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A study on the Braconidae (Hymenoptera: Ichneumonoidea) from some regions of northern Iran

Hassan GHAHARI & Maximilian FISCHER

Abstract

The fauna of Braconidae (Hymenoptera) from northern Iran is studied in this paper. In a total 32 species from 12 genera and subgenera and 9 subfamilies (Agathidinae, Alysinae, Brachistinae, Braconinae, Cheloninae, Euphorinae, Microtypinae, Opiinae, Rhyssalinae) were collected and identified. Among the collected materials, 2 species including, *Bracon* (*Glabrobracon*) *kirgisorum* TELENGA and *Chelonus microsomus* TOBIAS are newly recorded from Iran.

K e y w o r d s : Hymenoptera, Braconidae, Parasitoid, Fauna, Iran.

Zusammenfassung

Die Braconidenfauna (Hymenoptera) nördlicher Regionen des Irans wird erörtert. Insgesamt konnten 32 Arten aus 12 Gattungen bzw. Untergattungen und 9 Unterfamilien (Agathidinae, Alysinae, Brachistinae, Braconinae, Cheloninae, Euphorinae, Microtypinae, Opiinae, Rhyssalinae) nachgewiesen werden. *Bracon* (*Glabrobracon*) *kirgisorum* TELENGA und *Chelonus microsomus* TOBIAS erwiesen sich als neu für den Iran.

Introduction

Braconids (Hymenoptera: Braconidae) are one of the most diverse and powerful parasitoids which have efficient role in biological control programs. These parasitoids show a variety of biologies. Hosts are usually the larvae of Holometabola, although nymphs of Hemimetabola and adults of both Holometabola and Hemimetabola are also parasitized. Two major lineages occur within this family, the cyclostome and non-cyclostome braconids. Most species are endoparasitic koinobionts, although a large number are idiobiont ectoparasitoids. Idiobionts generally paralyze their hosts, lay an egg on or near the host, and begin consuming it immediately after the egg hatches. Most idiobionts are ectoparasitoids (ASKEW & SHAW 1986; SHARKEY 1993). Koinobionts usually do not paralyze their prey, and typically an egg is laid inside the host. The egg hatches immediately but undergoes a quiescent period while the host grows to an appropriate size and stage. Koinobionts usually exercise some control over the development of their hosts (VINSON & IWANTSCH 1980), and because they are closely associated with the life cycles of their hosts, they have limited host ranges. On the other hand, idiobionts are usually not closely synchronized with their hosts, and host ranges are generally quite large (ASKEW & SHAW 1986). Ectoparasitism and the idiobiont development are ground-plan attributes of Braconidae (SHARKEY 1993). Nevertheless, both endoparasitism and koinobiosis appear to have developed a few times independently within the family. Early larval development in braconids has also yielded surprises, such as the discovery of relatively closely related genera that differ in such import aspects as syncitial versus holoblastic cleavage, normally characterizing major animal phyla (GRBIC & STRAND 1998). Parasitism of adult insects (especially of Hemiptera and Coleoptera) is also known, and members of two subfamilies (Mesostoinae and Doryctinae) form galls on plants (INFANTE et al. 1995; AUSTIN & DANGERFIELD 1998). Several excellent general reviews of braconid biology are available (MATTHEWS 1974; SHAW & HUDDLESTON 1991; SHAW 1995; WHARTON 1993).

The fauna of Iranian Braconidae and also northern Iran was not studied very well (GHAHARI et al. 2009a, b, c, d, 2010), while Iran is a large country and therefore includes diverse faunistical types. This paper deals with the fauna of Northern Iran (South of Caspian Sea) towards to completing the fauna of Iranian Braconidae step by step.

Materials and Methods

The materials were collected by malaise traps and also rearing of hosts in optimum condition in incubator. The sampled regions of this research were included some areas of four provinces, Ardabil, Mazandaran, Guilan and Golestan located in northern Iran. Classification, nomenclature and distributional data of Braconidae suggested by YU et al. (2006) and for distributional data some other resources (NIXON 1986; TOBIAS 1986; ZETTEL & BEYARSLAN 1992; CETIN & BEYARSLAN 2001; PAPP 2003; YU et al. 2006) have been followed.

Results

Totally 32 braconid species of 12 genera and subgenera and 9 subfamilies were collected and determined from northern Iran. The list of species is given below.

Subfamily A g a t h i d i n a e HALIDAY 1833

Genus *Agathis* LATREILLE 1804

Agathis glaucoptera NEES 1834

M a t e r i a l e x a m i n e d : Guilan province: Astara (4 m), 1♀, July 2006.

D i s t r i b u t i o n outside Iran: Palaearctic: Azerbaijan, France, Germany, Hungary, Italy, Kazakhstan, Macedonia, Russia, Spain, Turkey, Ukraine, former Yugoslavia (YU et al. 2006).

Agathis melpomene NIXON 1986

M a t e r i a l e x a m i n e d : Mazandaran province: Behshahr (66 m), 1♀, April 2006.

D i s t r i b u t i o n outside Iran: Andorra, Austria, Italy, Mongolia, Poland (SIMBOLOTTI & ACHTERBERG 1999), Bulgaria, Hungary (NIXON 1986), Turkey (ZETTEL & BEYARSLAN 1992; CETIN & BEYARSLAN 2001).

Agathis semiaciculata IVANOV 1899

M a t e r i a l e x a m i n e d : Golestan province: Amol (198 m), 2♂♂, July 2007.

D i s t r i b u t i o n outside Iran: Switzerland (SIMBOLOTTI & ACHTERBERG 1999), Ukraine, Azerbaidzhan (Mts Caucasus), Kazakhstan, Greece (PAPP 2003).

Subfamily A l y s i n a e LEACH 1815

Tribe D a c n u s i n i FOERSTER 1862

Genus *Chorebus* HALIDAY 1833

Chorebus flavipes GOUREAU 1851

M a t e r i a l e x a m i n e d : Guilan province: Astara (-9 m), 2♀♀, September 2007.

D i s t r i b u t i o n outside Iran: Kazakhstan and Far East of Asiatic Russia (TOBIAS 1998), Mongolia and Greece (PAPP 2005, 2007), Britain, Denmark, France, Germany, Ireland, Poland (YU et al. 2006), Turkey (YILDRIM et al. 2010).

C o m m e n t : The members of tribe Dacnusini are suggested by GRIFFITHS (1964) to be monophagous parasitoids. On the contrary, Opiinae with similar hosts are often polyphagous or oligophagous parasitoids. The hosts of most species of Opiinae are unknown, but FISCHER (1972) listed several different hosts for diverse species.

Tribe A l y s i i n i LEACH 1815

Genus *Dinotrema* FOERSTER 1862

***Dinotrema intermissum* (FISCHER 1974)**

M a t e r i a l e x a m i n e d : Guilan province: Astara (4 m), 1♀, July 2006

D i s t r i b u t i o n outside Iran: Austria, Netherlands, Turkey (YILDIRIM et al. 2010).

Subfamily B r a c h i s t i n a e FOERSTER 1862

Genus *Schizoprymnus* FOERSTER 1862

***Schizoprymnus excisus* (ŠNOFLAK 1953)**

M a t e r i a l e x a m i n e d : Guilan province: Roodsar (8 m), 1♂, August 2006.

D i s t r i b u t i o n outside Iran: Known in Bohemia, Hungary, Serbia, European Russia, Ukraine, Armenia and Kazakhstan, Mongolia (PAPP 2003).

***Schizoprymnus pallidipennis* (HERRICH-SCHAEFFER 1838)**

M a t e r i a l e x a m i n e d : Mazandaran province: Sari (22 m) (Citrus orchard), 2♀♀, 2♂♂, June 2005.

D i s t r i b u t i o n outside Iran: Oriental, Palaearctic: Armenia, China, Germany, Hungary, Kazakhstan, Russia, Spain, Switzerland, Tajikistan (YU et al. 2006).

Genus *Triaspis* HALIDAY 1835

***Triaspis lugubris* ŠNOFLÁK 1953**

M a t e r i a l e x a m i n e d : Mazandaran province: Amol (148 m), 3♀♀, June, 2007.

D i s t r i b u t i o n outside Iran: Palaearctic: Hungary, Kazakhstan, Korea, Russia (YU et al. 2006).

Subfamily B r a c o n i n a e NEES von ESENBECK 1811

Genus *Bracon* FABRICIUS 1804

***Bracon* (*Bracon*) *fulvipes* NEES, 1834**

M a t e r i a l e x a m i n e d : Guilan province: Astara (4 m), 2♀♀, September 2007.

D i s t r i b u t i o n outside Iran: Austria, Belgium, Caucasus, Central Asia, England, Far East, Finland, France, Germany, Greece, Hungary, Italy, Kazakhstan, Mongolia, the Netherlands, Poland, Russia, Spain, Sweden, former Yugoslavia (SHENEFELT 1978; TOBIAS 1995).

C o m m e n t : One of the most common *Bracon* species in the Palearctic Region (PAPP 1968).

***Bracon* (*Bracon*) *pectoralis* WESMAEL 1838**

M a t e r i a l e x a m i n e d : Ardabil province: Aslandooz (212 m), 3♀♀, September 2008.

D i s t r i b u t i o n outside Iran: Albania, Austria, Azerbaijan, Belgium, Bulgaria, Caucasia, England, France, Germany, Hungary, Italy, Kazakhstan, Russia, Spain, Tunisia, Turkmenistan, Ukraine, former Yugoslavia (PAPP 1968; SHENEFELT 1978; TOBIAS 1995).

***Bracon* (*Bracon*) *trucidator* MARSHALL 1888**

M a t e r i a l e x a m i n e d : Ardabil province: Bilehsavar (145 m), 4♀♀, August 2007.

D i s t r i b u t i o n outside Iran: Belgium, Caucasia, England, France, Hungary, Italy, Kazakhstan, Lithuania, Romania, Russia, Spain, Switzerland, former Yugoslavia (PAPP 1968; SHENEFELT 1978).

***Bracon* (*Cyanopterobracon*) *sabulosus* SZEPLIGETI 1896**

M a t e r i a l e x a m i n e d : Golestan province: Bandar-Torkman (24 m), 1♀, 1♂, September 2007.

D i s t r i b u t i o n outside Iran: Caucasus, Hungary, Kazakhstan, Romania, Russia, former Yugoslavia (SHENEFELT 1978; TOBIAS 1995).

***Bracon* (*Glabrobracon*) *kirgisorum* TELENGA 1936**

M a t e r i a l e x a m i n e d : Golestan province: National Park (134 m), 1♀, October 2007. **New record for Iran.**

D i s t r i b u t i o n outside Iran: Palaearctic (YU et al. 2006).

***Bracon* (*Glabrobracon*) *lividus* TELENGA 1936**

M a t e r i a l e x a m i n e d : Ardabil province: Germi (764 m), 2♀♀, July 2008.

D i s t r i b u t i o n outside Iran: Caucasus and Armenia (TOBIAS 1995).

***Bracon* (*Glabrobracon*) *osculator* NEES 1812**

M a t e r i a l e x a m i n e d : Ardabil province: Pars-Abad (96 m), 2♀♀, June 2007.

D i s t r i b u t i o n outside Iran: Mongolia, Azerbaijan, Caucasus, Russia, former Yugoslavia, Italy, Romania, Poland, Hungary, Switzerland, Sweden, Siberia, Spain, Finland, Denmark, Austria, Belgium, the Netherlands, Germany, France and England (GÜLER & CAGATAY 2001; YU et al. 2006).

***Bracon* (*Glabrobracon*) *tschitscherini* KOKOUJEV 1904**

Material examined: Golestan province: Minoodasht (31 m), 1♀, 1♂, March 2008.

Distribution outside Iran: Middle Asia, Azerbaijan, Kazakhstan, Turkmenia, South Caucasus, Russia, Romania and Hungary (GÜLER & CAGATAY 2001; YU et al. 2006).

***Bracon* (*Glabrobracon*) *variator* NEES 1812**

Material examined: Guilan province: Rasht (39 m), 2♀♀, September 2007.

Distribution outside Iran: China, Middle Asia, Mongolia, Siberia, Russia, Crimea, Romania, former Yugoslavia, former Czechoslovakia, Hungary, Finland, Sweden, Italy, Belgium, the Netherlands, Poland, Austria, Germany, France, Spain, England, Mongolia, Switzerland and Turkey (GÜLER & CAGATAY, 2001; YU et al., 2006).

***Bracon* (*Habrobracon*) *radialis* TELENGA 1936**

Material examined: Golestan province: Bandar-Torkman (24 m), 2♀♀, September 2007.

Distribution outside Iran: Austria, Kazakhstan, Mongolia, Turkistan, (SHENEFELT 1978; TOBIAS 1995).

***Bracon* (*Pigeria*) *piger* WESMAEL 1838**

Material examined: Mazandaran province: Savadkooh (269 m) (Rice field), 1♀, 1♂, May 2008.

Distribution outside Iran: Nearctic, Palaearctic: Afghanistan, Albania, Algeria, Azerbaijan, Belgium, Canary Islands, China, Croatia, Cyprus, Egypt, Finland, France, Georgia, Germany, Greece, Hungary, India, Israel, Italy, Kazakhstan, Macedonia, Moldova, Mongolia, Montenegro, Netherlands, Portugal, Romania, Russia, Saudi Arabia, Serbia, Spain, Sweden, Switzerland, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan, former Yugoslavia (GÜLER & CAGATAY 2001; YU et al. 2006).

***Bracon* (*Rostrobracon*) *urinator* (FABRICIUS 1798)**

Material examined: Mazandaran province: Sari (43 m), 2♀♀, August 2008.

Distribution outside Iran: Albania, Belgium, Caucasus, China, France, Germany, Greece, Hungary, India, Italy, Kazakhstan, Mongolia, the Netherlands, Portugal, Russia, Siberia, Spain, Syria, Tajikistan, Turkey (SHENEFELT 1978; TOBIAS 1995).

Genus *Coeloides* WESMAEL 1838

***Coeloides bostrichorum* GIRAUD 1872**

Material examined: Ardabil province: Pars-Abad (96 m), 3♀♀, June 2007, parasitoid of *Ips typographus* (Coleoptera: Scolytidae).

Distribution outside Iran: Palaearctic (YU et al., 2006).

Subfamily Cheloninae FOERSTER 1862

Genus *Chelonus* JURINE 1801

***Chelonus bidens* TOBIAS 1976**

Material examined: Mazandaran province: Sari (37 m), 2♀♀, 1♂, August 2006.

Distribution outside Iran: South Russia, Kazakhstan (TOBIAS 1986), Turkey (AYDOGDU and BEYARSLAN 2002).

***Chelonus microsomus* TOBIAS 1964**

Material examined: Golestan province: Gorgan (110 m), 1♀, September 2006. **New record for Iran.**

Distribution outside Iran: Kazakhstan (TOBIAS, 1986), Turkey (AYDOGDU & BEYARSLAN 2002).

***Chelonus ocellatus* ALEXEEV 1971**

Material examined: Mazandaran province: Savadkooh (326 m), 1♀, July 2008.

Distribution outside Iran: Crimea, Middle Asia, Turkey (AYDOGDU & BEYARSLAN 2002).

***Chelonus varimaculatus* TOBIAS 1986**

Material examined: Guilan province: Lahijan (3 m), 3♀♀, 1♂, September 2007.

Distribution outside Iran: South Azerbaijan (Tobias, 1986), Turkey (AYDOGDU & BEYARSLAN 2002).

Subfamily Euphorinae FOERSTER 1862

Genus *Leiophron* NEES VON ESENBECK 1819

***Leiophron* (*Euphoriana*) *deficiens* (RUTHE 1856)**

Material examined: Mazandaran province: Ghaemshahr (24 m) (Citrus orchard), 2♀♀, 1♂, October 2007.

Distribution outside Iran: Palaearctic: Finland, Germany, Greece, Kazakhstan, Korea, Moldova, Poland, Russia, Sweden, Ukraine (YU et al. 2006).

***Leiophron* (*Leiophron*) *heterocordyli* RICHARDS 1967**

Material examined: Guilan province: Talesh (77 m), 2♀♀, 26 September 2007.

Distribution outside Iran: Palaearctic (YU et al. 2006).

Subfamily Microtypinae SZÉPLIGETI 1908

Genus *Microtypus* RATZEBURG 1848

***Microtypus wesmaelii* RATZEBURG 1848**

Material examined: Guilan province: Rasht (39 m), 2♀♀, September 2007.

Distribution outside Iran: Palearctic, Nearctic: Bulgaria, Canada, China, Czech Republic, Germany, Hungary, Italy, Netherlands, Russia, Slovakia, Turkey, U.S.A, United Kingdom (YU et al. 2006).

Subfamily Opiinae BLANCHARD 1845

Genus *Opius* WESMAEL 1835

***Opius basalis* FISCHER 1958**

Material examined: Mazandaran province: Ramsar (18 m), 2♀♀, June 2007. Parasitoid of *Agromyza* sp. (Diptera: Agromyzidae).

Distribution outside Iran: Palaearctic: Croatia, Czech Republic, Denmark, Finland, Germany, Hungary, Israel, Kazakhstan, Poland, Russia, Sweden, United Kingdom, former Yugoslavia (YU et al. 2006).

***Opius* (*Agnopius*) *rex* FISCHER 1958**

Material examined: Ardabil province: Ardabil (1299 m), 1♂, 26 July 2008.

Distribution outside Iran: Britain (Pitkin et al., 2008), Austria, Bulgaria, Crete, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Netherlands, former Yugoslavia (YU et al. 2006), Turkey (YILDRIM et al. 2010).

***Opius* (*Utetes*) *magnus* FISCHER 1958**

Material examined: Ardabil province: Bilehsavar (145 m), 1♀, 2♂♂, August 2007, parasitoid of *Rhagoletis* sp. (Diptera: Tephritidae).

Distribution outside Iran: Palaearctic (FISCHER & KOPONEN 1999, BELOKOBYLSKIJ et al. 2003).

C o m m e n t : The genus *Utetes* FOERSTER 1862 was treated as a subgenus of *Opius* WESMAEL by FISCHER (1983). The interpretation of *Utetes* by WHARTON et al. (1997) is different from FISCHER (1983). It would be difficult to find out what and how many species of the whole world would be *Utetes* in the sense of WHARTON et al. (1997). They introduced a character (a small carina on the base of the hind tibia) which was not examined in the other species of *Opius* (see FISCHER 1999).

Subfamily R h y s s a l i n a e FOERSTER 1862

Genus *Histeromerus* WESMAEL 1838

***Histeromerus mystacinus* WESMAEL 1838**

M a t e r i a l e x a m i n e d : Mazandaran province: Noshahr (55 m) (Citrus orchard), 1♀, February 2005.

D i s t r i b u t i o n outside Iran: Palaearctic: Belgium, Czech Republic, Denmark, France, Georgia, Germany, Ireland, Lithuania, Netherlands, Poland, Russia, Slovakia, Sweden, Ukraine, United Kingdom (YU et al. 2006).

Discussion

The results of this research indicate that there exist a diverse and interesting fauna of Braconidae in Northern Iran. The mentioned region is the main agricultural part in Iran and because of the variety in the flora, diverse elements of the fauna and of pests and natural enemies, here exist a special ecosystem. In despite of importance of northern Iran for having the vast fields and orchards, the fauna of braconids was not studied there perfectly. Of course the fauna of Iranian Bracoidae was studied very poorly too, and the main related researches are restricted to the five papers which have been published recently (GHAHARI et al. 2009a, b, c, d, 2010). Four provinces with various climates were sampled in this research and upon the result there is diverse fauna in each of them. Of course this paper is a partial study on braconids of these provinces; surely for completing the faunal studies in these areas of Iran, several other researches are necessary to be done in the future. Climate change consequent on global warming is likely to impact strongly on parasitoids because it will change the characteristics of their habitat. Apart from the high probability that substantial vegetational change will mask all other effects, however, there are relatively few situations in which obvious outcomes seem predictable. One fairly strong possibility is that hosts and their parasitoids will sometimes become asynchronous. This could occur in one of two ways. Either the major developmental cues of temperature and daylight might be balanced differently in host and parasitoid, in which case a gap in synchrony would be expected to arise as the thermal regime changed, or else the development rate at different temperatures will differ for host and parasitoid, again leading to asynchrony under novel temperature conditions. This might happen in quite subtle ways, as for example when mobile hosts are able to optimize their thermal experience in ways in which static parasitoid cocoons are not, and plurivoltine parasitoids that successively attack different cohorts of the same generation of a

univoltine host may experience appreciable disruption (SHAW 2006). More generally, for specialists, when the host's life cycle gets ahead of the parasitoid's, species of the latter that have the narrowest window of opportunity for attacking their host will presumably suffer the worst, and if the parasitoid is the more advanced then the species that potentially have long adult lives will presumably fare best. Species with wide host ranges will obviously be more likely to retain synchrony with at least a part of their potential host range than absolute specialists. In all of these respects it looks as though in general some groups of idiobionts are likely to survive the disruptions of climate change better than most koinobionts, but this is crude speculation and individual species will no doubt respond in individual and perhaps surprising ways (SHAW & ASKEW 1978; MORRIS et al. 2001, 2004; SHAW 2006). The several samplings in different regions of Iran by the first author in recent years indicate the highest diversity of Braconidae is related to the north and northwestern Iran where included diverse agroecosystems and forests. Therefore, focusing on these areas by the researchers is suggested, and we are sure that many other new country species remain to be found and determined.

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YILDIRIM E.M., CIVELEK H.S., CIKMAN E., DURSUN O. & A. ESKIN (2010): Contributions to the Turkish Braconidae (Hymenoptera) fauna with seven new records. – Türk. entomol. derg. **34** (1): 29-35.

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Addresses of the authors:

Hassan GHAHARI

Department of Agriculture,

Islamic Azad University,

Shahre Rey Branch, Tehran, Iran;

E-mail: hghahari@yahoo.com

Hofrat i.R. Univ.-Doz. Mag. Dr. Maximilian FISCHER,

Naturhistorisches Museum,

2. Zoologische Abteilung,

A-1010 Wien, Burgring 7, Austria;

E-mail: maximilian.fischer@chello.at

Buchbesprechungen

KLAUSNITZER B., BEHNE L., FRANKE R., GEBERT J., HOFFMANN W., HORNIG U., JÄGER O., RICHTER W., SIEBER M. & J. VOGEL (2009): **Die Käferfauna (Coleoptera) der Oberlausitz. Teil 1.** – Entomologische Nachrichten und Berichte. Beiheft **12**: 252 S., 1 Karte. Dresden 2009.

Bereits 2009 erschien "Die Käferfauna (Coleoptera) der Oberlausitz", zusammengetragen und verfasst von einer Arbeitsgemeinschaft erfahrener Coleopterologen.

Wie dem Vorwort des Werkes zu entnehmen ist, sind gegenwärtig 3.843 Käferarten aus der Oberlausitz bekannt, davon werden in dem vorliegenden Band 2.889 Arten behandelt. Die Staphyliniden (bis 16.3.2009 wurden 954 Arten nachgewiesen) werden im 2. Teil der Käferfauna der Oberlausitz publiziert.

Das sehr ansprechend gestaltete Buch ist in einen allgemeinen und einen speziellen Teil gegliedert. Dazu kommt ein umfangreiches Literaturverzeichnis und ein Register mit dessen Hilfe sich die Familien, Unterfamilien, Tribus und Gattungen rasch finden lassen. Wie akribisch die Arbeitsgruppe vorging, zeigt sich darin, dass 5 Arten, die erst nach Redaktionsschluss neu für die Oberlausitz gefunden wurden, in einem Anhang aufgeführt werden.

Im allgemeinen Teil wird ein kurzer Abriss über die Oberlausitz als Land mit einer wechselvollen Geschichte gegeben, die naturnahe Gliederung wird skizziert, die geologischen und hydrographischen Bedingungen beschrieben, danach die Flora und Vegetation. In einem kulturgeschichtlichen Exkurs wird der Leser mit den Käfern im oberlausitzer Brauchtum bekannt gemacht. Im Kapitel "Geschichte der Erforschung der Oberlausitz" werden die meisten Personen aufgeführt, die sich in diesem Raum mit Käfern befassten. Ausführlicher wird auf Nathanael Gottfried Leske eingegangen, der im Jahr 1785 eine erste Käferliste aufstellte, die auch Daten für die Oberlausitz enthält. Ein Überblick über die Vereine, Museen und Tagungen und über Benennungen von Käfern und anderen Arthropoden nach der Lausitz runden diesen Teil ab.

Im Unterkapitel "Systematische Übersicht und Arteninventar" geben verschiedene Auflistungen einen Überblick über die Artenzahlen in den einzelnen Familien, über die Stellung der oberlausitzer Polyphaga in einem Großsystem, über die Arten-Areal-Beziehung, die Neufunde für Sachsen (auf das Attribut, neu für die Oberlausitz' wurde bewusst verzichtet) und natürlich die Artenzahlen der Familien nach Region, Zeithorizont und Frequenz. Sehr interessant sind die Auswertungen bei ausgewählten Familien für das Artengefälle innerhalb der geographischen Räume, über die Häufikeitsindizes nach Fundorten und "alten" und aktuellen Nachweisen. Die zoogeographische und ökologische Analyse gibt Aufschluss über die Zugehörigkeit verschiedener Käfer zu bestimmten Refugialgebieten innerhalb des besprochenen Gebietes. Die Ursachen des Artenrückgangs werden genauso erörtert wie Beispiele für die Zunahme von Funden, seien es Erstnachweise oder eine zunehmende Häufigkeit. Eigene Unterkapitel sind den Neozoen und ökologischen Besonderheiten gewidmet.

Der spezielle Teil beginnt mit einer kurzen Ausführung zur Methodik bei der Erfassung der Daten. Danach folgen die Ergebnisse der "Arteninventur" in systematischer

Reihenfolge. Der Kenntnisstand über die Familien wird jeweils kurz dargestellt, deren Lebensgewohnheiten und nomenklatorische Hinweise. Der detaillierten, nach Naturraum und Fundhäufigkeit gegliederten Artentabelle sind Hinweise bei ausgewählten Arten angefügt.

Dem Autorenteam ist es mit diesem Werk nicht nur gelungen einen wertvollen Fundus an Kenntnissen über das Vorkommen und die Verbreitung der Käfer in der Oberlausitz zusammenzutragen, das Buch stellt zudem einen wichtigen Baustein zur Käferkunde in Deutschland dar. Es gibt Anregungen zur Aufarbeitung und Aufbereitung der Käferfauna des eigenen, heimatlichen Landstriches. Es zeigt, dass Artenlisten nur der Anfang einer Fauna sein können, dass in der Verknüpfung der vielen Komponenten, die für den einzelnen Käfer wichtig sind, die Daten erst zu leben beginnen und Aussagen über Lebensräume ermöglichen.

Das Buch darf deshalb in keiner entomologischen Bibliothek fehlen.

H. Mühle

HANGAY, G. & P. ZBOROWSKI: **A Guide to the Beetles of Australia.** – CSIRO Publishing, Collingwood, 2010. 238 S.

Käfer bilden die artenreichste Ordnung im Tierreich; mit etwa 350.000 beschriebenen Arten machen sie mehr als 40 % aller Insektenarten aus. Von Australien sind etwa 20.000 Arten bekannt, die meisten davon Curculionidae (6.500), Scarabaeidae und Carabidae (jeweils ca. 2.600) sowie Chrysomelidae (2.250).

Im vorliegenden Buch (wohlgemerkt kein Bestimmungsführer) werden die wesentlichen, in Australien vorkommenden, Käferfamilien vorgestellt. Die einführenden Seiten erläutern, was das besondere an einem Käfer ist, wie er anatomisch gebaut ist, wie seine Fortpflanzung und Entwicklung funktioniert, wie er sich ernährt und für's Überleben gerüstet ist.

Die Vorstellung der Familien beinhalten einen kurzen Steckbrief der wesentlichen Merkmale (u.a. Größe, Antennenform, Tarsenformel), die grobe Verbreitung inkl. der wesentlichen Habitate, die Lebensweise und eventuelle Besonderheiten. Mindestens eine, manchmal mehr als ein Dutzend Arten sind als Farbfoto dargestellt, so dass man in der Regel einen sehr guten Überblick über die jeweilige Familie bekommt. Literatur und Glossar bilden den Abschluss des Buches.

Ein sehr gelungener Band mit durchwegs sehr guten (wenn auch zum Teil recht kleinen) Farbfotos, der eine hervorragende Übersicht zur Diversität der Käfer (nicht nur für Australien) gibt und somit uneingeschränkt für alle entomologisch Interessierte empfohlen werden kann.

R. Gerstmeier

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Maximilian SCHWARZ, Konsulent f. Wissenschaft der Oberösterreichischen Landesregierung, Eibenweg 6, A-4052 Ansfelden, E-Mail: maximilian.schwarz@liwest.at.

Redaktion: Erich DILLER, ZSM, Münchhausenstraße 21, D-81247 München;
Roland GERSTMEIER, Lehrstuhl f. Tierökologie, H.-C.-v.-Carlowitz-Pl. 2, D-85350 Freising
Fritz GUSENLEITNER, Lungitzerstr. 51, A-4222 St. Georgen/Gusen;
Wolfgang SCHACHT, Scherrerstraße 8, D-82296 Schöngeising;
Wolfgang SPEIDEL, MWM, Tengstraße 33, D-80796 München;
Thomas WITT, Tengstraße 33, D-80796 München.

Adresse: Entomofauna, Redaktion und Schriftentausch c/o Museum Witt, Tengstr. 33, 80796 München, Deutschland, E-Mail: thomas@witt-thomas.com; Entomofauna, Redaktion c/o Fritz Gusenleitner, Lungitzerstr. 51, 4222 St. Georgen/Gusen, Austria, E-Mail: f.gusenleitner@landesmuseum.at