Taxonomic diversity of the genus *Ochicanthon* in Sundaland (Coleoptera: Scarabaeidae: Scarabaeinae)

J. Krikken & J. Huijbregts

The Sundaland representatives of the Oriental genus *Ochicanthon* Vaz-de-Mello, 2003 (= *Phacosoma* Boucomont, 1914) are reviewed, on the basis of a study of 1100 specimens and the literature. The genus is rediagnosed, its species are listed, and the Sundaland species are keyed and diagnosed; 13 new species are described from Sabah & Sarawak (11 new species), the Malay Peninsula (1), and Java (1), bringing the total to 36. Taxonomic, biogeographic, and ecological aspects are discussed, and research questions summarized. *Ochicanthon* species are associated with dung and carrion. They are hypothesized to be essentially Indo-Gondwanan, having dispersed from India to the East, but not into Wallacea and beyond. At least one species is flightless. The following species from Malaysia and Indonesia are new: *Ochicanthon edmondsi* (Borneo), *rombauti* (Borneo), *crockermontis* (Borneo), *crypticus* (Borneo), *peninsularis* (Malay Peninsula), *neglectus* (Borneo), *dulitmontis* (Borneo), *tambunan* (Borneo), *mulu* (Borneo), *kimanis* (Borneo), *danum* (Borneo), *javanus* (Java), *hanskii* (Borneo). New records of described species are given. The type locality of *O. dytiscoides* (Boucomont, 1914) is restricted to Sabah by designating a lectotype for this species. Suspected synonyms are briefly discussed, and attention is drawn to the poorly resolved complex of species around *O. dytiscoides*. A note on Scarabaeinae erroneously recorded from Sulawesi is added, the record of the unidentifiable *Ochicanthon punctatus* (Boucomont, 1914) being one of them. The recommendation is given not to describe new species-group taxa based on females only, unless they show evidently unique characters.

J. Krikken* & J. Huijbregts, National Museum of Natural History Naturalis, Postbus 9517, NL-2300 RA Leiden, The Netherlands. krikken@nnm.nl

Introduction

Until a few years ago the small scarabs treated in this paper figured in the literature and in collections under the genus-group name *Phacosoma* Boucomont, 1914, a widely used junior homonym, for which the replacement name *Ochicanthon* Vaz-de-Mello, 2003 was proposed. As currently understood *Ochicanthon* comprises a variety of more or less slender-legged Canthonini, essentially Oriental in distribution, most of them characterized by the combination of long first tarsal segments on the middle and hind legs, a bidentate clypeus, an evenly, slightly convex dorsal side, a broadly produced, roundish protibial apex, and a double-crested elytral pseudepipleuron – all attributes that suffice to distinguish them without problems from other Oriental Scarabaeinae. They appear all to be associated with carrion and/or excrements. Locally, at least in Southeast Asia, they may be quite common in forest environments, being easily attracted to baited ground traps – even in forest remnants, as on Singapore Island. This paper increases the number of known *Ochicanthon* species with 13 to a total of 36. Long series were obtained during both our own field campaigns and those of ecological colleagues, mainly on Borneo. On analyzing ecological samples some decades ago (see for instance Hanski & Krikken 1991), we already recognized several new *Ochicanthon* (= *Phacosoma*)
species, but their taxonomic description had to be delayed due to our other obligations. Meanwhile, manuscript names and codes circulate, even a genus-group name which should have replaced \textit{Phacosoma}, and some of the new Sundaland species were described by others (Ochi et al. 1996 through 2007). Nevertheless, as indicated, there are still many undescribed species left, and more are likely to turn up in the future, as will be clear from this paper. When we started looking at our \textit{Ochicanthon} material the variation in several of the characters seemed confusing and rather due to intraspecific polymorphism, but on going through the long series mentioned, we gradually learned that the operational units recognized from the outset nearly all represented species in their own right, as confirmed by the virtually constant, characteristic shape of the male genitalia of these units, and sometimes by their ecology. Although a few species seem to be more widespread, many species may have a limited distribution and ecology, one being flightless – a phenomenon not unusual among canthonines (see General discussion below). Records of \textit{Ochicanthon} species located far from their type localities, particularly with species inhabiting primeval forest environments or sites with a known history of ecological isolation, must always be critically verified, starting with an analysis of the structure of the male genitalia. This taxonomic review, part of a series on the taxonomy of laparostict scarabs of the Indo-Australian islands, more than doubles the number of \textit{Ochicanthon} species known from Sundaland. We present a generic diagnosis, a list of the known species, a character analysis, a key to 23 Sundaland species, accounts of these species, including descriptions of 13 new species. A compilation of the material seen, including numerous new records, is appended. The systematic position of the genus, its species-level diversity, some biogeographic aspects, and the ensuing research questions, are discussed at the end of this paper.

**Material, methods, conventions**

**Scope and information sources**

The substance of this paper concerns straightforward morphological taxonomy; i.e. the diagnosis and description of the new Sundaland species alluded to in the introduction, and their insertion in an identification key. The \textit{Ochicanthon} material on which this study is based was nearly all collected in the context of tropical forest biodiversity projects on Borneo. We are aware that a phylogenetic analysis should follow, but this is at present considered premature (see argumentation in General discussion). Most specimens were collected by pitfall trapping on ground surface level, using either human faeces or fish as bait. All in all, about 1100 \textit{Ochicanthon} specimens belonging to over 20 species were seen by us, and all relevant published descriptions and illustrations of \textit{Ochicanthon} were checked, and the information processed to the best of our ability. Efforts to access types of some species recently described remained unsuccessful. Potentially related genera were screened to assess their taxonomic position in relation to \textit{Ochicanthon} (see General discussion, below).

**Characters and descriptive terminology**

The diagnoses and descriptions follow a standard pattern, taking into account the diagnostic value of the \textit{Ochicanthon} characters resulting from a character analysis. The format of the character list (Appendix 1) and other descriptive information follows from the use of a DELTA oriented system (Dallwitz 2005) tuned to our scarab diversity database. The list makes our use of characters to distinguish the known Sundaland species transparent, and includes characters possibly significant in a future phylogeny reconstruction; the synoptic table facilitates multi-character identification.

Ecological remarks following the diagnoses are based on both published reports and our own records. Comments at the end of each of the species accounts usually start with some comparative morphological features, followed by any further comments. Some additional terminological explanation is in order (for colour pattern coding and aedeagus elements see next section).

Interstriae are the intervals between the elytral striae; note that \textit{Ochicanthon} are characterized by the presence of a broad pseudepipleuron. Our term meta-
tarsus denotes the entire tarsus of the hind leg, as distinct from metatarsal segment 1. The qualification \textit{abundant} for micros sculptural units (like punctures) usually means: separated by 2-5 diameters, \textit{dense}: 1-2 diameters, \textit{crowded}: less than 1 diameter; \textit{sparse}: at least 5 diameters. Estimates may be imprecise due to peripunctural depressions (particularly on rugulate surfaces). Different types of punctures (like annulate or ocellate) are specified only if they are distinctly and unambiguously different from simple punctures (a central micro-pit [potentially] supporting a seta, for instance, does not qualify them to be called ocellate). Attributes with the prefix \textit{micro}- are defined as those distinct at magnifications of about 40×, or higher. Some parts may be characteristically microstriolate or microreticulate (appearing sericeous, more or less matt).
Marginate is a general term, meaning that the margin of the body element concerned is set off from the general surface (by being raised, narrowly reflexed, or whatever). The pronotum usually shows a fold parallel and close to the posterior section of the lateral border (opposite base of pseudepipleural crest), here termed paramarginal fold.

Total body length measurements given are approximate (different body part postures may create imprecision). All body part measurements taken in strictly dorsal view. Ratio interocular distance / (single) maximum eye width measured along transverse axes. Length proportions of the metatibial terminal spur versus the tarsal segments 1-5 given by the numbers \( s/a/b/c/d/e \), as estimated with an ocular scale in the microscope.

It should be noted that some published descriptions of *Ochicanthon*, also recent ones, are nearly useless, lacking the detail required, lacking pictures compensating this, and/or being based on a single uncharacteristic female. Note that Paulian (1980, 1983, 1987) did not sex his material.

**Colour patterns and aedeagus**

In Sundaland some groups of *Ochicanthon* species can be distinguished, one being characterized by a patterned pronotum and/or ditto elytra (the *O. dytiscoides* group). The basic pronotal and elytral colour patterns in this group are coded according to the approximate position and fusion of the markings, as follows (Fig. 3):

- Pronotal lighter marks (yellow-orange-reddish) on dark background: PL (= posterolateral), ML (= mediolateral), AL (= anterolateral), C (= central), BM (= basomedian), PBM (= para-basomedian), PAM (= para-apicomedian); these lighter marks may be expanded-confluent or reduced, according to (sub)species.
- Three sets of lighter elytral marks (with their interstrial extension) are given as: B (= basal), M (= postmedial), A (apical); these marks may also be expanded-confluent or reduced over the various interstriae 2-7 (as indicated by interstrial numbers from the suture; comma means separated, hyphen means confluent; mark numbers between square brackets refer to vague patches). The males in one group of species (the gangethu group) have their parameres more or less excised from the apex, usually in an asymmetric way, forming branches and lobes (when deeply excised a superior lobe or branch may develop, distinct in lateral view). Many *Ochicanthon* species show a superior sclerotized, usually paired strut, distinct in upper side view, sitting between or over the parameres, varying in shape (length) and degree of sclerotization. The bottom of the parameres may have sclerotized pieces; in some species a piece in the right paramere is developed into a more or less curved surface (bottom sclerite), with a pointed (usually basomedian) expansion; this expansion may take the form of a lobe or hook (in the *dytiscoides* group). The detailed configuration of the parameres differs among species, and an assessment of this configuration is indispensable in morphological species identification. Proposing new species based only on females lacking distinctly unique features is absolutely to be avoided.

**Illustrations**

As the differences between the species cannot all be represented by abstract text and coding, compare the homologous elements in the pictures. We have chosen for comparative photographs of the various body parts of *Ochicanthon* (usually head, pronotum, elytron, protibia, metatibia and -femur), supplemented with diagrammatic line drawings of the male genitalia (membranous structures in line drawings indicated with streaks). In the captions note the different meanings of full-face versus other views; full-face here means: body part surface positioned maximally parallel to the plane of the picture; dorsal and ventral views are those from above and below, parallel to the plane formed by the median and transverse body axes. Body pilosity (and spurs) in photographs of body parts (not in habitus pictures) may be (partially) removed to clearly show contours. In some pictures the body element is slightly tilted. Refer to the measurements in the descriptions for size indications.

**Distribution and ecology**

As for geographic terminology, Sundaland is here defined as the Malay Peninsula + Borneo + Sumatra + Java + Bali, plus intervening and adjacent smaller islands, i.e. minus Sulawesi. The locations of place names are usually easily traceable with current topographic tools (including travel guidebooks and the Microsoft Encarta Atlas), but some are specified (Appendix 2). The generic distribution as given on the map (Fig. 2) is large-scale and approximate, with indications of gaps requiring further exploration. The limit between lowland versus upland is (somewhat arbitrarily) set at an altitude of 1000 m (no records from subalpine environments available). Much of the material examined (Appendix 2) is labelled with sample codes, here, in addition to the # symbol, frequently preceded by (lower case) project or collector initials. The indication “multistr evergr forest” on many of the labels means multistratal evergreen forest (a term used in the classification of Fosberg 1967 to replace the ambiguous term rainforest).
Note that some species may be restricted to special forest types (like riverine, heath [kerangas] and limestone forest). Aliases were used to handle operational taxonomic units from ecological samples, and references are given to occurrences of these aliases in published reports.

**Types and deposition of material**

All specimens seen (including the types) are recorded in Appendix 2, most of these being at present kept in the National Museum of Natural History Naturalis, Leiden (RMNH), The Natural History Museum, London (BMNH), and the National Museum of Wales, Cardiff (NMWC). The Muséum National d’Histoire Naturelle, Paris (MNHN) will receive paratypes of a number of new species. Redistribution of material to other institutional collections (including local ones) will take place in due course. Ecological samples are kept elsewhere, and specimens in these samples may bear manuscript names or codes (see previous section for aliases used by ecologists, or consult us).

The label data of some types are quoted verbatim in this paper, as follows: text lines are separated by \ label upper- and underside text by \ , texts on different labels are enclosed in quotation marks; our comments or additions in square brackets [p] means printed text, [h] handwritten text.

**Ochicanthon Vaz-de-Mello**

*Ochicanthon* Vaz-de-Mello, 2003: nom. n. for *Phacosoma* Boucomont, 1914, preoccupied by *Phacosoma* Jukes-Browne, 1912 (Mollusca).

*Phacosoma* Boucomont, 1914, Type-species: *Phacosoma dytiscoides* Boucomont, 1914 (designated by Arrow 1931).


**Generic diagnosis**

Posterolateral section of pronotal surface with paramarginal fold closely parallel to lateral border, running forward from base at level of pseudepipleural ridge. Elytral surface moderately convex, with stria 7 laterally limited by pronounced (usually anteriorly geminate) pseudepipleural ridge, pseudepipleuron with two distinct striae. Procoxal cavity small, not distinctly transverse. Base of elytra from humerus to humerus fitting well to pronotal base (at most a minimal pronotal-elytral constriction in dorsal view). Protibia with three large external denticles and proximal serration, inner side unmodified; apex extended, more or less lobiform (apex more or less rounded, short, not digitate), spur sitting externally on apex. Postocular part of propectus evenly deeply concave, separated from other proctopteral parts by well-pronounced ridge. Tarsi present, slender. Mesometatarsal segments 1 much longer than next segment. Head broader than long, clypeal apex with paramedian denticles separated by widely rounded emargination (denticles may also laterally be limited by emargination). Genae laterally subangular to rounded, border very weakly rounded or straight (and virtually uninterrupted) to clypeal denticles. Tarsal claws simple. Mesometasternal suture straight, transverse. Anal and antennal abdominal sternite normally separated (not fused).

**Description**

**Head.** Head about as wide as long, apex usually 2-dentate, with or without variably deep adjacent emargination; in one known species quasi-4-dentate. Clypeus emarginate between the more or less angular, more or less reflected paramedian denticles. Clypeofrontal surface generally very slightly convex. Clypeofrontal transition without any elevation; sutures laterally distinct. Clypeal border from eye-canthus forward rounded or virtually straight, at most with very slight protrusion or incision at suture; margin not reflexed. Genae projecting beyond eyes (in full-face view), their tip rounded to subangular. Frontovertex entirely devoid of protrusions. Eye ventrally globose, usually large, smaller (reduced) in certain species. Eyes (foramen in full-face view) usually small, more or less narrowly elliptic or reniform, to large, broadly elliptic.

**Pronotum.** Prothorax slightly less wide or about as wide as elytra (which usually cover abdomen completely). Pronotum generally evenly convex, base, disc and anterior declivity unmodified (midline may be very slightly impressed near base). Prothorax in dorsal outline nearly parallel-sided, usually slightly convergent rostrad. Anterolateral pronotal angle rounded or angular (in some species straight or concave between two distinct angles). Lateral sides of pronotum simply declivous. Posterolateral section of pronotum with (variably distinct) paramarginal fold running from level of pseudepipleural ridge forward, sometimes extended into (angled) groove (fold and groove may be vague, depending on coarseness of microsculpture and angle of view). Pronotal posterolateral angles more or less distinct, obtuse. Base of pronotum immarginate, usually evenly widely rounded (at most a very slight indication of a median angle). Pronotal sides finely marginate or immarginate, dorso-ventral transition sharp, simple. Scutellum indistinct.

**Elytra.** Disc generally evenly convex, punctate-striate, elytra combined usually slightly wider than
prothorax. Elytron between suture and humeral section of pseudepipleural ridge with 7 punctate striae. Total number of elytral striae (including juxtepipleural one) 9 – an additional stria on the pseudepipleuron may be obliterated by the (anteriorly usually duplicated) pseudepipleural ridge. Humeral umbone slight or absent. Anteapical elytral umbone vague, if distinct at all. Apicosutural angle of elytron (sub)rectangular. Posterior declivity of elytron unmodified. Elytral epipleuron narrow. Pseudepipleuron reaching elytral apex (with 2 striae, including juxtepipleural one). Striae on elytral disc all reaching base, distinct, shallowly impressed to superficial. Interstriae flat to feebly convex.


Sexual dimorphism. Where dimorphism occurs this is mainly evident in shape of legs; then female protibial and metatibial dentation relatively unmodified; female pro- and metafemur without extra angles, dentication, lobes; metatibia ditto. Pygidial shape may differ, arrangement of distal sternites may be slightly more compact in males.

Note. This description of the genus has been composed with special reference to the Sundaland species at hand.

Distribution and ecology
Range mapped (Fig. 2): Oriental Region (transgression into China; not known for certain from Wallacea). Gap between southern and northern India, genus still unknown from most of Sumatra, Philippines, etc.

Attracted to dung and carrion, inhabiting various forest types, and possibly more open habitats, up to 2150 m (India); also collected from soil litter or forest debris. Most species are flyers, some getting into flight interception traps; at least one species is flightless.

List of Ochicanthon species-group taxa
Sundaland species arranged and numbered as in the Species accounts, other species alphabetically arranged. All species-group names followed by author names between parentheses were formerly combined with Phacosoma.
Ochicanthon Vaz-de-Mello, 2003
Phacosoma Boucomont, 1914

O. dytiscoides group

O. dytiscoides subgroup
1. O. edmondsi sp.n. – Borneo (Sarawak)
2. O. dytiscoides (Boucomont, 1914) – Borneo (Sarawak, Sabah)
3. O. masumotoi (Ochi & Araya, 1996) – Borneo (Sabah, Sarawak)
4. O. maryatiae Ochi et al., 2006 – Borneo (Sabah)
5. O. cambeforti sp.n. – Borneo (Sabah)

O. cambeforti subgroup
6. O. crockermontis sp.n. – Borneo (Sabah)
7. O. crypticus sp.n. – Borneo (Sabah)
8. O. peninsularis sp.n. – Malay Peninsula + Singapore
9. O. kikutai Ochi et al., 2006 – Borneo (Sabah)
10. O. neglectus sp.n. – Borneo (Sarawak)
11. O. cambeforti (Ochi, Kon & Kikuta, 1997) – Borneo (E Kalimantan)
12. O. simboroni Ochi et al., 2006 syn. n.

O. woroae group
13. O. karasuyamai Ochi et al., 2007 – Sumatra (N)

O. cambeforti group
14. O. woroae Ochi et al., 2006 – Borneo (E Kalimantan)
15. O. tambunan sp.n. – Borneo (Sabah)
16. O. mulu sp.n. – Borneo (Sabah)

O. gangkui group
17. O. gangkui (Ochi, Kon & Kikuta, 1997) – Borneo (Sabah)
18. O. kimanis sp.n. – Borneo (Sabah)
19. O. danum sp.n. – Borneo (Sabah)
20. O. paramitae (Ochi, Kon & Kikuta, 1997) – Borneo (Sabah)
21. O. javanus sp.n. – Java

O. hanskii group
22. O. hanskii sp.n. – Borneo (Sabah)

Species not placed in group
23. O. hikidai (Ochi, Kon & Kikuta, 1997) – Borneo (W Kalimantan)
24. O. punctatus (Boucomont, 1914) – Sumatra?

Species outside Sundaland
- O. cingalesinis (Arrow, 1931) – Sri Lanka
- O. deplanatus (Paulian, 1983) – India (NE)
- O. lactus (Arrow, 1931) – India (S)
- O. loebli (Paulian, 1980) – India (S)
- O. nitidus (Paulian, 1980) – India (S)
- O. obscureus (Boucomont, 1920) – Myanmar (S), India (NE), Thailand, Laos, Vietnam (C)
- O. ochii (Hanboonsong & Masumoto, 2001) – Thailand (N)
- O. philippinensis (Ochi, 1990) – Philippines (Mindanao)
- O. thai (Paulian, 1987) (as ssp. of tristoides) – Thailand (N), Vietnam (N)

Phacosoma fallcilaetum Masumoto, 1988
- O. thailandicus (Masumoto, 1989) – Thailand (N), China (Yunnan, Löbl & Smetana 2006)
- O. tristis (Arrow, 1931) – India (SW)
- O. tristoides (Paulian, 1983) – India (NE)

Key to Sundaland Ochicanthon species

The key should primarily aid in the identification to species, and does not reflect the taxonomy implied in this paper. See also the species groupings as indicated under the relevant headings in the section Species accounts and the relevant text under the respective species headings. Appendix 1 gives a synoptic table of the characters. Ochicanthon punctatus omitted from the key.

1. Elytra uniform, entirely brown or black, un-patterned ........................................ 2
   - Elytra predominantly black-brown, with distinct pattern of (orange-)yellow marks ........ 10
   - Elytra as well as pronotum predominantly shining (orange-)yellow, symmetric black marks limited ........................................ 6, O. crockermontis 1
2. Alae present; pronotal-elytral transition (in profile) gradual, habitus deplanate; clypeal denticles separated by emargination down to their base ................................................ 3
   - Alae absent; pronotal-elytral transition (in profile) with dip, habitus distinctly convex; clypeal denticles fused at base; internal side of male metabia angularly dilated halfway its length .................................... 22, O. hanskii 3
3. Borneo ........................................................ 4
   - Java .................................................. 21, O. javanus 4
4. Clypeal denticles adjoined laterally by simple concave curve .................................... 5
   - Clypeal denticles adjoined laterally by shallow (sinuate) emargination; dorsum with coarse setae; parameres subsymmetric (Fig. 130) ........................................ 16, O. mulu 5
   - Clypeal paramedian denticles adjoined laterally by deep emargination, producing extra denticle on either side ................................ 23, O. hikidai 5
5. Parameres subsymmetric (in upper side and lateral view) ........................................ 6
   - Parameres distinctly excised and/or asymmetric, complex (lateral view) .................. 7

6. Discal elytral interstriae with numerous scattered microsetae; pronotum with numer-
   ous scattered microsetae; dorsal punctuation more crowded, surface matt .................. 15. O. tambunan
   - Discal elytral interstriae mainly with scattered microstubbles; pronotum glabrous, or
     nearly so; dorsum densely, distinctly punctate, shining ................................. 14. O. woroae

7. Left paramere very deeply excised, inferior branch elongate-expanded ................. 8
   - Left paramere more shallowly excised, inferior branch short .............................. 9

8. Right paramere sinuate-lobate (lateral view, Fig.132) .............................. 17. O. gangkui
   - Right paramere very widely arcuate (lateral view, Fig. 133) ........................... 18. O. kinanis

9. Pronotum glabrous, or nearly so; right paramere simply widely sinuate (Fig. 134) .... 19. O. datum
   - Pronotum with numerous scattered microsetae; both parameres with deep rounded
     excision ........................................ 20. O. parantia

10. Pronotum uniformly (brown-)-black (at most with small, very vague marks) ........ 11
    - Pronotum with distinct symmetric pattern of (orange-)-yellow and (brown-)-black .... 13

11. Body size small (length usually much less than 8 mm) .................................. 12
    - Body size large (length over 8 mm); metafemur (posterior side) and -tibia (internal
      side) without mini-crenulation; parameres relatively short; dorsum not microreticulate .... 11. O. dulimontis

12. Pygidium convex along apex, basal surface flat or concave (in profile); apical elytral
    (orange-)-yellow absent; discal interstrial punctuation dense to crowded; dorsum be-
    tween punctures shining, without microreticulation; Borneo ............................. 10. O. neglectus
    - Pygidium more or less conical; discal interstrial punctuation abundant; dorsum entirely
      matt, due to microreticulation; Sumatran .................................................. 13. O. karasuyamai

13. Protibial denticles (male) all simply, sharply acuminate; parameres different from
    Fig. 123 ........................................ 14
    - Protibial denticles (male) 1-2 acuminate, but apico-external denticle broad, basal half
      or more parallel-sided ............................... 15

14. Parameres subsymmetric, elongate, their apex pointed (upper side view, Fig. 124),
    not excised above (lateral view); discal elytral interstrial punctuation abundant; clypeal
    denticles adjoined laterally by simple concave curve .................................. 17
    - Parameres asymmetric, short, upper side of right paramere excised (lateral view,
      Fig. 127), complex; discal elytral interstrial punctuation dense to crowded; elytral inter-
      striae shining between punctures, without microreticulation; clypeal denticles laterally
      virtually straight; Borneo 12. O. cambeforti

15. Pronotal (orange-)-yellow marks limited to small lateral patch on either side; anterola-
    teral border of pronotum concave, limited by secondary angle; large, length at least 8
    mm, dorsum generally shining ............................................................... 1. O. edmondse
    - Pronotal (orange-)-yellow marks extensive, (orange-)-yellow predominant ............ 2. O. dytiscoides
    - Pronotal (orange-)-yellow marks abundant, but (orange-)-yellow not predominant .... 16

16. Pronotal-elytral transition (in profile) gradual; small; discal elytral interstriae all flat or
    very slightly convex; pygidium convex along apex, basal surface flat or concave (in pro-
    file); dorsum generally shining ............................................................... 18
    - Pronotal-elytral transition (in profile) abrupt; body size large (length usually at or
      over 8 mm); discal elytral interstriae 3 and 5 slightly more elevated; pygidium more or
      less evenly convex (in profile); dorsum generally matt .................................. 5. O. rombauti

17. Elytra interstriae matt, due to distinct microreticulation; Malay Peninsula ...................... 8. O. peninsularis
    - Elytral interstriae shining, lacking microreticulation; Borneo ............................ 9. O. kikutai

18. Smaller species, with small bottom sclerite on aedeagus (lacking large backward hook) .... 3. O. masumotoi
    - Larger species, with large, angular bottom sclerite, point protruding to basal piece of
      aedeagus ........................................ 4. O. maraytiae
Species accounts

(a) The *Ochicanthon dytiscoides* group

At least elytra (usually also pronotum) with symmetric colour pattern (orange-yellow versus brown-black). Parameres usually subsymmetric (in upper side view). Metatibia of (major) males slightly angularly dilated (internally) near apex. Profemur of (major) males angularly expanded in front.

Two subgroups distinguishable in Sundaland: males with broadened, deflexed apico-external denticle on protibia (*dytiscoides* subgroup), or with simply acuminata denticle (*cambeforti* subgroup).

(a1) The *Ochicanthon dytiscoides* subgroup

1. *Ochicanthon edmondsi* sp. n.

Figs 1, 4-9, 118

**Type-material.** Male holotype (RMNH): Malaysia, with our type label, and the following label data: Sarawak: 4th Division: Gunung Mulu NP, iii/1978, I. Hanski, baited pitfall trap, LMR [lower montane rainforest], 800-1700 m, #668.

15 paratypes listed in Appendix 2.
Description (holotype, male)
Body length ca 8.8 mm. Colour generally black, with yellow marks on pronotum and elytra. Clypeal margin anteriorly bidentate (tips angular, median emargination widely rounded). Clypeofrontal surface generally feebly convex, black-brown, shining, with metallic lustre; glabrous, with crowded, distinct, simple punctuation. Clypeal border from gena forward widely rounded. Gena laterally round-ed. Eyes (foramen in full-face view) medium-sized, moderately elliptic. Maximum number of facet rows (transversely) across eye foramen ca 9. Ratio transverse interocular distance/maximum eye width ca 6.0. Pronotum generally evenly convex, disc and anterior declivity unmodified, slightly deplanate. Prothorax in dorsal outline nearly parallel-sided, slightly convergent rostrad. Anterior border of pronotum unmodified. Anterolateral pronotal angle (nearly) rectangular. Anterolateral section of pronotum very distinctly angulate at ca 0.2 of length behind anterior angle. Lateral sides of pronotum simply declivous. Posterolateral section of pronotum modified as in all congeners, with distinct fold parallel and close to border. Pronotal posterolateral angles simple, distinct. Base of pronotum immarginate, evenly, very widely rounded, surface unmodified. Pronotal border finely marginate in front. Pronotum microsetose, setae mostly long, appressed; generally with simple crowded punctuation. Estimated number of punctures per 0.25 sq mm on pronotal disc ca 50-60, punctures ca 0.06 mm. Pronotum black-brown, with metallic lustre, posterolaterally with yellow-orange spot on either side. Elytra black-brown, shining, with yellow-orange pattern, on disc with abundant appressed, long microsetae. Pseudepipleuron reaching elytral apex (broad, pseudepipleural crest with 2 fine ridges in front). Elytral striae distinct, shallowly impressed; punctures of discal striae slightly impressed (crenulating interstriae, separated by 1-3 times their diameter); interstriae flat to feebly convex, simply punctate, punctures scattered, crowded. Antennal lamellae brown. Propectus laterally black-brown, virtually smooth, microstriolate. Mesosternum virtually smooth. Metasternal anterior lobe and disc densely punctate-microsetose, setae very short. Metasternum black-brown, laterally with annulate punctuation (on microreticulate surface), dense. Abdominal venter black-brown, proximal sternites with narrow punctate basal zone, distal sternites densely punctate-microsetose, setae long, non-punctate microstriolate surface matt. Hind wings fully developed. Pygidium evenly, slightly convex, marginate along base, black-brown, densely punctate-microsetose, punctures fine. Profemur brownish, projecting in front (distinct obtuse angle near apex). Protibia externally with 3 denticles (apico-external denticle very broad, largely parallel-sided, with rounded [worn?], deflexed tip). Proximal serration on outer side of protibia distinct, fine. Protibia with rounded, protruding apex; internal side evenly, slightly curved. Protibial spur

Aedeagus large, more or less symmetric, as in Fig. 118; bottom sclerite of right paramere distinct, curved, with strong basomedian point.

Measurements in mm. Maximum width of head 2.5. Pronotal dorsal median length 2.6, maximum width 4.5. Dorsal sutural length of elytra 4.6, maximum width combined 5.1.

Colour patterns. Pronotal lighter marks present: PL pair only. Elytral lighter marks present: B (5-7), M (5-7), A (2-3, 5-7).

Variation and sexual dimorphism

Derivation of species name
Dedicated to the distinguished American scarabaeologist W.D. Edmonds, who contributed much to the taxonomy and ecology of New World Scarabaeinae, particularly the Phanaeini.

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curved-linear. Clypeofrontal surface densely to crowdedly punctate. Eye size moderate, foramen narrowly elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) conspicuously angularly bent inward. Paramarginal fold on posterolateral surface of pronotum distinct. Pronotum densely to crowdedly punctate, with numerous scattered microsetae. Pronotal (orange-)yellow marks limited to small but distinct lateral patch on either side. Elytra with distinct symmetric pattern of (brown-)black and (orange-)yellow marks. Basal elytral (orange-)yellow B (5-7) present. Postmedial elytral (orange-)yellow M (5-7) present. Apical elytral (orange-)yellow A (2-3, 5-7) present. Discal elytral interstrial punctuation dense to crowd-ed; interstriae shining, without microreticulation, all flat or very slightly convex, with numerous scattered microsetae. Pygidium slightly evenly convex, brown to black, (virtually) uniform. Protibial denticles (male) 1-2 acuminate, apico-external denticle very robust, extremely broad, its base largely parallel-sided. Profemur (male) anteriorly strongly lobate-dentate near apex. Metatibia long, slender, curved, dilated near apex. Metatibia internally (male) continuous internally (not angulate halfway), angulate-dilated at short distance from apex. Metatibia posteriorly and metatibia internally not multidenticulate. Alae present. Parameres subsymmetric (in upper side view), long, dilated distally, somewhat spatuliform (full-face upper side); bottom sclerite of right paramere well-developed, tip projecting basomedially (distinct in profile). Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size large (length usually at or over 8 mm).

Both sexes known. Length 8-10 mm.

Distribution and ecology
Borneo: Sarawak. Hanski (1983, as Phacosoma sp. n. B) collected this species in carrion baited pitfall traps at Mulu, at 800-1700 m altitude, in what was termed lower montane rain forest (no dung traps were operated on the sites concerned).

Comments
O. edmondsi may well be the largest member of the genus; it is easily recognizable from the characteris-tically shaped, anterolaterally concave prothoracic border (creating a secondary anterolateral angle), and a well-defined yellow versus black-brown dorsal colour pattern, although only a small yellow patch on either side of pronotum is present; apico-external denticle on male protibia remarkably broad, de-flexed; parameres large, distally dilated (in full-face view).

2. Ochicanthon dytiscoides (Boucomont, 1914)
Figs 16-21, 119

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curvedinear. Clypeofrontal surface densely to crowdedly punctate. Eye size moderate, foramen narrowly elliptic.
Figs 4-15. *Ochicanthion*, habitus (male holotypes) and body parts. – 4-9, *O. edmondsi*, habitus, oblique (4); head, full-face (5); pronotum, dorsal (6); left elytron, dorsal (7); protibia, upper side (8); metatibia and -femur, underside (9); 10-15, *O. rombauti*, habitus, oblique (10); head, full-face (11); pronotum, dorsal (12); left elytron, dorsal (13); protibia, upper side (14); metatibia and -femur, underside (15).
Pronotal border anterolaterally (at ca 0.2 behind anterior angle) more or less abruptly rounded. Paramarginal fold on posterolateral surface of pronotum short, moderately distinct. Pronotum densely to crowdedly punctate, with numerous scattered microsetae, with symmetric pattern of (orange)-yellow and (brown-)black. Pronotal (orange)-yellow extensive on disc. Elytra with symmetric pattern of (brown)-black and (orange)-yellow marks. Basal elytral (orange)-yellow B (5-7) present. Postmedial elytral (orange)-yellow B (5-7) present. Apical elytral (orange)-yellow A (3, [5-7]) present. Discal elytral interstrial punctation dense to crowded, interstriae between punctures shining, without microreticulation, interstriae all flat or very slightly convex, with numerous scattered microsetae. Pygidium convex along apex, basal surface flat (in profile), largely (orange)-yellow, but may be more or less infuscated. Protibial denticles (male) 1-2 acuminate, apico-external denticle broad, its base more or less parallel-sided. Profemur (male) anteriorly lobate-dentate near apex. Metafemur (male) posteriorly lobate-dentate at 0.3-0.5 from base. Metatibia long, slender, curved, dilated near apex. Metatibia internally (male) continuous internally (not angulate halfway), angulate-dilated at short distance from apex (male). Metatibia posteriorly and metatibia internally not multidenticate. Alae present. Parameres subsymmetric, long, slender, tapering (lateral and upper side view), bottom of right paramere with basomedially pointed, curled sclerite. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small. Both sexes known. Length 5-7 mm.

Distribution and ecology
Borneo. New data listed in Appendix 2.
We have seen much O. dytiscoides-like material from Sabah, Brunei and Sarawak. Most specimens were collected in pitfall traps baited with either carrion or human faeces. A few specimens were collected on fungi and fruit. Extensive trapping with flight interception traps in Danum Valley (Sabah) yielded only one specimen. All specimens were collected in lowland forest at 20-300 m altitude. At Mulu (Sarawak) O. dytiscoides was only found in kerangas (heath forest), while Davis characterizes this species in Danum Valley as a riverine/edge specialist – all the more reason to take a closer look at the taxonomic status of the various populations (see comments hereafter). Generally, this species seems to have a preference for open forest types. (Mentioned in Hanski 1983; Davis 1999, Davis et al. 2000, Davis 2000, Davis et al. 2001.)

Comments and lectotype designation
O. dytiscoides is a somewhat variably patterned species, possibly limited to Borneo; it is recognizable from its largely yellow pronotum, densely to crowdedly punctate, non-sericeous elytral interstriae, and dilated apico-external protibial denticle in the male sex. The closely related O. masumotoi (as here conceived) has a largely dark pronotum, but appears otherwise very similar to dytiscoides. The forms around dytiscoides need revision, taking both morphological and molecular characters from different populations into account. Pending the outcome of such work, some action to stabilize the nomenclature seems appropriate.

Boucomont (1914), when describing his Phacosoma dytiscoides, apparently had two species before him, one from Kinabalu (agreeing with the present concept of dytiscoides), and one from Singapore (agreeing with the present concept of peninsularis, see below). We have examined type material, and hereby designate a lectotype, effectively restricting the type locality to North Borneo. The male lectotype is labelled as follows: “N. BORNEO\KINA BALU\COLL. V.DE POLL” [p], “MUSEUM PARIS [p]\Boucomont [h]”, “Typus” [p in box, red label], “Boucomont det. 191[4\p]\Phacosoma n.g\dytiscoides n.sp.[h]”, “jk7912”[h] (in MNHN). Handwriting on labels, apart from last label, by Boucomont. Male genitalia of lectotype extracted, on a card, on the pin with the type. The indication Kinabalu on the type label needs not necessarily refer to the mountain. The information in Ochi et al. (1997) on the identity of O. dytiscoides seemed inconsistent, which was the primary reason for us to re-examine Boucomont’s Kinabalu specimen just cited. The protibial apico-external denticle of the lectotype is broadened, not simply acuminate, as suggested in their paper (by their Fig. 20). This inconsistency was recognized in Ochi et al. (2006), referring their material to O. kikutai (q.v.), without settling the matter completely: this is done by the present lectotype designation.

3. Ochicanthon masumotoi (Ochi & Araya, 1996)
Figs 22-27, 120

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curvilinear. Clypeo-frontal surface densely to crowdedly punctate. Eye size moderate, foramen narrowly elliptic. Pronotal
Figs 16-27. Ochicanthon, habitus (males) and body parts. – 16-21, O. dytiscoides, habitus, oblique (16); head, full-face (17); pronotum, dorsal (18); left elytron, dorsal (19); protibia, upper side (20); metatibia and -femur, underside (21); 22-27, O. masumotoi, habitus, oblique (22); head, full-face (23); pronotum, dorsal (24); left elytron, dorsal (25); protibia, upper side (26); metatibia and -femur, underside (27).
border anterolaterally (at ca 0.2 behind anterior angle) more or less abruptly rounded. Paramarginal fold on posterolateral surface of pronotum short, moderately distinct. Pronotum densely to crowdedly punctate, with numerous scattered microsetae, with symmetric pattern of (orange-)yellow and (brown-)black. Pronotal (orange-)yellow marks may be abundant, but not predominant (small on disc). Elytra with distinct, usually symmetric pattern of (brown-)black and (orange-)yellow marks. Basal elytral (orange-)yellow B (5-7) present. Postmedial elytral (orange-)yellow M (5-7) present. Apical elytral (orange-)yellow A (3-7) present. Discal elytral interstriae shining between punctures, without microreticulation, interstriae all flat or very slightly convex, interstriae with numerous scattered microsetae. Pygidium convex along apex, basal surface flat (in profile), largely (orange-)yellow, but may be more or less infuscated. Protibial denticles (male) 1-2 acuminate, apico-external denticle broad, its base parallel-sided. Pro femur (male) anteriorly lobate-dentate near apex. Metatibia (male) posteriorly lobate-dentate at 0.3-0.5 from base. Metatibia long, slender, curved, dilated near apex. Metatibia internally (male) continuous internally (not angulate halfway), angulate at short distance from apex. Metatibia posteriorly and metatibia internally not multidenticulate. Alae present. Parameres subsymmetric, long, slender, tapering to fine point (in lateral and upper side view), bottom of right paramere with basomedially pointed, curled sclerite. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small.

Both sexes known. Length 4-6.5 mm.

Distribution and ecology
Borneo. New data listed in Appendix 2.
We have seen *O. masumotoi* from both Sabah and Sarawak. Most specimens were collected in pitfall traps baited with carrion, smaller numbers with human excrements, fungi, or with flight interception traps. In the Mulu region (Sarawak) it was collected at 715-1070 m altitude, in both high mixed dipterocarp forest and lower montane rain forest – in Hanski's (1983) terminology. Although on the sites concerned both carrion and dung traps were operated, *O. masumotoi* was only collected in fish and meat traps. Davis characterizes the occurrence of this species in the Danum Valley lowland forest as a riverine/edge specialist. ( Mentioned in Hanski 1983, as *Phacosoma* sp.n. F, in Davis et al. 2000, as *Phacosoma pictum* MS, in Davis 1999, 2000; Davis et al. 2001, as *Phacosoma* sp. 3.)

Comments
*O. masumotoi* was originally based on a single female from Sabah (without further locality specification), and may (as conceived here) be recognizable from its patterned, largely brownish-black pronotum, crowd edly punctate, non-sericeous elytral interstriae, and dilated apico-external protibial denticle in the male sex (provided that the present male-female association is correct). In their key Ochi et al. (2006) mention body size and eye distance in relation to eye width as important characters.
In this review we have simply assigned every *O. dytiscoides*-like specimen with a dark, patterned pronotum to *O. masumotoi*, being aware that the two species are very close, and suspecting that some or all of the material may eventually turn out to be conspecific – with the material now available definite conclusions cannot be drawn. The aedeagi of the two species are very similar.
See also comments under *O. dytiscoides* above.

4. *Ochicanthon maryatiae* Ochi, Ueda & Kon, 2006

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curvilinear. Clypeofrontal surface densely to crowdedly punctate to rugulate-punctate. Eye moderate, foramen moderate-sized. Clypeal denticles separated by emargination downward, apicoexternal denticle broadly curved, its base parallel-sided. Pygidium convex, largely flat along apex, basal surface flat (in profile), largely yellow usually not predominant. Elytra predominantly black-brown, with (usually symmetric) pattern of (orange-)yellow marks. Basal elytral (orange-)yellow B (5-7) present. Medial elytral (orange-)yellow M (5-7) present. Distal elytral (orange-)yellow A (5-7) present. Discal elytral interstitial punctuation dense to crowded, interstriae shiny, without microreticulation, interstriae all flat or very slightly convex, interstriae with numerous scattered microsetae. Pygidium convex along apex, basal surface flat or concave (in profile). Pro Tibial denticles (male) 1-2 acuminate, apico-external denticle broad, its base parallel-sided. Metatibia (male) posteriorly lobate-dentate at 0.3-0.5 from base. Metatibia long, slender, curved, dilated near apex. Internal side of
metatibia (male) continuous (not angulate halfway), angulate-dilated at short distance from apex (male). Metatibia posteriorly and metatibia internally not multidenticulate. Meso- and metatarsal long, relatively slender. Alae present. Parameres roughly subsymetric with pointed apex (in upperside view), long, slender, tapering (lateral view); bottom sclerite large, angular tip pointing well backward (distinct in profile). Pronotal-elytral transition (in profile) gradual. Both sexes known. Length 7.2-8.1 mm.

**Distribution**
Borneo: Sabah.

**Comments**
This recently described species should, in its group, immediately be distinguishable by the combination of its colour pattern, relatively large size, and characteristic aedeagal structure, including a large, angular bottom sclerite (Ochi et al. 2006, Figs 19a-d).

O. maryatiae was collected only at Poring, on the slopes of Mt Kinabalu (Sabah), at 1200 m altitude. Our collecting efforts around Poring Hot Springs was collected only at Poring, on the slopes of Mt Kinabalu (Sabah), at 1200 m altitude. Our collecting efforts around Poring Hot Springs (baited pitfall trapping, sifting cattle dung, etc.) did not yield any other Ochicanthon, but this may be due to a difference in location.

**5. Ochicanthon rombauti** sp.n.
Figs 10-15, 121

**Type-material.** Male holotype (RMNH): Malaysia, with our type label, and the following label data: Sabah: Crocker Range: Keningau-Kimanis road (km25), 18-23/xi/1987, J. Krikken & E. Rombaut, 1300 m, multistr evergr forest, 8 human excr traps, #sa45.

72 paratypes listed in Appendix 2.

**Description** (holotype, male)

Pronotum generally evenly, moderately convex-declivous in front, midline vaguely depressed. Prothorax in dorsal outline nearly parallel-sided, very slightly sinuate, waisted at base. Anterior border of pronotum unmodified. Anterolateral pronotal angle obtuse, rounded off; anterolateral section of pronotal border rounded behind anterior angle, adjacent surface slightly depressed. Lateral sides of pronotum simply declivous. Posterolateral section of pronotum modified as in all congeners, with distinct fold parallel and close to border, distinctly extended (sulcate) in front. Pronotal posterolateral angles rounded. Base of pronotum immarginate, evenly, very widely rounded, with surface unmodified. Pronotral border finely marginate in front. Pronotum microsetose, setae short, erect; surface generally microreticulate and with crowded, more or less rugulate, ocellate punctuation. Estimated number of punctures per 0.25 sq mm on pronotal disc 55-65, punctures ca 0.04 mm (away from midline, depressed midline less punctate). Pronotum brown-black, faintly metallic, with vague yellow-orange mark on either side. Elytra brown-black, with vague yellow-orange pattern, matt, general surface slightly uneven, wrinkly. Humeral and anteapical umbones indistinct. Pseudepipleuron reaching elytral apex (broad, matt, pseudepipleural crest with 2 fine ridges in front). Elytral surface with erect numerous microsetae; striae superficial, punctures of discal striae slightly impressed (slightly crenulating interstriae, separated by 3-4 times their diameter); interstriae flat to feebly convex (basal surface of 3 and 5 raised), simply punctate and microreticulate, punctuation scattered, crowded to dense. Antennal lamellae light-brown.

Propectus laterally black-brown, largely smooth, shining, vaguely punctate. Finely marginate in front. Mesosternum virtually smooth. Metasternal anterior lobe and disc densely punctate-microsetose, setae very short; metasternum black-brown, laterally with dense, annulate punctuation (on vaguely microstriolate surface). Abdominal venter black-brown, matt, abundantly punctate-microsetose distally, setae short, proximally with microstriolation, matt; basal margin of proximal sternites punctate. Hind wings present. Pygidium very convex (near apex), underside with fine median ridge, marginate along base, black-brown, very densely punctate-microsetose, punctures very distinct.

Profemur brown, projecting in front (slight, obtuse denticle at ca 0.3 from apex). Protibia externally with 3 denticles (apico-external denticle broad, apex obtusely angular, largely parallel-sided). Proximal serration on outer side of protibia, distinct, fine. Protibia with rounded, protruding apex, internal side evenly, slightly curved. Protibial spur inserted away from inner angle, simply acuminate, fine. Protibia brown.
Protarsi slender. Mesofemur slender, unmodified. Metatibia posteriorly with slight protrusion at 0.3 from base, otherwise unmodified. Meso- and metatibia long, curved, without fossorial protrusions on outer side. Metatibia strongly curved, dilated near apex (with slight, obtuse apico-internal angle). Meso- and metatibia brown. Meso- and metatarsi slender. Metatarsal segment 1 distinctly longer than segment 2 (approximate proportions spur//segments 1-5 10//24/13/9/7/12).

Aedeagus large, more or less symmetric, as in Fig. 121; bottom sclerite of right paramere distinctly, tip sharply pointed mesad, halfway parameral length.

Measurements in mm. Maximum width of head 2.4. Pronotal dorsal median length 2.7, maximum width 4.3. Dorsal sutural length of elytra 4.0, maximum width combined 4.9.

Colour patterns. Pronotal lighter marks very vague: PL only. Elytral lighter marks vague: B (3-4)-5-7, M (5-7), A (2-3, 5-7).

Variation and sexual dimorphism

Derivation of species name
Dedicated to our able colleague E. Rombaut, who accompanied Krikken on the 1987 trip during which this species was collected.

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curvilinear. Clypeofrontal surface crowdedly punctate. Eye size small (note underside of eye). Pronotal border anterolaterally (at ca 0.2 behind anterior angle) simply rounded. Paramarginal fold on posteraleral surface of pronotum distinct, angularly extended in front (sulcate). Pronotum with very shallow midline depression, crowdedly punctate, with numerous more or less erect scattered microsetae, largely blackish, vague posteraleral patch only. Pronotal (orange-)yellow marks extensive, (orange-)yellow not predominant, vague. Elytra with symmetric pattern of (brown-)black and (orange-)yellow marks. Basal elytral (orange-)yellow B (3-4-5-7) present. Postmedial elytral (orange-)yellow M (5-7) present. Apical elytral (orange-)yellow A (2-3, 5-7) present. Discal elytral surface slightly uneven; interstrial punctation dense, interstrial surface sericeous, due to microreticulation, with abundant, short, more or less erect microsetae; interstriae 3 and 5 slightly elevated at base. Pygidium (male) convex near apex, its underside medially finely carinate, basal surface concave; brown to black, base may be lighter. Protibial denticles (male) 1-2 acuminate, apico-external denticule broad, its base parallel-sided. Profemur (male) anteriorly lobate-dentate near apex. Metatibia (male) posteriorly lobate-dentate at 0.3-0.5 from base. Metatibia long, slender, curved, dilated near apex. Metatibia internally (male) continuous internally (not angulate halfway), slightly angulate near apex. Metatibia posteriorly and metatibia internally not multidenticate. Alae present. Parameres subsymmetric (in upper side view), long, slender, pincer-shaped; bottom sclerite of right paramere distinct, with sharp point about halfway parameral length. Pronotal-elytral transition (in profile) abrupt, habitus strongly convex. Body size large (length usually at or over 8 mm).

Both sexes known. Length 8-9 mm.

Distribution and ecology
Borneo: Sabah.
All specimens were collected in upland forest in the Crocker Range, in human faeces baited pitfall traps at 1300 m altitude (no carrion traps were set in this area).

Comments
O. rombauti is a large, matt, vaguely patterned Sabah species, with wrinkly elytra, related to the preceding set of species on account of its broad apico-external protibial denticule (in the male sex). The swollen general appearance, with the pronotal-elytral dip (distinct in profile), suggests flightlessness (as is the case in O. hanski, q.v.), but the hind wings of rombauti seem normally developed and functional.

(a2) The Ochicanthon cambeforti subgroup

6. Ochicanthon crockermontis sp.n.
Figs 28-33, 122

Type-material. Male holotype (RMNH): Malaysia, with our type label, and the following label data: Sabah: Crocker Range: Kota Kinabalu-Tambunan road (km64), 21-24/11/1987, J. Krikken & E. Rombaut, 1150 m, multistr evergreen forest, 3 human excr traps, #sa49a.

5 paratypes listed in Appendix 2.
**Description** (holotype, male)

Body length ca 5.8 mm. Colour generally orange, with black marks on pronotum and elytra. Clypeal margin anteriorly bidenate (tips angular, median emargination widely rounded). Clypeal frontal surface generally feebly convex, brown, very shining, somewhat metallic, glabrous, with crowded, distinct, fine, simple, shallow punctuation. Clypeal border from gena forward widely rounded. Gena laterally rounded. Eyes (foramen in full-face view) medium-sized, moderately elliptic. Maximum number of facet rows (transversely) across eye foramen ca 7. Ratio transverse interocular distance/maximum eye width ca 9.6.

Pronotum generally evenly convex, disc and anterior declivity unmodified, slightly deplanate. Prothorax in dorsal outline nearly parallel-sided, slightly convergent rostrad. Anterior border of pronotum unmodified. Anterolateral pronotal angle (nearly) rectangular. Anterolateral section of pronotum virtually straight, more or less angular at ca 0.2 of length behind anterior angle. Lateral sides of pronotum simply declivous. Posterolateral section of pronotum modified as in all congeners, with distinct fold parallel and close to border, sulcate. Pronotal posterolateral angles simple, distinct, obtuse. Base of pronotum immarginate, narrow margin is metallic green; base overall very widely, evenly rounded, with surface unmodified. Pronotal border finely marginate in front. Pronotum with microsetae, generally with simple, dense to crowded punctation. Estimated number of punctures per 0.25 sq mm on pronotal disc 60-65, punctures ca 0.04 mm. Pronotum largely orange, very shining, with few symmetric, somewhat blurred black marks.

Elytra largely orange, very shining, with few symmetric, somewhat blurred black marks, on disc with abundant microsetae. Pseudipleuron reaching elytral apex (broad, pseudipleural crest with 2 fine ridges in front). Elytral striae distinct, shallowly impressed; punctures of discal striae slightly impressed (crenulating interstriae, separated by 2-3 times their diameter). Elytra with abundant microstubbles; interstriae flat to feebly convex, simply punctate (making slightly annulate impression), punctuation scattered, dense.

Antennal lamellae brown.

Propectus laterally black-brown, microstriolate. Mesosternum virtually smooth. Metasternal anterior lobe and disc densely punctate-microsetose, setae very short; metasternum black-brown, laterally with dense, annulate punctuation. Abdominal venter black-brown, matt, abundantly punctate-microsetose distally, setae short; proximally with microstriolation and vague basal punctuation, matt. Hind wings fully developed. Pygidium very convex near apex, remainder flat, marginate along base, largely yellowish, densely punctate-microsetose, punctures fine.


Aedeagus more or less symmetric, as in Fig. 122; bottom sclerite of right paramere double curled, projecting basically on either side.

Measurements in mm. Maximum width of head 1.8. Pronotal dorsal median length 1.7, maximum width 3.0. Dorsal sutural length of elytra 3.1, maximum width combined 3.7.

Colour patterns unusual. Pronotum orange-yellow, with few dark symmetric marks. Elytra orange-yellow, with few dark symmetric marks.

**Variation and sexual dimorphism**

Angles on anterior side of profemur and posterior side of metatibia in female absent. Distal section of female metatibia unmodified.

**Derivation of species name**

Named after the type locality, situated in the Crocker Range.

**Diagnosis**

Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curvilinear. Clypeofrontal surface crowdedly punctate. Eye size moderate, foramen narrowly elliptic. Pronotal border anterolaterally straight (virtually angular at ca 0.2 behind anterior angle). Paramarginal fold on posterolateral surface of pronotum short, distinct. Pronotum crowdedly punctate, with microsetae. Pronotal (orange-)yellow very extensive, covering most of surface. Elytra also with extensive (orange-)yellow, dark marks...
somewhat blurred. Discal elytral interstrial punctation dense to crowded, interstriae shining, without microreticulation. Interstriae all flat or very slightly convex, mainly with scattered microsetae. Pygidium convex along apex, basal surface flat (in profile), largely (orange-)yellow. Protibial external denticles (male) all acuminate. Profemur (male) anteriorly lobate-dentate near apex. Metafemur (male) posteriorly lobate-dentate at 0.3-0.5 from base. Metatibia long, slender, curved, dilated near apex. Metatibia internally (male) continuous internally (not angulate halfway), slightly angulate-dilated at short distance from apex (male). Metafemur posteriorly and metatibia internally not multidenticulate. Alae present. Parameres subsymmetric (in upper side view), short, broad, tapering (lateral view); superior strut of aedeagus distinctly elongate; bottom sclerite distinctly curled. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small.

Both sexes known. Length 5.5-6 mm.

**Distribution and ecology**

Borneo: Sabah.

All specimens were collected in upland forest in the Crocker Range, in human faeces baited pitfall traps, at 1150 m altitude (no carrion traps were set in the area).

**Comments**

*O. crockermontis* is a uniquely patterned species, its dorsum being conspicuously shining orange-yellow, with a limited, somewhat vague, symmetric dark pattern; anterolateral section of pronotal border straight.

7. *Ochicanthon crypticus* sp.n.

Figs 34-39, 123

**Type-material.** Male holotype (RMNH): Malaysia, with our type label, and the following label data: Sarawak: 4th Division: Gunung Mulu NP, iii-v/1978, I. Hanski, 100-500 m, baited pitfall trap, MD [mixed dipterocarp] forest, #413. 48 paratypes listed in Appendix 2.

**Description** (holotype, male)

Body length ca 5.7 mm. Colour black-brown, with yellow-orange-mark on pronotum and elytra. Clypeal margin anteriorly bidentate (tips angular, median emargination widely rounded). Clypeofrontal surface generally feebly convex, brown, shining, with faint metallic lustre; glabrous, with crowded, distinct, simple punctation. Clypeal border from gena forward widely rounded. Gena laterally rounded. Eyes (foramen in full-face view) medium-sized, moderately elliptic. Maximum number of facet rows (transversely) across eye foramen ca 10. Ratio transverse interocular distance/maximum eye width ca 5.0.

Pronotum generally evenly convex, disc and anterior declivity unmodified, slightly deplanate. Prothorax in dorsal outline nearly parallel-sided, slightly convergent rostrad. Anterior border of pronotum unmodified. Anterolateral pronotal angle (nearly) rectangular. Anterolateral section of pronotum subangular at ca 0.2 of length behind anterior angle. Lateral sides of pronotum simply declivous. Posteralateral section of pronotum modified as in all congeners, with distinct fold parallel and close to border, anteriorly somewhat sulcate. Pronotal posteralateral angles simple, distinct, obtuse. Base of pronotum immarginate, evenly, very widely rounded, with surface unmodified. Pronotal border finely marginate in front. Pronotum with microsetae; generally with simple, dense punctation. Estimated number of punctures per 0.25 sq mm on pronotal disc 60-65, punctures ca 0.04 m\\m. Pronotum black-brown, shining, with metallic lustre and with yellow-orange pattern. Elytra black-brown, with yellow-orange pattern, shining, with abundant microsetae. Pseudopleuron reaching elytral apex (broad, crest with 2 fine ridges in front). Elytral striae distinct, shallowly impressed; punctures of discal striae slightly impressed (crenulating interstriae, separated by 3-4 times their diameter); interstriae flat to feebly convex, simply punctate, punctures scattered, dense (almost rugulate). Antennal lamellae brown. Propectus laterally brown, microstriolate, matt. Mesosternum virtually smooth. Metasternal anterior lobe and disc densely punctate-microsetose, setae very short; metasternum black-brown, laterally with dense annulate punctation (on microreticulate surface). Abdominal venter black-brown, matt, abundantly punctate-microsetose distally, setae short, proximally with microstriolation and vague punctation. Hind wings fully developed. Pygidium very convex near apex, remainder flat, marginate along base, largely yellow, densely punctate-microsetose, punctures fine. Profemur brown-yellow, projecting in front (distinct denticle near apex). Protibia with 3 external denticles, all acuminate (apico-external denticle also simply tapering). Proximal serration on external side of protibia distinct, fine. Protibia with rounded, protruding apex, internal side evenly, slightly curved. Protibial spur inserted away from inner angle, simply acuminate, very fine. Protibia brown. Protarsi slender. Mesofemur slender, unmodified. Metafemur
posteriorly with extremely slight angle at 0.3 from base, otherwise unmodified. Meso- and metafemur brown. Meso- and metatibiae brown, long, curved, without fossorial protrusions on outer side. Mesotibia simply curved. Metatibia strongly curved, abruptly dilated near apex (with internal angle); apex lobate-dentate. Meso- and metatarsi slender. Metatibia segment 1 distinctly longer than segment 2 (approximate proportions spur vs. segments 1-5 8/17/7/6/4/7).

Aedeagus more or less symmetric, as in Fig. 123; bottom sclerite of right paramere distinct, flat, with slight basomedical point.

Measurements in mm. Maximum width of head 1.9. Pronotal dorsal median length 1.8, maximum width 3.1. Dorsal sutureal length of elytra 3.0, maximum width combined 3.7.

Colour patterns. Pronotal lighter marks present: PL-ML, AL, [BM], [PBM], [PAM]. Elytral lighter marks present: B(2-7), M(5-7)-A(2-7).

Variation and sexual dimorphism
Angles on anterior side of profemur and posterior side of metatibia in female absent. Distal section of female metatibia unmodified. Protibial denticles vary in length. Pygidium may be yellow or brown, or intermediate.

Derivation of species name
This species was initially hidden in a multi-species set under the name *O. dytiscoides*.

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeognathal border from lateral tip to anterior denticles widely convex-curved. Clypeofrontal surface densely to crowdedly punctate. Clypeal border from gena forward widely rounded. Paramarginal fold on posterolateral surface of pronotum distinct. Pronotum densely to crowdedly punctate, with microsetae, with symmetric pattern of (orange-)yellow and (brown-)black. Pronotal (orange-)yellow marks extensive, but not predominant. Elytra with symmetric pattern of (brown-)black and (orange-)yellow marks. Basal elytral (orange-)yellow B (3-7) present. Postmedial elytral (orange-)yellow M (5-7) present. Apical elytral (orange-)yellow A (2-7) present. Discal elytral interstrial punctuation dense to crowded, interstriae shining, without micoreticulation, all flat or very slightly convex, mainly with scattered microsetae. Pygidium convex along apex, basal surface flat (in profile), largely yellow to brown. Protibial denticles (male) all simply acuminate. Profemur (male) anteriorly lobate-dentate near apex. Metatibia (male) posteriorly at most lobate-dentate at 0.3-0.5 from base. Metatibia long, slender, curved, dilated near apex. Metatibia internally (male) continuous internally (not angulate halfway), angulate-dilated at short distance from apex (male). Metatibia posteriorly and metatibia internally not multidenticulate. Aedeagal present. Parameres subsymmetric (in upper side view), short, broad, tapering (lateral view); bottom sclerite distinct. Habitus deplanate, body size small. Both sexes known. Length 5.5-6 mm.

Distribution and ecology
Borneo: Sarawak. All specimens were collected by Hanski (1983, as *Phacosoma* sp.n. A) in pitfall traps baited with either carrion or human excrement, at Mulu, at 100-670 m altitude, mainly in what was termed mixed dipterocarp forest; a small number was found in alluvial forest.

Comments
*O. crypticus* is a small species, mainly recognizable from its elytral colour pattern (shining, yellow marks on elytral base, from interstria 2 on), short, virtually unmodified parameres, and simply acuminate, rather short protibial denticles.

8. **Ochicanthon peninsularis** sp.n.
Figs 40-45, 124

Type-material. Male holotype (BMNH): Malaysia, with our type label, and the following label data: Malaysia: Pahang: Fraser’s Hill, 29/x-3/xi/1977, B. Bendell. 4 paratypes listed in Appendix 2.

Description (holotype, male)
Body length ca 6.7 mm. Colour generally black-brown, partly matt, pronotum and elytra with yellow-orange marks.

Clupeal margin anteriorly bidentate (tips angular, median emargination widely rounded). Clypeofrontal surface generally feebly convex, brown, shiny, glabrous, with crowded, distinct, simple punctuation. Clypeal border from gena forward widely rounded. Eyes (foramen in full-face view) medium-sized, rather broadly elliptic. Maximum number of facet rows (transversely) across eye foramen ca 9. Ratio transverse interocular distance/maximum eye width ca 7.6. Pronotum generally evenly convex, disc and anterior declivity unmodified, slightly deplanate. Prothorax in dorsal outline nearly parallel-sided, slightly...
Figs 28-39. *Ochicanthon*, habitus (male holotypes) and body parts. – 28-33, *O. crockermontis*, habitus, oblique (28), head, full-face (29); pronotum, dorsal (30); left elytron, dorsal (31); protibia, upper side (32); metatibia and -femur, underside (33); 34-39, *O. crypticus*, habitus, oblique (34); head, full-face (35); pronotum, dorsal (36); left elytron, dorsal (37); protibia, upper side (38); metatibia and -femur, underside (39).
Figs 40-51. Ochicanthon, habitus and body parts. – 40-45, *O. peninsularis* (male holotype), habitus, oblique (40); head, full-face (41); pronotum, dorsal (42); left elytron, dorsal (43); protibia, upper side (44); metatibia and -femur, underside (45); 46-51, *O. karasuyamai* (female), habitus, oblique (46); head, full-face (47); pronotum, dorsal (48); left elytron, dorsal (49); protibia, upper side (50); metatibia and -femur, underside (51).
convergent rostrad. Anterior border of pronotum unmodified. Anterolateral pronotal angle (nearly) rectangular. Anterolateral section of pronotum abruptly rounded at ca 0.2 of length behind anterior angle. Lateral sides of pronotum simply declivous. Posterolateral section of pronotum modified as in all congeners, with distinct fold parallel and close to border, anteriorly somewhat sulcate. Pronotal posterolateral angles simple, distinct, obtuse. Base of pronotum immarginate, evenly, very widely rounded, with surface unmodified. Pronotal border finely marginate in front. Pronotum microsetose, setae moderately long; largely yellow, shiny, with metallic lustre and with symmetric black marks; generally with simple, crowded punctuation. Estimated number of punctures per 0.25 sq.mm on pronotal disc 55-65, punctures 0.05 mm.

Elytra black-brown, with yellow-orange pattern, matt (sericeous), on disc with abundant, moderately long microsetae. Pseudepipleuron reaching elytral apex (broad, pseudepipleural crest with 2 fine ridges in front). Elytral striae distinct, shallowly impressed; punctures of discal striae slightly impressed (crenulating interstriae, separated by 1-3 diameters); interstriae flat to feebly convex, simply punctate, punctures scattered, abundant.

Antennal lamellae brown.


Aedeagus more or less symmetric, as in Fig. 124; bottom sclerite of right paramere distinct, curled, with slight basomedian point.

Measurements in mm. Maximum width of head 2.2. Pronotal dorsal median length 2.1, maximum width 3.6. Dorsal sutural length of elytra 3.5, maximum width combined 4.4.

Colours. Pronotal lighter marks present: PL-ML-AL-BM-PBM-PAM. Elytral lighter marks present: B(2-7), M(5-7)-A(2-7).

Variation and sexual dimorphism

Angles on anterior side of profemur and posterior side of metafemur in female absent. Distal section of female metatibia unmodified. Colour pattern of pronotum and interstrial punctuation of elytra very variable.

Derivation of species name

Occurring on the peninsular extension of continental Southeast Asia.

Diagnosis

Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogena border from lateral tip to anterior denticles widely convex-curvilinear. Clypeofrontal surface crowdedly punctate. Eye size moderate, foramen narrowly elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) more or less abruptly rounded. Paramarginal fold on posterolateral surface of pronotum distinct. Pronotum crowdedly punctate, with numerous scattered microsetae, with symmetric pattern of (orange-)yellow and (brown-)black. Pronotal (orange-)yellow marks variably extensive. Elytra with symmetric pattern of (brown-)black and (orange-)yellow marks. Basal elytral (orange-)yellow B (2-7) present. Postmedial elytral (orange-)yellow M (5-7) present. Apical elytral (orange-)yellow A (2-7) present. Discal elytral interstrial punctuation abundant to dense, interstriae sericeous, due to micoreticulation between punctures, interstriae all flat or very slightly convex, interstriae with numerous scattered microsetae. Pygidium convex along apex, basal surface flat or concave (in profile), largely (orange-)yellow. Protibial denticles (male) all simply acuminate, slender. Profemur (male) anteriorly lobate-dentate near apex (distinct). Metafemur (male) posteriorly lobate-dentate at 0.3-0.5 from base to doubly lobate(-dentate). Metatibia long, slender, curved, dilated near apex. Metatibia internally (male) continuous internally (not angulate halfway), angulate-dilated at short distance from apex (male).
Metafemur posteriorly and metatibia internally not multidenticulate. Alae present. Parameres subsymetric (in upper side view), rather long, slender, tapering (lateral view); bottom sclerite distinct. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small.

Both sexes known. Length 6-7 mm.

**Distribution**
Malay Peninsula, incl. Singapore.

**Comments**
*O. peninsularis* is a patterned species, with protibial denticles all simply acuminate in both sexes; background microsculpture of elytra distinctly microreticulate (giving the interstriae a sericeous appearance), and elytral basal and apical marks extensive. Also occurring on Singapore Island (Bukit Timah), whence we have a male specimen very similar to the one described from the same area by Boucomont (1914) under *P. dytiscoides*. Considering its variability and wide range possibly a set of (sub)species – more material required.


**Diagnosis**
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeonotal fold on posterolateral surface of pronotum short, moderately distinct to distinct, (angularly) extended in front. Pronotum densely to crowdedly punctate, with microstubbles, with symmetric pattern of (orange-)yellow and (brown-)black. Pronotal (orange-)yellow marks extensive, (orange-)yellow predominant. Elytra predominantly black-brown, with (usually symmetric) pattern of (orange-)yellow marks. Basal elytral (orange-)yellow B(5-7) present. Mediolateral elytral (orange-)yellow M(5-7) present. Distal elytral (orange-)yellow A(2-7) present. Discal elytral interstrial punctuation dense to crowded, interstriae shining between punctures, without microreticulation, interstriae all flat or very slightly convex, interstriae with numerous scattered microsetae. Pygidium convex along apex, basal surface flat or concave (in profile). Protibial denticles (male) all simply acuminate, slender. Profemur (male) anteriorly lobate-dentate near apex. Metafemur (male) posteriorly doubly lobate(-dentate). Metatibia long, slender, curved, dilated near apex. Internal side of metatibia (male) continuous (not angulate halfway), angulate-dilated at short distance from apex (male). Metafemur posteriorly and metatibia internally not multidenticulate. Meso- and metatarsi long, relatively slender. Alae present. Parameres subsymmetric (in upperside view), long, slender, tapering (lateral view); bottom sclerite distinct. Pronotal-elytral transition (in profile) gradual. Habitus deplanate. Body size small.

Both sexes known. Length 7.2-7.5 mm.

**Distribution**
Borneo: Sabah.

**Comments**
*O. kikutai* is a patterned species with all acuminate protibial denticles, close to *O. peninsularis*, but lacking the microreticulation on the elytral interstriae characteristic of that species. The aedeagi of the two species are also different (see Ochi et al. 2006, Figs 20a-d). Ochi et al. (1997) misinterpreted *O. kikutai* as *dytiscoides*, rectifying this in Ochi et al. (2006). It was found only at Sayap (Sabah), at 1000 m altitude.

10. *Ochicanthon neglectus* sp.n.
Figs 52-57, 125

**Type-material.** Male holotype (RMNH): Malaysia, with our type label, and the following label data: Sarawak: 4th Division: Gunung Mulu NP, 11/1978, 1. Hanski, 400-600 m, pitfall trap, fish bait, limestone forest, #204. 11 paratypes listed in Appendix 2.

**Description** (holotype, male)
Figs 52-63. *Ochicanthon*, habitus (holotypes) and body parts. – 52-57, *O. neglectus*, habitus, oblique (52); head, full-face (53); pronotum, dorsal (54); left elytron, dorsal (55); protibia, upper side (56); metatibia and -femur, underside (57); 58-63, *O. dulitmontis*, habitus, oblique (58); head, full-face (59); pronotum, dorsal (60); left elytron, dorsal (61); protibia, upper side (62); metatibia and -femur, underside (63).
Prothorax in dorsal outline nearly parallel-sided, slightly convergent rostrad. Anterior border of pronotum unmodified. Anterolateral pronotal angle (nearly) rectangular. Anterolateral section of pronotum abruptly rounded at ca 0.2 of length behind anterior angle. Lateral sides of pronotum simply declivous. Posterolateral section of pronotum modified as in all congeners, with distinct fold parallel and close to border, anteriorly somewhat sulcate. Pronotal posterolateral angles simple, distinct, obtuse. Base of pronotum immarginate, evenly, very widely rounded, with surface unmodified. Pronotal border finely marginate in front. Pronotum entirely black-brown, microsetose, setae long, appressed; surface generally with simple punctuation, crowded. Estimated number of punctures per 0.25 sq.mm on pronotal disc ca 55-65, punctures ca 0.04 mm.

Elytra black-brown, with yellow-orange pattern, moderately shining, on disc with abundant appressed microsetae. Pseudepipleuron reaching elytral apex (broad, pseudepipleural crest with 2 fine ridges in front). Elytral striae distinct, shallowly impressed; punctures of discal elytral striae slightly impressed (crenulating interstriae, separated by 2-4 times their diameter); surface with appressed, long microsetae; interstriae flat to feebly convex, simply punctate, punctures scattered, crowded.

Antennal lamellae brown.

Propectus laterally black-brown, microstriolate. Mesosternum virtually smooth. Metasternal anterior lobe and disc densely punctate-microsetose, setae very short; metasternum black-brown, laterally with dense, annulate punctuation (on microreticulate surface). Abdominal venter black-brown, matt, with vaguely punctate basal zone on proximal sternites, abundantly punctate-microsetose distally, setae long, with microstriolation, matt. Hind wings fully developed. Pygidium very convex near apex, marginate along base, black-brown, densely punctate-microsetose, punctures fine.
Profemur brown, projecting in front (dentine near apex). Protibia externally with 3 denticles (apico-external denticle simply tapering). Proximal serration on outer side of protibia distinct, fine. Protibia with rounded, protruding apex, internal side evenly, slightly curved. Protibial spur inserted away from inner angle, simply acuminate, fine. Protibia dark brown. Protarsus slender. Mesofemur slender, unmodified. Metafemur posteriorly with angle at 0.3 from base, followed by row of fine, irregular denticulations. Meso- and metafemur dark brown. Meso- and metatibiae long, curved, without fossorial protrusions on outer side. Meso- and metatibia simply curved. Metabasal half with inner surface irregularly denticulate; apex modified (angular). Meso- and metabasal dark brown. Meso- and metasternal slender. Metasternal segment 1 distinctly longer than segment 2 (approximate proportions spur/segments 1-5 10/24/11/7/6/10). Aedeagus more or less symmetric, as in Fig. 125; bottom sclerite of right paramere distinct, with slight basomedian point.

Measurements in mm. Maximum width of head 2.1. Pronotal dorsal median length 2.2, maximum width 3.5. Dorsal sutural length of elytra 3.4, maximum width combined 6.2.

Colour patterns. Pronotal lighter marks absent. Elytral lighter marks present: B(5-7), M(5-7)-A(2-7).

Variation and sexual dimorphism
Angles on anterior side of profemur and posterior side of metafemur in female absent. Distal section of female metatibia unmodified. Female also lacking metafemoral and -tibial denticulation.

Derivation of species name
This species was initially missed, being hidden in a multi-species set under the name dytiscoides.

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogentral border from lateral tip to anterior denticles widely convex-curvilinear. Clypeofrontal surface crowdedly punctate. Eye size moderate, foramen narrowly elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) more or less abruptly rounded (subangular). Paramarginal fold on postero-lateral surface of pronotum short, distinct. Pronotum densely to crowdedly punctate, with numerous scattered microsetae, uniform (brown-)black. Elytra with symmetric pattern of (brown-)black and (orange-)yellow marks. Basal elytral (orange-)yellow B (5-7) present. Postmedial elytral (orange-)yellow M (5-7) present. Apical elytral (orange-)yellow (A) virtually absent (2-7 lighter brown, but indistinct). Discal elytral interstitial punctuation dense to crowded, interstriae shining, without microreticulation, interstriae all flat or very slightly convex, with numerous scattered microsetae. Pygidium convex near apex, basal surface flat (in profile), brown to black, (virtually) uniform. Protibial denticles (male) all simply acuminate, slender. Profemur (male) anteriorly lobate-dentate near apex (slight). Metafemur (male) posteriorly lobate-dentate at 0.3-0.5 from base. Metatibia long, slender, curved, dilated near apex. Metatibia internally (male) continuous internally (not angulate halfway), angulate-dilated at short distance from apex (male). Metafemur posteriorly and metatibia internally with longitudinal row of fine denticles. Alae present. Parameres subsymmetric (in upper side view), long, slender, tapering (lateral view); bottom sclerite distinct. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small.

Both sexes known. Length 7-8 mm.

Distribution and ecology
Borneo: Sarawak.

All specimens were collected by Hanski (1983, as Phacosoma sp.n. G) in fish baited pitfall traps at Mt Api in Mulu, in limestone forest. In this area only fish baited traps were set, at altitudes of 400 and 650 m, and O. neglectus was collected at both altitudes.

Comments
O. neglectus is a small species from limestone forest in Sarawak, characterized by an all black pronotum, and finely multidenticulate (mini-crenulate) posterior-interior sides of the metafemora and metatibiae in the male sex (best seen from above). O. dulitmontis has also a uniformly dark pronotum, but is presumably larger (one male known), and lacks the multidenticulate ornamentation on the hind legs.

11. Ochicanthon dulitmontis sp.n.
Figs 58-63, 126

Type-material. Male holotype only (BMNH): Malaysia, with our type label, and the following label data: Sarawak: Mt Dulit, 18/x/1932, B.M. Hobby & A.W. Moore (Oxford Univ. Exped.), 4000 ft, moss forest.

Description (holotype, male)
Body length ca 8.2 mm. Colour generally black-brown, elytra with yellow-orange marks. Clypeal margin anteriorly bidentate (tips angular,

Pronotum generally evenly convex, disc and anterior declivity unmodified, slightly deplanate. Prothorax in dorsal outline nearly parallel-sided, slightly convergent rostrad. Anterior border of pronotum unmodified. Anterolateral section of pronotum sub-angular at ca 0.2 of length behind anterior angle. Lateral sides of pronotum simply declivous. Post-\(\text{\textit{eral}}\)ateral section of pronotum modified as in all congeners, with distinct fold parallel and close to border. Pronotal posterolateral angles simple, distinct, obtuse. Base of pronotum immarginate, evenly, very widely rounded, with surface unmodified. Pronotal border finely marginate in front. Pronotum entirely black-brown, microsetose, setae long, appressed; surface generally with simple punctuation, crowded. Estimated number of punctures per 0.25 sq.mm on pronotal disc 60-65, punctures ca 0.04 mm.

Elytra dark brown, with yellow-orange pattern, moderately shining, on disc with abundant microsetose. Pseudopileuron reaching elytral apex (broad, pseudopileural crest with 2 fine ridges in front). Punctures of discal elytral striae slightly impressed (crenulating interstriae, separated by 2-3 times their diameter). Elytral striae distinct, shallowly impressed. Elytra with microsetae only (appressed, long). Interstriae flat to feebly convex, simply punctate, punctures scattered, crowded. Antennal lamellae brown.


Profemur brown, projecting in front (\(\text{\textit{large denticle near apex}}\)). Protibia externally with 3 denticles (apico-external denticle simply tapering). Proximal serration on outer side of protibia distinct, fine. Pro-\(\text{\textit{tibia with rounded, protruding apex, internal side evenly, slightly curved. Protibial spur inserted away from inner angle, simply acuminate, fine. Protibia brown. Protarsi slender. Mesofemur slender, unmodified. Metafemur posteriorly with denticle at 0.3 from base, followed by distinctly convex, simple curve. Meso- and metafemur brown. Meso- and metatibiae long, curved, without fossorial protrusions on outer side. Mesotibia simply curved. Metatibia strongly curved, gradually dilated to apex, inner surface lacking denticulation; apex modified (angular). Meso- and metatibia brown. Meso- and metatarsi slender. Metatarsal segment 1 distinctly longer than segment 2 (approximate proportions spur//segments 1-5 12//30/14/10/9/12). (Legs partly missing.) Aedeagus more or less symmetric (poorly preserved), as in Fig. 126.

Measurements in mm. Maximum width of head 2.6. Pronotal dorsal median length 2.5, maximum width 4.3. Dorsal sutural length of elytra 4.0, maximum width combined 5.2.

Colour patterns. Pronotal lighter marks absent. Ely-\(\text{\textit{tral}}\) lighter marks present: B (5-7), M (5-7), A (3).

**Derivation of species name**

Named after the type locality, situated in the moun-\(\text{\textit{tainous}}\) hinterland of Sarawak.

**Diagnosis**

Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogena\(\text{\textit{l}}\) border from lateral tip to ante-rior denticles widely convex-curvilinear. Clypeofron-\(\text{\textit{tal}}\) surface crowdely punctate. Eye size moderate, foramen narrowly elliptic. Pronotal border anterolaterally (at ca 0.2 behind angle) more or less abruptly rounded (subangular). Paramarginal fold on poste-\(\text{\textit{rolateral}}\) surface of pronotum short, distinct. Prono-\(\text{\textit{tum}}\) crowdely punctate, with numerous scattered microsetae, uniform (brown-)black. Elytra with symmetric pattern of (brown-)black and (orange-)yellow marks. Basal elytral (orange-)yellow B (5-7) present. Postmedial elytral (orange-)yellow M (5-7) present. Apical elytral (orange-)yellow limited, A (3) present. Discal elytral interstitial punctuation crowd-ed, interstriae shining, without microreticulation, interstriae all flat or very slightly convex, interstriae with numerous scattered microsetae. Pygidium convex along apex, basal surface flat (in profile) to more or less pointed, brown to black, (virtually) uniform. Pro-\(\text{\textit{tribial denticles}}\) (male) all simply acuminate, slender. Profemur (male) anteriori-\(\text{\textit{y}}\) lobate-dentate near apex. Metafemur (male) posteriorly lobate-dentate at 0.3-0.5 from base. Metatibia long, slen-\(\text{\textit{der}}\), curved, dilated near apex. Metatibia internally (male) continuous internally (not angulate halfway), angulate-dilated at short distance from apex (male).
Metafemur posteriorly and metatibia internally not multidenticulate. Alae present. Parameres subsymmetric (in upper side view), long, slender, tapering (lateral view). Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size large (length at or over 8 mm).

One male available, female unknown. Length between 8-8.5 mm.

**Distribution and ecology**

Borneo: Sarawak. Collected in moist upland forest.

**Comments**

*O. dulitmontis* presumably is a large species (one male available), possibly related to the much smaller *neglectus*, and different in the details of the legs (hind femoral and tibial multidenticulation absent) and the aedeagus (parameres short, plump); note that our information on aedeagal characters need verification. Boucomont saw this specimen, labelling it *dytiscoides* (“comp. au type”).

12. *Ochicanthon cambeforti* (Ochi, Kon & Kikuta, 1997)

Figs 64-69, 127

* O. *simboroni* Ochi, Ueda & Kon, 2006 syn. n.

**Diagnosis**

Clypeal denticles separated by emargination down to their base, laterally virtually straight. Clypeogenal border from lateral tip to anterior denticles virtually straight (gena shortly rounded). Clypeofrontal surface densely to crowdedly punctate. Eye size moderate, foramen rather narrowly elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) shortly rounded. Paramarginal fold on posterolateral surface of pronotum short, distinct. Pronotum densely to crowdedly punctate, with numerous scattered microsetae, with symmetric pattern of (orange-)yellow and (brown-)black. Pronotal (orange-)yellow marks extensive, (orange-)yellow not predominant. Elytra with symmetric pattern of (brown-)black and (orange-)yellow marks. Basal elytral (orange-)yellow B (2-7) present. Postmedial elytral (orange-)yellow M (5-7) present. Apical elytral (orange-)yellow A (2-7) present. Discal elytral interstrial punctuation dense to crowded, interstriae shining, without microreticulation, interstriae all flat or very slightly convex, interstriae with numerous scattered microsetae. Pygidium convex along apex, basal surface flat or concave (in profile), brown to black, (virtually) uniform. Protibial denticles (male) all simply acuminate, slender. Profemur (male) anteriorly lobate-dentate near apex. Metafemur (male) posteriorly doubly lobate(-dentate), distal-posterior lobe rounded. Metatibia long, slender, curved, dilated near apex. Metatibia internally (male) continuous internally (not angulate halfway), angulate-dilated at short distance from apex (male). Metafemur posteriorly and metatibia internally not multidenticulate. Alae present. Parameres distinctly excised above, asymmetric. Left paramere broad, tapering. Right paramere widely sinuate (with narrow apex, in lateral view); bottom sclerite small, flat, with distinct basomedian projection. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small. Possibly both sexes known (diagnosis above primarily based on male holotype of *cambeforti* figured). Length 5-6.5 mm.

**Distribution**

Borneo: East Kalimantan. Type data of *cambeforti* in Appendix 2.

**Comments**

In spite of its asymmetric parameres, everything else in *O. cambeforti* (like the patterned dorsum) points to a position in the *dytiscoides* group; the combination of the shape of the head and the aedeagus, plus the extensive basal and apical yellow elytral marks, should render this Southeast Bornean species easily recognizable. We saw the single known male specimen, ca 6.5 mm long, which is kept in Paris (ex collection H.W. Bates > R. Oberthur). Apart from the region of origin (Indonesian East Kalimantan) no further details available. From the same region, i.e. from a partly forested lowland area near Balikpapan, comes the single female type on which *O. simboroni* is based, which, in the original description (Ochi et al. 2006), is compared with *O. cambeforti*, and presumably rightly so; we tentatively synonymize both species, as they appear at least extremely close. The length of the female is given as 5.1 mm.


Figs 46-51

**Diagnosis**

Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curvilinear. Clypeofrontal surface densely ocellate-punctate. Eye size moderate, foramen narrowly elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) more
or less abruptly rounded; anterolateral corners of pronotum depressed. Paramarginal fold on posterolateral surface of pronotum distinct (extending into groove in front). Pronotum densely ocellate-punctate, glabrous, or nearly so, uniform (brown-)black. Pronotal base with shallow midline depression. Elytra with symmetric pattern of (brown-)black and (orange-)yellow marks. Basal elytral (orange-)yellow B (5-7) present. Postmedial elytral (orange-)yellow M (5-7) present. Apical elytral (orange-)yellow A (2-3, 5-7) present. Discal elytral interstrial punctation ocellate, fine, abundant, intervening surface matt, due to microreticulation, all flat or very slightly convex, with numerous scattered microsetae. Pygidium more or less pointed, brown to black, (virtually) uniform, or with vague lighter patches. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Major males have the usual apico-internal angular expansion of the metatibia. Body size varies considerably. Protibial denticles (male) all acuminate. Profemur (male) anteriorly lobate-dentate near apex. Metafemur (male) posteriorly lobate-dentate at 0.3-0.5 from base. Metatibia long, slender, curved, dilated near apex. Internal side of metatibia (male) continuous (not angulate halfway), angulate-dilated at short distance from apex (male). Metafemur posteriorly and metatibia internally not multidenticulate. Parameres distinctly excised, asymmetric; superior strut, and hook on bottom sclerite distinct. Pronotal-elytral transition (in profile) gradual. Habitus deplanate. Body size small. Both sexes known. Length 5.8-8.2 mm.

Distribution and ecology

Sumatra. New data listed in Appendix 2. Our four females were collected in pitfall traps baited with human faeces, in one area (Lawe Mamas) in Mt Leuser NP, in multistratal evergreen forest. In this area Räisänen sampled an extensive transect section of pronotum modified as in all congeners, with distinct fold parallel and close to border, anterolaterally extended, sulcate. Pronotal posterolateral angles shortly rounded. Base of pronotum immarginate, evenly, very widely rounded. Pronotal border finely marginate in front. Pronotum with microstubbles; entirely black-brown, matt, microreticulate, generally with fine, dense, ocellate punctation. Estimated number of punctures per 0.25 sq.mm on pronotal disc 45-50, punctures 0.03 mm. Elytra black-brown, with yellow-orange pattern, matt, microreticulate, on disc with abundant microstubbles. Pseudepipleuron reaching elytral apex (broad, pseudepipleural crest with 2 fine ridges in front). Elytral striae distinct, shallowly impressed; punctures of discal elytral striae slightly

Material examined. Female figured (RMNH) has the following label data: N Sumatra: Gunung Leuser NP: Lawe Mamas, 1983, H. Räisänen, 800-820 m, #32Cb. More specimens data on karasuyamai in Appendix 2.

Description (female figured)

Body length ca 6.7 mm. Colour generally matt black-brown, with yellow-orange elytral marks. Clypeal margin anteriorly bidentate (tips angular, median emargination widely rounded). Clypeo-frontal surface generally feebly convex, black-brown, matt, glabrous, with dense, distinct but slightly superficial, ocellate punctuation; punctuation less dense between eyes. Clypeal border from gena forward widely rounded. Gena laterally rounded. Eyes (foramen in full-face view) medium-sized, moderately elliptic. Maximum number of facet rows (transversely) across eye foramen 8-9. Ratio transverse interocular distance/maximum eye width ca 8.0. Pronotum generally evenly convex, disc and anterior declivity unmodified, slightly deplanate, basal half with vague midline depression. Prothorax in dorsal outline nearly parallel-sided, slightly convergent rostrad. Anterior border of pronotum unmodified. Anterolateral pronotal angle obtuse, abruptly rounded at ca 0.2 of length behind anterior angle. Lateral sides of pronotum simply declivous. Posteralateral section of pronotum modified as in all congeners, with distinct fold parallel and close to border, anterolaterally extended, sulcate. Pronotal posterolateral angles shortly rounded. Base of pronotum immarginate, evenly, very widely rounded. Pronotal border finely marginate in front. Pronotum with microstubbles; entirely black-brown, matt, microreticulate, generally with fine, dense, ocellate punctation. Estimated number of punctures per 0.25 sq.mm on pronotal disc 45-50, punctures 0.03 mm. Elytra black-brown, with yellow-orange pattern, matt, microreticulate, on disc with abundant microstubbles. Pseudepipleuron reaching elytral apex (broad, pseudepipleural crest with 2 fine ridges in front). Elytral striae distinct, shallowly impressed; punctures of discal elytral striae slightly

The original material of O. karasuyamai came from the Sibolangit area, which is ca 100 km (as the crow flies) from where the Leuser females were found. The description of karasuyamai more or less fits our (female) specimens; differences may be due to variation and/or to choices in terminology. To facilitate verification of the identity of the Leuser material a detailed description of one of our females is given below. The male characters in the diagnosis above are based on the original description of karasuyamai.

Comments

O. karasuyamai is a North Sumatran species with a plump, entirely matt appearance; its pronotum is completely black (or nearly so); dorsal punctuation, for instance on elytral interstriae, much finer than in other species. The somewhat similar peninsularis has a distinctly patterned pronotum, a different aedeagus, and a coarser dorsal punctuation. The type locality Sibolangit is at 1200 m.

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curvilinear. Clypeofrontal surface densely punctate (punctation fine). Eye size moderate, foramen moderately elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) simply rounded. Paramarginal fold on posterolateral surface of pronotum vaguely distinct. Pronotum abundantly to densely punctate, glabrous, or nearly so, uniform black or brown, shining. Elytra uniform, entirely brown or blackish. Discal elytral interstrial punctation fine, somewhat irregular, abundant. Pygidium more or less evenly convex (in profile), brown to black, (virtually) uniform. Protibial denticles all simply acuminate, slender. Profemur anteriorly unmodified. Metatibia posteriorly unmodified. Metatibia very slightly curved, internally continuous (not angulate halfway), gradually dilated to apex. Alae present. Parameres subsymmetric (in upper side view), short, broad, tapering (lateral view), on top separated by elongate strut. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small. Both sexes known. Length 3.5-4.5 mm.

Distribution and ecology
Borneo. New data in Appendix 2. We have seen much material from lowland forest in Sabah and Sarawak. Most specimens were collected in pitfall traps baited with human faeces, or in flight interception traps; smaller numbers in fish baited pitfall traps. At Mulu (Sarawak) O. woroae was collected at 110-150 m altitude in what was termed mixed dipterocarp forest. Davis characterizes this species in the Danum Valley lowland forest as an interior forest specialist. (Mentioned in Hanski 1983, as Phacosoma sp. n. E, in Davis et al. 2000, as Phacosoma paneloides MS, in Davis 1999, Davis 2000, Davis et al. 2001, as Phacosoma sp. 2.)

Comments
O. woroae is a small, shining black-brown species, with subsymmetric, characteristically shaped, relatively short parameres (Fig. 128); the dorsal punctuation of woroae is simple, less dense, but more distinct than in tambunan and other uniformly black-brown Bornean species. The type locality is in Indonesian East Kalimantan, not far from Balikpapan, so it seems that this species occurs all around lowland Borneo. Although the populations from the various parts of Borneo appear

(b) The Ochicanthon woroae group
Dorsum virtually uniformly brown-black. Parameres simple, roughly symmetric, never deeply excised-lobate (lateral view).

Figs 70-75, 128
conspicuous, we add here a detailed description of the male figured in this paper, for reference purposes.

**Material examined.** Male figured (RMNH) has the following label data:

**Description** (male figured)
Body length 3.6 mm. Colour generally shining dark-brown.


Pronotum generally evenly convex, disc and anterior declivity unmodified, slightly deplanate. Prothorax in dorsal outline nearly parallel-sided, slightly convergent rostrad. Anterior border of pronotum unmodified. Anterolateral pronotal angle rounded. Lateral sides of pronotum simply declivous. Postero-lateral section of pronotum modified as in all congeneres, with vague fold parallel and close to border. Pronotal posterolateral angles simple, distinct, obtuse. Base of pronotum immarginate, evenly, very widely rounded, with surface unmodified. Pronotal sides finely marginate, simple. Pronotal border finely marginate in front. Pronotum glabrous, generally with simple, dense punctuation. Estimated number of punctures per 0.25 sq.mm on pronotal disc 60-65, punctures ca 0.01 mm. Pronotum dark-brown, generally shining.

Elytra entirely dark-brown, generally shining, virtually glabrous at x50. Pseudepipleuron reaching elytral apex (broad, pseudopleural crest with fine ridge in front, stria 7 bordered by fine ridge). Elytral striae distinct, shallowly impressed; punctures of discal striae slightly impressed (crenulating interstriae, separated by 3-5 diameters); interstriae flat, simply punctate (pseudepipleuron coarsely rugulate-punctate, shining); punctures fine, scattered, abundant.

Antennal lamellae brown.

*Ochicanthon* tambunan sp.n.
Figs 76-81, 129

**Type-material.** Male holotype (NMWC): Malaysia, with our type label, and the following label data: Sabah: Crocker Range: 5.50°N-116.00°E, 7-11/viii/1991, A.H. Kirk-Spriggs, 1280 m, 2 pitfall traps baited with dung, #ks084.
164 paratypes listed in Appendix 2.

**Description** (holotype, male)
Body length ca 3.7 mm. Colour generally brown, matt.


Pronotum generally evenly convex, disc and anterior declivity unmodified, slightly deplanate. Prothorax in
Figs 70-81. *Ochicanthon*, habitus and body parts. – 70-75, *woroa* (male), habitus, oblique (70); head, full-face (71); pronotum, dorsal (72); left elytron, dorsal (73); protibia, upper side (74); metatibia and -femur, underside (75); 76-81, *O. tambunan* (male holotype), habitus, oblique (76); head, full-face (77); pronotum, dorsal (78); left elytron, dorsal (79); protibia, upper side (80); metatibia and -femur, underside (81).
Figs 82-93. *Ochicanthon*, habitus and body parts. – 82-87, *O. mulu*, habitus (male holotype), oblique (82); head, full-face (83); pronotum, dorsal (84); left elytron, dorsal (85); protibia, upper side (86); metatibia and -femur, underside (87); 88-93, *O. gangkui* (male), habitus, oblique (88); head, full-face (89); pronotum, dorsal (90); left elytron, dorsal (91); protibia, upper side (92); metatibia and -femur, underside (93).
dorsal outline nearly parallel-sided, slightly convergent rostrad. Anterior border of pronotum unmodified. Anterolateral pronotal angle rounded, abruptly rounded at ca 0.2 behind anterior angle. Lateral sides of pronotum simply declivous. Posterolateral section of pronotum modified as in all congeners, with indistinct fold parallel and close to border. Pronotal posterolateral angles simple, distinct, obtuse. Base of pronotum immarginate, evenly very widely rounded, with surface unmodified. Pronotal sides finely marginate, simple. Pronotal border scarcely marginate in front. Pronotum microsetose, setae long, appressed. Pronotum generally with simple, crowded punctation. Estimated number of punctures per 0.25 sq.mm on pronotal disc 80, punctures 0.01 mm. Pronotum brown, generally matt, interpunctural spaces very narrow. Elytra entirely brown, generally matt, with long, fine appressed microsetae in rugulate punctation. Pseudepipleuron reaching elytral apex (broad, pseudepipleural crest with fine ridge in front, stria 7 bordered by fine ridge). Punctures of discal elytral striae slightly impressed (crenulating interstriae, but partly lost in more or less irregular surface, separated by 1-2 diameters). Elytral striae distinct, shallowly impressed (somewhat indistinct in irregular surface). Elytra with abundant microsetae. Interstriae flat, crowdedly, simply punctate, somewhat rugulate (pseudepipleuron coarsely rugulate-punctate, slightly shining).


Distribution and ecology
Borneo: Sabah. All specimens were collected in upland forest in the Crocker Range, in baited pitfall traps, set between ca 1250 and 1465 m altitude. The species seems to prefer human excrement over fish.

Comments
O. tambunan appears a small, all black-brown upland species with somewhat rugulate elytra,
superficially similar to O. gangkui and its relatives, but with a very different, subsymmetric aedeagus (Fig. 129), much shorter than in worae.

16. Ochicanthon mulu sp.n.
Figs 82-87, 130

Type-material. Male holotype (RMNH): Malaysia, with our type label, and the following label data: Sarawak: 4th Division: Gunung Mulu NP, iii-v/1978, I. Hanski, ca 150 m, baited pitfall trap, kerangas, #224.
11 paratypes listed in Appendix 2.

Description (holotype, male)
Body length ca 4.0 mm. Colour generally brownish, matt.
Clypeal margin anteriorly bidentate (tips acute, laterally delimited by distinct sinuate curve, median emargination widely rounded). Clypeofrontal surface generally feebly convex, brown, generally matt, glabrous, with crowded, distinct, annulate punctation. Clypeal margin from gena forward virtually straight. Clypeogenal margin (at suture) slightly discontinuous. Genae laterally rounded to subangulate, with shallowly concave surface. Eye size ventrally large, globose. Eyes (foramen in full-face view) very large, elliptic-circular, short, widely open behind. Maximum number of facet rows (transversely) across eye foramen ca 12. Ratio transverse interocular distance/maximum eye width ca 3.4.
Pronotum generally evenly convex, disc and anterior declivity unmodified. Prothorax in dorsal outline nearly parallel-sided, slightly convergent rostrad. Anterior border of pronotum unmodified. Anterolateral pronotal angle rounded. Anterolateral section of pronotum not depressed. Lateral sides of pronotum simply declivous. Posterolateral section of pronotum modified as in all congeners, with fold parallel and close to border. Pronotal posterolateral angles simple, distinct, obtuse. Base of pronotum immarginate, evenly, very widely rounded, with surface unmodified. Pronotal sides finely marginate, ridge obsolescent (or absent) posteriorly. Pronotal border scarcely marginate in front. Pronotum brown, generally matt, microsetose, setae long (short recurved pale bristles, length about twice punctural diameter). Pronotum generally with crowded annulate punctuation. Estimated number of punctures per 0.25 sq.mm on pronotal disc ca 80, punctures ca 0.01 mm.
Elytra entirely brown, moderately shining; with erect, apically more or less recurved pale bristles (distally in 2 rows). Humeral umbone distinct. Pseudopileuron reaching elytral apex (broad, very coarsely rugulate-punctate). Elytral striae superficial; punctures of discal striae slightly impressed (strongly crenulating interstriae, separated by 1-2 times their diameter); interstriae flat, annulate-punctate to rugulate; interstrial punctures arranged in rows (less so on basodiscal surface), more or less crowded. Antennal lamellae brown.
Propectus laterally brown, crowdedly annulate-punctate-microsetose. Mesosternum shining, sparsely annulate-punctate. Metasternal anterior lobe and disc densely, finely annulate-punctate, with very fine setae, black-brown, laterally with dense annulate punctation. Abdominal venter brown, matt, entirely finely annulate-punctate (distal sternites) or along base (proximal sternites), punctures microsetose, impunctate parts microstriolate. Hind wings fully developed. Pygidium strongly convex, marginate along base, brown, with fine setae, densely annulate-punctate.
Aedeagus more or less symmetric, as in Fig. 130. Measurements in mm. Maximum width of head 1.3. Pronotal dorsal median length 1.3, maximum width 2.0. Dorsal sutural length of elytra 1.8, maximum width combined 2.4.

Variation and sexual dimorphism
Slight, quantitative. Colour may be rufous brown, also dependent on lighting

Derivation of species name
Named after the type locality, a National Park in Sarawak.

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by shallow (sinuate)
emargination. Clypeogenal border from lateral tip anteriorly widely convex-curvilinear. Clypeofrontal blackish-brown surface densely to crowdedly annulate-punctate. Eye size large, foramen broadly elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) simply rounded. Paramarginal fold on posterolateral surface of pronotum moderately distinct, extending into vague groove. Pronotum crowdedly annulate-punctate, with numerous scattered microsetae, uniform blackish-brown. Elytra uniform, entirely blackish-brown. Discal elytral interstrial punctation dense to crowded, annulate; interstriae moderately shining, all flat or very slightly convex, interstriae abundantly, distinctly setose (setae more or less in rows). Pygidium more or less evenly convex (in profile), brown to black, (virtually) uniform (strongly convex). Protibial denticles all simply acuminate, slender. Profemur anteriorly unmodified. Metafemur posteriorly unmodified. Metatibia straight to very slightly curved, internally continuous (not angulate halfway), gradually dilated to apex. Meso- and metatarsi short, relatively compact. Alae present. Parameres subsymmetric (in upper side view), elongate, broad, tapering (lateral view), separated on top by elongate strut. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small. Both sexes known. Length 3.5-4.5 mm.

**Distribution and ecology**

Borneo: Sarawak. All specimens were collected by Hanski (1983, as Phacosoma sp.n. D) using pitfall traps baited with either fish or human excrement, at Mulu, in kerangas [heath forest] at an altitude of 150 m.

**Comments**

O.mulu is a small, all rufous to blackish-brown species characterized by large eye foramina, clypeal denticles delimited by a lateral emargination, coarsely annulate-setose dorsum, and short, tapering, subsymmetric parameres (Fig. 130).

(c) The *Ochicanthon gangkui* group

Dorsum virtually uniformly brown-black. Parameres (lateral view) more or less deeply, usually asymmetrically excised, complex.

17. *Ochicanthon gangkui* (Ochi, Kon & Kikuta, 1997)

Figs 88-93, 132

**Diagnosis**

Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curvilinear. Clypeofrontal surface crowdedly punctate. Eye size large, foramen moderately elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) abruptly rounded. Paramarginal fold on posterolateral surface of pronotum short, moderately distinct. Pronotum crowdedly punctate, glabrous, or nearly so, uniform (brown-)black. Elytra uniform, entirely brown or black. Discal elytral interstrial punctuation crowded to almost rugulate, interstriae slightly matt, due to crowded microsculpture; interstriae all flat or very slightly convex, with numerous scattered microsetae. Pygidium slightly evenly convex (in profile), brown to black, uniform. Protibial denticles all simply acuminate, slender. Profemur anteriorly unmodified. Metafemur posteriorly unmodified. Metatibia straight to very slightly curved, dilated distad, internal side continuous (not angulate halfway). Alae present. Parameres distinctly excised, asymmetric, complex. Left paramere very deeply excised, inferior branch elongate-expanded. Right paramere sinuate, lobate at base, inferior branch also elongate-expanded (lateral view); strut topping aedeagus distinct. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Punctures of dorsum matt. Body size small. Both sexes known. Length 4-4.5 mm.

**Distribution and ecology**

Borneo: Sabah. New data listed in Appendix 2. Known from moist forest on Mt Kinabalu and Mt Trus Madi, at altitudes between 1200 and 1550 m. Specimens were collected in pitfall traps baited with either fish or human faeces.

**Comments**

*O. gangkui* is an all black-brown, more or less matt species, best recognizable from the structural details of its asymmetric parameres (see diagnosis above and Fig. 132). The series we collected comes from the same area as the types, not far from the Mt Kinabalu NP headquarters.

18. *Ochicanthon kimanis* sp.n.

Figs 94-99, 133

**Type-material.** Male holotype (RMNH): Malaysia, with our type label, and the following label data: Sabah: Crocker Range: Keningau-Kimanis road (km25), 18-23/xi/1987, J. Krikken & E. Rombaut, 1300 m, multistr evergr forest,
Description (holotype, male)

Pronotum generally evenly convex, disc and anterior declivity unmodified, slightly deplanate. Prothorax in dorsal outline nearly parallel-sided, slightly convergent rostrad. Anterior border of pronotum unmodified. Anterolateral pronotal angle rounded. Lateral sides of pronotum simply declivous. Posterolateral section of pronotum modified as in all congeners, with distinct fold parallel and close to border. Pronotal posterolateral angles simple, distinct. Base of pronotum immarginate, evenly rounded (very widely so), with surface unmodified. Pronotal sides finely marginate, simple. Pronotal border uninterrupted (very finely marginate in front). Pronotum virtually glabrous. Pronotum generally with simple, crowded punctuation. Estimated number of punctures per 0.25 sq.mm on pronotal disc ca 100, punctures 0.01 mm. Pronotum dark-brown, generally matt due to crowded punctuation, narrow inter punctural surfaces shining.
Elytra entirely dark-brown, generally matt, with short microsetae, in slightly rugulate punctuation. Pseudopileuron reaching elytral apex (broad, pseudopileural crest with 2 fine ridges in front). Punctures of discal elytral striae slightly impressed (crenulating interstriae, but partly lost in more or less rugulate surface, separated by 1-2 diameters). Elytral striae mostly distinct, shallowly impressed. Interstriae flat or very slightly convex. Pseudopileuron rugulate-punctate.
Antennal lamellae brown.

Variation and sexual dimorphism
Slight, quantitative.

Derivation of species name
Named after the type locality, i.e. one of the localities in the Crocker Range region.

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curvilinear. Clypeofrontal surface densely to crowdedly punctate. Eye size large, foramen broadly elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) simply rounded. Paramarginal fold on posterolateral surface of pronotum short, moderately distinct. Pronotum crowdedly punctate, glabrous, or nearly so, uniform (brown-)black. Elytra uniform, entirely brown or black. Discal elytral interstrial punctuation crowded to almost rugulate, interstriae slightly matt, due to rugulate microsculpture, interstriae all flat or very slightly convex, with numerous scattered microsetae. Pygidium more or less evenly convex (in profile), brown to black, uniform. Protibia smooth, denticles all simply acuminate, slender. Profemur anteriorly unmodified. Metatibia posteriorly unmodified. Metatibia straight to very slightly curved, distal half dilated. Metatibia internally continuous internally (not angulate halfway), gradually dilated to apex. Alae present. Parameres distinctly excised, asymmetric, complex. Left paramere very deeply excised, lobate inferior branch elongate-expanded. Right paramere also deeply, but more widely

8 human excr traps, #sa45.
10 paratypes listed in Appendix 2.
excised, lacking lobe formed by sinus; inferior branch
elongate-expanded. Strut topping aedeagus distinct.
Pronotal-elytral transition (in profile) gradual, habi-
tus deplanate. Body size small.
Both sexes known. Length 4-4.5 mm.

Distribution and ecology
Bornéo: Sabah.
All specimens were collected in upland forest in the
Crocker Range, in human faeces baited pitfall traps,
at 1300 m altitude (no carrion traps were set in the
area).

Comments
O. kimantis is an all black-brown, somewhat matt
species, found in an area more than a hundred km
SW of Mount Kinabalu; it is best to be recognized
from the structural details of its asymmetric para-
meres (see diagnosis above and Fig. 133).

19. Ochicanthon danum sp.n.
Figs 100-105, 134

Type-material. Male holotype (RMNH): Malaysia,
with our type label, and the following label data:
Sabah: Danum Valley: 5.01’N-117.47’E, 1991,
A.J. Davis, #0787.
131 paratypes listed in Appendix 2.

Description (holotype, male)
Body length ca 3.5 mm. Colour generally dark-
brown.
Clypeal margin anteriorly bidentate (tips acute,
median emargination widely rounded). Clypeo-
frontal surface generally feebly convex, dark-brown,
shining, glabrous, with crowded, distinct, fine, sim-
ple punctuation. Clypeal border from gena forward
widely rounded. Gena laterally rounded. Eye size
ventrally large, globose. Eyes (foramen in full-face
view) large, broadly elliptic. Maximum number of
facet rows (transversely) across eye foramen 12-13.
Ratio transverse interocular distance/maximum eye
width ca 3.1.
Pronotum generally evenly convex, disc and anterior
declivity unmodified, slightly deplanate. Prothorax in
dorsal outline nearly parallel-sided, slightly conver-
genent rostrad. Anterior border of pronotum unmodi-
fied. Anterolateral pronotal angle rounded. Lateral
sides of pronotum simply declivous. Posteralateral
section of pronotum modified as in all congeners,
with vague fold parallel and close to border. Prono-
tal posterolateral angles simple, distinct, obtuse.
Base of pronotum immarginate, evenly, very widely
rounded, with surface unmodified. Pronotal sides
finely marginate, simple. Pronotal border scarcely
marginate in front. Pronotum microsetose, setae long
(with micro-stubbles, scarcely distinct at × 50). Pro-
notum generally with simple, crowded punctuation.
Estimated number of punctures per 0.25 sq.mm on
pronotal disc 80-90, punctures 0.03 mm. Pronotum
dark-brown, generally shining.
Elytra entirely dark-brown, generally shining, with
microstubbles in crowded, somewhat rugulate punc-
tation, setae laterally longer. Pseudepipleuron reach-
ing elytral apex (broad, pseudepipleural crest with
2 fine ridges in front). Punctures of discal elytral
striae slightly impressed (crenulating interstriae, but
indistinct in more or less rugulate surface, separat-
ed by 1-3 diameters); striae distinct, shallowly im-
pressed; interstriae with crowded, simple punctuation
and abundant microsetae; surface flat; pseudepipleu-
ron coarsely rugulate-punctate, somewhat shining.
Antennal lamellae brown.
Propectus laterally brown, glabrous, shining, sparsely
punctate. Mesosternum shining, scarcely punctate.
Metasternal anterior lobe and disc abundantly, finely
punctate, shining, dark-brown, laterally with annu-
late, crowded punctuation. Abdominal venter dark-
brown, shining, finely, densely punctate, proximal
sternites with microriolate posterior margin. Hind
wings fully developed. Pygidium moderately, evenly
convex, marginate and base, brown, finely micro-
setose, crowdedly punctate.
Profemur brown, unmodified. Proptibia smooth,
externally with 3 denticles. Proximal serration on
outer side of protibia distinct, fine. Proptibia api-
cally rounded, protruding, with internal side evenly,
slightly curved. Protibial spur inserted away from in-
nier angle, simply acuminate (long, acute). Protibia
brown. Protarsi very slender. Mesos- and metafemur
slender, unmodified, brown. Mesos- and metatibiae
distinctly dilated distad, without fossorial protrusions
on outer side. Mesos- and metatibia simply, slightly
curved, apex lobate-dentate to (virtually) straight.
Mesos- and metatibia brown. Mesos- and metatarsi
slender. Metatarsal segment 1 distinctly longer than
segment 2 (approximate proportions spur/segments
1-5 7//13/6/5/4/7).
Aedeagus asymmetrical, as in Fig. 134.
Measurements in mm. Maximum width of head 1.3.
Pronotal dorsal median length 1.1, maximum width
1.8. Dorsal sutural length of elytra 1.8, maximum
width combined 2.3.

Variation and sexual dimorphism
Slight, quantitative. A male from Mount Danum,
higher than the other sites (nearly 1100 m), has
slightly different genitalia, and is excluded from the
type-series.
**Derivation of species name**
Named after the type locality, Danum Valley, a well-known forest ecology study site.

**Diagnosis**
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curved. Clypeofrontal surface crowdedly punctate. Eye size large, foramen broadly elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) simply rounded. Paramarginal fold on posterolateral surface of pronotum short, vaguely distinct. Pronotum crowdedly punctate, glabrous, or nearly so, uniform (brown-)black. Elytra uniform, entirely brown or black. Discal elytral interstitial punctation densely to crowdedly punctate. Interstriae shining, without microreticulation, interstriae all flat or very slightly convex, with numerous scattered microsetae. Pygidium more or less evenly convex (in profile), brown to black, uniform. Protibial denticles all simply acuminate, slender. Profemur anteriorly unmodified. Metatibia straight to very slightly curved, distal half dilated. Metatibia internally continuous internally (not angulate halfway), gradually dilated to apex. Alae present. Parameres distinctly excited, complex, excision of either rounded, with short, non-lobose superior branch. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small.

Both sexes known. Length 4.2 mm.

**Distribution and ecology**
Borneo: Sabah.

Virtually all specimens were collected in lowland forest at Danum Valley (eastern Sabah) at an altitude between 100 and 250 m. This species was almost exclusively collected in human faeces baited pitfall traps. Extensive deployment of flight interception traps yielded only one specimen, carrion baited traps did not yield any specimens. Davis characterizes this species in Danum Valley as a riverine/edge specialist. Mentioned in Davis et al. 2000, as Phacosoma danum MS, in Davis 1999; Davis 2000, Davis et al. 2001, as Phacosoma sp. 1.

**Comments**
O. danum is an all black-brown species, best to be recognized from the structural details of its asymmetric parameres (see diagnosis above and Fig. 134).

20. *Ochicanthon parantisae* (Ochi, Kon & Kikuta, 1997)

**Diagnosis**
Clypeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curved. Clypeofrontal surface densely to crowdedly punctate. Eye size large, foramen broadly elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) more or less abruptly rounded. Paramarginal fold on posterior surface of pronotum short, moderately distinct. Pronotum densely to crowdedly punctate, with numerous scattered microsetae, uniform (brown-)black. Elytra uniform, entirely brown or black. Discal elytral interstitial punctation (asperate-)rugulate, interstriae shining, without microreticulation, interstriae all flat or very slightly convex, interstriae with numerous scattered microsetae. Pygidium more or less evenly convex (in profile), brown to black, uniform. Protibial denticles all simply acuminate, slender. Profemur anteriorly unmodified. Metatibia straight to very slightly curved, internally continuous internally (not angulate halfway), gradually dilated to apex. Meso- and metatarsi short, relatively compact. Alae present. Parameres distinctly excited, complex, excision of either rounded, with short, non-loboform superior branch. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small.

Both sexes known. Length 4.5-5 mm.

**Distribution and ecology**
Borneo: Sabah.

Recorded from altitudes of 1200-1400 m.

**Comments**
This *Ochicanthon* is reputedly related to the questionable *punctatus* (see below); at any rate its aedeagus is different from other known males in the *gangkui* group, particularly by the evenly rounded excision, without invading lobes, between the short inferior and superior parameral branches (on either side) – see Figs 2-4 in Ochi, Kon & Kikuta (1997).

21. *Ochicanthon javanus* sp.n.

**Type-material.** Male holotype (RMNH): Indonesia, with our type label, and the following label data: W Java: Mt Puncak: Telaga Warna, 27-30/xii/1985, J. Krikken, 1600 m, multisstr evergr forest (degraded), 2 fish traps, # pw71b.

38 paratypes listed in Appendix 2.
Figs 94-105. *Ochicanthon*, habitus (male holotypes) and body parts. – 94-99, *O. kimanis*, habitus (94), oblique; head, full-face (95); pronotum, dorsal (96); left elytron, dorsal (97); protibia, upper side (98); metatibia and -femur, underside (99); 100-105, *O. danum*, habitus (100), oblique; head, full-face (101); pronotum, dorsal (102); left elytron, dorsal (103); protibia, upper side (104); metatibia and -femur, underside (105).
Fig. 106-117. *Ochicanthon*, habitus (male holotypes) and body parts. – 106-111, *O. javanus*, habitus, oblique (106); head, full-face (107); pronotum, dorsal (108); left elytron, dorsal (109); protibia, upper side (110); metatibia and -femur, underside (111); 112-117, *O. hanskii*, habitus, oblique (112); head, full-face (113); pronotum, dorsal (114); left elytron, dorsal (115); protibia, upper side (116); metatibia and -femur, underside (117).
Description (holotype, male)

Body length ca 3.5 mm.

Clupeal margin anteriorly bidentate (tips acute, median emargination widely rounded). Clupeofrontal surface generally feebly convex, black, moderately shining, with microstubbles, in crowded, distinct, simple punctuation. Clupeal border from gena forward widely rounded. Gena laterally rounded. Eye size ventrally small; eyes (foramen in full-face view) moderately elliptic. Maximum number of facets rows (transversely) across eye foramen ca 7. Ratio transverse interocular distance/maximum eye width ca 7.5.

Pronotum generally evenly convex, disc and anterior declivity unmodified, slightly deplanate. Prothorax in dorsal outline nearly parallel-sided, slightly convergent rostrad. Anterior border of pronotum unmodified. Anterolateral pronotal angle obtuse to rounded. Lateral sides of pronotum simply declivous. Posterolateral section of pronotum modified as in all congeners, with short fold parallel and close to border. Pronotal posterolateral angles simple, distinct, obtuse. Base of pronotum immarginate, evenly, very widely rounded, with surface unmodified. Pronotal sides finely margiante, simple. Pronotal border very finely marginate in front. Pronotum virtually glabrous, generally crowdedly punctate, somewhat rugulate entirely black, generally shining. Estimated number of punctures per 0.25 sq.mm on pronotal disc 60-65, punctures 0.04 mm.

Elytra entirely black, generally slightly shining, with microstubbles and microsetae in abundant fine punctuation in rugulate surface. Pseudopleuron reaching elytral apex (broad, pseudopleural crest with 2 fine ridges in front). Elytral striae largely distinct, superficially impressed; punctures of discal striae also superficially impressed (crenulating interstriae, basomedian surface, separated by 1-2 diameters); interstriae flat, rugulate-punctate (pseudopleuron slightly rugulate, shining).

Antennal lamellae brown.

Propectus laterally (brown-)black, virtually glabrous, irregularly, abundantly punctate. Mesosternum largely smooth. Metasternal anterior lobe and disc irregularly, abundantly, coarsely punctate, virtually glabrous. Metasternum (brown-)black, laterally with fine, dense annulate punctuation. Abdominal venter (brown-)black, matt, virtually glabrous, vaguely microstriolate, distal sternites finely, densely punctate-microsetose. Hind wings fully developed. Pygidium very convex (subconical), marginate along base, black, rugulate-punctate, with short microsetae.


Aedeagus asymmetrical, as in Fig. 135.

Measurements in mm. Maximum width of head 1.3. Pronotal dorsal median length 1.1, maximum width 2.0. Dorsal sutural length of elytra 1.7, maximum width combined 2.3.

Variation and sexual dimorphism

Variation quantitative, mainly evident in punctural sizes and densities, and in body length and colour, possibly also in the shape of the eye foramen. There may be subspecific differences between populations on Java (for instance, West versus East), but for a proper assessment more material is required – specimens from East Java excluded from type-series.

Derivation of species name

Named after its home island, Java.

Diagnosis

Clupeal denticles separated by emargination down to their base, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curved. Clypeofrontal surface densely to crowdedly punctate. Eye size large, foramen moderately elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) simply rounded. Paramarginal fold on posterolateral surface of pronotum short, vaguely distinct. Pronotum densely to crowdedly punctate, glabrous, or nearly so, uniform (brown-)black, shining. Elytra uniform, entirely brown or black. Discal elytral interstrial punctuation simple to rugulate, interstriae shining, without microreticulation, all flat or very slightly convex, mainly with scattered microstubbles. Pygidium more or less evenly convex (in profile) (near apex), brown to black, uniform. Protibial denticles all simply acuminate, slender. Profemur anteri-orly unmodified. Metatibia posteriorly unmodified. Metatibia straight to very slightly curved, internally continuous (not angulate halfway), gradually dilated to apex. Alae present. Parameres distinctly excised, asymmetric, complex. Left paramere very deeply excised, inferior branch elongate-expanded; right
paramere deeply excised, lobate; strut topping aedegaus distinct. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small. Both sexes known. Length 3.5-4.5 mm.

**Distribution and ecology**

Java. 
Most specimens were collected in moist upland forest (and forest remnants) on the slopes of Java’s volcanoes, at altitudes of 1200-1600 m, by baited pitfall trapping with fish as well as human faeces.

**Comments**

*O. javanus* is a small, variable, all black-brown species, possibly occurring all over Java, from West to East; differing from other *gangkui* group members (from Borneo) in the structural details of the asymmetric parameres (see diagnosis above and Fig. 135), eye foramen size, pilosity, microsculpture, etc.

(d) The *Ochicanthon hanskii* group

Dorsum virtually uniformly brown-black. Parameres simple, roughly symmetric. Elytra with distinct rows of bristles. Inner side of male metatibia angularly dilated about halfway. The single known species also shows attributes apparently related to the loss of its hind wings.

22. *Ochicanthon hanskii* sp.n.

Figs 112-117, 131

**Type-material.** Male holotype (RMNH): Malaysia, with our type label, and the following label data: Sarawak: 4th Division: Gunung Mulu NP, i-v/1978, I. Hanski, LMR [lower montane rainforest], baited pitfall trap, 800-1700 m, #678.
386 paratypes listed in Appendix 2.

**Description** (holotype, male)

Body length ca 4.6 mm. Colour generally brown. Clypeal margin anteriorly bidentate (tips acute, sitting on a short upright lobe, intervening emargination consequently less deeply rounded than in other species). Clypeofrontal surface generally feebly convex, brown, generally matt, glabrous, with crowded, distinct, ocellate punctuation. Clypeal border from gena forward very widely rounded. Clypeogena1 margin (at suture) slightly discontinuous. Genae laterally rounded to subangular; with shallowly concave surface. Eye size ventrally small. Eyes (foramen in full-face view) medium-sized, moderately elliptic, short, widely open behind. Maximum number of facet rows (transversely) across eye foramen 6-7. Ratio transverse interocular distance/maximum eye width ca 10.5.

Pronotum generally evenly convex, disc and anterior declivity unmodified. Prothorax in dorsal outline nearly parallel-sided, in lateral outline showing pronotal-elytral dip. Anterior border of pronotum unmodified. Anterolateral pronotal angle widely rounded. Anterolateral section of pronotum distinctly depressed, particularly behind eyes. Lateral sides of pronotum simply declivous (apart from anterior depression). Postero1ateral section of pronotum with fold parallel to border indistinct. Pronotal postero-lateral angles simple, distinct, obtuse. Base of pronotum immarginate, evenly, very widely rounded, with surface unmodified. Pronotal sides immarginate. Pronotal border scarcely marginate in front. Pronotal surface setose, setae long and more or less squamiform; short, recurved pale bristles changing to ditto scales from sides and apex to base); pilosity standing in annulate, crowded punctuation (midline at base partly free); colour brown, anterolaterally rufous, generally matt, due to sculpture and pilosity. Estimated number of punctures per 0.25 sq.mm on pronotal disc 65-70, punctures 0.04 mm. Elytra entirely brown, moderately shining, with erect, apically more or less squamiform and recurved pale bristles. Humeral and antecapital umbones absent; elytral base shallowly depressed. Pseudepipeuron reaching elytral apex (broad, very coarsely rugulate-punctate, pseudepipeural crest narrow, lacking paired ridges in front). Punctures of discal elytral striae slightly impressed (slightly crenulating interstriae, separated by 1-2 times their diameter), striae superficial; interstriae flat, mostly annulate-punctate, seta-bearing punctures arranged in two distinct rows, abundant to dense, shining between punctures. Antennal lamellae yellow-brown.

Propectus laterally brown, abundantly annulate-punctate-microsetose, microstriolate, Mesosternum shining, finely annulate-punctate. Metasternal anterior lobe and disc abundantly, finely annulate-punctate, with very fine setae; metasternum brown, laterally with annulate punctuation, dense. Abdominal venter brown, matt, entirely finely annulate-punctate (distal sternites) or along base (proximal sternites), lateral punctures microsetose, impunctate parts microstriolate. Hind wings absent. Pygidium slightly convex, marginate along base, brown, with fine setae, densely annulate-punctate. Profemur brown, unmodified. Protibia with short denticles. Protibia smooth, externally with 3 short denticles. Proximal serration on outer side of protibia distinct, fine. Protibia apically rounded, only slightly protruding, internal side evenly, slightly curved. Protibial spur inserted away from inner

Aedeagus more or less symmetric, as in Fig. 131. Measurements in mm. Maximum width of head 1.6. Pronotal dorsal median length 1.4, maximum width

Figs 118-127. Ochicanthon, aedeagus, upper side full-face. – 118, O. edmondsi; 119, O. dytiscoides; 120, O. masumotoi; 121, O. rombauti; 122, O. crockermontis; 123, O. crypticus; 124, O. peninsularis; 125, O. neglectus; 126, O. dulitmontis; 127, O. cambeforti, aedeagus, lateral views (a, right, b, left side), upper side full-face (c). Scale line = 0.5 mm, all same scale.
Variation and sexual dimorphism
Angles on anterior side of profemur and posterior side of metafemur in female absent. Internal side of female metatibia continuous, lacking the distinct angle of the male.

Derivation of species name
Named after one of the collectors, the distinguished ecologist I. Hanski, who, with Y. Cambefort, co-edited a most useful volume on dung beetle ecology (1991).

Diagnosis
Clypeal denticles slightly fused at base, emargination


2.5. Dorsal sutural length of elytra 2.3, maximum width combined 2.9.
less deep than in other species, adjoined laterally by simple concave curve. Clypeogenal border from lateral tip to anterior denticles widely convex-curvilinear. Clypeofrontal surface blackish-brown, crowdedly ocellate-punctate. Eye foramen short, small; underside of eye also small. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) simply, widely rounded. Paramarginal fold on posterolateral surface of pronotum virtually effaced. Pronotum crowdedly annulate-punctate, with numerous scattered setae, uniform blackish-brown. Elytra uniform, entirely blackish-brown. Discal elytral interstrial punctation dense, interstriae shining, without microreticulation, all flat or very slightly convex, mostly with 2 rows of (squamiform) bristles. Pygidium more or less evenly convex (in profile), brown to black, uniform. Protibia relatively broad, apex slightly expanded, denticles all shortly acuminate. Profemur anteriorly unmodified. Metafemur (male) posteriorly obtusely angulate at 0.3-0.5 from base. Metatibia straight to very slightly curved, in male distal half abruptly dilated, internal side angulate halfway its length. Meso- and metatarsi short, relatively compact. Alae absent. Pronotal-elytral transition (in profile) with dip, habitus relatively convex. Body size small.

Both sexes known. Length 4.5-6 mm.

Distribution and ecology
Borneo: Sarawak.

Most specimens of this remarkable flightless species were collected by Hanski (1983, as Phacosoma sp.n. C) in carrion baited pitfall traps at Mulu (Sarawak) at 1320-1800 m altitude, in what was termed upper montane rain forest. Smaller numbers were found at human dung, in flood refuse (150-200 m), and in litter.

Comments
O. hanskii is a uniformly brown species from upland Sarawak, easily recognizable from its general body shape, pilosity, clypeal dentation, angulate metatibiae (in the male sex), etc. The hind wings seem to be always completely absent. The conspicuous dorsal scale-like bristles are easily brushed off. If there is any closer relative in the preceding groups at all, that might be O. mulu. Note that the paramarginal pronotal fold seems effaced and that the doubleness of the pseudepipleural crest is absent; nevertheless, there can be no doubt that this species is congeneric with the preceding species.

(e) Position uncertain and/or unusual (males unknown)

23. *Ochicanthon hikidai* (Ochi, Kon & Kikuta, 1997)

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by deep emargination, producing extra denticle on either side. Clypeogenal border from lateral tip to anterior denticles virtually straight. Clypeofrontal surface densely to crowdedly punctate. Eye size large, foramen broadly elliptic. Pronotal border anterolaterally (at ca 0.2 behind anterior angle) simply rounded. Paramarginal fold on posterolateral surface of pronotum short, moderately distinct. Pronotum densely to crowdedly punctate, with numerous scattered microsetae, uniform (brown-)black. Elytra uniform, entirely brown or black. Discal elytral interstrial punctation dense to crowded, interstriae shining, without microreticulation, interstriae all flat or very slightly convex, interstriae with numerous scattered microsetae. Pygidium more or less evenly convex (in profile), brown to black, (virtually) uniform. Metatibia straight to very slightly curved, distal half dilated. Metatibia internally (male) gradually dilated to apex. Metafemur posteriorly and metatibia internally not multi-denticulate. Meso- and metatarsi short, relatively compact. Alae present. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small. Male unknown. Length 4.0-4.7 mm.

Distribution
Borneo: West Kalimantan.

Comments
This blackish Southwest Bornean species has four protrusions on its clypeal margin, setting it, within the genus, completely apart. Note that only one female is known, from Mt Bawang in Indonesian Kalimantan (no altitude given).

24. *Ochicanthon punctatus* (Boucomont, 1914)

Diagnosis
Clypeal denticles separated by emargination down to their base, adjoined laterally by deep emargination, producing extra denticle on either side. Clypeogenal border from lateral tip to anterior denticles virtually straight. Eyes (foramen in full-face view) moderately distinct. Pronotum densely to crowdedly punctate, with numerous scattered microsetae, uniform (brown-)black. Elytra uniform, entirely brown or black. Discal elytral interstrial punctation dense to crowded, interstriae shining, without microreticulation, interstriae flat or very slightly convex, interstriae with numerous scattered microsetae. Pygidium more or less evenly convex (in profile), brown to black, (virtually) uniform. Metatibia straight to very slightly curved, distal half dilated. Metatibia internally (male) gradually dilated to apex. Metafemur posteriorly and metatibia internally not multi-denticulate. Meso- and metatarsi short, relatively compact. Alae present. Pronotal-elytral transition (in profile) gradual, habitus deplanate. Body size small. Male unknown. Length 4.0-4.7 mm.

Distribution
Erroneously from North Sulawesi; see Supplementary note, after the General discussion; type data also in Appendix 2.

Comments
*O. punctatus* is an all black-brown species, apparently mislabelled, though presumably from Sundaland, and likely to belong to the *ganglei* or *woroe* group; with the single female at hand the species is as yet unidentifiable. Further morphological and/or molecular work and ensuing nomenclatural decisions required. Omitted from the key to the species. *Phacosoma punctatum* (sic) is mentioned in Monaghan et al. (2007), in their molecular trees being placed near certain Malagasy canthonines, as suggested in the discussion hereafter.

General discussion

Scope
The objectives of this discussion are 1) to review the taxonomic and biogeographic patterns emerging from this study of *Ochicanthon*, 2) put forward some testable hypotheses on the evolution of the group, and 3) formulate a number of ensuing research questions. In view of the extent of these questions, a full cladistic analysis down to species level is considered premature.

Biological background
The small scarabs of the genus *Ochicanthon* are widespread in southern Asia (Fig. 2), and in parts of Sundaland they are quite common in both lowland and upland forest ecosystems, being attracted to ground traps baited with faeces or carrion; some species are active flyers, others are flightless. Their known generic distribution is more or less mosaic – due to simple ignorance, recent ecological changes (including habitat loss), historically and geologically determined gaps, or whatever. Although the biology of *Ochicanthon* species is still scarcely known, the middle and hind legs of some (not all) species are long and curved, suggesting an adaptation to translocating food and/or breeding material – a behavioural trait so familiar in telecoprid Scarabaeinae; genuine ball rolling has not been reported. Supposedly related small canthonines are known to indeed transport material, and to produce ovoid, egg-containing brood balls – see, for instance, Paulian (1976a, b). For a general review of the nesting behaviour of Scarabaeinae see Halffter & Edmonds (1982). Immatures of *Ochicanthon* are still unknown.

Generic monophyly, supraspecific relationships, biogeography
*Ochicanthon* are structurally quite homogeneous, and (at least the Sundaland taxa) constitute a monophyletic group, with potential relatives outside Asia, i.e. among other Old World members of the predominantly austral tribe Canthonini (we disregard the New World fauna here, as we see no direct relationships, cf. latest review of Halffter & Martinez (1966-1977), and subsequent additions). The paramarginal pronotal fold and the detailed configuration of the pseudopipleuron may be among the apomorphies uniting all *Ochicanthon* (in the odd, flightless *O. hanskii* the pronotal fold appears obsolete). The elytral striation pattern (7+2 striae), with the broad elytral pseudopipleuron, the shape of the tarsal claws, and the long first metatarsal segment, should all be helpful in the search for the closest relatives of *Ochicanthon*, with one important notion: there are no known close relatives in the Oriental and adjacent Palaearctic Regions (simply because none of the other canthonines there has pseudopipleura or anything else qualifying as synapomorphic). Formerly, some non-Oriental Canthonini were placed in or near *Phacosoma*, but meanwhile they are all, and rightly so, placed elsewhere, in other genera. Nevertheless, the groups to which they are currently assigned may include genuine relatives of *Ochicanthon*. Old World faunal synopses to consider here include: Lebis (1953), Matthews (1974), Paulian (1975, 1976a, b, 1985, 1991), Paulian & Pluotsigwalt (1985), and Scholtz & Howden (1987).

From our scan of both these publications and recent descriptions of generic novelties, plus an inspection of relevant specimens, we conclude that suitable candidates for a closer phylogenetic relationship with *Ochicanthon* may be found among Paulian’s (1976b) Afrotropical-Madagascan “Canthonina Longitarises”, rather than among Australasian-Pacific genera. Actually, Paulian indeed placed *Ochicanthon* in the same league as his “Longitarises”, based on their
Similarities in the characters mentioned above (note, however, that some of his generic characterizations are very sketchy and illustrations limited). A modern reclassification of the rich Malagasy canthonine fauna, started by Montreuil around 2002, might well shed light on the position of *Ochicanthon*, for a taste of what is to come, see also Monaghan et al. (2007).

On the intrageneric levels, within the Oriental Region, the Indian Subregion, the obvious source region for the Southeast Asian members of *Ochicanthon*, has a morphologically diverse but poorly known fauna (8 species, few records). There are considerable gaps in the known western distribution of the genus, but, based on our experience in Sundaland, with adequate sampling many novelties might be discovered — scarabaeologists in the region could do a useful job here. The described Indian-Sri Lankan species are in need of revision in relation to the Southeast Asian fauna and, with the supplementary exploration suggested, we predict the discovery of elements basic to the Sundaland groups dealt with in this paper. Apart from the Indian connection, the Sundaland fauna has close relatives nearby, for instance in Thailand (see discussion of species groups below).

Everything would, of course, be turned upside down if Southeast Asia would prove to be the cradle of *Ochicanthon*, for instance, if oddities, like *O. hanskii*, would (say, on molecular characters) prove to be older (i.e. closer to the root of the *Ochicanthon* phylogeny) than the other groups discussed here. All in all, irrespective of our chequered knowledge, present-day *Ochicanthon* lineages seem to have a long standing in the Oriental Region, and they may well represent a heritage from Indo-Gondwanan ages, now ranging from the Indian Subregion into Southeast Asia (for the general context of Scarabaeinae history and classification see also Scholtz & Grebennikov (2005) and included references).

Until recently some authors (including Matthews 1974) have maintained, formally or informally, two groups within the Canthonini, the “primitive” Mentophilina (with pseudopipleura and indentate tarsal claws, not genuine ball rollers) and the “derived” Canthonina (no pseudopipleura, with dentate tarsal claws, genuine ball rollers) — and clearly, in this simplified scheme, *Ochicanthon* would belong to the first group. We are sceptical, however, as to the phylogenetic validity of this dual division, and look forward to future critical analyses of the world fauna of what appears to be a polyphyletic group Canthoninini (see also Philips et al. 2004, Monaghan et al. 2007). Our scepticism is strengthened by three morphological points: (i) the distinction between claws that are dentate, subdentate or indentate is not clear-cut, and usage of the terms varies among authors; (ii) the absolute homology of the development of pseudopipleura in various genera, along with other characters of the elytra, has not been settled; (iii) in some genera the elytral and claw characters do not correlate as indicated in the previous paragraph (see *Oficanthon* Paulian, 1985 and *Penalus* Paulian, 1985, both from New Guinea).

**Sundaland species: tentative grouping and distribution**

The ranges of most species appear to be limited, and one species, *O. hanskii* from Sarawak, is flightless; although *Ochicanthon* may be ancient as a group (how ancient is, of course, uncertain), this flightlessness may well have evolved more recently, i.e. measured on a geological time scale. In practical terms limited ranges mean that the collecting density has to be both high and with an adequate ecological resolution to fully appreciate a local *Ochicanthon* fauna, and, as already indicated above for the continental range of the genus, even on a large scale, gaps are considerable. A few species seem to be more widespread, particularly certain lowland species, like the Bornean *O. dytiscoides* and *woroae*, and perhaps *obscurus* in continental Southeast Asia (this is apparently a species of open habitats, Kabakov & Napolov 1999).

*O. woroa* seems a widespread, active flyer, being frequently encountered in flight interception traps. Scholtz (2000) discussed various aspects of flightless scarabs, which include many canthonines (see also Bell et al. 2004, for a relevant molecular view on flightless canthonines in Australia).

We estimate that there are at least ten more undescribed *Ochicanthon* species in Sundaland — let alone the remainder of the Oriental Region. Some regions show a very limited, others, like Borneo, a remarkably rich *Ochicanthon* fauna (see Table 1) — the question, as indicated before, is of course: why — is this a sampling artefact, or is it genuine? So far, only one species, not directly related to our Sundaland species, was recorded from the Philippines (Mindanao: Mount Apo). The fauna of Java seems poor (we recognize only one species), and no *Ochicanthon* were found on Bali and the Lesser Sundas (although the Javan species reaches the eastern tip of Java). Our intensive explorations on Sulawesi and beyond neither yielded *Ochicanthon*; the single known specimen recorded from Sulawesi seems to be part of a miscalled lot (see note below). Sulawesi and other eastern islands, have an assortment of canthonine species belonging to the very widespread, heterogeneous Afro-Indo-Pacific *Panelus-Lepanus* complex and to typically Australasian-Pacific canthonine elements (Matthews...
In summary, adding our knowledge of (the eastern limits of) the range of *Ochicanthon* to the possible Afrotropical-Madagascan-Indian connection discussed above, there is every reason to hypothesize that the genus invaded pre-Quaternary Southeast Asia, including “proto-Borneo”, from the West, subsequently profusely speciating there, but not crossing into Wallacea.

Four operational, possibly phylogenetically acceptable groups of species may be distinguished within Sundaland *Ochicanthon*, and, in the preceding section Species accounts, the species have been arranged accordingly:

(a) The symmetrically patterned (orange-yellow versus brown-black) members of the *dytiscoides* group, with a usually subsymmetric aedeagus (showing more or less modified parameral bottoms) and angularly dilated metatibial apex in the male sex; two subgroups are here distinguished (on protibial dentation and aedeagus details); this group comprises here 13 known species.

(b) The small, uniformly brown to black members of the *woroae* group with a subsymmetric aedeagus, with unmodified legs and all winged; includes three known species.

(c) The small, uniformly brown to black members of the *gangkui* group with a distinctly asymmetric aedeagus, lacking coarser bristles and scales, with unmodified legs; includes five species.

(d) The uniformly brown to black members of the *hanskii* group with a subsymmetric aedeagus, serially arranged, coarse interstitial bristles, and peculiarly shaped metatibiae; includes the single known flightless species *O. hanskii*.

Two species are placed outside these four groups (under e): both are known from females only, one having a characteristic clypeal shape (*O. hidikai*), another belonging to either group b or c, and with an uncertain geographic origin (*O. punctatus*).

We are content that our operational groups (a, b, c) constitute natural (monophyletic or paraphyletic) clusters. As indicated above, this is particularly based on genital structure, colour patterns, nature of dorsal pilosity, and shape of leg elements. The *gangkui* group members (c), with strongly modified parameres, may well be descendants of (a member of) the *woroae* group (b), the members of which have relatively simple parameres – morphoclinal transitions are quite conceivable.

As for the possible ancestry of the flightless *O. hanskii* (d), it could well have a more direct relationship with the flight-capable, peculiarly setose *O. mulu* or another species in the *woroae* group (b), but this consideration would be based rather on overall similarity than on synapomorphy or any other phylogenetic consideration; their parameres are unmodified.

*O. hanskii* has not just lost its hind wings: the presumably flightlessness-related pronotal-elytral shape is clearly different from its flight-capable relatives in group (b). It is peculiar that in the *dytiscoides* group a large species with a similar shape (*O. rombaui*) seems fully winged and capable of flight.

Intra-group species-level relationships must, for the time being, remain in the domain of speculation, additional material, also from outside Malaysian Borneo, as well as the application of other techniques (see below), being required.

The relationships of the four Sundaland groups (a-d) with *Ochicanthon* elsewhere are not immediately clear, were it alone for the fact that the taxonomically important structure of the male genitalia of several non-Sundaland species has not been studied. Species with colour patterns and leg shapes basically similar to those in the *dytiscoides* group (a) occur in continental Southeast Asia (in Thailand, see Hanboonsong & Masumoto 2001), and these are undoubtedly closely related to Sundaland members of the group.

### Table 1.

Comparison of total scarab specimen numbers collected in four different Sundaland areas in relation to *Ochicanthon* numbers. Flight interception traps were only used in Danum valley and are therefore omitted from this table. As for the Leuser material, only a reference collection was available.

<table>
<thead>
<tr>
<th>Area</th>
<th>Altitude</th>
<th>Total number of scarab dung beetles</th>
<th>Total number of <em>Ochicanthon</em> specimens</th>
<th><em>Ochicanthon</em> species</th>
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Some species seem to constitute sets of closely related geographical or ecological vicariants; ecological gradients are lowland vs. upland, and heath forest vs. limestone forest. Samples from such different situations were initially only suspected to represent different species, but they were confirmed in their status by morphological characters, above all, by the detailed shape of the male genitalia. In Sundaland, only the forms united under or close to O. dytiscoides, and O. woroae, appear to be more widespread lowland species, within Borneo. Yet, here also caution is required, as there is some variation which might prove to be geographic (i.e., subspecific or population), and, moreover, the status of the forms in the dytiscoides complex remains a moot point.

Research questions

In conclusion, the scarab genus Ochicanthon proves to be a most interesting taxonomic and evolutionary research challenge, with questions on various levels of integration, such as:

- can we pinpoint the closest relative (sister group) of Ochicanthon, perhaps in non-Oriental faunas, among the Afrotropical-Madagascan “Longitares” of Paulian?
- what are the relationships of the Sundaland fauna with the species elsewhere in the vast generic range, from Sri Lanka to China?
- what is the precise biology of Ochicanthon, what could be its bearing on speciation, what do their immature stages look like, are their characters taxonomically complementary to those of the adults?
- which factors selected for an ecological differentiation, apparent in the specialization of certain species (ecosystem type, soil type, altitudinal occurrence, etc.)?
- which ecological processes favoured the loss of flight in certain species (regional, ecological isolation?), is this indeed an ecological phenomenon, or do historical or geological factors (also) play a role?
- would further systematic baited pitfall trapping campaigns (particularly outside Malaysian Borneo!) indeed reveal much more taxonomic diversity, as predicted, and where?
- can the taxonomy of the dytiscoides complex be resolved, are there a few variable species, or are more taxa involved?
- could character mapping of the known species and any additional taxa produce a well-supported phylogeny, a cladogram, a phylogeography?
- would the answers to the previous and related questions support the hypothesis of Ochicanthon being essentially Indo-Gondwania-based, with subsequent differentiation in Oriental subregions?

Some of these questions could certainly be answered by working from research stations with easy access to Ochicanthon populations – Borneo being a prime candidate. To local scientists, therefore, we recommend to use their resources and opportunities to systematically collect material, and do associated field and lab work, as these are likely to be rewarding. Applying complementary molecular techniques might be most helpful in reconstructing the evolution of Ochicanthon, and estimating a time frame (see the example of Bell et al. 2004, and, in a very different ecosystem setting, Sole et al. 2005). With the present α-taxonomic paper we just hope to have pushed Ochicanthon slightly further into a β-taxonomic future.

Supplementary note on Boucomont’s 1914 Sulawesi records

On examining material in the Paris museum it became clear that seven species in the Scarabaeinae recorded by Boucomont (1914) from Sulawesi were based on material having all the same label “Tondano \ coll. C”; Tondano is a place in North Sulawesi visited by several insect collectors. Our colleague Y. Cambeafort could not shed any light on the mysterious collector or collection C of 1899. The species are:

- Ochicanthon punctatus (Boucomont, 1914) (as Phacosoma)
- Cassius peninsularis Arrow, 1907
- Onthophagus aphodioides Lansberge, 1883
- Onthophagus denticollis Lansberge, 1883
- Onthophagus rorarius Harold, 1877
- Onthophagus rudis Sharp, 1875
- Onthophagus vulpes Harold, 1877

North Sulawesi was particularly well surveyed during Project Wallace (1985). However, none of the above species was rediscovered in the region. Furthermore, none of the species we found to be common in North Sulawesi during 1985 were found in the collection of the Paris museum with a label “Tondano \ coll. C”. It is therefore assumed that all the specimens with these specific data were mislabelled. Most of the species are found on Borneo, Sumatra and the Malay Peninsula. As O. denticollis is known only from Sumatra, this island seems the most likely origin of the material, or, at any rate, one of the Sunda Islands. The reputed occurrence of Ochicanthon on Sulawesi is based on the type of Phacosoma punctatum from Tondano.
For the time being it is assumed that *Ochicanthon* is not represented on Sulawesi (we collected all over Sulawesi).

**Acknowledgements**

Sincere thanks are due to our ecological colleagues for contributing a wealth of material from their research in the Southeast Asian islands, in particular Ilkka Hanski and Hannu Räisänen (both Finland), Andrew Davis (UK), and Ashley Kirk-Spriggs (South Africa, formerly UK). The names of other collectors appear in Appendix 2.

Ed Rombaut (Netherlands) rendered invaluable technical assistance to the first author during a trip to Sabah in 1987. Frenk Driessen (Netherlands) produced the habitus drawing of *Ochicanthon edmondasi*. Rienk de Jong and Jan van Tol (Netherlands), and Olivier Montreuil (France) commented on a draft of this paper. Peter Hammond and his colleagues supported our work in The Natural History Museum, London, and facilitated the loan of specimens. Shuhei Nomura of the National Science Museum, Tokyo, supplied literature.

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**References**


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Appendix 1

Synoptic table of *Ochicanthon* characters

**Characters and their states**

1. **clypeal denticles (shape)**
   1. separated by emargination down to their base
   2. fused at base (emargination less deep)
2. **clypeal denticles (shape, delimitation, number)**
   1. adjoined laterally by simple concave curve
   2. adjoined laterally by shallow (sinuate) emargination
   3. adjoined laterally by deep emargination, producing extra denticle on either side
   4. laterally virtually straight
3. **clypeogenal border from lateral tip to anterior denticles (outline)**
   1. widely convex-curvilinear
   2. virtually straight
4. **clypeofrontal surface (punctation)**
   1. abundantly punctate
   2. densely to crowdely punctate
   3. rugulate-punctate
5. **eye (size foramen and eye underside)**
   1. large, foramen broadly elliptic (inner border straight or convex)
   2. moderate, foramen moderately or narrowly elliptic (inner border more or less concave)
   3. small (underside of eye also small)
6. **pronotal border anterolaterally (at ca 0.2 behind anterior angle, full-face view)**
   1. more or less abruptly rounded (may be subangular)
   2. simply rounded
   3. angularly bent inward (straight or concave in dorsal view)
7. **paramarginal fold on posterolateral surface of pronotum**
   1. short, moderately distinct
   2. distinct, (angularly) extended in front
   3. extended in front with two branches
   4. obsolescent (effaced, may be lost in microsculpture)
8. **pronotum (discal punctation)**
   1. abundantly punctate
   2. densely to crowdedly punctate
   3. rugulate-punctate
9. **pronotum (discal pilosity)**
   1. with numerous scattered microsetae (may be very inconspicuous)
   2. abundantly, relatively coarsely setose or squamos
   3. with microstubbles

10. **pronotal colour**
    1. uniform (brown-)black (no trace of (orange-)yellow marks)
    2. with symmetric pattern of (orange-)yellow and (brown-)black
11. **pronotal (orange-)yellow marks**
    1. limited to small lateral patch on either side
    2. abundant, (orange-)yellow not predominant
    3. extensive, (orange-)yellow predominant
12. **elytral colour (pattern blurred in some species)**
    1. uniform, entirely brown or black
    2. predominantly black-brown, with (usually symmetric) pattern of (orange-)yellow marks
    3. predominantly (orange-)yellow, symmetric-black marks limited
13. **basal elytral (orange-)yellow (B)**
    1. absent
    2. present
14. **postmedial elytral (orange-)yellow (M)**
    1. absent
    2. present
15. **distal elytral (orange-)yellow (A)**
    1. absent
    2. present
16. **discal interstrial punctation**
    1. abundant
    2. dense to crowded
    3. (asperate-)rugulate
17. **discal interstriae (reflection)**
    1. shining, without microreticulation
    2. sericeous, due to microreticulation
    3. matt, due to (asperate-)rugulate microsculpture
18. **discal interstriae (elevation)**
    1. all flat or very slightly convex
    2. 3 and 5 slightly elevated
19. **discal interstriae (pilosity)**
    1. with numerous scattered microsetae (may be very inconspicuous)
    2. abundantly, relatively coarsely setose or squamos (more or less in rows)
    3. mainly with scattered microstubbles
    4. glabrous, or nearly so
    5. mostly with two distinct rows of bristles
20. **pygidium (shape, specify male or female)**
    1. more or less evenly convex (in profile)
    2. convex along apex, basal surface flat or concave (in profile)
    3. more or less pointed (may be subconical)
21. **pygidium (predominant colour)**
    1. brown to black, (virtually) uniform
    2. largely (orange-)yellow
    3. with distinct light patches
Synoptic table of *Ochicanthon* characters. x not scored (unknown or not applicable); - from-to symbol; & and symbol (more states); / or symbol (more states).

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22. protibial denticles (male) (shape, avoid abraded specimens)
   1. all simply acuminate, slender
   2. all shortly acuminate
   3. 1-2 acuminate, apico-external denticle broad, its base parallel-sided

23. profemur (male) anteriorly (angle, denticle)
   1. unmodified
   2. lobate-dentate near apex

24. metafemur (male) posteriorly (angles, denticles)
   1. unmodified
   2. lobate-dentate at 0.3-0.5 from base
   3. doubly lobate(-dentate) (also protruding at ca 0.8 from base)

25. metatibia (curve and dilatation)
   1. straight to very slightly curved, dilated distad
   2. long, slender, curved, dilated near apex

26. internal side of metatibia (male) (shape of metatibia 25-1))
   1. continuous (not angulate halfway)
   2. abruptly angular halfway its length

27. internal side of metatibia (male) (ventral view, obtuse internal angle)
   1. not angulate near apex
   2. angulate-dilated at short distance from apex (male)

28. metafemur posteriorly and metatibia internally (denticulation)
   1. not multidenticulate
   2. with longitudinal row of fine denticles (minicrenulate)

29. meso- and metatarsi (relative length)
   1. short, relatively compact and complanate
   2. long, relatively slender

30. alae (reduction)
   1. present
   2. distinctly reduced
   3. absent

31. parameres (general shape)
   1. roughly symmetric (in upper side view)
   2. distinctly excised, asymmetric, complex

32. parameres (general shape)
   1. short, broad, tapering (lateral view)
   2. long, slender, tapering (lateral view)
   3. long, dilated distally (full-face upper side)

33. left paramere (shape details)
   1. very deeply excised, inferior branch elongate-
39. sexes
1. both known
2. male unknown
3. female unknown
40. length in mm (usually in 0.5 mm)

Appendix 2

Compilation of material examined

Label data
Species sequence as in the section Species accounts in the main text (using same species numbers). Missing species numbers: no specimens seen. All specimens of new species recorded below, and seen and labelled by us, are types, unless explicitly excluded. For holotypes see also under heading of new species concerned. The totals for species include males and females, unless mentioned otherwise.

RMNH National Museum of Natural History
Naturalis, Leiden, The Netherlands
1. **Ochicanthon edmondsi**

**Types.** Malaysia, Sarawak: Mt Mulu, iii-v.1978, Hanski, 800-1700 m, lower montane rain forest, carrion trap, 16 exx. incl. Holotype (RMNH).

Total 16 exx., 1 record (RMNH).

2. **Ochicanthon dytiscoides**

Malaysia, Sabah: Danum Valley: Fld Centre envs, vii.1986, Malumphy, 200-300 m, multistr evergr forest, on fungi, 2 exx.; Danum Valley: Fld Centre envs (W10-W15), 20-23.vii.1986, Malumphy #cm075, 100-200 m, multistr evergr forest, chicken trap, 1 ex.; Danum Valley: Fld Centre envs (W3N3), 7-10.vii.1990, Davis #ad074-078, 100-250 m, multistr evergr forest, human exctr trap, 1 ex.; Danum Valley: Fld Centre envs (W5-W10/S), 12-15.vii.1986, Malumphy #cm090, 100-200 m, multistr evergr forest, fish trap, 1 ex.; Danum Valley: Segama River, 17-20.v.1990, Davis #ad001-054, 100-250 m, multistr evergr forest, human exctr trap, 3 exx.; Danum Valley: Segama River, 5-8.vii.1990, Davis #ad063-071, 100-250 m, multistr evergr forest, human exctr trap, 1 ex.; Kinabalu, [Waterstradt ?], 1 ex. Lectotype (MNHN); Ula Segama Reserve, 13-19.vii.1990, Davis #ad079-085, 100-250 m, forest logged in 1989, human exctr trap, 1 ex.; Ula Segama Reserve, 13-16.ix.1990, Davis #ad167-173, 100-250 m, forest logged in 1989, human exctr trap, 1 ex.; Ula Segama Reserve, 24-26.iii.1992, Davis #ad793, 100-250 m, forest logged in 1989, flight interception trap, 1 ex.

Brunei: Telisai, 22km SW of, 17-20.xi.1980, Edmonds, 50 m, forest, human faeces, 1 ex.; Telisai, 5km E of, 12-30.xi.1980, Edmonds, 20 m, forest, human faeces, 2 exx.; Telisai, 5km E of, 12-30.xi.1980, Edmonds, 20 m, forest, fruit trap, 1 ex. Malaysia, Sarawak: Mt Mulu, iii-v.1978, Hanski, 150 m, kerangas forest, fish trap, 21 exx.

Total 40 exx., 16 records (MNHN, NMWC, RMNH).

3. **Ochicanthon masumotoi**

Malaysia, Sabah: Danum Valley: Bole River, 23-25.ix.1987, Kirk-Spriggs #ks15-1, 100 m, multistr evergr forest, fish trap, 1 ex.; Danum Valley: Bole River, 28-30.ix.1987, Kirk-Spriggs #ks25-1, 100 m, multistr evergr forest, fish trap, 1 ex.; Danum Valley: Fld Centre envs, vii.1986, Malumphy, 200-300 m, multistr evergr forest, on fungi, 1 ex.; Danum Valley: Nature Trail, 14-17.ix.1990, Davis #ad140-164, 100-250 m, multistr evergr forest, human exctr trap, 1 ex.; Danum Valley: Segama River, 17-20.v.1990, Davis #ad001-054, 100-250 m, multistr evergr forest, human exctr trap, 4 exx.; Danum Valley: Segama River, 24-27.viii.1990, Davis #ad115-124, 100-250 m, multistr evergr forest, human exctr trap, 1 ex.; Ula Segama Reserve, 24-26.iii.1992, Davis #ad793, 100-250 m, forest logged in 1989, flight interception trap, 2 exx. Malaysia, Sarawak: Mt Mulu, iii-v.1978, Hanski, 800-1700 m, lower montane rain forest, meat trap, 60 exx.; Mt Mulu, iii-v.1978, Hanski, 500-800 m, mixed dipterocarp forest, meat trap, 4 exx.

Total 75 exx., 9 records (NMWC, RMNH).

5. **Ochicanthon rombauti**

**Types.** Malaysia, Sabah: Crocker Range: Keningau-Kimanis rd (km25), 18-23.xi.1987, Krikken & Rombaut #sa44, 1300 m, multistr evergr forest edge, human exctr trap, 4 exx. (RMNH); Crocker Range: Keningau-Kimanis rd (km25), 18-23.xi.1987, Krikken & Rombaut #sa45, 1300 m, multistr evergr forest, human exctr trap, 69 exx. incl. Holotype (RMNH).

Total 73 exx., 2 records (RMNH).

6. **Ochicanthon crockermontis**

**Types.** Malaysia, Sabah: Crocker Range: Kota Kinabalu-Tambunan rd (km64), 21-24.xi.1987, Krikken & Rombaut #sa49a, 1150 m, multistr evergr forest, human exctr trap, 6 exx. incl. Holotype (RMNH).

Total 6 exx., 1 record (RMNH).

7. **Ochicanthon crypticus**

**Types.** Malaysia, Sarawak: Mt Mulu, iii-v.1978, Hanski, 100-500 m, mixed dipterocarp forest, fish trap, 28 exx. (RMNH); Mt Mulu, iii-v.1978, Hanski, 100 m, alluvial forest, fish trap, 5 exx. (RMNH); Mt Mulu, iii-v.1978, Hanski, 100-500 m, mixed dipterocarp forest, baited trap, 16 exx. incl. Holotype (RMNH).

Total 49 exx., 3 records (RMNH).

8. **Ochicanthon peninsularis**

**Types.** Malaysia, Peninsular: Pahang: Fraser’s Hill, 29-3.xi.1977, Bendell, 3 exx. incl. Holotype (BMNH), MNHN; Selangor: Bangi Universiti Kebangsaan, 6.viii.1996, Chan Yoong Yoong, ground trap, 1 ex.
Ochicanthon neglectus

**Types.** Malaysia, Sarawak: Mt Mulu NP: Mt Api, 11-16.i.v.1983, Hanski, 400-600 m, limestone forest, fish trap, 12 exx. incl. Holotype (RMNH).

Total 12 exx., 1 record (RMNH).

12. Ochicanthon cambeforti

**Type.** Malaysia, Sarawak: Mt Dulit, 18.x.1932, Hobby & Moore, 1200 m, moss forest, 1 ex. Holotype (BMNH).

Total 1 ex. (male only), 1 record (BMNH).

11. Ochicanthon dulitmontis

**Type.** Indonesia, Kalimantan: SE Borneo: loc. unspecified, 1 ex. Holotype (MNHN).

Total 1 ex. (male only), 1 record (MNHN).

13. Ochicanthon karasuyamai

**Indonesia, Sumatra:** Mt Leuser NP: Lawe Mamas, 11-16.i.x.1983, Räisänen #hr32Cb, 900-920 m, lowland evergreen forest, human excr trap, 3 exx. (RMNH); Mt Leuser NP: Lawe Mamas, 16-22.i.x.1983, Räisänen #hr30Cc, 580-600 m, lowland evergreen forest, human excr trap, 1 ex. (RMNH).

Total 4 exx. (females only), 2 records (RMNH).

14. Ochicanthon woroae

**Malaysia, Sabah:** Danum Valley:Fld Centre envs (W0-W5), 3-6.vi.1986, Malumphy #cm009, 100-200 m, multistr evergreen forest, fish trap, 1 ex. (NMWC); Danum Valley: Fld Centre envs (W10), 18-22.i.x.1987, Kirk-Spriggs #ks13-2, 260 m, multistr evergreen forest, human excr trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W10), 9-12.v.1991, Davis #ad299-308, 100-250 m, multistr evergreen forest, human excr trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W10), 1-4.viii.1991, Davis #ad471-480, 100-250 m, multistr evergreen forest, human excr trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W2-3), 20-24.x.1987, Krikken & Rombaut #sa07a, 100-200 m, multistr evergreen forest, human excr trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W22), 15-18.vi.1991, Davis #ad387-395, 100-250 m, multistr evergreen forest, human excr trap, 2 exx. (RMNH); Danum Valley: Fld Centre envs (W22), 9-12.ix.1991, Davis #ad619-627, 100-250 m, multistr evergreen forest, human excr trap, 3 exx. (RMNH); Danum Valley: Fld Centre envs (W3N3), 24-27.i.1992, Davis #ad640, 100-250 m, multistr evergreen forest, flight interception trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W3N3), 8-11.i.1992, Davis #ad685-689, 100-250 m, multistr evergreen forest, human excr trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W3N3), 28-31.iii.1992, Davis #ad803-812, 100-250 m, multistr evergreen forest, human excr trap, 2 exx. (RMNH); Danum Valley: Fld Centre envs (W8), 7-10.iv.1991, Davis #ad215-223, 100-250 m, multistr evergreen forest, fish trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W8), 18-21.vi.1991, Davis #ad449-458, 100-250 m, multistr evergreen forest, human excr trap, 3 exx. (RMNH); Danum Valley: Fld Centre envs (W8), 24-27.i.1992, Davis #ad650-659, 100-250 m, multistr evergreen forest, human excr trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W8), 14-17.vii.1990, Davis #ad086-092, 100-250 m, podzol forest, human excr trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W8), 29-30.vii.1991, Davis #ad460-469, 100-250 m, multistr evergreen forest, human excr trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W8), 27-30.vii.1991, Davis #ad759, 100-250 m, multistr evergreen forest, flight interception trap, 1 ex. (RMNH); Keningau area: Nabawan #ks13-2, 100-250 m, multistr evergreen forest, flight interception trap, 3 exx. (RMNH); Danum Valley: Fld Centre envs (W8), 29-30.vi-ii.1992, Davis #ad738, 100-250 m, multistr evergreen forest, flight interception trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W8), 3-6.iii.1992, Davis #ad758, 100-250 m, multistr evergreen forest, flight interception trap, 3 exx. (RMNH); Danum Valley: Fld Centre envs (W8), 6-9.iii.1992, Davis #ad759, 100-250 m, multistr evergreen forest, flight interception trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W8), 24-27.i.1992, Davis #ad650-659, 100-250 m, multistr evergreen forest, human excr trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W8), 29-30.vi-ii.1992, Davis #ad738, 100-250 m, multistr evergreen forest, flight interception trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W8), 3-6.iii-ii.1992, Davis #ad449-458, 100-250 m, multistr evergreen forest, human excr trap, 3 exx. (RMNH); Danum Valley: Fld Centre envs (W8), 24-27.i.1992, Davis #ad650-659, 100-250 m, multistr evergreen forest, human excr trap, 2 exx. (RMNH); Ula Segama Reserve, 14-17.vii.1990, Davis #ad086-092, 100-250 m, forest logged in 1988, human excr trap, 1 ex. (RMNH); Ula Segama Reserve, 28-31.viii.1990, Davis #ad126-132, 100-250 m, forest logged in 1988, human excr trap, 2 exx. (RMNH); Ula Segama Reserve, 16-19.iv.1991, Davis #ad240-249, 100-250 m, forest logged in 1988, human excr trap, 1 ex. (RMNH); Ula Segama Reserve, 3-6.viii.1991, Davis #ad481-490, 100-250 m, forest logged in 1989, human excr trap, 5 exx. (RMNH); Ula Segama Reserve, 9-12.ii.1992, Davis #ad693-702, 100-250 m, forest logged in 1989, human excr trap, 2 exx. (RMNH); Ula Segama Reserve, 24-26.iii.1992, Davis #ad793, 100-250 m, forest logged in 1989, flight interception trap, 4 exx. (RMNH); Ula Segama Reserve, 29-1.iii-iv.1992, Davis #ad814, 100-250 m, forest logged in 1989, flight interception trap, 2 exx. (RMNH); Ula Segama Reserve: Bole Kecil River, 9-12.iv.1992, Davis #ad...
15. *Ochicanthon tambunan*

**Types.** Malaysia, Sabah: Crocker Range NP, 7-11.viii.1991, Kirk-Spriggs #ks53-91, 1463 m, multistr evergr forest, fish trap, 1 ex. (NMWC); Crocker Range NP, 7-11.viii.1991, Kirk-Spriggs #ks54-92, 1249 m, multistr evergr forest, montane, human excr trap, 4 exx. (RMNH); Crocker Range: Kota Kinabalu-Tambunan rd (km56), 21-24.xi.1987, Krikken & Rombaut #sa48a, 1350 m, multistr evergr forest, human excr trap, 4 exx. (RMNH); Crocker Range: Kota Kinabalu-Tambunan rd (km56), 21-24.xi.1987, Krikken & Rombaut #sa48b, 1350 m, multistr evergr forest, fish trap, 1 ex. (RMNH).

Total 165 exx., 4 records (NMWC, RMNH).

16. *Ochicanthon mulu*

**Types.** Malaysia, Sarawak: Mt Mulu, iii-v.1978, Hanski, 150 m, kerangas forest, fish trap, 8 exx. (RMNH); Mt Mulu, iii-v.1978, Hanski, 150 m, kerangas forest, human excr trap, 4 exx. incl. Holotype (RMNH).

Total 12 exx., 2 records (RMNH).

17. *Ochicanthon gangkui*

**Malaysia, Sabah:** Kinabalu NP: Silau Silau (canteen slope), 16-23.i.1986, Krikken #pw86a, 1540 m, multistr evergr forest, fish trap, 9 exx.; Mt Kinabalu, 24-25.x.1977, Bacchus, 1550 m, dung trap, 1 ex.; Mt Kinabalu, 24-25.x.1977, Bacchus, 1200 m, dung trap, 1 ex.

Total 11 exx., 3 records (BMNH, RMNH).

18. *Ochicanthon kimanis*

**Types.** Malaysia, Sabah: Crocker Range: Keningau-Kimanis rd (km25), 18-23.xi.1987, Krikken & Rombaut #sa44, 1300 m, multistr evergr forest edge, human excr trap, 1 ex. (RMNH); Crocker Range: Keningau-Kimanis rd (km25), 18-23.xi.1987, Krikken & Rombaut #sa45, 1300 m, multistr evergr forest, human excr trap, 10 exx. incl. Holotype (RMNH).

Total 11 exx., 2 records (RMNH).

19. *Ochicanthon danum*

**Types.** Malaysia, Sabah: Danum Valley: Danum River, 27-30.viii.1991, Davis #ad533-542, 100-250 m, multistr evergr forest, human excr trap, 1 ex. (RMNH); Danum Valley: Fld Centre envs (W0), 14-17.v.1991, Davis #ad312-321, 100-250 m, multistr evergr forest, human excr trap, 2 exx. (RMNH); Danum Valley: Fld Centre envs (W3N3), 16-19.v.1992, Davis #ad871-880, 100-250 m, multistr evergr forest, human excr trap, 1 ex. (RMNH); Danum Valley: Mt Danum, 7-9.x.1987, Kirk-Spriggs #ks48-2, 293 m, multistr evergr forest, human excr trap, 1 ex. (NMWC); Danum Valley: Nature Trail, 28-1.vi-vii.1991, Davis #ad397-426, 100-250 m, multistr evergr forest, human excr trap, 1 ex. (RMNH); Danum Valley: Nature Trail, 6-9.ix.1991, Davis #ad586-614, 100-250 m, multistr evergr forest, human excr trap, 1 ex. (RMNH); Danum Valley: Nature Trail, 18-21.iv.1992, Davis #ad821, 100-250 m, multistr evergr forest, human excr trap, 2 exx. (RMNH); Danum Valley: Segama River, 17-20.v.1990, Davis #ad001-054, 100-250 m, multistr evergr forest, human excr trap, 1 ex. (RMNH); Danum Valley: Segama River, 5-8.vii.1990, Davis #ad063-071, 100-250 m, multistr evergr forest, human excr trap, 1 ex. (RMNH); Danum Valley: Segama River, 4-27.vii.1990, Davis #ad115-124, 100-250 m, multistr evergr forest, human excr trap, 5 exx. (RMNH); Danum Valley: Segama River, 15-18.v.1991, Davis #ad229-239, 100-250 m, multistr evergr forest, human excr trap, 8 exx. (RMNH); Danum Valley: Segama River, 28-31.vi.1991, Davis #ad427-437, 100-250 m, multistr evergr forest, human excr trap, 14 exx. (RMNH); Danum Valley: Segama River, 3-6.ix.1991, Davis #ad565-575, 100-250 m, multistr evergr forest, human excr trap, 2 exx. (RMNH); Danum Valley: Segama River, 31-3-ii.1992, Davis #ad672-682, 100-250 m, multistr evergr forest, human excr trap, 5 exx. (RMNH); Danum Valley: Segama River, 15-18.ii.1992, Davis #ad716, 100-250 m, multistr evergr forest, flight interception trap, 1 ex. (RMNH); Danum Valley: Segama River, 8-11.v.1992, Davis #ad838-848, 100-250 m, multistr evergr forest, human excr trap, 11 exx. (RMNH); Ula Segama Reserve, 16-19.iv.1991, Davis #ad240-249, 100-250 m, forest logged in 1989, human excr trap, 3 exx. (RMNH); Ula Segama Reserve, 30-2-vi.1991, Davis #ad351-360, 100-250 m, forest logged in 1978, human excr trap, 1 ex. (RMNH); Ula Segama Reserve, 3-6.viii.1991, Davis #ad481-490, 100-250 m, forest logged in 1989, human excr trap, 20 exx. (RMNH); Ula Segama Reserve, 9-12.ii.1992, Davis #ad693-702, 100-250 m, forest logged in 1989, human excr trap, 11 exx. (RMNH); Ula Segama Reserve, 14-17.ii.1992, Davis #ad705-714, 100-250 m, forest logged in 1989, human excr trap, 1 ex. (RMNH); Ula Segama Reserve: Bole Kecil River, 5-8.iii.1991, Davis #ad493-502, 100-250 m, forest logged in 1981, human excr trap, 5 exx. (RMNH).

Total 132 exx., 25 records (NMWC, RMNH).
Excluded from type series. Malaysia, Sabah: Danum Valley: Mt Danum, 7-9.x.1987, Kirk-Spriggs #ks52-2, 1093 m, multistr evergr forest, human excr trap, 1 ex.
Total 1 ex. (male only), 1 record (NMWC).

21. Ochicanthon javanus

Types. Indonesia, Java: Mt Puncak: Telaga Warna, 27-30.xii.1985, Krikken #pw71a, 1600 m, multistr evergr forest, human excr trap, 16 exx. (RMNH); Mt Puncak: Telaga Warna, 27-30.xii.1985, Krikken #pw71b, 1600 m, multistr evergr forest, fish trap, 16 exx. incl. Holotype (RMNH); Mt Puncak: Telaga Warna, 15-17.iii.1986, van Berge Henegouwen, 1500 m, submontane forest, human excr trap, 3 exx. (RMNH); Mt Salak: N slope, 28-31.xii.1985, Krikken #pw72a, 900 m, multistr evergr forest, human excr trap, 3 exx. (RMNH); Mt Salak: N slope, 28-31.xii.1985, Krikken #pw72b, 900 m, multistr evergr forest, fish trap, 3 exx. (RMNH); Mt Tangkuban Prahu, iv.1937, Drescher, 1200-1500 m, 1 ex. (RMNH).
Total 39 exx., 5 records (RMNH).

Total 3 exx., 3 records (RMNH).

22. Ochicanthon hanskii

Types. Malaysia, Sarawak: Mt Mulu, iii-v.1978, Hanski, 1700-2180 m, upper montane rain forest, fish trap, 246 exx. (RMNH); Mt Mulu, iii-v.1978, Hanski, 800-1700 m, lower montane rain forest, carrion trap, 129 exx. incl. Holotype (RMNH); Mt Mulu, iii-v.1978, Hanski, 500-800 m, mixed dipterocarp forest, carrion trap, 1 ex. (RMNH); Mt Mulu: Site H, v-viii.1978, Hammond & Marshall, 1650 m, lower montane forest, litter, 1 ex. (BMNH); Mt Mulu: Site I, v-viii.1978, Hammond & Marshall, 1860 m, upper montane forest, litter, 2 exx. (BMNH); Mt Mulu: nr Camp 1, v-viii.1978, Hammond & Marshall, 150-200 m, flood refuse, 1 ex. (BMNH); Mt Mulu: nr Camp 4, v-viii.1978, Hammond & Marshall, 1800 m, upper montane forest, human faeces, 7 exx. (BMNH).
Total 387 exx., 7 records (BMNH, RMNH).

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thai, Ochicanthon ................................................ 426
thailandicus, Ochicanthon ..................................... 426
tristis, Ochicanthon .............................................. 426
tristoides, Ochicanthon ......................................... 426
vulpes, Onthophagus ............................................ 470
worao, Ochicanthon ............................................... 426, 427, 450, 477

24. Ochicanthon punctatus

Type. Indonesia, Sulawesi: Tondano, 1899, Collector C, 1 ex. Holotype (MNHN).
Total 1 ex. (female only), 1 record (MNHN) [assumed to be mislabelled].
Total 20 taxa, 1108 exx.
Book review

continued from page 388

The list with references is extensive and is followed by a list of all illustrations, credits for the use of illustrations and the acknowledgements.

The book is well produced. An added bonus, for easier use of the book, is that the insides of the cover have been used to give illustrations with morphological terms (front cover) and an abstract key for quick reference to parts of the key for more experienced users. Its reasonable size and prize make this book a must for every dipterist and otherwise interested entomologist.

Paul L.Th. Beuk


With this title, the KNNV publishers, known as producers of Dutch nature books, continue publishing books for the international market. This book reviews a very actual theme, and one that should interest us all.

The organisation of the book is somewhat curious: there are eight chapters, from “history”, “patterns of bio-invasions”, “impacts”, “lessons learned” etc., but they are intermixed by a huge number of “boxes” (87 in all), that give examples of cases. The mixing of the two kinds of text, with slight lay-out difference only, makes reading the book cumbersome. On the other hand, the case studies are interesting reading, although finding your way through it is quite a challenge. Many deal with invasions of pathogens, including historic ones, such as the plague, the foot-and-mouth disease, but also plants, insects, island invasions, extinctions, etc. The sources are dutifully cited, although one sometimes wonders why rather cryptic sources are used in cases were better officially published studies exist as well. An example is the correct name of the Varroa mite, for which an interview that I have given to the journal “Bionieuws” is cited: in passing I mentioned this. There are, however, several articles, that would have been a much better source.

Reading through this book, one realises the disaster brought about by our omnipresence on this planet. Reading is interesting, but also tiring by the enormous flood of information. Finding back something can therefore also be difficult. It is a pity that no separate index to the boxes is included.

Despite the aim to sell this book to the international market, it has a strong Dutch bias. Nevertheless, the book is advised as extensive overview of the subject and important for policy makers and conservationists, to understand the impact of what we are doing with our travel and trade.

Erik J. van Nieukerken