

MINIATURE SCARABS OF THE GENUS *HAROLDIUS*  
ON SULAWESI, WITH NOTES ON THEIR RELATIVES  
(COLEOPTERA: SCARABAEIDAE)

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*Haroldius* Boucomont, an Oriental-Afrotropical genus of unusually small Scarabaeinae, is re-diagnosed, and recorded from the island of Sulawesi (Indonesia) for the first time. Five new species from North and Southeast Sulawesi are described, pictured, and keyed (*Haroldius cambeforti*, *H. celebensis*, *H. kolaka*, *H. penelopae*, *H. tangkoko*). Their characters are analyzed and compared with those of the Sundaland species. An annotated list of the species currently placed in *Haroldius* and some related genera is given. The Sundaland and Sulawesi species of *Haroldius* are all diagnosed. Outstanding problems with the systematic position of *Haroldius* and related genera are discussed, and their world distribution is mapped.

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The species commonly referred to the Old World genus *Haroldius* Boucomont, 1914 and their direct relatives are miniature, generally smooth, globular or oval scarabs, varying in length between about 1.5 and 4.5 mm. Earlier authors positioned *Haroldius* in the tribe Alloscelini (first proposed as Alloscelides by Janssens 1946, suffix changed in 1949b; Balthasar 1963), but since the transfer of the type-genus *Alloscelus* Boucomont, an African associate of driver ants, to the Onthophagini, and the consequent complete dissolution of the tribe, a position in the Canthonini seems more appropriate (Paulian 1985, Branco 1997). This tribal position may be correct, but no explicit justification has been given so far, and the Canthonini as currently conceived may not be monophyletic; it seems that *Haroldius* remained absent from recent Scarabaeinae phylogeny discussions (for instance, Philips et al. 2004).

Although over 30 species have now been placed in *Haroldius*, little of substance is known about their biology and ecology; larvae are unknown. In Asia, adult *Haroldius* appear to be soil-surface, litter-inhabiting beetles, flying in forest environments. They may be saprophagous or mycophagous (Scheuern 1995), and some have long been found in association with ants, possibly also with termites (see remarks in Paulian

1985, and notice that termite mounds usually also harbour ant nests); some individuals we saw appear to be nibbled at (by ants?). Whatever their precise ecological relationship, the smooth, loricated structure of *Haroldius*, including the characteristically broadened and flattened tibiae, suggests that the association of these beetles with social insects is not accidental. Specimens of *Haroldius* remain rare – or poorly sampled: the total number in collections may still not exceed one hundred. From around 1980 most individuals seem to have been collected by litter sifting, or in flight interception traps (so are, by the way, the analogous, also non-coprophilous ‘smoothies’ usually placed in the Onthophagini, such as the Southeast Asian *Cyobius* Sharp and *Anoctus* Sharp; cf. Krikken 1971, Krikken & Huijbregts unpublished, and below, in the list of taxa, under *Larhodium* Balthasar, 1963).

Most of the *Haroldius* used in this study come from the Southeast Asian islands of Borneo and Sulawesi, the latter island being a significant range extension, particularly as five species can be distinguished, all new to science. The majority of the *Haroldius* species inhabit the Oriental Region; already more than 50 years ago three species were described from Central Africa, in *Afroharoldius* Janssens (1949a, 1953) – nothing has been reported since.

We provisionally accept the inclusion of *Afroharoldius* and *Ponerotrogus* Silvestri 1924 in *Haroldius*, as well as the upgrading of *Larhodium* Balthasar (1963, then a subgenus in *Haroldius*) to full genus in the Onthophagini, actions which were all proposed by Paulian (1985). This acceptance is conditional on a further revision of all these non-coprophilous scarab 'smoothies'. *Larhodium* now includes three species (Masumoto & Utsunomiya 2003), which are, as indicated in the title of the publication cited, placed in the 'Dichotomini' [recte Dichotomiini]. A third Asian genus to be considered in a revision is the monospecific *Phaedotrogus* Paulian (1985) of Sri Lanka. A distinct myrmecophilous and equally monospecific genus of South Africa also to be taken into account is *Formicdubius* Philips & Scholtz (2000), which we – looking only at the habitus picture – would immediately have placed in or near *Haroldius*. As befits a true myrmecophile, *Formicdubius* has what appear to be trichomes, on the back side of its prothorax.

The current classification of *Haroldius* and its (quasi)-relatives (see list of taxa below) is compounded by the fact that some authors have not picked up Paulian's (1985) revisionary comments on the application of the available genus-group names and seem to be otherwise incorrectly or insufficiently informed. For instance, Masumoto & Utsunomiya (2003) state that they are the first to upgrade *Larhodium* to genus rank. This is not so: Paulian (1985) already did this, with a simultaneous transfer to the Onthophagini (notice also that the two Southeast Asian *Larhodium*, as pictured by the Japanese authors, strongly look like small *Cyobius*, an unquestionably onthophagine genus). Our acceptance of Paulian's views also implies that *Ponerotrogus krali* Utsunomiya & Masumoto (2000) should be recombined with *Haroldius*. *Formicdubius* is certainly not distinct from all Scarabaeinae genera because of its convex and oval body shape, as claimed by its authors (Philips & Scholtz 2000): all *Haroldius*, including the 'Afroharoldius' and the apparently onthophagine *Larhodium* species mentioned, are more or less shaped in this way. A detailed comparison of *Formicdubius* with actual material of other 'smoothies' is definitely in order.

As for the approximate evolutionary position of *Haroldius* and its (genuine) relatives in the overall scarabaeoid system, three circumstances seem to imply an ancient, but post-Gondwanan, possibly Tertiary lineage: (a) *Haroldius* has an essentially austral distribution, but there appear to be no direct relatives in the faunas of ex-Gondwana components like Madagascar, South America or Australia (Paulian and certain other workers would certainly have recognized them); (b) ants and termites, with which at least some of our 'smoothies' seem to have an intimate

relationship, have evolved in, and greatly radiated since, the Cretaceous (Grimaldi & Engel 2005); and (c), if *Haroldius* indeed have to be regarded as modified Canthonini (as maintained by Paulian 1985, 1993), this entails (in accordance with the long-standing consensus view among scarabaeologists) austral, or, for that matter, Gondwanan roots (cf. also discussion of Scarabaeinae relationships in Philips et al. 2004, Scholtz & Grebennikov 2005, and included references). In conclusion, the *Haroldius* group constitutes an interesting challenge for future, more detailed phylogenetic and biogeographic research; their inclusion in critical scarabaeine phylogeny studies might clarify more than only their own direct relationships.

In this paper the genus *Haroldius* Boucomont (1914) is re-diagnosed, and the five new species from Sulawesi are described, pictured, and keyed (the late Paulian already alluded to the existence of this Sulawesi material in some of his papers, see References). The novelties were collected while participating in Project Wallace in North Sulawesi during 1985 and during follow-up activities elsewhere in Sulawesi during 1989. The characters of all Sundaland-Sulawesi species are analyzed and tabulated, taking material and published information of the entire genus (including some potential novelties from Borneo) into account. It is very likely that the Sulawesi *Haroldius* described here are all endemic to the island (our current estimates of species-level endemism for Sulawesi lamarostict Scarabaeinae are over 80%), and we expect that the forests on the island's different peninsulas and nearby islands harbour more *Haroldius* (sub)species – in accordance with the distribution patterns known for other groups of organisms. *Haroldius* is reputed to occur in the Moluccas (Hanski & Krikken 1991), but actual specimens are not available. A list of all *Haroldius*-like taxa described up till now is given below, and the world distribution of the genera discussed in this paper is mapped (fig. 1).

This paper is part of an ongoing programme focussing on the classification of scarab genera, with particular reference to the fauna of the Southeast Asian islands, taking into account the results of field surveys in the area, both by ourselves and by our ecological colleagues.

#### MATERIAL, METHODS, CONVENTIONS

The substance of this paper concerns straightforward morphological taxonomy, i.e. the diagnosis and description of the Sulawesi novelties and their comparison with Sundaland relatives. In view of the paucity of both actual material and context data, we make no phylogenetic claims; further

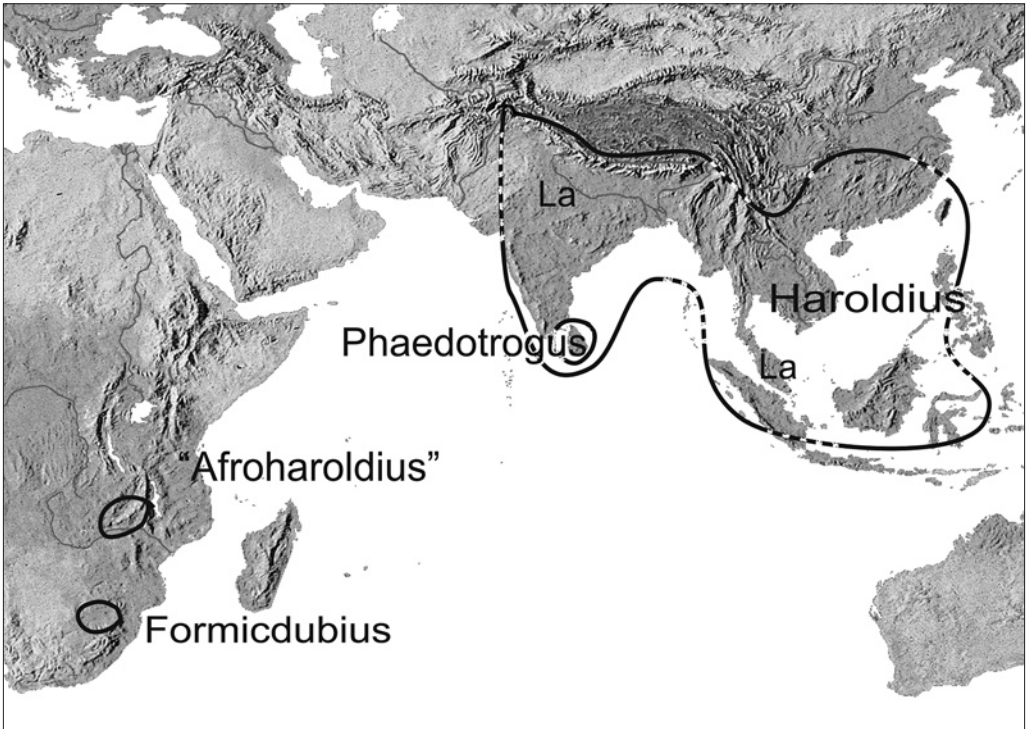


Fig. 1. Approximate range of *Haroldius*-like genera mentioned in this paper (solid lines, possible gaps at interrupted lines). La = two areas of *Larhodium*. *Phaedotrogus* on Sri Lanka.

research (as suggested in the introduction) is required. Nevertheless, the character diversity of adult *Haroldius* is reconsidered in some detail, with particular reference to the Sundaland and Sulawesi material at hand. All in all, about 30 specimens belonging to about 13 species were studied more closely, and all relevant published descriptions and illustrations were processed for inclusion in the information here presented. The material is sometimes poorly preserved due to the collecting techniques applied and poor preservation in the field.

Our descriptions and figures of *Haroldius* follow a standard model, taking into account the diagnostic value of the characters resulting from the character analysis. The format of both the character list and the diagnoses follows from the use of a DELTA-oriented data system (Dallwitz 2005), tuned to a scarab diversity database. Some features peculiar to *Haroldius* deserve a considered terminology, most of which should be clear from generic section below and Appendix 1. The term *interstriae* is used for the intervals between the elytral striae. Attributes with the prefix *micro-* are defined as those usually distinct at magnifications of about  $\times 40$  or higher; the use of adequate illumination

is essential in correctly interpreting microsculptural and micropilosity characters.

A note on the sculpture frequently present on the basolateral surface of the pronotum is in order: these consist of fine, forward-directed *striolae*, i.e. aciculate lines, varying in density, more or less parallel, or (with greater densities and lengths) braided; in some species they take the appearance of coarser (more or less drawn out) punctures, starting from (and crenulating) the basolateral edge. In some species the basomedian surface of the pronotum has a small area, delimited by a fine (aciculate) line (a feature also seen in other small canthonines). Total length measurements given are approximate (different body part postures may create imprecision). Note the differences between full-face and other views in the illustrations; full-face here actually means: body part surface positioned maximally in the plane of the picture; dorsal views are from above, parallel to the median and transverse body axes. Comparable diagrammatic line-drawings, habitus pictures, and genitalia silhouettes support the text. Scale lines are 0.5 mm, unless mentioned otherwise; same elements same scale, unless mentioned otherwise.

As for geographic terminology, Sundaland is here defined as the Malay Peninsula +Borneo +Sumatra +Java +Bali, plus intervening islands, i.e. minus Sulawesi; Indochina is here defined as Vietnam +Laos +Cambodia. Congo-K = Democratic Republic of Congo, Congo-Kinshasa, formerly Zaïre. Nowhere in this paper are political boundaries implied. Generic distributions as given on the map (fig. 1) are large-scale and approximate.

At present the Sulawesi material recorded is kept in The Natural History Museum, London (BMNH) and the National Museum of Natural History Naturalis, Leiden (RMNH). The label data of primary types are quoted; text lines are separated by /, label upper- and underside text by //, texts on different labels are enclosed between quotation marks; our comments or additions between square brackets.

ANNOTATED LIST OF HAROLDIUS-LIKE TAXA

The most recent list of *Haroldius* was compiled by Kral (2003), who excluded *Larhodium*. With the recent additions of two new *Haroldius* and two new *Larhodium*, the present five Sulawesi novelties, and the monotypic genera *Phaedotrogus* and *Fornicidubius*, some updating is in order – the checklist given hereafter should now be complete for *Haroldius* and its immediate relatives and quasi-relatives, reflecting the observations of Paulian (1985) and ours. There are now 33 *Haroldius* species, including 13 from Sundaland-Sulawesi. The tribal positions of the genera are, of course, tentative (see introduction). In addition to the references in the text above, only references to novelties published after Balthasar (1963) are mentioned in full in the References. The map of the generic ranges (fig. 1) is approximate, and rather reflects ignorance over knowledge: there are considerable gaps in Asia (Myanmar, parts of China), and it remains remarkable that in Africa all known *Haroldius* were found in southeastern Congo-K. The 13 described Sundaland-Sulawesi species, as included in the character table (Appendix 1), the key, and the diagnoses, are marked with an asterisk. Our remarks are enclosed between square brackets.

currently placed in the Canthonini:

*Haroldius* Boucomont, 1914 / Paulian 1985 – Oriental, Afrotropical – type-species *rugatulus* = *Afroharoldius* Janssens, 1949 – type-species *ennearthrus* = *Ponerotrogus* Silvestri, 1924 – type-species *annandalei* = *Cyclotrogus* Wasmann, 1918 – type-species *heimi*

Asia [*Haroldius sensu stricto*]:

*H. annandalei* (Silvestri, 1924, *Ponerotrogus*) – India = *H. chapmani* Paulian, 1934  
 \**H. borneensis* Paulian, 1993 – Borneo  
 \**H. cambeforti* sp.n. – Sulawesi  
*H. cardoni* Boucomont, 1923 – India = *H. oberthueri* Paulian, 1934  
 \**H. celebensis* sp.n. – Sulawesi  
 \**H. discoidalis* Paulian, 1993 – Borneo  
 \**H. fairmairei* Boucomont, 1914 – Singapore  
*H. fleutiauxi* Paulian, 1945 – Vietnam, Thailand  
*H. globosus* Boucomont, 1925 – Luzon  
*H. heimi* (Wasmann, 1918, *Cyclotrogus*) – India, Pakistan, Nepal = *Cyclotrogus nigrita* Wasmann, 1918  
*H. herrenorum* Paulian, 1985 – Sri Lanka  
*H. hwangi* Masumoto et al., 2005 – Taiwan  
*H. kawadai* Masumoto, 1995 – Thailand  
 \**H. kolaka* sp.n. – Sulawesi  
*H. krali* (Utsunomiya & Masumoto, 2000), (*Ponerotrogus*) [comb. n.] – Sri Lanka  
*H. lassallei* Cambefort, 1986 – Nepal  
*H. loebli* Paulian, 1987 – Thailand  
 \**H. maruyamai* Utsunomiya & Masumoto, 2005 – Malay Peninsula  
 \**H. pahangensis* Kral, 2003 – Malay Peninsula  
 \**H. pauliani* Scheuern, 1995 – Borneo  
 \**H. penelopae* sp.n. – Sulawesi  
*H. perroti* Paulian, 1939 – Vietnam, Taiwan  
*H. philippinensis* Pereira, 1954 – Luzon  
 \**H. rugatulus* Boucomont, 1914 – Singapore  
*H. stevensi* Arrow, 1931 – India, Thailand, Vietnam  
 \**H. sumatranus* Paulian & Scheuern, 1994 – Sumatra  
 \**H. tangkoko* sp.n. – Sulawesi  
*H. thailandensis* Paulian & Scheuern, 1994 – Thailand  
*H. turnai* Kral, 2003 – China: Hubei  
*H. uenoi* Masumoto & Wen-ying, 1993 – China: Yunnan

Africa [*Afroharoldius group*]:

*H. ennearthrus* (Janssens, 1949), (*Afroharoldius*) – Southeast Congo-K  
*H. leleupi* (Janssens, 1953), (*Afroharoldius*) – Southeast Congo-K  
*H. modestus* (Janssens, 1953), (*Afroharoldius*) – Southeast Congo-K

*Phaedotrogus* Paulian, 1985 – Oriental – type-sp. *ceylonicus*  
*Ph. ceylonicus* (Balthasar, 1973), (*Ponerotrogus*) – Sri Lanka

**currently placed in the Onthophagini:**

*Larhodium* Balthasar, 1963 / Paulian, 1985, Masumoto & Utsunomiya, 2003 (Dichotomiini) [relation with *Cyobius*? Onthophagini] – Oriental – type-species *calcaratus*

*L. calcaratus* (Janssens, 1934), (*Haroldius*) – India

*L. bashimi* Masumoto & Utsunomiya, 2003 – Malay Peninsula

*L. maruyamai* Masumoto & Utsunomiya, 2003 – Malay Peninsula

*Formicdubius* Philips & Scholtz, 2000 [to be placed in the Canthonini?] – Afrotropical – type-species *convexus*

*F. convexus* Philips & Scholtz, 2000 – South Africa

#### HAROLDIUS AND ITS SUNDALAND-SULAWESI DIVERSITY

Paulian (1985) re-assessed the status of *Haroldius* and its (possible) relatives. We here present an extensive new diagnosis of the genus *Haroldius*, and analyze the morphological diversity of the species included. There are some published keys to the Asian species, varying in quality (e.g., Balthasar 1963, Paulian 1993, Scheuern 1995), which all give clues to the value of particular characters. The last-mentioned paper, supplemented with the pictures in Paulian & Scheuern (1994), contains the most practical key so far. Janssens (1953) provided a key to his *Afroharoldius* species. In this paper we give both a tentative synoptic table (Appendix 1) and an analytical key, with special reference to the 13 named species of Sundaland and Sulawesi. Several species are known from a single individual only, but those of which small series are available (species from Borneo) are remarkably constant in their characters, thus telling us something about the nature of individual variation in *Haroldius*.

#### *Haroldius* Boucomont, 1914

##### Diagnosis

Very small scarabaeines, general shape hemispherical to slightly oval, usually smooth, more or less uniformly blackish to (yellow-)brownish. Protibia with one or two (lateral-)external denticles, its apex modified, never simply oblique from apico-internal angle onto edge of external denticle (as, for instance, in most *Onthophagus*); internal side of protibia straight or slightly concave-curvilinear. Mesocoxae widely separated, intervening space with mesometasternal suture widely arcuate. Clypeus with well-defined anteromedian excision, frequently flanked by angulate (projecting) denticle on either side, thence evenly convex-curvilinear to expanded genae. Clypeofrontal surface without any protrusions, disc (nearly) evenly,

slightly convex. Meso- and metatibiae dorso-ventrally strongly flattened, distinctly widened from base to apico-external edge. All femora elongate and relatively slender, not strongly rounded-dilated and complanate (as in *Cyobius*). Antennae eight-segmented. All tibial spurs more or less reduced, particularly on middle and hind legs. Body lacking distinct trichomes. Male and female similar in their external morphology.

##### Description

Head. – About as wide as long, in some species longer, yellow(-brown) to black. Clypeal margin anteromedially bidentate-emarginate, or just distinctly, deeply, abruptly emarginate. Narrow clypeopleuron present under emargination. Clypeofrontal surface generally feebly convex, margin of clypeus may be broadly, very slightly concave. Clypeus without any postapical protrusion. Clypeofrontal transition also without any protrusion. Clypeofrons generally smooth (or nearly so), or with simple punctation. Clypeal border (from gena forward) rounded, or slightly sinuate near denticles. Clypeogenal border (at the usually vague suture) widely rounded to straight. Genae laterally rounded or more or less angulate. Genae projecting well beyond eyes (in full-face view). Frontoververtex entirely devoid of protrusions. Eye size ventrally small; eyes in full-face view (foramen) small, more or less narrowly elliptic; maximum number of facet rows across eye ca 4-6. Gena expanded to (and joining) postocular area around foramen (posterior surface abruptly folded downward).

Pronotum. – Prothorax about as wide as hind body – back side of prothorax fitting perfectly against mesothorax; without trichomes. Pronotal disc strongly, simply convex. Prothorax in dorsal outline usually more or less trapeziform. Anterolateral pronotal angle rectangular (angle rounded off) or more widely rounded. Pronotal apex unmodified (margin may be slightly shifted forward). Sides of pronotum usually simply, strongly declivous (in some species deplanate or distinctly depressed). Posterolateral angle of pronotum simple, distinct, rectangular or nearly so (may be rounded off). Base of pronotum immarginate or finely marginate (occasionally crenulated by large punctures or finer striolae), angulate or evenly widely rounded medially; surface basomedially with (slightly depressed) field, or with pair of impressions, or with surface entirely unmodified. Pronotal sides marginate, margin as such not particularly modified. Pronotal surface glabrous or setose, setae varying in length (according to species), in some species surface distinctly (micro)punctate(-setose) or otherwise microsculptured; in several species pronotum basolaterally with peculiar, variably developed striolation. Pronotal colour yellow(-brown) to black. Back side of prothorax without trichomes. Scutellum indistinct.

Elytra. – Yellow(-brown) to black, disc strongly evenly convex (base may be dipping or depressed), fitting well against broad prothoracic base. Total number of elytral striae, including juxtepleural gutter, eight (in some species striae entirely or partly effaced). Humeral umbone at most vaguely elevated. Apicosutural angle of elytron rectangular (at least in Sundaland-Sulawesi species). Elytral surface without trichomes. Posterior declivity of elytron evenly convex, no anteapical umbone developed. Elytral epipleuron wide to very wide in front. Pseudepipleuron absent. Posthumeral elytral emargination absent. Elytral stria 1 (if not effaced) reaching elytral base. Elytral striae usually distinct, roughly equidistant (on disc), shallowly impressed (in some species effaced), more or less (in several species extremely vaguely) punctate. Elytra completely glabrous, or with (micro)setae, or with fine, but stout bristles. Interstriae flat, simply (micro)punctate, or with fine, superficial streaks, or just smooth; surface in some species microreticulate or alutaceous (and consequently matt).

Underside. – Total number of antennal segments eight; number of antennal lamellae three, their surface pubescent. Antennal lamellae not conspicuously modified. Mouthparts indistinct from above. No pre- and postprosternal apophyses developed. Prothoracic underside yellow-brown to black, with well-defined postocular concavities. Metasternal disc and anterior lobe slightly convex, flat, or disc somewhat concave. Mesometasternal suture widely, evenly arcuate (fig. 22). Metasternum yellow-brown to black. Abdominal sternites (6 [+1] distinct) more or less connate. Abdominal venter yellow-brown to black. Hind wings fully developed. Venter of male not impressed. Abdomen without conspicuous modifications. Pygidium transverse, slightly convex, more or less reflexed under elytra (indistinct in dorsal view); apex marginate, base immarginate, colour yellow-brown to black. Parameres not conspicuously modified.

Legs. – Generally yellow(-brown) to black. Tibial shapes apparently similar in both sexes (apart from possible dimorphism in character 24). Number of (lateral-)external protibial denticles one or two (proximal may be reduced). Proximal section of external edge of protibia straight or slightly convex-curvilinear, serration very fine or absent; internal side straight to slightly concave-curvilinear. Protibial apex generally transverse (yet more or less projecting or otherwise modified, varying according to species); internal edge straight to slightly concave-curvilinear from apex to base. Protibial spur fine, small, inserted near upper apico-internal angle, simply acuminate. Protarsal length slightly exceeding apical width of protibia+denticle. Protarsi slender but segmentation compact (may be folded transversely, in apical groove). Profemur elongate, slender, without

anterior protrusions. Protrochanter pointed forward. Mesocoxae widely separated, subparallel (slightly oblique-divergent forward). Metacoxae contiguous. Meso- and metafemur elongate, slender, in some species somewhat inflated. Metafemur lacking fossorial protrusions. Meso- and metatibiae distinctly complanate, without fossorial protrusions on outer edges. Meso- and metatibial apex strongly modified (tibial dilated-complanate distally, angular or rounded apico-externally). Meso- and metatibia with terminal spur strongly reduced. Meso- and metatarsi short, segmentation compact. Metatarsal segment 1 not greatly differing in length from segment 2 (shape of segments 1-4, however, varies according to species); segment 5 longer than the others. All claws simple, fine, more or less curved.

Habitus. – Body more or less hemispherical, looking smooth (in spite of any setae present), impression of shape somewhat dependent on broadest point of elytra; size very small, length ca 1.5-4(-4.5) mm. Dorsum usually uniformly light- to dark-coloured, in the black or brown-black forms margins, legs and other appendages, and underside, usually lighter; light reflection of surface varying according to the (frequently reticulate and punctate) microsculpture pattern on the respective species, some species with faint metallic reflection.

#### Note

The genus was named by Boucomont (1914) after the renown 19<sup>th</sup> century German scarabaeologist Freiherr/Baron Edgar von Harold.

#### Character diversity and key to species

The character list and the synoptic table in Appendix 1 give a number of characters (potentially) useful in distinguishing the species; for details, variations, etc. (like those pertaining to microsculpture) see also the species diagnoses and descriptions. The primary purpose of the information presented in the Appendix and the key below is to position the Sulawesi novelties. Included in the character list, however, are some features of more than regional importance; we have also left these in the synoptic table in order to support diagnostic efforts by anyone working on extra-limital species. Only the 13 known Sundaland-Sulawesi species are tabulated; we do not recognize close relationships with the species described from Luzon. It should be noted that some character states were gleaned from published descriptions, keys and illustrations, and inserted by implication (i.e., no differences indicated → states identical or similar). Caution is here required, as the interpretation of certain characters may be heavily dependent on the individual observer-describer, for instance, where a shagreened (alutaceous) or microreticulate surface is termed either shiny or matt;

some authors give ambiguous information. Note the presence of an apico-internal projection on the metatibia in three of the five Sulawesi species (character 24), an attribute apparently absent in the Sundaland species; this may be a male sexual character. The 13 Sundaland and Sulawesi species can be recognized as follows.

### Key to the species of *Haroldius* from Sundaland and Sulawesi

Compare your specimens with the diagnoses in the next section which contain more characters (species numbers come back in diagnosis headings).

1. Pronotum with base evenly arcuate ..... 2
- Pronotum with (medially rounded) basomedian expansion ..... 8
- Pronotum with distinct angular basomedian expansion ..... 1. *H. pauliani*
2. Pronotum without transverse basomedian depression(s) ..... 3
- Pronotum with special small, superficial (but well delineated) basomedian depression ..... 7
3. Clypeus with median excision, paramedian angles not projecting; body yellow-brown, legs yellow-brown ..... 11. *H. tangkoko*
- Clypeus with median excision, paramedian denticles projecting; elytra black, legs brown ..... 4
4. Pronotum at most with very short basolateral striolation; pronotal sides deplanate ..... 12. *H. cambeforti*
- Pronotum with less than 14 basolateral striolae on each side ..... 10. *H. penelopae*
- Pronotum with more than 14, densely arranged basolateral striolae on each side ..... 5
- Pronotum basolaterally with very dense, braided striolation, extending onto disc and/or anterior surface ..... 8. *H. rugatulus*
5. Elytron glabrous, or with very few scattered setae; with 8 fine striae ..... 6
- Elytron with distinct, erect setae over most of interstitial length; with 8 distinct striae ..... 9. *H. pabangensis*
- Elytron with distinct, erect setae limited to distal section of interstriae; with striae effaced (or nearly so) ..... 7. *H. borneensis*
6. Body moderately small (over 2mm long) ..... 5. *H. celebensis*
- Body very small (under 2 mm long) ..... 6. *H. kolaka*
7. Metatibia with oblique (straight or concave) apex and apico-external angle; body moderately small; elytra black; forebody brown; legs brown ..... 4. *H. discoidalis*
- Metatibia with rounded apico-external edge;

body very small; elytra yellow-brown; forebody yellow-brown; legs yellow-brown ..... 3. *H. fairmairei*

8. Genal lobe rectangular (or nearly so); elytral punctures at least partly with more than one seta; elytral interstriae 1-3 with single, from 4 with double row of setae; body large; pronotum (virtually) without basolateral striolation ..... 13. *H. maruyamai*
- Genal lobe obtuse-rounded; elytral punctures with single seta; elytral interstriae with scattered setae; body very small; pronotum with less than 14 basolateral striolae on each side ..... 2. *H. sumatranus*

### DIAGNOSES AND DESCRIPTIONS

#### Diagnoses of Sundaland and Sulawesi *Haroldius* species

Character states of primary diagnostic value in *italics*. Full descriptions of the five Sulawesi novelties given separately after the diagnoses.

##### 1. *Haroldius pauliani* Scheuern

Diagnosis. – Large species, with a uniquely shaped prothoracic base. Clypeus with median excision, paramedian denticles projecting. Genal lobe *obtusely rounded*. Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with *distinct angular basomedian expansion*; basomedially with *distinct depressions*, (virtually) without basolateral striolation. Pronotal sides normally declivous. Elytron in profile with pronotal-elytral dip to distinctly depressed transversely; with 8 fine striae; glabrous, or with very few scattered setae; more or less shiny. Protibia with 2 denticles. Protibial apex on underside expanded beyond apico-external denticle. Mesotibia strongly dilated distally. Metatibia dilated distally, with *rounded apico-external edge*; with terminal spur reduced. Body relatively large, length *ca* 3 mm. Forebody mainly black and brown. Elytra mainly black. Legs brown.

Distribution. – Sundaland.

##### 2. *Haroldius sumatranus* Paulian & Scheuern

Diagnosis. – Identifiable from the small size, medially expanded pronotal base, limited pronotal striolation, and metatibial shape. Clypeus with median excision, paramedian denticles projecting. Genal lobe *obtusely rounded*. Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with slight subangular *basomedian expansion*; *without transverse basomedian depression(s)*; with *much less than 14 basolateral striolae* on each side. Pronotal sides normally declivous. Elytron in profile with pronotal-elytral dip to distinctly depressed transversely; with 8

distinct striae; with distinct, erect setae over most of interstrial length; distinctly matt. Protibia with 2 denticles (proximal very small). Protibial apex on underside expanded beyond apico-external denticle. Mesotibia dilated but relatively slender. Metatibia dilated distally, with oblique (straight or concave) apex and *apico-external angle*; with terminal spur reduced. Body small, length *ca 1.7 mm*. Forebody brown. Elytra *brown*. Legs brown.

Distribution. – Sundaland.

3. *Haroldius fairmairei* Boucomont

Diagnosis. – Easily identifiable from the combination of colour, size and more oval body shape, rounded metatibial apex, distinct basomedian pronotal depression, and dense pronotal striolation. Clypeus with median excision, paramedian denticles projecting. Genal lobe rectangular (or nearly so). Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with base evenly arcuate; with special small, transverse basomedian depression, well delineated in front; (virtually) without basolateral striolation; with simple posterolateral angle. Pronotal sides normally declivous. Elytron convex at base, in profile collinear with pronotum (or nearly so); with 8 distinct striae; with distinct, erect setae over most of interstrial length, or with distinct, erect setae limited to distal section of interstriae (setae long); more or less shiny. Protibia with 2 denticles. Protibial apex on underside expanded beyond apico-external denticle. Mesotibia dilated but relatively slender. Metatibia dilated distally, with *rounded apico-external edge*, with terminal spur reduced. Body somewhat oval, *ca 1.5 mm*. Forebody and elytra *yellow-brown*. Legs yellow-brown.

Distribution. – Sundaland.

4. *Haroldius discoidalis* Paulian

Diagnosis. – Identifiable from its combination of colour, size, distinct basomedian pronotal depression, and undeveloped pronotal striolation. Clypeus with median excision, paramedian denticles projecting. Genal lobe rectangular (or nearly so). Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with base evenly arcuate; with special small, *transverse basomedian depression, well delineated* in front; (virtually) without basolateral striolation; with simple posterolateral angle. Pronotal sides normally declivous. Elytron convex at base, in profile collinear with pronotum (or nearly so); with 8 distinct striae; with distinct, erect setae limited to distal section of interstriae (setae short); more or less shiny. Protibia with 2 denticles. Protibial apex on underside expanded beyond apico-external denticle. Mesotibia dilated but relatively slender. Metatibia dilated distally, with oblique (straight or concave) apex and *apico-*

*external angle*, with terminal spur reduced. Body length *ca 2-2.4 mm*. Forebody *brown*. Elytra mainly *black*. Legs brown.

Distribution. – Sundaland.

5. *Haroldius celebensis* sp.n.

Diagnosis. – Close to *kolaka*, but identifiable from the combination of differences in size, pronotal shape and striolation, elytral striation, and the presence of a metatibial 'hook'. Clypeus with median excision, paramedian denticles projecting. Genal lobe rectangular (or nearly so). Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with base evenly arcuate; without transverse basomedian depression(s); with more than 14, densely arranged basolateral striolae on each side; with simple posterolateral angle. Pronotal sides normally declivous. Elytron convex at base, in profile collinear with pronotum (or nearly so); with 8 fine striae; glabrous, or with very few scattered setae; more or less shiny. Protibia with 2 denticles. Protibial apex on underside expanded beyond apico-external denticle. Mesotibia dilated but relatively slender. Metatibia dilated distally, with oblique (straight or concave) apex and apico-external angle (*apico-internal angle acuminate*); with terminal spur reduced. Body larger than *H. kolaka*, length *ca 2.3 mm*. Forebody mainly black. Elytra brown-black, moderately shiny (sericeous). Legs dark brown.

Distribution. – Sulawesi.

6. *Haroldius kolaka* sp.n.

Diagnosis. – Close to *celebensis*, but smaller and with differences in pronotal shape, microsculptural details and protibial apex; other differences may be merely sexual. Clypeus with median excision, paramedian denticles projecting. Genal lobe rectangular (or nearly so). Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with base evenly arcuate; without transverse basomedian depression(s); with more than 14, densely arranged basolateral striolae on each side; with simple posterolateral angle. Pronotal sides normally declivous. Elytron convex at base, in profile collinear with pronotum (or nearly so); with 8 fine striae; glabrous, or with very few scattered setae; more or less shiny. Protibia with 2 denticles. Protibial apex on underside expanded beyond apico-external denticle, slightly dentate. Mesotibia dilated but relatively slender. Metatibia dilated distally, with oblique (straight or concave) apex and apico-external angle; with terminal spur reduced. Body smaller than *H. celebensis*, length *ca 1.8 mm*. Forebody mainly black. Elytra black. Legs brown. (Based on female only.)

Distribution. – Sulawesi.

7. *Haroldius borneensis* Paulian

Diagnosis. – Small species, readily identifiable from the vagueness of its elytral striae, and the pronotal striolation pattern. Clypeus with median excision, paramedian denticles projecting. Genal lobe rectangular (or nearly so). Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with base evenly arcuate; without transverse basomedian depression(s); with more than 14, *densely arranged basolateral striolae on each side*; with simple posterolateral angle. Pronotal sides normally declivous. Elytron convex at base, in profile collinear with pronotum (or nearly so); with *striae effaced* (or nearly so); with distinct, erect setae limited to distal section of interstriae (setae long); more or less shiny. Protibia with 2 denticles. Protibial apex on underside expanded beyond apico-external denticle. Mesotibia dilated but relatively slender. Metatibia dilated distally, with oblique (straight or concave) apex and apico-external angle; with terminal spur reduced. Body length ca 2 mm. Forebody brown. Elytra mainly black, shiny. Legs brown.

Distribution. – Sundaland.

8. *Haroldius rugatulus* Boucomont

Diagnosis. – Relatively large in its group, very close to *pahangensis*, but different by its elytral microsculpture. Clypeus with median excision, paramedian denticles projecting. Genal lobe rectangular (or nearly so). Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with base evenly arcuate; without transverse basomedian depression(s); basolaterally with very dense, braided striolation, extending onto disc and/or anterior surface; with simple posterolateral angle. Pronotal sides normally declivous. Elytron convex at base, in profile collinear with pronotum (or nearly so); with 8 distinct striae; with distinct, erect setae over most of interstitial length (setae short); more or less shiny. Protibia with 2 denticles. Mesotibia dilated but relatively slender. Metatibia dilated distally, with oblique (straight or concave) apex and apico-external angle; with terminal spur reduced. Body length 2.5–2.8 mm. Forebody mainly black. Elytra black, *shiny*. Legs brown.

Distribution. – Sundaland.

9. *Haroldius pahangensis* Kral

Diagnosis. – Very close to *rugatulus*, but apparently different by its elytral microsculpture. Clypeus with median excision, paramedian denticles projecting. Genal lobe rectangular (or nearly so). Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with base evenly arcuate; without transverse basomedian depression(s); with more than 14, densely arranged basolateral striolae on each side; with simple posterolateral angle. Pronotal sides normally declivous. Elytron convex at base, in profile

collinear with pronotum (or nearly so); with 8 distinct striae; with distinct, erect setae over most of interstitial length (mostly in two rows per interstria); distinctly matt. Protibia with 2 denticles. Mesotibia dilated but relatively slender. Metatibia dilated distally, with oblique (straight or concave) apex and apico-external angle; with terminal spur reduced. Body length ca 2.6 mm. Forebody mainly black. Elytra black, *matt*, due to microsculptured interstriae. Legs brown. Distribution. – Sundaland.

10. *Haroldius penelopae* sp.n.

Diagnosis. – Readily identifiable from its combination of its shiny black colour, elytral pilosity and metatibial shape. Clypeus with median excision, paramedian denticles projecting. Genal lobe rectangular (or nearly so). Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with base evenly arcuate; without transverse basomedian depression(s); with less than 14 basolateral striolae on each side; with simple posterolateral angle. Pronotal sides normally declivous. Elytron convex at base, in profile collinear with pronotum (or nearly so); with 8 fine striae; with distinct, erect setae over most of interstitial length; setae pale, *very long*, in pustuliform punctures, mostly in *one row per interstria*. Elytral surface more or less shiny. Protibia with 2 denticles. Protibial apex on underside expanded beyond apico-external denticle. Mesotibia dilated but relatively slender to strongly dilated distally. Metatibia dilated distally, with *rounded apico-external edge*, with terminal spur reduced, *lacking apico-internal projection*. Body length ca 2 mm. Forebody and elytra mainly *shiny black*. Legs brown.

Distribution. – Sulawesi.

11. *Haroldius tangkoko* sp.n.

Diagnosis. – Readily identifiable from the combination of its clypeal shape, overall yellow-brown colour, elytral pilosity, and pronotal microsculpture. Clypeus with median excision, paramedian angles *not projecting, not reflexed*. Genal lobe rectangular (or nearly so). Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with base evenly arcuate; without transverse basomedian depression(s); basolaterally with *very dense, fine, braided striolation*, extending onto disc and/or anterior surface; with simple posterolateral angle. Pronotal sides normally declivous. Elytron convex at base, in profile nearly collinear with pronotum; with 8 fine striae; with distinct, erect setae over most of interstitial length (setae long, mostly in *two rows per interstria*); more or less shiny. Protibia with 2 denticles. Protibial apex on underside expanded beyond apico-external denticle. Mesotibia dilated but relatively slender. Metatibia dilated distally, with oblique (straight or concave)

apex and apico-external angle (apico-internal angle *acuminate*); with terminal spur reduced. Body length ca 2 mm. Forebody *yellow-brown*. Elytra *yellow-brown*. Legs *yellow-brown*.

Distribution. – Sulawesi.

12. *Haroldius cambeforti* sp.n.

Diagnosis. – A relatively large, blackish species, with a uniquely shaped, laterally strongly depressed pronotum. Clypeus with median excision, paramedian denticles projecting. Genal lobe rectangular (or nearly so). Lateral edge of pronotum *nearly straight* (slightly *sinate* halfway length). Pronotum with base evenly arcuate; without transverse basomedian depression(s); (virtually) without long basolateral striolation (elongate punctures crenulate base); posterolaterally *hinged with humeral protrusion* of elytral epipleuron. Pronotal sides *distinctly depressed*, marginal surface explanate. Elytron in profile with *pronotal-elytral dip*; with 8 distinct striae; with distinct, erect setae over most of interstitial length (setae long, mostly in *two rows per interstria*, punctures *very distinct*); more or less shiny. Protibia with 2 denticles. Protibial apex on underside expanded beyond apico-external denticle. Mesotibia dilated but relatively slender. Metatibia dilated distally, with oblique (straight or concave) apex and apico-external angle (apico-internal angle *acuminate*); with terminal spur reduced. Body *large* compared to other Sulawesi species, length ca 2.8–3.0 mm. Forebody mainly black, shiny. Elytra black, shiny. Legs brown.

Distribution. – Sulawesi.

13. *Haroldius maruyamai* Utsunomiya & Masumoto

Diagnosis. – Size, shape of pronotal base, and the multisetose elytral punctures, should make this species readily identifiable. Clypeus with median excision, paramedian denticles projecting. Genal lobe rectangular (or nearly so). Lateral edge of pronotum widely arcuate or nearly straight. Pronotum with *distinct, rounded, basomedian expansion*, without transverse basomedian depression(s), (virtually) without basolateral striolation, with simple posterolateral angle. Pronotal sides simply steeply declivous. Elytron at base distinctly depressed transversely, with 8 fine striae, with distinct, erect setae over most of interstitial length. Many of the raised elytral punctures with *more than one seta*. Protibia with external 2 denticles (plus slight apico-external dentation). Mesotibia dilated but relatively slender. Metatibia dilated distally, with oblique (straight or concave) apex and apico-external angle, with terminal spur reduced. Large, body length ca 3.1–3.3 mm. Forebody black. Elytra black, more or less shiny (sericeous). Legs lighter.

Distribution. – Sundaland.

Descriptions of Sulawesi species

*Haroldius celebensis* sp.n.

(figs. 2, 7, 12, 17, 23, 28, 33, 38, 42)

Description (holotype). – Body length ca 2.3 mm. Dorsum strongly convex, in profile without pronotal-elytral dip, more or less collinear. Colour generally black, elytra dark brown; legs dark brown; margins, appendages, lighter, brown; clypeofrons, pronotum, and elytra moderately shiny. Dorsum glabrous.

Clypeal border generally rounded, with distinct widely U-shaped anteromedian excision, bidentate, paramedian tips distinct, angular. Surface of clypeal margin shallowly concave, shiny, very finely punctate. Clypeofrontal disc slightly convex, surface shiny, abundantly very finely punctate, punctures mostly separated by 3–6 times their diameter. Clypeogenal edge continuous; genal tip rectangular, micromarginate; general surface smooth. Eyes (in full-face view) with 4–5 facet rows across widest point.

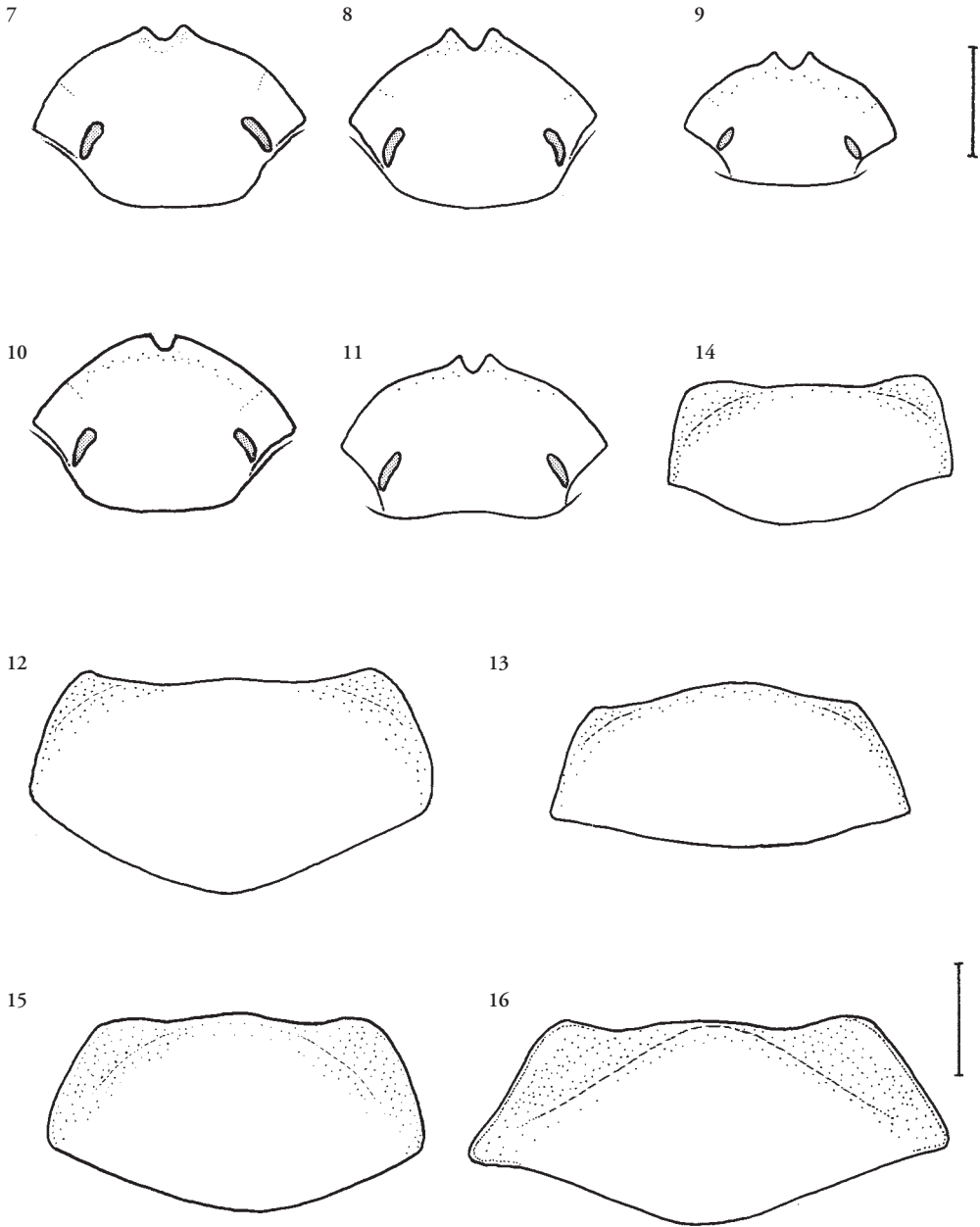
Pronotum with disc evenly, strongly convex, midline and base not impressed, sides evenly steeply declivous. Anterior border of pronotum finely marginate, section behind vertex very slightly curved. Lateral border of pronotum entirely, distinctly marginate; anterolateral angle of pronotum indistinct, widely rounded; major section of lateral border widely convex-curvilinear, posterolateral angle distinct, slightly obtuse. Pronotal base widely, evenly rounded, immarginate. Pronotal surface abundantly, very finely punctate, punctures mostly separated by 3–6 times their diameter; basolateral surface (on either side) with field of ca 25 more or less parallel (somewhat braided) striolae, starting from (and crenulating) basal margin (longest medially in each field).

Elytra broad, strongly evenly convex, humeral area very slightly raised. Striae very fine, well defined, not equidistant at base (interstria 2 twice as wide as 1 and 3); striae punctures indistinct. Interstriae virtually flat; without long setae; interstitial surface shiny, with abundant, scattered micropunctuation, larger micropunctures separated by many times their diameters. Epipleuron wide, surface smooth, microreticulate, matt.

Prothoracic underside largely smooth; postprothoracic border immarginate, slightly angulate on either side, fitting well against mesothorax. Mesosternal surface smooth, without distinct microsculpture. Mesometasternal suture very distinct, widely arcuate; metasternal disc smooth, without distinct microsculpture. Abdominal sternites laterally nearly flat, surface matt, microreticulate. Surface of pygidium slightly convex, abundantly, very finely punctate, shiny; general shape strongly transverse, height/width ratio over 0.5; apex marginate.



Fig. 2-6. Habitus (dorsal view) of five *Haroldius* species from Sulawesi, dorsal view. – 2, *H. celebensis*; 3, *H. kolaka*; 4, *H. penelopae*; 5, *H. tangkoko*; 6, *H. cambeforti*.



Figs. 7-16. *Haroldius*, outline of head (full-face view, 7-11); pronotum (dorsal view, 12-16). – 7, 12, *H. celebensis*; 8, 13, *H. kolaka*; 9, 14, *H. penelopae*; 10, 15, *H. tangkoko*; 11, 16, *H. cambeforti*.

Protibia with two well-developed external denticles, their tips acute; proximal section of external side very slightly convex-curvilinear, serration obsolete; tibial apex with slightly protuberant underside; both upper- and underside of protibia with longitudinal ridge; terminal spur very fine, elongate-acuminate; protarsus slender, segments 1-4 subcylindrical, short, compact, segment 5 longer. Mesotibia complanate, strongly dilated distad, external side convex-curvilinear to distinct apico-external angle; internal side slightly sinuate; surface microreticulate, matt, surface and edges with numerous fine setae; mesotarsus with segments 1-4 short, compact, segment 5 longer. Metatibia complanate, much more slender than mesotibia, with external side convex-curvilinear to distinct apico-external angle; internal side sinuate, apico-internal angle produced inward, pointed; surface microreticulate, matt, surface and edges with numerous fine setae; metatarsus with segments 1-4 short, compact (1 internally expanded, modified), segment 5 longer. Femora all very slender, elongate, surface shiny, with sparse seta-bearing punctures.

Parameres with truncate apex, figs. 38, 42.

Variation. – The two females available are slightly different from the holotype in size and colour, and it is not clear whether this concerns variation or sexual dimorphism. They lack the metatibial hook; the elytra are dark-black, and their body length is ca 2.1 mm. All in all, they may belong to a different species.

Material examined. – Holotype, male, labelled 'INDONESIA:/ SULAWESI UTARA,/ Dumoga Bone N.P./ February 1985. [printed]// carrion [handwritten]', 'R.Ent.Soc.Lond./ PROJECT WALLACE/ B.M. 1985-10" [printed], '28' [handwritten], and our *H. celebensis* holotype labels (BMNH). Two females excluded from type series: N Sulawesi: Dumoga Bone NP, 18-22.v.1985, J Huijbregts HH329, ditto, 22-26.viii.1985, J Huijbregts HH428 (both RMNH).

Derivation of species name. – Named after the home island of this species, Celebes = Sulawesi.

#### *Haroldius kolaka* sp.n.

(figs. 3, 8, 13, 18, 24, 29, 34)

Description (holotype). – Body length ca 1.8 mm. Dorsum strongly convex, in profile without pronotal-elytral dip, more or less collinear. Colour generally black; margins, legs and other appendages, underside, brown; frons, pronotum, and elytra moderately shiny. Dorsum glabrous.

Clypeal border generally rounded, with distinct widely U-shaped anteromedian excision, bidentate, paramedian tips distinct, angular. Surface of clypeal margin shallowly concave, matt, microreticulate. Clypeofrontal disc slightly convex, surface more or

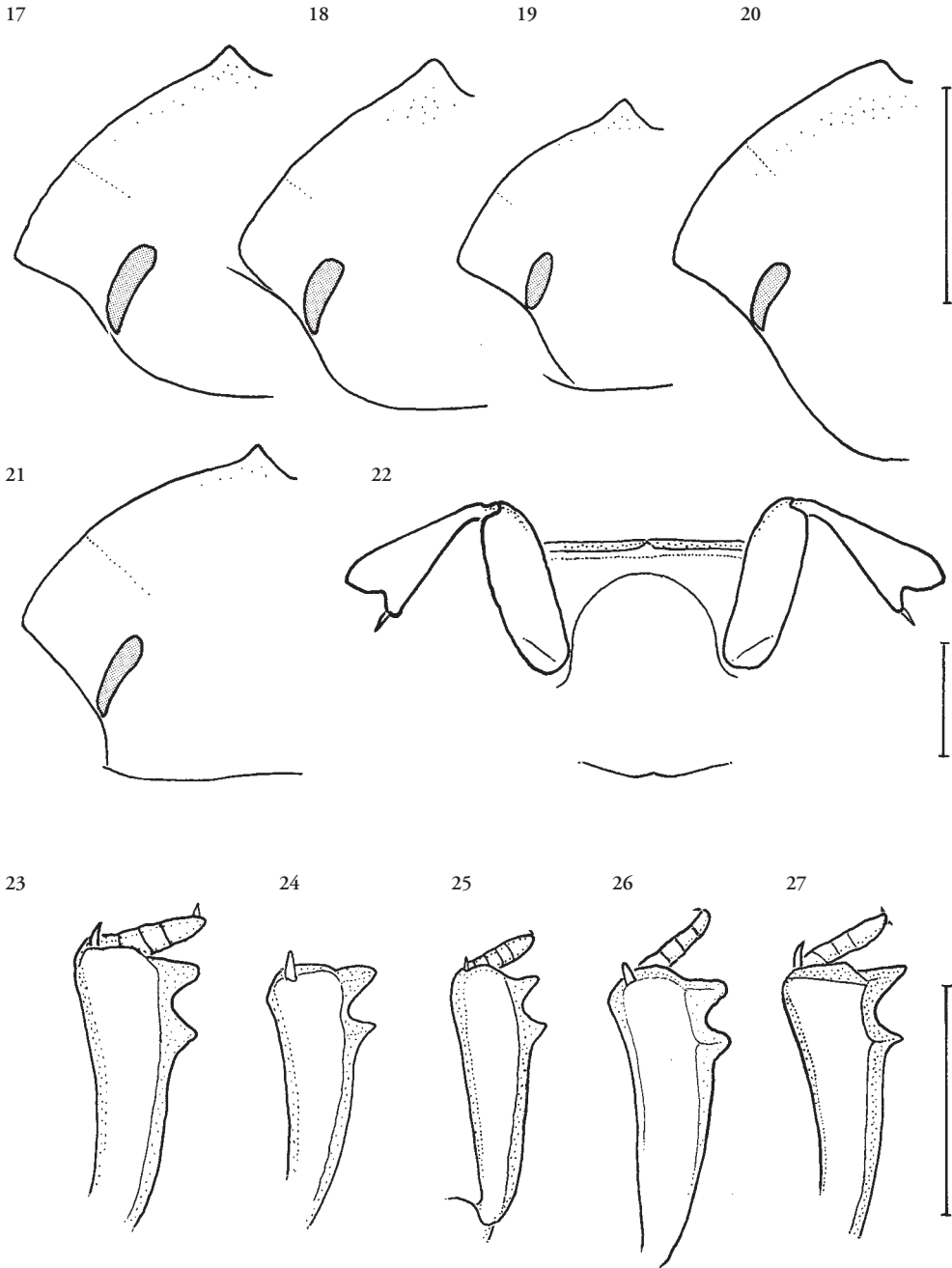
less shiny, abundantly micropunctate, punctures mostly separated by 3-6 times their diameter. Clypeo-genal edge continuous; genal tip rectangular, micromarginate; general surface smooth, microreticulate, matt. Eyes (in full-face view) with 5-6 facet rows across widest point.

Pronotum with disc evenly, strongly convex, midline and base not impressed, sides evenly steeply declivous. Anterior border of pronotum finely marginate, section behind vertex very slightly curved. Lateral border of pronotum entirely, distinctly marginate; anterolateral angle of pronotum indistinct, widely rounded; major section of lateral border very widely convex-curvilinear, posterolateral angle distinct, slightly obtuse. Pronotal base widely, evenly rounded, immarginate. Pronotal surface abundantly micropunctate, punctures mostly separated by 3-6 times their diameter; basolateral surface (on either side) with ca 20 more or less parallel, long striae, starting from (and slightly crenulating) basal margin.

Elytra broad, strongly evenly convex, humeral area very slightly raised. Striae very fine, well defined, not equidistant at base (interstria 3 wider than 2 and 4); stria punctures indistinct. Interstriae virtually flat; without long setae; surface shiny, abundantly micropunctate. Epipleuron wide, surface smooth.

Prothoracic underside largely smooth; postprosteral border immarginate, slightly angulate on either side, fitting well against mesothorax. Mesosternal surface smooth, without distinct microsculpture. Mesometasternal suture very distinct, widely arcuate; metasternal disc smooth, without distinct microsculpture. Abdominal sternites laterally nearly flat, surface smooth, microreticulate. Surface of pygidium slightly convex, abundantly, micropunctate, shiny; general shape strongly transverse, height/width ratio over 0.5; apex marginate.

Protibia with two well-developed external denticles, their tips acute; proximal section of external side very slightly convex-curvilinear, serration obsolete; internal side slightly concave-curvilinear; slightly protuberant underside with short denticle; both upper- and underside of protibia with longitudinal ridge; terminal spur very fine, elongate-acuminate; protarsus slender, segments 1-4 subcylindrical, short, compact, segment 5 longer. Mesotibia complanate, strongly dilated distad, external side convex-curvilinear to distinct apico-external angle; internal side slightly sinuate; surface microreticulate, matt, surface and edges with fine setae; mesotarsus with segments 1-4 short, compact, segment 5 longer. Metatibia complanate, with external side convex-curvilinear to apico-external angle; internal side slightly sinuate; surface microreticulate, matt, surface and edges with fine setae; metatarsus with segments 1-4 short, compact



Figs. 17-27. *Haroldius*, outline of left side of head (full face view, enlarged, 17-21); mesometasternal transition, with arcuate suture between middle legs (ventral view, 22); right protibia (full-face view, 23-27). – 17, 23, *H. celebensis*; 18, 24, *H. kolaka*; 19, 25, *H. penelopae*; 20, 26, *H. tangkoko*; 21, 22, 27, *H. cambeforti*.

(1 internally expanded, modified), segment 5 longer. Femora all very slender, elongate, surface shiny, with sparse seta-bearing punctures.

Material examined. – Holotype only, female, labelled 'RMNH / sw06b/ SE SULAWESI: KOLAKA/ Sanggona Base Camp/ alt.m 0200/ 13-17/x/1989/ Krikken & Van der Blom', 'multistr[atal] evergr[een] forest/ 2 fish traps', and our *H. kolaka* holotype labels (RMNH).

Note. – Relation with fish carrion seems accidental (no specimens in numerous other traps in the area).

Derivation of species name. – Named after the collecting region of the single known specimen, in Southeast Sulawesi.

*Haroldius penelopae* sp.n.

(figs. 4, 9, 14, 19, 25, 30, 35, 39, 43)

Description (holotype). – Body length ca 2.0 mm. Dorsum strongly convex, in profile without pronotal-elytral dip, more or less collinear. Colour generally black; margins, legs and other appendages, underside, brown; clypeofrontal disc, pronotum, and elytra largely shiny. Elytra with very long setae.

Clypeal border generally rounded, with distinct widely U-shaped anteromedian excision, bidentate, paramedian tips angular. Surface of clypeal margin shallowly concave, matt, microreticulate. Clypeofrontal disc slightly convex, glabrous, surface shiny, abundantly, evenly micropunctate, punctures mostly separated by many times their diameter. Clypeogenal edge continuous; genal tip rectangular, micromarginate; general surface smooth. Eyes (in full-face view) with 4-5 facet rows across widest point.

Pronotum with disc evenly, strongly convex, midline and base not impressed, sides evenly steeply declivous. Anterior border of pronotum finely marginate, section behind vertex very slightly curved. Lateral border of pronotum entirely, distinctly marginate; anterolateral angle of pronotum indistinct, rounded; major section of lateral border very widely convex-curvilinear, posterolateral angle distinct, slightly obtuse. Pronotal base widely, evenly rounded, immarginate. Pronotal surface virtually glabrous, finely, sparsely punctate, punctures separated by many times their diameter; sparse micropunctuation also present; basolateral surface (on either side) with ca 10 more or less parallel, well separated, short striolae, starting from (and crenulating) basal margin.

Elytra broad, strongly evenly convex, with conspicuously long setae (several with length 10 times their punctural diameter); humeral area not raised. Striae very fine, well defined, not equidistant at base (interstria 2 conspicuously narrowed); stria punctures hardly distinct, very feebly crenulating interstitial

edges. Interstriae virtually flat, all with single row of very distinct (pustuliform, distinct in profile) seta-bearing punctures (arranged more or less midway over length of each interstria); setae very long, erect, tip recumbent; interstitial surface shiny, with scattered, indistinct micropunctuation. Epipleuron very wide in front, surface smooth, posteriorly with some setae.

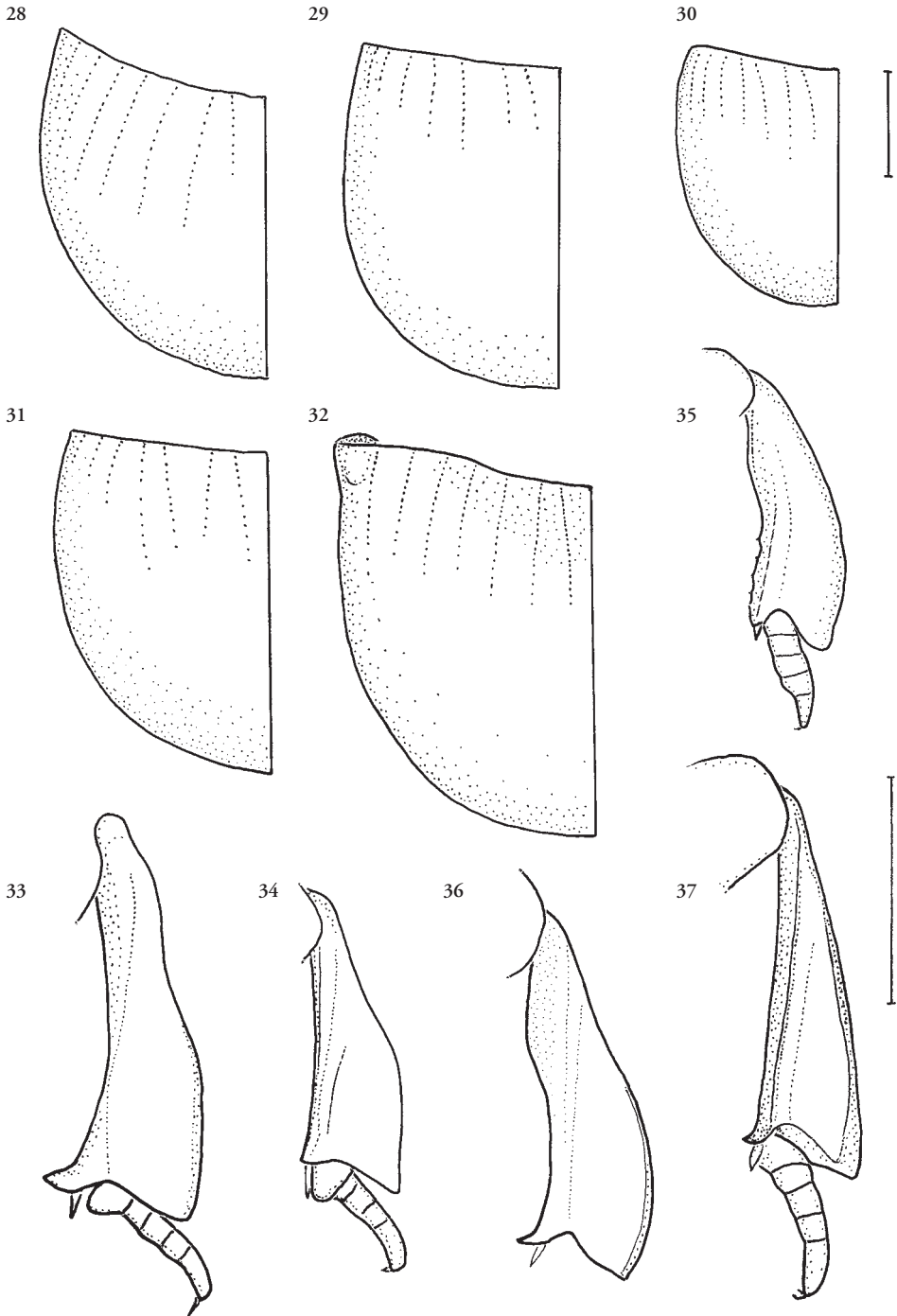
Prothoracic underside largely smooth; postprosteral border immarginate, slightly angulate on either side, fitting well against mesothorax. Mesosternal surface sparsely micropunctate, shiny. Mesometasternal suture very distinct, widely arcuate; metasternal disc smooth, sparsely micropunctate, shiny. Abdominal sternites with laterally nearly flat, smooth, microreticulate surface. Surface of pygidium slightly convex, sparsely micropunctate, shiny; general shape strongly transverse, height/width ratio over 0.5; apex marginate.

Protibia with two distinct external denticles, their tips acute; proximal section of external side, and internal side, almost straight, serration obsolete; tibial apex with very slightly protuberant underside; both upper- and underside of protibia with longitudinal ridge; terminal spur very fine, elongate-acuminate; protarsus slender, segments 1-4 subcylindrical, short, compact, segment 5 longer. Mesotibia complanate, strongly dilated distad, external side convex-curvilinear to distinct apico-external angle (which is rounded off); internal side very slightly sinuate; surface microreticulate, matt, surface and edges with numerous fine setae; mesotarsus with segments 1-4 short, compact, segment 5 longer. Metatibia complanate, with external side convex-curvilinear to rounded apico-external lobe; internal side slightly sinuate; surface microreticulate, matt, surface and edges with numerous fine setae; metatarsus with segments 1-4 short, compact, segment 5 longer. Femora all very slender, elongate, surface shiny, with sparse seta-bearing punctures.

Parameres long, slender, fig. 39, 43.

Material examined. – Holotype only, male, labelled 'INDONESIA: SULAWESI UTARA/ Dumoga Bone N.P./ September 1985.' [printed], 'R.Ent.Soc. Lond./PROJECT WALLACE/ B.M. 1985-10' [printed], 'G. Mogogonipa/ summit, 1008m./ 22-23.ix.1985' [printed], 'sticks' [handwritten], '43.15 in BM' [handwritten] (BMNH), and our *H. penelopae* holotype labels. Mt Mogogonipa is an isolated mountain near the coast, with lowered vegetation belts.

Derivation of species name. – Dedicated to the collector, Ms Penny Greenslade (Canberra, ACT, Australia), ardent student of soil arthropods.



Figs. 28-37. *Haroldius*, outline of left elytron (with indication of striae only at base, dorsal view, 28-32), left metatibia (full-face view, 33-37). – 28, 33, *H. celebensis*; 29, 34, *H. kolaka*; 30, 35, *H. penelopae*; 31, 36, *H. tangkoko*; 32, 37, *H. cambeforti*.

*Haroldius tangkoko* sp.n.

(figs. 5, 10, 15, 20, 26, 31, 36, 40, 44)

Description (holotype). – Body length ca 2.0 mm. Dorsum strongly convex, with in profile slight pronotal-elytral dip. Colour generally yellow-brown; margins, sutures, and ridges may be infuscated; dorsum moderately shiny, locally more or less matt. Pilosity on some parts rather abundant; on elytra pale, erect, distinct.

Clypeal border generally rounded, with distinct, widely U-shaped anteromedian excision, limiting angles distinct, not projecting, i.e., without lateral sinus (in full-face view). Surface of clypeal margin shallowly concave, matt, microreticulate. Clypeofrontal disc slightly convex, surface shiny, glabrous, densely, finely punctate, punctures mostly separated by 1-3 times their diameter. Clypeogenal edge continuous; genal tip rectangular, micromarginate; general surface smooth, microreticulate. Eyes (in full-face view) with 4-5 facet rows across widest point.

Pronotum with disc evenly, strongly convex, midline and base not impressed, sides evenly steeply declivous. Anterior border of pronotum very finely marginate, section behind vertex very slightly curved. Lateral border of pronotum entirely, distinctly marginate; anterolateral angle of pronotum shortly rounded, obsolescent; anterior section of lateral border widely rounded, major lateral section very widely convex-curvilinear, posterolateral angle distinct, slightly obtuse. Pronotal base widely, evenly rounded, immarginate. Pronotal surface virtually glabrous, finely, densely, evenly punctate, punctures mostly separated by 1-3 times their diameter; basolateral surface (on either side) with field of numerous, more or less braided striolae, starting from (and crenulating) basal margin.

Elytra broad, strongly evenly convex, humeral area not raised. Striae fine, well defined, not equidistant at base (interstria 2 and 4 narrower than 3 at base); stria punctures indistinct. Interstriae virtually flat; interstria 1 with single row, others with double row of distinct seta-bearing punctures (arranged close to striae on either side of interstria), setae long (many are at least 5 times their punctural diameter), more or less erect; rows less distinct on lateral and distal declivities; interstitial surface moderately shiny, with abundant, scattered micropunctuation. Epipleuron wide in front, surface smooth.

Prothoracic underside largely smooth; postprosteral border immarginate, slightly angulate on either side, fitting well against mesothorax. Mesosternal and metasternal surface densely, very finely punctate, punctures mostly separated by 1-3 times their diameter. Mesometasternal suture very distinct, widely arcuate. Abdominal sternites laterally nearly flat, surface smooth, microreticulate. Surface of pygidium shiny,

abundantly, finely punctate, very sparsely setose, slightly convex; general shape strongly transverse, height/width ratio over 0.5; apex marginate.

Protibia with two well-developed external denticles, their tips rounded off (worn?); proximal section of external side very slightly convex-curvilinear, serration obsolete; internal side slightly concave-curvilinear; tibial apex with slightly protuberant, microbristle-bearing underside; both upper- and underside of protibia with longitudinal ridge, inferior ridge serrate; terminal spur very fine, elongate-acuminate; protarsus slender, segments 1-4 subcylindrical, short, compact, segment 5 longer. Mesotibia complanate, strongly dilated distad, external side straight, slightly sinuate to distinct apico-external angle (which is rounded off); internal side also slightly sinuate; surface microreticulate, matt, surface and edges with numerous fine setae; terminal spur very fine, elongate-acuminate; mesotarsus slender, segments 1-4 short, compact, segment 5 longer. Metatibia complanate, with external side slightly sinuate to apico-external angle (which is rounded off); internal side also slightly sinuate; surface microreticulate, matt, surface and edges with numerous fine setae; apico-internal angle produced inward, pointed; terminal spur very fine, elongate-acuminate; metatarsus slender, segments 1-4 short, compact (1 expanded, modified), segment 5 longer. Femora all very slender, elongate, surface shiny, with sparse seta-bearing punctures.

Parameres with truncate apex, figs. 40, 44.

Material examined. – Holotype only, male, labelled 'SULAWESI UTARA/ Tangkoko/ coastal forest/ 29-31/x/85' [handwritten], 'pitfall/ traps/ P Greenslade' [handwritten], '43.47 in BM' [handwritten] (BMNH), and our *H. tangkoko* holotype labels. This is a forested area on volcanic soil close to the coast, on the eastern tip of the northern peninsula.

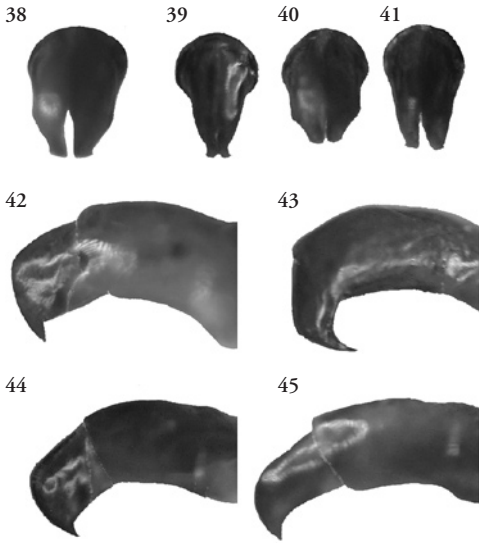
Derivation of species name. – Named after the collecting location of the single known specimen, on North Sulawesi.

*Haroldius cambeforti* sp.n.

(figs. 6, 11, 16, 21, 22, 27, 32, 37, 41, 45)

Description (holotype). – Body length ca 2.8 mm. Dorsum very convex, in profile with very distinct pronotal-elytral dip. Colour generally black; margins, legs and other appendages, underside, brownish; elytra and pronotal disc shiny, other dorsal parts more or less matt. Pilosity generally sparse, pale, short; very distinct, longer, and more abundant on elytra.

Clypeal border generally rounded, anteromedially bidentate-emarginate, paramedian denticles distinct, their tips angular. Surface of clypeal margin shallowly concave, matt, microreticulate. Clypeofrontal disc



Figs. 38-45. *Haroldius*, silhouettes of male genitalia (full-face view aedeagal tip, 38-41, lateral view distal parts, 42-45). 38, 42, *H. celebensis*; 39, 43, *H. penelopae*; 40, 44, *H. tangkoko*; 41, 45, *H. cambeforti*. Not to same scale.

slightly convex, surface smooth, very sparsely punctate(-setose), with additional sparse micropunctuation. Clypeogenal edge continuous, gena rectangular, micromarginate, surface smooth. Eyes (in full-face view) with 4-5 facet rows across widest point.

Pronotum with disc evenly, strongly convex, midline and base not impressed, sides distinctly depressed halfway pronotal length (surface of depression microreticulate, matt). Anterior border of pronotum finely marginate, section behind vertex very slightly curved. Lateral border of pronotum entirely, distinctly marginate; anterolateral angle of pronotum shortly rounded, obsolescent; anterior section of lateral border widely rounded, major lateral section more or less straight (slightly sinuate halfway), posterolateral angle rectangular. Pronotal base widely, evenly rounded, immarginate. Pronotal surface virtually glabrous, sparsely, evenly micropunctate; basal surface with some scattered primary punctures, including ca 10 distinct punctures crenulating margin basolaterally, on either side.

Elytra broad, strongly evenly convex, anterodiscal area dipping to base; humeral surface slightly raised. Striae fine, well defined, more or less equidistant at base; stria punctures indistinct (at most very slight crenulations of stria edges noticeable). Interstriae virtually flat; interstria 1 with single row, others with two rows of distinct (pit-like) seta-bearing punctures (arranged on either side close to striae), setae short

(many are ca 5 times their punctural diameter), more or less erect; rows less distinct on lateral and distal declivities; interstriae surface shiny, with sparse, scattered micropunctuation. Epipleuron very wide in front, protuberant, surface smooth.

Prothoracic underside largely smooth, with sparse micropunctuation; postprosternal border marginate, bisinuate on either side, fitting well against mesothorax and elytra. Mesometasternal suture very distinct, widely arcuate; mesosternal and metasternal surface smooth, without distinct microsculpture. Abdominal sternites laterally nearly flat, surface smooth, microreticulate. Surface of pygidium smooth (indistinctly micropunctate-setose), shiny, slightly convex; general shape strongly transverse, height/width ratio over 0.5; apex marginate.

Protibia with two well-developed external denticles, their tips acute; proximal section of external side very slightly convex-curvilinear, serration obsolete; internal side slightly concave-curvilinear; tibial apex with slightly protuberant, microbristle-bearing underside; both upper- and underside of protibia with longitudinal ridge, inferior ridge feebly serrate; terminal spur fine, elongate-acuminate; protarsus slender, segments 1-4 subcylindrical, short, compact, segment 5 longer. Mesotibia complanate, strongly dilated distad, external side straight, slightly convex-curvilinear near distinct apico-external angle (which is rounded off); internal side very slightly sinuate; surface microreticulate, matt, surface and edges with numerous fine setae; mesotarsus slender, segments 1-4 short, compact, segment 5 longer. Metatibia complanate, more slender than mesotibia, with external side slightly convex-curvilinear to apico-external angle (which is rounded off); internal side almost straight; apico-internal angle produced inward, pointed; surface microreticulate, matt, surface and edges with numerous fine setae; metatarsus slender, segments 1-4 short (1 expanded, modified), compact, segment 5 longer. Femora all very slender, elongate, surface shiny, with sparse seta-bearing punctures.

Parameres tapering with truncate apex, figs.41, 45.

Material examined. – Holotype, male, labelled 'INDONESIA: SULAWESI UTARA/ Dumoga Bone N.P./ March 1985.' [printed], 'R.Ent.Soc.Lond./PROJECT WALLACE/ B.M. 1985-10' [printed], 'Flight / interception/ trap 1' [printed], '2.' [handwritten], 'Plot D, ca 400m/ Lowland forest' [printed+handwritten], and our *H. cambeforti* holotype labels (BMNH). Paratype, male [incomplete], N Sulawesi: Dumoga Bone NP: Toraut, 31/08/1985, J Huijbregts HH356, 234m, multistratal evergreen forest, window trap (RMNH).

Derivation of species name. – Dedicated to our ever helpful colleague Yves Cambefort (Paris).

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## APPENDIX I

## CHARACTER LIST AND SYNOPTIC TABLE

Characters and character states of *Haroldius* species

1. clypeus (shape of medial margin)
  1. with median excision, paramedian angles not projecting
  2. with median excision, paramedian denticles projecting
  3. evenly rounded medially (neither excised, nor dentate)
2. genal lobe (shape of lateral edge)
  1. rectangular (or nearly so)
  2. obtuse-angular
  3. obtuse-rounded
3. lateral edge of pronotum (dorsal view)
  1. widely arcuate or nearly straight
  2. distinctly angular halfway
4. pronotum (shape of basal edge)
  1. with base evenly arcuate
  2. with (medially rounded) basomedian expansion
  3. with distinct angular basomedian expansion
5. pronotum (modification basomedial surface)
  1. without transverse basomedian depression(s)
  2. with special small, superficial (but well delineated) basomedian area
  3. basomedially with distinct depressions
6. pronotum (sculpture of basolateral surface)
  1. (virtually) without basolateral striolation (at most with some crenulating punctures)
  2. with less than 14 basolateral striolae on each side
  3. with more than 14, densely arranged basolateral striolae on each side
  4. basolaterally with very dense, braided striolation, extending onto disc and/or anterior surface
7. pronotum (posterolateral angle)
  1. with simple posterolateral angle (and epipleuron not distinctly protuberant)
  2. posterolaterally 'hinged' with humeral protrusion of elytral epipleuron
8. pronotal sides (shape)
  1. normally steeply declivous
  2. distinctly depressed, margins explanate
9. elytron (basal dip)
  1. convex at base, in profile collinear with pronotum (or nearly so)
  2. in profile with pronotal-elytral dip
  3. distinctly depressed transversely
10. elytron (striae)
  1. with 8 distinct striae (juxtepipleural stria included)
  2. with 8 fine striae (juxtepipleural stria included)
  3. with striae effaced (or nearly so)
11. elytron (pilosity)
  1. glabrous, or with very few scattered setae
  2. with distinct, erect setae over most of interstitial length
  3. with distinct, erect setae limited to distal section of interstriae
12. elytron (reflection)
  1. more or less shiny
  2. distinctly matt (alutaceous or otherwise microsculptured)
13. elytral interstriae (rows of setae)
  1. 2-5 with single row of (sub)erect setae
  2. 2-5 with double row of (sub)erect setae
  3. 1-3 with single, from 4 with double row of setae
  4. with scattered setae
14. elytral punctures (aberrant shape or number of setae)
  1. with single seta
  2. at least partly with more than one seta
15. protibia with [number] denticles
16. protibial apex (shape)
  1. not expanded beyond apico-external denticle
  2. on underside expanded beyond apico-external denticle
17. mesotibia (length/width)
  1. dilated but relatively slender (with l/w ratio over 4)
  2. strongly dilated distally (with l/w ratio under 3.5)
18. metatibia (shape of dilated apex)
  1. dilated distally, with oblique (straight or concave) apex and apico-external angle
  2. dilated distally, with rounded apico-external edge (apex lobiform)
19. metatibia (terminal spur)
  1. with long terminal spur (*Larhodium*)
  2. with terminal spur reduced
20. male genitalia (details parameres)
21. body (size class)
  1. moderately small (usually 2.0-3.1 mm)
  2. large (usually over 3.1 mm)
  3. very small (under 2.0 mm)
22. body length ca [number] mm
23. forebody (main general colour)
  1. black (margins and legs may be lighter)
  2. brown
  3. yellow-brown
24. elytra (main general colour)
  1. black (margins and legs may be lighter)
  2. brown
  3. yellow-brown
25. legs (main general colour)
  1. black
  2. brown
  3. yellow-brown
26. metatibia (male) (apico-internal protrusion)
  1. without inward apico-internal projection
  2. with inward apico-internal projection
27. (distribution known range)
  1. Sundaland
  2. Sulawesi
  3. continental Asia

**Synoptic table**

Sundaland-Sulawesi *Haroldius* species and their listed character states. Explanation of symbols:

- [to] between numbers means: two states and transitions (may) occur
- x [absent value] means: state not scored (not known, or not applicable)
- & [and] means: more states (may) occur in same individual in same species
- / [or] between numbers means: more alternative states (may) occur in same species

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	22	23	24	25	26	27
1. <i>H. pauliani</i>	2	3	1	3	3	1	1	1	2-3	2	1	1			2	2	2	2	2	1	3.0	18&2	1	2	1	1
2. <i>H. samatranus</i>	2	3	1	2	1	2	1	1	2-3	1	2	2	4	1	2	2	1	1	2	3	1.7	2	2	2	2	1
3. <i>H. fairmairei</i>	2	1	1	1	2	1	1	1	1	1	2/3	1			2	2	1	2	2	3	1.5	3	3	3	1	1
4. <i>H. discoidalis</i>	2	1	1	1	2	1	1	1	1	1	3	1			2	2	1	1	2	1	2.0-2.4	2	1	2	1	1
5. <i>H. celebensis</i>	2	1	1	1	1	3	1	1	1	2	1	1			2	2	1	1	2	1	2.3	1	1	2	2	
6. <i>H. kolaka</i>	2	1	1	1	1	1	1	1	1	2	1	1			2	2	1	1	2	3	1.8	1	1	2	1	2
7. <i>H. borneensis</i>	2	1	1	1	1	3	1	1	1	3	3	1			2	2	1	1	2	1/3	2.0	2	1	2	1	1
8. <i>H. rugatulus</i>	2	1	1	1	1	1	4	1	1	1	2	1			2	x	1	1	2	1	2.5-2.8	1	1	2	1	1
9. <i>H. pahangensis</i>	2	1	1	1	1	1	3	1	1	1	2	2			2	x	1	1	2	1	2.6	1	1	2	1	1
10. <i>H. penelopae</i>	2	1	1	1	1	1	2	1	1	1	2	1	1	1	2	1-2	2	2	2	1/3	2.0	1	1	2	1	2
11. <i>H. tangkoko</i>	1	1	1	1	1	4	1	1	1	1	2	2	2	1	2	2	1	1	2	1/3	2.0	3	3	3	2	2
12. <i>H. cambeforti</i>	2	1	1	1	1	1	2	2	2	1	2	1	2	1	2	2	1	1	2	1	2.8-3.0	1	1	2	2	2
13. <i>H. maruyamai</i>	2	1	1	2	1	1	1	1	3	2	2	1	3	2	2	x	1	1	2	2	3.1-3.3	1	1	1-2	1	1

## BOOK REVIEWS

*continued from page 160*

For each species there is information on 'Life cycle and behaviour', 'Flight period and hibernation', 'Habitat', 'Mobility, distribution and trend', 'Conservation', and 'Future', all summarized in a 'Profile'. Finally, as mentioned above, there is a short English summary. The text is supplemented by distribution maps of Europe and the Netherlands (the latter covering the situation before 1981, between 1981 and 1994 and from 1995 to the present (or to extinction). Further, there are diagrams on life cycle, flight period, and trends over longer periods (where applicable, over 1900-2000, and 1992-2004). If only for the detailed information per species, this book should find a place on the shelves of every lepidopterist, in the Netherlands as well as in the countries surrounding it.

The design of the book is in accordance with the high standards of the series of which it is the seventh part. As with the other parts, the dust jacket is covered with parts of photos used in the book, composed into a mosaic pleasing to the eye. Unfortunately, this has not been done conscientiously in the case of the present book. Of course, it is not important, but one

would not expect to find fragments of non-Dutch butterflies (*Parnassius apollo*, *Pyrgus carthami*) on the cover. In addition to the other inaccuracies mentioned above this detracts from an otherwise important and beautifully designed book.

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[Rienk de Jong]