



Discovery of the Oriental genus *Piyumoides* Leclercq, 1963 (Hymenoptera, Crabronidae) in the Indian subcontinent with the description of a new species

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ABSTRACT. The genus *Piyumoides* Leclercq, 1963 (Hymenoptera, Crabronidae) is a rarely reported genus of crabronid wasp, till now not much is known about the genus. In the present study, we are reporting for the first time the distribution of *Piyumoides* Leclercq, 1963 from the Indian subcontinent with the description of a new species *Piyumoides indicus* Amal & Girish Kumar **sp. nov.** from the Western Ghats. The newly described species closely allies with the Malaysian species *P. hewitti* (Cameron, 1908) by having a propodeal enclosure without bordering carinae, without distinct basal striae, and having a vestigial pygidial plate. A key to the species of the genus *Piyumoides* is also provided with illustrations of the new species.

Key words: Crabronini, key, Parambikulam, square-headed wasps, Western Ghats

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INTRODUCTION

The Family Crabronidae (Hymenoptera, Apoidea) is a diverse family of aculeate wasps having 9154 species in 249 genera worldwide and 518 species in 69 genera from India (Pulawski, 2023). Members of the family are usually predatory where the female lays eggs on larvae of various groups of insects (Bohart & Menke, 1976). *Piyumoides* Leclercq, 1963 is a Southeast Asian genus of the digger wasp of the Family Crabronidae (square-headed wasps). To date, five species of the genus have been described namely *P. becvari* Řiha, 2005 from Thailand, *P. hewitti* (Cameron, 1908) from Malaysia, *P. jeuniauxi* Leclercq, 1994 from Brunei, *P. narcissus* Leclercq, 1963 and *P. turbator* Leclercq, 1994 from the Philippines (Pulawski, 2023). This genus can be separated from others in the tribe Crabronini by having the following combination of characters: pronotal collar not notched medially; scape bicarinate; transverse frontal carina present and broken medially; metasoma sessile or subsessile; omaulus present; and mandible not notched externo-ventrally (Bohart & Menke, 1976; Leclercq, 1994). In the present study, the genus *Piyumoides* Leclercq, 1963 is newly recorded from the Indian sub-continent along with the description of a new species based on a specimen collected from the Parambikulam Tiger Reserve, Kerala.

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MATERIAL AND METHODS

This study is based on a specimen collected from Parambikulam Tiger Reserve of Palakkad district of Kerala (Fig. 1). The specimen collected was dried, mounted on entomological pins, examined, and photographed under a Stereo microscope model LEICA® M 205A with LEICA® DFC 450 Camera. The measurements were obtained using Leica LAS software (Leica Application Suite V3.80) and images taken at varying focal depths were stacked using LAS. Final illustrations were improved for contrast and brightness using Adobe® Photoshop CS5 (Version 12.0 x64) software. The distribution map of species of the genus was constructed by using GIS (version 3.14) software (Fig. 4). The specimen is deposited in the National Zoological Collections of the Zoological Survey of India, Western Ghat Regional Centre, Kozhikode (ZSIK). The terms used for morphology follow Říha (2005) and Bohart & Menke (1976). Terms for cuticular sculpturing follow Harris (1979). The following abbreviations were used for the morphometric characters in the text: **OD** = Ocellar Diameter; **OOL** = Ocello-Ocular Length (the minimum distance between a posterior ocellus and eye); **POL** = Posterior Ocellar Length (distance between the two posterior ocelli); **S** = Metasomal sternum; **T** = Metasomal tergum.

RESULTS

Taxonomic hierarchy

Order Hymenoptera Linnaeus, 1758

Superfamily Apoidea Latreille, 1802

Family Crabronidae Latreille, 1802

Subfamily Crabroninae Latreille, 1802

Genus *Piyumoides* Leclercq, 1963

Type species: *Crabro hewitti* Cameron, 1908



Figure 1. Collection locality of *Piyumoides indicus* Amal & Girish Kumar **sp. nov.** in Kerala, India.

Piyumoides indicus Amal & Girish Kumar **sp. nov.** (Figs 1A–D, & Figs 2A–F)

<https://zoobank.org/urn:lsid:zoobank.org:act:7DF9A0E6-DCEB-4B34-BDD5-70C069E9F04C>

Material examined. Holotype female, India: Kerala, Palakkad district, Parambikulam Tiger Reserve, Anappady (10°26'43.2024" N, 76°48'33.8724" E), 19.viii.2023, Coll. V.D. Hegde & Party, ZSIK Regd. No. ZSI/WGRC/I.R.-INV.25290.

Diagnosis. This species can be recognized by the following combination of characters: median carina of clypeus complete; propodeal enclosure without bordering carinae, and without distinct basal striae; occipital carina not reaching hypostomal carina; all femora black; mandibles almost entirely black; mesoscutum, mesopleuron, mesosternum, and propodeum black; and metasoma ferruginous with few black patches. *Piyumoides indicus* **sp. nov.** is closely allied to *P. hewitti* (Cameron, 1908) by having a propodeal enclosure without bordering carinae, without distinct basal striae, and having a vestigial pygidial plate. But it distinctly differs in having: (1) All femora black (in *P. hewitti* femora and tibiae of all legs entirely yellow); (2) Mandibles almost entirely black (in *P. hewitti* mandibles entirely ferruginous); and (3) Median carina of clypeus complete (in *P. hewitti* median carina evanescent at apex).

Description. — **Holotype, female** (Fig. 2A). Length 5.5 mm. Body black with ferruginous and yellow markings. Ferruginous as follows: mandibular teeth, metasoma (except the base of T1 and S1, T2–T4 posteromedially black), and hind tibia. Yellow as follows: scape, labial palpi, maxillary palpi, band on pronotal collar, pronotal lobe, inner side of tegula, basal band on scutellum, all trochanters, apex of femora, fore and mid tibiae, and all tarsi. Flagellar segments and outer side of tegula blackish brown. Wings (Fig. 3C) hyaline, veins blackish brown, pterostigma dark blackish brown. Setae silvery.

Head. Mandibles microsculptured except bifid apex (Fig. 2B); median lobe of clypeus elongated, apex triangularly projected, with medial carina reaching anterior margin (Fig. 2C); scapal basin smooth and glossy without lateral carinae; head with transverse frontal carina, broken medially (Fig. 2D); frons flat, with minute sparse punctures, almost smooth (Fig. 2D); POL 0.89× OOL; POL as long as OD; punctuation of vertex and genae almost as that of frons; occipital carina high, somewhat strongly crenate, disappearing posteriorly well before hypostomal carina. Antenna (Fig. 3A) with scape bicarinate, with one distinct carina, second carina feebly indicated; relative length of antennal segments: Scape: Pedicel: F1: F2: F3: F4: F5: F6: F7: F8: F9: F10 = 110: 109: 146: 136: 127: 101: 124: 107: 106: 111: 203.

Mesosoma. Mesosoma (Fig. 3B) rather dull; mesoscutum including anterior portion strongly and densely punctate, intervals between punctures more or less as long as their diameter; notauli and admedian lines present; parapsidal lines distinct; anterior margin of scutellum slanting towards mesoscutum, but not formed as a distinct furrow and not crenulate; scutellum with fine punctures, each puncture bearing one hair; mesopleuron rather smooth and glossy, finely, uniformly, and sparsely punctate, intervals between punctures larger than their diameter; verticulus present. Propodeum (Fig. 3D) glossy, with a shallow alveolus at posterior surface, after that a median carina reaching posterior margin, and two carinae present postero-laterally. Legs with fore-tarsus relatively short; middle basitarsus with few spines on interior side; length of fore-tibia: fore-tarsus: fore-basitarsus = 16.3: 17.5: 7.9; length of middle tibia: middle tarsus: middle basitarsus = 18: 25.5: 11; length of hind tibia: hind tarsus: hind basitarsus = 24: 31.5: 14.

Metasoma. Metasoma (Fig. 3E) subsessile; T1–T4 with fine, superficial coriaceous punctation; T5 with more superficial punctation; T1 basally about one-third with a medial furrow, around it impunctate, smooth, and glossy; median length of T1 1.45× its maximum width; T6 (Fig. 3F) microsculptured, with pygidial plate vestigial, lateral margins weakly carinated.

Male. Unknown.

Biology. Unknown.

Habitat. Moist deciduous forest.

Etymology. The species is named after the country where it was collected.

Distribution. India (Kerala) (Fig. 4)

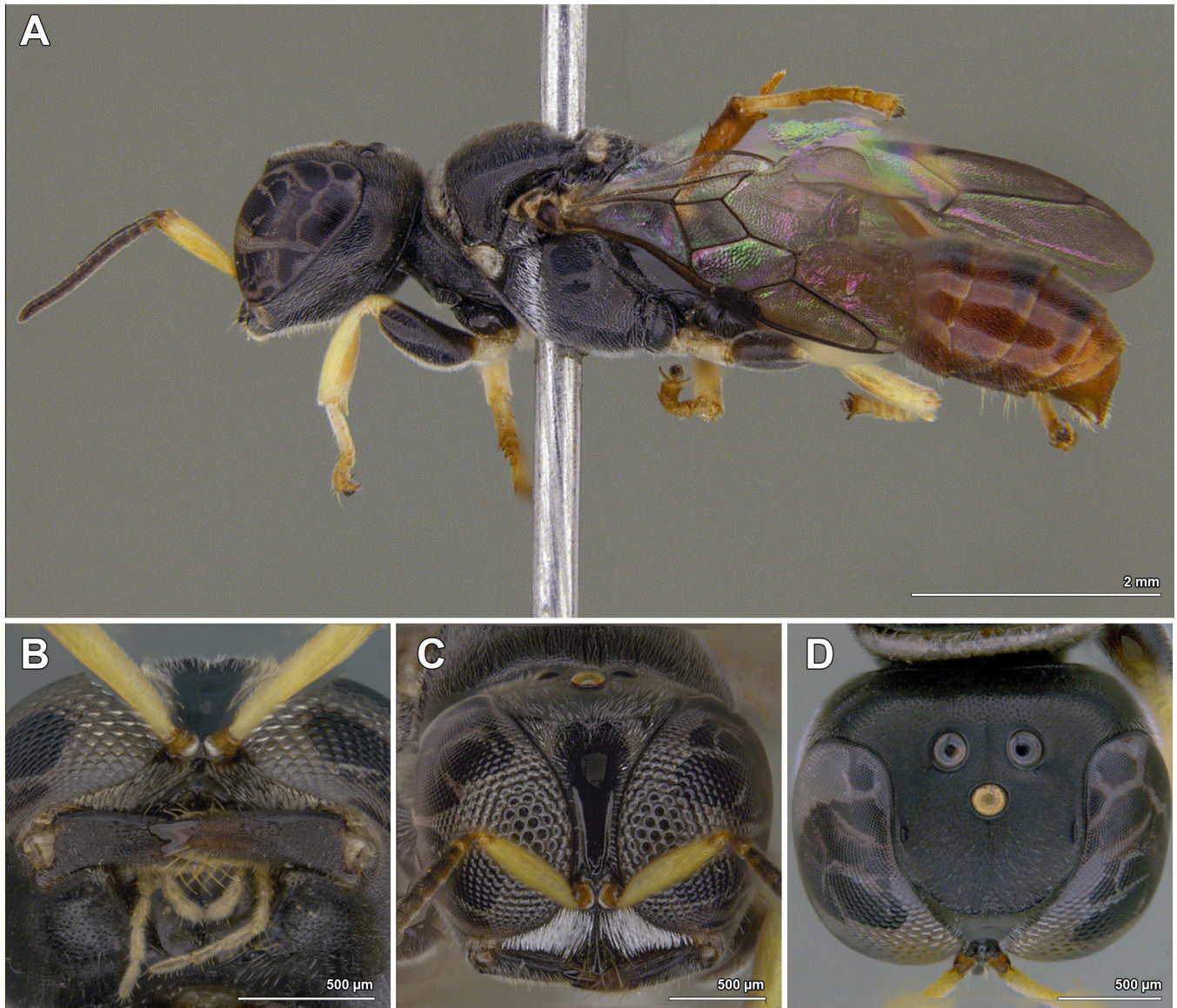


Figure 2. *Piyumoides indicus* Amal & Girish Kumar **sp. nov.**, holotype female. **A.** habitus, lateral view; **B.** Head showing mandibles; **C.** Head, frontal view; **D.** Head, dorsal view.

Key to species of *Piyumoides* in the world (modified from Leclercq, 1994)

- 1 Metasoma either entirely ferruginous or ferruginous with few black patches; occipital carina not reaching hypostomal carina. 2
- Metasoma black; occipital carina reaching hypostomal carina. 4
- 2 More yellow markings: clypeus entirely, prothorax, sides of mesoscutum, mesopleuron, and mesosternum (along mesopleural suture), above metapleuron, axilla, scutellum, metanotum and its sides, propodeal enclosure almost entirely; propodeal enclosure with bordering carinae and with distinct long striations. *P. narcissus* Leclercq, 1963
- Fewer yellow parts; mesoscutum, mesopleuron, mesosternum, and propodeum black; propodeal enclosure without bordering carinae, and without distinct basal striae. 3
- 3 All femora black; mandibles almost entirely black (Fig. 2B); median carina of clypeus complete (Fig. 2C). *P. indicus* Amal & Girish Kumar **sp. nov.**
- Femora and tibiae of all legs entirely yellow; mandibles entirely ferruginous; median carina evanescent at the apex (see Leclercq, 1994: p. 520, fig. 3). *P. hewitti* (Cameron, 1908)

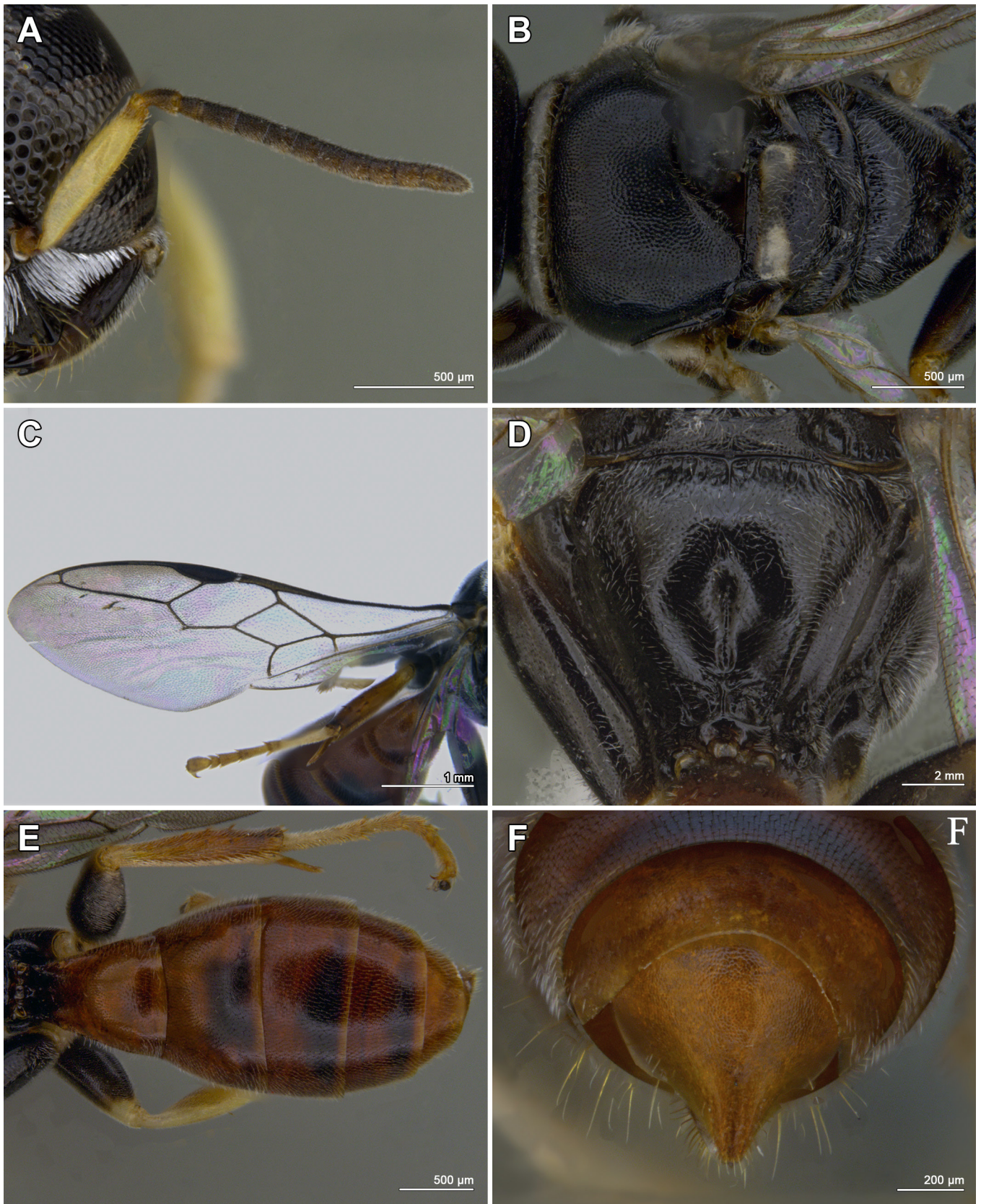


Figure 3. *Piyumoides indicus* Amal & Girish Kumar **sp. nov.**, holotype female. **A.** Antenna; **B.** Mesosoma, dorsal view; **C.** Fore wing; **D.** Propodeum, dorsal view; **E.** Metasoma, dorsal view; **F.** Metasomal tergum VI.

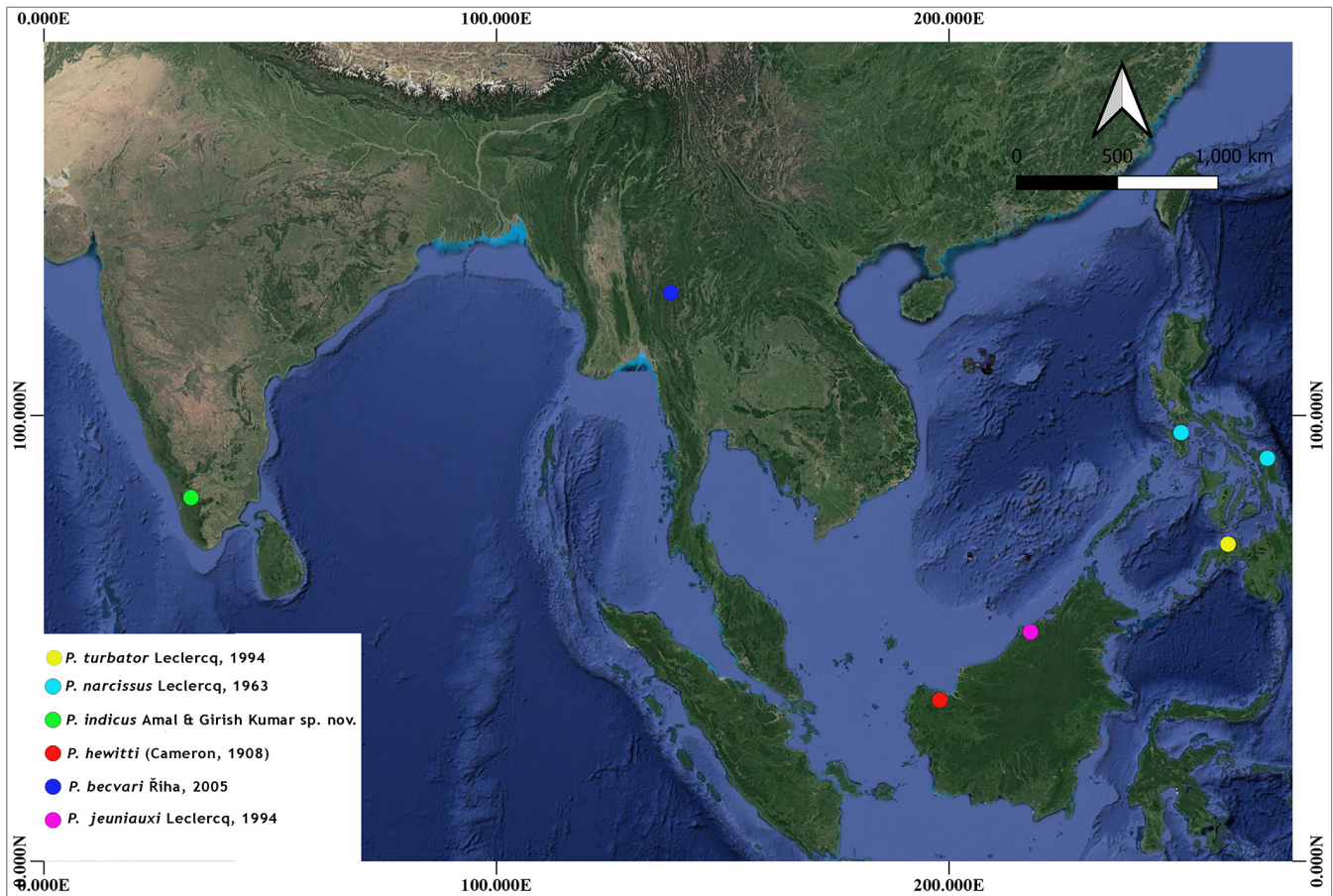


Figure 4. Distribution map for the species of the genus *Piyumoides* Leclercq, 1963 in the Oriental region.

- 4 Scapal basin without lateral carinae (see Leclercq, 1994: p. 520, fig. 4); body with no coarse punctuation. *P. jeuniauxi* Leclercq, 1994
- Scapal basin with lateral carinae (see Leclercq, 1994: p. 520, fig. 5); punctuation coarse especially on frons, mesoscutum, scutellum, mesopleuron and T1 (see Řiha, 2005: p. 245, figs 4). 5
- 5 Apical margin of clypeus rounded without a cleft medially (see Řiha, 2005: p. 245, fig. 2); median carina of the clypeus not reaching apical margin (see Řiha, 2005: p. 245, fig. 2); carinae of propodeum stronger (see Řiha, 2005: p. 245, figs 3a & 3b). *P. becvari* Řiha, 2005
- Apical margin of clypeus somewhat triangular with a cleft medially (see Leclercq, 1994: p. 520, fig. 5); median carina of the clypeus reaching apical margin (see Leclercq, 1994: p. 520, fig. 5); carinae of propodeum less strong than in alternate (see Leclercq, 1994: p. 520, fig. 8). .. *P. turbator* Leclercq, 1994

DISCUSSION

Specimens of the genus *Piyumoides* Leclercq, 1963 are rarely collected worldwide, with only five species from Southeast Asia. The major contribution to the genus is made by Leclercq (1994) who provides the updated definition and key to the females of four species known to that period. Řiha (2005) described another species from Thailand. Till then there were no additions of species in this genus. The five species of *Piyumoides* have a southeast Asian distribution, *P. becvari* Řiha, 2005 from Thailand, *P. hewitti* (Cameron, 1908) from Malaysia, *P. jeuniauxi* Leclercq, 1994 from Brunei, *P. narcissus* Leclercq, 1963 and *P. turbator* Leclercq, 1994 from the Philippines (Pulawski, 2023). In the present study, we reported this genus from the Indian subcontinent with the description of a new species which shows its range extension from southeast Asia to south Asia. Further elaborate studies in the region may shed light on further understanding of the genus.

AUTHOR'S CONTRIBUTION

The authors confirm their contribution to the paper as follows: S.A. and P.G.K. designed the methodology and wrote the manuscript with the support of V.D.H. All authors discussed the results and contributed to the final version of the manuscript.

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AVAILABILITY OF DATA AND MATERIAL

The specimen examined in this study are deposited in the National Zoological Collections of the Zoological Survey of India, Western Ghat Regional Centre, Kozhikode and is available from the curator, upon request. The authors declare that the data and material during the study are publicly available after publication with proper citation.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The authors declare that this study received ethics approval and consent for the publication of details including the photographs and details within the text to be published in the journal from the competent authority.

CONSENT FOR PUBLICATION

The authors declare that this study received consent for publication from the competent authority.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

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کشف جنس اورینتال (*Piyumoides* Leclercq, 1963) (Hymenoptera, Crabronidae) در شبه‌جزیره هند و توصیف یک گونه جدید

سریداران آمال*، پوتووابی گیریش کومار، ویشوانات هگ

مرکز منطقه‌ای گهات غربی، بخش مطالعات جانورشناسی هند، کراالا-۶۷۳۰۰۶، هند.

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چکیده: جنس *Piyumoides* Leclercq, 1963 (Hymenoptera, Crabronidae) یک آرایه جنس کمتر گزارش شده از زنبورهای سرمکعبی می‌باشد که اطلاعات زیادی در مورد آن ثبت نشده است. در این مطالعه، با معرفی و توصیف یک گونه جدید به نام *Piyumoides indicus* Amal & Girish Kumar **sp. nov.** از منطقه گهات غربی، انتشار جنس *Piyumoides* برای اولین بار در کشور هند ثبت می‌شود. گونه جدید توصیف شده ارتباط نزدیکی با گونه مالزیایی به نام *P. hewitti* (Cameron, 1908) دارد. در هر دو گونه بخش مرکزی پروپوڈئوم فاقد کاریناهای محاطی و نقوش طولی قاعده‌ای بوده است و صفحه انتهای شکم تحلیل رفته است. کلید تشخیص گونه‌های جنس *Piyumoides* و تصاویر گونه جدید ارائه شد.

واژگان کلیدی: Crabronini، کلید شناسایی، پارامبیکولام، زنبورهای سرمکعبی، گهات غربی