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The taxonomic position and geographical distribution of *Grimmia andreaeopsis* C. Muell. (Grimmiaceae, Musci)

ABSTRACT: *Grimmia andreaeopsis* C. Muell., a species described from sterile material from the Chukotka Peninsula, is redescribed and illustrated. The species is actually a member of the genus *Schistidium*. It can be distinguished from its closest relatives, viz. species of *S. strictum* complex, by the possession of a unique combination of characters: (1) inky black coloration of gametophytes; (2) strongly and asymmetrically keeled, rapidly wide-spreading to squarrose when moist, leaves; (3) cells entirely smooth, very incrassate and strongly nodulose nearly to the base of the lamina; (4) a costa totally smooth or only occasionally slightly roughened on the back below the apex, but never scabrous with conical papillae; (5) leaf margins always entire; (6) peristome teeth bluntly acuminate. Unlike most rupestral species of *Schistidium* it grows in wet arctic fens. *S. holmenianum* Steere & Brassard, a species known to be widely distributed in the Nearctic, and *Racomitrium depressum* Lesq. var. *nigricans* Kindb., a variety described from Labrador and Hudson Bay, are synonymous with *S. andreaeopsis* (C. Muell.) Laz. A comparison of *S. andreaeopsis* with the Andean-Subantarctic *S. angustifolium* (Mitt.) Herz. is made and these species are considered to be closely related, but not conspecific, bipolar counterparts. Also, a comparison with the South Georgian *S. urnulaceum* (C. Muell.) Bell and the Holarctic species of *S. strictum* complex, which are characterized by having similar leaf cell patterns, is made. *S. andreaeopsis* has a circumpolar distribution, mainly within the High Arctic. In addition to the Nearctic, the species is known to occur in Svalbard, North Land, Taymyr Peninsula, Yakutia, Wrangel Island, and on the Chukotka Peninsula.

Key words: Arctic, bryology, taxonomy, *Grimmiaceae*, *Schistidium*, distribution.

1. Brief historical account

Grimmia andreaeopsis was originally described by Müller (1883) on the basis of material collected by Arthur and Aurel Krause in Lütke's Harbour on the northeastern coast of the Chukotka Peninsula. When describing this species, Müller indicated its similarity to *G. atrata* Hornsch., mainly because of the black tinge of the plants. Therefore he placed it in the section *Dryptodon* (Brid.) C. Muell. but he stated that these species differ markedly from one another in the leaf shape and areolation.

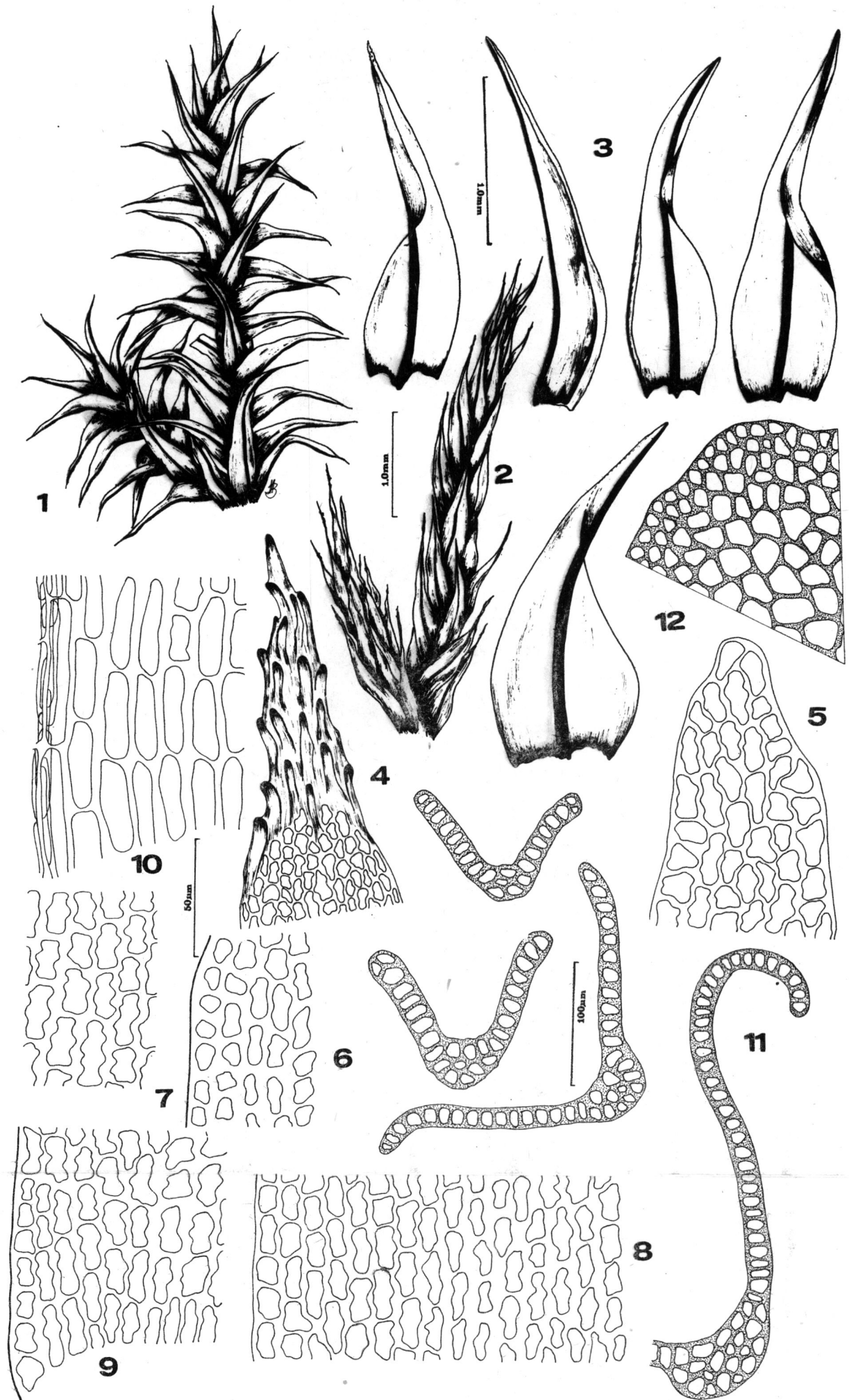
Brotherus (1902, 1924) placed *G. andreaeopsis* in the subgenus *Schistidium* of *Grimmia*. This subgenus, however, is often treated by bryologists, especially in Europe, as an independent genus and Lazarenko (1940) transferred *G. andreaeopsis* to *Schistidium*, making the appropriate new combination, *S. andreaeopsis* (C. Muell.) Laz.

Savič-Ljubickaja and Smirnova (1970) included *G. andreaeopsis* in *Racomitrium* and attributed this transfer to V. P. Brotherus. It appears, however, that Brotherus never made such a combination and the information given by Savič-Ljubickaja and Smirnova is seemingly not correct. Pekka Isoviita has kindly informed the senior author (in litt. 16 November 1984) that although Brotherus (1902, 1924) placed *G. andreaeopsis* in *Grimmia* subgenus *Schistidium*, the type specimen of this species was filed as a *Racomitrium* in his personal herbarium. It is possible that after 1925, Brotherus, when working on several North Asiatic moss collections, had changed his mind regarding the taxonomic position of *G. andreaeopsis*. However, Brotherus apparently did not make the new combination anywhere in his post-1925 publications, particularly in those edited posthumously in the USSR. Thus, the combination *Racomitrium andreaeopsis* has to date not been validly published.

In a critical review of the mosses of the Chukotka Peninsula, including many of Müller's (1883) species, Abramova and Abramov (1980) examined and illustrated type material of *G. andreaeopsis* (based on specimens in BREM). However, these authors concluded only that *G. andreaeopsis* required further critical study in order to establish its proper taxonomic position.

Finally, Bremer (1980) in a worldwide monograph of *Schistidium* examined the original collection of *G. andreaeopsis* in the Naturhistoriska Riksmuseet in Stockholm (S). She placed this species without comment in the synonymy of *S. apocarpum* (Hedw.) B., S. & G. along with many other species from throughout the world.

Perhaps the main reason why *G. andreaeopsis* has been neglected and misunderstood is because of the sterile condition of the type material. Although Müller (1883) provided no illustrations of his new species,



Figs 1—12. *Schistidium andreaeopsis* (C. Muell.) Laz. 1—portion of sterile shoot in wet condition; 2—portion of sterile shoot in dry condition; 3—leaves; 4—leaf apex ended with hyaline awn; 5—cells at apex of mucous leaf; 6—cells at margin just below the apex; 7—cells at the upper part of lamina; 8—cells in midleaf region from the margin towards the costa; 9—basal cells at leaf angle; 10—basal paracostal cells; 11—transverse sections of leaf; 12—transverse sections of the stem (1—3, 4—15 drawn from lectotype of *Grimmia andreaeopsis* — BREM; 4—drawn from Kuc — KRAM-B-19470).

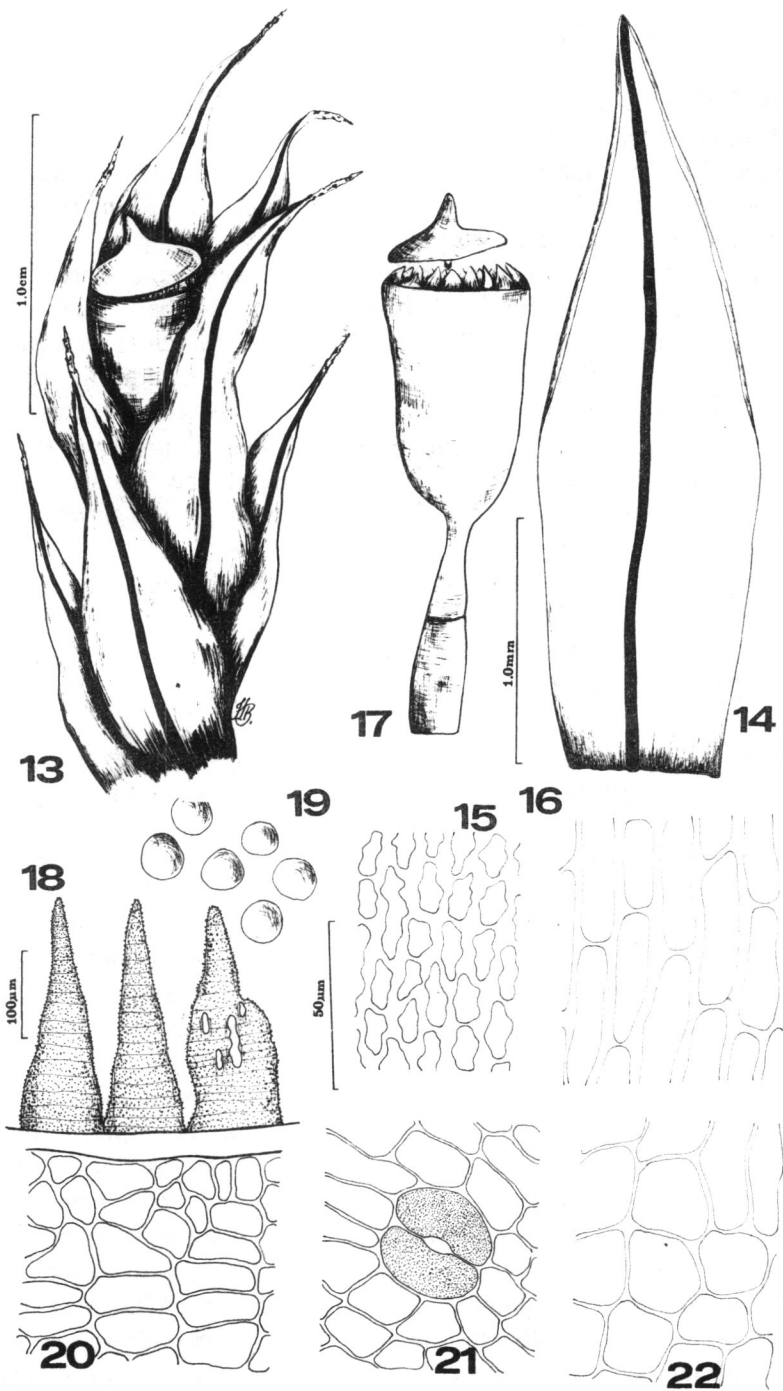
the description is accurate and thorough, and permits its recognition as a distinct species. Moreover, Arctic mosses are mainly poorly known taxonomically, and many regions in the Arctic remain undercollected. It is, therefore, possible that further collections of *G. andreaeopsis* may be present in herbaria under other names.

During the course of the present study we found three specimens of this species in collections of mosses from Svalbard made by Kuc (1963), who provisionally named them as *Schistidium apocarpum* s. lat. These plants from Svalbard are in fine fruiting condition and it was possible, therefore, for us to confirm that *G. andreaeopsis* was correctly placed by earlier authors in *Schistidium*. These data show that further records of *S. andreaeopsis* may be expected in the Arctic, and special attention should be drawn to Arctic collections of *S. apocarpum*, *S. alpicola* and *S. strictum* complex.

2. Description of *Schistidium andreaeopsis* (C. Muell.) Laz. (Figs 1—22)

Plants robust, in large, dense or loose, somewhat glossy tufts, deeply black throughout or with apices rufous or blackish-brown, seldom rufous to blackish-brown throughout. Stems 3—10 cm long, repeatedly branched, in transverse section composed of 2—3 layers of smaller, thick-walled, orange-brown or reddish cortical cells surrounding several rows of larger, firm-walled inner cells, central strand absent. Leaves densely arranged, erect and appressed, straight or often somewhat curved and crisped when dry, wide-spreading to squarrose when moist, 1.5—3.0 mm long, 0.4—1.0 mm wide, lanceolate to ovate-lanceolate, gradually acuminate, acute, strongly and asymmetrically keeled, mucicous or ending in a rather short, 0.1—1.0 mm long, hyaline, denticulate awn; margins entire, revolute on one or both sides nearly throughout, partially bistratose in the upper part; costa stout, 40—80 μm at the base, disappearing in or just below the apex, terete, smooth or occasionally slightly roughened, but never papillose, on the back below the apex, in transverse section planoconvex, with all cells of about the same size and shape or ventral layer composed of somewhat larger cells; lamina cells smooth throughout, very incrassate, with strongly sinuose walls, in the upper part subquadrate or somewhat elongate, about 5—8 μm wide, 7—12 μm long, in midleaf elongate and distinctly nodulose, 6—12 μm wide, 8—22 μm long, basal paracostal cells mostly oblong to oblong linear with thick, smooth walls or sometimes shorter and moderately sinuose, becoming elongate and nodulose towards the margin and grading to quadrate, more or less sinuose marginal cells.

Autoicous. Sporophytes terminal, deeply immersed; perichaetial leaves



Figs 13—22. *Schistidium andreaeopsis* (C. Muell.) Laz. 13 — tip of fertile shoot and capsule in wet condition; 14 — perichaetial leaf; 15 — areolation of perichaetial leaf in the upper part; 16 — areolation of perichaetial leaf in the lower part; 17 — capsule with operculum in wet condition; 18 — peristome teeth; 19 — spores; 20 — exothelial cells below the mouth; 21 — stomate; 22 — exothelial cells in medium part of the urn (all drawn from Kuc — KRAM-B-19470).

ovate-lanceolate, larger and broader than vegetative leaves, 3–4 mm long, closely wrapped around the sporophyte, with lamina cells in the upper half short- to long-rectangular, incrassate and strongly nodulose, becoming in the lower half long-rectangular, smooth- and thick-walled; capsule brown, ovoid to short-cylindric, 1.0–1.3 mm long, 0.8–1.0 mm wide at the mouth; seta short, 0.3–0.4 mm long; columella falling with the plane and rostrate operculum; stomata few, 2-celled, at the extreme base of the urn; exothecial cells variable in shape, quadrate to rectangular, transversally rectangular below the mouth, thin-walled; peristome teeth 16, erect when dry, incurved when moist, fragile, lanceolate-triangular, bluntly acuminate, red to yellow-red, densely and finely papillose throughout with numerous cross bars, entire or irregularly cracked or perforate. Spores spherical, smooth or very finely roughened, 11–16 μm in diameter.

3. Discussion

Schistidium andreaeopsis is a distinct species that is warranted by the combination of several structural characters. The species is best distinguished from other species of the genus by its unusual leaf areolation of entirely smooth and very incrassate, elongate cells with strongly nodulose walls throughout most of the lamina. In this character, it resembles species of *Racomitrium*, not *Schistidium*. In addition, the species is characterized by nearly always having an inky black hue, strongly and asymmetrically keeled leaves that rapidly spread and are squarrose when wet, totally smooth or occasionally slightly roughened, but never papillose costa, lack of central strand, and sporophytes deeply immersed in large, ovate-lanceolate perichaetial leaves, which are much broader and longer than the vegetative leaves, with strongly nodulose cells in the upper half of the lamina.

The ecological requirements of *S. andreaeopsis* are also unlike most species of *Schistidium*, the latter characterized by predominantly rupestral habitats. Only very occasionally some species, e.g. *S. scabripes* (Bartr.) Deguchi from southern Chile, are epiphytic (Deguchi 1984). *S. andreaeopsis* thrives in masses in wet, calcareous fens of Arctic tundra, and is associated with typical peatland mosses of the genera *Drepanocladus*, *Scorpidium* and *Calliergon* instead of being associated with such rupestral mosses as *Grimmia*, *Tortula* or *Orthotrichum*. Only occasionally, does the species grow in drier situations on rock ledges and outcrops or on scree, habitats that are temporarily damp. Plants growing in such conditions lose the typical deep black colour and become rather rufous to blackish-brown, and the leaves commonly end in a papillose, hyaline awn. Moreover, *S. andreaeopsis* seems to produce sporophytes only under drier habitat

conditions, whereas plants thriving in wet environmental niches are sterile. Nevertheless, irrespective of habitat conditions, the typical leaf areolation and the smooth condition of the costa and lamina cells of this species remain unchanged.

There are only few species of *Schistidium* that exhibit leaf areolation similar to that of *S. andreaeopsis*. One of these is *S. angustifolium* (Mitt.) Herz., a species widely scattered in the Andes, from Ecuador to southern Chile and on some sub-Antarctic islands as far east as Îles Kerguelén (Bremer 1980), and recently also discovered in the maritime Antarctic (South Shetland Islands, King George Island, Ochyra 913/80 & 2711/80, KRAM). Like *S. andreaeopsis*, *S. angustifolium* is characterized by having lamina cells with very incrassate, strongly sinuose walls that become elongate towards the base. In *S. angustifolium*, the basal marginal cells are differentiated in 1–2 rows of hyaline, transparent, subquadrate to short-rectangular, esinuose cells extending upwards along the leaf margins, in contrast to opaque, quadrate marginal cells with more or less sinuose walls in *S. andreaeopsis*. The basal leaf cells are strongly elongate and smooth-walled in *S. angustifolium* and occupy nearly the entire base, extending several rows upwards, whereas those in *S. andreaeopsis* are generally nodulose to the base with only a small, paracostal area occupied by elongate, smooth-walled cells (only rarely such cells extend in the larger part of the leaf base). In addition, *S. angustifolium* has small spores, 8–12 μm , in comparison to larger, 11–16 μm spores of *S. andreaeopsis*. Thus, both species are different; however, they appear to be related bipolar counterparts, a situation parallel to that of such pairs of species as *Andreaea rupestris* Hedw. — *A. mutabilis* Hook. f. & Wils. (Vitt 1980) or *Racomitrium heterostichum* (Hedw.) Brid. — *R. crispulum* (Hook. f. & Wils.) Hook. f. & Wils. (Frisvoll 1984). It should be noted that there are two other species of *Schistidium*, namely *S. hyalinocuspdatum* (C. Muell.) Bell from the subantarctic island of South Georgia (Bell 1984) and *S. perichaetiale* (P. Varde) Ochyra in Ochyra & Pócs from East Africa (Ochyra and Pócs 1982) which exhibit identical leaf cell patterns as *S. andreaeopsis* and *S. angustifolium*. However, they seem to be closely related to or identical with *S. angustifolium*.

The second species of *Schistidium* that has a similar leaf cell pattern as *S. andreaeopsis* is *S. urnulaceum* (C. Muell.) Bell, a species known to occur only on South Georgia (Bell 1984). It can be readily separated from all other species of this group by its strongly incrassate, 7–8 μm thick, walls of exothecial cells. Furthermore, this species is diagnosed by very small capsules that are 0.6–0.8 mm long and subglobose to ovoid-obloid in shape.

In the Northern Hemisphere, there are few species of *S. strictum* complex for which *S. andreaeopsis* is likely to be mistaken. Species of

this critical complex, including *S. strictum* (Turn.) Loeske ex Mart., *S. trichodon* (Brid.) Poelt and *S. boreale* Poelt, share several morphological, anatomical and ecological characters with *S. andraeopsis*. This refers especially to the black colour of the plants, the common presence of the nodulose lamina cells, similar spore size, and the association of the plants with moist habitats. From all species of *S. strictum* complex, *S. andraeopsis* differs markedly in having entirely smooth costa and lamina cells; the former is only occasionally a little roughened on the back near the apex, but never papillose. Also, it has always entire leaf margins throughout. Contrary to *S. andraeopsis*, species of *S. strictum* complex are characterized by having the costa of at least younger leaves always scabrous at the back below the apex with tall, conical papillae. Similar papillae also cover frequently upper lamina cells, and leaf margins below the apex are usually bluntly denticulate. Otherwise, *S. andraeopsis* appears to be closely related to *S. strictum* and some populations of the latter species may be readily confused with *S. andraeopsis*.

The only Holarctic species of *Schistidium* that shares the same aggregation of characteristics as *S. andraeopsis* and occupies identical environmental niches is *S. holmenianum* Steere & Brassard, a species that has been hitherto known to be widespread throughout the Nearctic. It was described by Steere and Brassard (1976) from material collected from Alaska, in the vicinity of Ogotoruk Creek near the Chukchi Sea. These authors also enumerate many additional collections from the whole North American Arctic and Greenland. Steere (1978) expressed the opinion that *S. holmenianum* will almost certainly be discovered in other parts of the Arctic, especially in Arctic Siberia. This assumption has recently been substantiated by Afonina (1985), who recorded this species at several stations on the Chukotka Peninsula and on the Taymyr Peninsula.

During the course of the present study we compared numerous specimens of *S. holmenianum* cited by Steere and Brassard (1976) including the type material with the type of *S. andraeopsis* and found that both species are not separable from one other. They agree in all character states including habit of the plants, leaf shape and areolation, and ecological requirements. It is not especially surprising because the *loci classici* of *S. holmenianum* and *S. andraeopsis* are not far-away from one another, separated only by the Bering Strait. Consequently, *S. holmenianum* must be considered synonymous with *S. andraeopsis*.

It appears that Steere and Brassard (1976) were not the first to call attention to this distinct and widespread taxon. During the course of a revision of herbarium materials of *S. holmenianum* from the National Museum of Canada in Ottawa (CANM), among many specimens revised by Dr. R. R. Ireland that originally were misnamed as *S. apocarpum*, the senior author traced two specimens that had been named as *Raco-*

mitrium depressum Lrsq. var. *nigricans* Kindb. It appeared that one of these specimens is a syntype of the taxon described by Kindberg (1910). Further specimens of this variety have been traced in the Naturhistoriska Riksmuseet in Stockholm (S). This variety matches excellently all character states of *S. andreaeopsis*, and Kindberg (1910), probably inspired by the unique leaf areolation, suggested the genus *Racomitrium* for this plant.

Schistidium andreaeopsis (C. Muell.) Laz.

Jour. Bot. Ac. Sc. RSS Ukraine 1 (3—4): 71. 1940. — *Grimmia* (*Dryptodon*) *andreaeopsis* C. Muell., Bot. Centralbl. 16: 126. 1883. — *Racomitrium andreaeopsis* (C. Muell.) L. Savič — Ljubickaja & Z. Smirn., Opr. Listosteb. Mhov SSSR Verhopl. Mhi 507, 1970, comb. inval. Type: Lütke's Harbour, 11. Aug. [Lectotype (selected here): "*Grimmia andreaeopsis* C. Müll. n. sp. 64. Terra Tschuktschorum. Krause" — BREM!; isotypes: H-Br!, S!].

Racomitrium depressum Lesq. var. *nigricans* Kindb.

Ottawa Natural. 23: 181. 1910. Type: Collected on Southampton Island, near Fullerton, northwest of Hudson Bay, by Commander A. P. Low in 1904, also at Whale River, Labrador, in 1896. [Lectotype (selected here): "*Racomitrium depressum* var. *nigricans* Kindb. Fullerton Island Lat. 64° N, Hudson Bay, July 10, 1904, coll. A.P. Low 328" — CANM!; isotype: S-Müller!; syntype: "Herb. N. C. Kindberg. *Racomitrium depressum* Lesq. Canada, Labrador, Whale River. 13/8 98 A. P. Low, com. Macoun" — S-Kindb.!], *syn. nov.*

Schistidium holmenianum Steere & Brassard.

The Bryologist 79: 208, fig. 1—16. 1976. Type: Alaska, Cape Thompson, vicinity of Ogotoruk Creek, Chukchi Sea, 68°07' N, 165°55' W, wet tundra, Steere 63—507 (Holotype — NYi), *syn. nov.*

Grimmia melanophylla Steere, *nom. nud. in sched.*

(Chirotype: Alaska, Cape Thompson and vicinity, Chukchi Sea, ca. lat. 68°06' N, 165°45' W, ridge in *Carex*-*Eriophorum* meadow, July 2, 1966, G. L. Smith A270 — ALA!), *syn. nov.*

4. The geographical distribution of *S. andreaeopsis*

The conspecificity of *S. andreaeopsis* and *S. holmenianum*, as well as a number of recent collections reported by Afonina (1985) and in the present paper from the Chukotka Peninsula, Wrangel Island, Taymyr Peninsula, North Land and Svalbard, have further extended the known range of *S. andreaeopsis*. The presently known distribution of *S. andreaeopsis* can be characterized as northern circumpolar (Fig. 23). It seems to be rather common in the Canadian Arctic Archipelago where it reaches its northernmost locality on Ellesmere Island at lat. 82°30' N. On the North American mainland *S. andreaeopsis* is known only from northwestern Alaska, Cape Parry area, Boothia Isthmus and Melville Peninsula. Moreover, some disjunct localities outside the Arctic Circle have been discovered in Quebec where its southernmost locality is 56°08' N lat.

Steere and Scotter (1978) reported *S. andreaeopsis* (as *S. holmenianum*) from the Nahanni Plateau in the Northwest Territories in Canada. Bremer

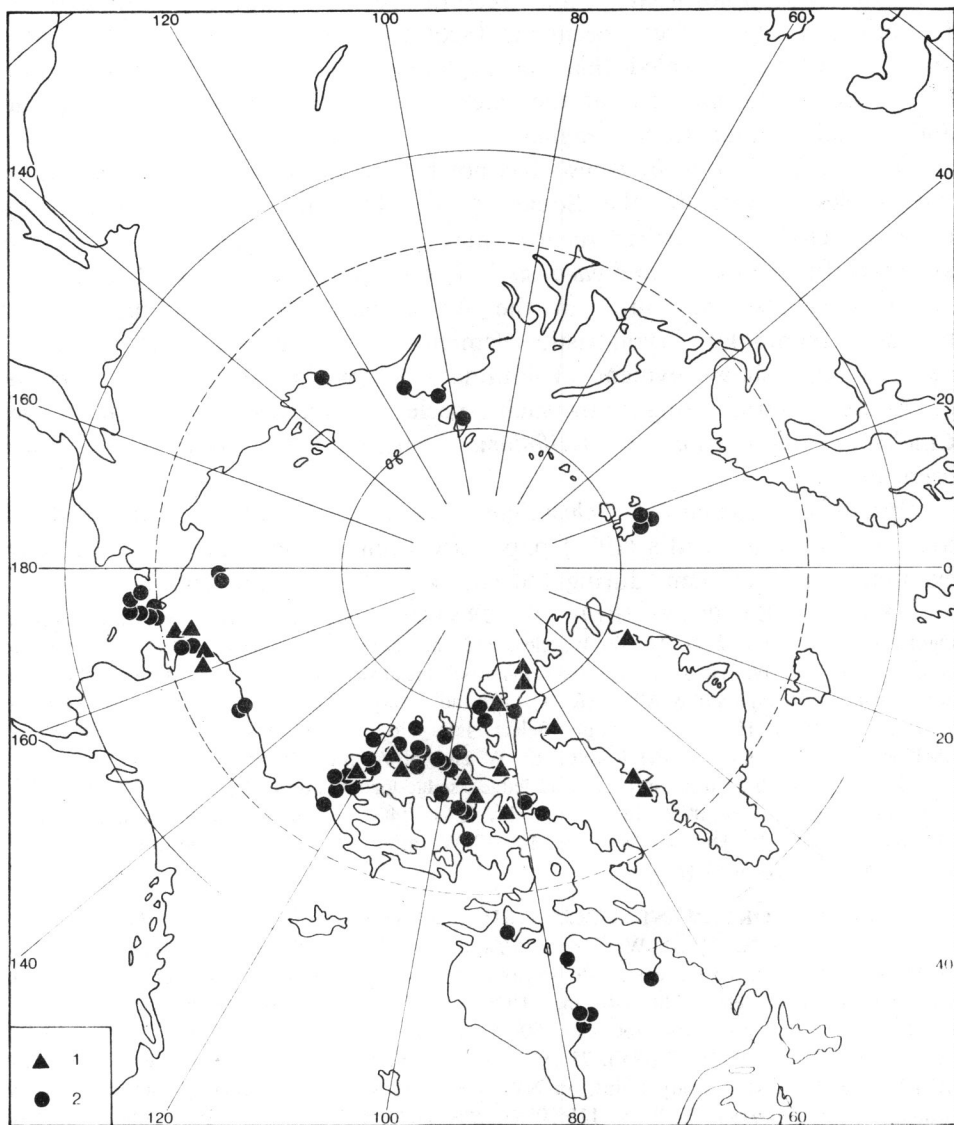


Fig. 23. Distribution map for *Schistidium andreaeopsis* based upon specimens examined in ALA, ALTA, BREM, CANM, H, KRAM, LE, NY, S. Circles — localities cited by Steere and Brassard (1976); triangles — new localities reported in the present paper.

(1980) having examined specimen reported earlier by Steere et al. (1977) as *S. alpicola* confirmed the occurrence of this species in Nahanni National Park. Unfortunately, these records are based upon misidentifications. Examination of voucher specimens (Scotter 22260 and Steere 76—527 & 76-533, NY) has revealed that these plants have strongly scabrous upper lamina cells and midribs on the back below the apex with tall papillae and actually belong to *S. strictum*.

In Greenland, *S. andreaeopsis* has not been collected very often. Similarly, the species is rare in the Soviet Arctic, but this region still remains undercollected and further records may be expected as more areas are explored. In Europe, *S. andreaeopsis* is known presently only from Svalbard, but it may also be found in the Arctic part of Fennoscandia. Thus, to the circumpolar bryofloristic element is now added one additional member that shows evident evolutionary adaptation to the wet habitats of Arctic tundra, along with such species as *Aulacomnium acuminatum*, *Cinclidium subrotundum*, *C. latifolium*, *Tortella arctica*, and *Trichostomum arcticum*.

Specimens studied of *Schistidium andreaeopsis* (those enumerated in Steere and Brassard's (1976) paper are omitted here; however, we have examined most of them during the course of the present study):

U.S.A.: ALASKA. POINT HOPE QUADRANGLE: Ogotoruk Creek, W side of upper Ogotoruk Valley, 68°12' N, 165°46' W, elev. 185 m, *Murray 10095* (ALA). Cape Thompson, 68°06' N, 165°45' W, ridge in *Carex-Eriophorum* meadow, *Smith A270* (ALA — chirotype of *Grimmia melanophylla*) & A269 (ALA); around camp at Cape Thompson, in swampy area, elev. 100 m, H. Inoue, Bryoph. Select. Exs. No. 740 (CANM, KRAM, S). **PHILIP SMITH MOUNTAINS QUADRANGLE:** W end of Atigun Canyon, 68°27' N, 149°18' W, elev. 915—1220 m, limestone outcrops and ledges, sedge-forb meadow, *Murray 77—292A* (ALA); E of Galbraith L., 68°30' N, 149°25' W, elev. 915—1400 m, in drainage channel, *Murray 77—444* (ALA); Mt. Hulten, 68°27' N, 149°18' W, alpine tundra on limestone cliffs, elev. 915—1220 m, *Buck 8844* (NY).

CANADA: NORTHWEST TERRITORIES. BANKS ISLAND: Sachs Harbour, elev. 100—200 ft, 71°59' N, 125°16' W, *Scotter 17589b* (CANM, NY); Johnson Point, elev. 25 ft, 72°48' N, 118°30' W, dry areas with *Dryas* and *Salix* communities, *Scotter 17670* (NY); near Nelson Head, elev. 430—440 m, 71°06' N, 122°46' W, *Scotter 28129* (NY); 73°18' N, 120°47' W, *Dryas* community type, elev. 80—90 m, *Scotter 28170* (NY); 73°57' N, 118°40' W, elev. 85—95 m, *Scotter 28329* (NY); 73°59' N, 118°57' W, elev. 30—125 m, *Scotter 28214* (NY). **MELVILLE ISLAND:** Sandy Point, on NW coast with scattered vascular plants, particularly *Draba bellii* and *Parrya*, 76°28' N, 115°30' W, *Bliss* s.n. (ALTA); Sabine, Peninsula 3 mi. SW of Drake Point, 76°28' N, 108°43' W, elev. 30 m, *Maddison M1504* (ALTA); Marrayant Point, 76°22' N, 108°19' W, elev. 30 m, *Maddison & Sten M1784* (ALTA); E arm of Weatherall Bay, 75°42' N, 106°52' W, elev., 90 m, *Maddison & Sten M1680* (ALTA). **PRINCE PATRICK ISLAND:** 1 mi. S of Landing Lake, 76°19' N, 119°46' W, elev. 100 m, siltstone/clay ravine slope, *Luzula confusa-Racomitrium lanuginosum* community, *Bird 33502* (CANM). **PRINCE OF WALES ISLAND:** Northern Peninsula, *Bliss* s.n. (ALTA). Bathurst Island: 9 mi. N of Bracebridge Inlet, 75°50' N, 99°06' W, elev., 240 m, *Sten S-34* (ALTA); 10 mi. W of Goodsir Inlet, slope just below Inca Head, 75°43' N, 98°25' W, *Miller 7624, 7707* (CANM), *7451* (ALTA, CANM) & *7541* (ALTA, CANM, NY). **KING CHRISTIAN ISLAND:** along NE

coast at 4 km inland, 77°45' N, 102°00' W, on soil hummocks, *Bliss* s.n. (ALTA). SOMMERSET ISLAND: 2 mi. SE of Stanwell Fletscher Lake, 72°40' N, 94°20' W, *Maddison M1433* (ALTA); 2.5 mi. W of Creswall Bay, 72°42' N, 93°52' W elev. 30 m, *Pasiuk P99* (ALTA); 1 mi. E of Stanwell Fletscher Lake, 72°50' N, 94°37' W, elev. 30 m, *Pasiuk P83* (ALTA). AXEL HEIBERG ISLAND: 79°46' N, 87°18' W, elev. 530 m, *Scotter 45521 & 45528* (NY); 80°17' N, 88°27' W, elev. 215 m, *Scotter 45508* (NY). BAFFIN ISLAND: Pond Inlet, Cockburn Island. 72°45' N. Low 326 (CANM). SOUTHAMPTON ISLAND: near Fullerton. 64° N. Low 328 (CANM, S-Müller — lectotype of *Racomitrium depressum* var. *nigricans*). ELLESMERE ISLAND: Johan Peninsula, Alexandra Fjord, 78°53' N, 75°53' N, 75°50' W, *Gillet & Shchepanek 18122* (ALA, CANM, S) & *18161* (ALTA, CANM, NY) BYLOT ISLAND: Eclipse Sound, S coast at mouth of Aktiney River, 72°48' N, 78°51' W, Drury 2507K (LE, NY) & 2209E (ALTA, NY). CAPE PARRY AREA: near Pin Main Dewline Station, 70°11' N, 124°42' W, elev. 0—75 m, polar semidesert and seepage areas, *Scotter 26013, 26048 & 26071* (NY). QUEBEC. Mosquito Bay, on rocks, 61°25' N, Low 907 (CANM); Whale River, 58°15' N, 67°40' W, Low s.n. (S-Kindberg — syntype of *Racomitrium depressum* var. *nigricans*); Richmond Gulf, La Tourelle, 22 km N of Le Goulet, 56°21' N, 76°27' W, on limestone rock, *Ireland 21177* (CANM); *ibidem*, near University of Laval Base Camp, 56°08' N, 76°33' W, on sandstone outcrops, *Ireland 21370* (CANM); *ibidem*, 56°08' N, 76°34' W, on limestone and sandstone boulders, *Ireland 21113, 21127 & 21053* (CANM).

SVALBARD: HORNSUND, TORELLBREEN — HORN BREEN AREA. FUGLEBERG-SLETTA: on boulders, 22 July 1958, *Kuc* s.n. (KRAM). SOFIEKAMNEN: in rock crevices, 28 July 1958, *Kuc* s.n. (KRAM) FLATRYGGEN: on clayey soil mixed with weathered rocks, 27 August 1958, *Kuc* s.n. (KRAM).

U.S.S.R.: SIBERIA. SEVERNAJA ZEMLJA (NORTH LAND): Ostrov Oktjabrskoj Revoljucii. Cape Vatutina. 27 July 1979. *Hodaček* s.n. (LE). POLUOSTROV TAJMYR (TAYMYR PENINSULA): Cape Čeljuskin. 2 July 1974. *Matveeva* s.n. (LE); Buhta M. Prončiščevoj, in wet tundra, 11 August 1972, *Matveeva* s.n. (KRAM, LE). JAKUTJA: Tiksi Bay, vicinity of the village of Sogo-Ugol'nyj, 20 July 1955, *Kil'djuševskij* s.n. (LE). OSTROV WRANGELJA (WRANGEL ISLAND): Buhta Somnitel'naja, 1974, *Holod* s.n. (LE) and 1985, *Afonina* s.n. (LE). ČUKOCKIJ POLUOSTROV (CHUKOTKA PENINSULA): Erguveem River, on wet, stony tundra, 6 August 1970, *Afonina* s.n. (KRAM, LE); Lake Aččen (LE); village of Janrakinnot, in moist skeleton tundra, 7 August 1976, *Afonina* s.n. (KRAM, LE); Lake Ioni. on stony. moist slope. 7 July 1977. *Afonina* s.n. (KRAM. LE. S); NW part of Lavrentija Bay. Cape Krause. on wet tundra, 2 September 1975. *Afonina* s.n. (KRAM, LE); Lavrentija Bay, Pinakul' (LE); Buhta Lütke, A. & A. Krause 64 (BREM, H-Br, S — type of *Grimmia andreaeopsis*).

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5. Резюме

Пересматривается систематическое положение и иллюстрируется *Grimmia andreaeopsis* C. Muell. — вид, описанный на стерильном материале с Чукотского полуострова. В действительности этот вид принадлежит к роду *Schistidium*. Он отличается от близко родственных видов комплекса *S. strictum* наличием уникальной комбинации признаков: (1) интенсивно черная окраска гаметофита; (2) сильно ассиметрично килеватые, быстро расширяющиеся, до оттопыренных во влажном состоянии, листья; (3) клетки гладкие, очень утолщенные и сильно узловатые до основания пластинки; (4) жилка вся гладкая или только слегка шероховатая на спинной стороне ниже кончика, но без конических папилл; (5) край листа всегда цельный; (6) зубцы перистома тупо заостренные. Он растет в отличие от большинства эпилитных видов рода *Schistidium* в сырых арктических тундрах. *S. holmenianum* Steere et Brassard — вид широко распространенный в неоарктике, и *Racomitrium depressum* Lesq. var. *nigricans* Kindb., разновидность, описанная с Лабрадора и северо-западного побережья Гудзонова залива, являются синонимами *S. andreaeopsis* (C. Muell.) Laz. Проводится сравнение *S. andreaeopsis* с андско-субантарктическим видом *S. angustifolium* (Mitt.) Herz.; эти виды считаются близко родственными, но не консpezifичными, биполярными двойниками. Проведено также сравнение с *S. urnulaceum* (C. Muell.) Bell из Южной Георгии и с голарктическими видами комплекса *S. strictum*, которые характеризуются сходными клетками листа.

S. andreaeopsis имеет циркумполярное распространение, главным образом в пределах высокой Арктики. Известно, что кроме неоарктики, вид встречается на Шпицбергене, Северной Земле, Таймырском полуострове, в Якутии, на острове Врангеля и на Чукотском полуострове.

6. Streszczenie

Grimmia andreaeopsis C. Muell., gatunek opisany na podstawie płonych okazów zebranych na Czukotce, został w niniejszej pracy ponownie opisany i zilustrowany. Gatunek ten aktualnie należy do rodzaju *Schistidium* z rodziny *Grimmiaceae*. Charakteryzuje się on szczególną budową komórek blaszki liściowej. Są one całkowicie gładkie i mają błony bardzo silnie zatokowato zgrubiałe prawie do samej nasady liścia. Również żebro w części grzbietowej jest całkowicie gładkie lub co najwyżej nieco szorstkie poniżej szczytu ale nigdy nie jest ono brodawkowane. Rośliny *S. andreaeopsis* (C. Muell.) Laz. są prawie zawsze atramentowo czarne, a liście z reguły są silnie, niesymetrycznie łódkowato zgięte; ich końce w stanie wilgotnym są bardzo silnie w tył odgięte. W odróżnieniu od większości naskalnych gatunków z rodzaju *Schistidium*, *S. andreaeopsis* rośnie na siedliskach okresowo lub permanentnie zalanych wodą w bagnach arktycznej tundry. *Schistidium holmenianum* Steere & Brassard, gatunek szeroko rozprzestrzeniony w Arktyce Amerykańskiej oraz *Racomitrium depressum* Lesq. var. *nigricans* Kindb., odmiana opisana z Labradoru, zostały zredukowane do synonimów *S. andreaeopsis*. Porównanie *S. andreaeopsis* z andyjsko-subantarktycznym *S. angustifolium* (Mitt.) Herz. wykazało, że oba te gatunki są blisko spokrewnionymi lecz całkowicie różnymi zarazem bipolarnymi gatunkami zastępczymi. Porównano także *S. andreaeopsis* ze *S. urnulaceum* (C. Muell.) Bell ze subantarktycznej wyspy Georgia Południowa oraz z holarktycznymi gatunkami z krytycznej grupy *S. strictum*, które charakteryzują się podobną budową komórek blaszki liściowej.

Od gatunków z kompleksu *S. strictum* omawiany gatunek różni się całkowicie gładkimi

komórkami blaszki liściowej oraz gładkimi żeberkami na stronie grzbietowej, podczas gdy *S. strictum* i pokrewne mu gatunki mają żebro na szczycie w części grzbietowej oraz komórki liścia w górnej części silnie brodawkowane. *S. andraeopsis* ma zasięg wokółbiegunowy i jest ograniczony w swym występowaniu do wysokich szerokości geograficznych w Arktyce. Poza Arktyką Amerykańską, gatunek ten został po raz pierwszy stwierdzony na Spitsbergenie oraz w arktycznej części Syberii, a mianowicie na Nowej Ziemi, Półwyspie Tajmyr, w Jakucji, na wyspie Wrangla oraz na Czukotce. Istniejące w literaturze briologicznej informacje o występowaniu *S. andraeopsis* na Nahanni Plateau na Terytoriach Północno-Zachodnich Kanady oparte są na błędnych oznaczeniach materiałów zielnikowych.

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