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VERONICA SCARDICA – A NEGLECTED SPECIES OF THE SERBIAN FLORA*

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There has been almost no precise information about distribution, ecology, and exact distinction of *Veronica scardica*, in Serbia, a species often confused with *V. beccabunga* and *V. anagallis-aquatica*, and sometimes doubted in its species status. We succeeded to give several exact records for Serbia and differential descriptions of the three species. *V. scardica* is serpentinophytic (at least in the mountains of the Balkan Peninsula).

Key words: *Veronica scardica* Griseb., serpentinophyte, neglected species in Serbian flora, morphological characteristics and its status, Flora of Serbia.

Ključne reči: *Veronica scardica* Griseb., serpentinofit, zanemarena vrsta u flori Srbije, morfološke odlike i njen status, flora njen status, flora Srbije.

INTRODUCTION

As early as in 1859, *Veronica scardica* Griseb. is recorded for Serbia for the first time by the father of Serbian natural history and botany in this paper on the flora of the serpentine mountains in central Serbia, viz. as a variety of *V. beccabunga*, L.

*Systematics of *Veronica* sect. *Beccabunga*, II. (part I.: Öztürk et Fischer 1982).

which, however, he compares with *V. scardica*: „*V. Beccabunga* L. var., eine magere Form mit verlängerten Blütenstielen und überhaupt den auf Kosten der Vegetationssphäre mehr entwickelten Fructificationstheilen, mit *V. scardica* Grisebach zu vergleichen” (Pančić 1859: 144).

Evidently, this knowledge got lost later on, and even J. Pančić himself does neither mention this taxon in his Flora (Pančić 1874: 533) nor in the Supplement to his Flora (Pančić 1884). This neglect is probably due to the great variability of *V. anagallis-aquatica* L. which made it difficult to decide whether *V. scardica* is a distinct species. Accordingly, several authors attribute to it infraspecific rank only (e. g. Ritter – Studnička 1970 b; Stojanov *et al.* 1967) or put it into the synonymy (Elenevskij 1978). On the other hand, this species, however, is as conspicuous as to have caused several independent descriptions at species rank. After its first description by Grisebach (1844) from Albania it was described by Uechtritz (1886, 1887) from Dobrudža (as *V. gracilis* and *V. velenovskyi*), by Borbás (1887) from Burgenland (Eastern Austria, then Hungary: *V. kovacsii*) and by Simonkai from Bačka (then Hungary: *V. bacsensis*). Soon, however, their conspecificity became evident (Hayek 1929) at the latest: Slavnić 1967 probably had not really a deviating opinion but simply made a compilation mistake. It was also considered to be perhaps a hybrid between *V. beccabunga* and *V. anagallis-aquatica* (Dostal 1950) because it has petiolate leaves like *V. beccabunga* but in other characters resembles *V. anagallis-aquatica*. The petiolate leaves, which were considered to be an important character, are the reason why several authors included our taxon within *V. beccabunga* or put it next to it. In *V. anagallis-aquatica* too, however, basal vegetative branches usually have petiolate leaves. Taking this into account, and also all the other characters as well as the existence of probable hybrid specimens (Fischer 1978: 729; 1980: 253; the hybrid reported by Keller 1942: 154 is, however, doubted by Marchant 1970: 79–80), there seems to be no doubt that it is more closely related to *V. anagallis-aquatica* than to *V. beccabunga*, a view held already by Schlenker (1936: 32), Keller (1942: 139: subsectio *Anagallides* Keller), Fischer (1981: 165) and Öztürk *et al.* Fischer (1982). Despite Marchant's (1972: 222, 223, 229) reporting an artificial cross – with inviable seeds – between *V. scardica* and *V. beccabunga*, there seems to exist a genetic barrier between *V. beccabunga* and the *V. anagallis-aquatica* group (with *V. scardica*) in the field, according to the experience of the first author (M. A. F.) who has checked many hundreds of specimens.

In the time after Pančić and Simonkai there have been only very few and vague records of *V. scardica* for Serbia: Hayek (1929), Diklić (1974: for Sukovo in S. E. Serbia, this record originating from Adamović 1911). Prior to our investigation there have been no correctly determined specimens of *V. scardica* in Belgrade herbaria (BEO and University), and that is why the description and the figure by Diklić (1974) had to be taken from Ghisa (1960: 547–548, whose description is based on Keller 1942 but supplemented by observations on Roumanian material and by fig. 2 in plate 94 on p. 545). – Recently, Fischer *et al.* Fischer (1981: 198–199, no. 22 and 22a in the map fig. 9 on p. 229) tried to collect all distribution data of *V. scardica* for the Balkan Peninsula.

Serpentinophily. – Strangely, it was not earlier than that paper and Fischer (1981) that *V. scardica* was supposed to be serpentinophytic. In spite of several records from serpentine soils there has been no previous general statement or investigation of the serpentinophily of this species. The oldest record is that one by Pančić (1859: 144) already mentioned for the serpentine mountains of central

Serbia. Malý (1908: 231) records serpentine soil for his Bosnian locality (Vardište). Ritter – Studnička (1970b: 63) gives several localities all situated in the same serpentine region of Varda palnina s. of Višegrad. The type locality of *V. kovacsii* in Burgenland (= Gradišće; E. Austria) is on serpentine rocks, a fact stated by Borbás (1887: 228) expressively. The species was collected there many times and still grows there, (M. A. Fischer, 1982). In 1978, *V. scardica* was collected by M. A. Fischer in Turkey on three localities, all on serpentine rocks (Öztürk et Fischer 1982: 311). For the type locality in Albania near Kukes (= Kukës) Grisebach mentions „substr. diorit.” Furthermore, in herb. M (Munich) the first author found *V. scardica* from 3 localities in Greece, collected by K. H. Rechingner, all on serpentine according to label information (M. A. Fischer, ined.). From these data – the species is present in serpentine regions close to the western border of Serbia (in E. Bosnia and E. Albania), beyond the southern border in Greece, and also east of Serbia (in Bulgaria and Turkey) – we presumed that it is distributed also in Serbia in the water courses all over the serpentine mountains.

Our consequent investigations in herbaria and in the field (3 days of excursions in October 1983 through the environments of Kraljevo) revealed, as was expected, several new records which are listed below together with the literature data. Our personal collections (nos. 7, 8, 9) were all from serpentine soils. In most of the other localities where no substrate data are given on the labels, we know that they are situated in areas with prevailing serpentine (ophiolithic) rocks: in the Kopaonik mts. (10), Tara mts. (5), Stolovi mts. (6), Varda mts. (14–19). Remarkably, also in two more localities there are comparatively small and isolated serpentine outcrops: near Ripanj (3) and near Tekija (4)! So, one gets almost the impression that the distribution of *V. scardica* draws a detailed geological map of serpentine outcrops! – To sum up, we can conclude that there is ample evidence for *V. scardica* being a prominent or even exclusive serpentinophytic species, at least on the Balkan Peninsula.

We must admit, however, that there are also some facts pleading against our serpentine hypothesis: (1) We do not know the substrate of *V. scardica* habitats in Moravia (ČSSR), in Hungary, in Roumania, in Bessarabia (Moldavian SSR) and in Bulgaria and also in Vojvodina (Simonkai 1888), and the relevant Floras do not mention serpentinophily (Dostal 1950; Soó et Karpati 1968; Ghisa 1960; Borisova 1955; Stojanov, et al. 1967). – (2) There are a few scattered records from places in E. Austria (eastern Niederösterreich and northern Burgenland) with no serpentine substrate (Fischer 1975 and Fischer, unpubl.). – (3) There is, however, a literature indication of a high salt tolerance of this species (Hartl 1968: 233; Meusel 1978: 128) which might be connected with serpentine tolerance. – (4) None of the taxonomical monographic *Veronica* studies mentions serpentinophily for *V. scardica* (Rompf 1928; Schlenker 1936; Keller 1942; Elenovskij 1978 reduced this species to synonymy). – (5) Not only does the floristic and taxonomic literature fail to mention serpentinophily for our species (in addition to those already mentioned under (1) also Hayek 1929; Janchen 1959; Walters et al. 1972; Slavnić 1967; Diklić 1974), but even ecological (phytocenological) studies of the serpentine vegetation on the Balkan Peninsula do not mention *V. scardica*: Ritter – Studnička (1970a; in 1970b) this author mentions our taxon under the name *V. beccabunqa* var. *gracilis* but she does not indicate any serpentinophily of it, for she does not even attribute the lowest degree which she marks by one single asterisk; in our opinion *V. scardica* deserves at least two or perhaps three asterisks!), Markgraf (1932), Krause et Ludwig (1957: they mention only *V. beccabun-*

ga and *V. serpyllifolia* in streams and source vegetation on serpentine rocks), Horvat *et al.* (1974), Tatić (1969) and others.

We would like to draw attention to the fact that there exist only very few serpentinophytic species of wet habitats (in the Balkan Peninsula, but maybe also generally). This type of habitat and species specialized to it seem to be rather rare, as was already stated by Horvat *et al.* (1974: 656): There are only two species known from the alpine region of Greek mountains: *Pinguicula hirtiflora* Ten. and *Soldanella pindicola* Hausskn. forming a characteristic serpentinophilous community. They were also observed in Albania by Markgraf (1932: 72). Krause et Ludwig (1957) mention several wet serpentine habitats but no serpentinophytes from Bosnien. Krause *et al.* (1963: 376, 387–389, 394) observed *Pinguicula hirtiflora* as a main constituent for the serpentine exclusive to preferent *Adiantum capillus-veneris* community on irrigated serpentine rocks and in source moss tufts, and *Centaurea thracica* in stagnant wet habitats on serpentine.

RECORDS

The subsequent paragraph is a list of all reliable literature records and herbarium specimens of *Veronica scardica* checked by us for the country of the SR Serbia (including SAP Vojvodina and SAP Kosovo) and adjacent regions (see also the map Fig. 5). The exclamation mark (!) designates herbarium specimens seen by us. — Herbarium abbreviations: BEO = Muzej Srpske Zemlje, Botaničko odeljenje (National Museum of Serbia, Botanical Department); BEO-K = Botanički zavod Prirodno-matematičkog fakulteta (Herbarium Košanin at the Science Faculty of the Belgrade University); GZU = Institut für Systematische Botanik der Universität Graz (Institute of Systematic Botany, University of Graz, Austria); PR = Botanické oddelení Přírodověd muzea Národního muzea, Praha (Pruhonice) (Botanic Departm., Natural History, National Museum, Pruhonice near Prague).

Vojvodina: (1) Marshes nr Gložan (= Dunagalos fide Keller 1942: 153) (20 km W of Novi Sad), a. 1875, anonym. (type locality of *V. bacsensis* Simonkai 1888: 107).

Serbia s. str.: (2) Serpentine mountains in central Serbia (c. region of the mts. close to Brđani nr Gornji Milanovac, and mts. Stolovi and Kopaonik S. of Kraljevo), in several places, J. Pančić (Pančić 1859: 143–144; without an asterisc by which he denotes those species he met exclusively on serpentine). — (3) Klenje nr Ripanj (S. of Beograd), X. 1930, Soška, BEO-K! — (4) Đerdapska klisura: Tekija, marshes, 3. X. 1968, V. Nikolić, BEO! — (5) Tara mts.: Canyon of Rača (c. 25 km WNW of Titovo Užice), 17. IX. 1966, N. Diklić, BEO! — (6) Valley of the river Ibar: Dobre strane (W. slope of mts. Stolovi, c. 20 km SSW of Kraljevo), 12. VII. 1967, V. Nikolić, BEO! — (7) Northwestern end of the Goč mts. (SSE of Kraljevo): valley of the rivulet Ribnica between the villages Ribnica and Kamenica, c. 7 km S of Kraljevo, small stream (right hand tributary of riv. Ribnica, between serpentine rock steppes with *Teucrium montanum*, *Fumana bonapartei*, *Medicago prostrata*, scattered *Juniperus oxycedrus*), sandy spots in the water, serpentine, c. 300 msm. a few scattered specimens, together with *Cyperus fuscus* L., 21. X. 1983, log. Gerlinde et Manfred A. Fischer, WU!, BEO! Kraljevo, University!). — (8) Goč mts. (SSE of Kraljevo): valley of the rivulet Ribnica, 20 road-km S of Kraljevo, c. 5 road-km S of the village Kamenica, sandy spot in the rivulet, serpentine, c. 580 msm, only one specimen observed, 22. X. 1983, leg. G. et M. A. Fischer, WU! — (9) Čemerno mts., southern end, c. 30 km SSW of Kraljevo,

valley of the river Studenica, 6 road-km SE of Studenica monastery towards Ušće, in a small stream crossing the road (left side tributary of Studenica river), sandy spots in the water, serpentine, c. 520 msm, copiously (also in the road-side ditch), 22. X. 1983, leg. G. et M. A. Fischer, WUQ, BEO!, Kraljevo Univ.!). — (10) Mt. Kopaonik, VII. 1887, J. Velenovský, GZU! — (11) Cultiv. in the Belgrade Botan. Garden from seeds collected on mt. Kopaonik, Bornmüller, PR! — (12) Environment of Vranje („in agro Vranjano”) (S. Serbia), VI. 1896, L. Adamović, W! — (13) At streams, wet places and in marshes around Sukovo (between Pirot and Dimitrograd, SE of Niš) (Adamović 1911: 164).

SAP Kosovo: No record so far.

Bosna and Hercegovina: (14) Varda mts. (SE of Višegrad): in the Borcik valley, nr the village Rudo, serpentine soil, 28. X. 1920, K. Malý, WU! — (15) Varda mts., VIII. 1907, Vandas, PR! — (16) Nr Vardište (c. 10 km ESE of Višegrad), in wet places on serpentine, K. Malý (Malý 1908: 231). — (17) In the Jablanica valley nr Gornje Vardište (15 km ESE of Višegrad), H. Ritter-Studnička (Ritter-Studnička 1970b: 63). — (18) On mt. Varda, nr. Rudo, up to 840 msm, a. 1923, K. Malý (Ritter-Studnička 1970b: 63). — (19) Environment of Drinsko (5 km S of Višegrad): in the Kruševica stream, a. 1923, K. Malý, and very frequent in the Jastrebovac stream, H. Ritter-Studnička (both: Ritter-Studnička 1970b: 63).

Albania: (20) Prokletije mts. (= Alpet), eastern part: mt. Shkelzen, nr the village Tropoj (Tropoja), in the water of a pool, c. 700 msm, 5. IX. 1918, S. Javorika, W! — (21) Nr Kukës (= Kuks = Kukeš), wet places in shady forest, c. 220 msm, dioritic substrate, 26. VII. 1839 (collecting date fide Markgraf 1932: 35), A. Grisebach (Grisebach 1844: 31–32), type of *V. scardica* (Goet?).

COMPARATIVE DESCRIPTIONS OF VERONICA SCARDICA, *V. ANAGALLIS*—*AQUATICA* AND *V. BECCABUNGA*

Those characters are mentioned which are of diagnostic value in sect. *Beccabunga*. The most important diagnostic characters are displayed. — See also Figs. 1–4.

Veronica scardica Grisebach (Sl. 1). — Syn.: *V. beccabunga* var. *scardica* (Griseb.) Stojanov, Stefanov et Kitano, Flora na Balgarija 2: 973 (1967) (non rite publ.). — *V. gracilis* Uechtritz ex Velenovský, Abh. Kon. Bohm. Ges. Wiss. (Math. — Nat.) 7, ser. 1B: 35 (1886), non R. Br. (1810). — *V. beccabunga* var. *gracilis* (Uechtr. ex Velen.) Uechtr. et Sint. in Kanitz, Pl. Roman. huc. cogn.: 81, 87 (1879 — 1881). — *V. kovacsii* Borbás, Vasvárm. Növényföldr. Flórája (Geogr. Enum. Pl. Com. Castrife rei Hung.): 227–228 (1887) (the spelling „kovatsii” is incorrect, it stems from an orthographic error in herbarium labels distributed by Borbás; not in the original description; see Keller 1942: footnote on p. 151). — *V. velenovskyi* Uechtr., (Engl.) Bot. Jahrb. 8, Literaturbericht: 46 (1887). — *V. bacsensis* Simonkai, Osterr. Bot. Z. 38: 107 (1888). — *V. delicatula* Velen. in sched., nom. nud. — *V. tenerrima* auct., non Schmidt.

Perennial (or rarely annual?), whole plant always completely glabrous, often ± strongly tinged purple. Stems shortly creeping and procumbent or (much rarer?!) ascendent or erect, often purple, ± fistulose, usually strongly branched, sometimes forming dense tufts; low, i. e. 5–20(–40) cm tall. Leaves thin (not subsucculent), dull green, lower surface often purple, shortly petiolate, upper leaves often sessile but at least with a distinctly cuneate base, petiole (1–)2–3(–5) mm long. Lamina small, i. e. (10–)12–20(–26) mm long, (8–)10–16(–18) mm wide, subrotundate or broadly ovate



Fig. 1. — Herbarium specimen of *V. scardica* to show leaves and racemes; locality no. (7) cited in this paper.

or subrhobic, base cuneate, apex obtuse to acute, margin shallowly of \pm distinctly to coarsely serrate with (3-)6-9(-15) teeth on each side, sometimes almost entire. Flowering shoots (branches) with 1-8 alternate or opposite racemes. Racemes (with peduncle) (2-)3-6(-8) times as long as their subtending leaf, peduncles short (5-15 mm), usually shorter than the subtending leaf, peduncles short (5-15 mm), usually shorter than the subtending leaf, fertile part 3-10(-15) cm long, always glabrous, with (10-)15-30(-45) flowers which are rather loosely arranged: (1-)2-4(-5) pedicels (flowers) per 1 cm axis length (fruiting stage). Fruiting pedicels 5-7 mm long, (1,5-)2-3 times as long as the oblanceolate, 1,5-4(-6) mm long bracts, completely glabrous, erecto-patent to horizontally patent, not or only very slightly curved upwards below the fruit, as a consequence, the fruit is not in a vertical position but oblique. Fruiting calyx 3-3,5(-4,5) mm long; fruiting sepals erect, oblanceolate to obovate, 1,2-1,7(-2,0) mm wide, maximum width in the upper half, apex obtuse to \pm slightly subacuminate, sometimes 1 teeth on one side below the apex (very rarely 1-2 on each side), margin often papillose, three usually distinct and \pm prominent veins, the central one usually forming an acute keel leading down to the top of the pedicel so as to produce an almost 4-lobed calyx base. Corolla 4,5-6 mm in diameter, pale lilac-purple to pale pinkish, with violet or pink veins. Style short, (1,0-)1,2-1,6(-1,8) mm long. Capsule 2,5-3,0(-3,5) mm long, 2,0-2,3(-2,7) mm wide, a little shorter than or almost equalling the calyx, slightly obovate or orbicular, usually slightly longer than wide, apex rounded-subtruncate, with a short (0,1-0,3 mm deep) and very narrow sinus, sometimes almost lacking. Seeds 30-40 per capsule, broadly elliptic, 0,4-0,6 x 0,35-0,40 mm, planoconvex, very delicately subrugulose, pale brownish yellowish. — Chromosome number (determined in plants from Anatolia): $2n=18$ (see Ö z t ü r k et F i s c h e r 1982: 311). — See Figs. 1 and 4a and 5.

Habitat: From our field experience (M. A. F.) in Burgenland, in central Serbia, and in Turkey we would describe the habitats of *V. scardica* like this: It grows in very small streams of moving water, on mineral-rich, humus-poor serpentine soil, in open, labile, sandy-argillose places in full light, with no shade by larger plants, and it usually forms large one-species-(one-individual-) patches; it does not grow in dense, covered vegetation together with other species, it seems to have normally no or very few companions in the same niche. We never met it in (as stated in some Floras:) „wet meadows of pastures”. — On our excursion through the serpentine region south of Kraljevo we saw no *V. anagallis-aquatica*, but several specimens of *V. beccabunga*.

Total Distribution Range: E. Austria, Hungary, Yugoslavia, Albania, Roumania, Bulgaria, Moldavian SSR, Greece, Turkey, Syria, Iran. — A distribution map for Hungary (in the largest, historical sense, viz. „Transleithania” during the Austro-Hungarian Monarchy: i. e. including Slovakia, Burgenland, parts of Yugoslavia and of Roumania) is given by K e l l e r (1942: 150). The map given by R a u s c h e r t (1978) is to be corrected, according to our present knowledge in this way: the continuous range is to be enlarged in southern and southeastern direction, up to N. Greece, including whole Anatolia up to N. Syria; a dot symbol is to be placed in S. Persia (Fars province). The area diagnosis and the floral element formula given by M e u s e l *et al.* (1978: 128, 242) is to be altered to: (m/(mo))-sm . k2-3 Eur.- Vordas. and to or-omed-osubmed-whell-alb-illyr-panns.l.*

Iconography: J á v o r k a et C s a p o d y (1933: tab. 460, fig. 3289), S c h l e n k e r (1936: tab. 1, fig. 4), G h i ş a (1960: 545, tab. 94, fig. 2), F i s c h e r (1981: 159, fig. A3). — Figs. 1 and 4a.

*i. e. „pann” sensu M e u s e l map 257!

Variability and Intraspecific Taxonomy. — Compared with *V. anagallis-aquatica*, the degree of variability is remarkably low in *V. scardica*, its differential characters are fairly constant from Austria to Iran. This fits well with the idea of its role as a diploid ancestral species of the polyploid *V. anagallis-aquatica* (Öztürk et Fischer 1982). — Keller (1942) in his thorough revision of the Hungarian (s. l.) members of sect. *Beccabunga* distinguishes 3 formae besides the typical one: f. *kovacsii* (Borb.) Jávorka (including the type of *V. kovacsii*) with strongly serrate leaves and serrate (incised) sepal apex; f. *subintegrifolia* (Borb. in Dörfler) with longer stems and subentire leaves; „f. *javorkae* Kell.,” nom. illeg., with stems erect, not branched (nomenclaturally incorrect because Keller says it includes Grisebach's type material). Keller, however, records some of his heterotypic formae from the same localities (same gathering!) as his „typical” one, so, his formae probably reflect intrapopulational variation or even modifications. Specimens with regularly and strongly toothed sepals seem to be rare; we know this character only from the Burgenlandian serpentine locality (between Bernstein and Redlschlag: type locality of „*V. kovacsii*”) where each sepal in every specimen shows 1–3 teeth! — The variation in growth habit (erect vs. decumbent) needs further study, this trait being often difficult to decide in herbarium material. We found, in Serbia, strongly creeping/prostrate plants only. — Velenovský (1891: 428) claimed to be able to distinguish his Dobruđa plants (*V. velenovskyi*) from Albanian and Serbian *V. scardica*; this, however, probably is not really possible but is to be understood as the almost excusable attempt to save the dedication name.

As already indicated above (p. Ms: 2) there are probably hybrids between *V. scardica* and *V. anagallis-aquatica* (and other closely related species in Anatolia), especially in Anatolia. We saw a few putative hybrid herbarium specimens also from Yugoslavia which need further investigation. (This question should be treated together with *V. anagallis-aquatica* and its variation). In the contact areas between serpentine and non serpentine rocks, critical observation and collecting of *V. anagallis-aquatica* group promises to be rewarding. Already now, however, we can state that *V. scardica* is well distinct by a good set of differential characters, and problematic intermediate specimens are very rare.

Generally, the descriptions of *V. scardica* in the floras are not so bad. The absolute and relative (bracts) length of the pedicels is often somewhat exaggerated, and we feel, the characteristic habit of the raceme is mainly due to the only weakly or scarcely curved pedicels and the resulting oblique position of the fruiting calyces. The oblanceolate to obovate shape of the sepals seems us to be a very good and reliable character; although it has been already mentioned previously, it is worth more emphasis. The subulate calyx base and the papillose sepal margin are other characters not observed previously but, in our opinion, useful though delicate. We never met bluish corollas (as given in some floras) but only pale pink (purplish) ones. — The occurrence of hairs is completely wrong. Specimens with indument are never pure *V. scardica* but hybrids which differ also in other characters, or they are untypical specimens or branches of *V. anagallis-aquatica* which exceptionally produce petioled leaves also in the upper parts of the stem (probably mainly in specimens originating from vegetative branches). So, the determination should never rely exclusively on this single character of petioled leaves. Many wrong determinations are due to this mistake.

Serpentinomorphic Characters. — Many serpentinophytes generally show one or more serpentinomorphic characters (listed by Pichi-Sermolli 1936; Ritter-Studnička 1968). If we compare *V. scardica* with its closest



Fig. 2. — Herbarium specimen of *V. anagallis-aquatica* s. str. to show leaves and racemes; Austria: Niederösterreich, near Moosbrunn (S of Vienna), 180 msm, 19. 7. 1965, M. A. Fischer.

relative *V. anagallis-aquatica*, we can find several of these serpentinomorphoses: (a) glabrescence as there are never hairs (glandular) which, however, are often present in the racemes of *V. anagallis-aquatica*: (b) plagiotropism („abito prostrato” by Pich-Sermolli) and nanism as our species is usually much smaller, lower, and more strongly branched; (c) purpurascence: the vegetative parts are \pm strongly tinged purple; (d) decoloration of the flower: very pale purple corollas instead of blue-lilac ones.

V. anagallis-aquatica L. s. str. (Sl. 2). — Perennial (or rarely annual?), usually green, rarely tinged purple. Stems erect or shortly ascendent, fistulose; only basal vegetative branches shortly creeping, not branched apart from these basal shoots, usually big, i. e. (10-)40-100(-150) cm tall. Leaves thin (not succulent at all), bright green, middle and upper leaves (on erect flowering shoots) sessile, \pm amplexicaul, sometimes subauriculate, only the basal leaves and usually the leaves of the basal lateral vegetative offshoots are shortly petiolate. Lamina large, i. e. (15-)40-80(-120) mm long, (7-)15-30(-40) mm wide, oblong or broadly elliptical or oblong-ovate or oblong-lanceolate, apex obtuse to acute, margin subentire to finely and shallowly serrulate with up to 50 teeth on each side. Flowering shoots with (2-)6-25 usually opposite racemes. Racemes (with peduncle) (1-)2-3 times as long as their subtending leaf; peduncles 10-30 mm long, much shorter than the subtending leaf; fertile part 5-20 cm long, glabrous or sparsely glandular-puberulent, with (10-)20-60 flowers which are rather densely arranged: (2-)4-7 pedicels (flowers) per 1 cm axis length (fruiting stage). Fruiting pedicels 4-7(-8) mm long, (0,8-)1-2(-3) times as long as the narrowly linear to linear-lanceolate, acute, 2-6 mm long bracts, glabrous or with scatte red very short glandular hairs, erecto-patent, distinctly curved upwards, as a consequence the fruit is in always vertical, erect position. Fruiting calyx (3-)4-6 mm long; fruiting sepals erect, linear-lanceolate to ovate-lanceolate, 0,8-1,3(-1,5) mm wide, maximum width in the lower half or in the middle, apex acute, margin entire, not or scarcely papillose, with 1-3 veins not or hardly prominent; calyx at base not or only slightly subalate. Corolla (5-)6-8 mm in diametre, pale lilac-blue or bright lilac, with darker veins. Style long, (1,5)1,9-2,3(-2,5) mm. Capsule (2,5-)3-3,5(-4) mm long, 2,5-3,2(-4) mm wide, a little shorter than to subequalling the calyx, orbicular or orbicular-broadly-ovate, slightly longer than wide to as long as wide, rarely slightly wider than long, apex rounded, sometimes slightly asymmetric, with a very short or often indistinct or absent sinus. Seeds 40-70 per capsule, broadly elliptic, (0,4-)0,5-0,6(-0,7) x 0,4-0,5 mm, planoconvex, very delicately subrugulose, pale brownish yellowish. — Chromosome number (determined in plants from several European and a few Asiatic countries by several authors): $2n=36$ (for references see Öztürk et Fischer 1982). — Figs. 2 and 4b.

Habitat: In \pm moving water, in streams, ditches, riversides; in low altitudes only. Probably not on serpentine soils.

Total Distribution Range: *V. anagallis-aquatica* s. str. is spread over most parts of Europe, its variation is still not adequately studied. In S.W. Asia there are several closely related taxa which probably are best treated at subspecific level (Fischer 1981). — *V. anagallis-aquatica* s. l. is distributed subcosmopolitically, as it is recorded from all continents (Rauscher 1978; recently, it was found also in Madagascar: M. A. Fischer, unpubl.).

V. beccabunga L. subsp. *beccabunga*. (Sl. 3). — Perennial, always whole plant completely glabrous, sometimes \pm tinged purple. Lower part of the (20-)30-50(-80) cm long stems creeping, upper part ascendent to erect, often pale purple, usually pruinose, solid (not fistulose), usually strongly branched; low. i. e. 5-20(-40) cm tall. Leaves

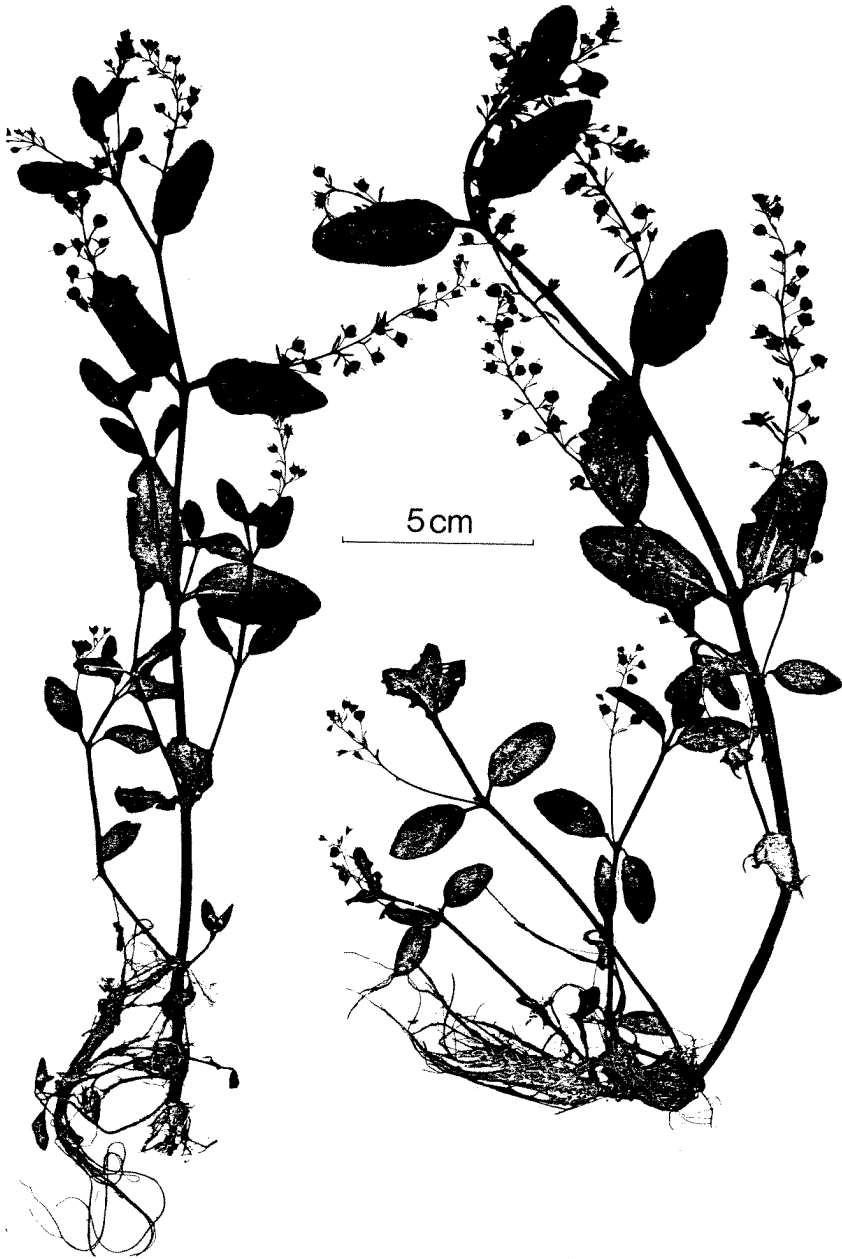


Fig. 3. — Herbarium specimen of *V. beccabunga* subsp. *beccabunga* to show leaves and racemes; Georgian SSR: Džavachethi region, in the Caucasus Minor, Boržomi distr., near Bakuriani, c. 1800 msm, 19.7.1981, M. A. Fischer C424.

fleshy (subsucculent), usually dark green, all shortly petiolate (even the uppermost ones), petiole (2-)3-7(-12) mm long. Lamina medium-sized, i. e. (10-)15-40(-65) mm long, (6-)8-20(-33) mm wide, elliptic, broadly oblong or ovate, base usually truncate (rarely shortly cuneate), apex founded-obtuse to subtruncate, margin denticulate or subserrulate or subcrenulate or subentire, with (10-)12-18(-20) teeth on each side. Flowering shoots (branches) with 2-6(-10) usually opposite racemes. Racemes (with peduncle) 1,5-2,5(-3) times as long as their subtending leaf, peduncles (15-)20-30(-50) mm long, usually shorter than the subtending leaf, fertile part 2-6(-8) cm long, always glabrous, with (5-)10-20(-25) flowers which are rather loosely arranged: 1-4(-5) pedicels (flowers) per 1 cm axis length (fruiting stage). Fruiting pedicels 3-7 mm long. (0,8-)1-1,5(-2) times as long as the linear-oblancheolate 3-8(-10) mm long bracts, completely glabrous, horizontally patent to erecto-patent, not or slightly or distinctly curved upwards below the fruiting calyx, as a consequence the fruit is \pm oblique to suberect. Fruiting calyx 3,5-6 mm long; fruiting sepals erect to suberect, lanceolate, 1-1,5 mm wide, maximum width usually in the middle or in the upper half, apex acute, margin entire, not papillose, with 3 indistinct veins not or scarcely prominent; calyx base not alate. Corolla 5-8 mm in diameter, deep blue with white centre or sometimes bright blue, with darker veins. Style medium long, (1,3-)1,6-2,1(-2,2) mm long. Capsule 3-4 mm long, 3,5-4,5 mm wide, slightly shorter to slightly longer than the calyx, transversely broadly elliptic, usually slightly wider than long, base and apex rounded-subtruncate, with a very slight, obtuse sinus. Seeds (30-)40-60 per capsule, broadly elliptic, 0,6-0,7 x 0,45-0,55 mm, planoconvex, slightly rugose, pale yellowish. — Chromosome number (determined on plants from several different European countries by several authors): $2n=18$ (for references see Ö z t ü r k et F i s c h e r 1982: 309). — Figs. 3 and 4c.

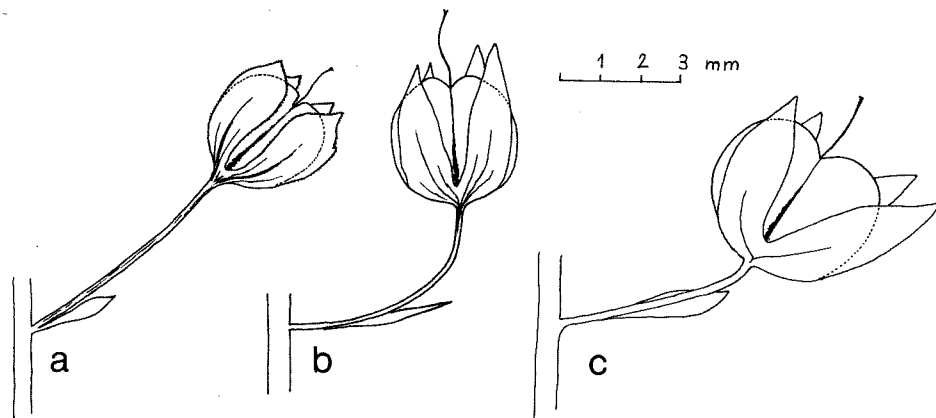


Fig. 4. — Bracts, pedicels, fruiting sepals, capsules, styles of (a) *V. scardica*, (b) *V. anagallis-aquatica* s. str., and (c) *V. beccabunga* subsp. *beccabunga*. — These drawings give average character states; for variation see text!

Habitat: Mainly in fresh water, in sources and small streams; climbing up in the mountains. Also on serpentine soils (Serbia, Burgenland).

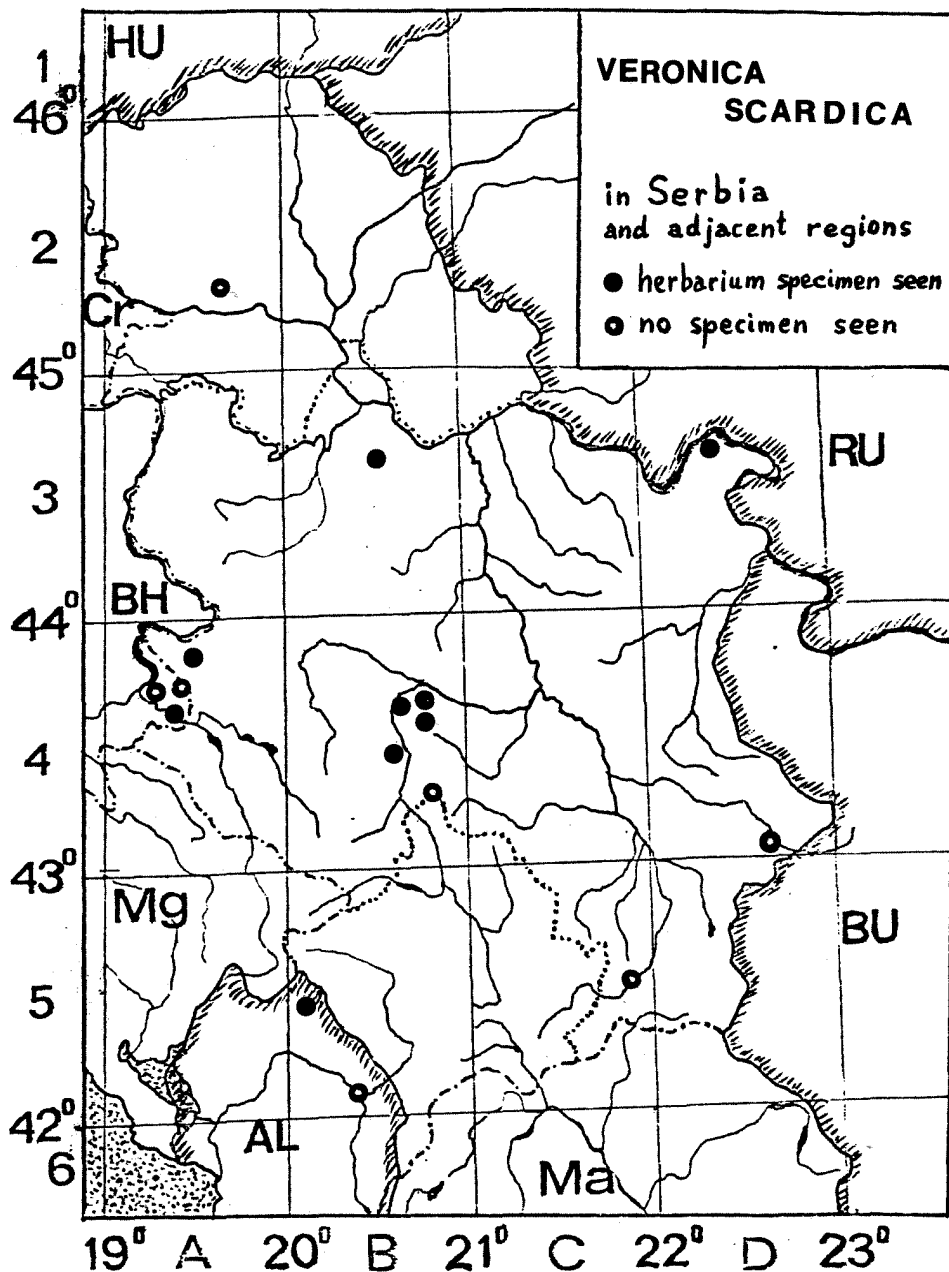


Fig. 5. – Herbarium and literature records of *Veronica scardica* from Serbia and adjacent countries.

Total Distribution Range: Mainly Europe and W. Asia (see Rauscher 1978). Recently, Fischer (1981: 146) and Öztürk et Fischer (1982: 309) distinguish three subspecies; in Europe only subsp. *beccabunga* is present.

KEY TO THE SPECIES OF VERONICA SECT. BECCABUNGA
IN SERBIA

1. Racemes bearing stems creeping (i. e. procumbent with roots originating from the nodes) in the lower part; middle leaves shortly petiolate; racemes completely glabrous; growing in moving water
 2. Base of leaf lamina usually truncate (distinctly set off from the petiole), lamina twice or more as long as wide, thick, fleshy, subsucculent; pedicel in the average less than twice as long as its bract; corolla deep (rarely bright) blue; capsule often slightly wider than long; sepals lanceolate; style usually longer than 1,6 mm; seeds in the average longer than 0,6 mm and wider than 0,4 mm *V. beccabunga*
 - 2 a. Base of leaf lamina cuneate (tapering into the petiole), lamina less than twice as long as wide, thin; pedicel in the average more than twice as long as its bract; corolla pale pink; capsule slightly longer than wide or as long as wide; sepals oblanceolate; style usually shorter than 1,6 mm; seeds up to 0,6 mm long, not wider than 0,4 mm *V. scardica*
- 1 a. Racemes bearing stems erect or ascendent, rooting only at the base, not creeping; middle and upper leaves sessile, often ± amplexicaul; racemes glabrous or with very short glandular hairs; growing in moving or stagnant water
 3. At least the lowest leaves shortly petiolate, less than 4 times as long as wide; corolla pinkish or lilac–bluish; growing in moving water
 4. Leaves more than 3 times as long as wide, usually longer than 3 cm, oblong or lanceolate, the middle and upper ones sessile and ± amplexicaul; sepals lanceolate, widest in the lower half; fruiting pedicels erecto-patent, conspicuously curved upwards, thus fruits erect (vertical); style usually longer than 1,7 mm; corolla usually bluish or pale violet (lilac); plant usually taller than 40 cm; not on serpentine substrate *V. anagallis-aquatica*
 - 4 a. Leaves not more than twice as long as wide, shorter than 3 cm, suborbicular or broadly ovate or almost rhombic, also middle and upper ones shortly petiolate or with distinctly cuneate base; sepals oblanceolate, widest in the upper half; fruiting pedicels and fruits in the average subpatent to erecto-patent, not or only slightly curved upwards, fruits thus in an oblique (not vertical) position; style usually shorter than 1,7 mm; corolla usually pale pinkish (purplish); plant usually lower than 40 cm; growing on serpentine substrate (only?) *V. scardica*
 - 3 a. All leaves sessile, usually more than 4 times as long as wide; corolla pale pinkish; growing in stagnant water or in wet mud
 5. Capsule longer than wide, elliptic; pedicel longer than its bract; annual; raceme conspicuously glandular-puberulent; leaves up to 6 mm wide *V. anagalloides*
 - 5 a. Capsule wider than long or as wide as long; pedicel as long as its bract or shorter; perennial; raceme glabrous or sparsely glandular-puberulent; leaves wider than 6 mm *V. catenata*

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R e z i m e

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VERONICA SCARDICA – ZANEMARENA VRSTA U FLORI SRBIJE

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Vrstu *Veronica scardica* opisao je Grisebach 1844. godine za Albaniju. Posle njega su mnogi autori istu vrstu pod sinonimima opisivali za različite predele Evrope. Neki autori su je smatrali hibridnom vrstom, nastalom između *Veronica becabunga* i *V. anagallis-aquatica*. Međutim, čak i eksperimentom dokazano je da je *V. scardica* dobra biljna vrsta.

Otac prirodnih nauka u Srbiji Pančić je u svom radu 1859. godine vrstu *V. scardica* Gris. naveo kao varijetet vrste *V. becabunga*. Vrsta *V. scardica* je posle toga ispuštena i ne navode je autori objavljenih radova za teritoriju Srbije. Smatra se da je ona zanemarivana i zbog srodnosti sa vrstom *V. anagallis-aquatica*, koja se odlikuje velikom raznovrsnošću.

U cilju lakšeg određivanja vrste *V. scardica* i njenog odvajanja od vrsta *V. anagallis-aquatica* i *V. becabunga* u ovom radu priloženi su dosta opširni opisi i ključ za određivanje vrsta sekcije *Becabunga*, kojoj pripadaju ove tri vrste.

V. scardica Gris. razlikuje se od blisko srodne vrste *V. anagallis-aquatica*, ne samo po gornjem lišću sa dugim drškama i mnogo sitnijim, široko jajastim do rombičnim liskama, već po ne toliko jako naviše povijenim plodnim drškama, ka vrhu proširenim čašičnim listićima, kratkom stubiću i drugim karakteristikama, kojima je do sada poklanjana mala pažnja. Od vrste *V. becabunga*, sa kojom ova vrsta ne stoji u bliskoj srodnosti, razlikuje se klinastom osnovom liski, manjom debljinom iste, skoro lopatičastim čašičnim listićima, sitnijim čahurama, kraćim stubićima i sitnijim fino bradavičavim semenima.

Vrsta *V. scardica* navodi se za flore okolnih zemalja, Bugarske, Grčke, Albanije, a kod nas Bosne i Hercegovine, pa smo zaključili da je nemoguće da se na tako velikoj teritoriji Srbije ne javlja. Stoga je pregledan herbarski materijal Prirodnjačkog muzeja u Beogradu i herbarijum profesora N. K o š a n i n a. Iz ovih herbarijuma vid i se da je vrsta *V. scardica* nalazena na više lokaliteta. Radi potvrde ovih nalaza preduzeli smo trodnevnu ekskurziju u toku meseca oktobra 1983. po srednjoj Srbiji. Pokazalo se da je mesec oktobar pogodan za prikupljanje herbarskog materijala, jer su mnoge biljke i u ovo doba godine bile u cvetu. Vrsta je konstatovana na serpentinskim staništima pored potoka koji se ulivaju u reku Ribnicu, nedaleko od Kraljeva, uz potocić koji se uliva kao pritoka leve strane Studenice i drugim lokalitetima.

Vrsni poznavalac sistematike roda *Veronica* Manfred A. Fischer je na osnovu dugogodišnjih istraživanja došao do zaključka da je *Veronica scardica* Gris. vezana vrsta za serpentinsku podlogu. Na osnovu etiketa herbarskog materijala, a pogotovu na osnovu obilaska lokaliteta sa kojih smo i mi prikupili materijal, stekli smo utisak da je ova vrsta barem na Balkanskom poluostrvu vezana za serpentinsku podlogu, te je treba smatrati tipičnom serpentinitom.