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Discovery of the Lucanid Genus *Aesalus* (Coleoptera) in Mainland China, with Description of a New Species¹⁾

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Abstract As the first record of a lucanid genus *Aesalus* from Mainland China, a new species whose antenna consists of nine segments is described from the Daba Mountains in Sichuan Province, central China. This new species, named *Aesalus sichuanensis* sp. nov., closely resembles Taiwanese *A. imanishii* but can be distinguished from the latter by the differences in both external and genitalic characters. A key to the *Aesalus* recorded from China and its neighboring countries is presented.

Lucanid beetles of the genus *Aesalus* are known from both the Old and New Worlds. In the Old World, *A. scarabaeoides* has been described from Europe, *A. ulanowskii* from Caucasus, *A. asiaticus* from Japan, *A. imanishii* from Taiwan, *A. himalayicus* from Nepal, and about 10 species, including *A. timidus*, from Tropical Asia.²⁾ However, no species of this genus has so far been recorded from Mainland China in spite of its location in the center of the known distributional range of *Aesalus* in the Old World and the presence of many mountains in its vast land space. Therefore, if some new members of *Aesalus* are discovered from mountainous areas in Mainland

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²⁾ Recently, ZELENKA (1993, 1994) erected a new genus *Echinoaesalus* and moved all the Southeast Asian species of the genus *Aesalus* to this new genus. However, there still remain many problems concerning generic classification of the tribe Aesalini, and we prefer to treat all the members of *Echinoaesalus* as those of *Aesalus* for the time being.

China, they will be quite important and interesting both taxonomically and zoogeographically (KUROSAWA, 1985).

Recently, we had an opportunity to examine several remarkable materials of a strange *Aesalus* collected from the Daba Mountains in Sichuan Province, central China. In general appearance, this *Aesalus* closely resembles Taiwanese *A. imanishii*, with the antenna consisting of nine segments and the body surface covered with only scale-like setae, lacking scattered stick-like bristles. However, a close examination revealed that the *Aesalus* from the Dabas can be distinguishable from the Taiwanese congener and is new to science. Thus, in the following lines, we are going to describe this new species as the first member of the genus recorded from Mainland China. The abbreviations of morphometric measurements used herein are: PEL-pronotum-elytra length; BT-body thickness; HL-head length; HW-head width; PL-pronotum length; FTW-front tibia width (see ARAYA *et al.* (1993) for measuring methods). The genital organs were observed in 70% ethanol after treated with weak solution of potassium hydroxide. The terminology for description of genitalia used herein is the same as that in other papers of the first author's (ARAYA *et al.*, 1993; ARAYA, 1993, 1995).

Aesalus sichuanensis ARAYA, TANAKA et TANIKADO, sp. nov.

[Japanese name: Shisen-madara-kuwagata] (Figs. 1-18)

A large-sized *Aesalus*, length from anterior margin of head to apices of elytra 5.05–5.90 mm (\overline{X} =5.47). Body (Figs. 1–3, 8) elongate, outline elliptical in dorsal view (EW/PEL 0.57–0.66; \overline{X} =0.58), relatively flat in lateral view (BT/PEL=0.35–0.43; \overline{X} =0.39). Body integument dark-greyish brown in color; dorsal surface largely covered



Figs. 1–3. Aesalus sichuanensis ARAYA, TANAKA et TANIKADO, sp. nov., 3, holotype; 1, dorsal view; 2, ventral view; 3, lateral view.

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Figs. 4–12. Aesalus sichuanensis ARAYA, TANAKA et TANIKADO, sp. nov. — 4, Head of 3, paratype (left), and of 9, paratype (right); 5, mandibles of 3, paratype; 6, antenna of 3, paratype; 7, intercoxal process of prosternum of 3, paratype; 8, ornaments on the dorsal body surface of 3, paratype; 9, metasternum of 3, paratype; 10, abdominal segments of 3, paratype; 11, hind tibia of 3, paratype; 12, ditto, 9, paratype. Scales: 0.25 mm for Figs. 5, 6, 11, 12; 0.5 mm for Figs. 4, 7; 1.0 mm for Figs. 8, 9, 10.

with scale-like black and whitish-golden setae but without stick-like bristles and tomentum; scale-like whitish-golden setae partly lying like tomentum; erect scale-like setae partly forming clumps.

Head (Fig. 4) punctuated weakly, its anterior margin obtusely projected. Eye without canthus. Mandible (Fig. 5) with a sharp apical tooth and a subapical tooth on dorsal side near the middle; apical tooth of left mandible distinctly forked. Mentum with well-defined punctures each bearing a short yellowish grey hair; some of the punctures connected and forming irregular sulcus. Antenna (Fig. 6) consisting of nine segments, geniculate between scape and second segment; scape moderately curved, with several setae; second segment strongly subconical, subequal in length; third not slender, subequal in length; fourth and fifth oblong; sixth very short and somewhat acutely projected laterally; seventh to ninth forming wholly pubescent club, weakly lamellate, seventh and eighth oblong, ninth subequal in length.

Pronotum about three-fifths as long as wide (PL/PW = 0.54–0.59; \overline{X} = 0.57), widest near the posterior part; dorsal surface elevated on the middle, densely but shallowly punctuated, with scale-like bristles forming a pair of large black clumps on the middle. Scutellum forming an elongate triangle. Elytra about 1.4 times as long as combined width (EL/EW = 1.23–1.31; \overline{X} = 1.27), densely but shallowly punctuated, without striae but with regularly arranged black and whitish-golden clumps of scale-like bristles; each shoulder somewhat elevated. Hind wing fully developed (Fig. 13).

Intercoxal process of prosternum (Fig. 7) ginkgo-leaf-shaped, expanding anteriorly and reaching metasternum, both anterior and posterior margins rounded, middle part slender and convex, with isodiametric and well-defined punctures each bearing a short yellowish grey hair. Metasternum (Fig. 9) with a large circular depression in the middle, with isodiametric and fine punctures each bearing a yellowish grey hair. Metepisternum with shallow sulcus for receiving middle leg. Mesocoxae separated. Intercoxal process of hind legs forming a sharp, regular triangle produced anteriorly. Abdomen (Fig. 10) about five-sixths as long as wide; five abdominal sternites visible, each with isodiametric to elongate foveae bearing minute setae.



Fig. 13. Hind wing of *Aesalus sichuanensis* Araya, Tanaka et Tanikado, sp nov., φ , paratype. Scale: 1.0 mm.

Front tibia relatively slender, only slightly widened in distal portion (FTW/ FTL=0.21-0.29; \overline{X} =0.24), with fine punctures bearing minute setae; outer margin with two denticles and a large, curved hook-like apical spine at distal end. Front femora with punctures bearing minute setae. Middle and hind legs with fine punctures bearing obliquly erect pilosity; middle and hind tibiae with small denticles on outer margins, with a large denticle at outer distal end, with a sharp spine at inner distal end.

Male genital organ. Male genitalia (Figs. 14–16) well sclerotized, with very short basal piece fused to both parameters and penis; penis slender, symmetrical, spatulately



Figs. 14–22. Genital organs of Aesalus spp. — 14–18. Aesalus sichuanensis ARAYA, TANAKA et TANIKADO, sp nov.; 14–17, male genitalia of paratype; 14, aedeagus, ventral view; 15, ditto, left lateral veiw; 16, ditto, dorsal view; 17, ninth abdominal segment; 18, female genitalia of paratype. — 19–22. Aesalus imanishii INAHARA et RATTI; 19–21, male genitalia; 19, aedeagus, ventral view; 20, ditto, left lateral view; 21, ninth abdominal segment; 22, female genitalia. Scale: 0.5 mm for Figs. 14–22.

expanding in distal end; internal sac visible but not everted; paired struts absent; paramere quite slender, subequal in length to penis, closely appressed to penis. Ninth abdominal segment (Fig. 17) flat, well sclerotized in outer margin, middle of ventral side weakly sclerotized with several setae.

Female genital organ. Female genitalia (Fig. 18) with large styli strongly curved outward; hemisternite weakly sclerotized, outer-lateral side gently concave, with long setae at distal end.

Variations in external characters. In females, the outer distal end of the hind tibia is swollen protuberantly with many spines like minute setae on the ventral side (Fig. 12). On the other hand, in males, the outer margin of the hind tibia is somewhat widened toward the distal end but without protuberance (Fig. 11). No sexual dimorphism is distinct in the shape of mandibles.

The greatest variations are observed in the distribution of black and whitish-golden clumps of scale-like bristles on the dorsal surface. Morphometric data are summarized in Table 1 (both sexes are combined because no sexual dimorphism is apparent in the characters measured).

Distribution. Known only from the Daba Mountains, Sichuan Province, central China (1,800–1,900 m in altitude).

Type series. Holotype: 3, Bashan, Chengkou Xian, Sichuan Province, central China (northern slope of the Daba Mountains, 1,800–1,900 m in altitude), 21–IV–1994. Paratypes : 333, 299, same data as the holotype; 499, same locality as the type series, $21 \sim 22$ –VI–1994. The holotype and one of the female paratypes will be preserved in the collection of the Museum of Nature and Human Activities, Hyogo. As to the other paratypes, one pair will be deposited in the entomological collection of the Graduate School of Human and Environmental Studies, Kyoto University (catalogued

PEL	BT	HL	HW	PL
5.47±0.292	2.13±0.103	0.93±0.059	1.02 ± 0.067	1.57±0.067
(5.05-5.80)	(1.90-2.25)	(0.80-1.00)	(0.90–1.10)	(1.45–1.65)
4.76 ± 0.594	1.65 ± 0.158	0.86 ± 0.096	0.92 ± 0.045	1.41 ± 0.160
(4.10–5.60)	(1.45–1.85)	(0.75–1.00)	(0.90–1.00)	(1.20–1.60)
PW	EL	EW	FTL	FTW
2.77+0.116	4.04+0.184	3.18 ± 0.116	1.19±0.074	0.29 ± 0.039
(2.55–2.95)	(3.75-4.30)	(3.00-3.35)	(1.00-1.25)	(0.25–0.35)
2.36 ± 0.171	3.36 ± 0.397	2.62 ± 0.182	0.99 ± 0.085	0.31-0.025
	(0.00	(0.00)	(0.00.1.10)	(0.20, 0.25)
	5.47 ± 0.292 (5.05-5.80) 4.76 ± 0.594 (4.10-5.60) PW 2.77 ± 0.116 (2.55-2.95) 2.36 ± 0.171	$\begin{array}{cccc} 5.47 \pm 0.292 \\ (5.05 - 5.80) \\ 4.76 \pm 0.594 \\ (4.10 - 5.60) \end{array} \begin{array}{c} 2.13 \pm 0.103 \\ (1.90 - 2.25) \\ 1.65 \pm 0.158 \\ (1.45 - 1.85) \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

Table 1. Morphometric characters ($\bar{x} \pm SD$, followed by	y ranges
in parentheses, in mm) of Aesalus sichuanensis sp. n	ov.
and A. imanishii. See text for abbreviations.	

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as KUHE), a female in the Museo Zoologico de "La Specola", Universita degli Studi Firenze, Italy, one pair in the collection of the second author, and the remainings, a male and two females, in the third author, respectively.

Notes. This new taxon closely resembles Taiwanese *A. imanishii* (Figs. 19–26) and doubtlessly, they belong to the same species-group in the genus. However, it differs from the latter in the following characteristics: body broader, larger in size; dark-greyish brown in color (reddish brown in *A. imanishii*); middle part of intercoxal process of prosternum not constricted; the large depression in the middle of metasternum circular (oval in *A. imanishii*); intercoxal process of hind legs forming a sharp regular triangle (an elongate isosceles triangle in *A. imanishii*); penis of male genitalia broader, distal end much more expanding; paramere shorter and broader; ninth abdominal segment broader; styli of female genitalia larger, more strongly curved outward; inner-lateral side of hemisternite gently concave (strongly concave in *A. imanishii*).

The Daba Mountains stretch on the borders of Sichuan and Shaanxi provinces and are zoogeographically nearly at the northernmost part of the Oriental Region. This mountain range is extensively covered with primeval summer green oak (*Quercus*) forests that are now not common in Mainland China, and its insect fauna has not been intensively investigated as yet. The discovery of *A. sichuanensis* sp. nov. from the Daba Mountains suggests that the beetle fauna, including lucanids, of this mountain range is similar to that of Taiwanese mountains. On the other hand, from the neighboring mountain ranges of the Daba Mountains such as the Qinling Mountains, several lucanid species of the genera *Platycerus* and *Ceruchus* were recently described (IMURA, 1993; IMURA *et al.*, 1994; TANIKADO *et al.*, 1994). These genera are distributed on the mountains of the Palearctic Region such as Japan and Europe. This fact suggests that some beetles of Palearctic element invaded the high mountains at the northernmost part of the Oriental Region such as the Qinling and Daba Mountains. Further field works may yield additional undescribed species of the genus *Aesalus*, which might be closely related to the Palearctic taxa, from these two adjoining mountain ranges.

It is difficult to determine the systematic position of the *imanishii-sichuanensis* species-group in the genus *Aesalus* because of its unique characteristics. Such characteristics as the antenna consisting of nine segments, body covered with only scale-like setae and without scattered stick-like bristles, and body dorso-ventrally flat are unique to this group and shared by no other species in this genus. Such characteristics as sexually non-dimorphic mandible and wholly pubescent antennal club are also found in *A. himalayicus* and other congeners from Southeast Asia. On the other hand, the *imanishii-sichuanensis* species-group and the Palearctic *Aesalus* (*A. asiaticus*, *A. scarabaeoides*, *A. ulanowskii*) share the following important characteristics that are not shared by *A. himalayicus* or Southeast Asian members: third antennal segment transverse, not slender; eye without distinct canthus; pronotum widest near the posterior part; intercoxsal process of prosternum convex, not flat; penis slender and symmetrical, with long paramere. Thus, *A. sichuanensis* and *A. imanishii* might possibly be intermediate between the Palearctic and Oriental mem-



Figs. 23–26. Aesalus imanishii INAHARA et RATTI. — 23, Ornaments on the dorsal body surface of 3; 24, intercoxal process of prosternum of 3; 25, metasternum of 3; 26, abdominal segments of 3. Scales: 1.0 mm for Figs. 23, 25, 26; 0.5 mm for Fig. 24.

bers both taxonomically and zoogeographically. It is also possible that these two *Aesalus* are relict species which have been isolated in the mountains of central China and Taiwan, and retain the most ancestral character states in the Old World *Aesalus* members. Anyway, detailed analyses of the genus *Aesalus* will reveal the systematic position of this interesting species-group within the genus.

Adults and larvae of *A. sichuanensis* were collected from brown-rotten oak tree. This is true for the larval habitat of *A. sichuanensis*, which is similar to that hitherto recorded for other members of the genus *Aesalus* (ARAYA, 1993).

Key to the Species of *Aesalus* Recorded from China and its Neighboring Countries

Two subspecies of Japanese A. asiaticus, nominotypical A. a. asiaticus from the main islands of Japan and A. a. sawaii FUJITA et ICHIKAWA, 1985, from Yaku-shima Island, are included in this key.

- 1b. Eye without canthus; third antennal segment not slender: apical tooth of left mandible distinctly forked; intercoxal process of prosternum convex, anterior and posterior margins rounded; male genitalia with symmetrical slender penis

2a.	Antenna	consisting	of 9	segments;	antennal	club	wholly	pubescent;	sexual
	dimorr	ohism in ma	ndible	indistinct;	body flat (BT/PI	EL 0.34-	0.36); body	surface
	covered	d with only	scale-	like setae ar	nd lacking	scatte	red stick	k-like bristle	s; penis
	flat and	d spatulate							3.

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Specimens Examined for Comparison

The acronyms of specimens are: KUHE-the entomological collection of the Graduate School of Human and Environmental Studies, Kyoto University; NSMT-National Science Museum (Natural History), Tokyo; TOC-personal collections of T. OCHI; MT-personal collections of the third author.

A. imanishii: 1 3, Sungkan, Taiwan, 23–III–1974, О. Іманіяні leg. (ТОС); 1 ех., ditto, 23–III–1974, О. Іманіяні leg. (NSMT); 1 3, ditto, 1–Х–1986, Т. Осні leg. (ТОС);

13, Meifeng, Taiwan, 6–IX–1981, YU Ching-Jin leg. (NSMT); 13, 19, Sungkan, Nantou, Taiwan, 21–IV–1992, W. I. CHOU leg. (KUHE); 13, 19, Meifeng, Taiwan, 11–V–1992, M. TANIKADO leg. (MT).

要 約

荒谷邦雄・田中正浩・谷角素彦:中国大陸からはじめて記録されたマダラクワガタ属の1新種. ーー中国四川省と陝西省の境界に位置する、大巴山脈の北斜面にある標高1,800-1,900 mの夏緑ナラ 林で採集されたマダラクワガタ属の1種を新種と認め、Aesalus sichuanensis sp. nov. (シセンマダラク ワガタ)として記載した.本種は、中国大陸からはじめて記録されるマダラクワガタ属のクワガタム シである. A. sichuanensisは、台湾中部の山地に生息するタイワンマダラクワガタA. imanishii にきわ めて近縁で、この2種は触角が9節から成ること、背面を被う毛はすべて鱗片状で棒状の毛を欠くこ と、および体の厚みがごく薄いことによって他のすべてのマダラクワガタ属の種と明確に区別される. さらに、A. sichuanensisはタイワンマダラクワガタに比べると、体形がより大型で幅広く、体色が灰 色味を帯びる、鞘翅上の毛束は規則正しく列をなして配列する、前胸腹板の基節突起の中央部のくび れが弱い、後胸腹板中央部の凹部は円形(A. imanishiiでは楕円形)である、後脚の基節突起は正三角 形をなす(A. imanishiiでは長二等辺三角形)、雄交尾器の陰茎は太く先端部がスプーン状に広がり、 側片もやや短く幅広い、第9腹板はより幅広い、雌交尾器の半腹板の外側のえぐれはごく弱い、尾毛 は大きくかつ外側に強く曲がる、などの特徴があり容易に区別できる.

A. sichuanensisとタイワンマダラクワガタの持つ特徴のうち,大顎に性的2型が見られないこと,および触角の片状部全体が短い毛で覆われていることは、ネパール産のA. himalayicusをはじめとする他の東洋区産の種と共通している.一方,触角の第3節は伸長せず短い,眼縁突起は発達しない,前胸背板の幅は中央より後ろ寄りで最大となる,前胸腹板の基節突起は著しく隆起する,などの外部形態の特徴、および陰茎は左右対称形で細長く伸長する,側片は細長く伸長する,などの交尾器形態の特徴は旧北区産の種と共通するものである.このように東洋区の種と旧北区産の種の両方の特徴を合わせ持つA. sichuanensisとタイワンマダラクワガタは、もしかすると中国内陸部と台湾中部の山地帯に取り残された,旧世界産のマダラクワガタ属のうちでもっとも祖先的な形質をとどめた遺存的な種群として位置づけられるのかもしれない.

今回,中国内陸部の大巴山脈から台湾産の種にきわめて近縁なマダラクワガタ属の新種が見つかっ たことは,クワガタムシ類をはじめとするこの地域の甲虫と台湾のそれとの共通性を示唆するもので あるが,近隣の秦嶺山脈にはルリクワガタ属やツヤハダクワガタ属など旧北区要素のクワガタムシ類 が生息することが知られている.今後,大巴山脈およびその周辺地域から旧北区産の種に近縁なマダ ラクワガタ属が発見される可能性もある.

なお、中国およびその近隣諸国から知られている、A. sichuanensisを含む4種のマダラクワガタ属の検索表を付記した.

References

ARAYA, K., 1993. Two new species of tropical Aesalus (Coleoptera, Lucanidae) from the Malay Peninsula. Jpn. J. Ent., 61: 697-710. — 1995. A redescription of Aesalus himalayicus (Coleoptera, Lucanidae) from Nepal. Spec. Bull. Jpn. Soc. Coleopterol., Tokyo, 365-370.

—, M. Kon & Y. JOHKI, 1993. A new species of the genus *Aesalus* (Coleoptera, Lucanidae) from the Malay Peninsula. *Elytra*, *Tokyo*, **21**: 93–107.

- BARTOLOZZI, L., 1991. Osservazioni sulle species Paleartiche del genere Aesalus FABRICIUS, 1801 (Coleoptera, Lucanidae). Opusc. zool. flumin., **76**: 1–8.
- IMURA, Y., 1993. On the *Platycerus* of China and Korea. *Gekkan-Mushi*, *Tokyo*, (272): 10–13. (In Japanese with English description.)
- & L. BARTOLOZZI, 1994. Descriptions of two new species of *Platycerus* (Coleoptera, Lucanidae) from central Sichuan, western China. *Elytra*, *Tokyo*, **22**: 139–143.
- 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.
- TANIKADO, M., & N. OKUDA, 1994. Two new species of the genera Ceruchus and Platycerus (Coleoptera, Lucanidae) from the Qingling Mountains in Shaanxi Province, Central China. Gekkan-Mushi, Tokyo, (278): 4-9. (In Japanese with English description.)
- ZELENKA, W., 1993. Echinoaesalus gen. n.—eine neue Lucaniden-Gattung aus Südostasien (Coleoptera, Lucanidae). Koleopt. Rdsch., 63: 235–237.
- ——— 1994. Zwei neue Echinoaesalus-Arten aus Südostasien (Coleoptera, Lucanidae). Z. Arbgem. österr. Ent., 46: 56-61.

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A New Record of *Lissorhoptrus oryzophilus* (Coleoptera, Curculionidae) from the Yayeyama Islands of the Ryukyus

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Since the invasion of *Lissorhoptrus oryzophilus* KUSCHEL from North America into Japan in 1976, it has rapidly spread over the Japanese mainland as a pest of rice plant. Though this species has not been recorded from the Yayeyama Islands of the Ryukyu Archipelago until now, it seems to expand gradually its distribution onto those islands in recent years. In the last three years, but not before, I have met the species on three of the Yayeyama Islands as recorded below. These are the southernmost known localities of the weevil in the Japanese territory.

Specimens examined. 1 ex., Omoto, Ishigaki-jima, 16–III–1993, M. SATÔ leg.; 2 exs., Komi, Iriomote-jima, 23–III–1994, M. SATÔ leg.; 4 exs., Sonai, Yonaguni-jima, 20–III–1995, M. SATÔ leg.