Linzer biol. Beitr.	44/2	1319-1330	28.12.2012

On a collection of Braconidae (Hymenoptera) from northern Iran

H. SAKENIN, H. NADERIAN, N. SAMIN, J. RASTEGAR, M. TABARI & J. PAPP

A b s t r a c t : The fauna of Braconidae (Hymenoptera) from northern Iran is studied in this paper. In total 35 species of 13 subfamilies (Agathidinae, Aphidiinae, Brachistinae, Braconinae, Cheloninae, Doryctinae, Euphorinae, Hormiinae, Microgastrinae, Microtypinae, Opiinae, Rhyssalinae, Rogadinae) were collected and identified.

K e y w o r d s : Hymenoptera, Ichneumonoidea, Braconidae, Northern 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 (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 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).

Northern Iran includes the Southern Caspian regions of Iran, and represents Hyrcania:

Guilan and Mazandaran, and to some extend Golestan (former East Mazenderan). The major provinces, Guilan and Mazandaran, are covered with dense forests, snow-covered mountains and impressive sea shores. The climate of Northern Iran is: a/ Plain moderate climate: covering central and western plains of Mazandaran. The average annual rainfall amounts to 1200 or 1300 millimetres, and as we proceed to the east the amount decreases; b/ Mountainous climate: the high mountains and northern parts of the Alborz range. In the heights, the weather is cold mountainous and most of the precipitation is in the form of snow; c/ Semi-arid climate: This climate prevail some parts of Gorgan valley (north of Gorgan Rud as far as the Turkmenistan border). In this area, the average annual rainfall stands at 500 millimetres. The fauna of Iranian Braconidae and also northern Iran was not studied very well, while Iran is a large country with various geographical regions, and therefore included diverse fauna.

Materials and Methods

The sampled regions in this research were some areas of three Northern provinces including, Mazandaran, Guilan and Golestan. Materials were collected by sweeping net and the collected specimens were put in ethanol 75 % and determined. Also the specimens of some insect museums and collections were used in this paper. 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.

Species list

In this research totally 35 braconid species of 13 subfamilies were determined from northern Iran and vicinity as below together with the distribution data.

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

Genus *A g a t h i s* 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, 1 ♀, summer 2008.

G e n e r a l d i s t r i b u t i o n : Palaearctic: Azerbaijan, France, Germany, Hungary, Italy, Kazakhstan, Macedonia, Russia, Spain, Turkey, Ukraine, former Yugoslavia.

***Agathis melpomene* NIXON 1986**

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

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

Agathis semiaciculata **IVANOV 1899**

Material examined: Golestan province: Amol, 2♂♂, summer 2007.

General distribution: Switzerland (SIMBOLOTTI & ACHTERBERG 1999), Ukraine, Azerbaidzhan (Mts Caucasus), Kazakhstan, Greece (PAPP 2003).

Subfamily Aphidiinae

Genus *Aphidius* NEES VON ESENBECK 1819

Aphidius matricariae **HALIDAY 1834**

Material examined: Golestan province: Minoodasht, 2♀♀, 1♂, April 2009.

General distribution: Afrotropical, Nearctic, Neotropical, Oceanic, Oriental, Palaearctic (Algeria, Andorra, Bermuda, Bulgaria, Canada, Canary Islands, Chile, China, Cyprus, former Czechoslovakia, Egypt, Finland, France, Georgia, Germany, Greece, Guam, Hungary, India, Iraq, Ireland, Israel, Italy, Latvia, Lebanon, Lithuania, Macedonia, Madeira Islands, Morocco, Netherlands, Norway, Pakistan, Peru, Poland, Portugal, Réunion, Slovakia, Slovenia, South Africa, Spain, Turkey, U.S.A., Ukraine, United Kingdom, Uzbekistan, former Yugoslavia, Zimbabwe).

Aphidius transcaspicus **TELENGA 1958**

Material examined: Mazandaran province: Sari, 1♀, October 2008.

General distribution: Holarctic.

Genus *Diaeretiella* STARÝ 1960

Diaeretiella rapae **(M'INTOSH 1855)**

Material examined: Guilan province: Lahijan, 2♀♀, 4♂♂, August 2008. Mazandaran province: Chalus, 3♀♀, 3♂, September 2009.

General distribution: Australasian, Afrotropical, Nearctic, Neotropical, Oceanic, Oriental, Palaearctic (Afghanistan, Algeria, Andorra, Argentina, Australia, Austria, Azerbaijan, Azores, Bermuda, Brazil, Bulgaria, Canada, Canary Islands, Cape Verde Islands, Chile, China, Croatia, Cuba, Cyprus, former Czechoslovakia, Egypt, Finland, France, Georgia, Germany, Greece, Guam, Hungary, India, Iraq, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya, Korea, Kyrgyzstan, Latvia, Lebanon, Libya, Macedonia, Madeira Islands, Mexico, Moldova, Mongolia, Morocco, Netherlands, New Zealand, Norway, Pakistan, Peru, Poland, Portugal, Puerto Rico, Russia, Saudi Arabia, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Syria, Tajikistan, Turkey, Ukraine, United Kingdom, Uruguay, Uzbekistan, Venezuela, former Yugoslavia).

Genus *Monoctonus* HALIDAY 1833

Monoctonus mali **van ACHTERBERG 1989**

Material examined: Guilan province: Fooman, 1♀, April 2009.

General distribution: Nearctic, Neotropical, Oceanic, Oriental, Palaearctic (Czech Republic, Netherlands, Serbia, Turkey, former Yugoslavia).

Genus *Praon* HALIDAY 1833

***Praon volucre* (HALIDAY 1833)**

Material examined: Mazandaran province: Behshahr, 3♀♀, 2♂♂, June 2009.

General distribution: Neotropical, Oriental, Palaearctic (Algeria, Andorra, Argentina, Austria, Azerbaijan, Belgium, Bosnia Hercegovina, Bulgaria, Canary Islands, Chile, China, Czech Republic, Denmark, Egypt, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, India, Iraq, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Kyrgyzstan, Lebanon, Lithuania, Macedonia, Madeira Islands, Moldova, Mongolia, Montenegro, Morocco, Netherlands, Norway, Pakistan, Poland, Portugal, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Ukraine, United Kingdom, Uzbekistan, former Yugoslavia).

Subfamily Brachistinae

Genus *Schizoprymnus* FOERSTER 1862

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

Material examined: Guilan province: Astara, 1♂, September 2004.

General distribution: Known in Bohemia, Hungary, Serbia, European Russia, Ukraine, Armenia and Kazakhstan, Mongolia (PAPP 2003).

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

Material examined: Mazandaran province: Sari, Joibar (Citrus orchard), 2♀♀, 2♂♂, June 2005.

General distribution: Oriental, Palaearctic: Armenia, China, Germany, Hungary, Kazakhstan, Russia, Spain, Switzerland, Tajikistan.

Genus *Triaspis* HALIDAY 1835

***Triaspis lugubris* ŠNOFLÁK 1953**

Material examined: Mazandaran province: Amol, 3♀♀, June, 1999.

General distribution: Palaearctic: Hungary, Kazakhstan, Korea, Russia.

Subfamily Braconinae

Genus *Bracon* FABRICIUS 1804

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

Material examined: Golestan province: National Park, 1♀, October 2005.

General distribution: Palaearctic.

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

Material examined: Golestan province: Gorgan, 3♀♀, 5♂♂, spring 2009.
General distribution: Palaearctic.

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

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

***Bracon* (*Lucobracon*) *suchorukovi* (TELENGA 1936)**

Material examined: Guilan province: Rasht, 2♂♂, April 2008.
General distribution: Palaearctic.

Subfamily C h e l o n i n a e

Genus *C h e l o n u s* JURINE 1801

***Chelonus bidens* TOBIAS 1976**

Material examined: Mazandaran province: Sari, 2♀♀, 1♂, August 2006.
General distribution: South Russia, Kazakhstan (Tobias 1986), Turkey (AYDOGDU & BEYARSLAN 2002).

***Chelonus microsomus* TOBIAS 1964**

Material examined: Golestan province: Gorgan, 1♀, September 2006.
General distribution: Kazakhstan (TOBIAS 1986), Turkey (AYDOGDU & BEYARSLAN 2002).

***Chelonus ocellatus* ALEXEEV 1971**

Material examined: Mazandaran province: Savadkooh, 1♀, July 2005.
General distribution: Crimea, Middle Asia, Turkey (AYDOGDU & BEYARSLAN 2002).

***Chelonus varimaculatus* TOBIAS 1986**

Material examined: Guilan province: Lahijan, 3♀♀, 1♂, September 2006.
General distribution: South Azerbaijan (TOBIAS 1986), Turkey (AYDOGDU & BEYARSLAN 2002).

Subfamily D o r y c t i n a e

Genus *L e l u t h i a* CAMERON 1887

***Leluthia paradoxa* (PICARD 1938)**

M a t e r i a l e x a m i n e d : Golestan province: Gorgan, 1♂, June 2009.
G e n e r a l d i s t r i b u t i o n : Palaearctic.

***Spathius maderi* FAHRINGER 1930**

M a t e r i a l e x a m i n e d : Mazandaran province: Savadkooh, 2♀♀, 1♂, August 2009.
G e n e r a l d i s t r i b u t i o n : Palaearctic.

Subfamily E u p h o r i n a e

Genus *L e i o p h r o n* NEES VON ESENBECK 1819

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

M a t e r i a l e x a m i n e d : Mazandaran province: Sari (Citrus orchard), 2♀♀, 1♂, October 2007.

G e n e r a l d i s t r i b u t i o n : Palaearctic: Finland, Germany, Greece, Kazakhstan, Korea, Moldova, Poland, Russia, Sweden, Ukraine.

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

M a t e r i a l e x a m i n e d : Guilan province: Astara, July 1998 (2♀♀).
G e n e r a l d i s t r i b u t i o n : Palaearctic.

Subfamily H o r m i i n a e

Genus *C l i n o c e n t r u s* HALIDAY 1833

***Clinocentrus cunctator* HALIDAY 1836**

M a t e r i a l e x a m i n e d : Mazandaran province: Ramsar, 2♀♀, 1♂, June 2010.
G e n e r a l d i s t r i b u t i o n : Palaearctic.

Subfamily M i c r o g a s t r i n a e

Genus *C o t e s i a* CAMERON 1891

***Cotesia callimone* (NIXON 1974)**

M a t e r i a l e x a m i n e d : Mazandaran province: Behshahr, 1♀, 3♂♂, September 2008.
G e n e r a l d i s t r i b u t i o n : Palaearctic.

***Cotesia ordinarius* (RATZEBURG 1844)**

M a t e r i a l e x a m i n e d : Golestan province: Gorgan, 2♀♀, 2♂♂, August 2010.
G e n e r a l d i s t r i b u t i o n : Palaearctic.

Subfamily M i c r o t y p i n a e

Genus *M i c r o t y p u s* RATZEBURG 1848

***Microtypus wesmaelii* RATZEBURG 1848**

M a t e r i a l e x a m i n e d : Guilan province: Lahijan, 2♀♀, November 2006.
G e n e r a l d i s t r i b u t i o n : Palaearctic, Nearctic: Bulgaria, Canada, China, Czech Republic, Germany, Hungary, Italy, Netherlands, Russia, Slovakia, Turkey, U.S.A, United Kingdom.

Subfamily O p i i n a e

Genus *O p i u s* WESMAEL 1835

***Opius* (*Opiothorax*) *abditus* FISCHER 1960**

M a t e r i a l e x a m i n e d : Golestan province: Kalaleh, 2♂♂, May 2010.
G e n e r a l d i s t r i b u t i o n : Palaearctic.

***Opius basalis* FISCHER 1958**

M a t e r i a l e x a m i n e d : Mazandaran province: Ramsar, 2♀♀, June 2007. Parasitoid of *Agromyza* sp. (Diptera: Agromyzidae).
G e n e r a l d i s t r i b u t i o n : Palaearctic: Croatia, Czech Republic, Denmark, Finland, Germany, Hungary, Israel, Kazakhstan, Poland, Russia, Sweden, United Kingdom, former Yugoslavia.

***Opius* (*Phaedrotoma*) *diversiformis* (FISCHER 1960)**

M a t e r i a l e x a m i n e d : Golestan province: Kalaleh, 2♀♀, 2♂♂, May 2010.
G e n e r a l d i s t r i b u t i o n : Palaearctic.

***Opius* (*Xynobius*) *macrocerus* (THOMSON 1895)**

M a t e r i a l e x a m i n e d : Guilan province: Fooman, 2♀♀, summer 208.
G e n e r a l d i s t r i b u t i o n : Palaearctic.

***Opius* (*Misophthora*) *monilicornis* FISCHER 1962**

M a t e r i a l e x a m i n e d : Mazandaran province: Sari, 1♀, 1♂, August 2007.
G e n e r a l d i s t r i b u t i o n : Palaearctic.

***Opius* (*Agnopius*) *similis* SZÉPLIGETI 1898**

Material examined: Golestan province: Gonbad, 1♀, April 2011.
General distribution: Palaearctic.

Subfamily Rhyssalinae

Genus *Histeromerus* WESMAEL 1838

***Histeromerus mystacinus* WESMAEL 1838**

Material examined: Mazandaran province: Ramsar (Citrus orchard), 2♀♀, February 2005.

General distribution: Palaearctic: Belgium, Czech Republic, Denmark, France, Georgia, Germany, Ireland, Lithuania, Netherlands, Poland, Russia, Slovakia, Sweden, Ukraine, United Kingdom.

Subfamily Rogadinae

Genus *Aleiodes* WESMAEL 1838

***Aleiodes* (*Chelonorhogas*) *unipunctator* (THUNBERG 1822)**

Material examined: Guilan province: Roodsar, 3♀♀, September 2011.
General distribution: Palaearctic.

Discussion

The results of this research indicate that there is diverse and interesting fauna of Braconidae in Northern Iran. The mentioned region is the main agricultural part in Iran and because of various flora, diverse fauna of pests and natural enemies exist in almost ecosystems. 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 a few valuable papers which have been published recently (ACHTERBERG & MEHRNEJAD 2002; RAKHSHANI et al. 2005; GHAHARI & FISCHER 2009; GHAHARI et al. 2009a, b, c, d, 2012; DARSOUEI et al. 2011; LASHKARI-BOD et al. 2011a, b; AHMAD-ABADI & MODARRES AWAL 2012).

Insects and their parasitoids are extremely important components of terrestrial ecosystems, but it is also partly because of the substantial levels of specialization, or at least community fidelity, exhibited by parasitic wasps that theoretical ecologists have taken them so strongly to heart. Indeed, the extent to which phytophagous insect populations and communities are regulated and structured 'top down' through host/parasitoid interactions (in contrast with 'bottom up' processes, or 'donor control': cf. HAWKINS 1992, 1994) has engaged ecologists strongly over the past half century. Theory has generally run well ahead of empirical evidence (for readable accounts of some issues see HASSELL 1986; LAWTON 1986), but over the past few years some intensive field studies have

provided robust tests and in many cases strong support for theoretical ideas. On the face of it, the enduring successes of various classical biological control programmes around the world might be taken as clear evidence that parasitoids can regulate host populations, but the possibility has been recognized (e.g., HANSKI 1987) that the introduced parasitoid(s) may have merely caused a reduction in the host population to a point at which some other regulatory process can operate. Relatively recently, however, analysis of long time-series data has shown not only that density dependence per se is a real phenomenon in insect populations (e.g., WOIWOD & HANSKI 1992), but also that regulation of insect populations by parasitoids can occur (e.g., HASSELL et al. 1989; BONSALL et al. 2004; REDFERN & HUNTER 2005). Similar analyses of long time-series data on host/parasitoid systems have confirmed that heterogeneity within populations (such that not all individuals are equally susceptible, cf. HASSELL 2000) can underlie empirical cases of coexistence that contradict simplistic ecological models (e.g., BONSALL et al. 2002, 2004), and in scaled-up habitat and landscape terms this is manifest in the great success and importance of the ideas of metapopulation ecology (HANSK 1999) in insect conservation. Additionally, within communities involving parasitoids, experimental manipulations, especially following the construction of quantitative food-webs, have started to unravel the extent to which apparent competition (cf. HOLT & LAWTON 1993, 1994) provides structure at various trophic levels (VAN NOUHUYS & HANSKI 2000; MORRIS et al. 2001, 2004; SHAW 2006). There are obviously reciprocal effects on the parasitoids such that these and other aspects of community ecology will impact on concepts of 'habitat' for parasitic wasps in important ways. For example, different numbers of species of potential hosts and potential competitors, different levels of intensity or exclusivity of interactions, and both dynamic and stochastic issues surrounding the evenness of host occurrence in space and time, are aspects of 'habitat' that will all contribute to the short, medium and long term viability of particular parasitoid populations (SHAW 2006).

Acknowledgements

The authors are grateful to M.R. Shaw of Scotland, C. van Achterberg of the Netherlands, and V. Tobias of Russia for scientific cooperation. The research was supported by Islamic Azad University (Khoy and Qaemshahr Branches, and Young Researchers Club).

Zusammenfassung

Vorliegende Arbeit behandelt die Fauna der Braconidae (Hymenoptera) des nördlichen Irans. Es gelang der Nachweis von 35 Arten aus 13 Unterfamilien (Agathidinae, Aphidiinae, Brachistinae, Braconinae, Cheloninae, Doryctinae, Euphorinae, Hormiinae, Microgastrinae, Microtypinae, Opiinae, Rhyssalinae, Rogadinae).

References

ACHTERBERG C. VAN & M.R. MEHRNEJAD (2002): The braconid parasitoids (Hymenoptera: Braconidae) of *Kermania pistaciella* Amsel (Lepidoptera: Tineidae: Hieroxestinae) in Iran. — Zool. Med. Leiden **76**: 27-39.

AHMAD-ABADI N.J. & M. MODARRES AWAL (2012): Aphid parasitoids associations on stone fruit trees in Khorasan Razavi Province (Iran) (Hymenoptera: Braconidae: Aphidiinae). — Munis Entomology & Zoology **7** (1): 418-423.

ASKEW R.R. & M.R. SHAW (1986): Parasitoid communities: their size, structure and development, pp. 225-264. — In: WAAGE J. & D. GREATHEAD (eds), Insect parasitoids. Academic Press, London, England, 389 pp.

AUSTIN A.D. & P.C. DANGERFIELD (1998): Biology of the *Mesostoa kerri* AUSTIN and WHARTON (Insecta: Hymenoptera: Braconidae: Mesostoinae), an endemic Australian wasp that causes stem galls on *Banksia marginata* CAV. — Austral. J. Bot. **46**: 559-569.

AYDOGDU M. & A. BEYARSLAN (2002): *Chelonus* JURINE (Hymenoptera: Braconidae: Cheloninae) species of the Marmara region. — Turkish Journal of Zoology **26** (1): 1-13.

BONSALL M.B., HASSELL M.P. & G. ASEFA (2002): Ecological trade-offs, resource partitioning, and coexistence in a host-parasitoid assemblage. — Ecology **83**: 925-934.

BONSALL M.B., HASSELL M.P., READER P.M. & T.H. JONES (2004): Coexistence of natural enemies in a multitrophic host-parasitoid system. — Ecol. Entomol. **29**: 639-647.

CETIN O. & A. BEYARSLAN (2001): The Agathidinae (Hymenoptera: Braconidae) fauna of the Marmara region. — Turkish Journal of Zoology **25** (3): 257-268.

DARSOUEI R., KARIMI J. & M. MODARRES AWAL (2011): Parasitic wasps as natural enemies of aphid populations in the Mashhad region of Iran: New data from DNA barcodes and SEM. — Arch. Biol. Sci., Belgrade **63** (4): 1225-1234.

GHAHARI H., YU D.S. & C. VAN ACHTERBERG (2006): World Bibliography of the Family Baraconidae (Hymenoptera: Ichneumonoidea) (1964-2003). — NNM Technical Bulletin **8**: 293 pp.

GHAHARI H. & M. FISCHER (2009): A study on the Braconidae (Hymenoptera: Ichneumonoidea) from some regions of northern Iran. — Entomofauna **32** (8): 181-196.

GHAHARI H., FISCHER M., ÇETIN ERDOGAN O., BEYARSLAN A. & M. HAVASKARY (2009a): A Contribution to the Knowledge of the Braconid-Fauna (Hymenoptera, Ichneumonoidea, Braconidae) of Arasbaran, Northwestern Iran. — Entomofauna **30** (20): 329-336.

GHAHARI H., FISCHER M., ÇETIN ERDOGAN O., BEYARSLAN A., HEDQVIST K.J. & H. OSTOVAN (2009b): Faunistic note on the Braconidae (Hymenoptera: Ichneumonoidea) in Iranian alfalfa fields and surrounding grasslands. — Entomofauna **30** (24): 437-444.

GHAHARI H., GADALLAH N.S., CETIN ERDOGAN O., HEDQVIST K.J., FISCHER F., BEYARSLAN A. & H. OSTOVAN (2009c): Faunistic note on the Braconidae (Hymenoptera: Ichneumonoidea) in Iranian cotton fields and surrounding grasslands. — Egyptian Journal of Biological Pest Control **19** (2): 115-118.

GHAHARI H., FISCHER M., ÇETIN ERDOĞAN O., TABARI M., OSTOVAN H. & A. BEYARSLAN (2009d): A contribution to Braconidae (Hymenoptera) from rice fields and surrounding grasslands of northern Iran. — Munis Entomology & Zoology **4** (2): 432-435.

GHAHARI H., FISCHER M. & V.I. TOBIAS (2012): A study on the Braconidae (Hymenoptera: Ichneumonoidea) from Guilan province, Iran. — Entomofauna **33** (22): 317-324.

GRBIC M. & M.R. STRAND (1998): Shifts in the life history of parasitic wasps correlate with pronounced alterations in early development. Proceedings of the National — Academy of Sciences of the USA **95**: 1097-1101.

HANSKI I. (1987): Pine sawfly population dynamics: patterns, processes, problems. — Oikos **50**: 327-335.

HANSKI I. (1999): Metapopulation Ecology. — Oxford University Press, Oxford.

HASSELL M.P. (1986): Parasitoids and population regulation. — In: WAAGE J. & D. GREATHEAD (eds), Insect Parasitoids. Symposia of the Royal Entomological Society **13**, Academic Press, London, pp. 201-224.

HASSELL M.P. (2000): Host-parasitoid population dynamics. — J. Anim. Ecol. **69**: 543-566.

HASSELL M.P., LATTO J. & R.M. MAY (1989): Seeing the wood for the trees: detecting density dependence from existing life-table studies. — J. Animal Ecology **58**: 883-892.

HAWKINS B.A. (1992): Parasitoid-host food webs and donor control. — Oikos **65**: 159-162.

HAWKINS B.A. (1994): Pattern and Process in Host-Parasitoid Interactions. — Cambridge University Press, Cambridge.

HOLT R.D. & J.H. LAWTON (1993): Apparent competition and enemy-free space in insect host–parasitoid communities. — Am. Nat. **142**: 623-645.

HOLT R.D. & J.H. LAWTON (1994): The ecological consequences of shared natural enemies. — Annu. Rev. Ecol. Syst. **25**: 495-520.

INFANTE F., HANSON P. & R. WHARTON (1995): Phytophagy in the genus *Monitoriella* (Hymenoptera: Braconidae) with description of new species. — Ann. Entomol. Soc. Amer. **88**: 406-415.

LASHKARI-BOD A., RAKHSHANI E., TALEBI A.A., LOZAN A. & V. ZIKIC (2011a): A contribution to the knowledge of Braconidae (Hym., Ichneumonoidea) of Iran. — Biharean Biologist **5** (2): 147-150.

LASHKARI-BOD A., RAKHSHANI E., TALEBI A.A., LOZAN A. & V. ZIKIC (2011b): New records of Cheloninae (Förster, 1862) and Braconinae (Nees, 1811) (Insecta: Hymenoptera: Braconidae) from Iran. — Check List **7** (5): 632-634.

LAWTON J.H. (1986): The effect of parasitoids on phytophagous insect communities. In: Waage J. and Greathead D. (eds), Insect Parasitoids. — Symposia of the Royal Entomological Society 13, Academic Press, London, pp. 265-287.

MATTHEWS R.W. (1974): Biology of Braconidae. — Annual Review of Entomology **19**: 15-32.

MODARRES AWAL M. (1997): Family Braconidae (Hymenoptera), pp. 265-267. — In: (ed.) List of agricultural pests and their natural enemies in Iran. Ferdowsi University Press, 427 pp.

MORRIS R.J., LEWIS O.T. & H.C.J. GODFRAY (2004): Experimental evidence for apparent competition in a tropical forest food web. — Nature **428**: 310-313.

MORRIS R.J., MULLER C.B. & H.C.J. GODFRAY (2001): Field experiments testing for apparent competition between primary parasitoids mediated by secondary parasitoids. — J. Anim. Ecol. **70**: 301-309.

NIXON G.E.J. (1986): A revision of the European Agathidinae (Hymenoptera, Braconidae). — Bull. Brit. Mus (Nat. Hist) Ent. Ser. **52** (3): 183-242.

NOUHUYS S. VAN. & I. HANSKI (2000): Apparent competition between parasitoids mediated by a shared hyperparasitoid. — Ecol. Lett. **3**: 82-84.

PAPP J. (2003): Braconidae (Hymenoptera) from Korea, XXI. Species of fifteen subfamilies. — Acta Zoologica Academiae Scientiarum Hungaricae **49** (2): 115-152.

RAKHSHANI E., TALEBI A.A., KAVALLIERATOS N.G., REZWANI A., MANZARI S. & Z. TOMANOVIC (2005): Parasitoid complex (Hymenoptera, Braconidae, Aphidiinae) of *Aphis craccivora* Koch (Hemiptera: Aphidoidea) in Iran. — J. Pest Sci. **78**: 193-198.

REDFERN M. & M.D. HUNTER (2005): Time tells: long-termpatterns in the population dynamics of the yew gall midge, *Taxomyia taxi* (Cecidomyiidae), over 35 years. — Ecol. Entomol. **30**: 86-95.

SHARKEY M.J. (1993): Family Braconidae, pp. 362-395 — In: GOULET H. & J.T. HUBER (eds), Hymenoptera of the world: An identification guide to families. Agriculture Canada.

SHAW S.R. (1995): Braconidae, pp. 431-463. — In: HANSON P.E. & I.D. GAULD (eds), The Hymenoptera of Costa Rica. Oxford University Press.

SHAW M.R. (2006): Habitat considerations for parasitic wasps (Hymenoptera). — Journal of Insect Conservation **10**: 117-127.

SHAW M.R. & T. HUDDLESTON (1991): Classification and Biology of Braconid Wasps (Hymenoptera: Braconidae). — Handbooks for the Identification of British Insects, Vol. **7**, Part 11. Royal Entomological Society of London.

SIMBOLOTTI G. & C. VAN ACHTERBERG (1999): Revision of the west palearctic species of the genus *Agathis* LATREILLE (Hymenoptera, Braconidae). — Zool. Verh. Leiden **325**: 1-167.

TOBIAS V.I. (1986): New species of the subfamily Cheloninae (Hymenoptera: Braconidae) from the Far East of the USSR. (In Russian). — Trudy Zoologicheskogo Instituta. Akad. Nak. SSSR. **159**: 3-17.

WOIWOD I. & I. HANSKI (1992): Patterns of density dependence in moths and aphids. — J. Anim. Ecol. **61**: 619-630.

YU D.S., ACHTERBERG C. VAN & K. HORSTMANN (2006): World Ichneumonoidea 2005. Taxonomy, biology, morphology and distribution [Braconidae]. — Taxapad 2006 (Scientific names for information management) Interactive electronical catalogue on DVD/CD-ROM. Vancouver.

VINSON S.B. & G.F. IWANTSCH (1980): Host suitability for insect parasitoids. — Annual Review of Entomology **25**: 397-419.

WHARTON R.A. (1993): Bionomics of the Braconidae. — Annual Review of Entomology **38**: 121-143.

ZETTEL H. & A. BEYARSLAN (1992): Über Agathidinae aus der Türkei (Hymenoptera: Braconidae). — Entomofauna **13**: 121-132.

Author's addresses:

Hamid Sakenin
Department of Plant Protection
College of Agriculture, Qaemshahr Branch
Islamic Azad University, Mazandaran, Iran
E-mail: n_samin63@yahoo.com

Najmeh SAMIN
Young Researchers Club
Science and Research Branch,
Islamic Azad University
Tehran, Iran

Hamid NADERIAN & Jinoos RASTEGAR
Department of Entomology, Garmsar Branch
Islamic Azad University
Semnan, Iran

Mehrdad TABARI
Amol Rice Research Institute
Mazandaran, Iran

Jenö PAPP
Zoological Department
Hungarian Natural History Museum
Baross- u. 13, H-1088 Budapest, Hungary