



A new species of *Chalcis* Fabricius (Hymenoptera, Chalcididae) from south India

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ABSTRACT: The morphologically diverse and cosmopolitan chalcidid genus, *Chalcis* includes 59 species. Most of the species are distributed in the temperate regions of the Northern Hemisphere. Till date only two species were recorded from the Oriental region. A new species, *Chalcis biligiriensis* from scrub forests of Biligiri Rangaswamy Temple Tiger Reserve (BRT) of the Western Ghats (Karnataka, India) is described. In addition, detailed illustrations of *C. gibsoni* Narendran for the first time along with an illustrated key to the identification of the Oriental species are provided. © 2023 Association for Advancement of Entomology

KEYWORDS: Western Ghats, Chalcidoidea, taxonomic key, BR Hills, Oriental Region, malaise trap

The family Chalcididae (Hymenoptera, Chalcidoidea) includes more than 1500 species in over 90 genera globally (Noyes, 2023). This family contains eight subfamilies and nine tribes (Cruaud *et al.*, 2020). The genus *Chalcis* belongs to the subfamily Chalcidinae (Bouček, 1988), contains 59 species (Saguiah *et al.*, 2020; Noyes, 2023). Even though the natural history of *Chalcis* is not yet explored much, species were recorded as egg-larval or larval-pupal primary parasitoids of Stratiomyidae (Diptera) (Müller, 1908; Burks, 1940; Schremmer, 1960). Though species of *Chalcis* morphologically diverse, they can be recognized by the combination of following characters; mesotibial spur reduced or absent, tarsal claws only slightly curved in both male and female, pectinate basally in male, medial portion of female hypopygium sclerotized and most often extending posteriorly and male hypopygium enlarged and posteriorly emarginated (Delvare, 1992).

No taxonomic revision of *Chalcis* is carried out in a global scale. Literature about species revisions were available for the following regions; North America (Burks, 1940, 1977), New World (Delvare, 1992), Europe (Bouček 1951), Iran (Lotfalizadeh *et al.*, 2012), Oriental region (Narendran, 1989), Japan (Habu, 1960), and Australasia (Bouček, 1988). The highest species diversity is recorded in the New World (Saguiah *et al.*, 2020). Only two species were reported from the Oriental region; one from India and another from Taiwan (Narendran, 1989). In the present study, the third species of *Chalcis* is described with illustrations from the Oriental region. A key to the Oriental species is provided along with the illustration of *Chalcis gibsoni* Narendran.

Holotype was collected through the Malaise trap from Biligiri Rangaswamy Temple Tiger Reserve, Karnataka. After sorting the specimen was preserved

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in ethyl alcohol and later card mounted. Images of the holotype were taken with Keyence VHX-6000 and edited in Adobe Photoshop CS8. Holotype is deposited in the collection of ATREE Insect Museum, Bengaluru, India (AIMB). Morphological terminology followed Hymenoptera Anatomy Ontology (Yoder *et al.*, 2010; <http://glossary.hymao.org>). The terminology for body sculpture follows Harris (1979).

Abbreviations used

AIMB: ATREE Insect Museum, Bengaluru, India

Fu1, Fu2: Funicular segments 1 and 2

MOD: Maximum diameter of median ocellus

OOL: Ocular-ocellar line or minimum distance between a lateral ocellus and eye margin

POL: Posterior ocellar line or minimal distance between lateral ocelli

SMV: Submarginal vein

MV: Marginal vein

PMV: Postmarginal vein

Chalcis Fabricius, 1787

Chalcis Fabricius, 1787: 272. Type species *Sphex sispes* Linnaeus, 1761, by subsequent designation of Westwood (1839: 65).

Smiera Spinola, 1811: 147. Type species *Sphex sispes* Linnaeus, 1761, by subsequent designation of Curtis (1833: 472). Synonymy by Gahan & Fagan (1923: 31).

Smicra Spinola, 1837: 1. Unjustified emendation of *Smiera*.

Diagnosis: Scape distinctly exceeding median ocellus (Figs. 1B, 4C); mandibular formula 2:3 or 3:3, the upper tooth larger and longer than the others; pre and post orbital carinae indistinct (Figs. 1B, 4C); frontogenal sulcus often present rarely absent (Figs. 1B, 4C); propodeum often with midlongitudinal carina (Figs. 1E, 5B); mesocoxa with short pubescence dorsolaterally (Fig. 1A); mesotibial spur at most as long as apical width of mesotibia, occasionally absent; metafemur with basal tooth

long in most species or short in Oriental species (except in *C. gibsoni*) (Figs. 1A, 2C, 3A, 4A, 5C); metafemur mostly with (Figs. 3A, 5D) or without inner basal tooth (in *C. edentata*); tarsal claws usually slightly curved, sometimes falcate in female, apically bifid in males (Fig. 3B); petiole with dorsal tubercle like projection anteriorly and posteriorly (Figs. 1A, 2A, B, 4B, 5E); female hypopygium with median portion narrowly extended posteriorly with median portion distinct from the lateral areas, or thickened but only slightly extended posteriorly beyond the adjacent margins; apex of ovipositor with long setae; male hypopygium enlarged, flat or concave, with distal margin truncate to notched.

Biology: Egg-larval or larval-pupal primary parasitoids of Stratiomyidae.

Distribution: Cosmopolitan.

Key to Oriental species of *Chalcis* Fabricius

1. Hind femur fully black, without inner basal tooth; Gaster including petiole distinctly longer than thorax; head $1.4 \times$ as wide as long; petiole with tubercle like projection anteriorly [Taiwan].....*Chalcis edentata* Narendran
- Hind femur with yellow spots basally and subapically (Figs. 1A, 2C, 3A, 4A, 5C), with distinct inner basal tooth (Figs. 3A, 5D); Gaster including petiole as long as thorax (Figs. 1A, 4A); head less than $1.4 \times$ as wide as long (Figs. 1B, 4C); petiole with tubercle like projection anteriorly and posteriorly (Figs. 1A, 2A, B, 4B, 5E).....2
2. First tooth of outer ventral margin of hind femur long (Fig. 5C); propodeum without midlongitudinal carina basally (Fig. 5B); petiole long $4.2 \times$ as long as maximum width (Fig. 5E); post marginal vein longer than marginal vein (Fig. 4B); second gastral tergite with three or more rows of setae (Figs. 4A, 5E) [India].....*Chalcis gibsoni* Narendran
- First tooth of outer ventral margin of hind femur short (Fig. 2C); propodeum with a short midlongitudinal carina basally (Fig. 1E); petiole short, $2.6 \times$ as long as maximum width

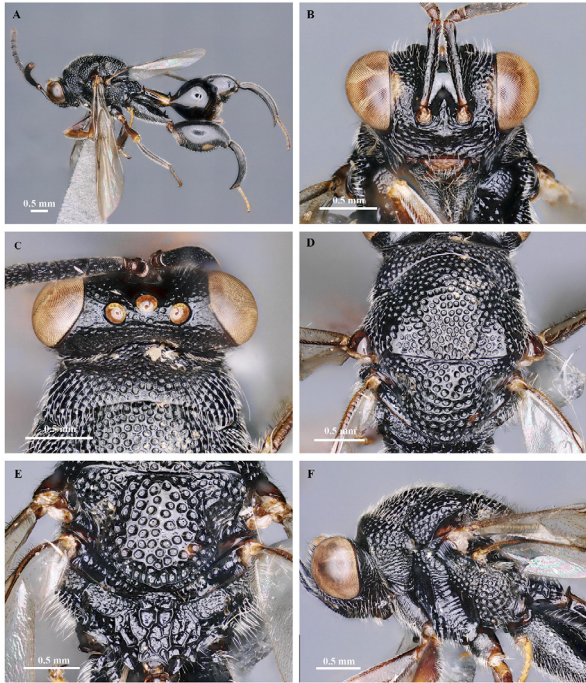


Fig. 1 *Chalcis biligiriensis* sp. nov., holotype, female - A) Habitus, in lateral view; B) Head, in anterior view; C) Head, in dorsal view; D) Mesosoma, in dorsal view; E) Scutellum and propodeum, in dorsal view; F) Head and mesosoma, in lateral view



Fig. 2 *Chalcis biligiriensis* sp. nov., holotype, female - A) Gaster, in lateral view; B) Gaster, in dorsal view; C) Hind femora, in lateral view; D) Fore wing

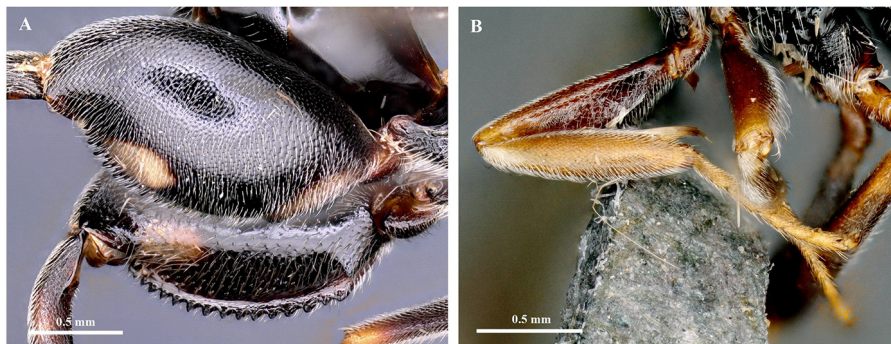


Fig. 3 *Chalcis biligiriensis* sp. nov., holotype, female - A) Hind femora, in ventro-lateral view; B) Fore leg

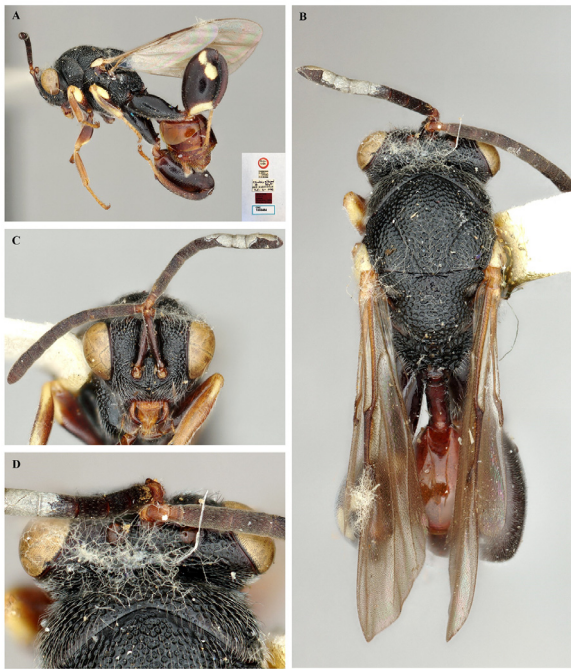


Fig. 4 *Chalcis gibsoni* Narendran, holotype, female - A) Habitus, in lateral view; B) Habitus, in dorsal view; C) Head, in anterior view; D) Head, in dorsal view



Fig. 5 *Chalcis gibsoni* Narendran, holotype, female - A) Head and mesosoma, in lateral view; B) Propodeum, in dorsal view; C) Hind femora, in lateral view; D) Hind femora, in ventro-lateral view; E) Gaster, in dorsal view

(Fig. 2B); post marginal vein shorter than marginal vein (Fig. 2D); second gastral tergite with single row of setae (Figs 1A, 2A) [India]*Chalcis biligiriensis* sp. nov.

***Chalcis biligiriensis* sp. nov. (Figs. 1–3)**

LSIDurn:lsid:zoobank.org:act:F49C0679-FBA4-4161-BFF6-CA06F043B972

Material examined.

Holotype. Female. INDIA: Karnataka, Chamarajanagar, Biligiri Rangaswamy Temple Tiger Reserve, scrub jungle, 77°06 55.1 E, 12°01 41.4 N; 31.v–15.vi.2005, Malaise trap, coll. D.R. Priyadarsanan.

Description. Female, holotype. Body length 5.4 mm.

Head. Lower face slightly bulging above clypeus, with shallow umbilicate fovea, interspaces broad and finely granulate; parascrobal area foveolate, interspaces moderately broad, smooth; median

intumescence present; malar space $0.4 \times$ eye height; malar sulcus distinct, straight, crenulated; gena smooth to rugulose, genal carina present; mandibular formula 2:3; antennal scrobe smooth, shiny and without transverse carina below median ocellus; interantennal projection without longitudinal carina anteriorly, with shallow narrow groove, posteriorly with more or less elongated triangular area; MOD:POL:OOL = 1: 2: 1. Scape $6.0 \times$ as long as wide, inner face slightly sinuous; anellus about $0.5 \times$ as long as wide; Fu1 longer than other funicular segments, about $2.5 \times$ as long as wide and $1.4 \times$ as long as Fu2 length.

Mesosoma. Mesoscutum sparsely setose, interspace mostly smooth and shiny, broad medially, $1.0 \times$ diameter of umbilicate foveae; mesoscutellum convex, interspaces broad and smooth anteriorly, narrow and granulate posteriorly, frenal carina acutely convex medially, blade-like; mesopleuron with mesepisternum longitudinally striate dorsally, foveolate ventrally; propodeum rugose antero-

laterally with irregular median and submedian carinae, anterior and posterior costulae irregular, adpetiolar area with irregular fovea, anterosubmedian area irregularly areolate-rugose; tarsomeres 4 and 5 of all legs with pubescence similar to basal tarsomeres; protarsomeres 4 and 5 ventrally with pairs of distinct peg-like spines; protarsal claws falcate, ventrally with 5 basal spines followed by 1 wide and blunt tooth; mesocoxa sparsely setose posteriorly; mesotibial spur 0.7× as long as the width of the mesotibial apex; metacoxa smooth and shiny dorsally, punctulate and interstices smooth and shiny ventrally, inner face glabrous; metafemur with outer face punctulate and interstices smooth and shiny, ventrally without inner basal tooth but with 16 teeth along outer margin, outer basal tooth at most as large as and close to second tooth, the following teeth equal in size; metatibia with apical spine triangular and longer than the apical width of metatibia; metatarsomere 1. shorter than tarsomeres 2. Fore wing SMV:MV:PMV = 2.3: 1: 1.

Metasoma. Petiole about 2.6 × as long as wide, cylindrical, with dorsolateral carina at most along basal half, with a short pair of submedian carina basally, with dorsal tubercle like projection anteriorly and posteriorly, anterior projection pointed and posterior projection blunt in lateral view; gastral tergites smooth; second gastral tergite sparsely punctate submedially; apex ovipositor sheath rounded apically, with long setae.

Colour: Black, except eye, parascrobal area medially, ocelli, fore tibia basally, fore tarsus, metatibia apically, mid tarsus, posterior part of hind femur basally and subapically, outer face of hind tarsus, petiole dorsally, apico-laterally, ovipositor apically yellow.

Male. Unknown;

Biology. Unknown.

Distribution. India (Karnataka).

Comparative diagnosis: Apart from the differences mentioned in the key, the new species can be distinguished from *C. gibsoni* in having petiole yellow dorsally (reddish brown dorsally in

C. gibsoni), apical half of fore and mid femora yellowish brown (yellow in *C. gibsoni*); gaster black (reddish brown in *C. gibsoni*), metafemur with 17 ventral teeth (with 19 ventral teeth in *C. gibsoni*), tegula reddish brown (yellow in *C. gibsoni* (Fig. 5A)), frons with a pair of yellow spots laterally (frons without yellow spots in *C. gibsoni*), POL 2.0 × as long as OOL (POL 1.6 × as long as OOL in *C. gibsoni* (Fig. 4D)), hind femora without yellow spot apico-dorsally (with yellow spot apico-dorsally in *C. gibsoni*).

Etymology: The species is named after the type locality, Biligiri Rangaswamy Temple Tiger Reserve, Karnataka, India.

ACKNOWLEDGEMENTS

Authors are thankful to Dr. Gary Gibson, Canadian National Collection, Canada for sending the holotype images of *Chalcis gibsoni*. APR is grateful to Dr. Gérard Delvare, France for the discussion on the new species and his invaluable suggestions. Authors thank Department of Biotechnology, Government of India for financial assistance through a major research project on “Bio-resource and Sustainable livelihoods in North East India” (BT/01/17/NE/TAX) which was instrumental for completion of this study. DRP acknowledge Schlinger Foundation USA and Prof. Michael Irwin (University of Illinois, Urbana) for financial supports for the collections.

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(Received March 13, 2023; revised ms accepted June 10, 2023; published September 30, 2023)