

# Note on *Lucanus Scopoli 1763* species from Southeast Asia with the description of a new species (Coleoptera: Lucanidae)

Jin Sato<sup>1</sup>, Van Dang Ngoc<sup>2</sup>, Michele Zilioli<sup>3\*</sup>

**Abstract** - *Lucanus collardi* n.sp. from Vietnam and Laos is described. It belongs to the large *L. fortunei* Saunders 1854 species group and is closely related to *L. adelmae* Zilioli 2003. *Lucanus collardi* n.sp. can be easily distinguished at a glance from *L. adelmae* through the longer and differently denticulated mandibles, the pronounced posterolateral corners of the cephalic lobes, and the aedeagus, with longer flagellum, less widened apex and feebly curved parameres. The female of *Lucanus satoi* Nagai & Tsukamoto 2003 is also described for the first time, and the genitalia of that species are illustrated.

**Key words:** Laos, Lucanidae, *Lucanus*, new species, Vietnam.

**Riassunto** - Nota sulle specie di *Lucanus Scopoli 1763* del sud est asiatico con descrizione di una nuova specie (Coleoptera: Lucanidae).

*Lucanus collardi* n.sp. del Vietnam e del Laos è descritto. Appartiene al grande gruppo di specie di *L. fortunei* Saunders 1854 ed è strettamente imparentato con *L. adelmae* Zilioli 2003. *Lucanus collardi* n.sp. può essere facilmente distinto a colpo d'occhio da *L. adelmae* grazie alle mandibole più lunghe e diversamente denticolate, alla presenza di angoli posterolaterali pronunciati dei lobi cefalici e all'aedeago, con flagello più lungo, meno allargato all'estremità e parameri debolmente curvati apicalmente. Viene anche descritta per la prima volta la femmina di *Lucanus satoi* Nagai & Tsukamoto 2003 e sono illustrati i genitali della specie.

**Parole chiave:** Laos, Lucanidae, *Lucanus*, nuova specie, Vietnam.

## INTRODUCTION

Indochina is considered the centre of distribution for the genus *Lucanus*, with many species inhabiting the area. In recent years, a large number of new species have been

discovered in Vietnam (Xin *et al.*, 2024) and Laos. The species described in this paper was initially known from a single medium-sized male specimen collected in Laos in 2010 by our colleague and friend Steeve Collard, but since then no additional specimens were found. However, in July 2023, during a visit to our colleague Van Dang in Vietnam, the first author examined a few specimens from a new collecting locality. Among them there were some *Lucanus* closely resembling the Laotian male, exhibiting the same distinctive features. In October of the same year, we also obtained an additional small male from Steeve Collard. Furthermore, in September 2024, our colleague Shinichi Murata travelled to Laos (Fig. 1) for research and found another medium-sized male. Although the examined specimens come from different localities, we consider all of them as belonging to the same species.

## MATERIALS AND METHODS

Pictures were taken with a Sony DSC-HX90V digital camera. Photographs of genitalia were taken with a Canon PowerShot S50 digital camera mounted on a Leica MS5 stereomicroscope and processed through the Helicon Focus 8 pro software.

## Depositories

The specimens are deposited in the following institutions or private collections:

JSC Jin Sato Collection, Sendai, Japan.  
MSNM Museo di Storia Naturale, Milano, Italy.  
MZC Michele Zilioli Collection, Albizzate, Italy.

***Lucanus collardi* sp.n.** (Fig. 2 a-d)  
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## Type material

Holotype ♂: VIETNAM, Nghe An Province, Ki Son, 1500 m a.s.l., VII/2023, local collectors leg. (MSNM).

Paratypes. 2 ♂♂, same locality as the holotype (MZC); 1 ♀, same locality as the holotype (MZC); 1 ♂, LAOS, Xieng Khouang Province, Phu SamSoum, 2300 m a.s.l., 15.X.2023, Steeve Collard leg. (JSC).

Description. Male Holotype (Fig. 2a). Length, includ-

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Received for publication: 21 October 2024

Accepted for publication: 31 October 2024

Online publication: 5 November 2024

ing mandibles: 48.6 mm. Length without mandibles: 31.1 mm. Maximum head width, excluding mandibles: 13.7 mm.

Body slender, mainly reddish brown, densely and finely punctate throughout, covered with appressed, moderately long yellowish pubescence. Antenna and palpi black. Elytra reddish brown, black along the suture and lateral edges. Legs with tarsi and coxae dark castaneous brown to black; femora and tibiae ferruginous with black margins.

Head. Transverse (W/L: 1.63), matt, punctate-granulate, covered by a dense yellowish appressed pubescence. Frons subtrapezoidal, slightly concave, fused with the clypeolabrum. Clypeolabrum subpentagonal, with a prominent narrowly pointed apex and fringed with yellowish hairs; clypeal ridge obsolete medially, laterally projecting as two very small blunt teeth. Frontal ridge bisinuate, distinctly raised medially. Lateral cephalic ridges strongly sinuate, with rounded, apically raised posterior lobes. Head with projecting antero-lateral corners, whose lateral margins are dorsally produced as a strong, slightly backward directed tooth. Ocular canthus shorter than half eye's diameter. Mandibles long and slender, about 3.5 times as long as the head, strongly curved basally, then almost

straight up to their slightly curved apex; surface, especially basally, granulate-punctate and covered with yellowish appressed pubescence, which is denser and much longer proximally and becomes sparser and very short apically. Median tooth strong, triangular, sharp, hardly tilted backwards and upwards, placed a little before the midlength. Inner mandibular margin with 6 (right) and 7 (left) proximal and 5 (right) and 7 (left) distal denticles, some of which are just little visible bumps. Upper apical tooth bent upwards, with a feebly marked dorsolateral carina; lower apical tooth shorter, conical, slightly downward directed.

Antennal club 6-jointed with scattered short setae; joints 6-10 with a long lamella; joint 5 with a shorter and thinner one. Lamellae covered with dense, short, raised pubescence (lamella of joint 5 pubescent only anteriorly). Mentum wide, trapezoidal, matt, finely and irregularly granulate, covered with long dense yellowish pubescence; anterior margin medially downward bent, convex and with broadly rounded lateral corners.

Thorax. Pronotum transverse (W/L: 1.80), matt, finely granulate-punctate, covered with moderately dense, appressed yellowish pubescence; anterior margin bisinuate, widely and weakly convex medially; anterior angles sharp and feebly directed forwards. Lateral margins strongly



Fig. 1 – Slopes of Mount Samsoun (Laos), habitat of *Lucanus collardi* n.sp. (photo: Shinichi Murata). / Pendici del Monte Samsoun (Laos), habitat di *Lucanus collardi* n.sp. (foto: Shinichi Murata).

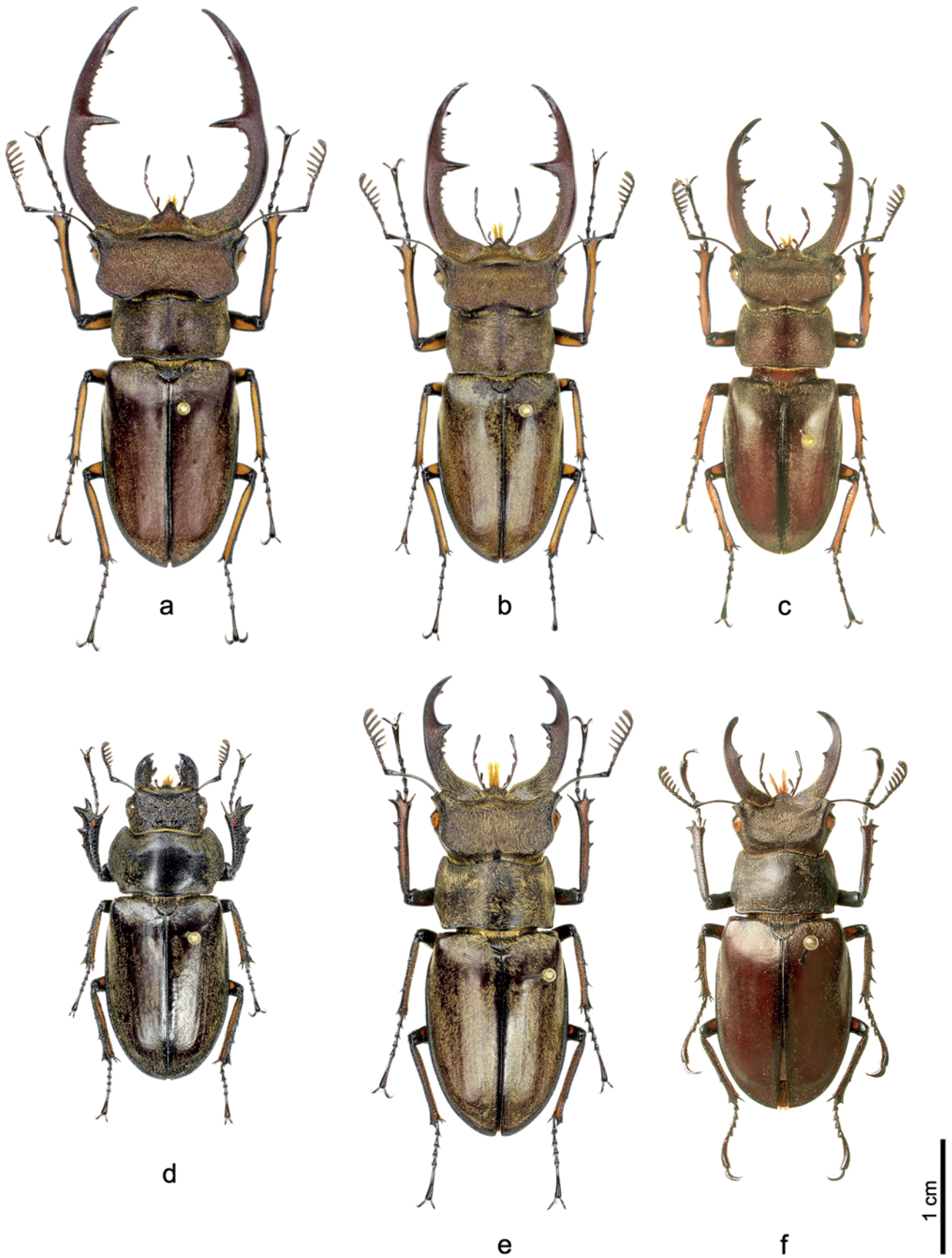


Fig. 2 – a-d) *Lucanus collardi* n.sp. a) holotype male, MSNM; b) paratype males, MZC; c) paratype male, JSC; d) paratype female, MZC; e, f) *Lucanus adelmae* Zilioli e) big male, Myanmar, JSC; f) holotype male, Myanmar, Kiyotami Fukinuki Collection, Okinawa, Japan. / a-d) *Lucanus collardi* n.sp. a) maschio olotipo, MSNM; b) maschi paratipi, MZC; c) maschio paratipo, JSC; d) femmina paratipo, MZC; e, f) *Lucanus adelmae* Zilioli e) maschio grande, Myanmar, JSC; f) maschio olotipo, Myanmar, Collezione Kiyotami Fukinuki, Okinawa, Giappone.

convex behind their midlength. Posterior margin weakly bisinuate, posterior corners as obtuse angles. Median longitudinal depression hardly visible, anteriorly more developed. Prosternal apophysis strong, prominent, forming a blunt right angle inside view, laterally covered with yellowish pubescence. Scutellum transverse, rounded, slightly pointed posteriorly, finely punctate and granulate except its margins that are superficially reticulate, covered with appressed yellowish pubescence.

Elytra finely and densely punctate throughout, superficially microreticulate, covered with sparse (because mostly abraded) yellowish pubescence. Shoulders forming slight, rounded obtuse angles. Legs slender, femora fairly shining, sparsely punctate with a superficial ground reticulation, and with sparse, short yellowish pubescence, even shorter on protibiae. Protibia with three spines on its outer edge, apex sharply bifurcated, mesotibia with three spines increasing in size from base to apex, metatibia with two weak lateral teeth, the proximal hardly visible.

Aedeagus (Fig. 3 a-d) in dorsal view about 2.5 times longer than wide. Basal piece elongate, in lateral view thin in the feebly upturned basal part, about 1.6 times as long as parameres, without sclerotized dorsal plates; in ventral view apex of basal piece membranous. Paramere with small basal process; in lateral view feebly curved, apically slightly protruding. Penis slender, with subparallel lateral margins, distinctly shorter than parameres. Flagellum about 2.3 times as long as parameres and 0.8 times as long as aedeagus, apically widened. Two long, slender struts run almost throughout the entire length of basal piece, from base to articulation of penis, feebly enlarged on their distal third.

## Description

Female Paratype: (Fig. 2d). Length, including mandibles: 28.1 mm. Length, without mandibles: 25.2 mm. Maximum head width: 7 mm.

Body slender; shining, blackish brown. Antennae and palpi black, mandibles black. Elytra dark reddish brown with suture and lateral edges black; femora ferruginous with base, apex and longitudinal stripe along both edges black, protibiae black with a small ferruginous apicodeorsal spot, meso and metatibiae with a median longitudinal ferruginous streak.

Head. Transverse (W/L 1.70), lacunose-foveate-punctate, covered with sparse and yellow short pubescence; frontal ridge concave. Frons punctate, tilted forwards and fused with clypeolabrum, well defined by a transverse suture. Clypeolabrum trapezoidal, short with weakly convex lateral edges and anterior corners hardly protruding as blunt teeth. Head with blunt anterior angles, backward produced into stout, punctate canthi, as long as less than half eye diameter. Eyes globular; temple short, not prominent. Mandibles short, asymmetrical, evenly curved from base to the apical tooth, dorsally grooved. Besides the apical tooth, mandibles edentate with a straight (right mandible) or weakly concave (left one), continuous masticatory margin; left mandible with a preapical indentation. External surface irregularly punctate with sparse, appressed yellow pubescence; inner one basally lacunose-foveate to distally punctate, with sparse standing hairs; masticatory edge with an ill-defined

sculpturation, partially shining. Antenna with a weakly curved scape and a club formed by joints 5-10. Mentum trapezoidal, widely anterolaterally rounded, areolate, covered with sparse, long yellowish hairs. Submentum sparsely punctate, with irregular ground microsculpture, covered with sparse, mostly appressed long hairs.

Thorax. Pronotum transverse (W/L 1.64), its anterior margin distinctly bisinuate, medially weakly convex and with blunt protruding anterior angles. Lateral margins anteriorly weakly convex to the postmedian angles, then almost straight and markedly convergent backwards, feebly sinuate just before the obtuse posterior corners. Posterior pronotal margin slightly bisinuate. Pronotal surface punctate, medially glabrous (because of abraded pilosity), laterally with appressed, short yellowish hairs; punctuation gradually stronger towards sides. Prosternal process distinctly prominent, blunt angled, laterally covered with yellowish pubescence. Scutellum ogival, faintly microreticulate, irregularly punctate and covered with sparse long yellowish hairs.

Elytra shining, with sublateral shallow concavities; shoulders bluntly angulate, lateral edge grooved and moderately convex from base to apex, sutural angles rounded. Elytral surface densely and finely punctate, covered with appressed yellowish pubescence, longer at sides. Protibia flattened and apically widened with two robust, sharp apical teeth and three triangular lateral ones, the apicalmost being the largest, the second smaller and the basalmost hardly distinct; mesotibia with three sharp preapical teeth, hind tibia with two preapical teeth.

Female genitalia. Hemisternite (Fig. 4) elongate, moderately wide, slightly rounded apically, with long yellowish setae; inner lateral margin of sclerotized part short. Spermatheca sclerotized, J-shaped, proximally slender and slightly curved inwards. Spermathecal duct long, about 3.6 times as long as spermatheca (N.B. spermathecal gland lost during extraction). Central conjunction of 9<sup>th</sup> tergite protruding medially and roundly narrowed at tip.

Paratype males. Consistent with the holotype except for the usual allometric differences. Small males with mandibles less curved and denticulated.

## DISCUSSION AND CONCLUSIONS

### Derivatio nominis

This new species is cordially dedicated to our friend and colleague Steeve Collard from Châlons-en-Champagne, France, a great connoisseur of the Laotian fauna, who was the first to collect this interesting new species.

### Comparative notes

*Lucanus collardi* n.sp. is closely related to *L. adelmae* described by Zilioli (2003) on a single male from Myanmar and both belong to the very large *Lucanus fortunei* species-group. However, *L. collardi* n.sp. can be easily distinguished at glance from its relative species through Tab. 1 comparison table.

**Note on *Lucanus satoi* Nagai & Tsukamoto, 2003** (Fig. 5 a-b)

Schenk (2012) in a short note published in "Beetles World No. 6" illustrated and briefly described what he

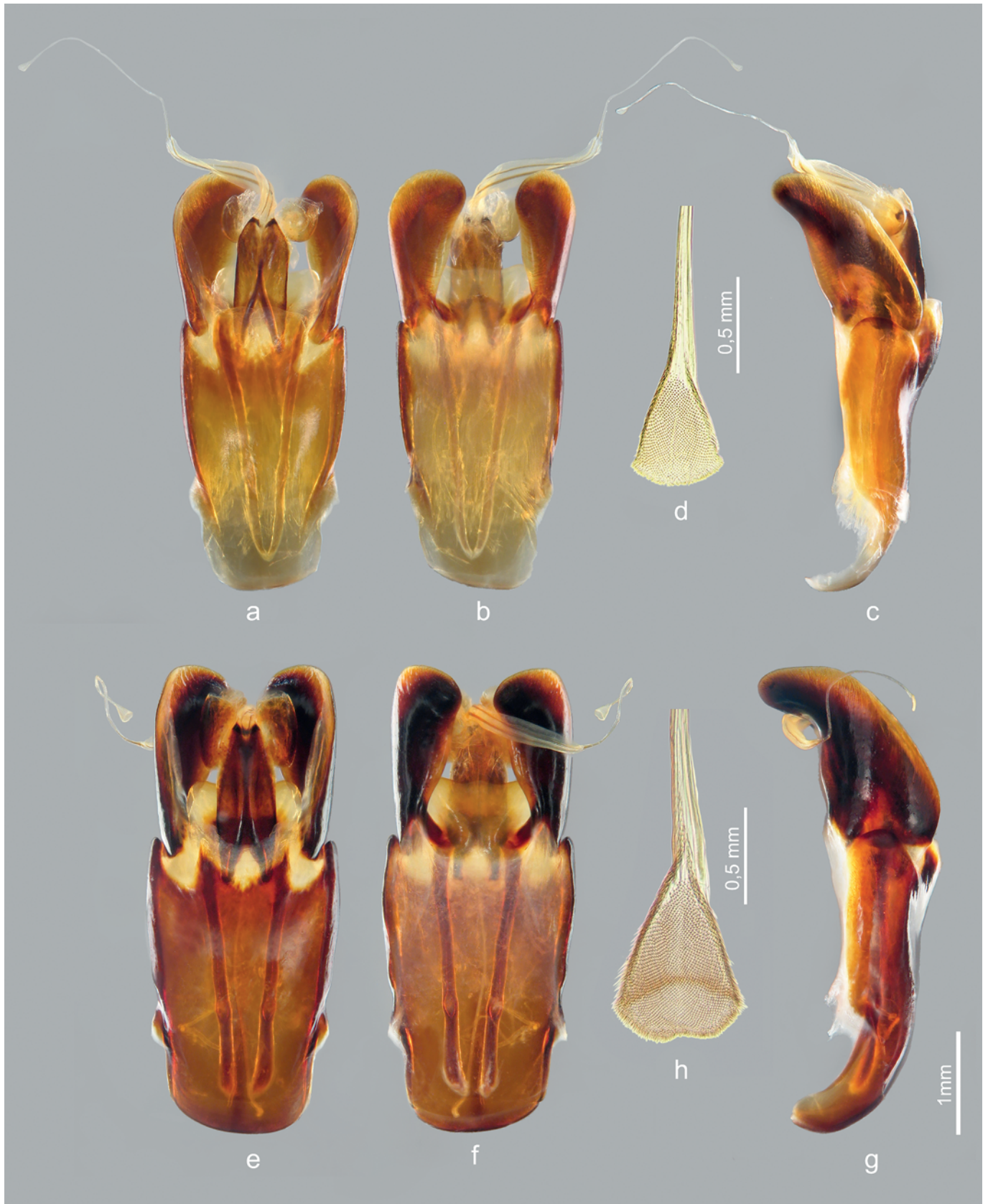
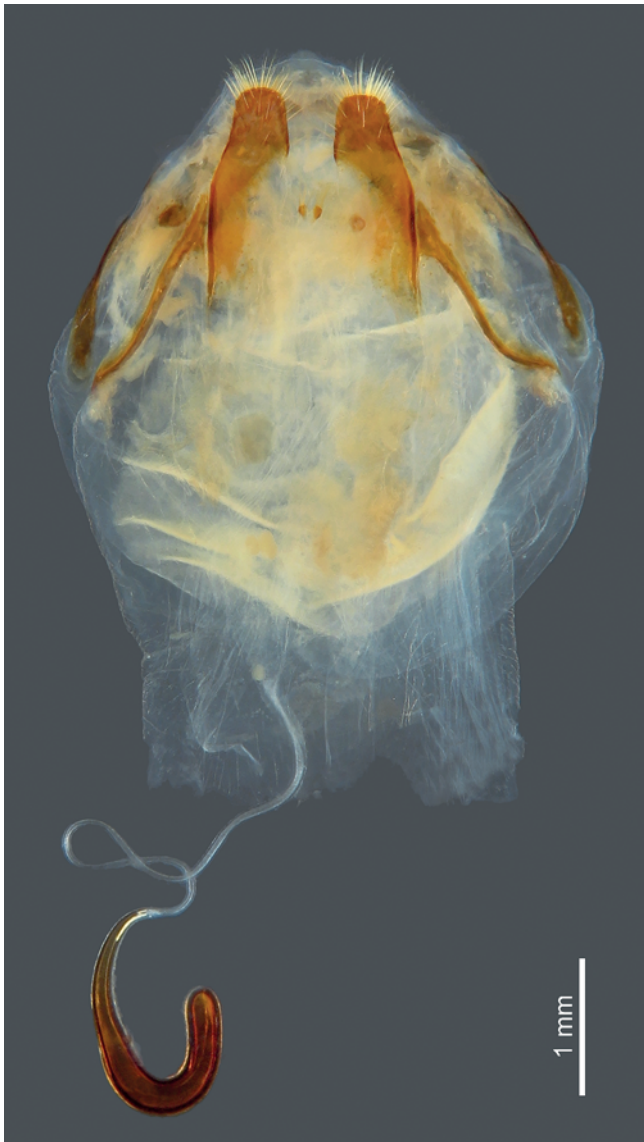
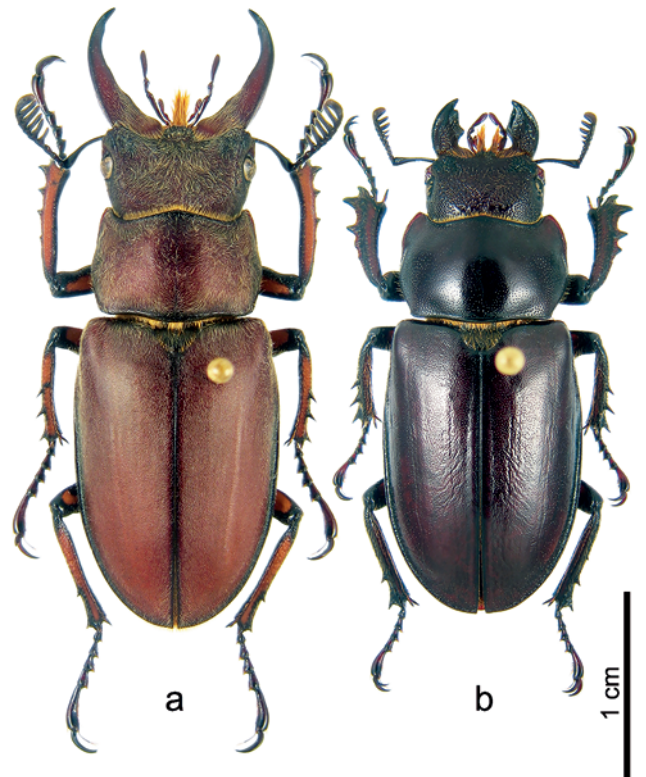


Fig. 3 – *Lucanus collardi* n.sp. Aedeagus. a) Ventral view; b) dorsal view; c) lateral view; d) apex of flagellum. *Lucanus adelmae* Zilioli. Aedeagus; e) ventral view; f) dorsal view; g) lateral view; h) apex of flagellum. *Lucanus collardi* n.sp. Aedeago. a) Vista ventrale; b) vista dorsale; c) vista laterale; d) apice del flagello. *Lucanus adelmae* Zilioli. Edeago; e) vista ventrale; f) vista dorsale; g) vista laterale; h) apice del flagello.

Tab. 1 – Comparison table. / Tabella di confronto.

<i>Lucanus collardi</i> sp.n. (Fig. 2 a-d)	<i>Lucanus adelmae</i> Zilioli, 2003 (Fig. 2 e,f)
Mandibles long and slender, about 3.5 times as long as head, with a long and sharp median tooth, placed before the mid-length, with inner mandibular margin with 3-7 proximal and 4-7 distal small denticles.	Mandible shorter and slender, about 1.7 times as long as head, with a short and conical median tooth, placed after the mid-length with inner mandibular margin with only 2-3 proximal small denticles.
Frontal ridge bisinuate, strongly raised and protruding medially.	Frontal ridge concave, feebly raised laterally and almost vanishing in the middle.
Lateral cephalic edges strongly sinuate, with rounded, apically raised posterior angles.	Lateral cephalic ridge weakly sinuate behind the anterior angle, with bluntly rounded posterior angles.
Aedeagus (Fig. 3a) in ventral view about 2.5 times longer than wide. In profile basal piece elongate, thin in the feebly upturned basal part. Paramere in profile feebly curved, apically slightly protruding. Penis with subparallel lateral margins. Flagellum (Fig. 3d) about 2.3 times as long as parameres and 0.8 times as long as the aedeagus, with moderately enlarged apex.	Aedeagus (Fig. 3e) in ventral view about 2.4 times longer than wide. In profile basal piece feebly proximally constricted, thicker and upturned. Paramere in profile curved, apically strongly protruding. Penis with apically convergent lateral margins. Flagellum (Fig. 3h) about 1.7 times as long as parameres and 0.6 times as long as the aedeagus, with strongly enlarged apex.

Fig. 4 – *Lucanus collardi* n.sp. female paratype genitalia. / *Lucanus collardi* n.sp. genitali del paratipo femminile.Fig. 5 – a,b) *Lucanus satoi* Nagai & Tsukamoto, Laos. a) Male, MZC; b) female, MZC. / (a,b) *Lucanus satoi* Nagai & Tsukamoto, Laos. a) Maschio, MZC; b) femmina, MZC.

believed to be the female of *Lucanus satoi*, unknown to Nagai & Tsukamoto (2003). In 2014, our colleague Steve Collard, during one of his collecting expeditions in Laos, found a thriving population of *Lucanus satoi*, with several mating males and females (Fig. 6). A careful examination of those females revealed that the specimen described and illustrated by Schenk is most likely a female of *Lucanus formosus* Didier 1925, a species living

in sympatry with *Lucanus satoi* (Steeve Collard, pers. comm.). Below, we provide the description of the female of *Lucanus satoi* and, for the first time, illustrate the genitalia of this interesting species.

**Description of the female of *Lucanus satoi*** (Fig. 5b, Fig. 7)

Length, including mandibles: 27.5 mm. Length, without mandibles: 24.2 mm. Maximum head width: 6.4 mm.

Body slender; mainly shining, dark reddish brown. Antennae, palpi and mandibles black. Elytra dark reddish brown with suture and lateral edges black; femora ferruginous with black edges, tibiae black with a dorsal longitudinal ferruginous streak.

Head. Transverse (W/L 1.7), densely areolate-punctate, and covered with thin sparse and moderately long yellow pubescence; frons anteriorly shallowly concave, tilted forwards and fused with the clypeolabrum. Clypeolabrum subtrapezoidal, short, apically weakly bilobed.

Head with blunt anterior corners, and punctate canthi. The latter as long as less than half a diameter of an eye. Eyes globular, temple short, feebly prominent. Mandibles short, asymmetrical, evenly curved from base to the apical tooth, dorsally grooved. Besides the apical tooth, mandibles edentate with a straight (right mandible) or weakly concave (left mandible), continuous masticatory margin; left mandible with a preapical indentation. External surface irregularly punctate with sparse, appressed yellow pilosity; inner one basally lacunose-foveate to distally punctate, with sparse standing hairs; apical edges with an ill-defined sculpturation, partially shining. Mentum trapezoidal with widely rounded anterior corners, foveate-punctate, covered with sparse, raised long yellow hairs. Submentum with irregular ground microsculpture, sparsely punctate and with long, mostly appressed hairs. Scape weakly curved, antennal club formed by joints 6-10.

Thorax. Pronotum transverse (W/L 1.57), its anterior



Fig. 6 – *Lucanus satoi* Nagai & Tsukamoto, mating pair. (photo: Steeve Collard). / *Lucanus satoi* Nagai & Tsukamoto, copula. (foto: Steeve Collard).



Fig. 7 – *Lucanus satoi* Nagai & Tsukamoto, Laos, detail of head and prothorax. / *Lucanus satoi* Nagai & Tsukamoto, Laos, particolare del capo e del protorace.



Fig. 8 – *Lucanus satoi* Nagai & Tsukamoto, female genitalia. / *Lucanus satoi* Nagai & Tsukamoto, genitali femminili.

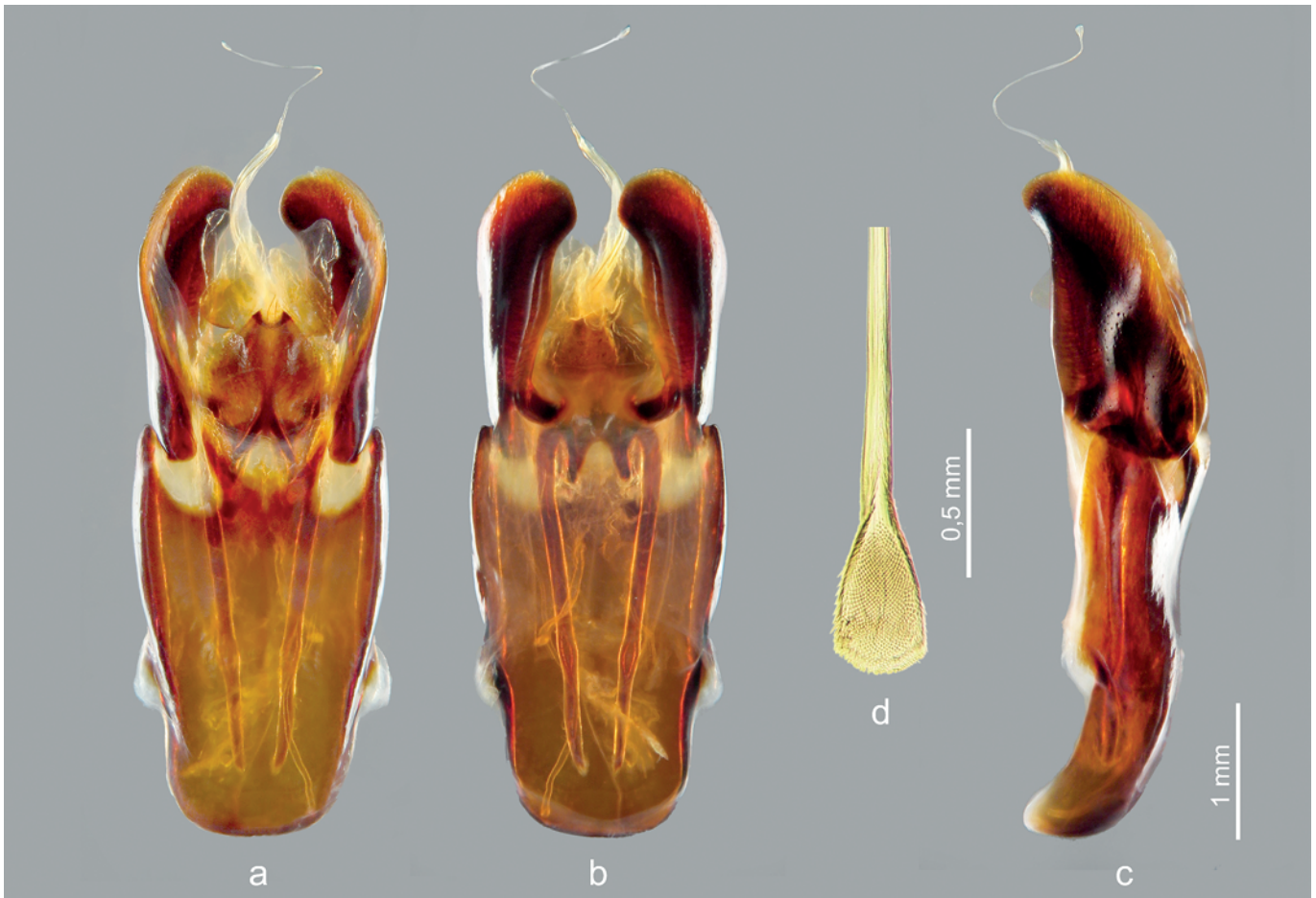


Fig. 9 – *Lucanus satoi* Nagai & Tsukamoto, Aedeagus. a) Ventral view; b) dorsal view; c) lateral view; d) apex of flagellum. / *Lucanus satoi* Nagai & Tsukamoto, Aedeagus. a) Vista ventrale; b) vista dorsale; c) vista laterale; d) apice del flagello.

margin distinctly bisinuate, weakly convex medially; anterior angles slightly pointed and directed forwards; lateral edges convex and hardly bisinuate, posterior 2/5 markedly convergent backward; posterior margin slightly bisinuate. Pronotum finely and sparsely punctate in the middle; punctuation becoming gradually stronger laterally, and bearing a minute, hardly visible pubescence. Prosternal process feebly protruding apically rounded, laterally covered with yellowish pubescence. Scutellum rounded, microreticulate, densely punctate and covered with sparse long yellowish hairs.

Elytra shining, densely and finely punctate, with some poorly visible longitudinal striae, and minutely and sparsely pubescent; elytral base feebly concave; shoulders rounded; lateral edge evenly curved from base to apex, sutural angles feebly pointed. Protibia strongly flattened and distally widened, with two apical adjacent robust teeth and three lateral ones, the first large, the second much smaller and the third hardly distinct; mesotibia with two sharp apical as well as two lateral teeth; hind tibia with two apical as well as two lateral teeth, of which the proximal minute and/or hardly visible

Female genitalia. Hemisternite (Fig. 8) elongate, moderately wide and rounded, apically coated with yellowish setae, its apex slightly curved outwards; inner lateral scler-

otized margin long. Spermatheca sclerotized, J-shaped, proximally thin for about half of its total length. Spermathecal duct short, about 0.47 times as long as the spermatheca. Spermathecal gland vermiform, slightly shorter than the spermatheca. Central conjunction of the 9th tergite protruding medially as a narrow and subacute tip.

Male. Aedeagus: (Fig. 9 a-d) in ventral view about 2.6 times longer than wide. Basal piece proximally constricted, in profile thick and feebly upturned, about 1.4 times as long as parameres, without sclerotized dorsal plates; in ventral view basal piece apically membranous. Paramere with small basal process, curved in profile, apically feebly protruding. Penis strong, with convex sides, almost as long as half parameres' length. Flagellum short, about 1.3 times as long as parameres and 0.57 times as long as the aedeagus, with feebly enlarged apex. Two long struts run almost the length of the basal piece, from the base to the articulation of the penis with a feebly enlarged distal third.

#### Acknowledgements

We are grateful to Steeve Collard (Châlons-en-Champagne, France) for providing specimens and information. We also thanks Kazuho Kobayashi (Saitama, Japan) for taking the photos of type specimens; Takeshi Maeda (Iba-



raki, Japan) for providing us useful specimens; Shinichi Murata (Miyagi, Japan) for providing the habitat pictures of Laos. Many thanks to Fabrizio Rigato (MSNM) and Cinzia Monte for their critical readings of the manuscript. Last, two reviewers, Luca Bartolozzi (Florence, Italy) and Lin Jing Zhi (Taipei, Taiwan), provided their valuable comments that improved the quality of this paper.

## REFERENCES

- Nagai S. & Tsukamoto K., 2003 – Two new species of the genus *Lucanus* (Coleoptera, Lucanidae) from Indocina. *Special Bulletin of the Japanese Society of Coleopterology Tokyo*, 6: 201-205.
- Schenk K.D., 2012. – Notes to the *Lucanidae* of Asia and description of new taxa of the genus *Neolucanus* (Coleoptera, Lucanidae). *Beetles World*, 6: 2-8.
- Xin F.Y., He H., Zhong X.T., Zhang Y.F & Qi Z.H., 2024. – *Lucanus ludivinae*, a newly recorded stag beetle from Vietnam, with a description of a new subspecies (Coleoptera: Lucanidae: Lucaninae). *Faunitaxys*, 12 (39): 1-7.
- Zilioli M., 2003 – A description of *Lucanus adelmae* n.sp., a new stag-beetle from Myanmar. (Coleoptera, Lucanidae). *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano*, 144 (1): 83-89.