



**Full Length Article**

## ***Podagrion pachymerum* (Walker 1833) (Hymenoptera: Torymidae) – A New Record for Iraqi Wasps from Basrah Province**

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### **Abstract**

*Podagrion pachymerum* (Hymenoptera: Torymidae) was collected from Basrah Province in Southern Iraq during 2020 by sweeping. It is a new record for the fauna of Iraq along with Podagrioninae, Podagrionini and *Podagrion*. Illustration of the species, a map of the collecting locations of the specimen and a review of Torymidae in Iraq are provided. © 2023 Friends Science Publishers

**Keywords:** Hymenoptera; Torymidae; *Podagrion pachymerum*; New record; Iraq

### **Introduction**

Chalcidoidea, a superfamily of Hymenoptera, currently includes 24 families (Heraty *et al.* 2013; Haas *et al.* 2018; Janšta *et al.* 2018; Burks *et al.* 2022; Zhang *et al.* 2022), including Torymidae *sensu* Janšta *et al.* (2018). Adult wasps are distinguished from other wasps belonging to different families by their long ovipositor, extremely short stigma veins, slightly raised cercal plates and transverse petiole (Janšta *et al.* 2018). Ca. 960 species in 70 genera are placed within Torymidae (Janšta *et al.* 2018, 2020; Noyes 2019), which has been recently divided into six subfamilies and six tribes, namely, Chalcimerinae, Glyphomerinae, Microdontomerinae, Monodontomerinae, Podagrioninae (Palachiini, Propalachiini and Podagrionini) and Toryminae (Boucekinini, Torymoidini and Torymini) (Janšta *et al.* 2018). Torymidae is a cosmopolitan family, although most genera are distributed in the Old World (Janšta *et al.* 2018). The biology of torymid species is still largely unknown, but as far as known, torymids are ectoparasitoids of various gall makers (Cynipidae [Hymenoptera] and Cecidomyiidae [Diptera]) and bees (Hymenoptera), endoparasitoids of the eggs of Heteroptera (Hemiptera) and the pupae of Lepidoptera and Symphyta (Hymenoptera) and parasitoids of mantid (Mantodea) eggs, although only a few species are phytophagous (Janšta *et al.* 2018). A few species of Torymidae have been employed in the practical control of pests; Grissell (1995) can be referred for a brief review.

The genus *Podagrion* was first described by Spinola (1811) on the basis of *Podagrion splendens* Spinola. Since

then, many authors have redescribed or regarded this genus under various synonyms (Narendran and Shella 2013). This genus is distributed widely worldwide with 101 described species (Noyes 2019), most of which are found in tropical and subtropical regions (Grissell 1995). *Podagrion* closely resembles the genus *Palmon* Dalman, however, the two genera can be distinguished by the following characteristics: *Podagrion* has a transverse anellus and its metasternum has one metasternal carina between the metacoxae whereas *Palmon* has a cylindrical anellus, and the metasternum is longer than its width and has two metasternal carinae (Grissell 1995). With regard to life history, *Podagrion* and other members of the tribe Podagrionini compose a homogeneous group which are parasitoids of Mantodea egg cases (Delvare 2005). The economic importance of *Podagrion* species have not documented yet.

Torymidae of Iraq, along with other insects of the country, has not been studied thoroughly in the past and present, contrary to the latest faunistic investigations, such as those of Augul (2017, 2018, 2019), because only five torymid species have been documented in Iraqi fauna, namely, (1) *Adontomerus amygdali* (Bouček 1958), which parasitises almond fruit/seed wasp (*Eurytoma amygdali* (Enderlein 1907; Hymenoptera, Eurytomidae) that damages almond fruits (*Prunus amygdalus* (Batsch 1801; Rosaceae) in Erbil Province as studied by Abdul-Rassoul and Mohammed (2017a); (2) *Erimerus indicus* (Rao and Bhatia 1962) as *Liodontomerus indicus* from unspecified location in the study of Farooqi (1986); (3) *Idiomacromerus longicarpus* (Abdul-Rassoul 2000) as *Liodontomerus*

*longicarpus* from Diyala Province by Abdul-Rassoul (2000); (4) *Monodontomerus obscurus* (Westwood 1833) emerging from the mud nests of black mud dauber or black mud-dauber wasp (*Sceliphron* spp.; Hymenoptera, Sphecidae) from Dohuk Province by Abdul-Rassoul and Mahmoud (2017b) and (5) *Oopristus turkestanicus* (Skriptshinsky 1929), which parasitises the eggs of shield/stink bugs (Hemiptera, Pentatomidae) on *Thuja* spp. (Cupressaceae) from Salahuddin Province by Bouček (1978: 105). Consequently, the Torymid fauna of other provinces, such as Basrah Province in Southern Iraq, is completely unknown even in recent faunistic surveys. Torymidae is absent in the studies of Al-Edani and Kareem (2015), Al-Saadi (2017), Ahmed (2020), Al-Frhany (2022) and Jappar (2022) who recorded insects from Basrah Province.

The lack of information about the fauna, ecology and economic importance of Hymenoptera in Basrah Province prompted authors to conduct research to elucidate Hymenoptera diversity. Partial results are presented here, announcing new faunistic findings for Torymidae.

## Materials and Methods

Specimens were collected from January to December 2021 by sweeping nets from different regions of Basrah Province in Southern Iraq (Fig. 1). The specimens were placed in containers containing 70% ethanol. In the laboratory, each material was poured into a Petri dish and placed on the base of a stereomicroscope to collect wasps by tweezers or tiny hook using magnification. Specimens were identified and photographed using a V003 Nikon camera installed on an EZ4 binocular stereomicroscope using identification keys and were preserved in vials containing 70% ethanol at the Museum of Natural History, Baghdad University, Iraq.

## Results

Different taxa of Hymenoptera were collected and determined from which *Podagrion pachymerum* (Hymenoptera, Torymidae) is reported herein.

**Family: Torymidae (Walker 1833)**

**Subfamily: Podagrioninae (Ashmead 1904)**

**Tribe: Podagrionini (Bouček 1976)**

**Genus: Podagrion (Spinola 1811)**

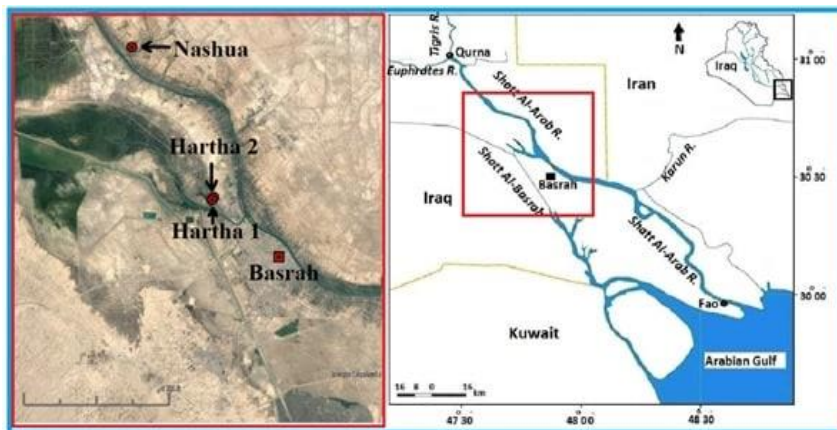
The antennal anellus is much wider than long and sometimes difficult to see. The mesepimeron does not bulge outwardly or does not make a flange above the surface of the metapleuron. The metasternum has one median carina, the metatibial apex subpointed with a distal spur, and the propodeal foramen is greatly separated from the metacoxal foramina (Grissell 1995).

**Species: Podagrion pachymerum (Walker 1833)**

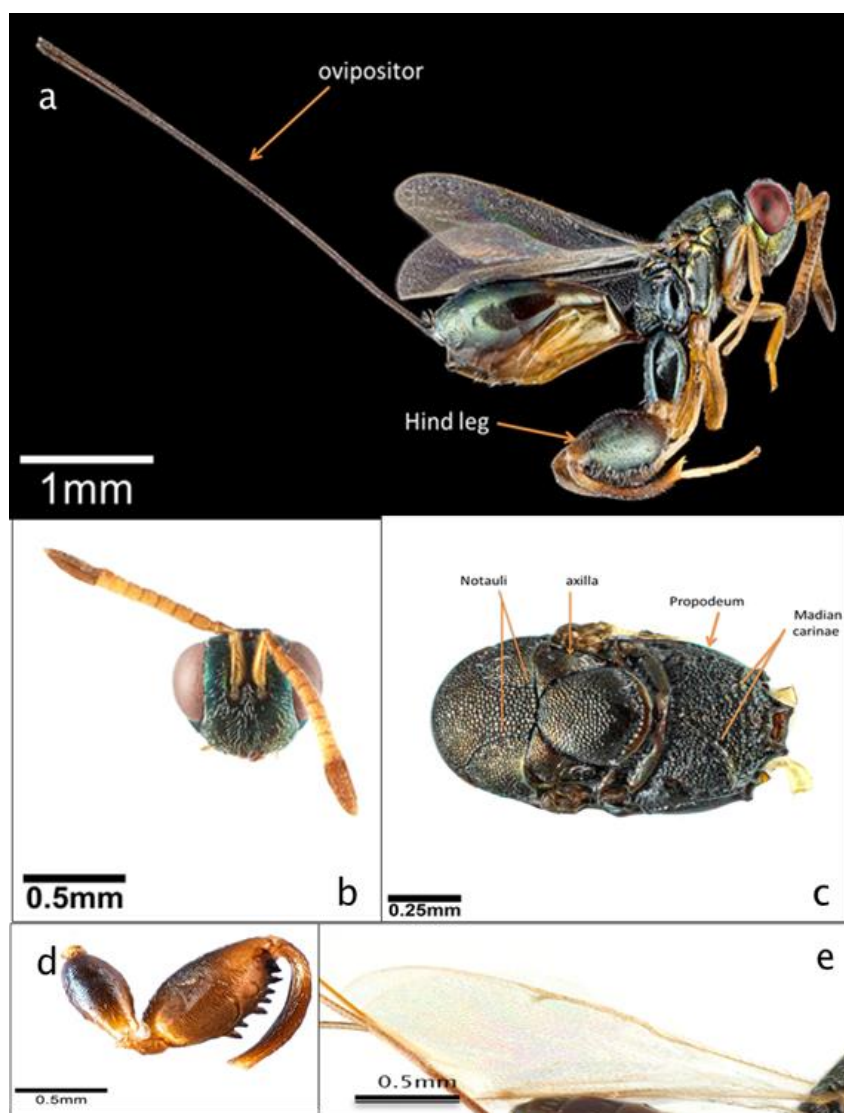
**Diagnosis (Female):** Body (Fig. 2a) with a metallic greenish colour, total length 3.1 mm (excluding ovipositor

sheath), ovipositor length 3.45 mm. Head (Fig. 2b) about 2 times as long as broad; compound eyes red, ocelli pale, reflecting black; outline of frons in dorsal view moderately convex. in anterior view with 0.644 mm length and 0.73 mm width, in lateral view with 0.7 mm length and 0.5 mm width; OOL (ocellar-ocular distance: the distance between a lateral ocellus and the closest eye), 0.9 mm slightly shorter than or equal to OD (ocellar diameter: the diameter of a lateral ocellus) ( $\times 0.85-1$ ), POL (postocellar distance: the distance between the lateral ocelli) 0.38 mm; occipital carina reaching down the temple margin. Antenna (Fig. 2b) with total length 1.2, inserted slightly above the lower ocular line; scape always reaching the anterior ocellus but does not reach the vertex level; pedicel shorter than first funicular segment; flagellum distinctly elongate, combined with pedicel 1.55–1.65 times as long as width of head; first funicular segment 1.6–1.95 times as long as wide; 7<sup>th</sup> funicular segment 0.7–0.9 times as long as wide; clava longer than the three preceding segments but not longer than the four preceding segments combined; scape 0.345 mm; pale yellow; pedicel 0.115 mm; pale yellowish brown; anellus 0.023 mm; funicular segments pale yellowish brown 0.09 mm; clava black 0.345 mm. Head and mesosoma dark green with metallic refringence. Thorax (Fig. 2c), notauli complete; midlobe of mesoscutum reticulate, cells larger than cells on lateral lobes; axillae with a more delicate, squamose sculpture; axillar grooves narrow; frenal area well distinct, nearly smooth; propodeum rugulose-reticulate with median carinae as an inverted Y, the lateral carinae straight and forming together an acute angle (70–80°); adpetiolar area subpentagonal, postero-laterally delimited by distinct costulae; propodeal spiracle elongate, as long as its distance to hind margin of metanotum propodeal spiracular groove fairly deep. Fore and mid legs yellow; hind legs (Fig. 2d), black except for pale yellowish brown hind tibiae, yellow tarsi and yellowish brown bases of the coxae and the femora; coxa shorter than hind femur whose ventral margin has seven teeth: second, fifth and seventh are longer than the remaining teeth, with the second tooth the largest, hind coxa 0.6 mm, hind femur 1.02 mm, hind tibia 0.9 mm. Forewing (Fig. 2e) 2.77 times as long as width, with 2.22 mm length, 0.8 mm width, submarginal vein setose along the basal cell, with 11–20 hairs, basal vein with 9–14 hairs, submarginal vein 0.7 mm, marginal vein 0.41 mm, length of marginal vein as long as 4 times or longer than postmarginal vein, postmarginal vein 0.138 mm, stigmal vein 0.069 mm. Metasoma (Fig. 2b) excluding the ovipositor sheath 1.62 mm; Metasoma including gaster metallic green; ovipositor sheath (Fig. 2a) black to brown, longer than the body, 1.2–1.4 times as long as body.

**Distribution.** Oriental (India) and mainly Palaearctic (Algeria, Austria, Bulgaria, Caucasus, Croatia, Czech Republic, France, Germany, Hungary, Iran, Italy, Moldova, Poland, Portugal (Madeira), Romania, Spain, Syria and Ukraine) (Noyes 2019) including Iraq (present study) thus *Podagrion pachymerum* is new record for the fauna of Iraq.



**Fig. 1:** Map of Iraq with focus on the south (right) showing collection sites (left)



**Fig. 2:** *Podagrion pachymerum* Walker 1833. **A**, female Lateral view of whole body; **B**, head and antenna; **C**, dorsal view of mesosoma; **D**, outside view of hind leg excluding tarsus; **E**, fore wing

**Table 1:** Present status of Torymidae of Iraq

Taxonomy		Distribution (province)	Biology (in Iraq)	Reference	
Subfamily	Tribe				Species
Microdontomerinae -		<i>Adontomerus amygdali</i> (Bouček 1958)	Erbil	Parasitoid of <i>Eurytoma amygdali</i> Enderlein 1907 (Hymenoptera, Eurytomidae) damaging almond fruits	Abdul-Rassoul and Mohammed (2017a, b)
		<i>Erimerus indicus</i> (Rao and Bhatia 1962)	Unspecified	Unknown	Farooqi (1986: 263), Grissell (1995: 225), Narendran et al. (2012)
		<i>Idiomacromerus longicarpus</i> (Abdul-Rassoul 2000)	Diyala	Unknown	Abdul-Rassoul (2000); Doğanlar (2016)
Monodontomerinae -		<i>Monodontomerus obscurus</i> (Westwood 1833)	Dohuk	Parasitoid of <i>Sceliphron</i> spp. (Hymenoptera, Sphecidae)	Abdul-Rassoul and Mahmoud (2017a, b)
		<i>Oopristus turkestanicus</i> (Skriptshinsky 1929)	Salahuddin	Parasitoid of eggs of shield/stink bugs (Hemiptera, Pentatomidae) on <i>Thuja</i> spp. (Cupressaceae)	Bouček (1978: 105), Farooqi (1986: 266), Tarla et al. 2010
Podagrioninae	Podagrionini	<i>Podagrion pachymerum</i> (Walker 1833)	Basrah	Unknown	Present study

Biology. Egg parasitoid of praying mantis (*Mantis religiosa* (Linnaeus 1758); Mantodea; Mantidae) from Europe (Thompson 1958: 664), France (e.g., Delvare (2005)), India (e.g., Farooqi (1986: 271)), Italy (Delvare 2005), Romania (e.g., Popescu (2009)) and Turkey (Bolu and Öztaşlan 2015) and conehead mantis (*Empusa pennata* (Thunberg 1815) (= *E. egena* Charpentier 1841); Mantodea; Empusidae) from France (Herting 1971: 66). Thorette (1992) mentioned *Podagrion pachymerum* was reared from the Mediterranean mantis (*Iris oratoria* (Linnaeus 1758); Mantodea; Mantidae) though this is misidentification of *Podagrion gibbum* (Bernard 1938) specimens (Delvare 2005).

Material Examined. 8 ♀, Nashua and Hartha region, Basrah province in southern of Iraq, 30° 30' 7.23" N, 47° 50' 30.93" E, in 2020.

## Discussion

Table 1 summarises the Torymidae of Iraq, which obviously demonstrates the unknown torymid fauna of the country. Consequently, much effort and investigation is required to reveal the biodiversity of Iraqi Torymidae (Farooqi 1986; Abdul-Rassoul 2000; Abdul-Rassoul and Mohammed 2017a, b).

To date, only six species of Torymidae have been recorded from Iraq (Table 1), which belong to 16 taxa, including three subfamilies (Microdontomerinae, Monodontomerinae and Podagrioninae), one tribe (Podagrionini), six genera (*Adontomerus*, *Erimerus*, *Idiomacromerus*, *Monodontomerus*, *Oopristus* and *Podagrion*) and six species (*amygdali*, *indicus*, *longicarpus*, *obscurus*, *pachymerum* and *turkestanicus*). Hence, other current taxa of Torymidae, including three subfamilies (Chalcimerinae, Glyphomerinae and Toryminae), five tribes (Boucekinini, Palachiini, Propalachiini, Torymoidini and Torymini), genera and species, are not known in Iraq. Previous studies (Table 1)

reported 12 taxa for Iraqi torymid fauna, including two subfamilies (Microdontomerinae and Monodontomerinae), five genera (*Adontomerus*, *Erimerus*, *Idiomacromerus*, *Monodontomerus* and *Oopristus*) and five species (*amygdali*, *indicus*, *longicarpus*, *obscurus* and *turkestanicus*), whereas the present survey recorded four new taxa for Iraqi fauna, namely, one subfamily (Podagrioninae), one tribe (Podagrionini), one genus (*Podagrion*) and one species (*pachymerum*).

Currently known Iraqi torymids are from the Old World, although *Monodontomerus obscurus* has been recorded from the New World as well (Noyes 2019). Thus, this species is the most distributed among the current torymids of Iraq. *Adontomerus amygdali*, *Idiomacromerus longicarpus* and *Oopristus turkestanicus* have been recognized only from the Palaearctic region, whereas *Erimerus indicus* and *Podagrion pachymerum* have been identified from the Oriental region, although the latter is moreover known from the Afrotropical region (Noyes 2019). *Idiomacromerus longicarpus* is unique in distribution, because it has been recorded only from Diyala Province, Iraq (Noyes 2019). Currently known Iraqi torymids have been documented from five provinces (Table 1): Basrah, Diyala, Duhok, Erbil and Salahuddin. Torymids in the other 13 Iraqi provinces (i.e., Anbar, Babil, Baghdad, Dhi Qar, Qadisiyah, Karbala, Kirkuk, Maysan, Muthanna, Najaf, Ninawa, Sulaymaniyah and Wasit) are completely unexplored. Previous studies reported five torymids from Diyala, Duhok, Erbil and Salahuddin (Table 1), whereas the present study recorded a torymid species from Basrah Province.

Known hosts of currently identified Iraqi torymids are almond fruit/seed wasp (*Eurytoma amygdali*; Hymenoptera, Eurytomidae), black mud dauber or black mud-dauber wasp (*Sceliphron* spp.; Hymenoptera, Sphecidae) and unspecified shield/stink bugs (Hemiptera, Pentatomidae), which are parasitised by *Adontomerus amygdali*, *Monodontomerus obscurus* and *Oopristus turkestanicus*, respectively (Table

1). Therefore, the hosts of torymid species in Iraq are scarcely recognised. Amongst currently recorded Iraqi torymids, *Adontomerus amygdali*, *Monodontomerus obscurus* and *Oopristus turkestanicus* are known to parasitise almond fruit/seed wasp (*Eurytoma amygdali*; Hymenoptera, Eurytomidae), black mud dauber or black mud-dauber wasp (*Sceliphron* spp.; Hymenoptera, Sphecidae) and shield/stink bugs (Hemiptera, Pentatomidae), respectively in Iraq (Table 1). Hence, the biology of torymid species in Iraq is hardly determined.

## Conclusion

The present revision demonstrates that the current knowledge about Torymidae in Iraq is at most superficial. Thus, several recommendations are put forward to increase knowledge in this field. Specimen collection should be conducted in different places (e.g., provinces and diverse agro-ecosystems) in different times (e.g., day/night or a month/year) and by several methods (e.g., sweeping, trapping, yellow pan trap, Malaise trap) to obtain rich material. In particular, rearing parasitoids from their hosts, especially economically important pest species of Hemiptera and Lepidoptera, is necessary. Determination keys need to be prepared for the correct and reliable identification of Iraqi Torymidae. Hosts of Iraqi Torymidae and the torymid parasitoid species of hosts, particularly Hemiptera and Lepidoptera in Iraq, need to be determined and analyzed for the practical biological control of pests so that potential torymid parasitoids would be employed to control pests in ecosystems.

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## Author Contributions

D K and N A planned the work, Z F did the field work and write the paper also S A help in writing the paper.

## Conflict of Interest

There are no conflicts of interest to declare, and the authors agree to publish this paper in your journal.

## Data Availability

Data presented in this study will be available on a fair request to the corresponding author.

## Ethics Approval

Not applicable in this paper.

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