



Redescriptions of ten chigger mite species (Acariformes: Trombiculidae) from Vietnam

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Abstract

Ten species of chigger mites from the genera *Gahrlepia* Oudemans, 1912, *Walchia* Ewing, 1931, *Cheladonta* Lipovsky, Crossley and Loomis, 1955, *Doloisia* Oudemans, 1910, *Schoutedenichia* Jadin and Vercammen-Grandjean, 1954, and *Microtrombicula* Ewing, 1950, incompletely described by Schluger *et al.* (1960a, c, 1961, 1963) from rodents in North Vietnam, are redescribed based on type series. Lectotypes and paralectotypes have been designated for all species. A new synonymy has been established: *Walchia delicatula* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960) (= *Walchia tianguangshanensis* Zhao, 1981 **syn. nov.**).

Key words: chiggers, taxonomy, Southeast Asia

Introduction

The significance of trombiculids as specific vectors of *Orientia tsutsugamushi*, the etiological agent of scrub typhus, precipitated their extensive taxonomic investigations immediately after the Second World War and in several following decades in endemic areas of this severe tropical disease, including Southeast Asia (Womersley 1952; Traub & Audy 1953; Audy 1956, 1957; Womersley & Audy 1957; Traub & Evans 1957; Domrow 1962; Nadchatram & Traub 1964; Vercammen-Grandjean 1968). An important contribution to the knowledge on Vietnamese chiggers was brought in by Eugenia G. Schluger (1911–1987), who worked in the N.F. Gamaleya Institute of Epidemiology and Microbiology of the USSR Academy of Medical Sciences (IEM; known today as the N.F. Gamaleya Federal Research Center for Epidemiology & Microbiology, Moscow, Russia). In a series of publications, in collaboration with Inna M. Grochovskaja (IEM), she described a number of new chigger species and recorded many new host associations based on the material collected by her coauthors from the Department of Parasitology of the University of Hanoi (known today as the Vietnam National University, Hanoi, Vietnam) in various field trips (Schluger *et al.* 1959, 1960a, b, c, 1961, 1963). The material from Vietnam together with other collections examined by Schluger, had been stored at her home since 1964 for a long time; in 1988, her daughter, I.S. Vasilieva, donated the whole collection (493 boxes with microscopic slides) to the Zoological Museum of Moscow State University (ZMMU, Moscow, Russia) (Lyubarsky 2009). Schluger's collection was revised by Naina I. Kudryashova (ZMMU) who assigned accession numbers to the slides, provided them with paper labels (originally, slides were labelled by Schluger with Indian ink, directly on the glass), and designated lectotypes for a portion of species (Kudryashova 1998, 2004).

However, lectotypes were not designated in the material from Vietnam because of an old manner of mounting technique and condition of slides; therefore, specimens from the type series in this material retained so far, the status of syntypes. Many of these slides included several specimens (about 4–5 per slide) assigned to different species; in some cases, two or more species of the same genus were present in one slide. In addition, a large proportion of specimens were of a poor quality because of crystallization of the medium that is common in old or carelessly mounted slides (Stekolnikov & Daniel 2012; Stekolnikov 2018). Under these conditions, a justified choice and designation of a single specimen as a lectotype could be difficult.

Usually, type series of Southeast Asian chigger species are distributed in many museums of the US, Europe, and Australia (Wharton & Fuller 1952; Womersley 1952), but the Vietnamese material of Schluger was inaccessible for a long time. The only known exception was the revision of the *Leptotrombidium* generic complex (Vercammen-Grandjean & Langston 1976), where the authors examined some specimens from series of obvious syntypes: one specimen of *Leptotrombidium globosum* (Schluger, 1960), four specimens of *L. gracipalpe* (Schluger, 1960), ten specimens of *L. horridum* (Schluger, 1960), five specimens of *L. magnum* (Schluger, 1960), and three specimens of *L. monstrosum* (Schluger, 1960).

All species described by Schluger from the territory of the former USSR were re-described by Kudryashova (1998). In the present paper, we provide redescriptions of ten species described from the Vietnam and belonging to the following genera: *Gahrliepia* Oudemans, 1912, *Walchia* Ewing, 1931 (Gahrliepiinae), *Cheladonta* Lipovsky, Crossley and Loomis, 1955, *Doloesia* Oudemans, 1910, *Schoutedenichia* Jadin and Vercammen-Grandjean, 1954, and *Microtrombicula* Ewing, 1950 (Trombiculinae).

The genera *Gahrliepia*, *Walchia*, *Doloesia*, and *Microtrombicula* are richly represented in Southeast Asia, with 39, 42, 17, and 16 species, respectively (Stekolnikov 2021). *Cheladonta* includes in total 17 species (Stekolnikov & Daniel 2012; Shamsi *et al.* 2020) distributed mainly in the Palearctic and Nearctic regions (Kudryashova 1998). *Schoutedenichia* prevails in Africa (Vercammen-Grandjean 1958; Stekolnikov 2018), and only four its species are known from Southeast Asia (Domrow 1962; Stekolnikov 2021).

The total number of chigger species in the material from Vietnam identified by Schluger is 40, including 23 described as new ones. The selection of type series and possible re-descriptions of the remaining 13 species is the goal of our future studies.

Materials and methods

The present work was based on the material (61 microscopic slides) loaned from ZMMU and examined mainly at the Zoological Institute of the Russian Academy of Sciences (ZIN, Saint Petersburg, Russia). Examination of slides

and capture of microphotographs was performed with microscopes Leica DM5000B and Leica DM2500 (Leica Microsystems GmbH, Wetzlar, Germany) supplied with digital cameras TouPCam 5.1, model FMA050 (Hangzhou TouPTek Photonics Co., Ltd, Hangzhou, Zhejiang, China) and Leica DMC 4500, respectively, and using differential interference contrast (DIC). Drawings were prepared, using a drawing tube attached to microscopes Leica DM2500 with DIC and MBI-3 (LOMO plc, St. Petersburg, Russia) with phase contrast optics.

Measurements were taken by A.A. Antonovskaia at the Department of Entomology (Moscow State University, Moscow, Russia) from photos by calibrated software TouPView (Hangzhou TouPTek Photonics Co.) and ImageJ (Fiji) (Schindelin *et al.* 2012); the photos were captured on a Micromed-3 Professional Microscope (Ningbo Sheng Heng Optics & Electronics Co., Ltd., Gao Qiao, Yin, Ningbo, China) equipped with phase contrast and a digital camera TouPCam TP705100A (Hangzhou TouPTek Photonics Co.).

In order to have references to the measured or figured specimens, to lectotypes and paralectotypes in slides, we made designations of individual specimens in corresponding scanned images of slides enhanced with Photoshop CC (Adobe Inc., San Jose, CA, US); the specimens were not marked directly on the slides. The arrangement of specimens on the scanned images is the same as that observed by a naked eye (not the inverted view observed under a microscope). Thus, each chigger specimen has its own number; in total, 10 lectotypes and 80 paralectotypes (plt) have been designated (Table 1). The slides of type series usually include a mixture of various species in addition to the type specimens; identifications of specimens representing other species are not given in the slides, slides' images and in captions. Kudryashova had misinterpreted field numbers of hosts as accession collection numbers of slides and placed them in mite identification labels rather than in labels bearing collection data. In the descriptions below, these field numbers are placed after host names.

TABLE 1. Type specimens and their accession numbers.

Species	Slide number	Type specimens
<i>Gahrlepiea mirabilis</i>	Tdt-3223	lectotype
<i>Gahrlepiea mirabilis</i>	Tdt-3224	1 plt
<i>Gahrlepiea mirabilis</i>	Tdt-3225	1 plt
<i>Gahrlepiea mirabilis</i>	Tdt-3226	1 plt
<i>Gahrlepiea mirabilis</i>	Tdt-3227	1 plt
<i>Gahrlepiea mirabilis</i>	Tdt-3228	1 plt
<i>Walchia delicatula</i>	Tdt-3234	3 plt
<i>Walchia delicatula</i>	Tdt-3236	2 plt
<i>Walchia delicatula</i>	Tdt-3237	1 plt
<i>Walchia delicatula</i>	Tdt-3238	1 plt
<i>Walchia delicatula</i>	Tdt-3239	1 plt
<i>Walchia delicatula</i>	Tdt-3240	lectotype, 1 plt
<i>Walchia delicatula</i>	Tdt-3241	1 plt
<i>Walchia delicatula</i>	Tdt-3242	1 plt
<i>Walchia dismina</i>	Tdt-3252	lectotype, 2 plt
<i>Walchia dismina</i>	Tdt-3254	1 plt
<i>Walchia dismina</i>	Tdt-3255	1 plt
<i>Walchia dismina</i>	Tdt-3258	2 plt
<i>Cheladonta neda</i>	Tdt-3277	1 plt
<i>Cheladonta neda</i>	Tdt-3282	1 plt
<i>Cheladonta neda</i>	Tdt-3283	lectotype, 1 plt
<i>Cheladonta neda</i>	Tdt-3284	1 plt
<i>Doloesia alata</i>	Tdt-3157	1 plt
<i>Doloesia alata</i>	Tdt-3171	1 plt
<i>Doloesia alata</i>	Tdt-3173	1 plt

.....continued on the next page

TABLE 1. (Continued)

Species	Slide number	Type specimens
<i>Doloisia alata</i>	Tdt-3174	lectotype
<i>Doloisia alata</i>	Tdt-3176	1 plt
<i>Doloisia fulminans</i>	Tdt-3145	1 plt
<i>Doloisia fulminans</i>	Tdt-3154	4 plt
<i>Doloisia fulminans</i>	Tdt-3155	1 plt
<i>Doloisia fulminans</i>	Tdt-3156	1 plt
<i>Doloisia fulminans</i>	Tdt-3157	2 plt
<i>Doloisia fulminans</i>	Tdt-3158	3 plt
<i>Doloisia fulminans</i>	Tdt-3159	1 plt
<i>Doloisia fulminans</i>	Tdt-3160	lectotype, 1 plt
<i>Doloisia fulminans</i>	Tdt-3161	1 plt
<i>Doloisia fulminans</i>	Tdt-3162	1 plt
<i>Doloisia fulminans</i>	Tdt-3164	1 plt
<i>Doloisia fulminans</i>	Tdt-3166	2 plt
<i>Doloisia fulminans</i>	Tdt-3167	3 plt
<i>Doloisia fulminans</i>	Tdt-3173	2 plt
<i>Doloisia fulminans</i>	Tdt-3174	2 plt
<i>Doloisia fulminans</i>	Tdt-3183	1 plt
<i>Doloisia fulminans</i>	Tdt-3184	2 plt
<i>Doloisia fulminans</i>	Tdt-3186	3 plt
<i>Doloisia fulminans</i>	Tdt-3187	1 plt
<i>Doloisia fulminans</i>	Tdt-3188	1 plt
<i>Doloisia fulminans</i>	Tdt-3190	1 plt
<i>Doloisia fulminans</i>	Tdt-3191	1 plt
<i>Doloisia gigantea</i>	Tdt-3176	1 plt
<i>Doloisia gigantea</i>	Tdt-3178	1 plt
<i>Doloisia gigantea</i>	Tdt-3179	lectotype
<i>Schoutedenichia alongensis</i>	Tdt-3277	1 plt
<i>Schoutedenichia alongensis</i>	Tdt-3278	lectotype
<i>Schoutedenichia alongensis</i>	Tdt-3279	1 plt
<i>Microtrombicula fulgida</i>	Tdt-3232	lectotype
<i>Microtrombicula fulgida</i>	Tdt-3229	1 plt
<i>Microtrombicula fulgida</i>	Tdt-3231	1 plt
<i>Microtrombicula fulgida</i>	Tdt-3280 “ <i>Trombicula vitosa</i> ”	1 plt
<i>Microtrombicula vitosa</i>	Tdt-3280 “ <i>Trombicula vitosa</i> ”	1 plt
<i>Microtrombicula vitosa</i>	Tdt-3280 “ <i>Trombicula vitosa</i> -2”	1 plt
<i>Microtrombicula vitosa</i>	Tdt-3280 “ <i>Trombicula vitosa</i> -3”	1 plt
<i>Microtrombicula vitosa</i>	Tdt-3280 “ <i>Trombicula vitosa</i> -4”	1 plt
<i>Microtrombicula vitosa</i>	Tdt-3280 “ <i>Trombicula vitosa</i> -5”	lectotype
<i>Microtrombicula vitosa</i>	Tdt-3281 “ <i>Trombicula vitosa</i> ”	2 plt
<i>Microtrombicula vitosa</i>	Tdt-3281 “ <i>Trombicula vitosa</i> -2”	1 plt

Designations of lectotypes and paralectotypes have been applied only to those specimens, which we were able to examine completely. The entire type series include many more specimens, but often some of them are of a poor condition that taking in account that the majority of slides includes a mixture of species could lead to misidentifications.

We use the original spelling “Grochovskaja” for the collector’s last name, which was used in her publications, instead of “Grokhovskaya” or “Grokhovskaia”, which correspond to the modern systems of transliteration (Romanization of Russian 2020). In the names of Vietnamese coauthors of Schluger and Grochovskaja (Dang Van Ngu, Nguyen Xuan Hoe, and Do Kinh Tung), we abbreviated their family names and middle names, according to the standard practice.

According to the paper introducing the series of publications on Vietnamese chiggers, Schluger identified and described all species, Vietnamese coauthors collected the material, and Grochovskaja wrote the introduction (Schluger *et al.* 1960a). Since all coauthors were listed directly after a new species name in corresponding description, the authorship should be reserved for all of them.

Corrections of hosts’ identifications are based on the thesis “Bloodsucking insects, mites, and ticks of Vietnam as vectors of human diseases” prepared by Grochovskaja in Russian in 1967 (unpublished typescript deposited in the library of the Department of Entomology, Moscow State University, Moscow, Russia). Initially, some hosts were identified as putative new species, and their names were included in the publications (Schluger *et al.* 1959, 1960a, b, c, 1961, 1963) as *nomina nuda*. In the thesis by Grochovskaja, they were replaced by valid names of previously described species. We revised the toponymical names given in Russian in the above works on the basis of maps and descriptions from the thesis by Grochovskaja using public geoinformation resources on the Internet – the database of geographical names created by National Geospatial-Intelligence Agency (Bethesda, MD, USA) and currently available at https://geographic.org/geographic_names/ and Google Earth (Google LLC, Mountain View, CA, USA).

We use the specific morphological terminology generally accepted in the taxonomy of chigger mites since the 1950s. Their equivalents to the general terminology for Prostigmata (Grandjean 1947; Kethley 1990) were given by Goff *et al.* (1982) and Stekolnikov (2018). The index DS (number of dorsal idiosomal setae) includes the following setae situated on the dorsal surface of idiosoma: humeral setae (H) (marginal setae of the row C according to the common terminology of Prostigmata) and all setae of the posthumeral rows (C, except marginal, D, E, F, etc.). This index does not include the setae inserted on the scutum (prodorsal sclerite) – anteromedian (AM), anterolateral (AL), posterolateral (PL), sensilla (S) (trichobothria), and the usurped setae (setae from the anterior rows of dorsal idiosomal setae that have been incorporated into the extended scutum of the genera *Gahrlipeia* and *Schoengastiella* Hirst, 1915). Consequently, the formula of dorsal idiosomal setae (e.g., fD = 2H-4-7-8-6-4-4-3) includes separately humeral setae (2H) and does not include usurped setae; the sum of all numbers in this formula constitutes DS. The index V (number of ventral idiosomal setae) includes preanal and postanal setae and does not include sternal, coxal, and ventrohumeral setae (setae inserted between leg coxae II and III on each side in a few genera). The index characterizing the abundance of idiosomal setae (NDV) includes only DS, V, and ventrohumeral setae; since none of the species mentioned in the present paper possess ventrohumeral setae, for all of them NDV = DS + V.

Diagnostic formulas and descriptions are given on the base of our examination; differences from original descriptions are noted in the sections Remarks. The formula for the arrangement of dorsal idiosomal setae is given only for a specimen used for the corresponding drawing.

Results

Family Trombiculidae Ewing, 1944

Subfamily Gahrlipeinae Womersley, 1952

Genus *Gahrlipeia* Oudemans, 1912

Gahrlipeia mirabilis Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960

(Figs. 1A, B, 2–4)

Gahrlipeia mirabilis Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960c: 472, figs. 54–60.

Gahrlipeia (Gateria) mirabilis: Vercammen-Grandjean 1968: 116.

Gahrlipeia (Gahrlipeia) mirabilis: Lakshana 1973: 23; Kudryashova 2004: 46; Chau *et al.* 2007: 157, fig. 75.

Diagnosis. SIF = 4B-N-3-2110.0000; fsp = 7.6.6; fCx = 1.1.1; fSt = 2.2; fPp = B/N/NNN; fSc: PL > AL; Ip =

653–766; fD = 2H-4-7-8-6-4-4-3; DS = 28–36; V = 44–50; NDV = 74–83. Scutal puncta of two types: sparse large and dense small. Two pairs of usurped setae on scutum. Standard measurements of type series given in Table 2.

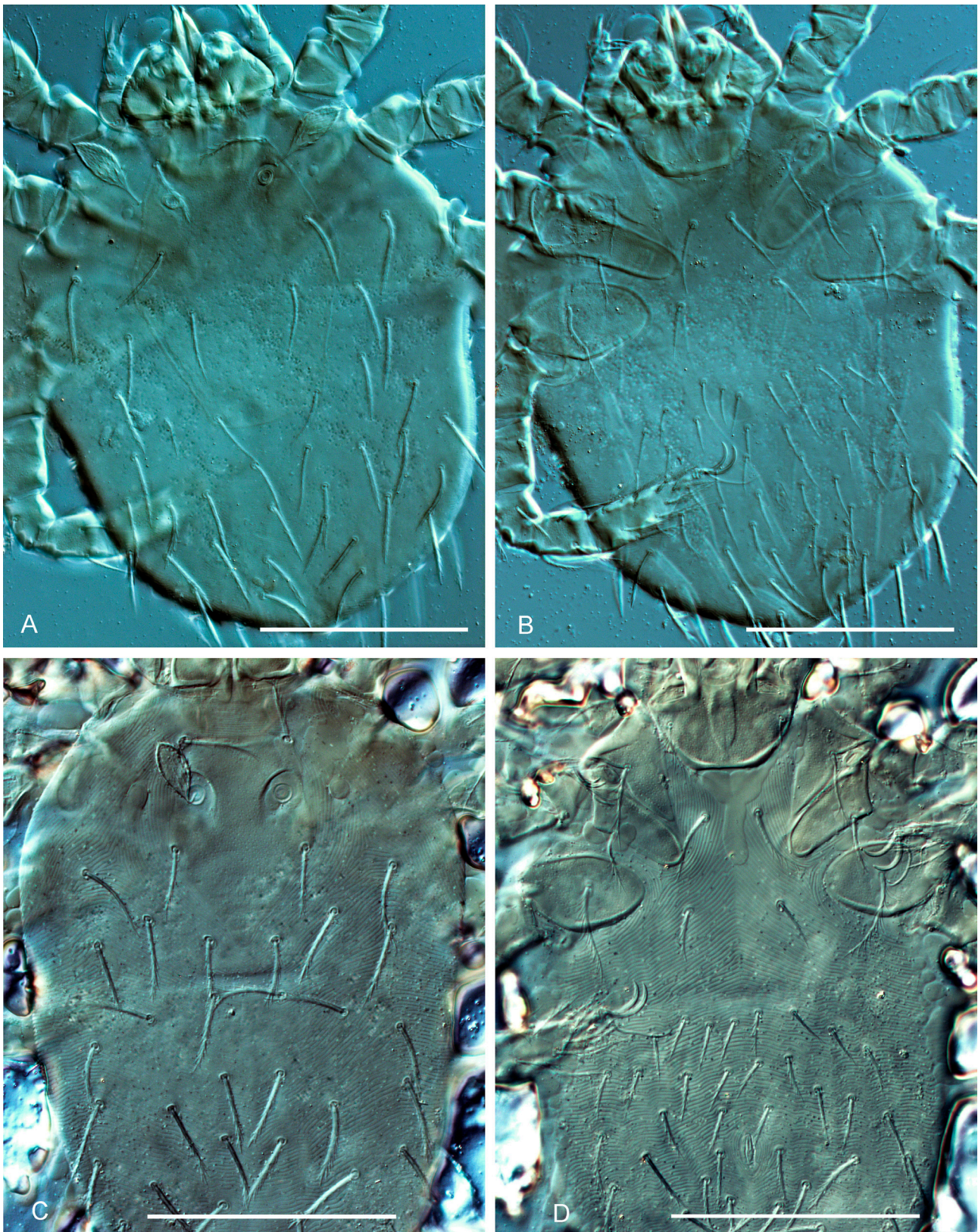


FIGURE 1. *Gahrlepiea mirabilis* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960, lectotype. **A**, dorsal aspect of body; **B**, ventral aspect of body. *Walchia delicatula* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960), lectotype. **C**, dorsal aspect of idiosoma; **D**, ventral aspect of idiosoma. Scale bars: 100 μ m.

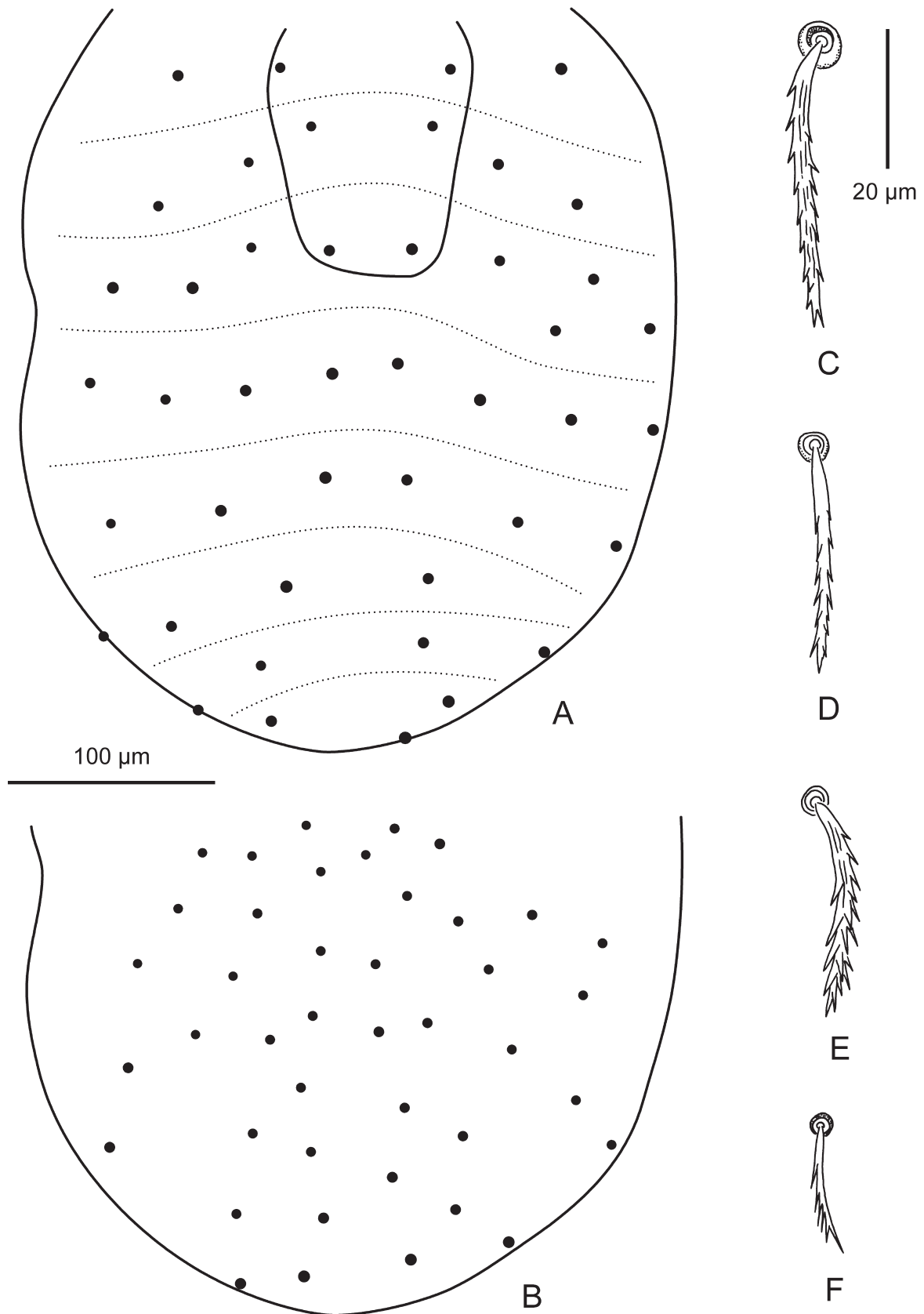


FIGURE 2. *Gahrliepia mirabilis* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960. **A**, arrangement of dorsal idiosomal setae of paralectotype ZMMU Tdt-3227 (specimen 1); **B**, arrangement of ventral idiosomal setae of paralectotype ZMMU Tdt-3227 (specimen 1); **C**, humeral seta of lectotype; **D**, dorsal idiosomal seta of 1st row of lectotype; **E**, caudal seta of lectotype; **F**, preanal seta of lectotype. Scale bars: 100 µm (A, B), 20 µm (C–F).

Description (larva) [based on lectotype and 5 paralectotypes]. IDIOSOMA (Figs. 1A, B, 2). Eyes 2 + 2, posterior pair very small, almost reduced; 28–36 barbed dorsal idiosomal setae including one pair of humeral setae; 4 sternal setae; 44–50 ventral setae; NDV = 74–83.

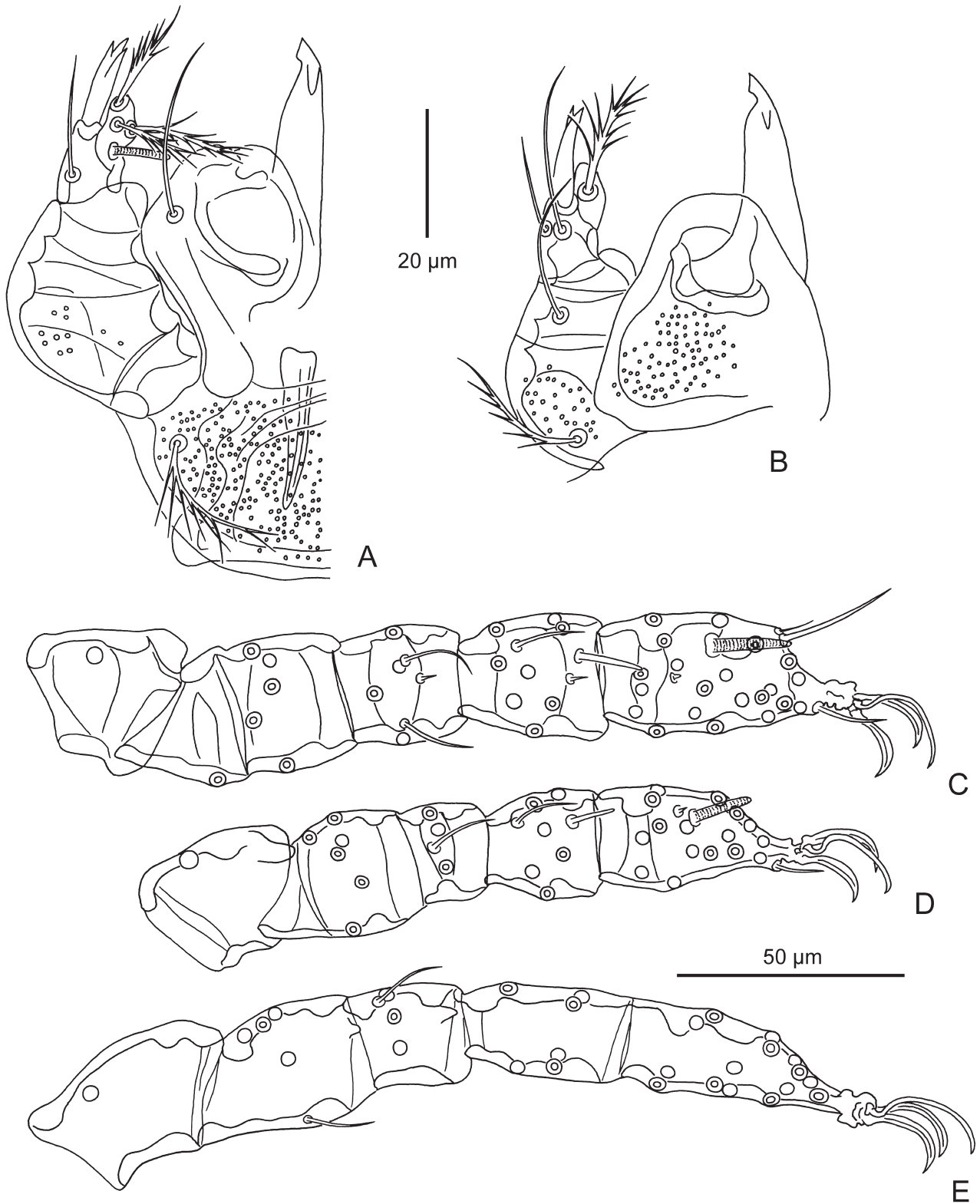


FIGURE 3. *Gahrlipeia mirabilis* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960, lectotype. **A**, ventral aspect of gnathosoma; **B**, dorsal aspect of gnathosoma; **C**, leg I (trochanter–tarsus); **D**, leg II (trochanter–tarsus); **E**, leg III (trochanter–tarsus). Scale bars: 20 µm (A, B), 50 µm (C–E).

TABLE 2. Standard measurements (μm) and numbers of setae of *Gahrlepiea mirabilis* (n = 6).

	Range	Mean	Lectotype
AW	49–56	52	50
PW	70–86	80	70
SB	46–54	50	46
ASB	21–30	24	22
PSB	112–126	117	115
SD	134–155	142	137
P-PL	90–104	96	92
AP	40–45	43	43
AL	28–36	33	35
PL	32–38	36	37
H	38–42	40	42
D _{min}	25–30	28	30
D _{max}	32–38	36	35
V _{min}	16–19	17	17
V _{max}	31–34	32	32
pa	202–282	241	282
pm	173–263	212	212
pp	234–272	251	272
Ip	653–766	704	766
DS	28–38	32	34
V	42–50	47	49
NDV	74–83	79	83

GNATHOSOMA (Fig. 3A, B). Cheliceral blade with tricuspid cap; cheliceral base with dense puncta; gnathobase with dense puncta; palpal femur with sparse puncta; gnathobase with 1 pair of branched setae; galeala nude; palpal claw with 3 prongs; seta on palpal femur branched; setae on palpal genu and tibia nude; palpal tarsus with 4 branched setae and tarsala.

SCUTUM (Fig. 1A). Hexagonal, longer than wide, with 1 pair of ALs, 1 pair of PLs, and 2 pairs of usurped setae (dorsal idiosomal setae situated on the scutum as a result of its expansion in the posterior direction), widest between PLs and anterior pair of usurped setae, posterior scutal margin almost straight; anterior usurped setae situated far from lateral scutal margins, posterior usurped setae situated in posterior scutal angles, distance between anterior usurped setae about same as distance between posterior usurped setae; PLs slightly longer than ALs; ALs and PLs thicker than usurped setae; sensilla fusiform, covered with spikes; sensillum bases situated closer to level of ALs than to level of PLs; scutal puncta of two types: sparse large and dense small.

LEGS (Fig. 3C–E). All with 1 pair of claws and claw-like empodium. Leg I: 7-segmented, coxa with 1 branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 2 genualae, microgenuala; tibia 8B, 2 tibialae, microtibialae; tarsus 21B, tarsala, microtarsala proximal to tarsala, subterminala, parasubterminala, pretarsala. Leg II: 6-segmented, coxa 1B; trochanter 1B; femur 6B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala, microtarsala near and proximal to tarsala, pretarsala. Leg III: 6-segmented, coxa 1B; trochanter 1B; femur 4B, nude ventral femorala; genu 3B, genuala; tibia 6B; tarsus 15B.

Hosts. *Rhizomys pruinus* Blyth, 1851 (Rodentia: Spalacidae), *Leopoldamys edwardsi* (Thomas, 1882) (= *Rattus edwardsi camphaensis* D. Tien (*nomen nudum*)), *Rattus tanezumi* Temminck, 1844 (= *R. rattus khyensis*) (Rodentia: Muridae), *Tupaia* sp. (Scandentia: Tupaiidae) (Schluger *et al.* 1960c), *Tupaia glis* (Diard and Duvaucel, 1820) (Scandentia: Tupaiidae), *Hylomys suillus* S. Müller, 1840 (Erinaceomorpha: Erinaceidae), *Crociodura horsfieldii* (Tomes, 1856) (Soricomorpha, Soricidae), *Bandicota indica* (Bechstein, 1800), *Berylmys berdmorei* (Blyth, 1851), *Maxomys surifer* (Miller, 1900), *Rattus rattus* (L., 1758) (Rodentia: Muridae), *Menetes berdmorei* (Blyth, 1849) (Rodentia: Sciuridae), *Cannomys badius* (Hodgson, 1841) (Rodentia: Spalacidae) (Lakshana 1973), *Suncus murinus* (L., 1766), (Soricomorpha, Soricidae), *Paradoxurus hermaphroditus* (Pallas, 1777) (Carnivora: Viverridae),

Herpestes urva (Hodgson, 1836) (Carnivora: Herpestidae), *Bandicota bengalensis* (Gray, 1835), *Berylmys bowersi* (Anderson, 1879), *Niviventer fulvescens* (Gray, 1847) (= *Rattus fulvescens*), *N. niviventer* (Hodgson, 1836) (= *Rattus niviventer*), *Rattus andamanensis* (Blyth, 1860) (= *R. koratensis* Kloss, 1919), *R. norvegicus* (Berkenhout, 1769), *R. tanezumi* Temminck, 1844 (= *R. flavipectus* (Milne-Edwards, 1872)) (Rodentia: Muridae) (Chau *et al.* 2007).

Distribution. Thailand (Lakshana 1973), Vietnam.

Type material examined (Fig. 4). Lectotype (here designated): larva ZMMU Tdt-3223 (specimen 1) ex *R. tanezumi* No 42018, Vietnam, Quang Tri Province, Vinh Linh, 18 August 1956, coll. I.M. Grochovskaja. Paralectotypes: two larvae, ZMMU Tdt-3224 (specimen 1) and ZMMU Tdt-3225 (specimen 4), same collection data as for lectotype; one larva ZMMU Tdt-3226 (specimen 4) ex unknown host, Vietnam, Nghe An Province, Phu Quy, 9 September 1956, coll. I.M. Grochovskaja; one larva ZMMU Tdt-3227 (specimen 1) ex *L. edwardsi* (labeled as *Rattus edwardsi camphaensis*), Vietnam, Quang Ninh Province, Ha Lam, 1 February 1956, coll. I.M. Grochovskaja; one larva ZMMU Tdt-3228 (specimen 3) ex “tupaia”, Vietnam, Quang Ninh Province, Cam Pha, 2 March 1956, coll. I.M. Grochovskaja.

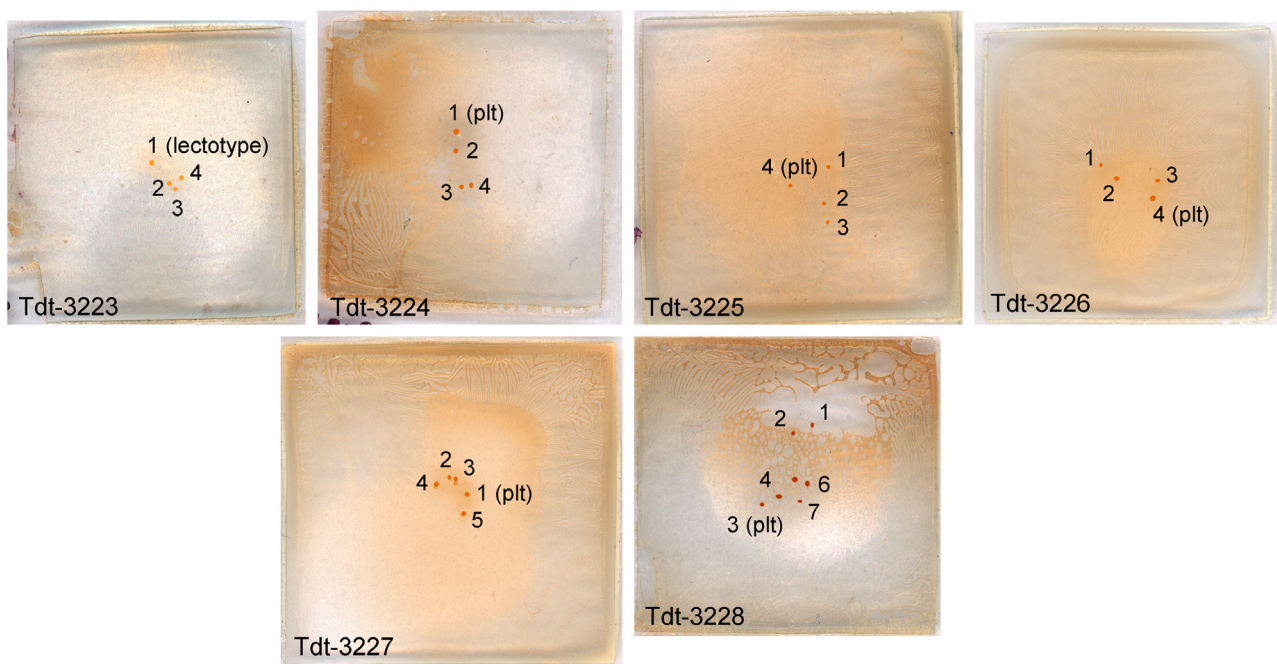


FIGURE 4. Type specimens of *Gahrliopia mirabilis* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960 on slides.

Remarks. According to the original description, in this species “all scutal surface with small puncta” (Schluger *et al.* 1960c); thus, Schluger did not recognize two types of scutal puncta in *G. mirabilis*, obviously due to insufficiently precise optics. However, she described such punctation in *G. tenella* Traub and Morrow, 1955, where this trait is more distinct (Schluger *et al.* 1960c, Fig. 63).

Gahrliopia mirabilis is similar to *G. yangchenensis* Chen and Hsu, 1957 and differs from the latter by the presence of nude ventral palpal tibial seta vs. having slender branches; the presence of two types of scutal puncta vs. one type (however, the original description of *G. yangchenensis* could be inexact in this point); and by a slightly larger scutum (AW = 49–56 vs. 42–51, PW = 70–86 vs. 67–79, ASB = 21–30 vs. 19, and PSB = 112–126 vs. 109) (Chen & Hsu 1957; Li *et al.* 1997). *Gahrliopia mirabilis* is also similar to *G. eurypunctata* Jeu, Yu and Wan, 1983 and differs from it by the presence of nude palpal genual and ventral palpal tibial setae (fPp = B/N/NNN vs. B/B/NNB), slightly smaller scutum (PW = 70–86 vs. 86–90, PSB = 112–126 vs. 136–141, SD = 134–155 vs. 161–170, AP = 40–45 vs. 46–51), and much shorter scutal setae (AL = 28–36 vs. 45–53 and PL = 32–38 vs. 52–54) (Jeu *et al.* 1983).

Genus *Walchia* Ewing, 1931

Walchia delicatula (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960)

(Figs. 1C, D, 5–7)

Gahrliopia (Walchia) delicatula Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960c: 470, figs. 46–53.

Gahrliopia (Walchia) delicatula: Chau *et al.* 2007: 167, fig. 82.

Walchia (Walchia) delicatula: Vercammen-Grandjean 1968: 111.

Walchia delicatula: Kudryashova 2004: 45.

Walchia tianguangshanensis Zhao, 1981: 324, figs. 1–5, **syn. nov.**

Diagnosis. SIF = 4B-N-3-2110.0000; fsp = 7.6.6; fCx = 1.1.1; fSt = 2.2; fPp = N/N/NNN; fSc: AL > PL; Ip = 552–639; fD = 2H-6-6-6-4-3-2; DS = 31–38; V = 38–49; NDV = 69–87. Eyes 2 + 2. Standard measurements of type series given in Table 3.

TABLE 3. Standard measurements (μm) and numbers of setae of *Walchia delicatula* (n = 12).

	Range	Mean	Lectotype	<i>W. tianguangshanensis</i> (by Zhao 1981)
AW	41–49	46	41	45
PW	52–69	59	52	58
SB	34–45	39	34	43
ASB	22–31	27	22	24
PSB	59–72	63	61	70
SD	83–99	90	83	94
P-PL	36–46	41	39	-
AP	42–52	46	44	45
AL	31–38	34	33	34
PL	29–32	31	29	34
H	30–40	35	35	31
D _{min}	22–30	28	28	23
D _{max}	26–38	35	35	28
V _{min}	14–19	17	17	16
V _{max}	24–35	31	32	29
pa	190–234	212	220	210
pm	157–184	174	183	183
pp	203–238	218	211	216
Ip	552–639	604	614	610
DS	31–38	36	36	33
V	38–49	43	43	45
NDV	69–87	79	79	78

Description (larva) [based on lectotype and 11 paralectotypes]. IDIOSOMA (Figs. 1C, D, 5). Eyes 2 + 2, posterior pair smaller; 31–38 barbed dorsal idiosomal setae including one pair of humeral setae; 4 sternal setae; 38–49 ventral setae; NDV = 69–87.

GNATHOSOMA (Fig. 6A, B). Cheliceral blade with tricuspid cap; cheliceral base moderately covered with puncta; gnathobase with dense puncta and 1 pair of branched setae; galeala nude; palpal claw with 3 prongs; setae on palpal femur, genu, and tibia nude; palpal tarsus with 4 branched setae and tarsala.

SCUTUM (Fig. 1C). Pentagonal, longer than width, with pointed posterior angle, densely covered with small puncta, with 1 pair of ALs and 1 pair of PLs; sensilla fusiform, covered with spikes; sensillum bases situated at equal distances from levels of ALs and PLs.

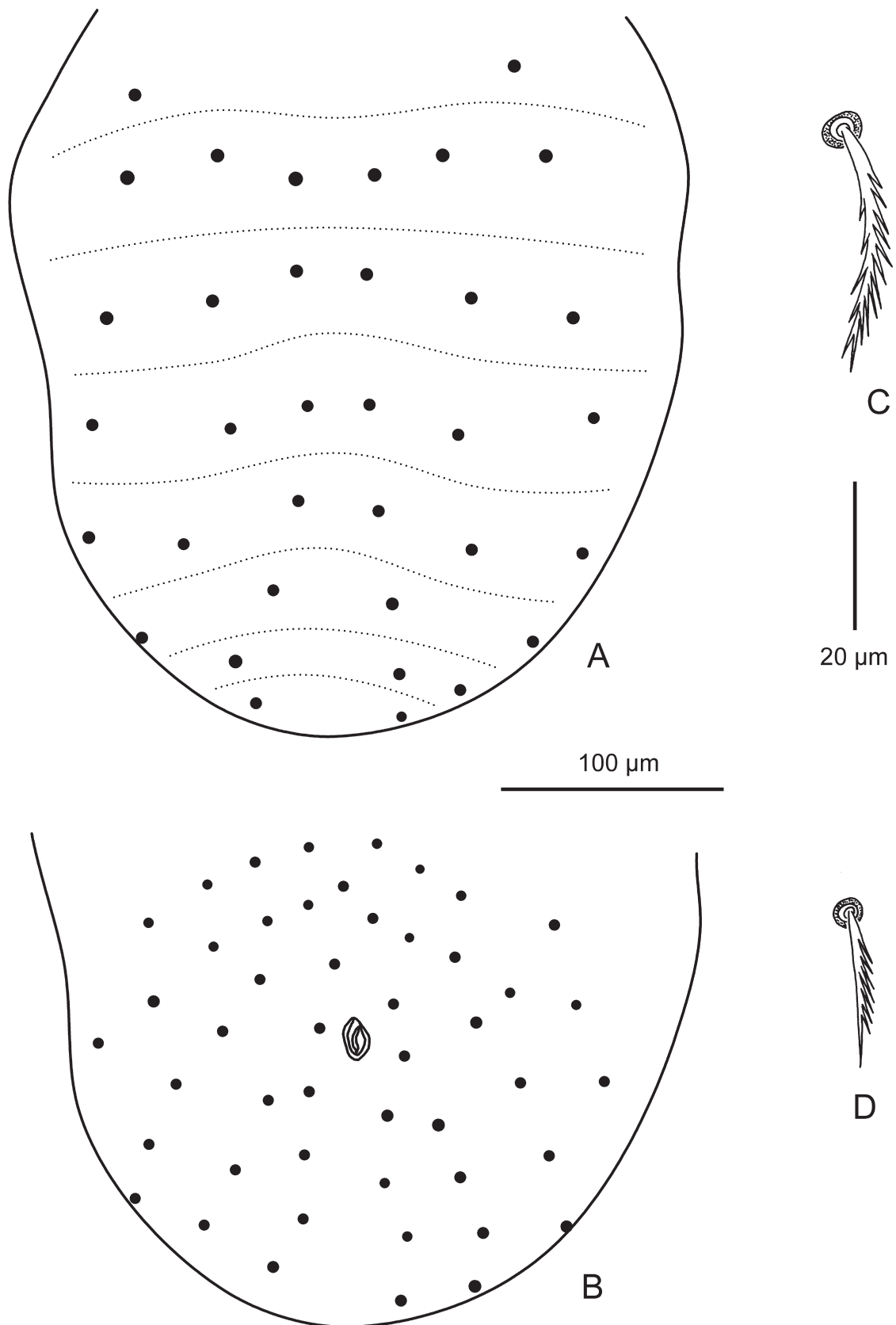


FIGURE 5. *Walchia delicatula* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960). **A**, arrangement of dorsal idiosomal setae of paralectotype ZMMU Tdt-3239 (specimen 2); **B**, arrangement of ventral idiosomal setae of paralectotype ZMMU Tdt-3239 (specimen 2); **C**, dorsal idiosomal seta of 1st row of paralectotype ZMMU Tdt-3238 (specimen 2); **D**, preanal seta of paralectotype ZMMU Tdt-3238 (specimen 2). Scale bars: 100 µm (A, B), 20 µm (C, D).

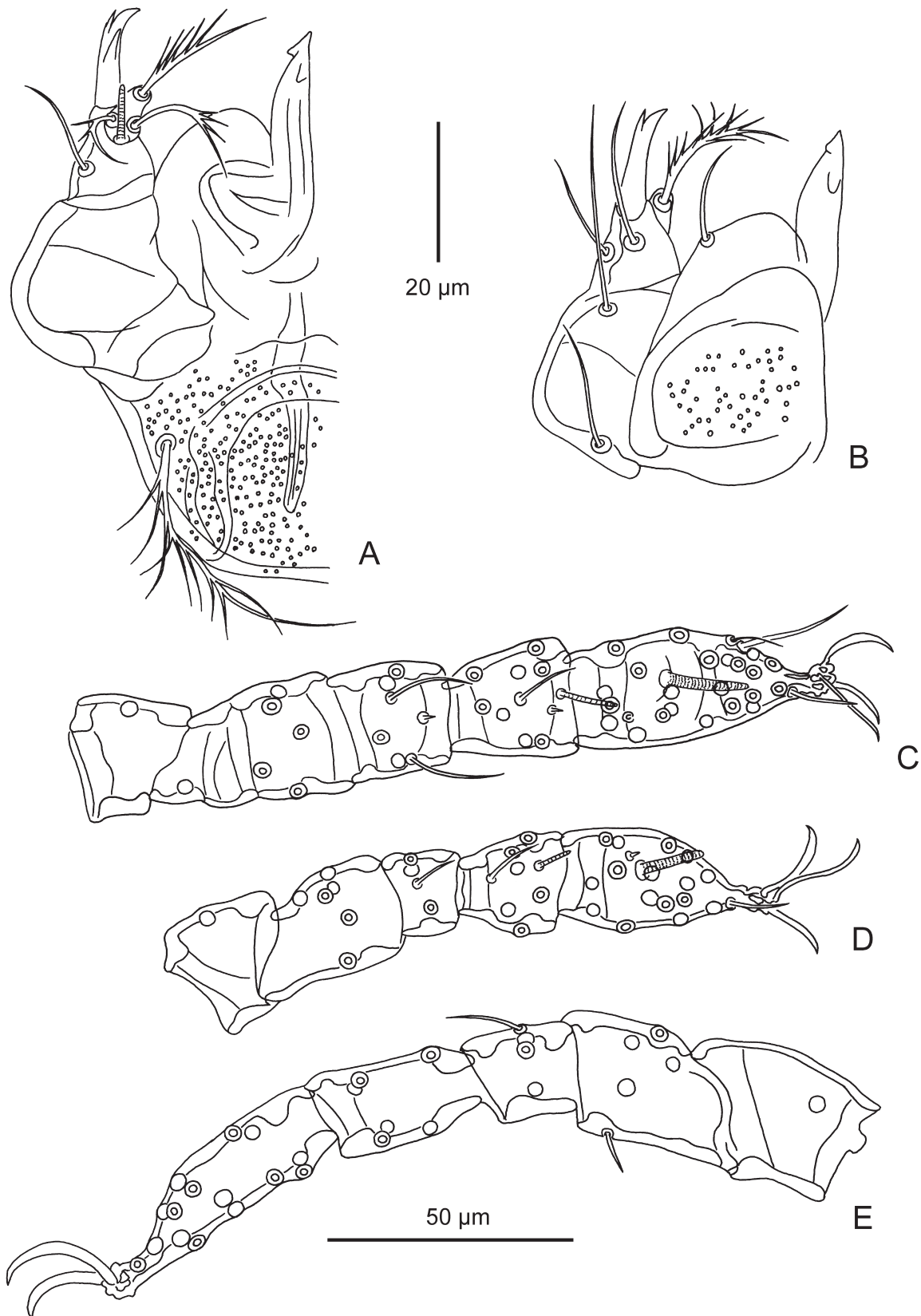


FIGURE 6. *Walchia delicatula* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960). **A**, ventral aspect of gnathosoma of paralectotype ZMMU Tdt-3238 (specimen 2); **B**, dorsal aspect of gnathosoma of paralectotype ZMMU Tdt-3238 (specimen 2); **C**, leg I (trochanter–tarsus) of paralectotype ZMMU Tdt-3239 (specimen 2); **D**, leg II (trochanter–tarsus) of paralectotype ZMMU Tdt-3239 (specimen 2); **E**, leg III (trochanter–tarsus) of paralectotype ZMMU Tdt-3239 (specimen 2). Scale bars: 20 μm (A, B), 50 μm (C–E).

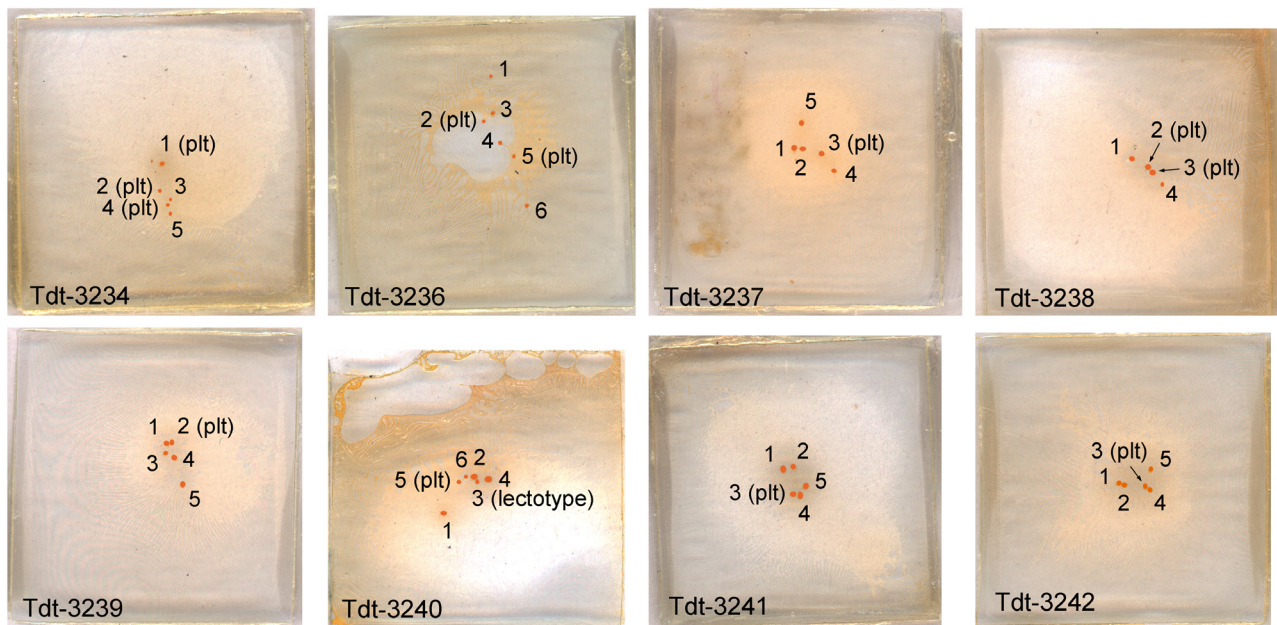


FIGURE 7. Type specimens of *Walchia delicatula* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960) on slides.

LEGS (Fig. 6C–E). All with 1 pair of claws and claw-like empodium. Leg I: 7-segmented, coxa with 1 branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 2 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala, microtarsala proximal to tarsala, subterminala, parasubterminala, pretarsala. Leg II: 6-segmented, coxa 1B; trochanter 1B; femur 6B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala, microtarsala near and proximal to tarsala, pretarsala. Leg III: 6-segmented, coxa 1B; trochanter 1B; femur 4B, nude ventral femorala; genu 3B, genuala; tibia 6B; tarsus 15B.

Hosts. *Tupaia hongensis* (*nomen nudum*) (Scandentia: Tupaiidae), *Rattus norvegicus*, *Rhizomys pruinosus* (Schluger *et al.* 1960c), *Rattus tanezumi* (= *R. flavipectus*) (Chau *et al.* 2007), *Berylmys bowersi* (this study).

Distribution. China (this study), Vietnam.

Type material examined (Fig. 7). Lectotype (here designated): larva ZMMU Tdt-3240 (specimen 3) ex *R. pruinosus* No 208, Vietnam, Ha Giang Province, Ha Giang, 19 May 1956, coll. I.M. Grochovskaja. Paralectotypes: seven larvae, ZMMU Tdt-3237 (specimen 3), ZMMU Tdt-3238 (specimens 2, 3), ZMMU Tdt-3239 (specimen 2), ZMMU Tdt-3240 (specimen 5), ZMMU Tdt-3241 (specimen 3), ZMMU Tdt-3242 (specimen 3), same collection data as for lectotype; five larvae, ZMMU Tdt-3234 (specimens 1, 2, 4), ZMMU Tdt-3236 (specimens 2, 5), ex *R. pruinosus* No 258, Vietnam, Ha Giang Province, Ha Giang, 3 June 1956, coll. I.M. Grochovskaja.

Remarks. According to the original description, *W. delicatula* is similar to *W. neosinensis* (Hsu and Wen, 1956), but differs in the “shape of trichobothria (sensilla), position of seta on leg coxa III, nude outer lateral seta on palpal tibia, wider scutum, and other characters” (Schluger *et al.* 1960c). The “outer lateral seta on palpal tibia” is actually ventral palpal tibial seta. The difference in its shape (fPp = N/N/NNN in *W. delicatula* and fPp = N/N/NNB in *W. neosinensis*) is the most clear difference between these two species. We did not find the difference between these species in the position of coxal seta III. The difference in the shape of sensilla (narrower in *W. delicatula* than in *W. neosinensis*) seems reliable, although rather slight. According to our data, the metric differences between these species are as follows: AW = 41–49, PW = 52–69, SB = 34–45, ASB = 22–31, SD = 83–99, and AP = 42–52 in the type series of *W. delicatula* vs. 33, 41, 29, 20, 82, and 38 in *W. neosinensis*, respectively (Hsu & Wen 1956; Li *et al.* 1997).

The species *W. tianguangshanensis* Zhao, 1981, which was described from a single specimen ex *B. bowersi* from Guangdong Province of China, does not differ from *W. delicatula*, neither by morphology, nor by measurements (Table 2), and therefore is synonymized here with the latter.

Specimens Nos 1 and 2 on the slide ZMMU Tdt-3237 belong to *Walchia pacifica* (Chen and Hsu, 1955).

***Walchia dismina* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960)**

(Figs. 8A, B, 9–11)

Gahrlipeia (*Walchia*) *dismina* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960c: 468, figs. 31–38.

Gahrlipeia (*Walchia*) *dismina*: Lakshana 1973: 24; Chau *et al.* 2007: 168, fig. 83.

Walchia (*Walchia*) *dismina*: Vercammen-Grandjean 1968: 112.

Walchia dismina: Kudryashova 2004: 45; Chaisiri *et al.* 2016: 335.

Diagnosis. SIF = 4B-N-2-2110.0000; fsp = 7.6.6; fCx = 1.1.2; fSt = 2.2; fPp = N/N/NNN; fSc: PL > AL; Ip = 688–739; fD = 2H-6-[6-2]-6-[4-2]-4-5; DS = 32–39; V = 44–51; NDV = 77–90. Eyes absent. Standard measurements of type series given in Table 4.

TABLE 4. Standard measurements (µm) and numbers of setae of *Walchia dismina* (n = 7).

	Range	Mean	Lectotype
AW	30–34	32	30
PW	40–44	41	41
SB	21–24	23	22
ASB	19–24	21	23
PSB	35–41	37	35
SD	55–65	59	59
P-PL	18–24	21	19
AP	34–38	35	38
AL	19–23	21	21
PL	28–30	29	30
H	27–31	29	27
D _{min}	24–29	27	29
D _{max}	33–38	36	36
V _{min}	17–21	18	20
V _{max}	28–33	30	29
pa	240–263	252	253
pm	207–218	211	208
pp	241–258	251	254
Ip	688–739	715	715
DS	32–39	35	37
V	44–51	47	46
NDV	77–90	83	83

Description (larva) [based on lectotype and 6 paralectotypes]. IDIOSOMA (Figs. 8A, B, 9). Eyes absent; 32–39 dorsal idiosomal setae covered with long barbs, including one pair of humeral setae; 4 sternal setae; 44–51 ventral setae; NDV = 77–90.

GNATHOSOMA (Fig. 10D, E). Cheliceral blade with tricuspid cap; cheliceral base with sparse puncta; gnathobase with sparse puncta and 1 pair of branched setae; galeala nude; palpal claw with 2 prongs; setae on palpal femur, genu, and tibia nude; palpal tarsus with 4 branched setae and tarsala.

SCUTUM (Fig. 8A). Pentagonal, longer than width, with angulate posterior margin, moderately covered with small puncta, with 1 pair of ALs and 1 pair of PLs; PLs longer ALs; sensilla claviform, covered with spikes; sensillum bases situated at equal distances from levels of ALs and PLs.

LEGS (Fig. 10A–C). All with 1 pair of claws and claw-like empodium. Leg I: 7-segmented, coxa with 1 branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 2 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala, microtarsala proximal to tarsala, subterminala, parasubterminala, pretarsala. Leg II: 6-segmented, coxa 1B; trochanter 1B; femur 6B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus

16B, tarsala, microtarsala far proximal to tarsala, pretarsala. Leg III: 6-segmented, coxa 2B; trochanter 1B; femur 4B, nude ventral femorala; genu 3B, genuala; tibia 6B; tarsus 14B.

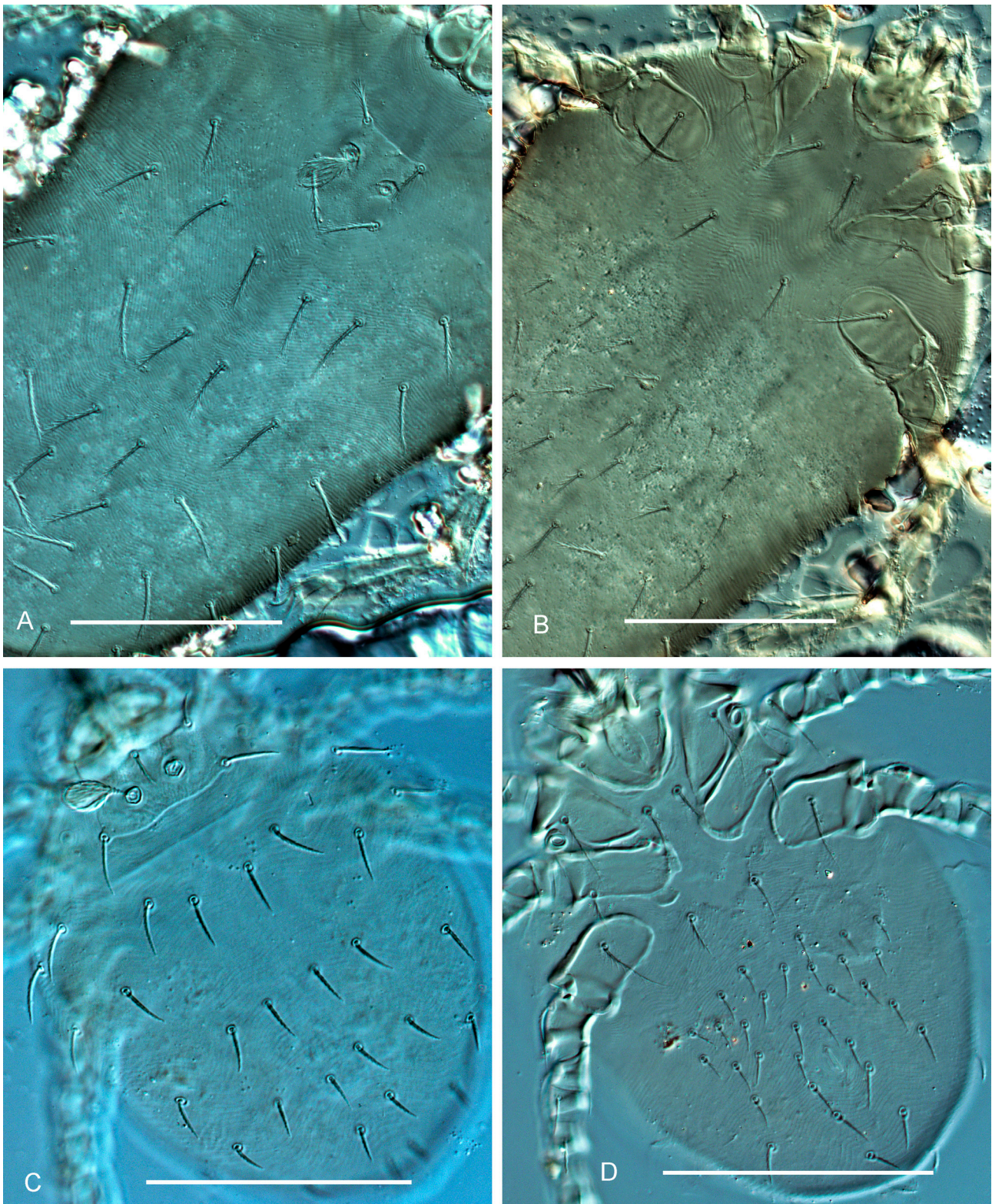


FIGURE 8. *Walchia dismina* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960), paralectotype ZMMU Tdt-3252 (specimen 2). **A**, dorsal aspect of idiosoma; **B**, ventral aspect of idiosoma. *Cheladonta neda* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960, additional material ZMMU XM14.63k1 (specimen 11). **C**, dorsal aspect of body; **D**, ventral aspect of body. Scale bars: 100 μ m.

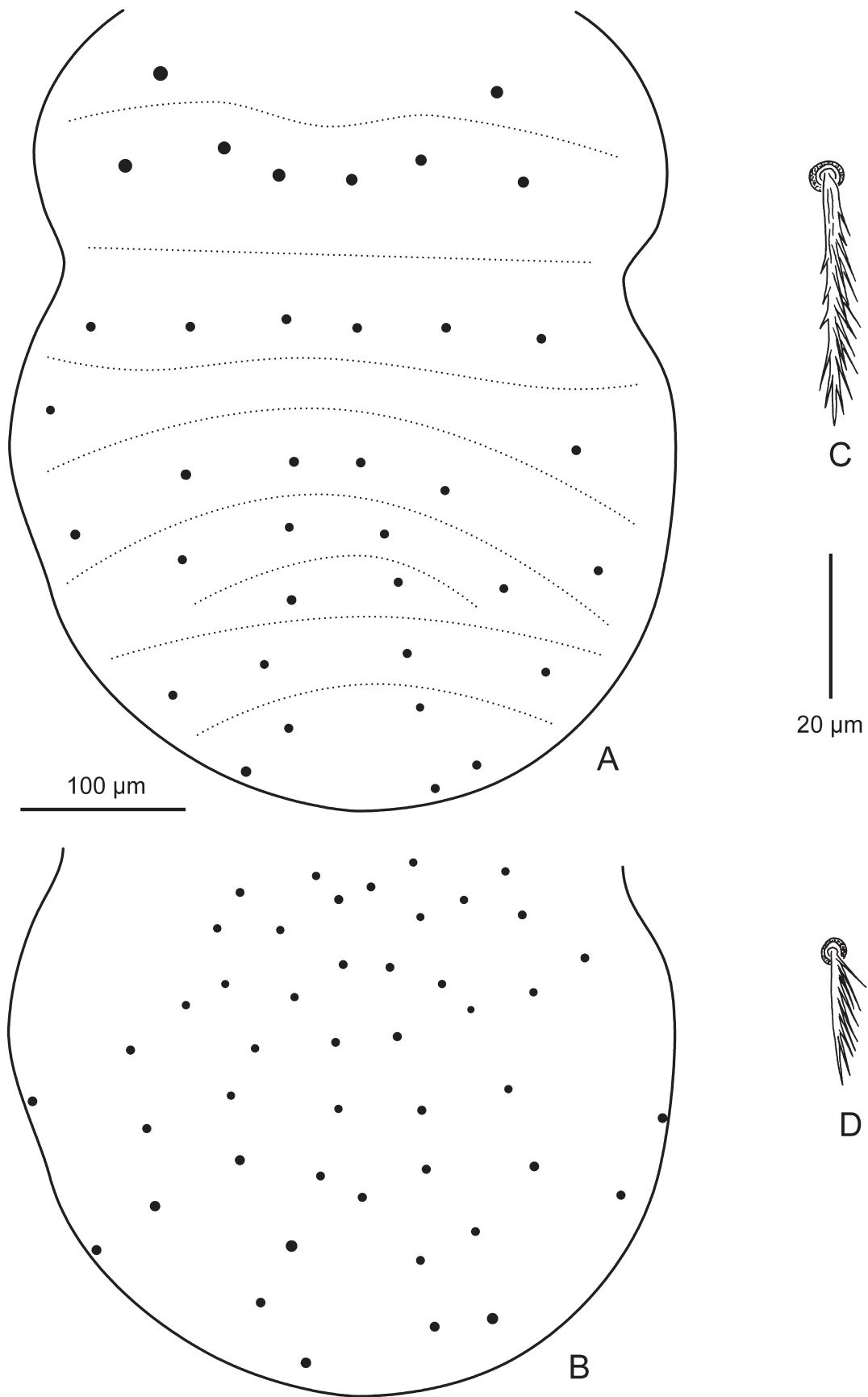


FIGURE 9. *Walchia dismina* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960), lectotype. **A**, arrangement of dorsal idiosomal setae; **B**, arrangement of ventral idiosomal setae; **C**, dorsal idiosomal seta of 1st row; **D**, preanal seta. Scale bars: 100 µm (A, B), 20 µm (C, D).

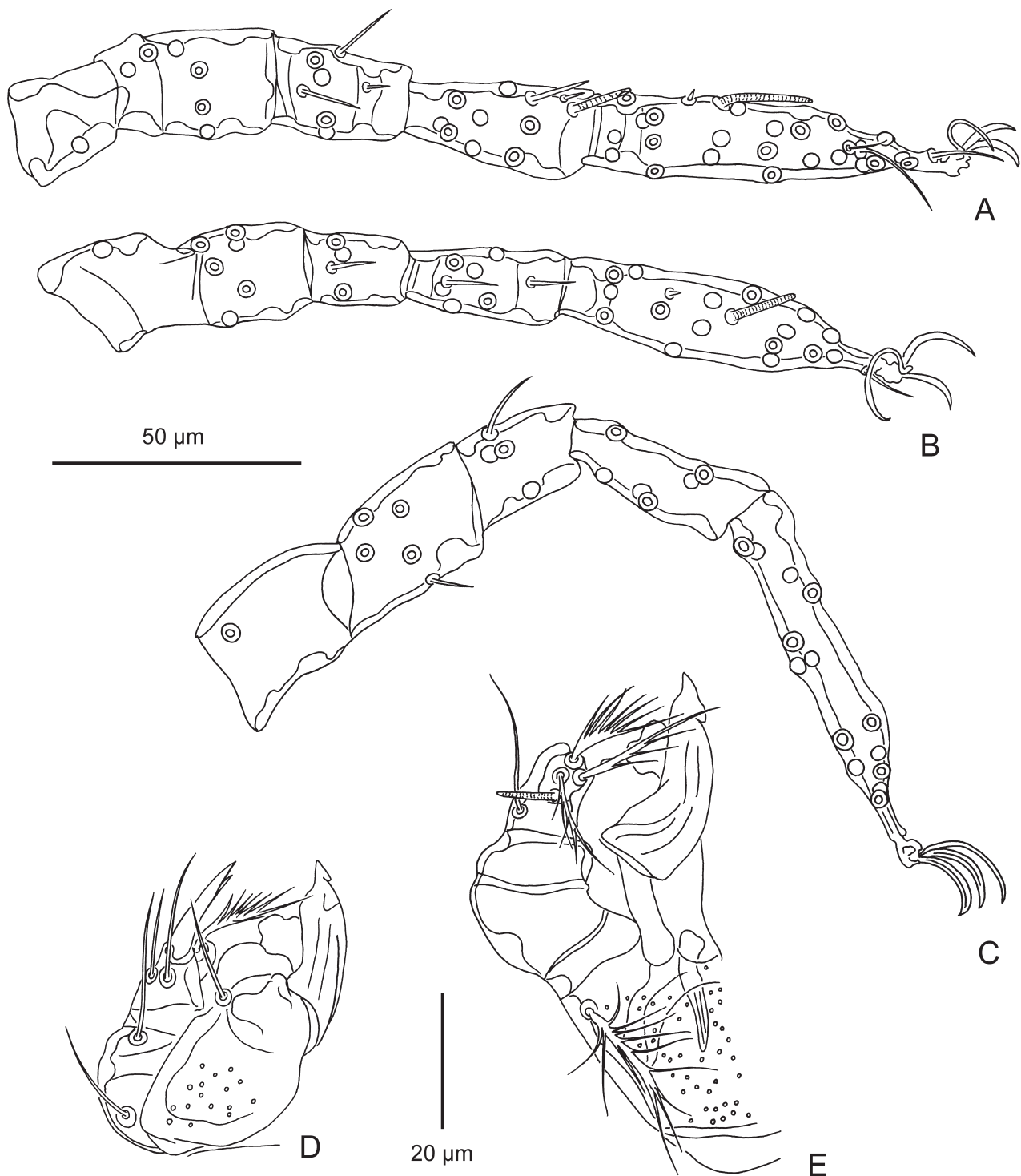


FIGURE 10. *Walchia dismina* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960). **A**, leg I (trochanter–tarsus) of lectotype; **B**, leg II (trochanter–tarsus) of paralectotype ZMMU Tdt-3252 (specimen 2); **C**, leg III (trochanter–tarsus) of lectotype; **D**, dorsal aspect of gnathosoma of lectotype; **E**, ventral aspect of gnathosoma of lectotype. Scale bars: 50 µm (A–C), 20 µm (D, E).

Hosts. *Rattus* sp. (Schluger *et al.* 1960c), *Leopoldamys sabanus* (Thomas, 1887) (= *Rattus sabanus*), *Mus cervicolor* Hodgson, 1845 (Rodentia: Muridae), *Rattus tanezumi* (= *R. sladeni* (Anderson, 1879)), *Bandicota indica*, *Maxomys surifer*, *Menetes bermorei*, *Niviventer niviventer*, *Rattus rattus*, *Tupaia glis* (Lakshana 1973), *Mus cookii* Ryley, 1914, *Rattus losea* (Swinhoe, 1871) (Rodentia: Muridae) (Chaisiri *et al.* 2016).

Distribution. Thailand (Lakshana 1973; Chaisiri *et al.* 2016), Vietnam.

Type material examined (Fig. 11). Lectotype (here designated): larva ZMMU Tdt-3252 (specimen 1) ex *Rattus*

sp. No 542, Vietnam, Nghe An Province, Phu Quy, 8 September 1956, coll. I.M. Grochovskaja. Paralectotypes: two larvae, ZMMU Tdt-3252 (specimens 2, 3), same collection data as for lectotype; two larvae, ZMMU Tdt-3254 (specimen 1), ZMMU Tdt-3255 (specimen 2), ex *Rattus* sp. No 542, Vietnam, Nghe An Province, Phu Quy, 9 September 1956, coll. I.M. Grochovskaja; two larvae, ZMMU Tdt-3258 (specimens 3, 4), ex *Rattus* sp. No 595, Vietnam, Nghe An Province, Phu Quy, 13 September 1956, coll. I.M. Grochovskaja.

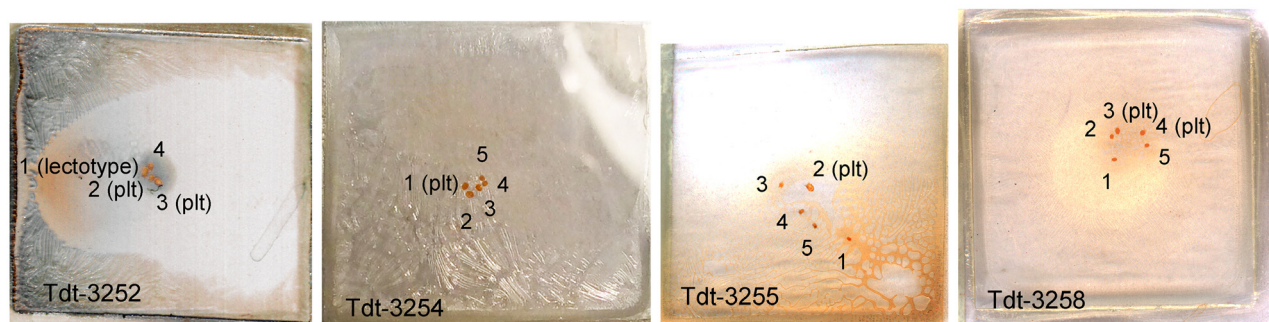


FIGURE 11. Type specimens of *Walchia dismina* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960) on slides.

Remarks. According to the original description, *W. dismina* is similar to *W. kritochaeta* Traub and Evans, 1957 and differs from it by longer legs and by the presence of two setae on leg coxa III (fCx = 1.1.2 vs. 1.1.1) (Schluger *et al.* 1960c). The latter difference is reliable, but the former one is unclear, as the lengths of legs were absent in the original description of *W. kritochaeta* (Traub & Evans 1957). However, we found the following additional differences between these species. *Walchia dismina* has 2-pronged palpal claw, equal leg claws, and has no eyes, while *W. kritochaeta* has 3-pronged palpal claw, unequal leg claws (one claw is very thin, like the empodium), and one pair of eyes.

Walchia dismina is also similar in the size and shape of scutum to *W. isonychia* Nadchatram and Traub, 1964, but differs in the presence of two setae on leg coxa III (vs. one seta), a 2-pronged palpal claw (vs. 3-pronged), and by the absence of eyes (vs. eyes 1 + 1).

Specimen No. 4 on the slide ZMMU Tdt-3254, specimens Nos 1, 3, 4, and 5 on the slide ZMMU Tdt-3255, specimens Nos 2 and 5 on the slide ZMMU Tdt-3258 belong to *Walchia chinensis* (Chen and Hsu, 1955). Specimen No. 2 on the slide ZMMU Tdt-3254 presumably belongs to *Walchia disparunguis* (Oudemans, 1929).

Subfamily Trombiculinae Ewing, 1929

Tribe Schoengastiini Vercammen-Grandjean, 1960

Genus *Cheladonta* Lipovsky, Crossley and Loomis, 1955

Cheladonta neda Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960

(Figs. 8C, D, 12–14)

Cheladonta neda Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960a: 190, fig. 11.

Schoutedenichia (*Schoutedenichia*) *neda*: Vercammen-Grandjean 1965b: 101; 1968: 96.

Cheladonta (*Cheladonta*) *neda*: Lakshana 1973: 21; Chau *et al.* 2007: 151, fig. 73.

Diagnosis. SIF = 4B-N-3-2110.0000; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fPp = B/b/BbB; fSc: PL ≥ AM > AL; Ip = 473–531; fD = 4H-8-4-8-6-2-2; DS = 31–35; V = 27–31; NDV = 61–66. Eyes 2 + 2. Cheliceral blade with dorsal serration. Standard measurements of type series given in Table 5.

Description (larva) [based on lectotype, 4 paralectotypes, and 1 additional specimen]. IDIOSOMA (Figs. 8C, D, 12). Eyes 2 + 2; 31–35 barbed dorsal idiosomal setae including two pairs of humeral setae; 4 sternal setae; 27–31 ventral setae; NDV = 61–66.

TABLE 5. Standard measurements (μm) and numbers of setae of *Cheladonta neda* (n = 6).

	Range	Mean	Lectotype
AW	42–48	45	46
PW	49–55	53	53
SB	17–21	19	21
ASB	15–19	16	16
PSB	13–16	14	15
SD	29–31	30	31
P-PL	5–10	7	10
AP	20–22	21	20
AM	17–23	20	21
AL	10–12	11	10
PL	21–24	23	24
H	22–27	25	27
D _{min}	13–32	19	32
D _{max}	22–26	24	25
V _{min}	11–13	12	12
V _{max}	17–20	18	18
pa	164–195	182	179
pm	141–162	152	141
pp	164–184	174	184
Ip	473–531	508	504
DS	31–35	34	34
V	27–31	29	31
NDV	61–66	63	65

GNATHOSOMA (Fig. 13A, B). Cheliceral blade with tricuspid cap and dorsal serration; cheliceral base with few puncta; gnathobase with sparse puncta and 1 pair of branched setae; galeala nude; palpal claw with 3 prongs; seta on palpal femur branched; seta on palpal genu with 1 branch; dorsal and ventral palpal tibial setae branched, lateral palpal tibial seta with one branch; palpal tarsus with 4 branched setae and tarsala.

SCUTUM (Fig. 8C). Nearly rectangular, wider than long, with almost straight posterior margin, moderately covered with small puncta, with 1 AM, 1 pair of ALs and 1 pair of PLs; PLs longer than ALs; sensilla claviform, covered with spikes; sensillum bases situated anterior to level of PLs (PSB – P-PL = 5–9 μm).

LEGS (Fig. 13C–E). All 7-segmented, with 1 pair of claws and claw-like empodium. Leg I: coxa with 1 branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 2 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala, microtarsala proximal to tarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala, microtarsala at level of tarsala, pretarsala. Leg III: coxa 1B; trochanter 1B; basifemur 1B; telofemur 3B; genu 3B, genuala; tibia 6B; tarsus 14B.

Hosts. *Leopoldamys edwardsi* (= *Rattus edwardsi camphaensis* D. Tien (*nomen nudum*)) (Schluger *et al.* 1960a), *Menetes berdmorei*, *Tupaia glis* (Lakshana 1973), *Maxomys surifer* (this study).

Distribution. Thailand (Lakshana 1973), Vietnam.

Type material examined (Fig. 14). Lectotype (here designated): larva ZMMU Tdt-3283 (specimen 5) ex *Leopoldamys edwardsi* No 595, Vietnam, Nghe An Province, Phu Quy, 13 September 1956, coll. I.M. Grochovskaja. Paralectotypes: two larvae, ZMMU Tdt-3283 (specimen 2), ZMMU Tdt-3282 (specimen 4), same collection data as for lectotype; one larva ZMMU Tdt-3277 (specimen 3) ex *Leopoldamys edwardsi* No 27, Vietnam, Quang Ninh Province, Ha Long (= Hon Gai), 1 February 1956, coll. I.M. Grochovskaja; one larva ZMMU Tdt-3284 (specimen 3) ex *Leopoldamys edwardsi* No 555, Vietnam, Nghe An Province, Phu Quy, 9 September 1956, coll. I.M. Grochovskaja.

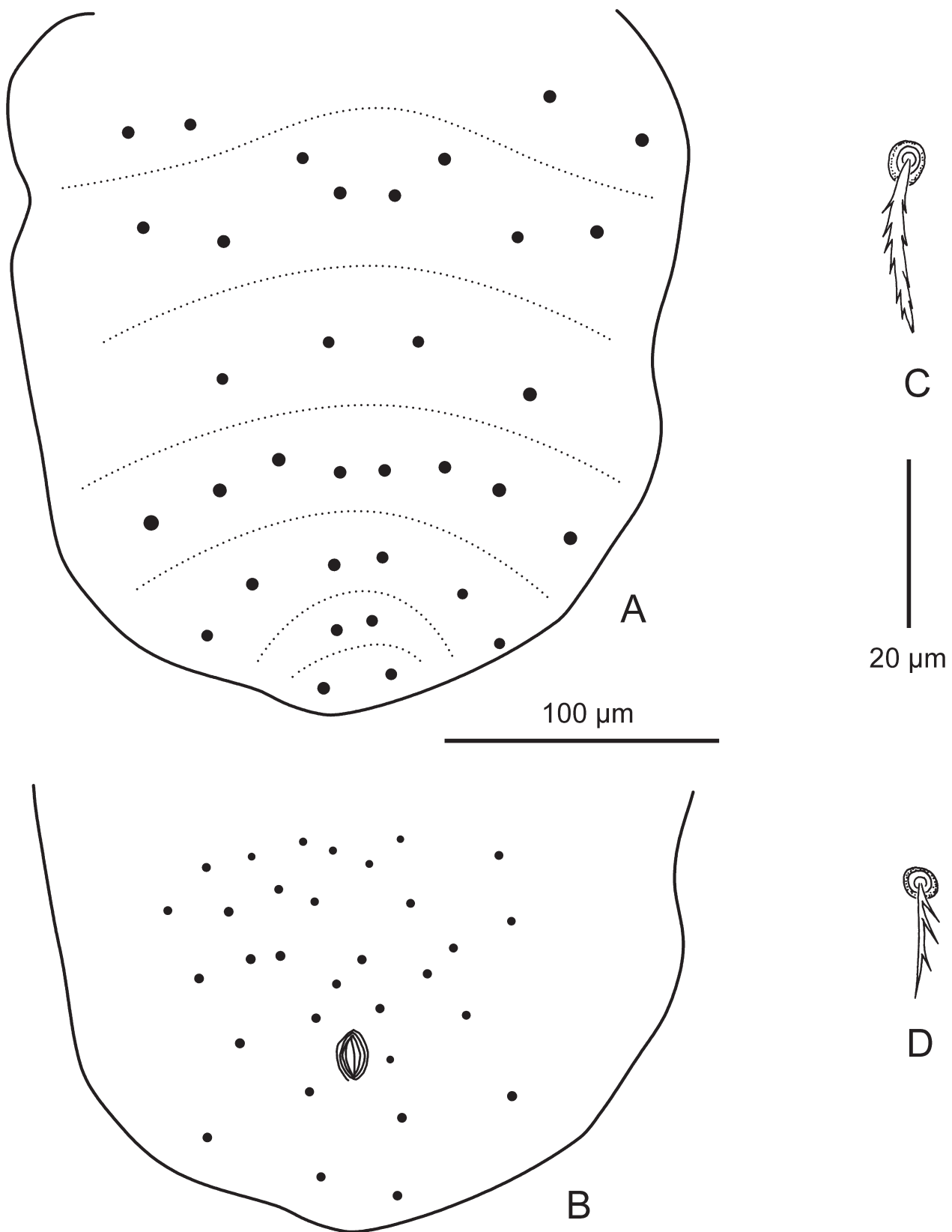


FIGURE 12. *Cheladonta neda* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960. **A**, arrangement of dorsal idiosomal setae of lectotype; **B**, arrangement of ventral idiosomal setae of lectotype; **C**, dorsal idiosomal seta of 1st row of additional material ZMMU XM14.63k1 (specimen 11); **D**, preanal seta of additional material ZMMU XM14.63k1 (specimen 11). Scale bars: 100 μm (A, B), 20 μm (C, D).

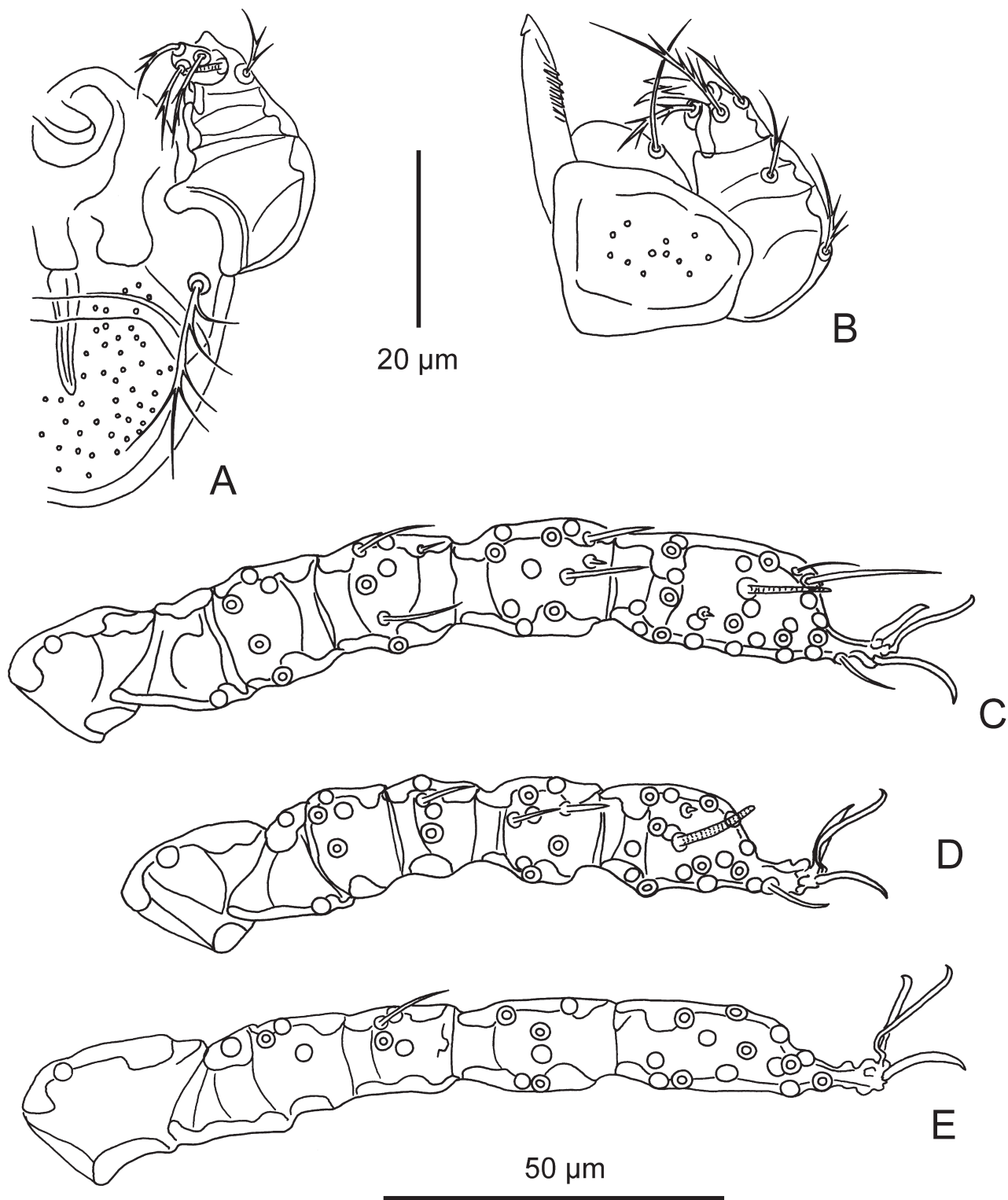


FIGURE 13. *Cheladonta neda* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960, additional material ZMMU XM14.63k1 (specimen 11). **A**, ventral aspect of gnathosoma; **B**, dorsal aspect of gnathosoma; **C**, leg I (trochanter–tarsus); **D**, leg II (trochanter–tarsus); **E**, leg III (trochanter–tarsus). Scale bars: 20 µm (A, B), 50 µm (C–E).

Additional material examined. One larva ZMMU XM14.63k1 (specimen 11) ex *Maxomys surifer* No CT-63, Vietnam, Dong Nai Province, Dong Nai National Reserve (Cat Tien), 11°24'42.65"N, 107°23'8.58"E, 11 November 2014, coll. Yu.V. Lopatina.

Remarks. The serrated cheliceral blade and shape of scutum (significantly wider than long, with the distance

between sensillum bases almost equal to the distance from sensillum base to the lateral scutal margin) confirm that this species belongs to the genus *Cheladonta* Lipovsky, Crossley and Loomis, 1955, contrary to the opinion of Vercammen-Grandjean (1968).

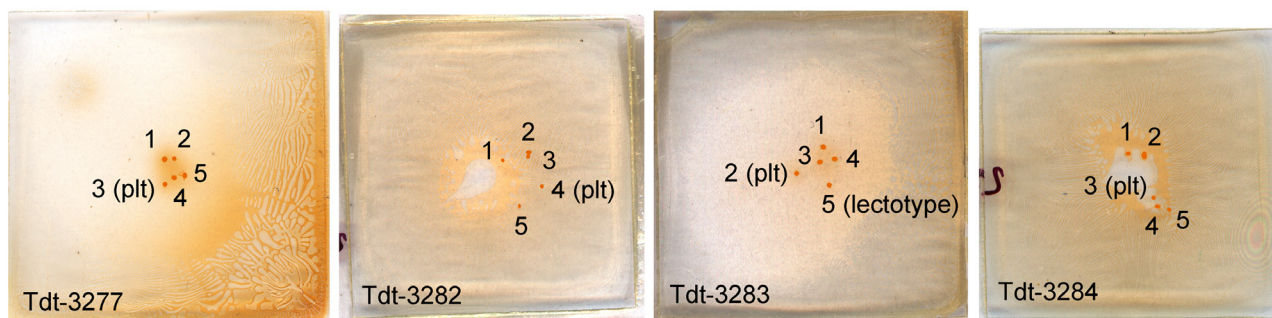


FIGURE 14. Type specimens of *Cheladonta neda* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960 on slides.

According to the original description, *C. neda* is similar to *C. micheneri* Lipovsky, Crossley and Loomis, 1955 and differs in “significantly lesser body size, number of dorsal setae, feathered setae on femur and tibia of palps and other characters” (Schluger *et al.* 1960a). Actually, *C. neda* is most similar to *C. brevipalpis* (André, 1946) described from a gerbil in Tunisia (Vercammen-Grandjean & André 1967) and differs from the latter by the presence of a 3-pronged palpal claw vs. 4-pronged, two pairs of eyes vs. one pair, shorter legs (Ip = 473–531 vs. 577–613), slightly smaller scutum (PW = 49–55 and SD = 29–31 vs. 60–64 and 34–35, respectively), and shorter scutal setae (AL = 10–12 and PL = 21–24 vs. 19 and 26–30, respectively). *Cheladonta neda* is also similar to *C. gouldi* Lakshana, 1969 and differs from it by the presence of branched dorsal and lateral palpal tibial setae (fPp = B/b/BbB vs. B/B/NNB), presence of tibiala III, a lesser number of idiosomal setae (DS = 31–35 and V = 27–31 vs. 40–46 and 40, respectively), narrower scutum (AW = 42–48 and PW = 49–55 vs. 52–55 and 68–72, respectively), shorter setae (AM = 17–23, AL = 10–12, PL = 21–24, and H = 22–27 vs. 25–27, 20–23, 33–36, and 34, respectively), and by shorter legs (Ip = 473–531 vs. 632) (Lakshana 1969).

Genus *Doloisia* Oudemans, 1910

Remarks. We treat *Traubacarus* Audy and Nadchatram, 1957 as a subgenus of *Doloisia* following Stekolnikov (2021).

Doloisia (Doloisia) alata Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961

(Figs. 15A, B, 16–18)

Doloisia alata Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961: 448, figs. 1–7.

Doloisia alata: Wen 1984: 302; Li *et al.* 1997: 333, fig. 2-23-2; Kudryashova 2004: 37.

Doloisia (Doloisia) alata: Vercammen-Grandjean 1968: 97; Chau *et al.* 2007: 142, fig. 67.

Diagnosis. SIF = 3B1b-N-3-2110.0000; fsp = 7.7.7; fCx = 3.5.10; fSt = 2.2; fPp = B/B/NNB; fSc: PL >> AM > AL; Ip = 688–741; fD = 4H-10-8-6-6-2; DS = 36–40; V = 38–41; NDV = 75–80. Eyes absent. Standard measurements of type series given in Table 6.

Description (larva) [based on lectotype and 4 paralectotypes]. IDIOSOMA (Figs. 15A, B, 16). Eyes absent; 36–40 dorsal idiosomal setae covered with long thin barbs, including two pairs of humeral setae; 4 sternal setae; 38–41 ventral setae; NDV = 75–80.

GNATHOSOMA (Fig. 17A, B). Cheliceral blade with two large hooks; gnathobase with moderate puncta and 1 pair of branched setae; galeala nude; palpal claw with 3 prongs, internal prong long and strongly curved; setae on palpal femur and genu branched; dorsal and lateral palpal tibial setae nude, ventral palpal tibial seta branched; palpal tarsus with 1 small dorsal seta having 1 branch, 3 heavily branched ventral setae, and tarsala.

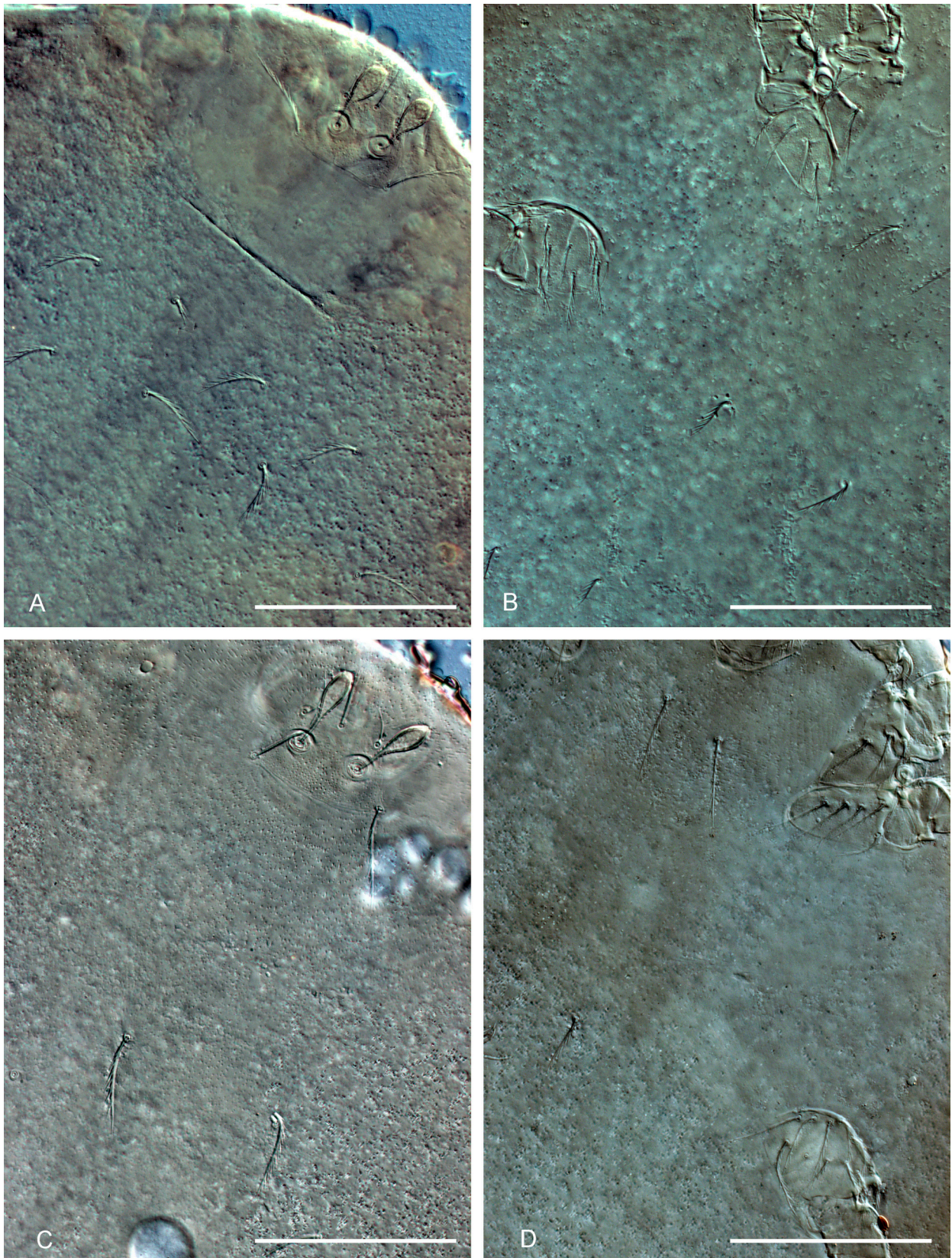


FIGURE 15. *Doloisia alata* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961. **A**, anterior part of idiosoma, dorsal aspect, of paralectotype ZMMU Tdt-3173 (specimen 2); **B**, anterior part of idiosoma, ventral aspect, of paralectotype ZMMU Tdt-3157 (specimen 2). *Doloisia fulminans* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961. **C**, anterior part of idiosoma, dorsal aspect, of paralectotype ZMMU Tdt-3159 (specimen 2); **D**, anterior part of idiosoma, ventral aspect, of lectotype. Scale bars: 100 μ m.

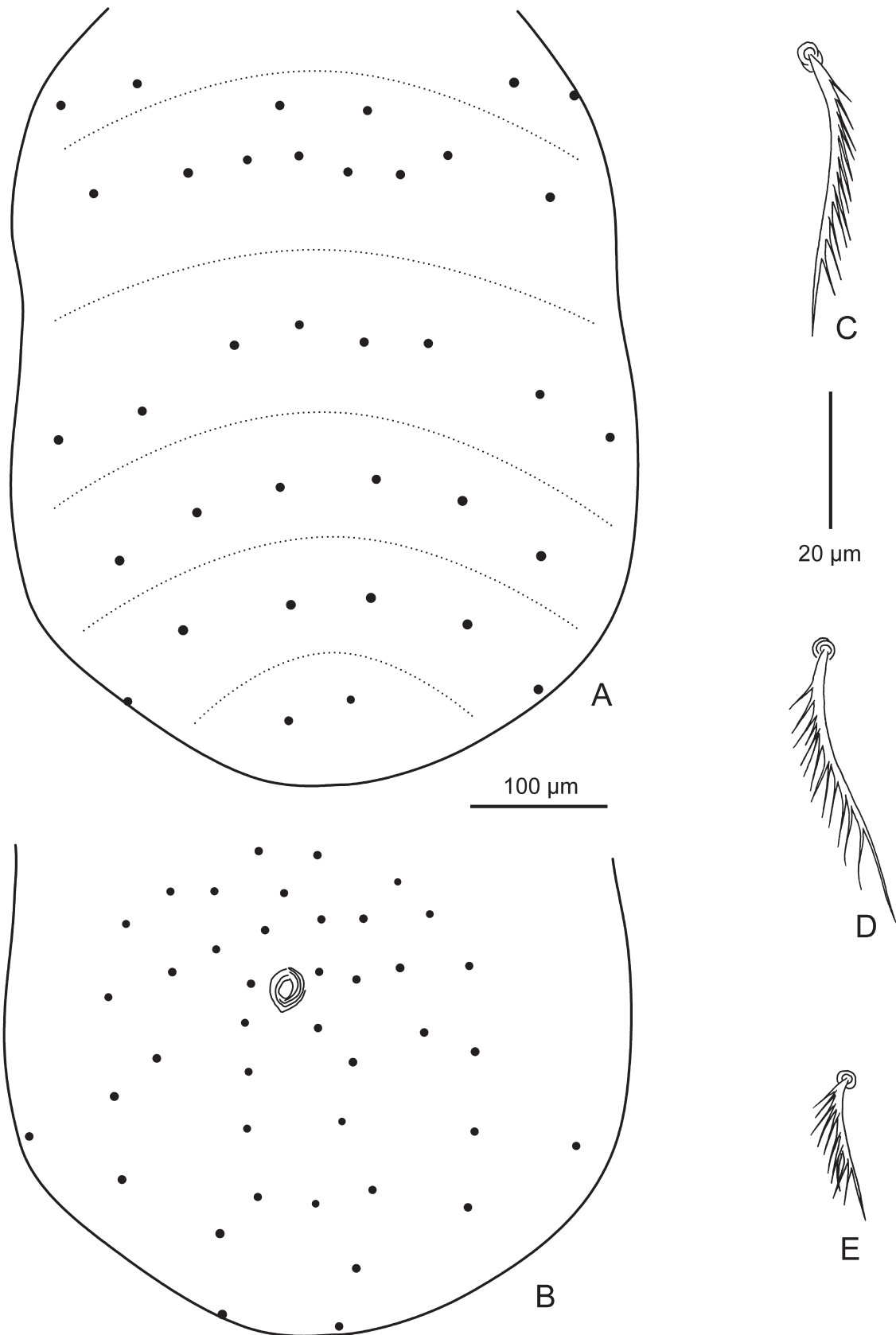


FIGURE 16. *Doloisia alata* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961. **A**, arrangement of dorsal idiosomal setae of paralectotype ZMMU Tdt-3176 (specimen 1); **B**, arrangement of ventral idiosomal setae of paralectotype ZMMU Tdt-3176 (specimen 1); **C**, dorsal idiosomal seta of 1st row of lectotype; **D**, anterior sternal seta of lectotype; **E**, preanal seta of lectotype. Scale bars: 100 μm (A, B), 20 μm (C–E).

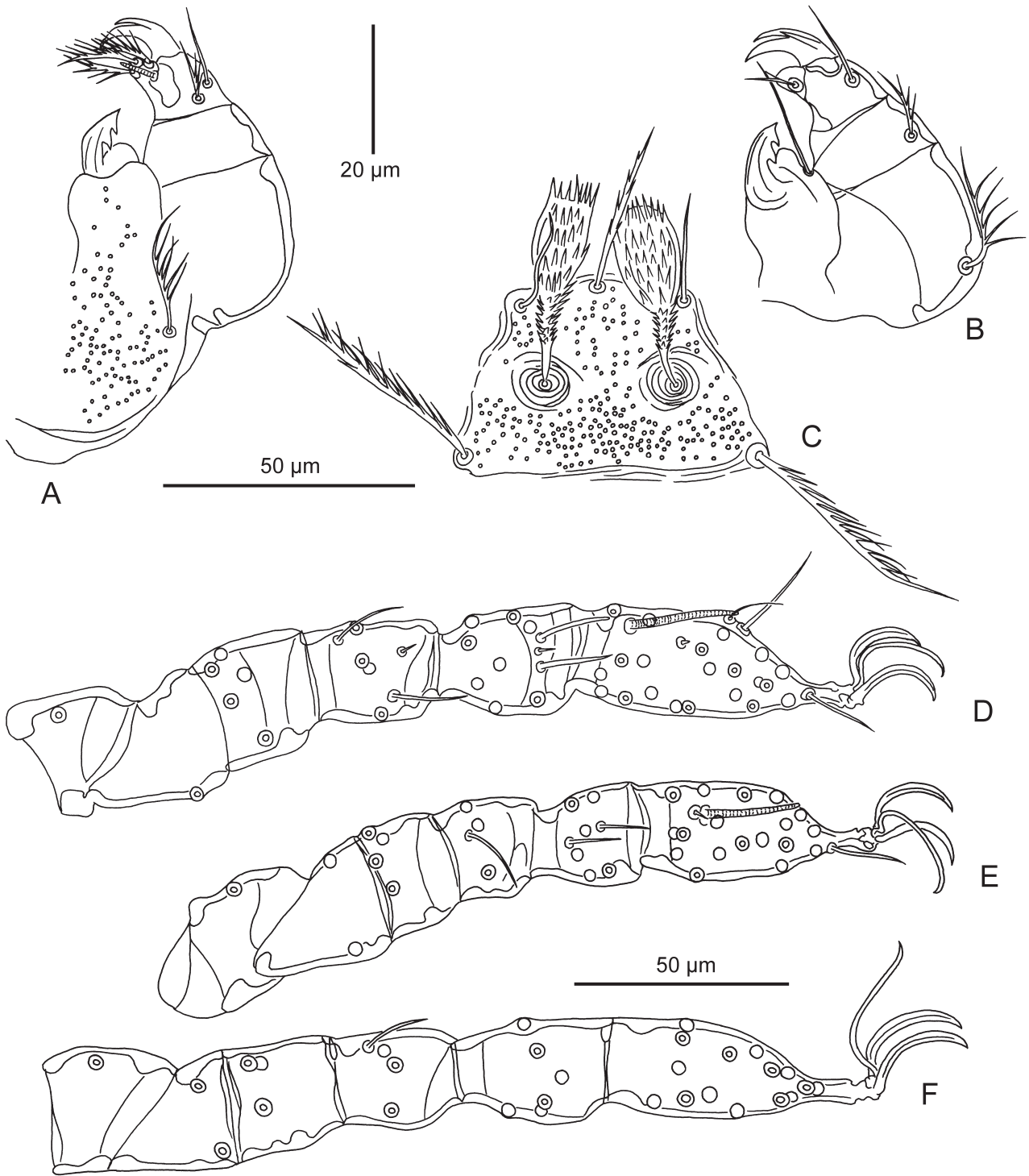


FIGURE 17. *Doloisia alata* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961, lectotype. **A**, ventral aspect of gnathosoma; **B**, dorsal aspect of gnathosoma; **C**, scutum; **D**, leg I (trochanter-tarsus); **E**, leg II (trochanter-tarsus); **F**, leg III (trochanter-tarsus). Scale bars: 20 µm (A, B), 50 µm (C), 50 µm (D–F).

SCUTUM (Fig. 15A, 17C). Trapezoidal, wider than long, with straight posterior margin, moderately covered with small puncta, with 1 AM covered with short barbs, 1 pair of nude ALs and 1 pair of PLs covered with long thin barbs; AM anterior to level of ALs; PLs much longer AM, ALs shorter AM; sensilla bulbous, covered with spikes; sensillum bases situated at equal distances from levels of ALs and PLs.

LEGS (Fig. 17D–F). All 7-segmented, with 1 pair of claws and claw-like empodium. Leg I: coxa with 3 branched setae (3B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 2 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 21B, tarsala, microtarsala distal to tarsala, subterminala, parasubterminala, pretarsala. Leg II:

coxa 5B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 18B, tarsala, microtarsala near and proximal to tarsala, pretarsala. Leg III: coxa 10B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B; tarsus 15B.

TABLE 6. Standard measurements (μm) and numbers of setae of *Doloesia alata* ($n = 5$).

	Range	Mean	Lectotype
AW	29–35	31	31
PW	51–58	56	58
SB	24–26	25	24
ASB	19–22	21	22
PSB	17–19	18	19
SD	38–42	40	42
P-PL	5–7	6	5
AP	29–32	30	32
AM	29–32	31	32
AL	16–19	17	19
PL	42–43	43	43
H	40–42	41	42
D _{min}	27–32	31	32
D _{max}	39–43	41	43
V _{min}	21–24	22	22
V _{max}	31–36	33	34
pa	241–267	252	255
pm	205–212	209	208
pp	239–262	245	240
lp	688–741	706	703
DS	36–40	38	40
V	38–41	40	40
NDV	75–80	78	80

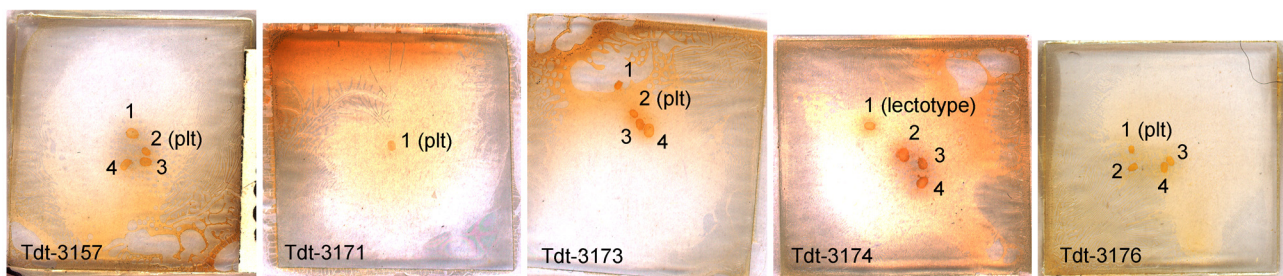


FIGURE 18. Type specimens of *Doloesia alata* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961 on slides.

Hosts. *Leopoldamys edwardsi* [= *Rattus grochovskii* D. Tien (*nomen nudum*)] (Schluger *et al.* 1961), *Rattus losea* (Wen 1984).

Distribution. China (Wen 1984; Li *et al.* 1997), Vietnam.

Type material examined (Fig. 18). Lectotype (here designated): larva ZMMU Tdt-3174 (specimen 1) ex *L. edwardsi* No 44 [labeled as “*Rattus* sp. n. (*Rattus grochovskii*)”], Vietnam, Quang Ninh Province, Ha Lam District, Ha Long (= Hon Gai), 6 February 1956, coll. I.M. Grochovskaja. Paralectotypes: four larvae, ZMMU Tdt-3157 (specimen 2), ZMMU Tdt-3171 (specimen 1), ZMMU Tdt-3173 (specimen 2), ZMMU Tdt-3176 (specimen 1), same collection data as for lectotype.

Remarks. According to the original description, *D. alata* is similar to *D. synoti* Oudemans, 1910 and differs

from it “by the absence of eyes, greater number of dorsal setae, and by other characters” (Schluger *et al.* 1961). In our opinion, *D. alata* is more similar to *D. hopuensis* Hsu and Chen, 1964 than to *D. synoti*, and differs from it by a slightly lower number of idiosomal setae (fD = 4H-10-8-6-6-2 vs. 4H-12-10-8-6-4-2, DS = 36–40 vs. 46–48) and by longer legs (Ip = 688–741 vs. 546) (Li *et al.* 1997).

***Doloisia (Doloisia) fulminans* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961**

(Figs. 15C, D, 19–22)

Doloisia fulminans Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961: 449, figs. 8–16.

Doloisia fulminans: Kudryashova 2004: 39.

Doloisia (Doloisia) fulminans: Vercammen-Grandjean 1968: 97; Chau *et al.* 2007: 147, fig. 71.

Diagnosis. SIF = 3B1N-N-3-2110.0000; fsp = 7.7.7; fCx = 3.5.10; fSt = 2.2; fPp = B/B/NNB; fSc: PL >> AM > AL; Ip = 688–763; fD = 4H-7-8-6-6-3; DS = 31–36; V = 31–38; NDV = 67–72. Eyes 1 + 1. Telofemur of leg I with long nude seta. Standard measurements of type series given in Table 7.

TABLE 7. Standard measurements (µm) and numbers of setae of *Doloisia fulminans* (n = 37).

	Range	Mean	Lectotype
AW	35–45	39	38
PW	59–71	66	68
SB	28–33	31	32
ASB	17–23	20	23
PSB	19–24	21	21
SD	39–44	42	44
P-PL	5–10	7	8
AP	30–36	33	36
AM	27–35	32	34
AL	18–28	23	23
PL	41–55	48	49
H	52–60	57	59
D _{min}	31–43	38	39
D _{max}	45–60	51	49
V _{min}	24–34	28	24
V _{max}	38–50	46	46
pa	239–270	256	252
pm	203–231	213	218
pp	242–273	256	263
Ip	688–763	726	733
DS	31–36	34	34
V	31–38	35	34
NDV	67–72	69	68

Description (larva) [based on lectotype and 36 paralectotypes]. IDIOSOMA (Figs. 15C, D, 19). Eyes 1 + 1; 31–36 dorsal idiosomal setae sparsely covered with short barbs, including two pairs of humeral setae; 4 sternal setae; 31–38 ventral setae; NDV = 67–72.

GNATHOSOMA (Fig. 20A, B). Cheliceral blade with two large hooks; gnathobase with sparse puncta and 1 pair of branched setae; galeala nude; palpal claw with 3 prongs, internal prong long and strongly curved; setae on palpal femur and genu branched; dorsal and lateral palpal tibial setae nude, ventral palpal tibial seta branched; palpal tarsus with 1 nude dorsal seta, 3 branched ventral setae, and tarsala.

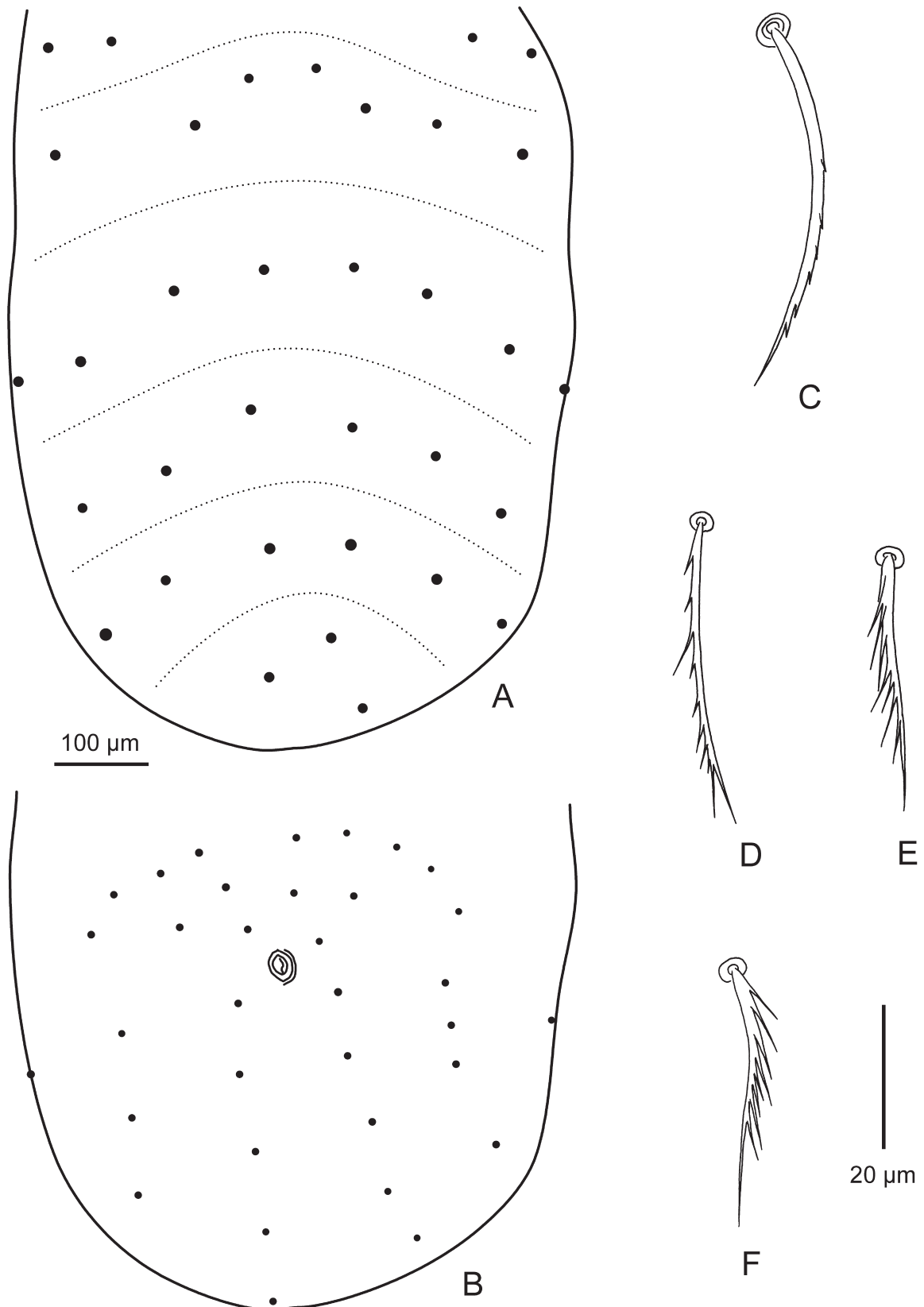


FIGURE 19. *Doloisia fulminans* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961. **A**, arrangement of dorsal idiosomal setae of lectotype; **B**, arrangement of ventral idiosomal setae of lectotype; **C**, dorsal idiosomal seta of paralectotype ZMMU Tdt-3184 (specimen 2); **D**, anterior sternal seta of paralectotype ZMMU Tdt-3184 (specimen 2); **E**, posterior sternal seta of paralectotype ZMMU Tdt-3184 (specimen 2); **F**, preanal seta of paralectotype ZMMU Tdt-3184 (specimen 2). Scale bars: 100 μm (A, B), 20 μm (C–F).

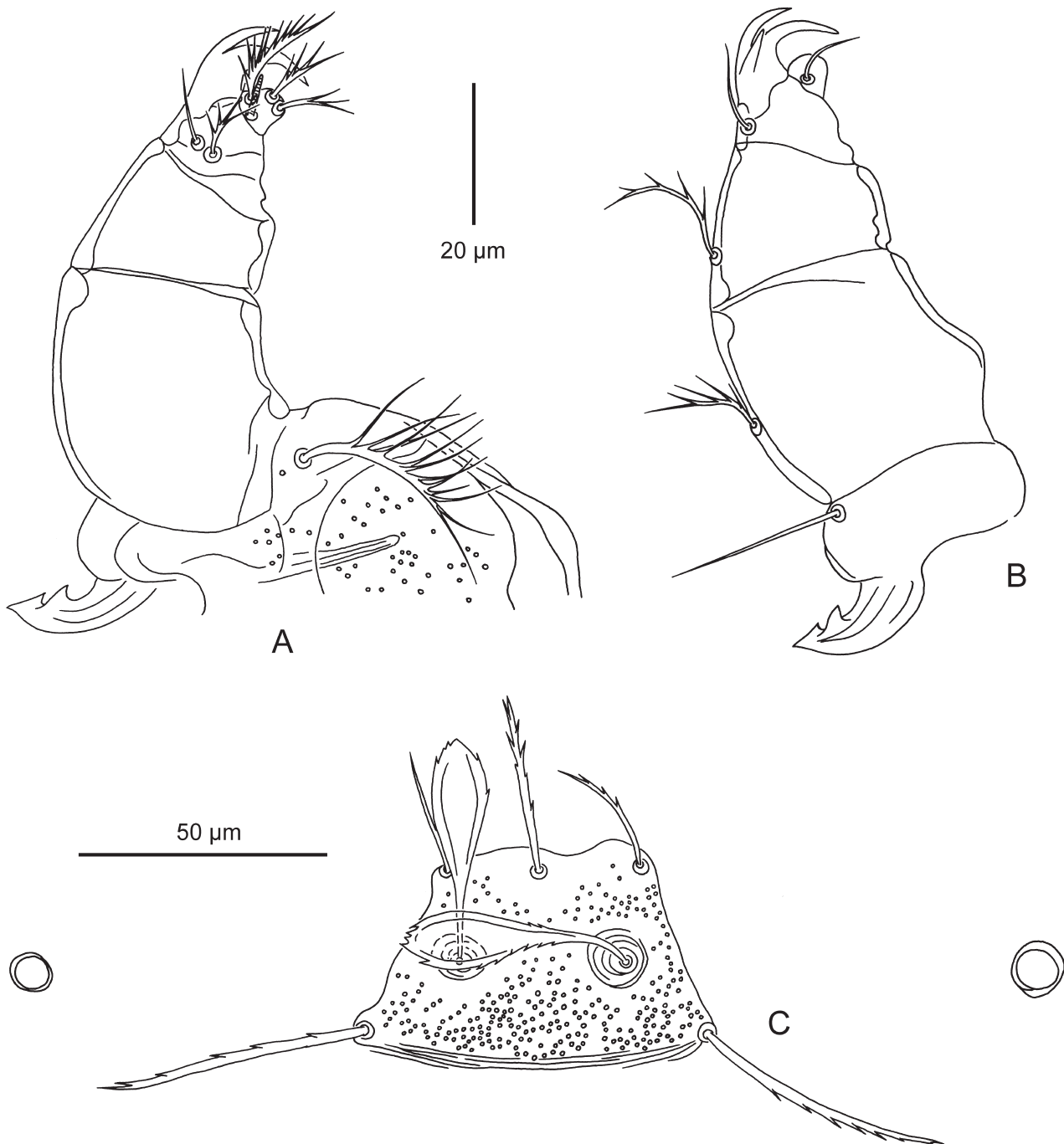


FIGURE 20. *Doloisia fulminans* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961, lectotype. **A**, ventral aspect of gnathosoma; **B**, dorsal aspect of gnathosoma; **C**, scutum and eyes. Scale bars: 20 µm (A, B), 50 µm (C).

SCUTUM (Figs. 15C, 20C). Trapezoidal, wider than long, with almost straight posterior margin, moderately covered with small puncta, with 1 AM, 1 pair of ALs, and 1 pair of PLs; all scutal setae sparsely covered with short barbs; AM at level of ALs; PLs much longer AM, ALs shorter AM; sensilla claviform, bearing few barbs; sensillum bases situated at equal distances from levels of ALs and PLs.

LEGS (Fig. 21). All 7-segmented, with 1 pair of claws and claw-like empodium. Leg I: coxa with 3 branched setae (3B); trochanter 1B; basifemur 1B; telofemur 4B and 1 long nude seta; genu 4B, 2 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 20B, tarsala, microtarsala distal to tarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 5B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 15B, tarsala, microtarsala near and proximal to tarsala, pretarsala. Leg III: coxa 10B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B; tarsus 16B.

Hosts. *Leopoldamys edwardsi* [= *Rattus grochovskii* D. Tien (*nomen nudum*)] (Schluger *et al.* 1961).

Distribution. Vietnam.

Type material examined (Fig. 22). Lectotype (here designated): larva ZMMU Tdt-3160 (specimen 3) ex *L. edwardsi* No 44 [labeled as “*Rattus* sp. n. (*Rattus grochovskii*)”], Vietnam, Quang Ninh Province, Ha Lam District, Ha Long (= Hon Gai), 6 February 1956, coll. I.M. Grochovskaja. Paralectotypes: 36 larvae, ZMMU Tdt-3160 (specimen 2), ZMMU Tdt-3145 (specimen 3), ZMMU Tdt-3154 (specimens 1, 2, 3, 4), ZMMU Tdt-3155 (specimen 1), ZMMU Tdt-3156 (specimen 1), ZMMU Tdt-3157 (specimens 1, 3), ZMMU Tdt-3158 (specimens 1, 2, 3), ZMMU Tdt-3159 (specimen 2), ZMMU Tdt-3161 (specimen 4), ZMMU Tdt-3162 (specimen 1), ZMMU Tdt-3164 (specimen 4), ZMMU Tdt-3166 (specimens 1, 2), ZMMU Tdt-3167 (specimens 2, 3, 4), ZMMU Tdt-3173 (specimens 3, 4), ZMMU Tdt-3174 (specimens 2, 3), ZMMU Tdt-3183 (specimen 4), ZMMU Tdt-3184 (specimens 1, 2), ZMMU Tdt-3186 (specimens 2, 3, 4), ZMMU Tdt-3187 (specimen 1), ZMMU Tdt-3188 (specimen 3), ZMMU Tdt-3190 (specimen 3), ZMMU Tdt-3191 (specimen 2), same collection data as for lectotype.

Remarks. According to the original description, *D. fulminans* is similar to *D. alata* and differs from it “by the presence of eyes and nude seta on telofemur of leg I and by longer dorsal setae, shape of trichobothria, greater size of body and scutum” (Schluger *et al.* 1961). We confirm the similarity of these species and their difference by the presence of eyes (1 + 1 in *D. fulminans* and 0 in *D. alata*) and by the presence of long nude seta on telofemur of leg I in *D. fulminans* (absent in *D. alata*). Sensilla (trichobothria) bear a few barbs in *D. fulminans* and are densely covered with spikes in *D. alata*. Morphometric differences between these two species are as follows. Size of scutum: AW = 35–45, PW = 59–71, SB = 28–33, and PSB = 19–24 in *D. fulminans* vs. 29–35, 51–58, 24–26, and 17–19 in *D. alata*, respectively; lengths of setae: H = 52–60, D_{\max} = 45–60, and V_{\max} = 38–50 in *D. fulminans* vs. 40–42, 39–43, and 31–36 in *D. alata*, respectively. *Doloesia fulminans* also has a lower number of idiosomal setae (fD = 4H-6-8-6-6-3 and NDV = 67–72 vs. 4H-10-8-6-6-2 and 75–80 in *D. alata*).

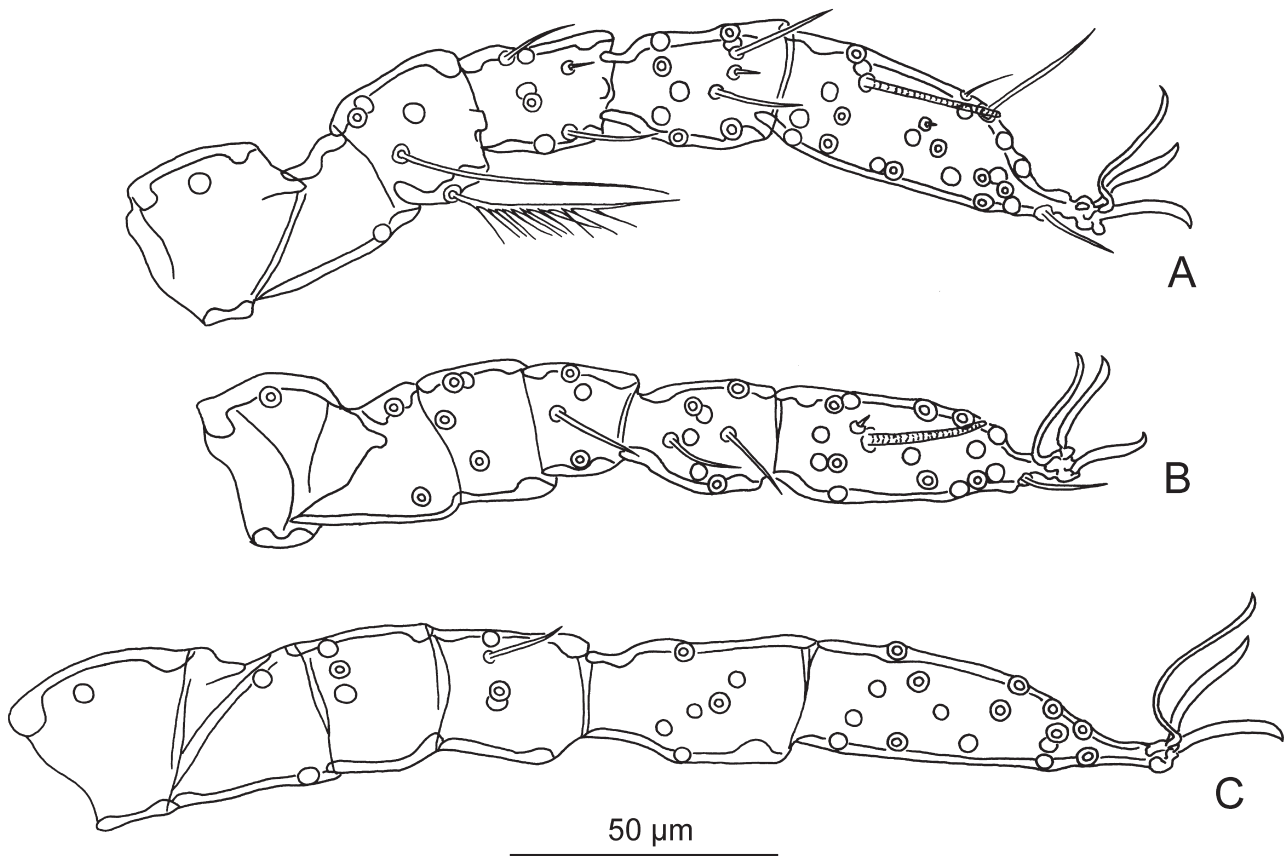


FIGURE 21. *Doloesia fulminans* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961, lectotype. A, leg I (trochanter–tarsus); B, leg II (trochanter–tarsus); C, leg III (trochanter–tarsus).

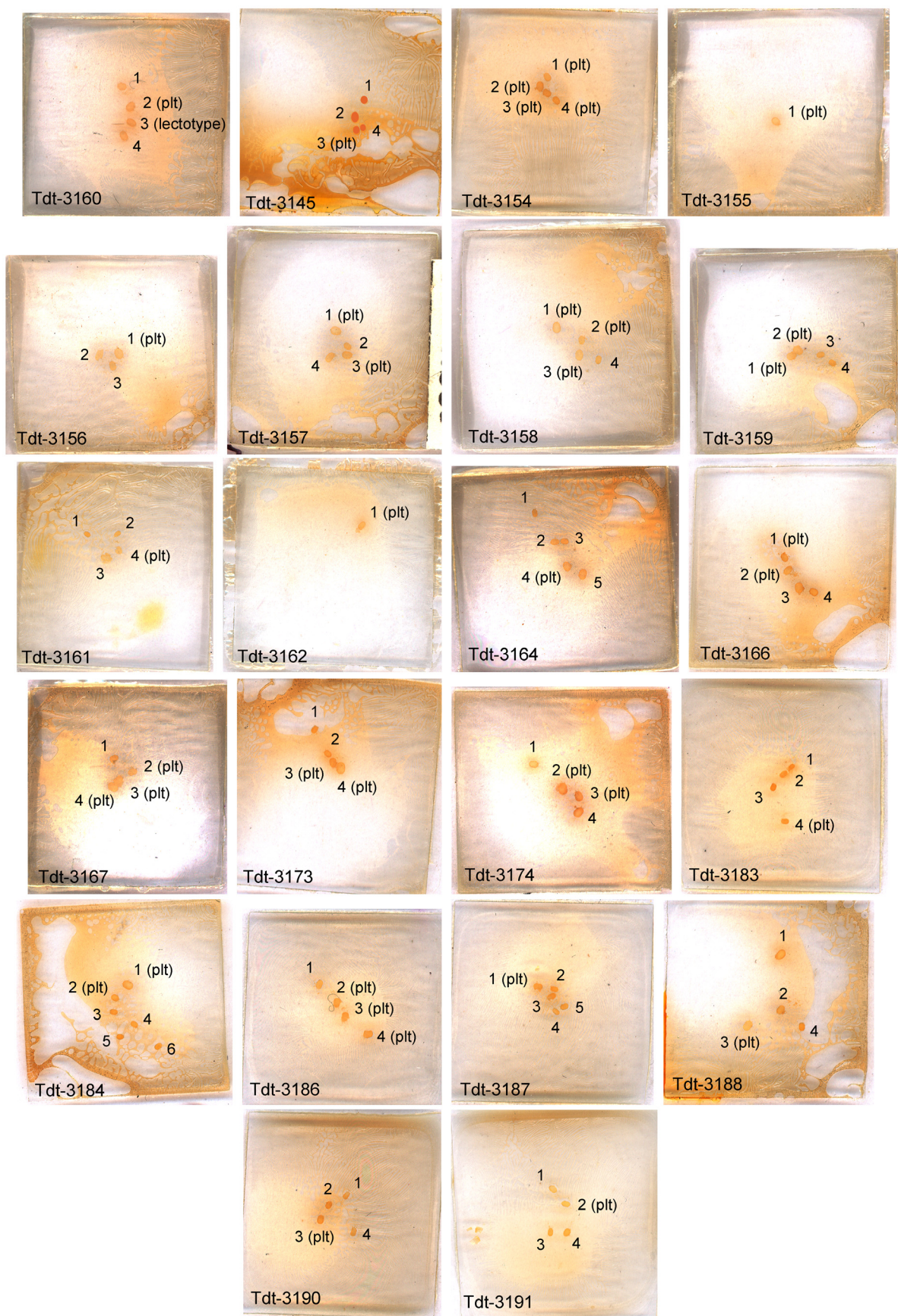


FIGURE 22. Type specimens of *Dolosisia fulminans* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961 on slides.

***Doloesia (Traubacarus) gigantea* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961)**

(Figs. 23A, B, 24–27)

Traubacarus giganteus Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961: 452, figs. 25–32.

Traubacarus giganteus: Kudryashova 2004: 39.

Doloesia (Doloesia) gigantea: Vercammen-Grandjean 1968: 97.

Doloesia gigantea: Wen 1984: 302.

Doloesia (Doloesia) gigantens (sic): Chau *et al.* 2007: 146, fig. 70.

Doloesia outoensis Chen and Hsu, 1965: 286, figs. 8–10.

Diagnosis. SIF = 4B-N-3-2110.0000; fsp = 7.7.7; fCx = 1.3.7(6); fSt = 2.2; fPp = B/B/NNN(b); fSc: PL > AM > AL; Ip = 938–972; fD = 4H-[6-2]-8-6-4-3; DS = 32–33; V = 37–38; NDV = 70. Eyes absent. Standard measurements of type series given in Table 8.

TABLE 8. Standard measurements (μm) and numbers of setae of *Doloesia gigantea* (n = 3).

	Range	Mean	Lectotype
AW	30–35	33	34
SB	29–34	31	31
ASB	25–29	27	26
PSB	17–19	18	-
SD	44–46	45	-
AM	39–39	39	39
AL	18–24	22	18
PL	44–47	46	44
H	54–54	54	-
D _{min}	45–45	45	-
D _{max}	55–55	55	-
V _{min}	27–27	27	-
V _{max}	43–43	43	-
pa	329–342	336	337
pm	268–306	284	306
pp	329–356	339	329
Ip	938–972	959	972
DS	32–33	33	-
V	37–38	38	-
NDV	70–70	70	-

Description (larva) [based on lectotype and 2 paralectotypes]. IDIOSOMA (Figs. 23A, B, 24). Eyes absent; 32–33 dorsal idiosomal setae covered with few short barbs, including two pairs of humeral setae; 4 sternal setae; 37–38 ventral setae; NDV = 70.

GNATHOSOMA (Fig. 25). Cheliceral blade with two large hooks; gnathobase with sparse puncta and 1 pair of branched setae; palpal femur, genu, and tibia with sparse puncta; galeala nude; palpal claw with 3 prongs, internal prong long and strongly curved; setae on palpal femur and genu branched; dorsal and lateral palpal tibial setae nude, ventral palpal tibial seta nude or branched; palpal tarsus with 4 branched setae and tarsala.

SCUTUM (Fig. 23A). Bell-shaped, longer than wide, with slightly concave posterior margin, densely covered with small puncta, with 1 AM covered with few inconspicuous cilia and 1 pair of nude ALs; 1 pair of PLs covered with few inconspicuous cilia and situated off scutum; AM anterior to level of ALs; PLs much longer AM, ALs shorter AM; sensilla bulbous, with few short barbs on its stalk and 6 long spikes terminally; sensillum bases situated much closer to ALs than to PLs.

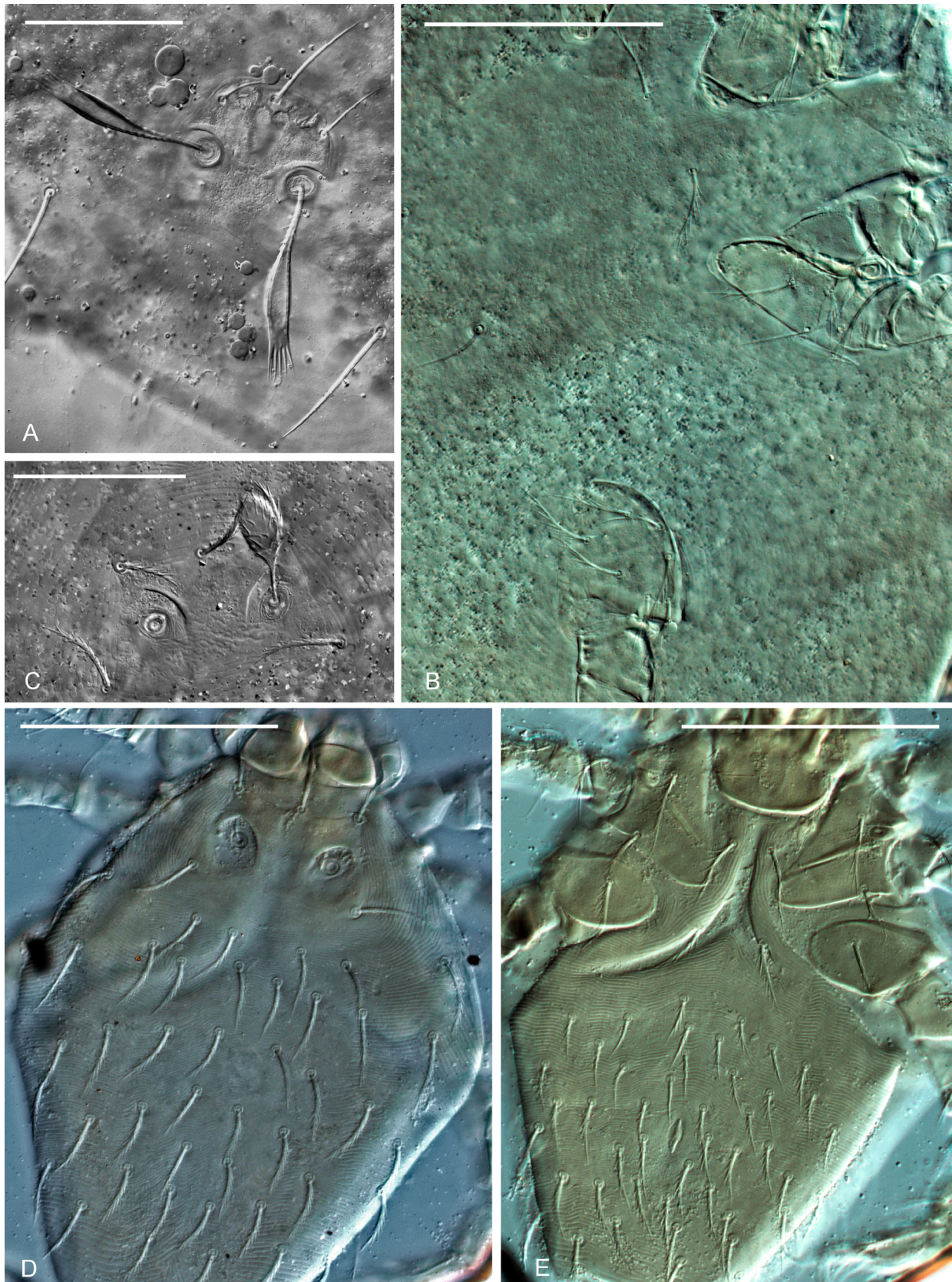


FIGURE 23. *Doloiisia gigantea* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961). **A**, scutum of lectotype; **B**, anterior part of idiosoma, ventral aspect, of paralectotype ZMMU Tdt-3176 (specimen 4). *Schoutedenichia alongensis* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960 [syn. of *S. centralkwangtungana* (Mo, Chen, Ho and Li, 1959)]. **C**, scutum of paralectotype ZMMU Tdt-3279 (specimen 4); **D**, dorsal aspect of idiosoma of lectotype; **E**, ventral aspect of idiosoma of lectotype. Scale bars: 50 μm (A, C), 100 μm (B, D, E).

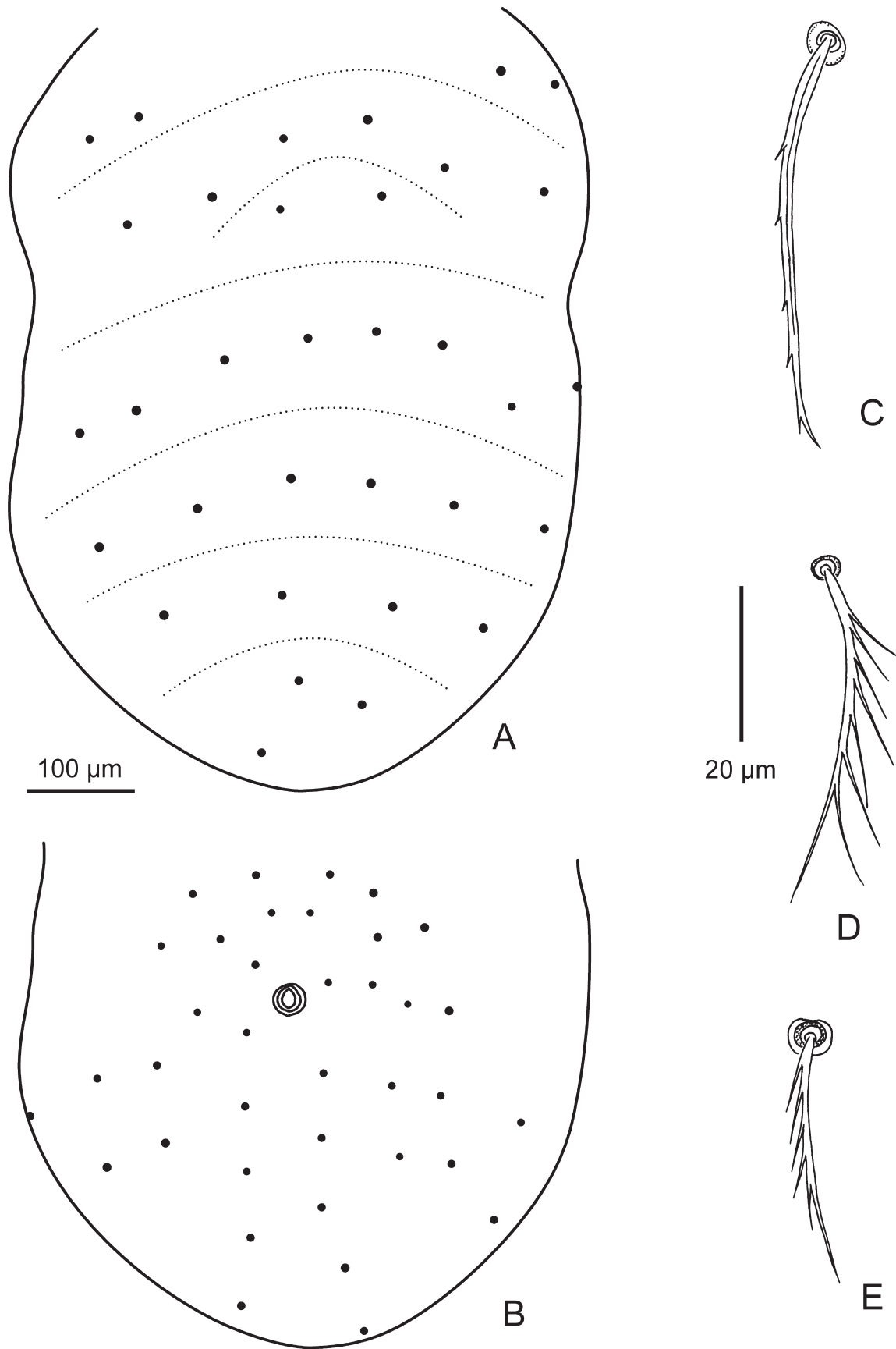


FIGURE 24. *Doloisia gigantea* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961), paralectotype ZMMU Tdt-3176 (specimen 4). **A**, arrangement of dorsal idiosomal setae; **B**, arrangement of ventral idiosomal setae; **C**, dorsal idiosomal seta of 1st row; **D**, anterior sternal seta. **E**, preanal seta. Scale bars: 100 μm (A, B), 20 μm (C–E).

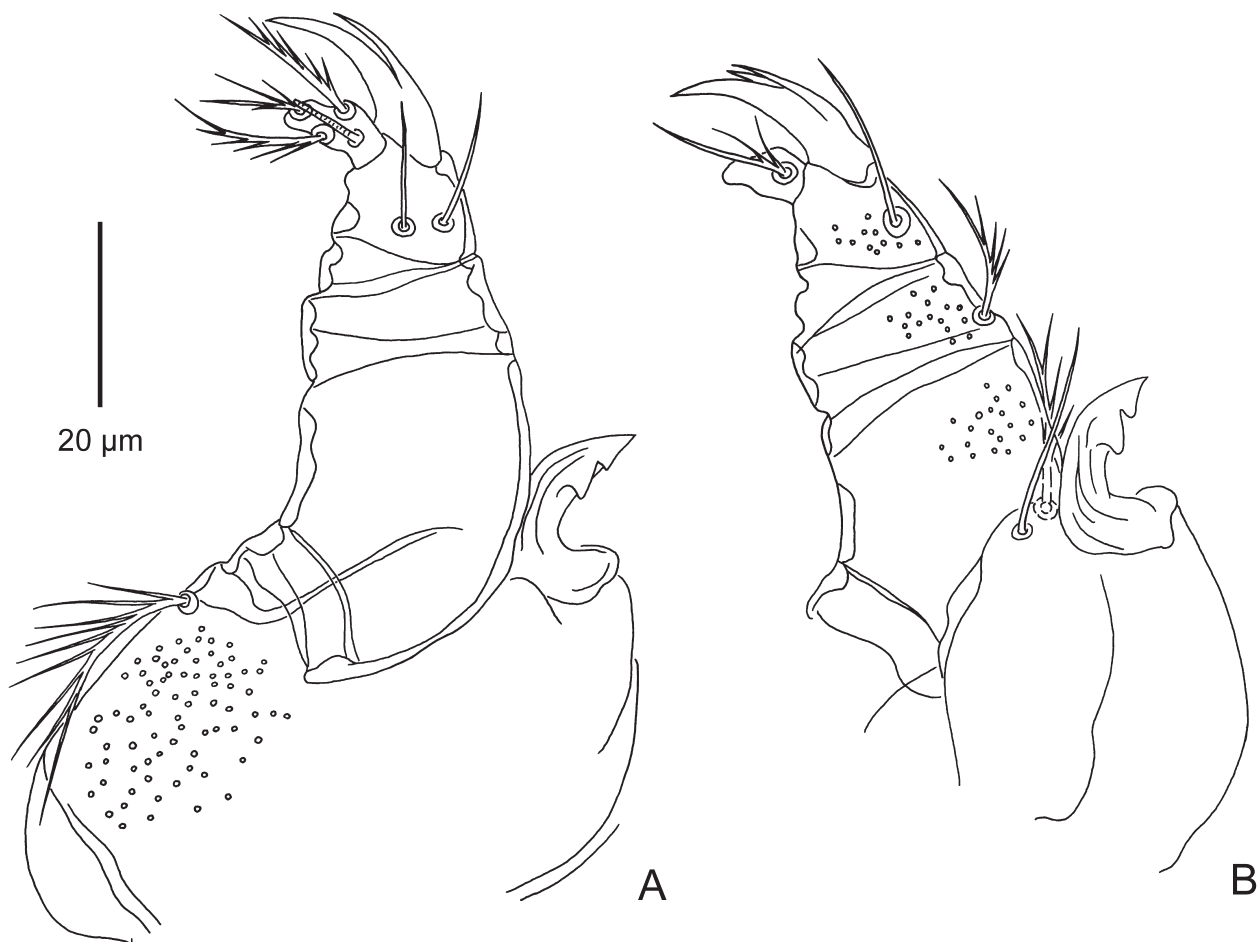


FIGURE 25. *Doloisia gigantea* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961), lectotype. **A**, ventral aspect of gnathosoma; **B**, dorsal aspect of gnathosoma.

LEGS (Fig. 26). All 7-segmented, with 1 pair of claws and claw-like empodium. Leg I: coxa with 1 branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 2 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala, microtarsala distal to tarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 3B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 18B, tarsala, microtarsala near and proximal to tarsala, pretarsala. Leg III: coxa 7B or 6B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B; tarsus 18B.

Hosts. *Leopoldamys edwardsi* [= *Rattus grochovskii* D. Tien (*nomen nudum*)] (Schluger *et al.* 1961), *Niviventer confucianus* (Milne-Edwards, 1871) (Rodentia: Muridae), *Berylmys bowersi* (= *Rattus bowersi latouchei*), *Rattus rattus* (Wen 1984).

Distribution. China (Wen 1984), Vietnam.

Type material examined (Fig. 27). Lectotype (here designated): larva ZMMU Tdt-3179 (specimen 1) ex *L. edwardsi* No 44 [labeled as “*Rattus* sp. n. (*Rattus grochovskii*)”], Vietnam, Quang Ninh Province, Ha Lam District, Ha Long (= Hon Gai), 6 February 1956, coll. I.M. Grochovskaja. Paralectotypes: two larvae, ZMMU Tdt-3176 (specimen 4), ZMMU Tdt-3178 (specimen 1), same collection data as for lectotype.

Remarks. *Doloisia gigantea* is similar to *D. varmai* (Audy and Nadchatram, 1957) (Schluger *et al.* 1961), from which it differs by the shape of sensillum (with an expanded top bearing 6 long spikes vs. rounded top covered with multiple, but shorter setules), by the presence of 3 setae on coxa II, vs. 4, branched palpal genual seta, vs. nude, wider scutum (AW = 30–35 vs. 25–26 and SB = 29–34 vs. 23–25), and longer AM (39 vs. 26–29). This species is also similar to *D. vercammeni* (Audy and Nadchatram, 1957) by the very large size and by the shape of sensilla, but differs in the presence of 3 setae on coxa II, vs. 4, branched palpal genual seta, vs. nude, shorter scutal and idiosomal setae (AL = 18–24, PL = 44–47, and H = 54, vs. 31–34, 66–72, and 83, respectively), and lower number of idiosomal setae (NDV = 69–70 vs. 82–107).

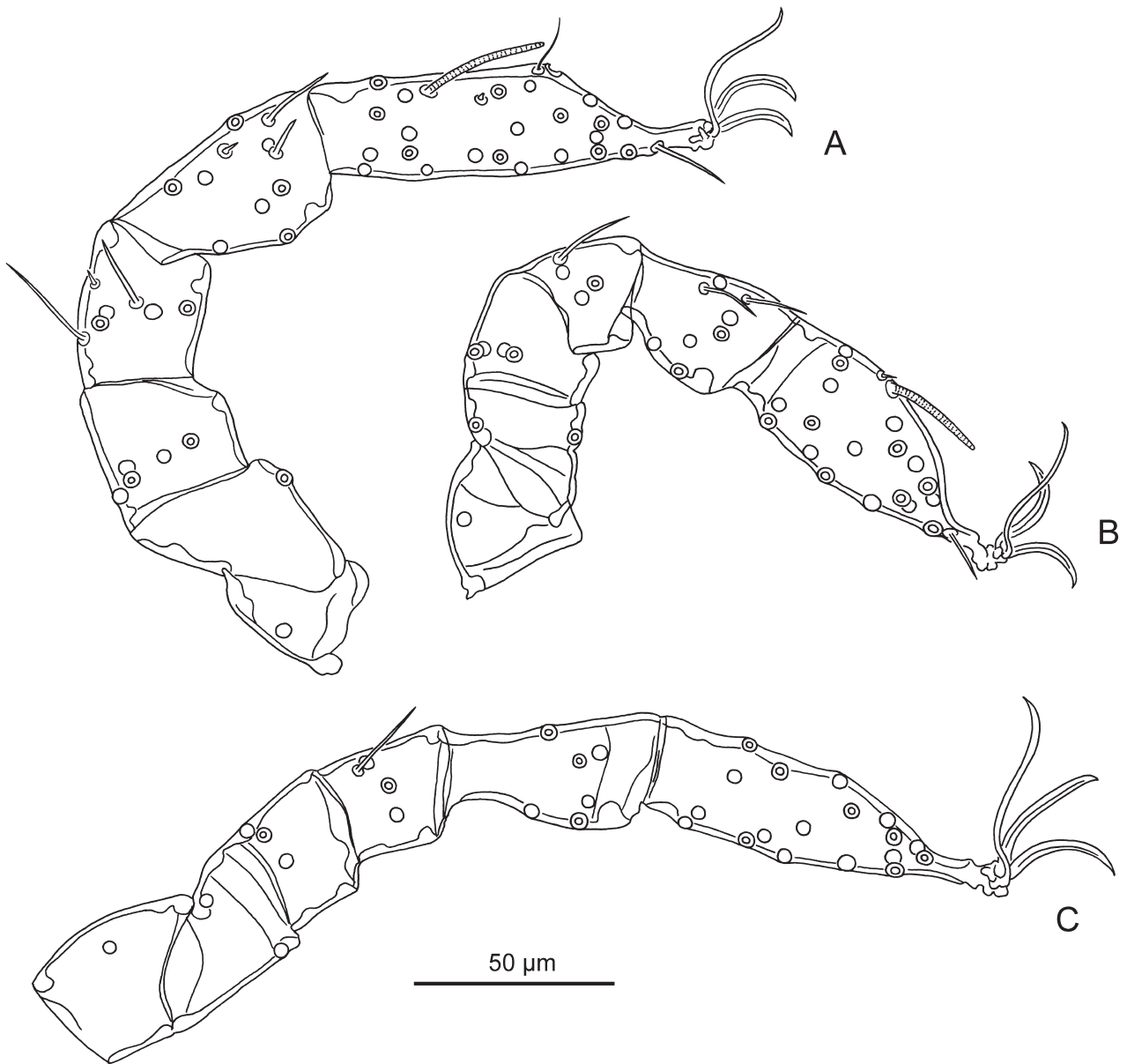


FIGURE 26. *Doloisia gigantea* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961), lectotype. A, leg I (trochanter-tarsus) (subterminala missing); B, leg II (trochanter-tarsus); C, leg III (trochanter-tarsus).

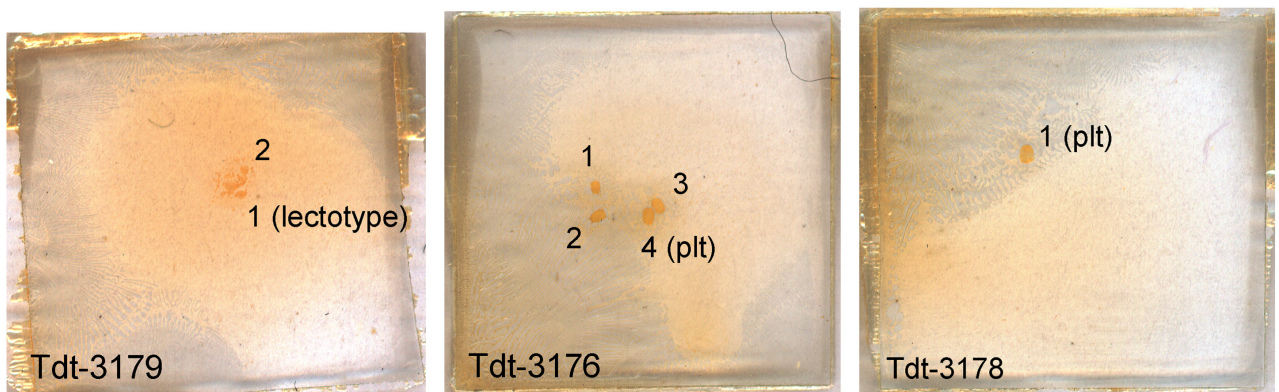


FIGURE 27. Type specimens of *Doloisia gigantea* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1961) on slides.

Doloisia outoensis was synonymized with *D. gigantea* by Wen (1984). According the original description of *D. outoensis*, it has 3–4 setae on coxa II and 6–8 setae on coxa III (Chen & Hsu 1965); thus, variation of these characters in *D. gigantea* is obviously wider than in its type series.

Genus *Schoutedenichia* Jadin and Vercammen-Grandjean, 1954

Schoutedenichia centralkwangtung (Mo, Chen, Ho and Li, 1959)

(Figs. 23C–E, 28–30)

Eushoengastia centralkwangtung Mo, Chen, Ho and Li, 1959: 255, figs. 17–24.

Schoutedenichia centralkwangtung: Domrow 1962: 359, figs. 1–10; Lakshana 1973: 20; Wen 1984: 304; Li *et al.* 1997: 432, fig. 2-36-2; Chau *et al.* 2007: 149, fig. 72; Chaisiri *et al.* 2016: 332.

Schoutedenichia (Schoutedenichia) centralkwangtung: Vercammen-Grandjean 1965b: 102; 1968: 96.

Schoutedenichia alongensis Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960a: 191, fig. 12; Kudryashova 2004: 37.

Diagnosis. SIF = 4BS-N-3-2110.0000; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fPp = N/N/NNN; fSc: PL > AM > AL; Ip = 548–672; fD = 4H-[7-3]-10-8-8-7-6-2; DS = 48–55; V = 45–48; NDV = 96–103. Eyes absent. Standard measurements of the type series of *Schoutedenichia alongensis* given in Table 9.

TABLE 9. Standard measurements (μm) and numbers of setae in the type series of *Schoutedenichia alongensis* and their comparison to those in *S. centralkwangtung*.

	<i>S. alongensis</i> , type series, n = 3			by Mo <i>et al.</i> (1959)		<i>S. centralkwangtung</i> by Domrow (1962)		Specimen from Thailand
	Range	Mean	Lectotype	Range	Mean	Spec. 1	Spec. 2	ZIN 9844
AW	47–49	48	47	36–43	40	49	47	52
PW	65–75	70	65	53–60	56	65	64	77
SB	37–40	38	38	30–34	32	38	36	43
ASB	20–23	21	20	15–19	18	22	19	23
PSB	17–20	19	17	18–20	19	19	17	18
SD	37–43	41	37	-	-	41	36	41
P-PL	3–5	4	3	-	-	-	-	-
AP	35–39	37	35	30–34	31	38	32	38
AM	26–29	28	26	19–23	22	24	23	25
AL	18–21	19	20	15–19	18	19	18	19
PL	27–32	29	32	23–30	26	27	25	29
H	29–36	32	-	-	-	-	-	34
D _{min}	20–23	22	23	-	15	-	-	20
D _{max}	27–34	32	34	-	30	-	-	31
V _{min}	15–18	16	18	-	11	-	-	18
V _{max}	21–27	25	27	-	23	-	-	25
pa	199–239	219	219	-	-	-	-	212
pm	159–196	178	178	-	-	-	-	178
pp	190–238	217	223	-	-	-	-	196
Ip	548–672	614	620	-	-	-	-	587
DS	48–55	53	48	50–60	-	-	-	49
V	46–48	47	48	52–58	-	-	-	40
NDV	96–103	100	96	-	-	-	-	89

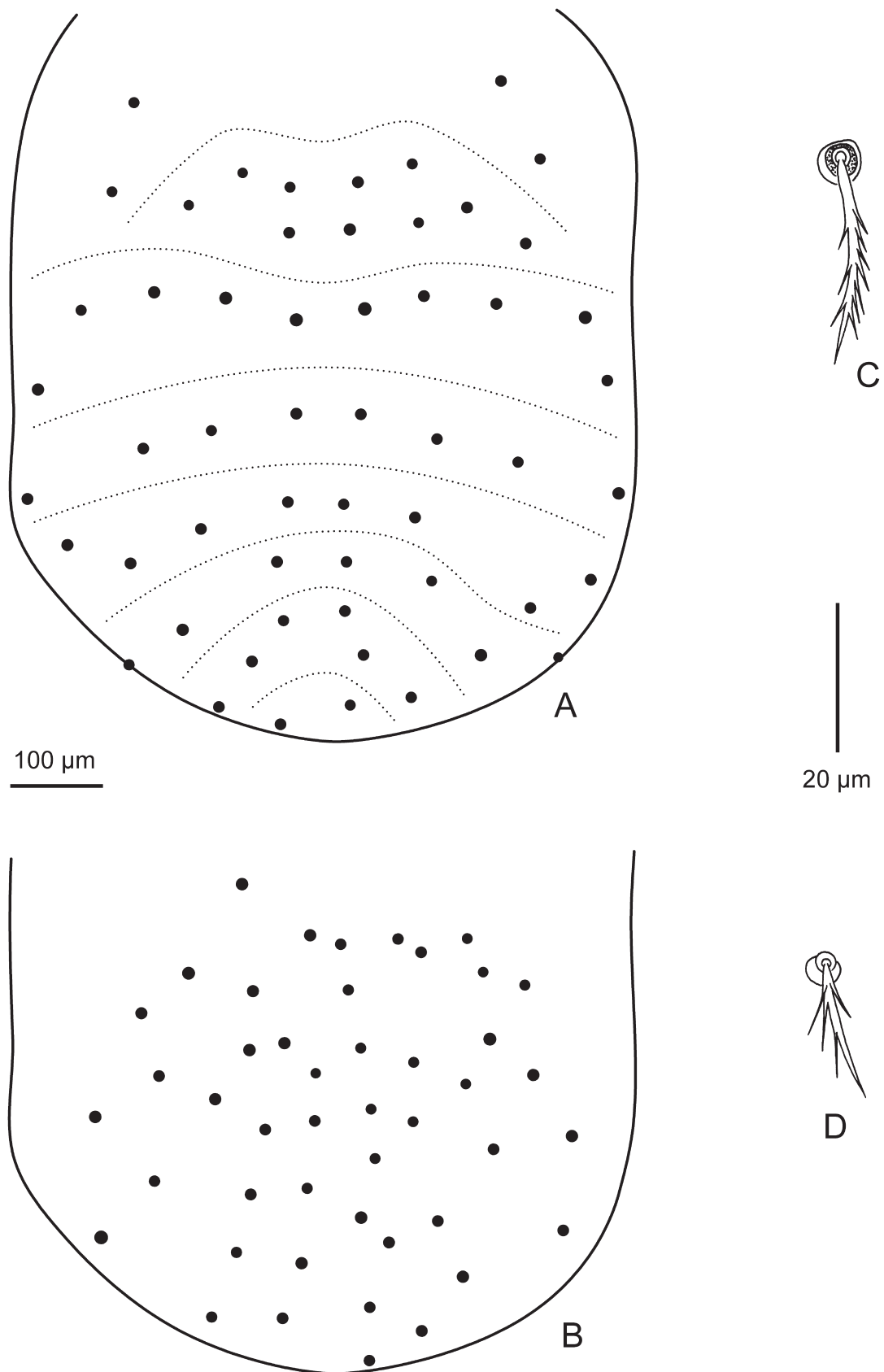


FIGURE 28. *Schoutedenichia alongensis* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960 [syn. of *S. centralkwangtung* (Mo, Chen, Ho and Li, 1959)]. **A**, arrangement of dorsal idiosomal setae of paralectotype ZMMU Tdt-3279 (specimen 4); **B**, arrangement of ventral idiosomal setae of paralectotype ZMMU Tdt-3279 (specimen 4); **C**, dorsal idiosomal seta of 1st row of lectotype; **D**, preanal seta of lectotype. Scale bars: 100 μm (A, B), 20 μm (C, D).

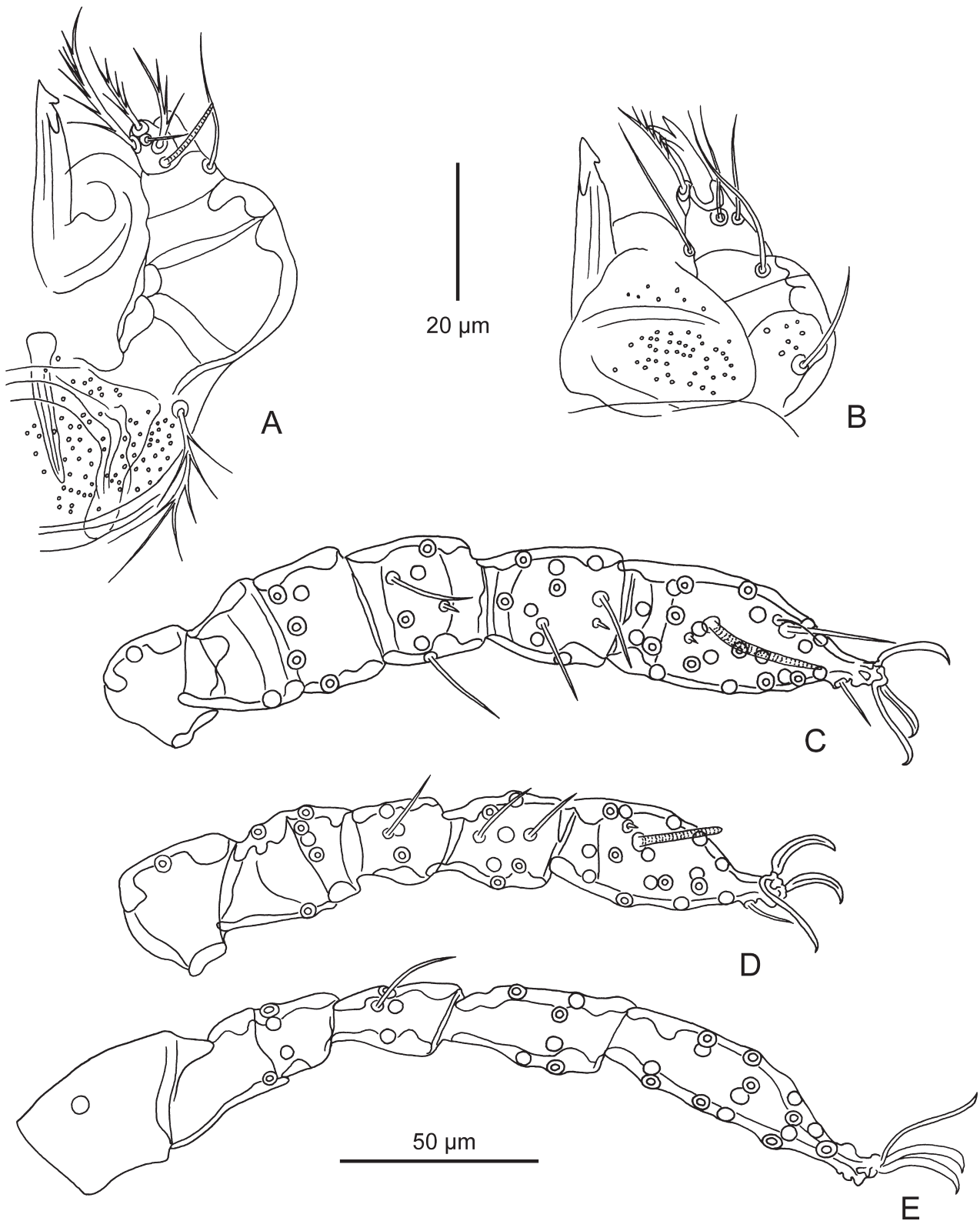


FIGURE 29. *Schoutedenichia alongensis* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960 [syn. of *S. centralkwangtungensis* (Mo, Chen, Ho and Li, 1959)], lectotype. **A**, ventral aspect of gnathosoma; **B**, dorsal aspect of gnathosoma; **C**, leg I (trochanter-tarsus); **D**, leg II (trochanter-tarsus); **E**, leg III (trochanter-tarsus). Scale bars: 20 µm (A, B), 50 µm (C-E).

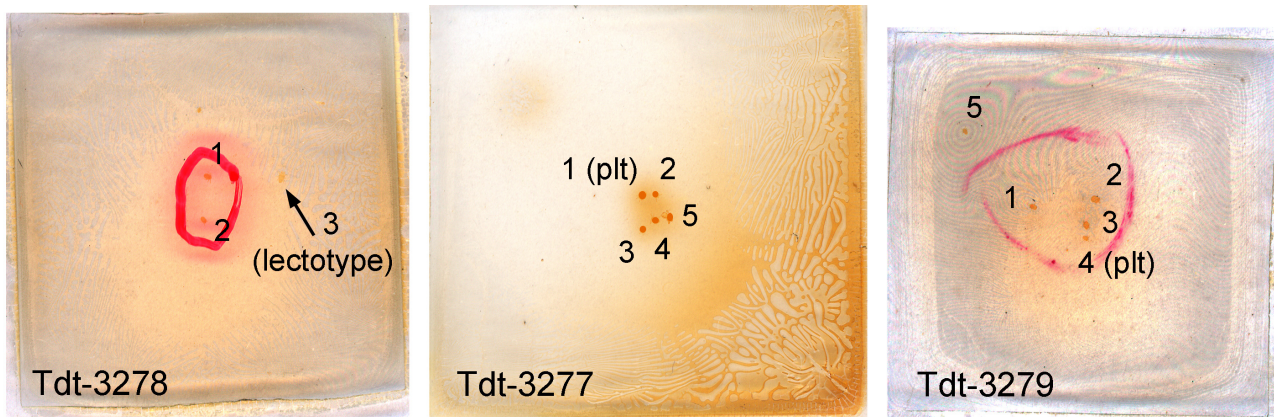


FIGURE 30. Type specimens of *Schoutedenichia alongensis* Schluger, Grochovskaja, Ngu, Hoe and Tung, 1960 [syn. of *S. centralkwangtungana* (Mo, Chen, Ho and Li, 1959)] on slides.

Description (larva) [based on lectotype and 2 paralectotypes of *S. alongensis*]. IDIOSOMA (Figs. 23C–E, 28). Eyes absent; 48–55 barbed dorsal idiosomal setae, including two pairs of humeral setae; 4 sternal setae; 45–48 ventral setae; NDV = 96–103.

GNATHOSOMA (Fig. 29A, B). Cheliceral blade with tricuspid cap; gnathobase with sparse puncta and 1 pair of branched setae; cheliceral base and palpal femur with sparse puncta; galeala nude; palpal claw with 3 prongs; setae on palpal femur, genu, and tibia nude; palpal tarsus with 4 branched setae, nude subterminala, and tarsala.

SCUTUM (Fig. 23C, D). Trapezoidal, wider than long, with concave posterior margin, moderately covered with small puncta, with 1 AM, 1 pair of ALs, and 1 pair of PLs; all scutal setae uniformly barbed; AM at level of ALs; PLs much longer AM, ALs shorter AM; sensilla claviform, covered with setules; sensillum bases situated at equal distances from levels of ALs and PLs.

LEGS (Fig. 29C–E). All 7-segmented, with 1 pair of claws and claw-like empodium. Leg I: coxa with 1 branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 2 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala, microtarsala slightly proximal to tarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala, microtarsala near and proximal to tarsala, pretarsala. Leg III: coxa 1B; trochanter 1B; basifemur 1B; telofemur 3B; genu 3B, genuala; tibia 6B; tarsus 15B.

Hosts. *Suncus murinus* (Mo *et al.* 1959), *Leopoldamys edwardsi* [= *Rattus edwardsi* (Domrow 1962); = *Rattus grochovskii* D. Tien (*nomen nudum*) (Schluger *et al.* 1960a)], *Herpestes javanicus* (É. Geoffroy, 1818) (Carnivora: Herpestidae), *Tamiops mccllellandii* (Horsfield, 1840) (Rodentia: Sciuridae), *Bandicota indica*, *Crocidura horsfieldi*, *Menetes berdmorei*, *Niviventer niviventer*, *Rattus rattus*, *Tupaia glis* (Lakshana 1973), *Niviventer confucianus*, *Rattus tanezumi* (= *Rattus flavipectus*) (Wen 1984), *Rattus andamanensis* (= *R. koratensis*) (Chau *et al.* 2007).

Distribution. China (Mo *et al.* 1959; Wen 1984), Thailand (Lakshana 1973; Chaisiri *et al.* 2016), Vietnam (Domrow 1962).

Type material examined (Fig. 30). Lectotype of *Schoutedenichia alongensis* (here designated): larva ZMMU Tdt-3278 (specimen 3) ex *L. edwardsi* No 27 [labeled as “*Rattus* sp. n. (*Rattus grochovskii*)”], Vietnam, Quang Ninh Province, Ha Lam District, Ha Long (= Hon Gai), 1 February 1956, coll. I.M. Grochovskaja. Paralectotypes of *Schoutedenichia alongensis*: one larva ZMMU Tdt-3277 (specimen 1), same collection data as for lectotype; one larva ZMMU Tdt-3279 (specimen 4) ex *Rattus rattus* No 421, Vietnam, Quang Tri Province, Vinh Linh, 18 August 1956, coll. I.M. Grochovskaja.

Additional material examined. One larva ZIN 9844 ex *Bandicota indica* No. R7112, Thailand, Tak Province, Mae Sot District, rice field (harvested), Lat. 16.48168, Long. 98.44047, 30 November 2013, coll. K. Chaisiri.

Remarks. *Schoutedenichia alongensis* was synonymized with *S. centralkwangtungana* by Domrow (1962) who examined two of its specimens collected from *Suncus murinus* in Saigon (currently Ho Chi Minh City) in South Vietnam. He provided measurements of scutum and scutal setae of these specimens. Comparison of our measurements of the *S. alongensis* type series, measurements of one additional specimen of *S. centralkwangtungana* from Thailand, and the reference data provided by Mo *et al.* (1959) and Domrow (1962) shows that these data

constitute a continuous range of variability for the most part of characters (Table 9). One exception is the width of scutum (AW, PW, and SB), which is clearly smaller in the type series of *S. centralkwangtung* than in other materials. That could be a result of geographic variation or a deformation of the scutum during preparation in the latter set of materials.

Tribe Trombiculini Vercammen-Grandjean, 1960

Genus *Microtrombicula* Ewing, 1950

Microtrombicula fulgida (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963)

(Figs. 31A, B, 32–34)

Trombicula fulgida Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963: 696, figs. 23–29.

Microtrombicula fulgida: Kudryashova 2004: 19.

Microtrombicula (Microtrombicula) fulgida: Chau *et al.* 2007: 95, fig. 44.

Diagnosis. SIF = 6B-N-2-3111.1000; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fPp = B/B/BbB; fSc: PL > AM > AL; Ip = 547–565; fD = 2H-7-10-5-5-4-4; DS = 31–37; V = 31–42; NDV = 67–74. Sensilla, sternal and coxal setae branched. Standard measurements of type series given in Table 10.

TABLE 10. Standard measurements (μm) and numbers of setae of *Microtrombicula fulgida* (n = 4).

	Range	Mean	Lectotype
AW	42–44	43	42
PW	52–56	54	52
SB	15–18	16	16
ASB	20–21	20	20
PSB	19–21	21	19
SD	39–43	41	39
P-PL	11–14	12	11
AP	19–22	21	22
AM	24–25	25	25
AL	20–22	21	22
PL	29–33	31	32
H	33–39	36	39
D _{min}	18–24	21	24
D _{max}	25–26	25	26
V _{min}	9–16	14	14
V _{max}	22–24	23	24
pa	192–198	195	198
pm	161–176	167	162
pp	189–194	191	189
Ip	547–565	553	549
DS	31–37	33	31
V	31–42	36	36
NDV	67–74	70	67

Description (larva) [based on lectotype and 3 paralectotypes]. IDIOSOMA (Figs. 31A, B, 32). Eyes 2 + 2; 31–37 barbed dorsal idiosomal setae, including one pair of humeral setae; 4 sternal setae, each with 2 barbs; 31–42 ventral setae; NDV = 67–74.

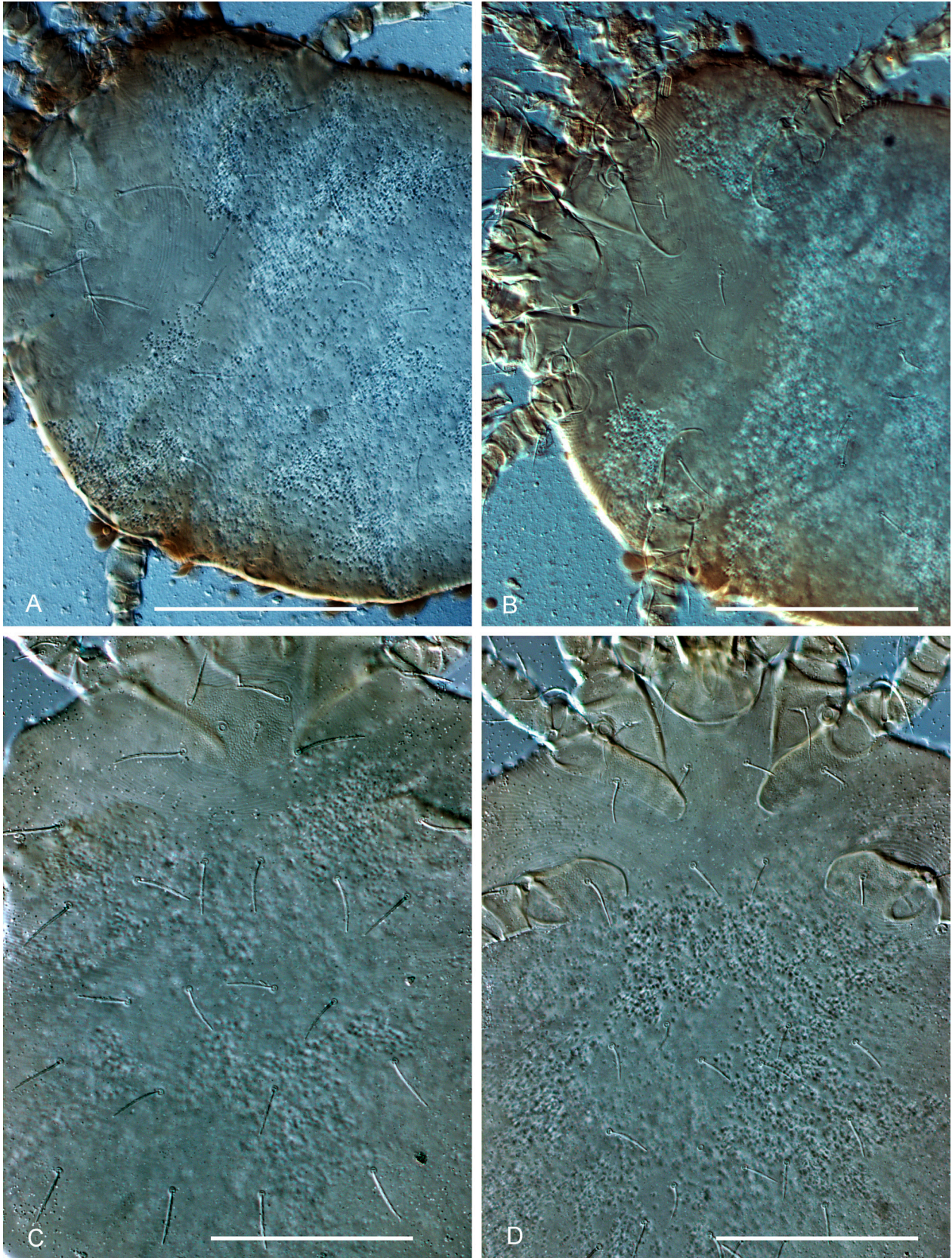


FIGURE 31. *Microtrombicula fulgida* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963), lectotype. **A**, anterior part of idiosoma, dorsal aspect; **B**, anterior part of idiosoma, ventral aspect. *Microtrombicula vitosa* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963), paralectotype ZMMU Tdt-3281 (specimen 1). **C**, anterior part of idiosoma, dorsal aspect; **D**, anterior part of idiosoma, ventral aspect. Scale bars: 100 μm .

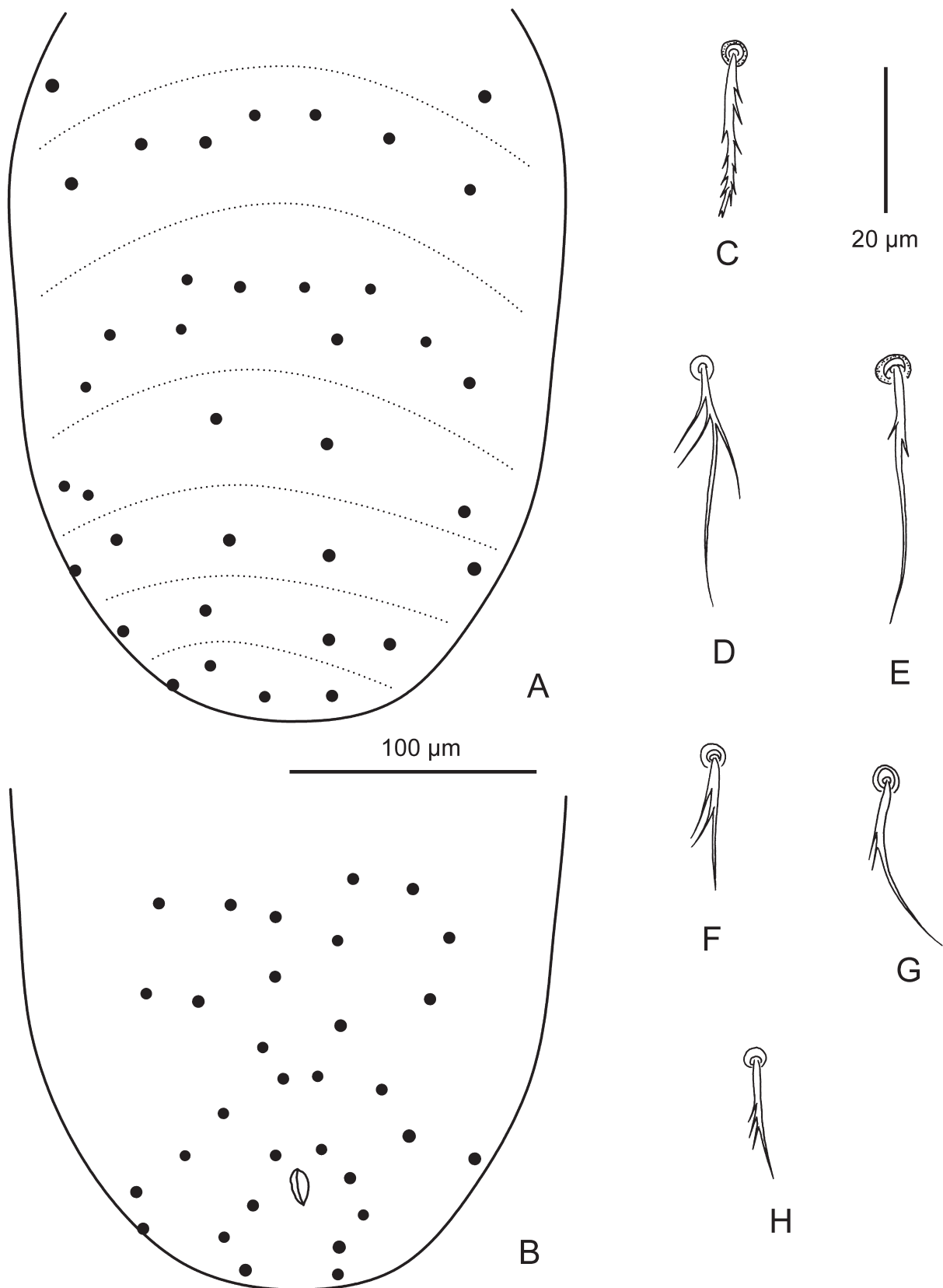


FIGURE 32. *Microtrombicula fulgida* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963). **A**, arrangement of dorsal idiosomal setae of paralectotype ZMMU Tdt-3231, specimen 3; **B**, arrangement of ventral idiosomal setae of paralectotype ZMMU Tdt-3231, specimen 3; **C**, dorsal idiosomal seta of 1st row of lectotype; **D**, coxal seta I of lectotype; **E**, coxal seta II of lectotype; **F**, anterior sternal seta of lectotype; **G**, posterior sternal seta of lectotype; **H**, preanal seta of lectotype. Scale bars: 100 µm (A, B), 20 µm (C–H).

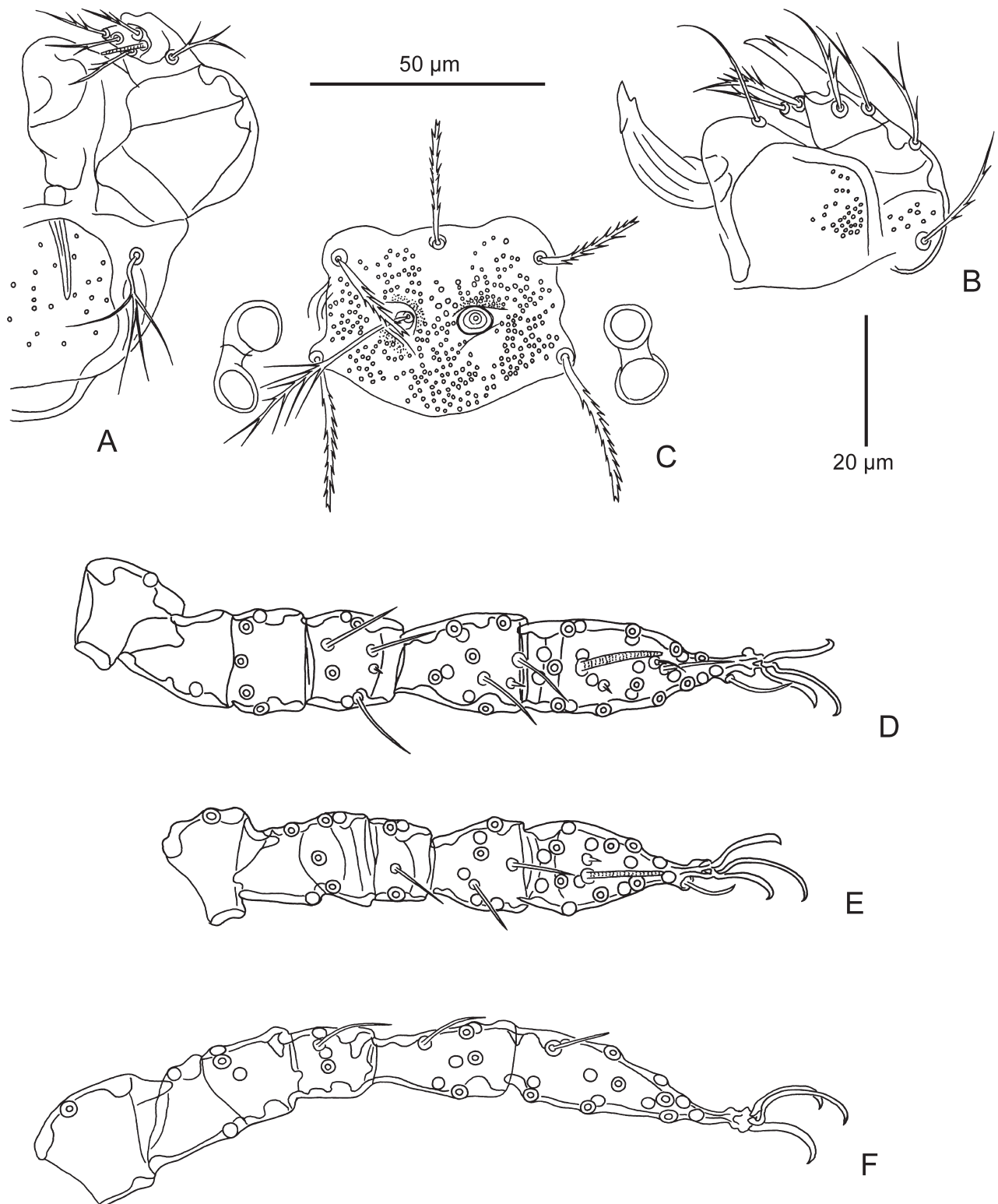


FIGURE 33. *Microtrombicula fulgida* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963). **A**, ventral aspect of gnathosoma of lectotype; **B**, dorsal aspect of gnathosoma of lectotype; **C**, scutum and eyes of lectotype (one sensillum missing); **D**, leg I (trochanter–tarsus) of paralectotype ZMMU Tdt-3231 (specimen 3); **E**, leg II (trochanter–tarsus) of paralectotype ZMMU Tdt-3231 (specimen 3); **F**, leg III (trochanter–tarsus) of paralectotype ZMMU Tdt-3231 (specimen 3) (mastitarsala broken). Scale bars: 20 µm (A, B), 50 µm (C–F).

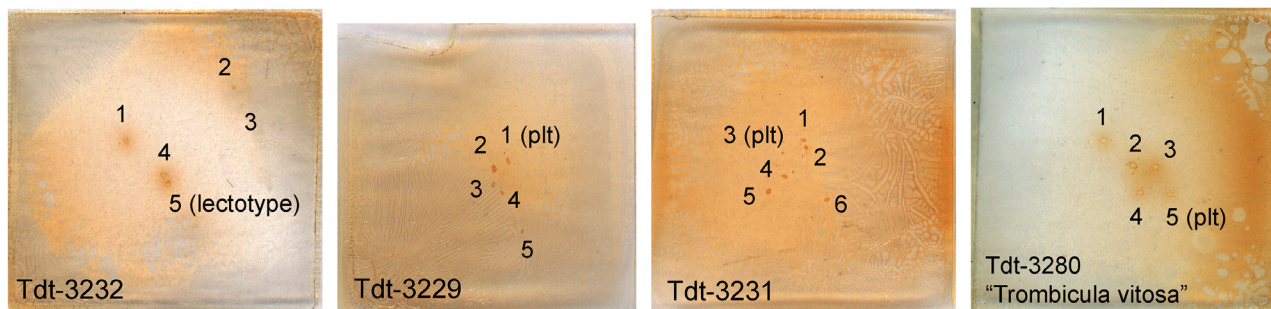


FIGURE 34. Type specimens of *Microtrombicula fulgida* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963) on slides.

GNATHOSOMA (Fig. 33A, B). Cheliceral blade with tricuspid cap; gnathobase with sparse puncta and 1 pair of branched setae; cheliceral base and palpal femur with sparse puncta; galeala nude; palpal claw with 2 prongs, internal prong longer; setae on palpal femur and genu branched; dorsal and ventral palpal tibial setae branched, lateral palpal tibial seta with 1 branch; palpal tarsus with 6 branched setae and tarsala.

SCUTUM (Figs. 31A, 33C). Pentagonal, wider than long, with anterolateral shoulders, with rounded posterior margin, moderately covered with small puncta, with 1 AM, 1 pair of ALs and 1 pair of PLs; AM anterior to level of ALs; all scutal setae uniformly covered with small barbs; PLs longest and ALs shortest scutal setae; sensilla flagelliform, with 8 long branches in distal half; sensillum bases situated close to each other and far anterior to level of PLs (PSB – P-PL = 7–10 μ m).

LEGS (Fig. 33D–F). All 7-segmented, with 1 pair of claws and claw-like empodium. Leg I: coxa with 1 seta bearing 3 long branches (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 3 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 23B, tarsala, microtarsala distal to tarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 1B (with 2 short barbs); trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala, microtarsala at level of tarsala, pretarsala. Leg III: coxa 1B (with 3 long branches); trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B, tibiala; tarsus 13B, mastitarsala.

Host. *Rattus tanezumi* Temminck [= *Rattus flavipectus* (Milne-Edwards)]. The host was indicated as a “rat” on the slide labels but was identified as *R. flavipectus* in the thesis of Grochovskaja (unpublished typescript).

Distribution. Vietnam.

Type material examined (Fig. 34). Lectotype (here designated): larva ZMMU Tdt-3232 (specimen 5) ex *R. tanezumi* (labeled as “rat”) No 543, Vietnam, Nghe An Province, Phu Quy, 8 September 1956, coll. I.M. Grochovskaja. Paralectotypes: three larvae, ZMMU Tdt-3229 (specimen 1), ZMMU Tdt-3231 (specimen 3), ZMMU Tdt-3280 “*Trombicula vitosa*” (specimen 5), ex *R. tanezumi* (labeled as “rat”) Nos 571, 568, Vietnam, Nghe An Province, Phu Quy, 10 September 1956, coll. I.M. Grochovskaja.

Remarks. *Microtrombicula fulgida* is similar to *M. munda* (Gater, 1932) and differs from it in the greater number of idiosomal setae (fD = 2H-7-10-5-5-4-4, DS = 31–36, V = 32–42, and NDV = 67–74 vs. 2H-6-6-4-4-2-2, 26, 32, and 58, respectively), all coxal and sternal setae branched vs. nude (except coxal setae I), and by longer legs (Ip = 547–565 vs. 488) (Vercammen-Grandjean 1965a).

This species is also close to *M. nadchatrami* Vercammen-Grandjean, 1965 and differs from it in a shorter scutum (ASB = 20–21, PSB = 19–21, SD = 39–43, and AP = 19–22, vs. 24, 25, 49, and 25, respectively), shorter setae (AM = 24–25, AL = 20–22, PL = 29–33, D_{min} = 18–24, D_{max} = 25–26, V_{min} = 9–16, V_{max} = 22–24, vs. 31, 28, 38, 27, 32, 21, and 28, respectively), shorter legs (Ip = 547–565 vs. 644), and less branched sternal and coxal setae (sternal setae with 2 vs. about 6 barbs; coxal setae I and III with 3 vs. about 6 long branches; coxal setae II with 2 vs. multiple short barbs) (Vercammen-Grandjean 1965a).

***Microtrombicula vitosa* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963)**

(Figs. 31C, D, 35–37)

Trombicula vitosa Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963: 694, figs. 16–22.

Microtrombicula (Microtrombicula) vitosa: Wen 1984: 315; Li *et al.* 1997: 277, fig. 2-10-11; Chau *et al.* 2007: 98, fig. 46.

Diagnosis. SIF = 4B1b1N-N-2-3111.1000; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fPp = B/B/BNB; fSc: PL > AM = AL; Ip = 585–636; fD = 2H-6-6-4-5-5; DS = 24–28; V = 25–31; NDV = 49–58. Sensilla branched; sternal setae nude; coxal setae I with 1 short cilium; coxal setae II and III nude. Standard measurements of type series given in Table 11.

TABLE 11. Standard measurements (μm) and numbers of setae of *Microtrombicula vitosa* (n = 8).

	Range	Mean	Lectotype
AW	45–49	47	45
PW	53–58	57	58
SB	15–18	17	17
ASB	22–23	22	22
PSB	24–26	24	24
SD	46–48	47	47
P-PL	11–15	13	14
AP	22–26	24	24
AM	25–28	27	26
AL	25–27	26	26
PL	33–37	35	34
H	36–49	39	49
D _{min}	23–27	25	26
D _{max}	27–34	30	31
V _{min}	14–18	17	14
V _{max}	20–29	24	27
pa	199–222	213	207
pm	171–198	181	178
pp	203–225	212	203
Ip	585–636	606	589
DS	24–28	25	25
V	25–31	29	31
NDV	49–58	54	56

Description (larva) [based on lectotype and 7 paralectotypes]. IDIOSOMA (Figs. 31C, D, 35). Eyes 2 + 2; 24–28 barbed dorsal idiosomal setae, including one pair of humeral setae; 4 nude sternal setae; 25–31 ventral setae, nude or having few inconspicuous cilia; NDV = 49–58.

GNATHOSOMA (Fig. 36A, B). Cheliceral blade with tricuspid cap; gnathobase with sparse puncta and 1 pair of branched setae; cheliceral base with sparse puncta; galeala nude; palpal claw with 2 prongs, internal prong longer; setae on palpal femur and genu with few short barbs, dorsal palpal tibial seta with few short barbs, lateral palpal tibial seta nude, ventral palpal tibial setae with few branches; palpal tarsus with 4 branched setae, 1 seta with single branch, 1 nude seta and tarsala.

SCUTUM (Figs. 31C, 36C). Pentagonal, wider than long, with anterolateral shoulders, with rounded posterior margin, densely covered with small puncta, with 1 AM, 1 pair of ALs and 1 pair of PLs; AM anterior to level of ALs; all scutal setae uniformly barbed; PLs longest scutal setae, ALs and AM of about equal length; sensilla flagelliform, slightly expanded, with 8 long branches in distal half; sensillum bases situated close to each other and far anterior to level of PLs (PSB – P-PL = 9–14 μm).

LEGS (Fig. 36D–F). All 7-segmented, with 1 pair of claws and claw-like empodium. Leg I: coxa with 1 seta bearing 1 short cilium (1b); trochanter with 1 branched seta (1B); basifemur 1B; telofemur 5B; genu 4B, 3 genualae, microgenuala; tibia 8B, 2 tibialae, microtibialae; tarsus 22B, tarsala, microtarsala at level of tarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa with 1 nude seta (1N); trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala, microtarsala at level of tarsala, pretarsala. Leg III: coxa 1N; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B, tibiala; tarsus 13B, mastitarsala.

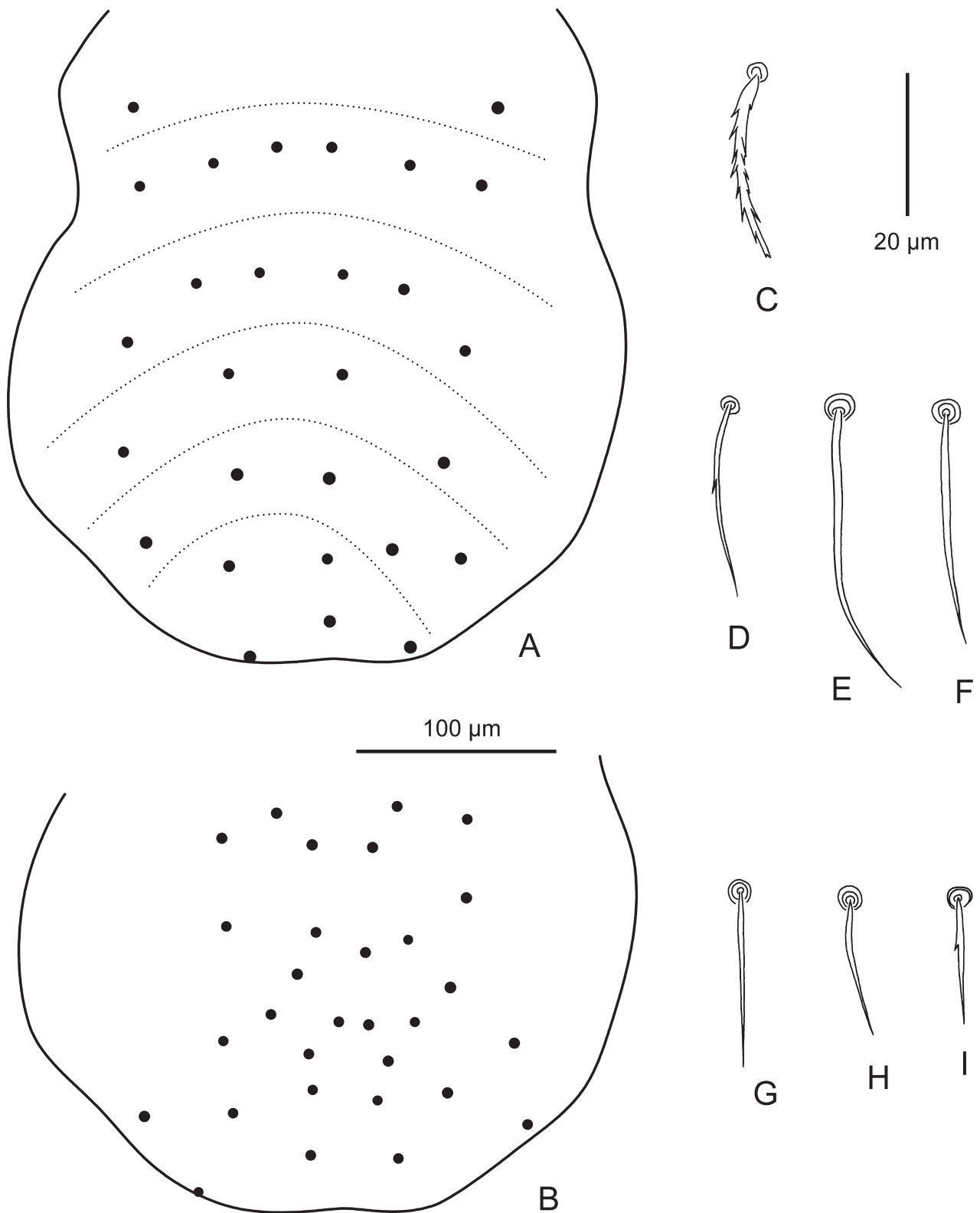


FIGURE 35. *Microtrombicula vitosa* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963). **A**, arrangement of dorsal idiosomal setae of paralectotype ZMMU Tdt-3281 “*Trombicula vitosa-2*” (specimen 3); **B**, arrangement of ventral idiosomal setae of paralectotype ZMMU Tdt-3281 “*Trombicula vitosa-2*” (specimen 3); **C**, dorsal idiosomal seta of 1st row of lectotype; **D**, coxal seta I of paralectotype ZMMU Tdt-3280 “*Trombicula vitosa-2*” (specimen 1); **E**, coxal seta II of paralectotype ZMMU Tdt-3280 “*Trombicula vitosa-2*” (specimen 1); **F**, coxal seta III of paralectotype ZMMU Tdt-3280 “*Trombicula vitosa-2*” (specimen 1); **G**, anterior sternal seta of lectotype; **H**, posterior sternal seta of lectotype; **I**, preanal seta of lectotype. Scale bars: 100 µm (A, B), 20 µm (C–I).

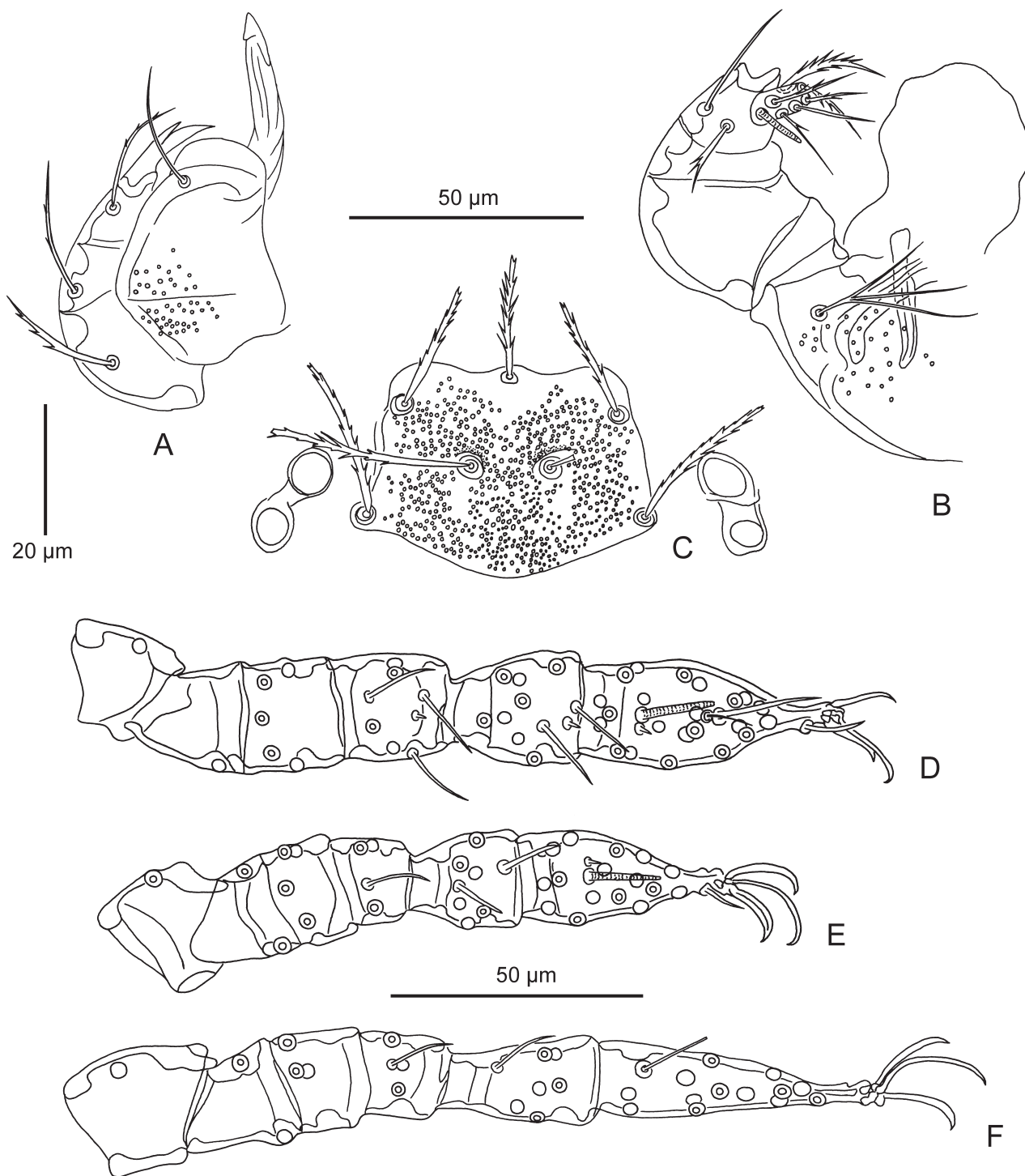


FIGURE 36. *Microtrombicula vitosa* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963), lectotype. **A**, dorsal aspect of gnathosoma; **B**, ventral aspect of gnathosoma; **C**, scutum and eyes (right sensillum and branches of left sensillum missing); **D**, leg I (trochanter–tarsus); **E**, leg II (trochanter–tarsus); **F**, leg III (trochanter–tarsus) (mastitarsala broken). Scale bars: 20 µm (A, B), 50 µm (C), 50 µm (D–F).

Hosts. *Rattus tanezumi* Temminck [= *Rattus flavipectus* (Milne-Edwards)]. The host was indicated as “rat” on the slide labels but was identified as *R. flavipectus* in the thesis of Grochovskaja (unpublished typescript).

Distribution. China (Wen 1984; Li *et al.* 1997), Vietnam.

Type material examined (Fig. 37). Lectotype (here designated): larva ZMMU Tdt-3280 “*Trombicula vitosa*-5” (specimen 2) ex *R. tanezumi* (labeled as “rat”) No 568, Vietnam, Nghe An Province, Phu Quy, 10 September 1956,

coll. I.M. Grochovskaja. Paralectotypes: four larvae, ZMMU Tdt-3280 “*Trombicula vitosa*” (specimen 2), ZMMU Tdt-3280 “*Trombicula vitosa*-2” (specimen 1), ZMMU Tdt-3280 “*Trombicula vitosa*-3” (specimen 5), ZMMU Tdt-3280 “*Trombicula vitosa*-4” (specimen 1), same collection data as for lectotype; three larvae, ZMMU Tdt-3281 “*Trombicula vitosa*” (specimens 1, 2), ZMMU Tdt-3281 “*Trombicula vitosa*-2” (specimen 3) ex *R. tanezumi* (labeled as “rat”) No 577, Vietnam, Nghe An Province, Phu Quy, 11 September 1956, coll. I.M. Grochovskaja.

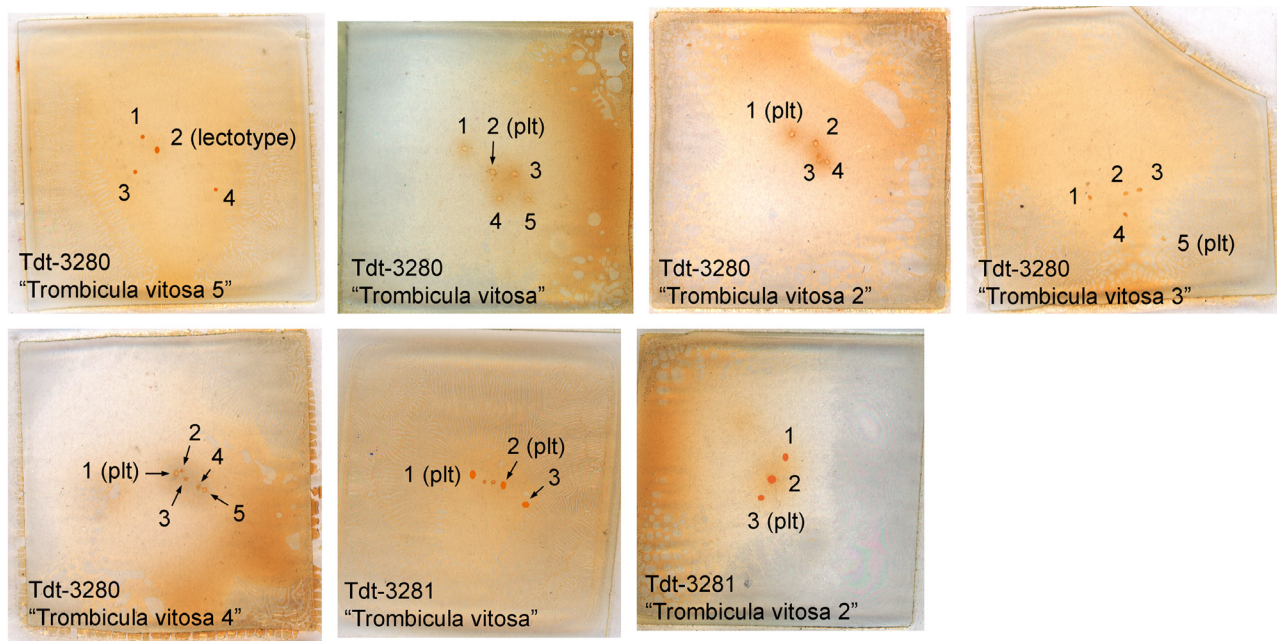


FIGURE 37. Type specimens of *Microtrombicula vitosa* (Schluger, Grochovskaja, Ngu, Hoe and Tung, 1963) on slides.

Remarks. This species is similar to *M. spicea* (Gater, 1932) by the presence of slightly expanded sensilla, but differs by the nude lateral palpal tibial seta (fPp = B/B/BNB vs. B/B/BBB), 7-segmented legs (fsp = 7.7.7 vs. 7.6.6), longer scutum (SD = 46–48 vs. 41–42), and longer legs (Ip = 585–636 vs. 516–534) (Vercammen-Grandjean 1965a).

As Vercammen-Grandjean (1965a) noted for *M. spicea*, the presence of slightly expanded sensilla relates this species to the genus *Ascoschoengastia* from the tribe Schoengastiini. Probably, Kudryashova (2004) did not list *M. vitosa* in the catalogue of types because of the uncertainty of the taxonomic position of this species.

Discussion

The latest review of chigger mites of Vietnam was published by Chau *et al.* (2007). That work reported 85 species from the country, including many new host records. However, morphological descriptions of previously described species were not updated; these authors simply reproduced those, including drawings from the original publications. Later, Antonovskaia *et al.* (2017) and Kalúz *et al.* (2016) reported several new species and records of chiggers from Vietnam. Currently, the number of chigger species recorded in Vietnam counts 105; thus, it is the third result in Southeast Asia, after Malaysia (202 species) and Thailand (156 species) (Stekolnikov 2021).

The most part of the ten species re-described in the present work have been recorded in Southeast Asia more than one time. Thus, *Gahrliepia mirabilis* was recorded in Thailand (Lakshana 1973) and on a vast range of host species in different localities in Vietnam (Chau *et al.* 2007). *Walchia delicatula* was recorded in new localities of Vietnam (Chau *et al.* 2007); in the present paper, it is for the first time reported in China. *Walchia dismina* and *Cheladonta neda* were previously found in Thailand (Lakshana 1973; Chaisiri *et al.* 2016). *Doloisia alata*, *D. gigantea* and *Microtrombicula vitosa* were recorded in China (Wen 1984; Li *et al.* 1997). *Schoutedenichia centralkwangtungia* is known from different localities in Vietnam (Chau *et al.* 2007), China (Mo *et al.* 1959; Wen 1984), and Thailand (Lakshana 1973; Chaisiri *et al.* 2016). Only two species, *Doloisia fulminans* and *Microtrombicula fulgida*, are known so far only from their type localities. Taking into account that chigger fauna of Southeast Asia is being

studied rather actively, we can expect that known ranges of all these species will expand to other territories, for example, Cambodia and Laos.

Another research area, to which our results contribute, is generic revisions. A shortage of taxonomic revisions is a serious disadvantage of the current state of chigger studies (Stekolnikov & Daniel 2012; Stekolnikov 2018). Trombiculid taxa considered in the present work are not an exception. Thus, for the subfamily Gahrlepiinae (including *Gahrlepieia* and *Walchia*), a new status and ideas on classification of this taxon proposed by Wen (2004) were not supplied even with the list of included species. The content of the world fauna of Gahrlepiinae can be found only in the checklists of chiggers published more than a half-century ago (Wharton & Fuller 1952; Radford 1954). The genus *Dolosisia* was represented by three species in the checklist by Radford (1954); at present, only Chinese fauna includes 19 species of this genus (Li *et al.* 1997), but it has not been completely revised. The latest revision of *Schoutedenicchia* was published in the 1950s (Vercammen-Grandjean 1958); the genus *Microtrombicula* was revised only once, in the 1960s (Vercammen-Grandjean 1965a); and the genus *Cheladonta* has never been revised, except for a list of species provided by Stekolnikov and Daniel (2012). All these checklists and revisions now can be considered as completely outdated, taking into account that tens or hundreds of new chigger species were described afterwards (e.g., Audy & Nadchatram 1957; Chen & Hsu 1965; Wen & Xiang 1984). In addition, many of old species descriptions are quite incomplete that does not allow a reliable comparison with recently described species, as well as identification of a newly collected material. Thus, the descriptions of species published by Schluger did not include standard measurements of the scutum and total number of idiosomal setae; legs were measured without coxae; microtarsalae and pretarsalae of legs I and II, and parasubterminala of leg I were not figured or described; depressions in the scutum (puncta) were usually drawn too schematically, etc. With our complement of these descriptions, a detailed comparison of the Schluger's species with chiggers described afterwards, first in China, became possible. In addition to comparisons to closest species provided in the present work, precise revisions of chigger species described so far from China could obviously help to recover other related species (including possible synonyms) in Southeast and East Asia.

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