

Two new species of *Xanthoparmelia* (Ascomycota: *Parmeliaceae*) from Spain

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Abstract: *Xanthoparmelia isidiiovagens* and *X. subverrucigera* from Spain are described as new to science. Both species are characterized by an isidiate upper surface and the presence of the stictic acid chemosyndrome in the medulla, but *X. isidiiovagens* has a vagrant thallus with markedly revolute lobes with a black lower surface, whereas *X. subverrucigera* has adnate thalli with subirregular lobes and a brown lower surface.

Key words: lichenized Ascomycota, *Parmeliaceae*, Spain, *Xanthoparmelia*

Introduction

The genus *Xanthoparmelia* (Vain.) Hale represents the largest genus of foliose lichens with more than 800 species worldwide (Giordani *et al.* 2002; Elix 2003; Blanco *et al.* 2004), at least 600 of which have a yellow-green upper surface and contain cortical usnic or isousnic acids.

However, the genus is poorly represented in Europe with just 20 yellow-green species recorded (Giordani *et al.* 2002; Blanco *et al.* 2004). Although *Xanthoparmelia* shows extraordinary chemical variation (with more than 40 chemosyndromes represented), to date only five chemosyndromes have been identified among the European species (*viz.* constipatic acid, fumarprotocetraric acid, norstictic acid, salazinic acid and stictic acid). In the present work we describe two new species from central Spain which contain the stictic acid chemosyndrome.

Material and Methods

The morphology of the lichen specimens was examined using a Zeiss Stemi 2000C stereo microscope, and conidia and ascospores were studied using a Zeiss Axiolab compound microscope. Chemical constituents were identified by thin layer chromatography (Culberson 1972; Culberson *et al.* 1981; Culberson & Johnson 1982; Elix & Ernst-Russell 1993), high performance liquid chromatography (Elix *et al.* 2003) and comparison with authentic samples.

The Species

Xanthoparmelia isidiiovagens O. Blanco, A. Crespo, Divakar & Elix sp. nov.

Thallus ut in *Xanthoparmelia vagans* sed superficie isidiata differt.

Typus: Spain, Guadalajara, Torremocha del Pinar, 40°55'N, 2°05'W, 1200 m, vagrant over decarbonated soils in open *Juniperus tunifera* and *J. hemisphaerica* forest, 22 May 2003 O. Blanco, P. K. Divakar & A. Crespo 120603/7 (MAF 9956—holotypus).

(Fig. 1A)

Thallus foliose, vagrant, free-growing on soil, 2–4 cm wide. *Lobes* separate, linear-elongate, subdichotomously to subirregularly branched, 1–3 mm wide, eciliate; apices subrotund. *Upper surface* yellow-green, darkening with age, convex, markedly convolute, white-maculate, shiny at apices but rugulose and cracked in the thallus

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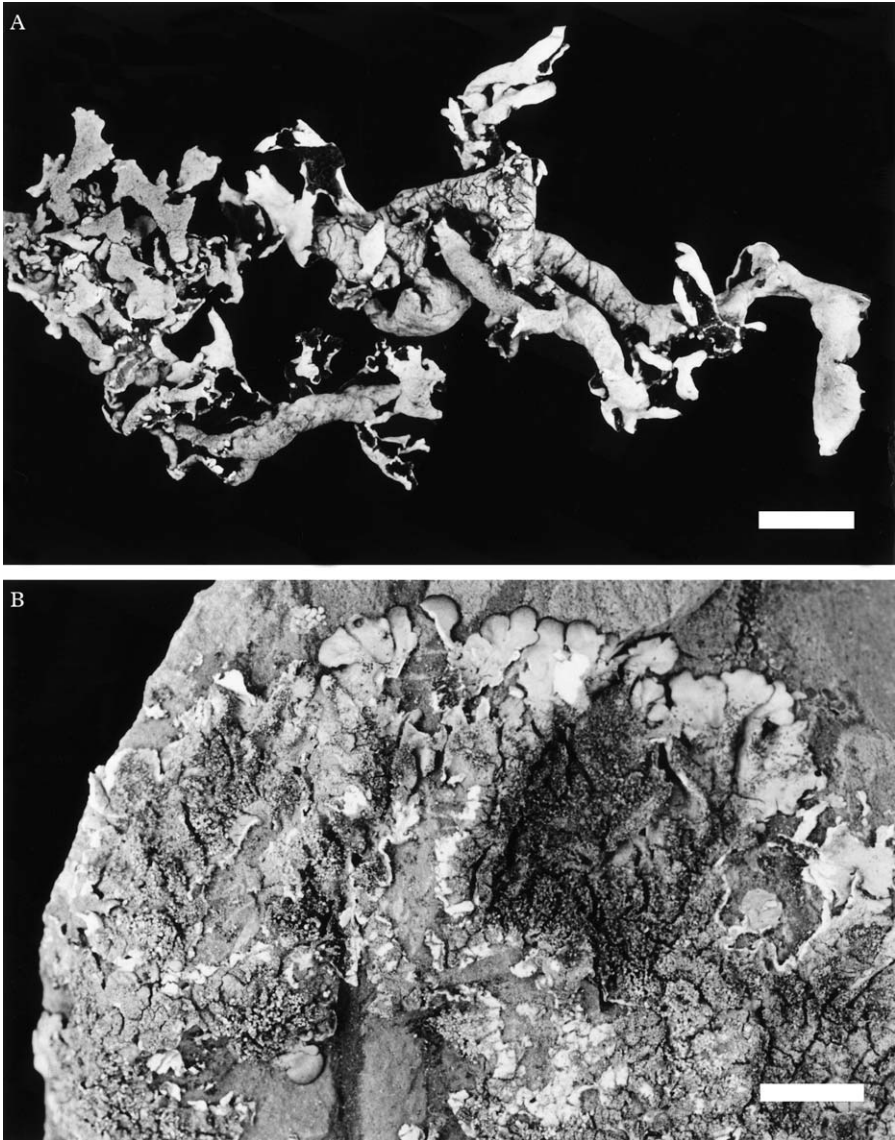


FIG. 1. New species of *Xanthoparmelia*. A, *X. isidiovagans* (holotype in MAF); B, *X. subverrucigera* (holotype in MAF). Scales: A & B=5 mm.

centre, soredia absent, isidiate. *Isidia* scattered, globose, apices syncorticate, \pm blackened. *Medulla* white. *Lower surface* black, rugulose; rhizines moderately dense, \pm tufted, simple or sparsely furcate, to 1 mm long.

Apothecia and *pycnidia* not seen.

Chemistry. Cortex K $-$, C $-$, KC+ pale yellow, P $-$; UV $-$, medulla K+ yellow to orange, C $-$, KC+ red, P+ orange; containing usnic acid (minor), stictic acid (major), norstictic acid (minor), constictic acid (minor), cryptostictic acid (minor), peristictic acid (trace).

Etymology. The specific epithet derives from the similarity of this species to *Xanthoparmelia vagans* except for the presence of laminal isidia.

Notes. This new species is characterized by the vagrant habit, the markedly convolute, linear-elongate lobes, the globose isidia on the upper surface and the presence of the stictic acid chemosyndrome in the medulla. Superficially *X. isidiiovagens* closely resembles the American species *X. vagans* (Nyl.) Hale as both are vagrant lichens with broad, convolute lobes and contain the stictic acid complex. However, *X. vagans* can be readily distinguished by the brown to dark brown lower surface (black in *X. isidiiovagens*), and by the absence of isidia. The Brazilian species *X. catarinae* Hale also produces the stictic acid complex, has a black lower surface and subglobose to cylindrical isidia and subconvolute laciniae. However, the primary lobes of *X. catarinae* are tightly adnate on rocks and only the imbricate laciniae become weakly convoluted at the tips. At present *X. isidiiovagens* is the only vagrant species of *Xanthoparmelia* known to produce markedly convolute, linear-elongate lobes with an isidiate upper surface. Molecular studies (utilizing nuclear ITS, LSU rDNA and mitochondrial SSU rDNA sequences) have been conducted on this species (Blanco *et al.* 2004, as *X. aff. vagans*) which forms a strongly supported clade with *X. conspersa* (Ach.) Hale and *X. vicentii* A. Crespo, M.C. Molina & Elix. Although both *X. isidiiovagens* and *X. conspersa* have an isidiate upper surface, a black lower surface and identical medullary chemistry, the thallus of *X. isidiiovagens* is distinguished by being vagrant on soils and in having linear-elongate, markedly convolute lobes. By contrast, the thallus of *X. conspersa* is adnate on rocks, and has subirregular, more or less flat lobes. Furthermore, the isidia are globose in *X. isidiiovagens* but soon become cylindrical in *X. conspersa*. At present this new species is known only from the type locality in the continental highlands (parameras) of central Spain.

***Xanthoparmelia subverrucigera* O. Blanco, A. Crespo & Elix sp. nov.**

Thallus ut in *Xanthoparmelia verrucigera* sed pagina inferiore coffeata differt.

Typus: Spain, Zaragoza, Embid de la Ribera, 41°22'N 01°36'W, 510 m, on siliceous rocks, 23 May 2003 O. Blanco, A. Crespo & H. T. Lumbsch 120603/8 (MAF 10209—holotypus).

(Fig. 1B)

Thallus saxicolous, foliose, adnate to tightly adnate, 3–5 cm wide. *Lobes* contiguous to sparingly imbricate, subirregular, irregularly branched, 1–3 mm wide, eciliate; apices subrotund. *Upper surface* yellow-green, flat, emaculate, shiny at apices but dull within, rugulose, black-margined at apices, soredia absent, isidiate. *Isidia* moderately dense, globose at first but then cylindrical or rarely becoming coralloid-branched; apices syncorticate, blackened. *Medulla* white. *Lower surface* mid-brown to dark brown, blackening at tips; rhizines sparse to medium, simple, concolorous with the lower surface.

Apothecia and *pycnidia* not seen.

Chemistry. Cortex K–, C–, KC+ pale yellow, P–; UV–, medulla K+ yellow to orange, C–, KC+ red, P+ orange; containing usnic acid (minor), stictic acid (major), constictic acid (submajor), verrucigeric acid (minor), lusitanic acid (minor), cryptostictic acid (minor), connorstictic acid (trace), methyl stictic acid (trace).

Etymology. The specific epithet refers to the similarity of this new species to *X. verrucigera* (Nyl.) Hale.

Notes. *Xanthoparmelia subverrucigera* closely resembles *X. verrucigera*, as they have similar adnate thalli with contiguous, subirregular lobes, a moderately to densely isidiate upper surface and identical medullary chemistry. However, the lower surface of *X. subverrucigera* is mid-brown to dark brown whereas that of *X. verrucigera* is jet-black. In addition, the isidia become coralloid-branched in *X. subverrucigera*

whereas they are usually simple, or rarely sparsely branched and verrucose, in *X. verrucigera*. This new species could also be confused with *X. plittii* (Gyeln.) Hale, a morphologically similar species with cylindrical isidia, a brown lower surface and the stictic acid complex in the medulla. Chromatography provides the most reliable method for distinguishing these taxa: *X. plittii* contains stictic, constictic and norstictic acids whereas *X. subverrucigera* contains stictic, constictic, lusitanic and verrucigeric acids but lacks norstictic acid (Elix & Wardlaw, 2000). Molecular studies (utilizing nuclear ITS, LSU rDNA and mitochondrial SSU rDNA sequences) have been conducted on this species (Blanco *et al.* 2004, as *X. aff. verrucigera*) which forms a strongly supported clade with *X. verrucigera* and *X. transvaalensis* Hale, T. Nash & Elix. One specimen of this new species has been reported as *X. plittii* in Crespo *et al.* (2004), but at present, authentic material of *X. plittii* is not known from the Iberian peninsula. In fact *X. plittii* is very rare in Europe, having been recorded only from Sardinia and Norway (Giordani *et al.* 2002), although it is widespread and common in North, Central and South America and in South Africa. At present this new species is known from the type locality in Spain and from Zimbabwe. Interestingly, *X. subverrucigera*, *X. verrucigera* and *X. transvaalensis* all exhibit a disjunct southern European—southern African distribution.

Additional specimens examined. **Spain:** type locality, 4 vi 2004 O. Blanco, A. Crespo & H. T. Lumbsch (MAF 9807). — **Zimbabwe:** Rhodes Matopos National Park, 20° 28' 52" S, 28° 30' 39" E, 1470 m, on granite rock, 1994, U. Becker 232024 (KOELN).

We thank Stuart Hay and Neal McCracken of the Photographic Unit at ANU for preparing the photographs, Dr Patrick McCarthy for helpful amendments to the draft manuscript and the project CGL 2004-1848/BOS for support.

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Accepted for publication 8 December 2004