



# Article

## New feather mites of the subfamily Pterodectinae (Acari: Proctophyllodidae) from passerines and woodpeckers (Aves: Passeriformes and Piciformes) in Vietnam

SERGEY MIRONOV<sup>1,5</sup>, IVAN LITERAK<sup>2</sup>, NGUYEN MANH HUNG<sup>3</sup> & MIROSLAV CAPEK<sup>4</sup>

<sup>1</sup> Zoological Institute, Russian Academy of Sciences, Universitetskaya Embankment 1, 199034, Saint Petersburg, Russia. E-mail: astigmata@zin.ru

<sup>2</sup> Department of Biology and Wildlife Diseases, Faculty of Veterinary Hygiene and Ecology, University of Veterinary and Pharmaceutical Sciences Brno, Palackeho 1-3, 612 42 Brno, Czech Republic. E-mail: literaki@vfu.cz

<sup>3</sup> Department of Parasitology, Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology, 18-Hoang Quoc Viet, Hanoi, Vietnam. E-mail: hung\_iebr@yahoo.com

<sup>4</sup> Institute of Vertebrate Biology AS CR, v. v. i., Kvetna 8, 603 65 Brno, Czech Republic. E-mail: capek@ivb.cz

<sup>5</sup> Corresponding author

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### Abstract

Two new genera and nine new species of the feather mite subfamily Pterodectinae (Proctophyllodidae) are described from passerines and woodpeckers in Vietnam: *Dolichodectes furcilobus* sp. n. from *Copsychus malabaricus* (Scopoli) (Muscicapidae), *Montesauria abroscopi* sp. n. from *Abroscopus superciliaris* (Blyth) (Cettiidae), *M. macronoi* sp. n. from *Macronous gularis* (Horsfield) (Timaliidae), *M. pellornei* sp. n. from *Pellorneum ruficeps* Swainson (Pellorneidae), *M. phylloscopi* sp. n. from *Phylloscopus ricketti* (Slater) (Phylloscopidae), *M. seicerci* sp. n. from *Seicercus valentini* (Hartert) (Phylloscopidae), *Picipterodectes sasiae* gen. n., sp. n. from *Sasia ochracea* Hodgson (Picidae), *Proterothrix alcippeae* sp. n. from *Alcippe rufogularis* (Mandelli) (Pellorneidae), and *Vireodectes erporni* gen. n., sp. n. from *Erpornis zantholeuca* (Blyth) (Vireonidae). The new genera *Picipterodectes* gen. n. and *Vireodectes* gen. n. belong to the *Proterothrix* generic group uniting archaic genera in the tribe Pterodectini. Brief comments on the current state of

systematics of the genera *Dolichodectes* Park and Atyeo, 1971, *Montesauria* Oudemans, 1905 and *Proterothrix* Gaud, 1968 are provided. A new species group *macronoi* is established in the genus *Montesauria*.

**Key words:** Acari, feather mites, Proctophyllodidae, systematics, Aves, Passeriformes, Piciformes, Vietnam

## Introduction

Feather mites are highly specialized parasitic and commensal astigmatan mites (Acari: Astigmata) permanently inhabiting the plumage or skin of birds. The approximately 2500 species in 450 genera and 34–38 families occur throughout the World and have been recorded from all avian orders; nevertheless, it is considered that the currently known number of species represents not more than 15% of the extant fauna (Peterson 1975; Gaud & Atyeo 1996; Mironov 2003; Proctor 2003; Dabert *et al.* 2008; OConnor 2009; Schatz *et al.* 2011).

With the present work we start a series of papers dedicated to new taxa of feather mites from passerines and other terrestrial birds from Vietnam. Information on feather mite biodiversity in Vietnam, as for all countries of the Indo-Malayan, is quite scanty. The investigation of Atyeo (1973) allows us to understand how poorly explored this region is. This author investigated a vast material from ten countries of the Indo-Malayan region (Vietnam was not included), representing collections from over 589 avian species of about 2200 species occurring in this region, and identified to the species level only 95 feather mite species from 84 genera and 17 families, while much greater number of potentially new species remained identified only to the generic level.

The first records of five feather mites from Vietnam were mentioned in the taxonomic papers of early researchers of the nineteenth century (Méglin & Trouessart 1884; Trouessart 1884, 1885, 1887). Further, Gaud and Petitot (1948) reported 32 feather mite species referring (according to the modern taxonomic system) to 21 genera and 12 families. These authors also suggested the quite probable presence of 22 more species in this country. Later on, Gaud *et al.* (1985) reported three species of the genus *Megninia* Berlese, 1883 (Analgidae) from domestic chickens and wild *Gallus gallus* Linnaeus in Vietnam. Finally, Mironov (1990, 1992, 1993) described eleven new species and two new genera of the family Pteronyssidae. In total, 45 species, 23 genera, and 12 families of feather mites have been recorded so far in Vietnam.

In the plumage of avian hosts, pterodectines mainly inhabit the primaries and secondaries of the wings, where they are located in corridors on the ventral surface of the vane. The subfamily Pterodectinae is one of the two subfamilies currently recognized within the family Proctophyllodidae (Mironov 2009; Knowles & Klimov 2011), although previous authors arranged members of the former subfamily in three or two separate subfamilies (Park & Atyeo 1971a, 1971b, 1972a; Gaud & Atyeo 1996). The Pterodectinae in the modern sense have included up to now about 175 species in 19 genera (Mironov *et al.* 2008b; Mironov 2009; Valim & Hernandez 2010; Mironov & González-Acuña 2011). Representatives of this subfamily are distributed mostly on two major taxonomic groups of hosts, passerines (Passeriformes) and hummingbirds (Apodiformes: Trochilidae); however, several species are known from Coraciiformes and Piciformes, and a single species has been found on each of Gruiformes, Musophagiformes and Caprimulgiformes (Park & Atyeo 1971a, 1975; Gaud & Atyeo 1996; Mironov 2006, 2009; Valim & Hernandez 2010). Pterodectines restricted to hummingbirds constitute the tribe Rhamphocaulini, and the remaining genera are referred to the tribe Pterodectini. Representatives of the latter tribe are currently arranged into two generic groups, *Proterothrix* and *Pterodectes*, which can be considered as archaic and derived groups, respectively (Mironov 2009).

Pterodectines distributed in the Old World have been most extensively explored in Africa (Gaud 1952, 1953, 1957, 1964, 1979; Till 1954, 1957; Gaud & Mouchet 1957; Gaud & Till 1961; Mironov & Kopij 1996a, 1996b, 1997; Mironov & Fain 2003; Mironov 2008, Mironov & Wauthy 2010; Mironov *et al.* 2010). In the Oriental part of the Old World, mainly in countries of the Indo-Malayan region, these mites have been studied to a much lesser extent (Sugimoto 1941, Gaud & Petitot 1948; Gaud 1962, 1968, Atyeo & Gaud 1977; Mironov 2006; Kuroki *et al.* 2006; Mironov *et al.* 2008a, Mironov & Proctor 2009; Hernandez *et al.* 2010). Investigations of pterodectines in Europe and Northern Asia are not numerous at all, but this is explained by the fact that only a few species of the genera *Alaudicola* Mironov, 1996 and *Montesauria* Oudemans, 1905 and a single species of the genus *Pterodectes* Robin, 1877 are known to occur in these territories (Robin & Méglin 1877; Oudemans 1905; Vassilev 1958; Černý 1963; Mironov 1996). Although pterodectines from the Old World have been explored for a long time, and generic diagnoses and species content of genera are at present quite clear, most species described before the 1970s need redescription and almost all genera require construction of keys to species.

Pterodectines distributed in the New World have been most extensively explored in South and Central America. A long series of publications by Park & Atyeo (1971a, 1971b, 1972a, 1972b, 1973a, 1973b, 1974a, 1974b, 1975) was focused exclusively on pterodectines living on hummingbirds. Other researchers dealt with pterodectines associated with passerines (Berla 1958, 1959a, 1959b, 1959c, 1960, 1973; Černý 1974; Černý & Lukoschus 1975; O'Connor *et al.* 2005; Hernandez & Valim 2005, 2006; Mironov *et al.* 2008b; Mironov & González-Acuña 2011). In a series of special papers, Valim & Hernandez (2006, 2008, 2009, 2010) redescribed all pterodectine species recorded so far from passerines of the New World, including those described by early authors (Robin & Mégnin 1877; Trouessart 1885; Stoll 1893; Banks 1909); and Mironov and González-Acuña (2011) provided a key to all pterodectines of the *Pterodectes* generic complex. Compared to the Old World, pterodectines known from the New World are taxonomically better understood, because all known species are adequately (re)described, and almost all genera have keys to species, with the exception of a few passerine-associated genera that contain only one or two known species. The present paper describes nine new species and two new genera of the feather mite subfamily Pterodectinae (Analgoidea: Proctophyllodidae) from Vietnam.

## Material and methods

The materials used in the present work were collected by the junior coauthors (IL, NMH and MC) in two national parks in Vietnam: Ba Be NP (Bac Kan Province) in July of 2008 and in Cuc Phuong NP (Ninh Binh Province) in February 2010. Birds were captured by means of mist-nets, identified and visually checked for the presence of mites. In cases when feather mites were detected in their plumage, a small part of a flight feather with mites was cut off with scissors and placed into a tube with 70% ethanol. After processing, which included measuring, weighting and banding and mite collecting, birds were released back into the wild. Mite specimens collected were mounted on microslides in Faure medium according to standard technique for small-sized acariform mites (Evans 1992). Drawings were made by S. V. Mironov using a Leica DM 5000B light microscope with DIC illumination and camera lucida.

The descriptions of new taxa are given in the format elaborated for taxa of pterodectine mites in the past decade (Mironov & Fain 2003; Hernandez & Valim 2006; Mironov 2006, Mironov *et al.* 2008b). General morphological terms and leg chaetotaxy follow Gaud and Atyeo (1996), idiosomal chaetotaxy also follows these authors with corrections proposed by Norton (1998). All measurements are in micrometers ( $\mu\text{m}$ ). The measuring techniques used for particular structures are as follows:

(i) length of idiosoma is measured from the anterior margin of the propodosoma to the lobar apices (in males) and to the lobar apices excluding the terminal appendages (in females); width of idiosoma is measured as the widest portion of the humeral area;

(ii) hysterosoma is measured from the level of the sejugal furrow on lateral margins of the body to the lobar apices;

(iii) distance between setae of the same pair is the direct distance between their bases, and distance between different pairs of setae is the shortest distance between the transverse levels formed by the setae of respective pairs;

(iv) prodorsal shield length is the greatest length measured from the anterior margin along the midline (if posterior margin is convex) or to the level of the posterior angles (if posterior margin is concave), and width is the greatest width at the level of the posterior margin;

(v) hysteronotal shield length in males is the greatest length from the anterior margin to the lobar apices bearing setae *h3*; width is measured at the anterior margin;

(vi) anterior hysteronotal shield length in females is the greatest length from the anterior margin to the transverse furrow separating this shield from the lobar shield; width is measured at the anterior margin;

(vii) length of the lobar region in females is the greatest length from its anterior margin to the lobar apices (the terminal appendages are excluded), and the width is measured at the level of the lateral extensions bearing setae *h2*.

The taxonomic system and scientific names of birds follow Clements (2007) and Clements *et al.* (2011). Type material depositories: IEBR—Museum of Institute of Ecology and Biological Resources (Hanoi, Vietnam), UMMZ—Museum of Zoology of the University of Michigan (Ann Arbor, USA), ZISP—Zoological Institute of the Russian Academy of Sciences (Saint Petersburg, Russia).

## Taxonomy

### Family Proctophyllodidae Trouessart and Mégnin, 1884

#### Subfamily Pterodectinae Park and Atyeo, 1971

#### Genus *Montesauria* Oudemans, 1905

Type species: *Proctophyllodes (Pterodectes) cylindricus* Robin, 1877 by original designation.

The genus *Montesauria* is the most species-rich genus in the subfamily Pterodectinae and currently includes 54 species arranged in nine species groups (Park & Atyeo 1971a; Mironov & Kopij 1996a, 1996b, 1997; Mironov & Fain 2003; Kuroki *et al.* 2006; Mironov 2006, 2008, 2009; Hernandez *et al.* 2010; Mironov *et al.* 2010). The majority of described species are associated with ten families of passerines, from both the infraorders Passerida and Corvida (Mironov, 2006), with two species recorded from a few non-passeriform hosts, namely from African barbets (Piciformes: Lybiidae) (Gaud & Mouchet 1957) and New Guinean rails (Gruiformes: Rallidae) (Atyeo & Gaud 1977; Hernandez *et al.* 2010). All representatives of this genus were recorded from birds distributed in the Old World.

The genus *Montesauria* belongs to the *Pterodectes* generic group, which unites morphologically derived pterodectine genera, characterized by the posterior or postero-lateral position of setae *ps3* in relation to anal suckers in the male, and associated predominately with passerines (Mironov 2009). Within this generic group, *Montesauria* and four more genera, *Alaudicola* Mironov, 1996, *Anisodiscus* Park and Atyeo, 1971, *Dolichodectes* Park and Atyeo, 1971, and *Pedanodectes* Park and Atyeo, 1971, constitute the *Montesauria* generic complex, representatives of which have the genital papillae situated at the level of the genital arch or posterior to it. This generic complex can be also interpreted as a grouping of derived pterodectines distributed in the Old World.

When Oudemans (1905) established the genus *Montesauria* he did not clearly differentiate it from *Pterodectes* Robin, 1877. Therefore until the 1960s, subsequent authors described the species that actually belong to *Montesauria* as members of the genus *Pterodectes*, which encompassed in that period all pterodectines in the current sense. Park and Atyeo (1971a) established the subfamily Pterodectinae and gave uniform diagnoses for genera they recognized. As a result of this work the genus *Montesauria* received a modern diagnosis and became the most numerous genus of the subfamily. Further, Mironov (2006) revised the species content of *Montesauria* and arranged all known species into nine species groups. Although the species content and taxonomic limits of this genus are relatively clear now, this taxon still needs redescriptions of many species described prior to the 1960s (Trouessart 1885; Robin & Mégnin 1877; Gaud & Petitot 1948; Gaud 1952; Gaud & Mouchet 1957).

Three species of this genus, *Montesauria mainati* (Trouessart, 1885), *M. oxyphylla* (Gaud and Petitot, 1948) and *M. papillo* (Gaud and Petitot, 1948), were previously recorded from Vietnam. In the present paper we describe five new species of the genus *Montesauria* and establish one new species group in its content. Three previously recorded *Montesauria* species were not recollected in the course of the present study. *Montesauria mainati* was recently redescribed based on the type material (Mironov 2006).

#### *Montesauria abroscopi* sp. n.

(Figs. 1–3)

**Type material.** Male holotype (ZISP 4728), 2 male and 3 female paratypes from *Abroscopus superciliaris* (Blyth) (Cettiidae), VIETNAM: Bac Kan, Ba Be National Park, 22°23' N, 105°37' E, 4 July 2008, coll. I. Literak, Nguen Manh Hung and M. Capek.

**Type depository.** Holotype, 1 female paratype—ZISP, remaining paratypes—UMMZ, IEBR.

**Description.** MALE (holotype, sizes for 2 paratypes in parentheses). Length of idiosoma 285 (280–290), width 100 (100–105), length of hysterosoma 188 (180–190). Prodorsal shield: entire, antero-lateral extensions short and acute, lateral margins without incisions, posterior margin straight, length 95 (90–98), width 82 (78–84), surface with numerous circular lacunae (Fig. 1A). Setae *ve* present, represented by microsetae. Scapular setae *se* separated by 40 (38–40). Scapular shields narrow. Humeral shields present, rudimentary, situated above bases of

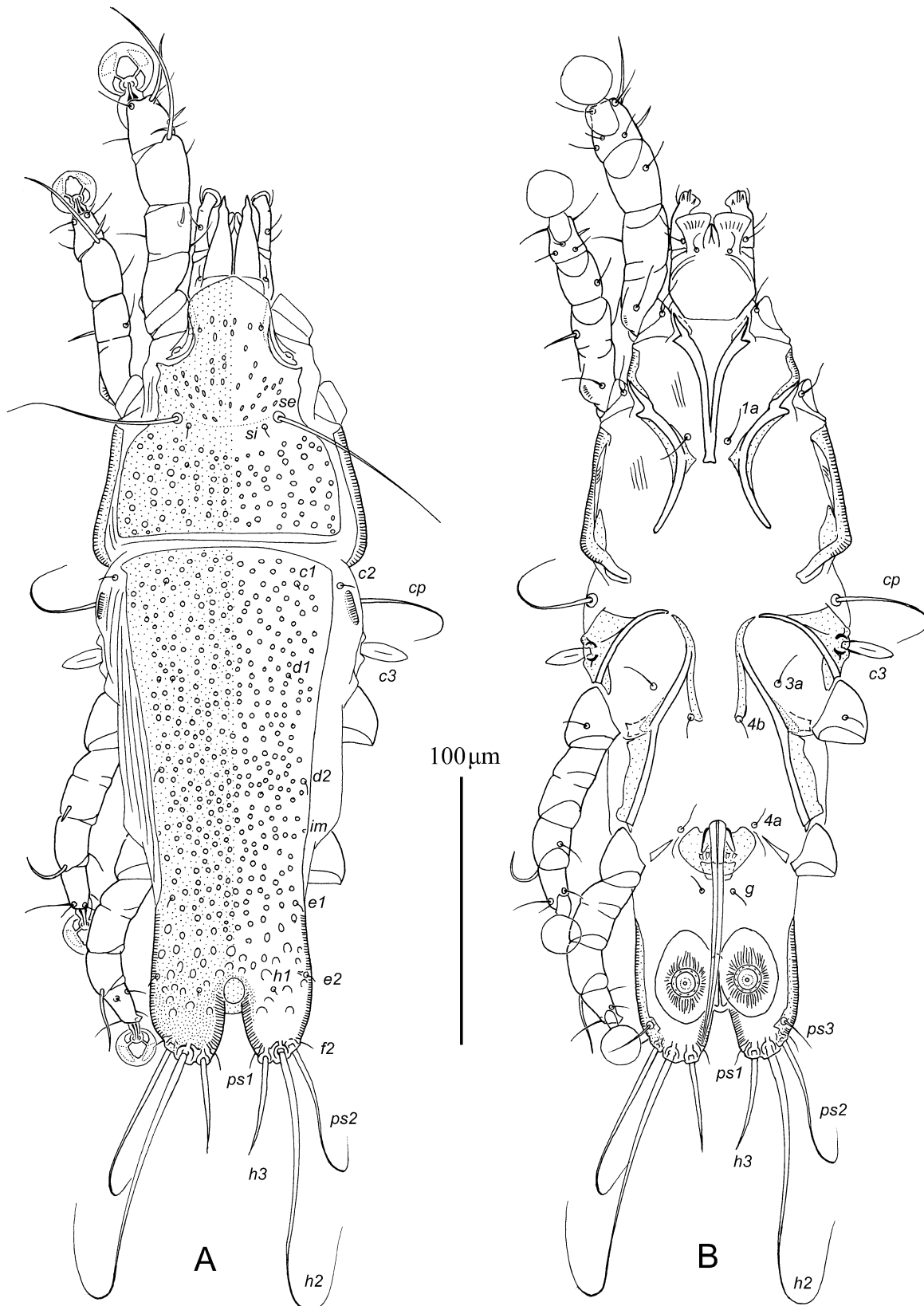
setae *cp*. Setae *c2* situated dorsally, near anterior margins of hysteronotal shield. Subhumeral setae *c3* lanceolate, 17 (17–18) × 5 (5–6). Hysteronotal shield: greatest length 190 (188–195), width at anterior margin 75 (72–80), anterior margin convex, anterior angles blunt, surface with numerous small circular lacunae as in prodorsal shield. Opisthosomal lobes short, slightly wider than long, posterior margin roughly rounded, with extremely short blunt extensions at base of setae *h2* and *h3*. Terminal cleft shaped as narrow trapezium, 20 (20–24) long, anterior margin straight or slightly convex. Supranal concavity distinct, circular. Setae *f2* present, situated slightly anterior to base of setae *ps2*. Setae *h1* at level of supranal concavity. Setae *h3* thick spiculiform, 34 (32–36) long; setae *ps2* 60 (54–60) long; setae *ps1* filiform, minute, situated on margins of terminal cleft near bases of setae *h3*. Distance between bases of dorsal setae and setal pairs: *c2:d2* 75 (72–77), *d2:e2* 71 (70–74), *e2:h3* 33 (32–35), *d1:d2* 33 (33–35), *e1:e2* 33 (30–32), *h1:ps2* 23 (23–25), *h2:h2* 36 (36–40), *h3:h3* 22 (22–26), *ps2:ps2* 46 (45–49),.

Epimerites I fused as a Y, sternum about ¼ of total length of epimerites, its posterior end free (Fig. 1B). Coxal fields I–II without large sclerotized areas. Coxal fields I, II open, coxal fields III almost closed. Coxal fields IV without sclerotized areas at corresponding trochanters. Inner margins of epimerites IIIa with straight extension directed backward and bearing bases of setae *4b*. Rudimentary sclerites rEpIIa absent. Epimerites IVa present, small. Genital arch small, with wing-like lateral extensions, 20 (18–20) long, 26 (24–26) wide; basal sclerite of genital apparatus shaped as inverted trapezium. Aedeagus 84 (83–86) long, almost extending to level of setae *h3* bases (Fig. 3A). Genital papillae not connected by their bases, arranged in transverse row. Genital and adanal shields absent. Anal suckers 11 (11–12) in diameter, corolla with 11–12 small indentations, surrounding membrane large, with wavy radial striae. Opisthoventral shields narrow, with small extension immediately anterior to bases of setae *ps2*. Setae *ps3* postero-lateral to anal suckers, situated on extension of opisthoventral shields approximately at midlevel of terminal cleft. Distance between ventral setae: *3a:4b* 12 (10–12), *4b-4a* 40 (40–44), *4a-g* 24 (23–25), *g-ps3* 49 (47–50), *ps3-ps3* 49 (48–51), *ps3:h3* 12 (12–13).

Legs I noticeably thicker than legs II, especially tarsi and tibiae. Femora I, II with narrow ventral crests, other segments of legs I, II without processes. Solenidion  $\sigma I$  of genu I 5 (5–6) long, situated at midlevel of segment; genual setae *cGI*, II, *mGI*, II filiform. Solenidion  $\sigma$  of genu III in distal half of segment. Setae *d* of tarsi II, III much shorter than corresponding setae *f*. Tarsus IV 16 (16–18) long, with apical claw-like process; setae *d* as minute spine, situated on small inflated base in proximal part of segment; seta *e* button-like, scarcely distinct, situated at base of apical claw-like process. Solenidion  $\phi$  of tibia IV extending to midlevel of ambulacral disc (Figs. 3B–E). Length of solenidia:  $\omega II$  8 (8–10),  $\omega III$  5 (5–6),  $\phi I$  51 (48–50),  $\phi II$  38 (38–42),  $\phi III$  13 (13–15),  $\phi IV$  26 (26–28).

FEMALE (range for 3 paratypes). Length of idiosoma 420–428, width 125–130, length of hysterosoma 292–305. Prodorsal shield: general form as in the male, antero-lateral extensions reaching to lateral margins of propodosoma, lateral margins without incisions around bases of scapular setae, posterior margin straight or slightly convex, 125–130 long, 102–108 wide, anterior one third with small ovate lacunae, remaining part with numerous minute pit-like lacunae (Fig. 2A). Setae *ve* represented by microsetae. Setae *se* separated by 52–56. Humeral shields absent. Setae *cp* and *c2* situated on soft tegument. Setae *c3* lanceolate, 16–17 × 6.5–7. Anterior and lobar parts of hysteronotal shield separated from each other by narrow transverse band of soft tegument, but remain connected lateroventrally. Anterior hysteronotal shield roughly rectangular, anterior margins slightly concave or straight, anterior angles rounded, greatest length 215–223, width at anterior margin 110–115; entire surface with small pit-like lacunae as on posterior part of prodorsal shield. Length of lobar region 82–86, width 72–77, anterior margin slightly convex. Terminal cleft parallel-sided, very narrow, 45–47 long, 4–5 wide at midlevel. Supranal concavity present, circular. Setae *f2* present. Setae *h1* on lobar shield, approximately at level of supranal concavity. Setae *h2* spindle-like, 39–42 long, 7–8 wide. Setae *ps1* near inner margins of opisthosomal lobes. Setae *h3* 12–15 long, about 1/5–1/6 of terminal appendages. Distance between dorsal setae: *c2:d2* 108–115, *d2:e2* 98–106, *e2:h2* 40–42, *h2:h3* 40–44, *d1:d2* 46–48, *e1:e2* 40–47, *h1:h2* 20–24, *h2:ps1* 26–28, *h1:h1* 31–38, *h2:h2* 57–62.

Epimerites I fused as a Y, sternum about ¼ of total length of epimerites (Fig. 2B). Coxal fields I, II without wide sclerotized areas. Epimerites IVa absent. Translobar apodemes of opisthosomal lobes present, wide, fused each other anterior to terminal cleft. Epigynum horseshoe-shaped, lateral parts widened, with small ledge, greatest width 55–58. Copulatory opening situated immediately posterior to anal opening. Proximal part of primary spermaduct near head of spermatheca slightly thickened; head of spermatheca with cup-like structure having tooth-like extensions; secondary spermaducts very short, 4–5 in length (Fig. 3F). Distance between pseudanal setae: *ps2:ps2* 42–44, *ps3:ps3* 23–25, *ps2:ps3* 10–11.



**FIGURE 1.** *Montesauria abroscopi* sp. n., male. **A**—dorsal view, **B**—ventral view.

Legs I slightly longer than legs II; femur II with angle-shaped ventral crest; other segments of legs I, II without processes. Solenidion  $\sigma 1$  of genu I, 5–6 long, situated slightly closer to distal margin of this segment. Genual setae  $cGI$ ,  $cGII$ ,  $mGI$  filiform,  $mGII$  spiculiform. Setae  $d$  of tarsi II–IV longer than corresponding setae  $f$ . Genu IV

strongly inflated dorsally, with narrow longitudinal crest, genu III with narrow longitudinal crest (Figs. 3G, H). Solenidion  $\phi$  of tibia IV much shorter than that on tibia III. Length of solenidia:  $\omega$ I 10–12,  $\omega$ III 7–9,  $\phi$ I 56–58,  $\phi$ II 44–46,  $\phi$ III 17–20,  $\phi$ IV 5–7.

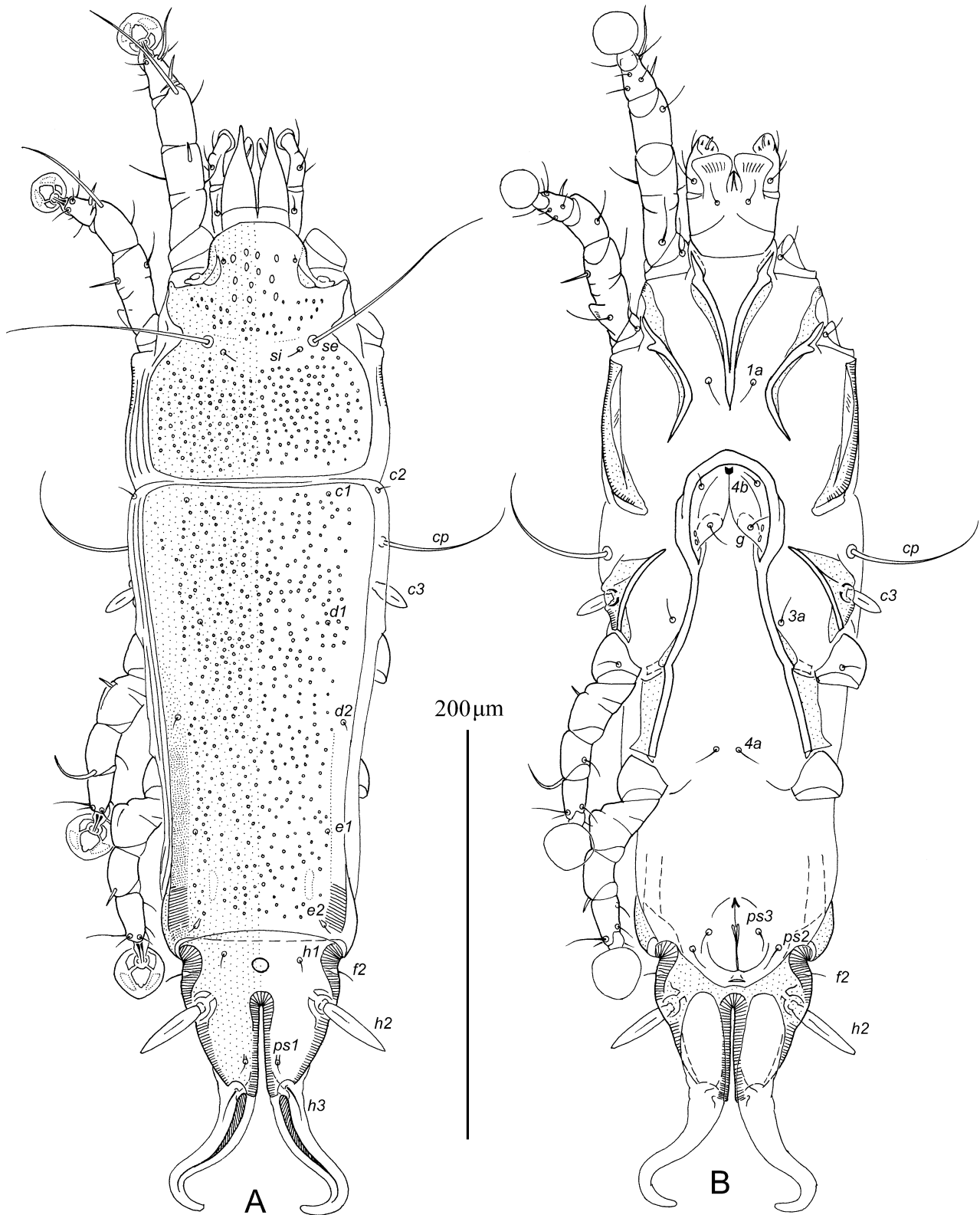
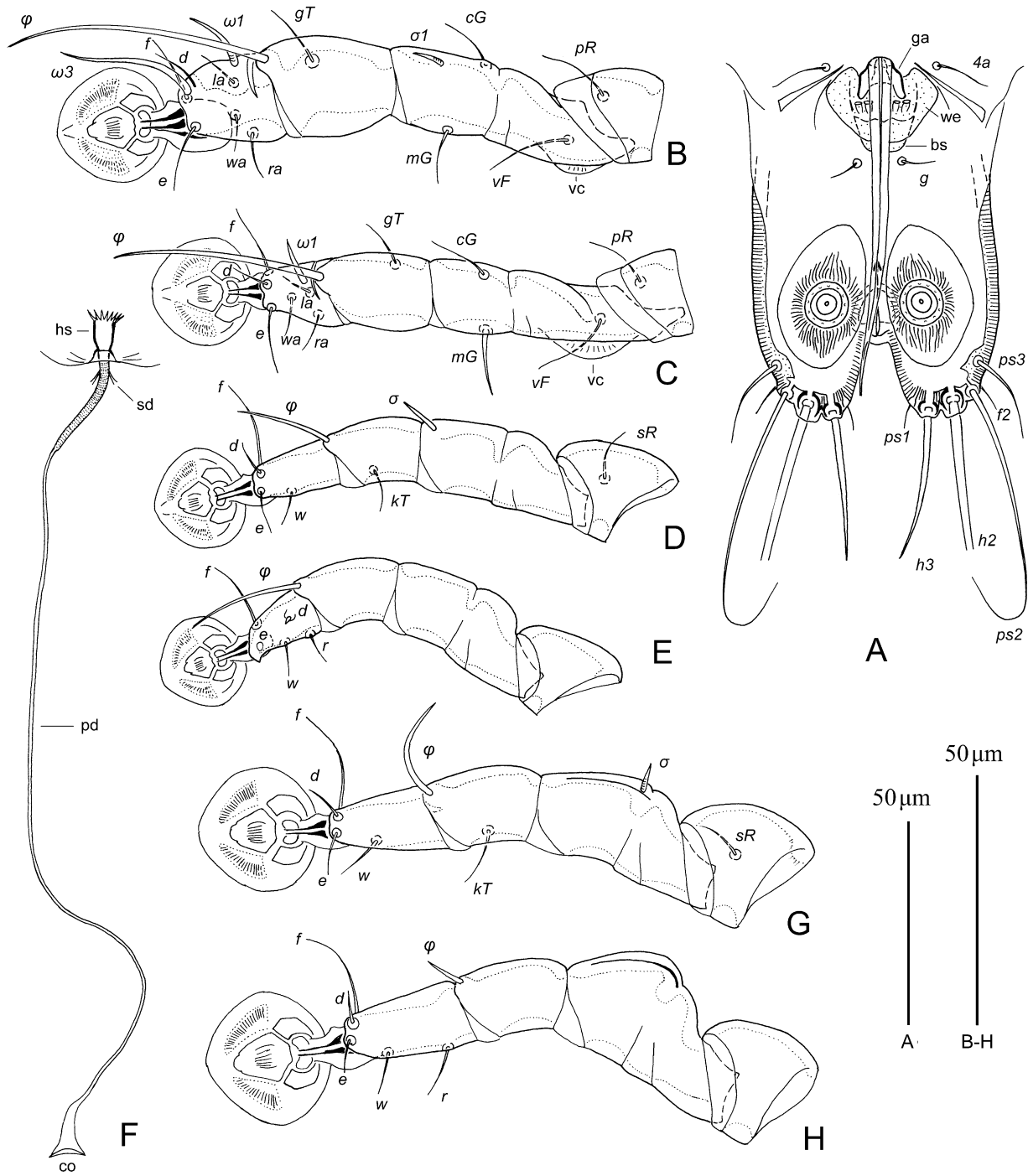


FIGURE 2. *Montesauria abroscopi* sp. n., female. A—dorsal view, B—ventral view.



**FIGURE 3.** *Montesauria abroscopi* sp. n., details. **A**—opisthosoma of male, ventral view, **B–E**—legs I–IV of male, respectively, **F**—head of spermatheca and spermatheca setae, **G, H**—legs III and IV of female, respectively. bs—basal sclerite, co—copulatory opening, ga—genital arch, hs—head of spermatheca, pd—primary spermatheca, sd—secondary spermatheca, vc—ventral crest of femora I, II, we—wing-like extensions of genital arch.

**Differential diagnosis.** *Montesauria abroscopi* sp. n. belongs to the *papillo* species group (Mironov 2006) and among its previously known species is most close to *M. eurycalyx* (Gaud, 1964), described from *Cisticola brachyptera* (Sharpe) (Cisticolidae) by having the following features in males: the genital arch has relatively short wing-like extensions, the basal sclerite of the genital arch is trapezium-shaped, the aedeagus extends to the level of terminal cleft, and setae *h3* are spiculiform. *Montesauria abroscopi* differs from that species by the following features:



in both sexes, the prodorsal and hysteronotal shields are covered with numerous small circular lacunae (Figs. 1A, 2A); in males, the terminal cleft is narrow trapezoidal in form, the inner margins of epimerites IIIa have narrow extensions directed backward and bearing setae *4b* (Fig. 1B), setae *h3* 32–36 long, seta *d* of tarsus IV is short spiculiform sitting on small inflated base (Fig. 3E); in females, the posterior margin of prodorsal shield is straight, and the primary spermaduct is slightly enlarged in the proximal 1/8<sup>th</sup>. In both sexes of *M. eurycalyx*, the prodorsal and hysteronotal shields lack lacunae; in males, the terminal cleft is angle-shaped, the inner margins of epimerites IIIa have no extensions, setae *h3* are 65–75 long, seta *d* of tarsus IV is button-like; in females, the posterior margin of prodorsal shield is sinuous, and the proximal enlargement of the primary spermaduct is about 1/3<sup>rd</sup> of its total length.

**Remark.** Within the *papillo* species group, *M. abroscopi* and two more species described below in the present paper (*M. phylloscopi* sp. n. and *M. seicerci* sp. n.) constitute a distinct complex of closely related species, characterized by the following combination of features in males: the anterior margin of prodorsal shield has a short blunt-angular extension, the terminal cleft is shaped as a narrow trapezium, the anterior margin of the terminal cleft is slightly convex, the inner margins of epimerites IIIa have a narrow extension directed backward and bearing the bases of setae *4b*, and seta *d* of tarsus IV is short spiniform sitting on small inflation (Figs. 1A, 3A, E.)

**Etymology.** The specific epithet derives from the generic name of the host, and is a noun in the genitive case.

### ***Montesauria macronoi* sp. n.**

(Figs 4–6)

**Type material.** Male holotype (ZISP 4730), 12 male and 4 female paratypes from *Macronous gularis* (Horsfield) (Timaliidae), VIETNAM: Ninh Binh, Cuc Phuong National Park, 20°21' N 105°35' E, 1 February 2010, coll. I. Literak, Nguen Manh Hung and M. Capek.

**Type depository.** Holotype, 10 male and 2 female paratypes—ZISP, remaining paratypes—UMMZ, IEBR.

**Description.** MALE (holotype, range for 10 paratypes). Length of idiosoma 352 (345–360), width 117 (113–120), length of hysterosoma 240 (225–240). Prodorsal shield: entire, antero-lateral extensions short and rounded, lateral margins with shallow incisions extending to bases of setae *se*, posterior margin straight, length of shield 102 (100–105), width 88 (85–90), surface without ornamentation (Fig. 4A). Setae *ve* absent. Scapular setae *se* separated by 53 (50–55). Scapular shields narrow. Humeral shields absent. Setae *cp* and *c2* situated on striated tegument. Subhumeral setae *c3* lanceolate, 18 (18–20) × 7 (6.5–7.5). Hysteronotal shield: length 245 (235–248), width at anterior margin 77 (70–80), anterior margin slightly concave or straight, anterior part may bear sparse transverse dashes.

Opisthosomal lobes short, slightly longer than wide, straight, posterolateral margin rounded; lobar apex with pair of blunt teeth at bases of setae *h3*. Terminal cleft narrow, almost parallel-sided, length 24 (22–25), greatest width 5 (3–5). Supranal concavity circular, well outlined, 13 (11–13) in diameter. Setae *f2* slightly anterior to bases of setae *ps2*. Setae *h1* situated at level of anterior margin of supranal concavity. Setae *ps1* situated at level of opisthosomal lobe bases, equidistant from outer and inner margins of these lobes. Setae *h3* lanceolate, 42 (39–43) long, 9 (9–11) wide; setae *ps2* 36 (30–36) long. Distance between dorsal setae: *c2:d2* 95 (92–98), *d2:e2* 84 (75–85), *e2:h3* 58 (55–60), *d1:d2* 39 (35–40), *e1:e2* 25 (22–27), *h1:ps2* 27 (22–28), *ps1:h3* 18 (18–21), *h2:h2* 37 (35–40), *h3:h3* 22 (20–24), *ps2:ps2* 47 (43–48).

Epimerites I fused into a Y, sternum over 1/2 of total length of epimerites, posterior end of sternum connected to middle parts of epimerites II by transverse branches (Fig. 4B). Epimerites II elongate, extending to level of sejugal furrow. Coxal fields I, II without wide sclerotized areas. Rudimentary sclerites rEpIIa absent. Coxal fields I closed, coxal fields II, III almost closed. Anterior tips of epimerites IIIa connected to each other by transverse sclerite. Medial part of epimerites III with long extensions directed backward and bearing setae *4b*. Coxal fields IV without sclerotized area at bases of trochanters IV. Epimerites IVa present, short. Genital arch small, with short and rounded wing-like extensions, 16 (13–16) in length, 25 (24–26) in width including extensions; basal sclerite of genital apparatus shaped as inverted trapezium; aedeagus 115 (115–120) long, almost extending to lobar apices (Fig. 6A). Genital papillae not connected by their bases, arranged in rectangle or trapezium. Anal suckers 13.5 (12–14) in diameter, corolla with 11–12 indentations, surrounding membrane with radial striae. Opisthoventral shields narrow, with short and oblique extension bearing setae *ps3* at level of anal suckers. Distance between ventral setae: *3a:4b* 7 (7–9), *4b–4a* 55 (45–55), *4a–g* 35 (33–36), *g–ps3* 44 (44–48), *ps3–ps3* 49 (47–50), *ps3:h3* 40 (36–40).

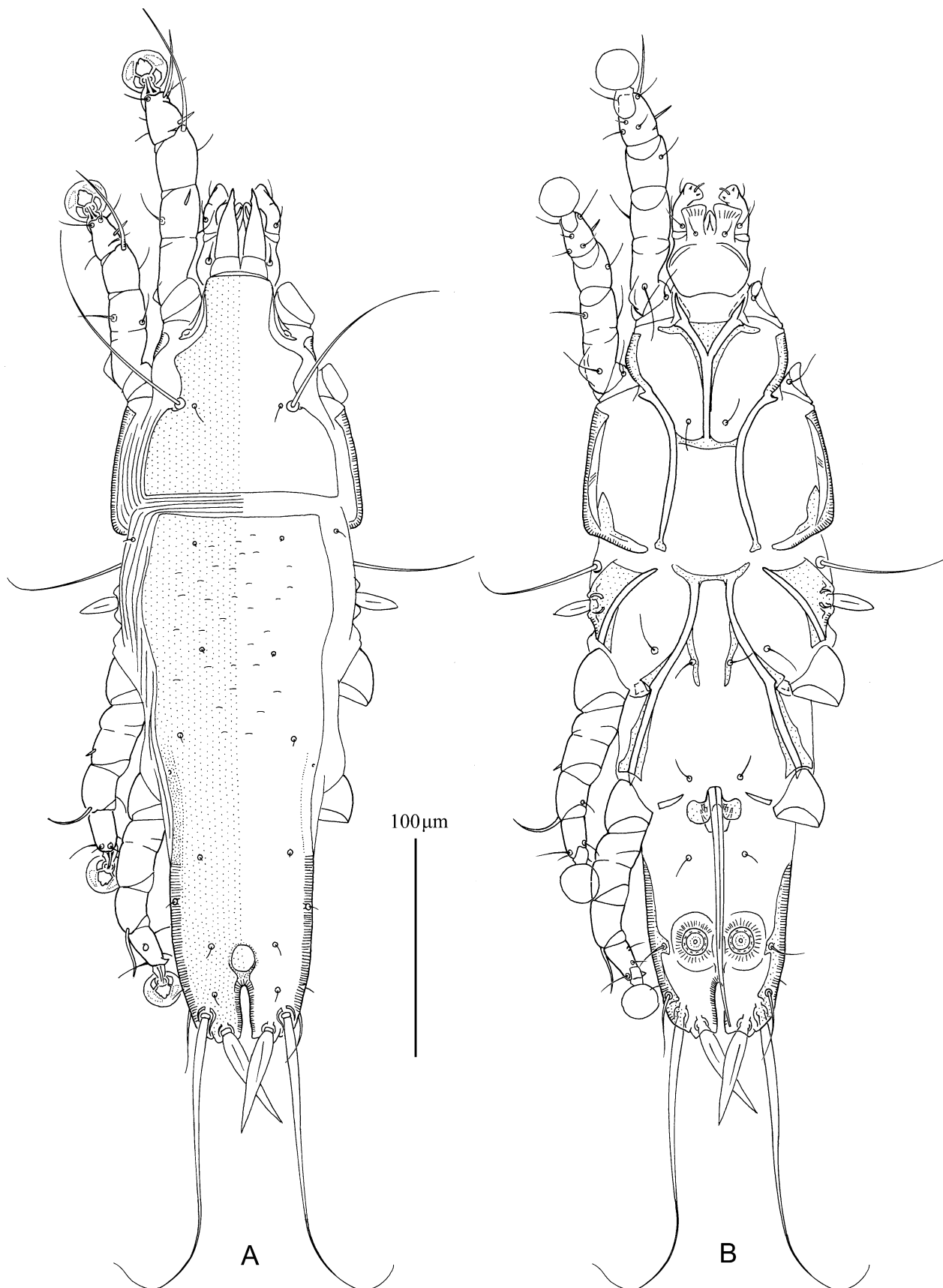


FIGURE 4. *Montesauria macronoi* sp. n., male. A—dorsal view, B—ventral view.

Legs I thicker and slightly longer than legs II; femora I, II with ventral crest, other segments of legs I, II without processes. Solenidion  $\sigma I$  of genu I spiculiform, 6 (4–6) long, situated in distal half of segment. Genual setae  $cGI$ ,  $cGII$ ,  $mGI$ ,  $mGII$  filiform. Seta  $d$  of tarsi II, III shorter than corresponding seta  $f$ . Legs III, IV similar in size. Trochanters III without setae  $sRIII$ . Solenidion  $\varphi$  of tibia IV extending to midlevel of ambulacral disc. Tarsus IV 20 (19–20) long, with short apical claw-like process; setae  $d$  button-like, situated at midlevel of segment, seta  $e$  indistinct (Figs 6B–E). Length of solenidia:  $\omega II$  11 (10–12),  $\omega III$  8 (6–8),  $\varphi I$  66 (62–67),  $\varphi II$  43 (41–44),  $\varphi III$  22 (22–23),  $\varphi IV$  22 (20–24).

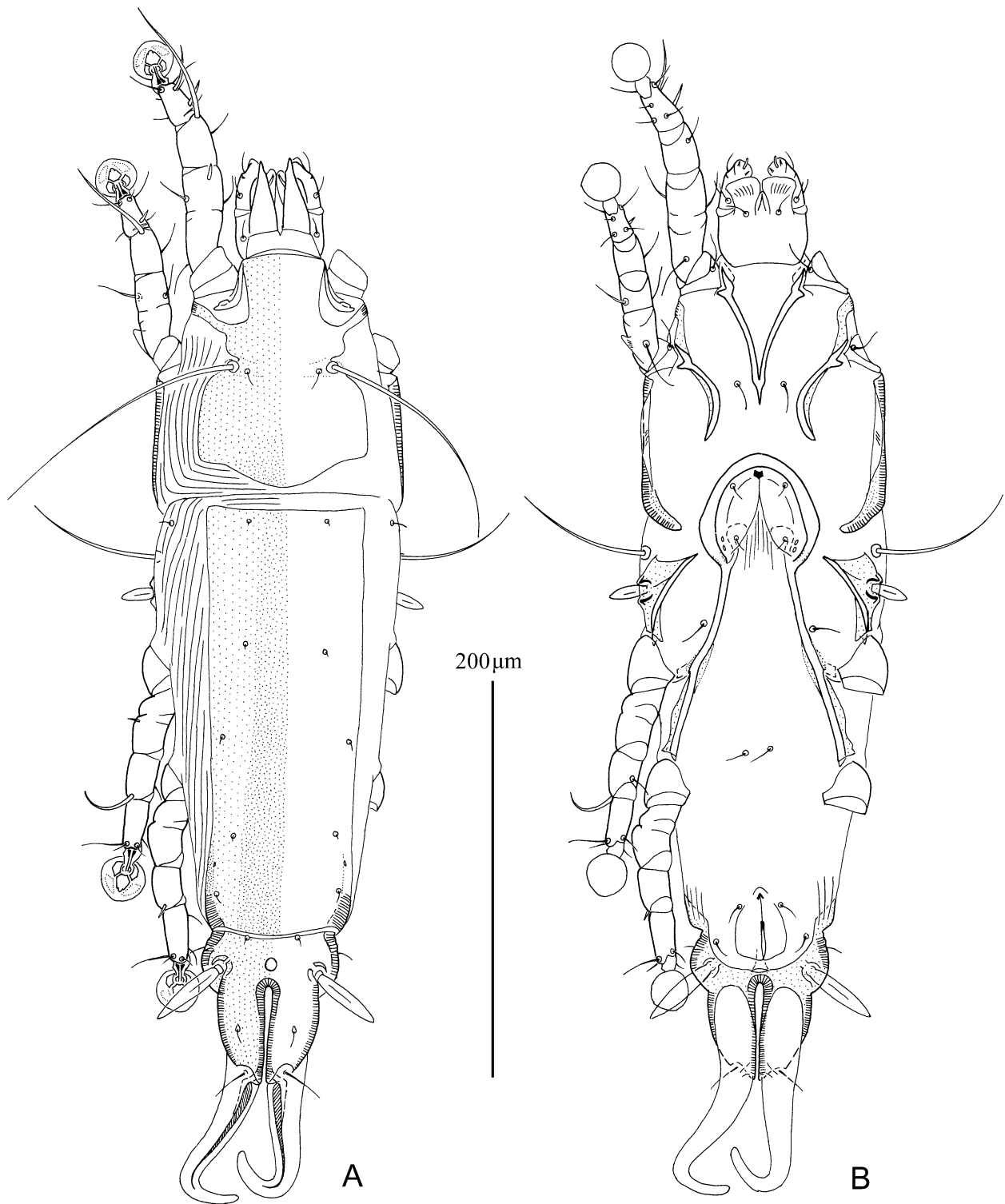
FEMALE (4 paratypes). Length of idiosoma 423–455, width 125–145, length of hysterosoma 285–310. Prodorsal shield: entire, antero-lateral extensions narrow and connected with bases of epimerites Ia, lateral margins with incisions extending to bases of setae  $se$ , posterior margin strongly convex, length 120–130, width 88–93, surface without ornamentation, postero-medial part sclerotized more strongly than remaining surface of this shield (Fig. 5A). Setae  $ve$  absent. Setae  $se$  separated by 53–58. Scapular shields narrow. Humeral shields absent; setae  $cp$  and  $c2$  situated on soft tegument. Setae  $c3$  lanceolate,  $17-20 \times 6.5-7$ . Anterior and lobar pieces of hysteronotal shield separated dorsally by narrow transverse groove but remain connected ventro-laterally by narrow bands. Anterior hysteronotal part of shield roughly rectangular, anterior margin straight, length 215–236, width at anterior margin 88–95, surface without ornamentation, median area sclerotized noticeably more strongly than lateral parts of this shield. Length of lobar region 77–82, width 73–75, anterior margin shallowly concave. Terminal cleft parallel-sided, narrow, lateral margins almost touching, length 48–52, width at midlevel 2–8. Supranal concavity circular, small. Setae  $h1$  situated near anterior margin of lobar shield. Setae  $h2$  spindle-like,  $40-45 \times 7-8$ . Setae  $ps1$  equidistant from inner and outer margins of opisthosomal lobes. Setae  $h3$  17–21 long, about  $1/4^{\text{th}}$  the length of terminal appendages. Distance between dorsal setae:  $c2:d2$  115–122,  $d2:e2$  95–100,  $e2:h2$  37–40,  $h2:h3$  55–57,  $d1:d2$  40–45,  $e1:e2$  35–37,  $h1:h2$  11–13,  $h2:ps1$  28–33,  $h1:h1$  23–29,  $h2:h2$  50–58.

Epimerites I fused into a Y with very short and acute stem. Lateral parts of coxal fields I, II without heavily sclerotized areas (Fig. 5B). Epimerites IVa absent. Translobar apodemes of opisthosomal lobes present, wide, fused to each other anterior to terminal cleft. Epigynum horseshoe-shaped, outer margins without ledge, greatest width 60–68. Copulatory opening situated ventrally, immediately anterior to margin of fused translobar apodemes; proximal end of primary spermaduct slightly thickened, distal one third of primary spermaduct strongly enlarged forming bursa copulatrix; head of spermatheca shaped as tea cup, with sinuous margin; secondary spermaducts short, 11–13 long (Fig. 6F). Distance between pseudanal setae:  $ps2:ps2$  39–41,  $ps3:ps3$  21–23,  $ps2:ps3$  13–15.

Legs I slightly thicker than legs II; femur II with angular ventral crest (Fig. 6G); other segments of legs I, II without processes. Solenidion  $\sigma I$  of genu I 6.5–7.5 long. Genual setae  $cGI$ ,  $cGII$ ,  $mGI$ ,  $mGII$  filiform. Setae  $d$  of tarsi II–IV slightly longer than corresponding setae  $f$ . Genua III, IV without noticeable dorsal inflation (Figs. 6H, I). Trochanteral setae  $sRIII$  absent. Length of solenidia:  $\omega II$  14–15,  $\omega III$  7–8,  $\varphi I$  62–70,  $\varphi II$  45–47,  $\varphi III$  24–26,  $\varphi IV$  3.5–4.5.

**Differential diagnosis.** *Montsauria macronoi* sp. n. strongly differs from all *Montsauria* species characterized by the presence of setae  $f2$  (Mironov 2006). Among previously described species, this species could be formally compared with species of the *heterocaula* species group, for instance with *M. nesocharis* Mironov and Fain, 2003 from *Nesocharis shelleyi* (Alexander) (Estrildidae), because of having elongated epimerites II and lanceolate setae  $h3$  in males and of the absence of setae  $ve$  in both sexes. *Montsauria macronoi* differs from that species and other representatives of the species complex “with setae  $f2$ ” by the following features. In both sexes, trochanteral setae  $sRIII$  are absent, coxal fields I, II lack large heavily sclerotized areas. In males, the terminal cleft is parallel-sided and narrow, setae  $ps1$  are situated in the middle of opisthosomal lobes and approximately equidistant from their inner and outer margins; the aedeagus almost extends to the level of lobar apices. In females, setae  $ps1$  are situated dorsally and approximately equidistant from the margins of opisthosomal lobes; the head of spermatheca is cup-shaped, the distal one third of the primary spermaduct is enlarged forming a rather long bursa copulatrix.

In both sexes of *M. nesocharis*, trochanteral setae  $sRIII$  are present, lateral parts of coxal fields I, II are heavily sclerotized; in males, the margins of the terminal cleft are strongly divergent, setae  $ps1$  are situated on the inner margin of the opisthosomal lobes, the aedeagus does not extend to the level of the terminal cleft; in females, setae  $ps1$  are situated on the inner margins of the opisthosomal lobes, the head of spermatheca is cylindrical and longitudinally striated, the primary spermaduct is enlarged near the copulatory opening only.

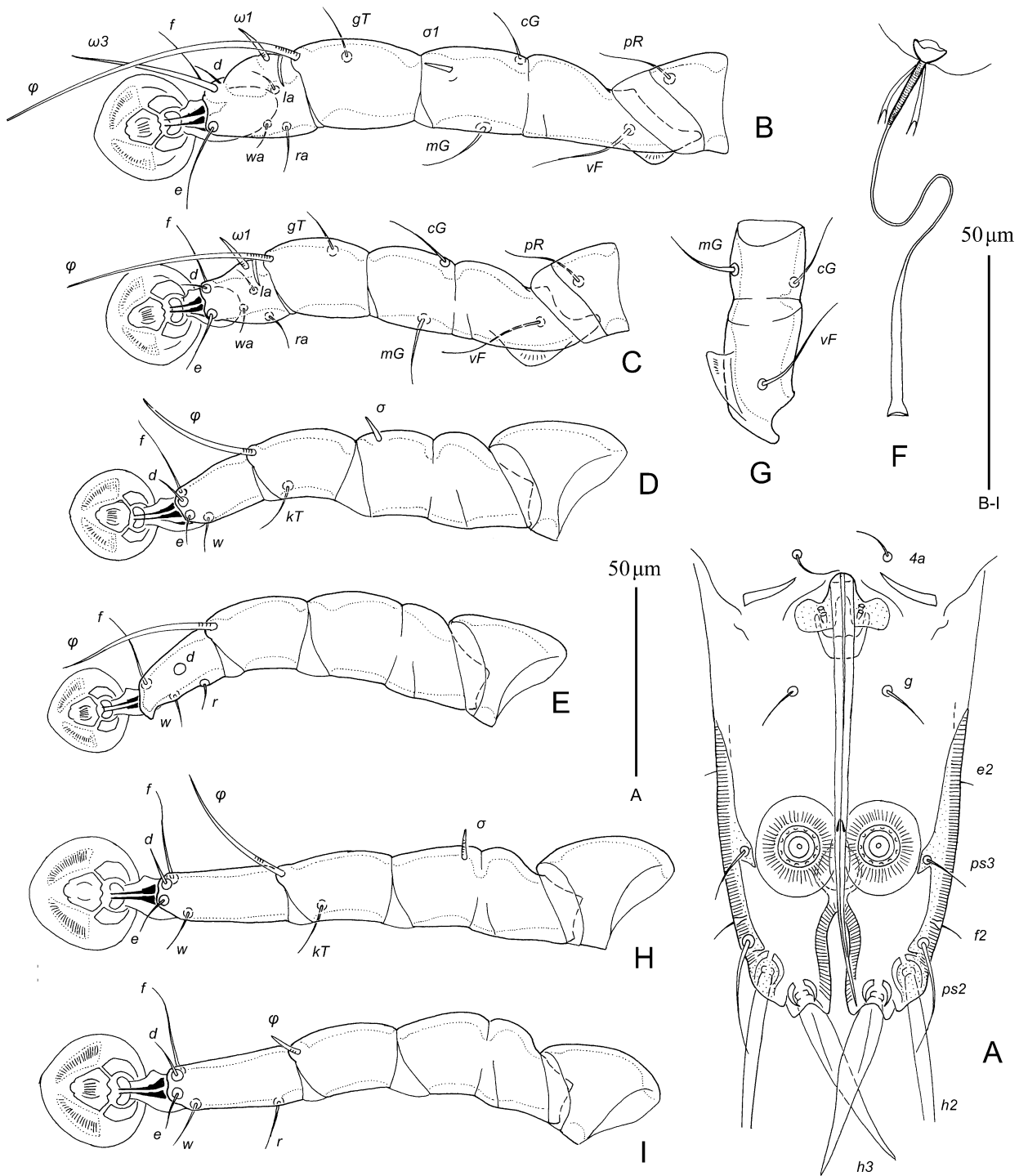


**FIGURE 5.** *Montesauria macronoi* sp. n., female. **A**—dorsal view, **B**—ventral view.

**Remark.** *Montesauria macronoi* sp. n. and the next species, *M. pellernei* sp. n., are strongly different from all previously described species, and we arrange them here into a separate species group *macronoi*. Based on the set of characters proposed for diagnoses of species groups of the genus *Montesauria* (Mironov 2006), the *macronoi* species group is characterized by the following combination of features. Both sexes: setae *f2* present; coxal fields I, II without large sclerotized area; setae *c2* situated dorsally and off hysteronotal shield, trochanteral setae *sRIII* absent. Male: setae *h1* anterior to terminal cleft; setae *ps1* situated in the middle of opisthosoma, distantly from

inner margins of lobes; opisthosomal lobes short (not longer than wide), not narrowed apically, lobar apex with pair of blunt teeth, lateral margin with rounded extensions at base of setae *h2*; setae *h3* lanceolate, genital arch small with short lateral extensions; sternum long and connected to epimerites II; coxal fields III open, coxal fields IV without large sclerotized areas; legs III, IV without ventral apophyses. Female: setae *ps1* situated dorsally, distant inner margins of opisthosomal lobes, anterior hysteronotal and lobar shields separated dorsally; legs I, II not modified.

**Etymology.** The specific epithet is taken from the generic name of the host, and is a noun and is a noun in the genitive case.



**FIGURE 6.** *Montesauria macronoi* sp. n., details. **A**—opisthosoma of male, ventral view, **B–E**—legs I–IV of male, respectively, **F**—head of spermatheca and spermatheca, **G**—femur and genu II of female, **H, I**—legs III and IV of female, respectively.

***Montsauria pellornei* sp. n.**

(Figs. 7–9)

**Type material.** Male holotype (ZISP 4743), 9 male and 10 female paratypes from *Pellorneum ruficeps* Swainson (Pellorneidae), **VIETNAM:** Ninh Binh, Cuc Phuong National Park, 20°21' N 105°35' E, 1 February 2010, coll. I. Literak, Nguen Manh Hung and M. Capek.

**Type depository.** Holotype, 7 male and 8 female paratypes—ZISP, remaining paratypes—UMMZ, IEBR.

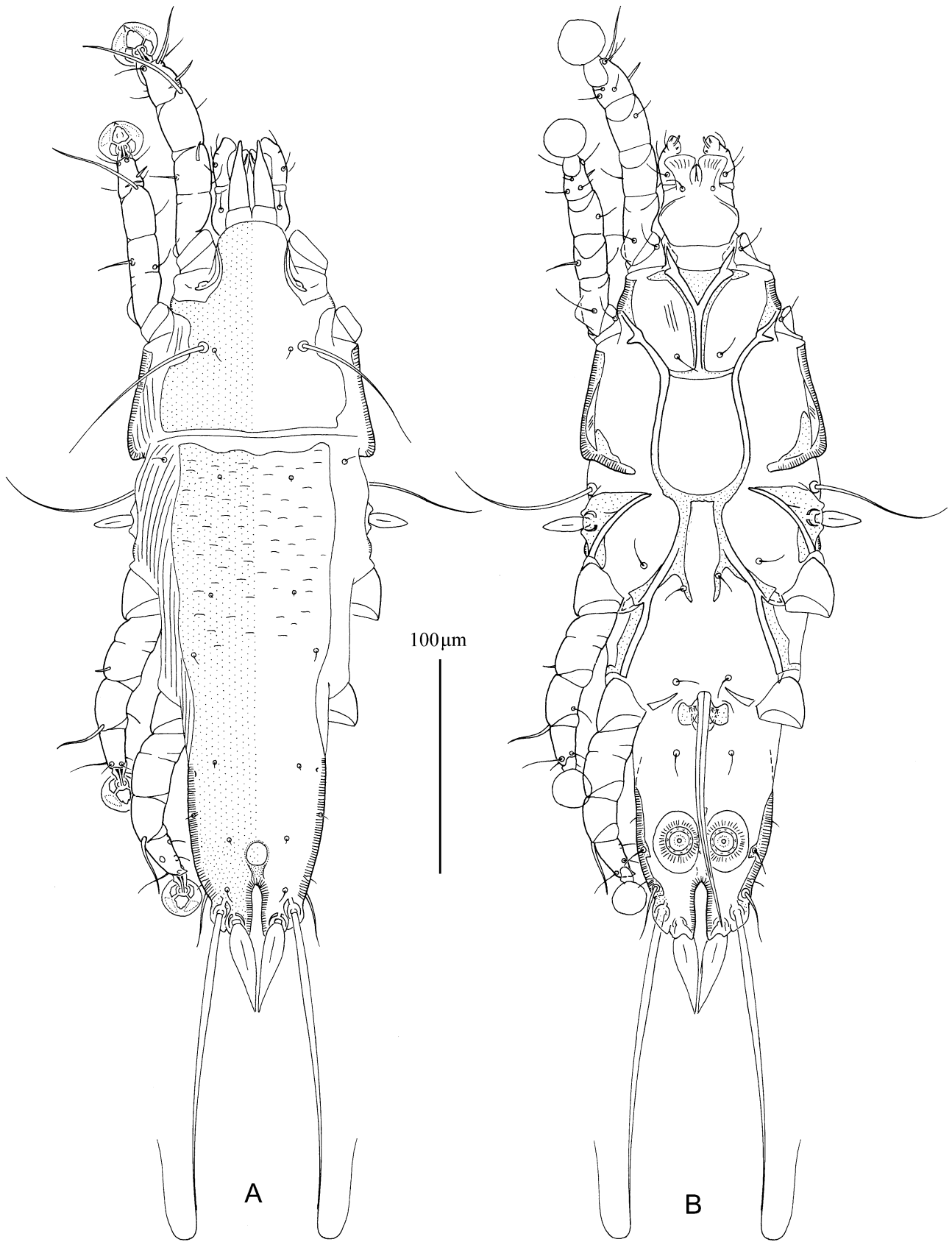
**Description.** MALE (holotype, range for 9 paratypes). Length of idiosoma 340 (335–355), width 115 (113–123), length of hysterosoma 218 (210–235). Prodorsal shield: entire, antero-lateral extensions narrow, connected with bases of epimerites Ia, lateral margins with shallow incisions not extending to bases of setae *se*, posterior margin almost straight, length of shield 82 (90–98), width 88 (86–93), surface without ornamentation (Fig. 7A). Setae *ve* absent. Scapular setae *se* separated by 48 (48–52). Scapular shields narrow. Humeral shields absent. Setae *cp* and *c2* situated on soft tegument. Subhumeral setae *c3* lanceolate, 20 (19–21) × 7.5 (7–8). Hysteronotal shield: length 223 (220–245), width at anterior margin 75 (73–78), anterior margin slightly sinuous, anterior half with sparsely disposed dash-like transverse striae.

Opisthosomal lobes short, slightly longer than wide, straight, posterolateral margin rounded; lobar apex with pair of blunt teeth at bases of setae *h3* (Fig. 9A). Terminal cleft narrow, almost parallel-sided, length 24 (22–26), greatest width 6 (5–7). Supranal concavity circular, well outlined, 13 (12–13) in diameter. Setae *f2* anterior to bases of setae *ps2*. Setae *h1* situated at level of anterior margin of supranal concavity. Setae *ps1* situated at level of opisthosomal lobe bases, equidistant from outer and inner margins of these lobes. Setae *h3* lanceolate, 45 (42–46) long, 10 (10–11) wide; setae *ps2* 28 (26–30) long. Distance between dorsal setae: *c2:d2* 88 (88–94), *d2:e2* 79 (78–84), *e2:h3* 53 (52–62), *d1:d2* 28 (28–33), *e1:e2* 20 (20–24), *h1:ps2* 27 (25–28), *ps1:h3* 16 (16–18) *h2:h2* 37 (36–40), *h3:h3* 20 (20–22), *ps2:ps2* 44 (44–47).

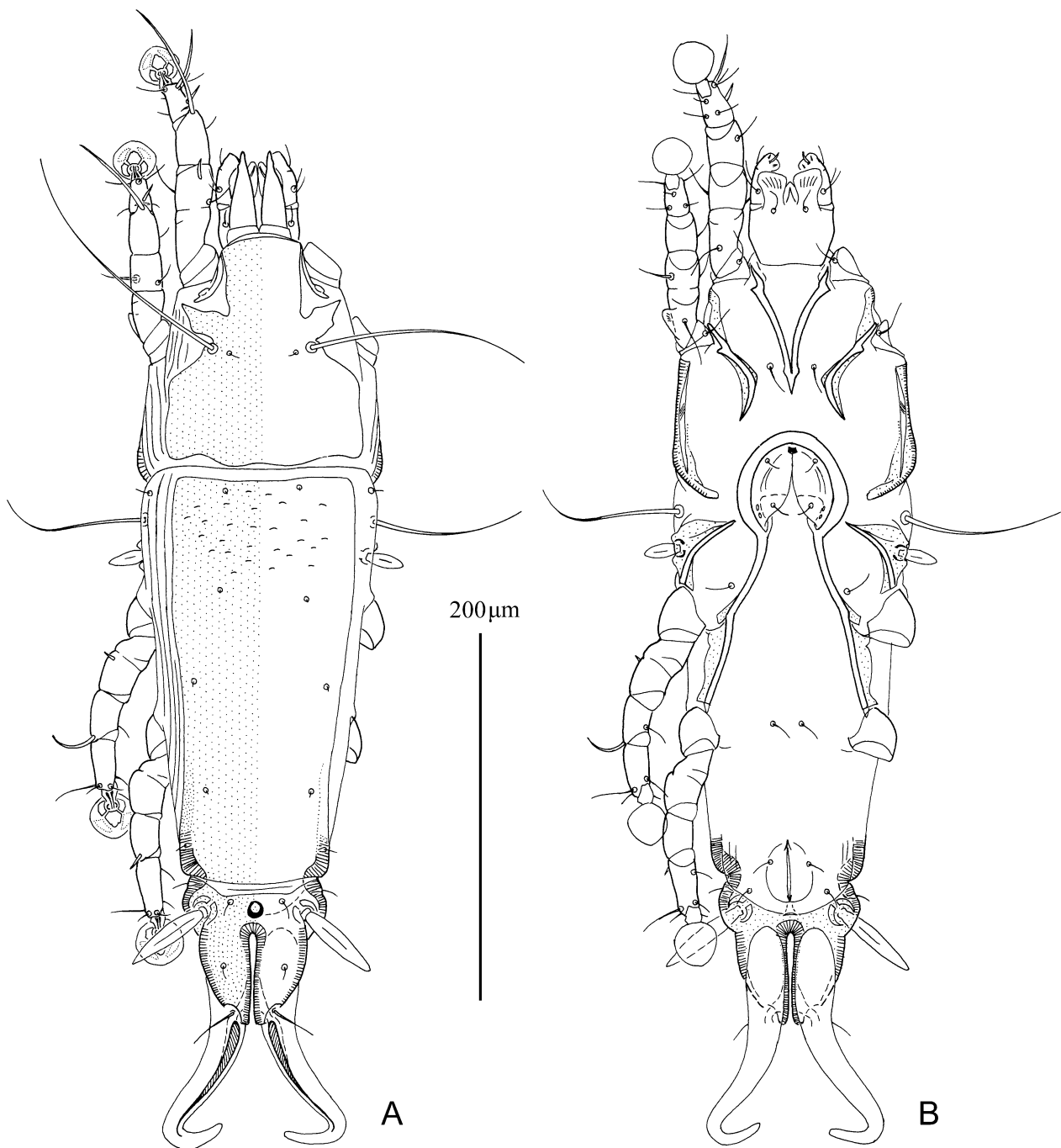
Epimerites I fused into a Y, sternum half as long as total length of epimerites, posterior end of sternum connected to middle parts of epimerites II by transverse branches. Epimerites II strongly elongate, extending to level of sejugal furrow; posterior ends of epimerites II fused with anterior ends of epimerites IIIa, which are in turn connected to each other by transverse sclerite. Posterior end of sternum, posterior parts of epimerites II, and anterior ends of epimerites IIIa form large completely closed frame in median part of ventral propodosoma (Fig. 7B). Medial part of epimerites IIIa with extensions directed backward and bearing bases of setae *4b*. Rudimentary sclerites rEpIIa absent. Coxal fields I closed, coxal fields II, III almost closed. Coxal fields IV without sclerotized area at bases of trochanters IV. Epimerites IVa present, short. Genital arch small, with short lateral extensions, 17 (15–18) in length, 22 (22–25) in width including extensions; basal sclerite of genital apparatus semicircular, small; aedeagus 113 (110–115) long, extending to level of lobar apices (Fig. 9A). Genital papillae not connected by their bases, arranged in transverse row. Anal suckers 13 (11–13) in diameter, corolla with 11–13 indentations. Opisthoventral shields narrow, with short and acute extension bearing setae *ps3* at level of anal suckers. Distance between ventral setae: *3a:4b* 7 (4–10), *4b-4a* 47 (46–51), *4a-g* 36 (35–38), *g-ps3* 46 (45–48), *ps3-ps3* 51 (50–54), *ps3:h3* 36 (36–40).

Legs I slightly longer and thicker than legs II; femora I, II with ventral crest, other segments of legs I, II without processes. Solenidion  $\sigma$ I of genu I 6 (5.5–7) long, situated in distal half of segment; setae *cGI*, *cGII*, *mGI*, *mGII* filiform. Setae *d* of tarsi II, III shorter than corresponding setae *f*. Legs III, IV similar in size. Solenidion  $\phi$  of tibia IV extending to midlevel of ambulacral disc. Tarsus IV 22 (22–24) long, with short apical claw-like process; setae *d* button-like, situated at midlevel of segment, seta *e* indistinct (Figs. 9B–E). Length of solenidia:  $\omega$ II 10 (10–11),  $\omega$ III 7 (7–9),  $\phi$ I 60 (60–65),  $\phi$ II 45 (45–49),  $\phi$ III 22 (22–24),  $\phi$ IV 27 (27–30).

FEMALE (10 paratypes). Length of idiosoma 427–442, width 130–140, length of hysterosoma 295–315. Prodorsal shield: entire, antero-lateral extensions acute, lateral margins with incision extending to bases of setae *se*, posterior margin sinuous, length 120–130, width 102–110, surface without ornamentation (Fig. 8A). Setae *ve* absent. Setae *se* separated by 52–55. Scapular shields not developed dorsally. Humeral shields absent; setae *cp* and *c2* situated on soft tegument. Setae *c3* lanceolate, 17–18 × 6–7. Anterior and lobar pieces of hysteronotal shield separated dorsally by wide transverse band of soft tegument but remain connected ventro-laterally. Anterior hysteronotal part of shield roughly rectangular, anterior margin straight, length 215–225, width at anterior margin 93–108, anterior part can bear small sparsely disposed transverse dashes. Length of lobar region 77–84, width 75–77, anterior margin shallowly concave. Terminal cleft parallel-sided, narrow, with margins almost touching, length 52–57, width at midlevel 2–5. Supranal concavity circular, well outlined. Setae *h1* on anterior margin of lobar shield. Setae *h2* spindle-like, 45–47 × 8–9. Setae *ps1* approximately equidistant from inner and outer margins of opisthosomal lobes. Setae *h3* short, 22–24 in length, about 1/5<sup>th</sup> the length of terminal appendages. Distance between dorsal setae: *c2:d2* 103–110, *d2:e2* 90–95, *e2:h2* 35–42, *h2:h3* 50–55, *d1:d2* 42–46, *e1:e2* 32–34, *h1:h2* 4–11, *h2:ps1* 22–27, *h1:h1* 24–31, *h2:h2* 55–57.



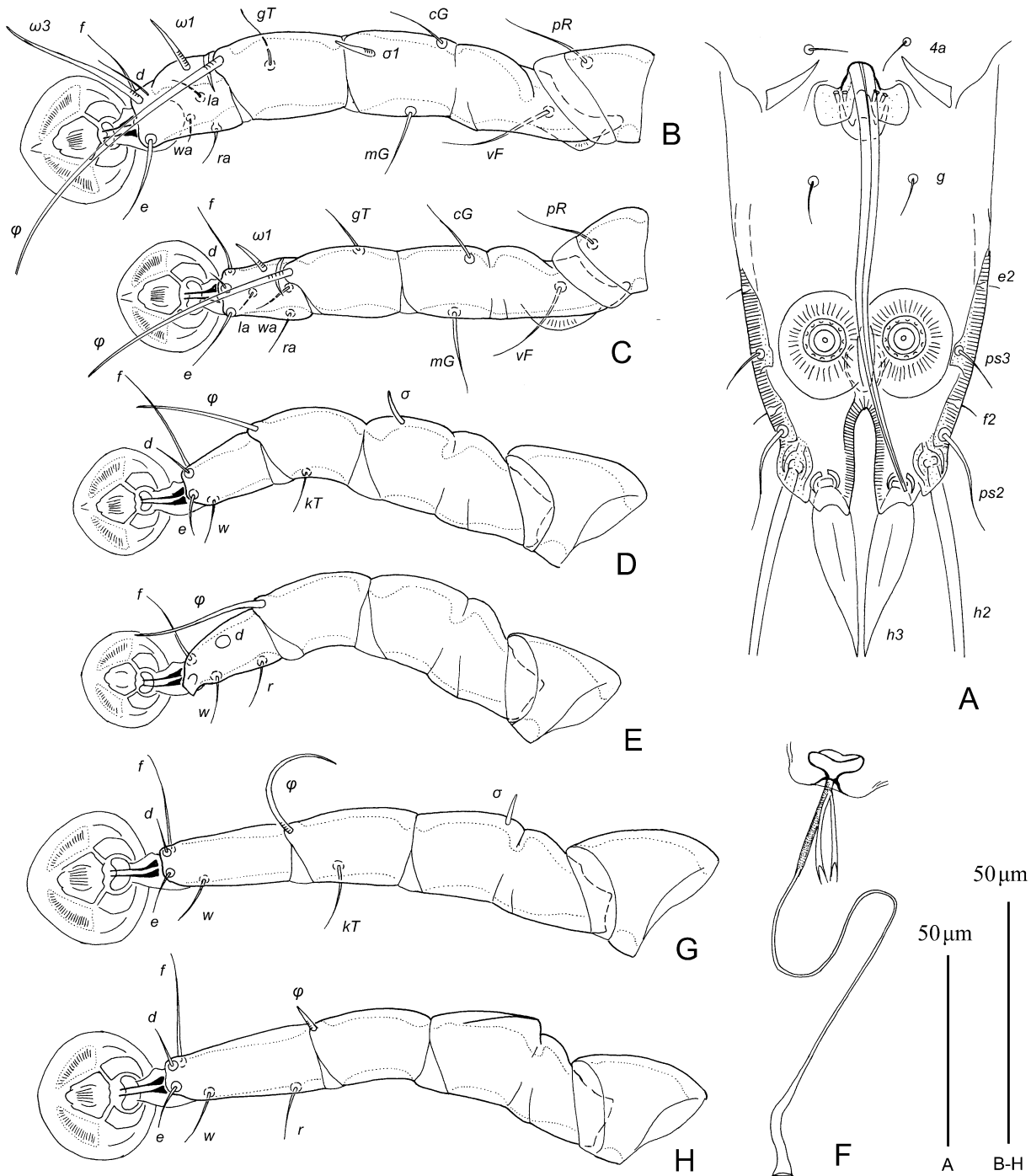
**FIGURE 7.** *Montesauria pellornei* sp. n., male. **A**—dorsal view, **B**—ventral view.



**FIGURE 8.** *Montesauria pellorrei* sp. n., female. **A**—dorsal view, **B**—ventral view.

Epimerites I fused into a Y with very short and acute stem. Lateral parts of coxal fields I, II without heavily sclerotized areas (Fig. 8B). Epimerites IVa absent. Translobar apodemes of opisthosomal lobes present, wide and well sclerotized, fused to each other anterior to terminal cleft. Epigynum horseshoe-shaped, outer margins smooth, greatest width 57–60. Copulatory opening situated ventrally at anterior margin of fused translobar apodemes. Proximal part of primary spermaduct near head of spermatheca slightly thickened, distal 1/5<sup>th</sup> of primary spermaduct enlarged forming bursa copulatrix, head of spermatheca shaped as small cup with sinuous margin, secondary spermaducts 13–15 long (Fig. 9F). Distance between pseudanal setae: *ps2:ps2* 43–45, *ps3:ps3* 20–22, *ps2:ps3* 16–18.





**FIGURE 9.** *Montesauria pellorneri* sp. n., details. **A**—opisthosoma of male, ventral view, **B–E**—legs I–IV of male, respectively, **F**—head of spermatheca and spermaducts, **G, H**—legs III and IV of female, respectively.

Legs I slightly thicker than legs II; femur II with angular ventral crest; other segments of legs I, II without processes. Solenidion  $\sigma 1$  of genu I 6–7 long. Genual setae  $cGI$ ,  $cGII$ ,  $mGI$ ,  $mGII$  filiform. Setae  $d$  of tarsi II, III much shorter than corresponding setae  $f$ . Genu IV without not inflated dorsally, with narrow longitudinal crest (Figs. 9G, H). Length of solenidia:  $\omega I$  9–12,  $\omega III$  5–6,  $\phi I$  66–70,  $\phi II$  50–52,  $\phi III$  22–26,  $\phi IV$  5–7.

**Differential diagnosis.** *Montesauria pellorneri* sp. n. is very close to the previous species, *M. macronoi*; as was mentioned above, these two species constitute a separate species group *macronoi* within the genus *Montesauria*. *Montesauria pellorneri* differs from *M. macronoi* by the following characters: in males, epimerites IIa are connected

with the anterior tips of epimerites IIIa, the postero-median part of ventral propodosoma bears an area completely closed by elements of coxae I–III, the antero-lateral extensions of prodorsal shield are fused with bases of epimerites Ia; in females, the antero-lateral extensions of prodorsal shield are free and acute, the prodorsal and anterior hysteronotal shields are uniformly sclerotized. In males of *M. macronoi*, epimerites IIa are not connected with the anterior tips of epimerites IIIa, the rectangular area in the postero-median part of propodosoma outlined by the coxal elements remains unclosed in postero-lateral angles, the antero-lateral extension of prodorsal shield are free and rounded; in females, the antero-lateral extension of prodorsal shield are connected to bases of epimerites Ia, the postero-median part of prodorsal shield and median part of anterior hysteronotal shields are more strongly sclerotized than remaining areas of these shield.

**Etymology.** The specific epithet is taken from the generic name of the host and is a noun in the genitive case.

### ***Montesauria phylloscopi* sp. n.**

(Figs. 10–12)

**Type material.** Male holotype (ZISP 4759), 4 male and 6 female paratypes from *Phylloscopus ricketti* (Slater) (Phylloscopidae), VIETNAM: Ninh Binh, Cuc Phuong National Park, 20°21' N 105°35' E, 4 February 2010, coll. I. Literak, Nguen Manh Hung and M. Capek.

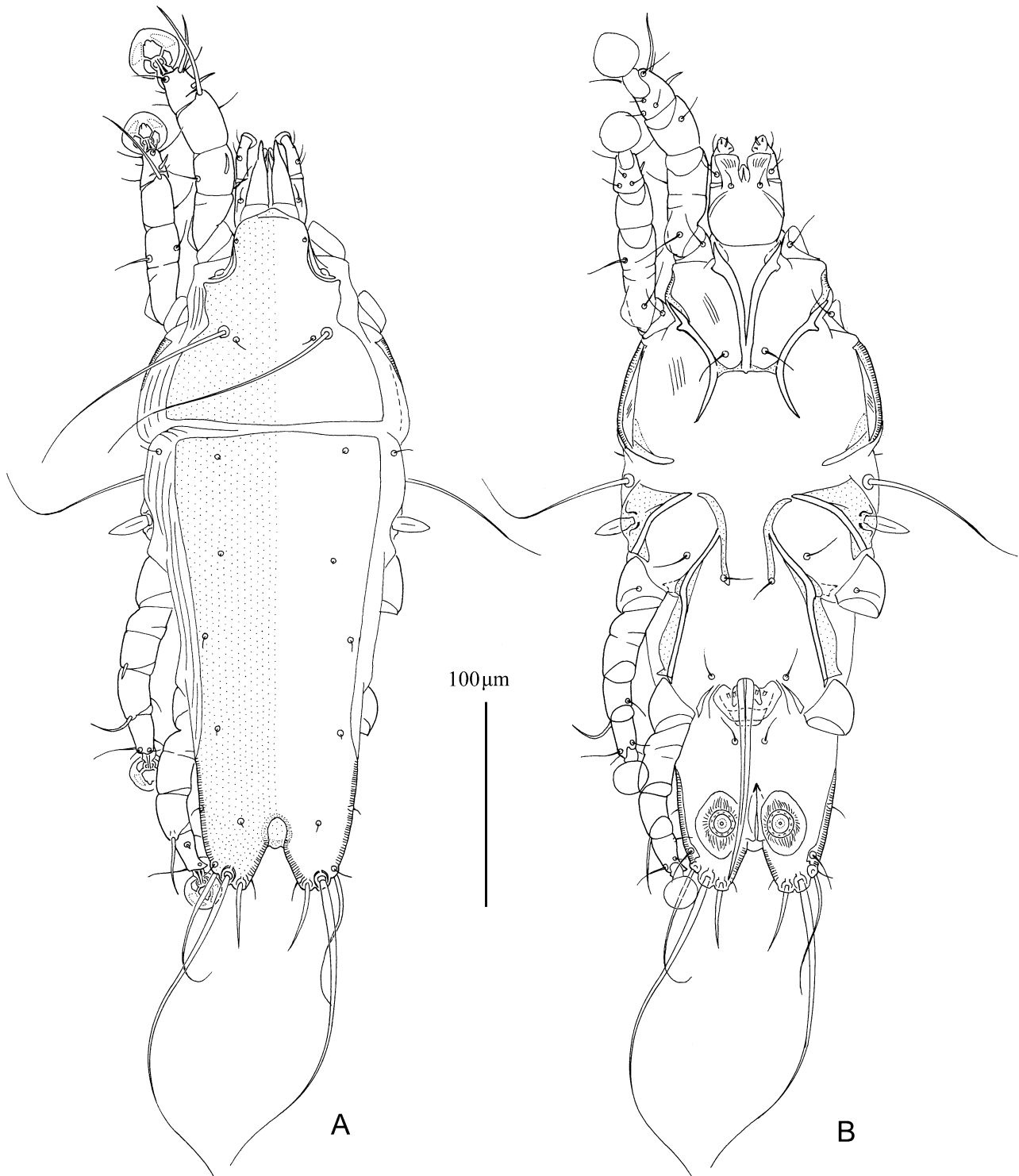
**Type depository.** Holotype, 2 male and 4 female paratypes—ZISP, remaining paratypes—UMMZ, IEBR.

**Description.** MALE (holotype, range for 4 paratypes). Length of idiosoma 334 (320–335), width 128 (125–130), length of hysterosoma 218 (208–220). Prodorsal shield: entire, occupying almost entire prodorsum, antero-lateral extensions short and acute, lateral margins without incisions, posterior margin straight, length of shield 110 (108–111), width 110 (110–113) (Fig. 10A). Setae *ve* represented by microsetae. Scapular setae *se* separated by 49 (48–53). Scapular shields narrow. Humeral shields absent. Setae *cp* and *c2* situated on soft tegument. Subhumeral setae *c3* lanceolate, 19 (19–21) × 8 (8–9). Hysteronotal shield: greatest length 223 (214–225), width at anterior margin 102 (102–108), anterior margin straight, surface without ornamentation.

Opisthosomal lobes short, approximately as long as wide at base, slightly narrowed apically; posterior margin with short and blunt extensions at bases of setae *h2*, *h3*. Terminal cleft as narrow inverted trapezium, anterior margin of this cleft slightly convex, 20 (19–20) in length. Supranal concavity roughly ovate. Bases of setae *f2* and *ps2* at same transverse level. Setae *h1* at level of supranal concavity. Setae *h3* spiculiform, 28 (28–30) long, setae *ps2* 70 (70–75) long; setae *ps1* minute, shorter than 5, situated on inner margin of opisthosomal lobes, slightly anterior to bases of setae *h3*. Distance between dorsal setae: *c2:d2* 88 (85–90), *d2:e2* 83 (77–85), *e2:h3* 40 (38–40), *d1:d2* 40 (32–38), *e1:e2* 37 (36–38), *h1:ps2* 20 (20–21), *h2:h2* 44 (44–48), *h3:h3* 33 (32–34), *ps2:ps2* 56 (55–60).

Epimerites I fused into a Y, sternum about 1/4<sup>th</sup> of total length of epimerites, posterior end of sternum connected to epimerites II by narrow transverse bands (in some specimens one or both bands may be interrupted) (Fig. 10B). Coxal fields I, II without wide sclerotized areas. Rudimentary sclerites rEpIIa absent. Inner margin of epimerites IIIa with narrow extensions directed backward and bearing setae *4b*. Coxal fields I closed, coxal fields II open, coxal fields III nearly closed. Coxal fields IV without sclerotized area at bases of trochanters. Epimerites IVa thin, and short, not extending to bases of setae *4a*. Genital arch small, with short and rounded lateral extension, 17 (17–19) long, 33 (31–34) wide including extensions; basal sclerite shaped as inverted trapezium. Aedeagus 100 (98–100) long, extending almost to level of lobar apices (Fig. 12A). Genital papillae not connected by their bases, arranged in transverse or slightly curved row. Anal suckers 11 (11–12) in diameter, corolla with 13–15 small indentations, surrounding membrane wide, with wavy radial striae. Opisthoventral shields narrow, with very short and acute extension on inner margin. Setae *ps3* situated postero-lateral to anal suckers, approximately at level of anterior margin of terminal cleft. Distance between ventral setae: *3a:4b* 11 (11–12), *4b-4a* 46 (45–47), *4a-g* 31 (26–30), *g-ps3* 55 (51–55), *ps3-ps3* 60 (58–60), *ps3:h3* 15 (15–20).

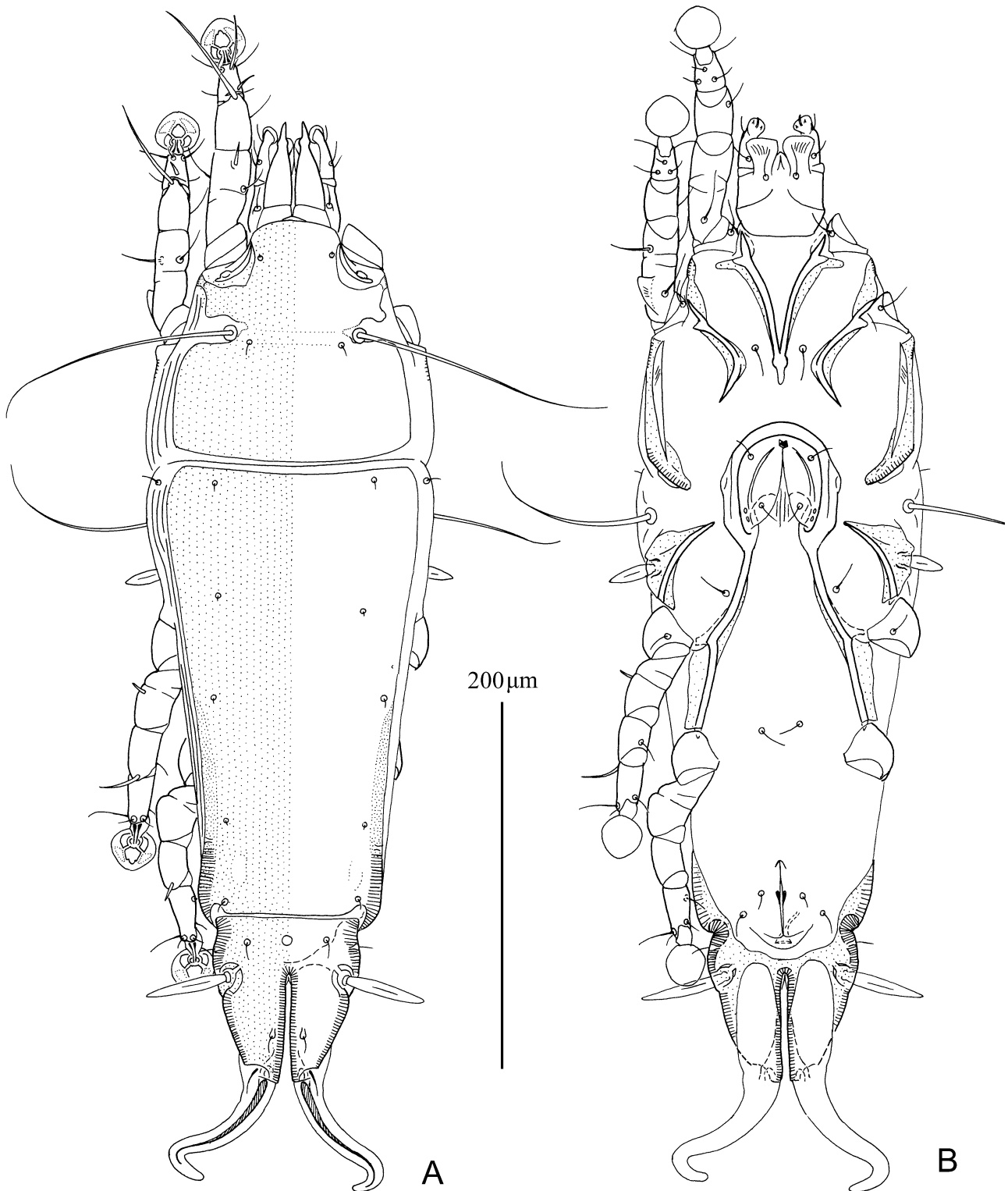
Legs I, especially their tarsus and tibia, thicker than legs II; femora I, II with ventral crest, other segments of legs I, II without processes. Solenidion  $\sigma I$  of genu I 8 (8–9) long, situated at midlevel of segment; genual setae *cGI*, *cGII*, *mGI* filiform, setae *mGII* slightly thicker than these setae in basal part. Seta *d*, *f* of tarsi II, III half as long as corresponding seta *f*. Legs III, IV similar in size. Solenidion  $\phi$  of tibia IV extending to midlevel of ambulacral disc. Tarsus IV 20 (19–20) long, with short apical claw-like extension; seta *e* button-like, seta *d* minute spiculiform, with noticeably inflated bases, situated in proximal half of segment (Figs. 12B–E). Length of solenidia:  $\omega I$  10 (9–10),  $\omega III$  7 (7–8),  $\phi I$  55 (54–56),  $\phi II$  42 (42–44),  $\phi III$  20 (18–20),  $\phi IV$  26 (26–29).



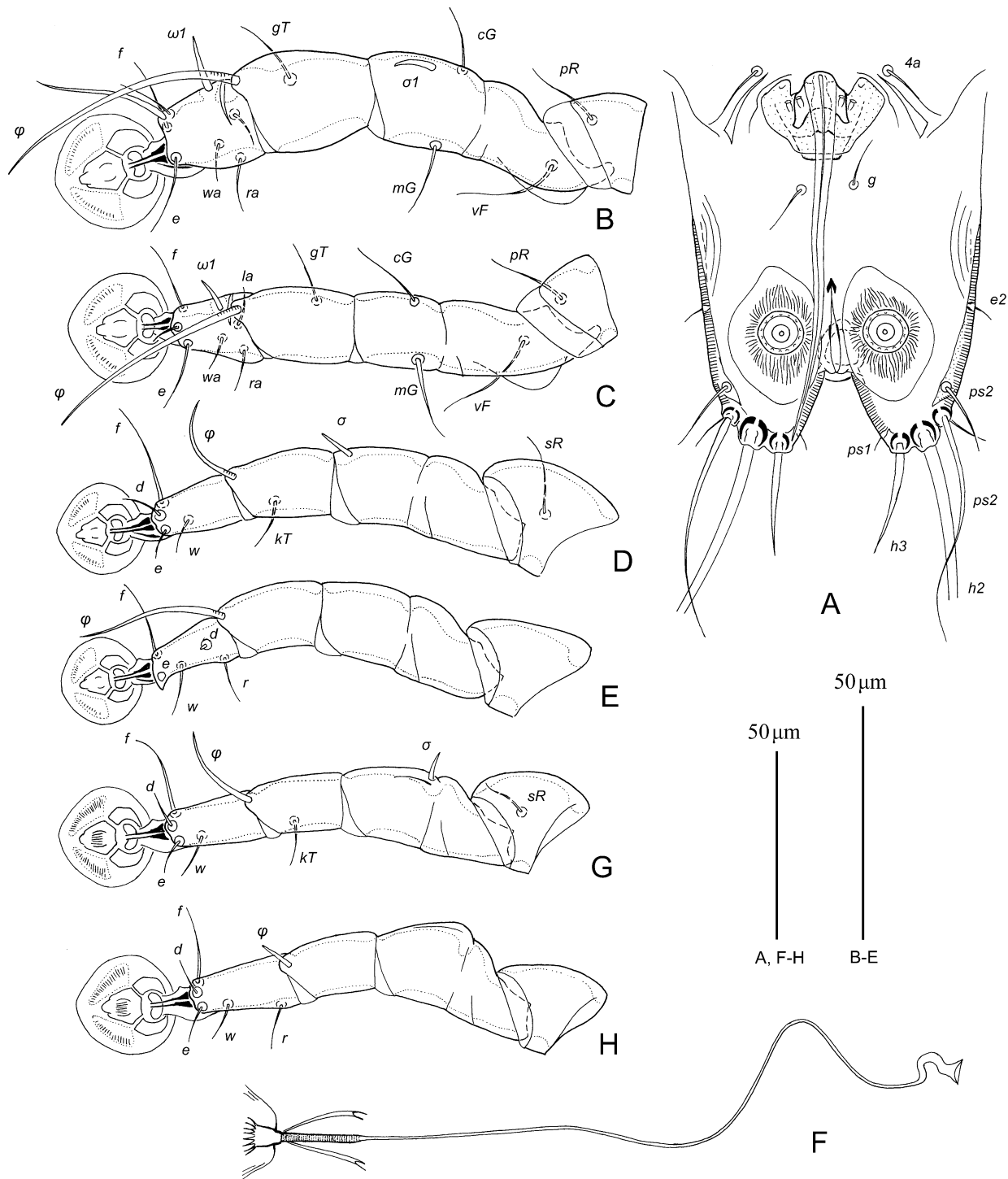
**FIGURE 10.** *Montesauria phylloscopi* sp. n., male. **A**—dorsal view, **B**—ventral view.

**FEMALE** (6 paratypes). Length of idiosoma 455–470, width 146–155, length of hysterosoma 330–340. Prodorsal shield: antero-lateral extensions connected with epimerites Ia, lateral margins with incisions usually encompassing bases of setae *se*, posterior margin slightly convex, length 133–135, width 128–135, surface without ornamentation (Fig. 11A). Setae *ve* represented by microsetae. Setae *se* separated by 70–72. Scapular shields not developed dorsally. Humeral shields absent; setae *cp* and *c2* situated on soft tegument. Setae *c3* lanceolate, 21–22 × 6.5–7.5. Anterior and lobar pieces of hysteronotal shield separated dorsally by narrow transverse band of soft tegument but remain connected ventro-laterally. Anterior hysteronotal shield slightly attenuate posteriorly, anterior margin straight, greatest length 235–245, width at anterior margin 125–135, surface without ornamentation. Length

of lobar region 86–90, greatest width 77–80, anterior margin straight. Terminal cleft parallel-sided, very narrow, length 54–58, width at midlevel 4–5. Supranal concavity circular, small. Setae *h1* on lobar shield, situated at level of supranal concavity. Setae *h2* spindle-like, 43–45 × 7–8. Setae *ps1* closer to inner margins of opisthosomal lobes than to outer ones. Setae *h3* short, 10–12 in length, about 1/5<sup>th</sup> the length of terminal appendages. Distance between dorsal setae: *c2:d2* 120–124, *d2:e2* 105–108, *e2:h2* 42–44, *h2:h3* 46–48, *d1:d2* 51–55, *e1:e2* 40–43, *h1:h2* 20–22, *h2:ps1* 31–33, *h1:h1* 38–44, *h2:h2* 64–66.



**FIGURE 11.** *Montesauria phylloscopi* sp. n., female. **A**—dorsal view, **B**—ventral view.



**FIGURE 12.** *Montesauria phylloscopi* sp. n., details. **A**—opisthosoma of male, ventral view, **B–E**—legs I–IV of male, respectively, **F**—head of spermatheca and spermaducts, **G, H**—legs III and IV of female.

Epimerites I fused into a Y with very short sternum about  $1/5^{\text{th}}$  of total length of epimerites, sternum with short and blunt lateral extensions (Fig. 11B). Lateral parts of coxal fields I, II without heavily sclerotized areas. Epimerites IVa absent. Translobar apodemes of opisthosomal lobes present, narrow, fused to each other anterior to terminal cleft. Epigynum horseshoe-shaped, lateral parts widened, greatest width 64–66. Copulatory opening situated ventrally at anterior terminal cleft, covered with narrow semicircular fold. Proximal part of primary spermaduct near head of spermatheca slightly thickened; head of spermatheca with cup-like structure having tooth-like extensions; secondary spermaducts short, 15–17 long (Fig. 12F). Distance between pseudanal setae:  $ps2:ps2$  42–44,  $ps3:ps3$  22–24,  $ps2:ps3$  7–9.

Legs I slightly thicker than legs II; femur II with wide ventral crest; other segments of legs I, II without processes. Solenidion  $\sigma I$  of genu I 10–12 long. Genual setae  $cGI$ ,  $cGII$ ,  $mGI$  filiform, setae  $mGII$  noticeably thickened in basal part. Setae  $d$  of tarsi II–IV shorter than corresponding setae  $f$ . Genu IV inflated basally, without narrow longitudinal crest (Figs. 12G, H). Length of solenidia:  $\omega II$  9–11,  $\omega III$  6–7,  $\phi I$  55–62,  $\phi II$  48–50,  $\phi III$  22–24,  $\phi IV$  7–8.

**Differential diagnosis.** *Montesauria phylloscopi* sp. n. belongs to the *papillo* species group (Mironov 2006), and among described species is most close to *M. abroscopi* (see above) by having in males the following features: a blunt-angular extension on the anterior margin of prodorsal shield, a narrowly-trapezoidal terminal cleft, and a short spiniform seta  $d$  of tarsus IV sitting on small inflation. *Montesauria phylloscopi* differs from that species by the following features. In both sexes, the prodorsal and hysteronotal shields are without ornamentation; in males, the posterior end of sternum is connected to epimerites II by narrow transverse bands, setae  $h3$  are 28–30 long and subequal to distance between their bases; in females, the lateral margins of prodorsal shield has deep incisions encompassing bases of setae  $se$ , and the anterior margin of lobar shield is straight. In both sexes *M. abroscopi*, the prodorsal and hysteronotal shields are covered by numerous small circular lacunae; in males, the posterior end of sternum is not connected to epimerites II, and setae  $h3$  are 32–34 long and exceed the distance between their bases by 1.5 times; in females, the prodorsal shield has no lateral incisions, and the anterior margin of lobar shield is convex.

**Etymology.** The specific epithet derives from the generic name of the host and is a noun in the genitive case.

### *Montesauria seicerci* sp. n.

(Figs. 13–15)

**Type material.** Male holotype (ZISP 4766), 9 male and 6 female paratypes from *Seicercus valentini* (Hartert) (Phylloscopidae), VIETNAM: Ninh Binh, Cuc Phuong National Park, 20°21' N 105°35' E, 1 February 2010, coll. I. Literak, Nguen Manh Hung and M. Capek.

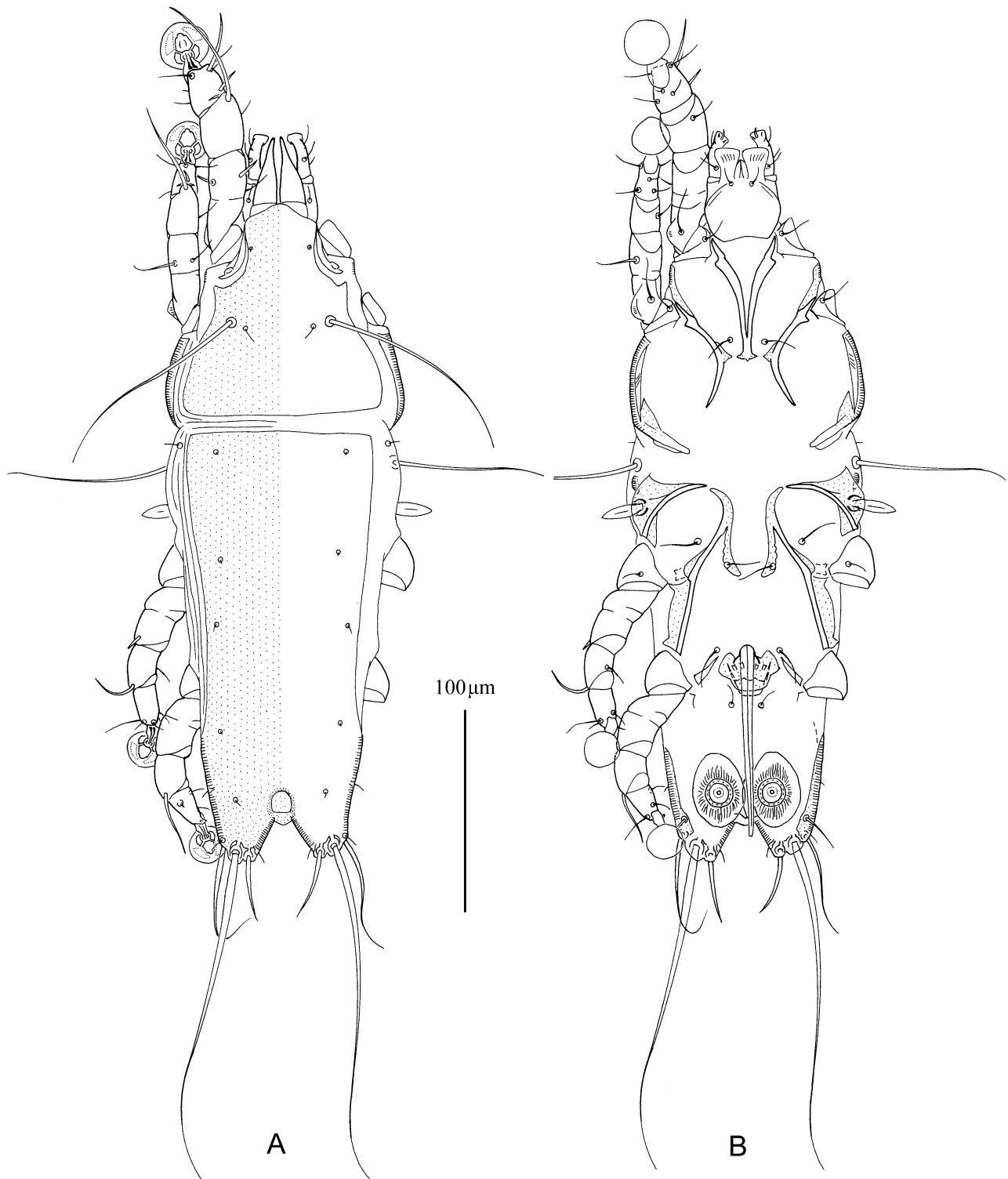
**Type depositories:** Holotype, 7 male and 4 female paratypes—ZISP, remaining paratypes—UMMZ, IEBR.

**Description.** MALE (holotype, range for 9 paratypes). Length of idiosoma 353 (315–355), width 120 (118–123), length of hysterosoma 210 (200–215). Prodorsal shield: entire, occupying almost entire prodorsum, antero-lateral extensions short and acute, lateral margins without incisions, posterior margin straight, length of shield 110 (104–110), width 100 (97–100) (Fig. 13A). Setae  $ve$  represented by microsetae. Scapular setae  $se$  separated by 51 (50–52). Scapular shields narrow. Humeral shields present, rudimentary, represented by small sclerites posterior to bases of setae  $cp$ . Setae  $cp$  and  $c2$  situated on soft tegument. Subhumeral setae  $c3$  lanceolate, 20 (18–20)  $\times$  7 (6.5–7). Hysteronotal shield: greatest length 210 (205–215), width in anterior part 95 (93–98), anterior margin straight, surface without ornamentation.

Opisthosomal lobes short, approximately as long as wide at base, slightly narrowed apically; posterior margin with short and blunt extensions at bases of setae  $h2$ ,  $h3$ . Terminal cleft as narrow inverted trapezium, anterior margin of cleft slightly convex, 20 (19–22) in length. Supranal concavity closed, roughly ovate, length from anterior margin of terminal cleft to anterior end of concavity 18 (17–19). Bases of setae  $f2$  and  $ps2$  at same transverse level. Setae  $h1$  at level of supranal concavity. Setae  $h3$  spiculiform, 29 (28–35) long, setae  $ps2$  66 (60–66) long; setae  $ps1$  minute, shorter than 5, situated on inner margin of opisthosomal lobes, slightly anterior to bases of setae  $h3$ . Distance between dorsal setae:  $c2:d2$  93 (86–95),  $d2:e2$  80 (75–82),  $e2:h3$  36 (30–35),  $d1:d2$  35 (32–38),  $e1:e2$  31 (27–31),  $h1:ps2$  25 (22–25),  $h2:h2$  52 (49–53),  $h3:h3$  37 (33–37),  $ps2:ps2$  60 (58–61).

Epimerites I fused into a Y, sternum about  $\frac{1}{4}$  of total length of epimerites, posterior end of sternum with short and acute extensions not connected to epimerites II (Fig. 13B). Epimerites II with short and acute extension on inner margin. Coxal fields I, II without wide sclerotized areas. Rudimentary sclerites rEpIIa absent. Inner margin of epimerites IIIa with slightly widened extensions directed backward and bearing setae  $4b$ . Coxal fields I, III nearly closed, coxal fields II open. Coxal fields IV without sclerotized area at bases of trochanters. Epimerites IVa thin, and short, not extending to bases of setae  $4a$ . Genital arch small, with short and rounded lateral wing-like extension, 13 (13–15) long, 29 (28–33) wide (including extensions); basal sclerite shaped as inverted trapezium, with branches diverging wider than genital arch. Aedeagus 95 (93–96) long, extending to midlevel of terminal cleft (Fig. 15A). Genital papillae not connected by their bases, arranged in transverse or slightly curved row. Genital and adanal shields absent. Anal suckers 13 (13–14) in diameter, corolla with 16–18 slightly distinct indentations,

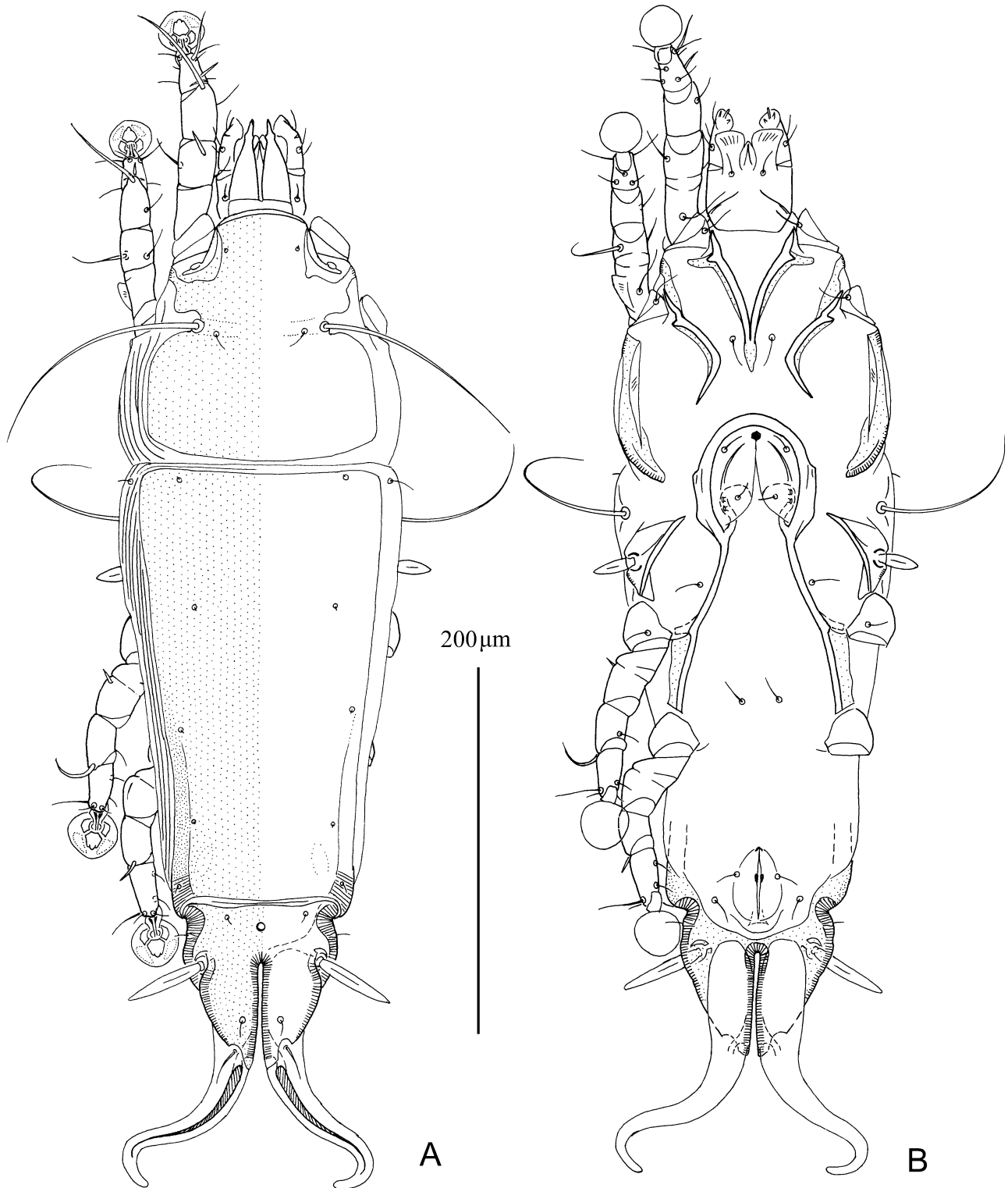
surrounding membrane wide, with radial striae. Opisthoventral shields narrow, without extensions on inner margin. Setae *ps3* situated postero-lateral to anal suckers, approximately at level of anterior margin of terminal cleft. Distance between ventral setae: *3a:4b* 10 (9–11), *4b-4a* 46 (43–46), *4a-g* 28 (27–30), *g-ps3* 58 (55–60), *ps3-ps3* 60 (55–60), *ps3:h3* 15 (14–15).



**FIGURE 13.** *Montesauria seicerci* sp. n., male. **A**—dorsal view, **B**—ventral view.

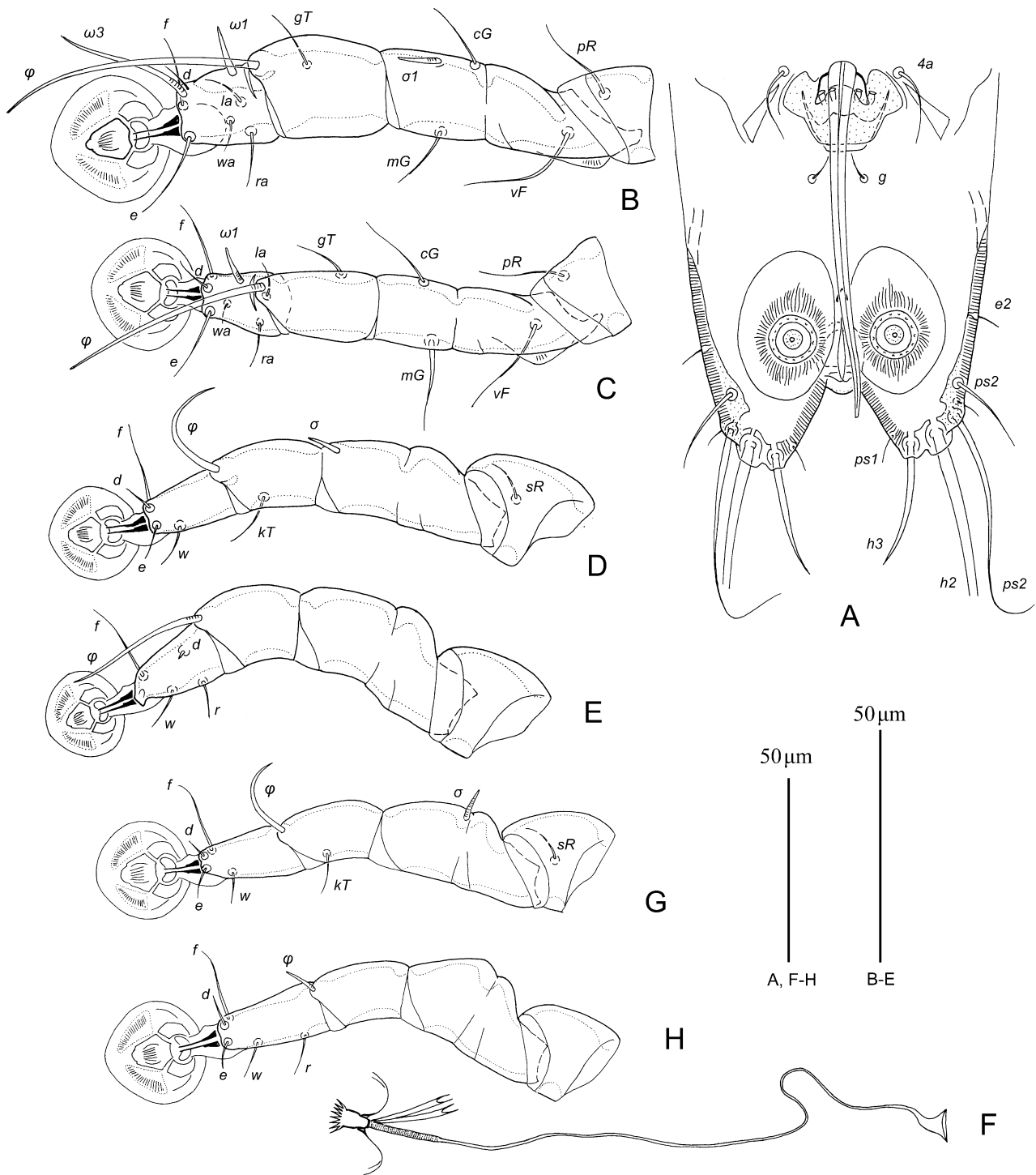
Legs I, especially their tarsus and tibia, thicker than legs II; femora I, II with ventral crest, other segments of legs I, II without processes. Solenidion  $\sigma 1$  of genu I spiculiform, 8 (7–8) long, situated at midlevel of segment;

genual setae *cGI*, *cGII*, *mGI* filiform, setae *mGII* slightly thicker than these setae in basal part. Seta *d*, *f* of tarsi II, III shorter than corresponding seta *f*. Legs III, IV similar in size. Solenidium  $\varphi$  of tibia IV extending to midlevel of ambulacral disc. Tarsus IV 20 (19–20) long, with short apical claw-like extension; seta *e* button-like, seta *d* minute spiniform, with noticeably inflated base, situated in proximal half of segment (Figs. 15B–E). Length of solenidia:  $\omega$ I 11 (9–11),  $\omega$ II 7 (7–8),  $\varphi$ I 55 (50–55),  $\varphi$ II 44 (40–44),  $\varphi$ III 24 (18–24),  $\varphi$ IV 29 (25–30).



**FIGURE 14.** *Montesauria seicerci* sp. n., female. **A**—dorsal view, **B**—ventral view.





**FIGURE 15.** *Montesauria seicerci* sp. n., details. **A**—opisthosoma of male, ventral view, **B–E**—legs I–IV of male, respectively, **F**—head of spermatheca and spermaducts, **G, H**—legs III and IV of female.

**FEMALE** (6 paratypes). Length of idiosoma 450–470, width 135–155, length of hysterosoma 315–330. Prodorsal shield: antero-lateral extensions connected with epimerites Ia, lateral margins with incisions extending to bases of setae *se*, posterior margin slightly convex, surface without ornamentation, length 132–139, width 115–126 (Fig. 14A). Setae *ve* rudimentary, represented by microsetae. Setae *se* separated by 65–71. Scapular shields not developed dorsally. Humeral shields absent; setae *cp* and *c2* situated on soft tegument. Setae *c3* lanceolate, 19–21 × 7–8. Anterior and lobar pieces of hysteronotal shield separated dorsally by narrow transverse band of soft tegument

but remain connected ventro-laterally. Anterior hysteronotal shield slightly attenuate posteriorly, anterior margin straight, greatest length 230–236, width at anterior margin 118–133, surface without ornamentation. Length of lobar region 88–93, greatest width 79–82, anterior margin straight or slightly concave. Terminal cleft parallel-sided, very narrow, length 50–57, width at midlevel 2–5. Supranal concavity circular, small, well outlined. Setae *h1* on lobar shield, anterior to level of supranal concavity. Setae *h2* spindle-like, 39–44 × 7–8. Setae *ps1* closer to inner margins of opisthosomal lobes than to outer ones. Setae *h3* short, 15–22 in length, about 1/5<sup>th</sup> the length of terminal appendages. Distance between dorsal setae: *c2:d2* 102–128, *d2:e2* 95–110, *e2:h2* 42–46, *h2:h3* 44–50, *d1:d2* 45–60, *e1:e2* 32–35, *h1:h2* 22–27, *h2:ps1* 29–31, *h1:h1* 37–44, *h2:h2* 64–66.

Epimerites I fused into a Y with very short sternum about 1/5<sup>th</sup> of total length of epimerites, sternum without lateral extensions (Fig. 14B). Lateral parts of coxal fields I, II without heavily sclerotized areas. Epimerites IVa absent. Translobar apodemes of opisthosomal lobes present, narrow, fused to each other anterior to terminal cleft. Epigynum horseshoe-shaped, lateral parts widened, with small ledge, greatest width 60–68. Copulatory opening situated ventrally at anterior terminal cleft, covered with narrow semicircular fold. Proximal part of primary spermaduct near head of spermatheca slightly thickened; head of spermatheca with cup-like structure having tooth-like extensions; secondary spermaducts short, 20–25 long (Fig. 15F). Distance between pseudanal setae: *ps2:ps2* 46–48, *ps3:ps3* 20–22, *ps2:ps3* 12–15; setae *ps2* situated at level of posterior half of anal opening.

Legs I slightly thicker than legs II; femur II with wide ventral crest; other segments of legs I, II without processes. Solenidion *σ1* of genu I spiculiform, 10–11 long. Genua setae *cGI*, *cGII*, *mGI* filiform, setae *mGII* noticeably thickened in basal part. Setae *d* of tarsi II–IV shorter than corresponding setae *f*. Genu IV inflated basally, without noticeable longitudinal crest (Figs. 15G, H). Length of solenidia: *ωII* 13–14, *ωIII* 7–9, *φI* 62–64, *φII* 48–51, *φIII* 22–24, *φIV* 8–9.

**Differential diagnosis.** *Montesauria seicerci* sp. n. is most similar to the previous species, *M. phylloscopi*, by having the following features: in males, small genital arch, basal sclerite of genital apparatus is shaped as inverted trapezium, seta *d* on tarsus IV is short spine-like and situated on an inflated base; in females, the copulatory opening is covered ventrally with a narrow transverse fold of cuticle, the head of spermatheca with basal denticles. *Montesauria seicerci* differs from that species by the following features: in males, the sternum is distinctly separated from epimerites II, the aedeagus extends to the midlevel of terminal cleft, the rudimentary humeral shields are present, stick-like extensions of epimerites IIIa bearing setae *4b* are thickened posteriorly; in females, setae *h1* are situated near the anterior margin of the lobar shield, the lateral incisions of prodorsal shield extend only to bases of setae *se*. In males of *M. phylloscopi*, the sternum is connected to epimerites II by narrow transverse bands, the aedeagus extends almost to the level of lobar apices, the humeral shields are absent, stick-like extensions of epimerites IIIa are not thickened posteriorly; in females, setae *h1* are situated at the level of supranal concavity, the lateral incisions of prodorsal shield extend mesal to bases of setae *se* or encompass them.

**Etymology.** The specific epithet derives from the generic name of the host and is a noun in the genitive case.

## Genus *Dolichodectes* Park and Atyeo, 1971

Type species: *Proctophyllodes (Pterocolus) edwardsi* Trouessart, 1885 by original designation.

The genus *Dolichodectes* was established in the course of revising the subfamily Pterodectinae and it currently includes seven species (Park & Atyeo 1971; Mironov & Fain 2003; Mironov 2008; Mironov *et al.* 2010). Within the *Montesauria* generic complex, the genus *Dolichodectes* (derived taxon) is characterized by significantly elongated opisthosoma in males with setae *ps3* situated posterior to the anal suckers and bases of setae *g* and *ps3* arranged in a long rectangle.

Representatives of this genus have been recorded from a wide diversity of passerine families of the Old World: Acrocephalidae, Platysteiridae (Sylvioidea), Muscicapidae, Turdidae (Muscicapoidea), Ploceidae (Passeroidea) and Monarchidae (Corvoidea). Of seven species included in this genus, the type species *D. edwardsi* (Trouessart, 1885), associated with warblers of the genera *Acrocephalus* Naumann and Naumann and *Phylloscopus* Boie, is widely distributed in the Old World, while six other species have been recorded only from Africa (Trouessart 1885;

Gaud & Mouchet 1957; Gaud & Till 1961; Mironov 1996; Mironov *et al.* 2010). Hernandez and Valim (2006) for the first time constructed a key to known *Dolichodectes* species and also described *D. neotropicus* Hernandez and Valim, 2006 from a cotingid host in Brazil. Further study of these authors (Valim & Hernandez 2009) showed that this species actually belongs to the *Pterodectes* complex, rather than to the *Montesauria* complex, and this species was removed to a separate genus *Berladectes* Valim and Hernandez, 2009.

***Dolichodectes furcilobus* sp. n.**

(Figs. 16–18)

**Type material.** Male holotype (ZISP 4777), 3 male and 3 female paratypes from *Copsychus malabaricus* (Scopoli) (Muscicapidae), VIETNAM: Ninh Binh, Cuc Phuong National Park, 20°21' N 105°35' E, 1 February 2010, coll. I. Literak, Nguen Manh Hung and M. Capek.

**Type depository.** Holotype, 1 male and 1 female paratypes—ZISP, remaining paratypes UMMZ, IEBR.

**Description.** MALE (holotype, range for 3 paratypes). Length of idiosoma 456 (415–450), width 150 (145–155), length of hysterosoma 385 (360–380). Prodorsal shield: antero-lateral extensions widely connected to bases of epimerites Ia, lateral margins without incisions around scapular setae, posterior margins straight, length 155 (145–155), width at posterior margin 128 (120–128), posterior part with transverse dashes (Fig. 16A). Setae *ve* represented by microsetae. Scapular setae *se* separated by 57 (55–58). Humeral shields present, poorly developed, separated from epimerites III, not encompassing setae *cp*. Setae *c2* situated on soft tegument near anterior end of humeral shields. Setae *c3* lanceolate, 29 (28–30) × 9 (8–9). Hysteronotal shield: greatest length 400 (375–395), width at anterior margin 120 (125–130), anterior margin straight, anterior angles rounded, anterior half of shield from margin to level of trochanters IV with transverse striae and dashes, area from level of trochanters IV to bases of opisthosomal lobes with small ovate lacunae. Opisthosomal lobes 3 times longer than wide, lateral margins at level of setae *h2* noticeably convex, posterior end of each lobe with pair of acute and long extensions, length of apical extensions 22 (17–22) (Fig. 18A). Setae *h3* approximately equidistant from lobar apices and bases of setae *h2*. Terminal cleft a narrow parallel-sided slit, lateral margins almost touching, length 93 (84–94), width at level of setae *h2* 2–3. Supranal concavity a long and narrow median groove stretching from anterior end of terminal cleft to level of setae *e2*. Setae *f2* and *ps2* situated at same transverse level. Setae *h1* slightly closer to level of setae *f2* than to setae *e2*. Setae *h3* lanceolate, with acute tips, length 75 (70–75), greatest width 17 (15–17); setae *ps2* 90 (80–85) long, extending to lobar apices; setae *ps1* filiform, about 20 long, situated slightly anterior to bases of setae *h3*. Distance between bases of dorsal setae: *c2:d2* 128 (120–130), *d2:e2* 102 (90–102), *e2:h2* 90 (78–85), *h2:h3* 31 (30–32), *d1:d2* 55 (52–55), *e1:e2* 33 (26–33), *h1:ps2* 28 (26–28), *ps1:h3* 9 (8–10), *h2:h2* 51 (48–52), *h3:h3* 24 (22–24), *ps2:ps2* 55 (52–55).

Epimerites I fused into a Y, sternum about 1/3<sup>rd</sup> of total length of epimerites, posterior end of sternum with transverse extensions connected with medial part of epimerites II (Fig. 16B). Coxal fields I, II without large sclerotized areas. Coxal fields I–IV closed. Rudimentary sclerites rEpIIa absent. Coxal fields IV with large sclerotized areas at bases of trochanters IV. Genital arch of moderate size, 22 (20–22) long, 31 (27–32) wide; basal sclerite of genital apparatus large, shaped as inverted trapezium. Aedeagus 95 (90–95) long, extending to anterior margins of anal suckers. Genital papillae well distinct, situated at midlevel of genital arch, arranged in transverse row. Paragenital apodemes fused to each other by their medial parts, anterior branches of these apodemes fused with inner margins of epimerites IIIa and posterior branches fused with epimerites IV. Genital shields, epimerites IVa, posterior branches of paragenital apodemes and shield-like areas of coxal fields IV fused altogether to form almost complete sclerotized oval surrounding genital apparatus (Fig. 18A). Genital shields elongate and not fused each other at midline of body. Setae *4b* on anterior branches of paragenital apodemes, setae *4a* on posterior branches of paragenital apodemes, setae *g* on inner margin of genital shields. Opisthoventral shields wide, fused together by wide transverse bridge immediately posterior to anal opening; anal field flanked from posterior and lateral sides by opisthoventral shields and transverse bridge. Anal suckers 15 (13–15) in diameter, corolla without indentations. Setae *ps3* situated on anterior margin of transverse band connecting opisthoventral shields. Distance between ventral setae: *3a:4b* 5 (5–7), *4b-4a* 75 (66–75), *4a-g* 44 (42–44), *g-ps3* 66 (64–66), *ps3-ps3* 37 (36–38), *ps3:h3* 93 (88–92).

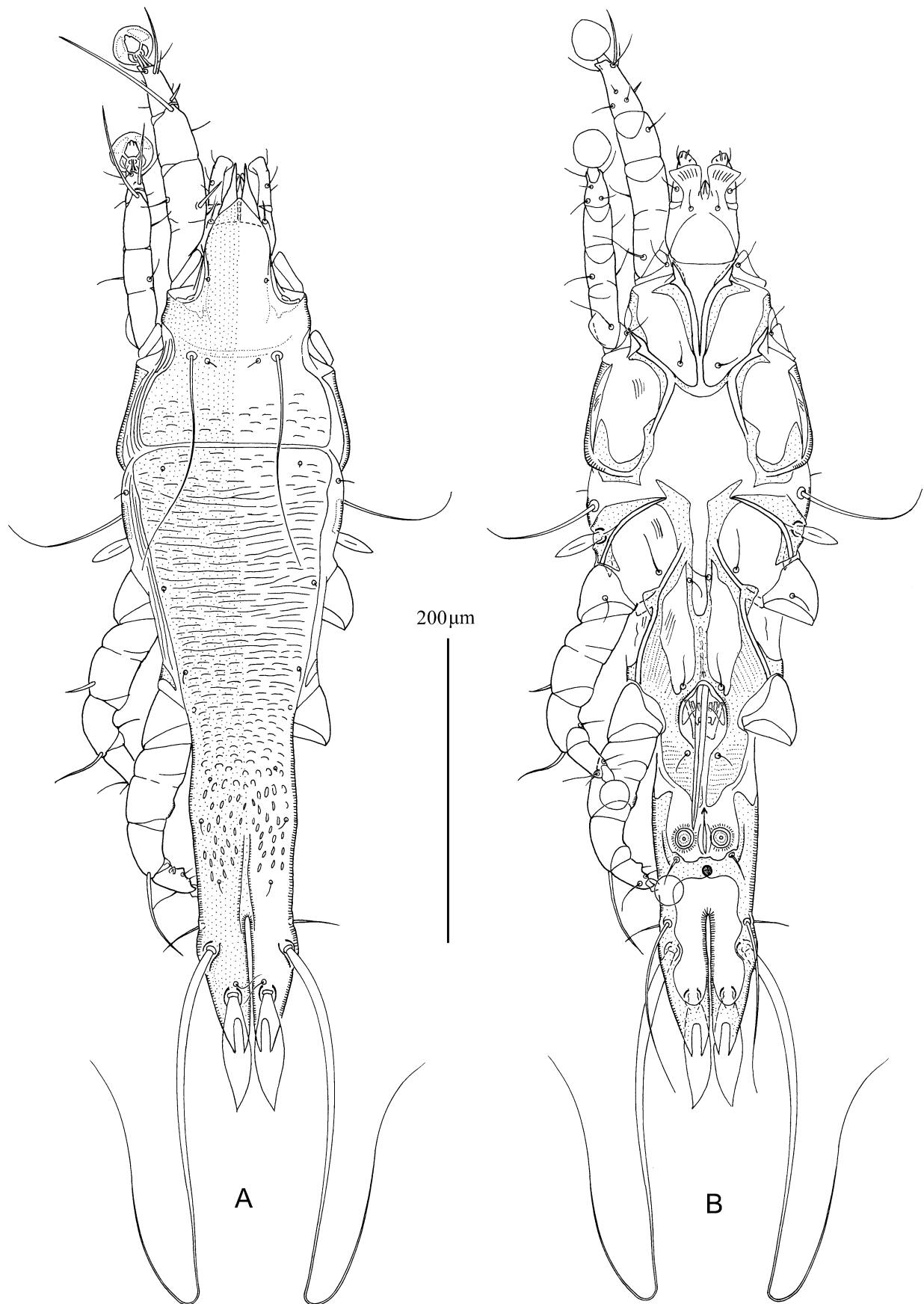
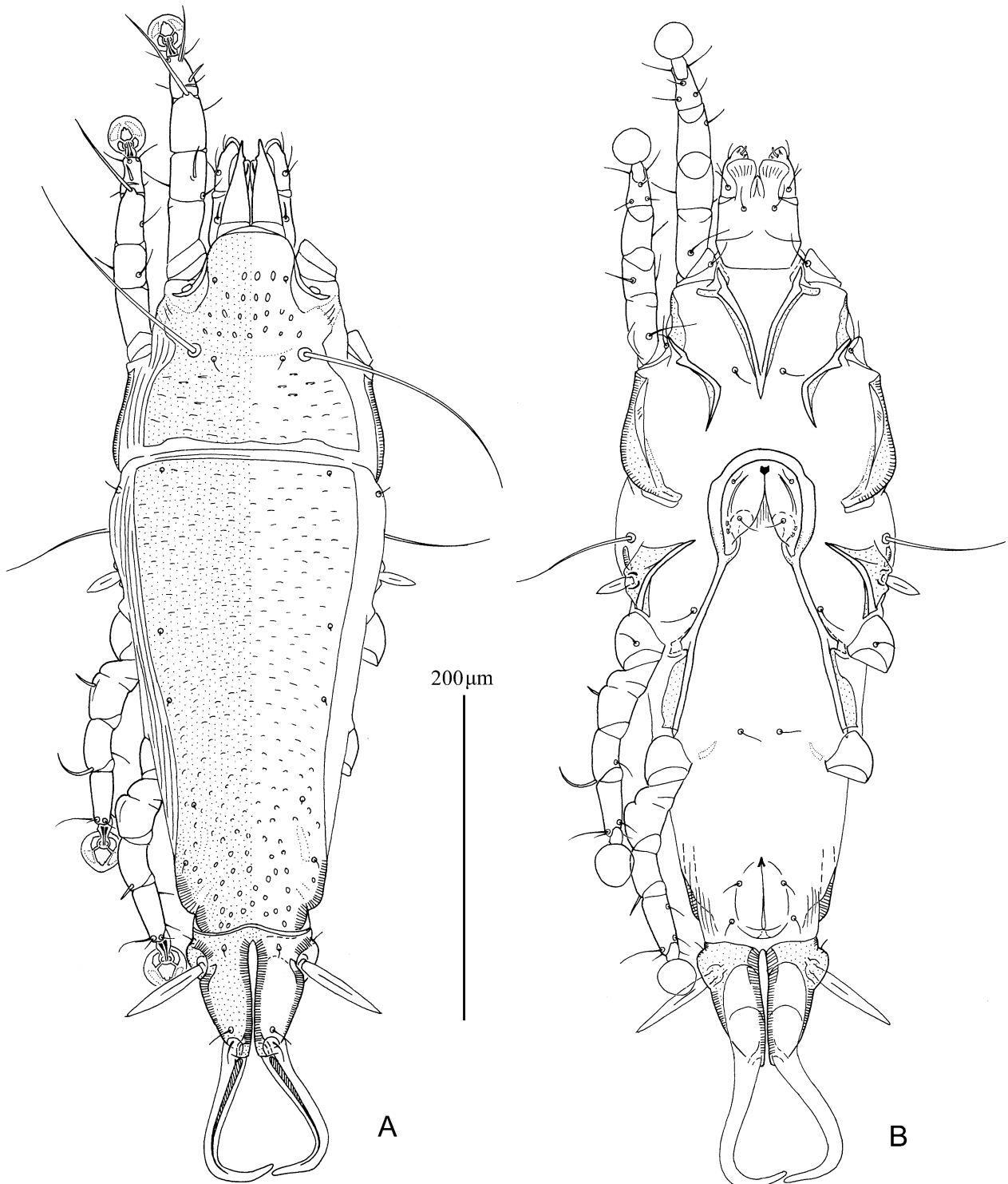
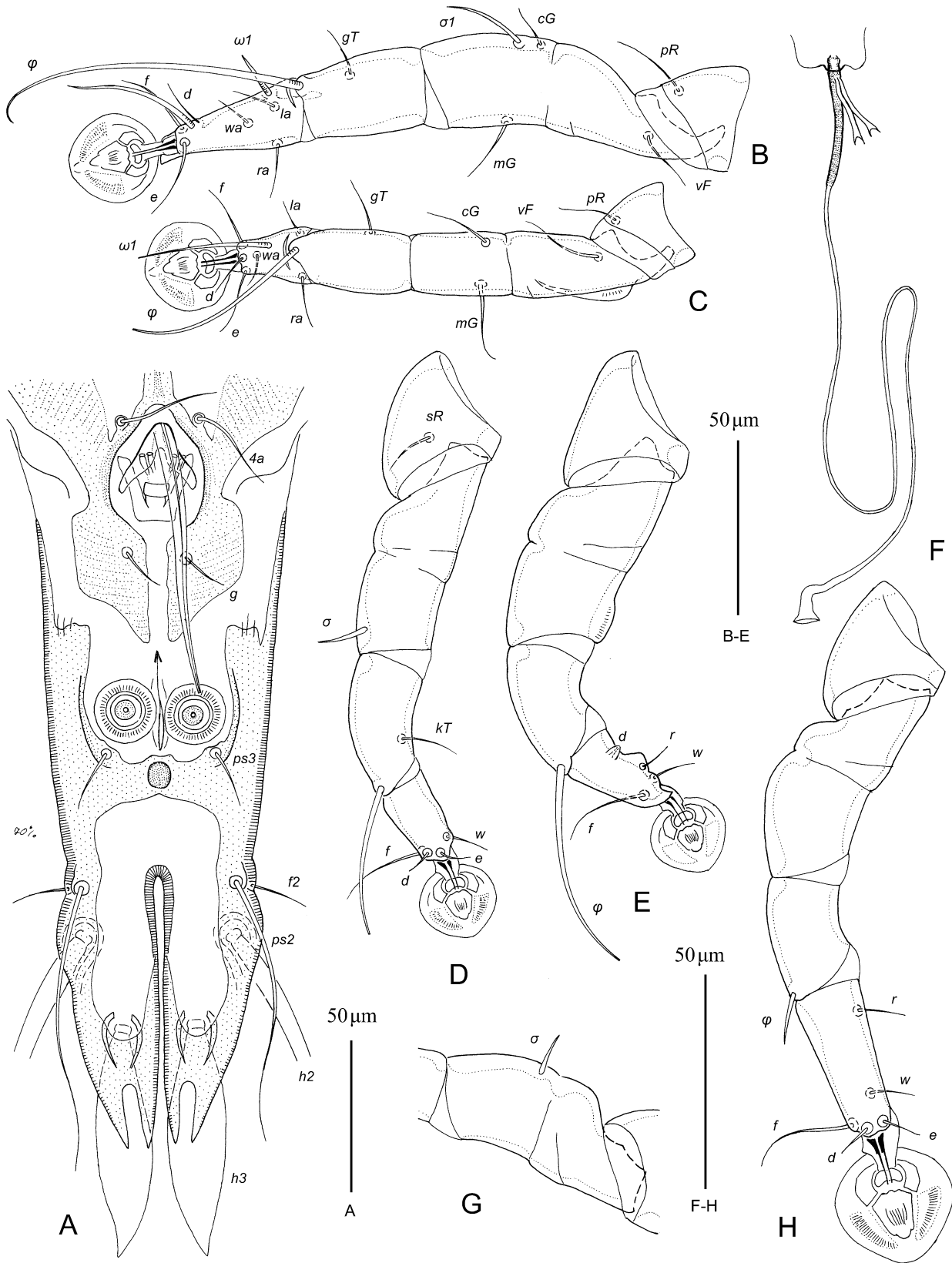


FIGURE 16. *Dolichodectes furcilobus* sp. n., male. **A**—dorsal view, **B**—ventral view.



**FIGURE 17.** *Dolichodectes furcilobus* sp. n., female. **A**—dorsal view, **B**—ventral view.

Legs I longer and thicker than legs II, femora II with narrow ventral crests, tarsus I with small apicoventral claw-like extension, other segments of these legs without processes. Solenidion  $\sigma 1$  of genu I 20 (18–20) long, situated in proximal part of segment; genual setae *cGI*, II, *mG* I, II filiform. Genu IV with narrow heavily sclerotized ventral crest. Solenidion  $\omega 1$  of tarsus II elongate, extending to distal margin of ambulacral disc; seta *d* of tarsus II half as long as corresponding seta *f*. Seta *d* of tarsus III much shorter than corresponding setae *f*. Tarsus IV 33 (26–33) long, with small apical claw-like process and blunt-angular ventral extension; seta *d* hemispherical, with thick walls, situated in proximal part of this segment; seta *e* indistinct. Solenidion  $\phi$  of tibia IV extending to midlevel of ambulacral disc. Length of solenidia:  $\omega II$  12 (11–12),  $\omega III$  40 (30–38),  $\phi I$  90 (84–90),  $\phi II$  55 (48–54),  $\phi III$  35 (32–35),  $\phi IV$  54 (46–52).



**FIGURE 18.** *Dolichodectes furcilobus* sp. n., details. **A**—opiosoma of male, ventral view, **B–E**—legs I–IV of male, respectively, **F**—head of spermatheca and spermatheca, **G**—femur and genu III of female, **H**—leg III of female.

**FEMALE** (3 paratypes). Length of idiosoma 485–515, width 164–175, length of hysterosoma 342–360.

Prodorsal shield: antero-lateral extensions wide and connected to epimerites Ia, posterior margin sinuous, 128–134 long, 130–134 wide, anterior part with small ovate lacunae, posterior part with transverse dashes (Fig. 17A). Setae *ve* represented by microsetae. Setae *se* separated by 66–70. Humeral shields represented by small longitudinal sclerite situated posterior to bases of setae *cp*. Setae *c2* situated laterally on soft tegument. Setae *c3* lanceolate, 22–24 × 7–8. Anterior and lobar parts of hysteronotal shields completely separated from each other by narrow transverse band of soft tegument. Hysteronotal shield noticeably enlarged in anterior part, anterior margin straight, posterior margin slightly concave, length 285–290, width at anterior margin 132–144; anterior two thirds of this shield with dash-like transverse striae, posterior one third with small ovate lacunae. Length of lobar region 75–78, width 76–82, anterior margin convex. Terminal cleft parallel-sided, narrow, with margins almost touching, 66–72 long, 4–5 wide in anterior part. Supranal concavity absent. Setae *f2* present. Setae *h1* situated on lobar shield near its anterior margin. Setae *h2* spindle-like, 54–56 long, 7–9 wide. Setae *ps1* approximately equidistant from inner and outer margins of opisthosomal lobes and close to lobar apices. Setae *h3* filiform, 9–12 long, about 1/8<sup>th</sup> of terminal appendages. Distance between dorsal setae: *c2:d2* 130–132, *d2:e2* 92–100, *e2:h2* 62–71, *h2:h3* 48–51, *d1:d2* 40–44, *e1:e2* 35–38, *h1:h2* 11–13, *h2:ps1* 37–44, *h1:h1* 32–33, *h2:h2* 57–62.

Epimerites I fused into a Y, sternum about 1/5<sup>th</sup> of total length of epimerites (Fig. 17B). Lateral parts of coxal fields I, II without wide sclerotized areas. Epimerites IVa scarcely distinct. Translobar apodemes of opisthosomal lobes wide, not fused to each other anterior to terminal cleft. Copulatory opening ventral, situated immediately posterior to anal opening. Primary spermaduct with punctate enlargement in most proximal part, secondary spermaducts 10–11 long (Fig. 18F). Distance between pseudanal setae: *ps2:ps2* 36–38, *ps3:ps3* 22–25, *ps2:ps3* 20–22.

Legs I slightly longer than legs II, femur II with narrow ventral crest, other segments of these legs without processes. Solenidion  $\sigma I$  of genu I 15–16 long, situated at midlevel of segment. Genual setae *cGI*, *cGII*, *mGI*, *mGII* filiform. Genu IV with small dorsal inflation. Setae *d* of tarsi II–IV much shorter than corresponding setae *f*. Solenidion  $\phi IV$  about 1/4<sup>th</sup> of corresponding tarsus (Figs. 18G, H). Length of solenidia:  $\omega I$  9–11,  $\omega III$  10–11,  $\phi I$  62–73,  $\phi II$  54–56,  $\phi III$  25–27,  $\phi IV$  12–15.

**Differential diagnosis.** Among previously known *Dolichodectes* species, the new species is most similar to *D. myrmecocichlae* Mironov and Fain, 2003 described from *Myrmecocichla nigra* (Vieillot) (Muscicapidae) by having the following features in males: the posterior part of hysteronotal shield is ornamented with small ovate lacunae, the genital shields is separated into two pieces, and the transverse bridge flanking the anal field is straight and not touching the anterior margin of terminal cleft. *Dolichodectes furcilobus* sp. n. clearly differs from that species by the following features: in males, the posterior ends of opisthosomal lobes have a pair of long spine-like extensions, sternum formed by epimerites I is connected to epimerites II by transverse bands, the median part of paragenital apodemes is entire, and solenidion  $\omega I$  of tarsus II is strongly elongated and extends to the distal part of ambulacral disc; in females, the lobar shield is completely separated from the anterior part of hysteronotal shield, and the proximal part of the primary spermaduct is uniformly enlarged. In males of *D. myrmecocichlae*, the posterior ends of opisthosomal lobes is simply acute, the posterior end of sternum has short lateral extensions not reaching corresponding epimerites II, the median part of paragenital apodemes is split into several separate fragments, and solenidion  $\omega I$  of tarsus II extends to distal end of the segment; in females, the lobar shield is not separated from the anterior part of hysteronotal shield, and the primary spermaduct has a short ampuliform enlargement separated from the head of spermatheca by 15–20 micrometers.

**Etymology.** The specific epithet refers to the bifurcate posterior ends of the opisthosomal lobes in males.

## Genus *Proterothrix* Gaud, 1968

Type species: *Pterodectes wolffi* Gaud, 1962 by original designation.

*Proterothrix* Gaud, 1968 is the most species-rich and morphologically diverse genus of the *Proterothrix* generic group, which unites morphologically archaic pterodectine genera associated with passerines and coraciiforms (Mironov 2009). To date this genus has included 22 species, of which 20 species are provisionally arranged into three species groups, *megacaula*, *schizothyra*, and *wolffi* (Mironov *et al.* 2008a, 2010; Mironov & Proctor 2009). The majority of species in the *wolffi* group (9 of the 15 included species) are associated with passerines of the infraorder Corvida in the Australian and Indo-Malayan regions, and only two species from this group, *Proterothrix ranci* (Gaud, 1952) and *P. terpsiphone*

Mironov, Literak, Capek and Koubek, 2010, were described from corvid hosts in Africa and Madagascar (Gaud 1952, 1968; Park & Atyeo 1971a; Mironov *et al.* 2010). Three species of the *wolffi* group and a sole species of the *megacaula* group (*P. megacaula* Mironov and Diao, 2008) were described from hosts of the infraorder Passerida in China (Mironov *et al.* 2008a; Mironov & Proctor 2009). Species of the *schizothyra* group are known exclusively from kingfishers (Coraciiformes: Alcedinidae) in Africa (Gaud 1979). In the present study we describe for the first time a new *Proterothrix* species from a passerine host of the family Pellorneidae (Passerida: Sylvioidea).

***Proterothrix alcippeae* sp. n.**

(Figs. 19–21)

**Type material.** Male holotype (ZISP 4780), 6 male and 10 female paratypes from *Alcippe rufogularis* (Mandelli) (Pellorneidae), **VIETNAM:** Ninh Binh, Cuc Phuong National Park, 20°21' N 105°35' E, 2 February 2010, coll. I. Literak, Nguen Manh Hung and M. Capek.

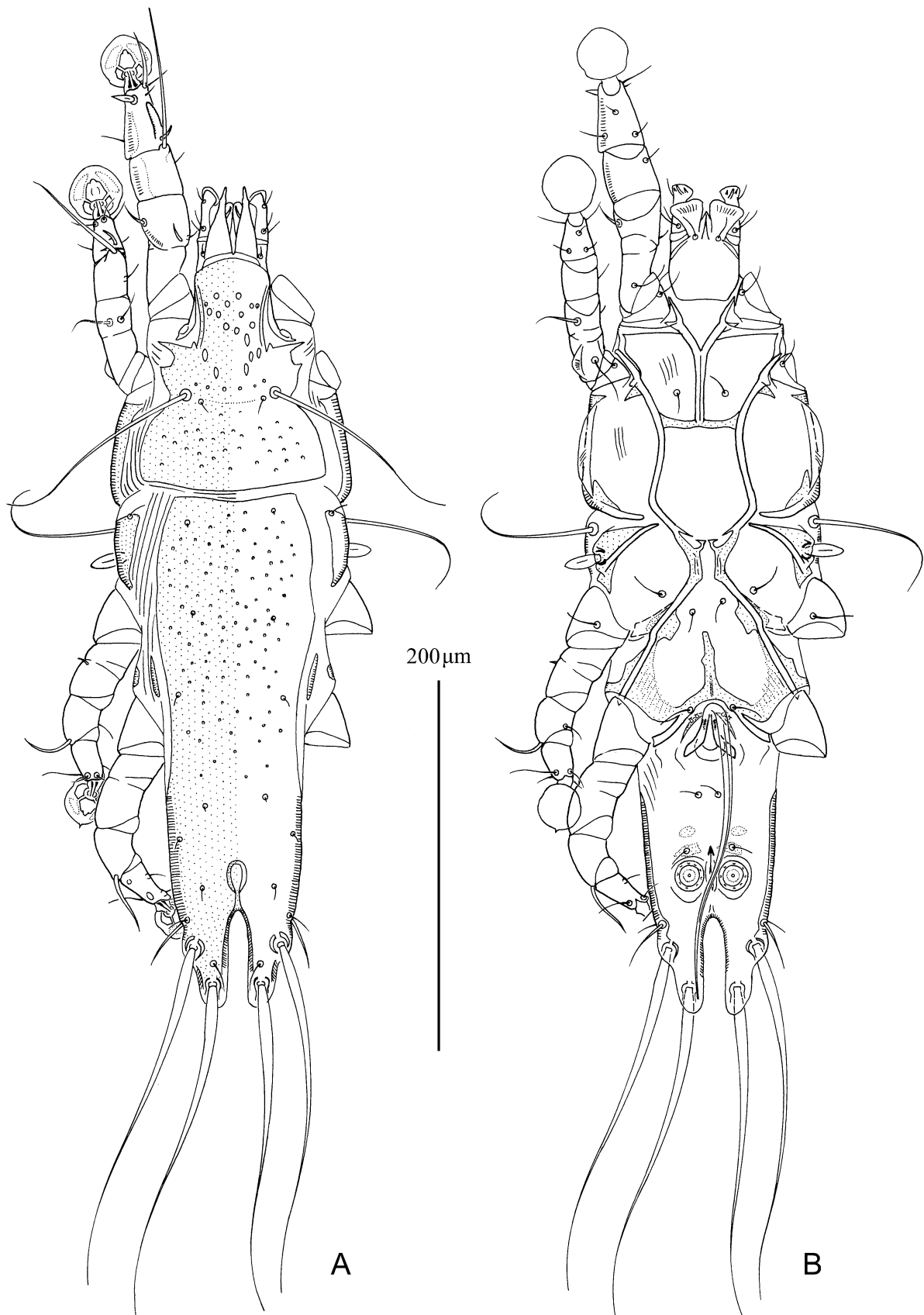
**Type depository.** Holotype, 4 male and 6 female paratypes—ZISP, remaining paratypes—UMMZ, IEBR.

**Description.** MALE (holotype, range for 6 paratypes in parentheses). Length of idiosoma 400 (390–406), width 124 (120–130), length of hysterosoma 265 (260–270). Prodorsal shield: entire, antero-lateral extensions acute, lateral margin shallowly concave, posterior margin slightly convex, length 126 (122–130), width 90 (88–94), surface with circular and ovate lacunae in anterior part and with minute pit-like lacunae in posterior part (Fig. 19A). Setae *ve* rudimentary, represented by alveoli. Scapular setae *se* separated by 51 (46–54). Scapular shields narrow. Humeral shields present, well developed, separated from epimerites III. Setae *cp* situated off humeral shields. Setae *c2* situated on anterior end of humeral shield. Subhumeral setae *c3* lanceolate, 15 (14–15) × 7 (6–7). Hysteronotal shield: length 272 (265–275), width in anterior margin 88 (82–90), anterior margin slightly concave, surface of anterior half with numerous small pit-like lacunae. Lateral hysteronotal sclerites present, situated slightly anterior to level of trochanters IV.

Opisthosomal lobes elongated, nearly twice as long as wide at base, distal half about half as wide as basal part, posterior margin of lobar apices rounded and poorly sclerotized; setae *h3* situated near lobar apices (Fig. 21A). Terminal cleft narrowly U-shaped, 53 (48–55) in length, 11 (9–12) in width at midlevel; margins of terminal cleft without narrow membranes. Supranal concavity ovate, with clearly outlined margin. Setae *f2* and *ps2* situated at same transverse level. Setae *h1* at level of supranal concavity. Setae *ps1* at midlevel between setae *h2* and *h3*, closer to inner margin of opisthosomal lobe than to outer margin. Setae *h3* and *h2* represented by macrosetae of subequal length, 150 (150–170) and 160 (145–170), respectively; setae *ps2* setiform, 20 (20–25) long; setae *ps1* filiform 20 (18–22) long. Distance between dorsal setae: *c2:d2* 100 (95–104), *d2:e2* 75 (70–78), *e2:h3* 81 (78–85), *h2:h3* 22 (20–25), *d1:d2* 46 (42–50), *e1:e2* 22 (12–22), *h1:ps2* 17 (13–18), *ps1:h3* 13 (10–14), *h2:h2* 48 (44–50), *h3:h3* 26 (25–27), *ps2:ps2* 57 (53–59).

Epimerites I fused into a long Y, posterior end of sternum connected with middle parts of epimerites II by transverse sclerotized bands. Epimerites II very long, extending to level of sejugal furrow and fused with anterior ends of elongated epimerites IIIa forming a pentagonal frame in median part of ventral propodosoma; frame unclosed in the very posterior end (Fig. 19B). Inner tips of epimerites IIa and epimerites III almost touching posterior ends of epimerites II. Rudimentary sclerites rEpIIa absent. Coxal fields I closed, coxal fields II, III nearly closed, with narrow gaps between tips of corresponding epimerites. Coxal fields IV with triangle-shaped sclerotized area at bases of trochanters IV. Epimerites IVa present, well developed, their anterior tips fused with corresponding posterior ends of pregenital sclerites and sclerotized areas of coxal fields IV. Setae *4a* situated on anterior end of epimerites IV. Pregenital sclerite shaped as an inverted Y, its anterior tip almost extending to level of trochanters III. Genital arch of moderate size, 27 (22–30) in length (from its base to bending of aedeagus backward), 26 (24–26) in width at base; basal sclerite of genital apparatus large and short; aedeagus 162 (162–165) long, almost extending to level of lobar apices (Fig. 21A). Genital papillae situated on small narrow sclerites lateral to genital arch. Genital shields represented by two pairs of small roughly ovate sclerites situated anterior to anal field. Anal suckers 17 (15–17) in diameter, corolla with 9–10 indentations, surrounding membrane without striae. Opisthoventral shields not developed. Setae *ps3* situated on posterior pair of adanal sclerites, distance between them subequal to distance between centers of anal suckers. Distance between ventral setae: *3a:4b* 9 (8–10), *4b:4a* 51 (50–55), *4a:g* 46 (46–50), *g-ps3* 29 (28–31), *ps3-ps3* 24 (20–25), *ps3:h3* 73 (70–75).

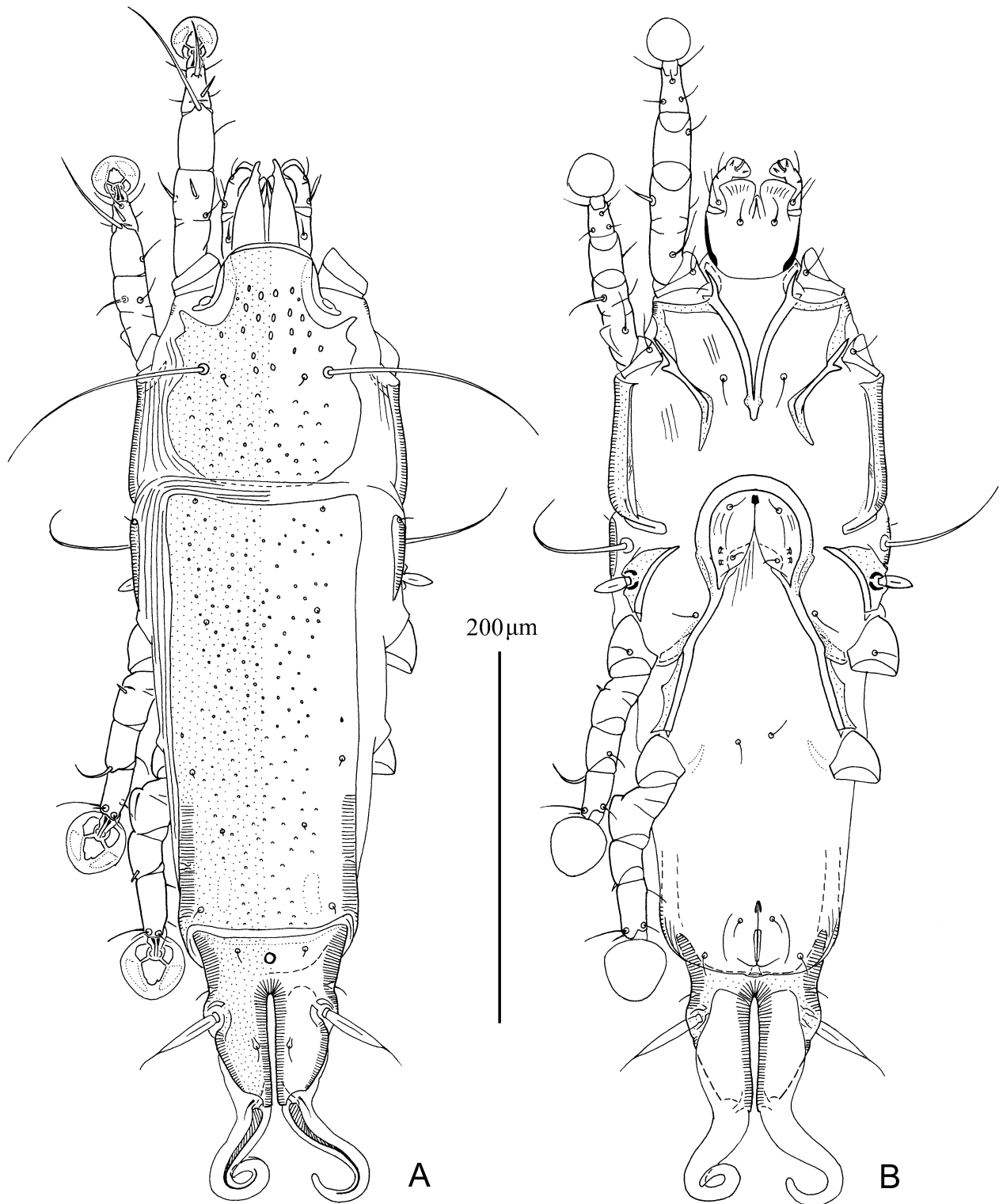




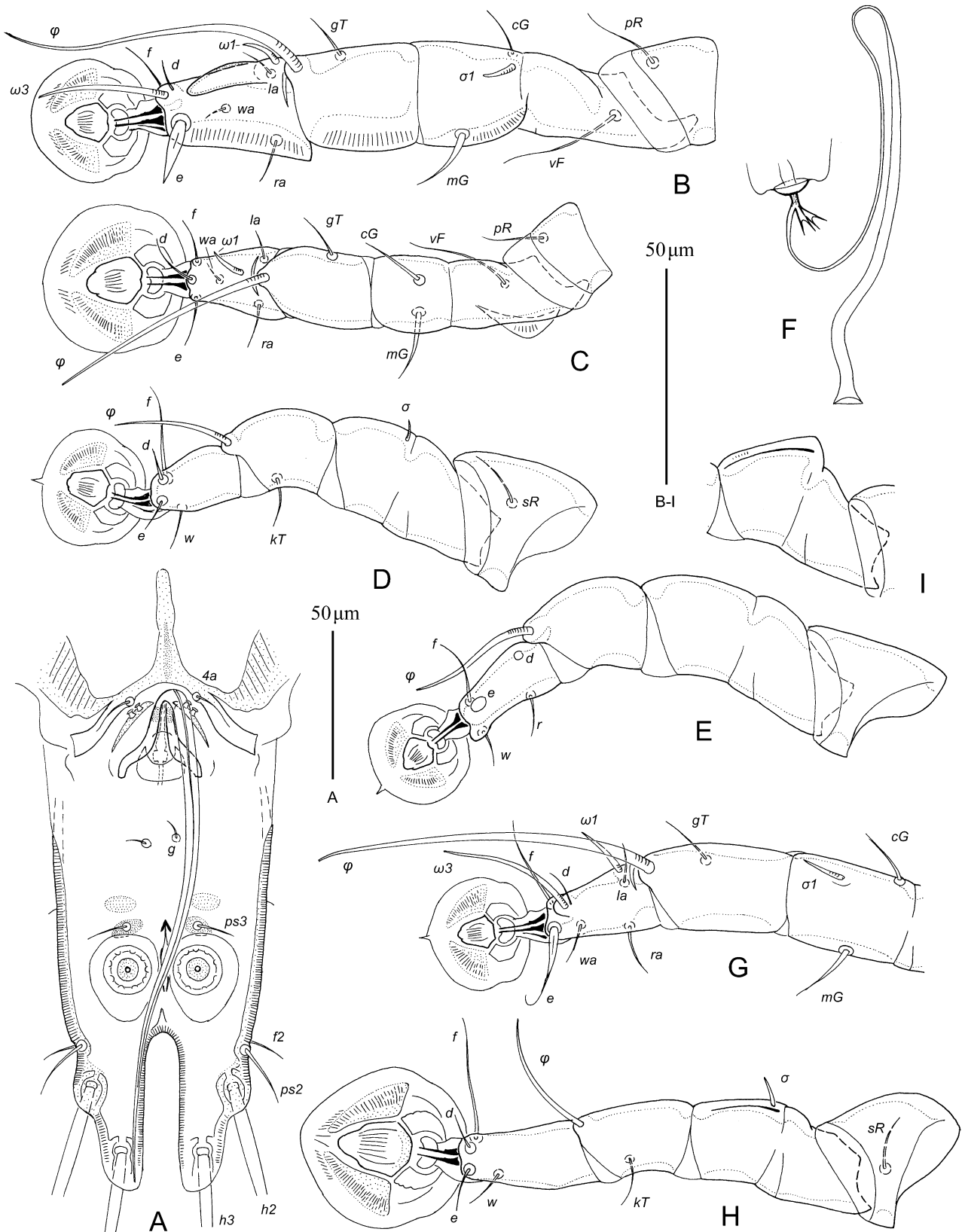
**FIGURE 19.** *Proterothrix alcippeae* sp. n., male. **A**—dorsal view, **B**—ventral view.

Legs I longer and noticeably thicker than legs II; femur II with wide ventral crest; genu, tibia and tarsus I with lateral longitudinal heavily sclerotized crests, tarsus I with thumb-like dorsal process anterior to base of solenidion  $\omega 1$

(Figs. 21B, C); other segments of legs I, II without processes. Solenidion  $\sigma I$  of genu I small spiculiform, 9 (7–9) long, situated at very base of segment; setae  $cGI$ ,  $cGII$  filiform, setae  $mGI$   $mGII$  strongly thickened but with filiform apex. Seta  $e$  of tarsus I narrowly lanceolate, 12 (11–12) long. Seta  $d$  of tarsus II slightly longer than corresponding seta  $f$ ; seta  $d$  of tarsus III approximately half the length of corresponding seta  $f$ . Legs III, IV similar in size. Solenidion  $\sigma$  of genu III situated at base of segment (Fig. 21D). Solenidion  $\varphi$  of tibia IV slightly extending beyond tarsal apex. Tarsus IV 24 (22–24) long, with a small apico-ventral extension bearing seta  $w$ ; setae  $d$ ,  $e$  button-like, situated in basal and apical parts of segment, respectively, seta  $d$  in diameter twice as large as seta  $e$  (Figs, 21E). Length of solenidia:  $\omega I$  7 (6–7),  $\omega III$  6 (5–6),  $\varphi I$  75 (73–78),  $\varphi II$  55 (49–55),  $\varphi III$  26 (24–26),  $\varphi IV$  24 (22–26).



**FIGURE 20.** *Proterothrix alcippeae* sp. n., female. **A**—dorsal view, **B**—ventral view.



**FIGURE 21.** *Proterothrix alcippeae* sp. n., details. **A**—opisthosoma of male, ventral view, **B–E**—legs I–IV of male, respectively, **F**—head of spermatheca and spermatheca, **G**—tarsus tibia and genu I of female, **H**—leg III of female, **I**—femur and genu IV of female.

FEMALE (10 paratypes). Length of idiosoma 460–485, width 140–155, length of hysterosoma 323–355. Prodorsal shield: entire, antero-lateral extensions acute, lateral margins without incisions, posterior angles not expressed, posterior margin convex, length 128–135, width 100–108, surface with numerous small circular lacunae, lacunae in anterior part noticeably larger than in posterior one (Fig. 20A). Setae *ve* rudimentary, represented by alveoly. Setae *se* separated by 59–69. Scapular shields narrow. Humeral shields narrow, separated from epimerites III; setae *cp* situated on soft tegument near ventral margin of humeral shields. Setae *c2* situated on anterior ends of humeral shields. Setae *c3* lanceolate, 17–18 x 7–8. Anterior and lobar pieces of hysteronotal shield separated dorsally by narrow transverse band but remain connected ventro-laterally by narrow bands. Anterior hysteronotal shield roughly rectangular, anterior margin slightly concave, greatest length 235–255, width at anterior margin 104–115, surface with numerous very small circular lacunae as on posterior part of prodorsal shield. Length of lobar region 100–110, width 72–80, anterior margin concave. Terminal cleft parallel-sided, narrow; length 62–66, width at midlevel 2–5. Supranal concavity well developed, circular. Setae *h1* on lobar shield, slightly anterior to supranal concavity. Setae *h2* spindle-like, with short terminal filaments, length including filaments 60–68, width 7–8. Setae *ps1* near inner margins of opisthosomal lobes. Setae *h3* 10–15 long, about 1/8<sup>th</sup>–1/10<sup>th</sup> the length of terminal appendages. Distance between dorsal setae: *c2:d2* 135–150, *d2:e2* 77–82, *e2:h2* 62–64, *h2:h3* 47–52, *d1:d2* 84–93, *e1:e2* 40–44, *h1:h2* 33–42, *h2:ps1* 15–17, *h1:h1* 36–42, *h2:h2* 60–62.

Epimerites I fused as a short-stemmed Y, sternum shorter than 1/5<sup>th</sup> of total length of epimerites, with very short lateral extensions. Lateral parts of coxal fields I, II without heavily sclerotized areas (Fig. 20B). Epimerites IVa present, poorly sclerotized. Translobar apodemes of opisthosomal lobes present, wide, fused to each other anterior to terminal cleft. Epigynum horseshoe-shaped, greatest width 58–64. Copulatory opening situated ventrally at anterior margin of fused translobar apodemes. Distal half of primary spermaduct enlarged, approximately 3 times wider than proximal half; secondary spermaducts 5–6 long (Fig. 21F). Distance between pseudanal setae: *ps2:ps2* 44–51, *ps3:ps3* 17–20, *ps2:ps3* 20–22; setae *ps2* situated at level of posterior end of anal opening.

Legs I slightly longer and thicker than legs II; femur II with wide ventral crest; other segments of legs I, II without processes. Solenidion  $\sigma 1$  of genu I, 8–9 long, situated slightly close to distal margin of this segment. Genual setae *cGI*, *cGII* filiform, *mGI* spiculiform, *mGII* spiculiform with filiform terminal part. Seta *e* of tarsus I strongly enlarged in basal part, apical part filiform (Fig. 21G). Setae *d*, *e*, *f*, of tarsus II subequal in length, setae *d* of tarsi III, IV about 3 times shorter than respective setae *f*. Genu IV slightly inflated dorsally, with narrow longitudinal crest, genu III not modified (Figs. 21H, I). Solenidion  $\phi$  of tibia IV much shorter than that on tibia III. Length of solenidia:  $\omega II$  11–14,  $\omega III$  7–8,  $\phi I$  70–77,  $\phi II$  47–53,  $\phi III$  21–24,  $\phi IV$  6–7.

**Differential diagnosis.** Within the *wolffi* species group, *Proterothrix alcippeae* sp. n. obviously belongs to the *paradoxornis* species complex (Mironov & Proctor 2009) by having setae *e* of tarsi I lanceolate in males. Among three previously known species of this complex, the new species is most similar to *P. sarabushae* Mironov and Proctor, 2009 described from *Paradoxornis verreauxi* (Sharpe) (Sylviidae) (in other classifications, the genus *Paradoxornis* Gould is included in Timaliidae or constitute a separate family Paradoxornithidae; see Robson, 2007) by the following features in males: tarsus I has a thumb-like dorsal extension (Fig. 21B), a pregenital sclerite is present and fused with the inner tips of epimerites IV, lateral hysteronotal sclerites are present. *Proterothrix alcippeae* differs from *P. sarabushae* by these features: in both sexes, setae *mG* of genera I, II are distinctly thickened but have filiform apex; in males, the pentagonal sclerotized frame in the postero–median part of propodosoma remains open posteriorly, the inner tips of epimerites IIa are separated from epimerites II, the posterior part of hysteronotal shield is without lacunae; in females, spindle-shaped setae *h2* have short filiform apices, the posterior margin of anterior hysteronotal shield lack incisions. In both sexes of *P. sarabushae*, setae *mG* of genera I, II are lanceolate; in males, the pentagonal sclerotized structure is completely closed, the inner tips of epimerites IIa are fused with the posterior ends of epimerites II, almost all surface of the hysteronotal shield with exception of opisthosomal lobes is covered with small circular lacunae; in females, setae *h2* are simple spindle-like, the posterior margin of anterior hysteronotal shield has a pair of deep lateral incisions extending beyond bases of setae *e2*.

**Etymology.** The specific epithet derives from the generic name of the host and is a noun in the genitive case.

## Genus *Picpterodectes* gen. n.

Type species: *Picpterodectes sasiae* sp. n., by original designaton.

**Diagnosis.** BOTH SEXES. Vertical setae *ve* absent. Hysterosomal setae *c1*, *d2*, *e2* absent. Prodorsal shield covering median area of prodorsum, split by transverse band of soft cuticle at level of scapular setae *se*, *si* into anterior and posterior parts. Scapular shields narrow. Humeral shields absent. Supranal concavity well expressed. Setae *c2* and *cp* on soft striated tegument. Legs I, II subequal in size. Setae *wa* anterior to setae *la* and *ra* on tarsi I, II. Seta *gT* of tibia I in proximal half of segment. Setae *cG* and *mG* on genua I, II setiform. Solenidion  $\sigma 1$  of genu I distinctly shorter than solenidion  $\omega 3$  on tarsus I. Femora II with ventral crest. Seta *sR* of trochanters III present; solenidion  $\sigma$  of genu III absent. Seta *kT* of tibia IV absent.

**MALE.** Epimerites I fused into a Y (with short sternum), fused part connected with epimerites II by narrow transverse bands. Coxal fields I and III closed, coxal fields II, IV open; all coxal fields with extensive sclerotized areas. Opisthosomal lobes present, moderately elongated, approximately as long as wide, distal part poorly sclerotized, with membranous rounded posterior margin. Setae *h3* long whip-like, represented by macrosetae as setae *h2*. Setae *h1* situated anterior to bases of opisthosomal lobes, close to lateral margins of opisthosoma. Setae *ps1* filiform, minute, situated anterior to level of *h3*. Genital arch at midlevel of trochanters IV, with well developed branches; aedeagus much longer than genital arch, running backward immediately from its apex. Genital papillae strongly reduced, situated closely to anterior margin of genital arch. Paragenital apodemes, genital shields and other sclerotized structures around genital apparatus absent. Opisthoventral shields narrow. Corolla of anal suckers with indentations; surrounding membrane without striae. Adanal shields absent. Setae *ps3* anterior to anal suckers. Setae *g* and *ps3* in high-trapezoid arrangement. Epimerites IV present. Legs III, IV subequal, slightly longer than legs I, II. Tarsus IV without apical claw-like process, setae *d* and *e* button-like.

**FEMALE.** Epimerites I shaped as a V. Lobar region of opisthosoma clearly separated from remaining part of opisthosoma; opisthosomal lobes well developed, with long terminal appendages. Hysteronotal shield split dorsally into anterior and lobar shields, these parts remain connected ventro-laterally. Macrosetae *h2* spindle-like, with short filiform apices. Epigynum horseshoe-shaped, large. Apodemes of oviporus connected with epimerites IIIa. Translobar apodemes present. Setae *ps2*, *ps3* filiform, arranged in low trapezium. Legs I slightly thicker and longer than legs II. Genu IV dorsally inflated. Solenidia  $\phi$  of tibiae IV much shorter than on tibiae III.

**Differential diagnosis.** The new genus belongs to the *Proterothrix* generic group (Mironov 2009) and in overall appearance it is a typical representative of this group. It clearly differs from the genus *Proterothrix* Park and Atyeo, 1971 and three other genera of this group, *Afroproterothrix* Mironov and Wauthy, 2010, *Megalodectes* Park and Atyeo, 1971, and *Nanopterodectes* Mironov, 2009, by the following combination of features: in both sexes, idiosomal setae *c1*, *d2*, and *e2*, solenidion  $\sigma$  of genu III and seta *kT* of tibia III are absent; in males, the distal part of opisthosomal lobes is poorly sclerotized and resembles terminal membranes. Within the generic group, *Proterothrix* has the full set of leg setae occurring in Proctophyllodidae, and most its species also have full set of idiosomal setae (with the exception of *Proterothrix megacaula*, which lacks setae *c1*). *Picpterodectes* is similar to *Afroproterothrix* in lacking idiosomal setae *c1*, *d2*; however the latter genus, in contrast to *Picpterodectes*, has also lost idiosomal setae *f2* and trochanteral setae *sR*III, but retains the solenidion  $\sigma$  of genu III.

**Hosts.** Picifomes, Picidae, *Sasia*.

**Etymology.** The generic name is a combination of the Picidae host family and the *Pterodectes* feather mite genus.

### *Picpterodectes sasiae* sp. n.

(Figs. 22–24)

**Type material.** Male holotype (ZISP 4793), 4 male and 5 female paratypes from *Sasia ochracea* (Picidae), VIETNAM: Bac Kan, Ba Be National Park, 22°23'N, 105°37'E, 5 July 2008, coll. I. Literak, Nguen Manh Hung and M. Capek.

**Type depository.** Holotype, 2 male and 3 female paratypes—ZISP, remaining paratypes—UMMZ, IEBR.

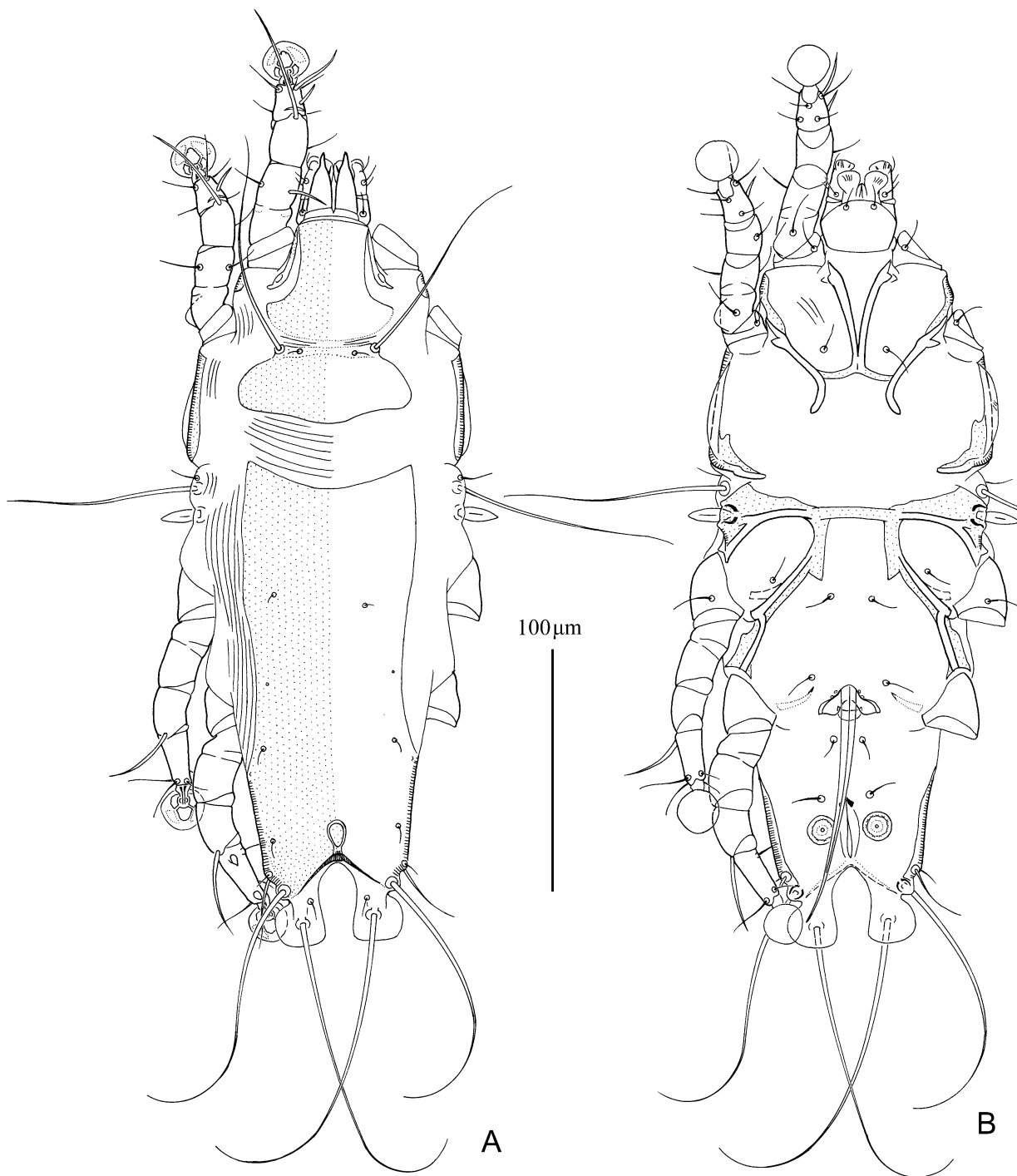
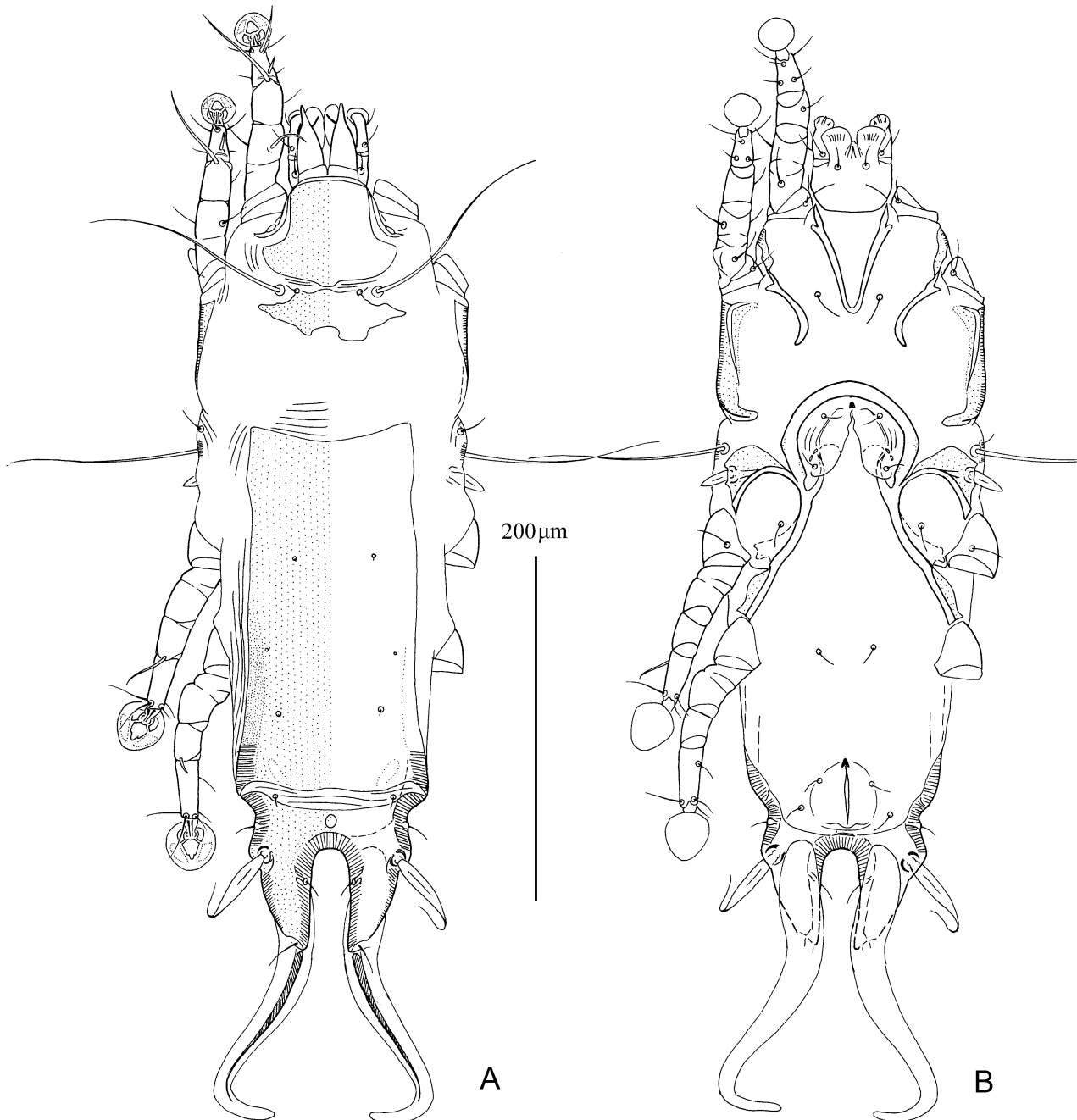


FIGURE 22. *Picipterodectes sasiae* sp. n., male. **A**—dorsal view, **B**—ventral view.

**Description.** MALE (holotype, range for 4 paratypes). Length of idiosoma 300 (295–305), width 117 (115–122), length of hysterosoma 196 (195–200). Prodorsal shield: split into two parts by transverse band of soft cuticle at level of scapular setae, antero-lateral extensions not expressed, total length of shield along median line 80 (78–82), width of posterior piece 73 (70–75), posterior margin of this piece slightly convex, surface without ornamentation (Fig. 22A). Setae *ve* absent. Scapular setae *se* separated by 42 (40–44). Scapular shields narrow. Humeral shields absent. Setae *cp* and *c2* situated on soft tegument. Subhumeral setae *c3* lanceolate, 17 (17–18) × 7 (7–8). Hysteronotal shield: greatest length 183 (180–186), width at anterior margin 71 (69–72), anterior margin concave, surface without ornamentation.

Opisthosomal lobes slightly longer than wide at base, enlarged apically, posterior margin widely rounded, posterior to bases of setae *h2* these lobes membranous; setae *h3* situated approximately in centre of membranous

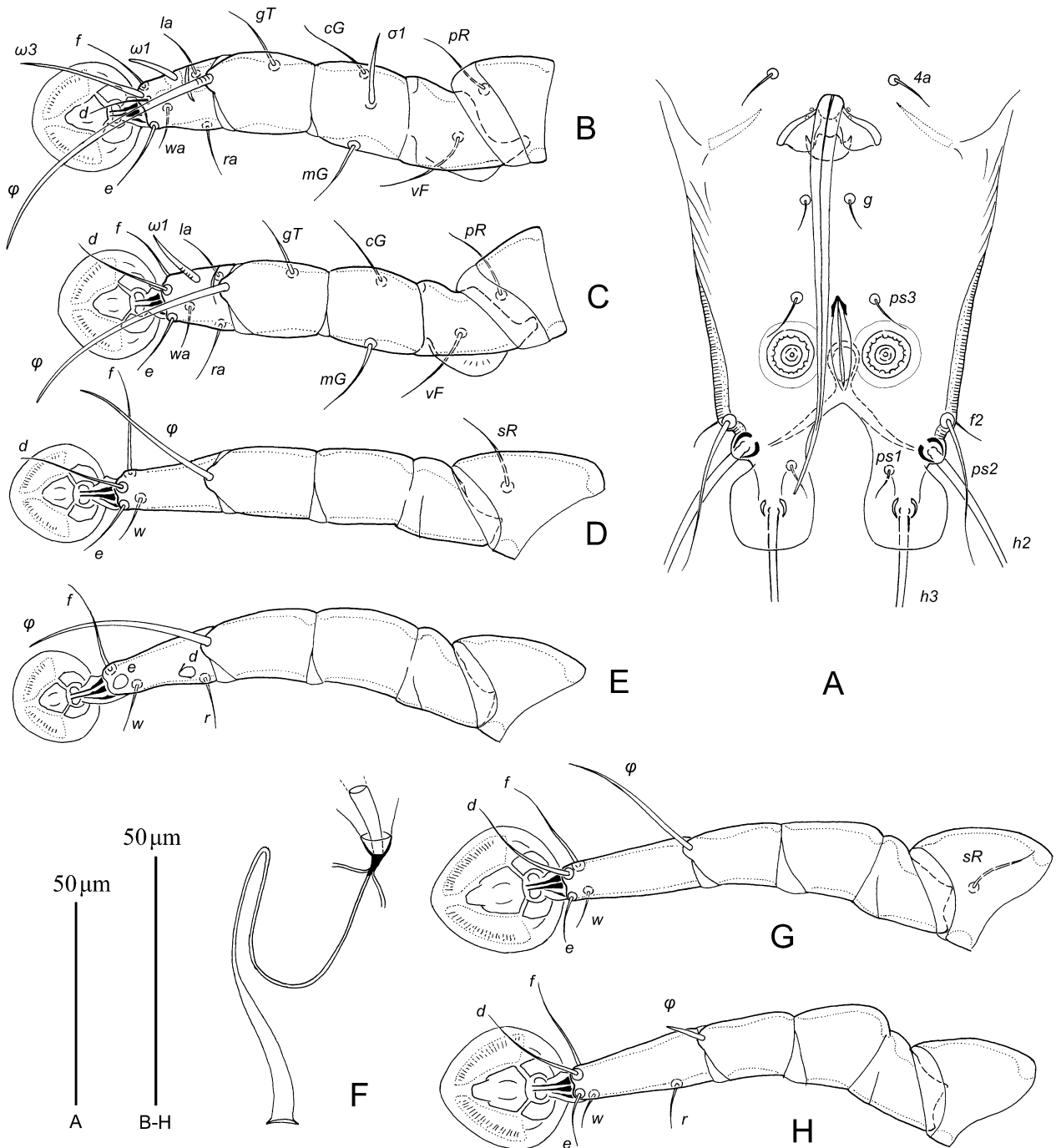
part (Fig. 24A). Terminal cleft narrowly ovate, length 33 (31–34), greatest width 16 (15–18). Supranal concavity ovate, open posteriorly. Setae *f2* and *ps2* situated at same transverse level. Setae *h1* at level of supranal concavity. Setae *h3* represented by macrosetae, longer than macrosetae *h2*, 135 (12–140) and 90 (90–100) in length, respectively; setae *ps2* setiform, 26 (26–30) long; setae *ps1* minute, about 5 long, situated near inner margin of opisthosomal lobe, equidistantly from levels of setae *h2* and *h3*. Distance between dorsal setae: *c2:e1* 115 (110–122), *e1:h2* 60 (58–60), *h2:h3* 13 (12–14), *d1:e1* 64 (62–66), *h1:ps2* 15 (14–15), *ps1:h3* 7 (6–8), *h2:h2* 44 (42–45), *h3:h3* 31 (29–32), *ps2:ps2* 55 (52–56).



**FIGURE 23.** *Picipterodectes sasiae* sp. n., female. **A**—dorsal view, **B**—ventral view.

Epimerites I fused into a Y, sternum about  $\frac{1}{4}$  of total length of epimerites, posterior end of sternum connected with middle parts of epimerites II by transverse sclerotized bands (Fig. 22B). Coxal fields I, II without wide sclerotized areas. Rudimentary sclerites rEpIIa absent. Coxal fields I, III closed, coxal fields II widely open. Coxal fields III of each side connected by straight transverse sclerite. Epimerites IVa poorly developed, not extending to

bases of setae *4a*. Genital arch of moderate size, 12 (11–12) in length, 25 (24–25) in width; basal sclerite of genital apparatus small, semicircular; aedeagus 102 (100–102) long, extending to level of setae *h3* in the middle of opisthosomal lobes (Fig. 24A). Genital papillae strongly reduced, situated at the very anterior margin of genital arch branches. Genital and adanal shields absent. Anal suckers 11 (11–12) in diameter, corolla with 10–12 indentations, surrounding membrane narrow and smooth. Opisthoventral shields not developed. Setae *ps3* situated anterior to anal suckers, slightly closer to each other than to centers of these suckers. Distance between ventral setae: *3a:4b* 9 (9–10), *4b–4a* 35 (32–35), *4a–g* 24 (22–24), *g–ps3* 24 (22–25), *ps3–ps3* 20 (19–20), *ps3:h3* 53 (50–55).



**FIGURE 24.** *Picipterodectes sasiae* sp. n., details. **A**—opisthosoma of male, ventral view, **B–E**—legs I–IV of male, respectively, **F**—head of spermatheca and spermathecal ducts, **G, H**—legs III and IV of female.



Legs I, subequal in size; femora I, II with ventral crest, other segments of these without processes. Solenidion  $\sigma 1$  of genu I 16 (14–16) long, situated at midlevel of segment; genual setae  $cGI$ ,  $cGII$ ,  $mGI$ ,  $mGII$  filiform. Seta  $d$ ,  $f$  of tarsi II, III subequal in length. Solenidion  $\phi$  of tibia IV extending to midlevel of ambulacral disc. Tarsus IV 24 (23–24) long, without apical claw; setae  $d$ ,  $e$  button-like, situated in basal and apical parts of segment, respectively (Figs. 24B–E). Length of solenidia:  $\omega I$  9 (9–10),  $\omega III$  9 (8–10),  $\phi I$  55 (53–55),  $\phi II$  46 (43–46),  $\phi III$  29 (28–30),  $\phi IV$  36 (35–37).

FEMALE (5 paratypes). Length of idiosoma 430–445, width 155–165, length of hysterosoma 398–305. Prodorsal shield: split into two parts by transverse band of soft cuticle at level of scapular setae, antero-lateral extensions not expressed, posterior piece with strongly irregular margins, total length of shield along midline 93 (88–95), width of anterior part 77 (74–78), width of posterior part 66 (60–70), surface without ornamentation (Fig. 23A). Setae  $ve$  absent. Setae  $se$  separated by 58 (55–58). Scapular shields narrow. Humeral shields rudimentary, represented by small sclerites above bases of setae  $cp$ ; setae  $c2$  and  $cp$  situated on soft tegument. Setae  $c3$  lanceolate, 19–20  $\times$  7–8. Anterior and lobar pieces of hysteronotal shield separated dorsally by transverse band of unsclerotized tissue but remain connected ventrolaterally by strongly sclerotized bands. Anterior hysteronotal shield roughly rectangular, anterior margin concave, length 214 (208–215), width at anterior margin 100 (95–100), surface without ornamentation. Length of lobar region 88 (86–88), width 93 (88–94), anterior margin concave. Terminal cleft U-shaped, length 57 (55–57), width at midlevel 22 (22–24). Supranal concavity present, circular. Setae  $h1$  on striated tegument between anterior hysteronotal and lobar shields. Setae  $h2$  spindle-like, with short terminal filaments, length including filament 60 (60–63), length of spindle-like part 40–42, greatest width 7–8. Setae  $ps1$  on inner margin of opisthosomal lobes. Setae  $h3$  short, 15–17 long, about 1/6<sup>th</sup> the length of terminal appendages. Distance between dorsal setae:  $c2:e1$  148–157,  $e1:h2$  85–88,  $h2:h3$  44–47,  $d1:e1$  78–82,  $h1:h2$  28–30,  $h2:ps1$  10–12,  $h1:h1$  50–53,  $h2:h2$  75–77.

Epimerites I fused as a V. Lateral parts of coxal fields I, II without heavily sclerotized areas (Fig. 23B). Epimerites IVa absent. Translobar apodemes of opisthosomal lobes present, wide, fused to each other anterior to terminal cleft. Epigynum horseshoe-shaped, greatest width 78–80. Inner tips of epimerites III fused with posterior ends of epigynum. Copulatory opening situated ventrally at anterior margin of fused translobar apodemes. Distal one third of primary spermaduct enlarged forming bursa copulatrix; secondary spermaducts about 5 long, continuation of primary spermaduct in head of spermatheca clearly distinct (Fig. 24F). Distance between pseudanal setae:  $ps2:ps2$  45–48,  $ps3:ps3$  29–31,  $ps2:ps3$  18–19.

Legs I slightly thicker than legs II; femur II with wide ventral crest; other segments of legs I, II without processes. Solenidion  $\sigma 1$  of genu I 18–20 long, situated closer to basal part of segment. Genual setae  $cGI$ ,  $cGII$ ,  $mGI$ ,  $mGII$  filiform. Setae  $d$ ,  $f$  of tarsi II–IV subequal in length. Genu IV inflated dorsally, genu III not modified (Figs 24G, H). Solenidion  $\phi$  of tibia IV much shorter than that on tibia III. Length of solenidia:  $\omega I$  10–11,  $\omega III$  10–11,  $\phi I$  55–57,  $\phi II$  47–49,  $\phi III$  31–33,  $\phi IV$  7–8.

**Etymology.** The specific epithet derives from the generic name of the type host, and is a noun in the genitive case.

### Genus *Vireodectes* gen. n.

Type species: *Vireodectes erporni* sp. n., by original designation.

**Diagnosis.** BOTH SEXES. Moderately elongated pterodectines. Vertical setae  $ve$  rudimentary, represented by alveoli. Setae  $c1$  absent. Prodorsal shield covering most of prodorsum, split by transverse band of soft cuticle at level of scapular setae  $se$ ,  $si$  into anterior and posterior parts. Scapular shields narrow. Humeral shields present. Setae  $c2$  situated dorso-laterally on striated tegument. Legs I, II subequal in size. Setae  $wa$  anterior to setae  $la$  and  $ra$  on tarsi I, II. Seta  $gT$  of tibia I in proximal part of segment. Setae  $cG$  and  $mG$  on genua I, II setiform. Solenidion  $\sigma 1$  of genu I distinctly shorter than solenidion  $\omega 3$  of tarsus I. Femora II with ventral crests. Solenidion  $\sigma$  of genu III absent. Supranal concavity well expressed.

MALE. Epimerites I fused into a narrow Y with short sternum, posterior end of sternum with lateral extensions not connected to epimerites II. Coxal fields I, II, IV open; coxal fields III closed, surface of coxal fields I–IV without extensive sclerotized areas. Opisthosomal lobes small, narrowed apically, approximately as long as wide,

with membranous posterior ends. Terminal cleft as a narrow inverted U. Setae *h3*, whip-like, slightly distant from membranous posterior margin of opisthosomal lobes. Setae *h1* situated anterior to bases of opisthosomal lobes. Setae *ps1* filiform, minute. Genital arch approximately at midlevel of trochanters IV, with well developed branches; aedeagus whip-like, comparable in length to idiosoma, aedeagus running backward immediately from its apex. Genital papillae situated anterior to branches of genital arch. Paragenital apodemes, genital shield and other sclerotized structures around genital apparatus absent. Opisthoventral shields narrow. Corolla of anal suckers with indentations; suckers surrounded by verrucous membrane. Adanal shields absent. Setae *ps3* anterior to anal suckers. Setae *g* and *ps3* in high-trapezoid arrangement. Legs III and IV subequal in size. Tarsus IV without distinct apical process, setae *d* and *e* button-like.

**FEMALE.** Epimerites I touching by posterior ends or fused into a V. Lobar region of opisthosoma clearly separated from remaining part of opisthosoma, but remain connected ventrolaterally; opisthosomal lobes well developed, with long terminal appendages. Hysteronotal shield split into anterior and lobar shields. Macrosetae *h2* spindle-like. Epigynum horseshoe-shaped, large. Apodemes of oviporus connected with epimerites IIIa. Translobar apodemes present. Setae *ps2*, *ps3* filiform, arranged in trapezium. Genua III, IV without dorsal inflation. Solenidia  $\phi$  of tibiae IV much shorter than on tibiae III.

**Hosts.** Passeriformes: Vireonidae: *Erpornis*.

**Differential diagnosis.** The new genus is very close to the genus *Proterothrix* by having almost an complete set of idiosomal setae in both sexes, closed coxal fields III and the genital papillae situated anterior to genital arch in males. *Vireodectes* gen. n. is distinguished from *Proterothrix* by the following features: in both sexes, idiosomal setae *c1* and solenidion  $\sigma$  of genu III are absent; in males, the adanal shields are absent, and the opisthosomal lobes are small and for the most part are poorly sclerotized, resembling membranes. In both sexes of the genus *Proterothrix*, solenidion  $\sigma$  of genu III is always present, and setae *c1* are also present (with exception of one species); in males, the adanal shields are present (one or two pairs), the dorsal surface of opisthosomal lobes is heavily sclerotized and only the terminal or inner margin of them is sometimes membranous.

**Etymology.** The generic name is a combination of the Vireonidae host family and the *Pterodectes* feather mite genus.

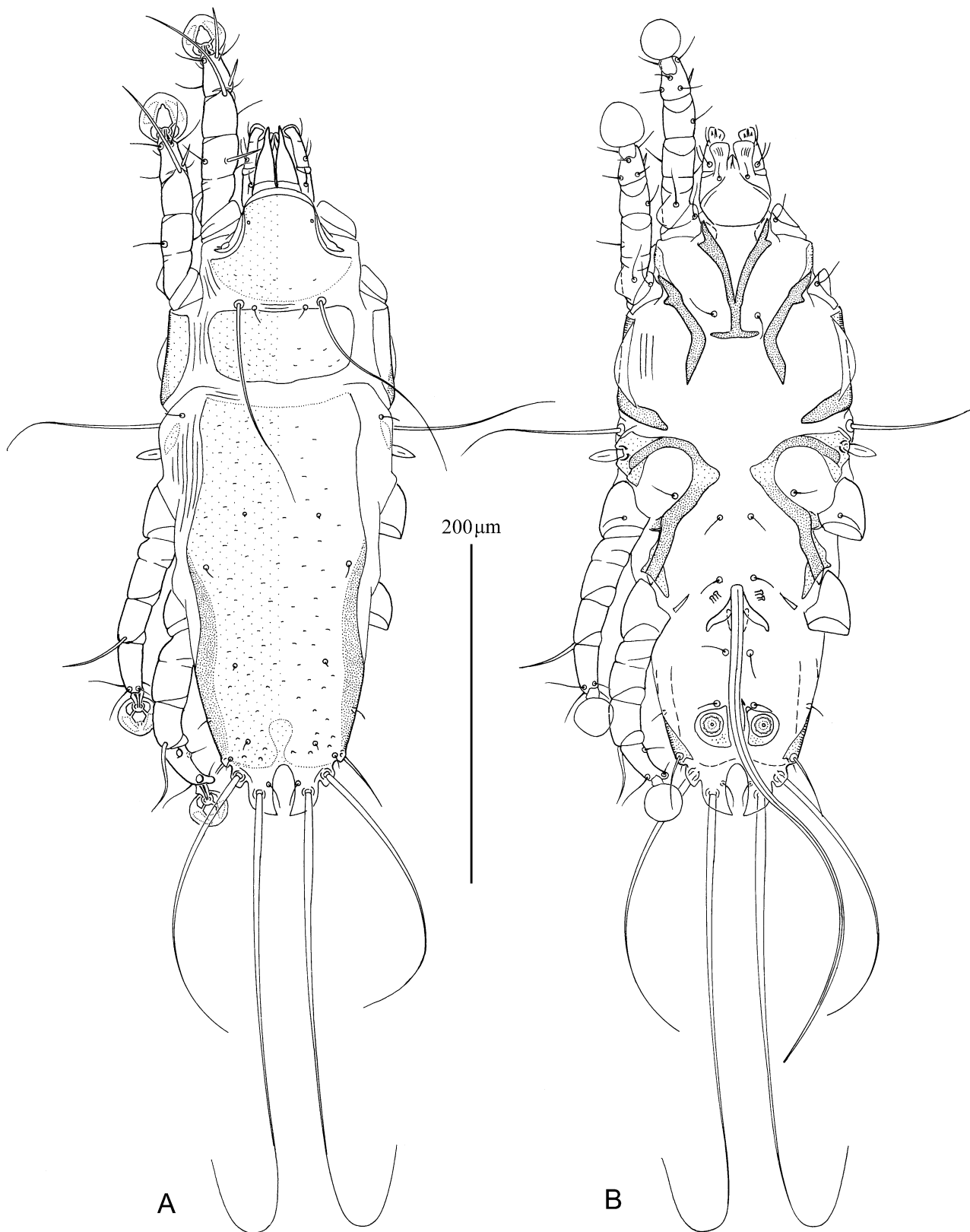
### ***Vireodectes erporni* sp. n.**

(Figs. 25–27)

**Type material.** Male holotype (ZISP 4799), 3 male and 4 female paratypes from *Erpornis zantholeuca* (Blyth) (Vireonidae), **VIETNAM:** Bac Kan, Ba Be National Park, 22°23'N 105°37'E, 5 July 2008, coll. I. Literak, Nguen Manh Hung and M. Capek.

**Type depository.** Holotype, 2 male and 3 female paratypes—ZISP, remaining paratypes—UMMZ, IEBR.

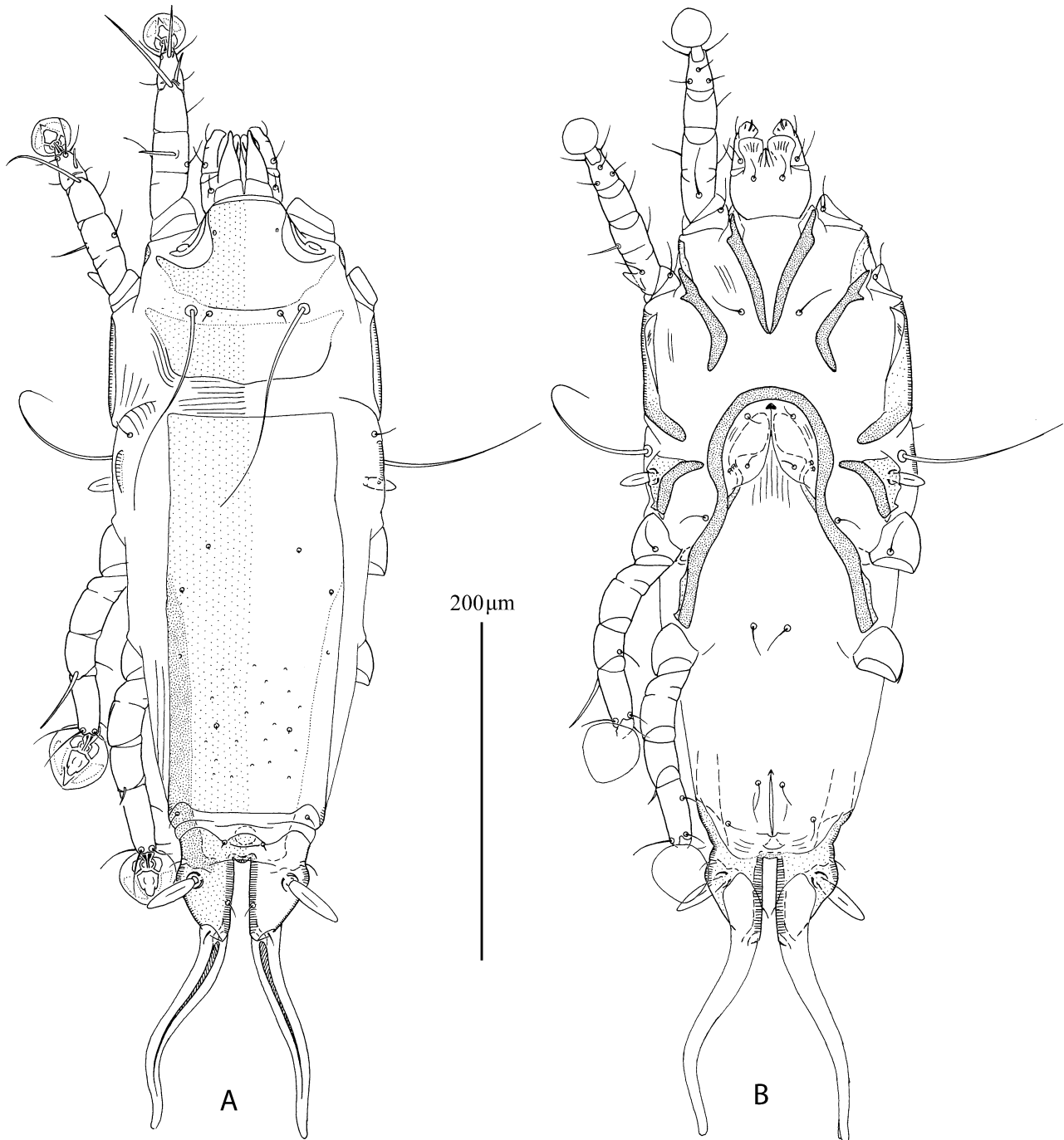
**Description.** MALE (holotype, range for 3 paratypes). Length of idiosoma 352 (334–350), width 137 (128–135), length of hysterosoma 227 (220–225). Prodorsal shield: separated in two parts by transverse band of soft cuticle at level of scapular setae, antero-lateral extensions short and acute, total length of shield 110 (104–110), width of posterior piece 80 (75–80), posterior margin of this piece nearly straight, surface without ornamentation (Fig. 25A). Setae *ve* rudimentary, represented by alveoli. Scapular setae *se* separated by 48 (45–48). Scapular shields narrow. Humeral shields absent. Setae *cp* and *c2* situated on soft striated tegument. Subhumeral setae *c3* lanceolate, 17 (16–17)  $\times$  6 (6–7). Hysteronotal shield: length 223 (216–220), width at anterior margin 95 (88–95), anterior margin slightly concave, surface of posterior half with numerous minute lacunae, lateral margins posterior to level of trochanters III dark coloured. Opisthosomal lobes short and narrow, distal margin oblique; portion of lobes posterior to setae *ps2* mostly membranous; setae *h3* situated at midlevel of these lobes (Fig. 27A). Terminal cleft small, almost ovate, 26 (24–26) in length, 12 (11–12) in width. Supranal concavity circular, open posteriorly, poorly outlined. Setae *f2* and *ps2* at same transverse level. Setae *h1* at midlevel of supranal concavity. Setae *h3* represented by macrosetae, exceeding macrosetae *h2*, 300 (280–310) and 170 (155–165) in length, respectively; setae *ps2* setiform, 36 (32–36 long; setae *ps1* filiform, about 10 long, situated on inner margin of opisthosomal lobe closely to levels of setae *h3*. Distance between dorsal setae: *c2:d2* 83 (78–80), *d2:e2* 82 (77–80), *e2:h2* 38 (36–38), *h2:h3* 11 (10–12), *d1:d2* 25 (23–25), *e1:e2* 27 (24–26), *h1:ps2* 12 (10–12), *ps1:h3* 5 (4–5), *h2:h2* 51 (48–50), *h3:h3* 29 (27–29), *ps2:ps2* 66 (62–66).



**FIGURE 25.** *Vireodectes erporni* sp. n., male. **A**—dorsal view, **B**—ventral view.

Epimerites I fused into a Y, posterior end of sternum T-shaped, lateral extensions not connected with middle parts of epimerites II (Fig. 25B). Epimerites of all coxae heavily sclerotized. Coxal fields I, II without wide sclerotized areas. Rudimentary sclerites rEpIIa absent. Coxal fields I, II open, coxal fields III closed. Coxal fields IV with small sclerotized area at bases of trochanters IV. Epimerites IVa present. Genital arch of moderate size, 24

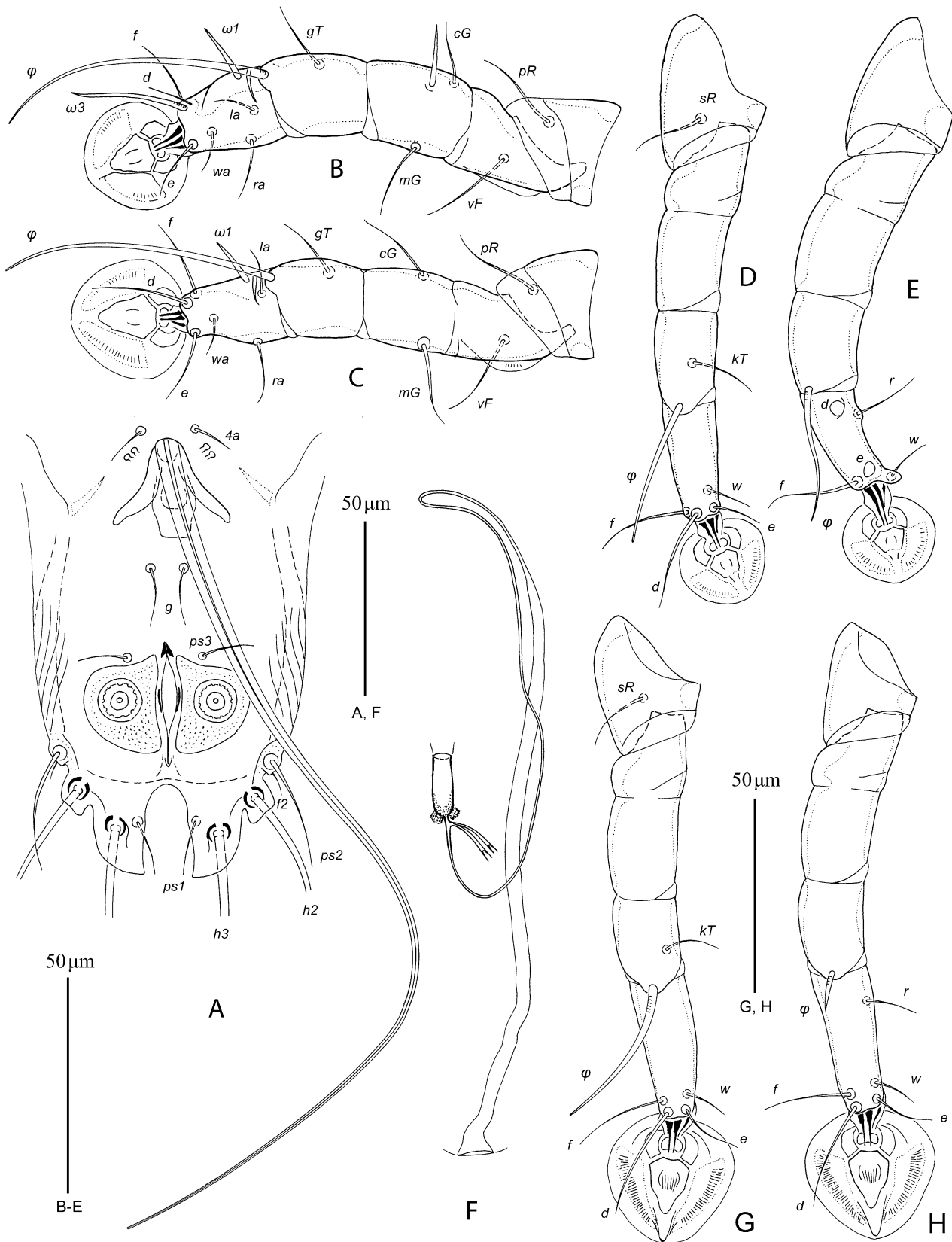
(22–24) in length, 40 (38–40) in width; basal sclerite of genital apparatus small; aedeagus long whip-shaped, 295 (280–290) long, extending beyond lobar apices by half its length (Fig. 27A). Genital papillae not connected by their bases. Genital and adanal shields absent. Anal suckers 12 (11–12) in diameter, corolla with 10–11 indentations. Opisthoventral shields not developed. Setae *ps3* situated closer to each other than to centers of these suckers. Distance between ventral setae: *3a:4b* 15 (13–15), *4b-4a* 37 (35–38), *4a-g* 40 (37–40), *g-ps3* 31 (29–31), *ps3-ps3* 22 (20–22), *ps3:h3* 53 (50–53).



**FIGURE 26.** *Vireodectes erporni* sp. n., female. **A**—dorsal view, **B**—ventral view.

Legs I, II subequal in size; femora I, II with ventral crest, other segments of legs I, II without processes. Solenidion  $\sigma 1$  of genu I 15 (13–15) long, situated in proximal part of segment; setae *cGI*, *cGII*, *mGI*, *mGII* filiform. Seta *d*, *f* of tarsi II, III subequal in length. Solenidion  $\varphi$  of tibia IV extending to tarsal apex. Tarsus IV 28 (27–28)

long, with short and rounded apical extension; setae *d*, *e* button-like, situated in basal and apical parts of segment, respectively; setae *w* on ventral side of apical extension (Figs. 27B–E). Length of solenidia:  $\omega$ II 14 (13–14),  $\omega$ III 11 (10–11),  $\phi$ I 66 (64–66),  $\phi$ II 55 (54–55),  $\phi$ III 37 (35–37),  $\phi$ IV 26 (24–26).



**FIGURE 27.** *Vireodectes erporni* sp. n., details. **A**—opithosoma of male, ventral view, **B–E**—legs I–IV of male, respectively, **F**—head of spermatheca and spermaducts, **G, H**—tarsi, tibiae and genua III, IV of female, respectively.

FEMALE (4 paratypes). Length of idiosoma 440–450, width 155–160, length of hysterosoma 300–312. Prodorsal shield: separated in two parts by transverse band of soft cuticle at level of scapular setae, antero-lateral extensions acute, posterior piece as inverted trapezium, its posterior margin slightly convex, total length 110–115, greatest width of posterior piece 106–112, surface without ornamentation (Fig. 26A). Setae *ve* rudimentary, represented by alveoli. Setae *se* separated by 66 (66–70). Scapular shields narrow. Humeral shields absent; setae *cp* and *c2* situated on soft tegument. Setae *c3* lanceolate, 16 (15–16) x 7 (7–8). Anterior and lobar pieces of hysteronotal shield separated dorsally by wide transverse band of unsclerotized tissue but remain connected ventrolaterally. Anterior hysteronotal part of shield roughly rectangular, anterior margin straight, length 236–242, width at anterior margin 98–102, most surface quite poorly sclerotized, but lateral margins posterior to level of trochanters III dark coloured. Length of lobar region 75–78, width 75–79, anterior margin with pair of concavities and short median extension. Terminal cleft parallel-sided, narrow, length 51–53, width at midlevel 11–13. Supranal concavity circular, poorly expressed. Setae *h1* on anterior margin of lobar shield, approximately at level of supranal concavity. Setae *h2* spindle-like, 33–35 x 7–8. Setae *ps1* on inner margin of opisthosomal lobes. Setae *h3* 8–10 long, about 1/10<sup>th</sup> the length of terminal appendages. Distance between dorsal setae: *c2:d2* 90–95, *d2:e2* 136–140, *e2:h2* 37–40, *h2:h3* 26–29, *d1:d2* 24–27, *e1:e2* 52–55, *h1:h2* 26–28, *h2:ps1* 13–15, *h1:h1* 22–24, *h2:h2* 56–58.

Posterior tips of epimerites I almost touching or connected by very thin commissure. Lateral parts of coxal fields I, II without heavily sclerotized areas (Fig. 26B). Epimerites IVa absent. Translobar apodemes of opisthosomal lobes present, wide, their connection anterior to terminal cleft very narrow. Epigynum horseshoe-shaped, outer margins without ledge, greatest width 73–75. All epimerites and epigynum dark colored. Copulatory opening situated ventrally between anal opening and anterior margin of terminal cleft. Distal half of primary spermatid narrow enlarged forming bursa copulatrix; secondary spermatids 13–15 long (Figs. 27F). Distance between pseudanal setae: *ps2:ps2* 44–46, *ps3:ps3* 15–16, *ps2:ps3* 20–21.

Legs I slightly thicker than legs II; femur II with angular ventral crest; other segments of legs I, II without processes. Solenidion  $\sigma$ 1 of genu I 14–16 long. Genu setae *cGI*, *cGII*, *mGI*, *mGII* filiform. Setae *d*, *f* of tarsi II–IV subequal in length (Figs. 27G, H). Genu IV without inflations and longitudinal crests. Solenidion  $\phi$  of tibia IV much shorter than that on tibia III. Length of solenidia:  $\omega$ II 13–14,  $\omega$ III 14–15,  $\phi$ I 62–65,  $\phi$ II 55–58,  $\phi$ III 40–42,  $\phi$ IV 10–11.

**Etymology.** The specific epithet derives from the generic name of the type host and is a noun in the genitive case.

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