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Taxonomy of the dung beetle genus *Ochicanthon* Vaz-de-Mello (Coleoptera: Scarabaeidae: Scarabaeinae) of the Indian subcontinent, with notes on distribution patterns and flightlessness

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Abstract

The taxonomy of the genus *Ochicanthon* Vaz-de-Mello of the Indian subcontinent is revised and an identification key to the species is provided. The number of *Ochicanthon* species from the region is increased to 15, eight of which are new: *O. besucheti* Cuccodoro **sp. nov.**, *O. ceylonicus* Cuccodoro **sp. nov.**, *O. devagiriensis* Sabu & Latha **sp. nov.**, *O. ernei* Cuccodoro **sp. nov.**, *O. gauricola* Cuccodoro **sp. nov.**, *O. murthyi* Vinod & Sabu **sp. nov.**, *O. mussardi* Cuccodoro **sp. nov.** and *O. vazdemelloi* Latha & Sabu **sp. nov.** Four species from the upper montane cloud forests are wingless, raising the number of wingless species of *Ochicanthon* to five. At least two groups of *Ochicanthon* exist in the Indian subcontinent: i) the *O. tristis* group with dorsum predominantly black-brown, with a distinct pattern of orange-yellow patches on the elytra and ii) the *O. laetus* group with dorsum entirely brown or black and with or without a faint orange patch. The distributions in the moist forests of the southwestern and northeastern regions of the Indian subcontinent, the possible origin of the genus in the Western Ghats in the southwest of the subcontinent and the flightlessness of montane species are discussed.

Key words: Canthonini, winglessness, montane cloud forests, the Western Ghats, Indo-Burma, biodiversity hotspots

Introduction

The genus *Ochicanthon* Vaz-de-Mello, 2003, previously referred to as *Phacosoma* Boucomont, 1914 (Vaz-de-Mello 2003), includes small to medium sized forest dwelling Canthonini. The genus has a geographic distribution restricted to the Oriental region, where it occurs from the Indian subcontinent bioregion to the Sunda Shelf and Philippines bioregion of the Indo-Pacific region (Wikramanayake *et al.* 2002, Krikken & Huijbregts 2007). Of the 39 known species, seven are recorded from the Indian subcontinent (Arrow 1931, Balthasar 1963, Paulian 1980, Paulian 1983, Krajcik 2006, Löbl & Smetana 2006, Schoolmeesters 2008), four from Indochina (Boucomont 1920, Paulian 1987, Masumoto 1989, Hanboonsong & Masumoto 2001, Krajcik 2006, Löbl & Smetana 2006, Schoolmeesters 2008) and 28 from the Sunda Shelf and Philippines bioregion (Boucomont 1914, Ochi 1990, Ochi & Araya 1996, Ochi *et al.* 1997, Krajcik 2006, Ochi *et al.* 2006, Krikken & Huijbregts 2007, Ochi *et al.* 2007, Ochi & Kon 2008, Schoolmeesters 2008).

Though the Indian subcontinent is suggested to have a morphologically diverse *Ochicanthon* fauna (Krikken & Huijbregts 2007), no additions have been made to the genus in the area since the works of Paulian (1980, 1983). In the present work, we describe eight new species, three of which are flightless, and redescribe all species recorded from Indian subcontinent except *O. obscurus* (Boucomont) whose status as an Indian species requires confirmation (see diagnosis under key to the species). Notes on the disjunct distribution of the genus in the southwest and northeast of the Indian subcontinent, flightlessness and possible origin of the genus in the southwest of the subcontinent and subsequent dispersion to Indochina, Sunda Shelf and Philippines ecoregions are also discussed.

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Material and Methods

The specimens examined are deposited in the following collections: The Natural History Museum, London, U.K. (BMNH); Kerala Forest Research Institute, Peechi, Kerala, India (KFRI); Muséum d'histoire naturelle, Geneva, Switzerland (MHNG); National Pusa Collection, Indian Agricultural Research Institute, New Delhi, India (NPC); St. Joseph's College, Devagiri, Calicut, Kerala, India (SJC); Zoological Survey of India, Western Ghats Regional Station, Calicut, Kerala, India (ZSI-Ca).

Locality data are given, with additional unpublished information provided in square brackets []. Labels pertaining to the identification history of the specimens are detailed only for the type series of *O. laetum* (Arrow).

Measurements were taken dorsally and are defined as follows: total body length (TL) = distance from apex of clypeus to tip of pygidium; body width (BW) = maximal distance between lateral elytral margins; pronotal length (PL) = medial length of pronotum; pronotal width (PW) = maximal width of pronotum; elytral length (EL) = elytral sutural length. All figures (except Fig. 9) are composites taken using a digital camera mounted onto a Leica MZ Apo dissecting microscope and processed using Automontage software.

Key to the species of *Ochicanthon* of the Indian subcontinent

This key includes all the species of *Ochicanthon* reported from the Indian subcontinent, including *O. obscurus* Boucomont, 1920 (not treated in taxomomy below). *Ochicanthon obscurus* is widely distributed in the Indochina ecoregion in Myanmar (type locality), Laos, Vietnam and Thailand (Hanboonsong & Masumoto 2001, Krikken & Huijbregts 2007). In India, it has been reported only once from the Kachin Hills in Arunachal Pradesh (Sewak 2006). However, the specimens identified by Sewak (2006) could not be located and this identification could not be verified. Moreover, the examination of five MHNG specimens from Myanmar (1) and Thailand (4) and matching the description of *O. obscurus* revealed that these represent not less than four distinct species, whose adequate taxonomic treatment was beyond the scope of this study. In this context, we consider that the *O. obscurus* determined by Sewak (2006) probably represents an undescribed species. Although we do not consider *O. obscurus* to occur in India, we included it in this key to indicate that there is a similar undescribed species that occurs here.

1 Each elytron with 1–3 distinct orange-yellow spots (Figs. 10, 41) (*O. tristis* group) 2
- Each elytron with a faint orange humeral spot or no spots (Figs. 26, 46) (*O. laetus* group) 5
2 Each elytron with 2–3 orange-yellow spots (Fig. 10); background microsculpture of elytral interstriae coriaceous. 3
- Each elytron with a single orange-yellow spot (Fig. 41); background microsculpture of elytral interstriae smooth 4
3 Pronotum with anterolateral lobes orange-yellow . . . . . *O. obscurus* (Boucomont)
- Pronotum unicolored . . . . . *O. deplanatus* (Paulian)
4 Mesosternum impunctate (Fig. 33) 6
- Mesosternum with posterior area coarsely punctate (Fig. 43) . . . . . *O. mussardi* Cuccodoro
5 Punctation on head and pronotum with distance between punctures not exceeding their diameter (Fig. 26) . *O. laetus* (Arrow)
- Punctation on head and pronotum with interval between punctures exceeding their diameter (Fig. 46) . . . . *O. nitidus* (Paulian)
6 Punctation on pronotum very fine, almost indistinct, with interval between punctures exceeding by more than 5 times their diameter; elytral striae consisting of long straight sulci without depressions (Fig. 32); hind wings absent. . . *O. loebli* (Paulian)
- Punctation on pronotum coarse and distinct, with interval between punctures not exceeding 5 times their diameter; elytral striae consisting of long straight sulci with depressions (Fig. 9); hind wings present or absent 7
7 Pygidium fairly impunctate, except a few minute punctures at the sides; metasternal shield smooth and shiny. . . . . *O. cingalensis* (Arrow)
- Pygidium markedly punctate; metasternal shield punctate and shiny. 8
8 Protrochanter with outer margin angulate; elytra each with a faint orange humeral spot. . . . . *O. murthyi* Vinod & Sabu
- Protrochanter with outer margin arcuate; elytra unicolored 9
9 Elytral pubescence conspicuous, arcuate, semi-erect, arranged in two rows; hind wings absent. 10
- Elytral pubescence inconspicuous, straight, recumbent, not arranged in two rows; hind wings present or absent 11
10 Pronotal pubescence inconspicuous, recumbent; elytral disc lacking tubercles . . . . . *O. vazdemelloi* Latha & Sabu
- Pronotal pubescence conspicuous, semi-erect; posterior portion of elytral disc bearing projecting tubercles . . . . . *O. devagiriensis* Sabu & Latha
11 Elytral striae consisting mainly of chains of confluent discoidal depressions (Fig. 19) 12
- Elytral striae consisting mainly of chains of oval depressions joined by straight sulci (Fig. 24) 14
12 Metasternal shield with central area coarsely punctate (Fig. 3); hind wings absent. . . . . *O. besucheti* Cuccodoro
- Metasternal shield with central area finely punctate (Fig. 58); hind wings present 13

13 Mesosternum appearing impunctate (Fig. 20). . . . . *O. ernei* Cuccodoro
- Mesosternum with large punctures along meso-metasternal line (Fig. 58) . . . . . *O. tristoides* (Paulian)
14 Median portion of meso-metasternal line arcuate (Fig. 8) . . . . . *O. ceylonicus* Cuccodoro
- Median portion of meso-metasternal line subangulate (Fig. 25) 15
15 Metasternal shield impunctate along meso-metasternal line (Fig. 25) . . . . . *O. gauricola* Cuccodoro
- Metasternal shield coarsely punctate along meso-metasternal line (Fig. 53) . . . . . *O. tristis* (Arrow)

Ochicanthon besucheti Cuccodoro sp. nov.

(Figs. 1–5)

Description. Body (Fig. 1) predominantly black. Punctation on dorsal surface of head setiferous and annular separated by intervals not exceeding their diameter. Pronotum in lateral view weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge well marked, extended on slightly more than one third of pronotal length. Pronotal punctation (Fig. 2) consisting of annular setiferous punctures separated by interval not exceeding their diameter, becoming sparser medially and larger posteriorly; setae fine and very short, almost indistinct. Elytra in lateral view moderately convex; suture not raised; striae shallow, wide, consisting of chains of fairly confluent discoidal depressions (Fig. 2); interstriae fairly flat, even, covered with annular setiferous punctures scattered irregularly and separated by interval nearly equal to their diameter; background microsculpture smooth; setae fine, straight and recumbent; lateral ridge posteriorly extended to level of apex of third stria. Mesosternum impunctate; meso-metasternal line arcuate; metasternum coarsely and uniformly punctate (Fig. 3). Pygidium covered with shallow setiferous punctures becoming finer and sparser ventrally. Protrochanter with outer margin arcuate. Hind wings absent.

Male lacking obvious secondary sexual characters. Aedeagus as in Figs 4–5.

Measurements (mm; n = 4): TL = 3.3–4.5; BW = 2.2–2.7; PL = 1.0–1.2; PW = 1.9–2.3; EL = 1.9–2.2.

Type material. Holotype (male, MHNG): “India, Meghalaya, Khasi Hills, Shillong, 1850–1950m, 25.x.1978, leg. Besuchet & Löbl, #27” [sifting in primary forest, Shillong Peak, slope North].

Paratypes (3, MHNG): Same data as holotype, 1 male and 1 female; “India, Meghalaya, Khasi hills, Shillong Peak, 1800m, 21.x.2000 <25°32’30’’ N; 91°50’55’’ E>, leg. Carlton, Cuccodoro, Erne & Leschen, #9a” [sifting leaf litter in mixed Pine forest], 1 female.

Distribution and natural history. North East India (Upper montane forest in Shillong Peak in the Meghalaya subtropical forests ecoregion**)**.

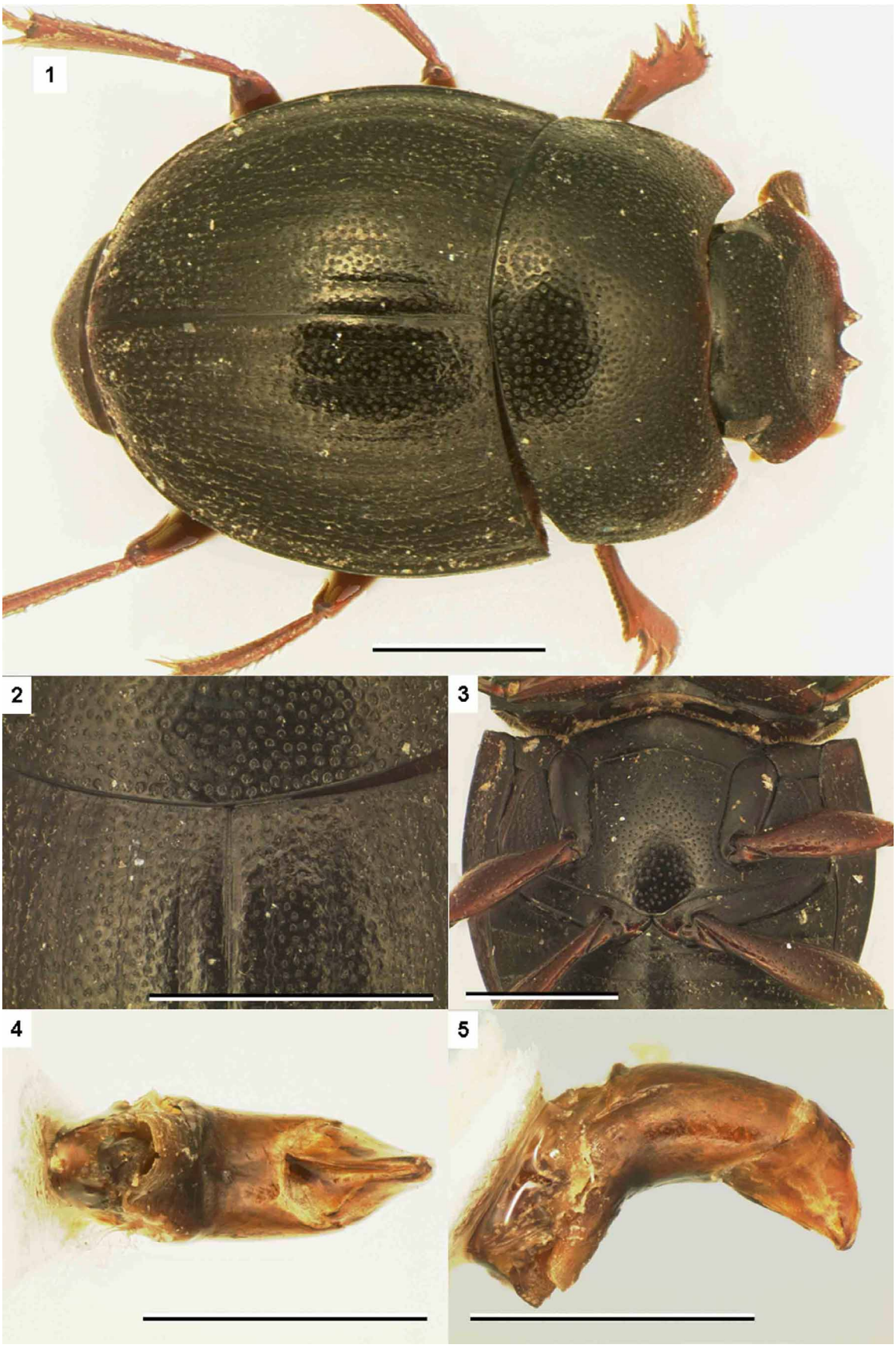
Etymology. Named after Claude Besuchet, Geneva, who collected part of the type series.

Diagnosis. Among the four wingless species of *Ochicanthon* (*O. besucheti*, *O. devagiriensis*, *O. loebli* and *O. vazdemelloi)* in the Indian subcontinent, *O. besucheti* and *O. loebli* possess elytral interstriae with annular setiferous punctures not arranged in two rows. It is the only wingless *Ochicanthon* recorded from northeast of the Indian subcontinent. *Ochicanthon besucheti* strongly resembles *O. ernei* and *O. tristoides*, from northeast India, but is easily distinguishable by the absence of wings, aedeagal shape and coarsely punctate central area of the metasternal shield.

Ochicanthon ceylonicus Cuccodoro sp. nov.

(Figs. 6–8)

Description. Body (Fig. 6) predominantly black. Dorsal surface of head with annular setiferous punctures separated by intervals almost equal to their diameter. Pronotum in lateral view weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge absent. Pronotal punctation (Fig. 7) consists of annular setiferous punctures separated by interval equal to their diameter, becomes finer anteromedially; setae indistinct, straight and recumbent. Elytra moderately convex in lateral view; suture not raised; striae shallow, narrow, consisting of chains of oval depressions joined by straight sulci (Fig. 7); interstriae slightly convex, uneven, finely



FIGURES 1–5. *Ochicanthon besucheti* (holotype). Dorsal habitus (1); base of pronotum and elytra (2); mesosternum and metasternum (3); aedeagus, ventral view (4); aedeagus, lateral left view (5). Scale bars = 1 mm.

FIGURES 6–8. *Ochicanthon ceylonicus* (holotype). Dorsal habitus (6); base of pronotum and elytra (7); mesosternum and metasternum (8). Scale bars = 1 mm.

punctate, irregular; background microsculpture smooth; setae fine, straight and recumbent; lateral ridge posteriorly extended to level of apex of second stria. Mesosternum impunctate, meso-metasternal line arcuate, metasternal shield coarsely punctate along the sides and finely punctate in the centre (Fig. 8). Pygidium covered with shallow setiferous punctures becoming finer and sparser ventrally. Protrochanter with outer margin arcuate. Hind wings present.

Male unknown.

Measurements (mm; n = 3): TL = 4.2–4.4; BW = 2.4–2.5; PL = 1.1–1.2; PW = 2.0–2.1; EL = 2.1–2.2.

Type material. Holotype (female, MHNG): "Ceylan [Sri Lanka], Central, Peradeniya, 550m, 19.i.1970, leg. Besuchet, Löbl & Mussard, #10" [sifting in forest near experimental agricultural station].

Paratypes (2 females, MHNG): same data as holotype.

Distribution and natural history. Sri Lanka. (Peradeniya in the Sri Lanka lowland rainforest ecoregion).

Etymology. Named after "Ceylon", the former name of Sri Lanka.

Diagnosis. *Ochicanthon ceylonicus* and *O. cingalensis* are the only *Ochicanthon* known from Sri Lanka. Both species can be easily distinguished by the pygidium, which is markedly punctate in *O. ceylonicus* and appearing impunctate in *O. cingalensis*. They uniquely share unicolored elytra and striae consisting of chains of oval depressions joined by straight sulci with the South Indian species *O. gauricola* and *O. tristis.* However the South Indian species have the middle portion of the meso-metasternal line subangulate.

***Ochicanthon cingalensis* (Arrow)**
(Fig. 9)

Phacosoma cingalensis Arrow, 1931: 357.

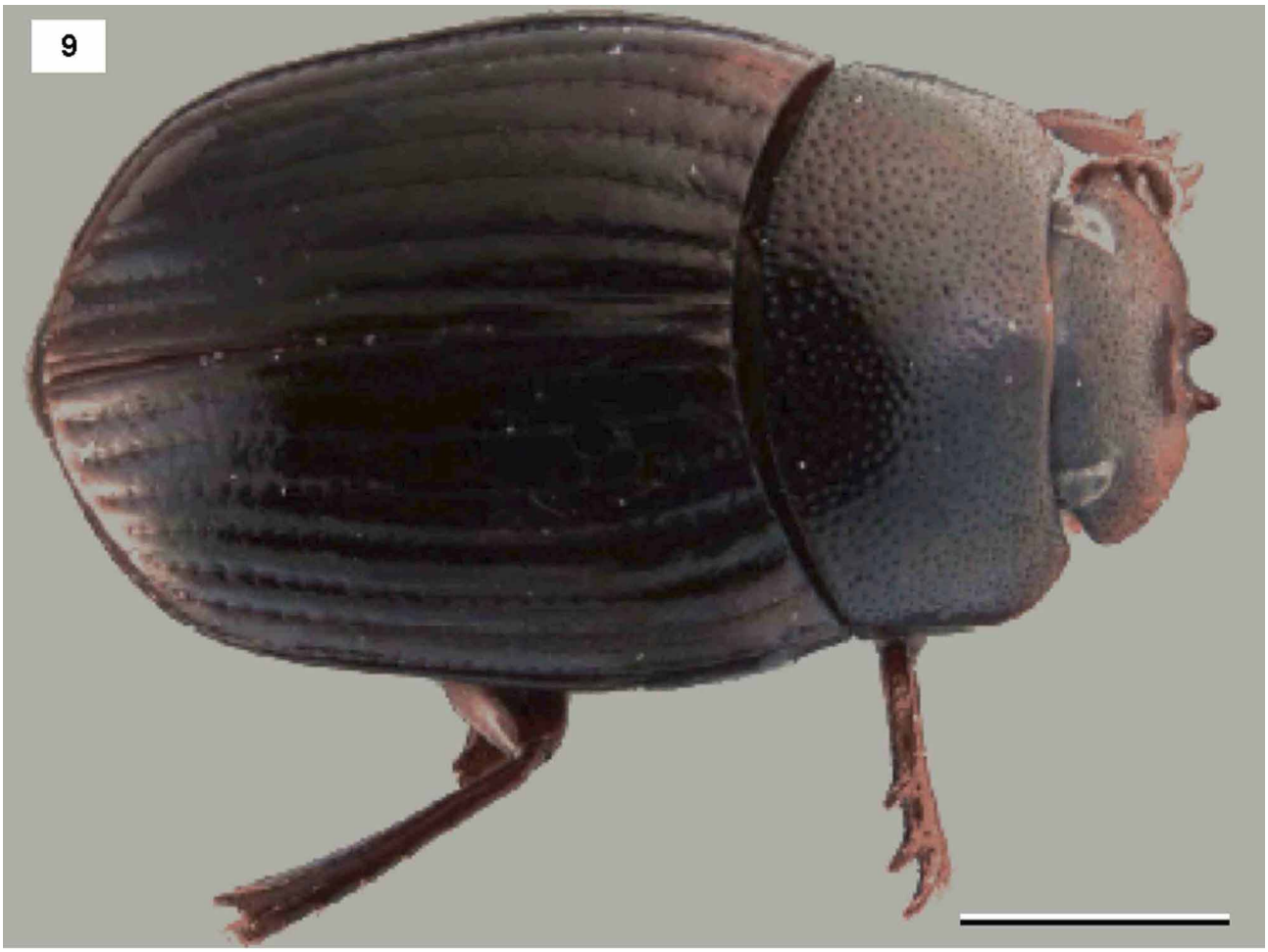


FIGURE 9. *Ochicanthon cingalensis* (holotype). Dorsal habitus. Scale bar = 1 mm.

Description. Body (Fig. 9) predominantly reddish brown. Punctation on dorsal surface of head fine and even with punctures becoming very fine and sparse anteriorly and larger posteriorly. Pronotum in lateral view weakly convex, outline at base almost in line with that of elytral suture. Pronotal punctation consisting of rather large annular setiferous punctures separated by intervals fairly equal to their diameter, becoming finer anteriorly. Elytra moderately convex; striae well marked, narrow, consisting of chains of oval depressions joined by straight sulci; interstriae slightly convex, fairly even, impunctate; background microsculpture smooth; lateral ridge posteriorly extended nearly to level of apex of second stria. Mesosternum and metasternal shield smooth. Meso-metasternal line gently rounded. Pygidium smooth, except for few minute punctures at the sides. Protrochanter with outer margin arcuate. Hindwings present.

Measurements (mm; n = 1: holotype): TL = 4.5; BW = 2.6; PL = 1.1; PW = 2.2; EL = 2.6.

Material examined. Holotype (female, BMNH): "Ceylon [Sri Lanka], Ohiya, 6500ft [ca. 2000m], 09.iv.1935, leg. Henry".

Distribution and natural history. Sri Lanka (Ohiya in the Sri Lanka montane evergreen forests).

Diagnosis. *Ochicanthon cingalensis* is the only species treated in this study to possess the pronotum markedly punctate in combination with unicolor elytra almost impunctate pygidium and impunctate metasternal shield. See discussion under *O. ceylonicus* and *O. nitidus*.

Ochicanthon deplanatus (Paulian)

(Figs. 10–12)

Phacosoma deplanatum Paulian, 1983: 615.

Description. Body (Fig. 10) predominantly black with two orange-yellow spots along lateral margin of each elytron. Punctation on head and pronotum (Fig. 11) consists of annular setiferous punctures separated by interval approximately equal to their diameter. Pronotum weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge well marked, extended on slightly more than one third of pronotal length; setae almost indistinct, straight and recumbent. Elytra weakly convex; suture not raised; striae shallow, narrow, consisting of chains of oval depressions joined by straight sulci (Fig. 11); interstriae fairly flat, finely punctate, uneven; background microsculpture coriaceous; lateral ridge posteriorly extended to level of apex of second stria. Mesosternum smooth, meso-metasternal line weakly arcuate, metasternum coarsely punctate (Fig. 12). Pygidium covered with shallow annular setiferous punctures becoming finer and sparser ventrally. Protrochanter with outer margin arcuate. Hind wings present.

Male unknown.

Measurements (mm; n = 1: holotype): TL = 6.0; BW = 3.8; PL = 1.8; PW = 3.0; EL = 3.0.

Material examined. Holotype (female, MHNG): "India Meghalaya, Khasi Hills, Cherrapunjee, 1200m, 26.x.1978, leg. Besuchet & Löbl, #28b" [below Cherrapunjee, sifting in forest at base of rocks].

Distribution and natural history. Northeast India (Cherrapunjee, in the Meghalaya subtropical forests ecoregion).

Diagnosis. *Ochicanthon deplanatus* is the only species of the Indian subcontinent to have each elytron with 2 orange-yellow spots and coriaceous elytral background microsculpture. These characters are shared with *O. obscurus* recorded from the eastern boundary of Arunachal Pradesh and beyond the northeast of the Indian subcontinent in Myanmar, Laos, Vietnam and Thailand (Boucomont 1920, Hanboonsong & Masumoto 2001, Sewak 2006), but *O. deplanatus* has the pronotum unicolored unlike *O. obscurus* with anterolateral lobes of pronotum orange-yellow.

Ochicanthon devagiriensis Sabu & Latha sp. nov.

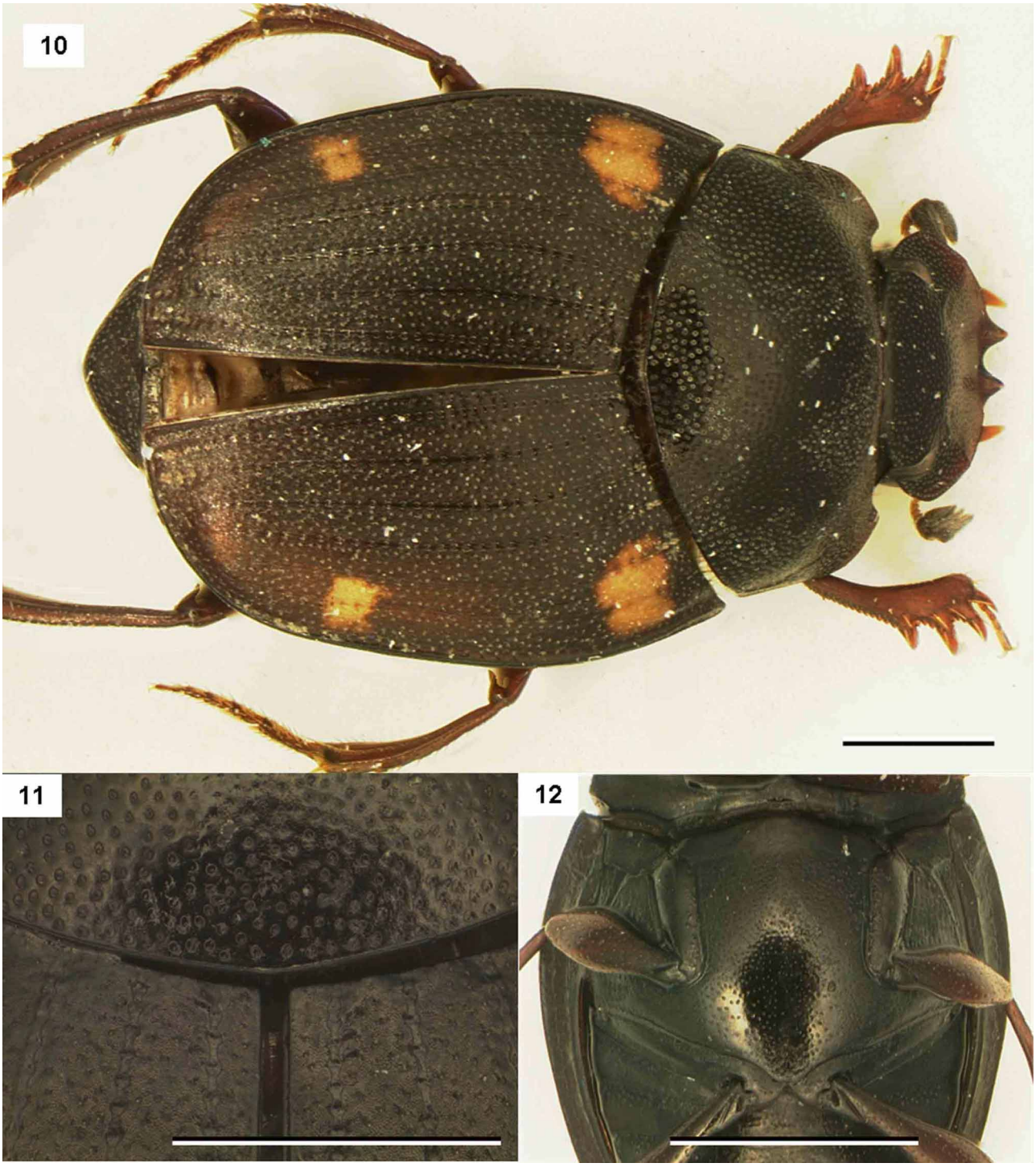
(Figs. 13–17)

Description. Body (Fig. 13) predominantly black. Dorsal surface of head glabrous, with annular punctation separated by intervals approximately equal to their diameter. Pronotum in lateral view strongly convex, outline at base obtusely angled with that of elytral suture; laterobasal paramarginal ridge absent. Pronotal punctation (Fig. 14) consists of annular setiferous punctures separated by interval approximately equal to their diameter, becoming larger laterally and posteriorly; setae conspicuous, arcuate and semi-erect. Elytra in lateral view strongly convex, bearing about a dozen tubercles, some on posterior portion of disc projecting conspicuously; suture conspicuously raised, except on apical quarter; striae shallow, wide, consisting of chains of discoidal depressions joined by straight sulci (Fig. 14); interstriae moderately convex, uneven, covered with fine, sparse setiferous punctures arranged in two rows; background microsculpture smooth; setae stout, arcuate and semi-erect, never scale-like; lateral ridge posteriorly extended to level of apex of second stria. Mesosternum with sparse punctures towards base; meso-metasternal line angulate; metasternal shield with uniform punctation separated by intervals fairly equal to their diameter (Fig.15). Pygidium rather uniformly covered with shallow annular setiferous punctures. Protrochanter with outer margin arcuate. Hind wings absent.

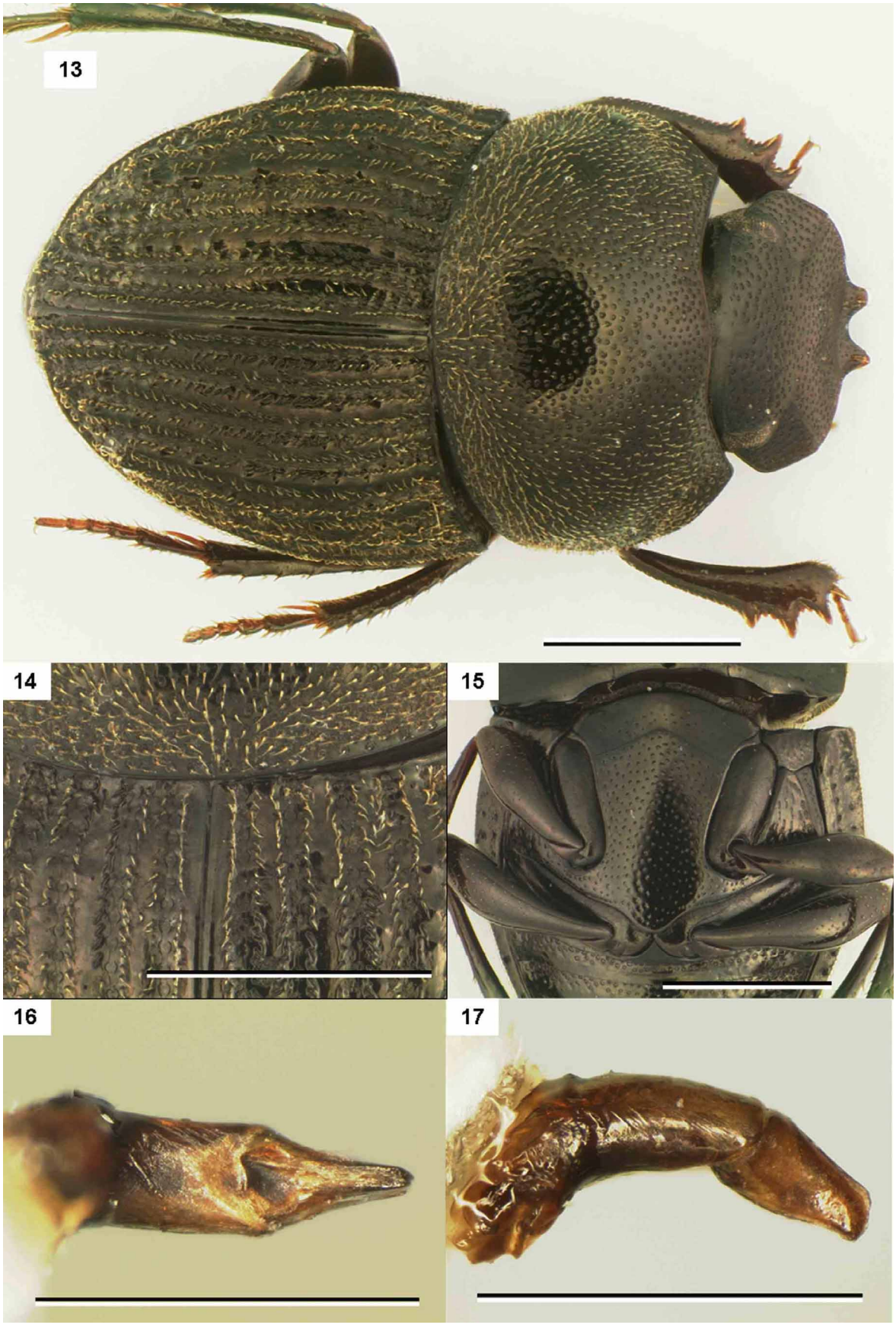
Male lacking obvious secondary sexual characters. Aedeagus as in Figs 16–17.

Measurements (mm; n = 27): TL = 3.8–4.3; BW = 2.2–2.4; PL = 1.3–1.4; PW = 2.1–2.3; EL = 1.9–2.2.

Type material. Holotype (male, in NPC): "India, Kerala, Idikki District, Umayamalai (Eravikulam National Park), 2368 m, upper montane evergreen forest, dung baited pit fall trap, 1. IX. 2007, Shiju, T.R."



FIGURES 10–12. *Ochicanthon deplanatus* (holotype). Dorsal habitus (10); base of pronotum and elytra (11); mesosternum and metasternum (12). Scale bars = 1 mm.



FIGURES 13–17. *Ochicanthon devagiriensis* (holotype). Dorsal habitus (13); base of pronotum and elytra (14); mesosternum and metasternum (15); aedeagus, ventral view (16); aedeagus, lateral left view (17). Scale bars = 1 mm.

Paratypes (26): Same data as holotype, 15 females in SJC and ZSI-Ca; same data as holotype, but 2. IX. 2007, 5 females in KFRI; "India, Kerala, Idikki District, Rajamalai (Eravikulam National Park), 2114 m, montane evergreen forest, dung baited pit fall trap, 5. XII. 2006, Vinod, K.V," 4 females in NPC; "India, Kerala," 1 male and 1 female in MHNG.

Distribution and natural history. South India (upper montane evergreen forests at Eravikulam National Park, in the South Western Ghats montane rain forest ecoregion).

Etymology. Named after the local name 'Devagiri' of St. Joseph's College, Calicut, Kerala State, India.

Diagnosis. Within the genus, the presence of projecting tubercles on elytral disc is unique to *O. devagiriensis*. Among the four wingless Indian species of *Ochicanthon* (see diagnosis under *O. besucheti*), only *O. devagiriensis* and *O. vazdemelloi* have the elytral pubescence arcuate, semi-erect and arranged in rows. The only other *Ochicanthon* species to possess erect elytral pubescence arranged in rows is *O. hanskii* Krikken & Huijbregts, 2007, from Borneo, which is interestingly also the only non-Indian wingless species of the genus.

***Ochicanthon ernei* Cuccodoro sp. nov.**
(Figs. 18–22)

Description. Body (Fig. 18) predominantly dark brown. Punctation on dorsal surface of head annular separated by intervals of less than their diameter. Pronotum weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge well marked, extended on slightly more than one third of pronotal length. Pronotal punctation (Fig. 19) similar to head but becoming somewhat denser and finer anteriorly; setae almost indistinct, straight and recumbent. Elytra moderately convex; suture not raised; striae shallow, wide, consisting of chains of fairly confluent discoidal depressions (Fig. 19); interstriae flat, impunctate, uneven; microsculpture smooth; setae fine, straight and recumbent; lateral ridge posteriorly extended to level of apex of fourth stria. Mesosternum smooth; meso-metasternal line subangulate; metasternal shield with few large punctures at the base; sides, centre and top with fine sparse punctures (Fig. 20). Pygidium covered with annular setiferous punctures becoming finer and sparser ventrally. Protrochanter with outer margin arcuate. Hind wings present.
Male lacking obvious secondary sexual characters. Aedeagus as in Figs 21–22.

Measurements (mm; n = 2): TL = 3.6–3.7; BW = 2.5–2.6; PL = 1.1; PW = 2.0–2.1; EL = 2.0.

Type material. Holotype (male, MHNG): "India, Meghalaya, Ri Bhoi dist., near Nongpoh, <25°55'31'' N; 91°52'25'' E>, 600m, 12.X.2000, leg. Carlton, Cuccodoro, Erne & Leschen, #1" [sifting forest leaf litter and plant debris].

Paratypes (1 female, MHNG): "India, Meghalaya, Khasi Hills, Nongpoh, 700m, 5.xi.1978, leg. Besuchet & Löbl, #42b" [sifting in forest above the village, on north slope, at base of rocks and tall trees].

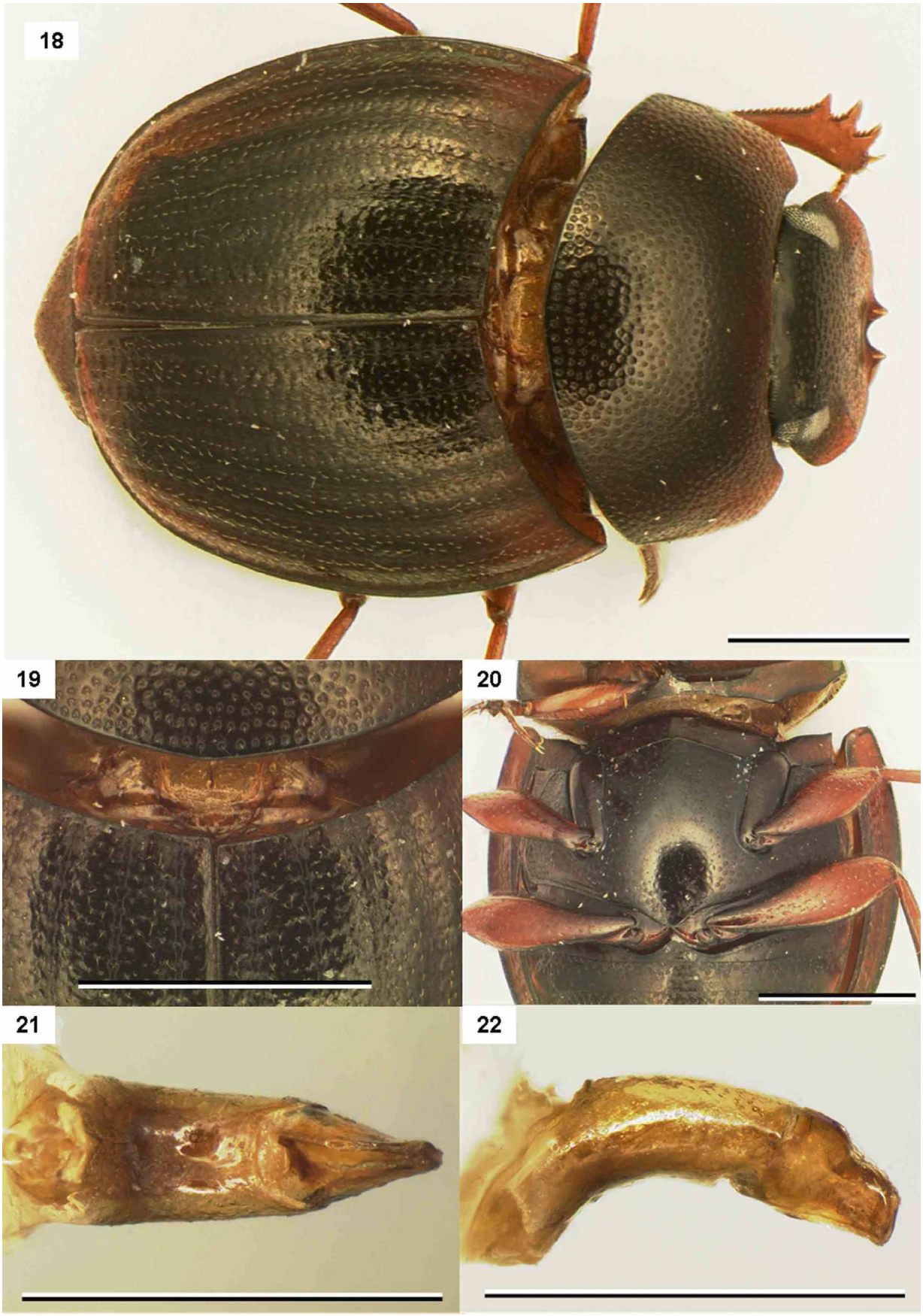
Distribution and natural history. Northeast India (Nongpoh, in Meghalaya subtropical forests ecoregion).

Etymology. Named after Daniel Erne, Geneva, one of the collectors of the holotype.

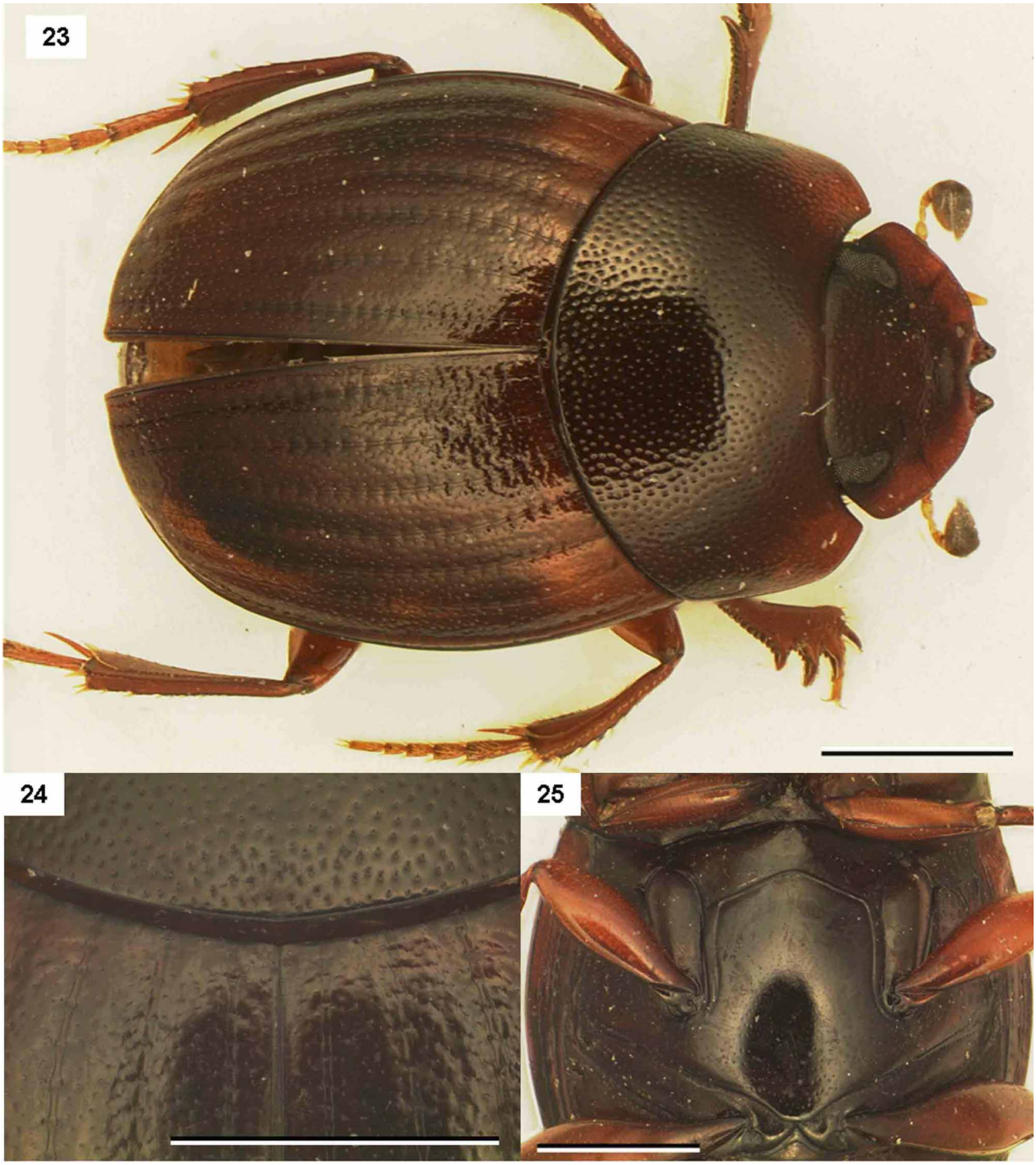
Diagnosis. *Ochicanthon ernei* can be easily distinguished from *O. tristoides* by its impunctate mesosternum and the distinctly different adeagus. See discussion under *O. besucheti*.

***Ochicanthon gauricola* Cuccodoro sp.nov.**
(Figs. 23–25)

Description. Body (Fig. 23) predominantly reddish brown. Punctation on dorsal surface of head annular, separated by intervals slightly exceeding their diameter. Pronotum in lateral view weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge well marked, extended on slightly more than one third of pronotal length. Pronotal punctation (Fig. 24) consisting of annular setiferous punctures separated by interval approximately equal to their diameter, becoming finer anteriorly; setae almost indistinct, straight and recumbent. Elytra in lateral view moderately convex; suture not raised; striae shallow, narrow, consisting of chains of oval depressions joined by straight sulci (Fig. 24); interstriae slightly convex, uneven, finely punctate, irregularly; microsculpture smooth; setae almost indistinct, straight and recumbent; lateral ridge posteriorly extended to level of apex of fourth stria. Mesosternum smooth; meso-metasternal line angulate; metasternum with few large punctures near base and fine, sparse punctures on centre, at the sides and on anterior portion (Fig. 25). Pygidium



FIGURES 18–22. *Ochicanthon ernei* (holotype). Dorsal habitus (18); base of pronotum and elytra (19); mesosternum and metasternum (20); aedeagus, ventral view (21); aedeagus, lateral left view (22). Scale bars = 1 mm.



FIGURES 23–25. *Ochicanthon gauricola* (holotype). Dorsal habitus (23); base of pronotum and elytra (24); mesosternum and metasternum (25). Scale bars = 1 mm.

covered with shallow setiferous punctures becoming finer laterally and ventrally. Protrochanter with outer margin arcuate. Hind wings present.

Male unknown.

Measurements (mm; n = 1: holotype): TL = 4.9; BW = 3.2; PL = 1.5; PW = 2.6; EL = 2.4.

Type material. Holotype (female, MHNG): "India, Kerala, Nelliampathi Hills, Pothundy Dam, 300 m, 30.xi.1972, leg. Besuchet, Löbl & Mussard, #57" [sifting in a forest ravine].

Distribution and natural history. South India (Pothundy Dam, in the South Western Ghats moist deciduous forest ecoregion).

Etymology. Named from 'Gaur' (= bison), called 'Pothu' in the local language, which is also the derivation of the name of the type locality.

Diagnosis. *Ochicanthon gauricola* and *O. tristis* are the only south-Indian members of the genus to possess unicolored elytra with striae consisting of chains of oval depressions joined by straight sulci. However, they can be easily distinguished by the metasternum, which is impunctate along the meso-metasternal line in *O. gauricola* and punctate in *O. tristis*. See diagnosis under *O. ceylonicus*.

Ochicanthon laetus (Arrow)

(Figs. 26–30)

Phacosoma laetum Arrow, 1931: 356.

Description. Body (Fig. 26) predominantly black with distinct orange-yellow humeral spot on each elytron. Punctation on dorsal surface of head annular separated by intervals of nearly their diameter. Pronotum in lateral view weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge well marked, extended on slightly more than one third of pronotal length. Pronotal punctation (Fig. 27) consisting of annular setiferous punctures separated by interval of approximately their diameter, becoming finer anteromedially; setae almost indistinct, straight and recumbent. Elytra in lateral view weakly convex; suture not raised; striae shallow, wide, consisting of chains of fairly confluent discoidal depressions (Fig. 27); interstriae weakly convex, uneven, finely punctate, irregularly; background microsculpture smooth; setae fine, recumbent and straight; lateral ridge posteriorly extended nearly to level of apex of third stria. Mesosternum punctate along the base; meso-metasternal line subangulate in middle; metasternum coarsely punctate except the centre which is almost smooth (Fig. 28). Pygidium covered with annular setiferous punctures becoming finer ventrally. Protrochanter with outer margin arcuate. Hind wings present.

Male lacking obvious secondary sexual characters. Aedeagus as in Figs. 29–30.

Measurements (mm, n=4): TL = 4.1–4.5; BW = 2.5–2.8; PL = 1.1–1.2; PW =2.2– 2.4; EL = 2.1–2.3.

Material examined. Holotype (female, BMNH): "Nilgiri Hills, H.L. Andrews [printed] / Andrewes Bequest B.M.1922-331 [printed] / *Phacosoma laetum* type arr. [handwritten by Arrow] / *Phaccosoma laetum* Arrow [handwritten by Bacchus] M.E. Bacchus det 1975".

Paratypes (3, BMNH) "Nilgiri Hills H.L. Andrews [printed] / Andrewes Bequest B.M.1922-331 [printed] / *Phacosoma laetum* Arrow [handwritten by Bacchus] M.E. Bacchus det 1975", 1 male; "Nilgiri Hills H.L. Andrews [printed] / H.L. Andrews Nilgiri Hills [printed] / 363 [handwritten] / Andrewes Bequest B.M.1922-331 [printed] / *Phacosoma laetum* co-type Arr. [handwritten by Arrow] / *Phacosoma laetum* Arrow [handwritten by Bacchus] M.E. Bacchus det 1975", 1 male; "Nilgiri Hills H.L. Andrews [printed] / H.L. Andrews Nilgiri Hills [printed] / Andrewes Bequest B.M.1922-331 [printed] / *Phacosoma laetum* co-type Arr. [handwritten by Arrow] / *Phacosoma laetum* Arrow [handwritten by Bacchus] M.E. Bacchus det 1975" 1 female.

Additionnal material (1 male, MHNG): "India, Kerala, Palghat Hills, [10 km N of] Malampuzha Dam, 150 m, 27.xi.1972, leg. Besuchet, Löbl & Mussard, #54" [sifting in *Hevea* plantation].

Distribution and natural history. South India (Nilgiri Hills in the South Western Ghats montane evergreen forests ecoregions; Malampuzha, in the South Western Ghats moist deciduous forests ecoregion). The occurrence of this species in northeast India (Balthasar 1963: Bihar, Chota Nagpur) is very doubtful.

Diagnosis. *Ochicanthon laetus* is the only member of the genus to possess spotted elytra bearing elytral striae consisting of chains of fairly confluent discoidal depressions. It can be easily distinguished from *O. mussardi* and *O. nitidus* by its basally punctate mesosternum. See discussion under *O. mussardi*.

Ochicanthon loebli (Paulian)

(Figs. 31–35)

Phacosoma loebli Paulian, 1983: 58.

Description. Body (Fig. 31) predominantly dark brown with a light green metallic shine. Punctation on dorsal surface of head consisting of simple setiferous punctures separated by interval of about two times their diameter. Pro-

notum in lateral view weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge absent. Pronotal punctation (Fig. 32) similar to that on head, but finer and sparser; setae almost indistinct, straight and recumbent. Elytra in lateral view moderately convex; suture not raised; striae shallow, narrow, consisting of long straight sulci without depressions (Fig. 32); interstriae fairly flat, very finely and unevenly punctate; setae very fine, straight and recumbent; background microsculpture smooth; lateral ridge posteriorly extended to level of apex of third stria. Mesosternum impunctate; meso-metasternal line angulate in the middle; metasternal shield with even, fine sparse punctures (Fig. 33). Pygidium fairly smooth, scarcely covered with very fine setiferous punctures. Protrochanter with outer margin arcuate. Hind wings absent.

Male lacking obvious secondary sexual characters. Aedeagus as in Figs 34–35.

Measurements (mm; n = 4): TL = 3.8–4.4; BW = 2.1–2,6; PL = 1.2–1.3; PW = 2.0–2.3; EL = 2.1–2.4.

Material examined. Holotype (male, MHNG): "India, Madras, Palni Hills, 10 km NW Kodaikanal, 2150m, 15.xi.1972, leg. Besuchet, Löbl & Mussard, #27" [sifting at forest edge with ferns and *Rhododendron*, near a river].

Additional material (3, MHNG): " India, Madras, Palni Hills, Kodaikanal, 2200m, 12.xi.1972, #23" [sifting in degraded forest with *Rhododendron*], 2 males and 1 female.

Distribution and natural history. South India (Kodaikanal, in the South Western Ghats montane rain forest ecoregion).

Diagnosis. Presence of elytral striae consisting of long straight sulci without depressions is unique to *O loebli*. The close proximity of two distinctly different wingless species (*O. devagiriensis* and *O. loebli*) in nearby mountain peaks in the South Western Ghats montane rain forest ecoregion point towards local endemism and isolation in the montane habitats. See diagnosis under *O. besucheti*.

***Ochicanthon murthyi* Vinod & Sabu sp. nov.**
(Figs 36–40)

Description. Body (Fig. 36) predominantly black with a faint orange-yellow humeral spot on each elytron. Punctation on dorsal surface of head annular with intervals between punctures not exceeding their diameter. Pronotum in lateral view weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge well marked, extended on slightly more than one third of pronotal length. Pronotal punctation (Fig. 37) consisting of annular setiferous punctures separated by interval of less than their diameter, becoming somewhat sparser anteromedially; setae almost indistinct, straight and recumbent. Elytra in lateral view moderately convex; suture not raised; striae shallow, wide, consisting of chains of fairly confluent discoidal depressions (Fig. 37); interstriae fairly flat, uneven, and irregularly punctate; background microsculpture smooth; setae fine, straight and recumbent; lateral ridge posteriorly extended to level of apex of third stria. Mesosternum without punctures; meso-metasternal line arcuate; metasternal shield with close annular punctures separated by intervals fairly equal to their diameter (Fig. 38). Pygidium densely covered with well-marked annular setiferous punctures becoming finer ventrally. Protrochanter with outer margin angulate Hind wings present.

Male lacking obvious secondary sexual characters. Aedeagus as in Figs 39–40.

Measurements (mm; n = 12): TL = 4.5–5.2; BW = 3.0–3.4; PL = 1.2–1.7; PW = 2.8–3.0; EL = 2.6–2.8.

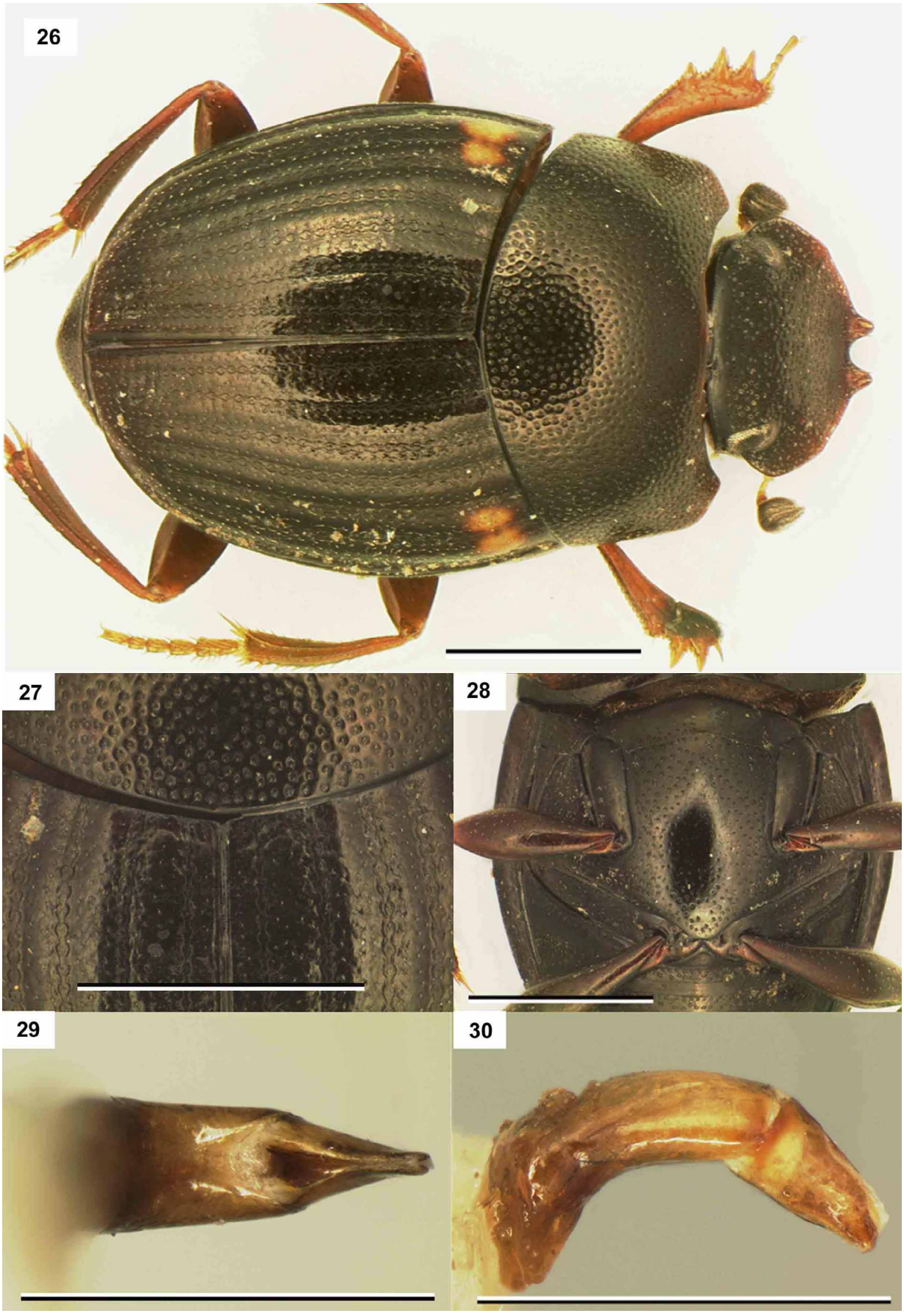
Type material. Holotype (male, in NPC): "India, Kerala, Wayanad District, Thirunelly, 900 m, moist deciduous forest, dung baited pit fall trap, 23.IX.2005, leg. Vinod, K.V."

Paratypes (11): Same data as holotype, 2 males and 6 females in NPC and SJC; "India, Kerala, Kozhikode District, Devagiri, 50 m, shrub jungle, dung baited pit fall trap, 14. X. 2008, leg. Jizla, V.P." 2 females in ZSI-Ca; "India, Kerala" 2 males in MHNG.

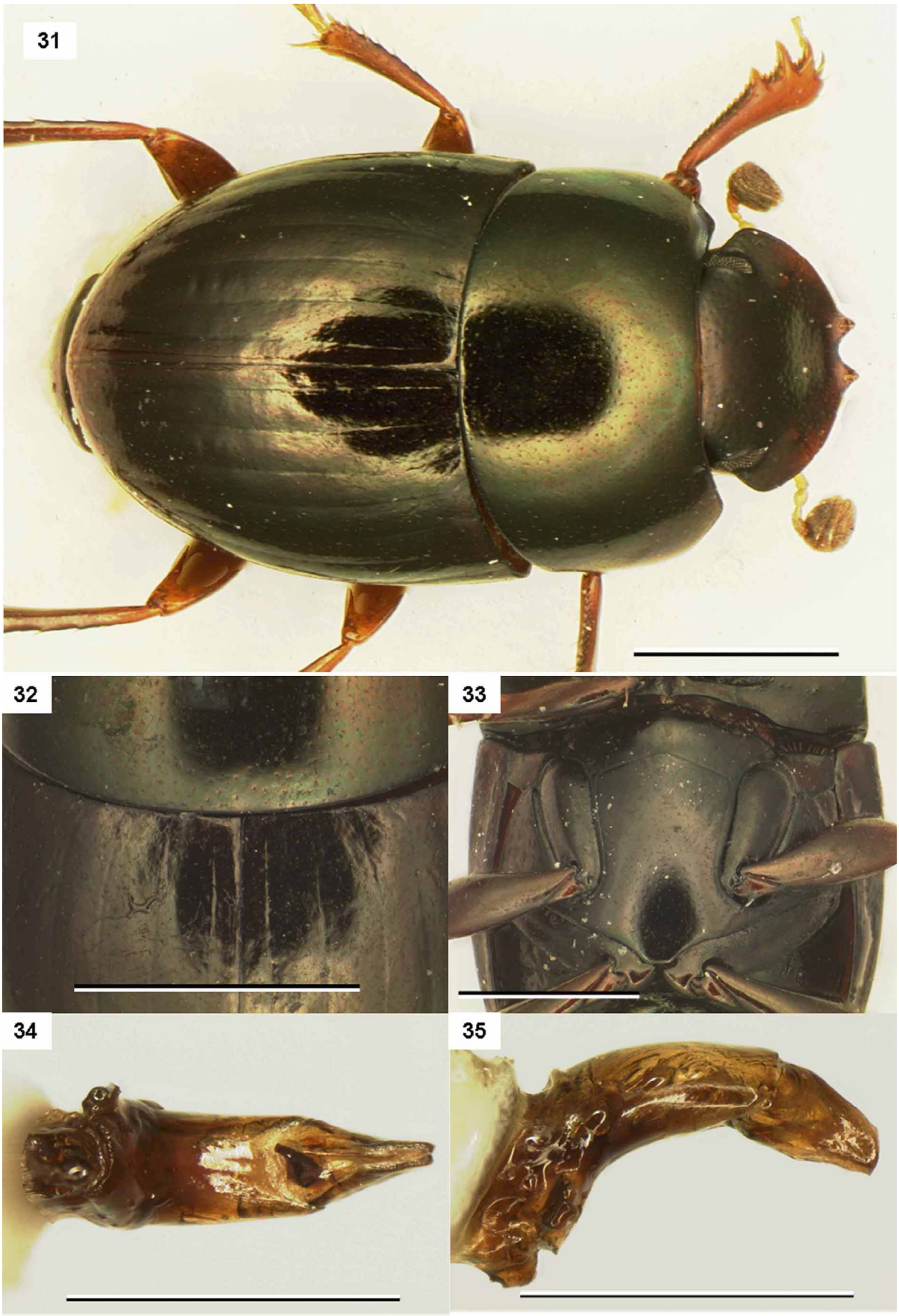
Distribution and natural history. South India (upper montane cloud forests at Thirunelly in the South Western Ghats montane rain forest ecoregion; Calicut-Devagiri college campus in Malabar Coast moist deciduous forest ecoregion).

Etymology. This species is named in honor of late Prof. V.A. Murthy, Loyola College, Chennai, India.

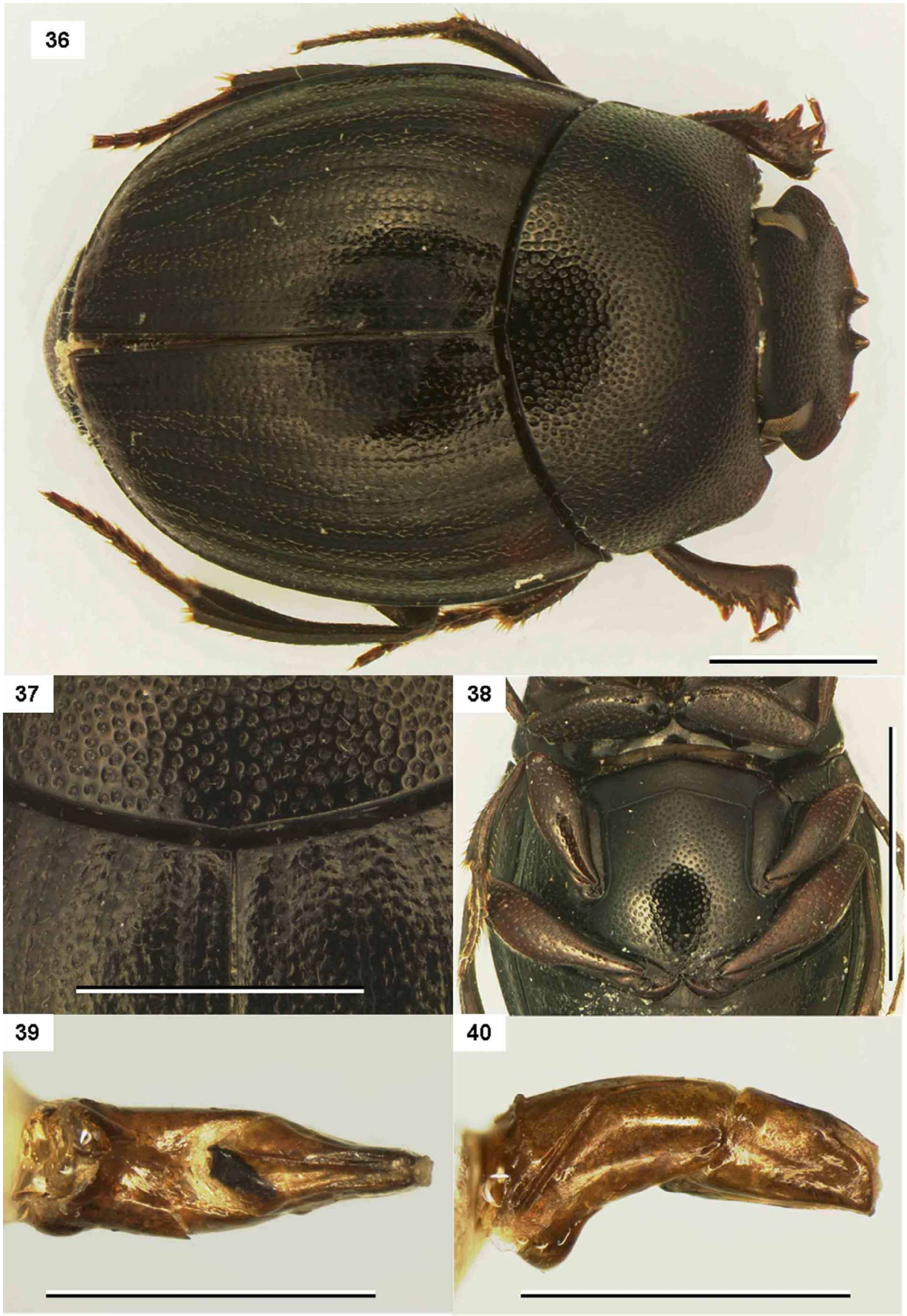
Diagnosis. *Ochicanthon murthyi* shares unicolored elytra bearing striae consisting of chains of fairly confluent discoidal depressions only with *O. tristoides*, from northeast India. This species is easily distinguishable from *O. tristoides* by the presence of angulate outer margin of the protrochanter and the variation in the morphology of aedeagus.



FIGURES 26–30. *Ochicanthon laetus*. Dorsal habitus (26); base of pronotum and elytra (27); mesosternum and metasternum (28); aedeagus, ventral view (29); aedeagus, lateral left view (30). Scale bars = 1 mm.



FIGURES 31–35. *Ochicanthon loebli* (holotype). Dorsal habitus (31); base of pronotum and elytra (32); mesosternum and metasternum (33); aedeagus (paratype), ventral view (34); aedeagus, lateral left view (35). Scale bars = 1 mm.



FIGURES 36–40. *Ochicanthon murthyi* (holotype). Dorsal habitus (36); base of pronotum and elytra (37); mesosternum and metasternum (38); aedeagus, ventral view (39); aedeagus, lateral left view (40). Scale bars = 1 mm.

***Ochicanthon mussardi* Cuccodoro sp. nov.**
(Figs 41–45)

Description. Body (Fig. 41) predominantly black with one distinct orange-yellow humeral spot on each elytron. Punctation on dorsal surface of head annular separated by an interval of about half their diameter. Pronotum in lateral view weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge well marked, extended on slightly more than one third of pronotal length. Pronotal punctation (Fig. 42) similar to that on head, becoming finer anteromedially and larger anterolaterally; setae almost indistinct, straight and recumbent. Elytra in lateral view weakly convex; suture not raised; striae shallow, narrow, consisting of chains of oval depressions joined by straight sulci (Fig. 42); interstriae weakly convex, uneven, finely punctate, irregularly; background microsculpture smooth; setae fine, straight and recumbent; lateral ridge posteriorly extended nearly to level of apex of fourth stria. Mesosternum impunctate, meso-metasternal line subangulate; metasternal shield with punctures separated by intervals equal to less than their diameter, centre very finely and sparsely punctate (Fig. 43). Pygidium covered with large annular setiferous punctures becoming finer ventrally. Protrochanter with outer margin arcuate. Hind wings present.

Male lacking obvious secondary sexual characters. Aedeagus as in Figs 44–45.

Measurements (mm; n = 4): TL = 3.3–4.3; BW = 2.2–2.5; PL = 1.0–1.1; PW = 1.7–2.0; EL = 2.0–2.2.

Type material. Holotype (male, MHNG): "India, Kerala, Cardamon Hills, between Pambanar Peermade, 950m, 9.xi.1972, leg. Besuchet, Löbl & Mussard, #18" [sifting in forest, near a river],

Paratypes (26): Same data as holotype, 5 males and 11 females in BMNH, MHNG and SJC; same data, but " 5.xi.1972, #11 [sifting in forest, near a river]", 5 males and 3 females in MHNG; "India, Kerala, Cardamon Hills, Valara Fall [56 km southeast of Munnar], 450–500m, 25.xi.1972, leg. Besuchet, Löbl & Mussard, #49 [sifting in forest near the river]", 1 female in MHNG; "India, Kerala, Nelliampathi Hills, Kaikatty, 900m, 30.xi.1972, leg. Besuchet, Löbl & Mussard, #58" [sifting in forest, near a river], 1 male in MHNG.

Distribution and natural history. South India (mid and high elevation moist forests in the South Western Ghats montane rain forest ecoregion and South Western Ghats moist deciduous forest ecoregion).

Diagnosis. Three *Ochicanthon* species, *O. laetus*, *O. mussardi* and *O. nitidus* possess a conspicuous orange-yellow humeral spot on elytron. Among them, *O. mussardi* shares in common with *O. nitidus* an impunctate mesosternum, but these two species have a different punctation pattern, notably on the head and the elytra.

***Ochicanthon nitidus* (Paulian)**
(Figs. 46–50)

Phacosoma nitidum Paulian, 1980: 58.

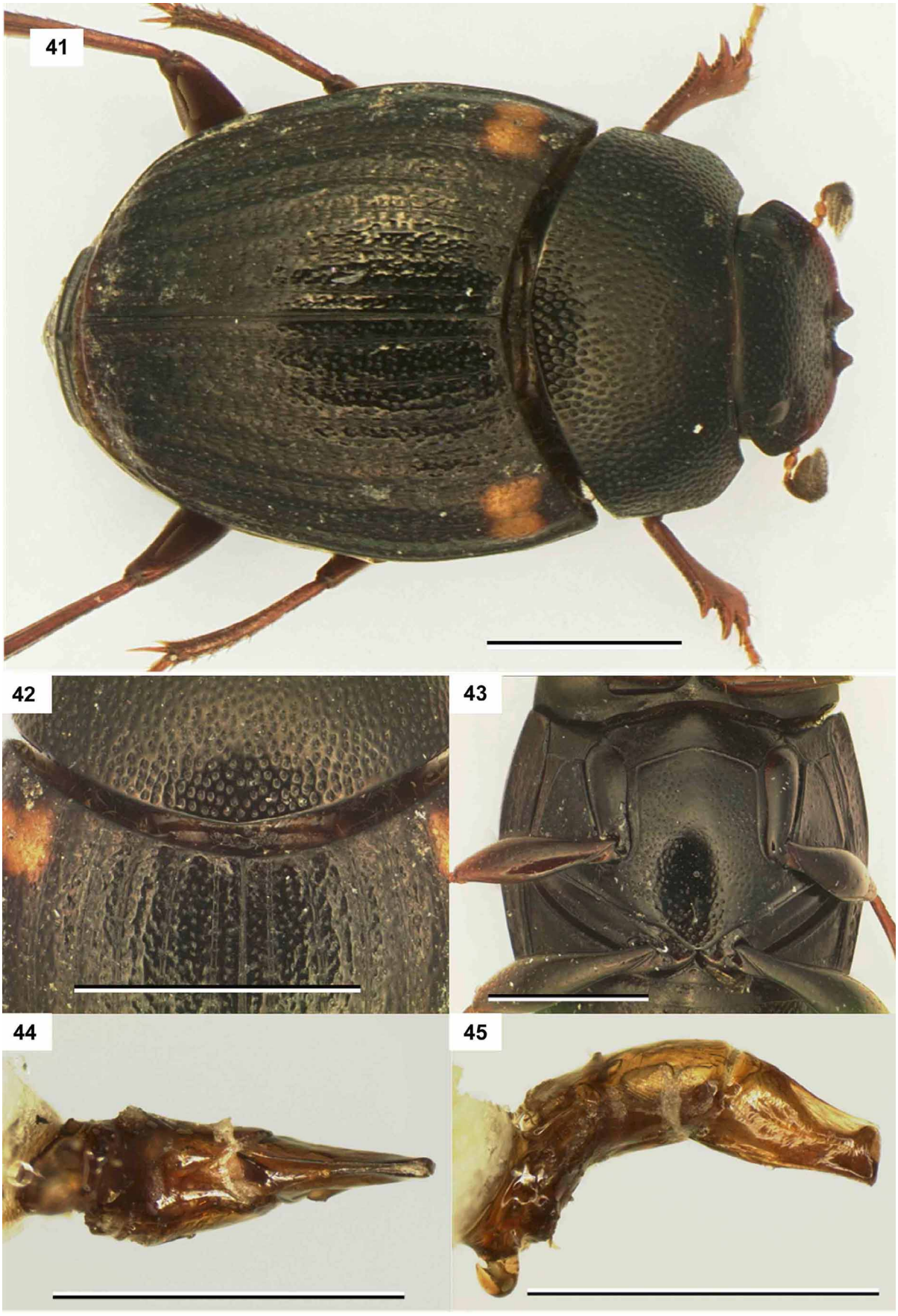
Description. Body (Fig. 46) predominantly black with one marked orange-yellow humeral spot on each elytron. Annular punctation on dorsal surface of head separated by intervals of nearly two times their diameter. Pronotum in lateral view weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge absent. Pronotal punctation (Fig. 47) consisting of annular setiferous punctures similar to that on head becoming finer anteromedially; setae almost indistinct, straight and recumbent. Elytra in lateral view weakly convex; suture not raised; striae rather deep, narrow, consisting of chains of small oval depressions joined by long straight sulci (Fig. 47); interstriae weakly convex, fairly even, finely punctate, irregularly; background microsculpture smooth; setae fine, straight and recumbent; lateral ridge posteriorly extended to level of apex of fourth stria. Mesosternum smooth; metasternal shield with fine punctures separated by distance that exceeds their diameter (Fig. 48). Pygidium smooth, except a few marked punctures along dorsal margin. Protrochanter with outer margin arcuate. Hind wings present.

Male lacking obvious secondary sexual characters. Aedeagus as in Figs 49–50.

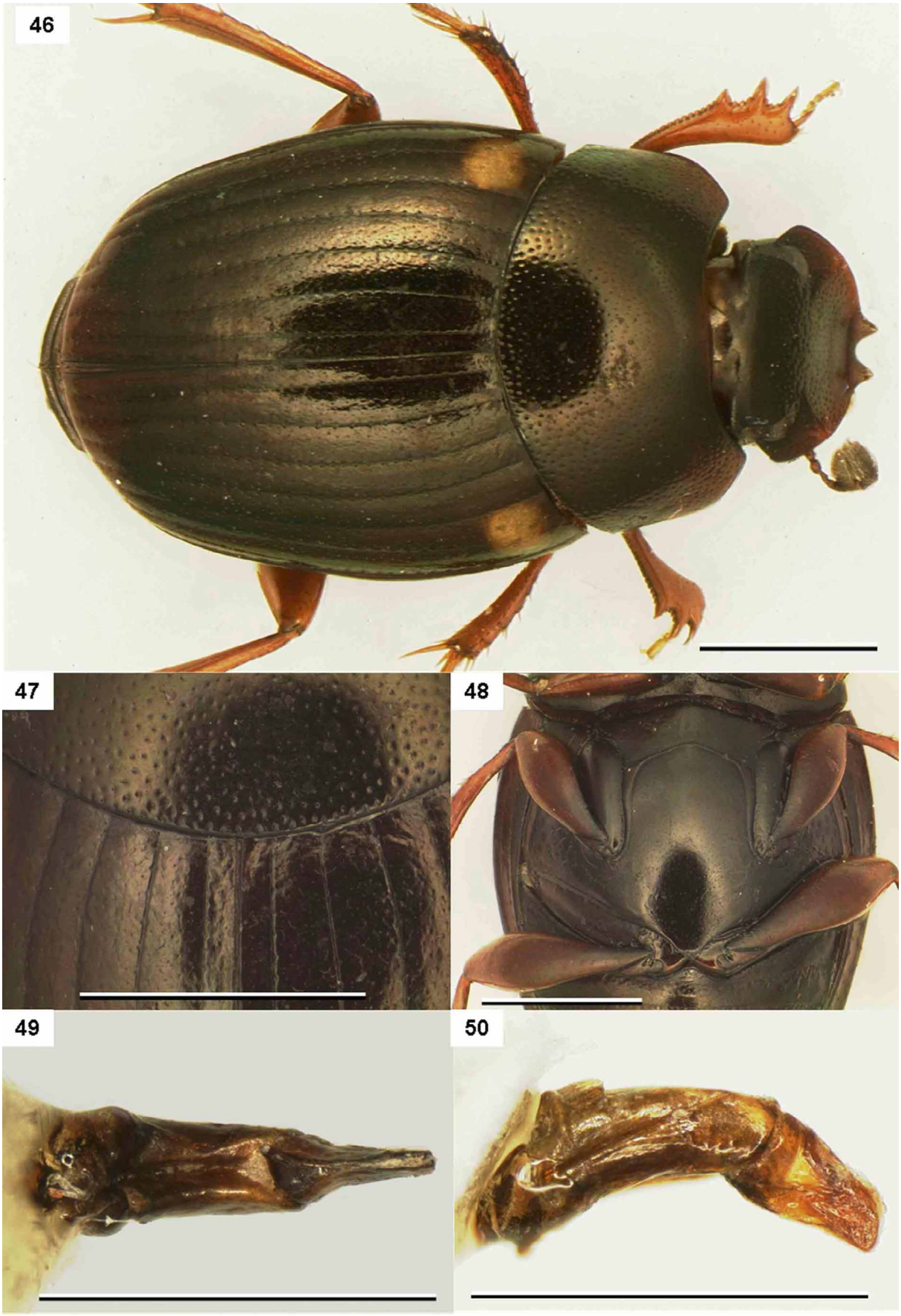
Measurements (mm; n = 12): TL = 4,4–4,7; BW = 2,6–2,7; PL = 1,1–1,2; PW = 2,1–2,2; EL = 2,5–2,6.

Material examined (12 specimens)**.** Holotype (male, in MHNG): "India, Madras, Anaimalai Hills, 18 km N of Valparai, 1250m, 18.xi.1972, leg. Besuchet, Löbl & Mussard, #35" [sifting in forest].

Paratype: same data as holotype, 1 female in MHNG.



FIGURES 41–45. *Ochicanthon mussardi* (holotype). Dorsal habitus (41); base of pronotum and elytra (42); mesosternum and metasternum (43); aedeagus ventral view, (44); aedeagus, lateral left view (45). Scale bars = 1 mm.



FIGURES 46–50. *Ochicanthon nitidus* (holotype). Dorsal habitus (46); base of pronotum and elytra (holotype) (47); mesosternum and metasternum (holotype) (48); aedeagus, ventral view (49); aedeagus, lateral left view (50). Scale bars = 1 mm.

Additional material: "India, Kerala", 1 male in MHNG; "India, Kerala, Idikki District, Thekkadi, 1000 m, montane evergreen forest, dung baited pit fall trap, 10.v.2006, leg. Shiju, T.R.", 1 female in SJC; same data, but 800 m, 1 female in SJC; "Idikki District, Mannavan shola, 1600 m, montane evergreen forest, dung baited pit fall trap, 1.xii.2006, leg. Shiju, T.R.", 3 female in NPC; "Kerala, Palghat District, Nelliampathi, Hill Top, 1400 m, montane evergreen forest, dung baited pit fall trap, 12.v.2007, leg. Shiju, T.R.", 1 male in NPC; same data, but 16. xii. 2007, 1 female in ZSI-Ca; "Kerala, Wayanad District, Panamaram, 600 m, moist deciduous forests, dung baited pit fall trap, 10.V. 2006, leg. Vinod, K.V.", 2 females in ZSI-Ca.

Distribution and natural history. South India (Valparai, Mannavan shola, Thekkadi, Nelliampathi and Panamaram in the South Western Ghats montane rain forest ecoregion). Wide distribution across the moist forests on either side of Palghat gap in Western Ghats is of apparent significance while analysing dispersal patterns.

Diagnosis. *Ochicanthon nitidus* can be easily distinguished from the very similar species *O. laetus* and *O. mussardi* by the sparser pronotal punctation and almost impunctate pygidium. See discussions under *O. laetus* and *O. mussardi*.

Ochicanthon tristis (Arrow)

(Figs. 51–55)

Phacosoma tristis Arrow, 1931: 355; Balthasar, 1963: 273

Description. Body (Fig. 51) predominantly black. Head with annular punctation separated by interval of less than their diameter. Pronotum in lateral view weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge obsolete, extended on about one third of pronotal length. Pronotal punctation (Fig. 52) similar to that on head, becoming finer anteromedially; setae almost indistinct, straight and recumbent. Elytra in lateral view moderately convex; striae shallow, narrow, consisting of chains of oval depressions joined by straight sulci (Fig. 52); suture not raised; interstriae flat, uneven, finely and irregularly punctate; background microsculpture smooth, irregularly covered with fine, sparse setiferous punctures; setae fine, straight and recumbent; lateral ridge posteriorly extended to level of apex of fourth stria. Mesosternum smooth; meso-metasternal line subangulate; metasternal shield with strong regular punctation along the margins, and with fine and sparse punctation in the middle (Fig. 53). Pygidium covered with annular setiferous punctures becoming finer and sparser ventrally. Protrochanter with outer margin arcuate. Hind wings present.

Male lacking obvious secondary sexual characters. Aedeagus as in Figs 54–55.

Measurements (mm; n = 2): TL = 4.3–4.5; BW = 2.7–2.8; PL = 1.2–1.3; PW = 2.2–2.3; EL = 2.5–2.6.

Material examined (6). "India, Kerala, Niligiri Hills, Palghat District, Silent Valley National Park, 1000 m, evergreen forest, dung baited pit fall trap, 9.v.2008, leg. Vinod, K.V.", 1 male and 2 females in NPC, SJC, ZSI-Ca; same data, but 1100 m, 5.vi.2009, leg. Arunraj, C., 1 female in SJC; "Kerala", 2 males in MHNG.

Distribution and natural history. South India (Niligiri Hills in the South Western Ghats montane rain forest ecoregion).

Diagnosis. See diagnosis under *O. ceylonicus* and *O. gauricola*.

Ochicanthon tristoides (Paulian)

(Figs. 56–60)

Phacosoma tristoides Paulian, 1983: 616.

Description. Body (Fig. 56) predominantly black. Annular punctation on head separated by interval of less than their diameter. Pronotum in lateral view weakly convex, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge well marked, extended on slightly more than one third of pronotal length. Pronotal punctation (Fig. 57) consisting of annular setiferous punctures separated by interval of less than their diameter; setae almost indistinct, straight and recumbent. Elytra in lateral view moderately convex; suture not raised; striae shallow, wide, consisting of chains of confluent discoidal depressions (Fig. 57); interstriae weakly convex, uneven, finely and irregularly punctate; background microsculpture smooth; setae fine, straight and recumbent; lateral ridge

posteriorly extended nearly to level of apex of second stria. Mesosternum irregularly punctate towards the base; meso-metasternal line subangulate; metasternal shield with coarse punctation except in the centre which is with fine punctures (Fig. 58). Pygidium covered with shallow setiferous punctures becoming finer ventrally. Protrochanter with outer margin arcuate. Hind wings present.

Male lacking obvious secondary sexual characters. Aedeagus as in Figs. 59–60.

Measurements (mm; n = 3): TL = 4.0–4.3; BW = 2.1–2.2; PL = 1.2–1.3; PW = 2.2–2.4; EL = 2.5–2.8.

Material examined (3 specimens, MHNG)**.** Holotype (male): "India, West Bengal, Darjeeling dist., Teesta-Rangpo, [11 km of Teesta] 350m, 12.x.1978, leg. Besuchet & Löbl, #11b" [under bark].

Paratypes (2): Same data as holotype, 1 female; "India, West Bengal, Darjeeling dist., Sukha, 200m, 7.x.1978, #2b" [sifting in forest], 1 female.

Additional material (6)" India Meghalaya, West Garo Hills dist, Tura, 700–900m, 01.xi.1978, leg. Besuchet & Löbl, #37b" [sifting in forest of Tura Peak], 2 males and 3 females; "India Meghalaya, West Garo Hills dist, Mt Nokrek National Park <25°30'02'' N; 90°14'54'' E>, 1200m, leg. Carlton, Cuccodoro, Erne & Leschen, #5a" [sifting forest litter], 1 female, in MHNG.

Distribution and natural history. Northeast India (Teesta river valley, in Lower gangetic plains moist deciduous forests ecoregion; Tura and Mount Nokrek National Park in the Meghalaya subtropical forest ecoregion).

Diagnosis. See discussion under *O. besucheti*. Two males from Garo Hills have the aedeagus very similar to the holotype from Darjeeling, except for a more sinuate dorsal outline of the parameres. Both sexes from Garo Hills have the punctation on metasternum and mesosternum slightly less marked. These specimens from the Garo Hills may represent new species closely related to *O. tristoides*. However, in the absence of sufficient material of *O. tristoides* from the type locality in Darjeeling district, notably males, to adequately assess the taxonomic significance of these subtle differences, we treat the specimens from Garo Hills as putative *O. tristoides.*

***Ochicanthon vazdemelloi* Latha & Sabu sp. nov.**
(Figs. 61–65)

Description. Body (Fig. 61) predominantly black. Dorsal surface of head glabrous, with annular punctures separated by intervals fairly equal to their diameter. Pronotum moderately convex in lateral view, outline at base almost in line with that of elytral suture; laterobasal paramarginal ridge absent. Pronotal punctations (Fig. 62) similar to that on head, but becoming sparser medially; setae almost indistinct, straight and recumbent. Elytra strongly convex, lacking tubercles, suture conspicuously raised, except on apical quarter; striae shallow, wide, consisting of chains of circular depressions joined by straight sulci (Fig. 62); interstriae moderately convex, uneven, covered with fine, sparse setiferous punctures arranged in two rows; background microsculpture smooth; setae stout, arcuate and semi-erect, but never scale-like; lateral ridge posteriorly extended to level of apex of second stria. Mesosternum impunctate, meso-metasternal line subangulate; metasternal shield coarsely punctate, except in the centre, which is smooth (Fig. 63). Pygidium rather uniformly covered with shallow annular setiferous punctures.
Male with base of metafemur forming a distinct angle and base of metatibia slender and arcuate. Protrochanter with outer margin arcuate. Hind wings absent. Aedeagus as in Figs. 64–65.

Measurements (mm; n = 5): TL = 4.3–5.0; BW =2.7– 3.2; PL = 1.3–1.7; PW = 2.3–2.7; EL = 2.4–2.7.

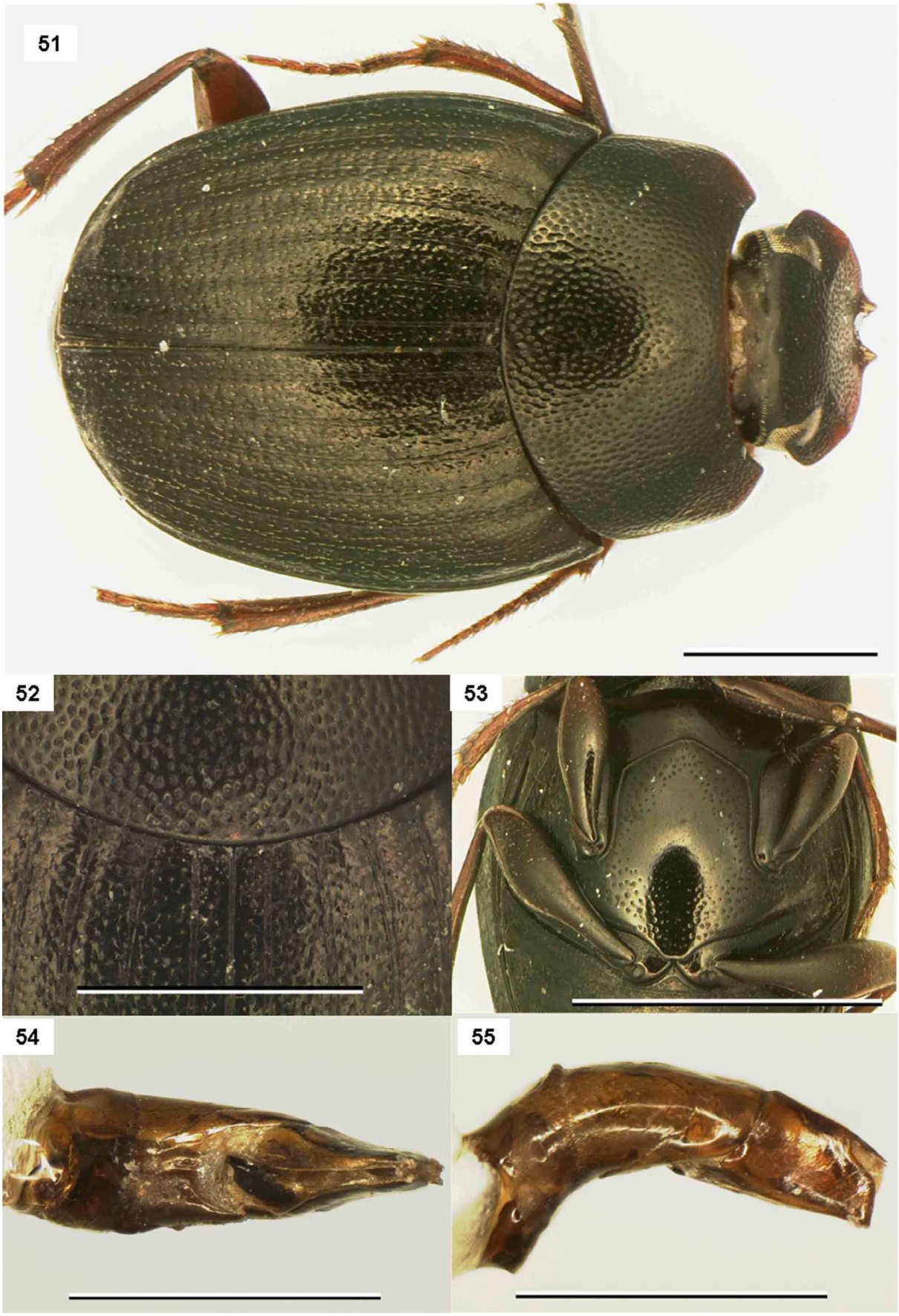
Type material: Holotype (male, in NPC): "India, Kerala, Palghat District, Silent Valley National Park, 2010 m, montane evergreen forest, dung baited pit fall trap, 5.vi.2009, leg. Vinod, K.V."

Paratypes (4): Same data as holotype, 3 females in NPC, SJC and ZSI-Ca; "India, Kerala", 1 male in MHNG.

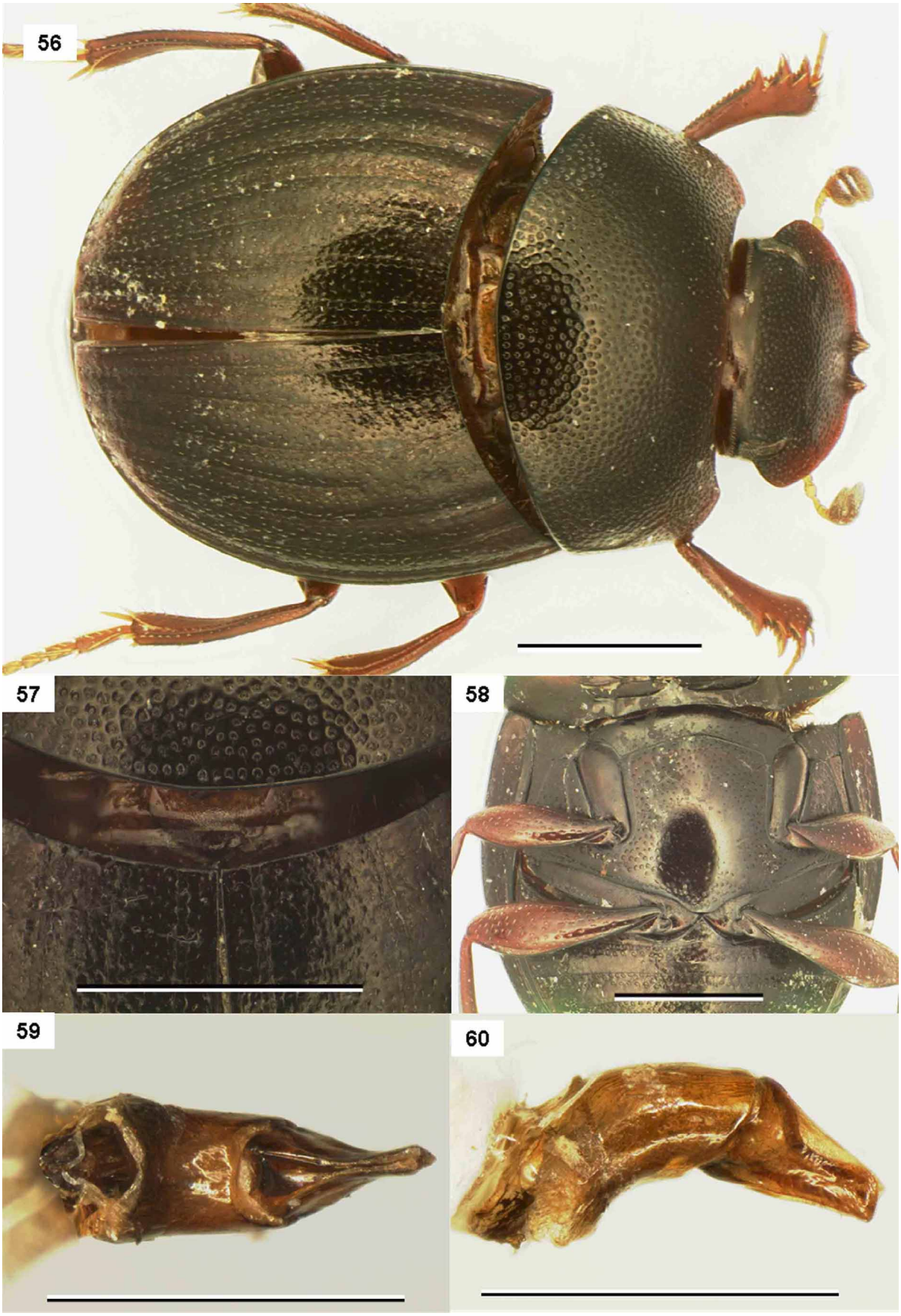
Distribution and natural history. Southwest India **(**upper montane cloud forests at Silent Valley in the South Western Ghats montane rain forest ecoregion).

Etymology. Named in honor of Fernando Z. Vaz-de-Mello, Veracruz, Brazil, who renamed the genus in 2003.

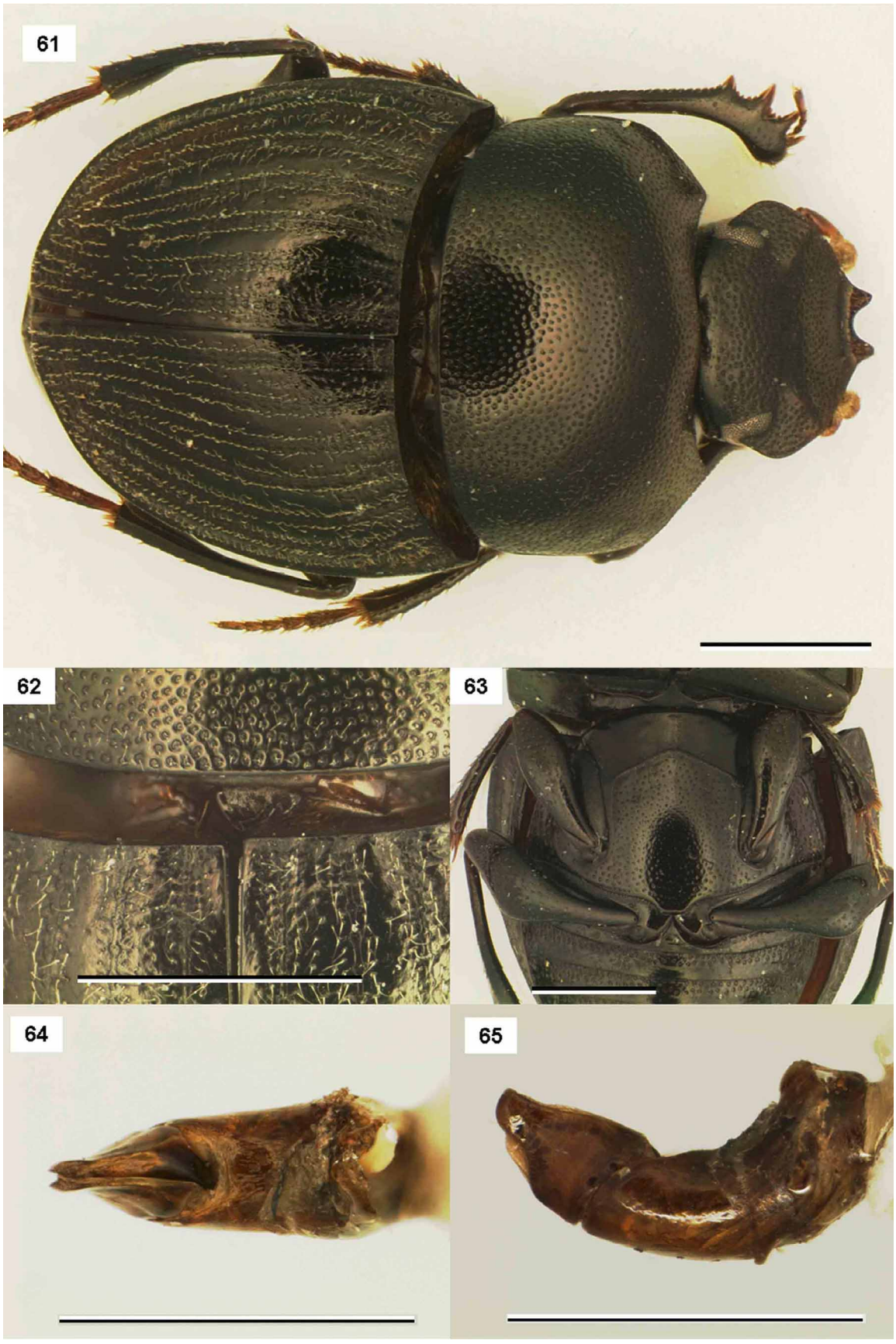
Diagnosis. Only two Indian *Ochicanthon* species, *O. devagiriensis* and *O. vazdemelloi*, have the elytral pubescence arranged in rows. *Ochicanthon vazdemelloi* can be readily distinguished from *O. devagiriensis* by its indistinct pronotal pubescence. See diagnosis under *O. besucheti* and *O. devagiriensis.*



FIGURES 51–55. *Ochicanthon tristis*. Dorsal habitus (51); base of pronotum and elytra (52); mesosternum and metasternum (53); aedeagus, ventral view (54); aedeagus, lateral left view (55). Scale bars = 1 mm.



FIGURES 56–60. *Ochicanthon tristoides* (holotype). Dorsal habitus (56); base of pronotum and elytra (57); mesosternum and metasternum (58); aedeagus, ventral view (59); aedeagus, lateral left view (60). Scale bars = 1 mm.



FIGURES 61–65. *Ochicanthon vazdemelloi* (holotype). Dorsal habitus (61); base of pronotum and elytra (62); mesosternum and metasternum (63); aedeagus, ventral view (64); aedeagus, lateral left view (65). Scale bars = 1 mm.

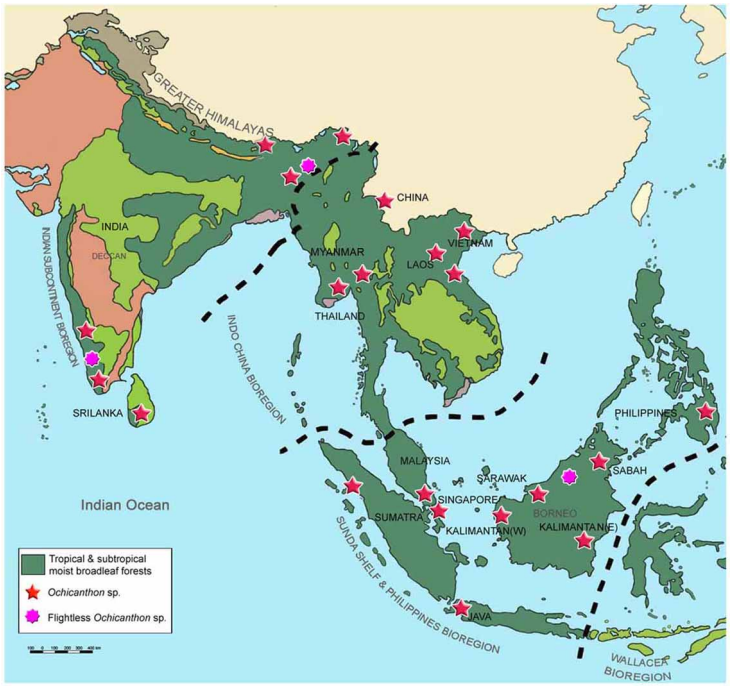


FIGURE 66. Distribution pattern of *Ochicanthon* in the Indo-Pacific ecoregion.

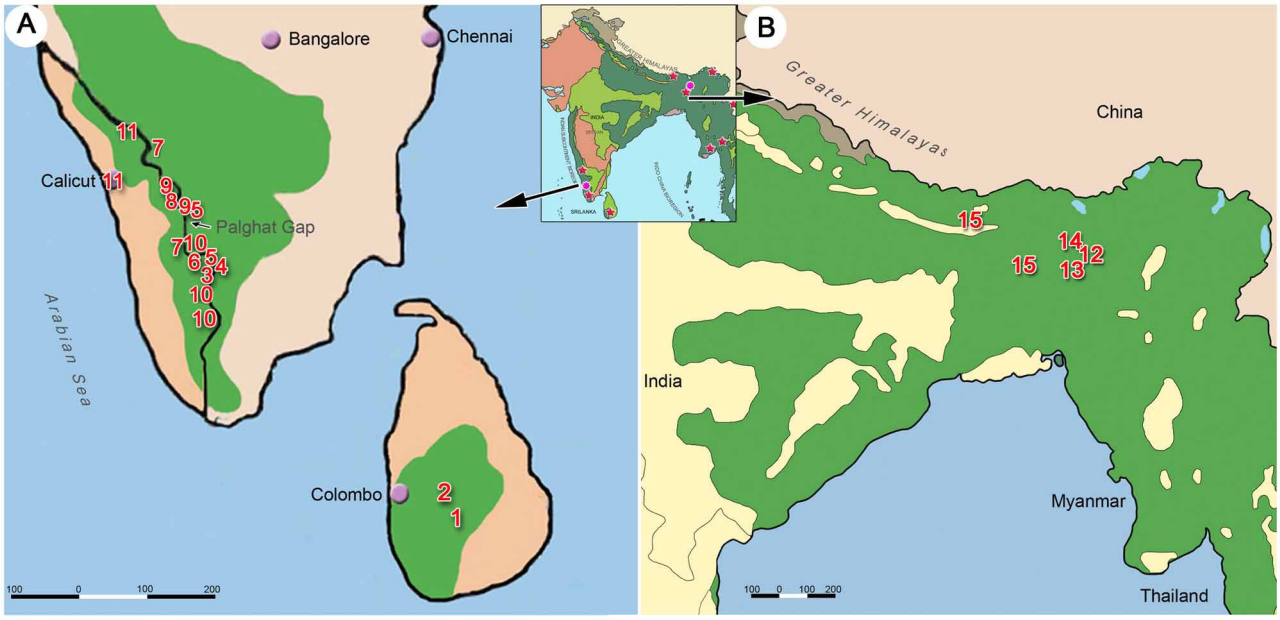


FIGURE 67. Localities of *Ochicanthon* in the southwest (a) and northeast (b) of the Indian subcontinent. 1) *Ochicanthon cingalensis*; 2) *O. ceylonicus*; 3) *O. devagiriensis*; 4) *O. loebli*; 5) *O. nitidus*; 6) *O. gauricola*; 7) *O. laetus*; 8) *O. vazdemelloi*; 9) *O. tristis*; 10) *O. mussardi*; 11) *O. murthyi*; 12) *O. besucheti*; 13) *O. deplanatus*; 14) *O. ernei*; 15) *O. tristoides.*

Discussion

Two groups of *Ochicanthon* occur in the Indian subcontinent bioregion: i) the *O. tristis* group, with the dorsum predominantly black-brown and a distinct pattern of orange-yellow patches on the elytra and ii) the *O. laetus* group with the dorsum entirely brown or black and with or without a faint orange patch on the elytra. The distributional pattern of *Ochicanthon* in the Indian subcontinent is notable in that both groups of the genus are confined to the moist forests of southwestern and northeastern India and absent from the vast intervening stretches of central India

(Arrow 1931, Balthasar 1963, Paulian 1980, Paulian 1983). A similar distributional pattern is seen in many plant and animal taxa (Jayaram 1974, Kurup 1974, Meher-Homji 1983) especially Coleoptera (Pearson & Ghorpade 1989; Sabu *et al*. 2008) with closely related species at either extremes of the subcontinent. The geological history of the Indian continent (Mani 1974; Mitchell & Widdowson 1991; Bossuyt & Milinkovitch 2001) and the geographical distribution pattern of the two *Ochicanthon* groups (*O. tristis* and *O. laetus*) in the moist southwest and northeast regions suggests that these two groups might have been widespread throughout India until the climate change following Deccan Trap formation eliminated the moist forests of Central India (Courtillot *et al*. 1988, Karanth 2003).

All known *Ochicanthon* species are moist forest dwellers of the Indo-Pacific bioregion (Figure 66; Boucomont 1914, Boucomont 1920, Paulian 1987, Masumoto 1989, Ochi 1990, Ochi & Araya 1996, Ochi *et al*. 1997, Hanboonsong & Masumoto 2001, Löbl & Smetana 2006, Ochi *et al.* 2006, Krikken & Huijbregts 2007, Ochi *et al.* 2007, Ochi & Kon 2008). The smaller size (2.5–10 mm) and habitat preference of *Ochicanthon* might explain their rarity in collections. The wet, moist subtropical and tropical forests that these species occur in are generally difficult to access for sampling.

All flightless (= wingless) species (*O. besucheti*, *O. devagiriensis*, *O. loebli*, and *O. vazdemelloi*) are local endemics within upper (tropical) montane cloud forests (> 2000 m) in the Western Ghats and Indo-Burma biodiversity hotspots (Figure 67). The similar presence of a flightless montane endemic species, *O. hanskii* Krikken & Huijbregts, was recorded from the upper montane forests in Borneo (Hanski 1983, Krikken & Huijbregts 2007). Such occurrence of flightless species in geographically distant but similar environments (upper montane cloud forests) is an archetypal case of parallel evolution of related species isolated in geographically similar environments and evolving along similar lines. Though winglessness is the result of secondary loss of wings of a fully winged ancestor species (Mostert & Holm 1982, Harrison *et al*. 2003, Harrison & Philips 2003, Forgie *et al*. 2005) and is a common feature in the isolated high altitude montane habitats with stable environment and limitation of habitat area (Darlington 1943, Roff 1990), it may turn out to be a good character in the phylogenetic analysis of *Ochicanthon* and further scrutiny is needed to reach conclusions. The distinctly convex body with the pronotal-elytral dip of all flightless *Ochicanthon* species is a result of the overall shortening of the body, increased dorsal convexity and full wing reduction (Scholtz 2000). The absence of wingless species in the *O. laetus* group and their absence from upper montane cloud forests indicate that all species belonging to *O. laetus* group are low elevation montane dwellers and only members of the *O. tristis* group have the adaptations to venture into upper montane cloud forests. Since the origin of montane fauna is through vertical colonization of the high altitudes by low-elevation species (Escobar *et al*. 2006), this perhaps indicates that neither group is monophyletic. The wide dispersal of the *O. tristis* group is evident from the distributional pattern from the high altitude montane forests to the low elevation forests in the coastal belts. The taxonomic diversity and evolution of flightlessness in montane species belonging to the group suggest that the *O. tristis* group is a more recent, derived lineage of the genus *Ochicanthon* compared to the *O. laetus* group.

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