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RESEARCH PAPER

The first record of *Archiclaviger* in continental Asia, with description of a new species from China (Coleoptera: Staphylinidae: Pselaphinae)

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Abstract. The monospecific clavigerite genus *Archiclaviger* Heller, 1936 (Coleoptera: Staphylinidae: Pselaphinae), previously only known from Java, is reported to occur in China. A new species, *A. gaofani* sp. nov., was collected in nests of *Nylanderia* Emery, 1906 ants (Hymenoptera: Formicidae) in Jiangsu Province, and is described here. The new species can be separated from *A. overbecki* Heller, 1936 by different proportions of the antennomeres, and much sparser setae at the apex of the elytra and base of the abdomen. A revised diagnosis of *Archiclaviger* is provided, and a lectotype is designated for *A. overbecki*.

Key words. Coleoptera, Staphylinidae, Pselaphinae, Clavigeritae, *Archiclaviger*, lectotype designation, range extension, *Nylanderia* ant, myrmecophily, China, Asia

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Introduction

The obligate myrmecophilous supertribe Clavigeritae currently contains 108 extant genera, all with a reduced number of antennomeres, comprising three to six segments. Among them, only 14 genera bear six-segmented antennae, with the Palaearctic genus *Claviger* Preysler, 1790 being the most diverse group, containing 39 species and subspecies. Ten genera with six-segmented antennae are restricted to Africa, i.e., *Clavigeropsis* Raffray, 1882, *Corynotopsis* Jeannel, 1951, *Dejaegeria* Jeannel, 1964, *Gericlavodes* Jeannel, 1960, *Hexamerodes* Jeannel, 1959, *Mesoleptochir* Jeannel, 1959, *Palaeoclaviger* Reichensperger, 1930, *Xenalluaudia* Raffray, 1913, *Xenomussardia* Célis, 1975 and *Zuluclavodes* Hlaváč, 2007; and two genera, *Tapas* Besuchet, 2008 and *Mataranka* Hlaváč, 2016, occur in Australia. The monospecific genus *Archiclaviger* Heller, 1936, established for *A. overbecki* Heller, 1936 from Java, Indonesia, is the only genus with six-segmented antennae known from the Oriental Region. Its description (Heller 1936), based on one or more females, is of the quality usual for the first half of the 20th century, and is accompanied with a simple habitus sketch, providing insufficient information to clearly distinguish *Archiclaviger* from the other genera. Besuchet (2008) transferred *Archiclaviger* from Clavigerodina to Clavigerina, and mentioned a number of subtribe-related, but not genus-diagnostic, characters. A brief diagnosis of *Archiclaviger*, based on the papers by Heller (1936) and Besuchet (2008), was given by Hlaváč (2016).

The clavigerite fauna of China is represented by eight genera and 16 species; all have three- or four-segmented antennae. The genus *Diartiger* Sharp, 1883 is the most species-rich group (6 spp., Beijing, Anhui, Zhejiang, Yunnan), followed by *Triartiger* Kubota, 1944 (3 spp., Taiwan), *Anaclasiger* Raffray, 1890 (2 spp., Guangdong, Taiwan), *Ambrosiger* Silvestri, 1926 (1 sp., Macau), *Micrelytriger* Nomura, 1997 (1 sp., Taiwan), *Cerylambus* Newton & Chandler, 1989 (1 sp., Hainan), *Sinoclavigerodes* Yin &

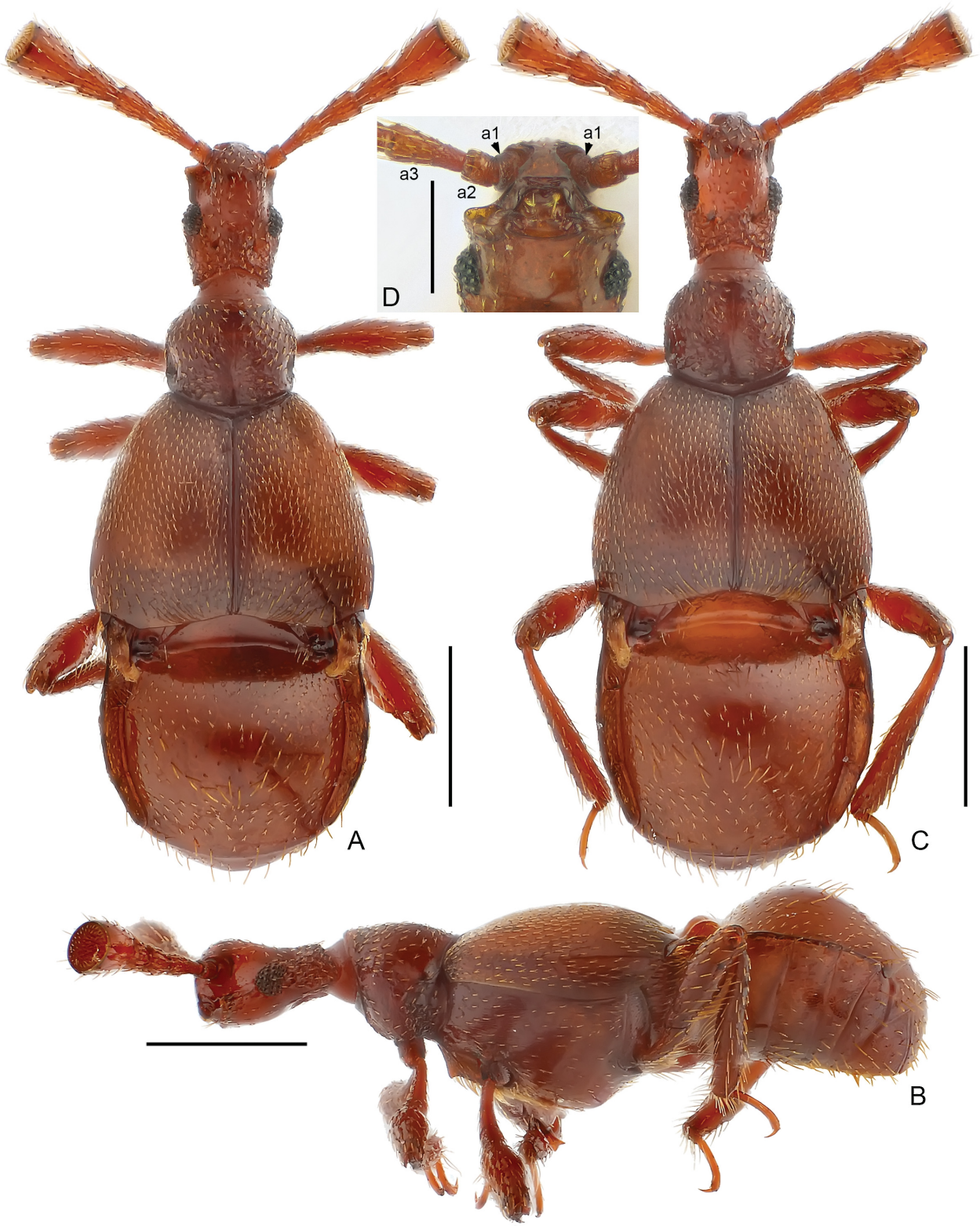

Fig. 1. *Archiclaviger gaofani* sp. nov. A–C – habitus (A – dorsal, male; B – lateral, male; C – dorsal, female); D – frontoventral view of antennal bases, showing antennal fossae and scapes. Abbreviations: a1–3 = antennomere 1–3. Scale bars: 0.5 mm in A–C; 0.2 mm in D.

Hlaváč, 2011 (1 sp., Guangdong), and *Colilodion* Besuchet, 1991 (1 sp., Hainan) (Silvestri 1926; Nomura 1997a–c; Löbl 1998; Yin et al. 2010, 2011, 2012; Yin & Li 2013, 2014; Yin & Cuccodoro 2016; Hlaváč et al. 2017; Yin 2018; Li et al. 2019). In March 2020, two individuals of a clavigerite beetle with six antennomeres were collected from nests of a *Nylanderia* Emery, 1906 ant in Jiangsu, eastern China, by Mr. Fan Gao, a college student and an insect photographer based at Nanjing University. The material was later transferred to the first author for identification. After a direct comparison with the type of *A. overbecki*, the Chinese specimens were found to be congeneric with *Archiclaviger*, and clearly represent a new species which is described here.

Material and methods

The type material of the new species described in this paper is deposited in the Insect Collection of Shanghai Normal University, Shanghai, China (SNUC). The type of *A. overbecki* was found in Muséum d'histoire Naturelle, Geneva (MHNG), to where it was loaned by Claude Besuchet from the Museum für Tierkunde, Dresden (MTD); the specimen will be returned to MTD after this study.

The text of the specimen labels is quoted verbatim in quotation marks, supplementary notes are included in parenthesis.

Dissected parts were preserved in Euparal on a plastic slide that was pinned under the specimen. The habitus images of the beetles were taken using a Canon 5D Mark III camera in conjunction with a Canon MP-E 65mm f/2.8 1–5× Macro Lens, and a Canon MT-24EX Macro Twin Lite Flash was used as the light source (Fig. 1); or using a Leica M 205C stereo microscope (Figs 4A–F). Images of the morphological details (Figs 2–3) were produced using a Canon G9 camera mounted to an Olympus CX31 microscope under reflected or transmitted light. Zerene Stacker (version 1.04) was used for image stacking. The maps were produced using Google Earth Pro 7.1.8.3036 (Fig. 4B), and SimpleMappr online service (Fig. 4C) (Shorthouse 2010). All images were modified and grouped into plates using Adobe Photoshop CC 2018.

The abdominal tergites and sternites are numbered following Chandler (2001) in Arabic (starting from the first visible segment) and Roman (reflecting true morphological position) numerals, e.g., tergite 1 (IV), and sternite 1 (III).

Taxonomy

tribe Clavigerini

subtribe Clavigerina
(after Besuchet 2008: 70)

Archiclaviger Heller, 1936

Chinese common name: 原寡节蚁甲属

Archiclaviger Heller, 1936: 66.

Type species. *Archiclaviger overbecki* Heller, 1936 (by original monotypy).

Revised diagnosis. Small clavigerite beetles with body size slightly over 2.0 mm. Body moderately convex dorso-ventrally. Head elongate, sub-rectangular, with small, moderately separated asetose vertexal foveae; gular region impressed around small and asetose posterior tentorial pits (gular foveae). Each antenna composed of six antennomeres; antennal fossae entirely and scapes largely covered by rostrum in dorsal view, but can be clearly observed in frontoventral view (Fig. 1D); antennomeres 1 (scape) and 2 (pedicel) short, antennomeres 3 to 6 each distinctly longer than pedicel, apex of antennomere 6 truncate, filled with dense, thick setae. Pronotum sub-globose, transverse, broadest near middle, with lateral antebasal foveae and median longitudinal sulcus/impression. Prosternum with shallow lateral procoxal foveae; anterior margin of coxal cavities slightly carinate. Elytra roundly trapezoidal; each elytron with oblique anterior margin; lacking basal foveae, sutural striae complete, lacking obvious discal striae; posterolateral corners obliquely truncate; posterior margin slightly curved; disc covered with short and evenly distributed setae, posterior margin lacking trichomes, with sparse or dense long setae. Mesoventrite strongly protuberant in middle, transverse, confluent with metaventrite, the latter strongly convex in middle and evenly sloping laterally; both meso- and metaventrite with linear microsculpture. Legs short, tibiae straight, narrow at bases and thickening distally. Abdomen dorso-ventrally rounded, disc strongly to moderately convex; composite tergite deeply concave at base, lacking trichomes in cavity; with three pairs of paratergites, both paratergites of first pair bearing well-developed trichome. Sternite 2 (IV) approximately twice length of sternite 1 (III) along midline, as long (in *A. overbecki*) as to 1.35 times longer (in *A. gaofani* sp. nov.) than sternite 3 (V).

Sexual dimorphism. The male of *A. gaofani* sp. nov. described below possesses a large, curved spine on mesofemur, and a preapical spur on mesotibia. Only a single female is known for *A. overbecki*, hence the condition of sexual dimorphism of this species remains unknown.

Distribution. China (Jiangsu), Indonesia (Java).

Archiclaviger gaofani sp. nov.

(Figs 1–3; 5)

Chinese common name: 高氏原寡节蚁甲

Type material. Holotype: **CHINA:** ♂, 'China: Jiangsu, Changzhou, Jintan Dist., nr. cross of S240/S340 HWY, 31º45′45.64″N, 119º36′38.40″N E, 2 m, 18.iii.2020, F. Gao leg., 常州金坛S240/S340交叉路口 (four workers of the host ant are pinned under the specimen)' (SNUC). Paratype: **CHINA:** 1 ♀, same collection data as holotype (one worker and one male of the host ant are pinned under the specimen) (SNUC).

Comparative diagnosis. The female of the new species can be readily separated from *A. overbecki* from Java (known from a single female) by the relatively much shorter antennomeres 4–5, the presence of a pair of admesal carinae on the gular plate of the head (lacking in *A. overbecki*), the posterior margin of the elytra and the base of the abdomen with only few setae (with row of dense, long golden setae in *A. overbecki*), the more convex disc of the abdomen with fewer long, thick setae, and the relatively longer sternite 2 (IV) in relation to sternite 3 (V).

Description. [Figs 2 and 3B are based on a female specimen, but the morphology is the same in both sexes.] ***Male*** (Figs 1A, B). Body length (from anterior margin of clypeus to apex of abdomen) 2.27 mm; reddish-brown. Head (Figs 2B–D, C) longer than wide, length from anterior margin of clypeus to head base along midline (excluding neck region) 0.40 mm, width across eyes 0.33 mm; anterior margin of clypeus protuberant and slightly arcuate, gular plate (Fig. 2C) with pair of admesal carinae extending from posterior tentorial pits (gular foveae) to mouthpart; each eye composed of approximately 30 facets. Antenna (Fig. 2A) clubbed, length of exposed part 0.71 mm; scape and pedicel short, antennomere 3 elongate, slightly and evenly broadening distally, antennomere 4 shorter and slightly broader than 3, elongate, antennomere 5 shorter

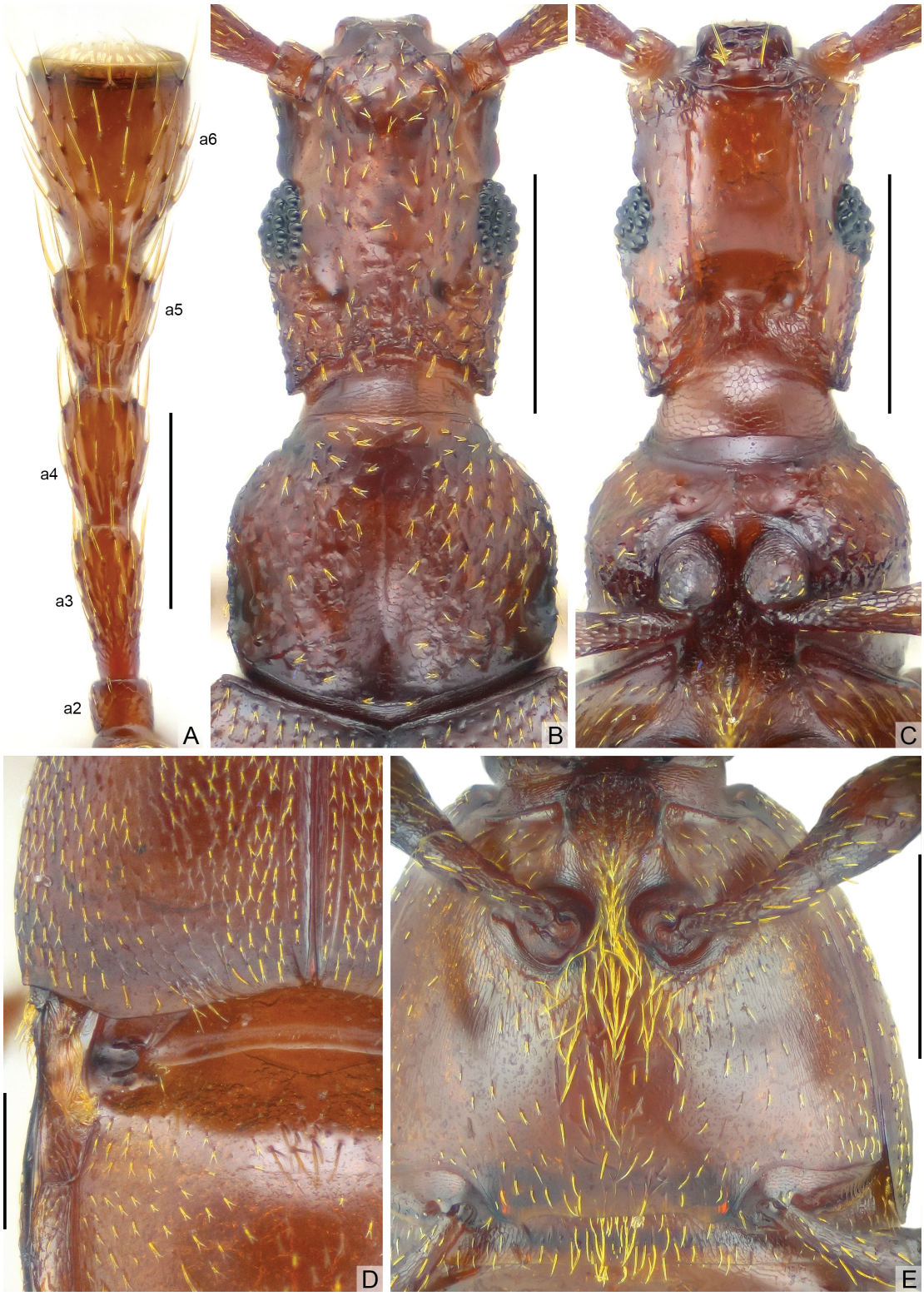

Fig. 2. Morphology of *Archiclaviger gaofani* sp. nov. A – antenna; B – head and pronotum; C – head venter and prosternum; D – elytral apex and base of abdomen; E – meso- and metaventrite. Abbreviations: a2–6 = antennomere 2–6. Scale bars: 0.2 mm in A, D; 0.3 mm in B, C, E.

and at apex slightly broader than 4, broadening from base toward apex, antennomere 6 much broader than 5, shorter than 4 and 5 combined, with truncate and densely setose apex. Pronotum (Fig. 2B) subglobose, slightly transverse, length along midline 0.38 mm, maximum width 0.41 mm, with broad median longitudinal impression. Prosternum (Fig. 2C) with weak median carina, anterior margin of procoxal cavities slightly carinate. Elytra (Figs 1A, B; 2D) roundly trapezoidal, much wider than long, length along suture 0.61 mm, maximum width 0.92 mm; lacking trichomes at posterior margins. Mesoventrite (Fig. 2E) with golden setae along midline, with short carinae at base; metaventrite (Fig. 2E) medially strongly convex, with scattered long, golden setae, with microsculpture in

Fig. 3. Morphology of *Archiclaviger gaofani* sp. nov. A – middle leg; B – abdominal sternites; C–E – aedeagus, dorsal (C), lateral (D), and ventral (E). Scale bars: 0.3 mm in A, B; 0.2 mm in C, D, E.

area posterior to coxal cavities. Legs short; mesofemur (Fig. 3A) with large, curved ventral projection at base, apex of projection bifid; mesotibia (Fig. 3A) with large triangular preapical spine in apical fourth. Abdomen (Fig. 1A) rounded, approximately as long as wide, and slightly narrower than elytra, length along midline 0.80 mm, maximum width 0.86 mm, disc (Fig. 1B) strongly convex dorsally; composite tergite (Fig. 2D) broadly and deeply concave at base, lacking basolateral trichomes; both paratergites of first pair bearing group of linear trichome. Sternite 1 (III) and basal margin of sternite 2 (IV) (Fig. 3B) with rhombic microsculpture, sternite 2 (IV) along middle 1.35 times as long as sternite 3 (V), sternites 3 (V) and 4 (VI) along middle each approximately twice as long

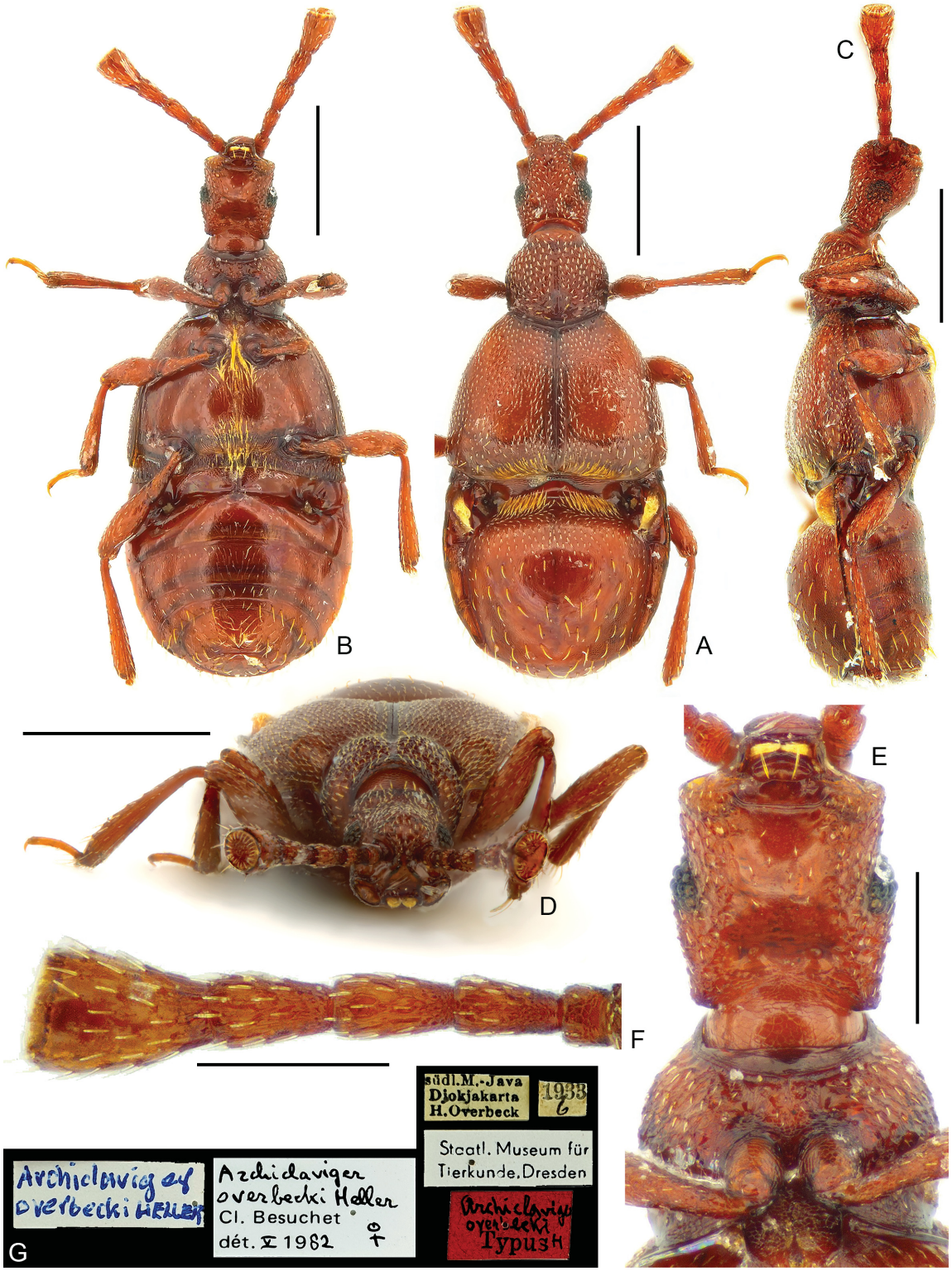

Fig. 4. Lectotype of *Archiclaviger overbecki* Heller, 1936. A–D – habitus, in dorsal (A), ventral (B), lateral (C), and axial (D) view; E – head venter and prosternum; F – antenna; G – type label. Scale bars: 0.5 mm in A–D; 0.2 mm in E, F.

as their next segment. Aedeagus (Figs 3C–E) strongly sclerotized, symmetrical, length 0.59 mm; median lobe undivided, apex pointed; endophallus composed of two elongate sclerites.

Female (Fig. 1C). Similar to male in external morphology; body size slightly larger; each eye composed of approximately 30 facets. Measurements (as for male): body length 2.32 mm, length/width of head 0.41/0.33 mm, pronotum 0.38/0.41 mm, elytra 0.60/0.89 mm, abdomen 0.85/0.87 mm, length of antenna 0.69 mm.

Etymology. The new species is named after Fan Gao (Nanjing University, Jiangsu, China), who collected this interesting species, and kindly donated the material to the SNUC.

Biology and host ant. Both individuals were collected in March with a *Nylanderia* ant nesting under concrete

Fig. 5. Collection site, distribution and host ant of *Archiclaviger*. A – environment of the collection site of *A. gaofani* sp. nov.; B – the collection site of *A. gaofani* sp. nov. is located in a highly industrial area of Jintan District, Changzhou; C – distribution of *Archiclaviger* species in Asia; D – a living adult of *A. gaofani* sp. nov. was discovered in a nest of *Nylanderia* ants after a concrete block had been turned over (photo by F. Gao).

blocks in a small green space in a highly industrial area of Jintan City (Figs 5A, B, D). An attempt to find additional specimens in the same locality by the first author on August 24, 2020 failed, possibly because it was already too late in season, but the presence of the same ant species was confirmed.

Distribution. Eastern China: Jiangsu (Fig. 5C).

Archiclaviger overbecki Heller, 1936

(Figs 4, 5C)

Archiclaviger overbecki Heller, 1936: 67.

Type material examined. Lectotype (by present designation): **INDONESIA:** ♀, with six labels (Fig. 4G): 'südl. M.-Java, Djokakarta (= Yogyakarta), H. Overbeck / 1933, 6 / Staatl. Museum für Tierkunde, Dresden / *Archiclaviger overbecki* H Typus / *Archiclaviger overbecki* HELLER / *Archiclaviger overbecki* Heller, Cl. Besuchet, det. v. 1982, ♀' (MDT).

Diagnosis. ***Female.*** Body (Fig. 4A–C) length 2.23 mm; dorsal surface of head, pronotum, elytra and basal third of abdomen with evenly distributed, short setae; venter of head lacking carinae (Fig. 4E); antennomeres 1 (scape) and 2 (pedicel) short, antennomeres 3–6 elongate (Fig. 4F), antennomere 6 broadening from base toward apex, apex truncate and densely setose (Fig. 4D); both posterior margin of elytra and basal cavity of abdomen with row of long, golden setae; disc of abdomen moderately convex dorsally (Fig. 4C), composite tergite with linear microsculpture and scattered long, thick golden setae (Fig. 4A); sternite 2 (IV) along middle twice as long as sternite 1 (III), and approximately as long as sternite 3 (V) (Fig. 4B).

Lectotype designation. In the original description, Heller (1936: 67) gave '(♀ ?)', indicating doubts about the sex of the examined material. Although the type material comprised possibly only a single specimen, the presence of more specimens cannot be excluded. Therefore, in the interest of the stability of nomenclature and to provide a unique name-bearing type, we designate here the examined female as the lectotype.

Distribution. Indonesia: Java (Fig. 5C).

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