A review of the genus Cryptocephalomorpha Ritsema in southern Asia with special reference to Laos (Coleoptera: Carabidae: Pseudomorphinae) : 13th supplement to the "Revision of the Pseudomorphinae of the Australian Region"

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A review of the genus *Cryptocephalomorpha* Ritsema in southern Asia with special reference to Laos (Coleoptera: Carabidae: Pseudomorphinae): 13th supplement to the "Revision of the Pseudomorphinae of the Australian Region"

by Martin Baehr

Abstract. Three new species of the pseudomorphine genus *Cryptocephalomorpha* Ritsema are described from mainland southern Asia: *Cryptocephalomorpha laosensis* sp.nov. from Laos, *C. ovalis* sp.nov. from Malaysia, and *C. indica* sp.nov. from southern India. The previously published keys to the species of *Cryptocephalomorpha* are updated to include the new species. Additional records of the already-described species *Cryptocephalomorpha gaverei* Ritsema and *C. maior* Baehr from Laos, and of *C. collaris* (Waterhouse) from Thailand and the Philippines are provided.

Keywords. Coleoptera – Carabidae – *Cryptocephalomorpha* – new species – southern Asia – records from Laos

Introduction

M. Brancucci and M. Geiser of Naturhistorisches Museum, Basel very kindly supplied me with a small number of specimens of the pseudomorphine ground beetle genus *Cryptocephalomorpha* Ritsema for identification which proved to include unique specimens of two new species. In material recently seen at an insect exchange I found a specimen of an additional new species. The three new species are described herein and additional records of three other species, two likewise from Laos, are communicated.

Pseudomorphinae is a subfamily of carabid beetles of quite curious external morphology. In their body shape they are somewhat reminiscent of Dytiscidae or even Colydiidae or Nitidulidae, meaning that they are not immediately recognizable as carabid beetles. Their biology is also exceptional, because the species of nearly all pseudomorphine genera, except *Cryptocephalomorpha*, are known to be arboricolous and mainly occur under bark or in the bark fissures of a variety of trees. Moreover, species of several genera are ovoviviparous, i.e. the larvae hatch within the female oviducts and are then "born" alive. This type of reproduction is extremely rare in beetles and probably arises out of the possible myrmecophilous habits of larvae and adults of all ovoviviparous representatives.

Even within this peculiar subfamily, the genus *Cryptocephalomorpha* Ritsema, 1875, is unique in its very convex body shape with the mouthparts and legs largely concealed. To date, eight species have been recorded, most of which occur in South Asia, but with one species each in New Guinea and the Solomon Islands, north-eastern Australia, and South Africa. Almost nothing is known about the life history, ecological requirements, and behaviour of any species of *Cryptocephalomorpha*, except that the few recorded specimens of the New Guinean species *C. papua* Darlington were collected in association with ants. Only very few, or even single, specimens of the majority of species have been ever captured, with most samples attracted to light. It is not, therefore,

established where the species of this genus actually live and thus whether they are regularly tree-living or not. Similarly, their mode of reproduction is unknown.

An extensive diagnosis of the genus, a key to all species known at the time, and complete references to the relevant literature may be found in my monograph (BAEHR 1997). Two additional species have been described by BAEHR (2002, 2009), and the relevant papers include partly updated keys.

Although species of the genus *Cryptocephalomorpha* are known from several countries in south-eastern Asia, it appears that the genus is particularly diverse in Laos, since four of the seven species now recorded from mainland South Asia have been found in that country with two, namely *C. maxima* Baehr and one of the new species described in the present paper, so far recorded exclusively from Laos. The apparent rarity of these beetles elsewhere and their little-known and presumably secretive habits may be worth considering in the light of the fact that they occur more commonly in Laos for whatever reason, or it may also be a simple reflection of the better scientific exploration of that country.

All species recorded from Laos belong to the main body of the genus and are apparently closely related. As mentioned by BAEHR (1997), the most plesiomorphic species of the genus, in several aspects of its external and genital morphology, occurs in southern Africa, and the most apomorphic species inhabits the Papuan and Australian regions. Mainland South Asia, and the Greater Sunda Islands, but less so, therefore seem to be the area in which not only do most species occur, but also where conditions for the occurrence of a greater number of rather similar species may be most favourable.

Methods and material

Dissecting methods and measurements follow BAEHR (1997).

The labels are completely reproduced. A / with a blank before and after denotes a new label, two blanks denote a new line.

The holotypes of two of the new species and most of the additional specimens are deposited in Naturhistorisches Museum Basel (NHMB); the holotype of the third species and some voucher specimens are held in the working collection of the author (CBM) at Zoologische Staatssammlung, München.

Genus *Cryptocephalomorpha* Ritsema

Ritsema, 1875: Versl. XCII. – Baehr 1997: 374; 2002: 124; 2009: 195.

For diagnosis, type species, and additional citations, see the revision in BAEHR (1997).

Cryptocephalomorpha gaverei Ritsema

Ritsema, 1875: Versl. XCII. – Baehr 1997: 378.

New records: 1 ♀, "LAOS, Attapeu prov. Thong Kai ohk, Ban Kachung (Mai) env., 1200–1450 m, 15°01–02′N/107°26–27′E, 15.VI.2011 / degraded primary forest, ant nest under bark of tree Michael Geiser

leg. / NHMB Basel, Laos 2011 Expedition M. Brancucci, M. Geiser, D. Hauck, Z. Kraus, A. Phantala & E. Vongphachan" (NHMB); 1 ♀, "NW-Thailand, Chiang Dao, Ban San Pakia, 5.–10.V.2004, 1200m, Sv. Bilý leg." (CBM).

Remark. The specimen from Laos represents one of the very few records of a *Cryptocephalomorpha* specimen actually collected in an ants' nest. It is also the first authentic record from the bark of a tree.

Cryptocephalomorpha collaris (Waterhouse)

Adelotopus collaris Waterhouse, 1877: 2.
Cryptocephalomorpha collaris, Ritsema 1909: 254; Baehr 1997: 383.

New records: 1 ♂, "THAI, 10.–14.V.1991 CHIANG DAO, 600m, 19°24′N, 98°33′E, Vít. Kubáň leg. / Thailand '91 "Thanon Thong Chai" D. Král & V. Kubáň" (NHMB); 1 ♂, "PHILIPPINES, 150 m, Palawan, PORT BARTON, 14.–18. Dec. 1990, Bolm leg." (NHMB).

Cryptocephalomorpha maior Baehr

Baehr, 1997: 385.

New records: 1 ♀, "LAOS-NE, Xiang Khouang prov. 19°37–8′N 103°20′E, 30km NE Phonsavan: Ban Na Lam→Phou Sane Mt., 1300–1500m, 10–30.v.2009, M. Brancucci leg. / NHMB Basel, NMPC Prague Laos 2009 Expedition, M. Brancucci, M. Geiser, D. Hauck, Z. Kraus, D. Hauck, V. Kubáň" (NHMB); 1 ♀, "LAOS, 1.–16.v.1999, Louangprabang pr., 20°33–4′N 102°14′E, BanSongCha (5km W), 1200m, Vit Kubáň leg." (CBM).

Crytocephalomorpha laosensis sp.nov.

Type material. Holotype: ♀, "LAOS-NE, Xiang Khouang prov. 19°37–8′N 103°20′E, 30km NE Phonsavan: Ban Na Lam→Phou Sane Mt., 1300–1500m, 10–30.v.2009, M. Brancucci leg. / NHMB Basel, NMPC Prague Laos 2009 Expedition, M. Brancucci, M. Geiser, D. Hauck, Z. Kraus, D. Hauck, V. Kubáň" (NHMB).

Description. Measurements and quotients. Body length: 5.5 mm; body width: 2.65 mm. Width/length of pronotum: 1.46; width of pronotum/width of head: 1.51; length/width of elytra: 1.32; length of elytra/length of pronotum: 1.95.

Colour (Fig. 1). Surface piceous, anterior margin of head, all margins of pronotum and elytra, and elytral spot light reddish. Reddish apical margin of pronotum narrow, lateral margins wide but very ill-defined, basal margin at centre slightly wider than at lateral sides. Reddish margins of elytra wide but very ill-defined. Elytra with a large, fairly well-delimited, trapezoidal reddish spot which reaches the apex. Lower surface reddish to reddish-piceous. Mouthparts, antennae and legs dark reddish, femora reddish, tibiae and tarsi piceous.

Head (Fig. 1). Short and wide, deeply embedded in the prothorax, anterior margin of head moderately convex, border quite convex, protruding far beyond and above mouthparts, completely concealing them from above. Frons convex. Clypeus not separated from frons. Labrum very small, invisible from above. Mandibles small, almost indiscernible from above, outer margin angulate-convex. Eye oval, on lower surface of head triangular. Orbit angulate, projecting slightly, partly visible from above, with 3–5

Figs 1–3. 1 – *Cryptocephalomorpha laosensis* sp.nov.; length 5.5 mm. 2 – *Cryptocephalomorpha ovalis* sp.nov.; length 5.0 mm. 3 – *Cryptocephalomorpha indica* sp.nov.; length 3.3 mm.

short setae. Antennal groove moderately deep, comparatively short. Mental tooth moderately wide, elongate, obtuse at apex. Wings of mentum wide, laminate, widely rounded at apex. Glossa large, apparently completely fused with paraglossae to a moderately wide, tongue-like, far-protruding plate with convex apex that is ventrally keeled and quite downwards-inclined. Glossa at apical margin with around eight fairly long setae, dorsal surface apparently without hairs. Lacinia inconspicuous, almost indiscernible. Galea narrow and fairly elongate, fusiform. Terminal palpomere of maxillary palpus elongate and almost parallel-sided, sparsely pilose. Terminal palpomere of labial palpus very large and wide, remarkably securiform, more than twice as long as wide, quite densely pilose. Antenna apparently short and wide, depressed, but both antennae broken after the antennomere 4 or 5. Microreticulation on dorsal surface absent, surface not perceptibly punctate, impilose, highly lustrous. Gula impilose.

Pronotum (Fig. 1). Wide, dorsally convex, lateral parts of dorsal surface not fully perpendicular, therefore lateral margin just visible from above. Base much wider than apex. Apex slightly convex, not margined; apical angles shortly produced, obtusely angulate. Lateral margins gently but evenly convex, finely margined, lateral channel absent, margins not at all explanate. Base very slightly convex, not margined, basal angles evenly rounded. Microreticulation absent, surface with extremely fine, sparse punctures, barely perceptible even at high magnification , impilose, highly lustrous.

Elytra (Fig. 1). Comparatively short, wide, parallel-sided, markedly convex, very slightly depressed on disk. Lateral parts perpendicular, therefore lateral margin not

visible. Apex wide, truncature evenly convex, slightly incurved towards suture but not dehiscent, lateral apical angles widely rounded. Base wide, basal angles rounded. Basal margin running about three-fourths the distance to suture, whole base including scutellum usually concealed by base of pronotum. Basal border laterally with a few short setae. Marginal channel narrow, clearly visible, in anterior half even slightly explanate. Two or three marginal punctures to the rear of humerus and two or three punctures in front of apical curvature present, all slightly removed from lateral margin. Scutellary puncture absent. Dorsal punctures absent. Striae including sutural stria absent. Microreticulation absent, surface with very fine, barely discernible, scattered punctures, highly lustrous. Posterior wings fully developed.

Lower surface. Anterior border of prosternum without glandular boss at centre. Prosternal process elongate, far exceeding procoxae, narrow, apparently impilose. Metepisternum elongate, about twice as long as wide, neither hollowed nor bent at rear. Abdominal sterna at centre bisetose, with coarse, fairly dense punctures and erect pilosity. Terminal sternum in female quadrisetose, punctate and sparsely pilose, without glandular, densely pilose area. Male terminal sternum unknown.

Legs. Short, first tarsomere of protarsus slightly longer than wide. Femora wide, tibiae quite short, widened towards apex. Metatibia moderately elongate, around four times as long as wide, first tarsomere of metatarsus roughly twice as long as wide. Male protarsus unknown.

Male genitalia. Unknown.

Female genitalia (Fig. 4). Comparatively large, fairly wide. Sternum VIII elongate, apical part quite elongate, triangular, at tip obtuse, laterally gently angulate, basal process narrow and elongate. Lateral margin of apical part with 4–5 very elongate and some very short setae; slightly below tip on upper surface on either side with a tuft of 4–5 shorter hairs. Both gonocoxites very narrow and elongate, gonocoxite 1 at apex not widened, gonocoxite 2 spine-shaped, at apex with one fairly elongate seta. Latero-basal angle of basal plate of tergum VIII markedly protrusive at rear.

Variation. Unknown.

Vivipary. Not confirmed in the material examined.

Differential diagnosis. Moderately large species, lacking microreticulation; distinguished from the related *C. gaverei* Ritsema and *C. ovalis* sp.nov. by mostly dark pronotum and a large, reddish spot that extends to the apex of the elytra.

Distribution. Laos. Known only from type locality.

Collecting circumstances. Largely unrecorded, holotype collected at quite high altitude.

Crytocephalomorpha ovalis sp.nov.

Examined types: Holotype: ♂, "MALAYSIA-W., Pahang, 30 km E of IPOH, 1500m, Cameron Highlands, TANAH RATA, 21.-24.iv.2001, P. Čechovský leg." (CBM).

Description. Measurements and quotients. Body length: 5.0 mm; body width: 2.5 mm. Width/length of pronotum: 1.67; width of pronotum/width of head: 1.62; length/width of elytra: 1.27; length of elytra/length of pronotum: 2.25.

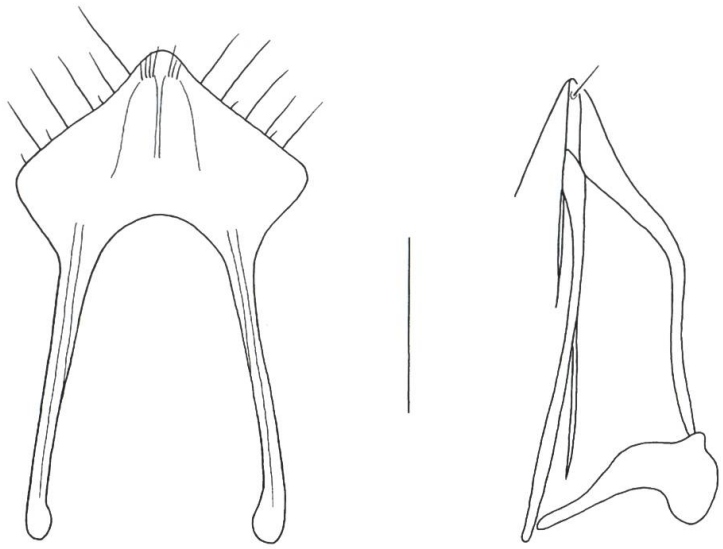


Fig. 4. *Cryptocephalomorpha laosensis* sp.nov., female genitalia, ventral view: sternite VIII, gonocoxites 1 and 2 and tergite VIII. Scale bar: 0.5 mm.

Colour (Fig. 2). Surface dark piceous, anterior margin of head narrowly reddish, pronotum reddish throughout, elytra with wide but very ill-defined reddish margin in basal two-thirds. Elytra with a large, fairly well-delimited, trapezoidal reddish spot that ends clearly distant from apex, therefore apex widely dark. Lower surface reddish to reddish-piceous. Mouthparts and antennae dark reddish, legs reddish-piceous.

Head (Fig. 2). Short and wide, deeply embedded in prothorax, anterior margin of head moderately convex, border quite convex, protruding some distance over mouthparts, which are completely concealed from above. Frons convex. Clypeus not separated from frons. Labrum very small, invisible from above. Mandibles small, almost indiscernible from above, outer margin angulate-convex. Eye oval-shaped, on lower surface of head triangular. Orbit angulate and slightly projecting, partly visible from above, with 3–4 short setae. Antennal groove moderately deep, comparatively short. Mental tooth moderately wide, elongate, obtuse at apex. Wings of mentum wide, laminate, apex widely rounded. Glossa large, apparently completely fused with paraglossae to a moderately wide, tongue-like, distinctly-protruding plate with convex apex that is ventrally keeled and quite downwards-inclined. Glossa at apical margin with around eight fairly elongate setae, dorsal surface apparently without hairs. Lacinia inconspicuous, almost indiscernible. Galea narrow and fairly elongate, fusiform. Terminal palpomere of maxillary palpus elongate and almost parallel-sided, quite sparsely pilose. Terminal palpomere of labial palpus very large and wide, remarkably securiform, more than twice as long as wide, quite densely pilose. Antenna comparatively elongate, antennomeres 6–8 depressed, approx. 1.25 times as long as wide. Microreticulation on dorsal surface absent, surface with sparse and extremely fine punctures, impilose, highly lustrous. Gula impilose.

Pronotum (Fig. 2). Wide, dorsally convex, lateral parts of dorsal surface not fully perpendicular, therefore lateral margin clearly visible from above. Base much wider than apex. Apex convex, not margined; apical angles shortly produced, obtusely angulate. Lateral margins markedly and evenly convex, finely margined, lateral channel absent, margins not explanate. Base very slightly convex, not margined, basal angles evenly rounded. Microreticulation absent, surface with fairly sparse, moderately fine although distinct punctures, impilose, highly lustrous.

Elytra (Fig. 2). Comparatively short, wide, narrowing markedly towards the apex, slightly oviform, very convex, very slightly depressed on disk. Lateral parts not fully perpendicular, therefore lateral margin narrowly visible at least at centre. Apex wide, truncature very convex, slightly incurved towards suture, but not dehiscent, lateral apical angles widely rounded. Base wide, basal angles rounded. Basal margin almost reaching suture, whole base including scutellum usually concealed by base of pronotum. Basal border with a few short setae laterally. Marginal channel narrow, clearly visible but not explanate. Two or three marginal punctures to the rear of humerus and two or three punctures in front of apical curvature present, all slightly removed from lateral margin. Scutellary puncture absent. Dorsal punctures absent. Striae including sutural stria absent. Microreticulation absent, surface with extremely fine, barely discernible and scattered punctures, highly lustrous. Posterior wings fully developed.

Lower surface. Anterior border of prosternum without glandular boss at centre. Prosternal process elongate, far surpassing procoxae, narrow, apparently impilose. Metepisternum elongate, about twice as long as wide, neither hollowed nor bent at the rear. Abdominal sterna in middle bisetose, with coarse, fairly dense punctures and erect pilosity. Terminal sternum in male bisetose, punctate and sparsely pilose, apparently without a glandular, densely pilose area.

Legs. Short, first tarsomere of protarsus slightly longer than wide. Femora wide, tibiae quite short, widened towards apex. Metatibia comparatively elongate, around four times as long as wide, first tarsomere of metatarsus about twice as long as wide. Male protarsus barely widened, fourth tarsomere biseriately squamose.

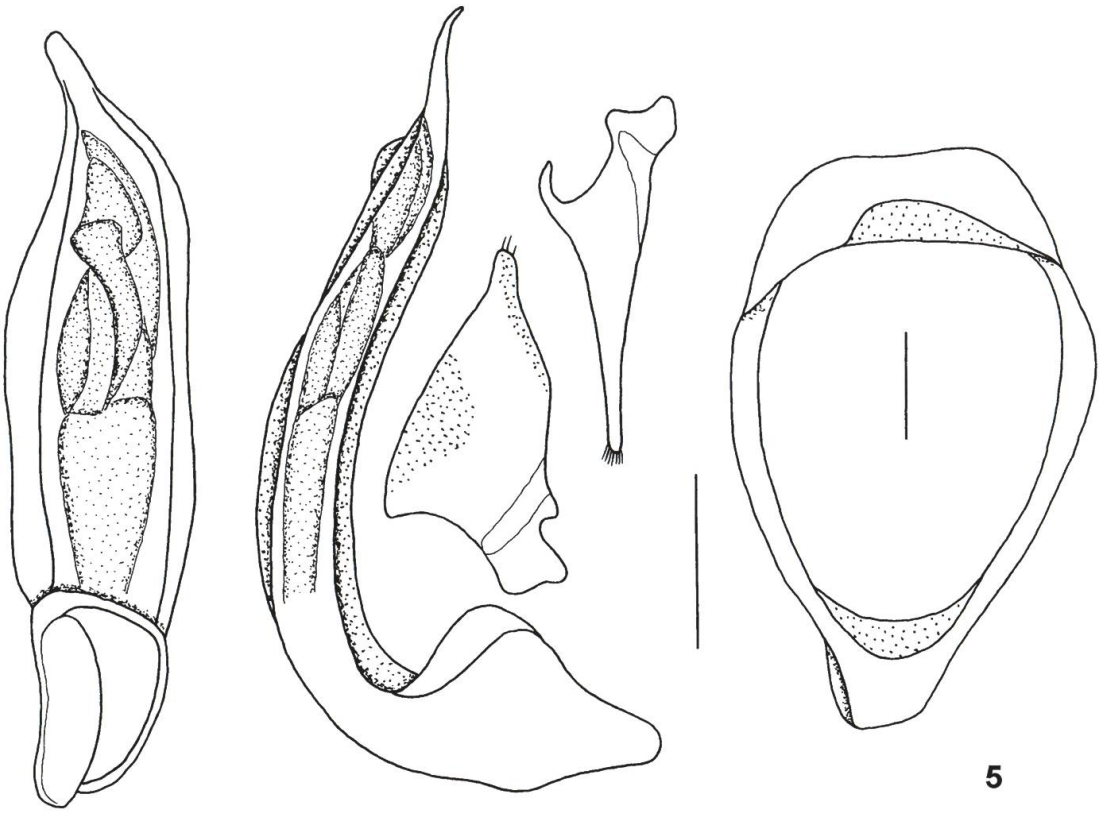
Male genitalia (Fig. 5). Genital ring wide at base, convexly triangular, slightly asymmetrical, with large, asymmetrical basal plate and fairly wide, obliquely transverse apex. Aedeagus rather short, wide, markedly curved in apical part, asymmetrical and quite depressed; basal part large, remarkably curved, lower surface very concave in basal two-thirds, then convex, near apex again slightly concave; apex elongate, narrow, very depressed, curved left and at tip, which bends downwards slightly; internal sac with simple folding, with no sclerotized parts; both parameres triangular and elongate, the left one with two hyaline fields, the right one very elongate and with a tuft of very short setae at apex.

Female genitalia. Unknown.

Variation. Unknown.

Vivipary. Not confirmed in the material examined.

Differential diagnosis. Moderately large species, lacking microreticulation; distinguished from related *C. gaverei* Ritsema and *C. laosensis* sp.nov. by elytra



Figs 5–6. *Cryptocephalomorpha* spp., male genitalia: aedeagus, lower surface, lateral view, left and right parameres, genital ring. 5 – *C. ovalis* sp.nov. 6 – *C. indica* sp.nov. Scale bars: 0.25 mm.

conspicuously narrowed towards apex; further from *C. gaverei* by larger size and elongate, not knobbed apex of aedeagus, and from *C. laosensis* by reddish pronotum and the pale elytral spot not reaching the apex.

Distribution. Malaysia, Cameron Highlands. Known only from type locality.

Collecting circumstances. Largely unrecorded, holotype collected at quite high altitude.

Crytocephalomorpha indica sp.nov.

Examined types: Holotype: ♂, "S-INDIA; KARNATAKA; W-Ghats 20km W Taiguppa; JOG FALLS; 14°14′N 74°44′E; 500±200m; P. Pacholátko leg; 22.–28.v.2002" (NHMB).

Description. Measurements and quotients. Body length: 3.3 mm; body width: 1.6 mm. Width/length of pronotum: 1.55; width of pronotum/width of head: 1.46; length/width of elytra: 1.22; length of elytra/length of pronotum: 1.94.

Colour (Fig. 3). Surface dark piceous, anterior margin of head narrowly reddish, basal half and lateral margins of pronotum widely pale reddish, elytra with wide, quite well-defined, transverse dark yellow to pale reddish spot in middle which does not reach the lateral margin. Base and apex therefore widely dark, lateral margin in middle narrowly dark. Lower surface reddish to reddish-piceous. Mouthparts and antennae pale reddish, legs reddish-piceous.

Head (Fig. 3). Short and wide, deeply embedded in prothorax, anterior margin of head straight at mid-point, laterally slightly convex, border convex, protruding markedly over mouthparts which are thus completely concealed from above. Frons convex. Clypeus not separated from frons. Labrum very small, cannot be seen from above. Mandibles small, almost indistinguishable from above, outer margin angulate-convex. Eye oval-shaped, on lower surface of head triangular. Orbit angulate and slightly projecting, partly visible from above, with 3–4 short setae. Antennal groove moderately deep, comparatively short. Mental tooth moderately wide, elongate, obtuse at apex. Wings of mentum wide, laminate, apex widely rounded. Glossa very small, apparently completely fused with paraglossae to a moderately wide, tongue-like, slightly-protruding plate with convex apex that is ventrally keeled and quite downwardly-directed. Glossa at apical margin with around eight fairly elongate setae, dorsal surface apparently without hairs. Lacinia inconspicuous, almost invisible. Galea narrow and fairly elongate, fusiform. Terminal palpomere of maxillary palpus elongate and almost parallel-sided, quite sparsely pilose. Terminal palpomere of labial palpus large and wide, securiform, but less than 1.5 times as long as wide, somewhat densely pilose. Antenna very short, depressed, antennomeres 6–8 approx. 1.5 times as wide as long. Microreticulation on dorsal surface extremely superficial, surface with sparse and extremely fine, barely-recognizable punctures, impilose, lustrous. Gula impilose.

Pronotum (Fig. 3). Wide, dorsally convex, lateral parts of dorsal surface not fully perpendicular, therefore lateral margin in some parts just visible from above. Base wider than apex. Apex convex, not margined; apical angles shortly produced, obtusely angulate. Lateral margins comparatively slightly convex, finely margined, lateral channel absent, margins not explanate. Base slightly convex, not margined, basal angles

evenly rounded. Microreticulation present, but extremely fine and very superficial, only visible at high magnification, surface apparently impunctate, impilose, lustrous.

Elytra (Fig. 3). Comparatively short, wide, almost parallel-sided, convex but quite depressed on disk. Lateral parts perpendicular, therefore lateral margin not visible from above. Apex wide, truncature convex, slightly incurved towards suture, but not dehiscent, lateral apical angles widely rounded. Base wide, basal angles rounded. Basal margin reaching about halfway to suture, whole base including scutellum usually concealed by base of pronotum. Basal border with a few short setae laterally. Marginal channel very narrow, clearly visible but not explanate. One marginal puncture present at a distance from humerus and close to margin, subapical punctures absent. Scutellary puncture absent. Dorsal punctures absent. Striae including sutural stria absent. Microreticulation present, but extremely fine and very superficial, only visible at high magnification, surface apparently impunctate, impilose, lustrous.

Lower surface. Anterior border of prosternum without glandular boss at centre. Prosternal process elongate, far exceeding procoxae, narrow, apparently impilose. Metepisternum elongate, slightly less than twice as long as wide, neither hollowed nor bent at the rear. Abdominal sterna in middle bisetose, with coarse, fairly dense punctures and erect pilosity. Terminal sternum in male bisetose, punctate and sparsely pilose, apparently without a glandular, densely pilose area.

Legs. Short, first tarsomere of protarsus about as long as wide. Femora wide, tibiae rather short, widened towards apex. Metatibia comparatively elongate, approx. five times as long as wide, first tarsomere of metatarsus approx. 1.5 times as long as wide. Male protarsus barely widened, tarsomeres 2 – 4 biseriately squamose.

Male genitalia (Fig. 6). Genital ring wide at base, asymmetrically triangular, with large, asymmetrical basal plate, and narrowly triangular, slightly curved apex. Aedeagus short and stout, straight, symmetrical, depressed; basal part large, remarkably curved, lower surface very slightly concave, at apex straight; apex itself convexly triangular, very depressed; internal sac with simple folding, no sclerotized parts; both parameres triangular and elongate, the left one hyaline at apex.

Female genitalia Unknown.

Variation. Unknown.

Vivipary. Not confirmed in the material examined.

Differential diagnosis. Small species with fine but perceptible microreticulation; distinguished from similarly sized species by the colour pattern of pronotum and elytra; from *C. collaris* (Waterhouse) and *C. maior* Baehr also by the parallel-sided, dorsally depressed elytra. With respect to body size and shape, presence of microreticulation, and shape and structure of the male genitalia, this species appears quite related to *C. papua* Darlington and *C. australica* Baehr than to any other described species. It differs in its superficial microreticulation and the unique colour pattern of pronotum and elytra.

Distribution. Southern India. Known only from type locality.

Collecting circumstances. Largely unrecorded, holotype collected at quite low altitude.

Revised key to the species of the genus *Cryptocephalomorpha* Ritsema

[For ease of use, figure indication numbers from previous papers by BAEHR (1997, 2002, 2009) are included as **B97** fig., **B02** fig., **B09** fig.]

1. Elytra with distinct light spot; apex of aedeagus wide, rounded and turned up, or asymmetrically spoon-shaped (**B97** figs 269f,g, 271f,g), or unknown. South-eastern Asia. ..... 2.
– Elytra without distinct light spot; apex of aedeagus regularly acute (**B97** figs 273f,g, 274f,g), or unknown. South Africa, New Guinea, Solomon Islands, north-eastern Australia. ..... 9.
2. Size very large, body length *c.* 6 mm; elytral spot close to circular or slightly elliptic and pronotum not contrastingly red. ..... 3.
– Size smaller, body length <5.5 mm; either elytral spot clearly trapezoidal or oblique, or pronotum contrastingly red. ..... 4.
3. Elytra longer, quotient length/width *c.* 1.3, with no marginal punctures or setae; lateral margin of elytra incurved below, therefore not visible from above (**B02** fig. 14); terminal sternum (in female) asetose. Borneo: Brunei. ..... ***gigantea* Baehr, 2002**
– Elytra shorter, quotient length/width *c.* 1.2, with 1–3 marginal punctures; setae near humerus and a single puncture and seta near apex present; lateral margin of elytra slightly explanate laterad, therefore visible from above (**B09** fig. 1); terminal sternum (in female) quadrisetose. Laos. ..... ***maxima* Baehr, 2009**
4. Surface without microreticulation; elytral spot trapezoidal (Figs 1, 2; **B97** fig. 431). ..... 5.
– Surface with fine though distinct microreticulation; elytral spot circular, triangular, or transverse (Fig. 3; **B97** figs 433, 434). Southern India, Thailand, Laos, Vietnam, Philippines. ..... 7.
5. Pronotum contrastingly red; elytral spot removed from apex of elytra, apex widely dark. ..... 6.
– Pronotum largely dark, only the basal margin narrowly and inconspicuously reddish; elytral spot reaching the apex of the elytra, apex reddish (Fig. 1); aedeagus unknown; female genitalia as in Fig. 4. Laos. ..... ***laosensis* sp.nov.**
6. Elytra almost parallel-sided; apex of aedeagus asymmetrically knobbed (**B97** fig. 269f,g); for female genitalia see **B97** figs 269k,l. Malaysia, Thailand, Laos, Sumatra, Java, Borneo. .... ***gaverei* Ritsema, 1875**
– Elytra distinctly narrowed towards the tips, body shape markedly oviform (Fig. 2); apex of aedeagus asymmetrical, straight (Fig. 5); female genitalia unknown. Malaysia. ..... ***ovalis* sp.nov.**
7. Elytral spot circular or somewhat triangular; pronotum completely reddish (**B97** figs 433, 434); microreticulation very fine but distinct;

aedeagus narrow, slightly asymmetrical, with widely rounded apex (**B97** fig. 271f), or unknown. Thailand, Laos, Vietnam, Philippines. .... 8.

– Elytral spot transverse; only the basal half of the pronotum pale reddish (Fig. 3); microreticulation very superficial, visible only at high magnification (>60×); aedeagus wide, symmetrical, with wide, convexly triangular apex (Fig. 6); female genitalia unknown. Southern India. ..... ***indica* sp.nov.**

8. Smaller species, length <4.2 mm; elytra longer, quotient length/width >1.28; elytral spot always well delimited, regularly circular (**B97** fig. 433). Southern Thailand, Philippines. .... ***collaris* (Waterhouse, 1877)**

– Larger species, length >4.2 mm; elytra shorter, quotient length/width <1.28; elytral spot usually less well delimited, somewhat triangular (**B97** fig. 434). Northern Thailand, Laos, Vietnam. .... ***maior* Baehr, 1997**

9. Larger, wider species, length >4 mm; lateral margin of elytra near base with punctures and elongate setae (**B97** fig. 432); surface not distinctly punctate; lateral margin of mandible regularly curved (**B97** figs 267, 268). South Africa. ..... ***genieri* Baehr, 1997**

– Smaller, narrower species, length <3.5 mm; lateral margin of elytra asetose (**B97** figs 435, 436); surface distinctly punctate; lateral margin of mandible excised and with acute spine (**B97** fig. 273m). Australia, New Guinea, Solomon Islands. ..... 10.

10. Pronotum slightly wider, more trapeziform; coloration more contrasting; punctation of surface coarser; aedeagus longer, symmetrical, apex obtuse at tip (**B97** figs 274f,g). Australia: northern Queensland. ..... ***australica* Baehr, 1997**

– Pronotum slightly narrower, less trapeziform; coloration less contrasting; punctation of surface finer; aedeagus shorter, slightly asymmetrical, apex acute at tip (**B97** figs 273f,g). Papua New Guinea, Solomon Islands: Guadalcanal. ..... ***papua* Darlington, 1968**

Remarks

The three newly-described species demonstrate not only the very restricted current knowledge of species diversity in the genus *Cryptocephalomorpha*, but they also confirm the rarity of these beetles, which are usually sampled only as single specimens, or very few at a time. The record of *C. gaverei* as occurring in an ants' nest seems to indicate at least one reason for the apparent rarity: their myrmecophilous habits. Future careful and systematic exploration of ants' nests will probably demonstrate that the species are far less rare than we believe at present.

In consideration of the putative myrmecophilous habits, the convex body shape and highly lustrous surface, with mouthparts and legs completely hidden under pronotum

and elytra, appear to make good sense, since they are very much reminiscent of the body shapes and surface structures of other beetle groups that live with ants, e.g. the Paussine beetles. However, we lack knowledge of larvae of the genus *Cryptocephalomorpha*. It would be very interesting to know the grade to which they are physogastric like the larvae of such evolved pseudomorphine genera as *Adelotopus* Hope, *Cainogenion* Notman, and *Paussotropus* Waterhouse, and how they differ from "normal" pseudomorphine larvae. Knowledge of the larvae could also help further elucidate the systematic position of *Cryptocephalomorpha* within Pseudomorphini, which is currently unsettled.

Most species of *Cryptocephalomorpha* were recorded from an area that includes Thailand, Laos, Vietnam, Malaysia, Sumatra, Java, Bali, Borneo, and the Philippines. Three species, as mentioned in the introduction, have also been recorded from South Africa, Papua New Guinea and the Solomon Islands, and north-eastern Australia. Therefore the new species from south-west India considerably enlarges the recorded range of the genus. However, this is not too surprising, because the distribution of *Cryptocephalomorpha* is not yet defined with any degree of certainty due to the extreme rarity of specimens.

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