Two new species of braconid wasps (Hymenoptera, Braconidae) from India

Zubair Ahmad1,2,4, Hamed A. Ghramh1,2,3, Anjum Ansari5

1 Research Center for Advanced Materials Science (RCAMS), King Khalid University, 9004, Abha 61413, Saudi Arabia
2 Unit of Bee Research and Honey Production, Faculty of Science, King Khalid University, P.O. Box 9004, Abha 61413, Saudi Arabia
3 Biology Department, Faculty of Science, King Khalid University, P.O. Box 9004, Abha 61413, Saudi Arabia
4 Biology Department, Faculty of Sciences and Arts, Dhahran Al Janoub, King Khalid University, Saudi Arabia
5 Department of Zoology, Aligarh Muslim University, Aligarh, 202002, UP, India

Corresponding author: Zubair Ahmad (dzubair@gmail.com)

Academic editor: J. Fernandez-Triana | Received 22 May 2019 | Accepted 26 August 2019 | Published 14 November 2019

doi: 10.3897/zookeys.889.36436

Citation: Ahmad Z, Ghramh HA, Ansari A (2019) Two new species of braconid wasps (Hymenoptera, Braconidae) from India. ZooKeys 889: 23–35. https://doi.org/10.3897/zookeys.889.36436

Abstract
Two new species viz., Pambolus (Phaenodus) shujai sp. nov., and Parachremylus trachysi sp. nov., of braconid wasps are described as new to science. Parachremylus trachysi sp. nov., is reared from larvae of the leaf miner Trachys sp. (Coleoptera, Buprestidae) on Corchorus sp. (Wild Jute Plant). A new species of Pambolus Haliday along with two known species is also recorded. A key to the Indian species of Pambolus is also provided. Diagnoses with morphological characters and illustrations are provided.

Keywords
Braconidae, coleopteran leafminer host, Corchorus, Pambolus, Parachremylus, taxonomy, Trachys

Introduction
Braconid wasps (Hymenoptera, Braconidae) represent an important insect group of natural parasitoids which have an efficient role in biological control programs (Matthews 1974, Shaw 1995). Braconids are speciose with 19,801 described species belonging to 1071 genera, which represent nearly 20% of the total hymenopteran diversity worldwide (van Achterberg 2014, Yu et al. 2016). Braconids are distributed in all zoogeographical regions (Wahl and Sharkey 1993) and play an ecological role as regulators of other insect...
groups. The majority of the species are parasitoids especially upon the larval stages of insect pests in the various orders including Hemiptera, Coleoptera, Diptera, Hymenoptera, and Lepidoptera (Shaw and Huddleston 1991, Whitfield and Wharton 1997).

In the present work, two new braconid species, one each from the genus *Pambolus* Haliday and the genus *Parachremylus* Foerster are described as new to science. Taxonomically the genus *Pambolus* was included either in the subfamily Hormiinae Foerster, 1862 s. l. (Whitfield and Wharton 1997) or in a separate subfamily Pambolinae Marshall, 1885 (van Achterberg 1995, Braet and van Achterberg 2003, van Achterberg and Braet 2004). The subsequent classification is most popular among the recent workers (Martínez et al. 2012) as it is based upon a natural group as revealed by a previous phylogenetic study of the cyclostome subfamilies of Braconidae (Zaldívar-Riverón et al. 2006). Presently *Pambolus* is subdivided into two subgenera *Pambolus* (females always brachypterous or micropterous, and males always macropterous) and *Phaenodus* (females always macropterous, and males usually macropterous) (Belokobylskij and Kula 2012). *Phaenodus* is often treated as a separate genus (see Belokobylskij 1986, Belokobylskij 1988, Belokobylskij 1992b, Papp 1996, 2000, Belokobylskij 1998, 1999, Braet and van Achterberg 2003). The genus *Pambolus* is cosmopolitan in distribution and is particularly diverse in the Neotropics (Whitfield and Wharton 1997). Of the 43 species worldwide, six are reported from the Oriental region (Yu et al. 2016) of which three species, viz., *P. (Phaenodus) ignarus* Papp, *P. (Ph.) topali* Papp and *P. (Ph.) ruficeps* Belokobylskij are reported from India (Papp 1996). All species known from India, including the new species described herein, belong to the subgenus *Phaenodus*. A key to the Indian species of the genus *Pambolus* is also provided in this paper.

The systematic position of the genus *Parachremylus* Granger is disputed, either included in the subfamily Exothecinae (tribe Avgini Belokobylskij, 1993) or more traditionally in the subfamily Hormiinae (Wharton 1993). The genus *Parachremylus* is restricted to the Old World tropics and is represented by only four species viz., *P. litchi* Belokobylskij & Maeto, *P. oblongus* (Papp), *P. seyrigi* Granger and *P. temporalis* Belokobylskij (Papp 1996, Papp 1997, Belokobylskij and Maeto 2006, Yu et al. 2016). In the present work, one new species of *Parachremylus* is described from the leafmining larvae of *Trachys* sp., on *Chorchorus* sp., a wild jute plant in India. This is the first record of this genus reared from coleopteran leafminer hosts. Other species of this genus viz., *P. litchi* (Belokobylskij and Maeto 2006) were reared from larvae of *Conopomorpha sinensis* and *C. litchiella* (Lepidoptera: Gracillariidae).

**Materials and methods**

The specimens were collected from northern Uttar Pradesh in order to study the biodiversity and conservation of parasitoid wasps in the northern region of India. The subfamily keys of van Achterberg (1993) and Wharton et al. (1997) and generic keys of Belokobylskij (1993) and Wharton (1993) were used for the identification. Descriptions by Belokobylskij (1992a) and Papp (1996) were used for *Pambolus*, and descriptions by
Belokobylskij and Maeto (2006) were used for determining *Parachremylus* species. We followed Sharkey and Wharton (1997) for terminology of various body parts and wing venation and Eady (1968) for the terminology of micro-sculpture. The following abbreviations are used in the text: **OOL** – ocello-ocular line (distance from the outer edge of a lateral ocellus to the compound eye); **POL** – post-ocellar line (distance between the inner edges of the two lateral ocelli); **AOL** – anterior-ocellar line (distance between the inner edges of anterior and lateral ocellus); **OOD** – diameter of an ocellus; **T1** – First metasomal tergite; **F1** – First antennal flagellomere. All descriptions, measurements, and photographs of wings and body parts were made under a Zeiss Discovery V20 stereo zoom microscope while scanning electron microscope (SEM) photomicrographs were taken using a LEO 435VP SEM. The specimens have been deposited in the Insect Collection section of the Department of Zoology, Aligarh Muslim University, Aligarh, India (ZDAMU).

**Results**

**Taxonomy**

**Genus *Pambolus*** Haliday, 1836

**Key to the Indian species of *Pambolus* (Phaenodus) Haliday (females)**

1. Female length 3–4.2 mm; notauli distinct throughout, deep, crenulated; antennae about 1.5–1.7 × as long a body; propodeal spines as long as second and third tarsomere of hind tarsus; face and vertex sculptured usually rugose to rugulose.................................................

   – Female length at most up to 2.8 mm; notauli indistinct anteriorly, rather prominent posteriorly; antennae about 2.0 × as long as body; propodeal spines short, half as long as third tarsomere of hind tarsus; face polished, vertex smooth to finely granulate.........................................................3

2. Eyes about 2.0 × as long as temple in dorsal view, latter rounded; hind femur 4.6–5.0 × as long as broad medially; antennae with 27–30 segments. T1 as long as broad apically; vertex, and occiput rather transversely rugulo-rugose ........

   .......................................................................................................................... **P. (Ph.) topali** Papp

   – Eyes 2.7–3.0 × as long as temple in dorsal view, latter receded; hind femur 3.5–3.8 × as long as broad medially; antennae with 33–40 segments. T1 1.1–1.3 × as long as broad apically; vertex and, occiput coriaceous to rugulose ....

   ........................................................................................................... **P. (Ph.) ruficeps** Belokobylskij

3. Antennae yellowish brown; malar space 2.0–2.5 × basal width of mandible; pterostigma 4.0–5.0 × as long as wide; propodeal spines located anterior to middle of propodeum; antennae 26 segmented......... **P. (Ph.) ignarus** Papp

   – Antennae with F17–F29 creamish-white; malar space 3.5 × basal width of mandible; pterostigma 3.0 × as long as wide; propodeal spines located in the middle of the propodeum; antennae 29 segmented.................................

   .......................................................................................................................... **P. (Ph.) shujai** Ahmad, sp. nov.
**Pambolus (Phaenodus) ignarus** Papp

Figs 1–3

*Pambolus (Phaenodus) ignarus* Papp, 1996: 46; Yu et al. 2016.

**Material examined.** 2 females, “INDIA: Uttar Pradesh, Aurriva, 23.IX.03; coll. M Shamim (ZDAMU)”. 1♀, “INDIA: Uttar Pradesh, Aligarh, 09.X.01; Coll. Zubair Ahmad (ZDAMU)”.

**Remarks.** *Pambolus (Ph.) ignarus* is known among all the Oriental species by its smaller size and almost absence of notauli, which is hardly impressed on the anterior part of mesoscutum and without any crenulation. A brief diagnosis is as follows: body length 1.8 mm long; forewing length 1.9 mm; ground color of head brownish yellow; meso- and metasoma rusty brown; antennae unicolor (yellowish brown); head in dorsal view less transverse 1.7 × as broad as long; eye 4.0 × as long as temple; antenna nearly 2.0 × as long as body and with 25 segments; F1 5.0 × as long as broad apically; face polished; notauli hardly distinct on disc of mesonotum; mesonotum finely granulose; propodeal spines short, as long as half of third tarsomere of hind tarsus; forewing vein r arising beyond middle of pterostigma; ovipositor sheath as long as hind basitarsus.

**Host.** Unknown.

**Distribution.** India: Karnataka, Uttar Pradesh (Papp 1996).

---

*Pambolus (Phaenodus) shujai* Ahmad, sp. nov.

http://zoobank.org/D6EE6537-36D1-4F99-B972-71C77A6D9243

Figs 8, 9

**Material examined.** Holotype, female, “INDIA: Uttar Pradesh, Etawah, 13.IV.02; coll. M Shamim (ZDAMU)”. Paratypes, 3 females with same data as holotype.

**Diagnosis.** The new species *Pambolus shujai* Ahmad sp. nov., is closely related to *Pambolus ignarus* Papp. However, it differs from *P. ignarus* in having (1) antennae with F17–F29 creamish-white (antennae yellowish brown in *P. ignarus*); (2) POL: ØOD: OOL = 2:1.5:6 (POL: ØOD: OOL = 2: 2: 5 in *P. ignarus*); (3) antennae as long as body (antennae 2.0 × as long as body length in *P. ignarus*); (4) propodeal spines present at the middle of propodeum, length of spine 0.4 × as long as fore basitarsus, 0.3 × the distance between them (pair of lateral spines present at one-third below the middle of propodeum, length of spines as long as fore basitarsus, 0.5 × the distance between them length in *P. ignarus*); (5) hind basitarsus 1.2 × as long as tarsal segment 2–4 combined (hind basitarsus 0.7 × as long as tarsal segment 2–4 combined in *P. ignarus*); (6) forewings distinctly shorter than the body (forewings distinctly longer than the body *P. ignarus*). (7) pterostigma 3.0 × as long as wide (pterostigma 5 × as long as wide *P. ignarus*). The new species also differs from other Indian species, *P. ruficeps* Belokobylskij, by having (1) vertex finely granulates around ocelli, smooth elsewhere (rugulose in *P. ruficeps*); (2) forewing veins r, 2RS, 3RSa thickened (forewing veins r, 2RS, 3RSa...
normal in *P. ruficeps*); (3) antennae as long as body (antennae 1.5–1.7 × as long as body length in *P. ruficeps*); (4) face smooth (face reticulate rugulose in *P. ruficeps*).

**Description.** Female, body length: 2.8 mm; forewing: 2.3 mm.

**Head.** Antennae 29 segmented, almost as long as body; scape 1.6 × as long as wide, F1 3.5–4.0 × as long as wide, head transverse, ca. 2.0 × as wide as long in dorsal view, temple smooth, distinctly widening ventrally, widest distance from eyes 2.0 × as long as eye dorsally; AOL: POL: ØOD: OOL =1:2:1.5:6; malar space 3.5 × basal width of mandible; face sparsely setose, smooth, 1.3 × as wide as long; clypeus smooth, distinctly separated from face, slightly convex, 3.5 × as wide as long; hypoclypeal depression elliptical almost 3.0 × as wide as long medially; frons strigose with few setae; vertex finely granulate around ocelli, rest smooth.

**Mesosoma.** Mesosoma 1.8 × as long as wide in dorsal view, 2.0 × as long as high in lateral view; pronotum small and sparsely setose; median and lateral lobes of mesoscu-

**Figures 1–3.** *Pambolus (Ph.) ignarus* Papp 1 mesosoma, dorsal view 2 metasoma, dorsal view 3 forewing.
tum granulate, sparsely setose; notauli poorly developed anteriorly, distinct posteriorly with some longitudinal carinae; scutellar sulcus deep and broad with four crenulae, 0.6–0.7 × as long as scutellum, scutellum polished with fine setae laterally and posteriorly, side of scutellum concave with longitudinal striations, metanotum almost at the same level, longitudinally striated, sparsely setose; propodeum with strong areolation, areola elongate, with a pair of spines, present at the middle of propodeum; propodeal spine 0.4 × as long as fore basitarsus and 0.3 × the distance between them; pleuroterion anteriorly granulate, posteriorly rugose, sparsely setose; mesopleuron anteriorly rugose, otherwise smooth and polished; episternal scrobe deep and isolated, crenulate at the margins.

**Wings.** Forewing 2.7 × as long as wide, 0.8–0.9 × as long as body, 2.7 × as long as hind tibia; pterostigma 3.0 × as long as wide, 0.8 × length of R1a, r arising from its middle; r about as long as width of pterostigma; second marginal cell of moderate size; 3RSa 0.9 × as long as r, 0.5 × 2RS, 0.25 × 3RSb; r-m 0.7 × 3RSA; CU1b arising from the middle of brachial cell; marginal cell somewhat short about 2.25 × as wide as high, 3RSb straight and falls much before the tip of wing; (RS+M)a slightly curved; hind wing 4.0 × as long as wide; M+CU 0.6 × 1M.

**Legs.** Hind leg setose, hind femur 4.0 × as long as broad, hind tarsus 0.9 × as long as hind tibia, hind basitarsus 1.2 × as long as tarsal segment 2–4 combined.

**Metasoma.** Metasoma as long as head and mesosoma combined in dorsal view, 2.0 × as long as wide; T1 longitudinally striated, strongly broadening posteriorly; 2 × as long as broad basally, spiracles present a little basally from middle; further tergites polished; ovipositor sheath in lateral view 1.1 × as long as tarsomere 2–4 combined; ovipositor short, straight and pointed.

**Color.** Head brownish yellow with dark brown patches; eyes, stemmaticum, propleuron, mesopleuron, propodeum black; mesonotum, metanotum, legs brownish; metasoma reddish brown; ovipositor sheath brownish; mandibles yellowish brown; tip of mandible, claws, antennal segment F1–F16 dark brown; F17–F29 creamish-white; ocelli transparent; wings hyaline, pterostigma yellowish brown, veins yellowish brown and thickened.

**Male.** Unknown.

**Host.** Unknown.

**Distribution.** India (Uttar Pradesh).

**Etymology.** The species is named after Dr Shujauddin for his valuable contributions to the taxonomy of Indian Braconidae.

**Pambolus (Phaenodus) ruficeps Belokobylskij**

Figs 4–7

*Pambolus (Phaenodus) ruficeps* Belokobylskij, 1988: 27 (Taiwan); Belokobylskij 1990: 128 (Malaysia) Belokobylskij 1992a, 167 (Vietnam); Papp 1996: 50 (India)

**Material examined.** 2 females, “INDIA: Uttar Pradesh, Etawah, 13.IV.02; coll. M Shamim (ZDAMU)”. 
Figures 4–7. *Pambolus (Ph.) ruficeps* Belokobylskij 4 head, dorsal view 5 mesosoma, dorso-lateral view 6 metasoma, lateral view 7 forewing.
Diagnosis. *Pambolus (Ph.) ruficeps* is quite unlike all Oriental species of the genus *Pambolus* due to the presence of a heavily sculptured head. A brief diagnosis of *P. (Ph.) ruficeps* follows: body length 3.0–4.2 mm long, forewing length 3.0 mm long; eye 2.7–3.0 × as long as temple in dorsal view, latter receded; antenna with 33–40 segmented, 1.5–1.7 × as long as body; vertex, occiput coriaceous to rugulose; face reticulate rugulose; notauli distinct and crenulated; vein r, 2RS, 3RSa normal; propodeal spine as long as second or third tarsomere of hind tarsus; hind femur 3.5–3.8 × as long as broad medially; F1 1.1–1.3 × as broad behind as long medially.

Host. Unknown.

Distribution. India: Jammu and Kashmir, Orissa and Uttar Pradesh; Malaysia, Taiwan, Vietnam (Papp 1996).
Parachremylus Granger, 1949

Parachremylus trachysi Ahmad, sp. nov.
http://zoobank.org/6837B17F-77C7-48C1-A5A6-B11EAEFA9C69
Figs 10–13

Material examined. Holotype, female, “INDIA: Uttar Pradesh, Aligarh, 10.VIII.2005; ex Trachys sp. on Corchorus sp., Coll. Zubair Ahmad (ZDAMU)”. Paratypes, 3 females and 2 males; with same data as holotype.

Diagnosis. Following the key to world species of Parachremylus by Belokobylskij and Maeto (2006), Parachremylus trachysi sp. nov., runs near to another Indian species viz., P. oblongus (Papp). The new species shares similarities with P. oblongus in having the presence of longer temple; transverse diameter of eye 4.0 × as long as temple length in dorsal view; malar space 1.2 × basal width of mandible; mesopleuron smooth in upper half, striation partly present in subalar depression only; 1–4 segments of hind tarsomere with narrow and partly indistinct flanges and shallow field of hind half of mesonotum with a medio-longitudinal carinae running up to middle of mesonotum. However, the new species can easily be distinguished from P. oblongus by having the head and mesosoma densely setose (head and mesosoma sparsely setose in P. oblongus); median longitudinal carina of metasoma reaching up to almost T3 (median longitudinal carina of metasoma reaching up to almost T2 in P. oblongus); pterostigma 3.5 × as long as high (pterostigma 5.0 × as long as high in P. oblongus); malar space 1.2 × as long as basal width of mandible (malar space 0.75 × as long as basal width of mandible in P. oblongus); scutellar sulcus with three crenulae (scutellar sulcus with five crenulae in P. oblongus); forewing veins 2RS and 3RSa 3.5 × as long r (forewing veins 2RS and 3RSa 2.7 × as long r in P. oblongus)

Description. Female, body length: 2.1 mm; forewing: 2.0 mm.

Head. Antennae 27 segmented, about as long as body length, F1–F2 3–3.3 × as long as apical width, except the apical segment which is 4.5 × as long as wide; head transverse, 1.5–1.7 × as wide as long in dorsal view and 1.2 × as high as long in lateral view; eyes in lateral view 1.2 × as high as wide, 4.0 × as long as temple, inner margin of eyes not parallel; temple granulate, sparsely setose, its widest part behind eye 0.25 × as long as width of eye; occipital carina dorsally slightly curved towards ocelli, rather widely interrupted medially; occiput with uniform transverse striations; AOL: POL: ØOD = 2:1:3:2; face polished, laterally shagreened, sparsely setose, 1.5 × as wide as long medially; clypeus 1.6 × as wide as long; vertex granulate, sparsely setose; malar space 0.4 × as long as eye and 1.2 × as long as basal width of mandible;

Mesosoma. Mesosoma 1.5 × as long as wide in dorsal view, 1.6 × as long as high in lateral view; pronotum small, indistinct; median and lateral lobes of mesoscutum granulate, sparsely setose; notauli broad anteriorly, shallow posteriorly, shallow field of hind half of mesonotum with a medio-longitudinal carinae running up to middle of mesonotum; scutellar sulcus deep and 3.5 × as wide as long with three crenulae; scutellum indistinctly granulate, rather densely setose; propodeal areola with a median longitudinal carinae anteriorly, two transverse carina inside, lateral areola with longi-
Figures 10–13. *Parachremylus trachysi* Ahmad, sp. nov. 10 head, anterior view 11 mesosoma, dorsal view 12 metasoma, dorsal view 13 forewing.
Two new species of Braconidae from India

Wings. Forewing 2.5 × as long as wide, as long as body; pterostigma 3.0 × as long as wide, issuing r from its middle; length of marginal cell along R1a about 1.2 × as long as pterostigma; 2RS and 3RSa 3.5 × as long r respectively; hind wing vein M+CU 0.8 × 1M; hind femur 3.4–3.6 × as long as broad medially; hind tibia 1.2 × as long as hind tarsus; hind basitarsus 0.6 × as long as tarsomere 2–4 combined.

Metasoma. Metasoma dorsally sub-sclerotized, 1.0 × as long as head and mesosoma combined, T1 evenly and distinctly broadening posteriorly, T2 2.1 × as broad as long, 1.5 × as long as T3; T3 3.0 × as broad as long; T4 4.0 ×, as wide as long medially; basal pair of carinae of T1 meeting at its basal one-third and continuing a medio-longitudinal carinae up to apical end of T3; all tergites sub-sclerotized; ovipositor sheaths setose and blunt, in lateral view 1.2 × as long as hind basitarsus.

Color. Vertex yellow with brown marking, mandibles, scutellar sulcus, metanotum creamish; tip of mandible, mesoscutum, claws, dark brown; antennae brown; ocelli transparent; eyes, stemmaticum black; wings hyaline, pterostigma pale yellow, veins brown; scutellum, propodeum, legs yellow.

Male. Same as ♀ except body size (2 mm).

Host. Trachys sp. on Corchorus sp. (Wild Jute).

Distribution. India (Uttar Pradesh).

Etymology. The species name is derived from the name of the genus of the host insect.

Acknowledgements

The first two authors (Zubair Ahmad and Hamed A. Ghramh) extend their appreciation to the Research Center of Advanced Material, King Khalid University, Abha, KSA. The first author (ZA) extends his gratitude to the Research Center Advanced Materials Science (RCAMS), King Khalid University for funding through research program (RCAMS)-009/19. We also thank the editor, associate editor, and anonymous reviewers for their valuable and helpful comments to improve the quality of the manuscript. Authors are also thankful to Phillip Raines (Academic Organizer, Native English Language Section, King Khalid University Abha, Saudi Arabia) for improving the use of English in the manuscript.

References

van Achterberg C (1993) Illustrated key to the subfamilies of the Braconidae (Hymenoptera:Ichneumonoidea). Zoologische Verhandelingen 283: 1–189.

van Achterberg C (1995) Generic revision of the subfamily Betylobraconinae (Hymenoptera: Braconidae) and other groups with modified fore tarsus. Zoologische Verhandelingen 298: 1–242.
van Achterberg C (2014) Notes on the checklist of Braconidae (Hymenoptera) from Switzerland. Mitteilungen der Schweizerischen Entomologischen Gesellschaft 87: 191–213.
van Achterberg C, Braet Y (2004) Two new species of *Pambolus* Haliday (Hymenoptera: Braconidae: Pambolinae) from Argentina. Zoologisch Mededelingen Leiden 78 (22): 337–344.
Belokobylskij SA (1986) A review of the Palaeartic species of the genera *Pambolus* Hal. and *Dimerus* Ruthe (Hymenoptera, Braconidae). Trudy Zoologicheskogo Instituta Leningrad 159: 18–37. [in Russian]
Belokobylskij SA (1988) Braconids of the supertribe Exothecidii (Hymenoptera, Braconidae, Doryctinae) of Taiwan. Trudy Zoologicheskogo Instituta Leningrad 175: 3–37. [In Russian]
Belokobylskij SA (1990) Material of the braconid subtribe Exothecidii (Hymenoptera, Braconidae, Doryctinae) in Vietnam. Proceeding of Zoological Institute Leningrad 209: 115–140. [In Russian]
Belokobylskij SA (1992a) On the Indo-Malayan braconid fauna of the tribe Exothecini, Pambolini and Pentatermini (Hymenoptera, Braconidae). Proceeding of Zoological Institute Leningrad 245: 125–173. [In Russian]
Belokobylskij SA (1992b) Braconid wasps of the tribe Pambolini (Hymenoptera, Braconidae) of Australia. Entomologicheskoye Obozrenye 71(1): 179–198. [Entomological Review 72(2): 46–65] [in Russian with English summary]
Belokobylskij SA (1993) On the classification and phylogeny of the braconid wasps of subfamilies Doryctinae and Exothecinae (Hymenoptera, Braconidae). Part I. On the classification, 2. Entomologicheskoe Obozrenie 72: 143–164.
Belokobylskij SA (1998) 1. Rhyssalinae, 2. Doryctinae, 3. Histeromerinae, 4. Exothecinae, 7. Gnamptodontinae, 9. Alysiinae (Alysiini), 10. Helconinae, 11. Cenocoeliinae, 12. Brachistinae, 14. Meteorideinae, 16. Xiphozelinae, 17. Homolobinae, 18. Charmontinae, 19. Orgilinae, 20. Ecnomiinae, 21. Sigalphinae, 23. Ichneuminae, 25. Cardiochilinae, 27. Dirrhopinae, 28. Miricinae, 29. Adeliinae. In: Ler, P.A. ‘Key to the insects of Russian Far East. Vol. 4. Neuropteroidea, Mecoptera, Hymenoptera. Pt 3.Dal’nauka, Vladivostok, 41–162, 163–298, 411–520, 531–558.
Belokobylskij SA (1999) New taxa of the braconid subfamily Exothecinae (Hymenoptera, Braconidae) from tropical and subtropical regions of the Old World. Entomologichesko Obozrenie 78(3): 674–693.
Belokobylskij SA, Maeto K (2006) A new species of the genus *Parachremylus* Granger (Hymenoptera: Braconidae), a parasitoid of *Conopomorpha* lychee pests (Lepidoptera: Gracillariidae) in Thailand. Journal of Hymenoptera Research 15(2): 181–186.
Belokobylskij SA, Kula RR (2012) Review of the brachypterous, micropterous, and apterous Braconidae of the cyclostome lineage (Hymenoptera: Ichneumonoidea) from the Palearctic Region. Zootaxa 3240: 1–62. https://doi.org/10.11646/zootaxa.3240.1.1
Braet Y, van Achterberg C (2003) New species of *Pambolus* Haliday and *Phaenocarpa* Foerster (Hymenoptera: Braconidae: Pambolinae, Alysiinae) from French Guaya, Suriname and Panama. Zoologische Mededelingen Leiden 77(7): 153–179.
Eady RD (1968) Some illustrations of micro sculpture in the Hymenoptera, Proceeding of Royal Entomological Society London 43(4–6): 66–72. https://doi.org/10.1111/j.1365-3032.1968.tb01029.x
Granger C (1949) Braconides de Madagascar. Memoires of Institute of Madagascar A, ser.1, Tananarive 2: 1–428.

Haliday AH (1836) Essay on parasitic Hymenoptera. Entomological Magazine 4: 38–59.

Martínez JJ, Ceccarelli FS, Zaldívar-Riverón A (2012) Two new species of Pambolus (Hymenoptera, Braconidae) from Jamaica. Journal of Hymenoptera Research 24: 85–93. https://doi.org/10.3897/jhr.24.2300

Matthews RW (1974) Biology of Braconidae. Annual Review of Entomology 19: 15–32. https://doi.org/10.1146/annurev.en.19.010174.000311

Papp J (1996) On the genus Pambolus (Hymenoptera: Braconidae: Pambolinae), with description of four new tropical species. Acta Zoologica Academiae Scientiarum Hungaricae 42: 41–57.

Papp J (1990) New Braconid wasps (Hymenoptera, Braconidae) in the Hungarian Natural History Museum, 1. Annales historico-naturales Musei nationalis hungarici 82: 175–190.

Papp J (1997) New Braconid wasps (Hymenoptera, Braconidae) in the Hungarian Natural History Museum, 5. Annales historico-naturales Musei nationalis hungarici 89: 157–175.

Papp J (2000) Pambolus oblongispina sp. nov. from Honduras (Hymenoptera: Braconidae: Pambolinae). Genus (Wroclaw) 11(1): 87–93.

Sharkey MJ, Wharton RA (1997) Morphology and Terminology. In: Wharton RA, Marsh PM, Sharkey MJ (Eds) Manual of the New World Genera of the Family Braconidae (Hymenoptera). The International Society of Hymenopterists, Washington D.C., 19–37.

Shaw SR (1995) Braconidae. In: Hanson PE, Gauld ID (Eds) The Hymenoptera of Costa Rica, Oxford University Press, 431–463.

Shaw MR, Huddleston T (1991) Classification and Biology of Braconid Wasps (Hymenoptera: Braconidae). Handbooks for the identification of British Insects, 126 pp.

Wahl DB, Sharkey MJ (1993) Superfamily Ichneumonoidea. In: Goulet H, Huber JT (Eds) Hymenoptera of the World: An Introduction Guide to Families. Research Branch, Agriculture Canada Publication, Ottawa, 358–509.

Wharton RA (1993) Review of the Hormiini (Hymenoptera: Braconidae) with a description of new taxa. Journal of Natural History 27: 107–171. https://doi.org/10.1080/00222939300770061

Wharton RA, Marsh P, Sharkey MJ (1997) Manual of the New World genera of the family Braconidae. International Society of Hymenopterists Special Publication No. 1: 1–439.

Whitfield JB, Wharton RA (1997) Subfamily Hormiinae, In: Wharton RA, Marsh PM, Sharkey MJ (Eds) Manual of the New World genera of the family Braconidae (Hymenoptera). The International Society of Hymenopterists, Washington D.C., 284–301. [figs 1–41]

Yu DSK, van Achterberg C, Horstmann K (2016) Taxapad 2016, Ichneumonoidea 2015, Database on flash-drive, Ontario, Canada. http://www.taxapad.com

Zaldívar-Riverón A, Mori M, Quicke DLJ (2006) Systematics of the cyclostome subfamilies of braconid parasitic wasps (Hymenoptera: Ichneumonoidea): a simultaneous molecular and morphological Bayesian approach. Molecular Phylogenetics and Evolution 38: 130–145. https://doi.org/10.1016/j.ympev.2005.08.006