



***Copelatus* Erichson, 1832 from Maharashtra, India, with description of three new species and notes on other taxa of the genus (Coleoptera: Dytiscidae: Copelatinae)**

SAYALI D. SHETH¹, HEMANT V. GHATE² & JIŘÍ HÁJEK^{3,4}

¹Annasaheb Kulkarni Department of Biodiversity, Abasaheb Garware College, Pune-4, Maharashtra, India.

E-mail: saylisheth@gmail.com

²Department of Zoology, Modern college, Shivajinagar, Pune -5, Maharashtra, India. E-mail: hemantghate@gmail.com

³Department of Entomology, National Museum, Cirkusová 1740, CZ-193 00 Praha 9–Horní Počernice, Czech Republic.

E-mail: jiri_hajek@nm.cz

⁴Corresponding author

Abstract

The *Copelatus* species occurring in Maharashtra State, India, are reviewed. Altogether, nine species are recorded, three of which are described as new: *Copelatus deccanensis* **sp. nov.** (*C. nigrolineatus* species group), *C. maushomi* **sp. nov.** (*C. consors* group) and *C. bezdeki* **sp. nov.** (*C. irinus* group). Habitus and male genitalia are illustrated for all *Copelatus* species from Maharashtra, a key to the species and distribution maps are presented. New distributional records along with short diagnoses of already known species are provided. In addition, the study of extensive material of *Copelatus* species from the Indian subcontinent outside Maharashtra revealed the following new synonymies: *Copelatus freudei* Guignot, 1955 = *C. gibsoni* Vazirani, 1974 **syn. nov.** = *C. gibsoni* Vazirani, 1975 **syn. nov.** = *C. spangleri* Vazirani, 1974 **syn. nov.** = *C. spangleri* Vazirani, 1975 **syn. nov.**; *Copelatus oblitus* Sharp, 1882 = *C. karnatakus* Holmen & Vazirani, 1990 **syn. nov.**; *C. sociennus* J. Balfour-Browne, 1952 = *C. bangalorensis* Vazirani, 1970 **syn. nov.**; *Copelatus tenebrosus* Régimbart, 1880 = *C. ceylonicus* Vazirani, 1969 **syn. nov.** = *C. assamensis* Vazirani, 1970 **syn. nov.**

Key words: Dytiscidae, Copelatinae, Oriental Region, India, Maharashtra State, Western Ghats, taxonomy, new species, new synonyms, new records

Introduction

Copelatinae represents a hyper-diverse subfamily of the predaceous diving beetles or Dytiscidae, with the most species-rich, pantropical genus *Copelatus* Erichson, 1832 containing up to now 439 described species (Balke *et al.* 2004, Nilsson & Hájek 2018). Members of the genus inhabit a large variety of water bodies, typically temporary puddles and small stagnant pools, or side pools of streams and rivers; a few species are also known to occur in more specialised habitats: bromeliad phytotelmata (Balke *et al.* 2008) and pools inside caves (Caetano *et al.* 2013). In particular, the species associated with running water show a high level of regional endemism (Balke *et al.* 2004).

Most *Copelatus* species are characterised by elytra with a varying number of longitudinal striae—the character used for grouping the species into informal species groups (Sharp 1882, Guignot 1961, Guéorguiev 1968). Although the species groups do not represent monophyletic units (Balke *et al.* 2004), and variability of elytral striation has recently been repeatedly reported in many *Copelatus* species (e.g. Hájek *et al.* 2018, Manuel *et al.* 2018), the groups are still largely in use as a practical tool for orientation within this speciose genus.

Ghosh & Nilsson (2012) listed 22 *Copelatus* species from India, and two additional species from Kerala were recently described by Manivannan & Madani (2011), and Wewalka (2017) respectively. However, *Copelatus schuhi* Hendrich & Balke, 1998 is the only species so far described and recorded from the Maharashtra State. The study of museum specimens, as well as the recently collected material during an extensive water beetle survey revealed an additional eight species, three of which represent so far unknown taxa formally described below.

Illustrations and a key to all species are presented, to facilitate the identification of the species. In addition, a thorough revision of Indian *Copelatus* material, including several type specimens, uncovered the synonymy of some names, which we present here in purpose to clarify the taxonomy of the group.

Material and methods

Maharashtra water beetle survey. The survey was realised by visiting more than a hundred localities in western Maharashtra during 2013–2017. Western Maharashtra includes the northern part of the Western Ghats and Konkan region; the Western Ghats or Sahyadri Mountains are the western edge of the Deccan plateau (Mani 1974). The study area for present work ranges between 15°40'–20°00'N and 73°30'–74°10'E which encompasses a narrow strip of over 400 km stretching across western Maharashtra. Different types of freshwater habitats, i.e. lentic (pools, ponds, tanks, reservoirs) and lotic (slow flowing streams and drying rivers), were visited during the survey. The specimens were collected using pond nets (mesh 1 mm) with telescopic handles, and preserved in absolute alcohol. The specimens were subsequently examined under a Leica M3Z stereomicroscope.

Museum material. Museum material was examined using an Olympus SZX12 stereomicroscope. Habitus photographs were taken using a Canon MP-E 65mm f/2.8 macro lens with 5:1 optical magnification on bellows attached to a Canon EOS 550D camera. Male genitalia were illustrated wet, in temporary glycerine mounts using an Olympus BX41 transmitted light microscope with Canon DS126291 attachment. The genitalia were subsequently washed in distilled water and mounted in DMHF on the same card as the beetle. Images of the same specimen/structure at different focal planes were combined using Helicon Focus 5.1.19 software. The images were subsequently edited in Photoshop CS3. The plates were compiled in CorelDraw X5.

Measurements were taken with an ocular graticule. The following abbreviations were used in the descriptions: **TL**—total length of body, a single measurement of length from front of head to apex of elytra; **TL-h**—total length without head length, length of body from anterior margin of pronotum to apex of elytra; **MW**—maximum width of body. The terminology to denote the orientation of the genitalia follows Miller & Nilsson (2003).

Exact label data are cited and given in quotation marks for the type material. Authors' additional remarks are provided in square brackets; [p]—preceding data are printed, [hw]—preceding data are handwritten. Separate label lines are indicated by a slash (/), separate labels by a double slash (/). The locality coordinates were supplemented using Google Earth®. The species distribution maps were prepared in QGIS freeware (version 2.18.5, <http://www.qgis.org/en/site/forusers/download.html>) and edited in CorelDraw X5.

The specimens included in this study are deposited in the following collections:

BMNH	The Natural History Museum [formerly British Museum (Natural History)], London, United Kingdom
GWCV	Günther Wewalka collection, Vienna, Austria
HVGC	Hemant Vasant Ghate collection, Pune, India
JSCL	Jaroslav Štátný collection, Liberec, Czech Republic
LHCM	Lars Hendrich collection, Munich, Germany (property of NHMW)
NHMB	Naturhistorisches Museum Basel, Switzerland
NHMW	Naturhistorisches Museum Wien, Vienna, Austria
NMPC	National Museum, Prague, Czech Republic
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany
USNM	Smithsonian Institutions, National Museum of Natural History, Washington, USA
UWPC	University of Wroclaw, Poland
ZMFK	Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany
ZMUC	Zoological Museum, University of Copenhagen, Denmark
ZSMG	Zoologische Staatssammlung München, Munich, Germany

Taxonomic account of *Copelatus* from Maharashtra

Copelatus nigrolineatus species group

Copelatus deccanensis sp. nov.

(Figs 1–2, 17–18)

Type locality. India, Maharashtra, Pune district, ca. 4 km SSW of Lonavala village, Bhushi dam, 18°43.2–4'N, 73°23.7–24.0'E, ca. 640 m a.s.l.

Type material. Holotype ♂ (NMPC), labelled: "INDIA W, 24.–28.ix.2005, / Maharashtra st., 4 km S of / Lonavala, Bhushi dam env., / 500 m, J.Bezdék leg. [printed] // HOLOTYPE / *COPELATUS* / *deccanensis* sp. nov. / S. Sheth *et al.* det. 2016 [red label, printed]". Paratypes: 14♂, 13♀, same label data as holotype (BMNH, JSCL, NHMW, NMPC, UWPC, ZSMG); 10♂, 10♀, labelled: "INDIA occ. Maharashtra st. / Bhushi Dam env.24–28.ix. / 4 km S of Lonavala 2005 / leg.F.&L.Kantner 500 m [printed]" (NMPC, SMNS); 1♂, 1♀, labelled: "INDIA W, 7.–11.x.2005 / Maharashtra state, / 40 km W of Pune, / Mulshi env. / J. Bezdék leg. [printed]" (NMPC); 1♂, 2♀, labelled: "INDIA, Maharashtra / Pune Distr., Mulshi at / Mulshi Lake, 7–8 X 2005 / at light, leg. L. Borowiec [printed]" (NMPC); 3♀, labelled: "INDIA occ., 7–11.x.2005 / Maharashtra state / MULSHI env.F.Kantner leg. / 40 km W of Pune [printed]" (SMNS); 1♀, labelled: "India / Maharashtra st., / Tamhini, Kalubai Mandir / 18°27'38.95"N, 73°24'41.89"E, 570m / 27.VIII.2013 / coll. S. D. Sheth [printed]" (HVGC); 4♂, 7♀, labelled: "India / Maharashtra st., / Tamhini, 18°26'41.50"N, 73°25'39.72"E, 625m / 29.X.2014 / coll. S. D. Sheth [printed]" (HVGC); 2♂, 1♀, labelled: "INDIA, Maharashtra / TAMHINI / 18°23'54.6"N 73°23'47.3"E / 29.x.2014 [printed]" (HVGC); 1♂, 1♀, labelled: "India / Maharashtra st., / Tamhini, Dongerwadi stream / 18°27'38.95"N, 73°24'41.89"E, 570m / 1.X.2015 / coll. S. D. Sheth [printed]" (HVGC); 7♂, 6♀, labelled: "India / Maharashtra st., / Harishchandragad fort / 19°23'26.37"N, 73°46'15.09"E, 1213m / 20.X.2013 / S.D. Sheth leg. [printed]" (HVGC, NMPC); 4♂, 5♀, labelled: "India / Maharashtra st., / Alanggad fort / 19°34'59.88"N, 73°39'39.26"E, 1175m / 9.I.2014 / coll. N. Modak [printed]" (HVGC); 2♂, 2♀, labelled: "India / Maharashtra st., / Madangad fort / 19°35'23.48"N, 73°38'57.63"E, 1151m / 10.I.2014 / coll. N. Modak [printed]" (HVGC); Each paratype provided with the respective red printed label.

Description of male holotype. *Habitus* (Fig. 1) elongate oblong oval, nearly parallel sided with continuous outline, broadest in 1/3 of elytral length, slightly convex. Dorsal surface shiny.

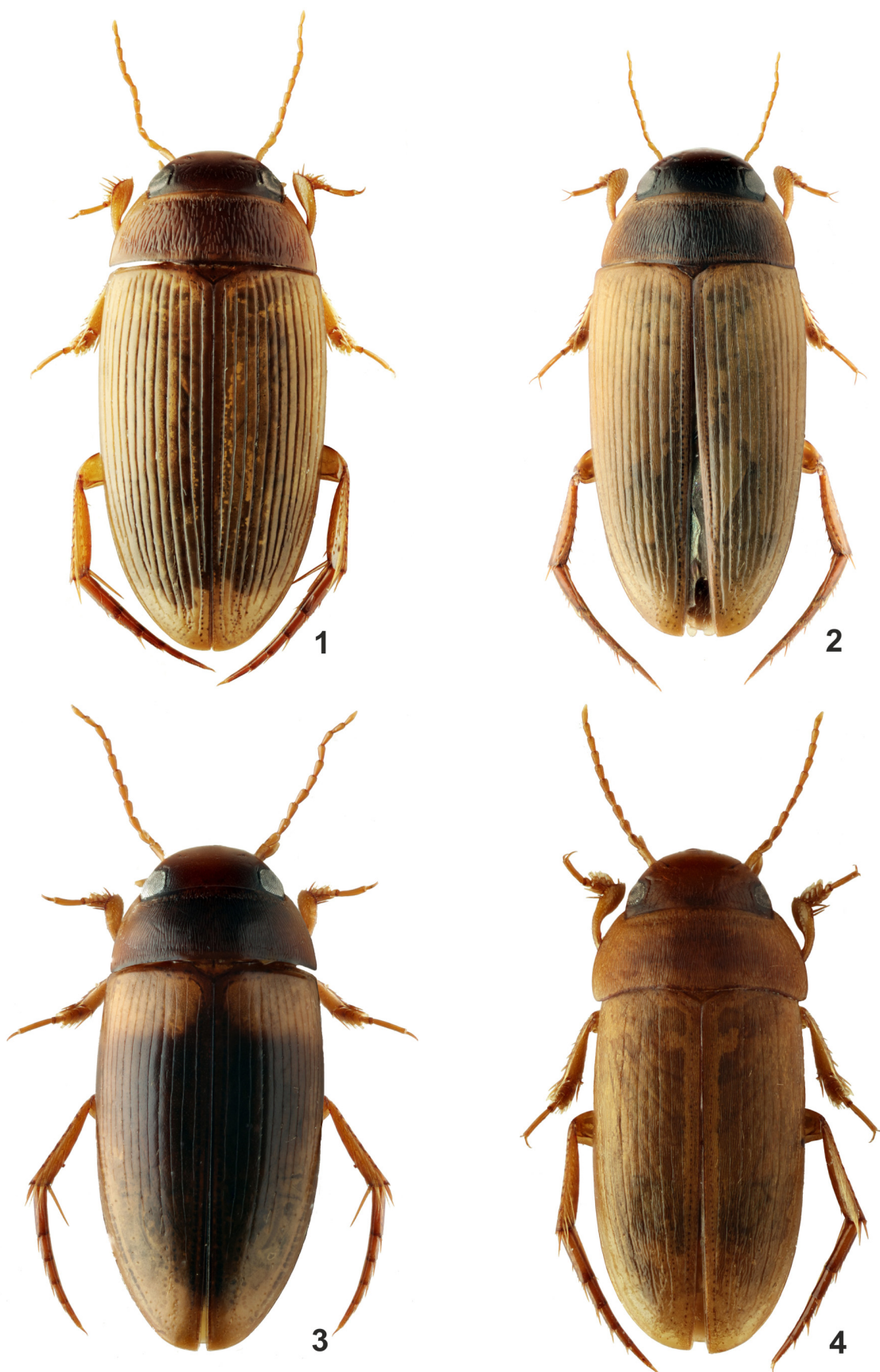
Coloration. Head rufous, darker (almost blackish) around eyes and medially between eyes, lighter on clypeus, labrum and medially on vertex. Pronotum rufous, infuscate on disc, lighter laterally. Elytra testaceous, somewhat darker in striae; numerous dark punctures present along basal and apical parts of elytral striae 1–5, and along sides of elytra. Ventral part rufous; abdomen dark. Appendages testaceous.

Head. Moderately broad, ca. 0.7× width of pronotum, transversely elliptical. Labrum emarginate medially. Anterior margin of clypeus slightly concave. Antennae with antennomeres slender, club-shaped, antennomere I longest. Eyes emarginate anterolaterally. Reticulation consisting of fine, well impressed isodiametric polygonal meshes. Numerous short, deep and isolated striae present between eyes. Punctuation double; several large setigerous punctures present in fronto-clypeal depressions, frontal depressions at level of anterior margin of eyes, and in depressions along inner margin of eyes; very fine and sparsely distributed punctures placed among meshes of microreticulation.

Pronotum. Transverse, broadest at posterior angles. Anterior angles acute, posterior angles rectangular. Sides slightly and evenly curved, with lateral beading very thin and indistinct. Anterior margin straight, posterior margin nearly straight with only indistinct sinuation medially. Reticulation similar to that of head, but slightly less impressed. Disc of pronotum with numerous deep irregular striae of variable length. Punctuation double; row of coarse setigerous punctures presents along anterior margin, basal margin (except medially), and laterally close to sides; fine punctures placed among meshes of microreticulation, denser than on head. Scutellar shield broadly triangular.

Elytra. Elytral striation consisting of twelve discal striae: stria 1 shorter, ending at ca. 4/5 of elytral length; stria 2 longest; striae 7, 9 and 12 shorter apically, ending at ca. 3/4–4/5 of elytral length; stria 11 shortest, beginning more posteriorly than other striae and present only in basal third of elytral length. Surface reticulation consisting of fine, shallowly impressed isodiametric polygonal meshes. Punctuation double; few large setigerous punctures present along elytral striae, but predominantly along lateral margin of elytra; very fine, sparsely distributed punctures placed among meshes of microreticulation, similar to those on pronotum.

Legs. Protibia modified, angled near base, distinctly broadened anteriorly, club shaped. Pro- and mesotarsomeres 1–3 distinctly broadened, ventrally with adhesive setae.



FIGURES 1–4. Habitus of *Copelatus*. 1–2. *C. deccanensis* **sp. nov.**: 1. male holotype; 2. male paratype with striolate elytra (Harishchandragad); 3. *C. schuhi*, male (Lonavala); 4. *C. maushomi* **sp. nov.**, male holotype.



FIGURES 5–8. Habitus of *Copelatus*. 5–6. *C. bezdeki* sp. nov.: 5. male holotype; 6. female paratype (Lonavala); 7–8. *C. indicus*: 7. male (Lonavala); 8. female (Mahabaleshwar).



9



10



11



12

FIGURES 9–12. Habitus of *Copelatus*. 9–11. *C. neelumae*: 9. male, pale form (Karnataka); 10. male, dark form (Maharashtra, Lonavala); 11. female, immature specimen of dark form (Maharashtra, Mulshi); 12. *C. schereri*, male (Sadawaghapur).



FIGURES 13–16. Habitus of *Copelatus*. 13–14. *C. cryptarchoides*: 13. male (Lonavala); 14. female (Kaas area); 15–16. *C. mysorensis*: 15. male (Wai); 16. female (Igatpuri).



FIGURES 17–22. Male genitalia of *Copelatus*. 17–18. *C. deccanensis* **sp. nov.**; 19–20. *C. schuhi*; 21–22. *C. maushomi* **sp. nov.** 17, 19, 21. median lobe in lateral view; 18, 20, 22. paramere. Scale bar 0.5 mm.

Ventral side. Prosternum sinuate anteriorly, obtusely keeled medially. Prosternal process shortly lanceolate, in cross-section convex, apex obtuse; process distinctly bordered laterally; reticulation almost effaced except some superficial meshes apically. Metaventricle with microsculpture consisting of polygonal meshes; numerous short, oblique, deep striae present laterally but absent medially; lateral parts of metaventricle ('metasternal wings') tongue-shaped, slender. Metacoxal lines well impressed, nearly complete—absent only close to metaventricle. Metacoxal plates covered with long, deep longitudinal striae; reticulation consisting of extremely elongate, longitudinal polygonal meshes. Metacoxal processes rounded and incised at posterior margin. Abdominal ventrites

I–II with longitudinal striae; ventrites III–IV with oblique striae laterally. Tuft of setae present antero-medially on ventrites III–V; ventrite VI with setigerous punctures laterally on either side. Abdominal reticulation consisting of elongate polygonal meshes, longitudinal on ventrites I–II, oblique on ventrite III and transverse on ventrites IV–VI. Punctuation consisting of fine, sparsely distributed punctures.

Male genitalia. Median lobe in lateral aspect broad in basal 3/4, then narrowing to pointed apex; almost evenly curved except at base (Fig. 17). A fold present till subapical region. Parameres 'D'-shaped, apex very narrow and long; apical lobe long (Fig. 18).

Female. Females do not differ in external morphology from male except for nearly straight, apically less broadened protibia, and slender pro- and mesotarsi without adhesive setae. Additionally, we have studied two females with elytral stria 11 absent, thus they have only eleven striae on each elytron.

Variability. The specimens of the type series vary in coloration, especially infuscation of head and pronotum (from rufous to nearly black) and elytra (from testaceous to reddish brown). A form with longitudinal striolation on elytra occurs in both males and females of this species (Fig. 2): striae long, often confluent, distinctly less impressed than striae; present between all striae, but missing in apical fourth of elytral length. Striolate form differs from the typical specimens also in striae on the pronotum, which are usually longer and denser than those in non-striolate form.

Measurements (N = 31). TL: 5.3–6.9 mm (holotype: 6.1 mm); Tl-h: 4.8–6.4 mm (holotype: 4.9 mm); MW: 2.0–3.0 mm (holotype: 2.7 mm).

Differential diagnosis. Based on the presence of 11–12 dorsal elytral striae and absent submarginal stria, the new species can be classified within the *Copelatus nigrolineatus* species group sensu Guéorguiev (1968). This group so far contains only five species (Nilsson & Hájek 2018): *C. flavicans* Guignot, 1952 and *C. luctuosus* Guignot, 1939 occurring in the Neotropical region, *C. nigrolineatus* Sharp, 1882 from Australia, *C. zimmermanni* Gschwendtner, 1934 distributed in China and Japan, and *C. schuhi* Hendrich & Balke, 1998 known so far only from Maharashtra (India).

The new species differs from *C. schuhi* by its large size, 5.3–6.9 mm (body length ranges between 4.0–4.5 in *C. schuhi*); elytral striae extending apically (elytral striae are missing the in apical third in *C. schuhi*); pale basal transverse elytral band absent (broad and distinct pale band present in *C. schuhi*); and the different shape of the median lobe, which is in lateral view, broad in the basal 3/4, then narrowing to a pointed apex (Fig. 17), and almost evenly curved except at the base (median lobe of *C. schuhi* is unevenly curved in lateral view, its outer margin is slightly sinuate; subapically broad; abruptly pointed at apex, see Fig. 19).

Etymology. The new species is named after the Deccan plateau, a large volcanic basalt plateau in southern India, which covers most of the territory of Maharashtra state. Mani (1974) referred to Maharashtra as the 'Deccan Lavas Country'. The specific epithet is an adjective in the nominative case.

Collecting circumstances. This species appears to inhabit isolated, clean water bodies. The specimens were collected in a side pool of a stream (Fig. 40), an ephemeral puddle with decaying leaves (Fig. 41) and muddy substrate, in remnant pools with pebbles as substrate formed in drying streams (Fig. 39); also in nearly permanent man-made tanks and small puddles (Fig. 42) on basaltic rocks. The physicochemical parameters of water bodies range as follows: pH: 6.2 to 9.0, temperature 18 to 25°C and salinity 23 to 115 ppm.

Distribution. The species was found in Pune, Nashik, Ahemadnagar districts of Maharashtra (Fig. 45). Collected within an altitude range of 500–1,215 m a.s.l.

***Copelatus schuhi* Hendrich & Balke, 1998** (Figs 3, 19–20)

Copelatus schuhi Hendrich & Balke, 1998: 360.

Type locality. "Westindien, Maharashtra, Lonavla".

Type material. Holotype ♂, deposited in NHMW (not studied).

Additional material examined. India: Maharashtra: 6 specimens, 4 km S Lonavala, Bhushi dam env., 500 m, 24.–28.ix.2005, J. Bezděk lgt. (NMPC); 4 specimens, same data, but: F. & L. Kantner lgt. (NMPC, SMNS); 2 specimens, same data, but: 25.ix.2005, at light, L. Borowiec lgt. (NMPC); 2 specimens, Tamhini, 18°35.2'N,

73°18.2'E, 70m, 27.viii.2013, S.D. Sheth lgt. (HVGC); 3 specimens, Devi Hasol, 16°44.4'N, 73°25.9'E, 164 m, 1.ix.2015, at light, M.R. Kulkarni & S.V. Paripatyadar lgt. (HVGC).

Diagnosis. Medium sized (TL: 4.0–4.5 mm), elongate oblong oval species. Elytra with broad transverse testaceous basal band, which does not reach suture (Fig. 3). Head and pronotum with numerous longitudinal striae. Elytra with 12–13 superficially impressed dorsal longitudinal striae, ending between two thirds and three fourths of elytral length; although 12 dorsal striae being reported in holotype (Hendrich & Balke 1998), in most specimens, an additional short stria presented in basal third of elytra, laterally from stria 12. Median lobe unevenly curved in lateral view; outer margin slightly sinuate, subapically broad, abruptly pointed at apex (Fig. 19). Parameres 'D'-shaped, apex very narrow and long; apical lobes long (Fig. 20).

Collecting circumstances. *Copelatus schuhi* was found in an ephemeral water body, less than 10 cm in depth, with no vegetation (Fig. 43); it is also occasionally attracted to light.

Distribution. The species is known so far from only three localities in Maharashtra (Fig. 45).

Copelatus consors species group

Copelatus maushomi sp. nov.

(Figs 4, 21–22)

Type locality. India, Maharashtra, 120 km NE of Mumbai, Igatpuri environment, 19°42.3'N, 73°33.1'E, 600 m a.s.l.

Type material. Holotype ♂ (NMPC), labelled: "INDIA occ. centr. / MAHARASHTRA prov. / 120 km NE of MUMBAI / IGATPURI env., 600m [printed] // INDIA 2002 Expedition / 19°42.17'N, 73°33.06'E / 1. – 12. VIII. 2002 / P.Šípek & M.Fikáček leg. [printed] // HOLOTYPE / *COPELATUS* / *maushomi* sp. nov. / S. Sheth *et al.* det. 2016 [red label, printed]" (NMPC). Paratypes: 4♂, 1♀ same data as holotype (LHCM, NMPC, ZSMG). Each paratype is provided with the respective red printed label.

Description of male holotype. Habitus (Fig. 4) elongate oblong oval, nearly parallel sided; outline not continuous as pronotal posterior corners protrude; broadest in basal third of pronotum; very slightly convex. Dorsal surface matt due to dense striolation.

Coloration. Dorsally almost uniformly testaceous; head slightly darker than pronotum and elytra, infusate posterior to eyes; pronotum indistinctly infusate on disc; elytra laterally and apically somewhat paler; appendages testaceous. Ventral part testaceous to brownish.

Head. Moderately broad, ca. 0.6× width of pronotum, almost semicircular. Labrum medially emarginate. Anterior margin of clypeus slightly concave. Antennae with antennomeres slender, club-shaped, antennomere I longest. Eyes emarginate anterolaterally, small, eye width only ca. 0.1× width of head. Reticulation consisting of well impressed polygonal meshes; meshes slightly larger in anterior region. Rather long, longitudinal or oblique striae present between eyes and on vertex. Punctuation double; several large setigerous punctures present in fronto-clypeal depressions, frontal depressions at level of anterior margin of eyes, and in depressions along inner margin of eyes; very fine and sparsely distributed punctures placed among meshes of microreticulation, punctures denser posteriorly.

Pronotum. Transverse, broadest in basal third. Anterior angles acute, posterior angles rectangular. Sides largely and evenly curved, with lateral beading very thin and indistinct. Anterior margin straight, posterior margin sinuate. Surface reticulation consisting of polygonal meshes, similar to that of head, but slightly less impressed. Disc of pronotum completely longitudinally striolate; striae mostly long, well impressed, rarely confluent; few short, shallow striae present between long striae. Punctuation double; row of coarse setigerous punctures present along anterior margin, basal margin (except medially), and laterally close to sides; fine punctures placed among meshes of microreticulation. Scutellar shield broadly triangular.

Elytra. Elytral striation consisting of nine complete shallow discal striae; striae almost imperceptible due to dense striolation of elytra. Striae very long, rarely confluent. Surface reticulation consisting of fine, shallowly impressed isodiametric polygonal meshes. Punctuation consisting of setigerous punctures only, few punctures present along elytral striae, but predominantly apically and along lateral margin of elytra; fine punctures, due to dense striolation not perceptible.

Legs. Protibia modified, angled near base, distinctly broadened anteriorly, club shaped. Pro- and mesotarsomeres 1–3 distinctly broadened, with four rows of adhesive setae on their ventral side.

Ventral side. Prosternum sinuate anteriorly, obtusely keeled medially. Prosternal process shortly lanceolate, in cross-section convex, apex rounded; distinctly bordered laterally; reticulation or punctation absent. Metaventrite with microsculpture consisting of polygonal meshes; punctation imperceptible. Lateral parts of metaventrite ('metasternal wings') tongue-shaped, slender. Metacoxal lines well impressed, incomplete—absent in anterior fourth. Metacoxal plates covered with deep, longitudinal or oblique striae; reticulation consisting of elongate, longitudinal polygonal meshes. Punctation on metacoxae absent. Metacoxal processes rounded and incised at posterior margin. Abdominal ventrites I–II with longitudinal striae; ventrites III–IV with oblique striae laterally, absent medially. Abdominal reticulation consisting of elongate polygonal meshes, longitudinal on ventrites I–II, oblique on ventrite III and transverse on ventrites IV–VI. Punctation consisting of fine punctures medially, and larger and deeper punctures laterally.

Male genitalia. Median lobe in lateral aspect almost evenly curved; narrowing from base to pointed apex; broadest in middle (Fig. 21). A fold present till subapical region. Parameres more or less 'D'-shaped, slightly sinuate on outer margin, apex very narrow and long; apical lobe club-shaped (Fig. 22).

Female. Females do not differ in external morphology from male except for nearly straight, apically less broadened protibia, and slender pro- and mesotarsi without adhesive setae.

Variability. All specimens of the type series are rather uniform and vary only in extent of infuscation of head and pronotum.

Measurements (N=5). TL: 4.6–5.0 mm (holotype: 4.8 mm); Tl-h: 4.2–4.5 mm (holotype: 4.4 mm); MW: 2.0–2.1 mm (holotype: 2.0 mm).

Differential diagnosis. Based on the presence of nine dorsal striae on the elytra, the new species can be tentatively classified within the *Copelatus consors* species group sensu Guignot (1961). This group so far contains eighteen species: 11 in the Afrotropical and seven in the Nearctic region (Nilsson & Hájek 2018).

Copelatus maushomi **sp. nov.** does not seem to be related to any species of the *C. consors* group. With small eyes, pronotum distinctly broader than elytra, and elytra with dense striolation, the new species has very unique appearance within all known *Copelatus* species. The shape of the male median lobe suggests that the species may be related to Indian species of the *C. nigrolineatus* group—*C. deccanensis* **sp. nov.** and *C. schuhi*.

Etymology. The species is named after the 'maushom'—a local name for the monsoon, indicating that the specimens were collected at the beginning of the monsoon season. The name is a noun in the genitive case.

Collecting circumstances. The specimens were collected in small deep pools in a stony stream below a table mountain (Fig. 44). The place was visited at the beginning of the monsoon. Sudden large amount of water could have brought the specimens to the normal stream from less accessible habitat, e.g. wet gravels on the stream bottom or other interstitial water habitats (M. Fikáček, pers. comm. 2017).

Distribution. The species is so far known only from the type locality (Fig. 45).

Copelatus irinus species group

Copelatus bezdeki **sp. nov.**

(Figs 5–6, 23–24)

Type locality. India, Maharashtra, Pune district, ca. 4 km SSW of Lonavala village, Bhushi dam, 18°43.2–4'N, 73°23.7–24.0'E, ca. 640 m a.s.l.

Type material. Holotype ♂ (NMPC), labelled: "INDIA W, 24.–28.ix.2005, / Maharashtra state, 4 km S of / Lonavala, Bushi dam env., / 500 m, J. Bezděk leg. [printed] // HOLOTYPE / COPELATUS / bezdeki sp. nov. / S. Sheth *et al.* det. 2016 [red label, printed]". Paratypes: 3♂, 8♀ same data as holotype (NMPC); 3♂, labelled: "INDIA, Maharashtra / Pune Distr., Lonavla / Bhushi Dam, 26 IX 05 / at light, leg. L. Borowiec [printed] // INDIA Expedition 2005 / Dept. of Biodiversity / and Evol. Taxonomy / Wroclaw University [printed]" (NMPC, UWPC); 35♂, 25♀, labelled: "INDIA W, 7.–11.x.2005 / Maharashtra state, / 40 km W of Pune, / Mulshi env. / J. Bezděk leg. [printed]" (BMNH, JSCL, NHMW, NMPC, ZSMG); 8♂, 3♀, labelled: "INDIA occ., 7–11.x.2005 / Maharashtra state / MULSHI env.F.Kantner leg. / 40 W of Pune [printed]" (SMNS); 16♂, 9♀, labelled: "INDIA, Maharashtra /

Pune Distr., Mulshi at / Mulshi Lake, 7–8 X 05 / at light, leg. L. Borowiec [printed] // INDIA Expedition 2005 / Dept. of Biodiversity / and Evol. Taxonomy / Wroclaw University [printed]" (UWPC); 1♂, labelled: "INDIA W, 2–7.x.2005, / Maharashtra state, / 70 km S of Pune, / Wai env., J. Bezděk leg. [printed]" (NMPC); 1♂, 1♀, labelled: "India / Maharashtra st., / Rohida fort 18°6'10.00"N, 73°49'16.00"E 1087m / 16.XI.2014 / coll. S. D. Sheth [printed]" (HVGC). Each paratype is provided with the respective red printed label.

Description of male holotype. *Habitus* (Fig. 5) oblong oval with continuous outline, broadest in 1/3 of elytral length, slightly convex. Dorsal surface shiny.

Coloration. Head rufous; lighter on clypeus and anterior to eyes; blackish medially on vertex and posterior to eyes. Pronotum rufous; infusate on disc; paler laterally. Elytra testaceous with sutural large dark (blackish) spot extending laterally up to stria II in middle third of elytral length; small dark spot present subbasally between striae II–IV, indistinct infuscation subbasally also between striae V–VI; elytra darker along striae. Ventral part dark brown. Appendages testaceous.

Head. Moderately broad, ca. 0.6× width of pronotum, transversely elliptical. Labrum emarginate medially. Anterior margin of clypeus slightly concave. Antennae with antennomeres slender, club-shaped, antennomere I longest. Eyes emarginate anterolaterally. Reticulation consisting of well impressed polygonal meshes; striae absent on head. Punctuation double; several large setigerous punctures present in fronto-clypeal depressions, frontal depressions at level of anterior margin of eyes, and in depressions along inner margin of eyes; very fine and sparsely distributed punctures placed among meshes of microreticulation.

Pronotum. Transverse, broadest in posterior angles. Anterior angles acute, posterior angles rectangular. Sides evenly curved, with lateral beading very thin and indistinct. Anterior margin straight, posterior margin nearly straight with only indistinct sinuation medially. Reticulation similar to that of head, but slightly less impressed. Indistinct median longitudinal impression present on disc. Punctuation double; row of coarse setigerous punctures presents along anterior margin, basal margin (except medially), and laterally close to sides; fine punctures placed among meshes of microreticulation, denser than on head, coarser and denser towards sides. Scutellar shield broadly triangular.

Elytra. Elytral striation consisting of six dorsal striae and one submarginal stria: stria 1 beginning more posteriorly than other striae, running all length to apex; striae 2, 3 and 5 terminate shortly before apex; stria 6 ending in posterior fourth of elytral length; submarginal stria starts at elytral midlength and terminating shortly before apex, similarly to dorsal striae 2, 3, 5. Surface reticulation consisting of fine, shallowly impressed isodiametric polygonal meshes, similar to those on head and pronotum. Punctuation double; few large setigerous punctures present along elytral striae and along lateral margin of elytra; very fine, sparsely distributed punctures placed among meshes of microreticulation, similarly to those on pronotum.

Legs. Protibia modified, angled near base, distinctly broadened anteriorly – club shaped. Pro- and mesotarsomeres 1–3 distinctly broadened, with adhesive setae on their ventral side. Longer spur on metatibia sinuate in posterior third.

Ventral side. Prosternum sinuate anteriorly, obtusely keeled medially. Prosternal process shortly lanceolate, in cross-section convex, apex obtuse; process distinctly bordered laterally; reticulation absent; surface sparsely punctured. Metaventricle with microsculpture consisting of polygonal meshes; lateral parts of metaventricle ('metasternal wings') tongue-shaped, slender, with irregular striae. Metacoxal lines well impressed, incomplete—absent in basal 1/5. Metacoxal plates covered with long, deep longitudinal striae; reticulation consisting of elongate, oblique polygonal meshes; sparsely punctured. Metacoxal processes rounded and incised at posterior margin. Abdominal ventrites I–II with longitudinal striae; ventrites III–IV with oblique striae laterally, absent medially; ventrite V with transverse striae laterally. Abdominal reticulation consisting of elongate polygonal meshes, longitudinal on ventrites I–II, oblique on ventrite III and transverse on ventrites IV–VI. All ventrites sparsely and finely punctured.

Male genitalia. Median lobe in lateral aspect broad in basal 2/3, then obtusely angled, apical third narrow, sinuous ventrally, almost straight dorsally until distinctly dorsally bent pointed apex; in 2/3 of its length with two distinct 'teeth' on ventral side—broad rectangular lower one, and narrower acute upper one (Fig. 23). Parameres more or less 'D'-shaped; apex short and broad; apical lobe long, club-shaped (Fig. 24).

Female. Females do not differ in external morphology from male except for nearly straight, apically less broadened protibia, slender pro- and mesotarsi without adhesive setae, and straight longer spur of metatibia. Short irregular striae present in middle third of elytra laterally from striae 3–4 (Fig. 6).

Variability. The specimens of type series vary in coloration, especially infuscation of head, pronotum and elytra. In one extreme, dark area on elytra is reduced to single narrow oval spot along suture; in the other extreme, the blackish sutural spot is extended laterally and connected with subbasal spot, usually confluent to subbasal dark transverse band. Females vary in extent of elytral striolation.

Measurements (N=19). TL: 5.3–6.4 mm (holotype: 5.5 mm); Tl-h: 4.8–5.9 mm (holotype: 5.1 mm); MW: 2.7–3.3 mm (holotype: 3.0 mm).

Differential diagnosis. Based on the presence of six dorsal striae and a submarginal elytral stria, the new species can be classified within *Copelatus irinus* group sensu Guignot (1961). This largely heterogeneous group contains 106 species altogether, occurring in all zoogeographical regions (Nilsson & Hájek 2018).

The characteristic shape of the median lobe with two 'teeth' on the ventral side (Fig. 23) places the new species close to *Copelatus brivioi* Rocchi, 1976 from Bangladesh, *C. schereri* Wewalka, 1981, from southern India, and Malayan *C. latipes* Sharp, 1882. Although *Copelatus bezdeki* **sp. nov.** differs from *C. brivioi* and *C. latipes* by the extended yellow coloration of elytra, and from the latter species also by the complete elytral stria 1 (stria 1 present only in apical fourth of elytra in *C. latipes*), certain identification of the new species is only possible based on the shape of male genitalia: in *C. bezdeki* **sp. nov.**, the apical third of median lobe is almost straight on the dorsal side with the apex distinctly dorsally bent, while the apical third is almost regularly sinuous throughout in all other species mentioned above.

Etymology. The new species is dedicated to Jan Bezděk (Mendel University, Brno, Czech Republic), a specialist on Chrysomelidae, who collected part of the type material. The name is a noun in the genitive case.

Collecting circumstances. The species was found in temporary water bodies with algal growth, and rock and mud substrate. The physicochemical parameters of the water body were as follows: pH 8, temperature 30°C and salinity 522 ppm.

Distribution. The species was found only in Pune district of Maharashtra, within the altitudinal range 500–1,087 m a.s.l. (Fig. 45).

Copelatus indicus Sharp, 1882

(Figs 7–8, 25–26)

Copelatus indicus Sharp, 1882: 582.

Type locality. "India".

Type material. *Copelatus indicus*: Lectotype ♂ (BMNH), designated by Vazirani (1970: 312), labelled: "Type [p, round label with red frame // India / 696 [hw] // Sharp coll. / 1905-313. [p] // Type 696 / Copelatus indicus n.sp. / India [hw]" Paralectotypes: 1♂, "Co- / type [p, round label with yellow frame] // India 696 [hw] // Sharp coll. / 1905-313. [p] // Copelatus / indicus / ♂ Sharp. / Co-type [hw]"; 1♀, "Co- / type [p, round label with yellow frame] // 696 [hw] // India [p, underlined yellow] // Sharp coll. / 1905-313. [p] // Copelatus / indicus / Sharp. / ♀ Co-type [hw]"; 1♀, "Co- / type [p, round label with yellow frame] // India bor. / 696 [hw] // Sharp coll. / 1905-313. [p] // Copelatus / indicus / Sharp. / ♀ Co-type [hw]".

Notes. Median lobe of the lectotype lost.

Additional material examined. India: Maharashtra: 2♂, 4 km S Lonavala, Bhushi dam env., 500 m, 24.–28.ix.2005, J. Bezděk lgt. (NMPC); 1♂, 70 km S of Pune, Wai env., 2.–7.x.2005, J. Bezděk lgt. (NMPC); 1♀, 15 km E of Mahabaleshwar, E of Panchgani, table land, 17°55'N, 73°49'E, 1280 m, 3.–6.vi.2006, V. Ryjáček lgt. (NMPC); 1♂, 1♀, Satara distr., Kaas area, 17°43.4'N, 73°49.5'E, 1237 m, 16.vii.2014, S. D. Sheth lgt. (HVGc).

Diagnosis. Medium sized (TL: 4.8–5.4 mm), oblong oval species. Dorsal surface black, pronotal sides, elytra laterally from dorsal stria 4, and apex of elytra yellow (Fig. 7). All six dorsal striae on elytra complete, well impressed; submarginal stria rather long, starting at about elytral midlength and terminates in approximately apical fifth of elytral length. Females with numerous short striae covering basal two thirds of elytral length, except for base and lateral margin (Fig. 8). Median lobe sickle-shaped in lateral view, in apical fourth gradually narrowing to obtusely pointed apex (Fig. 25). Parameres 'D'-shaped; apex short and broad; apical lobes long, club-shaped (Fig. 26).

Collecting circumstances. The species was found in a shallow, ephemeral water body.

Distribution. India; Ghosh & Nilsson (2012) listed the species from Assam, Bihar, Delhi, Jharkhand, Manipur, Tripura and Uttar Pradesh. We add records from Maharashtra (Satara District) (Fig. 45).

***Copelatus neelumae* Vazirani, 1973**

(Figs 9–11, 27–28)

Copelatus neelumae Vazirani, 1973: 224.

Type locality. India: "Tamilnadu: Ottokovil, Tiruchirapally District".

Type material. *Copelatus neelumae*: Holotype ♂, deposited in Zoological Survey of India, Kolkata, India (not studied).

Additional material examined. India: Maharashtra: 1♂, 4 km S Lonavala, Bhushi dam env., 500 m, 24.–28.ix.2005, J. Bezděk lgt.; 1♂, 40 km W of Pune, Mulshi env., 7.–11.x.2005, J. Bezděk lgt.; 1♀, Pune Distr., Mulshi at Mulshi Lake, 7.–8.x.2005, L. Borowiec lgt. (all NMPC). Goa: 1♂, NW of Panaji, Baga Beach, 26.–28.v.2000, D. Hauck lgt. (NMPC). Karnataka: 1♂, Udipi Distr., E of Bhatkal, Kollur, 26.–29.v.2006, Z. Kejval lgt. (NMPC).

Diagnosis. Medium sized (TL: 5.1–5.6 mm), oblong oval species. Species highly variable in elytral coloration: elytra of type specimens largely yellow with only blackish, oval sutural spot extending to elytral stria 3, but not reaching base or apex of elytra (Vazirani 1973); specimens from Karnataka similarly coloured, but with dark spot extended to elytral base and apex as narrow dark band along suture (Fig. 9); specimens from Goa and Maharashtra darker, with yellow coloration confined to elytral base, interval between striae 3–4 and laterally from stria 5, and elytral apex (Figs 10–11). Elytral striae well impressed: stria 1 starting subbasally, striae 2, 3 and 5 shorter than striae 1 and 4—not reaching apex of elytra; stria 6 shortest, ending approximately in apical fifth of elytral length; submarginal stria long, starting at about elytral midlength and terminates in approximately apical fifth of elytral length. Female with few short striae in middle third of elytra between striae 4–6 (Fig. 11). Median lobe sickle-shaped in lateral view, almost uniformly broad throughout, with broad, obtusely pointed apex (Fig. 27). Parameres moderately broad, 'C'-shaped; apex short and broad; apical lobes long, club-shaped (Fig. 28).

Comments on classification. The species was described from the holotype only, and remained enigmatic for a long time. Although Holmen & Vazirani (1990) keyed the species and published the first record of *C. neelumae* from Sri Lanka, and Rocchi (2001) mentioned the species from Nepal, none of these authors provided additional diagnostic characters and thus all researchers were referred to rather sketchy illustrations of elytral coloration and median lobe (Fig. 27a). We have based our interpretation of the species on a specimen from Karnataka in which dorsal coloration is similar to the figured holotype and also the shape of the median lobe more or less agrees with the original illustration. Subsequently, we also assigned darker specimens from Goa and Maharashtra, based on the same shape of the median lobe, to *C. neelumae*.

On the other hand, we had the possibility to study specimens from Sri Lanka (deposited in ZMUC), identified as *C. neelumae* by T.G. Vazirani, and published by Holmen & Vazirani (1990: 27). However, the male genitalia (although the tip of the median lobe is broken) of specimens from Sri Lanka do not agree with the figure in the original description. We believe that this material belongs to another species, known to us across the Indian subcontinent, and similar to the widely distributed Afrotropical *C. pulchellus* (Klug, 1834).

Collecting circumstances. Unknown.

Distribution. Southern India (Goa, Karnataka, Maharashtra, Tamil Nadu) (Fig. 45). The records from Sri Lanka and Nepal need to be verified.

***Copelatus schereri* Wewalka, 1981**

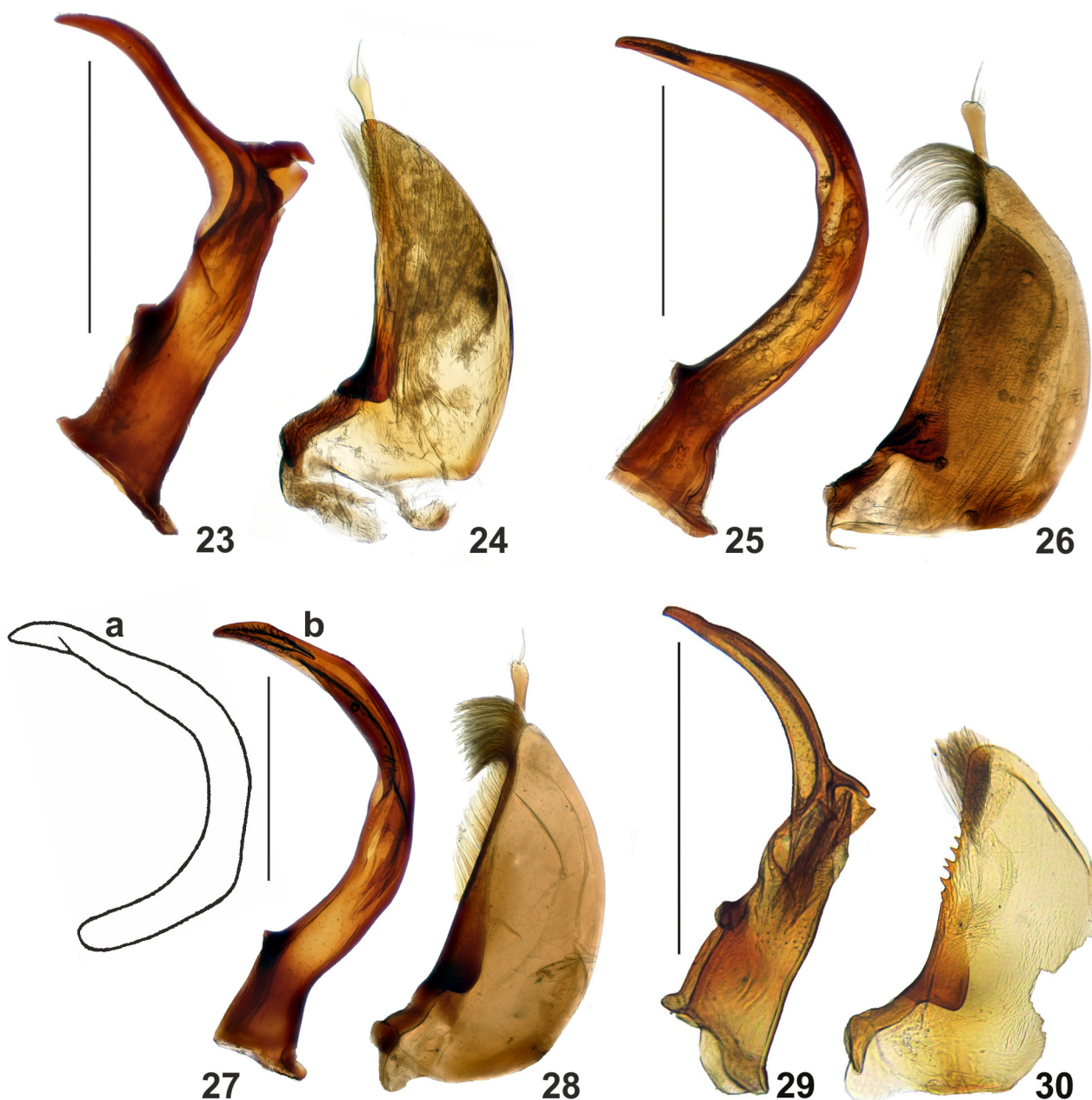
(Figs 12, 29–30)

Copelatus schereri Wewalka, 1981: 65.

Type locality. "Indien: Mysore [Karnataka]: Shimoga".

Type material. Holotype ♂ (ZSMG), labelled: South India / Mysore State / Shimoga 1936 / P. S. Nathan [printed] // R. Mouchamps det [printed] / *Copelatus* / indicus shp [hw] // HOLOTYPUS / *Copelatus* ♂ / schereri n sp. / Wewalka 80 [hw].

Additional material examined. India: Maharashtra: 1♂, Satara distr., Sadawaghapur, 17°26.2'N, 73°55.7'E, 1093 m, 31.viii.2013, S.D. Sheth lgt. (HVGC).



FIGURES 23–30. Male genitalia of *Copelatus*. 23–24. *C. bezdeki* **sp. nov.**; 25–26. *C. indicus*; 27–28. *C. neelumae*; 29–30. *C. schereri*. 23, 25, 27, 29. median lobe in lateral view (27a. redrawn from original description of *C. neelumae*); 24, 26, 28, 30. paramere. Scale bar 0.5 mm.

Diagnosis. Medium sized (TL: 5.0–5.4 mm), oblong oval species. Species variable in elytral coloration: elytra of holotype largely yellow with blackish subbasal transverse band extending somewhat posteriad between striae 4–6, black sutural area between suture and stria 2, and with narrow blackish stripes along elytral striae; elytra of recently collected Maharashtra specimen with only vaguely delimited infuscation on disc of elytra (Fig. 12). Elytral striae well impressed: all striae starting at elytral base; striae 2, 3 and 5 shorter than striae 1 and 4—not reaching apex of elytra; stria 6 shortest, ending approximately in apical fifth of elytral length; submarginal stria long, starting at about elytral midlength and terminates in approximately apical fifth of elytral length. Median lobe in lateral aspect sickle-shaped; broad in basal half, narrow, almost regularly curved in apical half, with shallow emargination on ventral side before apex; apex beak-shaped; median lobe after midlength with two distinct 'teeth' on ventral side—broad rectangular lower one, and narrower acute upper one (Fig. 29). Parameres rather broad, 'D'-shaped, with distinct serration on inner margin in apical half; apex short and broad (Fig. 30).

Collecting circumstances. The species was found in a temporary water body (Fig. 38) with rock and mud as substrate, algal vegetation, pH 7.85, temperature 32.5°C and salinity 29.7 ppm.

Distribution. A species previously known only from the type locality in Karnataka, India. Here, we add the first record from Maharashtra (Satara District) extending the range of species northward (Fig. 45).

Copelatus duodecimstriatus species group

Copelatus cryptarchoides Régimbart, 1899

(Figs 13–14, 31–32)

Copelatus cryptarchoides Régimbart, 1899: 293.

Copelatus nilgircus J. Balfour-Browne, 1939: 74; synonymy by Vazirani (1970: 318).

Type locality. *Copelatus cryptarchoides*: "Inde: Kanara" (Coastal Karnataka); *C. nilgircus*: "India: Nilgiri Hills" (Tamil Nadu).

Type material. *Copelatus cryptarchoides*: Lectotype ♂, designated by Vazirani (1970: 318), deposited in Muséum national d'Histoire naturelle, Paris, France (not studied); *C. nilgircus*: Holotype ♂, deposited in BMNH (not studied).

Additional material examined. India: Maharashtra: 1♂, 1♀, 4 km S Lonavala, Bhushi dam env., 500 m, 24.–28.ix.2005, J. Bezděk lgt. (NMPC); 3 specimens, same data, but F. & L. Kantner lgt. (SMNS); 2 specimens, same data, but 12.–15.x.2005, F. & L. Kantner lgt. (SMNS); 1♂, 1♀, Tamhini, 18°35.2'N, 73°18.2'E, 70 m, 27.viii.2013, S.D. Sheth lgt. (HVGC); 1♀, Tamhini, 18°26.7'N, 73°25.7'E, 625 m, 29.x.2014, S.D. Sheth lgt. (HVGC); 1♀, Satara distr., Kaas area, 17°43.4'N, 73°49.5'E, 1237 m, 16.vii.2014, S.D. Sheth lgt. (HVGC).

Diagnosis. Small (TL: 3.7–4.2 mm), oblong oval species. Elytra yellowish-brown with blackish median square spot extending laterally to stria 3 and along suture to elytral base and apex, blackish longitudinal band between striae 4–5, indistinct infuscation subbasally between striae 5–6, and with narrow dark stripes along elytral striae (Fig. 13). Elytral striae well impressed: stria 1 starting subbasally; striae 2, 3 and 5 shorter than striae 1 and 4—not reaching apex of elytra; stria 6 shortest, ending approximately in apical fifth of elytral length. Females dimorphic, with or without striolation (Fig. 14). Median lobe sickle-shaped in lateral view, almost evenly curved except for basal fourth; apex narrowly pointed (Fig. 31). Parameres moderately broad, 'C'-shaped; apex short and broad; apical lobes long, club-shaped (Fig. 32).

Collecting circumstances. The species was collected in ephemeral water bodies (Fig. 43).

Distribution. Widely distributed in south-western India. Ghosh & Nilsson (2012) listed the species from Karnataka, Kerala and Tamil Nadu. We add records from Maharashtra (Nashik, Pune, Ratnagiri and Satara districts) in the altitudinal range 70–1,237 m a.s.l. (Fig. 45).

Copelatus mysorensis Vazirani, 1970

(Figs 15–16, 33–34)

Copelatus mysorensis Vazirani, 1970: 319.

Type locality. "India: Mysore [Karnataka]: Shimoga".

Type material. *Copelatus mysorensis*: Holotype ♂, deposited in Museum national d'Histoire naturelle, Paris, France (not studied).

Additional material examined. India: Maharashtra: 1♀, 120 km NE of Mumbai, Igatpuri env., 19°42.3'N, 73°33.1'E, 600 m, 1.–12.viii.2002, M. Fikáček & P. Šípek lgt. (NMPC); 1♂, 70 km SSW Pune, Mahabaleshwar, 1400 m, 30.ix.–2.x.2005, J. Bezděk lgt. (NMPC); 1♂, 1♀, same data, but F. & L. Kantner lgt. (SMNS); 1♂, 70 km S of Pune, Wai env., 2.–7.x.2005, J. Bezděk lgt. (NMPC); 1♀, 40 km W of Pune, Mulshi env., 7.–11.x.2005, J. Bezděk lgt. (NMPC); 2♂, 1♀, 15 km E of Mahabaleshwar, E of Panchgani, table land, 17°55'N, 73°49'E, 1280 m, 3.–6.vi.2006, V. Ryjáček lgt. (NMPC); 4♂, 3♀, Satara distr., Panchagani [Table land], 17°55.8'N, 73°48.4'E, 1320 m, 30.viii.2013, S.D. Sheth lgt. (HVGC); 1♂, 1♀, Satara distr., Medha-Panchagani road, 17°52.1'N, 73°50.5'E 777

m, 30.viii.2013, S.D. Sheth lgt. (HVGC); 2♀, Satara distr., Kaas area, 17°43.6'N, 73°49.5'E, 1237 m, 16.vii.2014, S.D. Sheth lgt. (HVGC); 1♀, Pune distr., Shiota, 18°49.1'N, 73°25.5'E, 645 m, 6.ix.2013, N. Modak & S. Padhye lgt. (HVGC); 1♀, Pune distr., Panshet, 18°22.9'N, 73°37.3'E, 588 m, 7.vi.2014, S.D. Sheth lgt. (HVGC).

Diagnosis. Medium sized (TL: 4.9–5.6 mm), oblong oval species. Elytra brownish-black with yellowish base laterally from stria 2, longitudinal band between striae 3–4, sides laterally from stria 5, and yellowish apical fifth of elytra (Fig. 15). Elytral striae well impressed: stria 1 starting subbasally; striae 2, 3 and 5 shorter than striae 1 and 4—not reaching apex of elytra; stria 6 shortest, ending approximately in apical fifth of elytral length. Female with short striae in middle third of elytra between striae 4–6 (Fig. 16). Median lobe sickle-shaped in lateral view; broad in basal two thirds, almost straight and narrowing to pointed apex in apical fourth (Fig. 33). Parameres moderately broad, 'C'-shaped; apex short and broad; apical lobes long, club-shaped (Fig. 34).

Collecting circumstances. The species was found in temporary pools on high level lateritic plateaus (Fig. 35–37), as well as in a remnant pool of a rivulet with algal vegetation.

Distribution. A species distributed in south-western India. Ghosh & Nilsson (2012) listed the species from Gujarat, Karnataka and Tamil Nadu. We add records from Maharashtra (Nashik, Pune and Satara districts) in the altitudinal range 70–1,320 m a.s.l.



FIGURES 31–34. Male genitalia of *Copelatus*. 31–32. *C. cryptarchoides*; 33–34. *C. mysorensis*. 31, 33. median lobe in lateral view; 32, 34. paramere. Scale bar 0.5 mm.

Key to *Copelatus* species of Maharashtra

1. Body elongate oval; elytra with more than six dorsal striae 2
- Body broadly oval; elytra with six dorsal striae 4
2. Elytra with 11–12 dorsal striae (*C. nigrolineatus* group) 3
- Elytra with 9 dorsal striae (*C. consors* group). Base of pronotum distinctly wider than width of elytra; elytra completely striolate (Fig. 4) *Copelatus maushomi* sp. nov.
3. Bigger species (TL: 5.3–6.9 mm), elytra ochre unicolorous; elytral striae well impressed complete (Figs 1–2). Median lobe in lateral aspect broad in basal three fourths, then narrowing to pointed apex; almost evenly curved except at base (Fig. 17) *Copelatus deccanensis* sp. nov.
- Smaller species (TL: 4.0–4.5 mm), elytra bicolorous with broad pale transverse basal band; elytral striae shallowly impressed, absent from apical fourth of elytral length (Fig. 3). Median lobe in lateral aspect broad from base to apex, broader in apical half, apex abruptly pointed; not evenly curved (Fig. 19) *C. schuhi* Hendrich & Balke, 1998
4. Elytra with submarginal stria (*C. irinus* group) 5
- Elytra without submarginal stria (*C. duodecimstriatus* group) 8
5. Median lobe in lateral view with two distinct 'teeth' on ventral side (Figs 23, 29) 6
- Median lobe simply sickle-shaped, without any 'teeth' on ventral side (Figs 25, 27) 7

6. Median lobe in apical third almost straight on dorsal side with distinctly dorsally bent apex (Fig. 23); parameres smooth on inner side (Fig. 24) *Copelatus bezdeki* **sp. nov.**
- Median lobe in apical third almost regularly sinuous with shallow emargination before apex on ventral side (Fig. 29); parameres with distinct serration on inner side (Fig. 30) *C. schereri* Wewalka, 1981
7. Slender species with dorsal coloration uniformly dark except for lateral margin (Figs 7–8). Elytral stria 1 starts at base. Median lobe in apical third gradually narrowing to pointed apex (Fig. 25) *C. indicus* Sharp, 1882
- Broader species with variable, but distinct yellow-black elytral coloration (Figs 9–11). Elytral stria 1 starts subbasally. Median lobe in apical third broad with dorsally bent obtusely pointed apex (Fig. 27) *C. neelumae* Vazirani, 1973
8. Smaller species (TL: 3.7–4.2 mm). Median lobe almost evenly curved throughout, except basal fourth; apex narrowly pointed (Fig. 31) *C. cryptarchoides* Régimbart, 1899
- Bigger species (TL: 4.9–5.6 mm). Median lobe broad in basal two thirds, almost straight and narrowing to pointed apex in apical fourth (Fig. 33) *C. mysorensis* Vazirani, 1970

Synonymical notes on other Indian species of *Copelatus* not found in Maharashtra

Copelatus freudei Guignot, 1955

(Figs 46–48)

Copelatus freudei Guignot, 1955: 72.

Copelatus gibsoni Vazirani, 1974: 19; **new synonymy.**

Copelatus gibsoni Vazirani, 1975: 345; preoccupied by *Copelatus gibsoni* Vazirani, 1974: 19; **new synonymy.**

Copelatus spangleri Vazirani, 1974: 19; **new synonymy.**

Copelatus spangleri Vazirani, 1975: 344; preoccupied by *Copelatus spangleri* Vazirani, 1974: 19; **new synonymy.**

Type localities. *Copelatus freudei*: "Bengale: Chapra"; *C. gibsoni*: "New Delhi". *C. spangleri*: "New Delhi".

Type material. *Copelatus freudei*: Holotype ♂ (ZSMG), labelled: "Chapra [p] // Mackenzie [p] // TYPE [p, red label with black margin] // F. Guignot det., 19 [p] 54 [hw] / Copelatus / Freudei Guign. / Type ♂ [hw Guignot]".

Copelatus gibsoni: Holotype ♂ (USNM), labelled: "INDIA / NewDelhi [p] // 3-XI-1967 / KEGibson / light trap [p] // HOLOTYPE [p, underlined red] // TypeNo [p] / 72328 [hw] / U S N M [p] [red label] // Copelatus / gibsoni / sp.nov. [hw Vazirani] / T.G. Vazirani Det. [p]".

Copelatus spangleri: Holotype ♂ (USNM), labelled: "INDIA / NewDelhi [p] // 6-VII-1967 / KEGibson / light trap [p] // HOLOTYPE [p, underlined red] // TypeNo [p] / 72327 [hw] / U S N M [p] [red label] // Copelatus / spangleri / sp.nov. [hw Vazirani] / T.G. Vazirani Det. [p]".

Additional material studied. India: 1♀, Delhi, 30.viii.1980, J. Seifert leg. (NMPC); 1♂ 1♀, Rajasthan, Bharatpur, Keoladeo NP, 29.x.1997, J. Štátný leg. (JSCL); 12 specimens, Rajasthan, Bharatpur, Keoladeo NP and around, 27°12.4'N, 77°30.5'E, 220 m, 31.viii.–5.ix.2002, M. Fikáček & P. Šípek leg. (NMPC); 1♂ 1♀, Uttaranchal [Uttarakhand], 30 km W of Mussoorie, Dakpathar vill., Yamuna river, 790 m, 4.viii.2003, Z. Kejval & M. Trýzna leg. (NMPC); 1♂ 2♀, Uttar Pradesh, Faizabad, 2.ix.1980, J. Seifert leg. (NMPC); 2♂, Uttar Pradesh, Agra, 28.ix.1997, P. Pucholt leg. (NMPC). Nepal: 1♂, Prov. Bheri, Nepalgunj, Hotel Batika, LF [Lichtfang, = light trap], 28°02.6'N, 81°36.6'E, 11.–12.vii.2001, A. Weigel leg. (LHCM).

Comments on classification. Vazirani (1974, 1975) described both *C. gibsoni* and *C. spangleri* from the same light trap collecting in New Delhi. Both species were described twice (based on the same material), in two different publications. Vazirani only compared the two species to each other and to *C. andamanicus* (= *C. oblitus*). Although the author was aware of the existence of *C. freudei* (see Vazirani 1970), he was not able to see its holotype and only studied specimens from Sri Lanka, tentatively assigned to that species. We have compared the holotypes of all three taxa: *C. spangleri* agrees in all details with the holotype of *C. freudei*. The holotype of *C. gibsoni* is a soft, not fully matured specimen—which explains its paler coloration; in addition to that, the soft median lobe was deformed (flattened) when mounted into a slide; however, after careful examination, the shape of the median lobe is assumed to be the same in *C. gibsoni* and *C. spangleri* (i.e. also in *C. freudei*), including internal structures, see Figs 47–48. Minor differences between *C. gibsoni* and *C. spangleri* in elytral striation, as mentioned in the original description, undoubtedly represent intraspecific variability. Therefore, we establish the following synonymy: *Copelatus freudei* Guignot, 1955 = *C. gibsoni* Vazirani, 1974 **syn. nov.**, = *C. gibsoni* Vazirani, 1975 **syn. nov.**, = *C. spangleri* Vazirani, 1974 **syn. nov.**, = *C. spangleri* Vazirani, 1974 **syn. nov.**



FIGURES 35–40. Habitat of *Copelatus*. 35. temporary pool (Tableland); 36. temporary pool (Medha-Panchagani road; photo M.R. Kulkarni); 37. ephemeral pool (Sadawaghapur); 38. temporary pool (Sadawaghapur); 39. remnant pool in stream (Tamhini); 40. side pool of a stream (Tamhini).



FIGURES 41–44. Habitat of *Copelatus*. 41. ephemeral puddle (Tamhini); 42. rock puddle (Harishchandragad); 43. puddle (Tamhini); 44. mountain stream (Igatpuri area; photo M. Fikáček).

Distribution. *Copelatus freudei* was described based on two specimens: male holotype from Bengal and female allotype from Sri Lanka. Subsequently, Wewalka (1975) added records from Bhutan and Bihar, Rocchi (1976) published the species from Bangladesh, and Rocchi (1986) added localities from Sri Lanka. Holmen & Vazirani (1990) also mentioned the species from the Maldives, Rocchi (2001) recorded the species under the name *C. spangleri* from Assam, and finally Darilmaz & Ahmed (2016) published the first record from Pakistan. We confirm the occurrence of *C. freudei* in the northern part of the Indian subcontinent and add the first country record from Nepal, and Indian state records from Rajasthan, Uttarakhand and Uttar Pradesh.

Copelatus oblitus Sharp, 1882

Copelatus oblitus Sharp, 1882: 582.

Copelatus andamanicus Régimbart, 1899: 302; synonymy by Hendrich *et al.* (2004: 118).

Copelatus sociennus ryukyuensis Satô, 1961: 8; synonymy by Hendrich *et al.* (2004: 118).

Copelatus subfasciatus Zimmermann, 1919: 76; synonymy by Hendrich *et al.* (2004: 118).

Copelatus tokaraensis Nakane, 1963: 25; synonymy by Hendrich *et al.* (2004: 118).

Copelatus karnatakus Holmen & Vazirani, 1990: 27; **new synonymy**.

Type localities. *Copelatus oblitus*: "Singapore". *C. karnatakus*: "India, Karnataka, Mudigere Area".

Type material. *Copelatus oblitus*: Holotype ♂ (BMNH), labelled: "Type [p, round label with red frame] // Singapore / 695 [hw] // Sharp Coll. / 1905-313. [p] // Type 695 DS. / Copelatus / oblitus n.sp. / Singapore [hw]".

Copelatus karnatakus: Holotype ♂ (ZMUC), labelled: "S.India: Karnataka / Mudigere area, c.900 m / 2-10.xi.1977 / Zool.Mus.Copenhagen Exp. [p] // Holo- / type [p, round label with red margin] // Copelatus / karnatakus / sp. n. [hw] / det. T.G. Vazirani, 198 [p] 2 [hw] / m. Holmen [hw] // zmuc00020126 [p]".

Additional material studied. **India:** 1♂, Uttarakhand, Kumaon district, Haldwani, H.G. Champion (BMNH).

Comments on classification. Holmen & Vazirani (1990) diagnosed *C. karnatakus* as a member of the *C. irinus* species group with characteristic shape of median lobe with characteristic dorsal (ventral in current concept) projection. Apparently, they were not aware of the widespread *C. oblitus*. The direct comparison of the two holotypes undoubtedly proved that they are identical. Therefore, we establish the following synonymy: *Copelatus oblitus* Sharp, 1882 = *C. karnatakus* Holmen & Vazirani, 1990 **syn. nov.**

Distribution. Widely distributed species ranging in the Oriental region from India to Sulawesi, and also reaching southern China and Japan in the Palearctic region. First record from Indian state of Uttarakhand.

Copelatus sociennus J. Balfour-Browne, 1952

(Figs 49–51)

Copelatus sociennus J. Balfour-Browne in Guignot, 1952: 26.

Copelatus bangalorensis Vazirani, 1970: 311; **new synonymy**.

Type localities. *Copelatus bangalorensis*: "India: Bangalore". *C. sociennus*: "China: (Hongkong)".

Type material. *Copelatus bangalorensis*: Holotype ♂, deposited in Muséum national d'Histoire naturelle, Paris, France (not found; A. Mantilleri, pers. comm.).

Copelatus sociennus: Holotype ♂ (BMNH), labelled: "833 [hw, round label] // Hong Kong / [on reverse:] 48 / 60 [hw] // Copelatus / discoideus Shp [hw] // Copelatus / japonicus / ♂ Sharp. / det.J.Balfour-Browne [hw, blue ink] // Copelatus ♂ / chinensis Rég. [hw] / J.Balfour-Browne det. [p] / Det. from Descr. [p] ii.1946 [hw] // HOLOTYPE ♂ / COPELATUS / sociennus / J.Balfour-Browne, 1952 / labelled by J. Hájek 2016 [p, red label]". Paratypes: 1♂ (BMNH), labelled: "Bowring / China [hw] // 457 / 17/8/49 [hw, round label] // Copelatus / japonicus / ♂ Sharp. / det.J.Balfour-Browne [hw, blue ink] // Copelatus ♂ / chinensis Rég. [hw] / J.Balfour-Browne det. [p] / Det.from Descr. [p] ii.1946 [hw]"; 1♂ (BMNH), labelled: "Bowring / China [hw] // 457 / 7/8/53 [hw, round label] // Copelatus / ? chinensis Rég. [hw] / J.Balfour-Browne det. [p]"; 1♀ (BMNH), labelled: "Bowring / China [hw] // 457 / 9/6/52 [hw, round label]". All paratypes provided with additional label "PARATYPE ♂ [♀, respectively] / COPELATUS / sociennus / J.Balfour-Browne, 1952 / labelled by J. Hájek 2016 [p, red label]".

Additional material studied. **India:** 1♂ 1♀, Uttar Pradesh [currently Uttarakhand], Rishikesh, 23.x.1997, J. Šťastný leg. (JSCL); 1♂, Uttaranchal [Uttarakhand], 30 km W of Mussoorie, Dakpathar vill., Yamuna river, 790 m, 4.viii.2003, Z. Kejval & M. Trýzna leg. (NMPC); 1♀, Karnataka, Western Ghats Mts., Chikmagalur, 31.v.2006, V. Ryjáček lgt. (NMPC). **Nepal:** 2♂ 2♀, Bagmati Prov., Nagarjun forest, 27.45N, 85.17E, 1387 m, at light, D. Král leg. (NMPC); 1♂, same data, but J. Farkač leg. (NHMB).

Comments on classification. Vazirani (1970) diagnosed *Copelatus bangalorensis* based on the unique dorsal (ventral in the current concept) projection of the median lobe. Indeed, the shape of the median lobe of the species is very characteristic within all Oriental *Copelatus*. However, the author was apparently not aware of *C. sociennus* described from Hong Kong, the median lobe of which has exactly the same dorsal protuberance and ventral projection. Although we were not able to study the holotype of *C. bangalorensis*, the comparison of its description, especially the elytral coloration, and drawing of the median lobe (Fig. 50), with the type material of *C. sociennus* (Fig. 51) and additional material from the region leaves no doubt that the two taxa are conspecific. Therefore, we establish the following synonymy: *Copelatus sociennus* J. Balfour-Browne, 1952 = *Copelatus bangalorensis* Vazirani, 1970 **syn. nov.**

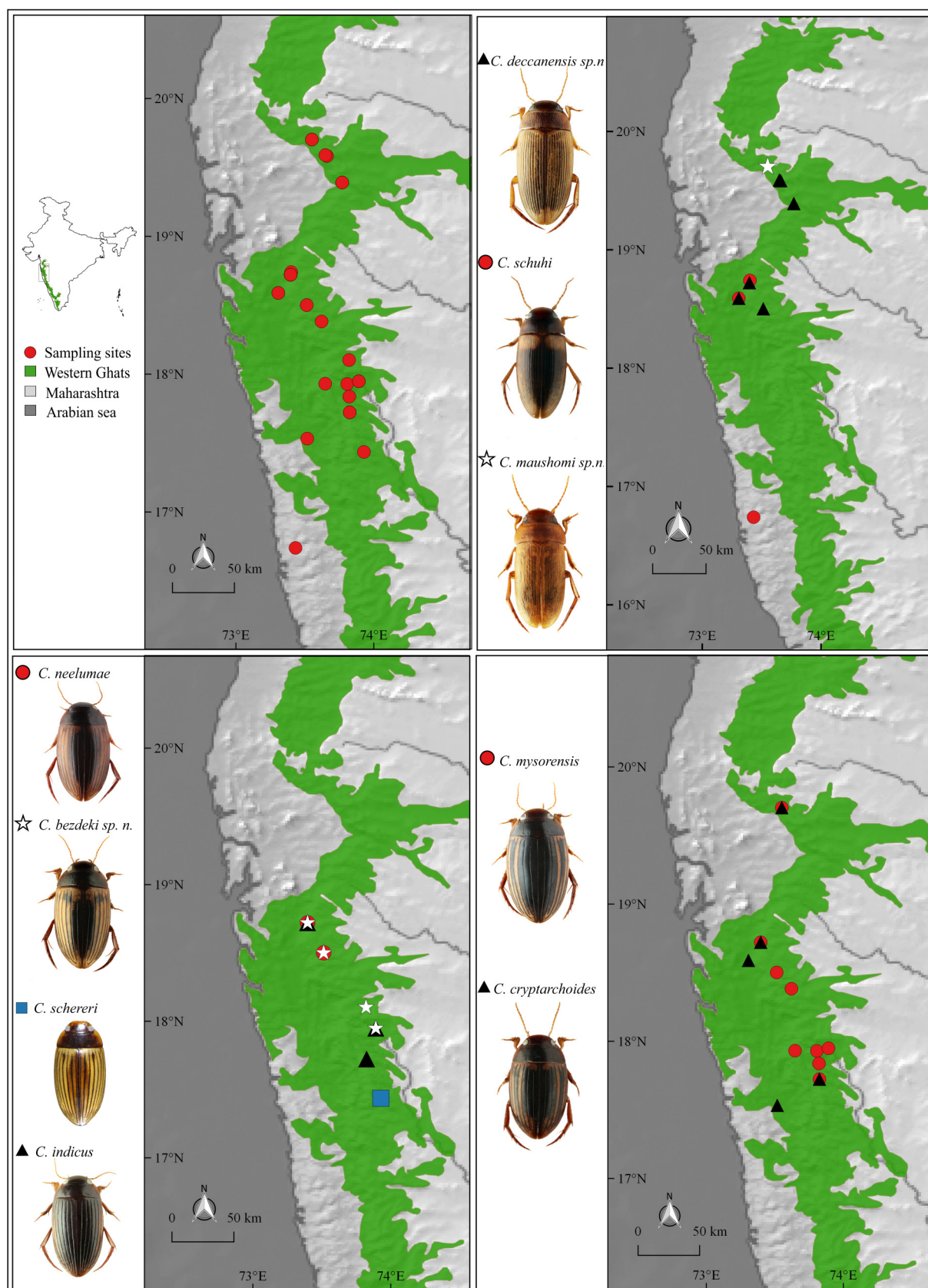
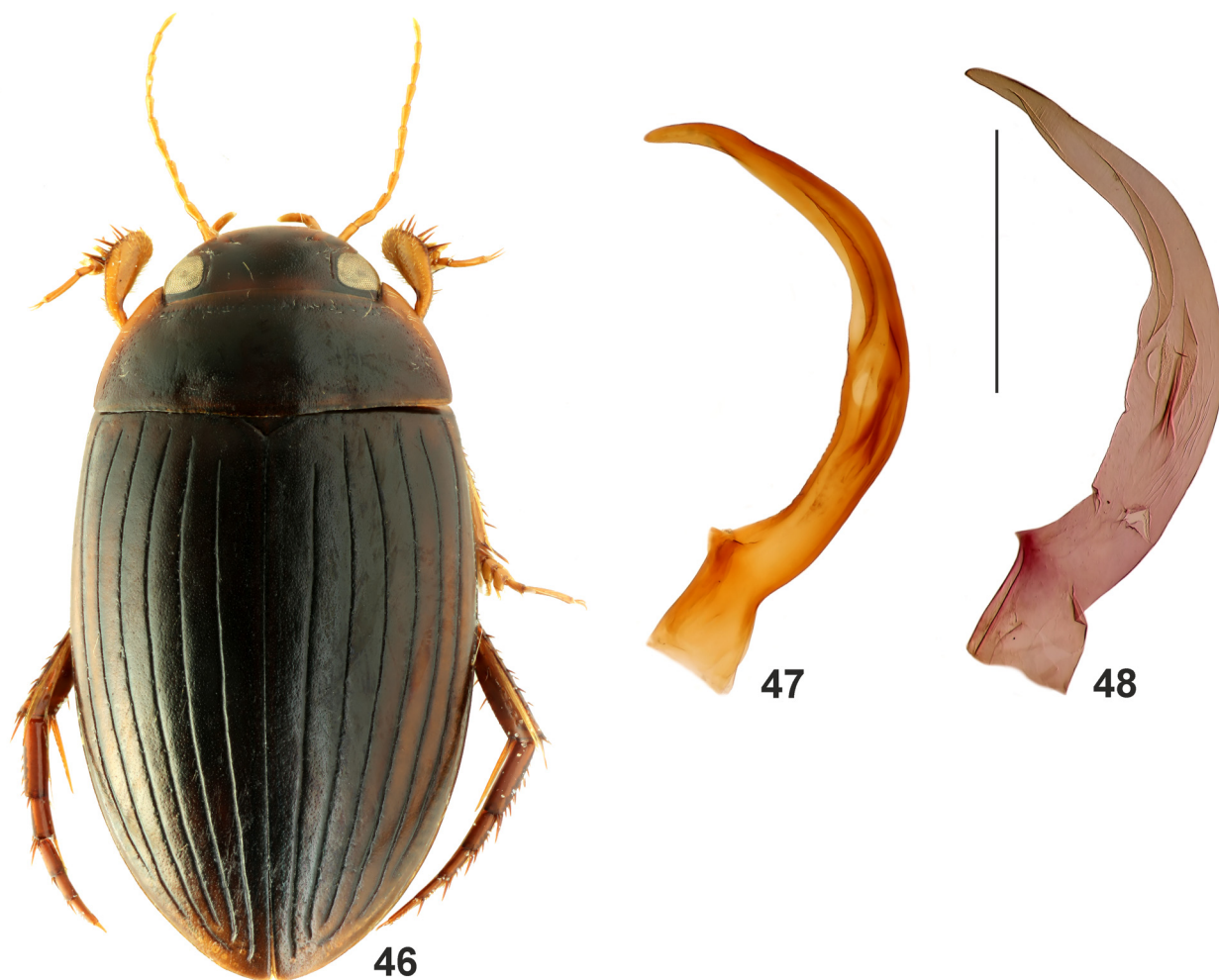


FIGURE 45. Distributional map of *Copelatus* species in Maharashtra.



FIGURES 46–48. *Copelatus freudei*. 46. male habitus (Rajasthan); 47. median lobe in lateral view (holotype of *C. spangleri*); 48. same (holotype of *C. gibsoni*). Scale bar 0.5 mm (Figs 47–48).

Distribution. A species occurring in the Indian subcontinent, Sri Lanka, southern China, and also reaching continental Southeast Asia. Here, we present the first record from the Indian state of Uttarakhand.

***Copelatus tenebrosus* Régimbart, 1880**

Copelatus tenebrosus Régimbart, 1880: 210.

Copelatus pusillus Sharp, 1882: 580; synonymy by Régimbart (1899: 296).

Copelatus hisamatsui Satô, 1961: 8; synonymy by Satô (1983: 36).

Copelatus ceylonicus Vazirani, 1969: 402; **new synonymy**.

Copelatus assamensis Vazirani, 1970: 316; **new synonymy**.

Type localities. *Copelatus assamensis*: "India: Assam: Umrau near Shilong". *C. ceylonicus*: "Ceylon, Colombo".

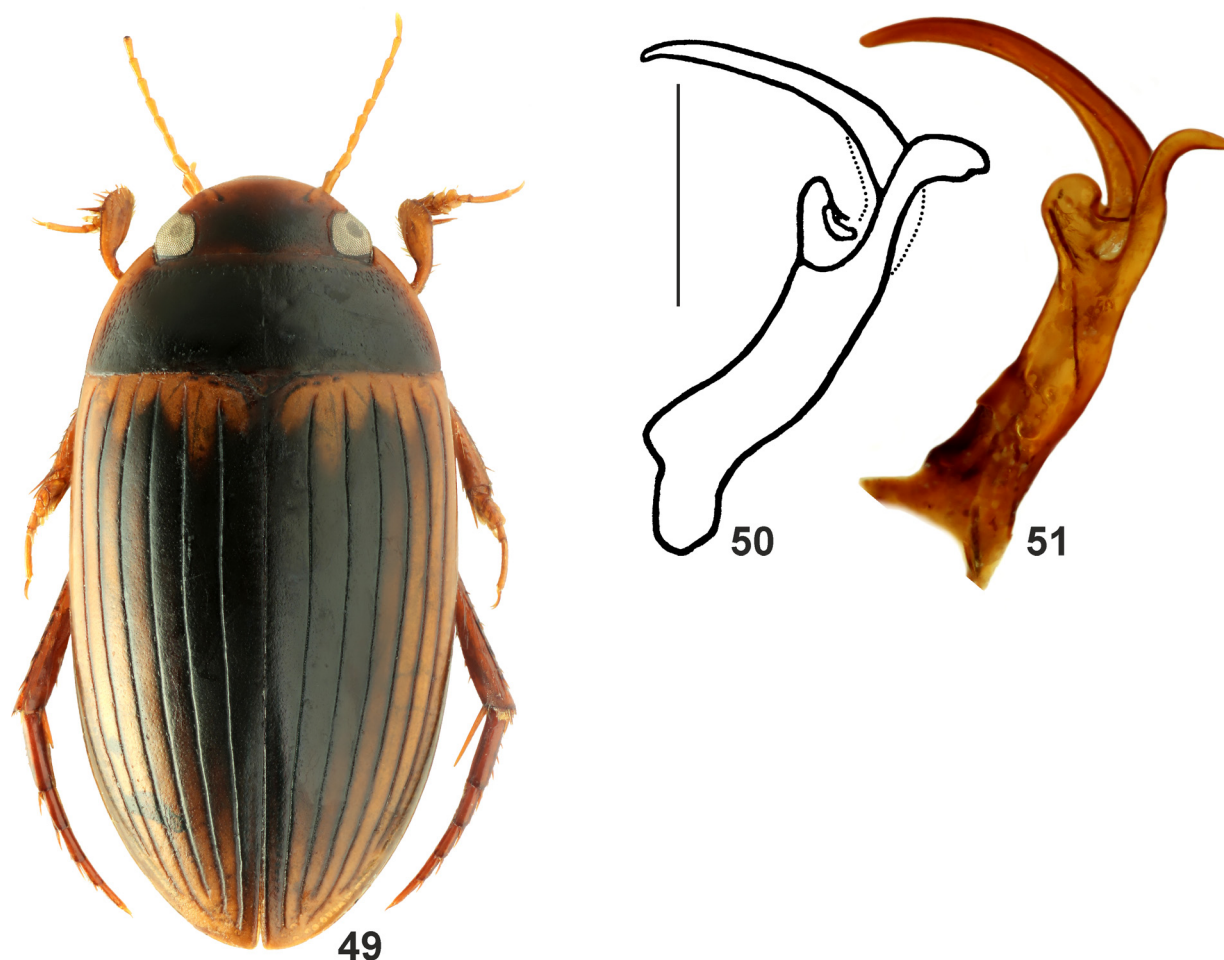
Type material. *Copelatus assamensis*: Holotype ♂, deposited in Zoological Survey of India, Kolkata, India (not studied). *Copelatus ceylonicus*: Holotype ♀, deposited in Colombo National Museum, Sri Lanka (not studied).

Additional material studied. **Bhutan:** 1♂ 1♀, Mongar [district], Thrumshingla [Phrumsengla] NP, 20.–27.vi.2010, local collector (NMPC). **India:** 1♀, Assam, Chabua, vi.1943, D.E. Hardy leg. (GWCW); 1♀, Assam, Kaziranga, 75 m, 7.–9.v.1976, Wittmer & Baroni U. leg. (GWCW); 5 specimens, Assam, Bhalukpong, 27°02'N, 92°35'E, 150 m, 26.v.–3.vi.2006, L. Dembický leg. (LHCM); 1♀, same data, but P. Pacholátko leg. (LHCM); 2♂ 4♀, Kohora (= Kaziranga vill.) at green Reed hotel, 25°35'N, 93°26'E, 160 m, 16.–19.iv.2008, M. Fikáček, H.

Podskalská & P. Šípek leg. (NMPC); 3 specimens, Assam-Arunachal border, Bhalukpong, 27°00.8'N, 92°39.1'E, 150 m, 1.–8.v.2012, L. Dembický leg. (NMPC, ZMFK); 1♂, Darjeeling, Sonapur, Mahahandra river, 9.–15.xi.1984, B. Bhakta leg. (NHMB). **Nepal:** 1♀, Chitwan Roy. NP, Sauraha vill., 27.35N, 84.30E, 166 m, at light, 21.–27.vii.2000, J. Schneider leg. (NMPC); 1♀, same data, but D. Král leg. (NMPC). **Sri Lanka:** 1♀, Sinharaya, 4.–7.xii.1979, V. Mahler Jensen lgt., *Copelatus tenebrosus* Rég., det. T.G. Vazirani 1981 (ZMUC); 1♂, Hanwella, 20.xii.1979, V. Mahler Jensen lgt., *Copelatus ceylonicus* Vaz., det. T.G. Vazirani 1981 (ZMUC); 2♂, Inginiyagala, 14.xii.1979, V. Mahler Jensen lgt. [as *C. ceylonicus*] (ZMUC); 20 specimens, Colombo env., 8.xi.1980, M.A. Jäch leg. (NHMW, GWCW); 1♂, Galle, Unawatuna, 30.xi.2002, M. Janalík leg. (NMPC).

Comments on classification. Vazirani (1969) described *C. ceylonicus* based on a single female collected in 'pond in Museum' in Colombo city. The author mentioned its similarity to *C. tenebrosus* and differentiated the new species by the more subparallel habitus, rufo-ferruginous coloration and by the elytral striae terminating apically at the same level. We had no possibility to see the holotype, but have studied three males identified as *C. ceylonicus* by Vazirani and deposited in ZMUC (Holmen & Vazirani 1990). They are all teneral, which explains their more subparallel habitus and rufo-ferruginous coloration. Otherwise, they agree well with typical specimens of *C. tenebrosus* from Sri Lanka and other countries across its area of distribution; the length of the dorsal elytral striae is variable even within specimens in one population and it is not usable for species delimitation.

Copelatus assamensis was described based on a single male specimen. It was compared with *C. andamanicus* (= *C. oblitus*) and *C. malaisei* Guignot, 1954, but actually it was keyed with *C. tenebrosus* and *C. ceylonicus* with only one difference mentioned: dorsal elytral striae equally abridged apically (i.e. terminated at the same level). As mentioned above, the length of the elytral striae is variable, and moreover the same character was also mentioned



FIGURES 49–51. *Copelatus sociennus*. 49. male habitus (Nepal); 50. median lobe in lateral view (redrawn from original description of *C. bangalorensis*); 51. same (paratype of *C. sociennus*). Scale bar 0.5 mm (Figs 50–51).

in description of *C. ceylonicus*. We had no possibility to study the holotype, however all characters mentioned in the original description, especially the testaceous surface of the pronotum and the elytra, body size 4.9 mm and sketchy drawing of median lobe fits with extensive material of *C. tenebrosus* from Assam and neighbouring areas in our hands. Therefore, we have no doubts about its identity and establish the following new synonymies: *Copelatus tenebrosus* Régimbart, 1880 = *Copelatus ceylonicus* Vazirani, 1969 **syn. nov.** = *Copelatus assamensis* Vazirani, 1970 **syn. nov.**

Distribution. *Copelatus tenebrosus* is one of the most widespread *Copelatus* species. It occurs in the entire Oriental region, in southern China and Japan in the Palaearctic region, and also reaches Australia. Here, we present the first country records from Bhutan and Nepal.

Acknowledgements

We are grateful to all colleagues mentioned in material section, for the material placed at our disposal. We are obliged to Hans Fery (Berlin, Germany) for critical comments on the manuscript. Special thanks are due to Maxwell V. L. Barclay (Natural History Museum, London, UK) who improved the language of the manuscript. SDS acknowledges her teammates for their help in the collections, Dr. Anand Padhye, Dr. Neelesh Dahanukar and authorities of Garware College and Modern College for facilities and support, and the Maharashtra State Biodiversity Board for the collection permits. The part of the work of SDS is supported by University Grants commission, Delhi, India. The work of JH was supported by the Ministry of Culture of the Czech Republic (DKRVO 2018/13, National Museum, 00023272).

References

- Balfour-Browne, J. (1939) On *Copelatus* Er. and *Leiopterus* Steph. (Col. Dytiscidae) with descriptions of new species. *The Transactions of the Royal Entomological Society of London*, 88, 57–88.
<https://doi.org/10.1111/j.1365-2311.1939.tb00250.x>
- Balke, M., Gómez-Zurita, J., Ribera, I., Vilorio, A., Zillikens, A., Steiner, J., García, M., Hendrich, L. & Vogler, A.P. (2008) Ancient associations of aquatic beetles and tank bromeliads in the Neotropical forest canopy. *PNAS*, 105, 6356–6361.
<https://doi.org/10.1073/pnas.0710368105>
- Balke, M., Ribera, I. & Vogler, A.P. (2004) MtDNA phylogeny and biogeography of Copelatinae, a highly diverse group of tropical diving beetles (Dytiscidae). *Molecular Phylogenetics and Evolution*, 32, 866–880.
<https://doi.org/10.1016/j.ympev.2004.03.014>
- Caetano, D.S., Bená, D. de C. & Vanin, S.A. (2013) *Copelatus cessaima* sp. nov. (Coleoptera: Dytiscidae: Copelatinae): first record of a troglomorphic diving beetle from Brazil. *Zootaxa*, 3710 (3), 226–232.
<https://doi.org/10.11646/zootaxa.3710.3.2>
- Darilmaz, M. & Ahmed, Z. (2016) Aquatic Coleoptera from Pakistan: faunistic and zoogeographical contribution (Coleoptera: Gyrinidae: Dytiscidae: Hydrophilidae). *Journal of Natural History*, 50, 149–162.
<https://doi.org/10.1080/00222933.2015.1059515>
- Ghosh, S.K. & Nilsson, A.N. (2012) Catalogue of the diving beetles of India and adjacent countries (Coleoptera: Dytiscidae). *Skörvnöpparn Supplement*, 3, 1–77.
- Guéorguiev, V.B. (1968) Essai de classification des coléoptères Dytiscidae. I. Tribus Copelatini (Colymbetinae). *Izvestija na Zoologicheskija Institut s Musei, Sofia*, 28, 5–45.
- Guignot, F. (1952) Description de dytiscides inédits de la collection Régimbart. *Revue Française d'Entomologie*, 19, 17–31.
- Guignot, F. (1955) Dytiscides inédits de la collection Zimmermann (Col. Dytiscidae). *Annales de la Société Entomologique de France*, 123 (1954), 67–73.
- Guignot, F. (1961) Revision des hydrocanthares d'Afrique (Coleoptera Dytiscidae [sic!]). Troisième partie. *Annales du Musée Royal du Congo Belge, Série 8vo (Sciences Zoologiques)*, 90, 659–995.
- Hájek, J., Hendrich, L. & Balke, M. (2018) The *Copelatus doriae-masculinus* species complex in Greater Sunda, with description of three new species and a new synonymy (Coleoptera, Dytiscidae). *Spixiana*, 41. [in press]
- Hendrich, L. & Balke, M. (1998) Zwei neue Schwimmkäfer der Gattung *Copelatus* Erichson 1832 aus Indien (Coleoptera: Dytiscidae). *Entomologische Zeitschrift*, 108 (9), 356–362.
- Hendrich, L., Balke, M. & Yang, C.M. (2004) Aquatic Coleoptera of Singapore: Species richness, ecology and conservation. *The Raffles Bulletin of Zoology*, 52 (1), 97–145.
- Holmen, M. & Vazirani, T.G. (1990) Notes on the genera *Neptosternus* Sharp and *Copelatus* Erichson from Sri Lanka and India with the description of new species (Coleoptera: Dytiscidae). *Koleopterologische Rundschau*, 60, 19–32.

- Mani, M.S. (1974) *Ecology and biogeography in India*. W. Junk, The Hague, 647 pp.
<https://doi.org/10.1007/978-94-010-2331-3>
- Manivannan, D. & Madani, J.I. (2011) Two new species *Hydrovatus sringeriensis* and *Copelatus wayanadensis* (Coleoptera: Dytiscidae) from Western Ghats of South India. *Records of the Zoological Survey of India*, 111 (2), 1–6.
- Manuel, M., Deler-Hernández, A., Megna, Y.S. & Hájek, J. (2018) *Copelatus* Erichson from the Dominican Republic, with the description of a new species, comments on elytral striation and faunistic notes on Antillean species (Coleoptera: Dytiscidae: Copelatinae). *Zootaxa*, 4399 (3), 371–385.
<https://doi.org/10.11646/zootaxa.4399.3.7>
- Miller, K.B. & Nilsson, A. N. (2003) Homology and terminology: Communicating information about rotated structures in water beetles. *Latissimus*, 17, 1–4.
- Nakane, T. (1963) New or little-known Coleoptera from Japan and its adjacent regions. XVIII. *Fragmenta Coleopterologica*, 6, 23–26.
- Nilsson, A.N. & Hájek, J. (2018) *A world catalogue of the family Dytiscidae, or the diving beetles (Coleoptera, Adephaga). Version 1.1.2018*. Distributed as a PDF file via Internet. Available from: <http://www.waterbeetles.eu> (accessed 10 May 2018)
- Régimbart, M. (1880) The new Dytiscidae and Gyrinidae collected during the recent scientific Sumatra-expedition. *Notes from the Leyden Museum*, 2, 209–216.
- Régimbart, M. (1899) Révision des Dytiscidae de la région Indo- Sino-Malaise. *Annales de la Société Entomologique de France*, 68, 186–367.
- Rocchi, S. (1976) Dytiscidi del Bengla-desh con descrizione di *Copelatus brivioi* n. sp. (Coleoptera Dytiscidae). *Bollettino della Società Entomologica Italiana*, 108, 177–180.
- Rocchi, S. (1986) Dytiscidi di Birmania, Thailandia e Sri Lanka, con descrizione di due nuove specie (Coleoptera) (XVI Nota sui coleotteri idrodefagi). *Bollettino della Società Entomologica Italiana*, 118, 31–34.
- Rocchi, S. (2001) Dytiscidae raccolti in India durante due missioni entomologiche (1995, 1997) organizzate dal Museo Zoologico "La Specola" dell'Università di Firenze (Coleoptera, Dytiscidae). *Atti del Museo di Storia Naturale della Maremma*, 19, 63–75.
- Satô, M. (1961) Aquatic Coleoptera from Amami-Oshima of the Ryukyu Islands (II). *Akitu*, 10, 7–10.
- Satô, M. (1983) Distribution of the genus *Copelatus* in Japan (Coleoptera: Dytiscidae). In: Satô, M. (Ed.), *Special Issue Concerning the Aquatic Coleoptera Presented at the Workshop of the XVI International Congress of Entomology in Kyoto, Japan in 1980*. Nagoya, 1983, pp. 35–41.
- Sharp, D. (1882) On aquatic carnivorous Coleoptera or Dytiscidae. *Scientific Transactions of the Royal Dublin Society*, Series 2, 2, 179–1003, pls. 7–18.
- Vazirani, T.G. (1969) Two new species and notes on other species of aquatic Coleoptera from Ceylon. *Spolia Zeylanica*, 31, 399–403.
- Vazirani, T.G. (1970) Contributions to the study of aquatic beetles (Coleoptera). VII. A revision of Indian Colymbetinae (Dytiscidae). *Oriental Insects*, 4, 303–362.
<https://doi.org/10.1080/00305316.1970.10433967>
- Vazirani, T.G. (1973) Contribution to the study of aquatic beetles. 14. *Copelatus neelumae* sp. nov. (Dytiscidae) from India. *Journal of the Bombay Natural History Society*, 70 (1972), 224–226.
- Vazirani, T.G. (1974) Two new species of Dytiscidae (Insecta: Coleoptera) from India. *Indian Museum Bulletin*, 7 (1), 16–20. [1972]
- Vazirani, T.G. (1975) Two new species of *Copelatus* Erichson, (Insecta: Coleoptera: Dytiscidae) from India. In: Tiwari, K.K. & Srivastava, C.B. (Eds.), *Dr. B.S. Chauhan commemoration volume*. Zoological Society of India, Vani Vihar, Orissa, pp. 341–347.
- Wewalka, G. (1975) Ergebnisse der Bhutan-Expedition 1972 des Naturhistorischen Museums in Basel. Coleoptera: Fam. Dytiscidae, unter Berücksichtigung einiger Arten aus benachbarten Gebieten. *Entomologica Basiliensia*, 1, 151–165.
- Wewalka, G. (1981) Drei neue Arten der Gattung *Copelatus* aus Indien (Dytiscidae, Col.). *Koleopterologische Rundschau*, 55, 65–70.
- Wewalka, G. (2017) A new species of the *Copelatus trilobatus* group from Kerala, South India (Coleoptera: Dytiscidae). *Koleopterologische Rundschau*, 87, 9–13.
- Zimmermann, A. (1919) H. Sauter's Formosa-Ausbeute: Haliplidae et Dytiscidae (Col.). *Entomologische Mitteilungen*, 8, 75–77.
<https://doi.org/10.5962/bhl.part.27264>