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A survey of the oreophytic species of *Taraxacum* in the Carpathians reveals a very limited overlap with the flora of the Alps

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Abstract: The genus *Taraxacum* in the subalpine and alpine areas in the Carpathians (Poland, Slovakia, Ukraine, Romania, montane habitats in Czechia) is revised using newly collected material and old herbarium collections. Four *Taraxacum* sections are recognized, viz. *T.* sect. *Crocea* (= *T.* sect. *Fontana*), *T.* sect. *Alpina*, *T.* sect. *Rhodocarpa* (= *T.* sect. *Alpestria*) and a newly described *T.* sect. *Oreodoxa* Štěpánek et Kirschner, a peculiar monotypic taxon with a single species, *T. incredibile*, confined to limestone ranges in northern Romania. There are 16 species in Slovakia, 7 in Poland, 5 in Ukraine and 11 in Romania; out of the 25 species adopted after the revision, 10 are newly described and 14 occur only in a single country. The study of the *Taraxacum venustum* group in the Carpathians revealed a new Romanian species, which is described, and another new species in the Western Alps, which in the present paper is compared with the similar Bulgarian species, *T. humifusum* of *T.* sect. *Bulgarica*. *Taraxacum venustum* sensu lato is reported from the Eastern Carpathians, but further study is needed. Three species known from the Carpathians, *T. crocelliforme*, *T. pawlowskii* and *T. hercynicum*, are also recorded in the Alps. Endemism of dandelions in the Carpathians is analysed and compared with published data for other Carpathian plants and the neighbouring regions. Twenty-one species (of 25) are confined to the Carpathians, 17 are endemic to a single Carpathian region and most of them to the Western Carpathians. The main literature sources of *Taraxacum* records from the Carpathians are analysed in detail; numerous published records of Alpine species in the Carpathians were rejected. The seven names published by R. Doll from Slovakia were thoroughly revised, with four names accepted and three synonymized. Five names are lectotypified.

Keywords: Carpathians, *Cichorieae*, endemism, mountain flora, Poland, Romania, Slovakia, *Taraxacum*, taxonomy, Ukraine

Introduction

The Carpathians, one of the largest mountain ranges in Europe (Fig. 1), extending over more than 1500 km in central and south-central regions, has been overshadowed by the Alps as regards botanical explorations and study of dandelions (*Taraxacum*) in particular. Despite the fact that one of the first high mountain dandelions was described from the Carpathians (Schultes 1814), about 150 years ago, the focus of mountain *Taraxacum* research was in the Alps (Hoppe 1825, Candolle 1838, Hegetschweiler & Heer 1840, Handel-Mazzetti 1907, Haglund 1950). The current knowledge of Alpine dandelions is mainly

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Fig. 1. The Carpathians. Major division corresponding to that used in the present paper. After Kliment et al. (2011). With permission. © Peter Turis.

based on the studies of J. L. van Soest (1959, 1969), which cover the whole of the Alps and form a framework of the mountain diversity of the genus *Taraxacum* in Europe at the levels of agamospermous species and sections. The latest works dealing with oreophytic dandelions in Europe are again confined to the Alps, for instance Richards (1972), Sahlin & Lippert (1983), Uhlemann (2011, 2015) and Stöhr & Pilsl (2018). The studies of mountain dandelions in Corsica (Štěpánek & Kirschner 2013) and Bulgaria (Štěpánek & Kirschner 2022a) and the *T. alpestre* group in central Europe (Štěpánek et al. 2011) are an exception. An important contribution to the present study is that made by I. Uhlemann whom JK & JŠ invited as a co-author because of his enormous knowledge and his collection of material of Alpine dandelions for comparison with the Carpathian ones.

There are two relatively recent, important studies on *Taraxacum* in the high Carpathians, viz. Doll (1977) and Tacik (1980). They, however, cover relatively minor parts of the oreophytic flora of the Carpathians (the eastern part of the Slovak Tatra Mts and the Polish Carpathians, respectively). Long ago, the present authors were invited to contribute to the *Taraxacum* treatment for the Flora of Slovakia series (see Goliašová & Michalková 2017), but much new material is now accessible. Only a single study on the group including *T. alpestre* and *T. nigricans* is available (Štěpánek et al. 2011), but relevant herbarium voucher material revealed that neither Doll (1977) nor Tacik (1980) could be accepted as a reliable basis for further taxonomic revision. Therefore a new treatise on *Taraxacum* in the alpine and subalpine belts of the Carpathians is presented, with three main objectives: (i) a revision of published records, based on the current principles of *Taraxacum* taxonomy (Kirschner et al. 2020), (ii) on the basis of a new study of the material (together with the above revision), to compile a modern taxonomic survey of oreophytic *Taraxacum* in the Carpathians, as a new starting point for further exploration, (iii) present an outline of the phytogeography of oreophytic dandelions in central Europe with the aim of reconsidering the idea that there are a very close relationships between dandelions in the Alps and Carpathians, the latter allegedly being a depauperate derivative of the former (van Soest 1959, Tacik 1980).

Material and methods

Sources of plant material

The initial material studied came from major herbarium collections of plants from the Carpathians. The Polish part of the Carpathians is represented by herbaria KRAM, KRA, POZ and WRSL, with numerous voucher specimens for records in Tacik (1980), the Slovak part by SAV, SLO, BRA, BP, BRNM, PR, PRC, W and JE, the latter with a complete set of vouchers from the study of Doll (1977), the Ukrainian part by BP, W, PR and PRC, the Romanian Carpathians by BP, PR and PRC (abbreviations according to the Index Herbariorum, NYBG 2023). However, there is a serious limitation to using earlier plant material, mainly in the rather casual character, incompleteness and overall quality of herbarium specimens.

The main source of information for the present taxonomic survey was plant material collected during this study and a number of collectors, most often as samples of achenes, but frequently also as field herbarium specimens. Most of the material was obtained by means of cultivation. Methods of cultivation followed those described in Kirschner & Štěpánek (1993) and Kirschner et al. (2020), with half-sibs cultivated side by side in a low box. In all samples the reproduction system was determined using the indirect approach described in Kirschner et al. (2006, 2020). For some samples, chromosome numbers were determined, the methods used are described in Štěpánek et al. (2011). Almost complete material collected and cultivated is deposited in the herbarium of Institute of Botany of the Czech Academy of Sciences (PRA).

Although the majority of the herbarium samples were collected by J. Štěpánek (a lower amount by J. Kirschner), a reasonably representative geographical and taxonomic coverage could not be obtained without an enormous contribution from collectors. L. Hrouda, often together with D. Kochjarová, collected in the Ukrainian Carpathians and

the Slovak Tatry Mts (1987 and 1990). Other collectors with an important contribution in terms of samples include H. Barešová, R. Businský, V. Grulich, W. Gutermann, P. Kovář, M. Lhotská, W. Lippert, L. Paclová, A. Petrík, A. Plocek, V. Samková, K. Sutorý, O. Šída, B. Trávníček, R. J. Vašut and V. Žíla.

Basic approaches to the taxonomic study of the genus Taraxacum

There are several basic features and phenomena in *Taraxacum* that add to the difficulties encountered in the taxonomic research (Kirschner et al. 2020): They are (i) a low level of structural morphological differentiation; (ii) coexistence of agamospermy and sexuality, sometimes sympatric, but usually parapatric to allopatric, with complicated distribution patterns often corresponding to the geographical parthenogenesis model (Hörandl 2006); a substantial number of the sections include both sexual and agamospermous entities; (iii) a complex hybridity, a phenomenon with far-reaching consequences: primarily, it is a widespread high heterozygosity and the frequent occurrence of taxa morphologically intermediate between putative parental groups, or close to a putative parent, but the parental taxa of most hybridogenous entities in *Taraxacum* remain unknown or are not extant; agamospermy thus may "freeze" even very old hybridization events; (iv) an extensive polyploidy, from triploids to dodecaploids (Kirschner & Štěpánek 1993, 2004).

As regards the practical application of the above features in *Taraxacum* taxonomy, great attention was paid to the effect of reproduction on population structures because different modes of reproduction usually mean very different ranges in variation, and species in *Taraxacum* differ substantially in this respect.

Specific features of oreophytic dandelions

There are a few special features of oreophytic Carpathian dandelions for which the taxonomic approaches to the plasticity of individual forms need to be modified. First it is the field studies, complicated by small size of populations and often by the difficulty of finding the plants. The localities are often difficult to visit anew and in most cases, moreover, special permits for a visit and collecting are required.

Under the extreme conditions in the alpine zone, it is often difficult to collect samples with well developed leaves, flowers and achenes, and there is a possibility of mixed collections because of sympatric occurrence of several species. As a consequence, field samples seldom provide a complete picture of the plasticity of individual taxa.

Ripe achenes are not easy to obtain in the field and cultivation is usually needed (from roots). It is a common situation that description of achenes, one of the most important taxonomic criteria of oreophytic dandelions, is missing from protologues or is inadequate, or the comparison of specimens used for the description indicate a possible taxonomic heterogeneity.

The cone (pyramis in Latin) is usually defined as the narrow part of achene above achene body of the same colour. However, in many oreophytic Carpathian species, the whole cone does not have the same colour as the achene body, and the distal part (up to half) of the cone often has a whitish-stramineous colour similar to that of the beak. Sometimes it is even difficult to discern beak and cone (higher magnification is needed, about 60–100 ×). In the present paper, the cone is defined as the whole achene part connecting achene body to the beak (and details of cone colouration is given when necessary).

Comments on the interpretation of the results of cultivation

Mass cultivation is a standard method in taraxacology for associating flowering specimens with ripe, well developed achenes. Nevertheless, it poses specific problems in the case of oreophytic dandelions. When cultivated under lowland conditions (with a lower relative humidity, higher spring temperatures and a narrow temperature amplitude with fewer frosty nights in spring), they tend to exhibit a more compact growth with much more deeply and conspicuously dissected leaves, shorter and fewer outer phyllaries of a paler colour. Achene characters remain unchanged (although achenes of cultivated plants may be smaller). In the case of several Carpathian and Alpine mountain species, plants from lower, subalpine altitudes may deviate from the high alpine plants in a similar way to cultivated specimens.

Technical notes

Most of our revision labels are numbered and refer to the specimens to which they are attached (as "no. det.", not necessarily to duplicates).

Plant names are used in accordance with the ICN (Turland et al. 2018).

Vegetative characters and features of inflorescences, in order to be comparable, are recorded at full anthesis, if not stated otherwise.

In achene descriptions, the achene length includes the whole cone, the achene thickness (width) is measured at the widest part of the achene body.

The IUCN conservation status was estimated according to the criteria published by IUCN (Anonymous 2012).

The labels of herbarium specimens from the Carpathians are written in several languages (Polish, Slovak, Hungarian, German, Latin, Czech); they are translated into English in the lists of localities, and currently used topographic names are used whenever possible. The original wording on the label is available upon request. Type specimen citations retain the original spelling, with occasional comments.

History of the *Taraxacum* exploration in the Carpathians

The name *Taraxacum nigricans* (for a detailed analysis, see Štěpánek et al. 2011) dates back to 1814 when *Leontodon nigricans* Kitaibel in Schultes (1814: 405) was published. As shown in the paper cited, this taxon is confined to the Nízke Tatry Mts in north-central Slovakia. Another name in the same work, *Leontodon glaberrimus* Rochel ex Schultes (1814: 406), although provided with a short diagnosis, was not validly published because it was not accepted in that work (moreover, unlike *L. nigricans*, it is not listed among accepted names in the Index, without pagination, after page 577).

Specimens named *Leontodon glaberrimus* or *L. taraxacum* b. *glaberrimus* are not rare in herbarium collections and a list is presented with probable interpretations. When a more detailed locality is given, it refers to one of the lakes called Nižné / Vyšné / Suché Račkovo pleso [either Lower or Upper or Dry Račkovo Lake], Liptov Region, in the western Tatra Mts, Slovakia, at ~1,700 m, ~49°11'57"N, 19°48'19"E]:

"Ex alpe Račkowa. Com. Lipt. in Carpathis, in Hungaria", s. dato, Rochel as *Leontodon taraxacum* b. *glaberrimum* (WRSL, no. det. 28692) – Interpretation: *T.* sect. *Rhodocarpa*.

"Alp. Carp.", s. dato, Rochel as *Leontodon tarax.* b. *glaberrimus* (PR, no. det. 31238) – Interpretation: Only an envelope with achenes and fragment, identification not possible.

"Ad lacum Račkowa C. Lipt. ♂.", s. dato, [Rochel] as *Leontodon glaberrimus*, rev. Handel-Mazzetti as *Taraxacum nigricans* (PR, no. det. 36419) – Interpretation: A nice plant of the *T. vidlense* or *T. skalnatense* vicinity.

[a note written by P. M. Opiz] "No. 57. Ad lacum Račkowa C. Lipt. hungariae Rochl", s. dato, [Rochel] (PR, no. det. 36422) – Interpretation: Probably *T.* sect. *Rhodocarpa*.

Since then, the mountain dandelion research was only carried out in the Alps. The knowledge was summarized in Handel-Mazzetti (1907) who recognized *T. alpinum*, *T. fontanum* and *T. nigricans*, roughly corresponding currently to the sections *T.* sect. *Alpina*, *T.* sect. *Crocea* and *T.* sect. *Rhodocarpa*. Another comprehensive work relevant for the *Taraxacum* flora in both the Alps and Carpathians is the Flora of central Europe by Hegi (1928), which includes all the mountain dandelions (with the exception of red-fruited ones) under the name *T. officinale*, with subsp. *alpinum* (incl. var. *fontanum*) and subsp. *nigricans*. The same names appear also in the main regional works dealing with the flora of the Carpathians, e.g. Polívka et al. (1928), Dostál (1950, 1958), Kotov (1965), Pawłowski (1956), Nyárády (1965), Čopyk (1976).

The main breakthrough in the methodology and coverage of oreophytic groups of *Taraxacum* is the work of van Soest (1959), followed by further papers (van Soest 1966a, b, 1969, 1976), where the method of agamospecies recognition was used in an analysis of a rich collection of material collected mainly by J. L. van Soest himself in the Alps. At the same time, a framework of the sectional system was developed, with *T.* sect. *Alpina*, *T.* sect. *Fontana* and *T.* sect. *Alpestria*, a system that proved useful also in the Carpathians. Four oreophytic species are reported by van Soest (1959) from the Carpathians, viz. *T. panalpinum* van Soest (1959: 88), *T. helveticum* van Soest (1959: 85), *T. fontanicola* van Soest (1959: 108) and *T. peralatum* van Soest (1959: 113). The same names (probably on the basis of the same Carpathian records) appeared in van Soest (1969) and in Richards & Sell (1976). Voucher specimens of these records are deposited in W, which revealed they did not belong to these four Alpine species. Nevertheless, the names of agamospermous species reported by van Soest are repeated in recent literature on the Carpathians (e.g. Dostál 1989, Dostál & Červenka 1992, Kirschner & Štěpánek 1992, Marhold & Hindák 1998). The most recent *Taraxacum* survey in Poland (Marciniuk & Marciniuk 2019) gives maps of selected oreophytic species, all but one originally published by van Soest from the Alps (viz. *T. aestivum*, *T. albulense*, *T. carinthiacum*, *T. fontanicola*, *T. fontanosquameum*, *T. helveticum*, *T. panalpinum*, *T. pawlowskii*, *T. peralatum* and *T. perfissum*).

There are two important studies on the Carpathian oreophytic dandelions, which are the results of research on new collections, Doll (1977) and Tacik (1980). They are analysed below.

Interpretation of the records and taxa reported by R. Doll (1977)

The first specialized research on *Taraxacum* in the Carpathians was conducted by R. Doll in July, 1975. Results were published two years later (Doll 1977), and nine species (eight newly described) were recognized. For a long time, it was difficult to use these results because the original material was not accessible. Currently, the complete set of voucher specimens, including the potential type specimens associated with the new names, is deposited in JE. In this herbarium, the plant material (originally in newspaper folders) was carefully prepared and rich gatherings presented on two or more herbarium sheets. Sometimes, these specimens are not explicitly annotated as parts of a single gathering, and, in the cases of type gatherings, it was inevitable to select lectotypes from the original material.

A survey of the material used by Doll (1977) for the descriptions of his new species and an attempt at the interpretation of his names is presented. We also studied Western Carpathian specimens determined by R. Doll in the herbarium BP but he did not use the names published in 1977 and used names published from the Alps. Doll (1977) did not explain the criteria used in the sectional classification or descriptions of any of the sections recognized by him (*T.* sect. *Alpina*, *T.* sect. *Fontana*, *T.* sect. *Alpestria*). There is a case of a single species with two names, each placed in a different section. However, although this traditional sectional classification is useful it does not present a complete picture of the diversity of mountain dandelions in central Europe.

Taraxacum tatrense Doll (1977: 121)

Type indication: "Holotypus in herb. Doll (Am Fuss des Hlúpy, S-Seite am Weg, 5. 7. 1975. Doll)" [SLOVAKIA, the Belianske Tatry, Mt Hlúpy (2,061 m), ~49°14'12" N, 20°13'12" E, near the divide between the Belianske Tatry and the Vysoké Tatry Mts]

The original material consists of four elements:

(1) Flora Tatrensis, Hohe Tatra, am Fuss des Hlupy, S-Seite am Weg, 5 Jul 1975, R. Doll, as *Taraxacum tatrense* spec. nov. (JE, no. det. 19089). In JE, this specimen is labelled as the holotype. There are three plants on this sheet, the upper left one (B) belongs to *T. pawlowskii*, the other two plants (A) to *T. skalnatense*. Both A and B were used for the description and Fig. 1 in Doll (1977).

(2) A specimen, labelled "Präparate verschiedener *Taraxacum*-Arten von R. Doll" (without data on the locality or date of collection), determined as *T. tatrense* (JE, no. det. 19090), which consists of a little card with three phyllaries and one achene glued to the paper, obviously the basis for Fig. 1 in Doll (1977). It is again a mixture of two different elements (phyllaries belong to *T. skalnatense*, the achene to *T. pawlowskii*).

(3) Flora der Tatra (ČSSR), Am Weg vom Hlúpy zum Ždiarska Vidla, ~1,800 m, 5 Jul 1975, R. Doll, not identified (JE, no. det. 19091). Of the five plants on this sheet, two (and loose achenes) belong to *T. skalnatense* and three to another species difficult to identify. The specimen is cited in the protologue (Doll 1977: 121) and is a paratype.

(4) [Transcribed label, without any original text or determination] "Flora der Tatra (ČSSR)? am Hlúpy.",? 5 Jul 1975, R. Doll (JE, no. det. 19092). On two herbarium sheets (I, II), there are four plants and two envelopes with achenes, all belonging to *T. skalnatense*.

Conclusion: The original material is heterogeneous and the name requires lectotypification. The specimen (1A), JE, no. det. 19089, is designated as the lectotype in the

taxonomic treatment below. The name *T. tatrense* is treated as a synonym of the simultaneously published and accepted *Taraxacum skalnatense*.

Taraxacum latericulum Doll (1977: 122)

Type indication: "Holotypus in herb. Doll (Brnčalova chata, am See zwischen Geröll, 4. 7. 1975, Doll)."

The original material consists of four herbarium sheets in JE:

(1) Flora Tatrensis. Herbarium Reinhard Doll. *Taraxacum etagense* Doll, spec. nov. Hohe Tatra, Brncalova Chata, am See zw. Geröll, 4 Jul 1975, R. Doll (JE, no. det. 19093) [SLOVAKIA, the Vysoké Tatry Mts, the chalet called Chata pri Zelenom plese, ~49°12'36" N, 20°13'16" E, 1,550 m]. – There are three plants on this herbarium sheet, all belonging to what is accepted as *T. latericulum* below. The name *T. etagense* used by R. Doll was later abandoned in favour of *T. latericulum*.

(2) [transcribed in JE, including the name] Bryncalova Chata, am See zw. Geröll, 4 Jul 1975, R. Doll (JE, no. det. 19022). – The material is on two sheets I and II, each with a couple of plants and some fragments. These plants belong to what is below accepted as *T. latericulum*.

(3) A specimen consisting of a little card with two phyllaries and one achene glued to the paper, obviously a basis for Figure 1 ["Abb. 1 (rechts)" in Doll (1977)]. The original determination is *T. etagense*.

Conclusion: The above four specimens are the complete original material of the name *T. latericulum*. They are more or less equal as regards their type status, they represent syntypes (although specimen 3 is not of suitable quality for name interpretation). The herbarium sheet (1), JE, no. det.19093, is designated as the lectotype in the taxonomic treatment below.

Taraxacum flumineum Doll (1977: 122)

Type indication: "Holotypus in herb. Doll (Brnčalova chata, Gebirgsbach, 4. 7. 1975, Doll)."

The complete original material in JE consists of five gatherings preserved on six herbarium sheets:

(1) Flora Tatrensis, Herbarium Reinhard Doll, Hohe Tatra, Brncalova Chata, Gebirgsbach, Nr. 4, Jul 1975, R. Doll, as *Taraxacum flumineum* Doll spec. nov. (JE, no. det. 19223) [SLOVAKIA, the Vysoké Tatry Mts, the chalet called Chata pri Zelenom plese, ~49°12'36" N, 20°13'16" E, 1,550 m]. – A single herbarium sheet with two plants and an envelope with achenes. Material of rather low quality but conspecific with what is accepted under the name *T. flumineum* in the taxonomic treatment below (Fig. 2).

(2) Nr. 7, Weg am Gebirgsbach bei der Bryncalova Chata, unweit Nr. 6, 4 Jul 1975, R. Doll (JE, no. det. 19222). – A single herbarium sheet with three imperfectly preserved plants and a bag with achenes. All these plants belong to what is accepted under the name *T. flumineum* in the taxonomic treatment below.

(3) Nr. 6, Weg am Gebirgsbach bei der Bryncalova Chata, 4 Jul 1975, R. Doll (JE, no. det. 19220). – A single herbarium sheet with three imperfectly preserved (brownish) plants, a loose scape and a bag with a late capitulum. There is no determination label attached to this specimen by Doll. All plants belong to what is accepted under the name



Fig. 2. *Taraxacum flumineum*. General habit of the lectotype plant (JE, no. det. 19223).

T. flumineum in the taxonomic treatment below, with the exception of the upper left plant (a different but not determinable species).

(4) Gebirgsbach, Bryncalova Chata, 4 Jul 1975, R. Doll (JE, no. det. 19224). – A gathering divided between two sheets (I, II). On sheet I, there is a big plant, on the sheet II, about 10 loose leaves and two scapes. All plants belong to what is accepted under the name *T. flumineum* in the taxonomic treatment below; the only exception is the smaller plant on sheet I (not identified). It is possible that the gathering (4) originally a part of the original gathering but it is not annotated as *T. flumineum* by Doll.

(5) A specimen consisting of a little card with two phyllaries and one achene glued to the paper, obviously the basis for the drawing of *T. flumineum* in Figure 1 (Doll 1977); Doll wrote the name "*flumineum*" on the card and the original specimen belongs to that species, as understood and accepted in the present paper.

Conclusion: The specimens (1), (2) and (5) probably originally formed the holotype cited above; plants are homogeneous taxonomically. As they were later divided in JE, they are now syntypes. In the chapter with the taxonomic treatment, we select the specimen (1), JE, no. det. 19223, as the lectotype. The name *T. flumineum* is accepted.

Taraxacum crocellum van Soest (1959: 119)

Type: SWITZERLAND. Vernelathal (Silvretta), 2,150 m, 18 Jul 1954, J. L. van Soest (L 2421!)

Reported to occur in the Slovak Carpathians on the basis of plant material collected by R. Doll; three herbarium sheets are deposited in JE:

(1) Flora der Tatra (ČSSR), Kežmarska chata: im Moor am See, 4. VII. 1975, R. Doll as *T. crocelliforme* Doll spec. nov. (JE, no. det. 19148). – In JE, a note was attached to one of the herbarium sheets saying [translated]: "A herbarium label name! Not a new species but *Taraxacum crocellum* van Soest. 1985, R. Doll (personal communication)." A rich gathering on two herbarium sheets (I, II). Altogether, eight plants, all belonging to what is described as *T. crocelliforme* in the present paper.

(2) Flora Tatrensis, im Moor bei der Kezmarska Chata, 4 Jul 1975, R. Doll, as *Taraxacum crocelliforme* Doll spec. nov. "Holotypus!" (JE, no. det. 19149). – Three well developed plants, all belonging to *T. crocelliforme*.

Conclusion: Results of the current study comply with the original opinion of R. Doll that the gathering belongs to a new species distinct from *T. crocellum* and described as *T. crocelliforme* in the taxonomic part of the present paper.

Taraxacum bujacense Doll (1977: 124)

Type indication: "Holotypus in herb. Doll (Am Weg beim Bujačí, 5. 7. 1975, Doll)".

The original material consists of three herbarium sheets in JE:

(1) [SLOVAKIA]. Flora Tatrensis, am Weg beim Bujaci, 5 Jul 1975, R. Doll, as "*Taraxacum bujacense* Doll spec. nov. Holotypus!" (JE, no. det. 19225). A single plant with achenes, and an envelope with achenes, florets and a late capitulum. The plant corresponds to the protologue.

(2) Flora der Tatra (ČSSR), am Weg beim Bujaci, 5 Jul 1975, R. Doll, as *Taraxacum bujacense* Doll spec. nov. (JE, no. det. 19226). A herbarium sheet with a single plant

(with a single fruiting capitulum) and an envelope with achenes, fruiting capitula and fragments. Stored as the isotype in JE.

(3) A specimen consisting of a little card with two phyllaries and one achene glued to the paper, obviously a basis for the Figure 2 ["Abb. 2"]. The card is annotated as "Präparate verschiedener *Taraxacum*-Arten von R. Doll.", sine dat. & coll. (JE, no. det. 19227). The original determination is *T. bujacense*.

Conclusion: The whole of the original material is homogeneous taxonomically and corresponds to the protologue of the name *T. bujacense*. The name is a synonym of *T. flumineum*, see below.

Note: Another locality mentioned in the protologue (Am Weg bei der Hütte Plesnivec, 6 Jul 1975, Doll) is without any voucher specimen in JE and probably was not documented by herbarium specimens.

Taraxacum cuspidatiforme Doll (1977: 125)

Type indication: "Holotypus in herb. Doll (Am Weg beim Bujačí, 6. 7. 1975, Doll)".

The original material consists of three herbarium sheets in JE. R. Doll originally introduced a rather non-standard form of the name, *T. cuspidum* and during the editorial process, the name was changed to *T. cuspidatiforme* (and in JE, each herbarium sheet bears an explanatory note to that end).

(1) [SLOVAKIA]. Flora Tatrensis, am Weg beim Bujaci, 6 Jul 1975, R. Doll as [sic!] "*Taraxacum cuspidum* Doll spec. nov. Holotypus!" (JE, no. det. 19228). This sheet bears a single plant with two capitula (achenes unripe). Florets are missing. Obviously, this specimen should be considered as the holotype of *T. cuspidatiforme*.

(2) Flora der Tatra (ČSSR), am Weg beim Bujačí vrch, Kalk, mit *T. bujacense*, 6 Jul 1975, R. Doll as "*Taraxacum cuspidum* Doll spec. nov." (JE, no. det. 19229). Two plants with a fruiting scape each, and an envelope with achenes and florets (pollen present, although the protologue reports the absence of pollen). Taxonomically homogeneous.

(3) A specimen consisting of a little card with two phyllaries and one achene glued to the paper, obviously a basis for the Figure 2 ["Abb. 2" in Doll (1977)]. The card is annotated as "Präparate verschiedener *Taraxacum*-Arten von R. Doll.", sine dat. & coll. (JE, no. det. 19230). The original determination is *T. cuspidum*.

Conclusion: Specimens (1) and (2) might have been separated during the preparation in JE, but there is a label "Holotypus" written by R. Doll on sheet (1) and that plant is retained as the holotype. The whole of the original material is homogeneous taxonomically and it is concluded that the name *T. cuspidatiforme* represents a synonym of *T. flumineum*.

Taraxacum kezmarkense Doll (1977: 125)

Type indication: "Holotypus in herb. Doll (Bei der Kežmarská chata am Wegrand, 4. 7. 1975, Doll)."

The original material consists of four gatherings on seven herbarium sheets in JE. R. Doll originally introduced a rather non-standard form of the name, *T. kezmarskum*, which during the editorial process was changed to *T. kezmarkense* (and in JE, each herbarium sheet bears an explanatory note to that end).

(1) [SLOVAKIA]. Flora Tatrensis, Kezmarska Chata, Wegrand, 4 Jul 1975, R. Doll, as "*Taraxacum kezmarskum* Doll spec. nov. Holotypus!" (JE, no. det. 19095). Herbarium sheet (1) is stored in a folder of red colour indicating the holotype status in JE. There are three plants on this sheet, and an envelope with fruiting capitulum. The lower plant (marked as B, together with the achenes in the envelope) and the upper left plant (A) belong to *T. skalnatense*. The upper right plant (C) belongs to *T. flumineum*. Because the sheet (1) is treated as holotype but is not homogeneous taxonomically, we recommend to select the plant A as the lectotype of the name *T. kezmarkense*. The specimen (A), JE, no. det.19095, is therefore designated as the lectotype in the taxonomic treatment below.

(2) Flora der Tatra (ČSSR), Kezmarska chata, Wegrand, 4 Jul 1975, R. Doll, as "*Taraxacum kezmarskum* Doll spec. nov." (JE, no. det. 19096). This folder includes two herbarium sheets (I, II), the former with five plants (and fragments and achenes in an envelope), the latter with three relatively well developed fruiting plants (and an envelope with achenes). The whole gathering, isotype, belongs to *T. skalnatense*.

(3) Flora der Tatra (ČSSR), Kezmarska Chata, am Weg, 4 Jul 1975, R. Doll, as "Doll spec. nov." (JE, no. det. 19097). This gathering consists of three herbarium sheets (I, II, III), with two plants (and an envelope), a single plant, and two plants (and an envelope with achenes), respectively. Only the achenes in the envelope on sheet III belong to *T. skalnatense*, while all the remaining material clearly belongs to *T. flumineum*. Thus, also with regard to the absence of any original determination, this gathering may not be a part of the original material (moreover, morphological characters of the plants do not correspond to the protologue description).

(4) A specimen consisting of a little card with two phyllaries and one achene glued to the paper, obviously a basis for the Figure 3 ["Abb. 3" in Doll (1977)]. The card is annotated as "Präparate verschiedener *Taraxacum*-Arten von R. Doll.", sine dat. & loc. (JE, no. det. 19098). The original determination is *T. kezmarskum*. The achene belongs to *T. skalnatense*.

Conclusion: With the exception of the gathering (3), almost all the plants are in good agreement with the description and other data in the protologue; sheet (1) is not homogeneous and a lectotype is selected in the taxonomic part of the present study. The lectotype and isotype plants are conspecific with *T. skalnatense*, an accepted name with *T. kezmarkense* as a synonym.

Taraxacum skalnatense Doll (1977: 126)

Type indication: "Holotypus in herb. Doll (Skalnaté Pleso, am Seeufer, 2. 7. 1975, Doll)."

The original material consists of three herbarium sheets in JE. R. Doll originally introduced a rather non-standard form of the name, *T. skalnatum*, which during the editorial process was changed to *T. skalnatense* (and in JE, each herbarium sheet bears an explanatory note to that end).

(1) [SLOVAKIA]. Flora Tatrensis, Skalnate Pleso, am See, Jul 1975, R. Doll, as "*Taraxacum skalnatum* Doll spec. nov." (JE, no. det. 19099). A single herbarium sheet (marked as isotype in JE, see Fig. 3) with two well developed plants with achenes (achenes also in an envelope). One of the plants is probably only very sparsely polliniferous (or even without pollen).



Fig. 3. *Taraxacum skalnatense*. General habit of the lectotype plant (JE, no. det. 19099).

(2) Flora der Tatra (ČSSR), Tatransk Lomnica / Skalnate Pleso, Am See, 2 Jul 1975, R. Doll, as "*Taraxacum skalnatum* Doll spec. nov." (JE, no. det. 19100). A single sheet with a single plant (again marked as isotype in JE) and an envelope with achenes, all conspecific with sheet (1).

(3) A specimen consisting of a little card with three phyllaries and one achene glued to the paper, obviously a basis for the Figure 3 ["Abb. 3" in Doll (1977)]. The card is annotated as "Präparate verschiedener *Taraxacum*-Arten von R. Doll.", sine loc., s. dato, R. Doll. Originally identified as "[*Taraxacum*] *skalnatum*" (JE, no. det. 19101). In JE, treated as an isotype.

Conclusion: The whole of the original material is taxonomically homogeneous and is of a taxon accepted as *T. skalnatense* in the taxonomic part of the present study. Specimens (1) and (2) probably originally formed the holotype. As no specimen was designated as a holotype by R. Doll, a lectotype was selected [sheet (1), JE, no. det. 19099], see the taxonomic treatment below. The name *T. skalnatense* is accepted, with two synonyms, *T. tatrense* and *T. kezmarkense*.

Taraxacum vidlense Doll (1977: 126)

Type indication: "Holotypus in herb. Doll (Am Weg vom Hlúpy zum Ždiarska Vidla, 5. 7. 1975, Doll)."

The original material consists of three herbarium sheets in JE. R. Doll originally introduced a rather non-standard form of the name, *T. zdiarskum*, which during the editorial process was changed to *T. vidlense* (and in JE, each herbarium sheet bears an explanatory note to that end).

(1) [SLOVAKIA]. Flora Tatrensis, am Weg vom Hlupy zum Zdiarska Vidla, 5 Jul 1975, R. Doll, as "*Taraxacum zdiarskum* spec. nov. Holotypus!" (JE, no. det. 19217). A single sheet with two well developed plants in flower and with achenes (and an envelope with loose achenes and fragments, Fig. 4).

(2) Flora der Tatra (ČSSR), am Weg vom Hlupy zum Zdiarska Vidla, 5 Jul 1975, R. Doll, as "*Taraxacum zdiarskum* spec. nov." (JE, no. det. 19218, Fig. 5). A single sheet with a well developed plant (flowers and almost ripe achenes, and an envelope with loose achenes and florets).

(3) A specimen consisting of a little card with three phyllaries and one achene glued to the paper, obviously a basis for the Figure 3 ["Abb. 3" in Doll (1977)]. The card is annotated as "Präparate verschiedener *Taraxacum*-Arten von R. Doll.", sine loc., s. dato, R. Doll. Originally identified as "[*Taraxacum*] *zdiarskum*" (JE, no. det. 19219).

Conclusion: The (probably complete) original material is homogeneous taxonomically and the sheet (1), annotated as "Holotypus" by R. Doll, is accepted as the type of the name. *Taraxacum vidlense* and is an accepted name in the taxonomic treatment below.

Note: From the same locality ("Am Weg von Kežmarska Chata nach dem H[l]upy, ~300 m hinter der Baude", 5 Jul 1975, R. Doll), there is a specimen (JE, no. det. 19102) identified as *T. peralatum* by R. Doll. This record remains unpublished and it was not possible to identify the specimen because of its low quality and imperfect preparation, but the specimen does not belong to *T. peralatum*.



Fig. 4. *Taraxacum vidlense*. The holotype (JE, no. det. 19217).

Interpretation of the alpine and subalpine *Taraxacum* records in Flora Polska

One of the most important sources of *Taraxacum* records in the Carpathians is Flora Polska, Vol. 14 (Tacik 1980: 62–78). Tadeusz Tacik (1926–1989) systematically collected alpine dandelions in Poland, and his collection, together with the herbarium material of other botanists, was examined by J. L. van Soest in the period of 1974–1977. Then T. Tacik continued the research and applied the system of agamospermous taxa in the evaluation of the whole *Taraxacum* material in the herbarium collections of KRAM and KRA. This material was later included in the current study, with the exception of a part of KRA and the collections of Z. Mirek and J. K. Mądalski.



Fig. 5. *Taraxacum vidlense*. The isotype (JE, no. det. 19218).

The following account is ordered in the same way as in Tacik (1980), according to sections (*T.* sect. *Alpina*, *T.* sect. *Fontana* and *T.* sect. *Alpestria*) and species number codes. Not all specimens are annotated in detail.

2733. *Taraxacum carinthiacum* van Soest

Tacik (1980: 65) listed two specimens from Poland (and another two from Slovakia and one from Ukraine, this material was not included in this study) under the name *T. carinthiacum*. The Polish specimens included:

1. The High Tatra Mts, Morskie Oko, below Mt Mięguszowiecki Średni, 1,910 m, 12 Aug 1953, B. Pawłowski (KRAM 337374). There are eight plants on this specimen, one of them belongs to *T. crocelliforme* (KRAM, no. det. 34408), the rest (at least partly) to *T.* sect. *Rhodocarpa*. A duplicate of this gathering (KRAM 337280) was not seen by van Soest, and Tacik identified one plant as *T. panalpinum*, another one as *T. carinthiacum*. Both plants belong to *T. pawlowskii*.

2. The West Tatra Mts, Ciemniak, 27 Jul 1953, A. Jasiewicz (KRAM 439053 & 439052). The former specimen belongs to *T. skalnatense* (KRAM, no. det. 34407), the latter to a species of *T.* sect. *Rhodocarpa*.

Note: There are another four specimens in KRAM identified as *T. carinthiacum* by T. Tacik. One belongs to *T. skalnatense* (KRAM 392499, no. det. 34470), the other remain without our identification.

Conclusion: None of the material studied belonged to *T. carinthiacum*. Under the correct name, *T. venustum*, this species is recognized in the Alps as one of the most distinctive members of *T.* sect. *Alpina* and it is highly probable that this species does not occur in the Polish Carpathians.

2734. *Taraxacum helveticum* van Soest

Tacik (1980: 65) reports two specimens from the Polish Tatra Mts (and repeated the record published by van Soest in 1959). The only specimen included in this study [the West Tatra, Czerwone Wierchy, Mt Krzesanica, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 570212)] belongs to a species of *T.* sect. *Rhodocarpa* (not *T. helveticum* of *T.* sect. *Alpina*).

Note: T. Tacik identified another three specimens in KRAM as *T. helveticum* (KRAM 437888, no. det. 34504; KRAM 437884, no. det. 34502; KRAM 392631, no. det. 34500) but none of these plants belongs to it.

Conclusion: *Taraxacum helveticum*, in all likelihood, does not occur in the Carpathians.

2735. *Taraxacum panalpinum* van Soest

There are four specimens from Poland quoted by Tacik (1980: 66) under this name. We have examined all of them:

1. Tatry, Krzesanica, 20 Jul 1950, T. Tacik (KRAM 387822, det. van Soest). Plants on this sheet belong to more than one species but they are partly damaged and not well developed.

2. Tatry, Czerwone Wierchy, między Krzesanicą a Ciemniakiem [between Krzesanica and Ciemniak], 27 Jul 1953, T. Tacik (KRAM 387824, no. det. 34426). Plants belonging to *T. skalnatense*.

3. Tatry, Czerwone Wierchy. Dolina Mułowa, 1,730 m, 25 Jul 1953, T. Tacik (KRAM 387823). The herbarium specimen consisting of 15 fragments, an unidentifiable mixture of plants of sections *Rhodocarpa* and *Alpina*.

4. The West Tatra, Przy Kopie Pass, below the rocks of Chuda Turnia, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 387825). A species of *T.* sect. *Rhodocarpa* we are unable to identify.

Note: There are another twelve, mostly Polish, specimens in KRAM under the name of *T. panalpinum*. None of them belongs to *T. panalpinum*. One matches our *T. obesum*

(KRAM 256944, no. det. 34525). The others are difficult to identify; they belong to *T.* sect. *Rhodocarpa* (KRAM 337210, no. det. 34535; KRAM 437886, no. det. 34498; KRAM 337282, no. det. 34537; KRAM 337283, no. det. 34539; KRAM 337281, no. det. 34520; KRAM 337285, no. det. 34643; KRAM 437891, no. det. 34628; KRAM 337284, no. det. 34541; KRAM 265102, no. det. 34497), *T.* sect. *Alpina* (KRAM 088436, no. det. 34527) or the section is unclear (KRAM 337209, no. det. 34533).

Conclusion: None of the specimens examined belong to *T. panalpinum* and its presence in the Carpathians is very doubtful.

2736. *Taraxacum pawlowskii* van Soest

This name belongs to a taxon widespread in the Carpathians (and, until recently, tentatively recognized by us under the provisional name of *T. argentatum*, ined.). In addition to the type specimen, Tacik (1980: 67) records it in Slovakia ["Tatry Wysokie, nad Długim Stawem w Dolinie Wielickiej", 5 Sep 1956, A. Jasiewicz (KRAM 437889, no. det. 34420)]. The latter specimen belongs to *T. pawlowskii*.

Conclusion: The name *T. pawlowskii* is accepted in the present paper and all the details are given below in the taxonomic treatment.

2737. *Taraxacum pseudofontanum* van Soest

Tacik (1980: 68) lists two gatherings of Z. Mirek from Slovakia (not included in this study), and there are six specimens determined by T. Tacik as *T. pseudofontanum* before 1980. The majority of them are species of *T.* sect. *Crocea*, *T. crocelliforme* (KRAM 337290, no. det. 34540; KRAM 337289, no. det. 34538; KRAM 392567, no. det. 34490; KRAM 392568, no. det. 34492). The remaining two specimens (KRAM 439025, no. det. 34488, KRAM 337381, no. det. 34647) belong to *T.* sect. *Rhodocarpa* and *T.* sect. *Alpina*, respectively, and *T. pseudofontanum* is excluded.

Conclusion: There is no evidence in favour of the inclusion of *T. pseudofontanum* in the flora of the Carpathians.

Note: The name *T. pseudofontanum* van Soest is a synonym of the earlier *T. insubricum* van Soest.

2738. *Taraxacum fontanicola* van Soest

Tacik (1980: 70) reports *T. fontanicola* as a common species in the Polish Tatra Mts, without listing the specimens. The 12 Carpathian specimens studied are identified as *T. fontanicola* by van Soest or T. Tacik in the herbarium KRAM. They represent a mixture of taxa, with three specimens of *T. flumineum* (KRAM 337379, no. det. 34380; KRAM 037554, no. det. 34560; KRAM 337378, no. det. 34378) and one specimen of *T. pawlowskii* (KRAM 256424, no. det. 34566). The remaining eight specimens are very difficult to identify, but *T. fontanicola* is again very improbable as they include *T.* sect *Rhodocarpa* (KRAM 337205, no. det. 34521; KRAM 392592, no. det. 34583; KRAM 437882, no. det. 34489; KRAM 256945, no. det. 34564), *T.* sect. *Alpina* or *T.* sect. *Crocea* (KRAM 169657, no. det. 34561), *T.* sect. *Rhodocarpa* or *T.* sect. *Crocea* (KRAM 337380, no. det. 34523), *T.* sect. *Rhodocarpa* or *T.* sect. *Alpina* (KRAM 290032, no. det. 34568) and *T.* sect. *Taraxacum* (KRAM 392593, no. det. 34562).

Conclusion: There is no evidence that *T. fontanicola* occurs in the Carpathians.

Note: The name *T. fontanicola* van Soest is a synonym of *T. fontanum* Hand.-Mazz. (cf. Uhlemann, in litteris).

2739. *Taraxacum fontanosquameum* van Soest

Tacik (1980: 71) listed two specimens from Poland and one from Slovakia (the latter not seen).

1. The West Tatra Mts, Polana Upłaz, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 570159). A plant of *T.* sect. *Rhodocarpa*, surely not *T. fontanosquameum*.

2. The West Tatra Mts, Kominy Tylkowe (= Kominiarsky Wierch), 1,825 m, 19 Aug 1976, H. & T. Tacik (KRAM 570156). There is a single plant, with fruits, belonging to *T. flumineum*.

There are another nine specimens from the Polish Tatra Mts, determined as *T. fontanosquameum* by Tacik before 1980. Six of them represent *T. flumineum* (KRAM 392591, no. det. 34389; KRAM 392589, no. det. 34391; KRAM 392590, no. det. 34393; KRAM 392588, no. det. 34394; KRAM 392587, no. det. 34468; KRAM 337263, no. det. 34373), one *T. vidlense* (KRAM 439048, no. det. 34570), one *T. skalnatense* (KRAM 337264, no. det. 34382); the last one remains without our identification (*T.* sect. *Rhodocarpa*, KRAM 570155, no. det. 34630).

Conclusion: In all likelihood, *T. fontanosquameum* does not occur in the Carpathians.

2740. *Taraxacum peralatum* van Soest

Tacik (1980: 72) lists five localities in the Polish Tatra Mts, two in Slovakia and repeats the Ukrainian record published by van Soest (1959). The voucher specimens examined include:

1. The West Tatra Mts, between Piec and the Przy Kopie Pass, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 387770, no. det. 34430). Three plants of *T.* sect. *Rhodocarpa* on this sheet do not belong to *T. peralatum*.

2. The West Tatra Mts, Giewont, 1,894 m, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 387768, no. det. 34427). The single plant belongs to *T. flumineum*.

3. The West Tatra Mts, Czerwone Wierchy, Krzesanica, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 387766, no. det. 34425). Originally determined as *T. absurdum* by Tacik, revised as *T. peralatum* by van Soest. There are two plants on this sheet, they belong to *T. latericulum*.

4. The West Tatra Mts, Czerwone Wierchy, Ciemniak, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 387771, no. det. 34428). Two plants identified as *T. peralatum* by van Soest represent *T. flumineum*.

5. The West Tatra Mts, Czerwone Wierchy, Ciemniak, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 388134, no. det. 34423). T. Tacik originally identified this specimen as *T. fontanicola*, later van Soest determined it as *T. peralatum*. The three, rather imperfectly preserved plants probably belong to *T. flumineum*.

6. The West Tatra Mts, Kominy Tylkowe (= Kominiarsky Wierch), 1,825 m, 19 Aug 1976, H. & T. Tacik (KRAM 387769, no. det. 34432). The only plant on this sheet probably belongs to *T. flumineum*.

7. The High Tatra Mts, Dolina Furkotna, ~1,740 m, 17 Aug 1955, A. Jasiewicz (KRAM 437881). The specimen (a single plant divided in two parts) was determined as "*Taraxacum peralatum* forma *rubriflora* v. S. Ligulae extus rubriflorae." by van Soest in 1974. The plant undoubtedly belongs to *T. crocelliforme* (KRAM, no. det. 34434). The specimen represents the holotype of *T. peralatum* f. *rubriflorum* van Soest ex Tacik (1980: 72).

There are another six specimens from the Carpathians identified as *T. peralatum* by T. Tacik before 1980. One of them belongs to *T. skalnatense* (KRAM 437879, no. det. 34493) and one to *T. crocelliforme* (KRAM 392571, no. det. 34487). The remaining specimens belong to *T.* sect. *Rhodocarpa* (species not identified): KRAM 437892, no. det. 34491; KRAM 387767, no. det. 34496; KRAM 265101, no. det. 34494; KRAM 337204, no. det. 34531.

There is no evidence that *T. peralatum* occurs in the Carpathians.

2741. *Taraxacum pohlii* van Soest

Tacik (1980: 74) gives two localities in Slovakia and Ukraine; the voucher specimens were not included in this study. As there is no sample resembling *T. pohlii* in the material examined, these records are considered as doubtful.

2742. *Taraxacum aestivum* van Soest

There is a single, uncertain record of *T. aestivum* from Poland (Tacik 1980: 74):

The West Tatra Mts, "Pyszna pod Banistem", 1,760–1,800 m, 18 Jul 1936, B. Pawłowski (KRAM 337368, no. det. 34384). The little plant on this sheet belongs to *T. pawlowskii*.

There are another five specimens from the Tatra Mts determined (with a various degree of uncertainty) as *T. aestivum* by T. Tacik before 1980. Two of them belong to *T. pawlowskii* (KRAM 337369, no. det. 34637; KRAM 337203, no. det. 34410), the other specimens remain unidentified (KRAM 337370, no. det. 34532; KRAM 437885, no. det. 34554; KRAM 439023, no. det. 34556).

Note: The name *Taraxacum aestivum* is a synonym of the name *T. panalpinum* van Soest.

Conclusion: *Taraxacum aestivum* can be deleted from the list of the Carpathian flora.

2743. *Taraxacum albulense* van Soest

Tacik (1980: 75) reports *T. albulense* at two localities. One specimen was examined:

The West Tatra Mts, between Piec and the Przy Kopie Pass, 1,500–1,640 m, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 387213, no. det. 34412). It is a little plant and it is unclear whether it belongs to *T.* sect. *Rhodocarpa*.

There is another plant under the name of *T. albulense* (KRAM 437893, no. det. 34552). It belongs to *T.* sect. *Rhodocarpa*.

Conclusion: *Taraxacum albulense* is a distinctive Alpine species and both of the Carpathian specimens examined differ from it and *T. albulense* and in all likelihood it does not occur in the Carpathians.

2744. *Taraxacum nigricans* (Kit.) Reichenb.

This name is probably the most frequently used dandelion binomial in Carpathian literature. Tacik (1980: 76) lists a number of localities from the Karkonosze Mts in the west to the Ukrainian Carpathians in the east. The six voucher specimens were identified as *T. nigricans* by van Soest between 1974 and 1977. None of them belong to *T. nigricans*:

1. "Tatry Wys.: dol. Pańszczycy", 1,500 m, 25 Aug 1960, H. Piękoś (KRAM 088391, no. det. 34508). The only plant on this herbarium sheet very probably represents *T. vidlense*.

2. The West Tatra Mts, between Piec and the Przy Kopie Pass, 1,500–1,640 m, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 570071, no. det. 34409). An unidentified member of *T.* sect. *Rhodocarpa*.

3. The West Tatra Mts, between Piec and the Przy Kopie Pass, 1,500–1,640 m, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 570075, no. det. 34411). An unidentified member of *T.* sect. *Rhodocarpa*.

4. The High Tatra Mts, below the summit of Mięguszowiecki Wielki, ~1,700 m, 18 Aug 1926, B. Pawłowski (KRAM 337270, no. det. 34406). The two plants on this sheet belong to *T. pawlowskii*.

5. The High Tatra Mts, Wielki Kocioł below Mt Szczyt Mięguszowiecki, 1,900 m, 12 Aug 1953, A. Jasiewicz (KRAM 439054, no. det. 34417). A species of *T.* sect. *Rhodocarpa*.

6. The Eastern Carpathians, Trojaga [Romania, Toroiaga], 1,700–1,750 m, 27 Jul 1935, J. Mądalski (KRAM 337258, no. det. 34404). There are three plants, all belonging to *T.* sect. *Rhodocarpa* (but not to *T. nigricans*).

In the herbarium KRAM, we examined another 24 specimens preserved under the name of *T. nigricans*. Four of them represent *T. vidlense* (KRAM 337272, no. det. 34375; KRAM 392577, no. det. 34472; KRAM 392575, no. det. 34474; KRAM 337271, no. det. 34522), two *T. pawlowskii* (KRAM 392594, no. det. 34459; KRAM 337269, no. det. 34377), one probably *T. skalnatense* (KRAM 392578, no. det. 34506), and one probably *T. rupicaprae* (KRAM 337276, no. det. 34618). The remaining specimens were identified at the level of section, mostly *T.* sect. *Rhodocarpa* (KRAM 337274, no. det. 34524; KRAM 088389, no. det. 34415; KRAM 169636, no. det. 34519; KRAM 570077, no. det. 34511; KRAM 337275, no. det. 34645; KRAM 576000, no. det. 34644; KRAM 570076, no. det. 34518; KRAM 439056, no. det. 34515; KRAM 392576, no. det. 34514; KRAM 570069, no. det. 34516; KRAM 011576, no. det. 34510; KRAM 169637, no. det. 34642; KRAM 265100, no. det. 34513), or *T.* cf. sect. *Alpina* (KRAM 337273, no. det. 34526), or *T.* sect. *Taraxacum* KRAM 570079, no. det. 34507; KRAM 570080, no. det. 34509).

Conclusion: *Taraxacum nigricans* has a much narrower distribution than reported in the literature. It most probably does not occur in Poland and Ukraine.

Taraxacum nigritum van Soest

In a separate note, Tacik (1980: 76) mentioned a possible occurrence of *T. nigritum* in the High Tatra Mts There is a voucher specimen: "Tatry: brzeg Czarnego Stawu Gąsienicowego", 1,620 m, 10 Aug 1978, H. & T. Tacik (KRAM 392573, no. det. 34413). The only plant on this sheet belongs to *T. pawlowskii*.

Taraxacum ochrospermum van Soest

There is a single record (with an identification uncertainty expressed) of *T. ochrospermum* from the Carpathians (Tacik 1980: 77). The voucher specimen was examined by us:

"Carpati Occidentales, Tatry Zach.: … dol. Kościeliskiej", [partly illegible], 14 Jul 1923, B. Pawłowski (KRAM 337279, no. det. 34403). The plant belongs to *T.* sect. *Rhodocarpa* but not to *T. ochrospermum*.

2745. *Taraxacum perfissum* van Soest

We examined one of the two specimens cited by Tacik (1980: 77):

The West Tatra Mts, Olczysko, 1,090 m, 10 Aug 1976, H. & T. Tacik (KRAM 388133, no. det. 34421). The specimen is incomplete and consist merely of loose leaves. We excluded *T. perfissum* but were unable to identify the specimen.

In KRAM, there is another specimen identified as *T. perfissum* by T. Tacik. It comes from a lower elevation and belongs to *T.* sect. *Taraxacum* (KRAM 392570, no. det. 34486).

Conclusion: In all likelihood, *T. perfissum* does not occur in the Carpathians.

2746. *Taraxacum rufocarpum* van Soest

Tacik (1980: 78) gave two localities of *T. rufocarpum*, from Slovakia and Poland. They were not seen by us; we only studied eight herbarium specimens deposited in KRAM under the name of *T. rufocarpum* (determined by T. Tacik before 1980). One of them belongs to *T. crocelliforme* (KRAM 392561, no. det. 34485), the other specimens belong to *T.* sect. *Rhodocarpa* but not to *T. rufocarpum* (KRAM 337291, no. det. 34536; KRAM 392563, no. det. 34484; KRAM 392559, no. det. 34477; KRAM 392550, no. det. 34479; KRAM 392562, no. det. 34481; KRAM 337207, no. det. 34534; KRAM 439027, no. det. 34483).

Conclusion: The occurrence of *T. rufocarpum* in the Carpathians therefore appears as improbable.

General remarks on the reports of Alpine dandelions from the Carpathians in Tacik (1980)

The obvious conclusion based on summarizing the above analysis is that the Alpine species of *Taraxacum* listed by Tacik (1980) do not occur in the Carpathians. The majority of records are based on the identifications of J. L. van Soest, who expected (or previously recorded) many of them to occur in the Carpathians.

The main reason for so many wrong determinations is the low quality or an incompleteness of the majority of voucher specimens. According to current standards, they were not suitable for a responsible identification. Another reason is the fact that many Carpathian plants are superficially similar to Alpine ones, which may be misleading.

Taxonomic treatment

The oreophytic *Taraxacum* flora in the Carpathians includes four sections and 25 species, when *T.* sect. *Erythrocarpa* is not considered (treated separately in Štěpánek & Kirschner 2022b) and without *T.* sect. *Taraxacum*, which occasionally reaches subalpine regions as an expanding synanthropic taxon. For the sake of convenience, all the species are included in a single key.

Identification key to the oreophytic species of *Taraxacum* in the Carpathians

1a Pollen grains of ± equal size, regular (sexual reproduction) ..... 8. ***T. carpaticum***
1b Pollen absent or pollen grains of conspicuously unequal size, irregular (agamospermous reproduction) 2
2a Achenes light reddish brown, light rusty, light ochraceous or light cinnamon 3
2b Achenes variously light greyish, light greyish stramineous, light greyish brown, light beige or whitish or ivory pale greyish 7
3a Beak 4.5–5.5 mm long; outer phyllaries loosely appressed at anthesis ..... 3. ***T. tantulum***
3b Beak usually (6–) 7–9 mm long; at least some outer phyllaries erect-patent, arcuate-patent or arcuate-recurved at anthesis 4
4a Outer phyllaries 6–11 ..... 11. ***T. pastorum***
4b Outer phyllaries 13–19 5
5a Achenes 4.8–5.1 mm long, reddish brown ..... 12. ***T. iucundum***
5b Achenes 3.8–4.6 mm long, light orange-rusty or light ochraceous 6
6a Petiole narrow, unwinged ..... 9. ***T. rupicaprae***
6b Petiole broadly winged ..... 18. ***T. latericulum***
7a Stigmas yellow 8
7b Stigmas discoloured 11
8a Outer ligules abaxially yellow, not striped; outer phyllaries 25–28 ..... D. *T.* sect. *Oreodoxa*: 25. ***T. incredibile***
8b Outer ligules abaxially conspicuously striped; outer phyllaries 13–22 9
9a Beak usually 9–12 mm long; pollen absent ..... 6. ***T. hercynicum***
9b Beak usually 7–8 mm long; pollen either absent or developed 10
10a Outer phyllaries with a distinct, ± white border 0.1–0.3 mm wide; achene body gradually narrowing into the cone; achenes 3.5–4.4 mm long ..... 1. ***T. crocelliforme***
10b Outer phyllaries unbordered; achene body ± abruptly narrowing into the cone; achenes 4.3–4.8 mm long ..... 13. ***T. pseudoalpestre***
11a Achenes of conspicuously pale silvery colour ..... 2. ***T. pawlowskii***
11b Achenes variously light greyish, light greyish stramineous, light greyish brown, or light beige 12
12a Pollen absent 13
12b Pollen present 15
13a Cone 1.0–1.2 mm long ..... 16. ***T. obesum***
13b Cone 0.4–0.8 mm long 14
14a Outer phyllaries with a distinct white border usually 0.2–0.3 mm wide; achenes 4.6–5.9 mm long ..... 11. ***T. skalnatense***

14b Outer phyllaries ± unbordered or with a dark, ± membranous indistinct border ~0.10–0.15 mm wide; achenes 3.9–4.8 mm long ..... 23. ***T. innuptum***
15a Outer phyllaries with a distinct white border 0.1–0.3 mm wide 16
15b Outer phyllaries ± unbordered, or with a dark, ± membranous indistinct border ~0.10–0.15 mm wide 19
16a Achene body abruptly narrowing into the cone ..... 22. ***T. subelegantissimum***
16b Achene body gradually to ± subabruptly narrowing into the cone 17
17a Cone cylindrical ..... 21. ***T. flumineum***
17b Cone conical to subconical 18
18a Achenes 4.6–5.9 mm long; outer phyllaries with a white border usually 0.2–0.3 mm wide ..... 15. ***T. skalnatense***
18b Achenes 3.8–4.7 mm long; outer phyllaries with a white border ~0.1 mm wide .... 16. ***T. vidlense***
19a Beak 4.0–5.5 mm long ..... 5. ***T. pseudovenustum***
Note: The Carpathian populations close to *T. venustum* (see the map on Fig. 18A) also belong here.
19b Beak 5.5–9.5 mm long 20
20a At least some outer phyllaries arcuate-reflexed or reflexed with tips close to the scape, some outer phyllaries often twisted ..... 24. ***T. paclovae***
20b Outer phyllaries loosely appressed, erect, erect-patent, erect-arcuate or ± patent or sigmoid-patent 21
21a Achene body abruptly or subabruptly narrowing into the cone; cone thin, cylindrical to subcylindrical; petiole narrow, unwinged, or narrowly winged only in outer leaves 22
21b Achene body gradually narrowing into the cone; cone broadly conical to conical; petiole broadly winged in all leaves, or outer and middle leaves broadly winged and inner leaves narrowly winged 23
22a Leaf lateral segments with distal margin usually sigmoid (to concave), with sparse, irregular, thin, acuminate teeth up to 6 mm long ..... 19. ***T. jugicola***
22b Leaf lateral segments with distal margin conspicuously convex, rarely sigmoid to ± straight, entire or with a single broad ± short tooth, or with a few minute teeth less than 2 mm long ..... 10. ***T. elegantissimum***
23a Outer phyllaries 1.5–2.5 mm wide; petioles of outer and middle leaves broadly winged (but base not dilated), inner leaves narrowly winged ..... 7. ***T. nigricans***
23b Outer phyllaries 2.5–4.4 mm wide; petioles of all leaves extremely broadly winged with base dilated, ± auriculate 24
24a Outer phyllaries loosely appressed to erect-arcuate at anthesis (erect-patent to patent and ± sigmoid after anthesis); the longest outer phyllaries up to 10 mm long; achenes usually yellowish stramineous ..... 11. ***T. ursinum***
24b Outer phyllaries ± patent to sigmoid-patent at anthesis; the longest outer phyllaries up to 7 mm long; achenes greyish beige ..... 23. ***T. pseudoursinum***

A. *Taraxacum* sect. *Crocea* M. P. Christ., Bot. Iceland 3(3): 255, 1942.

≡ *T.* subsect. *Crocea* (M. P. Christ.) Richards, Bot. J. Linn. Soc. 65: 38,1972.

Type: *Taraxacum croceum* Dahlstedt, Bih. K. Svenska Vet.-Akad. Handl., sect. III, 26: 12, 1901. – Sweden. [Hälsingland], Vänsjö, Vänsjöhammaren, 12 Jul 1898, M. Östman (S 05-7995!, lectotype, designated by Lundevall & Øllgaard 1999: 74).

= *Taraxacum* sect. *Fontana* van Soest, Acta Bot. Neerl. 8: 103, 1959.

≡ *T.* subsect. *Fontana* (van Soest) Doll, Feddes Repert. 93: 538, 1982.

Type: *Taraxacum fontanum* Handel-Mazzetti, Monogr. Gatt. Taraxacum 100, 1907. – Austria. Tyrol, an feuchten Stellen zwischen Steinen in der Rinne ober dem Kaserl im Sendersthal bei Innsbruck gegen das Pleisenjoch, ~1,800 m, 23 Jul 1903, H. Handel-Mazzetti (WU, no. det. 8943, lectotype, designated by Kirschner & Štěpánek 1997: 92).

Plants (10–) 15–25 (–30) cm tall but usually ± slender, not robust; plant base without tunic, usually glabrous to sparsely arachnoid. Petioles broadly winged, usually pale green, seldom suffused purplish, mainly on mid-vein. Leaves usually remotely and shallowly pinnatilobed, sometimes almost undivided (then often remotely dentate), or pinnatisect, usually glabrous to subglabrous or sparsely arachnoid. Scapes most often glabrous to sparsely arachnoid (mainly just below capitulum), usually overtopping leaves. Capitulum usually deep yellow or deep golden yellow, outer ligules ± flat. Involucre most often olivaceous-green to dark so, often pruinose; outer phyllaries appressed to loosely appressed, less often erect to erect-patent, sometimes with arcuate-patent distal part, most often ovate-lanceolate to lanceolate, not imbricate or slightly so, surface ± evenly dark olivaceous green to grey-green, rarely darker or lighter, usually with a narrow, inconspicuous or less often distinct, paler, membranous or whitish border, sometimes unbordered, apex flat, margins subglabrous. Achenes light greyish stramineous-brown, stramineous-brown or light beige, usually 4–5 mm long, body subdensely to densely spinulose above, subabruptly narrowing into a short, subconical, conical, less often subcylindrical cone, usually 0.3–0.9 mm long; beak thin, usually 6–10 mm long; pappus white, usually 5.5–7.5 mm long.

1. ***Taraxacum crocelliforme*** Doll ex Štěpánek et Kirschner, **sp. nov.** (Figs 6–8, 9A, 10A, B).

Type: SLOVAKIA. Slovacia borealis, montes Vysoké Tatry, vallis Velká Studená dolina, locis herbosis petrosisque secundum viam turisticam caerulee signatam sub radicibus boreal. montis Bradavica (2,476 m), supra casam alpinam Zbojnická chata, 49°10'30"N, 20°09'30"E, ~2,050 m, Aug 1997, J. Štěpánek, cultivated from achenes JŠ 6326 as JŠ 6736, collected in 1999 (PRA, no. det. 34505, holotype; isotype: no. det. 36378).

Note: The name *T. crocelliforme* first appeared on a herbarium label in the R. Doll's collection; the same material was referred to as *T. crocellum* in Doll (1977).

= *Taraxacum peralatum* f. *rubriflorum* van Soest ex Tacik in Fl. Polska 14: 72, 1980.

Type indication: Tatri Alti (Čechoslovakia), vallis Furkotna, loco paludoso prope laculos Małe Stawy Furkotne, ~1,740 m, 17. Augusti 1955, lg. A. Jasiewicz, herb. Jasiewicz (in Instituto Botanico Acad. Scient. Polon[i]ae, Cracoviae).

Type: SLOVAKIA. Tatry Wysokie, Dolina Furkotna, [...] koło Małych Stawów Furkotnych na wys. ok. 1,740 m, 17 Aug 1955, A. Jasiewicz (KRAM 437881, no. det. 34434, holotype)



Fig. 6. *Taraxacum crocelliforme*. The holotype specimen (PRA, no. det. 34505).

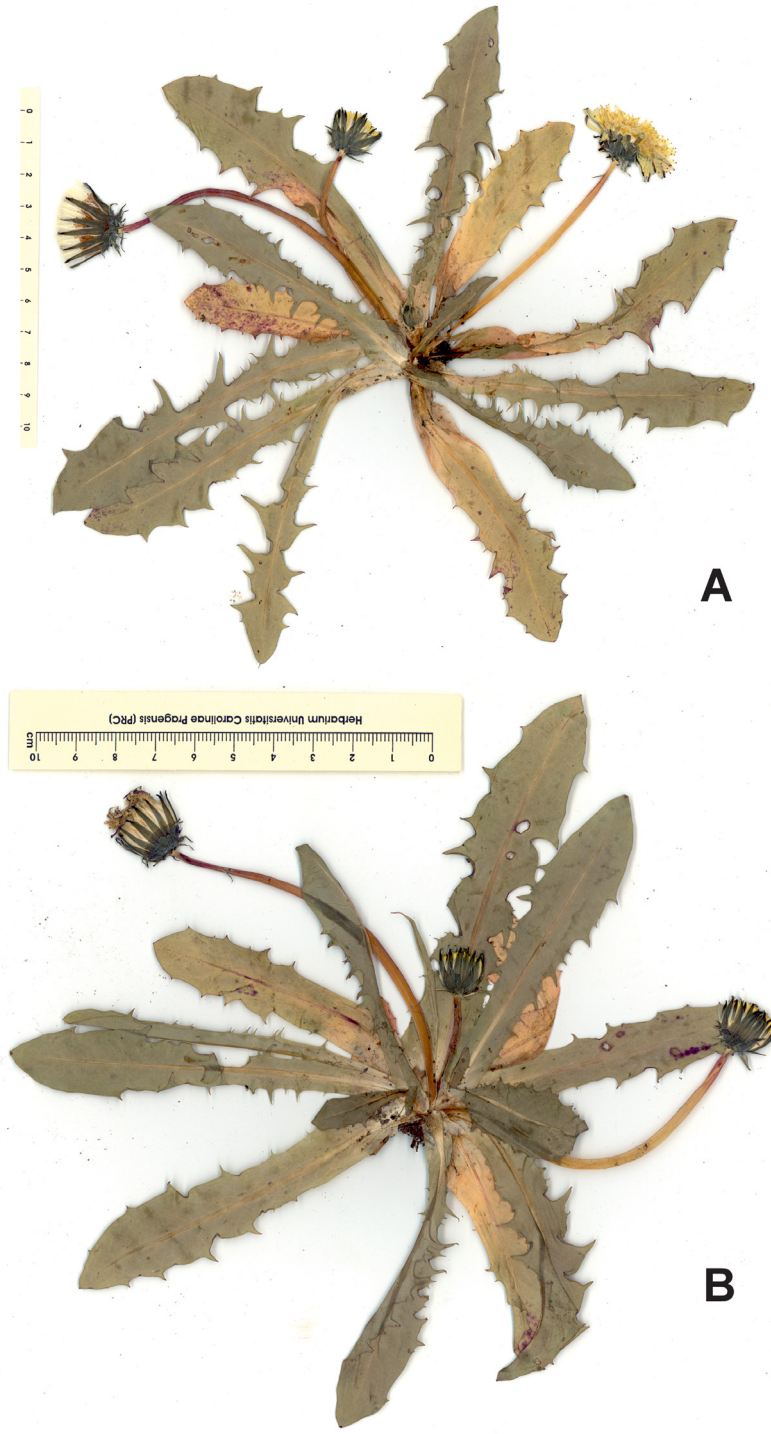


Fig. 7. *Taraxacum crocelliforme*. General habit (A, B): PRA, no. det. 19929.

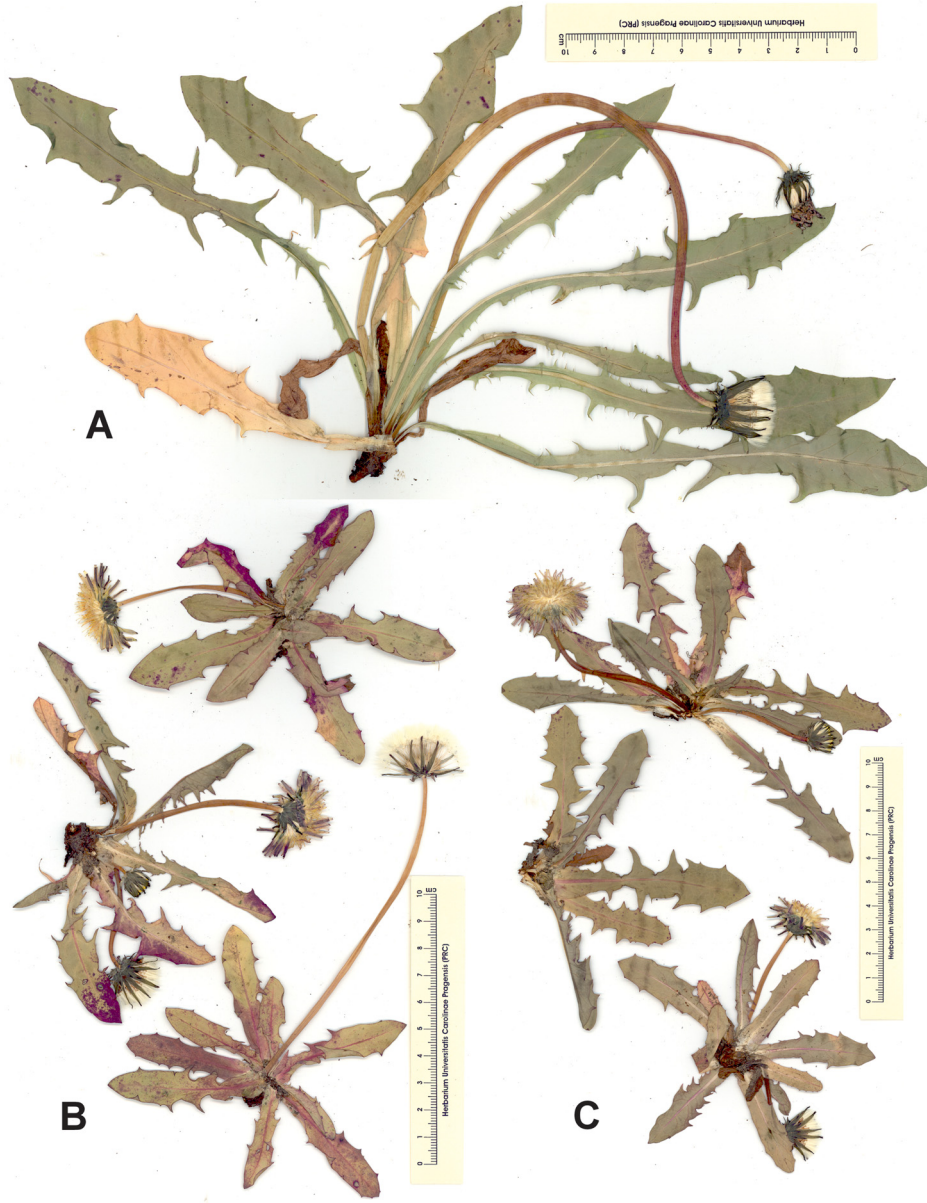


Fig. 8. *Taraxacum crocelliforme*. Various forms of general habit: (A) PRA, no. det. 19944; (B) PRA, no. det. 19936; (C) PRA, no. det. 19934.

– *Taraxacum crocellum* sensu auct. fl. Carpatorum (e.g. Doll 1977, JŠ in sched.), non sensu orig. van Soest (1959).

Etymology: Similar to *T. crocellum*.

Diagnosis: Species nostra, *Taraxaco crocelli* affinis, a quo petiolis latissime alatis, phyllariorum involucralium exteriorum marginibus angustioribus sed distinctissimis,

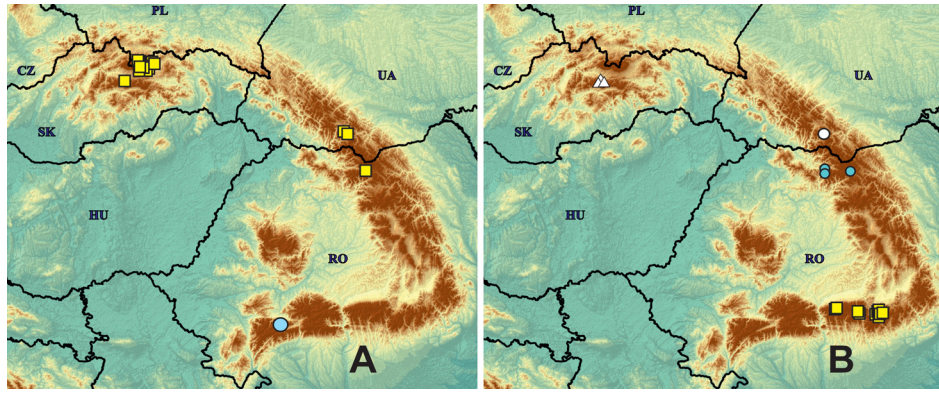


Fig. 9. Distribution of selected Carpathian species. (A) yellow squares – *Taraxacum crocelliforme* (localities in the E. Alps not displayed); blue circle – *T. iucundum*; (B) yellow squares – *T. carpaticum*, blue circles – *T. incredibile*, white circle – *T. obesum*, white triangles – *T. nigricans*.

vena mediana pallide viridi vel roseola differt, ceterum insignis foliis clare viridibus, glaberrimis et nitentibus, stigmatibus laete luteis et acheniis superne subdense breviter spinulosis, corpore in pyramidem conicam sensim transeunte.

Plants small to medium-sized, 8–15 cm tall. Leaves light bright green, ± shiny, glabrous, unspotted, ± erect to erect-patent, usually 10–15 cm long, outer leaves narrowly oblong to narrowly oblong-oblanceolate, undivided, with remote, triangular, recurved teeth, middle and ± inner leaves pinnatilobed to runcinate-pinnatipartite; terminal segment dominant, elongated helmet-shaped, usually with distinct teeth or ± pentagonal, distal margin with a pair of distinct broad teeth, basal lobules usually with a falcate, acuminate tip, proximal margin concave, entire; lateral segments in 1–3 (4) pairs, with a broadly triangular base and an elongated acuminate distal part, either straight recurved or arcuate-recurved, distal margin sigmoid, entire or with a single distinct tooth, proximal margin straight or concave (to sigmoid), entire; interlobes short to medium-long, broad, with raised margins, usually entire, not blotched, nor bordered (or with an indistinct, very narrow brown-purple border); petiole extremely broadly winged, pale greenish or pink above, pale green or pink below; mid-vein pale greenish or pinkish in proximal 1/3–2/3. Scapes sparsely arachnoid, suffused pink, ± equalling or overtopping leaves. Capitulum relatively small, 2.5–3.5 (–4) cm wide, convex, deep yolk yellow to slightly orange-yellow, later (after full blossom) gradually getting orange-reddish to purplish. Involucre ± greyish olivaceous-green, ± broadly obconical to almost rounded at base. Outer phyllaries usually numerous, (13) 17–22, erect or variously erect-patent to subpatent, straight or subsigmoid, reaching (1/3–) 1/2 of the inner ones, linear-lanceolate to lanceolate, 6.5–9 × 1.5–3 mm, greyish light olivaceous-green, sometimes suffused brownish-purplish distally, with a narrow, distinct white border ~0.1–0.2 (–0.3) mm wide, apex flat; the 1–2 lowermost phyllaries very narrow, often inserted ± below capitulum; inner phyllaries 12–13 mm long, of ± equal width. Outer ligules flat, striped dirty purplish outside, teeth dark purple or black-purple, inner ligules narrow, shorter, canaliculate, apical teeth dark yellow. Stigmas ± pure yellow, or with a faint greyish-greenish hue. Pollen absent or abundant, then irregular in size. Achenes very light yellowish stramineous-brown (sometimes with a pale ochraceous tinge), (3.5–) 4.1–4.4 × 1.0–1.2 mm, body with

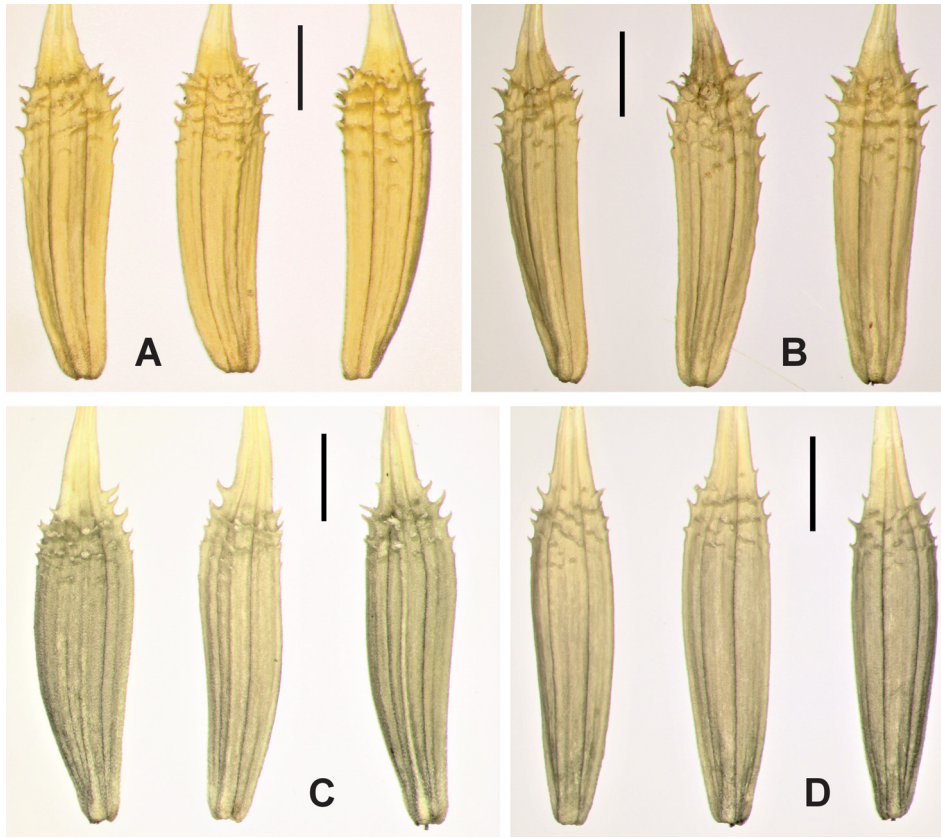


Fig. 10. Achenes of (A) *Taraxacum* sect. *Crocea* and *T.* sect. *Alpina*; (B) *Taraxacum crocelliforme* (PRA, no. det. 19134, 18136, respectively); (C), (D) *Taraxacum pawlowskii* (PRA, no. det. 19833, 19863, respectively).

± dense, short, erect-patent to subrecurved flat spinules in upper (1/4–) 1/5, otherwise smooth or slightly tuberculate (in outer achenes), body gradually narrowing into a short and broad conical cone 0.4–0.7 (–0.8) mm long (only basal 0.3–0.5 mm with the same colour as the achene body); beak 7–7.5 mm long (in cultivated specimens often only 4.5 mm); pappus 5.5–6 mm, ± dirty whitish. – Tetraploid, 2n = 32 [as 2n = 32 + 3B] (PRA, no. det. 34401, counted by W. Lippert).

Diagnostic notes: *Taraxacum crocelliforme* is similar (originally misidentified) to *T. crocellum* van Soest (1959: 119). Diagnostic characters of this new species include conspicuously broadly winged petioles and numerous, more narrowly but very distinctly bordered outer phyllaries, yellow stigmas and a dirty whitish pappus. *Taraxacum vidlense* has very similar achenes; they are thicker (usually more than 1.2 mm), with sparser sculpture composed of coalescing squamules. The leaf shape of *T. crocelliforme* is quite close to that of *T. fontanosquameum*, and may be similar to some members of *T.* sect. *Palustria* (H. Lindb.) Dahlst.

Distribution and habitat: The only member of *T.* sect. *Crocea* known from the Carpathians, *T. crocelliforme*, occupies a large Alpine-Carpathian geographical range. In Poland and Slovakia, it is mostly confined to the Vysoké Tatry Mts (with the single

exception of a locality on the highest summit of the Nízke Tatry Mts, Slovakia), and extends to the Ukrainian Carpathians and the northernmost Romanian Carpathians in the east. *Taraxacum crocelliforme* was also collected in the eastern part of the Alps, mainly in Tyrol (on both Austrian and Italian sides) but also in the Hohe Tauern in Austria. It most frequently grows in humid habitats on the shores of alpine lakes, near springs and along brooks. The IUCN conservation status is estimated as VU.

Specimens examined: SLOVAKIA. The High Tatra Mts, the former chalet of Kežmarská chata [49°13'18.38"N, 20°13'50.93"E, 1,610 m], 4 Jul 1975, R. Doll (JE, no. det. 19148, 19149). – The High Tatra Mts, valley of Velká Studená dolina, above the chalet of Zbojnícka chata, ~1,950 m, 49°10'40"N, 20°10'E, Aug 1997, J. Štěpánek, cult. as JŠ 6396 (PRA, no. det. 19134). – Ibidem, below the chalet of Zbojnícka chata, ~1,900 m, 49°10'30"N, 20°10'15"E, Aug 1997, J. Štěpánek, cult. as JŠ 6419 (PRA, no. det. 19137). – Ibidem, cult. as JŠ 6418 (PRA, no. det. 19136). – Vysoké Tatry, Tatranská Polianka, Velická dolina, above Velické pleso, ~1,750 m, 49°09'40"N, 20°09'30"E, Aug 1997, J. Štěpánek, cult. as JŠ 6424 (PRA, no. det. 19135). – Vysoké Tatry, Štrbské Pleso, valley of Furkotská dolina, along Furkotský potok (brook), ~1,800 m, 49°08'30"N, 20°02'E, Aug 1997, J. Štěpánek, cult. as JŠ 6405 (PRA, no. det. 19132). – Ibidem, cult. as JŠ 6328 (PRA, no. det. 19129). – Vysoké Tatry, valley of Mlynická dolina, Malé Kozie Pleso, 14 Aug 2001, B. Trávníček (OL, no. det. 19131). – Vysoké Tatry, valley of Velká Studená dolina, below N slopes of Mt Bradavica, above the chalet of Zbojnická chata, ~2,050 m, 49°10'30" N, 20°09'30"E, Aug 1997, J. Štěpánek, cult. as JŠ 6326 (PRA, no. det. 19130). – Ibidem (PRA, no. det. 19944). – Belianske Tatry, summit area of Mt Bujačí, Sep 1989, J. Kirschner, cult. as JK 299 (PRA, no. det. 19128). – Vysoké Tatry, Nefcerka valley, Aug 1953, M. Součková (BRNM 65885, no. det. 20139). – Vysoké Tatry, Litvorová kotlina, the lake of Litvorové pleso, 49°10'30"N, 20°08'E, 1,863–1,890 m, Aug 1997, J. Štěpánek, cult. as JŠ 6442 (PRA, no. det. 34633). – Ibidem, cult. as JŠ 6330 (PRA, no. det. 34629). – Vysoké Tatry, Štrbské Pleso, valley of Mlynická dolina, lower lake of Nižné Kozie plieska, 49°09'30"N, 20°02'40"E, 2,050 m, Aug 1997, J. Štěpánek, cult. as JŠ 6329 (PRA, no. det. 34631). – Ibidem, cult. as JŠ 6412 (PRA, no. det. 34625). – Vysoké Tatry, valley of Velká Studená dolina, below the lakes of Sesterská plesa, ~500 m above the chalet of Zbojnícka chata, 49°10'40"N, 20°10'E, ~1,950 m, Aug 1997, J. Štěpánek, cult. as JŠ 6325 (PRA, no. det. 34627). – Vysoké Tatry, Štrbské Pleso, valley of Mlynická dolina, above the waterfall called Skok, ~1,760 m, 49°09'20"N, 20°02'40"E, Aug 1997, J. Štěpánek, cult. as JŠ 6455 (PRA, no. det. 19950). – Ibidem, cult. as JŠ 6458 (PRA, no. det. 19949). – Ibidem, cult. as JŠ 6456 (PRA, no. det. 19948). – Ibidem, cult. as JŠ 6460 (PRA, no. det. 19945). – Vysoké Tatry, Štrbské Pleso, valley of Furkotská dolina, Horné Furkotské pleso, 1,850 m, 13 Jun 1948, A. Hrabětová (BRNU 357222, no. det. 20156). – Vysoké Tatry, Štrbské Pleso, valley of Furkotská dolina, ~1,835 m, 28 Jul 1928, V. Krajina (PR, no. det. 19954). – Vysoké Tatry, Velická dolina, Kvetnica, 1,850 m, 18 Jul 1928, V. Krajina (PR, no. det. 19544; PRC, no. det. 19901). – Vysoké Tatry, [Mt] Zámky, 15 Jul 1925, V. Krajina (PRC, no. det. 19885). – Vysoké Tatry, the pass of Bystré sedlo, between Mt Solisko and Mt Furkotský štít, ~2,100 m, 2 Aug 1935, J. Dostál & F. A. Novák 5209 (PRC, no. det. 19888). – Vysoké Tatry, the lake of Skalnaté pleso, Jul 1922, S. Trapl (PRC, no. det. 19887). – Liptovské Tatry, Tichá dolina, below the saddle of Zánory, 1,670 m, 13 Aug 1962, J. Unar (BRNU 423049, no. det. 20714). – Vysoké Tatry, Malá Studená dolina, 24 Jul 1917, J. Schneider (W, no. det. 21139). –Vysoké Tatry, Štrbské Pleso, valley of Furkotská dolina, Furkotské plesá, 1,740 m, 17 Aug 1955, A. Jasiewicz (KRAM 437881, no. det. 34434, see *Taraxacum peralatum* f. *rubriflorum*). – Vysoké Tatry, Velická dolina, 1,800 m, 24 Jul 1925, B. Pawłowski (KRAM, no. det. 34538; KRAM, no. det. 34540). – Vysoké Tatry, valley of Veľký Studený potok, 1,600 m, 27 Jul 1938, A. Margittai (BP, no. det. 36995). – Vysoké Tatry, Kežmarské zelené pleso, 15 Jul 1912, G. Lengyel (BP 350148, no. det. 36977; BP 350144, no. det. 36971). – Vysoké Tatry, the lake of Zelené pleso Kežmarské, 16 Jul 1912, A. Degen (WU, no. det. 21880). – Vysoké Tatry, the little lake near Kežmarské zelené pleso, 16 Jul 1912, A. Degen (BP 700759, no. det. 36969). – Vysoké Tatry, Furkotská dolina, 26 Jul 1912, Filarszky (BP, no. det. 36490; BP, no. det. 36198). – [Nízke Tatry, Ďumbier] "Gyömbér", 27 Jul 1948, sine coll. (BRA, no. det. 20003).

POLAND. Tatry Wysokie, Morskie Oko, below Mt Mięguszowiecki Średni, 1,910 m, 12 Aug 1953, B. Pawłowski (KRAM 337374, no. det. 34408). – Tatry Wysokie, dolina Suchej Wody, ~1,400 m, 13 Jul 1961, H. Piękoś (KRAM, no. det. 34571). – Tatry Wysokie, the pass of Zawrat, 17 Aug 1875, W. Kulczyński (KRAM 169638, no. det. 34461). – Tatry Wysokie, dolina Gąsienicowa, W side of Czerwone Stawki, 16 Aug 1978, H. Trzcińska-Tacik (KRAM, no. det. 34485). – Tatry Wysokie, shore of Czarny Staw Gąsienicowy, 1,620 m, 10 Aug 1978, H. & T. Tacik (KRAM, no. det. 34490; KRAM, no. det. 34492).

UKRAINE. The Eastern Carpathians, Černovcy, Čornogora Mts, E. slopes of Mt Dančer, near Mt Šešul above Kvasy, 1,600–1,700 m, Jun 1990, L. Hrouda, cult. as JŠ 4098 (PRA, no. det. 34638). – Ibidem, cult. as JŠ 5000 (PRA, no. det. 34636). – Ibidem, cult. as JŠ 5888 (PRA, no. det. 34614). – Černovcy, Čornogora Mts, in

the valley of Breskulec below Požiževskaja Mts, ~1800, Jun 1990, L. Hrouda, JŠ 4099 (PRA, no. det. 34610). – Ibidem, cult. as JŠ 4993 (PRA, no. det. 34608). – Čornogora Mts, in the valley of Breskulec below Požiževskaja Mts, above the chalet of the Ukrainian Academy of Sci., ~1,500 m, Jun 1990, L. Hrouda, cult. as JŠ 4985 (PRA, no. det. 34606). – Ibidem, cult. as JŠ 4100 (PRA, no. det. 34635).

ROMANIA. Northern Romania, the Rodna Mts, shore of the alpine lake of Lacu Lala Mică, NE. slopes of Mt Vf. Ineu (2,279 m), ~1,932 m, 9 Aug 1981, J. Štěpánek, cult. as JŠ 129 (PRA, no. det. 19952; PRA, no. det. 19951).

AUSTRIA. Tirol, Zillertaler Alpen, from Schlegeisspeicher towards Friesenberghaus, 2,150 m, 15 Aug 1980, W. Lippert 17394, cult. in Munich, collected in 1985 (PRA, no. det. 34401). – Ibidem, cult. as JŠ 2782 (PRA, no. det. 34400). – Ibidem, cult. as JŠ 3978 (PRA, no. det. 34402). – Ötztaler Alpen, Vent, chalet of Rofen, ~2,010 m, 13 Jul 1989, B. Slavík, cult. as JŠ 4457 (PRA, no. det. 34395). – Tirol, Tuxer Voralpen, Mölsalm S. of Wattenberg, Mölser Hochleger – Mölssee – Mölser Scharte, 2,050–2,140–2,379 m, 17 Jul 1987, W. Gutermann 22302 (herb. W. Gutermann, no. det. 34362). – Hohe Tauern, Mittersill, valley of Amertal, near Felbertauerntunnel, 17 Jul 1995, J. Štěpánek, cult. as JŠ 5883 (PRA, no. det. 34616).

ITALY. Trentino-Alto Adige, Dolomiti (Dolomiten), Dobbiaco (Toblach), valley of Rienz Tal (Valle della Rienza), banks of the brook of Schwarze Rienz, upper part of Valle di Rimbon, ~300–500 m SW of Drei Zinnen Hütte, 2,200 m, 19 Jul 1995, J. Štěpánek, cult. as JŠ 6341 (PRA, no. det. 34397).

Less certain identification: SLOVAKIA. Vysoké Tatry, Zbojnická chata, ~1,900 m, 10 Aug 1981, L. Kirschnerová & J. Kirschner, cult. as JŠ 355 (PRA, no. det. 19133). – Vysoké Tatry, Štrbské Pleso, Mlynická dolina, Skok Waterfall, ~1,900 m, 49°09'20"N, ~20°03'E, Aug 1997, J. Štěpánek, cult. as JŠ 6413 (PRA, no. det. 19946). – Vysoké Tatry, Štrbské Pleso, Mlynická dolina, lakes of Nižné Kozie plieska, ~2,050 m, 49°09'30"N, 20°02'40"E, Aug 1997, J. Štěpánek, cult. as JŠ 6329 (PRA, no. det. 19947). – Vysoké Tatry, Furkotská dolina, ~1,700 m, 12 Jul 1959, J. Šmarda (TNP 1507, no. det. 5125). – Vysoké Tatry, Velická dolina, Kvetnica, ~1,850 m, 4 Aug 1874, F. Bohatsch (BP 186322, no. det. 36988). – POLAND. Tatry Wysokie, N. slopes of Mt Świnica, 16 Aug 1978, H. Trzcińska-Tacik (KRAM, no. det. 34487). – AUSTRIA. Rottenmanner Tauern, Trieben, Hohentauern, at a lake near Edelraute Hütte, 1,770 m, 25 Jul 1994, O. Šída, cult as JŠ 5644 (PRA, no. det. 34612).

B. *Taraxacum* sect. *Alpina* Haglund, Ber. Schweiz. Bot. Ges. 60: 237, 1950.

Type: *Taraxacum oreophilum* Haglund, Ber. Schweiz. Bot. Ges. 60: 237, 1950, see also Kirschner & Štěpánek (1997: 88). – SWITZERLAND. Kt. Graubünden, Oberengadin, Südfuss des Piz Padella, auf einem Alpweg, ~2,350 m, 15 Jul 1938, W. Koch 171, cultivated in Zürich (S, no. det. 9230, holotype).

Note: The robust habit of the cultivated plant on the holotype sheet and other conspicuous features (subtubular to narrowly canaliculate ligules, small achenes) make the interpretation of *T.* sect. *Alpina* rather complicated. The name is used here in its traditional sense, as circumscribed by Uhlemann (2015).

Plants small, usually 8–12 cm tall, or medium-sized in cultivation; plant base without tunic, usually subglabrous, or sparsely arachnoid. Petioles unwinged or narrowly winged, rarely broadly winged. Leaves subglabrous, variously erect-patent, patent or suberect, some may be loosely appressed to the ground (not tightly appressed to the ground, which characterizes *T.* sect. *Bulgarica*), oblanceolate-obovate, usually pinnatisect (sparsely dentate, lobation pattern not complicated), lateral segments most often ± patent, sometimes recurved. Scapes subglabrous to sparsely arachnoid, most often subequalling leaves. Capitulum deep yellow, golden yellow or mid-yellow, usually 2.5–3.5 cm wide. Involucre dark olivaceous-green to blackish, rounded to truncate at base, usually 7–10 mm wide. Outer phyllaries usually 8–15, appressed, loosely appressed to erect, not or slightly imbricate, most often ovate (from ovate-lanceolate to broadly ovate), usually (4–) 5–6 (–7) mm long (usually 1/3–1/2 as long as the inner phyllaries), abaxial surface usually blackish green, unbordered or inconspicuously narrowly bordered, rarely with a narrow

whitish border (e.g., *T. mattmarkense*, *T. schmidianum*, *T. saasense*, *T. silvrettense*, *T. tantulum*), apex ± flat. Achenes usually light greyish stramineous, often with a light ochraceous, light beige or light brownish tinge, usually (3.5–) 4–5 mm long, body subsparsely to ± densely short-spinulose and/or squamulose above, usually subgradually narrowing in a subconical to conical cone usually 0.3–0.8 mm long; beak thin, 3–5 (–6) mm long, rarely longer (up to 9 mm, as in *T. pawlowskii*), pappus ± white. – Agamospermous polyploids (sexuality not known).

2. *Taraxacum pawlowskii* van Soest, Proc. Konikl. Nederl. Akad. Wet., ser. C, 79: 181, 1976 (Figs 10C, D, 11–13).

Type: [POLAND] Tatry Wysokie, pod przełęczą Szpigłasową od strony Pięciu Stawów Polskich, 1,970 m, *Salicetum herbaceae*, 9 Aug 1959, B. Pawłowski (KRAM 026589, holotype!; isotypes: L 0002605, no. det. 19679; KRAM 026590, photo!).

Etymology: Named after an outstanding personality of Polish botany, Prof. Bogumił Pawłowski (1898–1971).

Illustration: van Soest (1976: 181, fig. 7).

Note: The type gathering of *T. pawlowskii* originally consisted of 18 plants (without ripe achenes). Seven of these plants were designated the holotype, which was studied by J. L. van Soest and photographed for the protologue (van Soest 1976: 181, fig. 7). Then J. L. van Soest removed two (upper middle) plants and these became an isotype in the Leiden herbarium (our Fig. 11). As only a minority of the original holotype plants were removed, the herbarium sheet with the remaining five plants is treated as the holotype. There is another specimen in KRAM, with 11 plants belonging to the original gathering.

– *Taraxacum argentatum*, nom. inval., nudum, in schedulis (e.g., Taraxaca Exs., no. 781–786).

Exsiccates: Taraxaca Exs., no. 781–786.

Plants small to ± medium-sized, often slender (in alpine habitats), usually 10–18 cm tall. Plant base without tunic, sparsely brownish arachnoid among petiole bases. Leaves considerably vary in size and shape, with three main forms, (A) in alpine habitats, (B) in subalpine habitats, and (C) in cultivation at lower elevations. (A) Leaves patent (loosely appressed to the ground) and erect-patent, bright light mid-green, not spotted, glabrous, ± narrowly oblanceolate in outline, 8–12 × 1.5–2.5 cm, undivided, acute, entire or with remote minute teeth, or pinnatilobed to pinnatipartite with lobe pairs stepwise shorter towards leaf base; terminal segment short to elongated, helmet-shaped, acute, distal margin convex, entire or often with a single asymmetrical incision, proximal margin straight, short, entire; lateral segments in 1–3 (4) pairs, short, broadly triangular or short, broad, bird-wing-like, distal margin convex or sigmoid, usually entire (or ± denticulate in proximal segments), proximal margin ± straight, entire; interlobes short and broad when developed, not coloured (green) or bordered brown-purple, margin often ± raised; petiole narrow to moderately winged, tapering, pale green, rarely faintly pinkish; mid-vein pale greenish. (B) Leaves of subalpine morphotypes differ in the following features: leaves 10–22 × 3.5–5 cm, pinnatipartite to pinnatisect; terminal segment triangular to broadly so, acute, distal margin straight to ± undulate, entire, proximal margin concave, entire; lateral segments in 2–3 pairs, sometimes asymmetrical, patent, subrecurved to recurved, sometimes pointing upwards (all these positions can be observed in a single plant or even

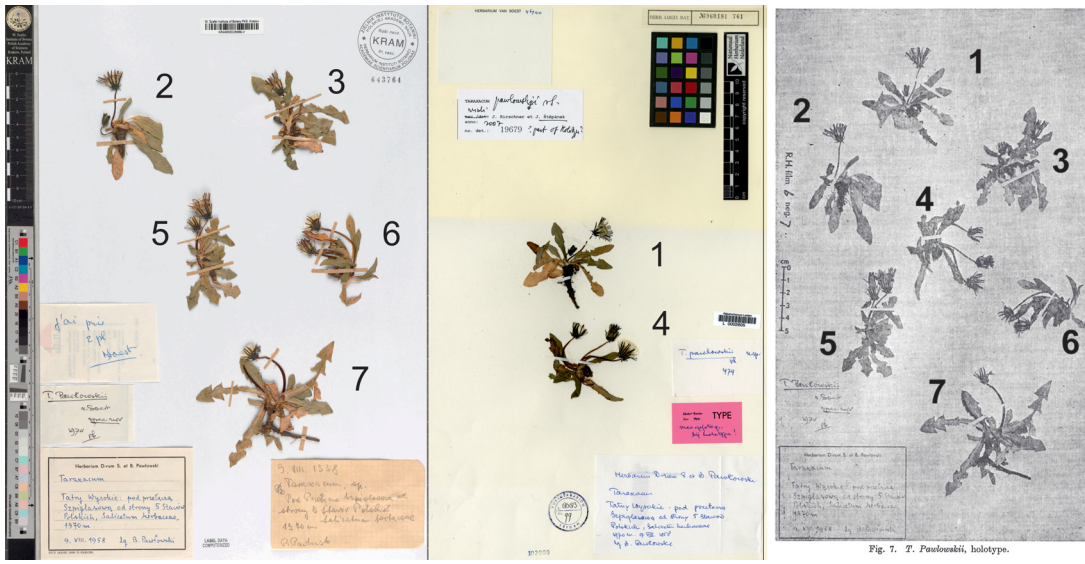


Fig. 11. *Taraxacum pawlowskii*. Left: The holotype (KRAM) after the removal of two plants (deposited in L, in the middle). Right: The original holotype sheet as photographed in the protologue (plants with numbers added by us, and the corresponding numbering is on the pictures in the middle and the left).

leaf), triangular, broadly triangular or bird-wing-like, subacute, distal margin usually sigmoid, entire, proximal margin most often concave or straight, entire; interlobes of variable length, gradually broadening into the next proximal segment, entire or with rare short triangular teeth; petiole ± broadly winged, pale greenish. (C) Leaves in cultivation differ from (A) in being pinnatisect to pinnatipartite, very sparsely arachnoid, narrowly oblanceolate to oblanceolate or spathulate in outline; terminal segment broadly triangular to flat helmet-shaped, ± subacute, often with base sagittate, entire or with a single deep incision (or with a pair of incisions); lateral segments in 2–3 pairs, short, recurved to subpatent, subacute, entire, distal margin sigmoid, proximal margin concave; interlobes short, bordered, with raised margins, surface often ± faintly blotched; petiole winged to very broadly winged, tapering towards the base, pale greenish to light purplish pink; midvein pale or pale brownish pink, sparsely arachnoid adaxially. Scapes pale green, almost glabrous (totally glabrous in alpine sites, sparsely arachnoid in subalpine ones), ± equalling leaves. Capitulum small to medium-sized, 2–3.5 cm wide, flat to subconvex, deep, relatively dark yellow. Involucre dark olivaceous-green, ± truncate at base. Outer phyllaries (7) 10–16 (18), loosely appressed in their proximal part, otherwise arcuate-subpatent to sigmoid-patent, ± not imbricate, usually ± broadly lanceolate to ovate, or oblong-elliptical or narrowly lanceolate, with an elongated lingulate tip, 3.5–7 (–9) × 2–4 (–4.5) mm, surface black-green (± black when dry), suffused pink near apex, unbordered or with an almost invisible, very narrow paler border to 0.1mm wide (with a very gradual transition), margin glabrous or very sparsely ciliate, apex flat to slightly callose; inner phyllaries 11–12 mm long, of ± equal width. Outer ligules flat, striped dark black-grey outside (sometimes with a purple hue), inner ligule teeth black to black-green. Stigmas medium dark discoloured, grey-yellow or green-yellow, stigma hairs apically black. Pollen absent



Fig. 12. *Taraxacum pawlowskii*. Plants in a natural habitat (Gavia Pass, Italy). Photo I. Uhlemann.

(in the majority of populations) or present, then pollen grains variable in size. Achenes conspicuously pale silvery (light silvery greyish, sometimes with a pale beige tinge), relatively slender, (4.3–) 4.5–5.0 (–5.2) × 0.9–1.2 mm, body mostly almost smooth, with subsparse spinules and squamules in upper 1/5, ± subabruptly narrowing in a ± thin, ± conical to subconical cone 0.8–1.1 (–1.3) mm long; not even the marginal achenes exhibit a more conspicuous spinulosity (they often are covered with well developed squamules above); beak (6–) 7–9 (–10) mm long, pappus ± yellowish dirty white, 6–7 (–8.5) mm long. – Agamospermous tetraploid, 2n = 32 (J. Kirschner as K-109/86, PRA, no. det. 19866), 2n = 32 (J. Štěpánek as 161/86, PRA, no. det. 19838), 2n = 31 (J. Štěpánek as 160/86, PRA, no. det. 19837).

Diagnostic notes: *Taraxacum pawlowskii*, when the general habit and outer phyllaries are considered, represents a core member of *T.* sect. *Alpina*. It is relatively close to *T. helveticum* van Soest and *T. saasense* van Soest. The conspicuously pale silvery colour of achenes of *T. pawlowskii*, together with the longer cone, is a decisive diagnostic character. The relatively long beak (usually 6–9 mm) is rather unusual in *T.* sect. *Alpina*. *Taraxacum helveticum*, moreover, has shorter achenes, smaller outer phyllaries, darker stigmas and a different leaf shape (often entire or dentate, undivided). *Taraxacum saasense* has outer phyllaries with a paler green, ± distinct border, its beak is shorter (4–5 mm), and the shape of outer phyllaries is narrower. Another morphologically close species is *T. panalpinum*, a species characterized by more numerous (4–6 pairs), triangular lateral leaf segments.



Fig. 13. *Taraxacum pawlowskii*. A detail of the holotype sheet (KRAM 026589). Photo courtesy of the KRAM curator.

Distribution and habitat: *Taraxacum pawlowskii* is one of the very few species of Alpine-Carpathian dandelions. In the Alps, it occurs in north-easternmost Lombardy, Italy, and in Tirol, Austria. It even reaches Switzerland in the vicinity of Zermatt. It is

quite common in Slovakia and Poland, from the West Tatra Mts, including the Czerwone wierchy, through the Vysoké Tatry Mts and the Nízke Tatry Mts, to the Belianske Tatry in the east. It also reaches the Ukrainian Carpathians. Most frequently, it occurs in humid, stony alpine grasslands along shores of lakes, at the foot of mountain slopes, along tracks and paths, in the vicinity of mountain chalets. It usually grows above 1,800 m but occasionally occurs at lower altitudes along brooks. The IUCN conservation status is estimated as VU.

Specimens examined:SLOVAKIA. Vysoké Tatry, Velická dolina, Kvetnica, 25 Jul 1890, coll. illegible (W, no. det. 21134). – Vysoké Tatry, Velická dolina, ~1,730 m, 27 Jul 1932, B. Pawłowski (KRAM 337269, no. det. 34377). – Vysoké Tatry, valley of Litvorová kotlina, lake of Litvorové pleso, 49°10'30"N, 20°08'E, 1,863–1,890 m, Aug 1997, J. Štěpánek cult. as JŠ 6449 (PRA, no. det. 19867). – Západné Tatry, Liptovský Mikuláš, valley of Jalovecká dolina above Jalovec, ~1,000 m, 3 Jul 1985, J. Kirschner, cult. as JŠ 1505 (PRA, no. det. 19866). – Západné Tatry, Červené vrchy, *Seslerion tatrae* below the summit of Mt Temniak, ~1,900 m, 17 Aug 1987, V. Grulich, cult. as JŠ 3191 (PRA, no. det. 19865). – Vysoké Tatry, Velická dolina, Dlhé pleso, ~1,950 m, 6 Aug 1992, J. Štěpánek (PRA, no. det. 19864). – Západné Tatry, Oravica, slopes of Mt Bobrovec, ~1,600 m, Jul 1989, J. Kirschner & L. Kirschnerová, cult. as JK 1057 (PRA, no. det. 19863). – Nízke Tatry, Liptovský Hrádok, Liptovská Teplička, ~2 km E of Mt Velká Vápenica (1,691 m), 1,400–1,500 m, Jul 1983, J. Štěpánek, cult. as JŠ 691/2 (PRA, no. det. 19862). – Ibidem, cult. as JŠ 694 (PRA, no. det. 19860). – Nízke Tatry, Heľpa, ~2 km E of Mt Velká Vápenica, ~1,500 m, 6 Jul 1983, J. Štěpánek (PRA, no. det. 19861). – Ibidem, cult. as JŠ 693/2 and 693/4 (PRA, no. det. 19859). – Západné Tatry, lakes of Roháčske plesá, between the lower lake and a path fork in the valley of Smutná dolina, 19 Jun 2001, R. J. Vašut (herb. R. Vašut, no. det. 19857). – Vysoké Tatry, Furkotský štít, between the saddle of Bystré sedlo and the lake of Čapie pleso, 14 Aug 2001, B. Trávníček (OL, no. det. 19853). – Západné Tatry, Mt Malá Kopa (1,637 m), ~2.5 km S of Mt Sivý vrch (1,805 m), 21 Jul 1988, J. Štěpánek, cult. as JŠ 3990 (PRA, no. det. 19856). – Vysoké Tatry, valley of Velká Studená dolina, below the lakes of Sesterská plesá (Zbojnícke plesá), ~500 above the chalet of Zbojnícka chata, ~1,950 m, 49°10'40"N, 20°10'E, 9 Aug 1999, J. Štěpánek (PRA, no. det. 19852). – Vysoké Tatry, valley of Velká Studená dolina, N foot of Mt Bradavica, above Zbojnická chata, ~2,050 m, 49°10'30"N, 20°09'30"E, 9 Aug 1999, J. Štěpánek (PRA, no. det. 19851). – Vysoké Tatry, Litvorová kotlina, shore of Litvorové pleso, 1,863–1,890 m, 49°10.5'N, 20°08'E, 6 Aug 1992, J. Štěpánek (PRA, no. det. 19849). – Ibidem, cult. as JŠ 6446 (PRA, no. det. 19846). – Ibidem, cult. as JŠ 6447 (PRA, no. det. 19845). – Ibidem, cult. as JŠ 6449 (PRA, no. det. 19846). – Ibidem, cult. as JŠ 6445 (PRA, no. det. 19843). – Ibidem, cult. as JŠ 6448 (PRA, no. det. 19842). – Ibidem, cult. as JŠ 6399 (PRA, no. det. 19841). – Vysoké Tatry, Štrbské Pleso, upper part of the valley of Mlynická dolina, ~2,200 m, ~49°10'N, 20°02'30"E, Aug 1997, J. Štěpánek, cult. as JŠ 6331 (PRA, no. det. 19844). – Vysoké Tatry, Štrbské Pleso, valley of Mlynická dolina, above the waterfall called Skok, ~1,760 m, 49°09'20"N, 20°02'40"E, Aug 1997, J. Štěpánek, cult. as JŠ 6455 (PRA, no. det. 19847). – Nízke Tatry, Liptovský Hrádok, Vyšná Boca, between Mt Homoľka (1,660 m) and Vrbovica (1,393 m), near the chalet of Havrania, ~1,400 m, 7 Jul 1983, J. Štěpánek, cult. as JŠ 1032 (PRA, no. det. 19840; PRA, no. det. 19839). – Nízke Tatry, Heľpa, ~2 km E of Mt Velká Vápenica, ~1,500 m, 6 Jul 1983, J. Štěpánek, cult. as JŠ 1033 (PRA, no. det. 19838). – Ibidem, cult. as JŠ 1035 (PRA, no. det. 19837). – Ibidem, cult. as JŠ 1034 (PRA, no. det. 19836). – Ibidem, cult. as JŠ 1036 (PRA, no. det. 19835). – Ibidem, cult. as JŠ 1030 (PRA, no. det. 19834). – Nízke Tatry, Poprad, Telgárt (Švermovo), below the summit of Mt Kráľova hoľa, 1,800–1,850 m, 48°53'N, 20°09'E, 28 Jul 1992, J. Štěpánek, cult. as JŠ 5048 (PRA, no. det. 19833). – Ibidem, cult. as JŠ 5050 (PRA, no. det. 19832). – Ibidem, cult. as JŠ 5047 (PRA, no. det. 19831). – Ibidem, cult. as JŠ 5049 (PRA, no. det. 19572). – Ibidem, cult. as JŠ 5052 (PRA, no. det. 19571). – Vysoké Tatry, Štrbské pleso, lower part of the valley of Furkotská dolina, 11 Jun 1979, J. Chrtek & B. Deylová (PR, no. det. 20127). – Vysoké Tatry: along a track ~2 km NW of Štrbské pleso, ~1,400 m, 11 Jun 1979, J. Chrtek & B. Deylová (PR, no. det. 20126). – Západné Tatry, Červené vrchy, Svišťovka, 1,900 m, 17 Aug 1987, A. Petrík 1205 (herb. A. Petrík, no. det. 19873). – Vysoké Tatry, scree above Zbojnícka chata, 15 Jul 1954, M. Součková (BRNU, no. det. 20138). – Vysoké Tatry, slopes of Mt Nad Zeleným, ~1,900 m, 15 Jul 1926, V. Krajina (PRC, no. det. 19882). – Vysoké Tatry, Mt Gerlach, 4 Sep 1919, [K. Domin] (PRC, no. det. 19884). – Vysoké Tatry, Velká Studená dolina, between Zbojnícka chata and the saddle of Prielom, 12 Sep 1955, J. Holub (PRA, no. det. 36794). – Vysoké Tatry, Lomnický štít, sine dato, Láng (W, no. det. 21140). – Nízke Tatry, Mt Králova Hola, below Mt Orlava [Orlová], ~1,600 m, 10 Aug 1948, I. Klášterský (PR, no. det. 36404). – Belianske Tatry, Prostredné Jatky, 1,950 m, 15 Jul 1917, Kümmerle (BP, no. det. 36202). – Vysoké Tatry, Malá Studená dolina, 29 Aug 1908, L. Thaisz (BP, no. det. 36197). – Belianské Tatry, the ridge of Mt Belianska kopa, 26 Jul 1929, G. Lengyel (BP, no. det. 36215). – Vysoké Tatry,

between Prostredný hrebeň and Sedielko, ~2,400 m., 8 Oct 1962, F. Dočolomanský (BRA, no. det. 19999). – Vysoké Tatry, between Lomnický štít and Prostredná Slavkovská veža, 19 Aug 1897, Woloszczak (W, no. det. 21136). – Vysoké Tatry, Kriváň, 2,100 m, 13 Aug 1893, F. Pax (BP, no. det. 36998). – Vysoké Tatry, Malá Studená dolina, 28 Aug 1879, M. Winkler (BP, no. det. 36194). – Ibidem, 11 Aug 1882, W. Wagner (BP, no. det. 36196). – Vysoké Tatry, Veľká Zmrzlá dolina, 26 Jul 1931, G. Lengyel (BP, no. det. 36213). – Vysoké Tatry, Veľká Studená dolina, the lake of Dlhé pleso, 8 Aug 1928, G. Lengyel (BP, no. det. 36211). – Vysoké Tatry, Priečne sedlo, ~2,250 m, 8 Aug 1928, G. Lengyel (BP, no. det. 36994). – Vysoké Tatry, Dolina Bielej vody, 27 Jul 1931, s. coll. (BP, no. det. 36205). – Vysoké Tatry, Javorová dolina, ~1,900 m., Aug 1929, G. Lengyel (BP, no. det. 36217).

POLAND. Tatry Wysokie, Morskie Oko, below Mt Mięguszowiecki Średni, 1,910 m, 12 Aug 1953, B. Pawłowski (KRAM 337280, no. det. 34379). – The West Tatra Mts, "Pyszna pod Banistem", 1,760–1,800 m, 18 Jul 1936, B. Pawłowski (KRAM 337368, no. det. 34384). – Tatry Wysokie, below the summit of Mięguszowiecki Wielki, ~1,700 m, 18 Aug 1926, B. Pawłowski (KRAM 337270, no. det. 34406). – Tatry Wysokie, shore of Czarny Staw Gąsienicowy, 1,620 m, 10 Aug 1978, H. & T. Tacik (KRAM 392573, no. det. 34413; KRAM 392594, no. det. 34459). – Ibidem, 30 Jul 1921, B. Pawłowski (KRAM 337203, no. det. 34410). – Ibidem, sine dato, E. Pancer (KRAM 282394, no. det. 34392). – Tatry Wysokie, above Zmarzły staw, below Mt Zawrat, 1,810 m, 7 Aug 1925, B. Pawłowski (KRAM 337286, no. det. 34381). – Tatry Wysokie, valley of Pańszczyca, 1,650 m, 19 Jun 1961, H. Piękoś (KRAM 088390, no. det. 34385). – Tatry, Czerwone Wierchy, 20 Jul 1954, K. Chronowska (KRAM 221064, no. det. 34388). – The West Tatra Mts, Czerwone Wierchy, dolina Litworowa, 8 Sep 1974, A. Plocek (PRA, no. det. 19855). – Ibidem, 6 Sep 1974, A. Plocek (PRA, no. det. 19854).

UKRAINE. Čornogora, Mt Breskul, 17 Jun 1925, T. Wilczyński (KRAM 256424, no. det. 34566).

AUSTRIA. Tirol, Ötztaler Alpen, Timmelsjoch, 2,500 m, 14 Aug 1999, I. Uhlemann (herb. Uhlemann). – Tirol, Stubaier Alpen, Kühtai, Drei-Seen-Hütte, 2,200 m, 7 Jul 2009, I. Uhlemann (herb. Uhlemann). – Tirol, Silvrettagebiet, Jamtal, on the way to Fatschölpass, 2,400–2,900 m., Aug 1983, H. Hertel, cult. in Munich under no. 1714 (M, no. det. 20922). – Ibidem, cult. under no. 1715 (M, no. det. 20921). – Ibidem, cult. under no. 1713 (M, no. det. 20920). – Ibidem, cult. under no. 1720 (M, no. det. 20919).

ITALY. Lombardy, Upper Veltlin, Ortler-Gruppe, St. Caterina Valfurva, Passo di Gavia, between Rif. Berni and the glacier of Corno dei Tre Signori, ~2,700 m, 2 Aug 2015, I. Uhlemann (herb. Uhlemann; GLM).

SWITZERLAND. Wallis, Schwarzsee near Zermatt, 24 Sep 1966, K. Zarzycki (KRAM, no. det. 34499).

Less certain identification: SLOVAKIA. Nízke Tatry, Telgárt, NE slopes of Mt Králova hola (1,948 m), 1,600–1,800 m, 48°53'00–30"N, 20°09'E, 11 Aug 1991, J. Štěpánek (PRA, no. det. 19858). – Vysoké Tatry, towards Zelené pleso, 25 Aug 1919, K. Domin (PRC, no. det. 19883). – Vysoké Tatry, the valley of Lievikový kotol, 1,920 m, a. 2000, L. Paclová, cult. as JŠ 7627 (PRA, no. det. 19868). – Vysoké Tatry, Lomnický štít, sine dato, Láng (PRC, no. det. 21042). – Vysoké Tatry, Velická dolina, Dlhé pleso, 5 Sep 1956, A. Jasiewicz (KRAM, no. det. 34420). – Vysoké Tatry, Svišťová dolina, Zamrznuté pleso, 5 Aug 1890, Th. Wraný (BRA, no. det. 20000). – Vysoké Tatry, Velická dolina, Kvetnica, 27 Jul 1912, E. Korb (W, no. det. 21137). – Vysoké Tatry, Veľká Studená dolina, Strelecké polia, 20 Aug 1935, G. Lengyel (BP, no. det. 36991). – Vysoké Tatry, Prostredný hrot, 15 Aug 1882, s. coll. (KRAM, no. det. 34559). – POLAND. The West Tatra Mts, Wielki Giewont, 1,600–1,700 m, 5 Aug 1933, J. Dostál 5212 (PRC, no. det. 19878). – The West Tatra Mts, "Baniste nad Pyszną", 1,800 m, 18 Jul 1936, B. Pawłowski (KRAM, no. det. 34637). – Vysoké Tatry, the saddle of Liliowe, 30 Jul 1880, s. coll. (KRAM, no. det. 34553).

3. ***Taraxacum tantulum*** Štěpánek, Trávn. et Kirschner, **sp. nov.** (Figs 14, 15, 26B).

Type: SLOVAKIA. Vysoké Tatry, opp. Štrbské Pleso, vallis Mlynická dolina, herbosis petrosisque alpinis in decl. sub lacubus alpinis Nižné Kozie plieska, 49°09'30"N, 20°02'40"E, ~2,000 m, Aug 1997, J. Štěpánek, cultivated as JŠ 6411, collected in 1999 (PRA, no. det. 19139, holotype; isotype: PRA, no. det. 19140).

Etymology: So tiny, minute, minuscule.

Diagnosis: Plantae parvulae, distinctissimae acheniis pallide ochraceis, corpore superne sparse spinuloso, spinulis tenuibus inaequalibus, in pyramidem anguste cylindricam (0.7–) 0.8–1.0 (–1.1) mm longam subabrupte abeunte, necnon phyllariis involucralibus exterioribus ovatis, laxe adpressis, marginibus obscure membranaceis 0.1–0.2 mm latis.



Fig. 14. *Taraxacum tantulum*. The holotype (PRA, no. det. 19139).

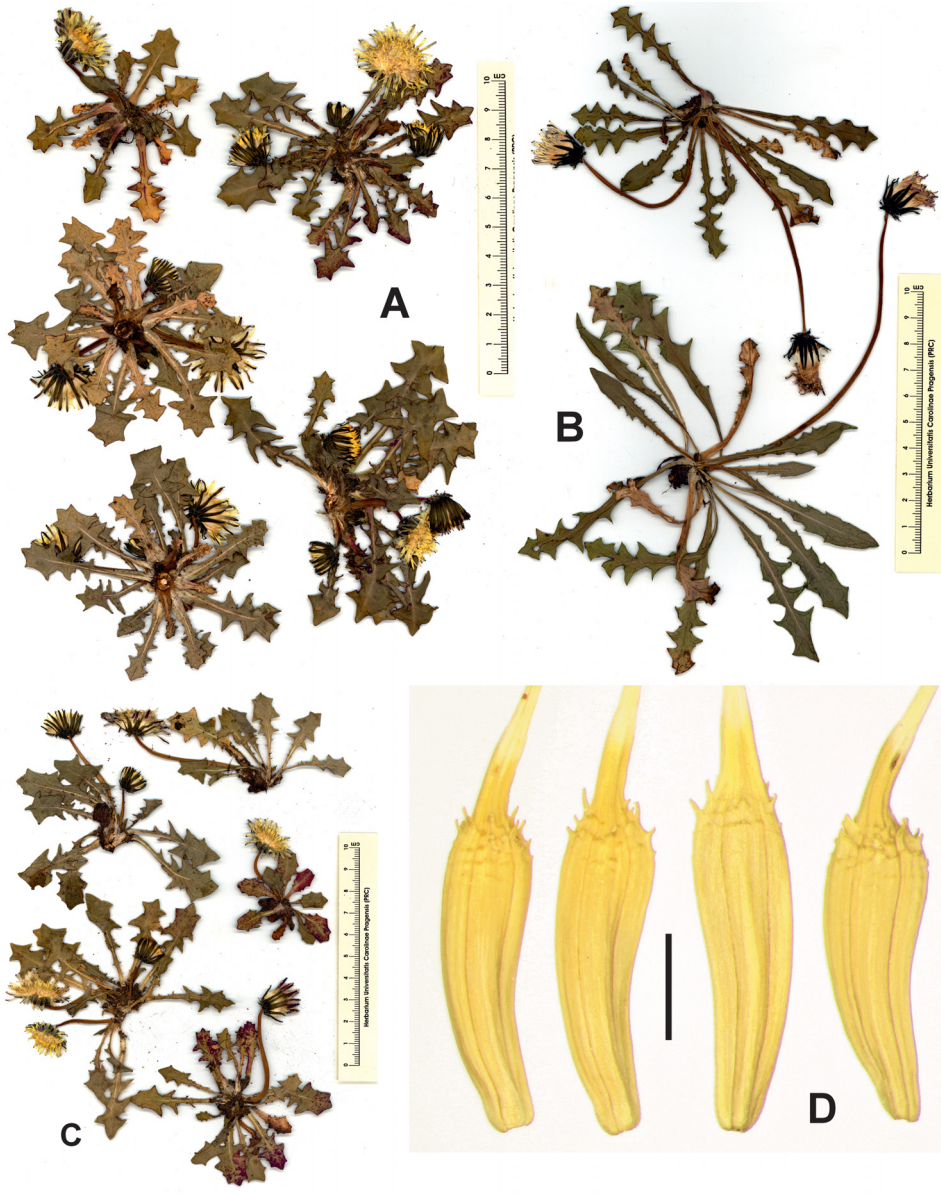


Fig. 15. *Taraxacum tantulum*. Various forms of the general habit: (A) PRA, no. det. 19139; (B) PRA, no. det. 19138; (C) PRA, no. det. 19141). Achenes (D) PRA, no. det. 19141; scale bar = 1 mm).

Plants small, 4–8 cm tall, ± slender. Plant base with sparse brownish hairs, tunic absent. Leaves light green, not spotted, glabrous (seldom with sparse hairs along mid-vein beneath), variously erect-patent, spathulate to narrowly oblanceolate in outline, 5–8 (–12) × 1.5–2 cm, with a distinct terminal segment and stepwise smaller lateral ones; terminal segment relatively large, oblong-helmet-shaped to ± triangular to flat triangular in

outline, usually with distinct lobules or broad teeth in upper 1/3 of its distal margin (a ± pentagonal appearance), basal lobules patent to subrecurved; lateral segments in (2) 3–4 pairs, ± short, usually patent, seldom subrecurved, narrowly triangular, entire or rarely with 1 (2) teeth to the distal margin; interlobes short, medium broad, entire or with a single triangular tooth, margin often raised, bordered brown-purple; mid-vein pale greenish; petiole unwinged to narrowly winged, ~2–3 cm long, pale green. Scapes almost glabrous (most often very sparsely arachnoid), light green, sometimes suffused brownish-pinkish below capitulum, usually ± overtopping leaves. Capitulum ± golden yellow, subconvex, relatively small, 2–2.5 cm wide. Involucre dark greyish olivaceous-green, probably ± pruinose, ± truncate at base. Outer phyllaries 15–17, ± loosely appressed (apex subrecurved), usually ovate-lanceolate to broadly ovate, 3.5–5.5 × 2–3.2 mm, reaching 1/3–1/2 of the inner phyllaries, abaxial surface black-green, border narrow, ± sharply delimited, dark membranous, ~0.1–0.2 mm wide, margin irregularly ciliate, apex flat; inner phyllaries of ± equal width, ~11 mm long. Outer ligules flat, relatively broad, striped dirty purple to black-purple outside, ligule teeth reddish to black-purple, inner ligules ± canaliculate, shorter. Stigmas medium discoloured, yellow-green with black pubescence outside. Pollen absent or developed, then pollen grains irregular in size. Achenes very light ochraceous, or light ochraceous-brown, 3.8–4.0 × 0.9–1.0 mm, body relatively smooth, with sparse thin unequal suberect spinules (and sometimes also squamules) in upper 1/4–1/5, ± subabruptly narrowing in a thin cylindrical cone (0.7–) 0.8–1.0 (–1.1) mm long (only proximal 1/2 with the same colour as the achene body); beak 4.5–5.0 (–5.5) mm, pappus ± white, 4.5–5 mm long.

Diagnostic notes: *Taraxacum tantulum* differs from the other Carpathian members of *T.* sect. *Alpina* primarily in the achene characters: they are light ochraceous, body with sparse, unequal, thin spinules in a narrow distal zone, subabruptly narrowing into a thin, cylindrical cone. When Alpine members of this section are considered, the *T. venustum* group seems to be the closest neighbour of *T. tantulum*. In the *T. venustum* group, we should point out achenes with less sparse spinulosity (and squamulosity), a shorter, subconical cone, and less numerous outer phyllaries. *Taraxacum tantulum* has a conspicuous, often pentagonal terminal leaf segment; in this feature, and in a low number of lateral segments, it approaches *T. senile*; the latter differs in its broadly winged petioles. *T. panalpinum*, a less similar species, has achenes with a short, conical cone.

Distribution and habitat: The known range is restricted to the western and central part of the Slovak High Tatra Mts, including the Červené vrchy Mts and the Vysoké Tatry. The occurrence of *T. tantulum* in Poland is probable, but there is no material from there. *Taraxacum tantulum* most frequently grows in snow-beds and in low, stony alpine grassland slopes, usually at altitudes between of 2000 and 2,200 m. The IUCN conservation status is estimated as EN.

Specimens examined: SLOVAKIA. Západné Tatry [the West Tatra Mts], Červené vrchy, snow-beds below the summit of Mt Kresanica, 2,090 m, 29 Jul 1991, B. Trávníček (OL, no. det. 19138). – Vysoké Tatry, Štrbské Pleso, valley of Mlynická dolina, below Nižné Kozie plieska, 49°09'30"N, 20°02'40"E, ~2,000 m, Aug 1997, J. Štěpánek, cult. as JŠ 6409 (PRA, no. det. 19141). – Vysoké Tatry, Furkotská dolina, above the lake of Wahlenbergovo pleso, 2,200 m, 24 Jul 1952, J. Šourek 8496 (PR, no. det. 36408). – Vysoké Tatry, Kežmarské Zelené pleso, 25 Jul 1929, G. Lengyel (BP, no. det. 36192).

Taraxacum venustum agg.

One of the most widespread Alpine members of *T.* sect. *Alpina* is *Taraxacum venustum* Dahlst. There are similar forms known both from the Alps and the Carpathians, constituting what is called *Taraxacum venustum* agg. in the present paper. The group around *T. venustum* belongs to the core of this section and is characterized by the following features:

Plants dwarf or small, glabrous or subglabrous; petioles unwinged or narrowly winged, leaves usually pinnatisect with few remote pairs of ± patent, elongated to lingulate lateral segments; outer phyllaries appressed to erect (often with an incurved apex), not imbricate, abaxial surface dark olivaceous-green, black-olivaceous when dry, not bordered or with an almost invisible, very narrow, dirty membranous border, apex flat; stigmas slightly discoloured to medium dark discoloured, pollen grains irregular or absent, achenes variously stramineous, achene body with relatively sparse spinulosity.

The most widely distributed and distinctive taxon in this group, most frequent in the eastern part of the Alps, is *T. venustum* itself. A detailed analysis of the literature dealing with, or mentioning, *T. venustum* (incl. *T. carinthiacum*), particularly Uhlemann (2015), van Soest (1959, 1969), Stöhr & Pilsl (2018), revealed a rather surprising fact, there is no complete and accurate description of this taxon. The description of *T. carinthiacum* (van Soest 1959: 83) includes only a part of the morphological range of this taxon. Therefore, a full treatment of *T. venustum* is provided in order to facilitate the comparison with other members of this group. The morphological comparison of the members of *T. venustum* agg. is given in Table 1. *Taraxacum venustum* agg. includes the following taxa: *T. venustum* s. str., *T. pseudovenustum* (Romania) and *T. pygmaeum* (France); for the sake of comparison, *T. humifusum*, a Bulgarian species linking *T.* sect. *Bulgarica* and *T.* sect. *Alpina* is also discussed (Štěpánek & Kirschner 2022a).

4. *Taraxacum venustum* Dahlst., Ark. Bot. 7(1): 5, (1908) (Figs 16, 17, 19A).

≡ *Taraxacum alpinum* var. *hyoseridifolium* Baer & Hellweger in Dörfler, Herb. Norm. Sched. Cent. XLI: 16, 1901.

Type indication: "Diese in I. Dörflers Herbarium normale Nr. 4063, wo eine kurze Beschreibung vorliegt, aufgestellte Varietät"... (Dahlstedt, loc. cit., footnote).

Type: [ITALY]. Austria, Tirolia centr., in declivibus humidiusculis montis "Hühnerspiel" (= "Amthorspitze") prope "Gossensass", 2,400–2,730 m, Aug 1899, H. Baer & M. Hellweger, [Dörfler, Herbarium normale, no. 4063] (Z, no. det. 24678; G, no. det. 22341, 22342; M 27506!; M 30809!; LD!; PRC 401859!; S 13-8933!, syntypes).

Note 1: The protologues of both homotypic names include a single gathering (H. Baer & M. Hellweger in Dörfler, Herbarium normale, no. 4063, see also Dörfler 1901), and individual herbarium specimens are syntypes. The same conclusion is published by van Soest (1959), without the necessary typification procedure completed. Dahlstedt (1908: 5–6) did not specify any specimen in this gathering, either.

= *Taraxacum carinthiacum* van Soest, Acta Bot. Neerl. 8: 83, 1959.

Type indication: Hohe Tauern, Mallnitzer Tauerntal, slopes of Geiselkopf, 1,900 m, 18. 7. 1957, v. Soest (h. 38034).

Table 1. Comparison of selected characters of the members of the *Taraxacum (Alpina) venustum* group and *T. (Bulgarica) humifusum*.

	T. venustum	*T. pseudovenustum*	*T. pygmaeum*	*T. humifusum*
	Taraxacum sect. *Alpina*			*Taraxacum* sect. *Bulgarica*
Leaves	variously erect = patent, sometimes ± subappressed to the ground			tightly appressed to the ground
Number of leaf lateral segments	2–3 (4)	2–3 (4)	4–5 (8)	(2) 3–4
Outer ligules	flat	flat	cucullate to involute	flat
Pollen	conspicuously irregular, with a considerable proportion of markedly larger grains	clearly irregular but conspicuously larger grains absent	absent	clearly irregular but conspicuously larger grains absent
Achene colour	light greyish stramineous-brown	light greyish beige or ± stramineous	pale greyish beige	± deep olivaceous grey-brown or brownish grey
Achene length	3.6–4.7 mm	4.1–5.0 mm	3.5–4.0 mm	3.6–4.0 mm
Cone length	0.5–0.9 mm	0.3–0.5 mm	0.4–0.6 mm	0.4–0.5 mm
Achene body spinulosity	a short, delicate spinulosity in upper 1/3, spinules often erect or curved upwards, often with a few squamules	subsparse squamules in upper 1/4, sometimes coalescing to form irregular rims, basal 1/2–2/3 smooth	very sparsely and minutely spinulose in upper 1/5, then minutely tuberculate, proximal 2/3 smooth	± dense squamules (and scattered spinules), distally forming a low collar masking the cone base
Petioles of outer leaves	± winged to narrow	broadly winged	broadly winged	broadly winged
Interlobe indentation	dentate and lobulate, margin flat	usually entire, margin usually flat	entire or with a single tooth, margin raised	usually entire, margin raised
Terminal leaf segment	trilobed	helmet-like pentagonal, dentate and incised in outer leaves, otherwise ± triangular	broadly triangular to broadly helmet-shaped	flat rhombic, trilobed

Type: AUSTRIA. Tauerntal b. Mallnitz (Kä), onder Geiselkopf, 1,900 m, 18 Jul 1957, J. L. van Soest (L, herb. van Soest 38034, no. det. 19671, holotype).

Illustrations: Handel-Mazzetti (1907: Plate V, fig. 10b); Uhlemann (2011: 43, fig. 8B, 8C).

Note 2: The general habit and leaf shape of *T. venustum* is quite plastic, with two extreme morphotypes, one corresponding to what used to be traditionally understood as *T. carinthiacum* (more slender, less deeply divided leaves, lateral segments triangular, not lingulate, and narrower petioles), marked **c** in the following description and the other morphotype similar to what is described as *T. venustum* (little plants with a more compact growth, usually ± broadly winged petioles, deeply pinnatisect leaves, marked **v** in the description). The development of individual morphotypes and common intermediates primarily depends on the ecological conditions (subalpine grasslands host **c**, open alpine habitats **v**) and ontogenetic stages (early plants are closer to **c**).



Fig. 16. *Taraxacum venustum*. Austria, Tyrol, Zeblasjoch, 27 Jul 2008. Photo I. Uhlemann.

Plants small to dwarf, 5–12 cm tall, slender to subcompact. Plant base one-headed, without tunic, with very sparse dirty whitish hairs among petiole bases. Petiole pale greenish, winged to broadly winged (v) in outer leaves, narrowly so in middle ones, narrow, unwinged in the inner leaves (c). Leaves subprostrate-patent to erect-patent, light green, not spotted, subglabrous, oblong-lanceolate to elliptical in outline, usually 4–9 × 1.4–3 cm, pinnatisect; terminal segment most often broadly triangular in outline, conspicuously trilobed with lingulate lobes, sometimes broadly helmet-shaped to broadly triangular, usually 0.7–1.5 (–1.8) × 1–1.6 cm, obtusely acute to ± obtuse, distal margin (c) subconvex, entire or sparsely denticulate, in (v) concave, often with short broad tooth in the concavity, otherwise ± entire, basal lobules ± patent, often forward-pointing (v), acute to subobtuse and lingulate, proximal margin straight, subsigmoid or subconvex, entire or with a single sub-basal tooth; lateral segments in 2–3 (4) pairs, usually 6–14 mm long, 3–8 mm wide at base, (v) ± narrowly oblong-lingulate, subobtuse to rounded, patent to ± pointing forwards, distal margin ± straight to subconvex, or subsigmoid, entire or with a short broad tooth at base, or (c) deltoid-triangular to narrowly so, acute, distal margin subconvex or subsigmoid, with a single short tooth or several minute teeth, both with proximal margin straight to subconcave, entire or with a single little tooth (c) or a conspicuously long (to 6 mm), lobule-like, oblong-lingulate tooth (v); interlobes short and ± broad, usually 3–9 × 2–6 mm, not bordered nor blotched, entire or with 1–2 little or medium-sized teeth, margin often raised; mid-vein pale greenish. Scapes pale greenish, very sparsely arachnoid and early glabrescent, shorter or longer than leaves. Capitulum medium-sized, ~3–3.5 cm wide, ± dirty yellow, usually subconcave to ± flat, often with "untidy" ligules. Involucre dark olivaceous-green, not pruinose, rounded at base. Outer phyllaries 10–15, loosely appressed to suberect, often with tip curved inwards, the lowermost phyllaries sometimes ± patent, lanceolate to narrowly lanceolate (the lowermost ones sometimes ovate-lanceolate), usually (5–) 6–7 × 1.5–2.4 (–3) mm, adaxial surface medium dark greyish green, abaxial surface evenly deep olivaceous-green, getting dark grey-olivaceous when dry, sometimes with a dark longitudinal middle line, unbordered or border indistinct, dirty membranous, 0.05–0.1 mm wide, margin rarely sparsely minutely ciliate, apex flat; inner phyllaries ~10 mm long, often of unequal width. Outer ligules narrow or



Fig. 17. *Taraxacum venustum*. A part of the holotype specimen of *T. carinthiacum* (L, no. det. 19671) documenting the "carinthiacum" morphotype.

medium broad, long, relatively sparse, narrowly striped dark grey outside, apical teeth long, greenish or purplish grey-black, inner ligules long, canaliculate, their teeth greyish yellow. Pollen present, pollen grains irregular in size. Stigmas long, medium dark discoloured, ± light grey-green, with black pubescence outside. Achenes light greyish straminеous-brown, 3.6–4.7 × 0.85–1.05 mm, body with a short, delicate spinulosity in upper 1/3

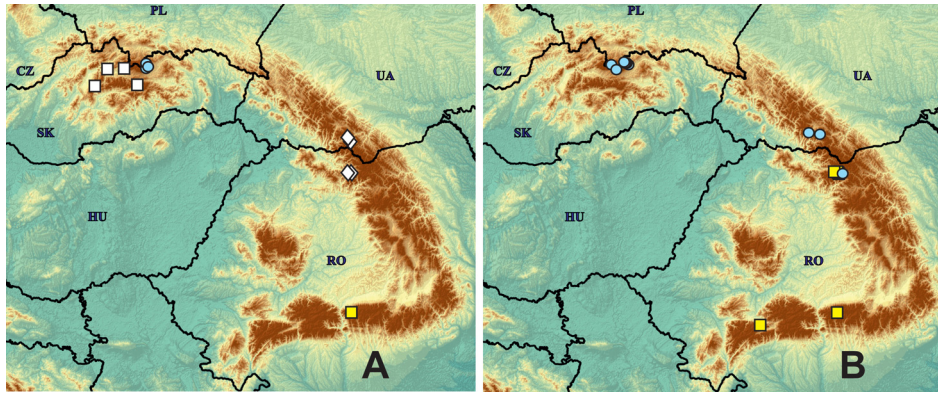


Fig. 18. Distribution of selected Carpathian species. (A) white diamonds – *T. venustum* agg., yellow square – *Taraxacum pastorum*, blue circles – *T. rupicaprae*, white squares – *T. subelegantissimum*; (B) blue circles – *T. ursinum*, yellow squares – *T. elegantissimum*.

(otherwise smooth or sparsely minutely tuberculate), spinules often erect or curved upwards, often with a few squamules, body relatively gradually narrowing into a subconical (distally subcylindrical) cone 0.5–0.9 mm long (the light greyish stramineous-brown part of the cone represents the proximal 1/2–3/5, the rest is whitish); beak (4–) 4.5–6 mm long, pappus white or whitish, 5.5–6 mm long.

Distribution: *Taraxacum venustum*, in all likelihood, is endemic to the Alps. Published records for the Carpathians (van Soest 1959: 99, Tacik 1980) are based on specimens from the Tatra Mts identified as *T. carinthiacum* and belonging to *T.* sect. *Rhodocarpa* (= *T.* sect. *Alpestria*). The true *T. venustum* was not found in the rich material from the Carpathians.

Taraxacum venustum agg. in the Carpathians

Nevertheless, plants similar to *T. venustum* undoubtedly occur in the Carpathians where there are several agamospermous lineages. There are several gatherings from the Ukrainian and Romanian Carpathians (Fig. 18A, map) belonging to this assemblage, but the amount and quality of the material does not make it possible to define the taxonomy of these plants. They are therefore only listed as members of *T. venustum* agg., or *T. venustum* sensu lato:

1. UKRAINE. The Carpathians, Čornogora, summit area of Pop Ivan Chornogorskiy [Чорногора, Піп Іван Чорногорський, 48°2'50"N, 24°37'39"E], 2,026 m, 1991, A. Plocek, cult. as JK 747 (PRA, no. det. 34887).

2. UKRAINE. The Carpathians, Ivanofrankivsk Region, Čornogora, between Mt Turkul and Mt Tomnatek, ~1,900 m, 30 Jun 1991, R. Businský, cultivated as JK 561 (PRA, no. det. 34885).

3. ROMANIA. Northern Romania, the Rodna Mts, glacial valley of Zănoaga Piatra Rea, between Mt Vf. Galaţului (2,048 m) and Vf. Cailor (1,922 m), ~1,600 m, 12 Aug 1981, J. Štěpánek et al., cultivated as JŠ 147 (PRA, no. det. 34889).

4. ROMANIA. Northern Romania, the Rodna Mts, slopes in a valley north of Mt Ripa Piatra Rea, south of Borşa Village, ~1,500 m, 12 Aug 1981, J. Štěpánek et al., cult. as JŠ 439 (PRA, no. det. 34891).

The only member of *T. venustum* agg. from the Carpathians with herbarium material sufficient for a complete taxonomic treatment is described as a new species below.

5. ***Taraxacum pseudovenustum*** Štěpánek et Kirschner, **sp. nov.** (Figs 19B, 20, 21).

Type: Romania. Montes Fagaraş: in decl occid. supra lacum Biala lac, ~2,100 m, a. 1987, M. Lhotská, cult. from achenes no. JŠ 3217 as JŠ 4475, collected in 1991 (PRA, no. det. 34892, holotype; isotypes: PRA, no. det. 34883).

Etymology: Similar to *T. venustum*.

Diagnosis: Species distincta ex grege *Taraxaci venusti*, notabilis acheniis stramineis usque pallide griseo-hinnuleis, corpore superne squamulis subsparsis saepe horizontaliter coalescentibus praedito, in pyramidem brevissimam late conicam 0.3–0.5 mm longam sensim transeunte, et stigmatibus obscuris.

Plants small, 5–11 cm tall, light green, with a ± compact growth. Plant base without tunic, ± glabrous. Leaves variously erect-patent, yellowish green, ± glabrous, ± narrow, narrowly elliptical to narrowly oblong, usually 4–7 × 1–1.8 cm, usually pinnatipartite; terminal segment in outer leaves often large, ~1.5 cm long, helmet-shaped to pentagonal, distal margin with teeth and incisions, in middle leaves it is ± small, 0.6–1 cm long, ± broadly triangular, ± entire, basal lobules almost rounded; lateral segments in 2–3 (4) pairs, remote, short, usually 4–8 mm long, 3.5–5 mm wide at base, broadly lingulate to triangular, patent, sometimes subrecurved to slightly pointing upwards, subobtuse to obtuse, distal margin convex to sigmoid, entire, proximal margin convex to subsigmoid, entire or with a single distinct tooth; interlobes relatively broad, usually 3–7 × 3–5 mm, surface light green, margins bordered brown-purple, often slightly raised; mid-vein pale greenish or slightly suffused pinkish; petiole ± broadly winged, 1.5–2 cm long, pale green. Scapes light green, later getting purplish distally, almost glabrous, ± equalling leaves. Capitulum yellow, ± flat, ~3–3.5 cm wide. Involucre slightly pruinose, ~5–6 mm wide and ± rounded at base. Outer phyllaries 15–18, loosely appressed, not imbricate, narrowly lanceolate to lanceolate, usually 4.5–5.5 (–6) × 1.5–2.5 mm (the lowermost one often ± linear, to 1 mm wide), abaxial surface ± evenly dark olivaceous-green (black-olivaceous when dry), with a darker, flat apex, paler border absent or very inconspicuous, narrow, less than 0.1 mm wide, margin irregularly minutely ciliate; adaxial surface light glaucous; inner phyllaries ~11 mm long, of ± uniform width. Outer ligules long, ± flat, variably broad, striped medium dark purplish grey outside, teeth long, black-purple, inner ligules narrow, canaliculate, with grey-purple apical teeth. Stigmas ± dark discoloured, grey-green, with a dark pubescence outside. Pollen present, pollen grains irregular in size. Achenes light greyish beige or ± stramineous, 4.1–5.0 × 1.0–1.2 mm, body with subsparse squamules in upper 1/4, sometimes coalescing to form irregular rims, otherwise (upper 1/2 or 1/3) sparsely tuberculate, basal 1/2–2/3 smooth, body gradually narrowing into a short, broadly subconical cone 0.3–0.5 mm long; beak 4.0–5.5 mm long, pappus whitish, 5–5.5 mm long. – Agamosperm.

Diagnostic notes: *Taraxacum pseudovenustum* resembles *T. venustum* in its leaf lobation pattern, and superficially seems to be a more robust morphotype of the latter species



Fig. 19. Achenes of *Taraxacum* sect. *Alpina*. (A) *T. venustum* (PRA, no. det. 34895); (B) *T. pseudovenustum* (PRA, no. det. 34883); (C) *T. pygmaeum* (PRA, no. det. 34909). For the sake of comparison, (D) *T. humifusum* of *T.* sect. *Bulgarica* is also shown (PRA, no. det. 26126).

but the pentagonal terminal leaf segment substantially differs from the usually trilobed or small triangular one in *T. venustum*. *Taraxacum pseudovenustum*, furthermore, differs from *T. venustum* in the achene colour, cone und spinulosity pattern, darker involucre and outer phyllaries and darker style coloration (greyish in *T. venustum*). In particular, leaves with large terminal segments and in general the dark styles are also similar to *T. senile* but the latter species has more broadly winged petioles and a fewer and broader lateral leaf segments.

Distribution and habitat: At present known only from the Fagaras Mts, southern Romania. It grows in moist alpine grasslands and stabilized scree along streams, above 2,000 m a. s. l. We estimate its IUCN conservation status as EN.

Specimens examined: ROMANIA. Fagaraş Mts, W slopes above the lake of Biala lac, ~2,100 m, 1987, M. Lhotská, cult. as JŠ 3217 (PRA, no. det. 34876).

A note on the Taraxacum venustum group in the Western Alps

While *T. venustum* (sensu stricto) is widely distributed in the eastern and central Alps and its frequency decreases towards the west, there is a distinctive taxon known from the Mt Cenis region. It is close to *T. venustum* and *T. humifusum* and, in order to give a more complete picture of this group, it is described below as a new species, *T. pygmaeum*.



Fig. 20. *Taraxacum pseudovenustum*. The holotype (PRA, no. det. 34892).

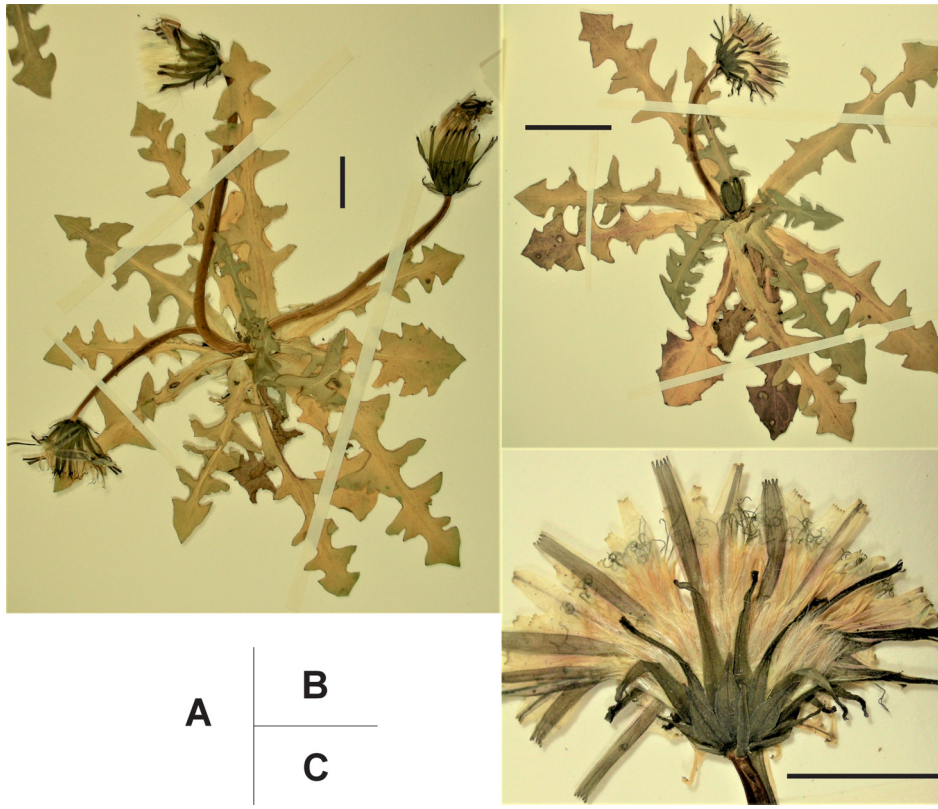


Fig. 21. *Taraxacum pseudovenustum*. (A), (B) general habit; (C) a detail of inflorescence (all PRA, no. det. 34892). Scale bars: (A), (C) = 1 cm; (B) = 2 cm.

Taraxacum pygmaeum Štěpánek et Kirschner, **sp. nov.** (Figs 19C, 22).

Type: FRANCE. Gallia orientalis, département Savoie, Alpes, urbs Grenoble, opp. Modane, massif du Mt Cenis, lacus structilis Lac du Mt Cenis, in locis graminosis alpinis glareosisque in valle rivi Rouiseau de Ronce, inter locum Plan des Cavales (2,512 m) et cataractam sub lacu 'le Lac Clair', 2,500–2,600 m, 6°58'–59' E, ~45°15' N, 1 Aug 1996, J. Štěpánek et al., cult. from achenes no. JŠ 6003 as JŠ 6586, collected in 1999 (PRA, no. det. 34874, holotype; isotypes: PRA, no. det. 34894).

Etymology: Dwarf.

Diagnosis: Species ex grege *Taraxaci venusti*, insignis acheniis perpallide griseo-hinnuleis, superne sparsissime minute spinulosis, corpore in pyramidem basi ± conicam, ceterum subcylindricam sensim abeunte, antheris polline carentibus, phyllariis exterioribus irregulariter laxe adpressis, in sicco atro-olivaceis, fere immarginatis, et foliis glaberrimis, petiolis late alatis.

Plants small, compact, usually 4–7 cm tall, glabrous. Plant base with a slightly developed dark brown tunic, ± glabrous. Leaves ± prostrate, totally glabrous, ± greyish light green, not spotted, elliptical to lanceolate in outline, usually 3–5 × 1–1.7 cm, pinnatisect; terminal segment broadly triangular to helmet-shaped, sometimes trilobed, ~5–8 × 8–12 mm,

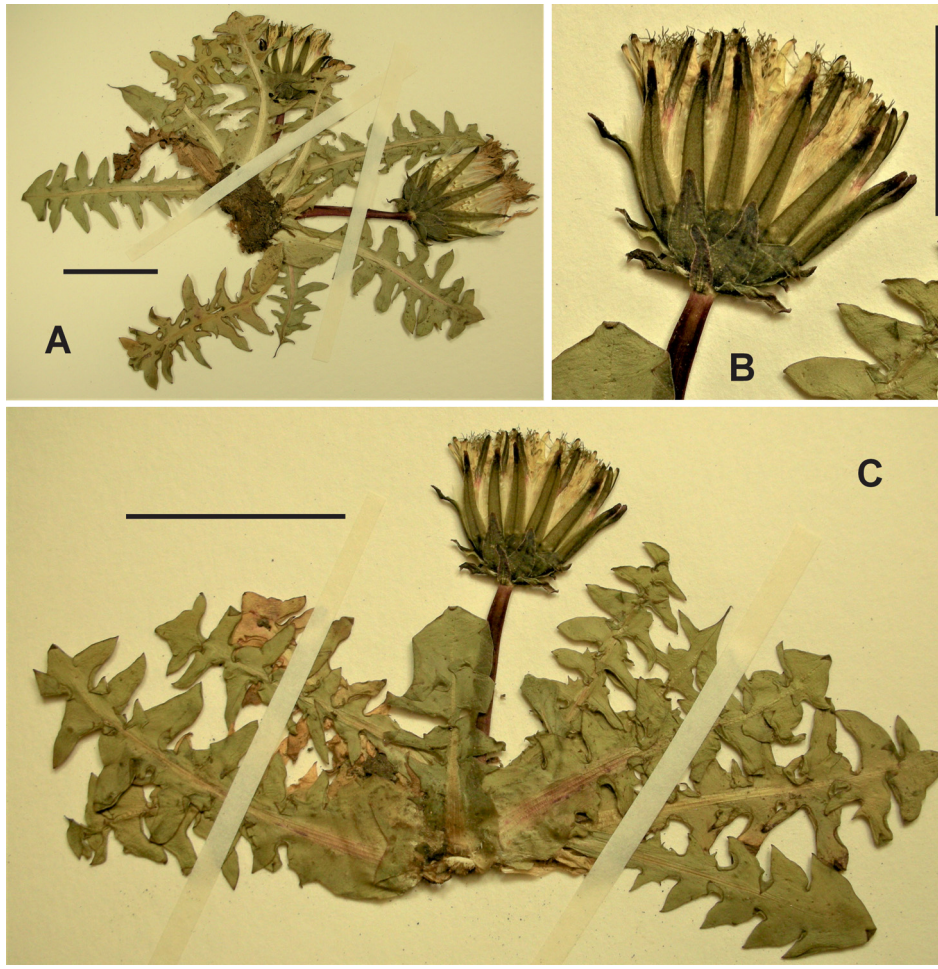


Fig. 22. *Taraxacum pygmaeum*. (A), (C) general habit; (B) a detail of inflorescence (all PRA, no. det. 34894). Scale bars: (A), (C) = 2 cm; (B) = 1 cm.

acute, distal margin subundulate to convex, ± entire, proximal margin subconcave, basally ± raised, entire or sometimes with a single tooth; lateral segments in 4–5 (8) pairs, usually approximated, ± narrowly triangular to linear-triangular or lingulate, patent to subrecurved, usually 4–8 mm long, 1.5–3 (–4) mm wide at base, acute to subobtuse, distal margin subconvex to sigmoid, usually with a single basal tooth; interlobes short, usually 1.5–3 × 2–3 mm, entire or with a single distinct tooth, surface green, margins raised, ± bordered brown-purple; petiole broadly winged, 1–1.5 cm long, pale green; mid-vein usually pale greenish, seldom pinkish (more often so abaxially in the middle part). Scapes short, usually 2.5–4 cm long, ± glabrous (sometimes 1–3 arachnoid hairs below capitulum), ± pale greenish, distally often suffused brown-purple, subequalling leaves. Capitulum not fully opening, ± flat to concave, yellow, ~1.5–2.5 cm wide, ligules rather "untidy". Involucre not pruinose, ~7 mm wide and ± rounded at base. Outer phyllaries 14–16, reaching ~2/5 of the length of the inner ones, irregularly loosely appressed, the

lowermost ones often up to patent, inconspicuously imbricate, lanceolate to ovate with an elongated tip, 4–6 × 2–3 mm, abaxial surface evenly coloured dark olivaceous-green (black-olivaceous when dry), slightly paler border very narrow, not sharply delimited, less than 0.1 mm wide, margin irregularly minutely ciliate, apex flat; inner phyllaries ~10 mm long, of uniform width, olivaceous-green with apex suffused purple. Outer ligules ± irregularly arranged ("untidy", some slightly crumpled), distally narrower, ± cucullate or involute, less often ± flat, distinctly striped grey-purple outside, teeth black-purple, inner ligules shorter, canaliculate to subtubular, their apical teeth red-brown. Stigmas medium dark discoloured, greyish yellow-green, with pubescence of hairs with black tips. Pollen absent. Achenes light, pale greyish beige, 3.5–4 × 0.85–1.0 mm, body very sparsely and minutely spinulose (rarely also squamulose) in upper 1/5, then minutely tuberculate, at least the proximal 2/3 smooth, body gradually narrowing in the basally conical, distally ± subcylindrical cone 0.4–0.6 mm long; beak thin, 6.5–7.5 mm long, pappus pale brownish white, 5–5.5 mm long. – Agamosperm.

Diagnostic notes: *Taraxacum pygmaeum* is distinct in having relatively numerous, approximated, often lingulate leaf lateral segments, very broadly winged greenish petioles, and a very narrow, indistinct border to outer phyllaries; the absence of pollen and ± small, very sparsely spinulose achenes with a short cone are also diagnostic. The cucullate, subtubular or narrowly canaliculate ligules arranged rather irregularly represent another unusual feature. A detailed comparison with other similar taxa is given in Table 1. *Taraxacum pygmaeum*, at first sight, resembles *T.* (*Rhodocarpa*) *congestilobum* with similar but much fewer lateral leaf segments and unwinged purplish petioles.

Distribution and habitat: A species known from the type macrolocality in the Mt Cenis region, France; in view of its relatively frequent occurrence there, it might be overlooked elsewhere in the westernmost Alps. It thrives in moist, open and ± sparse alpine grasslands, and on stony slopes. Its IUCN Conservation Status is estimated as EN.

Specimens examined: FRANCE. Savoie, Modane, Mt Cenis Massif, Lac du Mt Cenis, brook valley of Rouiseau de Ronce, between Plan des Cavales (2,512 m) and a waterfall below le Lac Clair, 2,500–2,600 m, 6°58'–59' E, ~45°15' N, 1 Aug 1996, J. Štěpánek et al., cult. as JŠ 6632 (PRA, no. det. 34896). – Ibidem, cult. as JŠ 6003 (PRA, no. det. 34905). – Ibidem, cult. as JŠ 6583 (PRA, no. det. 34913). – Ibidem, cult. as JŠ 6580 (PRA, no. det. 34911). – Ibidem, cult. as JŠ 6598 (PRA, no. det. 34909). – Ibidem, cult. as JŠ 6636 (PRA, no. det. 34907).

Taraxacum (Bulgarica) humifusum Štěpánek et Kirschner, Phytotaxa 569: 58, 2022 (Figs 19D, 23).

Type: Bulgaria. montes Pirin, opp. Bansko, vallis flum. Banderica, locis graminosis herbosisque subalpinis secundum viam turisticam rubre signatam in declivitate ± orientali in vallis rivi Vichrenska voda supra casam alpinam Vichren (1,950 m), inter montes Chvojnati vrch (2,635 m) et Vichren (2,914 m), ~2,200–2,400 m, 41° 45–46' N, 23° 24–25' E, 9 Aug 1997, J. Štěpánek, J. Kirschner & B. Trávníček, cultivated as JŠ 6550, collected in 1999 (PRA, no. det. 35728, holotype; isotype: PRA, no. det. 26126, and duplicates).

Illustrations: Štěpánek & Kirschner (2022a: figs 27C, 29, 30).

A brief description (for details, see Štěpánek & Kirschner 2022a): Plants small, 4–7 cm tall. Leaf rosette light green, compact. Petiole broadly winged, pale to pale green. Leaves prostrate, tightly appressed to the ground, stiff, light green, ± glabrous, oblanceolate to



Fig. 23. *Taraxacum humifusum*. General habit (PRA, no. det. 26126).

elliptical in outline, pinnatipartite to pinnatisect; terminal segment relatively small, flat rhombic in outline, usually trilobed; lateral segments in 3–4 pairs, usually patent, narrowly triangular to deltoid-triangular, often with an elongated, patent to forward-pointing distal part, distal margin convex or concave, entire or with one to several minute acute teeth or with a distinct incision, often undulate; interlobes not bordered, entire, always raised; mid-vein pale greenish. Scapes pale greenish, very sparsely arachnoid, shorter than leaf length. Capitulum deep yellow, 2.5–3.5 cm wide, ± flat. Involucre olivaceous-green, very slightly pruinose, 7–8 mm wide and ± rounded at base. Outer phyllaries 18–23, variously loosely appressed, erect or erect-patent to patent, often the innermost ones appressed, the outermost ones patent, lanceolate to narrowly lanceolate, usually 4.5–6.5 × 1.5–2 mm, abaxial surface ± evenly dark olivaceous-green (darkening when dry), border not developed; inner phyllaries 11–12 mm long. Outer ligules ± flat, striped purplish dark grey outside, apical teeth dark greyish to dirty yellow. Stigmas medium discoloured, greyish to yellowish light green, most of the stigmatic hairs hyaline, some with grey or grey-black apex. Pollen present, pollen grains irregular in size. Achenes olivaceous grey-brown, brownish grey to grey, 3.6–4.2 × 0.9–1.0 mm, body with ± dense squamules and interspersed spinules, particularly dense on the top of achene body, forming a low collar masking the cone base, body subabruptly narrowing into a subcylindrical to subconical cone 0.4–0.5 (–0.7) mm long, ~0.4 mm thick at base, 0.3 mm distally; beak (4.5–) 7–9.5 mm long, pappus whitish, 4.5–5.5 mm long. – Agamosperm.

Distribution and habitat: Confined to the Vichren Massif, Pirin, Bulgaria, and it is considered to be endemic to the Pirin (for the list of specimens, see Štěpánek & Kirschner 2022a). It grows in short-grass wet subalpine and alpine grasslands.

Diagnostic notes and relationships: *Taraxacum humifusum* is distinct in terms of its combination of light green, unspotted leaves with patent, narrowly triangular, acute lateral segments, outer phyllaries narrow, unbordered and peculiar brown-grey achenes. It is most similar to *T. bulgaricum* of *T.* sect. *Bulgarica* (but with very different achenes).

Because of the shape of its leaves and unbordered outer phyllaries *T. humifusum* is similar to *T. venustum* Dahlst. (syn. *T. carinthiacum* van Soest, see Uhlemann 2011). The most striking is the similarity in leaf shape. However, while *T. humifusum* is not very variable, *T. venustum* has a variety of leaf shapes, from a "humifusum-like" leaf to a more complicated pattern with numerous segments and lobules (the *T. carinthiacum* morphotype). The fundamental difference, however, is a sectional one, consisting, for instance, in the leaf orientation.

C. *Taraxacum* sect. *Rhodocarpa* van Soest, Collect. Bot. 4: 15, 1954.

Type: *Taraxacum rhodocarpum* Dahlst., Acta Horti Berg. 4: 21, 1907.
= *Taraxacum* sect. *Alpestria* (van Soest) van Soest, Proc. Konikl. Nederl. Akad. Wet., ser. C, 69: 459, 1966.
≡ *Taraxacum* subgroup *Alpestria* van Soest, Acta Bot. Neerl. 15: 35, 1966.
Type: *Taraxacum reophilum* van Soest, Acta Bot. Neerl. 8: 132, 1959.

The heterogeneous nature of *T.* sect. *Rhodocarpa* is mentioned elsewhere, with a more detailed discussion (Štěpánek et al. 2011, Štěpánek & Kirschner 2022a, b). There are several groups of species within this section, which are characterized morphologically. When the flora of the Carpathians is considered, there is the group of *T. alpestre* (Tausch) DC., includes eight species around *T. nigricans* (Kit.) Reichenb., a group common in the Carpathians (and in the Krkonoše Mts, Czech Republic), which probably does not occur in the Alps (a few relatively similar species occur in the Eastern Alps). Then, there is a group of *T. vidlense* (see below), which is widely distributed in the Carpathians, but does not occur in the Alps. Currently it is likely that the only group of this section undoubtedly occurring both in the Alps and Carpathians is the group of *T. rhaeticum* van Soest, which includes a marginal member of this section, *T. hercynicum*, which grows mostly at montane to subalpine altitudes in the Alps, Carpathians and the highlands between these two ranges. In the Carpathians, *T.* sect. *Rhodocarpa* is the most diverse group, which is similar to the situation in the Alps.

The following description is a brief extract from that published in Štěpánek & Kirschner (2022a, b), which emphasises the features shared by the majority of the members of *T.* sect. *Rhodocarpa*.

Plants ± medium-size. Leaves variously erect-patent, most often subglabrous to glabrous, usually deeply dissected, often having a shape of those of *T. officinale* s. lat. (= *T.* sect. *Taraxacum*), petiole winged or unwinged. Capitulum yellow, usually deep yellow or golden yellow, often large (i.e., ~3–4 cm wide or more); stigmas discoloured, pollen usually present. Outer phyllaries most often 12–19, usually appressed, erect-patent or arcuate-patent, usually ± lanceolate, relatively short, most frequently (5–) 6–9 × 2–3.5 mm, abaxial surface usually ± evenly dark olivaceous-green or deep grey-green, often blackish-green when dry, most often with an abrupt transition in an inconspicuous, membranous or whitish-membranous border 0.1–0.3 mm wide, sometimes border absent, phyllary apex flat. Achenes variously light stramineous-brown, sometimes light brown to medium brown or ochraceous, 3.5–5 × ~0.9–1.1 mm, achene body usually ± densely spinulose above, most often abruptly or subabruptly, seldom gradually narrowing in a short, usually subconical, sometimes conical, cone usually 0.5–0.9 mm long, rarely longer; beak thin, persistent, (4.5–) 6–8 (–9) mm long, pappus ± white.

Taraxacum sect. *Rhodocarpa* is an imperfectly explored section. It is quite heterogeneous, even in each of the main regions of its distribution and a complete revision will have to be based on newly collected material. When the whole section is considered, the following species groups may be recognized:

(1) The group of *T. alpestre* and *T. nigricans*, almost confined to the Carpathians, but also present in mountain ranges in Bulgaria and with a few relatively similar species in the Eastern Alps. This group is characterized by leaves with a large, dominant terminal segment.

(2) The group in the vicinity of *T. rhodocarpum*, *T. rufocarpoides* van Soest and *T. reophilum*, with leaves often similar to those of *T.* sect. *Crocea*, and a relatively slender growth, which is only reported in the Alps.

(3) An important Alpine-Carpathian group is centred around *T. rhaeticum* and *T. hercynicum*, with greenish, ± patent outer phyllaries, short achenes (considerably shorter than in the other groups) and numerous, narrow lateral leaf segments; it is most variable in the Alps but *T. hercynicum* also occurs in the westernmost Carpathians.

(4) The group of *T. paclovae* characterized by reflexed, sometimes twisted outer phyllaries, which occurs frequently in lower mountain regions below the Tatra Mts, and consists of a number of morphotypes, all intermediate between *T.* sect. *Rhodocarpa* and *T.* sect. *Taraxacum*.

(5) The core species of another Carpathian group, the *T. vidlense* group, have numerous, distinctly bordered outer phyllaries and frequently also broadly winged petioles; this group only occurs in the Carpathians.

(6) There is an Alpine group around *T. ochrospermum*, with very sparsely spinulose, ochraceous-castaneous achenes.

(7) In Bulgaria, there is a group of *T. rhodopaeum* Štěpánek et Kirschner, somewhat intermediate between the two sexual species *T. linearisquameum* van Soest and *T. paludosiforme* Doll (Štěpánek & Kirschner 2022a).

(8) Another Bulgarian group in this section is centred around *T. serenum* (Štěpánek & Kirschner 2022a), with leaves similar to those of *T. urbicola* Kirschner, Štěpánek et Trávn. (Štěpánek & Kirschner 2022a).

(9) And finally, there is a group of *T. recognitum* Štěpánek et Kirschner, characterized by stiff leaves with narrow lateral segments, similar to *T. erzincanense* Doll (Štěpánek & Kirschner 2022a).

There are a few distinct, isolated species with no clear relationships with the above groups. As a single, notable example, we give the Bulgarian *T. hamosius* Doll, with numerous, closely approximated, hamate leaf lateral segments, leaf surface spotted, hairy; its outer phyllaries and achenes similar to those of the *T. rhaeticum* group. In the present paper, a similarly isolated species is *T. flumineum*.

In the Carpathians, the following morphologically delimited groups are recognized below: The *T. rhaeticum* group, *T. alpestre* group, *T. vidlense* group, *T. paclovae* group, and a few taxa remote from the above groups and from one another, *T. flumineum*, *T. subelegantissimum* and *T. innuptum*.

The group allied to T. rhaeticum and T. albulense

There is a convincing discussion of the features and relationships of the group of *T. rhaeticum* and *T. albulense* as a marginal part of *T.* sect. *Rhodocarpa* (= *T.* sect. *Alpestria*) in

Uhlemann et al. (2015). One of the species belonging to it is *T. hercynicum*, a species temporarily equated with *T. rhaeticum* (Trávníček et al. 2010). Uhlemann (2015) also decisively documented the separate status of the latter two entities. In addition to the very different leaf shapes, *T. rhaeticum* is a tetraploid with 2n = 32, whereas *T. hercynicum* is a triploid (2n = 24). Most of the species recognized as members of this group are late flowering, occur in submontane to subalpine habitats, and have a relatively intermediate position between the core *T.* sect. *Rhodocarpa* and *T.* sect. *Taraxacum*. In particular, the achene size approaches that of *T.* sect. *Taraxacum*, while the length of outer phyllaries (up to 10 mm) are characteristic of *T.* sect. *Rhodocarpa*.

6. *Taraxacum hercynicum* Kirschner et Štěpánek, Preslia 69: 51, 1997 (Fig. 24).

Type: CZECH REPUBLIC. District of Žďár nad Sázavou, village of Račín, along the road in the settlement of Polnička, 27 May 1985, J. Štěpánek (PRA, no. det. 11182, holotype; isotypes: PRA, no. det. 10637, and plants distributed in Taraxaca Exs., no. 317)

Exsiccates: Taraxaca Exs., no. 314–319, 399.

Illustrations: Kirschner & Štěpánek (1997: 52, fig. 5); Uhlemann (2015: 16, fig. 1A).

Plants usually medium-sized, up to 20 cm tall, of a slender appearance. Plant base subglabrous; petioles 3–7 cm long, evenly narrowly winged, pale greenish (without any pink or purplish tinge). Leaves variously erect-patent, sparsely arachnoid, light green or light yellowish green, narrowly oblong-lanceolate in outline, usually 6–20 × 1.5–4.5 cm, pinnatisect; terminal segment relatively small, ± triangular, 1–3 × 0.8–2.0 cm, sometimes ± elongated distally, distal margin subconvex to subsigmoid, entire, proximal margin ± straight to subconcave, apex acute; lateral segments numerous, 4–7 pairs, patent to subrecurved, 5–20 mm long, very narrowly triangular to triangular, distal margin variable, often straight to subsigmoid, usually entire, proximal margin straight to subconcave, entire; interlobes variable, 3–20 mm long, 2–5 mm wide, distal ones entire to sparsely denticulate, proximal ones often irregularly dentate, often bordered brown-purplish, rarely inconspicuously blotched; mid-vein pale greenish. Scapes sparsely arachnoid, usually light green, sometimes suffused light brownish-purplish. Capitulum relatively small, usually 3–3.5 cm wide, ± light yellow. Involucre ± light green to deep green. Outer phyllaries usually 18–22, patent to arcuate-patent, sometimes sigmoid-patent, narrowly lanceolate to ovate-lanceolate, usually 8–10 × 2–3.5 mm, adaxial surface ± light green, border not conspicuous, whitish-membranous, ~0.1–0.2 mm wide. Outer ligules flat, striped brownish grey outside. Pollen absent. Stigmas yellow. Achenes light greyish stramineous-brown, usually 3.5–4.0 × 1.1 mm, body subsparsely to medium densely short-spinulose in upper 1/4–1/3, ± gradually narrowing into a broadly conical cone 0.2–0.4 (–0.5) mm long; beak (8.5–) 9–12 mm long, pappus ± white, 6–7 mm long. – 2n = 24 (Trávníček et al. 2010). – Agamosperm.

Diagnostic notes: The group around *T. albulense* van Soest and *T. rhaeticum* van Soest, including *T. walo-kochii* van Soest, *T. laiense* van Soest, *T. podlechianum* Sahlin, *T. perfissum* van Soest, marginally also *T. pilatense* van Soest and a few other taxa, is characterized by relatively narrow leaves with patent or subpatent, usually narrowly triangular lateral segments, green, usually ± unwinged petioles, outer phyllaries from erect-arcuate to arcuate-recurved, without distinct border, and usually submontane to montane (and subalpine) habitats. The diversity centre of this group is situated in the Swiss Alps.



Fig. 24. *Taraxacum hercynicum*. Germany, Braunlage, 1 Jun 2019. Photo I. Uhlemann.

The light green leaves with numerous, usually narrowly triangular and entire lateral segments are very distinctive in the field. Moreover, the relatively short, arcuate-patent, light green and inconspicuously bordered outer phyllaries, the absence of pollen, yellow stigmas, and relatively small achenes with a body gradually narrowing into a very short, broadly conical cone are equally remarkable and diagnostic, when compared with *T. rhaeticum* and *T. albulense*. In the field, in central Europe at least, it is a species that flowers substantially later than taxa of *T.* sect. *Taraxacum*, i.e., in late May and June at altitudes of about 600–1000 (–1450) m.

Distribution and habitat: The relatively wide distribution of *T. hercynicum* is summarized by Uhlemann (2015; further records in Uhlemann 2003) and include several regions in Austria (Oberösterreich, Salzburg, Kärnten) and adjacent Italy (Südtirol), a number of localities in Germany (Bayern, Erzgebirge in Sachsen, Harz, see Uhlemann et al. 2013) and is common in mountainous regions in the Czech Republic (Bohemia and N., W. and NE. Moravia) and the SW. Poland (the Karkonosze and the Śnieżnik Kłodzki). Only selected herbarium specimens are listed, in addition to those given in Kirschner & Štěpánek (1997), Trávníček et al. (2010), Uhlemann (2003) and Uhlemann et al. (2015); the most remarkable occurrences are those in the Veľká Fatra Mts, a new record for Slovakia and the Moravsko-slezské Beskydy Mts, NE. Moravia. Thus, *T. hercynicum* is another mountain species that occurs in both the Alps and Carpathians.

Taraxacum hercynicum grows in a variety of habitats, frequently along paths and tracks in montane woodlands, supramontane to subalpine pastures, also often on slightly disturbed meadow habitats, sometimes occurring at low altitudes (deep valleys, shady places along woodland paths) and occurs in the subalpine belt in several mountain ranges in C. Europe (several sites above 1,400 m); it occurs at 2,000 m in the Alps. The IUCN conservation status is estimated as LC.

Selected specimens examined: SLOVAKIA. Central Slovakia, Veľká Fatra, pastures south of Mt Biela skala (1384.6 m), N. of Mt Ostredok (1,592 m). 1,300–1,400 m, 5 Aug 2009, J. Štěpánek & D. Bernátová, cult. as JŠ 8891 (PRA, no. det. 29541).

POLAND. Województwo dolnośląskie, Stronie Śląskie, ruins of the former lookout tower near the summit of Mt Śnieżnik Kłodzki, 50°12'27.34"N, 16°50'49.32"E, 1,420 m, 4 Jul 2005, J. Zámečník (HR, det. J. Zámečník). – Województwo dolnośląskie, Karpacz-Wodna, the Karkonosze Mts, along tourist path near the chalet of Strzecha Akademicka, 50°45'02.86"N, 15°42'32.05"E, 1,265 m, 21 Jul 2019, J. Zámečník & J. Zahradníková (HR, det. J. Zámečník).

CZECH REPUBLIC. West Bohemia, Konstantinovy Lázně, N. slopes of the hill of Hradiště, 6 Jun 1987, L. Kirschnerová (PRA, no. det. 10628). – South Bohemia, Vimperk, lawns in the village of Kvilda, ~1,000 m, 13°35'E, 49°01'N, 9 Jul 1991, J. Štěpánek (PRA, no. det. 9321). – Northern Moravia, Hrubý Jeseník, Karlova Studánka, 27 May 1993, B. Trávníček (herb. Trávníček, no. det. 12367, 12368). – The Moravsko-Slezské Beskydy Mts, Visalaje, N. margin of the Obidová Reserve, 49°31'13.339"N, 18°31'17.112"E, 18 May 2023, B. Trávníček (herb. Trávníček, field photo!).

GERMANY. Baden-Württemberg, Feldberg, Grafenmattstraße, 22 Jun 2004, Hügin (herb. Hügianum). – Bayern, Bischofsheim an der Rhön, Rockenstein (776 m) near Oberweissenbrunn [corrected], 14 May 1993, L. Meierott (herb. Meierott, no. det. 10626). –Bayern, Franken, Fichtelgebirge, Karches, 28 May 2017, H.-D. Horbach (UBT). – Franken, Fichtelgebirge, Fichtelberg, 28 May 2017, H.-D. Horbach (UBT). – Werdenfelser Land, Mittenwald, Nördliche Kalkalpen, Karwendelgebirge, from Bergstation der Karwendelbahn to Mittenwald, Am Bankle, ~1,100 m, 29 Jun 2017, I. Uhlemann (herb. Uhlemann). – Sachsen-Anhalt, Harz, Hochharz, ~2 km E of Braunlage, 1 Jun 2019, I. Uhlemann (HAL). – Thüringen, Illmenau, S of the Wohlrose Valley, ~2 km N of Neustadt a. R. 19 May 2001, H. Korsch (JE). – Saalfeld, S of Roderberg, 1 km N of Sitzendorf, 16 May 2005, H. Korsch (JE). – Thüringen, between Oberhof and Luisenthal, 24 May 2011, K. Helmecke (JE). – Sachsen, Mittleres Erzgebirge, Marienberg, between Rübenau and Rothenthal, 7 Jun 2021, I. Uhlemann (GLM).

AUSTRIA. Kärnten, Hermagor-Pressegger See, Egger Alm, periodic lake of Egger Alm See, 46°35'01.94"N, 13°23'05.00"E, 1,414 m, 15 May 2015, J. Zámečník & B. Trávníček (HR, no. det. 32462).

The group of species allied to Taraxacum nigricans and T. alpestre

This group was studied by Štěpánek et al. (2011) in considerable detail and with the exception of *T. alpestre*, all the taxa included in it are relevant for the present paper. A short treatment of all the taxa is provided, with brief diagnostic descriptions; otherwise full descriptions and images of plants and achenes are referred to in Štěpánek et al. (2011).

The group around *T. nigricans* and *T. alpestre* is characterized as follows: Plants medium-sized to tall, leaves light green to bright green, not spotted, with a big, conspicuous terminal segment, outer phyllaries conspicuously short, usually lanceolate to linear-lanceolate to triangular-lanceolate (rarely ovate-lanceolate), not tightly appressed, usually loosely appressed at the base and arcuate in the upper part or arcuate-patent, abaxially blackish green, unbordered or nearly so, ligules deep to golden yellow, with blackish apical teeth, achenes small (achene body less than 3.5 mm), usually slightly squamulose above, with a short, conical to subconical cone, usually 0.5–0.7 (–0.8) mm long.

7. *Taraxacum nigricans* (Kitaibel in Schultes) Reichenbach, Fl. Germ. Excurs. 270, 1832 (Fig. 9B, map).

≡ *Leontodon nigricans* Kit. in Schultes, Österr. Fl., ed. 2, 2: 405, 1814.

Type: [SLOVAKIA]. In alpe Kunstava et Gyumbér, [P. Kitaibel] (BP-KIT, no. XXVI/76, lectotype, designated by Štěpánek et al. 2011: 545).

Illustrations: Štěpánek et al. (2011: 547, fig. 2A; 548, fig. 3).

Petiole relatively short, those of the outer leaves broadly and inner leaves narrowly winged, pale green, Leaves usually 10–15 × 2.5–4.0 cm, glabrous or almost so, ± light green to deep mid-green, not spotted, slightly shiny, oblanceolate to subspathulate in outline,

regularly pinnatifid to pinnatisect, with terminal segment large, triangular to broadly triangular or helmet-shaped to elongated helmet-shaped, distal margin convex to sigmoid, entire or with a single conspicuous tooth, proximal margin ± straight, entire; lateral segments 2–3 on each side, broadly deltoid to broadly triangular, moderately recurved, distal margin usually sigmoid, entire or with one or several broad short teeth, interlobes entire, margins slightly raised, indistinctly bordered brown-purplish. Scapes sparsely arachnoid. Outer phyllaries relatively numerous (13–18), appressed at base, ± patent distally, usually (5–) 6–8 × 1.5–2.5 mm, dark olive green (black-green when dry), often with purplish apex, not pruinose, ± without any distinct paler border, relatively short. Outer ligules ± flat, relatively broad, striped purplish grey-green outside, inner ligules canaliculate, ligule teeth black to black-purple, sometimes dark red. Stigmas medium dark, yellow-green, dark pubescent on outer surface. Pollen present, of irregular size. Achenes pale brownish to greyish straw-brown, (3.7–) 4.0–5.0 mm × (0.9–) 1.0–1.3 mm, upper 1/3–1/4 of the achene body ± densely squamulose-spinulose (and marginal achenes tuberculate throughout), achene body gradually narrowing into a short, conical to subconical cone (0.5–) 0.6–0.8 (–0.9) mm long; beak (5.5–) 7.0–8.0 mm long; pappus ± white, 5.5–6.0 mm long. – Agamospermous tetraploid (2n = 32).

Diagnostic notes: The characters distinguishing *T. nigricans* from its closest neighbour, *T. alpestre*, were given in the identification key in Štěpánek et al. (2011: 544). The leaf colour (most often deeper mid-green), winged petioles, the convex shape of leaf terminal segment with ± entire margins, broader outer phyllaries, and, most importantly, the very different achene sculpturing (more densely spinulose with ± small spinules *versus* subsparse distinct squamules in *T. alpestre*) are diagnostic. As regards the leaf shape, *T. nigricans* is remotely similar to *T. rufocarpum*, an Alpine species characterized by brownish red achenes.

Distribution and habitat: Since 2011, there is no evidence that contradicts the conclusion that *T. nigricans* is endemic to the Nízke Tatry Mts in central Slovakia (see Fig. 9B). It occurs in alpine habitats, sparsely vegetated scree, stony slopes, open mozaic-like grasslands along paths and also in the vicinity of alpine chalets, usually at altitudes between 1,500 m and 1,900 m. The IUCN conservation status is estimated as EN.

8. *Taraxacum carpaticum* Štěpánek et Kirschner in Štěpánek et al., Preslia 83: 550, 2011 (Fig. 9B, map).

Type: Romania. K. Domin et V. Krajina: Iter romanicum 1931, no. 884, habitat in montibus Bucegi, in summo cacumine montis Omul, solo calcareo, 2,511 m, 9 Jul 1931, V. Krajina (PRC, no. det. 20998, holotype).

Illustrations: Štěpánek et al. (2011: 547, fig. 2C, 2D; 552, fig. 5).

Leaves light green to deep green, glabrous to very sparsely arachnoid, 5–12 cm long; subspathulate, narrowly lanceolate to linear elliptic in outline; terminal segment small to very conspicuous, broadly helmet-shaped to narrowly triangular, distal margins convex or straight, entire or with an incision; lateral segments 1–4 pairs, triangular to triangular-deltoid, sometimes recurved-hamate, always slightly to distinctly pointing downwards, usually entire or with a single tooth, proximal margins ± concave, entire or with a few small acute teeth; interlobes usually narrow, entire or with a few acute teeth, bordered brown-purple; mid-vein pale or pinkish brown or pinkish purple. Petioles narrow or

± narrowly winged, usually pale green. Scapes glabrous to medium densely arachnoid. Capitulum small to medium-sized (4 cm diam.), yellow, ± flat to concave. Involucre slightly to distinctly obconical at the base; outer phyllaries variable in number, shape and colour, usually 9–23, narrowly ovate, lanceolate to linear-lanceolate (with a correlation between number and shape – the more numerous, the narrower), the narrowest outermost 1–2 often remote on the scape, all usually loosely appressed, often arcuate-recurved in the distal part, 4–8 × 1–3 mm, flat, abaxial surface dark green to black-green (almost black when dry), ± evenly coloured, unbordered or with an indistinct very narrow paler border, not ciliate or sparsely so. Outer ligules ± flat, relatively long and probably narrow, striped ± pale grey abaxially, all ligules with black or dark grey teeth. Stigmas medium dark to very dark (almost black when dry). Pollen present, pollen size regular. Achenes pale brown, 3.6–4.3 × 1.1–1.3 mm, upper 1/3 of achene body relatively densely covered with minute spinules or small squamules (otherwise almost smooth), with subgradual transition into a short conical cone 0.2–0.6 mm long; rostrum 5–6 mm long, pappus white, ~6 mm long. – Sexual.

Diagnostic notes: The relatively narrowly obconical shape of the involucre base of *T. carpaticum* is a conspicuous feature (a similar shape is found in *T. pastorum* and in some sexual species in Europe). As diagnostic, we consider relatively thick achenes with ± dense, very short spinules and squamules. The leaf shape is too variable to serve as a discriminant feature but the frequent dominant, often elongated terminal segment and the generally narrow shape of leaves are to be pointed out.

Distribution and habitat: *Taraxacum carpaticum* occurs only in the southern part of the Romanian Carpathians; it was previously recorded in the mountain ranges of Bucegi and Piatra Craiului. Herbarium vouchers were cited by Štěpánek et al. (2011), and additional material is given below, which completes the Southern Carpathian distribution of *T. carpaticum* with localities in the Fagaras Mts (see Fig. 9B). *Taraxacum carpaticum* most frequently grows on wet or temporarily wet calcareous scree, moist rocky slopes, sometimes in alpine and subalpine calcareous grasslands with *Festuca carpatica* F. Dietr. (cf. Bělohlávková & Fišerová 1989, Biţă-Nicolae 2011), between altitudes of 1,600 m and 2,500 m. In the Piatra Craiului, *Taraxacum carpaticum* is a regular part of the association *Seslerio rigidae-Festucetum carpaticae* Bělohlávková & Fišerová. The IUCN conservation status is estimated as VU.

Specimens examined: ROMANIA. The Bucegi Mts, subalpine grasslands in the Malaiesti Valley [~45°28'N, 25°27'E], 1,800 m, 9 Jul 1912, sine coll. [“Schottlaender-Stiftung, Reise nach Siebenbürgen”] (WRSL, no. det. 28638). – Bucegi, between Mt Babele and the valley of Sugarilor, 2,000–2,100 m, 10 Sep 1984, A. Plocek (PRA, no. det. 35517). – Ibidem, cult. as JŠ 2768 (PRA, no. det. 35519). – Bucegi, Mt Bucşoiu [(2,493 m) 45°27'21"N, 25°27'46"E], 20 Aug 1911, A. Degen (BP 219547, no. det. 36209). – Bucegi, summit of Mt Omu [2,507 m, 45°26'43"N, 25°27'22"E, locus classicus], ~2,500 m, 31 Aug 1911, A. Degen (BP 700754, no. det. 36214). – The Făgăraş Mts, around the alpine lake of Lacul Bâlea, 45°36.2'N, 24°37.0'E, 6 Sep 1977, J. Měsíček (PRA, no. det. 35459). – The Făgăraş Mts, Mt Vînătorea [Vârful Vânătoarea lui Buteanu (2,507 m), 45°36'15”N, 24°37'52”E], 2,000 m, 8 Sep 1955, T. Pócs (BP 204962, no. det. 37006).

9. *Taraxacum rupicaprae* Štěpánek et Kirschner in Štěpánek et al., Preslia 83: 553, 2011 (Fig 18A, map).

Type: SLOVAKIA. Slovacia boreal., montes Vysoke Tatry, vallis Velicka dolina: locis scaturiginosis super lacu alpino Dlhé pleso, 1,950 m, 49°10'N, 20°09'E, 6 Aug 1992, J. Štěpánek (PRA, no. det. 19917, holotype).

Illustrations: Štěpánek et al. (2011: 547, fig. 2E; 554, fig. 6).

Plants often ± slender. Petiole narrow, unwinged, pale green or suffused pink-purple. Leaves bright light green, shiny, ± glabrous, narrowly oblanceolate to oblanceolate in outline, runcinate-pinnatisect, with long narrow interlobes; terminal segment conspicuously dominant, narrowly triangular to helmet-shaped, acute, distal margins convex, entire or ± coarsely dentate, proximal margins concave to sigmoid; lateral segments 1–2 pairs, triangular, pointing downwards, distal margin ± straight to sigmoid, entire or with 1–2 relatively large teeth, proximal margin ± concave or sigmoid, entire; interlobes long, narrow, entire or with ± remote, acuminate teeth; mid-vein pale green or pinkish. Scapes glabrous. Capitulum medium-sized, 3–4 cm wide. Involucre subobconical at the base, dark green, slightly pruinose; outer phyllaries 13–17, very short, reaching ~1/3 of inner ones, loosely appressed at the base, arcuate-patent in the upper part, sometimes ± recurved, lanceolate to narrowly lanceolate, 5–6 × 2 mm, abaxially black-green, black when dry, evenly coloured, sometimes with an indistinct, slightly paler narrow, dark membranous border, flat, almost not ciliate, adaxial surface paler, grey-green, sometimes suffused pink-purplish. Outer ligules sparse, ± flat, striped dark purplish grey-black outside, ligule teeth grey-black, grey or grey-purple. Stigmas dark, grey-green. Pollen present, pollen grains of irregular size. Achenes light (orange) rusty, (3.8–) 4.2–4.6 × 1.0–1.2 mm, upper 1/4–1/3 of achene body relatively densely squamulose, otherwise ± tuberculate, ± gradually (seemingly subabruptly because of a "collar" of the uppermost squamules) narrowing into a subconical or subcylindrical, relatively thick cone 0.5–0.7 mm long; beak ~8 mm long, pappus slightly yellowish dirty white, 5.0–5.5 mm long. – Agamosperm.

Diagnostic notes: There are two important diagnostic features of *T. rupicaprae* to be emphasized: the light rusty colour of achenes and the dense achene body squamulosity. The subconical, relatively short cone, the narrow, long leaf interlobes, the dominant terminal lobe, and the glabrous scape are additional characters distinguishing it from other members of the *T. nigricans* group.

Distribution: *Taraxacum rupicaprae* was reported to be a rare taxon confined to the central High Tatra Mts, and to the Belianske Tatry Mts, Slovakia, by Štěpánek et al. (2011). Since then, no new distribution data appeared to change this geographical picture. The IUCN conservation status is estimated as EN.

10. *Taraxacum elegantissimum* Štěpánek et Kirschner in Štěpánek et al., Preslia 83: 555, 2011 (Fig. 18B).

Type: ROMANIA. Distr. Bistriţa-Năsăud, Munţii Rodnei Mts, ~18.5 km SSW of Borşa town, slope S of saddle between peaks of Vf. Gropilor and Vf. Buhăescu Mare, 1,850 m, 47°34'18"N, 24°37'32"E, 3 Jul 2003, M. Suková & M. Tůmová, cult. as JŠ 7854 (PRA, no. det. 19926, holotype; isotypes: PRA, no. det. 19918, and also distributed as Taraxaca Exs., no. 789).

Exsiccates: Taraxaca Exs., no. 789–790, 897–898.

Illustrations: Štěpánek et al. (2011: 547, fig. 2F; 557, fig. 7).

Petiole not winged to ± winged (outer leaves), pinkish purple. Leaves subprostrate, ± light to deep mid-green, shiny, ± glabrous or very sparsely arachnoid; leaf not flat, with raised and dentate interlobe margins, ± oblanceolate, runcinate-pinnatisect, lateral segments numerous, interlobes short; terminal segment broadly helmet-shaped to semi-rounded, distal margins convex, usually entire, proximal margins ± straight, entire or with a single tooth; lateral segments in (3–) 4–5 (–6) pairs, triangular to ± narrowly triangular, recurved to hamate, distal margin convex, entire or ± dentate (with teeth up to 1–2 mm long), proximal margin concave to undulate, usually with a big tooth or lobule; interlobes short, ± entire or with a single big tooth, margins raised, bordered brown-purple; mid-vein pale green or pinkish purple proximally. Scapes arachnoid, distally brownish pink. Capitulum ~3.5 cm wide, deep golden yellow. Involucre slightly obconical at base, dark green, indistinctly pruinose. Outer phyllaries 13–18 (–20), loosely appressed or erect-patent distally, ± ovate to narrowly lanceolate, 6–9 mm long, the broadest ones 3.5–4 mm wide, abaxially dark olivaceous-green, ± pruinose, with an inconspicuous, very narrow paler membranous border up to 0.1 mm wide, not ciliate or sparsely so; inner phyllaries ± unevenly broad, sometimes coalescent. Outer ligules ± flat, striped deep purplish grey-green outside, inner ligules narrower, canaliculate, ligule teeth black to greyish. Stigmas yellow-green with blackish pubescence outside. Pollen present, pollen grains of irregular size. Achenes light straw-brown, 3.2–3.8 (–4.5) × 0.8–0.9 (–1.1) mm, upper 1/4–1/5 of achene body densely covered with minute squamules, sometimes coalescent to form suberect collar-like rims, otherwise ± smooth, subabruptly narrowing into a ± narrow, subcylindrical cone (0.4–) 0.5–0.6 (–0.8) mm long; beak (4.5–) 7–8 mm, pappus ± white to dirty white, 5.5–7.5 mm.– Agamospermous triploids (2n = 24, Štěpánek et al. 2011).

Diagnostic notes: The presence of almost unbordered, ovate outer phyllaries, the broadest ones up to 4 mm wide, is a unique feature in *T.* sect. *Rhodocarpa* in the Carpathians. In the Alps only few species share this diagnostic character (e.g., *T. polycercum* Sahlin). Leaves with numerous lateral segments and short interlobes, and the dense, minute squamulosity of achene body subabruptly narrowing in an almost cylindrical cone are also diagnostic. In its leaf shape, *T. elegantissimum* is similar to *T. pallidisquameum* van Soest from the eastern part of the Austrian Alps, a core member of *T.* sect. *Rhodocarpa*.

Distribution and habitat: As stated in Štěpánek et al. (2011), *T. elegantissimum* is a species widely distributed in the south-eastern and Southern Carpathians; currently, it is reported in the Rodna Mts, the Fagaras Mts and the Retezat Mts, all in Romania (localities are listed in Štěpánek et al. 2011). It grows in relatively humid pastures, alpine and subalpine grasslands, along streams and also at disturbed alpine sites, usually at altitudes between 1,600 m and 1,900 m. The IUCN conservation status is estimated as VU.

11. *Taraxacum pastorum* Štěpánek et Kirschner in Štěpánek et al., Preslia 83: 556, 2011 (Fig. 18A).

Type: ROMANIA. Southern Carpathians, the Fagaras Mts, slopes above Avrig Lake, towards Scura, Şerbola, Negoin, acid bedrock, ~2,100 m, 15 Jul 2002, P. Kusák, cult. as JK 4874 (PRA, no. det. 25018, holotype; isotypes: PRA, no. det. 25019).

Illustrations: Štěpánek et al. (2011: 558, fig. 8).

Plants medium-sized, up to 25 cm tall. Petiole winged to narrowly winged, purplish. Leaves greyish green, subglabrous, sometimes ± suffused purplish, oblanceolate in outline, usually 8–16 × 2–4.5 cm, pinnatisect; terminal segment triangular to narrowly triangular, acuminate, distal margin ± straight, entire or with an incision, basal lobules ± patent, acuminate, proximal margin ± straight, entire; lateral segments 4 (–6) pairs, subpatent to divaricate, narrowly triangular, from a broad base narrowing into a narrowly triangular, acuminate apex, distal margin sigmoid, usually with an incision or a tooth, proximal margin ± concave to straight, entire; interlobes usually entire, sometimes denticulate, frequently suffused brown-purplish; mid-vein pink-purple, at least abaxially. Scapes arachnoid, brownish-purplish. Capitulum golden yellow, flat, (3.5–) 4.0–4.5 cm wide. Involucre slightly pruinose, narrowly obconical and ~8 mm wide at base. Outer phyllaries 6–9 (–11), loosely appressed, subrecurved at apex, later to arcuate-patent, ovate to ovate-lanceolate, usually 7–8 × (2.5–) 3.5–4.5 mm, abaxially black-green, border indistinct, paler membranous, to 0.05 mm wide, margin distally sparsely ciliate, apex flat; inner phyllaries 13–14 mm long. Outer ligules flat, striped ± dark greyish purple outside, teeth black-purple, inner ligules canaliculate, inner ligule teeth black or dark grey. Stigmas deep discoloured, greyish yellow-green, with dark pubescence outside. Pollen present, pollen grains irregular in size. Achenes light cinnamon, 4.3–4.6 × 1–1.1 mm, body with subdense minute spinules and squamules in upper 1/5, otherwise ± smooth, ± gradually narrowing into a conical cone 0.5–0.6 mm long; beak 7–8 mm long, pappus ± white, ~7 mm long. – Agamosperm.

Diagnostic notes: The most conspicuous feature of *T. pastorum* is the cinnamon achene colour. The obconical involucre base, achene spinulosity limited to a narrow upper zone of the achene body, and the frequent elongated-acuminate distal part of leaf lateral segments are also important for the identification. The IUCN conservation status is estimated as EN.

Distribution: *Taraxacum pastorum* is restricted to the Fagaras Mts in the Southern Carpathians, Romania (Štěpánek et al. 2011). It is known from a single macrolocality.

12. *Taraxacum iucundum* Štěpánek et Kirschner in Štěpánek et al., Preslia 83: 559, 2011 (Fig. 9A).

Type: ROMANIA. Pars merid. montium Retezat, massivum Culmea Piule-Pleşa: in decl. ± orient. inter casam alpinam Buta et cacuminem montis Vf. Piule (2,080 m), ca 1,800 m, solo calc., 30 Aug 1984, R. Bělohlávková & D. Fišerová, cult. as no. JŠ 2771 (PRA, no. det. 25020, holotype; isotypes: PRA, no. det. 25021).

Illustrations: Štěpánek et al. (2011: 561, fig. 9).

Plants small to medium-sized, up to 25 cm tall. Petiole broadly winged in outer leaves, narrowly so in inner ones, pale greenish, often light purplish on mid-vein. Leaves light green to light greyish green, sparsely arachnoid, narrowly oblanceolate or spathulate in outline, usually 8–12 × 1.5–3.5 cm, pinnatisect; terminal segment usually broadly triangular, subhastate, distal margin ± convex or sigmoid, usually entire, sometimes with 1–2 incisions, basal lobules patent to subrecurved, acuminate from broad base, proximal margin entire; lateral segments 3–4 pairs, triangular to hamate, divaricate to recurved, with apex elongated, thin, acuminate, distal margin ± sigmoid, entire or with 1–2 incisions, proximal margin concave to straight, entire; interlobes variable, with brow-purple submarginal

spots, margin raised, entire or with a single long tooth; mid-vein brownish-purplish, at least in outer leaves. Scapes usually greenish, ± densely arachnoid, later glabrescent. Capitulum ± golden yellow, flat, ~4.5–5 cm wide. Involucre ~9 mm wide and ± truncate at base. Outer phyllaries 15–19, ± appressed at base, distally arcuate-recurved, lanceolate to ovate-lanceolate (the outermost often narrowly lanceolate), 8–9 × 2.5–3.5 mm, abaxially blackish green, almost invisibly paler bordered, sparsely ciliate; inner phyllaries ~14 mm long, often of unequal width. Outer ligules flat, striped grey-olivaceous outside, with teeth black, inner ligules with teeth grey or black. Stigmas medium discoloured, grey-green, with pubescence composed of hairs distally black. Pollen present, pollen grains irregular in size. Achenes light reddish brown, 4.8–5.1 × 1.1–1.3 mm, with dense, broad, sometimes coalescing squamules in upper 1/4–1/3, subabruptly narrowing into a subconical or subcylindrical cone 0.5–0.7 mm long; beak 8–9 mm long, pappus white, 7–8 mm long. – Agamosperm.

Diagnostic notes: *Taraxacum iucundum* is characterized by numerous outer phyllaries and initially densely arachnoid scapes. The achene colour, light reddish to light reddish brown, is diagnostic in this group. As regards its leaf shape, it resembles *T. nigritum* van Soest from the eastern Austrian Alps but the latter species has unwinged petioles, blackish styles and grey achenes.

Distribution and habitat: *Taraxacum iucundum* is only recorded from Retezat, Southern Carpathians, Romania (Fig. 9A). It is therefore a narrow endemic, as it is only known from a single macrolocality (Štěpánek et al. 2011) The most common alpine habitats include calcareous scree, shallow, temporarily humid soils on calcareous rocks, often along paths; it occurs at altitudes around 1,800 m. This species occurs in calcareous alpine grasslands, in communities of the association of *Saxifrago heucherifolii-Poetum montanae* Bělohlávková & Fišerová (1989: 21), belonging to the alliance *Festucion carpaticae*. The IUCN conservation status is estimated as EN.

13. *Taraxacum pseudoalpestre* Štěpánek et Kirschner in Štěpánek et al., Preslia 83: 560, 2011.

Type: Romania, the Southern Carpathians, NE part of the Fagaras Mts, slopes above Avrig Lake, towards Scura, Şerbola, Negoin, acid bedrock, ~2,100 m, 15 Jul 2002, P. Kusák, cultivated as JK 4874 (PRA, no. det. 25023, holotype; isotype: PRA, no. det. 25024, and duplicates).

Illustrations: Štěpánek et al. (2011: 562, fig. 10).

Plants small to medium-sized, usually 10–18 cm tall. Plant base without tunic. Petiole pale greenish or partly bordered purplish, winged to broadly winged in outer leaves, unwinged to narrowly winged in inner ones. Leaves numerous, erect-patent, vivid light green, not spotted, subglabrous, with a few scattered hairs along mid-vein, oblanceolate to narrowly oblanceolate in outline, usually 7–11 × 2–3 cm, runcinate-pinnatisect; terminal segment ± dominant, triangular, helmet-shaped or ovate-triangular, subacute, with a ± sagittate base, 1.5–4 × 2–3 cm, distal margin ± straight to convex, subundulate, entire, rarely with an asymmetrical incision, basal lobules patent to recurved, acuminate, proximal margin ± straight to concave, usually entire, or with a single basal tooth; lateral segments in 3–4 (5) pairs, narrowly triangular, ± patent to recurved, or bird-wing-like, acuminate, distal margin convex to sigmoid, entire or with a few minute teeth in proximal segments, proximal margin concave to ± straight, usually entire; interlobes long, usually

5–12 × 2–7 mm, inconspicuously blotched brown-purplish, margin usually raised, with teeth and lobules of varied length; mid-vein pale greenish. Scapes sparsely arachnoid, later glabrescent, pale green during anthesis, later distally getting purplish, ± equalling leaves. Capitulum yellow, ~4 cm wide. Involucre not pruinose, broadly obconical and ~7 mm wide at base. Outer phyllaries 15–22, loosely appressed at base, distally loosely appressed, erect or subarcuate, reaching 1/3–1/2 of the inner, lanceolate to linear-lanceolate, 6–7 × 2–3 mm, with an elongated, acuminate apical part, abaxial surface evenly blackish-green, distally often suffused purplish, paler border almost invisible, margin ± minutely ciliate, apex flat; inner phyllaries 13–14 mm long, light olivaceous, of ± equal width. Outer ligules narrow, subcanaliculate, striped light purplish-greyish, apical teeth black, inner ligules canaliculate, their apical teeth black. Stigmas very light, yellow or slightly greenish yellow, with usually hyaline pubescence outside. Pollen present, pollen grains variable in size. Achenes pale coloured, whitish stramineous-brown or pale stramineous with an ochraceous hue, 4.3–4.8 × 1.1–1.3 mm, body subdensely spinulose and squamulose only in the uppermost part, ± abruptly narrowing into a conical cone 0.5–0.6 mm long; beak 7–8 mm long, pappus white, 5–6 mm long. – Agamosperm.

Diagnostic notes and variation: *Taraxacum pseudoalpestre* is similar to *T. alpestre* in its leaf shape. The numerous, loosely appressed, narrow outer phyllaries, pale achenes with a body spinulose and squamulose only in its uppermost part, and the conical, short cone are diagnostic.

Distribution and habitat: *Taraxacum pseudoalpestre* represents the only mountain *Taraxacum* species with a geographical range that includes the Southern Carpathians and Bulgaria. The distribution and ecology in Romania are described in Štěpánek et al. (2011); it occurs in the Fagaras Mts. In Bulgaria, *T. pseudoalpestre* is reported in the western part of the Stara Planina Mts. It grows in humid subalpine grasslands below 2,000 m a.s.l., on granite bedrock. Voucher specimens from Bulgaria are cited in Štěpánek & Kirschner (2022a). The IUCN conservation status is estimated as VU.

The group of species similar to Taraxacum vidlense

This group is relatively weakly delimited and only includes a few similar core species (*T. vidlense* and *T. skalnatense*), which have numerous outer phyllaries relatively conspicuously bordered whitish. All taxa in this group are characterized by achenes with the body only sparsely spinulose/squamulose, and cone very short, conical to ± cylindrical.

14. *Taraxacum vidlense* Doll, Preslia 49: 126, 1977 (Figs 4, 5, 25A, 26A, 27–29).

Type: Slovakia. Am Weg vom Hlupy zum Zdiarska Vidla [the Belianske Tatry Mts, Mt Ždiarska Vidla, 49°14'41"N, 20°12'25"E], 5 Jul 1975, R. Doll (JE, no. det. 19217, holotype; isotype: JE, no. det. 19218).

Etymology: The epithet is derived from Mt Ždiarska Vidla (2,142 m, the Belianske Tatry, Slovakia).

Plants relatively small, 8–20 cm tall. Plant base without tunic, almost glabrous among petiole bases. Petiole broadly winged at the base, slightly narrowing towards leaf blade, pink-purple on mid-vein, light green to pinkish on the wings, sometimes wholly purplish. Leaves variously erect-patent, to 10 cm long, vivid green, glabrous, oblanceolate, oblong-oblanceolate or spathulate in outline, runcinate-pinnatipartite, less often pinnatisect; terminal segment relatively large, usually 1.5–5 × 1.5–3.5 cm, triangular to helmet-shaped,



Fig. 25. Achenes of *T.* sect. *Rhodocarpa* (= *T.* sect. *Alpestria*). (A) *T. vidlense* (PRA, no. det. 19111); (B) *T. obesum* (KRAM, no. det. 34478, one achene on the left; KRAM, no. det. 34471, three achenes on the right); (C), (D) *T. skalnatense* (PRA, no. det. 19567, 19570, respectively).

sometimes oblong-rhombic, acute to ± obtuse (seldom ± rounded), distal margin convex to straight, often with distinct acute teeth or lobules in lower 1/3, basal lobules usually subrecurved, less often patent; lateral segments in 2–3 (4) pairs, the largest ones 1–1.5 cm long, 0.8–1.3 cm wide at base, usually clearly getting smaller towards leaf base, narrowly triangular, usually ± recurved, often curved downwards, less often ± straight, subacute (to almost subobtuse), distal margin convex to subsigmoid, entire or with a single short and broad tooth, proximal margin concave to subsigmoid, ± entire; interlobes relatively broad (4–10 mm), the broadest one is most distal, margins raised, with one or several broad subobtuse teeth or small lobules; mid-vein pink-purple, at least in the proximal half (coloration more distinct adaxially). Scapes light green, juvenile ones sparsely arachnoid, later ± glabrous, overtopping leaves. Capitulum ± large, ~4.5 cm wide, ± flat or slightly convex, deep golden yellow. Involucre olivaceous-green, ~9 mm wide and truncate at base. Outer phyllaries numerous, up to 26–28 (less numerous, ~15, shorter and broader in cultivated plants), erect-patent to patent, imbricate, narrowly lanceolate to lanceolate, ~7 × 3 mm, abaxial surface evenly dark olivaceous-green, darker near apex (wholly black-green when dry), border distinct, sharply delimited, white or distally brownish-purplish, 0.1–0.15 mm wide, margin ± densely and ± long ciliate, basal phyllaries often with one tooth or 2–3 remote teeth, sometimes the lowermost phyllaries inserted remotely on the scape; inner phyllaries 12–14 mm long, of unequal width. Outer ligules ± sparse, ± flat, variously long, striped greyish-purplish outside, inner ligules shorter, narrower, canaliculate,

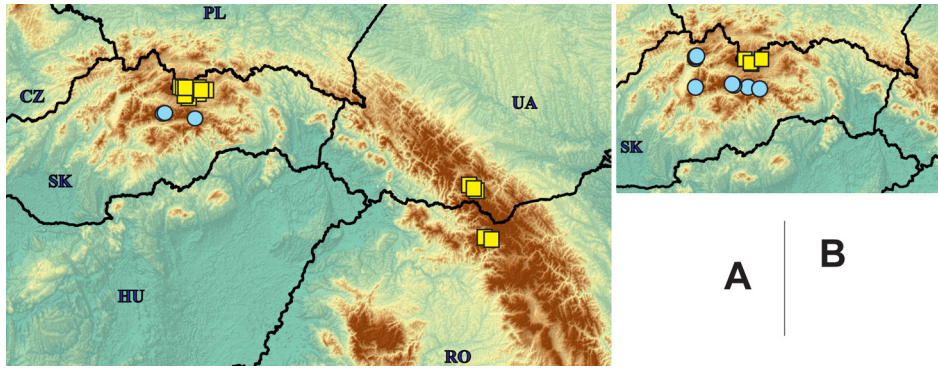


Fig. 26. Distribution of selected Carpathian species. (A) yellow squares – *T. vidlense*, blue circles – *T. jugicola*; (B) yellow squares – *T. tantulum*, blue circles – *T. innuptum*.

all ligule teeth black or black-purple. Stigmas medium discoloured, greyish yellow-green, pubescence hairs with black apex. Pollen present, pollen grains irregular in size. Achenes very light sandy-coloured to very light ochraceous-stramineous, sometimes more brownish, (3.8–) 4.2–4.7 × (1.1–) 1.2–1.4 mm, body ± sparsely squamulose (not spinulose) in upper 1/4–1/5, squamules sometimes coalescing to form horizontal rims (sometimes the rim encircles the whole achene body), the number of rims reaches 4–5, the uppermost squamules erect or erect-patent, body otherwise ± smooth (even in the outer achenes), body gradually narrowing into a short to very short broadly conical cone; the distal part of the cone whitish and difficult to discern from the beak (binocular lens with the magnification 100×), whole cone (0.5–) 0.6–0.8 mm long [the coloured part (0.2–) 0.3–0.6 (–0.7) mm long]; beak 4–7 mm long, slightly thickened (0.2–0.3 mm); pappus 5.5–7 (–8) mm, slightly dirty white. Sometimes there is a certain proportion of sterile achenes. – Agamosperm.

Note: As a rule, cultivated plants are smaller, with shorter and less numerous outer phyllaries; the features of achenes and leaves remain stable.

Diagnostic notes: *Taraxacum vidlense* is a distinct species with very narrow outer phyllaries conspicuously bordered whitish (the similar *T. skalnatense* has the outer phyllary border substantially broader), achene body with sparse, minute, coalescing squamules forming horizontal rims, achenes of conspicuously light (yellowish) ochraceous-stramineous colour, leaves with a purple mid-vein and leaf segment margins entire or with sparse indentation. Another exceptional feature includes numerous outer phyllaries (over 20, up to 28). All these characters are diagnostic when the closest species, *T. skalnatense*, is considered. Another similar species, *T. pseudoursinum*, differs from *T. vidlense* in having densely squamulose, light beige-coloured achenes.

Distribution and habitat: *Taraxacum vidlense* occurs relatively commonly and widespread in the Western Carpathians and reaches the Ukrainian and Romanian Eastern Carpathians (the Čornogora Mts, the Rodna Mts), see Fig. 26A (map). It is reported in Poland, Slovakia, Ukraine and Romania. Its most frequent habitats include alpine and subalpine grasslands, humid scree, margins of paths and also tall-herb communities along streams. The IUCN conservation status is estimated as VU.



Fig. 27. *Taraxacum vidlense*. General habit (PRA, no. det. 19116).

Specimens examined: SLOVAKIA. The Vysoké Tatry, Litvorová kotlina, the lake of Litvorové pleso, 49°10'30"N, 20°08'E, 1,863–1,890 m, Aug 1997, J. Štěpánek, cult. as JŠ 6437 (PRA, no. det. 19127). – The Vysoké Tatry, Štrbské Pleso, valley of Mlynická dolina, above the waterfall called Skok, ~1,760 m, 49°09'20"N, 20°02'40"E, Aug 1997, J. Štěpánek, cult. as JŠ 6453 (PRA, no. det. 19126). – Ibidem, cult. as JŠ 6459 (PRA, no. det. 19125). – Ibidem, cult. as JŠ 6461 (PRA, no. det. 19111). – Vysoké Tatry, Štrbské Pleso, Mlynická dolina, lakes of Nižné Kozie plieska, ~2,050 m, 49°09'30"N, 20°02'40"E, Aug 1997, J. Štěpánek, cult. as JŠ 6410 (PRA, no. det. 19124). – Slovacia borealis, montes Vysoké Tatry, Tatranská Lomnica, Mt Jahňačí štít (2,229 m), near the lake of Červené pleso above the chalet of Brnčálova chata, 1,800–1,900 m, 49°12'45"N, 20°13'E, 10 Aug 1998, J. Štěpánek (PRA, no. det. 19118). – Vysoké Tatry, Mlynická dolina, lakes of Plesa nad Skokom, ~1,800 m, 13 Aug 1981, L. Kirschnerová & J. Kirschner, cult. as JŠ 354 (PRA, no. det. 19117). – Vysoké Tatry, Štrbské Pleso, Mlynická dolina, near the waterfall of Skok, ~1,900 m, 49°09'20"N, ~20°03'E, Aug1997, J. Štěpánek, cult. as JŠ 6416 (PRA, no. det. 19116). – Ibidem, cult. as JŠ 6414 (PRA, no. det. 19109). – Vysoké Tatry, Tatranská Polianka, Velická dolina, above the lake of Velické pleso, ~1,750 m, 49°09'40"N, 20°09'30"E, Aug 1997, J. Štěpánek, cult. as JŠ 6426 (PRA, no. det. 19115). – Ibidem, 49°09'40"N, 20°09'30"E, cult. as JŠ 6401 (PRA, no. det. 19112). – Vysoké Tatry, valley of Velká Studená dolina, below Mt Bradavica (2,476 m), above the alpine chalet of Zbojnícka chata, ~2,050 m, 49°10'30"N, 20°09'30"E, Aug 1997, J. Štěpánek, cult. as JŠ 6326 (PRA, no. det. 19110). – Vysoké Tatry, near the catarcts in the valley of Veľká Studená dolina, ~2,000 m, 27 Aug 1928, J. B. Kümmerle (S, no. det. 23477; BP 186470, no. det. 37004). – Vysoké Tatry, upper part of the valley of Malá Studená dolina, 16 Aug 2001, B. Trávníček, cult. as JŠ 7760 (PRA, no. det. 34655). – Ibidem, cult. as JŠ 7762 (PRA, no. det. 34653). – Vysoké Tatry, valley of Veľká Studená dolina, between Zbojnícka chata and the saddle of Prielom, 12 Sep 1955, J. Holub (PRA, no. det. 36796). – Vysoké Tatry, Mlynická dolina, lakes of Plesa nad Skokom, 1,820 m., 9 Aug 1913, F. Pax (BP, no. det. 37000). – Vysoké Tatry, valley of Mengusovská dolina, 26 Jul 1928, G. Lengyel (BP, no. det. 36993). – Vysoké Tatry, valley of Malá Studená dolina, ~1,800 m, 16 Jul 1931, *G. Lengyel* (BP, no. det. 36985). – Vysoké Tatry, Velická dolina, Kvetnica, ~1,800 m, 23 Jul 1907, Perlaky (BP, no. det. 36981). – Vysoké Tatry, valley of Mengusovská dolina, Veľké Hincovo pleso, 26 Jul 1928, G. Lengyel (BP, no. det. 36979). – Vysoké Tatry, Kriváň, ~1,900 m, 19 Aug 1877, F. Bohatsch (BP, no. det. 36990). – Vysoké Tatry, Štrbské Pleso, valley of



Fig. 28. *Taraxacum vidlense*. General habit (PRA, no. det. 19126).



Fig. 29. *Taraxacum vidlense*. General habit (PRA, no. det. 19108).

Furkotská dolina, 26 Jul 1912, Filarszky (BP, no. det. 36492). – Vysoké Tatry, Velická dolina, Kvetnica, 1,825 m, Aug 1916, Hulják (BP, no. det. 36485). – Vysoké Tatry, valley of Bielovodská dolina ["Tatra, Poduplaskital"], 3 Jul 1918, K. Ronniger (W, no. det. 21132). – The Západné Tatry, Červené vrchy, slopes SE. of the summit of Mt Temniak (2,090 m), ~2,020 m, 29 Jul 1991, B. Trávníček (OL, no. det. 19119). – The Belianske Tatry Mts, a path from Mt Hlúpy to Mt Ždiarska Vidla, 5 Jul 1975, R. Doll (JE, no. det. 19217, 19218). – Belianske Tatry, Mt Predné Jatky, Sep 1989, J. Kirschner, cult. as JK 325 (PRA, no. det. 19122). – Ibidem, cult. as JK 331 (PRA, no. det. 19106). – Belianske Tatry: a path near the summit of Mt Bujačí, Sep 1989, J. Kirschner, cult. as JK 281 (PRA, no. det. 19121). – Ibidem, cult. as JK 294 (PRA, no. det. 19104). – Ibidem, cult. as JK 292 (PRA, no. det. 19103). – Ibidem, cult. as JK 285 (PRA, no. det. 34436). – Belianske Tatry, along path on slopes of Mt Zadné Jatky, Sep 1989, J. Kirschner, cult. as JK 343 (PRA, no. det. 19108). – Ibidem, cult. as JK 336 (PRA, no. det. 19107). – Ibidem, cult. as JK 346 (PRA, no. det. 19105). – Ibidem, cult. as JK 353 (PRA, no. det. 34702).

POLAND. Tatry Wysokie, valley of Dolina Pięciu Stawów Polskich, 23 Jul 1917, J. Schneider (W, no. det. 21131). – Ibidem, Wielki staw, 5 Jul 2009, V. Samková (HR, no. det. 22904). – [without locality data, only a code of a phytosociological relevé] 39/46, S. & B. Pawłowski (KRAM 337271, no. det. 34522). – Tatry Wysokie, the lake of Czarny Staw Gąsienicowy, 1,600 m, 15 Jun 1952, A. Jasiewicz (KRAM 439048, no. det. 34570). – Tatry Wysokie, valley of Dolina Gąsienicowa, ~100–200 m E. of Czerwone Stawki, 16 Aug 1978, H. Trzcińska-Tacik (KRAM 392575, no. det. 34474). – Ibidem, 16 Aug 1978, H. Trzcińska-Tacik (KRAM 392577, no. det. 34472). – Tatry Wysokie, Rysy, 2,490 m, 20 Aug 1931, B. Pawłowski (KRAM 337272, no. det. 34375).

UKRAINE. The Eastern Carpathians, Černovcy, the Čornogora Mts, between Čornogora and Stohorec, 6 Jul 1913, S. Jávorka (BP 186477, no. det. 37002). – Černovcy, the Čornogora Mts, valley of Breskulec Brook, below Mt Požiževskaja, ~1,800 m, Jun 1990, L. Hrouda, cult. as JŠ 4994 (PRA, no. det. 34634).

ROMANIA. The Rodna Mts [Munţii Rodnei], 26 Jul 1860, Haynald (BP 186324, no. det. 36986). – Rodna, Vârful [Mt] Pietrosul Rodnei, 6 Jul 1907, Filarszky & Jávorka (BP 186326, BP 186327, no. det. 36980). – Rodna, Mt Cisia, 2,000 m, 27 Jul 1903, A. Ade (BP, no. det. 36488).

Less certain determination: SLOVAKIA. Belianske Tatry, valley of Monkova dolina, ~1,700 m., 21 Jun 2001 [B. Trávníček] (OL, no. det. 19123). – The Západné Tatry, the Červené vrchy Mts, near the summit of Mt Kresanica (2,122 m), ~2,100 m, 29 Jul 1991, B. Trávníček (OL, no. det. 19120). – Vysoké Tatry, Tatranská Polianka, valley of Velická dolina, above the lake of Velické pleso, 1,700–1,750 m, 49°09'30"N, 20°09'30"E, Aug 1997, J. Štěpánek, cult. as JŠ 6402 (PRA, no. det. 19113). – Vysoké Tatry, Velická dolina, Kvetnica, 27 Jul 1912, E. Korb (W, no. det. 21138). – Vysoké Tatry, Mlynica, Mt Satan, Aug 1925, F. Weber (BRA, no. det. 27825). – Belianske Tatry, Mt Predné Jatky, Sep 1989, J. Kirschner, cult. as JK 330 (PRA, no. det. 34429). – POLAND. Tatry Wysokia, valley of Pańszczyca, ~1,500 m, 25 Aug 1960, H. Piękoś (KRAM, no. det. 34508). – UKRAINE. [Ivano-Frankivsk Region, the Pip Ivan group], above Mt Dzembronja, 20 Jun 1881, H. Zapałowicz (KRAM 170020, no. det. 34544).

15. *Taraxacum skalnatense* Doll, Preslia 49: 126, 1977 (Figs 3, 25C, D, 30, 31).

Type: Slovakia. [the Vysoké Tatry Mts] Skalnaté Pleso, am See, 2 Jul 1975, R. Doll (JE, no. det. 19099, **lectotype, designated here**; isolectotype: JE, no. det. 19100).

Note: While *T. skalnatense* generally is a polliniferous species, the type plants are very sparsely polliniferous, almost without pollen. This feature is a rare and aberrant condition.

Etymology: The name is derived from the name of an alpine lake, Skalnaté pleso in the High Tatra Mts.

= *Taraxacum kezmarkense* Doll, Preslia 49: 125, 1977.

Type: Slovakia. [the Vysoké Tatry Mts] Kezmarská Chata, Wegrand, 4 Jul 1975, R. Doll (JE, no. det. 19095, plant A, **lectotype, designated here**; isolectotype: JE, no. det. 19096).

Note: The original material of this name was analysed in the introductory part of the present study. As the upper right plant on the type herbarium sheet is not conspecific with the other plants, a lectotype was selected from the remaining plants. The upper left plant (marked as A in JE) was selected.



Fig. 30. *Taraxacum skalnatense*. General habit (PRA, no. det. 19553).



Fig. 31. *Taraxacum skalnatense*. General habit (PRA, no. det. 19555).

= *Taraxacum tatrense* Doll, Preslia 49: 121, 1977.

Type: Slovakia. [the Belianske Tatry Mts, Mt Hlúpy, 2,061 m] "Hohe Tatra [sic!], am Fuß des Hlupy, S-Seite am Weg", 5 Jul 1975, R. Doll (JE, no. det. 19089, plants A, **lectotype, designated here**).

Note: The original material of this name is heterogeneous, and the protologue description combines characters of *T. skalnatense* (leaves and flowers) and *T. pawlowskii* (achenes). The material, as stated in the introductory part of the present paper, is of low quality. The flowering specimen (two plants marked A) was selected as the lectotype.

Plants medium-sized, often quite tall at the locality (usually 15–20 cm), often smaller in cultivation, 8–11 (–15) cm tall. Plant base without tunic, subglabrous among petiole bases. Petiole usually medium broadly winged, sometimes ± dilated, with an almost stem-clasping base, mostly pale greenish but often also purplish. Leaves variously erect-patent, light bright green, not spotted, ± glabrous, often with sparse, remote hairs on mid-vein, leaves (including petiole) oblanceolate to linear-oblanceolate in outline, usually 10–13 (–20) × 2–3 (–4) cm, pinnatisect to pinnatipartite, or runcinate pinnatisect, with gradually narrower interlobes towards leaf base (in cultivation leaves sometimes only 5–6 × 1 cm, with 4–7 pairs of lateral segments); terminal segment relatively large, triangular to helmet-shaped, sometimes oblong-pentagonal, usually 1–2.5 × 1.5–3 cm, subacute to acute, distal margin convex to straight, entire or one or several triangular teeth, proximal margin ± straight to subconcave, sometimes with distinct incisions and a pair of separate lobules, basal lobules ± recurved; lateral segments in 3–5 pairs, deltoid-triangular, usually 6–12 mm long, 5–10 mm wide at base, sometimes arcuate-recurved, subacute to acute, distal margin sigmoid, entire or with very sparse conspicuous teeth, proximal margin straight to subconcave, entire; interlobes relatively broad in the distal part of leaves, gradually narrower in the proximal one, bordered brown-purple, margin narrowly raised, entire or with a single tooth; mid-vein pale greenish, often getting pinkish-brownish on both sides. Scapes almost glabrous to very sparsely arachnoid, pale greenish or slightly suffused pinkish at base, overtopping leaves. Capitulum relatively large, 4–5 cm wide, ± flat to subconvex, golden yellow, outer ligules long, relatively sparse. Involucre slightly glaucous-green, slightly pruinose, dark olivaceous-green when dry, 6–7 mm wide and ± truncate at base. Outer phyllaries usually numerous, (15) 17–22, loosely appressed to erect patent, or frequently ± appressed at base and distally arcuate-recurved, subimbricate, reaching 2/5–1/2 of the inner ones, broader of them ovate-lanceolate to ovate, usually 6–10 × 2.5–4 mm, with a distinct coloration, abaxial surface ± dark olivaceous-green, slightly pruinose, border conspicuous, white, (0.1–) 0.2–0.3 mm wide, often sharply delimited (when dark surface evenly deep coloured), sometimes with a more gradual transition (when middle part of the phyllary gradually paler towards margins), distal part of phyllary often suffused purplish, margin ciliate, with a tendency to develop minute teeth (sometimes the lowermost phyllary very narrow and denticulate; inner phyllaries ~12 mm long, of ± invariable width. Outer ligules long, sparse, flat, relatively narrow, striped greyish brown-purple outside (greenish hue missing), inner ligules shorter, subcanaliculate, all ligule teeth black or black-purple. Stigmas long, medium discoloured, greyish yellow-green with a dark pubescence. Pollen present, pollen grains irregular in size, rarely ± absent. Achenes relatively long and ± narrow, very light brown to stramineous-brown with a beige hue (greyish or olivaceous tinge missing), (4.6–) 4.8–5.9 × 1.0–1.2 (–1.3) mm, body relatively smooth, with short subsparse minute

spinules and squamules in upper 1/6, with a totally gradual transition into a subconical cone (0.4–) 0.5–0.7 (–0.8) mm long; beak 6–8 (–9.5) mm, pappus yellowish dirty white, 6–7.5 mm long. – Agamosperm.

Note: On the basis of the analysis of publications (Štěpánek & Kirschner 2022a), the chromosome counts published by Doll (1977) were not considered as it is not possible to tell which count is a result of a karyological examination and which is derived from indirect indicators.

Diagnostic notes: *Taraxacum skalnatense* is characterized by a combination of distinct, relatively broad (up to 0.3 mm) white border of outer phyllaries, light bright green leaf colour, and the long, sparsely minutely spinulose achenes with a relatively short subconical cone. The similar *T. vidlense* has a narrower border to outer phyllaries and very different achenes.

Distribution and habitat: *Taraxacum skalnatense* is restricted to the Western Carpathians where it occurs in the whole Tatra Mts in both Slovakia and Poland. The most common habitats include humid patches in subalpine and alpine meadows, along paths and tourist tracks, also on stony slopes, usually between 1,700–2,100 m. There is a phytosociological record of the occurrence on grassland slopes belonging to the alliance *Seslerion tatrae*. The IUCN conservation status is estimated as VU.

Specimens examined: SLOVAKIA. The Západné Tatry, Červené vrchy, grassland slope (*Seslerion tatrae*) SE. of the summit of Mt Temniak (2,090 m), ~1,900 m, 17 Aug 1987, V. Grulich, cult. as JŠ 3188 (PRA, no. det. 19563). – Belianske Tatry, a path on the S. side of Mt Hlúpy, 5 Jul 1975, R. Doll (JE, no. det. 19089, 19092). – Belianske Tatry, from Mt Hlúpy to Mt Ždiarska Vidla, ~1,800 m, 5 Jul 1975, R. Doll (JE, no. det. 19091). – Belianske Tatry, Mt Ždiarska Vidla, 1,970 m, 31 Jul 1990, A. Petrík 1282 (herb. A. Petrík, no. det. 19931). – Belianske Tatry, from the saddle of Široké sedlo (1,830 m) to Mt Hlúpy (2,061 m), 21 Jun 2001, [B. Trávníček] (OL, no. det. 19564). – Belianske Tatry, a summit path on Mt Bujačí, Sep 1989, J. Kirschner, cult. as JK 287 (PRA, no. det. 19570). – Belianske Tatry, a ridge above the saddle of Kopské sedlo, Sep 1989, J. Kirschner, cult. as JK 310 (PRA, no. det. 19569). – Ibidem, cult. as JK 314 (PRA, no. det. 19568). – Vysoké Tatry, Veľká Studená dolina, above the chalet of Zbojnícka chata, ~1,950 m, 49°10'40"N, 20°10'E, Aug 1997, J. Štěpánek, cult. as JŠ 7420 (PRA, no. det. 19567). – Ibidem, cult. as JŠ 6398 (PRA, no. det. 19554). – Vysoké Tatry, below the rocks of Bystré sedlo, ~1,900 m, 13 Aug 1981, L. Kirschnerová & J. Kirschner, cult. as JŠ 353 (PRA, no. det. 19566). – Vysoké Tatry, Štrbské Pleso, Mlynická dolina, the lowest of the lakes of Nižné Kozie plieska, ~2,050 m, 49°09'30"N, 20°02'40"E, Aug 1997, J. Štěpánek, cult. as JŠ 6329 (PRA, no. det. 19565). – Vysoké Tatry, below the rocks of Bystré sedlo, near Nižné Kozie plieska, ~2,000 m, 13 Aug 1981, L. Kirschnerová & J. Kirschner, cult. as JŠ 356 (PRA, no. det. 19562). – Vysoké Tatry, Štrbské Pleso, Furkotská dolina, along Furkotský potok, ~1,800 m, 49°08'30"N, 20°02'E, Aug 1997, J. Štěpánek, cult. as JŠ 6406 (PRA, no. det. 19561). – Ibidem, cult as JŠ 6404 (PRA, no. det. 19555). – Vysoké Tatry, Litvorová kotlina, above the shore of lake Litvorové pleso, 1,863–1,890 m, 49°10'30"N, 20°08'E, Aug 1997, J. Štěpánek, cult. as JŠ 6441 (PRA, no. det. 19559). – Vysoké Tatry, Štrbské Pleso, Mlynická dolina, lake of Pleso nad Skokom, above the Skok waterfall, ~1,760 m, 49°09'20"N, 20°02'40"E, Aug 1997, J. Štěpánek, cult. as JŠ 6462 (PRA, no. det. 19560). – Ibidem, cult. as JŠ 6457 (PRA, no. det. 19558). – Ibidem, cult. as JŠ 6450 (PRA, no. det. 19557). – Ibidem, cult. as JŠ 6451 (PRA, no. det. 19556). – Vysoké Tatry, Tatranská Polianka, Velická dolina, above Velické pleso, ~1,700–1,750 m, 49°09'30"N, 20°09'30"E, Aug 1997, J. Štěpánek, cult. as JŠ 6403 (PRA, no. det. 19553). – Vysoké Tatry, Štrbské Pleso, Mlynická dolina, above the Skok waterfall, 1,800 m, 17 Aug 1948, J. Šourek 6028 (PR, no. det. 20124). – Vysoké Tatry, Mengusovská dolina, near the lake of Popradské pleso, ~1,500 m, 14 Jun 1979, J. Chrtek & B. Deylová (PR, no. det. 20128). – Vysoké Tatry, Štrbské Pleso, Mlynická dolina, Nižné Kozie pliesko, 16 Aug 1931, V. Krajina (PR, no. det. 20129). – Vysoké Tatry, Malá Studená dolina, lakes of Päť Spišských plies, ~2,025 m, 19 Jul 1928, V. Krajina (PR, no. det. 20131). – Vysoké Tatry, Velická dolina, Kvetnica, 1,850 m, 18 Jul 1928, V. Krajina (PR, no. det. 19545). – Ibidem, 13 Jul 1925, V. Krajina (PRC 400775, no. det. 19906). – Vysoké Tatry, lower slopes of Lomnický štít, above the lake of Skalnaté pleso, ~2,000 m, 13 Jul 1947, J. Dostál (PRC, no. det. 19881). – Vysoké Tatry, Štrbské Pleso, Mlynická dolina, 20 Jul 1937, J. Veselý (PRC, no. det. 19890). – Vysoké Tatry, Furkotská dolina, ~2,100 m., 8 Aug 1971, J. Dvořák (BRA, no. det. 20001). – Vysoké Tatry, Skalnaté pleso, Jul 1975, R. Doll (JE, no. det. 19099, 19100). – Vysoké

Tatry, valley of Dolina Bielich plies, Kežmarská chata, 4 Jul 1975, R. Doll (JE, no. det. 19096, 19095). – Vysoké Tatry, Malá Studená dolina, lakes of Päť Spišských plies, 2,100 m, 17 Aug 1910, F. Pax (BP, no. det. 36999). – Vysoké Tatry, Veľká Studená dolina, Strelecká veža, 20 Aug 1935, G. Lengyel (BP, no. det. 36989).

POLAND. Tatry Zachodnie, Czerwone Wierchy, Mt Krzesanica, 1,850 m, 20 Aug 1987, A. Petrík 1224 (herb. A. Petrík, no. det. 19874). – Tatry Wysokie, Walenthowa, 23 Jul 1925, B. Pawłowski (KRAM 337264, no. det. 34382). – Tatry Wysokie, N. slopes of Mt Świnica, between Czerwone Stawki and the pass, 16 Aug 1978, H. Trzcińska-Tacik (KRAM, no. det. 34470). – Tatry Zachodnie, Upłazkowa Turnia, 14 Jul 1987, A. Łobarzewska (KRAM, no. det. 34387).

Less certain determinations: SLOVAKIA. Vysoké Tatry, Velická dolina, Kvetnica, 1,850 m, 18 Jul 1928, V. Krajina (PRC, no. det. 19902). – Ibidem, 13 Jul 1925, V. Krajina (PRC, no. det. 19905). – Belianske Tatry, Mt Havran, 20 Jul 1929, K. Domin (PRC, no. det. 19895). – Vysoké Tatry, Zelené pleso, 15 Jul 1912, G. Lengyel (BP, no. det. 36973). – Vysoké Tatry, Batizovská dolina, 27 Jul 1933, G. Lengyel (BP, no. det. 36987). – Vysoké Tatry, Velická dolina, Kvetnica, 21 Jul 1901, Brancsik (BRA, no. det. 20004). – Vysoké Tatry, sine dato, sine coll. (BRA, no. det. 19998). – POLAND. The West Tatra Mts, Czerwone Wierchy, Ciemniak, 1,950 m, 20 Aug 1987, A. Petrík 1215 (herb. A. Petrík, no. det. 19875). – Ibidem, 27 Jul 1953, A. Jasiewicz (KRAM 439053, no. det. 34407). – The West Tatra Mts, Czerwone Wierchy, between Mt Krzesanica and Mt Ciemniak, 27 Jul 1953, T. Tacik (KRAM 387824, no. det. 34426). – Tatry Wysokie, valley of Dolina Pięciu Stawów Polskich, above Morskie Oko, 13 Aug 1953, A. Jasiewicz (KRAM 437879, no. det. 34493). – Tatry Wysokie, N. slopes of Mt Świnica, between Czerwone Stawki and the pass, 16 Aug 1978, H. Trzcińska-Tacik (KRAM, no. det. 34506).

16. ***Taraxacum obesum*** Štěpánek et Kirschner, **sp. nov.** (Figs 9B, 25B, 32).

Type: [UKRAINE, the Čornogora Mts, Mt Požiževska (1,822 m, 48°8'39"N, 24°31'23"E)]. Czarnohora, Pożyżewska, ~1,700–1,800 m, na lewo od Breskuła, Aug 1923, T. Wilczyński (KRAM 256407, no. det. 34471, holotype; isotypes: KRAM 256408, no. det. 34475; KRAM 256409, no. det. 34473).

Etymology: Fat.

Diagnosis: Plantae subrobustae insignes foliorum lobis terminalibus magnis, segmentis lateralibus apice subobtusis, petiolis tenuissimis, antheris polline carentibus, acheniis robustis, superne dense breviter spinulosis, stigmatibus obscuris, phyllariis involucralibus exterioribus atroviridibus, peranguste marginatis.

Plants medium-sized to subrobust, usually 15–30 cm tall. Plant base without tunic, subglabrous among petiole bases; petiole narrow, unwinged, ± pale greenish, ~2.5–12 cm long. Leaf rosette relatively rich; leaves variously erect, erect-patent or subpatent, green, subglabrous, spathulate in outline, usually 10–20 × 2–4 (–5) cm, distinctly runcinate-pinnatisect or pinnatisect, the outermost leaves sometimes pinnatilobed or remotely lobulate-dentate; terminal segment usually helmet-shaped, seldom rhombic or pentagonal, usually 2–6 × 2–5 cm, obtusely acute, with distal margin convex, often with 1–2 large, up to 5 mm long obtuse teeth, rarely with sparse acute teeth to 1 mm long, basal lobules broad, obtusely acute, subrecurved to arcuate-recurved, proximal margin convex to sigmoid, ± entire; lateral segments in 3–4 pairs, ± medium broadly deltoid-triangular, usually 1–2 cm long, 0.6–2 cm wide at base, with subobtuse apex pointing perpendicularly, distal margin ± sigmoid, less often almost straight, entire, sometimes with 1–2 broad short teeth, rarely with sparse minute acute teeth, proximal margin straight, undulate or convex, entire; interlobes variably broad, most often 5–10 × 3–5 mm, distally sometimes up to 2 cm wide, margin often raised, usually ± entire; mid-vein probably pinkish. Scapes ± overtopping leaves, almost glabrous. Capitulum relatively small, 2.5–3 cm wide, yellow. Involucre ± rounded and ~7 mm wide at base. Outer phyllaries 15–18, initially probably loosely appressed, later erect-arcuate to arcuate-recurved, probably



Fig. 32. *Taraxacum obesum* (KRAM, no. det. 34475).

indistinctly imbricate, the longest ones reaching 1/2 of the inner phyllaries, lanceolate to ovate-lanceolate (the outermost phyllaries sometimes narrowly lanceolate), usually 4.5–6 × 2–3 mm, abaxial surface blackish green (± black when dry), border very narrow, paler, less than 0.1 mm wide, margin glabrous, apex flat; inner phyllaries ~12 mm long, of ± invariable width. Outer ligules narrow, ± canaliculate, striped dark outside, ligule teeth dark, inner ligules canaliculate, shorter, teeth greyish. Stigmas long, medium dark discoloured, grey-green, with black pubescence outside. Pollen absent. Achenes large, dark stramineous (± light brownish with a rusty hue), 4.8–5.7 × 1.1–1.4 mm, body ± densely covered with short spinules and some squamules in upper 1/5, spinules short, up to 0.2 mm long, often broad and ± obtuse, body otherwise tuberculate to smooth, gradually narrowing into a basally conical, distally cylindrical cone 1.0–1.2 mm long, cone sometimes with solitary little spinules or tubercles, distal part of cone often not coloured, whitish; beak 7–9 mm long, pappus whitish, 6–6.5 mm long. – Agamosperm.

Diagnostic notes: One of the very few Carpathian species of *T.* sect. *Rhodocarpa* lacking pollen. It is distinct in the leaf shape with a dominant terminal segment, and in the large achenes with a short and restricted spinulosity.

Distribution and habitat: *Taraxacum obesum* is known from three sites at a large macrolocality in the vicinity of Mt Požiževska and Mt Breskul in the Ukrainian (Eastern) Carpathians (Fig. 9B). It occurs in moist subalpine and alpine stony grasslands and along streams, at the elevation between 1500 and 1,800 m. The IUCN conservation status is estimated as EN.

Specimens examined: UKRAINE, the Čornogora Mts, Mt Požiževska, next to the station, 6 Aug 1925, T. Wilczyński (KRAM 264062, no. det. 34476). – Čornogora Mts, Mt Breskul, waterfall I [on Prut R., at ~1,500 m], 29 Aug 1925, T. Wilczyński (KRAM 264162, no. det. 34480; KRAM 264161, no. det. 34478; KRAM 264345, no. det. 34482). – Less certain identification: the Čornogora Mts, [from] Mt Breskul [to] Mt Požiževska, 28 Aug 1926, T. Wilczyński (KRAM 256944, no. det. 34525).

17. ***Taraxacum pseudoursinum*** Štěpánek et Kirschner, **sp. nov.** (Fig. 33)

Type: SLOVAKIA. Slovakia borealis, montes Vysoké Tatry, Litvorová kotlina, locis graminosis petrosisque supra ripam lacus alpini Litvorové pleso, 1,863–1,890 m, 49°10'30"N, 20°08'E, Aug 1997, J. Štěpánek, cultivated as JŠ 6438, collected in 1999 (PRA, no. det. 34719, holotype; isotype: PRA, no. det. 34721).

Etymology: Similar to *T. ursinum*.

Diagnosis: Phyllariis involucralibus exterioribus numerosis, imbricatis plusminusve patentibus vel sigmoideo-patentibus et forma foliorum ad *Taraxacum ursinum* accedens sed differt praecipue acheniis pallidis, pallide hinnuleis vel pallide griseo-hinnuleis.

Plants medium-sized, usually 7–11 cm tall (up to 15 cm in shade), with a compact growth. Plant base with remnants of a dark brown tunic, brownish arachnoid among petiole bases; petiole very broad, almost auriculate at base, usually 2–3 × 1.5–2 cm, pale greenish (not suffused purplish). Leaves variously erect-patent to prostrate, conspicuously light green, not spotted, almost glabrous, usually with sparse arachnoid hairs along mid-vein, broadly oblong to broadly oblanceolate in outline, usually 5–8 × 1.5–2.5 (–3) cm, undivided and coarsely dentate to lobulate-dentate, sometimes up to pinnatipartite; terminal part large, dominant, obtuse to rounded, entire or with remote sparse little teeth; lateral segments or lobules in 1–2 (3) pairs, short, broad, ± recurved, sometimes ± subhamate, acute, distal margin convex to sigmoid, entire or with solitary short broad teeth, proximal margin ± concave, entire; interlobes, when developed, short and broad, not bordered nor blotched, flat; mid-vein usually pale greenish, sometimes slightly suffused purplish. Scapes pale green, later getting purplish distally, medium densely arachnoid, usually overtopping leaves. Capitulum large, 3.5–4.5 cm wide, ± flat (ligule arrangement rather "untidy"), deep yellow, inflorescence bud ovoid-cylindrical. Involucre dark green, not pruinose, ± truncate and 6–7 mm wide at base. Outer phyllaries 16–20, ± imbricate, ± patent to sigmoid-patent, sometimes curved upwards, lanceolate to broadly ovate, usually 5–7 × 2.5–3.5 mm, the lowermost ones often only 1.5 mm wide, narrowly lanceolate, adaxial surface pale green to ± glaucous-green, abaxial surface blackish green (black-green when dry), suffused purple in distal 1/3, border almost absent, indistinct, slightly paler, ~0.05 mm wide, margin irregularly ciliate, apex flat, slightly elongated; inner phyllaries ~11 mm long, of ± invariable width. Outer ligules narrow, long, often narrowed distally, canaliculate, narrowly striped greyish olivaceous-green outside, apical teeth black, inner ligules similar, short, ± cucullate at apex, teeth black. Pollen present, pollen grains irregular in size. Stigmas long, dark, dirty yellow-green, with a short dark pubescence outside. Achenes light, greyish beige or beige-grey, 4.5–5.3 × 1.2–1.3 mm, upper 1/3 of the achene body densely covered with squamules and comb-like squamules often coalescing to form transversal rims or lines, upper squamules often acuminate, relatively long, the uppermost ones in a form of solitary spinules to 0.25 mm long, squamules in lower part of body gradually shorter or in a form of low tubercles, achene body gradually narrowing in a broadly conical cone (0.3–) 0.7–0.9 mm long, sometimes with very

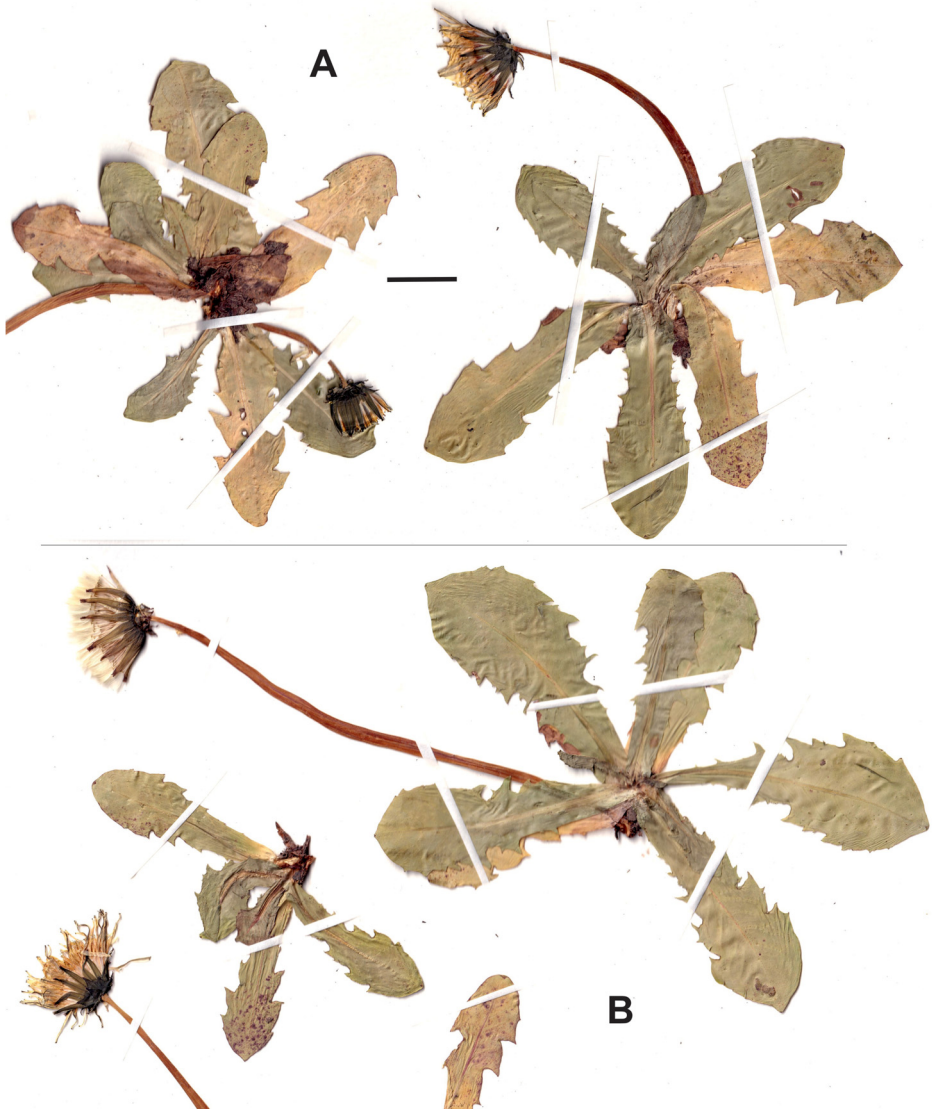


Fig. 33. *Taraxacum pseudoursinum*. General habit of plants of the holotype gathering (A, B): PRA, no. det. 34719.

sparse minute spinules at base; beak 6.5–7.5 mm long, pappus dirty white, with a slightly brownish tinge, 6–6.5 mm long. – Agamosperm.

Diagnostic notes: *Taraxacum pseudoursinum* approaches *T. ursinum* in the outer phyllary characters (± imbricate, numerous, ± patent to sigmoid-patent) and the unusual leaf shape. The greyish beige achenes of *T. pseudoursinum* are diagnostic, also when compared with those of *T. latericulum*, another similar species. Other similar species, *T. vidlense* and *T. skalnatense*, differ in having a distinct, broader border to outer phyllaries.

Distribution and habitat: Known from the Tatra Mts, Slovakia. The occurrence in Poland is very probable. It grows in ± humid subalpine and alpine grasslands and stony or gravelly slopes, between 1800 and 2,000 m. The IUCN conservation status is estimated as EN.

Specimens examined: SLOVAKIA. Vysoké Tatry Mts, Litvorová dolina, the lake of Litvorové pleso, 1,863–1,890 m, 49°10'30"N, 20°08'E, Aug 1997, J. Štěpánek, cult. as JŠ 6439 (PRA, no. det. 34723). – Belianske Tatry, Predné Jatky, Sep 1989, J. Kirschner, cult. as JK 333 (PRA, no. det. 34710). – Belianske Tatry, Zadné Jatky, Sep 1989, J. Kirschner, cult. as JK 339 (PRA, no. det. 34708). – Západné Tatry, Červené vrchy, slope grasslands (*Seslerion tatrae*) below the summit of Mt Temniak, ~1,900 m, 17 Aug 1987, V. Grulich, cult. as JŠ 3191 (PRA, no. det. 34729). – Ibidem, cult. as JŠ 3187 (PRA, no. det. 34727). – Ibidem, cult. as JŠ 3186 (PRA, no. det. 34725).

18. ***Taraxacum latericulum*** Doll, Preslia 49: 122, 1977 (Figs 34A, 35, 36).

Type: SLOVAKIA. [the Tatra Mts, chalet of Brnčalova chata, now called Chata pri Zelenom plese] Bryncalova Chata, am See zw. Geröll, 4 Jul 1975, R. Doll (JE, no. det. 19022, **lectotype, designated here**; isolectotype: JE, no. det. 19093).

Etymology: Also *laterculus*, a small brick or a tile.

Plants small to medium-sized, usually 7–16 cm tall. Leaf rosettes relatively rich, compact; plant base without tunic, ± sparsely greyish arachnoid among petiole bases. Petiole broadly winged, pale green, usually abbreviated. Leaves variously erect-patent, ± deep green, glabrous or with sparse hairs on mid-vein beneath, usually narrowly oblanceolate to oblanceolate in outline, most often 5–7 (–10) × 2–2.5 cm, (runcinate) pinnatilobed to pinnatipartite, sometimes ± undivided and remotely serrate with teeth hamate-recurved; terminal segment up to 2–2.5 × 2 cm, often conspicuous, triangular to helmet-shaped, acute, distal margin usually convex, entire or with a single tooth or a pair of teeth; lateral segments usually in 2–3 pairs, short, usually hamate-recurved, usually acute, sometimes subobtuse, distal margin distinctly convex, ± entire, proximal margin straight or concave, entire; interlobes short and broad, or indistinct, with a slightly raised margin; mid-vein pale greenish or suffused pinkish. Scapes pale green, very sparsely arachnoid, ± equalling leaves. Capitulum relatively large, ~3.5–4 cm wide, ± flat to subconvex, yellow, with ligules less regularly arranged ("untidy"). Involucre ± broadly rounded to broadly obconical and ~8–9 mm wide at base. Outer phyllaries usually 13–17, loosely appressed to regularly erect-patent and curved upwards or ± sigmoid with tip pointing inwards (outer involucre bowl-shaped), subimbricate, relatively short (reaching 2/5–1/2 of the inner phyllaries), ± lanceolate, 6–8 × 2–3 mm, the lowermost one often linear-lanceolate, to 1 mm wide, surface evenly black-green, distally suffused black-purple, border absent, sometimes inconspicuous, slightly paler and very narrow, margin ± ciliate, apex subobtuse, flat; inner phyllaries ~12 mm long, deep green, distally dark black-purple, of ± invariable width. Outer ligules ± flat, striped greyish purple outside, inner ligules narrower, canaliculate, much shorter, teeth of all ligules black. Stigmas long, relatively light discoloured, slightly greyish yellow-green, usually with a hyaline pubescence outside (some hairs often with a darker tip). Pollen abundant, pollen grains irregular in size. Achenes light ochraceous, 4.0–4.5 × 1.0–1.3 mm, body ± smooth, only in the upper 1/4–1/5 with medium dense minute squamules mixed with some spinules and tubercles (exterior achenes tuberculate in the upper 1/2), subabruptly to subgradually narrowing in a 0.5–0.8 mm long cone with a broadly conical base and a subcylindrical to cylindrical



Fig. 34. Achenes of *Taraxacum* sect. *Rhodocarpa* (= *T.* sect. *Alpestria*). (A) *T. latericulum* (JE, no. det. 19022); (B) *T. paclovae* (PRA, no. det. 36384); (C) *T. flumineum* (PRA, no. det. 19174).

distal part (of which the upper 0.1–0.2 mm lacks ochraceous coloration); beak 6.5–7 mm long, pappus ± white, 6–6.5 mm long. – Agamosperm.

Note: *Taraxacum latericulum* is interpreted and described largely on the basis of cultivated plants deposited in PRA (JŠ 3187 a JŠ 3186), and, in comparison with other taxa treated in the present paper, the material, including the original material, is rather scanty.

Diagnostic notes: *Taraxacum latericulum* is distinct in its achene colour and sparse squamulosity, and in the quite unusual leaf shape. A similar leaf shape is found in *T. pseudoursinum* but achenes are diagnostic.

Distribution and habitat: Known only from the western and eastern parts of the Tatra Mts (the Červené vrchy / Czerwone Wierchy Mts, and the eastern part of the Vysoké Tatry Mts) in Poland and Slovakia. It grows in subalpine stony grasslands, scree and rock ledges, mostly on limestone, between elevations of 1,550 m and ~2,100 m. The IUCN conservation status is estimated as VU.



Fig. 35. *Taraxacum latericulum*. General habit of cultivated plants (PRA, no. det. 19551).



Fig. 36. *Taraxacum latericulum.* A detail of cultivated plants (PRA, no. det. 19551).

Specimens examined: SLOVAKIA. The Vysoké Tatry Mts, Chata pri Zelenom plese, 4 Jul 1975, R. Doll (JE, no. det. 19093, 19022). – The Červené vrchy Mts, a grassland slope (*Seslerion tatrae*), SE. of the summit of Mt Temniak (2,090 m), ~1,900 m, 17 Aug 1987, V. Grulich, cult. as JŠ 3186 (PRA, no. det. 19551). – Ibidem, cult. as JŠ 3187 (PRA, no. det. 19552).

POLAND. Tatry Zachodnie, Czerwone Wierchy, Mt Krzesanica, among rocks ~5 m below the summit (2,123 m), 16 Aug 1976, H. Trzcińska-Tacik (KRAM 387766, no. det. 34425).

19. ***Taraxacum jugicola*** Štěpánek et Kirschner, **sp. nov.** (Figs 26A, 37, 38A).

Type: SLOVAKIA. Montes Nízke Tatry, opp. Brezno nad Hronom, ad viam [...] inter casam alpinam Štefánikova chata (1,740 m) et locum Trangoška (1,121 m), in valle inter montes Veľký Gápeľ et Ďumbier, 1,500–1,700 m, 22 Jul 1990, J. Štěpánek (PRA, no. det. 20304, holotype; isotype: PRA, no. det. 20305).

Etymology: Growing on mountain ridges and passes.

Note: The wild plants differ from cultivated ones in their general habit and the leaf shape to a certain degree. We therefore give a full description of the former, and add different features of the latter separately.

Diagnosis: Species propria, distinctissima foliis longissimis lobo terminali elongato, petiolis angustis longis viridibus, phyllariis exterioribus fere immarginatis, et praecipue acheniis pallidissimis, pallide subochraceo-stramineis, pallide brunnescenti-stramineis usque subeburneis, superne dense, conspicue squamulosis, corpore in pyramidem anguste cylindricam abrupte transeunte.

Plants relatively tall, not robust, often over 30 cm; leaf rosette not rich. Plant base without tunic, with sparse hairs among petiole bases. Petiole unwinged to narrowly winged, ± green, up to 8 cm long. Leaves suberect to erect-patent, mid-green, ± glabrous, not spotted, narrowly oblanceolate to narrowly oblong in outline, usually 15–25 × 4–5 cm, with a distinct petiole, usually runcinate pinnatisect to pinnatipartite; terminal segment ± narrowly triangular or elongated helmet-shaped, sometimes triangular, usually hastate or even sagittate, usually 2–7 × 2.5–5.5 (–6.5) cm, acute, distal margin ± convex, distally entire, with sparse large patent teeth or incisions in basal 1/2–1/3, proximal margin most often ± straight, ± entire, basal lobules usually elongated, ± patent to subrecurved; lateral segments in 3–4 (5) pairs, usually 1.5–2.5 cm long, 1–2 cm wide at base, ± patent to subrecurved, with a triangular to deltoid basal part and a lingulate-elongated distal one, distal margin usually sigmoid (to concave), with sparse, irregular, thin, acuminate teeth up to 6 mm long (often the longest 1–2 teeth perpendicular to the margin), rarely entire, distal part of the segment entire, proximal margin straight, entire; interlobes distinct, relatively long and broad (up to 2 × 1 cm), inconspicuously bordered brownish-purplish, with sparse coarse teeth or entire; mid-vein probably pale green. Scapes usually suffused brownish, sparsely arachnoid, overtopping leaves. Capitulum yellow, ~4 cm wide, flat to subconvex. Involucre dark green, pruinose, subconical and ~7–8 mm wide at base. Outer phyllaries relatively numerous, 15–22, erect, erect-patent or patent, often ± sigmoid, narrowly lanceolate to ovate-lanceolate, 6–8 × 2.5–3.5 mm, abaxial surface dark green (black-green when dry), pruinose, unbordered or with very narrow, ± indistinct paler border, adaxially light glaucous-green, margin usually minutely ciliate, apex flat; inner phyllaries ~14 mm long, dark green, pruinose, of ± invariable width. Outer ligules ± flat, relatively sparse, narrow, long, striped dark grey with a greenish and brownish tinge outside, inner ligules canaliculate, teeth grey-brown or black. Stigmas long exserted, medium light discoloured, greyish green with a dark pubescence outside. Pollen present, pollen grains irregular in size. Achenes very light stramineous-ochraceous to light brownish sand-coloured, sometimes even ivory-stramineous, 4.0–4.8 × 0.9–1.2 mm, achene body very densely conspicuously squamulose in upper 1/3, otherwise distinctly tuberculate throughout, upper squamules often ± curved outwards, body abruptly narrowing (as if inserted in a collar of squamules) in a cylindrical, ± thin cone 0.5–0.7 (–1.0) mm,



Fig. 37. *Taraxacum jugicola*. The holotype (PRA, no. det. 20304).



Fig. 38. Achenes of *Taraxacum* sect. *Rhodocarpa* (= *T.* sect. *Alpestria*). (A) *T. jugicola* (PRA, no. det. 20306); (B) *T. innuptum* (PRA, no. det. 19940); (C) *T. ursinum* (PRA, no. det. 19146).

sometimes with one or a few minute spinules proximally; beak 8–9 mm long, pappus dirty white, 6–7 mm long. – Agamosperm.

Differences of cultivated plants: Plants medium-sized; leaves suberect-patent, 6–8 × 2–2.5 cm, bright green, adaxially sparsely arachnoid, more densely so along mid-vein proximally, conspicuously dentate (teeth pointing to various sides); interlobes conspicuously bordered brown-purple, with margins raised; petiole deep purplish. Involucre ± conical at base, Outer phyllaries loosely appressed to irregularly patent, not imbricate, reaching 2/5–1/2 of inner phyllaries, sometimes pale green, darker blackish green only distally, sometimes dark glaucous-green.

Diagnostic notes: The long, conspicuously dentate leaves, relatively light discoloured stigmas, ± short outer phyllaries, and particularly the character of achene squamulosity represent a diagnostic combination of attributes. It is not closely allied to any other Carpathian species.

Distribution and habitat: *Taraxacum jugicola* is known to occur in the Nízke Tatry Mts, central Slovakia; it is therefore confined to the Western Carpathians. It grows on

subalpine meadows and slightly ruderalized subalpine grasslands, between 1,500 m and 1,850 m. The IUCN conservation status is estimated as EN.

Specimens examined: SLOVAKIA. The Nízke Tatry Mts, between Mt Ďumbier (2,043 m) and the Králička Ridge, in the vicinity of alpine chalet of Štefánikova chata, ~1,700 m, 24 Jul 1990, J. Štěpánek, cult. as JŠ 4788 (PRA, no. det. 20309). – Nízke Tatry, Telgárt village, northern slopes of Mt Kráľova hoľa, 1,800–1,850 m, 48°53'N, 20°09'E, 28 Jul 1992, J. Štěpánek, cult. as JŠ 5045 (PRA, no. det. 20308). – Ibidem, cult. as JŠ 5046 (PRA, no. det. 20307). – Nízke Tatry, between alpine chalet of Štefánikova chata (1,740 m) and Trangoška (1,121 m), in a valley between Mt Veľký Gápeľ and Mt Ďumbier, 1,500–1,700 m., 1 Aug 1990, J. Štěpánek, cult. as JŠ 4791 (PRA, no. det. 20306).

20. ***Taraxacum ursinum*** Štěpánek et Kirschner, **sp. nov.** (Figs 18B, 38C, 39, 40).

Type: SLOVAKIA. Montes Belanské Tatry: in monte Hlúpy, ~1,950 m, Jun 1987, L. Hrouda & D. Kochjarová (PRA, no. det. 19155, holotype).

Note: The holotype consists of leaves and scapes of a single plant; its root was cultivated and achenes were added to the holotype specimen in a separate envelope for the sake of completeness, and they are not considered as a part of the holotype material.

Etymology: Derived from *ursus*, bear, and refers to the fact that there is a large population of brown bear, *Ursus arctos*, near the type locality.

Exsiccates: Taraxaca Exs., no. 787–788.

Diagnosis: Species distinctissima foliis indivisis usque pinnatilobatis, raro pinnatipartitis, petiolis latissimis auriculatis, subtus saepissime obscure purpureis, phyllariis exterioribus atroviridibus, fere immarginatis, acheniis laete stramineis, corpore superne subdense squamuloso, squamulis horizontaliter coalescentibus, pectiniformibus, seriatim ordinatis, in pyramidem brevissimam late conicam gradatim transeunte.

Plants medium-sized to ± robust, 15–25 (–30) cm tall, with a compact leaf rosette. Plant base without tunic; petiole extremely broadly winged, with a cordate, almost amplexicaul base, often broader than the lower part of leaf blade, often purple beneath, rarely wholly pale green. Leaves dark deep green, glossy, outer and middle ones glabrous or with sparse arachnoid hairs along mid-vein above, not spotted, broadly oblong, ovate or obovate in outline, usually 8–15 × 4–6 cm, not divided or pinnatilobed to pinnatipartite; terminal segment ± triangular, flat triangular or broadly helmet-shaped or rounded, ~2.5–6 × 3.5–6 cm, obtusely acute or obtuse, sometimes acute, distal margin convex, sometimes sigmoid, entire or with 1–2 broadly triangular teeth, with a subhastate base; lateral segments in 1–3 (4) pairs, ± recurved, broadly triangular-deltoid, usually 1–1.5 cm long, 1–2.5 cm wide at base, distal margin subsigmoid, entire or with 1–2 short, broadly triangular teeth, proximal margin entire; interlobes short and very broad (sometimes ± absent because of closely approximated short lateral segments), margin raised, bordered brown-purple (rarely indistinctly blotched); sometimes not divided, ± obovate to oblanceolate, with large recurved teeth; mid-vein conspicuously purple or brownish purple; inner leaves slightly narrower, with more distinct interlobes and a longer petiole. Scapes sparsely arachnoid, more densely so just below capitulum, later suffused brownish pink, overtopping leaves. Capitulum relatively large, 4–5 cm wide, deep golden yellow, ± flat to convex. Involucre ± truncate and ~8–9 mm wide at base, dark green, not pruinose. Outer phyllaries 13–18, loosely appressed to erect-arcuate (erect-patent to patent and ± sigmoid after anthesis), subimbricate, broadly ovate to lanceolate (the lowermost one often linear-lanceolate), 6–10 × 2.5–4.4 mm, always broadest in the lower 1/3, abaxial



Fig. 39. *Taraxacum ursinum*. The holotype (PRA, no. det. 19155).



Fig. 40. *Taraxacum ursinum*. A detail of several parts of the holotype (PRA, no. det. 19155).

surface evenly black-green (± black when dry), suffused black-purple in distal 1/3, with a narrow, dark, often black-purple submembranous border ~0.1 mm wide, margin not ciliate, apex flat, adaxial surface light greenish, distally suffused purplish; inner phyllaries dark green, distally black-green, ~15 mm long, width ± invariable. Outer ligules ± long and subsparse, rather irregularly arranged, flat, relatively narrow, striped dark purplish

greyish- or brownish-green outside, inner ligules canaliculate, all teeth black. Stigmas long, medium discoloured, greyish light green to greyish yellow-green, pubescence of distally dark hairs. Pollen present, pollen grains irregular in size. Achenes light yellowish stramineous with an olivaceous tinge, (3.5–) 4.2–5.0 × 1.1–1.4 mm, body with medium dense squamuliform spinules or squamules, often coalescing to form comb-like rows (usually four rows) in upper 1/4, otherwise short-tuberculate or almost smooth, ± gradually narrowing in a short, broadly conical cone (0.4–) 0.5–0.7 (–0.8) mm long; beak 6.5–8 (–9) mm long, pappus slightly yellowish white, 6–7 mm long. – Tetraploid (2n = 32, det. J. Štěpánek under no. 88/81 on plants from Rodna, PRA, no. det. 19143). – Agamosperm.

Diagnostic notes: At first sight, there is a striking feature characterizing *T. ursinum* – the leaf shape with very broadly winged and auriculate petiole and short and broad interlobes. Relatively numerous, suberect outer phyllaries with a blackish surface and an almost invisible, very narrow border, and the peculiar character of achene body squamulosity are also diagnostic, particularly in comparison with the closest species, *T. pseudoursinum*.

Distribution and habitat: *Taraxacum ursinum* is relatively widely distributed in the Western Carpathians and in the northern part of the Eastern Carpathians, and is known from Slovakia (common in the Belianske Tatry Mts), Ukraine and Romania; the occurrence in Poland is highly probable. It grows on rocky and stony alpine slopes, along mountain paths, in subalpine grasslands, more often on limestone, less often on granite, usually between (1,300–) 1,600–2,000 m. The IUCN conservation status is estimated as VU.

Specimens examined: SLOVAKIA. Belianske Tatry, valley of Monkova dolina, ~1,750 m, 21 Jun 2001, [B. Trávníček] (OL, no. det. 19163). – Belianske Tatry, valley of Monkova dolina, ~1,600 m, 21 Jun 2001, [B. Trávníček] (OL, no. det. 19162). – Belianske Tatry, Široké sedlo, 1,830 m, 21 Jun 2001, [B. Trávníček] (OL, no. det. 19161). – Belianske Tatry, Mt Hlúpy, 21 Jun 2001, [B. Trávníček] (OL, no. det. 19160). – Belianske Tatry, the ridge of Mt Predné Jatky, 49°14'N, 20°15'E, Jun 1988, P. Kovář, cult. as JŠ 4472 (PRA, no. det. 19156). – Ibidem, cult. as JŠ 3294 (PRA, no. det. 19157). – Belianske Tatry, Mt Hlúpy, ~1,950 m, Jun 1987, L. Hrouda & D. Kochjarová, cult. as JŠ 2623 (PRA, no. det. 19154). – Ibidem, cult. as JŠ 2624, only achenes collected (PRA, no. det. 19155). – Belianske Tatry, Mt Ždiarska Vidla, Jun 1987, L. Hrouda & D. Kochjarová (PRA, no. det. 19152). – Belianske Tatry, the valley of Zadné Meďodoly, Jun 1987, L. Hrouda & D. Kochjarová, cult. as JŠ 2622 (PRA, no. det. 19151). – Ibidem, cult. as JŠ 2621 (PRA, no. det. 19153). – Belianske Tatry, a path in Mt Predné Jatky, Sep 1989, J. Kirschner, cult. as JK 323 (PRA, no. det. 19147). – Ibidem., cult. as JK 321 (PRA, no. det. 19146). – Belianske Tatry, the ridge of Mt Predné Jatky, Jun 1988, P. Kovář, cult. as JŠ 3293 (PRA, no. det. 19145). – Belianske Tatry, a path on the slopes of Mt Zadné Jatky, Sep 1989, J. Kirschner, cult. as JK 341 (PRA, no. det. 19142). – Belianske Tatry, Vyšné Kopské sedlo, 1,925 m, 1 Aug 1992, A. Petrík 1393 (herb. A. Petrík, no. det. 19935, 19876). – Belianske Tatry, Mt Ždiarska Vidla, 2,010 m, 3 Aug 1992, A. Petrík 1405 (herb. A. Petrík, no. det. 19930). – Belianske Tatry, Mt Bujačí, SW. slope, ~1,900 m, 3 Aug 1946, J. Müller (BRNU 335859, no. det. 20155). – Belianske Tatry, ridge between the N. slope of Mt Faixová skala and Mt Skalné Vráta, ~1,520 m, 24 Jul 1937, K. Domin (PRC 400778, no. det. 19892). – Belianske Tatry, valley of Dominův důl, ~1,300 m, 12 Aug 1933, K. Domin (PRC 400779, no. det. 19893). – Belianske Tatry, limestone rocks on the S. slope of Mt Bujačí, 1,850 m, 8 Jul 1936, J. Dostál & F. A. Novák *3223* (PRC 400785, no. det. 19899). – Belianske Tatry, a path on the ridge below Mt Zadné Jatky, ~1,900 m, 7 Sep 1989, J. Kirschner, cult. as JK 116 (PRA, no. det. 21123). – Belianske Tatry, a path on the ridge between Mt Skalné Vráta and Mt Bujačí, ~1,900 m, 7 Sep 1989, J. Kirschner, cult. as JK 114 (PRA, no. det. 21124). – Belianske Tatry, a path in Mt Predné Jatky, Sep 1989, J. Kirschner, cultivated as JK 321 and 323, and distributed as Taraxaca Exs., no. 787 (e.g. PRA, no. det. 32154). – Belianske Tatry, N. slope of Mt Košiáre, 2,011 m, 14 Aug 1948, J. Šourek 6027 (PR 274782, no. det. 20119). – Západné Tatry, the Červené vrchy Mts, grassland slope (*Seslerion tatrae*), SE. of the summit of Mt Temniak, ~1,900 m., 17 Aug 1987, V. Grulich, cult. as JŠ 3186 (PRA, no. det. 19158).

UKRAINE. The Eastern Carpathians, the Čornogora Mts, Mt Breskul, 20 Aug 1990, Ju. Kobiv, cult. as JŠ 5441 (PRA, no. det. 34632).

ROMANIA. The Rodna Mts, upper part of glacial cirque, Căldarea Putreda, below a ridge between [Mt] Vf. Ineu (2,279 m) and [Mt] Vf. Coăsta Netedă (2,060 m), near the latter, ~1,950–2,000 m, 9 Aug 1981, J. Štěpánek, cult. as JŠ 2722 (PRA, no. det. 19144). – Ibidem, cult as JŠ 148 (PRA, no. det. 19143). – Ibidem, distributed as Taraxaca Exs., no. 788 (e.g. PRA, no. det. 32152).

Less certain identification: SLOVAKIA. The Nízke Tatry Mts, Krakova hoľa, sine dat., R. J. Vašut (herb. R. Vašut, no. det. 19159). – Vysoké Tatry, valley of Furkotská dolina, ~1,835 m, 28 Jul 1928, V. Krajina (PR, no. det. 19953). – [the westernmost Belianske Tatry, locality not identified] "Unter nassen Felsen am Greiner [illegible], ~1,750 m, in der Javorinaer Kalkalpen", 25 Jul 1912, E. Korb (W, no. det. 21133). – UKRAINE. The Čornogora Mts, Mt Petros [2,020 m], 23 Aug 1929, [K. Domin?] (PR, no. det. 19955).

Species not assigned to any species group

21. ***Taraxacum flumineum*** Doll, Preslia 49: 122, 1977 (Figs 2, 34C, 41, 42).

Type: SLOVAKIA. [the Vysoké Tatry Mts, the chalet called Chata pri Zelenom plese, ~49°12'36" N, 20°13'16" E, 1,550 m] "Hohe Tatra, Brncalova Chata, Gebirgsbach", 4 Jul 1975, R. Doll (JE, no. det. 19223, **lectotype, designated here**; isolectotype: JE, no. det. 19222).

Etymology: The epithet is derived from *flumen*, river, refers to the occurrence along alpine streams.

= *Taraxacum cuspidatiforme* Doll, Preslia 49: 125, 1977.

Type: SLOVAKIA. [the Belianske Tatry Mts, Mt Bujačí] "Am Weg beim Bujaci", 6 Jul 1975, R. Doll (JE, no. det. 19228, holotype; isotype: JE, no. det. 19229).

= *Taraxacum bujacense* Doll, Preslia 49: 124, 1977.

Type: SLOVAKIA. [the Belianske Tatry Mts, Mt Bujačí] "Am Weg beim Bujaci", 5 Jul 1975, R. Doll (JE, no. det. 19225, holotype; isotype: JE, no. det. 19226).

Exsiccates: Taraxaca Exs., no. 712–715.

Plants medium-sized to robust, usually 15–30 cm tall. Plant base without tunic, with ± dense greyish-whitish hairs among petiole bases; petiole very broadly winged, rarely pale greenish, usually suffused deep purple beneath. Leaves ± greyish light green, not spotted, glabrous (in the wild in more humid sites) or with relatively dense arachnoid hairs, mainly along mid-vein above (in cultivation), oblanceolate to narrowly so in outline, usually 8–23 × 3–4.5 cm. There are two extreme leaf shape morphotypes connected by numerous intermediate forms. Leaves of plants growing under natural, relatively humid conditions, and plants in dryer conditions, usually in cultivation, less frequently in the nature. The former (humidicolous) morphotype has leaves often undivided, acute to obtusely acute, ± sparsely dentate, with teeth often recurved, unequal, up to 1 cm long, narrowly triangular or triangular with an elongated acuminate distal part; petiole more often greenish, or suffused purplish along mid-vein beneath; mid-vein usually slightly suffused brownish pink (paler than in the other morphotype. The form from drier habitats has leaves pinnatipartite to pinnatisect, narrowly oblanceolate to oblanceolate in outline, with a conspicuous, helmet-shaped or oblong helmet-shaped, subhastate, acute terminal segment (1/4–1/3 of the leaf length), usually distinctly lobed (it is often difficult to discern the terminal segment lones from lateral segments), distal margin usually with 1–3 large, narrow, acute, subrecurved teeth or lobules, proximal margin patent, entire, basal lobules narrowly triangular, elongated, subpatent; lateral segments in 2–4 pairs, recurved to patent triangular to narrowly triangular, distally usually narrowed in an elongated,



Fig. 41. *Taraxacum flumineum*. General habit (PRA, no. det. 19173).

acuminate part up to 2 cm long, distal margin sigmoid to concave, entire or with a single large tooth, proximal margin straight, subconcave to undulate, entire; interlobes short and broad, almost entire or with a series of filiform teeth, bordered or broadly bordered brown-purple, margin usually slightly raised; mid-vein deep pink-brown, main secondary veins also purplish. Scapes suffused brownish pink, sparsely, or distally ± densely, arachnoid, overtopping leaves. Capitulum golden yellow, flat, 4.5–5 cm wide. Involucre relatively light coloured, light olivaceous-green, slightly pruinose, ± rounded and 10–11 mm wide at base. Outer phyllaries numerous, 20–25, erect-patent to mostly subarcuate-patent, lower ones to arcuate-recurved, relatively long, reaching 2/3 of the inner phyllaries,



Fig. 42. *Taraxacum flumineum*. General habit (PRA, no. det. 19184).

narrowly lanceolate to lanceolate, 8–11 × (2.0–) 2.5–3.5 mm, abaxial surface light or very light olivaceous green, distally sometimes suffused purplish, with a distinct whitish border 0.1–0.3 mm wide, margin with remote short thin teeth, apex flat, the lowermost 1–3 phyllaries often linear, pale green, sparsely dentate; inner phyllaries 12–14 mm long, of ± invariable width. Outer ligules relatively sparse, not broad (distally even narrower), flat, striped dark, black-grey outside, inner ligules narrow, subcanaliculate, all ligule teeth black. Stigmas ± long, dark, grey-green with a black pubescence outside. Pollen abundant, pollen grains irregular in size. Achenes (4.0–) 4.2–5.0 × (0.9–) 1.0–1.3 (–1.4) mm, brownish grey to ash-grey, body densely covered with squamuliform subarcuate spinules in upper 1/2, otherwise verrucose to tuberculate throughout (even in the inner achenes), body subabruptly narrowing in a ± cylindrical, relatively short cone (0.4–) 0.5–0.8 mm long; beak 7.5–8.5 mm long, pappus whitish, 6–7 mm long. – Agamosperm.

Diagnostic notes: *Taraxacum flumineum* is a relatively isolated species, without closely similar taxa. The ash-grey, densely spinulose achenes, numerous, ± light, distinctly bordered outer phyllaries, and the unusual leaf shape are diagnostic.

Distribution and habitat: A relatively common species in the Tatra Mts, from the West Tatra Mts to the Belianske Tatry Mts. It is known from Poland and Slovakia. It grows in a variety of alpine habitats, on humid gravelly slopes, grasslands along streams, calcareous grasslands (*Seslerion tatrae*) or sheltered under or among krummholz (*Pinus mugo*) stands, usually between 1,500 m and 2,100 m. The IUCN conservation status is estimated as VU.

Specimens examined: SLOVAKIA. Západné Tatry, between Biela skala (1,316 m) and Sivý vrch (1,805 m), limestone, 1,450–1,500 m, 21 Jul 1988, J. Štěpánek et al., cult. as JŠ 4465 (PRA, no. det. 19547). – Ibidem, cult. as JŠ 3303 (PRA, no. det. 19546). – Ibidem, JŠ 3304 (PRA, no. det. 19587). – Ibidem, JŠ 3305 (PRA, no. det. 19586). – Západné Tatry, Mt Malá Ostrá, ~1,680 m, 21 Jul 1988, J. Štěpánek et al., cult. as JŠ 3301 (PRA, no. det. 19073). – Ibidem, cult. as JŠ 4466 (PRA, no. det. 19072). – Ibidem, cult. as JŠ 4467 (PRA, no. det. 19187). – Ibidem, cult. as JŠ 3306 (PRA, no. det. 19186). – Západné Tatry, Mt Malá Ostrá, ~1,700 m, 21 Jul 1988, J. Štěpánek, cult. as JŠ 3306 (PRA, no. det. 19185). – Západné Tatry, Červené vrchy, SE. slope below the summit of Mt Temniak (2,090 m), ~1,900 m, 17 Aug 1987, V. Grulich, cult. as JŠ 3189 (PRA, no. det. 19183). – Západné Tatry, Roháče, W. of Roháčske plesá, below Spálená dolina, 19 Jun 2001, B. Trávníček (OL, no. det. 19428). – Zapadné Tatry, near the lake of Roháčske pleso, ~1 km N. of Mt Tri kopy (2,136 m), ~1,650 m, 19 Jun 2001, R. J. Vašut & M. Vašutová (herb. Vašut, no. det. 19427). – The Vysoké Tatry Mts, valley of Mlynická dolina, above Skok waterfall, 1,800 m, 17 Aug 1948, J. Šourek 6028 (PR, no. det. 20123). – Vysoké Tatry, Zelené pleso, Jul 1938, M. Deyl (PR, no. det. 2894). – Vysoké Tatry, Tatranská Polianka, valley of Velická dolina, above the lake of Velické pleso, ~1,750 m, 49°09'40"N, 20°09'30"E, Aug 1997, J. Štěpánek, cult. as JŠ 6427 (PRA, no. det. 19549). – Ibidem, cult. as JŠ 6428 (PRA, no. det. 19548). – Vysoké Tatry, upper part of Malá Studená dolina, 16 Aug 2001, B. Trávníček, cult. as JŠ 7759 (PRA, no. det. 19084). – Vysoké Tatry, chalet of Téryho chata in the valley of Malá Studená dolina, 16 Aug 2001, B. Trávníček, cult. as JŠ 7763 (PRA, no. det. 19083). – Vysoké Tatry, Velká Studená dolina, below the chalet of Zbojnícka chata, ~1,900 m., 49°10'30"N, 20°10'15"E, Aug 1997, J. Štěpánek, cult. as JŠ 6423 (PRA, no. det. 19171). – Ibidem, cult. as JŠ 6422 (PRA, no. det. 19170). – Ibidem, cult. as JŠ 6421 (PRA, no. det. 19169). – Ibidem, cult. as JŠ 6420 (PRA, no. det. 19168). – Vysoké Tatry, Chata pod Zeleným plesom, 4 Jul 1975, R. Doll (JE, no. det. 19224, 19220, 19222, 19223). – Liptovské Hole, Javorina ridge, W. part of Mt Osobitá, 1,400 m, 10 Jul 1930, J. Dostál (PR, no. det. 20134). – Vysoké Tatry, Malá Studená dolina, lakes of Päť Spišských plies, ~2,025 m, 19 Jul 1928, V. Krajina (PR, no. det. 20130). – Vysoké Tatry, Veľké Biele pleso, the former chalet of Kežmarská chata, 4 Jul 1975, R. Doll (JE, no. det. 19097). – Liptovské Tatry, a path to Zadní Tichá dolina, 1,580 m, 11 Aug 1962, J. Unar (BRNU 423131, no. det. 20140). – Vysoké Tatry, Furkotská dolina, ~2,100 m, 8 Aug 1971, J. Dvořák (BRA, no. det. 20002). – Vysoké Tatry, Hlinská dolina, ~1,600–1,700 m, Jul 1936, J. Dostál (PRC 400771, no. det. 19903). – Vysoké Tatry, Velká Studená dolina, Zbojnícka chata, ~1,900 m, 49°10'30"N, 20°10'15"E, Aug 1997, J. Štěpánek, cult. as JŠ 6422 and JŠ 6423, distributed as Taraxaca Exs., no. 713 (e.g. PRA, no. det. 31375). – Ibidem, cult. as JŠ 6420 and JŠ 6421, distributed as Taraxaca Exs., no. 712 (e.g. PRA, no. det. 31373). – Vysoké Tatry, the Prielom saddle, ~2,250 m, 8 Aug 1928, G. Lengyel (BP 234566, no. det. 36996). –

Belianske Tatry, Jahňačí žlab, N. side of Mt Bujačí, ~1,500 m, 6 Aug 1987, A. Plocek (PRA, no. det. 19550). – Belianske Tatry, a path on the slopes of Mt Zadné Jatky, Sep 1989, J. Kirschner, cult. as JK 344 (PRA, no. det. 19585). – Ibidem, cult. as JK 348 (PRA, no. det. 19088). – Ibidem, cult. as JK 337 (PRA, no. det. 19087). – Ibidem, cult. as JK 340 (PRA, no. det. 19086). – Ibidem, cult. as JK 350 (PRA, no. det. 19085). – Belianske Tatry, summit area of Mt Bujačí, Sep 1989, J. Kirschner, cult. as JK 284 (PRA, no. det. 19082). – Ibidem, cult. as JK 289 (PRA, no. det. 19081). – Ibidem, cult. as JK 302 (PRA, no. det. 19080). – Ibidem, cult. as JK 288 (PRA, no. det. 19079). – Ibidem, cult. as JK 283 (PRA, no. det. 19078). – Ibidem, cult. as JK 286 (PRA, no. det. 19077). – Ibidem, cult. as JK 298 (PRA, no. det. 19076). – Ibidem, cult. as JK 290 (PRA, no. det. 19075). – Ibidem, cult. as JK 281 (PRA, no. det. 19074). – Belianske Tatry, Mt Belianska kopa (1,832 m), S. slope at the foot of the mountain, ~1,750 m, 49°13'30"N, ~20°13'30"E, 10 Aug 1998, J. Štěpánek (PRA, no. det. 19184). – Belianske Tatry, Mt Predné Jatky, Sep 1989, J. Kirschner, cult. as JK 324 (PRA, no. det. 19182). – Ibidem, cult. as JK 326 (PRA, no. det. 19181). – Ibidem, cult. as JK 334 (PRA, no. det. 19180). – Ibidem, cult. as JK 327 (PRA, no. det. 19179). – Belianske Tatry, a ridge above Kopské sedlo, Sep 1989, J. Kirschner, cult. as JK 309 (PRA, no. det. 19178). – Ibidem, cult. as JK 308 (PRA, no. det. 19177). – Ibidem, cult. as JK 307 (PRA, no. det. 19176). – Ibidem, cult. as JK 306 (PRA, no. det. 19175). – Ibidem, cult. as JK 305 (PRA, no. det. 19174). – Ibidem, cult. as JK 315 (PRA, no. det. 19173). – Ibidem, cult. as JK 313 (PRA, no. det. 19172). – Belianske Tatry, Mt Predné Jatky, Sep 1989, J. Kirschner, cult. as JK 324, JK 326, JK 327 and JK 334, distributed as Taraxaca Exs., no. 715 (e.g. PRA, no. det. 31378). – Belianske Tatry, a ridge above Kopské sedlo, Sep 1989, J. Kirschner, cult. as JK 305, JK 306, JK 307, JK 308, JK 313 and JK 315, distributed as Taraxaca Exs., no. 714 (e.g. PRA, no. det. 31377). – Belianske Tatry, from Široké sedlo (1,830 m) towards Mt Hlúpy (2,061 m), 21 Jun 2001, [B. Trávníček] (OL, no. det. 19167). – Belianske Tatry, Mt Hlúpy (2,061 m), 21 Jun 2001, [B. Trávníček] (OL, no. det. 19166). – Belianske Tatry, Vyšné Kopské sedlo, 1,925 m, 1 Aug 1992, A. Petrík 1393 (herb. Petrík, no. det. 19934). – Belianske Tatry, Vyšné Kopské sedlo, 1,935 m, 30 Jul 1992, A. Petrík 1385 (herb. Petrík, no. det. 19933). – Belianske Tatry, Mt Ždiarska Vidla, 2,000 m, 3 Aug 1992, A. Petrík 1406 (herb. Petrík, no. det. 19932). – Belianske Tatry, Mt Ždiarska Vidla, 1,890 m, 3 Aug 1992, A. Petrík 1402 (herb. Petrík, no. det. 19937). – Belianske Tatry, Mt Hlúpy, 31 Jul 1992, A. Petrík 1389 (herb. Petrík, no. det. 19936). – Belianske Tatry, summit of Mt Bujačí, 1,950 m, 21 Jul 1928, V. Krajina (PR, no. det. 20135). – Belianske Tatry, in the glacial cirque between Mt Muráň and Mt Nový, 1,600 m, 9 Jul 1950, J. Šourek 7605a (PR 274795, no. det. 20137). – Belianske Tatry, Mt Bujačí, 5 Jul 1975, R. Doll (JE, no. det. 19226, 19225). – Ibidem, 6 Jul 1975 (JE, no. det. 19229, 19228). – Belianske Tatry, Mt Havran, 15 Aug 1925, K. Domin & V. Krajina (PRC 400781, no. det. 19896). – Belianske Tatry, S. slopes of Mt Bujačí, 1,850 m, 8 Jul 1936, J. Dostál & F. A. Novák 3223 (PRC 400785, no. det. 19898). – Belianske Tatry, Široké sedlo, between Mt Hlúpy and Mt Ždiarska Vidla, 1,800 m, 29 Jun 1936, J. Dostál 2807 (PRC 400786, no. det. 19900). – Belianske Tatry, Mt Muráň, 18 Jul 1929, [K. Domin] (PRC 400774, no. det. 19904). – Belianske Tatry, Široké sedlo between Mt Ždiarska Vidla and Mt Hlúpy, 8 Jul 1957, H. Piotrowska (POZ, no. det. 21609). – Belianske Tatry, saddle above Červená hlina, below Mt Bujačí, 5 Jul 1957, H. Piotrowska (POZ, no. det. 21610).

POLAND. Tatry Zachodnie, Mt Giewont, 1,894 m, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 387768, no. det. 34427). – Tatry Zachodnie, Czerwone Wierchy, Mt Ciemniak, near the summit, 2,080 m, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 387771, no. det. 34428). – Tatry Zachodnie, slopes of Góra Beskid, ~1,900–1,950 m, 23 Jul 1925, B. Pawłowski (KRAM 337263, no. det. 34373). – Tatry Zachodnie, "Pyszna pod Banistem", 1,760–1,800 m, 18 Jul 1936, B. Pawłowski (KRAM 337379, no. det. 34380). – Tatry Zachodnie, chalet of Hala Kondratowa, 23 Aug 1978, H. Trzcińska-Tacik (KRAM 392591, no. det. 34389). – Tatry Zachodnie, Wielka Rówień below Mt Giewont, 1,400 m, 14 Aug, sine anno [probably between 1930 and 1965], H. Czeczott (KRAM 037554, no. det. 34560). – Tatry Zachodnie, below the summit of Mt Błyszcz, ~1,850 m, 29 Aug 1923, B. Pawłowski (KRAM 337378, no. det. 34378). – Tatry Wysokie, Mt Gęsia Szyja, 1,460 m, 22 Aug 1978, H. & T. Tacik (KRAM 392589, no. det. 34391; KRAM 392590, no. det. 34393). – Tatry Wysokie, the saddle of Liliowe, 16 Aug 1978, H. Trzcińska-Tacik (KRAM, no. det. 34394, 34468). – Tatry Wysokie, N. slopes of Szczyty Mięguszowiecke, ~2,100 m, 23 Jul 1928, V. Krajina (PR, no. det. 20133).

Less certain identifications: SLOVAKIA. Belianske Tatry, ridge between the N. slope of Mt Faixová skala and Mt Skalné Vráta, ~1,520 m, 24 Jul 1937, K. Domin (PRC 400777, no. det. 19891). – Belianske Tatry, Mt Havran, 20 Jul 1929, K. Domin (PRC 400780, no. det. 19894). – Belianske Tatry, below the cliff of Mt Faixová skala, ~1,470 m, 24 Jul 1935, K. Domin (PRC, no. det. 19897). – POLAND. Tatry Wysokie, N. slopes of Szczyty Mięguszowiecke, ~2,000 m, 23 Jul 1928, V. Krajina (PR, no. det. 20132). – Tatry Zachodnie, Kominy Tylkowe (= Kominiarsky Wierch), 1,825 m, 19 Aug 1976, H. & T. Tacik (KRAM, no. det. 34414, 34432). – Tatry Zachodnie, Czerwone Wierchy, Mt Ciemniak, near the summit, ~2,080 m, 16 Aug 1976, H. Trzcińska-Tacik (KRAM 388134, no. det. 34423). – Tatry Zachodnie, valley of Dolina Goryczkowa, ~1,450 m, 13 Jul 1961, H. Piękoś (KRAM, no. det. 34383).

22. ***Taraxacum subelegantissimum*** Štěpánek et Kirschner, **sp. nov.** (Figs 18A, 43, 44).

Type: SLOVAKIA. Nízke Tatry, pagus Helpa, graminosis secundum tugurium pastoris, ~2 km situ orient. a monte Veľká Vápenica, ~1,500 m, 6 Jul 1983, J. Štěpánek, cultivated as JŠ 3257, collected in 1989 (PRA, no. det. 20281, holotype; isotype: PRA, no. det. 20282).

Etymology: Similar to *T. elegantissimum*.

Diagnosis: Plantae *Taraxaci elegantissimi* primo aspectu valde affines sed differunt stigmatibus pallidioribus, foliorum lobis lateralibus integerrimis, achenii corpore dense breviter spinuloso et squamuloso, squamulis non coalescentibus, achenii rostro longiore et phyllariis exterioribus angustissime sed distincte albo-marginatis.

Plants small to medium-sized, 8–25 cm tall. Plant base without tunic, with sparse to subdense, dirty whitish arachnoid hairs among petiole bases. Petiole winged, almost unwinged in inner leaves, slightly suffused brownish pink or brownish purple. Leaves ± patent to subprostrate, relatively numerous, bright mid-green, not spotted, glabrous or subglabrous (cultivated) or subdensely arachnoid along mid-vein, narrowly oblanceolate to narrowly elliptical in outline, regularly pinnatisect (cultivated) or pinnatipartite to pinnatisect; terminal segment (in cultivation) medium-sized, 1–1.5 × 1–1.5 cm, ± triangular to broadly helmet-shaped, with a sagittate base, acute or mucronate, or relatively large, to 3 × 2.5 cm, triangular, helmet-shaped or subhastate, distal margin convex to sigmoid, entire, rarely with a small asymmetrical incision, proximal margin concave to straight, entire, basal lobules reflexed to recurved or patent; lateral segments in 2–4 pairs, triangular to subdeltoid, often bird-wing-shaped or hamate, ± patent to subrecurved, usually 1.5–2 cm long, 1–2 cm wide at base, smaller in cultivation, distal margin convex to sigmoid, entire, proximal margin concave, straight or undulate, entire, wild plants often with proximal segments distally ± denticulate; interlobes relatively short (distal ones very short), usually 1–8 × 3–4 mm, narrow, entire, bordered brown-purple, margin slightly raised (in wild plants, interlobes sometimes broad, occasionally with a single little tooth); mid-vein adaxially dull brown-purple, pale greenish beneath. Scape relatively densely arachnoid, basal part suffused greyish purple, shorter than leaves. Capitulum medium-sized, ~3.5 cm wide, ± flat, deep yellow. Involucre olivaceous-green, slightly pruinose, ± truncate and 8–9 mm wide at base. Outer phyllaries usually 17–21, ± not imbricate, reaching 1/2 of the inner phyllaries, very loosely appressed, erect-patent or ± patent, narrowly lanceolate to ovate-lanceolate, sometimes ovate, usually 5–7 × 2–3 mm, abaxial surface olivaceous-green (dark so when dry), often with a ± darker middle part, distal 1/3–1/4 often suffused purplish, border narrow but distinct, whitish, 0.1–0.15 mm wide, margin subglabrous to ciliate, apex flat, adaxial surface light greyish green, sometimes suffused purplish; inner phyllaries 11–13 mm, of equal, sometimes of unequal, width (coalescing). Outer ligules ± flat, striped dark purplish grey-brown outside, inner ligules canaliculate, all teeth dark grey to black. Stigmas ± light discoloured, yellow-green, outer pubescence hairs pale, with a black apex. Pollen abundant, pollen grains irregular in size. Achenes very light brownish, with a greyish or subolivaceous tinge, relatively small, 3.6–4.2 × 0.95–1.1 mm, body relatively densely spinulose and squamulose in upper 1/4, otherwise tuberculate (or ± smooth in inner achenes), lateral ridges often distinct at least in some achenes, often serrulate in upper 1/3–2/5, body ± abruptly narrowing in a subconical to subcylindrical cone (0.5–) 0.6–0.7 mm long; beak (7–) 9–10 mm long,



Fig. 43. *Taraxacum subelegantissimum*. General habit of the holotype (PRA, no. det. 20281).

pappus dirty whitish, ~6 mm long. – Triploid (2n = 24, det. J. Štěpánek under no. 162/86, PRA, no. det. 20284). – Agamosperm.

Diagnostic notes: The most similar species, *T. elegantissimum*, can be distinguished by its frequently dentate leaf lateral segments and interlobes, darker stigmas, shorter beak, and the achene sculpturing consisting of dense little squamules often coalescing to form collar-like rims. Outer phyllaries of *T. subelegantissimum* are not distally recurved and have a more distinct, although narrow, whitish border.



Fig. 44. *Taraxacum subelegantissimum*. General habit of wild plants: (A) PRA, no. det. 20285, and cultivated plants: (B) PRA, no. det. 20281.

Distribution and habitat: *Taraxacum subelegantissimum* occurs in four mountain ranges in the Western Carpathians, Slovakia; as it is known from the Chočské vrchy, the Veľká Fatra, the Nízke Tatry and the Západné Tatry (Roháče), its range is quite unique among the Carpathian oreophytic species. It grows in humid subalpine pastures and semiruderal subalpine grasslands, usually between 1,000 m and 1,500 m. The IUCN conservation status is estimated as VU.

Specimens examined: SLOVAKIA. Chočské vrchy [Mts], pastures below the summit area of Mt Veľký Choč, ~1,200–1,300 m, 27 May 1983, L. Kirschnerová & J. Kirschner (PRA, no. det. 20288). – Veľká Fatra, below the summit area of Mt Kráľova Studňa, ~1,200 m, 26 May 1983, J. Kirschner (PRA, no. det. 20285). – Nízke Tatry, village of Heľpa, ~2 km E. of Mt Veľká Vápenica, ~1,500 m, 6 Jul 1983, J. Štěpánek, cult. as JŠ 692 (PRA, no. det. 20287). – Ibidem, cult. as JŠ 1031 (PRA, no. det. 20284). – Ibidem, cult. as JŠ 1031 (PRA, no. det. 20283). – Ibidem, cult. as JŠ 3257 (PRA, no. det. 20282, 20281). – Západné Tatry, Roháče, valley of Jalovecká dolina, ~1,000 m, 3 Jul 1985, J. Kirschner (PRA, no. det. 36380, 36540). – Ibidem, cult. as JŠ 1502 (PRA, no. det. 36542, 36547).

Less certain identification: SLOVAKIA. Veľká Fatra, along a path between Mt Úplazy and Mt Králova Studňa, ~1,280 m, 1983, J. Kirschner, cult. as JŠ 665 (PRA, no. det. 20286).

23. ***Taraxacum innuptum*** Štěpánek et Kirschner, **sp. nov.** (Figs 26B, 38B, 45–47).

Type: SLOVAKIA. Liptovský Mikuláš, montes Nízke Tatry, prope casam alpinam "Hrdinov SNP" sub monte Ďumbier, 4 Jul 1985, J. Kirschner (PRA, no. det. 19938, holotype; isotype: PRA, no. det. 19939).

Etymology: Unmarried, virgin (referring to the absence of pollen).

Diagnosis: Species insignis foliis suis longissimis, lobis lateralibus remotis eximie longis, interlobiis angustis, integris vel dente unico acuminato praeditis, stigmatibus aterrimis, antheris polline carentibus et acheniis tenuibus corpore in pyramidem subconicam persensim abeunte.

Plants medium-sized, sometimes tall (not very robust, relatively slender), usually 12–20 cm. Plant base without tunic, subglabrous among petiole bases; petiole narrow, unwinged or very narrowly winged, ~3–6 cm long, pinkish purple to bright purple. Leaves erect-patent, deep green, adaxially glabrous, sparsely arachnoid beneath, oblanceolate to ± narrowly elliptical in outline, usually 15–20 × 4–7 cm, deeply pinnatisect with long segments and long and narrow interlobes, often not flat, with lateral segments



Fig. 45. *Taraxacum innuptum*. A detail of a plant in cultivation (PRA, JŠ 8984).

curved upwards; terminal segment broadly triangular, flat rhombic or subsagittate, usually 2.5–5 × 3–5 cm, acute or mucronate, distal margin subconcave or subsigmoid, less often ± straight, entire or with a single tooth or incision, proximal margin straight to subsigmoid, entire, basal lobules patent to subrecurved, acute, sometimes elongated, acuminate; lateral segments in (2) 3–4 pairs, usually opposite, relatively long, up to 4.5 cm long, up to 2 cm wide at base, narrowing from a broad base into a long narrow acuminate distal part (often bird-wing-shaped), patent to subrecurved, distal margin usually sigmoid, ± entire (mostly in distal segments) or with 1–3 long acuminate teeth and a few little teeth (more densely dentate in proximal segments), apex acuminate, proximal margin usually straight to subconvex, ± entire, slightly raised near interlobe; interlobes long, up to 1–2 cm, ± narrow, entire or with a single distinct narrowly acuminate tooth to 1 cm long (rarely a few teeth), bordered brown-purple, ± distinctly blotched brown-purple; mid-vein usually suffused brownish pink. Scapes sparsely arachnoid to arachnoid, often suffused brown-green, subequalling leaves. Capitulum ± light yellow, ± flat, ~3–4.5 cm wide. Involucre dark olivaceous-green, slightly pruinose, ± broadly obconical to ± truncate and 7–9 mm wide at base. Outer phyllaries (13–) 16–20, relatively irregularly erect-patent, arcuate-patent to arcuate-recurved, often sigmoid or with apex curved upwards, linear-lanceolate to ovate-lanceolate (up to ovate in cultivation), usually 8–12 × 2–3.5 mm, abaxial surface ± dark olivaceous-green (grey-black with an olivaceous tinge when dry), with an indistinct, dark membranous border 0.1–0.15 mm wide; inner phyllaries ~14 mm long, of ± invariable width. Outer ligules ± flat, narrow and long, relatively sparse, striped dark greenish grey-black outside, ligule teeth black to black-green; inner ligules canaliculate to subcucullate, teeth dirty yellow to greyish. Stigmas long, very dark discoloured (black when dry), with a dense black pubescence outside. Pollen absent. Achenes



Fig. 46. *Taraxacum innuptum*. General habit (PRA, no. det. 19872).

light greyish stramineous, narrowly turbinate, relatively slender, (3.9–) 4.3–4.8 × 0.8–1.0 (–1.1) mm, body with medium dense acute spinules or (often predominantly) little erect squamules in upper 1/4, otherwise (or only in the remaining part of upper 1/2) tuberculate, body very gradually narrowing in a subconical, relatively broad cone 0.5–0.8 mm long; beak 7.5–9 mm long, pappus dirty whitish, 5.5–7 mm long. – Agamosperm.

Diagnostic notes: The most conspicuous feature of *T. innuptum* is the leaf shape, with long, very distinct, remote lateral segments. The ± black stigmas, the absence of pollen, and the ± slender achenes with a very gradual body/cone transition are also diagnostic. It is a relatively solitary species without closely similar taxa.

Distribution and habitat: *Taraxacum innuptum* is confined to the mountain ranges in central Slovakia (the Nízke Tatry, the Veľká Fatra and the Malá Fatra). It grows along paths and in slightly disturbed places in subalpine pastures and meadows, usually within an elevation span of ~1,200–1,800 m. The IUCN conservation status is estimated as VU.



Fig. 47. *Taraxacum innuptum*. The holotype (PRA, no. det. 19938).

Specimens examined: SLOVAKIA. The eastern Nízke Tatry, Telgárt, NE. slopes of Mt Kráľova hola (1,948 m), 1,600–1,800 m, 48°53'00–30"N, 20°09'E, 11 Aug 1991, J. Štěpánek (PRA, no. det. 19943). – Nízke Tatry, between the chalet of Štefánikova chata (1,740 m) and Trangoška (1,121 m), 1,500–1,700 m, 1 Aug 1990, J. Štěpánek, cult. as JŠ 4708 (PRA, no. det. 19941). – Ibidem, cult. as JŠ 4793 (PRA, no. det. 19940). – Nízke Tatry, near the chalet of "Hrdinov SNP" [now Štefánikova chata], below Mt Ďumbier, 4 Jul 1985, J. Kirschner (PRA, no. det. 19938, 19939). – Nízke Tatry, above Závadka nad Hronom, NW. slopes of Mt Kolesárová, ~1,450 m, 7 Jul 1983, J. Štěpánek (PRA, no. det. 19872). – Nízke Tatry, between the chalet of Štefánikova chata (1,740 m) and Trangoška (1,121 m), 1,500–1,700 m, 22 Jul 1990, J. Štěpánek (PRA, no. det. 19870). – Malá Fatra, Štefanová, summit of Mt Poludňový Grúň, 1,460 m, 12 Jun 1998, V. Žíla (herb. V. Žíla, no. det. 19871). – Malá Fatra, Mt Velký Rozsutec, W. slopes in the saddle of Medzirozsutce, ~1,180 m, 6 Jun 1982, J. Štěpánek (PRA, no. det. 19942). – Malá Fatra, valley of Vrátna dolina, near the chalet of Chata pod Chlebom, ~1,420 m, 3 Jun 1982, H. Barešová & T. Herben, cultivated as JŠ 373 (PRA, no. det. 19869). – Veľká Fatra, SE. slopes of Mt Ploská (1,532 m), 1,450–1,500 m, 5 Aug 2009, J. Štěpánek & D. Bernátová, cult. as JŠ 8991 (PRA, no. det. 32979). – Ibidem, cult. as JŠ 8988 (PRA, no. det. 32988). – Ibidem, cult. as JŠ 8990 (PRA, no. det. 32986). – Ibidem, cult. as JŠ 8984 (PRA, no. det. 32984).

The *Taraxacum paclovae* group

For the sake of completeness, the montane belt in the Western Carpathians is included. Among the samples gathered in montane habitats, there is a predominant group of dandelions, morphologically and possibly also by descent intermediate between *T.* sect. *Taraxacum* (*T. officinale* agg.) and *T.* sect. *Rhodocarpa* (= *T.* sect. *Alpestria*). This group, recognized as the *T. paclovae* group below, combines the leaf shape and most of the characters of the involucre for *T.* sect. *Taraxacum* with the achene features often reported in *T.* sect. *Rhodocarpa*. Outer phyllaries of these plants are variously arcuate-recurved to arcuate-reflexed, sometimes even twisted, their achenes differ considerably from those of *T. officinale* as they are usually longer, with distinct lateral longitudinal ridges, a long, conspicuous spinulosity (and squamulosity); stigmas are variously discoloured, pollen always present. The group consists of several species, each probably multiclonal, and is quite widespread in the West Tatra Mts; it is also also reported in the Belianske Tatry Mts and the expectation is that it will also occur in the Vysoké Tatry proper and adjacent ranges (the Nízke Tatry Mts and Babia Góra, etc.).

Within the *T. paclovae* group, a single species is formally described, *T. paclovae*. The other forms, not so abundant in the material studied, are briefly mentioned (with reference to specimens) and left for further study.

24. ***Taraxacum paclovae*** Štěpánek et Kirschner, **sp. nov.** (Figs 34B, 48).

Type: SLOVAKIA. Slovacia borealis, montes Západné Tatry, ad viam turisticam rubre signatam in jugo Radové skaly dicto inter montes Biela skala (1,316 m) et Sivý vrch (1,805 m), ~1.5–0.5 km situ occid. a monte Sivý vrch, solo calcareo, 1,500–1,600 m, 21 Jul 1988, J. Štěpánek, cultivated from achenes no. JŠ 3307 as JŠ 4468, collected in 1991 (PRA, no. det. 36382, holotype; isotypes: PRA, no. det. 36384).

Etymology: Named after Libuše Paclová, born on January 9, 1928, in Poprad, Slovakia, an outstanding specialist in the subnival flora in the Tatra Mts, who published a number of plant records (e.g. Paclová 1977).

Diagnosis: Plantae inter *Taraxaci* sectiones *Rhodocarporum* et *Taraxacorum*, ut videtur, intermediae, phyllariis involucralibus exterioribus variantibus, erecto-patentibus sigmoideis usque arcuato-reflexis, saepe tortilibus, lanceolatis vel anguste lanceolatis,



Fig. 48. *Taraxacum paclovae*. The holotype (PRA, no. det. 36382).

inconspicue anguste marginatis, achenii corpore superne subdense spinuloso-squamuloso, spinulis summis erectis longissimis, in pyramidem subcylindricam sensim transeunte.

Plants medium-sized, usually 8–12 cm tall. Plant base without tunic, with sparse brownish hairs among petiole bases; petiole (broadly) winged to narrowly winged, ~1–2.5 cm long, medium deeply suffused purple. Leaves variously erect-patent, mid-green to slightly greyish green, later often suffused brownish purple, with scattered arachnoid hairs to ± glabrous, usually oblong-oblanceolate in outline, 7–12 × 1.5–3.5 cm, usually pinnatisect; terminal segment broadly triangular to flat rhombic, usually 1–1.5 × 0.8–2 cm, acute, sometimes ± constricted, distal margin ± straight (less often subconcave), basal lobules usually patent, acute to acuminate, proximal margin ± straight to subconvex; lateral segments in 3–4 (5) pairs, usually ± short and broad, ~1–1.7 cm long, 0.7–1.3 cm wide at base, usually patent, distal margin subconcave, subsigmoid to subconvex, often with a single tooth, apex acute to acuminate, proximal margin subsigmoid to ± straight, entire or with a single little tooth; interlobes relatively long, usually 2–9 × 3–7 mm, with green surface, sometimes bordered brown-purple, sparsely dentate (with variously long teeth), margin usually raised; mid-vein pink-purple to purple. Scapes pale greenish, suffused purplish basally and distally, arachnoid, subequalling leaves, usually 5–9 cm long during anthesis. Capitulum yellow, convex, usually 3.5–4 cm wide. Involucre deep olivaceous-green, broadly obconical at base. Outer phyllaries 12–17, upper ones ± patent and sigmoid, lower ones arcuate-reflexed or reflexed with tips pointing towards the scape, often ± twisted, lanceolate to narrowly lanceolate, usually 7–9 × 2–3 mm, adaxially light greenish or greyish so, abaxial surface dark olivaceous-green to dark greyish green, with an abrupt transition into a dirty whitish border ~0.1 mm wide, margin not ciliate or sparsely so in the distal 1/3, apex flat; inner phyllaries ~12 mm long, of ± equal width or slightly unequal. Outer ligules ± flat, relatively narrow, striped purplish deep grey outside, ligule teeth blackish, inner ligules canaliculate, teeth brownish to dark yellow. Stigmas long exserted, light to medium dark discoloured, greyish honey-coloured to dirty yellow-grey, outer pubescence light coloured, in distal part of stigmas often with blackish tips, or all hairs with a dark distal half. Pollen present, pollen grains irregular in size. Achenes light greyish stramineous or light greyish-brownish, often with an olivaceous tinge, 2.7–4.7 × 1.0–1.1 mm, body with subdense, numerous dorsiventrally flattened spinules, sometimes also squamules, in the upper 1/4, spinules distinct, long, erect, to 0.5 mm, long acuminate, body otherwise transversally rugose and tuberculate, often with lateral longitudinal ridges serrulate-spinulose, body gradually narrowing in a subcylindrical cone (0.4–) 0.6–1.0 mm long, with one or several minute spinules near cone base; beak 6–9.5 mm long, pappus 5–8.5 mm, whitish to dirty white. – 2n = 32 (det. J. Kirschner under no. K-107/86, PRA, no. det. 36370). – Agamosperm.

Diagnostic notes: *Taraxacum paclovae*, as an intermediate between a subalpine and a lowland section, differs from all the high mountain, truly oreophytic taxa in features similar to those of *T.* sect. *Taraxacum* (see also above, the introduction to this group). Differences from other forms included in the *T. paclovae* group are given below.

Distribution and habitat: *Taraxacum paclovae* is known from Slovakia (the West Tatra Mts and the Belianske Tatry Mts), although its occurrence in Poland is quite probable. Its habitats include grassy banks of mountain roads, disturbed sites along mountain tracks and paths, clearings, usually between 1,000 m and 1,600 m. The IUCN conservation status is estimated as VU.

Specimens examined: SLOVAKIA. Západné Tatry, Oravica, slopes of Mt Bobrovec, ~1,600 m, Jul 1989, J. Kirschner & L. Kirschnerová, cult. as JK 1058 (PRA, no. det. 36360). – Ibidem, cult. as JK 1059 (PRA, no. det. 36358). – Ibidem, cult. as JK 1051 (PRA, no. det. 36356). – Ibidem, cult. as JK 1050 (PRA, no. det. 36354). – Ibidem, cult. as JK 1066 (PRA, no. det. 36377). – Ibidem, cult. as JK 1064 (PRA, no. det. 36375). – Ibidem, cult. as JK 1060 (PRA, no. det. 36373). – Ibidem, cult. as JK 1062 (PRA, no. det. 36371). – Ibidem, cult. as JK 1063 (PRA, no. det. 36376). – Ibidem, cult. as JK 1065 (PRA, no. det. 36374). – Liptovský Mikuláš, the Roháče Mts, valley of Jalovecká dolina, ~1,000 m, 3 Jul 1985, J. Kirschner (PRA, no. det. 36389, 36385). – Ibidem, cult. as JŠ 2249 (PRA, no. det. 36372). – Ibidem, cult. as JŠ 2250 (PRA, no. det. 36391). – Ibidem, cult. as JŠ 2251 (PRA, no. det. 36387). – Západné Tatry, a path on the ridge of Radové skaly, between Mt Biela skala (1,316 m) and Mt Sivý vrch (1,805 m), limestone, 1,500–1,600 m, 21 Jul 1988, J. Štěpánek, cult. as JŠ 3309 (PRA, no. det. 36383). – Ibidem, cult. as JŠ 3308 (PRA, no. det. 36381). – Ibidem, cult. as JŠ 4469 (PRA, no. det. 36379). – Ibidem, cult. as JŠ 3311 (PRA, no. det. 36390). – Ibidem, cult. as JŠ 4470 (PRA, no. det. 36388). – Ibidem, cult. as JŠ 3307 (PRA, no. det. 36386).

Less certain identification: SLOVAKIA. Západné Tatry, Oravica, slopes of Mt Bobrovec, ~1,600 m, Jul 1989, J. Kirschner & L. Kirschnerová, cult. as JK 1063 (PRA, no. det. 36362). – Liptovský Mikuláš, the Roháče Mts, valley of Jalovecká dolina, ~1,000 m, 3 Jul 1985, J. Kirschner (PRA, no. det. 36370). – Ibidem, cult. as JŠ 1503 (PRA, no. det. 35364, 36370).

Notes on the other morphotypes of the Taraxacum paclovae group

(A) Population from the valley of Jalovecká dolina, characterized by substantially less dentate leaves; it may represent several clones: SLOVAKIA. Liptovský Mikuláš, the Roháče Mts, valley of Jalovecká dolina, ~1,000 m, 3 Jul 1985, J. Kirschner (PRA, no. det. 36526, 2n = 32, det. J. Kirschner, no. K-108/86). – Ibidem (PRA, no. det. 36528). – Ibidem, cult. as JŠ 1499 (PRA, no. det. 36530, 2n = 32, det. J. Kirschner, no. K-104/86). – Ibidem, *R3* (PRA, no. det. 36532). – Ibidem, cult. as JŠ 1501 (PRA, no. det. 36534, 2n = 32, det. J. Kirschner, no. K-105/86; PRA, no. det. 36525). – Ibidem (PRA, no. det. 36527). – Ibidem, *R2* (PRA, no. det. 36529). – Ibidem, cult. as JŠ 1500 (PRA, no. det. 36531, 36533). – Ibidem, *RA3* (PRA, n. det. 36535). – Ibidem, cult. as 1506 (PRA, no. det. 36536, 36538, 2n = 24 det. J. Kirschner, no. K-110/86).

(B) Populations from the vicinity of Mt Sivý vrch in the Západné Tatry Mts, characterized by longer interlobes, narrower leaf lateral segments, relatively narrow, arcuate-recurved outer phyllaries and darker discoloured stigmas: SLOVAKIA. Západné Tatry, a path on the ridge of Radové skaly, between Mt Biela skala (1,316 m) and Mt Sivý vrch (1,805 m), limestone, 1,500–1,600 m, 21 Jul 1988, J. Štěpánek, cult. as JŠ 3310 (PRA, no. det. 36544). – Západné Tatry, subalpine meadow in Mt Malá Ostrá, ~2 km S. of Mt Sivý vrch, 21 Jul 1988, J. Štěpánek, cult. as JŠ 3996 (PRA, no. det. 36539). – Ibidem, cult. as JŠ 3998 (PRA, no. det. 36537). – Ibidem, cult. as JŠ 3995 (PRA, no. det. 36554). – Ibidem, cult. as JŠ 3993 (PRA, no. det. 36552). – Ibidem, cult. as JŠ 3997 (PRA, no. det. 36550). – Západné Tatry, a subalpine meadow in Mt Malá Kopa (1,637 m), 21 Jul 1988, J. Štěpánek, cult. as JŠ 3991 (PRA, no. det. 36548). – Ibidem, cult. as JŠ 3989 (PRA, no. det. 36546).

(C) A form close to *T. paclovae* but leaf segments and interlobes entire; different from the other Sivý vrch samples: SLOVAKIA. Západné Tatry, under *Pinus mugo* on S. slope of a ridge between Mt Biela skala (1,316 m) and Sivý vrch (1,805 m) 1,450–1,500 m, 21 Jul 1988, J. Štěpánek et al., cult. as JŠ 3302 (PRA, no. det. 36543). – Ibidem, cult. as JŠ 4464 (PRA, no. det. 36541).

(D) A population somewhat resembling *T. innuptum* but pollen present, interlobes not blotched, achenes different; from *T. paclovae* it differs in unbordered, narrow outer phyllaries: SLOVAKIA. Západné Tatry, village of Liptovské Matiašovce, ridge of Radove skaly near Mt Sivý vrch (1,805 m), 1,700–1,750 m, 21 Jul 1988, J. Štěpánek (PRA, no. det. 36545).

(E) The population from the Belanské Tatry Mts, with more densely arachnoid and more deeply purplish leaves, with filiform teeth scattered on interlobes and lateral segments, and terminal segment elongated: SLOVAKIA. Belianské Tatry, a ridge above Kopské sedlo, Sep 1989, J. Kirschner, cult. as JK 304 (PRA, no. det. 36524). – Ibidem, cult. as JK 312 (PRA, no. det. 36368). – Ibidem, cult. as JK 342 (PRA, no. det. 36366).

A new section recognized in the Romanian Carpathians

The complicated hybridogenous nature of polyploid agamospermous dandelions sometimes gives rise to extraordinary, morphologically outstanding populations almost incomparable in terms of their relationships and sectional position. For example, *Taraxacum* (*Wendelboa*) *obtusum* (van Soest) Doll (Kirschner et al. 2020), *T.* (*Pachera*) *pacheri* Sch. Bip. and *T.* sect. *Cucullata* van Soest (Uhlemann 2015). Sexual dandelions sometimes are represented by similarly isolated forms, such as *T.* (*Antarctica*) *gilliesii* (Uhlemann et al. 2004), *T.* (*Pristina*) *assemanii* (Kirschner et al. 2021b) and *T.* (*Echinulata*) *mirabile* (Kirschner et al. 2021a).

Whether or not such a conspicuous entity should be treated as a separate section is debatable, particularly in cases when relationships between isolated populations and a similar *Taraxacum* section are known. In the present paper, it was decided to erect a new section for plants from the calcareous mountain ranges in northern Romania; in spite of a relatively detailed knowledge of the taxonomy of *Taraxacum* in the Balkan Peninsula (Štěpánek & Kirschner 2022a) and the Carpathians (Štěpánek et al. 2011), it was not possible to place these Romanian plants in any of the known sections.

D. ***Taraxacum*** sect. ***Oreodoxa*** Štěpánek et Kirschner, **sect. nov.**

Type: *Taraxacum incredibile* Štěpánek et Kirschner

Diagnosis: Plantae heptaploideae, phyllariis exterioribus numerosissimis imbricatis, eis superioribus adpressis lanceolatis et longioribus, eis inferioribus subpatentibus ovatis et brevioribus, involucro aspectu generali plerumque quasi echinulato, necnon acheniis griseo-stramineis vel pallide griseo-brunnescentibus robustis superne squamulosis spectabiles.

The new section, *T.* sect. *Oreodoxa*, includes a single species and a full description is given below:

25. ***Taraxacum incredibile*** Štěpánek et Kirschner, **sp. nov.** (Figs 9B, 49–52).

Type: ROMANIA. Romania septentr., montes Rodna, herbosis in decl. petrosa (calc.) ~1 km situ boreal. a monte Ripa Piatra Rea, supra pagum Borşa, ~1,450 m, 12 Aug 1981, J. Štěpánek, cultivated as JŠ 146, collected in 1986 (PRA, no. det. 20301, holotype; isotype: PRA, no. det. 20302).

Etymology: Unbelievable, incredible, referring to the spectacular character combination.

Exsiccates: Taraxaca Exs., no. 792–793.

Diagnosis: Plantae mediocres, foliis crassioribus subglabris, phyllariis exterioribus conspicue imbricatis, adpressis usque subpatentibus, laete viridibus, pruinosis, conspicue albomarginatis, ligulis extus luteis estriatis, stigmatibus saturate luteis, acheniis robustis et crassis, corpore superne grosse squamuloso, pappo brunnescente bene dignoscendae.



Fig. 49. Three sites of *Taraxacum incredibile* in northern Romania, near the Ukrainian border.

Plants usually medium-sized, 12–20 (–25) cm tall, usually with a single root head. Plant base with a slightly developed brownish tunic, sparsely brownish arachnoid among petiole bases. Petiole pale greenish, sometimes pinkish adaxially, narrowly winged to unwinged (inner leaves). Leaves erect-patent, glaucous-green or greyish yellow-green, not spotted, glabrous or with sparse hairs on mid-vein, ± broadly oblanceolate in outline, usually 6–9 × 2–3 cm, (runcinate-) pinnatipartite to pinnatisect; terminal segment usually dominant, narrowly triangular to triangular, usually 2.5–4 × 2–2.7 cm, subacute, ± sagittate at base, distal margin ± straight or subsigmoid, entire or with shallow obtuse incisions (± undulate), proximal margin ± straight to sigmoid, entire, basal lobules acute, recurved; lateral segments in 2–4 (7) pairs, opposite, either broadly to narrowly deltoid or ± linear-triangular, from a broader base abruptly narrowing in an acuminate distal part, usually subhamate-recurved, most often (0.7–) 1–2.5 cm long, ~1 cm wide at base, proximal segments usually smaller and narrower, often with a convex or sigmoid distal margin, entire or with one or several teeth, and proximal margin straight or ± undulate, entire or with one or rarely several teeth at base; interlobes narrow and relatively long (5–10 × 2–3 mm), surface usually spotted brown-purple, margins often bordered brown-purple, ± raised, entire or sparsely dentate; mid-vein adaxially faintly brownish-pinkish or pale. Scapes overtopping leaves, pale greenish, scattered arachnoid, more densely so below capitulum, often with a single remote narrowly lanceolate bract-like phyllary ~1 cm long, descending 1–2 (–5) cm below involucre. Capitulum ± light yellow to bright yellow, ± flat, ~4–4.5 cm wide. Involucre pruinose, relatively robust, 9–10 mm wide and ± truncate at base. Outer phyllaries very numerous, usually 25–28, conspicuously imbricate, of echinate appearance as the upper ones are loosely appressed and distinctly longer

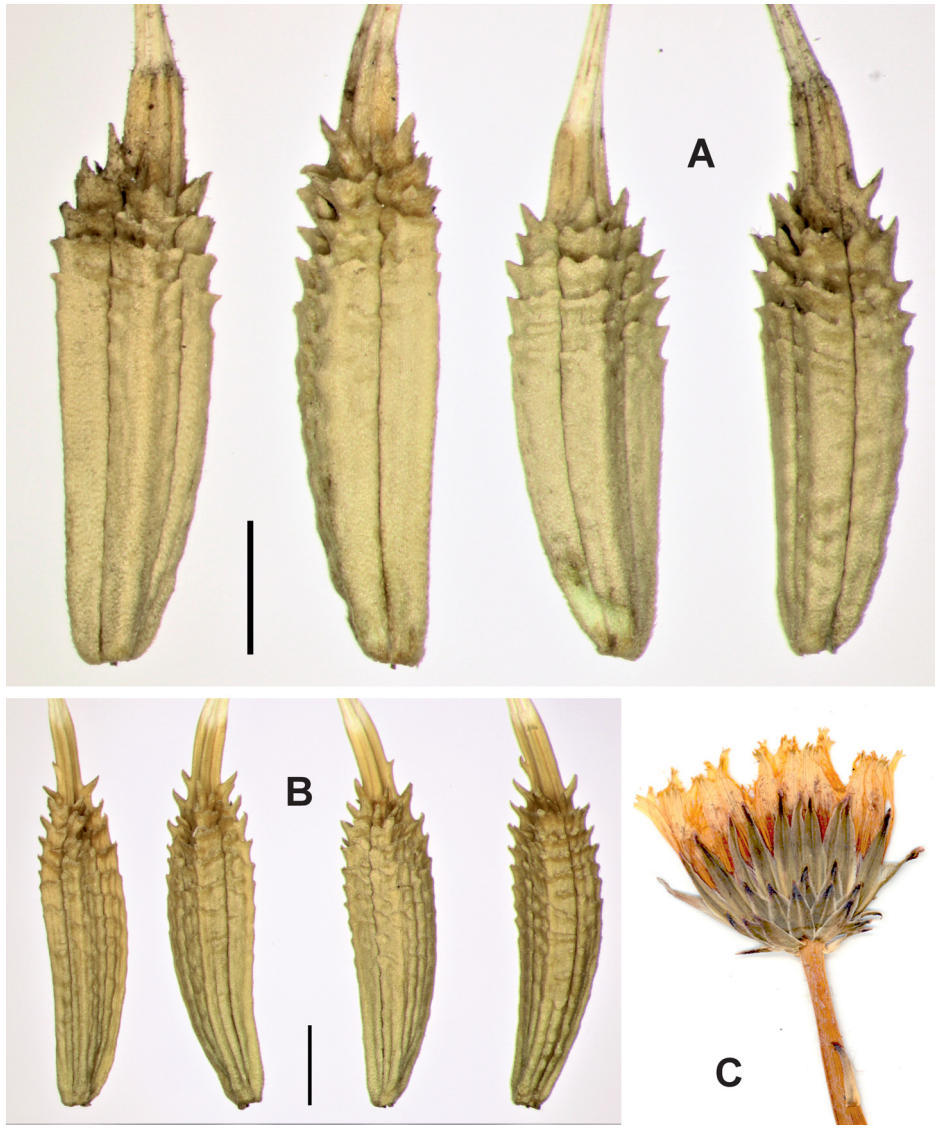


Fig. 50. *Taraxacum incredibile*. (A) achenes (PRA, no. det. 20302); (B) achenes (PRA, no. det. 20298); (C) flower head (PRA, no. det. 20301). A, B, scale bars = 1 mm.

(1/2–3/4 of the inner phyllaries) and narrower, gradually getting shorter (reaching 1/3 of the inner phyllaries) and broader and more patent towards involucre base, lanceolate to ovate, (4.5–) 6–10 × 2.5–3.5 mm, abaxial surface light greyish green and ± pruinose, with a dark green (or sometimes whitish green) middle part, with a distinct (but not sharply delimited) whitish border 0.3–0.4 mm wide, margin minutely ciliate or ± glabrous, apex flat, ± elongated, usually suffused brown-purple (± black when dry); inner phyllaries ~14 mm long, of ± invariable width, glaucous-green (darker than the outer phyllaries), apex flat, bright red when fresh. Outer ligules flat, relatively broad, abaxially pure yellow (not



Fig. 51. *Taraxacum incredibile*. A general habit of one of the holotype plants (PRA, no. det. 20301).

striped), teeth sometimes elongated (to 0.5 mm), yellow or brown-purple, inner ligules narrower, canaliculate, their teeth dark yellow. Stigmas long exserted, deep yellow with hyaline pubescence outside. Pollen abundant, pollen grains irregular in size. Achenes light greyish, greyish-stramineous or light greyish-brownish, relatively large, robust and thick, 4.5–5.4 × 1.1–1.4 mm, body ± densely covered with conspicuous, ± erect squamules (distally often also thick spinules) in upper 1/3, otherwise smooth or minutely tuberculate in upper 1/2, subgradually narrowing in a subconical to ± cylindrical cone (0.6–) 0.9–1.2 × 0.3–0.4 (–0.5) mm; beak (5.5–) 7.5–8 mm long, ± thin, pappus 5.5–6 mm long, dirty (brownish) white. – Agamospermous, heptaploid, 2n = ~56 (counted by J. Štěpánek under no. 270/83, PRA, no. det. 20303).

Diagnostic notes: *Taraxacum incredibile* (and the new section, *T.* sect. *Oreodoxa*) are distinct in having conspicuously imbricate outer phyllaries of "echinate" general appearance, with upper phyllaries subappressed and longer, and lower, proximal phyllaries



Fig. 52. *Taraxacum incredibile*. General habit of plants with a more compact growth and a higher number of leaf lateral segments (PRA, no. det. 20298).

shorter and erect-patent to subpatent. The whole involucre is pruinose and outer phyllaries pale green with a white border. Another distinct feature is the yellow colour of estriate outer ligules. The deep yellow stigmas are also rarely recorded among oreophytic dandelions in the Carpathians. The grossly squamulose sculpture of the achenes is also diagnostic. The derived, alloploid nature of *T. incredibile* is also indicated by its heptaploidy, a very rare ploidy level in *Taraxacum.* The involucre characters of *T. incredibile* are difficult to compare with those of other species of *Taraxacum*. Perhaps a similar pattern occurs in well developed involucres of *T. sonchoides* (D. Don) Sch. Bip. [*T.* sect. *Sonchidium* (DC.) Kirschner & Štěpánek], otherwise there is no taxon resembling the new section.

Distribution and habitat: *Taraxacum incredibile* occurs in two neighbouring mountain ranges in N. Romania, the Rodna Mts (Munţii Rodnei) and the Maramures Mts (Munţii Maramureşului). It is believed to be endemic to that region (Fig. 9B, 49). *Taraxacum incredibile* is also rather exceptional in its habitat preferences. It grows on and among limestone rocks in open areas in montane woodlands or subalpine stony slopes, at altitudes between ~1,000 m and 1,700 m. The IUCN conservation status of *T. incredibile* is estimated as EN.

Specimens examined: ROMANIA. The Rodna Mts, Borşa township, about 1 km N. of Mt Ripa Piatra Rea, ~1,450 m, 12 Aug 1981, J. Štěpánek, cult. as JŠ 146 (PRA, no. det. 20303). – Ibidem, distributed as Taraxaca Exs., no. 793, 2n = ~56, det. J. Štěpánek (e.g., PRA, no. det. 32143). – The Rodna Mts, limestone rocks in Mt Piatra Rea, 1,680 m, 14 Jul 1934, V. Krist (BRNU, no. det. 20300). – The Maramures Mts, village of Cârlibaba, limestone rocks above the conflunce of rivers Bistriţa and Ţibau, ~1,000 m, 28 Jun 1986, K. Sutorý, cult. as JŠ 2372 (PRA, no. det. 20298). – Ibidem, cult. as JŠ 3763 (PRA, no. det. 20299). – Ibidem, cultivated, distributed as Taraxaca Exs., no. 792 (e.g., PRA, no. det. 32145). – Ibidem, 28 Jun 1986, K. Sutorý (BRNM 391913, 391914, no. det. 32508; BRNM 391912, no. det. 32506).

Discussion

General features of the Taraxacum flora of the Carpathians

Although the coverage and sampling intensity of the material used in the present paper cannot be considered satisfactory, it does allow certain conclusions. The main observations show the flora as largely agamospermous, with a single but very notable exception, the only sexual member of *T.* sect. *Rhodocarpa* (= *T.* sect. *Alpestria*), which is widespread in the Southern Carpathians in Romania. A comparison with the geographically close oreophytic dandelion flora in Bulgaria shows a remarkable difference in this respect: With the exception of *T.* sect. *Rhodocarpa*, all the other alpine and subalpine sections in Bulgaria include a sexual species and a group of closely related apomicts (Štěpánek & Kirschner 2022a, b). Oreophytic sexual species of *Taraxacum* do not occur in most of the Carpathians and the Alps, where sexual oreophytes are unknown.

The morphological and species diversities of *Taraxacum* in the Carpathians can be compared with those in the Alps and Bulgaria. The Carpathians appear rather depauperate in this respect, which may be a consequence of the area of each of the mountain ranges and maximum extent of the distribution of forests in the Post-Glacial period (and the area above the timberline). The diversity in the western and southernmost Carpathians, however, is quite high. One of the exceptional features of the mountain flora of *Taraxacum* in the Carpathians is the separate monotypic section *T.* sect. *Oreodoxa* in

the limestone northern Romanian Carpathians (Rodna, Maramures). It is obviously a highly derived hybridogenous taxon.

General remarks on the distribution patterns of dandelions in the Carpathians

When generalizing the prevailing patterns in the geographical distribution of the oreophytic species of *Taraxacum* in the Carpathians, the following features are noteworthy: (i) the majority of the Carpathian species are confined to the Carpathians and do not occur in the Alps. (ii) there are two notable exceptions in the alpine belt, *T. crocelliforme* and *T. pawlowskii*, both known from the eastern Alps and western and eastern Carpathians, and both with a much higher frequency in the Carpathians. There is a possible third case, *T. venustum* sensu lato, but it requires further study.

Note: A marginal species of *T.* sect. *Rhodocarpa*, *T. hercynicum*, is a special case with its geographical range extending from the E. Alps and the Hercynian highlands (mainly Bohemia and Germany) to the westernmost Carpathians (the Moravsko-slezské Beskydy, Moravia, and the Veľká Fatra Mts, Slovakia). The Slovak occurrence seems to be quite isolated. (iii) species occurring in the Western Carpathians (Poland and Slovakia) often occur in the Ukrainian Carpathians and adjacent northern Romanian Carpathians. (iv) species known to occur in the Southern Carpathians (the Fagaras, the Retezat and the Bucegi Mts) do not occur in north-western ranges in the Carpathians. Only *T. elegantissimum* is known both from northern Romania (Rodna) and Southern Carpathians (Retezat, Fagaras).

The key factor shaping the distribution of mountain dandelions is the restricted area and isolation of alpine (and subalpine) "islands" in the Carpathians. Furthermore, it is probably the relatively recent origin of agamospermous *Taraxacum* species that also predetermines their occurring mostly in restricted geographical ranges (cf. Štěpánek & Kirschner 2022b). A comparable and very similar situation is reported for species of *Alchemilla* L. in central Europe (Fröhner 1995); with the exception of the species with a substantial distribution in the Balkan Peninsula, there are almost no species with an exclusively Alpine-Carpathian range (the existing records are mostly erroneous, perhaps with the exception of *A. versipila* Buser).

As regards the other taxa, mostly of an earlier origin, the majority of Alpine-Carpathian species have a certain part of their geographical ranges in the Balkan Peninsula (if we disregard the frequent occurrence in the Pyrenees and the Apennines), while the few Alpine-Carpathian dandelions do not occur in the Balkans. Examples of species with distributions similar to that of *T. crocelliforme* and *T. pawlowskii* are *Crepis alpestris* (Jacq.) Tausch, *C. jacquinii* Tausch, *Carex firma* Host, *C. fuliginosa* Schkuhr, *Carduus crassifolius* subsp. *glaucus* (Nyman) Kazmi, *Cerastium uniflorum* Rchb., *Cerastium fontanum* Baumg. subsp. *fontanum*, *Dianthus glacialis* Haenke, *Doronicum clusii* (All.) Tausch s. lat., *Pedicularis hacquetii* Graf, *Pinus cembra* L., *Salix helvetica* Vill., *Viola alpina* Jacq. and, if agamospermous members of the genus *Hieracium* L. are considered, the only Alpine-Carpathian species are *Hieracium rostanii* Nägeli et Peter, *Hieracium halleri* Vill. and *Hieracium vierhapperi* (Zahn) Szeląg. Almost all the other taxa with ranges largely confined to the Alps and Carpathians have a part of their distribution in the Balkan peninsula, such as, *Pinus mugo* Turra, *Senecio subalpinus* W. D. J. Koch, *Cardaminopsis halleri* (L.) Hayek and *Gentiana punctata* L. (mostly also extending to the Sudetes in the Czech Republic).

Table 2. A survey of endemism in the Carpathians, with a comparison of *Taraxacum* species and an overall Carpathian endemism according to Kliment et al. (2016). WC – the Western Carpathians, EC – the Eastern Carpathians, SC – the Southern Carpathians. The terms are expounded in Kliment et al. (2016). *Including apomictic taxa.

	Carpathian subunit	*Taraxacum*	Kliment et al. (2016)*
Mesochoric	WC	7	56
	EC	1	35
	SC	1	25
Stenochoric	WC	4	76
	EC	0	11
	SC	3	27
Microchoric	WC	0	29
	EC	1	2
	SC	0	3
Total		17	264

Species diversity and endemism of oreophytic Taraxacum in Carpathian countries

When the frequency of endemism is estimated and compared among countries, it is a striking fact that the least explored region, the Romanian Carpathians harbours five endemics (out of eleven species, and an endemic section, *T.* sect. *Oreodoxa*). Both the number of species and number of endemics are likely to increase with further explorations. A higher number of species (16), with eight endemics, are reported in Slovakia, an area with a variety of mountain ranges rich in dandelions, which can be attributed to the detailed exploration of most parts of Slovakia. The number of "state" endemics is expected to decrease when several species growing very close to the Polish border are also detected in Poland. This study revealed that there is not a single mountain dandelion endemic to Poland. It is, in all likelihood, a consequence of the topography of the Polish Carpathians where the major ranges are divided by the Slovak/Polish border. In spite of the relatively restricted alpine and subalpine area in the Ukrainian Carpathians, there are five species, one of which is considered as endemic to Ukraine.

As regards the whole of the Carpathians, there are 25 oreophytic dandelion species, and fourteen of them are confined to a single country. Comparison of endemism according to the geographical units and types of endemism recognized in Kliment et al. (2016, see also the map on Fig. 1) reveals that if only narrow endemism is considered (i.e., the mesochoric, stenochoric and microchoric distribution types of Kliment et al., op. cit.), the number of endemics in the Carpathian subdivisions roughly corresponds to the figures given by Kliment et al. (2016). The highest number, eleven endemic species, are found in the Western Carpathians; the lowest number (two) in the Eastern Carpathians and a relatively high proportion of endemics (four) in the Southern Carpathians in Romania.

Only four species of the Carpathian oreophytic *Taraxacum* are known to occur outside the Carpathians (*T. crocelliforme* and *T. pawlowskii* in the Alps, both with a wide distribution in the Western and Eastern Carpathians, *T. hercynicum* in the Alps and German and Czech highlands (and a locality in the Moravian westernmost Carpathians, there is only a single site in the Slovak Western Carpathians), and *T. pseudoalpestre*, a Southern Carpathian species, in Bulgaria. It is concluded that 21 species (84%) are confined to the Carpathians, but not a single one can be considered as a pan-Carpathian species (with localities in all the major parts of the Carpathians).

Table 2 summarizes the endemism of Carpathian dandelions and compares it with the overall endemism estimated by Kliment et al. (2016). Although the inclusion of apomictic taxa in the latter may introduce a bias because the knowledge of the distribution of various agamospecies is rather limited (which increases the number of microchoric taxa), the proportion of endemic species in individual parts of the Carpathians seems to be similar.

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Přehled vysokohorských druhů rodu *Taraxacum* v Karpatech ukazuje velmi omezený překryv s flórou Alp

Podrobili jsme taxonomické revizi rod *Taraxacum* v subalpínských a alpínských polohách Karpat (Polsko, Slovensko, Ukrajina, Rumunsko). Základem pro revizi byly vlastní sběry a sběry našich spolupracovníků, povětšinou z kultivovaných rostlin. Významný podíl materiálu tvoří rovněž starší herbářové sběry, včetně typových exemplářů. Karpatské horské pampelišky patří do čtyř sekcí, *T.* sect. *Crocea* (= *T.* sect. *Fontana*), *T.* sect. *Alpina*, *T.* sect. *Rhodocarpa* (= *T.* sect. *Alpestria*), a nově popsaná monotypická *T.* sect. *Oreodoxa*, s jediným, vysoce polyploidním druhem, *T. incredibile*, omezeným na vápencová pohoří severních rumunských Karpat. Druhové bohatství rodu *Taraxacum* v Karpatech zahrnuje po naší revizi 25 druhů, z toho deset nově popsaných; 16 druhů bylo nalezeno na Slovensku, sedm v Polsku, pět na Ukrajině a 11 v Rumunsku (14 druhů je svým výskytem omezeno na území jednoho státu). Zvláštní pozornost byla věnována skupině forem v blízkosti alpského *T. venustum*; výsledkem je nový podrobný popis *T. venustum*, zjištění, že se tato skupina, tj. *T. venustum* sensu lato, vyskytuje i ve východních Karpatech, a popis dvou nových druhů, *T. pseudovenustum* z jižních Karpat a *T. pygmaeum* ze západních Alp. Pouze tři horské druhy známé z Karpat se vyskytují také v Alpách: *T. crocelliforme*, *T. pawlowskii* a *T. venustum* sensu lato. Výjimečné postavení zaujímá *T. hercynicum*, rostoucí v submontánních a montánních, ojediněle i subalpínských polohách východních Alp, středoevropských hercynských vrchovin, sudetských pohoří, Moravsko-slezských Beskyd a izolovaně též ve Velké Fatře na Slovensku. Zkoumali jsme též charakter endemismu u horských karpatských pampelišek. Z 25 druhů je 17 svým výskytem omezeno na jednu karpatskou oblast, většina z nich na západní Karpaty. Kriticky jsme analyzovali hlavní moderní zdroje údajů o rodu *Taraxacum* v Karpatech, přičemž četné údaje o výskytu alpských druhů v Karpatech jsme museli zamítnout. Podrobně jsme revidovali originální materiál sedmi jmen publikovaných R. Dollem ze Slovenska; tři z nich jsme synonymizovali a pro pět jsme vybrali lektotypy; čtyři jména považujeme za nomenklatoricky správná.

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