

A New Species of the Genus *Aesalus* (Coleoptera, Lucanidae) from the Malay Peninsula^{1, 2)}

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Abstract A new species of the lucanid genus *Aesalus* is described from the mountain region of the Malay Peninsula under the name *A. hidakai*. This species closely resembles *A. timidus* KRIKKEN, but is readily distinguished from the latter by the following characters: abdominal sternites without sulcus; third to fifth abdominal sternites with semicircular depressions along anterior margin; anterior margin of head with a small triangular projection at middle. A key to the Old World species of the genus *Aesalus* is also provided.

The genus *Aesalus* FABRICIUS, 1801, consists of ten known species from both the Old and New Worlds. The Old World *Aesalus* includes *A. scarabaeoides* (PANZER, 1794) from central and northern Europe, *A. ulanowskii* GANGLBAUER, 1886, from Caucasus, *A. daghestanicus* DIDIER et SÉGUY, 1953, from Dagestan in Caucasus, *A. himalayicus* KUROSAWA, 1985, from Nepal and West Bengal, *A. asiaticus* LEWIS, 1883, from Japan, *A. imanishii* INAHARA et RATT, 1981, from Formosa, and *A. timidus* KRIKKEN, 1974, from the Sunda Islands and the Malay Peninsula (ARAYA & OCHI, 1992). On the other hand, three species of the genus *Aesalus* have been known from the New World: *A. trogoides* ALBERS, 1883, from Mexico; *A. smithi* BATES, 1889, also from Mexico; *A. neotropicalis* BATES, 1889, from Guatemala.

During our 1992 expedition to the Cameron Highlands, Malay Peninsula, several larvae of an *Aesalus* species were collected from a fallen log at Gunung Jasar. Through a rearing in the laboratory in Kyoto, three of them (two males and one female) have emerged to adults. Unfortunately, two of them (one male and one female) failed in emergence. Their elytra were partly deformed, but the other morphological features were normal.

In general appearance, these *Aesalus* beetles closely resembles *A. timidus*, the only

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Aesalus species known from Southeast Asia. After a careful examination, however, it has become apparent that this species is new to science. Later, we found three additional specimens of this species from Tanah Rata, Cameron Highlands, Malay Peninsula, among the specimens labelled "*Aesalus timidus*" in the entomological collection of the National Science Museum (Natural History), Tokyo. Thus, in this paper, we are going to describe the new species on the basis of these specimens.

Materials and Methods

Specimens examined. A total of six specimens of the new *Aesalus* species in question were examined. Four of them are dried specimens, and the other two (having deformed elytra) are preserved in 70% ethanol. Morphological comparisons were made with all the Old World *Aesalus* species except *A. daghestanicus*. We omitted *A. daghestanicus* from the comparisons because no specimen of this species was available for this study. The specimens compared are listed below (all dried specimens). The list includes new records for *A. timidus* and some data corrections of the type series of *A. himalayicus* and the other specimens which were erroneously reported in the original description (KUROSAWA, 1985). The acronyms for the entomological collection of the Department of Zoology, National Science Museum (Natural History), Tokyo, Department of Zoology, Kyoto University, and the personal collections of T. OCHI, T. ÔBUCHI, and the senior author, K. ARAYA, are NSMT, KUZ, TOC, TOB and KA, respectively.

- A. scarabaeoides scarabaeoides*: 2 ♂♂, Bois-de-Pau, France, V-1979 (TOC); 1 ♂, 1 ♀, Bohemia, Czecho-Slovakia, 2-IX-1979 (TOB); 1 ♂, Budapest, Hungary, 4-IV-1965, E. KISMARJAY leg. (NSMT); 1 ♂, Köln, Germany (no detailed data) (NSMT); 1 ♂, Raciec-B. c., VI-1968, SMRZ leg. (NSMT).
- A. ulanowskii*: 1 ♂, Ritsa Lake, Abkhasia, Caucasus, 25-V-1981, K. GASKÓ leg. (KUZ).
- A. himalayicus*: 3 ♀♀ (holotype and two paratypes), Kalapokhri (alt. 3,000 m), Singalila Dara, E. Nepal, 2-X-1983 (corrected from 1984), Y. NISHIKAWA leg. (NSMT); 1 ♂ (corrected from 1 ♀), Deorali, 3,200 m – Kuldi 2,800 m, nr. basecamp of Mt. Machhapuchhale, Central Nepal, 21-X-1981 (corrected from 20-X-1981) M. SAKAI leg. (NSMT); 1 ♀, Thakham (3,350 m), Singalila Ridge, West Bengal, India, 4-X-1983, M. SAKAI leg. (NSMT).
- A. asiaticus asiaticus*: 1 ♂, Ôaku-dani, Hakone, Kanagawa Pref., Japan, 9-X-1982, T. ÔBUCHI leg. (TOB); 1 ♂, Mt. Narahara-yama, Ehime Pref., Japan, 4-III-1976, T. ÔBUCHI leg. (TOB); 1 ♂, Mt. Kujuh, Ohita Pref., Japan, 25-XI-1973, H. IRIE leg. (NSMT); Koganesawa, Yamanashi Pref., Japan, 30-V-1980 (NSMT); 1 ♀, Oku-Tama, Tokyo, Japan, 17-V-1955, Y. KUROSAWA leg. (NSMT); 1 ♂, Shôbuhama, Nikko, Japan, 25-VII-1941 (NSMT); 1 ♂, Hase, Yamato, Japan, 15-VII-1958, T. SHIBATA leg. (NSMT); 1 ♂, Jin-ja-Yama, Sapporo, Japan, 14-XI-1939 (NSMT).

- A. asiaticus sawaii*: 1 ♂, 1 ♀, Ôko, Yakushima-Island, Kagoshima Pref., Japan, 9-V-1992 (collected as larvae; adult emergence in VIII-1992), K. ARAYA leg. (KA); 1 ♂, 1 ♀, ditto, 8-V-1992 (collected as larvae; adult emergence in VIII-1992), K. ARAYA leg. (KUZ).
- A. imanishii*: 1 ex., Sunkang, Taiwan, 23-III-1974, O. IMANISHI leg. (TOC); 1 ex., ditto, 23-III-1974, O. IMANISHI leg. (NSMT); 1 ex., ditto, 1-X-1986, T. OCHI leg. (TOC); 1 ex., Meifeng, Taiwan, 6-IX-1981, YU Ching-Jin leg. (NSMT).
- A. timidus*: 1 ex., Maxwell's Hill, Malay Peninsula, 5-III-1974, Y. KIYOYAMA leg. (NSMT); 1 ♀, ditto, 1-IV-1979, T. OCHI leg. (TOC); 1 ♂, 1 ex., Khao-chong, C. Thailand (new record), 24~27-VI-1965, K. MORIMOTO leg. (NSMT); 1 ex., Headquarters (alt. 1,500-1,700 m), Mt. Kinabalu, Sabah, Borneo (new record), 29-III-1976, S. NAGAI leg. (NSMT); 1 ♂, ditto, 4-IV-1976, S. NAGAI leg. (NSMT).

Measurements. Morphometric measurements were made for the following characters: 1) pronotum-elytra length, from anterior margin of pronotum to apices of elytra (PEL); 2) body thickness at center of metathorax (BT); 3) head length along middle line (HL); 4) head width at widest part (HW); 5) pronotum length along middle line (PL); 6) pronotum width at widest part (PW); 7) elytra length (EL); 8) elytra width at widest part (EW); 9) front tibia length (FTL); 10) front tibia width (FTW). Both sexes were dealt with together because no sexual dimorphism was evident.

Observation of genitalia. The genital organ of new *Aesalus* species was observed in 70% ethanol after treating it with weak solution of potassium hydroxide. In the description of genitalia, we adopt the terminology of HOLLOWAY (1960).

Aesalus hidakai ARAYA, KON et JOHKI, sp. nov.

(Figs. 1-21)

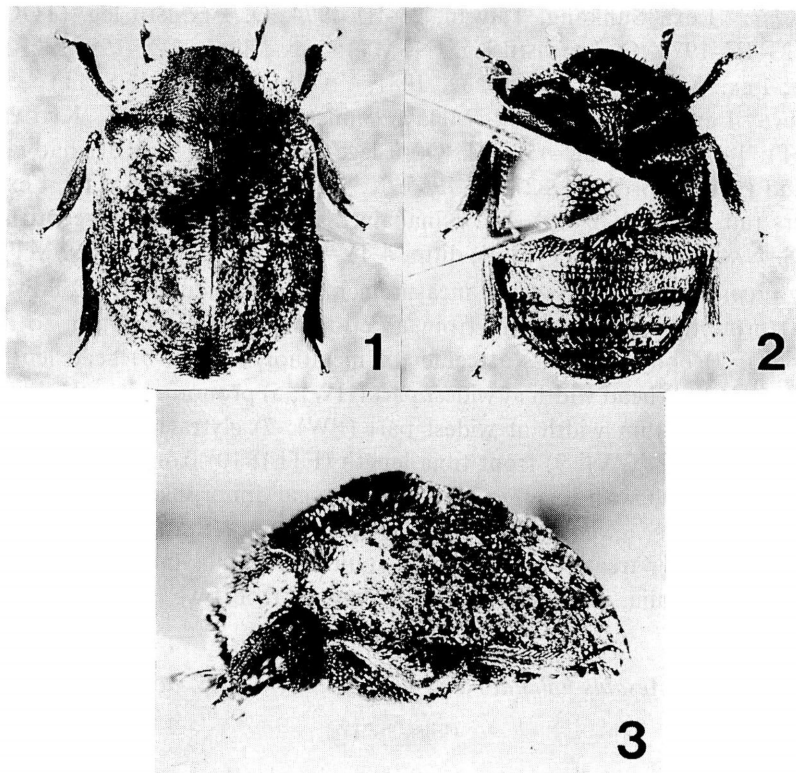
Diagnosis. In general appearance, this species closely resembles *A. timidus*, but is readily distinguished from the latter by the abdominal sternites lacking sulcus for receiving hind leg.

Description of holotype. Size small, length from anterior margin of head to apices of elytra 5.2 mm; body outline circular in dorsal view ($EW/PEL=0.68$) (Figs. 1-2), thickest at middle and gradually tapering both anteriorly and posteriorly in lateral view (Fig. 3). Body integument reddish brown in color; dorsal surface largely covered with either whitish or yellowish-golden tomentum, especially densely on antero-lateral parts of pronotum and on lateral sides of elytra. Pronotum and elytra with clumps of erect scale-like bristles and scattered stick-like ones.

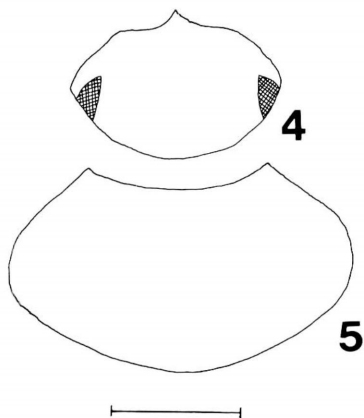
Head (Fig. 4) covered with whitish-golden tomentum and scattered stick-like bristles; anterior margin of head almost straight, with a small triangular projection at the middle. Eye with distinct canthus covering about one-third of outer margin. Antenna (Fig. 6) consisting of ten segments, partially geniculate; scape moderately curved, with setae; second segment subconical, about as long as wide; third slender, about three times as long as wide; fourth to sixth transverse; eighth to tenth forming

wholly pubescent club, weakly lamellate, eighth and ninth transverse, tenth about as long as wide.

Labrum fan-shaped, with yellowish setae especially densely on anterior margin.



Figs. 1-3. *Aesalus hidakai* ARAYA, KON et JOHKI, sp. nov., ♂, holotype; dorsal view (1); ventral view (2); lateral view (3).



Figs. 4-5. Head and pronotum of *Aesalus hidakai* ARAYA, KON et JOHKI, sp. nov., ♂, holotype; head (4); pronotum (5). (Scale: 1.0 mm)

Fig. 6. Right antenna of *Aesalus hidakai* ARAYA, KON et JOHKEI, sp. nov., ♂, paratype, from Gunung Jasar. (Scale: 0.25 mm)

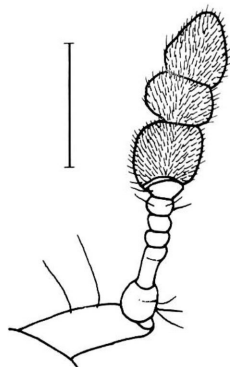
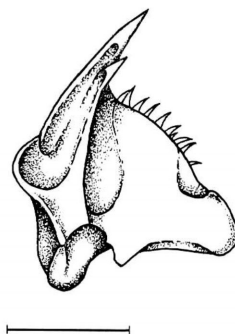


Fig. 7. Left mandible of *Aesalus hidakai* ARAYA, KON et JOHKEI, sp. nov., ♂, paratype, from Gunung Jasar. (Scale: 0.25 mm)



Mandible (Fig. 7) with a sharp apical tooth and two smaller subapical teeth on dorsal and ventral sides, respectively; outer side covered with yellowish-golden scaly tomentum; inner side with setae and well developed mola at base.

Pronotum about a half as long as wide ($PEL/PW=0.55$), evenly convex, widest near the middle; surface covered with whitish-golden tomentum especially densely on antero-lateral parts, with erect stick-like bristles in rows, without clumps of scale-like bristles. Scutellum forming a regular triangle, covered with whitish-golden tomentum. Elytra highly convex, about 1.2 times as long as combined width ($EL/EW=1.18$), without striae, with scattered stick-like bristles, densely covered with whitish-golden tomentum in lateral portion, with irregularly arranged clumps of either black or yellowish-brown scale-like bristles; elytral ornaments, especially clumps of scale-like bristles, arranged asymmetrically. Hind wings fully developed as in Fig. 8.

Prosternum with isodiametric and well-defined punctures bearing short yellowish scaly seta; intercoxal process of prosternum (Fig. 9) with flat surface, expanding anteriorly; anterior margin straight, not rounded; posterior margin reaching metasternum. Mesosternum and metasternum with fine punctures bearing yellowish scaly setae. Mesocoxae separated. Metepisternum with cavity. Intercoxal process of hind leg obtusely rounded. Abdomen about four-fifths as long as wide; five abdominal segments visible (Figs. 10–11); first and second fused, with slightly elongate foveae

bearing minute setae; third to fifth with semicircular depressions along anterior margin; first to fourth with crenulated posterior margins.

Front tibia (Fig. 12) somewhat plump but not so strongly widened in distal portion (FTW/FTL=0.24), with fine punctures bearing minute setae; outer margin with three denticles and a large curved apical spine like a hook; inner margin with a small sharp spine at the apex. Front femur with cavity for reception of tibia on anterior margin,

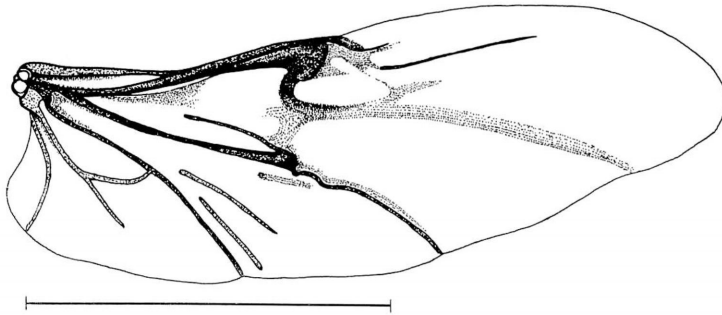


Fig. 8. Hind wing of *Aesalus hidakai* ARAYA, KON et JOHKI, sp. nov., ♂, paratype, from Tanah Rata, 7-IV-1974. (Scale: 5.0 mm)

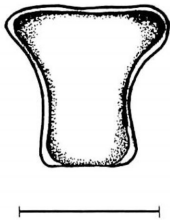
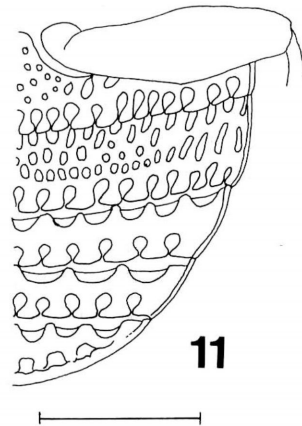
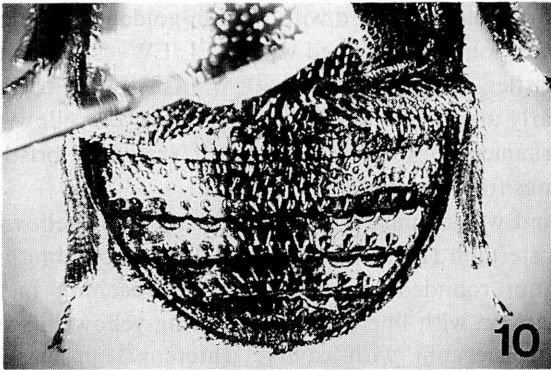


Fig. 9. Intercoxal process of prosternum of *Aesalus hidakai* ARAYA, KON et JOHKI, sp. nov., ♂, holotype. (Scale: 0.5 mm)



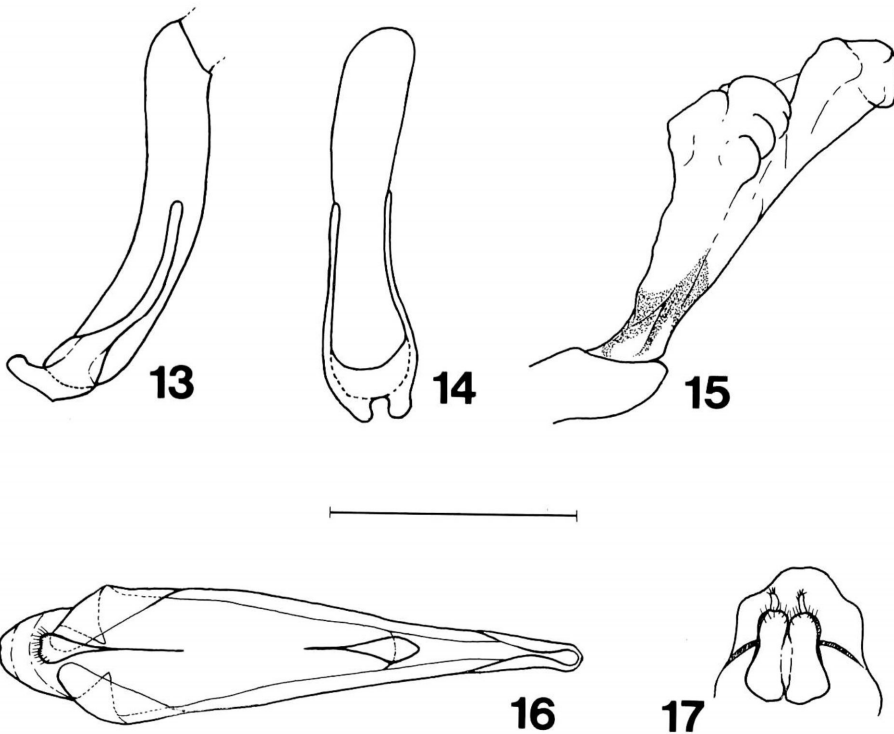
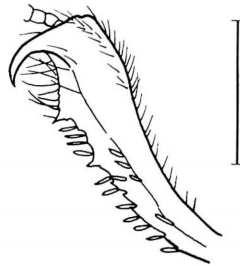
Figs. 10-11. Abdominal sternites of *Aesalus hidakai* ARAYA, KON et JOHKI, sp. nov., ♂, holotype. (Scale: 1.0 mm)

with punctures bearing minute setae. Middle and hind legs with fine punctures bearing semi-erect pilosity. Middle tibia with two small spines on outer margin.

Measurements of holotype (in mm). PEL 4.55; BT 2.40; HL 0.80; HW 1.25; PL 1.45; PW 2.65; EL 3.65; EW 3.10; FTL 1.05; FTW 0.25.

Male genitalia. Male genitalia of a paratype from Gunung Jasar with very short basal piece fused to both parameres and penis (Figs. 13–16). Penis cylindrical, slightly

Fig. 12. Left front tibia of *Aesalus hidakai* ARAYA, KON et JOHKI, sp. nov., ♂, holotype. (Scale: 0.5 mm)



Figs. 13–17. — 13–16. Male genital organ of *Aesalus hidakai* ARAYA, KON et JOHKI, sp. nov., ♂, paratype, from Gunung Jasar; aedeagus in lateral view (13); aedeagus in dorsal view (14); internal sac (15); ninth abdominal segment in dorsal view (16). (Scale: 1.0 mm). — 17. Female genitalia of *Aesalus hidakai* ARAYA, KON et JOHKI, sp. nov., ♀, paratype, from Gunung Jasar. (Scale: 1.0 mm)

Table 1. Morphometric characters ($\bar{x} \pm \text{SD}$, range in parenthesis; in mm) in the two *Aesalus* species from Southeast Asia. See Materials and Methods for abbreviations.

Species	PEL	BT	HL	HW	PL
<i>A. timidus</i>	3.82 \pm 0.398 (3.05–4.15) (n=6)	2.04 \pm 0.159 (1.75–2.20) (n=6)	0.74 \pm 0.074 (0.60–0.80) (n=6)	1.08 \pm 0.098 (0.90–1.15) (n=6)	1.20 \pm 0.055 (1.10–1.25) (n=6)
<i>A. hidakai</i> sp. nov.	4.73 \pm 0.740* (3.75–5.30) (n=4)	2.59 \pm 0.409* (2.10–2.95) (n=4)	0.88 \pm 0.125 (0.70–1.05) (n=6)	1.38 \pm 0.154 (1.20–1.55) (n=6)	1.46 \pm 0.206 (1.15–1.75) (n=6)
Species	PW	EL	EW	FTL	FTW
<i>A. timidus</i>	2.32 \pm 0.197 (1.95–2.45) (n=6)	2.94 \pm 0.254 (2.45–3.20) (n=6)	2.73 \pm 0.175 (2.40–2.90) (n=6)	0.90 \pm 0.071 (0.80–1.00) (n=6)	0.22 \pm 0.026 (0.20–0.25) (n=6)
<i>A. hidakai</i> sp. nov.	2.85 \pm 0.354 (2.25–3.20) (n=6)	3.61 \pm 0.673* (2.65–4.10) (n=4)	3.36 \pm 0.527* (2.75–3.85) (n=4)	1.04 \pm 0.153 (0.80–1.20) (n=6)	0.28 \pm 0.052 (0.20–0.35) (n=6)

* Not measured for the two specimens with deformed elytra.

curved upward. Internal sac slightly sclerotized at base (it is visible, but unable to be fully everted). Paired struts absent. Paramere slender, about a half as long as penis, closely appressed to penis. Ninth abdominal segment partly sclerotized, with setae on ventral side.

Female genitalia. Female genitalia of a paratype from Gunung Jasar with visible styli; hemisternite well sclerotized, with setae on posterior end (Fig. 17).

Variations. Morphometric data are summarized in Table 1 together with those for *A. timidus*. In the present samples, males (PEL 4.55–5.30, n=3; PW 2.65–3.20, n=4) are somewhat larger than females (PEL 3.75, n=1; PW 2.25–2.85, n=2), but sexual dimorphism in external morphology including the shape of mandibles is indistinct. The pattern of the ornaments on body surface is variable with individuals (Figs. 18–21). The greatest variabilities occur in the distribution of either whitish- or yellowish-golden tomenta and in the arrangement of clumps of scale-like bristles.

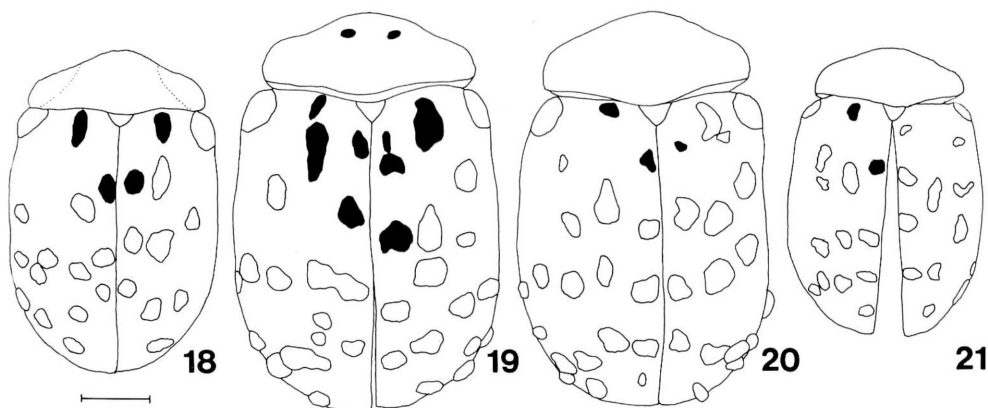
Types series. Holotype: ♂, Gunung Jasar (about 1,500 m in altitude), Cameron Highlands, Malay Peninsula, 24–III–1992 (collected as a larva, adult emergence on 12–VIII–1992), K. ARAYA leg. Paratypes: 1 ♂, 1 ♀, same data as for the holotype, (elytra partly deformed; preserved in 70% ethanol; collected as larvae, adult emergence in VI–1992); 1 ♂, Tanah Rata, Cameron Highlands, Malay Peninsula, 7–IV–1974, Y. KIYOYAMA leg.; 1 ♀, ditto, 10–IV–1975, Y. KIYOYAMA leg.; 1 ♂, ditto, 27–V–1975, Y. KIYOYAMA leg. The holotype and 3 paratypes (2 ♂♂, 1 ♀, from Tanah Rata) are deposited in the collection of the National Science Museum (Natural History), Tokyo, and two paratypes (1 ♂, 1 ♀, from Gunung Jasar) in the entomological collection of the Department of Zoology, Kyoto University.

Distribution. Known only from the Cameron Highlands, Malay Peninsula.

Table 2. Comparison of external characteristics of *A. scarabaeoides*, *A. ulanowskii*, *A. asiaticus*, *A. himalayicus*, *A. imanishii*, *A. timidus* and *A. hidakai* sp. nov. See Materials and Methods for abbreviations.

Characters	<i>A. scarabaeoides</i> (n=7)	<i>A. ulanowskii</i> (n=1)	<i>A. asiaticus</i> (n=11)	<i>A. himalayicus</i> (n=5)	<i>A. imanishii</i> (n=4)	<i>A. timidus</i> (n=6)	<i>A. hidakai</i> sp. nov. (n=6)
Canthus	absent	absent	absent	present	absent	present	present
Number of antennal segments	10	10	10	10	9	10	10
Pubescence of antennal club	partly	partly	partly	wholly	wholly	wholly	wholly
Shape of 3rd antennal segment	transverse	transverse	transverse	slender	transverse	slender	slender
Sexual dimorphism in mandibles	distinct	distinct	distinct	indistinct	indistinct	indistinct	indistinct
Intercoxal process of prosternum	convex	convex	convex	convex	convex	flat	flat
Tomentum on body surface	absent	absent	absent	absent	absent	present	present
Widest point of pronotum	posterior	posterior	posterior	posterior	posterior	middle	middle
EW/PEL	0.6 (0.57–0.62)	0.56	0.6 (0.56–0.62)	0.57 (0.56–0.58)	0.58 (0.55–0.61)	0.75 (0.68–0.79)	0.71 (0.68–0.73)
BT/PEL	0.43 (0.41–0.46)	0.37	0.43 (0.42–0.45)	0.43 (0.42–0.44)	0.35 (0.34–0.36)	0.54 (0.52–0.57)	0.55* (0.53–0.56)
FTW/FTL	0.34 (0.30–0.38)	0.21	0.25 (0.18–0.29)	0.22 (0.21–0.23)	0.32 (0.30–0.33)	0.24 (0.22–0.26)	0.27 (0.24–0.29)

* Not measured for the two specimens with deformed elytra.



Figs. 18–21. Schematic presentation of the variation in the distributional pattern of ornaments on the dorsal body surface of *Aesalus hidakai* ARAYA, KON et JOHKEI, sp. nov. Closed area: clump of black scale-like bristles; open area surrounded by solid line: clump of yellowish-brown scale-like bristles; open area surrounded by dotted line: area densely covered with whitish-golden tomentum; ♂, holotype (18); ♂, paratype, from Tanah Rata, 7–IV–1974 (19); ♂, paratype, from Tanah Rata, 27–IV–1975 (20); ♀, paratype, from Tanah Rata, 10–IV–1975 (21). (Scale: 1.0 mm)

Comparison. Comparison of external characters of the Old World *Aesalus* species except for *A. daghestanicus* is presented in Table 2. *Aesalus hidakai* sp. nov., together with *A. timidus*, is clearly distinguished from the other Old World *Aesalus* by the following peculiarities: body outline circular in dorsal view, thickest at middle and gradually tapering both anteriorly and posteriorly in lateral view; pronotum widest near the middle; intercoxal process of prosternum flat, and *A. hidakai* differs from *A. timidus* in the following characteristics: abdominal sternites lacking sulcus for receiving hind leg; third to fifth abdominal sternites with semicircular depressions along anterior margins; anterior margin of head with a small triangular projection at the middle; canthus covering about one-third of outer margin of eye.

Etymology. This new species is dedicated to the emeritus Professor Toshitaka HIDAKA, a leading ethologist in Japan, who retired from Kyoto University in March, 1993. When he was in Kyoto University, he gave us the opportunity of performing our researches in Malaysia.

Biological notes. The larvae of *A. hidakai* were collected from a decayed log (a kind of oak) lying on the forest floor dominated by oak trees. The decay type of the log was brown rot, but fungal species causal to decay was not identified.

This species appears to have the habit of flying to light because one male from Tanah Rata, 7–IV–1974, was captured at light.

Discussion

Aesalus hidakai is the second peculiar member described from the Southeast Asian

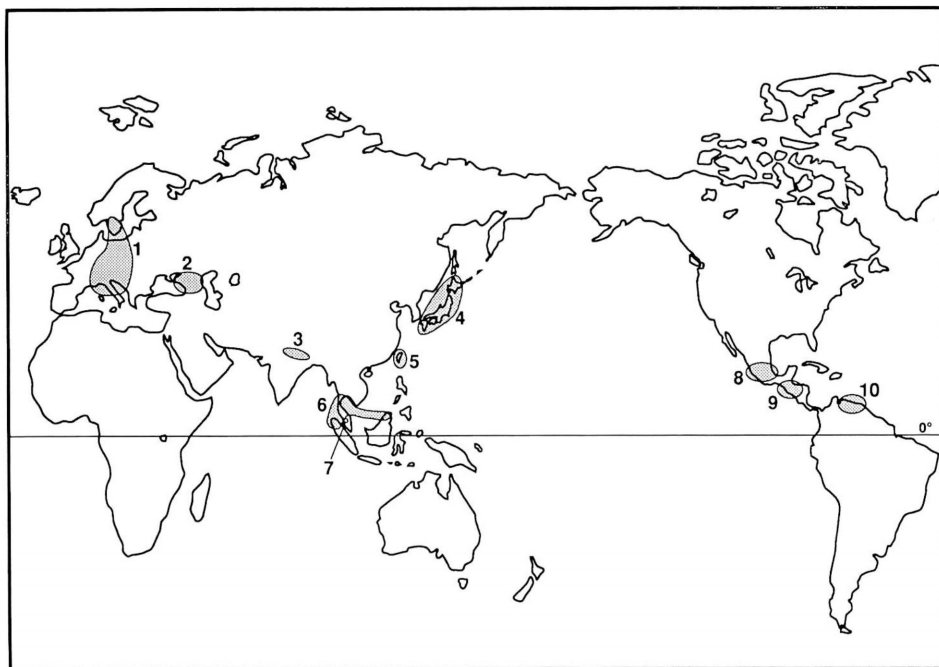


Fig. 22. Map showing the distribution of the genera *Aesalus* and *Lucanobium*; 1, *A. scarabaeoides* (PANZER); 2, *A. ulanowskii* GANGLBAUER and *A. daghestanicus* DIDIER et SÉGUY; 3, *A. himalayicus* KUROSAWA; 4, *A. asiaticus* LEWIS; 5, *A. imanishii* INAHARA et RATTI; 6, *A. timidus* KRIKKEN; 7, *A. hidakai* ARAYA, KON et JOHKI, sp. nov.; 8, *A. trogoides* ALBERS and *A. smithi* BATES; 9, *A. neotropicalis* BATES; 10, *L. squamosum* HOWDEN et LAWRENCE.

tropics within the genus *Aesalus*. *A. hidakai*, together with *A. timidus*, considerably differs from the other *Aesalus* members in general appearance. On the other hand, the structure of male genitalia of *A. hidakai* (which is characterized by the following characters: paired struts absent; penis cylindrical; basal piece very short, fused to parameres and penis; parameres slender, closely appressed to penis) agrees well with the specific structure of *Aesalus* male genitalia previously described for several species (*A. scarabaeoides*, SHARP & MUIR, 1912; HOLLOWAY, 1960; HOWDEN & LAWRENCE, 1974; BARTOLOZZI, 1989; *A. imanishii*, INAHARA & RATT, 1981; *A. asiaticus*, KIKUTA, 1984).

KUROSAWA (1985) suggested that *A. timidus* may represent a different genus from true *Aesalus*. According to his suggestion, a new genus could be established for *A. timidus* as the type species, and if so, *A. hidakai* should also be assigned to the new genus together with *A. timidus* because of the similarity between them in external morphology. However, we consider that both *A. timidus* and *A. hidakai* should be left assigned to the genus *Aesalus*, because it is difficult to assume the monophyly of the other members of the genus *Aesalus* excluding *A. timidus* and *A. hidakai*, until phylogenetic analysis can be made for the whole genus *Aesalus* including the New World members (*A. trogoides*, *A. smithi* and *A. neotropicalis*) and the most closely

allied genus *Lucanobium* from Venezuela (HOWDEN & LAWRENCE, 1974).

In addition, the present examination of external morphology of the Old World *Aesalus* also revealed that the Southeast Asian members (*A. timidus* and *A. hidakai*) shared the characters, which were not shared by the Palearctic ones (*A. scarabaeoides*, *A. ulanowskii* and *A. asiaticus*), with the Himalayan (*A. himalaycius*) and the Taiwanese (*A. imanishii*) ones, respectively (Table 2). The Himalayan species, together with the Southeast Asian ones, is separated from the Palearctic ones by the following characters: mandible showing no sexual dimorphism; third antennal segment long and slender, not transverse; antennal club wholly pubescent; eye with distinctly developing canthus. On the other hand, the Taiwanese species can also be separated from the Palearctic ones by the following characters: mandible showing no sexual dimorphism; antennal club wholly pubescent. Further, according to the original description (HOWDEN & LAWRENCE, 1974), the New World genus *Lucanobium*, containing only one species *L. squamosum*, also appears to resemble the Southeast Asian members of *Aesalus* in the following characters: body thickest at middle; mandible showing no sexual dimorphism; antennal club wholly pubescent; third antennal segment long and slender, not transverse; eye with distinctly developing canthus; front tibia with a large curved apical spine. In addition, *L. squamosum* and *A. hidakai* share the character, mandible with a distinct mola. In order to clarify their true affinities, phylogenetic analysis of the genus *Aesalus* including the New World members, together with its allied genus *Lucanobium*, is strongly desired.

Like that of *A. timidus* (KRIKKEN, 1975), the type locality (Cameron Highlands) of *A. hidakai* is at higher elevations (about 1,400–1,500 m in altitude) and rather cool (the average atmospheric temperature was less than 20°C) although the Malay Peninsula is located in the tropical region. The two pupae reared at 25°C failed in emergence with the result that the elytra of the emerged adults were deformed, whereas sound metamorphosis occurred in the single pupa reared at 20°C. This suggests that the higher temperature, 25°C, did harm to the metamorphosis.

The larvae of *A. hidakai* were collected from a brown-rotten log. Until now, it has been reported that the larvae of *A. scarabaeoides* (BARTOLOZZI, 1989), *A. imanishii* (ARAYA & OBUCHI, 1992) and *A. asiaticus* (ARAYA & OBUCHI, 1992; ARAYA, 1993) are also collected from brown-rotten logs. It is suggested that the genus *Aesalus* may be stenophagous for brown-rotten logs. We look for further information about the decay type of logs in which the other *Aesalus* larvae occur.

Key to the Species of *Aesalus* from the Old World

The diagnostic characters of measurements are summarized on the basis of the specimens examined in the present study.

Aesalus daghestanicus is omitted from this key because no specimen was available and the original description of this species (DIDIER & SÉGUY, 1953) is insufficient for showing its external morphology in detail, although this species appears to closely

resemble *A. ulanowskii*. On the other hand, *A. scarabaeoides* and *A. asiaticus* include two subspecies, respectively; *A. s. scarabaeoides*, subspecies from Central Europe, and *A. s. meridionalis* BARTOLOZZI, 1989, from Basilicata in Italy; nominotypical *A. a. asiaticus* from the main islands of Japan and *A. a. sawaii* FUJITA et ICHIKAWA, 1985, from Yaku-shima Island off southern Kyushu of Japan. These subspecies are included in this key. We refer to BARTOLOZZI (1989) for *A. s. meridionalis*, since no specimen of this subspecies was available.

1. Body outline circular in dorsal view (EW/PEL 0.68–0.79); pronotum widest near the middle; intercoxal process of proternum flat, anterior and posterior margins almost straight 2.
- Body outline oval in dorsal view (EW/PEL 0.55–0.62); pronotum widest near posterior margin; intercoxal process of prosternum convex, anterior and posterior margins strongly rounded 3.
2. Abdominal sternites with a deep sulcus; third to fifth abdominal sternites with foveae, without semicircular depression; anterior margin of head without projection at the middle; canthus covering about one-fifth of outer margin of eye *A. timidus*.
- Abdominal sternites lacking sulcus; third to fifth abdominal sternites with semicircular depressions along anterior margins; anterior margin of head with a small triangular projection at middle; canthus converging about one-third of outer margin of eye *A. hidakai* sp. nov.
3. Antenna consisting of 9 segments; body flat (BT/PEL 0.34–0.36) *A. imanishii*.
- Antenna consisting of 10 segments; body relatively thick (BT/PEL 0.37–0.46) 4.
4. Eye with distinct canthus; third antennal segment slender; antennal club wholly pubescent *A. himalayicus*.
- Eye without distinct canthus; third antennal segment transverse; antennal club partly pubescent 5.
5. Size smaller (PEL 3.90–5.70; \bar{x} 4.89); elytra with irregularly arranged large clumps of scale-like bristles; front tibia with a large curved apical spine 6.
- Size larger (PEL 5.65–6.95; \bar{x} 6.35); elytra with regularly arranged small clumps of scale-like bristles; front tibia with a large straight apical spine 7.
6. Pronotum with 6 to 8 clumps of black scale-like bristles on middle portion; elytral punctures smaller and united *A. asiaticus asiaticus*.
- Pronotum without clump of black scale-like bristles; elytral punctures distinct and sparser *A. asiaticus sawaii*.
7. Body surface densely but shallowly punctuated; front tibia relatively slender, not so widened in distal portion (FTW/FTL 0.21) *A. ulanowskii*.
- Body surface densely and deeply punctuated; front tibia plump, strongly widened in distal portion (FTW/FTL 0.30–0.38) 8.
8. Yellowish setae on elytra smaller; styli of female genitalia larger, hemisternite

- concave; median lobe of male genitalia longer. . . *A. scarabaeoides scarabaeoides*.
 — Yellowish setae on elytra larger; styli of female genitalia smaller, hemisternite not
 concave; median lobe of male genitalia shorter . . . *A. scarabaeoides meridionalis*.

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要 約

荒谷邦雄・近 雅博・常喜 豊：マレー半島から採集されたマダラクワガタ属の1新種。——マレー半島の山地からマダラクワガタ属の1新種を記載し、*Aesalus hidakai* sp. nov. と命名した。この新種は、スマトラを基準産地とする *A. timidus* KRIKKEN とよく似ているが、1) 腹板に後肢を収納するための溝を欠く、2) 第3~5腹板前縁部に半月状の凹みが並ぶ、3) 頭部前縁部は直線的で、かつ中央部に三角形のくさび状の突起がある、4) 眼縁突起はよく発達し、眼の外縁の1/3程度を覆う、などの特徴により後者とは明確に区別できる。なお、種名は長年マレーシアとの共同学術調査研究の代表を勤められ、先ごろ京都大学を退官された日高敏隆京都大学名誉教授に献名したものである。

Aesalus hidakai は *A. timidus* とともに、地理的な分布、および形態の特徴：1) 背面から見た体形がより円形に近い、2) 体の厚みが中央付近で最大となる、3) 前胸背板の幅が中央付近で最大となる、4) 前胸腹板の基節間突起は平面的で、かつ前縁・後縁部とも直線的な形状をしている、などにおいて旧世界産の同属の他種から明確に区別される。しかし一方、*A. hidakai* の雄交尾器に見られる特徴：1) 1対の支柱突起を欠く、2) 陰茎は筒状で、かつ細長く伸長する、3) 側片は細長く伸長し、陰茎に密着する、4) 基片はいちじるしく短小化し側片と融合するなどは、いずれもこれまでに報告のあるマダラクワガタ属の他種のそれとよく一致する。マダラクワガタ属各種の系統関係に関する研究は不十分であり、*A. hidakai* および *A. timidus* の系統的な位置を確定させるためにも、今後、新世界に産するマダラクワガタ属はもちろん、近縁な *Lucanobium* 属をも含めた検討が不可欠である。

なお、*A. hidakai* を含む7種の旧世界産のマダラクワガタ属の検索表を付記した。

References

- ARAYA, K., 1993. Relationship between the decay types of dead wood and occurrence of lucanid beetles (Coleoptera: Lucanidae). *Appl. Ent. Zool.*, **28**: 27-33.
 ——— & T. ÔBUCHI, 1992. Life histories of Japanese lucanid beetles (Coleoptera: Lucanidae): 3)

- Aesalus asiaticus* LEWIS. *Nat. & Ins., Tokyo*, **27** (13): 39–46. (In Japanese, with English summary.)
- ARAYA, K., & T. OCHI, 1992. A new record of *Aesalus timidus* (Coleoptera, Lucanidae) from the Malay Peninsula. *Elytra, Tokyo*, **20**: 206.
- BARTOLOZZI, L., 1989. Descrizione di una nuova sottospecie di *Aesalus scarabaeoides* (PANZER, 1794) di Basilicata. *Boll. Soc. ent. ital., Genova*, **121**: 104–107.
- DIDIER, R., & E. SÉGUY, 1953. Catalogue illustré des Lucanides du globe. *Encycl. ent., Paris*, **27**: 1–223.
- HOLLOWAY, B. O., 1960. Taxonomy and phylogeny in the Lucanidae (Insecta: Coleoptera). *Rec. Dom. Mus.*, **3**: 321–365.
- HOWDEN, H. F., & J. F. LAWRENCE, 1974. The New World Aesalinae, with notes on the North American lucanid subfamilies (Coleoptera, Lucanidae). *Can. J. Zool.*, **52**: 1505–1510.
- INAHARA N., & P. RATT, 1981. Description of a new species of Lucanidae from Formosa (Taiwan): *Aesalus imanishii* (Coleoptera). *Bull. Annls. Soc. r. belge. Ent.*, **117**: 189–194.
- KIKUTA, T., 1984. On the subfamilies and tribes of Lucanidae. *Jpn. coleopt. month. Mag.*, **1**(2): 1–4. (In Japanese, with English title.)
- KRIKKEN, J., 1975. *Aesalus timidus* sp. nov., a remarkable addition to the Indonesian stag-beetle fauna (Coleoptera, Lucanidae). *Ent. Ber., Amst.*, **35**: 49–51.
- KUROSAWA, Y., 1985. A new lucanid beetle of the genus *Aesalus* FABRICIUS (Coleoptera, Lucanidae) from the Himalayas. *Bull. natn. Sci. Mus., Tokyo*, (A), **11**: 49–51.
- SHARP, D., & F. MUIR, 1912. The comparative anatomy of the male genital tube in Coleoptera. *Trans. ent. Soc. Lond.*, **1912**: 477–642.

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A New Record of *Aceraius lamellatus* (Coleoptera, Passalidae) from Sumatra¹⁾

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In 1987–1988, one of the authors (M. KATO) had an opportunity to visit Sumatra as a member of the entomological group of the Sumatra Nature Study Project and to collect some