A key to *Grouvellinus* Champion, 1923 from mainland China with descriptions of two new species (Coleoptera, Elmidae)

Dongju Bian¹, Haibin Sun¹,²

¹ Institute of Applied Ecology, Chinese Academy of Sciences, Shenyang, 110016 China ² University of Chinese Academy of Sciences, Beijing 100049, China

Corresponding author: Dongju Bian (Biandongju@163.com)

Abstract

A key to *Grouvellinus* Champion from mainland China is provided. Two new species of *Grouvellinus* are described from Jiangxi, China, *Grouvellinus orbiculatus* sp. n. and *Grouvellinus sagittatus* sp. n. Descriptions, diagnoses, and illustrations of the new species are given. Habitus photos of the nine known species are provided including the four species from Taiwan.

Keywords

China, Elmidae, *Grouvellinus*, new species, taxonomy

Introduction

The generic name *Grouvellinus* was proposed by Champion, 1923 and is widely distributed in Oriental and Palearctic regions. Jäch (1984) made a revision of this genus based on material occurring in Himalaya and southeast Asia, re-describing seven species and reporting eight new species. Jäch and Kodada (1995) provided a check list of the Elmidae of China: four *Grouvellinus* species were mentioned as occurring in China, and five species were reported from bordering villages (Myanmar, Nepal). Subsequently, Jeng and Yang (1998) made a revision of *Grouvellinus* occurring in Taiwan.
and Japan, and three new species were reported from Taiwan. A total of 36 species of *Grouvellinus* are known so far (Brown 1981, Jäch et al. 2016, Jung et al. 2014).

According to Jäch et al. (2016), six species were known from mainland, China, and four species were reported from Taiwan. Jeng and Yang (1998) had already provided a key to *Grouvellinus* from Taiwan and Japan.

In this paper, a key for male to *Grouvellinus* from mainland China is provided and two new species of this genus are reported from Jiangxi, China. The genus *Grouvellinus* is reported from Jiangxi for the first time. Type material of the new species were deposited in Institute of Applied Ecology, Shenyang, Chinese Academy of Sciences (IAECAS). Type materials of the known species were from Natural History Museum, Vienna (NHMW). Habitus photos of *Grouvellinus carus* Hinton, 1941 were provided by Dr. Maxwell V. L. Barclay (London).

**Material and methods**

Specimens were examined with a Leica M205c stereomicroscope. Further details were studied under an Olympus BX51 compound microscope. Body length is the sum of pronotal and elytral lengths, body width means the broadest width of the elytra. The first strial interval means the sutureal interval. Genitalia illustrations were drawn with the aid of a drawing tube. Male genitalia were placed in concentrated lactic acid in a cavity slide for at least several hours before they were examined. Photos were made with KEYENCE VHX-2000 – Super Resolution Digital Microscope System. Label data for holotypes, paratypes, and paralectotypes has been recorded verbatim, with lines on the same label separated by “/” and labels separated by “;”.

**Key to species reported from mainland China (male)**

1. Metasternum with two small pits on median suture ...................... 2
   – Metasternum without two small pits on median suture .................. 3
2. Punctures on pronotum finer and sparser. Penis end up with an arrow, parameres gradually narrowed to apex (Figs 26–28) .............. *G. sagittatus* sp. n.
   – Punctures on pronotum bigger and denser. Penis end up with expanded rounded apex, and parameres distinctly narrowed at basal 1/3(Figs 23–25) .... ............................................................... *G. orbiculatus* sp. n.
3. Body length no less than 2.5 mm .............................................. 4
   – Body length less than 2.5 mm .............................................. 5
4. Disc of metasternum with a pair of protuberances on each side of median suture at base (Fig. 18); penis sharply narrowed from base toward apex ...... ................................................................. *G. hercules*
   – Disc of metasternum with a pair short carinae from basal 0.2 to 0.6 on each side of median suture (Fig. 20); penis sharply narrowed in distal 0.2 .... *G. tibetanus*
A key to Grouvellinus Champion, 1923 from mainland China with descriptions...

5 Pronotum with a shallow oval impression medially on disc (Fig. 21)... *G. carus*
- Pronotum without impression medially on disc...........................................6

6 Pronotum with one median carina extending from base to basal 0.6; each elytral interval with a carina, carinae on intervals 3, 5, 7, 8 more developed (Fig. 11).................................................................*G. nepalensis*
- Pronotum with a pair of short median carinae at base; elytra with strial intervals 7, 8 carinate (Fig.15).................................................................*G. sinensis*

Classification

**Grouvellinus** Champion, 1923

*Grouvellinus* Champion, 1923: 168. Type species: *Macronychus caucasicus* Victor, 1839.

**Grouvellinus orbiculatus** sp. n.
http://zoobank.org/ED10C0B1-C00D-4FD2-AC10-D397E7D578D9
Figures 1–2, 23–25

**Type material.** Holotype: male, “CHINA: Jiangxi / Ji’an City, Suichuan/ County, Duiqian Town; 26°20’N 114°17’E, 228 / m, 2009.10.02, leg. / Bian & Tong (loc. 10)” (white label); “HOLOTYPE / Grouvellinus / orbiculatus sp. n.” (red label). Paratypes: 3 males, 4 females, the same data as holotype. 4 males, 2 females: “CHINA: Jiangxi / Ji’an City, Suichuan / County, Caolin Town; 26°16’N 114°22’E, 228 / m, 2009.10.03, leg./ Bian & Tong (loc. 11)” (white label); “PARATYPE / Grouvellinus / orbiculatus sp. n.” (red label). 1 male: “CHINA: Jiangxi / Ganzhou City, Shangyou / County, Wuzhifeng Town; 25°57’N 114°05’E, 554 / m, 2009.10.05., leg. / Bian & Tong (loc. 12)”(white label); “PARATYPE / Grouvellinus / orbiculatus sp. n.” (red label).

**Diagnosis.** This species is characterized by its small size (<2 mm), dense punctures on pronotum, sparse pubescence on the elytra, and the metasternum with two small pits on median suture; the penis end has a rounded expanded apex, and the parameres are distinctly narrowed at basal 1/3 in dorsal view.

**Description.** Body length 1.70 mm, body width 0.80 mm. Body shape elongate obovate, subparallel (Figs 1–2). Head black, pronotum and elytra brown, femora and tibiae dark brown. Antennae and tarsi yellowish brown.

*Head* smooth, covered with long pubescence; surface with small circular punctures sparsely and superficially impressed. Clypeus surface smooth, weakly punctate, lateral sides sparsely covered with long pubescence. Labrum smooth, weakly punctate and densely pubescent laterally.

*Pronotum* 1.2 times as broad as long, broadest at basal 2/5, surface smooth and shining, covered with adpressed pubescence; small circular punctures densely impressed. Sub-lateral carinae present on basal 2/5, feebly raised and feebly converging...
anteriorly; an oblique impression on each side extending from the end of carina to anterior angle. Base with two elongated oval impressions in front of anterior angles of scutellum.
**Elytra** 1.5 times as long as broad, 1.4 times as broad as pronotum; sides subparallel in basal 2/3, and then gradually narrowed to separated rounded apex. Strial punctures larger and deeper in basal half separated by 0.5–1.0 diameter; punctures becoming smaller and widely separated (2–5 times diameters); intervals slightly convex, and each interval with one or two rows of small punctures and pubescence; intervals 2–4 slightly elevated at base; interval 8 carinate.

Process of prothoracic ventrite approximately 1/3 as broad as pronotum, distinctly rimmed; basal 2/3 disc smooth and shining, slightly elevated, apex somewhat truncate (Fig. 2). Disc of metasternum broadly impressed, surface smooth and shining, weakly punctate, and two small pits present on median suture; sub-lateral area of metasternum densely pubescent; metasternum with two rows of punctures on each side, one is oblique consisting of very large punctures which begin at anterior margin laterally and end up in front of metacoxae, the other one consisting of moderate-sized punctures is in front of posterior margin. Middle regions of ventrites I–IV smooth and shining, with small punctures sparsely distributed, and sub-lateral regions densely pubescent; middle region of ventrite V at basal 1/3 is similar to ventrites I–IV, elsewhere on ventrite V densely pubescent and sparsely granulate.

**Male genitalia** (Figs 23–25) long and slender, about 690 µm in length. Penis distinctly surpasses parameres, gradually narrowed from base to distal portion, apex expanded ending up with broadly rounded apex; ventral sac with lateral sides weakly sclerotized, surpassing the parameres. Parameres robust at base, distinctly narrowed at basal 1/3 in dorsal view.

**Female** similar to male, but disc of metasternum not broadly impressed, slightly elevated.

**Distribution.** China: Jiangxi.

**Etymology.** The specific name comes from the Latin word “orbiculatus” and refers to the rounded apical portion of penis.

**Remarks.** Grouvellinus orbiculatus sp. n. is similar to *G. sagittatus* sp. n. in body size, habitus, interval 8 on elytra with a carina, and two small pits on median suture of metasternum, but can be distinguished from the latter by its denser punctures on pronotum, penis ends with expanded rounded apex, and parameres distinctly narrowed at basal 1/3.

---

**Grouvellinus sagittatus sp. n.**
http://zoobank.org/609F02D9-A6C8-4F29-B2DF-A8EEBB5903F9
Figures 3–4, 26–28

**Type materials.** Holotype, male: “China: Jiangxi / Ganzhou, Longnan / County, Jiulianshan; 24°37’N 114°32’E, 560 / m 2009.10.10, Leg. Bian / & Tong (16)”(white label); “HOLOTYPE / Grouvellinus / sagittatus sp. n.”(red label). Paratypes: 2 males, 2 females: “CHINA: Jiangxi, / Ganzhou City, Longnan / County, Jiulianshan; Downstream of loc. 16; / 2009.10.10; leg. Bian & / Tong (loc. 17)” (white label); “PARATYPE / Grouvellinus / sagittatus sp. n.” (red label).
Diagnosis. This species is characterized by its small size (<2 mm), dorsum sparsely pubescent, and metasternum with two small pits on the median suture; penis ends with an arrow, and parameres gradually narrowed from base towards apex.

Description. Body length 1.75 mm, body width 0.80 mm. Body shape elongate obovate, subparallel (Figs 3–4). Dorsal surface brown to dark brown, with strong bronze luster; elytra paler than pronotum. Ventral surface brown to dark brown, femora and tibiae brown, antennae, mouth parts, and tarsi yellowish-brown.

Head smooth and shining, covered with long pubescence; small circular punctures sparsely impressed. Clypeus surface smooth, sparsely punctate and pubescent; labrum smooth, surface of disc weakly punctate and pubescent, and densely pubescent laterally.

Pronotum 1.2 times as broad as long; broadest at basal 2/5. Surface smooth and shining, accompanied with long adpressed pubescence; small circular punctures sparsely and superficially impressed. Basal sub-lateral carinae present on basal 2/5, but only slightly raised, feebly converging anteriorly; an oblique impression on each side extending from apical end of carina to anterior angle; base with two elongate oval impressions in front of anterior angles of scutellum.

Elytra 1.6 times as long as broad, 1.4 times as broad as pronotum; sides subparallel in basal 2/3, and then tapering to separated rounded apex. Strial punctures larger and deeper on disc, but becoming finer and shallower on apical declivity; intervals convex, smooth and shining, each interval with one or two rows of small punctures and pubescence; intervals 2–4 slightly elevated at base; interval 8 carinate.

Process of prothoracic ventrite approximately 1/3 as broad as pronotum, subquadrate, strongly rimmed, with transverse, smooth elevation at base; surface almost without punctures and pubescent on disc (Fig. 4). Disc of metasternum flat, smooth and shining, sparsely punctate, with two small pits on median suture, one is longitudinal which on the middle of metasternum, and the other one is transverse which is in front of the posterior margin; sub-lateral region densely pubescent, with two rows of coarse punctures on each side, one is oblique with very large punctures which begin at anterior margin laterally and end up in front of the metacoxae, the other one consisting of moderate-sized punctures is in front of posterior margin. Middle regions of ventrites I–IV smooth and shining, with few small punctures; sub-lateral regions densely pubescent; distal 2/3 of ventrite V granulate.

Male genitalia (Figs 26–28): long and slender, 605 µm in length; penis extends beyond parameres, distinctly narrowed from base toward apex, arrowed at the tip; ventral sac developed, longer than parameres. Parameres gradually narrowed from base to apex in dorsal view.

Females similar to males, but disc of metasternum not flat, distinctly elevated.

Distribution. China: Jiangxi.

Etymology. The specific name comes from the Latin word “sagittatus” meaning “arrow-shaped” and refers to the inflated apical portion of penis.

Remarks. Grouvellinus sagittatus sp. n. is similar to G. orbiculatus sp. n. in body size, habitus, interval 8 with a carina, and two small pits on median suture, but can be distinguished from the latter by sparser punctures on pronotum, penis ends with an arrow, and parameres gradually narrowed from base to apex in dorsal view.
A key to *Grouvellinus* Champion, 1923 from mainland China with descriptions...

**Figures 5–8.** Habitus. 5–6 *G. babai babai* Nomura, 1963 7–8 *G. hydropetricus* Jeng & Yang, 1998, paratype 5, 7 dorsal view 6, 8 ventral view. Scale bar: 1 mm. Photograph by Dongju Bian.

*Grouvellinus babai babai* Nomura, 1963

*Grouvellinus babai babai* Nomura, 1963: 55. TL: China, Taiwan.

**Distribution.** China: Taiwan.

**Material examined.** 1 male: “Taiwan, Taipei / Wanli 13. 8. 90 / M.L. Jeng (111)”.
**Grouvellinus chinensis** Mařan, 1939

*Grouvellinus chinensis* Mařan, 1939: 42. TL: China, Sichuan.

**Distribution.** China: Sichuan.

**Remarks.** This species was described by Mařan in 1939 based on a female specimen. The type specimen was deposited in National Museum, Prague, Czech Republic (NMPC). Dr. Martin Fikáček was contacted, but he did not find the type specimen in NMPC, and also did not find any record of rent loans. According to the original description, this species was 3.0 mm long, 1.3 mm wide, strial intervals transversely wrinkled on elytra, and intervals 3, 5, 7, 8 carinate, while the two new species were less than 2.0 mm long, strial intervals smooth and shining on elytra, and interval 8 carinate. This species was also not included in the key because the key was only for males.

**Grouvellinus hydropetricus** Jeng & Yang, 1998

*Grouvellinus hydropetricus* Jeng & Yang, 1998: 533. TL: China, Taiwan.

**Distribution.** China: Taiwan.

**Material examined.** Paratype: 1 male: “Taiwan 8.IX. 93 / Taipei, Wulei / leg. M. L. Jeng” (white label); “PARATYPUS / Grouvellinus / hydropetricus n. sp. / des Jeng & Yang, 1993” (red label).

**Grouvellinus montanus** Jeng & Yang, 1998

*Grouvellinus montanus* Jeng & Yang, 1998: 530. TL: China, Taiwan.

**Distribution.** China: Taiwan.

**Material examined.** Paratype: 1 male: “Ilan Taiwan / Chiduan / 29 III. 1990 / Jeng M. L. leg.” (white label); “PARATYPUS / Grouvellinus / montanus / JENG & YANG / des. Jeng & Yang” (red label).

**Grouvellinus nepalensis** Delève, 1970

*Grouvellinus nepalensis* Delève, 1970: 321. TL: China, Nepal.

**Distribution.** China: Xizang; Nepal.

**Material examined.** 1 male: “Nepal, 28.2.31 / Tibetan Grenze / leg. M. Jäch”.
Grouvellinus pilosus Jeng & Yang, 1998
Figures 13–14

Grouvellinus pilosus Jeng & Yang, 1998: 527. TL: China, Taiwan.

Distribution. China: Taiwan.

Material examined. Holotype: 1 male: “Taiwan 16. VIII. 90 / Taipei / Sanshah: Yomushi / leg. M. L. Jeng”; “HOLOTYUS / Grouvellinus / pilosus sp.n. / des. Jeng & Yang 1993” (red label).
Figures 13–16. Habitus. 13–14 G. pilosus Jeng & Yang, 1998, holotype 15–16 G. sinensis Grouvelle, 1906, paralectotype 13, 15 dorsal view 14, 16 ventral view. Scale bar: 1 mm. Photograph by Dongju Bian.

Grouvellinus sinensis Grouvelle, 1906
Figures 15–16

Grouvellinus sinensis Grouvelle, 1906: 126. TL: China, Yunnan.

Distribution. China: Yunnan.
Material examined. Paralectotypes: 1 male, 1 female: “Yun-nan, Chine / Grouvelle / 1906” (white label); “PARALECTOTYPUS / Microdes / sinensis Grouvelle / des. M. A. Jäch” (red label).
**Grouvellinus hercules** Jäch, 1984  
Figures 17–18

*Grouvellinus hercules* Jäch, 1984: 113. TL: Nepal.

**Distribution.** China: Xizang; Nepal.

**Material examined.** 1 male: “Nepal, 35 Km NW Pokhara / Ulleri 2000m / leg. Wewalka 5.5. 1984 (N4)”.

**Grouvellinus tibetanus** Jäch, 1984  
Figures 19–20

*Grouvellinus tibetanus* Jäch, 1984: 114. TL: Nepal.

**Distribution.** China: Xizang; Nepal.

**Material examined.** Paratype: 1 male: “Nepal, 1.3.81. / Tibetan. Gregze /leg. M. A. Jäch, N 31/ Tatopani” (white label); “Para / TYPUS” (red label).

**Grouvellinus carus** Hinton, 1941  
Figures 21–22

*Grouvellinus carus* Hinton, 1941: 71. TL: China, Fujian.

**Distribution.** China: Fujian.

**Remarks.** This species was described by Hinton in 1941, and the type specimens were deposited in Natural History Museum, London. Dr. Maxwell V. L. Barclay (London) provided the habitus photos of the holotype which were taken by Keita Matsumoto (London). According to the photos and the original description, the following differences between the *G. carus* and the two new species are noted: *G. carus* has an oval impression medially on pronotum, surface of head with a few granules, metasternum without two small pits on median suture, and all of ventrites II to V densely pubescent and sparsely granulate, while the two new species are without impressions medially on pronotum, head smooth and shining, without granules, metasternum with two small pits on median suture, and middle regions of ventrites I to IV smooth and shining, without granules, not densely pubescent.

**Concluding remarks**

The focus of this study, is on the species of *Grouvellinus* which occur in mainland China and Taiwan. Ten species including the two new species were examined. Some spec-
Figures 21–22. *G. carus* Hinton, 1941, holotype. 21 habitus, dorsal view 22 lateral view. Photograph by Keita Matsumoto (London).

cies occurring in neighboring countries such as *G. brevior* (Nepal), *G. nitidus* Nomura (Japan), and *G. subopacus* Nomura (Japan) were also examined during the study. Habitus and male genitalia photos of *G. sculptus* Bollow, 1940 (Myanmar) were provided by Dr. Johannes Bergsten (Stockholm). Unfortunately, we were unable to examined *G. carus* Hinton and *G. chinensis* Mařan. The original description of *G. carus* was detailed
Figures 23–28. Male genitalia. 23–25 Grouvellinus orbiculatus sp. n., holotype 26–28 Grouvellinus sagittatus sp. n., holotype 23, 26 in ventral view 24, 27 in dorsal view; 25, 28 in lateral view. Scale bar: 0.2 mm.
and habitus photos were clear, so some differences between *G. carus* and the two new species could be observed. The type specimen of *G. chinensis* was not deposited in the National Museum, Prague, Czech Republic (NMPC) as mentioned in the original publication, so the new species could only be compared with the original description of *G. chinensis*, but the original description was simple, so the main differences observed were the body size and carinae on elytral intervals. The topotype of *G. chinensis* Maran should be collected improving the revision of *Grouvellinus*.

**Acknowledgements**

We wanted to express our gratitude to Dr. Manfred Jäch (Vienna) who gave us the chance to check all the type materials of the genus *Grouvellinus* which were deposited in the Natural History Museum of Vienna, Austria. We also thank Dr. Johannes Bergsten (Stockholm), Dr. Max Barclay (London), and Dr. Martin Fikacek (Prague) for providing photos of type specimens and/or information about type material. This study was supported by the National Natural Science Foundation of China “31201742/ 31572310”.

**References**

Bollow H (1940) Entomological results from the Swedish expedition 1934 to Burma and British India. Coleoptera: Dryopidae, gesammelt von Rene Malaise. Arkiv for Zoologi Stockholm 32A (no. 13), 37 pp.

Brown HP (1981) A distributional survey of the world genera of aquatic Dryopoid Beetle (Coleoptera, Dryopidae, Elmidae, and Psephenidae sens Lat). Pan-Pacific Entomologist 57(1): 133–148.

Champion GC (1923) Some Indian Coleoptera (11). The Entomologist’s Monthly Magazine LIX 3(9): 165–179.

Delève J (1970) *Grouvellinus nepalensis* n. sp. du Nepal (Coleoptera Elminthidae). Berichte des naturwissenschaftlich-medizischen Vereins, Innsbruck 58: 319–322.

Grouvelle A (1906) Nitidulides, Colydiides, Cucujides, Monotomides et Helmides nouveaux. Revue d’Entomologie 1906: 113–126.

Hinton HE (1941) New genera and species of Elmidae (Coleoptera). Transactions of the Royal Entomological Society of London 91: 65–104. doi: 10.1111/j.1365-2311.1941.tb01044.x

Jäch MA (1984) DieGattung *Grouvellinus* im Himalaya und in Sudostasien (Coleoptera, Elmidae). Koleopterologische Rundschau 57: 107–127.

Jäch MA, Kodada J (1995) Elmidae: 1. Check list and bibliography of the Elmidae of China (Coleoptera). In: Jäch MA and Ji L, Water beetles of China. Volume 1. Zoologisch-Botanische Gesellschaft in Osterreich and Wiener Coleopterologenverein, Vienna, Austria, 289–298.

Jäch MA, Kodada J, Brojer M, Shepard W, Ciampor FJr (2016) World catalogue of Insects. Vol. 14. Coleoptera: Elmidae, Protelmidae. Brill, Boston, 318 pp.
Jeng ML, Yang PS (1998) Taxonomic review of the genus *Grouvellinus* Champion (Coleoptera: Elmidae) from Taiwan and Japan. Proceedings of the Entomological Society of Washington 100(3): 526–544.

Jung SW, Jäch MA, Bae YJ (2014) Review of the Korean Elmidae (Coleoptera: Dryopoidea) with descriptions of three new species. Aquatic Insects 36(2): 93–124. doi: 10.1080/01650424.2015.1046457

Mařan J (1939) Noví Palaearktičtí Helminthni. Neue palaarkticti Helminthni. Acta Societatis Entomologicae Bohemiae 36: 40–42.

Nomura S (1963) Notes on Dryopoidea (Coleoptera) IV. Tônô-Gakuhô 13: 41–56, 2 pl.