

## ***Schistidium leptoneurum* species nova from the South Shetland Islands, Antarctica**

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**Abstract** – *Schistidium leptoneurum* is described as a new species from King George Island and Deception Island in the South Shetland Islands archipelago in West Antarctica. It clearly belongs to sect. *Conferta* on account of the presence of the distinct basal marginal border in the vegetative leaves. The new species differs from all other local species of the genus *Schistidium* in having very narrow and weak costae which are 35–40 µm wide, bis-tratose throughout and not or scarcely convex on the dorsal side, and those in the perichaetial leaves end far below the apices. Moreover, *S. leptoneurum* has a well-developed peristome and its vegetative leaves are epilose and shorter than 1.3 mm, making it the smallest species of the genus in the Antarctic.

**Bryophyta / Grimmiaceae / *Schistidium* / Antarctica / South Shetland Islands / taxonomy / distribution**

### **INTRODUCTION**

During the course of the final work on the projected “Illustrated Moss Flora of Antarctica” (Ochyra *et al.*, 1997; Lewis Smith *et al.*, 1998) I have got access to several unusual specimens of *Schistidium* from King George Island and Deception Island in the South Shetland Islands archipelago. They comprise relatively small plants, the smallest ones amongst the local Antarctic species, in fine fruiting condition with the presence of well-developed peristome teeth immediately excluding any alliance with *S. antarctici* (Cardot) L.I. Savicz & Smirnova, the commonest and most abundant species of *Schistidium* in the Antarctic biome. A comparison of these plants with type specimens of species described from South America and the Subantarctic revealed that the Antarctic plants do not fit well with any of these species either. The set of characters exhibited by these plants clearly indicate that they represent an undescribed species. Consequently, a new species, *S. leptoneurum*, is described and its specific name signifies a very narrow and weak costa which is its basic distinguishing character.

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## DESCRIPTION

*Schistidium leptoneurum* Ochyra, sp. nov. (Fig. 1)

**Diagnosis** – *Species haec a speciebus alliis antarcticis generis costis tenuissimis bistratosisque, dorsaliter haud vel indistincte convexis, foliis epilosis, minoribus, ad 1.3 mm longis et costis foliorum perichaetialium subpercurrentibus facillime dignoscenda.*

**Type** – WEST ANTARCTICA. SOUTH SHETLAND ISLANDS. *King George Island*: Admiralty Bay, Keller Peninsula, Tyrell Ridge between Mt. Flagstaff and Piasecki Pass, lat. 62°04' S, long. 58°24'30" W, alt. 220 m; on bare earth in crevices of dry andesite rocks, 9 Jan 1980, *Ochyra 429/80* (Holotype: KRAM).

**Description** – **Plants** small to very small, forming compact cushions or growing in loose tufts, mostly with a greasy lustre to dull green, olive-green to yellowish-brown in the upper part, brown to blackish-brown in the lower portion. **Stems** erect, 0.4–1.3 cm tall, slender, irregularly branched, sparsely radiculose at the base or in the lower part buried in soil with brown, smooth, branched rhizoids, in transverse section round, consisting of a large and distinct central strand, a unistratose cortex of relatively large cells with moderately thickened, brown walls and large lumina, rather sharply set off from 3-4 layers of large, hyaline medullary cells with thin to moderately thickened, yellow to yellowish-brownish walls; **axillary hairs** filiform, hyaline throughout, 5-7-celled, composed of elongate cells in the distal part and shorter basal cells or all cells elongate. **Leaves** small, erect and loosely imbricate when dry, erect-spreading when moist, straight to slightly curved, ovate to shortly ovate-lanceolate, 0.9-1.3(-1.6) mm long, 0.25-0.35(-0.45) mm wide, gradually acuminate, acute, epilose, somewhat decurrent, obtusely keeled to narrowly canaliculate above, broadly concave below; **margins** entire, narrowly recurved on one side up to 3/4-4/5 of the leaf length, occasionally higher, plane or narrowly recurved in the mid-leaf portion on the other side, plain or deflexed on one side near the apex, 1-2-stratose in 1 row of cells in the distal portion, unistratose in the proximal part; **costa** percurrent, very narrow, (32-)35-40(-43) µm wide in the upper and median parts, becoming weaker downwards, yellowish-brownish, poorly delimited and nearly concolorous with the laminal cells, in transverse section flattened, smooth but appearing uneven owing to bulging dorsal epidermal cells, subrectangular, scarcely prominent on the dorsal surface to nearly of the same thickness as the lamina, especially below, bistratose throughout, occasionally with additional 1-2 central cells in the upper part; **laminal cells** smooth, unistratose throughout, slightly bulging below, thick-walled, with sinuose walls throughout the lamina or mostly straight-walled above and sinuose-walled in the central and lower parts, occasionally nearly straight-walled throughout, very variable in size and shape, isodiametric to shortly oblong, rounded, rounded-quadrate to elliptical, sometimes transversely oblong, (4-)6-16(-20) µm long, 6-8 µm wide in the upper, central and suprabaasal parts; **basal juxtacostal cells** short rectangular, chlorophyllous, thick- and straight-walled, (15-)20-35(-40) µm long, 4-8(-10) µm wide, yellowish, yellowish-hyaline to subhyaline; **basal marginal cells** quadrate to oblong, 10-22 µm long, 5-10 µm wide, with straight, thin to moderately thickened longitudinal walls and markedly incrassate transverse walls, forming a rectangular, subhyaline, 1-3-seriate border composed of up to 12 cells.

**Autoecious. Perichaetial leaves** ovate, broadly ovate to oblong-ovate, 1.9-2.5 mm long, 0.8-1.2 mm wide, broadly obtuse to shortly apiculate, epilose or terminated

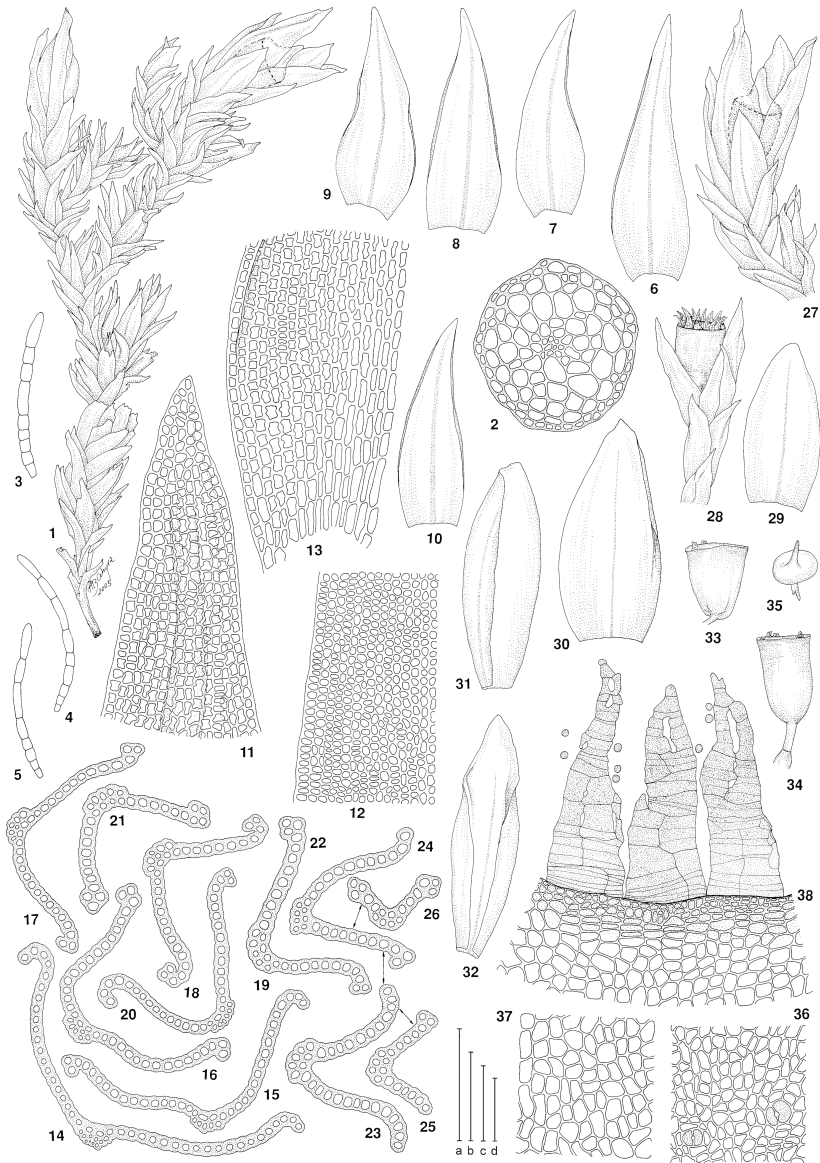


Fig. 1. *Schistidium leptoneurum* Ochyra. – 1. Habit. 2. Cross-section of stem. 3-5. Axillary hairs. 6-10. Leaves. 11. Leaf apex. 12. Mid-leaf cells at margin. 13. Basal cells. 14-26. Cross-sections of leaves, a sequence from base to apex. 27. Perichaetium with operculate capsule, dry. 28. Perichaetium with deoperculate and well-developed peristome teeth, wet. 29-32. Perichaetial leaves. 33. Old operculate capsule with destroyed peristome teeth, dry. 34. Same, wet. 35. Operculum. 36. Exothecial cells in middle of urn. 37. Peristome teeth, spores and rim cells of capsule. [1-5, 7-11, 13, 23-35 from *Ochyra* 429/80, holotype; 6, 12, 14-22, 36-38 from *Lewis Smith* 11296A, paratype; both in KRAM]. Scale bars: a – 1 µm (2-5, 11-26); b – 1 mm (6-10, 29-32); c – 1 mm (27-28, 33-35) and 100 µm (36-38); d – 1 mm (1).

with a short, to 0.25 mm long, flat, decurrent, denticulate hyaline awn when young, straight, concave, with a very narrow costa, nearly concolorous with the laminal cells, ceasing well below the apex and margins plane below and narrowly recurved above. **Seta** stout, 0.35-0.4 mm long, yellowish-brown to pale brown. **Capsules** shallowly immersed, ovoid to obloid, often somewhat campanulate when old, 0.9-1.1 mm long, 0.7-0.8 mm wide, light brown to yellowish-brown, somewhat lustrous, leptodermous; **operculum** distinctly convex, conical, with a straight, acute rostrum, to 0.3 mm long; **exothecial cells** predominantly isodiametric mixed with scattered shortly oblong and transversely oblong cells, (15-)20-40(-55)  $\mu\text{m}$  long, 16-38(-45)  $\mu\text{m}$  wide, thin-walled but with clear collenchymatous thickenings, becoming oblate to rounded at the orifice in 3-5, orange-brown tiers; **stomata** at the base of the urn, 5-8 per urn, superficial, bicellular, round-pored; **peristome teeth** lanceolate, usually gradually narrowed to a broad and obtuse or narrow and acute apex, orange to reddish-orange, 250-320  $\mu\text{m}$  long, 80-115  $\mu\text{m}$  wide at the base, straight, erect to erecto-patent, becoming recurved with age, variously perforate in the upper part, entire or with somewhat uneven margins, densely striate-papillose throughout. **Spores** globose, pale brownish, smooth to minutely roughened, 10-13  $\mu\text{m}$  in diameter. **Calyptra** very small and narrow, mitriform, split into 4 lobes at the base, extending nearly to the base of the urn rim.

**Additional specimens seen (Paratypes)** — WEST ANTARCTICA. **SOUTH SHETLAND ISLANDS. King George Island:** Admiralty Bay, Ezcurra Inlet, Urbanek Cragg, lat. 62°08'30" S, long. 58°32" W, alt. 100 m, in crevices of andesite rocks, 20 Feb 1980, *Ochyra 2323/80* (KRAM); Admiralty Bay, without specific locality, alt. ca 210 m, 24-25 Nov 1925, *Bennett s.n.* (KRAM) and 24-26 Nov. 1925, *Bennett 1404* (KRAM). **Deception Island:** Whalers Bay, northern slope of Ronald Hill, lat. 62°58' S, long. 60°34' W, alt. 60 m, on weathered volcanic rocks near the nesting place of *Larus dominicanus*, 20 Mar 1980, *Ochyra 2773/80* (KRAM); Telefon Bay, Telefon Ridge, 62°55' S, long. 60°42' W, alt. 210 m, on crest of ridge, mostly dry or snowcovered, 7 Mar 1987, *Lewis Smith 5744E* (AAS, KRAM); Fumarole Bay, 62°58' S, long. 60°42' W, alt. 50 m, bluff of yellowish tuffa inland from north end of bay, *Lewis Smith 11296A & 11298B* (AAS, KRAM).

## DISCUSSION

*Schistidium leptoneurum* is a very inconspicuous species which may be easily overlooked during fieldwork and confused with other species, as a result being possibly undercollected in the Antarctic. It is primarily characterized by its peculiar costa which is the weakest one, not only amongst the regional species, but of the whole genus *Schistidium*. On average, the costa is 35-40  $\mu\text{m}$  wide in the upper part, and only in occasional leaves its width varies from 32 to 43  $\mu\text{m}$ . The costa is entirely bistratose and only sometimes in the upper part can one observe one or two central cells. It is scarcely prominent dorsally and in the lower part it is often nearly of the same thickness as the lamina. In all other congeners, except for *S. urnulaceum* (Müll.Hal.) B.G.Bell, the costa is semi-terete to subrectangular and strongly convex on the dorsal side and this character at once separates *S. leptoneurum* from them. Additionally, the costa in the perichaetial leaves of *S. leptoneurum* ends far below the apex and this is also a unique feature in this genus.

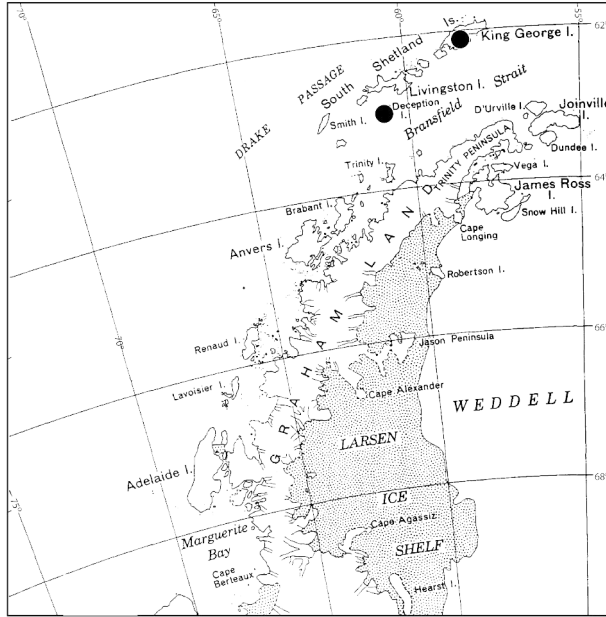


Fig. 2. Map of the global distribution for *Schistidium leptoneurum* Ochyra.

A similarly narrow costa, 35–45  $\mu\text{m}$  wide, is seen only in *Schistidium urnulaceum*, a species endemic to Antarctica and Subantarctic South Georgia (Ochyra, 1990, 1998a). However, this species is immediately distinguished by its hoary appearance due to the presence of the long hyaline hair-points on the upper leaves. In contrast, *S. leptoneurum* lacks entirely hyaline awns or they occur only rarely on the juvenile perichaetial leaves. In some plants (*Ochyra* 2323/80) the upper leaves are whitish, with seemingly hyaline leaf apices but in the Antarctic such “hyalinization” of upper leaves is a relatively frequent effect of living in severe climatic conditions and it is observed in species which consistently lack hyaline hair-points, for example in *Hymenoloma antarcticum* (Hook.f. & Wilson) Ochyra. In addition, the strongly incrassate walls of the exothecial cells and the elongate laminal cells in *S. urnulaceum* preclude any confusion of both species.

*Schistidium leptoneurum* is the smallest species of all Antarctic members of this genus and its leaves usually do not exceed 1.3 mm and only occasionally they are 1.6 mm long. They are entirely epilose and only some juvenile perichaetial leaves bear short hyaline hair-points. The species shows some variation of leaf areolation, especially with regard to the sinuosity of the cell walls which is especially distinct on the plants from Deception Island. On the same shoot there are leaves with markedly sinuose and with nearly straight cell walls.

In contrast to the median and upper cells, the areolation of the leaves in the basal part is very constant in *Schistidium leptoneurum*. The juxtacostal cells are relatively short, straight- and thick-walled and the marginal cells are hyaline to subhyaline, quadrate to oblong, with straight, thin to moderately thickened longitudinal walls and markedly incrassate transverse walls. They form a rectangular, hyaline, 1–3-seriate border composed of 10–12 cells. This character clearly indicate

the relationship of *S. leptoneurum* to sect. *Conferta* Ochyra, along with *S. deceptio-nense*, *S. amblyophyllum*, *S. cupulare*, *S. halinae* and *S. urnulaceum*.

*Schistidium leptoneurum* is a rupicolous species which grows usually in rock crevices, on soil covering dry andesite rocks, on weathered volcanic rocks and on yellowish tuffa rocks. The species is endemic to the Antarctic and so far it is known only from a few localities on King George Island and Deception Island in the South Shetland Islands (Fig. 2). It occurs at higher elevations and its altitudinal range extends from 50 to 220 m a.s.l.

The discovery of this new species of *Schistidium* further illustrates the well-known fact that Antarctica should be considered as a remarkable centre of diversity for this genus. Of thirteen species of *Schistidium* now known to occur in this biome, five are endemic, including *S. steerei* Ochyra (Ochyra, 1987), *S. halinae* (Ochyra, 1998b), *S. deceptionense* (Ochyra *et al.*, 2003), *S. lewis-smithii* Ochyra (Ochyra, 2003) and *S. leptoneurum*. In addition, three species, namely *S. antarctici*, *S. urnulaceum* and *S. cupulare*, are known to occur, outside the Antarctic, only on the Subantarctic islands of South Georgia and Kerguelen. Thus, the austral polar region holds at the moment no fewer than ten species of *Schistidium* which may be considered endemic and in the Antarctic itself it is the largest genus and its species are important constituents, both in terms of frequency and cover, of the fellfield vegetation.

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