



The *Paussus* (*Scaphipaussus*) *lanxangensis* species group of Indomalayan ant nest beetles (Coleoptera, Carabidae, Paussinae, Paussini) with description of a new species

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Abstract

The new species *Paussus agatae* **sp. nov.** could not easily be allocated to an established subgenus or even species group. The informal *Paussus lanxangensis* species group is established to include the new species and other related species. Its diagnostic characters are described and screened for possible use in cladistic analyses in the future. Currently, it consists of five described species of the Indomalayan mainland, which are arranged in a key.

Key words: *Paussus agatae* sp. nov., key to species, new locality records, Southeast Asia, diagnostic characters, morphological characters

Introduction

The detection of a new species of *Paussus* L. raised the question of its taxonomic affiliation. It became soon evident that it could not easily be classified into an established species group or subgenus (Robertson & Moore 2016). The single specimen of the new species was found while scrutinizing many jars full of preserved small ants and other “UFOs” (unidentified flying and crawling tiny objects) from flight interception traps. The new species described in the following was part of the yield of the late Michel Brancucci’s expeditions to Laos (Geiser & Nagel 2013). A more comprehensive treatise was required to unravel the decisive characters and to reveal the taxonomic position.

The new species is part of a group of *Paussus* species, which share similar morphological features (*P. agatae* **sp. nov.**, *P. drumonti* Maruyama, *P. haucki* Bednařík & Bocak, *P. lanxangensis* Nagel, *P. wakaharai* Maruyama & Nakase). Most of these species were described only recently. The following account of the new species as well as the species already described focuses on the characters and character states not or insufficiently treated in the original descriptions. The aim of the present study is, hence, to point to a new, informal group of species in order to focus future research on revealing relationships possibly allowing to recognize a new monophylum.

Material and methods

The first described species of the group is *Paussus lanxangensis* Nagel, 2009. Single specimens of the name-giving species and the new species are available from NMB and my own collection (CN in BGUB). All of them are dry mounted specimens. The original description of *P. lanxangensis* includes a detailed illustration of the male holotype. Information on other material was drawn from published accounts (Maruyama & Nakase 2023; Bednařík & Bocak 2023). Technical terms of body parts are mostly self-explanatory, sometimes used with reference to own publications (e.g., Nagel 2016), to revisionary works (e.g., Maruyama 2016) or to the comprehensive phylogenetic analysis of *Paussus* s.l. (Robertson & Moore 2016).

The mouthparts are partly sunk into the head capsule. An extensive destruction of the head capsule would have resulted from a detailed examination and description of the mouthparts. This was not done given the availability

of only one single specimen. Consequently, certain morphological details were not studied. The chaetotaxy of the ligula, the shape of the anterior margin of the ligula, or the setation of the lacinia were found to be important traits in the classification of subordinate taxa of the genus *Paussus* L. (Robertson & Moore 2016).

Conventions:

In the present text, names of taxa such as Sg. *Scaphipaussus* refer always to the revised status and new meaning as published by Robertson and Moore (2016) unless explicitly defined otherwise.

Measurements:

ACL Length of antennal club
BL Body length (anterior margin of head to apex of elytra)

Abbreviations:

DP Date of publication (cf. Bouchard *et al.* 2024 and further general references listed therein). It is instrumental in recognizing priority of taxonomy publications of the same year.

Acronyms (Depositories of specimens):

BGUB: Biogeographische Sammlung der Universität Basel, Switzerland (CN: Collection of P. Nagel).
I.R.Sc.N.B.: Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium.
NHMB [formerly used acronym] Naturhistorisches Museum Basel / Natural History Museum of Basel, Switzerland.
NMB [currently used acronym] Naturhistorisches Museum Basel / Natural History Museum of Basel, Switzerland.
KUM: Coll. M. Maruyama at the Kyushu University Museum, Fukuoka, Japan.
MBC: Michal Bednařík collection, Olomouc, Czech Republic.
NMPC: National Museum Prague, Czech Republic.

Taxonomic account of included species

Paussus agatae sp. nov.

Holotype. Female and single specimen, here designated: Dry mounted, glued to pinned card. Head and antennae with scapes detached and glued to the same card. BL 3.8 mm.

The following labels are pinned with the specimen:

Small, vertical rectangular label, black printing: ♀

White rectangular label (black handwriting): *Paussus agatae* sp. nov.

White rectangular label (black handwriting): NHM Basel

Red quadrat label (black handwriting): *Paussus agatae* sp. nov., P. Nagel 2021 HOLOTYPE

Two white rectangular labels, black printing, as shown in Fig. 1.

Depository: NMB

Type locality and additional information: Northwestern Laos, Bokeo Province, Houaixai district, 5km W of Ban Toup, Bokeo Nature Reserve, 500–700 m a.s.l., 20°27–28'N 100°45'E, 4–18 May 2011, leg. Natural History Museum Basel, Laos 2011 expedition Michel Brancucci, Michael Geiser, David Hauck, Zdeněk Kraus, Any Phantala, Elawan Vongphachan.

Habitat: Primary lowland evergreen dipterocarp forest, patches of secondary forest and small agricultural areas (Geiser & Nagel 2013). Captured in a flight interception trap, i.e., the specimen was probably flying at low height above ground.

Etymology: Named for Mrs. Agata Luka Stan, Research Institute of Organic Agriculture (FiBL), Frick, Switzerland, who, on behalf of the Natural History Museum of Basel, Switzerland, and with support of the foundation Pro Entomologia, Basel, searched for months many jars full of preserved tiny arthropods from flight interception traps. The specific epithet is a proper noun in the genitive case, derived from the given name “Agata”.

LAOS, Bokeo prov., 5 km W
Ban Toup, Bokeo Nature
Reserve. 500-700 m,
20°27-28' N / 100°45' E
4.-18.V.2011

NHMB Basel
Laos 2011 Expedition
M. Brancucci, M. Geiser,
D. Hauck, Z. Kraus
A. Phantala & E. Vongphachen

FIGURE 1. Original labels (20 X 10 mm each) pinned with holotype specimen of *P. agatae* sp. nov..

Description (Figs 2, 3)

Body yellowish-brown with the following areas infusate (dark brown to blackish, not sharply delimited): disc of elytra, lateral flanks of pronotum, frontal margin of head, dorsal and ventral disc of antennal clubs, external antennomeres 1 (scapes), proximal two thirds of all femora. Glossy parts restricted to posterior parts of vertex cavity, central part of transverse pronotal furrow, pygidial disc, and tibiae.

Dorsal head 1.3 times wider than long, almost as wide as the pronotum, temples large, evenly rounded towards neck constriction, not projecting beyond eyes, frontal margin sinuate. Dorsal head with rough surface, coarsely granulated, and with four deep excavations. Frontal excavation carving the frontal margin. Two laterodorsal excavations with coarse surface. Central posterior excavation indicating a stigmatoid fusion of ancestrally free lateral plate-like structures. Basal surface of the latter excavation smooth, even, impunctate and glossy.

Antennal club as shown in Fig. 2 (female! male unknown). Dorso-ventrally little compressed, 1.9 times longer than wide at dorsal view with anterior (inner) margin slightly and evenly convex and posterior (exterior) margin slightly and evenly emarginate. At hind view, antennal club excavated at little more than the proximal half of its length. At dorsal view, posterior basal angle little pronounced, forming a short, rounded projection.

Mouthparts (cf. Robertson & Moore 2016) as shown in Fig. 3. Maxillary palpomere III (penultimate palpomere) not distinctly wider than following (terminal) palpomere IV. Length of maxillary palpomere II (third from last) 0.26 mm. The labial palpomeres are not distinctly wide, flattened and spade-shaped. The terminal labial palpomeres are elliptic, with distal two thirds tapering. Tip diminutive. Lateral lobes of mentum broadest at basis, lateral margins slightly sinuate, not straight. Width/length ratio of gula at narrowest point 0.4 (Character 15, state S2 in Robertson and Moore (2016), Table S2. N.B.: here measured at original detached head capsule at plan view of posterior part, not taken from Fig. 3).

Pronotum slightly wider than long (1.13 times), divided by a deep transverse furrow, equipped with one small trichome brush each at both lateral ends. Frontal portion laterally projecting with angles broadly rounded. Hind portion with two large, blunt, central tubercles set left and right of the middle. Medial oblong depressions at fore and hind part shining.

Legs with tibiae moderately compressed, widened towards distal margin, especially at hind tibiae. Exterior margin of all tibiae rounded, outer apical angles rounded, not produced. Tibiae without terminal spurs. Tarsi with tarsomeres 1 to 4 subequal, ventrally with scattered bristles (adhesive pads absent). Infusate section of dorsal hind femora with transverse, slightly curved to straight, densely arranged, narrow, low and blunt ridges (see Fig. 2). This structure is larger and independent of the proximally adjoining small area of the stridulatory file.

Stridulatory organ: Basically as shown for Gen. *Paussus* in general (Di Giulio *et al.* 2014). The stridulatory file is a well demarcated, finely and densely ridged small area at the basal part of the dorsal femur. The micro-ridges of the file are orientated longitudinally along the axis of the femur, as usual. The scraper appears to be different from the exemplary *Paussus favieri* Fairmaire, 1851 (cf. Di Giulio *et al.* 2014) with regard to the low number of the spines and their wider spacing (less than 10 in *P. agatae* sp. nov. versus 25–30 in *P. favieri*, loc.cit., p. 695). One has to consider, though, that these characters are highly variable in *Paussus* (Di Giulio *et al.* 2014, p. 695), that the study of the organ was technically difficult and the details given here are, hence, of limited significance.

Scutellum with apex rounded, finely shagreened.

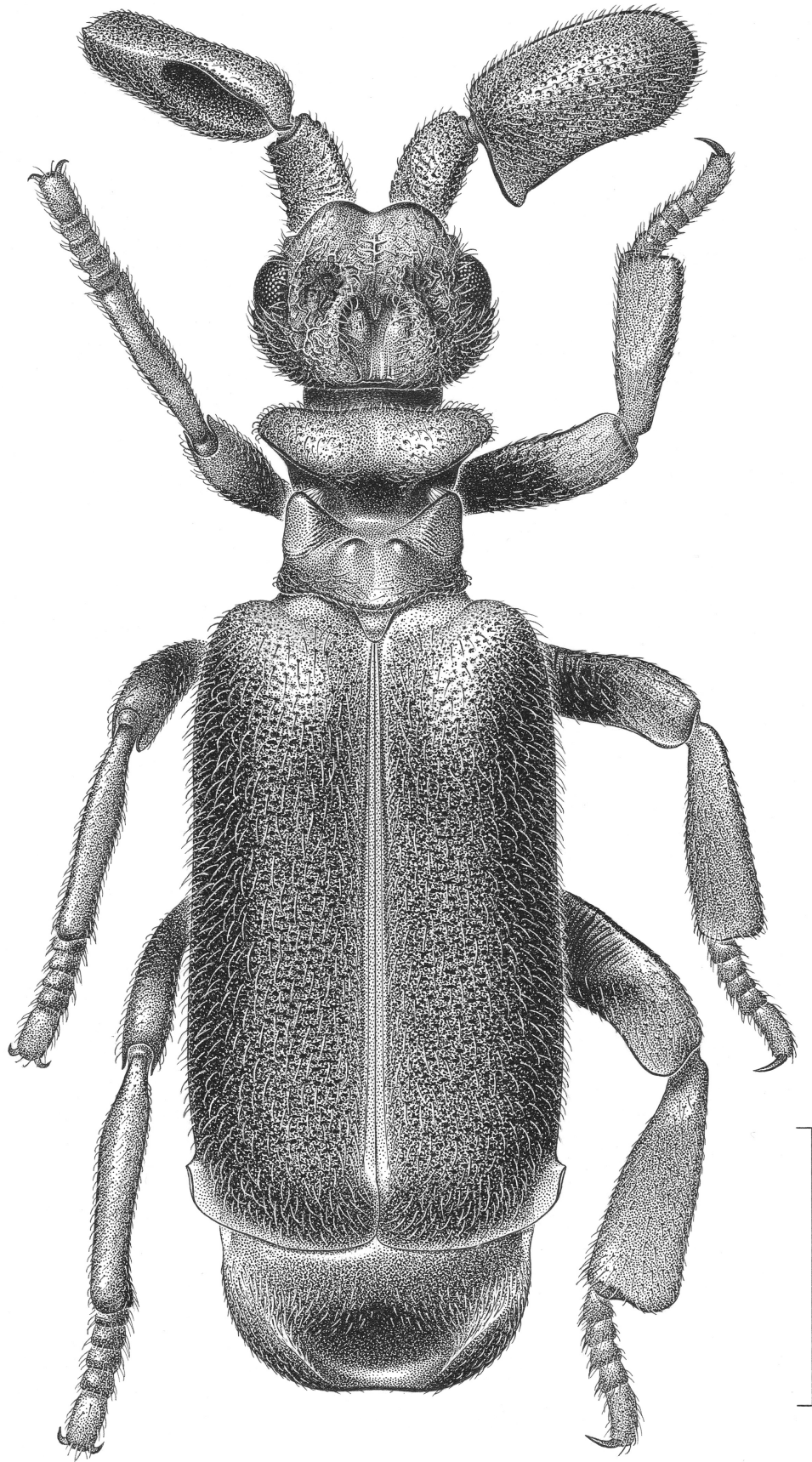


FIGURE 2. *Paussus agatae* sp.n., female holotype, habitus, dorsal view with pygidium artificially shown at plan view (originally strongly declined). Femora and tibiae of right and left side are shown at broadest and narrowest view respectively. Scale 1 mm. Illustration: Armin Coray, Basel.

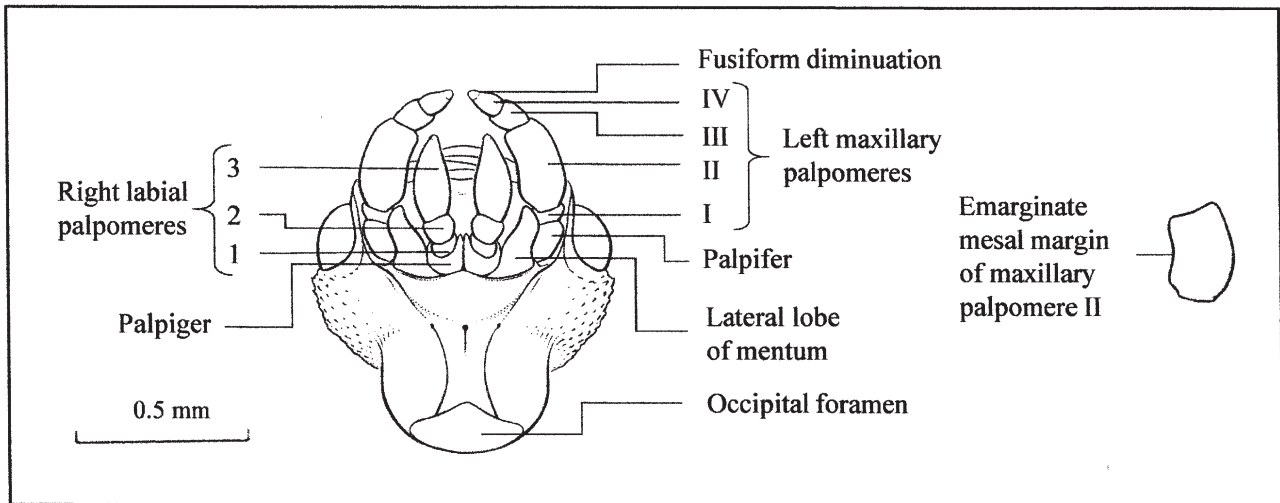


FIGURE 3. *Paussus agatae* sp. nov., female holotype, head, mouthparts, ventral view. Inset: Left maxillary palpomere II, ventral view, slightly distorted to show broadest view, with emarginate mesal margin and slightly convex outer margin. Scale 0.5 mm. Illustration: Armin Coray, Basel.

Elytra: Dorsal disc with dense punctuation, distance between neighboring punctures ca. 1 puncture at minimum. Pubescence of medium length, proximally upright to distally curved setae.

Hind wings visible through cleft of the dehiscent elytra, fully developed.

Pygidium excavated, bottom glossy, dorsolateral margins at both sides explanate, upturned, and bent towards the disc. Marginal trichome fringe absent.

Measurements: Body length from anterior margin of head to apex of elytra 3.8 mm. Elytra 1.7 times as long as wide (= length from anterior margin of shoulder to apex divided by total width of both elytra). Antennal club 0.84 mm long, twice as long as wide.

Differential diagnosis

For technical reasons not all decisive characters could be studied (see chapter Material and Methods above). Based on the major revision of the large genus *Paussus* L. (Robertson & Moore 2016) the new species matches the criteria of the clade “*Paussus* II series” and the criteria of the subgenus *Scaphipaussus* Fowler *sensu* Robertson and Moore (2016) almost without restriction. One difference is found in the absence of two cephalic openings in *P. agatae* sp. nov. (yet with vestiges present, although convergent evolution and subsequent reduction cannot be excluded).

A second main difference is the emarginate mesal margin of maxillary palpomere II (Fig. 3). This character state was not mentioned for either Sg. *Paussus* or Sg. *Scaphipaussus* (cf. Robertson & Moore 2016) and should be checked for a possible species-specific autapomorphic character state. The emargination is not distinctly sinuate and it lacks the “distinct incision just beyond midpoint” (loc.cit., table S2, morphological character and state 25-2, present in Sg. *Paussus*). The morphological character 25, state S1 (Robertson & Moore 2016) does not distinguish between mesal margin straight, slightly concave or rounded. Only *P. klugi* (Sg. *Klugipaussus*) was explicitly mentioned as an example of a slightly concave mesal margin of maxillary palpomere II.

Additionally, the construction of the maxillary palpomeres is different from Sg. *Paussus* in not having an enlarged maxillary palpomere III (Fig. 3). Given the current most comprehensive and parsimonious phylogenetic hypothesis (Robertson & Moore 2016) *P. agatae* sp.n. is classified as a member of Sg. *Scaphipaussus* Fowler, 1912.

The new species differs from its most similar congeners (*P. lanxangensis*, *P. haucki*, *P. wakaharai*, *P. drumonti* = members of the *P. lanxangensis* species group) by the construction of the antennal club, see key below. It also differs from *P. drumonti* by the distinctly elevated vertex and the considerably enlarged and projecting outer apical angle of the hind tibia of the latter. It differs from *P. lanxangensis* in the larger body size of the latter, in the relief of the dorsal head and in the shape of the pygidial margin (see next line).

The morphological character 82, state S0 (loc.cit.), is present in *P. agatae* sp.n. as well as in *P. haucki*, *P. wakaharai*, and *P. drumonti*, while in *P. lanxangensis* the broad explanate margin is not upturned and bent towards the middle.

The new species is herewith allocated to the new *P. lanxangensis* species group and, hence, to Sg. *Scaphipaussus*.

***Paussus lanxangensis* Nagel, 2009 [DP 28 Dec 2009]**

Type locality: NE Laos, Xieng Khouang prov., Pek district, 19°38.2'N 103°20.2'E, Ban Na Lam to Phou Sane Mt., 20.–30.v.2009, 1420 m. Secondary tropical montane forest, flight interception trap, D. Hauck leg., Laos 2009 expedition NHMB Basel [M. Brancucci], NMPC Prague (Geiser & Nagel 2013).

BL: 4.3 mm (male)–5.0 mm (female)

Material examined (details below): Holotype male (Laos, NMB), one female Laos, Louang Phrabang prov. (Coll. Nagel in BGUB)

Localities (includes additional records):

LAOS, male, Xiengkhouang prov., type locality, see above.

LAOS, female, Khammouane prov., Nakai env., 17°43'N 105°09'E, 22.v.–8.vi.2021, 500–600 m a.s.l., E. Jendek & O. Šauša leg. (Maruyama & Nakase 2023).

LAOS, female, N-Laos, Louang Phrabang prov., Ban Song Cha (5 km W), 20° 33,4'N 102°14'E, 1200 m, leg. C.Holzschuh, *P.lanxangensis*, det Nagel 2011, ex Coll. C.Holzschuh, Coll.Nagel in BGUB,

THAILAND, male, Chiang Mai, Mae Rim, Ban Pong Yaeng Nai, 2.–5.v.2013, M. & K. Kawahara leg., dto., female, 8.v.2013, K.Takahashi leg. (Maruyama & Nakase 2023).

THAILAND, male, Chiang Mai, Samoeng, Ban Ang Khai, 12.–20.v. 2003, M.Maruyama leg. (Maruyama & Nakase 2023).

The original description is here amended with data identified as relevant during the phylogenetic analysis (Robertson & Moore 2016), yet see chapter “Materials and Methods” for limitations. Antennomere 1 (scape) subapically without trichome brush. The lateral lobes of the mentum broadest at base, the outer margin almost straight, the mesal margin convex. The maxillary palpomere II is large and explanate, with its mesal margin faintly emarginate, almost straight. The penultimate maxillary palpomere is not distinctly broader than palpomere IV. Labial palpomere 2 with socket for palpomere 3 is not shifted to the outer margin of palpomere 2. Terminal labial palpomere slightly flattened, of oval shape with acute tip as originally described (Nagel 2009). Ligula ventrally with short longitudinal, blunt carina. Pygidium with marginal trichome fringe absent, originally described and here confirmed. Pygidium marginally broadly explanate, not bent inwardly as in *P. agatae* sp. nov..

***Paussus wakaharai* Maruyama & Nakase, 2023 [DP 15 July 2023]**

Male holotype specimen only.

Type locality: Laos, Xiengkhouang prov., hot spring, 25 km SE of Ban Ban, 19°33'24.09"N 103°41'26.17", 570 m a.s.l., 28 iv–2 v 2014, Y.Nakase leg.

Depository: KUM

BL 3.95 mm.

The slight discolouration of the specimen was attributed by the original authors to a possible effect of the preservation fluid or to the possibility that the specimen was teneral. The latter seems at least equally probable because the illustration of the specimen displays several edges at the antennal club which may have well resulted from shrinking. This interpretation is supported by the remark that the holotype specimen has a fragile condition (Maruyama & Nakase 2023, p. 1).

The marginal pygidial trichome was described as absent. The original description of the pubescence of the scape (antennomere 1) does not mention a subapical trichome brush. The authors classify the new species as “allied to *P. lanxangensis* Nagel, 2009” (Maruyama & Nakase 2023, p. 1, title of account, see also introduction). Perhaps due to the fragile condition, no data were given on details of the mouthparts. The new species was not allocated to a subgenus or species group of *Paussus*.

***Paussus haucki* Bednařik & Bocak, 2023 [DP 14 Dec. 2023]**

Female holotype specimen only. The original authors classify the species as part of Sg. *Scaphipaussus*.
Type locality: NE Thailand, Loei prov., Phu Ruea N.P., 17°30'N 101°21'E, 1100 m, 6–9 April 1999, D. Hauck leg.
Depository: MBC.
BL 4.2 mm.

Although there is no specimen of either *P. wakaharai* or *P. haucki* available to the present study, the original descriptions and illustrations reveal just weak and possibly non-essential differences between the two holotype specimens. *Paussus wakaharai* and *P. haucki* were published almost simultaneously with the latter published half a year later.

The original description of *P. haucki* does not include information on the mouthparts. The description of the pygidium indicates that the marginal semicircular trichome is most probably absent.

According to the original descriptions there seem to be possibly gradual differences between *P. wakaharai* and *P. haucki*: Antennal club with posterior excavation absent in *P. wakaharai* and vertex with large medial tubercle. In *P. haucki* the antennal club shows a “posterolateral cavity” and vertex “with pair of curved ... vertical shields” (Bednařik & Bocak 2023, pp. 21, 22). The possible presence of the latter character in *P. wakaharai* is suggested by the description and illustration (Maruyama 2023). The probably shrunk antennal club of *P. wakaharai*, the non-teneral condition of *P. haucki* and a possible sexual dimorphism (female *P. haucki* versus male *P. wakaharai*) might sufficiently explain the differences. Consequently, *P. haucki* might turn out to be a younger synonym of *P. wakaharai* Maruyama & Nakase, 2023.

Future findings of non-teneral specimens each with the alternative sex will help to clarify the factual situation.

***Paussus drumonti* Maruyama, 2014 [DP 31 Mar 2014]**

Female holotype only.
Type locality: Thailand, Na Haeo, Malaise trap, 22–29 v.2003, leg. P.Grootaert, Coll. IRScNB
Depository: I.R.Sc.N.B. Institut Royal des Sciences Naturelles de Belgique, Bruxelles.
BL 3.84 mm

The habitus of this species is unique for *Paussus* s.l. with regard to almost all body parts. The description of antennomere I (scape) does not indicate the presence of the anterolateral trichome brush. Although, Figs 1–3 show subapical structures that could be interpreted as small tubercles or a trichome brush (a character state normally present in species of the *P. jousselinii* group, Sg. *Paussus*). The maxillary palpomere II (= third from last) is described as large, compressed, but the shape of the medial margin (straight, emarginate or convex) was not indicated. The illustration of the penultimate maxillary palpomere (Maruyama 2014, fig. 2) does not indicate that it is “distinctly wider” than the terminal maxillary palpomere (Robertson & Moore 2016). The terminal labial palpi are described as “slightly compressed, oblong oval with acute tip” (Maruyama 2014). The pygidium is described with marginal trichome fringe absent. Most criteria are characteristic of Sg. *Scaphipaussus*.

Key to species of the *Paussus lanxangensis* species group (Figs 2, 3)

Note: *P. wakaharai* and *P. haucki* cannot be separated for the purpose of a general key because non-teneral specimens of both sexes are not available for study (see notes of the taxonomy section above and the description of the group below).

- 1 Antennal club at dorsal view with posterior basal angle little pronounced, forming a short, rounded projection (female! male unknown). Antennal club dorso-ventrally little compressed, 1.9 times longer than wide, at dorsal view with anterior (inner) margin slightly and evenly convex and posterior (exterior) margin slightly and evenly emarginate. At hind view, antennal club excavated at little more than the proximal half of its length. ***agatae* sp.n.**
- Antennal club with oblong, distinctly marked and clearly projecting posterior basal tooth 2

- 2 Antennal club dorso-ventrally distinctly compressed, dorsally and ventrally complanate or slightly depressed. Antennal club 2.3 (male) or 1.9 times (female) longer than wide (basal tooth not considered), Antennal club in both sexes with hind (exterior) margin straight, with well-marked narrow furrow from basal tooth to short distance before reaching apex, dorsal margin of furrow explanate and narrowly projecting posteriad *lanxangensis*
- Antennal club not flattened dorsally and ventrally. 3
- 3 Antennal club distinctly inflated, basal margin with posterior angle compact with robust extension, apical end of posterior margin with large, acute tooth. Posterior margin with deep, subcircular, medial hollow. Mesotibiae compressed, with outer apical angle acutely toothed. Hind tibiae compressed, apically dilated, posterior apical angle markedly produced into a large, spur-like protuberance (female!, male unknown). *drumonti*
- Antennal club slightly compressed, ventrally with distinct hump at proximal part, antennal club 1.8 times longer than wide, without apical tooth. Antennal club at dorsal view with hind margin emarginate *wakaharai / haucki*

The *Paussus lanxangensis* species group

Important morphological structures just as the ligula or the lacinia could not be studied because only a singleton (*P. agatae* sp.n.) or very few specimens (*P. lanxangensis* male holotype and one single female) were available for the present treatise. Destructive dissection was avoided. Other characters of the mouthparts (maxillary palps, labial palps) could not be used for all species in this study because the original descriptions of *P. wakaharai* (Maruyama & Nakase 2023) and *P. haucki* (Bednařik & Bocak 2023) did not provide this information.

The text and illustration of the original description of *P. drumonti* describes the maxillary palpomere II as “large, compressed” (Maruyama 2014) but does not inform if its “mesal margin ... is strongly rounded or more or less straight” as in *Scaphipaussus* (Robertson & Moore 2016, pp. 29, 32, 33). The importance of several characters became only known as a result of the recent revision of *Paussus* L. (Robertson & Moore 2016). Publications that were issued earlier or contemporarily with the revision could not yet consider these criteria and their authors described the standard traits of the taxon instead.

I use the term “species group” for an informal, phenotypically denoted taxon. The term clade is reserved for a prospective proven monophylum (lineage).

Description of the group (diagnostic, phenotypical characters):

Small to very small species, BL 3.8–5.0 mm.

Head wider than long. Head approximately of same width as the pronotum, or little or considerably narrower than pronotum. Eyes small, temples large. Head with stigmatoid vestige of a short elongate opening at medial vertex.

Antennal club strongly inflated to oblong lens-shaped, posteriorly with roundish to elliptic cavity or with narrow longitudinal furrow. Basal margin uninterrupted, without central incision or semi-transparent impression.

Terminal labial palpomeres not distinctly spade-shaped.

Pronotum with deep transverse furrow with small dorsolateral trichomes. Anterior part of pronotum broader and much higher than posterior part. Posterior part of pronotum deeply excavated in the middle. Two prominent tubercles behind the transverse excavation at both sides of a longitudinal furrow.

Pygidium excavated, with posterior dorsal or latero-dorsal margins explanate, sometimes blade-like and upturned, and bent inwardly in some species. Pygidial disc even, smooth, and glabrous. Marginal pygidial trichome absent.

Tibiae slightly compressed, not edged, margins rounded. Tibiae widened towards apex, exterior apical angle not or little pronounced, apically rounded, rarely rectangular (*P. drumonti* excepted, see key above).

Elytral lateral trichome (serially arranged setae) absent.

The group lacks falciform ridges or crests at the dorsal head. It also lacks elytral mirror markings (present at most species of the *Paussus (Scaphipaussus) hystrix* group (Maruyama 2016; Bednařik & Bocak 2023) and the rounded elytral patches as well as the subapical trichome of antennomere 1 (scape) of the *Paussus (Paussus) jousselinii* group (Nagel 2016; Robertson & Moore 2016).

Distribution: Southeast Asian mainland, and most probably an Indomalayan endemic.

The group is characterized by the distinctive characters of the *Paussus* series II (see above) and the following possible common traits (candidates for common derived character states):

- Head with stigmatoid vestige of short elongate opening at medial vertex.
- Pygidial disc smooth, glabrous and shining, positioned at the bottom of a hollow or large excavation.
- Maxillary palpomere II not subcylindrical but large, explanate, with mesal margin sinuate, faintly emarginate or almost straight, but not convex.

The group is classified as part of genus *Paussus* L., and as a member of the clade “*Paussus* series II” in the latest revision (Robertson & Moore 2016). Most probably, it forms part of the subgenus *Scaphipaussus* Fowler, see checklist below.

The recent revision (Robertson & Moore 2016) listed two taxa near or in Sg. *Scaphipaussus* for which an exact placement could not be demonstrated with sufficient certainty: *P. ghanensis* Luna de Carvalho and *P. nr. leechi* Luna de Carvalho were both classified as “*incertae sedis*” of the “*Paussus II series*”. I checked specimens of *P. cochlearius* Westwood (Zimbabwe, CN) (part of the same species group as *P. leechi*) and *P. ghanensis* (Benin, CN) for characters that possibly indicate similarity beyond phenotypy with the *P. lanxangensis* species group, yet did not find any.

Equally small *Paussus* exist in other species groups and subgenera, such as the *P. jousselinii* group (Sg. *Paussus* L.) (*P. wittei* Reichensperger, 1950), the *P. cucullatus* group (Sg. *Hylotorus* Dalman, 1823) (*P. minutulus* Nagel & Rasool in Abdel-Dayem *et al.* 2019), or the *P. hystrix* group (Sg. *Scaphipaussus*) (*P. kecil* Maruyama, 2016). Therefore, the small size is not a good diagnostic character of the group.

The group could not yet convincingly be established as a clade, because not all or most species could sufficiently be studied with regard to some of the more relevant morphological characters, such as the ligula or the lacinia. The small number of species and specimens also prevented the application of a proper cladistic analysis.

It could, however, be demonstrated that the *P. lanxangensis* species group is a promising candidate for a new monophylum nested within the subgenus *Scaphipaussus* sensu Robertson and Moore (2016). Future research will have to consider this aspect.

Taxonomy and Checklist of the *P. lanxangensis* group:

Genus *Paussus* Linnaeus, 1775

Paussus II series sensu Robertson and Moore (2016, e.g., p. 164).

Subgenus *Scaphipaussus* Fowler, 1912, p. 472. Type species: *Paussus boysii* Westwood, 1845, p. 177 by subsequent designation of Jeannel (1946, p. 74) (see Lorenz 1998, Nagel *et al.* 2017).

Paussus lanxangensis Nagel, 2009 species group (informal taxon, here designated).

Included taxa: The group is currently comprised of five described species, of which one is possibly a subjective synonym of an earlier described species:

Paussus lanxangensis Nagel, 2009, LAOS, THAILAND (Classification of species as Sg. *Scaphipaussus* by Robertson & Moore 2016).

Paussus drumonti Maruyama, 2014, THAILAND (Classification of species as Sg. *Scaphipaussus* by Robertson & Moore 2016).

Paussus wakaharai Maruyama & Nakase, 2023, LAOS (Classification of species as Sg. *Scaphipaussus* by the present treatise) (Possible synonymy with *P. haucki*).

Paussus haucki Bednařik & Bocak, 2023, THAILAND (Classification of species as Sg. *Scaphipaussus* by Bednařik & Bocak 2023) (Possible synonymy with *P. wakaharai*).

Paussus agatae sp. nov., LAOS (Classification of species as Sg. *Scaphipaussus* by the present treatise).

The high percentage of convergent traits in Paussini and in *Paussus* in particular (Moore & Robertson 2014; Robertson & Moore 2016) does not allow to easily reveal the evolutionary history of the *P. lanxangensis* species group. Cladistic approaches and technical tools (relevant software, for example) could be applied once sufficient material is available.

Integrative taxonomic studies (i.e., including molecular studies of appropriately treated material) would contribute significantly to discriminate synapomorphies, symplesiomorphies, or random homoplasy. This, in turn, would help to reveal the phylogeny of the respective taxa. An example was recently elaborated, using a powerful tool (Robertson & Moore 2016).

Conclusions

A new species group of small species of the Sg. *Scaphipaussus* is introduced and defined, similar to the Indomalayan *P. hystrix* and *P. jousselinii* species groups. Possibly due to their small body size only few specimens and species were recorded, compared to the majority of other *Paussus* species of the region. The following combination of traits characterizes this species group within Sg. *Scaphipaussus*:

- Small body size of ≤ 5 mm.
- Head with stigmatoid vestige of short elongate opening at medial vertex.
- Maxillary palpomere II large and explanate, with mesal margin not convex.
- Basal flagellar notch or its vestige absent.
- Elytral lateral trichome (serially arranged setae) absent.
- Pygidium with hind margin explanate and upturned semi-circular or with median interruption.
- Pygidial marginal trichome (serially arranged setae) absent.

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