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ON THE FAUNA OF GASTERUPTIID WASPS (HYMENOPTERA, EVANIOIDEA, GASTERUPTIIDAE) OF BELARUS

A. M. Ostrovsky

E-mail: arti301989@mail.ru

A. M. Ostrovsky (https://orcid.org/0000-0003-1729-9750)

On the Fauna of Gasteruptiid Wasps (Hymenoptera, Evanioidea, Gasteruptiidae) of Belarus. Ostrovsky, A. M. — Based on the samples of gasteruptiid wasps belonging to the family Gasteruptiidae and genus *Gasteruption* Latreille, 1796 collected in Gomel area during 2005–2021, the six species are recorded for the first time from Belarus. A brief information on distribution and ecology of these species is given.
Key words: Evanioidea, Gasteruptiidae, *Gasteruption*, new records, Belarus.

Introduction

The family Gasteruptiidae is nearly worldwide distribution (except Micronesia and most of Polynesia), and about 500 species were described so far. The most species inhabit tropical and subtropical regions than in temperate areas. The family is represented in Europe by about 30 species belonging to the single genus *Gasteruption* Latreille, 1796 (Madl & Mitroiu, 2019).

The European members of the genus are medium sized wasps with slender body. The combination of the inflated hind tibia, the unarmed hind femur and the elongate propleuron (neck) makes them easy to recognize. Adults can be found near bee nests (in wood or in vertical walls) and on flowers with easily accessible nectar. The larva consumes first the bee larva (behaving as an ectoparasitoid) and continues with the stored food (making it a "predator-inquiline"). Considering the size of some individuals, it is likely that in some cases more than one larva and its food is devoured. Adult females may show interest in nests of Vespidae Eumeninae and Crabronidae, but there is no inclusive evidence that they are suitable hosts. The adults fly conspicuously in front of the bee nests with the metasoma upwards and using the hind legs for balance (Achterberg, 2019).

Belarusian fauna of Gasteruptiidae was hitherto poorly studied. Two species of the genus *Foenus* Fabricius (now a junior synonym of *Gasteruption* Latreille) were recorded by Arnold (1901) from the territory of Belarus more based on the material collected some 150 years ago in the Mogilev Province of Russian Empire, which at that time included part of Belarus within its current borders (but without specifying the exact place and time of collection).

The present contribution brings information on four species of the genus *Gasteruption* new to the Belarusian fauna. There is also information about new localities for other two species previously known from Belarus (Arnold, 1901).

The aims of the paper are:
– updating the information on gasteruptiid wasps in Belarus;
– filling the gaps in our knowledge of the distribution of Gasteruptiidae within the country,
– updating the checklist of Belarusian species.

Material and methods

The records are based on specimens collected by the author during the vegetation seasons of 2005–2021 in south-eastern Belarus. Insects were collected manually with the use of entomological net. The identification of species is based on the keys by Bogusch (2021). To study the morphological features of individual species a binocular microscope

MBS–10 and manual 7× and 10× magnifying lenses were used. The GPS coordinates (as DD°MM'SS") and altitude (in m a. s. l.) of the collecting sites are provided. Materials are deposited in the author's personal collection.

List of the Species

Genus *Gasteruption* Latreille, 1796

Gasteruption assectator (Linnaeus, 1758)

Material examined. Belarus: Gomel Region: Buda-Koshelevo District, Uvarovichi, 52°35'43" N, 30°43'50" E, 137 a. s. l., on window of log house, 15.06.2005, 1 ♂; Gomel District, edge of power line clearing in mixed forest W of Budatin, 52°25'36" N, 31°04'19" E, 145 a. s. l., on flowers of *Solidago canadensis* L., 03.08.2017, 2 ♀; Gomel District, the edge of the power line clearing in the mixed forest W of Gomel, 52°24'39" N, 30°53'49" E, 135 a. s. l., on flowers, 13.07.2019, 1 ♀; Bragin District, vil. Kirovo, 51°24'32" N, 30°34'47" E, 105 a. s. l., on wall of abandoned log house, 16.07.2020, 1 ♀; Loev District, vil. Karpovka, 52°01'28" N, 30°54'40" E, 114 a. s. l., on dry wood, 12.06.2021, 1 ♂ (Ostrovsky).

Distribution. Holarctic species. Almost all of Europe: Belarus (Arnold, 1901: as *Foenus affectator* F.); Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Finland, France (incl. Corsica), Croatia, Cyprus, Georgia, Germany, Greece, Hungary, Italy (incl. Sardinia and Sicily), Lithuania, Northern Macedonia, Montenegro, The Netherlands, Norway, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, and the United Kingdom, also in Middle East Asia: Jordan, Syria, and Iran, and in Morocco and Tunisia in North Africa (Ferrière, 1946; Šedivý, 1958; Hedqvist, 1973; Oehlke, 1984; Madl, 1989; Pagliano & Scaramozzino, 2000; Achterberg, 2013; Broad & Livermore, 2014; Strumia & Pagliano, 2014; Achterberg & Talebi, 2014; Žikić et al., 2014; Ceccolini, 2016; Vas, 2016; Orlovskyté et al., 2018; Madl & Mitroiu, 2019; Özbek, 2020; Wiśniowski, 2020; Bogusch, 2021). Also known from the USA and Canada (Johansson & Achterberg, 2016), China and Japan (Achterberg, 2019).

Notes. Recorded from May to September. Predator-inquiline of bees and wasps nesting in cavities and loess walls. Bees of the genus *Hylaeus* (Colletidae) are reported as the main hosts: *H. annularis* (Kirby), *H. brevicornis* Nylander, *H. communis* Nylander, *H. confusus* Nylander, *H. pectoralis* Förster, and *H. rinki* (Górski) (Höppner, 1904; Wagner, 1907; Wolf, 1953; Malyshev, 1964; Danks, 1971; Westrich, 1979; Brechtel, 1986; Wall, 1994; Jakubzik & Cölln, 1997; Tscharntke et al., 1998; Bürger, 2004; Pereira-Peixoto et al., 2016; Orlovskyté et al., 2018); direct proof from the nest of *H. punctatus* (Brullé) was published by Šedivý (1958). Smaller species of Megachilidae were also reported: *Chelostoma florisomne* (Linnaeus), *Ch. rapunculi* (Lepeletier), *Heriades truncorum* (Linnaeus), and *Osmia caerulescens* (Linnaeus) (Lindemans, 1921; Nicholson, 1928; Jakubzik & Cölln, 1997; Tscharntke et al., 1998; Westrich, 2008; Petrischak, 2014; Achterberg & Talebi, 2014; Breugel, 2014). Several authors have reported also crabronid wasps *Passaloecus cuspidatus* Smith, *Pemphredon fabricii* (Müller), *P. lethifer* (Shuckard), and *Trypoxylon figulus* (Linnaeus) (Höppner, 1904; Bradley, 1908; Habermehl, 1921; Fahringer, 1922; Ferrière, 1946; Györfi & Bajari, 1962; Oehlke, 1984; Bogusch et al., 2018) or solitary wasps (Vespidae): *Odynerus spinipes* (Linnaeus) (Györfi & Bajari, 1962; Oehlke, 1984), although no host records of wasps for any *Gasteruption* have been directly confirmed (Bogusch et al., 2018). Parslow et al. (2020) have summarised all host records of this species. Like most species of this genus, *G. assectator* frequently visits flowers of multiple species of families Apiaceae and Asteraceae (Wall, 1994).

Gasteruption boreale (Thomson, 1883)

Material examined. Belarus: Gomel Region: Buda-Koshelevo District, Uvarovichi, 52°35'43" N, 30°43'49" E, 137 a. s. l., at a wooden buildings, 15.06.2005, 1 ♀ (Ostrovsky).

Distribution. Probably widespread in Europe; some old records of *G. assectator* may belong here; Austria, Bulgaria, Czech Republic, Finland, Germany, Hungary, Lithuania, Netherlands, Norway, Russia, Serbia, Slovakia, Slovenia, Sweden, Turkey and Ukraine (Johansson & Achterberg, 2016; Orlovskyté et al., 2018; Özbek, 2020; Bogusch, 2021); Belarus (**first record**).

Notes. May to September. Biology is poorly known. Host range apparently covers some species recorded as hosts of *G. assectator* (Parslow et al., 2020). Orlovskyté et al. (2018) recorded *Hylaeus communis* Nylander (Colletidae) as a host of *G. boreale*. This species is the probably occurs mainly in warmer regions. Like most species of this genus, *G. boreale* frequently visits flowers of multiple species of families Apiaceae and Asteraceae (Bogusch, 2021).

Gasteruption caucasicum (Guérin-Méneville, 1844)

Material examined. Belarus: Gomel Region: Gomel District, SW "Romantika" gardens near Klenki, 52°27'44" N, 31°05'22" E, 121 a. s. l., dry wood on floodplain meadow, 25.06.2020, 1 ♀; Gomel District, the edge of the power line clearing in the mixed forest E of Zalyad'e, 52°25'12" N, 31°13'16" E, 123 a. s. l., on flowers of *Solidago canadensis* L., 23.08.2020, 1 ♀ (Ostrovsky).

Distribution. Western Palaearctic species. Most of Europe: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Finland, France (incl. Corsica), Greece (incl. Crete and Chalkidiki), Hungary, Italy (incl. Sardinia and Sicily), Israel, Lithuania, Macedonia, Montenegro, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom; Asia: Syria, Iran, Turkmenistan and Uzbekistan (Ferrière, 1946; Šedivý, 1958; Hedqvist, 1973; Oehlke, 1984; Madl, 1989; Pagliano & Scaramozzino, 2000; Broad & Livermore, 2014; Strumia & Pagliano, 2014; Achterberg & Talebi, 2014; Žikić et al., 2014; Ceccolini, 2016; Orlovskyté et al., 2018; Madl & Mitroiu, 2019; Achterberg, 2019; Özbek, 2020; Wiśniowski, 2020; Bogusch, 2021); Belarus (**first record**).

Notes. May to September. Hosts: *Colletes daviesanus* Smith and *Hylaeus soror* (Pérez) of Colletidae (Ferton, 1910, 1914; Malyshev, 1964; Achterberg & Talebi, 2014; Breugel, 2014) and *Heriades truncorum* (Linnaeus) and *Osmia versicolor* Latreille of Megachilidae (Fahringer, 1922; Ferrière, 1946; Crosskey, 1951; Šedivý, 1958; Györfi & Bajari, 1962; Oehlke, 1984; Wall, 1994), summarized by Parslow et al. (2020). It feeds on flowers of Asteraceae and Apiaceae plants, and on *Dorycnium herbaceum* Vill. (Fabaceae) and *Paliurus spina-christi* Mill. (Rhamnaceae) (Wall, 1994).

Gasteruption erythrostomum (Dahlbom, 1831)

Material examined. Belarus: Gomel Region: Gomel District, SW "Romantika" gardens near Klenki, 52°27'44" N, 31°05'22" E, 121 a. s. l., dry wood on floodplain meadow, 25.06.2020, 2 ♀ (Ostrovsky).

Distribution. European species. Europe: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Finland, France (incl. Corsica), Germany, Greece, Hungary, Italy, Lithuania, Montenegro, Netherlands, Poland, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland (Ferrière, 1946; Šedivý, 1958; Hedqvist, 1973; Oehlke, 1984; Madl, 1989; Pagliano & Scaramozzino, 2000; Wiśniowski, 2004, 2020; Achterberg, 2013; Strumia & Pagliano, 2014; Žikić et al., 2014; Vas, 2016; Orlovskyté et al., 2018; Madl & Mitroiu, 2019; Bogusch, 2021); Belarus **(first record**).

Notes. June to August. Hosts: Colletidae: *Hylaeus communis* Nylander, *H. hyalinatus* Smith, *H. pectoralis* Förster and *H. punctatus* (Brülle) (Malyshev, 1964; Oehlke, 1984; Jakubzik & Cölln, 1997; Windschnurer, 1997), smaller Megachilidae: *Chelostoma campanularum* (Kirby), *Ch. rapunculi* (Lepeletier) (Achterberg, 2013; Breugel, 2014; Bogusch, 2021). The ecology of *G. erythrostomum* is poorly known. Usually recorded at forest margins, wood-and-steppes and mesic meadows; not found on xerothermous sites (Bogusch, 2021). Both sexes visit mostly flowers of Apiaceae and occasionally also Asteraceae (Wall, 1994).

Gasteruption jaculator (Linnaeus, 1758)

Material examined. Belarus: Gomel Region: Buda-Koshelevo District, Uvarovichi, 52°35'43" N, 30°43'49" E, 137 a. s. l., at a wooden building, collection date unknown, 1 ♀; same locality, 24.06.2005, 1 ♀; Gomel District, edge of power line clearing in mixed forest W of Budatin, 52°25'36" N, 31°04'19" E, 145 a. s. l., on flowers of *Solidago canadensis* L., 03.08.2017, 1 ♀; Gomel District, SW "Romantika" gardens near Klenki, 52°27'44" N, 31°05'22" E, 121 a. s. l., dry wood on floodplain meadow, 25.06.2020, 1 ♀; Bragin District, vil. Kirovo, 51°24'32" N, 30°34'47" E, 105 a. s. l., on wall of abandoned log house, 16.07.2020, 1 ♀; Gomel District, on a plot of dead wood S of "Glushets" gardensnear Starye Dyatlovichi, 52°14'44" N,

30°50'30" E, 132 a. s. l., at the logs, 09.08.2020, 1 ♀; Gomel District, S of Rudnya Marimonova, 52°09'10" N, 30°42'31" E, 115 a. s. l., at a dry wood on the shore of a small lake in the floodplain of the Dnipro River, 25.06.2021, 1 ♀ (Ostrovsky).

Distribution. Western Palaearctic species. Europe: Belarus (Arnold, 1901); Austria, Belgium, Bulgaria, Croatia, Czech Republic, France, Finland, Germany, Greece, Hungary, Italy (incl. Sicily), Moldova, Montenegro, Netherlands, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and the United Kingdom (Ferrière, 1946; Šedivý, 1958; Hedqvist, 1973; Oehlke, 1984; Madl, 1989; Pagliano & Scaramozzino, 2000; Achterberg, 2013; Broad & Livermore, 2014; Strumia & Pagliano, 2014; Achterberg & Talebi, 2014; Žikić et al., 2014; Ceccolini, 2016; Vas, 2016; Orlovskyté et al., 2018; Madl & Mitroiu, 2019; Özbek, 2020; Wiśniowski, 2020; Bogusch, 2021); Asia: Iran, Syria, Turkmenistan and Uzbekistan; North Africa (Achterberg & Talebi 2014; Bogusch, 2021). More common in central and northern Europe than in the south.

Notes. May to September. Most hosts are the colletid bees: *Colletes daviesanus* Smith and *Colletes* sp. (Höppner, 1904; Oehlke, 1984; Achterberg & Talebi, 2014; Breugel, 2014); *Hylaeus annulatus* (Linnaeus), *H. confusus* Nylander, *H. communis* Nylander, *H. difformis* (Eversmann), *H. leptocephalus* (Morawitz), *H. pectoralis* Förster and an unidentified species of this genus (Malyshev, 1964; Oehlke, 1984; Westrich, 1989; Wall, 1994; Achterberg & Talebi, 2014; Orlovskyté et al., 2018; Bogusch, 2021); also associated with Megachilidae: *Chelostoma florisomne* (Linnaeus), *Heriades truncorum* (Linnaeus), *Hoplitis tridentata* (Dufour et Perris), *Osmia bicornis* (Linnaeus) and *Osmia leaiana* (Kirby) (Höppner, 1904; Morley, 1916; Crosskey, 1951; Malyshev, 1966; Oehlke, 1984). Additional records: crabronidae wasps: *Pemphredon lugubris* (Fabricius) (Morley, 1937; Oehlke, 1984), *Trypoxylon figulus* (Linnaeus) (Höppner, 1904) and *Lestiphorus bicinctus* (Rossi) (Oehlke, 1984), and Vespidae: *Symmorphus murarius* (Linnaeus) (Oehlke, 1984). Both sexes occur on flowers of Apiaceae, Asteraceae and Fabaceae plants (Wall, 1994).

Gasteruption undulatum (Abeille de Perrin, 1879)

Material examined. Belarus: Gomel Region: Bragin District, vil. Gden', 51°20'36" N, 30°26'37" E, 105 a. s. l., on wall of abandoned log house, 27.07.2020, 1 ♀ (Ostrovsky).

Distribution. Western Palaearctic species. Europe: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Finland, France + Corsica, Germany, Greece, Hungary, Italy + Sardinia, Netherlands, Poland, Portugal, Serbia, Slovakia, Spain, Switzerland, Turkey and Ukraine (Šedivý, 1958; Madl, 1990; Pagliano & Scaramozzino, 2000; Achterberg, 2013; Strumia & Pagliano, 2014; Achterberg & Talebi, 2014; Žikić et al., 2014; Ceccolini, 2016; Madl & Mitroiu, 2019; Wiśniowski, 2020; Bogusch, 2021). Recorded in Asia from Kazakhstan, Kyrgyzstan, Tajikistan, Turkey and Uzbekistan (Achterberg & Talebi, 2014; Özbek, 2020; Bogusch, 2021). Also known from Algeria and Iran (Achterberg, 2019). Belarus (**first record**).

Notes. Recorded from June to September. Biology poorly known. Hosts unknown, possibly parasitizing nests of smaller bees of Colletidae (*Hylaeus*) and Megachilidae. This species is restricted to warmer regions where is locally numerous. Adults visit flowers of Apiaceae plants, it is numerous on *Falcaria vulgaris* Bernh. (Bogusch, 2021); Wall (1994) reported occurrence on flowers of *Dorycnium herbaceum* Vill. (Fabaceae).

Conclusion

As the result of this study, six species of gasteruptiid wasps are recorded from the southeastern Belarus. Four species, *G. boreale*, *G. caucasicum*, *G. erythrostomum* and *G. undulatum*, are new for the Belarusian fauna. The fauna of Belarus is composed of one Holarctic species, three West-Palaearctic and two European species.

Orlovskyté et al. (2018), Madl & Mitroiu (2019) and Wiśniowski (2020) list 6–15 species of gasteruptiid wasps for the neighboring countries; thus, additional species are expected to be found in the forthcoming studies of gasteruptiid wasps of Belarus.

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