

NEW RECORDS OF THE INVASIVE *CAMPYLOPUS INTROFLEXUS* (BRYOPHYTA) IN EASTERN SPAIN

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ABSTRACT: Two new populations of the alien and invasive moss species *Campylopus introflexus* (Hedw.) Brid. are recorded from the Eastern Iberian Peninsula (Castellón province). **Keywords:** bryophyte; moss; invasive species; Iberian Peninsula; Castellón; Spain.

RESUMEN: Se indica el hallazgo de dos poblaciones del musgo invasor *Campylopus introflexus* (Hedw.) Brid. en la provincia de Castellón, en el parque natural de la sierra de Espadán. **Palabras clave:** briófitos; musgos; especie invasora; península Ibérica; Castellón; España.

INTRODUCTION

Campylopus introflexus (Hedw.) Brid. (Bryophyta, Dicranaceae) is a species of alien bryophytes (mosses) which is considered to have expanded worldwide outside its natural range, the tropical areas of the southern hemisphere (ESSL, 2013). The first observations from Europe date back to the first half of the 20th century, although their colonization pathways are unknown (KLINCK, 2010). In recent years there has been an increase in documenting the presence of *C. introflexus* in the Mediterranean basin (PERICÀS & al., 2016; PUGLISI & PRIVITERA, 2017), including the Iberian Peninsula (BENJUMEA & al. (2013) where it was scarcely reported.

Most of the recent reports in the later area are from NE Iberian Peninsula (Catalonia) and the Balearic Islands, two of the best known and intensive surveyed Spanish territories from a bryological perspective (fig. 1). However, the species is extremely rare in E Spain where it has been recently reported from a single location (Sierra Calderona), not far away from human settlements (SEGARRA-MORAGUES & PUCHE, 2016).

Recent bryological field work focusing to increase the bryological knowledge of sandstone substrates from Castellón province (Valencian Community, E Spain) has led to the discovery of two unnoticed populations of *C. introflexus* which are here reported. Voucher specimens are held in the private herbarium of the senior author at the Botanical Garden of Valencia University.

RESULTS

Campylopus introflexus (Hedw.) Brid.

Hs, CASTELLÓN: 30SYK3318, Artana, terraces, 260 m, 3-II-2021, J. Miravet. 30SYK3115, Eslida, towards Nevera de Castro, subvertical crevices in exposed locations, 705 m, 25-V-2021, A.J. Maravilla, J. Miravet & J.A. Rosselló.

The species has been located in two small areas of the sierra de Espadán mountains, at the foothills of the Sistema Ibérico mountain range, between the Palancia and the Mijares rivers. The substrates are mainly composed by sandstone, slate and schist rocks, although limestone and stony clay soils are rarely present. The average annual

rainfall where *C. introflexus* grows is over 650 mm. Companion moss species at Sierra de Espadán are few and include *Dicranella heteromalla*, *Hypnum cupressiforme*, *Tortella squarrosa*, and thalli of the lichen-forming fungi *Cladonia*.

The two recorded populations from Artana and Eslida municipality sites are separated about 3 km apart, but they are in contrasting environments (fig. 2-3). At Artana, the species grows on terraces under a *Quercus suber*-*Pinus pinaster* canopy, among shrubs and vines (*Osyris alba*, *Erica arborea*, *Cistus salviifolius*, *Lavandula stoechas*, *Ulex parviflorus*, *Smilax aspera*, *Clematis flammula*). The population was found near forest tracks from a residential settlement, in slightly human-disturbed habitats. In contrast, the population from Eslida is located in pristine habitats, not subjected to human disturbance, at sandstones crevices in open environments. In both sites, *C. introflexus* does not form large colonies and it covers a small amount of surface.

As far as our limited observations are concerned, the two populations of *C. introflexus* do not show capsule production. However, stem propagules are present in a significant amount at both populations. Additional monitoring studies are required to substantiate the absence of sexual reproduction in both populations. Unfortunately, no data related to reproductive behaviour was given by SEGARRA-MORAGUES & PUCHE (2016) for the other known population from E Spain.

Intensive bryological field trips to sierra de Espadán mountains have been previously conducted (PUCHE & al, 2000) failing to discover *C. introflexus*. However, the localities of Artana and Nevera de Castro and their surroundings, where we have located this species, were not surveyed. Thus, currently available data appears inconclusive regarding the independent number and precise time of introduction of the E Spain populations of *C. introflexus*.

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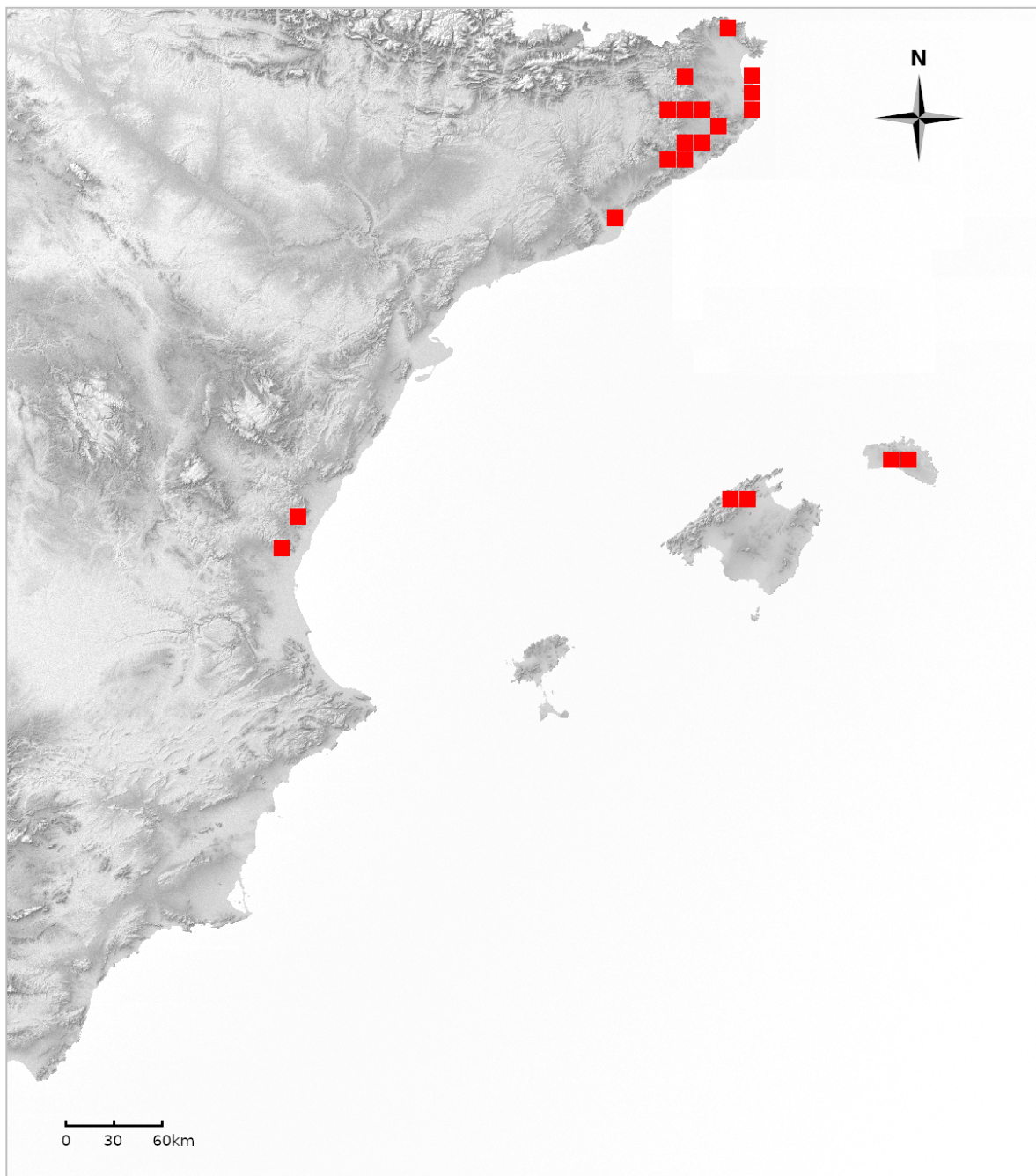


Figure 1. Distribution of *Campylopus introflexus* in E Spain and the Balearic Islands. Data from BRUGUÉS & CROS (2021), SEGARRA-MORAGUES & PUCHE (2016) and our own observations.



Figure 2. *Campylopus introflexus* growing at Artana (30SYK3318).



Figure 3. *Campylopus introflexus* growing at Eslida, towards Nevera de Castro (30SYK3115).

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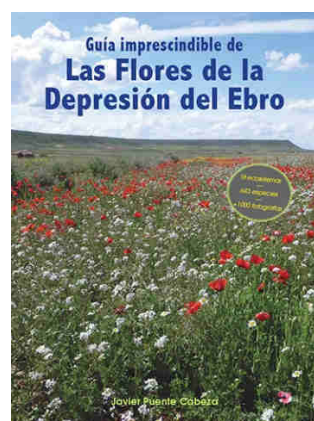
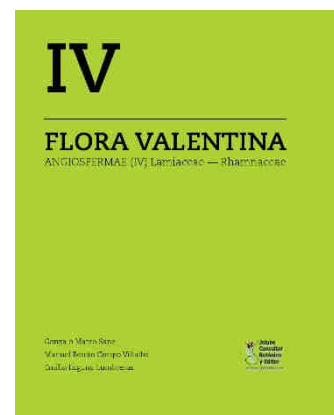
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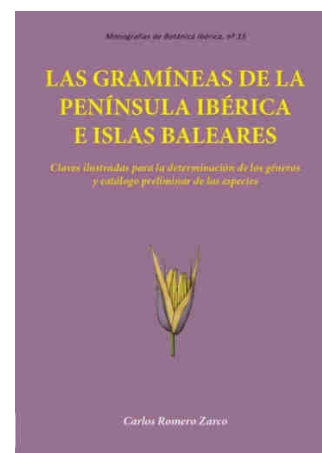
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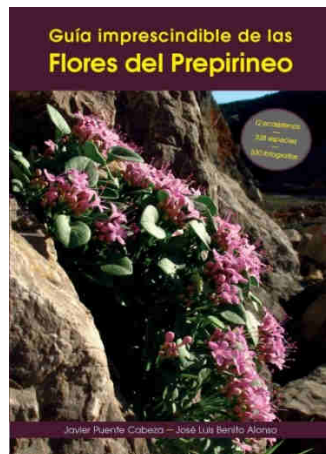
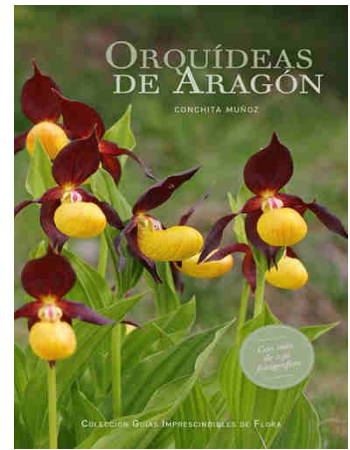
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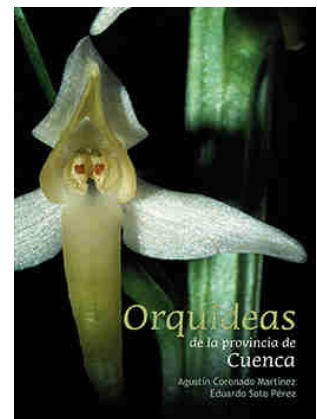
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