Taxonomic revision of *Rubus* ser. *Pallidi* in Hungary and adjacent regions

Taxonomická revize *Rubus* ser. *Pallidi* v Maďarsku a přilehlých oblastech

Gergely Király[1], Bohumil Trávníček[2] & Vojtěch Žíla[3]

[1]*University of West Hungary, Institute of Silviculture and Forest Protection, H-9400 Sopron, Ady E. u. 5., Hungary, e-mail: kiraly.gergely@emk.nyme.hu;* [2]*Department of Botany, Palacký University in Olomouc, Faculty of Science, Šlechtitelů 11, CZ-783 71 Olomouc, Czech Republic, e-mail: bohumil.travnicek@upol.cz;* [3]*Mládežnická 1227, CZ-386 01 Strakonice, Czech Republic, e-mail: zila@gymstr.cz*

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The apomictic taxa of section *Rubus*, subsection *Hiemales* E. H. L. Krause, series *Pallidi* W. C. R. Watson occurring in Hungary and adjacent regions are herein revised based on comprehensive field studies and herbarium revisions. The standard batological literature did not previously confirm the occurrence of this series in the region. However, the revision revealed that a formerly overlooked taxon grows in Hungary, which is described herein as a new species under the name *Rubus saladiensis*. In addition, we placed another regional species, *R. brunneri*, which was formerly included in ser. *Vestiti,* in ser. *Pallidi*. We present diagnostic features, drawings and photographs of both species plus characteristics of their habitats, distribution maps and lists of the specimens revised. *Rubus saladiensis* occurs in Illyrian *Aremonio-Fagion* forest communities in the Zala Hills (SW Hungary). *Rubus brunneri* is typically found in the region with beech forests and scattered acidic Scots pine-oak stands in the border region of Austria, Hungary and Slovenia. The presence of other taxa from this series reported in the region was not confirmed by herbarium vouchers so these records are treated as misinterpretations. The ranges of both *R. brunneri* and *R. saladiensis* have distinct sub-Atlantic characteristics in the Pannonian Basin. The climate in their distribution area (hills along the Rába and Mura rivers in the south-western part of the basin) is humid, precipitation-rich and similar in many aspects to that in the western foothills of the Alps. We demonstrate that the occurrence of the ser. *Pallidi* in the Pannonian Basin is of geobotanical importance and the species presented here have a distribution in the region unlike that of other series in the subgenus *Rubus*.

K e y w o r d s: apomixis, biogeography, distribution, Pannonian Basin, *Rubus*, taxonomy

Introduction

Studies of apomictic species provide opportunities for understanding biogeographical processes, distribution and migration dynamics with several genera of *Rosaceae* (e.g. *Cotoneaster*, *Sorbus*) guaranteed to be an unlimited repository of information for future studies (Bartish et al. 2001, Dickinson et al. 2007, Robertson et al. 2010, Vít et al. 2012). This opportunity applies especially to species of blackberries (*Rubus* L. subgen. *Rubus*), which include several diploid species and numerous agamospermic polyploids (Holub 1992, Weber 1995, 1999, Šarhanová et al. 2012). Based on regional studies (Weber 1985, Matzke-Hajek 1993, 1997), the taxonomy of the subgenus is well described for central and north-western Europe, whereas the first modern insights into the blackberries of

south-eastern Europe were only published recently (Trávníček & Zázvorka 2005, Kurtto et al. 2010). The range sizes and structure of *Rubus* biotypes are of particular taxonomic importance. Only stable morphotypes are accepted as species; the type of range and the minimum extent of their distribution areas are discussed and classified in different ways (Weber 1996, Holub 1997, Bijlsma & Haveman 2007, Ryde 2011, Haveman & de Ronde 2013).

Rubus subsect. *Hiemales* E. H. L. Krause ser. *Pallidi* W. C. R. Watson is a heterogeneous and possibly polyphyletic group (Holub 1992, Weber 1995). Watson (1946) established and gave this group of brambles series rank; nevertheless, this taxonomic unit has since been assessed in different ways. Even Watson (1958) only considered this group to be a subseries within the "ser. *Apiculati* Focke"; Heslop-Harrison (1968) and Weber (1973) mention the ser. *Pallidi* as a part of the ser. *Radula* (Focke) Focke. The ser. *Pallidi* is usually distinguished from other groups in the subgenus *Rubus* in terms of its procumbent or low-arching, slightly angled or rounded stem with numerous stalked glands and lack of felted hairs beneath the stem leaves and presence of scattered hairs on the upper surface of stem leaves. Weber (1985) refers to some species (e.g. *R. pallidus* Weihe, *R. fuscus* Weihe) as possibly being typical representatives of a separate series, but since other taxa (e.g. *R. scaber* Weihe, *R. foliosus* Weihe) seem to be transitional to the ser. *Radula* (which typically includes taxa having greyish or whitish stellate-hairs on the underside of the leaves), he rejected the separation of these series. Other authors (e.g. Trávníček & Havlíček 2002) include species that are usually considered to belong to the ser. *Micantes* Sudre (e.g. *R. chaerophylloides* Sprib.) or ser. *Glandulosi* (Wimmer et Grab.) Focke (e.g. *R. siemianicensis* Sprib.) to ser. *Pallidi*. Tomaszewski et al. (2013) record that small branched hairs occur on the leaves of all the four species of the ser. *Pallidi* that they analysed and propose the inclusion of these species in the ser. *Radula*.

Recently, despite the somewhat weak morphological differences, Weber (1995) and numerous new national monographs (e.g. Matzke-Hajek 1993, Holub 1995, Monasterio-Huelin 1999, Trávníček & Havlíček 2002, Zieliński 2004, Kurtto et al. 2010, van de Beek et al. 2014) accept this grouping, while Stace (2010) includes it in ser. *Radula*. Thus, along with the clear majority of recent European authors, we consider ser. *Pallidi* to be a separate group.

According to modern assessments, the number of European species in this series is approximately 60; the centre of its distribution is in north-western Europe, with many species being recorded in the Benelux states and England (Weber 1995, Kurtto et al. 2010). These species are relatively rare in the eastern part of central Europe. In Poland, Zieliński (2004) reports six species, of which three are endemic: *R. oboranus* (Sprib.) Sprib., *R. pfuhlianus* Sprib. and *R. posnaniensis* Sprib., the latter is also now recorded for the Czech Republic. Two species that are frequent in north-eastern Europe (*R. pallidus* and *R. scaber*) are rare in Poland; the only widespread species is the bipolar distributed *R. schnedleri* H. E. Weber. In the Czech Republic, species of this series were discovered only recently (Holub 1992, 1995, Weber 2000, Trávníček & Havlíček 2002), including an endemic species *R. josholubii* H. E. Weber. In Austria, a single species, *R. bregutiensis* A. Kerner ex Focke, is reported in the most western part of the country (Vorarlberg and Tirol; Weber 1987, Maurer 1994, Pagitz et al. 2014).

The Pannonian Basin and the Balkan Peninsula are practically unexplored from the point of view of modern batology (Király et al. 2013a, b), and although there are old records of the ser. *Pallidi* from several countries in this region (Hungary: Kiss 1966; Romania: Nyárády 1956; Slovakia: Gáyer 1921), these reports are not accepted by Kurtto et al. (2010). In this paper, we present the first confirmation and modern assessment of the presence of ser. *Pallidi* in the Pannonian Basin, based on both comprehensive herbarium revisions and field studies.

Material and methods

The field study was carried out between 2009 and 2014 at approximately 1200 localities with brambles in the Pannonian Basin and bordering mountains (in Austria, Croatia, Hungary, Romania, Slovakia and Slovenia). The coordinates of each locality were determined using a Garmin GPSMAP 64 hand held device in WGS 84 projection. Nearby localities (within 500 metres) were only considered when situated in a different quadrant or municipality. The quadrant numbers of the Central European Flora Mapping System are as presented by Niklfeld (1971), whereas the grid codes of old records with insufficient information regarding the exact locality were disregarded. Grid units of the Atlas Florae Europaeae (AFE) are as defined by Kurtto et al. (2010).

The material in the following herbaria (see acronyms defined by Thiers 2014) was searched for previous records of *Rubus* ser. *Pallidi* in the area studied: BP, BPU, DE, GJO, GZU, LJU, JPU, OL, PECS, SAMU, W, ZA, ZAHO.

Older literature records of the ser. *Pallidi* occurring in this region proved to be unusable after herbarium revision; thus, we only accepted the data in the literature of W. Maurer for *R. brunneri* as it is corroborated by voucher specimens. The conspectus of data follows the (bio)geographical systems that are presented by Nikolić et al. (1998) for Croatia, Dövényi (2010) for Hungary and Perko (1998) for Slovenia, whereas for Austria the administrative boundaries were used. The morphological characterization of *R. brunneri* and *R. saladiensis* was based on the revision of 20 reference specimens of each species from the herbaria listed above. First-year stems with well-developed leaves were examined together with the flowers and fruits of living material; abnormal and injured plants were not included in the assessments. Additional reference material for the comparative study of similar species was obtained from the herbaria listed above. The terms that were adopted in the ecological characterization of the species are those defined by Weber (2001).

Results and discussion

During the course of recent field studies in Hungary and adjacent parts of neighbouring countries, we repeatedly observed two widespread biotypes of brambles belonging to *Rubus* ser. *Pallidi* that can apparently be treated as distinct species. For both taxa, we provide a detailed morphological characterization, illustrations, notes on distribution and ecology. The first taxon differs in several features from the other species in this series; thus, we describe it as a hitherto unexplored regional species. The second biotype proved identical with *R. brunneri* W. Maurer, and herein we also discuss its systematic position.

Rubus saladiensis Király, Trávníček et Žíla, **spec. nova**

D e s c r i p t i o n (see also Figs 1 and 2; Electronic Appendix 1): Shrub, usually up to 60 cm tall. First-year stems low-arching, rooting at apex, bluntly angled, 4–6 mm in diameter. Sides flat or indistinctly convex, green or slightly reddish tinted when exposed to sun, with scattered to numerous, 0.2–0.8 mm long simple and fasciculate hairs, and with 5–20 (–30) various (0.5–1.5 mm long) stalked glands per 1 cm length of stem side. Prickles 13–22 per 5 cm length of stem, yellowish or greenish (rarely purplish), usually on angles, straight or slightly curved, slightly declining, slender, abruptly broadened at the base, considerably diverse in size, 4–8 mm long. Leaves indistinctly to distinctly pedate, (4–)5-foliolate; usually light dull green on both sides, with 0.2–0.5 mm long hairs on the leaf margin and 50–100 adpressed hairs per cm^2 above; hairy to the touch but not felted beneath with scattered patent longer and adpressed minute hairs on veins (hairs do not cover the entire surface). Terminal leaflet ovate, rounded or slightly cordate at the base, apex ± gradually narrowed, 15–20 (–30) mm long; petiolules 24–33% as long as its lamina. Basal leaflets often somewhat asymmetrical, narrowly ovate to ovate or indistinctly obovate, their lamina (0.9–) 1.1–1.4 (–1.7)× as long as the petiole of the leaf; petiolules (2–) 4–8 mm long. Indentation periodic, with incisions (1–) 2–4 (–8) mm deep, teeth ± as wide as long; late leaves sometimes deep doubly serrate to lobate. Petioles hairy, with many ± sessile and stalked glands and acicles, and with 17–23 (–28) indistinctly to distinctly curved prickles. Stipules filiform, with scattered bearded hairs and stalked glands. Inflorescence paniculate or (if few-flowered) often near racemose, narrowly pyramidal, rounded near apex, with erecto-patent to almost patent branches; distal 2–6 cm leafless, upper 1 (–2) leaves simple, the ones below 3 (–5)-foliolate; indumentum on inflorescence leaves is similar to that on the first-year stems. Bracts often up to 2 cm long, their hairiness resemble that of the stipules. Inflorescence axis densely hairy with many adpressed shorter silky and longer patent hairs; stalked glands (10–) 20–50 per 1 cm length of the axis, ± as long as the patent simple hairs. Prickles 8–22 per 5 cm length of axis, declining, conspicuously slender, straight or slightly curved, 3–8 mm long. Pedicels 1.0–1.5 cm long, densely hairy and with many (5–30) stalked glands, prickles 6–24, somewhat curved, 1.5–3.0 mm long. Sepals entirely reflexed after anthesis, 5–7 mm long, whitish-felted with patent hairs, bristles and scattered stalked glands; pricklets usually present, small. Petals not touching each other, white or slightly pinkish, ± spathulate, (10–) 12–14 mm long and 6–8 mm broad, rounded at the apex. Stamens longer than the light green styles; anthers glabrous, yellow or yellowish-green; filaments yellow. Carpels glabrous, receptacle glabrous or with few hairs. Flowering VI–VII.

H o l o t y p e: Hungary, Zala County, Homokkomárom, 0.7 km W of Korpavár along the road to Hosszúvölgy, Scots pine plantations; N46.517778°; E16.955556°; 9467.4; 170 m a. s. l., 16. 10. 2013, fruiting, leg. G. Király et D. Schmidt, BP 739623. Isotypes: BP 733734, BP 739624.

E t y m o l o g y: The name "*saladiensis*" refers to the administrative unit (county, or historical "comitatus") Zala (Latin: Sala, Salla) in south-western Hungary where most of stands of the new species grow.

T a x o n o m y: *Rubus saladiensis* can be regarded as a member of the ser. *Pallidi*, although the indumentum on the stem (with rather numerous stalked glands) also resembles that of some species of the ser. *Radula*. Nevertheless, the inclusion of this species in the

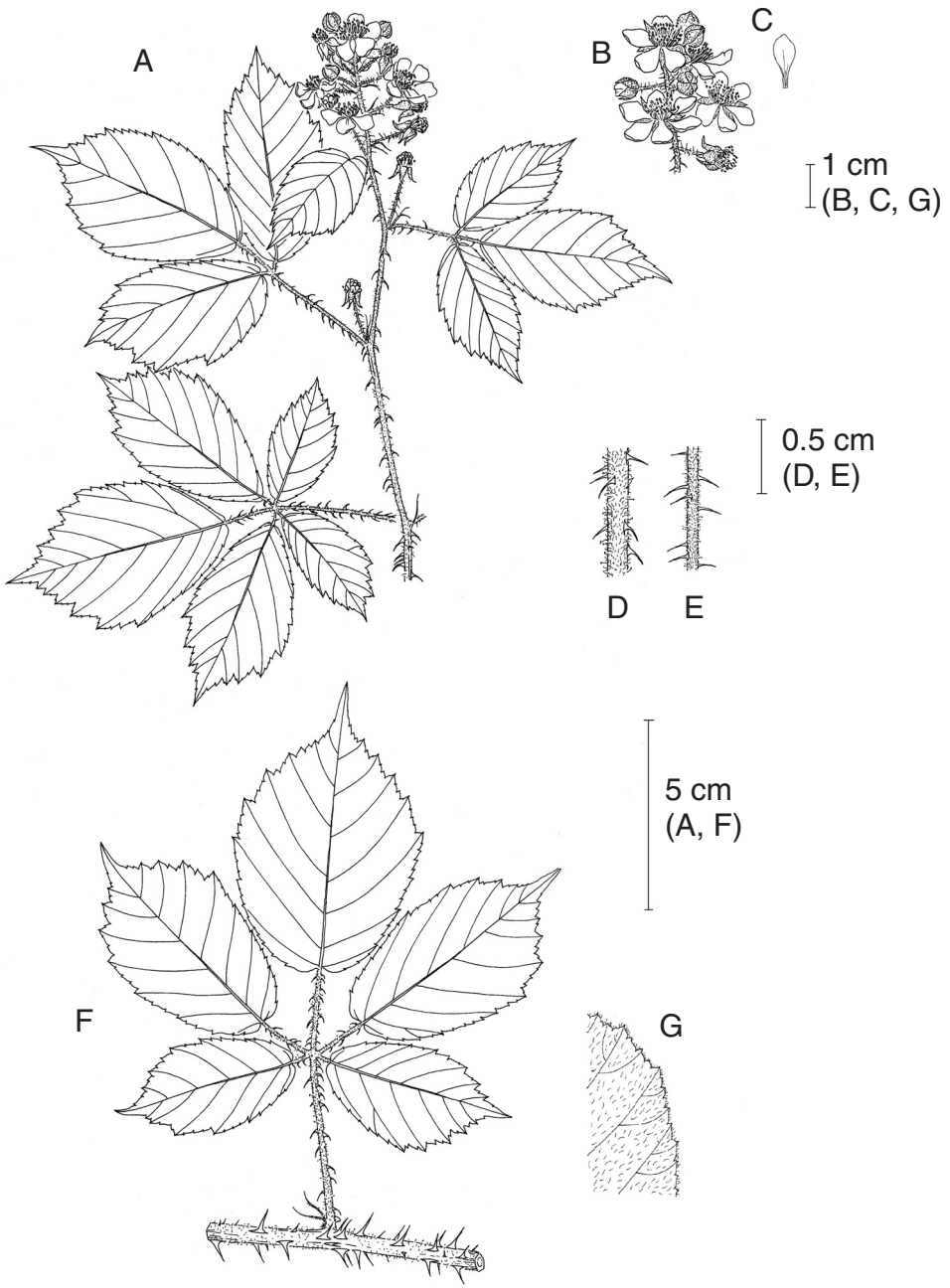

Fig. 1. – *Rubus saladiensis*: A – inflorescence, B – detail of inflorescence, C – petal, D – inflorescence axis, E – peduncle, F – first-year stem with leaves, G – margin of terminal leaflet. Del. J. Táborská.

Fig. 2. – *Rubus saladiensis*: scanned image of the holotype (SW Hungary, Homokkomárom, coll. G. Király & D. Schmidt, 16. 10. 2013, BP 739623).

latter series is incorrect, because *R. saladiensis* lacks stellate hairs on the underside of its green leaves. After delimitating the systematic position of this species, we studied all known modern European floras and numerous papers on brambles; however, we could not find any similar species in the ser. *Pallidi*. The form of the leaves is somewhat resembling that of *R. pedica* Matzk. (ser. *Hystrix*; Matzke-Hajek 1998), but differ significantly in the form of prickles on the stem and in the hairiness of the leaves (also confirmed by G. Matzke-Hajek, pers. comm.). The single former collection of *R. saladiensis* (coll. Jávorka & Zólyomi, BP 850004) was erroneously identified by Á. Kiss as "*Rubus pallidus*". *Rubus brunneri*, the other species in this series in the area studied, differs in several morphological features (see below and in Table 1).

D i s t r i b u t i o n: We could only find one former collection of this species in the herbaria examined (in addition, we confirmed its actual occurrence at the same locality, near Őrtilos). All of the other details of its distribution that are described here are based on actual field experience (see Electronic Appendix 3). *Rubus saladiensis* is a regional bramble species with a characteristic distribution area in western Hungary ("Nyugat-magyarországi peremvidék" macroregion). The range of the species is approximately 85 km long and 20 km across in a south-north direction in the eastern part of the Zala Hills; its southernmost recorded point is located south of Nagykanizsa near the Hungarian-Croatian border, and the northernmost one is located east of Vasvár (Fig. 5). The majority of the localities are concentrated within the Egerszeg–Letenyei-dombság microregion; the species is particularly abundant in the higher, southern part of this region (between the villages Bázakerettye and Oltárc). We know of two further somewhat isolated outposts in its distribution area, both with very rich stands of *R. saladiensis*: at the southernmost limit of its range in the forest area between the villages Belezna and Őrtilos (Zalaapáti-hát microregion) and at the northernmost margin of its range in the forest area between the villages Hosszúpereszteg and Mikosszéplak (Felső-Kemeneshát microregion). *Rubus saladiensis* grows only in hilly regions; the recorded localities range from 170 to 275 m a.s.l. In terms of the grid system of AFE it is present in the following units: 33TXM1, 33TXM2, 33TXN4.

E c o l o g y a n d b i o g e o g r a p h y: *Rubus saladiensis* is moderately thermophilous and often suffers severely from heat stress and low relative air humidity in summer. The species is most abundant in areas that are covered by tertiary loamy and clayey sediments (at a few localities near Nagykanizsa it also grows in loamy sands), whereas it is absent from the base-rich soils of loess-covered areas. The species prefers nutrient-poor, slightly acidic, mesic to occasionally water-logged, lessivated or pseudogley brown forest soils. In terms of habitats, *R. saladiensis* was almost exclusively found in clearings, fringes and semi-shadowed parts of natural and semi-natural broadleaf deciduous forests. Because the range of the species is located in the transition zone of the beech and oak-hornbeam forests in the Zala Hills, it can occur in both types of vegetation within a small area depending on exposure and altitude; however, the most dense and vigorous stands grow in the beech region (Zólyomi 1989; see also Fig. 5). Occurrences in secondary habitats (e.g., in older Scots pine plantations with a remarkable proportion of native deciduous tree species due to natural succession) are rather sparse. From a phytosociological point of view, forest communities of the Illyrian *Aremonio-Fagion* alliance (*Vicio oroboidi-Fagetum* and *Helleboro dumetoro-Carpinetum*) dominate in the Zala Hills (incl. Zalaapáti-hát and Egerszeg–Letenyei-dombság microregions). In the northernmost part of

the range (Felső-Kemeneshát microregion) of *R. saladiensis* Illyrian influences are weaker and these stands can be classified as *Cyclamen purpurescens-Carpinetum*, a plant association characteristic of sessile oak-hornbeam forest in the eastern foothills of the Alps (Kevey 2008, Borhidi et al. 2012). At the localities of *R. saladiensis*, typical companion species of bramble belong to the ser. *Discolores* (P. J. Müll.) Focke (most often *R. bifrons* Vest, *R. praecox* agg.), the ser. *Micantes* Sudre (e.g. *R. clusii* Borbás, *R. styriacus* Halácsy) and the ser. *Glandulosi*; however, we also know of large homogeneous stands of *R. saladiensis*. This vegetation resembles the bramble-rich scrub in clearings in western Europe, which were recently validated as a new alliance *Athyrio filicis-feminae-Rubion idaei* (Haveman et al. 2014).

Rubus brunneri W. Maurer, Mitt. Abt. Bot. Landesmus. Joanneum 21–22: 27, 1993

Type: "Oststeiermark, Haselbach nördlich von Salsach bei Weixelbaum, Kartierungsquadrant 9261/1", 24.7.1977, coll. W. Maurer (holotype: GJO 26315/1!; isotype: GZU 4994!)
Illustrations: Maurer 1993: 28 (photograph of the holotype specimen), 1993: 29 (2 colour photographs of flowering and fruiting plants)
Distribution maps: Maurer 1993: 30 ("Abb. 3."); Kurtto et al. 2010: 149 (Map. "AFE 4214")

D e s c r i p t i o n (see also Figs 3 and 4; Electronic Appendix 2): Shrub, usually up to 120 (–200) cm tall. First-year stems medium-high arching, rooting at apex in autumn, bluntly angled, 5–7 mm in diameter. Sides ± flat, dull green, with up to 100 patent hairs 0.3–1.0 mm long per 1 cm length of stem side, and with numerous sessile glands. Stalked glands (ca 0.5 mm long) 10–40 per 1 cm length of stem side. Prickles 10–25 (–30) per 5 cm length of stem, usually on angles, often of different lengths and on some parts markedly clustered, declining, abruptly broadened at the base, slender, slightly to distinctly curved, 2–5 mm long, yellowish or orange-tinted (rarely also brown-purplish at the base). Leaves pedate, (3–) 5-foliolate, usually dull green with up to 50 adpressed hairs per cm^2 on upper surface when young (later often glabrescent); light green, not felted but velvety hairy to the touch, with 0.3–0.5 mm long patents hairs beneath. Terminal leaflets with petiolules 25–32% as long as its lamina, broadly ovate or slightly obovate, rounded or indistinctly cordate at the base, with an abrupt tapering apex 10–15 mm long. Lateral leaflets obovate, with petiolules 2–5 mm long, their lamina 1.1–1.5 (–2.2) × as long as the petiole of the leaf. Serration almost regular, with incisions (1.0–) 1.5–3.0 mm deep, teeth broadly triangular. Petioles densely hairy with scattered to numerous stalked glands; prickles 10–25, strongly curved. Stipules filiform, with glandular hairs and stalked glands.

Inflorescence few-flowered (usually with less than 20 flowers), narrowly cylindrical, often branched only below (branches and pedicels erecto-patent to almost patent); distal 3–9 cm leafless, leaves (excluding the uppermost one) 3-foliolate; indumentum on leaves is similar to that on the leaves of first-year stems. Inflorescence axis densely hairy with (20–) 40–80 stalked glands per 1 cm length of the axis as long as the simple hairs. Prickles 7–15 per 5 cm length of axis, declining, slender, slightly or distinctly curved, 1–3 (–4) mm long. Pedicels 0.5–1.5 (–2.0) cm long, with adpressed and distant hairs and 30–80 stalked glands as long as or shorter than the hairs; prickles (4–) 10–23, slender, slightly curved, 1–2 mm long. Sepals patent after anthesis (reflexed later when fruiting), 5–9 mm long, greyish with dense felted and scattered patent hairs, with scattered stalked glands ± shorter than hairs; pricklets usually absent. Petals not touching each other, light

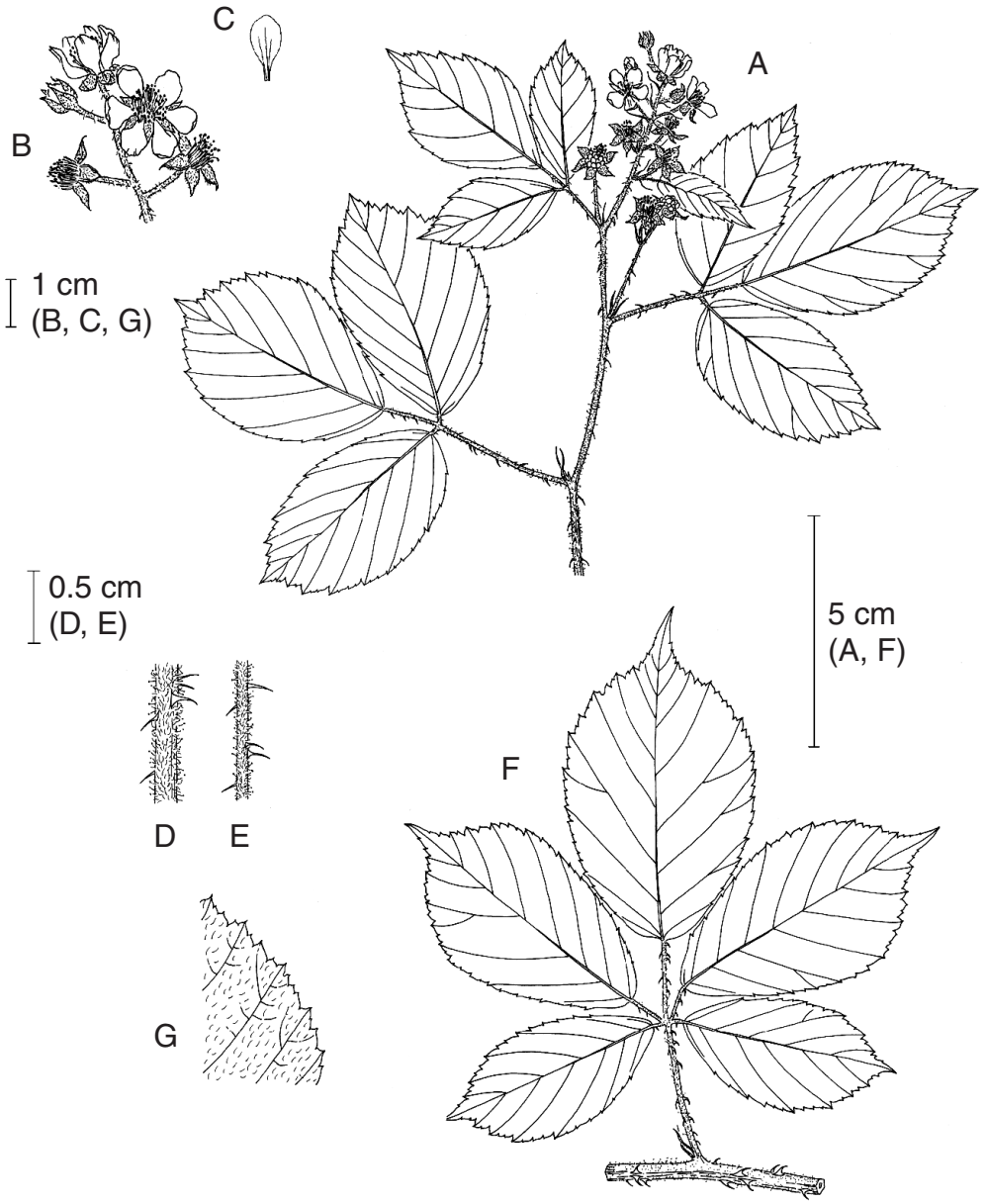

Fig. 3. – *Rubus brunneri*: A – inflorescence, B – detail of inflorescence, C – petal, D –inflorescence axis, E – peduncle, F – first-year stem with leaves, G – margin of terminal leaflet. Del. J. Táborská.

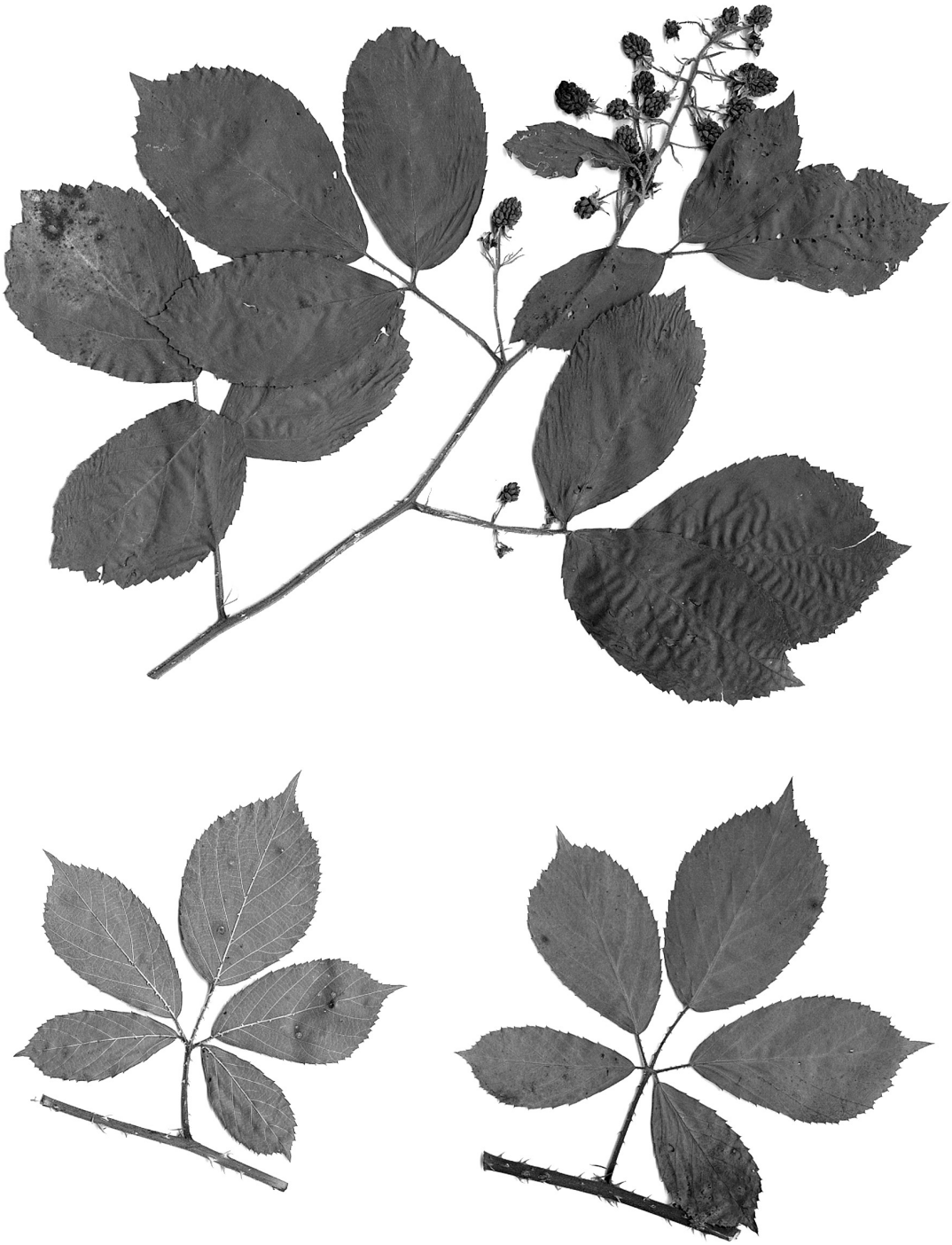

Fig. 4. – *Rubus brunneri*: scanned image of a typical specimen (loc.: SW Hungary, Apátistvánfalva, coll. B. Trávníček, 4. 8. 2011, OL).

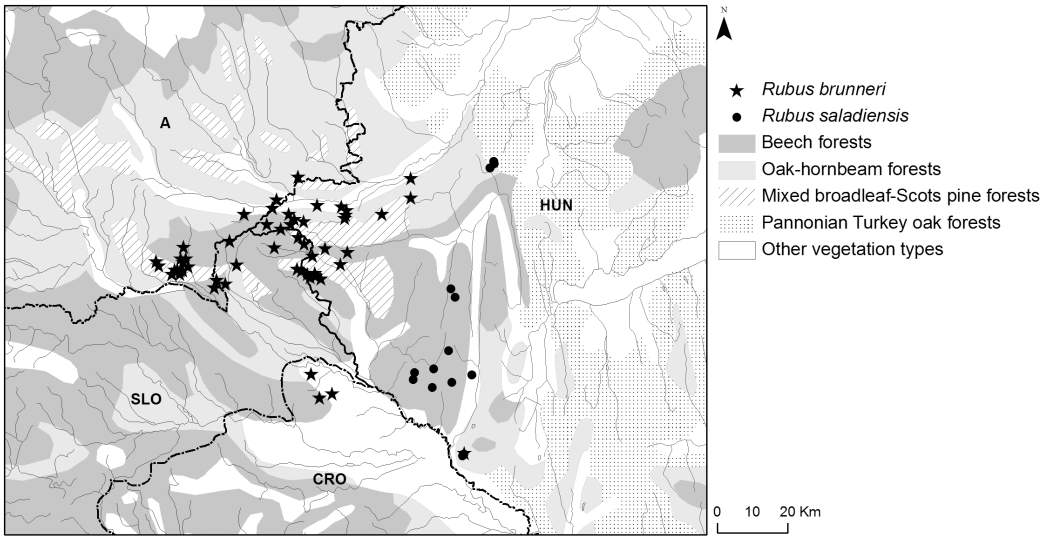

Fig. 5. – Distribution of *Rubus brunneri* and *R. saladiensis* (background: simplified vegetation map of the Pannonian Basin, plots drawn after Zólyomi (1989) and Bohn et al. (2000).

Table 1. – Main distinctive features of *Rubus brunneri* and *R. saladiensis*.

Characters	*Rubus brunneri*	*Rubus saladiensis*
Length of the prickles on the first-year stem (mm)	2–5	4–8
Form and position of the prickles on the first-year stem	strongly declining, slightly to distinctly curved	slightly declining, straight
No. of stalked glands on the first-year stem (per 1 cm of stem side)	10–40	5–20 (–30)
Form of the apex of the terminal leaflet	abrupt tapering	gradually narrows
Length of the apex of the terminal leaflet (mm)	10–15	15–20 (–30)
Form of the basal leaflets	obovate	narrowly ovate to ovate or indistinctly obovate
Serration of leaves on the first-year stem	regular	periodic
Depth of the incisions in the edges of leaves on the first-year stem (mm)	(1.0–) 1.5–3.0	(1–) 2–4 (–8)
Shape of the inflorescence	compact, narrowly cylindrical	less compact, paniculate or near racemose, narrowly pyramidal
Length of the prickles on the inflorescence axis (mm)	1–3 (–4)	3–8
Position of the sepals after anthesis	stellate-patent	reflexed
Colour of the petals	light pink	white or slightly pinkish
Length of the petals (mm)	9–12 (–14)	(10–) 12–14

pink, ± spathulate, 9–12 (–14) mm long and 6–8 mm broad, rounded at the apex. Stamens longer than the light yellowish-green styles; anthers and filaments glabrous, yellow or yellowish-green. Carpels glabrous, receptacle glabrous or (rarely) with few hairs. Flowering VI–VII.

T a x o n o m y: In the original description, Maurer (1993) wrote of *Rubus brunneri*, "it resembles (…) a species of the ser. *Mucronati*, however, based on the dense hairs on the stems and undersurface of the leaves, it is rather included in the ser. *Vestiti*". In the identification key to Austrian brambles of Danner & Fischer (2008) this species is placed in ser. *Pallidi*, but their assessment is somewhat debatable as these authors mention other more dubious species as belonging to this series. Finally, Kurtto et al. (2010) in Atlas Florae Europaeae follow the original classification of Maurer (1993) and place *R. brunneri* in ser. *Vestiti*. Although the separation of these series is not well-defined (in addition to "typical" species, there are several transitional taxa in each series), their differentiation is reasonable from at least a practical point of view. In any case, several morphological features support the inclusion of *R. brunneri* in ser. *Pallidi* (rather than ser. *Vestiti*). The leaves of this species are velvety hairy (with hairs up to 0.5 mm long) but not felted underneath. Stalked glands on the first-year stem are more numerous than in typical species in the ser. *Vestiti*. Furthermore, the shape of the prickles on the first-year stem corresponds well with this feature in ser. *Pallidi*.

D i s t r i b u t i o n (see also Electronic Appendix 3): *Rubus brunneri* was originally described as a regional species that occurred in an area approximately 40 km in diameter in south-eastern Austria and at a few localities in the adjacent part of Slovenia (Maurer 1993). The localities in both countries are well documented in Styrian herbaria (GZO and GJO). Some records without vouchers but reported by Maurer (1993, 1996) from the same quite narrow area are apparently correct. We also know of an overlooked historical herbarium sheet from south-western Hungary; however, the species is not recorded for this country. Our field work considerably extended the range of this species, which from west to east is approximately 90 km long and 70 km across (Fig. 5). In addition to the occurrences on the tertiary hill range between the Rába and Mura rivers, it was recorded north of the Rába River both in Austria and Hungary. Furthermore, there are two isolated areas at the south-eastern margin of its range: near Čakovec in north-western Croatia and south of Nagykanizsa in Hungary. *Rubus brunneri* grows only in hilly regions; the recorded localities range from 170 to 355 m a.s.l. The species is reported by Kurtto et al. (2010) from two grid units of the AFE system (33TWM3, 33TWN4). On the basis of recent field studies it is present also in the following units: 33TXM1, 33TXM2, 33TXN2.

E c o l o g y a n d b i o g e o g r a p h y: *Rubus brunneri* has sub-Atlantic characteristics and occurs in regions with high relative air humidity. This species requires tertiary clayey and gravelly sediments (at a single locality in Zala Hills in Hungary it also grows in loamy sands). It prefers nutrient-poor, acidic, semi-dry to mesic pseudogley brown forest soils and mainly grows in semi-shady and shady forest stands and gaps; occurrences in open clearings are rare. The range of *R. brunneri* is located in beech and oak-hornbeam regions with scattered occurrences in acidofrequent Scots pine-oak forests (Zólyomi 1989). With the exception of the Croatian outpost (which can be classified as *Helleboro dumetorum-Carpinetum* vegetation), these forests are only weakly affected by Illyrian elements. The majority of the occurrences in Austria, Hungary and Slovenia phytosociologically belong to species-poor variants of the *Genisto nervatae-Pinetum*

sylvestris and *Cyclamini purpurascenti-Carpinetum* (and much more rarely to *Luzulo-Fagenion*) associations and their derivatives (Bohn et al. 2000, Kevey 2008; Fig. 5). *Rubus brunneri* is a typical member of a species-poor group of acidophilous brambles (e.g. *R. clusii* Borbás, *R. gayeri* Király, Trávníček et Žíla, *R. holosericeus* Vest, *R. radula* Weihe), which occurs mainly scattered in the scrub layer of forests and never forms large homogenous stands.

Additional taxa of series Pallidi in the area studied

The very few modern assessments of the bramble flora in this region (e.g. Maurer 1994, Maurer & Drescher 2000) and the European monograph of Kurtto et al. (2010) consider species of ser. *Pallidi* to be absent from the Pannonian Basin. Floras based on the monograph of Sudre (1908–1913) report many names belonging (in actual sense) to ser. *Pallidi*. Nevertheless, herbarium vouchers for data from this region are missing in every case, thus none of these records can be accepted. Although this is not an exhaustive list, we give here the most important names that are published mistakenly as occurring in the study area: Austria (Danner & Fischer 2008): *R. flexuosus* P. J. Müller et Lefèvre, *R. scaber*; Hungary (Kiss 1966): *R. bloxamii* (Bab.) Lees, *R. foliosus* Weihe, *R. fuscus* Weihe, *R. leujenei* Weihe, *R. pallidus*, *R. scaber*, *R. tereticaulis* P. J. Müller, *R. teretiusculus* Kaltenb.; Romania (Nyárády 1956, Ciocârlan 2009): *R. fuscus*, *R. scaber*, *R. tereticaulis*; Slovenia (Martinčič 2007): *R. bregutiensis*, *R. scaber*.

Other assessments of neighbouring regions also report some unreliable records of taxa belonging to ser. *Pallidi*: Bulgaria (Assyov et al. 2002): *R. scaber*, *R. tereticaulis*; Ukraine (Mosyakin & Fedoronchuk 1999): *R. tereticaulis*.

Particulars of the distribution of series Pallidi in the Pannonian Basin

The range of ser. *Pallidi* is confined in Europe to sub-Atlantic regions (Weber 1995, Kurtto et al. 2010: 201, map. "AFE4375"). Occurrences of species in the series closest to Hungary are reported from western Austria and the border region between the Czech Republic and Poland; they are not recorded in either the Carpathians or the Balkans. We consider the distribution of ser. *Pallidi* in the Pannonian Basin, as characterized in a recent paper, as obviously associated with certain environments and vegetation history. Morphotypes (created by the hybridization of glandular and non-glandular biotypes) with *Pallidi*-like features have repeatedly been recorded occurring throughout Hungary and adjacent regions, but environmental pressure only allowed them to become species in the hilly south-western part of the region. The humid and precipitation-rich climate, the almost exclusively acidic soils and the occurrences of sub-Alpine habitats strengthen the general "Atlantic-mountainous" characteristics of this favourable area (Pócs 1981, Pécsi 1989, Zólyomi 1989, Niklfeld 1993, Bohn et al. 2000). Representatives of all of the other groups of brambles that are recorded in Hungary and its neighbouring areas also occur further east (e.g. in the sub-continental Western Carpathians, the North Hungarian Mts and Transylvania). Thus, ser. *Pallidi* has a unique distribution in the Pannonian Basin compared to that of other taxonomic units in sect. *Rubus*.

See www.preslia.cz for Electronic Appendices 1–3

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Souhrn

Na základě podrobného terénního výzkumu a revize příslušných herbářových sbírek bylo studováno zastoupení serie *Pallidi* W. C. R. Watson (rod *Rubus* L., sect. *Rubus*, subsect. *Hiemales* E. H. L. Krause) v Maďarsku a přilehlých územích. Přestože v moderní taxonomické literatuře nebylo z této oblasti zastoupení uvedené skupiny uváděno, podařilo se zde identifikovat dva stabilizované regionální apomiktické druhy, které lze podle morfologických znaků ke zmíněné sérii spolehlivě přiřadit. První z nich byl dosud taxonomií ostružiníků přehlížen a je v práci popsán jako nový druh pro vědu a nazván *Rubus saladiensis* Király, Trávníček et Žíla. Druhý zmíněný zástupce byl rozlišen již dříve a platně popsán pod jménem *Rubus brunneri* W. Maurer, byl však prvotně řazen do ser. *Vestiti* (Focke) Focke (detailní studium morfologických znaků ovšem ukázalo, že jeho zde navržené zařazení do ser. *Pallidi* je mnohem vhodnější). Rozšíření obou druhů ser. *Pallidi* je omezeno na širší oblast příhraničí mezi Maďarskem, Rakouskem, Slovinskem a Chorvatskem, přičemž *R. brunneri* byl zaznamenán ve všech těchto zmíněných zemích, zatímco *R. saladiensis* byl dosud nalezen pouze v maďarské části této oblasti. Ukazuje se tedy, že rozšíření ser. *Pallidi* je vázáno pouze na region ležící při západním okraji Panonské nížiny, který je již pod zřetelným vlivem vlhčího alpského klimatu. To poměrně dobře koresponduje s rozšířením doprovodné vegetace v daném území, ale na druhé straně také s hlavním rozšířením ser. *Pallidi* v dalších (především subatlanstkých) částech Evropy, takže nález této skupiny na rozhraní Alp a Panonské nížiny má význam rovněž z pohledu geobotanického.

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