

Polytrichum piliferum Hedw.

- 045 145 Field record 3296.
- 050 140 Field record 2866. 055 135 Field record 2792. 055 140 Field record 2829. 055 145 Field record 2879. 055 150 Field record 2807. 065 140 Field record 2821. 070 130 Field record 2836. 070 135 Field record 2851. 070 145 Greene 1209 (AAS, BA, INACH, LE, MEL, NY, PC, PRE, S-PA, TNS).
- 075 125 Field record 2855. 075 145 Field record 3255. 080 125 Greene 2620. (BM). 080 130 Field record 2812. 095 140 Field record 3319. 095 145 Field record 3268.
- 100 145 Field record 3276. 110 135 Longton 2325 (AAS). 115 130 Greene 3081 (AAS). 115 135

- Cragg D13a (DHM), Greene 1474 (AAS, BM, CHR, TNS), Greene 3306 (BA, BM, CHR, INACH, LE, MEL, NY, PC, PRE, S-PA), Longton 2327 (BM). 115 140 Field record 1059. 120 120 Field record 1062. 120 125 Longton 2322 (AAS, B, H, MSC). 120 130 Greene 2938 (AAS), Longton 2324 (AAS, B, MSC). 120 135 Greene 3400 (BM, TNS), Longton 2332 (BM, H). 120 140 Longton 2333 (AAS), Longton 2392 (BM, H).
- 125 115 Field record 3245. 125 120 Field record 1078. 125 125 Field record 1085. 125 130 Field record 3681. 125 135 Field record 1091. 130 110 Field record 1096. 130 115 J. Smith M34a (AAS). 130 120 BAS Misc. 11 (AAS), Clarke and Greene CG287 (AAS), Greene 128a (BM, INACH, PRE, S-PA), Greene 1778 (BM), Greene 3519 (AAS, LE, MEL, NY, PC), Longton 2320 (B, BM, H, MSC), Longton 2389 (AAS), Longton 2390 (B, BM, H, MSC), Longton 2391 (AAS), Skottsberg 400 (S-PA, as forma ad var. *Hoppei*), J. Smith M45a (AAS). 130 125 Bonner 265 (BM), Bonner 277 (BM), Clarke and Greene CG404 (AAS), Greene 111 (BA, BM, CHR), Greene 1932a (AAS, CHR, LE, NY, PRE), Skottsberg 398 (S-PA), J. Smith M2b (AAS). 130 135 Field record 1384. 135 110 Field record 1389. 135 115 Field record 1399. 135 120 Field record 1406. 140 105 Field record 2873. 140 110 Longton 2328 (BM), Longton 2387 (AAS). 140 115 Field record 3683. 140 120 Greene 954 (AAS), Greene 994 (BA, BM, MEL). 145 110 Longton 2388 (B, BM). 145 115 Greene 890 (AAS, PC). 145 120 Field record 3688.
- 155 095 Greene 2112 (AAS, INACH, TNS). 165 090 Field record 1432.

Inadequately localized

South Georgia, Cumberland Bay, int. of the West Fiord, 13.v.1902, Skottsberg 397 (PC, S-PA); South Georgia, Cumberland Bay, Moraine Fiord, 20.v.1902, Skottsberg 399 (H, Herb. V.F. Brotherus, S-PA*); Géorgie du Sud: Cumberland Bay, 1902, Skottsberg 400 (H, Herb. V.F. Brotherus as forma voisine de la var. *Hoppei*).

Psilopilum tapes (C. Muell.) Par.

- 035 150 Field record 2862. 045 145 Field record 3297. 045 150 Field record 3425.
050 155 Field record 3506. 055 135 Field record 2795. 055 140 Field record 2826. 055 145 Field record 2877. 055 150 Clarke and Greene CG38 (AAS). 065 140 Field record 2823.
- 075 125 R. Smith 1223 (AAS, B, BA, H). 075 130 R. Smith 1219 (AAS). 075 145 Field record 2911.
090 145 Greene 1715 (AAS).
- 115 130 Greene 3019 (BM). 115 135 Cragg D17 (DHM), Greene 1434 (AAS, CHR, NY, S-PA), J. Smith M133 (BM). 120 125 Longton 2314 (AAS, LE, MEL). 120 130 Longton 2313 (AAS, BM, H, INACH, MEL, PRE, S-PA).
- 125 125 Greene 1543 (BM, CHR, LE). 130 120 R. Smith 1299 (BM). 130 125 Clarke and Greene CG433 (AAS, BA, INACH, LE, MEL, NY, PC, PRE, S-PA, TNS). 145 110 Longton 2315 (BM).
160 090 Field record 1427. 160 095 Greene 2294 (AAS, PC, TNS).
175 065 Field record 1445.

Inadequately localized

Bachgrund am Ausgange des Brockenthales, grosse Flächen bedeckend, Süd-Georgien, 23.i.1883, Will 48 (HBG, M); Südgeorgien, Will s.n. (H, Herb. V.F. Brotherus as *Notoligotrichum tapes*, isotype of *Catharinea tapes* sel. T. Seki, Mar. 1972); Austro Georgia, 23.i.1883, Will s.n., com. C.M. (S-PA, Herb. P. Dusén); Syd-Georgien, 23.i.1883, Will s.n. det. C. Müller 1889 (S-PA, Herb. G. Roth).

Psilopilum trichodon (Hook. f. et Wils.) Mitt.†

- 020 150 Field record 3327.
025 150 Field record 3229. 030 145 Field record 3315. 030 150 Greene 213 (AAS, INACH, PRE, S-PA, TNS), Greene 220 (BM, MEL, NY, PC), Greene 379 (BA, BM, LE). 030 155 Greene 429 (AAS, BM, CHR, TNS). 035 145 Field record 3239. 035 150 Disc. Invest. D3 (BM), Greene 482 (AAS, LE, MEL, NY, PC). 035 155 Field record 3375. 040 150 Greene 766 (AAS, S-PA, TNS). 040 155 Field record 3290. 045 145 Field record 3298. 045 150 Field record 3342.
- 050 140 Field record 2863. 050 150 Field record 1041. 050 155 Field record 1043. 055 135 Field record 2794. 055 140 Disc. Invest. D2 (BM), Greene 1133 (AAS, BA, CHR, LE, MEL, NY). 055 145 Field record 3169. 055 150 Field record 1046. 055 155 Greene 650 (BM, INACH, PC, PRE, S-PA). 060 135 Field record 2871. 060 150 Field record 2835. 065 140 Field record 2822. 065 150 Field record 1048. 070 125 Field record 2884. 070 130 Field record 2838. 070 135 Field record 2843. 070 145 Bonner 172 (AAS, BA, CHR, LE, TNS), Bonner 185 (AAS, BA, BM, CHR), Greene 1250 (BM, INACH), Greene 1328 (AAS, MEL, NY, PC). 070 155 Greene 604 (BM, PRE, INACH, S-PA).
- 075 125 Field record 2859. 075 130 Field record 2785. 075 135 Field record 2890. 075 145 Field record 3257. 075 150 Field record 1053. 080 125 Greene 2727 (AAS, CHR, LE, NY, PRE), J. Smith M126 (AAS). 080 130 Field record 2815. 080 135 Field record 2801. 080 140 Field record 2805. 080 145 Field record 1054. 090 145 Greene 1723 (BM, CHR, INACH, PRE, TNS). 095 140 Field record 3320. 095 145 Field record 3269.
- 100 140 Field record 3454. 100 145 Field record 3277. 105 145 Field record 3354. 115 130 Greene 3080 (AAS). 115 135 Greene 1418 (AAS, BA, BM, MEL, PC, PRE, S-PA), Greene 1435 (BM, INACH, MEL, PC, TNS), Greene 3271b (AAS, NY, PRE, S-PA), J. Smith M136a (AAS). 115 140

- Greene 3349 (BM, LE). 120 120 Field record 1060. 120 125 Longton 2317 (B, BM, H). 120 130 Greene 2936 (AAS, CHR, LE, NY, PRE, S-PA, TNS), Longton 2318 (AAS). 120 135 Longton 86a (AAS), Longton 2316 (AAS, H), Sladen JB19/25 (BM). 120 140 Field record 1069.
- 125 095 Greene 2555 (AAS, BM, INACH). 125 115 Field record 3246. 125 120 Field record 1074. 125 125 Greene 1590 (AAS), Greene 3443 (BA, BM, CHR, LE, MEL, PC). 125 135 Field record 1086. 130 115 Greene 187 (BM, CHR, TNS). 130 120 BAS Misc. 9 (AAS), Greene 161 (AAS, NY, PRE, S-PA), Greene 3508 (AAS, BA, INACH, LE, MEL, NY, PC, PRE, S-PA, TNS), Skottsberg 375 (PC)‡, Skottsberg 376 (S-PA), Skottsberg 378 (S-PA), J. Smith M45b (BM). 130 125 Bonner 273 (BM), Clarke and Greene CG434 (BM, CHR, LE, NY, PRE), Greene 106 (AAS, INACH, S-PA, TNS), Greene 1829 (BM, PC, PRE), Greene 1953 (AAS, BA, LE, MEL, NY), Greene 2895 (AAS, BM, CHR), Longton 2337 (AAS), Skottsberg 377 (S-PA), Skottsberg 422 pro parte (S-PA as forma), J. Smith M25 (AAS). 130 130 Field record 1376. 130 135 Field record 1380. 135 110 Field record 1385. 135 115 Field record 1393. 135 120 Field record 1405. 140 110 Field record 3592. 140 115 Longton 2339 (AAS). 140 120 Greene 578 (AAS, BA, CHR, INACH, MEL, PC), Greene 920 (BM, INACH, PC, TNS). 145 065 J. Smith M108 (AAS). 145 070 Greene 2768 (AAS, PRE, S-PA). 145 110 Field record 3597. 145 115 Greene 810 (BM, NY), Greene 888 (AAS, BA, S-PA).
- 155 095 Greene 2109 (AAS, BA, CHR, LE, MEL). 160 095 Will 44 (HBG, 2 specimens, M). 165 065 Field record 1428. 165 090 Field record 1434.
- 175 065 Field record 1444.

Inadequately localized

Damp hills, on scree, Alt. 100 ft., Bird Island, 5.xii.1957, Bonner 231 (AAS); South Georgia, 1919, Hamilton 539 (BM); Süd-Georgien, 1883, Mosthaff s.n. (H, Herb. V.F. Brotherus as *P. antarcticum*, *Notoligotrichum trichodon* det. T. Seki, 1972); Süd-Georgien, 22.iii.1883, Will s.n. (H, Herb. V.F. Brotherus as *P. antarcticum*, *Notoligotrichum trichodon* det. T. Seki, 1972); Austro-Georgia, Will s.n. (H, Herb. V.F. Brotherus as *P. antarcticum*, *Notoligotrichum trichodon* det. T. Seki, 1972); Syd-Georgien, 12.viii.1883, Mosthaff s.n. (S-PA); Austro-Georgia, 24.i.1883, Will s.n. (S-PA); Austro-Georgia, Will s.n., com. C.M. (S-PA); Syd-Georgian, Will s.n., det. C. Müller (S-PA); S. G. Cumberland Bay, 15.v.02, Skottsberg s.n. (S-PA); South Georgia, Cumberland Bay, 15.iii.1902, Skottsberg 375 (S-PA).‡

Details from S-PA label, that in H. less complete.

† All specimens and field records cited for the grid squares bear the final determination *Psilopilum antarcticum* (C. Muell.) Par. except the Skottsberg specimens from S-PA for 130 120 and 130 125 which have been determined by the author as *Psilopilum trichodon* (Hook. f. et Wils.) Mitt.

‡ The specimens of Skottsberg 375 in PC and S-PA bear different collecting details.