

Noteworthy floristic records from the steppe-like area in North Macedonia

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Abstract



The steppe-like area in the central part of North Macedonia, situated mainly in the triangle between Veles, Negotino, and Štip, is among the most interesting floristic areas in the country. In this article, the authors present one or more new records of night species from this area, noteworthy for the flora of North Macedonia: *Astragalus utriger* (Štip - Hadži-Hamzali village), *Campanula macrostachya* (Štip - Penuš village, Sveti Nikole - Kišino village), *Crepis vesicaria* (Štip - Hadži-Hamzali village, Sveti Nikole - Stanjevci, Čoselari, and Kadrifakovo villages), *Heptaptera macedonica* (Štip - Tri Češmi village), *Klasea radiata* (Štip - Hadži-Hamzali village), *Lindernia dubia* (Štip - Sofilari village, Veles - Ubogo village) (*Mantisalca salmantica* (Sveti Nikole - Adžibegovo), *Phelipanche arenaria* (Štip - Tri Češmi village), and *Solanum elaeagnifolium* (Štip - Suševo village). For each of these studied taxa, chorological data from literature and a map of distribution in the country are also given as well as a photo of a live or herbarium specimen.

Key words: flora, literature data, new records, steppe-like area, North Macedonia.

Introduction

The steppe-like area in the central part of North Macedonia, also known as “Macedonian steppe”, is situated in the triangle formed by Veles, Negotino, and Štip. It is not considered a true steppe but only an area with a steppe-like landscape, created by the influence of anthropogenic deforestation in the past (Micevski 1971, Matevski & al. 2008). Its configuration is predominantly hilly, ranging in elevation from 120 to 755 meters above sea level. It is an interesting floristic phenomenon, characterized by the presence of many endemic, rare, steppe, and halophytic species. Its floristic composition is relatively well-known with numerous published floristic data so far (Soška 1940, Micevski 1971, Micevski 1985-2005, Matevski & al. 2008, Matevski 2010, 2021, Teofilovski 2020). However, despite this, during our five years of fieldwork within the northern two-thirds of this area, many additional noteworthy floristic data were recorded. In this paper, we present some of them.

Material and methods

The fieldwork was conducted between 2018 and 2022, during the spring and summer seasons. Live specimens were collected and herbarized, accompanied by appropriate field data and photographs. Herbarium sheets are deposited in the private herbarium of the first author. Identification was performed according to The Flora of the Republic of Macedonia (Micevski 2005), Flora Europaea (Tutin & al., 1964-1980), and some monographic works. Relevant literature was checked for the inventorying of the published chorologic data in the country for each of the treated taxa.

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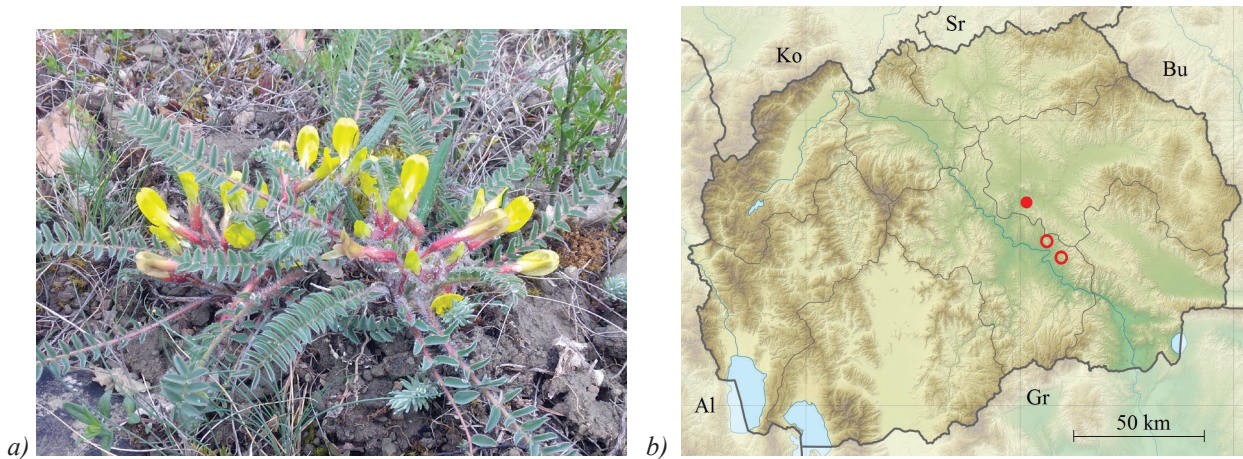


Figure 1. *Astragalus utriger* - **a.** live specimen, Štip, southwest of Hadži-Hamzali village, photo. A. Teofilovski; **b.** distribution in North Macedonia, ● – new locality, ○ – localities from literature.

Results and discussion

1. *Astragalus utriger* Pall. (Fabaceae) (Fig. 1) (= *A. cernjanskii* Stoj.)

Data from literature: Negotino (Orlovo Brdo) (Stojanoff 1936, sub *A. cernjanskii*; Micevski 2001, sub *A. cernjanskii*); Negotino (above Pepelište village) (Matevski & al. 2008, sub *A. cernjanskii*).

New records: Štip, northwest of Hadži-Hamzali village, dry shrubby places, 232 m, 41.696069°N, 22.014071°E, 30.4.2022, leg. A.T. & D.M., det. A.T.; Štip, southwest of Hadži-Hamzali village, dry shrubby places, 471 m, 41.670209°N, 22.023778°E, 30.4.2022, 28.5.2022, leg. A.T. & D.M., det. A.T.

The main part of the distributional range of this species is in Crimea and the northwestern Caucasus, in the steppe areas not far from the Black Sea (Podlech 1988, 2008). According to this author, the Macedonian population represents an isolated relic phenomenon.

The new localities near Štip significantly enlarge the range of this species in the country northward.

2. *Campanula macrostachya* Willd. (Campanulaceae) (Fig. 2)

Data from literature: Šar Mountains (Grisebach 1844), Suva Gora Mt. (Miletino village) (Teofilovski 2011), Taor gorge (train station Pčinja, Blace village) (Nikolov 2005), Strumica (Čam Čiflik, Kukliš) (Rudski 1943).

New records: Štip, south of Penuš village, open dry place, 41.693974°N, 22.105811°E, 307 m, 28.5.2022, leg. A.T. & D.M., det. A.T.; Sveti Nikole, NW of Kišino village, dry grassy place, 520 m, 41.713502°N, 21.898162°E, 8.5.2020, leg. A.T. & D.M., det. A.T.

A species with a main general distribution in much of southeast Europe and Turkey, including some adjacent parts of central Europe (Hungary and Slovakia) (Castroviejo & al. 2010). According to the presented literature data, it is a rare species in North

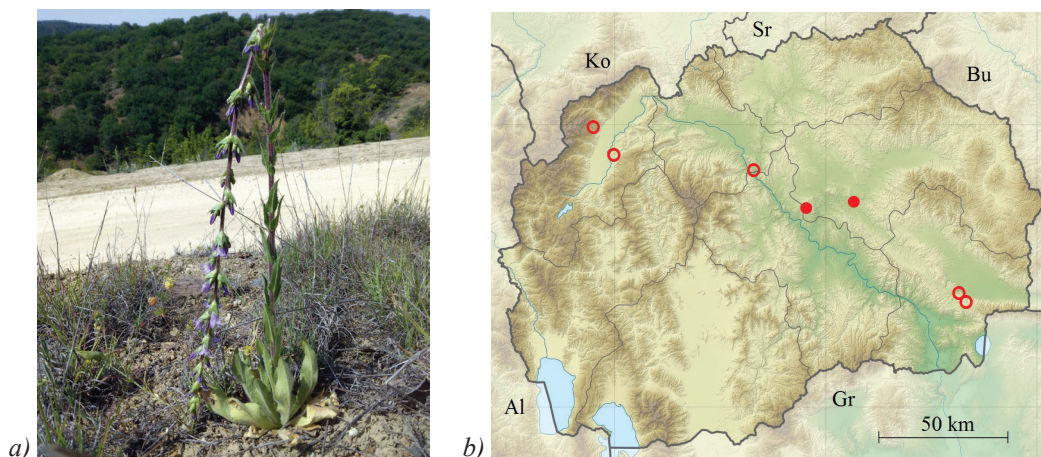


Fig. 2. *Campanula macrostachya* - **a.** live specimen, Štip, Penuš village, photo A. Teofilovski, **b.** distribution in North Macedonia, ● – new locality, ○ – localities from literature.

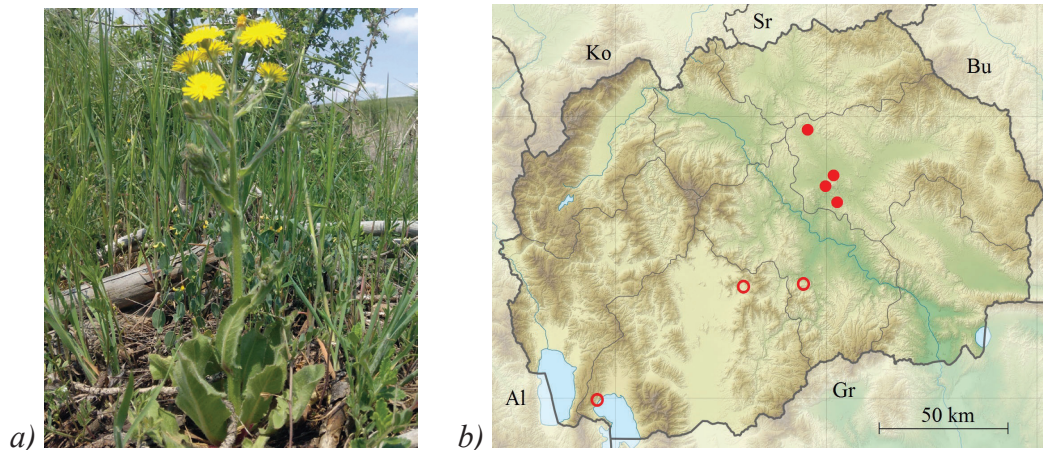


Fig. 3. *Crepis vesicaria* subsp. *vesicaria* - **a.** live specimen, Sveti Nikole, Čoselari village, photo A. Teofilovski, **b.** distribution in North Macedonia, ● – new locality, ○ – localities from literature.

Macedonia, with only a few reported stations, located in Šar Mountains, Suva Gora Mt., Taor gorge, and the close vicinity of Strumica. The new localities are the first ones in the steppe-like area in the central part of the country.

3. *Crepis vesicaria* L. subsp. *vesicaria* (Asteraceae) (Fig. 3)

Data from literature: Babuna Mt. (Han-Abdi-paša), Kavadarci (Drenovo village) (Bornmüller 1926, sub *C. scariosa* Willd. β. *vesicaria* (Willd.) Vierhapper), Galičica (Oteševo) (Micevski 1990, sub *C. vesicaria*).

New records: Štip, NW of Hadži-Hamzali village, dry grassy place, 378 m, 41.686001°N, 22.029914°E, 30.4.2022, leg. A.T. & D.M., det. A.T.; Sveti Nikole, SE of Stanjevci village, grassy place, 400 m, 41.952945°N, 21.907255°E, 30.4.2020, leg. A.T. & D.M., det. A.T.; Sveti Nikole, SW-S of Čoselari village, dry grassy place, 494 m, 41.7393311°N, 21.931840°E, leg. A.T. & D.M., det. A.T.; Sveti Nikole, SW-W of Kadrifakovo village, dry grassy

place, 288 m, 41.802777°N, 22.024384°E, leg. A.T. & D.M., det. A.T.

A polymorphic species distributed mainly in southern and western Europe, northern Africa, and Turkey (Greuter 2006+). In North Macedonia so far only the Mediterranean subsp. *vesicaria* is known to occur. The new localities are situated in the lower part of the Bregalnica Basin, a region still influenced by the Mediterranean climate. The recorded populations consist of a small number of individuals, inhabiting dry open places.

4. *Heptaptera macedonica* (Bornm.) Tutin (Apiaceae) (Fig. 4) (≡ *Colladonia macedonica* Bornm.)

Data from literature: Negotino (Orlovo Brdo) (Kitanov 1951, sub *Calladonia macedonica*), Kavadarci (Vataša, Resava and Begnište villages, Ljubaš) (Soška 1939, sub *C. macedonica*), Demir Kapija (Krasta) (Micevski 2005).

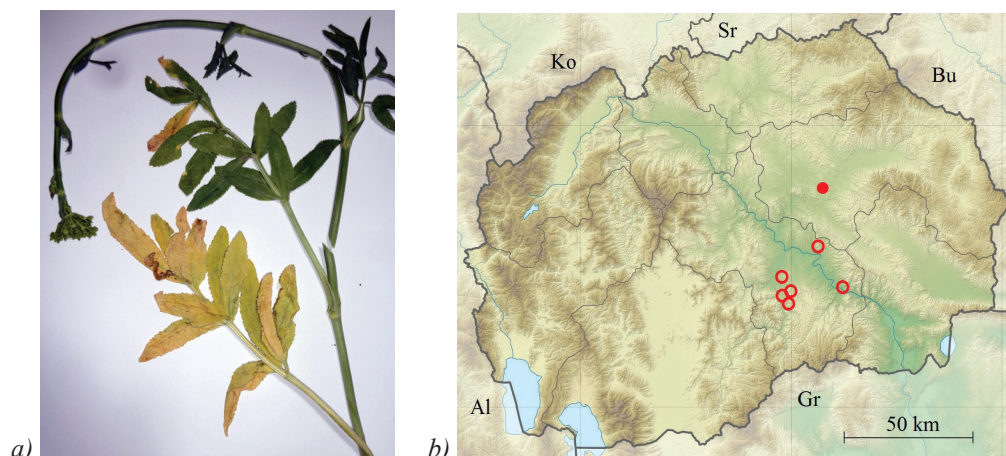


Fig. 4. *Heptaptera macedonica* - **a.** herbarium specimen, Štip, above Tri Češmi village, photo A. Teofilovski, **b.** general distribution, ● – new locality, ○ – localities from literature.

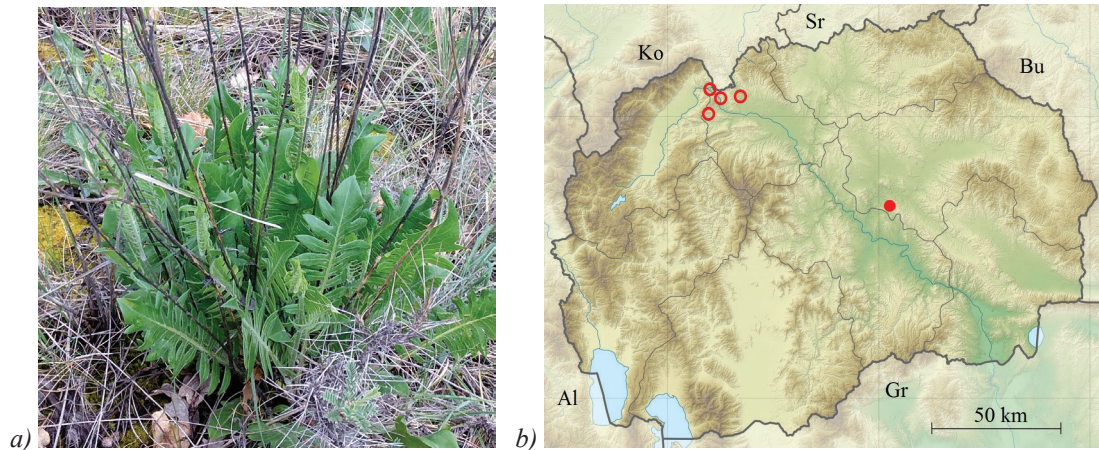


Fig. 5. *Klasea radiata* – a. live specimen, Štip, Hadži-Hamzali village, photo A. Teofilovski, b. distribution in North Macedonia, ● – new locality, ○ – localities from literature.

New records: Štip, above Tri Češmi village, in *Pinus nigra* plantation, 41.770523°N, 22.123616°E, 400 m, 13.6.2021, leg. A.T. & D.M., det. A.T.

This is a Macedonian endemic species, previously known from only six stations located in the vicinity of Demir Kapija, Negotino, and Kavadarci. The new locality near Štip extends the species' range by 25 km to the north.

5. *Klasea radiata* (Waldst. & Kit.) Á. Löve & D. Löve (Asteraceae) (Fig. 5)

[≡ *Serratula radiata* (Waldst. & Kit.) M. Bieb.]

Data from literature: Skopje (Volkovo village) (Soška 1939, sub *Serratula radiata*), Skopje (Orašje) (Micevski 1973, sub *S. radiata*), Skopje (Bojane, Raduša) (Teofilovski 2014).

New records: Štip, southwest of Hadži-Hamzali village, shrubby places, 471 m, 41.670209°N, 22.023778°E, 30.4.2022, 28.5.2022, leg. A.T. & D.M., det. A.T; Štip, southwest of Hadži-Hamzali village, thermophilous

oak forest, 376 m, 41.675838°N, 22.029197°E, 30.4.2022, 28.5.2022, leg. A.T. & D.M., det. A.T.

A Eurasian species, distributed from Slovenia and Belarusian to northwestern Iran (Greuter 2006+, PoWO 2023). Its distribution in North Macedonia so far was considered restricted in the western parts of the Skopje valley, and the adjacent part of the Derven gorge (Soška 1939, Micevski 1973, Teofilovski 2014). During the extensive fieldwork in the vicinity of Štip, we recorded this species only on two stations, southwest of Hadži-Hamzali village. About 20 individuals were observed, growing in shrubby places and thermophilous oak forests. According to Cannon & Marshall (1976), the populations of *Klasea radiata* in Albania and the territory of former Yugoslavia represent a separate Balkan endemic taxa - subsp. *cetinjensis* (Rohlena) Greuter & Wagenitz. [sub *Serratula radiata* subsp. *cetinjensis* (Rohlena) Hayek].

6. *Lindernia dubia* (L.) Pennell (Linderniaceae) (Fig. 6)

Data from literature: Štip, in the rice field near Krupište village (Micevski 1999, leg. K. Micevski 1974).

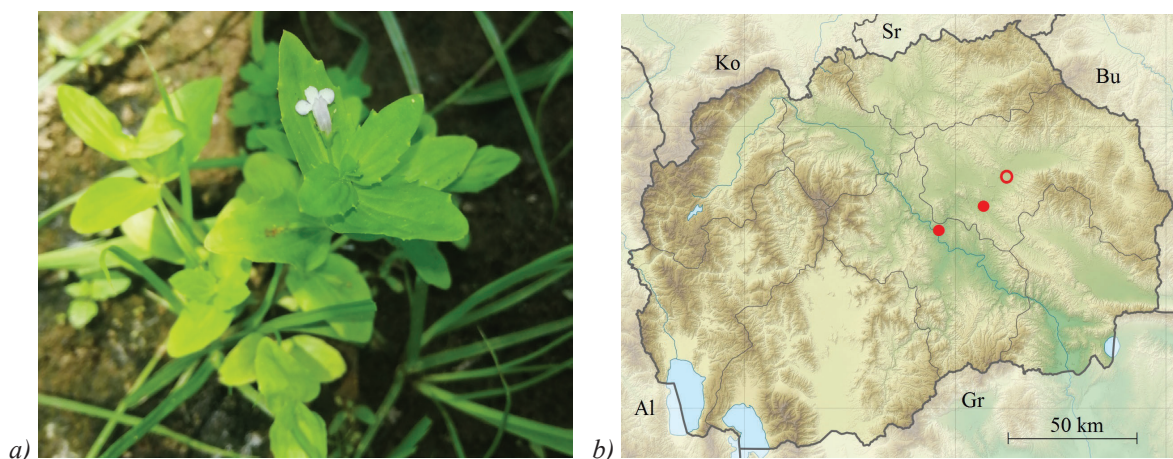


Fig. 6. *Lindernia dubia* – a. live specimen, Veles, Nogaevci village, photo A. Teofilovski, b. distribution in North Macedonia, ● – new locality, ○ – localities from literature.

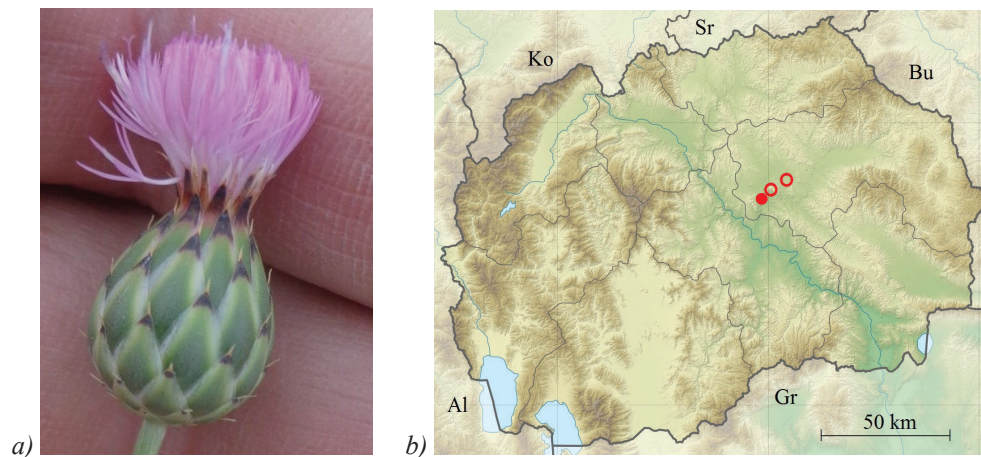


Fig. 7. *Mantisalca salmantica* – **a.** capitula of a live specimen, Sveti Nikole, Adžibegovo village, photo A. Teofilovski, **b.** distribution in North Macedonia, ● – new locality, ○ – localities from literature.

New records: Štip, Sofilari village, near Bregalnica River, sandbanks with *Tamarix* sp., 41.708346°N, 22.141995°E, 12.6.2018, leg. A.T. & D.M., det. A.T.; Veles, Nogaevci village, near Bregalnica River, sandbanks with *Tamarix* sp., 41.605168°N, 21.930709°E, 30.4.2019, obs. A.T. & D.M.

Lindernia dubia is a North American species widely introduced in wet and aquatic habitats throughout most of the temperate areas of the world, including much of Europe (Simons & Jansen 2018). The only previous record from North Macedonia, from the rice field near Krupište village (Štip), is based on a collection of K. Micevski from 1974 (Micevski 1992). The two new findings near the lower reaches of the Bregalnica River indicate a continuous presence of this species in this river basin for about half a century.

7. *Mantisalca salmantica* (L.) Briq. & Cavill. (Asteraceae) (Fig. 7)

[≡ *Microlonchus salmanticus* (L.) DC.]

Data from literature: Štip (between Mustafino and Vrsakovo villages) (Košanin 1926, sub *Microlonchus*

salmanticus), Sveti Nikole (Bogoslovec) (Soška 1940, sub *M. salmanticus*).

New records: Sveti Nikole, near Adžibegovo village, dry arable place, 221 m, 41.761661°N, 21.987256°E, 10.6.2018, leg. A.T. & D.M., det. A.T.

This rare Mediterranean species, besides North Macedonia, in the Balkan Peninsula is additionally known only from Greece and Croatia (Greuter 2006+). In North Macedonia, it was collected only twice, in 1921 by Ž. Jurišić (Košanin 1926) and in 1922 by Th. Soška (Soška 1940). The new record in the vicinity of Sveti Nikole (near Adžibegovo village) is important data for this extremely rare species, confirming its current presence in the flora of the country.

8. *Phelipanche arenaria* (Borkh.) Pomel (Orobanchaceae) (Fig. 8)

(≡ *Orobanche arenaria* Borkh.)

Data from literature: Skopska Crna Gora Mt. (Crn Kamen) (Grupče 1958, sub *Orobanche arenaria*), Skopje (Osoj) (Matveeva 1968, sub *O. arenaria*).

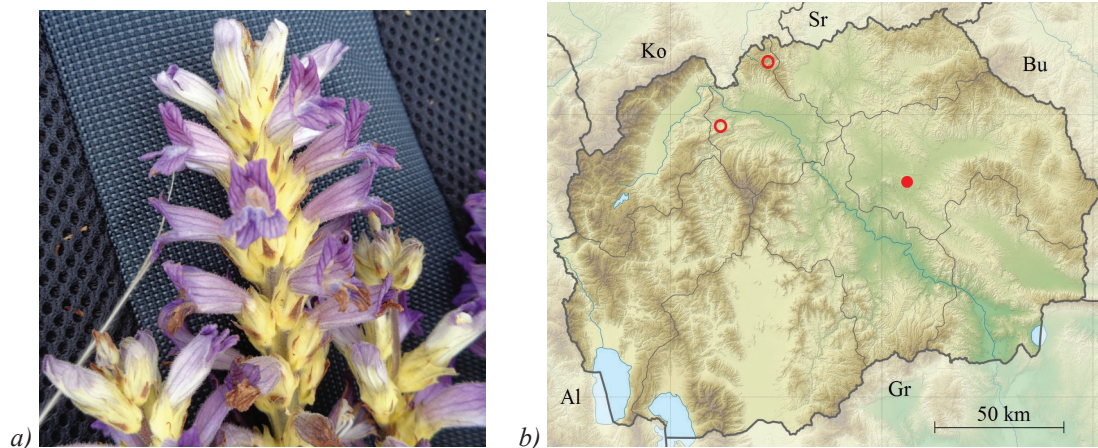


Fig. 8. *Phelipanche arenaria* – **a.** live specimen, Štip, Tri Češmi village, photo A. Teofilovski, **b.** distribution in North Macedonia, ● – new locality, ○ – localities from literature.

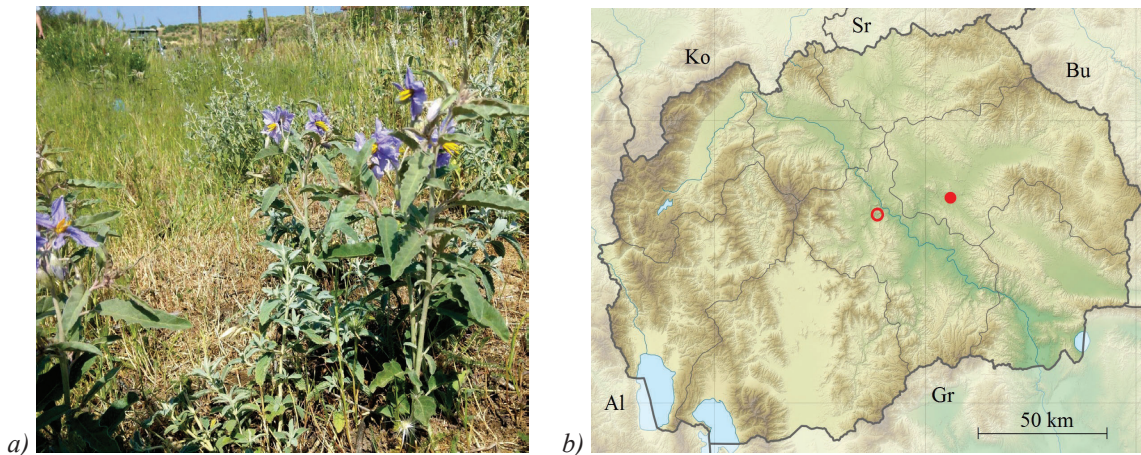


Fig. 9. *Solanum elaeagnifolium* – live specimens, Štip, Suševo village, photo A. Teofilovski, **b.** distribution in North Macedonia, ● – new locality, ○ – localities from literature.

New records: Štip, above Tri Češmi village, open dry place, 515 m, 41.773109°N, 22.116803°E, 13.6.2021, leg. A.T. & D.M., det. A.T.

A parasitic species with a wide distribution in Europe, Asia, and North Africa, but extremely rare and not recently recorded in North Macedonia. Both cited literature reports refer to the Skopje valley. The observed plants in the hilly area above Tri Češmi village (Štip), most probably parasitize on *Achillea coarctata* Poir.

9. *Solanum elaeagnifolium* Cav. (Solanaceae) (Fig. 9)

Data from literature: Babuna River gorge (Matevski 2000).

New records: Štip, Suševo village, waste and arable places, 360 m, 41.756165°N, 22.129263°E, 29.5.2022, leg. A.T., D.M. & M. Atanasovski, det. A.T.

This *Solanum* is native to northeastern Mexico and southwestern USA, nowadays spread and with high invasiveness in many areas in the world (Brunel 2011). It is known in all neighboring countries of North Macedonia except Albania and Kosovo (Valdés 2012+, Vladimirov & al. 2015) but is widely spread and naturalized only in Greece (Dimopoulos & al. 2013). In North Macedonia, for the first time, it was recorded 23 years ago, in the Babuna River gorge (Matevski 2000) and there have been no additional reports since then. The newly recorded population in 2022, at the periphery of Suševo village (Štip), consists of c. 150 vital individuals occupying c. 300 m². It could be a potential hotspot for the species' further spread, needing field monitoring in the future and eradication measures.

Conclusions

The new record of the Macedonian endemic *Heptaptera macedonica* near Tri Češmi village (Štip), extends its distributional range 25 km northward.

The range of *Astragalus utriger* in North Macedonia (and southeast Europe in general), which was known only from two close to each other localities near Negotino, is extended 18 km northwest. The species was recorded in two localities near Hadži-Hamzali village (Štip).

Mantisalca salmantica is rediscovered in the country after more than a century, with its finding near Adžibegovo village (Sveti Nikole).

Klasea radiata and *Phelipanche arenaria*, two rare species in the country flora, are recorded for the first time out of the Skopje valley, near Hadži-Hamzali village (Štip) and near Tri Češmi village (Štip), respectively.

The rare *Campanula macrostachya* and *Crepis vesicaria* subsp. *vesicaria*, are recorded for the first time in the steppe-like area, in the central part of the country.

The adventive species *Lindernia dubia*, collected only once, near Kupište village, in 1974, has been now newly recorded in two localities near Bregalnica River - Sofilari and Nogaveci villages.

The second locality of the adventive *Solanum elaeagnifolium* in the country is recorded near Suševo village (Štip), 22 years after its first finding in the country, in the Babuna River gorge. The recorded population could be a potential hotspot for the species further spreading in the country.

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