

Notes on *Centaurea vandasii* and *C. wettsteinii* (Asteraceae), two rare and little-known species in the Balkan Peninsula

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Abstract. *Centaurea vandasii* and *C. wettsteinii* (Asteraceae), two rare species in the Balkan Peninsula, are reported and illustrated. *Centaurea vandasii* belongs to *C. sect. Phalolepis* and is a south Balkan endemic only known from the Rhodopi mountains in Bulgaria and Mt Belasica in North Macedonia. It is now reported for the first time from Greece. *Centaurea wettsteinii* belongs to *C. sect. Acrolophus* and has been found only twice worldwide, both times on Mt Pinovo in north central Greece. It is now reported from Mt Tzena, Greece.

Key words: Asteraceae, *Centaurea*, Balkan endemics, distribution, new records, northern Greece

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Introduction

Although many parts of Greece are floristically well studied several regions in the far north remain relatively unexplored even today. For instance, only c. 500 species have been recorded by 22 botanists visiting the Greek side of Mt Beles in northeastern Greece, a mountain situated at the junction of three countries meeting at the North Macedonian-Bulgarian-Greek borders. Among them, the most important was Edvard Formánek (1845-1900) a college professor from Brno in present-day Czechia (Brünn in Moravia) who explored Mt Beles in 1899. Since he also visited areas

just outside the northern Greek border without recording the localities in detail his 'Greek' collections could have originated from either side of the present border. Formánek travelled extensively in the Balkan Peninsula mostly during summer vacations by virtue of his teaching profession. His specimens are deposited in the herbarium of the Moravian Land Museum, Brno (BRNM). The beautiful and impressively large *Campanula formanekiana* was named in his honour.

Formánek's identifications were often erroneous. Karel Vandas (1861-1923) a botanist at the National Museum in Prague (PR) and director of the department of botany at the Moravian Land Museum criti-

cally revised Formánek's Balkan collections, correcting the identifications over a period of five years, and published the results as a complete catalogue in *Reliquiae Formánekianae* (Vandas 1909). Vandas himself had a very large personal herbarium (c. 80,000 specimens) the greater part of which is deposited at PR. He was shot to death by an unknown assailant in Skopje (North Macedonia), apparently during a quarrel over a Macedonian lady. Several species including one of the taxa discussed in our paper (*Centaurea vandasii*) are named after him.

In comparison to Mt Beles, Mt Tzena in North Central Greece is relatively well known as a result of a recent comprehensive PhD study carried out by Minas Chasapis between 2009 and 2014 (Chasapis 2017, Chasapis & al. 2020). Approximately 1350 species have been recorded from the mountain, c. 68% of the taxa for the first time; however, *Centaurea wettsteinii*, the second species of our study, was not included. This species was named after Richard Wettstein, Ritter von Westersheim (1863–1931) an Austrian botanist, professor at Prague and then Vienna. Besides *Centaurea wettsteinii*, his name is commemorated in the Greek flora by two other taxa, viz., *Corydalis wettsteinii* Adamović and *Minuartia wettsteinii* Mattf.

Material and methods

Our recent field studies on Mt Beles and Mt Tzena in the far north of Greece resulted in a number of interesting taxa two of which are documented in this paper. For identification, comparison with relevant literature and specimens on the virtual herbaria portal JACQ (<https://www.jacq.org>) was made. Notes on the taxa, distribution according to literature and valuable indications on locality and site ecology are also provided. Seed collections have been made for a private herbarium and garden. Photographs are archived and will be available freely online (<https://www.greekflora.gr>).

Results and discussion

Centaurea vandasii Velen. [Sect. *Phalolepis* (Cass.) DC] (Fig. 1)

Nomos Serron, Eparchia Sintikis: Mt Beles, 5.2 km N of Kastanoussa, 1261 m, 41°19'N, 22°54'E, 20.08.2018, *Kofinas* obs. (photos) & specimen fragm. (herb. *Kofinas*); c. 7.8 km NE of Kastanoussa, near the border with North Macedonia, 1350 m, 41°20'N, 22°55'E, 20.08.2018, *Kofinas* obs. (photos); *loc. ibid.*, 1669 m, 41°19'N, 23°05'E, 13.08.2020, *Kofinas* obs. (photos & seed collection).

New for Greece. *Centaurea vandasii* was recently reported by Teofilovski (2019) from Mt Belasica (Mt Beles) as a new species for the flora of North Macedonia. His report was based on two collections from the southeastern part of North Macedonia, one from Tromegeje, 1730–1760 m, collected on 18 August 2018, the other above Gabrovo village at 1370–1400 m, collected on 22 September 2018. It is interesting that the second author of this paper (G. Kofinas) was on the Greek side of Mt Beles on 20 August 2018, just two days after the discovery of *C. vandasii* at Tromegeje on the North Macedonian side of the mountain. The Greek locality is c. 10 km E of the locality in North Macedonia which in turn, is c. 180 km WSW from the known occurrences in the Bulgarian Rhodopi.

For nearly 125 years *Centaurea vandasii* was considered endemic to the Bulgarian Rhodopi, restricted to Dobrostan (Čauševo), Ponory and Bačkovski Manastir which are localities near each other in Smolyan. It was published in 1895 by Velenovsky in Oesterr. Bot. Z. 45: 72, based on collections by Václav Stříbrný (1853–1933). Its occurrence in the Bulgarian part of Mt Beles had been postulated by Teofilovski (2019), likewise on the Greek side. Dimitrov & Vutov (2016), however, did not mention it in their account of the mountain's flora. According to Teofilovski the presence of *C. vandasii* on Mt Beles and the Rhodopi massif demonstrates a floristic connection between the two mountains, as also exemplified by the Balkan endemics *Viola stojanowii* W. Becker and *Lathraea rhodopea* Dingler.

According to Gamal-Eldin & Wagenitz (1991: 506)



Fig. 1. *Centaurea vandasii* from Mt Beles, Greece, showing habit, capitulum and achenes.

the affinities of *C. vandasii* seem to be with *C. marmorea* Bornm. & Soška which was described from Mt Sivec near Prilep in the southern part of North Macedonia; *C. marmorea* is also reported from Mt Orvilos in northeastern Greece. The phyllary appendages of *C. vandasii* are small (only partly covering the phyllaries) and with hyaline-membranous, denticulate-lacerate but not fimbriate margins, deeply emarginate at apex and with a small mucro. The dark blackish-brown central part of the appendage is broadly ovate or nearly orbicular. It thus differs from *C. marmorea* which has the phyllaries for the greater part covered by the appendages which are large, sub-orbicular, strongly decurrent and with a blackish or pale brown, triangular central part.

Stojanov & al. (1967) treats *C. vandasii* merely as a form of *C. splendens* L.; Dostál (1976) included it as a subspecies of *C. alba* L. The Balkan endemic was

accepted at species rank by Hayek (1931), Euro+Med (2006 +) and Assyov & al. (2012). The chemical composition of the essential oil from plants collected from the *locus classicus* in the Rhodopi Mts was recently investigated (Bancheva & al. 2021). The main components of the oil were hexadecanoic acid (18.3%), tetradecanoic acid (13.8%), caryophyllene oxide (12.1%) and germacrene D (8.4%). The authors found that the phytochemical profile of *C. vandasii* was not similar to that of other species in the same section [*Phalolepis* (Cass.) DC.]. This observation, to some extent, supports the recognition of *C. vandasii* as a separate species.

On Mt Beles, several plants of *C. vandasii* were noted in *Juniperus communis* subsp. *nana* scrub together with *Chamaecytisus eriocarpus* and *Vincetoxicum speciosum* (see Fig. 1). The habitat is dry deforested subalpine grassland with rocky outcrops of granite,



Fig. 2. *Dianthus petraeus* from Mt Beles, Greece with comparison to subsp. *petraeus* (Mt Rila, Bulgaria) and subsp. *orbelicus* (Mt Pangeo, Greece).



Fig. 3. *Centaurea wettsteinii* from Mt Tzena, Greece, showing old capitula, achenes and seedling.

gneiss and micaceous schist. Other interesting plants in the area on the way to the filakion (Neon Triethnes) and the summit are *Acinos alpinus* subsp. *nomismophyllus*, *Dianthus petraeus*, *Dianthus pinifolius* subsp. *tenuicaulis*, *Euphorbia thessala*, *Genista sagittalis*, *Hieracium sparsum*, *Scabiosa triniifolia*, *Silene armeria* and *Viola stojanowii*. In Greece, the latter is only known from Mt Beles. *Dianthus pinifolius* subsp. *tenuicaulis* is also a new report for Mt Beles. The petal limb in some plants of *D. petraeus* on Mt Beles approaches that of *D. petraeus* subsp. *petraeus* as seen on Mts Rila and Pirin in Bulgaria, being deeply and irregularly incised whereas in typical *D. petraeus* subsp. *orbelicus*, the limb is shallowly dentate to subentire (Fig. 2). However, no further taxonomic investigation on the group was carried out.

Centaurea wettsteinii Degen & Dörf. [Sect. *Acrolophus* (Cass.) DC.] (Figs. 3 & 4)

Nomos Pellis, Eparchia Almopias: Mt Tzena, steep rocky limestone slope above stream shaded by *Platanus*, 726 m, 41°06'N, 22°13'E, 03.08.2021, Kofinas & Polymenakos obs. (photos & seed collection); *loc. ibid.*, 09.08.2021, Kofinas & Christea s.n. (herb. Kit).

— [Mt Pinovo] in latere boreo-occidentali montis Pinovo (Kožuf), 1500 m, 41°07'N, 22°06'E, 20.08.1976, Greuter 14647 (GOET! herb. Greuter).

New for Mt Tzena, probably the third documentation of this species worldwide. It was first collected by Ignaz Dörfler (1866–1950) on 24 May 1893, and described by Degen and Dörfler in Denkschr. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. 64: 726 (1897) with the locality 'Macedonia centralis. In rupibus praeruptis prope Severni' (Fig. 4) which was presumed to be in present-day North Macedonia but had never been localized there. From an analysis of Dörfler's 1893 itinerary to Albania and Macedonia, Greuter (2007) concluded that this village 'Severni' was not in North Macedonia but synonymous with the village of 'Vorino' which is south of the border, within Greece. Pinovo is part of a long mountain ridge between Mt Voras (Kajmakčalan) and Mt Tzena. Thus our present documentation on Tzena proper is an additional one to Greuter's locality on Pinovo and to the *locus classicus* which is also probably on Pinovo since Dörfler bota-

nized on Kožuf (Mt Pinovo).

Mt Tzena is rich in Balkan endemics and several are restricted to the border area. Some interesting taxa noted in the alpine grassland with schistose and limestone rock outcrops are *Centaurea cuneifolia* subsp. *pallida*, *C. grbavacensis*, *Ramonda nathaliae* and *Veronica dillenii*. *Platanus orientalis* and *Salix* lined stream sides below the rock outcrop where *C. wettsteinii* was found. The few seeds collected were sown immediately and germinated readily. Fig. 3 shows a seedling c. six months since seed collection on 3 August 2021. *Centaurea wettsteinii* is probably a Greek endemic and although now known from limestone rock crevices in a very restricted distribution area it may occur elsewhere at moderate altitudes in north-



Fig. 4. *Centaurea wettsteinii* from *locus classicus* Macedonia centralis, prope Severni (isolectotype in W, Dörfler 1893: 220; W1893-0009428).

ern Greece. By a surprising coincidence it bears some morphological resemblance to *C. weneri* Wagenitz & al. from South Anatolia, a *Centaurea* stated to have no known affinities. The latter was named in honour of Werner Greuter (Berlin), who was the second person to collect *C. wettsteinii* on the southwest slopes of Mt Pinovo. *Centaurea wettsteinii* differs from *C. weneri* in leaf morphology and appendages which have more lateral cilia (up to 12) on each side. Wagenitz (1975) stated that taxonomic affinities between Balkan and Turkish *Centaurea* taxa are relatively rare and thus the affinities of both taxa should be investigated elsewhere.

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