

### Research article

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## First record of *Urocerus augur* from Bulgaria, with new occurrence data on *U. gigas* from collections and citizen science (Hymenoptera: Siricidae)

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### Abstract

This study reports the wood wasp *Urocerus augur* (Klug, 1803) for the first time in Bulgaria and provides new records of *U. gigas* (Linnaeus, 1758), based on both collection material and citizen science observations. While *U. gigas* is more widespread, *U. augur* appears to be very rare in the country. All available occurrence data are compiled to present an updated overview of their distribution in Bulgaria. The species' geographic ranges, elevational distribution, and seasonal activity are discussed. Photographs of *U. augur* and distribution maps for both species are included.

**Key words:** Balkans, distribution, horntails, new records, sawflies.

### Introduction

The Siricidae Billberg, 1820, also known as wood wasps or horntails, are a relatively small family of sawflies, with limited species diversity. It contains approximately 100 species belonging to two subfamilies and 11 genera worldwide. In Europe, the family Siricidae is represented by 16 species, split between two subfamilies and four genera: Tremicinae Ashmead, 1898 with three species of *Tremex* (Jurine, 1807), and the Siricinae Billberg, 1820 with six species of *Sirex* (Linnaeus, 1760), five species of *Urocerus* (Geoffroy, 1762), and two species of *Xeris* Costa, 1894. Additionally, there are records of four introduced species that were brought in with wood materials and did not become established (Lacourt 2020). The species of Siricidae are restricted to the Northern Hemisphere, occurring throughout the Holarctic and Oriental regions (Zhelohovtsev 1988), except for one genus containing two species distributed in the tropical regions of Africa (Lacourt 2020). Additionally, introduced and well-established species are present in other regions, such as South America, Australia, and New Zealand, due to the wood industry (Schiff et al. 2012).

Siricids can easily be distinguished from other sawflies due to their large size and distinctive morphology. Adults can reach up to 50 mm in length, making them among the largest hymenopteran species (Goulet & Huber 1993). Their nearly cylindrical bodies have a horn-like projection at the posterior end of the abdomen. In females, this projection is formed by the last tergite, and in males, it is formed by the last ventrite (Vassilev 1978). Female wood wasps prefer to lay their eggs in dying, stressed, or freshly cut trees, mainly coniferous ones, and only rarely infest living ones (Lacourt 2020; Marčiulynas et al. 2024). Females carry spores of symbiotic fungi in a mycangium and inject them, along with phytotoxic mucus, during egg-laying to promote fungal growth (Thomsen & Harding 2011). The fungus spreads around the oviposition site, degrading wood and creating food and space essential for larval development (Marčiulynas et al. 2024).

The first record of the family in Bulgaria dates back to 1914, in a publication by N. Nedialkov (1914). The Fauna of Bulgaria: “Hymenoptera: Symphyta” (Vassilev 1978) includes five species based on several additional records (Drenowski 1932, 1934; Buresh & Lazarov 1956; Vassilev

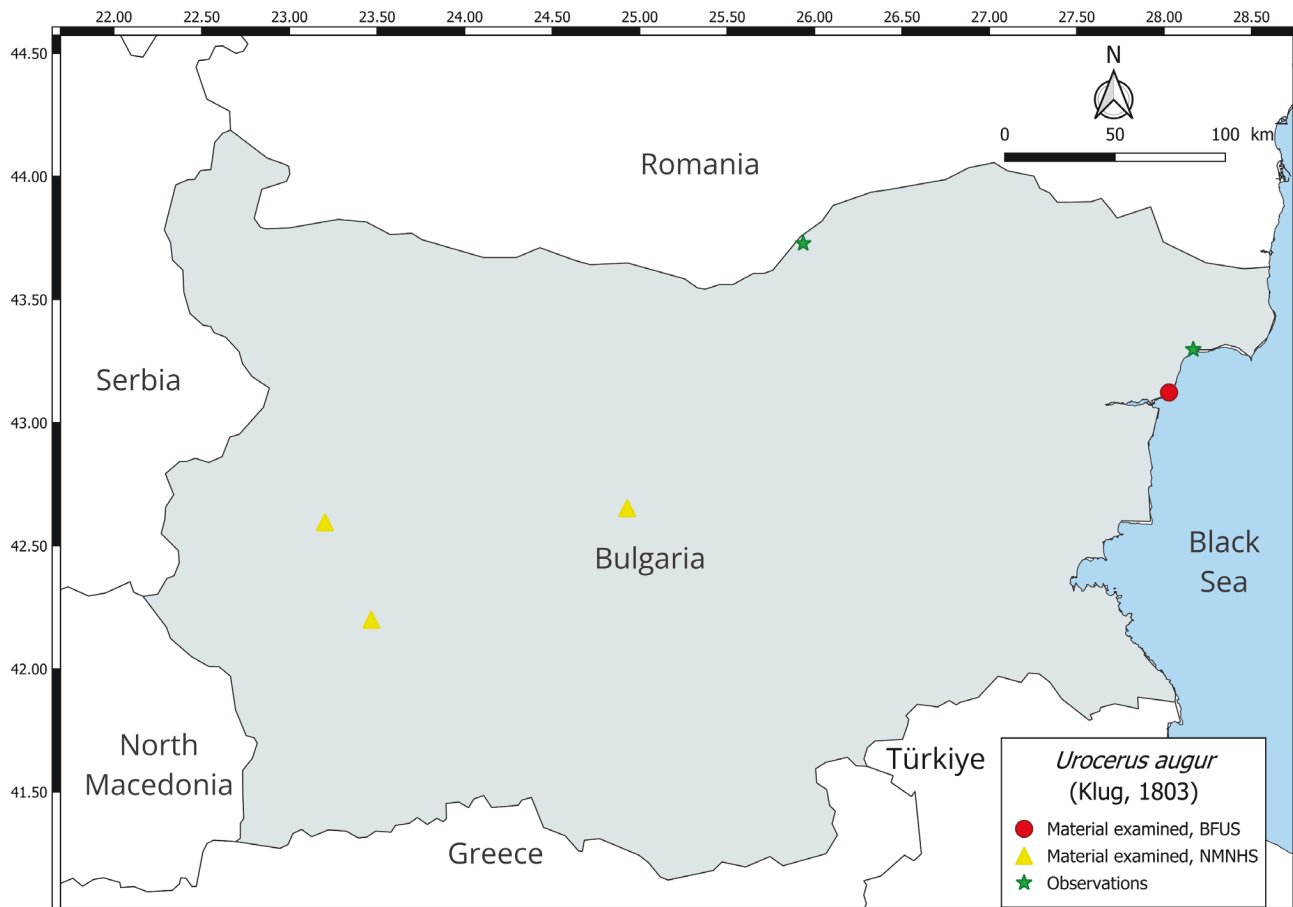


Fig. 1 – Known distribution of *Urocerus augur* in Bulgaria.

1972, 1977a, b). Since then, two additional species have been reported in the country (Stoyanov & Ljubomirov 2000; Goulet et al. 2015). The following species of the family Siricidae are currently known in Bulgarian fauna: *Tremex fuscicornis* Fabricius, 1787, *T. magus* (Fabricius, 1787), *Xeris pallicoxae* Goulet, 2015, *X. spectrum* (Linnaeus, 1758), *Urocerus gigas* (Linnaeus, 1768), *Sirex juvenicus* (Linnaeus, 1758) and *S. noctilio* Fabricius, 1793.

This study presents new faunistic data on the family Siricidae in Bulgaria, reporting *Urocerus augur* as new to the Bulgarian fauna.

## Materials and methods

The specimens examined in this study are deposited in the Zoological Collection of Sofia University, Bulgaria (BFUS), and in the Entomological Collection of the National Museum of Natural History, Bulgarian Academy of Sciences, Sofia (NMNHS). For *Urocerus augur*, one specimen from the collection of BFUS and three specimens from the collection of NMNHS were examined, while for *U. gigas*, two specimens from the col-

lection of BFUS and 68 specimens from the collection of NMNHS were included. To provide a more comprehensive overview of species distribution, we also used data from the following sources: published scientific literature and from citizen science observations voluntarily provided by amateur naturalists and members of the Bulgarian Facebook group „*The Insects and the Entomologists*“. Insects were identified based on morphology using Vassilev (1978), Lacourt (2020) and Zhelohovtsev (1988).

All occurrence data were assigned to geomorphological units according to Hubenov (1997), which are commonly used in Bulgarian faunistic studies. Additionally, distribution maps were created for each species using QGIS 3.40.3 software (<http://www.qgis.org>). When exact GPS coordinates were unavailable, particularly for older records and some observations from social media, approximate locations were used to georeference the data.

Photographs of *Urocerus augur* from the BFUS collection were taken using a mirrorless Canon EOS R50 camera with a Laowa 90mm F2.8 CA-Dreamer 2X macro lens and a modified lighting system. The images were then focus-stacked using Helicon Focus 8.1.0 software.



Fig. 2 – *Urocerus augur*, female, from Balchik, Photo: N. Petkova.

## Results

### *Urocerus augur* (Klug, 1803)

(Figs 1-3)

**Material examined – BULGARIA:** **Central Stara Planina Mts.:** Tazha hut, 09 Sep 1978, leg. M. Josifov, 1♀ (NMNHS); **Sofia Basin:** Sofia, 1911, leg. I. Buresh, 1♀ (NMNHS); **Rila Mt.:** Chamkoria (Borovets), Jun 1905, leg. Anonymous, 1♀ (NMNHS); **Northern Black Sea coast:** Varna, Botanical Garden “Sv. Sv. Konstantin i Elena”, 43.2355°N, 28.0034°E, 51 m, 17 Jun 2013, leg. I. Iliev, 1♀ (BFUS).

**Observations – BULGARIA:** **Eastern Danubian plain:** Ruse, 43.8425°N, 25.9501°E, 42 m, 14 Jun 2024, obs. I. Ganev, 1♀; **Northern Black Sea coast:** Varna, Balchik, 43.4093°N, 28.1420°E, 90 m, 26 Jun 2025, obs. N. Petkova, 1♀.

*Note:* First record for Bulgaria.

### *Urocerus gigas* (Linnaeus, 1758) (Fig. 4)

**Previous records – BULGARIA:** **Eastern Danubian plain:** Provadia (Nedialkov 1914), as *Sirex gigas* L.; **Central Stara Planina Mts.:** Karlovo (Drenowski 1934); **Sofia Basin:** Sofia (Nedialkov 1914), as *Sirex gigas* L.; **Vitosha Mt.:**

no specific location (Buresh & Lazarov 1956) as *Sirex gigas* L.; **Thracian Lowland:** Pazardzhik (Nedialkov 1914), as *Sirex gigas* L., Stara Zagora (Nedialkov 1914), as *Sirex gigas* L.; **Rila Mt.:** Golyam-Belovski Balkan (Nedialkov 1914), as *Sirex gigas* L., Chamkoria (Borovets) (Buresh & Lazarov 1956) as *Sirex gigas* L., Rila Monastery (Buresh & Lazarov 1956) as *Sirex gigas* L.; **Pirin Mt.:** no specific location (Drenowski 1934); **Slavianka Mt.:** Ali-Botush (Drenowski 1934); **Rhodopi Mts.:** no specific location (Nedialkov 1914), as *Sirex gigas* L., Chepelare (Drenowski 1934); **Northern Black Sea coast:** Cape Shabla (Vassilev 1977b).

**Material examined – BULGARIA:** **Western Stara Planina Mts.:** Petrohanski prohod, 43.1037°N, 23.1204°E, 1450 m, 21 Jul 2021, leg. Kirilov & Djekov, 1♀ (BFUS); **Central Stara Planina Mts.** Dobrila hut, 42.7111°N, 24.7612°E, 1790 m, 25 Jul 2009 leg. Anonymous, 1♀ (BFUS); **Eastern Stara Planina Mts.:** Aytos, 24 Jun 1915, leg. D. Iltschew, 1♀ (NMNHS); **Sofia Basin:** Sofia, Jun 1921, leg. I. Buresh, 1♀ (NMNHS); Sofia, 24 Jun 1922, leg. D. Iltschew, 1♀ (NMNHS); Sofia, 1925, leg. Anonymous, 1♀ (NMNHS); Sofia, 9 Aug 1951, leg. S. Minkova, 1♀ (NMNHS); **Lyulin Mt.:** no specific location, 10 Jun 1922, leg. Kr. Iwanoff, 1♀ (NMNHS); **Vitosha Mt.:** no specific location, 15 Jul 1956, leg.

Anonymous, 1♀ (NMNHS); Dragalevtsi, 23 Jul 1960, leg. Anonymous, 1♀ (NMNHS); **Thracian Lowland:** Plovdiv, no date, leg. S. Petrov, 1♀ (NMNHS); **Strandzha Mt.:** no specific location, 3 Aug 1935, leg. P. Drenski, 1♀ (NMNHS); **Belasitsa Mt.:** no specific location, 12 Aug 1961, leg. G. Peshev, 1♀ (NMNHS); **Rila Mt.:** Sitnyakovo: 20 Jul 1904, leg. Heublein, 1♀ (NMNHS); 30 Jul 1904, leg. Heublein, 1♀ (NMNHS); Chamkoria (Borovets): Jun 1905, leg. Anonymous, 1♀ (NMNHS); 12 Jul 1908, leg. Anonymous, 2♀♀ (NMNHS); 18 Aug 1908, leg. I. Buresh, 1♀ (NMNHS); 15-30 Aug 1920, leg. I. Buresh, 4♀♀ (NMNHS); 10 Aug 1921, leg. I. Buresh, 1♀ (NMNHS); 15-20 Jul 1922, leg. I. Bu-

resh, 2♀♀ (NMNHS); 15-30 Jul 1922, leg. I. Buresh, 3♀♀ (NMNHS); 25-30 Jul 1922, leg. I. Buresh, 1♀ (NMNHS); 1-10 Aug 1922, leg. I. Buresh, 1♀ (NMNHS); 1 Aug 1923, leg. I. Buresh, 2♀♀ (NMNHS); 2 Aug 1923, leg. I. Buresh, 1♀ (NMNHS); 20 Aug 1923, leg. P. Drenski, 1♀ (NMNHS); 8 Aug 1925, leg. I. Buresh, 1♀ (NMNHS); 26 Jul 1926, leg. I. Buresh, 1♀ (NMNHS); 25 Aug 1926, leg. P. Drenski, 4♀♀ (NMNHS); 7 Sep 1926, leg. P. Drenski, 1♀ (NMNHS); 16 Aug 1927, leg. I. Buresh, 1♀ (NMNHS); 27 Aug 1927, leg. I. Buresh, 1♀ (NMNHS); 25 Jun 1931 leg. P. Drenski, 2♀♀ (NMNHS); Jul 1932, leg. I. Buresh, 1♀ (NMNHS); 30 Aug 1932, leg. S. Kantardzhieva, 1♀ (NMNHS); Aug 1932, leg.



Fig. 3 – *Urocerus augur*, female, lateral view (a) and dorsal view (b), from Varna, Photo: M. Mohammed.

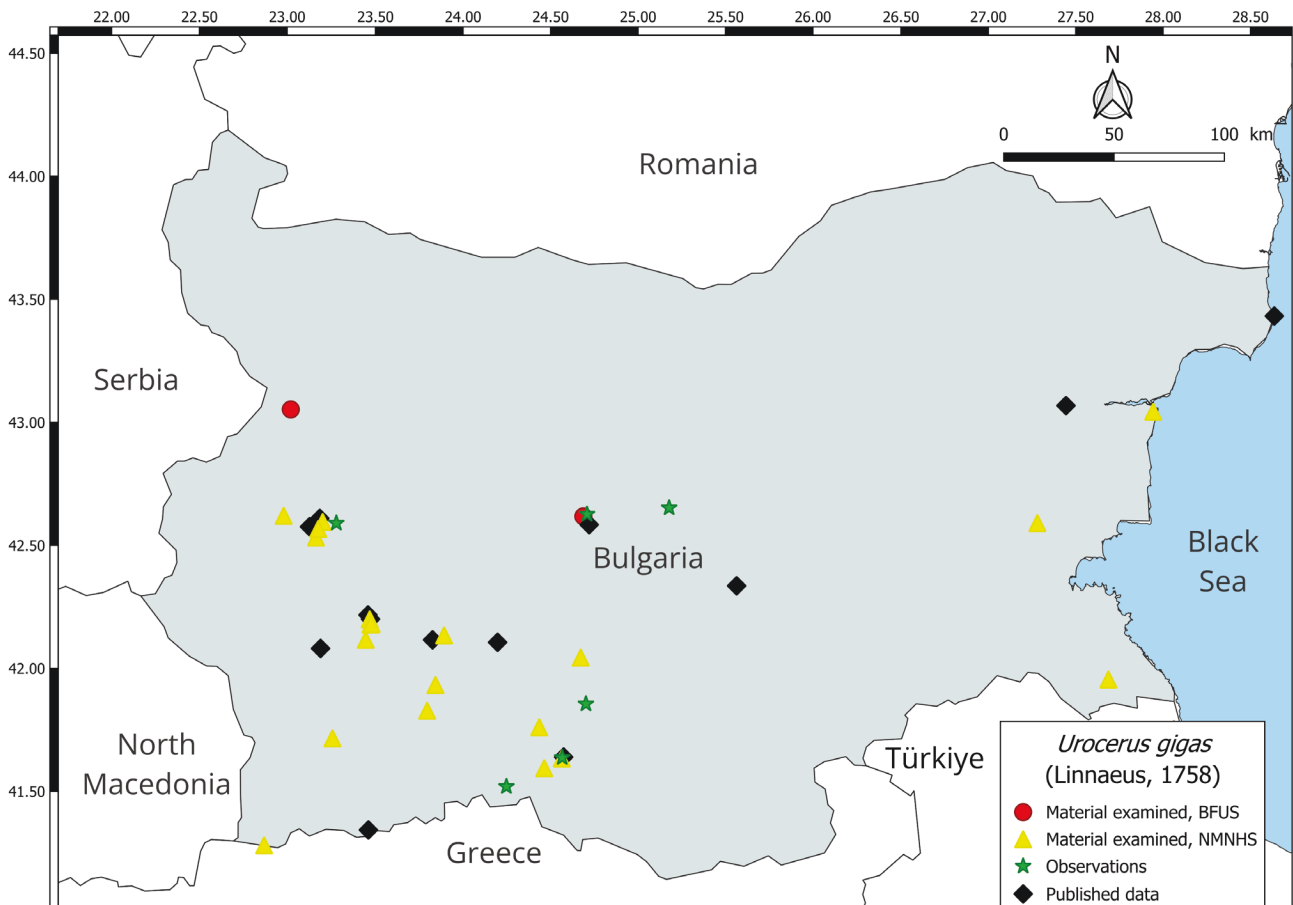


Fig. 4 – Known distribution of *Urocerus gigas* in Bulgaria.

P. Drenski, 3♀ (NMNHS); 10 Jul 1950, leg. I. Buresch & A. Popov, 1♀ (NMNHS); 22 Jul 1950, leg. I. Buresch, 3♀ (NMNHS); 25 Jul 1951, leg. I. Buresch & A. Popov, 1♀ (NMNHS); 6 Aug 1952, leg. I. Buresch & A. Popov, 1♀ (NMNHS); 20 Aug 1953, leg. P. Drenski, 1♀ (NMNHS); 1 Jul 1954, leg. I. Buresch & A. Popov, 1♀ (NMNHS); Musala peak, 24 Aug 1923, leg. D. Litcheff, 1♀ (NMNHS); Solenata voda river [Soleno dere], 21 Jul 1931, leg. P. Drenski, 1♀ (NMNHS); **Pirin Mt.:** Banderitsa Hut, 10 Jul 1915, leg. I. Buresch, 1♀ (NMNHS); **Rhodopi Mts.:** Shiroka Laka, 28 Jun 1924, leg. D. Iltschew, 1♀ (NMNHS); Chepelare, 30 Jun 1924, leg. D. Iltschew, 1♀ (NMNHS); Velingrad, State Forest Enterprise Chehlyovo, 1-7 Aug 1925, leg. P. Drenski, 1♀ (NMNHS); Chepino, 30 Jun 1927, leg. I. Buresch & P. Drenski, 1♀ (NMNHS); Persenk hut, 29 Jul 1965, leg. N. Atanasov, 1♀ (NMNHS); Belovo, no date, leg. J. Milde, 2♀ (NMNHS); **Northern Black Sea coast:** Varna, Gjundjuza (Borovets), 12 Jun 1968, leg. A. Slivov, 1♀ (NMNHS).

**Observations – BULGARIA: Central Stara Planina Mts.:** Ambaritsa hut, 42.7201°N, 24.7810°E, 2160 m, 30 Jul 2021, obs. A. Marinov, 1♀; Uzana, 42.7540°N, 25.2349°E, 1241 m, 23 Jul 2023, obs. A. Jovchev, 1♀; **Sofia Basin:** Sofia, 42.6486°N, 23.4008°E, 558 m, 19

Apr 2022, obs. V. Dimitrov, 1♀; **Rhodopi Mts.:** Chepelare, 41.7247°N, 24.6806°E, 1120 m, 12 Jun 2017, obs. R. Karakushev, 1♀; Plovdiv, Byala cherkva, 41.9464°N, 24.8022°E, 1200m, 20 Jul 2019, obs. R. Andreev, 2♀; Trigrad, 41.6002°N, 24.3814°E, 1230 m, 28 Jun 2025, obs. M. Doytchinova, 1♀.

*Note:* First record for Western and Eastern Stara Planina Mts., Lyulin Mt., Strandzha Mt. and Belasitsa Mt.

## Discussion

This study provides new data on the occurrence and geographic distribution of species from the family Siricidae in Bulgaria. We report *Urocerus augur* as a new record for Bulgaria, increasing the total number of Siricidae species known from the country to eight.

*Urocerus augur* has so far been recorded from Europe and the Middle East. It occurs across most of Europe but has not yet been reported from the Baltic countries, parts of Scandinavia, Portugal, Slovakia, Belarus, and Moldova; within the Balkans, records exist only from Greece, Croatia, and Romania (Taeger et al. 2018). This indicates

that the species is likely distributed throughout the Balkan Peninsula, and its presence in other Balkan countries can be expected. The species is very rare, which explains why it had not been reported in Bulgaria until now. However, Vasilev (1978) and Stoyanov and Ljubomirov (2000) had anticipated its eventual discovery in the country.

The species *Urocerus augur* and *U. gigas* are morphologically very similar. They can be distinguished by the colour of the postocular area of the head: in *U. augur*, it is entirely yellow, with only the medial groove possibly black, while in *U. gigas* it is black. Additionally, the hind tibia of females of *U. gigas* is infuscated only at the extreme apex, whereas in *U. augur*, it is yellow basally and black apically.

*Urocerus augur* is now known from a few regions of Bulgaria, with specimens collected from the Central Stara Planina Mountains, the Sofia Basin, the Rila Mountains, and the Northern Black Sea Coast, as well as recent citizen science observations from the Eastern Danubian Plain and the Northern Black Sea Coast. The species occurs from sea level up to about 1,500 m. In contrast, *U. gigas* is widespread in the country. It is documented from numerous mountain ranges and lowland regions, based on both historical records and newly examined specimens, including material from the Western and Eastern Stara Planina Mountains, Lyulin, Strandzha, and Belasitsa Mountains, which appear to represent the first records for these geomorphological units. Recent citizen science observations further extend its known distribution to additional localities, ranging from near sea level to elevations of over 2,100 m.

The records of both species are from June, July and August, consistent with literature data (Benson 1951). We can conclude that these are the peak activity months for the species in Bulgaria. There are also two records in September, near the end of their activity period. One additional record of *U. gigas* comes from Sofia in April, but it is important to note that this specimen was observed indoors, when the maximum outdoor temperature that day was only 10°C. All observations and examined specimens were of females. This is probably because mating usually takes place high in the tree canopy, after which females descend in search of oviposition sites. Females are most often noticed, photographed, or collected when they are stationary during wood inspection or egg-laying.

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