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Sorbus amici-petri MIKOLÁŠ, a new hybridogenous species of the genus *Sorbus* s.l. from eastern Slovakia

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Abstract: *Sorbus amici-petri* sp. nov., a new hybridogenous species of the genus *Sorbus* s.l. that is probably a product of hybridization between *S. torminalis* and *S. orbicularis* ined. (= ? *S. thaiszii*), is described in the paper. It is a tetraploid species stabilized by means of apomixis. *S. amici-petri* is stenoendemic species growing in xerothermous vegetation of forest-steppe and hornbeam forests near Kysak, Trebejov and Obišovce villages, ca. 15 km N from the town of Košice in eastern Slovakia. The species is closer to *S. orbicularis* than *S. torminalis* and it is characteristic by whiter tomentose lower side of leaves that are broadly ovate to rhombic and red (orange) globose fruits. Supposal on the origin of *S. dolomiticola* as a hybridogenous species evolved from *S. torminalis* and *S. cuneatifolia* ined. (= ? *S. javorkae*), is given. A new combination *S. apiculata* (KOVANDA) MIKOLÁŠ is also proposed for diploid Bohemian *S. danubialis* in opposite to tetraploid *S. danubialis* confirmed for southern Moravia and eastern Slovakia.

Keywords: *Sorbus amici-petri*, *S. dolomiticola*, *S. apiculata*, taxonomy, hybridogenous species, eastern Slovakia, Czech Republic.

The paper is dedicated to RNDr. PETER ČERNAJ, CSc. (1953-1993) on the occasion of 10th year from his premature death.

Introduction

Continuing my research as regards the flora of Stredné Pohornadie valley (Central Hornád valley) in 1994 I found another interesting hybridogenous *Sorbus* species. It was obvious that it is a product of hybridization between the *Sorbus* subg. *Aria* and *S. torminalis*. Another field study in 1995-2000 confirmed hybridogenous origin of the species and at the present time it is possible to estimate the total number of individuals to 100. Because their populations show considerable homogeneity and as it was found in exemplars from little (young) to impressive trees on relatively big area, I consider it a new species for science, that I describe as follows.

Sorbus amici-petri Mikoláš, sp. nov. (Fig. 1)

Diagnosis: Insignis corona lata, foliis ovatis usque rotunde ovatis, 90-110 x 70-80 mm, basi rotundis, laminis cum 6-8 sublobis utrobique et 12-13 venis lateralibus utrimque, petiolis 15-25 mm, corymbothyrsis densifloris usque semidensifloris, floribus cum sepalis 3.0-4.0 x 3.0-3.5 mm, erectis usque patentibus et petalis 7.5-8.5 x 5-6 mm, stylis 2 ad 1/2-4/5 coalescentibus, fructibus sphaericis, 11.0-13.0 x 13.0-14.0 mm, in statu maturo aurantiaco-rubris usque clare rubris, lenticellis parvis semidensis usque densis, mesocarpio heterogeno, endocarpio membranaceo usque cartilagineo, seminibus 1-2 (3) castaneis usque atro-castaneis, 5.5-6.5 x 2.0-2.5 mm. 2n = 68.

Nomen dedicari in honorem RNDr. Peter Černaj, CSc.

Holotypus: Slovakia orientalis, Kysak, ca. 1.3 km situ austro-orientali in silvo-steppa, V.Mikoláš, 22.9. 2002 (KO 28 231), cf. Fig. 1.

Up to 5-7 m high trees (or shrubs), with widely opening branches forming wide crown. Grey bark of trunk is smooth, longitudinally chapped in places and crosswise flecked by numerous rhomb or rhomboid cicatrices. Young shoots chestnut-brown, 2 year old ones purple-greyish-brown, older ones grey. Leaf buds ovoidly acute at apex, in beginning of April (6.0)-7.0-9.0-(10.0) x (2.0)-3.0-4.0-(5.0) mm, flower buds (8.0)-10.0-12.0-(13.0) x (4.0)-5.0-6.0-(7.0) mm, scales olivaceous greenish, lightly yellowish-brown to orange-brown, with (0.2)-0.5-0.8-(0.9) mm broad deep-brown margin, on above margins sparsely hirsute (hairs 0.5-1.5 mm long). Leaves broadly ovate to rhombic, the most broad in 1/3-1/2 part of leaves blades, rarely narrowly ovate, (85)-90-105-(125) x (65)-75-90 mm, with (11)-12-13 pairs of veins, white tomentose on lower surface, glabrous on upper surface, broadly cuneate to widely round or truncate at base, shallowly lobed, with (5)-6-8-(9) of lobes, the longest lobes up to 17-23 mm long, acute and upper 1/2 to 2/3 of leaves simply serrate to biserrate and somewhat irregularly serrate, at base with integrated margins. Petioles (9)-15-25 mm long, on the most narrow leaves longer, tomentose. Leaves in autumn becoming deep yellow and later brown, central vein of leaves becoming reddish-purple to purplish coloured in autumn. Inflorescence subdense to dense corymbothyrsus, 85-100 mm in diameter, with markedly tomentose pedicels, up to 35 mm long, becoming glabrous in autumn, with (27)-30-60-(78) flowers, with conspicuous,

sweet smell. Hypanthium turbinate, conspicuously tomentose. Flower buds 7-8 mm long. Flowers (14)-16-18-(20) mm in diameter. Trigonal sepal tips (2.0)-3.0-4.0-(4.3) mm long and (2.8)-3.0-3.5-(4.0) mm broad, erect to patent (or sometimes pressed back to hypanthium), on both surfaces considerably tomentose, concave petals broadly ovate to round, (6.5)-7.5-8.5-(10.0) mm long and (4.0)-5.0-6.0-(6.5) mm broad, greenish – yellowish white, with short claw at base and here (on inner surface) hirsute. Stamens ca. 20 (16-20), with yellowish, in the youth rosy-yellow coloured anthers, (1.2)-1.5-1.8-(2.0) mm long, filaments (2.8)-3.3-6.0-(8.5) mm long, ovary semi-inferior, on upper surface hirsute, styles 2, 3.5-4.5 mm long, villose at the base, connate to 1/2-4/5 length, stigmas flat or lightly concave. Infrutescence with (6)-10-18-(22) fruits. Pedicels tomentose, later glabrous. Fruits globose, tomentose at erect (to patent) sepals and apex, (10.0)-11.0-13.0-(15.0) x (8.5)-13.0-14.0-(15.5) mm, orange-red to brightly coral red, with dense enough to dense lenticels (120-170 on fruit), of small up to middle large size (in upper part of fruit 0.05-0.1 mm in diameter, in lower part of fruit 0.2-0.35 mm in diameter), mesocarp soft farinaceous, lightly orange, heterogenous, endocarp membranaceous to cartilagineous, with 1-2-(3) seeds in fruit. Seeds deep brown to black-brown, (5.5)-6.0-6.5-(7.0) x (2.0)-2.5-2.8-(3.3) mm. Tetraploid species with 2n = 68 (Kysak, 0.8 km SEE in xerothermous oak forest, leg. V.Mikoláš, Mártonfiová, unpubl.data).

Holotypus: Kysak, ca. 1.3 km SE, in forest-steppe vegetation, leg. V.Mikoláš, 22.9. 2002 (KO 28 231).

Distribution (Fig. 2): selected specimens: Kysak, ca. 0.8 km SEE, in xerothermous oak forest, leg. V.Mikoláš, 17.5.1997, (KO 18582); Kysak, ca. 1.0 km SE, in xerothermous oak forest, leg. V.Mikoláš, 17.5. 1997, (KO 18572); Trebejov, ca. 0.9 km SEE, in margin of oak forest and growth of allochtonous *Pinus nigra*, leg. V.Mikoláš, 1.11.1997, (KO 18881); Trebejov, ca. 1.5 km SE, in hornbeam-oak forest, leg. V.Mikoláš, 3.12. 1995; Obišovce, ca. 0.8 km S, on NW slope of hill (397.8), in oak and hornbeam forest, leg. V.Mikoláš, 8.4. 1995.

Origin of *Sorbus amici-petri* and *Sorbus* flora of localities with its occurrence.

In an older paper (Mikoláš 1997) I brought together information on the occurrence of *Sorbus* species in the flora of Stredné Pohornadie valley (phytogeographical district N and NW of the town of Košice) with frequent dolomite rocks. In this paper I suppose that new *Sorbus* species, *S. dolomiticola* Mikoláš, a remarkable triploid species of the region, is a product of hybridization of *S. torminalis* and *S. danubialis* agg. After new studies of the *Sorbus* flora of the area I conclude that one of the parents is probably *S. cuneatifolia* ined. (and the second one is *S. torminalis*). *S cuneatifolia* is a triploid species (Lysák, Mikoláš & Vrána, unpubl. data) with the occurrence in Stredné Pohornadie valley (similar morphotypes were observed also in Slovenský kras karst, Slovenský raj and Moravský kras karst/Czech Republic) and it is possibly identical with already described species *S. javorkae* (Soó) Kárpáti that was not given, however, from the area so far (cf. Májovský 1992) and it is diploid (2n = 34, Májovský & Uhríková 1990). The taxa *S. vajdae* Boros em. Kárpáti, *S. huljakii* Kárpáti, nom.inval. and *S. budaiana* Kárpáti, nom.inval. (Kárpáti 1960, Kovanda 1997) are also very

similar. These species are allegedly hybridogenous species with participation of *S. haszlinszkyana* (Soó) Májovský (Kárpáti 1960). Theirs distinctions are very problematical and these species call for lectotypification and possibly also for epitypification. If really *S. cuneatifolia* is the species with the participation of *Sorbus haszlinszkyana* and *S. dolomiticola* developed from a hybridization with this species, it would be threefold hybridogenous species. Utilizing of modern biosystematic methods is needed for a correct decision.

The Bohemian species with which I compared *S. dolomiticola* is *S. bohemica* Kovanda, an endemic of České Středohoří Mts. that is also triploid. Kovanda (in Jankun & Kovanda 1987) supposes that it is a hybridogenous species from a hybridization of *S. torminalis* (L.) Crantz and *S. danubialis* (Jáv.) Prodan. The latter species is, however, tetraploid (Lysák, Mikoláš & Vrána, unpubl. data for data from the Stredné Pohornadie valley, Slovakia, Šefl (2000) for data from Dyje valley, Moravia, Czech Republic) and the Bohemian *S. danubialis* is diploid species (Jankun & Kovanda 1987). However, Kovanda (1961) described Bohemian form of *S. danubialis* originally as *S. graeca* var. *apiculata* Kovanda. It is characteristic by pointed apex and incise serrate margin of leaves. That is why it is different from real *S. danubialis* and I propose a new combination for it here: *S. apiculata* (Kovanda) Mikoláš, comb. et stat. nov. (Basionym: *S. graeca* (Spach) Kotschy var. *apiculata* Kovanda, Acta Dendrol. Čechoslov. 3: p. 60, 1961, Icones: Kovanda, Acta Dendrol. Čechoslov. 3: p. 61, Fig. 11). Thus *S. bohemica* is a hybridogenous species with participation of *S. torminalis* and *S. apiculata*. *Sorbus amici-petri* is a species that probably developed from hybridization of *S. torminalis* and *S. orbicularis* ined. The latter taxon is a tetraploid species (Lysák, Mikoláš & Vrána, unpubl. data) and is possibly identical with *S. thaiszii* (Soó) Kárpáti, that is given by Májovský (1992) from the environment of Trebejov village and Hradová hill at the NW margin of the town of Košice, both in the Stredné Pohornadie valley phytogeographical district. The identity of the both taxa demands yet confirmation using the modern biosystematic methods, especially DNA studies. In my previous paper (Mikoláš 1997) I mentioned also *S. graeca* from the Stredné Pohornadie valley. However, a new comparison shows that it is probably *S. danubialis*. Its participation in the origin of *S. amici-petri* is little probable, especially because of its relatively minute leaves and rarity in the region. There is another similar taxon in the region, *S. inopinans* ined., however, with relatively minute leaves, too. *Sorbus amici-petri* is very similar to some Hungarian species: *S. latissima* Kárpáti, *S. pseudolatifolia* Boros and *S. semiincisa* Borbás. *S. latissima* is an endemic of Keszthely Hills on NW margin of Balaton lake and it is distinguishable especially large leaves (up to 140 x 125 mm, *S. amici-petri* up to 125 x 90 mm). *S. pseudolatifolia* is an endemic of Vertes Mts. (NW Hungary) and it is differentiated by leaves frequently heart-shaped at base (*S. amici-petri* broadly cuneate to truncate at base), sharp and long lobes (*S. amici-petri* blunt and short lobes), 10-11 pairs of veins (*S. amici-petri* 12-13 pairs of veins) and fruits purple-brown (*S. amici-petri* fruits orange-red to coral red). *S. semiincisa* is an endemic of the area between Budapest and Esztergom (NW Hungary) and it differentients especially by low number of pair of veins (8-9, *S. amici-petri* 12-13). Since these Hungarian species developed in other areas than *S. amici-petri* and have specific phylogenetic history, I consider

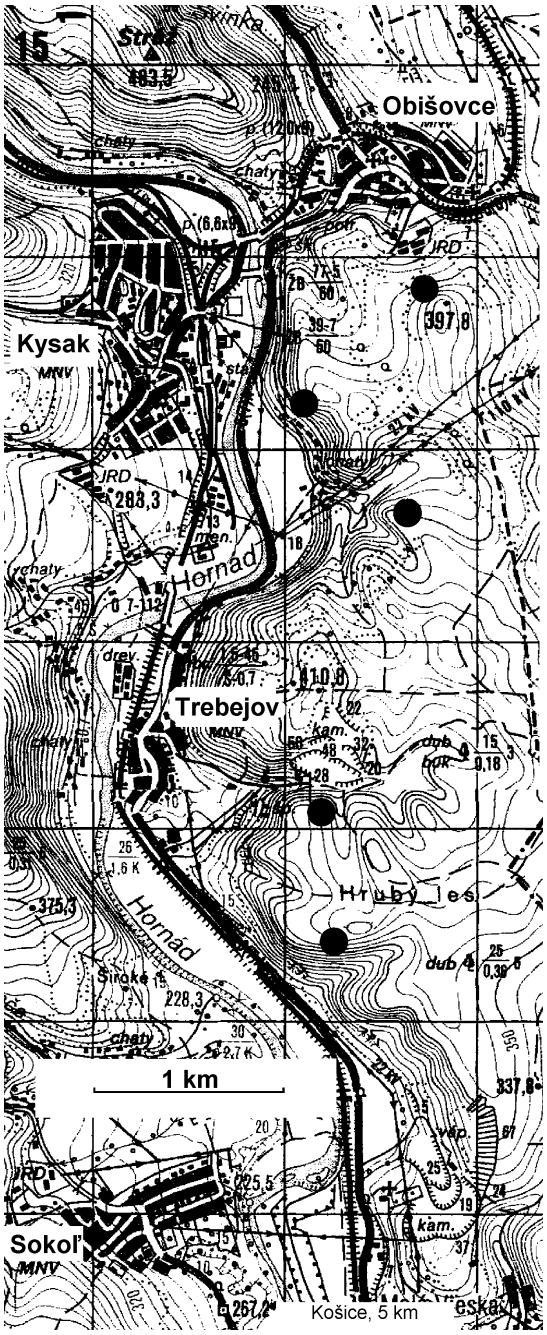

Fig. 2: Map of distribution of *Sorbus amici-petri*.

there are independent microspecies. Evaluation of all microspecies of *S. latifolia* agg. as only two species: *S. latifolia* s.s. and *S. semiincisa* (in ALDASORO et al. 1998) is artificial and unacceptable.

Notes on ecology and protection of *S. amici-petri*

S. amici-petri grows in park forest-steppe xerothermous vegetation, usually on western slopes, or in adjacent hornbeam and oak forests. Similarly to *S. dolomiticola*, it is characteristic especially for the association *Corno-Quercetum pubescentis* MÁTHÉ et KOVÁCS. Another occurrence is in the vegetation of *Carpinion betuli* ISSLER and shrubby communities *Prunion spinosae* SOÓ.

The species probably evolved in the post-glacial time on the western slopes of hills SEE of the Kysak village. The biggest amount of individuals is growing here, from little young to big old exemplars. Flowering and fruiting is regular enough, but as it is characteristic for all the family *Malaceae*, in some years it is missing or very weak. Opposite to *S. dolomiticola*, the species doesn't flower again in autumn. As it was confirmed by cultivation experiment, germination is better than in *S. dolomiticola*. Bigger fruits with richer mesocarp are surely more attractive for birds. That is why it is interesting that *S. dolomiticola* grows in the area in the number of ca. 200 individuals, but *S.*

amici-petri only 100 ones. It is probable that *S. dolomiticola* developed earlier in the post-glacial time, perhaps as consequence of more frequent occurrence of *S. cuneatifolia* (opposite to relatively more rare *S. orbicularis*). *S. amici-petri* has comparable amount of individuals to *S. eximia* KOVANDA (90 exemplars, JANKUN & KOVANDA 1988), an endemic of the Český kras karst (the central Bohemia). The most remote localities of *S. eximia* are 7-8 km from each other and only ca. 3 km in *S. amici-petri*. The latter species thus grows in the area with larger density than *S. eximia*. While *S. eximia* is, however, growing in protected areas of the Český kras karst, *S. amici-petri* occurs in the area that is not protected at all.

Sorbus amici-petri is a species growing in relatively little area, in the altitude of ca. 250 to 400 m above sea level, where the exploitation of wood is carried and the quarry at Trebejov exploits dolomitic stone. The forestry fortunately usually exploits only the beech woods, so the probability that it destroys the populations of the species is low.

However, if it is considered that the species grows in little total area with rich flora (cf. MIKOLÁŠ 1997, p. 10), it is more needed to declare the well-preserved parts of the area as state nature reserves. It would be desirable to save all of the area of the Stredné Pohornadie valley as Protected Landscape Territory with a number of nature reserves and also to conserve the populations of endemic species of *Sorbus* and another rich and rare flora of the region for future.

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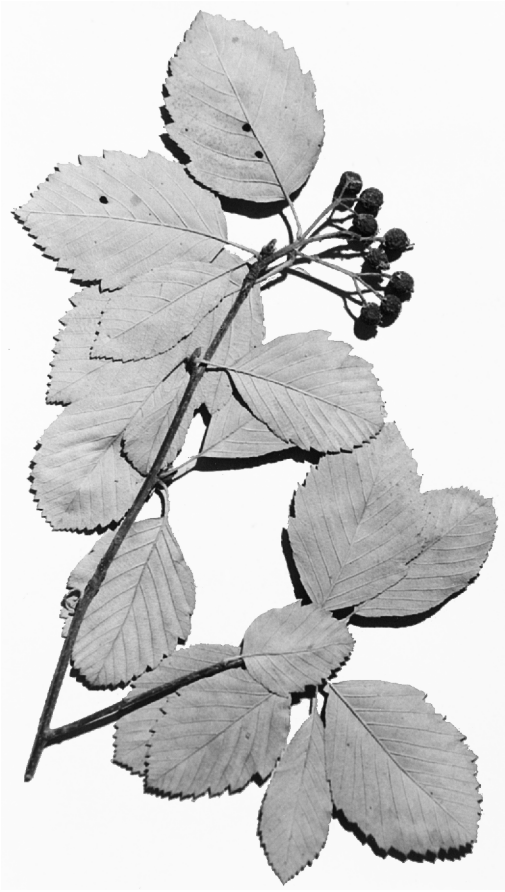

Fig. 1. Photograph of holotypus of *Sorbus amici-petri*.