

## The Wasps Associated with Seeds and Galls of *Rosa Canina* in Iran

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### ABSTRACT

The complex of wasps associated with hips and galls of dog rose (*Rosa canina* Linnaeus) was studied in Tehran, Tabriz and Uromieh, Iran. The hips and galls of dog rose was collected irregularly during 2002 and 2003 and kept in laboratory condition until the wasps were emerged. As a result of this study, two seed wasp species, *Megastigmus aculeatus* (Swederus) and *Megastigmus rosae* Bouček, 1971 (Hym.: Torymidae); one seed gall wasp species, *Diplolepis mayri* (Schlechtendal) (Hymenoptera: Cynipidae) and eight parasitoid species of gall wasp consisted of *Pteromalus bedeguaris* (Thomson) (Hym.: Pteromalidae), *Glyphomerus stigma* (Fabricius) and *Torymus bedeguaris* (Linnaeus) (Hym.: Torymidae), *Eurytoma pistaciae* Rondani and *Eurytoma rosae* Nees (Hym.: Eurytomidae), *Eupelmus urozonus* Dalman (Hym.: Eupelmidae), *Exeristes roborator* (Fabricius) and *Orthopelma mediator* Thunberg (Hym.: Ichneumonidae) were determined. Brief information on parasitoid diversity and frequency of each parasitoid species of *D. mayri* are given.

**Key words:** Gall wasps, Seed wasps, Parasitoid wasps, Tehran, North-Western of Iran

### Introduction

Galls occur on many different plants. This malformed growth maybe caused by insects, fungi, bacteria, or nematodes, but insect galls are the most common[16]. The ability to form galls represents an important and widespread life style among insects. The galling habit has evolved several times, and over 13000 species of gallers have been described[22].

Galling insects are usually not considered as pests. Most of them are harmless and just look interesting. However, certain species can physically and aesthetically damage high value plants by reducing photosynthesis and seed production, discoloring foliage, causing defoliation, branch dieback and rarely, plant death[16].

Gall wasps mainly belong to the family Cynipidae that attack herbaceous and tree species in the Palearctic and Nearctic regions[6]. Among cynipids, the genus *Diplolepis* include major gall

wasp species. *Diplolepis* wasps are restricted to wild roses[40]. One of the species *Diplolepis mayri*, which is widely distributed, induces gall on wild roses such as dog rose (*Rosa canina* L.)[10,21,35,68]. *D. mayri* has been reported by Farahbakhsh [23] from Chahar mahal-Bakhtiari in Iran.

Gall wasps have a complex of specific natural enemies such as parasitoid wasps that help suppress their population. These parasitoid wasps belong to the two great superfamilies: Chalcidoidea[10,68] and Ichneumonoidea[9,38,58]. Many chalcidoid species of the families Pteromalidae [31,36], Eulophidae, Eurytomidae, Ormyridae, Torymidae[31], Eupelmidae[13,19] and some species of Ichneumonidae [30,53] are important parasitoids of gall wasps.

Among chalcidoids, the most phytophagous torymids belong to the subfamily Megastigminae, which includes one genus *Megastigmus* [31]. The larvae of some species feed on tissue in developing

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seeds of *Rosa canina* [60]. The objective of this study was to determine seed wasps and parasitoids of gall wasp, *D. mayri* on *R. canina* in Iran.

Simpson diversity indices ( $D$  and  $E_D$ ) and Shannon diversity indices ( $H$  and  $E_H$ ) provide important information about rarity and commonness of species in a community. Also these indices are important tools for biologists trying to understand community structure [11].

### Materials and Methods

The studies on seed feeders, gall wasps and parasitoids of gall wasps on dog rose was carried out from April to November 2002 in Tehran province (Shahrestanak, Aghasht) and also February to June 2003 in Tabriz (campus of college of Agriculture, Tabriz University) and Uromieh (Nazlou).

The galls of dog rose were collected irregularly from field and transferred to the laboratory. The materials were placed in petri-dishes, covered with a layer of filter paper. The petri dishes were kept in room condition. The emerged wasps were collected daily using an aspirator and stored in 75% ethyl alcohol for future works. The wasp species were identified by experts.

Simpson diversity indices ( $D$  and  $E_D$ ) were calculated by the following equations:

$$D = \frac{1}{\sum_{i=1}^s p_i^2}$$

$$E_D = \frac{D}{D_{\max}} = \frac{1}{\sum_{i=1}^s p_i^2} \times \frac{1}{s}$$

where  $D$  is the Simpson's diversity index,  $p_i$  is the proportion of species  $i$  relative to the total number of species,  $S$  is the total number of species in the community and  $E_D$  is the equitability or evenness [11].

Shannon's diversity indices ( $H$  and  $E_H$ ) is another indices that is commonly used to characterize species diversity in a community:

$$H = -\sum_{i=1}^s p_i \ln p_i$$

$$E_H = \frac{H}{H_{\max}} = \frac{H}{\ln S}$$

where  $H$  is the Shannon's diversity index,  $E_H$  is the Shannon's equitability and  $H_{\max}$  is equal to  $\ln S$ , other characters are like Simpson's indices [11].

### Result and Discussion

Eleven species of wasps were recorded in our investigations. Among the wasps associated with *R. canina*, two species, *Megastigmus aculeatus* (Swederus) and *Megastigmus rosae* Bouček (Hym: Torymidae) were recorded as seed feeders. The species, *Diplolepis mayri* (Schlechtendal) was the only gall wasp on hips of *R. canina* in all studied regions and years.

A total of eight species of parasitoids from the superfamilies Chalcidoidea and Ichneumonoidea were reared from *D. mayri* on *Rosa Canina*. These belong to five families: Torymidae, Eurytomidae, Pteromalidae, Eupelmidae and Ichneumonidae. *Torymus bedeguaris* (Linnaeus), *Glyphomerus stigma* (Fabricius), *Eurytoma pistaciae* Rondani, *E. rosae* Nees, *Pteromalus bedeguaris* (Thomson), *Eupelmus urozonus* Dalman belong to Chalcidoidea, *Exeristes roborator* (Fabricius) and *Orthopelma mediator* Thunberg belong to Ichneumonidae that *Exeristes roborator* was newly recorded from *D. mayri*.

The total number of each parasitoid species and their relative frequency in the examined samples are given in table 1. In Tehran, *Pteromalus bedegusris* was found to be the most common parasitoid (33.17 %) followed by *E. rosae* (31.77%). *P. bedeguaris* was also found to be the dominant species (37.79%), followed by *O. mediator* (19.85 %) in Tabriz. Also in Uromieh, *P. bedeguaris* was the most common species (60.86 %), followed by *E. rosae* (13.04 %). The other species were less abundant.

Diversity indices provide more information than simply the number of species in a given area. The present study has also revealed that *D. mayri* had the highest parasitoid diversity in Tehran (Shannon's  $H=1.590$ , Simpson's  $D=4.175$ ), in comparison to Tabriz and Uromieh. For a given richness (e. g. Tehran and Uromieh,  $S=6$ ),  $D$  and  $H$  increase as equitability increases. Equitability is greatest when species are equally abundant (Table 2).

Rose Gall wasp

Family: Cynipidae

*Diplolepis mayri* (Schlechtendal, 1877)

#### Material examined

Tabriz, 14.II.2003, 41 females; 12.III.2003, 108 females; 16.IV.2003, 92 females, 24.IV.2003, 138 females; Uromieh, Nazlou, 10.IV.2003, 73 females.

In this research, *D. mayri* was collected from Tabriz and Uromieh regions on *R. canina*. This species has also been reported by Farahbakhsh [23] from Iran on

**Table 1:** Frequency of parasitoid species reared from *D. mayri* in three locations of Iran.

Parasitoid species	Number and Relative frequency					
	Tehran (2002)		Tabriz (2003)		Uromieh (2003)	
	No.	Frequency(%)	No.	Frequency(%)	No.	Frequency(%)
Family: Torymidae						
<i>Torymus bedeguaris</i> (Linnaeus)	20	9.34	16	3.82	2	4.34
<i>Glyphomerus stigma</i> (Fabricius)	21	8.87	15	3.58	0	0.00
Family: Eurytomidae						
<i>Eurytoma pistaciae</i> Rondani	19	9.81	26	6.22	5	10.86
<i>Eurytoma rosae</i> Nees	68	31.77	77	18.42	6	13.04
Family: Pteromalidae						
<i>Pteromalus bedeguaris</i> (Thomson)	71	33.17	158	37.79	28	60.86
Family: Eupelmidae						
<i>Eupelmus urozonus</i> Dalman	16	7.47	5	1.19	3	6.52
Family: Ichneumonidae						
<i>Exeristes roborator</i> (Fabricius)	0	0.00	38	9.09	0	0.00
<i>Orthopelma mediator</i> Thunberg	0	0.00	83	19.85	2	4.34

**Table 2:** Parasitoid diversity of *D. mayri* in three locations of Iran

Variables	Locations		
	Tehran	Tabriz	Uromieh
Simpson's diversity index ( <i>D</i> )	4.175	3.537	1.847
Simpson's equitability ( <i>E<sub>p</sub></i> )	0.696	0.442	0.308
Shannon's diversity index ( <i>H</i> )	1.590	1.563	0.970
Shannon's equitability ( <i>E<sub>H</sub></i> )	0.889	0.752	0.541

*Rosa* sp. It is widely distributed in Sweden [59], Spain [67], Romania[64].

*D. mayri* induces large, complex and multi-chambered galls in the hips of several species roses including *Rosa canina*, *Rosa rubiginosa*, *Rosa villosa* and *Rosa majalis* or *Rosa rugosa* [58,5,10,68,35,33,21].

A complex of parasitoid species of *D. mayri* on *R. canina* were identified. These include *Eurytoma rosae* Nees, *E. pistaciae* Rond., *Torymus bedeguaris* (L.), *Glyphomerus stigma* (F.), *Pteromalus bedeguaris* (Thoms.), *Eupelmus urozonus* Dalman, *Exeristes roborator* (Fabricius) and *Orthopelma mediator* Thunberg.

Rose seed wasps

Family: Torymidae

Subfamily: Megastigminae

*Megastigmus aculeatus* (Swederus, 1795)

#### Material examined

Tehran, Aghasht, 22.V.2002, 28 females, 4 males; Shahrestanak, 6.VI.2002, 18 females, 6 males; 22.VI.2002, 7 females, 5 males; Tabriz, 16.IV.2003, 1 female.

*M. aculeatus* is a phytophagous wasp. The larvae consume the entire contents of seeds of *Rosa multiflora* [44-46] and *R. canina*[39]. It is also reported from *Rosa rubiginosa*, [60], *R. gallica*, *R. palustris* and *R. virginiana* [51]. Gorlenko *et al.* [26] mentioned *M. aculeatus* as one of the pests of rose under field and glasshouse conditions.

In this study numerous *M. aculeatus* were found in Shahrestanak and Aghasht and one from Tabriz. Rakhshani *et al*[54] was reported *M. aculeatus* on *R.*

*canina* from Tehran. This wasp also has been recorded from Armenia, Austria, Bosnia and Herzegovina, China, Croatia, France, England, Japan, Kazakhstan, Moldova, New Zeland, Poland, Romania, Russia, Slovakia, Somalia, Yugoslavia, Sweden, Tajikistan, Turkmenistan, Ukraine and USA [48].

Multiflora rose is one of the most important weed. *M. aculeatus* is an interesting species which is used for biological control of *Rosa multiflora*[3].

*Megastigmus rosae* Boucek, 1971

#### Material examined

Tehran, Aghasht, 25.V.2002, 21 females, 5 males; Shahrestanak, 10.VI.2002, 11 females, 4 males; 15.VI.2002, 7 females, 2 males; Tabriz, 14.IV.2003, 6 females; 24.IV.2003, 8 females; Uromieh, Nazlou, 10.IV.2003, 1 female.

Bayram *et al.* [10] reported *M. rosae* Boucek in complex of *D. mayri* on dog rose in Turkey as a phytophagous (seedfeeder) species. This wasp has been also recorded from *R. arvensis*, *R. ferruginea*, *R. pendulina*, *R. rubiginosa*, *R. tshatyrdag* and *R. turkestanica*[55].

This wasp has been collected from Tehran province. It has been recorded from Armenia, Austria, Azerbaijan, Caucasus, Switzerland, Czech Republic, Germany, Georgia, Kazakhstan, Rissia, Tajikistan, Turkmenistan Turkey and Ukraine [48].

Parasitoids of Rose gall wasp

Family: Torymidae

Subfamily: Toryminae

*Torymus bedeguaris* (Linnaeus, 1758)

*Material examined*

Tehran, Shahrestanak, 25.VI.2002, 12 females, 8 males; Tabriz, 16.IV.2003, 12 females, 4 males; 24.IV.2003, 8 females; Uromieh, Nazlou, 21.IV.2003, 2 females.

The species *T. bedeguaris* has association with gall insects, especially cynipids. *T. bedeguaris* has previously been reported by Shodjai [56] as a parasitoid of *D. mayri*. Zerova and D'yakonchuk [68] and Bayram *et al.* [10] has also reared this species from *D. mayri*. This parasitoid wasp has been also recorded from *D. bicolor* [27], *D. centifoliae* [32], *D. ignota* [51,27], *D. rosae* [14,32,50], *D. multispinosa* [32,51], *D. spinosissimae* [32] and *D. tuberculatrix* [27].

In this study *T. bedeguaris* was found in the galls collected from Shahrestanak, Tabriz and Nazlou. It has been reported by Shodjai [56] as a parasitoid of *D. mayri* from Tehran and East Azerbaijan. It has been also reported from Armenia, Austria, Canada, Caucasus, Croatia, Switzerland, Czech Republic, Germany, Spain, France, England, Hungary, Ireland (North and South), Italy, Netherland, Romania, Slovakia, U S A, USSR, Sweden, Turkey, Kazakhstan and Ukraine [48].

Most of the species of Toryminae are ectoparasitic on cecidogenus insects of the families Cecidomyidae and Cynipidae [54,27,15]. A few species of the genus *Torymus* are parasitic on gall inducing Eurytomidae [47].

Subfamily: Monodontomerinae  
*Glyphomerus stigma* (Fabricius, 1793)

*Material examined*

Tehran, Shahrestanak, 26.VI.2002, 11 females, 8 males; Tabriz, 18.IV.2003, 5 females, 2 males; 24.IV.2003, 8 females.

*G. stigma* is one of the parasitoid of gall inducing cynipids that are mostly found in the complex of other parasitoids. Tachikawa [61] reared *G. stigma*, from *Diplolepis fukudae* (Shinji) on *R. rugosa*. This species has also been reported as parasitoid of *D. mayri* (Schlechtendal) on *R. canina* [68]. Bayram *et al.* [10] found *G. stigma* as parasitoid of *Diplolepis mayri* and *Diplolepis rosae* on dog rose in Turkey. It has been also recorded from *D. centifoliae*, *D. eglanteriae*, [28], *D. multispinosa*, *D. opaca*, *D. polita* [54] and *D. spinosissimae* [32].

Other distribution regions include Austria, Canada, Switzerland, Croatia, England, Japan, Romania, Russia, Slovakia, Yugoslavia, USSR, Spain, Sweden, Czech Republic, Germany and Turkey [48].

Family: Eurytomidae  
Subfamily: Eurytominae

*Eurytoma pistaciae* Rondani, 1877

*Material examined*

Tehran, Aghasht, 29.VI.2002, 8 females, 5 males; Shahrestanak, 2.VI.2002, 6 females, 2 males; Tabriz, 15.IV.2003, 14 females, 12 males; Uromieh, Nazlou, 16.IV.2003, 5 females.

*E. pistaciae* has been always reported with together *E. rosae* Nees as parasitoid of gall inducing cynipids on rose. Zerova and D'yakonchuk [68] recorded this species from *D. mayri* on *R. canina*. Kim [37] and Murakami *et al.* [43] listed *E. pistaciae* as one of the natural enemies of chestnut gall wasp, *Dryocosmus kuriphilus*.

Murakami *et al.* [42] investigated the activity of *Torymus sinensis* had been introduced for biocontrol of *Dryocosmus kuriphilus*. He found a facultative hyperparasitism by *E. pistaciae* on *T. sinensis*.

Other distribution regions include Austria, Switzerland, Croatia, Germany, Spain, Italy, England, Japan, Russia, USSR, Turkey, Ukraine, Hungary and Korea-South [48].

*Eurytoma rosae* Nees, 1834

*Material examined*

Tehran, Aghasht, 29.V.2002, 28 females; Shahrestanak, 25.VI.2002, 27 females, 13 males; Tabriz, 16.IV.2003, 31 females, 23 males; 27.IV.2003, 12 females, 11 males; Uromieh, Nazlou, 5.VII.2003, 6 females.

*E. rosae* has been reported as parasitoid of *D. mayri* on *R. canina* [10,68] and also galls of *R. pimpinellifoliae* [49]. Bayram *et al.*, [10] has recorded this species on *D. rosae* and *D. eglanteriae* from Turkey. It has been also recorded on *D. spinosissimae*, *D. rosarum*, *D. nervosa* and *D. centifoliae* [49,32].

*E. rosae* have parasitic activity on some other cynipids such as chestnut gall wasp *Dryocosmus kuriphilus* [41,34].

Other distribution regions include Argentina, Armenia, Austria, Belgium, Caucasus, Switzerland, Peoples' republic of China, Czech Republic, Czech Republic, Germany, Spain, Finland, France, England, Greece, Hungary, Ireland (North and South), Italy, Kazakhstan, Malaysia, North Africa, Netherlands, Poland, Romania, Slovakia, Yugoslavia, USSR (European and Central Asia), Sweden and Turkey [48].

Members of the genus *Eurytoma* can be entomophagous, phytophagous or both. Entomophagous forms are documented to parasitize a wide variety of insect orders, including members of

the Coleoptera, Lepidoptera, Hymenoptera, Homoptera and Diptera as well as Araneae [20]. Some of them are external parasite of the immature stages of hymenopterous, particularly gall-cynipids, others parasitize larvae of other gall insects. Phytophagous forms are known from at least six plant families and most often attack seeds and stems (borers or gallers) or live asinquilines in galls formed by other insects. Many species of *Eurytoma* are ectoparasitic on the larvae of gall making Tephritidae as well [17]. On the other hand some species of *Eurytoma* are gall inducing [65,2].

Family: Pteromalidae

Subfamily: Pteromalinae

*Pteromalus bedeguaris* (Thomson, 1878)

#### Material examined

Tehran, Aghasht, 25.V.2002, 33 females, 8 males; Shahrestanak, 10.VI.2002, 17 females, 13 males; Tabriz, 18.II.2003, 63 females, 34 males; 25.II.2003, 15 females, 14 males; 24.III.2003, 14 females, 18 males; Uromieh, Nazlou, 17.III.2003, 2 females, 1 male; 10.IV.2003, 3 females, 6 males; 18.IV.2003, 16 males.

In this research *P. bedeguaris* has been recorded from *D. maryri*. Also, *D. rosae* [68,50,32,24], *D. eglanteriae*, *D. rosarum* and *D. spinosissimae* [32] are the other hosts of this wasp.

During study, this wasp was collected from Karaj, Tabriz and Uromieh. Other distribution regions include Austria, Canada, Switzerland, Czech Republic, Germany, Spain, France, England, Hungary, the Netherlands, Romania, Russia, Kazakhstan, Slovakia, Yugoslavia, Sweden, USA, Sweden, Serbia, Caucasus and Turkey [48]. *Pteromalus bedeguaris* (Thomson) has previously been reared from galls induced by *Diplolepis mayri* on *R. canina* [10].

Family: Eupelmidae

Subfamily : Eupelminae

*Eupelmus urozonus* Dalman, 1820

#### Material examined

Tehran, Aghasht, 24.VI.2002, 16 females; Tabriz, 16.IV.2003, 5 females; Uromieh, Nazlou, 9.V.2003, 3 females.

In this research *E. urozonus* was recorded from *D. maryri*. It has been also reared from *D. centifoliae*, *D. eglanteriae*, *D. spinosissimae* [32] and *D. rosae* [50,8]. A good account of the biology of *Eupelmus urozonus* Dalman found parasitic on the cynipid galls of oak is available [4]. *E. urozonus* often parasitised gall insects specially cynipids and cecidomyiids. *E. urozonus* is one of the most

important natural enemies of chestnut gall wasp, *Dryocosmus kuriphilus* in China [[34,41,29]. This species reared as parasitoid of some other gall insects [25], such as *Dasineura gleditchiae* (O.S.) [12], *Janetia cerris* and *Dryomyia circinnans* [7] (Diptera, Cecidomyiidae). *Eupelmus urozonus* has also found with *Bruchidius chloroticus* on seeds of *Sesbania aculeata* (Leguminosae) [66]. There is an interesting report from *E. urozonus* as an egg parasitoid of *Dendrolimus pini* L. (Lepidoptera: Lasiocampidae) in Hungary [18]. Thuroczy [62] recorded *E. urozonus* as parasitoid of several species of gracillariids in Hungary.

Other distribution regions include Afghanistan, Andorra, Armenia, Australia, Austria, Algeria, Bulgaria, Bosnia Hercegovina, Egypt, Switzerland, Peoples' republic of China, Canary Islands, Croatia, Cyprus, Czech Republic, Germany, Spain, France, England, Greece, Hungary, India, Israel, Ireland (North and South), Italy, North Africa, Netherlands, Poland, Romania, Slovakia, Jordan, Japan, South Korea, Korea, Kazakhstan, Lebanon, Morocco, Moldova, Norway, Pakistan, Yugoslavia, USSR (European and Central Asia), Russia, Slovenia, Sweden, Syria, USA, Transcaucasus (Zakavkaz), Sweden and Turkey [48].

Several species are reported from the galls of plants and some are supposed to be gall inducer. Among the various genera of Eupelmidae, the genus *Eupelmus* includes a majority of species associated with plant galls [47]. Some species of Eupelmidae such as *E. urozonus* have parasitic activity on gall insects mainly on Cynipidae. *E. urozonus* has been reported as parasitoid of olive fly, *Daucus oleae* (Dip. Tephritidae) [19,13].

Family: Ichneumonidae

Subfamily: Pimplinae

*Exeristes roborator* (Fabricius, 1793)

#### Material examined

Tabriz, 28.IV.2003, 8 females, 14 males; 7.V.2003, 6 females, 10 males.

*E. roborator* has been known as the parasitoid of Coleoptera and Lepidoptera. In this study it was recorded from *D. maryri* which is the first record on cynipids. The lepidopteran hosts include *Ostrinia kasmirica* [30,1] and *Rhyacionia buoliana* [63] and it has also recorded from *Larinus saussureae* [30] and *L. obtusus* [52] as coleopteran hosts. The size of the Parasitoid wasps collected from *D. maryri* is smaller in comparison with the other hosts. Maybe gall wasps are not considered as favorite hosts for this parasitoid.

This Parasitoid wasp was recorded from Tabriz-Iran for the first time during 2003. It has already been reported from India (Uttar Paradesh and

Kashmir), Taiwan, Pakistan, Europe, China, Micronesia [30], Romania [52], Bulgaria [63] and Egypt [1].

Subfamily: Orthopelmatinae

*Orthopelma mediator* Thunberg, 1822

#### Material examined

Tabriz, 14.IV.2003, 1 female, 14 males; 19.IV.2003, 17 females, 20 males; 28.IV.2003, 15 females, 16 males; Uromieh, Nazlou, 15.IV.2003, 2 females.

The host-plant affinities and allozyme variation of cynipid *Diplolepis mayri* in southern Sweden were investigated, *Orthopelma mediator* was found in galls [59]. In addition this wasp also attack *D. rosae*, *D. eglanteriae*, *D. spinosissimae* and *D. rosarum* [58,24].

This Parasitoid is recorded here for the first time from Tabriz, Iran. It has been also recorded from Canada [57], Sweden [58,59] and Romania [64]. In southern Sweden, Parasitoid pressure was found to be high, causing *D. rosae* an estimated average larval loss of approximately 75%, mainly due to the attack of the ichneumonid wasp *Orthopelma mediator* [58].

In conclusion, the results of this study contribute to the knowledge of parasitoid-host relationships on *R. canina*. This study confirmed that the most parasitoids that attack cynipid rose gall wasp are members of the superfamily Chalcidoidea. Also the most parasitoids of gall wasps attack a wide range of gall wasp species.

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#### References

1. Abbas, M.S.T. and Y.A.A. El-Deeb, 1993. On the natural enemies of the major pests infesting cotton in Egypt. Egyptian Journal of Agricultural Research, 71 (1): 131-138.
2. Agarwal, B.D. and M.K. Jain, 1981. Studies on the leaf and shoot galls of *Emblica officinalis* Gaertn formed by Chalcidoidea (Hymenoptera). *Cecidologia Internationale*, 2(1): 39-44
3. Amrine, J.W. and T.A. Stasny, 1993. Biocontrol of multiflora rose. In Biological Pollution: The Control and Impact of Invasive Exotic Species. Indianapolis, Academy of Science, 9-21.
4. Askew, R.R., 1961. *Eupelmus urozonus* Dalman (Him., Chalcidoidea) as a parasite in cynipid oak galls. Entomologist, 94: 196-201.
5. Askew, R.R., 1980. The diversity of insect communities in leaf-mines and plant galls. J Anim Ecol 49(3): 817-829.
6. Askew, R.R., 1984. The biology of gall wasps. In: biology of Gall Insects (ed.: Anantkrishnan, T. N.). Arnold, London, pp. 223-271
7. Askew, R.R., 1999. Confirmation of an association of *Synergus* Hartig and *Saphonecrus* Dalla Torre and Kieffer (Him., Cynipidae) with oak galls of Cecidomyiidae (Diptera). Entomologist's Monthly Magazine, 135: 1616-1619.
8. Askew, R.R., and J.L. Nieves-Aldrey, 2000. The genus *Eupelmus* Dalma, 1820 (Hymenoptera, Chalcidoidea, Eupelmidae) in Peninsular Spain and the Canary Islands, with taxonomic notes and descriptions of new species. Graellsia, 56: 49-61.
9. Barron, J.R., 1977. The nearctic species of *Orthopelma* (Hymenoptera: Ichneumonidae). Systematic Entomology, 32 (2): 171-176.
10. Bayram, S., S. Ulgenturk and S. Torros, 1998. Research on the insects causing galls on dog rose (*Rosa* Sp.) and their parasitoids in Ankara province. Turkiye Entomoloji Dergisi, 22(4): 259-268.
11. Begon, M., J.L. Harper, and C.R. Townsend, 1996. *Ecology: Individuals, populations and communities*. Blackwell Scientific Publications, London.
12. Bene, G. and S. Landi, 1993. Natural enemies of *Dasineura gleditchiae* (O.S.) (Diptera, Cecidomyiidae) in Italy. Redia, 76 (1): 1-16.
13. Bigler, F., P. Neuenschwander, V. Delucchi and S. Michelakis, 1986. Natural enemies of preimaginal stages of *Daucus oleae* Gmel. (Dip.: Tephritidae) in Western Grete. II. Impact on olive fly population. Bullettino del Laboratoria di Entomologia Agaria " Fillippo Silvestri", 43: 76-96.
14. Boucek, Z., 1977. A faunistic review of the Yugoslavian Chalcidoidea (Parasitic Hymenoptera). Acta Entomologica Jugoslavica, 13 (Supplement): 24-38.
15. Burks, B.D., 1979. Family Torymidae, In: *Cataloge of Hymenoptera in America North of Mexico, Symphyta and Apocrita (Parasitica)*, ed. K. V. Krombein *et al.*, 1: 768-889, 961-1042. Smitsonian Institution Press. Washington, D. C. 1198pp.
16. Buss, E.A., 2003. Insecta galls. Department of Entomology and Nematology. University of Florida.
17. Clausen, C.P., 1972. *Entomophagous Insects*. New York: Hafner Publishing CO., nc. 661pp.
18. Csoka, G., K. Lesko and A. Ambrus, 1989. Biology and damage of *Dendrolimus pini* L. (Lepidoptera: Lasiocampidae) in Hungary. Novenyvedelem, 25(2): 61-65.

19. Delrio, G. and R. Prota, 1988. Determination of abundance in population of the olive fruit-fly. *Fruyula Entomologica*, 11: 47-55.
20. DiGiulio, J., 1997. Eurytomidae. In: Gibson G, Huber J, Woolley J, eds. Annotated Keys to the Genera of Nearctic Chalcidoidea (Hymenoptera). Ottawa, Canada: NRC Research Press.
21. Doganlar, M., 1984. Notes on Chalcidoidea of Turkey. I. Chalcididae, Eurytomidae, Torymidae, Ormyridae, Perilampidae, Eucharidae. *Turkiye Bitki Koruma, Dergisi*, 8 (3): 151-158.
22. Dreger-Jauffret, F. and J.D. Shorthouse, 1992. Diversity of gall inducing insects and their galls. In: "biology of Gall Insect-Induced Galls" (Ed.: Shorthouse, J. D. and Rohfritsch O.). Oxford University Press, Oxford. pp. 8-33.
23. Farahbakhsh, G., 1961. Check list of insects and other important enemies of plants and agricultural product of Iran. Department of Agriculture and Plant Protection, Tehran, 1: 1-153.
24. GarridoTorres, A.M. and J.L. Nieves-Aldrey, 1999. Pteromalid from the autonomus community of Madrid (CAM) (Spain): Faunistics and Catalogue (Hymenoptera; Chalcidoidea: Pteromalidae). *Graellsia*, 55: 42.
25. Gijswijt, M.J., 1993. Species of *Eupelmus* (Hymenoptera: Chalcidoidea) of Spanish juniper. *Entomologische Berichten*, 53(1): 10-12.
26. Gorlenko, S.V., N.A. Pan'ko and N.A. Podobnaya, 1984. *Pests and Diseases of Rose*. Minsk, USSR; "Nauka i Tekhnika", 127 pp.
27. Grissell, E.E., 1976. A revision of the western nearctic species of *Torymus* Dalman (Hymenoptera: Torymidae). University of California publication in Entomology, 79: 1-120.
28. Grissell, E.E., 1995. Toryminae (Hymenoptera: Chalcidoidea: Torymidae): A redefinition, generic classification and annotated world catalogue of species. *Memories on Entomology International*, 2:192-193.
29. Guo, S.J., A.J. Qu and W. Sun, 1997. A preliminary study on the parasitic wasps of *Dryocosmus kuriphilus* Y. *Scientia Silvae Sinicae*, 33(3): 242-246.
30. Gupta, V.K. and D.T. Tikar, 1976. Ichneumonologia orientalis or a monographic study of the oriental region, Part I, The tribe Pimplini (Hymenoptera: Ichneumonidae: Pimplinae). University of Delhi. PP: 1-312.
31. Hanson, P.E. and J. LaSalle, 1995. The chalcidoidea families. In: Hymenoptera of Costa Rica. (Eds., Hanson, P. E. and Gauld, I.). Oxford University press. pp: 266-388.
32. Herting, B., 1977. Hymenoptera. A catalogue of Parasites and predators of terrestrial arthropods. Section A. Host Prey/ Enemy. Commonwealth Agricultural Baurex, Institute of Biological Control, 4: 107-117.
33. Hintze-Podufal, C. and C. Thiele, 1988. Investigation of microfauna of rose bedeguar gall. *Mitteilungen der Deutschen Gesellschaft für Allgemeine und Angewandte Entomologie*, 6: 4-6, 537-541.
34. Huang, J.F., Y.Q. Luo and D.X. Liao, 1988. Studies on the natural enemies of chestnut gall wasp [*Dryocosmus kuriphilus*] in China. *Scientia Silvae Sinicae*, 24 (2): 162-169.
35. Jennings, M., 1995. A new record of *Diplolepis mayri* in kent. *Cecidology*. 10 (1): 3.
36. Kamijo, K., 1981. Pteromalid wasps record from cynipid galls on oak and chestnut in Japan, with description of 4 new species. *Kontyu*, 49: 272-282.
37. Kim, J.K., 1993. Natural enemies of *Dryocosmus kuriphilus* Yasumatsu (Hymenoptera: Cynipidae) and their seasonal prevalence of adult emergence in Korea. *Korean Journal of Applied Entomology*, 32 (3): 285-290.
38. Kilincer, N., 1983. Investigations on the parasites of rose gall- wasps (*Phodites* Sp.) (Hym.: Cynipidae) in the Ankara region. *Bitki Koruma Bulteni*, 23 (1): 1-11.
39. Kurir, A., 1975. *Megastigmus aculeatus* Swed. (Him. Chalcid., Torymidae), a destroyer of the seeds of the dog rose (*Rosa canina*). *Zeitschrift für Angewandte Entomologie*, 78 (4): 415-423.
40. Lalonde, R.G. and J.D. Shorthouse, 2000. Using rose galls for field exercises in community ecology and island biogeography. *The American Biology Teacher*. 62 (6).
41. Luo, Y.Q., J.F. Huang and D.X. Liao, 1987. Studies on the distribution and biology of *Torymus sinensis* Kamijo. *Journal of Beijing Forestry University*, 9(1): 47-57.
42. Murakami, Y., Y. Hiramatsu and M. Maeda, 1994. Parasitoid complexes of the chestnut gall wasp (Hymenoptera: Cynipidae) in two localities before introduction of *Torymus (Syntomaspis) sinensis* (Hymenoptera: Torymidae), with special reference to prediction of results after release of the parasitoid. *Japanese Journal of Applied Entomology*, Z 38 (1): 29-41.
43. Murakami, Y., N. Ohkubo, S. Moriya, Y. Gyoutoku, C.H. Kim and J.K. Kim, 1995. Parasitoids of *Dryocosmus kuriphilus* (Hymenoptera: Cynipidae) in South Korea with particular reference to ecologically different types of *Torymus (Syntomaspis) sinensis* (Hymenoptera: Torymidae). *Applied Entomology and Zoology*, 30 (2): 277-284.
44. Nalepa, C.A., 1989. Distribution of the rose seed chalcid *Megastigmus aculeatus* var. *nigroflavus* Hoffmeyer (Hymenoptera: Torymidae) in North Carolina. *Journal of Entomological Science*, 24(4):413-416.

45. Nalepa, C.A., 1992. Evaluation of flotation as a method for determining infestation of multiflora rose seeds by *Megastigmus aculeatus* var. *nigroflavus* (Hymenoptera: Torymidae). *J Entomol Sci* 27(1):35-36.
46. Nalepa, C.A. and E. Grissell, 1993. Host seed size and adult size, emergence, and morphology of *Megastigmus aculeatus* *nigroflavus* (Hymenoptera: Torymidae). *Environ Entomol* 22(6):1313-1317.
47. Narendran, T., 1994. Torymidae and Eurytomidae of Indian subcontinent (Hymenoptera: Chalcidoidea), 500 pp. Zoological Monograph, Department of Zoology, University of Calicut, Kerala, India
48. Noyes, J.S., 2008. Universal chalcidoid Database. The Natural History Museum. [online]. Available on the internet <http://www.nhm.ac.uk/entomology/chalcidoids>.
49. O'Connor, J.P., 2000. *Eurytoma hypochoeridis* Claridge and *E. eosae* Nees (Hymenoptera: Eurytomidae) new to Ireland. *Entomologist's Monthly Magazine*. 136: 198.
50. Ozbek, H., S. Guclu and G. Tozlu, 1999. Biological and natural enemies of *Diplolepis mayri* Schld. (Hymenoptera: Cynipidae), A pest of *Rosa canina* L. in Erzurum province, *Turkiye Entomoloji Dergisi*. 23(1): 39-50.
51. Peck, O., 1963. *A Catalogue of the Nearctic Chalcidoidea* (Insecta: Hymenoptera). *Can Entomol (Suppl)* 1092 pp.
52. Perju, T. and I. Moldovan, 1991. Entomo fauna of *Centaurea* Species with a view to biological control. *Buletinul institut uli Agronomic Cluj Napoca Seria Agricultura Si Horticultura*. 45 (2): 73-84.
53. Perkins, J., 1959. Subfamilies and Ichneumonoidea, Ichneumonidae, for the identification of British insects. Royal Entomological Society of London. Vol.III, Part 2(ai).116 pp.
54. Rakhshani, E., A.A. Talebi, Y. Fathipour, and S. Moharramipour, 2003. The first report of rose seed wasp, *Megastigmus aculeatus* Swederus (Hymenoptera: Torymidae) from Iran. *The Second Applied-Scientific Seminar on Flowers and Ornamental Plants*. pp.10.
55. Roques, A. and M. Skrzypczynska, 2003. Seed-infesting chalcids of the genus *Megastigmus* Dalman, 1820 (Hymenoptera: Torymidae) native and introduced to the west Palaearctic region: taxonomy, host specificity and distribution. *Journal of Natural History*, 37:194-195.
56. Shodjai, M., 1963. The results of the fauna of parasitic Hymenoptera (Terebrants) in Iran and the importance of their appliances in biological control. The 1<sup>st</sup>. Iran Plant Protection Congress, Tehran University, 25-35.
57. Shorthouse, J.D. and S.E. Brooks, 1998. Biology of the galler *Diplolepis rosaefolii* (Hymenoptera: Cynipidae), its associated component community, and host shift to the shrub rose *Therese* Bugnet. *Canadian Entomologist*, 130 (3): 357-366.
58. Stille, B., 1984. The effect of host plant and parasitoids on the reproductive success of the parthenogenetic gall wasp *Diplolepis mayri* and its relatedness to *Diplolepis rosae* (Hymenoptera: Cynipidae). *Entomologia Generalis*, 10 (2): 87-96.
59. Stille, B., 1985. Host plant specificity and allozyme variation in the parthenogenetic gall wasp *Diplolepis mayri* and its relatedness to *Diplolepis rosae* (Hymenoptera: Cynipidae). *Entomologia Generalis*, 10 (2): 87-96.
60. Syrett, P., 1990. The rose seed chalcid *Megastigmus aculeatus* Swederus (Hymenoptera: Torymidae) on Island tussock Country. *New Zealand Entomologist*, 13: 34-38.
61. Tachikawa, T., 1971. Notes on some chalcidoids from Japan (Hymenoptera). *Transactions of the Shikoku Entomological Society*, 11 (1): 31-34.
62. Thuroczy, C., 1999. Parasitoids of mining insects. *Novenyvedelem*, 35 (12): 643-644.
63. Tsankov, G. and V.K. Gupta, 1993. The ichneumonid parasites of the European pine shoot moth caterpillars in Bulgaria (Hymenoptera: Ichneumonidae). *Advances in parasitic Hymenoptera research: Proceedings of the II conference on the Taxonomy and Biology of Parasitic Hymenoptera*, 391-394.
64. Tudor, C. and V. Caruntu, 1980. On Some host-Parasite relationships on the Cynipinae of the south-east of the country. *Studii Si Cecetari de Biologie*. 32(2): 171-176
65. Van Staden, J., J.E. Davey and A.R. Noel, 1977. Gall formation in *Erythrina lattissima* Z. *Phytopathology*, 84: 283-294.
66. Verma, B.R. 1989. Observations on three parasites of bruchids on leguminous host plants. *Bulletin of Entomology*. Entomological Society of India, 30(2):246-247.
67. Villar, J.P., 1993. A new record of *Diplolepis mayri* in Kent. *Cecidology*. 10 (1):3.
68. Zerova, M.D. and L.A. D'yakonchuk, 1976. *Diplolepis mayri* Schlecht. (Hymenoptera: Cynipidae) and its parasites of the superfamily chalcidoidea in the fauna of the USSR. *Entomologicheskoe obozrenie*, 55(1): 178-188.