



Studies on the Rhagophthalmidae (Coleoptera) from China, part II. Three new species of *Diplocladon* Gorham, 1883

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Abstract

Three new rhagophthalmids of the genus *Diplocladon* Gorham, 1883 are described from China, *i.e.* *D. maai* **sp. nov.** from Fujian, *D. nezha* **sp. nov.** from Yunnan, and *D. wukong* **sp. nov.** from Chongqing. *Diplocladon atripenne* Yiu, 2017 is redescribed and first recorded from Guangdong and Guangxi. Illustrations of the habituses and diagnostic characters of all four Chinese species are provided; a key to Chinese species of *Diplocladon* based on males is compiled; and a map is presented to exhibit their distributions.

Key words: Distribution, Elateroidea, morphology, Oriental Realm, rhagophthalmids, taxonomy

Introduction

The genus *Diplocladon* Gorham, 1883 (Coleoptera: Rhagophthalmidae), with its larvae and larviform females commonly called as “star worms”, currently contains only two species. *Diplocladon hasseltii* Gorham, 1883, with its both subspecies (the nominotypical one and *D. hasseltii testaceum* Pic, 1921), is distributed in Indonesia, while *D. atripenne* Yiu, 2017 is known from China (Kundrata *et al.* 2022). In the most recent catalogue on rhagophthalmids worldwide, Kundrata *et al.* (2022) comprehensively summarized the literature for *Diplocladon*, and they replaced the name *Diplocladon* (*Haplocladon*) *hasseltii* Gorham, 1883 with *Haplocladon gorhami* Kundrata, 2022, because Gorham (1883a, b) named type species of both *Diplocladon* and *Haplocladon* Gorham, 1883 as “*hasseltii*”, which confused some subsequent authors. In addition, they mentioned that the generic complex containing taxa with strongly bipectinate antennae and long elytra, including *Bicladodrilus* Pic, 1921, *Bicladum* Pic, 1921 and *Diplocladon*, is in need of revision.

For Chinese fauna, Waterhouse (1889) reported a luminous larva (up to 2 inch [= 50.8 mm] long) from Hangchow [Hangzhou] and thought it belonged to Lampyridae, however, Harvey (1952) regarded it as an unidentified species of *Diplocladon*. This represents the earliest record of *Diplocladon* from China. More than half a century later, a gigantic larviform adult female of *Diplocladon* from Yunnan was described by Li & Liang (2008). However, Jeng (2008: p. 135) opined that it is “likely of *M. giganteus* (Fairmaire) [*Menghuoius giganteus* (Fairmaire, 1888)] or the other related species described from there”. Then Yiu (2017) described the second *Diplocladon* species, *D. atripenne* Yiu 2017, from Hong Kong.

In the present study, two new provincial records for *D. atripenne* (Guangdong and Guangxi) are given. Three new species, from Fujian, Yunnan and Chongqing, respectively, are described and illustrated. An identification key to all four Chinese species of *Diplocladon* is compiled.

Material and methods

Specimens were relaxed and softened in a HH-2 digital homoeothermic water bath at 44.4°C for 6 hours and then placed in distilled water for cleaning and dissection. To examine the male genitalia, the aedeagus together with abdominal segment IX were detached by fine point tweezers and cleared with a trypsin enzyme solution at room temperature for 12 hours. Then they were placed in 70% ethanol solution to remove the remaining trypsin. After examination, the dissected body parts were mounted on a slide using Euparal Mounting Medium for future studies. Images were taken with a Canon macro photo lens MP-E 65 mm on a Canon 5DsR. Images of the same object at different focal planes were combined using Zerene Stacker 1.04 stacking software. Adobe Photoshop CS6 was used for postprocessing. The terminology adopted in this paper for external features of the body and genitalia follows Lawrence *et al.* (2011). Measurement criteria in millimetres (mm) follow Wang (2024).

The material examined in this study is deposited in the following collections:

IZCAS—Institute of Zoology, Chinese Academy of Sciences, Beijing, China;

IZGAS—Institute of Zoology, Guangdong Academy of Sciences, Guangzhou, China;

MNHN—Museum National d’Histoire Naturelle, Paris, France;

MYNU—Invertebrate collection of Mianyang Normal University, Mianyang, China;

NHMW—Naturhistorisches Museum, Wien, Austria;

NKME—Naturkundemuseum Erfurt, Germany;

NMPC—Národní muzeum, Prague, Czech Republic;

SYSU—Museum of Biology, Sun Yat-sen University, Guangzhou, China.

Taxonomy

Diplocladon Gorham, 1883

Chinese common name: 星雌光萤属

[4 species; Palearctic and Oriental Realms]

See complete synonymy and literature in Kundera *et al.* (2022).

Type species: *Diplocladon hasseltii* Gorham, 1883, by monotypy.

Diagnosis. Male. Head subhypognathous, partially hidden by pronotum. Frontoclypeal suture absent. Frons without antennal tubercles. Eyes without any emargination or excavation. Labrum less sclerotised, transverse, more or less emarginate at median of anterior margin. Mandibles sickle-shaped, slender but short, not seen from dorsal view, strongly curved and gradually tapered towards acute apices. Maxillary palpus 4-segmented, with terminal palpomere long acuminate. Labial palpus 3-segmented, with terminal palpomere long, acuminate. Antennae with 12 antennomeres, scape and pedicel thicker than antennomeres 3–12; antennomeres 3–11 bipectinate. Gular sutures parallel. Epipleura broad at base. Hind wings fully developed. Tarsi simple, without ventral pads. Abdomen flexible, somewhat flattened. Aedeagus symmetrically trilobed; median lobe at least 1.5 times as long as parameres; phallobase covering small portions of paramere bases on ventral side, widely open dorsally.

Diplocladon atripenne Yiu, 2017

Chinese common name: 黑鞘星雌光萤

(Figs 1–3, 7–15, 25–28, 32–40, 50–52, 56–61, 68–73, 80–88)

Yiu, 2017: 64, Fig. 3 (*atripennis* [*sic!*]; description; illustrations; **type locality:** HONG KONG: Lantau [大嶼山], Wo Tin [窩田], N22.27351°, E113.98819°); Kundera *et al.*, 2022: 70 (*atripenne*; change of originally wrong gender).

Material examined. 12♂♂. **CHINA, Hong Kong:** 1♂ (NHMW), HONGKONG, 1984 / Tai Po Kau [大埔滘] / 28.6. light trap / leg. Dudgeon; 1♂ (NMPC), CHINA: Hong Kong, Lantau Isl., / NGONG PING vill. [昂坪市集], 26.–28.VI.2007 / Po Lin monastery [宝莲禅寺] env., 480– / 590 m, 22°15.2–5’N 113°54.6’E, / J. Hájek & J. Růžička leg. // individually on vegetation, on / trunks at night, in stream; / wet broad-leaved forest; 1♂ (MYNU), Tai Po Kau [大埔滘], Tai Mo Shan Country Park [大帽山郊野公园], public toilet, N22.429304° E114.180488°

136±12 m, at light, 21.VII.2023, Michael Lee [李泽伦] & Yi-Fei Huang [黄逸飞] leg. CHINA, Guangdong: 1♂ (SYSU), Kwangtung, S. China. / Kau-lin San [九连山], 700–900 / M., Lien-p'ing Distr. [连平] / April 20. 1940, J. L. / Gressitt and F. K. To. // En-075748 / 中山大学 [Sun Yat-sen University] / 生物博物馆 [Museum of Biology]; 1♂ (SYSU), same as previous except April 22. 1940 // En-075858; 1♂ (SYSU), 乳源·天井山 [Ruyuan, Tianjingshan] / 陈振耀 [Zhen-Yao Chen] 1974.V.30 // En-076879 / 中山大学 [Sun Yat-sen University] / 生物博物馆 [Museum of Biology]; 1♂ (IZGAS), 东莞银瓶山 [Dongguan, Yinpingshan] FIT-3 / 2020.IV.21 / 广东省科学院动物研究所 [Institute of Zoology, Guangdong Academy of Sciences]; 2♂♂ (IZGAS), same as previous except FIT-5 / 2020.V.24; 1♂ (IZGAS), 鼎湖山保护区 [Dinghushan Nature Reserve] 肇庆 [Zhaoqing] / E112°32'31.15" N23°10'14.25" / 2021.V.10–V.13 FIT-8 / 广东省科学院动物研究所 [Institute of Zoology, Guangdong Academy of Sciences]; 1♂ (IZGAS), 惠州古田飞阻 [Huizhou, Gutian Nature Reserve, FIT] 19 / 2021.V.24. CHINA, Guangxi: 1♂ (MYNU), 2023.V.31–VI.5 / 广西桂林市花坪保护区 [Guilin City, Huaping Nature Reserve] / 花坪村 [Huaping Country] 759 m / 邱鹭 [Lu Qiu] 飞阻 [FIT] / 绵阳师范学院 [Mianyang Normal University] MYNU.

Redescription. Male. Body small to medium for the genus, 6.4–8.1 mm in length, widest at basal 1/3 of elytra, 2.9 times as long as wide. Lengths of body parts (mm): head (0.4–0.7), eye (0.5–0.6), antenna (3.0–3.4), pronotum (1.0–1.5), elytra (5.2–5.9); width: head (1.2–1.4), pronotum (1.8–2.1), humeri (2.1–2.6), elytra (2.2–2.7).

Habitus (Figs 1–3, 7–15). Body elongate, subparallel, somewhat flattened and weakly shiny. Body color lighter or darker depending on different specimens: frons, vertex and abdomen dark brown to blackish; eyes black; antennae brown to blackish except light brown scape and pedicel; pronotum yellowish brown, with central part tinged with dark brown to blackish; scutellar shield brown to black; elytra dark brown to black; other parts yellowish brown to brown, more or less tinged with dark brown or blackish. Body almost entirely covered with moderately long, semierect, yellowish-brown pubescence.

Head (Figs 25, 27, 28) 2.8 times as wide as long, 0.7 times as wide as pronotum. Clypeus elongate, straight at anterior margin; surface smooth and sparsely covered with fine punctures. Frons slightly concave in centre, sparsely covered with fine punctures, interstices smooth and with micro wrinkles. Vertex broad and flat. Eyes subglobular, medium in size, moderately prominent, surface with several shallow grooves, separated from each other by 1.4 times of eye diameter on dorsal side and 1.2 times on ventral side. Antennae (Figs 32–40) medium in length, 2.4 times as long as head width, reaching about basal 1/4 of elytra when positioned backwards. Antennomeres with length ratio from scape to antennomere 12 as follows: 1.7 : 1.0 : 1.7 : 1.6 : 1.8 : 1.8 : 1.9 : 2.0 : 2.0 : 2.0 : 2.0 : 2.0. Scape subcylindrical, thick, weakly dilated apically, 1.4 times as long as wide; pedicel tuberculate, thick and shortest; antennomeres 3–11 bipectinate, subequal to each other in length; rami slender, flat and more or less curved, and medial rami more or less longer and wider than opposite lateral ones; length ratios of medial and lateral rami to respective antennomeres 3–11 as follows: (1.2 : 0.7), (1.8 : 1.3), (1.9 : 1.5), (1.9 : 1.6), (1.8 : 1.5), (1.7 : 1.5), (1.6 : 1.4), (1.6 : 1.2), (1.2 : 1.0); lateral ramus of antennomere 3 smallest; antennomere 12 spindle-shaped, medium in length (0.25 mm), 3.6 times as long as wide.

Thorax. Pronotum (Figs 26, 27, 28) subtrapezoidal, weakly convex, 1.7 times as wide as long, widest at posterior angles. Anterior margin widely and faintly arcuate; anterior angles obtuse, not projecting; lateral margins widely and weakly emarginate after anterior angles, then weakly arcuate; posterior angles widely round, projecting posterolaterally; posterior margin distinctly emarginate at both sides and slightly protruded in median part. Lateral pronotal carinae complete. Dorsum sparsely covered with fine punctures, interstices smooth and with micro wrinkles; median furrow inconspicuous. Scutellar shield (Figs 27, 28) long linguiform, subtruncate at apex. Surface sparsely and minutely punctate. Prosternum transverse, rather short, almost smooth, without prosternal process. Mesoventrite short, carinate medially. Metaventrite narrowly carinate between mesocoxae, with discrimen distinct and complete. Elytra (Figs 7, 10, 13) elongate, 2.3 times as long as wide, widest at basal 1/3, 2.9 times as long as pronotal width, with apical parts distinctly dehiscent. Humeri widely rounded, 1.2 times as wide as pronotum. Lateral margins gently divergent from humeri to basal 1/3, then gradually convergent to separately rounded apices. Each elytron with lateral margin together with sutural margin narrowly marginated. Dorsum flattened except basal and apical parts, irregularly and moderately densely covered with coarse punctures which attenuated in basal parts, interstices strongly rugulose and with micro wrinkles. Each elytron with two vague costae: medial one short, reaching about apical 2/5; lateral one long, running almost entire elytral length. Legs (Figs 7, 8, 10, 11, 13, 14) slender. Coxae elongate. Femora fusiform, wider than tibiae and subequal in length. Tibiae subparallel-sided though faintly constricted at bases, each with two short, weakly curved apical spurs. Tarsi simple; metatarsomeres 1–5 with length ratio as follows: 2.5 : 2.4 : 1.9 : 1.0 : 2.6. Claws simply curved.



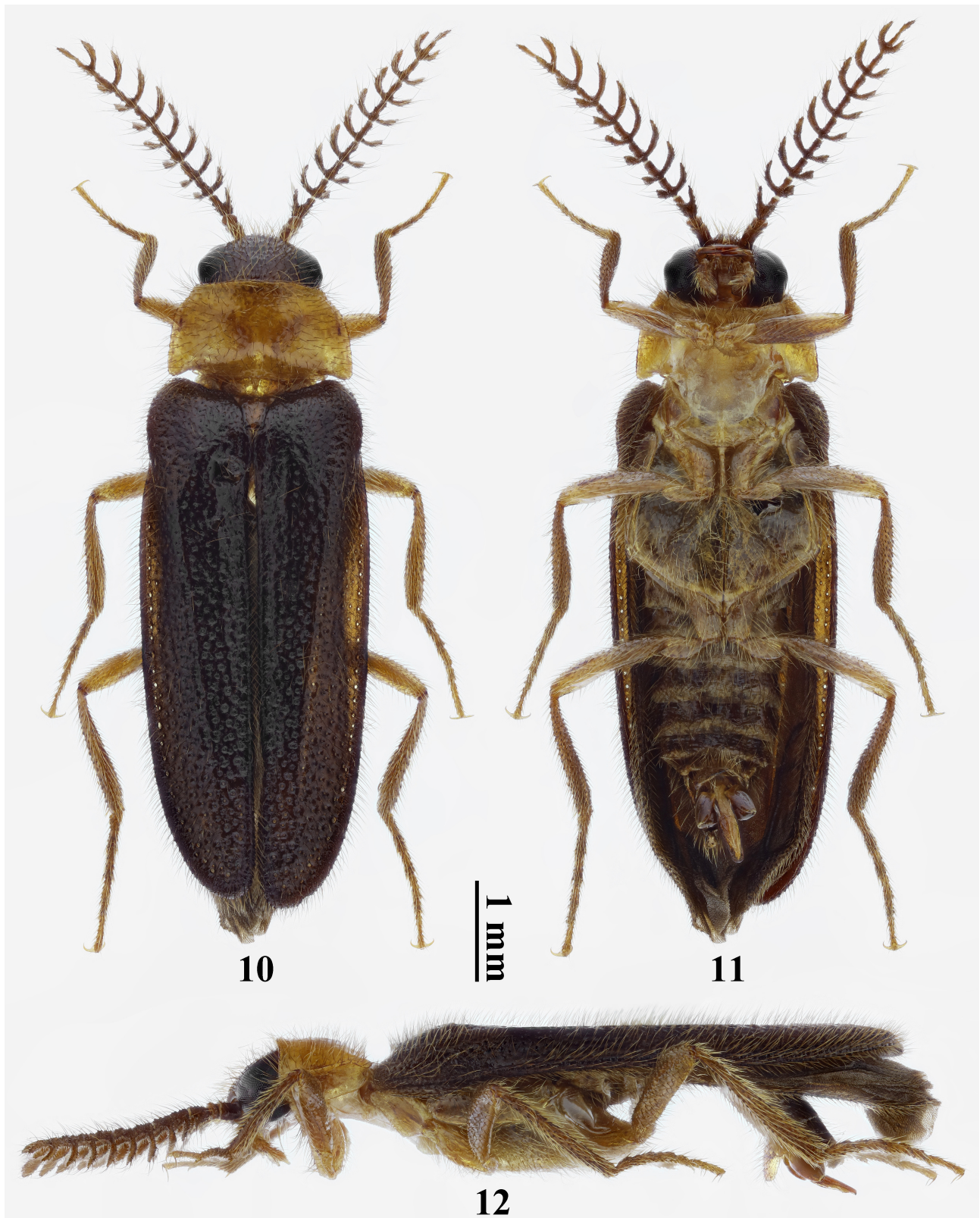
FIGURES 1–5. Habitus of *Diplocladon* spp., ♂♂, dorsal views. 1. *D. atripenne* Yiu, 2017, Hong Kong. 2. Ditto, Guangdong. 3. Ditto, Guangxi. 4. *D. maai* sp. nov., holotype. 5. *D. nezha* sp. nov., holotype. 6. *D. wukong* sp. nov., holotype.



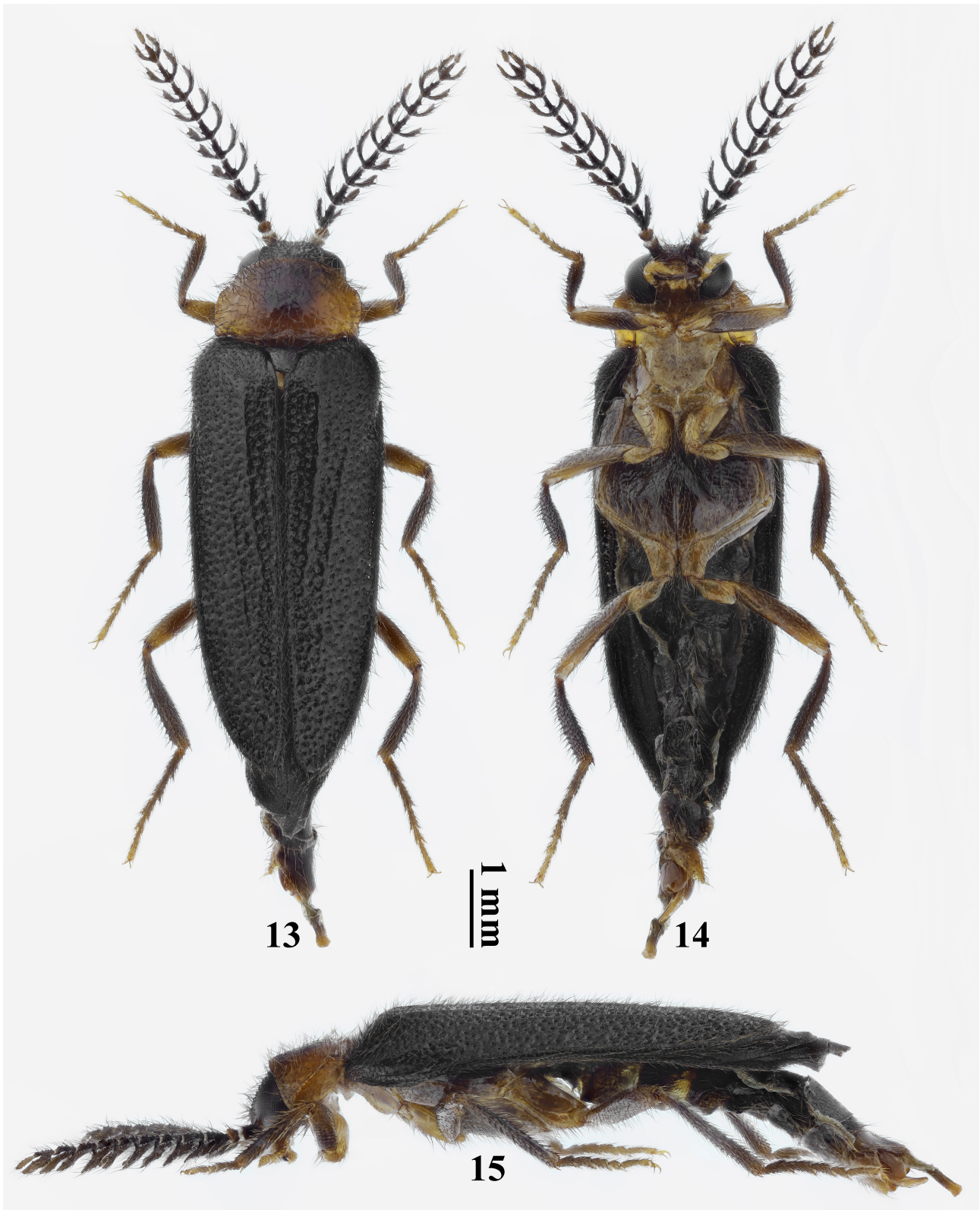
FIGURES 7–9. Habitus of *Diplocladon atripenne* Yiu, 2017, ♂, Hong Kong. 7. Dorsal view. 8. Ventral view. 9. Lateral view.

Abdomen (Figs 50–52) with sternites I–III subparallel laterally, then gradually convergent towards abdominal apex. Tergites and sternites sparsely covered with fine punctures; tergite IX (Figs 56–61) subtrapezoidal, 1.1 times as long as wide; tergite X (Figs 56–61) free, small, elongate subcylindrical, truncated at posterior margin; sternite IX

(Figs 68–73) small, elliptical, 1.8 times as long as wide, rounded or weakly emarginate at posterior margin. Aedeagus (Figs 80–85) small, about 2.0 times as long as phallobase width. Median lobe narrow, about 3.6 times as long as wide and 1.6 times as long as parameres; apex moderately rounded; in lateral view, moderately bent dorsally; basal struts moderately long, slender and divergent. Parameres oval. Phallobase subcordiform, with posterior margin emarginate and anterior margin rounded.



FIGURES 10–12. Habitus of *Diplocladon atripenne* Yiu, 2017, ♂, Guangdong. **10.** Dorsal view. **11.** Ventral view. **12.** Lateral view.



FIGURES 13–15. Habitus of *Diplocladon atripenne* Yiu, 2017, ♂, Guangxi. 13. Dorsal view. 14. Ventral view. 15. Lateral view.

Female. Unknown.

Distribution. China (Guangdong, Guangxi, Hong Kong) (Fig. 98).

Remarks. Guangdong and Guangxi are new provincial records for this species.

Differential diagnosis. This species most resembles *D. nezha* sp. nov. Their shared characters and differential diagnosis are listed in the corresponding section of the latter. *Diplocladon atripenne* is also somewhat similar to *D. hasseltii* in general appearance, but it is easily distinguished from the latter by the antennae, which reach about basal 1/4 of elytra when positioned backwards (only reaching posterior margin of pronotum in *D. hasseltii*) and with all rami rising from the bases of respective antennomeres (rami rising from bases only in several basal antennomeres, then gradually moving apically in more apical antennomeres).

***Diplocladon maai* sp. nov.**

Chinese common name: 马氏星雌光萤

(Figs 4, 16–18, 29, 41–43, 62, 63, 74, 75, 89–91)

Type material. HOLOTYPE: CHINA: ♂ (SYSU), Fukian, S. China / Shaowu, TachuFung [大竹岚] / Jun. 6–9. 1943 / T. C. Maa [马俊超] // En-075605 / 中山大学 [Sun Yat-sen University] / 生物博物馆 [Museum of Biology].

PARATYPE: CHINA: 1♂ (MNHN), Chine / Fukien.

Description. Male. Body small for the genus, 5.9 mm in length (6.1 mm in paratype), widest at elytral humeri, 3.3 times as long as wide. Lengths of body parts (mm): head (0.5), eye (0.4), antenna (2.4), pronotum (0.9), elytra (4.6); width: head (1.1), pronotum (1.4), humeri (1.8).

Habitus (Figs 4, 16–18). Body quite elongate, subparallel, somewhat flattened and weakly shiny. Body color: frons and vertex blackish brown; eyes black; antennae dark brown except yellowish light brown scape and pedicel; pronotum brown, with central part tinged with reddish brown to blackish; scutellar shield mainly reddish brown; elytra reddish brown to blackish; other parts more or less brown. Body almost entirely covered with moderately long, semierect, yellowish-brown pubescence.

Head (Fig. 29) 2.3 times as wide as long, 0.8 times as wide as pronotum. Clypeus elongate, slightly emarginate at anterior margin; surface smooth and sparsely covered with fine punctures. Frons weakly concave in centre, sparsely covered with fine punctures, interstices smooth and with micro wrinkles. Vertex broad and flat. Eyes subglobular, medium in size, moderately prominent, surface with several shallow grooves, separated from each other by 1.4 times of eye diameter on dorsal side and 1.1 times on ventral side. Antennae (Figs 41–43) medium in length, 2.2 times as long as head width, reaching about basal 2/9 of elytra when positioned backwards. Antennomeres with length ratio from scape to antennomere 12 as follows: 1.7 : 1.0 : 1.9 : 1.3 : 1.7 : 1.5 : 1.6 : 1.5 : 1.5 : 1.5 : 1.3 : 1.2. Scape subcylindrical, thick, weakly dilated apically, 1.7 times as long as wide; pedicel tuberculate, thick and shortest; antennomeres 3–11 bipectinate; rami rather stout, flat and more or less curved, and medial rami more or less longer and wider than opposite lateral ones; length ratios of medial and lateral rami to respective antennomeres 3–11 as follows: (0.5 : 0.3), (1.0 : 0.9), (1.0 : 0.9), (1.2 : 1.0), (1.0 : 0.9), (1.1 : 0.9), (1.0 : 0.9), (0.9 : 0.8), (0.8 : 0.7); lateral ramus of antennomere 3 tiny, smallest; antennomere 12 pyriform, short (0.16 mm), 1.9 times as long as wide.

Pronotum (Fig. 29) subtrapezoidal, feebly convex, 1.6 times as wide as long, widest at posterior angles. Anterior margin widely and faintly arcuate, slightly emarginate in median part; anterior angles obtuse, not projecting; lateral margins narrowly and faintly emarginate after anterior angles, then weakly arcuate and weakly constricted before posterior angles; posterior angles widely round, projecting posterolaterally; posterior margin gently emarginate at both sides and slightly protruded in median part. Lateral pronotal carinae complete. Dorsum sparsely covered with fine punctures, interstices smooth and with micro wrinkles; median furrow inconspicuous. Scutellar shield (Fig. 29) long linguiform, subrounded at apex. Surface sparsely and minutely punctate. Prosternum transverse, rather short, almost smooth, without prosternal process. Mesoventrite short, carinate medially. Metaventrite narrowly carinate between mesocoxae, with discrimen distinct and complete. Elytra (Fig. 16) quite elongate, 2.6 times as long as wide, widest at humeri, 3.3 times as long as pronotal width, with apical parts distinctly dehiscent. Humeri widely rounded, 1.3 times as wide as pronotum. Lateral margins slightly constricted after humeri, then gently sinuate and gradually convergent to separately rounded apices. Each elytron with lateral margin together with sutural margin narrowly marginated. Dorsum flattened except basal and apical parts, irregularly and moderately densely covered with coarse punctures which attenuated in basal parts, interstices strongly rugulose and with micro wrinkles. Each elytron with two fairly vague costae: medial one short, reaching about apical 1/4; lateral one long, reaching about apical 1/6. Legs (Figs 16, 17) slender. Coxae elongate. Femora fusiform, wider than tibiae and subequal in length. Tibiae subparallel-sided though faintly constricted at bases, each with two short, weakly curved apical spurs. Tarsi simple; metatarsomeres 1–5 with length ratio as follows: 1.8 : 1.8 : 1.5 : 1.0 : 2.6. Claws simply curved.



FIGURES 16–18. Habitus of *Diplocladon maai* sp. nov., ♂, holotype. 16. Dorsal view. 17. Ventral view. 18. Lateral view.

Abdomen with sternites I–III subparallel laterally, then gradually convergent towards abdominal apex. Tergites and sternites sparsely covered with fine punctures; tergite IX (Figs 62, 63) subtrapezoidal, much narrower at apex, 1.1 times as long as wide; tergite X (Figs 62, 63) free, small, elongate subcylindrical, truncated at posterior margin; sternite IX (Figs 74, 75) small, elliptical, tapered at base, 1.9 times as long as wide, rounded at posterior margin. Aedeagus (Figs 89–91) small, about 2.4 times as long as phallobase width. Median lobe wide, about 3.5 times as

long as wide and 1.5 times as long as parameres; apex widely rounded; in lateral view, moderately bent dorsally and dorsally convex around middle; basal struts moderately long, slender and divergent. Parameres oval. Phallobase subcordiform, with posterior margin emarginate and anterior margin rounded.

Female. Unknown.

Distribution. China (Fujian) (Fig. 98).

Etymology. The new species is dedicated to the collector of the holotype, late Prof. Tsing-Chao Maa (1910–1992), a renowned and respectable Chinese entomologist. The name is a noun in the genitive case.

Differential diagnosis. It is readily to distinguish *D. maai* **sp. nov.** from the congeners by the following characters (the congeners in brackets): rami of antennomeres 3–11 rather stout (Figs 42, 43) (slender or rather elongate slender; Figs 33, 34, 36, 37, 39, 40, 45, 46, 48, 49); medial rami of antennomeres 4–10 at most 1.2 times as long as respective antennomeres (Fig. 42) (at least 1.5 times; Figs 33, 36, 39, 45, 48); abdominal sternite IX tapered at base (Fig. 74) (regularly narrowed; Figs 68, 70, 72, 76, 78); aedeagus with a median lobe dorsally convex around middle in lateral view (Fig. 91) (not dorsally convex; Figs 82, 85, 88, 94, 97).

Diplocladon nezha **sp. nov.**

Chinese common name: 哪吒星雌光萤

(Figs 5, 19–21, 30, 44–46, 64, 65, 76, 77, 92–94)

Type material. HOLOTYPE: CHINA: ♂ (SYSU), 云南菜阳河 [Yunnan: Caiyanghe Nature Reserve] / 2011.7.20 // INB 128. **PARATYPE: CHINA:** 1♂ (NKME), CHINA: S-YUNNAN / (Xishuangbanna) / 20 km NW Jinghong / vic. Man Dian (NNNR) // N°22 07.80 [22°07.80] E100°40.05 / 730 m 08.VII.2008 EKL / leg. A. Weigel forest.

Description. Male. Body large for the genus, 8.9 mm in length (8.0 in paratype), widest at elytral humeri, 3.2 times as long as wide. Lengths of body parts (mm): head (0.5), eye (0.7), antenna (3.9), pronotum (1.4), elytra (7.1); width: head (1.7), pronotum (2.3), humeri (2.7).

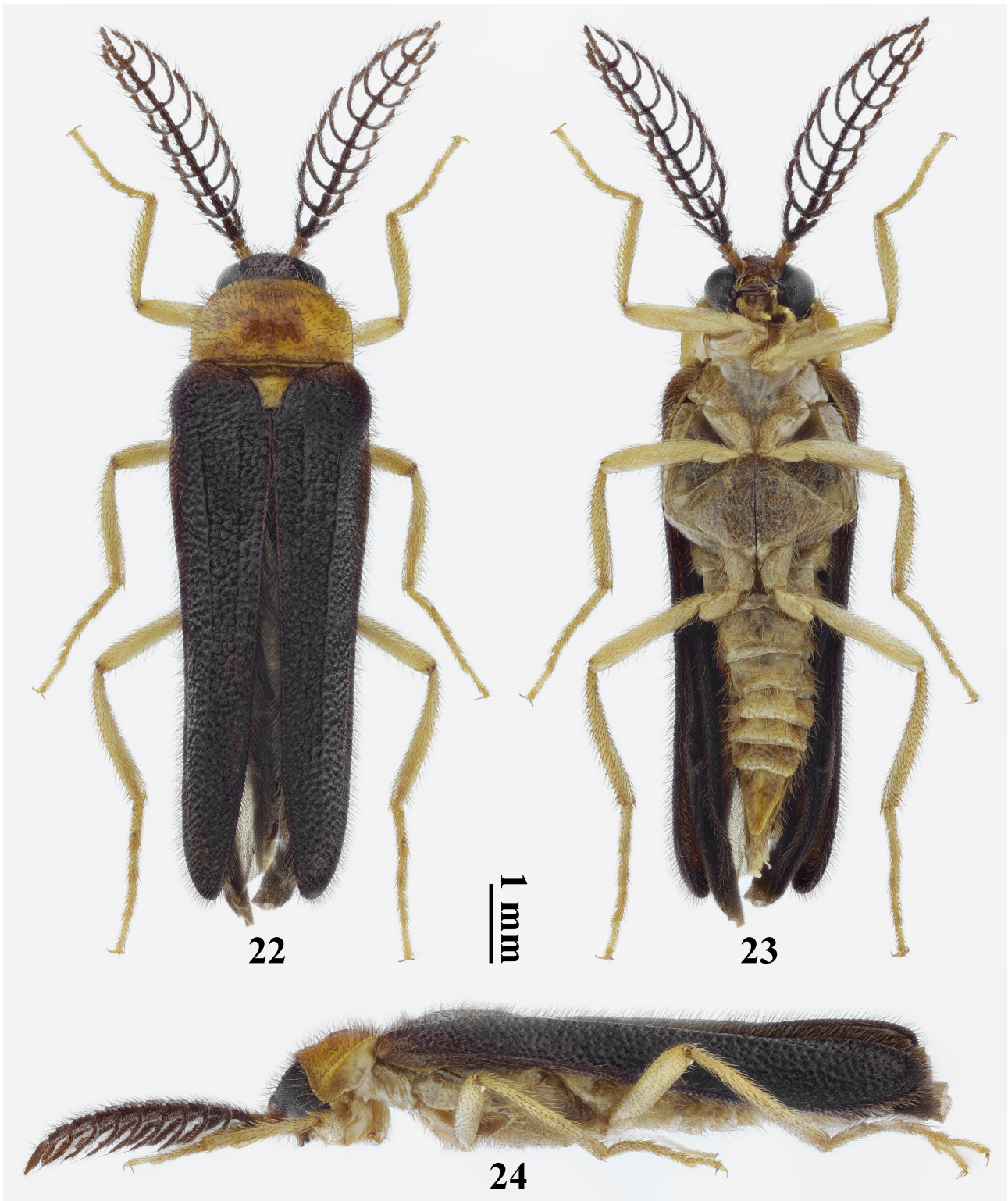
Habitus (Figs 5, 19–21). Body quite elongate, subparallel, somewhat flattened and weakly shiny. Body color: frons, vertex and mandibles dark brown; eyes black; mouthparts (except mandibles) and prothorax light brown; antennae brown with yellowish light brown rami; scutellar shield almost entirely yellowish brown; elytra except yellowish brown in basal part, mostly blackish brown to black; abdomen yellowish brown, tinged with dark brown. Body almost entirely covered with moderately long, semierect, yellowish-brown pubescence.

Head (Fig. 30) 3.2 times as wide as long, 0.7 times as wide as pronotum. Clypeus elongate, substraight at anterior margin; surface smooth and sparsely covered with fine punctures. Frons slightly concave in centre, sparsely covered with fine punctures, interstices smooth and with micro wrinkles. Vertex broad and slightly concave in centre. Eyes subglobular, large, moderately prominent, surface with several shallow grooves, separated from each other by 1.3 times of eye diameter on dorsal side and 0.8 times on ventral side. Antennae (Figs 44–46) medium in length, 2.3 times as long as head width, reaching about basal 1/4 of elytra when positioned backwards. Antennomeres with length ratio from scape to antennomere 12 as follows: 2.0 : 1.0 : 1.8 : 1.7 : 1.9 : 1.9 : 1.9 : 2.1 : 2.1 : 2.1 : 2.3 : 1.8. Scape subcylindrical, thick, weakly dilated apically, 1.6 times as long as wide; pedicel tuberculate, thick and shortest; antennomeres 3–11 bipectinate, subequal to each other in length; rami slender (except lateral ramus of antennomere 11), flat and more or less curved, and medial rami more or less longer and wider than opposite lateral ones; length ratios of medial and lateral rami to respective antennomeres 3–11 as follows: (1.0 : 0.2), (1.7 : 0.9), (1.7 : 1.1), (1.9 : 1.1), (1.7 : 1.1), (1.6 : 1.0), (1.5 : 1.0), (1.5 : 0.9), (1.1 : 0.6); lateral ramus of antennomere 3 tiny, smallest; lateral ramus of antennomere 11 rather stout; antennomere 12 spindle-shaped, medium in length (0.30 mm), 3.8 times as long as wide.

Pronotum (Fig. 30) subtrapezoidal, weakly convex, 1.6 times as wide as long, widest at posterior angles. Anterior margin widely and gently arcuate; anterior angles obtuse, not projecting; lateral margins narrowly and weakly emarginate after anterior angles, then weakly arcuate and slightly constricted before posterior angles; posterior angles narrowly round, projecting posterolaterally; posterior margin gently emarginate at both sides and slightly protruded in median part. Lateral pronotal carinae complete. Dorsum sparsely covered with fine punctures, interstices smooth and with micro wrinkles; median furrow inconspicuous. Scutellar shield (Fig. 30) linguiform, subtruncate at apex. Surface sparsely and minutely punctate. Prosternum transverse, rather short, distinctly depressed medially, without prosternal process. Meso- and metathorax missing. Elytra (Fig. 19) quite elongate, 2.6 times as long as



FIGURES 19–21. Habitus of *Diplocladon nezha* sp. nov., ♂, holotype. 19. Dorsal view. 20. Ventral view. 21. Lateral view.



FIGURES 22–24. Habitus of *Diplocladon wukong* sp. nov., ♂, holotype. 22. Dorsal view. 23. Ventral view. 24. Lateral view.

wide, widest at humeri, 3.1 times as long as pronotal width, with apical parts distinctly dehiscent. Humeri widely rounded, 1.2 times as wide as pronotum. Lateral margins slightly constricted after humeri, then gradually divergent to middle and gradually convergent to separately rounded apices. Each elytron with lateral margin together with sutural margin narrowly marginated. Dorsum flattened except basal and apical parts, irregularly and moderately densely covered with coarse punctures which attenuated in basal part, interstices strongly rugulose and with micro

wrinkles. Each elytron with two vague costae: medial one short, reaching about apical 3/8; lateral one long, reaching about apical 1/6. Legs (Fig. 20). (Except procoxae, left protrochanter, profemur and protibia, all other joints are missing.) Procoxae elongate. Profemur fusiform, wider than protibia and subequal in length.

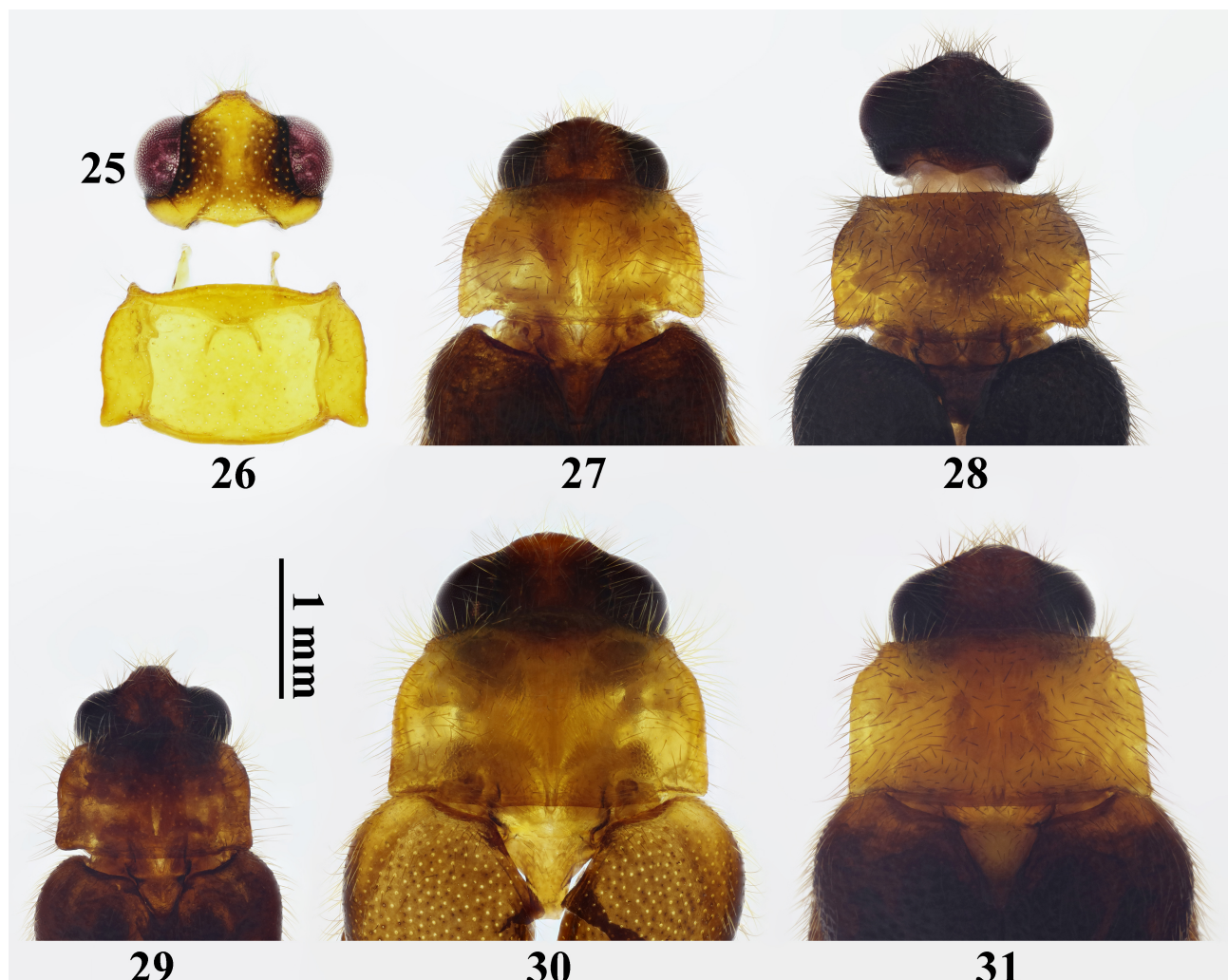
Abdomen (Figs 53–55) gradually convergent from abdominal sternite I towards apex. Tergites and sternites sparsely covered with fine punctures; tergite IX (Figs 64, 65) elongate subtrapezoidal, 1.4 times as long as wide; tergite X (Figs 64, 65) free, small, elongate subcylindrical, truncated at posterior margin; sternite IX (Figs 76, 77) large, elongate elliptical, 2.0 times as long as wide, weakly emarginate at posterior margin. Aedeagus (Figs 92–94) large, about 2.4 times as long as phallobase width. Median lobe distinctly narrowed from wide base to apex, about 3.9 times as long as wide and 1.5 times as long as parameres; apex narrowly rounded; in lateral view, distinctly bent dorsally; basal struts moderately long, slender and divergent. Parameres elongate oval. Phallobase subcordiform, with posterior margin emarginate and anterior margin rounded.

Female. Unknown.

Distribution. China (Yunnan) (Fig. 98).

Etymology. The specific epithet is from the name of “Nezha [哪吒]”, one of the most rebellious mythological figures in Chinese myths and legends. The name is a noun in apposition.

Remarks. The holotype was partly damaged as showed in Figs 5, 19–21. Fortunately, its critical diagnostic characters, e.g. antennae, abdominal sternite IX and aedeagus, are still remained.



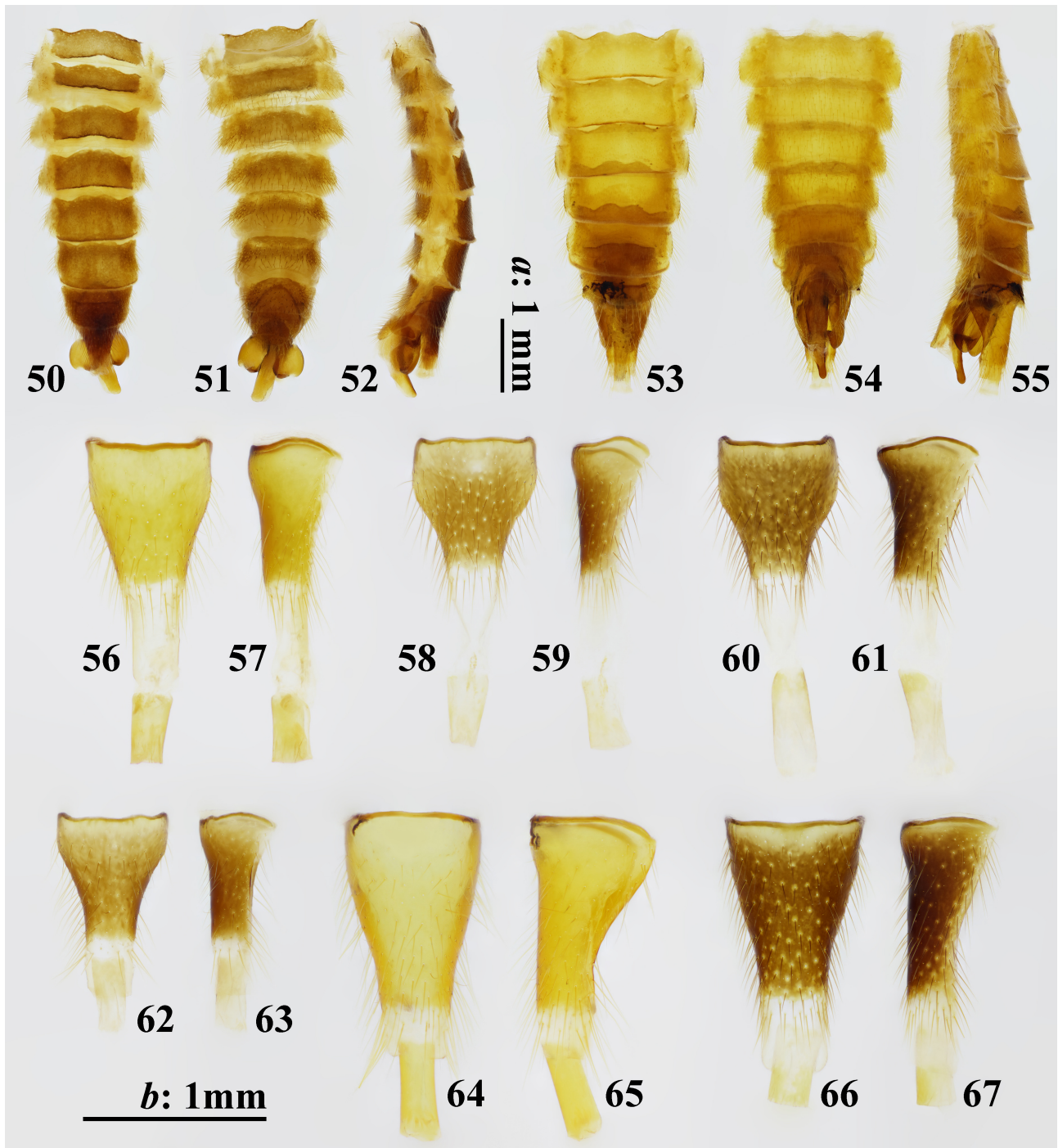
FIGURES 25–31. Heads and pronota of *Diplocladon* spp., ♂♂. **25, 26.** *D. atripenne* Yiu, 2017, Hong Kong. **27.** Ditto, Guangdong. **28.** Ditto, Guangxi. **29.** *D. maai* sp. nov., holotype. **30.** *D. nezha* sp. nov., holotype. **31.** *D. wukong* sp. nov., holotype. **25, 26.** Full views. **27–31.** Dorsal views.



FIGURES 32–49. Antennae of *Diplocladon* spp., ♂♂. 32–34. *D. atripenne* Yiu, 2017, Hong Kong. 35–37. Ditto, Guangdong. 38–40. Ditto, Guangxi. 41–43. *D. maai* sp. nov., holotype. 44–46. *D. nezha* sp. nov., holotype. 47–49. *D. wukong* sp. nov., holotype (red arrows indicate measurement criteria). 32, 35, 38, 41, 44, 47. Dorsal views. 33, 36, 39, 42, 45, 48. Full views of medial rami. 34, 37, 40, 43, 46, 49. Full views of lateral rami.

Differential diagnosis. This new species most resembles *D. atripenne* in sharing the following characters: antennomeres 3–11 with rami slender (Figs 33, 34, 36, 37, 39, 40, 45, 46); medial rami of antennomeres 4–10 at least 1.5 times as long as respective antennomeres (Figs 33, 36, 39, 45); abdominal sternite IX regularly narrowed at base (Figs 68, 70, 72, 76); aedeagus with median lobe not dorsally convex in lateral view (Figs 82, 85, 88, 94). However, it is distinguished from the latter by the following characters (those of *D. atripenne* in brackets): elytra mostly blackish brown to black except yellowish brown in basal part (Fig. 19) (entirely dark brown to black; Figs 7, 10, 13); lateral ramus of antennomere 11 rather stout (Fig. 46) (slender; Figs 34, 37, 40); tergite IX elongate

subtrapezoidal, 1.4 times as long as wide (Fig. 64) (subtrapezoidal, 1.1 times as long as wide; Figs 56, 58, 60); abdominal sternite IX large, elongate elliptical, 2.0 times as long as wide (Fig. 76) (small, elliptical, 1.8 times as long as wide; Figs 68, 70, 72); aedeagus large, about 2.4 times as long as phallobase width, with median lobe distinctly narrowed from wide base to apex (Fig. 92) (small, about 2.0 times as long as phallobase width, with median lobe not distinctly narrowed apically; Figs 80, 83, 86).



FIGURES 50–67. Abdomens and abdominal tergites IX & X of *Diplocladon* spp., ♂♂. **56, 57.** *D. atripenne* Yiu, 2017, Hong Kong. **50–52, 58, 59.** *D. atripenne* Yiu, 2017, Guangdong. **60, 61.** Ditto, Guangxi. **62, 63.** *D. maai* sp. nov., holotype. **53–55, 64, 65.** *D. nezha* sp. nov., holotype. **66, 67.** *D. wukong* sp. nov., holotype. **50, 53, 56, 58, 60, 62, 64, 66.** Dorsal views. **51, 54.** Ventral views. **52, 55, 57, 59, 61, 63, 65, 67.** Lateral views. Scale *a* for 50–55 and *b* for 56–67.



FIGURES 68–79. Abdominal sternite IX of *Diplocladon* spp., ♂♂. **68, 69.** *D. atripenne* Yiu, 2017, Hong Kong. **70, 71.** Ditto, Guangdong. **72, 73.** Ditto, Guangxi. **74, 75.** *D. maai* sp. nov., holotype. **76, 77.** *D. nezha* sp. nov., holotype. **78, 79.** *D. wukong* sp. nov., holotype. **68, 70, 72, 74, 76, 78.** Ventral views. **69, 71, 73, 75, 77, 79.** Lateral views.

***Diplocladon wukong* sp. nov.**

Chinese common name: 悟空星雌光萤

(Figs 6, 22–24, 31, 47–49, 66, 67, 78, 79, 95–97)

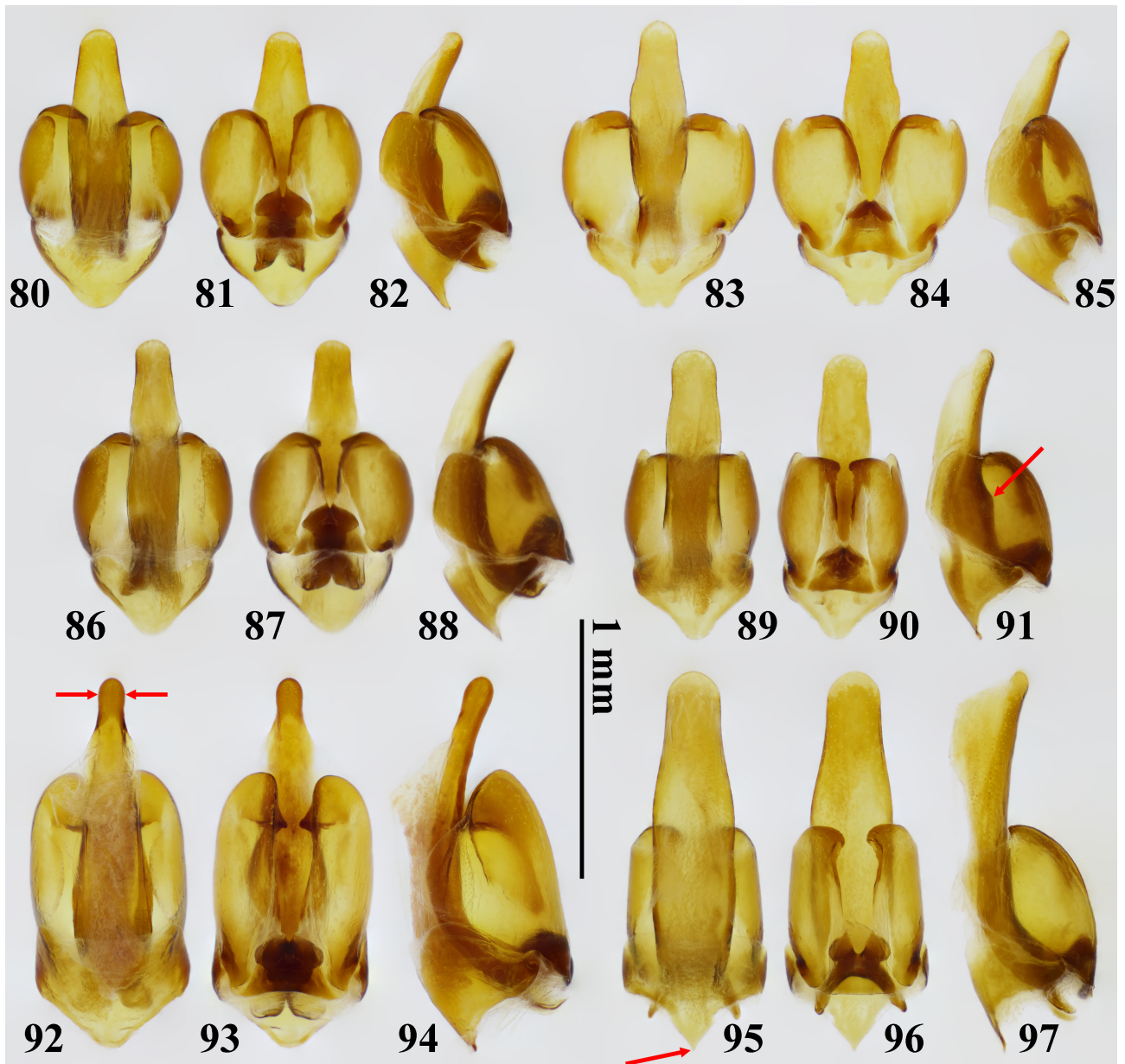
Type material. HOLOTYPE: CHINA: ♂ (IZCAS), 重庆丰都县雪玉洞 [Chongqing: Fengdu County, Xueyudong Scenic Area] / 2010.4.10 / 张志升 [Zhi-Sheng Zhang] 采 [leg.].

Description. Male. Body medium for the genus, 8.2 mm in length, widest at elytral humeri, 3.2 times as long as wide. Lengths of body parts (mm): head (0.6), eye (0.5), antenna (4.0), pronotum (1.3), elytra (6.8); width: head (1.5), pronotum (2.2), humeri (2.6).

Habitus (Figs 6, 22–24). Body quite elongate, subparallel, somewhat flattened and weakly shiny. Body color: frons, vertex and mandibles reddish brown; eyes black; antennae blackish brown except light brown scape and pedicel; pronotum light brown, with central part tinged with reddish brown; scutellar shield almost entirely yellowish brown; elytra blackish, tinged with reddish brown; other parts more or less yellowish brown. Body almost entirely covered with moderately long, semierect, yellowish-brown pubescence.

Head (Fig. 31) 2.4 times as wide as long, 0.7 times as wide as pronotum. Clypeus elongate, weakly emarginate at anterior margin; surface smooth and sparsely covered with fine punctures. Frons weakly concave in centre,

sparsely covered with fine punctures, interstices smooth and with micro wrinkles. Vertex broad and flat. Eyes subglobular, medium in size, moderately prominent, surface with several rather shallow grooves, separated from each other by 1.5 times of eye diameter on dorsal side and 1.2 times on ventral side. Antennae (Figs 47–49) long, 2.7 times as long as head width, reaching about basal 1/3 of elytra when positioned backwards. Antennomeres with length ratio from scape to antennomere 12 as follows: 2.6 : 1.0 : 1.9 : 2.1 : 2.1 : 2.3 : 2.4 : 2.6 : 2.3 : 2.5 : 3.0 : 3.1. Scape subcylindrical, thick, weakly dilated apically, 1.8 times as long as wide; pedicel tuberculate, thick and shortest; antennomeres 3–11 bipectinate; rami rather elongate slender, flat and more or less curved, and medial rami more or less longer and wider than opposite lateral ones; length ratios of medial and lateral rami to respective antennomeres 3–11 as follows: (2.4 : 1.4), (2.8 : 2.0), (3.0 : 2.1), (2.7 : 2.0), (2.7 : 2.0), (2.5 : 1.9), (2.7 : 2.1), (2.5 : 1.9), (1.8 : 1.5); lateral ramus of antennomere 3 smallest; antennomere 12 strongly elongated, long (0.43 mm), 5.5 times as long as wide.



FIGURES 80–97. Aedeagi of *Diplocladon* spp., ♂♂. **80–82.** *D. atripenne* Yiu, 2017, Hong Kong. **83–85.** Ditto, Guangdong (parameres twisted ventrally). **86–88.** Ditto, Guangxi. **89–91.** *D. maai* sp. nov., holotype (red arrow indicates dorsal convex of median lobe). **92–94.** *D. nezha* sp. nov., holotype (red arrows indicate distinctly narrowed apical part of median lobe). **95–97.** *D. wukong* sp. nov., holotype (red arrow indicates acuminate anterior margin of phallobase). **80, 83, 86, 89, 92, 95.** Ventral views. **81, 84, 87, 90, 93, 96.** Dorsal views. **82, 85, 88, 91, 94, 97.** Lateral views.

Pronotum (Fig. 31) subtrapezoidal, weakly convex, 1.7 times as wide as long, widest at posterior angles. Anterior margin widely and faintly arcuate, slightly emarginate in median part; anterior angles obtuse, not projecting; lateral margins widely and weakly emarginate after anterior angles, then weakly arcuate; posterior angles narrowly round, projecting posterolaterally; posterior margin gently emarginate at both sides and slightly protruded in median part. Lateral pronotal carinae complete. Dorsum sparsely covered with fine punctures, interstices smooth and with micro wrinkles; median furrow absent. Scutellar shield (Fig. 31) linguiform, subtruncate at apex. Surface sparsely and minutely punctate. Prosternum transverse, rather short, almost smooth, without prosternal process. Mesoventrite short, carinate medially. Metaventrite narrowly carinate between mesocoxae, with discrimen distinct and complete. Elytra (Fig. 22) quite elongate, 2.7 times as long as wide, widest at humeri, 3.1 times as long as pronotal width, with apical parts distinctly dehiscent. Humeri widely rounded, 1.2 times as wide as pronotum. Lateral margins slightly constricted after humeri, then gently sinuate and gradually convergent to separately rounded apices. Each elytron with lateral margin together with sutural margin narrowly marginated. Dorsum flattened except basal and apical parts, irregularly and moderately densely covered with coarse punctures which attenuated in basal parts, interstices strongly rugulose and with micro wrinkles. Each elytron with two vague costae: medial one short, reaching about apical 3/8; lateral one long, running almost entire elytral length. Legs (Figs 22, 23) slender. Coxae elongate. Femora fusiform, wider than tibiae and subequal in length. Tibiae subparallel-sided though faintly constricted at bases, each with two short, weakly curved apical spurs. Tarsi simple; metatarsomeres 1–5 with length ratio as follows: 2.8 : 2.5 : 1.8 : 1.0 : 2.8. Claws simply curved.

Abdomen gradually convergent from abdominal sternite I towards apex. Tergites and sternites sparsely covered with fine punctures; tergite IX (Figs 66, 67) elongate subtrapezoidal, 1.3 times as long as wide; tergite X (Figs 66, 67) free, small, elongate subcylindrical, truncated at posterior margin; sternite IX (Figs 78, 79) large, subelliptical, 2.0 times as long as wide, strongly narrowing towards rounded posterior margin. Aedeagus (Figs 95–97) large, about 2.6 times as long as phallobase width. Median lobe much wide, about 3.6 times as long as wide and 1.9 times as long as parameres; apex widely rounded; in lateral view, moderately bent dorsally; basal struts moderately long, slender and divergent. Parameres elongate oval. Phallobase subcordiform, with posterior margin emarginate and anterior margin acuminate.

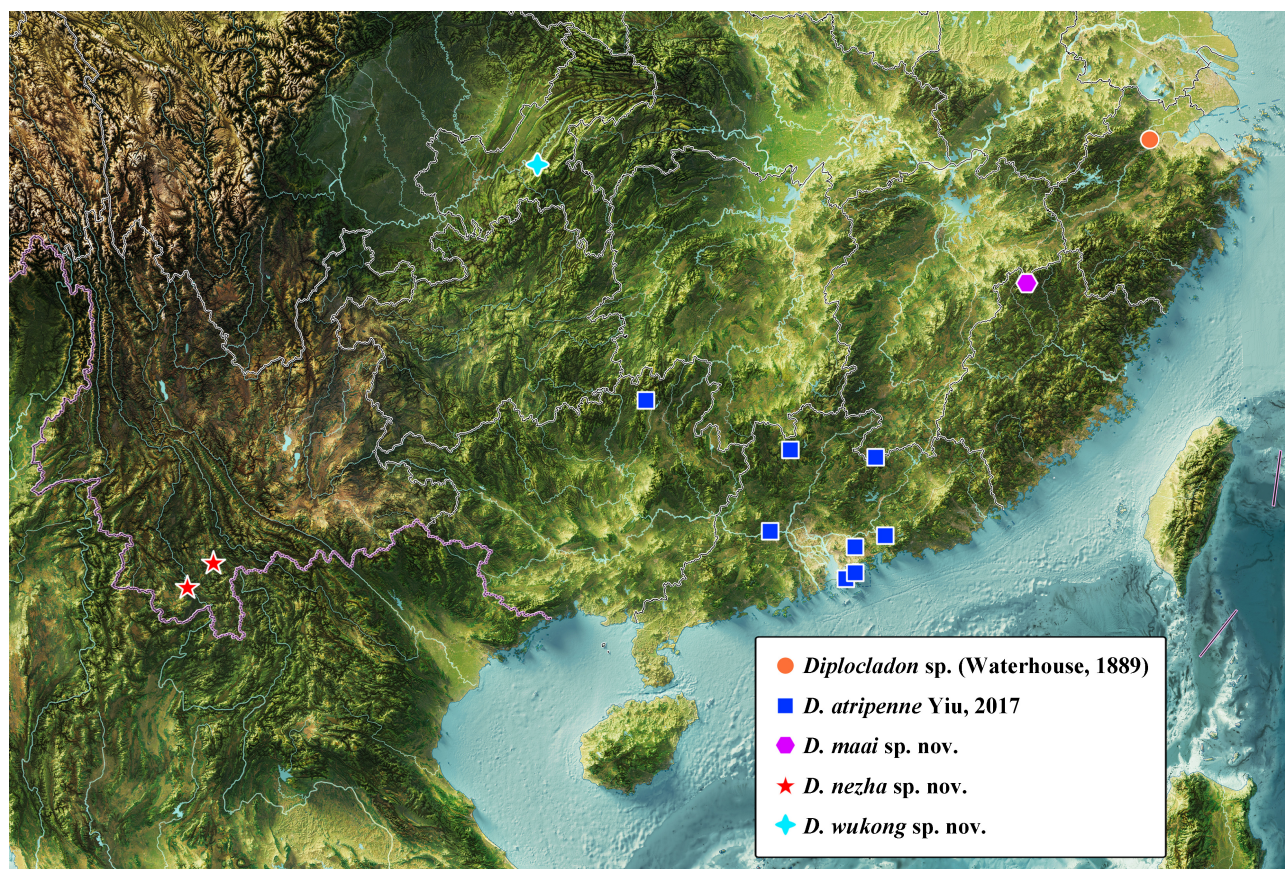


FIGURE 98. Distribution map of *Diplocladon* species from China.

Female. Unknown.

Distribution. China (Chongqing) (Fig. 98).

Etymology. The specific epithet is from the name of “Sun Wukong [孙悟空]”, also known as the Monkey King, one of the most rebellious mythological figures in Chinese myths and legends. The name is a noun in apposition.

Differential diagnosis. It is readily to distinguish *D. wukong* sp. nov. from the congeners by the following characters (the congeners in brackets): rami of antennomeres 3–11 rather elongate slender (Figs 48, 49) (slender or rather stout; Figs 33, 34, 36, 37, 39, 40, 42, 43, 45, 46); medial rami of antennomeres 4–10 at least 2.5 times as long as respective antennomeres (Fig. 48) (at most 1.9 times; Figs 33, 36, 39, 42, 45); lateral rami of antennomeres 4–10 at least 1.9 times as long as respective antennomeres (Fig. 49) (at most 1.6 times; Figs 34, 37, 40, 43, 46); abdominal sternite IX strongly narrowed towards posterior margin (Fig. 78) (regularly narrowed; Figs 68, 70, 72, 74, 76); aedeagus with a median lobe 1.9 times as long as parameres (Fig. 95) (1.5–1.6 times; Figs 80, 83, 86, 89, 92); phallobase with anterior margin acuminate (Fig. 95) (rounded; Figs 80, 83, 86, 89, 92).

Key to males of *Diplocladon* Gorham from China

1. Antennomeres 3–11 with rami rather elongate slender (Figs 48, 49); medial rami of antennomeres 4–10 at least 2.5 times as long as respective antennomeres (Fig. 48) and lateral rami at least 1.9 times (Fig. 49); abdominal sternite IX strongly narrowed towards posterior margin (Fig. 78); aedeagus with median lobe 1.9 times as long as parameres (Fig. 95); phallobase with anterior margin acuminate (Fig. 95) *D. wukong* sp. nov.
- Antennomeres 3–11 with rami slender or rather stout (Figs 33, 34, 36, 37, 39, 40, 42, 43, 45, 46); medial rami of antennomeres 4–10 at most 1.9 times as long as respective antennomeres (Figs 33, 36, 39, 42, 45) and lateral rami at most 1.6 times (Figs 34, 37, 40, 43, 46); abdominal sternite IX regularly narrowed towards posterior margin (Figs 68, 70, 72, 74, 76); aedeagus with median lobe 1.5–1.6 times as long as parameres (Figs 80, 83, 86, 89, 92); phallobase with anterior margin rounded (Figs 80, 83, 86, 89, 92). 2
2. Antennomeres 3–11 with rami rather stout (Figs 42, 43); medial rami of antennomeres 4–10 at most 1.2 times as long as respective antennomeres (Fig. 42); abdominal sternite IX tapered at base (Fig. 74); aedeagus with median lobe dorsally convex around middle in lateral view (Fig. 91) *D. maai* sp. nov.
- Antennomeres 3–11 with rami slender (Figs 33, 34, 36, 37, 39, 40, 45, 46); medial rami of antennomeres 4–10 at least 1.5 times as long as respective antennomeres (Figs 33, 36, 39, 45); abdominal sternite IX regularly narrowed at base (Figs 68, 70, 72, 76); aedeagus with median lobe not dorsally convex in lateral view (Figs 82, 85, 88, 94). 3
3. Lateral ramus of antennomere 11 rather stout (Fig. 46); abdominal tergite IX elongate subtrapezoidal, 1.4 times as long as wide (Fig. 64); abdominal sternite IX large, elongate elliptical, 2.0 times as long as wide (Fig. 76); aedeagus large, about 2.4 times as long as phallobase width, with median lobe distinctly narrowed from wide base to apex (Fig. 92) *D. nezha* sp. nov.
- Lateral ramus of antennomere 11 slender (Figs 34, 37, 40); abdominal tergite IX subtrapezoidal, 1.1 times as long as wide (Figs 56, 58, 60); abdominal sternite IX small, elliptical, 1.8 times as long as wide (Figs 68, 70, 72); aedeagus small, about 2.0 times as long as phallobase width, with median lobe not distinctly narrowed apically (Figs 80, 83, 86). *D. atripenne* Yiu, 2017

Acknowledgements

We are deeply indebted to Zhen-Hua Liu [刘振华] (IZGAS), Bing-Lan Zhang [张兵兰] (SYSU), Antoine Mantilleri (MNHN), Jiří Hájek (NMPC), Harald Schillhammer and Isidor Plonski (both NHMW), and Matthias Hartmann (NKME) for the loans of material used in this study. We would like to express our sincere gratitude to Chang-Chin Chen [陈常卿] (Tianjin, China), Tian-Long He [贺天龙] (Huainan, China), Gui-Qiang Huang [黄贵强] (Liupanshui Normal University, Liupanshui, China), Zhuo-Heng Jiang [蒋卓衡] (Westlake University, Hangzhou, China), Yi-Teng Li [李奕腾] (Wuhan, China), Michael Lee [李泽伦] (University of California, Riverside, the USA), Mei-Ying Lin [林美英] (MYNU), Ye-Jie Lin [林业杰] (Institute of Zoology, Chinese Academy of Sciences, Beijing, China), Lu Qiu [邱鹭] (MYNU), Hao Xu [许浩] (MYNU), and Jiang Zhu [朱江] (South China Institute of Environmental Sciences, Guangzhou, China) for their considerable help in this study. We thank Simone Policena Rosa (Universidade Federal de Itajubá, Itajubá, Brazil) and André Silva Roza (Cidade Universitária, Rio de Janeiro, Brazil) for their constructive comments on earlier versions of the manuscript. This study was supported by the Sichuan Provincial Science and Technology Plan Project (grant No. 2022NSFSC0127; to Ch-BW) and by the National Natural Science Foundation of China (grant No. 32270483; to RK).

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中国雌光萤科Rhagophthalmidae (鞘翅目) 研究II: 星雌光萤属*Diplocladon*三新种

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摘要: 描述中国星雌光萤属*Diplocladon*三新种, 即福建的马氏星雌光萤*D. maai* sp. nov.、云南的哪吒星雌光萤*D. nezha* sp. nov.和重庆的悟空星雌光萤*D. wukong* sp. nov.; 重描述了黑鞘星雌光萤*D. atripenne*并首次记录其广东和广西分布; 提供了这四种星雌光萤的整体与鉴别特征图、基于雄虫的种检索表以及分布地图。

关键词: 分布; 叩甲总科; 形态学; 东洋区; 雌光萤; 分类学