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Short Communication

Usnea chaetophora, a lichen new to the Macaronesian Region

Knowledge of species distribution is an integrative tool between systematics and ecology and therefore indispensable for the evaluation of biodiversity. The distribution data for species is also essential for estimating their extinction risk and classification into threat categories (Litterski & Otte 2002).

The genus *Usnea* Adans. is a cosmopolitan and very species-rich lichen genus. It currently comprises *c*. 300–600 species according to different authors (Kirk *et al*. 2001; Wirtz *et al*. 2006). According to Clerc (1998, 2004) between 700–800 taxon names have been published in this genus, but probably *c*. 50% of them will have to be reduce to synonymy in the future. On the African continent there are *c*. 140 species (Feuerer 2009), of which 40 are present in the Canary Islands (Hafellner 1995, 1999, 2002, 2005; Hernández Padrón 2004), although this number may eventually be reduced to 20 (Clerc 2006).

In recent years, several treatments of *Usnea*, either taxonomic or phylogenetic have tried to reduce confusion in this genus (Clerc 1998, 2004, 2006, 2007; Herrera-Campos *et al*. 1998; Halonen *et al*. 1998; Halonen 2000; Fos & Clerc 2000; Articus *et al*. 2002; Wirtz *et al*. 2006; Torra & Randlane 2007). Even so, the genus is still insufficiently known (Articus *et al*. 2002) in many regions even in Europe (Torra & Randlane 2007) and tropical and subtropical areas.

During recent studies of the lichen flora of the Canary Islands by the first author, and in connection with the revision of the genus *Usnea* in the Iberian Peninsula being carried out by the last two authors, some *Usnea* specimens have been found in some localities in "La Caldera de Taburiente" National Park, La Palma, Canary Islands. Among different species, we have found some interesting specimens determined as *Usnea chaetophora* Stirt. To our knowledge, these specimens represent the first record from Africa and Macaronesia and are the most southern reports known. In addition, a new chemotype of this species has been identified.

Morphology of the lichen specimens was examined using a Leica ZOOM 2000. Chemical constituents were identified by thin-layer chromatography using solvent systems A, B and C (Culberson 1972; Culberson *et al*. 1981; Culberson & Johnson 1982; Elix & Ernst-Russell 1993). Authentic samples of *Usnea chaetophora* (identified by P. Clerc and deposited in the personal herbarium of J. Etayo) were checked.

Usnea chaetophora Stirt.,
Scott. Naturalist nov. ser. **1:** 76 (1883).

(Fig. 1)

Thallus pendulous, more than 15 cm in length, distinguished by the numerous and smooth branches and large number of segments with annular cracks, base distinctly blackened. Papillae and fibrils sparse and irregularly distributed. Soralia mainly punctiform and without isidiomorphs, slightly tuberculate. Cortex moderately thick and medulla dense and white.

Two chemotypes have previously been recognized: chemotype I, with usnic and salazinic acids (K+ yellow to red and Pd+ yellow to orange), and chemotype II, with usnic acid only (K− and Pd−) (Halonen *et al*. 1998; Torra & Randlane 2007). We found only chemotype I among the specimens collected but discovered a new chemotype (III) with usnic and salazinic acids and barbatic acid as accessory substance.

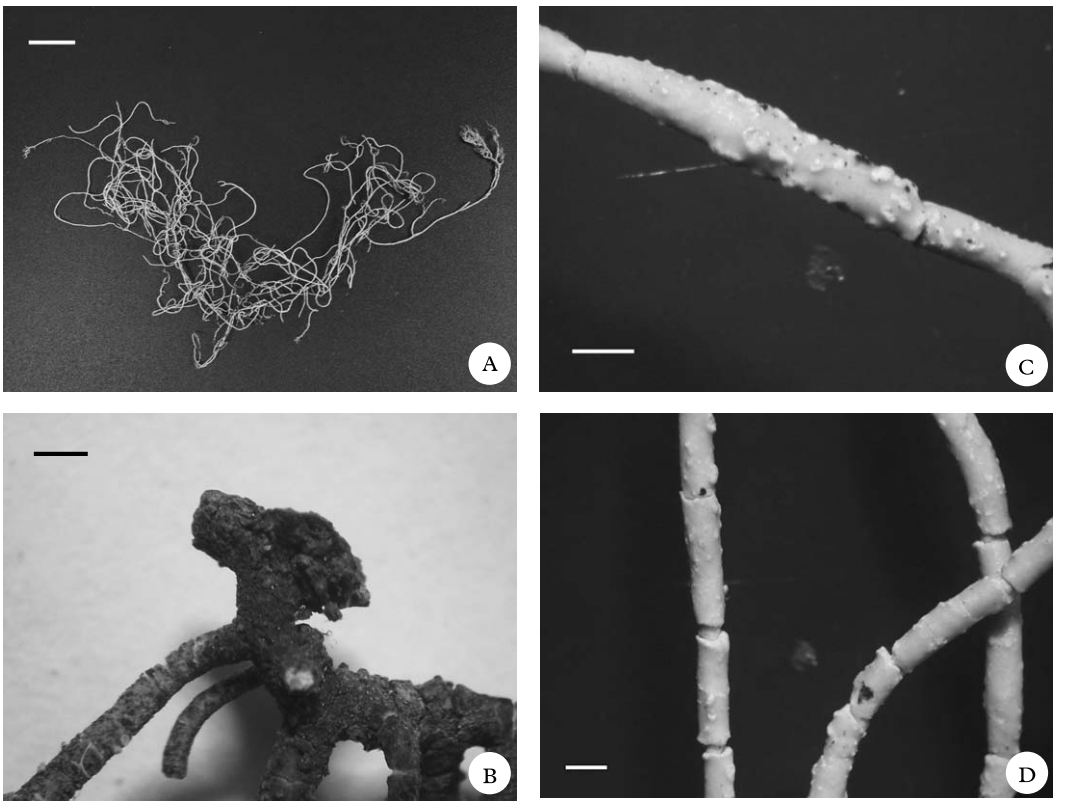

FIG. 1. *Usnea chaetophora* TFC Lich: 7024. A, habit; B, base; C, soralia; D, segments with annular cracks. Scales: A = 2 cm; B = 1mm; C & D = 0·5 mm.

FIG. 2. World distribution of *Usnea chaetophora* (● records extracted from the bibliography; ▲ new records). One dot may represent several localities.

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TABLE 1. *Main differences between* Usnea chaetophora *and related species.*

Character	*U. chaetophora*	*U. filipendula*	*U. articulata*	*U. barbata*	*U. schadenbergiana*	*U. trichodea*
Branches	Abundant, slender, divided into segments; abundant annular cracks.	Abundant; distinctly segmented.	Flacid, terete, conspicuous inflated 'sausage-like' segments.	Main branches thick, annular cracks sparse to abundant, ± constricted.	Terete and cylindrical.	Slender and cylindric; annular cracks, ± abundant.
Basal part	Slightly to distinctly blackened; annular cracks conspicuous.	Distinctly blackened; annular cracks conspicuous.	Occasionally blackened.	Pale or slightly blackened.	Concolorous, not blackened; conspicuously annulated.	Pale, conspicuously annulated.
Papillae	Absent or very few.	Abundant and cylindrical.	Sometimes present on swollen segments.	Absent or present on the thickest branches.	Absent.	Absent.
Fibrils	Scarce or absent; irregularly distributed.	Abundant, specially near the base 'fishbone pattern'.	Scarce or absent.	Sparse to abundant.	Sparse to relatively abundant, long and curved.	Sparse to scattered.
Soralia	Sparse, minute, occasionally somewhat enlarged.	Punctiform, rarely enlarging.	Absent.	Sparse to abundant, often minute.	Minute, few or abundant.	Absent.
Isidia	Usually absent; when present, short.	Abundant and usually tall.	Abundant to absent; when present, generally on pseudocyphellae.	Usually absent; when present, short.	Sparse to scattered, short.	Absent
Cortex	Moderately thick, glossy.	Moderately thick, matt to slightly shiny.	Thin.	Very thin.	Moderately thin, matt.	Thin, matt.
Medulla	Dense.	Usually dense.	Thin and loose.	Thick and loose.	Thin and compact.	Thin and compact.
Axis	Thick, white.	Thick, white.	Thin, white to pinkish.	Often thin, white.	Thick, white.	Thick, brown.
Chemistry	I. Salazinic acid. II. Without medullary substances. III (new). Salazinic acid and barbatic acid.	I. Salazinic acid and ± protocetraric acid. II. Without medullary substances.	I.. Fumarprotocetraric acid as main substance. II. Salazinic acid as main substance. III. Psoromic acid as main substance. IV. Stictic acid complex. V. Without medullary substances.	I. Salazinic acid as main substance. II. Without medullary substances.	I. Protocetraric acid. II. Stictic acid complex.	I. Constictic acid, ± salazinic, ± difractaric. II. Constictic acid and/or difractaric acid. III. Without medullary substances.
Distribution	Europe, W North America.	North America, Europe, Asia, Canary Islands.	Europe, E & N Africa, Canary Islands.	W North America, Eurasia, Canary Islands.	Europe, Africa, America, Asia, Canary Islands.	North America, Asia, Oceania, Canary Islands.

According to Halonen *et al.* (1998) and Halonen (2000), this is a coastal species, or with distinct coastal tendencies. In fact, all their collections from British Columbia are at, or close to, sea level. However, in Europe it seems that it can grow inland (Torra & Randlane 2007). Our collection was at 1600 m alt., although we bear in mind the size of La Palma island is only 708 km^2.

Worldwide, this species is sparsely distributed in the Northern Hemisphere (Fig. 2). In addition to the new records from the Canary Islands, *Usnea chaetophora* is known from a few localities in Europe where it seems to be rare (James *et al.* 1992; Halonen *et al.* 1998; Torra & Randlane, 2007), including Turkey (Aslan *et al.* 2002). Nevertheless, the reports from Nordland are very doubtful (Bjerke *et al.* 2006). In North America it seems to be restricted to the Pacific Coast of Canada and the NW of USA, but the extent of the North American distribution is poorly known (Halonen *et al.* 1998).

U. chaetophora is close to *U. filipendula* Stirt. s. lat. This species also has salazinic acid as the main secondary compound but is distinguished by the abundance of branches, fibrils and papillae. Furthermore, it has abundant and tall isidia on soralia (Halonen *et al.* 1998; Azami *et al.* 2004).

Usnea chaetophora may also resemble other pendulous species for example *U. articulata* (L.) Hoffm., *U. barbata* (L.) Weber & F. H. Wigg., *U. schadenbergiana* Göpp. & Stein, or *U. trichodea* Ach., all of them present in the Canary Islands. *Usnea articulata* has conspicuous annulations that are very swollen (James *et al.* 1992). In many cases, the density of the medulla is a good character to distinguish *U. barbata* and *U. chaetophora* (Torra & Randlane 2007). *Usnea schadenbergiana* and *U. trichodea* do not contain salazinic acid, and the first has a different morphology and the latter has a brown central axis (Halonen *et al.* 1998) (Table 1).

The status of *U. chaetophora* is not clear and some authors have pointed out the need for a critical revision, not only of this species (James *et al.* 1992) but of the whole pendulous species group (Halonen 2000).

Selected specimens examined. **Spain:** *Canary Islands*: La Palma, "El Bejenado", Caldera de Taburiente National Park, UTM: 219450/317695, 1600 m alt., on *Pinus canariensis*, 2000, *C. Hernández & P.L. Pérez de Paz* TFC Lich: 2775 (chemotype III), 7024 (chemotype I).

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