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Abstract: Floristic records of an alga from Hungary and a moss from Greece are reported, i.e. new Hungarian occurrence of a rare alga, *Sellaphora archibaldii* and the first confirmed record of a moss, *Entosthodon hungaricus* from Greece. We report the first data on *Orobanchë bartlingii* from the Sokoró Hills and the first observation of *Trifolium diffusum* from the Kisalföld region.

Key words: Algae, Bacillariophyceae, bryophyte, Fabaceae, Funariaceae, Greece, Hungary, Orobanchaceae, moss

INTRODUCTION

This paper is the 21th part of the series launched in *Studia botanica hungarica* focusing on the new chorological records, nomenclature, and taxonomy of plant species from algae to vascular plants and fungi (AKÁC *et al.* 2024, ASZALÓSNÉ BALOGH *et al.* 2021, BARINA *et al.* 2015, 2020, BAUER *et al.* 2023, CSIKY *et al.* 2017, DEME *et al.* 2019, DUDÁŠ *et al.* 2024, FARKAS *et al.* 2022, KIRÁLY *et al.* 2019a, b, MATUS *et al.* 2018, MESTERHÁZY *et al.* 2017, PAPP *et al.* 2016, 2020, RIGÓ *et al.* 2023, SCHMIDT 2020, SCHMIDT *et al.* 2018, SÜVEGES *et al.* 2021, TAKÁCS *et al.* 2016).

The recent part of the series provides new records of four species, an alga, a moss, and two vascular plants.

NEW RECORDS WITH ANNOTATIONS

Algae, Bacillariophyceae, Sellaphoraceae

(204) *Sellaphora archibaldii* (J.C. Taylor & H. Lange-Bertalot) É. Ács, C.E. Wetzel & L. Ector (Sellaphoraceae, Naviculales)

Hungary, Pest County, Soroksár-Danube, Ráckeve, near Árpád-bridge. Lat.: 47,161334° N; Long.: 18,948285° E; and Soroksár-Danube, Dunaharaszti, near railway bridge. Lat.: 47,359811° N; Long.: 19,080066° E, Leg.: Akác, A., Cser, B., 27.08.2024, det.: Buczko, K.

The species was found in two samples collected in the Soroksár-Danube system. The sites were sampled in the frame of biomonitoring implemented by the Nitrates Directive and Fish Physiology project of Pest County Government Agency, labelled as No.:3013/2024; 3015/2024, and deposited in the Collection of Algae, Hungarian National Museum Public Collection Centre, Budapest – Hungarian Natural History Museum as HNHM-ALG-D-2024/3013 and 2024/3015. *Sellaphora archibaldii* was described as *Eolimna archibaldii* by TAYLOR & LANGE-BERTALOT (2006).

The taxon was first recognized in March 2002, in River Vaal at Klipplaat Drift in South Africa and it was also detected in River Wilge in the same year. In River Vaal it was the dominant species with a relative abundance of 48% (TAYLOR 2004). For a long while, it had been considered as an endemic species to South Africa (TAYLOR *et al.*, 2007a, b). The earliest European record came from Spain (BLANCO *et al.*, 2009), and it was subsequently reported from Hungary (ÁCS *et al.*, 2017), Germany (HOFMANN *et al.*, 2018), and France (PEETERS & ECTOR, 2019), refuting the previously assumed endemic status of the taxon. ÁCS *et al.*, (2017) provided an emended description of *S. archibaldii* with a detailed distribution map based on its early records. The recent distribution data are available e.g. in Algbase (GUIRY & GUIRY 2025); including Asian records.

The taxon was first discovered in Hungary in an oxbow of the River Tisza, specifically Kanyari Holt-Tisza in 2011 (ÁCS *et al.*, 2017). The next data about the Hungarian occurrences of *S. archibaldii* came from 2019 and 2020, when a comprehensive survey of lesser-known waterbodies was carried out in the framework of KEHOP-1.1.0-15-2016-00002 project (ÁCS *et al.*, 2023). Altogether 75 lentic (standing waters) and 90 lotic (running waters) systems were sampled within the framework of this nationwide project associated with the EU WFD. *Sellaphora archibaldii* was detected in 7 lentic waters and 8 lotic waters among them with a maximum dominance value of 14.4% (BÍRÓ *et al.*, 2022, ÁCS *et al.*, 2023).

In 2024 we recorded its presence in the Soroksári-Danube, interpreting this as the appearance of *Sellaphora archibaldii* in the waters of the Danube.

This may indicate that the species is spreading. The Soroksár-Danube is the second largest side arm of the Danube in Hungary with its 57.3 km length between the 1642 and 1586 river kms (SZABÓ *et al.*, 2001). It maintains a continuous connection with the main river channel; However, a sluice system regulates its flow rate and water level. The Soroksári-Danube lies in the densely populated agglomeration area of Budapest; thus, it is heavily exposed to human activities including significant industrial impacts. At the same time, it also offers various recreational activities such as rowing, angling, leisure activities, water sports. The water quality of the Soroksári-Danube has attracted general attention. The history of algalological studies of the river is summarized in SZABÓ *et al.*, (2001).

In its natural habitat, *S. archibaldii* occurs in alkaline, eutrophic waters with elevated electrolyte content (TAYLOR *et al.* 2007a). Due to its small size, it can be easily confused with species of *Mayamaea* or especially with *Brevilinea kevei* (ÁCS *et al.*, 2023). Fortunately, it has great observable characteristics in LM such as the raphe and prominent central nodule. In general, the valve length is 5.5-6.5 μm while the valve width is 2.8-3.5 μm . Its shape is rhombic-elliptic with rounded to slightly pointed apices.

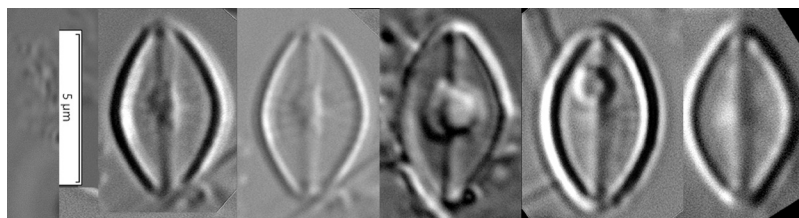


Fig. 1. *Sellaphora archibaldii* (light microscope). Soroksári-Danube, Ráckeve, 27.08.2024.

Achnantheidium minutissimum (Kützing) Czarnecki, *Nitzschia inconspicua* Grunow were the dominant taxa in the first sample (3013). Subdominant taxa were *Amphora pediculus* (Kützing) Grunow, *Nitzschia lacuum* Lange-Bertalot, and *Achnantheidium eutrophilum* (Lange-Bertalot) Lange-Bertalot. Some rarely noticeable species were *Rhoicosphenia abbreviata* (C.Agardh) Lange-Bertalot, *Nitzschia amphibia* f. *amphibia* Grunow, *Nitzschia dissipata* (Kützing) Grunow, and *Gomphonema pumilum* (Grunow) Reichardt & Lange-Bertalot. On the other hand, *Nitzschia inconspicua* was the dominant species, in the sample taken from Ráckeve (3015), while *Achnantheidium minutissimum*, *Nitzschia dissipata*, *Nitzschia amphibia*, *Sellaphora nigri* (De Not.) C. E. Wetzel & Ector were subdominant. *Amphora pediculus*, *Navicula cryptotenella* Lange-Bertalot, *Staurosira venter* (Ehrenberg) Cleve & Moeller, and *Cyclotella meneghiniana*

Kützing were also detected in the sample. The relative abundance of *S. archibaldii* was less than 1% in both samples.

Although algae – including diatoms – are widely distributed and often considered cosmopolitan, they still exhibit distinct and well-defined biogeographical patterns and community structures. Understanding these patterns is especially important, as investigating invasive species in rapidly changing habitats is both necessary and well-justified.

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Bryophytes

(205) *Entosthodon hungaricus* (Boros) Loeske (Funariaceae, Funariales)

Greece, Central Macedonia, Vromolimnes near Xiropotamos village, saline grassland at a drainage channel. Lat.: 40°46'39,1" N; Long.: 23°30'03,9" E; Alt.: 340 m a.s.l., leg. Papp, B. and Tsakiri, E., 06.04.2025, det. Papp, B., [BP 199558], and Lat.: 40°46'34,3" N; Long.: 23°30'11,2" E; leg. Papp, B. and Tsakiri, E., 06.04.2025, det. Papp, B., [BP 199568], and Lat.: 40°46'29,7" N; Long.: 23°30'18,0" E; leg. Papp, B. and Tsakiri, E., 06.04.2025, det. Papp, B., [BP 199570]

It is a continental, Mediterranean moss (DÜLL 1985) of steppe and saline grasslands. Its European distribution includes the Canary Islands, Malta, Portugal, Spain, Sicily, Austria, Germany, Slovakia, Greece, Hungary, Montenegro, Romania, Serbia, Moldova, south-eastern European Russia, and Ukraine. It has also been recorded in Asian Russia, Kazakhstan, Kyrgyzstan, and Israel (SABOVLJEVIĆ *et al.* 2019).

Entosthodon hungaricus was reported for the first time from Greece by PAPP (2002) from the same locality, Vromolimnes basin. However, the voucher specimens deposited at the Hungarian Natural History Museum (BP 165060, 165061) have recently been revised to *Physcomitrium arenicola* Laz., thus, based on these specimens, *Ph. arenicola* has been reported for the first time in Greece (SABOVLJEVIĆ *et al.* 2025). As these voucher specimens were the only records of *E. hungaricus* from Greece, it means that the species should have been excluded from the Greek bryophyte flora. The two species are morphologically very similar at first glance, the main distinguishing characters are microscopic features found on the sporophytes: the size and wall thickness of the exothecial cells of the capsule, and the size and shape of the spores. Moreover, they live in the same habitats, saline grasslands, and can occur together in the same localities. Both species are spring ephemerals and appear in March-April. Therefore, at the beginning of April 2025, we conducted field research targeting these two species at the same locality mentioned by PAPP (2002), which resulted in the collection of three specimens of *E. hungaricus*. These specimens are the first real records of the species in Greece. A specimen of *Ph. arenicola* was also collected during the survey, which proves the coexistence of the two species at



Fig. 2. The Vromolimnes basin.

the same locality in Greece as well. Further accompanying bryophyte species were the following: *Barbula unguiculata* Hedw., *Bryum argenteum* Hedw., *Bryum dichotomum* Hedw., *Didymodon vinealis* (Brid.) R.H. Zander, *Ptychostomum torquescens* (Bruch & Schimp.) Ros & Mazimpaka, *Rhynchostegium megapolitanum* (Blandow ex F. Weber & D. Mohr) Schimp., *Scleropodium cespitans* (Wilson ex Müll.Hal.) L.F.Koch, *Tortella squarrosa* (Brid.) Limpr., *Tortula acaulon* (With.) R.H. Zander.

The area of Vromolimnes is situated in a basin (Fig. 2) surrounded by the Vertiskos Mt. (1.103 m a. s. l. north-west), the Kerdylia Mt. (1.091 m a. s. l., north-east), and the Volvi Mt. (659 m a. s. l., south-west). The plant composition of the area is considered a relic of the once rich coastal vegetation (BABALONAS *et al.* 1980), when the sea intruded into the basin from the Strymon Gulf through a small, tectonic valley during the Pleistocene epoch. Then, in the Middle Pleistocene, the Vromolimnes basin was cut off from the sea due to the elevation of the nearby mountain ranges. At its lower part, a lake was formed, which was later divided into two smaller lakes (Mavrouda and Lantza; PSILOVIKOS 1978).



Fig. 3. Habitat of *Entosthodon hungaricus*.

Nowadays, as a result of drainage processes the lakes disappeared. The area is an agricultural landscape with fragments of semi-natural meadows and remnants of halophytic vegetation. *Entosthodon hungaricus* and *Ph. arenicola* occur mainly along the drainage channels (Fig. 3), and their population size in the area can be estimated to be less than 50, based on population size measurements in 1x1 m squares in line with the IUCN (2017) recommendation.

B. Papp, E. Tsakiri

Vascular plants

(206) *Orobanche bartlingii* Griseb. (Orobanchaceae)

Hungary, Transdanubian Mountains, Pannonhalma Hills: Győrújbarát, Francia-kő, near Napóleon lookout tower, abandoned wine yard, 47.606809° N, 17.634940° E, 218 m a.s.l., leg. D. Schmidt & B. Bozsaky 11.06.2021 (BP HNHM-TRA 00703726)

This Eurasian species is sporadic or rare throughout its range (KREUTZ 1995). *Orobanche bartlingii* Griseb., belonging to the section *Osproleon* Wallr. subsection *Curvatae* Beck, was generally treated as a taxon within the closely

related species, *Orobanche alsatica* Kirschl., until the end of the 20th century (e.g., GILLI 1966, Soó 1968). It was first described as an independent species by NIESCHALK and NIESCHALK (1968), and from the 1990s onward this view was gradually adopted by an increasing number of European works (e.g. KREUTZ 1995; MELZER and BARTA 1995; UHLICH *et al.* 1995; VIRÓK 2009).

Its occurrence in Hungary became known during a herbarium revision: according to VIRÓK *et al.* (2004), its first specimens were collected in 1937 in the Velence Hills by ÁDÁM BOROS. The number of its confirmed localities is currently low in Hungary. It appears to be locally frequent only in smaller areas of the North Hungarian Mountains, such as the Rudabánya Hills (VIRÓK *et al.* 2004) and the Uppony Hills (Beránek in MOLNÁR *et al.* 2019, SÜLYÖK and BERÁNEK 2019). It is considered data deficient species (KIRÁLY 2007, VIRÓK 2025). In addition to the general identification difficulties typical of broomrapes, its presumed rarity may also be explained by its short flowering period. At the same time, its identification is facilitated by the fact that its exclusive host plant, *Libanotis pyrenaica* (L.) Bourg. is an easily recognizable species.

From the Transdanubian Mountains only one published record and three floristic mapping records had previously been known. In the Balaton Uplands, near Pálozszak, it was found along vineyard margins and in shrubby grassland patches (BAUER 2010), it has also been reported from a quadrant near Pécsely (MÉSZÁROS A. 2014 in BARTHA *et al.* 2021+) and from a quadrant in Zalahaláp (VOIGT W. and SZALAI-DOBOSNÉ MÁRTA M. 2021 in BARTHA *et al.* 2021+).

Its new occurrence is located in the Sokoró Hills, where the species had not previously been recorded. Its habitat is a somewhat shrubby, dicot-rich semi-dry grassland that developed in an abandoned orchard, where *Libanotis pyrenaica* is an abundant species. Among the host plant population, a few dozen flowering shoots of *O. bartlingii* were found. Parasitism of the host species was confirmed by excavating the haustorium attached to its root.

D. Schmidt

(207) *Trifolium diffusum* L. (Fabaceae)

Hungary, Kisalföld: Felpéc, Sisek Hill, on sandy fallow land on the eastern side of the hill, 47.536641° N, 17.588762° E, 125 m a.s.l. [8471.4], leg. and det. D. Schmidt, 07.06.2024; Felpéc, Sisek Hill, on sandy fallow land on the southern side of the hill, 47.532013° N, 17.587034° E, 127 m a.s.l. [8471.4], leg. and det. D. Schmidt, 07.06.2024; (BP HNHM-TRA 00732426, 00732427)

A species with a Pontic–Mediterranean distribution (Soó 1966), whose continuous range extends westward to the Carpathian Basin (already absent in Austria), while it also appears in southern France and on the Iberian Peninsula. In Hungary, it occurs predominantly in the Great Hungarian Plain and its periphery, mainly in loess- and less frequently in sand-based grasslands, with many

observations coming from disturbed or fragmented grassland remnants (LUKÁCS *et al.* 2017, BÁTORI *et al.* 2024). Systematic studies of the vegetation of the lowland kurgans over the past decade have significantly expanded its previously scattered records (DEÁK *et al.* 2019, SÜVEGES *et al.* 2025, 2026), and these have been further supplemented by data collected as part of the Community Floristic Mapping in Hungary (2025) iNaturalist project (BARTHA *et al.* 2021+). East of the Danube, the species becomes much rarer, with only a few reports from the Balaton Uplands (BAUER *et al.* 2004, BAUER 2010), the Velence Hills, and the Dinnyési-Fertő area (BAUER 2019).

The occurrence of *Trifolium diffusum* has not been previously recorded in the Kisalföld region. In the summer of 2024, two localities were recorded during habitat mapping of the Sísek Hill near Felpéc, close to the southwestern foot of the Pannonhalma Hills. Both sites are sand-based fallow lands used as wild fields, which are occasionally disked. By early summer, the dominant species in the weed community were: *Ambrosia artemisiifolia*, *Ballota nigra*, *Bromus tectorum*, *Centaurea stoebe*, *Chondrilla juncea*, *Conyza canadensis*, *Erigeron annuus*, *Erysimum diffusum*, *Plantago lanceolata*, *Trifolium arvense*, and *Verbascum phlomoides*. Its appearance in the area can be considered unexpected due to the previous lack of records, but on the other hand, it supports the general slow expansion observed in the Great Hungarian Plain (SÜVEGES *et al.* 2026). It is also noteworthy that in Transdanubia, the precipitation conditions in spring 2024 were highly favourable compared to previous years for annual species flowering in late spring and early summer, and several legume species showed exceptional numbers of individuals.

D. Schmidt

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Összefoglaló: A sorozatban adatokat közlünk egy ritka alga, a *Sellaphora archibaldii* új magyarországi előfordulásáról és egy mohafaj, az *Entosthodon hungaricus* első bizonyított görögországi előfordulásáról. Az *Orobanché bartlingii* első előfordulási adatait közöljük a Sokorói-dombságból és a *Trifolium diffusum* első megfigyelését a Kisalföld régióban.

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