

RESEARCH PAPER

A review of *Gnathoncus* of Southeast Asia (Coleoptera: Histeridae: Sapriniinae)

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Abstract. Six species of the genus *Gnathoncus* Jacquelin du Val, 1857 occur in the region of Southeast Asia: *G. brevisternus* Lewis, 1907, *G. semimarginatus* Bickhardt, 1920, *G. vietnamicus* Kryzhanovskij, 1972, *G. rotundatus* (Kugelann, 1792), *G. nannetensis* (Marseul, 1862), and the newly described *G. sechuanus* sp. nov. (China: Sichuan). Two rare species, *G. brevisternus* and *G. semimarginatus*, are redescribed; all species are figured and keyed. The lectotype of *Gnathoncus brevisternus* is designated and the species is newly reported from Vietnam and Nepal.

Key words. Coleoptera, Histeridae, Sapriniinae, *Gnathoncus*, lectotype designation, new species, Southeast Asia

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Introduction

Gnathoncus Jacquelin du Val, 1857 is a monophyletic (LACKNER et al. 2019) and predominantly Holarctic genus containing 25 species worldwide (MAZUR 2011, VIENNA & RATTO 2013). Most of its species are distributed in the Holarctic Region, with only singletons known from the Afrotropical (one autochthonous species) or Oriental Regions (three autochthonous species; MAZUR 2011). *Gnathoncus* members are often collected inside bird nests, mammal burrows, on (bat) guano in caves, but are also found occasionally on (bird) carcasses, in dung and on excrements, or in decaying organic matter (LACKNER 2010). Several species have been distributed all over the world by human activity (see below). The recently published molecular phylogeny of the subfamily Sapriniinae (LACKNER et al. 2019) revealed *Gnathoncus* as a member of the earliest-branching clade, together with *Aphelosternus* Wenzel, 1962, *Tomogenius* Marseul, 1862, *Saprinodes* Lewis, 1891, and *Myrmetes* Marseul, 1862. *Gnathoncus* and *Myrmetes* are likewise well defined by morphological synapomorphies (see LACKNER 2010, LACKNER & LESCHEN 2017). In the Southeast Asia, only three autochthonous and two widely distributed species of the genus have been reported hitherto. Three of them (*G. brevisternus* Lewis, 1907, *G. vietnamicus* Kryzhanovskij, 1972 and *G. semimarginatus* Bickhardt, 1920) are endemic for the

region. *Gnathoncus rotundatus* (Kugelann, 1792) is a synanthrope widespread worldwide, and *G. nannetensis* (Marseul, 1862) is widespread in the Palaearctic Region but also reaching Southeast Asia (LACKNER et al. 2015; MAZUR 2011). Two of the endemic species, *G. brevisternus* and *G. semimarginatus*, have been known only from holotypes so far. *Gnathoncus vietnamicus* Kryzhanovskij, 1972, occurring in Vietnam and Thailand, is known only from female specimens. A female of an unidentified species of *Gnathoncus* has been reported from Java (Indonesia; ÔHARA & HARITINI 2008). In the present contribution, all species are keyed and figured and the two rare Southeast Asian endemics are re-described. One new species from Sichuan (China) is described.

Material and methods

The region of Southeast (SE) Asia basically corresponds to the Oriental Region of LÖBL & LÖBL (2015), but with several Chinese provinces included, and is here defined as the following territory: Nepal, Bangladesh, Bhutan, India, Sri Lanka, China (Sichuan, Yunnan, Guangxi, Guangdong, Hainan, Fujian, Jiangxi, Hunan, Huizhou, Chongqing), Taiwan, the Philippines, Thailand, Laos, Myanmar, Vietnam, Indonesia, Singapore, Malaysia, Timor-Leste and Brunei. Dry-mounted specimens



were relaxed in warm water for several hours. After removal from original cards, they were side-mounted on a triangular point and examined under a Nikon 102 binocular microscope with diffuse light. Male genitalia were first macerated in 10% KOH solution for about three hours, afterwards cleared in 80% alcohol and macerated in lactic acid with fuchsin, incubated at 60°C for another 30 minutes, and subsequently cleared in 80% alcohol and then observed in α -terpineol in a small glass dish. SEM micrographs were taken with a JSM 6301F microscope at the laboratory of Faculty of Agriculture, Hokkaido University, Sapporo, Japan. Digital photographs of male genitalia were taken by a Nikon 4500 Coolpix camera and edited in Adobe Photoshop CS5. Based on the photographs or direct observations, the genitalia were drawn using a light-box Hakuba klv-7000. Adult images were prepared by Mr. František Slamka (Bratislava, Slovakia). Specimens were measured with an ocular micrometer. Species of *Gnathoncus* in this work are listed alphabetically.

Body part terminology follows that of ÔHARA (1994) and LACKNER (2010) and the following abbreviations of morphological measurements are used:

| | |
|-----|---|
| APW | width between anterior angles of pronotum |
| EL | length of elytron along elytral suture |
| EW | maximum width between outer margins of elytra |
| PEL | length between anterior angles of pronotum and apices of elytra |
| PPW | width between posterior angles of pronotum. |

Labels of type specimens were recorded verbatim in single quotations; a vertical bar | separates rows within a label and a double vertical bar || separates individual labels. Additional remarks are given in square brackets.

Specimens examined in this study are deposited in the following collections:

| | |
|------|--|
| CTLA | Tomáš Lackner private collection (temporarily housed in ZSM); |
| MFNB | Museum für Naturkunde, Berlin, Germany (B. Jäger); |
| NHM | The Natural History Museum, London, United Kingdom (M. Barclay); |
| OKZC | Ondřej Konvička private collection, Zlín, Czech Republic; |
| SMNS | Staatliches Museum für Naturkunde, Stuttgart, Germany (A. Faille); |
| ZSM | Zoologische Staatssammlung, München, Germany (M. Balke). |

Taxonomy

Genus *Gnathoncus* Jacquelin du Val, 1857

Gnathoncus: MAZUR (2011): 175 (catalogue); VIENNA & RATTO (2013): 30 (description of a new species from Iran); LACKNER et al. (2015): 113 (catalogue); LACKNER & LESCHEN (2017): 28 (diagnosis and key to the Australopacific *Gnathoncus*).

Note. Complete list of synonymies and literature references of this taxon are given in LACKNER (2010: 105) and the reader is referred to them there. For the sake of completeness we only list the references published after LACKNER (2010) above.

Diagnosis. Members of the genus *Gnathoncus* can be easily distinguished from all other SE Asian Sapriniinae by the following external and genitalic characters: body rather small (PEL=1.70–3.20 mm), uniformly dark-brown to black, without metallic hue; frontoclypeal suture (frontal stria) absent; dorsum punctate; pronotal hypomeron aseto-

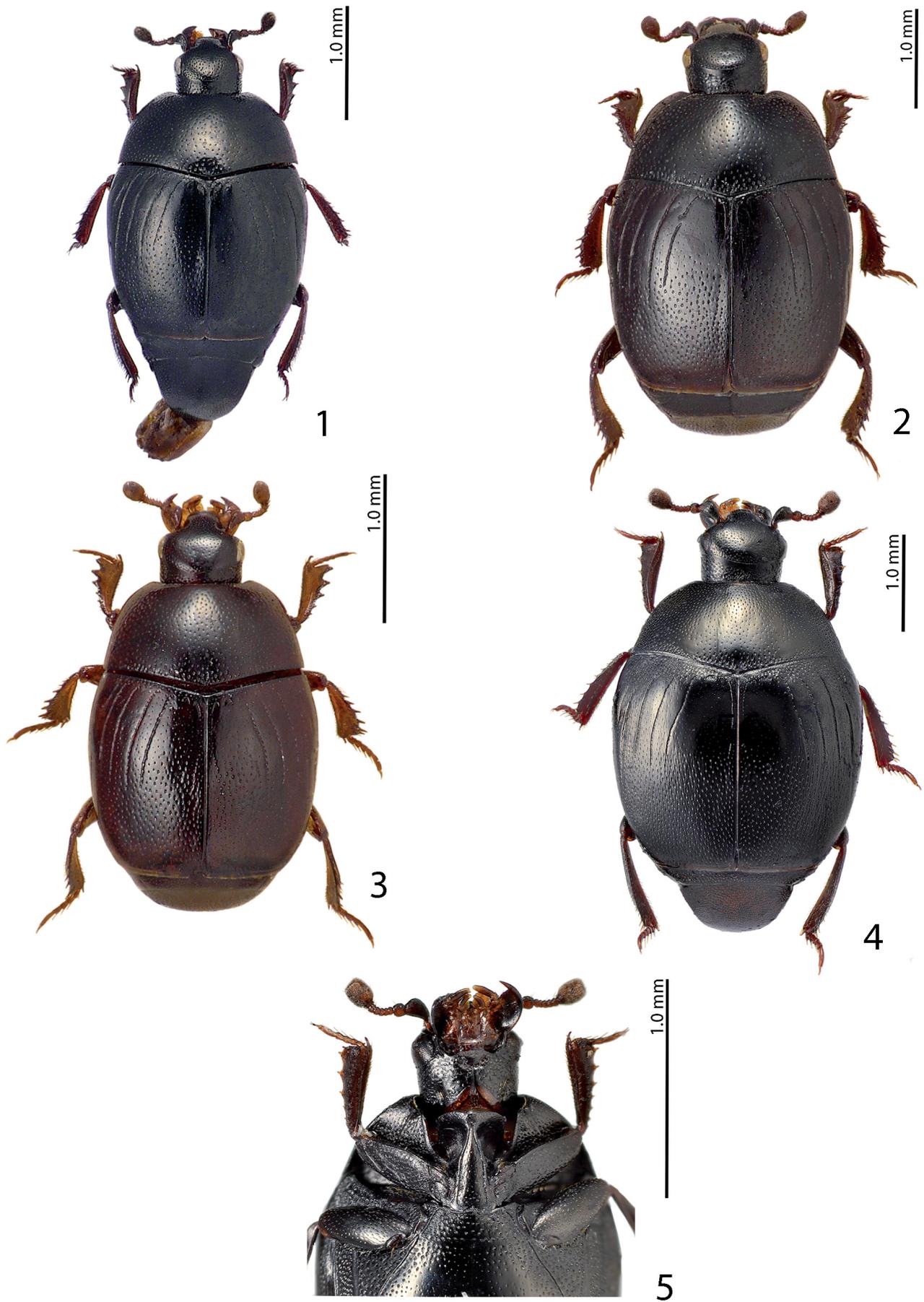
se, pronotum only with marginal pronotal stria (shortened in case of *G. semimarginatus*); elytra with complete striae I–IV; between base of elytral stria IV and sutural elytral stria (that can be interrupted or present only as a short basal fragment) present a characteristic short, hooked appendix; lateral prosternal striae very short, reaching approximately mid-length of carinal prosternal striae; outer lateral costa of prosternal process reaching prosternal keel. Ninth tergite of male terminalia longitudinally divided; VIII sternite and tergite not fused laterally. For a key to the Thai Sapriniinae see MAZUR & ÔHARA (2003); for a key to the Indonesian Sapriniinae see ÔHARA & HARITINI (2008). As yet, there is no key to the SE Asian genera of Sapriniinae, mostly due to the existence of undescribed taxa from Thailand and Vietnam (T. Lackner, unpublished).

Biology. *Gnathoncus brevisternus* was collected inside caves; *G. rotundatus* is a synanthrope often collected in anthropogenic settings; *G. nannetensis* was collected on carrion and in bird nests; *G. sechuanus* sp. nov. was collected under a mushroom on a tree trunk in a mixed forest. The biology of two SE Asian endemics (*G. vietnamicus* and *G. semimarginatus*) is unknown.

Distribution. In SE Asia, *Gnathoncus* is present mainly in the north of the region: southern China (Guangdong, Gansu, Sichuan), Taiwan, Nepal, northern Thailand and Vietnam. One unidentified species is known from Java (Indonesia). The exact distribution of *G. semimarginatus* is unknown (its holotype was either collected in northern India or southern China, see below).

Key to species

- 1(2) Marginal pronotal stria present only on basal pronotal half (Fig. 59). Distribution: China? India? *G. semimarginatus* Bickhardt, 1920
- 2(1) Marginal pronotal stria complete or nearly complete (Fig. 58).
- 3(4) Sutural elytral stria widely interrupted, present as short basal fragment and longer fragment on elytral apical half (Fig. 57). Distribution: Vietnam, Thailand. *G. vietnamicus* Kryzhanovskij, 1972
- 4(3) Sutural elytral stria present mostly only as short basal fragment, absent from apical elytral half (Fig. 1).
- 5(6) Elytral disc (except for a part of third elytral interval and space between fourth dorsal elytral and sutural striae) with very dense alutaceous microsculpture (Fig. 4), giving the species ‘matte’ appearance. Distribution: China: Sichuan. *G. sechuanus* sp. nov.
- 6(5) Elytral disc without dense alutaceous microsculpture among punctures, rather shiny (Fig. 1).
- 7(8) Punctures of pygidium round (Fig. 52), legs dark-brown (Fig. 2). Distr.: Almost entire Palaearctic Region, in SE Asia recorded from China: Guangdong. *G. nannetensis* (Marseul, 1862)
- 8(7) Punctures of pygidium oval-shaped (Fig. 53), legs reddish-brown (Fig. 3).
- 9(10) Prosternal fovea large, conspicuous, prosternum wider, carinal prosternal striae carinate (Fig. 10),



Figs 1–5. Dorsal (1–4) and ventral (5) habitus of SE Asian *Gnathoncus* species. 1 – *G. brevisternus* Lewis, 1907; 2 – *G. nannetensis* (Marseul, 1862); 3 – *G. rotundatus* (Kugelann, 1792); 4–5 – *G. sechuanus* sp. nov.

aedeagus strongly narrowing towards apex (Fig. 23). Distribution: China: Yunnan; Vietnam, Nepal.

..... *G. brevisternus* Lewis, 1907
 10(9) Prosternal fovea tiny, inconspicuous, prosternum narrower, carinal prosternal striae not carinate (see LACKNER 2010: fig. 366), aedeagus almost parallel-sided, slightly constricted medially, not narrowing strongly towards apex (Fig. 41). Distribution: nearly worldwide, in SE Asia recorded from Taiwan and China: Gansu.
 *G. rotundatus* (Kugelann, 1792)

Gnathoncus brevisternus Lewis, 1907

(Figs 1, 6–24, 58)

Gnathoncus brevisternus Lewis, 1907: 321 (original description).

Gnathoncus brevisternus: BICKHARDT (1916): 104 (catalogue); MAZUR (1984): 103 (catalogue); MAZUR (1997): 213 (catalogue); MAZUR (2004): 92 (catalogue); MAZUR (2011): 175 (catalogue); LACKNER et al. (2015): 113 (catalogue).

Type locality. China: Yunnan.

Type material examined. LECTOTYPE (by present designation): ♂, mounted on a triangle point, left antennal club missing, left protibia missing, both metatibiae missing, 'Yunnan | Donckier' [written] || 'Gnathoncus | brevisternus | Lewis | Type' [written] || 'prosternal | striae short.' [written] || 'George Lewis Coll. | B.M. 1926-369' [printed] || 'Type' [round, red-margined, printed] || 'D07-076' [yellow, pencil-written] || 'LECTOTYPE | Gnathoncus brevisternus | Lewis, 1907 | Designated by | T. Lackner, 2008' [red, hand-written] (NHM). LEWIS (1907) does not specify the number of specimens in his description. Lectotype designation serves to fix the identity of the species.

Additional material examined: VIETNAM: CAO BẮNG: Động Ngườm Ngao 3 [= Tiger Cave], N22°50'59.0" E106°42'17.7", 433 m, 19.x.2018, A. Faille, V.T. Tu, P.V. Phu lgt. (2 ♂♂ 5 ♀♀ in SMNS; 2 ♂♂ 3 ♀♀ in CTLA). NEPAL: BAGMATI PRADESH: Kathmandu valley, Balajv env., 11.viii.1983, 1 ♂, 3 ♀♀, Th. Deuve, M. Perrau, E. Krejčí & E. Queinnee lgt., inside an unnamed cave (ZSM).

Redescription. Body (Fig. 1): PEL: 2.00–2.70 mm; APW: 0.60–0.90 mm; PPW: 1.00–1.75 mm; EL: 1.30–1.80 mm; EW: 1.50–2.00 mm.

Body oval, moderately convex, slightly flattened from above, elytral humeri prominent, cuticle dark brown without metallic luster; legs, mouthparts and antennae rufous. Antennal scape (Fig. 6) somewhat thickened, lower margin carinate, with few short setae; club oval (Fig. 7), without visible articulation, entire surface covered with dense short setae, intermingled with sparse setae; sensory structures of antennal club organ not examined.

Mouthparts. Mandibles with rounded outer margin curved inwardly, acutely pointed, tooth on inner margin very small; labrum flattened, finely punctate, with only very shallow median excavation; labral pits very small, with one short seta in each pit; terminal segment of labial palpiger elongated, its width about one-fourth its length; mentum (Fig. 8) sub-quadrate, anterior angles slightly produced, anterior margin with shallow emargination, medially with two setae, lateral margins with one row of short sparse ramose setae, disc glabrous; cardo of maxilla with few short setae on lateral margin; stipes triangular, with three short setae; terminal segment of maxillary palpiger elongated, its width about one-third its length, approximately twice as long as penultimate. Clypeus large, rectangular, rounded laterally, covered with sparse fine punctures, separated by

several times their diameter; disc sparsely clothed with fine round punctures separated by several times their diameter; eyes convex, well visible from above (Fig. 6).

Pronotum. Pronotal sides (Fig. 1) moderately convergent anteriorly, apical angles obtuse, marginal pronotal stria thin, complete, weakened behind head; disc entirely covered with deep and round punctation, medially punctures fine, separated by several times their diameter, laterally punctation coarser and denser, punctures separated by their own diameter; scutellum very small.

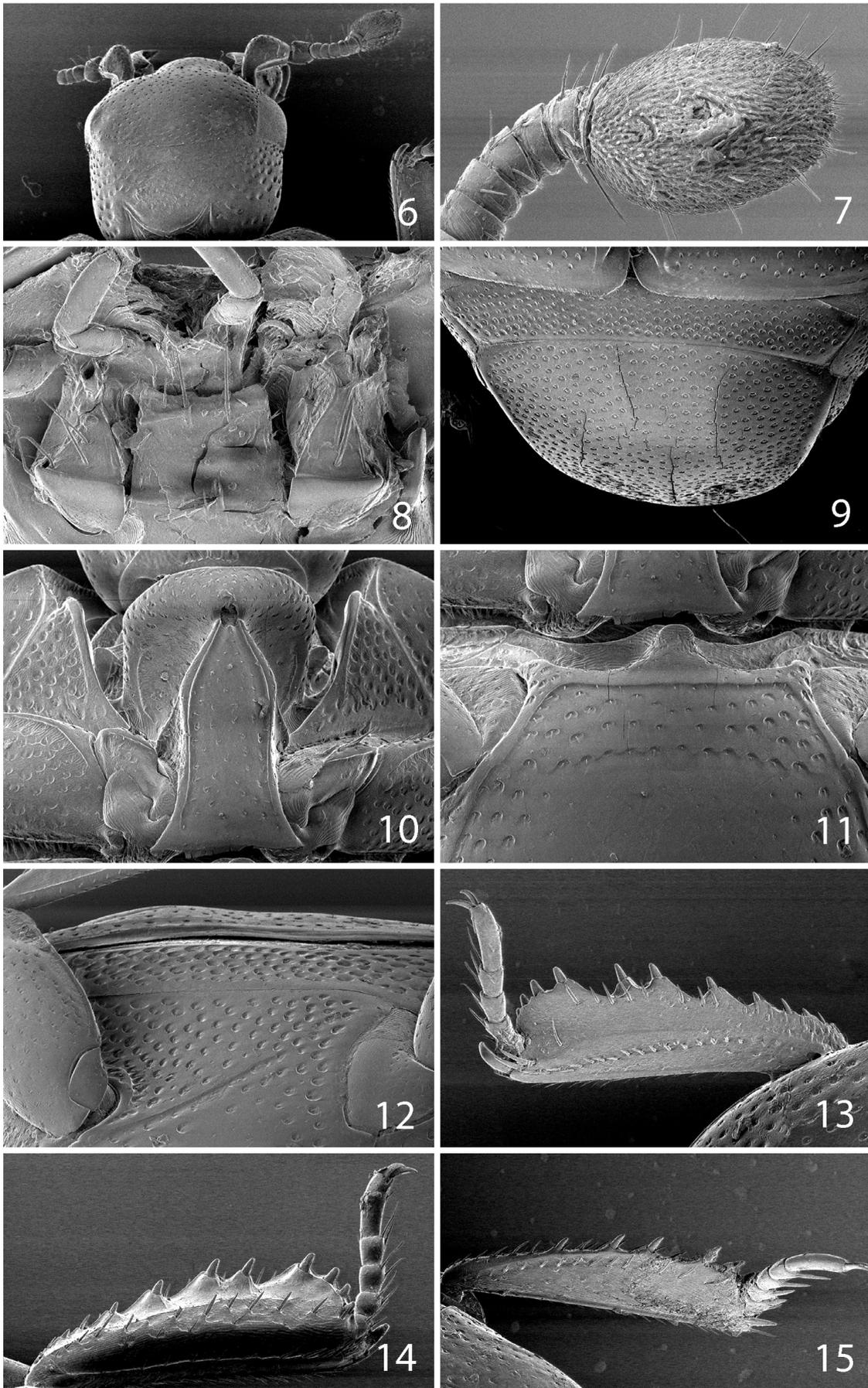
Elytra. Elytral epipleuron with scattered punctures of various sizes; marginal epipleural stria doubled, weakly impressed but complete; marginal elytral stria well impressed, slightly carinate, punctate, shortly continued along elytral apex, then erased; humeral elytral stria weakly impressed on basal third; internal subhumeral stria shortly present medially; elytral disc with four dorsal elytral striae I–IV, first the longest, deeply impressed, almost reaching elytral apex, second and third striae composed of fine punctures, reaching about elytral half, fourth stria only slightly shorter than second and third, basal end of fourth elytral stria forms small hook, between that and sutural elytral stria present short characteristic hooked appendix; basal end of sutural elytral stria also with small hook; sutural elytral stria very short, present as short basal fragment, then obliterated. Approximately apical two-thirds of elytral disc covered with deep round punctures separated by about two times their diameter, apically not forming longitudinal rugae; on basal third punctures much finer and sparser, separated by several times their diameter.

Propygidium (Fig. 9) covered with dense and coarse punctures separated by about their own diameter; pygidium (Fig. 9) convex medially, covered with less dense elliptic punctures, separated by about two times their own diameter, apically with fine microsculpture.

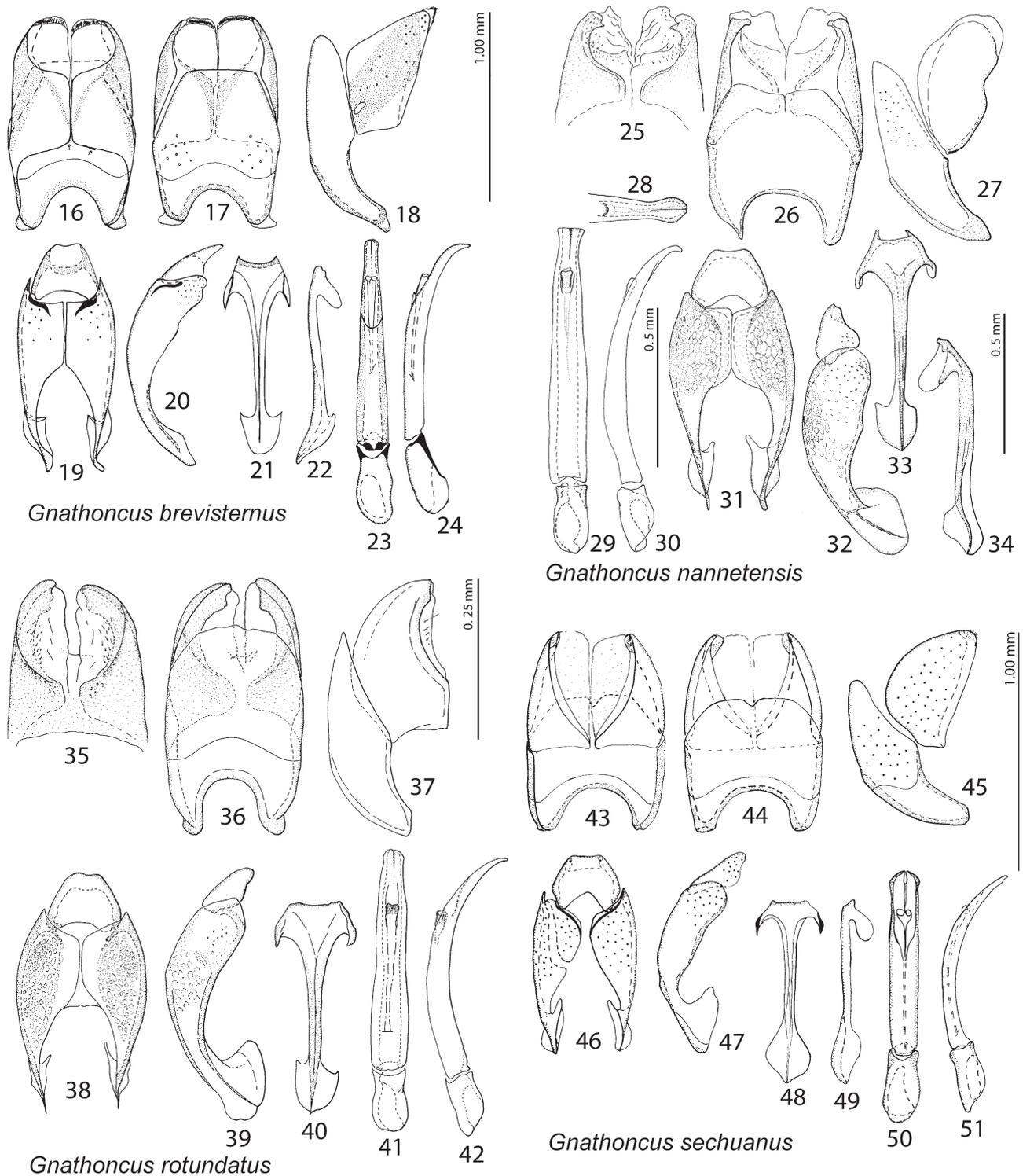
Prosternum. Anterior margin of median portion (Fig. 10) rounded; prosternal process flat, broad, dorsally covered with sparse punctures, laterally with microsculpture; carinal prosternal striae carinate, parallel on basal two-thirds, thence strongly convergent anteriorly, terminating in deep prosternal fovea; lateral prosternal striae very short, strongly convergent anteriorly, reaching carinal prosternal striae in middle of prosternal process.

Mesoventrite. Anterior margin (Fig. 11) straight; marginal mesoventral stria well impressed, slightly carinate; mesoventral disc flat, with round punctures separated about their own to three times their diameter; meso-metaventral suture very thin, straight, anterad of it runs an undulate, inwardly bent meso-metaventral stria; intercoxal disc of metaventrite laterally and along apical margin covered with deep round punctures of various sizes. Lateral metaventral stria (Fig. 12) well impressed, carinate, almost straight, almost reaching metacoxa; lateral disc of metaventrite (Fig. 12) flat, covered with deep ellipsoid large punctures, becoming finer and sparser posteriorly; metepisternum (Fig. 12) evenly covered with much coarser and denser punctation.

Abdomen. Intercoxal disc of first abdominal ventrite with lateral depressions, almost completely striate laterally; surface laterally and basally covered with moderate



Figs 6–15. *Gnathoncus brevisternus* Lewis, 1907, SEM micrographs. 6 – head, dorsal view; 7 – antennal club, ventral view; 8 – mentum; 9 – propygidium and pygidium; 10 – prosternum; 11 – mesoventrite; 12 – lateral disc of metaventrite and metepisternum; 13–14 – protibia (13 – dorsal view; 14 – ventral view); 15 – mesotibia, dorsal view.



Figs 16–51. Male genitalia of SE Asian *Gnathoncus* species. 16–24 – *G. brevisternus* Lewis, 1907: 16–18 – VIII sternite and tergite (16 – ventral view; 17 – dorsal view; 18 – lateral view). 19–20 – IX and X tergites (19 – dorsal view; 20 – lateral view). 21–22 – IX sternite (spiculum gastrale) (21 – ventral view; 22 – lateral view). 23–24 – aedeagus (23 – dorsal view; 24 – lateral view). 25–34 – *G. nannetensis* (Marseul, 1862) (after ÔHARA 1994). 25–27 – VIII sternite and tergite (25 – apical half in ventral view; 26 – dorsal view; 27 – lateral view). 28–30 – aedeagus (28 – apex, apical view; 29 – dorsal view; 30 – lateral view). 31–32 – IX and X tergite (31 – dorsal view; 32 – lateral view). 33–34 – IX sternite (spiculum gastrale) (33 – ventral view; 34 – lateral view). 35–42 – *G. rotundatus* (Kugelann, 1792) (after ÔHARA 1994). 35–37 – VIII sternite and tergite (35 – apical half in ventral view; 36 – dorsal view; 37 – lateral view). 38–39 – IX and X tergite (38 – dorsal view; 39 – lateral view). 40 – IX sternite (spiculum gastrale), ventral view. 41–42 – aedeagus (41 – dorsal view; 42 – lateral view). 43–51 – *G. sechuanus* sp. nov. 43–45 – VIII sternite and tergite (43 – ventral view; 44 – dorsal view; 45 – lateral view). 46–47 – IX and X tergites (46 – dorsal view; 47 – lateral view). 48–49 – IX sternite (spiculum gastrale) (48 – ventral view; 49 – lateral view). 50–51 – aedeagus (50 – dorsal view; 51 – lateral view).

punctures, medially punctation very fine and sparse.

Legs. Protibia (Fig. 13) slender, outer margin anteriorly with three small denticles, followed by four short teeth (second and third very approximate), topped by minute denticles, followed by three minute denticles, protarsal groove rather deep, protibial stria complete, median row of setae regular, dense, setae of outer row longer, irregular, protibial spur large and thick, growing out from anterior protibial margin, near tarsal insertion two prominent tarsal denticles present. Posterior surface of protibia (Fig. 14) with irregular setae, posterior protibial stria complete, setose, inner row of setae double. Mesotibia (Fig. 15) slender, outer margin with about five rather widely-spaced short denticles growing in size in proximal direction, setae of outer row regular, widely-spaced, growing in size in proximal direction; mesotibial spur rather short and stout. Anterior face of mesotibia near outer margin with dense row of thin denticles, anterior mesotibial stria almost complete, setae of inner margin fine, growing in size in proximal direction. Ultimate mesotarsoomere about as long as two preceding; mesotarsal claws shorter than half of its length. Metatibia slenderer than mesotibia, denticles on outer margin very thin, near tarsal insertion two prominent stout denticles, anterior face of metatibia similar to that of mesotibia.

Male genitalia. Eighth sternite (Fig. 16) separated medially, its apex with conspicuous velum; eighth tergite (Fig. 17) apically almost straight; eighth sternite and tergite not fused laterally (Fig. 18). Ninth tergite (Figs 19–20) separated medially, apically with pores and pseudopores; tenth tergite (Fig. 19) basally inwardly arcuate, narrowing apically. Ninth sternite (spiculum gastrale) basally shovel-like (Figs 21–22), apically slightly inwardly arcuate. Aedeagus (Figs 23–24) with strongly sclerotized apex of phallobase and base of fused parameres, narrowing apically, bluntly pointed, parameres fused in their basal two-thirds.

Differential diagnosis. This species is most similar to the widely distributed species *G. rotundatus*, from which it differs in larger and conspicuous prosternal fovea, wider prosternum, and carinate carinal prosternal striae. The aedeagi of the two species are likewise similar; however, that of *G. brevisternus* is strongly narrowed towards apex while that of *G. rotundatus* is blunt apically (compare Figs. 23 and 41).

Biology. Vietnamese and Nepali specimens were found inside caves by speleo-entomologists. Presumably this species feeds on arthropod larvae occurring on (bat) guano.

Distribution. China: Yunnan; newly reported from Vietnam and Nepal.

Gnathoncus nannetensis (Marseul, 1862)

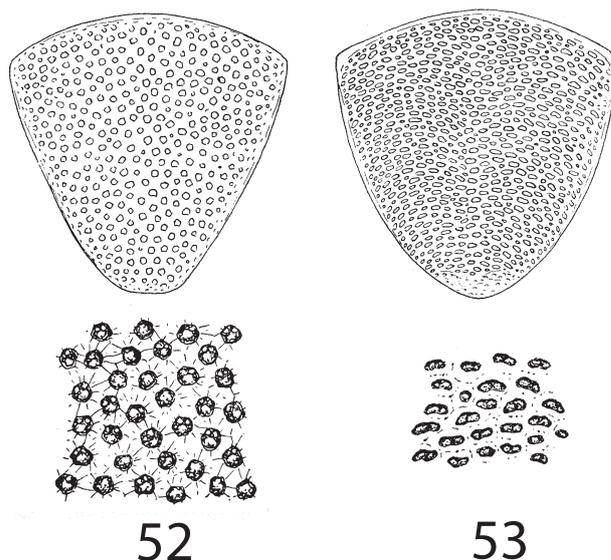
(Figs 2, 25–34, 52)

Saprinus nannetensis Marseul, 1862: 499 (original description).

Gnathoncus urganensis Reitter, 1896: 307 (original description) – synonymized by REICHARDT (1941): 162.

Gnathoncus suturalis Ganglbauer, 1899: 380 (original description) – synonymized by MAZUR (1984): 104.

Gnathoncus nannetensis: REITTER (1896): 308 (keyed); KRZYZHANOVSKIJ & REICHARDT (1976): 114, 117 (keyed, redescription); MAZUR (1984): 105 (catalogue); ÔHARA (1994): 215, figs 130, 131, 132, 135 (key, redescription); MAZUR (1997): 214 (catalogue); MAZUR (2004): 92 (catalogue); MAZUR (2011): 176 (catalogue); LACKNER et al. (2015): 114 (catalogue).



Figs 52–53. Pygidial microsculptures. 52 – *Gnathoncus nannetensis* (Marseul, 1862); 53 – *G. rotundatus* (Kugelann, 1792) (from STOCKMANN 1957).

Note. This species was very thoroughly redescribed and figured in detail by ÔHARA (1994: 215), and the reader is referred to the redescription and detailed figures there. For the sake of better recognition of this species among others distributed in Southeast Asia, the habitus (Fig. 2) as well as pygidium (Fig. 52) and male genitalia (Figs 25–34) are reproduced herein.

Differential diagnosis. In the rather shiny elytral disc, this species resembles both *G. rotundatus* and *G. brevisternus*, but differs from them in round pygidial punctures (Fig. 52) and dark-brown legs (Fig. 2). From *G. semimarginatus* it differs in the complete marginal pronotal stria; from *G. vietnamicus* in the absence of longer apical fragment of the sutural elytral stria, and from *G. sechuanus* in the absence of strong alutaceous microsculpture of the elytra.

Biology. This species is predominantly found in bird nests, but has also been recorded in burrows of small mammals, on (mostly bird) carrion, decaying fish, animal droppings, etc. (KRZYZHANOVSKIJ & REICHARDT 1976).

Distribution. Widespread in almost the entire Palearctic Region; from Southeast Asia recorded from China: Guangdong (LACKNER et al. 2015).

Gnathoncus rotundatus (Kugelann, 1792)

(Figs 3, 35–42, 53)

Gnathoncus rotundatus: MAZUR (2011): 176 (catalogue); LACKNER et al. (2015): 114 (catalogue); LACKNER & LESCHEN (2017): 33, figs 90–110, 754 (mentioned).

Notes. Complete synonymy and references of this species are given by LACKNER (2010: 118) and the reader is referred to them there. For the sake of completeness we list the references of all works containing *G. rotundatus* since 2010 above.

This species has been very thoroughly redescribed and figured in detail by ÔHARA (1994: 220) and the reader is referred to the redescription there. For the sake of better re-

cognition of this species among others spread in Southeast Asia, the habitus (Fig. 3) as well as pygidium (Fig. 53) and male genitalia (Figs 35–42) are reproduced herein. The differential diagnosis of this species is also provided. **Differential diagnosis.** *Gnathoncus rotundatus* differs from *G. semimarginatus* in the complete marginal pronotal stria; from *G. vietnamicus* in the absence of longer apical fragment of the sutural elytral stria, and from *G. sechuanus* in the absence of strong alutaceous microsculpture of the elytra. From the most similar *G. brevisternus* it differs in much smaller, inconspicuous prosternal fovea and narrower prosternum, as well as in different structure of the aedeagus (compare Figs 41 and 23). From *G. nannetensis* it differs in oval-shaped pygidial punctures, differently-shaped male VIII sternite and tergite (compare Figs 25–27 and 35–37) and in reddish-brown legs.

Biology. A typical synanthrope found mostly in anthropogenic settings, but collected also on carrion, bird nests, excrements, decaying vegetable matter, birch sap, occasionally even in anthills (KRYZHANOVSKI & REICHARDT 1976).

Distribution. Holarctic Region, Republic of South Africa, Chile, Saint Paul Island (MAZUR 2011). From SE Asia reported from Taiwan and China: Gansu (LACKNER et al. 2015).

Gnathoncus sechuanus sp. nov.

(Figs 4, 5, 43–51)

Type locality. China: Sichuan, Jiuzhaigou env., Zhongchacun.

Type material examined. HOLOTYPE: ♂, side-mounted on a triangular mounting card, with the genitalia extracted and disarticulated, glued to the same triangular card as the specimen, 'China, N Sichuan | Jiuzhaigou env. | Zhongchacun | 33°17'13"N 103°50'1"E | 9.-13.VII.2017, 2400-3000m | lgt. Ondřej Konvička' [printed] || 'Gnathoncus | spec. nov. | Det. T. Lackner 2018' [printed-written] || 'S. Mazur | O.K.!' [printed-written] || 'Gnathoncus | sechuanus sp. nov. | HOLOTYPE | det. T. Lackner 2019' [red label, written] (ZSM). PARATYPE: ♂, with extracted genitalia glued to the same mounting card as the specimen, locality label identical to holotype (OKZC).

Description. Body (Fig. 4): PEL: 2.40–2.50 mm; APW: 0.50–0.55 mm; PPW: 0.90–1.00 mm; EL: 1.70–1.80 mm; EW: 1.90–2.00 mm.

Body roundly oval, black, body appendages dark brown, antennal club lighter, reddish-brown. Head and clypeus

evenly punctate, punctures separated by several times their diameter; antennal scape with microsetae; sensory structures of the antennal club not examined; other mouthparts not examined.

Pronotum (Fig. 4) narrowing anteriorly, marginal pronotal stria on basal half slightly distanced from pronotal margin, stopping short of pronotal base. Entire pronotal disc with punctation, laterally punctures very dense and almost confluent, becoming finer and sparser medially, where they are separated by several times their diameter. Pronotal hypomeron asetose; along pronotal base present double row of larger punctures; scutellum small, triangular.

Elytra widest in middle, elytral epipleuron with two rows of tiny punctures; marginal epipleural stria double, fine; marginal elytral stria thin, complete, continued as very fine and complete apical elytral stria. Humeral elytral stria almost obliterated under very dense aciculate punctures; dorsal elytral stria I significantly shortened basally, reaching apically approximately elytral mid-length; dorsal elytral striae II–III carinate, only slightly shortened basally, stopping short of elytral mid-length; dorsal elytral stria IV basally hooked inwardly, approaching elytral base, between that and sutural elytral stria present characteristic short hooked appendix; sutural elytral stria basally hooked inwardly, stopping short of elytral mid-length. Elytral intervals 1–2, and partly also 3 with scattered fine punctures and dense alutaceous microsculpture; basal half of third elytral interval and space among fourth dorsal elytral and sutural striae without such microsculpture creating 'mirror' covered only with scattered microscopic punctures. Otherwise entire elytral disc, with exception of elytral base and extreme apex with variously dense punctures and strong alutaceous microsculpture creating almost matte appearance; punctation becoming denser apically.

Propygidium and pygidium densely punctate, punctures of pygidium separated by less than their diameter, interspaces with microsculpture.

Prosternum. Prosternal process (Fig. 5) basally widened, strongly convergent apically, carinal prosternal striae on basal half sub-parallel, thence strongly convergent apically, united in tiny prosternal fovea; lateral prosternal



Figs. 54–55. Habitat of *Gnathoncus sechuanus* sp. nov. 54 – high-altitude mixed forest in Sichuan; 55 – mushroom under which *Gnathoncus sechuanus* nov. sp. was collected.

striae carinate, very short, reaching middle of prosternal process.

Mesoventrite (Fig. 5) approximately 3.5 times as broad as long, with variously-sized punctures; meso-metaventral stria undulate, situated slightly anterad of meso-metaventral suture. Metaventrite along sides and base with large deep punctures, medially punctation becomes sparser and finer; lateral metaventral stria well developed, carinate, stopping short of metacoxa. Metepisternum with four rows of very dense elliptical punctures; intercoxal disc of first visible abdominal ventrite completely striate laterally, laterally with large dense punctures becoming sparser and finer medially.

Legs. Protibia on outer margin with 4–5 low teeth topped by tiny denticle, followed by several minute denticles; protibial stria carinate, complete; protarsal groove shallow; surface between outer protibial margin and protibial stria with microscopic striae; setae of median row regular, short, situated on definite stria; protibial spur short, hooked, articulated near tarsal insertion. Posterior surface of protibia convex, covered with tiny striae, posterior protibial stria complete; inner row of setae double; protibial apex with three tiny denticles. Mesotibia slender, on outer margin with seven thin denticles growing in size in proximal direction; mesotibial spur short, stout; metatibia similar to mesotibia, but on outer margin medially with two tiny denticles, another two longer denticles present apically, near tarsal insertion.

Male genitalia. Eighth sternite (Figs 43–44) widely separated medially, apex with large almost asetose velum; eighth tergite (Fig. 44) outwardly arcuate, medially with tiny “notch”; eighth sternite and tergite not fused laterally (Fig. 45). Ninth tergite (Figs 46–47) separated medially, densely covered with pores and pseudopores; tenth tergite (Fig. 46) basally deeply inwardly arcuate. Ninth sternite (spiculum gastrale) with both “head” and “tail” developed, “tail” outwardly arcuate and pointed apically (Figs 48–49); “head” (Fig. 48) rather slender, heavily sclerotized laterally. Aedeagus (Figs 50–51) strongly sclerotized on flanks, almost parallel-sided, bluntly pointed apically. Parameres fused in basal two-thirds approximately.

Differential diagnosis. This species is easily distinguishable from other congeners by dense microsculpture of elytra.

Biology. Found in a mixed forest on the underside of a mushroom (*Bondarzewia* sp.?) growing on a tree trunk (Figs 54–55).

Distribution. China: Sichuan; known only from the type locality.

Gnathoncus semimarginatus Bickhardt, 1920

(Figs 56, 59, 60–69)

Gnathoncus semimarginatus Bickhardt, 1920: 29 (original description).
Gnathoncus semimarginatus: KRZYZHANOVSKIJ & REICHARDT (1976): 115 (keyed); MAZUR (1984): 103 (catalogue); MAZUR (1997): 215 (catalogue); MAZUR (2004): 92 (catalogue); MAZUR (2011): 176 (catalogue); LACKNER et al. (2015): 114 (catalogue).

Type locality. ‘Shi-wan-tze’ (North India or China).

Type material examined. HOLOTYPE: ♀, mounted on a triangular mounting point, right protarsus missing, ‘Shi-wan-tze | Nord-Indien’ [written] || ‘G. semimargi- | natus m. | H. Bickhardt det. 1919’ ([printed-written]

|| ‘Type’ [brick-red, printed label] || ‘HOLOTYPE | Gnathoncus | semimarginatus | Bickhardt, 1920 | labelled by MNHUB 2008’ [red label, printed] || ‘D08-086’ [yellow, pencil-written label] (MFNB).

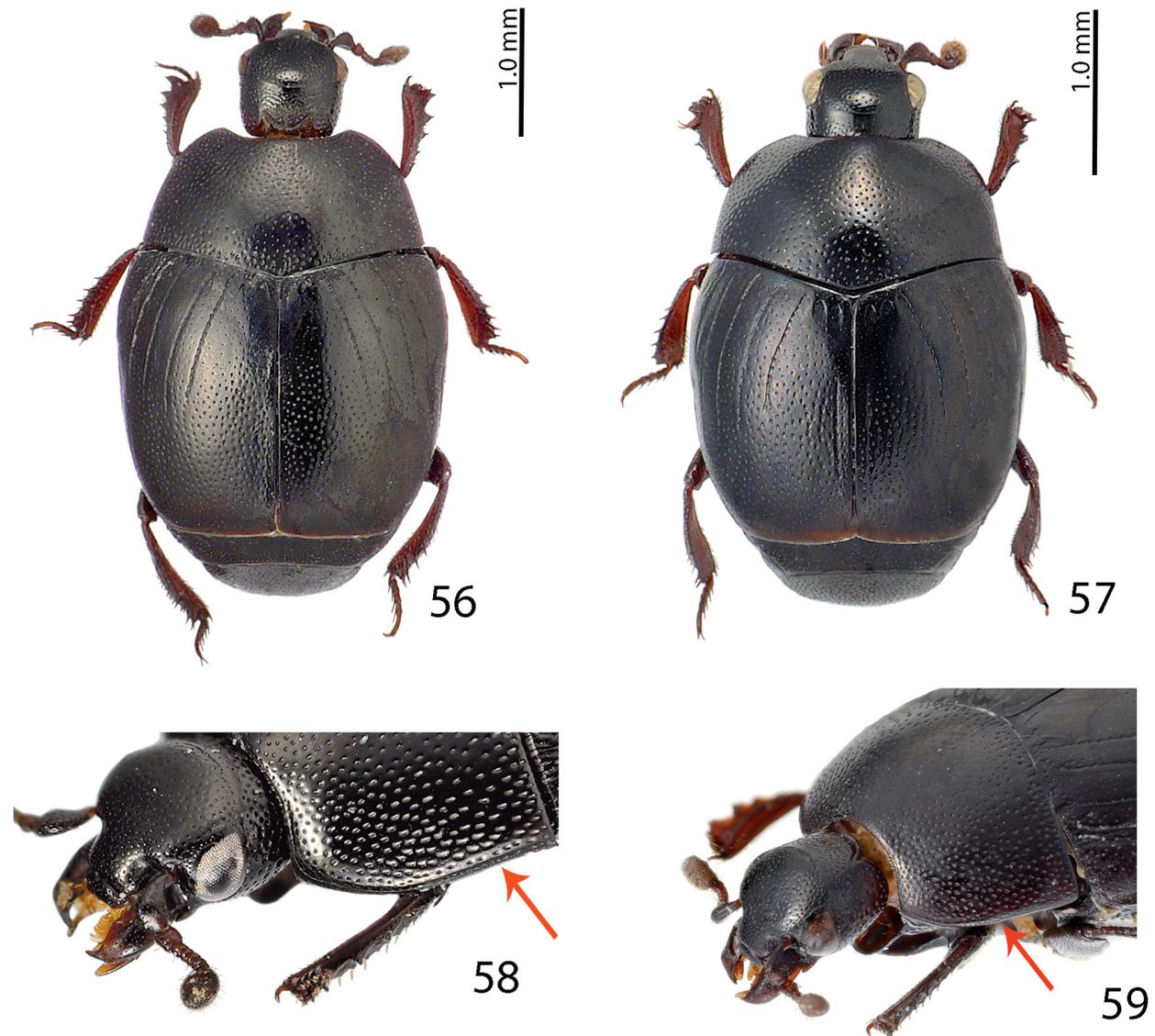
Note. Although BICKHARDT’S (1920) description mentions ‘China’ as the type locality, the actual specimen bears the label ‘Nord Indien: Shi-wan-tze’ (this locality has not been located). This species was described based on a single specimen, which is the holotype by original designation.

Redescription. Body (Fig. 56): PEL: 3.10 mm; APW: 1.10 mm; PPW: 2.20 mm; EL: 2.20 mm; EW: 2.60 mm. Body oval, moderately convex, slightly flattened from above, cuticle piceous black; legs, mouthparts and antennae dark brown.

Head. Antennal scape (Fig. 60) somewhat thickened, lower margin carinate, with few short setae; antennal club (Fig. 61) oval, without visible articulation, entire surface covered with dense short setae, intermingled with sparse setae; sensory structures of antennal club in form of two horizontal slit-like orifices on dorsal side of club, otherwise not examined. Mouthparts: mandibles with rounded outer margin curved inwardly, acutely pointed, sub-apical tooth on inner margin very small; labrum flattened, punctate, with only very shallow median excavation; labral pits with single short seta in each pit; terminal labial palpomere elongated, its width about one-fourth of its length; mentum (Fig. 62) sub-quadrate, anterior angles slightly produced, anterior margin with shallow emargination, medially with two setae, lateral margins with two rows of short sparse ramose setae, disc of mentum glabrous; cardo of maxilla with few short setae laterally; stipes triangular, with three short setae; terminal maxillary palpomere elongated, its width about one-fourth of its length, approximately three times as long as penultimate. Clypeus (Fig. 60) large, rectangular, flattened dorsally, rounded laterally, with dense punctures separated by about their own diameter; frons with coarse round to ellipsoid punctures separated by about their own diameter; eyes convex, well visible from above.

Pronotum. Pronotal sides (Fig. 56) in basal half moderately convergent anteriorly, thence strongly narrowing apically; apical angles obtuse, anterior emargination for head deep, almost straight medially; marginal pronotal stria present only on basal pronotal half (Fig. 59), thin, interrupted behind head; pronotal disc laterally covered with deep round punctation, punctures separated by about their own diameter, medially punctures become finer and sparser; scutellum very small, but visible.

Elytra. Epipleuron with coarse and dense ellipsoid punctures separated by about their own diameter; marginal epipleural stria doubled, weakly impressed but complete, in punctures; marginal elytral stria well impressed, slightly carinate and in punctures, shortly continued as weakened apical elytra stria, next obliterated; humeral elytral stria weakly impressed on basal third, crossed by number of fine oblique rugae; internal subhumeral stria present medially, well impressed, rather long; elytral disc with four dorsal elytral striae I–IV, first longest, deeply impressed on basal half, carinate, weakening on apical half, reaching about two-thirds of elytral length apically, second, third and



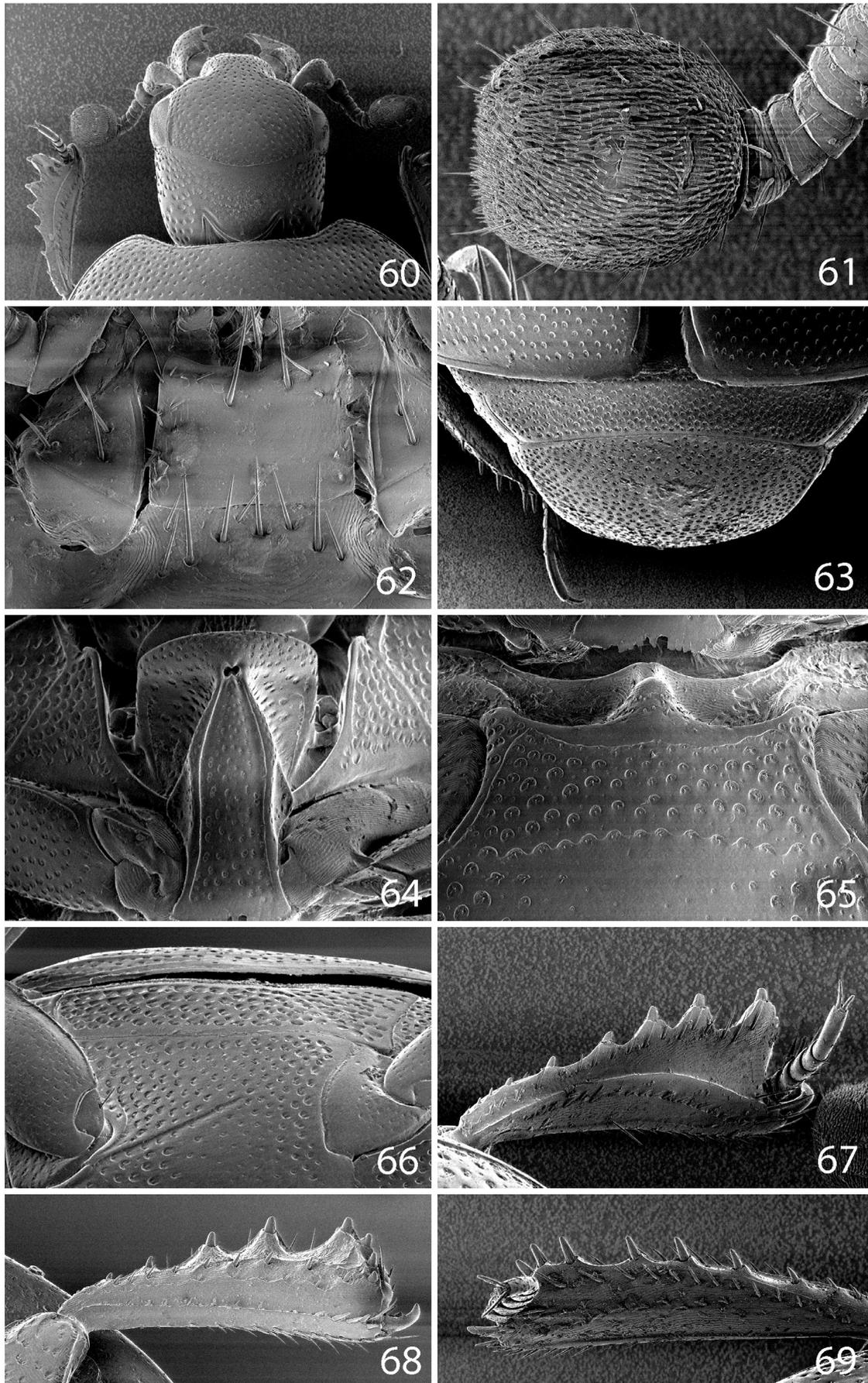
Figs 56–57. Habitus of SE Asian *Gnathoncus* species. 56 – *G. semimarginatus* Bickhardt, 1920, dorsal habitus; 57 – *G. vietnamicus* Kryzhanovskij, 1972, dorsal habitus. 58 – *G. brevisternus* Lewis, 1907, anterolateral view showing marginal pronotal stria; 59 – *G. semimarginatus*, the same.

fourth striae about the same length, reaching about elytral half apically, fourth stria in deep punctures, basal end of fourth stria forms small hook, between that and sutural stria present short characteristic hooked appendix; basal end of sutural elytral stria also with small hook; sutural elytral stria very short, reaching only about one-tenth of elytral length basally, then obliterated. Elytral punctation on apical half coarse and dense, punctures separated by about their own diameter; on elytral intervals 1–3 punctation much sparser, punctures separated by several times their diameter, on fourth elytral interval punctures become microscopic and very sparse; before elytral apex punctures laterally forming tiny elongate strioles.

Propygidium (Fig. 63) covered with very dense and coarse punctures separated by about half their own diameter, interspaces with alutaceous microsculpture; pygidium (Fig. 63) convex medially, covered with very coarse and dense round punctures separated by about half their own diameter, interspaces with alutaceous microsculpture.

Prosternum. Anterior margin of median portion of prosternum (Fig. 64) rounded; prosternal process flat, broad, dorsally and laterally covered with coarse and dense punctures separated by about 1.5 times their diameter; carinal prosternal striae well impressed, carinate, sub-parallel on basal two-thirds, thence strongly convergent anteriorly, terminating in deep tiny doubled prosternal fovea; lateral prosternal striae very short, strongly convergent anteriorly, reaching carinal prosternal striae in apical two-thirds of prosternal process.

Mesoventrite. Anterior margin of mesoventrite (Fig. 65) almost straight; marginal mesoventral stria well impressed, slightly carinate; mesoventral disc flat, covered with very coarse and dense round punctures separated about their own diameter; meso-metaventral suture very thin, straight, anterad of that present undulate, inwardly bent meso-metaventral stria; intercoxal disc of metaventrite laterad of lateral metaventral stria and before metacoxa with deep round punctures separated by about their own diameter,



Figs 60–69. SEM micrographs of *Gnathoncus semimarginatus* Bickhardt, 1920. 60 – head, dorsal view; 61 – antennal club, ventral view; 62 – mentum; 63 – propygidium and pygidium; 64 – prosternum; 65 – mesoventrite; 66 – lateral disc of metaventrite and metepisternum; 67–68 – protibia (67 – dorsal view; 68 – ventral view); 69 – mesotibia, dorsal view.

medially punctation becomes sparser and finer and completely disappears on short narrow area around median line. Lateral metaventral stria (Fig. 66) well impressed, carinate, straight, shortened; lateral disc of metaventricle flat, with deep ellipsoid large punctures, separated by about their own diameter; metepisternum evenly covered with much coarser and denser punctation, punctures separated by less than half their own diameter.

Abdomen. Intercoxal disc of first abdominal ventrite with lateral depressions, almost completely striate laterally; surface laterally and basally covered with coarse and dense punctures, medially punctation becomes finer and sparser.

Legs. Protibia (Fig. 67) slightly dilated and flattened, outer margin with five conspicuous teeth diminishing in size in proximal direction topped by minute denticles; protibial spur rather large, hooked, inserted near tarsal insertion; protarsal groove rather deep; setae of outer row sparse, regular; protibial stria carinate, complete; setae of median row dense, short; tarsal denticle single, conspicuous and thin. Posterior surface of protibia (Fig. 68) with row of widely-spaced minuscule denticles; apex of protibia with three minuscule apical denticles, posterior protibial stria complete, terminating in several inner posterior denticles; inner row of setae double, thin. Mesotibia (Fig. 69) slender, outer margin with approximately nine short denticles growing in size in proximal direction, outer row of setae regular, rather short; setae of median row microscopic; posterior mesotibial stria almost complete; mesotibial spur short and stout. Anterior face of mesotibia with dense row of rather long and thick setae near outer margin, another row of microscopic setae present medially; anterior mesotibial stria complete, terminating in several inner anterior denticles. Metatibia slenderer than mesotibia with five widely-spaced denticles on outer margin growing in size in proximal direction; anterior face of mesotibia with double row of dense regular microscopic setae; terminal metatarsomere approximately twice as long as two preceding, metatarsal claws very short, shorter than half its length.

Differential diagnosis. An unusually large species (PEL=3.10 mm), distinguished easily from all SE Asian congeners by shortened marginal pronotal stria that is completely absent on its posterior half (compare Figs 58 and 59; the name *semimarginatus* is very appropriate here). This species somewhat resembles *G. nannetensis* in its sheer size and elytral punctation but differs from it in shortened marginal pronotal stria as well as obliterated apical elytral stria. Unfortunately, the only known specimen is a female.

Biology. Unknown.

Distribution. Known only from the holotype, which was collected either in North India or in China.

Gnathoncus vietnamicus Kryzhanovskij, 1972

(Fig. 57)

Gnathoncus vietnamicus Kryzhanovskij, 1972: 22, figs 4 A–C (original description).

Gnathoncus vietnamicus: MAZUR (1984): 103 (catalogue); MAZUR (1997): 215 (catalogue); MAZUR (2011): 177 (catalogue); MAZUR & ÔHARA (2003): 2, 4, figs 1 A–F, 2 A–F, 3 A,B (key, redescription).

Type locality. North Vietnam: Hoa Binh.

Type specimens examined. None.

Additional specimens examined. THAILAND: MAE HONG SON: 4.–6.v.1991, Ban Si Lang, 1200 m, 1 ♀, J. Horák lgt. (CTLA).

Note. This species was thoroughly re-described and figured in detail by MAZUR & ÔHARA (2003: 4) and the reader is referred to that. Unfortunately, no male specimen has been reported hitherto. For the sake of better recognition of this species among others occurring in SE Asia the habitus (Fig. 57) is depicted herein.

Differential diagnosis. The widely interrupted sutural elytral stria (present merely as a short basal fragment and longer fragment on elytral apical half) distinguishes this species from all other SE Asian congeners.

Biology. No biological data are available for this species.

Distribution. Known so far only from Vietnam and Thailand (MAZUR 2011).

Discussion

According to the most recent phylogenetic analyses based on either morphological (LACKNER 2014) or molecular (LACKNER et al. 2019) characters, the genera *Gnathoncus* + *Myrmetes* Marseul, 1862 and *Saprinodes* Lewis, 1891 and *Tomogenius* + *Aphelosternus* Wenzel, 1962 form a highly supported clade situated near the root of the Saprininae phylogenetic tree. It is interesting to remark, that most of these genera do not have representatives in the tropics, with the exception of *Saprinodes*, known from north Queensland (Australia), and *Gnathoncus*, which has a single described bird-inquiline species from tropical Africa (*G. umbrettarum* Théron, 1952; Congo), as well as four described species from SE Asia (plus one unidentified species from Java). Likewise, most if not all of these genera are inquilines of either birds or small ground mammals, and in one case (*Myrmetes*) even ants; the biology of Australian *Saprinodes* is unfortunately unknown, and findings of *Gnathoncus* under non-inquiline conditions (e.g. on carcass) are rare. The low number of *Gnathoncus* in tropical parts of the Oriental Region mirrors the distribution of the Saprininae in the region in general, as it was already noticed by MAZUR & ÔHARA (2003).

When we focus on SE Asian *Gnathoncus* species, they are recorded predominantly in the north of the region. To be more specific: *G. vietnamicus* occurs in northern Thailand and northern Vietnam; *G. brevisternus* is known from China: Yunnan and caves in Nepal and northern Vietnam; *G. sechuanus* is known from China: Sichuan; and *G. semimarginatus* is known either from northern India or China (the locality is uncertain). Only one so far unidentified species has been reported from more southern parts (Java). The SE Asian *Gnathoncus* are hypothesised to colonize SE Asia from the Palaearctic Region in the north, and inhabiting relatively high-altitude places (North India, China: Sichuan; northern Vietnam, northern Thailand) or caves (Nepal, Vietnam). We can likewise hypothesise that *Gnathoncus* was once distributed all over the world, but went extinct in the warmest parts of the world, with a single described surviving species found in tropical Africa and several SE Asian species surviving in caves or high altitude places. A collecting bias, too, cannot be excluded,

and more effort aimed at exploring the caves or bird nests of the tropical regions would be required to address this possibility.

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