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***Isoëtes gymnocarpa* and *Utricularia* × *neglecta* – new taxa for Montenegro**

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Short communication

Isoëtes gymnocarpa and *Utricularia* × *neglecta* – new taxa for Montenegro

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Running title: NEW PLANT TAXA FOR MONTENEGRO

Abstract – One lycophyte genus and species (*Isoëtes gymnocarpa*), and one aquatic magnoliophyte species (*Utricularia* × *neglecta*) new for the flora of Montenegro are reported. It is suggested that the new population of *Isoëtes gymnocarpa* and its habitat should be protected.

Keywords: aquatic magnoliophytes, Balkans, flora, lycophytes, Montenegro, new records

Introduction

The flora of Montenegro (SE Europe) is easily recognized as one of the richest in Europe by the ratio of the number of species per square km (Pulević 2022). This is a reflection of evident habitat heterogeneity and richness resulting in large amounts of different ecological niches available for plants. A long tradition of botanical research has resulted in the more than 3,600 species and subspecies of vascular plants known from the Montenegrin flora (Rohlena 1942, Pulević 2005, 2022, Stešević et al. 2008, Stešević & Caković 2013, 2021). However, some habitat types, e.g., small temporary and permanent water bodies and wetlands in coastal region, have received less attention (cf. Bubanja 2016, Bubanja et al. 2016). A lot of them can be referred to “Mediterranean temporary ponds”, a priority habitat according to the European Union 92/43 Habitats Directive, showing a clearly regressive trend. Distributional patterns of plants associated with these habitats in the Balkan Peninsula are still poorly known.

Materials and methods

Some localities in the coastal region and Zeta plain of Montenegro were surveyed during 2022 and 2023 as potential habitats for charophytes (Characeae), focussing on species of plants associated with them. All types of water bodies and wetlands encountered were checked, including Mediterranean temporary ponds, inundated sand pits, quarries, and artificial depressions, excavated ponds, drainage channels, puddles, concrete ponds, temporary and permanent streams and springs and the water bodies associated with them. The strong seasonality in the traits of water bodies and the appearance of aquatic plants as well as habitat heterogeneity are remarkable for the area surveyed. The specimens were collected by hand and studied in a living state. Voucher specimens were deposited in the Herbarium of the Natural History Museum of Montenegro (NHMM) and the Herbarium Mediterraneum Panormitanum (PAL). The nomenclature for lycophytes follows Troia & Greuter (2014), for *Utricularia*, Bobrov et al. (2022).

Results and discussion

Fifteen species of charophytes, belonging to the genera *Chara* L., *Lamprothamnium* J.Groves, *Nitella* C.Agardh, *Tolypella* (A.Braun) A.Braun, and *Sphaerochara* Mädler, were found in the research area. Our efforts aimed at the listing of all associated vascular plant species resulted in the finding of one genus and two species, new for the flora of Montenegro.

Isoëtes gymnocarpa (Gennari) A.Braun (Fig. 1A): North of the Nature Park Ulcinjska Solana (US), unshaded drainage channel within farmland moderately damaged by livestock and probably briefly inundated during winter and early spring, 41.92966 N, 19.27361 E, 3 m a.s.l., 17 IV 2023, leg: Roman Romanov (RR) and Snežana Dragičević, det: Angelo Troia (NHMM, PAL).

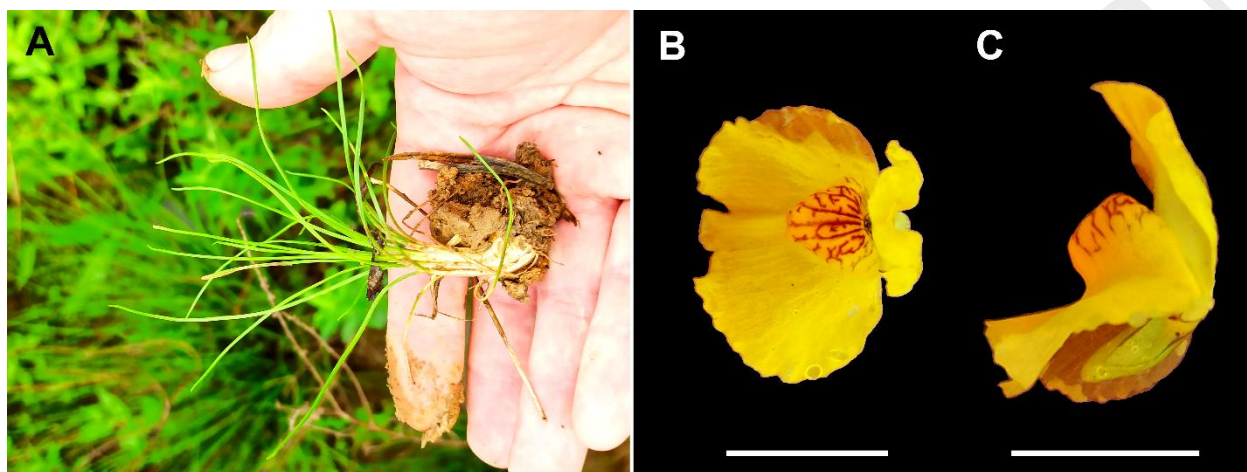


Fig. 1. New genus and species records for Montenegro: A – *Isoëtes gymnocarpa*, general appearance of unearthed plant, B, C – *Utricularia* × *neglecta*, B – isolated corolla showing large flat lower lip, view from above, C – isolated corolla showing short straight spur and nearly right angle between upper and lower lips, lateral view. Scale: B, C – 1 cm. All photos were taken from the voucher specimens by R. E. Romanov.

This habitat is characterized by the specific water regime, which implies an alternation of wet (winter, spring) and dry phases (summer and autumn), just like that in the meadows in the immediate vicinity with mosaic habitats and communities of wet grasslands and pastures which host Mediterranean therophytes and geophytes. These agricultural lands are pastures grazed by livestock (sheep, cows) or partly arable land, with other negative impacts in the immediate environment (like cutting of surrounding trees and shrubs and the associated physical disturbance). The cover abundance of *Isoëtes* was low, not exceeding 20%. The plants were spotted within an area of less than 10 square meters.

The locality is currently outside the Nature Park Ulcinjska Salina, but because of the presence of this rare species of *Isoëtes*, it should be protected by the Park area being extended to include it.

Isoëtes gymnocarpa is close to *I. histrix* Bory (for its terrestrial habitat, and for the presence of phyllopodia and tuberculate megaspores), the main diagnostic character being the length of phyllopodia lateral teeth (not longer and thinner than the central tooth as in *I. histrix*, but as long and as thick as the central tooth, cf. Troia & Greuter 2014, 2015a, 2015b). The group needs further investigation, but we follow here the taxonomic view of Troia & Greuter (2015a) with *I. gymnocarpa* = *I. sicula* Tod. = *I. subinermis* (Gennari) Cesca & Peruzzi. The taxon so circumscribed is spread around the Mediterranean area, from the Iberian Peninsula to Anatolia: the population here reported is the northernmost along the Adriatic coasts, both in the Balkan

Peninsula and in Italy. A previous report of *I. hystrix* for southern Albania (Barina et al. 2013) should be checked to assess if it belongs to *I. hystrix* or to *I. gymnocarpa*.

Isoetes gymnocarpa should be recognized as indigenous to Montenegro because no cases of non-native species are known for this genus. The inconspicuous general habit of terrestrial *Isoetes*, having the appearance of sterile monocots, can be a possible explanation why species of this genus were not spotted in Montenegro before.

Utricularia × *neglecta* Lehm. (Fig. 1B, C): Morača River, the lower reaches, the island of Vranjina, the wetland of Bakine Tige (BT), 19 VI 2023, 42.28217 N, 19.15145 E, 4 m a.s.l., 19 VI 2023, leg: RR, det: RR (NHMM); BT, small floodplain pool, 42.28746 N, 19.15261 E, 5 m a.s.l., 19 VI 2023, leg: RR, det: RR (NHMM). The cover abundance was low, not exceeding 20 % in both cases.

This hybrid is widely distributed in temperate and tropical regions of the Old World (Taylor 1989, Uotila 2013, Bobrov et al. 2022, <http://www.plantsoftheworldonline.org/>). For a long time, it was reported as *U. australis* R.Br. It was mentioned from Montenegro, from Lake Skadar, based on images of sterile plants, not showing the leaf-teeth bristle character (<https://www.inaturalist.org/observations/31338617>), a trait only visible with microscopy. Moreover, the use of solely this character can be unreliable (Taylor 1989). Therefore, our records are either the first verified ones for Montenegro, or else can be recognized as a confirmation of an earlier uncheckable record. The infrequent and short period of flowering, usually associated with habitats difficult of access, hampers reliable recording of *Utricularia* species. This hybrid seems to be indigenous to Montenegro; no cases of introduction are known for it in the Balkan Peninsula.

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