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Atlas Florae Europaeae notes 18. Synonymy and distribution of some native and alien species of *Cotoneaster* (Rosaceae) in eastern Europe and the Caucasus

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Some corrections to the nomenclatural checklist of *Cotoneaster* (Rosaceae) in eastern Europe and the Caucasus are proposed. *Cotoneaster uralensis* B. Hylmö & J. Fryer is treated as a synonym of *C. cinnabarinus* Juz., and *C. soczavianus* Pojark. as a synonym of *C. tomentosus* (Aiton) Lindl. For the sake of stability, the established use of the name *C. integerrimus* Medik. is maintained according to the lectotype designated by B. Hylmö and contrary to the conserved type belonging to *C. scandinavicus* B. Hylmö. The name *C. pyrenaicus* Gand. is found applicable to *C. integerrimus sensu* Hylmö if the conservation is followed. *Cotoneaster mamajevii* Knjaz. and *C. estiensis* J. Fryer & B. Hylmö are reduced to the synonymy of *C. integerrimus*. The second-step lectotypes of *C. antoninae* Juz. and *C. cinnabarinus* Juz. are designated. *Cotoneaster cinnabarinus* is reported as new to the Tyumen Region of Russia and Siberia as a whole. Some records of casual and naturalised alien species of *Cotoneaster* in the European Russia are revised and corrected.

A taxonomic and nomenclatural revision of *Cotoneaster* (Rosaceae) for *Atlas Florae Europaeae* and Euro+Med checklist resulted in changes in the synonymy and reported distribution of some taxa, especially in eastern Europe.

The changes proposed here are based on observations of morphological characters of the taxa in Russia (Leningrad and Pskov Regions, and Karelia), Estonia, Latvia, Sweden and the Czech Republic, both in dried collections and living plants (in nature and partly also in cultivation). Seasonal variability was observed, and the flowers, fruit and foliage were examined. Whenever possible, individual modification was observed for open and shaded places, and attention was paid to the development of leaves and flowers on plants of various ages.

The following characters were accepted as diagnostic in *Cotoneaster* sections *Cotoneaster* and *Acutifolii*: leaf shape and pubescence on both sides (elongated shoots only), leaf colour and texture (smooth or rugose), length

of racemes, pubescence of inflorescences and hypanthia, shape of flowers, shape of sepals, length of petals, size, shape and definitive colour of mature fruits. Differences in these characters are often not pronounced, and the plants can look different in various seasons and under various conditions, leading even experienced botanists to misidentifications.

The major difficulties are associated with the leaf shape and pubescence, and with the fruit colour. The cotoneaster plants have expressed heterophylly, which adds complexity to the difference between the leaves on the elongated and abbreviated shoots that is common to tribe *Pyreae* (as defined in Potter *et al*. 2007). The leaves on the abbreviated shoots are rather uniform, ranging from elliptic to subrotund, whereas those on the elongated shoots (preferably the largest leaves in the basal part of the shoots) show a species-specific difference in various types of the acute or round apex and base, and in various positions of the maximal width.

It has been frequently stated in the literature that the upper side of the leaves of cotoneasters may be hairy at first, but then the pubescence is lost with age. This statement has not been proven correct and is not accepted here. The pubescence on the upper side of the leaves, often used in diagnostics, is dependent on the heterophylly and shows an increasing gradient from the base to the apex of an elongated shoot. In the species with typically hairy leaves, like *C. niger*, the lowermost leaves (developed in the spring) are slightly pilose along the veins or almost totally glabrous, the sequent leaves are distinctly pilose along the veins and in the basal part of the lamina, and the uppermost leaves (developed in the late summer) are hairy throughout. The pubescence originally developed on the lowermost leaves is still visible in the autumn and it does not shed.

When the plants are observed in the spring, the "hairy" black-fruited species are sometimes mistaken for red-fruited species like *C. integerrimus* that is often said to have leaves subglabrous above. The abbreviated shoots usually develop just 1–2 pairs of leaves which are equivalent to the lowermost leaves on the elongated shoots and are therefore usually glabrous or almost glabrous in nearly all species. When the plants are collected without elongated shoots, the leaves on the abbreviated shoots make the plants appear glabrous. Another difficulty regards the fruit colour. Poyarkova (1954a) observed that many black-fruited species of *Cotoneaster* acquire the definitive fruit colour very late in the autumn, practically when the foliage is close to shedding. The colour of immature fruits may be a kind of red or violaceous but then it turns to dark-inky, blackish or black. Otherwise, the red fruits of many species turn to violet and even blackish when overripe, decaying or drying, either in nature or in collections. Observations on immature or overripe fruits have frequently led to misidentifications, unnecessary species descriptions and incorrect diagnoses.

Cotoneaster antoninae Juz.

Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS 13: 33. 1950. — TYPE: Russia. Republic of Karelia: Sortavala, "Rauskunrinne, in lapidosis locis", 6.VI.1908 *S. Cantell* [*Plantae Finlandiae Exsiccatae* No. 753, flowering specimen] (LE!, lectotype, designated by Flinck & Hylmö 1962: 349, second-step lectotype designated here; isolectotypes BP 156384!, H 267605!, H 381661!, H 381662!, H 381664!, H 381680!, H 381688!, H 492250!, K, LE!, S, UPS, etc.).

Cotoneaster niger auct. non (Wahlb. *ex* Fr.) Fr., *nec* (Ehrh.) H. Lindb.

TYPIFICATION. The type of *C. antoninae* was not designated in the protologue, and neither were any specimens cited, just the material referred to the alleged hybrid "*C. uniflora* × *C. melanocarpa*" circumscribed and identified by Poyarkova (1939). Poyarkova (1939) directly cited *Plantae Finlandiae Exsiccatae* No. 752 under this hybrid, and Flinck and Hylmö (1962) selected "the specimen" at LE from the flowering gathering distributed under this number as the lectotype of *C. antoninae*. Two sheets are present at LE, both signed by Poyarkova in the May of 1937, and I select the sheet having the branches mounted with the upper side of the leaves up.

The earlier lectotypification published by Orlova (1959) has no standing, because that lectotype was selected from non-original material collected after publication of the protologue.

SYNONYMY. *Cotoneaster antoninae* was reported from the northern parts of the European

Russia, from Karelia to the Urals (Gladkova & Krügel 2001). The Uralian part of the distribution area of *C. antoninae* is continuously connected with the Karelian one (Kobeleva 1976). This species avoids higher latitudes and mountain belts, occurring mostly in the southern and eastern parts of the Kola Peninsula (Orlova 1959).

Cotoneaster cinnabarinus Juz.

Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS 13: 32. 1950. — TYPE: Russia. Murmansk Region: Poachvumchorr Mt. (S slope), mountain birch forest, gravelly slopes, 8.IX.1945 *V. F. Golubkova & S. V. Juzepczuk* (LE, holotype, not located); "Lim. Parce in alpe Schelesna prope pag. Kandalakscha", 25.VII.1913 *H. Lindberg* [*Plantae Finlandiae Exsiccatae* No. 752] (LE!, lectotype, designated by Flinck & Hylmö 1962: 346, second-step lectotype designated here; isolectotypes BP 156448!, H 381523!, H 381524!, LE!, S, UPS, etc.).

Cotoneaster uralensis B. Hylmö & J. Fryer, Acta Bot. Fenn. 162: 181. 1999, *syn. nov.* — TYPE: Russia. Tyumen Region, Hanty-Mansi (Yugra) Autonomous District: upper reaches of Hulga River (tributary of Severnaya Sosva River), southern slope of a schist mount, birch zone, 27.VIII.1926 *B. N. Gorodkov 297* (C, holotype; isotype LE!).

Cotoneaster uniflorus auct. non Bunge.

TYPIFICATION. The holotype of *C. cinnabarinus* has not been traced at LE. Nikolai Tzvelev, the long-time curator of the European part of the former USSR at LE, kindly reported that a good part of Juzepczuk's collections from the Kola Peninsula was misplaced long ago, including some types. Flinck and Hylmö (1962) designated "the specimen" of *Plantae Finlandiae Exsiccatae* No. 752 at LE as the lectotype of this name. Since two sheets of these exsiccata have been kept at LE together at least from the 1930s (when this gathering was revised by Poyarkova in May 1937 for the *Flora of the USSR* and assigned to *C. uniflorus*), the second-step designation is formally done here. I select as the type the sheet with a branch having the foliage better preserved and a pedicel visible, thus facilitating identification. This gathering was not signed by Juzepczuk but directly cited in the protologue of *C. cinnabarinus*, being therefore a paratype of this name. An identification slip "*C. cinnabarinus* Juz. Det. A. Poyarkova, 1972" was added on this sheet at the end of the 1980s by Ado Haare, who was assistant curator at LE.

SYNONYMY. The Uralian populations of this species have been recently separated as *C. uralensis*, said to differ from *C. antoninae* in the leaf shape, longer petals, exceeding sepals in 1–2 mm (Hylmö & Fryer 1999), and in the shorter stipules (Knyazev 2007). However, the petals in well-developed flowers of *C. cinnabarinus* always exceed the sepals, and longer petals were observed on a plant collected from cultivation in Hylmö's private garden (H 1676636). The pubescence on the upper side of the leaves, described in the protologue of *C. uralensis*, is totally absent in the isotype kept at LE, and the characters of the leaf shape and pubescence, as well as the inflorescences, were found indistinguishable from those of *C. cinnabarinus*. The isotype of *C. uralensis* was correctly identified as *C. cinnabarinus* by T. Krügel in 1995.

An RAPD analysis of accessions of *C. antoninae* and *C. uralensis* revealed their very close similarity (Bartish *et al.* 2001). The accession 1754 used as "*C. antoninae*" in Bartish *et al.* (2001) is propagation of the material received by Bertil Hylmö in 1971 from the Polar-Alpine Botanical Garden, Kirovsk, and cultivated in his private garden in Bjuv, Sweden. As evident from our revision of the herbarium material in PABG, no vouchers were preserved in Kirovsk. The relevant material (catalogue entry 785) was collected from rocks in the vicinity of Kandalaksha (Murmansk Region), together with *C. cinnabarinus* (Avdyramutova *et al.* 1971). For this reason, the seeds were likely mixed and misidentified (both species are present around Kandalaksha). A specimen preserved from that propagation is deposited at H (H 1676636) and represents a typical sample of *C. cinnabarinus* slightly modified by cultivation towards larger dimensions of the plant parts (inflorescences up to 15 mm long, with 2–4 flowers, but the pedicels and inflorescence branches almost totally glabrous, the leaves totally glabrous above and very finely puberulous below). The other accession 2097 of "*C. antoninae*" used in Bartish *et al.* (2001) was received from the Polar-Alpine Botanical Garden under the originally correct name *C. cinnabarinus*; this accession appeared identical to 1754 in the RAPD analysis. The proximity of *C. cinnabarinus* (as "*C. antoninae*") and "*C. uralensis*" is therefore confirmed also by

molecular markers, and the synonymisation is respectively done here.

NATIVE DISTRIBUTION. This species is widespread in the subarctic area of the European Russia from the Kola Peninsula to the Polar Urals (Gladkova & Krügel 2001). Previously this species was considered subendemic to the Kola Peninsula, absent from NE Europe, whereas *C. uniflorus* was recorded just from the opposite side of the White Sea (Gladkova 1984). Its occurrence in the Urals has been recently doubted and the relevant material was referred to "the few-flowered forms of *C. uralensis*" (Knyazev 2007). The type collection of *C. uralensis* and the other material from Gorodkov kept at LE and H was examined and found representing *C. cinnabarinus* with the leaves very finely puberulous below and perfectly glabrous above, and very short subglabrous inflorescences. Apparently, the distributuion area of this species is as broad as that of *C. antoninae*, and sometimes they grow together. In contrast to *C. antoninae*, *C. cinnabarinus* is clearly a cold-demanding taxon tending to higher latitudes and mountain belts. The type locality of *Cotoneaster uralensis* is situated in the Tyumen Region of Russia and therefore provides a new record of *C. cinnabarinus* for this region and Siberia as a whole.

Cotoneaster lucidus Schlechtend.

Linnaea 27: 541. 1854. — *Cotoneaster acutifolius* Turcz. var. *lucidus* (Schlechtend.) L.-T. Lu, Acta Phytotax. Sin. 38(3): 277. 2000. — Described from cultivation (Germany, the Botanical Garden in Halle). Type not designated.

Cotoneaster acutifolius auct. non Turcz.

SECONDARY DISTRIBUTION. This species is very common in ornamental cultivation in eastern Europe, often used for "green hedges" along streets. It frequently escapes and spreads around the places of original cultivation, apparently dispersed by birds. As a casual alien, this species is found in many places, occasionally mistaken for the other species. The erroneous records of the casual aliens "*C. integerrimus* Medik." from the embankment of the Volga River in the town of Tver (Notov & Markelova 2005, Notov 2005, 2009) and "*C. tomentosus*" from the Ivanovo Region (Borisova 2006b, 2007) belong here.

The only presumably native record of *C. niger* in birch forest along the Seryona River, the Kaluga Region (Maiorov & Kramina 2003, Reshetnikova *et al.* 2005, Maiorov 2006) has proven to be *C. lucidus* escaped from an old manor formerly situated nearby. *Cotoneaster niger* is absent from the Kaluga Region.

The cases of naturalisation of *C. lucidus* in eastern Europe are yet scarce. Numerous shrubs of this species are found in an extensive area around Petrozavodsk Botanical Garden (Kravchenko 2007) where it may already have some seed reproduction. Another possible case of naturalisation is reported around a cemetery in the city of Voronezh (Grigorievskaya *et al.* 2004). This species is reported as abundant and "nearly naturalised" in the planted pine forests on the south-eastern side of the city of Kursk (Poluyanov 2005). Around the town of Ivanovo, *C. lucidus* was recorded as naturalised in various types of disturbed spruce, pine and mixed forests (Borisova 2006a). In the town of Orel and its vicinity, the wild occurrence of *C. lucidus* is assessed as stable with the capacity to irregular seed reproduction (Belousko 2011). In cultivation, this species was found reproduced by seeds in two old parks in the Moscow Region (Makridin 1989), in the Arboretum of the Volga-Kama State Nature Reserve (Bakin *et al.* 2000) and in the Botanical Garden of the Mordovian State University (Levin & Silaeva 2010). Indeed, in most cases *C. lucidus* was observed in the immediate proximity or at a very short distance from places of original cultivation. It seems that this species, even though old, widespread and truly abundant in cultivation (Zamyatnin 1954), just started its naturalisation in eastern Europe. Some evidence exists that *C. lucidus* is getting established easier in sparse pine forests on sandy soils (Skvortsov 1966, Borisova 2006a, and pers. obs.).

Cotoneaster integerrimus Medik.

Gesch. Bot.: 85. 1793. — *Mespilus cotoneaster* L., Sp. Pl.: 479. 1753. — *Cotoneaster vulgaris* Lindl., Trans. Linn. Soc. Bot. 13: 101. 1822, *nom. illeg.* (Art. 52.1). — TYPE: "Mespilus [folio subrotundo fructu rubro] cotoneaster", *Herb. Clifford* 33 (BM, lectotype, designated by Hylmö 1993: 327); Sweden. Uppland, Norby lund, at the Linnaean

Fig. 1. A specimen from the original material of *Cotoneaster pyrenaicus*.

path, 15.VII.2002 *S. Ryman* 9126 (UPS, conserved type).

Cotoneaster pyrenaicus Gand., Dec. Pl. Nov. 1: 8. 1875, *syn. nov.* — Described from France (Région Midi-Pyrénées, Département Hautes-Pyrénées): "in Pyrenaeorum centralium nemoribus, prope Gèdre (Bordère)". — Type not designated. Presumable original material: "Gèdre (Hautes-Pyrénées), juin 1867 *Bordère*" (LE!) — Fig. 1.

Cotoneaster alaunicus Golitsin, Novit. Syst. Pl. Vasc. 1964: 145. 1964. — Type: Russia. Lipetsk Region: Galichya Gora Nature Reserve, Botki on Yasenek River, "hilly" oak forest, among rocks, 30.VIII.1949 *S. Golitsyn* (LE, holotype).

Cotoneaster mamajevii Knjaz., Bot. J. (St. Petersburg) 92(3): 423. 2007, *syn. nov.* — Type: Russia. Cheliabinsk Region: Verkhneuralsk District, Karagay Pine Forest in 6 km to E from Karagayka Village, 6.VIII.2002 *P. Kulikov* (LE!, holotype; isotypes LE!, SVER).

Cotoneaster estiensis J. Fryer & B. Hylmö, Cotoneasters: 277. 2009, *nom. inval.* (Art. 37.1, 37.2), *syn. nov.* — Original material: Estonia. "Rapla, Lipstunõmme, 1982 *R. Cinovskis et al.*" ("RIG", correctly HBA).

Cotoneaster integerrimus Medik. *sensu* Hylmö (1993).

Identity. This taxon was recently recognised as a species in the narrow sense, part of the complex *Cotoneaster integerrimus s. lato* that

previously included all red-fruited taxa of sect. *Cotoneaster* but *C. tomentosus*. Hylmö (1993) proposed to treat this taxon as distinct from the similar species *C. scandinavicus* (native to southern Fennoscandia and the Baltic States) and *C. juranus s. lato* (native to the mountains of central Europe), peculiar of its robust habit, large, ovate to broadly elliptic leaves on elongated shoots that are deeply green and pilose above, elongated inflorescences of (1)3–4 flowers on pilose pedicels, and "bloody" red fruits. These characters match very well with the taxon native to central Europe and very common in ornamental cultivation in Fennoscandia and eastern Europe. Its distribution area is not precisely circumscribed yet because of the common inclusion of similar taxa, but its stability and distinction have been proven by long-term cultivation and are seemingly beyond doubt. The Fennoscandian species *C. scandinavicus* is constantly different in its generally lower habit, more acute and narrower leaves on elongated shoots that are bright green or slightly glaucous, totally glabrous or (the uppermost leaves) very rarely with few hairs along the central nerve and lateral veins above, abbreviated inflorescences of 1–2(3) flowers on glabrous pedicels, and pale-red fruits. The native distribution areas of *C. integerrimus* and *C. scandinavicus* are not overlapping.

Hylmö (1993: 326–327) typified the name *Mespilus cotoneaster* L. (*Cotoneaster* ***integerrimus*** Medik., *C. vulgaris* Lindl. *nom. illeg. superfl.*) by the specimen *Herb. Clifford* 33 (BM) in order to fix the application of this name to the species most widespread both in nature and in cultivation. The other parts of the original material were said to belong to *C. juranus*, *C. tomentosus* and even to *C. niger* (Hylmö 1993), because Linnaeus recognised a single species of *Cotoneaster* only. This typification was made by intention, not solely because of the absence of the available original material from Sweden as assumed by Thulin and Ryman (2003). However, Thulin and Ryman (2003) argued that another part of the original material of *M. cotoneaster* from the Celsius Herbarium (UPS) was overlooked, which is clearly referable to the Fennoscandian taxon. They said the restricted use of this name should be preferably attached to the plant known to Linnaeus from nature around his home, not from literature and foreign collections. Thulin and Ryman (2003) proposed to conserve the name *M. cotoneaster* with the conserved type collected in Uppsala and referable to *C. scandinavicus*.

The acceptance of this proposal resulted in a shift of the name *C. integerrimus* in the strict sense from the central European species to the Scandinavian one, leaving the first taxon nameless and the second with two names, both with undoubted application. Another name suggested for the former *C. integerrimus s. stricto*, *C. mathonnetii* (Thulin & Ryman 2003), is hardly applicable to this taxon because of its few-flowered (1–2 flowers) inflorescence and predominantly oblong leaves. In the absence of accessible original material, these characters point rather to *C. juranus s. lato*. The synonymy of *C. mathonnetii* with *C. juranus* was already accepted by Fryer and Hylmö (2009). A specimen collected by Mathonnet from the High Alpes was examined by me ("Paturages alpestres, La Grave, H^{es} Alpes, alt. 1250 m, 28.V.1861 *R. Mathonnet*" — LE). It belongs to *C. juranus*.

Among the species described by Gandoger (1875a, 1875b), only *C. pyrenaicus* shows the characters clearly applicable to *C. integerrimus sensu* Hylmö. A specimen from the original material of *C. pyrenaicus* is available at LE (Fig. 1). It agrees with the original description and shows broad, rounded, slightly ovate leaves unevenly hairy on the upper side, and inflorescences with 2–3 flowers on long, pendant, hairy pedicels. I consider this specimen as belonging to *C. integerrimus*.

With the strict application of formal rules, according to the current types, *C. scandinavicus* is a synonym of *C. integerrimus*, and *C. pyrenaicus* is the correct name for the central European taxon. This nomenclature was adopted in Euro+Med PlantBase checklist (Sennikov 2009) but was strictly negatively received by European botanists, both in publications (e.g. Dickoré & Kasperek 2010) and in personal communications.

The conservation of the type of *C.* ***integerrimus***, although being a legal and binding action, makes obvious violence to the stability of names. One of the basic principles of the International Code of Botanical Nomenclature (Preamble 9) reads: "The only proper reasons for changing a

name are either a more profound knowledge of the facts resulting from adequate taxonomic study or the necessity of giving up a nomenclature that is contrary to the rules." No new discoveries of taxonomy led to the conservation of *C. integerrimus*, neither was the current nomenclature contrary to the rules. Instead, two familiar names with undoubtful application and unequivocal use were replaced, while one of these two had been misleadingly shifted from one related species to the other. Now an obscure name, never in use and wanted by nobody, is going to be applied to the widespread and common taxon, and the familiar name of that taxon is to be used in the sense excluding its former type.

This situation is not only disruptive to the practice; logically it is contrary to Art. 57.1 that deals with names which have been widely and persistently used for a taxon not including its [current] type, and Art 14.1 that prescribes to avoid disadvantageous nomenclatural changes entailed by the strict application of the rules. Conservation is invented to maintain stability of names, and the present situation is a clear case for conservation. Regrettably it is the conserved type that should be replaced to achieve stability.

According to the spirit and aims of the International Code of Botanical Nomenclature, to avoid unnecessary, disruptive and misleading nomenclatural changes caused by the strict application of formal rules, the editors of *Atlas Florae Europaeae* decided to maintain the lectotype of *C. integerrimus* designated by Hylmö (1993). Under this typification the name *C. scandinavicus* remains correct for the red-fruited taxon endemic to the Baltic area.

Synonymy (native area). The native occurrence of *C. integerrimus sensu* Hylmö in Russia was circumscribed by Krügel (1999). She reduced *C. alaunicus*, the alleged endemic of the Central Russian Upland (Gladkova 1988), to the synonymy of *C. integerrimus*, noting that the only difference of the central Russian plants from the central European populations lies in the greater hairiness of all parts of the Russian plants, presumably reflecting the extremely dry and sun-exposed habitats of the latter. Golitsyn (1949), when providing the first (Russian) description of *C. alaunicus*, noted that it differs from *C. integerrimus* by the greater hairiness of the upper side of its leaves and by the longer inflorescences with 1–4(7) flowers. The ripe fruits were described as purple-red. In the unpublished diagnosis, written on the back side of the label of his earliest herbarium collection of *C. alaunicus* (recently discovered at LE), Golitsyn stated: "Differs from *C. integerrima* in the fruits black in winters, the sepals pilose at the apex, and from *C. melanocarpa* in the low growth" (originally in Russian). In the validating (Latin) description, Golitsyn (1964) amended the diagnostic characters and wrote that "the fruits at the stage of complete ripeness are brownish-black, dull, with a glaucous bloom". A similar fruit colour was described in these plants earlier by Poyarkova (1954b): "fruits first bright-red, fully ripe blackish-red". Krügel (1999) cultivated central Russian plants in Jena and confirmed that the fruits are red to dark-red, often with a bluish tint ("rot bis dunkelrot und meist leicht blaubereift"). My observations on the plants of *C. integerrimus* cultivated in Helsinki show that the ripe fruits in this species are dark red, acquiring a violet tint when overripe and turning blackish with frosts. The plants with a greater hairiness of their leaves can also be found sporadically in central Europe, and longer inflorescences are in fact typical of *C. integerrimus*, so that there is no reason to recognize *C. alaunicus* at all. The hypothesis on the hybridogenous origin of *C. alaunicus* and its characters intermediate between "*C. integerrimus*" and "*C. melanocarpus*" (Golitsyn 1964) is not confirmed by observations on the morphology (Krügel 1999, Gladkova & Krügel 2001).

The populations of "*C. alaunicus*" are isolated from the nearest western localities of *C. integerrimus*, which are situated in the Ukrainian eastern Carpathians (Gladkova & Krügel 2001). This disjunction is (to some extent) analogous to the case of *Daphne cneorum* (syn. *D. julia*) and *Chrysanthemum zawadskii*, also having an isolated fragment of their distribution area in central Russia (Grosset 1964). *Cotoneaster integerrimus* in the eastern part of central Europe is clearly a cold-adapted species, preferring north-facing slopes and higher mountain ranges (pers. obs.), whereas its occurrence in a low upland within the forest steppe zone of eastern Europe may be a consequence of its more continental

climate with cold winters (Alisov 1969).

The native records of *C. integerrimus* from Latvia, Estonia and NW Russia (Browicz 1968, Tzvelev 2000, Gladkova & Krügel 2001), except for a few misidentifications, belong to *C. scandinavicus*. The plants from the Valamo Islands (Lake Ladoga, southern Karelia, Russia), treated as *C. integerrimus* (Pobedimova & Gladkova 1966, Gladkova & Krügel 2001, Kravchenko 2007), are in fact *C. antoninae* (Kihlman 1900, Flinck & Hylmö 1962), the only cotoneaster species native to these islands.

Another isolated fragment of the area of *C. integerrimus s. lato* in the southern Urals (Poyarkova 1939, Gladkova & Krügel 2001) has been recently described as a separate species *C. mamajevii* Knjaz. (Knyazev 2007). Knyazev distinguished his new species from *C. integerrimus* by shorter petals (overtopping the sepals in 1 mm, not in 2 mm) and a different flower shape (globose, not campanulate). However, the short petals only very slightly overtopping the sepals have always been considered a peculiarity of *C. integerrimus*, and they are evident from e.g. the photographs in Hylmö (1993). The shape, colour and pubescence of its leaves fully fall into the range of the variability of *C. integerrimus*. According to Knyazev (2007), the south Uralian *C. integerrimus* ("*C. mamajevii*") grows on the tops of hills covered with the steppe vegetation, with a low snow cover in winters; this species has therefore a cold-adapted existence in that territory as well.

As currently circumscribed, *C. integerrimus* may be heterogeneous in certain parts of Europe because of the continuous inclusion of related taxa. Some taxa segregated in this group (e.g. *C. obtusisepalus*, *C. favargeri*) are not properly evaluated yet. The identity of the Crimean populations included in *C. integerrimus s. lato* (Gladkova & Krügel 2001) is still to be studied.

Synonymy (secondary area). *Cotoneaster estiensis* was said to differ from *C. scandinavicus* in its erect habit, longer flowering shoots with multiflorous inflorescences and in the deeply red fruits, but these characters are the very difference between *C. scandinavicus* and *C. integerrimus*. Nothing was stated concerning the difference of this taxon, declared to be endemic to Estonia and Latvia, from *C. integerrimus sensu* Hylmö, and I failed to find any difference when I studied the specimens from the vicinities of Kuusiku Village in the Rapla District of Estonia, the type locality of *C. estiensis*. I visited this place in 2003 and observed scattered large shrubs of *C. integerrimus*, probably originated from the old Kuusiku Manor and an agricultural park situated nearby. Propagation from this population is present in the National Botanical Garden in Salaspils, Latvia (L. Strode pers. comm.) and was examined from herbarium specimens (voucher in H).

The type of *C. estiensis* is designated at "RIG". However, all the Latvian collections of Cinovskis are kept at HBA, where Cinovskis worked, and nothing has been placed to RIG (a similar mistake was published in the list of paratypes of *C. rannensis* in Hylmö & Fryer 1999). Besides, there is no such particular specimen present at HBA, as cited for the type of *C. estiensis*. Instead, a series of plants from several localities around Kuusiku Village in the Rapla District, Estonia was collected during the dendrological expedition by R. Cinovskis, D. Knape and D. Šmite on 17–18.VIII.1981 (partly mislabelled 1982). Some specimens of this series were annotated as "*C. estonicus* sp. nova" by Hylmö and Fryer; two gatherings have the locality "Lipstunõmme" on the labels. The intended type of *C. estiensis* cannot therefore be recognised because the type indication is clearly referable to more than a single collection (Sennikov 2010). For this reason, the name *C. estiensis* is not validly published (Art. 37.1, 37.2).

Secondary distribution. *Cotoneaster integerrimus* is frequently cultivated outdoors in Finland, and is present in ornamental cultivation in Scandinavia, the Baltic States and European Russia. In Finland, it occasionally runs wild (Vuokko & Hämet-Ahti 1998) but no established populations are known. In Sweden, a single established population of this species is recorded from a pine forest on sands surrounding the village of Everöd in Skåne (Tyler *et al*. 2007).

This species reportedly runs wild in eastern Europe, but certain cases of naturalisation are very rare. A single naturalised population of *C. integerrimus* is known from the Klichno Island in Lake Seliger, north of the town of Ostashkov in the Tver Region, Russia. This island is an

old inhabited place with several arboreal species planted and partly naturalised. As evident from collections, the cotoneasters were planted on Klichno already before the Second World War ("Pine forest on Klichno Island, 25.VIII.1936 *Trofimov*" — MW). When recently rediscovered, this population was erroneously reported as a case of naturalisation of *C. tomentosus* (Notov 2005, 2009, Notov *et al.* 2006), a thermophilous species which is unstable in cultivation and never runs wild in central Russia (Zamyatnin 1954).

Another naturalised population of *C. integerrimus* that has been known for 50 years is located nearby the Elizavetino railway station, Izhora Upland, Leningrad Region, Russia. This record was erroneously considered as native *C. integerrimus sensu* Hylmö (Tzvelev 2000, Glazkova 2000). When revisited a few years ago, this population was found concentrated around a former farm that had been totally destroyed during the construction of an electric power line. The farm contours are still visible in that place, with *Viburnum lantana* and *Syringa vulgaris* remaining as other relics of cultivation.

In Estonia, at least one extensive naturalised population of this species exists in the Rapla District. This population was described as *C. estiensis*. A record of "*C. estiensis*" from Latvia (Fryer & Hylmö 2009) may belong to *C. integerrimus* as a casual alien (e.g. "Rīgas raj., Murjāņu apk., 'Sēnīte' [former restaurant], P damaksnī", 24.VII.1977 *L. Tabaka* 400 — LATV 40461; "Jēkabpils raj., Daugavas kr. krasts, Ābeļu apk., ceļmalā", 8.VIII.1980 *B. Talla* 205 — LATV 52722).

Cotoneaster integerrimus may spread as a casual alien to some distance from places of original cultivation. It has been found on a railway embankment in the Tver Region and erroneously reported as "*C. melanocarpus* Fisch. *ex* Blytt" (Notov *et al.* 2002, Notov 2005, 2009). A record of the casual alien "*C. integerrimus*" from the embankment of the Volga River in the town of Tver (Notov & Markelova 2005, Notov 2005, 2009) belongs to *C. lucidus*.

Cotoneaster tomentosus (Aiton) Lindl.

Trans. Linn. Soc. London 13(1): 101. 1821, *nom. cons. prop.* — *Mespilus orientalis* Mill., Gard. Dict., ed. 8: Mespilus No. 9. 1768, *nom. rej. prop.* — *Mespilus tomentosa* Aiton, Hort. Kew., ed. 1, 2: 174. 1789, *nom. cons. prop.* — TYPE: Specimen from Chelsea Physic Garden No. 1927, "*Mespilus Cretica folio circinato et quasi cordiformi*. Tourn. Cor. 43. *Chamaecerasus Idaea* Alpini Exotic. 5", dated 1760 (BM 000602204, lectotype, designated by Sennikov in Sennikov & Somlyay 2011: 583).

Cotoneaster soczavianus Pojark., Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS 17: 179. 1955, *syn. nov.* — TYPE: Russia. Krasnodar Region: "Caucasus borealis ad fl. Malaja Laba (systema fl. Labae), in querceto", 14.IX.1945 *V. Soczava, A. Gavrilevicz & M. Schik* (LE, holotype).

NOMENCLATURE. The name *C. tomentosus* is illegitimate together with its implied basionym; for this reason it was proposed for conservation (Sennikov 2011). A later specimen collected by K. Baenitz was not effectively designated as neotype ("lectotype") by Fryer and Hylmö (2009) under Art. 7.11.

SYNONYMY. The first record of this species outside Europe was recently published from Turkey (Zieliński 2000). It brought attention to the fact that another species, *C. soczavianus* from the Russian Caucasus and Abkhazia (Poyarkova 1955) is close to *C. tomentosus* in the RAPD analysis (Bartish *et al.* 2001). The original description and illustration of *C. soczavianus* show a narrow-leaved plant of *C. tomentosus*, which was compared in the protologue with unrelated species of *Cotoneaster* sect. *Acutifolii* (apparently in the absence of close relatives in the former USSR). Additional localities of this rare species may be overlooked in the Caucasus and even in the Crimea.

SECONDARY DISTRIBUTION. The only record of *C. tomentosus* as a casual escape in eastern Europe, which is not rejected yet, comes from the 19th century. It is based on a single herbarium specimen at MW (Ignatov *et al.* 1990), currently not located, that was collected along the Moscow River nearby the Pleasure Garden ("Neskuchny Sad") and Golitsyn's Hospital, first identified as "*C. integerrimus*" (Kaufmann 1866, 1889) and then corrected to *C. tomentosus* (Petunnikov 1896). Petunnikov (1896) noted that the place of this record was situated on a margin of a vast garden area stretching up to the Moscow River. He noticed the long inflorescences with numerous flowers and the leaves hairy above as the diagnostic characters of *C.*

tomentosus, said to be frequently cultivated in preference of "*C. vulgaris*" (*C. integerrimus*), but he omitted the hairiness of the hypanthium. Considering the very common misidentifications of cotoneasters in earlier times, this record may belong to *C. integerrimus*.

A recent record of this species as locally naturalised in the Tver Region (Notov 2005, 2009, Notov *et al.* 2006) belongs to *C. integerrimus*, and as a casual alien in the Ivanovo Region (Borisova 2006b, 2007) to *C. lucidus*.

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