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Advances to the taxonomic knowledge of *Plantago subulata* (Plantago sect. Maritima, Plantaginaceae)

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**Abstract:** *Plantago* sect. *Maritima* is a group of Mediterranean narrow-leaved plantains whose taxonomy and nomenclature are particularly complex and still unresolved. This work has the objective of advancing the taxonomic knowledge of this section by revising and presenting novelties for the synonymy of *P. subulata*, including the lectotypification of four names with recent usage (since 1985) within this group: *P. sarda, P. subulata var. atlantis, P. subulata var. granatensis*, and *P. subulata var. insularis*. Furthermore, two synonymizations are newly proposed, and the situation of two *Plantago* species names published by Nyman in 1881 in his *Con spectus Florae Europaeae* is clarified.

**Key words:** Mediterranean, Plantaginaceae, *Plantago sarda*, synonymization, typification

1. Introduction

*Plantago* sect. *Maritima* H.Dietr. is included in the genus *Plantago* L., subgenus *Coronopus* (Lam. & DC.) Rahn (Rahn, 1996; Rønsted et al., 2002; Hassemer et al., 2017a, 2017b). This section comprises a group of Mediterranean narrow-leaved plantains whose taxonomy and nomenclature are particularly complex, and, despite having been studied since the earliest European botanists, the classification and nomenclature of this group remains unresolved (Di Pietro and Iamonico, 2014; Hassemer et al., 2017a, 2017b; Iamonico et al., 2017). The number of species in this section accepted by botanists since 1970 varies from four to 12 (Hassemer et al., 2017b). Among recent taxonomic works that treated this section (entirely or partially) the most important are those of Moore et al. (1976), Pignatti (1982), Franco (1984), Rahn (1996), Aeschimann et al. (2004), and Pedrol (2009). All species in this section are endemic to the Mediterranean area, except for *P. maritima* L., which is widespread in Europe and parts of western and central Asia, and also in temperate areas of the New World (Moore et al., 1972; Rahn, 1996).

*Plantago* has an abundance of names, probably because of its study by early botanists, its global distribution, and its difficult morphology; this abundance of names is one of the reasons why the taxonomy of *Plantago* is so complex (Hassemer, 2017a, 2017b, 2018; Hassemer et al., 2017a, 2017b). In order to resolve the taxonomy of *Plantago* sect. *Maritima* it is first necessary to address the challenging questions concerning the nomenclature of this group. This work has the objective of advancing the taxonomic knowledge of this section by revising and presenting novelties for the synonymy of *P. subulata*, including the lectotypification of four names with recent usage (since 1985) within this group: *P. sarda, P. subulata var. atlantis, P. subulata var. granatensis*, and *P. subulata var. insularis*. Furthermore, two synonymizations are newly proposed, and the situation of two *Plantago* species names published by Nyman in 1881 in his *Con spectus Florae Europaeae* is clarified.

2. Material and methods

I studied *Plantago* specimens kept at ASE, BHCB, C, CEN, CGMS, CIDIR, DDMS, EAC, EFC, FI, FLOR, FT, FURB, GB, GH, HAS, HBR, HRB, HURB, IAC, ICN, K, MA, MBM, MVFA, MVJB, MVM, P, PI, RB, SGO, TANG, TEPB, TUB, UB, UESC, UFMT, UPCB, and UPS and images of specimens kept at B, BBF, BM, COI, CONC, CORD, DD, ESA, F, G, GOET, HFLA, IRAI, LE, LINN, MO, MPU, PRC, R, RO, S, SP, UC, UEC, US, and W. The nomenclature presented here follows the Melbourne Code (McNeill et al., 2012) and the recommendations of McNeill (2014).

3. Results

*Plantago subulata* L., Sp. Pl.: 115. 1753.

Type: Lectotype (designated by Hassemer et al., 2017a: 740) LINN-144.22!.

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(2017b: 202). Epitype designated by Iamonico et al. (2017: 79).
Figure 1. Lectotype of Plantago sarda (F.A. Müller s.n., TUB-022340). Copyright: Universität Tübingen.
Figure 2. Lectotype of *Plantago subulata* var. *atlantis* (M.L. Emberger s.n., MPU-002839) (left specimen, annotated “oui”). Copyright: Université de Montpellier.
Figure 3. Lectotype of *Plantago subulata* var. *granatensis* (E. Boissier s.n., TUB-022341). Copyright: Universität Tübingen.
Figure 4. Lectotype of *Plantago subulata* var. *insularis* (L. Kralik 752, FI-017193) (the two plants in the lower part of the sheet). Copyright: Università di Firenze.
1852) lived and worked in Prague, a lectotype from Czech herbaria would be preferred; nevertheless, no suitable material for typification was found among Czech herbaria.

Two sheets that include original material for this name were found: K-000648279 and TUB-022340, both including the exact same label and here accepted as duplicates. Both sheets were hitherto unrecognized as original material. I designate here TUB-022340 (Figure 1), the best and most complete among the available original material, as lectotype of P. sarda.

The type of P. sarda is composed of short-leaved, multibranched specimens of P. subulata; specimens of this species with this morphology also occur in Corsica (see below, under P. subulata var. insularis), southern Italy (see Hassemer et al., 2017b, under P. subulata f. grovesii), and other Mediterranean areas. Therefore, I agree with the synonymization of P. sarda with P. subulata proposed by Nyman (1881), because the morphology of the type of the former name is included within the known variation of P. subulata (see Figure 2 in Hassemer et al., 2017a, and also Hassemer et al., 2017b). Two new combinations have been published for the basionym P. sarda: P. subulata var. sarda was proposed by Pilger (1933), and P. humilis subsp. sarda was proposed by Brullo et al. (1985). It should be noted that P. sarda was accepted in very recent works such as those of Peruzzi et al. (2015) and Bartolucci et al. (2018).

4.2. Plantago subulata var. atlantis Emb. & Maire

The protologue of P. subulata var. atlantis (Maire, 1932: 211) provided the following information on the type: ”Grand Atlas: pelouses décalcifiées du Mougoun près des sources de la Tessaout, 3200 m (Emberger, 1931)”. I was able to locate a sheet at MPU (MPU-002839) that includes original material for this name. Nevertheless, the three specimens on this sheet clearly do not belong to the same species: the specimen to the left is P. subulata, whereas the central and right specimens are most probably P. maritima. In fact, a careful examination of the sheet reveals that the left specimen has an annotation “oui” (yes in French), while the other two have question marks (?), which probably indicates the specimen to which the name P. subulata var. atlantis is linked. All things considered, I designate here the left specimen (annotated “oui”) of MPU-002839 (Figure 2) as the lectotype of P. subulata var. atlantis.

The lectotype of P. subulata var. atlantis is a morphologically ordinary exemplar of P. subulata, not significantly differing from the lectotype of the latter (see Figure 2 in Hassemer et al., 2017a) and most of its populations. There is no mention of this synonymy in the published literature, although this has already been indicated in online material (http://lurig.altervista.org/flora/taxa/index1.php?scientific-name=plantago+subulata). Therefore, I formally propose the synonymization of P. subulata var. atlantis with P. subulata. Two new combinations have been published for the basionym P. subulata var. atlantis: P. subulata subsp. atlantis was proposed in Greuter and Raus (1982), and P. humilis subsp. atlantis was proposed by Brullo et al. (1985).

4.3. Plantago subulata var. granatensis Willk.

The protologue of P. subulata var. granatensis (Willkomm, 1870: 357) provided the following information on the type: ”in regione alpina Sierrae Nevadæ ad alt. 6–10000’ freq. (Wb.!: Bss!: Wk., Fk.: Bourg.: ALTH.)”. I was able to locate the following specimens that are original material for this name: one sheet of P.B. Webb s.n. at FI (FI-017191), annotated ”in summâ Sierrâ Nevadâ. 1826–28”; two sheets of E. Boissier s.n., one at FI (FI-017190) and another at TUB (TUB-022341), both annotated ”in pratis siccis Sierra Nevada. Jul. 1837. Alt. 6200’–9000”; one sheet of H.M. Willkomm 189 at COI (COI-0043343), annotated ”in Sierra Nevada. 6500–9000’. 18 Juli 1844”; one sheet of H.M. Willkomm s.n. at COI (COI-0043344), annotated ”in Sierra Nevada. 7–9000’. 18 Juli 1844”; and one sheet of Funk s.n. at COI (COI-0043343), annotated ”Sierra Nevada. 8–10000’. Aug. 1848”. With the exception of the material at FI, all these sheets were hitherto unrecognized as original material. The specimens on all these sheets are morphologically coherent and correspond to the same species. I designate here the best and most complete herbarium material, TUB-022341 (Figure 3), as lectotype for the name P. subulata var. granatensis. The chosen lectotype also has a duplicate (FI-017190).

Careful examination of the lectotype of P. subulata var. granatensis left it clear that this specimen belongs to P. subulata. For this reason, I agree with the synonymization of P. subulata var. granatensis with P. subulata proposed by Nyman (1881). Three new combinations have been published for the basionym P. subulata var. granatensis: P. subulata subsp. granatensis was proposed by Malagarriga Heras (1976), P. humilis subsp. granatensis was proposed by Brullo et al. (1985), and P. radicata subsp. granatensis was proposed by Rivas-Martínez et al. (1991). Nyman (1881: 618) listed ”P. granatensis (Willk.)” among the synonymy of P. subulata. Therefore, despite the indirect reference to P. subulata var. granatensis, this name was not validly published as a new combination, according to Art. 36.1(c).

4.4. Plantago subulata var. insularis Godr.

The protologue of P. subulata var. insularis (Godron, 1852: 725) provided the following information on the type: ”Soleir. exsicc. n° 3579 !; Kralk, exsicc. n° 752 !” and ”en Corse, Pozzi du mont Renoso, monte d’Oro, chaîne du Niolo, monte Rotundo”. I was able to locate the following specimens that are original material for this name: one sheet of H.A. Soleiroi 3579 at FI (FI-017192) annotated ”Mt. Rotundo”, and two sheets of L. Kralk 752, one at FI (FI-017193) and another at K (K-000648282), both
annotated “Paturages des hautes montagnes, Pozzi du Mt. Renoso, 2 Aout 1849”. The specimens on these three sheets are morphologically coherent and correspond to the same species. I designate here the best and mast complete herbarium material, FI-017193 (only the two plants in the lower part of the sheet belong to the gathering L. Kralik 752; see Figure 4), as lectotype for the name Plantago subulata var. insularis. The chosen lectotype also has a duplicate (K-000648282); this sheet at K was hitherto unrecognized as original material.

The morphological features of the lectotype, particularly the short leaves and densely branched stem, leave no doubt that Plantago subulata var. insularis is closely related to P. sarda (see above) and P. subulata f. grovesii (see Hassemer et al., 2017b), which are themselves synonyms of P. subulata. For this reason, I agree with the synonymization of P. subulata var. insularis with P. subulata proposed by Nyman (1881). One new combination has been published for the basionym P. subulata var. insularis: P. humilis subsp. insularis, proposed in Kerguélen et al. (1987). It should be noted that “Plantago subulata L. subsp. insularis (Gren. & Godr.) Nyman” (a name that was never validly published) was accepted in very recent literature, such as a study by Conti et al. (2005).

Nyman (1881: 618) listed “P. insularis (G.G.)” among the synonymy of P. subulata. Therefore, despite the indirect reference to P. subulata var. insularis (“G.G.” referring to Grenier and Godron, the editors of Flore de France), this name was not validly published as a new combination according to Art. 36.1(c). For this reason, the later name P. insularis Eastw. is nonetheless legitimate; this species was described from San Nicolas Island, California (Eastwood, 1898) and is considered a synonym of P. ovata Forssk. (fide Dempster, 1993).

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