

## **ICMADOPHILA AVERSA AND PICCOLIA CONSPERSA, TWO LICHEN SPECIES NEW TO BOLIVIA**

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**Abstract.** The species *Icmadophila aversa* and *Piccolia conspersa* are reported as new to the lichen biota of Bolivia. The studied material was collected in Madidi National Park (NW Bolivia). The species are briefly characterized and their ecology and distribution are discussed.

**Key words:** lichenized fungi, new records, Madidi region, Andes, South America

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### INTRODUCTION

Bolivia is still one of the countries least studied biologically, but the data already available indicate a potentially high level of biodiversity (Ibisch & Mérida 2004). Knowledge of the cryptogams, including lichens, is particularly deficient (Feuerer *et al.* 1998). In the last decade, however, lichenological studies have progressed in Bolivia. The most recent works have provided many new discoveries: records new to the country, continent or Southern Hemisphere, and species new to science (e.g., Ferraro 2002; Feuerer & Sipman 2005; Flakus & Wilk 2006; Flakus & Kukwa 2007; Flakus & Lücking 2008; Flakus 2009; Krzewicka & Wilk 2009; Kukwa & Flakus 2009).

During lichenological studies in Bolivia in 2004–2007 I conducted an inventory of lichens and lichenicolous fungi in the Madidi region. The region is located in NW Bolivia in La Paz and Beni Departments and covers *ca* 30,000 square kilometers. It forms a complex of three protected areas: Madidi National Park and Madidi Natural Area of Integrated Management (Madidi NP-IMNA; 18,854 km<sup>2</sup>), Apolobamba IMNA (4765 km<sup>2</sup>) and the Pilon Lajas Biosphere Reserve and Communal Lands (4027 km<sup>2</sup>). The region is of special interest as it is the country's most biodiverse area. For further information on the study area see Wilk (2010).

While studying the material collected in the Madidi region I identified two interesting lichen species – *Icmadophila aversa* and *Piccolia conspersa*. The species are reported here as new to Bolivia. Brief descriptions and notes on their ecology and worldwide distribution are provided.

### MATERIAL AND METHODS

The study is based on material collected in 2006–2007 in Madidi National Park. The collection sites are located in the Cordillera Apolobamba (Fig. 1). Voucher specimens are deposited in the lichen herbarium of the W. Szafer Institute of Botany of the Polish Academy of Sciences (KRAM) and in the Herbario Nacional de Bolivia (LPB).

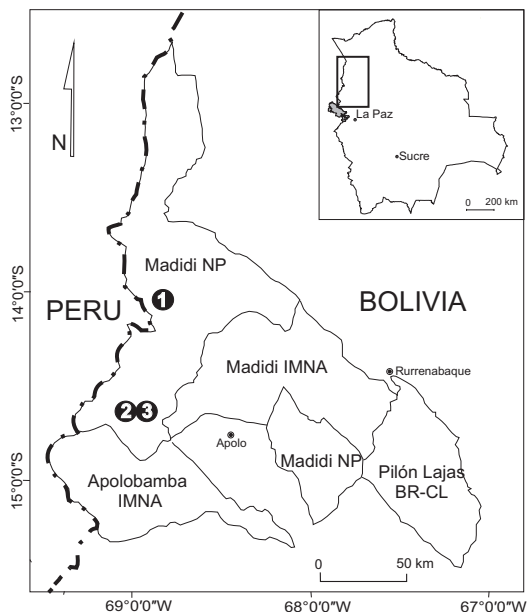
### THE SPECIES

*Icmadophila aversa* (Nyl.) Rambold & Hertel

Fig. 2

Biblioth. Lichenol. 53: 230. 1993.

Thallus dimorphic, gray, consisting of podetia and crustose basal thallus. Apothecia conspicuous: pinkish, spoon-shaped, and located terminally on podetia. Podetia, together with apothecia, 1.5–2.0 cm high. Spores predominantly 0–4(–5) septate and occasionally nonseptate, ellipsoid-fusiform, 24–41 × 3.5–5.0 μm.



**Fig. 1.** Location of collection sites in the Madidi region. 1 – San Martín, NW of Azariamas; 2 – area of Tolca Cocha lake, NE of Keara; 3 – Fuertecillo, between Tokoake and Mojos. NP – National Park; IMNA – Natural Area of Integrated Management; BR-CL – Biosphere Reserve and Communal Lands (after Killeen *et al.* 2005, modified).

*Icmadophila aversa* occurs in open and humid places in high mountain areas in the tropics (Rambold *et al.* 1993). In the Bolivian locality it grows in timberline forest of *Polylepis pepeii* at 4056 m a.s.l., where the habitat is extremely humid. The forest at the site is disturbed due to intense human activity. The species occupies bryophytes on boulder.

Besides *I. aversa* there are only three species included in the genus: *I. ericetorum* (L.) Zahlbr., *I. japonica* (Zahlbr.) Rambold & Hertel and *I. splachnirima* (Hook. f. & Taylor) D. J. Galloway (Rambold *et al.* 1993; Galloway 2000). Among them, *I. japonica* is most similar to *I. aversa*. The first taxon is distinguished, by having allantoids, smaller spores ( $19\text{--}22 \times 2\text{--}3 \mu\text{m}$ ) and chemistry – it contains fumarprotocetraric acid in addition to perlatolic and thamnolic acids. Furthermore, *I. japonica* has a different geographical range and ecology. The species occurs in forested areas of Far East Asia (Trass 1978; Rambold *et al.* 1993).

**GENERAL DISTRIBUTION.** The species has a neotropical distribution range. It is known from Central and South America: Costa Rica (Umaña-Tenorio *et al.* 2002), Colombia (Sipman 1989), Ecuador (Nöske & Sipman 2004) and Venezuela (Figueiras & Keogh 1977). This is the first record of the species and the genus from Bolivia.

**SPECIMEN EXAMINED.** SOUTH AMERICA. BOLIVIA. La Paz Dept., Franz Tamayo Province, Madidi National Park, Cordillera Apolobamba, NE of Keara village, timberline forest of *Polylepis pepeii* by Tolca Cocha lake, alt. 4056 m,  $14^{\circ}41'14''\text{S}$ ,  $69^{\circ}05'18''\text{W}$ , on bryophytes on rock, 14 Oct. 2007, K. Wilk 7685.

*Piccolia conspersa* (Fée) Hafellner Fig. 3

Biblioth. Lichenol. 58: 109. 1995.

Thallus minutely granulose, yellowish orange. Apothecia also orange, covered by a distinct concolorous pruina, 0.3–0.8 mm in diam. Asci multispored, producing hyaline, globose spores, ca  $2 \mu\text{m}$ . Pycnidia stipitate, brownish. Thallus and apothecia react  $\text{K}^+$  purple due to the presence of anthraquinones.

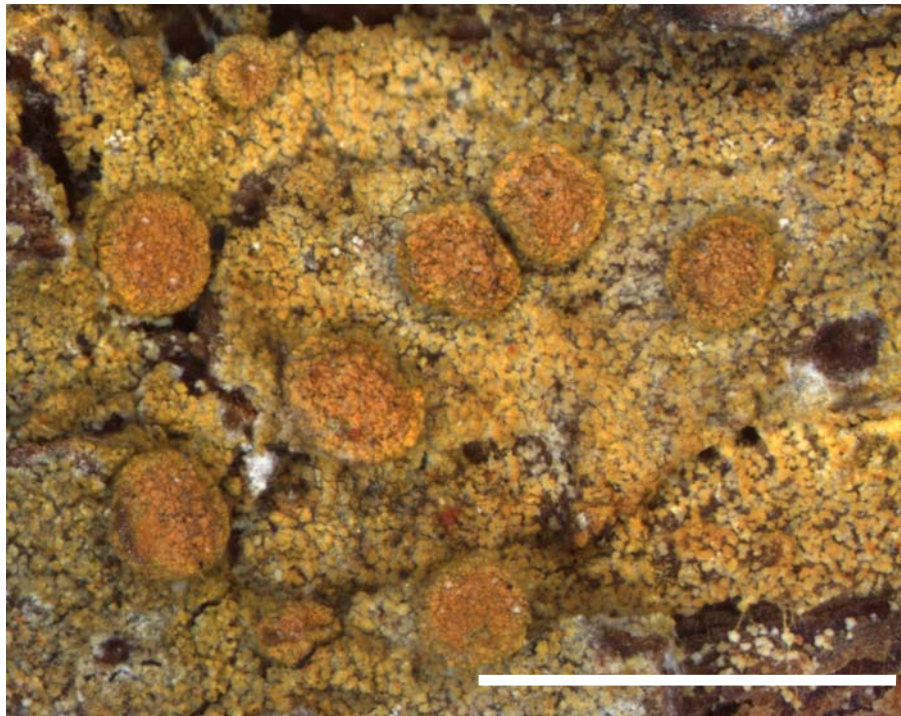
*Piccolia conspersa* occurs in tropical forests, both wet and dry, usually in lowland or lower mountain belts (Hafellner 1995). In the Bolivian locality it grows on bark of trees in closed montane forest at 1246 m a.s.l. in shady and moderately humid habitat.

*Piccolia conspersa* is likely to be confused with *P. nannaria* (Tuck.) Lendemer & Beeching, but the latter differs by having a yellow-green thallus and much smaller apothecia (Knudsen & Lendemer 2007). Morphologically *P. conspersa* resembles orange-colored *Caloplaca* species which, however, have entirely different anatomical features of apothecia.

**GENERAL DISTRIBUTION.** The species has a worldwide tropical or subtropical distribution range. It is known from Central and South America: Mexico, Jamaica, Costa Rica, Cuba, Colombia, Venezuela, Guyana, Ecuador, Peru, Brazil (Hafellner 1995) and Paraguay (Magnusson 1935), Africa: Kenya, Tanzania, Togo and Mascarene Islands (Hafellner 1995), Asia: Taiwan (Aptroot & Sparrius 2003), China, India, Nepal (Hafellner



**Fig. 2.** Habit of *Icmadophila aversa* (Nyl.) Rambold & Hertel (*K. Wilk* 7685, KRAM). Scale bar = 2 cm.



**Fig. 3.** Habit of *Piccolia conspersa* (Fée) Hafellner (*K. Wilk* 4884, KRAM). Scale bar = 2 mm.

1995), Thailand (Aptroot *et al.* 2007) and Papua New Guinea (Aptroot 1997), Australia (Hafellner 1995) and North America: U.S.A. – Alabama state (Knudsen & Lendemer 2007). This is a first record of the species and the genus from Bolivia.

SPECIMENS EXAMINED. SOUTH AMERICA. BOLIVIA. La Paz Dept., Franz Tamayo Province, Madidi National Park, Cordillera Apolobamba: San Martin, NW of Azariamas village, alt. 1246 m, 14°08'52"S, 68°44'29"W, humid montane forest, 29 May 2006, *K. Wilk 4884, 5290, 5297*; Fuertecillo, between Tokoake and Mojos, alt. 1700 m, 14°35'26"S, 68°55'16"W, humid montane forest, 29 Oct. 2007, *K. Wilk 9334*.

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