

## The *Placynthium nigrum* group in the Iberian Peninsula

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**Abstract** – The *Placynthium nigrum* group in the Iberian Peninsula consists of *P. dolichoterum* (Nyl.) Trevis., *P. garovaglii* (A. Massal.) Malme, *P. nigrum* (Huds.) Gray, *P. tantaleum* (Hepp) Hue and *P. tremniacum* (A. Massal.) Jatta. Ecological and distributional data, and a discussion of diagnostic characters of taxonomic value are provided. All taxa are clearly differentiated by their ascospores. *P. tantaleum* and *P. tremniacum* are new to Portugal. From many species there are new records for several provinces.

lichens / *Placynthium* / Iberian Peninsula / ecology / phytogeography

**Resumen** – El grupo de *Placynthium nigrum* está constituido en la Península Ibérica por: *P. dolichoterum* (Nyl.) Trevis., *P. garovaglii* (A. Massal.) Malme, *P. nigrum* (Huds.) Gray, *P. tantaleum* (Hepp) Hue y *P. tremniacum* (A. Massal.) Jatta. Se aportan datos sobre la ecología y distribución de los taxones, se relacionan los caracteres diagnósticos y su valor taxonómico, siendo la morfología de las ascósporas un carácter válido para diferenciarlos. *P. tantaleum* y *P. tremniacum* son nuevas para Portugal. Varias citas constituyen novedades provinciales.

líquenes / *Placynthium* / Península Ibérica / ecología / fitogeografía

### INTRODUCTION

The *Placynthium nigrum* group shares with other species of the genus the presence of a homoiomerous thallus, green olivaceous to bluish-black in colour, usually crustose or slightly squamulose when old. The apothecia are sessile, reddish, dark brownish to black, with a bluish epithecium. The ascospores are 1- to pluri-septate. The photobiont is a cyanobacterium of the genus *Dichotrix*. Usually they grow on calcareous rocks, being rare on acidic substrata, in northern exposures or humid areas, close to the ground or in sites prone to temporal flooding (Purvis & James 1992).

In the Iberian Peninsula this group is represented by *P. dolichoterum* (Nyl.) Trevis., *P. garovaglii* (A. Massal.) Malme, *P. nigrum* (Huds.) Gray, *P. tantaleum* (Hepp) Hue and *P. tremniacum* (A. Massal.) Jatta (Hladun & Llimona 2001).

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They are characterized by a fairly conspicuous bluish-black prothallus and by the absence of radiating lobes, although the prothallus may disappear with age. Rarely, other species of *Placynthium* with radiating lobes may develop a small prothallus, but the presence of these lobes excludes such taxa from this group.

The classification of these species as separate taxa is not unanimously accepted (Santesson 1993; Nimis 1993; Wirth 1995) due to the similar morphological and ascospore characters. Nevertheless, Clauzade & Roux (1985), Hafellner (1995) and Hafellner & Türk (2001) consider all of them to be valid species.

The genus was the subject of a monograph by Gyelnik (1940), mainly based on European material. Henssen (1963, 1984) studied the North and South American species, respectively, but the genus is still not well known. It comprises 25 species with a cosmopolitan distribution, although it is more frequent in temperate habitats (Nimis 1993).

*Placynthium* is poorly known in the Iberian Peninsula although it has been reported from different areas and is included in several floristic lists. The aim of this study is to evaluate the validity of the ascospore data, to gain a thorough knowledge of the distribution and ecology in the Iberian Peninsula of the taxa belonging to the *P. nigrum* group. The research is part of the Iberian Lichenological Flora Project.

## MATERIAL AND METHODS

The distribution maps are based on material collected by the authors, approximately 100 specimens deposited in MACB, and on data from some revised herbarium samples (BCC, GZU, LEB, LISU, MA, MACB, MUB, PO, SANT, VAB). Distributional maps were produced with the Surfer (Golden Inc. Co.) program using UTM grid projections.

Twenty mature released ascospores from different apothecia were examined whenever possible. Measurements were made with a Computer Image Analysis system.

## RESULTS

### *Placynthium dolichoterum* (Nyl.) Trevis. (Fig. 1)

Sched. ad Lichen. Ven.: 98, 1869. *Pannaria dolichotera* Nyl., Lichenes Scand.: 127, 1861.

*Placynthium pluriseptatum* (Arnold.) Arnold, Verhandl. zool.-bot. Gesellsch. Wien 39: 235, 1889.

Thallus up to 1.5 cm in diameter, pruinose and dull. Central part of the thallus with granulose squamules. Isidia frequent, granular, cylindrical to coralloid. Prothallus disappearing rapidly. Apothecia up to 1 mm in diameter. Ascospores fusiform, 22.5-30.0 × 3.8-5.0 mm, with 3-5 septa.

This species is very rare in the Iberian Peninsula, only found in the Pyrenees (Navarro-Rosinés & Hladun 1990), on soil and siliceous rocks in the sub-alpine belt. It has an arctic-alpine distribution (Wirth 1995).

Specimen examined: **SPAIN. Gerona:** Ripollés, Valle de Núria, Forat de l'Embut, **31TDG29**, 2300 m, *Navarro Rosinés*, 17-VII-86, BCC 4270.

***Placynthium garovaglii*** (A. Massal.) Malme (Fig. 1)

Lichenes Suecici Exsiccati n° 743, fasc. 30, 1918. *Racoblenna garovaglii* A. Massal., Mem. Lichenogr.: 134, 1853.

*Placynthium caesium* Vainio, Arkiv. Botan. 8,4: 98, 1909.

Thallus up to 1.5 cm in diameter, with not clearly lobate margins, heavily pruinose. Central part of the thallus with granulose not coralloid areoles, up to 1-2 mm in diameter. Prothallus small, up to 0.5 mm wide, finally disappearing. Apothecia up to 0.5 mm in diameter. Ascospores fusiform,  $33.0 \times 6.0$  mm, with 3-7 septa.

Very rare in the Iberian Peninsula, on humid calcareous slopes of the supramediterranean belt. It was reported from the montane belt of Navarra (Etayo *et al.* 1990; Etayo 1991) and Vizcaya (Renobales 1996) on humid and very steep calcareous rocks. It is distributed from central Europe to the submediterranean areas (Wirth 1995).

Specimen examined: **SPAIN. Zaragoza:** Calmarza, **30TWL95**, 700 m, *Burgaz*, 18-V-1998, MACB 79699. Other specimens examined: **GERMANY.** Schwaben, Auf nordseitigen Steilflächen, 930 m, *Poelt & Schröppel*, 29-12-1970, GZU 48-89. **AUSTRIA.** Steiermark, Niedere Tauern, 2200 m, *Hafellner et al.*, 18-VIII-1993, GZU 43-98. **HUNGARY.** prope Thermas Herculis, *Lojka*, GZU 147-84.

***Placynthium nigrum*** (Huds.) Gray (Fig. 2)

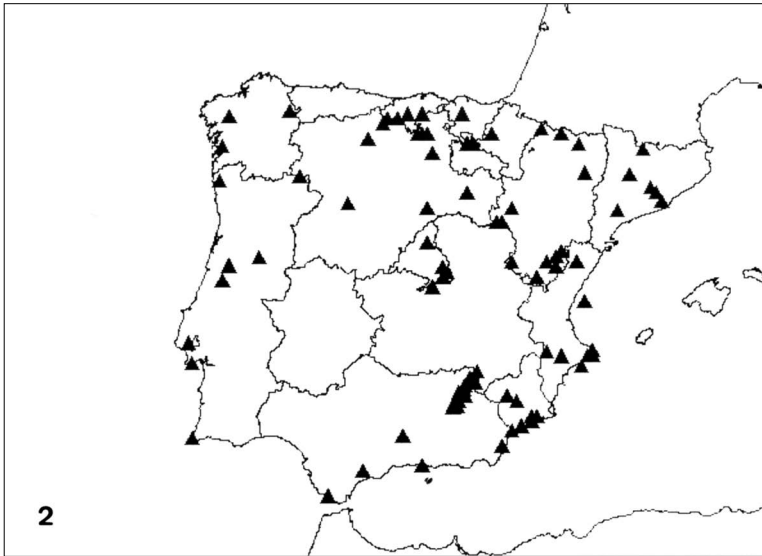
Nat. Arrang. Brit. Plants 1: 395, 1821. *Lichen niger* Huds., Fl. Angl., 2 ed., 2: 524, 1778.

*Placynthium corallinoides* (Hoffm.) Jatta, Sylloge Lich. Ital.: 38, 1900.

Thallus up to 4 cm in diameter, granulose-areolate with simple to coralloid isidia, occasionally pruinose. Prothallus bluish-black, usually persistent and prominent. Apothecia up to 0.7 mm in diameter. Paraphyses apically bifurcate with the apical cells swollen. Ascospores narrow ellipsoid,  $10.0-20.0 \times 4-7.5$  mm, with 1, 2 or 3 septa.

This is the most frequent species in the Iberian Peninsula, on different basic substrates, calcareous rocks, brick, conglomerate and concrete walls, exceptionally on the bases of trees. It is found from sea level to 2250 m. Previously cited in many floristic lists of Spain and Portugal (Hladun & Llimona 2001), and widely distributed in the Holarctic Kingdom, reaching South America (Nimis 1993).

Selected specimens examined: **PORTUGAL. Algarve:** Vila do Bispo, playa de Castilejo, **29SNB00**, *Egea*, 11-VII-1989, MUB 21128. **Beira Alta:** S<sup>a</sup> da Estrela, Sra. do Desterro, **29TPE17**, 790 m, VIII-1946, *Tavares* 1303, LISU. **Beira Litoral:** Rabaçal, S<sup>a</sup> de Sicó, **29TNE42**, 500 m, *Burgaz*, 28-I-1997, MACB 72849. Coimbra, Sta. Clara, **29TNE55**, *Sampaio* 1268, 5-I-1916, COI. **Estremadura:** S<sup>a</sup> de Arrabida, **29SMC95**, *Burgaz*, 8-VIII-1999, MACB 72851. Lisboa, Arieiro, **29SMC89**, *Sampaio* 1763, PORTO. **Minho:** Ponte do Lima, **29TNG22**, *Sampaio* 457, 19-VIII-1915, PORTO. **Tras os Montes:** Bragança, **29TPG84**, *Sampaio* 528, 10-IX-1915, PORTO. **SPAIN. Álava:** Pto. de Herrera, **30TWN21**, 1100 m, *Burgaz &*



Figs. 1-2. Distributions of *Placynthium dolichoterum* (\*), *P. garovaglii* (▲) and *P. nigrum* in the Iberian Peninsula.

*Rodríguez de Lope*, 27-XI-1999, MACB 72839. Leza, **30TWN31**, 27-IX-1999, *Burgaz & Rodríguez de Lope*, MACB 79702. **Albacete**: Almansa, Alviadeta, **30SXH89**, *Moreno*, 29-I-1988, MUB 8778. Riopar, S<sup>a</sup> de Calar del Mundo, **30SWH45**, 100 m, *Aragón & Martínez*, 4-I-96, MACB 72840. **Alicante**: Alcoy, Fuente Roja, **30SYH18**, *Egea*, 29-III-1988, MUB 8117. Denia, S<sup>a</sup> del Mongó, **31SBD49**, 300 m, *Alonso et al.*, 1-V-1986, MUB 21122. **Almería**: Los Lobos, S<sup>a</sup> Almagrera, **30SXG13**, *Egea*, 115 m, 6-IV-1972, MUB380. Turre, S<sup>a</sup> Cabrera, Loma del Colorado, **30SWG90**, 600 m, *Alonso & Egea*, 19-VI-1988, MUB 21127, 22134.

**Barcelona:** El Bages, Castellfollit del Boix, S<sup>a</sup> de Rubio, **31TCG91**, 500 m, *Burgaz*, 20-V-1998, MACB 72842. La Cova, **31TDF18**, 200 m, *Llimona*, 26-XI-1972, BCC 8187. Igualada, Guixeres de Coll, **31TCG89**, 350 m, *Llimona*, 6-II-1972, BCC 7317. Monistrol de Montserrat, Parque Natural de la Montaña de Montserrat, **31TDG00**, 550 m, *Burgaz*, 21-V-1998, MACB 72841. **Burgos:** Atapuerca, **30TVM59**, 900 m, *Burgaz & Rodríguez de Lope*, 27-IX-1999, MACB 72844. Sargentos de Lora, **30TVN23**, 1000 m, *Burgaz*, 23-VII-99, MACB 79700. **Cádiz:** Barbate de Franco, S<sup>a</sup> de Retín, **30STF40**, 310 m, *Alonso & Egea*, 8-IV-1990, MUB 21141. **Cantabria:** Bárcena Mayor, **30TVN07**, 200 m, *Burgaz & Rodríguez de Lope*, 29-IX-1999, MACB 72858. Vega de Pas, La Engaña, **30TVN37**, 800 m, *Burgaz*, 25-VII-1999, MACB 79304. **Castellón:** Ares del Maestre, barranc dels Horts, Microrreserva del Mas Vell, **30TYK47**, 1100 m, *Fos et al.*, 5-X-1999, VAB 10457. **Cordoba:** Iznajar, **30SUG92**, *Burgaz*, 2-IV-1996, MACB 79305. **La Coruña:** Monte Pedroso, **29TNH35**, 460 m, *Sánchez Biezma*, 20-II-1990, SANT 7627. **Granada:** Puerto de Ventorro de Zagra, 900 m, **30SUG92**, *Burgaz*, 1-IV-96, MACB 72845. Almuñecar, La Herradura, **30SVF36**, 315 m, *Alonso et al.*, 25-III-1989, MUB 21137. **Guadalajara:** Algar de Mesa, **30TWL85**, 750 m, *Burgaz*, 18-V-1998, MACB 72846. **Guipúzcoa:** Zegama, **30TWN31**, 400 m, *Burgaz & Rodríguez de Lope*, 28-IX-1999, MACB 72847. **Huesca:** Barbastro, El Pueyo, **31TBG98**, 400 m, *Llimona*, 15-VII-93, BCC 7881. Biescas, Piedrafita de Jaca, **30TYN13**, 1600 m, *Burgaz et al.*, MACB 72848. **Jaén:** Orcera, S<sup>a</sup> de Segura, cerro de los Villares, **30SWH3042**, 1200 m, *Aragón & Rico*, 17-III-1996, Aragón 0670/96, MAF. Pozo Alcón, S<sup>a</sup> de Cazorla, S<sup>a</sup> del Pozo, cerro Cabañas, **30SWG0485**, 1950 m, *Aragón & Martínez*, 14-V-1995, Aragón 787/95, MAF. Villacarrillo, S<sup>a</sup> de las Villas, **30SWH0814**, 1450 m, *Aragón & Martínez*, 8-IV-1998, Aragón 1061/98 (MAF). **León:** Espigüete, **30TUN55**, 1600 m, *Terrón*, 11-IX-1990, LEB. Filiel, **30TUN55**, 1200 m, *Terrón*, 27-V-1998, LEB 2391. **Lérida:** La Noguera, Ponts, **31TCG54**, 620 m, *Burgaz*, 19-V-1998, MACB 72852. **Lugo:** Fonsagrada, Vilarín de Abrixo, **29TPH57**, *Valcarcel*, 10-II-1987, SANT 7737. **Madrid:** Belmonte de Tajo, **30TVK74**, 770 m, *Burgaz*, 27-IX-1999, MACB 72853. Redueña, **30TVL41**, 800 m, *Burgaz*, 11-V-1998, MACB 72854. **Málaga:** Igualeja, S<sup>a</sup> Bermeja, **30SUF15**, 630 m, *Aragón & Martínez*, 17-III-1995, MACB 72855. **Murcia:** Aguilas, Cabo Cope, **30SXG34**, 245 m, *Alonso et al.*, 28-II-1988, MUB 21138. Bullas, S<sup>a</sup> de Ponce, Pico de la Selva, **30SXH00**, 800 m, *Egea*, 20-VI-82, MUB 8971. **Navarra:** Zudaire, **30TWN73**, 920 m, *Burgaz & Rodríguez de Lope*, 28-IX-1999, MACB 79308. Isaba, Larra, Macizo de Anielarra, **30TXN74**, *Etayo*, BCC. **Palencia:** Pico Curavacas, **30TUN66**, 2250 m, *Terrón*, 7-VII-1991, LEB 1281. Piedrasluengas, **30TUN86**, 1000 m, *Burgaz & Rodríguez de Lope*, 29-IX-1999, MACB 72857. **Pontevedra:** Mollobao, **29TNG29**, *Crespi*, SANT. **Segovia:** Cedillo de la Torre, **30TVL48**, 1100 m, *Ventureira*, 9-V-1985, MACB 19193. **Soria:** La Fragua, alto de Villaciervos, **30TWM21**, 1150 m, *Burgaz et al.*, 31-V-1999, MACB 79701. **Tarragona:** Les Garrigues, Poble de Cervoles, **31TCF27**, 760 m, *Burgaz*, 22-V-1998, MACB 72866. **Teruel:** Linares de Mora, S<sup>a</sup> de Nogueruelas, **30TYK06**, 1600 m, *Burgaz et al.*, 25-IV-1999, MACB 72864. Camarena de la Sierra, S<sup>a</sup> de Javalambre, **30TXK64**, 1650 m, *Burgaz et al.*, 25-IV-1999, MACB 72865. Noguera, S<sup>a</sup> de Albarracín, Bco. de las Fuentes, **30TXK17**, 1550 m, *Aragón et al.*, 18-V-1996, MACB 72859. **Toledo:** Ocaña, Tembleque, **30TVK52**, 800 m, *Llimona*, 18-IV-1973, BCC 8090. **Valladolid:** Castromonte, embalse de Santa Espina, **30TUN22**, 780 m, *Úbeda & Terrón*, 27-I-1995, LEB 1969. **Vizcaya:** Urigoiti, **30TWN17**, *Burgaz & Rodríguez de Lope*, 28-IX-1999, MACB 72867. **Zamora:** Villalazán, 780 m, **30TTL89**, *Aragón et al.*, 6-X-1997, MACB 72868. **Zaragoza:** Calmarza, **30TWL95**, 700 m, *Burgaz*, 18-V-1998, MACB 72869. Calatayud, Campiel, **30TXL18**, *B. Vicioso*, MA.

*Placynthium tantaleum* (Hepp) Hue (Fig. 3)

Bull. Soc. Linn. Normand, s. 5, 9: 153, 1906. *Biatora corallinoides* var. *tantalea* Hepp, Flechten Europas: 276, 1857.

Thallus up to 3 cm in diameter, with granulose to coralloid areoles, occasionally pruinose. Prothallus rare and disappearing rapidly. Apothecia up to 0.5 mm in diameter. Ascospores broad ellipsoid, 8.0-15.0 × 6.5-8.8 mm, and 1-septate.

A very rare species in the area, only reported from northeastern Spain (Vivant 1988, Llimona 1991, Pereira 1992). This is not a continental species. It grows on temporarily humid calcareous or granitic rocks, close to flowing water and is generally absent from the central Iberian Peninsula.

Specimens examined: **PORTUGAL: Estremadura:** Azoia, Cabo Espichel, **29SMC85**, Burgaz, 7-VIII-1999, MACB 72898. S<sup>a</sup> de Arrabida, **29SMC95**, Burgaz, 8-VIII-1999, MACB 72895. **SPAIN. Asturias:** Oviedo, San Miguel de Lillo, **30TTP60**, 450 m, Burgaz, 16-VIII-1998, MACB 79710. **Barcelona:** La Anoaia, camino a L'Espluges, **31TCF89**, 300 m, Burgaz, 20-V-1998, MACB 72893. El Bages, Castellfollit del Boix, S<sup>a</sup> de Rubio, **31TCG91**, 500 m, Burgaz, 20-V-1998, MACB 72894. L'Espluga de Francolí, S<sup>a</sup> de Prades, **31TCF48**, Pereira, 22-XI-1999, BCC 5462. **Cuenca:** Contreras, hoces del río Cabriel, **30SXJ27**, 600 m, Burgaz, 26-III-2000, MACB 76566. **Huesca:** Boltaña, río Ara, **31TBH50**, 650 m, Llimona & Pereira, 18-X-1989, BCC 6409. Escalona, Urbez, fuente de los Suspiros, **31TBH51**, 800 m, Burgaz, 28-7-1998, MACB 72897. Torla, Bco. de Sopeliana, **31TYN32**, 1080 m, Llimona & Pereira, 16-X-89, BCC 6390. **Zaragoza:** Calmarza, **30TWL95**, 700 m, Burgaz, 18-V-1998, MACB 72896.

*Placynthium tremniacum* (A. Massal.) Jatta (Fig. 4)

Sylloge Lich. Ital.: 38, 1900. *Racoblenna tremniaca* A. Massal., Ricerch. Auton. Lich.: 140, 1852.

Thallus up to 2 cm in diameter, with granulose to coralloid areoles, occasionally pruinose. Prothallus frequent not very prominent. Apothecia up to 1 mm in diameter. Ascospores ellipsoid, 8.0-16.0 × 3.8-6 mm, always 1-septate. It is morphologically very similar to *P. nigrum* and is included in this taxon by some authors. However, the 1-septate ascospore is definitive to identify the taxon.

It is not very often encountered although it is probably overlooked because the sterile thalli cannot be differentiated from those of *P. nigrum*. There are some early references in the area from the North, East and South (Llimona & Hladun 1988). It grows on basic substrates in humid exposed places. It is widely distributed in the Holarctic Kingdom.

Selected specimens examined: **PORTUGAL: Estremadura:** Azoia, Cabo Espichel, **29SMC85**, Burgaz, 7-VIII-1999, MACB 72901. **SPAIN. Álava:** Leza, **30TWN31**, 27-IX-1999, Burgaz & Rodríguez de Lope, MACB 79310. **Burgos:** Sargentos de Lora, **30TVN23**, 1000 m, Burgaz, 23-VII-1999, MACB 72905. **Castellón:** Geldo, **30SYK11**, 200 m, Llimona, 5-V-73, BCC 7994. **Granada:** Almuñecar, La Herradura, **30SVF36**, 315 m, Alonso *et al.*, 25-III-89, MUB 21137. **Guadalajara:** Algar de Mesa, **30TWL85**, 750 m, Burgaz, 18-V-1999, MACB 72903. **Guipúzcoa:** Zegama, **30TWN31**, 400 m, Burgaz & Rodríguez de Lope, 28-IX-1999, MACB 79311. **Jaén:** Cazorla, S<sup>a</sup> del Pozo, **30SWG1193**, 1430 m, Aragón & Martínez, 10-I-1998, Aragón 0612/98, MA. Pontones, S<sup>a</sup> de Segura, pico Arca, **30SWH2825**, 1500 m, Aragón & Martínez, 18-VI-1997, Aragón 1602/97, MAF. Villacarrillo, S<sup>a</sup> de las Villas, **30SWH0814**, 1450 m, Aragón & Martínez, 8-IV-1998,

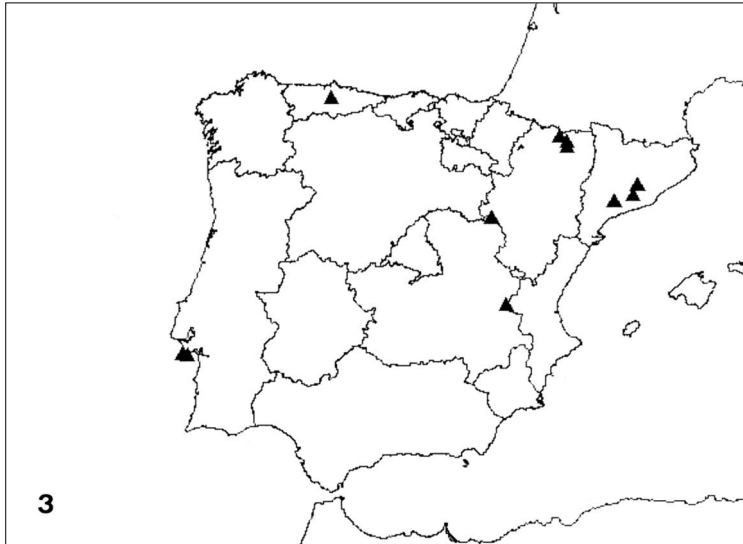


Fig. 3. Distribution of *Placynthium tantaleum* in the Iberian Peninsula.

Aragón 1060/98, MAF. **Teruel:** Alcalá de la Selva, Bco. de Valdalpino, **30TXK87**, 1500 m, *Burgaz & Rodríguez de Lope*, 25-IV-1999, MACB 72899. Pto. de Cuarto Pelado, S<sup>a</sup> Palomita, **30TYK19**, 1500 m, *Burgaz et al.*, 24-IV-1999, MACB 72900. **Valencia:** Cullera, alto de El Cabezol, **30SYJ34**, 30 m, *Fos*, 1-V-1990, VAB 10238. **Valladolid:** Castromonte, embalse de la Santa Espina, **30TUM22**, 822 m, *Burgaz*, 1-IX-2000, MACB 79312. **Zamora:** Las Enillas, **30TTL68**, 650 m, *Burgaz et al.*, 7-IX-1998, MACB 72902. Villalazán, **30TTL89**, *Aragón et al.*, 6-X-1997, MACB 72904.

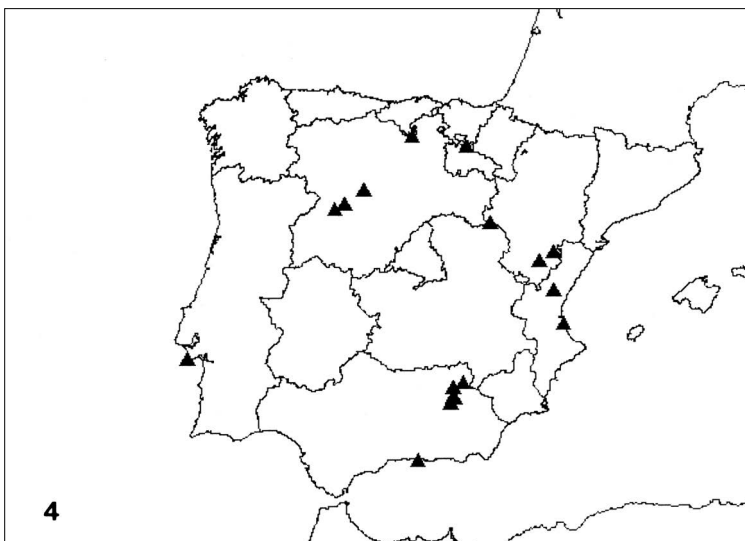


Fig. 4. Distribution of *Placynthium tremniacum* in the Iberian Peninsula.

## DISCUSSION

Within this group *Placynthium dolichoterum* and *P. garovaglii* have exclusively pluriseptate ascospores (Table 1). The substrate, the length of ascospores and the presence of pruina are the main differences between these species. Both are very rare in the Iberian Peninsula, and are restricted to northeastern Spain (Fig. 1). The examined samples of *P. garovaglii* had very few fertile apothecia and it was not possible to compare the ascospores of both species. Nevertheless, *P. garovaglii* apparently has longer and broader spores.

On the other hand, *P. nigrum*, *P. tantaleum* and *P. tremniacum* have similar ascospore sizes and number of septa in some cases. In the specimens studied, *P. tantaleum* and *P. tremniacum* have only 1 septum while the number in *P. nigrum* may vary from 1 to 3. Comparing the ascospore sizes (Table 2) of *P. nigrum* and *P. tantaleum*, the length and width are significantly different. The lengths and widths of *P. nigrum* and *P. tremniacum* are both significantly different, the former measurement more so than the latter. Between *P. tantaleum* and *P. tremniacum*, the ascospore width is the only significantly different character. These results confirm our opinion concerning the validity of the three taxa considered.

Table 1. Comparative table of features of *Placynthium nigrum* group in the Iberian Peninsula. Ascospores measurements in  $\mu\text{m}$  and altitude in metres.

	<i>Prothallus</i>	<i>Thallus</i>	<i>Ascospores</i>		<i>Septa</i>	<i>Altitude</i>
<i>dolichoterum</i>	yes/no	not pruinose	fusiform	22.5-30 × 3.8-5	3-(5)	2300
<i>garovaglii</i>	yes/no	pruinose	fusiform	33 × 6	3-(7)	700-1300
<i>nigrum</i>	yes	pruinose/not pruinose	narrow ellipsoid	10-20 × 4-7.5	1-2-(3)	0-2250
<i>tantaleum</i>	yes/no	pruinose/not pruinose	broad ellipsoid	8-15 × 6.5-8.8	1	0-1080
<i>tremniacum</i>	yes	pruinose/not pruinose	ellipsoid	8-16 × 3.8-6	1	0-1500

Table 2. Means  $\pm$  standard deviations of ascospores (in  $\mu\text{m}$ ). Species of *Placynthium nigrum* with 1-septate ascospores.  $p$  = significance level (\*\*\*) =  $p < 0.001$ ; \*\* =  $p < 0.01$ ; \* =  $p < 0.05$ ; ns = not significant). Test of significance refer to ANOVA

	<i>P. nigrum</i>	<i>P. tremniacum</i>	<i>P</i>
Spore length	14.7 $\pm$ 2.2	12.2 $\pm$ 2.3	***
Spore width	5.2 $\pm$ 0.9	4.8 $\pm$ 0.4	*
	<i>P. nigrum</i>	<i>P. tantaleum</i>	<i>P</i>
Spore length	14.7 $\pm$ 2.2	11.2 $\pm$ 1.9	***
Spore width	5.2 $\pm$ 0.9	6.9 $\pm$ 0.5	***
	<i>P. tremniacum</i>	<i>P. tantaleum</i>	<i>P</i>
Spore length	12.2 $\pm$ 2.3	11.2 $\pm$ 1.9	ns
Spore width	4.8 $\pm$ 0.4	6.9 $\pm$ 0.5	***



*Placynthium nigrum* is the most frequent and widely distributed species in the Iberian Peninsula (Fig. 2). In the Mediterranean Region it is always located in northern orientations or protected from direct exposure to the sun, while in the Eurosiberian Region it can also grow in exposed places. We consider *P. tremniacum* to be an independent taxon easily differentiated by its ascospore size and number of septa. Its distributional range is probably wider than it is currently known. *Placynthium tantaleum* can easily be differentiated on the basis of its ascospore width. It is rare, and usually is not to be found in continental areas.

Most of the studied taxa have an Holarctic distribution. They are most widely distributed in the central and eastern part of the Iberian Peninsula, mainly coincident with the existence of suitable calcareous substrates.

*Placynthium dolichoterum* and *P. tremniacum* have been included in the Austrian Lichen Red List (Hafellner 1997).

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