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First Report

First Record of Genus *Pseudoshirakia* Achterberg, 1983 (Insecta: Hymenoptera: Braconidae; Braconinae) from India with Description of Two New Species

Arshad Ali Haider[1] and Md. Humayoon Akhtar*[2]

[1] Department of Zoology, Maharashtra College of Arts, Science and Commerce, Mumbai Central (E), Mumbai - 400 008, Maharashtra, India
[2] Department of Zoology, Koshi College, Khagaria, Munger University, Munger - 851 205, Bihar, India

Abstract

In the present study genus *Pseudoshirakia* Achterberg (1983) is reported for the first time from India with description of two new species *Pseudoshirakia bengalensis* sp.nov. and *P. aligarhensis* sp.nov. This genus is known only from its type species from the Palearctic (Japan, China) and Oriental (Taiwan) regions. The genus was raised by Achterberg (1983) to accommodate *Bracon yokohamensis* Cameron (1910) known from China, Japan and Taiwan. as its type species.

***Key words*:** Insecta, Hymenoptera, Braconidae, Braconinae, *Pseudoshirakia*, Parasitoids

The genus *Pseudoshirakia* was described by Achterberg [1] to accommodate *Bracon yokohamensis* Cameron [2] as its type species. It is closely related to the genus *Mesobracon* Szepligeti [3]. However, it differs from *Mesobracon* for having scapus sub cylindrical, apically truncate in dorsal aspect; notauli present except for the posterior third of the mesoscutum; median area of metanotum formed into distinct carinae anteriorly; 2nd submarginal cell of fore wing short, strongly widened distally; fore wing veins C+SC+R and 1 -SR forming an angle of less than 90^0; vein cu-a of fore wing interstitial or virtually so; tarsal claws with pointed basal lobes; metasomal tergites smooth or coarsely sculptured; antero-dorsal aspect of tergite first steep.

As far as the biology is concerned, Achterberg [1] felt that *Pseudoshirakia* species might be ectoparasitoids of Scolytidae (Coleoptera) rather than Pyralidae (Lepidoptera) as indicated by earlier workers.

Among the parasitic Hymenoptera, the species belonging to the family Braconidae are not only recognized to keep pest population under control in their natural habitats but also extensively used in the classical biological control programmes directed against economically important pest species, mainly belonging to the Lepidoptera, Coleoptera, Hymenoptera, Diptera, Neuroptera, Psocoptera and Hemiptera [4]. The braconid parasitoids are solitary or gregarious ectoparasitoids and endoparasitoids, mostly larval parasitoids, attacking the larval stages of holometabolous insects. However, a number of egg parasitoids, few pupal parasitoids and some are known attacking nymphs of paurametabolous insects. Until the genus *Pseudoshirakia* was known by only two species *P. yokohamensis* Cameron [2] and *P. flavus* Wang and Chen [5] from Palearctic (Japan, China) and Oriental (Taiwan) region. In the present study two new species viz. *Pseudoshirakia bengalensis* sp.nov. and *P. aligarhensis* sp.nov. are described from Uttar Pradesh, of Indian sub-continent, taking the total number of species under this genus is four.

MATERIALS AND METHODS

a. *Collection and rearing*

Adult braconid parasitoids were collected from different parts of study area by using sweeping net and transferred to the rearing jars, which is covered with muslin cloth tightly held with rubber band. The jars were checked daily and fresh leaves were provided for the feeding and emerged parasitoids were preserved in 70% ethyl alcohol with few drops of glycerin. The subfamily level of identification was done following key to subfamilies of Braconidae by Achterberg [4] whereas the genus was identified following keys to old genera of Braconinae by Quicke [6].

b. *Preparation of card mount*

The freshly collected specimens were usually killed in ethyl acetate fumes and directly mounted on rectangular or triangular cards by using water soluble glue. The specimen was placed obliquely on the card and glued through the side of the thorax. The material available in 70% alcohol was also card mounted before study. Body colour, sculpture and measurements were noted from the card mounted specimens.

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Correspondence to: Md. Humayoon Akhtar, Department of Zoology, Koshi College, Khagaria, Munger University, Munger - 851 205, Bihar, India, Tel: +91 7417137037; E-mail: humayoon1982@gmail.com

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c. *Preparation of slide mount*

The permanent slides were prepared after dehydration and clearing was done in clove oil. The specimens were dissected under binocular microscope (Nikon SMZ1500) with the help of fine needles. The dissected parts viz., antennae, wings, legs and other body parts were placed in Canada balsam on a slide in required position and covered by cover slips. The slides were dried by keeping in the thermostat at 35±2°C.

d. *Illustration and measurement*

The permanent slides and card mount specimens were examined under the binocular microscope (Nikon SMZ1500). Drawing of taxonomically important body parts were made with the help of camera lucida. Measurements were taken with the help of Ocular micrometer fitted in one of the two eye pieces.

e. *Terminology*

The terminology used in the present study is followed after Achterberg [4] for various body parts and wing venation and for microsculpture [7].

RESULTS AND DISCUSSION

The genus *Pseudoshirakia* Achterberg [1] is recorded for the first time from India with two new species *Pseudoshirakia bengalensis* and *P. aligarhensis*.

Taxonomic account
Genus *Pseudoshirakia* Achterberg
Pseudoshirakia Achterberg, 1983: 74
Type-species: *Bracon yokohamensis* Cameron, 1910;
Monobasic and original designation
Pseudoshirakia: Quicke, 1987: 125

Diagnosis: Scape subcylindrical, apically truncate in dorsal aspect; notauli present but posterior quarter absent; scutellar sulcus smooth; metanotum crenulate medially; propodeum without mid longitudinal carinae; forewing veins C+SC+R and 1-SR forming an angle of less than 90°, marginal cell narrow apically, vein SRI straight, cu-a interstitial or virtually so, CUlb short; tarsal claws with pointed basal lobes, apex of fore tibia with only one spur; metasomal tergite smooth or coarsely reticulate; antero-dorsal aspect of tergite first steep. The genus *Pseudoshirakia* Achterberg is represented by a single species from Indo-Australian region [1] and is reported for the first time from India. In the present work, two new species viz., *P. aligarhensis* sp.nov. sp.nov. and *P. bengalensis* sp.nov. have been described and illustrated from India. A key to the Indian species of the genus is also provided.

Key to the Indian species of the genus Pseudoshirakia Achterberg

1. Forewing vein 1-SR+M distinctly curved; 2nd tergite without anterolateral areas; frons and vertex smooth and shining ……..……..……*aligarhensis*sp.nov.

-Forewing vein 1-SR+M straight; 2nd tergite with well-defined anterolateral areas; frons and vertex punctulate……..…..…… *bengalensis* sp.nov

1. *Pseudoshirakia aligarhensis* sp.nov (Fig 1-3)

Female: Head black; antenna dark brown; ocelli transparent; eyes grey; tips of mandible black; mesosoma brown except propodeum black; wings infuscate, venations brown, pterostigma dark brown; legs black, tibial spurs brown; metasoma completely black; ovipositor brown; ovipositor sheaths dark brown.

Head: Antenna 44 segmented; length of third antennal segment 1.6 × fourth segment; length of third, fourth and penultimate segments 2.0, 1.25 and 1.33 × their width respectively; length of apical segment 3.0 × their width; length of maxillary palp 1.2 × height of head; length of eye in dorsal view 1.2 × temple; AOL : POL : 0OD : OOL = 3:3:3:8; frons smooth, shining with mid longitudinal carina; vertex smooth and shining; face flat, densely setose, finally rugulose; clypeus almost flat and ventral margin protruding; length of malar space as long as basal width of mandible; mandible with pair of subequal teeth.

Mesosoma: Length of mesosoma 2.3 × its height; mesoscutum smooth, mesoscutal lobes convex, notauli anteriorly distinct; scutellum smooth; mesopleuron medially smooth, anteriorly somewhat rugulose, episternal scrobe wide and deep; metapleuron rugulose; propodeum smooth.

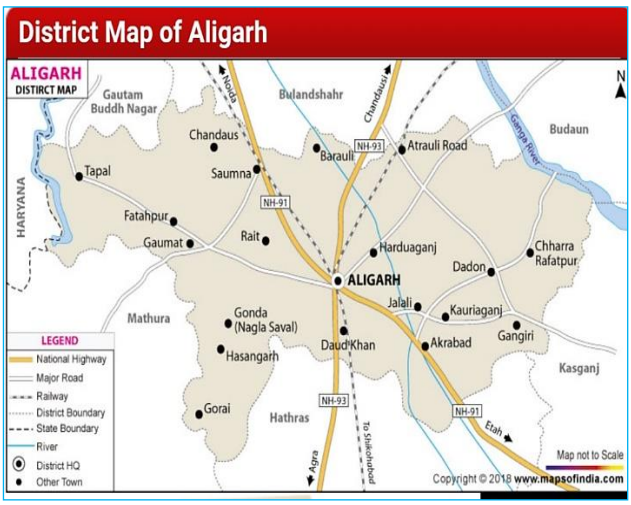
Wings: Fore wing vein 1-SR long and curved; r:3-SR: SRI = 9:32:43; 1-SR+M distinctly bent or curved; 2-SR :3-SR: r-m = 13: 32: 14.

Legs: Hind coxa punctulate; length of femur, tibia and basitarsus of hind leg 3.6, 7.0 and 4.4 × their width respectively; hind tibial spurs 0.45 and 0.36 x hind basitarsus.

Metasoma: Tergites 1-5 coarsely reticulate; tergite 6th smooth; length of first tergite 1.2 × its width, dorso-lateral carina crenulate and united anteriorly; 2nd tergite with a small well defined crenulate mid-basal triangular area and with a pair of posteriorly diverging sub-lateral crenulate grooves; suture between 2nd and 3rd tergite widely crenulate; 3rd tergite with anterolateral crenulate depression); 4th and 5th tergite crenulate transverse sub-apical grooves; ovipositor thick, without dorsal nodus and without ventral serrations; length of ovipositor sheaths 0.37 × fore wing.

Length: 5.63 mm, fore wing 5.12 mm.

Male: Same as female except antenna 43 segmented, smaller than female, body length 4.50 mm.

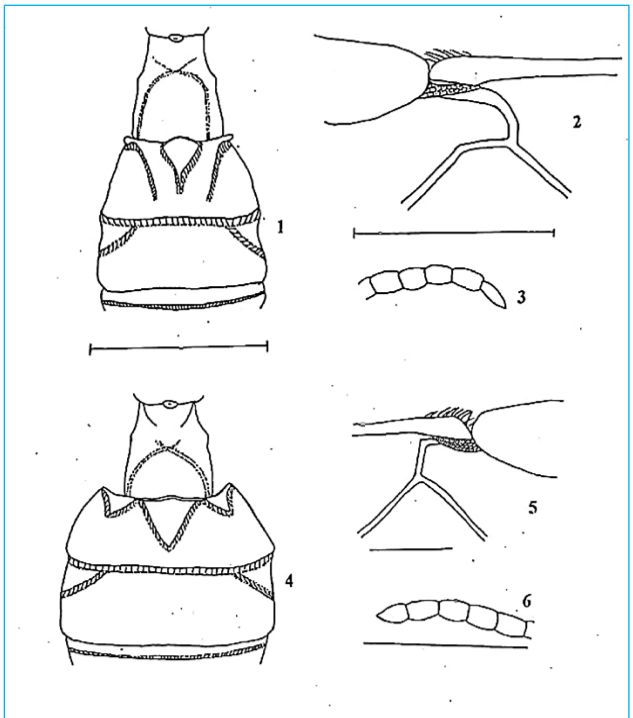


Geo-coordinates -27.88°N 78.08°E
Source- Google

Holotype: ♀ INDIA: Uttar Pradesh, Etawah, 28.x.{2000}: Coll. Mohammad Shamim. Paratype: 1 ♀ 1♂,

INDIA: Uttar Pradesh, Aligarh, 8.iv.2001, Coll. Arshad Ali Haider (DD4059). The type specimens are deposited in Department of Zoology, Aligarh Muslim University, Aligarh (ZDAMU).

Remarks: The new species *Pseudoshirakia aligarhensis* sp.nov. is closely related to *P. bengalensis* sp.nov. However, it differs in having (i) apical segment of antenna 3 × their width (ii) face densely setose and finally rugulose (iii) frons and vertex smooth and shining (iv) mesopleuron smooth medially and rugulose anteriorly, metapleuron rugulose (v) fore wing vein 1-SR+M distinctly bent or curved (vi) 2nd metasomal tergite with a pair of posteriorly diverging sublateral crenulate grooves.



Figs. 1-3: ***Pseudoshirakia aligarhensis*, sp.nov., ♀**

1. Metasomal tergites 1st-3rd
2. Venation of median part of fore wing.
3. Antenna, apical flagellomeres.

Fig. 4-6: ***Pseudoshirakia bengalensis*, sp.nov., ♀**

4. Metasomal tergites 1st-3rd
5. Venation of median part of fore wing.
6. Antenna, apical flagellomeres.

Scale lines: Figs. 1 & 4, 1.0 mm; Figs. 2,3 & 6, 0.5 mm; Fig. 5, 0.25 mm

2. *Pseudoshirakia bengalensis*, sp.nov. (Fig 4-6)

Female: Head black; antenna dark brown; ocelli transparent; eyes grey; tips of mandible black; mesosoma dark brown except metanotum and propodeum black; wings infuscate, venations brown, pterostigma dark brown; legs black except tarsal segments and tibial spurs of all legs brown; metasoma completely black; ovipositor brown; ovipositor sheaths black.

Head: Antenna 38 segmented; length of third antennal segment 1.2 × fourth segment; lengths of third, fourth and penultimate segments 2.0, 1.7 and 1.3 × their widths respectively; length of apical segment 2.0 × their width; length of maxillary palp 0.8 times height of head; length of eye in dorsal view 1.7 temple; AOL: POL: ~~O~~OD: OOL= 2: 2: 4: 5; frons punctulate with mid longitudinal carina; vertex punctulate; face flat, smooth and shining; clypeus almost flat, ventral margin protruding; length of malar space as long as basal width of mandible; mandible with pair of subequal teeth.

Masosoma: Length of mesosoma 1.7 × its height; mesoscutum punctulate, mesoscutal lobes convex, notauli distinct anteriorly; scutellum wide and smooth; mesopleuron punctulate, epistemal scrobe narrow; metapleuron punctulate; propodeum smooth.

Wings: Fore wing vein 1-SR short and straight; r: 3-SR: SRI=7:17:30; 1-SR+M straight; 2-SR: 3-SR: r-m=11:17:8.

Legs: Hind coxa smooth; lengths of femur, tibia and basitarsus of hind leg 3.0, 7.0 and 4.0 × their widths respectively; length of the two hind tibia spurs both 0.45 × hind basitarsus.

Metasoma: Tergites 1-5 coarsely reticulate; tergite 6th smooth; length of first tergite as long as wide, dorso-lateral carina crenulate and united anteriorly; 2nd tergite with well-developed anterolateral areas and with a large crenulate mid-basal triangular area; suture between 2nd and 3rd tergites widely crenulate; 3rd tergite with anterolateral crenulate depression; 4th and 5th tergites crenulate transverse sub-apical grooves; ovipositor thin, without dorsal nodus and without ventral serrations; length of ovipositor sheaths 0.25 × fore wing.

Length: 4.30mm., fore wing 3.55mm.
Male: Unknown
Host: Unknown
Distribution: India: West Bengal

Holotype: 1 ♀, INDIA: West Bengal, Nadia, Kalyani, 15.xi.1999, Coll. A. A. Haider (DD4059). *Paratypes*: 2 ♀ ♀, with same data as holotype. The type specimen is deposited in Department of Zoology, Aligarh Muslim University, Aligarh (ZDAMU).

Geo-coordinates- 22°58'30" N 88°26'04" E
Source- Google

Remarks: The new species *Pseudoshirakia bengalensis* sp.nov. is closely related to *Pseudoshirakia aligarhensis*, sp.nov. However, it differs in having (i) apical segment of antenna 2 × their width (ii) face smooth and shining (iii) frons and vertex punctulate (iv) mesopleuron and metapleuron punctulate (v) fore wing vein 1-SR+M straight (vi) 2nd metasomal tergite with well-defined antero-lateral areas.

Majority of the Braconids are larval parasitoids of other insect group like Lepidoptera, Diptera, Coleoptera and Tenthredinidae [4] and thus are considered as the most important group used in the biological control. It is largely accepted that a sound taxonomic base is essential for any biological control programme. This is so because the taxonomic research can lead us to the correct identification of both the pest and their biological control agent [8]. In the present work genus *Pseudoshirakia* belonging to subfamily Braconinae have been recorded for the first time from India of which *Pseudoshirakia aligarhensis* sp.nov. and *P. bengalensis* sp. nov are added to the existing fauna of Indian Braconidae.

Table 1 Differences between *Pseudoshirakia aligarhensis* sp.nov. and *Pseudoshirakia bengalensis* sp.nov.

Characteristics	*Pseudoshirakia aligarhensis* sp.nov.	*Pseudoshirakia bengalensis* sp.nov.
Apical segment of antenna	2 × their width	3 × their width
Face	Densely setose and finally rugulose,	Smooth and shining
Frons and vertex	Smooth and shining	Punctulate
Mesopleuron and metapleuron	Mesopleuron smooth medially and rugulose anteriorly, metapleuron rugulose	Both are punctulate
Fore wing vein	1-SR+M distinctly bent or curved	1-SR+M straight
2nd metasomal tergite	With a pair of posteriorly diverging sublateral crenulate grooves.	With well-defined antero-lateral areas

CONCLUSION

The new species described here will definitely provide additional information to the existing fauna of Indian Braconidae. Until the genus *Pseudoshirakia* was known by only two species *P. yokohamensis* Cameron (1910) and *P. flavus* Wang and Chen (2006) from Palearctic (Japan, China) and Oriental (Taiwan) region. The overall information has been compiled after a careful consultation of the available literature. The approach of biological control is not only a better replacement for chemical control but simultaneously prove to be a permanent and comparatively inexpensive method against insect pests.

Abbreviations

The following abbreviations are used in the present study.

ZDAMU: Zoology Department, Aligarh Muslim University, Aligarh, India
AOL: Anterior ocular line
POL: Posterior ocular line
OOL: Ocello ocular line
OOD: Ocellus diameter
sp.nov. New species

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