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***Taraxacum gratum*, a New Species of the Section *Erythrocarpa* from the Transcaucasus**

By

Jan ŠTĚPÁNEK*)**, Jan KIRSCHNER*) and Lenz MEIEROTT***)

With 2 Figures

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Summary

ŠTĚPÁNEK J., KIRSCHNER J. & MEIEROTT L. 2010. *Taraxacum gratum*, a new species of the section *Erythrocarpa* from the Transcaucasus. – *Phyton* (Horn, Austria) 50 (1): 59–68, with 2 figures.

A new species of *Taraxacum* sect. *Erythrocarpa* (*Asteraceae-Cichorieae*), *T. gratum* ŠTĚPÁNEK, KIRSCHNER & MEIEROTT is described from the Transcaucasus Region from Central Georgia. The new species is distinct in the very early flowering time, yellow or pale stigmas, absence of pollen, large reddish fruits and dark coloration of loosely appressed outer involucre bracts. The new species is known from a number of localities in the Tbilisi region. It is compared to other members of the sect. *Erythrocarpa* described or known from the Caucasus and with more widespread distribution as well as generally accepted *Erythrocarpa* species from the C. and E. Mediterranean. A new name, *T. voricola* A. J. RICHARDS is proposed to substitute a later homonym, *T. albomarginatum* A. J. RICHARDS non KITAMURA of this section.

*) Dr. Jan ŠTĚPÁNEK & Doz. Dr. Jan KIRSCHNER, Institute of Botany, Academy of Sciences, 25243 Pruhonice 1, Czech Republic; e-mail: jan.stepanek@ibot.cas.cz, jan.kirschner@ibot.cas.cz

**) Dr. Jan ŠTĚPÁNEK, Herbarium Universitatis Carolinae Pragensis, Benátská 2, 12801 Praha 2, Czech Republic

***) Dr. Lenz MEIEROTT, Am Happach 43, 97218 Gerbrunn, Germany; e-mail: lenz.jutta.meierott@t-online.de

Zusammenfassung

ŠTĚPÁNEK J., KIRSCHNER J. & MEIEROTT L. 2010. *Taraxacum gratum*, a new species of the section *Erythrocarpa* from the Transcaucasus. [*Taraxacum gratum*, eine neue Art der Sektion *Erythrocarpa* aus dem Transkaukasus] – Phytion (Horn, Austria) 50 (1): 59–68, mit 2 Abbildungen.

Mit *Taraxacum gratum* ŠTĚPÁNEK, KIRSCHNER & MEIEROTT wird eine neue Art von *Taraxacum* sect. *Erythrocarpa* (*Asteraceae-Cichorieae*) aus dem Transkaukasus in Zentralgeorgien beschrieben. Die neue Art ist durch sehr frühe Blütezeit, blass- bis reingelbe Narben, große, rötlichbraune Früchte und dunkle Färbung der locker anliegenden, äußeren Hüllblätter gekennzeichnet. Sie ist von mehreren Lokalitäten aus der Umgebung von Tbilisi bekannt. Die neue Art wird mit anderen aus dem Kaukasus beschriebenen oder bekannten Vertretern der sect. *Erythrocarpa* sowie mit weiter verbreiteten und allgemein akzeptierten *Erythrocarpa*-Arten aus dem zentralen und östlichen Mittelmeergebiet verglichen. Ein neuer Name, *T. voricola* A. J. RICHARDS, wird als Ersatz für das spätere Homonym *T. albomarginatum* A. J. RICHARDS non KITAMURA aus dieser Sektion vorgeschlagen.

1. Introduction

In 1982, JK & JŠ identified a *Taraxacum* collection of G. WORONOW from Tbilisi as a probable new species of the sect. *Erythrocarpa* (see no. det. 1105). At that time the material was not sufficient for any taxonomic conclusion. Since then, particularly during a herbarium study at the Sankt Petersburg herbarium (LE), convincing evidence gradually accumulated showing that the material indeed represents a new species, provisionally named (in schedis) as *T. gratum*. Early in 2009, LM had an opportunity to collect *Taraxacum* samples at several sites in Georgia (Transcaucasus). The plants collected by LM represent excellent material for documenting where the presumed taxon prevails. The existing material comes mostly from Tbilisi, Georgia, and its broader vicinity but also from other parts of Georgia. In herbarium collections it is usually found under the name of *T. praticola* SCHISCHKIN. The present paper gives a detailed analysis of the new species and a comparison with other members of the section *Erythrocarpa* from the Caucasus and other relevant regions.

The *Taraxacum* flora of the Caucasus was studied by a number of specialists (e.g., HANDEL-MAZZETTI 1907a, b, SCHISCHKIN in GROSSHEIM 1934, DOLL 1976a, b, 1977, KIRSCHNER & ŠTĚPÁNEK 1993, 1999). However, a revision of herbarium material and the examination of newly collected plants show that the knowledge of Caucasian dandelions is rather fragmentary. Among the main reasons are the rather careless taxonomic methods of R. DOLL (op. cit.), in particular rangs for the sect. *Erythrocarpa*.

The centre of diversification of the section *Erythrocarpa* is from the E. Mediterranean and Anatolia through the Caucasus to Iran. All relevant taxa of the section described from this territory are also discussed.

2. Taxonomic Treatment

2.1. *Taraxacum gratum* ŠTĚPÁNEK, KIRSCHNER & MEIEROTT, **spec. nova**

Typus: the Transcaucasus, Georgia, Gori, fortress hill [“Georgien, am Festungsberg in Gori”], 7 Apr 2009, L. MEIEROTT (holo: PRA, no. det. 21165; iso: PRA, herb. L. MEIEROTT, Gerbrunn).

Descriptio (cf. icones 1, 2): Plantae ex solito parvae, sed non graciles, usque ad 10 cm altae, raro mediocriter magnae (verisim. in locis subumbrosis vel subruderalibus), basi fragmentis foliorum veteriorum satis incrassatae. Folia intermedia et interiora 4–6 cm longa, 1.5–2 cm lata, erecto-patentia vel ascendentia, laete prasina usque subcineree viridia, vix non glaucescentia, fere glabra vel superne in nervo mediano crebrius araneosa, inter bases e contrario vero conspicue dense pallide fusco-villosa. Lamina ambitu anguste oblanceolata usque oblanceolata, pinnatisecta (in folia exteriora pinnatilobata vel pinnatipartita). Lobus terminalis triangularis vel galeiformis, plerumque non validus, parvus, aliquando asymmetricus vel cum incisura profunda aut in unam oram lateralem aut utrobique, acutus – obtuse acutus, margine distali convexo vel exigue sigmoideo, integerrimo vel inciso (cf. supra dict.), margine proximali recto – leniter concavo, integerrimo vel uno dente praedito, lobulis basalibus patentissimis – divaricatis. Lobi laterales numero (3–) 4–5 utrobique, 0.4–1 cm longi, 3–5 mm lati, deltoidei vel elongate lingulati, patentissimi – divaricati, acuti vel acutissimi, margine distali paene recti vel paulum convexi vel leniter sigmoidei, integerrimi, minus saepe uno dente haud longe a basi praediti, margine proximali \pm recti sed vulgo dentati uno dente maiore et 0–3 dentibus parvis. Interlobia brevia usque \pm longa (2–5 mm) et angusta – mediocriter lata (2–4 mm), satis conspiciende irregulariter dentata dentibus acuminatis, inaequilongis, fere conspicue purpureo-hepatico-maculata, ad marginem atroviolaceum replicata. Nervus medianus pallidus vel deorsum violascens. Petiolus angustus, saepissime 1.5–2.5 mm longus, expresse obscure subcinereo-violaceus, subaraneosus. Scapi floriferi foliis breviores, ad basin cineree violacei, alibi pallidi, \pm dense araneosi. Calathia parva \pm eradiantia, sub anthesi 1.5–2 cm diametro, \pm plana. Involucrum parvum, ad 9 mm longum, 4.5–5.5 mm latum, leniter pruinatum, conspicue bicoloratum squamis exterioribus obscurioribus, magis colorem variantibus, et squamis interioribus splendioribus minus pruinosisve. Squamae exteriores numero 11–14, late ovatae usque ovatae, internae (superiores) immo lanceolatae, plerumque 4–6 mm longae et 3–3.5 mm latae, in comparatione sq. interiorum breves (ad/in earum partem quintam usque tertiam erigentes), sub apice tuberculo nigro vel corniculo parvo praeditae, sub anthesi appressae, postea irregulariter erecto-patentes, patentibus usque interdum arcuate divaricatae, extus (in pagina abaxillari) conspicue colorataeque praetextae, \pm regulariter obscure virides (exsiccatae atrovirides), in tertia parte usque dimidio su-



Fig. 1. Holotype of *Taraxacum gratum*. General habit.

periore fere purpuratae / purpureo-violascentes, parte obscura centrali subite in marginem album (0.2–) 0.3–0.5 (–0.6) mm latum transeunte, margine non raro dense ciliolato. Squamae interiores mutuo \pm aequilatae, laete prasiniae, subpruinosae, sub apice corniculo parvo praeditae. Ligulae marginales planae et breves, extus stria argute purpurate cinereo-nigra ornatae, denticulis apicalibus obscure cinereis, ligulae centrales ut videtur canaliculatae denticulis apicalibus purpurascentibus, dilute cinereis vel luteis. Antherae polline carentes. Stigmata clare lutea usque subviride lutea. Achenia (Fig. 2) longa et angusta, anguste fusiformia, pyr. incl. (3.5–) 4.1–5.1 mm longa, 0.8–1.0 (–1.1) mm lata, obscure badio-rubra usque cinnamea vel badia, corpore in quinta parte superiore spinuloso spinulis directisve acutissimis, infra verrucoso, tuberculato usque glabro (latus exterior acheniorum marginalium aliquando per toto spinulosum), supra in pyramiden cylindricam, angustam, (0.9–) 1.2–1.5 mm longam, crebrius minimum uno spinulo instructam subite abeunte. Rostrum (6–) 8–

10 mm longum, pappus 5–6 mm longus, exigue sordide albus vel albidus. – Floret ineunte vere. – Species agamosperma, cum grano salis polyploidea, e sectione Erythrocarporum.

Description (see Fig. 1, 2): Plants usually small, to 10 cm tall, stout, less often, probably on shady slightly ruderalized sites, medium-sized. Plant base often conspicuously covered with dry remnants of old petioles. Leaf rosette medium dense to dense, petiole bases greyish-brownish villos, often conspicuously so. Leaves 4–6 cm long, 1.5–2 cm wide, subprostrate to erect-patent, bright to light green, without pruinosity or

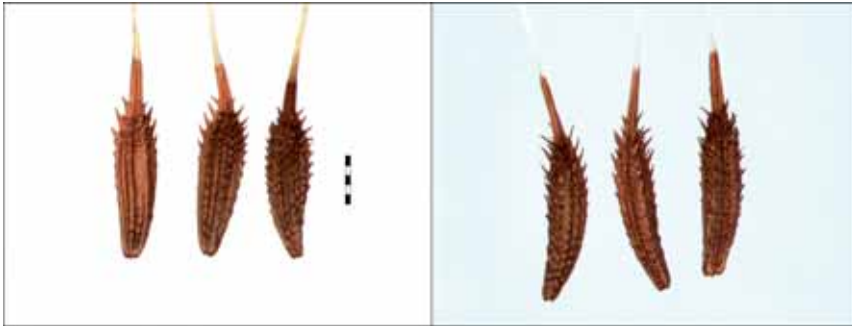


Fig. 2. Detail of achenes of *Taraxacum gratum*. Left: no. det. 21172 (scale bar = 1 mm); right: no. det. 21161.

greyish tinge, almost glabrous or sparsely aranose, midrib on upper surface sometimes more densely hairy. Leaf blade narrowly oblanceolate to oblanceolate in outline, pinnatisect, the oldest (outer) leaves less deeply incised. Terminal leaf segment triangular or helmet-shaped, usually not conspicuously big, sometimes asymmetrical, entire or with one or a pair of deep incisions, acute to subobtuse, its lateral parts convex or slightly sigmoid on distal margins, proximal margins straight or slightly concave, entire or with a single tooth, patent or slightly pointing downwards. Lateral lobes (3–) 4–5, 0.4–1 cm long, 3–5 mm wide, \pm deltoid or lingulate-elongated, patent or slightly pointing downwards, distal margins almost straight or slightly convex or sigmoid, entire or less often with a single basal tooth, sharply acute, proximal margins \pm straight, usually with several distinct perpendicular teeth, one of which big, the others (up to 3) smaller. Interlobes short to relatively long (2–5 mm) and up to medium wide (2–4 mm), quite distinctly irregularly dentate, teeth acute to acuminate with a long thin apex, interlobes brownish purple bordered and/or with brown-purple spots, usually with raised margins. Petioles narrow, usually 1.5–2.5 cm long, distinctly dark (greyish) purple, sparsely aranose. Midrib pale or purplish in lower part. Scapes shorter than leaves during flowering time, greyish purple at base, otherwise pale greenish, sparsely to

medium densely aranose. Capitula small, 1.5–2 cm in diam. in full blossom, involucre relatively small, c. 9 mm long, 4.5–5.5 mm wide, slightly pruinose, with characteristic coloration (outer bracts darker, with brighter colours and more intensive pruinosity, inner bracts pale green and less pruinose). Outer bracts 11–14, most of them broadly ovate to ovate, imbricate, i.e. the inner ones of them ovate-lanceolate, the outer ones usually 4–6 mm long and 3–3.5 mm wide, relatively short (reaching 1/3–1/5 of the length of the inner bracts, with a blackish callosity or a short minute horn near the apex, \pm loosely appressed at the beginning of flowering, later irregularly erecto-patent, some arcuate, with a distinct abaxial coloration, \pm uniformly dark green (almost greyish black when dry), usually suffused purplish in the distal 1/3–1/2, the central and dominant dark middle part is sharply delimited from a white border (0.2–)0.3–0.5 (–0.6) mm wide, relatively densely ciliate in the distal part. Inner bracts of \pm equal width, paler green, slightly pruinose, minutely corniculate below apex. Marginal ligules flat, short, outside with a distinct dark blackish grey stripe tinged purplish, apical teeth \pm dark grey in the outer ligules, reddish, pale grey or yellow in the inner ones, inner ligules probably canaliculate. Pollen absent (only very rarely sparse, small, abortive and irregular pollen grains can be observed in the anther tube). Stigmas pale yellow to pure yellow, sometimes slightly greenish yellow, covered with pale hairs on outer surface (the rarely darker colour of the stigma is caused by occasionally darker hairs). Achenes (Fig. 2) quite long, (3.5–) 4.1–5.1 mm long including cone, quite narrow, 0.8–1.0 (–1.1) mm wide, turbinate, dark brown-red to cinnamon brown or castaneous-brown (red colour most frequently prevails), achene body spinulose in the upper 1/5, tuberculate, slightly tuberculate or smooth below (exterior achenes sometimes wholly spinulose on the outer surface), spinules straight, acute, often present on the cone base, achene body \pm gradually tapering but then abruptly narrowed into (0.9–) 1.2–1.5 mm long narrow cylindrical cone, rostrum (6–) 8–10 mm long, pappus pure white to slightly dirty white, 5–6 mm long. – Floweringtime very early in spring. Agamospermous and (probably) polyploid.

2.2. Distribution, Phenology and Ecology of *Taraxacum gratum*

Taraxacum gratum, according to the material available, is confined to Georgia. Most specimens were collected from the city of Tbilisi but there are also specimens from Mtskheta, Gori, Bordzhomi etc. The species seems to be so widespread in Georgia that it might be expected from neighbouring regions of the Transcaucasus. *T. gratum* grows in sparse lawns, or substeppe grasslands, on rocky slopes and stony grasslands, and it does not avoid disturbed sites.

As far as the herbarium material indicates, *T. gratum* is remarkable in its very early anthesis (which corresponds to the herbarium label remark

by GROSSHEIM stating that these plants are among the first dandelions to flower in the region of Tbilisi). That is why the new species is well represented in older collections of botanists working in that region.

Typical localities of the new species comprise stony or rocky, open, nutrient-poor grasslands or barrens, with a sometimes slightly ruderalized appearance. It is usually accompanied by a diverse vegetation of annual therophytes (such as *Alyssum minus* (L.) ROTHM., *Erodium cicutarium* L., *Holosteum glutinosum* FISCH. & C. A. MEY., *Erophila spathulata* LANG, *Clypeola jonthlaspi* L., *Ceratocephala falcata* (L.) PERS., *Buglossoides arvensis* (L.) I. M. JOHNST., *Thlaspi perfoliatum* L.) and early geophytes (e.g., *Gagea chlorantha* SCHULT. f. and *G. chanae* GROSSH.). Occasionally, it also grows together with *Poa bulbosa* L. or *Carex stenophylla* WAHLENB.

2.3. Specimens Examined

Transcaucasus, Georgia: Tbilisi, vicinity of Institute of Botany, 28 Mar 2009, L. MEIEROTT (herb. L. MEIEROTT, no det. 21173). – NE of Telavi, Gremi Castlehill, 1 Apr 2009, L. MEIEROTT (herb. L. MEIEROTT, no det. 21172). – near David Goredza, 29 Mar 2009, L. MEIEROTT (herb. L. MEIEROTT, no det. 21171). – W of Mtskheta, E of the Shiongvime Monastery, 3 Apr 2009, L. MEIEROTT (herb. L. MEIEROTT, no det. 21169). – W of Mtskheta, Shiongvime Monastery, 3 Apr 2009, L. MEIEROTT (herb. L. MEIEROTT, no det. 21166). – E of Mtskheta, rocky slopes near Szvari Church, 2 Apr 2009, L. MEIEROTT (herb. L. MEIEROTT, no det. 21167, 21168). – SW Georgia, slopes NW of Vardsia, ca 1800 m, 6 Apr 2009, L. MEIEROTT (herb. L. MEIEROTT, no det. 21164). – 14 km N of Vardzia, a gorge 1 km S of Khertvasi, 5 Apr 2009, L. MEIEROTT (herb. L. MEIEROTT, no det. 21163). – SE of Borjomi, Atskusi Castlehill, 5 Apr 2009, L. MEIEROTT (herb. L. MEIEROTT, no det. 21162). – S of Tbilisi, Kodjovi Hill, near Kavagli Tower, 8 Apr 2009, L. MEIEROTT (herb. L. MEIEROTT, no det. 21161). – Tbilisi, near Lake Cherepashe, 9 Apr 1922, A. GROSSHEIM (LE, no. det. 17446); *ibidem*, 25 Apr 1923, A. GROSSHEIM (LE, no. det. 17445). – Tbilisi, between Lakes Cherepashe and Bebugov, 9 Apr 1922 A. GROSSHEIM (LE, no. det. 17444). – Tbilisi, “prope lacum Testudineum”, 30 Mar 1924, A. GROSSHEIM (LE, no. det. 17442). – Tbilisi [sine coll., sine dat.] (LE, no. det. 17441). – Tbilisi, Botanical Garden, 13 & 26 Mar 1910, G. WORONOW (LE, no. det. 17440); 13 Mar 1910, G. WORONOW [transcr. by HANDEL-MAZZETTI, who determined it as *T. laevigatum*] (W, no. det. 1105). – Tbilisi, a gorge of Dabakhanka River, 18 Apr 1924, A. GROSSHEIM (LE, no. det. 17439); 6 Apr 1924, A. GROSSHEIM (LE, no. det. 17437); 24 Apr 1924, A. GROSSHEIM (LE, no. det. 17435). – Tbilisi, [illegible], 12 Apr 1901 [probably], OWERIN (LE, no. det. 17438). – Tbilisi, “In silva Khudatovskiana”, 11 Mar 1923, O. ZEDELMEJER (LE, no. det. 17436). – Tbilisi, in Botanical Garden, 23 Apr 1923, Ya. MAMAEV (LE, no. det. 17434). – Tbilisi, Kuki, Mar 1861, RUPRECHT (LE, no. det. 17433). – Tbilisi, near Grma-Gole railway station, 20 Apr 1924, A. GROSSHEIM (LE, no. det. 17432).

Less safe determinations: Georgia: David Goredza, 29 Mar 2009, L. MEIEROTT (herb. L. MEIEROTT, no det. 21170). – Petrovsk, 23 Mar 1895, S. KORSHINSKY (LE, no. det. 17448). – Vicinity of Bordzhomi, between Sadgeri and Vorontsovski Park, 18 Mar 1918, V. KOZLOVSKI (LE, no. det. 17447). – Russian Federation, Dagestan: Tarki-Tau, 310 m, 17 Apr 1966, V. KUVAEV (LE, no. det. 17443)

2.4. Comparison with other Relevant Taxa of *Taraxacum* sect. *Erythrocarpa*

First, the sectional position of *T. gratum* should be elucidated. The decisive characters distinguishing *T. sect. Erythrocarpa* HAND.-MAZZ. from sect. *Erythrosperma* (H. LINDB.) DAHLST. (and sect. *Dissecta* VAN SOEST) are those of outer bracts and achenes. Big achenes (reaching or exceeding 5 mm) are restricted to sect. *Erythrocarpa*. Outer bracts of *T. gratum* are relatively large, usually appressed or loosely so, corniculate, distinctly bordered. All these characters also point to sect. *Erythrocarpa*. The lower (but not slender) growth of the new species thus cannot serve as a relevant character for the sectional classification of *T. gratum*.

Secondly, the following generally recognized species of the section *Erythrocarpa* should be compared with our taxon:

T. pindicola (BALD.) HAND.-MAZZ., *T. cinnamomeum* KIRSCHNER & ŠTĚPÁNEK and *T. calocephalum* HAND.-MAZZ. have broad and not sharply delimited whitish borders of the outer bracts, *T. delphicum* DAHLST. and *T. graecum* DAHLST. (members of *Scariosa* but close to *Erythrocarpa*) have a more complex leaf shape and are polliniferous, *T. breviscapum* A. J. RICHARDS (similar in leaf shape) has totally different outer bracts, *T. janchenii* KIRSCHNER & ŠTĚPÁNEK and *T. pseudohoppeanum* KIRSCHNER & ŠTĚPÁNEK have pale, indistinctly but broadly bordered outer bracts, *T. panhellenicum* SONCK has distinctly dentate leaves, green stigmas and outer bracts are suffused purple.

Taraxacum voricola A. J. RICHARDS, **nom. novum** [= *Taraxacum albomarginatum* A. J. RICHARDS in A. STRID & KIT TAN (eds.), Mountain Fl. Greece 2: 567 (1991), nom. illeg., non *Taraxacum albomarginatum* KITAMURA, Acta Phytotax. Geobot. 4: 103 (1935)] differs from our *T. gratum* in a totally different leaf shape, narrower outer bracts of green colour, broad white but not sharply delimited border to outer bracts, darker stigmas, smaller achenes and the presence of pollen. *T. armeniacum* SCHISCHK. has outer bracts reflexed and pollen present, which distinguishes it clearly from our species.

Of the Iranian members of the sect. *Erythrocarpa*, only the following species are comparable with *T. gratum*: *T. phaleratum* HAGL. and *T. spinulosum* subsp. *calocephaloides* SOEST (SOEST 1977). Both are polliniferous and have discoloured to dark stigmas. The Turkish *Erythrocarpa* (SOEST 1975) relevant for our comparisons are *T. davisii* SOEST, *T. kalchainum* SOEST and *T. poliochlorum* DAHLST. All are very different from our taxon in their leaf shapes, are polliniferous and have dark stigmas.

Taraxacum gratum is most commonly confused with another Transcaucasian dandelion often assigned to the section *Erythrocarpa* (but probably belonging to the sect. *Erythrosperma*, as judged from the size of achenes), *T. praticola* SCHISCHK. The latter is readily distinguishable from our new species in having dark stigmas, polliniferous anthers, much

smaller achenes with shorter cone, outer bracts recurved or erect-patent and leaf interlobes and distal margins of lobes with numerous long, narrow and acute teeth. Last, *T. praticola* is known to occur in a quite different region of the Transcaucasus, i.e., from the NE slopes of the Upper Karabakh region at the border between Azerbaijan and Armenia.

3. Names Published from the Caucasus by R. DOLL as Members of *Taraxacum* sect. *Erythrocarpa*

There are numerous names published from the Caucasus and the Transcaucasus and attributed to *T.* sect. *Erythrocarpa*. Most of them were published by DOLL 1976a, b, 1977. A considerable part of these names does not belong to the section *Erythrocarpa* and is not even remotely allied to it (*T. bezidum* DOLL, *T. breve* DOLL [as “brevum” !], *T. cachkadzorum* DOLL, *T. conicum* DOLL, *T. divulsiforme* DOLL, *T. dombaiense* DOLL, *T. ecmiadzinum* DOLL, *T. pseudophaleratum* DOLL).

The other names published by DOLL (op. cit.) referable to the section *Erythrocarpa* or suspected to belong to it are briefly compared with *T. gratum* below. The comparison is based on the examination of the type material in the collections of JE and TBI, the remaining names (mainly JERE) having been evaluated on the basis of their protologues. Selected diagnostic differences (characters distinguishing the given taxon from *T. gratum*), sometimes also notes on the taxonomic position are given below:

- T. bakuense* DOLL – stigmas blackish, pollen present;
- T. calocephaloides* DOLL – pale margins of the outer bracts very broad, not sharply delimited;
- T. cephalum* DOLL – morphologically intermediate between sections *Erythrocarpa* and *Orientalia*, totally different from *T. gratum* (outer bracts with a very broad pale margin, fruits very different);
- T. flugum* DOLL – it probably belongs to the sect. *Erythrosperma* (achenes of medium size, brown, outer bracts narrow, recurved-arcuate);
- T. forellense* DOLL – a very imperfect material, perhaps a member of the sect. *Confusa*;
- T. graciliforme* DOLL – section *Erythrocarpa* or *Erythrosperma*, surely different from *T. gratum* (outer bracts reflexed, stigmas green, totally different achenes);
- T. gracilium* DOLL – the sect. *Erythrocarpa* is possible but little resemblance to *T. gratum* (numerous, narrowly bordered outer bracts);
- T. pseudograkilens* DOLL – outer bracts reflexed, stigmas dark;
- T. pseudolaxum* DOLL – more probably sect. *Erythrosperma* but the taxon has virtually nothing in common with *T. gratum*;
- T. pseudosilesiacum* DOLL – sect. *Erythrocarpa* or *Erythrosperma* (outer bracts reflexed, leaf shape different, dark stigmas, achenes brown);

- T. rizaense* DOLL – a very marginal member of sect. *Erythrocarpa* (achenes large, pale greyish brown, stigmas dark green, outer bracts recurved);
- T. rizaense* subsp. *jerevanum* DOLL – marginal *Erythrocarpa* (achenes large, pale brownish, leaves similar to those of the sect. *Ruderalia*, very different from *T. gratum*);
- T. scolopendriforme* DOLL – stigmas dark, outer bracts narrow, patent to recurved;
- T. shirakium* DOLL – stigmas green, outer bracts erect-patent to recurved, leaf shape totally different;
- T. sieheaniforme* DOLL – sect. *Erythrocarpa* (pure brown achenes very different from those of *T. gratum*);
- T. stevenii* DOLL – a member of the sect. *Orientalia*;
- T. zineratum* DOLL – its classification in sect. *Erythrocarpa* might be correct (smaller brown achenes, outer bracts recurved).

4. Acknowledgements

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Autor(en)/Author(s): Stepanek Miroslav, Kirschner Jan, Meierott Lenz

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