Anchusa stylosa subsp. spruneri (Boraginaceae) and Dipsacus pilosus (Dipsacaceae) - new in the flora of North Macedonia

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Abstract
Anchusa stylosa subsp. spruneri and Dipsacus pilosus are reported for the first time in the native flora of North Macedonia. The first taxon was recorded in the urban area of the city of Skopje, while the second one in an alder forest in the vicinity of Kolešino village (Strumica). The phytogeographical significance of the new floristic records is discussed.

Key words: Kolešino village, new records, Skopje, phytogeography

Introduction
The floristic studies in North Macedonia continuously disclose new taxa for the country flora [Kostadinovski et al. (2019), Teofilovski (2019), etc.]. Such new records are often of phytogeographical importance, improving the knowledge for the general distribution of the taxa and the phytogeographical relations in the wider region. The new floristic records indicate a need of intensification of the floristic studies throughout the whole territory of the country. During the author’s recent field works, conducted in various parts of North Macedonia, a number of taxa that were not previously known from this territory were discovered, of which two are reported in this paper.

Material and methods
Plant specimens were collected and photographed during the field work. They were herbarized according to the standard methods and stored in the private herbarium of the author. Identification was performed according to Hayek (1931), Hansen (1976), Selvi and Begazzi (2003), Petrova (2012), etc. The general distribution of Anchusa stylosa subsp. spruneri and the recorded locality of Dipsacus pilosus in North Macedonia are mapped.

Results and discussion
Anchusa stylosa subsp. spruneri (Boiss.) Selvi & Bigazzi (Figs. 1, 2)
Record in North Macedonia: Skopje, 1,1 km SE from the train station, construction site, 41°58′59.80″N, 21°27′14.49″E, 22.4.2019, leg. & det. A. Teofilovski.

This is a first record of this subspecies in the flora of North Macedonia. On the discovered locality, in a densely populated area of Skopje, only a small population of c. 10 individuals were found, growing on a freshly cleared and flatten construction site. Individuals belonging to A. stylosa M. Bieb. subsp. spruneri, otherwise observed in a few other parts of the urban area of Skopje, were not found on the locality.

So far, the range of Anchusa stylosa subsp. spruneri was considered restricted to a small area in S Greece and two localities in SW Bulgaria. In the former country it was known from: Sterea Ellas (Attika, Viotia), western Aegean islands (Egina, Petalii), and NW Peloponnese (Acrocorinthos), while in the second one from Ivalovgrad on the East Rhodopes and Tsarevo on the Black Sea coast (Selvi and Bigazzi 2003; Dimitrov 2009, sub A. spruneri Biss.). The above cited chorological data of Anchusa stylosa subsp. spruneri from Greece are based on abundant herbarium collections from 19th century, while the attempts for field confirmation during the work on revision of the genus Anchusa L. in the flora of this country were unsuccessful (Selvi and Begazzi 2003). Therefore,
the cited authors considered this taxon in “in strong decline because of the changes in land-use and agricultural techniques which have recently occurred in this densely populated area”. The literature data from NE Greece and the Northern Aegean islands (Thasos, Samothraki) (Stojanov and Kitanov 1944, 1946) were considered by Selvi and Bigazzi (2003) as erroneous reports. Despite the recent discovery of this taxon in the neighboring parts of Bulgaria (Dimitrov 2009), the latter report still need a herbarium confirmation.

Having in consideration the previously known distribution range of A. s. ssp. spruneri, the new locality in Skopje, in the northern part of North Macedonia, represents its large extension toward central part of the Balkan Peninsula. The closest locality is Ivailovgrad in S Bulgaria, 400 km southeast-east. The rest of the sub-species known localities, several in S Greece and one on the Bulgarian Black Sea coast, are situated 450 km southeast-south and 530 km east, respectively.

A. stylosa ssp. spruneri was originally described as a separate species (Boissier 1849, as A. spruneri Boiss.), while later it was taxonomically variously considered: as synonym of A. stylosa (Boissier 1879), variety of A. stylosa (Halácsy 1902) and separate species (Gsuleac 1929, Hayek 1931, Chater 1972). Recently, Selvi and Bigazzi (2003) proposed its subspecific rank within A. stylosa, which is now widely accepted [Valdés (2011), Dimopoulos et al. (2013), etc.].

According to Selvi and Bigazzi (2003), A. s. subsp. spruneri, the only recognized subspecies of A. stylosa, differs from subsp. stylosa only by its shorter style and shorter corolla with an indication that intermediate forms occur. These authors considered as hardly reliable the other diagnostic characters used in the literature (more strigose indumentum, larger cauline leaves and longer floral pedicels), because these characters are very variable even in the type subspecies of A. stylosa, and thereby proposed the following key:

1 Corolla tube 8–10 mm, 1½–3 times as long as calyx; style 2–3 times as long as calyx ... A. s. subsp. stylosa

2 Corolla tube 6–7 mm, c. 1¼ times as long as calyx; style not more than 1½ times as long as calyx ... A. s. subsp. spruneri

A. stylosa is an annual synanthropic plant, distributed in parts of SE Europe and Asia Minor. Beside North Macedonia, it occurs in the following European countries: Albania, Greece, Bulgaria, Romania, Moldavia and Ukraine (Crimea), while as an alien species with unknown status it is reported from Spain (Valdés 2011). All literature data from North Macedonia refer to A. s. subsp. stylosa. It is distributed in much of the country territory with an exclusion of the north-east, north-west and west parts. It grows on various ruderal and cultivated places, hilly pastures and stony places (see Matevski 2010).
In “The Flora of Republic of Macedonia” four more species of the genus Anchusa L. (s. str.) are presented for the country flora: A. hybrida Ten., A. italica Retz., A. officinalis L., and A. procera Besser (Matevski 2010). Additionally, Teofilovski (2011) from the periphery of the city of Skopje reported A. thessala Boiss. & Spruner, an annual species which is by its habitus quiet similar to A. stylosa subsp. spruneri but strongly differs in the fruits morphology and the color of the corolla.

Dipsacus pilosus L. (Figs. 3, 4)

Record in North Macedonia: Strumica, the alder forest close to NW periphery of Kolešino village, 250 m, 15.8.2018, leg. A. Teofilovski, D. Mandzukovski, det. A. Teofilovski.

This is a first record of this species in North Macedonia. During the extensive field observation in the vicinity of Kolešino village, only a small group of 7-8 specimens were recorded, growing on a dump shady place in an alder forest. D. pilosus grows together with the following plant species: Alnus glutinosa (L.) Gaertn., Angelica sylvestris L., Frangula alnus Mill., Galium aparine L., Humulus lupulus L., Rubus caesius L., R. canescens DC., Silene baccifera (L.) Roth, Urtica dioica L., etc.

Dipsacus pilosus is distributed in W, C, E and SE Europe, SW Russia, Crimea, the Caucasus, W Siberia and Anatolia (Hansen 1976, Petrova 2012, Devesa 2007). Among the countries neighbouring North Macedonia, this species occurs in Serbia and Bulgaria, while missing from Greece and Albania (Devesa 2007, Dimopoulos et al. 2013, Barina et al. 2017), and the most probably also from Kosovo. In the territory of Serbia (incl. Kosovo) it has sporadic distribution (Diklić 1973) but according to the available literature it is not reported from the southern part and Kosovo. In Bulgaria it occurs in various floristic regions, including the West Frontier Mountains, close to the state border with North Macedonia (Petrova 2012). Slovenia, Croatia, Bosnia and Hercegovina and Romania are the rest of the Balkan countries in which this species also occurs (Domina 2017, Milanović et al. 2011). Having in consideration the occurrence of D. pilosus in SW Bulgaria, its presence in SE North Macedonia was expected in some extend.
The genus *Dipsacus* L. comprises c. 20 species distributed in Europe and Mediterranean region, SW and S Asia and W and E Africa (Devesa 2007). Six of eight representatives in the European flora occur in the Balkan Peninsula (Hansen 1976). In the flora of North Macedonia, besides *D. pilosus*, two additional species of this genus are also present - *D. fullonum* L. and *D. laciniatus* L., both of them frequently occurring in various open habitats in many regions of the country. *D. pilosus* noticeably differs from both of them by its more slender habitus, petiolate cauline leaves, smaller and globose capitulas, etc.

**Conclusions**

*Anchusa stylosa* subsp. *spruneri* and *Dipsacus pilosus* are reported as a new native subspecies and species, respectively, in the flora of North Macedonia.

*Anchusa stylosa* subsp. *spruneri* was recorded in the urban area of Skopje. The new record for this taxon is of a phytogeographical importance, significantly extending its distribution area toward central part of the Balkan Peninsula. The previously known localities are situated in S Bulgaria (400 km southeast-east), E Bulgaria (530 km east), and S Greece (450 km southeast-south) from the newly recorded locality in North Macedonia.

*Dipsacus pilosus* was recorded in an alder forest close to Kolešino village (Strumica). Its presence on the territory of North Macedonia was expected in some extent as it was already known from SW part of Bulgaria.

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**References**


Ачо Теофиловски

Во текот на неодамнешните флористички истражувања на авторот во различни делови на Северна Македонија беа регистрирани следните два таксони кои досега не беа познати за флората на оваа земја: Anchusa stylosa subsp. spruneri и Dipsacus pilosus.

Anchusa stylosa subsp. spruneri е регистрирана во густо населениот дел од Скопје, каде на едно свежо расчистено градилиште се пронајдени само децата примероци. Овој подвид се разликува од A. stylosa M. Bieb. subsp. stylosa со пократката венечна цевка и столбче чии должини не надминуваат 1¼ односно 1½ од должината на чашката.

A. stylosa subsp. spruneri беше познат за неколку локалитети во јужна Грција (хербарумски податоци од 19<sup>а</sup> век), еден локалитет во јужна и еден во југоисточна Бугарија. Новото наоѓалиште во Скопје е со фитогеографско значење преставувајќи прораснување на ареалот за неколку стотини километри кон централните делови на Балканскиот Полуостров.

Dipsacus pilosus е регистриран во околина на Струмица, во евловата шума покрај селото Колешино. Опсервираната популација се состои од само 7-8 примероци. Овој вид е со поширок евразијски ареал кој на Балканскиот Полуостров е присутен уште и во флорите на Словенија, Хрватска, Босна и Херцеговина, Србија и Бугарија.