

Three new *Asplenium* L. taxa (Aspleniaceae, Pteridophyta) for the flora of North-Eastern Iberian Peninsula

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Abstract

The presence of *Asplenium majoricum* Litard. is reported for the first time in Catalonia (North-eastern Iberian Peninsula). In addition, two wild hybrids: *Asplenium* × *orellii* Lovis & Reichst. and *A.* × *reichsteinii* Bennert, Rasbach & K. Rasbach are new records for the Iberian Peninsula and Catalonia, respectively.

Keywords: Pteridophyta; *Asplenium*; hybrids; North-eastern Iberian Peninsula.

Resum. *Tres nous tàxons del gènere Asplenium L. (Aspleniaceae, Pteridophyta) per a la flora del nord-est de la península Ibèrica*

S'indica per primera vegada la presència d'*Asplenium majoricum* Litard. a Catalunya (Nord-est de la península Ibèrica). A més, els híbrids: *Asplenium* × *orellii* Lovis & Reichst. i *A.* × *reichsteinii* Bennert, Rasbach & K. Rasbach suposen novetats per a la península Ibèrica i Catalunya, respectivament.

Paraules clau: Pteridophyta; *Asplenium*; híbrids; Nord-est de la península Ibèrica.

Introduction

Since the last general review of Pteridophyta in North-eastern Iberian Peninsula (Sáez, 1997; 1998), any new taxa have been added to this territory. However, some contributions have improved the knowledge of regional distribution of some taxa. The province of Tarragona (Southern Catalonia), has been among the floristically more intensively studied part of the territory during the last two decades. It is interesting to note, at regional level, the discovery of ferns of noticeably biogeographic interest, as *Asplenium viride* Huds. and *Dryopteris affinis* (Lowe) Fraser-Jenk. subsp. *affinis* at higher parts of “El Port” massif (Arrufat et al., 2008; Molero et al., 2006) and the new localities of extremely rare species, as *Botrychium lunaria* (L.) Swartz, *Phyllitis sagittata* (DC.) Guinea & Heywood and *Dryopteris mindshelkensis* N. Pavl. [= *D. submontana* (Fraser-Jenk. & Jermy) Fraser-Jenk.].

Asplenium L. is a cosmopolitan genus consisting of about 700 species (Kramer & Viane, 1990), showing considerable taxonomic complexity. In the last decades the genus *Asplenium* has been studied extensively, specially in Europe, where it comprises 50 taxa, half of which are diploid, while the other half are polyploids derived from the diploids (Vogel et al., 1999). This genus is well-known for its hybridization capacity especially in Central and Southern Europe. In North-eastern Iberian Peninsula, 28 taxa (hybrids included) have been previously recorded within this genus (Sáez, 1997: 51). During our recent fieldwork in Serra de Godall (Montsià, Southern Catalonia) aimed at increasing the pteridophytic knowledge of this area, we collected several specimens of ferns new to North-eastern Iberian Peninsula: *Asplenium majoricum* Litard., *A. × orellii* Lovis & Reichst. [= *A. majoricum* × *A. trichomanes* subsp. *quadrivalens* D. E. Meyer] and *A. × reichsteinii* Bennert, Rasbach & K. Rasbach [= *Asplenium fontanum* (L.) Bernh. subsp. *fontanum* × *A. majoricum*]. For *Asplenium × orellii*, was previously only known from Mallorca (Lovis & Reichstein, 1970), this being the first report for the Iberian Peninsula. This paper reports the presence in Southern Catalonia of *A. majoricum* and two interspecific hybrids in the genus *Asplenium* (*A. × orellii* and *A. × reichsteinii*).

Material and methods

Morphological and anatomical observations were undertaken on living plants and herbarium specimens. The main diagnostic characters presented in the literature were studied. The spores were mounted directly from the sorus on glycerogelatin and were observed under a light microscope. The length and width of the spores were measured at 600x with a OLYMPUS CH-2 microscope. We have taken 30 measurements of spore length excluding the perispore. For scanning electron microscopy (SEM) studies, samples of spores were glued to aluminium stubs, coated with 50 nm gold and examined in a HITACHI S-570 Scanning Electron Microscope at 15 kV. For every taxon we provide the locality and the 1x1 Km UTM square.

Results and discussion

Asplenium majoricum Litard.

Tarragona province, Montsià: Serra de Godall, Freginals, 31TBF8805, 280 m, 11-I-2010, R. Curto (L. Sáez, herb. pers.-BCB); Serra de Godall, La Galera, 31TBF8705, 180 m, 30-I-2010, R. Curto (MMA 26454).

Asplenium majoricum Litard., an allopolyploid species derived from *Asplenium fontanum* (L.) Bernh. subsp. *fontanum* and *A. petrarchae* (Guerin) DC. subsp. *bivalens* (D.E. Mey.) Lovis & Reichst., occurs in Eastern Iberian Peninsula [Alacant, Castelló and Valencia provinces (Aguilella et al., 2010)] and Northern Mallorca (Balearic Islands) where is restricted to Serra de Tramuntana range (Alomar et al., 1997). It colonizes calcareous rocky places, at altitudes ranging from 50-1200 m.

The closest localities are Serra d'Irta (Villaescusa, 2000) and Cabanes (Mateo & Rosselló, 2007). The new locality reported notably increases the distribution

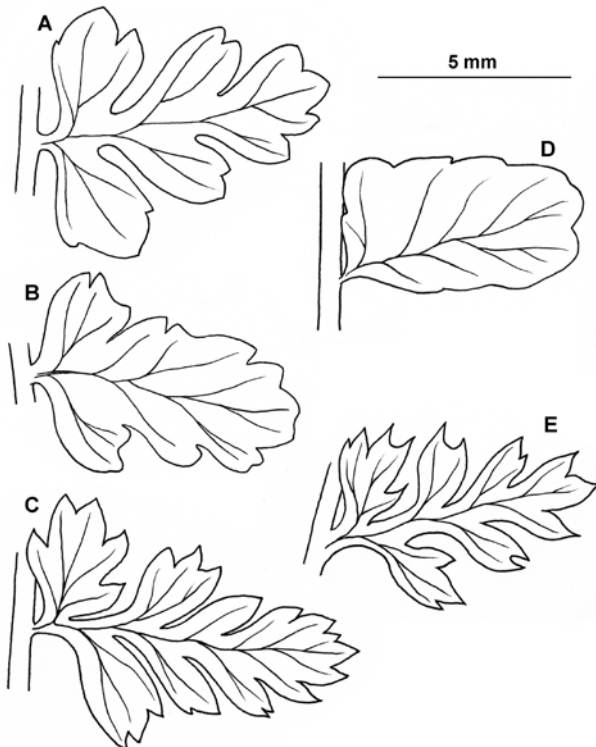


Figure 1. Drawings of middle pinnae of fronds. **A:** *Asplenium majoricum*, **B:** *A. x orellii*, **C:** *A. x reichsteini*, **D:** *A. trichomanes* subsp. *quadrivalens*, **E:** *A. fontanum* subsp. *fontanum*. From specimens collected in Serra de Godall.

area of the species. Moreover, attending to the existence of large regions in Southern Catalonia with similar habitats to those from Serra de Godall, the presence of new populations for the species is also possible.

Regarding to macromorphological characters, fronds attributable to *A. majoricum* of Serra de Godall population present the typical intermediate morphology between *A. fontanum* and *A. petrarchae* (fig. 1), glabrescent or sparsely covered by glandular trichomes, arranged less densely than those of *A. petrarchae* and with brown raquis in a large portion of its longitude, contrary to *A. fontanum*, usually with a green raquis. The measurements of the spores resulted in a mean length value of 43.9 ± 2.56 micrometers, with minimum and maximum values of 40 and 48 micrometers respectively (Fig. 2).

The habitat of *A. majoricum* in Serra de Godall corresponds to compact limestone rock fissures and spaces between terrace wall rocks, where some accumulated soil may be found. It is distributed in altitudes between 130 and 285 m. The vulnerability of *A. majoricum* population (which accounts for about 200 mature individuals) in Serra de Godall is noticeably high, since this area, at present lacking any type of legal protection, might be threatened by several anthropogenic

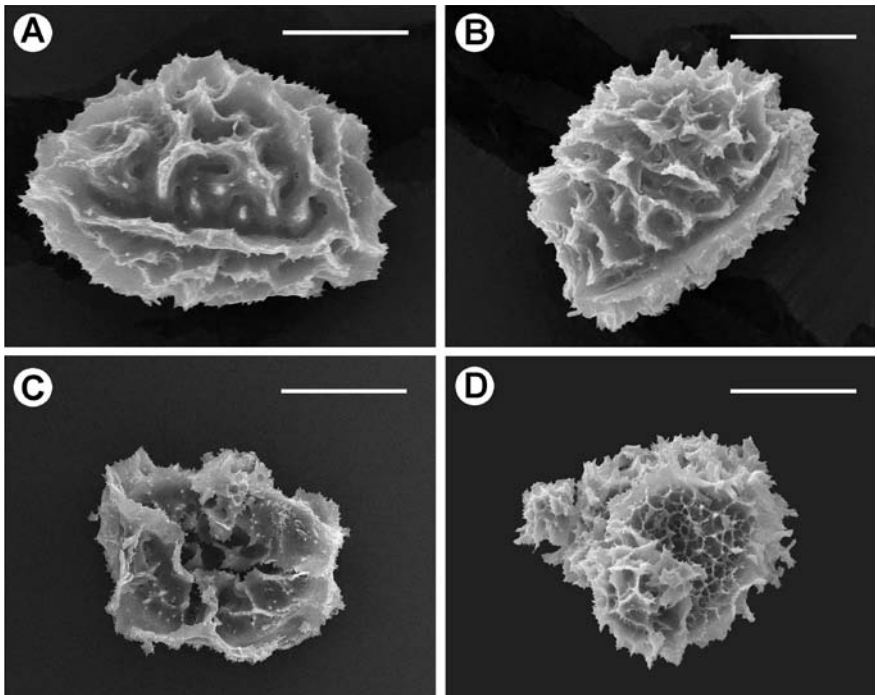


Figure 2. Scanning electron micrographs of spores. **A, B:** *Asplenium majoricum*, **C:** *A. × orellii*, **D:** *A. × reichstenii*. From specimens collected in Serra de Godall. Bars = 0.75 mm (A); 50 μ m (B, C, D).

disturbances like roads maintenance, wind farms installation, etc. This population of *A. majoricum* has been recently included in the “Vulnerable” (VU) category (Sáez et al., 2010), according to IUCN (2001) criteria. Nevertheless, new censuses and detailed demographic studies should be conducted in order to confirm its extinction risk status.

Asplenium* × *orellii Lovis & Reichst.

= *A. majoricum* × *A. trichomanes* subsp. *quadrivalens*

Tarragona province, Montsià: Serra de Godall, La Galera, 31TBF8705, 200 m, 11-I-2010, R. Curto (L. Sáez, herb. pers.-BCB).

Hybrids from genus *Asplenium* are characterized by their intermediate morphology and aborted spores (Reichstein, 1981; Lovis & Reichstein, 1985; Wagner et al., 1986). The fronds gross morphology of the collected plants in Serra de Godall is clearly intermediate between those of the putative parents (*A. majoricum* and *A. trichomanes* subsp. *quadrivalens*), with lobulate lower pinnae (Fig. 1) and black rachis, except for the green top, suggesting a hybrid origin. In addition, spores, which greatly vary in size and shape, are strongly abortive (Fig. 2 C), supporting their hybrid nature. So far, all individuals studied of *A. trichomanes* from Serra de Godall belong to the subsp. *quadrivalens* (Curto & Sáez, unpubl. data). The wild hybrid between *A. majoricum* and *A. trichomanes* subsp. *quadrivalens* is known from the central sector of Serra de Tramuntana in Mallorca (Lovis & Reichstein, 1970; Alomar et al., 1995) and it does not appear in the review of *Asplenium* hybrids for the Iberian Peninsula (Pérez Carro & Fernández Arecos, 1996). Since *A. trichomanes* subsp. *quadrivalens* is the most abundant taxon of the *A. trichomanes* group in Northeastern Iberian Peninsula (Sáez, 1997), it is highly likely that this subspecies has been hybridized with *A. majoricum* (assuming that *Asplenium* × *orellii* has arisen independently in Serra de Godall).

Asplenium × *orellii* is extremely rare in Serra de Godall we have only observed one individual growing in shady rock crevices.

Asplenium* × *reichsteinii Bennert, Rasbach & K. Rasbach

= *A. fontanum* subsp. *fontanum* × *A. majoricum*

Tarragona province, Montsià: Serra de Godall, La Galera, 31TBF8705, 180 m, 30-I-2010, R. Curto (L. Sáez, herb. pers.-BCB).

Based on fronds gross morphology, aborted spores (Fig. 2 D) and physical proximity of the hybrid plant to *A. fontanum* subsp. *fontanum* and *A. majoricum*, we assumed that these species are the presumably parents. We consider that individuals collected in Serra de Godall with intermediate fronds between those of *A. majoricum* and *A. fontanum* subsp. *fontanum* and with the content of the sporangia aborted, belong to *A. × reichsteinii*. Nevertheless, we have observed several well-formed spores, which are probably viable.

Although scarce, *A. fontanum* subsp. *fontanum* is present in Serra de Godall. Considering that *A. fontanum* subsp. *fontanum*, in Southern Catalonia, usually grows on middle mountain ranges (Sáez, 1997), it is interesting to find it in Godall at low altitudes.

This is the first record for *Asplenium* × *reichsteinii* for Catalonia and the second one for the Iberian Peninsula, where it was found in a locality close to Mogent (Valencia province) coexisting with *A. majoricum* (Pérez Carro & Fernández Areces, 1996).

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