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Contents

Schenk, KD.	Description of <i>Dorcus mattisi</i> spec. nov. and remarks about the taxa of the genus <i>Dorcus</i> Mac Leay, 1819 represented in south-eastern Europe, Asia Minor and West Asia (<i>Coleoptera, Lucanidae</i>)
Huang, H., Yang, QZ. & Chen, CC.	Description of a new species of the genus <i>Aesalus</i> Fabricius, 1801 from central China (<i>Coleoptera: Lucanidae</i>)
Huang, H. & Chen, CC.	New or little known stag beetles of the genus <i>Platycerus</i> Geoffroy, 1762 from China (<i>Coleoptera: Lucanidae</i>)

Description of *Dorcus mattisi* spec. nov. and remarks about the taxa of the genus *Dorcus* Mac Leay, 1819 represented in south-eastern Europe, Asia Minor and West Asia (Coleoptera, Lucanidae)

Klaus-Dirk Schenk

Abstract

The new species *Dorcus mattisi* is described and figured. An overview is given on the taxa of the genus *Dorcus* Mac Leay, 1819 represented in Asia Minor, the Caucasus region of southeastern Europe and West Asia. The morphological differences of *Dorcus parallelipipedus*, *Dorcus parallelipipedus var. leuthneri = reichei, Dorcus peyronis* and *Dorcus prochazkai* are outlined. The geographic distribution and taxonomical status are discussed. *Dorcus vavrai* has been placed as a subspecies of *Dorcus peyronis* (stat. nov.).

Keywords

Coleoptera, Lucanidae, *Dorcus mattisi*, *Dorcus parallelipipedus, Dorcus parallelipipedus var. leuthneri = reichei, Dorcus peyronis, Dorcus vavrai, Dorcus prochazkai, Dorcus alexisi,* Turkey, Cyprus, Caucasus, Georgia, Armenia, Azerbaijan, Syria, Iran, Iraq.

Introduction

Five taxa of the genus *Dorcus* Mac Leay, 1819 have been reported in the entomological literature to be represented in south-eastern Europe (Caucasus region), Asia Minor and the West-Asian countries Iran and Iraq. This are *Dorcus parallelipipedus* (Linneus, 1758), *Dorcus parallelipipedus var. leuthneri* Ganglbauer, 1886 (= *Dorcus parallelipipedus var. reichei* Ganglbauer, 1886), *Dorcus peyronis* Reiche et Saulcy, 1856, *Dorcus vavrai* Nonfried, 1905 and *Dorcus prochazkai* Schenk, 2003.

Further the new species *Dorcus alexisi* Muret et Drumont, 1999 has been described recently from Cyprus Island (MURET ET DRUMONT, 1999).

D. parallelipipedus is a well-known, widely distributed and common species. But *D. peyronis*, *D. vavrai*, *D. prochazkai* and *D. alexisi* are rare or very rare and less widely distributed or localised taxa. *D. prochazkai* is an endemic species of the southern part of Iran. *D. alexisi* is endemic of Cyprus Island.

A closer look to those taxa will be taken and the taxonomical status will be discussed. Further the new species *Dorcus mattisi* from the eastern part of the Caucasus Mountains is described. Dorcus mattisi spec. nov.

Holotype. ♂, Armenia, se of Goris, pass se Vorotan, Shurnuk area, 1500-1550m, 18. VII. 1996, J. Urban leg. (CKDS).

Paratypes. 1 ♂, 1 ♀ (allotype), same collecting data (CKDS), 2 ♂, Georgia, Lagodejkhi, Nature Reserve, 12.VII.1996, J. Urban leg. (CKDS).

Etymology. The name of the new species refers to the nickname "Mattis" of the grandson of the author.



Fig. 1: **Dorcus mattisi** spec. nov. (1) ♂ holotype, (2) ♀ paratype (allotype), Armenia, se of Goris, Shurnuk, 1.-3.VII. 2015 and (3) ♂ small paratype. Georgia, Lagodejkhi, N. R. (in coll. Dr. K.- D. Schenk, Wehretal, Germany [CKDS])



Fig. 2: Head and prothorax of *Dorcus mattisi* spec. nov. ♂ holotype (in CKDS).

Description and diagnosis

vert holotype (Figs. 1 and 2), total length 26,5 mm, mandibles length 3,5 mm, prothorax width 9,1 mm, elytra width 9,5 mm. Total length of the vert paratypes: 20,7-25,1 mm.

At first sight *Dorcus mattisi* spec. nov. is looking rather similar to the well-known and widely distributed *Dorcus parallelipipedus* (Linnaeus, 1758). But a careful examination is showing the following morphological differences.

- the mandibles are less curved inside and the tips are more acute. The major uprising tooth of mandibles is less massive and <u>less directed inward</u>. The diameter of the anterior 1/3 of the mandibles is approximately <u>triangulate</u> (not relatively rounded as at *D. parallelipipedus*)
- the ventral side of the mandibles is rather flattened and on the inner edge in front of the uprising tooth each mandible bears an <u>additional small but well-defined acute tooth</u>
- the clypeus is less wide and slightly concave at middle
- the mentum is more rounded in front and the frontal margin is <u>densely covered with</u> <u>short yellow hairs</u>
- prothorax less wide anterior
- the surface of head and prothorax is stronger and more densely punctured
- the elytra are stronger punctured also and the punctures are <u>confluent around the</u> <u>scutellum</u>

 \bigcirc paratype (allotype) (Fig. 1), total length 24,8 mm, mandibles length 2,0 mm, prothorax width 9,5 mm, elytra width 9,9 mm.

The \bigcirc of *D. mattisi* spec. nov. is characterised by the same surface-structure of head, prothorax and elytra as the \bigcirc .

The author did examine a total of 296 specimens of *D. parallelipipedus* from many countries and locations (Europe 157 \bigcirc , 28 \bigcirc , Morocco 2 \bigcirc , 2 \bigcirc , Turkey 18 \bigcirc , 12 \bigcirc Caucasus region 10 \bigcirc , 8 \bigcirc and Iran 9 \bigcirc , 9 \bigcirc for comparison with *D. mattisi* spec. nov.. None of the specimens did showing a mandible-form or a surface structure like *D. mattisi*.

D. mattisi spec. nov. seems to be restricted to the eastern part of the Caucasus Mountains (Fig. 11, map of geographic distribution). Obviously, it is living there sympatric with *D. parallelipipedus.*

Dorcus parallelipipedus (Linnaeus, 1758)

Scarabaeus parallelipipedus Linnaeus, 1758

Distribution

The well-known west palearctic species *Dorcus parallelipipedus* is widely distributed from the Iberian Peninsula and Morocco to the European part of Russia and Kazakhstan (Ural River basin) and in Asia Minor and west Asia from Turkey, Syria and Lebanon to the Caucasus region (Georgia, Armenia, Azerbaijan) and northern Iran (Fig. 11).

Examined material

The following specimens from Asia Minor, West Asia and se Europe have been examined:

Russia: 5 ♂, 3 ♀ (w Caucasus, Sotschi distr., Aibag Mt., 1000 m, 10.VI.2001; Daghestan, Derbent, 10.VII.1993, Jenis leg.)

Turkey: 22 \bigcirc , 12 \bigcirc (Adana region, 20 km s Kadirli, Karatepe Milli Park, 17.VI.-5.VII.2000, Schenk leg.; Akcali Daglari, 20 km n Aydincik, 1250 m, 2.-28.VII.1999, Schenk leg.; Aslanli, 15 km nw Erdemli, 36°41′N, 34°9′E, 22.-25.VI.2008, Grosser leg.; e Anatolia, n Kahta, Nemrud Dag, 1650 m, 16.VI.2001, Schenk leg.; Anatolia, s Eregli, Ivriz, 18.VII.1998, Schenk leg.; no Anatolia, Artvin env., 600 m, 15.VII.1983, Heinz leg.; Gerisum, 20.VII.1996, Dolder leg.; Trabzon, Torul, 4.VII.1993, Schenk leg.; Halfeti, 26.VI.1993. Nerger leg.; Belen env., 36°29′N, 36°12′E, 20.VI.2008, Grosser leg.).

Georgia and **Azerbaijan:** 15 $\stackrel{\circ}{\circ}$, 8 $\stackrel{\circ}{_{\sim}}$ (Georgia, Batumi env., 8.-10.VII.1988, A. Kopitz leg., Georgia, nw Kashui, Surami, Rikolis pass, 1000m, 27.-29.VI.2016, Heinz leg., Georgia, Kachetien, Lagodechi N. R., 650m, 6.VII.2013, Heinz leg.; Abkhasia, Guriani vill., 5.VI.-20.VII.2001, V. Vinnikova leg., sw Azerbaijan, Talysh, Avearud village, 18. V.1995, Komasov leg., all specimens in CKDS).



Fig. 3: Head and prothorax of *Dorcus parallelipipedus*. ♂, Turkey, Akcali Daglari, 20 km n Aydincik, 1250 m, 2.-28.VII.1999, Schenk leg (in CKDS).

Dorcus parallelipipedus var. leuthneri Gangelbauer, 1886

Dorcus parallelipipedus var. leuthneri Ganglbauer, 1886, Syrien und Kleiasien (Külek, Bozdag) (new replacement name) = *Dorcus parallelipipedus var. reichei* Ganglbauer, 1886

The original scientific name *Dorcus parallelipipedus var. reichei* has been changed by Ganglbauer, 1886 in *Dorcus parallelipipedus var. leuthneri* because the name "reichei" was already preoccupied by the east Asian *Dorcus reichei* Hope, 1848 (GANGLBAUER, 1886).

Dorcus parallelipipedus var leuthneri = *reichei* obviously is a local form of *D. parallelipipedus* represented in southern Turkey (Adana region, Amanus Mountains) and northwest Syria (region north-west of Aleppo). Maybe the specimens of *D. parallelipipedus* reported from Lebanon, Israel, Jordan and Iran belong to this form also.

It is only slightly differing from *D. parallelipipedus* by structure of prothorax and elytra. Nowadays it is frequently regarded as a synonym of *D. parallelipipedus* (BARTOLOZZI ET AL., 2016). But genetic research on the taxon is needed to clarify its taxonomic rank (species, subspecies or local population of *D. parallelipipedus*).

Examined material

Turkey: 2 ♂, 1 ♀ so Osmaniye, Yarpuz, Amanus Mts., 28.VII.1998, Schenk leg. Jordan: 1 ♂, 1 ♀, Wadi al Rayan, 385 m, 32°42′N, 35°67′E, VI.2006, W. Grosser leg. Iran: 11 ♂, 14 ♀ (Mazanderan, Chalus env., 8.-10.VI.2005, F. Pavel leg.; Mazanderan, n Kiasar, 30.III.1996, Heinz leg.; Mazanderan, ca. 19 km se Sari, 26.-30.VI.1998, Heinz leg., Khorasan prov., Golestan Forest Res., 40 km ne Minu-Dasht, 10.-12.VI.2006, F. Pavel leg. (all specimens in CKDS).

Bartolozzi et al. are listing several other locations in Iran for *D. parallelipipedus* = *var. leuthneri*? (BARTOLOZZI ET AL. 2014).



Fig. 4: *Dorcus peyronis*, Turkey, surroundings of Ciftehan, south of Alihoca village, Taurus Mountains, Bolkar Daglari (in CKDS).

Dorcus peyronis Reiche et Saulcy, 1856, ♂, "trouvée en Caramanie dans la chaine du Taurus" (= Turkey, central Taurus Mountains), ♀ "raportée de Syria par M. de Saulcy" = *Dorcus Peyroni*, Barau 1993 [sic.]

Morphology and Distribution

 \bigcirc length 20,1-34,1 mm, \bigcirc length 18,0- 28,7 mm, the body *D. peyronis* is of squat form and black shining all over. *D. peyronis* is characterized by the form of the mandibles, the expanded postocular process which is quite clear in the males, somewhat weaker in the females and by the external edge of the meso and metatibiae which has two or three small teeth. The shining elytra have clear, strong punctuated scratches ahead and more fines behind.

D. peyronis is reported from Macedonia, Bulgaria, Greece, Albania, Syria (Aleppo), Israel (Judean Hills and Foothills of Judea) and Turkey. Specimens reported from southern Armenia, Georgia and Azerbaijan and Iran probably are representing the subspecies *D. peyronis vavrai*. Specimens of *D. peyronis* reported from southern Iran obviously are *D. prochazkai*.

Examined material

1

Turkey: 1 \bigcirc , Eregli, Niedeck leg. (MZB); 1 \bigcirc , 1 \bigcirc , w of Nevshehir, Göreme, 20. Aug 1993, K.-D. Schenk lgt,; 3 \bigcirc , Akcali Daglari, 20 km n of Aydincik, 1250 m, 2.-28. July 1999, K.-D. Schenk lgt,; 2 \bigcirc , 1 \bigcirc surroundings of Ciftehan, south of Alihoca village, Bolkar Daglari, 950 m, in oak trunk, 12. July 1994, K.-D. Schenk lgt,; 1 \bigcirc , 1 \bigcirc , n of Karadut, Nemrud Dag, 4.-5. July 2004, K. Werner lgt,; (all in CKDS). We are not able not study any *D. peyronis* from the western part of Turkey and from Europe.



2



3

Fig. 5: *Dorcus peyronis*, (1) head of a big male, Turkey, Akcali Daglari, 20 km n of Aydincik, 1250, (2) head of a small male, Turkey, w of Nevshehir, Göreme, (3) head of female, Turkey, surroundings of Ciftehan, south of Alihoca village, Bolkar Daglari, 950 (in CKDS)

Remarks

Krayjik wrongly mention in his catalogue of Lucanidae "vallée de l'Araxe" (valley of Arax River) as type location of *D. peyronis* (KRAJCIK, M., 2001). But the Arax River (= Aras River) is the border river between Turkey and Georgia and Iraq and Armenia as well. It is close to the type locality of *D. vavrai*.

The rather rare *D. peyronis* is living sympatric in several places with the much more common *D. parallelipipedus*.

For example, the two species have been collected together in an old oak tree near Kozan in the province of Adana in southern Turkey (ATAY ET AL., 2012). The author could collect in July 1994 the two species together in a rotten oak trunk in Turkey at Bolkar Daglari (central Taurus Mts.), 959 m above Alihoca village and in July 1998 south-east of Osmaniye (Yarpuz village in the Amanus Mountains).

Dorcus peyronis vavrai Nonfried, 1905 stat nov.

Examined material

Iran: 2 ♂ (type and syntype of *D. vavrai*), Khosrova, Persia (= Salamas, Iran), ex coll. Nonfried (in CMZB);

Turkey: 2 ♂, 1 ♀ Kurdistan (south-east Turkey), Zap-Tal (valley of Zap River) (CKDS). **Iraq:** 2 ♂, 2 ♀ nordost Iraq, Tal des großen Zap (valley of Big Zap River), (CKDS).

Records from literature

Armenia: Yeghegnadzor, Areni-Noravank, 25.VII.1995, leg. Aghababyan K.; Ararat prov., two km n Surenavan, lamp trap, 12-13.VII.2007, leg. Kalashian (SHOKHIN ET KALASHIAN, 2016) (Specimens determined as *D. peyronis*).

Turkey: 1 ♀, sw Amasia, Tokat (HEYDEN, L. ET FAUST, J., 1888) (determined as *D. peyronis*). 4 ♂, 2 ♀, Hakkari Prov., Zabtal, 1600m, 5.7.1984, leg. Huber. (MITTER, 1987)

1 Å, Kurdistan, Zap Tal, 1500m, 7.VII.1985, Richter leg. (KRAJCIK, M. 2003 fig. 5); 4 Å and 2 ♀ of *D. vavrai* have been collected together with several specimens of *D. parallelipipedus* in south-east Turkey (Hakkari prov., valley of Zab River, 1600m, 5.7.1984, leg. Huber) (MITTER, 1987).

Remarks

We carefully compared 2 \bigcirc specimens (type and syntype) of *D. vavrai* from Khosrova, Persia (= Salamas, Iran) stored in CMNB (Fig. 6) and 4 \bigcirc , 2 \bigcirc from the Zap river valley (south-east Turkey, north-east Syria) (Fig. 7) with several specimens of *D. peyronis* from the central part of Turkey (the type locality of *D. peyronis* "Caramania" = central Taurus Mountains of Turkey) (Fig. 4 and 5) and found some morphological differences. In lateral view is can be seen clearly that the tips of the mandibles of *D. vavrai* are more upraised and the major internal teeth of *D. vavrai* are shorter and somewhat more directed upward.

The synonymy of *D. peyronis* and *D. vavrai* stated by Bartolozzi et al. (BARTOLOZZI ET AL., 2014) could so far not confirmed. As result of our study, we concluded that *D. vavrai* should be regarded as a subspecies of *D. peyronis* represented in the more eastern part of Asia Minor.

However due to the limited number of specimens available for examination further studies like a DNA-analysis might be required to clarify the final taxonomic status of *D. vavrai*.



Fig. 6 Type specimen of *Dorcus vavrai* Nonfried, 1905 from Persia, Khosrova (in CMNB)



Fig. 7: *Dorcus vavrai* (1) head of a small male and (2) head of a female, south-eastern Turkey, valley of the Zap river (in CKDS)



Fig. 8 Valley of the Great Zap River in north-east Syria, habitat of Dorcus peyronis vavrai.

Dorcus prochazkai Schenk, 2003

This rare species is similar to *D. peyronis and D. p. vavrai*. Male specimens have longer and more strait mandibles with only one tooth on the inner side of the mandibles, while *D. peyronis* and *D. p. vavrai* have two teeth. \bigcirc length 21,2-30,0 mm, \bigcirc length 24,3-29,3 mm.

Examined material

1 ♂, holotype and 1 ♀, paratype, sw Iran, Buyer Amad [= Kuhgiloyeh & Boyerahmad], east Kuhgiluye, 5 km east of Sisaht, 30.51" N, 51.30" E, J. Prochazka and I. Jenis leg. (CKDS); 1 ♀ (29,3 mm !), Iran, Fars: Zagros Mts., Shiras prov., Sangar, 21.V.2009, J. Dalihod leg. (CHR).

Records from literature

1 ♀, Fars: Zagros Mts., Sangar, 21.V.2009, J. Dalihod; 1♀, Fars: Sepidan (from wild pear), 13.V.1995 (BARTOLOZZI ET AL., 2014).

Remarks

Dorcus prochazkai is a rare endemic species from the Zagros Mountains of southern Iran.

Fig. 9: *Dorcus prochazkai*, ♂ holotype and ♀ paratype (allotype), sw Iran, Kuhgiloyeh & Boyerahmad, 5 km east of Sisaht (in CKDS)

Fig. 10: *Dorcus prochazkai*, head enlarged, ♂ holotype (1) and ♀ paratype (allotype) (2)

Fig. 11: Map showing the geographic distribution of Dorcus in Asia Minor and West Asia

Abbreviations used for collections

- CHR Private collection H. Rudolph, Quedlinburg, Germany
- CKDS Private collection Dr. K.-D. Schenk, Wehretal, Germany
- CMNB Collection Museum für Naturkunde Berlin, Berlin, Germany

Acknowledgements

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Description of a new species of the genus Aesalus Fabricius, 1801 from central China (Coleoptera: Lucanidae)

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Abstract

Aesalus (Huaesalus) qiaoweipengi Huang, Yang & Chen, **new species** is described from Henan, China. It is the third species of the subgenus *Huaesalus* Huang & Chen, 2017. Male and female genitalia are described in detail for the new species.

Key words

Aesalinae, Aesalini, Huaesalus, Henan.

Introduction

The subgenus *Huaesalus* Huang & Chen, 2017 of the genus *Aesalus* Fabricius, 1801 (Coleoptera: Lucanidae: Aesalinae: Aesalini) is restricted to central China and Taiwan. It is separable from the subgenus *Aesalus* Fabricius, 1801 by the 9-segmented antenna, the entirely tomentose antennal club, the indistinct sexual dimorphism in mandible, the two dorsal medial teeth of the left mandible in both sexes, and the median lobe of male genitalia widest at middle and markedly narrowed either basad or apically. Only two species of the subgenus *Huaesalus* were previously known: *A. imanishii* Inahara & Ratti, 1981 from Taiwan and *A. sichuanensis* Araya, Tanaka & Tanikado, 1995 from Dabashan and Guangtoushan, Chongqing. A third species of this subgenus was unexpectedly discovered by the second author and Mr. Wei-Peng Qiao from Baotianman Nature Reserve, Henan, central China and it is described herein as a new species.

Material and methods

Specimens were collected from the decayed logs in the field as adults, pupae, and larvae; and were reared in the laboratory. Specimens of adults were killed with ethyl acetate and dried.

All measurements are in mm. We measured the pronotum-elytra length instead of body length because the dorsal surfaces of head, pronotum, and elytra in Aesalini are not in a straight line in natural shape and are often variable in length when the adult is alive.

To examine the male and female genitalia, the last two abdominal segments were removed and treated with a weak solution of potassium hydroxide and then preserved in 70% ethanol. Photographs were taken with Canon Power-Shot G12 camera mounted on Olympus SZ61 stereoscope. Terminology follows Holloway (1997, 1998) and Huang *et al.* (2011).

The type specimens are deposited in the following public and private collections:

- CCCQ private collection of Chang-Qing Chen, Tianjin, China
- CHH private collection of Hao Huang, Qingdao, China
- **CQWP** private collection of Wei-Peng Qiao, China
- SHNU Department of Biology, Shanghai Normal University, Shanghai, China

Aesalus (Huaesalus) qiaoweipengi Huang, Yang & Chen, new species (Figs. 1-7, 10-12)

Type material. Holotype (Figs. 1-2, 7, 10): **CHINA**: \circledown , Henan Province, Neixiang, Baotianman Nature Reserve, 1400-1600m, Iarva collected on 18.IV.2016, Q.-Z. Yang & W.-P. Qiao leg., emerged in VIII.2016 (SHNU). Paratypes: 10 \circledown , 8 \circleqown , same data as for the holotype (CCCQ, CHH); 2 \circledown , 2 \circleqown , same locality as for the holotype, adults and Iarvae collected on 23.VIII.2018, Iarvae emerged in III.2019 (CCCQ, CHH, CQWP).

Holotype description. Length of pronotum-elytra measured from apex of pronotum to the caudal end of elytra: 4.1 mm. Ground color of the whole body on both surfaces dark reddish brown. Bristles on dorsal surface of the body scale-like, bright yellow or blackish brown. Bristles on ventral surface of the body scale-like or stick-like, bright yellow.

Head: Width approximately 0.45 times as wide as pronotum. Interocular width about 10 times as wide as eye. Anterior portion of head in front of eye nearly as long as eye. Intermandibular projection (clypeal apex) protruding in full-face view. Canthus absent. Left mandible with two dorsal teeth and a ventral step. Right mandible with a dorsal tooth but without ventral step. Both mandibles with mola obsolete, and each with a setose prostheca along medial edge. Labrum setose, movable and nearly 1/6 times as wide as head. Galea of maxilla with setae on apex not regularly curved. Lacinia of maxilla hardly separable from galea, nearly fused with galea. Ligula small and setose, not markedly divided. Base of labial palpomere 1 concealed by mentum. Palp insertions on prementum closely situated side by side. Antenna partially geniculate and composed of nine antennomeres. Antennal scape without longitudinal groove. Antennal club composed of the last three antennomeres and completely pubescent. Antennomere 3 nearly as long as wide. Mentum transverse, rounded at lateral sides and excavated on frontal margin, setose and punctate.

Thorax and abdomen: Dorsal line of elytra in lateral view strongly and evenly convex. Pronotum and elytra densely punctate, with punctures irregularly distributed and not serially in longitudinal lines. Scutellum slightly longer than wide. Intercoxal process of prosternum plate-like, strongly convex in lateral view, with posterior margin almost as far as procoxae, without a step-like projection posteriorly. Metasternum with a large circular depression. Posterior margin of the last abdominal ventrite concaved near center. Abdominal ventrites 1 and 2 fused and immovable. Hindwing with venation exactly as in *A. imanishii* and *A. sichuanensis*.

Surface structures: Vestiture of pronotum and elytra consisting of only one type of elements: the scale-like bristles (variable in size, color and detailed shape). Bristles longitudinally ribbed, inserted anteriorly in the wall of the punctures, forming clumps. All punctures with margins sharply defined, and with floor raised and polygonally sculptured. Puncture of bristle not associated with a tubercle outside of puncture.

Legs: Protibia markedly broadened from base to apex, with a small inner terminal spur, an outer apical spine and continuous spines on outer lateral margin. Apical spine curved and nearly 1/4 times as long as the width of protibia at apex. Mesotibia and metatibia with continuous spines. All tarsi short, with the combined length about half as long as tibia.

Male genitalia (Figs. 7, 10): 9th abdominal segment slender and elongate; basal lobe obsolete; paired pleurites small, plate-like and protruding ventrally; dorsal plate small. Basal piece very short. Parameres 2/3 times as long as median lobe. Median lobe strongly curved in lateral view and widest at middle, symmetrical.

Description of male paratypes. Individual variation is only found in the sizes and positions of the clumps of dark bristles on elytra.

Description of female paratypes. Sexual dimorphism in external morphology is very striking. Differences are found in the following characters. Apical spines of protibia and mesotibia markedly longer than in male. Apex of metatibia strongly convex at outer margin and markedly wider than in male. Last abdominal ventrite markedly longer than in male, with posterior margin more arched near center than in male. Last abdominal sternite (Fig. 11) with a large central projection on anterior margin, which is absent in male.

Female genitalia (Fig. 12). Hemisternites well sclerotized and setose, with styli short, setose, and pointed outwards; bursal duct thin and clearly marked; bursa copulatrix elongate; accessory gland clearly with a duct originated from bursal duct; spermathecal duct rather long, arising from the terminal end of bursa copulatrix; spermatheca large; spermathecal gland and its duct very long, with their combined length much greater than the length of the spermatheca.

Figs. 1-4: *Aesalus qiaoweipengi*, habitus in dorsal and ventral views under same scale. 1-2 — male holotype; 3-4 — female paratype.

Diagnosis. This new species seems to form a mixture of the previously known species, with clypeal apex similar to that of A. sichuanensis, elytral clumps of scale-like bristles arranged regularly like in A. imanishii, male genitalia like in A. imanishii, and with female genitalia similar to that of A. sichuanensis. It can be distinguished from the previously known species by the following combination of characters: 1) clypeal apex of head protruding (rounded in A. imanishii), but not so sharp as in A. sichuanensis; 2) elytral clumps of scale-like bristles arranged more regularly than in A. sichuanensis; 3) central depression on metasternum rather circular as in A. sichuanensis, not oval as in A. imanishii; 4) aedeagus with apex not expanded as in A. sichuanensis (Fig. 9); 5) aedeagus thinner in both lateral and dorsal views than in both A. imanishii (Fig. 8) and A. sichuanensis (Fig. 9); 6) central process of last sternite of female tapering apically, markedly wider than in A. imanishii but thinner than in A. sichuanensis, not so triangular as in A. sichuanensis; 7) stylus of female genitalia almost as long as wide, markedly stouter than in A. imanishii; 8) accessory gland of female genitalia with a duct as in A. sichuanensis (with no duct in A. imanishii); 9) spermathecal duct almost as long as bursal duct, markedly longer than in both A. imanishii and A. sichuanensis; 10) spermathecal gland and its duct nearly as long as in A. imanishii but markedly longer than in A. sichuanensis.

For the characters of *A. imanishii* and *A. sichuanensis*, Huang & Chen's (2017) work should be consulted.

Fig. 8 male genitalia of Aesalus imanishii. Fig. 9 male genitalia of Aesalus sichuanensis.

Remarks. The senior author at first considered this new species as a subspecies of *A. imanishii* from Taiwan solely on account of the similarity in male genitalia, however, the similarities between the new species and *A. sichuanensis* in clypeus, depression on metasternum and female genitalia strongly suggest that there is allopatric speciation among these three taxa. The unexpected discovery of this new species reveals that the biodiversity of the subgenus *Huaesalus* is richer than we knew, suggesting that the Chinese fauna of Aesalini is still little known with more new discoveries expected, especially in the southeastern Chinese area between central China and Taiwan. A primary phylogenetic analysis on morphological characters (Huang, unpublished data) suggests that *Huaesalus* deserves an independent genus from *Aesalus*. Further research on the phylogeny of Aesalini is necessary in the future to reach the final conclusion.

Figs. 10-11: *Aesalus qiaoweipengi*, characters. 10 — 9th abdominal segment, last tergite and last sternite of male; 11 — last tergite and last sternite of female; 12 — female genitalia.

Field observations. All adults and larvae of the new species were found in the decayed woods on the open slopes near streams within the broad-leaved forest (mostly oak trees) at 1400-1600m in Baotianman Nature Reserve. The environmental humidity is relatively high. The woods had some portion decayed as brown-rot, identified as *Euptelea* sp. (Eupteleaceae). In April, only larvae were found among the decayed woods and no adult or pupa was found; the larvae were emerged in August and November respectively. In August, both adults and larvae were collected in the decayed woods, and the larvae were emerged in next spring.

Ceruchus minor Tanikado & Okuda, 1994 was found living together with *Aesalus qiaoweipengi* in the same woods. Other Lucanid species living in the same biotope include *Dorcus wui* Huang & Chen, 2013, *Himaloaesalus satoi* (Araya & Yoshitomi, 2003) and three species of *Platycerus*.

Figs. 13-16: Biotope and field observation of *Aesalus qiaoweipengi.* 13-14 — biotope; 15 — the decayed wood from which the new species collected; 16 — adult of new species found in brown, rotten portion of the wood.

Type locality. Henan province: Baotianman Nature Reserve.

Etymology. This new species is named in honor of Mr. Wei-Peng Qiao, who discovered this new species together with the second author.

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We thank Mr. Wei-Peng Qiao for collecting the type specimens of the new species.

Fig. 17: Distribution of the subgenus *Huaesalus*.

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New or little known stag beetles of the genus *Platycerus* Geoffroy, 1762 from China (*Coleoptera: Lucanidae*)

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Abstract

Platycerus daguanensis Huang & Chen, **sp. nov.** and *P. weidengensis* Huang & Chen, **sp. nov.** are described from Yunnan, China. *P. liyingbingi* Huang & Chen, 2017 is discussed on individual and geographical variations. *P. ladyae* Imura, 2005 is reported from Baoxing and Meigu, Sichuan. Male genitalia are figured for all of the species discussed.

Key words

Platycerini, daguanensis, weidengensis, liyingbingi, ladyae, Yunnan, Sichuan, new species.

Introduction

Species of Platycerus from Yunnan are very similar to one another in external features and sclerotized structures of male genitalia, causing frequent misidentifications of specimens. By examining the internal sac of the male genitalia, the authors found that the previously reported specimens of *P. cupreimicans* Imura, 2006 from NE Yunnan (Huang & Chen, 2017: 505-507) belong to a new species, described below as P. daguanensis sp. nov.. A series of specimens were collected by a local collector from Biluoxueshan, NW Yunnan and were purchased by the junior author, belonging to two species: one was identified as a new species, described below as *P. weidengensis* **sp. nov.**, looking like the type specimens of *P. liyingbingi* Huang & Chen, 2017 in external appearance; another was identified as a population of P. livingbingi, looking like P. cupreimicans in external appearance. This experience confirmed that the characters of the internal sac in male genitalia are the most important and reliable diagnostic characters for specific identification of Platycerus whereas the size of the body, the color of the body and some characters of the mandibles are often useless, being individually variable. Two new populations of *P. ladyae* are reported, with considerable individual variations found. It is noted that nine more taxa of *Platycerus* have been described (Imura, 2010b, 2011, 2012a, 2018, 2019; Huang & Chen, 2017; Kubota et al., 2018) since Imura (2010a) published his revisional book.

Material and methods

Specimens were collected from the decayed logs in the field as adults, pupae, and larvae; and were reared in the laboratory. Specimens of adults were killed with ethyl acetate and dried.

All measurements are in mm. To examine the male genitalia, the last two abdominal segments were removed and treated with a weak solution of potassium hydroxide and then preserved in 100% ethanol.

The internal sac of the male genitalia was inflated by air using a syringe and dried and fixed by a air heater. Photographs were taken with Canon Power-Shot G12 camera mounted on Olympus SZ61 stereoscope. Terminology follows Huang & Chen (2009) and Imura (2010a).

The type specimens are deposited in the following public and private collections:

- **CCCC** private collection of Chang-Chin Chen, Tianjin, China
- CHH private collection of Hao Huang, Qingdao, China
- SHNU Department of Biology, Shanghai Normal University, Shanghai, China

Platycerus liyingbingi Huang & Chen, 2017

(Figs. 1-2, 6, 11-12, 17, 22) *Platycerus liyingbingi* Huang & Chen, 2017: 504 (type locality: Gongshan, Yunnan).
? *Platycerus hiro* Imura, 2018: 23 (type locality: Biluoxueshan, Weideng, Weixi, NW Yunnan).
? *Platycerus hirofumii* Imura, 2019: 26 (type locality: Yunling, Deqin, NW Yunnan).

Material. 2 ♂♂, 1♀ (type series); 2 ♂♂, 1♀ (CCCC), Yunnan Province, Gongshan, Kalabo, VI.2012 & X.2018, Y.-B. Li leg.; 19 ♂♂, 41 ♀♀ (CCCC, CHH), Yunnan Province, Weixi, Weideng, Xinhua, Biluoxueshan, IV.2018, B.-J. Li leg.

Remarks. The type locality is clarified as "Kalabo, on west slope of Biluoxueshan, Nujiang valley, near Gongshan" (Y.-B. Li, personal communication, 2021). More topotypic male specimens (Fig. 1) collected by Mr. Y.-B. Li (the collector of the type series) possess the following individual variations. Size is variable, with total length (measured from tip of mandible to end of elytra) varying from 10 mm to 11.7 mm. Color of tibiae can be blackish or reddish. Color of dorsal surface of body varies from purplish to greenish. Male mandibles (Fig. 11) are also variable in some details. One more female specimen (Fig. 1- rightmost) from the type locality shows the stouter elytra than the unique female paratype (Fig. 5).

Specimens from Weideng (on east slope of Biluoxueshan, Lancang valley) (Fig. 2) vary from 10.2 mm to 13.3 mm in total length, and are generally greenish on the dorsal surface, with the mandibles variable in some details (Fig. 12).

Four males from the type locality and five males from Weideng have been examined for internal sac of male genitalia, proving that the characters of the internal sac in male genitalia are very constant in this species. *P. liyingbingi* (Fig. 22) has a much longer apical lobe than *P. cupreimicans* Imura, 2006 (Fig. 24; type locality: Pantiange, Weixi).

P. hiro Imura, 2018 (type locality: Weideng, Weixi) and *P. hirofumii* Imura, 2019 (type locality: Yunling, Deqin) are probably geographical forms of *P. liyingbingi*, being in common with the latter in characters of the internal sac of male genitalia. The diagnostic characters used by Imura (2018, 2019) are individually variable, and they seem not to support the independence of *P. hiro* and *P. hirofumii*. It is noted that there is no barrier between the populations of *Platycerus liyingbingi* from the west (type locality of *P. liyingbingi*) and east (type locality of *P. hiro*) slopes of the same mountains. However, to treat *P. hiro* and *P. hirofumii* as synonyms of *P. liyingbingi*, a DNA-analysis might be required in future.

Platycerus daguanensis Huang & Chen, sp. nov.

(Figs. 3, 7, 13, 18, 23) *Platycerus cupreimicans*: Huang & Chen, 2017: 504-507, Misidentification.

Type material. Holotype (Figs. 3- leftmost, 7- leftmost): **CHINA**: \Diamond , Yunnan Province, Zhaotong, Daguan, Gaozhiba, 1996m, 24.X.2011, X.-D. Yang leg., SHNU. Paratypes: 3 $\Diamond \Diamond$, 2 $\bigcirc \bigcirc$, same data as for the holotype (CCCQ, CHH).

Holotype description. Length of body measured from apex of mandible to the caudal end of elytra: 12.8 mm. Ground color on dorsal surface bicolor: head and pronotum dark blackish green, with weak metallic reflection; elytra purplish red, with strong metallic reflection. Ground color on ventral surface bicolor: head, prosternum and mesosternum blackish; metasternum and abdominal ventrites reddish. Femora reddish. Tibiae dark and mostly brown on both surfaces, appearing reddish under strong light. Tarsi reddish brown.

Mandible: strongly bent at outer margin. Gap between incisor teeth and apex of mandible minute on left mandible but larger on right mandible. Conjoined inner margin of incisor teeth rather long and strongly dentate. Gap between incisor teeth and molae as long as the conjoined inner margin of molae, shallower on left mandible than on right mandible.

Male genitalia (Figs. 18, 23): 9th abdominal segment and sclerotized part of male genitalia as in *Platycerus cupreimicans*. Internal sac with 1st paraflagellar lobes slender and sharply pointed at caudal ends, and with apical lobe narrowed apically and not bilobed at end.

Description of male paratypes. Individual variation is found in length of body (12.1-12.8 mm), color of tibiae (dark and partly blackish or entirely bright reddish brown), color of mandibles (blackish or reddish), color of prosternum and mesosternum (blackish or reddish) and some details of mandibles (Fig. 13). No difference is found in characters of internal sac in male genitalia (all paratypes examined).

Description of female paratypes. Generally as in *Platycerus cupreimicans*. Ground color on dorsal surface variable: bicolor, with blackish head-pronotum and purplish elytra in one female; uniform greenish in another female (this may indicate that the male is also variable in color when more male specimens are available). Ground color on ventral surface: prosternum and mesosternum dark reddish brown; metasternum and abdominal ventrites bright red. Femora and tibiae all bright red.

Diagnosis. This new species can be distinguished from *Platycerus cupreimicans* and *P. liyingbingi* by the following combination of characters: 1) incisor teeth of mandible in fully developed male with the conjoined inner margin markedly longer than in both *P. cupreimicans* and *P. liyingbingi*; 2) 1st paraflagellar lobes of internal sac in male genitalia much slenderer, with caudal corners sharply pointed, not blunt as in both *P. cupreimicans* and *P. liyingbingi*; 3) apical lobe of internal sac markedly shorter than in *P. liyingbingi*, but markedly longer than in *P. cupreimicans*.

This new species somewhat recalls *P. cyanidraconis* Imura, 2008 from Maoxian, C Sichuan (a good number of specimens examined) in the characters of the internal sac of male genitalia, however, it can be easily distinguished from the latter by the following combination of characters: 1) metasternum and abdominal ventrites bright red in both sexes, not dark as in *P. cyanidraconis*; 2) incisor teeth of mandible in fully developed male with the conjoined inner margin markedly longer and more dentate; 3) apical lobe of internal sac in male genitalia not bilobed at end.

Platycerus weidengensis Huang & Chen, sp. nov.

(Figs. 4, 8, 14, 19, 21)

Type material. Holotype (Figs. 4- leftmost, 8- leftmost): **CHINA**: ♂, Yunnan Province, Weixi, Weideng, Xinhua, Luowushan, 2600-3200m, 15.III.2018, B.-J. Li leg., SHNU. Paratypes: 3 ♂♂, 3 ♀♀, same data as for the holotype (CCCQ, CHH).

Holotype description. Length of body: 10.8 mm. Ground color on dorsal surface metallic green, with purplish reflection in some parts. Ground color on ventral surface bicolor: head, prosternum and mesosternum dark blackish; metasternum and abdominal ventrites red. Femora red. Tibiae dark and blackish brown on both surfaces. Tarsi brown, appearing reddish under strong light.

Mandible: deeply curved at outer margin. Gap between incisor teeth and apex of mandible minute. Conjoined inner margin of incisor teeth short and strongly dentate. Gap between incisor teeth and molae as long as the conjoined inner margin of molae.

Male genitalia (Figs. 19, 21): 9th abdominal segment and sclerotized part of male genitalia as in *Platycerus cupreimicans*. Internal sac with 1st paraflagellar lobes slender and pointed at cephalic ends, and with apical lobe very stout and not bilobed at end.

Description of male paratypes. Individual variation is found in color of dorsal surface of body (more purplish than in holotype), and details of mandibles (Fig. 14). No difference is found in characters of internal sac of male genitalia (all paratypes examined).

Description of female paratypes. Generally as in *Platycerus cupreimicans*. Ground color on dorsal surface mostly purplish red. Head, prosternum and mesosternum blackish, metasternum and abdominal ventrites red as in male. Femora red as in male. Tibiae mostly reddish brown, not dark blackish as in male.

Diagnosis. This new species can be distinguished from *P. cupreimicans, P. liyingbingi* and *P. daguanensis* by the following combination of characters: 1) mandible in fully developed male markedly shorter than in *P. daguanensis*, with outer margin more curved than in *P. cupreimicans* and *P. liyingbingi*, and with gap between incisor teeth and apex of mandible smaller than in all other species; 2) 1st paraflagellar lobes of internal sac in male genitalia smaller and more pointed at cephalic end than in *P. cupreimicans* and *P. liyingbingi*, but markedly broader than in *P. daguanensis*; 3) apical lobe of internal sac much thicker than in all other species, longer than in *P. cupreimicans* and not narrowed at apex as in *P. liyingbingi* and *P. daguanensis*.

This new species somewhat recalls *P. tangi* Imura, 2008 from Maoxian, C Sichuan (a good number of specimens examined) in characters of internal sac of male genitalia, however, it can be easily distinguished from the latter by the following combination of characters: 1) metasternum and abdominal ventrites bright red in both sexes, not dark blackish as in *P. tangi*; 2) incisor teeth of mandible in fully developed male with the conjoined inner margin markedly longer and more dentate; 3) gap between incisor teeth and molae in fully developed male markedly longer; 4) apical lobe of internal sac in male genitalia larger and not bilobed at end.

Platycerus ladyae Imura, 2005

(Figs. 9-10, 16, 20, 25)

Platycerus ladyae: Imura, 2005: 507 (type locality: Erlangshan, Sichuan); Imura, 2010a: 98-101; Imura, 2012b: 257-258.

Material. 1 \bigcirc , 1 \bigcirc (CCCC), Sichuan Province, Tianquan, Erlangshan, 2229m, 3.IX.2010 & 9.IV.2014, X.-D. Yang leg.; 1 \bigcirc , 1 \bigcirc (CCCC), Sichuan Province, Baoxing, Fengtongzhai, 1950m, 2.X.2015, J.-Y. Qiu & H. Xu leg.; 10 $\bigcirc \bigcirc$, 6 $\bigcirc \bigcirc$ (CCCC, CHH), Sichuan Province, Meigu, Weiheiluo, 2487m, 30.III.2016, X.-D. Yang leg.

Remarks. This species had been recorded only from Erlangshan, Sichuan until the friends of the authors collected a few specimens from Baoxing and Meigu, reported herein. The following individual variations are noted. Male mandible can be very short in small-sized specimen, with a very short conjoined inner margin of the incisor teeth. Ground color of dorsal surface of body in both sexes can be more or less greenish on head and pronotum. Male metasternum can be entirely reddish. Male tibiae can be occasionally bright red. Female prosternum and mesosternum can be bright red.

This species is characterized in male genitalia by the strongly waved outer margin of the paramere in ventral view and the large membranous area near the basal ventral angle of the paramere. The internal sac of the male genitalia taken from the specimen from Meigu is not different from that of the specimen from Erlangshan (Imura, 2012b: 258).

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FIGURES 1-5: *Platycerus* species, habitus in dorsal view under same scale.

FIGURE 6: *Platycerus liyingbingi* from Weideng, habitus in dorsal and ventral views under same scale. Scale bar = 10 mm.

FIGURE 7: *Platycerus daguanensis* **sp. nov.**, habitus in dorsal and ventral views under same scale. Scale bar = 10 mm.

FIGURE 8: *Platycerus weidengensis* **sp. nov.**, habitus in dorsal and ventral views under same scale. Scale bar = 10 mm.

FIGURE 9: *Platycerus ladyae*, habitus in dorsal view under same scale. Scale bar = 10 mm.

FIGURE 10: *Platycerus ladyae*, habitus in ventral view under same scale, corresponding to Fig. 9. Scale bar = 10 mm.

FIGURES 11-16: Mandibles of *Platycerus* species in dorsal view under same scale. Scale bar = 1 mm. Serial numbers (P1-P10) corresponding to those in habitus figures.

FIGURES 17-20: Aedeagi of *Platycerus* species in ventral view under same scale. Scale bar = 1 mm. Serial numbers (P1-P10) corresponding to those in habitus figures.

FIGURES 21-25: Internal sacs of *Platycerus* species in various views under same scale.