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Cover: *Euphaea pseudodispar* shot at Kalindi River, Thirunelly, Wayanad district, Kerala. © Muneer P.K.



Authentic report of the emesine bug *Gardena melinarthrum* Dohrn, 1860 (Hemiptera: Heteroptera: Reduviidae) from India

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Abstract: An emesine bug, *Gardena melinarthrum* Dohrn, 1860, is reported from two areas in India—Kerala and Assam. Both, macropterous and apterous forms are found in India. This is the first illustrated report of this assassin bug from India.

Keywords: Assam, assassin bug, Emesinae, Emesini, Kerala, species distribution.

Two macropterous males collected from Kerala and one apterous female of thread-legged bug (Emesinae), collected from Assam (Guwahati), were identified as *Gardena melinarthrum* Dohrn, 1860 based on the identification keys in Wygodzinsky (1966). *Gardena melinarthrum* is the type species of the genus *Gardena* Dohrn, 1860 by monotypy (Capriles 1990). Wygodzinsky (1966) provided the taxonomic account with numerous line drawings of the diagnostic characters, along with information on the distribution of the species. Capriles (1990) also listed this species and its synonyms.

Dohrn (1860) described *Gardena melinarthrum* from an apterous specimen collected in Ceylon (=Sri Lanka). McAtee & Malloch (1926) reported the species from the Philippines by describing a new form as *Gardena*

melinarthrum var. *femoralis* McAtee & Malloch, 1926 and simultaneously also synonymized Dohrn's another species, *Gardena semperi* Dohrn, 1863 as a winged male of *G. melinarthrum*. Wygodzinsky (1966) illustrated brachypterous form known from other localities (e.g., Taiwan, Philippines, Java, Australia) and synonymized *G. m. femoralis* with *G. melinarthrum*. Ishikawa (2005) provided a brief redescription, supplemented with photographs of the species (including macropterous form, from Japan), along with illustrations of diagnostic characters, distribution records and synonyms; according to this paper, *G. melinarthrum* is distributed in Japan, Taiwan, China, Sri Lanka, the Philippines, Indonesia, Malaysia, and Australia. Recently, Rédei & Tsai (2010) have also provided information on diagnosis and distribution of this species. None of the above cited papers mention India as a locality for this species. Though original descriptions of the species are available (Dohrn 1860), the whereabouts of the type material collected from Sri Lanka remain unknown, as per Wygodzinsky (1966).

Wygodzinsky (1966) provided a detailed description

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of the genus *Gardena* as well as of the tribe Emesini to which it belongs; he further divided this genus into four species groups, the *melinarthrum*, *brevicollis*, *longimana*, and *pipara* groups, based on morphology of fore legs (especially the extent of spineless portion of fore femur) and the characters of male genitalia. *Gardena melinarthrum* obviously belongs to the nominotypical group. Members of the *melinarthrum* group show a length variation from 18.5 mm to 25.0 mm (Wygodzinsky 1966).

Ambrose (2006) published a checklist of Reduviidae of India but did not include this species; subsequently, Mukherjee & Saha (2017) published a paper claiming that they were presenting the first record of *G. melinarthrum* from West Bengal, India. However, Mukherjee & Saha (2017) mentioned the size of their apterous specimens to be: male 10 mm and female 15.37 mm. Based on the body size alone it appears that the specimens reported by Mukherjee & Saha (2017) belong to another species. In addition, the fore tibia in *G. melinarthrum* is less than half the length of fore femur, while, Mukherjee & Saha's image (their Fig. 3) shows a much longer fore tibia (the lengths provided by the authors are: fore femur 2.80 mm and fore tibia 1.68 mm (implying that the tibia is longer than half length of femur); in addition, the first long spine of posteroventral series of fore femur also seems closer to the base of femur (unlike what is observed in true *G. melinarthrum*). In any case, male genitalia of the specimen reported by Mukherjee & Saha (2017) must be studied to resolve the identity issue; hence, till such a time the previous record of *G. melinarthrum* from West Bengal, India must be considered doubtful. Thus, it is imperative to state that there is no reliable previous record of *G. melinarthrum* from India, although the finding of a Sri Lankan species in India is always likely, as mentioned earlier (Sarode et al. 2018).

In this work we are presenting morphological details along with the illustrations of macropterous male (based on two specimens), and one apterous form. Since diagnostic characters of the genus as well this species, along with illustrations are already provided by the earlier authors cited above, we are only giving photographic illustrations and relevant characters as a brief redescription here.

Reduviidae, Emesinae, Emesini.

***Gardena* Dohrn, 1860**

***Gardena melinarthrum* Dohrn, 1860, p. 214.**

***Gardena semperi* Dohrn, 1863, p. 64**

***Gardena melinarthrum* var. *femoralis* McAtee & Malloch, 1925, p. 136.**

Winged form from Kerala:

Colouration and vestiture: Overall colour reddish brown in dorsal aspect, posterior lobe of pronotum and distal half of abdomen darker (Image 1A,B; Image 2A). Head dark brown, slightly darker ventrally and covered by short, grey adpressed setae all over, a distinct shining 'V' mark in front of transverse sulcus is devoid of setae; all antennal segments dark brown, III and IV antennomeres appearing pale because of dense grey setae. First two antennomeres with long, erect but sparsely distributed grey setae. Eyes black; labium pale brown (Image 2B,C). Overall legs brown; fore coxae slightly darker than fore femora. In fore femora spiniform processes of postero-ventral series with pale bases and black spines while antero-ventral series consists of thin black setae. Mid and hind femora brown but blackish-brown sub apically, apex cream. Mid and hind tibiae brown but with basal cream area followed by dark brown area. Tarsal segments dark brown and hairy. Both mid and hind femora as well as tibia covered with fine, greyish microchaetae with only a few macrochaetae. Fore and hind wings pale brown; prosternum pale brown, meso and metasternum dark brown to black (Image 3D; Image 4 A,B). Mid and hind coxae and trochanters dark brown, shining due to sparse setae. Meso and meta sternum are dull because of dense cover of grey setae. Prosternum

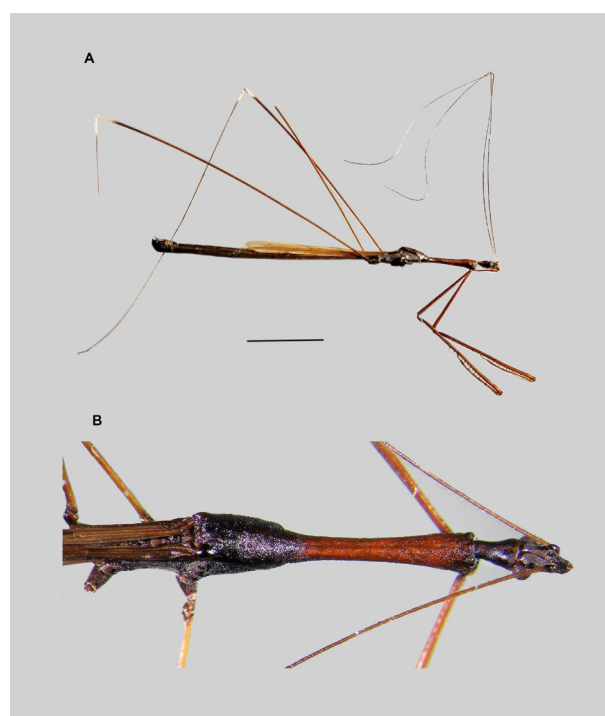


Image 1. *Gardena melinarthrum* from Kerala: A—lateral view (scale 5 mm) | B—dorsal view, anterior half. © H.V. Ghate.



Image 2. *Gardena melinarthrum* from Kerala, male: A—anterior half in lateral view | B—head, dorsal view; C—head, lateral view. © H.V. Ghate.

also has moderately dense cover of very fine setae, hence there is mild shining (Image 3D). Fore legs more setose than mid and hind legs.

Dorsally, abdomen dark brown along entire length, all abdominal tergites finely sculptured, with fine setae. Abdomen ventrally dark brown to black, sub shining from fifth segment to pygophore, whereas segments two to four dull; setae on pygophore slightly longer. Spiracles slightly elevated, their rims shining. Connexivum of moderate width, pale brown in anterior half and dark brown in posterior half.

Structure: Head elongate, fusiform, anteocular slightly longer than postocular (without neck). Eyes globular, of moderate size, occupying one third of head length, lower margin of eye not reaching ventral margin of head; transverse sulcus more or less straight not passing beyond posterior margin of eye. Anteocular part with distinct, short, median sulcus that ends at tip of 'V' like shining area. Antenniferous tubercles situated nearly in middle of anteocular area. Clypeus and mandibular plates slightly sloping. Labium bent between visible segments I and II, visible segment I very short, visible segment III longest. Postocular part of head

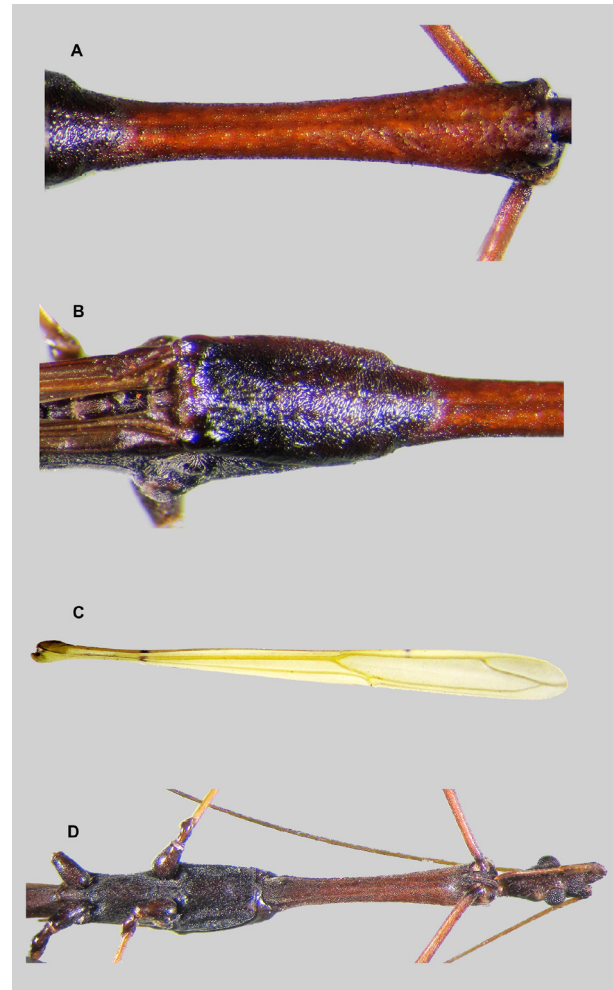


Image 3. *Gardena melinarthrum* from Kerala, male: A & B—pronotum anterior and posterior lobe, respectively, in dorsal view | C—forewing | D—head and thorax, ventral view. © H.V. Ghate.

distinctly narrowed in to neck (Image 2B,C; Image 4A).

Thorax with long pronotum; anterior lobe of pronotum much longer than posterior lobe and distinctly narrowed posteriorly, with a median shallow longitudinal depression, its surface sparsely granular (Image 1B, Image 2A; Image 3A); posterior lobe situated at an angle and about twice as wide as middle of anterior lobe, distinctly rugulose, sub shining, with humeral angles slightly elevated and button-like (Image 3B). Scutellum and metanotum without spines. Prosternum with its posterior margin round. Mesosternum rectangular, with a slight depression in distal part. Metasternum narrower than mesosternum, with an indistinct carina in between coxae (Image 3D; Image 4B). Fore and hind wings short, reaching only posterior border of fourth abdominal segment (Image 1). Both wings narrow and elongate; forewing with typical venation (Image 3C).

Fore legs extremely slender, coxae more than half

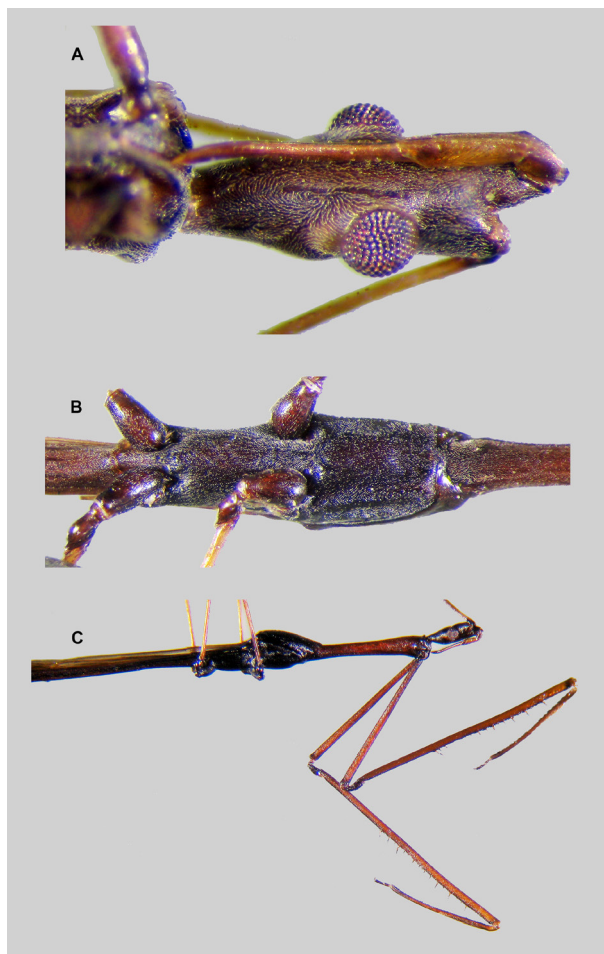


Image 4. *Gardena melinarthrum* from Kerala, male: A—head, ventral view | B—meso- and metasternum | C—anterior half with fore legs, lateral view. © H.V. Ghatе.

as long as femur, while tibia less than half as long as femur (Image 4C). Femur with postero-ventral series of spines that begins at about one third length of femur from base, first femoral spiniform process about 0.27 mm long (including basal tubercle) and its distance from base of femur 2.75 mm (i.e., the first spine is situated at about 10 times the length of the first spiniform process itself) (Image 5A). There are 12 long spiniform processes each with pale base and black spine. Extreme apical region there with only small black denticles; antero-ventral series composed of very fine setae without any conspicuous base. Fore tibia with long setae underneath, interspersed with short black and blunt denticles (Image 5B). Hind femora passing tip of abdomen (see Image 1A).

Abdomen narrow, parallel sided; connexivum narrow. Seventh tergite narrowed posteriorly, tongue shaped, set at an angle from body and nearly covering pygophore from dorsal side; eighth sternite partly visible laterally (Image 5C). Pygophore (detached) cup like, laterally

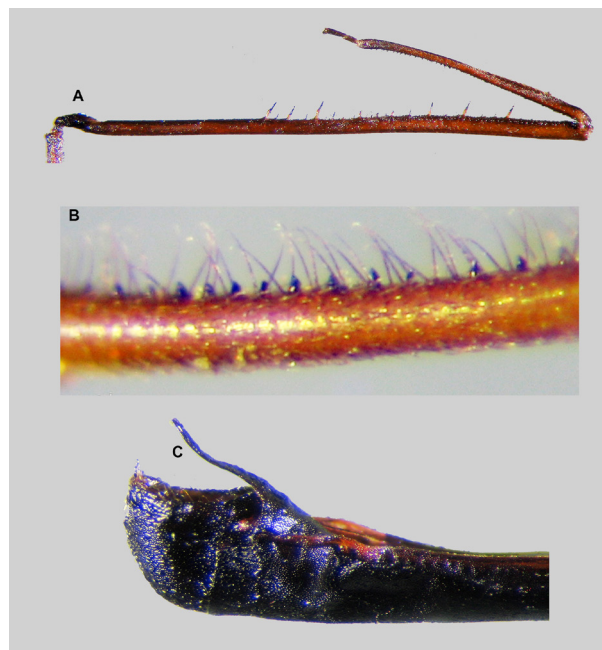


Image 5. *Gardena melinarthrum* from Kerala, male: A—fore leg details | B—fore tibia showing black tubercles and setae on under surface | C—pygophore in situ, lateral view. © H.V. Ghatе.

slightly compressed, with distinct posterosuperior spine and two moderately broad parameres, visible laterally on each side (Image 6A,B). Parameres as in Image 6E. Phallus symmetrical, with short but stout articulatory apparatus, basal plate struts fused into a sclerite. Phallosome with moderately sclerotized areas ventrolaterally (Image 6C); endosoma with two elongate processes bearing numerous spiny projections (Image 6D).

Material examined: Two winged males from Kerala and one apterous female from Guwahati, Assam. Preserved at Modern College at present.

Measurements (in mm): Males from Kerala (leg. S. Hiremath, 10 May 2018, loc. Vellayani) (n = 2): total body length 24.0/23.0. Total length of head 1.75/1.75, length of anteocular part 0.50/0.45, of postocular part 0.50/0.50, eye diameter 0.37/0.37. Antenna: length of segment I 14.0/14.0, of segment II 11.5/11.4, of segment III 0.50/0.50, of segment IV 2.70/NA. Labium: Length of visible segment I 0.18/0.20, of visible segment II 0.56/0.55, of visible segment III 1.1/1.0. Length of anterior lobe of pronotum 3.13/3.15, of posterior lobe 2.0/2.0. Length of fore coxa 4.5/4.5, of fore femur 7.0/6.95, of fore tibia 3.4/3.20, of fore tarsus 0.60/0.50; of mid coxa 0.60/0.60, of mid femur 15.0/15.0, of mid tibia 21.0/20.0, of mid tarsus with claw 0.50/0.50; of hind coxa 0.60 /0.58, hind femur 25.0/- hind tibia -/-, hind tarsus with claw -/-. Forewing 10.0/10.0.

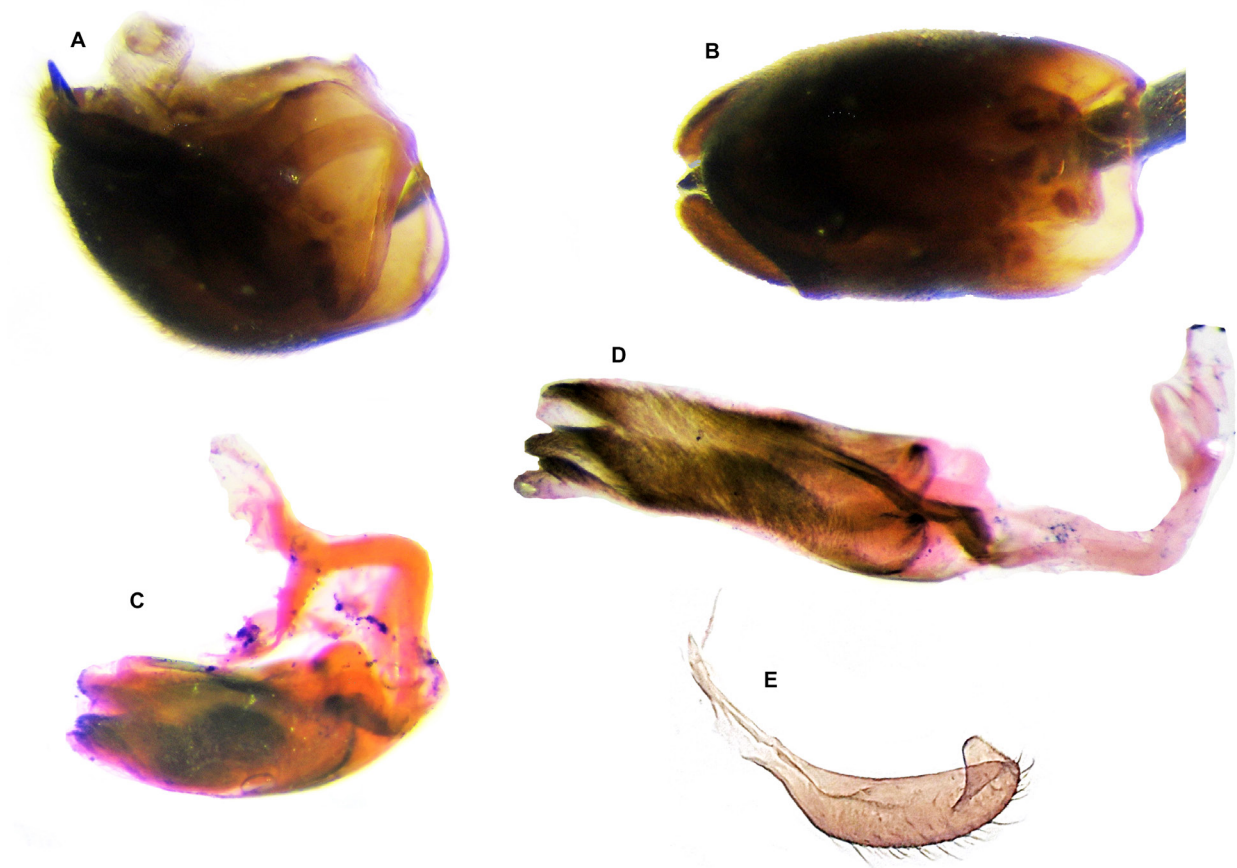


Image 6. *Gardena melinarthrum* from Kerala, male: A & B—pygophore in lateral and dorsal view, respectively | C & D—phallus in repose and everted | E—Paramere. © H.V. Ghatе.

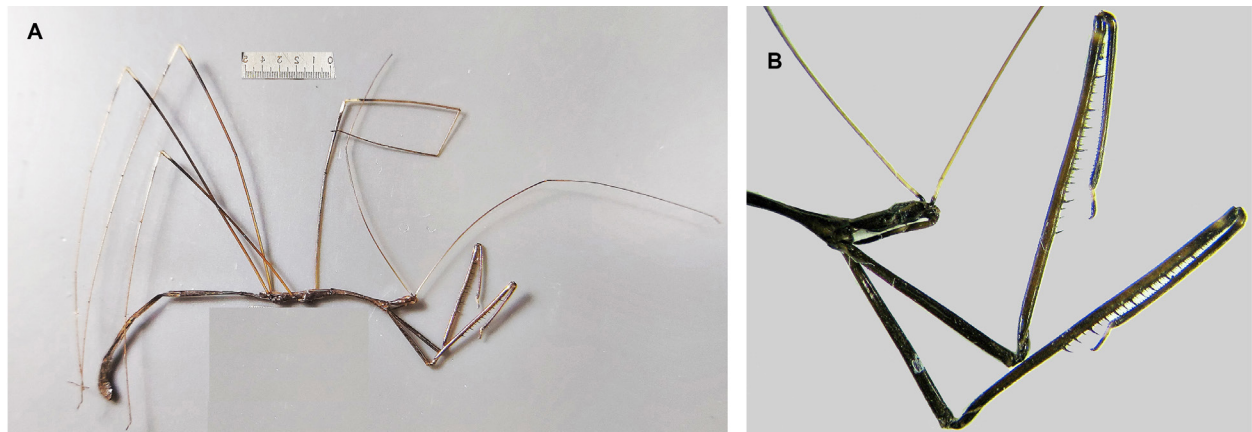


Image 7. *Gardena melinarthrum* from Assam, female: A—Lateral view | B—anterior part in lateral view, details of fore legs. © Santanta Saikia.

Apterous female: The apterous female from Assam (leg. S. Saikia, Morigaon District, 17 March 2020) is 25 mm in length. Other measurements are quite comparable to that of macropterous male given above, as seen from the Image 7A. The specimen was damaged in transit so genitalia preparation was not possible and

so those photographs are not included. Close up of anterior half (Image 7B) again shows elongate head, bent labium and slender fore legs. Note the distance of first femoral spiniform process from the base which is a diagnostic character.

General morphology, except for thoracic region,

is similar to winged form; pronotum is longer than meso and meta notum put together; posterior lobe of pronotum very short, not covering mesonotum. The fore legs are very slender, the femoral posteroventral series of spiniform setae starts away from the base (at one third length) of the femur itself, fore tibia are slightly less than one-half length of fore femur. Fore femur has preapical pale spot (mentioned in var. *femoralis* by McAtee & Malloch 1926), which is absent in winged form.

DISCUSSION

Gardena melinarthrum is evidently a widely distributed species. Wygodzinsky (1966) gives distribution as "Oriental and Australian regions, from Ceylon (Sri Lanka; type locality) to Formosa (Taiwan) and Australia". Its presence in India is therefore not surprising, even then, it has not been authentically documented before, with a series of illustrations of the diagnostic characters, as we have done here. It has already been pointed out that the report of this species by Mukherjee & Saha (2017) is likely to be a misidentification; it is clear from the measurements given by them, as well as the image that shows posteroventral series of spines beginning before one third length of the femur itself (i.e., the first process is closer to the base than is known for *G. melinarthrum*). These aspects were previously discussed while reporting *Gardena brevicollis* Stål, 1871 from India (Sarode et al. 2018). The apterous form which we have from Assam is about 25 mm and shows all the diagnostic characters of *G. melinarthrum*. It is interesting, at this juncture, to note that this species has not been reported from Sri Lanka in more than 150 years, i.e., since its original description by Dohrn (Ranasinghe & Ghate 2022).

Wygodzinsky (1966) illustrated diagnostic features of this species, however, a redescription was not provided. Ishikawa (2005) presented an excellent comparative account of five species of *Gardena* that occur in Japan, two of those being new species; he also included diagnostic characters and details of the male and female genitalia and revised the key to the Japanese species of *Gardena* (the key includes *G. melinarthrum*, *G. muscicapa* (Bergroth, 1906) and *G. brevicollis*, that occur

in India).

Ambrose (2006) had listed only *Gardena muscicapa* to be present in India; with the present report, and the already reported *G. brevicollis* (Sarode et al. 2018), the number of *Gardena* species known from India becomes three.

Much remains to be done about the Indian Emesinae and more thorough surveys need be conducted to know about the distribution and biology of the existing species and to check for possibilities of new species or new records.

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