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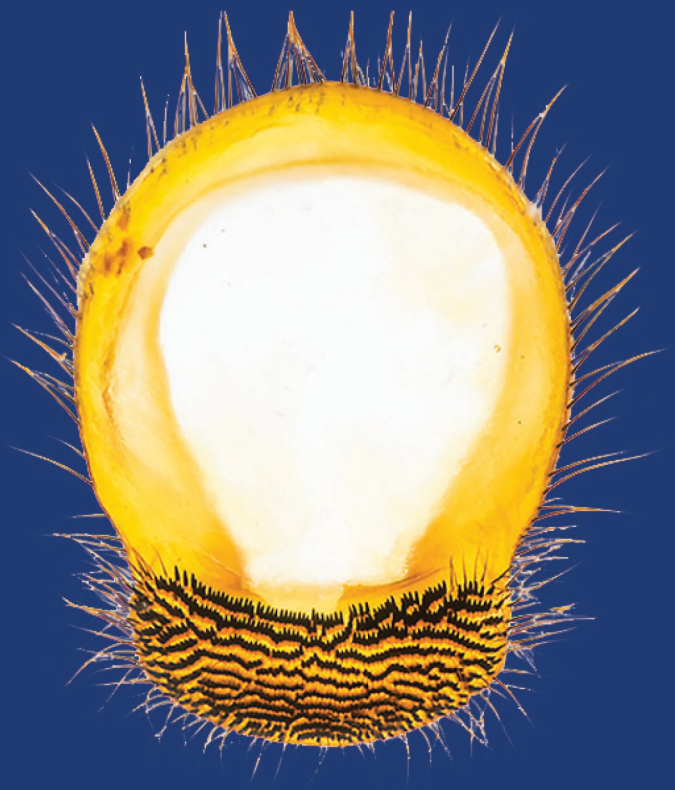

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Sicus indicus Kröber, 1940, neotype female, AAW0001, prepared abdominal segment 5 (transverse section) and theca, posterior view.

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Neotype designation and redescription of *Sicus indicus* Kröber, 1940 (Diptera: Conopidae)

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ABSTRACT
A neotype is designated for *Sicus indicus* Kröber, 1940, the original type material of which is lost. This species is accepted as valid (rev. stat.) and is redescribed and illustrated from material collected in the Kashmir Valley of the Western Himalayas of India. *Sicus indicus* is distinguished from other *Sicus* Scopoli, 1763 species primarily by the shape and configuration of the female theca, and also by the long ventral setulae on the hind femur which are otherwise only shared with the very dissimilar *S. ferrugineus* (Linnaeus, 1761). Two other species with very similar-looking thecae in the female, i.e. *S. abdominalis* Kröber, 1915 and *S. ogumae* (Matsumara, 1916), are distinguished by differences in colouration, dusting and setulation, the latter particularly with respect to the small sclerite at the inner hind edge of the hind coxa. *Sicus indicus* is the only species of the genus definitely recorded from India to date, and is confined to the Himalayan region.

KEY WORDS
Diptera, Conopidae, *Sicus*, redescription, Himalayas, India, revised status, neotype.

RÉSUMÉ
Désignation d'un néotype et redescription de Sicus indicus *Kröber, 1940 (Diptera: Conopidae).*
Un néotype est désigné pour *Sicus indicus* Kröber, 1940, dont le matériel type original est perdu. L'espèce est acceptée comme valide (rev. stat.) et est redécrite et figurée sur la base de matériel collecté dans la vallée du Kashmir, Himalayas occidentales, Inde. *Sicus indicus* se distingue des autres espèces de *Sicus* Scopoli, 1763 principalement par la forme et la configuration de la theca chez les femelles, ainsi que par les longues soies ventrales sur le fémur postérieur, soies présentes également chez l'espèce *S. ferrugineus* (Linnaeus, 1761), très différente par ailleurs. Deux autres espèces présentent, chez les femelles, une theca ressemblant à celle de *Sicus indicus*, i.e., *S. abdominalis* Kröber, 1915 and *S. ogumae* (Matsumara, 1916), mais elles s'en distinguent par leur coloration, leur pruinosité et leur sétation, ce dernier caractère surtout en ce qui concerne le petit sclérite situé sur la marge postérieure interne des coxas postérieures. *Sicus indicus* est la seule espèce du genre signalée de façon certaine en Inde à ce jour ; elle est cantonnée à la région himalayenne.

MOTS CLÉS
Diptère, Conopidae, *Sicus*, Himalayas, Inde, redescription, status révisé, néotype.

INTRODUCTION

The genus *Sicus* Scopoli, 1763 currently includes nine valid species which are primarily distributed in the Palaearctic region (Stuke 2002, 2004). Six species of this genus are currently reported from the Oriental and adjacent East-Palaearctic regions, comprising *Sicus abdominalis* Kröber, 1915, *S. chvalai* Stuke, 2004, *S. ferrugineus* (Linnaeus, 1761), *S. fusenensis* Ôuchi, 1939, *S. nishitapensis* (Matsumara, 1916) and *S. ogumae* (Matsumara, 1916) (Stuke 2017). The reliability of some of these records is uncertain, however, due to the past reliance on unsuitable characters for identification. As regards India, Brunetti (1923) somewhat dubiously reported a specimen of *S. ferrugineus* of unknown sex from "Tungu, Teesta Valley, Sikkim, 13,000-14,000 ft.", and Kröber (1940) similarly reported this species from "Kaschmir, Gulmarg" but again with no further details. Kröber (1915) also described *Sicus vaginalis* from "Ostindien" ["East Indies"], the exact *locus typicus* of which remains uncertain but could possibly refer to the Indian subcontinent. *Sicus vaginalis* Kröber, 1915 was later synonymised with *abdominalis* by Zimina (1976). Finally, Stuke (2004) reported a female of *abdominalis* from "N-India, 3200-3600m, Uttar Pradesh [now Uttarakhand], Badrinath", although as reported below this specimen was misidentified.

Sicus indicus was described by Kröber (1940) based on a male which he referred to an apparently non-existent taxon mistakenly attributed to Fabricius (see Smith 1975). The holotype, stated to be from "Himalaya" and deposited in the Berlin Museum, is now lost and in the absence of other material the species has previously been treated as a *nomen dubium* (Stuke 2004, 2017). Recent material of *Sicus* collected from the Indian Himalayas has given us an opportunity to re-evaluate the taxon *S. indicus*, however. This material appears to comprise a discrete taxon which matches the details and *locus typicus* provided in the original description of *indicus*, and which appears to be distinct to the Himalayas. Given the confusion in the genus caused by past reliance on unsuitable characters for identification, recently clarified by the revisionary works of Stuke (2002, 2004, 2017) and Stuke *et al.* (2020), and the need to stabilize the taxonomy of the genus in the light of current understanding, we herewith reinstate the taxon *Sicus indicus* as a good species and designate a neotype to fix the concept.

MATERIAL AND METHODS

The specimens used in this study were mainly collected in 2017 and 2019 by means of sweep-netting at the Aharbal Hill Station in the Kashmir Valley. This location is situated in the Palaearctic portion of India on the northern fringe of the Western Himalayas at between about 33°22"-34°50"N and 73°55"-73°33"E (Wachkoo *et al.* 2018, Wachkoo & Akbar 2019). Aharbal Hill Station is an alpine valley supporting meadows and coniferous forests in the south-western part of the Kashmir Valley, within the Pir Panjal Mountains. The specimens were collected in natural grassland vegetation and from flowers of *Dipsacus inermis*.

Specimens preserved in 70-75% ethanol were processed with hexamethyldisilazane (Heraty & Hawks 1998) and later card-mounted. The taxonomic study was conducted using a ReScholar RI-90-07 stereomicroscope. Card point-mounted specimens were placed inside a light box using cool daylight LED lamps (3W) and images were captured using a DSLR camera (Nikon D5300) with a macro lens (Tokina 100mm f 2.8) attached with microscope objectives. Multiple images were generated using an auto stacking-rail (Stackrail rs90) and merged using Combine ZP software. Final images were cleaned with Photoshop CS4. To prepare sternites and theca slides for microphotography, the abdomens of female specimens were detached with forceps and treated with 10% KOH for about 48 hours. Sternites were then dissected and slide-mounted. Prepared slides were placed on a stage prepared from cardboard and provided with an LED lamp (3W) to produce the transmission light beam. Microphotographs were captured with the same camera gear as above, with the addition of infinity-corrected microscope objectives.

Body-length was measured as the outstretched length from the anterior oral margin to the posterior end of the abdomen, in lateral view. Wing length was measured from the wing tip

to the apex of the basicosta. The morphological terms used are in accordance with Cumming & Wood (2017).

The described material is deposited in the collections of the Government Degree College, Shopian, Jammu and Kashmir, India (GCSI); Muséum national d'Histoire naturelle, Paris (MNHN) and in the private collection of Jens-Hermann Stuke, Leer, Germany (coll. PJHS).

Abbreviations

Institutions

GCSI	Government Degree College, Shopian, Jammu and Kashmir, India;
MNHN	Muséum national d'Histoire naturelle, Paris;
ZSM	Zoologische Staatssammlung, München.

Private collection

Coll. PJHS	Jens-Hermann Stuke, Leer.

RESULTS

Family Conopidae Latreille, 1802

Genus *Sicus* Scopoli, 1763

Sicus Scopoli, 1763: 360.

Type species. — *Sicus ferrugineus* (Linnaeus, 1761).

Sicus indicus Kröber, 1940 rev. stat.
(Figs 1; 2)

Sicus indicus Kröber, 1940: 244 (also 208 in key, and 225 in checklist).

Type locality. — Himalaya (without precision).

Type specimen. — **Holotype. Himalaya** • ♂; lost (Stuke 2004).

Neotype. India • ♀; Jammu and Kashmir, Kulgam, Aharbal; 33.6441, 74.777; 2270 m. a.s.l.; 7.VII.2019; Aijaz A. Wachkoo leg. (Fig. 1O); AAW0001; GCSI.

Additional material examined. — **India** • 1 ♀, 1 ♂; AAW0002, AAW0003; MNHN • 1 ♀, 1 ♂; same data as the neotype; AAW0004, AAW0005; coll. PJHS • 1 ♂; same data as precedent except: 25.VIII.2017; AAW0006; GCSI • 1 ♀; Uttarakhand, Badrinath; 3200-3600 m a.s.l.; Riedel leg.; ZSM; identified *S. abdominalis* by Stuke (2004).

Distribution. — All the recent and historical records of *Sicus* in the region, including all of those reliably recorded from mainland India, appear to be from the Himalayas, where *indicus* is the only species positively recorded to date.

Neotype designation

In order to stabilize the nomenclature, we herewith designate a neotype for *Sicus indicus* based on a female specimen collected in the Indian Himalayas.

The specimen fits with the original description and originates from the same locality as stated for the holotype ("Himalaya"). A female specimen has been designated because currently within the genus *Sicus* only females can be reliably identified to species level (Stuke 2002).

As a result of the present neotype designation, *Sicus indicus* Kröber, 1940 should no longer be treated as a *nomen dubium* but as a valid species (rev. stat.).

Description

Female neotype

Measurements. Body-length. 11.5 mm; wing-length 8.5 mm.

Head (Fig. 1B, C). Face and gena ferruginous brown, facial grooves shining, pale brown; gena bare, with abundant silver dusting; frons elongate, yellow, without distinct darker markings, covered with dense yellow dusting and with a few black setulae posterolaterally; central ocellar tubercle dark brown, clearly delimited from wider ocellar triangle which is yellow, as frons; vertical margins of frons lateral to ocellar triangle ferruginous brown, also clearly delimited from yellow frons; ocellar triangle with a few black setulae of varied lengths; occiput ferruginous brown, with abundant longer black setulae; medial occipital sclerite covered with black setulae; antenna yellowish-brown, dorsal subapical arista short and darker, short pilose (Fig. 1B, C); pedicel is the longest segment, about 2.75 × length of scape and about 1.4 × length of first flagellomere; scape and pedicel with short black setulae, scape with longer black setulae apically on outer face; pedicel with longer setulae on dorsal and outer lateral faces, shorter and less dense on inner-ventral face; first flagellomere bare; proboscis long, about 1.9 × as long as dorsoventral depth of head in lateral view (Fig. 1A); proboscis geniculated just after mid-point; labrum and labium dark brown, with scattered fine, short black setulae; labellum blackish, labella shortly separated at tip and paler; maxillary palps dark brown, with black apical setulae.

Thorax (Fig. 1D-F). Scutum in dorsal view ferruginous brown with central pattern of four merged thick blackish stripes, and with uniformly distributed black setulae which become longer laterally (Fig. 1D); scutum with extensive golden dusting, most visible in anterior view; in anterior view, central longitudinal golden dusting stripe splits black medial longitudinal stripe into two black submedial longitudinal stripes (Fig. 1F); margins of scutum (i.e., postpronotum, lateral and prescutellar mesonotum, postalar callus) with relatively longer black setulae; scutellum ferruginous brown with sparse silver dusting and scattered black setulae, the latter becoming longer posterolaterally (Fig. 1D); narrow yellowish subscutellar ridge, golden dusted (Fig. 1E); mediotergite of postnotum blackish with abundant silvery to golden dusting, setulae absent; laterotergite ferruginous brown with golden dusting, setulae absent (Fig. 1D, E); pleura ferruginous brown except for anterolateral ⅓ of katepisternum and ventral ⅓ of meron blackish; notopleuron and dorsal ⅓ of katepisternum with black setulae, other pleura lacking setulae (Fig. 1E); pleura generally with fine yellowish dusting, less distinct on medially subshining anepimeron; calypter pale yellowish with short golden pile,

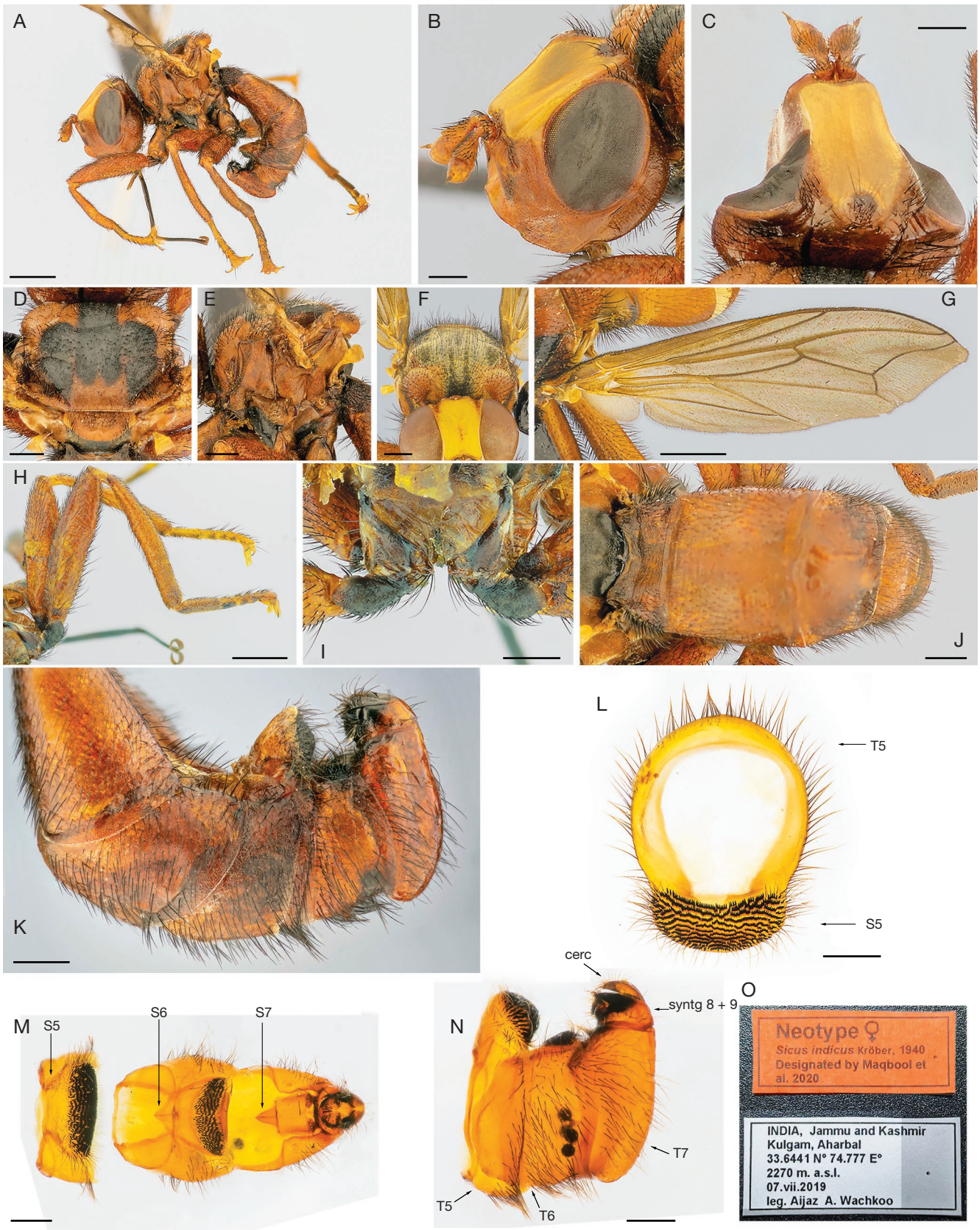

FIG. 1. — *Sicus indicus* Kröber, 1940, neotype female, AAW0001 (abdomen dissected out): **A**, habitus, lateral view; **B**, head, dorsolateral view; **C**, head, dorsal view; **D**, thorax, dorsal view; **E**, thorax, lateral view; **F**, scutum, anterior view **G**, wing, dorsal view; **H**, hind legs, lateral view; **I**, hind coxae, posterior view; **J**, abdomen, dorsal view; **K**, abdomen, lateral view; **L**, prepared abdominal segment 5 (transverse section) and theca, posterior view; **M**, prepared postabdomen, ventral view; **N**, prepared postabdomen, lateral view; **O**, neotype labels. Scale bars: A, G-H, 1 mm; B-F, I-N, 0.5 mm.

and short blackish setulae at margin; haltere pale yellowish, slightly darker at base; spiracular fringe brown.

Wing (Fig. 1G). Infuscated brownish, entirely microtrichose; venation brownish; tegula and costa with short black setulae, setulae on costa becoming shorter towards apex; wing-base not very obviously paler than rest of wing, although bases of radial vein R1, radial stem, medial vein M1, humeral vein, veins of basal cells and adjacent areas of membrane all somewhat paler yellowish; radial cell r4+5 open at costa.

Legs (Fig. 1H, I). Coxae partly blackish; trochanters mostly blackish; femora ferruginous brown; tibiae more orange-brown; tarsi somewhat paler yellowish; coxae and trochanters with fine pale dusting; legs generally covered with black setulae of varying length; hind coxa with 7-8 longer black setulae on small sclerite on inner posterior margin, some nearly as long as apical width of coxa in hind view (Fig. 1I); hind femur with scattered longer setulae ventrally, with some equal to or greater than diameter of the hind tibia (Fig. 1H); hind femur anteroventrally shining and bare of setulae; tarsi medioventrally covered with dense golden dusting, with short black setulae in patches laterally, and patches of longer setulae dorsally; claws light brown, black apically; pulvilli and empodia pale yellow.

Abdomen (Fig. 1J-N). Entirely ferruginous brown except for laterally blackish tergite 1; tergites 4-7 with some darker brown areas; tergites evenly covered with black setulae except tergite 1 medially bare, but with patches of conspicuously longer black setulae on bulbous lateral projections; setulae denser and longer on tergites 4-7; dusting obvious on tergites 1-4 in anterior view: tergite 1 with dense submedian dusting, subshining medially; tergites 2-4 dusted densely at anterior and posterior margins; tergites 3-4 obviously subshining medially; tergite 2 about as long as wide in dorsal view (Fig. 1J), about 1.5 × as long as maximum depth in lateral view (Fig. 1A); tergites 3-5 all wider than long in dorsal view (Fig. 1J); theca on sternite 5 projecting ventrally about as far as ventrally-directed tip of abdomen (Fig. 1A, K), its height about equal to its maximum anteroposterior width at base in lateral view (Fig. 1K); theca base in lateral view almost as wide as lateral margin of tergite 5 (Fig. 1K, N); anterior face of theca gently convex in lateral view, mostly bare of setulae except towards posterior margin; posterior face of theca also convex in lateral view (Fig. 1K, N), entirely covered with short, thick, blunt palisade spicules arranged in about 9-10 uneven, broken rows, and with long fine setulae around margin (Fig. 1L); bristle field on posterior face of theca oblong crescentric, about 2.7 × wider than vertical height in posterior view (Fig. 1L); bristle field on posterior face of theca about 1.2 × wider than bristle field on sternite 6 (Fig. 1M); bristle field on sternite 6 having the shape of a narrower crescent, about 3 × wider than high, with short, thick, blunt palisade spicules arranged in about 5-6 uneven, broken rows; sternite 7 posteriorly with small oval submedial sclerotized patches bearing a few short black setulae (Fig. 1M); syntergosternite 8 in lateral view with shining, curved blackish lateral spine about 1.6 × as long as maximum

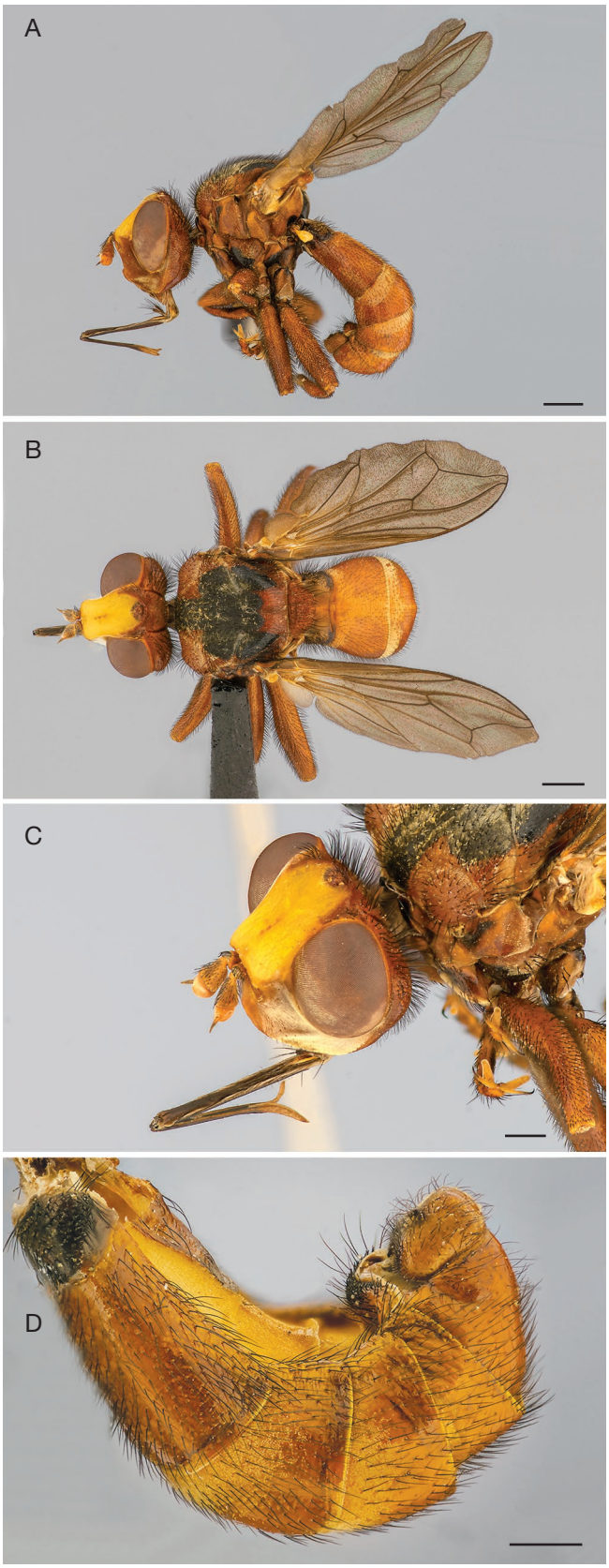

FIG. 2. — *Sicus indicus* Kröber, 1940, male, AAW0006: **A**, habitus, lateral view; **B**, habitus, dorsal view; **C**, head, dorsolateral view; **D**, abdomen, lateral view. Scale bars: A, B, 1 mm; C, D, 0.5 mm.

width at base (Fig. 1N); two pairs of spherical spermathacea, each pair almost immediately uniting onto one or other of two longer spermathecal ducts (Fig. 1N).

Male

Generally similar to female except for normal sexual dimorphism: overall dimensions smaller (body-length 9.5-10.5 mm; wing-length 7.1-8.0 mm); generally appearing somewhat more shining but with more obvious areas of dense dull brownish-golden dusting; gena, face and anterior scutum and katepisternum with dull brownish golden dusting (Fig. 2B, C); pleura with finer yellowish dusting, obviously less distinct or absent on medially subshining/shining anepisternum and anepimeron (Fig. 2A); tergites 3-5 with obvious, dense dull-golden dusted bands in basal ¼ to ⅓ which may also extend laterally and/or medially (Fig. 2B, D); epandrium thinly dull golden dusted, partially concealed at rest within a curved ventral cup-like expansion of sternite 5; posterior half of sternite 5 expansion covered with short, close-set black setulae, together with scattered long black setulae (Fig. 2D); frons with variable brownish stripe anteromedially (Fig. 2C); coxae and trochanters dark brownish; tergite 2 about 1.7 × wider than long in dorsal view (Fig. 2B) and about 1.4 × longer than maximum depth in lateral view (Fig. 2A); genitalia not examined but unlikely to show any reliable characters, a situation which is also found in other *Sicus* species (Stuke 2002, Clements, unpublished).

INTRASPECIFIC VARIATION

Some variation in body- and wing-length, in male as given above and in female: body-length 10.5-12.5 mm and wing-length 8.1-9.0 mm respectively (n = 3). Within-species morphological variation otherwise mainly comprises slight variation in colour characteristics such as the extent of blackish coloration on coxae and trochanters, and brownish marking on male frons.

DIAGNOSIS

Sicus indicus can be identified by the following set of characters: 1) scattered longer ventral setulae on the hind femora, some of which are equal to or greater than the width of the hind tibia (Fig. 1H); 2) wing-base not obviously much paler than the rest of the wing although it may be somewhat paler at the extreme base (Fig. 1G); 3) small sclerite on the inner posterior side of the hind coxa with 7-8 longer setulae, some of which are approaching the apical width of the hind coxa in length (Fig. 1I); 4) scutum in anterior view with a central golden dusting stripe which divides the black medial longitudinal stripe into two black submedial stripes (Fig. 1F); 5) anepisternum (and sometimes anepimeron) shining or subshining medially (Fig. 1E); 6) mediotergite completely or almost completely dusted (Fig. 1D); and 7) female with a broad protruding theca, the width of the posterior bristle field 2.7 × its height (Fig. 1L), and with the posterior bristle field on the theca being 1.1-1.2 × the width of the bristle field on sternite 6 (Fig. 1M).

Of the species so far recorded from the Oriental and adjacent East-Palaearctic regions, the majority can readily be ruled out by the shape and configuration of the theca in the female. Comparison therefore needs to be made primarily with *S. chvalai, S. abdominalis* and *S. ogumae*, the theca of the last two species being most similar to that of *S. indicus*. *Sicus indicus* differs from these three species in the long ventral setulae on the hind femora, and in the pattern of golden dusting on the scutum. The blackish coxae and trochanters found in some specimens of *S. indicus* are also quite characteristic but are not a reliable character.

The theca of *Sicus abdominalis* is very similar to that of *S. indicus* but the former has no setulae on the small sclerite on the inner posterior side of the hind coxa, and the anepisternum and anepimeron are more evenly dusted.

Sicus chvalai is readily distinguished by the shape of the theca in the female, the posterior bristle field of which is more nearly semicircular, with its maximum width in posterior view being about 1.7 × the vertical height. The width of the bristle field on the theca is also about the same as that of the bristle field on sternite 6. The mediotergite is largely shining in *S. chvalai*.

The theca of *Sicus ogumae* is also somewhat narrower and more nearly semicircular, with the bristle field about 2.4 × wider than the vertical height, although the difference in shape is less marked than in *S. chvalai*. Other less reliable characters which would nevertheless tend to identify *S. ogumae* include fine scattered black setulae on the gena, a completely dusted anepisternum, unicolourous legs and fewer, shorter black setulae on the inner posterior sclerite of the hind coxa, all of which are less than ½ the apical width of the coxa in length (see Stuke *et al.* 2020).

It is not certain that male specimens of *S. indicus* will necessarily be distinguishable based on characters 1-6 above, although the long ventral setulae on the hind femora are otherwise only shared with *S. ferrugineus*.

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