

***Sorbus omissa*, a new endemic hybridogenous species from the lower Vltava river valley**

Sorbus omissa, nový endemický hybridogenní druh jeřábu z údolí dolní Vltavy

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Sorbus omissa is described as a new hybridogenous triploid ($2n = 3x = 51$) species belonging to the *Sorbus latifolia* group. This species is considered to be of hybrid origin, with *S. danubialis* and *S. torminalis* being its putative parental species. It is a stenoendemic whitebeam occurring in central Bohemia (Czech Republic) in the vicinity of the towns of Roztoky and Libčice nad Vltavou (Praha-západ district) in the valley of the lower Vltava river, where it grows primarily in oak forests (*Viscario-Quercetum*). The only two known populations contain approximately 150 individuals. This species differs from other similar Czech species of the *S. latifolia* group in having broadly elliptical to rhomboidal leaves with very shallowly lobed laminas, predominantly with 9–11 lateral leaf veins on each side, and is orange-red fruit at maturity. Observation, morphological comparison and karyological (chromosome counts, DAPI flow cytometry) methods were used to identify this new species. A character-comparison table and a determination key including all taxa of the *S. latifolia* agg. endemic in the Czech Republic are provided. An illustration, a photograph and a distribution map of this new species are also presented.

K e y w o r d s: chorology, Czech Republic, endemic, geographical distribution, hybridogenous species, karyology, *Rosaceae*, *Sorbus latifolia* agg., taxonomy

Introduction

The dendroflora of the Czech Republic is relatively poor. Based on the approach currently used, it includes approximately 200 species. Moreover, inclusion of many of these species among true woody plants is problematic (Businský 2009). The majority of species belonging to the Czech dendroflora have a broad distribution (Meusel et al. 1965) and only a few endemic woody species are known (Gerža 2009, Suda & Chrtek 2009). The genus *Sorbus* L., which are true woody plants, includes the largest number of endemic species in the Czech dendroflora. Furthermore, *Sorbus* is a taxonomically problematic group of plants. The problems raised by this group are similar to those raised by certain complex genera such as *Rubus* (e.g. Holub 1995). The principal problem is the large number of taxa that are interspecific hybrids and often associated with polyploidization and the stabilization of offspring by apomixis. The same parental combination can polytopically form various apomictic, morphologically and genetically unique lineages that are classified as separate species, i.e. microspecies or agamospecies, which are, with a few exceptions, endemic to small, clearly defined areas. They often grow in places where access is difficult and may be overlooked if a detailed field exploration is not conducted (Kovanda 1999, Lepší et al. 2011). The rarely used broad-species concept (e.g. Aldasoro et al. 2004) is not too suitable

for this group because hybridogenous microspecies of *Sorbus* are clearly distinguishable from each other, both genetically and morphologically.

There are currently 12 (sub)endemic *Sorbus* species in the flora of the Czech Republic. The first is the whitebeam, *S. sudetica* (Tausch) Bluff, Nees et Schauer, which has long been known as it was described in 1834 by Tausch as *Pyrus sudetica* (Tausch 1834). This species is considered subendemic based on its historical occurrence in the Polish part of the Krkonoše Mts (Jeník 1960, Kovanda 1965, 1986). The second subendemic species is *S. hardeggensis* Kovanda. The distribution of this species extends into Lower Austria (Kovanda 1996b). The other 10 species are strictly endemic and were only discovered during the past 50 years. Miloslav Kovanda was the first to begin research on this genus in the former Czechoslovakia. From the 1960s through to the 1990s, he described most of the species (Kovanda 1961, 1984, 1996a, b): *Sorbus bohémica* Kovanda, *S. eximia* Kovanda, *S. rhodanthera* Kovanda, *S. gemella* Kovanda, *S. querneae* Kovanda, *S. hardeggensis* Kovanda and *S. alnifrons* Kovanda. He also compiled two publications on the genus *Sorbus* in the Czech Republic (Kovanda 1992, 2002). Recently, several new endemic hybridogenous species were described from the České středohoří hills (Lepší et al. 2008, 2009): *S. milensis* M. Lepší, Boublík, P. Lepší et Vít, *S. portae-bohemicae* M. Lepší, P. Lepší, Vít et Boublík and *S. albensis* M. Lepší, Boublík, P. Lepší et Vít. The most recently named species, *S. barrandienica* Vít, M. Lepší et P. Lepší, was described from the Bohemian Karst (Vít et al. 2012). Currently, several other undescribed taxa are being intensively studied. Furthermore, the hybridogenous population in the valley of the lower Vltava river was only very recently discovered.

An interesting taxon of whitebeam from the surroundings of Roztoky was first recorded in early January 2010 by Jiří Sádlo, who discovered an anomalous individual of *Sorbus* in the vicinity of Stříbrník, a hill near the village of Úholičky. A single plant of an unidentified taxon of the *S. hybrida* agg. was found at the top of this hill. A new population of the hybridogenous whitebeam (*S. latifolia* agg.), with a scattered distribution in the vicinity of the same hill, was found unexpectedly during a second visit in early May 2010 by the author. The second population was discovered almost four kilometres to the north during an ongoing study in early September 2011. The taxon examined during that study is described below as a new species based on subsequent comprehensive research.

Material and methods

Beginning in May 2010, the author studied the population of the new hybridogenous whitebeam growing in the vicinity of Stříbrník. Herbarium samples were collected and photographs taken during the field study. For the measurement and evaluation of morphological characters, the methodology of previous studies of related species of the genus *Sorbus* (Meyer et al. 2005, Lepší et al. 2008, 2009) were followed. Only well-developed and typical plants were used for the study of phenotypic and karyological variation in a total of 93 individuals (ca 62% of the total population) from two localities. Well-developed leaf buds from short shoots were collected for karyological analysis in April 2010 and April 2011. Actively growing vegetative tissues from these buds were prepared and chromosomes were counted for a total of seven plants using the method of Lepší et al. (2008). The genome size of three specimens from the population around Stříbrník hill was

analysed according to Lepší et al. (2008) and using DAPI flow cytometry of 93 individuals from the entire distributional range, as recommended by Vít et al. (2012). The vegetation types were described by the commonly used method of the Zurich-Montpellier school and the Braun-Blanquet scale (Braun-Blanquet 1964); the relevés are stored in the Czech National Phytosociological Database (below under CNPD, see Chytrý & Rafajová 2003). The phytosociological nomenclature follows Moravec (1998) and Moravec et al. (2000). The localities of the species in question were classified according to the regional-phytogeographical division system (Skalický 1988) and arranged according to the Central European grid-mapping scheme (Ehrendorfer & Hamann 1965). Altitudes and positions in WGS 1984 were determined with a Garmin GPSMAP 60CSx instrument together with MapSource software (with TOPO Czech PRO 2010 maps). The following public herbarium collections were examined (Holmgren et al. 1990): CB, CHEB, PR, PRA, PRC and herbarium of the Research Institute for Landscape and Ornamental Gardening (RILOG).

Results and discussion

Sorbus omissa Velebil, spec. nova (Figs 1–3)

Descriptio: Arbores (vel frutices) truncis 1–2 (–5), usque 12 m altis praeditae. Folia brachyblastorum fertiliump simplicia, laminis ambitu late ellipticis usque rhomboidalibus, regulariter pinnato-lobatis (lobis acutis usque acuminatis, serratis), in parte superiore duplicate serratis, (7.2–) 8.2–9.5 (–10.5) cm longis, (5.1–) 6.1–7.4 (–8.7) cm latis, ad basin late cuneatis, raro rotundatis, subintegris vel remote serratis, dilute usque obscure viridibus, subtus tomentosus tomento flavido-griseo-viridi, nervis utrinque (8–) 9–11 (–13). Folia brachyblastorum steriliump: nervis utrinque (8–) 9–10 (–12). Corymbothyrus multiflorus, compactus, convexus, ramis plus minusve tomentosus. Dentes calycis triangulares, acuminati usque acuti, (2.0–) 2.9–3.5 (–4.3) mm longi, (1.7–) 2.0–2.3 (–2.5) mm lati, patentes, post anthesin reclinati, dense tomentosi, in fructu sicci, persistentes. Petale late ovata usque late elliptica, breviter unguiculata, (5.0–) 5.8–6.3 (–6.9) mm longa, (3.9–) 4.3–4.6 (–4.9) mm lata, albida, patentia. Stamina ca 20, antheris pallide luteis, (1.0–) 1.1–1.2 (–1.4) mm longis. Ovaria semi-infera. Styli 2, ad (41–) 53–64 (–72)% longitudinis coalescentes, ad basin villosis, albo-virides, (3.4–) 4.0–4.5 (–4.7) mm longi, stigmatibus plus minusve planis. Fructus obovoidei usque subglobosi, (11–) 12–13 (–15) mm longi, (10–) 11–12 (–14) mm lati, maturitate aurantiaci usque rubri, glabri vel fere glabri, nitidi, lenticellis (7–) 10–20 (–32), parvis, ochraceis, ad 0.25 cm²; mesocarpium heterogenum; endocarpium cartilagineum; semina atrofusca. Numerus chromosomatum triploideus 2n = 51. Planta probabiliter apomictica. Floret mense Majo.

Holotypus: Bohemia centralis, distr. Praha-západ, pagus Úholičky-Podmoráň (5852a): ca 300 m a stationem viae ferreae austro-orientem versus, disperse in querceto in declivi boreo-orientali collis Stříbrník ad ripam sinistram fluminis Vltava; substratum: lapis sectilis; 250 m s. m.; 50°10'06.9"N, 14°21'09.5"E; arbor no. 39; 9. May 2011 leg. J. Velebil; PR, No. 110508/e. – Isotypi: PR, Nos. 110855/a, 110855/b; PRC, Nos. 110508/a, 110508/b; PRA, No. 110508/g; CB, No. 110508/f; ROZ, Nos. 110508/c, 110508/d.

Trees (or shrubs) with 1–2 (–5) trunks up to 12 m high. Trunks up to 90 cm in circumference. Bark grey to dark grey, smooth when young, with relatively early formation of vertical fissures (particularly on the trunk and bases of the branches), with scattered (3–) 5–8 (–12) mm long and (3–) 5–6 (–9) mm wide lenticels. Branches at an angle of (20–) 30–40 (–60)° to the trunk; twigs brownish-grey; young shoots brown, sparsely tomentose when young and almost glabrous at maturity, with numerous elliptical or subrotund pale brown to ochraceous lenticels. Buds 7–14 mm long and 3–6 mm wide, narrowly ovoid to turbinate; scales green, with narrow brown sparsely tomentose margins. Leaves simple; laminas (on short fertile shoots) broadly elliptical to rhomboidal, more or less flat to slightly concave, somewhat glossy, pale to dark green above, yellowish-greyish-green

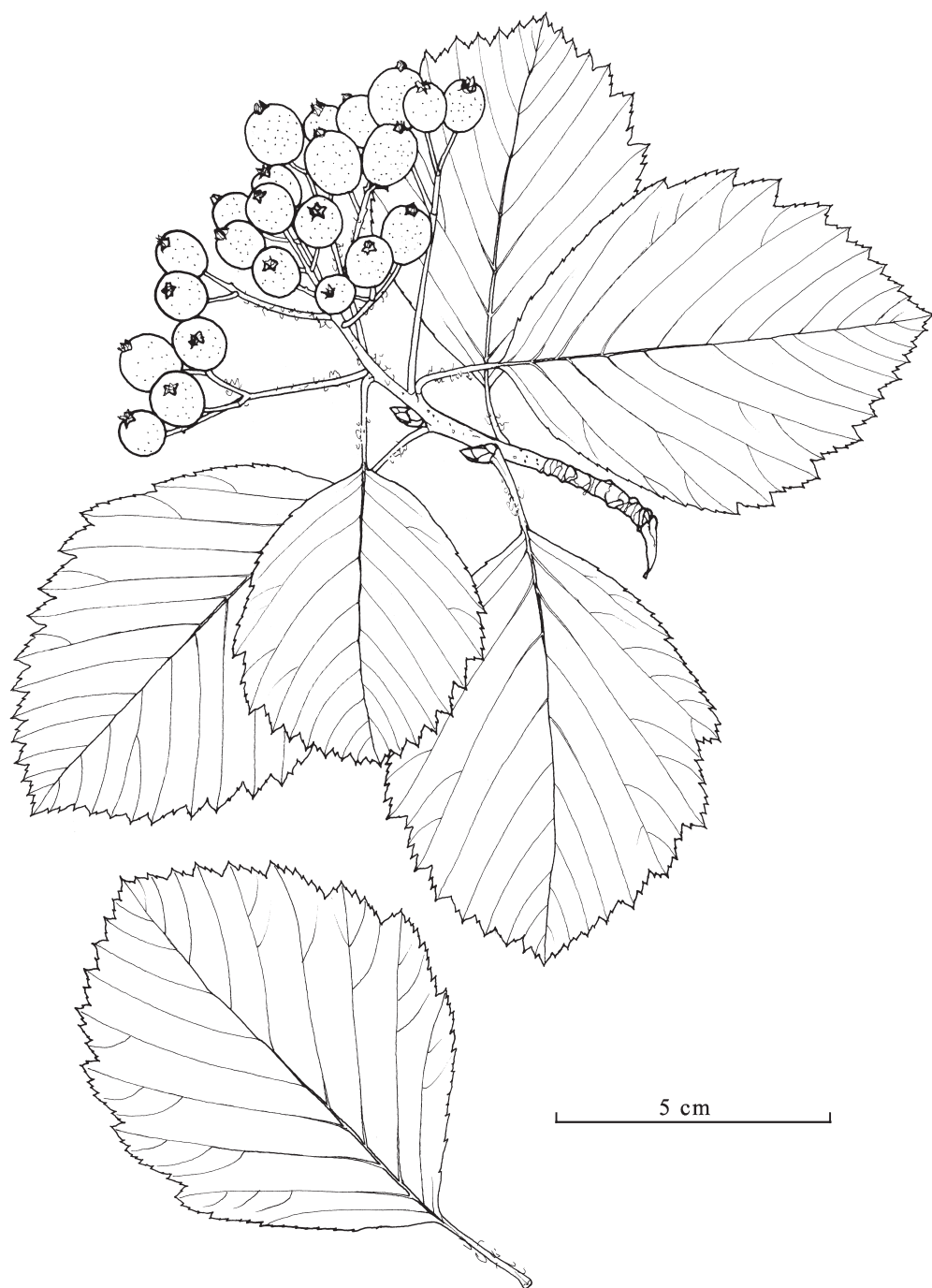


Fig. 1. – *Sorbus omissa*: short fructiferous shoot (top), leaf from the middle part of short sterile shoot (bottom).
Drawing by A. Skoumalová.



Fig. 2. – Flowering shoot of *Sorbus omissa* on Stříbrník hill (photograph by J. Velebil 2011).



Fig. 3. – Fruits of *Sorbus omissa* collected from the type tree on Stříbrník hill (photograph by J. Velebil 2011).

beneath, usually flat at margins, more or less triangular and acute at apex, usually broadly cuneate or rarely rounded and partly serrate at base, almost glabrous on upper surface, evenly tomentose on lower surface, (7.2–) 8.2–9.5 (–10.5) cm long and (5.1–) 6.1–7.4 (–8.7) cm wide, widest at (33–) 47–52 (–61)% of the lamina length (from the tip), regularly shallowly lobed (doubly serrate apically): lobes acute or acuminate, serrate or doubly serrate with acute to acuminate teeth terminating the main veins, other teeth smaller, acute; sides of lobes convex to straight; the third lobe (from the base) (0.4–) 0.7–1.0 (–1.3) cm broad; incision between the second and third lobe (0.2–) 0.3–0.5 (–0.8) cm; lobes broader than 1 cm 0–1 (–3) on each side; distance between the insertion of the petiole and the tip of the 1st lamina lobe (3.1–) 4.7–5.6 (–6.9) cm; veins (8–) 9–11 (–13) on each side; the third vein from the base is at an angle of (30–) 34–39 (–45)° to midrib at centre of the leaf; petioles (1.3–) 1.7–2.1 (–2.6) cm long, more or less tomentose. Leaves on short sterile shoots: the third lobe (from the base) (0.7–) 0.9–1.2 (–1.8) cm broad; veins (8–) 9–10 (–12) on each side; lobes broader than 1 cm (0–) 1–2 (–3) on each side. Inflorescences with (38–) 46–68 (–111) flowers, (5–) 7–9 (–10) cm in diameter, compact, convex; branchelets more or less tomentose. Hypanthium turbinate, tomentose. Sepals (2.0–) 2.9–3.5 (–4.3) mm long and (1.7–) 2.0–2.3 (–2.5) mm wide, triangular, acuminate or acute, densely tomentose on both surfaces, patent, reclinate after anthesis, persistent, dry, erect. Petals (5.0–) 5.8–6.3 (–6.9) mm long and (3.9–) 4.3–4.6 (–4.9) mm wide, broadly ovate to broadly elliptical, concave, whitish, patent, sparsely hirsute at base of upper surface, with a short claw. Stamens ca 20; filaments whitish; anthers pale yellow, (1.0–) 1.1–1.2 (–1.4) mm long. Ovary semi-inferior. Styles 2, crooked, greenish-cream, (3.4–) 4.0–4.5 (–4.7) mm long, hairy at the base, connate up to (41–) 53–64 (–72)%. Stigma greenish-cream, more or less flat, (0.4–) 0.5–0.6 (–0.7) mm wide. Fruit (11–) 12–13 (–15) mm long and (10–) 11–12 (–14) mm wide, obovoid to subglobose, often longer than wide, orange to orange-red at maturity, glabrous or almost glabrous, glossy, with (7–) 10–20 (–32) ochraceous lenticels per 0.25 cm², mesocarp heterogenous; endocarp cartilaginous. Seeds fuscous. Somatic chromosome number 2n = 51 (triploid). Reproduction tentatively apomictic. Flowers in May.

Etymology

The epithet “*omissa*” refers to its occurrence and the fact that it was only discovered recently in a habitat near to Prague. Because this plant grows in places to which access is difficult, it was previously overlooked (i.e. omission). The author proposes the Czech name “jeřáb opominutý” for this species.

Diagnostic characters

Leaf laminas (on short fertile shoots) broadly elliptical to rhomboidal, (7.2–) 8.2–9.5 (–10.5) cm long and (5.1–) 6.1–7.4 (–8.7) cm wide with (8–) 9–11 (–13) veins on each side, more or less triangular and acute at apex, usually broadly cuneate, rarely rounded at base, regularly shallowly lobed (doubly serrate apically) – incision between the second and the third lobe (0.2–) 0.3–0.5 (–0.8) cm long; lobes acute or acuminate with acute to acuminate teeth terminating the main veins. Styles connate up to (41–) 53–64 (–72)% of their length. Fruits are obovoid to subglobose, often longer than wide, orange to orange-red at maturity.

Number of chromosomes and variation in genome size

Sorbus omissa is triploid ($2n = 3x = 51$), as are other Czech hybridogenous *S. latifolia* agg. species (Lepší et al. 2008, 2009, Vít et al. 2012). The only exception to this pattern of triploidy is the diploid *S. hardeggensis* ($2n = 2x = 34$, see Vít 2006), but the taxonomic classification of this species is doubtful (Lepší et al. in verb.). The screening of the DNA ploidy level of 93 samples of *S. omissa* using DAPI flow cytometry did not reveal any intraspecific variation. The peak of the sample was on average 0.579 of that of the standard. The CV of the standard (*Bellis perennis* L.) was on average 1.46, and that of the sample 2.42. The holoploid genome size (propidium iodide flow cytometry; mean 2C-value \pm SE) of *S. omissa* was estimated as $2.09 \text{ pg} \pm 0.03$.

Phenotypic variation

Morphologically, *Sorbus omissa* is quite uniform. No occurrence of hybridization with other sympatric species was recorded in either population. All the characters of shade leaves tend to be larger and the lateral veins less numerous. The fruits change colour during maturation from orange to orange-red. *Sorbus omissa* is a member of the *S. latifolia* agg., which is characterized by shallowly and sharply lobed leaves with acute, triangular lobes. The geographically nearest hybridogenous species of this group occurring in central Bohemia are *S. barrandienica* and *S. eximia*, from the Bohemian Karst. Both of these species have orange to orange-red fruit like *S. omissa*, but have leaves with less numerous lateral veins and broader lobes. The other *Sorbus* species with fruit of this colour is *S. gemella*, but it differs in having predominantly rhomboidal and more deeply incised laminas. *Sorbus rhodanthera* and *S. milensis*, somewhat similar to the previous species, are distinguished from *S. omissa* by their deeper acuminate lobes, orange-red fruit and the pale rose to rose colour of their anthers. *Sorbus alnifrons* and *S. bohémica* have elliptical and more deeply lobed leaves. The latter species also has fewer lateral leaf veins. *Sorbus albensis* has an irregularly and usually only doubly serrate leaf margin and more numerous lateral leaf veins. *Sorbus portae-bohémicae* differs from *S. omissa* in having obovoid to ellipsoid fruit and broadly ovate to broadly elliptical leaves with a rounded base. The variable *S. hardeggensis* differs from the other species predominantly in having an inferior ovary and brownish-orange fruit. The sympatric *S. danubialis* has more or less rhomboidal to round rhomboidal, predominantly coarsely doubly serrate (or shallowly lobed) leaves with a greyish-green underside and its fruits are red. For a more detailed comparison of characters with the members of the *S. latifolia* agg. occurring in the Czech Republic, see Table 1.

Table 1. – Summary of quantitative and qualitative characters of members of the *Sorbus latifolia* agg. endemic in the Czech Republic. *Sorbus hardyensis*, currently formally included in the *S. latifolia* agg., is probably a diploid primary hybrid (Lepší et al., in verb.) and thus excluded from this table. Data for all taxa except *S. omissa* was adopted from previous studies by several authors: taxa marked with ¹ from Lepší et al. (2009), ² from Lepší et al. (2012), ³ from Vít et al. (2012), ⁴ partly from Kovanda (1996b) and partly from the author.

Character	<i>S. portae-bohemicae</i> ¹	<i>S. albensis</i> ¹	<i>S. bohemica</i> ¹	<i>S. omissa</i>	<i>S. alnifrons</i> ⁴
Leaf lamina length (cm)	(7.5–) 8.6–9.7 (–11.5)	(6.0–) 7.4–8.5 (–10.2)	(5.1–) 7.0–8.4 (–10.7)	(7.2–) 8.2–9.5 (–10.5)	(6.6–) 7.8–9.1 (–10.8)
Leaf lamina width (cm)	(5.1–) 5.9–6.8 (–8.5)	(3.7–) 4.8–5.6 (–7.8)	(3.4–) 4.9–6.1 (–8.3)	(5.1–) 6.1–7.4 (–8.7)	(4.5–) 5.2–6.5 (–7.8)
Width of the 3rd lobe from the base of the lamina of a leaf (cm)	(0.7–) 0.9–1.2 (–1.8)	(0.4–) 0.8–1.1 (–1.5)	(0.6–) 0.8–1.1 (–1.5)	(0.4–) 0.7–1.0 (–1.3)	(0.7–) 1.1–1.4 (–1.7)
Incision between the 2nd and 3rd lobe of the lamina (cm)	(0.2–) 0.4–0.5 (–0.6)	(0.1–) 0.2–0.3 (–0.6)	(0.2–) 0.4–0.6 (–0.9)	(0.2–) 0.3–0.5 (–0.8)	(0.4–) 0.6–0.7 (–0.8)
Number of lateral leaf veins	(10–) 11–12 (–13)	(9–) 11–12 (–15)	(7–) 8–9 (–11)	(8–) 9–11 (–13)	(8–) 9–10 (–11)
Number of lamina lobes wider than 1 cm	1–2 (–3)	0–1 (–4)	(1–) 2–3 (–4)	0–1 (–3)	(1–) 2 (–3)
Fruit width (mm)	(10–) 12–13 (–17)	(11–) 14–15 (–17)	(9.1–) 11.4–11.5 (–14.8)	(10–) 11–12 (–14)	(10–) 11–12 (–14)
Fruit length (mm)	(12–) 15–16 (–17)	(9.9–) 13–15 (–17)	(8.9–) 10.3 (–14.2)	(11–) 12–13 (–15)	–
Colour of anthers	pale rose, later pale yellow	pale rose, later pale yellow	pale rose, later pale yellow	yellow	yellow
Shape of lamina	broadly elliptical to (broadly) ovate	ovate (rarely broadly ovate) or broadly elliptical	(oblong) elliptical, rarely ovate	broadly elliptical to rhomboidal	elliptical
Colour of fruit	orange red	orange-red	orange-red	orange to orange-red	orange-red
Character	<i>S. rhodantha</i> ²	<i>S. milensis</i> ²	<i>S. gemella</i> ²	<i>S. barrandienica</i> ³	<i>S. eximida</i> ³
Leaf lamina length (cm)	(8.3–) 9.6–10.7 (–11.6)	(8.2–) 9.0–10.3 (–11.3)	(6.5–) 8.2–9.5 (–11.0)	(8.1–) 8.8–10.3 (–11.6)	(7.5–) 8.6–9.3 (–11.3)
Leaf lamina width (cm)	(6.4–) 7.8–9.0 (–9.4)	(6.0–) 6.8–7.8 (–9.6)	(4.6–) 6.8–8.0 (–8.6)	(5.4–) 6.7–7.4 (–8.9)	(5.0–) 6.7–7.5 (–9.4)
Width of the 3rd lobe from the base of the lamina of a leaf (cm)	(0.7–) 1.2–1.4 (–1.7)	(0.7–) 1.0–1.2 (–1.5)	(0.8–) 1.1–1.4 (–1.6)	(0.95–) 1.15–1.35 (–1.80)	(1.0–) 1.1–1.3 (–1.7)
Incision between the 2nd and 3rd lobe of the lamina (cm)	(0.4–) 0.8–1.0 (–1.2)	(0.3–) 0.6–0.7 (–0.9)	(0.5–) 0.8–0.9 (–1.0)	(0.40–) 0.45–0.60 (–0.75)	(0.25–) 0.40 (–0.55)
Number of lateral leaf veins	(8–) 9–10 (–11)	(9–) 10–11 (–13)	(8–) 9–10 (–11)	(7–) 8 (–9)	(6–) 7–8 (–9)
Number of lamina lobes wider than 1 cm	(2–) 3–4 (–5)	(1–) 2 (–3)	(2–) 3–4	(2–) 3–4	(2–) 3–4
Fruit width (mm)	(12–) 13 (–14)	(13–) 14–15 (–16)	(11–) 12 (–13)	(11–) 12–12.5 (–14)	(11–) 12–13 (–15)
Fruit length (mm)	(11–) 12 (–13)	(12–) 13–14 (–16)	(11–) 12 (–14)	(11.5–) 12–13 (–14)	(11–) 12–13 (–15)
Colour of anthers	rose	pale rose	yellow	pale yellow	pale yellow
Shape of lamina	rhomboidal to broadly ovate	rhomboidal to broadly ovate	rhomboidal to broadly ovate	elliptical	broadly ovate to broadly elliptical
Colour of fruit	orange-red	orange-red	orange	orange to orange-red	orange to orange-red

Geographical distribution and ecology

This stenoendemic whitebeam occurs in central Bohemia (Czech Republic) and only two populations separated by a distance of 3.6 km are known (Fig. 4). The first population occurs between Roztoky near Prague and the part of Úholičky village named Podmoráň, where the centre of its distribution, with approximately 130 individuals, is situated. The second population consisting of 19 individuals of *Sorbus omissa*, lies between the village of Dolany and Libčice nad Vltavou. Although both localities are parts of the Přírodní park Dolní Povltaví natural park, attention was previously focused on the parts of the park closer to Prague (see Kubíková 1976, Kubíková & Molíková 1981, Smrček & Kubíková 1990), where *S. omissa* has not been found. Overall, the area included in the current study extends from Kralupy nad Vltavou in the north to the centre of Prague in the south, following the course of the Vltava river. Relevant habitats were observed up to a distance of approximately 2 km along both the left and the right banks of the river, with two more distant localities, the Dřínovská stráň and Kopeč nature reserves, north of the town of Odolená Voda. The most detailed field exploration was conducted in the vicinity of Roztoky (growth around Podmoráň village, Roztocký háj – Tiché údolí nature reserve, Údolí Únětického potoka nature reserve, Sedlecké skály nature monument), the village of Máslovice (Hlaváčková stráň nature monument, Máslovická stráň nature reserve, Větrušická rokle national nature reserve) and Libčice nad Vltavou.

Sorbus omissa predominantly inhabits oak forests with open canopies. The species was recorded in the following vegetation types: *Viscario-Quercetum* Stöcker with transition to *Sorbo torminalis-Quercetum* Svoboda ex Blažková or *Luzulo albidae-Quercetum* Hilitzer (phytosociological data are stored in the CNPD under the relevé numbers 118522 and 118523). In these stands, it grows scattered on steep rocky slopes, primarily in the middle of the slope. Groups are rarely formed, and only at sunny sites. It prefers humus soils on a substratum of Proterozoic slate. Black Proterozoic graphitic quartzite and scree slopes are also found in the distributional area of *S. omissa*, but the species did not occur at these sites because of unfavourable soil conditions. The species occurs in places situated between ca 200–290 m above sea level. *Sorbus omissa* occurs sympatrically with *S. aucuparia* L., *S. torminalis* (L.) Crantz and *S. danubialis* (Jáv.) Prodan. The last-named species commonly occurs in many places in this region, especially rocky sites along the Vltava river. Generally, the older literature refers it to *S. aria* (L.) Crantz. However, no natural occurrence of *S. aria* s. str. is known from the relevant region. The above mentioned individual of the *S. hybrida* agg. found on the top of Stříbrník hill was evaluated as triploid (measured by M. Lepší and P. Koutecký using the same flow cytometry procedure used to evaluate *S. omissa*) in the course of this study.

Conservation status

The area studied is located in a suburban belt of Prague, which is characterised by a high proportion of developed areas and a dense network of roads. It is difficult to access the landscape in many places because of these influences. Various types of vegetation are scattered and somewhat isolated. Relatively continuous woodland or shrubby vegetation occurs only in the valley of the Vltava river, where the populations of *Sorbus omissa* discussed in this study are located. Although the surrounding vegetation is influenced by human activities (traditional forest management, the planting of allochthonous woody



Fig. 4. – Map showing the distribution of *Sorbus omissa*. The numbers on the map correspond to the locality numbers in the list of herbarium specimens. Hatched areas show the known distribution of the species. The blue point marks the position of the type tree (the use of the map was approved by the Ministry of Environment of the Czech Republic).

species, garbage pollution), both of the *S. omissa* populations are associated with indigenous (semi-)natural types of woody vegetation with well-preserved growth and age structure. Well-developed trees and shrubs with specific herbal undergrowth are present at these localities. *Sorbus omissa* grows predominantly at sunny sites where the canopy is open. Shaded plants are sterile, morphologically atypical and exhibit reduced vitality. Seedlings are very rare. Few seedlings survive the early years after germination and it is probable that even fewer survive where game is abundant and insect infestation of seed is high. More than half of the seed in the fruits examined were damaged by the larvae of unidentified insects. The seedlings of *S. omissa* can be confused with those of the sympatric *S. danubialis*. For this reason, their number cannot be accurately determined. The populations of *S. omissa* cannot expand naturally due to the lack of other suitable habitats. For the above mentioned reasons, *S. omissa* should according to the concept of Procházka (2001) be classified as a critically endangered species. In order to conserve this species its natural habitats need to be protected. Changes in forest management in which the most suitable sites for natural regeneration are maintained would also be helpful.

Herbarium specimens:

Czech Republic, central Bohemia, 9. Dolní povltaví: 1. Řivnáč hill: Roztoky-Žalov, N shaded stony slope above the Vltava river on side of Řivnáč hill, 235–255 m a.s.l., 5852a: 50°09'58.6"N, 14°21'35.1"E, tree No. 4 (leg. JV [= Jiří Velebil] 20 May 2010, RILOG 100523); 50°09'58.9"N, 14°21'36.6"E, tree No. 3 (leg. JV 20 May 2010, RILOG 100524); 50°09'58.9"N, 14°21'36.6"E, tree No. 2 (leg. JV 20 May 2010, RILOG 100525); 50°09'59.8"N, 14°21'45.0"E, tree No. 5 (leg. JV 20 May 2010, RILOG 100526); 50°09'56.8"N, 14°21'34.9"E, tree No. 113 (leg. JV 31. 8. 2011, RILOG 110857). **2. Slate slopes between Řivnáč hill and Stříbrník hill:** Shaded N slope above the Vltava river, 225–275 m a.s.l., 5852a: 50°10'00.0"N, 14°21'24.8"E, tree No. 50 (leg. JV 11 May 2010, RILOG 100508); 50°10'04.0"N, 14°21'17.8"E, tree No. 8 (leg. JV 20 May 2010, RILOG 100527); 50°10'02.5"N, 14°21'15.0"E, tree No. 45 (leg. JV 20 May 2010, RILOG 100529). **3. Stříbrník hill:** The part of Úholičky village named Podmoráň, shaded NE stony slope above the Vltava river, 245–275 m a.s.l., 5852a: 50°10'09.9"N, 14°21'04.9"E, tree No. 19 (leg. JV 11 May 2010, RILOG 100511); 50°10'10.0"N, 14°21'04.8"E, tree No. 20 (leg. JV 11 May 2010, RILOG 100512); 50°10'06.2"N, 14°21'07.0"E, tree No. 24 (leg. JV 11 May 2010, RILOG 100516); 50°10'08.0"N, 14°21'06.6"E, tree No. 25 (leg. JV 11 May 2010, RILOG 100518); 50°10'08.0"N, 14°21'06.6"E, tree No. 26 (leg. JV 11 May 2010, RILOG 100519); 50°10'07.6"N, 14°21'06.7"E, tree No. 27 (leg. JV 11 May 2010, RILOG 100520); 50°10'08.1"N, 14°21'07.0"E, tree No. 29 (leg. JV 11 May 2010, RILOG 100521); 50°10'07.3"N, 14°21'08.7"E, tree No. 37 (leg. JV 11 May 2010, RILOG 100522). – Roztoky (Praha-západ distr.), ca 1.5 km NE of the centre of Úholičky village, woody slopes of the Vltava river, scattered, 230–250 m a.s.l., 5852a: 50°10'06"N, 14°21'10"E (leg. M. Lepší 7 June 2010, CB 79293); 50°10'07"N, 14°21'11"E (leg. M. Lepší 7 June 2010, CB 79294); 50°10'07"N, 14°21'9"E (leg. M. Lepší 7 June 2010, CB 79295); 50°10'08"N, 14°21'10"E (leg. M. Lepší 7 June 2010, CB 79297); 50°10'07"N, 14°21'8"E (leg. M. Lepší 7 June 2010, CB 79298); 50°10'07"N, 14°21'10"E (leg. M. Lepší 7 June 2010, CB 79299). – Roztoky (Praha-západ distr.), E slopes of Stříbrník hill, ca 200 m SE from summit of hill, steep slope, in oak forest, rare, 259 m a.s.l., 5852a: 50°10'08,3"N, 14°21'06,4"E (leg. P. Lepší & M. Lepší 18 June 2010, CB 75964). – The part of the village Úholičky named Podmoráň, shaded NE stony slope above the Vltava river, 200–250 m a.s.l., 5852a: 50°10'08.8"N, 14°21'10.9"E, tree No. 14 (leg. JV 25 August 2010, RILOG 100801); 50°10'07.7"N, 14°21'11.3"E, tree No. 100 (leg. JV 25 August 2010, RILOG 100802); 50°10'11.7"N, 14°21'04.5"E, tree No. 16 (leg. JV 9 May 2011, RILOG 110507); 50°10'06.6"N, 14°21'09.8"E, tree No. 107 (leg. JV 9 May 2011, RILOG 110509); 50°10'06.7"N, 14°21'09.9"E, tree No. 63 (leg. JV 9 May 2011, RILOG 110510); 50°10'06.7"N, 14°21'10.4"E, tree No. 53 (leg. JV 9 May 2011, RILOG 110511); 50°10'10.6"N, 14°21'04.3"E, tree No. 17 (leg. JV 31 August 2011, RILOG 110853); 50°10'11.7"N, 14°21'04.5"E, tree No. 16 (leg. JV 31 August 2011, RILOG 110854); 50°10'06.7"N, 14°21'09.9"E, tree No. 63 (leg. JV 31 August 2011, RILOG 110856). – Shaded stony NW slope above the Podmoráňský potok stream, 215–240 m a.s.l., 5852a: 50°10'10.4"N, 14°21'00.6"E, tree No. 22, (leg. JV 11 May 2010, RILOG 100503); 50°10'09.6"N, 14°21'02.7"E, tree No. 21 (leg. JV 11 May 2010, RILOG 100504); 50°10'11.5"N, 14°21'03.5"E, tree No. 15 (leg. JV 11 May 2010, RILOG 100505); 50°10'11.7"N, 14°21'04.5"E, tree No. 16 (leg. JV 11 May 2010, RILOG 100506); 50°10'10.6"N, 14°21'04.3"E, tree No. 17 (leg.

JV 11 May 2010, RILOG 100507); 50°10'09.0"N, 14°20'52.9"E, tree No. 51 (leg. JV 11 May 2010, RILOG 100509); 50°10'08.6"N, 14°20'55.5"E, tree No. 52 (leg. JV 11 May 2010, RILOG 100510). **4. Unnamed hill opposite Stříbrník hill:** The part of the Úholičky village named Podmoráň, top of sun-exposed part of steep rocky slope above the Vltava river, 260 m a.s.l., 5852a: 50°10'20.0"N, 14°20'57.4"E, tree No. 11 (leg. JV 20 May 2010, RILOG 100528.). **5. Oak forest between Dolany and Libčice nad Vltavou:** Libčice nad Vltavou, ca 2 km NW from centre of the village, oak forest on steep rocky slopes, rare, 220–235 m a.s.l., 5752c: 50°12'42.6"N, 14°20'48.9"E, tree No. 127 (leg. JV 15 September 2011, RILOG 110908); 50°12'41.5"N, 14°20'51.8"E, tree No. 128 (leg. JV 15 September 2011, RILOG 110909); 50°12'40.9"N, 14°20'51.4"E, tree No. 129 (leg. JV 15 September 2011, RILOG 110910); 50°12'38.8"N, 14°20'50.4"E, tree No. 132 (leg. JV 15 September 2011, RILOG 110911); 50°12'31.5"N, 14°20'56.7"E, tree No. 135 (leg. JV 15 September 2011, RILOG 110912).

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Souhrn

V práci je popsán nový hybridogenní triploidní druh jeřábu, *Sorbus omissa* ($2n = 3x = 51$), patřící do skupiny *S. latifolia* agg., předpokládané rodičovské kombinace *S. danubialis* a *S. torminalis*. Jedná se o stenoendemický druh rostoucí převážně v dubových lesích (*Viscario-Quercetum*) v blízkosti měst Roztoky a Libčice nad Vltavou v údolí řeky Vltavy. Jediné dvě dosud známé populace čítají dohromady přibližně 150 jedinců. Od ostatních druhů ze skupiny *S. latifolia* agg. se liší široce eliptickými až kosočtverečnými listy a čepelí velmi mělce laločnatou, převážně s 9–11 páry postranních žilek a oranžovými až oranžově červenými plody. Počet chromozomů byl stanoven přímým počítáním, ploidní stupeň a jeho variabilita byla analyzována pomocí průtokové cytometrie. Druh je ohrožen zejména ubýváním vhodných stanovišť jejich postupným zarůstáním. Nepříznivě působí vysoké stavy zvěře a potenciálním rizikem je i holosečný způsob lesnického hospodaření. Pro přirozenou obnovu je vhodný výběrový způsob kácení porostu, vytvářející plochy s dostatkem světla, kde je umožněna přirozená obnova porostu. Příznivé by bylo též snížení stavu zvěře. Vzhledem k výše uvedenému by měl být jeřáb opominutý zařazen do kategorie kriticky ohrožených druhů České republiky a náležitým způsobem by měla být zajištěna jeho územní ochrana. Pro odlišení všech dosud popsáných druhů jeřábů formálně řazených do skupiny *Sorbus latifolia* agg. v České republice, včetně druhů vyskytujících se na lokalitách společně se *S. omissa*, poslouží následující klíč (čepel listů musí pocházet ze střední části fertálních brachyblastů). Klíč byl sestaven na základě zkušeností autora a následujících pramenů: Kovanda (1996b), Lepší et al. (2008, 2009), Businský (2009) a Vít et al. (2012).

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|----|--|--------------------------------|
| 1 | Listy lichozpeřené | <i>S. aucuparia</i> , j. ptačí |
| 1* | Listy jednoduché | 2 |
| 2 | Čepel listů peřenoklaná nebo v dolní části peřenodílná, na každé straně se (4–) 5–6 (–7) postranními žilkami, na rubu lysá nebo někdy pýřitá (čnělky na bázi lysé; semeník spodní; kališní cípy za plodu opadavé) | <i>S. torminalis</i> , j. břek |
| 2* | Čepel listů dvojitě pilovitá, peřenolaločná nebo peřenoklaná, na každé straně s (6–) 7–12 (–15) postranními žilkami, na rubu plstnatá, vzácně olysálá | 3 |
| 3 | Čepel listů dvojitě pilovitá (někdy mělce až pravidelně mělce laločnatá), na rubu žlutošedě nebo stříbřitě šedavě plstnatá; plody oranžové až oranžově červené nebo korálově červené; semeník polospodní; kališní cípy za plodu vytrvalé | 4 |
| 3* | Čepel listů zřetelně laločnatá, na rubu žlutošedě plstnatá, vzácně olysálá; plody okrově žluté, bronzové, oranžové až oranžově červené; semeník polospodní nebo spodní; kališní cípy za plodu vytrvalé, vzácně opadavé | 5 |

- 4 Čepel listů víceméně kosočtverečná až zaokrouhleně kosočtverečná, v horní třetině zastříhovaně dvojité pilovitá (až mělce laločnatá), se zvlněným okrajem, na rubu stříbřitě šedavě plstnatá; plody korálově červené *S. danubialis*, j. dunajský
- 4* Čepel listů široce vejčitá až široce eliptická, dvojité pilovitá (až pravidelně mělce laločnatá), s plochým okrajem, na rubu žlutošedě plstnatá; plody oranžové až oranžově červené *S. eximia*, j. krasový
- 5 Semeník spodní; zralé malvice okrově žluté až bronzové; kališní cípy vytrvalé nebo opadavé; listy na rubu plstnaté, slabě plstnaté nebo olysálé *S. hardeggenis*, j. hardeggský
- 5* Semeník polospodní; zralé malvice oranžové až oranžově červené; kališní cípy vytrvalé; listy na rubu plstnaté **6**
- 6 Čepel listů nejčastěji 6–8,5 cm dlouhá; zralé prašníky bledožluté; malvice téměř kulovité **7**
- 6* Čepel listů nejčastěji 8–11 cm dlouhá; zralé prašníky bledožluté nebo do různé míry růžové; malvice elipsoidní, obvejcovité až téměř kulovité **8**
- 7 Čepel listů v obrysu obvykle podlouhle eliptická, pravidelně mělce laločnatá, na každé straně se (7–) 8–9 (–11) postranními žilkami; malvice (9,1–) 11,4–11,5 (–14,8) mm široké *S. bohemia*, j. český
- 7* Čepel listů v obrysu vejčitá nebo široce eliptická, nepravidelně dvakrát pilovitá v kombinaci s mělkými laloky, na každé straně s (9–) 11–12 (–15) postranními žilkami; malvice (11–) 14–15 (–17) mm široké *S. albensis*, j. labský
- 8 Čepel listů na každé straně s (6–) 7–8 (–9) postranními žilkami **9**
- 8* Čepel listů na každé straně s (8–) 9–12 (–13) postranními žilkami **10**
- 9 Čepel listů víceméně eliptická, plochá, na bázi klínovitá nebo vzácněji široce klínovitá, mělce laločnatá; zářez mezi druhým a třetím lalokem (0,40–) 0,45–0,60 (–0,75) cm hluboký; kališní cípy (2,3–) 2,5–3,5 (–3,8) mm dlouhé; plody často delší než široké *S. barrandienica*, j. barrandienský
- 9* Čepel listů široce vejčitá až široce eliptická, často lžícovitě prohnutá, na bázi většinou zaokrouhlená nebo široce klínovitá, pravidelně mělce laločnatá (nebo někdy jen dvojité pilovitá); zářez mezi druhým a třetím lalokem (0,25–) 0,40 (–0,55) cm hluboký; kališní cípy (1,7–) 2,1–2,5 (–3,0) mm dlouhé; plody často stejně široké jako dlouhé nebo širší *S. eximia*, j. krasový
- 10 Malvice převážně obvejcovité nebo elipsoidní, výrazně delší než široké; čepel listů na každé straně s (10–) 11–12 (–13) postranními žilkami (korunní lístky nejčastěji 6,7–7,4 mm dlouhé; kališní cípy nejčastěji 3,2–3,8 mm dlouhé; zralé prašníky bledožluté) *S. portae-bohemicae*, j. soutěskový
- 10* Malvice kulovité, téměř kulovité nebo obvejcovité, když delší než široké, tak jen nevýrazně; čepel listů na každé straně s (8–) 9–11 (–13) postranními žilkami **11**
- 11 Zralé prašníky světle nebo sytě růžové; korunní lístky nejčastěji 6,7–7,3 mm dlouhé **12**
- 11* Zralé prašníky bledožluté; korunní lístky nejčastěji 5,2–6,8 mm dlouhé **13**
- 12 Zářez mezi 2. a 3. lalokem čepel listů nejčastěji 0,8–1,0 cm hluboké; kališní cípy nejčastěji 2,8–3,1 mm dlouhé *S. rhodantha*, j. manětínský
- 12* Zářez mezi 2. a 3. lalokem čepel listů nejčastěji 0,6–0,7 cm hluboké; kališní cípy nejčastěji 3,1–3,6 mm dlouhé *S. milensis*, j. milský
- 13 Zářez mezi druhým a třetím lalokem nejčastěji 0,3–0,5 cm hluboký (čepel listů široce eliptická až kosočtverečná, převážně s 9–11 páry postranních žilek; plody obvejcovité až téměř kulovité, za zralosti oranžové až oranžově červené; kmeny s relativně brzkou tvorbou podélně rozpukané borky) *S. omissa*, j. opominutý
- 13* Zářez mezi druhým a třetím lalokem nejčastěji 0,6–0,9 cm hluboký **14**
- 14 Okraje bazální části (pod 1. lalokem) čepel listů svírají úhel obvykle > 90°; zářezy mezi 2. a 3. lalokem čepel listů nejčastěji 0,8–0,9 cm hluboké; malvice s relativně hustými lenticelami ... *S. gemella*, j. džbánský
- 14* Okraje bazální části (pod 1. lalokem) čepel listů svírají úhel přibližně 90°; zářezy mezi 2. a 3. lalokem čepel listů nejčastěji 0,6–0,7 cm hluboké; malvice s relativně řídkými lenticelami *S. alnifrons*, j. olšolistý

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Appendix 1. – Key for identifying members of the *Sorbus latifolia* agg. endemic (subendemic) in the Czech Republic, including sympatric species occurring in the distributional area of *S. omissa* (the lamina collected from the middle part of a short fertile shoot should be examined). The key was compiled from those in Kovanda (1996b), Lepší et al. (2008, 2009), Businský (2009) and Vít et al. (2012) and based on the experiences of the author.

- 1 Leaves pinnate *S. aucuparia*
- 1* Leaves simple **2**
- 2 Leaf lamina pinnatifid or pinnately partite in lower part, with (4–) 5–6 (–7) lateral veins on each side, glabrous or sometimes puberulous beneath (styles glabrous at base; ovary inferior; sepals deciduous at fruit maturity) *S. torminalis*
- 2* Leaf lamina doubly serrate, pinnatifid or pinnatifid, with (6–) 7–12 (–15) lateral veins on each side, tomentose or rarely glabrescent beneath **3**
- 3 Leaf lamina doubly serrate (sometimes shallowly to regularly shallowly lobed), yellowish-greyish or silvery-greyish tomentose beneath; fruit orange to orange-red or red; ovary semi-inferior; sepals persistent at maturity) **4**
- 3* Leaf lamina conspicuously lobed, yellowish-greyish tomentose rarely glabrescent beneath; fruit ochraceous-yellow, bronze, orange to orange-red; ovary semi-inferior or inferior; sepals persistent rarely deciduous at maturity **5**
- 4 Leaf lamina more or less rhomboidal to rounded rhomboidal, coarsely doubly serrate (to shallowly lobed) distally, with folded margin, silvery-greyish pubescent beneath; fruit red *S. danubialis*
- 4* Leaf lamina broadly ovate to broadly elliptical, doubly serrate (to regularly shallowly lobed), with flat margin, yellowish-greyish tomentose beneath; fruit orange to orange-red *S. eximia*
- 5 Ovary inferior; fruit ochraceous-yellow to bronze at maturity; sepals persistent or deciduous; leaves tomentose, tomentellous or glabrescent beneath *S. hardwegensis*
- 5* Ovary semi-inferior; fruit orange to orange-red at maturity; sepals persistent; leaves tomentose beneath **6**
- 6 Leaf lamina most frequently 6–8.5 cm long; ripe anthers pale yellow; fruit subglobose **7**
- 6* Leaf lamina most frequently 8–11 cm long; ripe anthers pale yellow or rose in varying degrees; fruit ellipsoid, obovoid to subglobose **8**
- 7 Leaf lamina usually oblong elliptical in outline, regularly shallowly lobed, with (7–) 8–9 (–11) lateral veins on each side; fruit (9.1–) 11.4–11.5 (–14.8) mm wide *S. bohemica*
- 7* Leaf lamina ovate or broadly elliptical in outline, irregularly doubly serrate and/or shallowly lobed, with (9–) 11–12 (–15) lateral veins on each side; fruit (11–) 14–15 (–17) mm wide *S. albensis*
- 8 Leaf lamina with (6–) 7–8 (–9) lateral veins on each side **9**
- 8* Leaf lamina with (8–) 9–12 (–13) lateral veins on each side **10**
- 9 Leaf lamina more or less elliptical, flat, cuneate or rarely broadly cuneate at base, shallowly lobed; incision between the 2nd and 3rd lobe (0.40–) 0.45–0.60 (–0.75) cm deep; sepals (2.3–) 2.5–3.5 (–3.8) mm long; fruit often longer than wide *S. barrandienica*
- 9* Leaf lamina broadly ovate to broadly elliptical, often cochleariform, usually rounded or broadly cuneate at base, regularly shallowly lobed (or sometimes only doubly serrate); incision between the 2nd and 3rd lobe (0.25–) 0.40 (–0.55) cm deep; sepals (1.7–) 2.1–2.5 (–3.0) mm long; fruit often as wide as or wider than long *S. eximia*

- 10 Fruit predominantly obovoid or ellipsoid, conspicuously longer than wide; leaf lamina with (10–) 11–12 (–13) lateral veins on each side (petals most frequently 6.7–7.4 mm long; sepals most frequently 3.2–3.8 mm long; ripe anthers pale yellow) *S. portae-bohemicae*
- 10*Fruit globose, subglobose or obovoid, if longer than wide only inconspicuously so; leaf lamina with (8–) 9–11 (–13) lateral veins on each side **11**
- 11 Ripe anthers pale or deep rose; petals most frequently 6.7–7.3 mm long **12**
- 11*Ripe anthers pale yellow; petals most frequently 5.2–6.8 mm long **13**
- 12 Incision between the 2nd and 3rd lobe of the leaf lamina most frequently 0.8–1.0 cm deep; sepals most frequently 2.8–3.1 mm long *S. rhodanthera*
- 12*Incision between the 2nd and 3rd lobe of the leaf lamina most frequently 0.6–0.7 cm deep; sepals most frequently 3.1–3.6 mm long *S. milensis*
- 13 Incision between the 2nd and 3rd lobe of the leaf lamina most frequently 0.3–0.5 cm deep (leaf lamina broadly elliptical to rhomboidal, predominantly with 9–11 lateral veins on each side; fruit obovoid to subglobose, orange to orange-red at maturity; trunks with relatively early formation of longitudinally fissured bark) *S. omissa*
- 13*Incision between the 2nd and 3rd lobe of the leaf lamina most frequently 0.6–0.9 cm deep **14**
- 14 Margins of the basal part of leaf (under the first lobe) at an angle of usually >90°; incision between the 2nd and 3rd lobe of the lamina most frequently 0.8–0.9 cm deep; fruit with relatively dense lenticels *S. gemella*
- 14*Margins of the basal part of leaf (under the first lobe) at an angle of approximately 90°; incision between the 2nd and 3rd lobe of the lamina most frequently 0.6–0.7 cm deep; fruit with relatively sparse lenticels *S. alnifrons*

New taxa, combinations and names of plants published in Preslia 84 (2), 2012

Nová jména rostlin zveřejněná v tomto čísle

Molinia arundinacea subsp. *freyi* Dančák [p. 370]

Sorbus omissa Velebil [p. 377]