



***Rhyzodiastes (Temoana) xii* sp. nov. (Coleoptera: Rhysodidae: Clinidiini), a new species from Hainan Island, China**

CHENG-BIN WANG

Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, CZ-165 21
Praha 6, Czech Republic. E-mail: leiiodidae@hotmail.com

Abstract

Rhyzodiastes (Temoana) xii sp. nov. (Coleoptera: Rhysodidae: Clinidiini) is described from Hainan Island, China. Important morphological characters of the new species are illustrated. An updated key to nine species of the *R. (T.) singularis* species-group is compiled so as to include the new species.

Key words: Rhysodidae, Clinidiini, *Rhyzodiastes*, *Temoana*, taxonomy, new species, China

摘要

本文描述了产自中国海南岛的习氏狼条脊甲 *Rhyzodiastes (Temoana) xii* sp. nov. (鞘翅目: 条脊甲科: 斜条脊甲族)。作者提供了彩色图版来阐明其重要特征, 并且编制了一个独狼条脊甲种组 *R. (T.) singularis* species-group 九个种 (包括该新种) 的检索表。

Introduction

The genus *Rhyzodiastes*, belonging to the tribe Clinidiini (Coleoptera: Rhysodidae), was originally established by Fairmaire (1895), with *Rhyzodes parumcostatus* Fairmaire, 1868 as the type species fixed by the original designation. Before this study, the genus *Rhyzodiastes* Fairmaire was composed of 48 valid species worldwide; their geographical distributions are generally in the Oriental region, Australian region and eastern South America.

Bell & Bell (1985) excellently revised *Rhyzodiastes* Fairmaire and erected five subgenera to classify the congener species. All three known species in the Chinese fauna belong to the subgenus *Temoana* Bell & Bell, and they are categorized to two species-groups:

Rhyzodiastes (Temoana) mishmicus species-group (5 species worldwide):

1. *R. (T.) orestes* Bell & Bell, 2009 (CHINA, Xizang)
2. *R. (T.) puetzi* Bell & Bell, 2011 (CHINA, Yunnan)

Rhyzodiastes (Temoana) singularis species-group (8 species worldwide):

3. *R. (T.) rimoganensis* (Miwa, 1934) (CHINA, Taiwan)

The genus *Rhyzodiastes* Fairmaire had only three species recorded hitherto in China and was thus a poorly studied group. In this paper, a new species is described and illustrated: *R. (T.) xii* sp. nov., belongs to the *R. (T.) singularis* species-group and was collected from Hainan Island, southeast China. An updated key to all species of the *R. (T.) singularis* species-group is compiled based on the version of Bell & Bell (1985, 2000) to include the new species.

Materials and methods

Totally three specimens of the new species were individually collected from Hainan Island, China. From limited collecting data, we can only know one male from rotten wood at the altitude of 1000 m and another male from cow dung at the altitude of 620 m.

Specimens were relaxed and softened in a hot saturated solution of potassium hydroxide for 4 minutes (for mounted dry specimens) or 8 minutes (for alcohol-preserved specimens), and then transferred to distilled water to rinse the residual potassium hydroxide off and stop any further bleaching. The softened specimens were moved to glycerin and dissected there to observe morphological details. After examination, the body parts were mounted on a plastic slip with Gum Arabic for future studies. Observations and measurements were performed using a Zeiss Axio Zoom.V16 motorized stereo zoom microscope (magnification up to $\times 270$). Color photographs were taken with a Zeiss AxioCam MRc 5 and the final deep focus images were created with the stacking software Helicon Focus 5.3. The program Adobe Photoshop® CS6 was used for image post-processing. The morphological terminology follows Bell & Bell (1978, 1985). All the types of the new species will be deposited in the National Taiwan University, Taipei, Taiwan, China (NTUC).

The following abbreviations are used for the measurements in millimeters (mm):

AL (antennal length): length from the antennal base to its tip.

EL (eye length): length of a single compound eye in lateral view.

ELL (elytral length): length from the basal border to the elytral apex along suture.

ELW (elytral width): maximum width of two elytra combined together.

EW (eye width): width of a single compound eye in lateral view.

HL (head length): axial length from the anterior apex of clypeus through the posterior margin of temporal lobe.

HW (head width): maximum width of head (including compound eyes).

PL (pronotal length): axial length of the pronotum.

PW (pronotal width): maximum width of pronotum.

TL (total length): length from the mandibular apex (mandibles closed) to the elytral apex.

Taxonomy

Genus *Rhyzodiastes* Fairmaire, 1895

Fairmaire, 1895: 11 (*Rhyzodiastes*; species included: *parumcostatus*, *spissicornis*); Grouvelle, 1903: 147 (*Clinidium* (*Rhyzodiastes*); catalog; [unavailable name]); Bell & Bell, 1978: 61 (*Rhyzodiastes*; new combinations of 22 spp.; characters); Bell & Bell, 1985: 6 (*Rhyzodiastes*; revision; phylogeny; characters; keys); Bell, 2003: 78 (*Rhyzodiastes*; Palaearctic catalog; distribution); Beutel, 2005: 146 (*Rhyzodiastes*; in generic list; distribution); Lorenz, 2005: 156 (*Rhyzodiastes*; world list; 44 spp.).

Type species: *Rhyzodes parumcostatus* Fairmaire, 1868, by original designation.

Subgenus *Temoana* Bell & Bell, 1985

Bell & Bell, 1985: 11 (*Rhyzodiastes* (*Temoana*); characters; phylogeny; key to species; species included: *alveus*, *bifossulatus*, *bipunctatus*, *bonsae*, *convergens*, *denticauda*, *fairmairei*, *fossatus*, *frater*, *gestroi*, *guineensis*, *indigenus*, *maritimus*, *mirabilis*, *mishmicus*, *myopicus*, *patruus*, *pollinosus*, *preorbitalis*, *propinquus*, *raffrayi*, *rimoganensis*, *singularis*, *spissicornis*, *sulcicollis*, *vadiceps*, *waterhousei*); Bell, 2003: 78 (*Rhyzodiastes* (*Temoana*); Palaearctic catalog; distribution); Beutel, 2005: 146 (*Rhyzodiastes* (*Temoana*); in generic list; distribution); Lorenz, 2005: 157 (*Rhyzodiastes* (*Temoana*); world list; 29 spp.).

Type species: *Rhyzodiastes spissicornis* Fairmaire, 1895, by original designation.

Rhyzodiastes (*Temoana*) *singularis* species-group

Bell & Bell, 1985: 25 (characters; phylogeny; key to species; species included: *bipunctatus*, *convergens*, *guineensis*, *indigenus*, *mirabilis*, *rimoganensis*, *singularis*).

Key to species of the *Rhyzodiastes (Temoana) singularis* species-group, modified based on Bell & Bell (1985, 2000)

1	Metasternum with median sulcus	2
-	Metasternum without median sulcus.	4
2	Median sulcus incomplete, limited to posterior half. Temporal lobes convergent posteriorly	<i>R. convergens</i> Bell & Bell
-	Median sulcus complete. Temporal lobes not convergent posteriorly	3
3	Temporal lobe with one unique seta in disc, besides the usual one in orbital groove. Basal setae present on antennomeres VI–X. Median groove deep, sublinear in middle 1/3	<i>R. bipunctatus</i> Bell & Bell
-	Temporal lobe only with one usual seta in orbital groove. Basal setae absent, only antennomere X with one or two. Median groove with moderate width, as wide as median pits	<i>R. xii</i> sp. nov.
4	Sutural stria absent or only represented by a few punctures	5
-	Sutural stria impressed	6
5	Median groove obsolete. Parasutural stria setose	<i>R. singularis</i> (Heller)
-	Median groove impressed. Parasutural stria without setae	<i>R. guineensis</i> (Grouvelle)
6	Median groove between pits linear. Temporal lobe with two setae in orbital groove.	<i>R. mindoro</i> Bell & Bell
-	Median groove not as narrow. Temporal lobe only with one usual seta in orbital groove	7
7	Outer carina of pronotum strongly narrowed anteriorly; pronotum without distinct front angles. Outer antennomeres cylindrical, twice as wide as long	<i>R. indigenus</i> Bell & Bell
-	Outer carina only slightly narrowed anteriorly, truncate at apex; pronotum with distinct front angles. Outer antennomeres spheroid, about 1.5 wider than long	8
8	Apex of pronotum wider than base; median groove nearly linear, much narrower than anterior median pit. Antenna without basal setae	<i>R. mirabilis</i> (Lea)
-	Apex of pronotum slightly narrower than base; median groove dilated, as wide as anterior median pit. Antenna with sparse basal setae on antennomeres VIII–X.	<i>R. rimoganensis</i> (Miwa)

***Rhyzodiastes (Temoana) xii* sp. nov.**

(Figs. 1A–F; 2A–G; 3A–C; 4A–E)

Material examined. Holotype: ♂, CHINA, Hainan: Jianfengling, main peak, 1000 m, rotten wood, individually collected, 25.XI.2008. **Paratypes:** 1♂, same data as holotype except: 620 m, cow dung; 1♀, Baoting County, 14.IV.2015, Lu Qiu leg.

Description. *Male holotype.* Medium size, TL: 6.56 mm. Length of different body parts: HL : AL : PL : ELL = 1.02 : 1.64 : 1.78 : 3.67 mm; width: HW : PW : ELW = 0.95 : 1.22 : 1.44 mm.

Habitus (Figs. 1A, B) elongate, rather narrow, and lustrous. Body colour mostly blackish brown to black; antennae and legs somewhat reddish brown; mouthparts reddish brown to yellowish brown.

Head (Figs. 2A–C) only slightly longer than wide, HL / HW = 1.07. Median lobe short and triangular, with acute apex opposite middle of eyes. Antennal lobe glabrous, separated from median lobe. Temporal lobe 2.36 longer than wide; inner margins strongly curved, so at middle, temporal lobes are separated by less than half width of one of them; temporal lobe fringed with pilosity. Anterior tentorial pits and postantennal pits distinct. Postclypeal groove very narrow. Frontal space narrow anteriorly, becoming broad posteriorly. Frontal grooves narrow, pollinose in anterior part. Orbital groove narrow but complete, angulate opposite posterior margin of eye; one usual temporal seta present in orbital groove, posterior to eye. Eye entire, narrowly crescentic, EL / EW = 4.97, about half length of temporal lobe. Genae glabrous, posterior face of temporal lobe pilose.

Antenna (Fig. 2D) with stylet short, conical and subacute. Minor setae tufts present on antennomeres V–X. Basal setae absent, only antennomere X with one or two. Antennomere I dorsally pollinose, while other antennomeres almost without pollinosity.

Pronotum (Fig. 2E) elliptical, moderately elongate, widest around middle, PW / PL = 1.46. Sides evenly curved, both ends distinctly narrowed. Median groove with moderate width, as wide as median pits; anterior median pit with subequal width to posterior median pit; posterior median pit displaced anteriorly, with anterior end at 3/8 of pronotal length before basal margin; median groove deep but slightly narrowed after posterior median pit, with sides glabrous; median groove in and between median pits glabrous medially, but with pollinose lateral scarps. Inner carina convex, with lateral margin gradually sloping into paramedian groove. Paramedian groove laterally bounded by pollinose strip on vertical medial scarp of outer carina; inner margin of outer carina curved, slightly undulating; basal impression small, narrowly closed posteriorly, connected to margin by pollinose strip. Outer carina moderately narrow, slightly tapered anteriorly. Marginal groove fine, impressed, linear and complete; visible

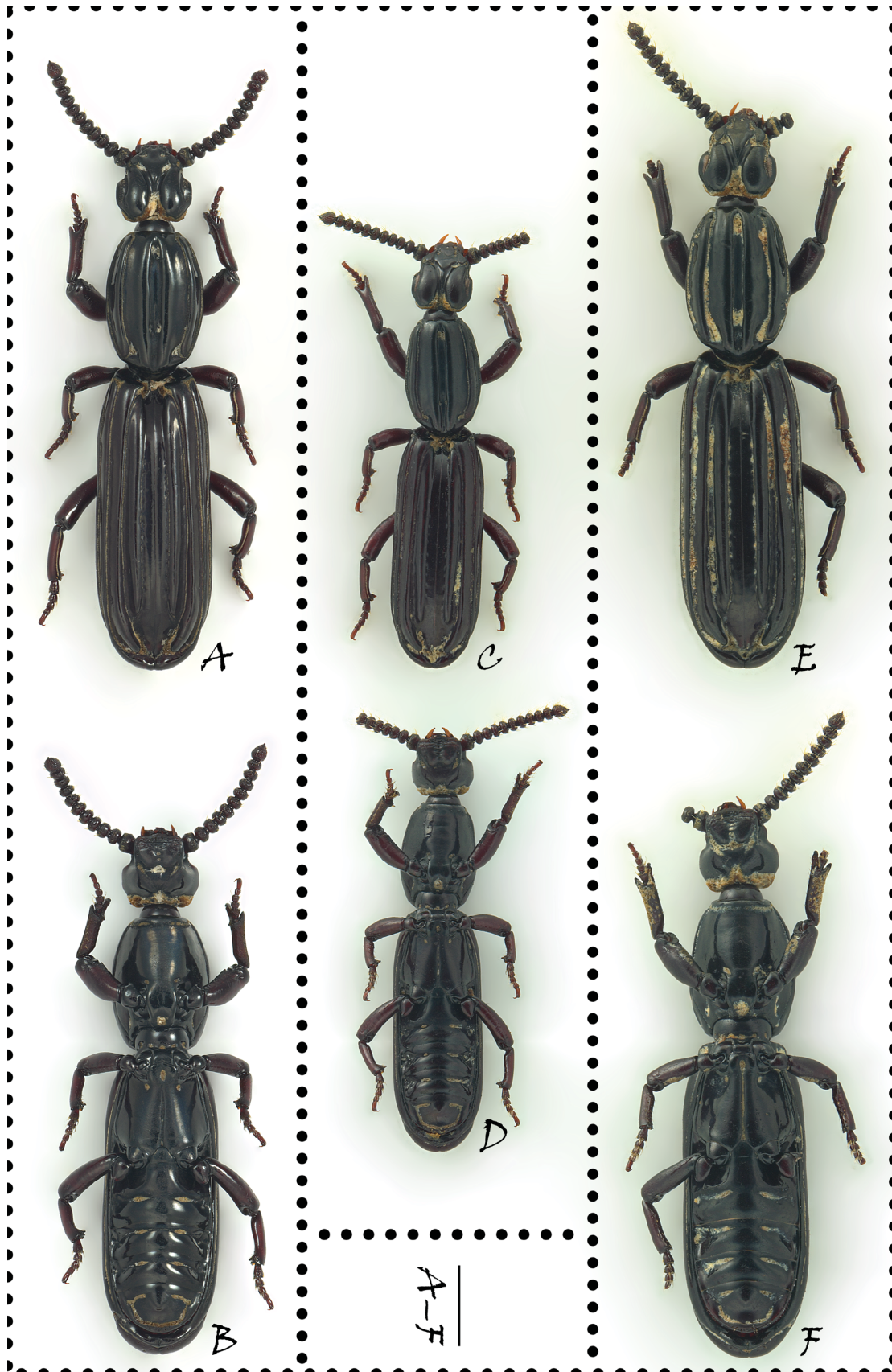


FIGURE 1. *Rhyzodiastes (Temoana) xii* sp. nov.: habitus: A, holotype ♂ (dorsal view); B, holotype ♂ (ventral view); C, paratype ♂ (small size; dorsal view); D, paratype ♂ (small size; ventral view); E, paratype ♀ (dorsal view); F, paratype ♀ (ventral view). Scales: 1 mm.

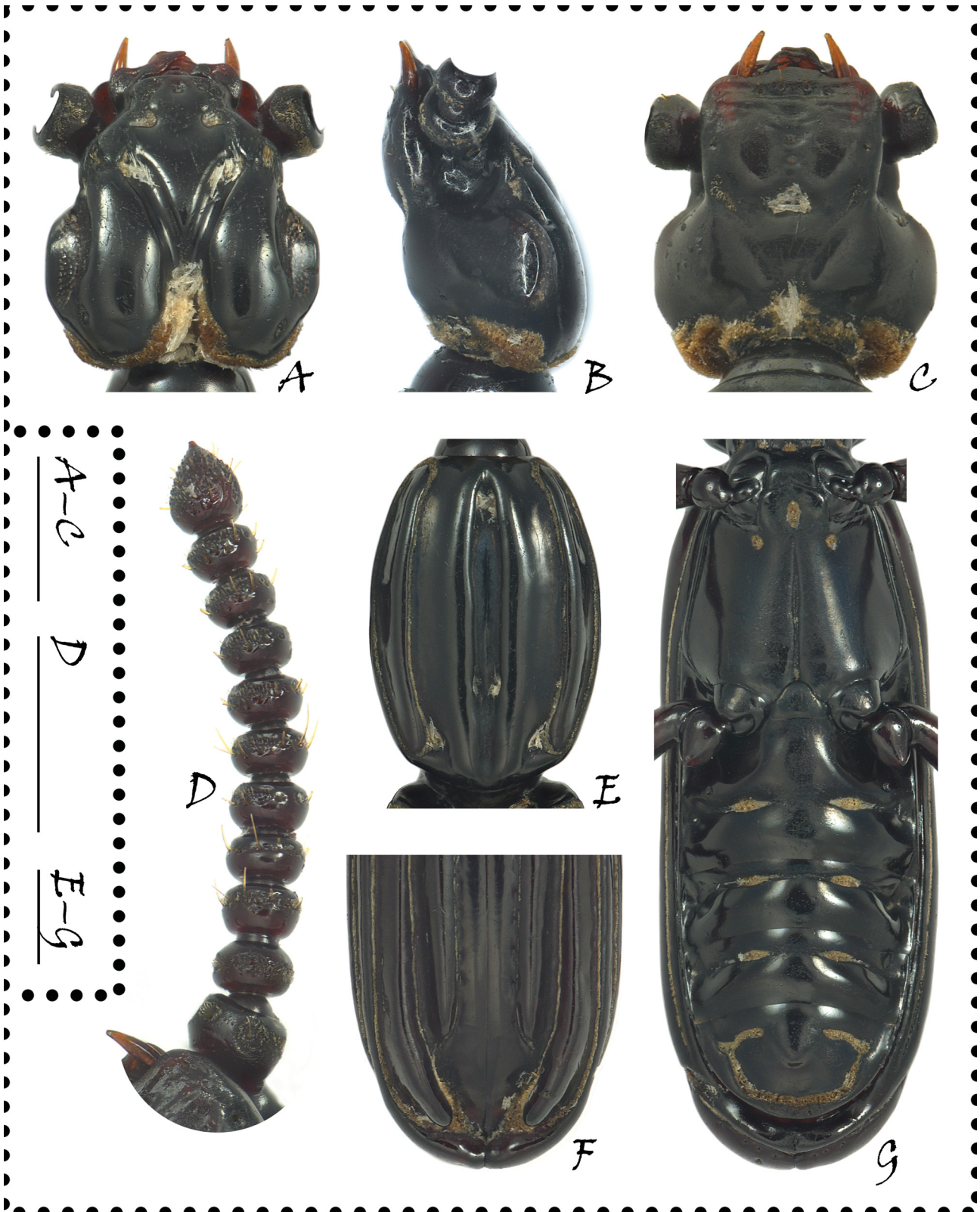


FIGURE 2. *Rhyzodiastes (Temoana) xii* sp. nov.: holotype ♂: A, head (dorsal view); B, head (lateral view); C, head (ventral view); D, antenna (ventral view); E, pronotum (dorsal view); F, elytral apex (dorsal view); G, metasternum & abdomen (ventral view). Scales: 0.5 mm.

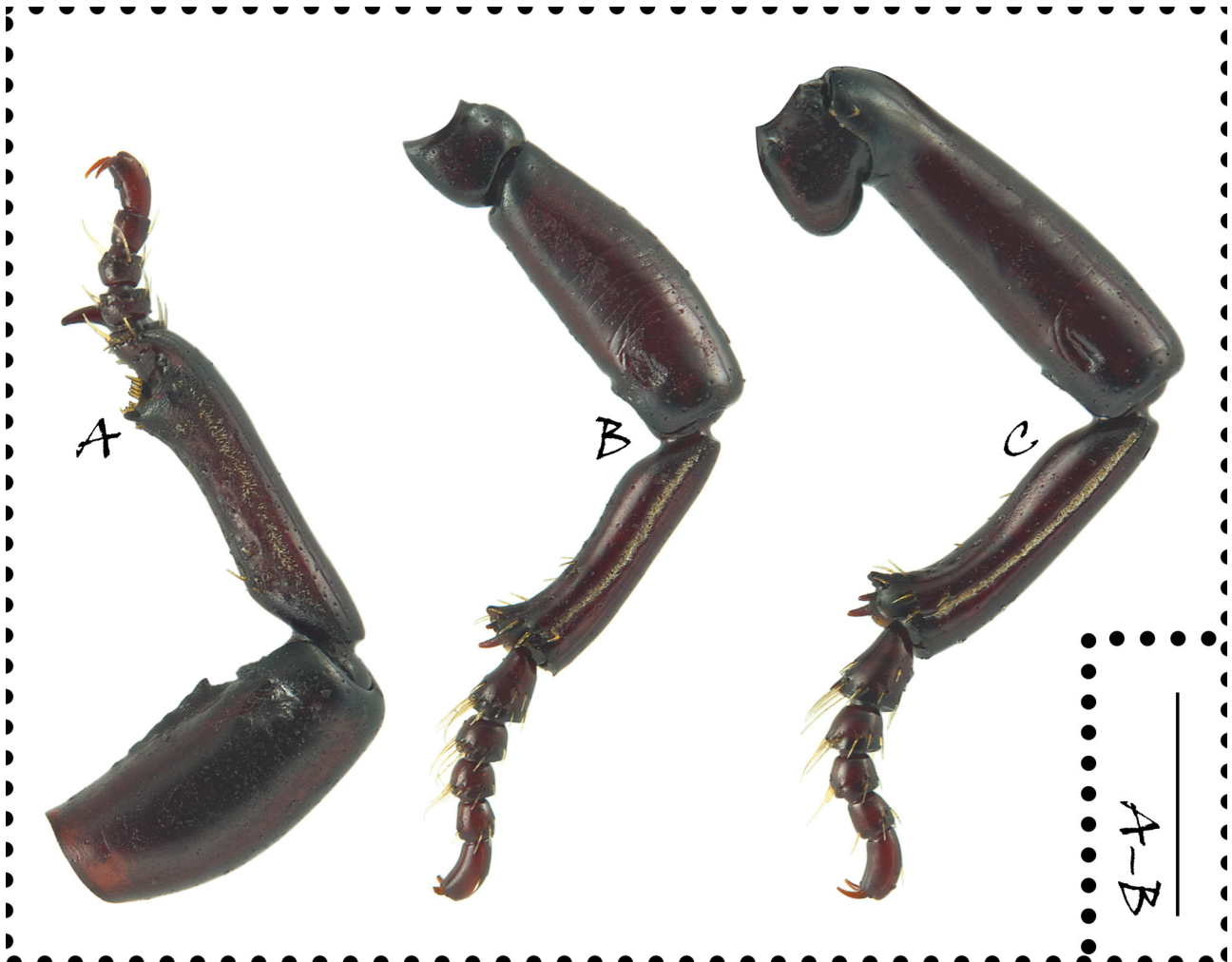


FIGURE 3. *Rhyzodiastes (Temoana) xii* sp. nov.: holotype ♂: A, fore leg (lateral view); B, middle leg (lateral view); C, hind leg (lateral view). Scales: 0.5 mm.

in dorsal view as is margin laterad to it. Submarginal groove nearly complete, becoming finely pollinose posteriorly. Pronotal setae absent. Notopleural suture slightly pollinose. Sternopleural groove absent. Pleural groove incurved and pollinose. Ventral surface of prothorax opalescent.

Elytra (Figs. 1A; 2F) elongate, widest at about apical 3/8, $ELL / ELW = 2.54$. Elytron pilose around scutellar pits, extending laterally to base of Interval II, but broadly interrupted in Interval III. Sutural interval flat. Sutural stria impressed, faintly punctate and finely pollinose, with apex laterally curved at apical 1/5 of elytron to join parasutural stria. Interval II convex, sloped laterally. Parasutural stria deep, its lateral wall a medially directed scarp, its apical part incurved, posterior its pollinosity combining with that of intratubercular stria, and the combined strip continuing across anterior face of apical tubercle up to suture. Interval III slightly convex, its apex forming scarcely dilated subapical tubercle, which separated by 3.17 width of one of them. Intratubercular stria impressed, pollinose, dilated. Interval IV slightly convex, continuous with moderately swollen apical tubercle. Marginal stria entire, impunctate, deep. Submarginal stria impressed, ending after base of sternum VI. (Because most of the elytral setae are missing in examined specimens, I abandon describing them.) Elytral cauda absent. Metathoracic wings vestigial.

Profemur (Fig. 3A) with a low and subacute tooth on ventral side. Meso- & metatibia (Figs. 3B, C) with two unequal spurs, and one small, protrudent, subacute calcar respectively. Pro- & metatrochanter with round apex.

Ventral surfaces of pterothorax and abdomen (Fig. 2G) opalescent. Metasternum with complete median sulcus. Abdominal Sterna I & II with flattened, microsculptured median area. Sterna III–V with large lateral pits and medially interrupted pollinose transverse sulci. Sternum VI without any tubercles, and with widely interrupted transverse sulci, each joined to apices of submarginal sulcus.

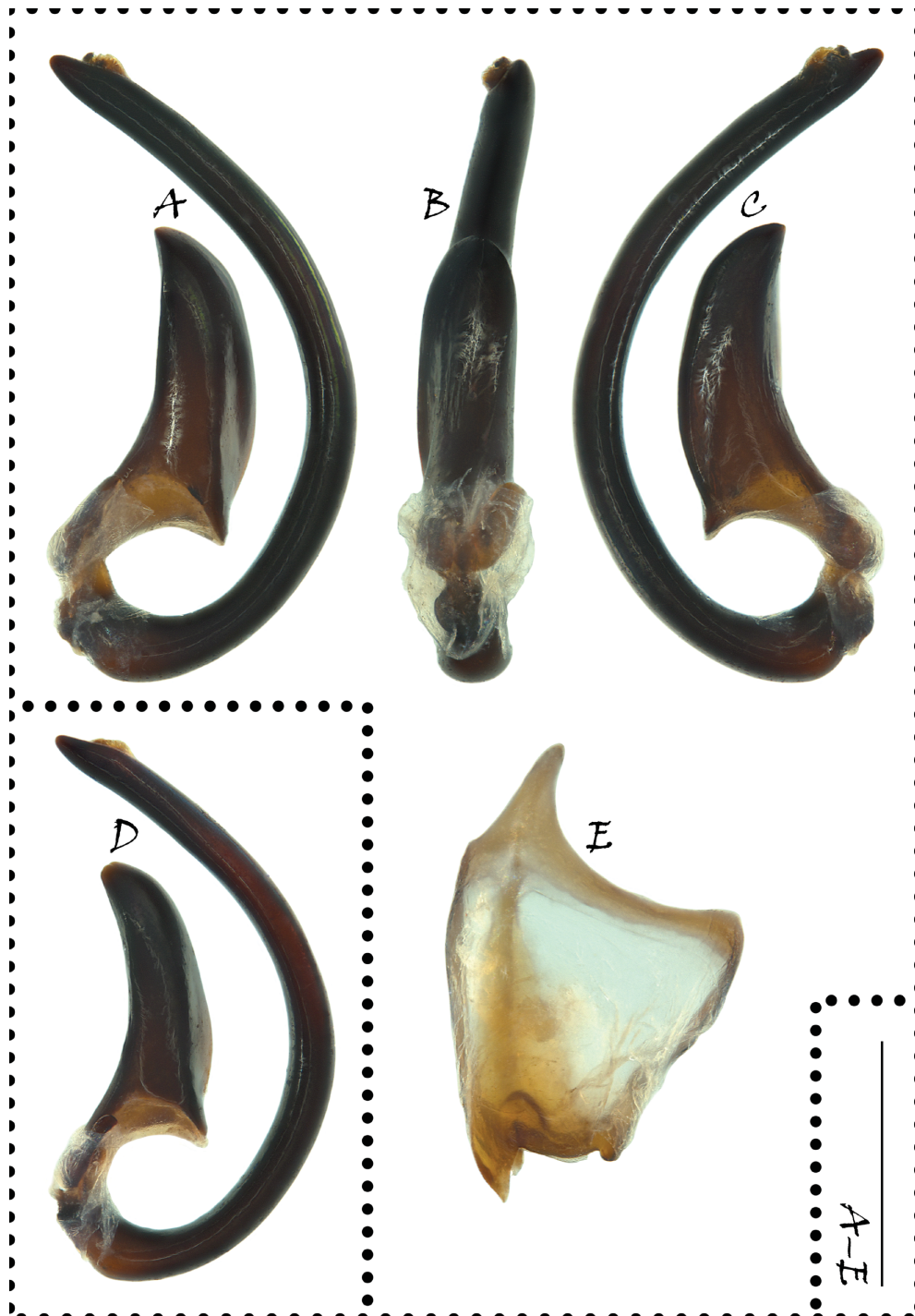


FIGURE 4. *Rhyzodiastes (Temoana) xii* sp. nov. ♂: **A**, aedeagus (holotype; left lateral view); **B**, aedeagus (holotype; ventral view); **C**, aedeagus (holotype; right lateral view); **D**, aedeagus (paratype; small size; left lateral view); **E**, genital segment (holotype; dorsal view). Scales: 0.5 mm.

Genital segment as shown in Fig. 4E, with handle moderately long and narrowly rounded at tip.

Aedeagus as shown in Figs. 4A–C, with median lobe very slender and tubular.

Male paratype (Figs. 1C, D; 4D). Much smaller than holotype, but there are no remarkable differences on external and aedeagal characters between them. The small body size is probably due to malnutrition during larval stage.

Female paratype (Figs. 1E, F). Similar to male in general appearance. Meso- & metatibia without calcars. Sternum IV with lateral pits distinctly larger than that on sterna III & V. Sternum VI with transverse sulci dilated laterally.

Etymology. The specific epithet is dedicated to Dr. Xi Jin-Ping, the President of the People's Republic of China, for his leadership making our motherland stronger and stronger.

Distribution. China (Hainan).

Diagnosis This new species well resembles *R. (T.) rimoganensis* (Miwa) in general appearance, but it is easily to distinguish it from the latter by the combination of the following characteristics: in *R. (T.)* xii **sp. nov.**, antenna without basal setae (only antennomere X with one or two), pronotal anterior median pit with subequal width to posterior median pit, metasternum with median sulcus, sternum VI without any tubercles; while in *R. (T.) rimoganensis* (Miwa), antenna with sparse basal setae on antennomeres VIII–X, pronotal anterior median pit wider than posterior median pit, metasternum without median sulcus, sternum VI with a pair of tubercles.

Additionally, for members in the *R. (T.) singularis* species-group, only the new species and *R. bipunctatus* Bell & Bell have complete median sulcus on metasternum, but it is easily to distinguish them from the Key 3 above.

Acknowledgements

I would like to express my sincere gratitude to Lu Qiu (Southwest University, Chongqing, China) for donating specimens of the new species. I am indebted to Jan Růžička (Czech University of Life Sciences, Prague, Czech Republic) for offering me the opportunity to continue my taxonomic research in Europe. I am obliged to Hong-Zhang Zhou (Institute of Zoology, Chinese Academy of Sciences, Beijing, China) for his supervision during my PhD time. I thank Harry Taylor (Natural History Museum, London, United Kingdom) for providing some important habitus photos. I also want to express my thanks to Miao-Miao Chen (Chengdu, Sichuan, China), Xi Fang (Beijing, China), Jia-Hui Feng (Chengdu, Sichuan, China), Li He (Chengdu, Sichuan, China), Liang He (Institute of Zoology, Chinese Academy of Sciences, Beijing, China), Bin Liu (Bin Insect Taxonomy Studio, Beijing, China), Hao Xu (Mt. Simianshan Nature Reserve, Chongqing, China), Pei-Fang Wang (Chengdu, Sichuan, China), Pei-Liang Wang (Chengdu, Sichuan, China), Qiao-Zhi Yang (Beijing, China) and so on for their continual support on my study. I am grateful to two reviewers who provided constructive comments on previous versions of the manuscript.

References

- Bell, R.T. (2003) Family Rhysodidae Laporte, 1840. In: Löbl, I. & Smetana, A. (Eds.), *Catalogue of Palaearctic Coleoptera. Volume I. Archostemata - Myxophaga - Adephaga*. Apollo Books, Stenstrup, p. 78.
- Bell, R.T. & Bell, J.R. (1978) Rhysodini of the world. Part I. A new classification of the tribe, and a synopsis of *Omoglymmius* subgenus *Nitiglymmius*, new subgenus (Coleoptera: Carabidae or Rhysodidae). *Quaestiones Entomologicae*, 14 (1), 43–88.
- Bell, R.T. & Bell, J.R. (1985) Rhysodini of the world. Part IV. Revisions of *Rhysodiastes* Fairmaire and *Clinidium* Kirby, with new species in other genera (Coleoptera: Carabidae or Rhysodidae). *Quaestiones Entomologicae*, 21 (1), 1–172.
- Bell, R.T. & Bell, J.R. (2000) Rhysodine beetles (Insecta: Coleoptera: Carabidae): new species, new data. II. *Annals of Carnegie Museum*, 69 (2), 69–91.
- Bell, R.T. & Bell, J.R. (2009) Rhysodine beetles (Insecta: Coleoptera: Carabidae): new species, new data III. *Annals of Carnegie Museum*, 78 (1), 45–77.
<http://dx.doi.org/10.2992/007.078.0104>
- Bell, R.T. & Bell, J.R. (2011) Four new species of Rhysodini (Coleoptera: Carabidae) with revised keys to *Grouvellina* Bell & Bell and the *mishmicus* group of *Rhysodiastes* Fairmaire. *Stuttgarter Beiträge zur Naturkunde A, Neue Serie* 4, 129–135.
- Beutel, R.G. (2005) 7.9. Family Rhysodidae Laporte, 1840 (= Rhysodini s. Bell). In: Beutel, R.G. & Leschen, R.A.B. (Eds.), *Handbook of Zoology. Volume IV Arthropoda: Insecta Part 38. Coleoptera, Beetles. Volume 1: Morphology and Systematics (Archostemata, Adephaga, Myxophaga, Polyphaga partim)*. Walter de Gruyter, Berlin, pp. 146–152.
- Fairmaire, L. (1868) Notes sur les Coléoptères recueillis par Ch. Coquerel à Madagascar et sur les Côtes d'Afrique. Rhysodidae. *Annales de la Société Entomologique de France*, 8 (4), 782–783.
- Fairmaire, L. (1895) Descriptions de quelques Coléoptères de Madagascar. *Annales de la Société Entomologique de Belgique*, 39, 10–12.
- Grouvelle, A. (1903) Synopsis des Rhysodides et descriptions d'espèces nouvelles. *Revue d'Entomologie*, 22, 85–148.
- Lorenz, W. (2005) *Systematic list of extant ground beetles of the world (Insecta Coleoptera "Geadephaga": Trachypachidae and Carabidae incl. Paussinae, Cicindelinae, Rhysodinae)*. Second Edition. Wolfgang Lorenz, Tutzing, Germany, 530 pp.
- Miwa, Y. (1934) On a new species of Rhysodidae from Formosa. *Transactions of the Natural History Society of Formosa*, 24 (133), 256–257.