

Mitt. Münch. Ent. Ges.	95	59-66	München, 31.01.2006	ISSN 0340-4943
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The Australian scaritine genus *Steganomma* MACLEAY (Coleoptera, Carabidae, Scaritinae)

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Abstract

The Australian scaritine genus *Steganomma* MACLEAY is revised and two new species are described: *S. doddi* **sp. n.** from North Queensland and *S. carteri* **sp. n.** from Western Australia. *S. carteri* is mainly distinguished from *S. doddi* and *S. porcatum* MACLEAY from Queensland by larger, laterally not enclosed eyes, bisetose margins of prothorax, impunctate elytral striae, and more massive build body. *S. doddi* is the sister species of *S. porcatum* and is mainly distinguished from the latter by laterally produced orbits, presence of additional small teeth on the right mandible, wider, more depressed prothorax with more produced anterior angles, presence of a conspicuous boss at apical margin of prosternum, and posteriorly less widened elytra. Habits and life histories of these very rare, small-eyed beetles are virtually unknown, except that they are fossorial and predatory.

Introduction

Beetles of the genus *Steganomma* MACLEAY are strange creatures due to their compact, convex body shape and, in particular, their tiny eyes that are almost invisible from above and are laterally more or less enclosed by the dentiform orbits. In view of these character states, they were included in the African-Oriental subtribe Scapterina (LORENZ 1998). According to MOORE et al. (1987) the single known species *S. porcatum* MACLEAY was known so far only from the holotype collected at Russell River near Innisfail, and from a specimen from Kuranda, both in North Queensland. The Kuranda specimen, however, belongs to a related species that is described below. In Australia, the genus is the single representative of the subtribe Scapterina that includes a few related genera from the Aethiopian and Oriental regions.

In the course of sorting out large numbers of unidentified Australian *Clivina* in the Australian National Insect Collection, Canberra (ANIC) and the MACLEAY Collection housed in the same institution (ANIC-MMS), I found, *inter alia*, some quite recently caught specimens of *S. porcatum*, and moreover, two single old specimens from Queensland and Western Australia, respectively, that in several respects deviate from the above species and therefore are described herein as new. Within a shipment of *Clivina* from Queensland Department of Primary Industries, Mareeba (DPIM), additional specimens from the same recently caught series were detected that are included in the present paper.

Virtually nothing is known about habits and life histories of these beetles. The markedly palmate protibiae, highly convex body form, and tiny eyes certainly are evidence of a strictly fossorial way of life. Because no collecting circumstances are recorded, it is not even known, in which habitats they occur. Although MOORE in his catalogue (MOORE et al. 1987: 108) wrote "litter, closed forest", this opinion is not corroborated by any observations but only by the recorded localities in North Queensland that suggest rain forest as habitat. MOORE also wrote "predator" which applies to all scaritine beetles and certainly also to *Steganomma*, in view of the remarkably dentate mandibles. Unfortunately, the sampling circumstances and the habitat type of the recently collected series are likewise unknown. It is worth noting, however, that specimens were collected at this locality at three times, hence probably they are not too rare there.

Methods

For the taxonomic treatment standard methods were used. The male genitalia and female stylomeres were removed from specimens soaked for a night in a jar under wet atmosphere, then cleaned for a short while in hot KOH.

Measurements were taken using a stereo microscope with an ocular micrometer. Length has been measured from apex of labrum to apex of elytra. Length of pronotum was measured along midline. Length of elytra was taken from the most advanced part of humerus to the most advanced part of apex.

The habitus photographs were taken with a digital camera using ProgRes Capture Basic and AutoMontage and subsequently enhanced with Corel Photo Paint 10.

Steganomma porcatum MACLEAY, 1887

(Figs 1-3, 6)

MACLEAY, 1887: 133; SLOANE 1905:103, 104; CSIKI 1927: 465; MOORE et al. 1987: 108; LORENZ 1998: 131.

Types. Holotype: (not sexed, because of fragility), Cairns (printed) / HOLOTYPE (printed, red) / *Steganomma porcatum*, MacI. Russell River N. Queens. (ANIC-MMS).

Note. Apart from the holotype, I only saw the recently caught series mentioned below. I also examined a specimen from Kuranda from the SLOANE Collection that SLOANE (1905: 105) mentioned as given to him by F. P. DODD, which belongs to another, related species.

Diagnosis. The genus is immediately recognized by very small eyes and compact, convex body. *S. porcatum* is distinguished from *S. carteri* **sp. n.** by lesser size, prothorax with produced apical angles and several marginal setae, and remarkably widened elytra with distinctly punctate striae. From *S. doddi* **sp. n.** it is distinguished by laterally barely produced orbits, absence of additional small teeth on the right mandible, longer, more convex prothorax with less produced apical angles, absence of a conspicuous boss at median apical margin of prosternum, and posteriorly more widened elytra with more explanate and therefore well visible lateral sulcus.

Redescription

Measurements: Length: 11.2-12.8 mm; width: 3.4-3.95 mm, Ratios: Width/length of pronotum: 1.03-1.05; length/width of elytra: 1.66-1.73; width elytra/pronotum: 1.06-1.08.

Colour: Upper and lower surfaces, legs, mouth parts, and antennae black.

Head (Figs 3, 6): Short and wide, slightly narrower than pronotum. Anterior margin of head slightly excised in middle, clypeus not separated from frons, with a shallow transverse ridge near apex. Labrum short and wide, quadrisetose, anterior margin gently produced and bidentate in middle. Lateral margin of head posteriorly straight and almost parallel, marginal ridge sloping down to the eyes which are situated far ventrally. Eyes very small, almost invisible from above, latero-ventrally narrowly enclosed by the orbits. Two supraorbital setae situated in a groove above eye close together. Mandibles moderately elongate, both with two large teeth in basal half. Scrobe and upper surface of mandibles little striolate. Lacinia with very dense fringe of elongate setae along median margin and on external apical margin. Glossa short, bisetose, paraglossae basally united with glossa, unisetose at apex. Mentum with elongate, triangular tooth. Submentum quadrisetose, separated from mentum by a deep transverse furrow. Galea and both palpi narrow and elongate, asetose, though penultimate labial palpomere bisetose. Antenna short, median antennomeres wider than long. Upper surface with a deeply impressed, transverse, punctate sulcus between frons and neck. Frons in middle slightly raised, separated from lateral parts by a somewhat irregular, punctate furrow. Anterior-lateral parts of head barely striolate. Surface barely punctate, glossy.

Prothorax (Fig. 6): About as long as wide, dorsal surface rather convex. Apical margin concave, apical angles well protruding, but slightly incurved at tip. Lateral margin generally rather straight and parallel, but near apical angles incurved and in middle very gently concave. Base evenly convex, basal angles completely rounded off. Apex and middle of base not margined, lateral margin very narrow. Apical transverse sulcus

deeply impressed, at bottom slightly crenulate, and with several narrow longitudinal “bridges”. Median line deeply impressed, running from anterior sulcus to base. Near middle of base with a very shallow transverse impression. Basal grooves almost invisible, but indicated by denser punctuation. Whole apical margin with a dense fringe of short hairs, lateral margin with 8-10 marginal setae, running even around basal angles. Surface with a few shallow transverse sulci, with sparse, rather fine, superficial punctures, without microreticulation, highly glossy.

Elytra (Fig. 6): Moderately elongate, remarkably widened from middle, almost oviform, apex regularly convex. Dorsal surface convex but somewhat depressed in middle, lateral margin visible throughout. Base not margined except laterally, humeri gently dentiform. Lateral margin very finely crenulate, marginal sulcus densely granulate. Striation complete till apex, striae deeply impressed, crenulate, towards apex even coarsely punctate. Intervals convex. Scutellary stria and seta absent, one discal seta present on 3rd interval very close to base. Lateral margin with c. 20 marginal setae. Surface not microreticulate, barely punctate, highly glossy. Posterior wings absent.

Lower surface: Prosternum microreticulate, without an antero-median boss. Proepisterna with elongate, shallow transverse striae, sparsely punctate. Prosternal process with c. 6 elongate setae. Metepisternum short, c. 1/3 longer than wide. Meso- and metathorax moderately punctate, abdomen with dense and very coarse punctuation. terminal abdominal sternum quadrisetose in both sexes, rarely with an additional seta on one side. Epipleura of elytra at base with c. 6 coarse punctures.

Legs: Short and stout. Protibia wide, tridentate, teeth moderately elongate. Mesotibia with an elongate spine in apical third on upper surface. Tarsi short. Males without any sexual characters.

Male genitalia (Fig. 1): Genital ring wide, oval-shaped, delicate, with wide apex. Aedeagus short and stout, remarkably curved, rather symmetric, with wide apex. Internal sac with several sclerites at base, in middle and near apex. One elongate sclerite near orificium remarkably spinose at apex. Parameres absolutely similar, very large, with elongate, barely sclerotized apical whip, with c. 15 hairs of very different length at lower surface of apical fifth.

Female genitalia (Fig. 2): Stylomeres united, elongate, towards apex slightly curved laterally. Median and lateral surfaces with 6-7 elongate ensiform setae each, near apex with a single dorsal ensiform seta.

Variation: Apart from minor differences in shape of elytra, degree of punctuation of elytral striae, and number of prothoracic marginal setae little variation noted.

Distribution: Known only from the vicinity of Innisfail, North Queensland.

Collecting circumstances: Not recorded, but probably sampled in more or less closed forest.

Relationships: Probably the sister species of to *S. doddi* sp. n., which likewise occurs in North Queensland.

Additional examined material (10 ex.): Stone Ck, Garradunga, N.Q. 4.5.1995, 15.9.1995, 15.4.1996, P. HASENPUSCH (ANIC, CBM, DPIM).

Steganomma doddi sp. n.

(Figs 4, 7)

Types. Holotype: (not sexed, because abdomen was lost by frass), Kuranda, Qld April'04 F. P. DODD (ANIC).

Diagnosis. Distinguished from both other species by presence of a conspicuous boss at median apical margin of prosternum. Further distinguished from *S. carteri* sp. n. by lesser size, prothorax with produced apical angles and several marginal setae, and more widened elytra with distinctly punctate striae; and from *S. porcatum* by laterally much more produced orbits, presence of additional small teeth on the right mandible, wider, more depressed prothorax with more produced apical angles, and posteriorly less widened elytra with less explanate and therefore less well visible lateral sulcus.

Description

Measurements: Length: 12.5 mm; width: 3.65 mm, Ratios: Width/length of pronotum: 1.18; length/width of elytra: 1.78; width elytra/pronotum: 0.96.

Colour: Upper and lower surfaces, legs, mouth parts, and antennae piceous in holotype.

Head (Figs 4, 7): Short and wide, slightly narrower than pronotum. Anterior margin of head slightly excised in middle, clypeus not separated from frons, with a shallow transverse ridge near apex. Labrum short and wide, quadrisetose, anterior margin deeply concave in middle. Lateral margin of head gently convex throughout, marginal ridge sloping down to the eyes which are situated far ventrally. Eyes very small, almost invisible from above, latero-ventrally well enclosed by the markedly produced orbits. Two supraorbital setae situated in a groove above eye close together. Mandibles elongate, left one with two large teeth in basal half, right one with two additional small teeth near base of basal tooth. Scrobe and upper surface of mandibles moderately striolate. Lacinia with very dense fringe of elongate setae along median margin and on external apical margin. Mentum and both labial palpi lacking in holotype. Galea and maxillary palpus narrow and elongate, asetose. Antenna short, median antennomeres probably wider than long, but both antennae in holotype broken near base or in middle, respectively. Upper surface with a fairly deep, transverse, impunctate sulcus between frons and neck. Frons in middle slightly raised, separated from lateral parts by a somewhat irregular, impunctate furrow. Anterior-lateral parts of head with about three distinct longitudinal furrows. Surface barely punctate, glossy.

Prothorax (Fig. 7): Distinctly wider than long, dorsal surface rather depressed. Apical margin concave, apical angles well protruding, barely incurved at tip, even somewhat turned outside. Lateral margin generally rather straight but slightly converging towards base, near apical angles barely incurved, in apical third very gently concave. Base evenly convex, basal angles completely rounded off. Apex and middle of base not margined, lateral margin very narrow. Apical transverse sulcus deeply impressed, at bottom slightly crenulate, and with several narrow longitudinal “bridges”. Median line deeply impressed, running from anterior sulcus to base. Base in middle with a well developed transverse impression. Basal grooves extremely shallow, about linear, without denser punctuation. Whole apical margin with a dense fringe of short hairs, lateral margin with 7-8 marginal setae, running even around basal angles. Surface with a few shallow transverse sulci, with extremely sparse and fine, superficial punctures, without microreticulation, highly glossy.

Elytra (Fig. 7): Moderately elongate, moderately widened from middle, somewhat oviform, apex regularly convex. Dorsal surface convex but somewhat depressed in middle, lateral margin narrowly visible throughout, but even in middle barely explanate. Base not margined except laterally, marginal ridge distinctly raised, humeri gently dentiform. Lateral margin very finely crenulate, marginal sulcus densely granulate. Striation complete till apex, striae deeply impressed, crenulate, towards apex coarsely punctate. Intervals convex. Scutellary stria and seta absent, one discal seta present on 3rd interval very close to base. Lateral margin with 18-19 marginal setae. Surface not microreticulate, barely punctate, highly glossy. Posterior wings absent.

Lower surface: Prosternum barely microreticulate, with a conspicuous antero-median boss. Proepisterna without distinct transverse striae, very sparsely punctate. Prosternal process with c. 8 elongate setae. Metepisternum short, c. 1/3 longer than wide. Meso- and metathorax barely punctate, abdomen with dense and very coarse punctuation. Terminal abdominal sternum in holotype apparently bisetose but uncertain. Epipleura of elytra at base with c. 6 coarse punctures.

Legs: Short and stout. Protibia wide, tridentate, teeth longer than usual in genus. Mesotibia with an elongate spine in apical third on upper surface. Tarsi short. Male sexual characters unknown.

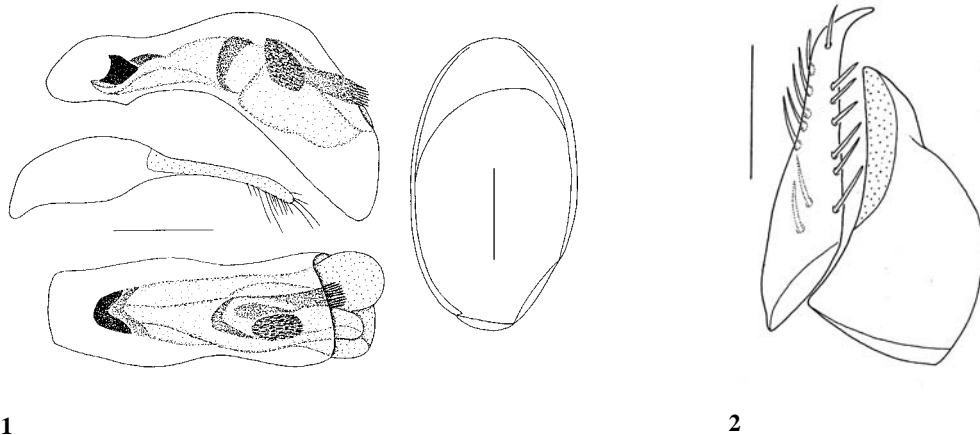
Male and female genitalia: Unknown.

Variation: Unknown.

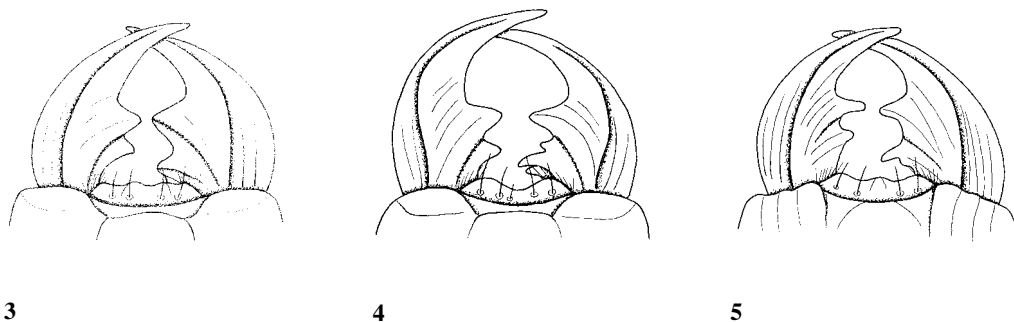
Distribution. Known only from Kuranda, North Queensland.

Collecting circumstances. Not recorded, but probably sampled in more or less closed forest.

Relationships. Very closely related to *S. porcatum* which likewise occurs in North Queensland.



Figs 1+2: Fig. 1. *Steganomma porcatum* MACLEAY. Male genitalia: aedeagus, left side and dorsal surface, left paramere, and genital ring. Scales: 0.5 mm; **Fig. 2.** *Steganomma porcatum* MACLEAY. Female stylomeres. Scale: 0.5 mm.

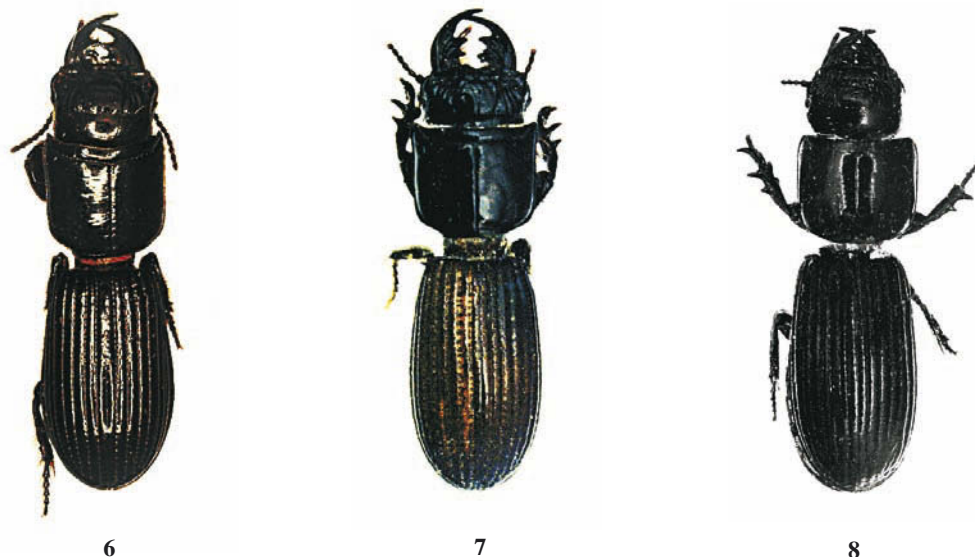


Figs 3-5. Mandibles: **3.** *Steganomma porcatum* MACLEAY. **4.** *S. doddi* sp. n. **5.** *S. carteri* sp. n.

***Steganomma carteri* sp. n.**
(Figs. 5, 8)

Types. Holotype: (not sexed, because abdomen was lost by frass), Geraldton, W.A. Sept. 1926. H. J. CARTER (ANIC).

Diagnosis. Distinguished from both, *S. porcatum* and *S. doddi* by larger size, larger eyes, prothorax with barely produced apical angles and with only a single anterior marginal seta, and posteriorly barely widened elytra bearing impunctate striae.



Figs 6-8. Habitus: 6. *Steganomma porcatum* MACLEAY (length: 12.2 mm). 7. *S. doddi* sp. n. (length: 12.5 mm). 8. *S. carteri* sp. n. (length: 14.8 mm).

Description

Measurements: Length: 14.8 mm; width: 4.3 mm, Ratios: Width/length of pronotum: 1.16; length/width of elytra: 1.83; width elytra/pronotum: 1.0.

Colour: Upper and lower surfaces, legs, mouth parts, and antennae dark piceous in holotype.

Head (Figs 5, 8): Short and wide, slightly narrower than pronotum. Anterior margin of head well excised in middle, clypeus separated from frons by an indistinct, more or less interrupted line which is better developed at lateral wings, without a transverse ridge near apex. Labrum short and wide, quadrisetose, anterior margin with shallow excision, but slightly produced in middle. Lateral margin of head posteriorly gently convex, marginal ridge barely sloping down, therefore eyes situated laterally. Eyes small, but larger than in both other species, well visible from above, only posteriorly enclosed by the orbits. Two supraorbital setae situated in a groove above eye close together. Mandibles moderately elongate, both with two large teeth in basal half, but the right mandible with an additional basal boss. Scrobe and upper surface of mandibles densely striolate. Lacinia with very dense fringe of elongate setae along median margin and on external apical margin. Glossa short, bisetose, paraglosae basally united with glossa, unisetose at apex. Mentum with elongate, triangular tooth. Submentum apparently bisetose, separated from mentum by a deep transverse furrow. Galea and both palpi narrow and elongate, asetose, though penultimate labial palpomere bisetose. Antenna short, median antennomeres probably wider than long, but both antennae in holotype broken near base or in basal half, respectively. Upper surface without a transverse sulcus between frons and neck. Frons in middle slightly raised, separated from lateral parts by a shallow, somewhat irregular furrow. Whole anterior half of head quite densely and coarsely striolate. Surface barely punctate, glossy.

Prothorax (Fig. 8): Distinctly wider than long, dorsal surface markedly convex. Apical margin concave, but apical angles little protruding, slightly incurved at tip. Lateral margin generally rather straight but slightly converging towards base, near apical angles distinctly incurved, in middle very gently concave. Base evenly convex, basal angles completely rounded off. Apex and base not margined, even laterally. Apical transverse sulcus shallow, merely consisting of a row of rather fine punctures. Median line deeply impressed, running from anterior sulcus to near base. Base without a well developed transverse impression. Basal grooves distinct, well impressed, linear, slightly oblique, attaining base, without any punctuation. Whole apical margin with a dense fringe of very short hairs, lateral margin with two marginal setae, one at position of

basal angle, the anterior one at apical sixth. Surface without transverse sulci, apparently also without punctures, without microreticulation, highly glossy.

Elytra (Fig. 8): Comparatively elongate, barely widened behind middle, not oviform, apex regularly convex. Dorsal surface convex, barely depressed in middle, lateral margin not visible in basal third, very narrowly visible behind, barely explanate. Base not margined except laterally, marginal ridge very strongly raised, humeri gently dentiform. Lateral margin barely crenulate, marginal sulcus densely granulate. Striation complete but becoming weaker towards apex, striae deeply impressed, smooth, only towards apex finely punctate. Intervals convex. Scutellary stria and seta absent, one discal seta present on 3rd interval very close to base. Lateral margin with 18-19 marginal setae. Surface not microreticulate, barely punctate, highly glossy. Posterior wings absent.

Lower surface: Prosternum not microreticulate, without a conspicuous antero-median boss, but sternum at this position slightly convex. Proepisterna without distinct transverse striae, with very few, rather coarse punctures. Prosternal process bisetose. Metepisternum short, c. 1/3 longer than wide. Meso- and metathorax with rather sparse, though quite coarse punctuation, abdomen densely and very coarsely punctate. Terminal abdominal sternum in holotype quadrisetose. Epipleura of elytra at base impunctate.

Legs: Short and stout. Protibia wide, tridentate, teeth moderately elongate. Mesotibia with an elongate spine in apical third on upper surface. Tarsi short. Male sexual characters unknown.

Male and female genitalia: Unknown.

Variation: Unknown.

Distribution. Known only from Geraldton, central western Western Australia.

Collecting circumstances. Not recorded, but probably sampled in more or less open country.

Relationships. Probably the adelphotaxon of both, *S. porcatum* and *S. doddi*.

Key to the species of the genus *Steganomma* MACLEAY

1. Eyes larger, laterally not enclosed by the orbits; clypeus separated from frons, lateral wings markedly striate; pronotum massive, wide **and** dorsally convex, lateral margin bisetose; elytra little widened posteriorly, striae barely punctate, almost smooth. Western Australia *carteri* **sp. n.**
- Eyes smaller, laterally enclosed by the orbits; clypeus not separated from frons, lateral wings barely striate; pronotum less massive, either wide and dorsally rather depressed, or narrower and dorsally convex, lateral margin multisetose; elytra decidedly widened posteriorly, striae coarsely punctate. North Queensland 2.
2. Orbits laterally well produced over eyes; right mandible with additional small teeth; prothorax wider, more depressed with more produced apical angles; apical margin of prosternum with a conspicuous boss in middle; elytra posteriorly less widened, with less explanate and therefore less well visible lateral sulcus *doddi* **sp. n.**
- Orbits laterally barely produced over eyes; right mandible without additional small teeth; prothorax longer, dorsally more convex with less produced apical angles; apical margin of prosternum without a conspicuous boss; elytra posteriorly markedly widened, with rather explanate and therefore well visible lateral sulcus *porcatum* MACLEAY

Remarks

The Australian scaritine genus *Steganomma* is yet very unsufficiently known, in particular with respect to ecology and ethology. We neither know exactly in which habitats these beetles actually live, nor how they forage and what they eat, and reproduction and life cycles are completely unrecorded. Due to the very sparse material available, not even the ranges of the three described species can be defined, because all three species were captured so far either at one locality and in a single specimen only or in a very restricted area. It seems, however, that both eastern species occur in closed forest, either in rain forest, either in more or less dense sclerophyll forest, whereas the western species presumably occurs in drier environments in rather open forest or woodland.

The extremely small eyes most probably are evidence of a largely subterranean life of all species of the genus and this behaviour then could explain the apparent great rarity of all known species that probably are found even more rarely outside of their burrows than other scaritine beetles.

The western *S. carteri* seems to exhibit some plesiomorphic states in certain characters of its external morphology that would suggest a generally less evolved status of this species. Below a number of those plesiomorphic character states are contrasted to their apomorphic status as seen in both eastern species:

- larger, laterally not enclosed eyes – small, laterally more or less well enclosed eyes
- presence of a border line between clypeus and frons – absence of such border
- absence of a transverse sulcus across vertex – presence of a sulcus
- bisetose lateral margins of pronotum – polysetose margins
- well developed basal grooves on pronotum – barely developed basal grooves
- bisetose prosternal process – polysetose prosternal process
- cylindrical, barely widened elytra – posteriorly markedly widened elytra
- smooth, almost impunctate elytral striae – coarsely punctate striae

In all mentioned characters both eastern species exhibit the apomorphic states. Although both species are very closely related, in certain characters *S. doddi* seems to exhibit the apomorphic state:

- dentiform projecting orbits
- presence of additional small teeth on the right mandible
- wide, depressed pronotum
- markedly advanced apical angles of pronotum
- presence of a conspicuous boss at apex of prosternum

The even more widened elytra in *S. porcatum*, on the other hand, seem to constitute the apomorphic status in this character.

Certainly it is premature to draw any phylogenetic or even biogeographic conclusions from these raw character states, the more, because the relationships of *Steganomma* as a whole are yet unknown, except that the genus belongs to the Ethiopian-Oriental subtribe Scapterina. Nevertheless, it may be speculated that the western species *S. carteri* is the most basal species of the genus, whereas both eastern species in many respects apparently are more evolved and together form the adelphotaxon of *S. carteri*. Certainly knowledge about the male and female genital organs of all species would be helpful to corroborate, or falsify these suggestions, respectively.

Certainly it would be unusual for a probably fairly recent immigrant from the Oriental Region into Australia to have its most basal member in mid Western Australia, because in those groups usually the most primitive stock still occurs in North Queensland. Thus, the distribution pattern in *Steganomma* would rather suit an old, indigenous, Gondwanan origin of the genus. Unfortunately, phylogenetic relations and biogeography of the subfamily Scaritinae and their tribes so far are uncertain, apart from that the subfamily is an old but remarkably evolved one due to the fossorial habits of almost all of its members.

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Zeitschrift/Journal: [Mitteilungen der Münchner Entomologischen Gesellschaft](#)

Jahr/Year: 2005

Band/Volume: [095](#)

Autor(en)/Author(s): Baehr Martin

Artikel/Article: [The Australian scaritine genus Steganomma MACLEAY \(Coleoptera, Carabidae, Scaritinae\). 59-66](#)