

# A new annual *Bupleurum* (*Apiaceae*) species from Northeastern Bulgaria and Romanian Dobrogea

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**Abstract.** *Bupleurum uechtritizianum* from NE Bulgaria and N Dobrogea (Romania) is described as a species new to science. The species is well distinguished with its large oil ducts visible as broad longitudinal purplish-brown lines on immature fruits. Morphologically, the new taxon is very similar to *B. asperuloides* and has been misidentified as it for a century. The invalidly published name of *B. sintenisianum* is commented on.

**Key words:** *Apiaceae*, *Bupleurum*, new species, Northeastern Balkans

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## Introduction

At the end of August 2009, I received some pictures of a suspicious *Bupleurum* species, found in the valley of river Cherni Lom (NE Bulgaria). The first conclusion based on the plant's habit and on the umbels' morphological characteristics was that this was *B. asperuloides* Heldr. I asked Ilcho Kolev (an amateur botanist, who sent me the pictures) to check for prominent papillose projections on the dorsal side of the petals and particularly in the point of bending, which are representative of the species and a diagnostic character often used in the identification keys. The absence of such formations was the initial, although tiny detail, that stirred up my interest for further explorations.

The population of *Bupleurum* in the vicinities of Ostritsa village, Ruse district (valley of river Cherni Lom) was visited at the end of September the same year. The observed plants were in the unripe fruit stage. One striking feature that gripped our attention were the purplish-brown longitudinal strips between the ridges of some mericarps. The surface on the dorsal side, around midrib of the petals retained by some individuals was finely granulose-rugulose but

not with verrucose formations, which are typical for *B. asperuloides*. The bractlets turned out to be 3-veined and flat, while these of *B. asperuloides* are univeined and pronouncedly keeled. From this moment on the question was: does this combination of characters differing obviously from *B. asperuloides* result from some local variation, or do they demonstrate stability and discretion?

The established distinctions provoked a critical review of the *Bupleurum* specimens in the Bulgarian herbarium collections, particularly of those deposited under the name of *B. asperuloides*. Three materials (see the list of examined specimens) were defined in the course of the study, all three from Northeastern Bulgaria, whose features (absence of verrucae on dorsal face of petals and non-keeled bractlets) coincided with the ones of the population around Ostritsa village. First, the localities in the valley of river Cherni Lom found by Ilcho Kolev were visited in October (near Ostritsa and Katselovo villages). Then an exploration was undertaken of the localities on the grounds of the existing herbarium specimens. The search was successful. Plants from five populations (two in the valley of river Cherni Lom, two in the surroundings

of Balchik town and one in the environs of Aksakovo town, Varna district) were collected for observation of the morphological peculiarities. The most important conclusion from the field work was that the mericarps of all individuals from all researched populations had purplish-brown longitudinal strips contrasting with the green background of the still unripe fruits.

The constancy of several characters in populations about 200 km away from each other has prompted the conclusion that the studied taxon is a separate one, a well differentiated and distinguished from *B. asperuloides* new species, described formally here.

## Species treatment

***Bupleurum uechtritizianum*** S. Stoyanov, sp. nov. (Fig. 1)

Haec species ab affini *Bupleuro asperuloide* Heldr. bracteolis trinerviis (non uninerviis carinatis), petalis dorso subglabris (non papillosis) marginibus subintegris (non denticulatis), pedicellis fructiferis 0.7–1.5 mm longis (non 0.3–0.6 mm), vittis majoribus (non minutis) valleculis solitariis (non 3–4) visibilibus inter jugiis in fructibus immaturis et commissuris binis (non 4) differt.

**Type.** Bulgaria: NE Bulgaria, Ruse district, Dve Mogili Municipality, East and Northeast of Ostritsa village, 210 m, 43°32.067' N, 25°59.000' E, 28.08.2009, coll. S. Stoyanov & I. Kolev (holotype SOM-165541!; isotypes SOM! PRC! BUCA!)

Annual, 20–70 cm, with a conspicuous main stem and many branches in the middle and the upper part. Stem erect, 4-angular in the upper part, cylindrical below, smooth. Leaves 20–80 × 1–6 mm, narrowly lanceolate to linear, acuminate, with 3–7 veins visible beneath, withered during anthesis, with amplexicaul base, margin scabrous. Top umbels 2(–3)-rayed, rays very unequal, non-divergent, 2–15(20) mm, lateral umbels 1(–2)-rayed, short-pedunculate to sessile. Bracts 2(–3), 2–4(5) × 0.5–0.8 mm, lanceolate, acuminate, 3-veined, subcarinate, scabrous on margin and veins. Bractlets 4, 2–3.5 × 0.5–0.7 mm, lanceolate, acuminate, 3-veined, non-keeled, scabrous on margin and veins. Umbellules 1–6-flowered, pedicels 0.5–0.8 mm during anthesis, 0.7–1.5 mm after anthesis, subequal. Petals yellow (sometimes purplish tinged at the bend and margin), 0.6–0.7 × 0.6–0.9 mm, subentire, slightly backward curved at lateral ends, inflexed lobe with

fragile raised marginal wing, c. 0.3 mm broad at top, midrib inconspicuous, at the bend elevated and finely granulose-rugulose. Anthers 0.3–0.4 mm, filaments 0.6–0.7 mm. Stylopodium 0.6–0.7 mm broad, narrower than fruit, styles 0.2–0.3 mm, shorter than stylopodium radius. Immature mericarps 2–2.5 × 0.8–1.0 mm, rounded pentagonal in transect, smooth, glossy, pale-green, with marked longitudinal purplish-brown lines in the furrows between the ribs, ridges filiform. Vittae large, vallecular solitary, commissural 2. Mature fruit nigrescence.

## Etymology

The new species is named after the German naturalist Rudolf Uechtritz, who has indirectly contributed to the species' discovery. The facts of his contribution are presented and commented on in the present article.

## Diagnostic characters and relationships (Fig. 2)

At first sight, mainly in the flowering period, *B. uechtritizianum* looks like *B. asperuloides*, with which, not by chance, it was misidentified until now. The mistake is caused by the conspicuous resemblance of their habit, as well as of their umbels' pattern. Both species have almost constantly two bracts and four bractlets, 2–3 non-divergent rays in the top umbels, uniradiated lateral umbels and 1–6-flowered umbellules. Such inflorescence morphology is also found in *B. rollii* (Montel.) Pignatti (endemic to South Italy and Sicily) which, according to Snogerup & Snogerup (2003), is undoubtedly the closest relative of *B. asperuloides*. The number of bracts and bractlets, although a reliable characteristic within the species, is not a sufficient distinguishing characteristic for a relationship. Idiosyncrasies of the fruits' structure are of greater weight in the taxonomic treatments of *Bupleurum*. Actually, after examination of the cross-section of the mericarps of *B. uechtritizianum*, all suspicions of identity with *B. asperuloides* dropped out. The comparatively big, single vallecular vittae not only distinguishes the new species but also proves its significant distance from *B. asperuloides* (which has three minute vittae per vallecule).

The papillate protuberances around the petal bend, as well as the presence of three vittae per vallecule are diagnostic characters that approximate *B. asperuloides* to undoubtedly closely related *B. tenuissimum* L. and *B. euboicum* Beauverd & Topali. The affinity between the two latter species is also emphasized by the presence

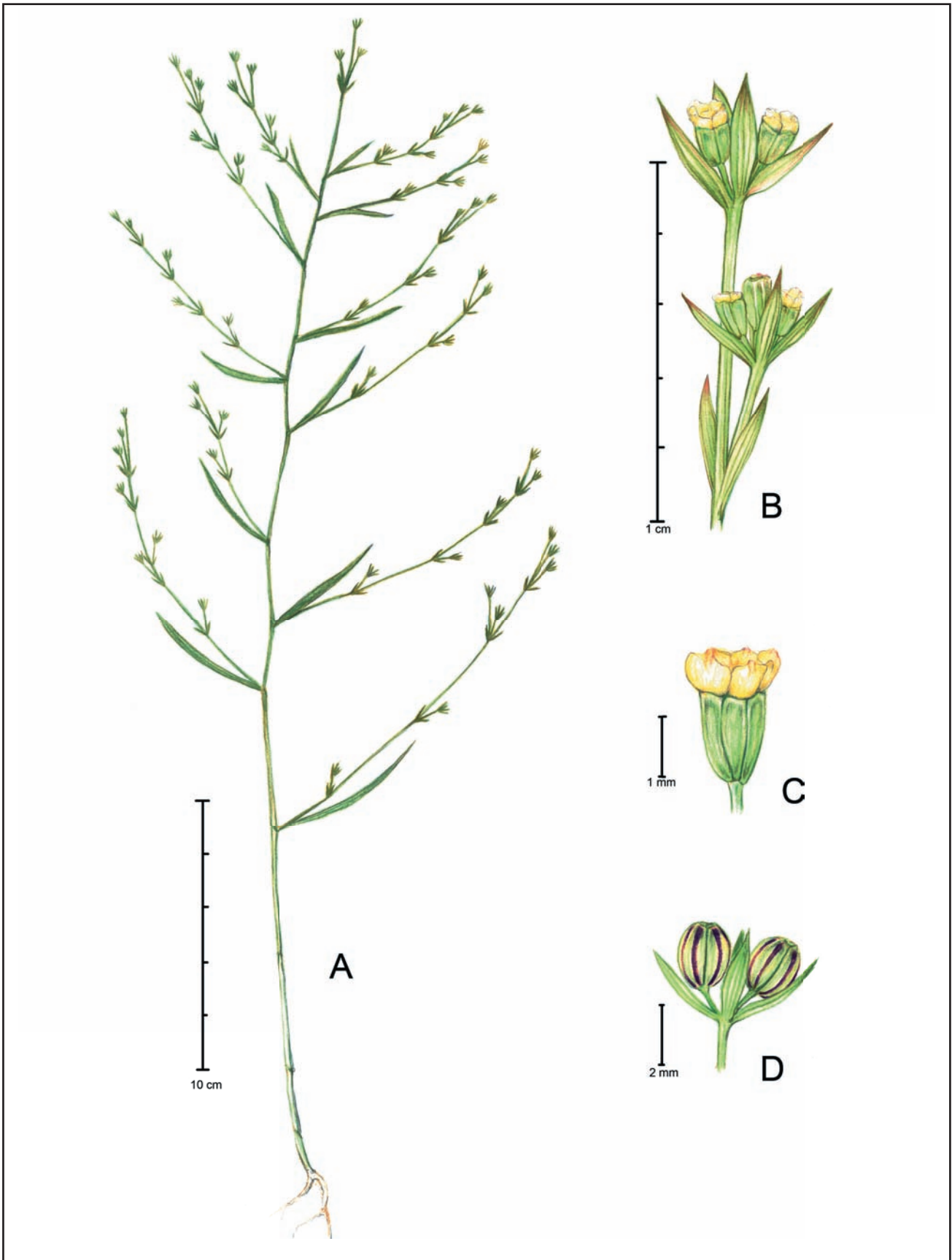
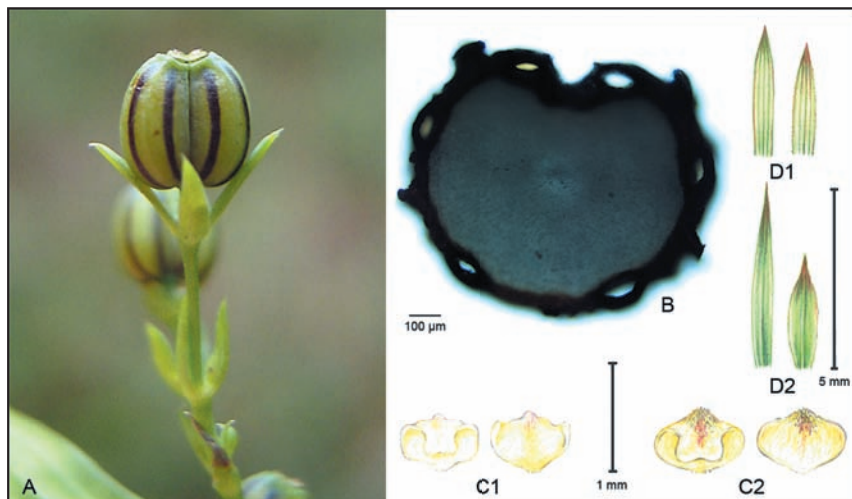


Fig. 1. *Bupleurum uechritzianum*: A – habit; B – top umbel; C – flower; D – umbellule with fruits.



**Fig. 2.** Diagnostic characters of *B. uechtritizianum* and comparison with *B. asperuloides*: **A** – vallecular vittae on immature fruit of *B. uechtritizianum*; **B** – transect of mericarp of *B. uechtritizianum*; **C** – petal (ventral and dorsal views), *B. uechtritizianum* (**C1**), *B. asperuloides* (**C2**); **D** – bract and bractlet, *B. uechtritizianum* (**D1**), *B. asperuloides* (**D2**).

of warty formations on the fruit surface. *Bupleurum asperuloides* is distinctive by its constant four bractlets per umbellule, while *B. tenuissimum* and *B. euboicum* have constant five each; furthermore, its mericarps have no verrucae. Despite these distinctions, it is closer to them than to *B. uechtritizianum*.

Often (except for the cases of ancient isolation) the species that have a limited area grow sympatrically with their close, widespread relative and, if such relative can be pointed out, then the types of genetic difference between them can be studied best (Snogerup & Snogerup 2003). In the present case, it can be assumed that the closest relative of *B. uechtritizianum* is *B. affine* Sadler, with an area of the Pannonian-Balkan-Pontic range. This supposition is based on the considerable similarity in the habit, the inflorescence structure and, to the greatest extent, in the morphological and anatomical characteristics of the mericarps. Both species have a conspicuous main stem, with numerous branches in its middle and upper part, non-divergent umbel rays, allied form and size of the petals, smooth mericarps, rounded in cross-section, singular vallecular vittae and two commissural. The most remarkable and unique diagnostic character of *B. uechtritizianum*, which distinguishes it from *B. affine* and from the other genus representatives, are the purplish-brown longitudinal strips contrasting with the green background of the unripe mericarp. These brown strips are the outward expression of the vallecular vittae, about 0.1 mm width. The two species are clearly differentiated

by the number of bracts and bractlets (2–3 bracts and four bractlets of *B. uechtritizianum*, respectively 3–4 and five of *B. affine*), by the number of umbel rays and by the colour of petals and the width of their inflexed lobe. Besides morphologically, *B. affine* and *B. uechtritizianum* also differ in their period of flowering. The first one flowers in the first half of July and the second about a month later.

On the other hand, recent studies on some critical *Bupleurum* species in Bulgaria have shown significant morphological and karyological similarities between *B. pachnospermum* Pančić and *B. affine* (Stoyanov

& Goranova 2009). This fact suggested that the new species is probably closely related to *B. pachnospermum*. The latter also proved to have singular vallecular vittae, their width comparable with the width of *B. uechtritizianum*. This was the most telling character and evidence of the assumed relationship. Some more significant resemblances were found between the two species: similarity in habit, petal morphology sameness, as well as relative closeness in the fruits' form and size. *Bupleurum pachnospermum* is well distinguished from *B. uechtritizianum*: the first one has 4–5 more or less divergent rays in the top umbels, three bracts (3–7-veined) and five bractlets (3–5-veined). The two species are also geographically separated, which evidences their ancient origin.

Finally, on the grounds of resemblance of several characters and of the presence of areas of sympatry (Pannonian-Western and Central Balkan zone of sympatry of *B. affine* and *B. pachnospermum*; Northeastern Balkan zone of sympatry of *B. affine* and *B. uechtritizianum*), a hypothesis can be made that the species *B. uechtritizianum*, *B. affine* and *B. pachnospermum* have common descent. Subsequent genetic studies will contribute to the elucidation of their relationships.

In compliance with the recently proposed taxonomic scheme by Snogerup & Snogerup (2001), the new species should be placed in sect. *Aristata* Godron subsect. *Juncea* Briq. The species commented on above are regarded as members of the same subsection. Discontinuity found in some morphological and anatomical features between the threesomes *B. uecht-*

*ritzianum*-*B. affine*-*B. pachnospermum* and *B. asperuloides*-*B. tenuissimum*-*B. euboicum* calls for clarification of the species position within subsect. *Juncea*, as well as for revision of the sectional and sub-sectional subdivision inside *Bupleurum*.

### ***Bupleurum sintenianum* treatment**

The history of this name is traced back almost 140 years ago, when the young German botanist Paul Sintenis undertook his first collecting trips as assistant to his brother Max. Both collected mammals, birds and plants in Northern Dobrogea, Tulcea county, in the period 1872–1875. Subsequently, botanical affinity of Paul Sintenis made him turn towards the Southern Balkans, Asia Minor and the Near East. His herbarium collection from Dobrogea was determined by another German botanist, Rudolf Uechtritz. He introduced the name *Bupleurum sintenianum* in the Addenda et Corrigenenda name list of the species of Romania, accompanied by information on the distribution, “Dobr. in silv. montanis Ciucarova et Grecii”, but unfortunately without any description (Kanitz 1879–81). Although not definitely indicated, it was apparent that this name was based on the herbarium specimens No. 474e and 475 (LD) from the collection of Sintenis from Dobrogea. Uechtritz annotated on herbarium sheet No. 474e (translated): “*Bupleurum gerardi* Jacq. from the forest of Cukarova is probably a new species: *B. sintenianum* Uechtr.” and on herbarium sheet No. 475 (translated): “Likewise belongs to *B. sintenianum* Uechtr.”. Presumably, he had some arguments testifying that this was a new species, he even named it, but never provided subsequently a description, and thus the name is invalidly published until now. An interesting fact (according to the note on herbarium sheet No 474e) is that Uechtritz not only realized that he had found a new species, but also suspected that it is closely related to *B. gerardi* Jacq. (synonym of *B. affine*). After him, herbarium specimen No. 474e was seen by Herman Wolff, who revised it and listed the name *B. sintenianum* as a synonym of *B. asperuloides* (Wolff 1910). Since then, almost 100 years, the name *B. sintenianum* has remained “in the shade” of *B. asperuloides*. The name has been used as a synonym during that period by some other authors, too (Hayek 1927; Todor 1958).

In their work on the annual *Bupleurum* species in Europe, Snogerup & Snogerup (2001) indicated that the name *B. sintenianum* Uechtr., based on herbari-

um specimen No. 474a [e] (LD) of Sintenis from Romania, is *nomen nudum*. They accepted both Sintenis’s specimens (No. 474a [e] and No. 475) from Romanian populations as belonging to *B. asperuloides*. Their treatment coincided with that of the earlier authors (except Uechtritz) and the only difference was that they considered *B. sintenianum* an invalidly published name but not a synonym. Besides the variability defined by them, both authors concluded for *B. asperuloides* from Romanian Dobrogea the following: “The variation among them is, however, hardly of such a magnitude that it can motivate taxonomic recognition at any rank”.

The suspicions, first of Rudolf Uechtritz and the recent ones of Snogerup & Snogerup (2001), initiated a new research of the Romanian materials. Additional motive was the finding of the wrongly determined as *B. asperuloides* specimens in the Bulgarian herbariums, originating from localities in Northeastern Bulgaria and belonging to the above described *B. uechtritzianum* from the valley of river Cherni Lom. The examination of herbarium specimens of *B. asperuloides* from Romania (provided by the herbarium of Botanical Museum Lund, LD) ascertained that their characters clearly coincide with the ones of the designated here type specimen and confirmed the suggestions of identity with *B. uechtritzianum*. The mystery around the undescribed *B. sintenianum* was disentangled. The Romanian *B. asperuloides* specimens should be considered as belonging to *B. uechtritzianum* S. Stoyanov.

The *nomen nudum*, *B. sintenianum*, was not validated because of the following circumstances: it has been regarded repeatedly and in the course of a hundred years as a synonym of *B. asperuloides*, the specific epithet is already used, although in an adjectival form, for another species from genus *Bupleurum* (*B. sintenisi* Huter, Cyprus endemic) and, finally, because the description of *B. uechtritzianum* is based on a type specimen, selected from a different population (see type locality).

### **Distribution and habitat**

*Bupleurum uechtritzianum* is a Northeastern Balkan endemic, with a scattered occurrence in Northeastern Bulgaria and Romanian Dobrogea. Its currently restricted distribution is probably due to its ineffective ability



Fig. 3. Distribution of *B. uechtritizianum* (▲ – type locality; △ – existing erroneously determined as other species) and *B. asperuloides* (●).

for dispersal and to fragmentation of natural habitats resulting from the old, long-lasting human presence in this plain-and-hilly part of Europe.

The distribution of new species is given together with the one of *B. asperuloides* (Fig. 3). Presently, the area of *B. asperuloides* (after excluding the incorrect localities) occupies Central and North Greece, South-east Macedonia, a great part of South Bulgaria, the European part of Turkey, Northwestern Asia Minor, and the Crimea. The Northernmost locality on the Balkan Peninsula and the only one specified to the North of Stara Planina Mountains is the locality in the area of Zlatni Pyasatsi, near the city of Varna. The hesitation whether *B. asperuloides* was found on the Crimea that appeared after the revision of the Romanian materials, turned groundless. The review of the sample, given by the PRC herbarium collection, proved that Crimea is

the Northernmost and the Easternmost point of its area. Its isolated and disjunct distribution is more than 500 km away from the nearest areas of occurrence in the Balkans and Asia Minor.

In Bulgaria *B. uechtritizianum* is known for certain with five populations. Two of them are in the valley of river Cherni Lom, 4 km away from each other. The new taxon was observed to grow on the periphery of dry, thermophilous *Carpinus orientalis* Mill. forests, amongst brushwood with prevalence of *Paliurus spina-christi* Mill., and in dry grasslands dominated by *Bothriochloa ischaemum* (L.) Keng, *Stipa capillata* L. and *Festuca valesiaca* Schleich. ex Gaudin (Fig. 4). In the mosaic grass and

bush communities that comprise mainly xerophilous species were also found: *Fraxinus ornus* L., *Cornus mas* L., *Crataegus monogyna* Jacq., *Ligustrum vulgare* L., *Pyrus pyraster* Burgsd., *Rhamnus saxatilis* Jacq., *Cleistogenes serotina* (L.) Keng, *Carex halleriana* Asso., *Calamintha nepeta* (L.) Savi, *Satureja coerulea*



Fig. 4. Habitat of *B. uechtritizianum* (near Katselovo village).

Janka, *Teucrium polium* L., *Teucrium chamaedrys* L., *Bupleurum praealtum* L., *Orlaya grandiflora* (L.) Hoffm., *Peucedanum alsaticum* L., *Achillea clypeolata* Sm., *Cota tinctoria* (L.) J. Gay, *Echinops ritro* L., *Lactuca viminea* (L.) J. Presl & C. Presl, *Convolvulus cantabrica* L., *Onosma visianii* Clementi, etc. The locality near Ostritsa village is the biggest one, with an area of 4 ha, and the one near Katselovo village has an approximate area of 0.5 ha.

The other two populations are to the Northwest of Balchik town, in the closest vicinity of the town's landfill site and 1.5 km away from each other. They are linearly disposed, following the edge of the forest, in the upper part of the left-side slopes (with Southwestern exposure) of the gullies, between which lies the landfill site. Around the border strip between the pasture areas and the slope some sparse woods and bushes have formed, with *Carpinus orientalis* Mill., *Fraxinus ornus* L., *Acer campestre* L., *Tilia tomentosa* Moench, *Quercus pubescens* Willd., *Ulmus minor* Mill., *Cornus mas* L., *Crataegus monogyna* Jacq., *Ligustrum vulgare* L., *Cotinus coggygria* Scop., *Euonymus verrucosus* Scop., *Viburnum lantana* L., *Jasminum fruticans* L., *Clematis vitalba* L. and some herbaceous species, such as *Brachypodium pinnatum* (L.) P. Beauv., *Piptatherum virescens* (Trin.) Boiss., *Dactylis glomerata* L., *Bupleurum praealtum* L., *Orlaya grandiflora* (L.) Hoffm., *Convolvulus cantabrica* L., *Buglossoides purpureocaerulea* (L.) I.M. Johnst., *Inula conyzae* (Griess.) DC., *Clinopodium vulgare* L., *Paeonia peregrina* Mill., *Asparagus verticillatus* L., *Teucrium chamaedrys* L., etc.

The fifth population, from which *B. uechtritizianum* has been probably collected for the first time in Bulgaria (see the list of examined specimens), is in the Western part of the Frangelsko Plateau, in the surroundings of Aksakovo town, where the species inhabits some sparse shrubby communities of *Carpinus orientalis*. It covers an area of about 0.2 ha.

In all Bulgarian localities the new species grows on shallow stony soils, with an expressed calcareous base influence, which refer to *Lithic Leptosols* (LPq) and *Rendzic Leptosols* (LPk), according to the Food and Agriculture Organization of the United Nations (FAO) classification (FAO 1988).

The Romanian distribution of *B. uechtritizianum* (at the Ciucurova and Greci villages) is based on the herbarium samples of Sintenis from Dobrogea, so far misidentified as *B. asperuloides*. The latter's presence in the Romanian flora needs confirmation.

#### List of localities of *B. uechtritizianum*

Bulgaria (according to the field studies):

- Ruse district, NE and E of Ostritsa village (see data on type locality);
- Ruse district, W of Katselovo village, 265 m, 43°32.118' N, 26°02.269' E;
- Dobrich district, NW of Balchik, E of landfill site, 200 m, 43°25.526' N, 28°08.030' E;
- Dobrich district, NW of Balchik, W of landfill site, 210 m, 43°25.360' N, 28°06.966' E;
- Varna district, Western part of the Frangelsko Plateau, NE of Aksakovo town, 310 m, 43°15.901' N, 27°49.671' E.

Romania (based only on herbarium specimens):

- Tulcea county, Dobrogea, Babadagh, at the Ciucurova village;
- Tulcea county, Dobrogea, Macin Mountains, at the Greci village.

#### List of examined specimens

Table 1 presents chronologically the herbarium specimens belonging to *B. uechtritizianum*, that have been so far misidentified and existed under other names. The history of their reference is given in the column named "Determined by/ revised by".

Table 2 enlists the herbarium specimens on which is based the updated distribution of *B. asperuloides*. The cited Bulgarian localities are based on the seen and revised materials from the Bulgarian herbarium collections of SO, SOM, and SOA (including a material from the PRC collection). The localities in Crimea, Macedonia and Greece are given according to Snogerup & Snogerup (2001), and the Turkish ones are based on the information in the *Flora of Turkey* (Snogerup 1972) and on the ISTE herbarium materials.

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Table 1. Localities of *B. uechtritizianum*, according to the revised material (\*in brackets current geographical names).

Original label*	Collected by/ Date	Determined by/ Revised by	Notes on the sheet	Herbarium sheet no.
<b>Romania</b>				
Dobrudscha. Babadagh: Wald von Tschukarowa (Ciucurova village)	P. Sintenis 24.08.1872 non-determined (coll. no. 474a [e])	– R. Uechtritz as <i>B. sintenianum</i> – Anonymous as <i>B. setaceum</i> Fenzl. – H. Wolff as <i>B. asperuloides</i> – S. Snogerup as <i>B. asperuloides</i>	<i>B. gerardi</i> Jacq. Wald von Cukarova ist wahrscheinlich eine neue Art: <i>B. sintenianum</i> Uechtr.	LD 1078470
Dobrudscha. Matschin: Gebirgswald von Greci (Greci village)	P. Sintenis 04.08.1873 non-determined (coll. no. 475)	– R. Uechtritz as <i>B. sintenianum</i> – Anonymous as <i>B. setaceum</i> Fenzl. – S. Snogerup as <i>B. asperuloides</i>	Ebenfalls zu <i>B. sintenianum</i> Uechtr. gehörig.	LD 1078406
<b>Bulgaria</b>				
In collis saxosis arenosisque Deli Orman supra pagum Azemler (Aksakovo town, Varna district)	B. Davidov 27.07.1902 non-determined	– I. Assenov as <i>B. asperuloides</i>		SOM 102758
In sparse coppice forests NW from the town of Balchik	D. Jordanov 06.08.1948	– D. Jordanov as <i>B. commutatum</i> Boiss. & Balansa – S. Stoyanov as <i>B. asperuloides</i>		SO 54267
Varna, 5 km NW of town on Tolbukhin (Dobrich) road, 300 m (probably in vicinities of Aksakovo town)	M. F. & S. G. Gardner 24.07.1985	– M. F. & S. G. Gardner as <i>B. tenuissimum</i>		SOM 149405

Table 2. Localities of *B. asperuloides* (\*in brackets current geographical names).

Original label*	Collected by/ Date	Determined by/ Revised by	Herbarium sheet no.
<b>Bulgaria</b>			
In siccis graminosis decliribus, solo calcareo, expos. SE, prope Zlatni Pjasaci, Varna district	Milos Kral, 14.09.1962	– Milos Kral as <i>B. junceum</i> – S. Snogerup as <i>B. asperuloides</i>	PRC 400983
In asperis mt. Balkan orient., Emine Balkan, ad cacumen Sveti Ilia	B. Davidov, 10.08.1905	– B. Davidov as <i>B. asperuloides</i>	SOM 55135 SOM 55137
Emine – Mesemvria (Nesebar town)	S. Georgiev, 14.08.1893	– S. Georgiev as <i>B. asperuloides</i>	SO 54226 SO 54227
Banya – Mesemvria (Nesebar town)	S. Georgiev, 16.08.1893	– S. Georgiev as <i>B. asperuloides</i>	SO 54228
E of Kosharitsa village, Nesebar district	S. Stoyanov, 20.08.2004	– S. Stoyanov as <i>B. asperuloides</i>	SOM 160531
between the villages of Maglen and Cherna Mogila, Aytos district	S. Stoyanov, 20.08.2004	– S. Stoyanov as <i>B. asperuloides</i>	SOM 160548 SOM 160549
between Kotel and Avramov (Mokren village, Sliven district)	P. Panov, 31.08.1965	– P. Panov as <i>B. asperuloides</i>	SOM 133977
Valley of Magareshka river, NW of Sliven	P. Panov, 02.09.1965	– P. Panov as <i>B. asperuloides</i>	SOM 133976
Barmuk Bair hill, above Sliven	P. Panov, 06.09.1970	– P. Panov as <i>B. asperuloides</i>	SOM 133975
Gagovets hill, above Sliven	D. Jordanov, 21.09.1941	– D. Jordanov as <i>B. asperuloides</i>	SO 54233 SO 54235



Table 2. Continuation

Original label*	Collected by/ Date	Determined by/ Revised by	Herbarium sheet no.
W of Binkos village, Sliven district	S. Stoyanov, 25.09.2009	– S. Stoyanov as <i>B. asperuloides</i>	SOM 165162
Mehmech Kyoy (Rosen village, Sozopol district)	A. Yavashov, 19.08.1903	– A. Yavashov as <i>B. asperuloides</i>	SOM 55136
NW of Kamen Vrah village, Elhovo district	D. Jordanov, 04.09.1941	– D. Jordanov as <i>B. asperuloides</i>	SO 54234
N of Golyam Dervent village, Elhovo district	S. Stoyanov, 22.08.2004	– S. Stoyanov as <i>B. asperuloides</i>	SOM 160551 SOM 160552
Manastirski hills, N of Madrets village, 230 m, 42°09.210' N, 26°05.998' E	S. Stoyanov, 26.09.2009	– S. Stoyanov as <i>B. asperuloides</i>	SOM 165163
Smirnentsi village, Harmanli district, 194 m, 41°48.064' N, 25°53.137' E	S. Stoyanov, 26.09.2009	– S. Stoyanov as <i>B. asperuloides</i>	SOM 165160
Oreshari village, Krumovgrad district	A.S. Petrova, I. Gerasimova, 28.08.1996	– A.S. Petrova, I. Gerasimova as <i>B. asperuloides</i>	SOM 156936
Papazli (Popovitsa village, Sadovo district)	J. Mrkvička, 28.08.1914	– J. Mrkvička as <i>B. asperuloides</i>	SOM 55130 SOM 55131 (p.p.)
Papazli (Popovitsa village, Sadovo district)	V. Stříbrný, 08.1914	– V. Stříbrný as <i>B. asperuloides</i>	SOM 55129 SOM 55132 SOM 55134
Nova Mahala village, Batak district	V. Stříbrný, 07.09.1899	– V. Stříbrný as <i>B. asperuloides</i>	SO 54229 SO 54230
Nova Mahala village, Batak district	V. Stříbrný, 07.1905	– V. Stříbrný as <i>B. asperuloides</i>	SOM 55133
near Kocherinovo railway station, Stanke Dimitrov district (Dupnitsa district)	P. Panov 31.08.1964	– P. Panov as <i>B. asperuloides</i>	SOM 117452 SOM 117453 SOM 118016
Dolna Gradeshnitsa village, Kresna district	D. Dimitrov 08.10.2008	– D. Dimitrov as <i>B. asperuloides</i>	SO 105270
between Lilyanovo village and Sandanski	D. Delipavlov 25.08.1989	– D. Delipavlov as <i>B. asperuloides</i>	SOA 47832
Slavyanka Mt., Yanovo village, Sandanski district	I. Pashaliev 25.08.1992	– I. Pashaliev as <i>B. asperuloides</i>	SOM 151052
<b>Macedonia</b>			
Demirkapia	Formánek 08.1891		PR
<b>Greece</b>			
Panorama village, Thessalonike district	Osborn & Osbornova 15.08.1981 non-determined	– Miloš Haek as <i>B. asperuloides</i>	PRC 400984
road Kastoria–Neapoli, 40° 23'N, 21° 25'E	Matthäs 15.09.1983	– Matthäs as <i>B. asperuloides</i>	B, LD
Distr. Grevena, in monte Mavrovouni, inter Anixis et Melissi	Greuter & Charpin 13.08.1974	– Greuter & Charpin as <i>B. asperuloides</i>	G, LD, UPA, W
Prope Rachova in regione inferiore mt. Parnassi	Heldreich 26.08.1856	– Heldreich as <i>B. asperuloides</i>	FI, G, LD, M, PRC, S, W, WU-Hal
<b>Turkey</b>			
Marmaraköy Yeniköy arası, Tekirdağ	G. Çakırer 05.09.1975	– Özhatay as <i>B. asperuloides</i>	ISTE 33752
Yeniköy Uçmakedere arası, Tekirdağ	G. Çakırer 05.09.1975	– Özhatay as <i>B. asperuloides</i>	ISTE 33758
Çanakkale: Dardanelles, nr. Kalabaklı	P. Sintenis 04.09.1883 non-determined (coll. no. 1009 p.p.)	– P. Ascherson as <i>B. setaceum</i> Fenzl. – S. Snogerup as <i>B. asperuloides</i>	LD 1078278

Table 2. Continuation

Original label*	Collected by/ Date	Determined by/ Revised by	Herbarium sheet no.
Bursa	Pichler 1873	– Pichler as <i>B. setaceum</i> Fenzl. – S. Snogerup as <i>B. asperuloides</i>	WU 2804
Istanbul: Yakadjik Dadg	Aznavour 25.09.1893	– S. Snogerup as <i>B. asperuloides</i>	G
Manisa: Manisa Dagħ (monte Sipylo)	J. Ball 21.10.1867	– S. Snogerup as <i>B. asperuloides</i>	
Kütahya: Gediz, Şaphane dagħ	Davis (coll. no. 18512)	– S. Snogerup as <i>B. asperuloides</i>	
<b>Crimea</b>			
Tauria meridionalis, Jalta	Golde 21.08.1900	– Golde as <i>B. pauciradiatum</i> – Anonymous as <i>B. asperuloides</i> var. <i>laxum</i> Fenzl. – S. Snogerup as <i>B. asperuloides</i>	PRC 400982

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