

## Checklist of the genus *Bracon* (Hymenoptera: Braconidae) in Serbia

Vladimir Žikić<sup>1\*</sup>, Saša S. Stanković<sup>1</sup>, Marijana Ilić<sup>1</sup>

<sup>1</sup>Faculty of Science and Mathematics, Department of Biology and Ecology, University of Niš, Višegradska 33, 18000 Niš, Serbia

\* E-mail: vzikic@yahoo.com

### Abstract:

Žikić, V., Stanković, S., Ilić, M.: Checklist of the genus *Bracon* (Hymenoptera: Braconidae) in Serbia, *Biologica Nyssana*, 3 (1), September 2012: 21-29.

This is the first checklist of the genus *Bracon* for the territory of Serbia. Here we present 80 species of this cosmopolitan genus of the subfamily Braconinae which is one of the cyclostome braconid groups. We connected the parasitoids with their hosts where the data about them were available. There are 290 host species in total belonging to 39 families of four insect orders: Diptera, Coleoptera, Hymenoptera and Lepidoptera.

**Key words:** Cyclostome Braconidae, *Bracon*, Serbia, checklist

## Introduction

Braconinae belongs to the cyclostome group of the family Braconidae. This subfamily assembles ectoparasitoid wasps which lay their eggs on the host body. According to their biology, ectoparasitic braconid wasps belong to the group of idiobionts; which means that they do not permit the host to continue its development after oviposition (Mathews, 1974). Oviposition in this group is split in two acts: paralisation of the host, than laying eggs which is opposite in koinobions. As a cosmopolitan group of parasitoids they represent a large and powerful biological weapon (eg. Baird, 1958; Lewis *et al.*, 1990) against various pests from the following holometabolous insect orders: Diptera, Coleoptera, Hymenoptera and Lepidoptera. The species of the genus *Bracon* show different degree of the host specificity, ranging from a strict specialization to only one host species, whereas other can be polyphagous, when parasitism occurs in more than a hundred hosts in different types of

habitats and geographical areas (Shaw & Huddleston, 1991). Because of their important role in biological control, biology of some species is very well studied: for *B. intercessor* (van Achterberg *et al.*, 1990; Georgiev *et al.*, 2005), for *B. brevicornis* (Temerak, 1982), or many publications for *B. hebetor* and its host *Plodia interpunctella* (Pyralidae) (Reinert *et al.*, 1971; Taylor, 1988a, b; Yu *et al.*, 1999; Milonas, 2005; Dweck *et al.* 2010). According to the Fauna Europaea (van Achterberg, 2012), about 250 species of the genus *Bracon* are recorded in Europe. The present publication stemmed from the need to make the list of all registered *Bracon* species on the territory of Serbia after many years of investigation and also to connect the parasitoids with their hosts. Investigation of the genus *Bracon* in Serbia in different aspects is presented in following publications by the authors Belokobyskij & Žikić (2009); Brajković (1989); Brajković *et al.* (1991, 1994); Stanković *et al.* (2010) and Žikić *et al.* (2000, 2010, 2012).

## Materials and methods

The majority of analyzed specimens were taken from the collection of the Faculty of Biology, University of Belgrade and the Faculty of Sciences and Mathematics, University of Niš, Serbia. A part of specimens is deposited at the Zoological Institute RAS (St. Petersburg, Russia) and The Natural History Museum of Budapest, Hungary. The data about braconid hosts are compiled using the available literature; the list of references is bellow. The basic key for the identification of the species we used is one by Tobias *et al.* (1986), updated Fauna Europaea (<http://faunaeur.org>) and the database Taxapad (Yu *et al.* 2012). A lot of information about the hosts and the distribution of the investigated genus we collected from Papp (1973, 1977, 2008) and Beyarslan *et al.* (2005).

## Results

We present 80 species of the genus *Bracon* registered on the territory of Serbia. The data regarding parasitoids are connected with the adequate data about their hosts. The species of *Bracon* are listed alphabetically according to their subgenera. For 25 braconid species there were no host records for Serbia nor for other parts of Europe. In addition, we give the geographical distribution of all registered parasitoids in continental part of Europe and Russia.

***Bracon (Bracon) alutaceus*** Szepligeti 1901 – no host data. Distribution: Austria, Great Britain, Bulgaria, Cyprus, Czech Republic, Denmark, Germany, Hungary, Lithuania, Poland, Russia (Northwestern), Slovakia, Spain, Sweden, Ukraine, Serbia.

***Bracon (Bracon) crassiceps*** Thomson 1892 – no host data. Distribution: Austria, Finland, Germany, Hungary, Russia (Northwestern), Sweden, Switzerland, Serbia.

***Bracon (Bracon) crassungula*** Thomson 1892 – no host data. Distribution: Austria, Hungary, Italy, Sweden, Switzerland, Serbia.

***Bracon (Bracon) filicornis*** Thomson 1892 – no host data. Distribution: Austria, Sweden, Serbia.

***Bracon (Bracon) flagellaris*** Thomson 1892 – no host data. Distribution: Croatia, Germany, Hungary, Romania, Russia (South), Slovenia, Sweden, Switzerland, Ukraine, Serbia.

***Bracon (Bracon) fulvipes*** Nees 1834 on *Apion minimum*, *Cistapion cyanescens* (Apionidae);

*Curculio villosus*, *Mononychus punctumalbum* (Curculionidae); *Tetramesa brevicornis* *T. hyalipennis* (Eurytomidae); *Coleophora coronillae* (Coleophoridae); *Paranthrene tabaniformis* (Sesiidae). Distribution: Austria, Belgium, Great Britain, Bulgaria, Croatia, Turkey, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Poland, Russia (Central and South), Slovakia, Slovenia, Spain, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Bracon) grandiceps*** Thomson 1892 on *Bembecia scopigera* (Sesiidae). Distribution: Austria, Croatia, Turkey, Finland, France, Germany, Greece, Hungary, Italy, Macedonia, Poland, Russia (South), Slovenia, Sweden, Serbia.

***Bracon (Bracon) intercessor*** Nees 1834 on *Apion opeticum* (Apionidae); *Agapanthia villosoviridescens* (Cerambycidae); *Anthonomus pedicularius*, *A. pomorum*, *A. sorbi*, *Lixus brevirostris*, *L. incanescens*, *L. junci*, *L. scabricollis*, *Microlarinus lareynii*, *M. lypriformis* (Curculionidae); *Rhynchites bacchus* (Rhynchitidae); *Tetramesa hyalipennis*, *T. rossica* (Eurytomidae); *Haplochrois theae* (Agonoxenidae); *Augasma atraphaxidellum* (Coleophoridae); *Synanthedon culiciformis*, *Paranthrene tabaniformis* (Sesiidae); *Sparganothis pilleriana* (Tortricidae). Distribution: Albania, Austria, Great Britain, Bulgaria, Croatia, Cyprus, Turkey, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Macedonia, Norway, Poland, Romania, Russia (Central, East, Northwestern and South), Slovakia, Slovenia, Spain, Sweden, Switzerland, Netherlands, Ukraine, Serbia.

***Bracon (Bracon) laetus*** Wesmael 1838 on *Anthonomus pomorum*, *Magdalis nitida* (Curculionidae); *Amblypalpis tamaricella* (Gelechiidae); *Argyresthia chrysidella*, *Prays citri*; *Prays oleae* (Yponomeutidae). Distribution: Belgium, Great Britain, Bulgaria, Croatia, Cyprus, Czech Republic, France, Germany, Greece, Hungary, Spain, Serbia.

***Bracon (Bracon) leptus*** Marshall 1897 on *Metzneria lapella* (Gelechiidae). Distribution: Austria, Great Britain, Bulgaria, Croatia, Cyprus, Germany, Greece, Hungary, Lithuania, Macedonia, Romania, Russia (Central and South), Slovakia, Slovenia, Spain, Switzerland, Netherlands, Serbia.

***Bracon (Bracon) longicollis*** Wesmael 1838 on *Chlorops pumilionis* (Chloropidae). Distribution: Austria, Belgium, Great Britain, Bulgaria, Croatia, Cyprus, Turkey, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, Macedonia, Norway, Poland, Russia (Central, Northwestern and South),

Slovenia, Spain, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Bracon) longulus*** Thomson 1892 on *Oscinella frit* (Chloropidae). Distribution: Austria, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Macedonia, Norway, Slovenia, Spain, Sweden, Netherlands, Serbia.

***Bracon (Bracon) luteator*** Spinola 1808 on *Urophora solstitialis* (Tephritidae); *Metzneria aestivella*, *M. lappella* (Gelechiidae). Distribution: Austria, Great Britain, Bulgaria, Croatia, Cyprus, Turkey, France, Greece, Hungary, Italy, Latvia, Macedonia, Russia (Central, Northwestern and South), Slovakia, Spain, Switzerland, Ukraine, Serbia.

***Bracon (Bracon) mariae*** Dalla Torre 1898 on *Chaetorellia jaceae* (Tephritidae). Distribution: Bulgaria, Croatia, Germany, Hungary, Italy, Russia (South), Slovakia, Spain, Sweden, Switzerland, Ukraine, Serbia.

***Bracon (Bracon) mediotriatus*** Papp 1968 – no host data. Distribution: Hungary, Serbia.

***Bracon (Bracon) nigratus*** Wesmael 1838 on *Chaetostomella cylindrica* (Tephritidae); *Coleophora millefolii* (Coleophoridae); *Grapholita compositella* (Tortricidae); *Zygaena loti* (Zygaenidae). Distribution: Austria, Belgium, Great Britain, Croatia, Czech Republic, France, Germany, Hungary, Ireland, Italy, Lithuania, Romania, Russia (Central and North), Slovakia, Slovenia, Spain, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Bracon) pallicarpus*** Thomson 1892 – no host data. Distribution: Great Britain, Bulgaria, Finland, Germany, Hungary, Italy, Spain, Sweden, Serbia.

***Bracon (Bracon) pectoralis*** Wesmael 1838 on *Chrysobothris affinis*, *Sphenoptera gossypii*, *S. lobicollis*, *S. montana* (Buprestidae); *Plagionotus arcuatus*, *Plagionotus bobelayei* (Cerambycidae). Distribution: Austria, Belgium, Great Britain, Bulgaria, Croatia, Cyprus, Turkey, France, Germany, Greece, Hungary, Italy, Macedonia, Romania, Russia (Central and South), Slovakia, Spain, Switzerland, Serbia.

***Bracon (Bracon) scabriusculus*** Dalla Torre 1898 – no host data. Distribution: Austria, Germany, Hungary, Italy, Romania, Russia (Central), Spain, Serbia.

***Bracon (Bracon) scutellaris*** Wesmael 1838 on *Anobium abietis* (Anobiidae); *Euura mucronata*, *Pontania pedunculi*, *P. viminalis* (Tenthredinidae).

Distribution: Belgium, Great Britain, Finland, France, Hungary, Ireland, Italy, Poland, Sweden, Netherlands, Serbia.

***Bracon (Bracon) speerschneideri*** Schmiedeknecht 1897 on *Argyresthia thuiella*, *Ocnerostoma* sp. (Yponomeutidae). Distribution: Austria, Great Britain, France, Germany, Norway, Sweden, Switzerland, Serbia.

***Bracon (Bracon) subglaber*** Szepliget 1901 on *Noeeta pupillata*, *Tephritis leontodontis*, *Terellia serratulae*, *Urophora cardui*, *U. quadrifasciata*, *U. solstitialis* (Tephritidae); *Metzneria lappella* (Gelechiidae); *Epichnopterix sieboldi* (Psychidae); *Paranthrene tabaniformis*, *Pennisetia hylaeiformis* (Sesiidae); *Aethes williana* (Tortricidae). Distribution: Croatia; Germany; Hungary; Italy, Kazakhstan, Moldova, Russia (Russia-Krasnodar, Yaroslavl Oblast), Slovenia, Switzerland, Ukraine, Serbia.

***Bracon (Bracon) trucidator*** Marshall 1888 on *Metzneria lappella* (Gelechiidae). Distribution: Albania, Austria, Belgium, Great Britain, Bulgaria, Croatia, Denmark, Turkey, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Poland, Romania, Russia (Central, Northwestern and South), Slovenia, Spain, Switzerland, Netherlands, Serbia.

***Bracon (Bracon) variegator*** Spinola 1808 on *Ernobius abietis* (Anobiidae); *Coleophora iutipennella* (Coleophoridae); *Agonopterix propinquella*, (Depressariidae); *Anarsia lineatella*, *Recurvaria nanella*, *Teleiodes luculella* (Gelechiidae); *Phyllonorycter klemannella*, *Ph. mespillella* (Gracillariidae); *Endrosis sarcitrella* (Oecophoridae); *Acrobasis obsutella* (Pyrilidae); *Archips rosana*, *Cydia strobilella*, *Tortrix viridana* (Tortricidae); *Yponomeuta padella* (Yponomeutidae). Distribution: Albania, Austria, Croatia, Cyprus, France, Hungary, Italy, Macedonia, Russia (South), Sardinia, Spain, Switzerland, Ukraine, Serbia.

***Bracon (CyanopteroBracon) sabulosus*** Szepliget 1896 on Tephritidae. Distribution: Bulgaria, Croatia, Cyprus, Greece, Hungary, Macedonia, Romania, Russia (South), Serbia.

***Bracon (CyanopteroBracon) urinator*** (Fabricius 1798) on *Larinus saussureae*, *L. sturnus*, *Rhinocyllus conicus* (Curculionidae); *Tephritis pulchra* (Tephritidae). Distribution: Albania, Austria, Belgium, Bosnia and Herzegovina, Great Britain, Bulgaria, Croatia, Cyprus, Turkey, France, Germany, Greece, Hungary, Italy, Macedonia, Portugal, Romania, Russia (Central, East,

Northwestern and South), Slovakia, Spain, Sweden, Switzerland, Netherlands, Ukraine, Serbia.

***Bracon (Cyanopterobracon) uromelas*** Costa 1888 – no host data. Distribution: Albania, Austria, Croatia, Cyprus, France, Hungary, Italy, Macedonia, Russia (South), Sardinia, Spain, Switzerland, Ukraine, Serbia.

***Bracon (Glabrobracon) abbreviator*** Nees 1834 on *Anthonomus pomorum* (Curculionidae); *Lipara lucens* (Chloropidae); *Cephus pygmaeus* (Cepidae); *Coleophora troglodytella* (Coleophoridae); *Mesapamea secalis*, *Oria musculosa*, *Sesamia nonagrioides* (Noctuidae); *Pennisetia hylaeiformis* (Sesiidae); *Cochylis posterna*, *Pandemis heparana*, *Rhyacionia buoliana* (Tortricidae). Distribution: Austria, Great Britain, Croatia, Cyprus, Czech Republic, Finland, Germany, Hungary, Poland, Romania, Slovakia, Spain, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Glabrobracon) arcuatus*** Thomson 1892 – no host data. Distribution: Austria, Great Britain, Bulgaria, Croatia, Cyprus, Czech Republic, Germany, Greece, Hungary, Slovenia, Sweden, Netherlands, Serbia.

***Bracon (Glabrobracon) atrator*** Nees 1834 on *Omphalopion budbergi* (Apionidae); *Gymnetron villosulum* (Curculionidae); *Amauromyza flavifrons* (Agromyzidae); *Tephritis conura*, *T. separata* (Tephritidae); *Coleophora coronillae* (Coleophoridae). Distribution: Austria, Belgium, Great Britain, Bulgaria, Croatia, Cyprus, Turkey, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Macedonia, Poland, Russia (Central, Northwestern and South), Slovakia, Spain, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Glabrobracon) caudatus*** Ratzeburg 1848 on *Hylesinus fraxini* (Curculionidae). Distribution: Austria, Great Britain, Bulgaria, Czech Republic, Germany, Greece, Hungary, Poland, Serbia.

***Bracon (Glabrobracon) caudiger*** Nees 1834 on *Coleophora obscenella* (Coleophoridae); *Aphelia amplana*, *Cydia splendana*, *C. strobilella* (Tortricidae). Distribution: Austria, Belgium, Czech Republic, Turkey, France, Germany, Hungary, Italy, Poland, Romania, Russia (Central, North, Northwestern and South), Sweden, The Netherlands, Serbia.

***Bracon (Glabrobracon) colpophorus*** Wesmael 1838 on *Coleophora* sp. (Coleophoridae). Distribution: Austria, Belgium, Great Britain, Czech Republic, France, Germany, Hungary, Italy, Moldova, Poland, Romania, Russia (Northwestern), Netherlands, Ukraine, Serbia.

***Bracon (Glabrobracon) coniferarum*** Fahringer 1928 on *Millieria dolosalis* (Choreutidae); *Coleophora gallipennella*, *C. serratella* (Coleophoridae). Distribution: Great Britain, Bulgaria, Czech Republic, Germany, Italy, Poland, Switzerland, Netherlands, Serbia.

***Bracon (Glabrobracon) delibator*** Haliday 1833 on *Gymnetron campanulae*, *Hylobius piceus* (Curculionidae); *Olibrus aeneus* (Phalacridae); *Urophora cuspidata* (Tephritidae); *Cydia strobilella* (Tortricidae). Distribution: Austria, Belgium, Bosnia and Herzegovina, Great Britain, Bulgaria, Croatia, Cyprus, Czech Republic, Turkey, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Macedonia, Poland, Russia (Central and South), Slovakia, Slovenia, Spain, Sweden, Switzerland, Netherlands, Ukraine, Serbia.

***Bracon (Glabrobracon) delusor*** Spinola 1808 – no host data. Distribution: Austria, Croatia, France, Germany, Italy, Latvia, Poland, Russia (Northwestern), Serbia.

***Bracon (Glabrobracon) dichromus*** Wesmael 1838 on *Gymnetron asellus* (Curculionidae); *Platyedra subcinerea* (Gelechiidae); *Grapholita funebrana* (Tortricidae). Distribution: Austria, Belgium, Bulgaria, Croatia, Cyprus, France, Germany, Hungary, Italy, Poland, Romania, Slovakia, Spain, Serbia.

***Bracon (Glabrobracon) discoideus*** Wesmael 1838 on *Saperda populnea* (Cerambycidae); *Anthonomus pomorum*, *A. spilotus*, *Ceutorhynchus assimilis*, *C. quadridens*, *Curculio crux*, *C. nucum*, *C. pyrrhoceras*, *C. salicivorus*, *Pissodes notatus* (Curculionidae); *Byctiscus betulae*, *B. populi*, *Rhynchites pauxillus* (Rhynchitidae); *Chlorops pumilionis* (Chloropidae); *Biorhiza pallida* (Cynipidae); *Euura mucronata*, *Pontania bridgmanii*, *P. collactanea*, *P. foetidae*, *P. pedunculi*, *P. proxima*, *P. vesicator*, *P. viminalis* (Tenthredinidae); *Anticlea badiata* (Geometridae); *Adoxophyes orana*, *Rhyacionia buoliana* (Tortricidae). Distribution: Austria, Belgium, Great Britain, Bulgaria, Czech Republic, France, Germany, Hungary, Ireland, Italy, Poland, Romania, Russia (Northwestern), Slovakia, Slovenia, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Glabrobracon) fumatus*** Szepliget 1901 – no host data. Distribution: Austria, Croatia, Cyprus, Turkey, France, Greece, Hungary, Russia (South), Spain, Switzerland, Serbia.

***Bracon (Glabrobracon) fuscipennis*** Wesmael 1838 on *Gastrophysa polygoni*, *G. viridula*, *Plagioderia versicolora* (Chrysomelidae). Distribution: Austria,

Belgium, Croatia, France, Germany, Hungary, Italy, Poland, Slovenia, Serbia.

***Bracon (Glabrobracon) hyalinipennis*** Szepliget 1901 – no host data. Distribution: Hungary, Serbia.

***Bracon (Glabrobracon) immutator*** Nees 1834 on *Anthonomus rubi*, *Ceutorhynchus pleurostigma*, *Cryptorhynchus lapathi*, *Curculio villosus*, *Pissodes notatus* (Curculionidae); *Urophora stylata* (Tephritidae); *Biorhiza pallida*, (Cynipidae). Distribution: Austria, Belgium, Bosnia and Herzegovina, Great Britain, Croatia, Cyprus, Czech Republic, Finland, France, Germany, Hungary, Italy, Macedonia, Poland, Romania, Russia (Central, North, and Northwestern), Slovenia, Sweden, Switzerland, Netherlands, Ukraine, Serbia.

***Bracon (Glabrobracon) larvicida*** Wesmael 1838 – no host data. Distribution: Austria, Belgium, Great Britain, Bulgaria, Croatia, Turkey, France, Germany, Greece, Hungary, Italy, Poland, Romania, Russia (Central, Northwestern and South), Slovakia, Slovenia, Serbia.

***Bracon (Glabrobracon) marshalli*** Szepliget 1901 on *Trachys* sp. (Buprestidae); *Myopites inulaedyssentericae* (Tephritidae); *Cydia nigricana* (Tortricidae). Distribution: Great Britain, Bulgaria, Croatia, Cyprus, Denmark, Finland, Germany, Greece, Hungary, Italy, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Serbia.

***Bracon (Glabrobracon) minutator*** (Fabricius 1798) on *Anthonomus pomorum* (Curculionidae); *Lipara lucens* (Chloropidae); *Trypeta jaceae* (Tephritidae); *Cephus pygmaeus* (Cepidae); *Caloptilia syringella* (Gracillariidae); *Mesapamea secalis*, *Oria musculosa*, *Sesamia nonagrioides* (Noctuidae); *Pennisetia hylaeiformis* (Sesiidae); *Cochylis posterana*, *Leguminivora glycinivorella*, *Rhyacionia buoliana* (Tortricidae). Distribution: Albania, Austria, Belgium, Great Britain, Bulgaria, Cyprus, Czech Republic, Denmark, Turkey, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Macedonia, Norway, Poland, Russia (Central and South), Slovakia, Slovenia, Spain, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Glabrobracon) obscurator*** Nees 1811 on *Trachys pumilus*, *T. troglodytes* (Buprestidae); *Hylesinus fraxini*, *Ips typographus*, *Orthotomicus suturalis*, *Trypodendron domesticum*, *T. signatum* (Curculionidae); *Coleophora caespititiella* (Coleophoridae); *Epermenia fulviguttella* (Epermeniidae); *Homoeosoma sinuella* (Pyrilidae). Distribution: Austria, Belgium, Bosnia and Herzegovina, Great Britain, Bulgaria, Croatia,

Cyprus, Czech Republic, Denmark, Turkey, Finland, France, Germany, Greece, Hungary, Italy, Macedonia, Poland, Romania, Russia (Central, Northwestern and South), Slovakia, Slovenia, Spain, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Glabrobracon) osculator*** Nees 1811 on *Millieria dolosalis* (Choreutidae); *Coleophora albicostella*, *C. alticolella*, *C. caespititiella*, *C. colutella*, *C. discordella*, *C. flaviella*, *C. frischella*, *C. gallipennella*, *C. lutipennella*, *C. milvipennis*, *C. obscenella*, *C. ochrea*, *C. saponariella*, *C. serenella*, *C. serratella*, *C. solitariella*, *C. spinella*, *Co. spiraeella*, *C. therinella*, *C. trifariella*, *C. vibicella*, *C. vicinella*, *C. vulpecula*, *Coleophora* sp.1, *Coleophora* sp.2 (Coleophoridae); *Cosmopterix eximia* (Cosmopterigidae); *Elachista contaminatella*, *Elachista* sp. (Elachistidae); *Phyllonorycter* sp. (Gracillariidae); *Mompha conturbatella* (Momphidae); *Ectoedemia agrimoniae* (Nepticulidae); *Retinia perangustana* (Tortricidae). Distribution: Austria, Belgium, Bosnia and Herzegovina, Great Britain, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Turkey, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Macedonia, Poland, Romania, Russia (Central, East, Northwestern and South), Slovakia, Slovenia, Spain, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Glabrobracon) peroculatus*** Wesmael 1838 on *Cnephasia chrysanthaeana* (Tortricidae). Distribution: Belgium, Finland, France, Germany, Hungary, Italy, Russia (Central), Serbia.

***Bracon (Glabrobracon) picticornis*** Wesmael 1838 on *Clytus* sp., *Plagionotus arcuatus* (Cerambycidae); *Nematus bipartitus*, *N. salicis*, *Pontania pedunculi*, *P. proxima*, *P. vesicator*, *P. viminalis* (Tenthredinidae); *Cochylis pallidana* (Tortricidae). Distribution: Austria, Belgium, Great Britain, Bulgaria, Turkey, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Poland, Russia (Central, Northwestern and South), Slovakia, Spain, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Glabrobracon) pineti*** Thomson 1892 on *Ernobius abietis*, *E. longicornis* (Anobiidae); *Cydia strobilella* (Tortricidae). Distribution: Austria, Bulgaria, Croatia, Czech Republic, Finland, Germany, Hungary, Lithuania, Moldova, Poland, Russia (Central, North, Northwestern and South), Slovakia, Sweden, Serbia.

***Bracon (Glabrobracon) ratzeburgii*** Dalla Torre 1898 on *Ceutorhynchus maculaalba*, *Hylesinus fraxini*, *Scolytus rugulosus* (Curculionidae). Distribution: Great Britain, Germany, Italy, Serbia.

***Bracon (Glabrobracon) terebella*** Wesmael 1838 on *Miarus campanulae* (Curculionidae); *Cephus pygmaeus*, *Trachelus tabidus* (Cephididae). Distribution: Austria, Belgium, Great Britain, Denmark, Finland, Germany, Hungary, Italy, Lithuania, Poland, Romania, Russia (Central, Northwestern and South), Slovakia, Sweden, Switzerland, Serbia.

***Bracon (Glabrobracon) titubans*** Wesmael 1838 – no host data. Distribution: Austria, Belgium, Bulgaria, Finland, France, Germany, Hungary, Italy, Poland, Russia (Northwestern), Slovakia, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Glabrobracon) tornator*** Marshall 1885 – no host data. Distribution: Austria, Great Britain, Bulgaria, Croatia, Finland, Germany, Greece, Hungary, Italy, Sweden, Switzerland, Serbia.

***Bracon (Glabrobracon) variator*** Nees 1811 on *Bruchidius lividimanus*, *Bruchus atomarius*, *B. laticollis*, *B. lentis*, *B. viciae* (Bruchidae); *Anthonomus pomorum*, *Baris chlorizans*, *B. cuprirostris*, *B. laticollis*, *Ceutorhynchus punctiger*, *Gymnetron asellus*, *G. tetrum*, *Larinus jaceae*, *L. turbinatus*, *Magdalis rufa*, *Miarus campanulae*, *Pissodes validirostris*, *Sibinia viscaria*, *Sitona longulus* (Curculionidae); *Chaetostomella cylindrica*, *Noeeta pupillata*, *Sphenella marginata*, *Tephritis leontodontis* (Tephritidae); *Hoplocampa brevis*, *H. flava* (Tenthrenidae); *Colephora coronillae*, *C. medelichenis* (Coleophoridae); *Mesophleps corsicella*, *Pexicopia malvella*, *Platyedra subcinerea*, (Gelechiidae); *Phyllonorycter mespilella* (Gracillariidae); *Hadena bicruris* (Noctuidae); *Dioryctria abietella*, *Etiella zinckenella*, *Myelois circumvoluta* (Pyrilidae); *Synathedon andrenaeformis* (Sesiidae); *Barbara herrichiana*, *Cydia strobilella*, *Eucosma cana*, *Grapholita funebrana*, *G. lunulana*, *Pandemis cerasana*, *Retinia resinella* (Tortricidae). Distribution: Austria, Belgium, Bosnia and Herzegovina, Great Britain, Bulgaria, Canary Is., Croatia, Cyprus, Czech Republic, Turkey, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Russia (Central, East, North, Northwestern and South), Slovakia, Slovenia, Spain, Sweden, Switzerland, Netherlands, Ukraine, Serbia.

***Bracon (Habrobracon) brevicornis*** Wesmael 1838 on *Sesamia cretica* (Noctuidae). Distribution: Belgium, Great Britain, Bulgaria, Czech Republic, France, Germany, Hungary, Italy, Poland, Portugal, Romania, Russia (Central and South), Slovakia, Spain, Switzerland, Netherlands, Serbia.

***Bracon (Habrobracon) hebetor*** Say 1836 on *Ostrinia nubilalis* (Crambidae); *Pexicopia malvella* (Gelechiidae); *Helicoverpa armigera*, *Heliothis peltigera*, *Spodoptera littoralis* (Noctuidae); *Ephestia elutella*, *E. kuehniella*, *Etiella zinckenella*, *Galleria mellonella*, *Plodia interpunctella* (Pyrilidae); *Adoxophyes orana*, *Lobesia botrana* (Tortricidae). Distribution: Austria, Belgium, Great Britain, Bulgaria, Croatia, Cyprus, Czech Republic, Turkey, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, Macedonia, Poland, Russia (Central and South), Slovakia, Slovenia, Spain, Netherlands, Serbia.

***Bracon (Lucobracon) apricus*** Schmiedeknecht 1897 – no host data. Distribution: Germany, Greece, Serbia.

***Bracon (Lucobracon) exarator*** Marshall 1885 – no host data. Distribution: Great Britain, Germany, Serbia.

***Bracon (Lucobracon) femoralis*** Brullé, – no host data. Distribution: Cyprus, Greece, Hungary, Spain, Switzerland, Serbia.

***Bracon (Lucobracon) fortipes*** Wesmael 1838 on *Plagionotus floralis* (Cerambycidae); *Lixus anguinus* (Curculionidae); *Gortyna xanthenes* (Noctuidae); *Bembecia scopigera* (Sesiidae). Distribution: Belgium, Bulgaria, Croatia, Cyprus, France, Germany, Greece, Hungary, Italy, Poland, Slovenia, Switzerland, Serbia.

***Bracon (Lucobracon) fumarius*** Szepligeti 1901 – no host data. Distribution: Austria, Croatia, Cyprus, Hungary, Romania, Serbia.

***Bracon (Lucobracon) hungaricus*** (Szepligeti 1896) on *Clytus arietis* (Cerambycidae). Distribution: Bulgaria, Croatia, Turkey, Hungary, Russia (Central and South), Slovakia, Ukraine, Serbia.

***Bracon (Lucobracon) hylobii*** Ratzeburg 1848 on *Hylobius abietis*, *H. piceus*, *Pissodes harcyniae*, *P. notatus*, *P. piceae*, *P. pini*, *Polygraphus polygraphus* (Curculionidae). Distribution: Austria, Great Britain, Bulgaria, Czech Republic, Denmark, Germany, Hungary, Italy, Lithuania, Poland, Russia (Central and Northwestern), Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Lucobracon) megapterus*** Wesmael 1838 on *Glaphyra umbellatarum* (Cerambycidae); *Chaetorellia jaceae* (Tephritidae). Distribution: Belgium, Bulgaria, Czech Republic, Finland, France, Germany, Sweden, Serbia.

***Bracon (Lucobracon) nigriventris*** Wesmael 1838 on *Plagionotus floralis* (Cerambycidae); *Hylobius piceus*, *Pissodes pini* (Curculionidae). Distribution:

Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Turkey, Germany, Hungary, Italy, Poland, Romania, Russia (South), Slovakia, Switzerland, Ukraine, Serbia.

***Bracon (Lucobracon) ochraceus*** Szepligeti 1896 – no host data. Distribution: Croatia, Hungary, Russia (South), Spain, Switzerland, Serbia.

***Bracon (Lucobracon) planiceps*** Telenga 1936 – no host data. Distribution: Russia (North), Serbia.

***Bracon (Lucobracon) romani*** Fahringer 1927 on *Chamaesphexia bibioniformis*, *Paranthrene tabaniformis*, *Pennisetia hylaeiformis*, *Sesia apiformis*, *S. bembeciformis*, *Synanthedon culiciformis*, *S. spheciformis* (Sesiidae). Distribution: Greece, Hungary, Slovakia, Slovenia, Sweden, Netherlands, Serbia.

***Bracon (Lucobracon) thuringiacus*** Schmiedeknecht 1896 – no host data. Distribution: Great Britain, Germany, Greece, Italy, Serbia.

***Bracon (Lucobracon) triangularis*** Nees 1834 on *Synanthedon tipuliformis* (Sesiidae). Distribution: Great Britain, Bulgaria, Czech Republic, Finland, Germany, Hungary, Ireland, Italy, Poland, Slovakia, Switzerland, Netherlands, Serbia.

***Bracon (Orthobracon) epitriptus*** Marshall 1885 on *Cryptorhynchus lapathi*, *Hylobius transversovittatus*, *Pissodes* spp. (Curculionidae); *Agromyza flaviceps* (Agromyzidae); *Iteomyia capreae* (Cecidomyiidae); *Fenusa pumila* (Tenthredinidae). Distribution: Austria, Great Britain, Bulgaria, Germany, Greece, Hungary, Italy, Lithuania, Poland, Russia (Central, Northwestern and South), Slovakia, Slovenia, Switzerland, Netherlands, Serbia.

***Bracon (Orthobracon) erraticus*** Wesmael 1838 on *Gastrophysa viridula*, *Phaedon cochleariae*, *Phyllotreta nemorum* (Chrysomelidae); *Chaetostomella cylindrca*, *Urophora eriolepidis*, *Terellia serratulae* (Tephritidae); *Coleophora laricella*, *C. lutipennella* (Coleophoridae); *Metzneria lappella* (Gelechiidae); *Pennisetia hylaeiformis* (Sesiidae); *Acleris rhombana* (Tortricidae). Distribution: Austria, Belgium, Bosnia and Herzegovina, Great Britain, Bulgaria, Croatia, Cyprus, Turkey, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Macedonia, Poland, Russia (Central, East, North, Northwestern, and South), Slovakia, Slovenia, Spain, Sweden, Switzerland, Netherlands, Ukraine, Serbia.

***Bracon (Orthobracon) exhilarator*** Nees 1834 on *Omphalopion hookerorum* (Apionidae); *Nanna* sp.

(Scatophagidae); *Acleris rhombana* (Tortricidae). Distribution: Belgium, Great Britain, Bulgaria, Cyprus, Turkey, Finland, France, Germany, Hungary, Italy, Latvia, Lithuania, Norway, Poland, Russia (Central, North, Northwestern and South), Slovakia, Sweden, Switzerland, Netherlands, Serbia.

***Bracon (Orthobracon) laevigatissimus*** Dalla Torre 1898 on *Plagionotus arcuatus* (Cerambycidae); *Pontania pedunculi*, *P. proxima*, *P. vesicator*, *P. viminalis* (Tenthredinidae). Distribution: Austria, Great Britain, Finland, France, Germany, Italy, Poland, Romania, Switzerland, Netherlands, Serbia.

***Bracon (Orthobracon) ochropus*** Nees 1834 – no host data. Distribution: Austria, France, Germany, Italy, Serbia.

***Bracon (Orthobracon) roberti*** Wesmael 1838 on *Synanthedon andrenaeformis* (Sesiidae); *Cydia strobilella* (Tortricidae). Distribution: Austria, Belgium, Great Britain, Turkey, France, Germany, Ireland, Russia (Northwestern), Netherlands, Serbia.

***Bracon (Orthobracon) subcylindricus*** Wesmael 1838 – no host data. Distribution: Belgium, Great Britain, France, Poland, Russia (Northwestern), Serbia.

***Bracon (Orthobracon) tenuicornis*** Wesmael 1838 on *Phloetribus scarabaeoides* (Curculionidae). Distribution: Belgium, Great Britain, France, Hungary, Russia (South), Sweden, Netherlands, Serbia.

***Bracon (Striobracon) idrianus*** Fahringer 1934 on *Hylesinus oleiperda* (Curculionidae). Distribution: Serbia.

## Discussion

The present account is the first summary of all available data about the genus *Bracon* and its hosts until now on the territory of Serbia. Out of total number 250 *Bracon* species in Europe, 80 species are present in Serbian fauna. We have registered 290 hosts for 55 parasitoid species connected in 409 trophic associations. The hosts come from four insect orders. The most frequent hosts belong to Lepidoptera and Coleoptera, whereas Diptera and Hymenoptera are less parasitized. Numbers in brackets refer to the number of registered host species.

1. Diptera (28) with five families: Agromyzidae (2); Chloropidae (3); Cecidomyiidae (1) Scatophagidae (1) and Tephritidae (21).
2. Coleoptera (109) with nine families: Anobiidae (3); Apionidae (5); Bruchidae (5); Buprestidae

- (7); Cerambycidae (12); Chrysomelidae (6); Curculionidae (66); Phalacridae (1) and Rhynchitidae (4).
3. Hymenoptera (26) with four families: Cephidae (2); Cynipidae (1); Eurytomidae (3) and Tenthredinidae (20).
4. Lepidoptera (128) with 21 families: Agonoxenidae (1); Choreutidae (1); Coleophoridae (37); Cosmopterigidae (1); Crambidae (1); Depressariidae (1); Elachistidae (1); Epermeniidae (1); Gelechiidae (11); Geometridae (1); Gracillariidae (4); Momphidae (1); Nepticulidae (1); Noctuidae (5); Oecophoridae (1); Psychidae (1); Pyralidae (9); Sesiidae (14); Tortricidae (24); Yponomeutidae (6) and Zygaenidae (1).

The most suitable host species in these trophic relations parasitoid-host, belongs to the coleopteran family Curculionidae and lepidopteran family Coleophoridae especially the genus *Coleophora* which has 11 parasitoids registered in this work. The tortricid moth *Cydia strobilella* has remarkably wide range of parasitoids, six *Bracon* species were registered here as parasitoids of this moth (*B. (Bracon) variegator*, *B. (Glabrobracon) caudiger*, *B. (Glabrobracon) delibator*, *B. (Glabrobracon) pineti*, *B. (Glabrobracon) variator* and *B. (Orthobracon) roberti*). We noted that *Bracon idrianus* is present only on the territory of Serbia. This basic research shows better insight into the trophic interactions about each parasitoid species which can help in further biological control programs. Nonetheless, it can ease the identification of some parasitoid species according to their hosts.

**Acknowledgements.** The authors wish to express their deepest gratitude to Dr. Sergey A. Belokobylskij from the Zoological Institute RAS (St. Petersburg, Russia) and Dr. Jenő Papp from The Natural History Museum of Budapest, Hungary for the identification of parasitoid specimens and to Dr. Aleksandar Četković from the Faculty of Biology, University of Belgrade for the loan of some specimens from his collection. For the present work the authors were supported by the Ministry of Science and Environment Protection of the Republic of Serbia (Grant No. III43001).

## References

- Achterberg, C. van 2012: Fauna Europaea: Braconidae. In: van Achterberg (ed.): Fauna Europaea: Hymenoptera: Symphyta + Ichneumonoidea. *Fauna Europaea*, Version 2.5. <http://www.faunaeur.org>
- Achterberg, C. van, Hemminga, M.A., Soelen, J. van 1990: New host record of *Bracon intercessor* Nees f. *megasomides* Strand (Hymenoptera: Braconidae), a parasite of *Agapanthia villosoviridescens* DeGeer (Coleoptera: Cerambycidae) in salt marshes. *Zoologische Mededelingen*, 64 (3): 25-29.
- Achterberg, C. van. 1985: Notes On Braconidae I-IV. *Zoologische Mededelingen*, 59 (15): 163-167.
- Baird, A.B. 1958: Biological control of insects and plant pests in Canada. In: Baecker, E.C., (ed.), *Proceedings of 10<sup>th</sup> International Congress of Entomologist*, Ottawa, 4: 483-485.
- Belokobylskij, S.A., Žikić, V. 2009: New data on cyclostome braconid subfamilies Doryctinae, Exothecinae, Rogadinae and Braconinae (Braconidae: Hymenoptera) of Serbia and neighbouring territories. *Acta Entomologica Serbica*, 14 (1): 65-71.
- Beyarslan, A., Çetin Erdoğan, Ö., Aydoğdu, M. 2005: A survey of Braconinae (Hymenoptera, Braconidae) of Turkish Western Black Sea Region. *Linzer Biologische Beiträge*, 37 (1): 195-213.
- Brajković, M., 1989: Knowledge of the Braconidae (Hymenoptera) fauna in Yugoslavia. *Glasnik Prirodnjačkog muzeja*, B (43/44): 127-138.
- Brajković, M., Krunić, M., Tomanović, Ž., 1991: A Contribution to the braconid Fauna (Braconidae: Hymenoptera) of Yugoslavia. In: Hawksworth, D.L. (ed.): Proceedings of the Fourth European Congress of Entomology and the XIII Internationale Symposium für Entomofaunistik Mitteleuropas, *Hungarian Natural History Museum, Budapest*, (2): 424-428.
- Brajković, M., Krunić, M., Tomanović, Ž., 1994: Research of braconids (Braconidae: Hymenoptera) of Deliblatska peščara. In: Marinković, P. (ed.): *Proceedings of Deliblatski pesak, Srbijašume*, 6: 197-502
- Dweck, H.K., Svensson, G.P., Gündüz, E.A., Anderbrant, O. 2010: Kairomonal response of the parasitoid, *Bracon hebetor* Say, to the male-produced sex pheromone of its host, the greater waxmoth, *Galleria mellonella* (L.). *Journal of Chemical Ecology*, 36: 171-178.
- Fischer, M. 1959: Neue und wenig bekannte Braconiden aus Jugoslawien (Hymenoptera). *Acta Musei Macedonici Scientiarum Naturalium*, 6 (1): 53: 1-25.
- Georgiev, G. 2005: Bioecological characteristics of *Bracon intercessor* Nees (Hymenoptera: Braconidae) as a parasitoid of the poplar clearwing moth, *Paranthrene tabaniformis*



- (Rott.) (Lepidoptera: Sesiidae) in Bulgaria. *Journal of Pest Science*, 78: 161-165.
- Lewis, W.J., Vet, L.E.M., Tumlinson, J.H., van Lenteren, J.C., Papaj, D.R. 1990: Variations in parasitoid foraging behavior: essential element of a sound biological control theory. *Environmental Entomology*, 19: 1183-1193.
- Mathews, R.W. 1974: Biology of Braconidae. *Annual Review of Entomology*, 19: 15-32.
- Milonas, P.G. 2005: Influence of initial egg density and host size on the development of the gregarious parasitoid *Bracon hebetor* on three different host species. *Biocontrol*, 50: 415-428.
- Papp, J. 1973: Contributions to the braconid fauna of Yugoslavia (Hymenoptera, Braconidae) I. *Acta Musei Macedonici Scientiarum Naturalium*, Skopje, 14 (1: 119): 1-23.
- Papp, J. 1977: Contribution to the Braconid fauna of Yugoslavia. (Hymenoptera: Braconidae) III. *Folia Entomologica Hungarica (Series nova)*, 30: 105-117.
- Papp, J. 2008: A revision of the *Bracon* (subgenera *Bracon* s. str., *Cyanopterobracon*, *Glabrobracon*, *Lucobracon*, *Osculobracon*, subgen. n., *Pigeria*) species described by Szépligeti from the western Palaearctic region. *Biologia*, 65 (1): 110-112.
- Reinert, J.A., King, E.W. 1971. Action of *Bracon hebetor* Say as a parasite of *Plodia interpunctella* at controlled densities. *Annals of the Entomological Society of America*, 64: 1335-1340.
- Shaw, M.R. and Huddleston, T. 1991: Classification and biology of braconid wasps (Hymenoptera: Braconidae). Royal Entomological Society of London, London. 126p.
- Stanković, S., Žikić, V., Ilić, M. 2010: *Betula* species as host plants for various insects parasitized by braconids (Hymenoptera: Braconidae) in Serbia. *Biologica Nyssana*, 1 (1-2): 117-122.
- Taylor, A.D. 1988a: Host effects on larval competition in the gregarious parasitoid *Bracon hebetor*. *Journal of Animal Ecology*, 57: 163-172.
- Taylor, A.D. 1988b: Host effects on functional and ovipositional responses of *Bracon hebetor*. *Journal of Animal Ecology* 57: 173-184.
- Temerak, A.S. 1982: Laboruntersuchungen zur Wirtshabitat-Wahl von *Bracon brevicornis* Wesm. (Hym., Braconidae), einem Parasitoiden der Raupen von *Sesamia cretica* Led. (Lep., Noctuidae) in Sorghum-Stengeln. *Anzeiger für Schädlingskunde, Berlin und Hamburg*, 55: 152-154.
- Tobias, V.I., Belokobylskij, S.A., Kotenko, A.G. 1986: Family Braconidae. - In: Medvedev G.S. (ed.). A Key to Insects of the European Part of the USSR. Hymenoptera 3: 4. *Leningrad: Nauka*. 500 p. [In Russian].
- Yu, D.S., Achterberg, C. van, Horstmann, K. 2012: World Ichneumonoidea 2011. Taxonomy, biology, Morphology and distribution (Braconidae). Taxapad (Scientific names for information management) *Interactive catalogue on DVD/CDROM*. Vancouver.
- Yu, S.-H., Ryoo, M.II., Na, J.H. 1999: Life History of *Bracon hebetor* (Hymenoptera: Braconidae) on *Plodia interpunctella* (Lepidoptera: Pyralidae) on a Dried Vegetable Commodity. *Journal of Asia-Pacific Entomology*, 2 (2): 149-152.
- Žikić, V., Achterberg, C. van, Stanković, S. 2010: A contribution to Braconidae, Hybrizontidae (Ichneumonoidea: Hymenoptera) and Stephanidae (Stephanoidea: Hymenoptera) from the south-West Balkans. *Acta Entomologica Serbica*, 15 (2): 227-235.
- Žikić, V., Brajković, M., Tomanović, Ž. 2000: Preliminary results of Braconid fauna research (Braconidae: Hymenoptera). *Acta Entomologica Serbica*, 5 (1/2): 95-111.
- Žikić, V., Stanković, S.S., Ilić, M., Kavallieratos, N.G. 2012: Braconid parasitoids (Hymenoptera: Braconidae) on poplars and aspen (*Populus* spp.) in Serbia and Montenegro. *North-Western Journal of Zoology [in press]*.

