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## Research article

urn:lsid:zoobank.org:pub:27DF46F5-C89A-45E9-87C9-9EF5C90CFAC1

# Six new species of the genus *Cacchothryptus* from the Himalayas (Coleoptera: Limnichidae)

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**Abstract.** Six new species of the genus *Cacchothryptus* (Coleoptera: Limnichidae) are described from the Himalayan region: *C. brendelli* sp. nov., *C. arakawae* sp. nov., *C. championi* sp. nov., *C. larryi* sp. nov., *C. tardarsauceae* sp. nov. and *C. abboti* sp. nov. Photographs of type specimens with relevant morphological characters to distinguish species are provided.

**Keywords.** Limnichidae, taxonomy, *Cacchothryptus*, new species, Himalayas.

Matsumoto K. 2021. Six new species of the genus *Cacchothryptus* from the Himalayas (Coleoptera: Limnichidae). *European Journal of Taxonomy* 739: 168–184. <https://doi.org/10.5852/ejt.2021.739.1275>

## Introduction

There are 28 currently described species of *Cacchothryptus* Sharp, 1902. These species are distributed from the Palearctic region to the Oriental region (Spangler *et al.* 2001; Yoshitomi 2015, 2018; Hernando & Ribera 2014, 2017). The genus was revised by Hernando & Ribera (2014), and within that paper five species groups were proposed: *compactus*, *rouyeri*, *testudo*, *jaechi* and *zetteli* groups. Since that revision, eight new species have been described (Yoshitomi 2015, 2018; Hernando & Ribera 2017).

Six new species described in this paper are from the Himalayan region and within the *testudo* and the *compactus* groups. Photographs of habitus and genitalia of *Cacchothryptus brendelli* sp. nov., *C. arakawae* sp. nov., *C. championi* sp. nov., *C. larryi* sp. nov., *C. tardarsauceae* sp. nov. and *C. abboti* sp. nov. are provided with differential diagnosis.

## Material and methods

All specimens used in this study are housed in the collection of the Natural History Museum, London (BMNH). The specimens were examined by relaxing them in warm water, then dissecting the abdomen and its inner contents. Genitalia are mounted on a card pinned under the specimen. Habitus photographs were taken with a Canon DSLR camera, using a Laowa 25mm macro lens. All photographs were processed through focus stacking software, Helicon Focus and were later edited using GIMP. The beginning and end of label text are indicated using double quotes (“ ”); a double slash (//) separates the data on different labels.

### Abbreviations for morphological characters

- AS = Antennal segment(s) (followed by numbers increasing from antennal insertion to the tip of the last antennomere)  
EL = elytral length  
EW = maximum elytral width  
PL = pronotal length  
PW = maximum pronotal width

## Results

### *Taxonomy*

Class Insecta Linnaeus, 1758  
Order Coleoptera Linnaeus, 1758  
Suborder Polyphaga Emery, 1886  
Series Elateriformia Crowson, 1960  
Superfamily Byrrhoidea Latreille, 1804  
Family Limnichidae Erichson, 1846  
Genus *Cacothryptus* Sharp, 1902

*Cacothryptus brendelli* sp. nov.

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Figs 1, 7A

### Diagnosis

*Cacothryptus brendelli* sp. nov. is within *C. testudo* group and can be distinguished by several genital characters: (1) apex of median lobe narrow with tip slightly pointed in ventral view; (2) concave structure between apical emargination narrowly V-shaped with rounded end; (3) dorsal side of parameres bisinuate in lateral view; (4) apical emargination of parameres V-shaped in ventral view.

### Etymology

This species is named after Martin J.D. Brendell, who was the curator of the Coleoptera Department of Entomology at the Natural History Museum, London.

### Material examined

#### Holotype

NEPAL • ♂; ‘NEPAL 5600’ Kathmandu Dist. Godawari 25/v/1983 // UNDER BARK OF DEAD TREE // M.J.D.Brendell BMNH(E) 1983-222 // NHMUK011225276”; BMNH.

### Description

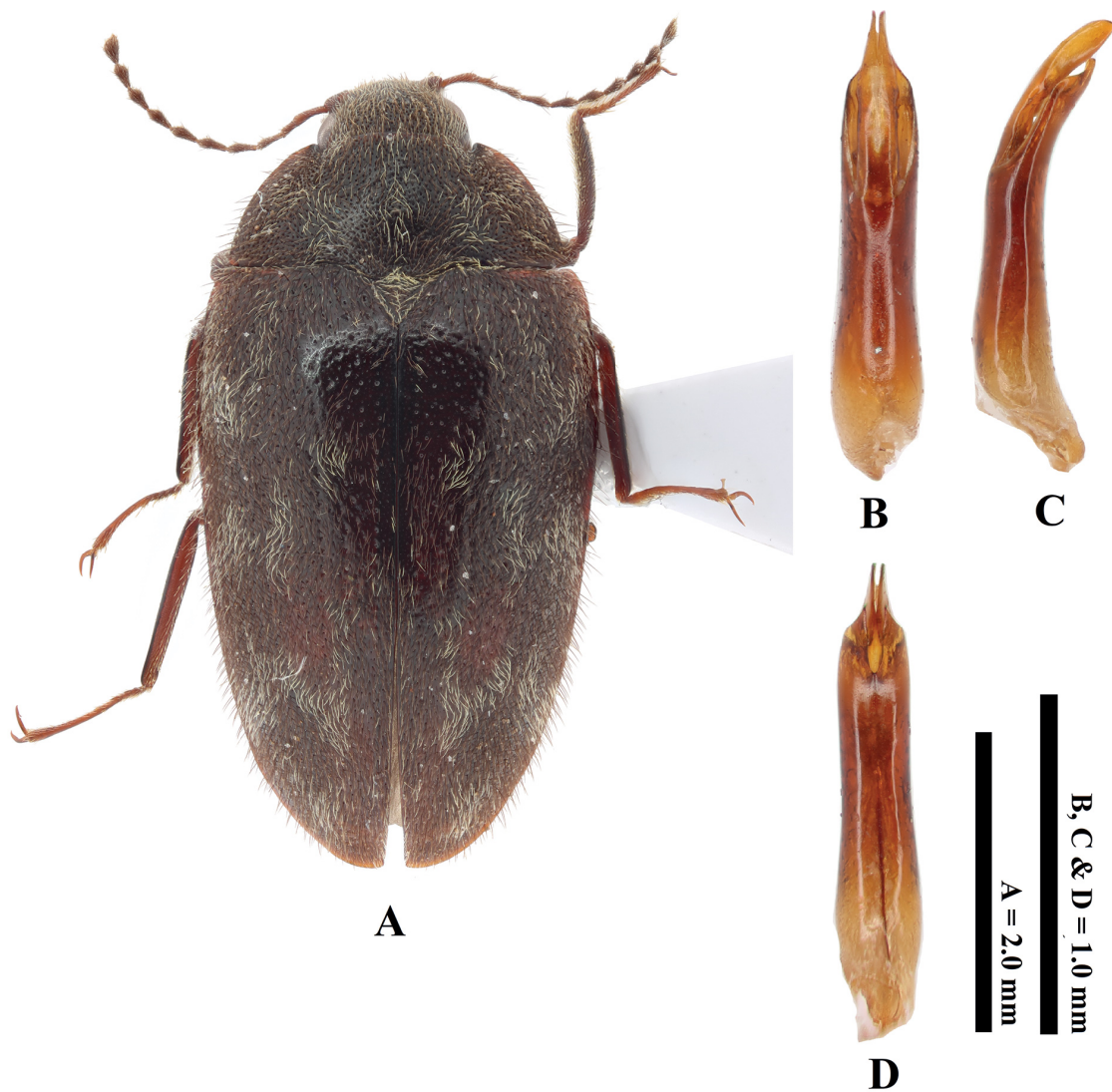
#### Male

**BODY.** Elongate, oval, dorsum convex, EL: 3.36 mm, EW: 2.44 mm, PL: 0.94 mm, PW: 2.07 mm. Colour: dorsal side brown; venter brown, tibia reddish brown, tarsal claws light brown. Dorsal surface densely covered with long setae with patches of white setae forming a wavy pattern, ventral surface with relatively long setae.

**DORSUM.** Head: partially retracted into pronotum; overall surface smooth, densely punctured across surface. Antennae: 11 segmented, filiform, fully pubescent, antennomeres long and slender, 1<sup>st</sup> AS widest, 2<sup>nd</sup> AS narrow and long, 3<sup>rd</sup> AS smallest, 4<sup>th</sup>–11<sup>th</sup> AS long, thin and obtusely angled on one side. Pronotum: transverse, widest at posterior end, narrowest at anterior end, narrower than elytra;

anterior margin convex, posterior margin trisinate, lateral margin convex; surface covered with dense punctation, surface between punctures smooth and shiny. Scutellum: subtriangular, large, lateral sides nearly straight. Elytra: longer than wide; anterior margin slightly convex, sinuate; anterior lateral angle nearly right angled, pointed; lateral margins strongly bordered; surface with mixtures of small fine and medium sized punctuations; surface between punctures smooth and shiny.

VENTER. Prosternum: concave on anterior margin, outer lateral margin concave; prosternal process as long as wide, lateral margin sinuated, posterior margin rounded. Mesoventrite: wider than long, narrowed towards posterior; anterior end concave where prosternal process fits, discrimen visible; laterally subparallel and gently curved, posteriorly flat, anteriorly trisinate. Metaventrite: long and wide, flat on the middle; discrimen thin visible across each end. Abdomen: five clearly visible ventrites. Intercostal process with pointed apex. Posterior margin of 1<sup>st</sup> and 2<sup>nd</sup> ventrites convex, 3<sup>rd</sup>–4<sup>th</sup> ventrites slightly concave around the middle, 5<sup>th</sup> ventrite curved. Surface covered with long, light yellow, recumbent setae.



**Fig. 1.** *Caccothryptus brendelli* sp. nov., ♂, holotype (NHMUK011225276). **A.** Dorsal habitus. **B.** Genitalia, dorsal. **C.** Genitalia, lateral. **D.** Genitalia, ventral.

LEGS. Tibia: protibia with outer and inner lateral ends curved. Meso- and metatibia with outer lateral margin almost straight, inner lateral margin straight. Tarsi: simple, segments increase in length towards the apex, 5<sup>th</sup> tarsal segment as long as 1<sup>st</sup>–4<sup>th</sup> tarsal segment combined. Tarsal claws: long, narrow, symmetrical.

GENITALIA. Aedeagus: elongate, strongly sclerotised. Base: asymmetrical, widest around basal 0.2 from both lateral and ventral view. Median lobe: approximately  $\frac{2}{5}$  length of genitalia; longer than parameres; gently curved on dorsal side, bisinuate on ventral side, widest at near apical end, narrowing towards apex, apex with round point in lateral view; apex flat split into two on anterior half and edge pointed, lower half of lateral end relatively straight in dorsal view; triangular emarginate on one side towards the parameres and small emarginate directing laterally in ventral view. Parameres: wider than median lobe in ventral view; apical emargination V-shaped, concave structure between parameres elongated narrow and deeply V-shaped with rounded end; bisinuate, lower half of sinuation long and shallow, upper half short and slightly deep on dorsal side in lateral view; gently curved on ventral side in lateral view; apex rounded and not overlapping median lobe, majority of parameres not overlapping median lobe with two spaces visible in lateral view.

#### **Female**

Unknown.

#### **Distribution**

*Cacothryptus brendelli* sp. nov. is known only from the type locality.

#### *Cacothryptus arakawae* sp. nov.

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Figs 2, 7B

#### **Diagnosis**

*Cacothryptus arakawae* sp. nov. is within the *C. testudo* group and can be distinguished by several genital characters: (1) apex of median lobe narrows with tip slightly pointed in ventral view; (2) concave structure between apical emargination narrow U-shaped with rounded end; (3) dorsal side of parameres bisinuate in lateral view; (4) apical emargination of parameres V-shaped in ventral view.

#### **Etymology**

This species is named after Hiromi Arakawa, who is a Japanese manga artist.

#### **Material examined**

##### **Holotype**

NEPAL • ♂; “NEPAL: 5600’ Kathmandu Dist., Godawari, 24.v.-6.vi.1983. // M.J.D.Brendell BMNH(E) 1983-222 // At light // NHMUK011225268”; BMNH.

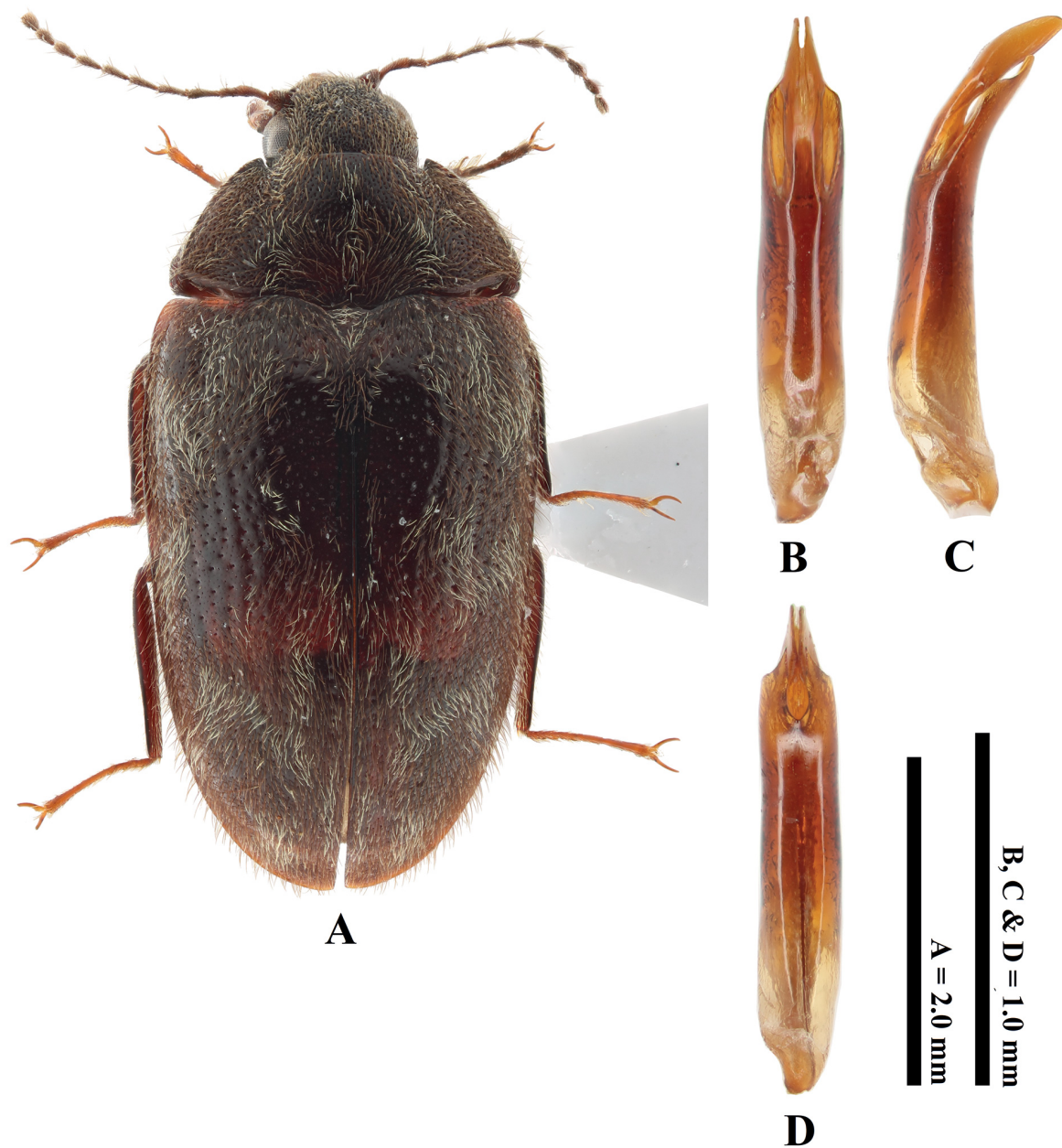
##### **Paratypes**

NEPAL • 3 ♂♂; same collection data as for holotype with additional label; “NHMUK011225269”, “NHMUK011225270”, “NHMUK011225271”; BMNH • 2 ♀♀; same collection data as for holotype with additional label; “NHMUK011225272”, “NHMUK011225273”; BMNH.

## Description

### Male

**BODY.** Elongate, oval, dorsum convex, EL: 3.39 mm, EW: 2.36 mm, PL: 0.93 mm, PW: 2.03 mm. Colour: dorsal side brown; venter brown, tibia reddish brown, tarsal claws light brown. Dorsal surface densely covered with long setae with patches of white setae forming a wavy pattern, ventral surface with relatively long setae.



**Fig. 2.** *Caccothryptus arakawae* sp. nov., ♂, holotype (NHMUK011225268). **A.** Dorsal habitus. **B.** Genitalia, dorsal. **C.** Genitalia, lateral. **D.** Genitalia, ventral.

**DORSUM.** Head: partially retracted into pronotum; overall surface smooth, densely punctured across surface. Antennae: 11 segmented, filiform, fully pubescent, antennomeres long and slender, 1<sup>st</sup> AS widest, 2<sup>nd</sup> AS narrow and long, 3<sup>rd</sup> AS smallest, 4<sup>th</sup>–11<sup>th</sup> AS long, thin and obtusely angled on one side. Pronotum: transverse, widest at posterior end, narrowest at anterior end, narrower than elytra; anterior margin convex, posterior margin trisinate, lateral margin convex; surface covered with dense punctation, surface between punctures smooth and shiny. Scutellum: subtriangular, large, lateral sides nearly straight. Elytra: Longer than wide; anterior margin slightly convex, sinuate; anterior lateral angle nearly right angled, rounded; lateral margins strongly bordered; surface with mixtures of small fine and medium sized punctuations; surface between punctures smooth and shiny.

**VENTER.** Prosternum: concave on anterior margin, outer lateral margin concave; prosternal process as long as wide, lateral margin sinuated, posterior margin rounded. Mesoventrite: wider than long, narrowed towards posterior; anterior end concave where prosternal process fits, discrimen visible; laterally subparallel and gently curved, posteriorly flat, anteriorly trisinate. Metaventrite: long and wide, flat on middle; discrimen not clearly visible. Abdomen: five clearly visible ventrites. Intercostal process with pointed apex. Posterior margin of 1<sup>st</sup> and 2<sup>nd</sup> ventrites convex, 3<sup>rd</sup>–4<sup>th</sup> ventrites slightly concave around middle, 5<sup>th</sup> ventrite curved. Surface covered with long, light yellow, recumbent setae.

**LEGS.** Tibia: protibia with outer and inner lateral ends curved. Meso- and metatibia with outer lateral margin almost straight, inner lateral margin straight. Tarsi: simple, segments increase in length towards apex, 5<sup>th</sup> tarsal segment as long as 1<sup>st</sup>–4<sup>th</sup> tarsal segment combined. Tarsal claws: long, narrow, symmetrical.

**GENITALIA.** Aedeagus: elongate, strongly sclerotised. Base: asymmetrical, widest around basal 0.2 from lateral, relatively consistent width in ventral view. Median lobe: approximately  $\frac{2}{5}$  length of genitalia; longer than parameres; slightly bisinuate on dorsal side, bisinuate on ventral side, widest at near apical end, narrowing towards the apex, apex rounded in lateral view; apex flat split into two on anterior half and edge pointed, lower half of lateral end relatively straight in dorsal view; lower half narrows, upper half oval and tip slightly rounded in lateral view; apical end smooth and narrows inwards in ventral view. Parameres: wider than median lobe in ventral view; apical emargination V-shaped, concave structure between parameres elongated slightly narrow and deep U-shape with rounded end; bisinuate, lower half of sinuation long and shallow, upper half short and slightly deep on dorsal side in lateral view; gently curved on ventral side in lateral view; apex rounded and ever so slightly overlapping with median lobe, majority of parameres do not overlap median lobe with two spaces visible in lateral view.

### **Female**

No morphological difference from male except for the longer 5<sup>th</sup> abdominal ventrite. Ovipositor long, gonocoxites strongly tapering to a point.

### **Morphological variation**

EL: 3.68–3.39 mm, EW: 2.52–2.35 mm, PL: 1.00–0.90 mm, PW: 2.11–2.03 mm.

### **Distribution**

*Cacothryptus arakawae* sp. nov. is known only from the type locality.

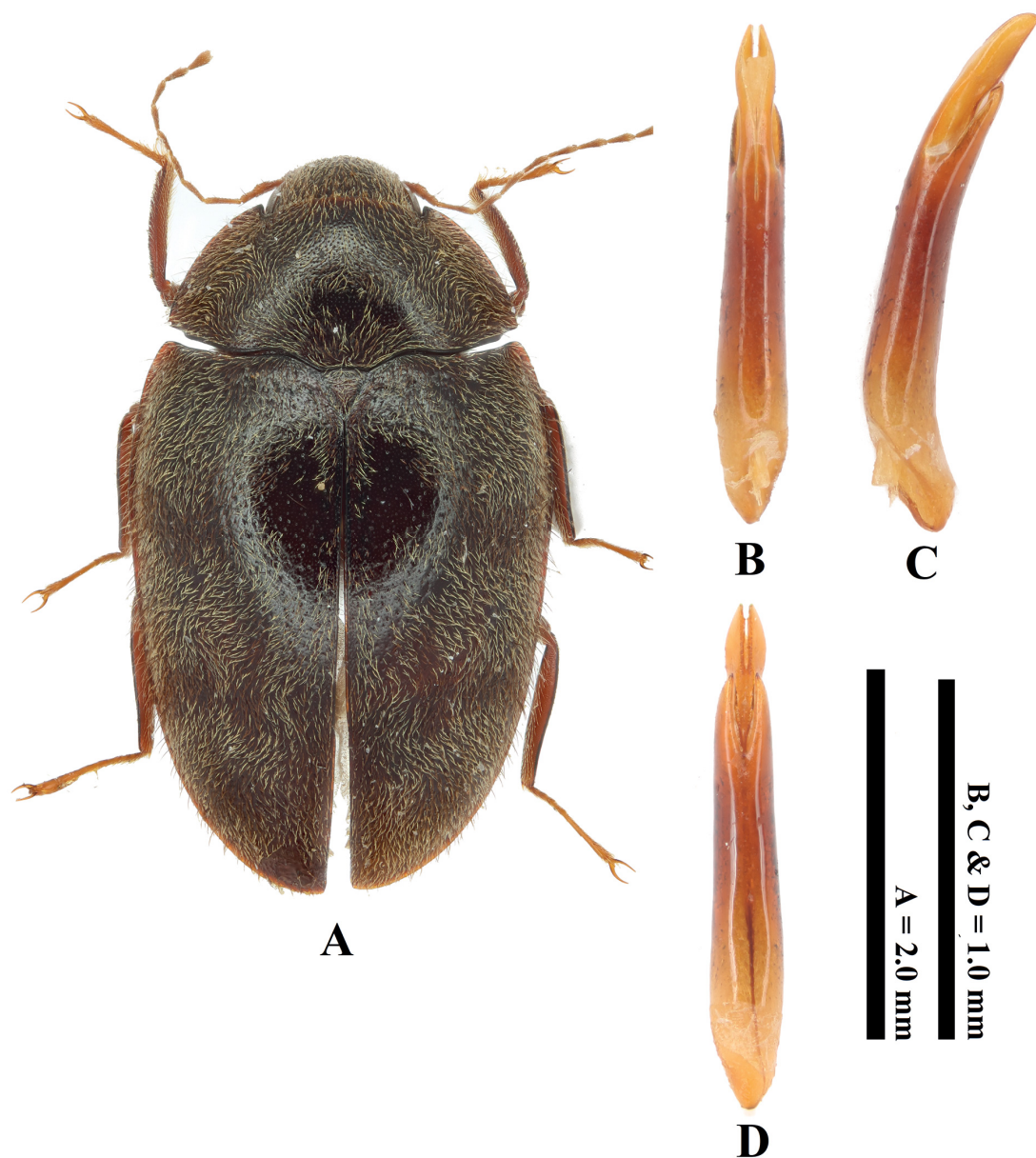
*Cacothryptus championi* sp. nov.

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Figs 3, 7C

**Diagnosis**

*Cacothryptus championi* sp. nov. is within *C. testudo* group and can be distinguished by several genital characters: (1) apex of median lobe oval in ventral view; (2) concave structure between parameres an elongated narrow and deeply V-shaped with pointed end; (3) dorsal side of parameres narrowed gradually towards apical end, small bump near the apex in lateral view; (4) apical emargination of parameres V-shaped in ventral view.



**Fig. 3.** *Cacothryptus championi* sp. nov., ♂, holotype (NHMUK011225382). A. Dorsal habitus. B. Genitalia, dorsal. C. Genitalia, lateral. D. Genitalia, ventral.

**Etymology**

This species is named after Harry George Champion, who collected this species.

**Material examined****Holotype**

INDIA • ♂; “Haldwani, Dist., Kumaon, India: H.G.C. // H.G. Champion B.M. 1953-156 // NHMUK011225382”; BMNH.

**Paratypes**

INDIA • 18 specs; same collection data as for holotype, with additional label: “NHMUK011225383”, “NHMUK011225384”, “NHMUK011225385”, “NHMUK011225386”, “NHMUK011225388”, “NHMUK011225436”, “NHMUK011225441”, “NHMUK011225442”, “NHMUK011225443”, “NHMUK011225444”, “NHMUK011225492”, “NHMUK011225494”, “NHMUK011225495”, “NHMUK011225496”, “NHMUK011225497”, “NHMUK011225498”, “NHMUK011225499”, “NHMUK011225500; BMNH • 6 specs; “Haldwani, Dist., Kumaon, India: H.G.C. H.G. Champion B.M. 1953-156” // [with additional label] “NHMUK011225387”, “NHMUK011225437”, “NHMUK011225438”, “NHMUK011225439”, “NHMUK011225440”, “NHMUK011225493”; BMNH • 2 specs; “Haldwani, Dist., Kumaon, India: H.G.C. // G.C. Champion B.M. 1926-146. // E. M. M. 1925. Det. G.C.C. *Cacc. ripicola* Ch” // [with additional label] “NHMUK011225548”, “NHMUK011225549”; BMNH.

**Description****Male**

**BODY.** Elongate, oval, dorsum convex, EL: 3.33 mm, EW: 2.47 mm, PL: 0.93 mm, PW: 2.06 mm. Colour: dorsal side brown; venter brown, tibia reddish brown, tarsal claws light brown. Dorsal surface densely covered with long setae with patches of white setae forming a wavy pattern, ventral surface with relatively long setae.

**DORSUM.** Head: partially retracted into pronotum; overall surface smooth, densely punctured across surface. Antennae: 11 segmented, filiform, fully pubescent, antennomeres long and slender, 1<sup>st</sup> AS widest, 2<sup>nd</sup> AS narrow and long, 3<sup>rd</sup> AS smallest, 4<sup>th</sup>–11<sup>th</sup> AS long, thin and obtusely angled on one side. Pronotum: transverse, widest at posterior end, narrowest at anterior end, narrower than elytra; anterior margin convex, posterior margin trisinate, lateral margin convex; surface covered with dense punctation, surface between punctures smooth and shiny. Scutellum: subtriangular, large, lateral sides nearly straight. Elytra: longer than wide; anterior margin slightly convex, sinuate; anterior lateral angle nearly right angled, pointed; lateral margins strongly bordered; surface with mixtures of small fine and medium sized punctuations; elytral striae more clearly visible towards lateral end; surface between punctures smooth and shiny.

**VENTER.** Prosternum: concave on anterior margin, outer lateral margin concave; prosternal process as long as wide, lateral margin sinuated, posterior margin rounded. Mesoventrite: wider than long, narrowed towards posterior; anterior end concave where prosternal process fits, discrimen visible; laterally subparallel and gently curved, posteriorly flat, anteriorly trisinate. Metaventrite: long and wide, flat on the middle; discrimen thin visible across each end. Abdomen: five clearly visible ventrites. Intercostal process with pointed apex. Posterior margin of 1<sup>st</sup> and 2<sup>nd</sup> ventrites convex, 3<sup>rd</sup>–4<sup>th</sup> ventrites slightly concave around the middle, 5<sup>th</sup> ventrite semioval. Surface covered with long, light yellow, recumbent setae.

**LEGS.** Tibia: protibia with outer and inner lateral ends curved. Meso- and metatibia with outer lateral margin almost straight, inner lateral margin straight. Tarsi: simple, segments increase in length towards



the apex, 5<sup>th</sup> tarsal segment as long as 1<sup>st</sup>–4<sup>th</sup> tarsal segment combined. Tarsal claws: long, narrow, symmetrical.

**GENITALIA.** Aedeagus: elongate, strongly sclerotised. Base: asymmetrical, widest around basal 0.2 from both lateral and ventral view. Median lobe: approximately  $\frac{1}{3}$  length of genitalia; longer than parameres; gently curved on dorsal side, slightly bisinuate on ventral side, widest at middle, narrowing towards the apex, apex with round point in lateral view; apex pointed, split into two on anterior half and edge blunt, lower half of lateral end gently concave in dorsal view; apical end oval in ventral view. Parameres: wider than median lobe in ventral view; apical emargination V-shaped, concave structure between parameres elongated narrow and deeply V-shaped with pointed end; narrowed gradually towards apical end, small bump near the apex in lateral view; gently curved on ventral side in lateral view; apex narrow oval and not overlap with median lobe, majority of parameres do not overlap median lobe with one space visible in lateral view.

#### **Female**

No morphological difference from male except for the 5<sup>th</sup> longer abdominal ventrite. Ovipositor long, gonocoxites strongly tapering to a point.

#### **Morphological variation**

EL: 2.74–2.35 mm, EW: 1.04–0.87 mm, PL: 2.16–1.97 mm, PW: 3.33–3.01 mm.

#### **Distribution**

*Caccothryptus championi* sp. nov. is known only from the type locality.

#### *Caccothryptus larryi* sp. nov.

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Figs 4, 7D

#### **Diagnosis**

*Caccothryptus larryi* sp. nov. is within *C. compactus* group and can be distinguished by several genital characters: (1) apex of median lobe with two asymmetrical emarginations in ventral view; (2) concave structure between parameres an elongated narrow and deeply V-shaped with pointed end; (3) dorsal and ventral side of parameres smooth and elongate, narrowing towards apical end in lateral view; (4) apical emargination of parameres oval in ventral view. *C. ripicola* has semicircle shaped apical emargination of parameres, median lobe with symmetrical emarginations, overall genitalia long and thin, which differs significantly from *C. larryi* sp. nov.

#### **Etymology**

This species is named after ‘Larry’ the cat that lives at 10 Downing Street and the current ‘Chief Mouser’ to the Cabinet Office.

#### **Material examined**

##### **Holotype**

INDIA • ♂; “AT LIGHT // Haldwani Divn. Kumaon, U.P. // 4017 // *Caccothryptus ripicola* Ch // *Caccothryptus ripicola* Champ. // H.G. Champion B.M. 1953-156 // NHMUK011225324”; BMNH.

##### **Paratype**

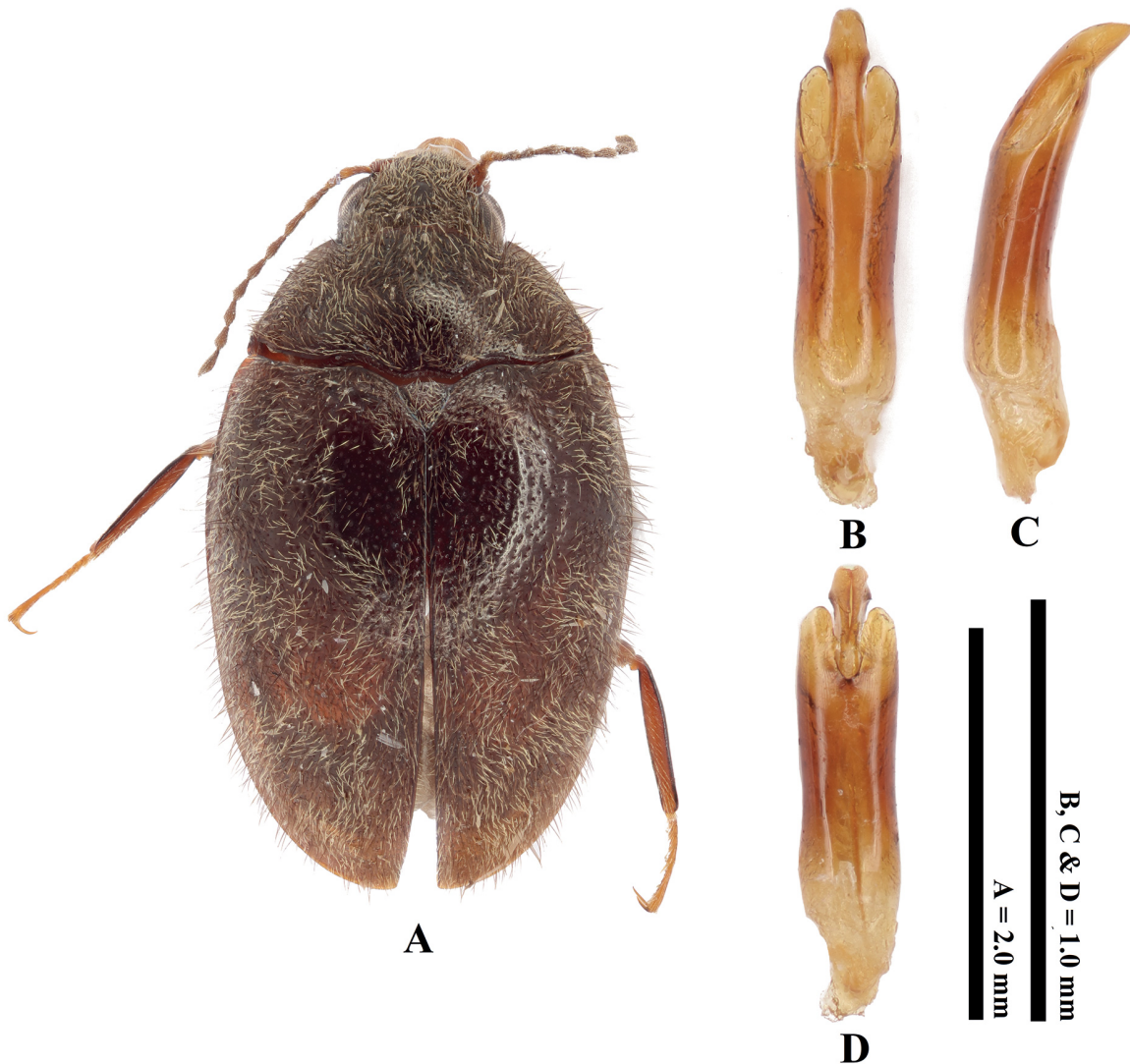
INDIA • 1 ♀; “AT LIGHT // Haldwani Divn. Kumaon, U.P. // 4017 // *Caccothryptus ripicola* Champ. // H.G. Champion B.M. 1953-156 // NHMUK011225325”; BMNH.

**Description**

**Male**

**BODY.** Elongate, oval, dorsum convex, EL: 2.44 mm, EW: 2.09 mm, PL: 0.75 mm, PW: 1.68 mm. Colour: dorsal side brown; venter brown, tibia brown, tarsal claws light brown. Dorsal surface densely covered with long setae with patches of white setae forming a wavy pattern, ventral surface with relatively long setae.

**DORSUM.** Head: partially retracted into pronotum; overall surface smooth, densely punctured across surface. Antennae: 11 segmented, filiform, fully pubescent, antennomeres long and slender, 1<sup>st</sup> AS widest, 2<sup>nd</sup> AS narrow and long, 3<sup>rd</sup> AS smallest, 4<sup>th</sup>–11<sup>th</sup> AS long, thin and obtusely angled on one side. Pronotum: transverse, widest at posterior end, narrowest at anterior end, narrower than elytra; anterior margin convex, posterior margin trisinate, lateral margin convex; surface covered with dense punctation, surface between punctures smooth and shiny. Scutellum: subtriangular, large, lateral sides nearly straight. Elytra: longer than wide; anterior margin slightly convex, sinuate; anterior lateral angle



**Fig. 4.** *Cacothryptus larryi* sp. nov., ♂, holotype (NHMUK011225324). **A.** Dorsal habitus. **B.** Genitalia, dorsal. **C.** Genitalia, lateral. **D.** Genitalia, ventral.

nearly right angled, pointed; lateral margins strongly bordered; surface with mixtures of small fine and medium sized punctuations; elytral striae not clearly visible throughout; surface between punctures smooth and shiny.

**VENTER.** Prosternum: concave on anterior margin, outer lateral margin concave; prosternal process as long as wide, lateral margin sinuated, posterior margin rounded. Mesoventrite: wider than long, narrowed towards posterior; anterior end concave where prosternal process fits, discrimen visible; laterally subparallel and gently curved, posteriorly flat, anteriorly trisinate. Metaventrite: long and wide, flat on the middle; discrimen thin visible across each end. Abdomen: five clearly visible ventrites. Intercostal process with pointed apex. Posterior margin of 1<sup>st</sup> and 2<sup>nd</sup> ventrites convex, 3<sup>rd</sup>–4<sup>th</sup> ventrites slightly concave around the middle, 5<sup>th</sup> ventrite semioval. Surface covered with long, light yellow, recumbent setae.

**LEGS.** Tibia: protibia with narrowly oval. Meso- and metatibia with outer lateral margin almost straight, inner lateral margin straight. Tarsi: simple, segments increase in length towards the apex, 5<sup>th</sup> tarsal segment as long as 1<sup>st</sup>–4<sup>th</sup> tarsal segment combined. Tarsal claws: Long, narrow, symmetrical.

**GENITALIA.** Aedeagus: elongate, strongly sclerotised. Base: asymmetrical, width gently narrowed towards apical end. Median lobe: approximately  $\frac{1}{3}$  length of genitalia; longer than parameres; consistent width on basal  $\frac{2}{3}$ , oval on apical half, maximum width of apical  $\frac{1}{3}$  in lateral view; apex flat and edge rounded, lower half of lateral end gently concave in dorsal view; dorsal and ventral end curved, narrow near the apex, apex pointed, width relatively consistent in lateral view; triangular emarginate on one side towards parameres and small emarginate directing laterally in ventral view. Parameres: wider than median lobe in ventral view; apical emargination oval, concave structure between parameres an elongated U-shaped with rounded end; smooth and elongate, narrowed towards apical end, apex pointed and overlaps with median lobe, majority of parameres overlaps with median lobe with no visible spacing in lateral view.

#### **Female**

No morphological difference from male except for the longer 5<sup>th</sup> abdominal ventrite. Ovipositor long, gonocoxites strongly tapering to a point. EL: 2.77 mm, EW: 2.18 mm, PL: 0.77 mm, PW: 1.71 mm.

#### **Distribution**

*Cacothryptus larryi* sp. nov. is known only from the type locality.

#### ***Cacothryptus tardarsaucae* sp. nov.**

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Figs 5, 7E

#### **Diagnosis**

*Cacothryptus tardarsaucae* sp. nov. is within the *C. testudo* group and can be distinguished by several genital characters: (1) apex of median lobe narrow with tip slightly pointed in ventral view; (2) concave structure between apical emargination narrowly V-shaped with gently pointed end; (3) dorsal side of parameres bisinuate in lateral view; (4) apical emargination of parameres V-shaped in ventral view.

#### **Etymology**

This species is named after the American internet celebrity cat ‘Tardar Sauce’, nicknamed ‘Grumpy Cat’.

**Material examined**

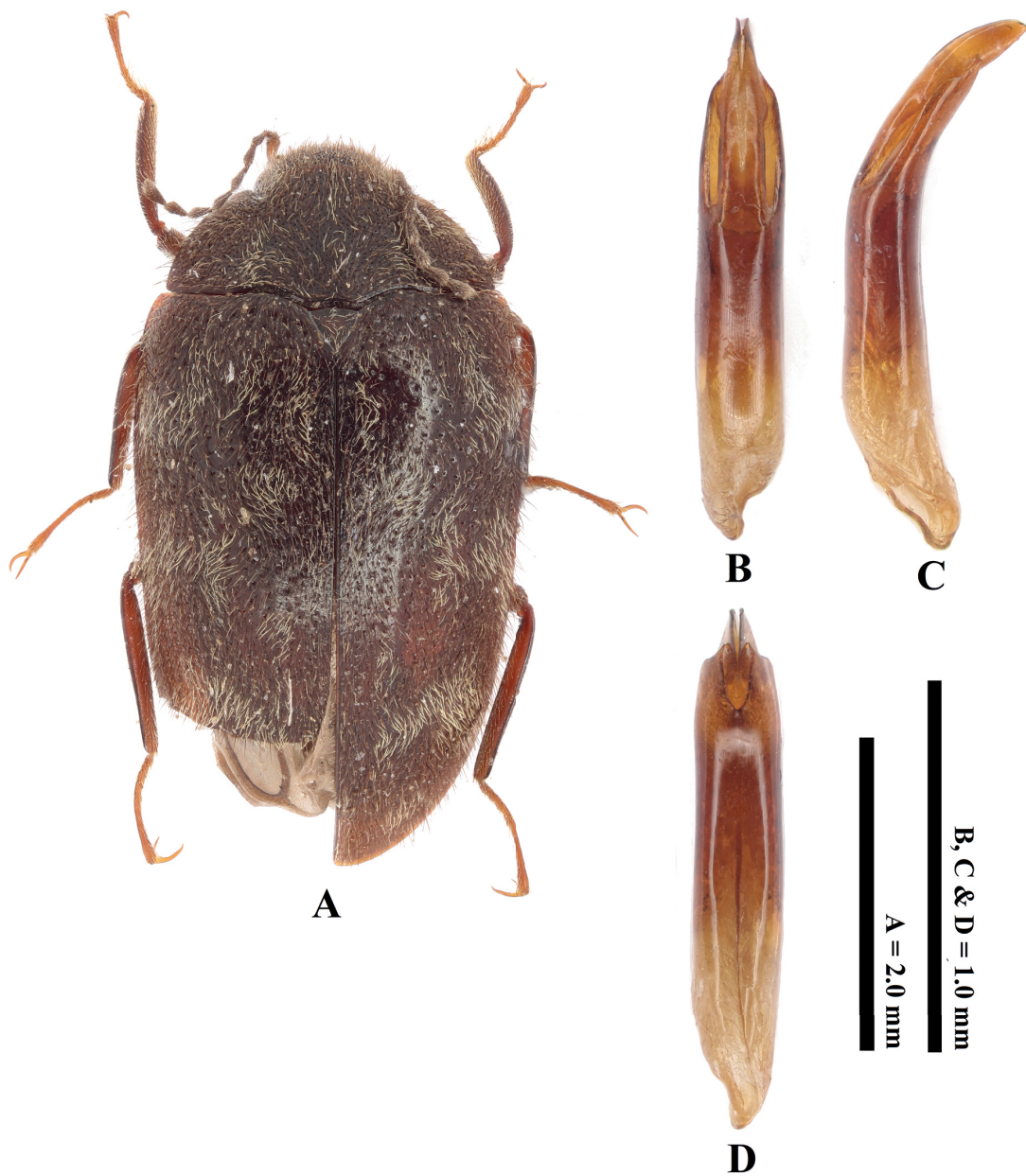
**Holotype**

INDIA • ♂; “Jhatingri, Mandi. Punjab. 6,000ft. H.G.C. // H.G. Champion B.M. 1953-156 // NHMUK011225274”; BMNH.

**Description**

**Male**

BODY. Elongate, oval, dorsum convex, EL: 3.64 mm, EW: 2.50 mm, PL: 0.87 mm, PW: 2.11 mm. Colour: dorsal side brown; venter brown, tibia reddish brown, tarsal claws light brown. Dorsal surface



**Fig. 5.** *Cacothryptus tardarsauceae* sp. nov., ♂, holotype (NHMUK011225274). **A.** Dorsal habitus. **B.** Genitalia, dorsal. **C.** Genitalia, lateral. **D.** Genitalia, ventral.

densely covered with long setae with patches of white setae forming a wavy pattern, ventral surface with relatively long setae.

**DORSUM.** Head: partially retracted into pronotum; overall surface smooth, densely punctured across surface. Antennae: 11 segmented, filiform, fully pubescent, antennomeres long and slender, 1<sup>st</sup> AS widest, 2<sup>nd</sup> AS narrow and long, 3<sup>rd</sup> AS smallest, 4<sup>th</sup>–11<sup>th</sup> AS long, thin and obtusely angled on one side. Pronotum: transverse, widest at posterior end, narrowest at anterior end, narrower than elytra; anterior margin convex, posterior margin trisinate, lateral margin convex; surface covered with dense punctation, surface between punctures smooth and shiny. Scutellum: subtriangular, large, lateral sides gently convex. Elytra: longer than wide; anterior margin slightly convex, sinuate; anterior lateral angle nearly right angled, pointed; lateral margins strongly bordered; surface with mixtures of small fine sized punctuations and medium sized punctuations forming irregular near the elytral suture; elytral striae more clearly visible towards lateral end; surface between punctures smooth and shiny.

**VENTER.** Prosternum: concave on anterior margin, outer lateral margin concave; prosternal process as long as wide, lateral margin sinuated, posterior margin rounded. Mesoventrite: wider than long, narrowed towards posterior; anterior end concave where prosternal process fits, discrimen visible; laterally subparallel and gently curved, posteriorly flat, anteriorly trisinate. Metaventrite: long and wide, flat on the middle; discrimen thin visible across each end. Abdomen: five clearly visible ventrites. Intercostal process with pointed apex. Posterior margin of 1<sup>st</sup> and 2<sup>nd</sup> ventrites convex, 3<sup>rd</sup>–4<sup>th</sup> ventrites slightly concave around the middle, 5<sup>th</sup> ventrite semioval. Surface covered with long, light yellow, recumbent setae.

**LEGS.** Tibia: protibia with outer and inner lateral margin curved. Meso- and metatibia with outer lateral margin almost straight, inner lateral margin straight. Tarsi: simple, segments increase in length towards the apex, 5<sup>th</sup> tarsal segment as long as 1<sup>st</sup>–4<sup>th</sup> tarsal segment combined. Tarsal claws: long, narrow, symmetrical.

**GENITALIA.** Aedeagus: elongate, strongly sclerotised. Base: asymmetrical, widest around basal 0.2 from both lateral and ventral view. Median lobe: approximately  $\frac{1}{3}$  length of genitalia; longer than parameres; gently curved on dorsal side, slightly bisinuate on ventral side, widest at middle, narrowing towards the apex, apex with round point in lateral view; apex pointed, split into two on anterior half and edge pointed, lower half of lateral end relatively straight in dorsal view; apical end smooth and narrows inwards in ventral view. Parameres: wider than median lobe in ventral view; apical emargination wide V-shaped, concave structure between parameres elongated and wide V-shaped, with gently pointed end; bisinuate, lower half of sinuation long and shallow, upper half short and slightly deep on dorsal side in lateral view; gently curved on ventral side in lateral view; apex pointed and overlaps with median lobe, majority of parameres overlaps with median lobe in lateral view.

#### **Female**

Unknown.

#### **Distribution**

*Cacothryptus tardarsauceae* sp. nov. is known only from the type locality.

*Cacothryptus abboti* sp. nov.

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Figs 6, 7F

**Diagnosis**

*Cacothryptus abboti* sp. nov. is within *C. compactus* group and can be distinguished by several genital characters: (1) apex of median lobe asymmetrical in ventral view; (2) concave structure between parameres deeply U-shaped with rounded end; (3) parameres deeply curved on dorsal side and gently curved on ventral side in lateral view; (4) apical emargination inward slanted and V-shaped.

**Etymology**

This species is named after Nick Abbot, who is a radio presenter.

**Material examined**

**Holotype**

INDIA • ♂; “AT LIGHT // Haldwani Divn. Kumaon, U.P. // 4016 // 4016 // *Cacothryptus testudo*, Ch. // *Cacothryptus testudo* Champ. // H.G. Champion B.M. 1953-156 // NHMUK011225275”; BMNH.

**Description**

**Male**

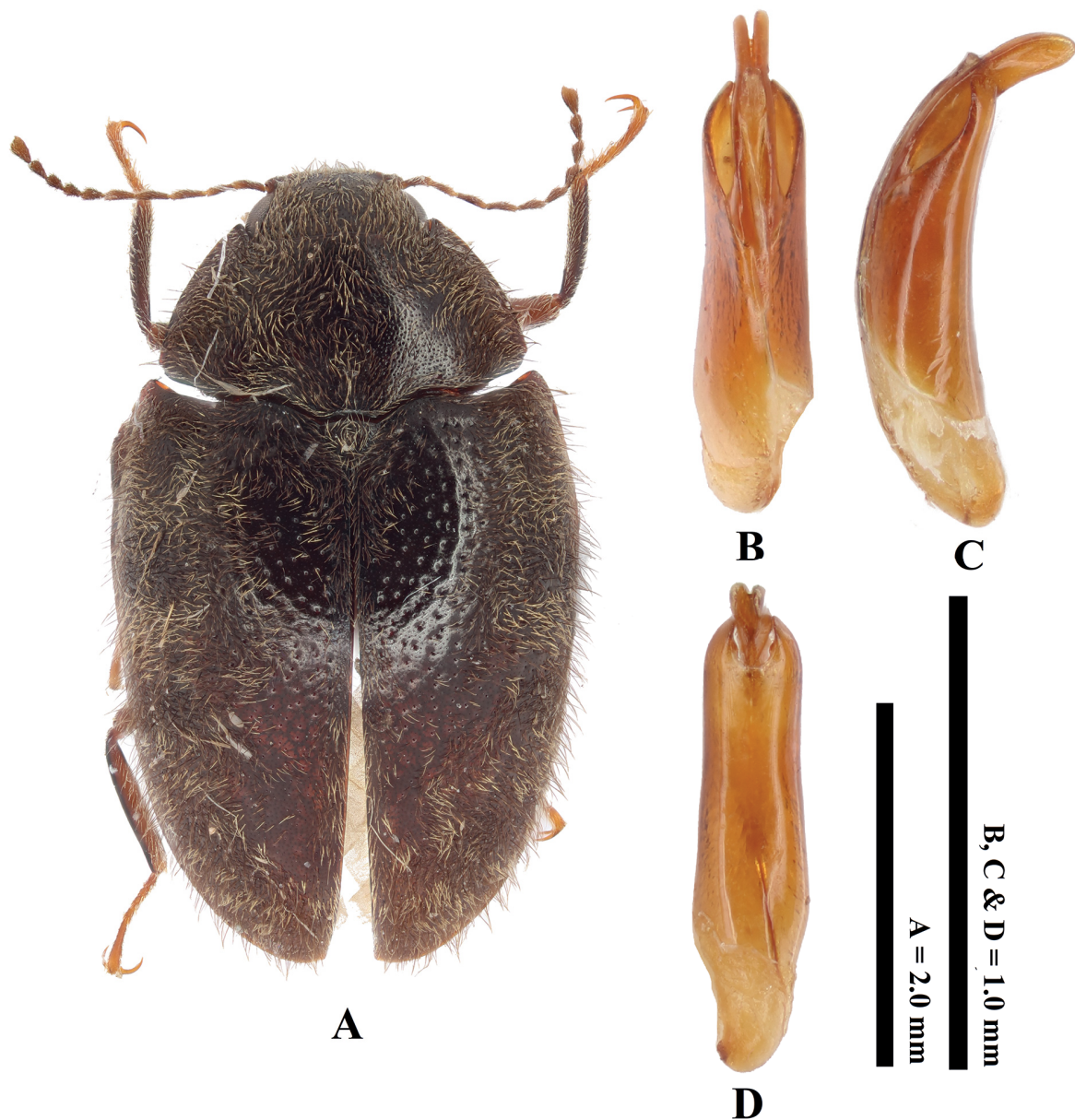
**BODY.** Elongate, oval, dorsum convex, EL: 3.21 mm, EW: 2.62 mm, PL: 1.01 mm, PW: 2.05 mm. Colour: dorsal side brown; venter brown, tibia reddish brown, tarsal claws light brown. Dorsal surface densely covered with long setae with patches of white setae forming a wavy pattern, ventral surface with relatively long setae.

**DORSUM.** Head: partially retracted into pronotum; overall surface smooth, densely punctured across surface. Antennae: 11 segmented, filiform, fully pubescent, antennomeres long and slender, 1<sup>st</sup> AS widest, 2<sup>nd</sup> AS narrow and long, 3<sup>rd</sup> AS smallest, 4<sup>th</sup>–11<sup>th</sup> AS long, thin and obtusely angled on one side. Pronotum: transverse, widest at posterior end, narrowest at anterior end, narrower than elytra; anterior margin convex, posterior margin trisinate, lateral margin convex; surface covered with dense punctation, surface between punctures smooth and shiny. Scutellum: subtriangular, large, lateral sides nearly straight. Elytra: longer than wide; anterior margin slightly convex, sinuate; anterior lateral angle acute, pointed; lateral margins strongly bordered; surface with mixtures of small fine and medium sized punctuations; elytral striae not clearly visible throughout; surface between punctures smooth and shiny.

**VENTER.** Prosternum: concave on anterior margin, outer lateral margin concave; prosternal process as long as wide, lateral margin sinuated, posterior margin rounded. Mesoventrite: wider than long, narrowed towards posterior; anterior end concave where prosternal process fits, discrimen visible; laterally subparallel and gently curved, posteriorly flat, anteriorly trisinate. Metaventrite: long and wide, flat on the middle; discrimen thin visible across each end. Abdomen: five clearly visible ventrites. Intercostal process with pointed apex. Posterior margin of 1<sup>st</sup> and 2<sup>nd</sup> ventrites convex, 3<sup>rd</sup>–4<sup>th</sup> ventrites slightly concave around the middle, 5<sup>th</sup> ventrite semioval. Surface covered with long, light yellow, recumbent setae.

**LEGS.** Tibia: protibia with outer and inner lateral ends curved. Meso- and metatibia with outer lateral margin almost straight, inner lateral margin straight. Tarsi: simple, segments increase in length towards the apex, 5<sup>th</sup> tarsal segment as long as 1<sup>st</sup>–4<sup>th</sup> tarsal segment combined. Tarsal claws: long, narrow, symmetrical.

GENITALIA. Aedeagus: elongate, strongly sclerotised. Base: asymmetrical, widest around basal 0.2 in ventral view, widest at middle in lateral view. Median lobe: approximately  $\frac{2}{5}$  the length of genitalia; longer than parameres; curved on both dorsal and ventral side, consistent width, narrows near the apex, apex with rounded in lateral view; apex pointed, split into two on anterior  $\frac{1}{4}$  and edge blunt, lower half of lateral end gently convex in dorsal view; apical end asymmetrical in ventral view. Parameres: wider than median lobe in ventral view; apical emargination inward slanted and V-shaped, concave structure between parameres deep U-shaped with rounded end; narrowed towards apical end, apical end oval in lateral view; deeply curved on dorsal side in lateral view; gently curved on ventral side in lateral view; apex narrow oval and overlaps with median lobe, majority of parameres overlaps with median lobe with no visible spacing in lateral view.



**Fig. 6.** *Caccothryptus abboti* sp. nov., ♂, holotype (NHMUK011225275). A. Dorsal habitus. B. Genitalia, dorsal. C. Genitalia, lateral. D. Genitalia, ventral.

**Female**

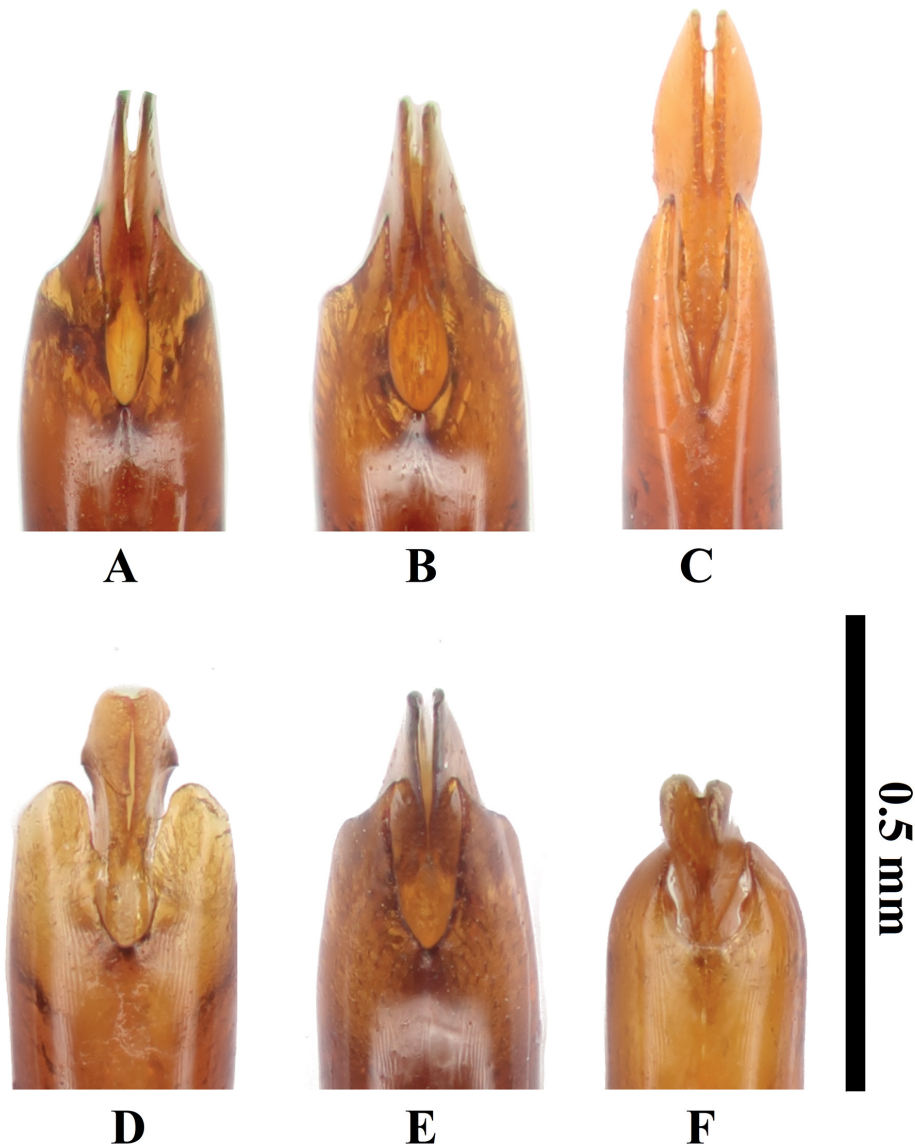
Unknown.

**Distribution**

*Cacothryptus abboti* sp. nov. is known only from the type locality.

**Discussion**

There are now 12 species of *Cacothryptus* recorded from Himalaya region: *C. brendelli* sp. nov.; *C. arakawae* sp. nov.; *C. championi* sp. nov.; *C. larryi* sp. nov.; *C. tardarsauceae* sp. nov.; *C. abboti*



**Fig. 7.** Close-up of *Cacothryptus* spp. genitalia ventral apex, ♂, holotype. **A.** *C. brendelli* sp. nov. (NHMUK011225276). **B.** *C. arakawae* sp. nov. (NHMUK011225268). **C.** *C. championi* sp. nov. (NHMUK011225382). **D.** *C. larryi* sp. nov. (NHMUK011225324). **E.** *C. tardarsauceae* sp. nov. (NHMUK011225274). **F.** *C. abboti* sp. nov. (NHMUK011225275).



sp. nov.; *C. jendeki* Hernando & Ribera, 2014; *C. ripicola* Champion, 1923; *C. testudo* Champion, 1923; *C. occidentalis* Hernando & Ribera, 2017; *C. tibetanus* Yoshitomi, 2015; *C. chayuensis* Yoshitomi, 2015. This is the first time that species within the *C. compactus* group were represented within the Himalayan region.

## Acknowledgments

I would like to thank Max Barclay (BMNH) providing access to the specimens studied. Many thanks to two anonymous reviewers for valuable and helpful comments on the manuscript.

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*Manuscript received: 29 July 2020*

*Manuscript accepted: 20 December 2020*

*Published on: 19 March 2021*

*Topic editor: Nesrine Akkari*

*Section editor: Max Barclay*

*Desk editor: Eva-Maria Levermann*

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