

Quercus iberica, a new oak species native to Slovakia and its differentiation from *Q. polycarpa*

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Summary: *Quercus iberica* is an oak taxon identified as *Q. polycarpa* by some authors. The respective taxonomical approaches to *Q. iberica* are briefly introduced and the reliable morphological characters for the differentiation of these two taxa which are available during the whole growing season are exemplified on the basis of carefully chosen field samples. Spontaneous occurrence of *Q. iberica* in Slovakia is confirmed and current knowledge on its distribution in Slovakia is presented along with a list of exsiccates revised till present.

Keywords: dendroflora, Malé Karpaty Mts, oak, *Quercus petraea* agg., taxonomy, Western Carpathians, Záhorská nížina Lowland

The flora of Slovakia counts altogether nine native oak species in the country and one allochthonous species planted in larger number in the forests, *Quercus rubra* L. (MAGIC 2006). The native species, except of *Q. cerris* L., are traditionally grouped into three species aggregates considering their morphology and presupposed genetical affinity:

- *Q. robur* agg. = *Q. robur* L. and *Q. pedunculiflora* K. Koch;
- *Q. petraea* agg. = *Q. petraea* (Matt.) Liebl., *Q. polycarpa* Schur and *Q. banatus* P. Kučera (syn. *Q. aurea* Wierzb. nom. illeg., *Q. dalechampii* sensu auct. medioeur. non Ten.; KUČERA 2018);
- *Q. pubescens* agg. = *Q. pubescens* Willd., *Q. virgiliana* (Ten.) Ten. and *Q. frainetto* Ten.

Only one species from the group of non-pubescent twig and short-stalked oaks, *Quercus petraea*, was traditionally reported for the whole area of Bohemia, Moravia and Slovakia (former Czechoslovakia) (DOSTÁL 1950; DOSTÁL 1958). Based on the evidence from the countries adjacent to Slovakia (SCHWARZ 1964; GANCHEV & BONDEV 1966; MÁTYÁS 1967, 1970), especially Hungaria, and from the field works on the flora and the geobotanical mapping of Slovakia, the list of Slovakian *Q. petraea* agg. basic species was extended with *Q. banatus* (ut *Q. dalechampii*) and *Q. polycarpa* (MAGIC 1974, 1975), two species widely recognized in the floras of Central and Southeastern European countries (detailed overview by KUČERA 2019).

In the frame of Slovakian oak flora study for the Slovak national determination key (Letz et al., in prep.), a renewed revision of exsiccates in the Slovak herbaria and recent field research is being performed by the present author. Among others, the preliminary results indicate that some of the mentioned species – *Q. frainetto*, *Q. pedunculiflora* s. str., *Q. virgiliana* s. str. – were either actually never recorded in Slovakia or they are not native to Slovakia (cf. KUČERA 2017).

The aim of this paper is to point out present-day knowledge on the occurrence of another distinctive basic oak taxon indigenously growing in Slovakia, *Quercus iberica* Steven ex M. Bieb. as well as to present the most important and easily recognizable morphological features available

for determination through the whole growing season and distinguishing this species from *Q. polycarpa* Schur as these two species are frequently identified as the same taxon in the literature.

Materials and methods

The field observations and the revision of historical and more recent exsiccates begun in the year 2014, the differentiation of *Q. iberica* has been focussed since November 2018. Except specified otherwise, recent documentation in the field was performed by myself. GPS coordinates were recorded with GPS device GPS®MAP 60CSx in the reference coordinate system WGS-84. My own herbarium samples are currently stored in BBZ – the reference herbarium of the Botanical Garden of Comenius University in Bratislava, workplace Blatnica. Scientific oak names and author abbreviations were adapted from the International Plant Names Index (IPNI 2019), the names of original determination of exsiccates within Appendix 2 are retained according to original author; other plant names follow MARHOLD (1998). Acronyms of herbaria follow *Index herbariorum* (THIERS 1997–) or VOZÁROVÁ & SUTORÝ (2001). Phytochorological units of Slovakia are according to FUTÁK (1980).

Results and discussion

Three taxonomical approaches to *Quercus iberica*. *Q. iberica* is referred in the literature either (1) as one of the basic oak species (SCHWARZ 1937; TAKHTAJAN 1962; NAKHUTSRISHVILI 2013; BATSATSASHVILI et al. 2017), or (2) as subspecies of *Q. petraea* (*Q. petraea* ssp. *iberica* (Steven ex M. Bieb.) Krassiln. (GOVAERTS & FRODIN 1998¹; TSVELEV et al. 2004; MENITSKY 2005; LE HARDY DE BEAULIEU & LAMANT 2010²; EKHVAIA et al. 2018; FISCHER et al. 2018) or (3) it is not recognized as an independent taxon and listed under the name *Q. petraea* ssp. *polycarpa* (Schur) Soó as synonym (Govaerts in WCSP 2019).

While some authors consider *Q. iberica* / *Q. petraea* ssp. *iberica* as a taxon endemic to the Caucasus and adjacent regions (e.g. SCHWARZ 1937; TSVELEV et al. 2004; BATSATSASHVILI et al. 2017), others suppose that *Q. iberica* and *Q. polycarpa* (in the taxonomical rank of species or lower) represent only one taxon,² '*Q. iberica*' should be therefore distributed also in Central Europe. Obviously, these two views are in a strong disagreement.

Quercus iberica occurrence was mentioned in the other parts of Europe outside of the Caucasus (FISCHER et al. 2018), even for Slovakia (LE HARDY DE BEAULIEU & LAMANT 2010); however, such records come either (1) from the above-mentioned identification of *Q. iberica* and *Q. polycarpa* as the same taxon based on other literature sources, or (2) these are data on the plantation of *Q. iberica* in culture (SCHWARZ 1937; MENITSKY 2005; CHOPYK & FEDORONCHUK 2015).

Differences between *Q. iberica* and *Q. polycarpa*. *Q. polycarpa* is a long-time known and accepted taxon in the floras of the western East European (CHOPYK et al. 1977; IVCHENKO 1987, DIDUKH et al. 2004), the Southeastern European (BELDIE 1952; GANCHEV & BONDEV 1966; JANKOVIĆ 1970) and the Central European countries (Soó 1970; KOBLÍŽEK 1990; MAGIC 2006) having wider distribution there; see also SCHWARZ (1964) and JALAS & SUOMINEN (1976).

1 Here synonymised with *Q. polycarpa* Schur / *Q. petraea* var. *polycarpa* (Schur) Cristurean [nom. inval.: cf. International Plant Names Index (IPNI 2019)].

2 In the subspecies rank correctly labelled by the name *Q. petraea* ssp. *polycarpa* (Schur) Soó as it is the older synonym: Govaerts in WCSP (2019).

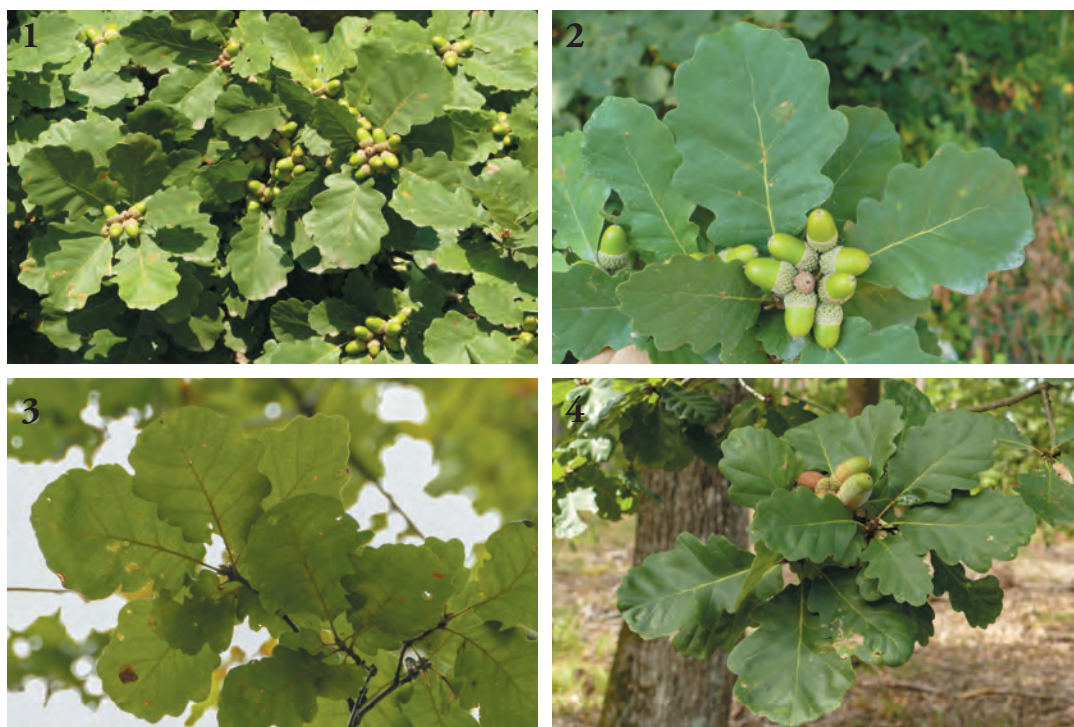


Figure 1. *Quercus polycarpa*, crown periphery of the tree by the roadside 'Pekná cesta' (Malé Karpaty Mts), near Bratislava-Krasňany, 6. 8. 2018. Photo P. Kučera.

Figure 2. The same tree of Fig. 1, leaves in detail, 6. 8. 2018 BBZ (documented several times). Photo P. Kučera.

Figure 3. One of the *Q. polycarpa* trees in the Fialková dolina (Malé Karpaty Mts), near to Devín (local part of Bratislava), outside of the Nature Reserve Fialková dolina, view from the ground, 9. 10. 2019 BBZ. Photo P. Kučera.

Figure 4. *Q. polycarpa* on eolic sands southwards of Šaštín (Záhorská nížina Lowland), 17. 9. 2018 BBZ (also 8. 8. 2018 and 1. 8. 2019). Photo P. Kučera.

Relying on the detailed description and illustrations of *Q. polycarpa* by SCHWARZ (1936, 1937) as well as characterization of the species in the above-mentioned national floras and other works of Central and Southeastern Europe, this oak species is easily recognized by the distinctly shallow-lobed leaf margin. The leaf blade is coriaceous and specimens in Slovakia have usually 5–7 lobes (somewhat disappearing at the leaf apex; Figs 1, 2, 3, 4).

The overall leaf blade shape may vary more or less, however, the above-mentioned combination of leaf characters is unique for *Q. polycarpa*. The view that determination of this taxon is very difficult and problematic (ŠTECH 2019) is controversial. Certain difficulties in the exact determination could arise only when the introgressive forms of *Q. polycarpa* are considered. Hybrids of *Q. polycarpa* close to this parental species are also characterized by a somewhat coriaceous leaf blade, but their lobes are markedly distinctive. On the contrary, leaves of *Q. iberica* are noticeably lobed and the number of lobes is 8–11 on well-developed leaves (BATSATSASHVILI et al. 2017, see photo by FISCHER et al. 2018), in Slovakia I have recorded mostly 7–9(10) lobes. This character unambiguously differentiates this taxon from all other basic species usually recognized within *Q. petraea* agg. (cf. also the available elements of the original diagnosis of *Q. petraea*, i.e. MATTUSCHKA 1777); see Figs 5, 6, 7, 8.

The leaf forms of Slovakian specimens are considerably corresponding to *Q. iberica* holotypes stored in the Royal Botanic Garden Edinburgh [E], specimens E00326720 and E00326721 (photos:

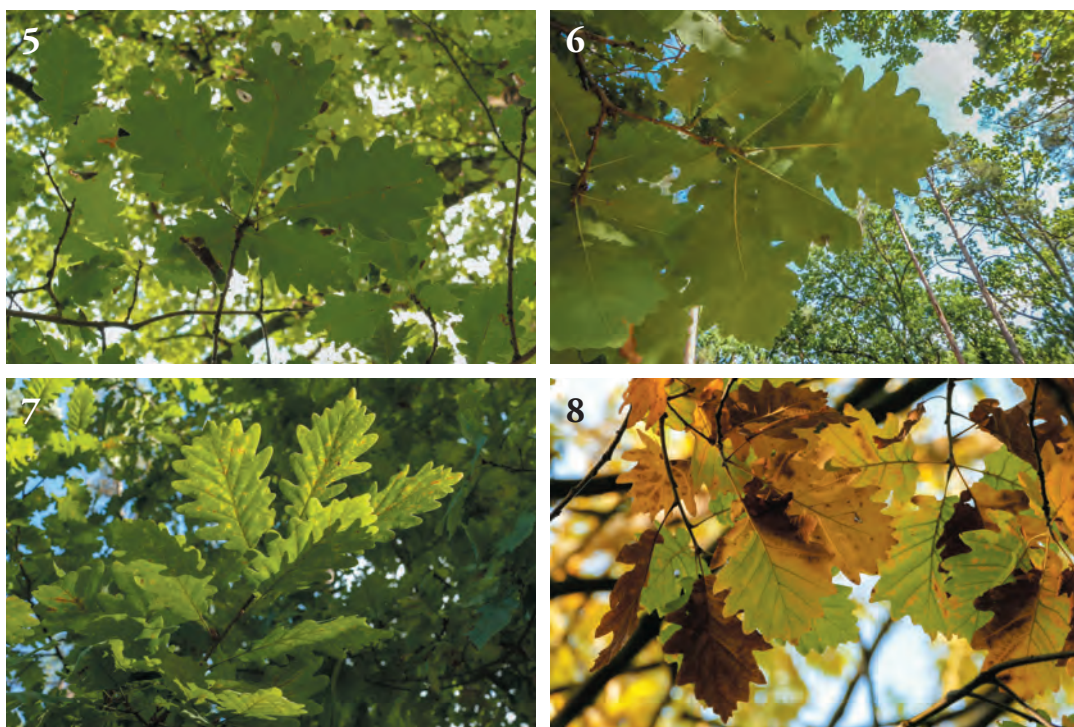


Figure 5. Leaves of the *Q. iberica* tree in the forest above Patrónka (Appendix 1: 3), view from the ground, 20.9.2018 BBZ. Photo P. Kučera.

Figure 6. Leaves of the old *Q. iberica* tree near the dune summit of Šibenica (Appendix 1: 12), view from the ground, 17.7.2019. Photo P. Kučera.

Figure 7. Early autumn leaves of the *Q. iberica* tree on undulated plains of eolic sand southwards of Šaštín (locality Appendix 1: 9A), 18.9.2019 BBZ. Photo P. Kučera.

Figure 8. Autumn leaves of *Q. iberica* on the SW slope of Braunsberg Hill (Austria, Appendix 1: 14), 25.10.2019. Photo P. Kučera.

<http://data.rbge.org.uk/herb/E00326720> and <http://data.rbge.org.uk/herb/E00326721>). The leaf blade might be firm (especially on sun exposed branches), but it is not coriaceous and leaves are markedly large. These differences are easily recognizable during the whole growing season and support the view that *Q. polycarpa* and *Q. iberica* unequivocally represent two distinct taxa.

The bark of the old trees of *Q. iberica* is deeply and considerably coarsely trenched (Fig. 9), on very old trees partially similar to middle-aged *Q. cerris* specimens, while old *Q. polycarpa* trees have only moderately deep trenched bark.³ The colour of the *Q. iberica* bark is not a reliable differential sign as it might depend on air pollution on the site: originally light greyish colour (except Slovakia confirmed also from Georgia: the photos kindly provided by Dr J. Ekhvaia) might turn to blackish in heavier polluted areas (e.g. Bratislava surroundings).

Current knowledge on *Quercus iberica* distribution. First trees of *Q. iberica* were identified in the southwestern margin of Slovakia, in the oak forests surrounding Bratislava, capital city of the country. The individuals (Appendix 1: 1–4) are rather infrequent as the majority of oak trees are

³ The most easily recognizable oak within *Q. petraea* agg. by bark is *Q. banatus*: the typical specimens (i.e. ± without visible influence of introgressive hybridization) have noticeably narrowly and shallowly trenched bark even when they are older than 150–200 years (Fig. 10), in the appearance closer to the bark of old *Acer campestre* trees than to other oak species native in Central Europe.



Figure 9. Bark of the old *Q. iberica* tree (Appendix 1: 11B; Fig. 7), 21. 10. 2019. Photo P. Kučera.

Figure 10. Bark of the very old *Q. banatus* tree (probably more than 300 years old), above the saddle southeastwards from the Bučková Mt. (545 m a.s.l.) near Kuchyňa (Malé Karpaty Mts), 31. 7. 2019. Photo P. Kučera.

Q. robur and species of *Q. petraea* agg. hitherto known from Slovakia (MAGIC 2006) including also their hybrids and introgressive forms. It is probable that *Q. iberica* could participate there on creation of various hybrid forms. The species grows on the habitat of mesic as well as acidic human-influenced oak stands.

The species was also recorded further to the north in the Malé Karpaty Mts, in the southeastern margin of the central part of the mountain range (Appendix 1: 5). The habitat is a very steep northeast-facing slope with domination of *Vaccinium myrtillus* and pteridophytes (especially *Dryopteris carthusiana*) or with total domination of *Avenella flexuosa*. Except of other oak species and hybrids, one older tree and also a sapling of *Q. cerris* (both probably descending from trees of historical anthropogenic stand of the species in the nearby forest) are growing here. All of the aforementioned occurrences indicate that *Q. iberica* is probably a more frequently distributed oak species in the Malé Karpaty Mts; however, it has been overlooked.

The second region with currently confirmed *Q. iberica* occurrence in Slovakia is the Záhorská nížina Lowland in the westernmost part of Slovakia adjacent to Malé Karpaty Mts (Appendix 1: 6–12). A distinct feature of the great part of the landscape plains, mostly covered by forest, are continuous areas of eolic, nutrient-poor and acidic sands, here and there with distinct dunes. The species was found in several localities within different habitats: from plains or slight depressions with *Molinia arundinacea* to south-facing upper parts of dune slopes and dune summit, accompanied by psamphytic flora (*Carex ericetorum*, *C. supina* etc.) and various oak taxa, mainly *Q. robur* and hybrids within *Q. petraea* agg. s. l.

The species was in the region probably more frequent before the human-influenced transformation of natural mixed oak forests to current widespread *Pinus sylvestris* monocultures (KRIPPEL 1965, 1986). Woodlands physiognomically and at least partially by vegetation composition resembling the original forest cover on dry acidic sands occur within the Záhorie Protected Landscape Area, e.g. in the Nature Reserve Vanišovec or in and eastwards of the reserve Kazárka (northern part of the Záhorská nížina Lowland).

In addition to currently confirmed localities in southwestern Slovakia, existence of *Q. iberica* was in the field registered within a very small plantation in the spurs of the Tatra Mountains (Table 1: 13). The occurrence of *Q. iberica* was also recorded in Austria, on the southernmost spur of the Malé Karpaty Mts [Kleine Karpathen] close to the state boundary to Slovakia (Appendix 1: 14). Another occurrence was also found in Moravia during an occasional visit, in the surroundings of Brno, within the noteworthy Nature Reserve Bábí lom as well as in the Holedná Game Preserve accessible to the public (Appendix 1: 15, 16).

Subsequently to recognition of *Q. iberica* in the field, I started a renewed study of the historical records of Slovak oak exsiccates to gather more general information on the distribution of the species in Slovakia. Until now, three of the most important herbaria in Slovakia were searched for samples of *Q. iberica*.

In herbarium BRA, no samples of *Q. iberica* could be found. In herbarium SLO, I have detected several herbarium sheets from four separate regions of Slovakia, where the respective authors documented individuals (at least to some extent) similar to recently sampled trees of localities 1–10 in Appendix 1. However, the highest number of exsiccates, revised by me as *Q. iberica* until now, are deposited in herbarium SAV. The results of exsiccate's revision are given in Appendix 2. SAV collection includes also samples of cf. *Q. iberica* from Moravia (Dlhé stráně, 1. 8. 1962, J. Ďurka), *Q. iberica* from Bulgaria (Istočna Stara planina, 6. 6. 1978, J. Michalko; two samples) and one exsiccate of cf. *Q. iberica* from Italy (Monticiano, 10. 11. 1979, J. Michalko, ut *Q. dalechampii* Ten.). The SAV collection comprises also the MLY collection since 2006. It includes for example field samples used for documentation of *Q. petraea* subtaxa distribution in parts of Slovakia published by HORVÁTHOVÁ (1986) (Appendix 2).

Evaluation of nativeness of *Q. iberica* population in Slovakia seems problematic especially when considering the trees found in the Bratislava surroundings. The forests adjacent to the city have considerably changed tree species abundancies (oaks were preferred for cultivation), species composition has also changed partially (*Q. cerris* was planted). Here and there are still recognizable traces of historical deforestation (e.g. straight nearby the locality Appendix 1: 3).

Forests of the Záhorská nížina Lowland were also changed artificially in the past centuries. Especially *Pinus sylvestris* was predominantly used for reforestation and afforestation (KRIPPEL 1965, 1986). However, recorded trees older than ± 200 years and their presence within the probably most preserved forest area in Záhorská nížina Lowland, i.e. southwards of Šaštín, indicate that *Q. iberica* is a native oak species on various habitats of eolic acidic sands here. Hitherto revised historical exsiccates suggest that the species is not uncommon also in other regions of Slovakia, especially in the southern lowland parts.

The question for further study is, beside the investigation of the overall *Q. iberica* distribution in the Eastern, Southeastern and Central Europe (maybe also further to the west), whether

Q. iberica is closely related to other species of the *Q. petraea* agg. or it belongs outside of this group. Genetical differentiation between the isolated Caucasian and other European *Q. iberica* populations should be examined for possible infraspecific taxonomical classification.

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Appendix 1. Sites of recently confirmed *Quercus iberica* occurrences.

	Locality	Phytogeographical district of Slovakia	
1.	Malé Karpaty Mts, Devínske Karpaty, near to Karlova Ves-Kútiky (local part of Bratislava), lower edge of the forest, young specimen at the edge of the road	Devínska Kobyla	
2.	Malé Karpaty Mts, Devínske Karpaty, near to Karlova Ves-Kútiky (local part of Bratislava), lower edge of the forest	Devínska Kobyla	
3.	Malé Karpaty Mts, Pezinské Karpaty, in the forest above Patrónka (local part of Bratislava)	Malé Karpaty	
4.	Malé Karpaty Mts, Pezinské Karpaty, lower edge of the forest above Patrónka (local part of Bratislava)	Malé Karpaty	
5.	Malé Karpaty Mts, Pezinské Karpaty, near to lower edge of the village of Píla	Malé Karpaty	
6.	Záhorská nížina Lowland, secondary <i>Pinus sylvestris</i> forest to the northeast of the town of Malacky, near the bus stop 'Tančibocký výhon'	Záhorská nížina	
7.	Záhorská nížina Lowland, secondary <i>Pinus sylvestris</i> forest to the northwest of the village of Lakšárska Nová Ves	Záhorská nížina	
8.	Záhorská nížina Lowland, southwards of the village of Šaštín, near the recreation area 'Kazárka', southwesterly faced moderate slope with mixed oak stand with <i>Pinus sylvestris</i>	Záhorská nížina	
9.	Záhorská nížina Lowland, southwards of the village of Šaštín	Záhorská nížina	
10.	Záhorská nížina Lowland, southwards of the village of Šaštín, to the southwest from the forester's house Fáberky	Záhorská nížina	
11.	Záhorská nížina Lowland, southwards of the village of Šaštín, short north-facing part of ridge of dune (A) and (B) south-facing dune slope near the summit of the dune Šibenica (215 m a.s.l.)	Záhorská nížina	
12.	Záhorská nížina Lowland, southwards of the village of Šaštín, in the summit area of the dune Šibenica (215 m a.s.l.)	Záhorská nížina	
13.	Popradská kotlina Basin, southwards of the Tatranská Kotlina, Dolky (below the spot height 812.5 m a.s.l.)	Podtatranské kotliny	
14.	<u>Austria</u> : Hundsheimer Berge, Braunsberg, near the lower edge of a secondary, successional forest on southeast slope	—	
15.	<u>Moravia</u> : Brněnská vrchovina Upland, northwards of the village of Lelekovice, northern half of the NN Babí lom and southern half of the NN Babí lom	—	
16.	<u>Moravia</u> : Brněnská vrchovina Upland, near Bystrc (part of Brno), Holedná Game Preserve, by the roadside southwestwards from the site 'U Jezírka'	—	

	Coordinates (WGS 84)	Altitude (a.s.l.)	Date with indication of specimen in herbarium BBZ and remarks
	48°10.047' N 17°2.570' E ± 7 m	225 m	15. 6. 2018 BBZ, 23. 7. 2018 (photo), 9. 8. 2018 BBZ
	48°10.077' N 17°2.489' E ± 6 m	ca 234 m	15. 6. 2018 BBZ (small windfallen twig), 25. 9. 2018 R. Rapant BBZ (windfallen twig), 26. 10. 2018 BBZ (fallen leaves on the ground); 25. 10. 2019 BBZ and later (fallen leaves on the ground)
	48°10.285' N 17°4.7773' E ± 6 m 48°10.298' N 17°4.778' E ± 6 m	ca 216 m 220 m	5. 10. 2016 BBZ, old tree (more than 150 years) 11. 5. 2016 (photo), 5. 10. 2016 BBZ, 9. 8. 2018 BBZ, 20. 9. 2018 BBZ
	48°10.232' N 17°4.726' E ± 8 m	ca 185 m	30. 11. 2018 BBZ, fallen leaves on the ground
	48°23.096' N 17°20.467' E ± 6 m 48°23.087' N 17°20.514' E ± 6 m	ca 285 m ca 280 m	19. 9. 2018 BBZ 19. 9. 2018 BBZ
	48°30.037' N 17°6.230' E ± 6 m 48°30.000' N 17°6.148' E ± 7 m	182 m 181 m	22. 10. 2019 BBZ, two young saplings descending from nearby older tree (above, 60–70 years old) 26. 10. 2019 BBZ, apart growing young tree
	48°35.376' N 17°9.504' E ± 8 m	206 m	2. 8. 2019 BBZ
	(A) 48°37.738' N 17°8.096' E ± 7 m (B) 48°37.684' N 17°8.161' E ± 7 m	(A) 183 m (B) 183 m	(A) 8. 8. 2018 BBZ, 1. 8. 2019 BBZ (B) 22. 7. 2020 BBZ
	(A) 48°37.424' N 17°8.007' E ± 10 m (B) 48°37.360' N 17°7.912' E ± 7 m	(A) 186 m (B) 186 m	(A) 10. 8. 2018 BBZ, 18. 9. 2019 BBZ (also other trees in the vicinity: 10. 8. 2018 photo, 22. 7. 2020 R. Rapant, P. Kučera BBZ) (B) 10. 8. 2018 BBZ, 18. 9. 2019 BBZ
	48°36.854' N 17°7.917' E ± 7 m	198 m	22. 7. 2020 BBZ
	(A) 48°36.741' N 17°8.290' E ± 4 m and nearby (B) 48°36.752' N 17°8.308' E ± 5 m	(A) 209 m (B) 208 m	(A) 17. 7. 2019 BBZ (B) 17. 7. 2019 R. Rapant & P. Kučera BBZ, 18. 9. 2019 and 21. 10. 2019 BBZ (acorns and cupules gathered from the ground), 22. 7. 2020 BBZ, both old trees older than ± 200 years
	48°36.768' N 17°8.421' E ± 10 m	215 m	10. 8. 2018 photo, 21. 10. 2019 BBZ
	49°13.138' N 20°19.358' E ± 9 m	786 m	15. 7. 2020 BBZ, on the locality except <i>Q. iberica</i> + <i>Q. cf. iberica</i> also <i>Q. banatus</i> + <i>Q. cf. banatus</i> (see KUČERA et al. 2020)
	48°9.094' N 16°57.156' E ± 7 m	ca 212 m	25. 10. 2019 BBZ, one young tree
	49°18.817' N 16°34.607' E ± 7 m 49°18.581' N 16°34.616' E ± 7 m	ca 552 m ca 534 m	13. 10. 2016 BBZ, 16. 5. 2017 (photo), 29. 9. 2017 BBZ 13. 10. 2016 BBZ, 16. 5. 2017 (photo), 29. 9. 2017 BBZ, old two-stemmed tree
	49°12.614' N 16°31.800' E ± 7 m	ca 3030 m	12. 10. 2016 and 20. 4. 2017 (only photos), supposedly planted tree

Appendix 2. Revised herbarium specimens of *Quercus iberica* from Slovakia. Localities are given from the west to the east of the country and from north to the south within supraregional phytogeographical units (FUTÁK 1980). Exsicates are without catalogue codes.

	Phytogeographical district	Locality (shortened)	Author	Date	
Eupannonicum					
1.	Záhorská nížina	Záhorie [locality not specified]	J. Futák, D. Magic	22. 5. 1948	
2.	Záhorská nížina	Záhorie [locality not specified]	J. Futák, D. Magic	22. 5. 1948	
3.	Záhorská nížina	Gbely	J. Michalko, A. Ščepka	3. 9. 1974	
4.	Záhorská nížina	Borský Peter (MV3006)	M. Valachovič	4. 6. 2009	
5.	Záhorská nížina	Borský Peter (MV3006)	M. Valachovič	4. 6. 2009	
6.	Záhorská nížina	Lakšárska Nová Ves – Borský Mikuláš	J. Horváthová	18. 8. 1983	
7.	Záhorská nížina	Lakšárska Nová Ves – Borský Mikuláš	J. Horváthová	18. 8. 1983	
8.	Záhorská nížina	Lakšárska Nová Ves – Borský Mikuláš	J. Horváthová	18. 8. 1983	
9.	Záhorská nížina	Lakšárska Nová Ves – Borský Mikuláš	J. Horváthová	18. 8. 1983	
10.	Záhorská nížina	Lakšárska Nová Ves – Borský Mikuláš	J. Horváthová	18. 8. 1983	
11.	Záhorská nížina	Lakšárska Nová Ves – Borský Mikuláš	J. Horváthová	18. 8. 1983	
12.	Záhorská nížina	Lakšárska Nová Ves – Borský Mikuláš	J. Horváthová	18. 8. 1983	
13.	Záhorská nížina	Ies Rybník pri Zohore	J. Michalko, A. Ščepka	3. 9. 1974	
14.	Podunajská nížina	Boleráz	E. Králik	19. 5. 1975	
15.	Podunajská nížina	Boleráz	E. Králik	19. 5. 1975	
16.	Podunajská nížina	Boleráz	E. Králik	19. 5. 1975	
17.	Podunajská nížina	Boleráz	J. Horváthová	8. 6. 1972	
18.	Podunajská nížina	Dubník (Šintava)	J. Michalko	18. 8. 1958	
19.	Podunajská nížina	Dubník (Šintava)	J. Ďurka	26. 9. 1961	
20.	Podunajská nížina	Dubník (Šintava)	J. Michalko, M. Michalko	26. 8. 1976	
21.	Podunajská nížina	Jarok	J. Horváthová	25. ?. 1978 [autumn]	
22.	Podunajská nížina	Nitra-Kynek	J. Horváthová	1967	
23.	Podunajská nížina	Párovské háje (Nitra)	J. Michalko, M. Michalko	26. 8. 1976	
24.	Podunajská nížina	Cerový háj (Nitra)	J. Horváthová	1968	
25.	Podunajská nížina	Mochovce	J. Horváthová	18. 9. 1981	
26.	Podunajská nížina	Mochovce (away from locality)	J. Horváthová	18. 9. 1981	
27.	Podunajská nížina	Mochovce	J. Horváthová	18. 9. 1981	

	Original determination	Herbarium	Revision date	Remarks
	–	SLO	29.11.2019	cf. <i>Q. iberica</i>
	–	SLO	29.11.2019	cf. <i>Q. iberica</i>
	<i>Q. robur</i>	BRA	5.3.2020	upper part of the original exsiccate belong to <i>Q. iberica</i> , lower part to <i>Q. robur</i>
	<i>Q. cf. petraea</i> agg.	BRA	4.3.2020	
	<i>Q. cf. robur</i>	BRA	4.3.2020	cf. <i>Q. iberica</i> (one of two samples)
	<i>Q. petraea</i> var. <i>petraea</i> f. <i>angulata</i>	MLY	6.3.2020	sample No. 20 122 (134)
	<i>Q. petraea</i> var. <i>laciniata</i> f. l. [<i>laciniata</i>] sf. <i>pinnata</i>	MLY	6.3.2020	sample No. 20 110 (141); cf. <i>Q. iberica</i> (? × <i>polycarpa</i>)
	<i>Q. petraea</i> var. <i>laciniata</i> f. l. [<i>laciniata</i>] sf. <i>pinnata</i>	MLY	6.3.2020	sample No. 20 111 (141); cf. <i>Q. iberica</i> (? × <i>polycarpa</i>)
	<i>Q. petraea</i> var. <i>laciniata</i> f. l. [<i>laciniata</i>] sf. <i>pinnata</i>	MLY	6.3.2020	sample No. 20 112 (141); cf. <i>Q. iberica</i> (? × <i>polycarpa</i>)
	<i>Q. petraea</i> var. <i>laciniata</i> f. l. [<i>laciniata</i>] sf. <i>pinnata</i>	MLY	6.3.2020	sample No. 20 113 (141); cf. <i>Q. iberica</i> (? × <i>polycarpa</i>)
	<i>Q. petraea</i> var. <i>laciniata</i> f. l. [<i>laciniata</i>] sf. <i>pinnata</i>	MLY	6.3.2020	sample No. 20 114 (141); cf. <i>Q. iberica</i> (? × <i>polycarpa</i>)
	<i>Q. petraea</i> var. <i>longifolia</i>	MLY	6.3.2020	sample No. 20 098 (150)
	<i>Q. robur</i>	BRA	5.3.2020	leaves of the original exsiccate belong to <i>Q. iberica</i> , fruits to <i>Q. robur</i>
	<i>Q. cerris</i>	SLO	25.11.2019	cf. <i>Q. iberica</i> , leaves are young, not fully developed
	<i>Q. cerris</i>	SLO	25.11.2019	cf. <i>Q. iberica</i> , leaves are young, not fully developed; not typical
	<i>Quercus</i>	SLO	29.11.2019	cf. <i>Q. iberica</i> , leaves are young, not fully developed
	<i>Q. petraea</i> var. <i>laciniata</i> f. l. [<i>laciniata</i>] sf. <i>pinnata</i>	MLY	6.3.2020	sample No. 20 047 (81)
	<i>Q. petraea</i>	SAV	3.3.2020	
	<i>Q. pubescens</i> × <i>Q. robur</i>	SAV	28.9.2020	small set of samples
	<i>Q. petraea</i>	SAV	5.3.2020	
	<i>Q. petraea</i> var. <i>laciniata</i> f. l. [<i>laciniata</i>] sf. <i>pinnata</i>	MLY	6.3.2020	sample No. 20 052 (86); cf. <i>Q. iberica</i>
	<i>Q. petraea</i> var. <i>laciniata</i> f. l. [<i>laciniata</i>] sf. <i>pinnata</i>	MLY	6.3.2020	sample No. 20 058 (92)
	<i>Q. petraea</i>	SAV	3.3.2020	
	<i>Q. petraea</i> var. <i>petraea</i>	MLY	6.3.2020	sample No. 19 976 (13); cf. <i>Q. iberica</i>
	<i>Q. petraea</i> var. <i>laciniata</i> f. <i>laciniata</i> sf. <i>pinnata</i>	MLY	6.3.2020	sample No. 20 055 (89)
	<i>Q. petraea</i> var. <i>laciniata</i> f. l. [<i>laciniata</i>] sf.	MLY	6.3.2020	sample No. 20 067 (101)
	<i>Q. petraea</i> var. <i>laciniata</i> f. l. [<i>laciniata</i>] sf. <i>acutiloba</i>	MLY	6.3.2020	sample No. 20 223 (101)/duplicate

Continuation **Appendix 2.** Revised herbarium specimens of *Quercus iberica* from Slovakia.

	Phytogeographical district	Locality (shortened)	Author	Date	
28.	Podunajská nížina	Mochovce	J. Horváthová	7. 7. 1983	
29.	Podunajská nížina	Mochovce	J. Horváthová	18. 9. 1981	
30.	Podunajská nížina	Čifáre	J. Horváthová	26. 7. 1983	
31.	Podunajská nížina	Čifáre	J. Horváthová	26. 7. 1983	
32.	Podunajská nížina	Farná	J. Horváthová	11. 7. 1984	
33.	(Podunajská nížina/Ipeľsko-rimavská brázda)	Sikenica	J. Horváthová	18. 7. 1979	
34.	Košická kotlina	Debraď	J. Michalko & M. Michalko	28. 8. 1976	
35.	Košická kotlina	Poľov, Gedeonský les	J. Ďurka	16. 5. 1962	
36.	Košická kotlina	Poľov, Gedeonský les	J. Ďurka	16. 5. 1962	
37.	Košická kotlina	Šaca	J. Michalko	28. 8. 1976	
38.	Východoslovenská nížina	les Kamy pri Úbreží	J. Michalko	4. 7. 1981	
39.	Východoslovenská nížina	Veľaty	J. Michalko & M. Michalko	30. 8. 1976	
Matricum					
40.	Ipeľsko-rimavská brázda	Malé Kosihy	J. Horváthová	5. 10. 1976	
41.	Ipeľsko-rimavská brázda	Bušince	J. Horváthová	11. 10. 1982	
42.	Ipeľsko-rimavská brázda	Bušince	J. Horváthová	11. 10. 1982	
43.	Ipeľsko-rimavská brázda	Bakta	J. Michalko & M. Michalko	28. 8. 1976	
44.	Ipeľsko-rimavská brázda	Bakta	J. Michalko & M. Michalko	28. 8. 1976	
45.	Ipeľsko-rimavská brázda	Bakta	J. Michalko & M. Michalko	28. 8. 1976	
46.	Ipeľsko-rimavská brázda	Bakta	J. Horváthová	12. 7. 1982	
47.	Ipeľsko-rimavská brázda	Bakta	J. Horváthová	12. 7. 1982	
Matricum / Praecarpaticum					
48.	? Ipeľsko-rimavská brázda / Slovenské stredohorie	Žemberovce	J. Horváthová	11. 10. 1982	
Praecarpaticum					
49.	Malé Karpaty	Horné Kramáre (Bratislava)	A. Popovič	12. 8. 1955	
50.	Malé Karpaty	Lamač	J. Ďurka	10. 10. 1961	
51.	Malé Karpaty	Dubová	J. Horváthová	6. 6. 1981	

	Original determination	Herbarium	Revision date	Remarks
	<i>Q. petraea</i> var. <i>laciniata</i> f. l. [<i>laciniata</i>] sf. <i>pinnata</i>	MLY	6. 3. 2020	sample No. 20 109 (142)
	<i>Q. petraea</i> var. <i>laciniata</i> f. <i>laciniata</i>	MLY	6. 3. 2020	sample No. 20 094 (156)
	<i>Q. petraea</i> var. <i>petraea</i> f. <i>platyphylla</i>	MLY	6. 3. 2020	sample No. 20 128 (131)
	<i>Q. petraea</i> var. <i>laciniata</i> f. sf. <i>laciniata</i>	MLY	6. 3. 2020	sample No. 20 121 (136)
	<i>Q. petraea</i> var. <i>laciniata</i> f. sf. <i>laciniata</i>	MLY	6. 3. 2020	sample No. 20 096 (155)
	<i>Q. petraea</i> var. <i>petraea</i>	MLY	6. 3. 2020	sample No. 19 978 (15); cf. <i>Q. iberica</i>
	<i>Q. petraea</i> s. l.	SAV	5. 3. 2020	
	–	SAV	4. 3. 2020	young leaves
	–	SAV	4. 3. 2020	young leaves
	<i>Q. petraea</i>	SAV	5. 3. 2020	
	<i>Q. petraea</i>	SAV	5. 3. 2020	(? introgression with <i>Q. robur</i>)
	<i>Q. petraea</i>	SAV	5. 3. 2020	
	<i>Q. petraea</i> var. <i>laciniata</i> f. <i>pinnata</i>	MLY	6. 3. 2020	sample No. 20 054
	<i>Q. petraea</i> var. <i>petraea</i> f. <i>petraea</i>	MLY	6. 3. 2020	sample No. 19 981 (18)
	<i>Q. petraea</i> var. <i>petraea</i> f. <i>petraea</i> sf. <i>normalis</i>	MLY	6. 3. 2020	sample No. 20 183 (18)/duplicate
	<i>Q. petraea</i>	SAV	3. 3. 2020	
	<i>Q. petraea</i>	SAV	5. 3. 2020	
	<i>Q. petraea</i>	SAV	5. 3. 2020	cf. <i>Q. iberica</i>
	<i>Q. petraea</i> var. <i>longifolia</i> f. <i>longifolia</i> sf. <i>racemosa</i>	MLY	6. 3. 2020	sample No. 20 090 (122)
	<i>Q. petraea</i> var. <i>longifolia</i> f. l. [<i>longifolia</i>] sf. <i>racemosa</i>	MLY	6. 3. 2020	sample No. 20 194 (122)
	<i>Q. petraea</i> var. <i>petraea</i> f. <i>petraea</i>	MLY	6. 3. 2020	sample No. 20 003 (37)
	<i>Q. petraea</i>	SAV	5. 3. 2020	cf. <i>Q. iberica</i>
	<i>Q. petraea</i> × <i>Q. robur</i>	SAV	28. 9. 2020	
	<i>Q. petraea</i> var. <i>petraea</i> f. <i>petraea</i>	MLY	6. 3. 2020	sample No. 19 983 (20)

Continuation **Appendix 2.** Revised herbarium specimens of *Quercus iberica* from Slovakia.

	Phytogeographical district	Locality (shortened)	Author	Date	
52.	Malé Karpaty	Dubová	J. Horváthová	20. 10. 1981	
53.	Malé Karpaty	Dubová	J. Horváthová	9. 6. 1981	
54.	Malé Karpaty	Dubová	J. Horváthová	9. 6. 1981	
55.	Malé Karpaty	Dubová	J. Horváthová	25. 5. 1982	
56.	Malé Karpaty	Dubová	J. Horváthová	20. 10. 1981	
57.	Malé Karpaty	Dubová	J. Horváthová	20. 10. 1981	
58.	Malé Karpaty	Dubová	J. Horváthová	20. 10. 1981	
59.	Považský Inovec	Šišov	J. Michalko	1. 9. 1976	
60.	Strážovské a Súľovské vrchy	Opatová, hill above the village	J. Ďurka	25. 10. 1961	
61.	Tribeč	Oponice, Veľká skala	Kováčiková	24. 9. 1972	
62.	Tribeč	Kostoľany pod Tribečom, pri Ploske	Kováčiková	29. 6. 1972	
63.	Poľana	Urpín (Banská Bystrica)	J. Ďurka	7. 9. 1962	
64.	Slovenské rudohorie	forest along the road from Rožňava to Štós	J. Horváthová	12. 10. 1982	
65.	Vihorlat	Šutová pri Vinnom	J. Michalko & M. Michalko	31. 8. 1976	
Carpathicum occidentale					
66.	Fatra	Domašín (Strečno)	J. Michalko	18. 9. 1960	
67.	Fatra	Domašín (Strečno)	J. Michalko	18. 9. 1960	
68.	Fatra	Nedožery-Brezany	J. Horváthová	1. 10. 1981	
69.	Fatra	Nedožery-Brezany	J. Horváthová	5. 10. 1982	
70.	Fatra	Nedožery-Brezany	J. Horváthová	1. 10. 1981	
71.	Fatra	Nedožery-Brezany	J. Horváthová	5. 10. 1982	
72.	Fatra	Nedožery-Brezany	J. Horváthová	6. 6. 1982	
73.	Fatra	Nedožery-Brezany	J. Horváthová	3. 6. 1982	
Beschidicum orientale					
74.	Východné Beskydy	Stavenec	J. Michalko	25. 5. 1975	
Carpathicum orientale					
75.	Bukovské vrchy	Nastáz, Stredný grúň; young trees	J. Májovský	12. 7. 1971	
76.	Bukovské vrchy	Nastáz, Stredný grúň	J. Májovský	12. 7. 1971	

	Original determination	Herbarium	Revision date	Remarks
	<i>Q. petraea</i> var. <i>laciniata</i> f. <i>lobulosa</i>	MLY	6. 3. 2020	sample No. 20 027 (61)
	<i>Q. petraea</i> var. <i>petraea</i> f. <i>petraea</i>	MLY	6. 3. 2020	sample No. 20 179 (20)/duplicate
	<i>Q. petraea</i> var. <i>petraea</i> f. <i>petraea</i>	MLY	6. 3. 2020	sample No. 20 180 (20)/duplicate
	<i>Q. petraea</i> var. <i>laciniata</i> f. <i>laciniata</i>	MLY	6. 3. 2020	sample No. 20 285 (71)/duplicate
	<i>Q. petraea</i> var. <i>laciniata</i> f. <i>l. [laciniata]</i> sf. <i>laciniata</i>	MLY	6. 3. 2020	sample No. 20 244 (76)/duplicate; two branchlets, the upper is <i>Q. iberica</i> , the lower <i>Q. robur</i> hybrid
	<i>Q. petraea</i> var. <i>laciniata</i> f. sf. <i>laciniata</i>	MLY	6. 3. 2020	sample No. 20 245 (76)/duplicate
	<i>Q. petraea</i> var. <i>laciniata</i> f. <i>lobulosa</i>	MLY	6. 3. 2020	sample No. 20 139 (152)
	<i>Q. dalechampii</i> (<i>Q. petraea</i> ?)	SAV	5. 3. 2020	
	<i>Q. petraea</i>	SAV	3. 3. 2020	
	<i>Q. petraea</i>	SLO	25. 11. 2019	cf. <i>Q. iberica</i>
	<i>Q. petraea</i>	SLO	25. 11. 2019	
	<i>Quercus</i>	SAV	4. 3. 2020	
	<i>Q. petraea</i> var. <i>laciniata</i> f. <i>lobulosa</i>	MLY	6. 3. 2020	sample No. 20 028 (62); cf. <i>Q. iberica</i>
	<i>Q. cf. petraea</i> s.l.	SAV	5. 3. 2020	cf. <i>Q. iberica</i>
	–	SAV	3. 3. 2020	(Hybrid <i>Q. robur</i> × <i>Q. petraea</i> agg.?)
	–	SAV	3. 3. 2020	(Hybrid <i>Q. robur</i> × <i>Q. petraea</i> agg.?)
	<i>Q. petraea</i>	MLY	6. 3. 2020	sample No. 19 964 (2); cf. <i>Q. iberica</i>
	<i>Q. petraea</i> var. <i>petraea</i> f. <i>petraea</i>	MLY	6. 3. 2020	sample No. 19 988 (25)
	<i>Q. petraea</i> var. <i>petraea</i> f. <i>heuffelii</i>	MLY	6. 3. 2020	sample No. 20 026 (60)
	<i>Q. petraea</i> var. <i>petraea</i> f. <i>petraea</i>	MLY	6. 3. 2020	sample No. 20 173 (25)/duplicate, No. 20 167 (25)/duplicate, No. 20 164 (25)/duplicate, No. 20 163 (25)/duplicate
	<i>Q. petraea</i> var. <i>laciniata</i> f. <i>l. [laciniata]</i>	MLY	6. 3. 2020	sample No. 20 057 (91)
	<i>Q. petraea</i> var. <i>laciniata</i> f. <i>l. [laciniata]</i> sf. <i>pinnata</i>	MLY	6. 3. 2020	sample No. 20 233 (91)/duplicate; cf. <i>Q. iberica</i>
	<i>Quercus</i>	SAV	5. 3. 2020	
	<i>Q. petraea</i>	SLO	28. 11. 2019	In respect of the habitat (originally beech forests) it is certainly an anthropogenic occurrence (planted trees)
	<i>Q. petraea</i>	SLO	28. 11. 2019	Ditto

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