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NEW CHOROLOGICAL DATA FOR SOME RARE SPECIES IN THE FLORA OF THE REPUBLIC OF NORTH MACEDONIA

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New chorological data for *Aconitum burnatii* subsp. *pentheri*, *Aquilegia aurea* (Ranunculaceae), *Cerastium dubium*, *Silene skorpilii*, *Silene fabarioides* (Caryophyllaceae), *Hypericum linarioides* (Hypericaceae), *Euphorbia apios* (Euphorbiaceae), *Astragalus austriacus* (Fabaceae), and *Phlomis tuberosa* (Lamiaceae) in the territory of the Republic of North Macedonia are presented in this paper. Four of the listed taxa – *A. aurea*, *S. skorpilii*, *S. fabarioides*, and *A. burnatii* subsp. *Pentheri* – are Balkan endemics, while the remaining taxa have a wider distribution.

Key words: chorology; flora; North Macedonia; Balkan endemics

INTRODUCTION

The flora of the Republic of North Macedonia has been the subject of intensive investigation for more than 170 years. However, data on new and rare species continue to emerge in the works of numerous authors, including Matevski & Teofilovski [1], Matevski [2, 3], Blažek & Matevski [4], Melovski & Hristovski [5], Niketić et al. [6], Nikolov [7–17], Teofilovski [18–28], and others.

Ongoing studies of herbarium material collected from various parts of the country have revealed new chorological data for *Aconitum burnatii* subsp. *pentheri* and *Aquilegia aurea* (Ranunculaceae), *Cerastium dubium*, *Silene skorpilii*, and *Silene fabarioides* (Caryophyllaceae), *Hypericum linarioides* (Hypericaceae), *Euphorbia apios* (Euphorbiaceae), *Astragalus austriacus* (Fabaceae), and *Phlomis tuberosa* (Lamiaceae).

According to the literature, *A. aurea* and *A. austriacus* are the rarest taxa, each previously known from a single locality. *Aconitum burnatii* subsp. *pentheri*, *Silene fabarioides*, and *Euphorbia apios* have been reported from two localities; *Hypericum linarioides* from three; *Phlomis tuberosa*

from five; *Silene skorpilii* from six; and *Cerastium dubium* from seven localities.

This paper presents new chorological data for the aforementioned taxa within the territory of North Macedonia.

MATERIALS AND METHODS

The material for the above-mentioned taxa was collected during various studies of the flora of North Macedonia and is preserved in the Museum's herbarium collection. Relevant and reliable sources were consulted for literature references and species determination, including Grecescu [29], Vandas [30], Bornmüller [31–32], Stojanoff [33], Soška [34–35], Velev [36], and Micevski [37–40, 1997] [41], as well as Niketić and Stevanović [42].

The nomenclature follows the Euro+Med Plant Base (<http://ww2.bgbm.org/EuroPlusMed/query.asp>, 2006+) [43]. Photos of the plants and their corresponding herbarium vouchers are provided, either separately or together. Additionally, distribution maps for all nine species are presented.

RESULTS AND DISCUSSION

1. *Aconitum burnatii* subsp. *pentheri* (Hayek) Jalas (Syn. *Aconitum divergens* Pančić).

Literature data: Šar Mountains, Nidže (Kajmakčalan) [37].

New data:

- Šar Mountains, near Čausicka River, moist area with *Cirsium appendiculatum*, 1300–1400 m, 2.116770°N, 1.003613°E, 4.8.1988 (leg. & det. A. Teofilovski),
- Šar Mountains, near Bogovinjska River, moist shrubby area, 1670 m, 41.950039°N, 20.824354°E, 9.8.2015 (leg. A. Teofilovski, Z. Nikolov, D. Mandzukovski; det. A. Teofilovski),



Figure 1. *Aconitum burnatii* subsp. *pentheri*
(Photo: Z. Nikolov)

- Mt. Pelister (Bitola), 1658 m a.s.l., 40°57.630'N, 021°13.984'E, 13.08.2023 (leg. & det. Z. Nikolov & A. Teofilovski),
- NP Mavrovo: Šar Mountains, Adzina Reka, moist area with *Cirsium appendiculatum*, 1480 m, 41.820021°N, 20.655884°E, 27.7.2024 (leg. & det. A. Teofilovski).

A. burnatii subsp. *pentheri* is a Balkan endemic recorded in Albania, Bulgaria, Greece, Montenegro, North Macedonia, Serbia, and Kosovo [43]. So far, in the flora of North Macedonia, this subspecies was known only from two localities: Šar Mountains and Nidže (Kajmakčalan) [37]. On Mount Pelister (Bitola), along the Sapundžica River and its small tributary, we encountered a well-developed population of this taxon at elevations ranging from 1505 to 1658 m a.s.l.

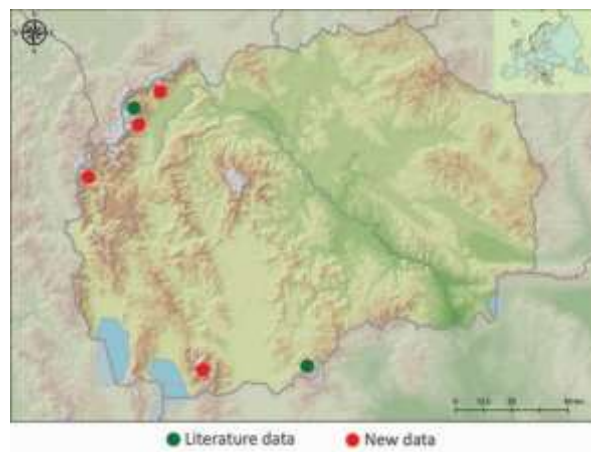


Figure 2. Distribution of *Aconitum burnatii* subsp. *pentheri*

2. *Aquilegia aurea* Janka

Literature data: Salakovi Lakes (Mt. Jakupica) [37].

New data:

- Mt. Karadžica, 1800 m a.s.l., 28.06.1999 (Leg./Det.: Nikolov),
- Mt. Osogovo: Ruen, 2000 m a.s.l. (Leg./Det.: Niketić, M.).

A. aurea is a Balkan endemic species recorded in North Macedonia and Bulgaria, while its presence in Greece is questionable [43, 44]. In North Macedonia, this species was reported only

from the vicinity of Salakovi Lakes, on Mt. Jakupica, at 2200 m a.s.l. [37]. Recent research revealed two additional populations: the first on the neighboring Mt. Karadžica, at 1800 m a.s.l., and the second on Mt. Osogovo, near the peak Ruen (on the border with Bulgaria), at 2000 m a.s.l. The latter population fills the chorological gap between those on Mt. Jakupica/Karadžica and the nearest locality of *A. aurea* in Bulgaria, Mt. Pirin.



Figure 3. *Aquilegia aurea* Janka (Photo: Z. Nikolov)

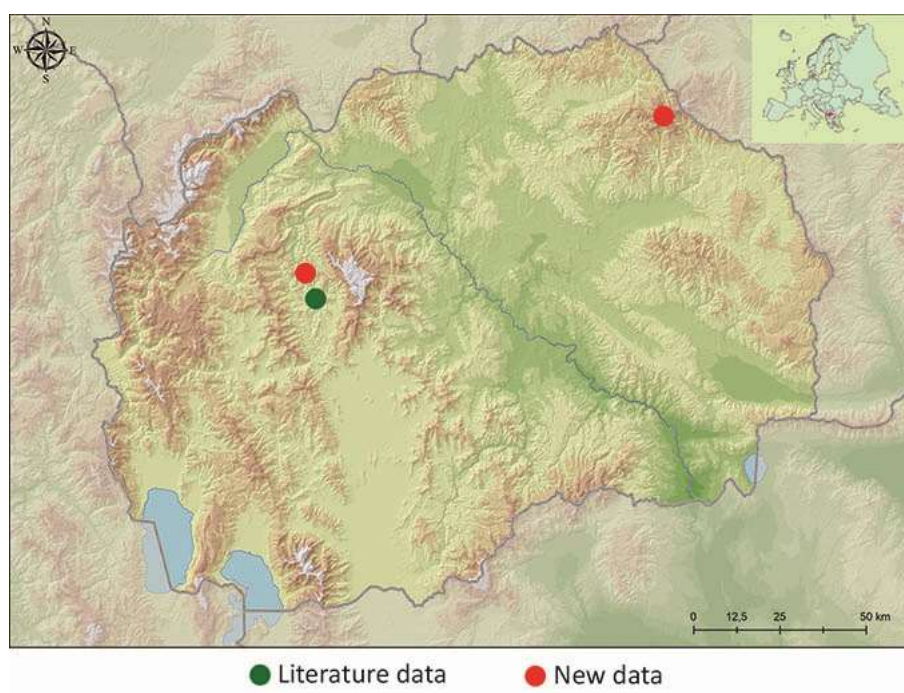


Figure 4. Distribution of *Aquilegia aurea* Janka

3. *Cerastium dubium* (Bastard) Guépin

Literature data: Surroundings of Bitola [29]; Mt. Baba – Pelister – village Malovište [31]; Prilep – Dobruševo [33]; Skopje – the city park; Taorska Gorge; Kočani – village Orizari; Strumica – Monospitovsko Blato [38].

New data:

- Skopje – village Tekija, 300 m a.s.l., 18.04.2009 (Leg. & Det.: Z. Nikolov),
- Osogovo Mt (Kočani): along the trail between "Sv. Pantelejmon" and the village

Rajčino, 600-855 m a.s.l., 12.04.2008 (Leg./Det.: Z. Nikolov).

The distribution area of *C. dubium* includes southern, southeastern, and central Europe (from Spain and western France to Kazakhstan), north-west Africa, southwest Asia (Anatolia, Caucasus, northern Iran), and it has been introduced to North America [45]. This species, in the flora of North

Macedonia, is recorded from the following localities: surroundings of Bitola [29], Mt. Baba – Pelister, village Malovište [31], Prilep – Dobruševo [33], Skopje – the city park, Taorska Gorge, Kočani – village Orizari, and Strumica – Monospitovsko Blato [38]. The new findings are in the eastern part of the Skopje valley – village Tekija, and on Mt. Osogovo.



Figure 5. *Cerastium dubium* (Bastard) Guépin

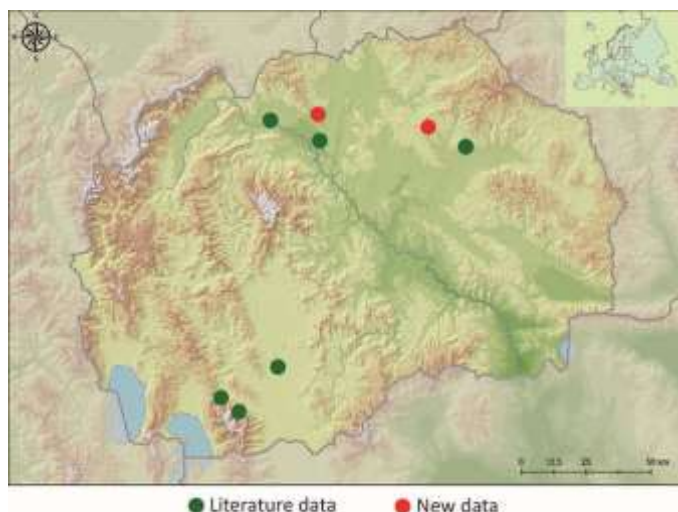


Figure 6. Distribution of *Cerastium dubium* (Bastard) Guépin

4. *Silene fabarioides* Hausskn.

Literature data: Mt. Kožuv – Balija Planina and Pržigrad [30], Kruša and Smrdliva Voda [38], Dve Uši [18], Suva Gora [18].

New data:

- Kozjak (Prilep) – along the trail to the peak, 1400 m a.s.l., 30.06.2023 (Leg./Det.: Z. Nikolov).

S. fabarioides is a Balkan endemic species distributed in Albania, Greece, North Macedonia,

Serbia, Kosovo, and Bulgaria [43]. Most of the data regarding the presence of this species in North Macedonia are associated with Mt. Kožuv [30, 38, 18]. The first data outside of Mt. Kožuv is from Teofilovski [18] for Suva Gora (northwestern part of North Macedonia). The occurrence of *S. fabarioides* on Mt. Kozjak (Prilep) represents the first record of this species in this part of North Macedonia.



Figure 7. *Silene fabarioides* Hausskn

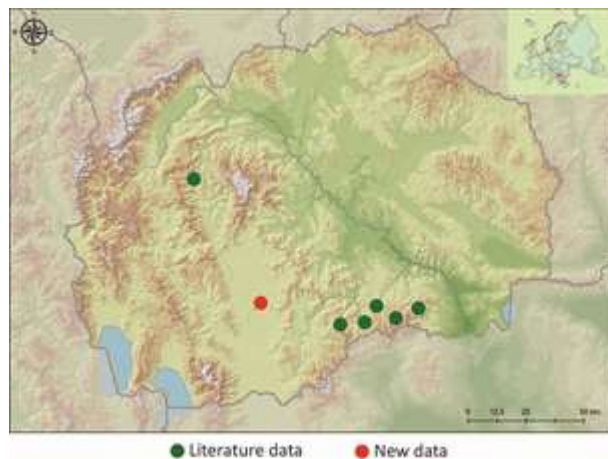


Figure 8. Distribution of *Silene fabarioides* Hausskn

5. *Silene skorpilii* Vel.

Literature data: Village Ulanci (Gradsko) [30], Veles (gorge of the river Topolka), Gradsko (Stobi), Štip (Grupiški Kamen), Negotino, and Kočani (village Orizari) [38].

New data:

- Village Miladinovci (Skopje).

S. skorpilii is a Balkan endemic species occurring in Bulgaria, North Macedonia, Greece, and

Turkey-in-Europe [41]. In the flora of Serbia [42], it is considered extinct (last collected in 1884). *S. skorpilii* is a rather rare species in the flora of North Macedonia [38]. The new data from the village Miladinovci (Skopje valley) extends the distribution of *S. skorpilii* northward by about 60 km from the nearest known locality (Veles, gorge of the river Topolka).



Figure 9. *Silene skorpilii* Vel.

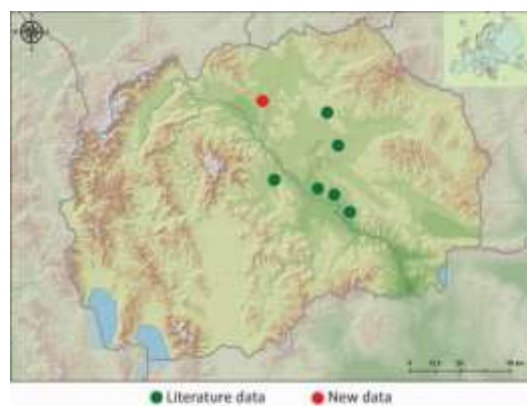


Figure 10. Distribution of *Silene skorpilii* Vel.

6. *Hypericum linarioides* Bosse

Literature data: Mt. Jakupica – Boropole, Dautica [34]; Babina Rupa (Jakupica), Suva Gora [46]; Suva Gora [18].

New data:

- Mt. Karadžica – Golem Pepeljak, 1800-2050 m a.s.l., 20.07.1998, 04.08.1999, 26.07.2022, No: 3883, 3863-3879, 15029 (Leg./Det.: Z. Nikolov),
- Dautica: Plavnik, 1700 m a.s.l., 10.07.1999, No.: 3884 (Leg./Det.: Z. Nikolov).

The distribution area of *H. linarioides* extends from the central part of the Balkan Peninsula through Anatolia to Crimea, the Caucasus, and

northwest Iran [47]. In neighboring countries, this species has been reported in Albania, Greece, Serbia, and Bulgaria. In North Macedonia, *H. linarioides* is a rather rare species. The oldest data comes from Soška [34], for Boropole (Mt. Jakupica) and Mt. Dautica. The first data that definitely confirmed its presence in the flora of North Macedonia comes from the works of Matevski [46]: Babina Rupa (Mt. Jakupica) and Suva Gora, and Teofilovski [18], also for Suva Gora.

The finding on Mt. Dautica actually confirms the old data of Soška [34], while the other on Golem Pepeljak (Mt. Karadžica) is new.



Figure 11. *Hypericum linarioides* Bosse
(Photo: Z. Nikolov)

7. *Euphorbia apios* L.

Literature data: Surroundings of Dojran [32]; village Organdžali (Gevgelija) and village Asanli (Nov Dojran) [39].

New data:

- Negotino (village Krivolak) – Orlovo Brdo, 250-400 m a.s.l., 11.04.2011 (Leg./Det.: Z. Nikolov).

E. apios is distributed in Bulgaria, Greece, Cyprus, Israel-Palestine-Jordan, Italy, Lebanon-Syria, and Turkey (Asian part) [43]. In North Mac-

edonia, *E. apios* is considered a rare species, known only from two localities: village Organdžali (Gevgelija) and village Asanli (Nov Dojran) [39]. The oldest data for the presence of this species in our flora, also mentioned by Micevski [39], comes from the work of Bornmüller [32], from the surroundings of Dojran. The new locality (Krivolak-Orlovo Brdo, near Negotino) is about 60 km north of the previous records, extending the known distribution area in North Macedonia.

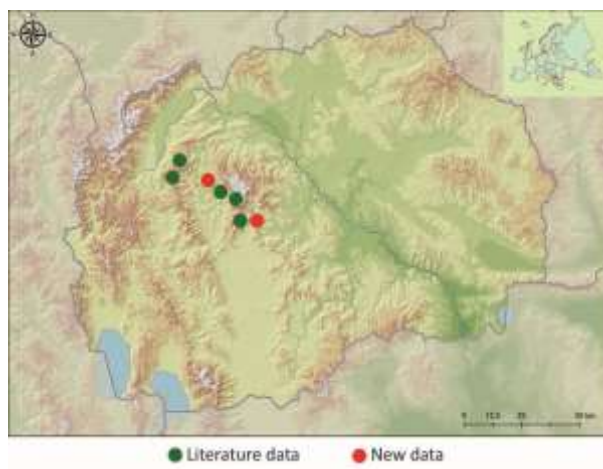


Figure 12. Distribution of *Hypericum linarioides* Bosse



Figure 13. *Euphorbia apios* L.

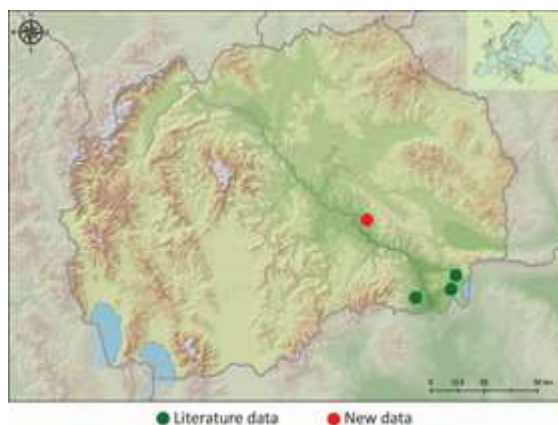


Figure 14. Distribution of *Euphorbia apios* L.

8. *Astragalus austriacus* Jacq.

Literature data: Kumanovo – between the villages Dobrošane and Orašec [40, 50].

New data:

- Kumanovo (village Pčinja) – locality "Kраста". 400–470 m a.s.l., 21.05.2011; N: 42°04'56.6"; E: 021°44'31.7" (Leg./Det.: Z. Nikolov).

A. austriacus is a widespread steppe species with a European-western Siberian distribution [49]. It is one of the rarest species in the flora of North

Macedonia, known so far from only one locality – between the villages Dobrošane and Orašec, near Kumanovo [40, 50]. In the neighboring area, along the road from Kumanovo to the village Pčinja (locality "Kраста", between quarries), a well-developed population of *A. austriacus* was found. Not far from the locality "Kраста", another steppe element, *Dianthus pallidiflorus* Ser., was discovered at the locality "Tekijski Rid" (village Tekija, Skopje valley) [13].



Figure 15. *Astragalus austriacus* Jacq.
(Photo: Z. Nikolov)



Figure 16. Distribution of *Astragalus austriacus* Jacq.

9. *Phlomis tuberosa* L.

Literature data: Bogoslovec [35]; Rašče, Raduša [48]; village Rakotinci (Skopje), village Cer (Kičevo), village Brezovo (KM) [51].

New data:

- Kozjak (village Nova Breznica), 1039 m a.s.l., 04.07.1998; N: 41°53'20.4"; E: 021°14'47.7". (Leg./Det.: Z. Nikolov),
- Kozjak (village Nova Breznica), 1040-1100 m a.s.l., 30.07.2011; (Leg./Det.: Z. Nikolov).

The range of *P. tuberosa* extends from Eastern and Central Europe to Siberia, Southeastern Europe, and Asia [43]. Its presence has been reported in the flora of neighboring countries: Albania, Greece, Serbia, and Bulgaria. Matevski (2021)

[51], in the edition "Flora of RN Macedonia", II/2, recorded *P. tuberosa* at three localities: village Rakotinci (Skopje), village Cer (Kičevo), and village Brezovo (KM). Older literature data, also mentioned in this edition, referred to Bogoslovec [35], and Rašče, Raduša [49].

The new finding of *P. tuberosa* is at the locality "Kozjak", above the village Nova Breznica (Skopje), on dry meadows with calcareous bedrock, along and on the right side of the road leading to the "Kozjak" dam. On the same meadow (along the road), where *P. tuberosa* was first recorded (04.07.1998), populations of *Orobanche amethystea* Thuill. (parasitic on *Eryngium campestre* L.) and *Salvia argentea* L. were also found.



Figure 17. *Phlomis tuberosa* L.

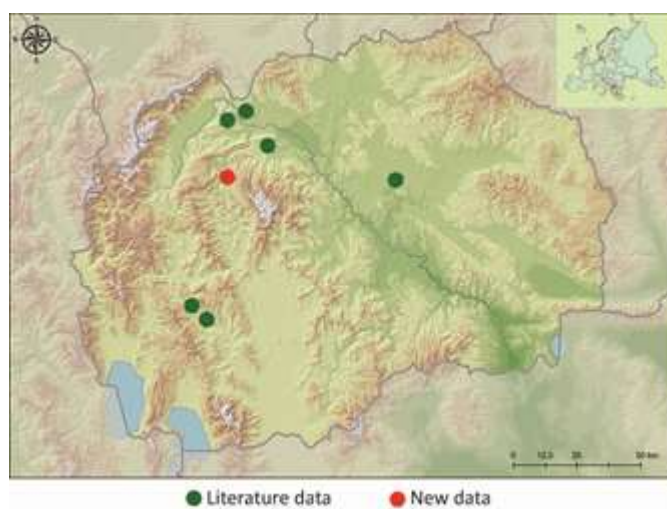


Figure 18. Distribution of *Phlomis tuberosa* L.

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НОВИ ХОРОЛОШКИ ПОДАТОЦИ ЗА НЕКОИ РЕТКИ ВИДОВИ ВО ФЛОРАТА НА РЕПУБЛИКА СЕВЕРНА МАКЕДОНИЈА

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Во трудот се наведуваат нови хоролошки податоци за *Aconitum burnatii* subsp. *pentheri*, *Aquilegia aurea* (*Ranunculaceae*), *Cerastium dubium*, *Silene skorpilii*, *Silene fabarioides* (*Caryophyllaceae*), *Hypericum linarioides* (*Hypericaceae*), *Euphorbia apios* (*Euphorbiaceae*), *Astragalus austriacus*, и *Phlomis tuberosa* (*Lamiaceae*), за територијата на Република Северна Македонија. Три од наведените видови – *Aquilegia aurea*, *Silene skorpilii* и *Silene fabarioides*, како и подвидот *Aconitum burnatii* subsp. *pentheri* се балкански ендеми, додека останатите видови се карактеризираат со пошироко распространување.

Клучни зборови: хорологија; флора; Северна Македонија; балкански ендемити