

New record of *Hymenophyllum caudatum* Bosch (Polypodiopsida, Hymenophyllaceae) extends the mainland distribution in the coastal Mediterranean Forest of South America.

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Abstract

During a botanical exploration in the Los Ruiles National Reserve (Chile), a population of *Hymenophyllum caudatum* Bosch was identified. Fronds were found at the base of a rock, under a hygrophilous vegetation cover, in a ravine (35°49'56.49"S -72°30'42.44"W). The finding in this wilderness area extends the distribution by 120 km northwards on the mainland, which until now was limited to the coastal area of the city of Concepción (36°47'07.86"). This contribution presents an observed specimen, the site of the find and the accompanying species.

Keywords

stream flora, filmy fern, species distribution, species inventory

Introduction

Hymenophyllum caudatum Bosch is one of 24 species of filmy ferns described for the temperate forests of South America. In insular Chile, the species is found in the Juan Fernández Archipelago (e.g. Furniel 2018) and on Mocha Island (e.g. Reiche 1903), more than 600 km and 32 km from the mainland, respectively. The known range of this species on the continent places the northern distribution limit on the Alejandro Selkirk (33°44'39.17"S) and Robinson Crusoe (33°38'34.33"S) Islands in the Archipelago above (Valparaíso Region), while on the mainland, the northernmost record is located on the coastal strip of Concepción city (Parque Hualpén, Biobío Region, 36°47'07.86"S). The

southern limit is found at Puerto Edén, on Wellington Island, Magallanes Region (49°09'S -74°26'20"W) (pers. comm. Alicia Marticorena, curator of the CONC Herbarium, see also Diem and Lichtenstein 1959, Rodríguez 1995, Rodríguez et al. 2009, Larsen et al. 2013). In Argentina, the species occurs in the Province of Chubut, in Lago Puelo National Park (e.g. Cassá De Pazos et al. 2010) and Los Alerces National Park (see Larsen et al. 2013). The wide range of the species determines its occurrence in a Mediterranean-temperate transition zone to the north and anti-boreal climate to the south (Luebert and Plissock 2006).

A similar species with comparable morphology is found in the Atlantic Forest of Brazil, around 2000 km distant. Although precedents were arguing for morphological differences between the species found in Chile and Brazil (e.g. Diem and Lichtenstein 1959, Rodríguez 1995, Ebihara et al. 2006), evidence was insufficient to classify these populations as two separate species. However, based on genetic and morphological traits, Larsen et al. (2020) propose the name *H. caudatum* for the species found in the temperate forests of Chile and Argentina, while the species growing in the tropical and subtropical forests of Brazil would retain the original name given to the species: *Hymenophyllum caudiculatum*.

H. caudatum inhabits very humid and shady mature forests. In general, it has an epiphytic habit on trunks. However, it is also possible to observe it on the ground or on rocks (Larsen et al. 2013, Furniel 2018), even on decaying logs (e.g. Pincheira-Ulbrich et al. 2021).

The new record

In a botanical exploration conducted on 14 September 2021 in the Los Ruiles sector of Los Ruiles National Reserve (Maule Region, Chile; Fig. 1), ten fronds of *H. caudatum* were observed in a small ravine (35°49'55.58"S; 72°30'42.55"W). The species was found on the southeast face and at the base of a partially moss-covered rock at 228 m above sea level (Fig. 2, Fig. 3). The finding in this wilderness area extends the distribution by 120 km northwards on the mainland, which until now was limited to the coastal area of Concepción city (36°47'07.86") (e.g. Rodríguez 1995, Rodríguez et al. 2009). The sample was deposited in Universidad de Concepción's Herbarium under code CONC 192213.

The site is located about 240 m on a straight line from the main access to the Reserve, surrounded by a forest of *Nothofagus glauca* Krasser. To reach the site, a footpath, not open to the public, is followed before turning off along a ravine (Fig. 2).

On the same rock, we counted 57 fronds of *Hymenophyllum tunbrigense* (L.) Sm., two rosettes of *Fascicularia bicolor* (Ruiz & Pav.) Mez and one individual of *Lapageria rosea* Ruiz & Pav, with a climbing habit, fallen on the rock from a culm of *Chusquea culeou* E. Desv. In a radius of three metres from the centre of the rock, *Persea lingue* (Ruiz & Pav.) Nees (DBH = 10 cm) and *Aextoxicon punctatum* Ruiz & Pav. (DBH = 32 cm) were present in the tree layer and *Cryptocarya alba* (Molina) Looser was present on the forest floor at

the regeneration stage. In the shrub stratum, *Azara petiolaris* (D. Don) I.M. Johnston., *Jovellana punctata* Ruiz & Pav., *Rhamnus diffusus* Clos., *Baccharis racemosa* DC. and *Ugni candollei* (Barnéoud) O. Berg were observed. On the herbaceous layer, *Adiantum chilense* Kaulf., *Chusquea coleu*, *Dioscorea bridgesii* Griseb. ex Kunth, *Nassella* spp. and *Greigia sphacelata* (Ruiz & Pav.) Regel were present. The climber *Lardizabala biternata* Ruiz & Pav. was also recorded at a diameter of more than 1 cm on an individual of *A. punctatum* (Table 1).

Importance for conservation

This finding highlights the importance of protecting wetlands to maintain biodiversity (Möller and Muñoz-Pederos 2014), especially the remaining Mediterranean Forest ravines in the landscape, particularly in the context of climate change (Peñuelas et al. 2017). For example, Troncoso and San Martín (1988) found new populations of vascular plants in small *Drimys winteri* J.R. Forst. & G. Forst forests located in a series of ravines in a nearby geographical area, which implied an extension of the northern limit of the range for several of these species. Similarly, Stoll and Hahn (2004) extended the northern limit of three species of the Hymenophyllaceae family, recorded in two ravines of the coastal mountain range in the same area. These species were: *Hymenophyllum cruentum* C. Presl, found growing on rocks, *Hymenophyllum darwinii* Hook. f. ex Bosch, growing epiphytically and *Trichomanes exsectum* Kunze found on the rock wall of a cave. Therefore, it seems necessary to encourage the development of inventories and basic research in streams or forest remnants, as well as to promote the training of advanced human capital in botany, taxonomy and genetics, which has been scarcely encouraged by the Chilean State.

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Conflicts of interest

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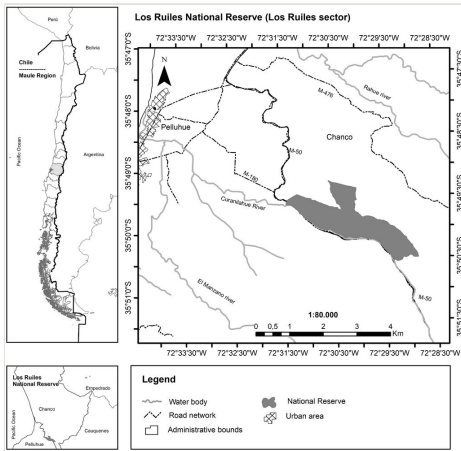


Figure 1.
Location map of Los Rulles National Reserve.

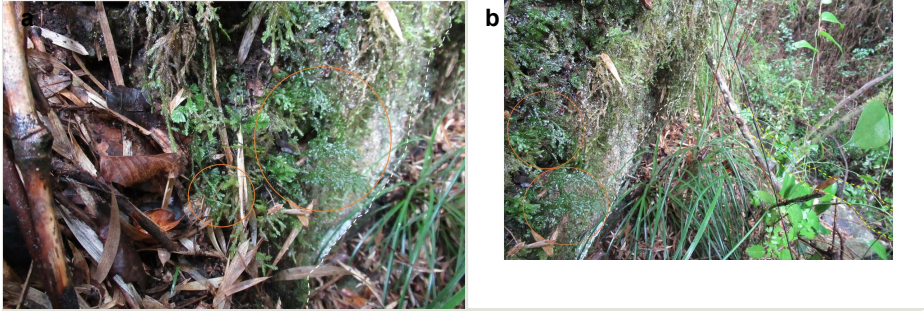


Figure 2.

Photographs of the site where the species was found. The dotted white line represents the rock's visual boundary and yellow dotted line represents the stream. The orange circles delimit some fronds of *H. caudatum*.

a: Accompanying species: *Hymenophyllum tunbrigense*, *Chusquea culeou* and also a single leaf of *Nothofagus glauca*.

b: Accompanying species: *Fascicularia bicolor*, *Jovellana punctata* and *Lapageria rosea*.



Figure 3.

Specimen of *H. caudatum*.

a: Frond

b: Petiole and rachis

c: Rhizome

d: Petiole and rhizome (human finger scale)

e: Sorus (human finger scale)

f: Sorus

Table 1.

Companion species found in the surroundings of *H. caudatum*. Species classification according to family, growth form and habit criteria are based on Rodriguez et al. (2018) and IPNI (2022).

Specie	Family	Gowth form	Habit
<i>Adiantum chilense</i> Kaulf.	Pteridaceae	Terricolous	Herb
<i>Aextoxicon punctatum</i> Ruiz & Pav.	Aextoxicaceae	Terricolous	Tree
<i>Azara petiolaris</i> (D.Don) I.M.Johnst.	Salicaceae	Terricolous	Shrub
<i>Baccharis racemosa</i> DC.	Asteraceae	Terricolous	Shrub
<i>Chusquea culeou</i> E. Desv.	Poaceae	Terricolous	Herb
<i>Cryptocarya alba</i> (Molina) Looser	Lauraceae	Terricolous	Tree
<i>Dioscorea bridgesii</i> Griseb. ex Kunth	Dioscoreaceae	Terricolous / Vine	Herb
<i>Fascicularia bicolor</i> (Ruiz & Pav.) Mez	Bromeliaceae	Lithophyte / Epiphyte	Herb
<i>Greigia sphacelata</i> (Ruiz & Pav.) Regel	Bromeliaceae	Terricolous	Herb
<i>Hymenophyllum tunbrigense</i> (L.) Sm.	Hymenophyllaceae	Lithophyte / Epiphyte	Herb
<i>Jovellana punctata</i> Ruiz & Pav	Calceolariaceae	Terricolous	Shrub
<i>Lapageria rosea</i> Ruiz & Pav	Philesiaceae	Terricolous / Vine	Shrub
<i>Lardizabala biternata</i> Ruiz & Pav.	Lardizabalaceae	Terricolous / Liana	Shrub
<i>Nassella</i> spp.	Poaceae	Terricolous	Herb
<i>Persea lingue</i> (Ruiz & Pav.) Nees	Lauraceae	Terricolous	Tree
<i>Rhamnus diffusus</i> Clos	Rhamnaceae	Terricolous	Shrub
<i>Ugni candollei</i> (Barnéoud) O. Berg	Myrtaceae	Terricolous	Shrub