

Linzer biol. Beitr.	44/1	1071-1077	28.12.2012
---------------------	------	-----------	------------

A checklist on Iranian Bethylidae (Hymenoptera: Chrysidoidea)

H. GHAHARI & J. LIM

A b s t r a c t : A checklist of Iranian Bethylidae (Hymenoptera, Chrysidoidea) is presented. The list is based on detail studies of all available published data, as well as on new records. Eleven bethylid species from six genera (including, *Bethylus* LATREILLE, *Botoryan* ARGAMAN, *Cephalonomia* Westwood, *Epyris* WESTWOOD, *Goniozus* FÖRSTER, and *Laelius* ASHMEAD) are currently recognized as occurring in Iran. Two species, *Cephalonomia gallicola* (ASHMEAD 1887) and *Epyris fuscipes* (KIEFFER 1906) are herein presented as new to the Iranian fauna. Synonymies and distribution data are given in this paper.

K e y w o r d s : Hymenoptera, Chrysidoidea, Bethylidae, Checklist, Iran.

Introduction

The family Bethylidae (Hymenoptera, Chrysidoidea) is known as a group of primitive aculeate Hymenoptera (BROTHERS & CARPENTER 1993), which its extant species represented by 2.216 species distributed in 97 genera of seven subfamilies (AZEVEDO 2006; LOTFALIZADEH et al. 2012). The bethylids are widely distributed throughout the world, being found in all zoogeographic regions, but the majority of species occur in tropical areas (AZEVEDO 1999). The lack of worldwide systematic collecting limits the improvement of the distribution data on these wasps, which often seem to be restricted to specific regions of the planet (AZEVEDO & GUIMARÃES 2006).

The fauna of Iranian Bethylidae was poorly studied and totally 9 species were reported so far (see the result: Iranian record). The aim of the present paper is to summarize all accessible published data on Bethylidae of Iran, as well as to present two new original faunal records. Furthermore, these results will provide a base for future investigations on biodiversity and systematic studies of Iranian bethylids.

Materials and Methods

The published data on Iranian bethylids was summarized. The original materials were collected in two different regions of the country, by Malaise trap as well as rearing of the host. The checklist comprises the following data: the valid scientific name, published records with provincial distribution, synonyms in records; original data: provinces and localities, altitude (m), month and year of collecting, number and sex of specimens, host

(in case of rearing); general distribution. Classification, nomenclature, and distribution data as suggested by GORDH & MÓCZÁR (1990), BROTHERS & CARPENTER (1993), and TERAYAMA (2003a, b) have been followed.

Results

The present paper includes 11 bethylid species of 6 genera belong to 3 subfamilies in Iran. Two species herein newly recorded to the fauna of Iran. The species are arranged in alphabetic order.

Subfamily **B e t h y l i n a e**

***Bethylus cephalotes* (FÖRSTER 1860)**

Perisemus cephalotes FÖRSTER 1860, 17: 111-112.

Bethylus fuscicornis var. *tibialis* KIEFFER 1905, 9: 280.

I r a n i a n r e c o r d : Mazandaran (GHAHARI et al. 2008).

G e n e r a l d i s t r i b u t i o n : Western and Northern Europe.

***Goniozus claripennis* (FÖRSTER 1851)**

Bethylus claripennis FÖRSTER 1851, 8: 7-10.

Bethylus fuscipennis FÖRSTER 1851, 8: 10.

Goniozus distigmus THOMSON 1861, 18: 452.

Goniozus audouinii WESTWOOD 1874: 168-169.

Goniozus claripennis var. *fuscipennis* KIEFFER 1905, 9: 266.

Goniozus claripennis var. *tibialis* KIEFFER 1905, 9: 267.

Goniozus claripennis claripennis KIEFFER 1914, 41: 522, 523, 525.

I r a n i a n r e c o r d : Khorasan (ALAVI & GHOLIZADEH 2008; LOTFALIZADEH et al. 2012), Khuzestan (KADJBAF VALA & BAYAT ASADI 1995).

G e n e r a l d i s t r i b u t i o n : Western Europe.

C o m m e n t : Ectoparasitoid of the lesser date moth, *Batrachedra amydraula* MEYRICK (Lepidoptera: Cosmopteridae) (KADJBAF VALA & BAYAT ASADI 1995), and also larval parasitoid of grape berry moth, *Lobesia botrana* (DENIS & SCHIFFERMÜLLER) (Lepidoptera: Tortricidae) (ALAVI & GHOLIZADEH 2008).

***Goniozus gallicola* (KIEFFER 1905)**

Parasierola gallicola KIEFFER 1905, 9: 260-261.

I r a n i a n r e c o r d : Khorasan (ALAVI & GHOLIZADEH 2008; LOTFALIZADEH et al. 2012).

G e n e r a l d i s t r i b u t i o n : France (Frejus), Italy (Sicily), Austria, former Czechoslovakia, USSR (Moldavia).

C o m m e n t : Larval parasitoid of grape berry moth, *Lobesia botrana* (DENIS & SCHIFFERMÜLLER) (Lepidoptera: Tortricidae) (ALAVI & GHOLIZADEH 2008).

***Goniozus indicus* ASHMEAD 1903**

Goniozus indicus ASHMEAD 1894, 25: 195, 196.

Goniozus indicus MUESEBECK 1940, 42: 121-122.

I r a n i a n r e c o r d : Khuzestan (SAKENIN et al. 2011).

G e n e r a l d i s t r i b u t i o n : India (Widespread), Pakistan, Philippines.

***Goniozus legneri* GORDH 1982**

Goniozus legneri GORDH 1982, 93: 136-139.

I r a n i a n r e c o r d : Fars (EHTESHAMI et al. 2010a).

G e n e r a l d i s t r i b u t i o n : Uruguay, U.S.A. (California, Arizona?), Israel, Palestine.

C o m m e n t : Biology of *G. legneri* as the larval ectoparasitoid of carob moth, *Ectomyelois ceratoniae* (ZELLER) (Lepidoptera: Pyralidae) was studied by EHTESHAMI et al. (2010b).

Subfamily E p y r i n a e

Tribe E p y r i n i

***Epyris fuscipes* (KIEFFER 1906)**

Rhabdepyris fuscipes KIEFFER & MARSHALL 1906: 378.

M a t e r i a l e x a m i n e d : East Azarbaijan province: Arasbaran (941 m), 2♂♂, April 2006.
New record for Iran.

G e n e r a l d i s t r i b u t i o n : Italy, Republic of Korea.

Tribe S c l e r o d e r m i n i

***Cephalonomia gallicola* (ASHMEAD 1887)**

Sclerochroa gallicola ASHMEAD 1887, 3: 75.

Holopedina nubilipennis ASHMEAD 1887, 3: 97.

Cephalonomia xambeui GIRAD 1898: 51.

Cephalonomia quadridentata DUCHAUSSOY 1920 (1917), 8: 111-112.

Cephalonomia caesarorum VAN EMDEN (nomen nudum).

Cephalonomia (Cephaloderma) strandi HOFFER 1936, 1: 460-461.

M a t e r i a l e x a m i n e d : Ardabil province: Bile-Savar (137 m), 2♀♀, August 2006,
parasitoid of *Lastoderma serricornis* (FABRICIUS) (Coleoptera: Anobiidae). New record for Iran.

G e n e r a l d i s t r i b u t i o n : USA (Florida), Europe, Algeria, Tunisia, Republic of Korea, Japan (worldwide in stored products).

***Cephalonomia hypobori* KIEFFER 1919**

Cephalonomia hypobori KIEFFER 1919: 32-33.

Cephalonomia nigricornis SARRA 1930, 24: 223-225.

I r a n i a n r e c o r d : Iran (no locality cited) (BERLAND 1928; ZEIRI et al. 2011).

General distribution: France, Iran, Israel, Italy, Morocco (BERLAND 1928), Tunisia (ZEIRI et al. 2011).

***Cephalonomia tarsalis* (ASHMEAD 1893)**

Ateleopterus tarsalis ASHMEAD 1893, 45: 44, 45-46.
Cephalonomia carinata KIEFFER 1907 (1906), 51: 295-296.
Cephalonomia meridionalis BRETHERS 1913, 24: 87-88.
Cephalonomia kiefferi FOUTS 1920, 22: 71-72.

Iranian record: Khuzestan (MOHAJERY & AZIMI 1995), Khorasan (AKBARI ASL et al. 2009).

General distribution: Albania, Argentina, Australia, England, Israel, Japan, Nigeria, Palestine, Republic of Korea, North America (Widespread).

Comment: *C. tarsalis* was collected from *Oryzophilus surinamensis* (LINNAEUS 1758) (Coleoptera: Cucujidae) from Iran (MOHAJERY & AZIMI 1995).

***Laelius microneurus* (KIEFFER 1906)**

Allepyris microneurus KIEFFER 1906, 9: 416-417.
Allepyris nigricrus KIEFFER 1906, 9: 417.

Iranian record: Mazandaran (GHAHARI et al. 2008).

General distribution: Belgium, France, Japan (Honshu).

Subfamily Mesitinae

***Botoryan discolor* (NAGY 1968)**

Iranian record: Southwestern Iran (no locality cited) (ARGAMAN 2003).

General distribution: India, Iran (ARGAMAN 2003).

Discussion

This paper is the first work on Iranian Bethyilidae which included all the data on Iranian bethyilids which were recorded in different resources so far together with two new records. Among the six genera of Iranian Bethyilidae, *Goniozus* FÖRSTER 1856 with four recorded species is the most diverse than the others. This genus consists of approximately 170 species worldwide, of which are recorded from Oriental (53 spp.), Neotropical (35), Nearctic (32), Palaearctic (28), Afrotropical (12), and Australian (9) regions (LIM & LEE 2012). Most species of *Goniozus* are the ectoparasitoids of immature stages of microlepidopteran families such as Cosmopteridae, Gelechiidae, Pyralidae, and Tortricidae (GORDH & MÓCZÁR 1990; KADJBAF VALA & BAYAT ASADI 1995; ALAVI & GHOLIZADEH 2008), and one species, *G. microstigma* MELO & EVANS is the parasite of *Microstigma* spp. (Hymenoptera: Crabronidae) (MELO & EVANS 1993). Due to these habits, some species (e.g. *Goniozus legneri* GORDH, parasitoid of *Amyelois transitella* WALKER (Lepidoptera, Phycitidae)) are using for control of agricultural pests (LEGNER & GUIDO 1983; BERRY 1998). On the other hand, temporary problem caused by stings of

G. antipodum WESTWOOD on human was reported (HARRIS 1996). Iran is a large country incorporating various geographical regions and climate. Nevertheless, we could just find the records or specimens belong to three subfamilies among the most common four subfamilies in other geographical regions. Thus, we expect that some other species remain to be discovered. Additionally faunistic works on bethylid wasps in different regions of the world toward to completing of distribution data, phylogenic studies which a few of them have been conducted so far (TERAYAMA 1995, 2003a; LANES & AZEVEDO 2008; CARR et al. 2010) are very necessary for resolving some present taxonomic problems and ambiguities. Hopefully, in the future such researches will be encouraged in different regions of the world especially in the areas where their faunas are unknown completely.

Acknowledgements

The authors are grateful to Dr. T. Ljubomirov of Bulgaria for identification of some specimens, Dr. C.O. Azevedo of Brazil for preparing several necessary resources, and Dr. F. Gusenleitner of Austria for editing and preparing the manuscript for publishing. The research was supported by Shahre Rey Islamic Azad University.

Zusammenfassung

Vorliegende Arbeit gibt eine Zusammenfassung über das Vorkommens der Bethyloidea (Hymenoptera, Chrysoidea) im Iran. Neben der Auswertung von Literaturangaben wurde auch unpubliziertes Material einbezogen. Insgesamt konnten 11 Arten aus den 6 Gattungen *Bethylus* LATREILLE, *Botoryan* ARGAMAN, *Cephalonomia* WESTWOOD, *Epyris* WESTWOOD, *Goniozus* FÖRSTER, *Laelius* ASHMEAD nachgewiesen werden. *Cephalonomia gallicola* (ASHMEAD 1887) und *Epyris fuscipes* (KIEFFER 1906) sind Neunachweise für den Iran.

References

- AKBARI ASL M.H., TALEBI A.A., KAMALI H. & S. KAZEMI (2009): Stored product pests and their parasitoid wasps in Mashhad, Iran. — *Advances in Environmental Biology* **3** (3): 239-243.
- ALAVI J. & M. GHOLIZADEH (2008): Report of two parasitoids bethylid wasp on larva of grape berry moth *Lobesia botrana* SCHIFF. (Lepidoptera: Tortricidae) from Khorasan-shomali province. — *Proceedings of 18th Iranian Plant Protection Congress, 24-27 August 2008*, 74 pp.
- ARGAMAN Q. (2003): Generic Synopsis of Mesitinae KIEFFER, 1914 (Hymenoptera: Bethyloidea). — *Entomofauna* **24** (4): 61-96.
- AZEVEDO C.O. (1999): Família Bethyloidea, pp. 169-181. — In: BRANDÃO C.R. & E.M. CANELO (eds), *Biodiversidade do estado de São Paulo, Brasil: síntese do conhecimento ao final do século XX. Vol. 5: Invertebrados Terrestres*. — São Paulo, FAPESP, 279 pp.
- AZEVEDO C.O. (2006): Insecta, Hymenoptera, Bethyloidea: range extension and filling gaps in Australia. — *Check List* **2** (1): 42-44.
- AZEVEDO C.O. & B.H. GUIMARÃES (2006): Insecta, Hymenoptera, Bethyloidea: range extension and filling gaps in Yemen. — *Check List* **2** (3): 26-29.

- BERLAND L. (1928): Faune de France 19: Hyménoptères vespiformes II: (Eumenidae, Vespidae, Masaridae, Bethylinidae, Dryinidae, Embolidae). — Paris, France, 208 pp.
- BERRY J.A. (1998): The bethyline species (Hymenoptera, Bethylinidae, Bethylinae) imported into New Zealand for biological control of pest leafrollers. — *New Zealand Journal of Zoology* **25**: 329-333.
- BROTHERS D.J. & J.M. CARPENTER (1993): Phylogeny of Aculeata: Chrysoidea and Vespoidea. — *Journal of Hymenoptera Research* **2**: 227-302.
- CARR M., YOUNG J.P.W. & P.J. MAYHEW (2010): Phylogeny of bethylid wasps (Hymenoptera: Bethylinidae) inferred from 28S and 16S rRNA genes. — *Insect Systematics & Evolution* **41**: 55-73.
- EHTESHAMI F., ALEOSFOOR M., ALLAHYARI H., ALICHI M., AKRAMI M.A. & M. KIANI (2010a): First record of *Goniozus legneri* GORDH (Hymenoptera: Bethylinidae), the larval ectoparasitoid of carob moth, in Iran. — *Proceedings of 19th Iranian Plant Protection Congress*, 31 July-3 August 2010, Iranian Research Institute of Plant Protection, Tehran, 123 pp.
- EHTESHAMI F., ALEOSFOOR M., ALLAHYARI H., ALICHI M., AKRAMI M.A. & M. KIANI (2010b): Primary investigation on the biology of *Goniozus legneri* GORDH (Hymenoptera: Bethylinidae), a larval ectoparasitoid of carob moth, on *Ectomyelois ceratoniae* (ZELLER). — *Proceedings of 19th Iranian Plant Protection Congress*, 31 July-3 August 2010, Iranian Research Institute of Plant Protection, Tehran, 605 pp.
- GHAHARI H., HAYAT R., TABARI M., OSTOVAN H. & S. IMANI (2008): A contribution to the predator and parasitoid fauna of rice pests in Iran, and a discussion on the biodiversity and IPM in rice fields. — *Linzer biologische Beiträge* **40** (1): 735-764.
- GORDH G. & L. MÓCZÁR (1990): A catalog of the world Bethylinidae (Hymenoptera, Aculeata). — *Memoirs of the American Entomological Institute* **46**: 1-364.
- HARRIS A.C. (1996): The effects on a human of the sting of *Goniozus antipodum* (Hymenoptera: Bethylinidae). — *New Zealand Entomologist* **19** (1): 49.
- KADJIBAF VALA GH. & H. BAYAT ASADI (1995): Introduction of *Goniozus claripennis*, an ectoparasitoid of the lesser date moth (*Batrachedra amydraula*) in province Khuzestan. *Proceedings of the 12th Iranian Plant Protection Congress*, 2-7 September 1995, Karadj, p. 213.
- LANES G.O. & C.O. AZEVEDO (2008): Phylogeny and taxonomy of Sclerodermini (Hymenoptera, Bethylinidae, Epyrinae). — *Insect Systematics & Evolution* **39**: 55-86.
- LEGNER E.F. & A. SILVEIRA-GUIDO (1983): Establishment of *Goniozus emigratus* and *Goniozus legneri* (Hym: Bethylinidae) on Navel orangeworm, *Amyelois transitella* (Lep: Phycitidae) in California and biological control potential. — *Entomophaga* **28**: 97-106.
- LIM J. & S. LEE (2012): Review of *Goniozus* Förster, 1856 (Hymenoptera: Bethylinidae) of Korea, with descriptions of two new species. — *Zootaxa* **3414**: 43-57.
- LOTFALZADEH H., MASNADI-YAZDINEJAD A. & M. SABER (2012): New records of the grape berry moth hymenopterous parasitoids in Iran. — *Munis Entomology & Zoology* **7** (1): 284-291.
- MELO G.A.R. & H.E. EVANS (1993): Two new *Microstigmus* species (Hymenoptera, Sphecidae), with the description of their parasite, *Goniozus microstigmati* sp. n. (Hymenoptera, Bethylinidae). — *Proceedings of Entomological Society of Washington* **95**: 258-263.
- MOHAJERY A. & A. AZIMI (1995): Preliminary study of *Cephalonomia tarsalis* ASHM. (Hym. Bethylinidae) a new parasite of saw-toothed grain beetle larvae on stored dates in Khuzestan province- Iran. — *Proceedings of the 12th Iranian Plant Protection Congress*, 2-7 September 1995, Karadj, 205 pp.
- SAKENIN H., SAMIN N., SHAKOURI M.J., MOHEBBI H.R., EZZATPANAH S. & S. MOEMEN Beitollahi (2011): A faunistic survey of the insect predators in some regions of Iran. — *Calodema* **142**: 1-10.

- TERAYAMA M. (1995): The phylogeny of the bethylid wasp tribe Sclerodermini (Hymenoptera, Bethyridae). — Proceedings of Japanese Society of Systematic Zoology **54**: 65-73.
- TERAYAMA M. (2003a): Phylogenetic systematics of the family Bethyridae (Insecta: Hymenoptera). Part I. Higher classification. — Academic Reports. Faculty of Engineering of Tokyo Polytechnic University **26** (1): 1-15.
- TERAYAMA M. (2003b): Phylogenetic systematics of the family Bethyridae (Insecta: Hymenoptera). Part II. Keys to subfamilies, tribes and genera in the world. — Academic Reports. Faculty of Engineering of Tokyo Polytechnic University **26** (1): 16-29.
- ZEIRI A., BRAHAM M. & M. BRAHAM (2011): First record of *Cephalonomia hypobori* on *Scolytus amygdali* in Tunisia. — Tunisian Journal of Plant Protection **6**: 43-47.

Author's addresses:

Dr. Hassan GHAHARI
Department of Plant Protection, Shahre Rey Branch
Islamic Azad University, Tehran, Iran
E-mail: hghahari@yahoo.com

Dr. Jongok LIM
Division of Forest Biodiversity
Korea National Arboretum
Pocheon, Republic of Korea
E-mail: jjongok7@gmail.com