작은 세상의 다양성

The Diversity of Small Worlds

Volume I
Issue I
Mar. 2025

Administrator & Editor
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원고 작성 요령은 출판사 사슴벌레연구소 누리집을 확인하십시오.
Manuscript preparation guidelines are available on the Stag Lab homepage.
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간행물 사업자 정보	**작은 세상의 다양성** **대표** 최원석 서울시 구로구 디지털로26길 43, R동 1102-A137호
간행물 신고 번호	구로, 사00024
간행물 신고 연월일	2025년 02월 25일
발행인	최원석
편집인	최원석
발행소	작은 세상의 다양성
발행일	2025년 02월 23일
ISSN	3059-1260

작은 세상의 다양성 1(1): 54-62, 2025
The Diversity of Small Worlds
Received: 01.Feb.2025
Accepted: 08.Feb.2025
doi.org/10.23332/DOSW.2025.1.1.54

Research

Pictorial Key for species identification of the *Cheirotonus* Hope (Coleoptera, Scarabaeidae, Melolonthinae) in Indochinese Peninsula

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초록

Cheirotonus Hope, 1840는 9종으로 구성되어 있는 딱정벌레 무리로, 인도차이나 반도에 5종이 분포한다. 인도차이나 반도에 분포하는 종의 경우 서식지가 겹치는 경우가 빈번하고, 형태적으로 유사한 경우가 많아 외부 형태 및 서식지를 기준으로 구분하는 것에 많은 어려움이 있다. 본 문헌에서는 인도차이나 반도에 서식하는 5종의 *Cheirotonus*속 곤충을 형태적으로 구분할 수 있도록, 각 종의 형태적 차이를 기반으로 한 사진 기반 검색표(Pictorial key)를 제공하였다.

Abstract

Cheirotonus Hope, 1840 is a group of beetles comprising nine species, five of which are found in the Indochinese Peninsula. These five species often have overlapping habitats and are morphologically very similar, making it difficult to distinguish them based on external characteristics and habitat alone. This paper provides a pictorial key based on the morphological differences of each species, to enable morphological identification of the five *Cheirotonus* species found in the Indochinese Peninsula.

Keywords: *Cheirotonus*, Indochinese Peninsula, pictorial key, Long-armed chafer beetles

Introduction

Cheirotonus Hope, 1840 is a group of beetles belonging to the tribe Euchirni, which is characterized by their long, developed forelegs in males. They are morphologically distinguished by their glossy, greenish pronotum with serrated edges and black elytra with orange markings (Hope, 1840; Young, 1989). The genus *Cheirotonus* comprises nine species (*C. battareli, C. formosanus, C. gestroi, C. jambar, C. jansoni, C. macleayi, C. parryi, C. peracanus* and *C. ternumai*), of which seven species (*C. battareli, C. gestroi, C. jansoni, C. macleayi, C. parryi,*

C. peracanus and *C. ternumai*) are found in the Himalayan highlands, southern China, and the Indochinese Peninsula (Schoolmeesters, 2025). The remaining two species (*C. formosanus* and *C. jambar*) are distributed in Taiwan and Okinawa Island, Japan, respectively (Ohaus, 1913; Kurosawa, 1984). Except for the two island-dwelling species, most *Cheirotonus* species are found in tropical highlands, with their main habitat known to be the Southeast Asian highlands stretching from the Himalayas, through northern India, and into northern Vietnam (Young, 1989). In particular, five species (*C. battareli, C. gestroi, C. jansoni, C. parryi* and *C. peracanus*) among the seven continental species are found in the Indochinese Peninsula, which includes Myanmar, Thailand, Vietnam, Laos, and Malaysia. These five species often share overlapping habitats, and many species have similar external morphologies, making it difficult to distinguish each species based on morphological characteristics and habitat.

This paper aims to establish a practical pictorial key for the five species of *Cheirotonus* inhabiting the Indochinese Peninsula, which are difficult to distinguish morphologically. The goal is to enable even those unfamiliar with this insect group to easily identify each species based on their morphological characteristics. The pictorial key presented in this paper is based on the external morphology of male individuals of the five *Cheirotonus* species inhabiting the Indochinese Peninsula. The descriptions of external morphology and diagnostic features were made by examining the specimens I possess and referring to the morphological characteristics described in the original descriptions of each species. Literatures describing the morphological characteristics of the genus *Cheirotonus* were consulted and summarized in addition to the original descriptions of each species. As the aim of this paper is to enable the simplest possible morphological classification through the presented pictorial key, features such as external genitalia were not used, and the pictorial key was created to organize the diagnostic features presented in existing literature.

Materials & Methods

Sample collection and examination

All adult specimens used in this paper were collected in the personal collection of the author, **MP**. Among 5 species in the Indochinese Peninsula, a total of 6 specimens from 5 species were examined (Table 1). The external morphology of the specimens was observed and recorded using a digital camera (ILCE-7M2; SONY, Tokyo, Japan). The abbreviations used in the taxonomic accounts are as follows. CM: Chiang Mai, Thailand; GH: Genting Highland, Malaysia; YB: Yen Bai, Vietnam.

Development of pictorial key for *Cheirotonus* in Indochinese Peninsula

Images of diagnostic characters were taken by a SONY A7M2(ILCE-7M2; SONY, Tokyo, Japan) equipped with a TAMRON 28-200mm f/2.8-5.6 Di III RXD A071(TAMRON, Saitama City, Japan) or SAMYANG 100mm f/2.8 ED UMC MACRO (LK Samyang, Changwon, South Korea) to capture 10 to 30 shots per image. Focus stacking was performed by Helicon Focus 8 (Helicon Soft, Ukraine) to merge the shots into a single image. The merged shots were adjusted using Adobe Lightroom (Adobe, California, USA). The final pictorial key

Species	Locality	Date
Cheirotonus battareli	Yen Bai, Vietnam	2023-05
Cheirotonus battareli	Yen Bai, Vietnam	2023-05
Cheirotonus gestroi	Yen Bai, Vietnam	2021-05
Cheirotonus jansoni	Yen Bai, Vietnam	2021-05
Cheirotonus parryi	Chiang Mai, Thailand	2015-08
Cheirotonus peracanus	Genting Highland, Pahang, Malaysia	2017-09

Table 1. Information of specimens used in observation of external characteristic.

used focus-stacked and adjusted images (Fig. 1). Morphological terminology used in this paper follows Young (1989).

Literature review

The author conducted a literature review of 7 papers, which documented the morphological characteristics of the *Cheirotonus* species in Indochinese Peninsula.

Pictorial key

The pictorial key was generated using external morphological characters including profemur projection, pronotal punctures, pronotal shape, and tuft of the prosternum (Fig. 1).

Taxonomic Accounts

***Cheirotonus battareli* Pouillaude, 1913** (Figs. 2A, 3A, 4A)

Cheirotonus battareli Pouillaude, 1913: 470–471.

Type locality. Haut-Tonkin, Bao-Lac, Cao Bang, Vietnam.

Materials examined. (2 exx) [MP] YB: 2 exx.

Diagnosis: Pronotum is wide, transverse in the middle, with the posterior part narrowing relatively sharply; small punctures are scattered less extensively, and the top of the globulous part is smooth. The profemur has triangular projection with wide base and an apex that curves outward. The protibia has two large spines on the inner side, and the apical spine is longer than median spine; the apical spine is medially toothed.

Distribution. China, Laos, Vietnam.

***Cheirotonus gestroi* Pouillaude, 1913** (Figs. 2B, 3B, 4B)

Cheirotonus gestroi Pouillaude, 1913: 470–471.
Cheirotonus corompti Pouillaude, 1913: 478.
Cheirotonus henrici Pouillaude, 1913: 472.
Cheirotonus chiangdaoensis Minet, 1987: 3

Type locality. Müssur-hills, Chiang Saen, Thailand.

1. Profemur with wide triangular projection.

1'. Profemur with narrow, spike like projection.

2. Punctures on pronotum small, less densely scattered.

2'. Punctures on pronotum large, densely scattered.

3. Pronotum adruptly narrowed towards the rear edge.

3'. Pronotum roundly narrowed towards the rear edge.

4. Prosternum between coxae naked.

4'. Prosternum between coxae covered by tuft of dense golden hairs.

Cheirotonus battareli

Cheirotonus gestroi

Cheirotonus jansoni

Cheirotonus parryi

Cheirotonus peracanus

Figure 1 (continued). Pictorial key of *Cheirotonus* species of Indochinese Peninsula. Illustrations of five species (*C. battareli*, *C. gestroi*, *C. jansoni*, *C. parryi*, and *C. peracanus*).

Materials examined. (1 ex) [MP] YB: 1 ex.

Diagnosis: Pronotum is wide, transverse in the middle, and the posterior part relatively sharply narrowed; large punctures are scattered extensively, and the top of the globulous part is smooth. The profemur has triangular projection with wide base and an apex that curves outward. The protibia has two large spines on the inner side, and the apical spine is longer than median spine; The apical spine is medially toothed.

Distribution. China, India, Laos, Myanma, Thailand, Vietnam.

Remark. In the original description, *C. battareli* and *C. gestroi* are distinguished based on the projection of the profemur. However, this feature does not seem to cover intraspecies variations, and all two species show both forms of profemur projections with pointed end and non-pointed end. Therefore, in the subsequent revision, this feature should not be used to distinguish these two species.

***Cheirotonus jansoni* (Jordan, 1898)** (Figs. 2C, 3C, 4C)

Propomacrus jansoni Jordan, 1898: 419.
Cheirotonus fujiokai Muramoto, 1994: 8–11.
Cheirotonus szetshuanus Medvedev, 1960: 14.
Propomacrus nankinensis Yu, 1936: 1.

Type locality. Kin-chang, Tse-kiang, China.

Materials examined. (1 ex) [MP] YB: 1 ex.

Diagnosis: Pronotum is wide, transverse in the middle, and the posterior part is abruptly narrowed; small, shallow punctures sparsely distributed except the depressed region between the globulous part. The profemur has spine-like projection in the middle. The protibia has numerous short spikes on the inside with two large spines; the anterior spine with an apical tooth. The elytra disc has a unicolorous burgundy to black color with orange lines on the suture and wing edges.

Distribution. China, Laos, Myanmar, Vietnam.

***Cheirotonus parryi* Gray, 1848** (Figs. 2D, 3D, 4D)

Cheirotonus parryi Gray, 1848: 59.

Type locality. Northern India.

Materials examined. (1 ex) [MP] CM: 1 ex.

Diagnosis: Pronotum is wide, transverse in the middle, roundly narrowing towards the rear; the punctures are densely distributed but sparsely distributed on the top of the globulous part. The profemur have spine-like projection in the middle. The protibia have two large spines on the

inner side; the apical spine is longer than the median spine, but the median spine also appears long, reaching a similar length; The apical spine is medially toothed.

Distribution. Cambodia, India, Laos, Myanmar, Vietnam, Thailand.

***Cheirotonus peracanus* Kriesche, 1919** (Figs. 2E, 3E, 4E)

Cheirotonus peracanus Kriesche, 1919: 77–78.
Cheirotonus arnaudi Minet, 1981: 287.

Type locality. Perak, Malaysia.

Materials examined. (1 ex) [MP] GH: 1 ex.

Diagnosis: Pronotum is wide, transverse in the middle, roundly narrowing towards the rear; the punctures are densely distributed. The profemur has spine-like projection in the middle. The protibia has two large spines on the inner side, and the apical spine is longer than median spine; the apical spine is apically toothed. Prosternum between coxae is covered by tuft of dense golden hairs.

Distribution. Peninsula Malaysia.

Remark. *C. peracanus* was described by Kriesche in 1919, but it was not listed in Ohaus' catalogues (1918, 1934). It seems that Ohaus was not aware of Kriesche's description. In 1981, Minet described new species in Malay peninsula, *C. arnaudi*, and Young listed this species in his revisional work instead of *C. peracanus*. Fujioka(1996) later corrected this, making *C. arnaudi* as a junior synonym of *C. peracanus*.

Figures continued on the following pages.

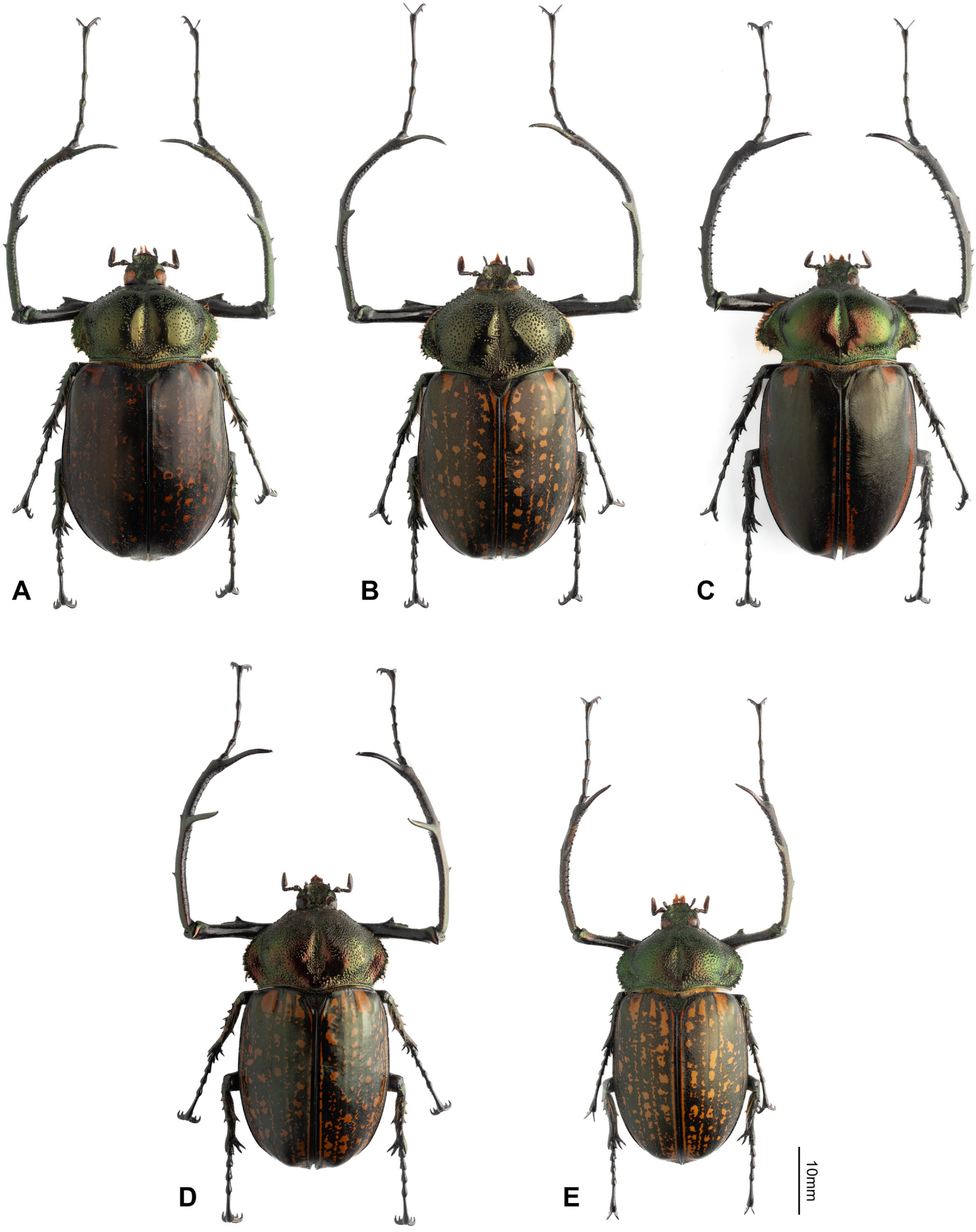

Figure 2. Habitus of *Cheirotonus* species of Indochinese Peninsula. (A) *C. battareli*, (B) *C. gestroi*, (C) *C. jansoni*, (D) *C. parryi*, (E) *C. peracanus*.

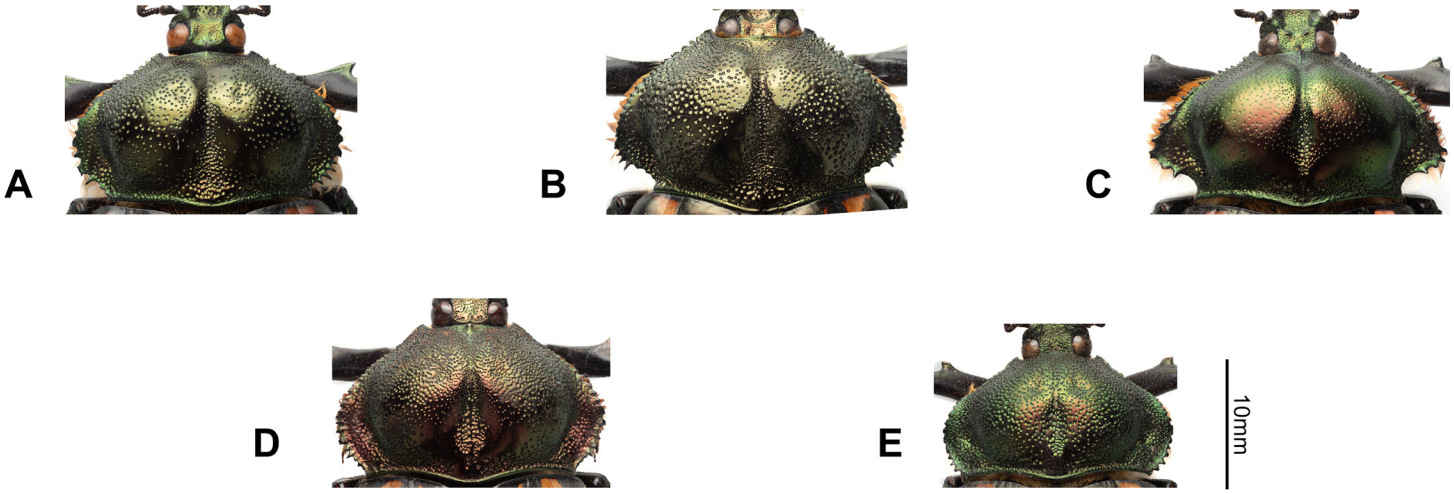

Figure 3. Pronota of *Cheirotonus* species of Indochinese Peninsula. (A) *C. battareli*, (B) *C. gestroi*, (C) *C. jansoni*, (D) *C. parryi*, (E) *C. peracanus*.

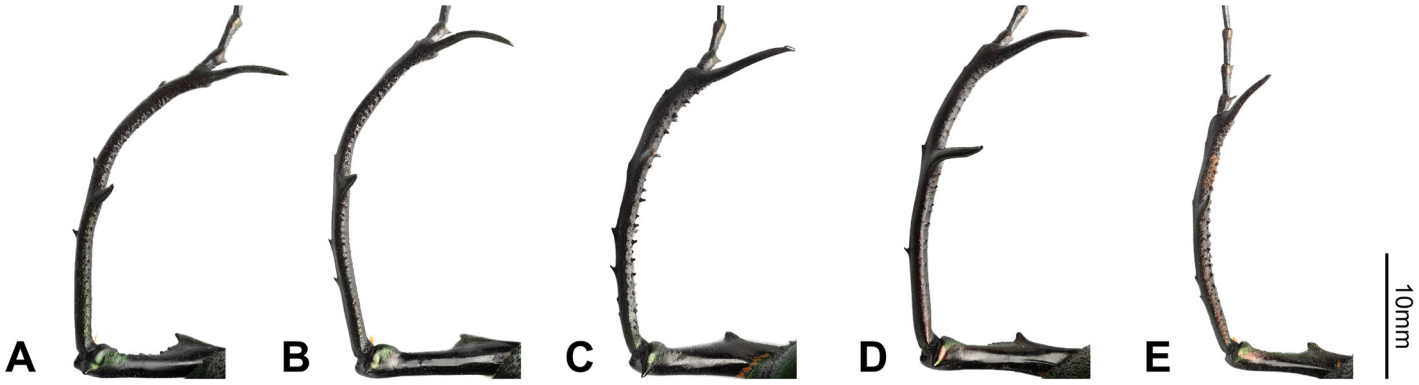

Figure 4. Protibiae and profemora of *Cheirotonus* species of Indochinese Peninsula. (A) *C. battareli*, (B) *C. gestroi*, (C) *C. jansoni*, (D) *C. parryi*, (E) *C. peracanus*.

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