

RESEARCH PAPER

# Redescriptions of *Ectomocoris cordiger* and *E. fenestratus* (Hemiptera: Heteroptera: Reduviidae) with two new synonyms

Yingqi LIU<sup>1)</sup> & Wanzhi CAI<sup>2,\*)</sup>

<sup>1)</sup> College of Life Sciences, Capital Normal University, Beijing 100048, China; e-mail: yingqiliu0720@163.com

<sup>2)</sup> Department of Entomology and MOA Key Lab of Pest Monitoring and Green Management, China Agricultural University, Beijing 100094, China; e-mail: caiwz@cau.edu.cn

\*<sup>1)</sup> corresponding author

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**Abstract.** Two assassin bugs, *Ectomocoris cordiger* Stål, 1867 and *E. fenestratus* (Klug, 1830) (Hemiptera: Heteroptera: Reduviidae: Peiratinae), are redescribed. *Ectomocoris picturatus* Distant, 1919, syn. nov., is treated as a junior synonym of *E. cordiger*, and *Pirates adjunctus* Walker, 1873 is confirmed as a synonym of that species. *Ectomocoris costatus* Miller, 1954, syn. nov., is treated as a junior synonym of *E. fenestratus*. Types of all four nominal species were examined, and lectotypes of *E. cordiger*, *E. picturatus*, *E. fenestratus* and *P. adjunctus* are designated. Habitus images of the type specimens, figures of the male genitalia and a distribution map are also provided. The occurrence of *E. fenestratus* in Uganda is confirmed.

**Key words.** Hemiptera, Heteroptera, Reduviidae, Peiratinae, lectotype designation, male genitalia, new synonymy, taxonomy, Afrotropical Region, Oriental Region, Palearctic Region

**Zoobank:** <http://zoobank.org/urn:lsid:zoobank.org:pub:5AE4A278-2DA5-4209-ACF2-B45B0BAC6548>

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## Introduction

Peiratinae is one of the speciose subfamilies of Reduviidae (assassin bugs) comprising more than 330 described species in 36 genera (MALDONADO CAPRILES 1990; CHLOND 2007, 2018; SWANSON 2019; LIU et al. 2020a, b, c, 2021, 2022, 2023; MALIPATIL et al. 2023, 2024; MALIPATIL & LIU 2024). Most peiratine species live on the ground and feed on other small insects. They are usually nocturnal and hide in cryptic microhabitats such as tree trunks or rock crevices during the daytime and become more active at night (WEIRAUCH et al. 2014).

Among the 36 peiratine genera, *Ectomocoris* Mayr, 1865 is the most species-rich one with over 90 described species distributed widely in the Old World (MALDONADO CAPRILES 1990, MALIPATIL et al. 2023). Taxonomic studies have been carried out for *Ectomocoris* species in certain areas or countries, such as the Afrotropical Region (VILLIERS 1948), China (HSIAO & REN 1981, CAI & LU 1991), Vietnam (CAI & TOMOKUNI 2004), the West Palearctic Region (PUTSHKOV & MOULET 2009) and Australia

(MALIPATIL et al. 2023). However, there are 45 species currently known from Africa and 30 species from Asia, while comprehensive revisions are still needed for most of them (MALDONADO CAPRILES 1990, LIU et al. 2020c, LIU & CAI 2022). Particularly, due to the relatively high intraspecific morphological variation or the lacking examination of the type specimens in previous studies, some described species may be invalid (COSCARÓN 1997, CHLOND et al. 2017, CHLOND 2018, LIU et al. 2020c, LIU & CAI 2022).

In the present study, two *Ectomocoris* species, *E. cordiger* Stål, 1867 and *E. fenestratus* (Klug, 1830), are redescribed with *E. picturatus* Distant, 1919, syn. nov., and *E. costatus* Miller, 1954, syn. nov., confirmed to be their junior synonyms, respectively, after examining the type specimens deposited in the Natural History Museum, London, UK and the Museum für Naturkunde, Berlin, Germany. Lectotypes of *E. cordiger*, *E. picturatus*, *E. fenestratus* and *Pirates adjunctus* Walker, 1873 are designated. Images of the type specimens and male genitalia as well as the distribution map are also provided for both species.



## Material and methods

The material examined in this study is preserved in the following collections:

|      |  |
|------|--|
| CAU  | China Agricultural University, Beijing, China;       |
| MFN  | Museum für Naturkunde, Berlin, Germany;              |
| NHM  | Natural History Museum, London, United Kingdom;      |
| NHRS | Naturhistoriska Riksmuseet, Stockholm, Sweden;       |
| NMNS | National Museum of Nature and Science, Tokyo, Japan. |

Male genitalia were soaked in hot 20% lactic acid solution for about ten minutes to remove the soft tissue, rinsed in distilled water, then dissected under an Olympus binocular dissecting microscope (Tokyo, Japan). Dissected genitalia were placed in plastic microvials with glycerin and pinned under the corresponding specimens after examination and imaging. Images were all taken by a Canon 7D Mark II digital camera (Tokyo, Japan) with a Canon EF 100 mm or EF 65 mm micro lens. Helicon Focus version 5.3 (Helicon Soft, Kharkiv, Ukraine) was used for image stacking. Measurements (mm) were obtained using a calibrated micrometer. Body length was measured from the apex of the head to the tip of the abdomen in resting position. The distribution map was built using the online version of SimpleMapp (SHORTHOUSE 2010) and the distribution data were based on our examination of museum specimens, supplemented by data from SERVILLE (1831), DE CARLINI (1895), WALKER (1873), DISTANT (1904), and MALDONADO CAPRILES (1990). Morphological terminology mainly follows that of LIU et al. (2020a) and LIU & CAI (2022).

## Taxonomy

### *Ectomocoris cordiger* Stål, 1867

(Figs 1–18)

*Ectomocoris cordiger* Stål, 1867: 256 (original description). Type locality: India.

*Eumerus (Eumerus) cordiger*: STÅL (1874): 62 (new combination).

*Ectomocoris cordiger*: MALDONADO CAPRILES (1990): 352 (catalogue).

*Pirates adjunctus* Walker, 1873: 114 (original description). Type locality: India. Synonymized by DISTANT (1904: 295). **Confirmed synonymy.**

*Ectomocoris picturatus* Distant, 1919: 74 (original description). Type locality: India. **New junior subjective synonym.**

*Ectomocoris picturatus*: MALDONADO CAPRILES (1990): 355 (catalogue).

**Type material examined.** *Ectomocoris cordiger*: LECTOTYPE (present designation), ♀, “Typus” // “Ind. or / bor.” // “Signoret” // “cordiger Stål” // “492 / 83” // “NHRS-GULI / 000000105” (NHRS).

*Pirates adjunctus*: LECTOTYPE (present designation): ♂, “LECTOTYPE” [purple-margined disc] // “Type” [green-margined disc] // “58. / 60.” [blue disc] – “E. Ind” [on reverse] // “67. PIRATES ADJUNCTUS” // “NHMUK 013588460” (NHM). PARALECTOTYPE: 1 ♀, “Ind” // “Saunders. / 65.13.” // “Pirates adjunctus Walker’s Catal.” (NHM).

*Ectomocoris picturatus*: LECTOTYPE (present designation): ♀, “LECTOTYPE” [purple-margined disc] // “Chikkaballapura / S. India. / T. V. Campbell.” // “S. India. / T.N. Campbell. / 1915-60.” // “Ectomocoris / picturatus / type Dist.” // “NHMUK 013588458” (NHM).

**Additional material examined.** **INDIA:** 1 ♂, “South India / T. V. Campbell / Coll. B.M. 1930-599.” (NHM); 1 ♂ 1 ♀, “Calcutta” (NHM); 1 ♀, “India. / Weston Coll.” // “B.M. 1924-199.” (NHM); 5 ♂♂ 5 ♀♀ (1 ♂ dissected), “2010-2014” // “INDIA, Andhra Pradesh / Nellore District / Naidupet mandal / Dwarakapuram village” (CAU). **NEPAL:** 1 ♀, “Hile” // “2070m Dhankuta” // “Nepal Nov. 2” // “1979 / M. Sato leg.” (NMNS).

**Diagnosis.** Macropterous, medium-sized. Blackish brown to black, most parts of antennae and legs yellow, heme-

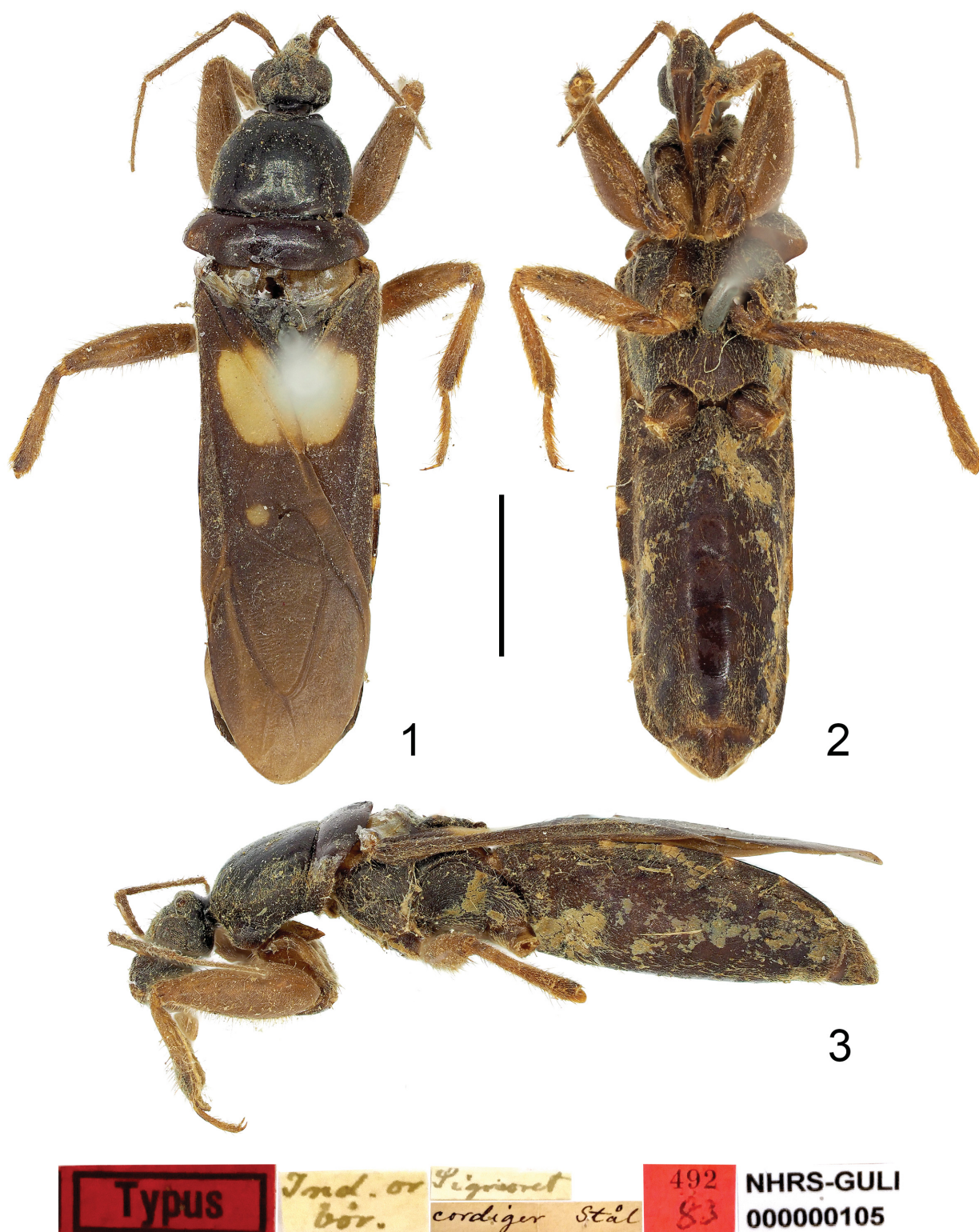
lytron with yellowish white, oval spot involving apical 1/2 to 2/3 of clavus and adjoining area of corium between veins Pcu+1A and Cu, and small, yellowish, round spot in inner cell of membrane. Lateral tubercles of neck tiny; median part of posterior margin of pronotum almost straight, lateral part slightly concave; apex of scutellar process knob-shaped, apex slightly directed obliquely backward in lateral view; protibia with fossula spongiosa occupying over 2/3 of tibial length, mesotibia with fossula spongiosa occupying about 1/2 of tibial length; in male, ventral surface of abdomen carinate in middle, seventh sternite without extragenital process; male genitalia with median pygophore process wavy and gradually tapered to extremely sharp apex in caudal view, blade-shaped, apical 1/3 gradually tapered, basal part with knobbed process in lateral view; apical margin of dorsal phallosclerite nearly straight; lower corner of inner margin of lateral phallosclerite with two sharp processes and lower one extending to venter of phallus.

**Redescription.** Macropterous male (Figs 4–6) and female (Figs 1–3, 7–9) known.

**Coloration** blackish brown to black (Figs 1–9). Antennae yellow; first two visible labial segments dark brown, third segment yellowish brown; coxae and trochanters of legs yellowish brown, tibiae and femora of legs yellow, with most bases and most apices somewhat yellowish brown, tarsi of legs yellow, with apices yellowish brown; hemelytron with yellowish white, oval spot involving apical 1/2 to 2/3 of clavus and adjoining area of corium between veins Pcu+1A and Cu, membrane greyish brown with small, yellowish, round spot in inner cell; basal external corner of each connexival segment with small yellow spot.

**Structure.** Medium-sized. Lateral margins of head and pronotum covered with brown setae; dorsal surface of head, stripes on anterior pronotal lobe, lateral area of posterior pronotal lobe, and lateral area of corium covered with yellowish-white, procumbent, short pubescence; thoracic pleura and abdominal sterna densely covered with yellowish-white, procumbent, short pubescence and golden, relatively long pubescence; legs densely covered with yellowish-white, procumbent pubescence and yellowish-brown, suberect or erect, thick setae of varying lengths, ventral surface of mesofemur also covered with several brown, thick setae.

**Head** moderately elongate, anteocular part about 2.28 times as long as postocular part, postocular part protruding laterally in female (Figs 1, 7); antenna inserted near anterior margin of eye, scape thickest and shortest, last three antennomeres gracile with pedicel longest; first and second visible labial segments thick, third segment noticeably tapered, second segment longest with basal half slightly swollen; eye reniform in lateral view, reaching both upper and lower margins of head in male (Fig. 6), reaching upper margin but not reaching lower margin of head in female (Figs 3, 9); width of interocular space subequal to width of eye in dorsal view in male (Fig. 4), but slightly longer than width of eye in female (Figs 1, 7), with shallow, longitudinal groove in middle; ocelli large, conspicuously raised,

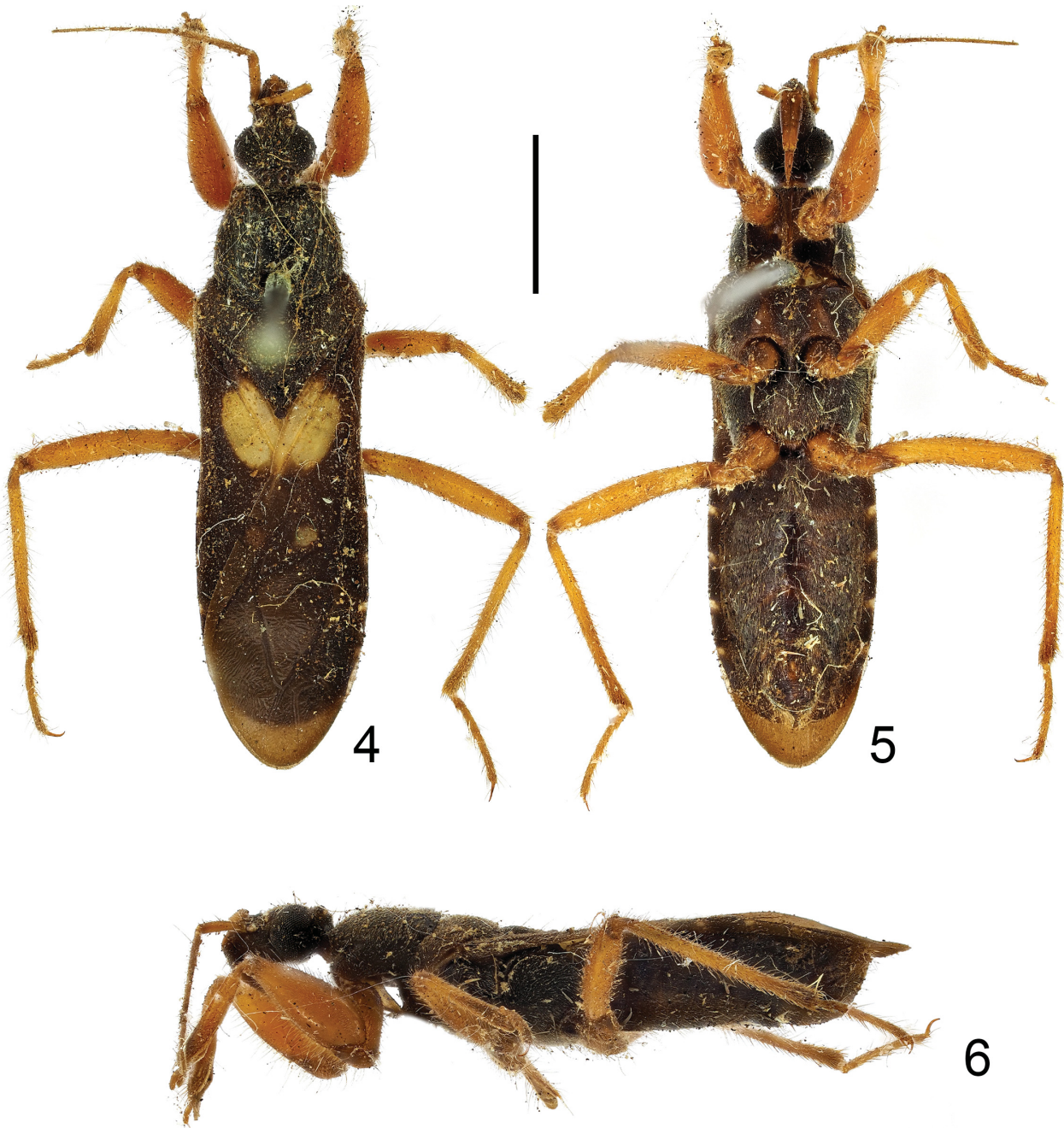


Figs 1–3. *Ectomocoris cordiger* Stål, 1867, lectotype with its labels, female, habitus: 1 – dorsal view; 2 – ventral view; 3 – lateral view. Scale bar = 3.00 mm.

separated from each other by about one width of ocellus; neck short, lateral tubercles of neck tiny.

*Pronotum* with collar process not developed, apex rounded, slightly produced forward; anterior pronotal lobe with thin, shallow, median longitudinal sulcus, stripes distinct and covered with short pubescence; pronotal transverse sulcus deep; median part of posterior margin of pronotum almost straight, lateral part slightly concave, lateral prono-

tal angle round; meso- and metathoracic pleura and sterna finely granulose; mesosternum carinate, metasternum slightly tumid in middle; disc of scutellum flat, Y-shaped ridges robust, apex of scutellar process knob-shaped, apex slightly directed obliquely backward in lateral view. Legs with procoxa long and thick; profemur thickest with distinct thin ridge on ventral surface, mesofemur slightly thicker than metafemur; apices of pro- and mesotibiae extended



67. PIRATES. ADJUNCTUS.



NHMUK 013588460

Figs 4–6. *Pirates adjunctus* Walker, 1873, lectotype with its labels, male, habitus: 4 – dorsal view; 5 – ventral view; 6 – lateral view. Scale bar = 3.00 mm.

into lobe, protibia with fossula spongiosa occupying over 2/3 of tibial length, mesotibia with fossula spongiosa occupying about 1/2 of tibial length. Hemelytron surpassing tip of abdomen in male (Fig. 4), nearly reaching (Fig. 7) to just reaching (Fig. 1) tip of abdomen in female.

*Abdomen* of male oval, width subequal to width of posterior pronotal lobe, ventral surface carinate in middle, seventh sternite without extragenital process; abdomen of female fusiform with connexivum slightly dilated laterally and upturned.

*Male genitalia* with pygophore oval (Fig. 10), median pygophore process wavy and gradually tapered to extremely sharp apex, dorsal surface ridged in middle, slightly oblique to right side in caudal view (Fig. 11), blade shaped, apical 1/3 gradually tapered, basal part with knobbed process in lateral view (Fig. 12); paramere broad, subtriangular with outer margin arcuate, apex of paramere with small mastoid process (Figs 13, 14), left paramere (Fig. 13) longer and straighter than right (Fig. 14); phallus in resting condition (Figs 15–18) with basal plate bridge



7



8



9



Chikkaballapura  
S. India  
T. V. Campbell.

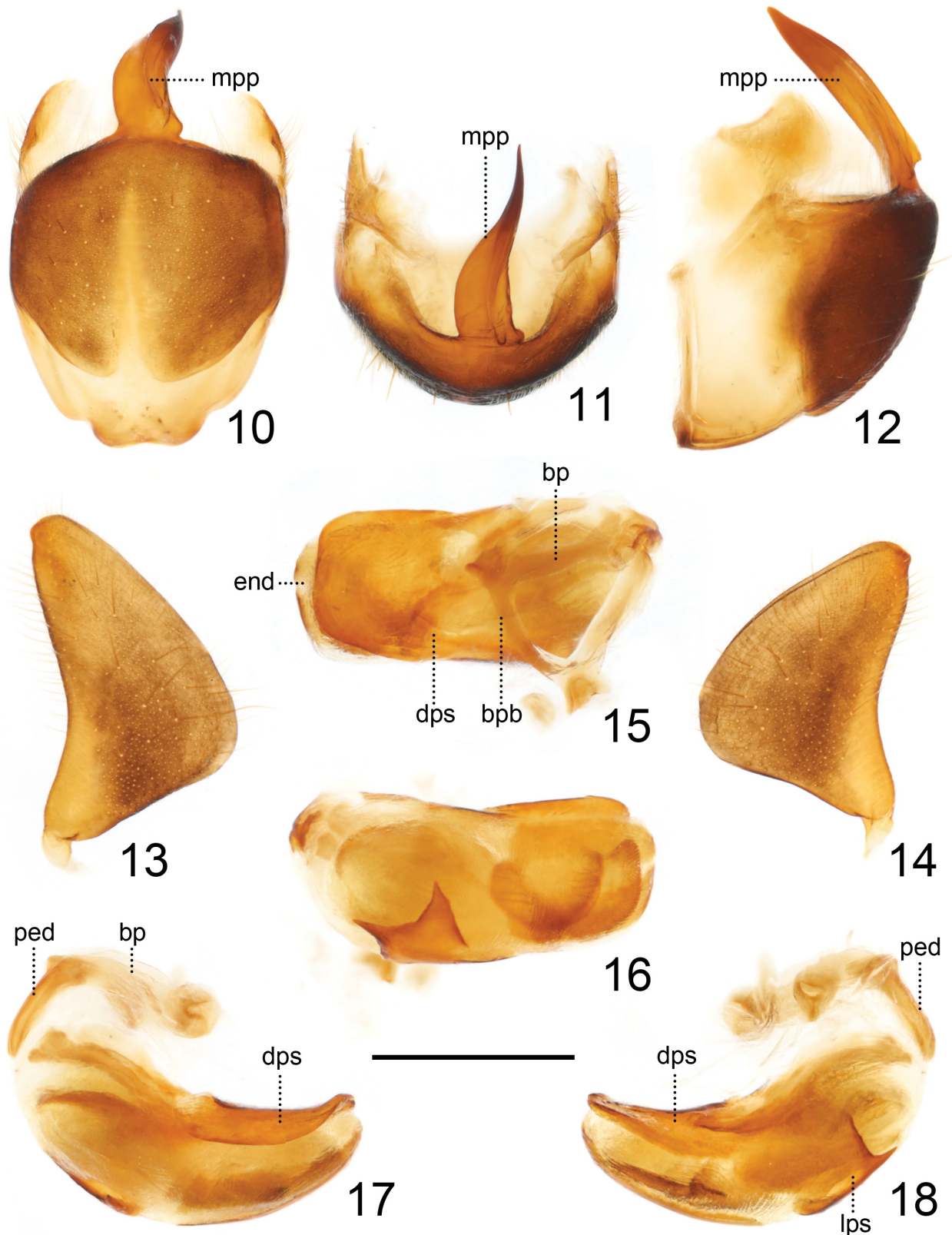
S. India,  
T. N. Campbell.  
1915-60.

*Ectomocoris*  
*picturatus*  
type Dist



NHMMUK 013588458

Figs 7-9. *Ectomocoris picturatus* Distant, 1919, lectotype with its labels, female, habitus: 7 – dorsal view; 8 – ventral view; 9 – lateral view. Blue circle indicates the small, yellowish, round spot in inner cell of membrane. Scale bar = 3.00 mm.



Figs 10–18. Male genitalia of *Ectomocoris cordiger* Stål, 1867, non-type from India: 10–12 – pygophore; 13 – left paramere; 14 – right paramere; 15–18 – phallus. 10, 16 – ventral view; 11 – caudal view; 12, 17, 18 – lateral view; 13, 14 – outer ventrolateral view; 15 – dorsal view. Abbreviations: bp – basal plate; bpb – basal plate bridge; dps – dorsal phallothecal sclerite; end – endosoma; lps – lateral phallothecal sclerite; mpp – median pygophore process; ped – pedicel. Scale bars = 1.00 mm (Figs 10–12), 0.80 mm (Figs 13–18).

slightly shorter than basal plate (Fig. 15); pedicel weakly curved, slightly shorter than basal plate (Figs 17, 18); dorsal phallothecal sclerite broad and strongly sclerotized, subrectangular with apical margin nearly straight (Fig. 15);

lateral phallothecal sclerite strongly sclerotized (Fig. 16), lower corner of inner margin with two sharp processes and lower one extending to venter of phallus (Figs 16, 18).

**Measurements** [in mm, ♂ (n = 3), ♀ (n = 5)]. Body

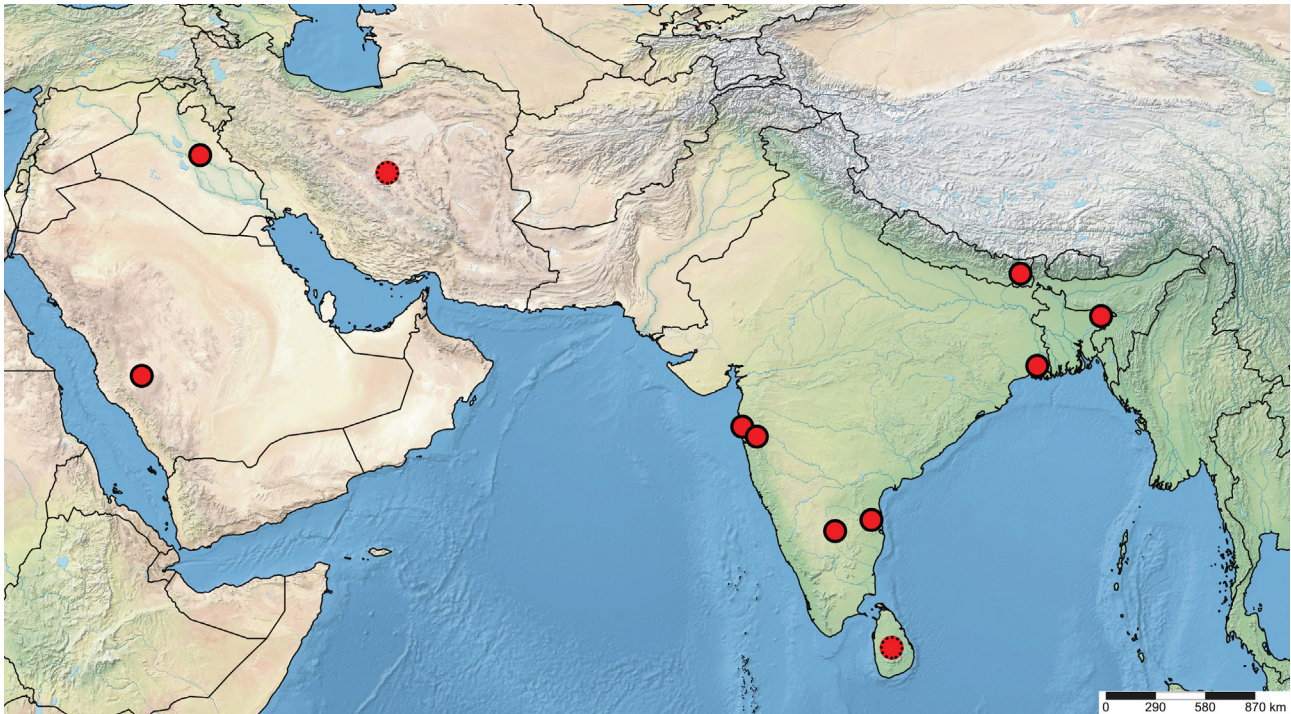


Fig. 19. Distribution map of *Ectomocoris cordiger* Stål, 1867. Symbols with dotted margins indicate inaccurate locations.

length 11.87–13.33 (♂), 13.89–14.88 (♀); maximum width of abdomen 3.21–3.46 (♂), 3.77–3.88 (♀); head length 2.13 (♂), 2.19–2.30 (♀); head width 2.13 (♂), 1.42–1.59 (♀); length of anteocular part 0.91–0.92 (♂), 0.97–0.99 (♀); length of postocular part 0.38–0.39 (♂), 0.41–0.48 (♀); width of eye 0.49–0.51 (♂), 0.42–0.51 (♀); width of interocular space 0.50 (♂), 0.56–0.58 (♀); distance between ocelli 0.26–0.28 (♂), 0.22–0.27 (♀); lengths of antennomeres I : II : III : IV = 0.17 : 2.18 : 1.72 : ? (♂), 1.03–1.12 : 1.99 : 1.70 : ? (♀); lengths of labial segments I : II : III = 0.70–0.71 : 1.19–1.25 : 0.61 (♂), 0.74–0.75 : 1.26–1.30 : 0.71–0.73 (♀); length of anterior pronotal lobe 2.15–2.29 (♂), 2.16–2.38 (♀); length of posterior pronotal lobe 0.89–0.99 (♂), 1.02–1.10 (♀); width of anterior pronotal lobe 2.33–2.51 (♂), 2.53–2.80 (♀); width of posterior pronotal lobe 3.16–3.28 (♂), 3.22–3.59 (♀); length of scutellum 1.11–1.18 (♂), 1.20–1.61 (♀); maximum width of scutellum 1.28–1.30 (♂), 1.45–1.92 (♀); length of hemelytron 8.48–8.80 (♂), 8.30–9.39 (♀).

**Distribution** (Fig. 19). Bangladesh (DISTANT 1904), India (WALKER 1873, DISTANT 1904), Iran (GHAHARI et al. 2024), Iraq (CHINA 1938), Nepal (WALKER 1873), Saudi Arabia (LINNAVUORI 1986), Sri Lanka (DISTANT 1904).

**Comments on synonyms.** STÅL (1867) described *Ectomocoris cordiger* based on the female type (Figs 1–3) collected from India. DISTANT (1904) synonymized the Indian species, *Pirates adjunctus* Walker, 1873, with *E. cordiger*. He noticed one important diagnostic character of this species, i.e., “a small spot on outer area of basal cell to membrane, luteous” (STÅL 1867, DISTANT 1904). We examined two type specimens of *P. adjunctus* deposited in NHM with the male one designated here as the lectotype (Figs 4–6), and further confirmed the synonymy proposed

by DISTANT (1904).

Later, DISTANT (1919) described another Indian species, *E. picturatus*, without any comparison with *E. cordiger* and did not mention the characteristic small yellowish spot in the description, which might be the reason why he treated it as a different species. After examining the type specimen of *E. picturatus* (Figs 7–9) deposited in NHM, we found that there is also a small yellowish spot in the inner cell of the membrane, but it is indeed obscure due to the colour fading of the type specimen (Fig. 7, in blue circle). Besides, we cannot find any other valuable and stable morphological characters to distinguish the type specimens of *E. cordiger* and *E. picturatus*, thus *E. picturatus* should be regarded as a junior subjective synonym of *E. cordiger*.

### *Ectomocoris fenestratus* (Klug, 1830)

(Figs 20–36)

*Reduvius fenestratus* Klug, 1830: 19 (original description). Type locality: Ambukohl, Dongalae [now Ambikal, Dongola, Sudan].

*Pirates fenestratus*: BURMEISTER (1835): 239 (new combination).

*Ectomocoris fenestratus*: STÅL (1867): 257 (new combination); MALDONADO CAPRILES (1990): 352 (catalogue).

*Reduvius (Eumenes)* [sic] *fenestratus*: WALKER (1873): 110 (incorrect record of the original name).

*Eumerus (Eumerus) fenestratus*: STÅL (1874): 62 (new combination).

*Pirates (Eumerus) fenestratus*: DE CARLINI (1895): 118 (new combination).

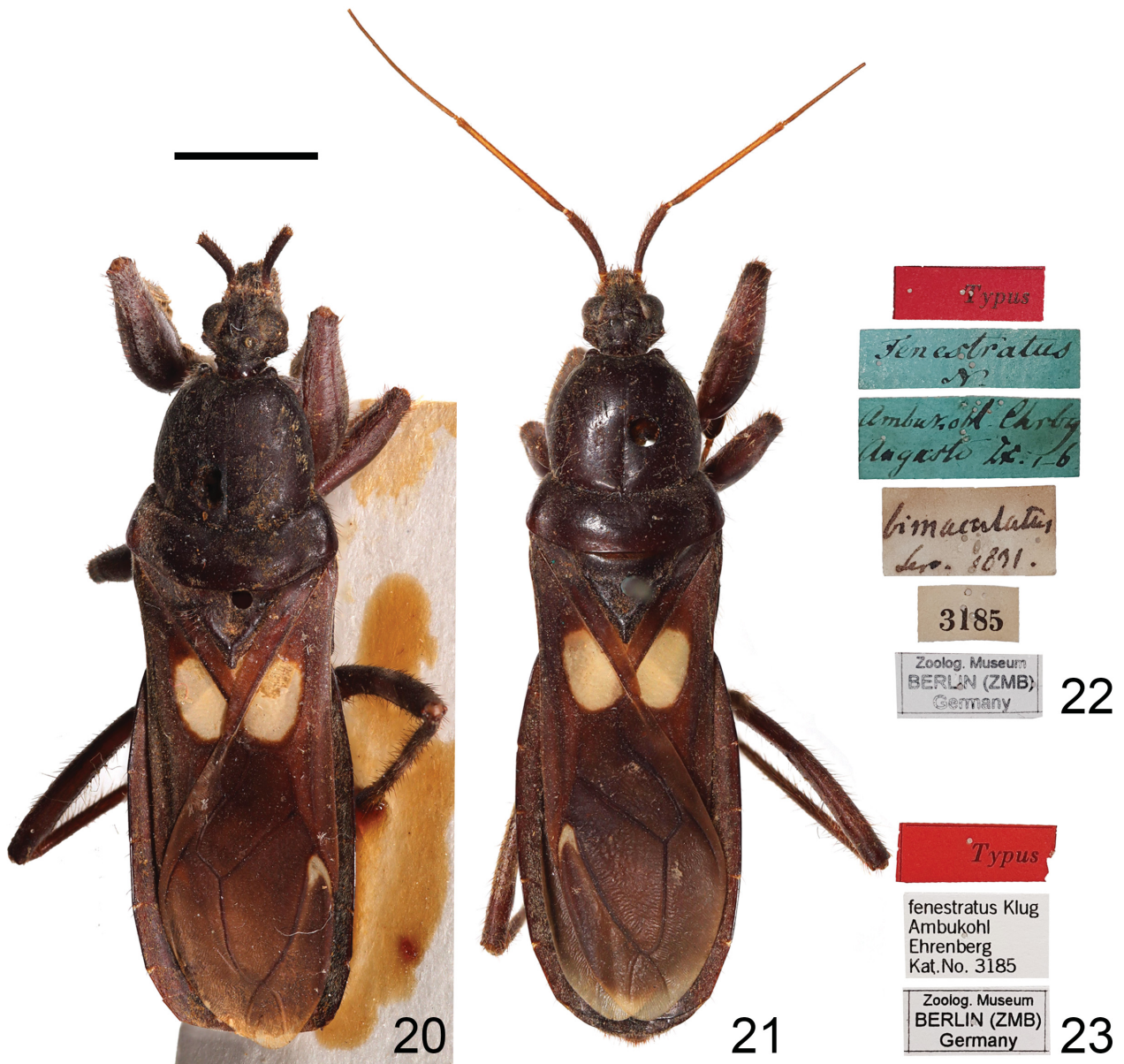
*Peirates bimaculatus* Serville, 1831: 218 (original description). Type locality: Senegal. Synonymized by STÅL (1867: 258).

*Pirates bimaculatus*: AMYOT & SERVILLE (1843): 324 (redescription).

*Ectomocoris costatus* Miller, 1954: 404 (original description). Type locality: Yemen. **New junior subjective synonym.**

*Ectomocoris costatus*: MALDONADO CAPRILES (1990): 352 (catalogue).

**Type material examined.** *Reduvius fenestratus*: LECTOTYPE (present designation): ♂, SUDAN: “Typus” // “fenestratus / n.” // “Ambukohl



Figs 20–23. *Reduvius fenestratus* Klug, 1830, types, habitus: 20 – lectotype, male, dorsal view; 21 – paralectotype, female, dorsal view; 22 – labels of lectotype; 23 – labels of paralectotype. Scale bar = 4.00 mm.

Lhrby / Augusto No. (?) 1–6” // “bimaculatus / Ser. 1831.” // “3185” // “Zoolog. Museum / BERLIN (ZMB) / Germany” (MFN). PARALECTOTYPES: 2 ♀♀, “Typus” // “fenestratus Klug / Ambukohl / Ehrenberg / Kat. No. 3185” // “Zoolog. Museum / BERLIN (ZMB) / Germany” (MFN). We only examined the images of the types of *E. fenestratus* that were kindly shared by Jürgen Deckert.

*Ectomocoris costatus*: HOLOTYPE: ♂, YEMEN: “Holotype” [red-margined disc] // “Type” [red-margined disc] // “YEMEN, / 1 mile W. of Ta’izz, / On road to / Mocha, ca. 4,500 ft., / 20. xii. 1937.” // “Taken in Mosque / by pool.” // “B.M. Exp. To / S. W. Arabia. / H.Scott & / E.B.Britton. / B.M.1938 246.” // “Ectomocoris / costatus sp. n. / N.C.E. Miller det. 1951.” // “NHMUK 013588384” (NHM). PARATYPE: 1 ♀, SAUDI ARABIA: “ARABIA: Wadi Amq, / II. ii. 1937 / H. St. J. B. Philby. / B. M. 1937 228.” // “Ectomocoris / costatus sp. n. / N.C.E. Miller det. 1951.” // “NHMUK 013588385” (NHM).

**Additional material examined.** UGANDA: 1 ♂ (dissected), “Uganda Prot” // “C.S. Betton. / 1902-146.” (NHM). SPAIN: CANARY ISLANDS: 1 ♂, “Canary Is. / T.V. Wollaston. / 69-85” (NHM).

**Diagnosis.** Macropterous, medium to large-sized species. Black, hemelytron with yellow, oval spot between veins

Pcu+1A and Cu on corium, membrane with thin, yellowish, obscure stripe along outer margin of vein M, membrane also with small, yellow, subtriangular spot at base of veins R and M, but sometimes absent in certain individuals (e.g. holotype of *E. costatus*, Fig. 24). Lateral tubercles of neck distinct, surface of tubercle with some tiny granules; posterior margin of pronotum arcuate; surface of scutellum rough, scutellar process short, horizontal or apex weakly directed obliquely backward in lateral view; protibia with fossula spongiosa occupying about 2/3 of tibial length, mesotibia with fossula spongiosa occupying over 1/2 of tibial length; hemelytron almost reaching but not surpassing tip of abdomen; in male, ventral surface of abdomen flat in middle without carina, seventh sternite without extragenital process; male genitalia with median pygophore process long, spine-shaped, dorsal surface ridged in middle with pair of pointed knobs near base in caudal view, blade-shaped with inner margin almost straight, apical 1/3 gradually



YEMEN,  
1 mile W. of Ta'izz,  
On road to  
Mocha, ca. 4,500 ft.,  
20.xii.1937.

Taken in Mosque  
by Poolo.

B.M. Exp. to  
S.W. Arabia.  
H. Scott &  
E.B. Britton.  
B.M. 1938-246.

*Ectomocoris*  
*costatus* sp. n.  
N.C.E. Miller det. 1951



NHMUK 013588384

Figs 24–27. *Ectomocoris costatus* Miller, 1954, holotype with its labels, male, habitus: 24 – dorsal view; 25 – male genitalia; 26 – ventral view; 27 – lateral view. Scale bar = 3.00 mm.

tapered to sharp apex in lateral view; apical margin of dorsal phallosclerite rounded; inner margin of lateral phallosclerite with many small, sharp processes and also extending to venter of phallus.

**Redescription.** Macropterous male (Figs 20, 24, 26, 27) and female (Fig. 21).

**Coloration** black (Figs 20, 21, 24–27). Second to fourth antennomeres, third visible labial segment and tarsi of legs

brown; hemelytron with yellow, oval spot between veins  $Pcu+1A$  and  $Cu$  on corium, membrane with thin, yellowish, obscure stripe along outer margin of vein  $M$  (Figs 20, 21, 24), membrane also with small, yellow, subtriangular spot at base of veins  $R$  and  $M$  (Figs 20, 21), but sometimes absent in certain individuals (e.g., holotype of *E. costatus*, Fig. 24), apical part of membrane pale brown.

**Structure.** Medium to large-sized, robust. Most of body covered with blackish, thick setae of varying lengths; dorsal surface of head and thoracic pleura densely covered with whitish, procumbent, short pubescence; apical parts of tibiae and tarsi also covered with brown setae.

**Head** distinctly elongate, anteocular part about three times as long as postocular part, postocular part protruding laterally; antenna inserted near anterior margin of eye, scape thickest and shortest, last three antennomeres gracile and tapered; first and second visible labial segments thick, third segment noticeably tapered and slightly shorter than first, second segment longest with basal half slightly swollen; eye reniform in lateral view, reaching upper margin but not reaching lower margin of head; width of interocular space longer than width of eye in dorsal view, with shallow, longitudinal groove in middle and small pit at base; ocelli large, conspicuously raised, separated from each other by more than one width of ocellus; lateral tubercles of neck distinct, surface of tubercle with some tiny granules.

**Pronotum** with collar process developed, apex rounded, produced forward; anterior pronotal lobe with thin, shallow, median longitudinal sulcus, stripes distinct and covered with whitish, short pubescence; pronotal transverse sulcus deep and with some longitudinal wrinkles; posterior margin of pronotum arcuate, lateral pronotal angle round; meso- and metathoracic pleura and sterna finely granulate; mesosternum carinate, metasternum slightly tumid and with several transverse wrinkles near base; surface of scutellum rough, disc of scutellum almost flat, Y-shaped ridges distinct, scutellar process short, horizontal or apex weakly directed obliquely backward in lateral view. Legs with procoxa long and thick; profemur thickest with distinct thin ridge on ventral surface, mesofemur slightly thicker than metafemur; apices of pro- and mesotibiae extended into lobe, protibia with fossula spongiosa occupying about 2/3 of tibial length, mesotibia with fossula spongiosa occupying over 1/2 of tibial length. Hemelytron almost reaching but not surpassing tip of abdomen.

**Abdomen** of male oval, width subequal to width of posterior pronotal lobe (Fig. 24) or slightly wider than width of posterior pronotal lobe (Fig. 20), ventral surface flat in middle, without carina, seventh sternite without extragenital process (Fig. 26); abdomen of female fusiform and distinctly wider than width of posterior pronotal lobe (Fig. 21).

**Male genitalia** with pygophore oval and strongly sclerotized (Fig. 28), median pygophore process long, spine-shaped and gradually tapered to apex, dorsal surface ridged in middle with pair of pointed knobs near base (also visible from lateral view, Fig. 30), oblique to right side in caudal view (Fig. 29), blade shaped with inner margin almost straight, apical 1/3 gradually tapered to sharp apex

in lateral view (Fig. 30); paramere broad, subtriangular with outer margin arcuate, apex of paramere almost round (Figs 31, 32), left paramere (Fig. 31) slightly longer and less curved than right (Fig. 32); phallus in resting condition (Figs 33–36) with basal plate bridge shorter than basal plate (Fig. 33); pedicel slightly curved, distinctly shorter than basal plate (Figs 35, 36); dorsal phallosclerite broad and strongly sclerotized, apical margin rounded (Fig. 33); lateral phallosclerite strongly sclerotized (Fig. 36), inner margin with many small, sharp processes and also extending to venter of phallus (Figs 34, 36).

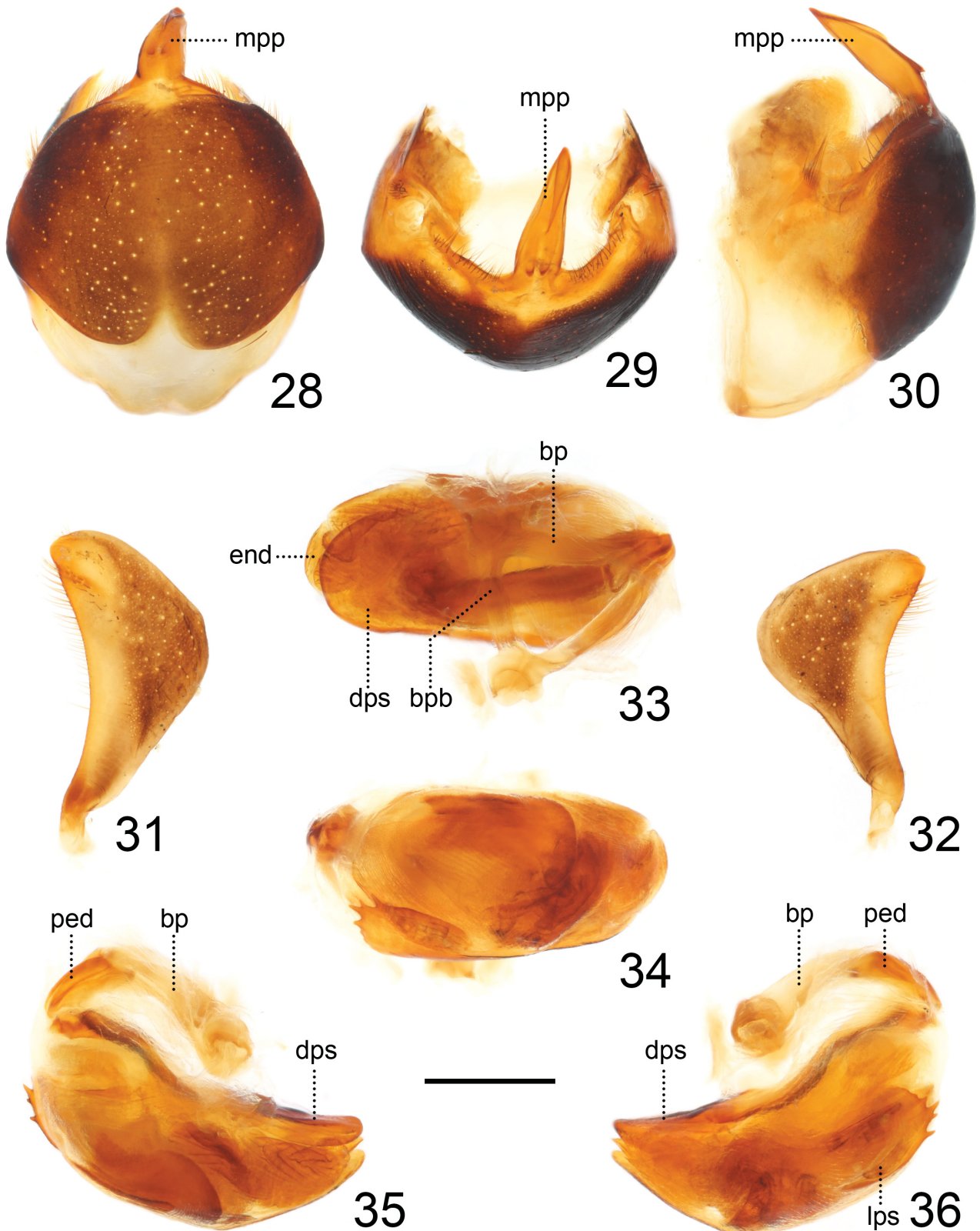
**Measurements** [in mm, ♂ (n = 3), ♀ (n = 1)]. Body length 17.82–20.48 (♂), 22.05 (♀); maximum width of abdomen 4.80–5.71 (♂), 6.11 (♀); head length 2.89–3.30 (♂), 3.28 (♀); head width 1.91–2.16 (♂), 2.13 (♀); length of anteocular part 1.39–1.70 (♂), 1.65 (♀); length of postocular part 0.38–0.51 (♂), 0.61 (♀); width of eye 0.60–0.62 (♂), 0.68 (♀); width of interocular space 0.70–0.81 (♂), 0.89 (♀); distance between ocelli 0.31–0.36 (♂), 0.40 (♀); lengths of antennomeres I : II : III : IV = 1.53–1.87 : 3.00–3.55 : ? : ? (♂), 1.95 : 3.68 : 4.65 : ? (♀); lengths of labial segments I : II : III = 0.99–1.19 : 1.54–2.11 : 0.91–0.91 (♂), 1.22 : 2.06 : 1.00 (♀); length of anterior pronotal lobe 3.32–3.91 (♂), 3.90 (♀); length of posterior pronotal lobe 1.35–1.48 (♂), 1.54 (♀); width of anterior pronotal lobe 3.59–4.22 (♂), 4.29 (♀); width of posterior pronotal lobe 4.59–5.37 (♂), 5.30 (♀); length of scutellum 1.72–2.16 (♂), 2.33 (♀); maximum width of scutellum 2.48–3.00 (♂), 2.98 (♀); length of hemelytron 11.06–12.69 (♂), 13.15 (♀).

**Distribution** (Fig. 37). Cape Verde (LINDBERG 1959), “Congo” (WALKER 1873), Egypt (DISPONS 1961), Ethiopia (DE CARLINI 1895, MANCINI 1939), Ghana (VILLIERS 1948, as Togo: Kete-Kratji [= Kete Krachi]), Libya (DISPONS 1961), Mali (VILLIERS 1948, as Sudan: Tombouctou and Niger: Ansongo), Mauritania (VILLIERS 1948), Saudi Arabia (CHINA 1938; MILLER 1954, as *E. costatus*), Senegal (SERVILLE 1831, VILLIERS 1971), Sierra Leone (WALKER 1873), Somalia (LINNAVUORI 1982), South Sudan (LINNAVUORI 1974), ? Spain (Canary Islands) (OSHANIN 1912; LINDBERG 1936, 1953), Sudan (KLUG 1830, LINNAVUORI 1974), Uganda (CHINA 1938, no exact record; confirmed record), Yemen (MILLER 1954, as *E. costatus*).

*Ectomocoris fenestratus* was recorded from the Canary Islands by OSHANIN (1912) and LINDBERG (1936, 1953), but the records were considered misidentifications of *E. ululans* (Rossi, 1790) by HEISS & BÁEZ (1990). Its occurrence in the archipelago was not confirmed later (e.g., PUTSHKOV & MOULET 2009, ROCA-CUSACHS et al. 2020). The specimen examined in this study may be mislabeled.

**Comments on synonyms.** *Ectomocoris fenestratus* was originally described by KLUG (1830) as *Reduvius fenestratus* based on specimens collected from Sudan. According to previous studies (SERVILLE 1831, WALKER 1873, DE CARLINI 1895, MALDONADO CAPRILES 1990), this species has a broad distribution in northern half of Africa.

MILLER (1954) described *E. costatus* based on specimens from Yemen and Saudi Arabia, and discussed the differences between *E. costatus* and *E. fenestratus* as follows:



Figs 28–36. Male genitalia of *Ectomocoris fenestratus* (Klug, 1830), non-type from Uganda: 28–30 – pygophore; 31 – left paramere; 32 – right paramere; 33–36 – phallus. 28, 34 – ventral view; 29 – caudal view; 30, 35, 36 – lateral view; 31, 32 – outer ventrolateral view; 33 – dorsal view. Abbreviations: bp – basal plate; bpb – basal plate bridge; dps – dorsal phallosclerite; end – endosoma; lps – lateral phallosclerite; mpp – median pygophore process; ped – pedicel. Scale bars = 1.00 mm (Figs 28–30), 0.80 mm (Figs 31–36).

[*E. costatus*] “Differs in its smaller size and its colour, in the shape of the spot on the corium and the absence of a small triangular yellowish spot on the costa. Structurally, the chief differences are (i) the shape of the scutellum,

which is relatively wider and is more strongly depressed, and (ii) that the pleura are more finely shagreened, and (iii) the genitalia are of different form”. However, after our examination of the type specimens of both species and

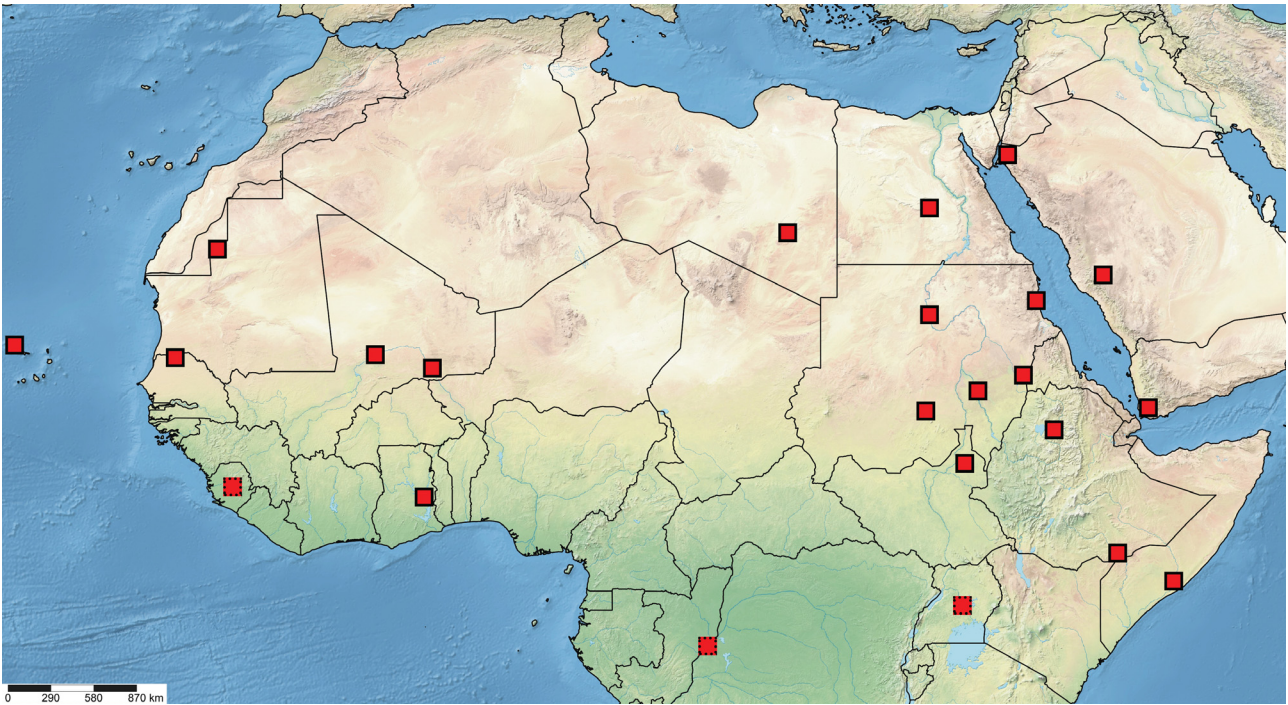


Fig. 37. Distribution map of *Ectomocoris fenestratus* (Klug, 1830). Symbols with dotted margins indicate inaccurate locations.

other materials, we found that the characters proposed by MILLER (1954) to distinguish these two species correspond merely to intraspecific morphological variation.

Firstly, as for the body size, we measured the distance between the apex of the head and the tip of the abdomen for the examined specimens, and this length ranges from 17.82 to 22.05 mm, so the body lengths indicated by MILLER (1954), 19.00 mm for male, 20.50 mm for female, are within the usual intraspecific range.

As for colour differences, it is true that types of *E. costatus* have a smaller yellow spot on corium (Fig. 24) compared to the types of *E. fenestratus* (Figs 20, 21), and they lack the small, yellow, subtriangular spot at the base of the veins R and M on the membrane (Fig. 24), which is a more obvious difference. But among the examined specimens, the shape of the yellow spot on the corium varies, and the depth of colour of the small, subtriangular spot on the membrane also varies so much that it could be very inconspicuous in some individuals.

Concerning the structural differences, the characters of scutellum and integument of pleura (see MILLER 1954) are unquantifiable and indistinctive when examining the specimens. Also, we dissected the male genitalia of the specimen with the small, yellow, subtriangular spot on the membrane conspicuous (Figs 28–36). The shape of the median pygophore process well matches MILLER's (1954: 404, figs 8E, F) illustrations of the median pygophore process of *E. costatus*, which further confirms that *E. fenestratus* and *E. costatus* could be the same species and the differences in colour pattern are unstable characters that vary among conspecific individuals.

Besides, the type localities (Yemen and Saudi Arabia) of *E. costatus* are close to the known distribution of *E. fenestratus* (Fig. 37). Therefore, we conclude that *E. costatus* should be regarded as a junior subjective synonym of *E. fenestratus*.

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