

## A review of the genus *Tetragonoderus* Dejean (Coleoptera: Carabidae: Cyclosomini) in China

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### ABSTRACT

Based on adult structural features, Chinese species of the genus *Tetragonoderus* Dejean are taxonomically treated. Four species are recognized in total. Of these, *T. microthorax* sp. n. (type locality: Jinghong, Yunnan Province, China) is described and illustrated. Two species, *T. rhombophorus* Schmidt-Göbel and *T. fimbriatus* (Bates), are newly recorded from China. *Tetragonoderus quadrisignatus* (Quens) which was originally known in Hongkong is reported from Guangdong and Hainan Provinces for the first time. A key to Chinese species of the genus is also provided.

*Key words:* Coleoptera, Carabidae, *Tetragonoderus*, new species, new records, China.

### INTRODUCTION

Members of *Tetragonoderus* Dejean, 1829 are found in Ethiopian, Neotropical, Palaearctic, Nearctic and Oriental regions. Three subgenera are recognized in the genus *Tetragonoderus*. The subgenus *Tetragonoderus* Dejean is the most diverse subgenus and is composed of 59 species in the world (Lorenz, 2005), among them 25 species from Africa, 21 from Neotropical region, 4 from Palaearctic region, and 2 from Nearctic region. Sixteen Oriental species are reported in China, India, Pakistan, Bangladesh, Nepal, Sri Lanka, Laos and Indonesia. The subgenera *Crossonychus* Chaudoir and *Peronoscelis* Chaudoir are reported in Nearctic and Neotropical regions only (Wiedmann, 1823; Dejean, 1829; Schmidt-Göbel, 1846; Bates, 1886; Andrewes, 1923; Csiki, 1932; Jeannel, 1949; Jedlička, 1963; Putschkov *et al*, 2003; Lorenz, 2005).

Previously, only one species, *T. quadrisignatus* (Quens), was known from Hong kong, China. When sorting specimens of *Tetragonoderus* in the Insect Collection of South China Agricultural University, we found one new species and two described species which had not been recorded from China. The four Chinese species are members of the nominated subgenus *Tetragonoderus* Dejean.

### MATERIALS AND METHODS

Dissection of specimens was made following the technique described by Lindroth (1974). Genitalia and other small structures were glued on small paper cards and

pinned beneath the specimen from which they were removed. Length of body was measured directly from the anterior edge of the labrum to apical margin of the elytra and the width of the body is the widest distance across the elytra.

All specimens of *Tetragonoderus* for this study are deposited in the Insect Collection of South China Agricultural University, Guangzhou (SCAU).

### Genus: *Tetragonoderus* Dejean

Dejean, 1829: 485; Schmidt-Göbel, 1846: 92; Bedel, 1905: 230; Jakbson, 1907: 391; Csiki, 1932: 1296; Jedlička, 1963: 291.

Type species: *Carabus quadrum* Fabricius, 1792.

**Generic characteristics.** The diagnostic combined features of *Tetragonoderus* are the following: habitus ovate, surface glabrous; head transverse, eyes large and semi-globate, with two pairs of supraorbital setae along eyes, posterior supraorbital seta on the level of posterior margin of eyes; antennae slender and filiform, reaching basal margin of elytra, pubescent from apical part of antennomere 4, antennomere 1 the stoutest, antennomere 2 short, antennomeres 3-11 equal in length, antennomeres 1-11 longer than wide; mouthparts, labrum short and wide, six-setose at apex; clypeus slightly emarginate, bisetose; mandibles short, right mandible markedly toothed internally, mandibular scrobal asetose; maxillary palpomere 3 oblong, labial palpomere 2 bisetose; mentum distinct, tooth of mentum sharp and emarginate at apex; ligula bisetose at apex, paraglossae well developed, with fine setae; pronotum transverse; narrower towards base, basal angle obtuse; lateral margin with two long setae; prosternal process quite sharp; elytra oblong and convex, base well bordered, truncate at apex; intervals deep, punctate-striate, scutellary stria distinct; legs slender; hind tibial spur very long, almost as long as tarsomere 1; tarsi slender, hind tarsomere 4 simple; claws simple. Fore tarsomeres 1-3 and middle tarsomeres 2-4 of male adult dilated; gonoxite 1 distinctly wider than gonoxite 2, gonoxite 2 longer than wide, asetose (Fig. 11).

### Key to Chinese species of *Tetragonoderus*

- 1 Elytra with two pairs of yellowish spots..... *T. quadrisignatus* (Quens)
- Elytral patches more or less fasciate.....2
- 2 Pronotum burnished bronze, basal part narrower than apical one ..... 3
- Pronotum yellow, basal part not narrower than apical one.....
- ..... *T. rhombophorus* Schmidt-Göbel
- 3 Basal foveae of pronotum deeper and round, lateral margin of pronotum narrower towards basal part and slightly sinuate at basal angle .....
- ..... *T. microthorax*, **n. sp.**
- Basal foveae of pronotum shallower, lateral margin of pronotum narrower towards basal part ..... *T. fimbriatus* (Bates)

***Tetragonoderus quadrisignatus* (Quens, 1806)** (Figs. 1, 9-10)

*Carabus quadrisignatus* Quens, 1806: 212.

*Tetragonoderus quadrisignatus* (Quens): Dejean, 1829: 491; Chaudoir, 1876: 41; Csiki, 1932: 1295; Jedlička, 1963: 292; Chen *et al*, 2002: 45; Lorenz, 2005: 450.

Length: 7.8-8.3 mm, width: 2.9-3.1 mm.

**Description.** Head, pronotum and elytra dark brown, shiny bronze, while basal part of antennomeres 1-4, labial palpi, maxillary palpomeres 1-2, and fore and middle tibiae yellow. Elytra with two pairs of yellow spots, anterior one across intervals 4-7, and posterior one on intervals 5-8.

Head convex and smooth; labrum a little concave; labial palpomere 2 the shortest, 0.75 times as long as palpomeres 1 and 3, palpomeres 1 and 3 equal in length, palpomere 3 fusiform, apical part flat; maxillary palpomere 2 the shortest, 0.75 times as long as palpomeres 1 and 3, palpomeres 1, 3 and 4 equal in length.

Pronotum transverse; 1.25 times as wide as head, 0.67 times as long as wide, widest at a third from apical margin; fore angle round, hind angle sharp; fore and hind margins not bordered, lateral margins beaded throughout, anterior seta at about a third from the apex of lateral marginal bead, posterior one on basal angle; basal foveae deep; several fine wrinkles at middle of base; median line distinct.

Elytra moderately convex, elongate oval, slightly wider than pronotum, 2 times as long as wide; bordered at base, humerus rounded; striae deep, intervals slightly convex, two setiferous pores on interval 3, close to stria 3, at about half and 0.66 times from base, respectively; apex of elytra obliquely truncate (Fig. 1).

Microsculpture mesh pattern isodiametric on head, pronotum and elytra.

Male genitalia (Figs. 9-10). The median lobe of aedeagus stout, slightly curved at about a fourth from basal part; apical part stout in dorsal aspect; the apical portion a little contracted near apex, rather short and broad at apex, wider than long.

**Remarks.** This species can be easily separated from other Chinese species by its elytra with two pairs of yellowish spots.

**Distribution:** China (Hainan, Guangdong and Hong Kong), Cambodia, Thailand and India.

**Material examined:** Guangdong Province (Zhanjiang), V.1982, 1 male; *ibid*, VI.1982, 1 male; *ibid*, VIII.1982, 1 male, 3 females; *ibid*, IV.1983, 6 female; *ibid*, IV.1983, 1 female; Hainan Province (Ledong, Jianfengling), 26.X.1982, 1 male; *ibid*, 15. XI.1982, 1 female; *ibid*, 15.V.1982, 1 female; *ibid*, 26.XI.1982, 1 male; *ibid*, 16.VII.1982, 4 females; *ibid*, 20.IX.1982, 1 male; *ibid*, 20.IV.1982, 1 male, 1 female; *ibid*, 16.IX.1982, 2 males; *ibid*, 12.IX.1982, 1 female; *ibid*, 30.X.1982, 1 female; *ibid*, 26.V.1982, 1 male; *ibid*, 10.X.1982, 1 male; *ibid*, II.1982, 1 male; *ibid*, 12.IX.1982, 1 female, Coll. Pei-Zhen Chen; Guangdong Province (Guangzhou), VIII.1979, 2 females; Guangdong Province (Xinfeng), 2.V.1984, 1 female, Coll. Min-Lian Huang; *ibid*, IV.1983, 2 females, Coll. Min-Lian Huang; Hainan Province (Danzhou), 2.IX.1982, 1 male.

***Tetragonoderus rhombophorus* Schmidt-Göbel, 1846** (Figs. 4, 5-6)

*Tetragonoderus rhombophorus* Schmidt-Göbel, 1846: 93; Chaudoir, 1876: 48; Csiki, 1932: 1295; Jedlička, 1963: 292; Lorenz, 2005: 450.

Length: 4.7-5.8 mm, width: 2.2-2.5 mm.

**Description.** Pronotum, legs and antennae yellow; elytra ferruginous; head, elytral markings and pores on lateral margin of elytra black or dark brown. Elytral patches pattern as in Fig. 4; the median markings largest, crossing from interval 1 to interval 5, airplane-liked, other markings smaller and around the median one.

Head a little convex and smooth; labrum slightly concave; labial palpomere 2 the shortest, 0.75 times as long as palpomeres 1 and 3, palpomeres 1 and 3 equal in length, palpomere 3 fusiform, apical part flat; maxillary palpomere 2 the shortest, 0.75 times as long as palpomeres 1 and 3, palpomeres 1, 3 and 4 equal in length.

Pronotum slightly convex; 2 times as wide as head, 0.6 times as long as wide, widest at a third from apical margin; both fore and hind angle round; lateral marginal bead moderately wide and apical sides rounded, lateral marginal bead widest at a fourth from apex, slightly sinuate near hind angle, anterior seta of lateral marginal bead at about a third from apex, posterior one on basal angle; basal foveae flat and round; median line fine.

Elytra slightly convex, elongate oval, 1.25 times as wide as pronotum, 2 times as long as wide; bordered at base, humerus rounded; striae deep, intervals slightly convex, interval 7 a little wider than others, interval 1 gradually narrower towards apex, other intervals subequal in wide; interval 3 with three setiferous pores, two close to stria 3, at about a third and half from base, respectively, and one close to stria 2, at about a fourth from apex; apex of elytra truncate and faintly sinuate on each side; pores of marginal series fourteen in number. (Fig. 4)

Microsculpture mesh pattern isodiametric on head and pronotum; moderately transverse on elytra.

Male genitalia (Figs. 5-6). The median lobe of aedeagus slender and relatively curved in the middle; the apical portion dilated and wider than long.

**Remarks.** This species can be easily distinguished from the other Chinese species of the genus by its yellow pronotum.

**Distribution:** China (Hainan), Cambodia and Laos. This species is recorded from China for the first time.

**Material examined:** Hainan Province (Ledong, Jianfengling), 25.IV.1982, 12 males, 7 females; *ibid*, 10.X.1982, 1 male, 8 females; *ibid*, 30.X.1982, 2 males; *ibid*, 5.XI.1982, 16 males, 9 females; *ibid*, XI.1984, 2 females; *ibid*, 26. X.1982, 3 males, 5 females; *ibid*, II.1982, 1 male, 2 females; *ibid*, 26.XI. 1982, 1 male; *ibid*, 20.IV.1982, 3 males, 4 females; *ibid*, 26.V.1982, 2 males, 1 female; *ibid*, 22.XI.1982, 2 males, 5 females; *ibid*, 20.IX.1982, 2 males, 3 females; *ibid*, 5.IV.1982, 2 males, 3 females; *ibid*, 28.X.1982, 4 males, 3 females; *ibid*, 15.XI.1982, 1 male; *ibid*, 25.III.1982, 3 males; *ibid*, 31.V.1982, 1 female; *ibid*, VI.5.1982, 1 female.

### ***Tetragonoderus microthorax*, new species** (Figs. 3, 7-8)

**Holotype.** Male, Yunnan Province (Jinghong), X.1984, [SCAU]. **Paratypes.** 2 females, Hainan Province (Sanya), XI.1984, [SCAU]; Yunnan Province (Jinghong), X.1984, [SCAU].

Length: 4.7-4.8 mm, width: 2.1-2.4 mm.

**Description.** Head, pronotum and basal part of elytra burnished bronze; elytra flavous; palpi, antennae and legs ferruginous. Elytra with an irregular light brown fascia, the fascia edged with black.

Head slightly convex, shiny and smooth; labrum slightly concave; labial palpomere 2 the shortest, 0.75 times as long as palpomeres 1 and 3, palpomeres 1 and 3 equal in length, palpomere 3 fusiform, apical part flat; maxillary palpomere 2 the shortest, 0.75 times as long as palpomeres 1 and 3, palpomeres 1, 3 and 4 equal in length.

Pronotum slightly convex, trapezoid; almost as wide as head, and as long as wide, widest and subangulate at a fifth from apical margin; narrowly bordered towards apex and slightly sinuate at basal angle; fore angle and hind angle sharp; lateral marginal bead narrow, anterior seta of lateral marginal bead at about a fourth from apex, posterior one on basal angle; basal foveae deep; median line fine; conspicuously longitudinal wrinkles at middle of base; prosternal process scutiform, without seta.

Elytra convex, ovate, 1.4 times as wide as pronotum, 2.2 times as long as wide; fairly emarginate and bordered at base, humerus rounded; striae deep, intervals slightly convex, subequal in width; two setiferous pores on interval 3, close to stria 3, at about a third and two thirds from base, respectively; apex of elytra obliquely truncate and sub-sinuate on each side, both apical angles round; pores of marginal series twelve in number (Fig. 3).

Microsculpture mesh pattern isodiametric on head and pronotum, and moderately transverse on elytra.

Male genitalia (Figs. 7-8). The median lobe of aedeagus slender and strongly curved in middle; the apical portion sharp and emarginate at apex in profile.

**Etymology.** The new taxon is named in reference to its small pronotum.

**Remarks.** This species is similar to *T. fimbriatus* Bates, but can be easily separated from the latter by: basal foveae of pronotum deeper and round, lateral bead narrower and slightly sinuate at basal angle; and the apical portion of aedeagus emarginated at apex.

**Distribution:** China (Hainan and Yunnan).

### ***Tetragonoderus fimbriatus* Bates, 1886** (Figs. 2, 11)

*Tetragonoderus fimbriatus* Bates, 1886: 202; Csiki, 1932: 1297; Jedlička, 1963: 292; Lorenz, 2005: 450.

*Tetragonoderus punctatus* Schmidt-Göbel, 1846: 92; Andrewes, 1923: 54.

Length: 4.9 mm, width: 2.4 mm.

**Description.** Head, pronotum and basal part of elytra burnished bronze; elytra flavous; palpi, antennae and legs ferruginous. Elytra with an irregular brown fascia, the fascia edged with black, a serrated black marking subapically. (Fig. 2)

Head a little convex, shiny and smooth; labrum slightly concave; labial palpomere 2 the shortest, half as long as palpomeres 1 and 3, palpomeres 1 and 3 equal in length, palpomere 3 fusiform, apical part flat; maxillary palpomere 2 the shortest, half as long as palpomeres 1 and 3, palpomeres 1, 3 and 4 equal in length, maxillary palpomere 2 with two short setae; ligula with two short fine setae at apex.

Pronotum slightly convex, quadrangle; 1.2 times as wide as head, and as long as wide, widest at a fifth from apex, narrowly bordered towards apex and slightly sinuate

at basal angle; fore angle round and hind angle fairly sharp; lateral marginal bead narrow, anterior seta of lateral marginal bead at about a fourth from apex, posterior one on basal angle; basal foveae deep; median line fine; conspicuously longitudinal and latitudinal wrinkles at middle of base; prosternal process scutiform, without seta.

Elytra convex, ovate, 1.5 times as wide as pronotum, 1.33 times as long as wide; strongly emarginate and bordered at base, humerus rounded; striae deep, intervals slightly convex, subequal in wide; two setiferous pores on interval 3, one close to stria 2, at about a fourth from apex, another close to stria 3, near the black marking, at about a third from base; apex of elytra truncate and faintly sinuate on each side, both apical angles round; pores of marginal series twelve in number (Fig. 2).

Microsculpture mesh pattern isodiametric on head and pronotum, transverse on elytra.

Male genitalia. Unknown.

**Remarks.** This species can be separated from the others of the genus in China by: pronotum quadrangle, burnished bronze, and shiny.

**Distribution:** China (Hainan), Cambodia, India and Sri Lanka. This species is recorded from China for the first time.

**Material examined:** Hainan Province (Ledong, Jianfengling), II.1982, 1 female; *ibid*, 28.X.1982, 1 female.

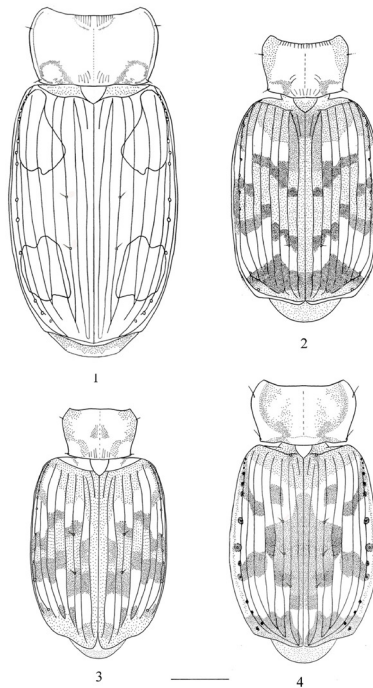
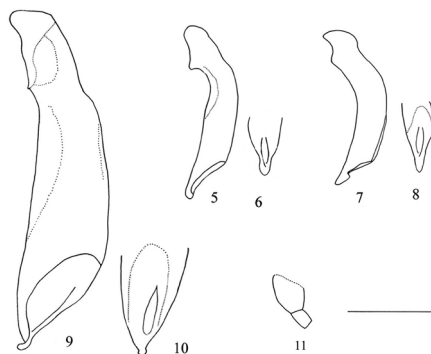


Fig. 1. *T. quadrisignatus*. dorsal view; Fig. 2. *T. fimbriatus*. dorsal view; Fig. 3. *T. microthorax*. dorsal view; Fig. 4. *T. rhombophorus*. dorsal view. (scale bar = 1.0 mm)



Figs 5-11. 5-6. *T. rhombophorus*. 5) aedeagus, lateral view ; 6) aedeagus, dorsal view ; Figs, 7-8. *T. microthorax*. 7) aedeagus, lateral view ; 8) aedeagus, dorsal view ; Figs, 9-10. *T. quadrisignatus*. 9) aedeagus, lateral view; 10) aedeagus, dorsal view ; Fig, 11. *T. fimbriatus*. styluses. (scale bar = 0.5 mm).

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