Four New Species of Ceratoderus Westwood, 1842 (Coleoptera, Carabidae, Paussinae) from Indochina

Maruyama, Munetoshi
The Kyushu University Museum

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Four New Species of *Ceratoderus* Westwood, 1842 (Coleoptera, Carabidae, Paussinae) from Indochina

Munetoshi Maruyama

The Kyushu University Museum, Fukuoka, 812-8581 Japan

Abstract. Four new species of *Ceratoderus* Westwood, 1842 are described from Indochina: *C. jendeki* sp. nov. (Central Laos), *C. kentaroi* sp. nov. (Southern Vietnam), *C. yunnanensis* sp. nov. (Yunnan, China), and *C. akikoae* sp. nov. (Northern Vietnam). They are similar to *C. bifasciatus* (Kollar, 1836), *C. tonkinensis* Wasmann, 1921 or *C. venustus* Hisamatsu, 1963, which are redescribed to distinguish from the new species.

Key words: Paussini, Ceratoderina, Laos, Vietnam, China.

Introduction

Six species of the genus *Ceratoderus* Westwood, 1842 (Paussini, Ceratoderina) are known from the Oriental region, namely, India, Pakistan, Afghanistan, Myanmar, Vietnam, Indonesia (Java), and Japan. Currently, several specimens *Ceratoderus* from across a large region of Indochina (*sensu lato*), namely, China (Yunnan), Laos and Vietnam, have accumulated in my collection. I classified these specimens into five species: in color pattern, four of them are almost the same as *C. bifasciatus* (Kollar, 1836) and *C. tonkinensis* Wasmann, 1921 which were originally described from India and Vietnam respectively. The remaining species is similar to *C. venustus* Hisamatsu, 1963 which was described from Japan. One of them from northeastern Laos was identified as *C. tonkinensis* Wasmann, 1921; the remaining four species were found to be new species. In this paper, I describe these four new species and redescribe *C. bifasciatus*, *C. tonkinensis* and *C. venustus*, and provide diagnostic characters for distinguishing these three species from the four new species.

Material and Methods

The specimens are deposited in the M. Maruyama collection at the Kyushu University Museum, Fukuoka (KUM), the Hokkaido University Museum (SEHU) and the National Museum of Nature and Science, Tsukuba (NSMT). Photographs were taken using a Canon EOS 50D with a Canon MP-E 65 mm 1–5X macro lens and mounted using the automontage software CombineZP. The following abbreviations are used for measurements: ACL, maximum length of antennal club; ACW, maximum width of antennal club; BL, body length (from apex of head to apices of elytra); H, head width; HTL, hind tibial length; PAW, maximum width of anterior part of pronotum; PL, pronotal length (at midline); PPW, maximum width of posterior part of pronotum (width of pronotal base). All measurements are in millimeters.

Ceratoderus Westwood, 1842

Ceratoderus Westwood, 1842: 51 (original description; type species: *Paussus bifasciatus* Kollar, 1836); Fowler, 1912: 455 (redescription, synonymic list, key to species known at that time); Luna de Carvalho, 1989: 410 (reissue of original description, key to species).

Diagnosis. Body small, shining, variable in color: normally clearly bicolored. Head simple, flattened on vertex. Mouthparts not clearly of the "closed" type, i.e. maxillary and labial palpi cover mouth opening from beneath only partially; antero-medial margin of memtum slightly visible; second from terminal segment of labial palpus widened apicad; terminal segment of labial palpus large,

E-mail: dendrolasius@gmail.com

wider than second from terminal segment of maxillary palpus, oval, with rounded tip. Antennal club with 5 subsegments, bean pod-shaped. Pronotum more or less apple-shaped, well divided into anterior and posterior parts by deep transverse furrow, and also divided by a longitudinal groove into left and right parts, furrows thus forming a "+"-shaped depression; transverse furrow with trichome-bearing glandular openings near lateral ends. Legs simple; tibiae narrow or flattened. Pygidium without marginal trichome.

Ceratoderus is similar to *Melanospilus* Westwood, 1845a, of the same subtribe Ceratoderina, but distinguished from it by the shallower transverse furrow on the pronotum, and the anterior part of the pronotum lacking a pair of spines.

Ceratoderus bifasciatus (Kollar, 1836)
(Figs. 1, 2)

Paussus bifasciatus Kollar, 1836: 336 (original description; type locality: India Orientali).

Ceratoderus bifasciatus: Westwood, 1845b: 37 (generic affiliation changed); Fowler, 1912: 455 (redescription, synonymic list); Luna de Carvalho, 1989: 413 (reissue of original description, notes).

Non-type material. 1♂, Kunjappanai, 15 km SE of Kotagiri, Nilgiri Hills, Tamil Nadu State, India, 10-12 VI 1999, Z. Kejval & M. Trýzna (KUM).

Redescription.

Body (Fig. 1) black but mouthparts, segment I and subsegments I-IV of antennal club, prothorax, basal 1/3 and apices of elytra, tibiae yellowish red to dark red. Dorsal surface of head moderately, rather coarsely punctured, but both sides of depressions glabrous; antennal club (Fig. 2), densely granulate-punctured except for junctions between subsegments, with minute seta on each granule, and sparse major setae; pronotum sparsely, finely punctured, with thin, short, subrecumbent setae; elytra smooth, sparsely with thin, short, subrecumbent setae; legs smooth and shining, sparsely with setae but apices of tibiae denser; pygidium with disc almost smooth, with short, subrecumbent setae in mesal area.

Head at frontal part with a pair of shallow depressions; vertex slightly convex; hind margin truncate; temples gently rounded, less prominent than eyes. Antennal club (Fig. 2) rather short, broad, slightly widened apicad, widest at base of subsegment V, ratio=2.4; fore margin shallowly emarginate; hind margin rounded overall, but subsegment I with distinct basal tooth, subsegments II-IV slightly emarginate.

Pronotum with anterior part much wider than posterior part, ratio=1.28; both ends of longitudinal groove indistinct around anterior 1/4 of anterior part and posterior 1/5 of posterior part; posterior part with almost parallel, slightly widened posteriad; posterior part with antero-lateral lobe which slightly towards laterally, truncate at apex, reaching near posterior margin of anterior part.

Elytra broad, widest around apical 1/3; surface with a pair of longitudinal glabrous line on black band; hind wings developed.

Legs robust; femora slightly compressed; tibiae well compressed, subparallel-sided; outer apical angle of hind tibiae obliquely truncate.

Pygidium with mesal area strongly convex, margined with shallow groove along posterior margin; disc glabrous around anterior and posterior areas.

Measurements. BL, 4.9; HW, 1.01; ACL, 1.53; ACW, 0.64; PL, 0.97; PAW, 1.02; PPW, 0.80; HTL, 1.01.

Distribution. India; Pakistan; and Myanmar.

Differential diagnosis. This species is readily distinguished from the other related species by the shorter antennal club and the compressed tibiae.

Ceratoderus jendeki Maruyama, sp. nov.
(Figs. 3, 4, 15)

Type material. Holotype, ♂, "Laos centr, Khammoun prov. NAKAI env., 17º43'N, 105º09'E, 22.V.-8.VI.2001, alt. 500-600m, E. Jendek & O. Šauša leg." (left antennal club, left fore tibia missing) (KUM).

Description.

Body (Fig. 3) black but mouthparts, segment I and subsegments I-III of club of antennae, prothorax, basal 1/3 and apices of elytra, tibiae yellowish red. Dorsal surface of head moderately, rather coarsely punctured; antennal club (Fig.4), except for between subsegments, densely granulate-punctured, with minute seta on each granule, and sparsely with major setae; pronotum sparsely, coarsely punctured, with thin, short, subrecumbent setae; elytra smooth, sparsely with thin, short, subrecumbent setae; legs smooth and shining, sparsely with setae but apices of tibiae denser; pygidium with disc moderately punctured, its mesal area with short, subrecumbent setae.

Head at frontal part with a pair of shallow depressions; vertex slightly convex; hind margin truncate; temples gently rounded, less prominent than eyes. Antennal club (Fig. 4) long, broad, slightly widened apicad, widest at base of subsegment V, ratio=2.4; fore margin shallowly emarginate; hind margin rounded overall, but subsegment I with distinct basal tooth, subsegments II-IV slightly

Figs. 1-10. *Ceratoderus* spp. 1, 2, Habitus and right antennal club of *C. bifasciatus*; 3, 4, ditto, *C. jendeki* sp. nov. (holotype); 5, 6, ditto, *C. kentaroi* sp. nov. (holotype); 7, 8, ditto, *C. tonkinensis*; 9, 10, ditto, *C. yunnanensis* sp. nov. (holotype).

emarginate.

Pronotum with; anterior part slightly wider than posterior part, ratio=1.18; both ends of longitudinal groove indistinct around anterior 1/8 of anterior part and posterior 1/4 of posterior part; posterior part gently widened posteriad; antero-lateral lobe of posterior part slightly towards laterally, slightly truncate at narrowed apex, almost reaching posterior margin of anterior part.

Elytra broad, widest around apical 1/3; surface with a pair of longitudinal glabrous line on apical half of black band; hind wings developed.

Legs slender; femora slightly compressed; tibiae slightly compressed, dilated apicad.

Pygidium with mesal area strongly convex, margined with deep groove along posterior margin; disc glabrous around anterior and posterior areas.

Measurements. BL, 4.2; HW, 0.91; ACL, 1.55; ACW, 0.64; PL, 0.82; PAW, 0.84; PPW, 0.71; HTL, 0.96.

Distribution. Central Laos (Khammoune Province).

Differential diagnosis. This species is distinguished from the other species (except *C. bifasciatus*) by a combination of the following character states: 1) antennae slightly widened apicad; 2) each subsegment of antennal club fully covered with setae; 3) subsegment I of antennal club with distinct tooth; 4) anterior part of pronotum much wider than posterior part (base of pronotum); 5) anterior end of longitudinal groove of pronotum almost reaching anterior margin; 6) posterior part of pronotum with antero-lateral lobe. Especially similar to *C. kentaroi* in body size and shape, and shape of antennal club, but distinguished from it by the setae and punctures on the body being more distinct, and the wider antennal club.

Etymology. Dedicated to Dr. Eduard Jendek, one of the collectors of the holotype.

Ceratoderus kentaroi Maruyama, sp. nov.
(Figs. 5, 6, 15)

Type material. Holotype, ♂, "Vietnam: Lam Dong, Da Lat, Ward 3, Near Tuyen Larn Lake, 22 XII 2001, Okajima K." (KUM).

Description.

Body (Fig. 5) black but mouthparts, segment I and subsegments I-III of club of antennae, prothorax, basal 1/3 and apices of elytra, tibiae yellowish red. Dorsal surface of head moderately, rather coarsely punctured; antennal club (Fig. 6), except for between subsegments, densely granulate-punctured, with minute seta on each granule, and sparsely with major setae; pronotum sparsely, finely punctured, with thin, short, inconspicuous setae; elytra smooth, sparsely with thin, short, inconspicuous setae; legs smooth and shining, sparsely with setae but apices of tibiae denser; pygidium with disc moderately punctured, its mesal area with short, subrecumbent setae.

Head at frontal part with a pair of shallow depressions; vertex slightly convex; hind margin truncate; temples gently rounded, less prominent than eyes. Antennal club (Fig. 6) long, slender, distinctly widened apicad, widest at middle of subsegment V, ratio=2.5; fore margin shallowly emarginate; hind margin rounded overall, but subsegment I with blunt basal tooth, subsegments II-IV slightly emarginate.

Pronotum with; anterior part much wider than posterior part, ratio=1.21; both ends of longitudinal groove indistinct around anterior 1/6 of anterior part and posterior 1/4 of posterior part; posterior part gently widened posteriad; posterior part without antero-lateral lobe.

Elytra slender, widest around apical 1/3; surface with some glabrous lines, its areas almost equal to setal areas; hind wings developed.

Legs slender; femora slightly compressed; tibiae slightly compressed, dilated apicad.

Pygidium with mesal area strongly convex, margined with deep groove along posterior margin; disc glabrous around anterior and posterior areas.

Measurements. BL, 4.5; HW, 0.93; ACL, 1.54; ACW, 0.63; PL, 0.85; PAW, 0.88; PPW, 0.72; HTL, 1.18.

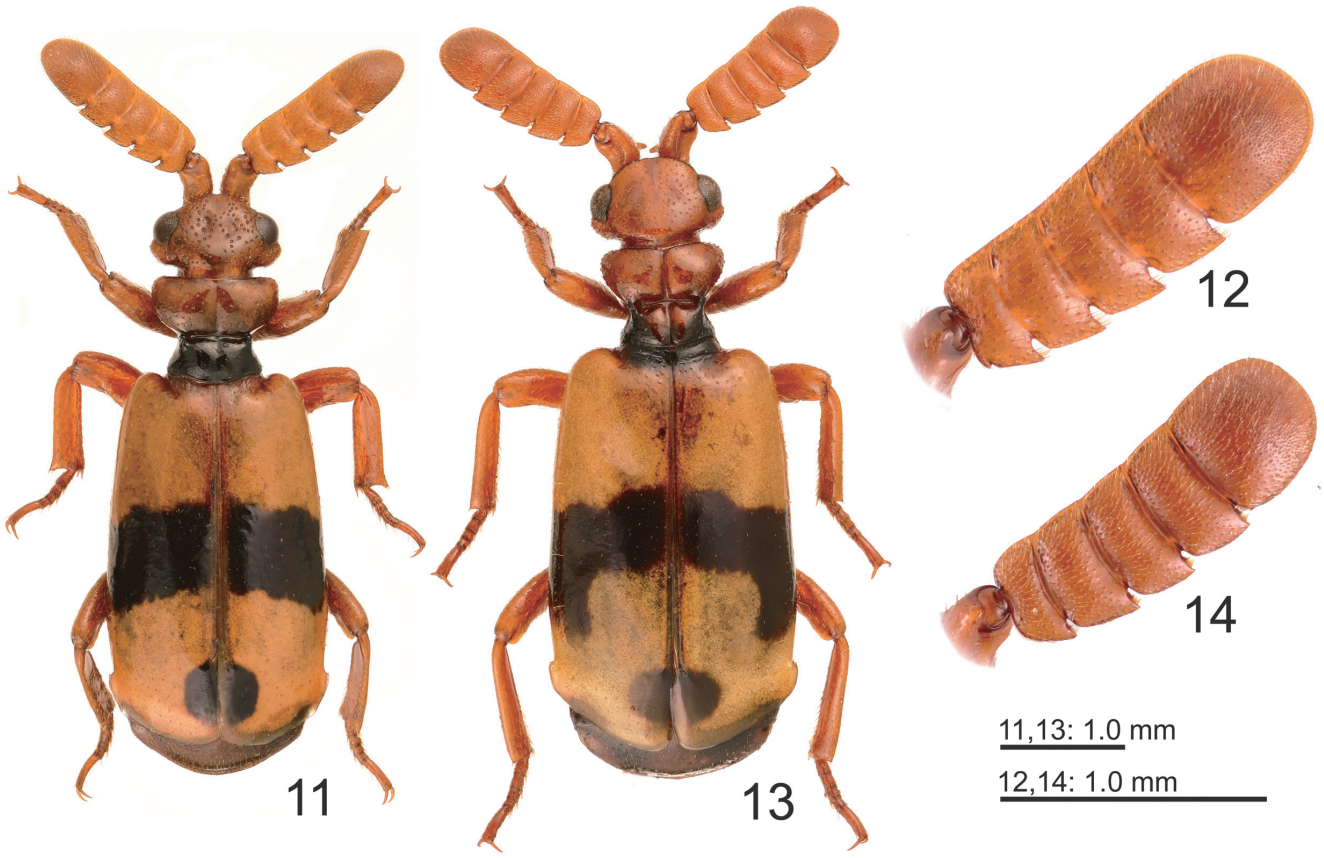
Distribution. Southern Vietnam (Lam Dong Province).

Differential diagnosis. This species is distinguished from the other species (except *C. bifasciatus*) by a combination of the following character states: 1) antennae distinctly widened apicad; 2) each subsegment of antennal club fully covered with setae; 3) subsegment I of antennal club with distinct tooth, but blunt at apex; 4) anterior part of pronotum wider than posterior part (base of pronotum); 5) anterior end of longitudinal groove of pronotum become indistinct around anterior 1/4 of apical part of pronotum; 6) posterior part of pronotum without antero-lateral lobe. Especially similar to *C. jendeki* in body size and shape, and the shape of the antennal club, but distinguished from it by the setae and punctures on the body being less distinct, and the narrower antennal club.

Etymology. Dedicated to Mr. Kentaro Okajima, collector of the holotype.

Ceratoderus tonkinensis Wasmann, 1921
(Figs. 7, 8, 15)

Ceratoderus tonkinensis Wasmann, 1921, 159 (original description; type locality: Hanoi, Vietnam); Luna de Carvalho, 1989: 417 (reissue of original description, notes).



Figs. 11-14. *Ceratoderus* spp. 11,12, habitus and right antennal club of *C. venustus*; 13, 14, ditto, *C. akikoae* sp. nov. (holotype).

Non-type material. 3♂, Phu Pan [Phoo Pan], Xam Neua [Sam Neua], Laos, VIII 2010, local collector (KUM).

Description.

Body (Fig. 7) black but mouthparts, segment I and subsegments I-III of club of antennae, prothorax, basal 1/3 and apices of elytra, tibiae yellowish red. Dorsal surface of head moderately, rather coarsely punctured, but around posterior margin of depressions glabrous; antennal club (Fig. 8) with subsegment I to basal half of subsegment V smooth, sparsely covered with major setae, without minute seta, and with apical half of subsegment V densely granulate-punctured with minute seta on each granule; pronotum sparsely, finely punctured, with thin, short, inconspicuous setae; elytra smooth, sparsely with thin, short, inconspicuous setae; legs smooth and shining, sparsely with setae but apices of tibiae denser; pygidium with disc finely punctured, with inconspicuous setae.

Head at frontal part with a pair of shallow depressions; vertex slightly convex; hind margin truncate; temples gently rounded, less prominent than eyes. Antennal club (Fig. 8) long, slender, distinctly widened apicad, widest at middle of subsegment V, ratio=2.6; fore margin shallowly emarginate; hind margin rounded overall, but subsegments I-IV distinctly emarginate, without basal tooth, but with round, inconspicuous corner.

Pronotum with; anterior part wider than posterior part, ratio=1.17; both ends of longitudinal groove indistinct around anterior 1/3 of anterior part and posterior 3/7 of posterior part; posterior part slightly widened posteriad; posterior part with antero-lateral lobe which towards upward, rounded at narrowed apex, not reaching posterior margin of anterior part.

Elytra slender, widest around apical 1/3; surface with some glabrous lines, its areas almost equal to setal areas; hind wings developed.

Legs slender; femora slightly compressed; tibiae slightly compressed, dilated apicad.

Pygidium with mesal area strongly convex, margined with deep groove along posterior margin; disc glabrous around anterior and posterior areas.

Measurements. BL, 5.1-5.4; HW, 0.99-1.06; ACL, 1.55-1.60; ACW, 0.60-0.65; PL, 1.04-1.06; PAW, 1.02-1.10; PPW, 0.87-0.91; HTL, 1.25-1.31.

Distribution. Northern Vietnam (Hanoi); and north-eastern Laos (Xam Neua). New record from Laos.

Differential diagnosis. This species is distinguished from the other species (except *C. bifasciatus*) by a combination of the following character states: 1) antennae distinctly widened apicad; 2) subsegments I-IV not punctured, not covered with minute setae, only with major setae; 3) subsegment I of antennal club without distinct tooth, but with round corner; 4) anterior part of pronotum almost as wide as posterior part (base of pronotum); 5) posterior end of longitudinal groove of pronotum become indistinct almost posterior half of apical part of pronotum; 6) posterior part of pronotum with antero-lateral lobe. Compared with the other species, the setae on the pronotum, the elytra, and the disc of the pygidium are shorter and more inconspicuous.

Although I did not examine the type specimen, the original description, especially of the states of the antennal club, completely agreed with the specimens examined.

Ceratoderus yunnanensis Maruyama, sp. nov.
(Figs. 9, 10, 15)

Type material. Holotype, ♂, "Datai, Shi-shan, Kunmin, Yunnan, China, 6 IX 2002" (KUM, will be deposited in Chinese Academy of Science)

Description.

Body (Fig. 9) black but mouthparts, segment I and subsegments I-III of club of antennae, prothorax, basal 1/3 and apices of elytra, tibiae yellowish red. Dorsal surface of head moderately, rather coarsely punctured; antennal club (Fig. 10), except for between subsegments and their sides, moderately granulate-punctured, with minute seta on each granule, sparsely with major setae, and punctures and setae on apical half of subsegment V denser; pronotum sparsely, finely punctured, with thin, short, subrecumbent setae; elytra smooth, sparsely with thin, short, subrecumbent setae; legs smooth and shining, sparsely with setae but apices of tibiae denser; pygidium with disc finely punctured, its mesal area with short, inconspicuous setae.

Head at frontal part with a pair of shallow depressions; vertex slightly convex; hind margin truncate; temples gently rounded, less prominent than eyes. Antennal club (Fig. 4) long, slender, distinctly widened apicad, widest at middle of subsegment V, ratio=2.8; fore margin shallowly emarginate; hind margin rounded overall, but subsegments I-IV slightly emarginate, without basal tooth, but with round, inconspicuous corner.

Pronotum with; anterior part almost as wide as posterior part, ratio=1.08; both ends of longitudinal groove indistinct around anterior 1/4 of anterior part and posterior 1/4 of posterior part; posterior part gently widened posteriad; posterior part with antero-lateral lobe which towards upward, slightly rounded at narrowed apex, almost reaching posterior margin of anterior part.

Elytra broad, widest around apical 1/3; surface with a pair of longitudinal glabrous line on black band; hind wings developed.

Legs slender; femora slightly compressed; tibiae slightly compressed, dilated apicad.

Pygidium with mesal area strongly convex, margined with deep groove along posterior margin; disc glabrous around anterior and posterior areas.

Measurements. BL, 5.4; HW, 1.03; ACL, 1.81; ACW, 0.65; PL, 1.01; PAW, 0.95; PPW, 0.88; HTL, .

Distribution. China (Kunming, Yunnan).

Differential diagnosis. This species is distinguished from the other species (except *C. bifasciatus*) by a combination of the following character states: 1) antennae distinctly widened apicad; 2) subsegments I-IV moderately covered with setae; 3) subsegment I of antennal club without distinct tooth, but with round corner; 4) anterior part of pronotum almost as wide as posterior part (base of pronotum); 5) anterior end of longitudinal groove of pronotum become indistinct around anterior 1/4 of apical part of pronotum; 6) posterior part of pronotum with antero-lateral lobe. Especially similar to *C. tonkinensis* in the shape of antennal club, but distinguished from it by the denser setae of the antennal club.

Etymology. Named after Yunnan where the type locality situated.

Ceratoderus venustus Hisamatsu, 1963
(Figs. 11, 12)

Ceratoderus venustus Hisamatsu, 1963: 112 (original description).

Material examined. 1♂, Ashizuri-misaki, Tosashimizu-shi, Kôchi-ken, Japan, 16 VI 2000, Hayakawa S.; 2♂, same data, but 10 VI 2010, Miyata T. & T.; 1♂, same data, but 16 VI 2010, Befu S.; 1♂, same data, but 1 VII 2012, Kageyama K. (above all KUM); 1♂, Kokubunji, Satsuma-Sendai-shi, Kagoshima-ken, VII 1966, Seribuchi M. (SEHU).

Redescription.

Body (Fig. 11) brownish red but posterior part of pronotum black, elytra yellowish red with black band at middle and black maculae near apices. Dorsal surface of head sparsely, rather coarsely punctured, but around apex of frontal part and center of vertex glabrous; antennal club (Fig. 12), except for between subsegments, densely

granulate-punctured, with seta on each granule, and sparsely with major setae on subsegment V; pronotum sparsely, finely punctured, with thin, short, subrecumbent setae; elytra smooth, sparsely with thin, short, subrecumbent setae; legs smooth and shining, sparsely with setae but apices of tibiae denser; pygidium with disc almost smooth, its mesal area with short, subrecumbent setae.

Head at frontal part with a pair of shallow depressions; vertex slightly convex; hind margin obscure, slightly rounded; temples strongly convex laterad, more prominent than eyes. Antennal club (Fig. 12) rather short, narrow, slightly widened apicad, widest at apex of subsegment IV, ratio=2.8-3.0; fore margin shallowly emarginate; hind margin rounded overall, but inter-subsegments notched in V-shape; subsegment I with small but distinct basal tooth.

Pronotum with anterior part much wider than posterior part, ratio=1.31; longitudinal groove indistinct, especially weakly defined on posterior part; posterior part widened posteriad; antero-lateral lobe of posterior part slightly towards laterally, acute at apex, reaching near posterior margin of anterior part.

Elytra broad, widest around apical 2/5; middle black band gently curved; hind wings developed.

Legs robust; femora slightly compressed; tibiae well compressed, subparallel-sided; outer apical angle of hind tibiae obliquely truncate.

Pygidium gently convex, margined with shallow, narrow groove along posterior margin; disc glabrous around anterior areas.

Measurements. BL, 4.3-4.5; HW, 0.97-1.06; ACL, 1.50-1.58; ACW, 0.52-0.53; PL, 0.74-0.83; PAW, 0.98-1.04; PPW, 0.74-0.78; HTL, 1.02-1.05.

Distribution. Japan (Shikoku; Kyûshû; and Yakushima).

Differential diagnosis. This species is closely similar to *C. akikoae*, but distinguished from it by the head being with a pair of distinct depression, the apical half of the antennal club being more slender, the shallower furrows on the pronotum, the thicker legs, and the black band on the elytra lacking a postero-lateral projection.

Ceratoderus akikoae Maruyama, sp. nov.
(Figs. 13-15)

Type material. Holotype, ♂, "Tam Dao (1230 m), Vinh Phu Prov., N. Vietnam, 22. IV. 1995, A. Saito leg." (NSMT)

Description.

Body (Fig. 13) brownish red but posterior part of pronotum black, elytra yellowish red with black band at middle and black maculae near apices. Dorsal surface of head sparsely, rather finely punctured; antennal club (Fig. 14), except for between subsegments, densely granulate-punctured, with seta on each granule, and sparsely with major setae on subsegment V; pronotum sparsely, finely punctured, with thin, short, subrecumbent setae; pronotum sparsely, finely punctured, with thin, short, subrecumbent

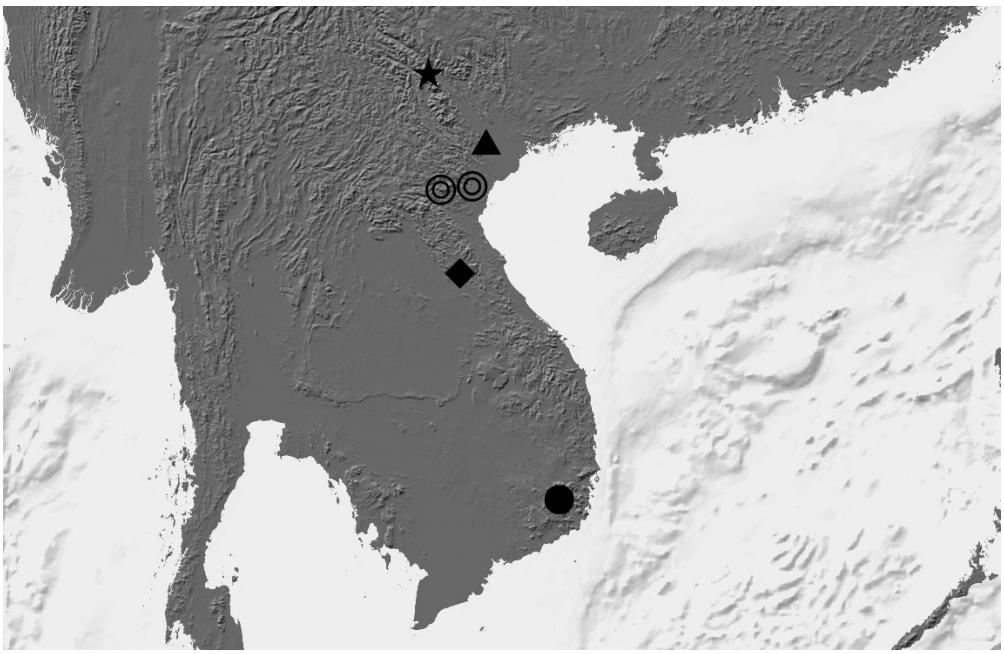


Fig. 15. Locality map of examined specimens of *Ceratoderus* spp. from Indochina: black star, *C. yunnanensis* sp. nov.; black triangle, *C. akikoae* sp. nov.; double circle, *C. tonkinensis*; black diamond, *C. jendeki* sp. nov.; black circle, *C. kentaroi* sp. nov. (From north to south.)

setae; elytra smooth, sparsely with thin, short, subrecumbent setae; legs smooth and shining, sparsely with setae but apices of tibiae denser; pygidium with disc almost smooth, its mesal area with short, subrecumbent setae.

Head at frontal part with a pair of shallow depressions which are ill-defined; vertex weakly convex; hind margin obscure, rounded; temples strongly convex laterad, more prominent than eyes. Antennal club (Fig. 12) rather short, broad, widened apicad, widest at apex of subsegment IV, ratio=2.8; fore margin shallowly emarginate; hind margin rounded overall, but inter-subsegments notched in V-shape; subsegment I without basal tooth.

Pronotum with anterior part much wider than posterior part, ratio=1.28; both ends of longitudinal groove distinct, reaching anterior and posterior margins; posterior part with widened posteriad; antero-lateral lobe of posterior part long, distinctly towards laterally, acute at apex, reaching near posterior margin of anterior part.

Elytra broad, widest around apical 2/5; middle black band gently curved, with postero-lateral projections; hind wings developed.

Legs rather robust; femora and tibiae slightly compressed; tibiae gently widened apicad; outer apical angle of hind tibiae obliquely truncate.

Pygidium gently convex, margined with shallow, narrow groove along posterior margin; disc glabrous around anterior areas.

Measurements. BL, 4.6; HW, 1.03; ACL, 1.42; ACW, 0.50; PL, 0.75; PAW, 0.96; PPW, 0.75; HTL, 1.05.

Distribution. Northern Vietnam (Vĩnh Phúc).

Differential diagnosis. This species is closely similar to *C. venustus*, but distinguished from it by the head which has a pair of weakly distinct depression, the apical half of the antennal club being wider, the deeper furrows on the pronotum, the slenderer legs, and the black band on the elytra lacking postero-lateral projections.

Etymology. Dedicated to Dr. Akiko Saito, collector of the holotype.

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