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Porotrichum squarrosum (Arzeni) H.A. Crum & Steere a new record to Brazil

Denilson Fernandes Peralta[1,3] and Alfons Schäfer-Verwimp[2]

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ABSTRACT - (*Porotrichum squarrosum* (Arzeni) H.A. Crum & Steere a new record to Brazil). *Porotrichum squarrosum* has never been reported from Brazil and it is a new record. While revising herbarium specimens we found a specimen named *Pireella squarrosa* (currently *Porotrichum*), identified by Massimo Mastracci. We have compared this specimen with records from literature and several hundreds of specimens and found that among specimens previously determined as *P. substriatum* several belong to *P. squarrosum.* These taxa are a quite common in Brazil ranging from Amazon, Atlantic Forest to Cerrado phytogeographical domains at elevations from near sea level to about 600 m. These taxa are fast differentiated by the squarrose leaves, spur costa at back and absence of stem central strand in *P. squarrosum* against to complanate leaves, without spurowed costa at back and presence of central strand in *P. substriatum.*
Keywords: bryophytes, Hypnales, moss, Neckeraceae, stipitate-frondose

RESUMO - (*Porotrichum squarrosum* (Arzeni) H.A. Crum & Steere um novo registro para o Brasil). *Porotrichum squarrosum* nunca foi reportado para o Brasil e trata-se de um novo registro. Durante a revisão de espécimes de herbário, o nome *Pireella squarrosa* (atualmente *Porotrichum*), identificado por Massimo Mastracci foi encontrado em algumas plantas. Após a comparação com literatura e centenas de espécimens de herbário, verificamos que *P. squarrosum* é uma espécie comum no Brasil, ocorrendo desde o domínio fitogeográfico da Amazônia até a Mata Atlântica e Cerrado em elevações desde o nível do mar até próximo 600 m. Esses táxons são rapidamente diferenciados pelos filídios esquarrosos, costa com esporão dorsal e ausência de banda central de estereides no caulídio em *P. squarrosum* em contraposição a filídios complanados, sem costa esporada dorsalmente e presença de banda central de estereides no caulídio em *P. substriatum*.
Palavras-chave: briófittas, Hypnales, musgos, Neckeraceae, estipitado-frondoso

While revising specimens for the Brazilian Flora online from online databases (Peralta 2019), we found a specimen named *Pireella squarrosa* Arzeni (nowadays, *Porotrichum squarrosum*), identified by Massimo Mastracci.

Porotrichum squarrosum has never been reported from Brazil in literature and is presented here as a new record. We checked several hundreds of unidentified specimens of Neckeraceae and found that *P. squarrosum* is quite common in Brazil ranging from Amazon, Atlantic Forest to Cerrado phytogeographical domains at elevations from near sea level to about 600 m.

Plants of this species were found in herbaria determined as *Porotrichum substriatum* (Hampe) Mitt., probably because of the synonymization proposed by Buck (1998). These species are distinguished by the concave and widely spreading to squarrose leaves of *P. squarrosum* (even on dry plants), spur costa at back and absence of stem central strand whereas *P. substriatum* has clearly plane and complanate leaves which are usually obliquely spreading (see the type at https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.bm000961357), absence of spur costa at back and presence of stem central strand; plates of both species will be soon available at FBO (2020).

The revision of Neckeraceae family of Sastre de Jesús (1987) does not include the name *Porotrichum squarrosum* (a combination of Crum & Steere 1958 on *Pireella squarrosa* by Arzeni 1954). The original publication does not include the description of the pseudoparaphyllia. The genus *Pireella* belongs to Pterobryaceae and the pseudoparaphyllia in this family are always filamentose (Allen 1987), but *Porotrichum* and all family Neckeraceae has the characteristic foliose pseudoparaphyllia (Sastre de Jesús 1987).

Porotrichum squarrosum has been described from Haiti and the Dominican Republic by Arzeni (1954, with pl. 20, as *Pireella*) with only one further specimen from Haiti was reported by Crum & Steere (1958, with figures 62-83). But after the synonymization proposed by Buck (1998) these names are never re-evaluated, even with the absence of specimens or types examined by this author. Our new records are the first ones from Brazil and we encourage the revision of specimens determined as *P. substriatum* to reveal the real range of this taxon.

In light of misinterpretation of the specimens examined we provide a description and pictures for this taxon and stimulating the reanalysis of preexisting herbaria specimens.

1. Instituto de Botânica, Avenida Miguel Stéfano, 3687, 04301-902 São Paulo, SP, Brazil
2. Mittlere Letten 11, 88634 Herdwangen-Schönach, Germany
3. Corresponding author: denilsonfperalta@gmail.com

Porotrichum squarrosum (Arzeni) H.A. Crum & Steere, Amer. Midl. Naturalist 60: 33. 1958 ≡ *Pireella squarrosa* Arzeni, Amer. Midl. Naturalist 52: 33. 1. 1954. Type: Haiti, Hardwood patch en route Savanne Zombi, Mornes des Comissaires, 28/IV/1944, *Faith P. Mackaness 99* (MICH [hb. Bartram], BM (photo!) [https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.bm000961357]), *non. vid.*

Figure 1.

Additional illustrations and descriptions in Arzeni (1954) and Crum & Steere (1958).

Plants gregarious, pale-green or partly brownish, dull, stipitate-frondose, mostly 2–4 cm tall. Stolons creeping, with small ovate-acuminate leaves and tufts of smooth, brownish-orange, densely branched rhizoids in the contact with the substratum; stolons transforming heteroblastically into stems consisting of a proximal, unbranched stipe and a distal, branched frond. Fronds irregular-pinnately branched, complanate. Stipe distinct, green, in cross section with a cortex consisting of 5–8 layers of very thick-walled cells grading into larger medullary cells with thinner walls; central

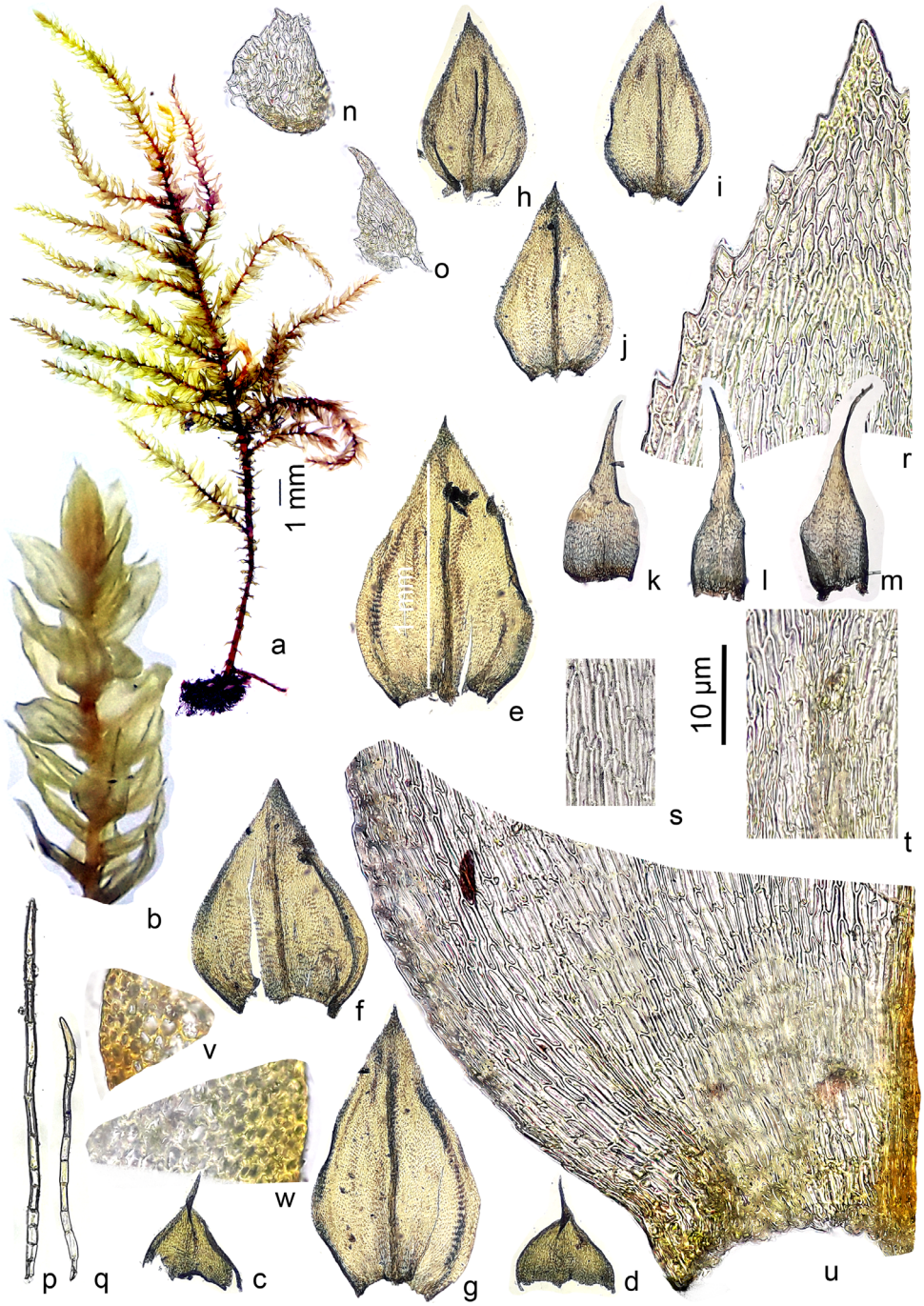

Figure 1. *Porotrichum squarrosum* (Arzeni) H.A. Crum & Steere. a. gametophytes. b. detail of a branch apex. c-d. stipe leaves. e-g. stem leaves. h-j. branch leaves. k-m. perigonial leaves. n-o. pseudopharaphylia. p-q. paraphyses. r. apical cells of the leaf. s. median cells of the leaf. t. spur costa. u. leaf base. v. branch cross section. w. stem cross section (pictures from *Peralta 1415* - SP362367).

strand present. Stipe leaves few, spaced, from a wide base narrowed at 3/4 of leaf length into an acute acumen, ca. 0.5 × 0.6 mm; margins recurved from base of leaf to base of acumen, entire; costa distinct, tapering and vanishing in lower part of acumen. Stem leaves plane when dry, not complanate, symmetric or nearly so, erect-spreading, imbricate, often somewhat concave, keeled by costa, ca. 1.0–1.2 × 0.5–0.6 mm, apex acute or obtuse and mucronate; margins plane to slightly recurved in lower half of leaf, entire near base, becoming serrulate upwards, in upper half of leaf serrate by distinct, uni- or bicellular teeth; costa strong, single, reaching to 9/10 of leaf length, spur and/or spinose above. Leaf cells smooth, prorulose, walls eporose; apical laminal cells fairly thick-walled, mostly long hexagonal, sometimes sinuose, 8–10 × 3–4 µm, median laminal cells thinner-walled, fusiform to irregularly penta- or hexagonal, 10–14 × 5–8 µm, basal laminal cells and marginal cells similar to the median; alar cells fairly distinct, thick-walled, subquadrate or subrounded to irregularly angular, shorter than basal laminal cells. Pseudoparaphyllia few, foliose, somewhat asymmetrically lanceolate, to 0.4 mm long. Dioicous. Perigonia bud-like, on stems; ca. 1.1 mm long, faintly costate, lancelate, above midleaf narrowed to a lanceolate-acuminate tip; paraphyses hyaline, uniseriate, filiform. Perichaetia not seen. Sporophyte not seen.

Examined material: BRAZIL: Amazonas State, São Gabriel da Cachoeira, Igarapé Arabu, Serra Curicuriari, 10/VII/1979, *O. Yano 1842* (SP). Goiás State, Formoso, Serra Dourada, 1/I/1985, *D.M. Vital 12789* (SP). Mato Grosso State, Chapada dos Guimarães, canyon forest, epiphytic, 600 m elev., 4/VII/1987, *Schäfer-Verwimp & Verwimp 8580* (SP, JE [det. M. Mastracci, as *Pireella squarrosa]*); idem, on shady rock, 520 m elev., 5/VII/1987, *Schäfer-Verwimp & Verwimp 8635* (SP, JE). Minas Gerais State, São Roque de Minas, Parque Nacional da Serra da Canastra, Cachoeira Casca d'Anta, Parte Baixa, afloramentos rochosos e margem de riacho, 18/VII/2013, *D.F. Peralta & D.M. Carmo 15238* (SP). Pará State, São Geraldo do Araguaia, Serra dos Martirios/Andorinhas, 18/VII/2009, *M.G.C. Souza et al. 712* (SP). São Paulo State, Cananéia, Ilha do Cardoso, Rio Pedro Luis, 1/VI/1982, D.M. Vital *10430* (SP); idem, trilha da Captação de água, restinga com transição para mata, 13/V/2009, *D.F. Peralta et al. 8047* (SP); Eldorado, Regenwald (Mata Atlântica) bei der Caverna do Diabo, auf schattigem Kalkfels, 500 m, 29/IV/1989, *Schäfer-Verwimp & Verwimp 11081* (SP, JE); Mogi das Cruzes, Parque Municipal da Serra de Itapety, 24/X/2005, *D.F. Peralta & B. Mialich 2987* (SP); Serra do Mar zwischen Mogi das Cruzes und Bertioga, Regenwald am Rio Itapanhaú, auf schattigem Felsblock, 150 m, 22/XI/1989, *Schäfer-Verwimp & Verwimp 12036* (SP, JE); Ubatuba, Parque Estadual da Ilha Anchieta (PEIA), 24/I/2001, *D.F. Peralta & F.P. Athayde Filho 1176* (SP); idem, 25/I/2001, *D.F. Peralta & F.P. Athayde Filho 1184, 1192, 1415, 1424* (SP); idem, 17/II/2004, *D.F. Peralta et al. 2079* (SP); idem, 18/II/2004, *D.F. Peralta et al. 2151, 2157, 2163* (SP); Serra do Mar, Fazenda Capricornio, an Wurzeln eines alten Baumes am Ufer des Rio Indaiá, 75 m elev., 19/III/1988, *Schäfer-Verwimp & Verwimp 9504* (SP, JE); idem, epiphytisch in Kakaoplantage, 45 m elev., 24/III/1989, *Schäfer-Verwimp & Verwimp 10963* (SP, JE).

The specimens were identified using the illustrations and descriptions of the original publication by Arzeni (1954) and Crum & Steere (1958).

There are three other records of *Porotrichum squarrosum* on the repositories of GBIF (2019) and this one includes the indication to be a synonym of *Porotrichum substriatum*, but as we indicate above we consider these taxa to be different.

The specimens examined are from the States of Amazonas, Goiás, Mato Grosso, Minas Gerais, Pará, São Paulo (figure 2) ranging from Amazon, Atlantic Forest to Cerrado phytogeographical domains at elevations from near sea level to about 600 m in Brazil.

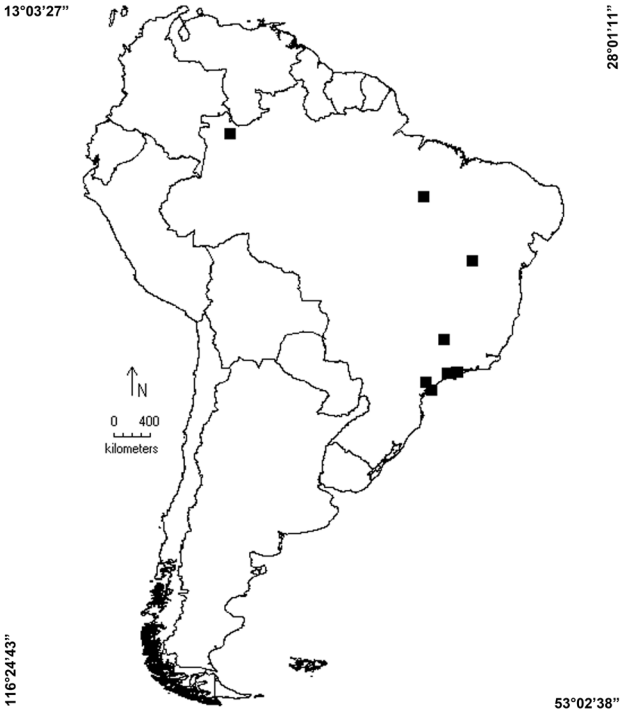

Figure 2. Map of examined specimens of *Porotrichum squarrosum* (Arzeni) H.A. Crum & Steere in Brazil (approximate coordinates in black squares).

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Conflicts of Interest

There is no conflict of interest.

Author Contributions

Denilson Fernandes Peralta: Concept and design of the study; data analysis and interpretation; manuscript preparation.

Alfons Schäfer-Verwimp: Manuscript preparation; data analysis and interpretation; critical revision.

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