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NOTES ON *PHILONOTIS* (BARTRAMIACEAE, MUSCI). 10. *PHILONOTIS FONTANA* ADDED TO, AND *P. THWAITESII* EXCLUDED FROM SOUTH AMERICAN FLORA

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Abstract. *Philonotis fontana* (Hedw.) Brid. is newly recorded from South America and Bolivia. The voucher specimens of the records of *P. thwaitesii* Mitt. (*P. revoluta* Bosch & Sande Lac.) from Bolivia and Columbia represent other taxa, and accordingly this species is excluded from the South American moss flora.

Key words: Andes, Bolivia, Colombia, distribution, neotropics, nomenclature, taxonomy

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A specimen from Bolivia distributed as *Philonotis revoluta* Bosch & Sande Lac. and published as *P. thwaitesii* Mitt. (Churchill *et al*. 2000, 2009) was identified as *P. fontana* (Hedw.) Brid. The voucher specimens of two other records of *P. thwaitesii* from South America were studied and they showed to represent other taxa.

Philonotis fontana (Hedw.) Brid. Fig. 1

Bryol. Univ. **2**: 18. 1827. – *Mnium fontanum* Hedw., Spec. Musc.: 195. 1801.

Philonotis fontana has a wide circumpolar range from the arctic to temperate areas of the northern hemisphere, and it is the most common as well frequent species of the type section of *Philonotis.* It is common in the United States and Canada (Zales 1973), known from Mexico (Griffin 1994) and recorded from Guatemala and Panama by Allen (2002), but not recorded, at least recently, from South America (Delgadillo *et al.* 1995). Some 15 years ago, in connection with studies on the New Guinean bryoflora (Koponen & Norris 1996), I had identified a Bolivian specimen, distributed as *Philonotis revoluta* Bosch & Sande Lac., as *P. fontana*, without paying further attention to it. Meanwhile the specimen in H had been filed according to the corrected identification under *P. fontana*. I restudied it in connection with the revision of North Asian *Philonotis* (Koponen *et al.*, unpublished).

PHILONOTIS FONTANA SPECIMEN STUDIED: BOLIVIA. DEPARTMENTO LA PAZ, Prov. Inquisivi Cordillera de Quimsa Cruz between Mina Veta Verde and Laguna Altarani, c. 12 km SW of Quime, 67°20′W, 17°01′S, 3570–4800 m, dripping cliff, 23.II.1987, *M. Lewis 87253* (H!, LPB, not seen, NY, not seen, MO, not seen).

On the basis of the basal leaf with cells mamillose to papillose on lower cell ends, the specimen belongs to *Philonotis* section *Philonotis*. The second character of the section *Philonotis*, the double crenulate marginal teeth at lower leaf margin are not well developed in the Bolivian specimen (Fig. 1). The leaf areolation of quadrate, rectangular and rhomboidal thin-walled cells of basal leaf and the geminate upper leaf margin fit to *P. fontana.* However, the leaf cells at acute leaf apex are not as narrow linear and the leaf base is not as broadly ovate as in typical *P. fontana*. In the Bolivian specimen the cells of leaf apex are rather strongly papillose on upper ends. This is the situation described and illustrated by Allen (2002) from

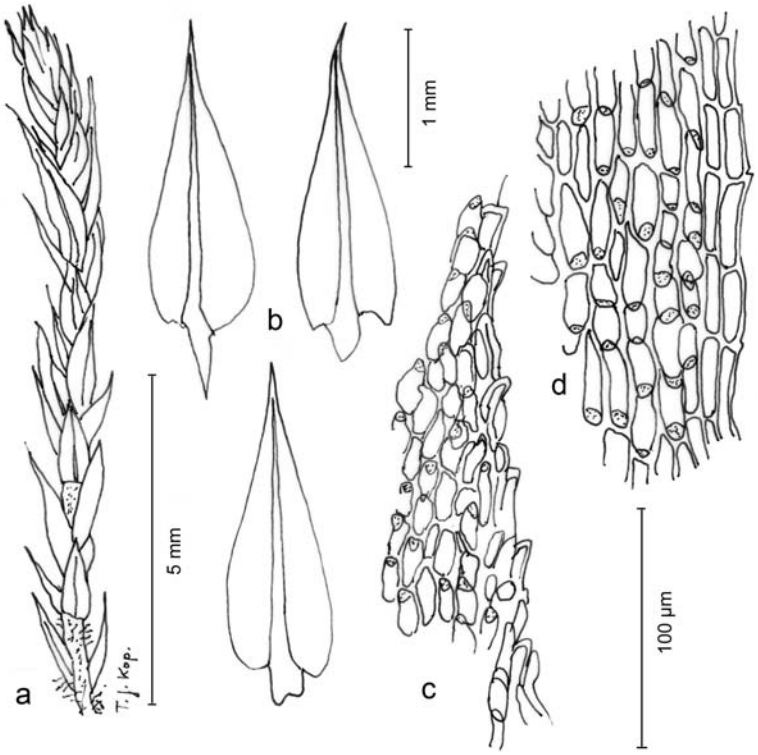

Fig. 1. *Philonotis fontana* (Hedw.) Brid. a – shoot, b – leaves, c – leaf margin and leaf cells at mid-leaf, d – leaf margin and leaf cells near leaf apex. All drawn from *M. Lewis 87253* (H). Scale bars: 5 mm for a, 1 mm for b, 100 µm for c & d.

Central American specimens of *P. fontana*. The papillosity of narrow apical cells is more variable in the specimens studied from Europe and Asia, the cells being papillose either on lower or upper cell end, or on both ends. The specimen possibly represents a male plant, in which the leaves may be narrow. However, it has no gametangia and hence the sexuality cannot be confirmed, neither the characters of perigonial leaves help with the specific identification.

The other species of *Philonotis* section *Philonotis* in South America is *P. polymorpha* (Müll. Hal.) Kindb., known from Argentina and Chile (Ochyra *et al*. 2008). The specimen from Bolivia was compared with the illustrations in Ochyra *et al*. (2008) and with one specimen of *P. polymorpha* (see below). The Bolivian and Kerguelen specimens differ for the characters of the leaf apex. The apex in *P. polymorpha* specimen is not as acuminate as in the *P. fontana* specimen and the cells of leaf apex are wider. The apical leaf cells in *P. fontana* tend to be narrow (Koponen *et al*., unpublished). However, a study of larger material of *Philonotis polymorpha* is necessary to confirm its taxonomic status at the specific level.

PHILONOTIS POLYMORPHA SPECIMEN STUDIED: KERGUELEN, 1907–08, *Rollier du Baty* (H-BR).

Philonotis thwaitesii Mitt.

Proc. J. Linn. Soc. Bot. Suppl. **1**: 60. 1859 ('*Thwaitesii*'). – LECTOTYPE (selected by Koponen & Norris 1996): [Sri Lanka]. Central Prov. Ceylon, *Thwaites C.M. 91* (NY-Mitten!; ISOLECTOTYPES in NY-Mitten!, H-SOL!).

P. revoluta Bosch & Sande Lac., Bryol. Jav. **1**: 158, *pl. 128*. 1861. – LECTOTYPE (selected by Koponen & Norris 1996): Indonesia. Java, *Junghuhn* (L!, herb. v. d. Sande Lacoste). – First synonymized by Koponen and Norris (1996).

Robinson (1967) recorded *Philonotis revoluta* for South America, based on a Colombian specimen (*King C-1099*, US), and Churchill (1989) listed a second specimen (*Cleef 7983*, U). Koponen and Norris (1996) synonymized *P. revoluta* with *P. thwaitesii* Mitt., which is one of the common species in SE Asia, ranging from the Himalayas to Japan in the east and to New Guinea in the south. *Philonotis thwaitesii* belongs to the section *Philonotula* and has narrow leaf cells with major papilla in distal cell end of leaf cells and hence easy to tell apart from *P. fontana*. The most important character separating *P. thwaitesii* from closely related taxa are its quadrate translucent basal laminal cells forming a wide area of about five cells at leaf base from leaf margin to costa. Koponen (2009, 2010a, b) presented keys for distinguishing Southeast Asiatic species of *Philonotis*.

Churchill *et al*. (2000, 2009) listed *Philonotis thwaitesii* from Bolivia. The record is based on *Lewis 87-253*, the same specimen discussed above as *P. fontana*. The verification of the specimens, on which the records by Robinson (1967) and Churchill (1989; Churchill and Linares 1995) are based, showed that they are not *P. thwaitesii*.

SPECIMENS NAMED AS *PHILONOTIS REVOLUTA* STUDIED: COLOMBIA. EASTERN CORDILLERA. Territory of Putumayo. 'El Mirador', c. 50 kms. generally east of San Francisco, 2100 m, 5.VIII.1965, *R. M. King C-10099 & A. E. Guevara* (US).

On the basis of the available keys to *Philonotis* of South America, I could not find any evident name for this specimen. It has similar leaf shape, rather strong costa and revolute leaf margin as *P. thwaitesii*, but it differs by not having the translucent area of quadrate cells across the leaf base. Other distinguishing characters are short and nearly smooth leaf cells (cells above leaf base elongate and distinctly papillose in *T. thwaitesii*) with firm walls throughout the leaf (± thin-walled in *P. thwaitesii*).

COLOMBIA. META, Páramo de Sumapaz, Cerro Nevado del Sumapaz, superpáramo del lado NW. Hondonada rodeada por rocas calichosas con almohadas de *Azorella multifida* predominantes asociadas con *Breutelia* sp., 4100 m, 16.I.1973, *Antoine M. Cleef 7983* (L).

Based on Allen's (2002) key the specimen might represent *Philonotis sphaericarpa* (Hedw.) Brid. The leaf is broadest at base, gradually tapering to long excurrent costa (leaves ovate in *T. thwaitesii* with more shortly excurrent costa). Also, the translucent area of quadrate cells at leaf base is limited to the alar corners, not extending across the leaf base.

The conclusion is that *Philonotis thwaitesii* should be removed from the moss flora of Bolivia, Colombia and South America, whereas *P. fontana* is a new addition to the flora of mosses of Bolivia and South America.

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