



Arachnitis uniflora: first report of Corsiaceae for the Peruvian Flora

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Summary. Corsiaceae is recorded for the first time in the Peruvian flora, based on recent collections of *Arachnitis uniflora* from the cloud forests of the southern Peruvian Andes. Our record extends considerably the distribution of this taxon in around a 500 km straight line to the northwest. The species is now known from Patagonia to southern Peru, in very diverse habitats. The discovery of this family in the Machu Picchu Sanctuary boosts the already well-known importance of this protected area regarding its highly rich plant diversity.

Key Words. Cloud forest, Machu Picchu, mycoheterotrophic plant, Peru.

Introduction

Peru is one of the 17 megadiverse countries in the world; it holds nearly 10% of the world plant diversity with around 19,542 seed plant species included in 241 plant families (Huamantupa *et al.* 2014; Vasquez & Rojas 2016; Ulloa Ulloa *et al.* 2017). Flora additions at the family taxonomic level are extremely rare. Although the number of species for the Peruvian flora is continuously increasing due to the description of new species and new reports, most changes in the number of the reported families for Peru during the last three decades were due to nomenclatural changes (Brako & Zarucchi 1993; Ulloa Ulloa *et al.* 2004; León *et al.* 2006; Rodríguez *et al.* 2006; Vasquez & Rojas 2016). One of the still unreported vascular plant families for Peru was the monocot Corsiaceae. Corsiaceae is a small family, which shows a disjunct distribution, occurring in South America, Australasia and China (Neinhuis & Ibsch 1998; Jones & Gray 2008; Mennes *et al.* 2015). The family currently consists of only 3 genera: *Corsia* Becc. (28 species; Jones & Gray 2008), *Corsiopsis* D.X.Zhang, R.M.K.Saunders & C.M.Hu (Zhang *et al.* 1999), and the American genus *Arachnitis* Phil. (1 species; Ibsch *et al.* 1996; Neinhuis & Ibsch 1998; Merckx *et al.* 2013).

Arachnitis is restricted to South America with *Arachnitis uniflora* Phil. as the only currently accepted representative of the genus (Ibsch *et al.* 1996; Merckx *et al.* 2013). The species is widely distributed in the southern areas of South America, such as the temperate forests of Patagonia (Andes and Tierra del Fuego), sandy areas of the Falkland Islands, and semi-humid

and cloud forests of the Bolivian Andes (Cribb *et al.* 1995; Ibsch *et al.* 1996; Merckx *et al.* 2013). Individuals of *A. uniflora* present a great morphological variability, especially in colour and dimensions of vegetative and floral structures (Minoletti 1986; Ibsch *et al.* 1996; Neinhuis & Ibsch 1998), which explains why a second species, *A. quetrihuensis* Dimitri, was earlier proposed (Dimitri 1972; Pisano 1996).

During a field exploration in the Machu Picchu Historical Sanctuary (Department of Cusco), in search of orchid specimens, a specimen of a remarkable orchid-like plant was collected. A previous year expedition by the senior author (JGO) also recorded this species, but it remained unidentified until 2016. Surprisingly, the collected specimen was identified as *Arachnitis uniflora*, which, to the best of our knowledge, was unknown for the Peruvian flora. Here, we record and illustrate the species as a new family addition for Peru, which highlights the importance of Machu Picchu as a conservation area and the rich plant diversity of the country.

Material and Methods

Field explorations within the Machu Picchu Historical Sanctuary (Cusco, southern Peru) were conducted in April 2010 and April 2011 as part as an orchid flora survey. The collected specimens were preserved in spirit and deposited at the Herbarium of Universidad Nacional Mayor de San Marcos (USM; herbarium acronym follows Thiers 2017). A Leica® Wild M8 stereomicroscope, a Canon® A-1 camera with a Canon

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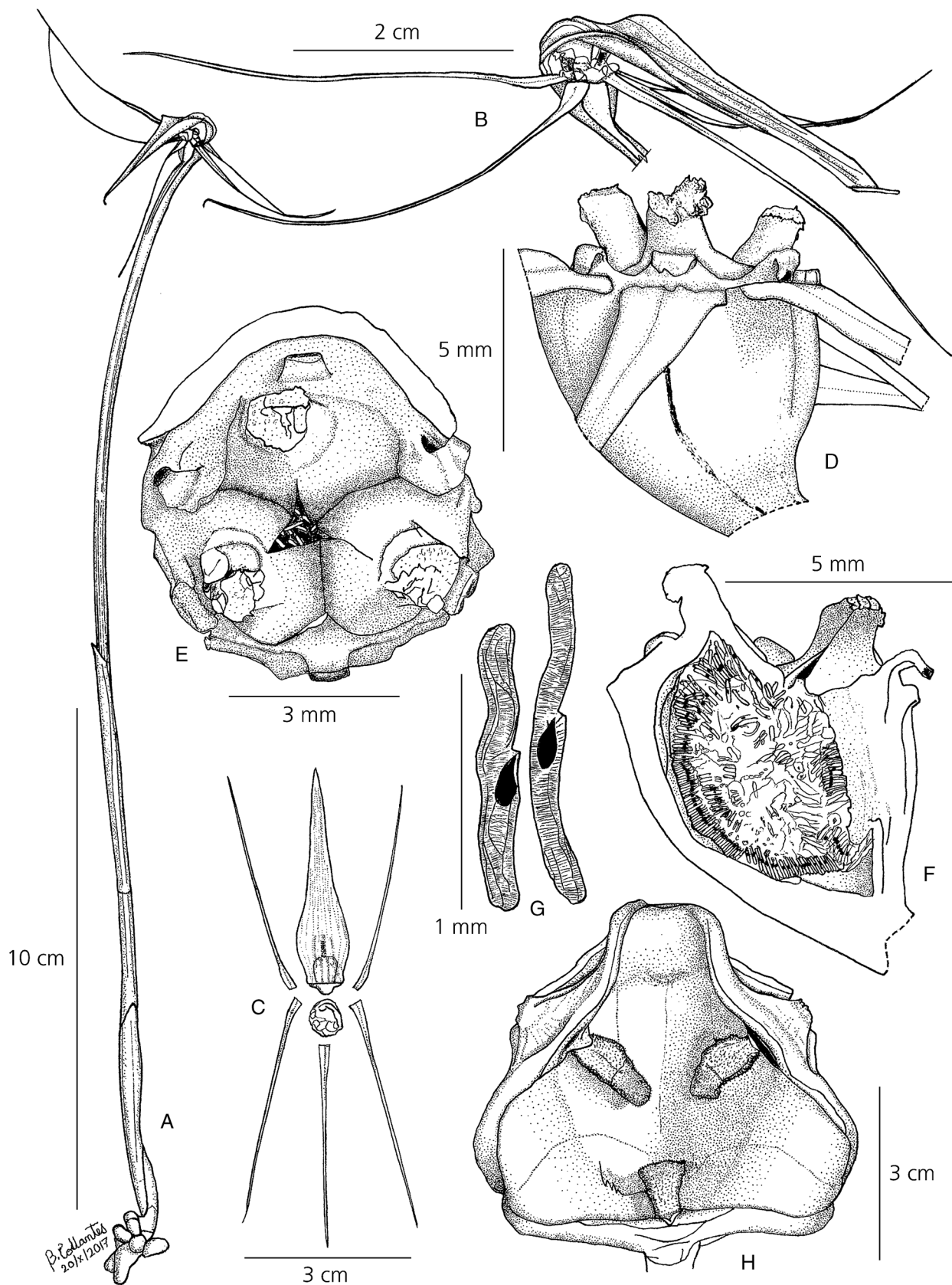


Fig. 1. *Arachnitis uniflora*. A habit, with details of the roots and a fruit in early stages; B flower in fruiting stage; C dissected flower; D ovary and stigmas, lateral view; E ovary and stigmas, top view; F ovary, transverse section with details of the seeds; G seeds; H dehiscent fruit, with details of the three placentas. DRAWING BY BENJAMÍN COLLANTES.



Fig. 2. *Arachnitis uniflora*. **A** habit, in habitat; **B** complete plant; **C** flower in fruiting-stage, with the perianth still present; **D** ovary and stigmas, close-up with details of pollen still present on the stigma. PHOTOS: BENJAMIN COLLANTES.

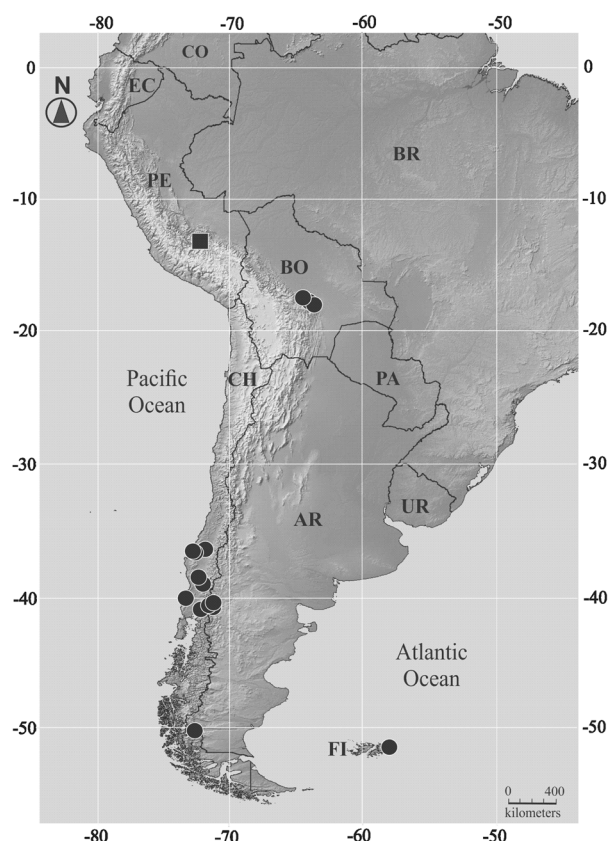
FD 50 mm F3.5 lens, and a Rotring® rapidograph 0.1 mm were used to prepare the line drawing on a Canson® paper of 120 g. Data on the distribution of the species in Peru is presented in a map. The distribution map was composed using DIVA-GIS software. The conservation assessment complies with the criteria of the IUCN (2017). GeoCAT (Bachman *et al.* 2011) was used to calculate the extent of

occurrence (EOO) and the area of occupancy (AOO) metrics based on our collection and specimens reviewed by Ibisch *et al.* (1996).

Taxonomic Treatment

Corsiaceae Becc. (Beccari 1878: 238).

Arachnitis Phil. (Philippi 1864: 217).



Map 1. Distribution of *Arachnitis uniflora* based on specimens reviewed by Ibsch *et al.* (1996; circles) and our collection from Peru (square). Abbreviations as follow: AR Argentina, BO Bolivia, BR Brazil, CH Chile, CO Colombia, EC Ecuador, FI Falkland Islands, PA Paraguay, PE Peru, UR Uruguay.

Arachnitis uniflora Phil. (Philippi 1864: 217). Lectotype: Chile, Prov. Valdivia, Farm San Juan, Nov. 1864, *F. Philippi* s.n. (B).

Synonym: *Arachnitis quetrihuensis* Dimitri (1972: 40).

MORPHOLOGICAL DESCRIPTION. Descriptions of *Arachnitis uniflora* from the already recorded distribution can be found elsewhere (e.g. Minoletti 1986; Ibsch *et al.* 1996; Merckx *et al.* 2013). The following description is based on the Peruvian material (Figs 1 and 2):

Mycoheterotrophic herb, 14 – 28.5 cm tall. *Roots* tuberous, clustered, subspherical to ovoid, brownish cream, 9 – 12 roots, 3.4 – 6 × 3.4 – 4 mm. *Stem* aphyllous, 2 – 3 mm diam., covered by 3 – 8 imbricated bracts at the base and 3 – 4 amplexicaul bracts along the stem, light to dark purple and pink towards the apex. *Inflorescence* apical, one-flowered. *Flower* bisexual, 55 – 75 × 21 – 35 mm. *Tepals* 6, dark to light purple. *Dorsal tepal* decurvedate, ovate, triangular, acute, 9 – 13-veined, dark purple, 30 – 40 × 6 – 9.5 mm. *Lateral and lower tepals* basally oblong, narrowly

triangular, 1 – 7-veined, largely caudate, pinkish to purple, 26 – 40 mm long. *Stamens* not seen. *Ovary* 1-locular, 3 parietal placentas, 3 styles, 3 stigmas. *Fruit* subglobose, apical dehiscence by 3 horizontally splitting valves. *Seeds* numerous, botuliform, subsigmoid, reticulate surface, minute, 0.75 – 1.55 × 0.1 – 0.2 mm. Figs 1, 2.

DISTRIBUTION. *Arachnitis uniflora* is known only from South America, between 13°15' and 50°25'S and from almost sea level up to an altitude of 3000 m. Thus, the species has been recorded in four different countries (i.e. Argentina, Bolivia, Chile and Peru) and the Falkland Islands (Map 1; Ibsch *et al.* 1996; Neinhuis & Ibsch 1998; Merckx *et al.* 2013; Renny *et al.* 2017). In Peru, it is only known from Machu Picchu (Map 1), where two populations are known, the presently recorded and another on the other margin of the Vilcanota river close to the Wiñay Wayna locality. Our collection extends the known distribution of the species by nearly 500 km to the northwest of its northernmost record in Bolivia.

SPECIMENS EXAMINED. PERU. Cusco: Prov. Urubamba, Distr. Machu Picchu, Santuario Histórico de Machu Picchu, Pampacahua, Quebrada Torontoy, Complejo Arqueológico Torontoy, El Palomar, 2910 – 3070 m, 12 April 2011, *B. Collantes & J. Ochoa* 178b (USM!).

HABITAT. *Arachnitis uniflora* is known from diverse habitats and vegetation types such as sandy areas, the subantarctic *Nothofagus* humid forests and montane and cloud Andean forests (Ibsch *et al.* 1996; Merckx *et al.* 2013). The Peruvian specimens were recorded in a cloud forest dominated by *Polylepis pauta* Hieron. (Rosaceae), *Myrsine latifolia* (Ruiz & Pav.) Spreng. (Myrsinaceae), *Piper elongatum* Vahl (Piperaceae), and *Myrcianthes oreophila* (Diels) McVaugh (Myrtaceae).

CONSERVATION STATUS. *Arachnitis uniflora* does not seem to be in any threatened category. It has an EOO much larger than 20,000 km². Since only eighteen records were used to calculate the EOO, the AOO results (it is 72 km²; cell size of 2 km) are highly biased. The species is known from diverse localities, especially those in Patagonia (see Minoletti 1986; Ibsch *et al.* 1996; Renny *et al.* 2017). Furthermore, since the plant is only observable during the flowering and fruiting season, it is very likely that the species might present a much larger distribution area. Ibsch *et al.* (1996) also suggested that the species cannot be considered as endangered.

REPRODUCTIVE BIOLOGY. There is no information on reproductive biology on the species. Nevertheless, Vogel (1978) suggested pollination by fungus gnats based on its floral morphology. Ibsch *et al.* (1996) suggested that the same insects may act as seed dispersers or act in combination with the wind.

ECOLOGICAL NOTES. *Arachnitis uniflora* is a non-photosynthetic plant and, therefore, it exploits fungi for carbon acquisition (Domínguez *et al.* 2009). To do so, the plant roots associate with arbuscular mycorrhizal fungi of the Glomeraceae family (Bidartondo *et al.* 2002; Domínguez *et al.* 2009), although other fungal families can be found (Renny *et al.* 2017). Plants are only observable during reproductive seasons.

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