

Additions to the vascular flora of Tunisia

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Ključne besede: Severna Afrika, Magreb, tujerodne vrste, domorodne vrste

Abstract

Over the course of our twenty years of field surveys in Tunisia, we have discovered a number of new taxa in the country that include three alien species (*Crassula decumbens*, *C. helmsii* and *Euphorbia maculata*), one fern (*Thelypteris palustris*) and eight angiosperms (*Alisma lanceolatum*, *Baldellia repens* subsp. *repens*, *Bolboschoenus glaucus*, *Carex echinata*, *Crassula vaillantii*, *Isolepis pseudosetacea*, *Ononis hispida* subsp. *arborescens*, *Zannichellia obtusifolia*). *Sphenopus divaricatus* subsp. *permicranthus*, which was already known on the Tunisian islands, was discovered on mainland Tunisia. Finally, we confirm the presence of *Carex panormitana*, which was identified from living material for the first time.

Izveček

V dvajsetletnem obdobju terenskih raziskav v Tuniziji smo odkrili številne nove taksone, med njimi tri tujerodne vrste (*Crassula decumbens*, *C. helmsii* in *Euphorbia maculata*), eno praproto (*Thelypteris palustris*) in osem kritosemenk (*Alisma lanceolatum*, *Baldellia repens* subsp. *repens*, *Bolboschoenus glaucus*, *Carex echinata*, *Crassula vaillantii*, *Isolepis pseudosetacea*, *Ononis hispida* subsp. *arborescens*, *Zannichellia obtusifolia*). Takson *Sphenopus divaricatus* subsp. *permicranthus*, ki je bil že poznan s tunijskih otokov, smo našli tudi na kopnem delu Tunizije. Na koncu smo tudi potrdili prisotnost vrste *Carex panormitana*, ki smo jo prvič določili na osnovi živega materiala.

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Introduction

The three volumes of *Flora of Tunisia* were compiled in the 1950s and published over a period of two decades. The first volume (Cuénod et al., 1954) included Lycopodiophytes, Polypodiophytes, Gymnosperms and Monocots, while the next two volumes, published more than twenty years later (Pottier-Alapetite, 1979, 1981), addressed dicotyledons, i.e. basal Angiosperms, Magnoliidae and Eudicots. The compendium has become incomplete and largely obsolete due to numerous changes in nomenclature and taxonomy over the last several decades (e.g., Bowe et al., 2000; APG II, 2003; APG III, 2009; APG IV, 2016; PPG I, 2016). Le Floch and collaborators were moved to undertake a synonymic catalogue of Tunisian flora (Le Floch & Boulos, 2008; Le Floch et al., 2010), a subject that had already elicited renewed interest, such as El Mokni and collaborators' publications on alien plant species in Tunisia (e.g., El Mokni & El Aouni, 2012; El Mokni & Iamónico, 2018; El Mokni & Hadj Khalifa, 2020; El Mokni, 2021).

Over the course of twenty years of field surveys conducted in Tunisia, we discovered a number of vascular plants that had not been included in the *Tunisian Flora* of Cuénod et al. (1954) and Pottier-Alapetite (1979, 1981). One of these (*Pilularia minuta*) was the subject of an in-depth study (Daoud-Bouattour et al., 2011, 2014); the others have only received mentions in works addressing ecology (Ferchichi-Ben Jamaa et al., 2014; Rouissi et al., 2014, 2016) or in botanical catalogues (Ghrabi-Gammar et al., 2009; Daoud-Bouattour et al., 2025), without providing details about localities, dates or diagnostic features. Here we report these discoveries and provide their localities, dates, the names of the collectors and herbarium specimens, and discuss their biogeography and taxonomy.

Material and methods

Since 2006, our Franco-Tunisian team has carried out annual botanical field surveys. The surveys initially focused on the wetland flora of northern Tunisia (e.g., Daoud-Bouattour et al., 2009, 2011; Ghrabi-Gammar et al., 2009; Muller et al., 2010, 2011), but we subsequently extended our research to the entire country (Figure 1) to help update the Le Floch et al. (2010) synonymic catalogue.

Our collects have been identified according to Maghrebi floras (Cuénod et al., 1954; Quézel & Santa, 1962–1963; Pottier-Alapetite, 1979, 1981; Fennane et al., 1999, 2007, 2014) and related literature that was reviewed in the course of the catalogue update (Daoud-Bouattour et al., 2025). We also consulted ancient herbarium specimens preserved either in Tunisian herbariums (INAT, Faculté des Sciences de Tunis) or at Montpellier Uni-

versity (MPU). For some groups lacking modern, locally adapted keys, we created new ones using criteria given in recent floras of southern Europe: mostly *Flora Gallica* (Tison & De Foucault, 2014) and *Flora Iberica* (<http://www.floraiberica.es/>).

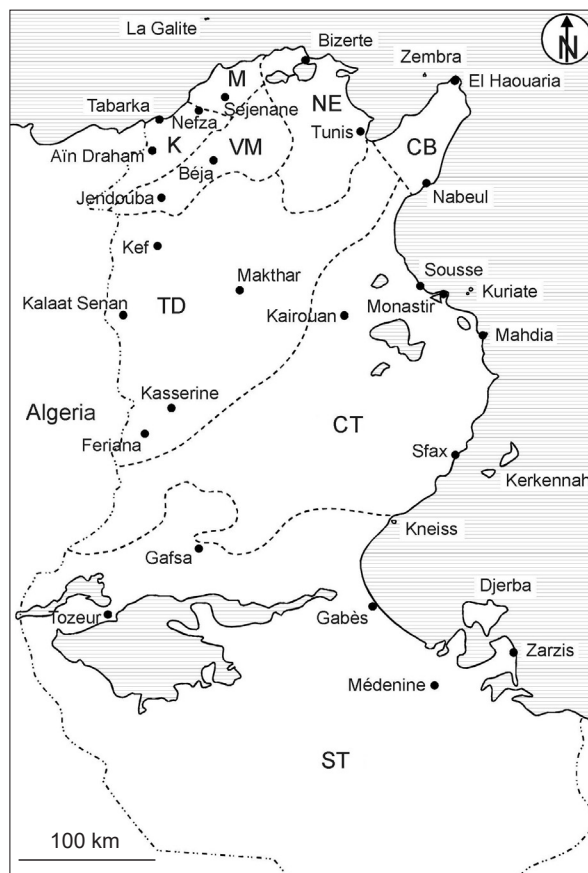


Figure 1: Regions and main cities of Tunisia. CB, Cap Bon; TD, Tunisian Dorsal; K, Kroumiria; M, Mogods; NE, Northeast; VM, Valley of Medjerda; CT, Central Tunisia; ST, Southern Tunisia.

Slika 1: Regije in glavna mesta Tunizije. CB, Cap Bon; TD, Tunijziski Dorsal; K, Kroumiria; M, Mogods; NE, severovzhod; VM, dolina Medjerda; CT, srednja Tunizija; ST, južna Tunizija.

Results and discussion

ALISMATACEAE

Alisma lanceolatum With., Bot. Arr. Brit. Pl., ed. 3, 2: 362 (1796) (Figure 2a)

≡ *Alisma plantago-aquatica* L. subsp. *lanceolatum* (With.) Arcang., Comp. Fl. Ital.: 709 (1882).

Specimens examined: Tunisia, Mogods, Garâa Sejenane (37°03'43"N, 09°13'12"E; 138 m a.s.l.), 21.IV.2008, leg. Amina Daoud-Bouattour; Tunisia, Kroumiria, Nefza (36°58'51"N, 09°04'02"E; 30 m a.s.l.), 23.IX.2023, leg. Imtinen Ben Haj Jilani.

Comments: Cuénod et al. (1954) and Le Floch et al. (2010) did not distinguish this taxon from *Alisma plantago-aquatica* L.. It has been observed since 2006 in Mogods and Kroumiria (northern Tunisia) by A. Daoud-Bouattour, I. Ben Haj Jilani and S. D. Muller (Daoud-Bouattour et al., 2011; Ferchichi-Ben Jamaa et al., 2014; Rouissi et al., 2014, 2016). It has been retained for Tunisia by Dobignard & Chatelain (2010–2013), without details about dates and localities, and then incorporated in the Tunisian flora by most of the online databases.

Alisma lanceolatum develops in shallow waterways, ditches and temporary ponds. It differs from *A. plantago-aquatica* mainly in its aerial leaf blades with $L/l > 3$ (vs. < 2.5) and a wedge-shaped base (vs. subcordate), and in petals that are generally pure pink (vs. white or pale pink), straight to bent stems (vs. straight) and occasionally a few achenes with 2 dorsal furrows (vs. always a single furrow). Our investigations only confirm the occurrence of both *A. lanceolatum* and *A. plantago-aquatica* in Tunisia. The recent mention of *A. gramineum* Lej. in the regions of Sejenane and Bizerte where it was erroneously considered an annual species by El Mokni & Domina (2020) could be the result of a confusion with *A. lanceolatum*.

Baldellia repens (Lam.) van Ooststr. ex Lawalrée, Nouv. Fl. Belg., Luxemb. N. Fr.: 759 (1973) subsp. ***repens*** (Figure 2b)

≡ *Alisma repens* Lam., Encycl. Méth. Bot. 2: 515 (1788).

≡ *Alisma ranunculoides* L. var. *repens* (Lam.) Duby, Bot. Gall. 1: 437 (1828).

≡ *Baldellia ranunculoides* (L.) Parl. subsp. *repens* (Lam.) Á. Löve & D. Löve, Bot. Not. 114 (1): 49 (1961).

Specimens examined: Tunisia, Kroumiria, Majen el Ma ($36^{\circ}46'52''N$, $08^{\circ}47'24''E$; 505 m a.s.l.), 27.V.2009, leg. Serge D. Muller; Tunisia, Mogods, Majen Chitane ($37^{\circ}09'08''N$, $09^{\circ}05'56''E$; 150 m a.s.l.), 22.VI.2010, leg. Amina Daoud-Bouattour.

Comments: While *Baldellia repens* is sometimes considered to be a subsp. of *Baldellia ranunculoides* (L.) Parl., we retain it at the species level according to *Plants of the World online* (<https://powo.science.kew.org/>), Kozłowski & Matthies (2009) and Daoud-Bouattour et al. (2025), because of the clear morphological and ecological differences between both taxa.

Cuénod et al. (1954) did not differentiate this taxon from *Baldellia ranunculoides* but it was collected (under *B. ranunculoides*) in 1952 at Majen Azoug (Kroumiria) by G. Pottier-Alapetite (MPU000622). It has been observed in peaty habitats of Mogods and Kroumiria since 2006 by A. Daoud-Bouattour and S. D. Muller.

It differs from *B. ranunculoides* by the presence of stolons (vs. absent), inflorescences with (1)2–6 flowers per whorl (vs. 6–20 flowers), that are often decumbent and rooting at nodes (vs. usually erect) and achenes with whitish papillae (vs. without papillae) that are generally grouped by < 20 (vs. > 20).

The *Baldellia repens* subsp. *repens*, endemic to the Iberian Peninsula, Canary Islands and the Maghreb, is opposed to subsp. *cavanillesii*, which is endemic to western Europe, and to the subsp. *baetica*, which is endemic to Andalusia. Kozłowski & Matthies (2009) note that *B. repens* grows on more acid substrates than *B. ranunculoides*, which develops in watery areas such as temporary ponds and lake shores. This is consistent with our own observations in Tunisia where *B. repens* is found in acid peaty habitats.

Red List status: *Baldellia repens* is listed as ‘Endangered’ in Tunisia (Daoud-Bouattour et al., 2022).

CRASSULACEAE

Crassula decumbens Thunb., Prod. Pl. Cap.: 54 (1794) (Figure 2f)

≡ *Gomara decumbens* (Thunb.) P. V. Heath, Calyx 5: 41 (1995).

Specimens examined: Tunisia, Kroumiria, Majen el Ma ($36^{\circ}46'52''N$, $08^{\circ}47'24''E$; 505 m a.s.l.), 27.V.2009, leg. Amina Daoud-Bouattour; Tunisia, Mogods, Garâa Sejenane ($37^{\circ}05'09''N$, $09^{\circ}11'55''E$; 100 m a.s.l.), 30.IV.2013, leg. Serge D. Muller.

Comments: Native to Australia and New Zealand, this taxon was collected at Garâa Sejenane, Cap Serrat (Mogods) and Majen el Ma (Kroumiria) by A. Daoud-Bouattour and S. D. Muller (Rouissi et al., 2016).

Crassula helmsii Cockayne, Trans. & Proc. New Zealand Inst. 39: 349 (1907) (Figure 2g)

= *Crassula helmsii* (Kirk) A. Berger, Nat. Pflanzenfam., ed. 2: 18a: 389 (1930).

Specimen examined: Tunisia, Mogods, Garâa Sejenane ($37^{\circ}05'29''N$, $09^{\circ}10'16''E$; 100 m a.s.l.), 30.IV.2013, leg. Serge D. Muller.

Comments: Native to Australia and New Zealand and introduced first in England, this taxon was collected in 2009 in Garâa Sejenane (Mogods; Rouissi et al., 2016) and subsequently in the brackish marshes (*sansouïres*) of Utique Nouvelle and Ichkeul National Park (Northeast) by A. Daoud-Bouattour and S. D. Muller. Extremely invasive, it seems to be seriously competing with the local flora in Garâa Sejenane, where it constitutes dense carpets.



Figure 2: Some newly recorded taxa: a, *Alisma lanceolatum* (Garâa Sejenane, 5 May 2007); b, *Baldellia repens* subsp. *repens* (Majen el Ma, 27 May 2009); c, *Bolboschoenus glaucus* (Garâa Sejenane, 4 May 2008); d, *Carex echinata* (Jbel Ghorra, 10 May 2023); e, *Carex panormitana* (Beni M'Tir, 5 May 2017); f, *Crassula decumbens* (Garâa Sejenane, 30 April 2013); g, *Crassula helmsii* (Garâa Sejenane, 8 May 2014); h, *Crassula vaillantii* (Garâa Sejenane, 20 April 2008); i, *Thelypteris palustris* (Ouchtata, 3 May 2013).

Slika 2: Nekateri novo zabeleženi taksoni: a, *Alisma lanceolatum* (Garâa Sejenane, 5.5.2007); b, *Baldellia repens* subsp. *repens* (Majen el Ma, 27.5.2009); c, *Bolboschoenus glaucus* (Garâa Sejenane, 4.5.2008); d, *Carex echinata* (Jbel Ghorra, 10.5.2023); e, *Carex panormitana* (Beni M'Tir, 5.5.2017); f, *Crassula decumbens* (Garâa Sejenane, 30.4.2013); g, *Crassula helmsii* (Garâa Sejenane, 8.5.2014); h, *Crassula vaillantii* (Garâa Sejenane, 20.4.2008); i, *Thelypteris palustris* (Ouchtata, 3.5.2013).

Crassula vaillantii (Willd.) Roth, Enum. Pl. Phaen. Germ. 1 (1): 992 (1827)

≡ *Tillaea vaillantii* Willd., Sp. Pl. 1: 720 (1798).

≡ *Bulliardia vaillantii* (Willd.) DC., Pl. Hist. Succ.: tab. 74 (1801).

Specimen examined: Tunisia, Mogods, Garâa Sejenane (37°05'09"N, 09°11'55"E; 100 m a.s.l.), 20.IV.2008, leg. Serge D. Muller.

Comments: Not mentioned by Pottier-Alapetite (1979), this taxon was discovered in 2006, along with *Elatine campylosperma* and *Pilularia minuta* (Ghrabi-Gammar et al., 2009), in Garâa Sejenane by A. Daoud-Bouattour and S. D. Muller. To date, this is its only known Tunisian locality.

The *Flora of Tunisia* (Pottier-Alapetite, 1979) only mentioned *Crassula alata* (Viv.) A. Berger, with two varieties today recognised at the species rank under *C. alata* and *C. tillaea* Lester-Garland. We thus propose a diagnostic key for the Tunisian *Crassula* that now comprise five species.

Diagnostic key of the genus *Crassula* in Tunisia

- 1a. Moss-like plant with very short internodes..... 2
- 1b. Plant with long internodes, more or less ramified ... 3
- 2a. Sessile flowers, generally 3-merous
..... ***C. tillaea*** [*C. alata* var. *genuina*]
- 2b. Pedunculate flowers, 4-merous, grouped in cymes of 3–7 flowers; distinctly mucronate sepals and upper leaves..... ***C. alata*** [*C. alata* var. *trichopoda*]
- 3a. Stem filiform, sparsely branched, with long internodes (monopod); pedicellate flowers, solitary in leaf axils; aquatic form resembling a tiny callitriche and terrestrial form forming dense, tangled clusters
..... ***C. helmsii***
- 3b. Stem branched at each node apparently dichotomously (sympod)..... 4
- 4a. Obtuse leaves; pink flowers with short sepals much smaller than petals ***C. vaillantii***
- 4b. Mucronate leaves; white flowers, sometimes tinged with pink, with long, fleshy sepals equal to petals
..... ***C. decumbens***

CYPERACEAE

Bolboschoenus glaucus (Lam.) S. G. Sm., Novon 5: 101 (1995) (Figure 2c)

≡ *Scirpus glaucus* Lam., Tabl. Encycl. 1: 142 (1791).

= *Scirpus tuberosus* Desf., Fl. Atlant. 1: 50 (1798).

= *Scirpus macrostachys* Willd., Enum. Pl. Hort. Berol.: 78 (1809).

= *Scirpus maritimus* L. var. *tuberosus* (Desf.) Roem. & Schult., Syst. Veg. 2: 139 (1817).

= *Bolboschoenus maritimus* (L.) Palla subsp. *macrostachys* (Willd.) Soják, Čas. Nár. Mus., Odd. Přír. 152: 19 (1983).

Specimen examined: Tunisia, Mogods, Garâa Sejenane (37°05'17"N, 09°12'07"E; 110 m a.s.l.), 26.V.2009, leg. Amina Daoud-Bouattour.

Comments: *Scirpus maritimus* L., cited by Cuénod et al. (1954), is a complex of three taxa in Europe and the Mediterranean region, which are treated at the species rank in the genus *Bolboschoenus* by Hroudová et al. (2007). Two of these – *Bolboschoenus glaucus* and *B. maritimus* (L.) Palla – are cited in Morocco by Fennane et al. (2014). Hroudová et al. (2007) specify that *B. glaucus* is a freshwater taxon adapted to temporary habitats and the most thermophilous of the group. *B. glaucus* differs from *B. maritimus* in its freshwater habitat (vs. brackish), akenes with epicarp < mesocarp (vs. epicarp ≥ mesocarp) and generally ramified inflorescences (vs. none or few). It was identified in Garâa Sejenane in 2010 by S. D. Muller (Ferchichi-Ben Jamaa et al., 2010; Rouissi et al., 2016).

Carex echinata Murray, Prodr. Stirp. Gött.: 76 (1770) (Figure 2d)

= *Carex stellulata* Gooden., Trans. Linn. Soc. (London) 2: 144 (1794).

Specimen examined: Tunisia, Kroumiria, Kbar el Hallouf (36°35'14"N, 08°21'33"E; 1005 m a.s.l.), 10.V.2023, leg. Serge D. Muller.

Comments: To date, this northern peatland species was known in North Africa only from Morocco, in the Rif and the High Atlas (Dahlgren & Lassen, 1972; Dobignard & Chatelain, 2010; Fennane et al., 2014). We discovered it in a pastured peatland on the ridge of the Ghorra Mountain range on the Algerian-Tunisian boundary, more than 1,000 km from its nearest Moroccan locality. It is easily distinguishable from other members of the *Carex muricata* group by its peatland habitat, stellate spikes and null bracts. This unique and isolated population, which may be a relict, is seriously endangered by the overgrazing of the zone.

Carex panormitana Guss., Fl. Sicul. Syn. 2: 575 (1844) (Figure 2e)

? *Carex gracilis* Curtis var. *mucronata* Maire, Bull. Soc. Hist. Nat. Afr. N. 33: 90 (1942).

Specimens examined: Tunisia, Kroumiria, Aïn Jmel Falls (36°43'33"N, 08°42'09"E; 600 m a.s.l.), 05.V.2017, 09.IV.2019, leg. Serge D. Muller; Tunisia, Kroumiria, Jbel Khroufa (36°56'22"N, 08°56'56"E; 325 m a.s.l.), 03.V.2023, leg. Serge D. Muller; Tunisia, Kroumiria, Jbel Khroufa (36°56'13"N, 08°56'51"E; 380 m a.s.l.),

04.V.2023, leg. Serge D. Muller; Tunisia, Kroumiria, National Parc Oued Zen (36°46'31"N, 08°47'50"E; 505 m a.s.l.), 06.V.2023, leg. Serge D. Muller; Tunisia, Kroumiria, Statir, National Parc El Feija (36°31'36"N, 08°18'04"E; 930 m a.s.l.), 08.V.2023, leg. Serge D. Muller; Tunisia, Kroumiria, National Parc El Feija (36°29'52"N, 08°19'17"E; 670 m a.s.l.), 09.V.2023, leg. Serge D. Muller; Tunisia, Kroumiria, Oued Bata (36°29'12"N, 08°17'44"E; 730 m a.s.l.), 09.V.2023, leg. Serge D. Muller.

Comments: Cuénod et al. (1954) confused this taxon with *Carex acuta* L. (syn. *C. gracilis* Curtis). *Carex panormitana* was identified in Tunisia by Jiménez-Mejías et al. (2014) on the basis of an 1888 specimen collected by E. Cosson in the Oued Bata near El Feija (Kroumiria). It differs from *C. acuta* in that it has non-papillose utricles and lamina-less basal sheaths (Jiménez-Mejías et al., 2014). We verified G. Pottier-Alapetite's herbarium specimen, which had been initially identified as *C. acuta* (Aïn Soltane, Kroumiria, 1949; MPU024815), and re-assigned it to *C. panormitana*. We also sampled every population observed in Kroumiria (Aïn Soltane, El Feija, Oued Bata, El Merij, Aïn Jmel Falls, Oued Zen Park): all of these belong to *C. panormitana*, which is obviously the only species of the *C. acuta* group present in Tunisia. The species is thus endemic to Sardinia, Sicily, and Tunisia and may also occur in Algeria, in El Kala National Park and the mountains of Guelma, where Quézel & Santa (1962–1963) report *C. gracilis* var. *mucronata* Maire.

Red List status: *Carex panormitana* is listed as 'Vulnerable' in Tunisia under *C. acuta* (Daoud-Bouattour et al., 2022).

Isolepis pseudosetacea (Daveau) Carv.-Vasc., Bol. Soc. Brot., ser. 2, 4: 83 (1970)

≡ *Scirpus pseudosetaceus* Daveau, Bol. Soc. Brot. 9: 85 (1891).

Specimen examined: Tunisia, Cap Bon, Jbel Korbous (36°50'11"N, 10°34'51"E; 175 m a.s.l.), 24.IV.2008, leg. Serge D. Muller.

Comments: Not mentioned by Cuénod et al. (1954), this taxon was collected in 2008 on Jbel Korbous (Cap Bon) by A. Daoud-Bouattour and S. D. Muller. It has never been found again despite being actively sought throughout northern Tunisia. It differs from *Isolepis cernua* in seed shape and ornamentation (Pignotti 1998): concave (vs. convex) faces covered with papillae < 10 μ (vs. > 10 μ). Other features such as stem and bract length appear to be highly variable in *I. cernua* and cannot be used to distinguish the two species.

Red List status: *Isolepis pseudosetacea* is listed as 'Vulnerable' in Tunisia (Daoud-Bouattour et al., 2022).

EUPHORBIACEAE

Euphorbia maculata L., Sp. Pl., ed. 1: 455 (1753)

≡ *Chamaesyce maculata* (L.) Small, Fl. S. E. U. S.: 713, 1333 (1903).

Specimen examined: Tunisia, Mogods, Majen Choucha (37°00'38"N, 09°12'43"E; 445 m a.s.l.), 15.VII.2008, leg. Amina Daoud-Bouattour.

Comments: Pottier-Alapetite (1979) did not know this exotic taxon, which is native to North America. It has been observed twice in Tunisia: once in 2008 in Majen Choucha (Mogods) by A. Daoud-Bouattour and S. D. Muller, and again in 2012, by Véla et al. (in Dobignard & Chatelain, 2013). While its presence at Gammarth could originate from plantations around tourist hotels, its occurrence around the semi-permanent lake of Mogods hills, far away roads, is more surprising. It could have been brought there by the flocks of sheep that frequent the watering hole. It can be confused with *E. chamaesyce* L. and *E. serpens*, both of which have similar opposite and stipulated stem leaves. However, it has smooth or adorned seeds with 3–6 regular transverse undulations (vs. irregular granulations or bumps in *E. chamaesyce*) and hairy ovaries and fruits (vs. glabrous in *E. serpens*).

FABACEAE

Ononis hispida Desf. subsp. *arborescens* (Desf.) Širj., Fl. Atlant. 2: 149, t. 193 (1798)

≡ *Ononis arborescens* Desf., Fl. Atlant. 2: 149 (1798).

Specimen examined: Tunisia, Tunisian Dorsal, Jbel Bargou (36°04'40"N, 09°37'06"E; 820 m a.s.l.), 6.V.2024, leg. Serge D. Muller.

Comments: Not mentioned by Pottier-Alapetite (1979–1981), this taxon was previously known from Morocco, Algeria and Libya (Fennane et al., 2007; Dobignard & Chatelain 2010–2013). It was collected in 2024 for the first time in Tunisia on the northern flank of Jbel Bargou (Tunisian Dorsal) by L. Dugerdil and S. D. Muller. The geographic range of this North African endemic thus encompasses Libya and the entire Maghreb. It differs from the typical subspecies by its dense inflorescences (vs. lax) and the fruit, which is as long as the calyx (vs. smaller).

POACEAE

Sphenopus divaricatus (Gouan) Rchb. subsp. *permicranthus* (Hausskn.) H.Scholz, Willdenowia 19: 410–411 (1990)

≡ *Sphenopus gouanii* Trin. var. *permicranthus* Hausskn., Mitt. Thüring. Bot. Ges. 13: 57 (1899).

Specimen examined: Tunisia, South Tunisia, Sebkha Zarkine (33°40'39"N, 10°14'31"E; 24 m a.s.l.), 17. III. 2022, leg. Serge D. Muller.

Comments: Overlooked by Cuénod et al. (1954), this taxon was first reported on the island of Djerba by Lambinon (2000). It was seen again by Médail et al. (2020) in 2014 on the Kerkennah archipelago, and in 2015 on the islands of Djerba and Kneiss. On mainland Tunisia, it was first observed in 2022 in the Sebkha Zarkine (southwestern Tunisia) by S. D. Muller. The subsp. *permicranthus* differs from the subsp. *divaricatus*

by having smaller lemma (1.0 mm vs. 1.5–1.7 mm) and anthers (0.2 mm vs. 0.4 mm). Le Floc'h et al. (2010) mistakenly listed it as a Tunisian-Libyan endemic species, omitting Scholz (1990), who had reported it from Palestine to Spain.

Red List status: *Sphenopus divaricatus* subsp. *permicranthus* is listed as 'Vulnerable' in Tunisia (Ghrabi-Gammar et al., 2022a).

POTAMOGETONACEAE

Zannichellia obtusifolia Talavera, García-Mur. & H. Smit, Lagasalia 14: 249 (1986) (Figure 3)

Specimen examined: Tunisia, Northeast, Kantaret Binzart (Pont de Bizerte) (36°59'35"N, 10°03'28"E; 08 m a.s.l.), 30.IV.2023, leg. Serge D. Muller.

Comments: Unknown to Cuénod et al. (1954), this taxon was considered with respect to North Africa to be only located in Morocco by Dobignard & Chatelain (2010). In 2023, S. D. Muller found it in an abandoned brackish continental and endorheic channel of the Oued Mejerda (Tunis region), which corresponds to the ecology described by Talavera et al. (1986). It is easily distinguished from all other *Zannichellia* species by its flat, obtuse leaves having no air canals (vs. thick, acute leaves with two air canals). A visit to the site by A. Daoud-Bouattour in spring 2025 showed its transformation into a dammed canal and the complete disappearance of aquatic vegetation. The species should be sought in similar habitats in northern Tunisia.



Figure 3: Details of *Zannichellia obtusifolia* (Kantaret Binzart, 30 April 2023). a, complete plant with a detached female flower; b, obtuse, mucronate apex of leaves; c, male flower with a complete stamen composed of an anther carried by a long filament (> 1 cm); d, carpels with membranous infundibuliform stigma. Scale bars represent 1 cm (a, c) and 1 mm (b, d).

Slika 3: Podrobnosti vrste *Zannichellia obtusifolia* (Kantaret Binzart, 30.4.2023). a, celotna rastlina z ločenim ženskim cvetom; b, topo zaobljen vrh listov; c, moški cvet s celotnim prašnikom, sestavljenim iz prašnic na dolgi prašnični niti (> 1 cm); d, plodni listi z membranasto brazdo v obliki lija. Merilo predstavlja 1 cm (a, c) in 1 mm (b, d).

THELYPTERIDACEAE

Thelypteris palustris Schott, Gen. Fil. adnot, tab. 10 (1834) (Figure 2i)

= *Acrostichum thelypteris* L., Sp. Pl., ed. 2: 1071 (1753).

= *Dryopteris thelypteris* (L.) A. Gray, Man. Bot. North U. S.: 630 (1848).

Specimens examined: Tunisia, Kroumiria, Ouchtata (36°57'52"N, 09°00'35"E; 25 m a.s.l.), 03.V.2013, leg. Serge D. Muller; Tunisia, Kroumiria, Ouchtata (36°58'12"N, 09°00'42"E; 32 m a.s.l.), 02.V.2023, leg. Serge D. Muller.

Comments: This Northern-Temperate taxon is very rare in North Africa and was not retained for Tunisia by Cuénod et al. (1954), Dobignard & Chatelain (2010–2013) and Le Floch et al. (2010). The citation in Tunisia by Roux (2009) is dubious, giving no details about the source of the information.

To our knowledge, this taxon was known in North Africa only from the marshes of Low Loukkos in northwestern Morocco (Fennane et al., 1999) and the El Kala and Guerbès-Senhadjia wetland complexes in northeastern Algeria (Quézel & Santa, 1962–1963; Belouahem-Abed et al., 2011). We discovered it in Tunisia in 2013 in a relictual alder swamp on the bank of the Nefza artificial lake, near Ouchtata (Kroumiria). This first population comprises several hundred leaves that developed at the edge of a disturbed alder swamp mixed with *Taxodium distichum* (L.) Rich. A second population, with fewer than 10 leaves, was found in 2023, approximately 1 km north of the first. This species differs from other Tunisian ferns by virtue of its 2-fold divided leaves, isolated along a subterranean rhizome, and in its peat-forming habitat (mainly alder swamps).

Red List status: *Thelypteris palustris* is listed as 'Critically Endangered' in Tunisia (Ghrabi-Gammar et al., 2022b).

Conclusions

Most recent additions to the vascular flora of Tunisia are alien species that were introduced after the redaction of the *Tunisian Flora* (Cuénod et al., 1954; Pottier-Alapetite, 1979, 1981) and native taxa described subsequently, such as *Limonium* spp. (Brullo & Erben, 1989; Suárez-Santiago et al., 2007; Sefi et al., 2020; Ben Haj Jilani et al., 2022), *Muscari baeticum* Blanca et al. (El Mokni, 2022), *Orobancha dominae* El Mokni (El Mokni, 2023) or *Thymus numidicus* Poir. subsp. *vagaensis* El Mokni & Domina (El Mokni et al., 2023). However, a number of taxa that obviously belong to the native flora

of Tunisia but were unknown in Tunisia in the 1950s (Cuénod et al., 1954; Pottier-Alapetite, 1979, 1981) have been discovered in the last decades. In addition to the species mentioned here, we cite *Asplenium balearicum* Shivas (Médail et al., 2020), *A. marinum* L. (Muracciole et al., 2010), *Bellis perennis* L. (Médail et al., 2020), *Carthamus creticus* L. (Médail et al., 2020), *Echinophora spinosa* L. (El Mokni, 2020), *Neottia nidus-avis* (L.) Rich (El Mokni et al., 2010), *Ononis minutissima* L. (Pavon & Véla, 2011), *Pilularia minuta* Dur. (Daoud-Bouattour et al., 2009), *Solenopsis laurentia* (L.) C. Presl subsp. *parvula* Brullo (Domina & El Mokni, 2012), *Sphenopus divaricatus* subsp. *permicranthus* (Lambinon, 2000; Médail et al., 2020), *Suaeda spicata* (Willd.) Moq. (Sukhorukov et al., 2019), *Suaeda splendens* (Pourr.) Gren. & Godr. (El Mokni & Debrulle, 2021), etc.

There are proportionately fewer additions than those concerning Charophytes (Muller et al., 2017; A. Daoud-Bouattour & S. D. Muller, unpublished data) and Bryophytes (e.g., Hugonnot et al., 2020; Ben Osman et al., 2021a, 2021b, 2022a, 2022b), but Daoud-Bouattour et al. (2025) estimate that they (including newly described taxa) represent almost 10% of the country's vascular plants which are estimated to include 2543 species and 2842 infraspecific taxa. This clearly points to the fact that Tunisia remains under-researched, even for vascular flora. Nevertheless, the fact that several dozen taxa eluded botanists in the 20th century suggests their extreme rarity in the country, and therefore the great danger of their regional extinction.

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