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Taxonomic revision of selected species in *Taraxacum* sect. *Erythrosperma* (Asteraceae: Cichorieae) from the E Mediterranean region

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Abstract: Selected species in *Taraxacum* F. H. Wigg., belonging to *T.* sect. *Erythrosperma* (H. Lindb.) Dahlst., described by C. E. Sonck, G. E. Haglund and A. J. Richards, were revised taxonomically. The types of their names were compared with plant material mainly from the Balkan Peninsula and Crimea. The main sources of material were ample collections of R. Willing and E. Willing from Greece (deposited at B), and plants collected and/or cultivated by us from the Balkan Peninsula and Crimea (deposited at PRA). Four names are relegated to synonymy. *Taraxacum amborum* G. E. Hagl. is newly interpreted and lectotypified, and *T. viale* Sonck is synonymized with it. *Taraxacum edessicum* Sonck and *T. aestuans* Sonck were found to be conspecific with *T. salonikiense* Sonck. *Taraxacum gionense* A. J. Richards belongs to *T. botanicorum* Sonck. Range extensions include *T. salonikiense* in Albania, *T. amborum* in Bulgaria, Montenegro and Romania, and *T. egnatiae* from Ukraine.

Key words: Asteraceae, Balkan Peninsula, Cichorieae, Compositae, Crimea, Mediterranean, nomenclature, synonymy, *Taraxacum*, *Taraxacum* sect. *Erythrosperma*, taxonomy, typification

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Introduction

After the publication of our recent studies in the Mediterranean *Taraxacum* sect. *Erythrosperma* (H. Lindb.) Dahlst. (Štěpánek & Kirschner 2013, 2014), new representative material of selected species of this section was made available for our study, mainly from Greece but also from other Balkan countries and Crimea, Ukraine. We also studied further material in OXF (herbarium codes according to Thiers 2018+). Many of the previously described *Taraxacum* species from the Mediterranean are based on good-quality material but are restricted to a single gathering, which makes it difficult to understand the plasticity limits, or even the taxonomic status, of the agamospermous taxa in question. The new material is very rich, particularly

that collected by Rita and Eckhard Willing in Greece. The Bulgarian and Crimean plants come from our expeditions and subsequent cultivations, so that material collected at various stages of development was studied, including full flowering time and seed set. A number of taxonomic novelties resulted from the above study, and the most important ones are given in the present paper.

A summary of the problems associated with *Taraxacum* taxonomy was given in Štěpánek & Kirschner (2013), together with an introduction into the circumscription and nomenclature of *T.* sect. *Erythrosperma*.

Complete descriptions of most of the taxa treated in the present paper will soon be published in volume 12 of the *Flora of the Republic of Bulgaria*, and we therefore limit ourselves to diagnostic notes here.

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Material and methods

Taxonomic principles and approaches follow Štěpánek & Kirschner (2013). Plant material has three main sources (in addition to the material of C. E. Sonck in H): (1) the collecting trips of Rita and Eckhard Willing in Greece (ample material deposited in B); (2) the expedition of the authors to Crimea, Ukraine and adjacent regions in 1991; because most gatherings from Crimea had well-developed achenes, it was possible to cultivate numerous samples at the Experimental Garden of the Institute of Botany of the Czech Academy of Sciences, Průhonice, Czech Republic (material deposited in PRA); and (3) from Bulgaria and other Balkan countries collected and cultivated by the authors during numerous expeditions, or provided by other collectors (see Acknowledgements). The living plants were studied to prove the limits of their plasticity or variation. The method of mass cultivation and the identification of reproduction systems are described in Kirschner & Štěpánek (1993) and Závěská Drábková & al. (2009). Plant names are in accordance with the *International Code of Nomenclature for algae, fungi, and plants* (Turland & al. 2018).

Taxonomic and nomenclatural treatment

- 1. *Taraxacum salonikiense*** Sonck in Ann. Bot. Fenn. 22: 144. 1985. – Holotype: Greece, Makedonia, Thessaloniki, gräslinda vid Egnatia, 16 Apr 1981, C. E. Sonck s.n. (H 1571181 – no. det. 25689).
 = *Taraxacum edessicum* Sonck in Ann. Bot. Fenn. 22: 139. 1985. – Holotype: Greece, Makedonia, Edessa, nära järnv. stationen, 15 Apr 1981, C. E. Sonck s.n. (H 1596848 – no. det. 25777).
 = *Taraxacum aestuans* Sonck in Ann. Bot. Fenn. 25: 73. 1988. – Holotype: [grown from fruits from Albania, Korça, roadside near the carpet factory, 3 Jun 1983, C. E. Sonck 8313/1] cultivated in the Botanic Garden of the University of Helsinki, 31 May 1986, C. E. Sonck 8613/13 (H 1577075 – no. det. 25801).

We already evaluated the validity of the name *Taraxacum salonikiense* (Štěpánek & Kirschner 2013) and added first

records for Bulgaria. It was not until we studied the ample material of Rita and Eckhard Willing that we recognized the limits of plasticity of this species and realized that the names *T. edessicum* and *T. aestuans* fall within these limits. In both cases, the type material matches that of *T. salonikiense* in all decisive characters; the only differences are found in leaf shape, but they are still within the general character of the variation of the species. The distribution of *T. salonikiense* extends to Albania (see the type citation of *T. aestuans*).

The above three names represent a good example of the situation when differences among published protologues are not a reliable tool for species recognition. In Table 1, we compare the protologue data of the three names with what was recorded during the examination of the type material. Most of the differences reported in the protologues cannot be confirmed on the type material. We suppose that most of the discrepancies between the protologues and our observations may be accounted for by the measurement method and number of achenes measured (cone length) or light conditions during the stigma colour assessment.

- 2. *Taraxacum amborum*** G. E. Haglund in Ark. Bot. 26A(5): 25. 1934. – **Lectotype (designated here):** [grown from fruits from Greece, Phocis, ad transitum inter Amphissa et Bralo, in prato, 4 May 1931, G. Samuelsson & A. Zander 494] cultivated in Stockholm, 23 May 1932, collector unknown (S – no. det. 1609).
 = *Taraxacum viale* Sonck in Ann. Bot. Fenn. 30: 208. 1993. – Holotype: Greece, Karditsa, Kerasea, Gura region, 850 m, forest road along a stream, 19 May 1985, C. E. Sonck s.n. (H 1677364 – no. det. 25826).

The main difficulty with the interpretation of the name *Taraxacum amborum* is associated with the quality of the type material. The numerous syntypes come from cultivation in an experimental garden in Stockholm, a place with much higher humidity and soil fertility than the wild locality in Greece. The morphotype resulting from this cultivation has a much larger leaf surface (i.e. broader lateral segments and shorter interlobes) and leaf size than plants from natural habitats. We therefore concentrated on the relatively stable, reliable diagnostic characters and

Table 1. Comparison of character states in the protologues and type material of *Taraxacum salonikiense* and its synonyms.

	<i>Taraxacum salonikiense</i>	<i>Taraxacum edessicum</i>	<i>Taraxacum aestuans</i>
Stigma colour, protologue	“stigmata ± obscura”	“stigmata leviter virescentia”	“stigmata obscura, sicca sat atra”
Stigma colour, holotype specimen	greyish, with a short black pubescence outside	greyish yellow-green, greenish with ± dark pubescence outside	greyish green to greyish yellow-green
Achene cone length, protologue	0.8–0.9 mm	1–1.2 mm	c. 0.8 mm
Achene cone length, type material	0.9–1 mm	0.9–1.1 mm	0.9–1.1 mm



Fig. 1. Detail of a representative specimen of *Taraxacum amborum* from Greece: Nom. Trikalon, Ep. Kalambakas, 3.3 km SW of Kastanea, 39°41'N, 21°21'30"E, 1240–1280 m, 1 Jun 1993, E. Willing 29681 (B 10 0134253 – no. det. 29156).

compared the rich Greek material of Rita and Eckhard Willing and the material in PRA with the original material of *T. amborum*. The decisive features are brownish green or yellowish green leaves with contrasting dark brown-purple interlobes (narrow and long in plants from natural habitats) and particularly the pure brown achenes with a distinctive character of spinulosity: they are distally very densely covered with conspicuously short spinules. A figure of a representative specimen of *T. amborum* is also included (Fig. 1).

The name *Taraxacum vialae* clearly applies to the same taxon. There is a problematic aspect of the typification: the only isotype of the name *T. vialae* is not conspecific with the holotype and belongs to the group of *T. epirense* Soest. Another problem is the ochraceous colour of the achenes reported by Sonck (1993) in the protologue of *T. vialae*. A detailed examination of the achenes of the holotype and its cultivated progeny (paratypes) revealed only pure brown achenes, and not even the non-conspecific isotype had ochraceous achenes. We therefore treat it as a mistake in the original description of *T. vialae*.

On the basis of the material available, the distribution of *Taraxacum amborum*, in addition to Greece, covers Bulgaria, Montenegro and Romania.

Selected specimens examined — MONTENEGRO: Central Crna Gora, Maganik mts, Mrtvo Duboko village, mouth of Mrtvica River gorge, 42°44'N, 19°20'E, 8 Jun 2007, R. Rosenbaumová s.n., cultivated in Průhonice as JŠ 8356 (PRA – no. det. 32348). — BULGARIA: Trojanska Planina, Trojan saddle (Trojanski prechod) in Beklemeto area, between Karnare village and Trojan town, c. 15 km SSW of Trojan town, 42°46'47.4"N, 24°36'22.7"E, 1540 m, 4 Jun 2010, F. Krahulec & A. Krahulcová 60, cultivated in Průhonice as JŠ 8929 (PRA – no. det. 32350). — ROMANIA: Banat, Sasca Montană village, Beușnița River, Apr 1987, J. Sádlo s.n., cultivated in Průhonice as JŠ 3741 (PRA – no. det. 32343); S Carpathians, Munții Mehedinți [mts], Băile Herculane, Mt Domogled (1105 m), near “Crucea Albă” above Cerna River, 44°52'–53'N, 22°25.7'–25.9'E, 600–800 m, 1 Jun 2010, J. Štěpánek s.n., cultivated in Průhonice as JŠ 8885 (PRA – no. det. 32341). — GREECE: see Fig. 1.

3. *Taraxacum botanicorum* Sonck in Ann. Bot. Fenn. 25: 74. 1988. – Holotype: [grown from fruits from Albania, Tirana, at the Botanical Institute, 1 Jun 1983, C. E. Sonck s.n.] cultivated in the Botanic Garden of the University of Helsinki, 26 May 1986, C. E. Sonck 8612/1 (H 1577079 – no. det. 25783).

= *Taraxacum gionense* A. J. Richards in Strid & Tan, Mount. Fl. Greece 2: 558. 1991. – Holotype: [grown from fruits from Greece, Attica, SW side of [Mt] Giona, N of Amphissa, 1500 m, beside forest road, 12 May 1981, A. J. Richards s.n.] cultivated at University of Newcastle-upon-Tyne, May 1983, collector unknown (OXF 54752 – no. det. 30436).

Both names were prepared for publication approximately at the same time and the earlier name was not therefore considered in the *Mountain Flora of Greece* (Richards 1991). The type specimens of both names are of excellent quality, which facilitates the taxonomic conclusion that they represent synonyms. The leaf shape and the colour, size and shape of achenes are diagnostic. We do not give morphological details as the protologue descriptions are of good quality.

4. *Taraxacum egnatiae* Sonck in Ann. Bot. Fenn. 22: 140. 1985. – Holotype: Greece, Thessalia, Olimbos [Mt Olympus], roadside in regio abietina between Litochoron and Stavros, 500–600 m, 6 May 1982, C. E. Sonck s.n. (H 1571188 plant A – no. det. 25821).

A species rather imperfectly known and probably neglected, up to now not recorded from localities other than those given in the protologue. It is similar to *Taraxacum persicum* Soest but possesses leaves suffused bronze, scape with denser floccose indumentum, outer phyllaries more often patent to moderately arcuate recurved with a less distinct border, styles longer, anthers abundantly polliniferous, and achenes paler with a longer pappus (6–7 mm). We identified this species in material from several sites in Greece and, surprisingly, also in our ample material from Crimea, Ukraine.

Selected specimens examined (we avoid quotation of the rest of the original material given in the protologue; it is correctly identified and deposited in H and PRA): — GREECE: Thessaloniki, S of Kryoneri, 40°47'24"N, 23°16'42"E, 560 m, 4 Apr 2009, R. Willing & E. Willing 181848 (B 100291144 – no. det. 32360); Pieria, SW of Mikri Milia, 40°24'25"N, 22°25'22"E, 400 m, 29 Mar 2009, R. Willing & E. Willing 179908 (B 100291197 – no. det. 32359); Magnisia, Ep. Volou, SW of Keramidhi, 39°32'22"N, 22°53'35"E, 670 m, 4 Apr 2002, R. Willing & E. Willing 97400 (B 100091795 – no. det. 32386); Serres, SW of Rodolithos, 40°54'08"N, 23°56'48"E, 270 m, 8 Apr 2009, R. Willing & E. Willing 183038 (B 100291126 – no. det. 33070). — UKRAINE: S Crimea, Yalta, along road in pine woodlands, slopes above the town, near “Gruševaja poljana”, 24 May 1989, J. Štěpánek & J. Kirschner s.n., cultivated in Průhonice as JŠ 3520/3 and as JŠ 4903 (PRA – no. det. 28550); *ibid.*, cultivated as JŠ 3520/3 – 2/3 (PRA – no. det. 28552).

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