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Xanthoparmelia pseudohungarica in Spain

The genus *Xanthoparmelia* (Vain.) Hale (including *Neofuscelia* Essl.) currently includes more than 800 species (Blanco *et al.* 2004, 2005), 21 of which have been recorded in the Iberian Peninsula (Llimona & Hladun 2001). During recent studies of the lichen flora of Castilla y León by the first author, a rare, loosely adnate or vagrant, terricolous *Xanthoparmelia* has been found at two localities in Burgos province. Although a collection (VAL-Lich 20080) from one of the localities (Fresnillo de las Dueñas) was previously reported as the American species *X. vagans* (Nyl.) Hale (Pérez-Ortega *et al.* 2002), this collection has now been redetermined as *X. pseudohungarica* (Gyeln.) Hale.

Thus *X. pseudohungarica* is now known from two localities in central Spain, both of which belong to the supramediterranean belt (del Río 2005). In the first locality, Fresnillo de las Dueñas, *X. pseudohungarica* occurs together with *X. pokornyi* (Körb.) O. Blanco *et al.*, forming bispecific colonies covering up to several square metres in area. These colonies are restricted to small hilltop areas where the calcareous soils dominated by *Junipero thuriferae-Querco rotundifoliae* sigmetum vegetation, are replaced by an accumulation of acid rocks in exposed, clear cuttings. Here, *X. pseudohungarica* grows either attached to small pebbles (Fig. 1) or directly on the soil. At the second locality, Páramo de Masa, which is characterized by *Spiraeo obovatae–Quercetum rotundifoliae* sigmetum vegetation, *X. pseudohungarica* occurs directly on bare soil, together with *Aspicilia hispida* Mereschk., *Toninia sedifolia* (Scop.) Timdal and *Placidium squamulosum* (Ach.) Breuss. Here, thalli of *X. pseudohungarica* were more loosely attached to the soil and had a more obvious vagrant habit



FIG. 1. *Xanthoparmelia pseudohungarica*, habit of a thallus from Fresnillo de las Dueñas (Burgos, Spain). Scale = 1 cm.

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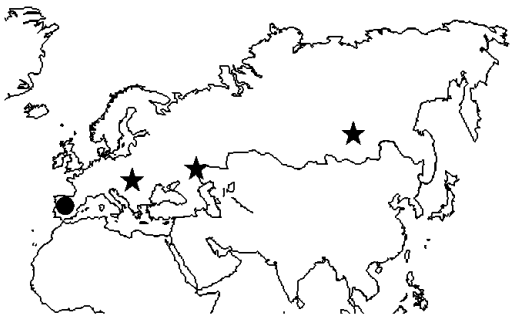


FIG. 2. World distribution of *Xanthoparmelia pseudohungarica*. Records extracted from the bibliography (★), new records (●).

and convoluted lobes. It is possible that this behaviour is a response to the more continental climate experienced at this more northerly locality. The presence of *X. pseudohungarica* at both localities suggests that it is a good indicator species for conservation of such terricolous ecosystems. The presence of vagrant and terricolous *Xanthoparmelia* species has previously been reported to be a good indicator of rangeland health (Elridge & Tozer 1996).

Worldwide *X. pseudohungarica* is a rather scattered species (Fig. 2). In addition to the new records from Spain, *X. pseudohungarica* is known from sterile soils of central and eastern Europe (Hungary, Czech Republic, ex-Yugoslavia) where it appears to be widespread (Hale 1990; Vězda & Liška 1999), western Russia and more particularly the Volgograd region (Kulakov 1999) and Archangai Aimak in Mongolia (Huneck *et al.* 1992, reported as *X.* cf. *pseudohungarica*). According to these data, *X. pseudohungarica* would appear to be part of the Irano-Turanian element.

Specimens studied. **Spain**: *Castilla y León*: Burgos, Fresnillo de las Dueñas, 887 m, in open *Quercus rotundifolia* forest, 30 iii 2002, *S. Pérez-Ortega* (F, hb Pérez-Ortega); Burgos, Páramo de Masa, 950 m, 8 iv 2001, *S. Pérez-Ortega & M. A Pérez* (F, hb Pérez-Ortega); the TLC of both specimens showed usnic acid (minor), salazinic acid (major), and consalazinic acid (minor).

Six terricolous species of *Xanthoparmelia* have now been recorded for the Iberian Peninsula (Atienza & Segarra 1999*a*; Blanco *et al.* 2004; Blanco *et al.* 2005; Burgaz & Ventureira 1990; Hale 1990; Llimona & Hladun 2001; Martínez *et al.* 2003). Three of these species, namely *X. pseudohungarica, X. subdiffluens* Hale and *X. camtschadalis* (Ach.) Hale, are closely related. All have typically terricolous, vagrant or loosely adnate thalli that lack vegetative propagules, identical medullary chemistry, weakly or strongly convolute lobes with a brown lower surface and a weakly to markedly white-maculate upper surface. Table 1 summarizes the differences between these three species. Both *X. subdiffluens* and *X. camtschadalis* have also been recorded from continental areas of Spain, the former from the *parameras* of Soria province (Blanco *et al.* 2004; Hale 1990) whereas the latter appears to be restricted to the more continental, eastern parts of Spain (Atienza & Segarra 1999*a*, *b*).

Xanthoparmelia isidiovagans O. Blanco, A. Crespo & Elix is a further vagrant species recently described from the *parameras* of Guadalajara province (Blanco *et al.* 2005). However, it can be readily distinguished from *X. pseudohungarica* by the presence of globose isidia on the upper surface (*X. pseudohungarica* lacks isidia), a black lower surface (brown in *X. pseudohungarica*) and the presence of the stictic acid chemosyndrome in the medulla.

Xanthoparmelia vagans (Nyl.) Hale has also been reported from the Iberian Peninsula (Crespo & Barreno 1978; Burgaz & Ventureira 1990; Martínez *et al.* 2003; Pérez-Ortega *et al.* 2002). Indeed, Crespo & Barreno (1978) published the alliance *Sphaerothallio-Xanthoparmelion vagantis* for vagrant lichen communities from the *parameras* of the central Iberian Peninsula. These communities have their optimum distribution in the high, continental moorland (1200–1400 m altitude) covered by juniper forests of the alliance *Juniperion thuriferae* Rivas Martinez (Crespo & Barreno 1978). *Xanthoparmelia vagans* is reported to be one of the characteristic species in this alliance. More recently, Burgaz & Ventureira (1990) published a new phytosociological association, *Parmelietum ryssolae*, from the *parameras* of central Spain (Segovia province),

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TABLE 1. *Principal differences between* Xanthoparmelia camtschadalis, X. subdiffluens *and* X. pseudohungarica

Character	*X. camtschadalis*	*X. subdiffluens*	*X. pseudohungarica*
Thallus	Free growing (vagrant)	Loosely adnate to free growing	Loosely adnate to free growing; subpulvinate
Lobes	1–3 mm broad; well developed yellowish rim, elaciniate, strongly convoluted	2·5–7 mm broad; yellow rim present, elaciniate, weakly to strongly convoluted	1–3 mm broad; yellow rim absent, short laciniae with revolute tips present; weakly convoluted
Upper surface	Markedly to effigurately white-maculate	Faintly white-maculate	Faintly white-maculate
Lower surface	Sparse to moderately rhizinate; rhizines simple to furcate	Moderately rhizinate; rhizines simple	Moderate to densely rhizinate; rhizines furcate

with *X. vagans* as a characteristic member of this community. Martínez *et al.* (2003) included *X. vagans* as a vulnerable species in their study of threatened lichens in central Spain, owing to the possible impact of tourism and recreational activities in this region. Despite the numerous records of *X. vagans* from Spain and in other countries of Europe and Asia, *X. vagans* s. str. is restricted to the American continent and most European specimens identified as this species belong to *X. camtschadalis* (Hale 1990). In his comprehensive treatise on *Xanthoparmelia*, Hale (1990: 81) outlined the most likely causes of this confusion. The most obvious difference between *X. vagans* and *X. camtschadalis* is in their medullary chemistries, with *X. vagans* containing stictic, constictic and norstictic acids rather than salazinic and consalazinic acids present in *X. camtschadalis*.

Key to the known terricolous species of *Xanthoparmelia* in the Iberian Peninsula

1 Thallus surface green, greenish or yellowish green **3**
Thallus surface brown **2**

2(1) Thallus not or slightly dorsiventral, upper and lower surface N+ blue . . . . . **X. ryssolea**
Thallus distinctly dorsiventral, upper surface N+ blue, lower surface N− . . . . . **X. pokornyi**

3(1) Isidia present; stictic acid present . . . . . **X. isidiovagans**
Isidia absent; salazinic acid present **4**

4(3) Lobes broad, 2·5–7 mm, rhizines simple . . . . . **X. subdiffluens**
Lobes narrower, rhizines simple to furcate **5**

5(4) Colonies subpulvinate, lobes laciniate, weakly convoluted, upper surface with faint white maculae, lower surface moderately to densely rhizinate . . . . . **X. pseudohungarica**
Thallus not subpulvinate, often free growing, lobes strongly convoluted, upper surface usually markedly white-maculate, lower surface sparse to moderately rhizinate . . . . . **X. camtschadalis**

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