

***Pteris* ×*pseudosefuricola* (Pteridaceae) a new alien fern for the Iberian Peninsula**

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Abstract

Pteris ×*pseudosefuricola* (Pteridaceae) is here reported as a new alien species to the flora of the Iberian Peninsula. An established population, previously included in databases as *Pteris cretica* was found north of Sabadell (Barcelona province). Morphological data are provided suggesting that these plants may refer to *Pteris* ×*pseudosefuricola* instead of *Pteris cretica*.

Key words: Chorology, ferns, Mediterranean Region, non-native plants.

Resumen

***Pteris* ×*pseudosefuricola* (Pteridaceae) un nuevo helecho alóctono para la península ibérica**

Se cita a *Pteris* ×*pseudosefuricola* (Pteridaceae) como nueva especie alóctona para la flora de la península Ibérica. Una población establecida, previamente incluida en bases de datos como *Pteris cretica*, fue encontrada recientemente al norte de Sabadell (provincia de Barcelona). Se aportan datos morfológicos que sugieren que estas plantas pueden ser asimiladas a *Pteris* ×*pseudosefuricola* en lugar de a *Pteris cretica*.

Palabras clave: corología, helechos, plantas alóctonas, Región Mediterránea.



Pteris x pseudosefuricola Ebihara, Nakato & S. Matsumoto in Bull. Natl. Mus. Nat. Sci., Tokyo, B. 41: 18 (2015)

SPAIN: Barcelona province, Sabadell, torrent de Colobrers, 31TDG2403, 200 m s.n.m., 5-11-2022, *P. Aymerich* & L. Sáez s.n. (L. Sáez herb. pers. (BCB), duplicado BC 998544) (Figures 1 and 2).

The cosmopolitan fern genus *Pteris* L. (Pteridaceae) includes about 250 species, mostly of tropical and subtropical distribution, but a few live in temperate regions (Tryon *et al.*, 1990; Zhang & Zhang, 2018). Some species have ornamental value, being cultivated worldwide and some have become naturalized (Chao *et al.*, 2014).

During a field survey in the Colobrers torrent, Sabadell, we visited a population of *Pteris* which was recorded in iNaturalist. This population corresponds to a locality (UTM square 31TDG20) that had been included in the Biodiversity data bank of Catalonia (based on an observation by R. Rigol in October 2022) as *P. cretica* L. (Font, 2025). According to the dichotomous key to subgenera and sections of *Pteris* (Zhang & Zhang, 2018) these plants correspond to *Pteris* sect. *Creticae* (Shieh) Liang Zhang & Li Bing Zhang. However, the identification at the species level of our samples was more problematic and the distinctive morphological characteristics of various species included in this section were compared with our specimens. In particular, the decurrence of the second or third distal pinnae raised doubts about their identification as *P. cretica* L. Four species belonging to *Pteris* sect. *Creticae* widely accepted in floristic synthesis and taxonomic databases were considered: *Pteris multifida* Poir., which is included in the *P. multifida* subclade and three species belonging to the *P. cretica* subclade: *Pteris parkeri* J.J. Parker, *P. umbrosa* R. Br. and *P. cretica* (Zhang & Zhang, 2018).

Pteris multifida is a native species to temperate and tropical eastern Asia. It is widely cultivated, populations have naturalized in many regions, including, South of Asia, Africa, Europe and America (Riefner & Smith, 2016; POWO, 2025). *Pteris multifida* strikingly differs from our specimens in having the pinnae of sterile fronds 6–10 mm wide, those of fertile fronds 4–7 mm wide (Liao *et al.*, 2013). The plants from Sabadell have the pinnae of sterile fronds 10–15 mm wide, those of fertile fronds 10–20 mm wide.

Pteris parkeri [= *P. nipponica* W.C. Shieh; *P. cretica* var. *albolineata* Hook.] is native to Korea, Japan and Taiwan. It has been introduced in Europe, North America and Argentina (Guerrero, 2017; POWO, 2025). Our specimens cannot be referred to *P. parkeri* since the rachis of this species is visible between the apical pinna and the distal pair, and the latter are shortly decurrent. On the other hand, *P. parkeri* has the sterile stipe scaly, the lateral pinnae of the fertile fronds are relatively narrow, c. 1.5 cm broad (Liao *et al.*, 2013) and the lamina and presents a conspicuous pale band or a less pigmented sector around the midvein of each pinna (Liao *et al.*, 2013; Guerrero, 2017).

Pteris umbrosa, an endemism to eastern Australia (Kramer & McCarthy, 1998) resembles our plants. However, *P. umbrosa* has robust fronds with pinnae (and pinnae segments) broadly attached and long-decurrent on rachis and the rachis is winged for most or all of its length, and the proximal pinnae have acroscopic and basiscopical secondary segments, whereas the plants from Sabadell differ in having smaller fronds with the rachis not winged for most or all of its length (the decurrence can occur up to the third distal pair of pinnae) and the proximal pinnae is lobed only on basiscopical side (Figure 1).

Pteris cretica is native to warm temperate and tropical regions from the Mediterranean Region and Africa to eastern Asia. It is also a widely cultivated species (dozens of cultivars are known, see Martínez, 2011), naturalized in North, Central and South America and Oceania. It is a taxonomically complex species (Martínez, 2011) in which various levels of ploidy have been documented and several infraspecific categories have been recognized (POWO, 2025). Our specimens share with *P. cretica* some of the morphological characteristics attributed to this species: fronds slightly dimorphic; stipe glabrous or with a few scales proximally, straw-colored distally, red-brown proximally at maturity; blade 1-pinnate, pinnae sessile or shortly pedicellate with margin white cartilaginous and serrate, terminal pinna 3-lobed, medial pinnae usually entire, proximal pinnae usually lobed only on basiscopical side, lobes 1–2 per pinna; distal pinnae adnate or shortly decurrent.

However, other characteristics are not consistent with what has been documented for *P. cretica*: The fronds of *P. cretica* show a short decurrence that is limited to the apical pair of pinnae (very rarely in the pair immediately below the apical pair), while in our plants the conspicuous and relatively long decurrence can reach the third distal pair (see Figure 1D). The type material of *Pteris cretica* (LINN 1246.7, lectotype designated by Tryon, 1964) has up to 6 pairs of pinnae—according to Liao *et al.* (2013) the species may present up to 8 pairs of pinnae—and the apical pair of pinnae are shortly decurrent in the rachis. Our plants have fertile fronds ovate in outline with 2–4(5) pairs of pinnae. According to the detailed description provided by Martínez (2011), *P. cretica* has hairs formed by 2–4 cells on the abaxial surface of the blade and black spores 50–66 µm. Our material present fronds with hairs 0.1–0.3 mm long, of 2–3 cells, and very scattered hairs basically on the abaxial surface, more frequently towards the median nerve and sparse lanceolate scales 0.7–1.8 mm long, red-brown, on the median nerve of the pinnae and close to the rachis on the abaxial side. The non-irregular spores are brown and somewhat smaller (44–50 µm), with a very high proportion of aborted or strongly irregular spores (64.7%, calculated for a count of 814 spores). However, we have found contradictions regarding some morphological characters, some authors attribute to *P. cretica* glabrous (Liao *et al.*, 2013) or slightly pubescent fronds (Tryon, 1964) and smaller spores (38–48 µm: Ferrarini *et al.*, 1986; 45–50 µm: Irfan *et al.*, 2021). These discrepancies regarding spore size could be related to differences in the ploidy levels of the plants studied, since ploidy levels ranging from 2x to 8x have been documented in *P. cretica* (Ferrarini *et al.*, 1986). The presence of irregular or aborted spores is not indicated by any of the following authors, who carried out specific studies of the spores or very detailed morphological descriptions: Ferrarini *et al.* (1986); Martínez (2011), Martínez & Morbelli (2009), Irfan *et al.* (2021). However, the presence of aborted spores has been mentioned for *P. cretica* (see references provided by Martínez & Morbelli, 2009).

The macromorphological and micromorphological characteristics of *P. cretica* and other plants intermediate between this species and *P. multifida*, native to temperate and tropical eastern Asia, naturalized in South Asia, Africa, Europe and America (Riefner & Smith, 2016; POWO, 2025), were studied by Ebihara *et al.* (2015). Among them, noteworthy the vein character of the sterile lamina and the ratio of the production of normal spores. According to Ebihara *et al.* (2015), in *P. cretica* the veins of sterile fronds always reach the cartilaginous margins and the spores are normal, whereas in *P. x pseudosefuricola* Ebihara, Nakato & S. Matsumoto, a plant originated from hybridization between *P. cretica* and *P. multifida*, the veins of sterile fronds usually not reach the cartilaginous margins and the spores are mostly irregular or abortive. Moreover, in *P. x pseudosefuricola* the decurrence can occur up to the second distal pair of pinnae, whereas in some forms of *P. cretica* only the distal pair may be usually decurrent. *Pteris multifida* has venuloid idioblasts that tend to cluster along the veins on the abaxial laminar tissue (Kao *et al.*, 2008, Yáñez *et al.*, 2023) while *P. cretica* does not present these venuloid idioblasts (Yáñez *et al.*, 2023). The study of the abaxial surface of the fronds collected in Sabadell does not allow us to confirm the presence of these venuloid idioblasts, which are not reported by Ebihara *et al.* (2015).

Thus, morphology of the plants collected in Sabadell is compatible with the description and morphology of the holotype of *P. x pseudosefuricola*. Specially, the veins of sterile fronds of our plants may not reach the margins (Figure 2B) and the proportion of abortive or irregular-shaped spores is high (see above). It is noteworthy that according to our observations (online image at Flora of Australia, 2025) the isotype of *P. umbrosa* (MEL 672393) has veins reaching the cartilaginous margins. Based on all these considerations, we assimilate, at least provisionally, the plants naturalized in Sabadell to *P. x pseudosefuricola*. This is the first record outside Japan for this taxon (POWO, 2025), which could be used in gardening.

Although we have not been able to examine the micromorphological characters of plants from other origins, we consider the presence of *P. x pseudosefuricola* probable as an allochthonous plant in other areas of the world, where it could have been confused with *P. cretica*. The plants currently identified as *P. cretica* from New Zealand (Brownsey & Perrie, 2021) are very similar in overall appearance to those from Sabadell; these plants also differ from *P. cretica* in having the rachis winged in at least the apical half. More rarely, images of plants with these characters obtained in other regions, such as North America, California, are also found in online resources (<https://www.inaturalist.org/observations/4793404>).

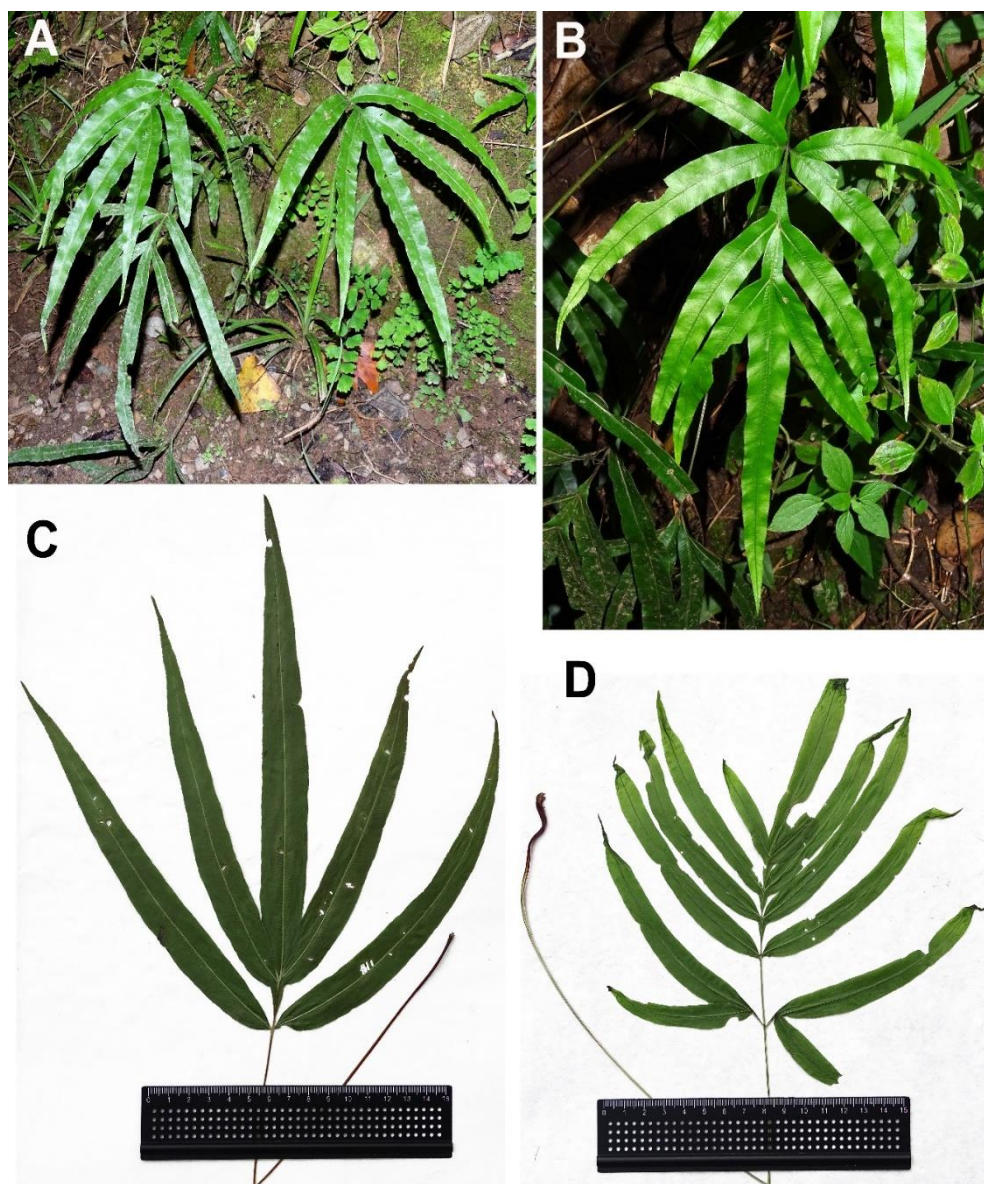


Figure 1. *Pteris x pseudosefuricola* from torrent de Colobriers, Sabadell. A-B) Specimens in their natural habitat. C) Reproductive frond. D) Vegetative frond. Photos: Llorenç Sáez.

Figura 1. *Pteris x pseudosefuricola* del torrent de Colobriers, Sabadell. A-B) Ejemplares en su hábitat natural. C) Fronde reproductiva. D) Fronde vegetativa. Fotografías: Llorenç Sáez.

The location where *P. x pseudosefuricola* has been found is a ravine in a semi-urbanized area with vegetation dominated by introduced trees (*Ligustrum lucidum* W.T. Aiton, *Laurus nobilis* L., *Platanus x hispanica* Münchh.) and a holm oak (*Quercus ilex* L.) forest in the higher parts. This fern grows on damp and shady slopes, together with other species such as *Adiantum capillus-veneris* L., *Carex pendula* Huds. P. Beauv., *Hedera helix* L. and *Parietaria judaica* L. Other ferns occurring in this area are *Equisetum telmateia* Ehrh., *Asplenium onopteris* L. and *Polystichum setiferum* (Forssk.) Woyнар.

The mechanism by which *P. x pseudosefuricola* has become established in this area is unknown. A search in nurseries in the Sabadell area has not revealed any species of the genus *Pteris* in their catalogues. However, this is a densely populated area with extensive urbanizations where this fern may have been planted for ornamental purposes and in some way (germination of spores or garden waste) it could have established a population in the Torrent de Colobriers. In 2022 five individuals of *P. x pseudosefuricola* were observed, two of them reproductive. In 2025 a single plant was observed, with 14

fronds. Despite the small size of the population, this fern has the potential for further spread along the Colobriers ravine by spore dispersal and rhizome fragmentation.

Given the attribution of the plants from Sabadell to *P. ×pseudosefuricola*, we have revised herbarium material and searched for images in on-line repositories to find out if there are similar plants in other Iberian locations. *Pteris cretica* is confirmed from Girona province, Catalonia (northeastern Iberian Peninsula) based on this herbarium specimen: BC71765 (see representative specimens below). This specimen shows the usual characters for the *P. cretica* known in natural or semi-natural habitats in Europe, with only the latter pair of pinnae shortly decurrent, and the veins of sterile fronds always reach the cartilaginous margins. On the other hand, two herbarium specimens previously identified as *P. cretica* from Girona province (BC824877 and BC824878) that were collected growing on the walls of a greenhouse, actually correspond to *P. multifida*. This is remarkable since it shows that ferns of the genus *Pteris* escaped from cultivation more than a century ago.

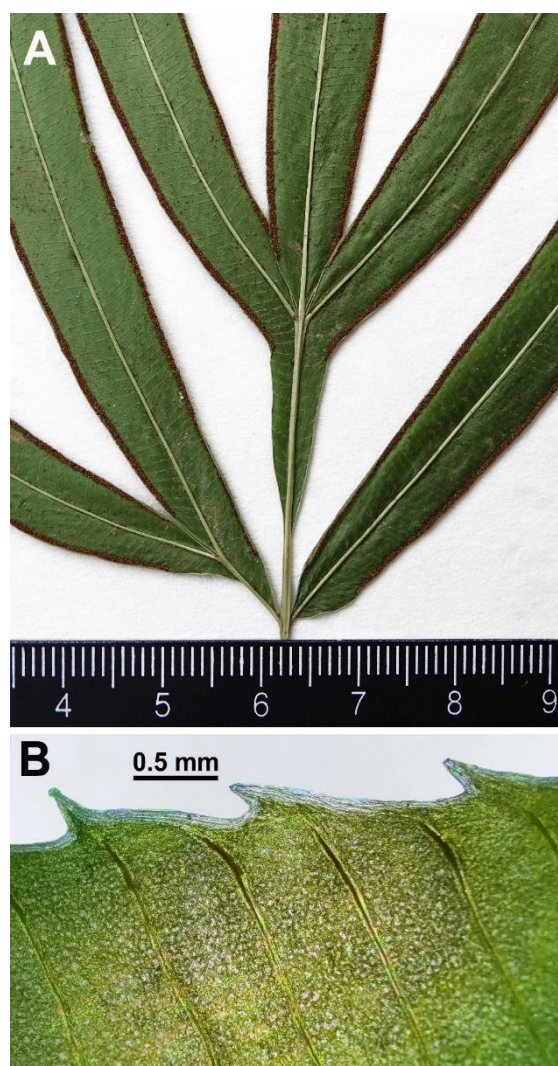


Figure 2. *Pteris ×pseudosefuricola* from torrent de Colobriers, Sabadell. A) Detail of the abaxial surface of a reproductive frond. B) Margins of the sterile frond with veins terminating short of cartilaginous margins. Photos: Llorenç Sáez.

Figura 2. *Pteris ×pseudosefuricola* en el torrent de Colobriers, Sabadell. A) Detalle de la superficie abaxial de una fronde reproductiva. B) Márgenes de la fronde estéril con los nervios que terminan antes de los márgenes cartilagosos. Fotografías: Llorenç Sáez.

The presence of non-native species of *Pteris* sect. *Creticae* in the Iberian Peninsula seems to have been little considered by experts in non-native plants and by pteridologists. A preliminary search of records (supported by images) in online databases reveals that escapes from cultivation of *P. multifida* and *P. parkeri* have been detected: *Pteris multifida*: Portugal: 1 km east of Vila de Cucujaes (<https://spain.inaturalist.org/observations/78603008>); Spain: Galicia, 2 km southeast of Pontevedra (<https://spain.inaturalist.org/observations/124087121>). *Pteris parkeri*: Portugal: 0.5 km south of Sintra (<https://spain.inaturalist.org/observations/194204976>). These species are probably more common than the records provided here suggest.

Other representative specimens studied

Pteris cretica L.

FRANCE: Corsica, Bastia, 10-11-1869, O. Debeaux s.n. (BC616153). SPAIN: Girona province, Osor, 5-11-1933, J. Codina s.n. (BC71765); Pontevedra province, Vigo, Pazo de Castrelos, 29TNG2173, 50 m s.n.m., cultivada como ornamental, 31-12-1988, C.R. Dacal s.n. (BC971333). SWITZERLAND: Oberhalb Gaggiole (Schweiz, Kanton Tessin), östlich Gordola, Höhe 500 m, Schulcht, 21-10-1944, E. Berger 18836 (BC861170).

Pteris multifida Poir.

SPAIN: Girona, spontaneous in the wall of a greenhouse, 1915, R. Queralt s.n. (BC824877, sub *Pteris cretica* L.); Girona, greenhouse, spontaneous, probably imported by other seeds, 12-1915, R. Queralt s.n. (BC824878, sub *Pteris cretica* L.).

Conflict of interest

The authors declare that they have not conflicts of interest relevant to the content of this manuscript.

CRediT authorship contribution statement

Conceptualization: LS, PA. Investigation: LS, PA. Visualization: LS, PA. Writing - Original Draft Preparation: LS, PA. Writing - Review & Editing: LS, PA.

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