

# Contribution to the knowledge of the genus *Viola* in Croatia

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## Abstract

The present work reports some interesting, rare and new taxa of the genus *Viola* L. for the Croatian flora. A fairly large population of an unknown *Viola* species was discovered in central Dalmatia and identified as *Viola hymettia* Boiss. et Heldr. This is a new species of the genus *Viola* in the flora of Croatia. From the taxonomic point of view it belongs to the somewhat difficult section *Melanium* Ging. and it can be easily mistaken for the similar but more widespread *V. kitaibeliana* Schult. Interestingly, *V. hymettia* was documented in Croatia nearly 20 years ago, but it was mistakenly identified as *V. kitaibeliana*. Beside the somewhat similar dwarf habitus, the two species differ very clearly in the floral structure. A description of *V. hymettia* and a comparison with the other taxa from the section *Melanium* recorded in Croatia are given. Also, an ambiguous and little-known taxon, *Viola kitaibeliana* Schult. f. *violascens* Trinajstić, recorded on the island of Lastovo, is presented and briefly discussed. Furthermore, for the first time *Viola collina* Besser is reported for Mt Žumberak, *V. mirabilis* L. for Mt Medvednica and *V. rupestris* F. W. Schmidt for Mt Velebit. All of them are rare and poorly known species in the Croatian flora and they are probably often overlooked in field work.

**Keywords:** new records, new species, *Viola hymettia*, *V. kitaibeliana* f. *violascens*, *V. collina*, *V. mirabilis*, *V. rupestris*

Čičmir, R. (2025): Doprinos poznavanju roda *Viola* u Hrvatskoj. Glas. Hrvat. bot. druš. 13(1): 41-60.

## Sažetak

U radu se predstavljaju podaci o pronalasku nekih zanimljivih, rijetkih i novih vrsta iz roda *Viola* L. za floru Hrvatske. U srednjoj Dalmaciji pronađena je velika populacija do sada nepoznate vrste iz roda *Viola* te je određena kao *Viola hymettia* Boiss. et Heldr. Ona predstavlja novu i do sada nezabilježenu vrstu iz roda *Viola* u flori Hrvatske. Taksonomski gledano, *V. hymettia* pripada relativno zahtjevnoj sekciji *Melanium* Ging. te se može vrlo lako zamijeniti sa sličnom i šire rasprostranjenom vrstom *Viola kitaibeliana* Schult. Zanimljivo je da je *V. hymettia* zabilježena u Republici Hrvatskoj prije dvadesetak

godina, ali je pogrešno određena kao *V. kitaibeliana*. Te dvije vrste donekle slične samo sitnim, nježnijim habitusom, ali bitno se razlikuju u građi cvjetova. Za vrstu *V. hymettia* daje se detaljan opis i uspoređuje se s ostalim svojstama iz sekcije *Melanium* prisutnima u flori Hrvatske. Također, predstavlja se slabo poznata i nedovoljno istraжена svojta, *Viola kitaibeliana* Schult. f. *violascens* Trinajstić, zabilježena na otoku Lastovu, te se ukratko raspravlja o njenom taksonomskom položaju. Nadalje, vrsta *Viola collina* Besser po prvi put se bilježi za Žumberačko gorje, *V. mirabilis* L. za Medvednicu, a *V. rupestris* F. W. Schmidt za Velebit. To su sve redom rijetke i slabo poznate vrste hrvatske flore koje su vjerojatno često previđene na terenskim istraživanjima.

**Ključne riječi:** novi nalazi, nova vrsta, *Viola hymettia*, *V. kitaibeliana* f. *violascens*, *V. collina*, *V. mirabilis*, *V. rupestris*

## Introduction

The genus *Viola* L. comprises about 600 species, mostly herbaceous, and is distributed throughout most temperate regions of the world (Ballard et al. 1999, Yockteng et al. 2003). The genus *Viola* is the only representative of the family in Europe. In the flora of the Balkan peninsula the genus is especially rich, with approximately 90 taxa (Beck 1918, Tomović et al. 2014). In the flora of Croatia the genus *Viola* is represented by 27 taxa (Nikolić et al. 2025) belonging to three sections: sect. *Viola*, sect. *Dischidium* and sect. *Melanium*. Three taxa, *V. suavis* M. Bieb. ssp. *adriatica* (Freyn) Haesler., *V. dinarica* Trinajstić and *V. elegantula* Schott., are considered (sub)endemic (Nikolić et al. 2025).

However, the number of Croatian violets and pansies is still increasing. Recently, in 2011, due to dedicated field research and molecular investigation, a new taxon, *V. suavis* M. Bieb. ssp. *austrodalmatica* Mered'a et Hodálová, was described and published (Mered'a et al. 2011). It constitutes an additional (sub)endemic taxon in the flora of Croatia (Nikolić et al. 2015, Nikolić et al. 2025).

The genus *Viola* is traditionally considered taxonomically difficult since many species possess several morphologically similar characteristics, and sometimes intermediate forms are present due to interspecific hybridization. Section *Viola* is one of the largest infrageneric groups of violets

in Europe and it is subdivided into subsection *Viola* and subsection *Rostratae* (Marcussen et al. 2012). The three species dealt within this paper belong to these two subsections. *Viola collina* Besser belongs to the subsect. *Viola*, while *V. mirabilis* L. and *V. rupestris* F. W. Schmidt belong to the subsect. *rostratae*. All of them are very rarely recorded in Croatia, probably due to the following: the lack of dedicated studies, being overlooked due to their very early flowering time and misidentification in the field. Thus, some species appear to be very rare, but probably some of them are just under-recorded. The other two taxa discussed in this paper, *V. hymettia* Boiss. et Heldr and *V. kitaibeliana* Schult. f. *violascens* Trinajstić, belong to the section *Melanium* Ging., the pansies. The section *Melanium* is formed of a morphologically well defined group of taxa. It is considered a derived and monophyletic group of species that have very close relationships with each other. That is demonstrated in the reduced genetic variation as compared to the other sections of *Viola*, and they are believed to originate from hybridisation events (Clausen 1927, Küpfer 1971, Davis 1988, Erben 1996). In the flora of Croatia the section *Melanium* is not very species-rich, but still, it is often taxonomically demanding. The very delicate differences between the taxa, the presence of atypical plants and any possible hybrids, occasionally makes identification in the field challenging.

## Materials and methods

In the period from 2011 to 2023, the taxa of the genus *Viola* were investigated in the various regions of Croatia. More detailed research was conducted in NW Croatia, the Lika region and Dalmatia. The mountains Medvednica, Žumberak and Velebit, and various places and mountains, lowlands and islands of Dalmatia were visited several times in March, April and May, and many species of violets and pansies were recorded and documented. The plants were carefully inspected in the field, with meticulous examination of all the features of the stems, stolones, leaves, stipules, bracteoles, sepals, petals, spurs and reproductive organs, the stigmas in particular. For identification the standard and specialized identification keys and iconographies were used: Domac (2022), Nikolić (2020), also Pignatti (1982) and Scoppola & Lattanzi (2012) for species not previously recorded in Croatia. Rare and interesting taxa were photographed with a digital camera, especially the more important diagnostic features of certain species. Several plants of some of the taxa, especially of species newly discovered for the national flora, were collected and transported to a home laboratory for a high magnification photo study of minute details of the stigma. Later they were preserved and deposited in the Herbarium Croaticum (ZA).

## Results and discussion

### *Viola hymettia* Boiss. et Heldr.

In 2006 Günther Blaich (Mannheim, Germany) posted on his well known website “European orchids and other plants“, four photos of a pansy photographed at the beginning of April near the town of Šibenik. The photos were placed under the *Viola kitaibeliana* Schult. presentation sheet. The plants on the photos looked very different from all *V. kitaibeliana* plants I have seen, and even looked very different from all other known species of the section *Melanium* present in Croatia. I have personally studied all Croatian species of the

section *Melanium* in the field and in the literature, and yet I could not satisfactorily accommodate Blaich's pansy under any presently known Croatian species. After a short investigation, the conclusion was drawn that Blaich's pansy is a new species of the genus *Viola* in the flora of Croatia. More detailed research pointed towards the *Viola hymettia*, a Mediterranean-Caucasian species not yet recorded in Croatia. What remained to be done was the inspection and detailed study of the plants *in situ*, to eventually confirm the proposed assumption.

In winter 2023, I contacted G. Blaich and asked for the site information of the mysterious Dalmatian pansy. He kindly described the site in as much detail as possible, taking it into account that plants were photographed nearly twenty years ago.

In early April 2023, with Günther's instructions, dedicated research focused on the plants of the genus *Viola* was carried out in the area between the towns of Vodice and Šibenik. At approximately halfway to Šibenik a fairly large population of the flowering pansy species was detected, and more than 200 flowering plants were counted. They grew along the road margins, in the nearby shallow dry canal, on a gentle slope of rocky grassland and in clearings between the bushes. Further up the hill where the stands of *Pinus halepensis* dominated, the plants were absent, obviously avoiding a deeper shade. After close inspection of the important floral features, the primary assumption was confirmed. The plants indeed proved to be *V. hymettia*. They were photographed (Fig. 1, 2) and herbarium material was collected.

The main information on this new species in Croatian flora is as follows:

***Viola hymettia* Boiss. et Heldr.** First published in P. E. Boissier, Diagn. Pl. Orient., ser 2, 1: 57 (1854)

**Lectotypus:** In monte Hymetto Atticae, non rara, alt. 2000-3000 (ft), 3-15 Apr 1852, Orphanides (Th. Orphanides, Fl. Graeca exs. Nr. 120) (M).





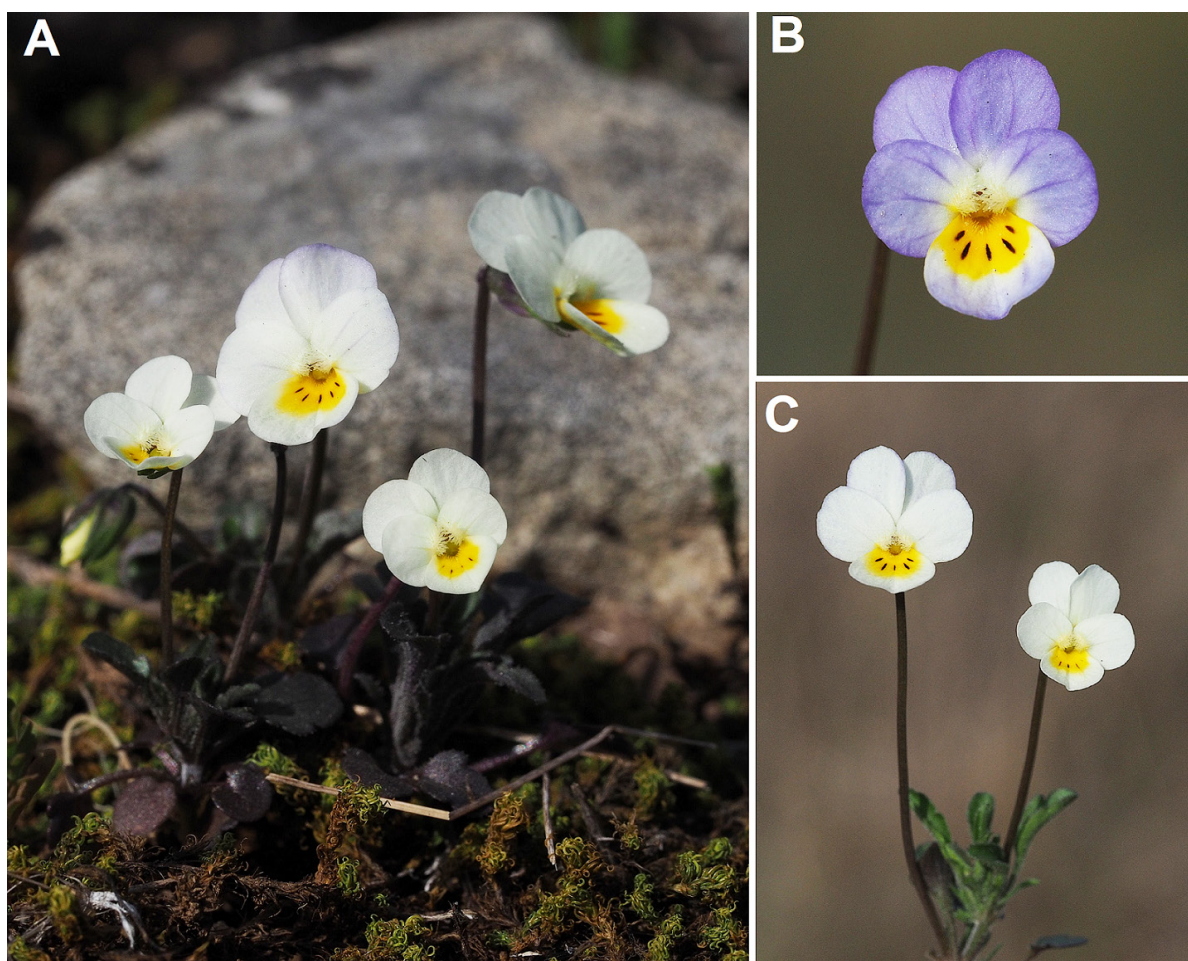
**Figure 1.** *Viola hymettia*, population.

**Slika 1.** *Viola hymettia*, populacija.

**Synonyms:** *Viola arvensis* Strobl, *V. arvensis* subsp. *olyssiponensis* (Rouy) W. Becker, *V. cretacea* Klokov, *V. lavrenkoana* Klokov, *V. olyssiponensis* Rouy, *V. tricolor* subsp. *olyssiponensis* Rouy, *V. tricolor* var. *hymettia* P. Fourn., *V. tricolor* var. *olyssiponensis* (Rouy) Henriq.

**Description:** shortly pubescent, herbaceous annual; stems 4-10 (20) cm, mostly branched; leaves alternate, petiolate, stipulate, 1.5-2 cm long, lower ovate-orbicular, the upper oblong-spathulate with crenate margins (rounded teeth); stipules pinnately divided almost to the base, central segment stalked and leaf-like, longer than the rest. Flowers small to medium size, 1-1.3 cm, frontally flattened; corolla significantly exceeding calyx; lateral petals obovate, abruptly narrowed at the base, creamy-whitish to yellow, or more rarely violet, mostly with a yellow base; lower petal with short black lines; spur 3-4 mm long, slightly longer than the sepals' appendages (Pignatti 1982, Scoppola & Lattanzi 2012, personal observation).

**Chromosome number:**  $2n = 16$  (Erben 1985, Espeut 1999).



**Figure 2.** *Viola hymettia* (A - a group of plants, B - a more rare violet colour form, C - habitus of a single plant).

**Slika 2.** *Viola hymettia* (A – grupa biljaka, B – rijetka forma s ljubičastim cvjetovima, C - habitus biljke).

**Life form:** therophyte

**Habitat:** grasslands, pastures, sparse garrigue, rocky terrain, roadside margins. Mainly acidophilus to sub-acidophilus species.

**Flowering time:** March - May.

**Distribution:** S. & E. Europe to the Caucasus. In Europe it is recorded in Greece, Albania, Romania, Ukraine, the European part of Turkey, Italy with Sicily, France and Portugal. In the Caucasus it is found in Georgia, Armenia, Azerbaijan and southern Russia (POWO 2024).

### Comparison with the other Croatian taxa of the section *Melanium* Ging.

According to the Flora Croatica Database (FCD) there are five taxa of the section *Melanium* recorded in Croatia, namely: *Viola elegantula* Schott., *V. tricolor* L., *V. tricolor* L. ssp. *subalpina* Gaudin, *V. arvensis* Murray and *V. kitaibeliana* Schult. (Nikolić et al. 2025). These five taxa can be divided into two groups defined by the sepals/petals length ratio: 1) the set of taxa with the petals clearly longer than

the sepals, and 2) the set of taxa with the petals shorter than or of the same length as the sepals.

1) petals distinctly longer than sepals: *V. elegantula* and *V. tricolor* (incl. ssp. *subalpina*).

***V. elegantula* Schott.**, has very large, usually violet, more rarely pink or entirely yellow flowers with yellow throat. The lower and the lateral petals are strongly decorated with black lines. The lateral petals are obovate and gradually tapering towards the base. The spur is extremely long and thin and up to three times longer than the sepals' appendages. The central lobe of the stipules is not especially distinct, hardly longer than the lateral lobes. It is a rare species in Croatia and mostly confined to high altitude habitats.

***V. tricolor* L.**, has large, violet, rarely yellow or creamy-whitish flowers. However, the most common are flowers the petals of which have a bicolor scheme. The upper and the lateral petals are violet, the lower one creamy-whitish with a yellow throat, or, the upper petals are violet and the lateral and the lower one are creamy-whitish with a yellow throat.



**Figure 3.** Comparison of the flower sizes (A - *V. hymettia*, B - *V. tricolor* and C - *V. elegantula*). Note the general outline of the flowers and the shape of the petals. The strongly violet coloured flowers were deliberately chosen to emphasize the morphology, rather than colouration system.

**Slika 3.** Usporedba veličina cvijeta (A - *V. hymettia*, B - *V. tricolor* i C - *V. elegantula*). Obratite pažnju na opći obris cvjetova i oblik latica. Cvjetovi jake ljubičaste boje namjerno su odabrani kako bi se naglasila morfologija, a ne sustav obojenosti.



Hence the specific name *tricolor* = of the three colours, violet, yellow and white. The black lines on the lower and the lateral petals are also prominent. The lateral petals are obovate and gradually narrowing towards the base. The spur is very long, up to twice as long as the sepals appendages. The central lobe of the stipules is well developed, with the blunt tip, much longer than the lateral lobes. A rather common species that often form large populations.

*V. hymettia* belongs to this group of species with the petals distinctly longer than the sepals. They are easily separated by the size and the colour of the flowers alone. *V. hymettia*, with its smaller and creamy-whitish flowers clearly differs from the larger and strongly coloured flowers of *V. elegantula* and *V. tricolor*. Also, the lateral petals of *V. hymettia* are roundish and abruptly narrowing towards the base, while in *V. tricolor* and *V. elegantula* they are more elongated, obovate and gradually tapering towards the base (Fig. 3). Identification of these three taxa in the field should be unambiguous.

2) petals clearly shorter than or of the same length as the sepals: *V. kitaibeliana* and *V. arvensis*

Surprisingly, although *V. hymettia* has petals distinctly longer than sepals, versus petals shorter than sepals in *V. arvensis* and *V. kitaibeliana*, it is often mixed up with these two species due to the creamy-whitish coloured, small to medium sized, flowers.

***V. arvensis* Murray**, has medium size creamy-whitish coloured flowers with yellow throats. Less often, the upper petals are pale violet. The lower petal is decorated with black lines, the lateral petals are more rarely so. The spur is medium size and usually hidden with the calyx appendages (viewed from the side). The stipules are well developed, large, the central lobe is petiolate, leaf-like, much longer than the lateral lobes, oblong-spathulate with a pointed tip. It is a very variable species, in both size of flowers and in the size of the whole

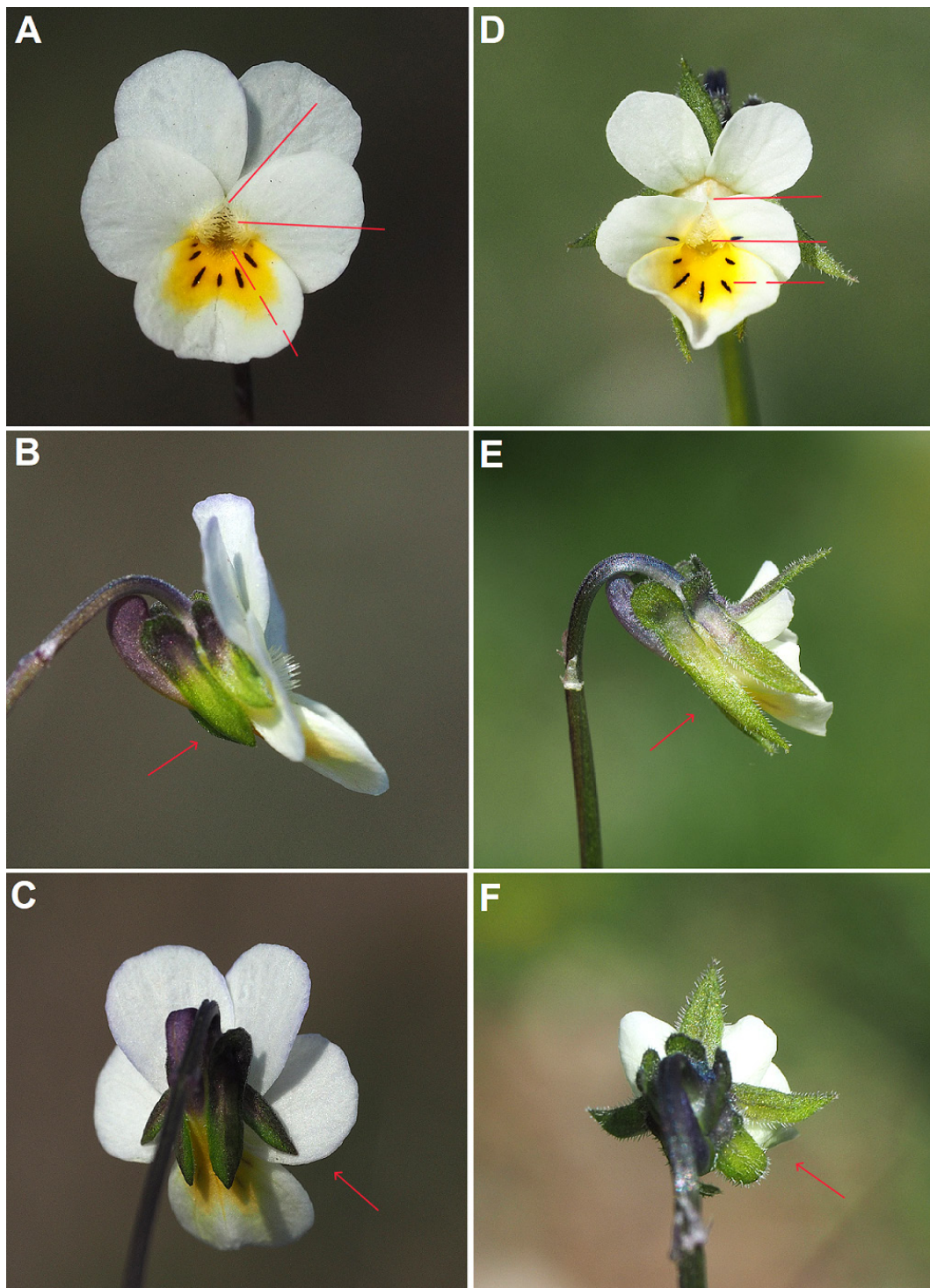
plant. It mostly inhabits scrublands, ruderal, disturbed and cultivated sites, often considered a weed. Usually it forms dense patches and can grow up to 40 cm on deep, rich soils.

The size and the colour of the flowers of *V. arvensis* are very similar to those of *V. hymettia*, ranging from small to medium size, and with the creamy-yellowish, to more rarely pale violet coloured flowers. However, they differ in having petals shorter than sepals or sometimes of equal length (the petals are significantly longer than the sepals in *V. hymettia*), and in the petal shape. In *V. arvensis* the petals are proportionally more elongated and usually have nearly parallel sides, not abruptly narrowing towards the base (in *V. hymettia* the petals are more roundish, abruptly narrowing at the base). Taking into account the size of the whole plant, the larger, more elongated, pointed leaves and stipules, the petal/sepal length ratio, and the petal shape, *V. arvensis* differs clearly from *V. hymettia*. There should be no misidentification in the field if the plants are inspected carefully.

***Viola kitaibeliana* Schult.**, has very small creamy-whitish flowers with yellow throats. The lower and more rarely the lateral petals are decorated with black lines. The small spur is slightly protruding beyond the calyx appendages (viewed from the side). The central lobe of the stipules is stalked, leaf-like, oval, longer than the lateral lobes. The whole plant is usually shortly pubescent.

*Viola kitaibeliana* due to its small, dwarf stature, and its smaller and pale-coloured flowers, is probably more often confused with *V. hymettia* as was the case when it was first discovered in Croatia in 2006. A more detailed comparison is needed for these two species.

Both species have small and delicate habitus. *V. kitaibeliana* is usually unbranched (*V. hymettia* is usually branched); the leaves are generally very similar in both species, but slightly larger in *V. hymettia*; the central lobe of the stipules is stalked, the lateral lobes are usually as long as the petiole of the central lobe



**Figure 4.** Note the shape of the lateral petals, roundish and abruptly narrowing at the base (A - *V. hymettia*), more elongated with the parallel sides not abruptly narrowing at the base (D - *V. kitaibeliana*). Also, note the sepals/petals length ratio seen from the sides and from the back (B, C - *V. hymettia*; E, F - *V. kitaibeliana*).

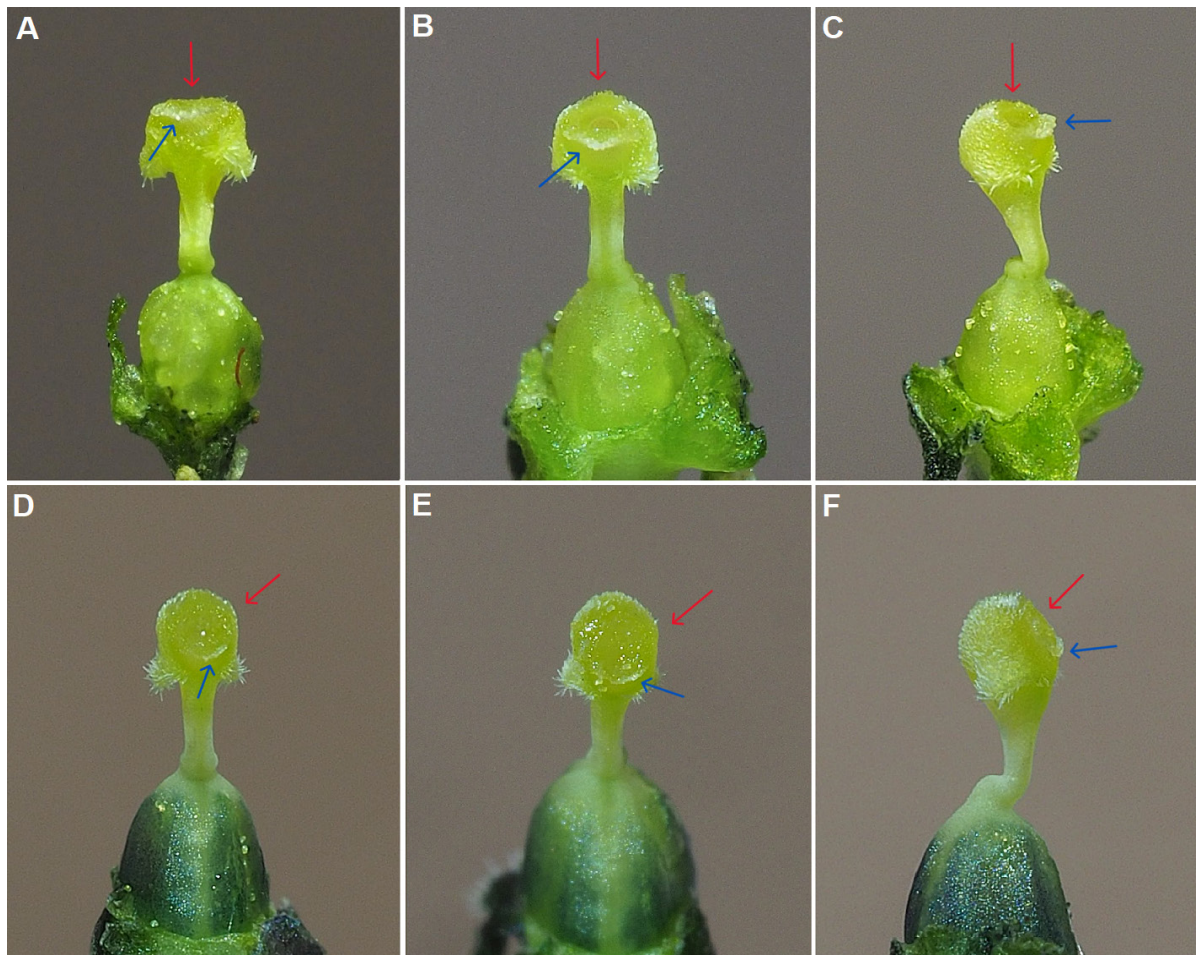
**Slika 4.** Obratite pažnju na oblik bočnih latica, okruglaste su i naglo se sužavaju pri bazi (A - *V. hymettia*), izduženije su s paralelnim stranicama koje se ne sužavaju naglo pri bazi (D - *V. kitaibeliana*). Također, obratite pozornost na omjer duljine lapova i latica gledano sa strane i straga (B, C - *V. hymettia*; E, F - *V. kitaibeliana*).



(in *V. hymettia* the lateral lobes of the stipules are usually shorter than the petiole of the central lobe). However, the leaves can vary significantly depending on the ecological conditions, habitat type and precipitation. Therefore, the most important features for the correct identification are the flower characteristics. These two species have smallish flowers, but they are usually much smaller in *V. kitaibeliana* (4-8 mm vs 9-13 mm). Also, the size of the flowers can vary in both species significantly, therefore the qualitative features are the most important and reliable for correct identification. The flowers of *V. kitaibeliana* are more funnel-shaped, which is especially well seen from the side (in *V. hymettia* they are very flat, this flattened form is

well seen frontally and sideways); the petals of *V. kitaibeliana* are shorter than the sepals, often concealed within the calyx (the petals of *V. hymettia* are significantly longer than the sepals); in shape, the petals of *V. kitaibeliana* are often proportionally more elongated and have nearly parallel sides, not abruptly narrowing towards the base (in *V. hymettia* the petals are roundish and abruptly narrowing at the base) (Fig. 4).

In the case of overlapping, when the characteristics of the stems, leaves, stipules and the flowers are unclear, additional details and differences can be found in the reproductive organs. The morphology of stigma can sometimes be helpful in identification.



**Figure 5.** Note the position/direction of the stigma pointed by the red arrows, and the presence/absence and size of the labellum pointed with the blue arrows (A, B, C - *V. hymettia*; D, E, F - *V. kitaibeliana*).

**Slika 5.** Primijetite položaj/smjer stigme označen crvenim strelicama te prisutnost/odsutnost i veličinu labeluma označenu plavim strelicama (A, B, C - *V. hymettia*; D, E, F - *V. kitaibeliana*).

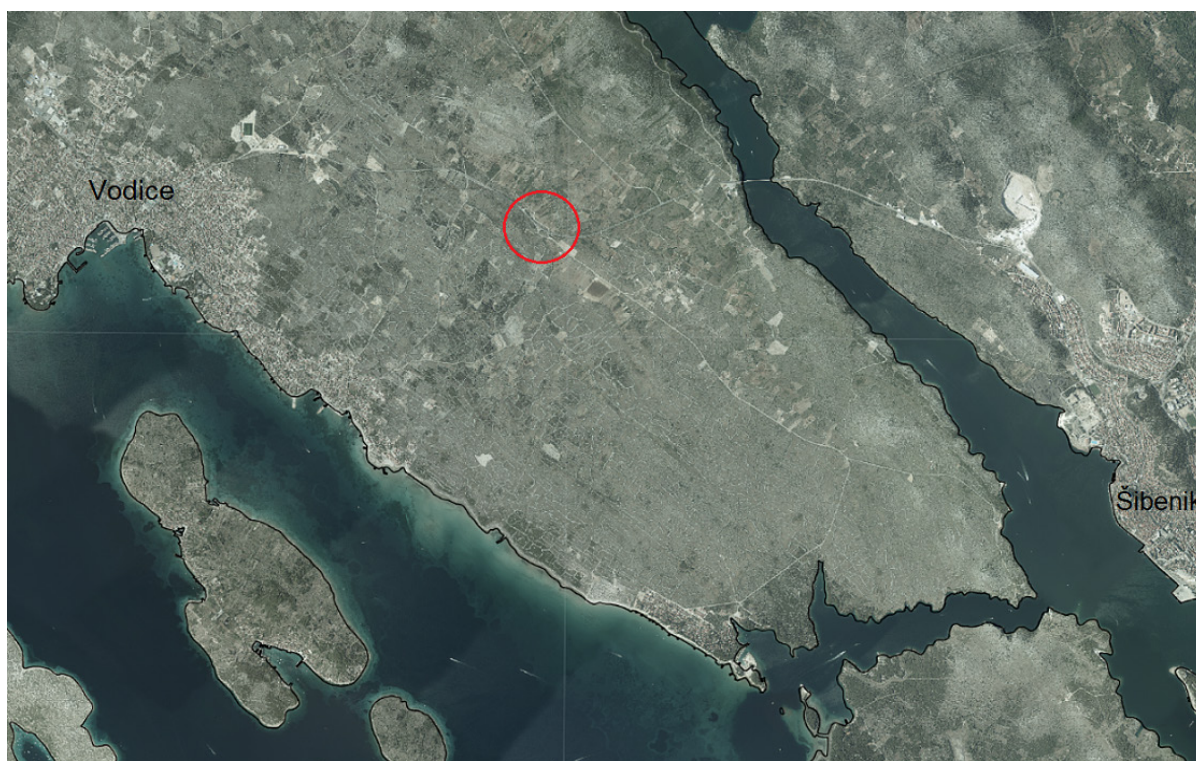


Important characteristics are the position of the opening to the stigmatic chamber and the development of the ventral, stilar flap (labellum). In *V. kitaibeliana* the opening to the stigmatic chamber is more forward-directed, the labellum is rudimentary, nearly absent. In *V. hymettia* the opening to the stigmatic chamber is more upward-directed, the labellum is well developed and visible (Clausen 1922, Kristofferson 1923, Espeut, 2004) (Fig. 5). The function of the labellum (stilar flap) is very important biologically. It is part of the stigma and it is placed just under the opening to the stigmatic chamber, and its presence or absence determines whether the plant is self-pollinating or not. In *V. kitaibeliana* and *V. arvensis* the labellum is strongly reduced to nearly absent and this condition allows self-pollination = autogamous species. In *V. hymettia* and *V. tricolor* the labellum is well developed and prevents self-pollination = allogamous species (Clausen 1931, Scoppola & Lattanzi 2012).

Still, sometimes the situation in the field can be far more complex and confusing, and even contradictory to what is written and suggested in descriptions and keys. Even an experienced botanist may come across a plant that is not identifiable when using the dichotomous keys. In the case of such a scenario it is strongly recommended that as many plants as possible be carefully inspected and that a final identification be made at population rather than single plant level. Over the years I have come across some plants that were intermediate between *V. arvensis* and *V. kitaibeliana*, and occasionally between *V. arvensis* and *V. tricolor*, and in such an uncertain situation all the characteristics of the stems, leaves, stipules, sepals, petals, spur and stigma structure must be very carefully investigated to identify the plants correctly. Sometimes the plants that have unusually small flowers are identified as *V. kitaibeliana*, but in fact they are examples of poorly developed *V. arvensis*. Similarly, the plants with the larger and sometimes more colourful flowers of *V. arvensis* can be mistakenly identified as *V. tricolor*. Occasionally, we can find

plants with atypical characteristics, the extreme individuals, that are not necessarily hybrids. Such plants demand detailed examination to identify them correctly. Fortunately, the population of *V. hymettia* near the town of Šibenik was easy to identify with the typical characteristics of the species.

So far, in Croatia, *V. hymettia* is only known from one site in central Dalmatia situated in between the towns of Vodice and Šibenik. However, I have received unpublished photo material from colleagues of various and often problematic violets and pansies. Some of them clearly represent *V. hymettia*. According to these unpublished photographs it seems that this species has a much broader distribution area in Croatia. The geographical locations of the unpublished photos that represent it range from the town of Vodice in the west to the city of Split in the east (Fig. 6, 7). According to the *Flora Croatica Database* in this particular area there are about ten records of *V. tricolor*, more than ten records of *V. kitaibeliana* and more than twenty records of *V. arvensis*. It is very possible that at least some of these records may actually refer to *V. hymettia*, but were misidentified as was the case when the species was first documented in Croatia in 2006. Based on FCD distribution maps, the three species, *V. tricolor*, *V. arvensis* and *V. kitaibeliana*, are all well represented along the Croatian coast with hundreds of records from Istria in the northwest to Konavle in the southeast, and it is very likely that the small Mediterranean *V. hymettia* is also more widespread, but it remains well hidden, misunderstood, and often misidentified. The closest known localities of *V. hymettia* are in Albania, and across the Adriatic sea in the Abruzzo region, Italy (Pignatti, 1982, Scoppola & Lattanzi 2012, POWO 2024). Most probably we can expect further findings of this species in Bosnia and Herzegovina and Montenegro, naturally connecting the Croatian populations with the Albanian populations, and further south to Greek populations from where the species was originally described.



**Figure 6.** Finding place of *Viola hymettia* between Šibenik and Vodice.

**Slika 6.** Nalazišta vrste *Viola hymettia* između Šibenika i Vodica.

### ***Viola kitaibeliana* Schult. f. *violascens* Trinajstić**

In late April 2015, the flora of the remote Croatian island of Lastovo (Lastovo Archipelago Nature Park), southern Croatia, was explored. At several spots on the central part of the island some rather unusual pansies were found in the olive groves, along the roads and in rocky grassland. Even at the first sight the plants appeared ambiguous, especially in the colour of the flowers, but also in their morphology. The plants were small to medium size, the flowers were entirely violet-pinkish in colour, somewhat unusual and confusing. Even so, the petal shape, the petals/sepals ratio was equally puzzling (Fig. 8), and I was unable to identify the plants satisfactorily. Only a few photos were taken, and the plants were insufficiently studied in the field. Unfortunately, herbarium material was not collected.

Later on I discovered that these particular plants were already mentioned in the literature. In the

time period from 1964 to 1976, the flora of the island of Lastovo was investigated by Prof. Ivo Trinajstić. He recorded the following taxa of the genus *Viola*: *V. alba* Besser ssp. *denhardtii* (Ten.) W. Becker, *V. arvensis* Murray, *V. kitaibeliana* Schult. f. *kitaibeliana*, and he also described a new taxon named *V. kitaibeliana* Schult. f. *violascens* Trinajstić (Trinajstić 1979). Most probably this smallish, violet-pinkish coloured taxon recorded in 2015 is conspecific with Trinajstić's *V. kitaibeliana* f. *violascens*. It is obvious that Trinajstić was equally intrigued by these plants and thus he distinguished them as a distinct form.

However, provided that I came across the same plants as Trinajstić, their subordination to *V. kitaibeliana* is problematic. The plants recorded in 2015 were indeed small to medium size. The flowers were also small to medium size, but on average larger than those of *V. kitaibeliana*, the shape was rather flat and the sepals were not longer than the petals.



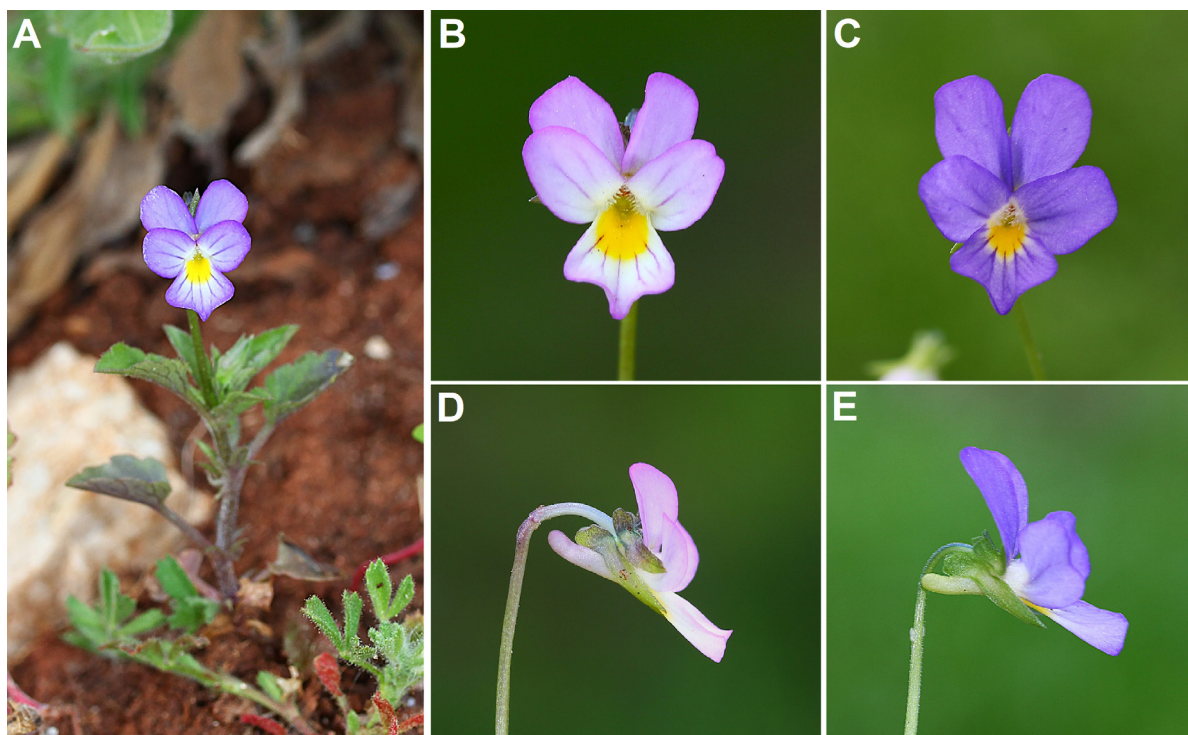


**Figure 7.** Approximate distribution area of *Viola hymettia* in Croatia based on field observation and unpublished photo material.

**Slika 7.** Pretpostavljeno područje rasprostranjenosti vrste *Viola hymettia* u Hrvatskoj na temelju terenskih opažanja i neobjavljenog fotomaterijala.

These features set it apart from *V. kitaibeliana* which has smaller, more funnel shaped flowers and sepals longer than petals. These plants also differ from *V. arvensis* by smaller habitus and shorter sepals than petals. From the much larger *V. tricolor*, they differ especially by the much smaller flower size, in the shape of the petals with the parallel sides not gradually narrowing towards the base. From newly discovered *V. hymettia* they differ in the shape of the petals that are more elongated and with the parallel sides not abruptly narrowing towards the base.

Taking into account the floral morphology and colouration, these plants seem to be intermediate between *V. kitaibeliana* and *V. tricolor*. However, according to the FCD only *V. kitaibeliana* and *V. arvensis* are reported for the island, while *V. tricolor* is missing. Smaller to medium size of the flowers and the petal shape fit *V. kitaibeliana* and *V. arvensis*, but sepals/petals length ratio and rich coloration are more consistent with *V. tricolor*. Unfortunately, the leaves and the stipules were not separately photographed and herbarium material was not collected, so their detailed characteristics are missing in this analysis.



**Figure 8.** *Viola kitaibeliana* f. *violascens* (A - habitus; B, C - individual flowers frontal view, note the shape of the petals; D, E - side view of the flowers, note the sepals/petals length ratio).

**Slika 8.** *Viola kitaibeliana* f. *violascens* (A - habitus; B, C - frontalni pogled na pojedinačne cvjetove, uočite oblik latica; D, E - bočni pogled na cvjetove, uočite omjer duljine lapova i latica).

At one site plants with violet flowers were accompanied by plants with creamy-whitish flowers, but both colour forms were difficult to identify with precision, although plants with the creamy-whitish colored flowers were more similar to *V. arvensis* than to *V. kitaibeliana*.

It is well known that all species of the section *Melanium* are able to hybridise regardless of their different chromosome numbers. For two of them the chromosome numbers have been known for a long time, *V. tricolor*,  $2n = 26$  and *V. arvensis*,  $2n = 34$  (Clausen 1922, Kristofferson 1923, Pettet 1964). More recently, for both, *V. kitaibeliana* and *V. hymettia*,  $2n = 16$ , were reported (Erben 1985, Espeut 1999). The hybrids are at least partially fertile (Kristofferson 1923). *Viola tricolor* and probably *V. arvensis* occupy a central position in the section *Melanium* forming hybrids with almost all species of the group (Clausen 1926). The

presence of intermediate forms and hybrids is well documented in the literature (Clausen 1926, Pettet 1964, Valentine et al. 1968, Stace 1991, Scoppola & Lattanzi 2012). However, before naming any plant/population hybrid/s, a very careful inspection of the plants is needed, and consultation with a specialist is recommended. Also, a molecular analysis would be welcome to confirm the eventual hybridogene status of the plant/s. The plants from Lastovo island, presumably *V. kitaibeliana* f. *violascens*, may actually represent a hybrid swarm, but the parent formula at this point is difficult to define due to insufficient study. On the other hand, it is possible that they indeed represent a distinct (stabilized) taxon as claimed by Trinajstić. To reconstruct the genesis of these interesting plants from Lastovo island, a dedicated research program is needed, both in the field and in the laboratory, hopefully to gain more accurate results, an undertaking that is beyond the scope of the present contribution.



***Viola collina* Besser**

In the spring 2013, a botanical survey was conducted across Mt Žumberak (Žumberak-Samoborsko gorje Nature Park), NW Croatia, including the well known basophilic fen Jarak. Along the eastern side of the fen runs a mountain road that separates the fen from the slopes and hills covered by the planted pine stands which further north it merges into a beech forest. At a few spots along the road several plants of the genus *Viola* were recorded. A close examination revealed two species. Most of the plants were identified as *Viola reichenbachiana* Jord. ex Boreau, one of the most common violets in Croatia, and, surprisingly, two individual plants of *V. collina* Besser, a rare species in the Croatian flora.

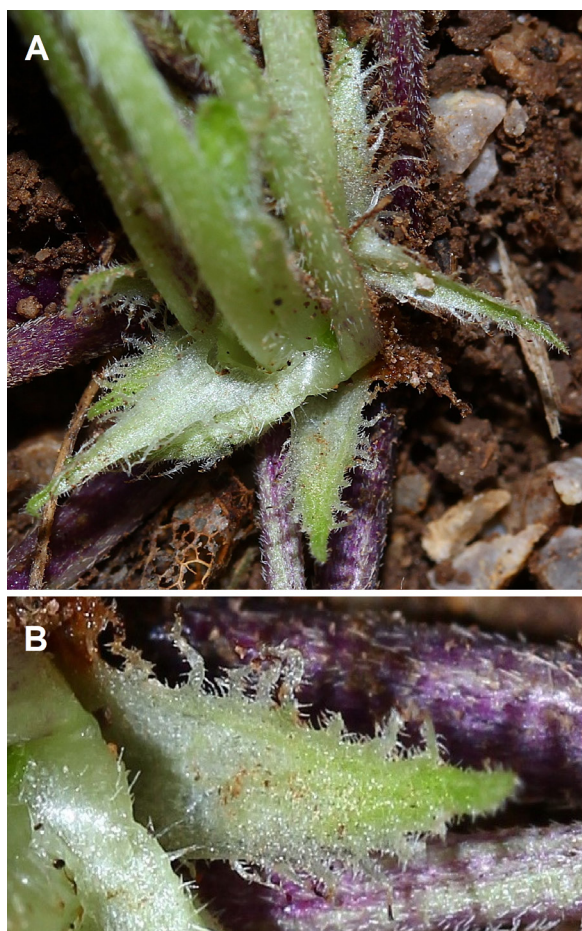
The flora of the Jarak fen was recently systematically studied and 222 plant species were recorded (Šoštarić et al. 2012), among which the only *Viola* species mentioned is *V. hirta* L.. The finding of *V. reichenbachiana* and *V. collina* at the very edge of the fen contributes to the floral diversity of the fen in a broader sense. Moreover, the record of *V. collina* is especially interesting since it represents a new species in the flora of Mt Žumberak, and it is a very rare species in Croatian flora.

The closest known location of *V. collina* in Croatia is at Veliki Oštrc in Samoborsko gorje, NW Croatia (Bauer et al. 2011). The aerial distance between the two sites is only about 20 km and most probably we can expect further findings of *V. collina* across the Žumberak and Samoborsko gorje, since these mountains offer an array of the open and semi shaded habitats on limestone and dolomite bedrock preferred by this species. Bauer et al. (2011) briefly discussed the historical presence of *V. collina* in Croatia and they stated that the earliest information for Croatia had been provided in Trinajstić (1975), but without any details of the location, or information about the source. Furthermore, recent data appeared in the *Flora Croatica Database* about the presence of the species in the Plitvice Lakes National Park, Lika Region, Central Croatia, recorded on July 15, 2006 (Jogan et

al. 2006). However, Bauer et al. (2011) argue about the correct identification in such a late phenophase (July), and call for confirmation of that record.

The first confirmed and published record of *V. collina* in the continental part of the country comes from the work of Bauer et al. (2011). They discovered the species on Veliki Oštrc in the Samoborsko gorje, on Mt Kalnik (NW Croatia), and Mt Papuk (NE Croatia). Six voucher specimens were collected and stored in BP (Hungarian Natural History Museum). Additionally, a small stand of the species was discovered on the summit of Mt Strahinjščica, NW Croatia (Borovečki-Voska 2011). In 2014, I received unpublished information from Damir Šešok (Legrad) about discovery of *V. collina* at the location Babin Zub, Mt Ivanščica (NW Croatia). That information was passed to the local botanists Dubravko Šincek (Varaždin) and Ljiljana Borovečki-Voska (Tuhelj). In the spring of 2015 they found the plants at the Babin Zub locality, confirmed the identification, and discovered several additional localities of *V. collina* on the same mountain (Šincek 2015). Beside these inland localities of *V. collina*, there are three records from the coastal region of the northern Adriatic. Two confirmed records come from Istria: one record comes from the very NW of the Peninsula near the town of Savudrija (Rottensteiner 2013), and the other from the eastern coast in the vicinity of the town of Labin (Starmühler 2011). The species was mentioned for the island of Lošinj, Kvarner Bay, but as *Viola* cf. *collina*, based on the herbarium material collected on 5 June, 1896, by K. Wilhem (Starmühler 2002). In the checklist of the vascular plants of the Cres and Lošinj islands the species is listed as: “? *Viola collina* Besser, (as cf.) - confirmation required!”, referring to the work of Starmühler (2002) (Wallnöfer 2008).

There are only a handful of records of *V. collina* in Croatia and most probably this species is often overlooked. Also, perhaps it is sometimes misidentified as *V. hirta*, another non-stoloniferous species with slightly narrower leaves and less fimbriate stipules (Bauer et al. 2011).



**Figure 9.** *Viola collina* (A - stipules, B - detail of the stipule with the ciliated fimbriae).

**Slika 9.** *Viola collina* (A - palistići, B – detalj palistića s cilijatnim trepljama).

However, *V. collina* differs sharply from all other non-stoloniferous violet species in Croatia by the structure of the stipules. While the shape of the leaves and their base, position of the bracteoles, hair system of the whole plants etc., are very helpful, and generally important features, a single look at the *V. collina* stipules makes identification straightforward and unmistakable. The stipules of *V. collina* can vary from ovate-triangular, to lanceolate or narrowly lanceolate, and they are heavily fimbriate. But unlike any other non-stoloniferous violet recorded in Croatia, the fimbriae themselves are strongly ciliate (Fig. 9). This last characteristic easily sets the taxon apart from all other Croatian

violet species, and it is a character that helps in the identification of *V. collina* in flowering and non-flowering stages.

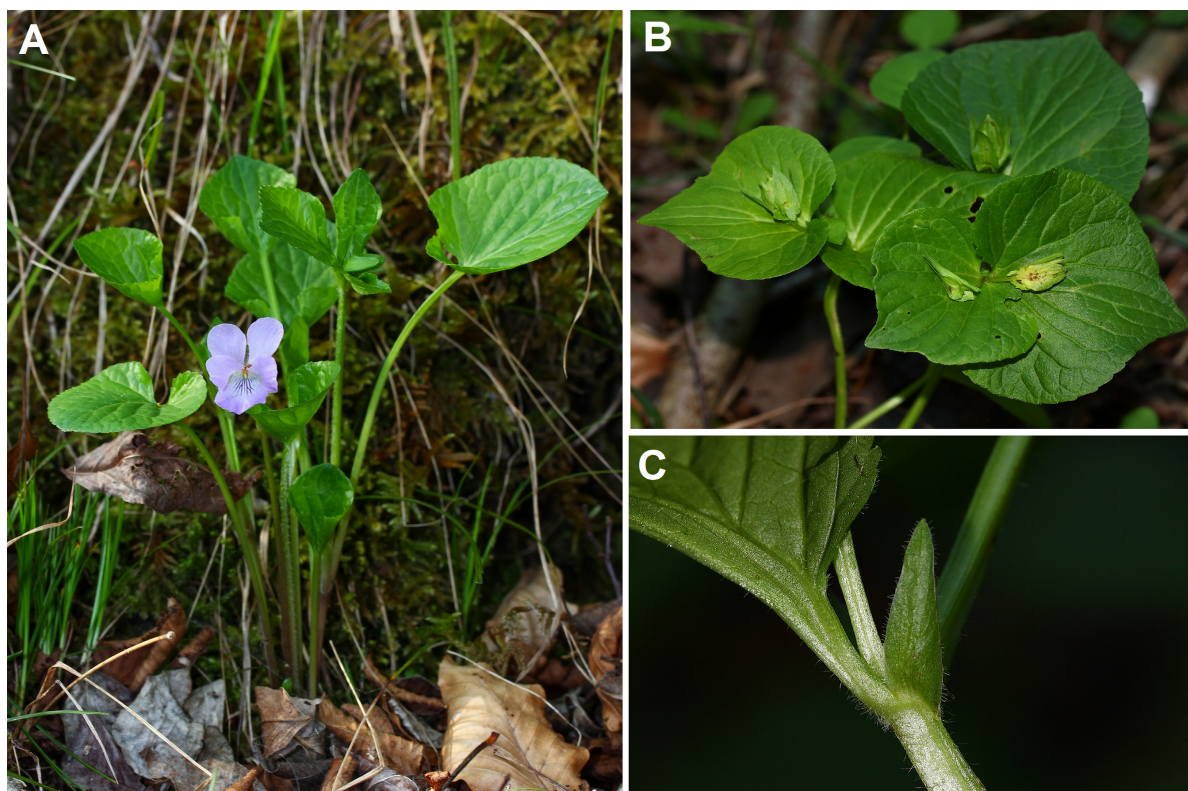
### ***Viola mirabilis* L.**

In spring of 2012, the genus *Viola* was systematically investigated in the hilly area above Gornje Vrapče (NW Zagreb), Mt Medvednica (NW Croatia). It resulted in the discovery of *Viola alba* Besser ssp. *alba*, *V. alba* Besser ssp. *scotophylla* (Jord.) Nyman, *V. odorata* L., *V. reichenbachiana* Jord. ex Boreau, *V. riviniana* Rchb., and *V. hirta* L. All of them were abundant, and mostly growing along the mountain paths, around the bushes, at the forest edges and in light forests. The field pansy, *V. arvensis* Murray, was also recorded, but it was represented by just a few plants. This is not surprising, since the research area offered limited amounts of the open habitats favoured by this species.

Also, several unusual rosettes of leaves of *Viola* species were found, but they were surprisingly large for the genus. After a closer inspection and a finding of more plants, some of them flowering, they were identified as *Viola mirabilis* L., a spectacular and robust *Viola* species. The plants were scattered within the narrow belt of vegetation along both sides of the mountain road bordered by the exposed limestone rocky cliffs on one side, and a deep valley with very steep slopes at the other side. Altogether about 30 flowering plants and several rosettes of young or non-flowering plantlets were found. This observation of *V. mirabilis* was added to the FCD in the same year (Čičmir 2012). Unfortunately, no photographs were taken, nor was any herbarium material collected. The photographs published here, taken a year later, constitute the first evidence of this species in the flora of Mt Medvednica (Fig. 10).

The remarkable *V. mirabilis* obviously belongs to a rare violet species in Croatia and there are only a very few recorded sites. In NE Croatia it was found in the Baranja region, near Beli Manastir (Kevey & Csete 2008) and in the Slavonia region on Mt Krndija (Trinajstić et al. 1996).





**Figure 10.** *Viola mirabilis* (A - habitus with the chasmogamous flower, B - leaves and cleistogamous flowers, C - undivided stipules).

**Slika 10.** *Viola mirabilis* (A – habitus s hazmogamnim cvijetom, B – listovi i kleistogamni cvjetovi, C – cjeloviti palistići).

In NW Croatia it was recorded near the town of Varaždin (Herbarium collection CNHM, 600:ZAG;871:BOT) and on Mt Strahinjščica (Borovečki-Voska 2009). On Strahinjščica there are a few very rich stations with up to 100 individuals, and it seems that Strahinjščica populations are an important stronghold of this species in Croatia (Lj. Borovečki-Voska, personal communication).

Even though identification of *V. mirabilis* is easy and straightforward, this elusive species is infrequently recorded in Croatia. With its very large leaves (about twice as large as the leaves of *V. riviniana*), and with the entire basal and cauline stipules, it can not be confused with any other violet species. Most probably it is often overlooked due to the early flowering time and its tendency to grow among bushes, or on the forest floor with important ground vegetation. Therefore, it is often hard to spot regardless of its size.

### ***Viola rupestris* F. W. Schmidt**

In early May 2015, the flora of the central part of Mt Velebit was investigated and studied. In the area around the Prpa mountain lodge and the nearby hill Basača several species of the genus *Viola* were detected and identified. They were represented in abundant groups and individual plants of flowering *Viola reichenbachiana* Jord. ex Boreau and more rarely *V. riviniana* Rchb., while *V. alba* Besser, *V. odorata* L. and *V. hirta* L. were more sparse and had nearly finished flowering. Also, small clumps of *Viola* species with a compact habitus, small sized roundish leaves and proportionally rather large flowers were discovered. After closer inspection of diagnostic morphological traits, these plants were identified as *V. rupestris* F. W. Schmidt. It is one of the rarest violets in Croatia and this was the first record of this species in the flora of Velebit.





**Figure 11.** *Viola rupestris* (A - group of plants, B, C - details of the stipules with the toothed margins).  
**Slika 11.** *Viola rupestris* (A - grupa biljaka, B, C - detalji palistića s nazubljenim rubovima).

The visit in May 2015 was fleeting due to the heavy rain and therefore no photos were taken. In mid May 2022, the site was visited again, but unfortunately the plants had already finished flowering, quite early on, regardless of the prolonged cold winter and spring weather. Nevertheless, a good and healthy population of around 25 clumps and individual plants were found and photographed (Fig. 11).

According to the FCD it seems that *V. rupestris* is an extremely rare species in Croatia. There are only a few known locations in the country, and none of them are recorded on Velebit. Two records come from Dalmatia, Mt Dinara (Topić 2010) and Krka National Park (Hršak et al. 2022), two sites were discovered in the central part of the island of Cres, Kvarner Bay (Starmühler 2005), two sites

from the region of Gorski Kotar (Vrbek & Buzjak 2004) and one site from Mt Kalnik, NW Croatia (Viličić-Kovačević 1975).

*Viola rupestris* is probably an under-recorded species in Croatia. It strongly resembles the smallish version of *V. riviniana*, and thus it is possible that it often remains unnoticed. However, while somewhat similar, a detailed examination easily sets them apart. *V. rupestris* is a small plant with the short stems that are usually hidden under the leaves due to the compactness of its growth. The leaves are small, roundish to cordiform, and the entire plant is pubescent, or, more rarely glabrous. The stipules are short and proportionally wide, with distinctly toothed and not fringed edges. The morphology of the stipules is one of the salient feature of the species (Fig. 11- B, C, 12.).





**Figure 12.** *V. riviniana* and *V. rupestris*, note the shape and the size of the stipules pointed by the red arrows.

**Slika 12.** *V. riviniana* i *V. rupestris*, obratite pažnju na oblik i veličinu palistića označenih crvenim strelicama.

## Conclusion

The violets and pansies are a very interesting group of attractive plants that are obviously under-studied in Croatia. They are often considered taxonomically difficult and demanding due to the very delicate differences between the species. Also, the presence of occasional populations with transitional characteristics, not necessarily hybrids, but more often just representing extreme forms due to the ecological conditions, additionally complicates identification in the field. Nevertheless, the hybrids are present and regularly recorded. The majority of taxa flower very early and therefore many rare species are simply overlooked, for example see in Čičmir & Boršić (2016). For instance, the beautiful, remarkable and unmistakable *V.*

*mirabilis* was discovered on Mt Medvednica in the vicinity of the capital city of Croatia, a mountain that is massively visited by hikers and biologists, and yet this large species remained hidden for a long time. The other two violets, *V. rupestris* and *V. collina*, were discovered on more remote mountains, Žumberak and Velebit, but also at the very popular places like Jarak Fen and the Prpa mountain lodge, having also been either overlooked or misidentified. The completely overlooked and forgotten taxon, *V. kitaibeliana* f. *violascens*, described by Trinajstić a half century ago, needs further study to resolve the mystery of whether it is just a hybrid swarm or indeed an original taxon. The most interesting and important finding reported in this paper is the discovery of *V. hymettia*, a new species for the national flora. This rather small pansy with its beautiful flowers was discovered nearly 20 years ago by a German naturalist, but it was misidentified as *V. kitaibeliana*, another dwarf species. I discovered the presence of this species in Croatia on the internet, in a website dedicated to European plants, and it took me 10 years to finally visit the population and to confirm the identification in the field. Interestingly, in those 10 years nobody identified the plants correctly, even though other pansies were reported from that particular area. This only demonstrate that many taxa are very similar in appearance, and how important it is to make a careful examination of the plants *in situ*. A dedicated investigation and a detailed examination of the plants demonstrates that a rare species can be found in new regions, but also, as the finding of *V. hymettia* shows, additional new species can be discovered for the national flora. This latter case emphasizes the need for further dedicated research particularly in the Mediterranean part of the country. There is no end to new discoveries, and currently another new species is under study. Hopefully, it will not take another 10 years to confirm and publish the finding.

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