

## ORIGINAL ARTICLE

# Taxonomy of the genus *Omonadus* Mulsant & Rey (Coleoptera: Anthicidae) from China, with a newly recorded species

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**Abstract** The genus *Omonadus* Mulsant & Rey from China is reviewed, including a newly recorded species, *O. cintomus* (Marseul) and another four species and subspecies: *O. confucii confucii* (Marseul), *O. confucii addendus* (Krekich-Strassoldo), *O. floralis* (Linnaeus) and *O. formicarius formicarius* (Goeze). All species checked are redescribed and illustrated. An identification key for this species from China is presented. The study was based on specimens from the Insect Collection, School of Agriculture, Ningxia University (SANXU) and Institute of Zoology, Chinese Academy of Sciences (IZCAS).

**Key words** *Omonadus*, Anthicinae, newly recorded species, narrow-necked grain beetle.

## 1 Introduction

The genus *Omonadus* Mulsant & Rey, 1866 belongs to the tribe Anthicini of the Anthicidae. The genus includes about 40 species/subspecies (Telnov, 2010a). It was generally catalogued by Chandler *et al.* (2008, 21 species occur in the Palaearctic region). Afterwards, Telnov transferred *O. lateriguttatus* (Marseul) to *Anthicus* Paykull, *O. spinosus* (Pic) to *Clavicollis* Marseul, and revised *O. addendus* (Krekich-Strassoldo) to be a subspecies of *O. confucii* (Marseul) (Telnov, 2010b, 2016). So far, 19 species/subspecies were distributed in the Palearctic Region, of which only 6 species/subspecies were recorded in China.

Members of the genus, such as *O. floralis* (commonly called “narrow-necked grain beetle”), were usually reported as stored grain pests (Zhang *et al.*, 1998). They do not feed directly on grain kernels but mainly on grain residues (Bousquet, 1990). Furthermore, *Omonadus* spp. are not only associated with grain but also with water chestnuts, straw, dried fruit, fungi, dung heaps, compost heaps, river flood-plains and sand-dune beaches (see the overview of Majka, 2011). The genus may also have some forensic significance as it may be collected from decaying carcasses (Sawaby *et al.*, 2016).

Morphological descriptions of *Omonadus* larvae were provided in Rey (1887), Hinton (1945) and Kitayama (1982), while its feeding habits and life cycles were reported in Hinton (1945) and Hemp & Dettner (2003).

## 2 Materials and methods

Specimens were collected by sweep nets or light traps and preserved in absolute ethanol. Male genitalia were examined after being cleared in hot 10% KOH solution. Specimens were examined with a Leica M205A stereomicroscope and

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measured with Leica Application Suite 4.12.0® software. Photographs of specimens were taken using a Leica DMC 4500 digital camera mounted on the stereomicroscope. Images of the same specimen at different focal planes were combined into a fully focused one using HeliconFocus 6.7.1® and edited with Adobe Photoshop CS6® and Macromedia Fireworks 8.0® softwares. Illustrations were made using CorelDRAW X8® software. The measurements and terminology used follow Werner & Chandler (1995) and Chandler (2010), identification used follow Uhmann (1992), Chandler (1995), Pollock & Ivie (1996), Telnov (2008). All redescriptions based on material examined from China. Data of distribution based on the material examined and Chandler *et al.* (2008).

### 3 Taxonomy

#### *Omonadus* Mulsant & Rey, 1866

*Omonadus* Mulsant & Rey, 1866: 104. Type species: *Meloe floralis* Linnaeus, 1758.

*Trapezicolles* Marseul, 1879: 66. Type species: *Meloe floralis* Linnaeus, 1758.

*Hemantus* Casey, 1895: 641, 682. Type species: *Meloe floralis* Linnaeus, 1758.

*Trapezonotus* Sahlberg, 1913: 191. Type species: *Anthicus phoenicius* Truqui, 1855.

**Diagnosis.** Beetles of *Omonadus* have short, appressed setae and very short tactile setae, a microsculptured forebody (usually on the head and pronotum), and spiculum gastrale lacking apical sclerites (Werner & Chandler, 1995).

**Remarks.** The genus *Omonadus* was originally described as a subgenus of *Anthicus* by Mulsant & Rey in 1866 based on *Meloe floralis* Linnaeus, 1758. However, the taxonomic status of *Omonadus* is in debate, and it was treated as either a subgenus of *Anthicus* or an independent genus under Anthicini (Werner & Chandler, 1995). Recent works treated it as an independent genus (Chandler *et al.*, 2008; Chandler, 2010; Wang & Wang, 2014). We follow the treatment here.

#### **Key to the species of the genus *Omonadus* from China (*O. longemaculatus* not included).**

1. With 2 sub-median bumps on apical 1/4 of pronotum; lateral margin of mesosternum strong arched, with fringe of setae on postero-lateral margins..... *O. floralis*  
Without sub-median bumps on pronotum; lateral margin of mesosternum straight, without fringe of setae on postero-lateral margins ..... 2
2. Tegmen slender, expanded apically, apical 1/3 and basal of elytra with distinct orange macula..... 3  
Tegmen tapered distally, more or less finger-shaped apically ..... 4
3. Puncture intervening spaces of head and pronotum not or indistinctly microreticulate ..... *O. confucii addendus*  
Puncture intervening spaces of head and pronotum distinctly and dense microreticulate ..... *O. confucii confucii*
4. Femora and antennae brownish-yellow, tegmen short finger-shaped apically ..... *O. cinctomus*  
Femora and antennae brown, tegmen long finger-shaped apically ..... *O. formicarius formicarius*

#### *Omonadus cinctomus* (Marseul, 1879) (Figs 1–5, 21)

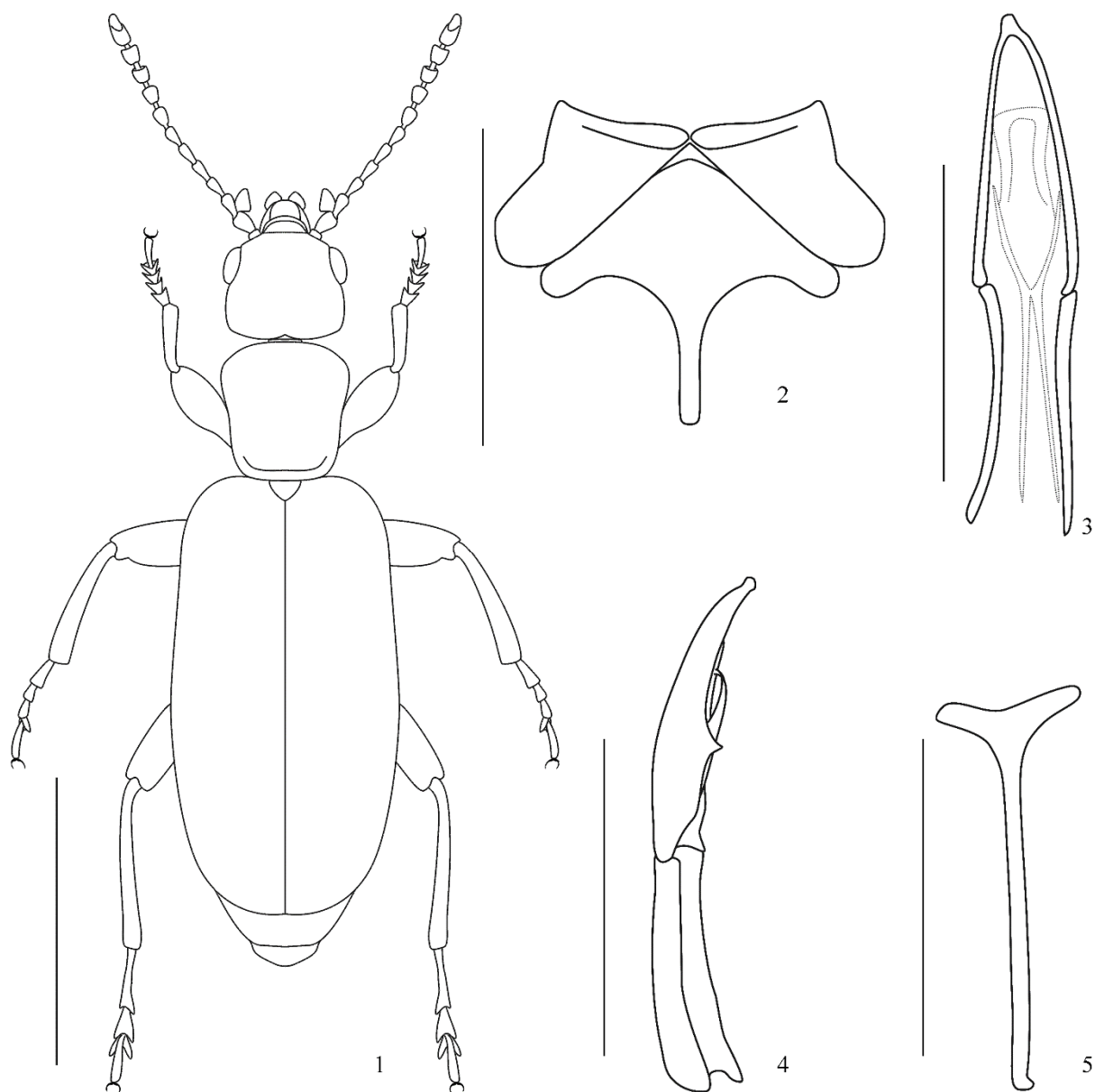
*Anthicus cinctomus* Marseul, 1879: 106.

**Material examined.** 46 ex., Ningxia Province, Pingluo County, Sand Lake Desert Park, 02.IV.2017, Zhangxun Wang (SANXU).

**Distribution.** China (Ningxia), Syria, Saudi Arabia, UAE, Israel, Lebanon.

**Redescription.** Body length 2.5–3.3 mm; head yellowish brown, cordate, base of head widest; temporal angles rounded; posterior margin of head with a broad median indentation; frons with punctures diameter 14.4 µm, less dense in midline; distance between adjacent punctures about 24.4 µm; antennae brownish-yellow, with dense, fine and suberect setae; antennomere XI longest, 1.17 times than antennomere I; antennomere X widest, 1.29 times than antennomeres I; antennomere XI conical asymmetrically, obliquely truncated apically; eyes setae between facets indistinct, length about 2 µm; frontoclypeal sulcus distinct; terminal maxillary palpomere securiform, penultimate palpomere expanded inward. Pronotum yellowish-brown uniformly, subtrapezoidal; pronotal length about 1.15 times the width; widest near the anterior margin of pronotum; lateral margins of pronotum not strongly constricted in dorsal view; diameter of punctures on pronotum about 15.9 µm, distance between adjacent punctures about 26.0 µm; microsculpture on pronotum indistinct. Scutellar subtriangular, rounded apically. Elytra yellowish brown, basal and apical 1/3 with indistinct pale macula; puncture diameter on elytra 14.4 µm, distance between punctures 28.9 µm, well defined on basal and weakly on apical; setae appressed, about 37.7 µm long. Lateral margins of mesosternum slightly straight laterally, without fringe of setae. Hind wings fully developed. Legs yellowish brown, femora clavate (especially front legs), setae of tibiae yellow, dense, suberect; claw simple. Male

genitalia long, length about 4.54 times the width, tegmen tapered distally, apically short finger-shaped.



Figures 1–5. *Omonadus cinctomus* (Marseul, 1879). 1. Habitus, dorsal view. 2. Mesosternum, ventral view. 3. Aedeagus, ventral view. 4. Aedeagus, lateral view. 5. Spiculum gastrale of male. Scale bars: 1 = 1.0 mm; 2–5 = 0.5 mm.

***Omonadus confucii confucii* (Marseul, 1876) (Figs 6–10, 22)**

*Anthicus confucii* Marseul, 1876: 464.

*Anthicus obscuripennis* Pic, 1913: 11.

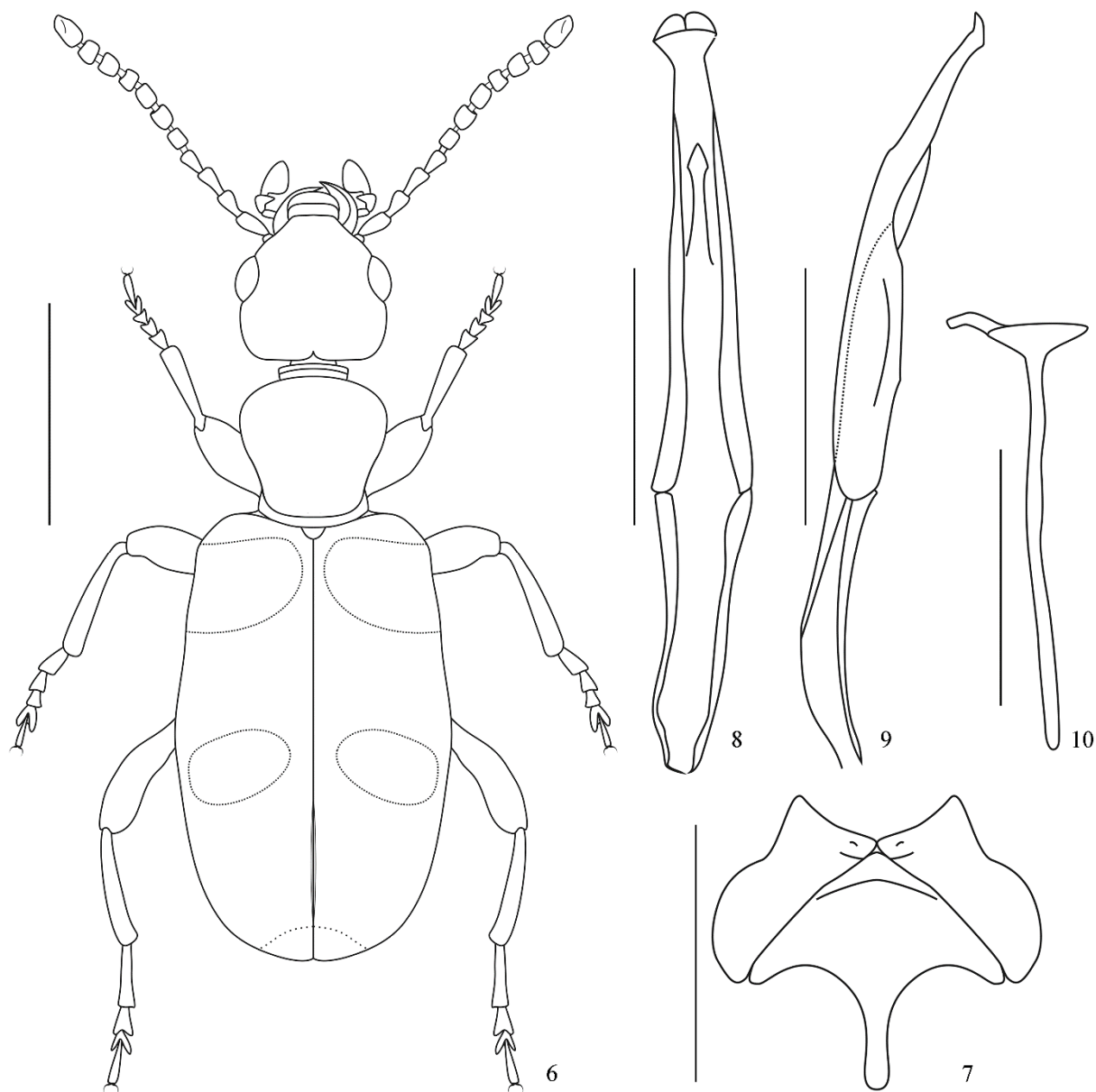
*Anthicus addendus* Krekich-Strassoldo, 1928: 102.

*Anthicus quadraticollis* Yawata, 1944: 1.

Material examined. 1 ex., Beijing City, Fengtai District, 27.VII.2017 (light trap), Yuchen Zhao (SANXU); 4 ex., Shaanxi Province, Baoji City, Qianyang County, 20.XI.2017, Haoliang Ni (SANXU); 2 ex., Fujian Province, Quanzhou City, Fengze District, 25.VII.2018 (light trap), Bing Yang & Yuchen Zhao (SANXU); 13 ex., Beijing City, Miyun District, Baiyunxia, 20.VII.2009 (light trap), Zhe Wang & Xingyi Li (IZCAS); 4 ex., Jiangsu Province, Yancheng City, 13.X.1956 (IZCAS); 4 ex., Beijing City, 13.X.1942 (IZCAS); 1 ex., Shanghai City, 14.VI.1933 (IZCAS); 1 ex., Shanghai City,

13.VI.1932 (IZCAS); 2 ex., Zhejiang Province, Jiaying City, 20.VI.1960 (feed residue) (IZCAS); 5 ex., Inner Mongolia Province, Tongliao City, 18.IX.1959 (kaoliang) (IZCAS); 4 ex., Inner Mongolia Province, 13.VIII.1959 (traditional Chinese medicine) (IZCAS); 1 ex., Henan Province, VI.1959 (granary) (IZCAS); 1 ex., Henan Province, Jiaozuo City, Mengxian, 18.VIII.1956 (wheat), Caixiang Zhang (IZCAS); 1 ex., Guangdong Province, Huizhou City, Huiyang County, 13.VII.1956 (paddy) (IZCAS); 9 ex., Heilongjiang Province, 18.VIII.1958 (maize & kaoliang) (IZCAS); 4 ex., Jilin Province, Yanji City, 15.VII.1959 (bran) (IZCAS); 7 ex., Shanxi Province, Jinzhong city, 17.VIII.1959 (bran) (IZCAS); 5 ex., Gansu Province, Lanzhou city, 24.VII.1959 (distillers' grains) (IZCAS); 1 ex., Beijing city, Xiangshan, 13.VII.1962, Shuyong Wang (IZCAS).

Redescription. Body length 3.0–3.2 mm; head brownish-black, cordate, widest at posterior margin of eyes; temporal angles rounded; posterior margin of head with a broad median indentation; frons with punctures diameter  $15.7\mu\text{m}$ , less dense in midline; distance between adjacent punctures about  $32.4\mu\text{m}$ ; antennae brown, lighter on the base; antennae with dense, fine and suberect setae; antennomere XI longest, 1.06 times than antennomere I; antennomere X widest, 1.35 times than antennomere I; antennomere XI conical asymmetrically, obliquely truncated apically; eyes with visible setae between facets, length about  $5\mu\text{m}$ ; frontoclypeal sulcus distinct; terminal maxillary palpomere securiform, penultimate palpomere expanded



Figures 6–10. *Omonadus confucii confucii* (Marseul, 1876). 6. Habitus, dorsal view. 7. Mesosternum, ventral view. 8. Aedeagus, ventral view. 9. Aedeagus, lateral view. 10. Spiculum gastrale of male. Scale bars: 6=1.0 mm. 7–10=0.5 mm.

inward. Pronotum subtrapezoidal, blackish-brown to orange, darker on apex; pronotal length about 1.3 times more than width; apical 1/3 widest; lateral margins of pronotum without strongly constricted in dorsal view; diameter of punctures on pronotum same to these on head, denser than head; microsculpture on head and pronotum distinct. Scutellar subtriangular, rounded apically. Elytra blackish-brown to black, lighter on apex, apical 1/3 and basal of elytra with distinct orange macula; puncture diameter on elytra 20.6  $\mu\text{m}$ , distance between puncture greater than the distance on head and pronotum about 42.9  $\mu\text{m}$ , well defined on omoplates and weakly on apical; setae appressed, about 42.4  $\mu\text{m}$ . Lateral margins of mesosternum slightly straight laterally, without fringe of setae. Hind wings fully developed. Femora, brown, clavate (especially front legs), tibiae yellow with dense and suberect setae; claw simple. Male genitalia long, length about 7.44 times greater than width, tegmen tapered distally, expanded apically.

Distribution. China (Heilongjiang, Jilin, Liaoning, Inner Mongolia, Beijing, Hebei, Shanxi, Henan, Shaanxi, Gansu, Shanghai, Jiangsu, Zhejiang, Fujian, Taiwan, Guangdong), Russia, Korea, Japan, Thailand, Vietnam, Philippines.

***Omonadus confucii addendus* (Krekich-Strassoldo, 1928)**

*Anthicus addendus* Krekich-Strassoldo, 1928: 102.

Material examined. 2 ex., Yunnan Province, Ruili City, 5.VII.1958 (paddy) (IZCAS).

Distribution. China (Yunnan), Myanmar, Nepal, India, Afghanistan.

Remarks. This subspecies has a similar appearance as *O. c. confucii*, but the punctures intervening the spaces of the head and pronotum are absent or indistinctly microreticulate (Telnov, 2016).

***Omonadus floralis* (Linnaeus, 1758)** (Figs 11–15, 23)

*Meloe floralis* Linnaeus, 1758: 420.

*Meloe pedicularius* Schrank, 1781: 224.

*Anthicus basalis* Villa & Villa, 1838: 63.

*Cantharis formicoides* Geoffroy, 1785: 156.

*Lytta fuscus* Marsham, 1802: 486.

*Anthicus semirufus* Fairmaire & Germain, 1860: 3.

*Anthicus fallax* Broun, 1893: 1168.

*Notoxus calycinus* Panzer, 1792: 3.

*Notoxus formicarius* Olivier, 1795: 51.

*Anthicus breviculus* Philippi, 1864: 353.

*Lytta fusca* Marsham, 1802: 485.

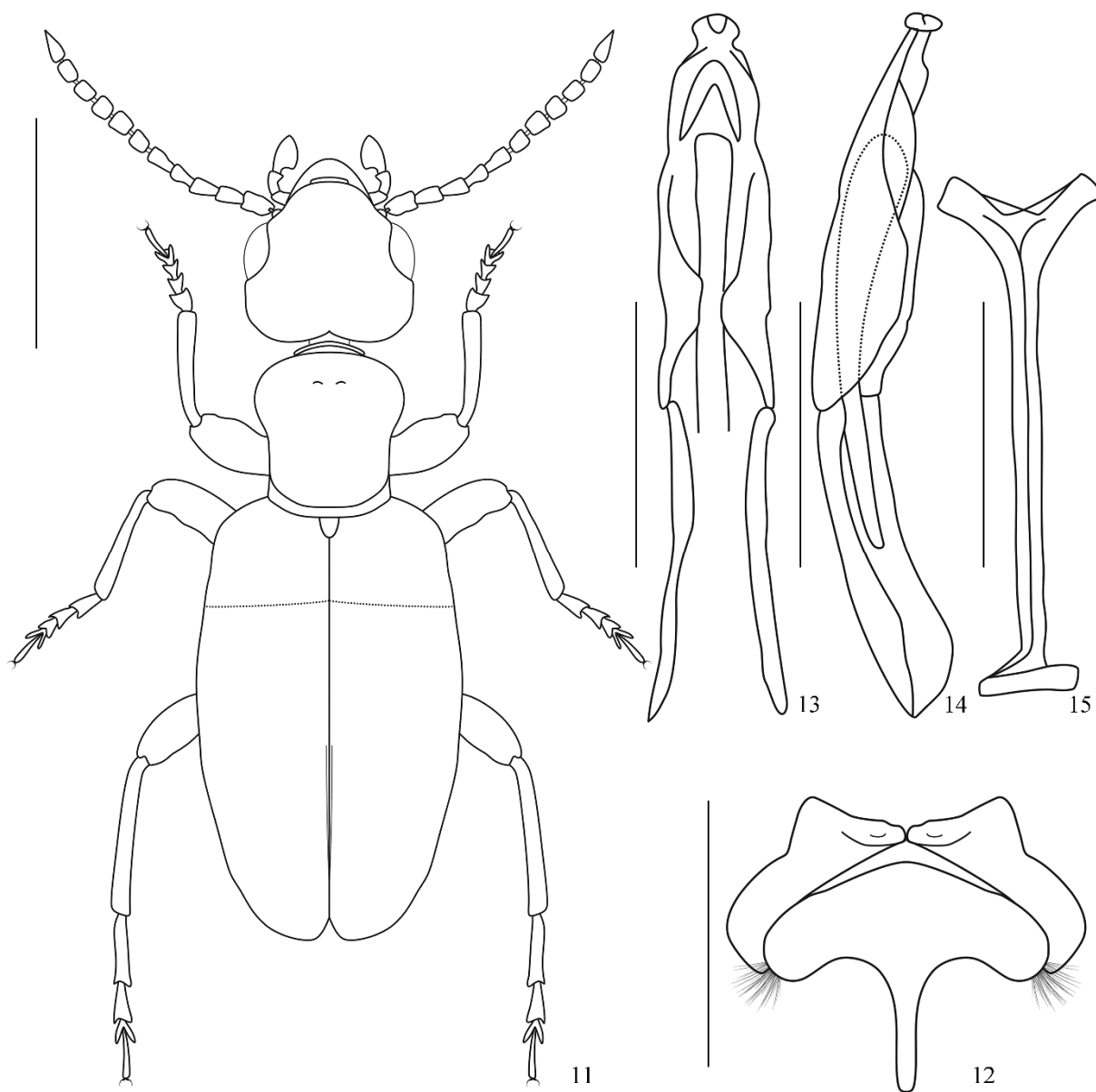
*Anthicus basillaris* Say, 1824: 279.

Material examined. 9 ex., Ningxia Province, Lingwu City, Langpiziliang Development Zone, 14.VII.2017, Yuchen Zhao, Yunchuan He & Hui Wang (light trap) (SANXU); 2 ex., Ningxia Province, Wuzhong City, 04.VI.2018, Yuchen Zhao & Shuai Wang (light trap) (SANXU); 1 ex., Ningxia Province, Wuzhong City, 12.VI.2018, Bing Yang & Yuchen Zhao (light trap) (SANXU); 8 ex., Xinjiang Province, Changji City, Hutubi, 10.VII.1959 (ragi); 11 ex., Xinjiang Province, Yili City, Huocheng County, 09.VII.1959 (rice bran) (IZCAS).

Distribution. China (Ningxia, Xinjiang, Hunan, Sichuan). Cosmopolitan distribute.

Redescription. Body length 3.1–3.4 mm; head brownish black, cordate, widest at posterior margin of eyes; temporal angles rounded; posterior margin of head with a broad median indentation; frons with punctures diameter 12.9  $\mu\text{m}$ , less dense in midline; distance between adjacent punctures about 32.6  $\mu\text{m}$ ; antennae brown, darker on apex; antennae with dense, fine and suberect setae; antennomere XI longest, 1.23 times more than antennomere I; antennoomere X widest, 1.18 times more than antennomere I; antennoomere XI conical asymmetrically, obliquely truncated apically; eyes setae between facets indistinct; frontoclypeal sulcus distinct; Terminal maxillary palpomere securiform, penultimate palpomere expanded inward. Pronotum subtrapezoidal, yellowish-brown; pronotal length about 1.2 times more than width; apical 1/4 widest, with 2 bumps on the median; lateral margins of pronotum without strongly constricted in dorsal view; diameter of punctures on pronotum about 13.4  $\mu\text{m}$ , distance between adjacent punctures about 25.9  $\mu\text{m}$ ; microsculpture on head and pronotum distinct. Scutellar subtriangular, rounded apically. Elytra blackish-brown to black, basal of elytra with yellowish brown; puncture diameter on elytra 15.6  $\mu\text{m}$ , distance between puncture greater than the distance on head and pronotum about 29.3  $\mu\text{m}$ , well defined on omoplates and weakly on apical; setae appressed, about 33.5  $\mu\text{m}$ , tactile setae erect, sparsed. Lateral margins of mesosternum broadly and semicircularly expand laterally, with fringe of setae 42.1  $\mu\text{m}$ . Hind wings fully developed. Femora, brown, clavate (especially front legs); tibiae yellowish brown, with dense and suberect setae; claw simple. Male genitalia long, length about 6.64 times greater than width, tegmen with lateral margin paralleled, apical 1/3 shallowly constricted,

expanded apically.



Figures 11–15. *Omonadus floralis* (Linnaeus, 1758). 11. Habitus, dorsal view. 12. Mesosternum, ventral view. 13. Aedeagus, ventral view. 14. Aedeagus, lateral view. 15. Spiculum gastrale of male. Scale bars: 11 = 1.0 mm. 12–15 = 0.5 mm.

***Omonadus formicarius formicarius* (Goeze, 1777) (Figs 16–20, 24)**

*Meloe formicarius* Goeze, 1777: 706.

*Anthicus semirufus* Fairmaire, 1896: 49.

*Anthicus quisquilius* Thomson, 1864: 360.

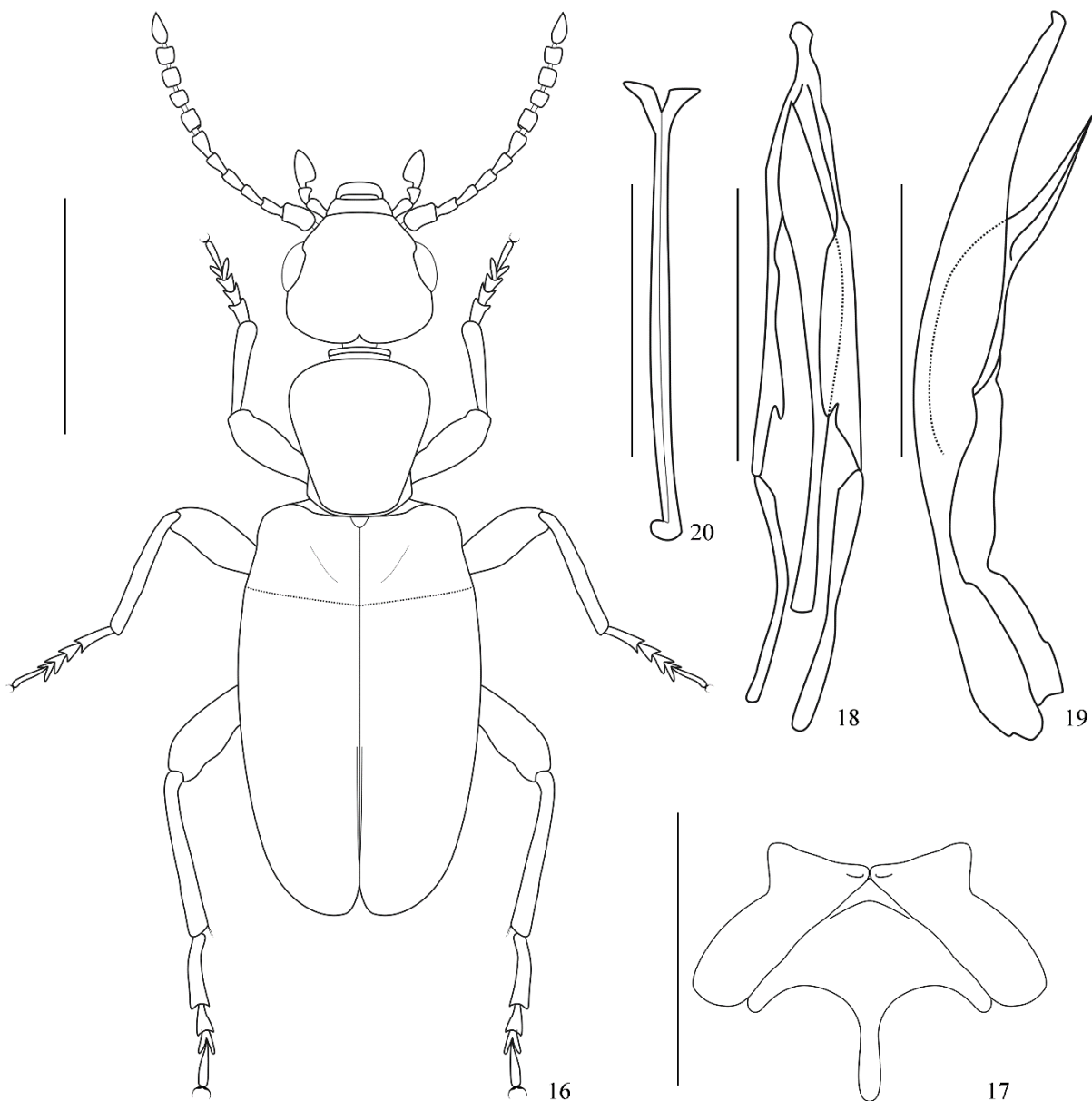
*Hemantus enodis* Casey, 1895: 684.

*Hemantus scenicus* Casey, 1895: 685.

*Anthicus picianus* Koch, 1931: 75.

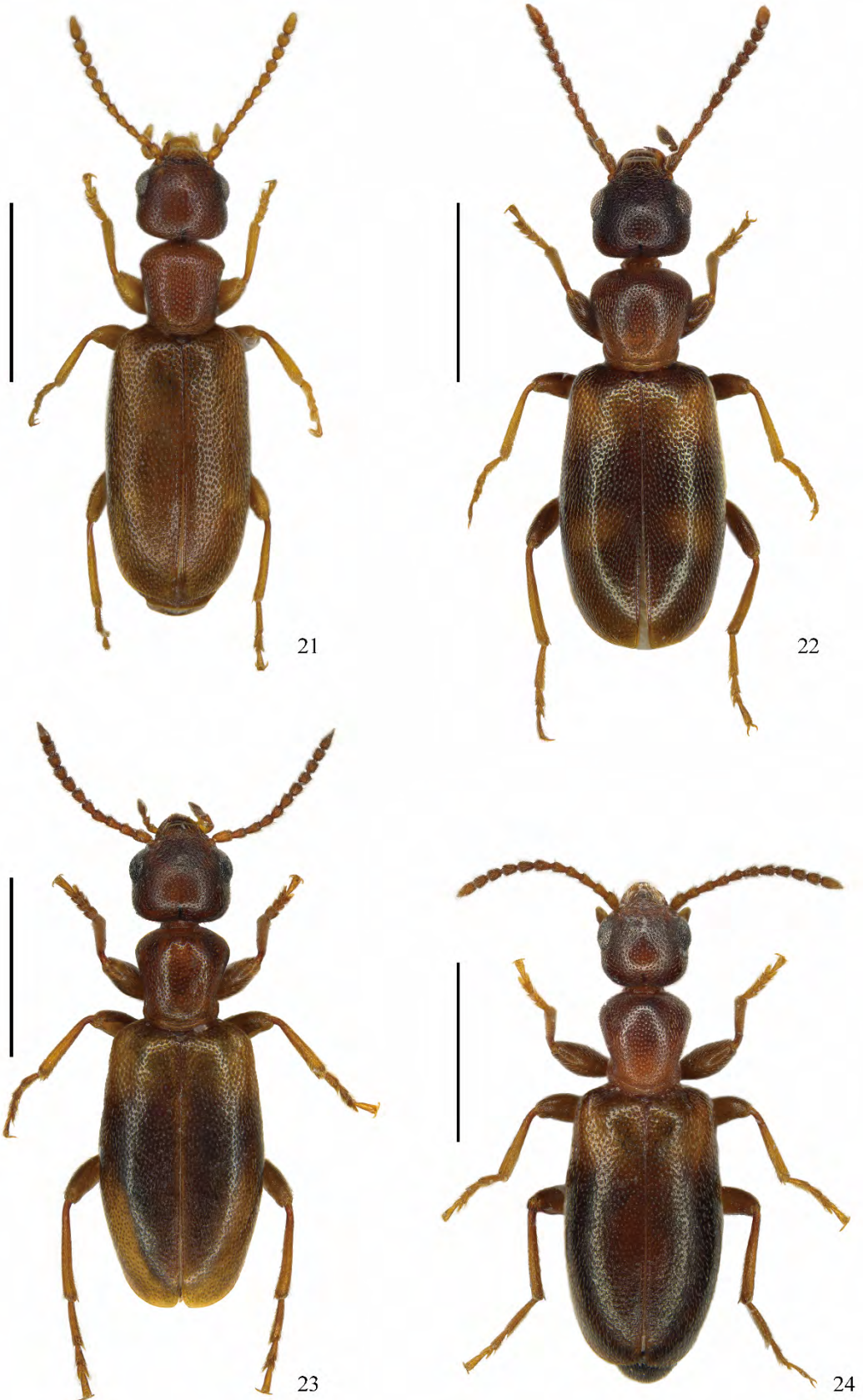
Material examined. 1 ex., Ningxia Province, Yinchuan City, Helan County, 03.VII.2014, Xipu Wang & Zhangxun Wang (SANXU); 1 ex., Sichuan Province, Ganzi City, Xiangcheng County, 04.VIII.2014, Zhangxun Wang & Yongqian Zhang (SANXU); 24 ex., Ningxia Province, Lingwu city, Langpiziliang Development Zone, 14.VII.2017 (light trap), Yuchen Zhao, Yunchuan He & Hui Wang (SANXU); 2 ex., Ningxia Province, Wuzhong city, Hongsipu, 14.VIII.2017, Yuchen Zhao

(SANXU); 1 ex., Ningxia Province, Yinchuan City, Xixia District, 08.X.2017, Yunchuan He (SANXU); 4 ex., Shanxi Province, Linfen City, Dahe County, 23.VII.2013, Haitian Song (SANXU); 1 ex., Hainan Province, Chengmai City, Yongfa Town, 15.VI.1957 (under the bark of firewood) (IZCAS); 1 ex., Heilongjiang Province, Harbin City, 17.V.1952; 1 ex., Hainan Province, Lingshui County, 06.VI.1957 (rice barn) (IZCAS); 1 ex., Jiangxi Province, Nanchang City, 26.XI.1957 (rice barn) (IZCAS); 3 ex., Xinjiang Province, Hutubi, 10.VII.1959 (ragi) (IZCAS); 5 ex., Xinjiang Province, Yili City, Suiding County, 09.VII.1959 (rice bran) (IZCAS); 5 ex., Xinjiang Province, Yili City, 11.VII.1959 (beef extract) (IZCAS); 8 ex., Xinjiang Province, Hami City, 25.VII.1959 (distillers' grains) (IZCAS); 5 ex., Xinjiang Province, Korla City, 26.VI.1959 (distillers' grains) (IZCAS); 1 ex., Yunnan Province, Xishuangbanna City, Menghai County, 25.VIII.1958 (IZCAS); 2 ex., Xinjiang Province, Shule County, 13.VI.1959 (seedcake) (IZCAS); 1 ex., Yunnan Province, Xishuangbanna City, 09.IX.1958 (IZCAS); 11 ex., Xinjiang Province, Hetian City, 05.VI.1959 (distillers' grains) (IZCAS); 3 ex., Xinjiang Province, Hetian City, Pishan County, 08.VI.1959 (seedcake) (IZCAS); 1 ex., Xinjiang Province, Kashi City, Shache County, 13.VI.1959 (distillers' grains) (IZCAS); 3 ex., Guangdong Province, Zhongshan City, 17.IX.1957 (paddy), Guangsheng Ou (IZCAS).



Figures 16–20. *Omonadus formicarius formicarius* (Goeze, 1777). 16. Habitus, dorsal view. 17. Mesosternum, ventral view. 18. Aedeagus, ventral view. 19. Aedeagus, lateral view. 20. Spiculum gastrale of male. Scale bars: 16=1.0 mm. 17–20=0.5 mm.





Figures 21–24. *Omonadus* spp., habitus, dorsal view. 21. *O. cinctomus*. 22. *O. confucii confucii*. 23. *O. floralis*. 24. *O. formicarius formicarius*. Scale bar = 1.0 mm.



Distribution. China (Heilongjiang, Shanxi, Ningxia, Sichuan, Xinjiang, Jiangxi, Fujian, Taiwan, Guangdong, Hainan, Yunnan). Cosmopolitan distribute.

Redescription. Body length 2.7–3.3 mm; head brownish black, cordate, widest at posterior margin of eyes; temporal angles rounded; posterior margin of head with a broad median indentation; frons with punctures diameter 13.1  $\mu\text{m}$ , less dense in midline; distance between adjacent punctures about 28.4  $\mu\text{m}$ ; antennae yellowish brown, darker on apex; antennae with dense, fine and suberect setae; antennomere XI longest, 1.10 times greater than antennomeres I; anthenomere X widest, 1.08 times greater than antennomere I; eyes setae between facets indistinct; frontoclypeal sulcus distinct; terminal maxillary palpomere securiform, penultimate palpomere expanded inward. Pronotum subtrapezoidal, yellowish-brown, orange base; pronotal length about 1.2 times greater than width; widest nearly anterior margin of pronotum, lacking bumps on pronotum; diameter of punctures on pronotum about 13.1  $\mu\text{m}$ , distance between adjacent punctures about 25.1  $\mu\text{m}$ ; microsculpture more distinct on later side. Scutellar subtriangular, rounded apically. Elytra blackish-brown to black, basal of elytra with yellowish brown; puncture diameter on elytra 15.9  $\mu\text{m}$ , distance between punctures greater than those on the head and pronotum (about 35.5  $\mu\text{m}$ ), well defined on omoplates and weakly on apical; setae appressed, about 38.4  $\mu\text{m}$ , tactile setae erect, sparsed. Lateral margins of mesosternum straight laterally. Hind wings fully developed. Femora, brown, clavate (especially front legs); tibiae yellowish brown, with dense and suberect setae; claw simple. Male genitalia long, length about 6.43 times greater than width, tegmen tapered distally, long finger-shaped.

### *Omonadus longemaculatus* (Pic, 1938)

*Anthicus longemaculatus* Pic, 1938: 18.

*Anthicus bifenestratus* Pic, 1938: 19.

*Anthicus gardneri* Heberdey, 1938: 163.

Distribution. China (Hebei, Xinjiang, Fujian, Jiangsu, Yunnan), Nepal, India, Pakistan.

Remarks. No specimen examined.

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