



Short Communication

Expansion of the distribution range of *Asplenium trilobum* Cav (Polypodiopsida, Aspleniaceae) in the Mediterranean forest of the Chilean coast

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Academic editor: Anatoliy Khapugin

Received: 05 May 2023 | Accepted: 22 Jun 2023 | Published: 17 Jul 2023

Citation: Pincheira-Ulbrich J, Zambrano U, Contreras F (2023) Expansion of the distribution range of *Asplenium trilobum* Cav (Polypodiopsida, Aspleniaceae) in the Mediterranean forest of the Chilean coast. Biodiversity Data Journal 11: e105990. <https://doi.org/10.3897/BDJ.11.e105990>

Abstract

The biodiversity hotspot of central Chile is home to a high proportion of endemic species, but some of these species are inconspicuous and not easily observed. During a botanical exploration in the Los Queules National Reserve (Chile), a population of *Asplenium trilobum* Cav. was identified. The plants were found growing on the bark of a *Myrceugenia parvifolia* (DC.) Kausel tree in a small swamp next to specimens of *Drimys winteri* J.R.Forst. & G.Forst. (35°59'11.84"S; 72°41'11.53"W). Several previously unrecorded species were found, including *Carex* cf. *excelsa* Poepp. ex Kunth, *Chusquea* cf. *quila* Kunth, *Ercilla* cf. *spicata* (Bertero) Moq., and *Boquila trifoliolata* (DC.) Decne., highlighting the importance of exploring and documenting this biodiversity hotspot. The discovery in this wilderness area extends the distribution 86 km north on the continent, which was previously limited to the east of the municipality of Penco in the Biobío region (36°44'9.26"S; 72°57'42.5"W). This paper presents an observed specimen, its locality, and associated species.

Keywords

biodiversity hotspot, epiphyte, queule, sclerophyllous forest, wetland

Introduction

With more than 750 species worldwide, *Asplenium* L. is one of the fern genera with the greatest species diversity and geographical distribution. This genus and *Hymenasplenium* (at least 66 species) comprise the family Aspleniaceae, with *Asplenium* known for its remarkable species richness (PPGI 2016, Hassler 2023).

In Chile, eleven species belonging to the genus *Asplenium* have been documented (Rodríguez et al. 2009). Among them, *Asplenium trilobum* Cav. is a fern species endemic to the sub-Antarctic rainforests of Chile and Argentina (Rodríguez et al. 2009, Ganen et al. 2017). *A. trilobum* is found at altitudes ranging from 5 to 600 m a.s.l., predominantly as an epiphyte that primarily inhabits tree trunks in shaded areas with high humidity.

The known distribution of this species has its northern limit in the Municipality of Penco, on the coast of the Biobío Region (36°44'9.26"S; 72°57'42.5"W), while the southern limit is in Laguna San Rafael, Aysén Region (46°40'S; 73°50'W) (pers. comm. Alicia Marticorena, curator of the CONC herbarium, see also Rodríguez 1995). In central Chile, *A. trilobum* has been classified as a threatened species by the Chilean Ministry of the Environment, highlighting the urgency of its conservation (MMA 2022).

Asplenium trilobum is distinguished by its 2 to 6 cm long rhombic laminae, often with an irregular lobe, contrastingly coloured with deep green on the upper surface and a paler, almost glaucous green beneath. Supported by a stipe of equal or sometimes greater length, the laminae's cuneate and entire base transition to small rounded or serrate teeth. Flabellate venation features 2 to 6 sori, each 0.5 to 1 cm long, flanking the rachis, with a persistent lateral indusium. The frond is completed by a slender, glabrous petiole, devoid of pilosity (Looser 1944, Rodríguez and Baeza 1991, Rodríguez 1995, Ganen et al. 2017).

The recent discovery of *A. trilobum* in the Los Queules National Reserve, located in the Mediterranean forest of central Chile, a global biodiversity hotspot, highlights the need for biodiversity monitoring and inventories, an unfulfilled need in Latin America (Myers et al. 2000, Mittermeier et al. 2011). Species inventories form the basis for improving our understanding of the distribution and ecology of species present in the region, and facilitate the implementation of appropriate conservation and management strategies to protect these ecosystems and their biodiversity.

This finding is particularly relevant in the context of global climate change and landscape fragmentation, as the central Chilean coast has been drastically altered by the almost complete replacement of native vegetation by forestry plantations and agricultural crops. These human activities have led to significant habitat loss and a decline in the region's biodiversity (Bustamante and Castor 1998, Echeverría et al. 2006).

In this paper, an observed specimen of *A. trilobum* is presented, the locality and associated species are described, and the significance of this discovery for the coastal distribution of the Mediterranean forest is highlighted.

Study site: Los Queules National Reserve

The Los Queules National Reserve is administratively located in the municipality of Pelluhue, in the Maule region (Fig. 1). It covers an area of 147 hectares and is located in a matrix of coastal forest plantations. The name "Keule" refers to an endemic and threatened species in Chile (*Gomortega keule* (Molina) Baill.). The forest on the hilltops is mainly dominated by *Nothofagus glauca* (Phil.) Krasser and *Nothofagus obliqua* (Mirb.) Oerst. In the wetter areas, species such as *Aextoxicon punctatum* Ruiz & Pav., *Cryptocarya alba* (Molina) Looser and *Persea lingue* (Ruiz & Pav.) Nees make up the dominant canopy layer.



Figure 1. [doi](#)

Los Queules National Reserve (satellite image from Google Earth).

The new record

During a botanical exploration carried out on 4 October 2022 in the Los Queules National Reserve (Maule Region, Chile; Fig. 1), 19 fronds, presumably at least partly connected by rhizomes and thus corresponding to an unknown number of individual plants fronds of *A. trilobum* (Fig. 3), were observed in a small swampy wetland (35°59'11.84"S; 72°41'11.53"W). The fronds were found on the northwestern face of the trunk of a *Myrceugenia parvifolia* (DC.) Kausel individual with a remarkably large diameter of about 40 cm at breast height, which is an unusual attribute for this species, located at 404 m a.s.l. (Fig. 2). The discovery in this wilderness area extends the distribution in Chile by 86 km to the north, which was previously limited to the east of the municipality of Penco (36°44'9.26"S / 72°57'42.5"W) (e.g. Rodríguez et al. 2018, Rodríguez 1995). The specimen has been deposited in the CONC herbarium under code 192770.

The site is located on the eastern edge of the wilderness area, about 60 metres from forest plantations. The accompanying species were *Parablechnum chilense* (Kaulf.) Gasper &

Salino, *Luzuriaga polyphylla* (Hook.) J.F. Macbr., *Carex* cf. *excelsa* Poepp. ex Kunth, *Chusquea* cf. *quila* Kunth, *Myrceugenia exsucca* (DC.) O. Berg, *Myrceugenia parvifolia* (DC.) Kausel, *Drimys winteri* J.R. Forst. & G. Forst., *Hydrangea serratifolia* (Hook. & Arn.) F. Phil., *Ercilla* cf. *spicata* (Bertero) Moq., *Rhamnus diffusus* Clos, *Boquila trifoliolata* (DC.) Decne., and *Ugni candollei* (Barnéoud) O. Berg.



Figure 2.

Study site in the Los Ruiles National Reserve.

a: In the centre of the picture, there is a specimen of *Myrceugenia parvifolia* and associated species including *Chusquea* cf. *quila* and *Carex* cf. *excelsa* [doi](#)

b: Detail of *M. parvifolia* leaves [doi](#)

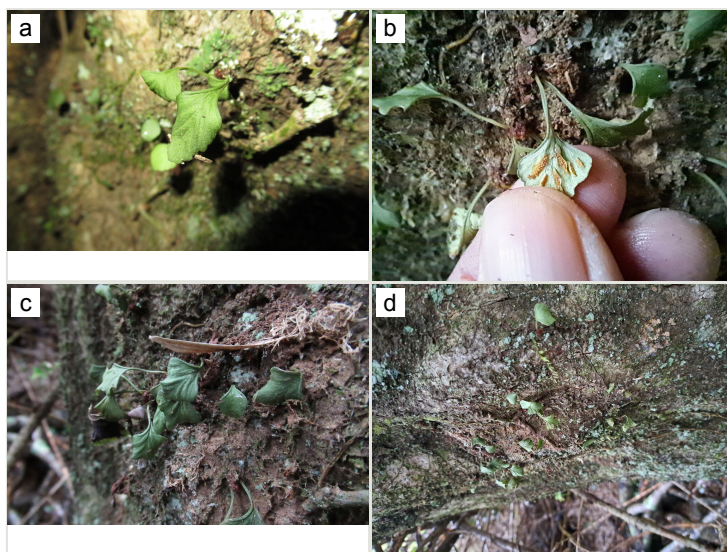


Figure 3.

Photographs of *Asplenium trilobum* growing on the bark of *Myrceugenia parvifolia*.

a: Frond adaxial surface (photography taken with flash) [doi](#)

b: Sori on the abaxial surface [doi](#)

c: Fronds taken in natural light [doi](#)

d: Fronds photographed from a perspective that allows their position on the trunk to be appreciated. [doi](#)

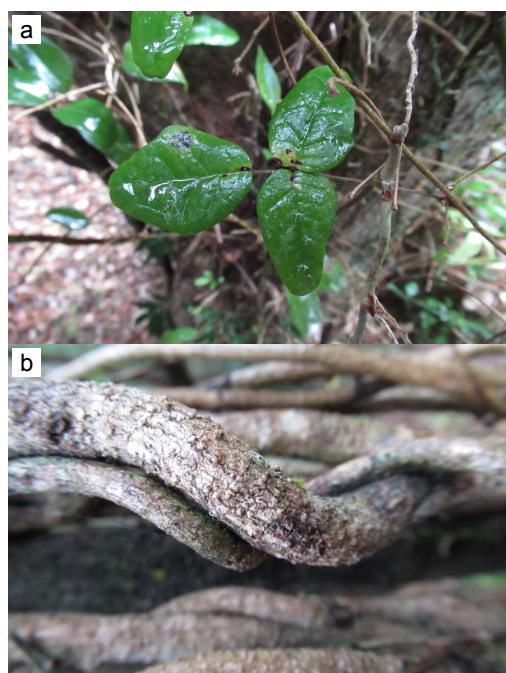


Figure 4.

Boquila trifoliolata.

a: Leaves [doi](#)

b: Stem [doi](#)

It is important to note that *Carex* cf. *excelsa* (Fig. 2a), *Chusquea* cf. *quila* (Fig. 2a), *Ercilla* cf. *spicata* (Fig. 5) and *Boquila trifoliolata* (Fig. 4) are new records for this wilderness area (Arroyo et al. 2005). The species identified as "cf." in this study indicate that the identification of these species is tentative, as reproductive structures were not observed at the time of sampling, making accurate identification difficult. The presence of *Ercilla spicata* in the study area is highly plausible, as it is one of only two species within its genus. *Chusquea quila* is also highly possible, as its morphology is clearly different from the only *Chusquea* species previously recorded at the site: *C. cumingii*. However, the identification of these species still needs to be confirmed. In a similar case, although *Carex aphylla* Kunth and *Carex excelsa* L. have been reported from nearby wild areas (Arroyo et al. 2005), the plant found in this swamp habitat seems more consistent with *C. excelsa*. If confirmed, this would be the first record of this genus at the site.

Importance of botanical explorations

The importance of botanical exploration in advancing our taxonomic knowledge is inestimable. However, many biodiversity studies have shown a marked accessibility bias, with sampling favouring areas close to major roads and other access routes, leaving interior and remote regions largely undersampled (Bebber et al. 2010, Hortal et al. 2015,

ter Steege et al. 2016). This sampling bias may result in the omission of rare or restricted species (Gotelli and Colwell 2001).



Figure 5.

Ercilla cf. *spicata* and its microhabitat.

a: Microhabitat. The picture shows associated species such as *Parablechnum chilense* and *Luzuriaga polyphylla*. [doi](#)

b: Leaves adaxial surface (photograph taken with flash) [doi](#)

c: Leaves abaxial surface (photograph taken with flash) [doi](#)

d: Habit in natural light [doi](#)

New species and distribution records are frequently detected in previously explored areas (e.g. Joppa et al. 2010, Pincheira-Ulbrich et al. 2022, Villarroel et al. 2022). This highlights the need to intensify sampling efforts, both in remote areas and in accessible regions that have also been under-sampled (e.g., Meyer et al. 2016, Pincheira-Ulbrich et al. 2021). Plant taxonomy, although fundamental to understanding biodiversity, faces serious challenges due to the scarcity of experts (Hopkins and Freckleton 2002, Wheeler et al. 2004, Rouhan and Gaudeul 2020).

In the context of this study, it is possible to suggest that the distribution of *A. trilobum* in Chile may be more extensive than we know. The discovery of *A. trilobum* in the Los Queules National Reserve, and the detection of other previously unrecorded species in the area, underlines the existence of a diversity and distribution of species yet to be explored and understood in these ecosystems. Consequently, the development of inventories and basic research in under-explored areas, such as ravines and forest remnants, should be promoted. Finally, it is crucial to encourage the training of advanced human capital in botany, taxonomy and genetics, areas that have received little attention from the Chilean State.

Acknowledgements

To Carlos Reyes, manager of Reserva Nacional Los Queules, for his guidance in the field. To Alicia Marticorena, for generously providing the geographic distribution data of *A. trilobum* from the CONC Herbarium. To Martina Pincheira and Benjamín Pincheira, for her support in the field. This research was supported by the Chilean agency ANID FONDECYT, under postdoctoral project number 3200698. We thank Michael Kessler, Jefferson Prado and an anonymous reviewer for their dedicated work in reviewing our manuscript. This publication was funded by the Núcleo de Investigación en Estudios Ambientales of the Universidad Católica de Temuco.

Funding program

ANID FONDECYT Postdoctoral 3200698

Grant title

Estructura de los ensambles de plantas trepadoras y epífitas vasculares en áreas silvestres localizadas en la franja de interacción fitogeográfica mediterráneo-templada de Chile: base para comprender los potenciales efectos del cambio climático global.

Hosting institution

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Conflicts of interest

The authors have declared that no competing interests exist.

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