Three new species of the genus *Trechus* Clairville, 1806 from Sichuan (Coleoptera: Carabidae: Trechini)

Три новых вида *Trechus* Clairville, 1806 из провинции Сычуань (Coleoptera: Carabidae: Trechini)

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КЛЮЧЕВЫЕ СЛОVA: Trechini, таксономия, Китай, Сычуань.

ABSTRACT. 3 new species of ground beetles of the genus *Trechus* Clairville, 1806 are described from the basin of the Zagunao River (China, Sichuan Province): *T. xiongmao* sp. n. from the mountains located west of the village of Shangmeng, NW of Lixian City, *T. comma* sp. n. and *T. sharovae* sp. n., both from the upper valley of the Sanchagou River located north of the Tonghua Township, between Lixian and Wenchuan cities. Two species groups are defined to incorporate the new species: *T. sharovae* sp. n. belongs to the *validicollis* species group while the two other species – to the *xiei* species group. Photographs of habitus are provided and the median lobe of aedeagus is illustrated for each species.

РЕЗЮМЕ. Описано три новых вида жужелиц рода *Trechus* Clairville, 1806 из бассейна р. Цзагунао (Китай, провинция Сычуань): *T. xiongmao* sp. n. из гор, расположенных к западу от пос. Шаньмэнь (СЗ города Лисьянь), *T. comma* sp. n. и *T. sharovae* sp. n., оба из верхнего течения р. Сапчагау к северу от пос. Тунхуа (между городами Лисьянь и Вэньчуань). Даны определения двух групп видов, в которые включены новые виды: *T. sharovae* sp. n. относится к группе видов *validicollis*, два других вида – к группе видов *xiei*. По каждому виду даны фотографии габитуса и рисунки медиальной доли эдеагуса.

Introduction

The present paper continues the authors’ studies on Chinese members of the genus *Trechus* Clairville, 1806 from China [Belousov, Kabak, 1996, 2000, 2001, 2019a, b, 2020]. Species of the genus occur mostly in high altitude areas of the country and are particularly abun-
quently processed with Zerene stacker software version 1.04 (http://zerenesystems.com/stacker).

Twenty specimens, if available, were measured for each geographical locality. Measurements used here are the same as in our previous articles [e.g., Belousov, Kabak, 2000, 2003, 2014, 2019b]. The body length was measured without mandibles, from the anterior margin of labrum to the elytral apex, the width of the pronotal base — at the narrowest point, i.e., without hind angles if these are protruding. The position of the anterior setiferous pore of the pronotum, the discal, preapical and umbilicate pores of the elytra are given as percentages of the length of the pronotum and elytra correspondingly. The latter were measured from the anterior termination of the lateral border to the apex of the longest elytron. Average values are given in parentheses. All morphometric characters are summarized in Table 1.

The nonparametric Mann-Whitney U-test and the parametric Student’s t-test were applied to study the sexual dimorphism, infraspecific variability and to estimate differences between species in morphometric characters.

The number of specimens studied is followed by the number of genitalia preparations given in parentheses.

The figures of the male genitalia are arranged in plates in a way to facilitate comparisons of closely related species and the species descriptions follow this order.

Abbreviations used in the paper are as follows: AL — length of antennae; AS — apical stria; BH — height of body, i.e. maximum thickness of abdomen with elytra in lateral view; D1, D2 — distance from the anterior end of the lateral border of elytron to the level of the anterior and posterior discal setiferous pores respectively; DP — the same for the preapical pore; EL — length of elytra; EW — width of elytra; HW — width of head; L2 — length of antennomere 2; L3 — length of antennomere 3; PA — width of pronotum at anterior margin; PB — width of pronotum at base; PL — length of pronotum; PSa — distance from the anterior margin of the pronotum to the level of the anterior lateral seta; PW — width of pronotum; Ps — distance from the anterior end of the lateral border of elytron to the level of the corresponding umbilicate pore; W3 — width of antennomere 3; YL — length of eye.

For description of striation on the apical slope of elytra we use the designation as follows “((2x3)x4) ((5x6)x7):AXS” where the sign “x” means the connection of the corresponding striae and braces indicate the order in which striae are joined in direction to the apex of elytra. In other words, “((5x6)x7)” means that stria 5 firstly joins stria 6 and the resulting stria is connected with stria 7 closer to the elytral apex.

All figures, unless noted otherwise, refer to the paratypes from the type locality.

The coordinates of the collecting sites for the species described in the present paper are determined using Google Earth software some years after expeditions and are missing in the original labels. To prevent misunderstanding, these are given in square brackets in contrast to the label text which is placed inside quotation marks. In the case when two pairs of coordinates are given, it means that, at least, a few specimens of the species were found between these coordinates.

All the holotypes and a proportion of the paratypes of the new species are housed in the collection of the Zoological Institute of the Russian Academy of Sciences (ZIN, St. Petersburg, Boris Kataev). Other paratypes are distributed among the following institutions and working collections: BMNH — British Natural History Museum, London, Great Britain; MLP — Moscow State Pedagogical University, Moscow, Russia; Kilmakerov; NME — Naturkundemuseum, Erfurt, Germany; Matthias Hartmann; SMNS — Staatliches Museum für Naturkunde, Stuttgart, Germany; Arnaud Faille; ZSM — Zoologische Staatssammlung, München, Germany, Michael Balke; CAG — working collection of Arthur Gitzen, Neuhojen, Germany; CKB — working collection of Igor Belousov and Ilya Kabak, St. Petersburg, Russia; CBK — working collection of Alexander Koval, St. Petersburg, Russia; CDW — working collection of David W. Wrse, Guskow-Platkow (part of Zoologische Staatssammlung München), Germany; CLS — working collection of Joachim Schmidt, Admanshagen, Germany; CVZ — working collection of Vladimir Ziers, Pardubice, Czech Republic.

Taxonomy

*Trechus* Clairville, 1806

The *xiei*-species group

The group includes species from northern and central Sichuan. It can be characterized by the following set of character states: medium to small body size, habitus robust and convex, color pale testaceous to brownish, occasionally with blackish elytra; eyes medium to rather small, pronotum with base clearly oblique on sides and small hind angles. The most important diagnostic feature of the group is the structure of the male genitalia: the median lobe small to medium, with a short comma-like endophallus armature pointed apically. The group is named after *Trechus xiei* Deuve, 1992 from Wolong ("col de Balangshan"), Sichuan [Deuve, 1992], the first described member of the group. Species of the group occur mostly in the upper forest belt, often near timber-line, rarely — in the lower alpine zone, but, to date, no species appears to be exclusive for high altitude alpine meadows.

*Trechus xiongmao* sp. n.

Figs 1–4.

MATERIAL. Holotype ♀, “China, NW Sichuan, NW of Lixian, 9 km W of Shangmeng, scree above timber-line 3600–3800 m, 23.07.2002, Belousov I. & Kabak I. leg.” [31°40′30″ N / 103°01′50″ E] (CBK).

Paratypes: (1♀) [31°40′30″ N / 103°01′50″ E] (CBK).

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Fig. 1. Habitus of Trechus xiongmao sp. n., ♂, paratype.
Рис. 1. Общий вид Trechus xiongmao sp. n., ♂, паратип.
DESCRIPTION. Small-sized species with body length usually less than 3 mm. Body broad ovate, constricted at pronotal base, very convex. Appendages not long, legs stout (Fig. 1). Upper side usually dark brownish, suture, margins of elytra, and occasionally disc of pronotum pale reddish; more rarely whole dorsum amber brownish. Head before clypeal suture much paler than behind, boundary not sharp. Legs yellowish. Antennae concolorous, reddish yellow.

Microsculpture well developed over entire surface of both head and pronotum, though becoming shallower on disc of the latter, consisting of isodiametric meshes on disc of head, slightly transverse meshes on anterior portion of pronotum, and markedly transverse meshes on its posterior portion; microsculpture of elytra shallow, consisting of transverse anastomosing lines, surface of elytra with iridescent luster. All upper side micropunctured.

Head of medium size, eyes rather small and flat, tempora long and convex, with a few very short hairs. Frontal furrows regularly impressed, subangulate and approaching one another before middle; frons convex. Supraorbital setae located in lines, distinctly convergent anteriorly, posterior seta far behind posterior margin of eye. Pores of both anterior and posterior setae foveolate, though posterior pore less deeply impressed. Mandibles stout, evenly curved. Tooth on right mandible tridentate, its shape rather variable but distal denticle always most prominent. Anterior margin of labrum concave.

Pronotum markedly transverse, convex, with maximum width in apical third, clearly contracted to base, approximately as wide at base as at apex. Its sides broadly arcuate in anterior part, then nearly straight and convergent, with very shallow or no sinuation before hind angles, latter obtuse, blunt, or sharp at apex, always distinct. Posterior margin straight or slightly convex medially, obliquely truncate laterally; anterior margin straight. Anterior angles marked but not salient. Lateral margins bordered and reflected, lateral groove of average width, clearly expanded posteriorly. Prebasal transverse impression shallow, vaguely delimited, angularly curved in basal foveae, the latter are of average size. Apical transverse impression continuous, well engraved laterally, becoming shallower or even interrupted medially. Discal foveae missing or slightly impressed. Anterior marginal seta placed in about anterior third of pronotum, posterior seta — in hind angle. Basal surface of pronotum distinctly rugose; wrinkles becoming sharper near basal margin. Median line regular, slightly impressed, becoming deeper near prebasal impression.

Elytra broad oval, with arcuate sides, widest just after their middle. Humeri broadly rounded, prehemeral margin evenly arcuate, posthemeral sinuation indistinct. Elytral apex broadly rounded, nearly truncate, with a distinct preapical sinuation. Elytral striae rather deep and regular, nearly entire, even stria 7 visible in its middle portion. Intervals 3–4 rather convex, interval 2 about 1.5 times as wide as interval 1 in their apical third. All elytral striae finely punctured and slightly undulate. Stria 2 surpassing level of preapical pore, occasionally reddoubled behind it, often without clear connection with stria 3, latter joining stria 4 at level slightly behind anterior end of apical stria. Striae 5 and 6 joining each other slightly behind median group of umbilicate series or near that level; stria 7 without clear connection with any of other striae. Parascutellar striae and parascutellar setae present. Apical recurrent striae of average length, rather deep and straight, usually not reaching level of mid-distance between umbilicate pores 7 and 8, joining merged stria (5x6) anteriorly. The dominant pattern of striation on apical slope of elytra may be described as follows: ((5x6)xAS)/(5x4)(2x5) where each next conjunction ‘x’ is located closer to the elytral apex. Apical triangle (consisting of three pores on the apical slope of each elytron, including the preapical pore) usually slightly elongate, its inner side convergent with suture anteriorly. Preapical pore set at level clearly behind anterior termination of apical striae. Angulo-apical pore usually placed closer to exterior pore than to elytral suture. Lateral margins bordered and markedly reflexed.

Protibiae flattened and grooved on exterior surface; two basal segments of male protarsi dilated, markedly transverse.

Median lobe of aedeagus of average size, subcyllindrical, sharply curved at basal third, with straight ventral margin and small apical dilatation, apical lamella rather large, its sides gradually narrowed toward apex in lateral view (Figs 2, 4); and nearly parallel sided in dorsal view (Fig. 3). Sagittal aleron of medium size. Parameres of average length, straight in apical half, left one clearly longer, with a well-developed ventral apophysis; each paramere bearing 4 apical setae (Fig. 2).

Endophallus armature is similar to that of T. gansuensis Deuve & Quéinnec, 1993 and related taxa, consisting of poorly defined sclerite, S-shaped in dorsal view, and one small scaly area located near left wall of the median lobe.

SEXUAL DIMORPHISM. Males differ in smaller head (PW/HW, on average, 1.32 mm vs. 1.29 mm in females, p≤0.01), larger eyes (YL/TL, on average, 1.34 vs. 1.25 in females, p≤0.05), and less transverse pronotum (PW/PL, on average, 1.41 vs. 1.44 in females, p≤0.05).

COMPARATIVE NOTES. T. xiongmao sp.n. is similar to T. xiei Deuve, 1992. However, it differs from this species in having larger body size (2.72–3.15, on average, 2.93 vs. 2.44–3.04, on average, 2.81 in T. xiei), darker color of upper side, broader base of pronotum and longer antennae (see Table 2) and particularly it may be distinguished by the shape of the median lobe, which is much bigger, with endophallus armature more heavily sclerotized, and its distal portion more markedly curved (Figs 2–4).

On the other hand, T. xiongmao sp.n. is similar to T. gansuensis Deuve & Quéinnec, 1993 described from Gansu: “120 km au sud-ouest de Lanzhou, Ponggartang” [Deuve, Quéinnec, 1993] but differs in having more broadly ovate habitus, smaller eyes (their diameter only slightly exceeding length of both tempora and antennomere 3), longer antennae, more transverse pronotum (PW/PL 1.43 vs. 1.36, PW/HW 1.30 vs. 1.26 in T. gansuensis), wider and more convex elytra (EL/BH 2.24 vs. 2.37) and larger pronotum (EL/PL 2.75 vs. 2.80); the preapical pore removed farther from the apex of elytra, umbilicate pores 1–4 removed from umbilicate pore 5 and placed closer to the base of elytra (the significance of differences in the above morphometric characters was based on the t-criterion, species comparison on the Mann-Whitney criterion is shown in Table 2). Male genitalia of T. xiongmao sp.n. are similar to those of T. gansuensis, but the new species can be readily distinguished by the endophallus armature more developed and by the apex of the median lobe distinctly attenuated downward in lateral view.

DISTRIBUTION. The species is known only from the type locality, situated in the upper valley of a small river located west of the village of Shangmeng in the upper basin of the Mengdonggou River, NW of Lixian Town, Li County, Sichuan.

BIONOMICS. The species occurs in a wide belt of altitudes in both the alpine and upper forest zones (though more common in the latter) at elevations from 3350 to 4000 m. Most specimens were sifted from the forest litter in rather humid habitats.

DERIVATIO NOMINIS. The species epithet refers to the Chinese name of giant panda occurring in the same area.
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**Trechus comma** sp. n.

**Figs 5–8.**

**MATERIAL.** Holotype ♀, “China, NW Sichuan, NE of Lixian, N Tonghua, basin of river near Pingshitou, S of Shibanpengzi, H~3900 m, 22.08.2002, Belousov I. & Kabak I. leg.” [31°44´41´ N / 103°22´50´ E]. Paratypes: 12(8); 8(1);, collected with holotype (IZAS, NME, MPU, SMNS, CAG, CBK, CIS); 13(4); 6(1);, “China, NW Sichuan, NE of Lixian, N Tonghua, basin of river near Pingshitou, S of Shibanpengzi, H~3600–3900 m, 20.08.2002, Belousov I. & Kabak I. leg.” [31°44´30´ N / 103°22´50´ E — 31° 44´41´ N / 103°22´50´ E] (BMNH, CAK, CVZ, CBK).

**DESCRIPTION.** Body ovate, markedly constricted at pronotal base, convex (Fig. 8). Appendages not long, legs stout, especially femora in males. Upper side reddish brown, often with darker blackish disc of elytra; the suture, margins of elytra and occasionally head and disc of pronotum paler, reddish. Legs and antennae uniformly yellowish. Head before clypeal suture reddish brown.

Microsculpture well developed on head and pronotum, though becoming shallower on disc of the latter, consisting of isodiametric meshes on median portion of head, more or less uniform transverse meshes on pronotum, and transverse shallow anastomosing lines on elytra, surface of elytra with iridescent luster. All upper side distinctly micropunctured.

Head of medium size, eyes rather small and flat, tempora long and convex, scarcely pubescent. Frontal furrows regularly impressed, subangulate, approaching one another in middle; frons convex. Supraorbital setae located in lines, slightly convergent anteriad, posterior seta far behind posterior margin of eye. Pore of anterior supraorbital seta markedly foveolate that of posterior seta slightly so. Mandibles stout, evenly curved. Tooth on right mandible tridentate, its shape rather variable, distal and proximal denticles always most prominent, with deepest notch between median and distal denticles. Labrum with anterior margin deeply concave.

Pronotum transverse, subconvex, with maximum width clearly before middle, markedly contracted at base. Its sides evenly and broadly arcuate, barely sinuate before hind angles, latter rather small but distinct, subrectangular. Posterior margin straight medially, obliquely truncate laterally; anterior margin straight. Anterior angles marked but not salient. Lateral margins narrowly bordered and slightly reflexed, lateral groove of average width, slightly expanded posteriorly. Prebasal transverse impression shallow, vaguely delimited, angularly curved in basal foveae, the latter rather small and shallow. Apical transverse impression irregular, occasionally interrupted medially. Discal foveae missing or slightly impressed. Anterior marginal seta placed in about anterior third of pronotum, posterior seta in hind angle. Base of...
Fig. 8. Habitus of *Trechus comma* sp. n., ♂, paratype.

Рис. 8. Общий вид *Trechus comma* sp. n., ♂, паратип.
pronotum distinctly rugose. Median line distinct, slightly impressed, deepest at level of prebasal transverse impression. Elytra oval, with evenly arcuate sides, widest just after their mid-length. Humeri broadly rounded, prehumeral margin evenly arcuate, posthumeral sinuation indistinct. Elytral apex broadly rounded, nearly truncate, with a distinct preapical sinuation. Elytral striae rather deep and regular, even stria 7 partially visible. Intervals 3–4 subconvex, others flat, interval 2 distinctly wider than interval 1 in apical portion of elytra. All elytral striae finely punctured and slightly undulate. Stria 2 surpassing level of preapical pore, with or without distinct connection with stria 3, latter joining stria 4 at level clearly beyond anterior termination of apical striae. Striae 5 and 6 joining each other slightly behind median group of umbilicate series or near that level; stria 7 without clear connection with any of other striae. Both paracostal striae and parascutellar seta present. Apical recurrent stria of average length, deep and straight anteriorly, usually surpassing level of mid-distance between umbilicate pores 7 and 8 and anteriad, joining fused striae (5x6) anteriorly. Striation on apical slope as follows: ((5x6)xAS)(3x4)(2x3). Apical triangle usually subequilateral, inner sides of apical triangles of both elytra subparallel to body axis. Preapical pore placed at level of umbilicate pore 8 or slightly behind. Angulo-apical pore usually set closer to exterior pore than to elytral suture. Lateral margins bordered and narrowly reflexed in posterior part while moderately reflexed in anterior part. Protiabae depressed and slightly grooved on exterior surface in their median part; two basal segments of male protarsi dilated, markedly transverse. Median lobe of aedeagus (Figs 5, 7) of medium size, rather thick, angularly curved at basal third, with ventral side nearly straight for most of its length, apical portion distinctly attenuates downwards and gradually narrowing toward small and button-like apex in lateral view. Apical lamella subparallel sided, with apical margin broadly rounded in dorsal view. Sagittal aileron small. Parameters of average size, their apex variable: rounded, oblique or truncate (Figs 5–6). Endophallic structure of the endophallus armature is similar to that of related taxa, with the principal structure of the main copulatory piece resembling the comma. The validicollii-species group

The group includes some species common in northern and central Sichuan. It can be characterized as follows: large-sized species, habitus robust and convex, color rufous to pitchy black, pronotum mostly with acute or rectangular hind angles and sides deeply sinuate before them, elytra broad ovate, with striae clearly impressed and roughly punctured. Preapical pore is mostly located closer to the elytral apex than level of anterior end of apical striae. The most important diagnostic feature of group members is the structure of the male genitalia: the median lobe large and thick, with apex curved upward; endophallic armature heavily sclerotized, consisting of several complexly twisted pieces.

The group is typical for Sichuan Province, only marginally penetrating to neighboring areas of Gansu Province (unpublished data). Species are largely ripiculous and inhabit humid biotopes on banks of mountain streams. Despite their dark pigmentation, robust habitus and large size, members of this species group inhabit not only forests but also alpine meadows and often occur at very high elevations exceeding 4000 m.

The group is named after the first species described, Trechus validicollii Sciaky et Pavesi, 1995 from the mountains near Sannagpar. The group encompasses six known taxa (including the new species described below): T. validicollii. T. validicollii yakoushanus Deuve, 2004, T. altitudinum Deuve, 2004, T. kurbatovi Belousov et Kabak, 2000, T. trachypachys Sciaky et Pavesi, 1995. The latter species is known only from female specimens (Sciaky, Pavesi, 1995; Belousov, Kabak, 2000) and its assignment to this group needs further evidence.

Trechus sharovae sp. n.
Figs 9–13.

MATERIAL. Holotype ♂, “China, NW Sichuan, NE of Lixian, N of Tonghua, basin of river near Pingshitou, H~3300–3500 m, 19.08.2002, Belousov I. & Kabak I. leg.” [31°43´49´´N / 103°23´11´´E — 31°44´15´´N / 103°22´54´´E, corrected height =3600 m]. Paratypes: 13(4) ♀♀, 5♂♂, collected with holotype (IZAS, NME, MPU, ZSM, CAG, CBK, CISJ; 3(3)♂♂); “CH, NW Sichuan, NE of Lixian, N Tonghua, basin of river near Pingshitou, S of Shibanpengzi, H~3600–3900 m, 20.08.2002, Belousov I. & Kabak I. leg.” [31°44´30´´N / 103°22´50´´E — 31°44´41´´N / 103°22´50´´E] (CBK); 1(1)♂, “CH, NW Sichuan, NE of Lixian, N Tonghua, basin of river near Pingshitou, S of Shibanpengzi, H~3900 m, 22.08.2002, Belousov I. & Kabak I. leg.” [31°44´41´´N / 103°22´49´´E, corrected height =3600 m] (CBK).

DESCRIPTION. Medium-sized species, body length usually slightly less than 4 mm, habitus robust and subparallel sided, dorsum moderately convex (Fig. 9). Legs and antennae rather slender, middle antennomeres much longer than wide. Color of upper side rather concolorous, reddish brown, usually with darker hind part of head and disk of elytra; the suture and margins of the latter normally slightly paler, amber reddish. Legs pale amber reddish, antennae vaguely obscured from segments 3–4.
Fig. 9. Habitus of *Trechus sharovae* sp. n., ♀, paratype.
Рис. 9. Общий вид *Trechus sharovae* sp. n., ♀, паратип.
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Microsculpture well distinguished, consisting of isodiametric meshes on head, very transverse meshes on pronotum, and transverse lines on elytra. Pronotum with slight, elytra with distinct iridescence. Micropunctures well developed on the whole upper surface.

Head of medium size. Frontal furrows well impressed, angularly curved in their anterior third. Parietal impression indistinct. Supraorbital setiferous pores located in lines subparallel to body axis; posterior pore more deeply foveolate, located at level clearly behind posterior edge of eye. Eyes medium-sized, evenly convex; tempora rather long, slightly convex, glabrous. Mandibles stout, evenly curved on their exterior margin. Tooth on right mandible tridentate, its shape rather variable but distal denticle always most prominent and more isolated from other denticles. Labrum with anterior margin concave.

Pronotum moderately transverse, subconvex on disk, with maximum width clearly before its mid-length, marginally wider at base than at apex. Sides slightly to moderately sinuate before hind angles. Latter medium-sized, subrectangular, pointed apically. Basal margin nearly straight, barely emarginate on sides. Anterior margin rectilinear to slightly concave; front angles rounded and barely salient. Prebasal transverse impression moderately impressed, located far from and subparallel to basal margin, sharply curved in basal foveae. The latter large and deep, often with a triangular impression in bottom. Basal surface longitudinally rugose. Preapical transverse impression vague and shallow, more distinct laterally, often with a few coarse punctures or impressions medially. Lateral groove rather wide, narrowed to front angles and dilated to pronotal base. Median line distinct, more deeply impressed toward base, shortened anteriorly, reaching basal margin of pronotum. Discal foveae shallow or indistinct.

Elytra ovate, subconvex, with maximum width near their mid-length, relatively narrow (as compared to other members of the group), elytra commonly rounded at apex. Humeri rounded. Preapical sinuation distinct. Two discal setiferous pores in stria 3. Preapical pore located in the apical cross, much closer to stria 2 than to stria 3, at level markedly behind anterior termination of apical stiolie. Apical triangle slightly elongate, its inner side normally slightly divergent posterior or parallel to elytral suture. Angulo-apical pore approximately in middle between exterior pore and elytral suture. Umbilicate pores well aggregated, umbilicate pores 7 and 8 most spaced (compared to those within other groups). Elytral striae 1–5 well impressed and distinct for most of their length, though becoming increasingly shallower toward sides; all striae coarsely punctured. Stria 6 very shallow, even in its median part, stria 7 only partially discernible. Inner interspaces slightly convex, others flat. Striation on apical slope
rather shallow: striae 3 and 4 joining each other at level between anterior termination of apical striae and preapical pore, striae 5 and 6 either independently directed to apical striae or disappearing posteriorly without clear connection. Striation on apical slope, although rather shallow, especially striae 5 and 6, could be summarized as follows: (5xAS|5x6xAS)(3x4|x2x3). Parascutellar pore present, parascutellar striae well developed, rather long. Apical striae sharply engraved; rather straight, directed to the site of stria 5 anteriorly and abruptly interrupted there. Lateral groove narrower than average for the group, but wider in than most other groups of the genus, margins slightly and evenly reflected throughout. Lateral border with a distinct hook anteriorly.

Protibiae thick, especially in apical half, barely grooved on exterior face in distal third, their anterior surface glabrous except for its closest apex bearing a few rudimentary hairs. Metatibiae slender, nearly straight, moderately thickened distally. Male protarsi with two basal segments markedly dilated and inwardly denticate; both segments 1 and 2 transverse.

Aedeagus relatively large (compared to body size) and thick, markedly curved at basal portion, rather bulky in middle portion (Figs 10–13). Apical portion attenuating downward, ending with a well-developed and oblique button, adjacent portion of ventral margin markedly sinuate. Sagittal aileron missing; basal orifice slightly concave. Endophallus armature consisting of two large and heavily sclerotized sclerites typical for most of the species, their shape and position deviated compared to other species: distal margin of longer sclerite semicircular, its proximal portion markedly concave. Parameres of medium length, each bearing 4–5 apical setae; left paramere longer, with a ventral apophysis.

SEXUAL DIMORPHISM. Males differ in larger body size (on average, 3.12 mm vs. 2.99 mm in females, p ≤ 0.01) and proportionally longer elytra (EL/EW, on average, 1.35 vs. 1.33 in females, p ≤ 0.05) and longer antennae (EL/AL, on average, 1.18 vs. 1.20 in females, p ≤ 0.05).

COMPARATIVE NOTES. Externally, the species is similar to other members of the group, especially to smaller

Table 1. Morphometric characters of *Trechus* species. Abbreviations are as indicated in Material and Methods.

| Indices | Range (average), N | Indices | Range (average), N |
|---------|-------------------|---------|-------------------|
| xiong-mao | comma | sharovae | xiong-mao | comma | sharovae |
| Length, mm | 2.72–3.15 | (2.93), 21 | 2.90–3.25 | (3.07), 34 | 3.56–4.05 | (3.82), 19 |
| EL/BH | 2.08–2.44 | (2.24), 13 | 2.22–2.52 | (2.32), 19 | 2.38–2.76 | (2.50), 11 |
| PW/HW | 1.26–1.34 | (1.30), 21 | 1.25–1.32 | (1.29), 34 | 1.25–1.34 | (1.31), 19 |
| EW/HW | 1.84–2.04 | (1.94), 20 | 1.84–2.02 | (1.93), 34 | 1.85–2.00 | (1.91), 19 |
| YL/L | 1.13–1.47 | (1.29), 21 | 1.35–1.80 | (1.48), 34 | 1.48–2.14 | (1.79), 19 |
| YL/L3 | 0.96–1.25 | (1.07), 21 | 1.05–1.27 | (1.18), 34 | 1.08–1.31 | (1.19), 19 |
| L3/YL | 0.80–1.05 | (0.94), 21 | 0.79–0.95 | (0.85), 34 | 0.76–0.93 | (0.84), 19 |
| L3/W3 | 1.80–2.33 | (2.06), 21 | 1.71–2.00 | (1.90), 34 | 2.05–2.36 | (2.19), 19 |
| L3/L2 | 1.04–1.23 | (1.12), 21 | 1.03–1.20 | (1.10), 34 | 1.10–1.27 | (1.18), 19 |
| EL/AL | 1.08–1.20 | (1.13), 21 | 1.10–1.20 | (1.15), 34 | 1.04–1.12 | (1.08), 19 |
| AL/EL | 0.83–0.92 | (0.88), 21 | 0.83–0.91 | (0.87), 34 | 0.89–0.96 | (0.93), 19 |
| PW/PL | 1.38–1.50 | (1.42), 21 | 1.34–1.44 | (1.39), 34 | 1.37–1.47 | (1.41), 19 |
| PW/PB | 1.29–1.43 | (1.37), 21 | 1.37–1.47 | (1.41), 34 | 1.31–1.42 | (1.34), 19 |
| PA/PB | 0.96–1.07 | (1.01), 21 | 1.01–1.08 | (1.04), 34 | 0.92–1.00 | (0.96), 19 |
| PB/PA | 0.93–1.04 | (0.99), 21 | 0.92–0.99 | (0.96), 34 | 1.00–1.09 | (1.04), 19 |
| PSa, % | 25.0–32.1 | (27.9), 21 | 21.3–30.7 | (25.7), 34 | 23.2–29.1 | (26.3), 19 |
| TiL/TaL | 1.20–1.40 | (1.31), 19 | 1.20–1.33 | (1.27), 34 | 1.23–1.35 | (1.29), 14 |

Table 1. Morphometric characters of *Trechus* species. Abbreviations are as indicated in Material and Methods.
Three new species of the genus *Trechus* from Sichuan

species like *T. trachypachys* Sciaky et Pavesi, 1995, *T. altitudinum* Dève, 2004, and *T. kurbatovi* Belousov et Kabak, 2000. From the former species which is known only from female specimens, it differs mostly in paler coloration and shape of pronotum with basal margin less oblique at sides and lateral margins less sinuate before hind angles. On the other hand, the membership of *T. trachypachys* in the *validicollis* species group, as it was noted earlier, needs to be confirmed, see also [Belousov, Kabak, 2000]. Among species with known males, *T. altitudinum* seems to be most similar to *T. sharovae* sp.n. Their closeness is also consistent with their neighboring distribution (approximately 100 km between the type localities). Both species share roughly the same coloration, habitus and very similar structure of the male genitalia: median lobe rather short and stout, with short apex and large endophallus armature filling up nearly all the lumen of the median lobe. However, *T. sharovae* sp.n. differs in having the median lobe with slenderer apical portion, deeper sinuation of ventral margin before apex and more developed button-like apex; endophallus armature readily differs in the main copulatory piece with distal portion much narrowly rounded vs. broad and subangular in *T. altitudinum*. *T. sharovae* sp.n. is also similar to *T. kurbatovi*. Externally, it differs from the latter species mainly in the structure of pronotum with hind angles which are smaller and less acute. The structure of the male genitalia is significantly different: median lobe more robust, ventral margin of apical portion much deeper emarginate, and the main copulatory piece more developed and complexly twisted, less elongate, with apical portion much more broadly arcuate (vs. falcate in *kurbatovi*) and apical lamella more acute (broadly rounded in *kurbatovi*) in dorsal view.

**DISTRIBUTION.** The species is known only from the upper valley of the Sanchagou River located north of the township of Tonghua, Li County, Sichuan.

**BIONOMICS.** The species was found in the forest zone at elevations from 3300 to 3900 m.

**Table 2. Statistically significant differences between *Trechus* species (Mann-Whitney criterion, both sexes). Abbreviations are as indicated in Material and Methods.**

Таблица 2. Статистически значимые различия между видами рода *Trechus* (U-критерий Манна-Уитни, оба пола). Сокращения указаны в разделе «Материал и методы»

| Indices | P     | Range (average) sp. 1 | N sp. 1 | Range (average) sp. 2 | N sp. 2 |
|---------|-------|------------------------|---------|------------------------|---------|
| PA/PB   | 0.001 | 0.96−1.07 (1.01)       | 21      | 0.96−1.10 (1.05)       | 53      |
| U5, %   | 0.001 | 51.23−57.87 (54.76)    | 21      | 52.83−60.45 (57.36)    | 53      |
| YL/L5   | 0.001 | 0.96−1.25 (1.07)       | 21      | 1.08−1.40 (1.21)       | 53      |
| U2, %   | 0.01  | 10.68−13.93 (12.39)    | 21      | 11.25−15.49 (13.47)    | 53      |
| PW/PB   | 0.01  | 1.29−1.43 (1.37)       | 21      | 1.30−1.48 (1.41)       | 53      |
| EL/TiL  | 0.05  | 2.17−2.49 (2.32)       | 19      | 2.30−2.54 (2.42)       | 51      |
| YL/TL   | 0.05  | 1.13−1.47 (1.29)       | 21      | 1.14−1.64 (1.38)       | 53      |
| U6, %   | 0.05  | 59.02−65.53 (62.28)    | 21      | 60.95−67.54 (64.04)    | 53      |
| EL/AL   | 0.05  | 1.08−1.20 (1.13)       | 21      | 1.09−1.21 (1.15)       | 52      |

**T. xiongmao vs. T. xiei**

| Indices | P     | Range (average) sp. 1 | N sp. 1 | Range (average) sp. 2 | N sp. 2 |
|---------|-------|------------------------|---------|------------------------|---------|
| EL/AL   | 0.001 | 1.08−1.20 (1.13)       | 21      | 1.13−1.26 (1.19)       | 75      |
| YL/TL   | 0.001 | 1.13−1.47 (1.29)       | 21      | 1.35−2.13 (1.68)       | 75      |
| YL/L3   | 0.001 | 0.96−1.25 (1.07)       | 21      | 1.11−1.44 (1.23)       | 75      |
| DP, %   | 0.01  | 84.43−91.45 (87.00)    | 21      | 85.95−93.69 (89.83)    | 75      |
| EW/PW   | 0.01  | 1.44−1.56 (1.49)       | 20      | 1.45−1.63 (1.54)       | 75      |
| EL/EW   | 0.05  | 1.24−1.36 (1.30)       | 20      | 1.28−1.42 (1.34)       | 75      |

**T. xiongmao vs. T. gansuensis**

| Indices | P     | Range (average) sp. 1 | N sp. 1 | Range (average) sp. 2 | N sp. 2 |
|---------|-------|------------------------|---------|------------------------|---------|
| Length, mm | 0.001 | 2.90−3.25 (3.07)       | 34      | 2.72−3.15 (2.93)       | 21      |
| PW/PL   | 0.001 | 1.34−1.44 (1.39)       | 34      | 1.38−1.50 (1.42)       | 21      |
| PW/PB   | 0.001 | 1.37−1.47 (1.41)       | 34      | 1.29−1.43 (1.37)       | 21      |
| YL/TL   | 0.001 | 1.35−1.80 (1.48)       | 34      | 1.13−1.47 (1.29)       | 21      |
| YL/L3   | 0.001 | 1.05−1.27 (1.18)       | 34      | 0.96−1.25 (1.07)       | 21      |
| L3/W3   | 0.001 | 1.71−2.00 (1.90)       | 34      | 1.80−2.33 (2.06)       | 21      |
| PA/PB   | 0.001 | 1.01−1.08 (1.04)       | 34      | 0.96−1.07 (1.01)       | 21      |
| PSS, %  | 0.001 | 21.28−30.68 (25.70)    | 34      | 25.00−32.09 (27.86)    | 21      |
| DP, %   | 0.001 | 85.94−91.83 (89.62)    | 34      | 84.43−91.45 (87.00)    | 21      |
| U5, %   | 0.001 | 53.41−59.22 (56.88)    | 34      | 51.23−57.87 (54.76)    | 21      |
| U6, %   | 0.001 | 61.11−67.23 (64.31)    | 34      | 59.02−65.53 (62.28)    | 21      |
| EL/EW   | 0.01  | 1.29−1.37 (1.32)       | 34      | 1.24−1.36 (1.30)       | 20      |
| EL/AL   | 0.05  | 1.10−1.20 (1.15)       | 34      | 1.08−1.20 (1.13)       | 21      |
| U8, %   | 0.05  | 85.94−89.92 (87.89)    | 34      | 84.45−89.77 (87.15)    | 21      |
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