

ON THE PRESENCE OF *CEPHALANTHERA CAUCASICA* (ORCHIDACEAE) IN RUSSIA: REDISCOVERY OF A THREATENED ORCHID IN THE REPUBLIC OF DAGESTAN

Valentina V. Fateryga¹ , Sergey A. Svirin^{2,3} , Alexander V. Fateryga¹ 

¹*T.I. Vyazemsky Karadag Scientific Station – Nature Reserve of RAS, Russia*
e-mail: valentina_vt@mail.ru, fater_84@list.ru

²*Sevastopol State University, Russia*
e-mail: sapsan7@mail.ru

³*Nikitsky Botanical Garden – National Scientific Centre of RAS, Russia*

Received: 04.01.2023. Revised: 12.02.2023. Accepted: 15.02.2023.

Cephalanthera caucasica had been reported previously from the Samur Forest in Dagestan (Russia), but that report was considered doubtful: a possible misidentification of supposed hybrids between *C. damasonium* and *C. longifolia* as *C. caucasica* was speculated. Moreover, this species was recently reduced to a synonym of *C. kotschyana* in the «Plants of the World Online» database. In the present study, we did not confirm the presence of *C. caucasica* in the Samur Forest, but it was revealed in a few localities in remnants of beech (*Fagus orientalis*) forests in Kaytagskiy district and Tabasarskiy district in the Republic of Dagestan, Russia. Living plants were studied in the vicinity of the village Tatil where 40 flowering individuals were counted. A morphological study suggested that these plants belonged to typical *C. caucasica*, not to any hybrid. The synonymy of this species with *C. kotschyana* has also been rejected, because it contradicted to the «International Code of Nomenclature for algae, fungi, and plants» and, besides, was not properly reasoned. The lectotype of *C. caucasica* is designated in the present paper. The description of the species is provided with measurements of the main morphological parameters. Differences of *C. caucasica* and the related taxa are discussed. A key to the species of the genus *Cephalanthera* from the North Caucasus is provided. *Cephalanthera caucasica* is highly threatened in Russia, being estimated as Endangered taxon (EN B1ab(iii)+2ab(iii)), according to the IUCN categories and criteria. It should be included to the next editions of both national and regional Red Data Books.

Key words: Caucasus, conservation status, distribution, lectotype, taxonomy

Introduction

The orchid family (Orchidaceae) is one of the most threatened groups of vascular plants (Fay, 2018; Khapugin, 2020; Wraith et al., 2020; Zhou et al., 2021). Approximately 28 000 species of orchids are known and it is the largest plant family in the world (Christenhusz & Byng, 2016). At least 135 orchid species were reported from Russia (Efimov, 2020). This is not particularly rich but the importance of their protection cannot be neglected. Russia is the largest country in the world and some generally threatened species of orchids (e.g. *Cypripedium calceolus* L.) may be numerous within its territory (Jakubská-Busse et al., 2021).

The genus *Cephalanthera* Rich. (Orchidaceae: Epidendroideae: Neottieae) is distributed in the Holarctic and the Oriental regions and contains 19 species according to POWO (2022). Among them, *Cephalanthera austiniiae* (A. Gray) A. Heller is known from North America, while all the other species inhabit the Old World. Seven species were listed for the Russian flora (Efimov, 2020). *Cephalanthera damasonium* (Mill.) Druce, *C. longifolia* (L.) R.M. Fritsch, and *C. rubra* (L.) Rich. are dis-

tributed there in the European part, including the Crimea and the North Caucasus. Two other species are known from the Far East, namely *Cephalanthera erecta* (Thunb.) Blume and *C. longibracteata* Blume. The sixth species, *Cephalanthera epipactoides* Fisch. & C.A. Mey., is restricted in its distribution to the Black Sea coastal area of the Krasnodarsky Krai in the North Caucasus (Fateryga et al., 2020). All these species are included in the Red Data Book of the Russian Federation (2008).

The seventh species is *Cephalanthera caucasica* Kraenzl. It was reported from the River Samur delta in the Republic of Dagestan, North Caucasus (Grossheim, 1940; Averyanov, 2006; Murtazaliev, 2009; Ivanov, 2019), but was included neither to the national Red Data Book nor the Red Data Book of the Republic of Dagestan (2020). Due to the absence of recent records of this species from the Republic of Dagestan, Efimov (2020) considered *C. caucasica* doubtfully present in Russia. He speculated that the reports of this species could be based on misidentifications of a possible hybrid between *C. damasonium* and *C. longifolia*, while the range of the true *C. caucasica* was outside of Russia. It is also noteworthy mentioning

that *C. caucasica* has recently been synonymised with *C. kotschyana* Renz & Taubenheim (POWO, 2022). The latter species was reported from Turkey and Azerbaijan (Delforge, 2016), while *C. caucasica* was known from Georgia, Armenia, Azerbaijan (type locality in Talysh), and Iran (Renz, 1978; Akhalkatsi et al., 2003; Averyanov, 2006; Vakhrameeva et al., 2008; Delforge, 2016).

The purpose of the present study is to ascertain, whether *C. caucasica* is present in Russia or not, to clarify its taxonomic status and diagnostic characters, as well as to report preliminary data on its distribution and conservation status.

Material and Methods

Field observations have been carried out in the Republic of Dagestan in 2022. Representatives of the genus *Cephalanthera* (excluding *C. rubra*) were studied there mainly in two localities, namely the vicinity of the village Tatil, Tabasaranskiy district (42.000278° N, 48.004722° E) on 04.05.2022, 08.05.2022, and 23.05.2022, and the Samur Forest in the vicinity of Khtun-Kazmalyar, Magaramkent district (41.815556° N, 48.528611° E) on 07.05.2022. The first locality was a *Fagus orientalis* Lipsky (hereinafter – beech) forest, while the second one was a deciduous forest with the predomination of hornbeam (*Carpinus betulus* L.) and participation of oak (*Quercus robur* L.), ash (*Fraxinus* sp.), maple (*Acer* sp.), and other trees, and numerous creepers (e.g. *Smilax excelsa* L., *Hedera pastuchovii* Woronow, *Vitis vinifera* L.). Photographs of the studied plants were made with a Canon EOS RP digital camera and a Sigma AF 105 mm f/2.8 macro lens with a Yongnuo YN-14EX macro flash and uploaded to the Plantarium website (Plantarium, 2022).

Twenty three plants were measured in the field with a metal tape measure. The measured parameters were the shoot and the inflorescence lengths as well as the length and the width of the longest leaf. The number of leaves and flowers was also counted. After that, the lowest flower of the plant was cut and its straightened parts were placed between a paper and a piece of a transparent adhesive tape. These flowers were then measured in the laboratory with a vernier calliper. The measured parameters were the length of the ovary, the length and the width of sepals and petals, the length of the lip, the width of the epichile, and the length of the column. Then, minimum, maximum, and mean values were calculated for each parameter. Confidence intervals of the mean values were calculated

for 95% confidence level ($p = 0.05$). A morphological description was made according to the original data. Statistical significance of the differences between the mean values of various species was checked with the Student's *t*-test (Lakin, 1990). A PCA analysis was made using Statistica 7 software (StatSoft Inc., USA).

Literature data, herbarium material, and observations on iNaturalist website (<https://www.inaturalist.org/>) were also studied. The data on herbarium specimens and their scans were provided by Petr G. Efimov (V.L. Komarov Botanical Institute RAS, Russia) from his database of the orchids of Russia (for the complete list of the studied herbaria, see Efimov, 2020). A distribution map was generated, using the online tool for producing publication-quality point maps, SimpleMapp (Shorthouse, 2010). For specimens, for which no geographic co-ordinates were present on labels, co-ordinates were estimated based on the approximate centre of the most specific locality given.

For definition of the IUCN Red List status of *C. caucasica* at the national level (Russia), we used the guidelines for IUCN Red List assessment (2012a,b, 2022), focusing on the extent of occurrence (EOO), the area of occupancy (AOO), and the number of the known localities. EOO and AOO were evaluated using GeoCAT, a geospatial conservation assessment tool (Bachman et al., 2011).

Results and Discussion

Summary of records

We found 40 flowering specimens of *C. caucasica* and 20 specimens of *C. damasonium* in the vicinity of the village Tatil. They were counted along a 2-km transect (about 10 m wide) around the locality. There were also several pre-generative specimens of *C. caucasica*, but it was difficult to count all of them along this transect. Two additional herbarium specimens of *C. caucasica* collected in the Republic of Dagestan were found in collections of DAG and LENUD, and one observation was found on the iNaturalist website (<https://www.inaturalist.org/>). We did not reveal any specimens of this species in the Samur Forest, from where it had been reported in the literature (Grossheim, 1940; Ivanov, 2019). At this locality, the genus *Cephalanthera* were represented by one *C. damasonium* and more than 200 *C. longifolia* plants (counted along a 2-km transect, like in the vicinity of the village Tatil). Detailed information on *C. caucasica* is

presented below, including its taxonomy, morphology, distribution, and conservation status.

Taxonomy

Cephalanthera caucasica Kraenzl. 1931, Repert. Spec. Nov. Regni Veg. Beih. 65: 67. ≡ *Cephalanthera acuminata* auct., non Lindl. 1840: Ledeb. 1853, Fl. Ross. 4: 78. ≡ *Cephalanthera damasonium* subsp. *caucasica* (Kraenzl.) H. Sund. 1980, Europ. Medit. Orchid., ed. 3: 41. Type locality [Azerbaijan]: «In silvis montis Talüsch pr. pagum Suwant» (Hohenacker 2740); lectotype (Fateryga, designated here): «Suwant», Hohenacker 2740 (LE01072106!) (Fig. 1); isolectotype: «Am obern Bünn.[?] der Walder gegen Swant bei Zawarü.[?] Juny[?]», Hohenacker 2740 (LE01072108!); other original material: «In sylvis prov. Swant. Jul.», Hohenacker (LE01072107!).

Kränzlin (1931) cited the gathering №2740 by R.F. Hohenacker in the protologue but did not indicate the number of specimens or herbarium sheets seen by him. Averyanov (1994) reported this gathering as the type of *C. caucasica* indicating that there are holo- and isotype(s) in LE. According to the Art. 9.10 of ICN (Turland et al., 2018), this «holotype» would be corrected to «lectotype»; however, it is not clear, which specimen might be designated by L.V. Averyanov as the lectotype by this way. There are three sheets of *C. caucasica* (original material) in LE with Averyanov's handwritten labels from 1994. Two of them are with Hohenacker's №2740: LE01072106 and LE01072108. They are syntypes according to the Art. 9.6 of ICN (Turland et al., 2018). Among them, only the first one is with F. Kränzlin's handwritten label (Fig. 1). Both sheets were labeled by L.V. Averyanov as isotypes. The third sheet (LE01072107) was labeled by him as «Typus»; this specimen is with the same F. Kränzlin's handwritten label but without Hohenacker's №2740 that is not corresponding to the protologue. Therefore, it belongs to the original material according to the Art. 9.4 of ICN (Turland et al., 2018) but not to the syntypes. Thus, since the L.V. Averyanov's designation is unclear, a further lectotypification is possible according to the Art. 9.17 of ICN (Turland et al., 2018). We hereby designate the specimen LE01072106 as the lectotype because it is with Hohenacker's №2740, fully corresponding to the protologue, and F. Kränzlin's handwritten label indicating that he saw this specimen.

Cephalanthera caucasica has recently been synonymised with *C. kotschyana* (POWO, 2022). According to POWO (2022), the taxonomic back-

bone for this solution was the book published by Kühn et al. (2019), where *C. caucasica* was merely listed as one of the synonyms of *C. kotschyana* without any argumentation. We do not follow such a taxonomic treatment of *C. caucasica* for two reasons. First of all, *C. caucasica* was described earlier (Kränzlin, 1931) than *C. kotschyana* (Renz & Taubenheim, 1980). Thus, the name *C. caucasica* published in 1931 has priority over the name *C. kotschyana* published in 1980. Accordingly, if these two taxa are treated as conspecific, the name *C. caucasica* should be accepted while the name *C. kotschyana* should be a synonym. Secondly, we prefer to recognise these taxa as two distinct species until they are thoroughly studied morphologically (and, possibly, genetically, too). There are at least two diagnostic characters declared to distinguish *C. caucasica* from *C. kotschyana* (see below). Thus, a statement of their synonymy without a strong argumentation looks not convincing. Therefore, we consider the genus *Cephalanthera* containing 20 species but not 19 as it was reported by POWO (2022).



Fig. 1. Lectotype of *Cephalanthera caucasica* Kraenzl. (LE01072106).



Fig. 2. *Cephalanthera caucasica* Kraenzl. from the vicinity of the village Tatil, Republic of Dagestan, Russia. Designations: A – specimen at the beginning of flowering (08.05.2022); B – inflorescence in full flower (23.05.2022) (Author: Alexander V. Fateryga).

Description

Cephalanthera caucasica is a rhizomatous perennial herb (Fig. 2A). Plants are usually with a single shoot. Stem is erect to slightly inclined, green, glabrous, with spirally arranged leaves. Leaves are green, spreading, significantly exceeding internodes; lower ones are ovate, medium ones are ovate to elliptic, upper ones are lanceolate. Inflorescence is ± compact (Fig. 2B). Bracts are linear, usually not exceeding flowers, dimin-

ishing in length higher up. Flowers are sessile, directed ± sideways. Ovary is whitish, glabrous. Perianth is ± opened, pure white with light pinkish shade on hypochile. Sepals are lanceolate; petals are broadly lanceolate, shorter than sepals. Lip is divided into hypochile and epichile. Hypochile is concave, with two erect, rounded lateral lobes, without spur. Epichile is cordate, with several orange-yellow longitudinal papillate ridges. Measurements are presented in Table 1.

Table 1. Morphometric parameters of the studied specimens of *Cephalanthera caucasica* Kraenzl., *C. damasonium* (Mill.) Druce, and *C. longifolia* (L.) R.M. Fritsch from the Republic of Dagestan, Russia

Parameter	<i>Cephalanthera caucasica</i> , n = 9		<i>Cephalanthera damasonium</i> , n = 5		<i>Cephalanthera longifolia</i> , n = 9	
	min–max	m ± M	min–max	m ± M	min–max	m ± M
Shoot length (with inflorescence), cm	19.0–42.8	29.5 ± 5.1	21.3–31.0	26.0 ± 3.3	26.5–56.8	38.0 ± 6.3
Inflorescence length, cm	3.0–11.0	6.9 ± 1.9	3.3–8.0	4.9 ± 1.7	7.0–22.5	13.7 ± 3.1**
Number of leaves	6–9	7.6 ± 0.6	3–6	4.4 ± 1.0**	4–9	7.0–1.0
Number of flowers	2–25	9.7 ± 4.9	3–6	4.6 ± 1.3	10–34	17.3 ± 4.8*
Longest leaf length, mm	8.2–14.2	11.0 ± 1.1	5.9–6.6	6.2 ± 0.3**	8.0–12.0	9.6 ± 0.8
Longest leaf width, mm	2.6–5.1	3.8 ± 0.6	1.6–6.4	2.9 ± 1.7	2.2–3.9	2.8 ± 0.5*
Ovary length, mm	24–41	37.5 ± 3.8	13–34	27.0 ± 7.3	25–36	31.2 ± 2.7
Upper sepal length, mm	16–27	23.4 ± 2.3	16–21	19.0 ± 1.8*	17–24	20.7 ± 1.4
Upper sepal width, mm	6–9	7.7 ± 0.7	5–8	6.2 ± 1.0*	3–8	5.7 ± 0.9**
Lateral sepal length, mm	17–27	23.1 ± 2.0	17–21	18.8 ± 1.6**	17–22	20.0 ± 0.9*
Lateral sepal width, mm	6–10	8.0 ± 0.9	6–9	8.0 ± 1.2	5–9	6.9 ± 0.8
Petal length, mm	14–21	17.8 ± 1.3	15–18	16.4 ± 1.3	13–16	14.9 ± 0.6**
Petal width, mm	6–9	7.7 ± 0.7	6–9	7.4 ± 1.0	5–7	5.7 ± 0.5**
Lip length, mm	11–15	13.1 ± 0.8	10–12	11.0 ± 0.9**	6–10	9.0 ± 0.9**
Epichile width, mm	10–14	11.8 ± 0.8	11–14	12.4 ± 1.0	7–12	9.7 ± 1.0**
Column length, mm	10–13	11.6 ± 0.7	10–11	10.6 ± 0.5	9–12	10.6 ± 0.6

Note: n – sample size, min – minimum value, max – maximum value, m – mean value, M – confidence interval (p = 0.05). Values of *C. damasonium* and *C. longifolia* significantly different from those of *C. caucasica* are marked with one (p = 0.05) or two (p = 0.01) asterisks.

Differences with the related taxa

Cephalanthera caucasica is sympatric with two relatively similar species, namely *C. damasonium* and *C. longifolia*. The characters of these three species are sometimes slightly overlapping (Fig. 3) which can cause misidentifications. The most noteworthy character of *C. caucasica* is the whitish ovary. It was stable in all plants from the Republic of Dagestan in our study, and this is in consistence with photographs published by Renz (1978) and Delforge (2016) from Iran and Azerbaijan, correspondingly. Only the drawing published by Vakhrameeva et al. (2008) has green ovaries that could be apparently due to its preparation based on a dried plant. Secondly, *C. caucasica* can be distinguished from *C. damasonium* by much longer and more numerous leaves and from *C. longifolia* by much shorter (and not loose but compact) inflorescence and broader leaves. Flowers of *C. caucasica* are larger than those of both *C. damasonium* and especially *C. longifolia* (Table 1). In addition, the flowers of *C. damasonium* are directed rather upwards than sideways. *Cephalanthera caucasica* is different from allopatric *C. kotschyana* by the whitish ovary and much longer leaves. The latter species has a green ovary and

leaves \pm equal in length to the internodes, as in *C. damasonium*, but large flowers directed rather sideways, as in *C. caucasica* (Delforge, 2016).

Efimov (2020) supposed that the reports of *C. caucasica* from the Republic of Dagestan might refer to a hybrid between *C. damasonium* and *C. longifolia*. We cannot exclude the presence of such a hybrid in the Republic of Dagestan, but the plants identified as *C. caucasica* in the present study are not hybrids. First of all, both *C. damasonium* and *C. longifolia* have a green ovary, while *C. caucasica* has a whitish ovary. Secondly, the flowers of *C. caucasica* are not intermediate in size between two other species but are larger than those of both *C. damasonium* and *C. longifolia*. Thirdly, *C. damasonium* is an autogamous species (Claessens & Kleynen, 2011) and any hybrids with it should be extremely rare, while we observed 40 flowering specimens of *C. caucasica* within one locality. Fourthly, *C. longifolia* was not present in the locality with *C. caucasica* in our study. Therefore, we can state that *C. caucasica* is indeed present in Russia. Moreover, it is not visually different from plants of this species occurring in Iran (Renz, 1978) and Azerbaijan (Delforge, 2016).

Key to the species of the genus *Cephalanthera* from the North Caucasus

1. Flowers are purple; rachis of inflorescence and ovary are largely pubescent *C. rubra*
+ Flowers are pure white to yellowish or cream; rachis of inflorescence and ovary are glabrous 2
2. Hypochile is with spur; leaves are \pm equal in length to internodes or shorter *C. epipactoides*
+ Hypochile is without spur; leaves are various, often longer than internodes 3
3. Leaves are \pm equal in length to internodes or slightly longer; flowers are self-pollinating, directed \pm upwards; ovary is always green *C. damasonium*
+ Leaves are always much longer than internodes; flowers are cross-pollinating, directed \pm sideways; ovary is various, green or whitish 4
4. Middle leaves are ovate to elliptic; inflorescence is short and compact; ovary is whitish *C. caucasica*
+ Middle leaves are lanceolate; inflorescence is long and loose; ovary is green *C. longifolia*

Specimens examined

Russia: Republic of Dagestan. Kaytagskiy District: (without given locality), 20.07.1971, Nasrulaeva (LENUD). Tabasaranskiy District: vicinity of Gurkhun, northern slope, 15.05.2014, Mallaliev (DAG); (without given locality, 42.011165° N, 47.989351° E), 08.05.2018, Teymurov (Teymurov, 2020); vicinity of the village Tatil, beech forest (42.000278° N, 48.004722° E), 08.05.2022, Fateryga, Svirin (PHEO); vicinity of the village Tatil, beech forest (42.000278° N, 48.004722° E), 23.05.2022, Fateryga (PHEO).

Efimov (2020) also reported that he observed a specimen of *C. caucasica* from the Republic of Dagestan in LE. It was apparently LE01038159 collected in the vicinity of Makhachkala in 1956 and identified as *C. caucasica*. In our opinion,

this specimen belongs not to *C. caucasica* but to *C. longifolia* due to much smaller flowers.

Distribution

Russia (Republic of Dagestan), Georgia, Armenia, Azerbaijan, Iran (Renz, 1978; Akhalkatsi et al., 2003; Averyanov, 2006; Vakhrameeva et al., 2008; Delforge, 2016). The records from Georgia and Armenia are based on literature data (e.g. Vakhrameeva et al., 2008) and require further verification (especially for Armenia). In the Republic of Dagestan, *C. caucasica* is distributed locally. There are four known localities in Kaytagskiy district and Tabasaranskiy district (Fig. 4), or even three, since the records made by A.A. Teymurov and by us were made nearly at the same place.

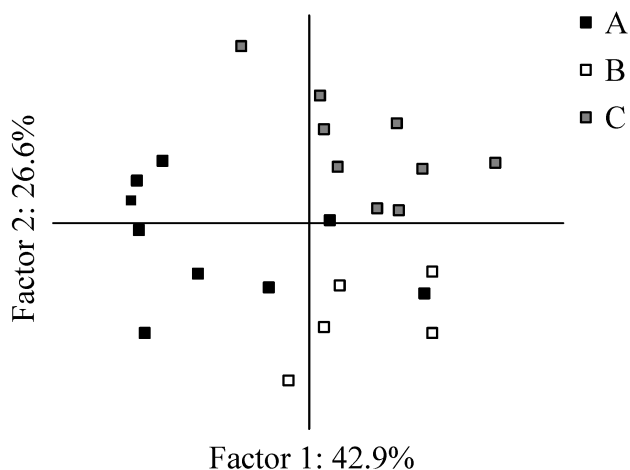


Fig. 3. PCA analysis for the studied specimens of *Cephalanthera caucasica* Kraenzl. (A), *C. damasonium* (Mill.) Druce (B), and *C. longifolia* (L.) R.M. Fritsch (C) from the Republic of Dagestan, Russia (based on the characters listed in Table 1).



Fig. 4. Distribution of *Cephalanthera caucasica* Kraenzl. in the Republic of Dagestan, Russia.

The presence of *C. caucasica* in the Samur Forest, from where it was reported in the literature (Grossheim, 1940; Ivanov, 2019), is also doubtful and requires confirmation. We observed there numerous plants of *C. longifolia*, and some of them had unusually broad leaves (Fig. 5). Such plants could be misidentified as *C. caucasica*. However, we failed to find the voucher material used by Grossheim (1940) who was apparently the first person reported *C. caucasica* from the Samur Forest. Due to the absence of any specimen-based records we did not include this locality to the distribution map (Fig. 4).



Fig. 5. *Cephalanthera longifolia* (L.) R.M. Fritsch from the Samur Forest, Republic of Dagestan, Russia (07.05.2022) (Author: Alexander V. Fateryga).

Habitat, phenology, and pollination

We observed *C. caucasica* in a beech forest only. The flowering period of this species is May. It starts to flower at the same time as *C. longifolia* (evidences from herbarium gathering of both species from the vicinity of the village of Gurkhun) but much earlier than *C. damasonium*. Apparently, there are no published data on pollinators of *C. caucasica*. We can suppose that the pollinators are solitary bees, and the pollination strategy is a food-deceptive mechanism, which is known in *C. longifolia* (Dafni & Ivri, 1981; Claessens & Kleynen, 2011).

Conservation status

We consider *C. caucasica* a highly threatened species. It occurs in Russia at a few localities within a small area of Kaytagskiy district and Tabasaranskiy district of the Republic of Dagestan. These localities are remnants of beech forests between settlements, orchards, and meadows used for haymaking. The forest remnants themselves can be used as a pasture for cows, since we observed such a case in the vicinity of the village of Tatil. The population number of *C. caucasica* is evidently very low in

Russia. *Cephalanthera caucasica* is one of the two rarest species of the genus in Russia (the second one is *C. erecta*), and at the same time it is the only species of *Cephalanthera* which is not included in the Red Data Book of the Russian Federation (2008).

In Russia, the estimated IUCN Red List category for *C. caucasica* is EN B1ab(iii)+2ab(iii). Its EOO is evaluated to be 32.5 km², which is less than 5000 km², and the number of the known localities is no more than five (actually no more than four), that fits to the criterion B1a of the EN category. At the same time, threats have been identified that indicate a continuing decline in habitat quality (due to its use as a pasture), that fits to the criterion B1b(iii). The AOO is evaluated to be 16.0 km², that is less than 500 km², so that both criteria B2a and B2b(iii) are also met.

Conclusions

Cephalanthera caucasica is present in Kaytagiskiy district and Tabasaranskiy district of the Republic of Dagestan (Russia) without any doubts, although in a few localities and by a low number of individuals. The presence of this species in the Samur Forest, reported earlier in the literature (Grossheim, 1940; Ivanov, 2019), could not be confirmed. *Cephalanthera caucasica* is a distinct species, but not a synonym of *C. kotschyana* and not a hybrid between *C. damasonium* and *C. longifolia* either. This species should be included in the next editions of both national and regional Red Data Books.

Acknowledgements

Irina Sokolova and Petr Efimov (both – V.L. Komarov Botanical Institute RAS, Russia) helped us in clarifying some taxonomic uncertainties. Petr Efimov provided information from his database of the orchids of Russia, as well as some herbarium scans. Scans of the type specimens of *C. caucasica* were obtained from the Virtual Herbarium LE (<http://herbariumle.ru>). Karel Kreutz (Naturalis Biodiversity Center, the Netherlands) and Petr Efimov provided some rare references. We thank two anonymous reviewers having provided helpful suggestions to improve the first version of the paper. The reported study was a part of the State research project №121032300023-7.

References

Akhalkatsi M., Kimeridze M., Künkele S., Lorenz R., Mosulishvili M. 2003. *Diversity and conservation of Georgian orchids*. Tbilisi: CGS Ltd. 40 p.

Averyanov L.V. 1994. Review of the species of the family Orchidaceae in the Caucasus flora. *Botanicheskii Zhurnal* 79(10): 108–127. [In Russian]

Averyanov L.V. 2006. Orchidaceae Juss. In: A.L. Takhtadjan (Ed.): *Caucasian Flora Conspectus*. Vol. 2. Saint Petersburg: Saint Petersburg University Press. P. 84–101. [In Russian]

Bachman S., Moat J., Hill A.W., de la Torre J., Scott B. 2011. Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. *ZooKeys* 150: 117–126. DOI: 10.3897/zookeys.150.2109

Christenhusz M.J.M., Byng J.W. 2016. The number of known plants species in the world and its annual increase. *Phytotaxa* 261(3): 201–217. DOI: 10.11646/phytotaxa.261.3.1

Claessens J., Kleynen J. 2011. *The flower of the European orchid. Form and function*. Voerendaal: Claessens & Kleynen. 440 p.

Dafni A., Ivri Y. 1981. The flower biology of *Cephalanthera longifolia* (Orchidaceae) – pollen imitation and facultative floral mimicry. *Plant Systematics and Evolution* 137(4): 229–240. DOI: 10.1007/BF00982788

Delforge P. 2016. *Orchidées d'Europe, d'Afrique du Nord et du Proche-Orient. 4^e éd.* Paris: Delachaux et Nistlé. 544 p.

Efimov P.G. 2020. Orchids of Russia: annotated checklist and geographic distribution. *Nature Conservation Research* 5(Suppl.1): 1–18. DOI: 10.24189/ncr.2020.018

Fateryga A.V., Popovich A.V., Fateryga V.V., Kreutz C.A.J. 2020. *Cephalanthera epipactoides* (Orchidaceae) in Russia. *Nature Conservation Research* 5(Suppl.1): 69–76. DOI: 10.24189/ncr.2020.014

Fay M.F. 2018. Orchid conservation: how can we meet the challenges in the twenty-first century?. *Botanical Studies* 59: 16. DOI: 10.1186/s40529-018-0232-z

Grossheim A.A. 1940. *Flora of the Caucasus. 2nd ed.* Vol. 2. Baku: Azerbaijanian Branch of the Academy of Sciences Press. 284 p. [In Russian]

IUCN. 2012a. *IUCN Red List categories and criteria. Version 3.1. 2nd ed.* Gland; Cambridge: IUCN. 32 p.

IUCN. 2012b. *Guidelines for application of IUCN Red List criteria at regional and national levels. Version 4.0.* Gland; Cambridge: IUCN. 41 p.

IUCN. 2022. *Guidelines for using the IUCN Red List categories and criteria. Version 15.1.* IUCN Standards and Petitions Committee. 114 p.

Ivanov A.L. 2019. *Conspectus florae Caucasi Rossicae (plantae vasculares)*. Stavropol: North-Caucasus Federal University Press. 306 p. [In Russian]

Jakubská-Busse A., Tsiftsis S., Śliwiński M., Křenová Z., Djordjević V., Steiu C., Kolanowska M., Efimov P., Hennigs S., Lustyk P., Kreutz K. 2021. How to protect natural habitats of rare terrestrial orchids effectively: a comparative case study of *Cypripedium calceolus* in different geographical regions of Europe. *Plants* 10(2): 404. DOI: 10.3390/plants10020404

Khapugin A.A. 2020. A global systematic review on orchid data in Protected Areas. *Nature Conservation Research* 5(Suppl.1): 19–33. DOI: 10.24189/ncr.2020.019

Kränzlin F. 1931. Orchidacearum Sibiriae enumeratio. *Repertorium Specierum Novarum Regni Vegetabilis, Beihefte* 65: 1–103.

Kühn R., Pedersen H.Æ., Cribb V. 2019. *Field guide to the orchids of Europe and the Mediterranean*. Kew: Kew Publishing. 430 p.

Lakin G.F. 1990. *Biometry*. Moscow: Vysshaya Shkola. 352 p. [In Russian]

- Murtazaliev R.A. 2009. *Conspectus of the flora of Dagestan*. Vol. 4 (Melanthiaceae – Acoraceae). Makhachkala: Epokha. 232 p. [In Russian]
- Plantarium. 2022. *Plants and lichens of Russia and neighbouring countries: open online galleries and plant identification guide*. Available from <http://www.plantarium.ru/>
- POWO. 2022. *Plants of the World Online*. Kew: Royal Botanic Gardens. Available from <http://www.plantsoftheworldonline.org/>
- Red Data Book of the Republic of Dagestan. Makhachkala: Dzhamaludinov M.A., 2020. 800 p. [In Russian]
- Red Data Book of the Russian Federation (plants and fungi). Moscow: KMK Scientific Press Ltd., 2008. 855 p. [In Russian]
- Renz J. 1978. Orchidaceae. In: K.H. Rechinger (Ed.): *Flora Iranica*. No. 126. Graz: Akademische Druck- u. Verlagsanstalt. 148 p.
- Renz J., Taubenheim G. 1980. *Cephalanthera kotschyana*: a new orchid from Turkey. *Notes from the Royal Botanic Garden, Edinburgh* 38(1): 97–101.
- Shorthouse D.P. 2010. *SimpleMappr; an online tool to produce publication-quality point maps*. Available from <https://www.simplemappr.net/>
- Teymurov A.A. 2020. *iNaturalist observation of Cephalanthera caucasica*. Available from <https://www.inaturalist.org/observations/62120880>
- Turland N.J., Wiersema J.H., Barrie F.R., Greuter W., Hawksworth D.L., Herendeen P.S., Knapp S., Kusber W.-H., Li D.-Z., Marhold K., May T.W., McNeill J., Monro A.M., Prado J., Price M.J., Smith G.F. (Eds.). 2018. *International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017. Regnum Vegetabile 159*. Glashütten: Koeltz Botanical Books. 254 p. DOI: 10.12705/Code.2018
- Vakhrameeva M.G., Tatarenko I.V., Varlygina T.I., Torosyan G.K., Zagulskii M.N. 2008. *Orchids of Russia and adjacent countries (within the borders of the former USSR)*. Ruggell: A.R.G. Gantner Verlag. 690 p.
- Wraith J., Norman P., Pickering C. 2020. Orchid conservation and research: an analysis of gaps and priorities for globally Red Listed species. *Ambio* 49(10): 1601–1611. DOI: 10.1007/s13280-019-01306-7
- Zhou Z., Shi R., Zhang Y., Xing X., Jin X. 2021. Orchid conservation in China from 2000 to 2020: achievements and perspectives. *Plant Diversity* 43(5): 343–349. DOI: 10.1016/j.pld.2021.06.003

О ПРОИЗРАСТАНИИ *CEPHALANTHERA CAUCASICA* (ORCHIDACEAE) В РОССИИ: НОВАЯ НАХОДКА ОРХИДЕИ, НАХОДЯЩЕЙСЯ ПОД УГРОЗОЙ ИСЧЕЗНОВЕНИЯ, В РЕСПУБЛИКЕ ДАГЕСТАН

В. В. Фатерыга¹ , С. А. Свирин^{2,3} , А. В. Фатерыга¹ 

¹Карадагская научная станция имени Т.И. Вяземского – природный заповедник РАН, Россия
e-mail: valentina_vt@mail.ru, fater_84@list.ru

²Севастопольский государственный университет, Россия
e-mail: sapsan7@mail.ru

³Никитский ботанический сад – Национальный научный центр РАН, Россия

Cephalanthera caucasica ранее указывали для Самурского леса в Республике Дагестан (Россия). Однако позже эти указания были подвергнуты сомнению – предполагалось, что они могли быть основаны на неверном определении возможных гибридов между *C. damasonium* и *C. longifolia*. Кроме того, согласно базе данных Plants of the World Online, этот вид недавно свели в синонимы к *C. kotschyana*. В настоящем исследовании мы не подтвердили произрастание *C. caucasica* в Самурском лесу, однако он был обнаружен в нескольких локалитетах, представляющих собой остаточные фрагменты буковых (*Fagus orientalis*) лесов в пределах Кайтагского и Табасаранского районов Республики Дагестан. Живые растения изучали в окрестностях с. Татиль, где было обнаружено 40 цветущих особей. Исследование их морфологии показало, что они относятся к типичному *C. caucasica*, а не какому-либо гибриду. Синонимия этого вида с *C. kotschyana* также отклонена нами на основании того, что она противоречила Международному кодексу номенклатуры водорослей, грибов и растений и, кроме того, не была должным образом обоснована. В данной работе обозначен лектотип *C. caucasica*. Приведено описание вида с промерами основных морфологических параметров. Обсуждаются отличия *C. caucasica* от близких видов. Приводится ключ для определения видов рода *Cephalanthera* на Северном Кавказе. *Cephalanthera caucasica* является в России крайне уязвимым видом, будучи оцененным со статусом Endangered (EN B1ab(iii)+2ab(iii)), согласно категориям и критериям МСОП. Вид следует включить в следующие издания региональной и федеральной Красных книг.

Ключевые слова: Кавказ, лектотип, охранный статус, распространение, таксономия