



New descriptions and notes on Chinese stag-beetles, with discovery of the second species of *Noseolucanus* from SE Tibet. (Coleoptera, Lucanidae)

by Hao HUANG

Department of Biology, Life and Environment Science College, Shanghai Normal University, P.R.China
private address: 503, East, # 1 Dong-Ting-Hu Road, Qingdao, 266071, P.R. China (Email: cmdhxx@hotmail.com)

Abstract

Three new stag-beetles are described from China, viz. *Noseolucanus zhengi* sp.n. from SE Tibet, *Lucanus* (*Pseudolucanus*) *mingyiae* sp.n. from NW Yunnan and *Lucanus* (*Pseudolucanus*) *pani* sp.n. from SE Tibet. The recently described genus *Noseolucanus* is proved to be a good genus independent from *Lucanus*, in light of the discovery of the second species within the genus including both sexes from the same habitat. *Pseudolucanus denticulus* is proved to be the senior synonym of *Noseolucanus rugosus* representing the ♀. Two stag-beetles are newly recorded for Chinese fauna, viz. *Neolucanus brochieri* from Dulong valley of W. Yunnan and *Neolucanus angulatus* from SE Tibet. The following new synonyms are given: *Pseudolucanus bicolor* syn. n. for *Pseudolucanus imitator* and *Lucanus wuyishanensis* syn. n. for *Lucanus klapperichi*.

Keywords

Noseolucanus, *Lucanus*, Tibet, China, checklist

Introduction

A small collection of stag-beetles was brought back by my recent two expeditions to NW Yunnan and SE Tibet. Among which the second species of the genus *Noseolucanus* Araya & Tanaka, 1998 was discovered and two new species of the subgenus *Pseudolucanus* Hope, 1845 of the genus *Lucanus* Scopoli, 1763 were found. In searching and studying the literatures on *Lucanus*, two new synonyms are recognized.

During my collecting of Chinese stag-beetles these years, some species of stag-beetles were collected as new records for Chinese fauna and formally recorded in this paper.

The following body measurements were taken based on Araya (1992):

- 1) BL- body length without mandibles.
- 2) BT- body thickness.
- 3) HL- head length.
- 4) HW- head width at widest part including eyes.
- 5) CHW- head width measured between tips of eye-canthus.
- 6) ML- mandible length in ventral view
- 7) DBT- distance from mandibular base to inner tooth
- 8) PL- pronotum length in middle
- 9) PW- pronotum width at widest part
- 10) EL- elytra length measured along the midline
- 11) EW- elytra width at widest part
- 12) PTL- protibia length measured from base of tibia to base of tarsi
- 13) PTW- protibia width measured just at base of apico-external fork

All measurements are in mm. The terminology of genital organs mainly follows Holloway (1960, 1969).

Abbreviations of Collections mentioned in the text

BVQC Biological Laboratory of Qingdao Vocational and Technical College, Qingdao, China.
HCQC Hao HUANG collection, Qingdao, China

Noseolucanus zhengi sp.n.

Type data

Holotype, ♀: 15km west of Hanmi, Motuo County, Linzhi District, SE Tibet, China, 2400m, August 2005. Leg. Hao HUANG. Captured in the field under daylight (BVQC).

Paratypes, 1 ♂: 14km west of Hanmi, 2400m, leg. Hao HUANG (HCQC). 2 ♀♀: Hanmi, 2000m, leg. Liang TANG, Da-Kang ZHOU (HCQC).

Diagnosis

Only one valid species has been known in the recently described genus *Noseolucanus* Araya & Tanaka, 1998. The new species can be easily distinguished from *Noseolucanus denticulus* (comb. nov.) from W. Yunnan and N. Myanmar by the following combination of characters.

Both sexes the eye-canthus is much thinner than in *N. denticulus*, not triangular as in *N. denticulus*, and is in a straight line with lateral margin of head behind eye, whereas in *N. denticulus* it is projected out of the lateral margin of head, forming a hollow



near each eye. The elytra are relatively longer than in *N. denticulus* with a larger L/W (length/width) ratio.

Only in the ♂ the head is nearly as wide as elytra, not narrower than elytra as in *N. denticulus*. Pronotum is conspicuously wider than elytra. The parameres is more pointed at apex than in *N. denticulus*, middle lobe is apparently shorter than parameres, not longer than parameres as in *N. denticulus*. (Aedeagus of *N. denticulus* was illustrated and described under *L. rugosus* in Araya, 2004.)

Description ♂

Color. Head above totally black, below black at lateral areas but reddish brown in the middle. Eye brown in dry condition. Mandible black above and beneath, but appearing reddish brown at base. Clypeus black. Maxillary palpus and labial palpus brown. Mentum reddish brown but appearing black at all edges. Pronotum black. Elytra dark reddish brown, darkened toward the lateral margins and along the suture. Scutellum black. Prosternum reddish brown at lateral sides and intercoxal process, black at mid portion in front of procoxal cavities. Mesosternum black at lateral sides but reddish brown at mid portion. Metasternum mostly black, only appearing reddish brown in anterior portion near metocoxal cavities. Abdomen with each sternite reddish brown but black near posterior margin. All femora mostly black, only appearing reddish brown at inner edges. All tibiae and tarsi black. All coxae appearing reddish brown at anterior edges, but black at the ventral surfaces.

Shape. Body much depressed.

Head. Nearly trapezoidal, narrowest at anterior margin and widest at posterior margin; nearly as long as pronotum in the middle and as wide as elytra; sunk perfectly by anterior margin of prothorax; with a feeble transverse furrow at anterior third of head in dorsal view, from which the dorsal surface declined to clypeus; with dorsal surface smoothly declined to clypeus and lateral margins, without carina or any traces of frontal ridge, lateral ridges and anterior angles; with eye-canthus in a straight line with lateral margin behind eye, not projected. Anterior and posterior margins of head and prothorax on both dorsal and ventral surfaces fringed with dense hairs. Anterior portion of dorsal surface of head covered with very minute, sparse and adpressed pubescence, nearly invisible to the naked eyes but visible under microscope. Anterior half of dorsal surface of head irregularly

sculptured and punctured, with more sparse but larger punctures near clypeus, but with posterior half of dorsal surface closely and transversely rugose; with ventral surface punctured at lateral areas but nearly smooth in central area.

Eye. Small, with narrow canthus covering more than three third of its external margin.

Mandible. Short, strongly curved near base, then gently and evenly curved toward tip, without any trace of inner tooth, somewhat obtuse at tip; base of outer margin somewhat straight, base of inner margin somewhat convex. Punctured on both dorsal and ventral surfaces, densely near base and sparsely near tip.

Clypeus. (=epistoma) Not projected, almost hidden in dorsal view, only visible in dorso-anterior view, very short and wide, nearly 1/3 times as wide as head, flattened, with anterior margin rather straight.

Mentum. Somewhat trapezoidal, with anterior angles rounded and frontal margin a little depressed in the middle. Punctured, more densely in the middle.

Antennal club. Formed by antennomeres seven to ten. Joints eight to ten, each with a broad, obtuse and pubescent lamella, brown in color; joint ten being the largest, a little longer and much broader than joints eight and nine. Joint seven with a shorter, thinner and pointed lamella, black in color as joints one to six.

Pronotum. Wider than elytra and nearly even in width at the anterior half, then constricted abruptly to the narrow posterior margin which is narrower than the anterior margin of elytra; with posterior angles well marked. Closely and transversely rugose as in the posterior half of head.

Elytra. About 1.4 times as long as wide, nearly as wide as head. With shallow but distinct and irregular longitudinal striae. Elytra almost naked, without pubescence. Scutellum semi-circular, clad with very minute and sparse pubescence and scales, hardly visible to the naked eyes.

Thorax. Intercoxal process of prosternum more elevated than in *Pseudolucanus*, dilated posteriorly. Edges of pro-, meso and metocoxal cavities fringed with dense yellowish brown hairs. Mesosternum clad with yellowish brown pubescence. Pro-, meso- and metasternum punctured and microsculptured. Metasternum almost naked, without pubescence.

Abdomen. With five visible sternites. Smooth, not punctured.

Legs. with tibiae and tarsi relatively short. Protibia broader than in ♀; with its apico-external



fork diverging deeply, the diverging position only a little exterior to base of tarsi; with three minute denticles on its external margin. Meso- and metatibiae, each with three large apico-external spines and two long inner spurs at terminal end, usually with one minute denticles (variable even in the same σ , sometimes up to three in number) on external margin. All femora and tibiae clad with sparse but conspicuous yellowish setae, mostly on their inner edges. All femora and tibiae sparsely punctured and microsculptured.

σ **genitalia.** Gonosomite and aedeagus symmetrical as in *Lucanus*. Aedeagus rather narrow at cephalic end, expanding considerably and gradually to caudal end. Parameres slender near tip and pointed at tip. Middle lobe (= penis) a little shorter than parameres, resting on distal end of basal piece; a pair of slender struts (basal struts) articulating with base of middle lobe lying with the basal piece whose dorsal part is membranous. No pair of lateral sclerites continued from the basal struts alongside the middle lobe. A long and simple internal sac everted from middle lobe as flagellum, in basal part it membranous, permanently expanded, even in width and thickness and without sclerotized inner lines for a considerable length (about 1.75 times as long as aedeagus), then it narrowed a little, depressed and with a pair of sclerotized lateral lines as framework for a length to tip (about 1.25 times as long as aedeagus), at terminal end it expanded again and membranous. (Both hand-drawings and photos are published because the photos show the shape more accurately whilst hand-drawings show some membranous or micro structures in detail which are hardly seen in photos.)

Description ♀

Measurement. HT's data are reported in parentheses BL- 22; BT-5.5; HL-4.5; HW-8.6; CHW-8; ML-4.5; PL-4.7; PW-10.5; EL-13; EW-9.3; PTL- 5.5; PTW-1.5; ♀: BL- 20-(23); BT-5.6-(6.3); HL-2.7-(3.0); HW-4.8-(5.8); CHW-4.8-(5.8); ML-2.5-(3.2); PL-4.2-(4.8); PW-8.0-(9.0); EL-12.8-(15.0); EW-9.0-(10.0); PTL- 4.5-(5.0); PTW-1.0-(1.1).

Color. Nearly all structures are same-colored as in male except only the abdominal sternites, which are totally black in ♀. Head, pronotum and elytra all with light lustre, more reflecting under light than in σ , whereas in σ they appearing much duller and darker, though same-colored.

Shape. Body less depressed as in σ , like in ♀♀ of *Pseudolucanus*.

Head. Nearly square, somewhat even in width throughout; much smaller than in σ ; much shorter and narrower than pronotum; sunk perfectly by anterior margin of prothorax; with a feeble transverse furrow at anterior third of head in dorsal view; with dorsal surface smoothly declined to clypeus and lateral margins, without carina; with eye-canthus in a straight line with lateral margin behind eye, not projected. Head densely punctured, without dense and transverse wrinkles of σ .

Eye. Small, with narrow canthus covering more than three third of its external margin as in σ .

Mandible. Shorter and thinner than in σ , strongly curved near base, then gently and evenly curved toward tip, without any trace of inner tooth, sharply pointed at tip, not obtuse as in σ ; base of outer margin somewhat straight, base of inner margin somewhat convex.

Clypeus. same-shaped as in σ , but relatively narrower in correspondence with the narrower head than in σ .

Antennal club. as in σ . Mentum as in σ .

Pronotum. A little narrower than elytra, with lateral margins almost evenly rounded. Pronotum densely punctured, without dense and transverse wrinkles of male.

Elytra. Similar to those of σ , but apparently larger in dorsal view and less depressed in lateral view than in σ .

Thorax. Intercoxal process of prosternum considerably elevated, dilated posteriorly as in σ . Metasternum densely covered with yellowish pubescence.

Abdomen. With five visible sternites as in σ .

Legs. Protibia somewhat narrower than in σ but nearly same-shaped as in σ . Meso -and metatibiae, each with a minute spine or a feeble protuberance at terminal third on external margin, sometimes two in number or remoter from the terminal end, otherwise as in σ . All tarsi relatively short as in σ .

Remark

Pubescence and hairs mostly as in σ , except only metasternum. Punctures and sculptures mostly as in male except only head and pronotum.

Etymology

The new species is named in honor of Mr. Wei-Lie Zheng, my close friend.

Field observation

This species is active only in daylight; not attracted to the lamp light at night (Such habit also



been found in some *Lucanus* species). I spent nearly two weeks to attract the insects using an electric lamp (250-500W) in the habitat of this species but failed to see it at night. The first individual captured, one ♀, was encountered and netted when it was flying rapidly in the daylight like a flower beetle. This reflects that the members of *Noseolucanus* should be good fliers. All the individuals captured were encountered only on sunny days in the daylight. The remaining ♀♀ and the unique ♂ were encountered when they were climbing on the path or the open ground in the subalpine broad-leaf forests. In the same habitat, many individuals of *Lucanus furcifer* Arrow, 1950 and very few *L. (Pseudolucanus) pani* sp.n. were attracted to the lamp light at nights.

Lucanus (Pseudolucanus) mingyiae sp.n.

Type data

Holotype: ♂: Haba Snow Mts., Zhongdian County, NW Yunnan, China, 2800m, June 2004. Leg. Hao HUANG. Captured under lamplight at night (BVQC).

Paratypes: 2 ♂♂, 1 ♀: same data as holotype (HCQC).

Diagnosis

This species belongs to the “*dauidis*-group” (sensu Boucher & Huang, 1991) of the subgenus *Pseudolucanus*. It is only similar to *L. prometheus* (Boucher & Huang, 1991) from Bomi area, SE Tibet in having femora, tibiae and tarsi relatively long and inner tooth of mandible obsolete, but can be easily distinguished from the latter by the following combination of characters in ♂.

All tibiae, antennal club and clypeus are black in color, not brown as in *L. prometheus*. Apico-external fork of protibia is much longer than in *L. prometheus*. Antennal club is formed by antennomeres seven to ten as in *L. prometheus*, but the joint seven bears a much shorter lamella than in *L. prometheus*. Clypeus has the anterior margin less pointed in the middle than in *L. prometheus*. Middle lobe of aedeagus is conspicuously longer than in *L. prometheus*; flagellum is somewhat narrower at cephalic portion than in *L. prometheus*.

The new species here described can be distinguished from *L. prometheus* by the following combination of characters in ♀.

Mandible has no inner tooth, which is well developed in *L. prometheus*. Apico-external fork of fore-tibia is much longer than in *L. prometheus*.

Hind-tarsi are much shorter than in *L. prometheus*. Nearly all structures are pure black on both dorsal and ventral surfaces, not brownish black as in *L. prometheus*.

Remarks

In the original description, only a hand-drawing of *L. prometheus* was published by Boucher & Huang (1991). Lately a good photo of the unique holotype was published and the species was re-described in Chinese by Huang (1999: 153 in Chen, 1999). No additional specimen has been discovered since the holotype was captured and described. However in my recent exploration to SE Tibet, a ♀ was captured in the same area of *L. prometheus* and *L. imitator* (Boucher & Huang, 1991), which has relative long tarsi as in *L. prometheus*, not so short as in *L. imitator*. Moreover this ♀ shares with *L. prometheus* in having the tibiae and antennal club brown in color and apico-external fork of fore-tibia relatively short. Thus this female was considered to represent the ♀ of *L. prometheus*.

Description ♂

Measurement. (HT's data in parentheses). BL-23-(28); BT-6-(8); HL-4-(5); HW-7-(9); CHW-7-(9); ML-4.5-(6.5); PL-4.8-(5.8); PW-7.8-(9.2); EL-14.4-(18); EW-10.9-(12.3); PTL- 6-(8); PTW-1.1-(1.2).

Color. All structures and portions black, the dorsal surface of head, pronotum and elytra strongly reflecting under light, with an iron-greenish lustre.

Head. Somewhat square, nearly as wide as pronotum, widest at outer edges of eyes, constricted gradually behind eyes; frontal ridge concave in dorsal view, more developed laterally and almost vanishing in the middle; lateral ridge feebly developed only in anterior half of head above eye and vanishing in posterior half of head where the dorsal surface of head declined to posterior margin smoothly; anterior angle truncated and obtuse, not projected. Head above densely microsculptured under microscope, looking somewhat smooth to the naked eyes and strongly reflecting under light; below densely microsculptured as well, with lateral areas punctured. Surfaces of head, mandibles, clypeus and mentum totally naked.

Eye. Large, with narrow canthus covering less than one half of its external margin.

Mandible. Bended abruptly and rectangularly in the middle, sharply pointed at tip, with a feeble tubercle in the middle on the ventral surface. Punctured sparsely everywhere, densely microsculptured at basal half on both dorsal and



ventral surfaces.

Clypeus. A little less than one third as wide as head, with anterior margin nearly straight, only feebly pointed in the middle, microsculptured.

Antennal club. Formed by antennomeres seven to ten. Joints eight to ten, each with a strong, long and pubescent lamella, blackish in color as in joints one to seven but with pubescence somewhat yellowish gray; joint seven with a much shorter, slender and pointed lamella, not pubescent but with few setae as in joints one to six.

Mentum. Somewhat trapezoidal, with anterior angles rounded and frontal margin gently convex, punctured and microsculptured.

Pronotum. Convex, with a feebly impressed narrow medial depression, nearly as wide as head, considerably narrower than elytra, with anterior and posterior margins subequal in width, anterior and posterior angles similarly produced, and lateral margins sinuate. Somewhat densely microsculptured at lateral areas, sparsely micropunctured in mid area, more smooth and reflecting under light than head to the naked eyes. Surfaces of pronotum totally naked.

Elytra. About 1.3-1.5 times as long as wide, wider than head and pronotum. Scutellum semi-circular. Elytra smooth and much more strongly reflecting under light than pronotum. Surfaces of elytra totally naked.

Thorax. Prothorax with anterior and posterior margins densely fringed with yellowish brown hairs on both dorsal and ventral surfaces. Pro- and mesosternum and abdomen covered with thin and short pale yellow hairs whilst metasternum more densely covered with much longer pale yellow hairs. Pro-, meso- and metasternum and abdomen microsculptured everywhere.

Abdomen. With five visible sternites.

Legs. Femora, tibiae and tarsi relatively long. Protibia with its apico-external fork rather long and exceeding its inner spur, with three to five irregular denticles and protuberances on its external margin. Meso- and metatibiae, each with three short apico-external spines and two long inner spurs at terminal end. Mesotibia with three spines on its external margin whilst metatibia with one protuberance at terminal third of external margin. Meso- and metatibiae covered with yellowish hairs on their inner ridges. All femora and tibiae sparsely punctured, each puncture mostly with a yellow hair.

♂ genitalia. Gonosomite as in most species of *Pseudolucanus*. Aedeagus more or less expanded

from cephalic end to caudal end; parameres slightly curved apically in lateral view; middle lobe only a little shorter than parameres; flagellum very long, more than two and a half times as long as aedeagus, wider at cephalic portion for a length (about three third times as long as aedeagus) then becoming very narrow to the terminal end, a little expanded as a triangular plate at tip under microscope.

Description ♀

Measurement. BL- 26.4; BT-7; HL-4; HW-6.7; CHW-6.7; ML-3.5; PL-5.5; PW-9; EL-17.2; EW-12; PTL- 5; PTW-1.4.

Color. Blackish as in male, but blacker in tone, without the iron-greenish lustre of ♂.

Head. Nearly square, much smaller and narrower than in male; much narrower than pronotum; without frontal ridge; lateral ridge feebly developed only in anterior third of head above eye and vanishing posteriorly; a pair of feeble depressions just inside of the lateral ridges at anterior third of head; anterior angle not produced, but broadly rounded from base of mandible to the tip of eye-canthus. The dorsal surface of head which is much more densely and heavily sculptured and punctured than in ♂.

Eye. Considerably smaller than in ♂, with narrow canthus covering less than one half of its external margin.

Mandible. Much shorter than in male, evenly curved to a sharp tip, without any trace of inner tooth or tubercle.

Clypeus. Somewhat pentagonal, apparently but obtusely pointed in the middle, much narrower but somewhat longer than in male. Maxillary and labial palpi shorter than in ♂.

Mentum. Somewhat pentagonal, apparently but obtusely pointed in the middle, narrower but longer than in ♂.

Antennal club. Formed by antennomeres seven to ten. Joints eight to ten, each with a strong, long and pubescent lamella; joint seven with a much shorter, slender and pointed lamella.

Pronotum. More convex than in ♂, with a feeble depression along mid line, wider than head and narrower than elytra, with anterior margin a little narrower than posterior margin, anterior angle obtuse, posterior angles well produced, and lateral margins sinuate.

Elytra. Tending to be stouter than in ♂. Scutellum semi-circular.

Abdomen. With five visible sternites.

Legs. Femora, tibiae and tarsi much shorter



than in male. Protibia much shorter but apparently broader than in ♂, with its apico-external fork somewhat longer and broader than in ♂, exceeding its inner spur very much, with three to four perfect triangular denticles on its external margin. Mesotibiae, each with three long apico-external spines and two long inner spurs at terminal end, and three perfect spines on its external margin. Metatibiae, each with three short apico-external spines and two long inner spurs at terminal end, and one perfect spine at terminal third of external margin.

Etymology

This new species is dedicated to my beloved, Ming-Yi Li.

Field observation

The combination of ♂ and ♀ was based upon the field observation that both sexes were captured under the same electric lamp in the same night at their biotope. Both sexes were attracted to lamp light at night. The biotope is within the needle-leaf forest at relatively high elevation above 2500m in NW Yunnan. The biotope were so cold at nights even in summer that only very few beetles were attracted by the lamp light in contrast with the abundance of beetles under lamp in the lower elevation of the same area.

Lucanus (Pseudolucanus) pani sp.n.

Type data

Holotype: ♂: Hanmi, Motuo County, SE Tibet, China, 2000m, August 2005. Leg. Hao HUANG. Captured under lamplight at night (BVQC).

Paratypes: 1 ♂ 1 ♀: Da-Yan-Dong, between Nage and Hanmi, Motuo County, SE Tibet, China, 2500m, August 2005. Leg. Da-Kang ZHOU. Captured under lamplight (HCQC); 1 ♀: same data as holotype (HCQC).

Diagnosis

This species belongs to the “*dauidis*-group” of the subgenus *Pseudolucanus*. It is similar to *L. dauidis* in having the inner tubercle on ventral surface of mandible closer to the tip of mandible, but can be easily distinguished from the latter by the following combination of characters.

♂: Inner tooth of mandible is obsolete, not so apparently marked as in *L. dauidis*. Apico-external fork of fore-tibia is much longer than in *L. dauidis*. Middle lobe of aedeagus is conspicuously longer

than in *L. dauidis*; flagellum has the basal expanded portion much shorter than in *L. dauidis*.

♀: Inner tooth of mandible is clear at terminal third of mandible, not obsolete as in *L. dauidis*. Apico-external fork of fore-tibia is much longer than in *L. dauidis*.

L. pani sp.n. can easily distinguished from *L. prometheus*, which is closely distributed, by the body and legs concolorous black, apico-external fork of fore-tibia much longer, all legs much shorter, clypeus less pointed in the middle, middle lobe of aedeagus longer and flagellum much shorter.

This species somewhat resembles *L. lesnei* in flagellum, but can be easily distinguished in ♂ by the different ♂ mandible, the relatively shorter legs, the relatively shorter parameres and longer middle lobe.

This species can be easily distinguished from *L. gracilis* and *L. mingyiae* simply by the different mandibles in both sexes and the very different flagellum of aedeagus.

Description ♂

Measurement. (HT's data in parentheses). BL- 24.5-(26); BT-5.7-(6); HL-4.5-(4.8); HW-7.8-(8.4); CHW-7.7-(8.3); ML-4.9-(5); PL-4.8-(4.9); PW-8.6-(9); EL-15.6-(16); EW-11-(11.3); PTL- 5.9-(6.1); PTW-1.2-(1.2).

Color. All structures and portions pure black on dorsal surface with elytra sometimes appearing brownish black; on ventral surface mostly pure black as on dorsal surface, only the central area of head and prosternum often appearing brownish black, sometimes abdomen and legs appearing brownish black as well. Dorsal surface of head, pronotum and elytra strongly reflecting under light, but without the iron-greenish lustre of *L. mingyiae*. Maxillary and labial palpi brown.

Head. Somewhat square, nearly as wide as pronotum, widest at outer edges of eyes, constricted gradually behind eyes; frontal ridge concave in dorsal view, more developed laterally and almost vanishing in the middle; lateral ridge clearly marked in anterior half of head above eye, then bended towards the middle of posterior margin of head and feebly marked; anterior angle truncated and obtuse, not projected. Dorsal surface of head totally naked. Head above densely microsculptured, only slightly reflecting under light; below densely microsculptured as well, with lateral areas punctured.

Eye. Large, with narrow canthus covering less than one half of its external margin.

Mandible. Punctured sparsely everywhere, densely microsculptured at basal half on both dorsal and ventral surfaces. Bended abruptly and



rectangularly in the middle, sharply pointed at tip, with a feeble tubercle near the tip on the ventral surface. Both surfaces of mandibles totally naked.

Clypeus. A little less than a third as wide as head, with anterior margin nearly straight, only feebly pointed in the middle. Surfaces of clypeus totally naked. Clypeus microsculptured.

Mentum. Somewhat trapezoidal or even semi-circular, with anterior angles rounded and frontal margin gently convex. Surfaces of mentum totally naked. Mentum punctured and microsculptured.

Antennal club. Formed by antennomeres seven to ten. Joints eight to ten, each with a strong, long and pubescent lamella, blackish in color as in joints one to seven but with pubescence somewhat yellowish gray; joint seven with a much shorter, slender and pointed lamella, not pubescent but with few setae as in joints one to six.

Pronotum. Convex, with a feebly impressed narrow medial depression, nearly as wide as head, considerably narrower than elytra, with anterior and posterior margins subequal in width, anterior and posterior angles well produced, and lateral margins sinuate. Surfaces of pronotum totally naked. Pronotum somewhat densely microsculptured at lateral areas, densely punctured in mid area, more smooth and reflecting under light than head to the naked eyes.

Elytra. Wider than head and pronotum. Scutellum semi-circular. Surfaces of elytra totally naked. Elytra smooth and much more strongly reflecting under light than pronotum.

Thorax. Prothorax with anterior and posterior margins densely fringed with yellowish brown hairs on both dorsal and ventral surfaces. Ventral surface of head clad with sparse and thin hairs in post-lateral areas. Prosternum and mesosternum covered with sparse and short yellowish brown hairs whilst metasternum densely covered with much longer yellowish brown hairs. Abdomen sparsely punctured, each puncture with a very short yellowish hair visible only under microscope. Pro-, meso- and metasternum and abdomen microsculptured everywhere.

Abdomen. With five visible sternites.

Legs. Femora, tibiae and tarsi relatively normal for the group. Protibia with its apico-external fork rather long and exceeding its inner spur, with two to four irregular denticles and protuberances on its external margin. Meso- and metatibiae, each with three apico-external spines and two longer inner spurs at terminal end. Mesotibia with two spines on its external margin whilst hind-tibia with one

protuberances at terminal third of external margin. Meso- and metatibiae covered with yellowish hairs on their inner ridges. All femora and tibiae sparsely punctured, each puncture mostly with a yellow hair.

♂ genitalia. Gonosomite as in most species of *Pseudohucanus*. Aedeagus more or less expanded from cephalic end to caudal end; parameres slightly curved apically in lateral view; middle lobe only a little shorter than parameres; flagellum nearly 1.5 times as long as aedeagus, wider at cephalic portion for a length (about half as long as aedeagus) then becoming very narrow to the terminal end.

Description ♀

Measurement. BL- 28.4-28.5; BT-6.5-6.9; HL-4.0-4.2; HW-6.7-7.0; CHW-6.6-6.9; ML-4.0-4.0; PL-5.3-5.5; PW-9.0-9.6; EL-18.0-18.5; EW-12.0-12.2; PTL- 5.8-6.4; PTW-1.4-1.5.

Color. As in ♂, but with maxillary and labial palpi black.

Head. Nearly square, much smaller and narrower than in ♂; much narrower than pronotum; without frontal ridge; lateral ridge feebly developed only in anterior half of head above eye and vanishing posteriorly; a pair of feeble depressions just inside of the lateral ridges at anterior third of head; anterior angle not produced, but gently angled from base of mandible to eye-canthus. The dorsal surface of head is much more densely and heavily sculptured and punctured than in ♂.

Eye. Nearly as big as in ♂, with narrow canthus covering less than half of its external margin.

Mandible. Much shorter but somewhat broader than in ♂, evenly curved to a sharp tip, with a slight but clear inner tooth at terminal third of mandible.

Clypeus. Somewhat pentagonal, apparently but obtusely pointed in the middle, much narrower and longer than in ♂. Maxillary and labial palpi nearly as long as in ♂.

Antennal club. Formed by antennomeres seven to ten. Joints eight to ten, each with a strong, long and pubescent lamella; joint seven with a much shorter, slender and pointed lamella.

Mentum. Variable, trapezoidal or semi-circular, as long as but narrower than in ♂.

Pronotum. Relatively larger than in male, with a feeble depression along mid line, wider than head and narrower than elytra, with anterior margin a little narrower than posterior margin, anterior angle obtuse, posterior angles well produced, and lateral margins sinuate.

Elytra. Relatively larger and more elongated



than in ♂, with a bigger L/W ratio. Scutellum semi-circular.

Thorax. Prosternum naked.

Abdomen. With five visible sternites, naked.

Legs. Femora, tibiae and tarsi somewhat longer than in ♂. Protibia variable in length, but always broader than in ♂, with its apico-external fork somewhat longer and broader than in ♂, exceeding its inner spur, with two to four perfect triangular denticles on its external margin. Meso- and metatibiae, each with three apico-external spines and two inner spurs at terminal end. Mesotibia with one or two spines on its external margin. Metatibia usually with one protuberance at terminal third of external margin, but sometimes smooth.

Etymology

This new species is named in honor of Mr. Gang Pan, my close friend, who worked in Tibetan Institute of Plateau Ecology and gave me enormous help during my 2005 expedition to SE Tibet.

Field observation

The combination of ♂ and ♀ was based upon the field observation that both sexes were captured under the same electric lamp in the same night at their biotope. Both sexes were attracted to lamp light at night. Two biotopes were found in Motuo (=Metok, Medog) area of SE Tibet, both on south of the Great Himalaya (whereas *L. prometheus* and *L. imitator* found on north of the Great Himalaya in the neighboring area); one is in the needle-leaf forest at relatively high elevation of 2500m, another is in the broad-leaf forest at lower elevation of 2000m. At the higher biotope, only a *Dorcus* stag-beetle was also found, however at the lower biotope, several stag-beetles were encountered including *Neolucanus angulatus*, *Lucanus furcifer* and some *Prismognathus* species.

The new species seems to be rather rare in nature, only two pairs were encountered during three weeks.

Discussion on sexual dimorphism and taxonomic notes on related species of *Noseolucanus zhengi* sp.n.

The unique ♂ of *Noseolucanus zhengi* sp.n. was encountered at an open ground no more than 1km away from the spot where one ♀ of *N. zhengi* sp.n. was netted in the air. The remaining two ♀♀ of *N. zhengi* sp.n. were encountered at relatively lower area, which is no more than 10km away. Thus the combination of ♂ and ♀ into the same species

should be correct on account of many similarities between them.

As shown in the above description, both sexes of the of *N. zhengi* sp.n. share the following main characters:

- Dorsal surface of head smoothly declined to clypeus and lateral margins, without carina.
- Eye-canthus thin, covering more than 3/4 of external margin of eye, and in a straight line with lateral margin of head behind eye.
- Eye relatively small.
- Mandible relatively short, curved and without any trace of inner tooth.
- Clypeus flattened.
- Antennal club formed by antennomeres 7-10, with joints 8-10 broad, obtuse and brown.
- Mentum somewhat trapezoidal.
- Elytra with similar L/W ratio.
- Intercostal process of prosternum much elevated, expanding posteriorly.
- Fore-tibia similar in shape in both sexes.
- Nearly all structures are same-colored in both sexes, though the female shows a lighter lustre and more reflecting under light.
- Nearly all structures with similar pubescence except only metasternum.
- Elytra with shallow but distinct and irregular longitudinal striae.

And they show the following sexual dimorphism:

- Body more depressed in ♂ than in ♀.
- Relative to elytra, head and pronotum wider in ♂ than in ♀.
- Mandible apparently broader and less pointed in ♂ than in ♀.
- Elytra relatively larger in ♀ than in ♂.
- Abdominal sternites wholly black in ♀, but chequered with reddish brown and black in ♂.
- Head, pronotum and elytra duller and darker in ♂ than in ♀.
- Metasternum almost naked in ♂, but with pubescence in ♀.
- Head and pronotum with dense and transverse wrinkles in ♂, but densely punctured in ♀.

Such sexual similarities and sexual dimorphism



in the new species mostly correspond with the similarities and differences between holotypes of *Pseudolucanus denticulus* Boucher, 1996 and *Noseolucanus rugosus* Araya & Tanaka, 1998. Furthermore, *P. denticulus* has been found not only from the type locality, Gaoligongshan, W. Yunnan, near China-Myanmar border (Boucher, 1995), but also from N. Myanmar (Nagai, 1998; Nagai, 2000) where *N. rugosus* was discovered. Therefore it is reasonable here to regard *N. rugosus* (syn. rev.) as a junior synonym of *P. denticulus*.

In the original description, Araya & Tanaka have noticed the similarities between *P. denticulus* and *N. rugosus*, however they only concluded that the two taxa had a close phylogenetic relationship and suspected that the two taxa possibly belong to the same genus, *Noseolucanus*. In a latter paper, Araya (2001: 14) suspected that *rugosus* possibly represents the male of *P. denticulus*. Krajcik (2001), in his <Lucanidae of the world>, simply stated *N. rugosus* as a synonym of *P. denticulus*, without further comments. Fujita (2003) again suggested *N. rugosus* to be a junior synonym of *P. denticulus*, but without convictive evidence. In a recent paper, Araya (2004) affirmed it was difficult to determine the taxonomic status of *N. rugosus* in relation to *P. denticulus* with confidence.

For further discussion see below “discussion on generic classification”.

Discussion on generic classification

In the original description, Araya & Tanaka (1998: 334) stated the following generic characters for *Noseolucanus* based upon a damaged ♂ specimen, without antennae and genital organs:

1. Size smaller.
2. Body shorter and broader, oval in dorsal view, much depressed in lateral view, dull brownish black in color, dorsal and ventral surfaces opaque, almost naked.
3. Head and prothorax relatively large to elytra.
4. Posterior part of head with dense and transverse wrinkles.
5. Eye much smaller, almost completely divided by triangularly projected canthus.
6. Mandible short, very strongly and regularly rounded from the base, outer margin strongly concave at base.
7. Mentum trapezoidal, apical part not rounded.
8. Prothorax with dense and transverse wrinkle.
9. Elytra much shorter and broader, with an anteriorly projected angle on each shoulder,

dorsal part with shallow but distinct striae.

10. Scutellum large.
11. Intercostal process of prosternum much developed, expanding posteriorly.
12. Metasternum and abdomen almost naked.
13. Legs shorter and broader.

Araya & Tanaka also noticed that the female holotype of *denticulus* shares some characters among the above-mentioned characters 2, 5, 9 and 13.

In a latter paper, Araya (2004) examined three more ♂ specimens of *rugosus* from Myanmar and described the antennae and ♂ genitalia of *rugosus*, pointed out that *Noseolucanus* differs from *Lucanus* additionally in having

14. The antennal club with lamellae smaller and flatter than in *Lucanus*.
15. The middle lobe of aedeagus almost lacking a pair of eversible gloves at the base of flagellate internal sac which are well marked in *Lucanus*.

Since *P. denticulus* and *N. rugosus* are now proved to represent the different sexes of same species and the second species, *zhengi* is discovered, it is reasonable here to clarify the stable generic characters for *Noseolucanus*.

The following characters stated by Araya & Tanaka are not considered here as generic because they are not found in both sexes of *N. zhengi*:

- Body shorter and broader, oval in dorsal view.
- Eye-canthus triangularly projected.
- Mandible with outer margin strongly concave at base.
- Elytra much shorter and broader, with an anteriorly projected angle on each shoulder.

The following characters stated by Araya & Tanaka are not considered here as generic because they are also shared by some species of *Lucanus*:

- Size smaller (some individuals of *Pseudolucanus* are smaller than in male of *N. zhengi*).
- Body dull brownish black in color (such color often found in *Lucanus*).
- Mandible short, very strongly and regularly rounded from the base; mentum trapezoidal, apical part not rounded.
- Scutellum large.



- Intercoxal process of prosternum much developed, expanding posteriorly.
- Legs shorter and broader.
- Antennal club with lamellae smaller and flatter (Such small and flat lamellae of club are frequently found in *Pseudolucanus*, thus *Noseolucanus* does not show a clear difference from *Lucanus* in this character introduced by Araya.
- Middle lobe of aedeagus almost lacking a pair of eversible gloves at base of flagellum (Such gloves are reduced very much but present in *Noseolucanus zhengi*. Moreover, such eversible membranous sac is very variable among species of *Lucanus*, being well expanded alongside lateral sides of middle lobe to the base of flagellum in many species including most *Pseudolucanus* species, but reduced and confined to the base of flagellum in a few species such as *L. klapperichi* (aedeagus illustrated here). Therefore in this feature *Noseolucanus* does not differ from *Lucanus* in a distinct way. This character introduced by Araya can not be regarded as a generic character).

To be distinguished from *Lucanus* including *Pseudolucanus*, the following characters stated by Araya & Tanaka are considered as generic characters for ♂ only, because they are not found in female of *N. zhengi*:

- A) body of male much depressed in lateral view.
- B) head and prothorax relatively large to elytra in ♂.
- C) posterior part of head with dense and transverse wrinkles in ♂.
- D) prothorax with dense and transverse wrinkles in ♂.
- E) metasternum and abdomen almost naked in ♂.

Only the following characters are remained as generic for both sexes:

- F) eye much smaller, almost completely divided by canthus;
- G) elytra with shallow but distinct striae, not punctured;

In addition, the following characters were considered by the author as generic:

- H) fore-tibia somewhat stouter in ♂ than in ♀, at least not stouter in ♀ than in male. (All species of *Lucanus* including *Pseudolucanus*

have fore-tibia more or less stouter in ♀ than in ♂.)

- I) flagellum with basal portion non-framed and expanded permanently for a considerable length, with the framed portion remote from the middle lobe. (Whereas in *Lucanus* the basal portion of flagellum well framed with sclerotized inner lines, viz. the framed portion immediately raised from the middle lobe).
- J) mandible of ♀ more slender than in all *Lucanus*.
- K) pronotum sculptured or punctured in the same format and same degree as posterior half of head in both male and ♀ (whereas in *Lucanus* including *Pseudolucanus* pronotum less punctured than posterior half of head at least in ♀).

The monophyly of the genus *Noseolucanus* is supported by at least three synapomorphies, the characters C, D and G, which are not shared by any known genera in Lucanidae.

Noseolucanus shows at least 11 morphological differences from *Lucanus* including *Pseudolucanus* but agrees with *Pseudolucanus* only in 3 very blurry similarities: size similar, body similar in shape and mandible similar in shape. Thus the ancestor of *Noseolucanus* must diverged from the ancestor of *Lucanus* and *Pseudolucanus* much earlier than the genus *Lucanus* diverged into the subgenera *Lucanus* and *Pseudolucanus*, to produce the most parsimonious cladogram.

Therefore it is reasonable to regard *Noseolucanus* as a good genus. In many cases the generic rank in Lucanidae has been accepted on lesser characters than those given for *Noseolucanus* in the above discussion.

Furthermore, there is no evidence to prove *Noseolucanus* and *Lucanus* to be a monophyletic group. They hardly share any important characters including ♂ genital structures as synapomorphies to support their monophyly. Araya (2004) has stated that *Noseolucanus* shares a long simple flagellate internal sac with *Lucanus*, however in the author's opinion, the flagellum of *Noseolucanus* is rather special in structure, not so simple as in *Lucanus*. It has the basal portion non-framed and expanded permanently for a considerable length, the framed portion remote from the middle lobe, not immediately raised from the middle lobe as in *Lucanus*, and the terminal end expanded and rather thick, not flattened as a plate as in *Lucanus*. Such expansion of flagellum in *Noseolucanus*



somewhat resembles that of *Macrodorcas* (Dorcini) species (aedeagus of *Macrodorcas striatipennis* Motschulsky 1861 illustrated here for comparison), however the end of flagellum of *Noseolucanus* is relatively simple in structure, not complicated as in Dorcini. In external appearance the ♂ of *Noesolucanus* looks like a small *Dorcus* or *Macrodorcas*, but there is no doubt that *Noseolucanus* has no close relationship to the tribe Dorcini, because *Noseolucanus* shows many difference not only in external features but also in genital organs, which lack a pair of lateral sclerites continued from basal struts alongside the middle lobe (such lateral sclerites well developed in all genera of Dorcini) and has the relatively simple end of flagellum. Nevertheless, *Noseolucanus* should be included into the tribe Lucanini as it shows more morphological similarities to Lucanini than to other tribes, with relatively simple end of flagellum as in Lucanini. Furthermore, the similarity of flagellum between *Noseolucanus* and *Macrodorcas* may suggest that a phylogenetic analysis of Dorcini and Lucanini is needed in future and a revision of generic classification of Dorcini is wanting.

Of *Noseolucanus*, some morphological characters (A, E, F, G, H) and the day-active habit seem to be primitive in phylogeny. These may imply the genus *Noseolucanus* to be a relict. However, such characters may only be homoplastic traits that are also shared by the other genera of Lucanidae. A phylogenetic analysis including studies on DNA is needed for all genera of Lucanidae in the future and then the stable position of *Noseolucanus* in the phylogeny can be clarified.

It should be noted here that the genus *Eolucanus* Kurosawa, 1970 based upon *L. gracilis* is not well established even for subgeneric rank, its genotype has been included into the *dauidis*-group of the subgenus *Pseudolucanus* by Boucher & Huang (1991). Only *Pseudolucanus* deserves good subgeneric rank within the genus *Lucanus*.

Discussion on species of *Lucanus* (including *Pseudolucanus*)

For the taxa published before 1960, the division between *Pseudolucanus* and *Lucanus* (s. str.) is very clear, the difficulty and confusion of classification mainly exist in *Lucanus* excluding *Pseudolucanus*, especially in some taxa based upon ♀ types and the *L. lunifer*-group (sensu Lacroix, 1971) including *L. singularis* Planet, 1900, *L. gemmestieri* Lacroix, 1971, *L. furcifer* Arrow, 1950 and *L. pseudosingularis* Didier & Seguy, 1952. For *Lucanus*, Araya (2001) recently published many useful photos of historical type material kept in European museums that makes the

further study of *Lucanus* more reliably.

However, since Benesh (1960) published his catalogue of Lucanidae, a lot of new species of *Lucanus* including *Pseudolucanus* have been published, mainly from Sino-Himalayan Subregion, most of which have been accumulated into the recently published catalogue (Krajcik, 2001) except a few taxa described recently. Thus it is necessary here to give a sketchy discussion on all of them as follows.

Lucanus hildagardae Zilioli

Lucanus hildagardae Zilioli 2002: 131.

Locality

Shaanxi, China.

Remark

Allied to *L. szetschuanicus* Hanus, 1932.

Lucanus victorius Zilioli

Lucanus victorius Zilioli, 2002: 210.

Locality

Sichuan, China.

Remark

Belonging to the *L. lunifer* group, with a feeble inner tooth remote from base of mandible.

Lucanus kirchneri Zilioli

Lucanus kirchneri Zilioli, 1999: 84.

Locality

Fujian, China.

Remark

Special species with four elongate inner teeth on each mandible.

Lucanus brivioi Zilioli

Lucanus brivioi Zilioli, 2003: 266.

Locality

Fujian, China.

Remark

Large species allied to *L. kraatzi* Nagel 1926.



Lucanus klapperichi Bomans

Lucanus klapperichi Bomans, 1989: 9.
Lucanus wuyishanensis Schenk, 1999: 114 **syn.n.**

Type locality

Kuatun, Wuyishan, Fujian.

Remark

L. wuyishanensis Schenk, 1999 is a new synonym of *L. klapperichi* Bomans, 1989

Lucanus gamunus Sawada & Watanabe

Lucanus gamunus Sawada & Watanabe, 1960: 217.

Locality

Japanese islands.

Remark

Small species with relatively shorter and roundly curved mandibles.

Lucanus hermani Delisle

Lucanus hermani Delisle, 1973: 137.

Locality

China.

Remark

Large species similar to *L. planeti* Planet, 1899.

Lucanus deveianus Boucher

Lucanus deveianus Boucher, 1998: 182.

Locality

Guangxi, S China.

Remark

Species allied to *L. szetschuanicus*.

Lucanus dirki Schenk

Lucanus dirki Schenk, 2002: 11.

Locality

N. Yunnan.

Remark

Species similar to *L. prossi*.

Lucanus gennestieri Lacroix

Lucanus gennestieri Lacroix, 1971: 565.

Locality

Nujiang (=Lou-tse-kiang), Yunnan, China.

Remark

Species belonging to *lucifer*-group, closer to *L. tibetanus* Planet, 1898.

Lucanus ludivinae Boucher

Lucanus ludivinae Boucher, 1998: 78.

Locality

Nushan area, W. Yunnan, China.

Remark

Small species with several small inner teeth on mandible.

Lucanus kazumiae Zilioli

Lucanus kazumiae Zilioli, 1998: 137.

Locality

N. Vietnam

Remark

Treated as junior synonym of *L. pulchellus* Didier, 1925 by Katsura & Giang (2002: 10)

Lucanus pesarinii Zilioli

Lucanus pesarinii Zilioli, 1998: 139.

Locality

N. Vietnam

Remark

Species close to *L. klapperichi*.

Lucanus fukinukiae Katsura

Lucanus fukinukiae Katsura, 2002: 14.

Locality

N. Vietnam

Remark

Medium to small species, close to *L. pesarinii*, but with finer pubescence.



Lucanus fujitai Katsura

Lucanus fujitai Katsura, 2002: 14.

Locality

N. Vietnam

Remark

Species close to *L. cyclommatoides* Didier, 1928.

Lucanus satoi Nagai & Tsukamoto

Lucanus satoi Nagai & Tsukamoto, 2003: 201.

Locality

Laos.

Remark

Medium or small species similar to *L. cyclommatoides*.

Lucanus koyamai Akiyama & Hirasawa

Lucanus koyamai Akiyama & Hirasawa, 1990: 53.

Locality

Thailand.

Remark

Small species allied to *L. miwai*.

Lucanus miyashitai Mizunuma

Lucanus miyashitai Mizunuma, 1994: 217.

Locality

Thailand.

Remark

Small species allied to *L. miwai*.

Lucanus tsukamotoi Nagai

Lucanus tsukamotoi Nagai, 2002: 3.

Locality

Thailand.

Remark

Species with dense pubescence, somewhat similar to *L. fortunei* in shape.

Lucanus manai Miyashita et Bomans

Lucanus manai Miyashita et Bomans, 1997: 2.

Locality

Myanmar.

Remark

Small species with two inner teeth for each mandible.

Lucanus hayashii Nagai

Lucanus hayashii Nagai, 2000: 88.

Locality

N. Myanmar.

Remark

(= *L. hansii* Zilioli, 2000 (1999): 41. As the exact publishing date of Zilioli's paper is unknown to me, I do not know which name is valid in nomenclature), species close to *L. dohertyi* Boileau, 1911.

Lucanus nosei Nagai

Lucanus nosei Nagai, 2000: 94.

Locality

N. Myanmar.

Remark

(= *L. wernerii* Zilioli, 2000 (1999): 43) species close to *L. manai*.

Lucanus derani Nagai

Lucanus derani Nagai, 2000: 91

Locality

N. Myanmar.

Remark

Small species with dense pubescence, maybe representing the small male form of *L. fukinukiae* Katsura, 2002 from N. Vietnam

Lucanus nyishwini Nagai

Lucanus nyishwini Nagai, 2000: 92

Locality

N. Myanmar.



Remark

Small species close to *L. manai*.

***Lucanus nangsarae* Nagai**

Lucanus nangsarae Nagai, 2000: 89

Locality

N. Myanmar.

Remark

Species close to *L. sericeus* Didier, 1925.

***Lucanus ziliolii* Fukinuki**

Lucanus ziliolii Fukinuki, 2000: 61.

Locality

Myanmar.

Remark

Species similar to *L. sericeus* Didier, 1925 in shape.

***Lucanus aungsani* Zilioli**

Lucanus aungsani Zilioli, 2000 (1999): 44.

Locality

Myanmar.

Remark

Species allied to *L. fortunei*.

***Lucanus prossi* Zilioli**

Lucanus prossi Zilioli, 2000: 53.

Locality

Myanmar.

Remark

(= *L. szetschuanicus lati* Nagai, 2000) species allied to *L. szetschuanicus*.

***Lucanus schenki* Schenk**

Lucanus schenki Schenk, 2002: 10.

Locality

N. Myanmar

Remark

Species similar to *L. prossi*

***Lucanus maedai* Nagai & Tsukamoto**

Lucanus maedai Nagai & Tsukamoto, 2003: 203.

Locality

Myanmar.

Remark

Small species close to *L. koyamai*.

***Lucanus adelmae* Zilioli**

Lucanus adelmae Zilioli, 2003: 84

Locality

Myanmar.

Remark

Small species allied to *L. miwai* and *L. koyamai*.

***Lucanus convexus* Lacroix**

Lucanus convexus Lacroix, 1982: 13.

Locality

Assam, NE Indian

Remark

Close to *L. pseudosingularis*.

***Lucanus bruanti* Lacroix**

Lucanus bruanti Lacroix, 1973: 138.

Locality

Bhutan.

Remark

Close to *L. didieri* Planet, 1927.

***Lucanus feglinae* Lacroix & Bomans**

Lucanus feglinae Lacroix & Bomans, 1973: 135

Locality

Afghanistan.

Remark

Close to *L. tetraodon* Thunberg, 1806 and *L. ibericus* Motschulsky, 1845.



Lucanus franciscae Lacroix
Lucanus franciscae Lacroix, 1971: 557

Locality

Shillong region of Assam, NE India.

Remark

Belonging to *lucifer*-group, closer to *L. villosus* Hope 1831.

The description of *L. klappherichi* was totally overlooked by Schenk who only compared his taxon with *L. kazumiae* Zilioli, 1998 and *L. pesarini* Zilioli, 1998 from N. Vietnam. Both *L. wuyishanensis* and *L. klappherichi* were described from the same area in Wuyishan, Fujian. The original figures in the publications have been compared carefully and they show the same diagnostic characters. Moreover, the Wuyishan area in N. Fujian has been thoroughly explored by various Chinese collectors and I have had an opportunity to check some of these collections and studied many specimens of *L. klappherichi*. According to a field observer, this species was very abundant at Wuyishan in August and attracted to lamp lights in large numbers at nights. This species is characterized by the inner tooth of mandible pentagonal in fully developed males. The size is very variable, many medium and small forms of males are performed, and the color of body is varied from brown to black, but usually with body and legs concolorous. The ♂ figured by Schenk (1999: 115) has more small teeth inside of the inner tooth and some small teeth closer to base of mandible than the ♂ figured by Bomans (1989: 10), however such difference is merged into individual variations. In ♂ genitalia, this species is characterized by a very short flagellum. Recently this species has been discovered also from S. Zhejiang and N. Guangdong by Chinese collectors.

The following species belonging to *Lucanus* (s. str.) are all described from Taiwan and fully studied in literatures thus not discussed here: *L. miwai* Kurosawa, 1966, *L. kanoi* Kurosawa, 1966, *L. datunensis* Hashimoto, 1984 (= *L. ritae* Lacroix, 1984), *L. ogakii* Imanishi, 1990 and *L. kurosawai* Sakaino, 1995.

Only the following species belong to the subgenus *Pseudolucanus* and I include them into a complete checklist for all years.

Lucanus (Pseudolucanus) imitator (Boucher & Huang)

Pseudolucanus imitator Boucher & Huang, 1991: 36
Pseudolucanus bicolor Schenk, 1996: 508. **syn.n.**

Locality

SE Tibet.

Remark

Type locality: Bomi (= "Zhamo"), SE Tibet (= *Pseudolucanus bicolor* Schenk, 1996 type locality: SW of Tongmai (= "Tangmai"), SE Tibet, syn. nov.)

Lucanus (Pseudolucanus) davidis (Deyrolle)

Pseudolucanus davidis Deyrolle, 1878: 93.

Locality

Sichuan.

Remark

Recently revised by Boucher & Huang (1991), with diagnostic structures and aedeagus illustrated.

Lucanus (Pseudolucanus) lesnei (Planet)

Pseudolucanus lesnei Planet, 1905: 212.

Locality

Yunnan.

Remark

Recently revised by Boucher & Huang (1991), with diagnostic structures and aedeagus of holotype illustrated.

Lucanus (Pseudolucanus) gracilis Albers, 1889

Lucanus gracilis Albers, 1889: 319.

Locality

Sikkim and Nepal.

Remark

Recently revised by Boucher & Huang (1991), with diagnostic structures and aedeagus illustrated.

Lucanus (Pseudolucanus) prometheus (Boucher & Huang)

Pseudolucanus prometheus Boucher & Huang, 1991: 32.



Locality

Bomi area (Zhamu), SE Tibet.

Remark

Fully described by Boucher & Huang (1991), with diagnostic structures and aedeagus illustrated.

Lucanus (Pseudolucanus) confusus (Boucher)
Pseudolucanus confusus Boucher, 1995: 507

Locality

Bhutan.

Remark

Fully described by Boucher (1994), with diagnostic structures and aedeagus illustrated

Lucanus (Pseudolucanus) oberthueri (Planet)
Pseudolucanus oberthueri Planet, 1896: 279.

Locality

Sikkim.

Remark

Recently revised by Boucher (1994), with diagnostic structures and aedeagus illustrated.

Lucanus (Pseudolucanus) atratus Hope
Lucanus atratus Hope, 1831: 22.

Locality

C. Nepal.

Remark

Recently revised by Boucher (1994), with diagnostic structures and aedeagus illustrated.

Lucanus (Pseudolucanus) kerleyi (Boucher)
Pseudolucanus kerleyi Boucher, 1995: 508.

Locality

W. Nepal.

Remark

Fully described by Boucher (1994), with diagnostic structures and aedeagus illustrated.

Lucanus (Pseudolucanus) wittmeri (Lacroix)
Pseudolucanus wittmeri Lacroix, 1983: 7.

Locality

Pakistan.

Remark

Species with evenly rounded smooth mandible and relatively long head, as illustrated by Araya (2001: 22).

Lucanus (Pseudolucanus) groulti Planet
Lucanus groulti Planet, 1897: 227.

Locality

NW India.

Remark

Species with longer, gently curved mandible and finer inner tooth of mandible, as illustrated by Araya (2001: 15).

Lucanus (Pseudolucanus) devei (Lacroix)
Pseudolucanus devei Lacroix, 1988: 7.

Locality

Kashmir, NW India.

Remark

Species with relatively longer mandible and more produced clypeus, well developed lateral ridges on dorsal surface of head, well pronounced inner tooth of mandible and fewer denticles on external margin of fore-tibia, as illustrated by Lacroix (1988: 9).

Lucanus (Pseudolucanus) xerxes (Kral)
Lucanus xerxes Kral, 2005: 183.

Locality

Iran.

Remark

Special species with antennal club formed by six very long lamellae.

Lucanus (Pseudolucanus) barbarossa Fabricius
Lucanus barbarossa Fabricius, 1801: 212.



Locality

Spain, Portugal and N. Africa.

Remark

Species with rounded appearance including short and stout elytra.

Lucanus (Pseudolucanus) mazama (Leconte)
Pseudolucanus mazama Leconte: 1861: 345.

Locality

USA.

Remark

Species with very short elytra and evenly rounded mandible.

Lucanus (Pseudolucanus) capreolus (Linné)
Lucanus capreolus Linné, 1763: 391.

Locality

E. USA and Canada.

Remark

Recently studied by Boucher & Huang (1991), with diagnostic structures and aedeagus illustrated.

The publication of *imitator* was overlooked by Schenk. Both taxa were taken from the same area in SE Tibet. The holotype of *bicolor* illustrated by Schenk (wrongly explained as “*tricolor*” in original publication) shows no difference from the figure of *imitator*. I have captured one ♂ specimen and two carcasses of ♂♂ from the same area in August 2005. The species is rather big and stout in shape, with deep brown body but reddish tibiae. The aedeagus has been illustrated by Boucher & Huang.

Within the subgenus *Pseudolucanus*, nearly all species are well defined in literatures and no confusion can be made. This is particularly attributed to Boucher’s recent revisional works on the *dauidis*-group (including *dauidis*, *gracilis*, *lesnei* and *imitator*) and the *atratus*-group (*atratus*, *confusus*, *kerleyi* and *oberthuri*). The new species here described, *mingyiae* undoubtedly belongs to the *dauidis*-group, with mandible abruptly bended, not evenly curved as in the *atratus*-group.

Within the *dauidis*-group, *mingyiae* is distributed very close to *lesnei* and shares the long legs with the latter, but can be easily distinguished by the

inner tooth of mandible obsolete, the middle lobe of aedeagus longer and the flagellum about twice as long as in that of *lesnei*. The new species can be easily distinguished from all other members within the group simply by the much longer legs and flagellum.

As discussed above, hitherto 16 species have been described under the subgenus *Pseudolucanus*. The new species here described *Lucanus pani* sp.n. should be included into the *dauidis*-group, with the male mandible abruptly bended in the middle, not evenly curved as in the *atratus*-group. For a quick look, *pani* is rather similar to *L. oberthuri* of the *atratus*-group, but can be easily distinguished by the clypeus pointed in the middle, mandible nearly straight on external ridge near the tip, flagellum much shorter, with basal expanded portion much shorter.

The evolution and differentiation seem to be very intense in the Himalayas and the mountain ranges around SE Tibet and NW Yunnan for the subgenus *Pseudolucanus*. It is hopeful that further explorations to the unexplored areas in SE Tibet will yield other undescribed members of the subgenus.

New records for the Chinese fauna

Neolucanus brochieri Bomans & Miyashita, 1997
Specimen examined

1 ♂: Longyuan, Dulongjiang valley, Gongshan County, NW Yunnan, China, 2300m, leg. H. HUANG. July 9, 2002.

Remark

This species was originally described from N. Myanmar. The unique ♂ captured from Dulong valley, NW Yunnan agrees exactly with those from N. Myanmar.

Neolucanus angulatus (Hope & Westwood, 1845)
Specimens examined

12 ♂♂, 13 ♀♀, Hanmi, Motuo County, SE Tibet, China, 1900-2200m, leg. H. HUANG, D.-K. ZHOU & L. TANG. August 10-29, 2005.

Remark

The species was previously known from N. India and Sikkim. It seems to be replaced by *Neolucanus lanwanorum* Nagai, 2000 in N. Myanmar. The specimens from Motuo area agree well with *angulatus* in all external features except only for



the color of elytra reddish brown, not blackish. They possibly represent a different subspecies of *angulatus*. However, it is not acceptable to name this population before further studies on the individual variations of *angulatus* in N. India.

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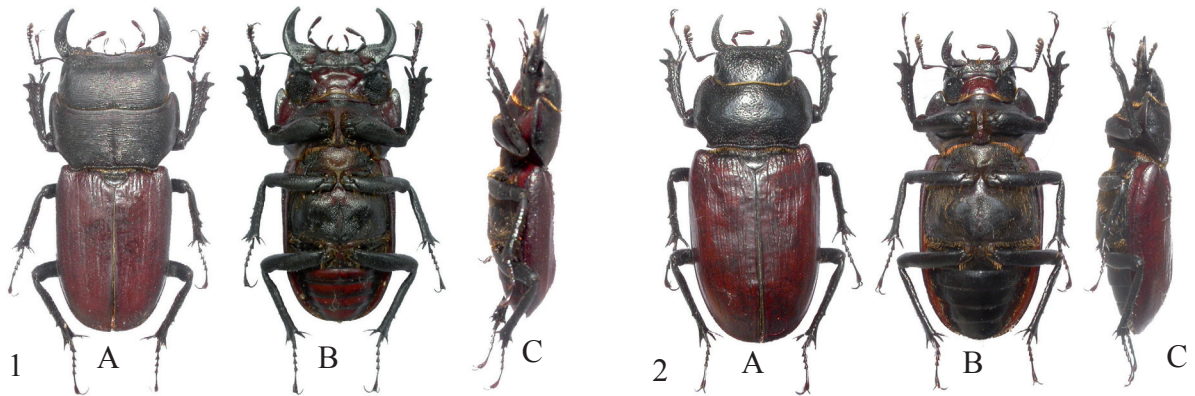
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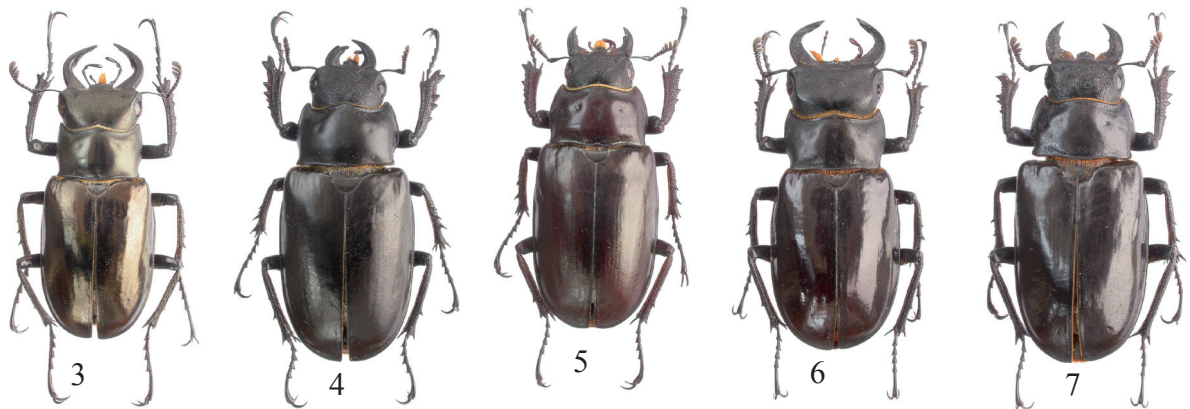


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Figs 1-2: *Noseolucanus zhengi* sp. n. (1) Paratype ♂ (A) dorsal view, (B) ventral view, (C) lateral view. (2) Holotype ♀ (A) dorsal view, (B) ventral view, (C) lateral view.



Figs 3-7: *Lucanus*, dorsal view: (3) *Lucanus mingyiae* sp.n. Holotype ♂, (4) Paratype ♀, (5) *Lucanus prometheus* Boucher & Huang ♀, (6) *Lucanus pani* sp.n. Holotype ♂, (7) Paratype ♀.



Fig. 8: Ventral surface of right protibia. (A) *Noseolucanus zhengi* ♂, (B) *N. zhengi* ♀, (C) *Lucanus mingyiae* ♂, (D) *L. mingyiae* ♀, (E) *L. prometheus* ♀, (F) *L. pani* ♂, (G) *L. pani* ♀.



Fig. 9: Antennal club. (A) *Noseolucanus zhengi* ♂, (B) *N. zhengi* ♀, (C) *Lucanus mingyiae* ♂, (D) *L. mingyiae* ♀, (E) *L. prometheus* ♀, (F) *L. pani* ♂, (G) *L. pani* ♀.



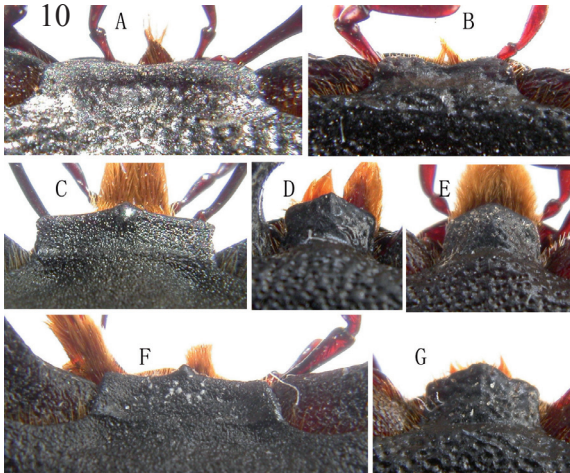


Fig. 10: Clypei: (A) *Noseolucanus zhengi* ♂, (B) *Noseolucanus zhengi* ♀, (C) *L. mingyiae* ♂, (D) *L. mingyiae* ♀, (E) *L. prometheus* ♀, (F) *L. pani* ♂, (G) *L. pani* ♀.

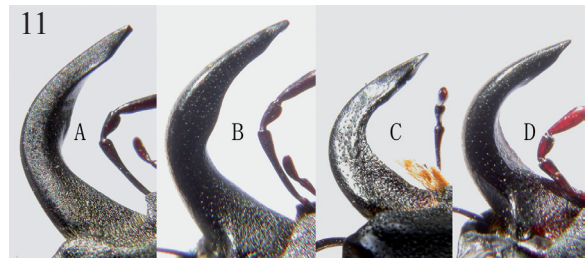
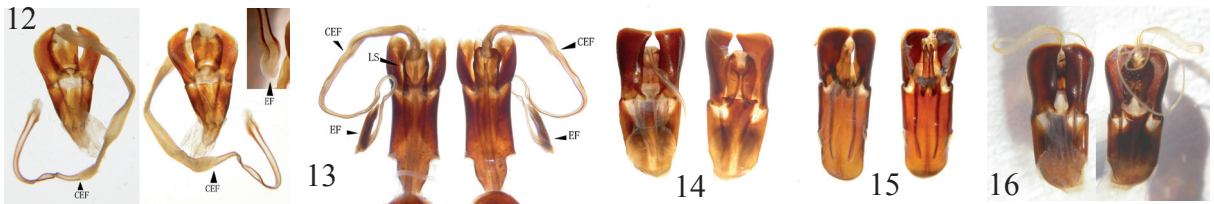


Fig. 11: ♂ mandible. *L. mingyiae* (A) dorsal view, (B) ventral view. *L. pani* (C) dorsal view, (D) ventral view.



Figs 12-16: Photos of aedeagus. (12) *Noseolucanus zhengi* in dorsal and ventral view, (CEF- cephalic end of framed portion of flagellum) and enlarged caudal end of flagellum (EF); (13) *Macroдоркас striatipennis* in ventral and dorsal views to show the lateral sclerites (LS) alongside the middle lobe, the cephalic end of framed portion of flagellum (CEF) and caudal end of flagellum (EF).; (14) *Lucnaeus mingyiae* in dorsal and ventral view; (15) *L. klapperichi* in dorsal and ventral views (LG-lateral glove of middle lobe); (16) *L. pani* in dorsal and ventral view.

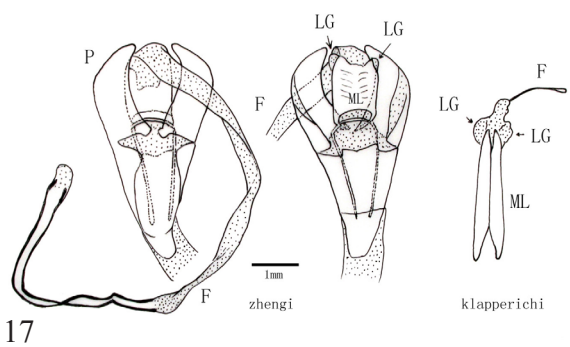


Fig. 17: Hand-drawing of aedeagus of *Noseolucanus zhengi* sp.n. in dorsal view (left) and ventral view (middle), and middle lobe of *L. klapperichi* in ventral view (right) (ML-middle lobe, F-flagellum, P-parameres, LG-lateral glove).

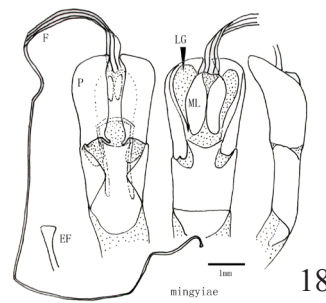


Fig. 18: Hand-drawing of aedeagus of *L. mingyiae* in dorsal view (left), ventral view (middle) and lateral view (right) (ML-middle lobe, F-flagellum, EF-enlarged end of flagellum, P-parameres, LG-lateral glove).

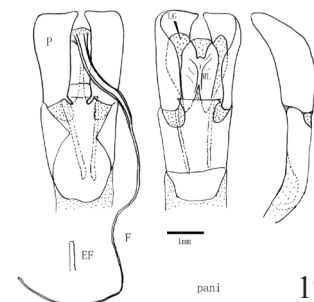


Fig. 19: Hand-drawing of aedeagus of *L. pani* in dorsal view (left), ventral view (middle) and lateral view (right) (ML-middle lobe, F-flagellum, EF-enlarged end of flagellum, P-parameres, LG-lateral glove).

