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Feather mites of the subfamily Proctophyllodinae (Acari: Proctophyllodidae) from passerines (Aves: Passeriformes) in Costa Rica

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Table of contents

Abstract

The paper provides new data on systematics and host associations of feather mites of the subfamily Proctophyllodinae (Astigmata: Proctophyllodidae) recorded on passerine birds (Passeriformes) in Costa Rica. A total of 25 proctophyllodine species of six genera have been recorded, of which 19 new species are described: *Anisophyllodes cuneiformis* **sp. n.** from *Sittasomus griseicapillus* (Vieillot) (Furnariidae), *Atrichophyllodes latilobus* **sp. n.** from *Hylophylax naevioides* (Lafresnaye) (Thamnophilidae), *Nycteridocaulus attila* **sp. n.** from *Attila spadiceus* (Gmelin, JF) (Tyrannidae), *N. hylophylax* **sp. n.** from *Hylophylax naevioides* (Lafresnaye) (Thamnophilidae), *N. ketourus* **sp. n.** from *Thryophilus rufalbus* (Lafresnaye) (Troglodytidae), *N. leptopogoni* **sp. n.** from *Leptopogon superciliaris* Tschudi (Tyrannidae), *N. myiobius* **sp. n.** from *Myiobius sulphureipygius* (Sclater, PL) (Tyrannidae), *N. myioborus* **sp. n.** from *Myioborus miniatus* (Swainson) (Parulidae), *N. platyrinchi* **sp. n.** from *Platyrinchus cancrominus* Sclater, PL and Salvin (Tyrannidae), *Platyacarus caulifer* **sp. n.** from *Glyphorynchus spirurus* (Vieillot) (Furnariidae), *Pl. dendrocinclae* **sp. n.** from *Dendrocincla homochroa* (Scalter, PL) (Furnariidae), *Pl. dendrocolapti* **sp. n.** and *Pl. picumnus* **sp. n.** from *Dendrocolaptes picumnus* Lichtenstein, MHK (Furnariidae), *Pl. sclerurus* **sp. n.** from *Sclerurus mexicanus* Sclater, PL (Furnariidae), *Proctophyllodes arremoni* **sp. n.** from *Arremon brunneinucha* (Lafresnaye) (Emberizidae), *Pr. euphoniae* **sp. n.** from *Euphonia hirundinacea* Bonaparte (Fringillidae), *Pr. vesicularis* **sp. n.** from *E. anneae* Cassin (Fringillidae), *Pr. parkesiae* **sp. n.** from *Parkesia motacilla* (Vieillot) (Parulidae), and *Pr. strictophyllus* **sp. n.** from *Coereba flaveola* (Linnaeus) (Thraupidae). The female of *Anisophyllodes pipromorphae* Atyeo, 1967, previously known from two forms of males only, is described for the first time.

Five new host associations are recorded for the following mites: *Anisophyllodes pipromorphae* from *Mionectes olivaceus* Lawrence (Tyrannidae), *Diproctophyllodes dielytra* (Trouessart, 1885) from *Chiroxiphia linearis* (Bonaparte) and *Corapipo altera* Hellmayr (Pipridae), *Nycteridocaulus pectinatus* Atyeo, 1966 from *Tolmomyias sulphurescens* (von Spix) (Tyrannidae), and *Proctophyllodes thraupis* Atyeo and Braasch, 1966 from *Tangara icterocephala* (Bonaparte) (Thraupidae).

Two species, *Proctophyllodes habiae* Atyeo and Braasch, 1966 from *Habia rubica* (Vieillot) (Cardinalidae) and *Platyacarus sittasomi* Hernandes *et al.*, 2007 from *Sittasomus griseicapillus* (Vieillot) (Furnariidae), are recorded in Costa Rica for the first time.

New diagnoses and keys to all currently known species are provided for the genera *Anisophyllodes* Atyeo, 1967, *Atrichophyllodes* Hernandes *et al.*, 2007, *Nycteridocaulus* Atyeo, 1966, and *Platyacarus* Kudon, 1982. Two new species groups, *caulifer* and *minor,* are established within the genus *Platyacarus*. The history of taxonomic investigations of proctophyllodine feather mites is briefly presented. We summarize host associations with passerine birds of the New World for these proctophyllodine genera and species, excluding the genus *Proctophyllodes*.

Key words: Proctophyllodidae, systematics, new species, fauna, host associations, Passeriformes, Costa Rica

Introduction

The family Proctophyllodidae is the most species-rich among all currently recognized feather mites (Astigmata: Analgoidea and Pterolichoidea) and includes over 400 species in 50 genera. According to current taxonomy, the family consists of two subfamilies, Proctophyllodinae (about 240 species in 22 genera) and Pterodectinae (about 165 species in 28 genera) (Gaud & Atyeo 1996; Mironov 2009, 2012; Mironov & González-Acuña 2009, 2011; Mironov *et al.* 2012b; Hernandes & Valim 2014; Mironov & OConnor 2014). Most proctophyllodid mites inhabit feathers with large and firm vanes (the primaries, secondaries, tertials, greater coverts of the wings and rectrices), where they are located in narrow inter-barb corridors on the ventral surface. The only exceptions are representatives of the tribe Rhamphocaulini (Pterodectinae), which live inside the quill cavities of primaries and secondaries (Mironov 2009; Park & Atyeo 1971b, 1972a, 1972b).

Representatives of both subfamilies are predominantly associated with passerine birds (Passeriformes), although members of the Pterodectinae are also widely distributed on hummingbirds (Apodiformes: Trochilidae). Additionally, several proctophyllodid species are associated with Coraciiformes, Piciformes and Trogoniformes, and a single species has been recorded on each of Caprimulgiformes, Gruiformes, Musophagiformes and Psittaciformes (Atyeo & Braasch 1966; Atyeo 1967a; Park & Atyeo 1971a, 1975; Atyeo & Gaud 1976, 1977; Gaud & Atyeo 1996; Mironov 2006, 2009, Valim & Hernandes 2010; Hernandes & Valim 2014).

Although Proctophyllodidae was one of the first four families established in feather mite taxonomy (Mégnin & Trouessart 1884; Trouesart & Mégnin 1884), extensive investigations of proctophyllodid diversity only started in the 1960s, directed mainly by W.T. Atyeo and J. Gaud, the world experts on feather mites. In nearly thirty

publications dealing specifically with proctophyllodids, these authors outlined modern taxonomic borders of the family, made revisions of most genera known at that time, established 28 new genera and described over a hundred of new species worldwide (for major references see: Gaud & Till 1961; Gaud & Atyeo 1996; Mironov 2006, 2009; Valim & Hernandes 2010; Mironov & González-Acuña 2011; Hernandes & Valim 2014). The most important publications of that period include the world revision of the genus *Proctophyllodes* Robin, 1968 by Atyeo & Braasch (1966) and the generic revision of the subfamily Pterodectinae by Park & Atyeo (1971a). The generic revision of *Proctophyllodes* provided uniform (re)descriptions of 133 species known in that time, for the first time established intrageneric structure of the genus and provided a key to species. Although this monograph was published forty years ago, it is still the main publication on systematics of this genus, and presently is the only key for identification of the world's species. In their generic revision of the Pterodectinae, Park & Atyeo (1971a) provided uniform diagnoses for all genera including eight newly established ones, and revised their species content. Other taxonomic works led by W.T. Atyeo and J. Gaud dedicated to proctophyllodids focused mainly on the two fields: pterodectines living on hummingbirds (Trochilidae, e.g. Park & Atyeo 1971b, 1972a, 1972b, 1973a, 1973b, 1974a, 1974b, 1975) and proctophyllodines associated with birds of tropical regions, mainly with suboscine passerines (Gaud & Berla 1963; Atyeo 1966a, 1966b, 1967a, 1967b, 1969, 1971a, 1971b, 1971c, 1972; Atyeo & Gaud 1968, 1970a, 1970b 1971a, 1971b; Gaud & Fain 1990). The last taxonomic works on proctophyllodids at the end of the 20th century were a series of papers by Kudon (1982a, 1982b, 1982c, 1982d, 1982e) and Mironov & Kopij (1996a, 1996b, 1997) on proctophyllodids of South America and South Africa, respectively.

The interest in proctophyllodid feather mites among acarologists recommenced in the middle of the 2000s. Most of publications published since that time period were dedicated to the subfamily Pterodectinae (Mironov & Fain 2003; Hernandes & Valim 2005; 2006, 2012, 2014; Valim & Hernandes 2006, 2008, 2009, 2010; Mironov 2006, 2008, 2009; Mironov *et al*. 2008a, 2008b, 2012b; Mironov & Proctor 2009b; Hernandes *et al*. 2010; Mironov & Wauthy 2010; Mironov & González-Acuña 2011; Hernandes 2013; Mironov & Tolstenkov 2013; Mironov & Overstreet 2015), whereas only a few dealt with Proctophyllodinae (Hernandes *et al*. 2007; Mironov & Proctor 2009a; Mironov & González-Acuña 2009; Mironov 2012; Hernandes 2014; Mironov & OConnor 2014). Hernandes and Valim (2014) provided an expanded key to all proctophyllodid genera including those established after Gaud and Atyeo's (1996) world revision of supraspecific feather mite taxa. .

The present study is dedicated to feather mites of the subfamily Proctophyllodine of Costa Rica and continues our investigations of feather mites associated with passerine birds of this country (Mironov *et al.* 2011, 2014). Investigations of the Proctophyllodinae associated with passerines of the New World are not numerous and have been carried out so far in just a few countries; considering the number of potential hosts, one can confidently state that the current knowledge of proctophyllodine diversity in this part of the world is quite incomplete. The earliest purposeful investigations of proctophyllodines of the New World were undertaken in Brazil by Berla (1959a, 1959b, 1959c). Then, Atyeo and Gaud published a series of works on proctophyllodines associated with the suboscines in various countries of South and Central America (Gaud & Berla 1963; Atyeo 1966a, 1966b, 1967a, 1967b, 1971a, 1971b, 1971c; Atyeo & Gaud 1968, 1970a, 1970b, 1971a, 1971b). Significant contribution to the knowledge on proctophyllodines of the New World was made by the revision of the genus *Proctophyllodes* (Atyeo & Braasch 1966), mainly for the USA and Mexico, and by the review of mites associated with woodcreepers (Furnariidae: Dendrocolaptinae) in South and Central America (Kudon 1982e). Much later, taxonomic investigations of proctophyllodines were carried out in Ecuador (OConnor *et al.* 2005), Chile (Mironov & González-Acuña 2009), Brazil (Hernandes *et al.* 2007), and the USA (Mironov & OConnor 2014). Additional data on distribution and host associations were added by local faunistic surveys and check-lists for Brazil (Roda & Faris 1999; Kanegae *et al.* 2008; Valim *et al.* 2011; Enout *et al.* 2012; Silva *et al.* 2015), Ecuador (Štefka *et al.* 2011; Villa *et al.* 2013), Chile (Fuentes *et al.* 2015; Fuentes-Castillo *et al*. 2016), Colombia (Barreto *et al.* 2012), USA (Forrester & Spalding 2003) and Canada (Galloway *et al.* 2014). Based on the works cited above, the number of proctophyllodines recorded on passerines of the New World includes about 110 species in 11 genera, of which 70 species belong to *Proctophyllodes*. Of them, only one proctophyllodine species, *Platyacarus brevicolicus* Kudon, 1982, has so far been recorded from Costa Rica.

In the present work, we report 25 species of the subfamily Proctophyllodine found on passerines from Costa Rica, including 19 new species described herein. We also provide new diagnoses for the genera *Anisophyllodes* Atyeo, 1967, *Atrichophyllodes* Hernandes, Valim and Mironov, 2007, *Nycteridocaulus* Atyeo 1966 and *Platyacarus* Kudon, 1982.

Material and methods

The material used in the present work was collected from live wild birds by the junior authors (IL, OS and MC) in the period between 31 July and 24 August 2009 at two locations in Costa Rica: Tapantí National Park and Rincón de la Vieja National Park. Birds were captured with mist-nets, identified and visually checked for the presence of mites and other ectoparasites. In cases where feather mites were detected on the primaries and secondaries of the wings, a small part of a flight feather infested with feather mites was cut off with scissors and placed into a tube with 96 % ethanol. After processing, captured birds were released back into the wild. In the laboratory conditions, mite specimens collected were mounted on microslides in Hoyer's medium according to the standard techniques used for many groups of small acariform mites (Evans 1992; Krantz & Walter 2009). Investigation of mite specimens and drawings were made by SM using a Leica DM 2500 light microscope with differential interference contrast (DIC) and equipped with a camera lucida.

The descriptions of new taxa and new generic diagnoses are given in the formats elaborated for species of proctophyllodid mites over the last ten years (Hernandes & Valim 2006; Mironov 2006; Mironov & González-Acuña 2009). General morphological terms and leg and idiosomal chaetotaxy follow Gaud & Atyeo (1996). Idiosomal chaetotaxy also generally follows these authors with subsequent corrections by Norton (1998) for coxal setation. All measurements are in micrometers (μm). Measuring techniques used for particular morphological structures are as follows:

(i) length of idiosoma is measured from the anterior margin of the propodosoma to the bases of setae *h3* in males, unless it is indicated specifically in description, and in females, to the lobar apices excluding the terminal appendages; 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 bases of setae *h3* in males, and in females, to lobar apices, as described above;

(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) distance between the prodorsal and hysteronotal shields is measured along the midline;

(viii) 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 Gill & Donsker (2017). Abbreviations used in collection numbers and type material depositories: IMUCR—the Insect Museum of the University of Costa Rica, San Jose, Costa Rica; 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 Proctophyllodinae Trouessart and Mégnin, 1884

Genus *Platyacarus* Kudon, 1982

Type species: *Platyacarus oligolaccius* Kudon, 1982, by original designation.

Diagnosis. BOTH SEXES. Moderately elongated proctophyllodines. Prodorsal shield covering nearly all prodorsum, entire or split into two pieces by transverse poorly sclerotized band, with antero-lateral extensions.

Vertical setae *vi* rudimentary, represented by alveoli or absent. Scapular setae *si* and *se* arranged in transverse line, situated on prodorsal shield or on a transverse band of soft tegument. Humeral shields well developed dorsally, encompassing bases of setae *cp*, setae *c2* on these shields. Subhumeral setae *c3* lanceolate or spiculiform. Hysterosomal setae *c1*, *f2* present or absent. Solenidion *σ1* of genu I shorter than solenidion *ω3* of tarsus I. Tarsi I, II with 4 ventral setae (*la, ra, wa*, and *s*), seta *wa* close to setae *la* and *ra* on these tarsi. Segments of legs I and II without processes or other modifications.

MALE. Hysteronotal shield covering almost all hysterosoma. Opisthosoma attenuate posteriorly. Opisthosomal lobes short, rounded or truncate, separated by usually small terminal cleft of semiovate or semicircular form. Posterior margin of lobes with small terminal lamellae variable in form (tongue-shaped, triangular, spiculiform or spatuliform). Supranal concavity present, narrowly ovate or teardrop-shaped. Setae *h3* long, whip-shaped, comparable in length to macrosetae *h2*. Setae *h1* distinctly anterior to level of setae *ps2*. Epimerites I convergent, fused into a Y or V. Coxal fields I–IV open, without extensive sclerotized areas. Genital apparatus usually at level of trochanters IV; genital arch of moderate size. Aedeagus in genital sheath much longer than genital arch, but in most species not extending beyond lobar apices. Adanal shields present, represented by 1 or 2 pairs usually of ovate form, situated antero-lateral to adanal suckers and setae *ps3*. Genital papillae situated at level of genital arch apex, on soft tegument or on small ovate plates. Pregenital apodeme absent; paragenital apodemes present or absent; if present situated lateral to genital apparatus. Adanal apodemes absent (present in *Platyacarus caulifer* **sp. n.**). Opisthoventral shields not developed. Adanal suckers cylindrical or cup-shaped, corolla dentate or edentate. Legs III and IV subequal in size. Tarsus IV without apical claw-like processes, modified tarsal setae *d* and *e* button-like.

FEMALE. Lobar region of opisthosoma clearly separated from remaining part of hysterosoma, opisthosomal lobes well developed, with terminal appendages. Anterior hysteronotal and lobar shields separated by narrow band of striated tegument (not split in *Platyacarus trigonicus* Kudon, 1982). Lobar shield entire. Supranal concavity absent. Macrosetae *h2* thickened basally, with filiform apex. Epimerites I with posterior tips convergent, connected by very thin commissure or free. Epigynum large semicircular, with tips acute or bidentate. Translobar apodemes present, fused to each other anterior to terminal cleft. Copulatory opening subterminal, situated between anal opening and anterior margin of fused translobar apodemes. Legs III and IV subequal in size; segments without modifications. Solenidion *φ* of tibia IV usually shorter than on tibia III.

Hosts: Furnariidae.

Remarks. (1) The genus was established by Kudon (1982a, 1982b, 1982c, 1982d, 1982e), who in a series of papers described 12 species and gave an analysis of their distribution among woodcreepers (Furnariidae: Dendrocolaptinae), an endemic group of suboscines restricted to tropics of the New World. Based on the morphological features of the male opisthosoma, this author arranged all described species into four species groups: *acaenophyllicus*, *epacrophyllicus, oligolaccius* and *psilocoronius.* In further investigations, one new species was described and one, *Platyacarus minor* (Berla, 1959), was transferred from the genus *Proctophyllodes* Robin, 1868 (Hernandes *et al.* 2007; Hernandes & Valim 2014). The latter study showed that the genus *Platyacarus* is not restricted to the subfamily Dendrocolaptinae, but is widely distributed among the Furnariidae. At present the genus includes 19 species including five described herein. Two new species groups, *caulifer* and *minor*, are established in this paper.

(2) A new key to species provided below is based in part on that by Kudon (1982e), but expanded by new characters for identification of previously known species. *Platyacarus brevicolicus* Kudon, 1982 originally referred to the *epacrophyllicus* group does not correspond to the diagnosis of that group and cannot be identified with the key by Kudon (1982e); this species is transferred here to the *acaenophyllicus* group.

(3) Our study has shown that the genus *Platyacarus* has four ventral setae on tarsi I and II (*la, ra, wa*, and *s*), rather than three (*la, ra*, and *wa*) as for all other proctophyllodids (Atyeo & Braasch 1966; Park & Atyeo 1971a). This morphological feature was not noticed by previous investigators (Kudon 1982a; Hernandes *et al.* 2007). A phylogenetic study of proctophyllodids based on molecular data (Knowles & Klimov 2011) showed that the genus *Platyacarus* is not the most basal lineage of Proctophyllodidae but is nested in the clade constituting the subfamily Proctophyllodinae. Therefore, two hypotheses can be drawn out to explain the presence of setae *s* on tarsi I, II in this genus. Their presence is either the result of reversal of setae *s*, which is more probable, or these setae have been lost independently in the subfamily Pterodectinae and in the branch comprising the remaining proctophyllodine genera.

Key to *Platyacarus* species

(Males and females)

1. In both sexes, hysterosomal setae *f2* present (*minor* group) 2
- In both sexes, hysterosomal setae *f2* absent 3
2. In male, terminal lamellae close to each other with inner margins separated by 5 μm, epimerites IVa present (Fig. 10A, B). In female, bases of trochanters III, IV flanked by sclerotized bands, terminal cleft 2.1–2.7 times longer than wide at midlength, prodorsal shield without lacunae (Fig. 11A, B) . . . . . *P. sclerurus* Mironov **sp. n.**
- In male, terminal lamellae well separated, distance between inner margins about 15 μm, epimerites IVa absent. In female, bases of trochanters III, IV not flanked by sclerotized bands, terminal cleft narrow, about 5 times longer than wide at midlength, prodorsal shield with minute circular lacunae. . . . . *P. minor* (Berla, 1959)
3. In male, terminal lamellae strongly elongated, exceeding 60 μm, aedeagus extending beyond midlength of terminal lamellae, anal field flanked laterally by large bow-shaped adanal apodemes (Fig. 13A, B). In female, distal half of primary spermaduct strongly enlarged (Fig. 15E) (*caulifer* group) . . . . . *P. caulifer* Mironov **sp. n.**
- In male, terminal lamellae tongue-shaped, triangular or spiculiform, shorter than 30 μm, aedeagus not extending to anterior end of terminal cleft, anal field not flanked laterally by adanal apodemes. In female, primary spermaduct enlarged only at copulatory opening 4
4. In male, corolla of adanal suckers smooth, only postero-mesal fragments of adanal shields bearing setae *ps3* present. In both sexes, setae *c3* filiform or bristle-shaped, not thicker than 1 μm (*psilocoronius* group) 5
- In male, corolla of adanal suckers indented, two pairs of adanal shield fragments present (except *P. epacrophyllicus* having only postero-mesal pair). In both sexes, setae *c3* lanceolate and 2–3 μm in width 8
5. In male, genital papillae connected at bases, genital organ 35-40 μm, terminal cleft semiovate or semicircular, incision outlined by interlobar membrane longer than wide. In female, setae *h2* 80–90 μm long. 6
- In male, genital papillae separated, genital organ about 30 long, anterior margin of terminal cleft straight, incision outlined by interlobar membrane wider than long. In female, setae *h2* about 65 μm long . . . . . *P. diversus* Kudon, 1982
6. In male, terminal cleft semicircular, incision outlined by free margin of interlobar membrane slightly longer than wide (Fig. 7A, B). In female, setae *h1* moved backward from anterior edge of lobar shield, secondary spermaducts 2–3 μm long (Fig. 8A, B). . . . . *P. picumnus* **sp. n.**
- In male, terminal cleft ovate, incision outlined by interlobar membrane and terminal lamellae nearly 2 times longer than wide. In female, setae *h1* on anterior edge of lobar shield, secondary spermaduct 5–10 μm long 7
7. In male, genital organ about 40 μm and almost extending to level of setae *ps3*, terminal lamellae with acute apices, setae *c2* on humeral shields, paragenital apodemes as teardrop-shaped longitudinal sclerites. (Female unknown). . . . . *P. longicolicus* Kudon, 1982
- In male, genital organ about 36 μm and extending ¾ the distance between setae *g* and *ps3*, tips of terminal lamellae rounded, paragenital apodemes as small roughly ovate sclerites, setae *c2* usually off humeral shields. In female, setae *h1* on anterior edge of lobar shield, distance between their bases *c*. 52 μm. . . . . *P. psilocoronius* Kudon, 1982
8. In male, terminal lamellae tongue-shaped, slightly longer than wide and rounded apically (*oligolaccius* group). 9
- In male, terminal lamellae triangular, spiculiform or as a pair of very short convexities. 13
9. In male, ratio of idiosoma length/width 1.6–2.0, entire surface of hysteronotal shield with distinct minute lacunae. In female, opisthosomal lobes short, with length approximately equal to width at base; terminal cleft equal or slightly longer than wide at midlevel; posterior part of hysteronotal shield abruptly widened in posterior one third 10
- In male, ratio of idiosoma length/width 2.2–2.5, surface of hysteronotal shield without distinct lacunae or with a few lacunae in postero-lateral part. In female, opisthosomal lobes elongated, 1.7–2 times longer than wide; terminal cleft narrow, 2.0–3.5 times longer than wide at midlevel; hysteronotal shield gradually widened toward posterior end 11
10. In male, paragenital apodemes present, lacunae usually restricted to hysteronotal shield, terminal cleft half as wide as terminal lamellae, length of genital organ about 40 μm. In female, length of idiosoma *c*. 430 μm, width of lobar region *c*. 105 μm . . . . . *P. dontocoronius* Kudon, 1982
- In male, paragenital apodemes absent, lacunae usually present on prodorsal and hysteronotal shields, width of terminal cleft approximately equal to that of terminal lamellae, length of genital organ about 50 μm. In female, length of idiosoma *c*. 470 μm, width of lobar region *c*. 120 μm . . . . . *P. oligolaccius* Kudon, 1982
11. In male, antero-lateral pieces of adanal shield bow-shaped, paragenital apodemes absent. In female, median extension and posterior angles of prodorsal shield approximately at same transverse level, anterior hysteronotal shield usually bears small circular lacunae . . . . . *P. sittasomi* Hernandes *et al.*, 2007
- In male, antero-lateral pieces of adanal shield ovate or reniform, thin paragenital apodemes represented by thin longitudinal sclerites. In female, median extension of prodorsal shield extending distinctly beyond level of posterior angles of this shield, minute circular lacunae on hysteronotal shield absent or barely distinct 12
12. In male, genital organ 14–18 μm long, not extending to level of setae *g* (Fig. 6A). In female, terminal cleft 85–90 μm long (Fig. 5A). . . . . *P. dendrocolapti* **sp. n.**
- In male, genital organ 40–45 μm long, almost extending to anterior end of anal opening (Fig. 2A). In female, terminal cleft 60–65 μm long (Fig. 2A). . . . . *P. dendrocinclae* **sp. n.**
13. In males, genital organ less than 41 μm long and extending approximately to midlevel between setae *g* and *ps3* (*acaenophyllicus* group) 14
- In male, genital organ longer than 44 μm and usually extending to level of setae *ps3* (*epacrophyllicus* group). 17
14. In both sexes, setae *cG, mG* of genu I spiculiform. In males, epimerites I fused into a Y, terminal lamellae as small semi-round convexities, setae *h1* inserted on lateral edges of hysteronotal shield. In female, hysteronotal shield not split into anterior hys-

teronotal and lobar parts . . . . . *P. trigonicus* Kudon, 1982

- In both sexes, setae *cG*, *mG* of genu I setiform. In males, epimerites I fused into a narrow U, setae *h1* inserted distinctly mesal from lateral edges of hysteronotal shield. In female, lobar shield is completely separated from anterior hysteronotal shield 15

15. In male, lamellae narrow, almost spiculiform; length of genual solenidion $\sigma 1$I *c.* 15 µm. In female, width of lobar region over 100 µm, length of genual solenidion $\sigma 1$I *c.* 19 µm . . . . . *P. acaenophyllicus* Kudon, 1982

- In male, lamellae triangular, length of genual solenidion $\sigma 1$I *c.* 10 µm. In female, width of lobar region 85–95, length of genual solenidion $\sigma 1$I 12–14 µm. 16

16. In male, genital papillae free, setae *g* and *ps3* arranged in inverted trapezium, length of genital organ *c*. 40 µm, adanal suckers with 12 denticles. In female, width of lobar region about 95 µm, proximal 1/3rd of primary spermaduct gradually expanding toward the head of spermatheca . . . . . *P. leptodonticus* Kudon, 1982

- In male, genital papillae fused, setae *g* and *ps3* arranged in rectangle, length of genital organ about 35 µm, adanal suckers with 10 denticles. In female, width of lobar region about 85 µm, primary spermaduct abruptly expanding in proximal 1/5th . . . . . *P. brevicolicus* Kudon, 1982

17. In male, antero-lateral pieces of adanal shields absent, setae *h1* inserted approximately 1/5th the distance from lateral edge to midline of hysterosomal shield. In female, setae *h1* inserted on soft tegument between anterior hysteronotal and lobar shields . . . . . *P. epacrophyllicus* Kudon, 1982

- In male, antero-lateral pieces of adanal shields present, setae *h1* inserted approximately 1/2 the distance from lateral edge to midline of hysterosomal shield. In female, setae *h1* inserted on anterior edge of lobar shields. 18

18. In male, genital papillae free, setae *g* and *ps3* in narrow trapezoid arrangement, length of idiosoma excluding lamellae *c.* 360 µm. In female, opisthosomal lobes slightly longer than wide at base, width of terminal cleft *c*. 25 µm. In both sexes, prodorsal shield completely divided into anterior and posterior parts . . . . . *P. lepidophagicus* Kudon, 1982

- In male, genital papillae connected at base, setae *g* and *ps3* in rectangular arrangement, length of idiosoma excluding lamellae *c.* 300 µm. In female, opisthosomal lobes narrow, 2 times longer than wide at base, width of terminal cleft *c*. 45 µm. In both sexes, prodorsal shield incompletely divided . . . . . *P. major* Kudon, 1982

Species group *oligolaccius*

Diagnosis. *Both sexes*. Setae *f2* absent, prodorsal shield entire, prodorsal and hysteronotal shields with or without lacunae. *Male*. Adanal suckers toothed, adanal shields represented by 2 pairs of sclerites, adanal apodemes absent, epimerites I fused into a narrow U or V, terminal lamellae short tongue-shaped, aedeagus not extending beyond adanal suckers. *Female*. Primary spermaduct short, with or without proximal enlargement, head of spermatheca small U-shaped.

Remark. The group consists of 5 species, including 2 species described herein.

Platyacarus dendrocinclae Mironov sp. n.

(Figs. 1–3)

Type material. Male holotype (ZISP 6 197), 15 male and 7 female paratypes from *Dendrocincla homochroa* (Scalter. PL, 1860) (Furnariidae), **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10°46'N, 85°18'W, 20 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 12 male and 4 female paratypes (ZISP 6198–6213)—ZISP; 2 male and 2 female paratypes—UMMZ (BMOC-15-1028-014), 1 male and 1 female paratype —IMUCR.

Description. MALE (holotype, range for 10 paratypes in parentheses). Idiosoma, length × width, 310 (290–310) × 135 (130–140), length of hysterosoma 195 (180–200). Prodorsal shield: entire, antero-lateral extensions rounded, lateral margins with incisions almost extending to setae *se*, posterior margin with blunt-angular median extension, 110 (105–110) in length, 87 (80–90) in width, surface uniformly sclerotized, without ornamentation or poorly sclerotized areas (Fig. 1A). Bases of scapular setae *se* separated by 50 (45–50). Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 21 (21–23) × 6 (6–6.5). Distance between prodorsal and hysteronotal shields 12 (10–15). Hysteronotal shield: 185 (175–190) in length and 82 (80–85) in width; anterior margin slightly concave, surface without ornamentation. Setae *c1* on hysteronotal shield. Supranal concavity well expressed, length from anterior end to anterior margin of terminal cleft 35 (30–35). Opisthosomal lobes poorly developed, as a pair of short and rounded convexities between bases of setae *h2*. Terminal cleft small triangular, 10 (10–12) long. Terminal lamellae tongue-shaped, short, with fine dorsal punctation, 15 (14–16) in length (from lobar apices to distal margins), 12 (12–13) in wide at base, distance between inner margins of lamellae 5 (3–5). Setae *f2* absent. Setae

ps1 on inner margin of opisthosomal lobes, at level of setae *h2*. Setae *h1* approximately at midlevel of supranal concavity. Distance between dorsal setae: *c2:d2* 65 (62–70), *d2:e2* 85 (77–88), *e2:h3* 35 (35–43), *h2:h2* 52 (50–55), *h3:h3* 37 (35–40), *ps2:ps2* 62 (60–65), *h1:h3* 32 (30–35), *ps1:h3* 5 (3–5), *d1:d2* 20 (20–28), *e1:e2* 35 (27–38).

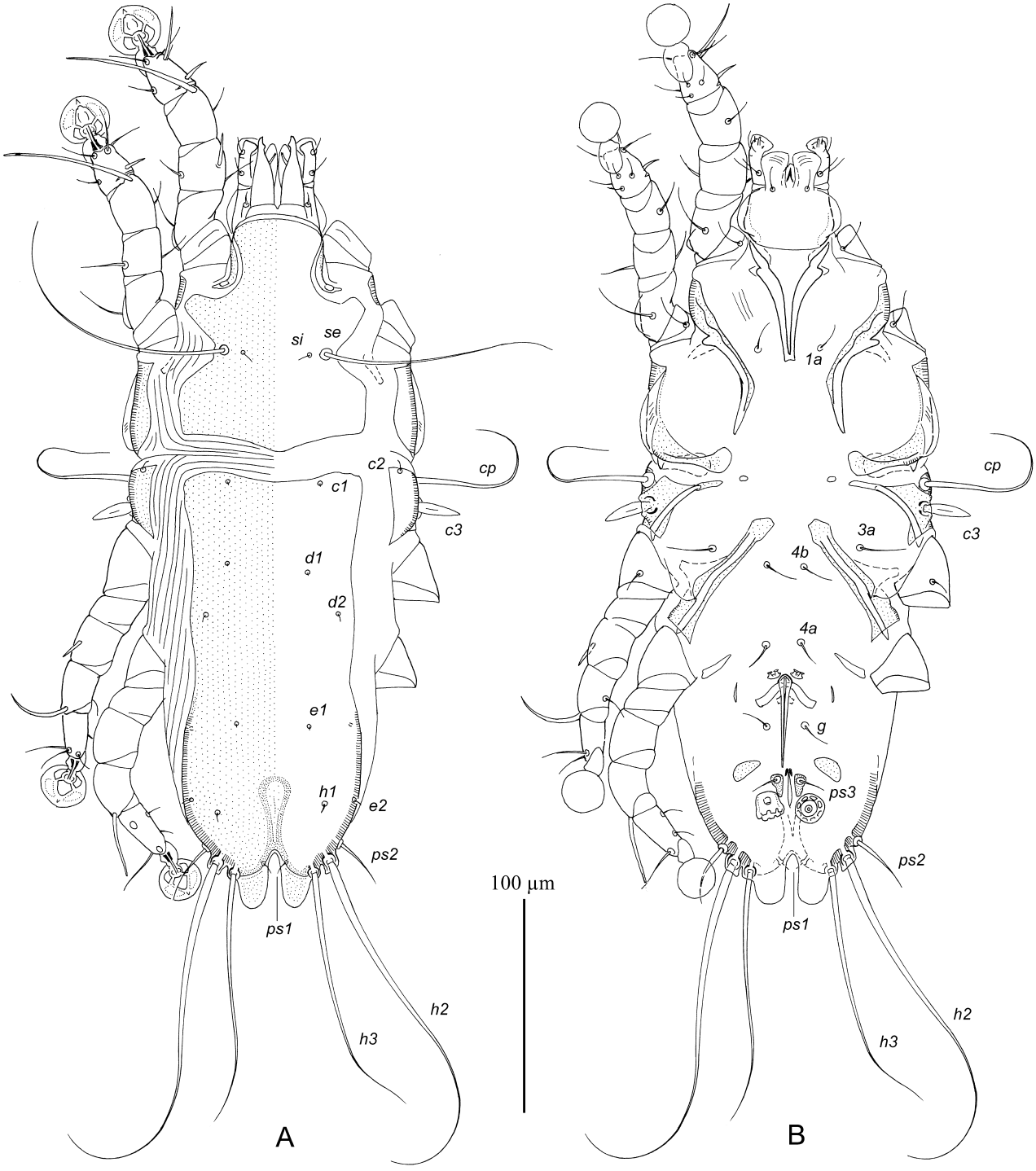

FIGURE 1. *Platyacarus dendrocinclae* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Epimerites I fused into a narrow V, with posterior parts of these epimerites very close to each other; epimerites I, II without surface fields (Fig. 1B). Epimerites IVa indistinct. Rudimentary sclerites rEpIIa present. Bases of epimerites I, II not inflated. Genital arch 15 (15–16) long and 27 (25–30) wide, its apex at midlevel of trochanters IV; genital organ (aedeagus in genital sheath) sword-like, 40 (40–45) long, reaching anterior end of anal opening (Fig. 3A). Distance from genital arch apex to level of setae *h3* 92 (87–95). Bases of genital papillae connected,

situated at level of genital arch apex. Paragenital apodemes rudimentary, represented by a pair of very thin longitudinal sclerites lateral to genital arch. Antero-lateral pieces of adanal shields present, reniform or seed-shaped; postero-medial pieces of adanal shields flanking anal opening and bearing setae *ps3*. Adanal suckers cup-shaped, 12 (11–13) in apical diameter; corolla with 8–9 truncate denticles, those on anterior margin of corolla slightly larger than on posterior one. Setae *4b* slightly posterior to level of setae *3a*. Distance between ventral setae: *4b:3a* 7 (7–9), *4b:4a* 35 (35–37), *4a:g* 40 (35–40), *g:ps3* 26 (24–26), *g:g* 17 (16–17), *ps3:ps3* 10 (10–11), *ps3:h3* 45(40–45).

Femora I, II with narrow ventral crest. Solenidion *σ1* of genu I shorter than this segment and situated at its midlevel. Solenidion *σ* of genu III situated approximately at midlevel of this segment (Fig. 3B–D). Legs IV with ambulacral disc extending to level of terminal lamellae. Tarsus IV 25 (24–26) long, without apical or dorsal processes; button-like seta *d* situated in basal half of this segment (Fig. 3E). Solenidion *φ* of tibia IV extending to midlevel of ambulacral disc. Length of solenidia: *σ1*I 12 (10–12), *σ*III 8 (8–10), *φ*IV 37 (35–38).

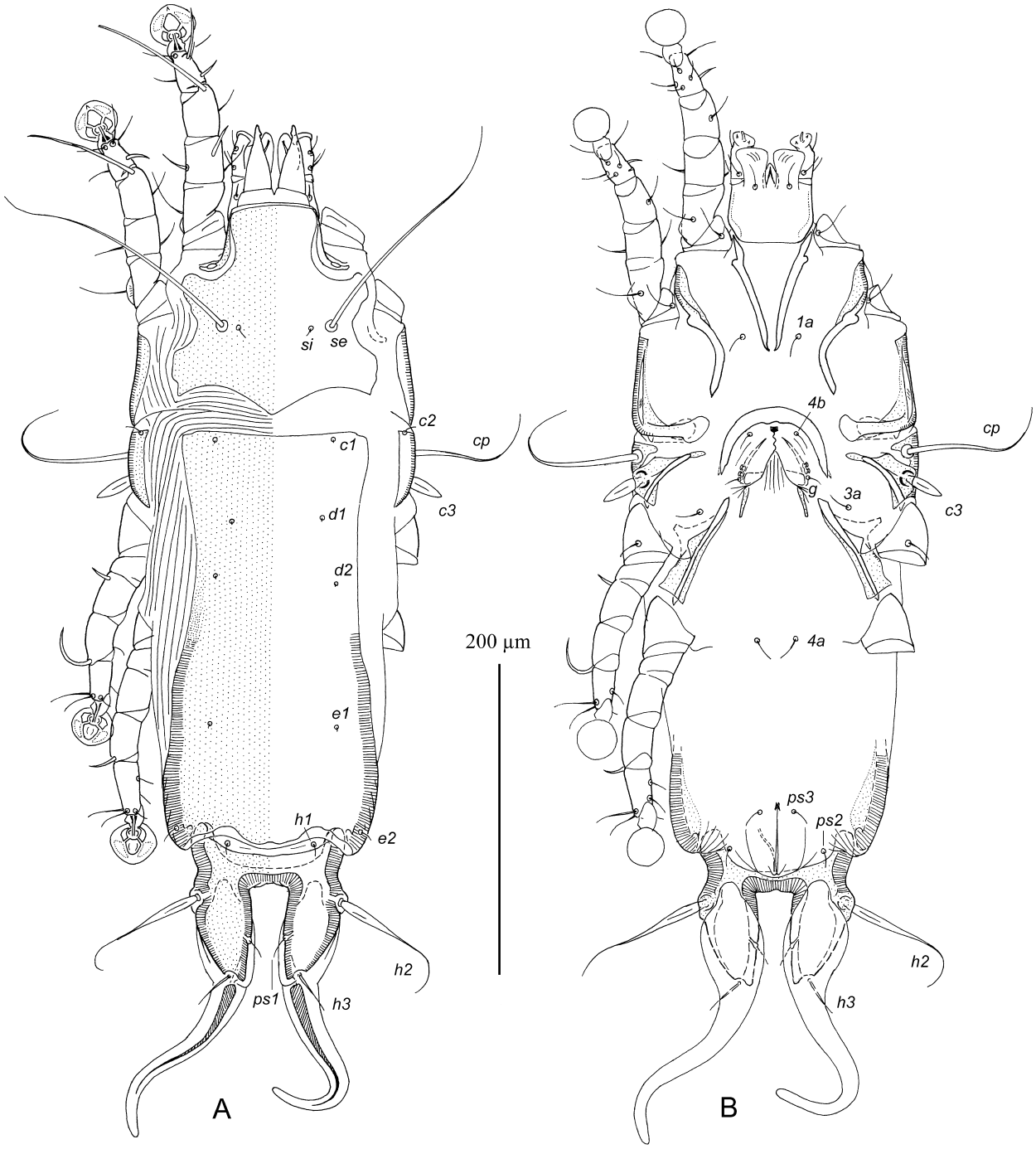

FIGURE 2. *Platyacarus dendrocinclae* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

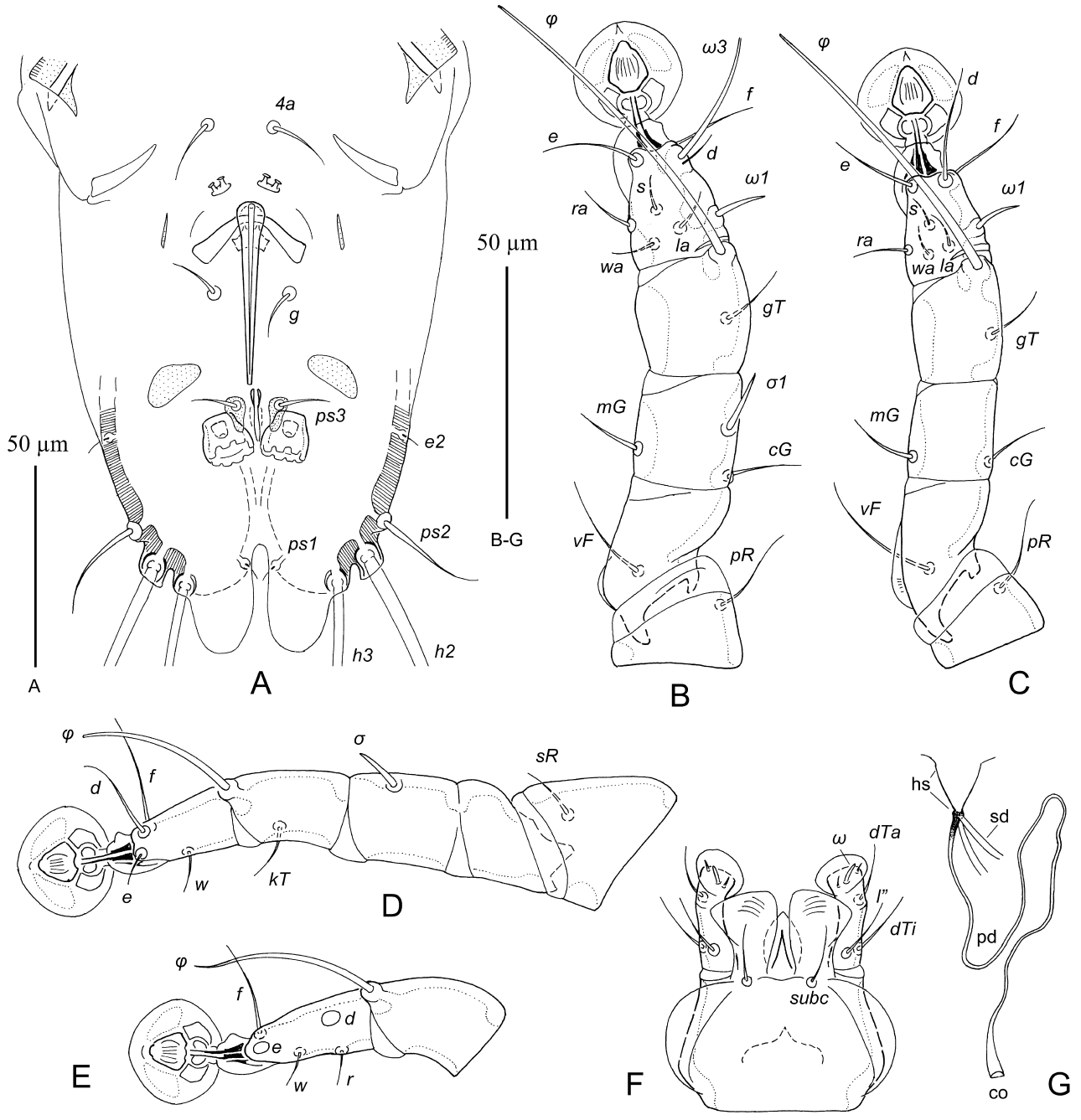

FIGURE 3. *Platyacarus dendrocinclae* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B–D—legs I–III of male, dorsal view, E—tibia and tarsus IV of male, dorsal view, F—subcapitulum of male, ventral view, G—spermatheca and spermaducts. Abbreviations: co—copulatory opening, hs—head of spermatheca, pd—primary spermaduct, sd—secondary spermaduct.

FEMALE (range for 7 paratypes). Idiosoma, length × width, 480–500 × 175–190. Length of hysterosoma 350–360. Prodorsal shield: form almost as in male, posterior margin with a more strongly expressed blunt-angular median extension and a pair of shallow concavities, 132–140 long and 130–135 wide, surface without ornamentation (Fig. 2A). Bases of setae *se* separated by 70–75. Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 23–25 × 6–7.5. Distance between prodorsal and hysteronotal shields 10–15. Hysteronotal shields completely split into anterior and lobar shields. Anterior hysteronotal shield: 255–270 in length and 115–120 in width at anterior margin, 130–135 in width in posterior part, anterior margin straight, posterior margin with short and wide median extension (in some specimens with uneven border), surface without ornamentation. Setae *c1* on anterior hysteronotal shield. Lobar shield: 90–95 in length and 98–105 in width. Opisthosomal lobes about 2 times

longer than wide. Terminal cleft almost rectangular, lateral margins slightly convex, 62–65 in length, 20–22 in width at midlevel. Supranal concavity absent. Setae *h2* with spindle-like basal enlargement and with filiform apical part, 75–83 in length, 6–7.5 in width; setae *h3* 25–28 in length, about 1/5th of terminal appendages. Setae *f2* absent. Setae *h1* inserted on soft tegument between the anterior hysteronotal and lobar shields. Setae *ps1* on lateral margins of terminal cleft, closer to lobar apices than to level of setae *h2*. Distance between dorsal setae: *c2:d2* 95–98, *d2:e2* 155–160, *e2:h2* 40–45, *h2:h3* 47–50, *h1:h2* 35–37, *d1:d2* 30–40, *e1:e2* 65–70, *h1:h1* 50–55, *h2:h2* 90–95, *h2:ps1* 25–28.

Epimerites I with posterior tips connected by very thin commissure (in some specimens this commissure absent); epimerites I–II without sclerotized fields (Fig. 2B). Epimerites IVa absent. Epigynum semicircular, thick, with acute tips almost extending to level of setae *g*, 38–45 in length, 65–70 in width, without lateral extensions. Genital papillae connected at bases. Setae *ps2* approximately at level of posterior half of anal opening. Translobar apodemes fused to each other anterior to terminal cleft. Copulatory opening situated ventrally, near anterior margin of translobar apodemes and covered with posterior ends of anal flaps. Head of spermatheca very short; primary spermaduct thin, with monotonous enlargement toward head of spermatheca; secondary spermaducts 10–12 long (Fig. 3G). Distance between pseudanal setae: *ps2:ps2* 55–60, *ps3:ps3* 20–22, *ps2:ps3* 22–25.

Legs I, II as in male. Solenidion σ of genu III situated in basal part of this segment. Legs IV with ambulacral discs extending to level of contraction separating lobar region. Solenidion φ of tibia IV half as long as corresponding tarsus. Length of solenidia: $\sigma 1$I 15–20, σIII 10–12, φIII 30–32, φIV 15–18.

Differential diagnosis. The new species *Platyacarus dendrocinclae* sp. n. belongs to the *oligolaccius* species group in having the prodorsal shield entire and uniformly sclerotized in both sexes, and the adanal suckers with an indented corolla and tongue-shaped terminal lamellae in males. Among the previously known species, the new species is most similar to *P. sittasomi* described from *Sittasomus griseicapillus* (Vieillot) (Furnariidae) in Brazil (Hernandes *et al.* 2007) in having the prodorsal shield with relatively short lateral incisions not extending to setae *se* in both sexes and the idiosoma noticeably elongated in males (with length/width ratio 2.2–2.5). *Platyacarus dendrocinclae* differs from *P. sittasomi* by the following features: in males, the genital organ is 40–45 μm long and extends to the anterior end of the anal opening, the paragenital apodemes are present, and the antero-lateral pieces of the adanal shield are seed-shaped or reniform; in females, the median extension of the prodorsal shield extends distinctly beyond the level of the posterior angles of this shield, the posterior margin of the anterior hysteronotal shield has a short and wide median extension, and genual solenidion $\sigma 1$I is half as long as genu I. In males of *P. sittasomi*, the genital organ is about 35 μm long and maximally extends to the midlevel between the bases of setae *g* and *ps3*, the paragenital apodemes are absent, and the antero-lateral pieces of the adanal shield are shaped as transverse bows; in females, the tip of the median extension and posterior angles of the prodorsal shield are at the same transverse level, the posterior margin of the anterior hysteronotal shield is straight or slightly convex, and genual solenidion $\sigma 1$I is similar in length to this segment.

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

Platyacarus dendrocolapti Mironov sp. n.

(Figs. 4–6)

Type material. Male holotype (ZISP 6556), 11 male and 8 female paratypes from *Dendrocolaptes picumnus* Lichtenstein, MHK, 1820 (Furnariidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamanca Mts., 09°46'N, 83°47'W, 9 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 9 male, 6 female paratypes (ZISP 6557–6571),—ZISP; 1 male and 1 female paratype—UMMZ (BMOC-15-1028-007), 1 male and 1 female paratype—IMUCR.

Description. MALE (holotype, range for 10 paratypes in parentheses). Idiosoma, length × width, 335 (225–335) × 145 (140–150), length of hysterosoma 215 (210–220). Prodorsal shield: entire, antero-lateral extensions rounded, lateral margins with narrow incisions extending to bases of setae *se*, posterior margin with blunt-angular median extension, 115 (110–115) in length, 87 (85–90) in width, surface uniformly sclerotized, without ornamentation (Fig. 4A). Bases of scapular setae *se* separated by 47 (45–50). Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 24 (23–25) × 6 (6–7). Distance between prodorsal and hysteronotal shields 15 (10–15).

Hysteronotal shield: 205 (190–205) in length and 87 (80–90) in width; anterior margin slightly concave, surface without ornamentation. Setae *c1* on hysteronotal shield. Supranal concavity well expressed, length from anterior end to anterior margin of terminal cleft 27 (27–38). Opisthosomal lobes poorly developed, as a pair of short and rounded convexities between bases of setae *h2*. Terminal cleft small triangular, 14 (12–15) long. Terminal lamellae tongue-shaped, short, with fine dorsal punctation, 16 (15–17) in length (from lobar apices to distal margins), 13 (13–15) in wide at base, distance between inner margins of lamellae 4 (3–5). Setae *f2* absent. Setae *ps1* on inner margin of opisthosomal lobes, at level of setae *h2*. Setae *h1* approximately at midlevel of supranal concavity. Distance between dorsal setae: *c2:d2* 72 (65–75), *d2:e2* 87 (85–90), *e2:h3* 50 (45–50), *h2:h2* 62 (57–65), *h3:h3* 44 (40–45), *ps2:ps2* 70 (65–70), *h1:h3* 30 (27–32), *ps1:h3* 5 (3–5), *d1:d2* 25 (22–28), *e1:e2* 30 (30–34).

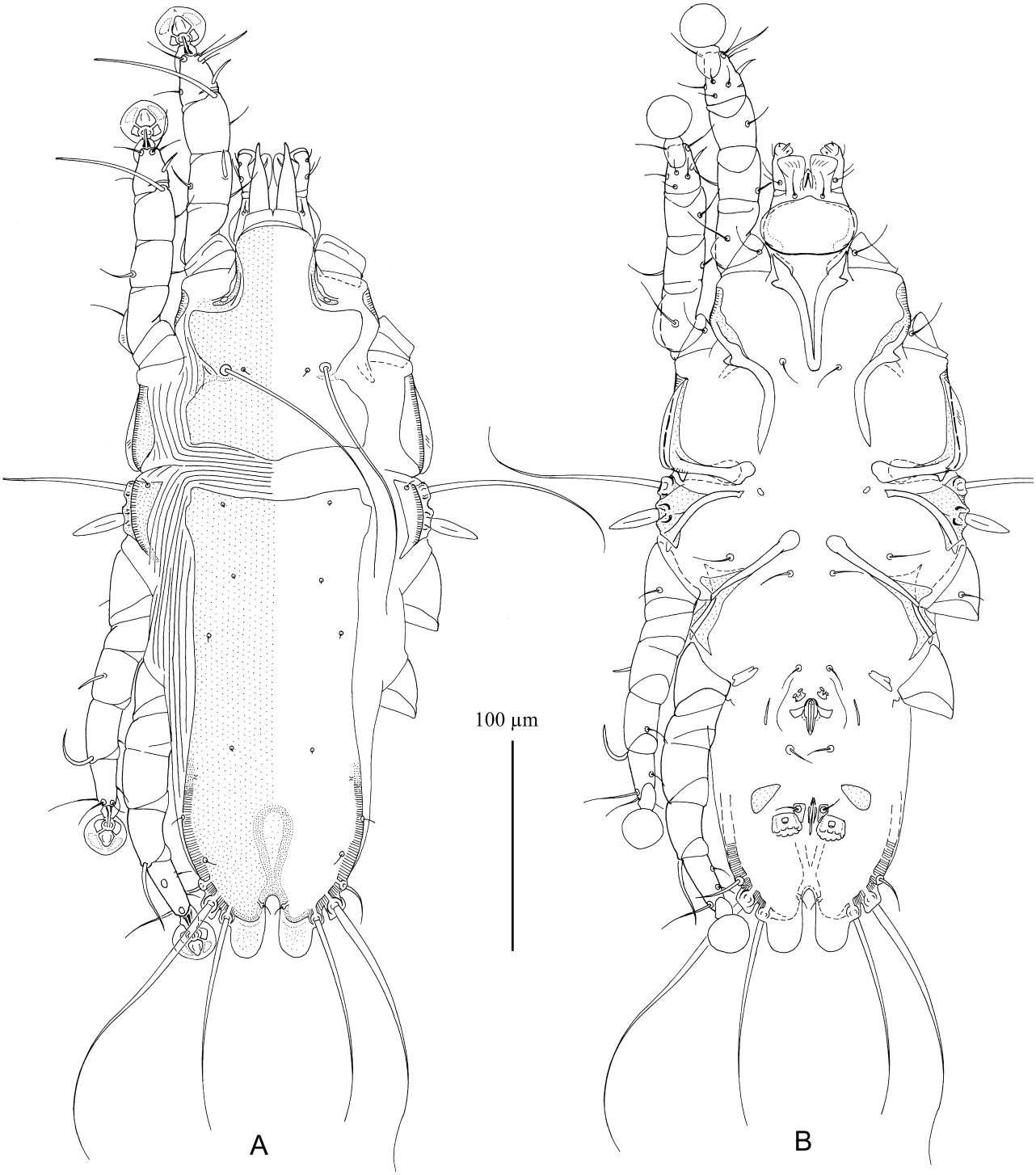

FIGURE 4. *Platyacarus dendrocolapti* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

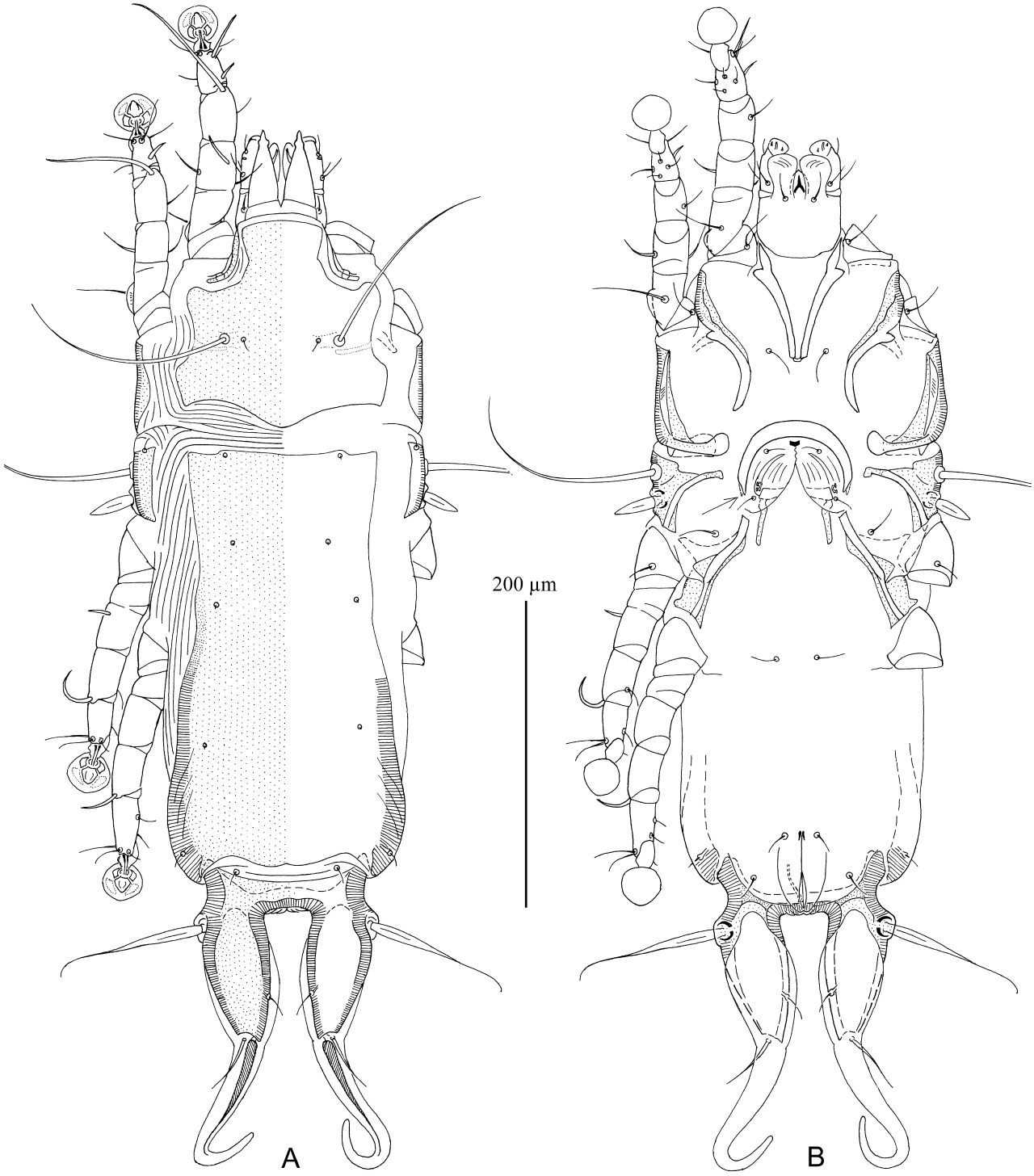

FIGURE 5. *Platyacarus dendrocolapti* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

Epimerites I fused into a narrow V, with posterior parts of these epimerites very close to each other; epimerites I, II without surface fields (Fig. 4B). Epimerites IVa small. Rudimentary sclerites rEpIIa present. Bases of epimerites I, II not inflated. Genital arch low, 10 (7–10) long and 20 (20–24) wide, its apex at level of posterior margin of trochanters IV; genital organ stylet-like, 18 (14–18) long, not reaching level of setae *g* (Fig. 6A). Distance from genital arch apex to level of setae *h3* 102 (95–105). Bases of genital papillae connected, situated at level of genital arch apex. Paragenital apodemes represented by a pair of very thin longitudinal sclerites lateral to genital arch. Antero-lateral pieces of adanal shields present, reniform or seed-shaped; postero-medial pieces of adanal shields flanking anal opening and bearing setae *ps3*. Adanal suckers cup-shaped, 14 (12–14) in apical

diameter; corolla with 9 truncate denticles, those on anterior margin of corolla slightly larger than on posterior one. Setae *4b* posterior to level of setae *3a*. Distance between ventral setae: *4b:3a* 8 (8–10), *4b:4a* 43 (40–44), *4a:g* 40 (35–40), *g:ps3* 30 (27–30), *g:g* 18 (18–20), *ps3:ps3* 13 (12–14), *ps3:h3* 50 (47–50).

Femora I, II with narrow ventral crest. Solenidion *σ1* of genu I half as long as this segment and situated at its midlevel (Fig. 6B, C). Solenidion *σ* of genu III situated at midlevel of this segment. Legs IV with ambulacral disc extending to level of terminal lamellae. Tarsus IV 28 (27–30) long, without apical or dorsal processes; button-like seta *d* situated in basal half of this segment (Fig. 6D). Solenidion *φ* of tibia IV extending beyond apex of this segment. Length of solenidia: *σ1*I 15 (13–15), *σ*III 13 (12–14), *φ*IV 32 (32–38).

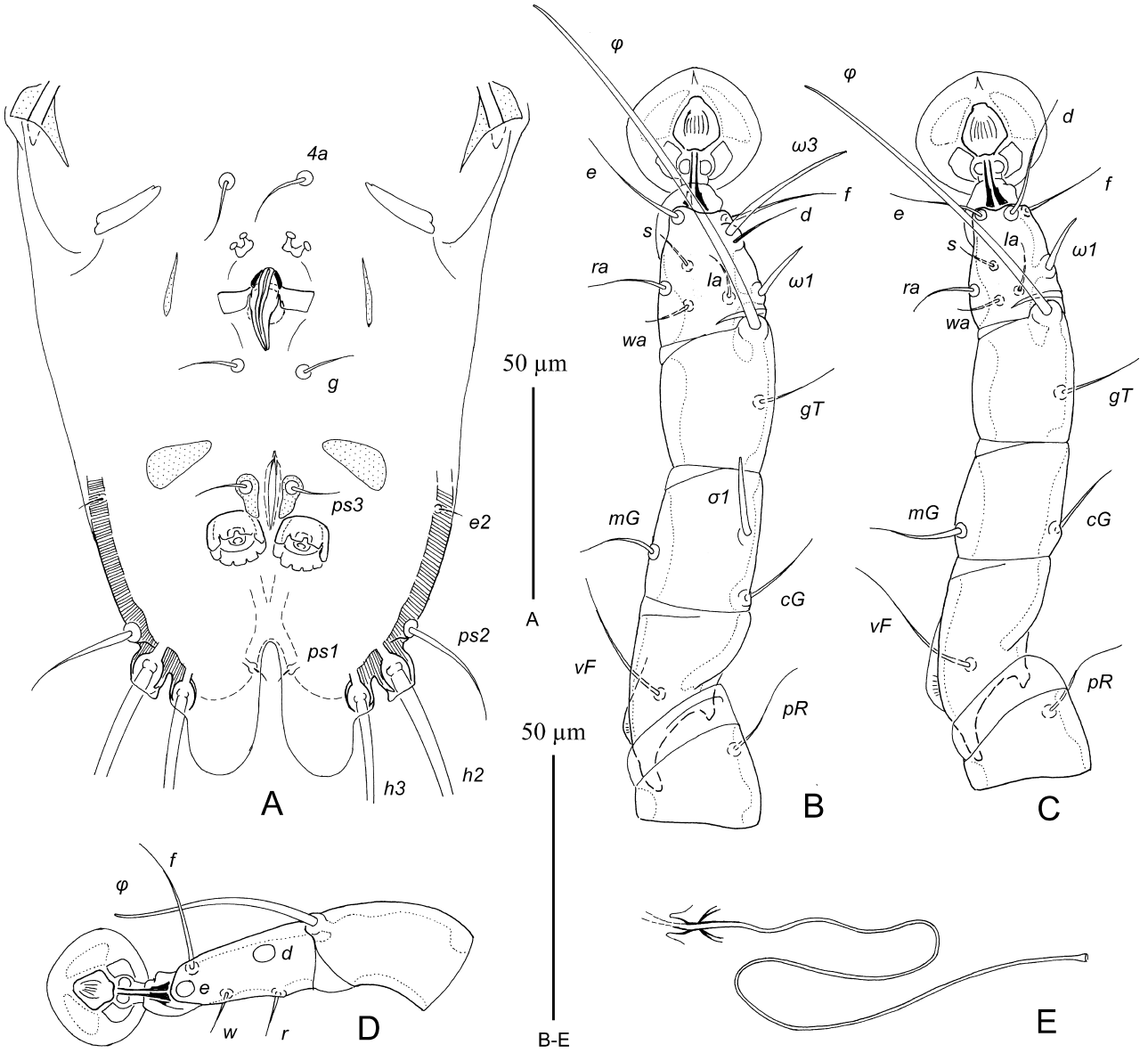

FIGURE 6. *Platyacarus dendrocolapti* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B, C—legs I and II of male, dorsal view, D—tibia and tarsus IV of male, dorsal view, E –spermatheca and spermaducts.

FEMALE (range for 8 paratypes). Idiosoma, length × width, 540–555 × 185–200, length of hysterosoma 390–410. Prodorsal shield: entire, anterolateral extensions rounded, lateral margins without incisions, posterior margin with widely rounded short median extension, 140–145 long and 135–145 wide, surface without ornamentation (Fig. 5A). Bases of setae *se* separated by 75–80. Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 25–30 × 7–8. Distance between prodorsal and hysteronotal shields 10–15. Hysteronotal shields completely split into anterior and lobar shields. Anterior hysteronotal shield: 280–285 in length and 120–130 in width at anterior margin, 145–155 in wide in posterior part, anterior margin straight, posterior margin with very short and wide

median extension and a pair of shallow concavities, surface without ornamentation. Setae *c1* on anterior hysteronotal shield. Lobar shield: 120–125 in length and 120–125 in width. Opisthosomal lobes 2 times longer than wide at base. Terminal cleft hourglass-shaped, with lateral margins slightly convex, 85–90 in length, 25–35 in width at midlevel. Supranal concavity absent. Setae *h2* with spindle-like basal enlargement and with filiform apical part, 110–120 in length, 7–8 in width; setae *h3* 28–35 in length, about 1/4–1/3 of terminal appendages. Setae *f2* absent. Setae *h1* inserted on soft tegument between the anterior hysteronotal and lobar shields. Setae *ps1* on lateral margins of terminal cleft, closer to lobar apices than to level of setae *h2*. Distance between dorsal setae: *c2:d2* 95–100, *d2:e2* 100–110, *e2:h2* 48–53, *h2:h3* 70–75, *h1:h2* 35–38, *d1:d2* 40–52, *e1:e2* 65–80, *h1:h1* 55–65, *h2:h2* 110–115, *h2:ps1* 42–45.

Epimerites I with posterior tips connected by very thin commissure (in some specimens this commissure absent); epimerites I–II without sclerotized fields (Fig. 5B). Epimerites IVa absent. Epigynum semicircular, thick, with bidentate tips extending to level of setae *g*, 47–50 in length, 72–80 in width, without lateral extensions. Genital papillae connected at bases. Setae *ps2* approximately at level of posterior half of anal opening. Translobar apodemes fused to each other anterior to terminal cleft. Copulatory opening situated ventrally, near anterior margin of translobar apodemes and covered with posterior ends of anal flaps. Head of spermatheca short, cone-shaped; primary spermaduct thin, without noticeable enlargement near head of spermatheca; secondary spermaducts about 5 long (Fig. 6E). Distance between pseudanal setae: *ps2:ps2* 60–62, *ps3:ps3* 20–23, *ps2:ps3* 26–28.

Legs I, II as in male. Solenidion σ of genu III situated in basal part of this segment. Legs IV with ambulacral disc extending to level of contraction separating lobar region. Solenidion φ of tibia IV half as long as corresponding tarsus. Length of solenidia: $\sigma 1$I 20–22, σIII 11–14, φIII 30–34, φIV 18–23.

Differential diagnosis. As with the previous species, *Platyacarus dendrocolapti* sp. n., belongs to the *oligolaccius* species group and is most similar to *P. sittasomi* and *P. dendrocinclae* in having the male idiosoma distinctly elongated (length/width ratio about 2.2–2.5) and the terminal lamellae tongue-shaped. *Platyacarus dendrocolapti* differs from *P. sittasomi* and *P. dendrocinclae* by the following features: in males, the genital organ is much shorter (14–18 μm) and does not extend to the level of genital setae *g*; in females, the median extension on the posterior margin of the prodorsal shield is widely rounded and setae *h3* are about 1/4–1/3 the length of the terminal appendages. In males of *P. dendrocinclae* and *P. sittasomi*, the genital organ is longer than 35 μm and extends distinctly beyond the level of setae *g*; in females, the median extension on the posterior margin of the prodorsal shield is blunt-angular and setae *h3* are about 1/5 the length of the terminal appendages. Additionally, males of *P. dendrocolapti* differ from those *P. sittasomi* in having the antero-lateral pieces of the adanal shields reniform or ovate (*vs.* narrow, bow-shaped in *P. sittasomi*) and the presence of paragenital apodemes (*vs.* absence); and females are distinguished by the lack of lacunae on the hysteronotal shield (*vs*. presence).

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

Platyacarus sittasomi Hernandes, Valim and Mironov, 2007

Platyacarus sittasomi Hernandes *et al.* 2007: 2675, figs. 41–51.

Material examined. 5 males and 4 females (ZISP 6415–6423) from *Sittasomus griseicapillus* (Vieillot, 1818) (Furnariidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamanca Mts., 09°46'N, 83°47'W, 2 August 2009, collectors I. Literak, O. Sychra and M. Capek; 10 males and 5 females (ZISP 6166–6181), same host, **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10°46'N, 85°18'W, 800 m, 21 August 2009, collectors I. Literak, O. Sychra and M. Capek.

This species was previously known only from the type host, *Sittasomus griseicapillus,* in Brazil (Hernandes *et al.* 2007). This is the first report of *Platyacarus sittasomi* from this host in Costa Rica.

Species group *psilocoronius*

Diagnosis. *Both sexes*. Setae *f2* absent, prodorsal shield split completely or partly into anterior and posterior parts by transverse band of weaker sclerotized cuticle, prodorsal and hysteronotal shield usually without lacunae. *Male*.

Adanal suckers with corolla edentate, only postero-mesal pair of adanal shields present, adanal apodemes absent, epimerites I fused into a heavily sclerotized Y, terminal lamellae short triangular, aedeagus not extending beyond adanal suckers. *Female*. Primary spermaduct short, without proximal enlargement, head of spermatheca elongate U-shaped.

Remark. The group currently incorporates 4 species, including one described herein.

Platyacarus picumnus Mironov sp. n.

(Figs. 7–9)

Type material. Male holotype (ZISP 6572), 10 male and 8 female paratypes from *Dendrocolaptes picumnus* Lichtenstein, MHK, 1820 (Furnariidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamanca Mts., 09°46'N, 83°47'W, 9 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 8 male and 6 female paratypes (ZISP 6572–6586)—ZISP; 1 male and 1 female paratype—UMMZ (BMOC-15-1028-008), 1 male and 1 female paratype—IMUCR.

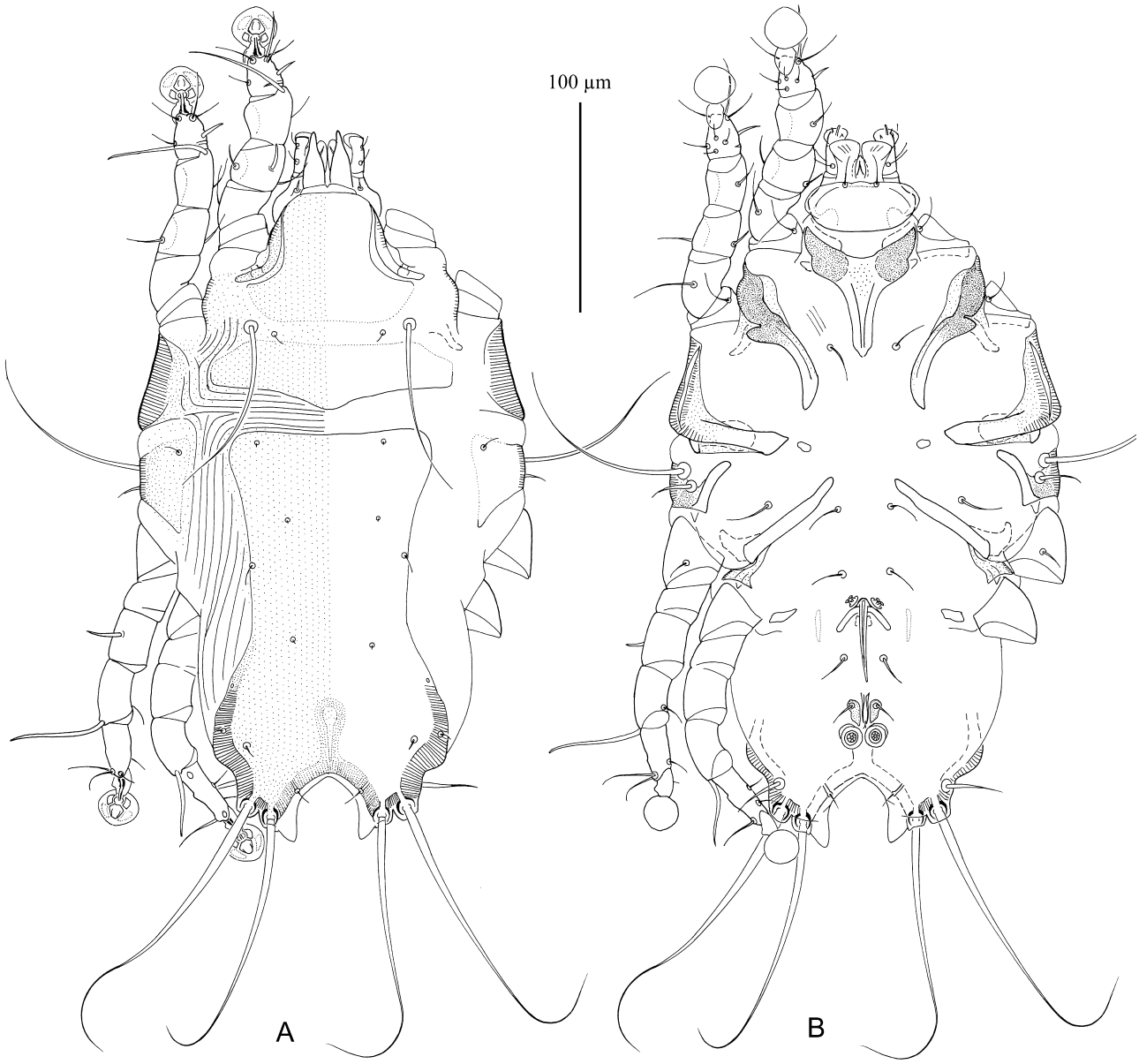

FIGURE 7. *Platyacarus picumnus* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

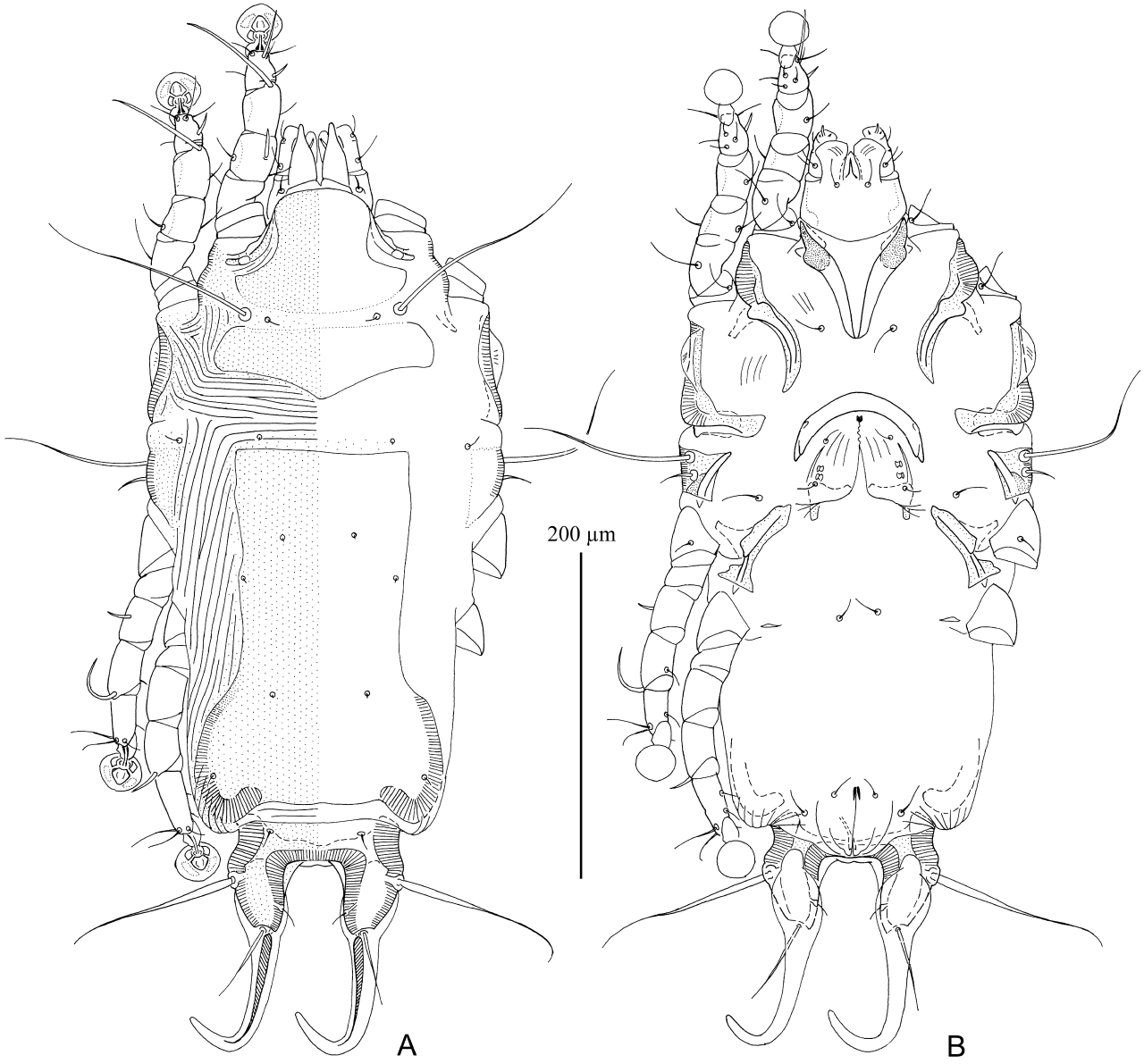

FIGURE 8. *Platyacarus picumnus* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

Description. MALE (holotype, range for 10 paratypes in parentheses). Idiosoma, length × width, 300 (290–310) × 180 (170–180), length of hysterosoma 185 (180–190). Prodorsal shield: completely split into anterior and posterior pieces by poorly sclerotized transverse band at level of scapular setae, posterior margin with wide and rounded median extension, total length 105 (95–105), length of anterior part 62 (58–65), length of posterior part 31 (28–32), width of posterior part 110 (100–110), surface of both parts without ornamentation (Fig. 7A). Bases of scapular setae *se* separated by 75 (72–75). Scapular shields with poorly distinct inner borders. Setae *c2* and *cp* on humeral shields. Setae *c3* bristle-like, 15 (15–17) long. Distance between prodorsal and hysteronotal shields 15 (15–20). Hysteronotal shield: 180 (170–180) in length and 97 (90–98) in width; anterior margin straight, surface without ornamentation. Setae *c1* on hysteronotal shield. Supranal concavity poorly expressed, 30 (27–32) long. Opisthosomal lobes roughly trapezoidal in form, with pair of truncate extensions bearing setae *h2* and *h3*; terminal cleft wide semicircular, 25 (20–25) long and 45 (40–45) wide at level of setae *h3*. Interlobar membrane narrow, its terminal extensions at lobar apices (terminal lamellae) triangular, short, 10 (10–12) in length from level of seta *h3* bases to apices, distance between inner margins of lamellae 29 (28–30). Setae *f2* absent. Setae *ps1* situated on lateral margins of terminal cleft, approximately at level of setae *ps2*. Setae *h1* approximately at midlevel of supranal concavity. Distance between dorsal setae: *c2:d2* 50 (50–54), *d2:e2* 85 (75–85), *e2:h3* 42 (42–45), *h2:h2* 75 (72–75), *h3:h3* 52 (50–54), *h1:h3* 38 (35–38), *d1:d2* 18 (17–20), *e1:e2* 42 (37–42), *ps1:h3* 13 (12–14).

Epimerites I fused into a thick Y, with stem about half the total length of epimerites. Epimerites I, II thick, without large surface fields, with bases inflated and heavily sclerotized (Fig. 7B). Epimerites IVa small. Rudimentary sclerites rEpIIa present. Genital arch situated at midlevel of trochanters IV, small, 18 (17–20) long and 27 (27–30) wide; genital organ stylet-like, 40 (36–40) long, extending to midlevel of between setae *g* and *ps3* (Fig. 9A). Distance from genital arch apex to level of setae *h3* 110 (100–110). Bases of genital papillae connected, situated on small oval plates at level of genital arch apex. Paragenital apodemes absent. Antero-lateral pieces of adanal shields absent; postero-medial pieces of adanal shield flanking anal opening and bearing setae *ps3*. Adanal suckers cup-shaped, 11 (11–12) in diameter; corolla smooth. Setae *4b* slightly posterior to level of setae *3a*. Distance between ventral setae: *4b:4a* 32 (32–34), *4a:g* 40 (37–40), *g:g* 19 (18–20), *g:ps3* 23 (22–24), *ps3:ps3* 13 (12–13), *ps3:h3* 55 (55–60).

Femora I, II without ventral crest. Tibiae I, II with noticeable ventral inflation. Solenidion *σ1*I half as long as genu I and situated at midlevel of this segment (Fig. 9B, C). Solenidion *σ* of genu III situated approximately at midlevel of segment. Legs IV with ambulacral disc extending slightly beyond level of terminal lamellae. Tarsus IV 30 (30–32) long, with ledge on dorsal margin, without apical processes; button-like seta *d* situated at base of this segment (Fig. 9D). Solenidion *φ* of tibia IV extending to tarsal apex. Length of solenidia: *σ1*I 10 (10–12), *σ*III 13 (12–14), *φ*IV 27 (25–28).

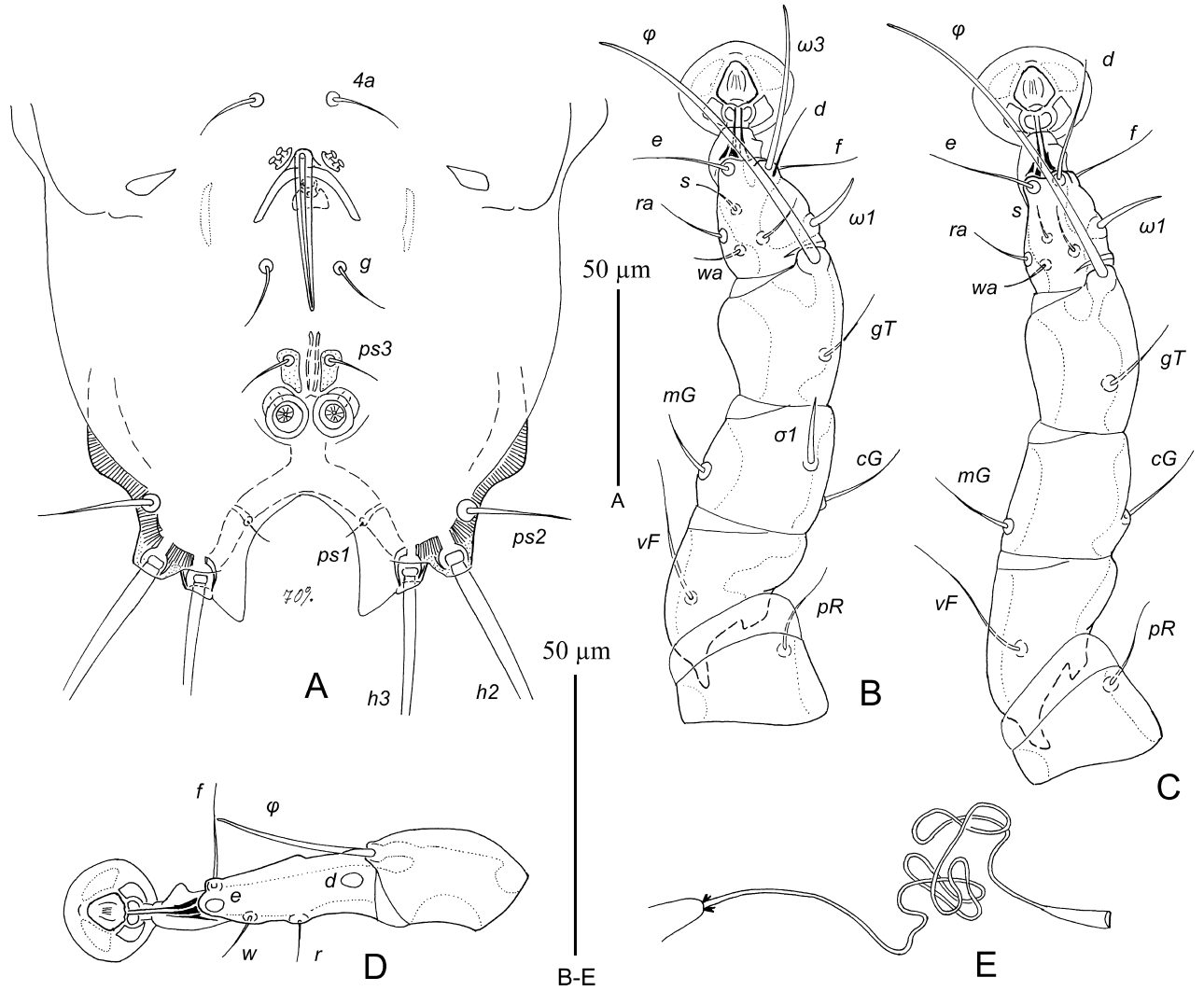

FIGURE 9. *Platyacarus picumnus* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B, C– legs I and II of male, dorsal view, D—tibia and tarsus IV of male, dorsal view, E –spermatheca and spermaducts.

FEMALE (range for 8 paratypes). Idiosoma, length × width, 440–455 × 210–220, length of hysterosoma 300–310. Prodorsal shield: shape and ornamentation as in male, total length 120–130, length of anterior part 75–80,

length of posterior part 42–45, width of posterior part 125–130 (Fig. 8A). Bases of setae *se* separated by 90–95. Scapular and humeral shields with poorly distinct inner margins. Setae *c2* and *cp* on humeral shields. Setae *c3* bristle-like, 16–20 long. Distance between prodorsal and hysteronotal shields 30–40. Hysteronotal shields completely split into anterior and lobar shields. Anterior hysteronotal shield: 220–230 in length, 105–110 in width at anterior margin, 145–155 in wide in posterior part, anterior margin straight, posterior margin shallowly concave, surface without ornamentation. Setae *c1* off hysteronotal shield near its anterior margin. Lobar shield: 65–70 in length and 100–110 in width. Terminal cleft wide U-shaped, lateral margins parallel-sided, 42–45 in length, 32–35 in width at midlevel. Supranal concavity absent. Setae *h2* slightly thickened in basal part and with filiform apical part, 80–90 in length, 4–5 in width; setae *h3* 52–56 in length, about 1/3 of terminal appendages. Setae *f2* absent. Setae *h1* inserted on lobar shields, distant from its anterior margin. Setae *ps1* on lateral margins of terminal cleft, closer to lobar apices than to level of setae *h2*. Distance between dorsal setae: *c2:d2* 72–75, *d2:e2* 120–125, *e2:h2* 60–64, *h2:h3* 30–38, *h1:h2* 27–30, *h2:ps1* 17–20, *d1:d2* 25–28, *e1:e2* 50–54, *h1:h1* 52–58, *h2:h2* 97–100.

Epimerites I fused into a V, with very thin connecting commissure. Epimerites I, II thick, without narrow surface fields, with bases inflated and heavily sclerotized (Fig. 8B). Epimerites IVa present, rudimentary. Epigynum semicircular, thick, with posterior ends bidentate and almost extending to level of anterior genital papillae, 40–46 in length, 75–80 in width. Genital papillae not connected at bases. Setae *ps2* at middle of anal opening. Translobar apodemes fused to each other anterior to terminal cleft. Copulatory opening ventral, situated at anterior margin of fused translobar apodemes and covered with posterior ends of anal flaps. Head of spermatheca small U-shaped, poorly sclerotized; primary spermaduct without enlargement at head of spermatheca, medial part of primary spermaduct forming a loose skein; secondary spermaducts extremely short, 2–3 long (Fig.9E). Distance between pseudanal setae, *ps2:ps2* 57–60, *ps3:ps3* 24–26, *ps2:ps3* 10–12.

Legs I, II as in male. Solenidion $\sigma 1$I about 2/3 length of genu I and situated at midlevel of this segment. Solenidion σ of genu III situated in basal part of this segment. Legs IV with ambulacral discs extending to level of setae *h2*. Solenidion φ of tibia IV about 1/3 of corresponding tarsus. Length of solenidia: $\sigma 1$I 13–15, σIII 10–12, φIII 32–34, φIV 13–15.

Differential diagnosis. The new species, *Platyacarus picumnus* sp. n., belongs to the *psilocoronius* group in having a smooth corolla of adanal suckers and triangular terminal lamellae in males. Within this group, the new species is most similar to *P. diversus* Kudon, 1982 in having a wide terminal cleft with triangular terminal lamellae in males and the epigynum with bidentate tips in females. *Platyacarus picumnus* sp. n. differs from *P. diversus* by the following features: in males of *P. picumnus,* the genital papillae are connected at their bases and situated on small ovate plates, the anterior margin of the terminal cleft is semicircular, and the anterior margin of the hysteronotal shield is straight; in females, setae *h1* are distant from the anterior edge of the lobar shield, and the terminal cleft is longer and wider (42–45 × 32–35 μm). In males of *P. diversus*, the genital papillae are free, the anterior margin of the terminal cleft is straight, and the anterior margin of the hysteronotal shield is slightly concave; in females, setae *h1* are inserted on the anterior edge of the lobar shield, and the terminal cleft is smaller (*c*. 29 × 22 μm). In having the genital papillae connected in males, *P. picumnus* is similar to two other species of the *psilocoronius* group, *P. longicolicus* Kudon, 1982 and *P. psilocoronius* Kudon, 1982. Males of *P. picumnus* are readily differentiated from these two species in having the terminal cleft almost semicircular *vs.* longitudinally ovate.

Etymology. The specific epithet is taken from the specific epithet of the type host and is a noun in apposition.

Species group *minor*

Diagnosis. *Both sexes*. Setae *f2* present, prodorsal shield entire, prodorsal and hysteronotal shield with lacunae. *Male*. Adanal suckers toothed, adanal shields represented by 2 pairs of sclerites, adanal apodemes absent, epimerites I Y-shaped, terminal lamellae short tongue-shaped, aedeagus not extending beyond adanal suckers, hysterosoma with small metapodosomal sclerites. *Female*. Primary spermaduct short, without monotonous proximal enlargement toward spermatheca; head of spermatheca small conical.

Remark. This group established herein includes two species: *Platyacarus minor* (Berla, 1959) and a new species described below.

***Platyacarus sclerurus* Mironov sp. n.**
(Fig. 10–12)

Type material. Male holotype (ZISP 6591), 11 male and 17 female paratypes from *Sclerurus mexicanus* Sclater, PL, 1857 (Furnariidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamanca Mts., 09º46'N, 83º47'W, 10 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 9 male and 15 female paratypes (ZISP 6592–6615)—ZISP; 1 male and 1 female paratype—UMMZ (BMOC-15-1028-009), 1 male and 1 female paratype—IMUCR.

Description. MALE (holotype, range for 10 paratypes in parentheses). Idiosoma, length × width, 295 (290–305) × 145 (140–150), length of hysterosoma 195 (190–205). Prodorsal shield: entire, antero-lateral extensions fused with epimerites Ia, lateral margins without incisions, posterior margin with short and widely rounded median extension, 105 (100–110) in length, 100 (95–105) in width, surface with numerous minute circular lacunae (Fig. 10A). Bases of scapular setae *se* separated by 57 (55–60). Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 22 (20–22) × 7 (6–7.5). Distance between prodorsal and hysteronotal shields 10 (8–10). Hysteronotal shield: 185 (180–195) in length and 88 (85–90) in width; anterior margin straight, surface with numerous minute circular lacunae. Setae *c1* on hysteronotal shield. Small metapodosomal sclerites situated laterally between levels of trochanters III and IV. Supranal concavity well expressed, length from anterior end to anterior margin of terminal cleft 35 (30–35). Opisthosomal lobes poorly developed, as a pair of short and rounded convexities between bases of setae *h2*. Terminal cleft small triangular, 15 (15–16) long. Terminal lamellae tongue-shaped, short, with fine dorsal punctation, 20 (17–20) in length, 14 (13–15) in wide at base, distance between inner margins of lamellae about 5. Setae *f2* present. Setae *h1* closer to level of setae *ps2* than to *e2*. Setae *ps1* on inner margin of opisthosomal lobes, slightly anterior to level of setae *h2*. Distance between dorsal setae: *c2:d2* 60 (60–65), *d2:e2* 78 (75–80), *e2:h3* 50 (50–55), *h2:h2* 58 (55–60), *h3:h3* 40 (40–45), *ps2:ps2* 70 (65–72), *h1:h3* 30 (26–30), *ps1:h3* 5 (3–5), *d1:d2* 18 (17–22), *e1:e2* 38 (25–38).

Epimerites I fused into a Y, sternum about half of the total length of epimerites; epimerites I, II without wide surface fields (Fig. 10B). Epimerites IVa small. Rudimentary sclerites rEpIIa present. Bases of epimerites I, II not inflated. Bases of trochanters III flanked by sclerotized band connecting corresponding epimerites. Bases of trochanter IV flanked by triangular sclerotized fields of epimerites IV. Genital arch of moderate size, 18 (16–18) long and 30 (30–32) wide, its apex at midlevel of trochanters IV; genital organ stylet-like, 38 (35–38) long, reaching midlevel between setae *g* and *ps3* (Fig. 12A). Distance from genital arch apex to level of setae *h3* 98 (98–105). Bases of genital papillae not connected, situated at level of genital arch apex. Paragenital apodemes represented by a pair of thin longitudinal sclerites lateral to genital arch. Antero-lateral pieces of adanal shields ovate; postero-medial pieces of adanal shields flanking anal opening and bearing setae *ps3*. Adanal suckers barrel-shaped, 18 (17–18) in apical diameter; corolla with 8 denticles, those on anterior margin of corolla slightly smaller than on posterior one. Setae *4b* posterior to level of setae *3a*. Distance between ventral setae: *4b:3a* 10 (10–12), *4b:4a* 38 (35–40), *4a:g* 38 (38–41), *g:ps3* 28 (26–30), *g:g* 10 (10–12), *ps3:ps3* 11 (11–13), *ps3:h3* 50(48–50).

Femora I, II with narrow ventral crest. Solenidion *σ1*I half as long as genu I and situated closer to distal margin of this segment (Fig. 12B, C). Solenidion *σ* of genu III situated at midlevel of this segment. Legs IV with ambulacral disc extending to level of terminal lamellae. Tarsus IV 28 (27–30) long, without apical or dorsal processes; button-like seta *d* situated in basal half of this segment (Fig. 12D). Solenidion *φ* of tibia IV extending to apex of this segment. Length of solenidia: *σ1*I 10 (10–12), *σ*III 12 (10–13), *φ*IV 30 (30–35).

FEMALE (range for 10 paratypes). Idiosoma, length × width, 435–455 × 195–200, length of hysterosoma 300–315. Prodorsal shield: entire, anterolateral extensions rounded, lateral margins without incisions, posterior margin with widely rounded short median extension, 130–140 long and 145–155 wide, surface without ornamentation (Fig. 11A). Bases of setae *se* separated by 92–95. Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 24–29 × 6.5–7.5. Distance between prodorsal and hysteronotal shields 8–10. Hysteronotal shields completely split into anterior and lobar shields. Anterior hysteronotal shield: 225–235 in length and 120–130 in width at anterior margin, 140–145 in wide in posterior part, anterior margin slightly concave, posterior margin with short and wide median extension and a pair of shallow concavities, surface with minute circular lacunae in posterior half. Setae *c1* on anterior hysteronotal shield. Lobar shield: 78–82 in length and 115–120 in width. Opisthosomal lobes slightly longer than wide at base. Terminal cleft almost rectangular, lateral margins slightly convex, 48–50 in length, 18–23 in width at midlevel. Supranal concavity absent. Setae *h2* with spindle-like basal

enlargement and with filiform apical part, 100–110 in length, 6–7 in width; setae *h3* 60–65 in length, about 2/3rd of terminal appendages. Setae *f2* present. Setae *h1* inserted on soft tegument between the anterior hysteronotal and lobar shields. Setae *ps1* on lateral margins of terminal cleft, close to lobar apices. Distance between dorsal setae: *c2:d2* 78–88, *d2:e2* 125–135, *e2:h2* 55–60, *h2:h3* 40–44, *h1:h2* 30–32, *d1:d2* 20–25, *e1:e2* 50–55, *h1:h1* 35–42, *h2:h2* 100–105, *h2:ps1* 27–30.

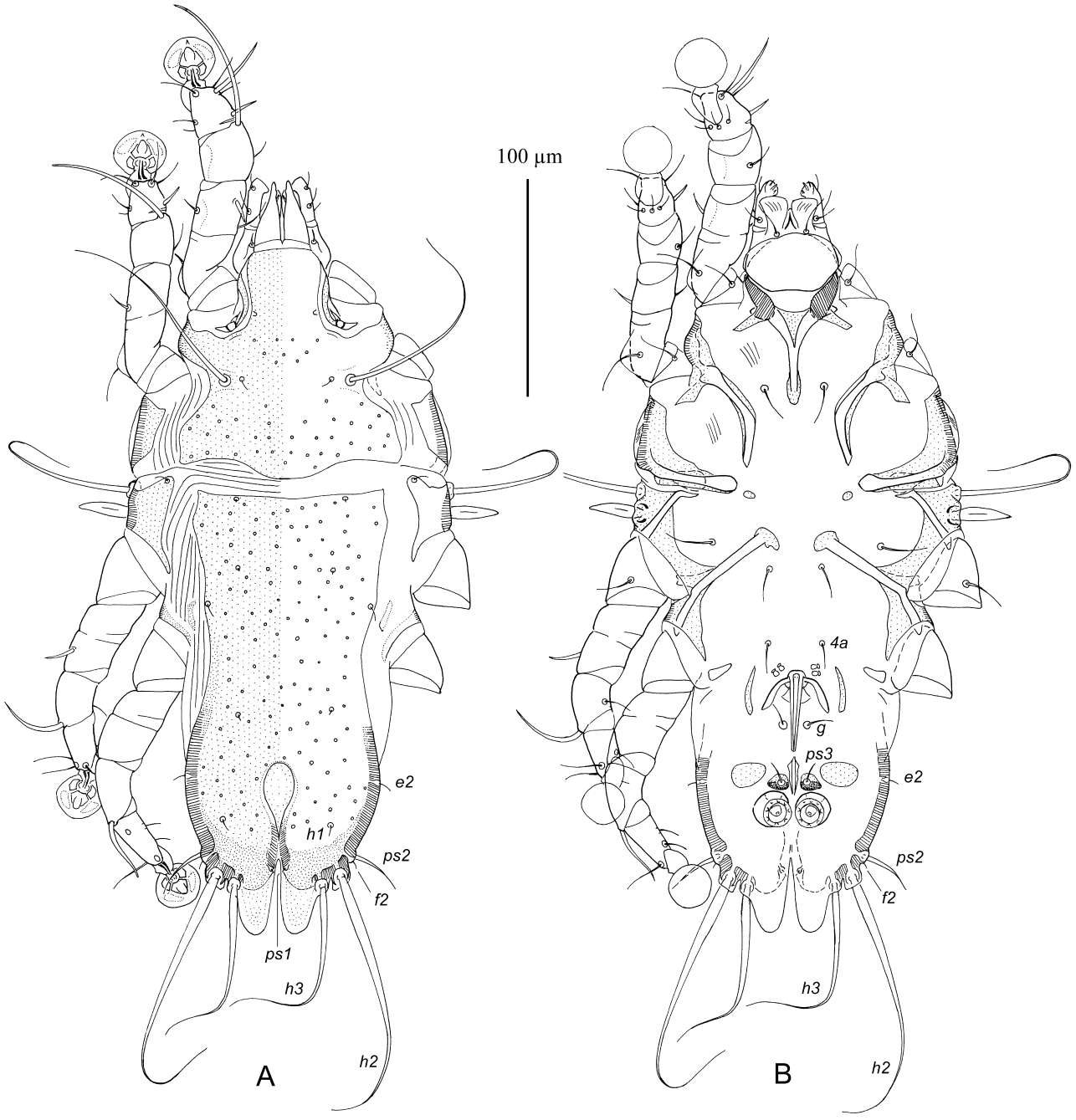

FIGURE 10. *Platyacarus sclerurus* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Epimerites I with posterior tips connected by very thin commissure; epimerites I, II without sclerotized fields (Fig. 11B). Epimerites IVa present, heavily sclerotized. Bases of epimerites I, II not inflated. Coxal fields II laterally with large sclerotized areas. Bases of trochanters III–IV flanked by sclerotized bands connecting corresponding epimerites. Epigynum semicircular, thick, with acute tips extending to level of genital papillae, 38–42 in length, 64–68 in width, without lateral extensions. Genital papillae not connected at bases. Setae *ps2* at midlevel of anal opening. Translobar apodemes fused to each other anterior to terminal cleft. Copulatory opening

situated ventral, near anterior margin of translobar apodemes, and covered with posterior ends of anal flaps. Head of spermatheca small cone-shaped, poorly sclerotized; primary spermaduct with short monotonous enlargement toward head of spermatheca; secondary spermaducts 10–12 long (Fig. 12E). Distance between pseudanal setae: *ps2:ps2* 60–62, *ps3:ps3* 25–28, *ps2:ps3* 8–10.

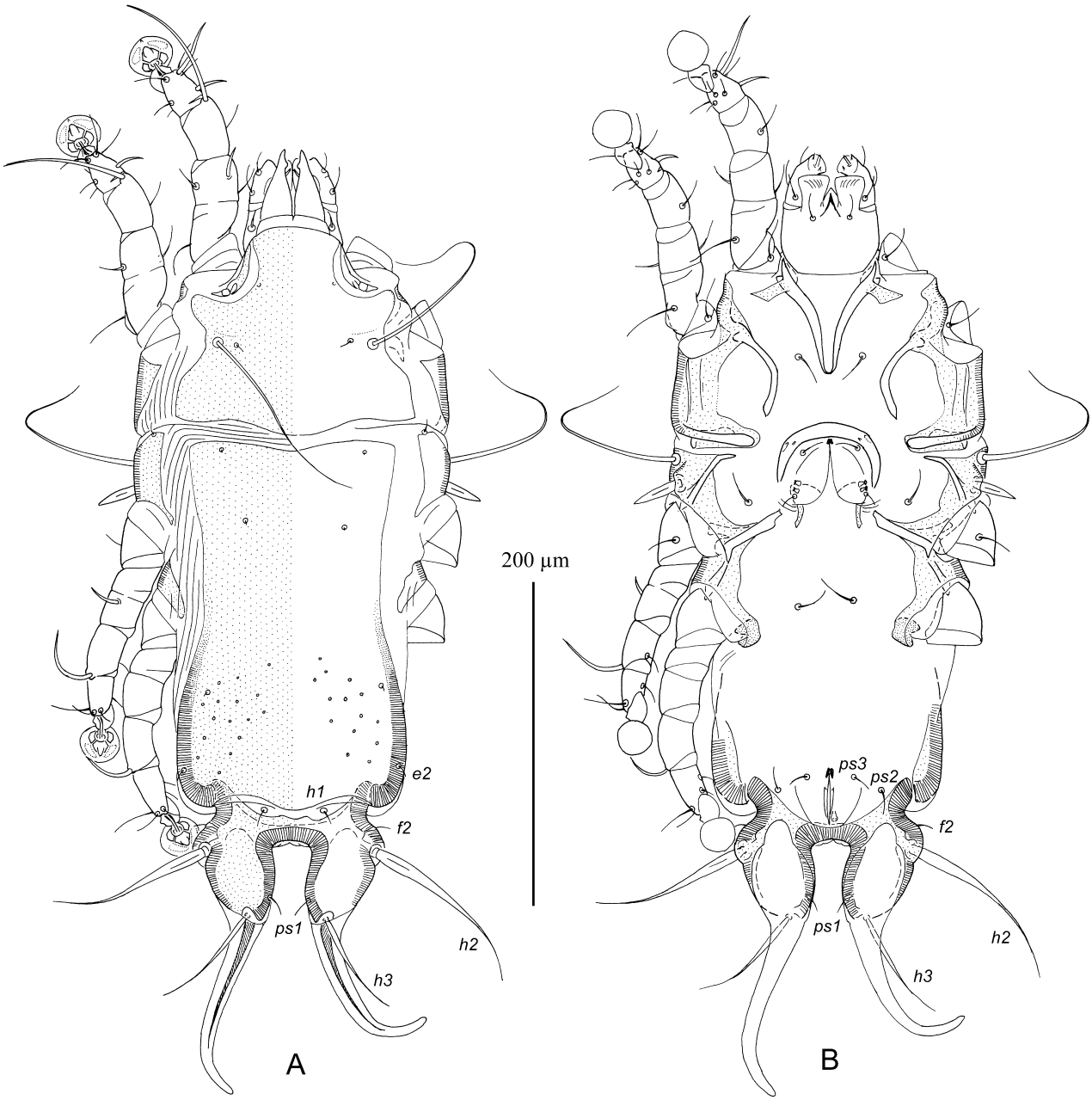

FIGURE 11. *Platyacarus sclerurus* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

Legs I, II as in male. Solenidion *σ* of genu III situated in basal part of this segment. Legs IV with ambulacral disc extending to level of setae *h2*. Solenidion *φ* of tibia IV slightly shorter than corresponding tarsus. Length of solenidia: *σ1*I 15–17, *σ*III 14–16, *φ*III 37–42, *φ*IV 25–28.

Differential diagnosis. The new species *Platyacarus sclerurus* sp. n. is very close to *P. minor* (Berla, 1959) from *Sclerurus scansor* (Ménétriès, 1835) (Furnariidae) described from Brazil (Berla 1959) in having setae *f2* in both sexes and a pair of small metapodosomal sclerites in males. *Platyacarus sclerurus* differs from *P. minor* by the characters as follows: in both sexes, the posterior margin of the prodorsal shield has a short and widely rounded median extension; in males, the anterior margin of the hysteronotal shield is straight, epimerites IVa are present, and the terminal lamellae are close to each other, with their inner margins separated by 5 µm; in females, the bases

of trochanters II–IV are flanked by sclerotized bands, the terminal cleft is 2.1–2.7 times longer than wide in the narrowest part (48–50 ×18–23 μm) and the prodorsal shield lacks any lacunae. In both sexes of *P. minor*, the posterior margin of the prodorsal shield is straight or slightly convex; in males, the anterior margin of the hysteronotal shield is concave, epimerites IVa are absent, and the terminal lamellae are separated by a distance of about 15 μm; in females, the bases of trochanters II–IV are not flanked by sclerotized bands, the terminal cleft is narrow (*c*. 10 μm in narrowest part) and the prodorsal shield bears minute circular lacunae.

Etymology. The specific epithet is taken from the generic name of the type host and is a noun in apposition.

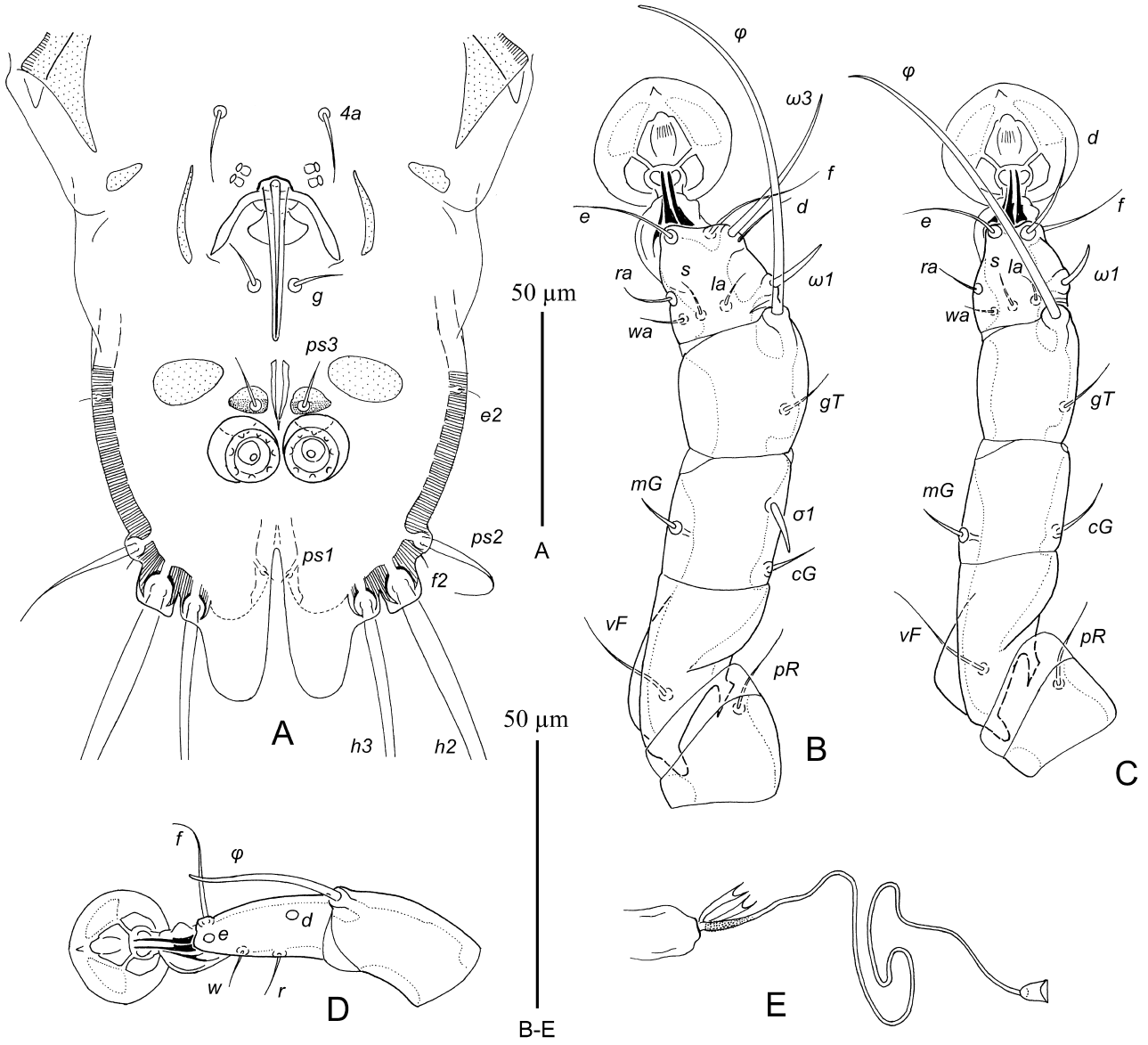

FIGURE 12. *Platyacarus sclerurus* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B, C—legs I and II of male, dorsal view, D—tibia and tarsus IV of male, dorsal view, E—spermatheca and spermaducts.

Species group *caulifer*

Diagnosis. *Both sexes*. Setae *f2* absent, prodorsal shield entire, hysteronotal shield with lacunae, prodorsal shield with or without lacunae. *Male*. Adanal suckers with corolla dentate, only postero-mesal pair of adanal shields present, epimerites I fused into a Y, adanal apodemes present, terminal lamellae long spatuliform (3–4 times longer than wide), aedeagus extending beyond posterior margins of opisthosomal lobes. *Female*. Primary spermaduct short, with monotonous proximal enlargement from middle of spermaduct toward spermatheca and with distal

enlargement (bursa copulatrix) constituting half the length of this spermaduct, head of spermatheca small hemispheric.

Remark. This new species group includes the single species described below.

***Platyacarus caulifer* Mironov sp. n.**
(Fig. 13–15)

Type material. Male holotype (ZISP 6509), 10 male and 7 female paratypes from *Glyphorynchus spirurus* (Vieillot, 1819) (Furnariidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamanca Mts., 09°46'N, 83°47′W, 8 August 2009, collectors I. Literak, O. Sychra and M. Capek.

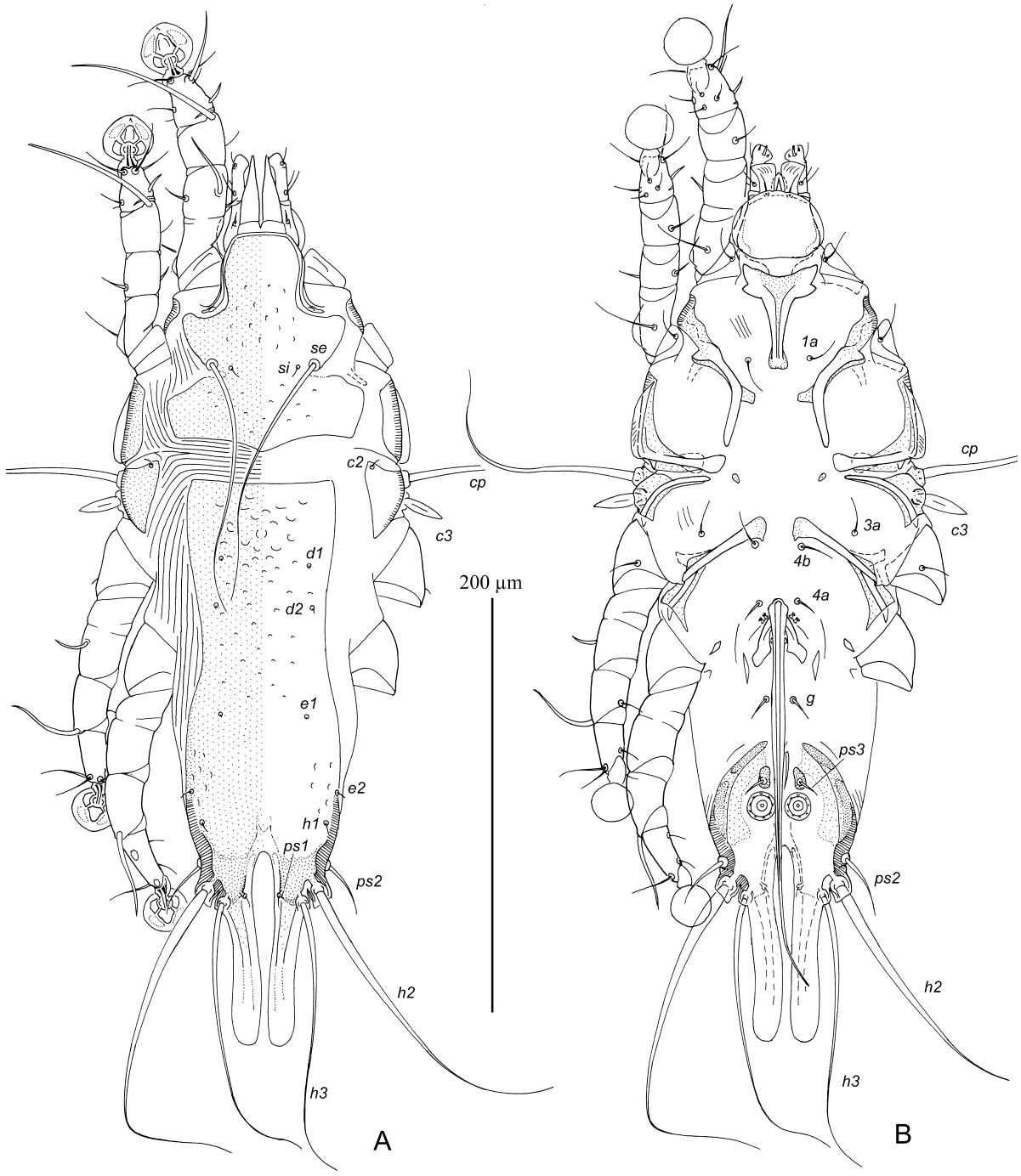

FIGURE 13. *Platyacarus caulifer* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Depository. Holotype, 7 male and 4 female paratypes (ZISP 6510–6520)—ZISP; 2 male and 2 female paratypes—UMMZ (BMOC-15-1028-006), 1 male and 1 female paratype—IMUCR.

Additional material. 14 males and 6 females (ZISP 6464–6483) same collection data as for the type material, except date, 7 August 2009.

Description. MALE (holotype, range for 10 paratypes in parentheses). Idiosoma, length × width, 320 (310–325) × 140 (140–150), length of hysterosoma 215 (200–220). Prodorsal shield: entire, antero-lateral extensions rounded, lateral margins with incisions extending to bases of setae *se*, posterior margin with short blunt-angular median extension, 105 (100–110) in length, 95 (90–105) in width, surface with minute poorly distinct lacunae (Fig. 13A). Setae *ve* absent. Bases of scapular setae *se* separated by 50 (47–52). Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 22 (20–22) × 6 (6–7.5). Distance between prodorsal and hysteronotal shields 15 (10–15). Hysteronotal shield: 200 (195–210) in length and 75 (72–80) in width; anterior margin straight, anterior and lateral parts with poorly pronounced ovate lacunae. Supranal concavity poorly expressed, ovate, length from anterior end to anterior margin of terminal cleft 28 (25–30). Opisthosomal lobes small, roughly trapezoidal, lateral margins with truncate extension bearing bases of setae *h2*. Terminal cleft small semiovate, length from anterior end to level of setae *h3* 28 (25–28), greatest width 9 (9–12). Terminal lamellae long spatuliform, parallel-sided, rounded terminally, with wide dorsal costa, 68 (65–70) in length, 12 (11–13) in wide at base. Setae *c1* and *f2* absent. Setae *ps1* situated near inner margins of opisthosomal lobes, approximately at level of setae *h2*. Setae *h1* at level of supranal concavity and close to lateral margins of hysteronotal shield. Distance between dorsal setae: *c2:d2* 65 (60–65), *d2:e2* 90 (80–90), *e2:h3* 52 (50–58), *h2:h2* 55 (55–60), *h3:h3* 40 (40–48), *ps2:ps2* 60 (60–68), *h1:h3* 38 (36–40), *d1:d2* 20 (20–22), *e1:e2* 38 (35–40).

Epimerites I fused into a Y, sternum about 2/3 of the total length of epimerites, slightly enlarged posteriorly (Fig. 13B). Inner margins of epimerites II with short and blunt extension. Epimerites IVa small. Rudimentary sclerites rEpIIa present. Bases of epimerites I, II not inflated. Genital arch of moderate size, with base at midlevel of trochanters IV, 32 (30–33) long and 27 (25–28) wide; genital organ whip-shaped, 182 (180–185) long, extending to or beyond midlength of terminal lamellae (Fig. 15A). Distance from genital arch apex to level of setae *h3* 140 (135–140). Bases of genital papillae touching, situated slightly posterior to genital arch apex. Paragenital apodemes represented by a pair of thin longitudinal sclerites lateral to genital arch. Antero-lateral pieces of adanal shields absent; postero-medial pieces of adanal shields flanking anal opening and bearing setae *ps3*. Anal field flanked laterally with wide bow-shaped adanal apodemes. Adanal suckers cylindrical, 12 (12–14) in diameter; corolla with 9 denticles similar in size. Setae *4b* slightly posterior to level of setae *3a*. Distance between ventral setae: *4b:3a* 5 (5–8), *4b:4a* 25 (22–25), *4a:g* 47 (45–50), *g:ps3* 40 (37–40), *g:g* 12 (12–13), *ps3:ps3* 17 (17–18), *ps3:h3* 55 (52–558).

Femora I, II with narrow ventral crest. Solenidion *σ1*I slightly longer than genu I and situated at its midlevel (Fig. 15B, C). Solenidion *σ* of genu III situated slightly closer to base of this segment. Legs IV with ambulacral disc extending to level of setae *h2*. Tarsus IV 30 (28–30) long, without apical or dorsal processes; button-like seta *d* situated in basal half of this segment (Fig. 15D). Solenidion *φ* of tibia IV extending almost to midlevel of ambulacral disc. Length of solenidia: *σ1*I 28 (25–29), *σ*III 15 (15–16), *φ*IV 38 (35–40).

FEMALE (range for 7 paratypes). Idiosoma, length × width, 435–465 × 165–180, length of hysterosoma 330–340. Prodorsal shield: entire, anterolateral extensions rounded, lateral margins without incisions, posterior margin with blunt-angular median extension, 115–120 long and 115–130 wide, surface without ornamentation (Fig. 14A). Setae *ve* absent. Bases of setae *se* separated by 65–70. Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 22–25 × 7–7.5. Distance between prodorsal and hysteronotal shields 15–20. Hysteronotal shields completely split into anterior and lobar shields. Anterior hysteronotal shield: 220–240 in length and 950–110 in width at anterior margin, 120–130 wide in posterior part, anterior margin straight, posterior margin slightly convex, surface with minute circular and ovate lacunae in median part. Setae *c1* and *f2* absent. Lobar shield: 88–100 in length and 100–110 in width. Opisthosomal lobes slightly longer than wide at base. Terminal cleft almost rectangular, lateral margins slightly convex, 62–70 in length, 16–18 in width at midlevel. Supranal concavity absent. Setae *h2* with spindle-like basal enlargement and with filiform apical part, 100–110 in length, 7–7.5 in width; setae *h3* 45–55 in length, about 1/3 of terminal appendages. Setae *h1* inserted on soft tegument between anterior hysteronotal and lobar shields. Setae *ps1* on lateral margins of terminal cleft, closer to lobar apices than to level of setae *h2*. Distance between dorsal setae: *c2:d2* 80–85, *d2:e2* 135–140, *e2:h2* 27–30, *h2:h3* 60–65, *h1:h2* 25–30, *d1:d2* 30–35, *e1:e2* 60–65, *h1:h1* 50–53, *h2:h2* 85–88, *h2:ps1* 30–38.

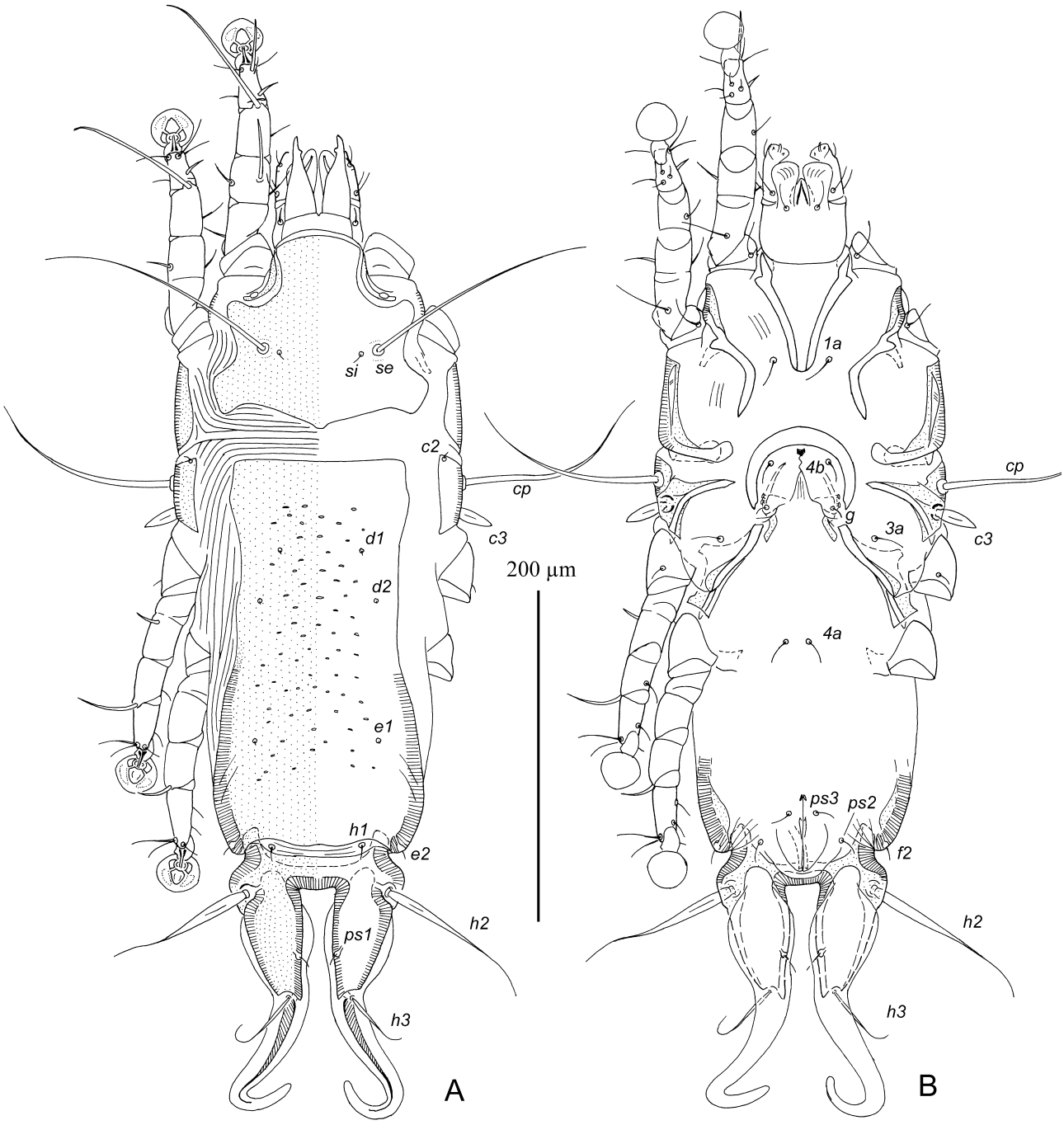

FIGURE 14. *Platyacarus caulifer* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

Epimerites I with posterior tips connected by very thin commissure; epimerites I, II without sclerotized fields (Fig. 14B). Epimerites IVa absent. Bases of epimerites I, II not inflated. Epigynum semicircular, thick, with acute tips extending to level of setae *g*, 47–53 in length, 62–68 in width, without lateral extensions. Genital papillae not connected at bases. Setae *ps2* at midlevel of anal opening. Translobar apodemes fused to each other anterior to terminal cleft. Copulatory opening situated ventrally, near anterior margin of translobar apodemes, and covered with posterior ends of anal flaps. Head of spermatheca small, hemispherical; primary spermaduct slightly enlarged near head of spermatheca, distal half 3-4 times wider than proximal part; secondary spermaducts 4–5 long (Fig.15E). Distance between pseudanal setae: *ps2:ps2* 60–62, *ps3:ps3* 25–28, *ps2:ps3* 8–10.

Legs I, II as in male. Solenidion σ of genu III situated in basal part of this segment. Legs IV with ambulacral discs extending to level of lateral extensions of lobar region. Solenidion φ of tibia IV half as long as corresponding tarsus. Length of solenidia: $\sigma 1$I 25–32, σIII 12–15, φIII 32–36, φIV 17–20.

Differential diagnosis. The new species *Platyacarus caulifer* sp. n. strongly differs from all other *Platyacarus* species and therefore is referred here to a separate species group. Among previously known species, *P. caulifer* is probably closest to species of the *oligolaccius* group based on the absence of setae *f2* in both sexes and in having, in males, the terminal lamellae relatively wide and rounded apically. *Platyacarus caulifer* is readily differentiated from all previously known species by the following unique features: in both sexes setae *c1* are absent; in males, the terminal lamellae are spatuliform, parallel-sided and about 3 times longer than wide, the anal field is flanked by large bow-shaped adanal apodemes, the aedeagus is very long and extends beyond the midlength of the terminal lamellae; in females, the enlarged distal part of the primary spermaduct (bursa copulatrix) is approximately half the length of the total spermaduct. In all other known species of the genus *Platyacarus*, setae *c1* are present in both sexes; in males, the terminal lamellae are of a different form (triangular or narrowly lanceolate) or, if tongue-shaped, are shorter (1.5–2 times longer than wide), the adanal apodemes are absent, the aedeagus is much shorter and never extends to the level of the terminal cleft; in females, the enlarged distal part of the primary spermaduct that opens into the copulatory opening is not longer than 1/8th of the total length of the spermaduct.

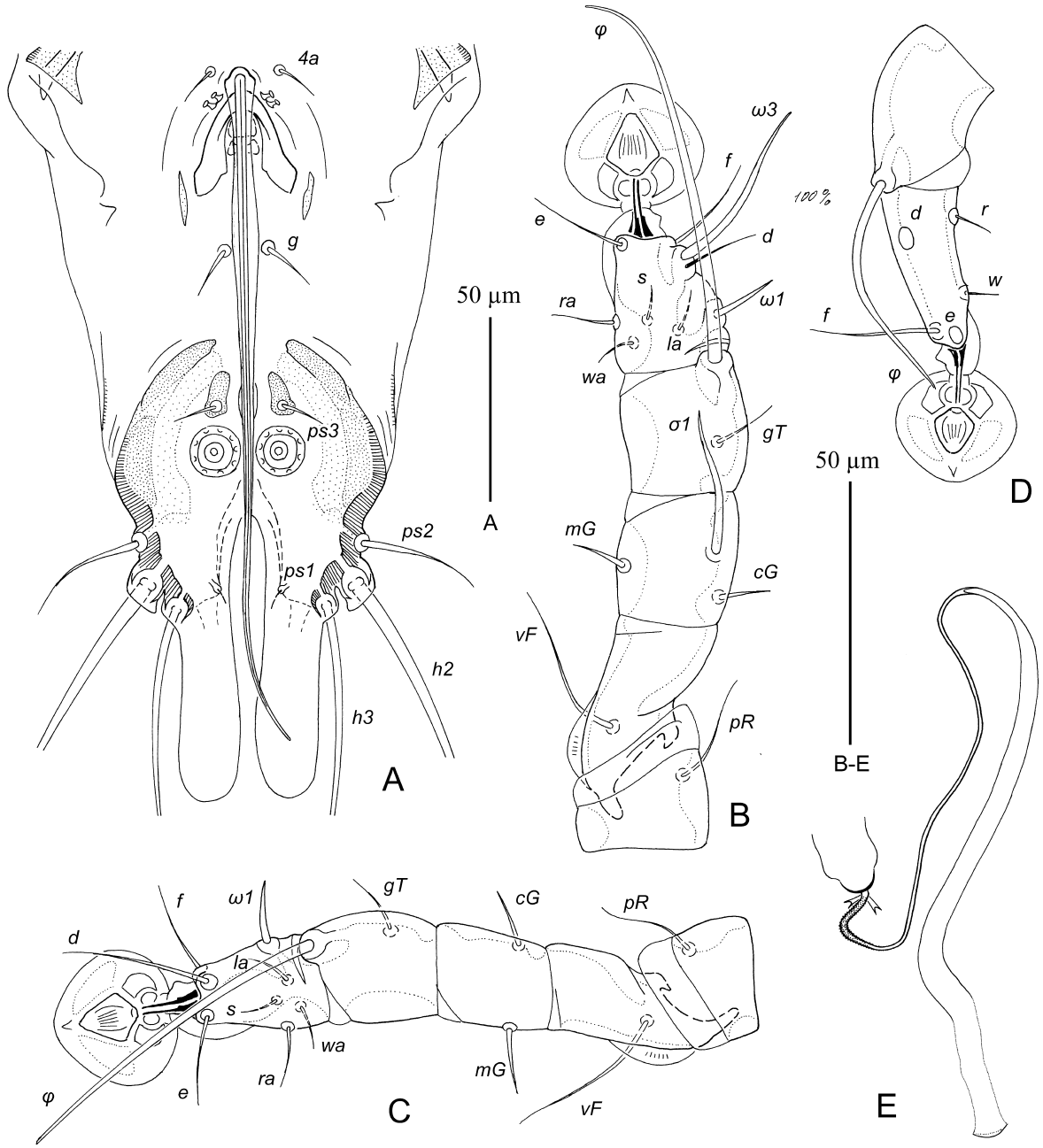

FIGURE 15. *Platyacarus caulifer* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B, C—legs I and II of male, dorsal view, D—tibia and tarsus IV of male, dorsal view, E——spermatheca and spermaducts.

Etymology. The specific epithet derives from *kaulos* (stem, stalk, Gr.) and *ferre* (to carry, to bear, L.) to refer to the extraordinarily long aedeagus in male and is a noun in nominative case.

Genus *Nycteridocaulus* Atyeo, 1966

Type species: *Nycteridocaulus tyranni* Atyeo, 1966, by original designation.

Diagnosis. BOTH SEXES. Moderately elongated proctophyllodines. Prodorsal shield entire, covering nearly the entire prodorsum, with extending antero-lateral extensions, and rounded posterior angles. Vertical setae *vi* rudimentary, represented by alveoli. Scapular setae *si* and *se* situated on prodorsal shield and arranged in transverse line. Humeral shields well developed dorsally, usually encompassing bases of setae *c2* and *cp*. Subhumeral setae *c3* lanceolate. Epimerites I free, bow-shaped, with posterior ends slightly divergent; in some species epimerites may be connected by transverse sclerotized band. Full set of hysterosomal setae occurring in proctophyllodines present. Solenidion *σ1* of genu I slightly longer than solenidion *ω3* of tarsus I. Tarsi I, II with 3 ventral setae, setae *wa* close to setae *la* and *ra* on these tarsi. Segments of legs I and II without processes or other modifications.

MALE. Hysteronotal shield covering almost all hysterosoma. Opisthosoma wide, opisthosomal lobes strongly variable in shape among species, from short truncate extensions to long semiovate or tongue-shaped extensions separated by large terminal cleft, lateral margins of lobes straight or forming strong semicircular convexities; posterior margin of lobes with variously shaped terminal lamellae (as short and wide membranes with smooth or indented free margin, semicircular, foliform, with fine dorsal ornamentation or without it). Supranal concavity well expressed. Setae *h3* shorter than macrosetae *h2*. Setae *h1* usually posterior to the level of setae *ps2*. Setae *f2* and *ps2* situated laterally or ventrally, distinctly moved from lateral margins of opisthosoma. Coxal fields I–IV open, without extensive sclerotized areas. Genital apparatus at level of trochanters IV; genital arch wide and low, with branches usually doubly recurved (resembling silhouette of a bat) or simple bow-shaped; aedeagus in sheath approximately equal or slightly longer than genital arch. Adanal shields present, variable in form, partly encircling adanal suckers and setae *ps3*, free or connected each other anterior to anal opening. Genital papillae situated at level of genital arch apex, surrounded by ovate plates or these plates absent. Pregenital apodemes present or absent, free or fused to each other. Adanal apodemes absent. Opisthoventral shields present (and bearing bases of setae *f2* and *ps2*) or not developed. Adanal suckers cylindrical, corolla dentate. Legs III and IV subequal, not hypertrophied. Tarsus IV with apical claw-like process, with or without ventral extension, modified setae *d* and *e* button-like.

FEMALE. Lobar region of opisthosoma clearly separated from remaining part of hysterosoma by transverse constriction, opisthosomal lobes well developed, with terminal appendages. Anterior hysteronotal and lobar shields completely separated by narrow band of striated tegument. Lobar shield entire (split longitudinally in *Nycteridocaulus lamellus* Atyeo, 1966). Supranal concavity absent. Macrosetae *h2* thickened basally, with long filiform apex. Epigynum large, semicircular or horseshoe-shaped, free from epimerites IIIa. Copulatory opening terminal or subterminal. Legs III and IV subequal in size; segments without modifications; solenidia *φ* of tibiae III, IV subequal or solenidion *φ*IV noticeably shorter.

Hosts. Furnariidae, Parulidae, Thamnophilidae, Tityridae, Troglodytidae, Tyrannidae (Table 1).

Remarks. The genus *Nycteridocaulus* was established by Atyeo (1966a) and originally included six species; later on, two more species were described (De Alzuet & Brandetti 1986; Hernandes 2014). Among proctophyllodine genera associated exclusively or predominately with suboscine passerines, the genus *Nycteridocaulus* is the most species-rich and diverse in the structure of opisthosomal lobes, terminal lamellae and genital apparatus in males. Meanwhile representatives of the two closest genera, *Anisophyllodes* and *Atrichophyllodes*, are more uniform morphologically. The genus incorporates 15 species including 7 new species described herein. A new key to species provided below includes all currently known species, except *Nycteridocaulus armandoi* De Alzuet and Brandetti, 1986, the only species associated with Furnariidae, because its description was not careful enough to recognize important discriminant features.

TABLE 1. Host associations of proctophyllodine species with passerines in the New World, except for members of the genus *Proctophyllodes*.

Mite genus and species	Host species	Host family	Locality	References
Anisophyllodes Atyeo, 1969				
Anisophyllodes candango Hernandes *et al.,* 2007	*Elaenia chiriquensis* Lawrence*	Tyrannidae	Brazil	Hernandes *et al.* 2007
«	*E. chilensis* Hellmayr	Tyrannidae	Brazil	Silva *et al.* 2015
An. cuneiformis **sp. n.**	*Sittasomus griseicapillus* (Vieillot)	Furnariidae	Costa Rica	PW
An. elaeniae Mironov and González-Acuña, 2009	*Elaenia albiceps* (Orbigney et Lafresnaye)*	Tyrannidae	Chile	Mironov & González-Acuña 2009
«	*E. chilensis* Hellmayr	Tyrannidae	Chile	Fuentes *et al.* 2015
«	*E. flavogaster* (Thunberg)	Tyrannidae	Colombia	Barreto *et al.* 2012
An. intermedius (Trouessart and Neumann, 1888)	*E. martinica* (Linnaeus)*	Tyrannidae	«America», Mexico: Isla Cozumel	Trouessart & Neumann 1888; Atyeo 1969
«	*Loxigilla noctis* (Linnaeus) (?)	Thraupidae	Guadeloupe	Trouessart & Neumann 1888
An. pipromorphae Atyeo, 1967	*Mionectes oleagineus* (Lichtenstein, MHK)*	Tyrannidae	Trinidad and Tobago, Costa Rica	Atyeo 1967a, PW
«	*M. olivaceus* Lawrence	Tyrannidae	Costa Rica	PW
«	*M. rufiventris* Cabanis	Tyrannidae	Brazil	Valim *et al.* 2011
Atrichophyllodes Hernandes *et al.,* 2007				
Atrichophyllodes delalandi Hernandes *et al.*, 2007	*Corythopis delalandi* (Lesson)	Tyrannidae	Brazil	Hernandes *et al.* 2007
At. latilobus **sp. n.**	*Hylophylax naevioides* (Lafresnaye)	Thamnophilidae	Costa Rica	PW
At.leucopterus Hernandes, 2014	*Pyriglena leucoptera* (Vieillot)	Thamnophilidae	Brazil	Hernandes 2014
At. mentalis Hernandes *et al.*, 2007	*Dysithamnus mentalis* (Temminck)	Thamnophilidae	Brazil	Hernandes *et al.* 2007
Diproctophyllodes Atyeo and Gaud 1968				
Diproctophyllodes dielytra (Trouessart, 1885)	*Antilophia galeata* (Lichtenstein, MHK.)	Pipridae	Brazil	Enout *et al.* 2012
«	*Ceratopipra erythrocephala* (Linnaeus)	Pipridae	S. America: French Guiana	Trouessart 1885; Atyeo & Gaud 1968
«	*C. rubrocapilla* (Temminck)	Pipridae	Brazil	Berla 1959a; Atyeo & Gaud 1968
«	*Chiroxiphia linearis* (Bonaparte)	Pipridae	Costa Rica	PW
«	*Corapipo altera* Hellmayr	Pipridae	Costa Rica	PW
«	*C. gutturalis* (Linnaeus)	Pipridae	French Guiana	Atyeo & Gaud 1968
«	*Manacus manacus* (Linnaeus)	Pipridae	West Indies; Brazil	Atyeo & Gaud 1968; Enout *et al.* 2012
«	*Neopelma pallescens* (Lafresnaye)	Pipridae	Brazil	Silva *et al.* 2015
«	*Pipra aureola* (Linnaeus)*	Pipridae	French Guiana	Trouessart 1885

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TABLE 1. (Continued)

Mite genus and species	Host species	Host family	Locality	References
«	*P. fasciicauda* Hellmayr	Pipridae	Brazil	Enout *et al.* 2012
D. oxyrunci Atyeo and Gaud, 1968	*Oxyruncus cristatus* Swainson	Tityridae	Brazil	Atyeo & Gaud 1968
Hemipterodectes Berla, 1959				
Hemipterodectes squalocauda Berla, 1959	*Oxyruncus cristatus* Swainson	Tityridae	Brazil	Berla 1959b; Atyeo & Gaud 1968
Mimicalges Atyeo and Gaud, 1971				
Mimicalges pteronyssoides (Trouessart, 1885)	*Ceratopipra erythrocephala* (Linnaeus)	Pipridae	S. America	Trouessart 1885; Atyeo & Gaud 1971b
«	*Pipra aureola* (Linnaeus)*	Pipridae	S. America	Trouessart 1885; Atyeo & Gaud 1971b
M. neopelmae Hernandes, 2014	*Neopelma pallescens* (Lafresnaye)	Pipridae	Brazil	Hernandes 2014
Nycteridocaulus Atyeo, 1966				
Nycteridocaulus armandoi De Alzuet and Brandetti, 1986	*Anumbius annumbi* (Vieillot)*	Furnariidae	Brazil	De Alzuet & Brandetti 1986
«	*Furnarius rufus* (Gmelin)	Furnariidae	Brazil	De Alzuet & Brandetti 1986
N. attila **sp. n.**	*Attila spadiceus* (Gmelin)	Tyrannidae	Costa Rica	PW
N. bilobatus Atyeo, 1966	*Sayornis nigricans* (Swainson) *	Tyrannidae	Mexico	Atyeo 1966a
«	*Cnemotriccus fuscatus* (zu Wied-Neuwied)	Tyrannidae	Brazil	Silva *et al.* 2015
N. foliatus Atyeo, 1966	*Empidonax difficilis* Baird SF*	Tyrannidae	Mexico	Atyeo 1966a
«	*Myiopagis viridicata* (Vieillot)	Tyrannidae	Brazil	Silva *et al.* 2015
N. guaratubensis Hernandes, 2014	*Phylloscartes kronei* Willis and Oniki	Tyrannidae	Brazil	Hernandes 2014
N. hylophylax **sp. n.**	*Hylophylax naevioides* (Lafresnaye)	Thamnophilidae	Costa Rica	PW
N. ketourus **sp. n.**	*Thryophilus rufalbus* (Lafresnaeye)	Troglodytidae	Costa Rica	PW
N. lamellus Atyeo, 1966	*Myiarchus crinitus* (Linnaeus)*	Tyrannidae	USA: Texas	Atyeo 1966a
«	*Tyrannus tyrannus* (Linnaeus)	Tyrannidae	USA: Nebraska	Atyeo 1966a
N. laticlunis Atyeo, 1966	*Schiffornis turdina* (zu Wied-Neuwied)*	Tityridae	Mexico	Atyeo 1966a
N. leptopogoni **sp. n.**	*Leptopogon superciliaris* Tschudi	Tyrannidae	Costa Rica	PW
N. myiobius **sp. n.**	*Myiobius sulphureipygius* (Sclater, PL)	Tyrannidae	Costa Rica	PW
N. myioborus **sp. n.**	*Myioborus miniatus* (Swainson)	Parulidae	Costa Rica	PW
N. pectinatus Atyeo, 1966	*Tolmomyias flaviventris* (zu Wied-Neuwied)*	Tyrannidae	West India, Brazil	Atyeo 1966a; Silva *et al.* 2015
«	*T. sulphurescens* (von Spix)	Tyrannidae	Costa Rica	PW

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TABLE 1. (Continued)

Mite genus and species	Host species	Host family	Locality	References
«	*Schiffornis virescens* (Lafresnaye) (?)	Tityridae	Brazil	Kanegae *et al*. 2008
N. platyrinchi **sp. n.**	*Platyrinchus cancrominus* Sclater, PL & Salvin	Tyrannidae	Costa Rica	PW
N. tyranni Atyeo, 1966	*Arremon flavirostris* Swainson (?)	Emberizidae	Brazil	Kanegae *et al*. 2008
«	*Contopus pertinax* Cabanis and Heine*	Tyrannidae	Mexico	Atyeo 1966a
«	*Elaenia cristata* Pelzeln	Tyrannidae	Brazil	Kanegae *et al*. 2008
«	*Leptopogon amaurocephalus* Cabanis	Tyrannidae	Brazil	Kanegae *et al*. 2008
«	*Myiothlypis flaveola* Baird, SF (?)	Parulidae	Brazil	Kanegae *et al*. 2008
	Mionectes rufiventris Cabanis	Tyrannidae	Brazil	Kanegae *et al*. 2008
«	*Pachyramphus aglaiae* (Lafresnaye) (?)	Tityridae	Mexico	Atyeo 1966a
«	*Synallaxis scutata* Sclater, PL (?)	Furnariidae	Brazil	Kanegae *et al*. 2008
«	*Vireolanius melitophrys* Bonaparte (?)	Vireonidae	Mexico	Atyeo 1966a
«	*V. pulchellus* Scalter, PL and Salvin (?)	Vireonidae	Mexico	Atyeo 1966a
«	*Schiffornis virescens* (Lafresnaye)(?)	Tityridae	Brazil	Kanegae *et al*. 2008
«	*Tolmomyias sulphurescens* (von Spix)	Tyrannidae	Brazil	Kanegae *et al*. 2008
Platyacarus Kudon, 1982				
Group *acaenophyllicus*		Furnariidae		
P. acaenophyllicus Kudon, 1982	*Dendrexetastes r. rufigula* (Lesson)	Furnariidae	Brazil, Surinam	Kudon 1982c
P. brevicolicus Kudon, 1982	*Campylorhamphus pusillus borealis* Carriker*	Furnariidae	Costa Rica	Kudon 1982d
«	*C. trochilorostris venezuelensis* (Chapman)	Furnariidae	Venezuela	Kudon 1982d
P. leptodonticus Kudon, 1982	*Lepidocolaptes s. souleyetii* (Lafresnaye)	Furnariidae	Ecuador	Kudon 1982c
P. trigonicus Kudon, 1982	*Hylexetastes perrotii* (Lafresnaye)*	Furnariidae	Brazil	Kudon 1982c
«	*H. stresemanni undulatus* Todd	Furnariidae	Brazil	Kudon 1982c
Group *caulifer*				
P. caulifer **sp. n.**	*Glyphorynchus spirurus* (Vieillot)	Furnariidae	Costa Rica	PW
Group *epacrophyllicus*				
P. epacrophyllicus Kudon, 1982	*Lepidocolaptes s. squamatus* (Lichtenstein, MHK)	Furnariidae	Brazil	Kudon 1982d

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TABLE 1. (Continued)

Mite genus and species	Host species	Host family	Locality	References
P. lepidophagicus Kudon, 1982	*L. duidae* Zimmer	Furnariidae	Brazil	Kudon 1982d
P. major Kudon, 1982	*Xiphocolaptes m. major* (Vieillot)	Furnariidae	Panama	Kudon 1982d
Group *minor*				
P. minor (Berla, 1959)	*Sclerurus s. scansor* (Ménétriès)	Furnariidae	Brazil	Berla 1959b; Hernandes & Valim 2014
P. sclerurus **sp. n.**	*S. mexicanus* Sclater, PL	Furnariidae	Costa Rica	PW
Group *oligolaccius*				
P. oligolaccius Kudon, 1982	*Xiphocolaptes a. albicollis* (Vieillot)*	Furnariidae	Brazil	Kudon 1982a
«	*X. promeropirhynchus* (Lesson)	Furnariidae	Ecuador	Kudon 1982a
P. dendrocinclae **sp. n.**	*Dendrocincla homochroa* (Sclater,PL)	Furnariidae	Coast Rica	PW
P. dendrocolapti **sp. n.**	*Dendrocolaptes picumnus* Lichtenstein, MHK	Furnariidae	Coast Rica	PW
P. dontocoronius Kudon, 1982	*Dendrocolaptes c. certhia* (Boddaert)	Furnariidae	Guyana	Kudon 1982a
P. sittasomi Hernandes *et al.,* 2007	*Sittasomus griseicapillus* (Vieillot)	Furnariidae	Brazil, Costa Rica	Hernandes *et al.* 2007; Enout *et al.* 2012; PW
Group *psilocoronius*				
P. diversus Kudon, 1982	*Deconychura s. stictolaema* (Pelzeln)	Furnariidae	Brazil	Kudon 1982b
P. longicolicus Kudon, 1982	*Xiphorhynchus pardalotus caurensis* Todd, 1948	Furnariidae	Venezuela	Kudon 1982b
P. picumnus **sp. n.**	*Dendrocolaptes picumnus* Lichtenstein, MHK	Furnariidae	Coast Rica	PW
P. psilocoronius Kudon, 1982	*Deconychura stictolaema secunda* Hellmayr	Furnariidae	No locality	Kudon 1982e; Barreto *et al.* 2012
«	*Dendrocincla f. fulginosa* (Vieillot)*	Furnariidae	Brazil	Kudon 1982b; Barreto *et al.* 2012
«	*Dendrocincla merula olivascens* Zimmer, JT	Furnariidae	Ecuador	Kudon 1982b; Barreto *et al.* 2012
«	*Dendrocolaptes c. certhia* (Boddaert)	Furnariidae	Brazil	Kudon 1982b; Barreto *et al.* 2012
«	*Dendrocolaptes hoffmannsi* Hellmayr	Furnariidae	Brazil	Kudon 1982b; Barreto *et al.* 2012
«	*Dendrocolaptes p. platyrostris* von Spix	Furnariidae	Brazil	Kudon 1982b; Barreto *et al.* 2012
«	*Dendroplex kienerii* (Des Murs)[1]	Furnariidae	Brazil	Kudon 1982b; Barreto *et al.* 2012
«	*Dendroplex p. picus* (Gmelin JF)	Furnariidae	Brazil	Kudon 1982b; Barreto *et al.* 2012
«	*Xiphorhynchus e. elegans* (Pelzeln)	Furnariidae	Brazil	Kudon 1982b; Barreto *et al.* 2012

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TABLE 1. (Continued)

Mite genus and species	Host species	Host family	Locality	References
«	*X. erythropygius aequatorialis* (von Berlepsch and Taczanouski)	Furnariidae	Columbia	Kudon 1982b; Barreto *et al.* 2012
«	*X. guttatus eytoni* (Sclater, PL)	Furnariidae	Brazil	Kudon 1982b; Barreto *et al.* 2012
«	*X. guttatus guttatoides* (Lafresnaye)	Furnariidae	Venezuela	Kudon 1982b; Barreto *et al.* 2012
«	*X. l. lachrymosus* (Lawrence)	Furnariidae	Panama	Kudon 1982b; Barreto *et al.* 2012
«	*X. o. obsoletus* (Lichtenstein, MHK)	Furnariidae	Brazil	Kudon 1982b; Barreto *et al.* 2012
«	*X. spixii* (Lesson)	Furnariidae	French Guiana	Kudon 1982b; Barreto *et al.* 2012
Rupicolacarus Atyeo, 1972				
Rupicolacarus laticlunis Atyeo, 1972	*Rupicola rupicola* (Linnaeus)	Cotingidae	French Guiana	Atyeo 1972
R. orbicularis Trouessart, 1899	*R. peruvianus sanguinolentus* Gould	Cotingidae	Ecuador	Trouessart 1899; Atyeo 1972
Tanyphyllodes Atyeo, 1966				
Tanyphyllodes pteroptochi Mironov and González-Acuña, 2009	*Pteroptochos tarnii* (King, PP)	Rhinocryptidae	Chile	Mironov & González-Acuña 2009
T. scelorchilae Atyeo, 1966	*Scelorchilus rubecula* (Kittlitz)	Rhinocryptidae	Chile	Atyeo 1966b
Tyranniphyllodes Hernandes *et al.*, 2007				
Tyranniphyllodes pitangi Hernandes *et al.*, 2007	*Pitangus sulphuratus* (Linnaeus)	Tyrannidae	Brazil	Hernandes *et al.* 2007

Remarks: * – type host if a mite is known from two or more hosts, (?) – questionable host association, PW – present work, [1] – referred as *Xiphorhynchus necopinus* (Zimmer) in Kudon (1992b) and as *Dendrornis kienerii* (Des Murs) in Barreto *et al.* (2012), presently it is placed in the genus *Dendroplex* Swainson (Alexio *et al*. 2007).

Key to *Nycteridocaulus* species

(Males)

1. Opisthosomal lobes bearing long leaf-like terminal lamellae . . . 2
- Opisthosomal lobes bearing short terminal lamellae with smooth or dentate posterior margin . . . 3
2. Apices of terminal lamellae attenuate, pregenital apodemes absent (Figs. 34A, B, 36A) . . . *N. attila* Mironov **sp. n.**
- Apices of terminal lamellae widely rounded, pregenital apodemes fused into H-shaped sclerite . . . *N. foliatus* Atyeo, 1966
3. Posterior margin of terminal lamellae pectinate, each with 10–12 spines; adanal shields wide and encircling anal field from anterior and lateral sides . . . *N. pectinatus* Atyeo, 1966
- Posterior margin of terminal lamellae edentate, adanal shields situated anterior to adanal suckers . . . 4
4. Opisthosoma with two elongated lobes separated by large U-shaped terminal cleft about 55 µm long and 30 µm wide, setae *e2* situated ventrally . . . *N. bilobatus* Atyeo, 1966
- Opisthosoma with short and wide lobes; terminal cleft small, not longer than 30 µm, setae *e2* situated dorsally . . . 5
5. Opisthosoma widened posteriorly, with lateral semi-ovate extensions bearing bases of macrosetae *h2*; setae *f2* and *ps2* situated ventrally . . . 6
- Opisthosoma slightly attenuate posteriorly, setae *f2* and *ps2* situated laterally . . . 8
6. Width of opisthosoma at level of lateral extension bearing setae *h2* subequal to its width at level of setae *e2*, setae *h1* approximately at level of setae *h2* (Fig. 28A, B) . . . *N. platyrinchi* Mironov **sp. n.**
- Opisthosoma at level of lateral extension much wider than at level of setae *e2* and roughly shaped as fish-tail, setae *h1* situated at level of anterior end of supranal concavity . . . 7
7. Pregenital apodemes absent, setae *4a* on soft tegument, terminal cleft extending to level of setae *h3* . . . *N. laticlunis* Atyeo, 1966
- Pregenital apodemes present and fused into H-shaped sclerite, setae *4a* on pregenital apodemes, terminal cleft extends to level of setae *h2* (Figs. 31A, B, 33A) . . . *N. ketourus* Mironov **sp. n.**
8. Terminal lamellae rounded, nearly semicircular, adanal shields distant from each other . . . 9
- Terminal lamellae truncated, roughly rectangular, adanal shields touching each other anterior to anal opening . . . 10
9. Entire surface of prodorsal and hysteronotal shields with large circular lacunae, genital arch almost semicircular, adanal shields represented by two pairs of sclerites, setae *ps3* situated on postero-mesal pair (Figs. 25 A, B, 27A) . . . *N. hylophylax* Mironov **sp. n.**
- Prodorsal and hysteronotal shields without ornamentation, genital arch shaped as recurved bow, adanal shields represented by one pair of postero-mesal sclerites, setae *ps3* situated off adanal shields . . . *N. lamellus* Atyeo, 1966
10. Entire surface of prodorsal and hysteronotal shields with large circular lacunae up to 10 µm in diameter . . . 11
- Hysteronotal shields with lacunae minute and sparsely distributed, prodorsal shield with the same ornamentation or without it . . . 13
11. Small pregenital apodemes shaped as small plates of irregular form present anterior to setae *4a*; setae *h1* situated posterior to level of setae *ps2*, terminal cleft not extending to level of setae *h2* . . . *N. tyranni* Atyeo, 1966
- Pregenital apodemes absent, setae *h1* situated anterior to level of setae *ps2*, terminal cleft extending to level of setae *h2* . . . 12
12. Adanal shields entire, thick L-shaped, anterior angles of opisthoventral shields at level of setae *ps3*, terminal lamellae 5–6 µm long (Figs. 16A, B, 18A) . . . *N. leptopogoni* Mironov **sp. n.**
- Antero-lateral pieces of of adanal shields connected to corresponding postero-mesal pieces by thin commissure or separated from them, anterior angles of opisthoventral shields extending distinctly beyond level of setae *ps3*, terminal lamellae 10–11 µm long (Figs. 19A, B, 21A) . . . *N. myiobius* Mironov **sp. n.**
13. Antero-lateral pieces of adanal shields circular, free or connected by thin commissure to corresponding postero-mesal pieces; setae *4b* situated off sclerotized fields of epimerites IIIa, rudimentary sclerites rEpIIa absent (Figs 22A, B, 24A) . . . *N. myioborus* Mironov **sp. n.**
- Adanal shields entire, thick L-shaped, setae *4b* situated on sclerotized areas around tips of epimerites IIIa, rudimentary sclerites rEpIIa present . . . *N. guaratubensis* Hernandes, 2014

(Females; unknown in *N. foliatus* and *N. laticlunis*)

1. Lobar shield split longitudinally, terminal cleft trapezoidal, in distal portion wider than long . . . *N. lamellus* Atyeo, 1966
- Lobar shield entire, terminal cleft longer than wide . . . 2
2. Terminal cleft large rectangular, 40–45 µm in width (Fig. 26A, B) . . . *N. hylophylax* Mironov **sp. n.**
- Terminal cleft narrow, not wider than 25 µm . . . 3
3. Strongly enlarged proximal part of primary spermaduct about half the total length of spermaduct, setae *h3* subequal in length to terminal appendages . . . *N. pectinatus* Atyeo, 1966
- Enlarged proximal part of primary spermaduct not longer than ¼ of its total length, setae *h3* not exceeding 2/3 the length of terminal appendages . . . 4
4. Anterior margin of lobar shield sinuous, with small and rounded median extension . . . 5
- Anterior margin of lobar shield with a pair of small triangular or slit-like incisions . . . 8
5. Entire surface of prodorsal and anterior hysteronotal shields with large circular lacunae up to 10 µm in diameter (Fig. 20A, B) . . . *N. myiobius* Mironov **sp. n.**
- Prodorsal and anterior hysteronotal shields without lacunae, or scarcely distinct minute lacunae present on anterior hysterono-

tal shield . . . . . 6.
6. Terminal cleft approximately 2 times longer than wide at midlevel, setae *h2* longer than terminal appendages. . . . . *N. tyranni* Atyeo, 1966
- Terminal cleft narrow, 4–6 times longer than wide at midlevel, setae *h2* not exceeding the length of terminal appendages . . 7.
7. Primary spermaduct with short cone-shaped enlargement at head of spermatheca about 12 µm long and 6 µm wide (Fig. 36G) . . . . . *N. attila* Mironov **sp. n.**
- Primary spermaduct monotonously enlarging toward the head of spermatheca (Fig. 30E) . . . . . *N. platyrhynchi* Mironov **sp. n.**
8. Entire surface of prodorsal and anterior hysteronotal shields with large circular lacunae up to 10 µm in diameter (Fig. 17A) . . . . . *N. leptopogoni* Mironov **sp. n.**
- Prodorsal and anterior hysteronotal shields without lacunae, or minute lacunae present on anterior hysteronotal shield . . . . . 9.
9. Incisions in anterior margin of lobar shield narrow slit-like (Fig. 23A) . . . . . *N. myioborus* Mironov **sp. n.**
- Incisions in anterior margin of lobar shield triangular . . . . . 10.
10. Primary spermaduct monotonously enlarging toward the head of spermatheca. . . . . *N. bilobatus* Atyeo, 1966
- Primary spermaduct with ampuliform enlargement at head of spermatheca approximately equal in length to secondary spermaducts . . . . . 11.
11. Epigynum extending to level of setae *g*, several large circular lacunae arranged in two longitudinal rows present in posterior part of anterior hysteronotal shield . . . . . *N. guaratubensis* Hernandes, 2014
- Epigynum not extending to level of setae *g*, large circular lacunae on anterior hysteronotal shield absent (Fig. 32A, B) . . . . . *N. ketourus* Mironov **sp. n.**

Nycteridocaulus leptopogoni Mironov sp. n.

(Figs. 16–18)

Type material. Male holotype (ZISP 6356), 10 male and 10 female paratypes from *Leptopogon superciliaris* Tschudi, 1944 (Tyrannidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamaca Mts., 09°46′N, 83°47′W, 31 July 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 8 male and 8 female paratypes (ZISP 6357–6372)—ZISP; 1 male and 1 female paratype—UMMZ (BMOC-15-1028-001), 1 male and 1 female paratype—IMUCR.

Description. MALE (holotype, range for 10 paratypes in parentheses). Idiosoma, length × width, 310 (305–340) × 140 (140–165), length of hysterosoma 210 (210–220). Prodorsal shield: anterolateral extensions with rounded tips, lateral margins entire, posterior margin slightly concave, 95 (95–105) in length and 105 (105–120) in width, surface with numerous circular lacunae up to 10 in diameter (Fig. 16A). Setae *ve* rudimentary. Scapular setae *se* separated by 65 (65–75). Setae *c2* and *cp* on humeral shield. Setae *c3* lanceolate, 18 (18–19) × 5 (5–6). Distance between prodorsal and hysteronotal shields 20 (15–20). Hysteronotal shield: 200 (195–220) in length and 115 (110–125) in width; anterior margin slightly concave, surface with numerous circular lacunae as on prodorsal shield. Opisthosoma slightly attenuate posteriorly. Opisthosomal lobes short, roughly rectangular, posterior margin almost straight; terminal lamellae short rectangular, 5 (5–6) in length and 16 (16–19) in width. Terminal cleft small, narrowly triangular, with anterior end extending to level of setae *h2*, 17 (15–17) in length, 9 (8–10) in width at posterior end. Supranal concavity present, narrowed posteriorly. Setae *h2* situated on small semiovate lateral extensions of opisthosomal lobes; setae *h3* situated in posterolateral angle of opisthosomal lobes; setae *ps1* in posteromedial angles of lobes, slightly posterior to level of setae *h3*; setae *h1* situated slightly anterior to setae *ps2*. Distance between dorsal setae: *c2:d2* 75 (72–80), *d2:e2* 80 (80–85), *e2:h3* 40 (40–43), *h2:h2* 58 (55–64), *h3:h3* 44 (42–50), *ps2:ps2* 70 (70–75), *h1:h2* 32 (32–38), *d1:d2* 15 (15–20), *e1:e2* 28 (28–35), *ps1:h3* 3 (3–4).

Epimerites I free, close to each other, posterior tips slightly divergent; epimerites I, II with narrow surface fields; epimerites IVa absent (Fig. 16B). Rudimentary sclerite rEpIIa present. Trochanters III flanked by sclerotized band connecting bases of epimerites III and IIIa. Epimerites IIIa wide, with sclerotized plates around their inner tips almost touching at midline. Trochanters IV flanked by sclerotized bands stretching from bases of epimerites IV. Genital apparatus situated posterior to level of trochanters IV. Genital arch shaped as recurved bow, 13 (13–15) in length and 42 (42–45) in width. Aedeagus stylet-like, 20 (20–22) in length, reaching level of setae *g* (Fig. 18A, B). Genital papillae on small oval plates at level of genital arch apex. Distance from genital arch apex to bases of setae *h3* 100 (100–105). Pregenital apodemes absent. Setae *4a* on soft tegument, setae *4b* on sclerotized areas of epimerites IIIa. Adanal suckers 16 (16–17) in diameter, corolla with 9 denticles. Adanal shields represented by a pair of roughly L-shaped sclerites situated anterior to anal suckers. Setae *ps3* situated on transverse branches of adanal shields. Opisthoventral shields shaped as small roughly triangular extensions at level of anal opening. Distance between ventral setae: *3a:4b* 15 (13–15), *4b:4a* 25 (25–28), *4a:g* 42 (42–45), *g:g* 18 (18–20), *g:ps3* 23 (23–25), *ps3:ps3* 23 (23–25), *ps3:h3* 53 (52–60).

Femora I, II with ventral crest. Solenidion *σ1* of genu I equal in length to this segment and situated at its midlevel. Solenidion *σ* of genu III situated in proximal half of this segment (Fig. 18C–E). Legs III, IV subequal in size, legs IV with ambulacral discs extending to level of lobar apices. Tarsus IV 20 (20–25) in length, with apicoventral claw-like process bearing seta *w*; modified setae *d* and *e* button-like, situated in distal half of this segment (Fig. 18F). Setae *d* and *f* of tarsi II, III subequal in length. Length of solenidia: *σ1*I 23 (23–28), *σ*III 10 (10–13), *φ*IV 30 (30–33).

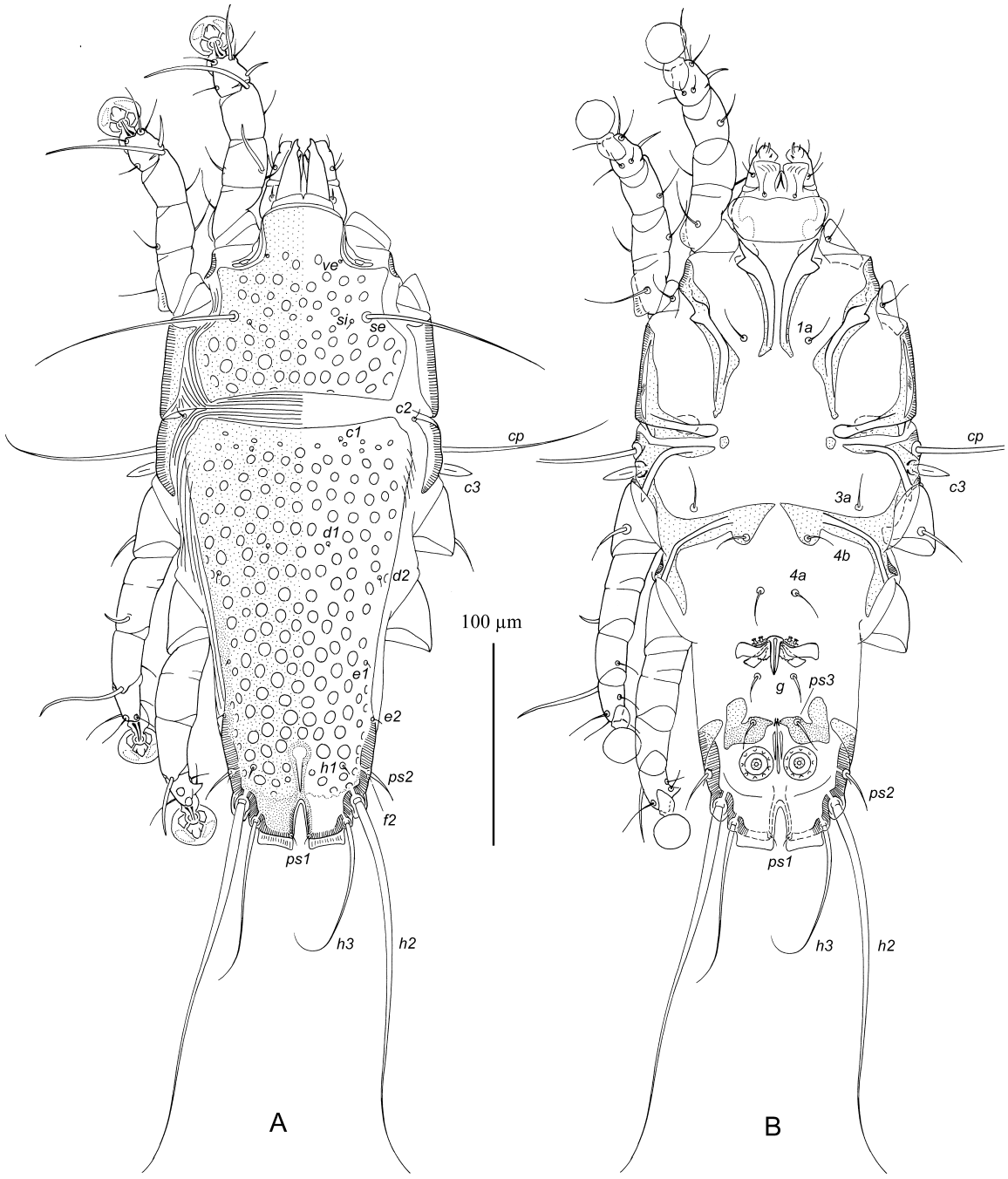

FIGURE 16. *Nycteridocaulus leptopogoni* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

FEMALE (range for 10 paratypes). Idiosoma, length × width, 430–450 × 170–180, length of hysterosoma 310–320. Prodorsal shield: form and ornamentation as in male, 110–115 in length and 130–135 in width. Setae *se* separated by 80–85. Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 18–20 × 5–6. Distance between prodorsal and hysteronotal shields 15–20. Anterior hysteronotal shield: 220–230 in length and 130–140 in width, anterior margin straight, posterior margin with short and widely rounded median extension, entire surface with

numerous circular lacunae; in posterior part these lacunae noticeably larger, up to 10 in diameter (Fig. 17A). Lobar region: 95–105 in length and 108–110 in width, lateral margins convex, without noticeable extensions bearing setae *h2*; lobar shield entire, its anterior margin with a pair of narrow triangular incisions and small semirounded extension between them. Terminal cleft narrow, almost parallel-sided, 65–73 in length, 12–15 in width at midlevel. Supranal concavity absent. Setae *h2* lanceolate in basal part and with filiform apex, 80–90 in length, 7–8 in width; setae *h3* 68–75 in length, approximately half the length of terminal appendages. Setae *h1* inserted on striated tegument between the anterior hysteronotal and lobar shields. Setae *h1* and *f2* in trapezoidal arrangement. Setae *ps1* on inner margins of opisthosomal lobes, close to level of setae *h3*. Distance between dorsal setae: *c2:d2* 90–95, *d2:e2* 120–125, *e2:h2* 50–55, *h2:h3* 38–45, *h1:h2* 40–45, *d1:d2* 30–35, *e1:e2* 60–65, *h1:h1* 28–30, *h2:h2* 85–88, *h2:ps1* 23–30.

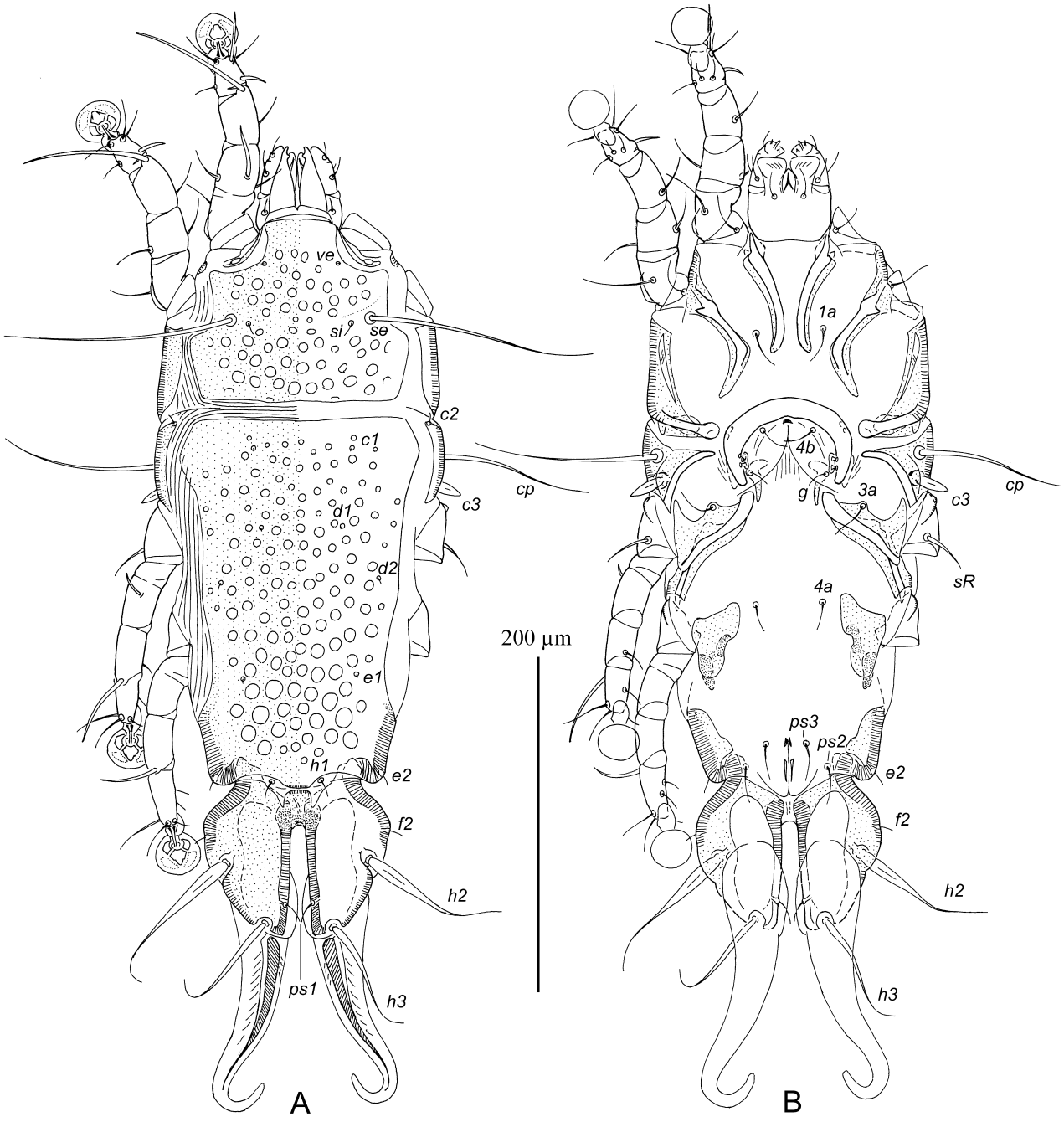

FIGURE 17. *Nycteridocaulus leptopogoni* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

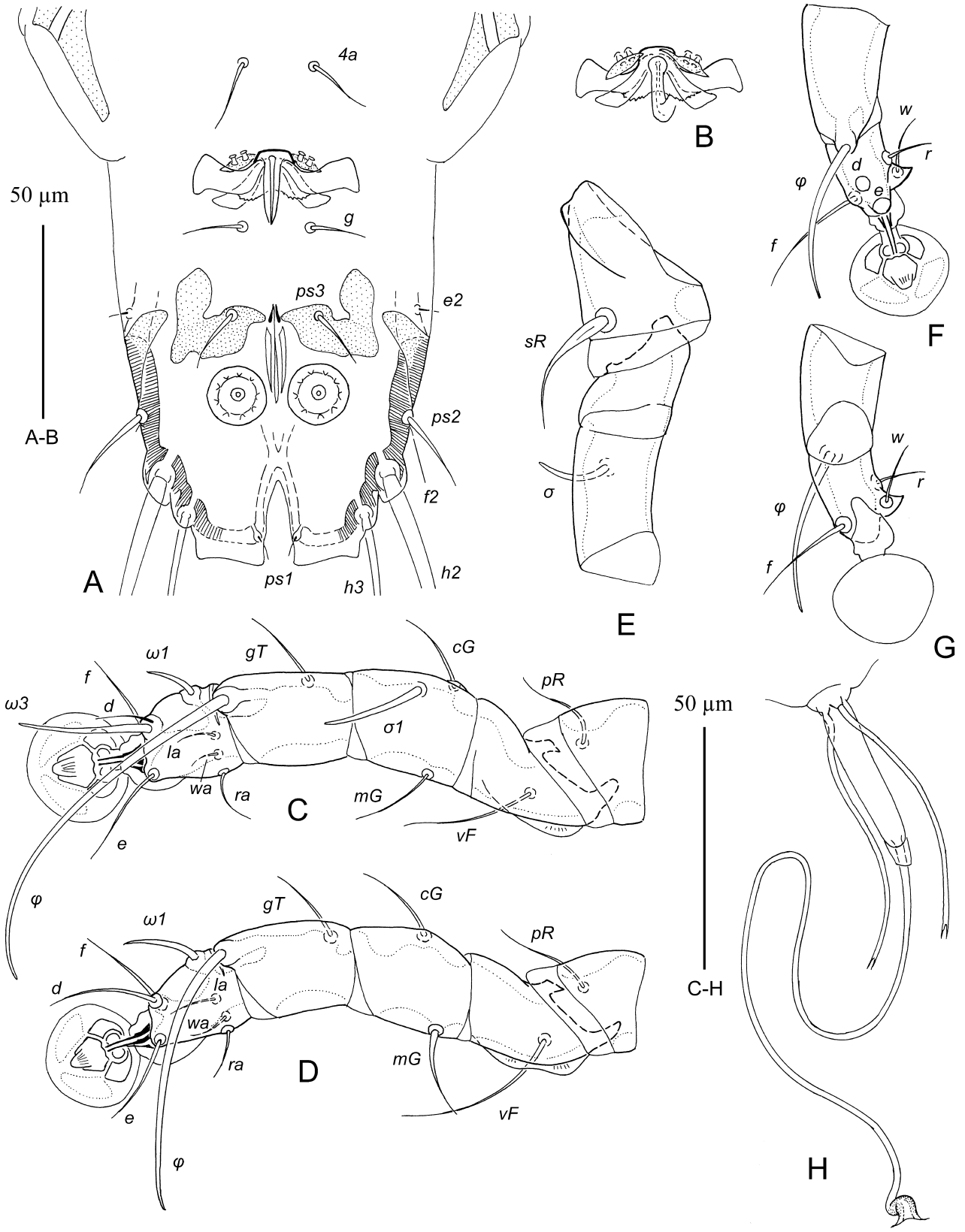

FIGURE 18. *Nycteridocaulus leptopogoni* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B—genital apparatus of male, dorsal view, C, D—legs I and II of male, dorsal view, E—trochanter, femur and genu III of male, ventral view, F—tibia and tarsus IV of male, dorsal view, G—tibia and tarsus IV of male, ventral view, H—spermatheca and spermaducts.

Epimerites I as in male; epimerites I–II with narrow sclerotized fields. Epimerites IVa large, roughly triangular, with long posterior extension (Fig. 17B). Epigynum horseshoe-shaped, thick, with rounded tips extending beyond level of setae *g*, 55–60 in length, 75–80 in width. Genital papillae of each side on small ovate sclerotized plate. Setae *ps2* at midlevel of anal opening. Translobar apodemes not fused to each other anterior to terminal cleft. Copulatory opening ventral, situated near to anterior end of terminal cleft. Head of spermatheca short; proximal part of primary spermaduct with strong enlargement 30–35 long, with short collar around base of narrowed part; secondary spermaducts 50–55 long (Fig. 18H). Distance between pseudanal setae, *ps2:ps2* 48–50, *ps3:ps3* 24–25, *ps2:ps3* 13–14.

Legs I, II as male. Solenidion *σ* of genu III in proximal half of this segment. Legs IV with distal margin of ambulacral disc extending to level of setae *h2*. Solenidion *φ* of tibia IV slightly shorter than corresponding tarsus. Seta *d* of tarsus II longer than corresponding seta *f*, setae *d* of tarsi III, IV shorter than corresponding setae *f*. Length of solenidia: *σ1*I 28–33, *σ*III 15–20, *φ*III 45–50, *φ*IV 35–40.

Differential diagnosis. The new species, *Nycteridocaulus leptopogoni* Mironov sp. n., is most similar to *N. tyranni* Atyeo, 1966 from *Contopus pertinax* Cabanis and Heine (Tyrannidae) from Mexico in having numerous large circular lacunae on the dorsal shields in both sexes, and short terminal lamellae of rectangular form and thick L-shaped adanal shields in males. *Nycteridocaulus leptopogoni* differs from the latter species as follows: in males, the pregenital apodemes are absent, setae *ps3* are situated on the adanal shields and the terminal cleft extends to the level of setae *h2*; in females, the terminal cleft is narrow and nearly 5 times longer than wide, and setae *h2* are distinctly shorter than terminal appendages. In males of *N. tyrrani*, the pregenital apodemes are represented by small sclerites of irregular form situated anterior to setae *4a*, setae *ps3* are situated off the adanal shields, and the terminal cleft barely extends to the level of setae *h3*; in females, the terminal cleft is 1.5–2 times longer than wide at midlength, and macrosetae *h2* are nearly 2 times longer than the terminal appendages.

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

Nycteridocaulus myiobius Mironov sp. n.

(Figs. 19–21)

Type material. Male holotype (ZISP 6 148), 8 male and 12 female paratypes from *Myiobius sulphureipygius* (Sclater, PL, 1857) (Tyrannidae), **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10°46'N, 85°18'W, 24 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 6 male and 8 female paratypes (ZISP 6149–6165)—ZISP; 1 male and 1 female paratype—UMMZ (BMOC-15-1028-015), 1 male and 1 female paratype—IMUCR.

Description. MALE (holotype, range for 8 paratypes in parentheses). Idiosoma, length × width, 295 (290–310) × 140 (140–150), length of hysterosoma 195 (190–200). Prodorsal shield: anterolateral extensions with rounded tips, lateral margins entire, posterior margin straight, 100 (95–105) in length and 100 (100–110) in width, entire surface with numerous circular lacunae up to 10 in diameter (Fig. 19A). Setae *ve* rudimentary. Scapular setae *se* separated by 65 (65–75). Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 18 (17–19) × 4 (4–5). Distance between prodorsal and hysteronotal shields 10 (10–15). Hysteronotal shield: 190 (190–200) in length and 110 (105–115) in width; anterior margin slightly concave, surface with numerous circular lacunae as on prodorsal shield. Opisthosoma slightly attenuate posteriorly. Opisthosomal lobes short, roughly rectangular, posterior margin almost straight; terminal lamellae short rectangular, 11 (10–11) in length and 15 (15–18) in width. Terminal cleft small triangular, with anterior end extending to level of setae *h2*, 15 (15–17) in length, 11 (10–13) in width at level of setae *ps1*. Supranal concavity present, narrowed posteriorly. Setae *h2* situated on truncate lateral extensions of opisthosomal lobes; setae *h3* situated in posterolateral angles of lobes; setae *ps1* in posteromedial angles of lobes, slightly anterior to level of setae *h3*; setae *h1* situated slightly anterior to setae *ps2*. Distance between dorsal setae: *c2:d2* 72 (70–75), *d2:e2* 65 (65–70), *e2:h3* 50 (50–60), *h2:h2* 65 (65–70), *h3:h3* 48 (48–55), *ps2:ps2* 72 (72–78), *h1:h3* 37 (30–38), *d1:d2* 22 (18–22), *e1:e2* 28 (23–28).

Epimerites I free, close to each other, posterior tips divergent; epimerites I, II with narrow surface fields; epimerites IVa absent (Fig. 19B). Rudimentary sclerite rEpIIa present. Trochanters III flanked by sclerotized bands going from bases of epimerites IIIa. Epimerites IIIa wide, with sclerotized areas around their inner tips with acute

anterior extensions almost touching at midline and with short posterior extensions. Trochanters IV flanked by sclerotized bands stretching from bases of epimerites IV. Genital apparatus situated slightly posterior to level of trochanters IV. Genital arch shaped as recurved bow, 10 (9–11) in length and 38 (38–42) in width. Aedeagus stylet-like, 18 (15–18) in length, reaching level of setae *g* (Fig. 21A). Genital papillae of each side on small oval plates at level of genital arch apex. Distance from genital arch apex to bases of setae *h3* 88 (85–92). Pregenital apodemes absent. Setae *4a* on soft tegument, setae *4b* on sclerotized areas of epimerites IIIa. Adanal suckers 15 (15–16) in diameter, corolla with 9 denticles. Adanal shields represented by a pair of roughly L-shaped sclerites situated anterior to anal suckers. Setae *ps3* situated on transverse branches of adanal shields. Opisthoventral shields shaped as small roughly triangular extensions at level of anal opening. Distance between ventral setae: *3a:4b* 10 (10–13), *4b:4a* 30 (30–33), *4a:g* 33 (32–35), *g:g* 11 (11–12), *g:ps3* 25 (25–28), *ps3:ps3* 25 (25–28), *ps3:h3* 48 (45–50).

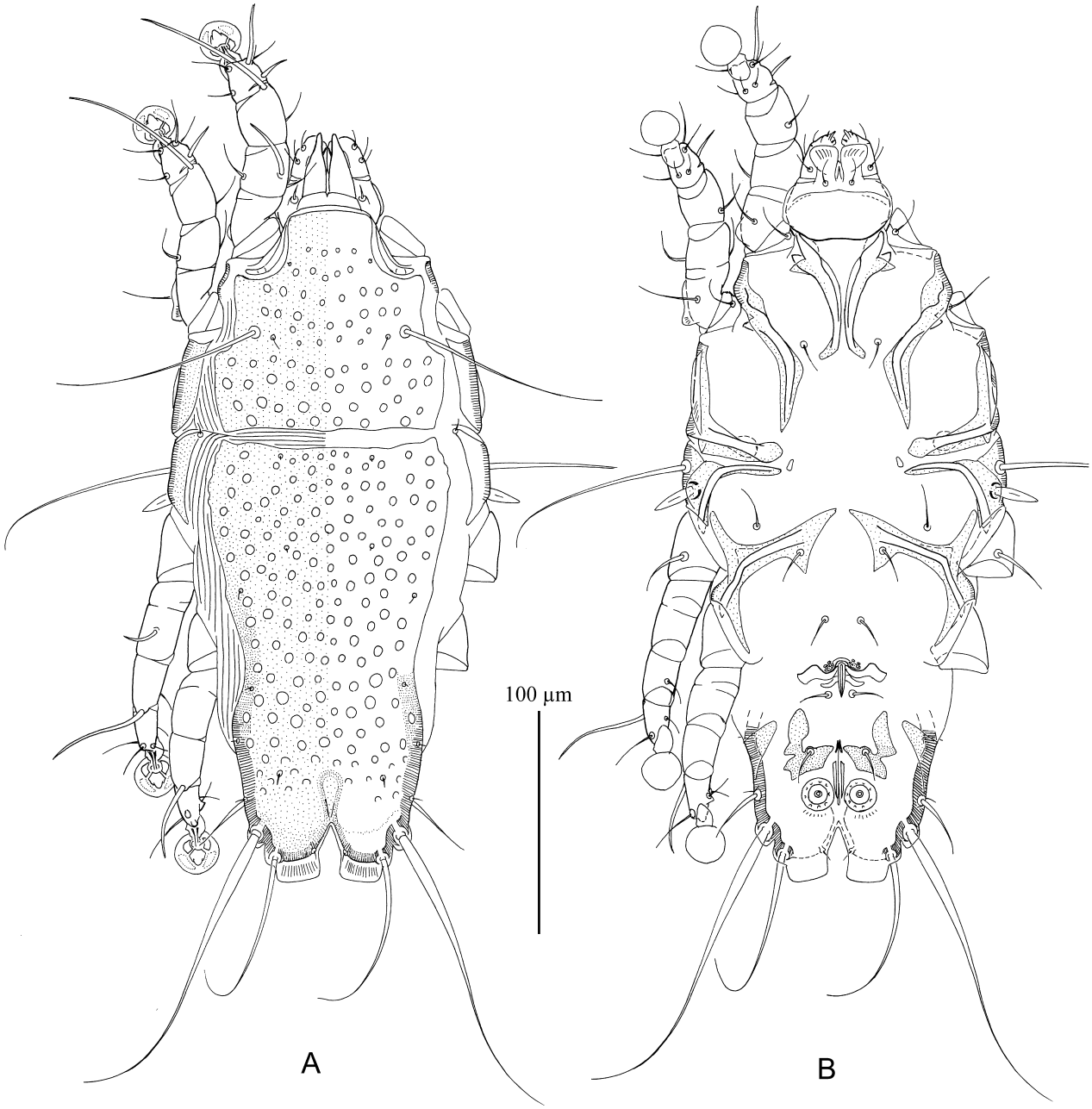

FIGURE 19. *Nycteridocaulus myiobius* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Femora I, II with ventral crest. Solenidion *σ1* of genu I slightly longer than this segment and situated at its midlevel (Fig. 21B, C). Solenidion *σ* of genu III situated at midlevel of this segment. Legs III, IV subequal in size, legs IV with ambulacral discs extending to level of setae *h3*. Tarsus IV 20 (20–24) in length, with apicoventral

spine-like process bearing seta *w*; modified setae *d* and *e* button-like, both situated in distal half of this segment (Fig. 21D). Seta *d* of tarsus II longer than corresponding seta *f*; setae *d* of tarsus III shorter than corresponding seta *f*. Length of solenidia: $\sigma 1$I 28 (25–28), σIII 15 (12–15), φIV 30 (30–35).

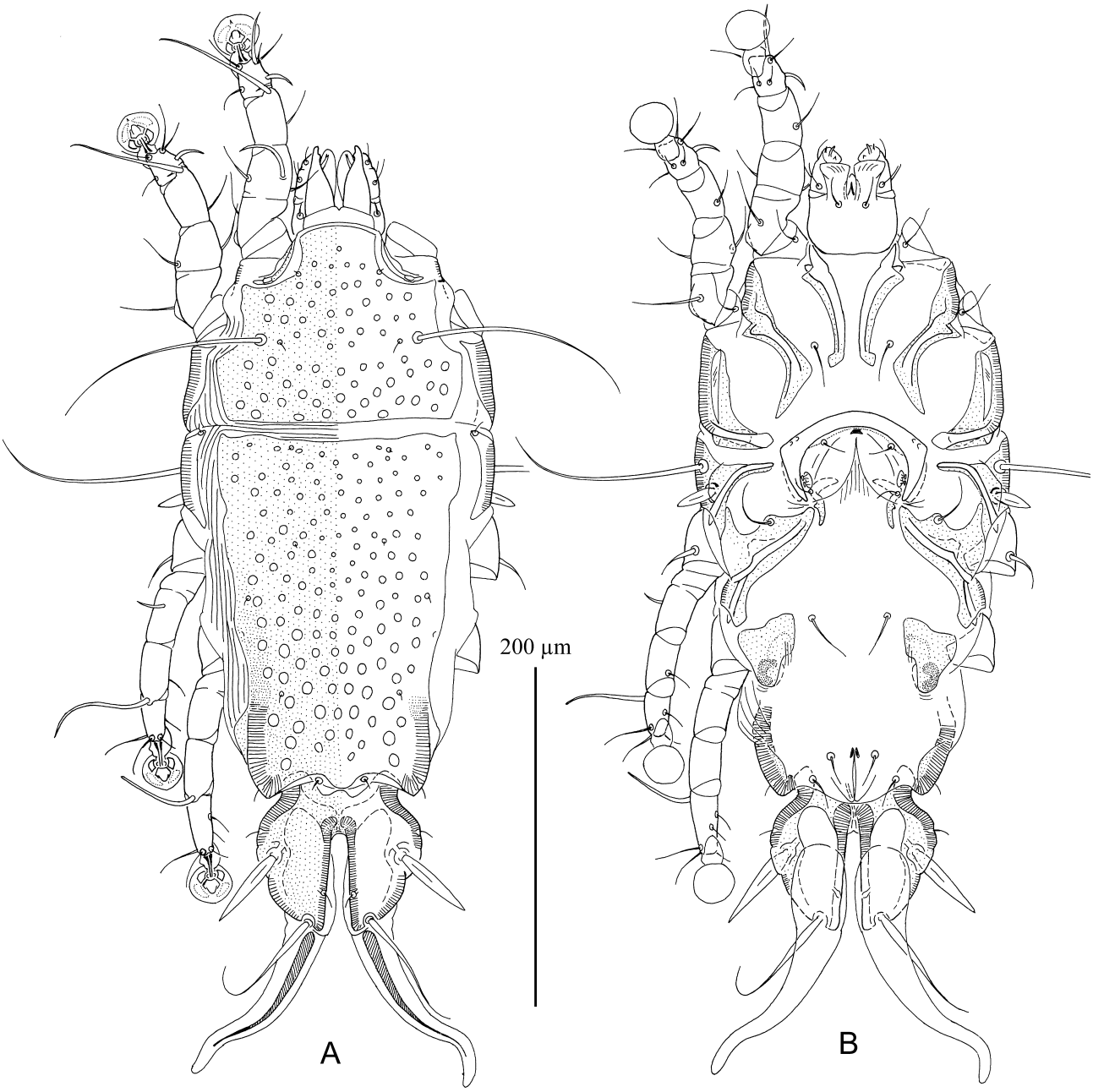

FIGURE 20. *Nycteridocaulus myiobius* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

FEMALE (range for 10 paratypes). Idiosoma, length × width, 390–420 × 165–185, length of hysterosoma 280–300. Prodorsal shield: form and ornamentation as in male, 105–120 in length and 130–140 in width. Setae *se* separated by 86–92. Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 20–22 × 4–5. Distance between prodorsal and hysteronotal shields 8–10. Anterior hysteronotal shield: 195–205 in length and 125–145 in width, anterior margin almost straight, posterior margin with small rounded median extension and a pair of shallow concavities, entire surface with numerous circular lacunae; in posterior part these lacunae noticeably larger, up to 10 in diameter (Fig. 20A). Lobar region: 90–95 in length and 90–98 in width, lateral margins strongly convex, without noticeable extensions bearing setae *h2*; lobar shield entire, its anterior margin concave, with small median extension. Terminal cleft narrow, almost parallel-sided, 55–64 in length, 12–17 in width at midlevel. Supranal concavity absent. Setae *h2* lanceolate without filiform apex, 50–55 in length, 7–8 in width; setae *h3* 70–75 in

length, approximately half the length of terminal appendages. Setae *h1* inserted on striated tegument between anterior hysteronotal and lobar shields. Setae *h1* and *f2* in trapezoidal arrangement. Setae *ps1* on inner margins of opisthosomal lobes, close to level of setae *h3*. Distance between dorsal setae: *c2:d2* 86–95, *d2:e2* 105–115, *e2:h2* 37–40, *h2:h3* 35–38, *h1:h2* 37–45, *d1:d2* 25–34, *e1:e2* 52–55, *h1:h1* 22–25, *h2:h2* 72–78, *h2:ps1* 25–30. \

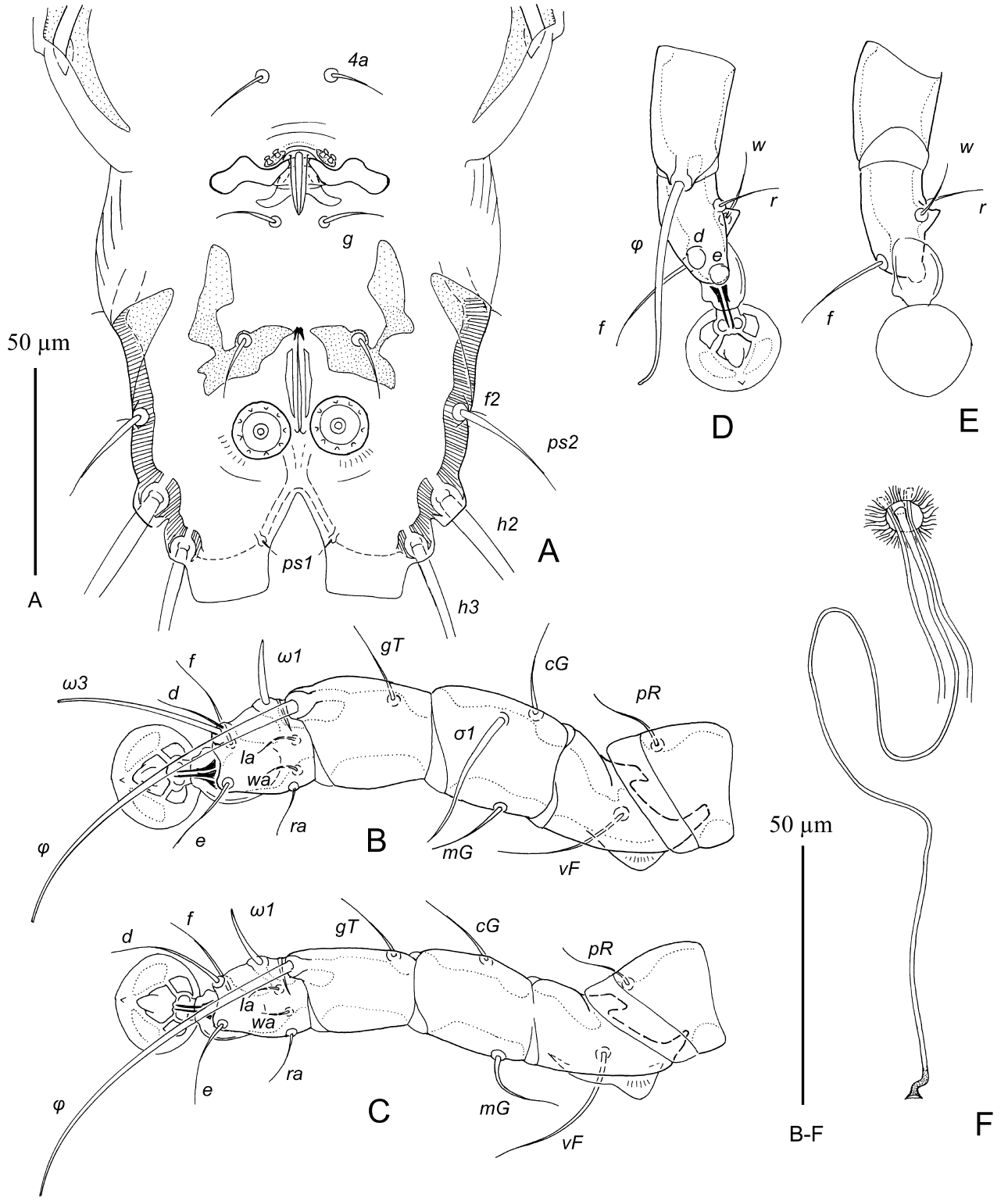

FIGURE 21. *Nycteridocaulus myiobius* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B, C—legs I and II of male, dorsal view, D—tibia and tarsus IV of male, dorsal view, E—tibia and tarsus IV of male, ventral view, F—spermatheca and spermaducts.

Epimerites I as in male; epimerites I, II with narrow surface fields. Epimerites IVa large, roughly triangular, with heavily sclerotized posterior extension (Fig. 20B). Epigynum horseshoe-shaped, thick, lateral margins with blunt-angular extensions, tips acute extending beyond level of setae *g*, 47–55 in length, 75–85 in width. Genital papillae of each side on small ovate sclerotized plate. Setae *ps2* situated at midlevel of anal opening. Translobar apodemes not fused to each other anterior to terminal cleft. Copulatory opening ventral, situated near anterior end of terminal cleft. Head of spermatheca short; primary spermaduct without enlargement; secondary spermaducts 35–38 long (Fig. 21F). Distance between pseudanal setae, *ps2:ps2* 47–50, *ps3:ps3* 21–25, *ps2:ps3* 13–15.

Legs I, II as male. Legs IV with distal margin of ambulacral disc extending to level of setae *h2*. Solenidion *σ1* of genu I slightly longer than this segment and situated at its midlevel. Solenidion *σ* of genu III in proximal half of this segment. Solenidion *φ* of tibia IV equal to corresponding tarsus. Seta *d* of tarsus II longer than corresponding seta *f*, setae *d* of tarsi III, IV slightly shorter than corresponding setae *f*. Length of solenidia: *σ1*I 30–35, *σ*III 15–18, *φ*III 52–55, *φ*IV 37–40.

Differential diagnosis. The new species *Nycteridocaulus myiobius* sp. n. is close to *N. guaratubensis* Hernandes, 2014 from *Phylloscartes kronei* Willis and Oniki (Tyrannidae) in having short opisthosomal lobes with nearly rectangular terminal lamellae in males, and the lobar shield with a small median extension on the anterior margin in females. *Nycteridocaulus myiobius* differs from *N. guaratubensis* by the following features: in both sexes, the prodorsal and anterior hysteronotal shields are covered with numerous circular lacunae; in males, the antero-lateral and postero-mesal parts of the adanal shields are connected by a very thin commissure; in females, the hysteronotal shield is wider (120–130 μm) and setae *h3* are 75–85 μm long, about 2/3 the length of the terminal appendages. In both sexes of *N. guaratubensis*, the prodorsal shield lacks ornamentation, the anterior hysteronotal shields bears minute and sparsely distributed circular lacunae; in males, the adanal shields are thick L-shaped; in females, the hysteronotal shield is 100–108 μm wide and setae *h3* are 66–72 μm long, about ½ the length of terminal appendages.

Etymology. The specific epithet is taken from the generic name of the type host and is a noun in apposition.

Nycteridocaulus myioborus Mironov sp. n.

(Figs. 22–24)

Type material. Male holotype (ZISP 6616), 4 male and 5 female paratypes from *Myioborus miniatus* (Swainson, 1827) (Parulidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamanca Mts., 09º46'N, 83º47'W, 11 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 2 male and 3 female paratypes (ZISP 6616–6621)—ZISP; 1 male, 1 female paratype—UMMZ (BMOC-15-1028-010), 1 male, 1 female paratype—IMUCR.

Description. MALE (holotype, range for 4 paratypes in parentheses). Idiosoma, length × width, 285 (280–300) × 160 (160–180), length of hysterosoma 180 (175–195). Prodorsal shield: anterolateral extensions acute, lateral margins entire, posterior margin almost straight, 92 (90–95) in length and 110 (105–120) in width, surface without ornamentation (Fig. 22A). Setae *ve* rudimentary. Scapular setae *se* separated by 70 (70–75). Setae *c2* and *cp* on humeral shield. Setae *c3* lanceolate, 16 (16–20) × 4 (4–5). Distance between prodorsal and hysteronotal shields 22 (18–25). Hysteronotal shield: 175 (170–180) in length and 105 (100–110) in width; anterior margin slightly concave, surface with minute sparsely distributed lacunae. Opisthosoma slightly attenuate posteriorly. Opisthosomal lobes short, roughly rectangular, posterior margin oblique; terminal lamellae short rectangular, 8 (7–8) in length and 15 (15–18) in width. Terminal cleft small triangular, with anterior end extending to level of setae *h2*, 12 (8–12) in length, 14 (12–16) in width at level of setae *ps1*. Supranal concavity present, narrowed posteriorly. Setae *h2* situated on truncate lateral extensions of opisthosomal lobes; setae *h3* situated in posterolateral angles of opisthosomal lobes; setae *ps1* in posteromedial angles of lobes, slightly anterior to level of setae *h3*; setae *h1* situated slightly anterior to setae *ps2*. Distance between dorsal setae: *c2:d2* 65 (60–68), *d2:e2* 70 (70–78), *e2:h3* 40 (37–42), *h2:h2* 68 (68–74), *h3:h3* 50 (50–55), *ps2:ps2* 75 (75–80), *h1:h3* 30 (27–30), *d1:d2* 15 (15–18), *e1:e2* 28 (28–30).

Epimerites I free, well separated from each other, posterior tips slightly divergent; epimerites I, II with narrow sclerotized fields; epimerites IVa absent (Fig. 22B). Rudimentary sclerite rEpIIa absent. Trochanters III flanked by sclerotized band connecting bases of epimerites III and IIIa. Epimerites IIIa narrow, with acute inner tips.

Trochanters IV flanked by sclerotized bands going from bases of epimerites III. Genital apparatus situated at level of trochanters IV. Genital arch shaped as recurved bow, 13 (13–15) in length and 42 (42–45) in width. Aedeagus stylet-like, 20 (20–22) in length, reaching level of setae *g* (Fig. 24A). Genital papillae of each side on small oval plates at level of genital arch apex. Distance from genital arch apex to bases of setae *h3* 88 (88–93). Pregenital apodemes absent. Setae *4a* and *4b* on soft tegument. Anal suckers 15 (13–16) in diameter, corolla with 7–8 denticles. Adanal shields represented by two pairs of sclerites: anterolateral sclerites circular, poorly sclerotized; posteromedial sclerites roughly triangular (in some specimens, sclerites of each side weakly connected). Setae *ps3* situated on posteromedial sclerites of adanal shields. Opisthoventral shields shaped as roughly triangular extensions at level of anal opening. Distance between ventral setae: *3a:4b* 13 (13–15), *4b:4a* 25 (25–28), *4a:g* 33 (32–35), *g:g* 15 (13–15), *g:ps3* 23 (22–25), *ps3:ps3* 18 (15–18), *ps3:h3* 45 (42–50).

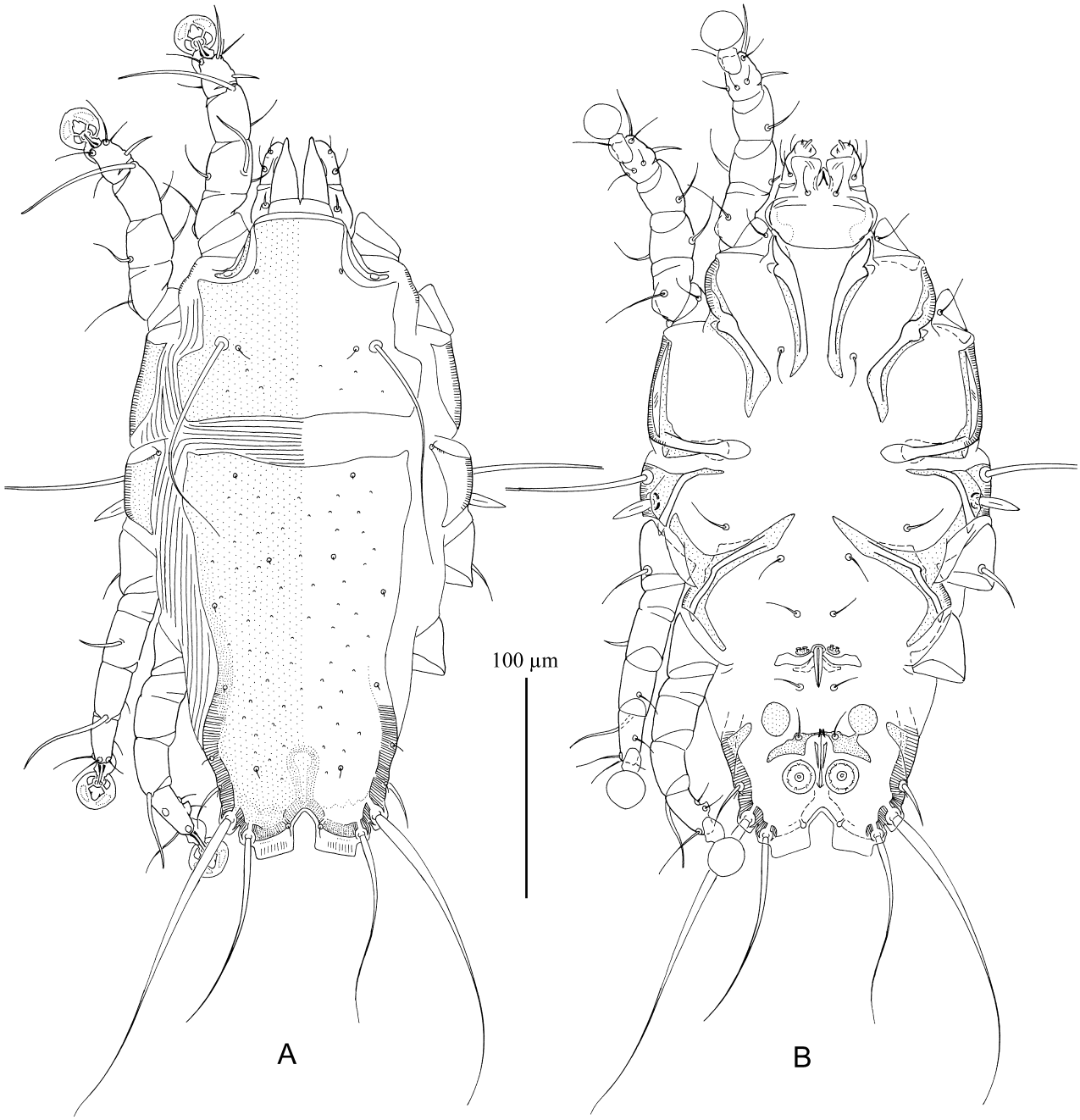

FIGURE 22. *Nycteridocaulus myioborus* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Femora I, II with narrow ventral crest. Solenidion *σ1*I slightly longer than genu I and situated at midlevel of this segment (Fig. 24B, C). Solenidion *σ* of genu III situated at midlevel of this segment. Legs III, IV subequal in

size, legs IV with ambulacral discs slightly extending beyond level of lobar apices. Tarsus IV 25 (22–25) in length, with apicoventral spine-like process bearing seta *w*; modified setae *d* and *e* button-like, seta *d* situated closer to base than to apex of tarsus (Fig. 24D). Setae *d* and *f* of tarsi II, III subequal in length. Length of solenidia: *σ1*I 33 (30–35), *σ*III 20 (18–20), *φ*IV 25 (23–25).

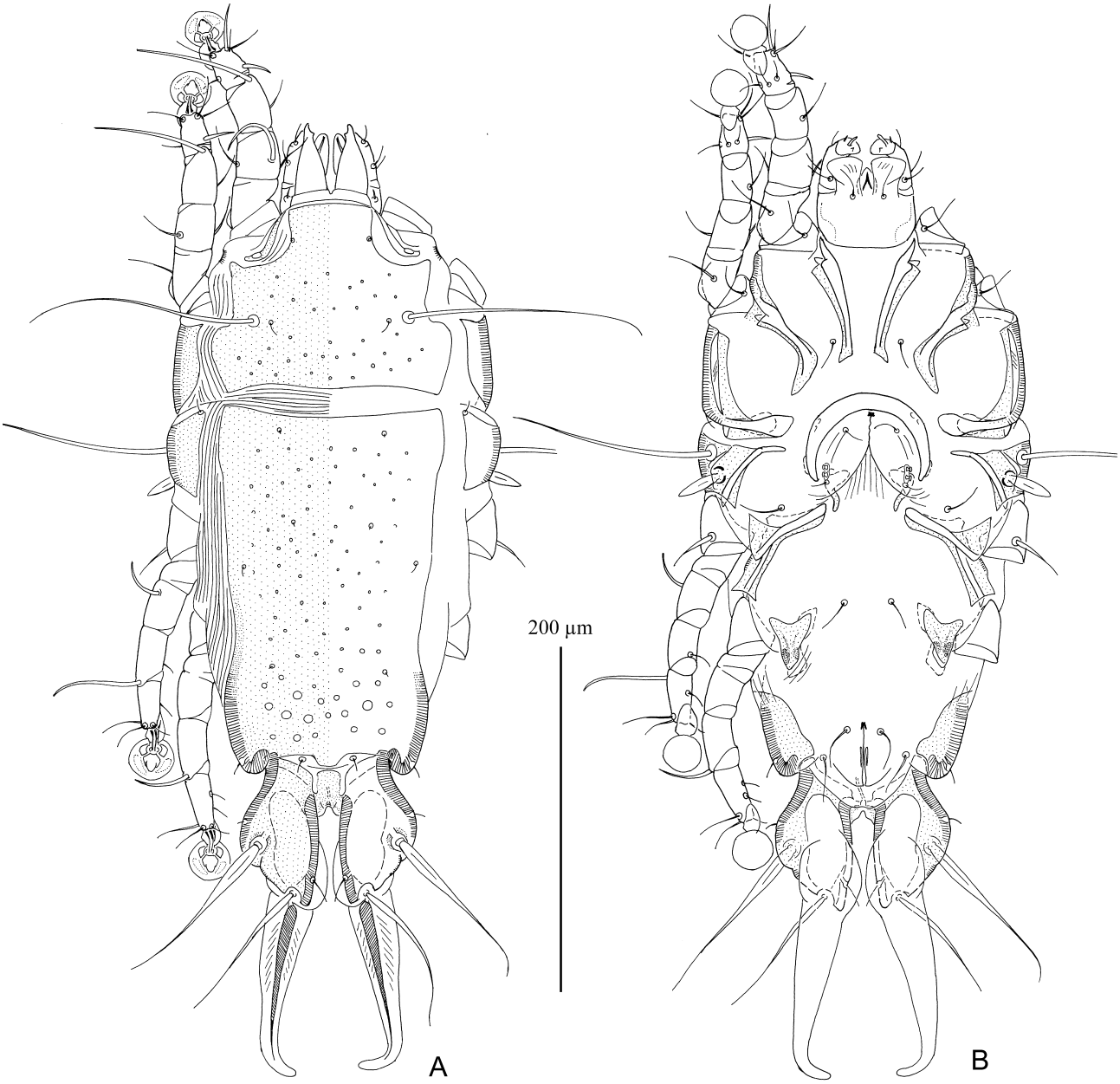

FIGURE 23. *Nycteridocaulus myioborus* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

FEMALE (range for 5 paratypes). Idiosoma, length × width, 400–415 × 185–195, length of hysterosoma 280–285. Prodorsal shield: shaped as in male, 105–110 in length and 135–140 in width, surface with minute circular lacunae. Setae *se* separated by 85–90. Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 20–22 × 5–6 in width. Distance between prodorsal and hysteronotal shields 25–30. Anterior hysteronotal shield: 195–200 in length and 120–130 in width, anterior margin slightly concave, posterior margin with small semi-rounded median extension, entire surface with numerous small circular lacunae, these lacunae noticeably larger near posterior end of this shield (Fig. 23A). Lobar region: 80–85 in length and 95–100 in width, lateral margins strongly convex; lobar shield entire, anterior margin with pair of deep narrow incisions and small truncate extension between them. Terminal cleft narrow, lateral margins slightly convex, 55–60 in length, 10–12 in width in anterior part. Supranal concavity absent. Setae *h2* lanceolate in basal part and with long filiform apex, 95–115 in length, 7–8 in width;

setae *h3* 75–85 in length, about 2/3 of terminal appendages. Setae *h1* inserted on striated tegument between the anterior hysteronotal and lobar shields. Setae *h1* and *f2* in trapezoidal arrangement. Setae *ps1* on inner margins of opisthosomal lobes, close to level of setae *h3*. Distance between dorsal setae: *c2:d2* 85–90, *d2:e2* 105–110, *e2:h2* 45–50, *h2:h3* 26–30, *h1:h2* 42–48, *d1:d2* 25–28, *e1:e2* 46–50, *h1:h1* 22–25, *h2:h2* 75–80, *h2:ps1* 20–22.

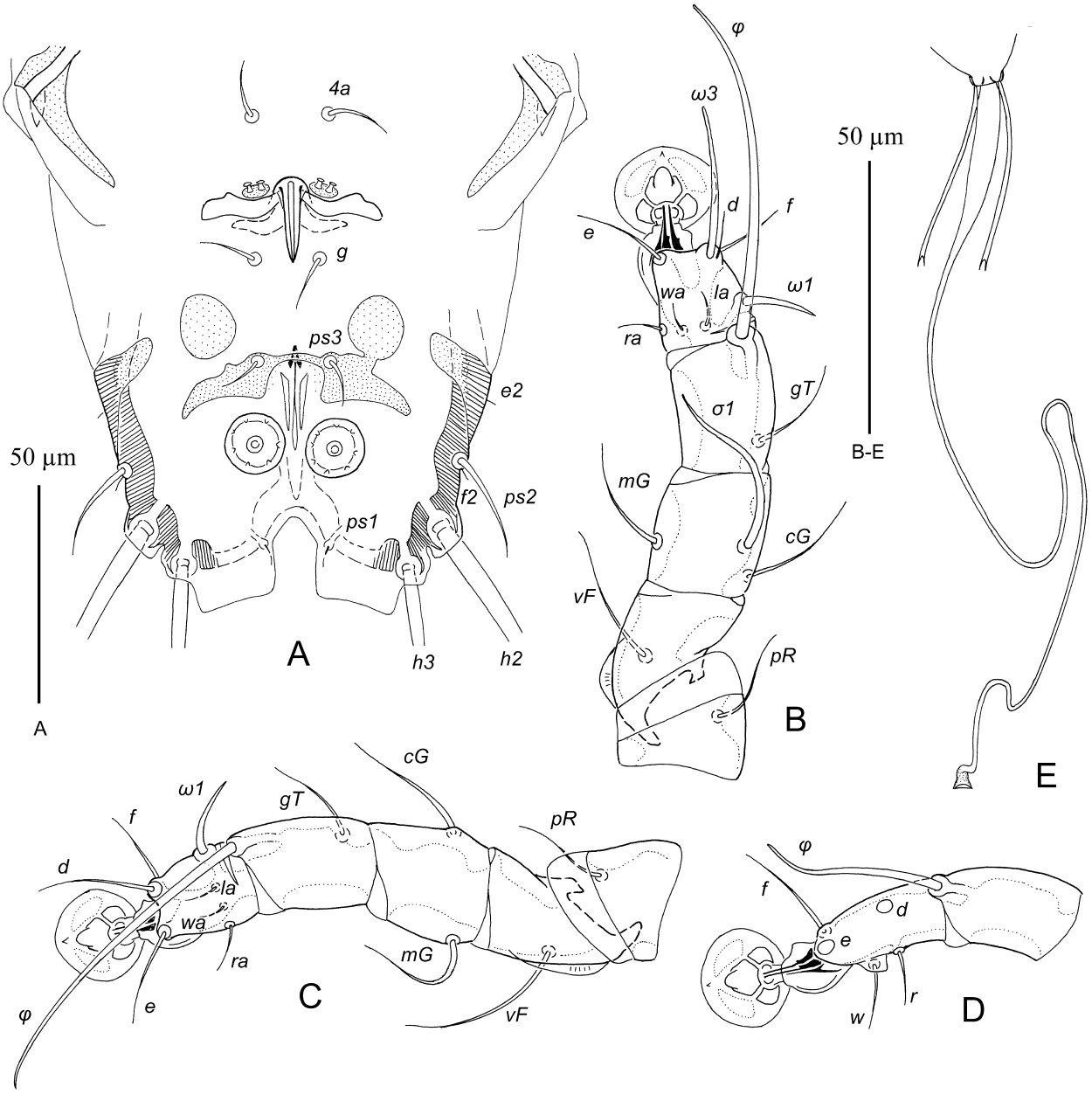

FIGURE 24. *Nycteridocaulus myioborus* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B, C—legs I and II of male, dorsal view, D—tibia and tarsus IV of male, dorsal view, E—spermatheca and spermaducts.

Epimerites I, II as in male, with narrow sclerotized fields. Epimerites IVa large, roughly triangular with concave anterior margin (Fig. 23B). Epigynum horseshoe-shaped, thick, with acute tips extending to level of setae *g*, 45–50 in length, 66–78 in width. Genital papillae of each side and corresponding seta *g* on small longitudinal plate. Setae *ps2* at midlevel of anal opening. Translobar apodemes not fused to each other anterior to terminal cleft. Copulatory opening ventral, situated near to anterior end of terminal cleft. Head of spermatheca short; proximal part of primary spermaduct with ampuliform enlargement about 30 long; secondary spermaducts 30–35 long (Fig. 24E). Distance between pseudanal setae, *ps2:ps2* 45–48, *ps3:ps3* 18–22, *ps2:ps3* 14–16.

Legs I, II as in male. Legs IV with distal margin of ambulacral disc extending to level of setae *h2*. Solenidion *σ1* of genu I slightly longer than this segment and situated slightly closer to its base. Solenidion *σ* of genu III in

proximal half of this segment. Solenidion *φ* of tibia IV slightly shorter than corresponding tarsus. Seta *d* of tarsus II longer than corresponding seta *f*, setae *d* and *f* of tarsi III, IV subequal in length. Length of solenidia: *σ1*I 32–38, *σ*III 37–30, *φ*III 50–54, *φ*IV 32–34.

Differential diagnosis. The new species, *Nycteridocaulus myioborus* sp. n., is very similar to *N. guaratubensis* Hernandes, 2014 in having short opisthosomal lobes with nearly rectangular terminal lamellae in males. The new species differs from the latter species by the features as follows: in males of *N. myioborus*, the antero-lateral pieces of the adanal shields are circular, free or connected by thin commissures to corresponding postero-mesal pieces; setae *4b* are situated off the sclerotized fields of epimerites IIIa, and rudimentary sclerites rEpIIa are absent; in females, the incisions in the anterior margin of the lobar shield are slit-like. In males of *N. guaratubensis,* the adanal shields are entire, thick L-shaped, setae *4b* are situated on sclerotized areas around the tips of epimerites IIIa, and rudimentary sclerites rEpIIa are present; in females, the incisions in the anterior margin of the lobar shield are triangular.

Etymology. The specific epithet is taken from the generic name of the type host and is a noun in apposition.

Remark. *Nycteridocaulus myioborus* is the only species of the genus *Nycteridocaulus* associated with oscine passerines of the family Parulidae.

Nycteridocaulus hylophylax Mironov sp. n.

(Figs. 25–27)

Type material. Male holotype (ZISP 6336), 1 male and 4 female paratypes from *Hylophylax naevioides* (Lafresnaye, 1847) (Thamnophilidae), **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10°46'N, 85°18'W, 20 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depositories: Holotype and 3 female paratypes (ZISP 6334–6339)—ZISP, 1 male and 1 female paratype—IMUCR.

Description. MALE (holotype, measurements for a single paratype in parentheses). Idiosoma, length × width, 290 (300) × 150 (160), length of hysterosoma 190 (185). Prodorsal shield: anterolateral extensions widely rounded, lateral margins entire, posterior margin with very short and wide median extension, 95 (100) in length and 110 (115) in width, surface with numerous circular lacunae up to 5 in diameter (Fig. 25A). Setae *ve* rudimentary. Scapular setae *se* separated by 67 (70). Setae *c2* and *cp* on humeral shield. Setae *c3* lanceolate, 18 (17) × 5 (6). Distance between prodorsal and hysteronotal shields 15 (17). Hysteronotal shield: 185 (190) in length and 105 (110) in width; anterior margin slightly concave medially, surface with numerous circular lacunae as on prodorsal shield. Opisthosoma slightly attenuate posteriorly. Opisthosomal lobes short and wide, with slightly oblique posterior margin and with short postero-lateral angle forming lobar apex and bearing setae *h3*. Terminal lamellae rounded, almost semicircular, 10 (10) in length and 18 (20) in width at base. Terminal cleft small, triangular, with anterior end extending to level of setae *h2*, 12 (13) in length, 24 (25) in width at level of setae *ps1*. Supranal concavity present, ovate. Setae *h2* situated on small semiovate lateral extensions of opisthosomal lobes; setae *ps1* in posteromedial margins of lobes, at the same level with setae *h3*; setae *h1* situated slightly anterior to setae *ps2*. Distance between dorsal setae: *c2:d2* 95 (100), *d2:e2* 78 (75), *e2:h3* 35 (40), *h2:h2* 73 (75), *h3:h3* 58 (56), *ps2:ps2* 73 (75), *h1:h3* 22 (23), *d1:d2* 23 (24), *e1:e2* 27 (28).

Epimerites I free, close to each other, posterior tips slightly divergent; epimerites I, II with narrow sclerotized fields; epimerites IVa absent (Fig. 25B). Rudimentary sclerite rEpIIa present. Trochanters III flanked by sclerotized band connecting bases of epimerites III and IIIa. Epimerites IIIa with sclerotized plates around their inner tips. Trochanters IV flanked by sclerotized bands going from bases of epimerites III. Genital apparatus situated posterior to midlevel of trochanters IV. Genital arch bow-shaped, 18 (17) in length and 35 (37) in width. Minute sclerites situated lateral to tips of genital arch. Aedeagus stylet-like, 25 (24) in length, reaching level of setae *g* (Fig. 27A). Genital papillae on small oval plates at level of genital arch apex. Distance from genital arch apex to bases of setae *h3* 93 (95). Pregenital apodemes absent. Setae *4a* on soft tegument, setae *4b* on posterior extensions of sclerotized areas of epimerites IIIa or on soft tegument near them. Adanal suckers 14 (15) in diameter, corolla with 7–8 denticles. Adanal shields represented by two pairs: antero-lateral pair represented by narrow oblique sclerites, and posteromedial pair roughly ovate and bearing setae *ps3*. Opisthoventral shields shaped as narrow oblique sclerites. Distance between ventral setae: *3a:4b* 13 (15), *4b:4a* 27 (28), *4a:g* 33 (35), *g:g* 24 (23), *g:ps3* 50 (48), *ps3:ps3* 18 (20), *ps3:h3* 44 (46).

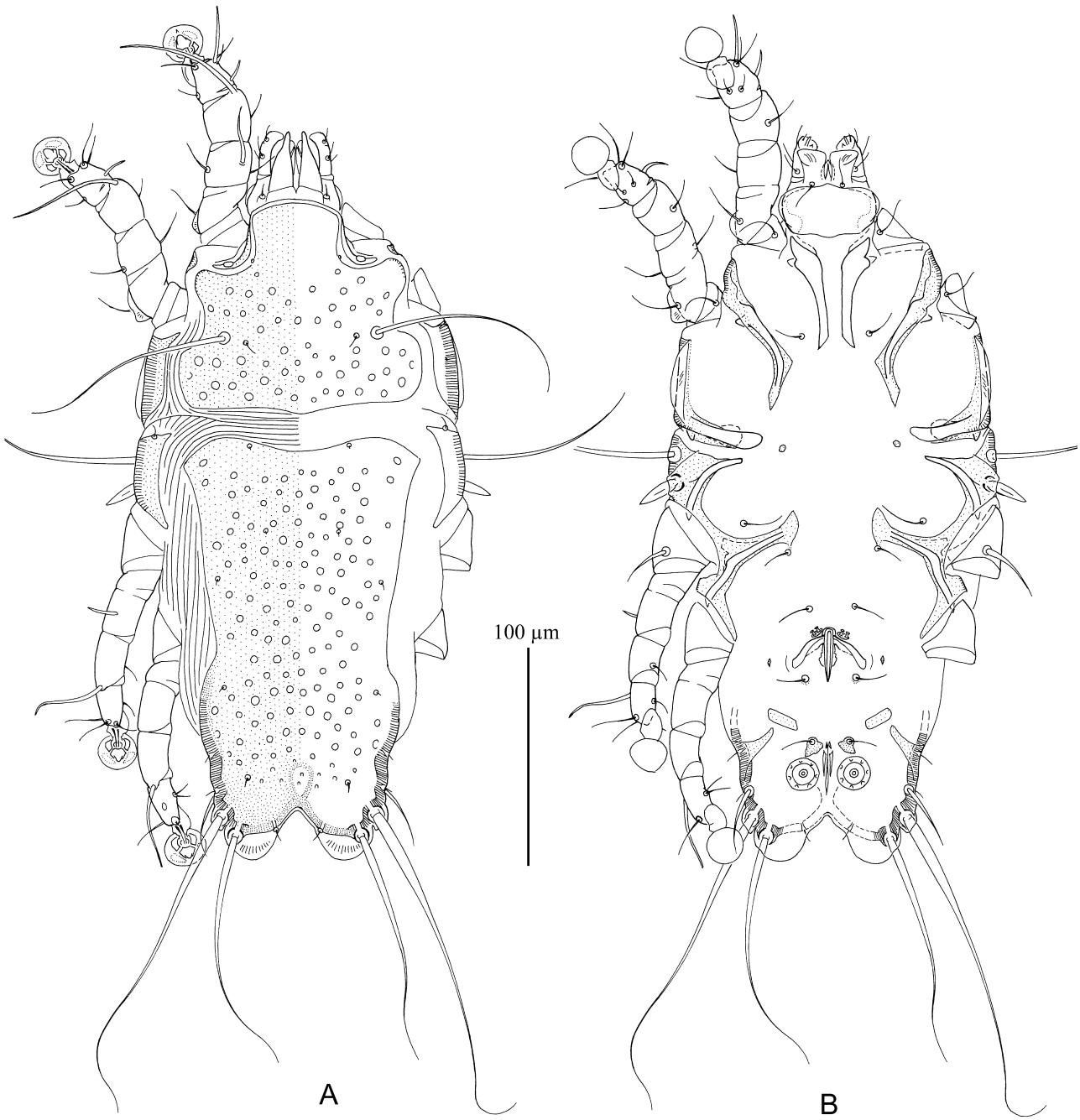

FIGURE 25. *Nycteridocaulus hylophylax* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Femora I, II with ventral crest. Solenidion *σ1*I longer than genu I and situated at midlevel of this segment (Fig. 25A, B). Solenidion *σ* of genu III situated at midlevel of this segment. Legs III, IV subequal in size, legs IV with ambulacral discs extending to level of terminal membrane. Tarsus IV 22 (21) in length, without apicoventral claw-like process; modified setae *d* and *e* button-like, situated in distal half of this segment, seta *e* with minute nipple (Fig. 27D). Seta *d* of tarsus II longer than corresponding seta *f*, setae *d* and *f* of tarsi III subequal in length. Length of solenidia: *σ1*I 25 (26), *σ*III 10 (12), *φ*IV 35 (37).

FEMALE (range for 4 paratypes). Idiosoma, length × width, 405–430 × 170–180, length of hysterosoma 300–305. Prodorsal shield: form and ornamentation as in male, 105–110 in length and 130–135 in width. Setae *se* separated by 85–90. Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 15–18 × 5–6 in width. Distance between prodorsal and hysteronotal shields 10–15. Anterior hysteronotal shield: 205–210 in length and 125–130 in width, anterior margin almost straight, posterior margin with short and widely rounded median extension and a pair

of shallow concavities, entire surface with numerous circular lacunae, about 5 in diameter (Fig. 26A). Lobar region: 92–100 in length and 110–115 in width, lateral margins slightly convex, with short extensions bearing setae *h2*; lobar shield entire, anterior margin slightly concave. Terminal cleft large nearly rectangular, 67–73 in length, 40–45 in width. Supranal concavity absent. Setae *h2* lanceolate in basal part and with filiform apex, 70–80 in length, 5–6 in width; setae *h3* 42–48 long, about 1/3 of terminal appendages. Setae *h1* inserted on striated tegument between parts of hysteronotal shields or on posterior margin of anterior hysteronotal shield. Setae *h1* and *f2* in trapezoidal arrangement. Setae *ps1* on inner margins of opisthosomal lobes, closer to level of setae *h3*. Distance between dorsal setae: *c2:d2* 78–85, *d2:e2* 115–120, *e2:h2* 40–48, *h2:h3* 50–52, *h1:h2* 35–40, *d1:d2* 26–30, *e1:e2* 47–52, *h1:h1* 30–35, *h2:h2* 100–105, *h2:ps1* 25–27.

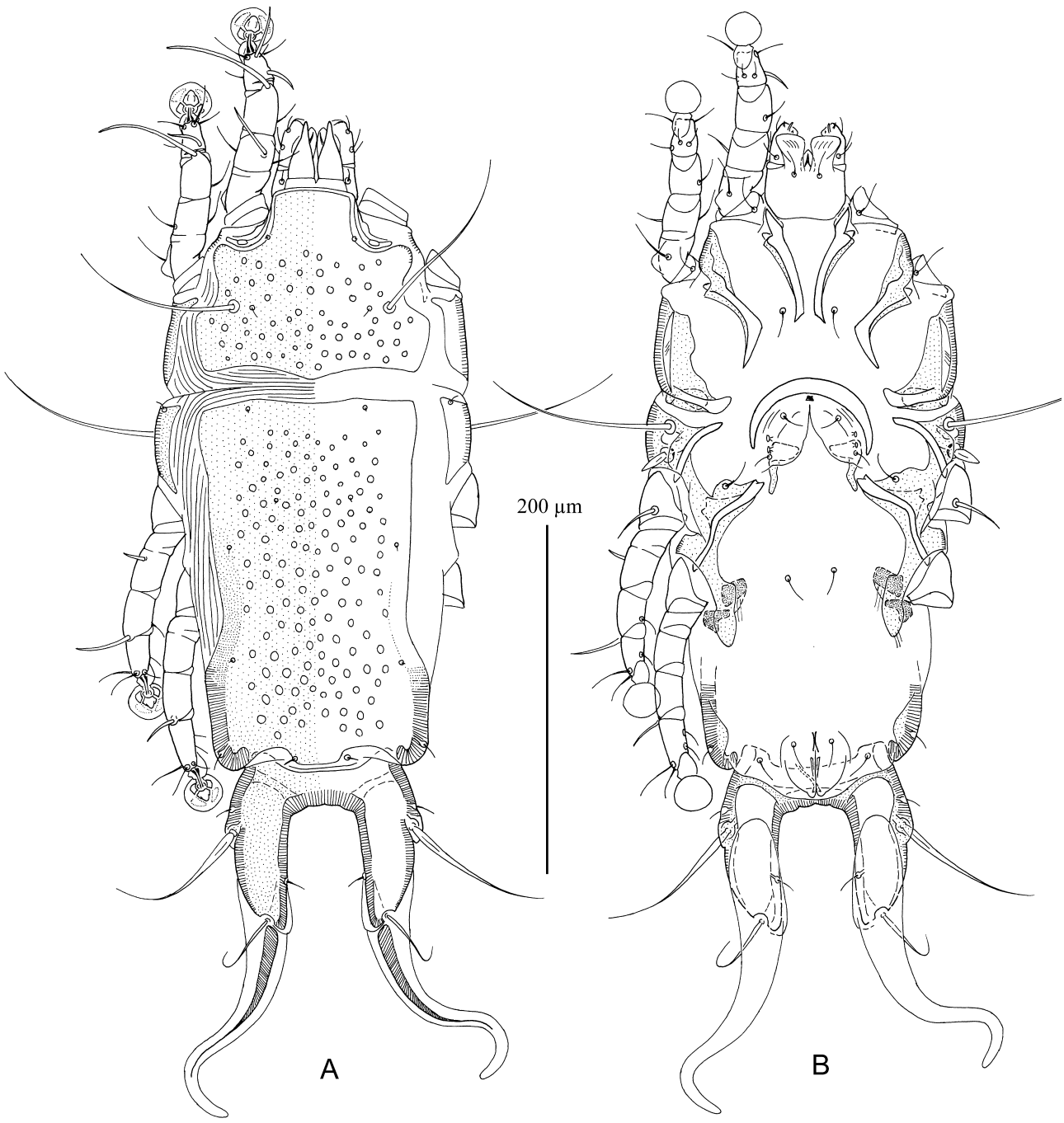

FIGURE 26. *Nycteridocaulus hylophylax* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

Epimerites I, II as in male, with narrow surface fields. Epimerites IVa large, with long posterior extensions (Fig. 26B). Trochanters III and IV flanked by narrow sclerotized bands connecting corresponding epimerites III

and IV. Epigynum semicircular, thick, with acute tips extending to level of genital papillae, 37–40 in length, 68–75 in width. Genital papillae of each side on small ovate sclerotized plate. Setae *ps2* at midlevel of anal opening. Translobar apodemes not fused to each other anterior to terminal cleft. Copulatory opening ventral, situated near anterior end of terminal cleft and covered with posterior ends of anal folds. Head of spermatheca short; proximal part of primary spermaduct with enlargement 25 long, secondary spermaducts 28–30 long (Fig. 27F). Distance between pseudanal setae: *ps2:ps2* 58–60, *ps3:ps3* 20–22, *ps2:ps3* 8–10.

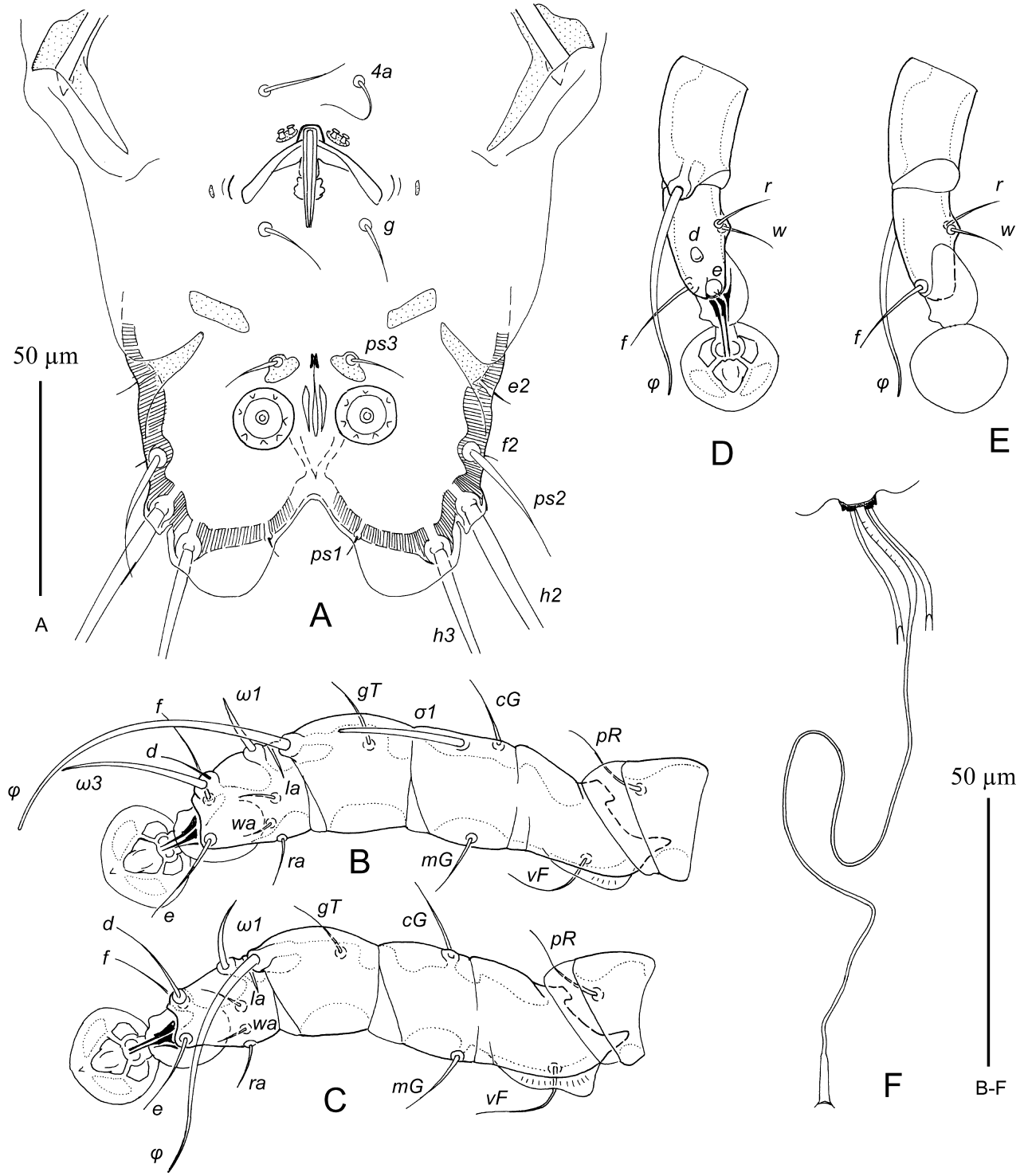

FIGURE 27. *Nycteridocaulus hylophylax* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B, C—legs I and II of male, dorsal view, D– tibia and tarsus IV of male, dorsal view, E—tibia and tarsus IV of male, ventral view, F—spermatheca and spermaducts.

Legs I, II as male. Legs IV with distal margin of ambulacral disc extending to level of setae *f2*. Solenidion *σ1* of genu I slightly longer than this segment and situated at its midlevel. Solenidion *σ* of genu III in proximal half of this segment. Solenidion *φ* of tibia IV slightly shorter than corresponding tarsus. Seta *d* of tarsus II longer than corresponding seta *f*, setae *d* of tarsi III, IV shorter than corresponding setae *f*. Length of solenidia: *σ1*I 30–32, *σ*III 12–14, *φ*III 37–40, *φ*IV 20–22.

Differential diagnosis. The new species *Nycteridocaulus hylophylax* sp. n. is most similar to *N. lamellus* Atyeo, 1966, described from *Myiarchus crinitus* (Linnaeus) from Texas, in having short and rounded terminal lamellae in males and a wide terminal cleft in females. *Nycteridocaulus hylophylax* sp. n. is readily differentiated from this species by the following features: in both sexes, the prodorsal and hysteronotal shields are entirely covered with large circular lacunae; in the male, the genital arch is relatively long and nearly semicircular in shape, the adanal shields are represented by two well-separated pairs of sclerites (antero-lateral and postero-mesal pairs), and setae *ps3* are situated on the sclerites of the postero-mesal pair; in the female, the lobar shield is entire, and the terminal cleft is large and rectangular, 40–45 μm in width (Fig. 26A). In both sexes of *N. lamellus*, the prodorsal and hysteronotal shields lack ornamentation; in males, the genital arch is low and shaped as a recurved bow, the adanal shields are represented by the postero-mesal pair, and setae *ps3* are situated off the adanal shields; in females, the lobar shield is split longitudinally and the terminal cleft is trapezoidal, with its greatest width about 25 μm.

Etymology. The specific epithet is taken from the generic name of the type host and is a noun in apposition.

Nycteridocaulus platyrinchi Mironov sp. n.

(Figs. 28–30)

Type material. Male holotype (ZISP 6316), 9 male and 14 female paratypes from *Platyrinchus cancrominus* Sclater, PL and Salvin, 1860 (Tyrannidae), **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10°46'N, 85°18'W, 800 m, 20 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 7 male, 12 female paratypes (ZISP 6317–6335)—ZISP; 1 male and 1 female paratype—UMMZ (BMOC-15-1028-013), 1 male and 1 female paratype—IMUCR.

Description. MALE (holotype, range for 9 paratypes in parentheses). Idiosoma, length × width, 285 (275–290) × 140 (140–145), length of hysterosoma 180 (140–180). Prodorsal shield: anterolateral extensions acute, lateral margins entire, posterior margin slightly concave, 95 (95–105) in length and 105 (105–120) in width, surface without ornamentation (Fig. 28A). Setae *ve* rudimentary. Scapular setae *se* separated by 62 (60–64). Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 18 (18–20) × 4 (4–5). Distance between prodorsal and hysteronotal shields 40 (30–40). Hysteronotal shield: 175 (170–185) in length and 87 (85–90) in width; anterior margin strongly concave, surface without ornamentation. Opisthosoma slightly narrowed posteriorly, with slightly concave margins at level of setae *ps2*. Opisthosomal lobes as very short and wide convexities; terminal lamellae semicircular, with radial striation, 14 (14–16) in length and 23 (23–25) in width. Terminal cleft small, semicircular, not extending to level of setae *h2*, about 5 long, 15 (14–15) in width at level of setae *ps1*, occupied by narrow interlobar membrane. Supranal concavity present, opened posteriorly into terminal cleft. Setae *h2* situated on semiovate lateral extensions of opisthosomal lobes; setae *ps1* on postero-medial margins of lobes, slightly posterior to level of setae *h3*; setae *h1* between levels of setae *h3* and *h2*. Distance between dorsal setae: *c2:d2* 62 (57–62), *d2:e2* 72 (69–72), *e2:h3* 33 (33–41), *h2:h2* 63 (60–67), *h3:h3* 55 (52–58), *ps2:ps2* 60 (60–68), *h1:h3* 3 (3–7), *d1:d2* 24 (20–25), *e1:e2* 22 (22–25).

Epimerites I free, close to each other, posterior tips slightly divergent; epimerites I, II with narrow sclerotized fields; epimerites IVa present (Fig. 28B). Rudimentary sclerite rEpIIa absent. Trochanters III flanked by sclerotized band connecting bases of epimerites III and IIIa. Inner ends of epimerites IIIa with small triangular sclerotized areas. Genital apparatus situated at level of trochanters IV. Genital arch with distal ends of its branches strongly widened and directed laterally, 12 (12–15) in length and 37 (35–38) in width. Aedeagus stylet-like, 18 (18–20) in length, reaching level of setae *g* (Fig. 30A). Genital papillae on large ovate plates anterolateral to genital arch. Distance from genital arch apex to bases of setae *ps1* 92 (90–95). Pregenital apodemes absent. Setae *4a* on soft tegument, setae *4b* on sclerotized areas of epimerites IIIa. Adanal suckers 13 (10–13) in diameter, corolla with 13–14 denticles. Adanal shields represented by two pairs of sclerites: anterolateral pair shaped as narrow sclerites

transversely oriented, posteromedial shaped as large plates of irregular form with setae *ps3* on anterior margins. Opisthoventral shields long and narrow, with anterior angle extending to level of setae *ps3*. Setae *ps2* and *f2* situated submarginally. Distance between ventral setae: *3a:4b* 10 (7–10), *4b:4a* 22 (22–25), *4a:g* 37 (35–40), *g:g* 10 (10–13), *g:ps3* 22 (20–22), *ps3:ps3* 23 (17–23), *ps3:h3* 47 (47–52).

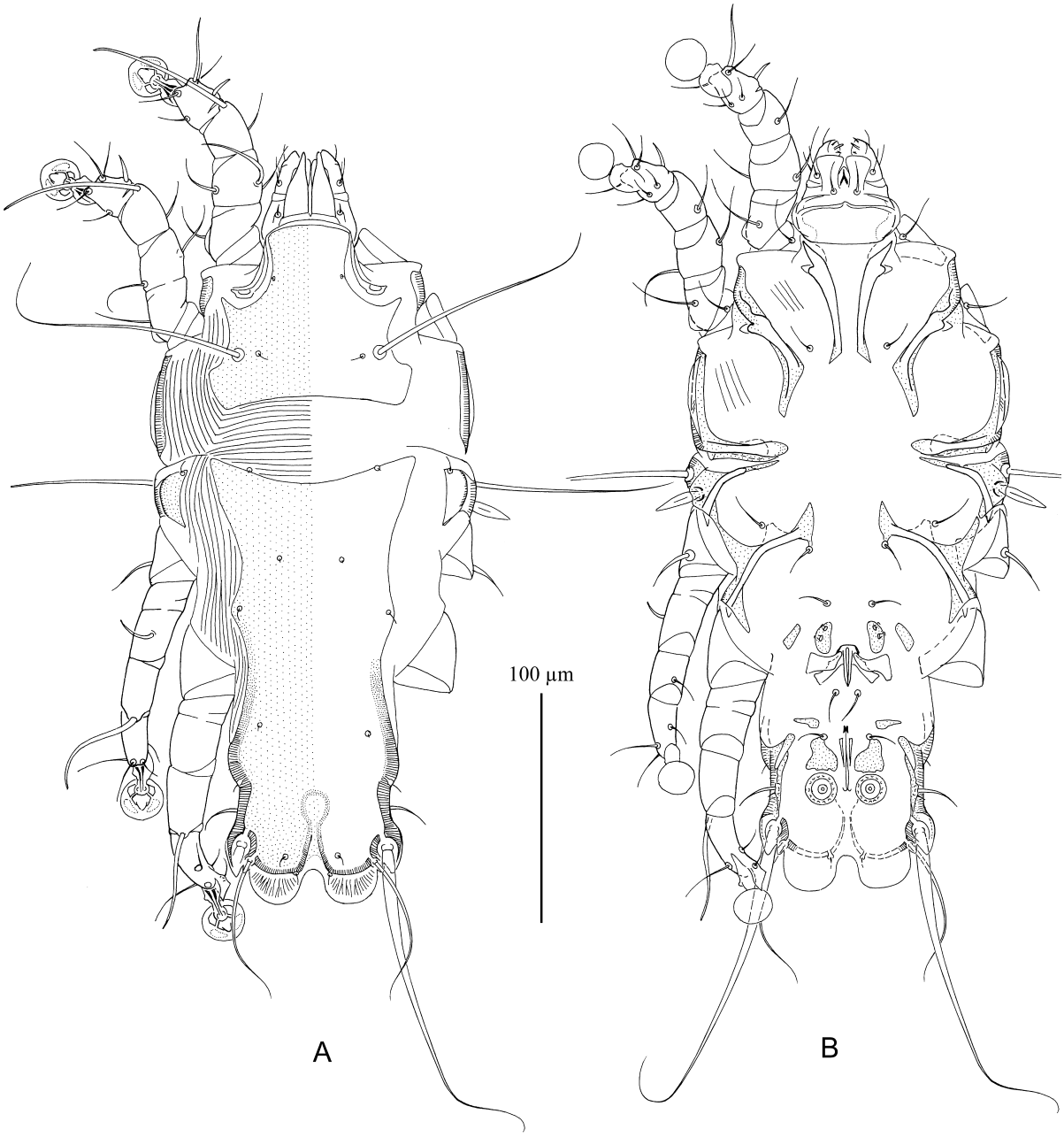

FIGURE 28. *Nycteridocaulus platyrinchi* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Femora I, II with ventral crest. Solenidion *σ1*I longer than genu I and situated at midlevel of this segment (Fig. 30B, C). Solenidion *σ* of genu III situated at midlevel of this segment. Legs IV slightly thicker than legs III, with ambulacral discs extending beyond margins of terminal lamellae. Tarsus IV 33 (30–37) in length; apicoventral process spatuliform, with oblique distal margin with seta *w* at base; modified setae *d* and *e* button-like, both situated in distal half of this segment (Fig. 30 D, E). Seta *d* of tarsus II longer than corresponding seta *f*; seta *d* of tarsus III shorter than corresponding seta *f*. Length of solenidia: *σ1*I 32 (30–28), *σ*III 17 (17–20), *φ*IV 35 (32–35).

FEMALE (range for 10 paratypes). Idiosoma, length × width, 370–390 × 140–155, length of hysterosoma 255–275. Prodorsal shield: anterolateral extensions acute, lateral margins with lateral incisions extending to bases of setae *se*, surface without ornamentation, 85–95 in length and 95–100 in width. Setae *se* separated by 70–75.

Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 17–20 × 4–5 in width. Distance between prodorsal and hysteronotal shields 25–30. Anterior hysteronotal shield: 185–200 in length and 85–95 in width, anterior margin concave, posterior with short and widely rounded median extension (posterior margin slightly convex), surface without ornamentation (Fig. 29A). Lobar region: 80–90 in length and 95–105 in width, lateral margins convex, with noticeable extensions bearing setae *h2*; lobar shield entire, its anterior margin medially convex. Terminal cleft narrow, almost parallel-sided, slightly enlarged in posterior quarter, 55–62 in length, 6–10 in width in anterior part. Supranal concavity absent. Setae *h2* lanceolate in basal part and with filiform apex, 80–95 in length, 6–7 in width; setae *h3* 46–50 in length, approximately 1/3 of terminal appendages. Setae *h1* inserted on striated tegument between anterior hysteronotal and lobar shields. Setae *h1* and *f2* arranged in low trapezium. Setae *ps1* on inner margins of opisthosomal lobes, close to level of setae *h3*. Distance between dorsal setae: *c2:d2* 79–75, *d2:e2* 95–105, *e2:h2* 30–35, *h2:h3* 46–52, *h1:h2* 17–20, *d1:d2* 22–32, *e1:e2* 35–45, *h1:h1* 30–32, *h2:h2* 80–90, *h2:ps1* 30–38.

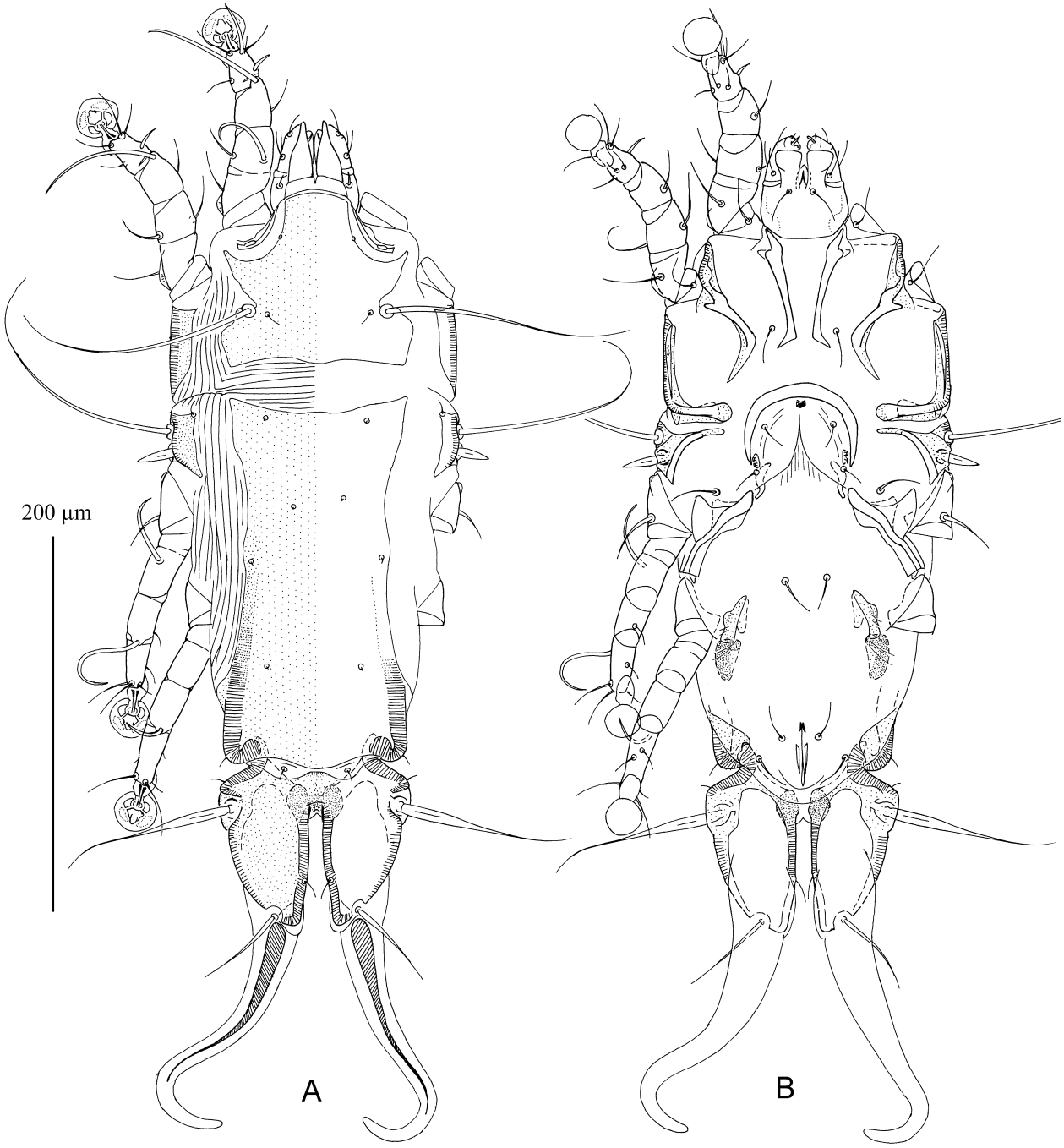

FIGURE 29. *Nycteridocaulus platyrinchi* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

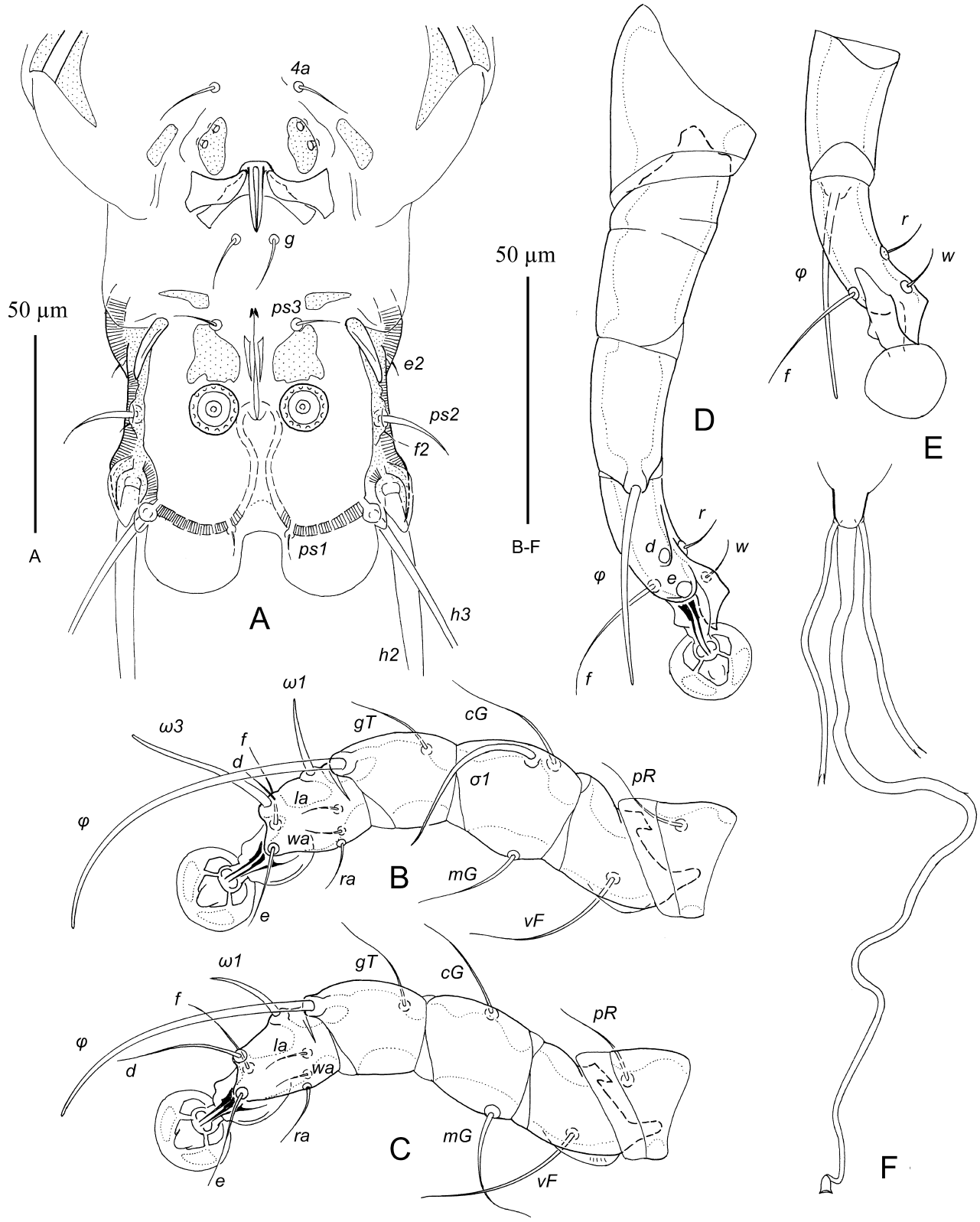

FIGURE 30. *Nycteridocaulus platyrinchi* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B–D—legs I, II and IV of male, dorsal view, E—tibia and tarsus IV of male, ventral view, F—spermatheca and spermaducts.

Epimerites I, II as in male, without surface fields. Epimerites IVa large, with long and heavily sclerotized posterior extension (Fig. 29B). Epigynum horseshoe-shaped, thin, with acute tips extending to level of genital papillae, 45–50 in length, 58–60 in width. Genital papillae of each side on small ovate plate. Setae *ps2* at midlevel

of anal opening. Translobar apodemes not fused to each other anterior to terminal cleft. Copulatory opening ventral, situated near anterior end of terminal cleft. Head of spermatheca cone-shaped; proximal half of primary spermaduct monotonously enlarged to head of spermatheca; secondary spermaducts 50–52 long (Fig. 30F). Distance between pseudanal setae, *ps2:ps2* 42–50, *ps3:ps3* 17–24, *ps2:ps3* 10–13.

Legs I, II as in male. Legs IV with ambulacral disc extending to level of setae *h2*. Solenidion *σ1* of genu I slightly longer than this segment and situated slightly closer to its base. Solenidion *σ* of genu III in proximal half of this segment. Solenidion *φ* of tibia IV approximately half the length of corresponding tarsus. Setae *d* of tarsi II–IV longer than corresponding setae *f*. Length of solenidia: *σ1*I 32–35, *σ*III 22–25, *φ*III 38–50, *φ*IV 18–23.

Differential diagnosis. Among previously described species, *Nycteridocaulus platyrinchi* sp. n. is most similar to *N. lamellus* in having very short opisthosomal lobes and semicircular terminal lamellae with radial striation in males, and the prodorsal shield with deep lateral incisions in females. *Nycteridocaulus platyrinchi* differs from *N. lamellus* by the following features: in males, the adanal shields are represented by two pairs of sclerites (small anterolateral and large posteromedial pairs), the bases of setae *h2* are situated on semi-ovate lateral extensions of opisthosomal lobes, setae *ps2* and *f2* are situated submarginally; setae *ps3* are situated on the anterior margins of the posteromedial adanal sclerites, setae *h1* are situated between the transverse levels of setae *h2* and *h3*, and epimerites IVa are present; in females, the lobar region is slightly wider than long (1.1–1.2 times), the terminal cleft is narrow (4–5 times longer than wide) and setae *h2* are shorter than the terminal appendages.

In males of *N. lamellus*, the adanal shields are represented by one pair of roughly triangular sclerites, the bases of setae *h2* are situated on the slightly convex lateral margins of the opisthosomal lobes, setae *ps2* and *f2* are situated marginally; setae *ps3* are situated off the adanal shields, setae *h1* are situated far anterior to the levels of setae *h2*, and epimerites IVa are absent; in females, the lobar region is 2 times wider than long, and the terminal cleft is U-shaped (slightly wider than long), and setae *h2* are whip-shaped, distinctly longer than the terminal appendages.

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

Nycteridocaulus ketourus Mironov sp. n.

(Figs. 31–33)

Type material. Male holotype (ZISP 6259), 7 male and 6 female paratypes from *Thryophilus rufalbus* (Lafresnaye, 1845) (Troglodytidae), **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10°46'N, 85°18'W, 16 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 5 male and 4 female paratypes (ZISP 6260–6268)—ZISP; 1 male and 1 female paratype—UMMZ (BMOC-15-1028-012), 1 male and 1 female paratype—IMUCR.

Description. MALE (holotype, range for 7 paratypes in parentheses). Idiosoma, length × width, 335 (325–345) × 150 (145–160), length of hysterosoma 230 (215–240). Prodorsal shield: anterolateral extensions acute, lateral margins entire, posterior margin slightly concave, with short median extension, 82 (80–85) in length and 105 (95–110) in width, surface with a few minute lacunae or without them (Fig. 31A). Setae *ve* rudimentary. Scapular setae *se* separated by 65 (60–70). Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 18 (17–19) × 5 (5–6). Distance between prodorsal and hysteronotal shields 30 (30–35). Hysteronotal shield: 225 (215–230) in length and 98 (95–100) in width; anterior margin concave, anterior half with minute circular lacunae. Opisthosoma shaped as fish-tail owing to abrupt expansion at level of setae *h2* and opisthosomal lobes. Opisthosomal lobes short and wide, with posterior margin convex, with large semi-ovate lateral extensions bearing setae *h2*, and with small triangular extensions at bases of setae *h3*. Terminal lamellae short semi-rounded, with radial striation, 10 (10–13) in length and 32 (30–34) in width. Terminal cleft small semi-ovate, with anterior end almost extending to level of setae *h2*, 23 (22–25) in length from anterior end to level of lobar apices, 18 (16–18) in width at level of setae *ps1*. Supranal concavity narrowed posteriorly, opened into terminal cleft. Setae *ps1* in posteromedial margins of opisthosomal lobes, slightly anterior to level of setae *h3*; setae *h1* situated at level of setae *ps2*. Distance between dorsal setae: *c2:d2* 68 (62–70), *d2:e2* 75 (70–88), *e2:h3* 75 (72–82), *h2:h2* 90 (82–90), *h3:h3* 75 (70–75), *ps2:ps2* 68 (65–68), *h1:h3* 53 (47–55), *d1:d2* 13 (10–15), *e1:e2* 35 (30–35), *ps1:h3* 8 (7–10).

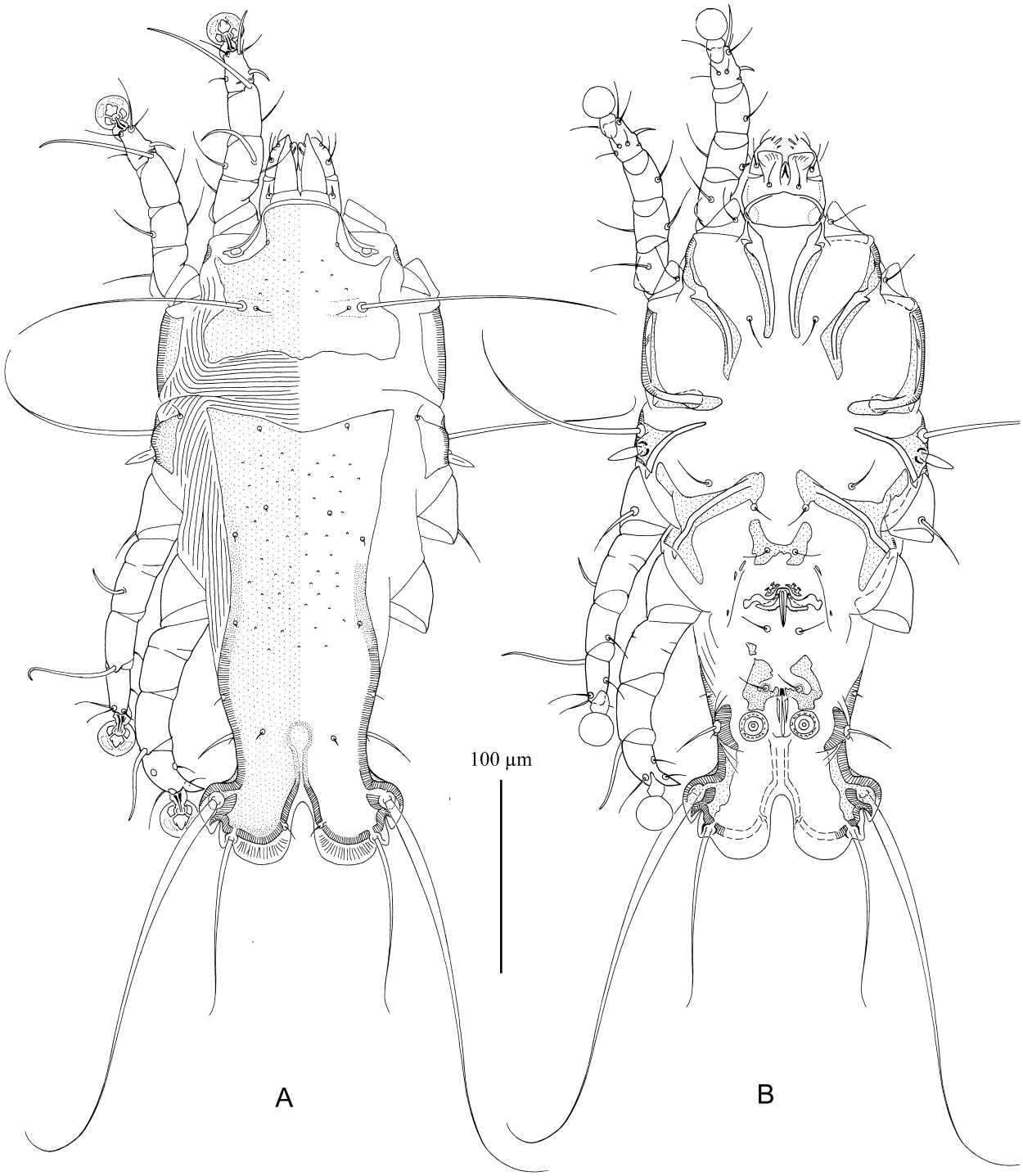

FIGURE 31. *Nycteridocaulus ketourus* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Epimerites I free, close to each other, posterior tips slightly divergent; epimerites I, II with narrow surface fields; epimerites IVa absent (Fig. 31B). Rudimentary sclerite rEpIIa absent. Trochanters III flanked by sclerotized band stretching from bases of epimerites IIIa. Epimerites IIIa with rounded sclerotized plates around their inner tips. Trochanters IV flanked by sclerotized bands stretching from bases of epimerites IV. Genital apparatus situated at level of trochanters IV. Genital arch shaped as recurved bow, 13 (13–14) in length and 42 (38–42) in width. Aedeagus stylet-like, 20 (20–22) in length, reaching level of setae *g* (Fig. 33A). Genital papillae of each side on small oval plates at level of genital arch apex. Distance from genital arch apex to bases of setae *h3* 125 (120–130). Pregenital apodemes connected by transverse branch forming single H-shaped sclerite. Setae *4a* on pregenital

apodemes, setae *4b* on sclerotized areas of epimerites IIIa. Adanal suckers 15 (15–16) in diameter, corolla with 14–15 denticles. Adanal shields represented by a pair of roughly L-shaped sclerites situated anterior to anal suckers. Setae *ps3* situated on transverse branches of adanal shields. Opisthoventral shields narrow, without extension on inner margin, heavily sclerotized around bases of setae *ps2* and *f2*. Distance between ventral setae: *3a:4b* 13 (13–15), *4b:4a* 23 (23–25), *4a:g* 42 (40–45), *g:g* 18 (18–22), *g:ps3* 33 (30–35), *ps3:ps3* 18 (18–22), *ps3:h3* 78 (74–78).

Femora I, II with ventral crest. Solenidion *σ1*I slightly longer than genu I and situated at midlevel of this segment (Fig. 33B, C). Solenidion *σ* of genu III situated in distal half of this segment. Legs IV slightly thicker than legs III, IV with ambulacral discs extending to level of lobar apices. Tarsus IV 28 (25–30) in length, with apicoventral claw-like process bearing seta *w*; modified setae *d* and *e* button-like, seta *d* about noticeably larger in diameter than seta *e* and situated at midlevel of this segment (Fig. 33E). Seta *d* tarsus II longer than corresponding seta *f*, seta *d* of tarsus III shorter than corresponding seta *f*. Length of solenidia: *σ1*I 35 (28–35), *σ*III 20 (20–23), *φ*IV 33 (32–35).

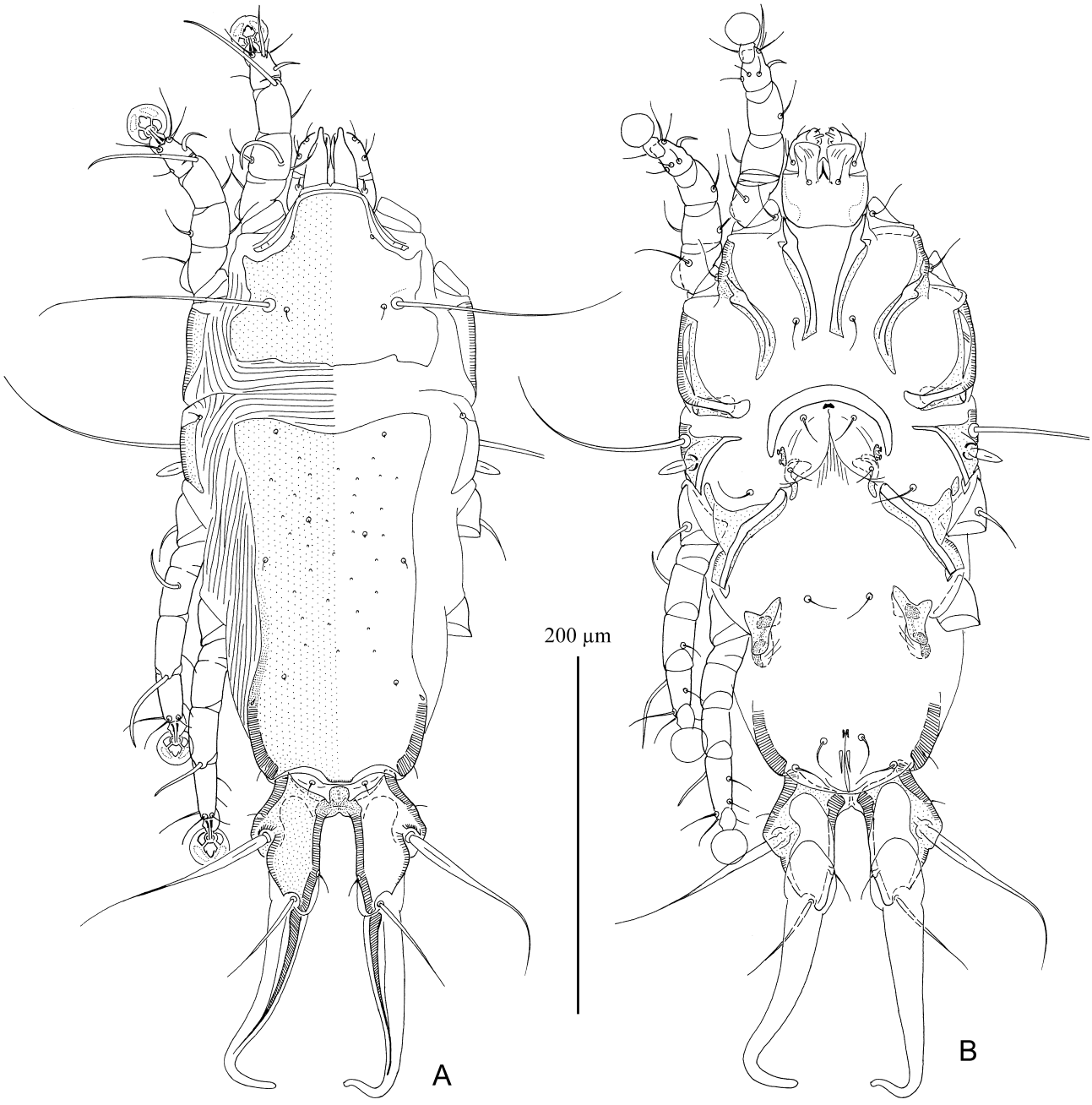

FIGURE 32. *Nycteridocaulus ketourus* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

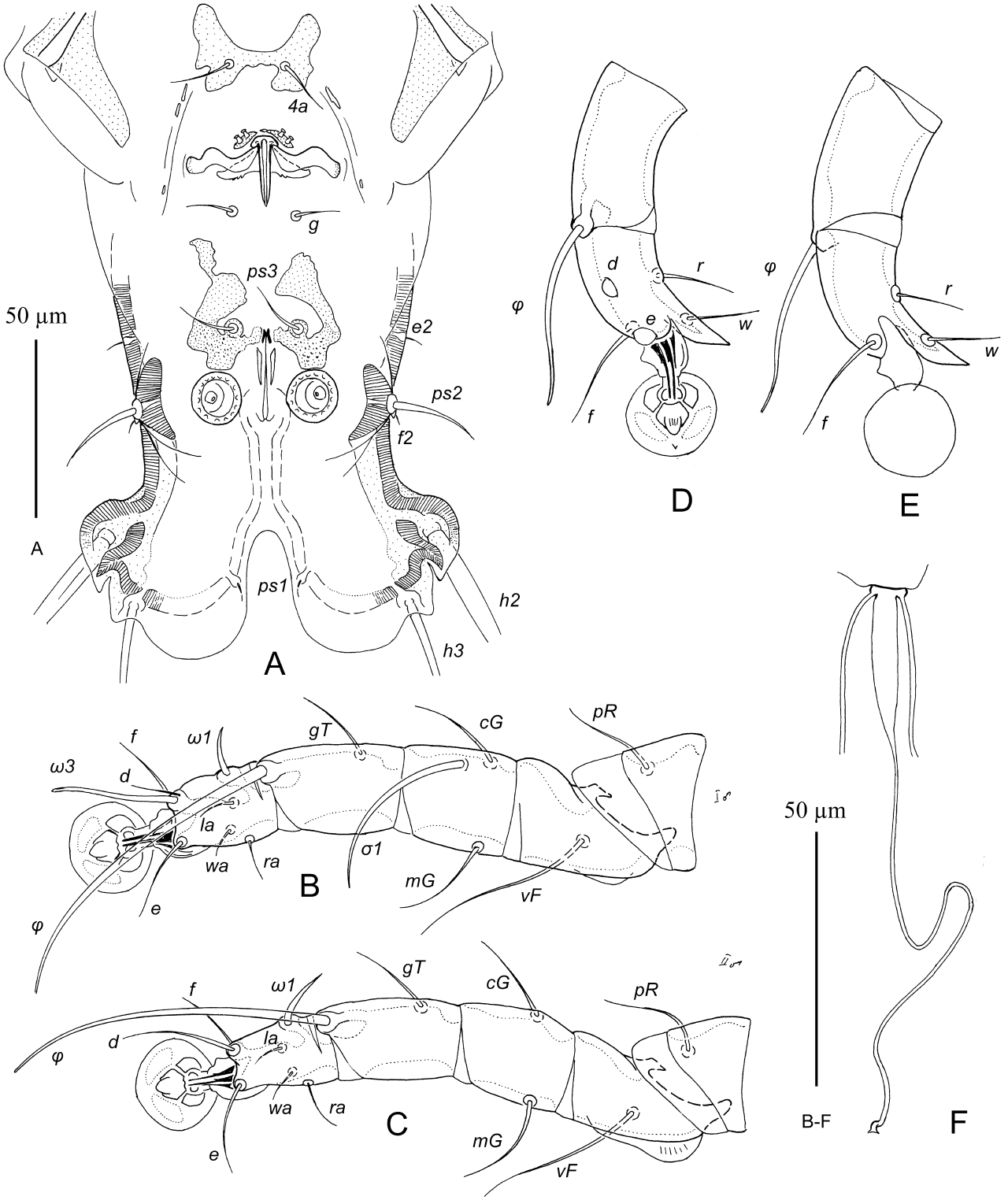

FIGURE 33. *Nycteridocaulus ketourus* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B, C—legs I, II of male, dorsal view, D—tibia and tarsus IV of male, dorsal view, E—tibia and tarsus IV of male, ventral view, F—spermatheca and spermaducts.

FEMALE (range for 6 paratypes). Idiosoma, length × width, 400–410 × 160–170, length of hysterosoma 280–290. Prodorsal shield: shape and ornamentation as in male, 95–100 in length and 110–120 in width. Setae *se* separated by 70–78. Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 19–20 × 5–6 in width. Distance between prodorsal and hysteronotal shields 35–40. Anterior hysteronotal shield: 200–210 in length and 105–110 in

width, anterior margin concave, posterior margin with short and wide median extension, surface with minute circular lacunae (Fig. 32A). Lobar region: 80–90 in length and 100–105 in width, lateral margins with well developed extensions bearing setae *h2*; anterior margin of lobar shield with a pair of narrow triangular incisions and small semi-rounded extension between them. Terminal cleft U-shaped with slightly divergent branches, 57–62 in length and 18–20 in width anterior part. Supranal concavity absent. Setae *h2* lanceolate in basal part and with long filiform apex, 90–100 in length, 7–8 in width; setae *h3* 58–60 in length, approximately half the length of terminal appendages. Setae *h1* inserted on striated tegument between the anterior hysteronotal and lobar shields. Setae *h1* and *f2* in trapezoidal arrangement. Setae *ps1* on inner margins of opisthosomal lobes, close to level of setae *h3*. Distance between dorsal setae: *c2:d2* 80–85, *d2:e2* 110–115, *e2:h2* 40–45, *h2:h3* 37–40, *h1:h2* 30–32, *d1:d2* 20–25, *e1:e2* 48–52, *h1:h1* 28–30, *h2:h2* 80–85, *h2:ps1* 25–30.

Epimerites I as in male; epimerites I, II with narrow surface sclerotized fields. Epimerites IVa large, roughly triangular, with long posterior extension (Fig. 32B). Epigynum semicircular, thick, with acute tips extending to level of genital papillae, 40–45 in length, 70–72 in width. Genital papillae of each side on small ovate sclerotized plate. Setae *ps2* at midlevel of anal opening. Translobar apodemes not fused to each other anterior to terminal cleft. Copulatory opening terminal, situated near to anterior end of terminal cleft. Head of spermatheca short; proximal part of primary spermaduct with ampuliform enlargement 25–30 long; secondary spermaducts 30–32 long (Fig. 33F). Distance between pseudanal setae: *ps2:ps2* 52–50, *ps3:ps3* 20–22, *ps2:ps3* 12–14.

Legs I, II as male. Solenidion *σ* of genu III in proximal part of this segment. Legs IV with distal margin of ambulacral disc extending to level of setae *h2*. Solenidion *φ* of tibia IV similar in length to corresponding tarsus. Seta *d* of tarsus II longer than corresponding seta *f*, setae *d* of tarsi III, IV slightly shorter than corresponding setae *f.* Length of solenidia: *σ1*I 33–35, *σ*III 22–25, *φ*III 47–53, *φ*IV 35–40.

Differential diagnosis. The new species, *Nycteridocaulus ketourus* sp. n., is similar to *N. laticlunis* Atyeo, 1966 in having, in males, strong lateral enlargements of the opisthosomal lobes bearing setae *h2* and a claw-like apical process on tarsi IV. Males of *N. ketourus* differ from that species by the following features: the pregenital apodemes are present and fused into an H-shaped sclerite, the terminal cleft is small, U-shaped, and extends to the level of setae *h2.* In males of *N. laticlunis*, the pregenital apodemes are absent, and the terminal cleft has divergent lateral margins and extends to the level of setae *h3*. Females of *N. laticlunis* are unknown; among species where females are known, females of *N. ketourus* are most similar to those of *N. guaratabuensis* Hernandes, 2014 in having similar proportions of the terminal cleft and a pair of small triangular incisions on the anterior margin of the lobar shield. Females of *N. ketourus* differ from that species by the following features: the anterior hysteronotal shield bears only minute poorly distinct lacunae in its central part and the epigynum does not extend to the level of setae *g*. In females of *N. guaratabuensis*, the anterior hysteronotal shield bears two longitudinal rows of large lacunae in its posterior part, and the epigynum extends to the level of setae *g*.

Etymology. The specific epithet, combination of *ketus* (Gr., whale) and *ourá* (Gr., tail), refers to the shape of opisthosoma in males.

Remark. This is the only species of the genus known from oscine passerines of the family Troglodytidae.

Nycteridocaulus attila Mironov sp. n.

(Figs. 34–36)

Type material. Male holotype (ZISP 6484), 4 male and 11 female paratypes from *Attila spadiceus* (Gmelin, JF, 1789) (Tyrannidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamaca Mts, 09°46′N, 83°47′W, 7 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 2 male and 9 female paratypes (ZISP 6485–6495)—ZISP; 1 male, 1 female paratype—UMMZ (BMOC-15-1028-005), 1 male, 1 female paratype—IMUCR.

Description. MALE (holotype, range for 4 paratypes in parentheses). Idiosoma, length × width, 290 (290–300) × 160 (150–160), length of hysterosoma 190 (190–200). Prodorsal shield: anterolateral extensions acute, lateral margins entire, posterior margin slightly concave with small median extension, 85 (82–90) in length and 92 (90–98) in width, surface without ornamentation (Fig. 34A). Setae *ve* rudimentary. Scapular setae *se* separated by 60 (60–65). Setae *c2* and *cp* on humeral shield. Setae *c3* lanceolate, 15 (15–16) × 5 (5–6). Distance between prodorsal and hysteronotal shields 25 (20–25). Hysteronotal shield: 185 (180–200) in length and 95 (90–95) in

width; anterior margin slightly concave, surface without ornamentation. Opisthosoma attenuated posteriorly. Opisthosomal lobes short, roughly rectangular, with blunt lateral extensions bearing bases of setae *h2* and *h3*. Terminal lamellae narrow leaf-like, 72 (70–75) in length and 28 (20–30) in width, dorsal surface with clear median vein and pennate pattern. Terminal cleft small semi-ovate, with anterior end extending beyond the level of setae *h2*, 20 (20–25) in length, 15 (12–15) in width at level of setae *ps1*. Supranal concavity narrowed posteriorly and opening into terminal cleft. Setae *ps1* in posteromedial angles of lobes, at level of setae *h3*; setae *h1* situated equidistant from transverse levels of setae *e2* and *h2*. Distance between dorsal setae: *c2:d2* 60 (60–65), *d2:e2* 55 (55–65), *e2:h3* 75 (60–75), *h2:h2* 63 (58–64), *h3:h3* 48 (45–50), *ps2:ps2* 62 (57–65), *h1:h3* 40 (40–44), *d1:d2* 20 (17–20), *e1:e2* 13 (13–20).

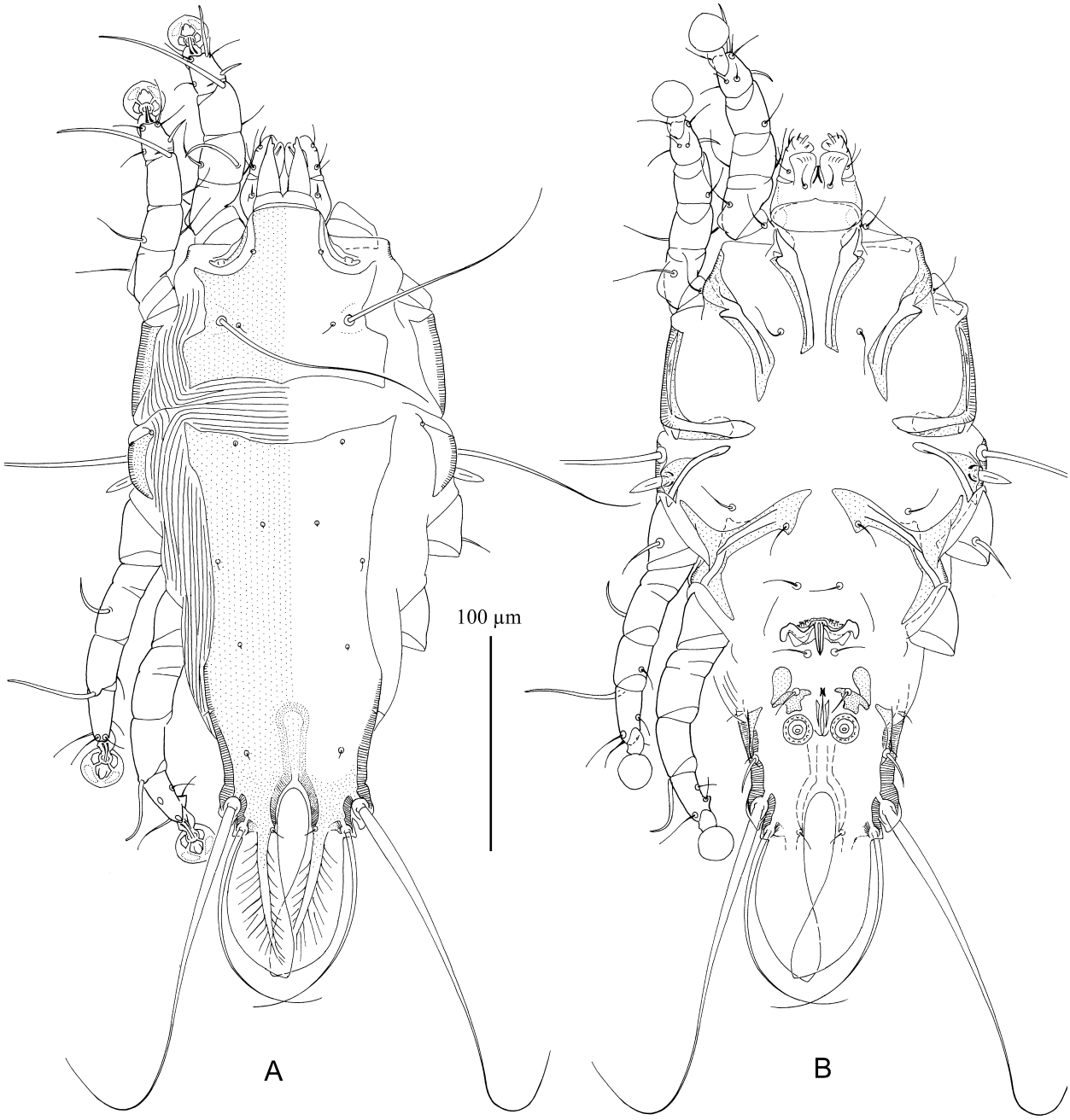

FIGURE 34. *Nycteridocaulus attila* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Epimerites I free, close to each other, posterior tips slightly divergent; epimerites I, II with narrow surface fields; epimerites IVa absent (Fig. 34B). Rudimentary sclerites rEpIIa absent. Trochanters III flanked by sclerotized bands connected with epimerites IIIa. Epimerites IIIa wide, with sclerotized plates around their inner tips almost

reaching midline. Trochanters IV flanked by sclerotized bands connected with bases of epimerites III. Genital apparatus situated posterior to midlevel of trochanters IV. Genital arch shaped as recurved bow, 13 (13–15) in length and 30 (28–36) in width. Aedeagus dagger-like, 18 (18–22) in length, reaching level of setae *g* (Fig. 36A, B). Both pairs of genital papillae on single bow-shaped transverse sclerite at level of genital arch apex. Distance from genital arch apex to bases of setae *ps1* 100 (100–105). Pregenital apodemes absent. Setae *4a* on soft tegument, setae *4b* on sclerotized areas on inner tips of epimerites IIIa. Adanal suckers 13 (13–14) in diameter, corolla with 13–14 denticles. Adanal shields represented by a pair of roughly L-shaped sclerites situated anterior to anal suckers. Setae *ps3* situated on transverse branches of adanal shields. Opisthoventral shields narrow, with small triangular extensions at level of anal opening. Setae *ps2* and *f2* situated submarginally. Distance between ventral setae: *3a:4b* 8 (8–10), *4b:4a* 27 (27–30), *4a:g* 33 (32–35), *g:g* 13 (13–15), *g:ps3* 20 (17–20), *ps3:ps3* 25 (25–28), *ps3:h3* 65 (58–65).

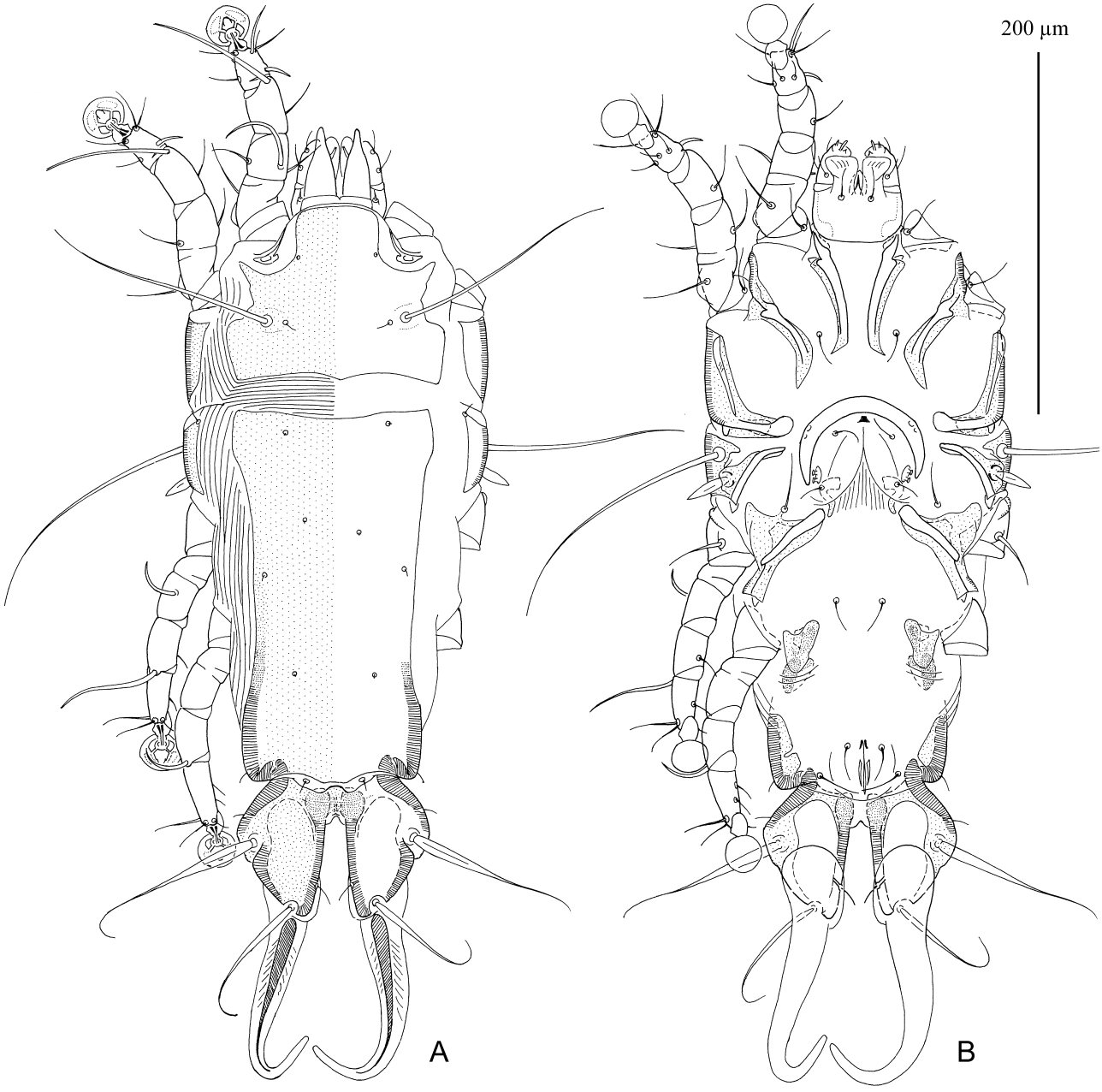

FIGURE 35. *Nycteridocaulus attila* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

Femora I, II with narrow ventral crest. Solenidion *σ1* of genu I longer than this segment and situated at its midlevel (Fig. 36C, D). Solenidion *σ* of genu III situated at midlevel of this segment. Legs III, IV subequal in size,

legs IV with ambulacral discs extending to level of setae *h3*. Tarsus IV 28 (25–28) in length, with apicoventral spine-like process bearing seta *w*; modified setae *d* and *e* button-like, seta *d* situated at midlength of this segment (Fig. 36E, F). *Seta* d of tarsus II longer than corresponding seta *f*; seta *d* of tarsus III shorter than corresponding seta *f*. Length of solenidia: *σ1*I 30 (30–32), *σ*III 24 (20–25), *φ*IV 35 (32–35).

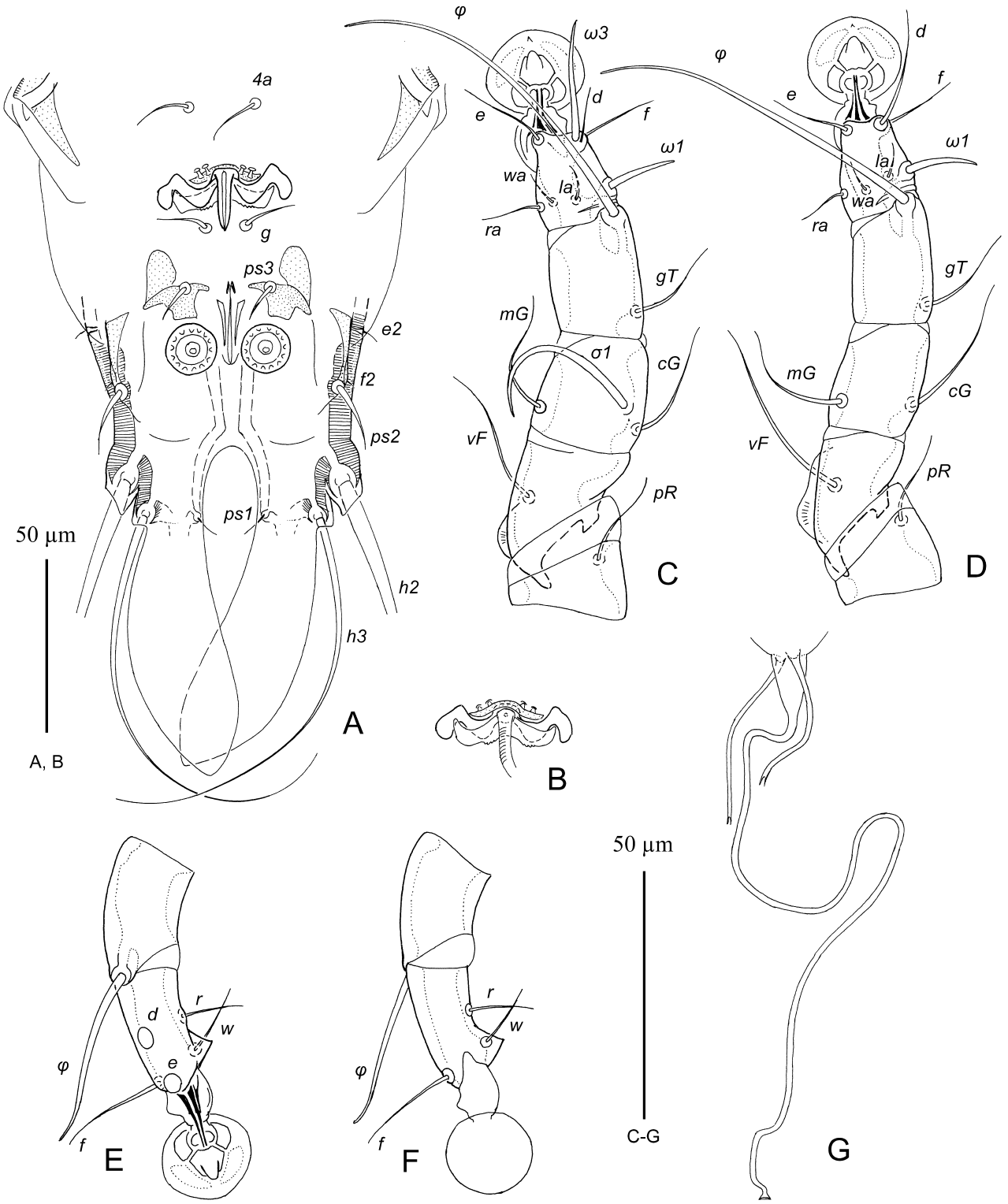

FIGURE 36. *Nycteridocaulus attila* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B—genital apparatus of male, dorsal view, C, D—legs I and II of male, dorsal view, E—tibia and tarsus IV of male, dorsal view, F—tibia and tarsus IV of male, ventral view, G—spermatheca and spermaducts.

FEMALE (range for 10 paratypes). Idiosoma, length × width, 400–415 × 170–180, length of hysterosoma 280–290. Prodorsal shield: form and ornamentation as in male, 95–100 in length and 120–130 in width. Setae *se* separated by 75–80. Setae *c2* and *cp* on humeral shields. Setae *c3* lanceolate, 19–20 × 6–6.5 in width. Distance between prodorsal and hysteronotal shields 20–25. Anterior hysteronotal shield: 200–210 in length and 105–115 in width, anterior margin straight or slightly concave, posterior margin with short and wide median extension, surface without ornamentation (Fig. 35A). Lobar region: 80–88 in length and 105–110 in width, lateral margins strongly convex, without noticeable extensions bearing setae *h2*; lobar shield entire, anterior margin with small median extension and a pair of shallow concavities. Terminal cleft narrow, with lateral margins slightly divergent posteriorly, 57–62 in length, 22–24 in width at level of setae *h3*. Supranal concavity absent. Setae *h2* lanceolate in basal part and with filiform apex, 80–90 in length, 7–8 in width; setae *h3* 68–75 in length, approximately half the length of terminal appendages. Setae *h1* inserted on striated tegument between the anterior hysteronotal and lobar shields. Setae *h1* and *f2* in trapezoidal arrangement. Setae *ps1* on inner margins of opisthosomal lobes, close to level of setae *h3*. Distance between dorsal setae: *c2:d2* 85–90, *d2:e2* 110–120, *e2:h2* 40–45, *h2:h3* 35–40, *h1:h2* 35–38, *d1:d2* 25–28, *e1:e2* 35–38, *h1:h1* 32–34, *h2:h2* 87–92, *h2:ps1* 23–28.

Epimerites I, II as in male, with narrow surface sclerotized fields. Epimerites IVa large, roughly triangular, with long and heavily sclerotized posterior extension (Fig. 35B). Epigynum horseshoe-shaped, thick, with rounded tips extending to level of genital papillae, 47–50 in length, 66–70 in width. Genital papillae of each side on small ovate sclerotized plate. Setae *ps2* at midlevel of anal opening. Translobar apodemes not fused to each other anterior to terminal cleft. Copulatory opening situated in anterior end of terminal cleft. Head of spermatheca short; proximal part of primary spermaduct with cone-shaped enlargement 10–15 long; secondary spermaducts 30–35 long (Fig. 36G). Distance between pseudanal setae, *ps2:ps2* 45–48, *ps3:ps3* 18–22, *ps2:ps3* 15–16.

Legs I, II as male. Legs IV with distal margin of ambulacral disc extending to level of setae *h2*. Solenidion *σ1* of genu I longer than this segment and situated slightly closer to its base. Solenidion *σ* of genu III approximately at midlevel of this segment. Solenidion *φ* of tibia IV shorter than corresponding tarsus. Seta *d* of tarsus II longer than corresponding seta *f*, setae *d* of tarsi III, IV slightly shorter than corresponding setae *f*. Length of solenidia: *σ1*I 36–38, *σ*III 27–29, *φ*III 54–57, *φ*IV 32–38.

Differential diagnosis. The new species *Nycteridocaulus attila* sp. n. is close to *N. foliatus* Atyeo, 1966 in having foliform terminal lamellae in males. The new species differs from *N. foliatus* by the following features: in males, the apices of the terminal lamellae are attenuate, the pregenital apodemes are absent, and the opisthoventral shields are narrow, with small triangular extensions at the level of the anal opening. In males of *N. foliatus*, the apices of the terminal lamellae are widely rounded, the pregenital apodemes are fused into an H-shaped sclerite, and the opisthoventral shields are half as wide as the opisthosomal lobes and have narrow and acute extensions posterior to the level of the adanal suckers. Females of *N. foliatus* are unknown; among previously described species, females of *N. attila* are most similar to those of *N. bilobatus* Atyeo, 1966 in having the lobar region slightly wider than long, with strongly convex lateral margins and a narrow terminal cleft. Females of *N. attila* are distinguished from those of *N. bilobatus* in having setae *h2* shorter than the terminal appendages, the proximal part of the primary spermaduct with a cone-shaped enlargement, and by the absence of ornamentation on the hysteronotal shield. In females of *N. bilobatus*, setae *h2* are longer than the terminal appendages, the primary spermaduct lacks a cone-shaped enlargement, and the anterior hysteronotal shield bears small circular lacunae.

Etymology. The specific epithet is taken from the generic name of the type host and is a noun in apposition.

Nycteridocaulus pectinatus Atyeo, 1966

Nycteridocaulus pectinatus Atyeo, 1966a: 486, figs. 9–13.

Material examined. 9 males and 9 females (ZISP 6269–6286) from *Tolmomyias sulphurescens* (von Spix, 1825) (Tyrannidae), COSTA RICA, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10°46'N, 85°18'N; 16 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Nycteridocaulus pectinatus is a remarkable species within the genus *Nycteridocaulus* in having a unique structure of terminal lamellae in males, which are strongly indented and resemble a hair comb. The species was previously known from *Tolmomyias flaviventris* (zu Wied-Neuwied) (Tyrannidae) in Trinidad (Atyeo 1966a). This

is the first finding of this species in Costa Rica, and *Tolmomyias sulphurescens* is a new host species record for this mite.

Genus *Anisophyllodes* Atyeo, 1967

Type species: *Anisophyllodes pipromorphae* Atyeo, 1967, by original designation.

Diagnosis. BOTH SEXES. Moderately elongated proctophyllodines. Prodorsal shield entire, covering nearly entire prodorsum, with extending antero-lateral extensions, and with posterior angles rounded or acute. Vertical setae *vi* rudimentary, represented by alveoli. Scapular setae *si* and *se* situated on prodorsal shield and arranged in transverse line. Humeral shields well developed dorsally, encompassing bases of setae *cp*, setae *c2* on or off these shields. Subhumeral setae *c3* lanceolate. Epimerites I free, bow-shaped, with posterior ends slightly divergent. Full set of hysterosomal setae occurring in proctophyllodines present. Solenidion *σ1* of genu I slightly longer than solenidion *ω3* of tarsus I. Tarsi I, II with 3 ventral setae, seta *wa* anterior to or at the same level with setae *la* and *ra* on these tarsi. Segments of legs I and II without processes or other modifications.

MALE. Hysteronotal shield covering almost all hysterosoma. Opisthosoma attenuate posteriorly. Opisthosomal lobes short, rounded or truncate, separated by narrow terminal cleft, posterior margin of lobes with semi-circular terminal lamellae, striated or punctated dorsally (heteromorph males); or triangular, with blunt-angular terminal cleft, without terminal lamellae (homeomorph males). Supranal concavity well expressed, narrow. Setae *h3* shorter than macrosetae *h2*. Setae *h1* close to transverse level of setae *ps2*. Coxal fields I–IV open, without extensive sclerotized areas. Genital organ at level of trochanters IV; genital arch of moderate size, wider than long, aedeagus in sheath longer than genital arch. Adanal shields present, variable in form, situated antero-lateral to adanal suckers and setae *ps3*, not connected each other anterior to anal opening. Genital papillae situated at level of genital arch apex, surrounded by ovate plates or these plates absent. Pregenital apodemes present, situated between epimerites IIIa and genital apparatus, fused to each other or free. Adanal apodemes absent. Opisthoventral shields not developed. Adanal suckers cylindrical, corolla dentate or edentate. Legs IV slightly thicker than legs III. Tarsus IV with bidentate or with simple apical claw-like process, with or without ventral extension at base of seta *w*, modified setae *d* and *e* button-like.

FEMALE. Lobar region of opisthosoma clearly separated from remaining part of hysterosoma, opisthosomal lobes well developed, with terminal appendages. Anterior hysteronotal and lobar shields separated by narrow band of striated tegument. Lobar shield entire. Supranal concavity absent. Macrosetae *h2* thickened basally, with filiform apex. Epigynum large, semicircular or horseshoe-shaped, free from epimerites IIIa or fused with them (*A. pipromorphae*); if fused, traces of fusion clearly distinct. Translobar apodemes present, fused to each other anterior to terminal cleft or free. Copulatory opening subterminal, near anterior margin of fused translobar apodemes. Legs III and IV subequal in size; segments without modifications; solenidion *φ* of tibia IV equal to or slightly longer than *φ* of tibia III.

Hosts: Tyrannidae.

Remarks. The genus currently included four species associated with Tyrannidae (Atyeo 1967a, 1969; Hernandes *et al.* 2007; Mironov & González-Acuña 2009). Atyeo (1967a) originally erected the genus *Anisophyllodes* based on a single species, *Anisophyllodes pipromorphae* Atyeo, 1967, which was described only from males. Establishing the genus, this author erroneously indicated that idiosomal setae *e1* are absent in *A. pipromorphae,* and this feature was included in the diagnosis of the genus. Actually these setae in *A. pipromorphae* are present but are very close to the strongly sclerotized lateral margins of the hysteronotal shield, and for this reason they were simply missed. In all subsequently described species these setae are clearly visible (Atyeo 1969; Mironov & González-Acuña 2009). Below we describe one new species, describe for the first time a female of *A. pipromorphae* and provide a new key to species.

Anisophyllodes pipromorphae is a unique species in the genus *Anisophyllodes* in having two uncommon features. First, this species exhibits male dimorphism (hetero- and homeomorphs), which is quite rare within the subfamily Proctophyllodinae. Second, females of *A. pipromorphae* are unique among proctophyllodines because they have the epigynum fused with epimerites IIIa, as it is in all representatives of the subfamily Pterodectinae.

Key to *Anisophyllodes* species
(Males and females)

1. In both sexes, prodorsal and hysteronotal shields close to each other, almost touching; entire surfaces of prodorsal and hysteronotal shields with numerous large circular lacunae, up to 10 μm in diameter (Figs. 40A, 41A). In males, pregenital apodemes fused together forming transverse sclerite shaped as a rectangular bracket (Fig. 42A). In female, epigynum fused with inner tips of epimerites IIIa, terminal cleft 3.5–4 time longer than wide at midlevel (Fig. 41B) . . . . . *A. pipromorphae* Atyeo, 1967
- In both sexes, prodorsal and hysteronotal shields clearly distant from each other; surface of prodorsal shield with ornamentation other than large circular lacunae or without ornamentation, hysteronotal shield with large ovate lacunae only in posterior part or only with small lacunae. In males, pregenital apodemes represented by longitudinal plates or bands well separated from each other. In female, epigynum free from epimerites IIIa, terminal cleft 2–3 times longer than wide at midlevel 2
2. In both sexes, prodorsal shield with angular or dash-like lacunae. In males, anterior half of hysteronotal shield with angular lacunae; adanal suckers dentate, tarsus IV with claw-like apical process, opisthosomal lobes with oblique posterior margin (Figs. 37A, B, 39A). In females, lacunae on hysteronotal shield of uniform size across all shield (Fig. 38A) . . . . . *A. cuneiformis* Mironov **sp. n.**
- In both sexes, prodorsal shield without ornamentation. In males, anterior half of hysteronotal shield without ornamentation; adanal suckers edentate or with faint radial striae, tarsus IV with bidentate apical process, opisthosomal lobes with truncate posterior margin. In females, anterior half of hysteronotal shield without ornamentation, its posterior half with large ovate lacunae. . . . . 3.
3. In both sexes, idiosoma 2.5–2.7 times longer than wide. . . . . *A. intermedius* (Trouessart and Neumann, 1888)
- Idiosoma longer than wide 1.8–2 times in males and 1.9–2.3 times in females. 4
4. In male, legs IV with ambulacral disc extending beyond posterior margin of terminal lamellae. In female, legs IV extending slightly beyond the level of lobar apices; head of spermatheca as small inflation at proximal end of primary spermaduct . . . . . *A. candango* Hernandes *et al.*, 2007
- In male, legs IV with ambulacral discs scarcely extending to posterior margin of terminal lamellae. In female, legs IV extending to the level of setae *h2*; head of spermatheca pear-shaped . . . . . *A. elaeniae* Mironov and González-Acuña, 2009

***Anisophyllodes cuneiformis* Mironov sp. n.**
(Figs. 37–39)

Type material. Male holotype (ZISP 6400), 9 male and 9 female paratypes from *Sittasomus griseicapillus* (Vieillot, 1818) (Furnariidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamaca Mts., 09°46′N, 83°47′W, 2 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 7 male and 7 female paratypes (ZISP 6401–6414)—ZISP; 1 male, 1 female paratypes—UMMZ (BMOC-15-1028-003), 1 male, 1 female paratypes—IMUCR.

Description. MALE (holotype, range for 9 paratypes in parentheses). Idiosoma, length × width, 325 (320–340) × 170 (170–180), length of hysterosoma 205 (200–220). Prodorsal shield: antero-lateral extensions short and acute, lateral margins without incisions, posterior angles obliquely cut, posterior margin almost straight, setae *ve* rudimentary, surface with numerous cuneiform lacunae, length along midline 92 (90–95), width at posterior margin 115 (110–120). Scapular setae *se* separated by 72 (70–75). Setae *c2* in antero-mesal angles of humeral shields. Setae *cp* on humeral shield. Setae *c3* lanceolate, 23 (22–25) × 6 (5–6.5). Distance between prodorsal and hysteronotal shields along midline 40 (40–45). Hysteronotal shield: 200 (200–215) in length, 110 (110–120) in width; anterior margin slightly concave; anterior angles acute, surface with numerous cuneiform lacunae in anterior part and with ovate lacuna in posterior part (Fig. Fig. 37A). Setae *c1* on anterior margin of hysteronotal shield. Opisthosoma noticeably attenuate from level of trochanters IV to lobar apices; opisthosomal lobes small roughly triangular, their postero-lateral margins with narrow and rounded terminal lamellae, about 3 in greatest length and 24 (22–25) in width. Terminal cleft between lobes slit-shaped, anterior end of the cleft extending to level of setae *h3*, length from anterior end to posterior margin of lobes 20 (20–24). Supranal concavity distinct, represented by narrow longitudinal groove opened posteriorly. Setae *h2* situated on small lateral extensions of opisthosomal lobes, setae *h3* on outer margins of opisthosoma, at level of opisthosomal lobe bases. Setae *ps1* minute filiform, situated on lateral margins of terminal cleft noticeably posterior to level of setae *h3*. Distance between dorsal setae: *c2:d2* 72 (70–75), *d2:e2* 82 (80–88), *e2:h3* 37 (35–40), *h2:h2* 40 (40–44), *h3:h3* 30 (30–32), *ps2:ps2* 52 (50–55), *h1:h3* 15 (15–18), *h3:ps1* 10 (10–12), *d1:d2* 20 (20–25), *e1:e2* 25 (25–30).

Epimerites I free, well separated, with posterior tips slightly divergent, without surface fields; epimerites II with narrow sclerotized fields (Fig. 37B). Epimerites IVa rudimentary, rudimentary sclerite rEpIIa present. Genital arch inverted, 12 (12–14) in length and 28 (27–33) in width; basal sclerite bow-shaped, similar in size and form to

genital arch. Aedeagus dagger-like, 23 (20–24) in length, reaching midlevel between setae *g* and *ps3* (Fig. 39A, B). Distance from margin of genital apparatus to lobar apices 95 (90–105). Genital papillae on small transverse plates at level of anterior margin of basal sclerite. Pregenital apodemes represented by a pair of longitudinal sclerites, their anterior ends fused with inner tips of epimerites IIIa, posterior ends of these apodemes extending to bases of setae *4a*; setae *4b* situated on anterior parts of these apodemes. Distance between ventral setae: *3a:4b* 17 (13–18), *4b:4a* 30 (30–32), *4a:g* 40 (40–45), *g:g* 18 (17–20), *g:ps3* 20 (19–20), *ps3:ps3* 18 (17–19), *ps3:h3* 43 (42–44). Adanal suckers 10 (10–12) in diameter, corolla with 6–7 denticles on posterior margin. Adanal shields of complicated uneven form (roughly V- or L-shaped), situated antero-lateral to adanal suckers, with inner branches touching or encompassing bases of setae *ps3*. Cupules *ih* present, surrounded by sclerotized areas (Fig. 37A).

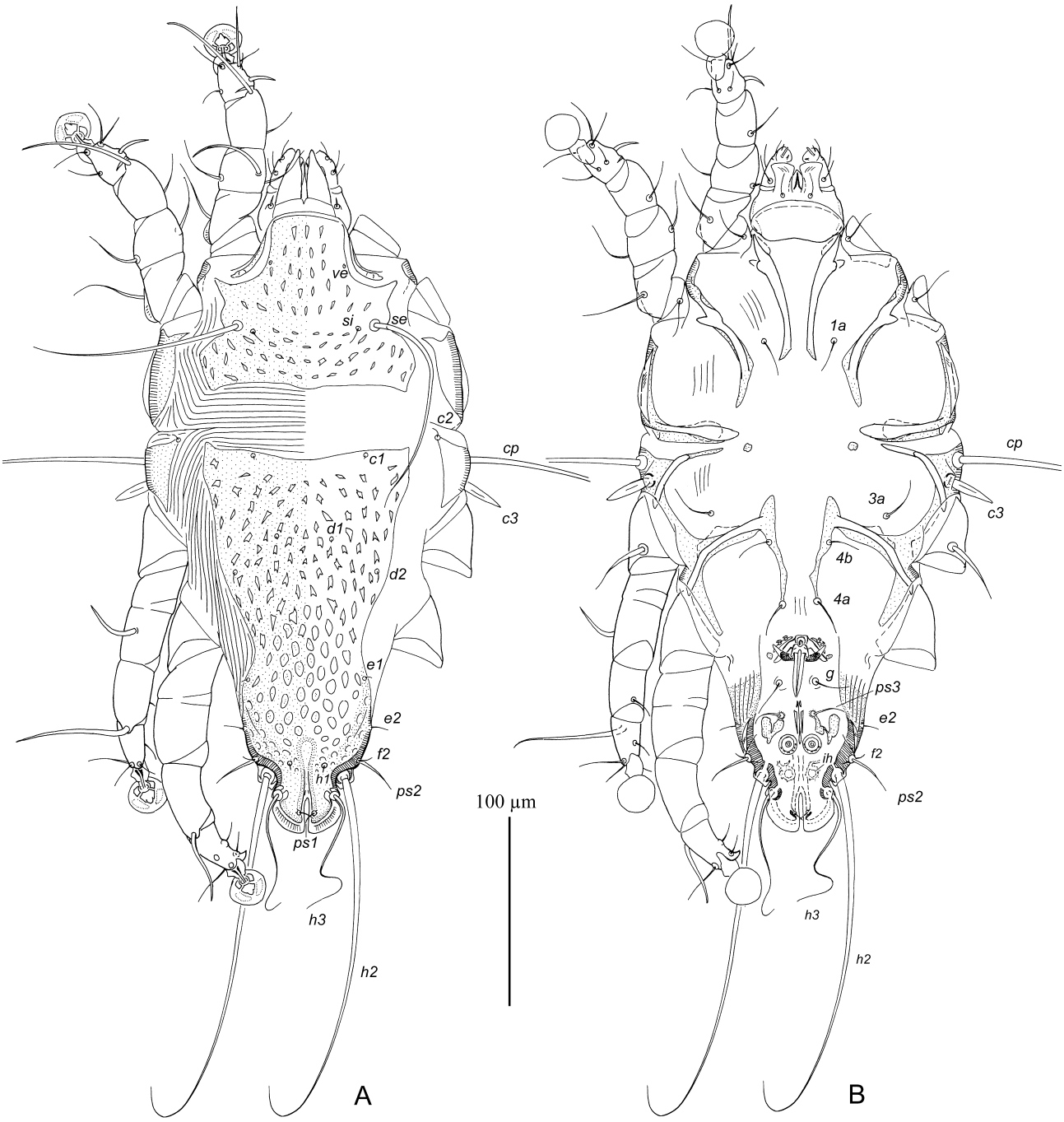

FIGURE 37. *Anisophyllodes cuneiformis* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Femora I, II with ventral crest, other segments of legs I, II without processes. Solenidion *σ1*I 1.5 times longer than genu I and situated at midlevel of this segment (Fig. 39C, D). Solenidion *σ* of genu III situated at midlevel of

segment. Legs IV slightly thicker than legs III, with tarsus IV extending beyond level of terminal lamellae. Tarsus IV 27 (27–28) long, with rounded apex and apicoventral claw-like process near base of l seta *r*; modified setae *d, e* button-like, seta *d* situated in distal half of this segment (Fig. 39F). Setae *d, f* of tarsi II, III subequal in length. Length of solenidia: $\sigma 1$I 37 (37–38), σIII 30 (30–32), φIV 35 (35–38).

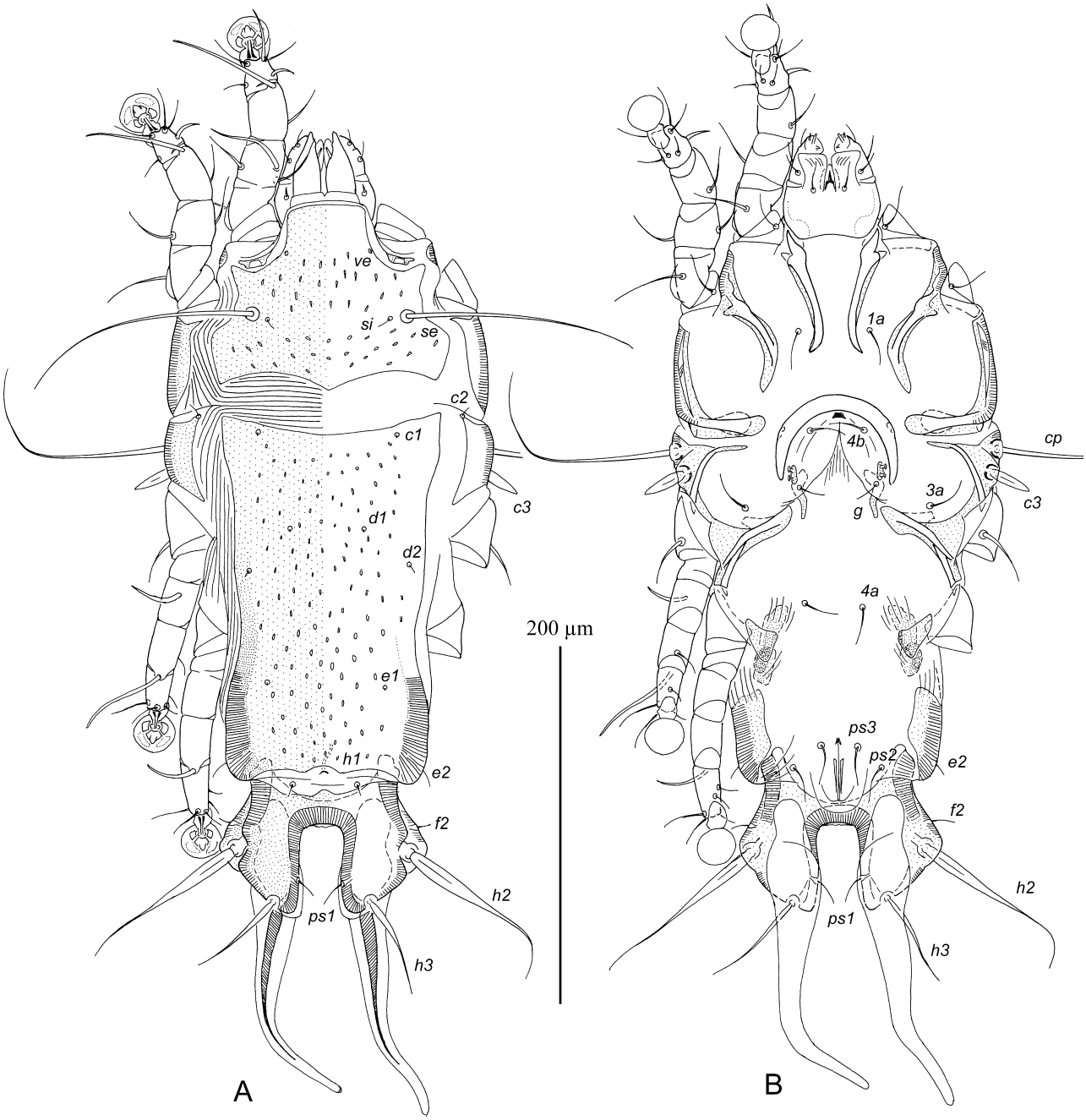

FIGURE 38. *Anisophyllodes cuneiformis* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

FEMALE (range for 9 paratypes). Idiosoma, length × width, 400–410 × 180–190, length of hysterosoma 260–270. Prodorsal shield: anterolateral extensions acute, lateral margins entire, posterior margin with blunt-angular median extensions and with a pair of shallow concavities, surface with numerous dash-like and narrowly ovate lacunae, 105–108 in length and 130–135 in width. Setae *ve* rudimentary. Setae *se* separated by 85–87. Setae *c2* on antero-mesal angles of humeral shields. Setae *c3* lanceolate, 22–24 × 5–5.5. Setae *cp* on humeral shields. Distance between prodorsal and hysteronotal shields along median line 30–35. Hysteronotal shield completely split into anterior and lobar parts. Anterior hysteronotal shield: 190–200 in length and 115–120 in width; anterior margin slightly concave, anterior angles acute, posterior margin with a pair of very short blunt-angular extensions, surface with numerous small narrowly-ovate lacunae (Fig. 38A). Setae *c1* on anterior margin of hysteronotal shield. Lobar

region: anterior margin concave, sinuous, greatest length 73–75, greatest width 112–115. Terminal cleft parallel-sided, shaped as an inverted U, 48–52 in length and 22–25 in width. Supranal concavity indistinct. Setae *h1* inserted on striated tegument between the anterior hysteronotal and lobar shields. Setae *h2* strongly thickened basally, with filiform apical part, 105–110 in length, 6.5–7.7 in width; setae *h3* 47–52 in length. Setae *h1* and *f2* in trapezoidal arrangement.

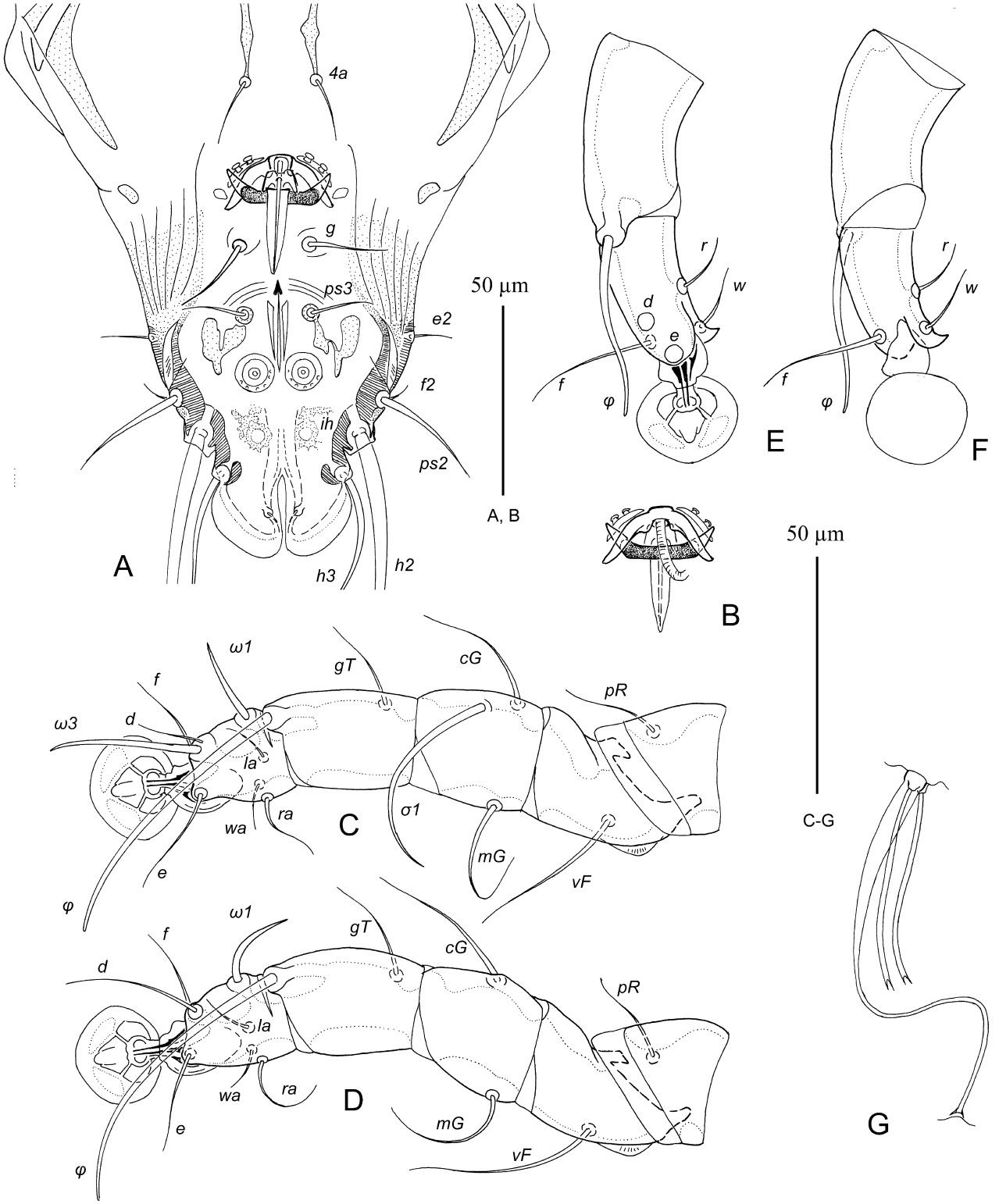

FIGURE 39. *Anisophyllodes cuneiformis* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B—genital apparatus of male, dorsal view, C, D—legs I and II of male, dorsal view, E—tibia and tarsus IV of male, dorsal view, F—tibia and tarsus IV of male, ventral view, G—spermatheca and spermaducts.

Distance between dorsal setae: *c2:d2* 85–88, *d2:e2* 105–110, *e2:h2* 42–48, *h2:h3* 30–32, *h1:h2* 36–38, *d1:d2* 20–22, *e1:e2* 45–48, *h1:h1* 35–38, *h2:h2* 96–100, *h2:ps1* 16–18.

Epimerites I as in male; epimerites I–II with narrow sclerotized fields. Epimerites IVa present, with long anterior and posterior extensions (Fig. 38B). Epigynum semicircular, thick, with small lateral extensions, 47–50 in length, 70–73 in width, tips extending to level of anterior pair of genital papillae. Genital papillae of each side on small ovate sclerite. Setae *ps2* at midlevel of anal opening. Translobar apodemes fused to each other anterior to terminal cleft. Copulatory opening ventral, situated immediately posterior to flaps of anal opening, head of spermatheca short, proximal part of primary spermaduct with ampuliform enlargement, secondary spermaducts 40–45 long (Fig. 39G). Distance between pseudanal setae: *ps2:ps2* 50–52, *ps3:ps3* 20–21, *ps2:ps3* 10–13.

Legs I, II as male. Solenidion σ of genu III situated in basal part this segment. Legs IV with ambulacral disc extending to level of setae *h2*. Solenidion φ of tibia IV slightly shorter than corresponding tarsus. Setae *d* of tarsi II–IV subequal in length to corresponding setae *f*. Length of solenidia: $\sigma 1$I 35–37, σIII 24–25, φIII 47–50, φIV 25–28.

Differential diagnosis. Among the four previously known species, *Anisophyllodes cuneiformis* sp. n. is most similar to A. *pipromorphae* in having the apicoventral extension of tarsus IV with a single point in males, and the entire surface of the dorsal shields with lacunae in both sexes. *Anisophyllodes cuneiformis* differs from *A. pipromorphae* by the following features. In males of *A. cuneiformis* sp. n., the prodorsal and hysteronotal shields are ornamented with numerous cuneiform and polygonal lacunae, the terminal lamellae are situated obliquely, setae *ps1* are situated posterior to the level of setae *h3*, the genital arch is inverted and its branches are directed anterolaterally; in females, the posterior margin of the hysteronotal shield does not have a median extension and the prodorsal shield bears small ovate and dash-like lacunae. In males of *A. pipromorphae*, the prodorsal and hysteronotal shields have numerous circular and ovate lacunae (up to 8 μm in diameter), the terminal lamellae are situated on the truncate posterior margins of the opisthosomal lobes, setae *ps1* are situated at the level of setae *h3* or slightly anterior to this, the genital arch is normally orientated, with branches directed posterolaterally; in females, the posterior margin of the anterior hysteronotal shield has a rounded medial extension and the prodorsal shield has numerous ovate lacunae (Fig. 41A).

Etymology. The specific epithet refers to the triangular form of the lacunae on the dorsal shields in males resembling cuneiform writing.

Anisophyllodes pipromorphae Atyeo, 1967

(Figs. 40–42)

Anisophyllodes pipromorphae Atyeo, 1967a: 467, figs. 1–6.

Material examined. 7 males and 15 females (ZISP 6214–6235) from *Mionectes oleagineus* (Lichtenstein MHK, 1823) (Tyrannidae) (type host), **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10°46'N, 85°18'W, 20 August 2009, collectors I. Literak, O. Sychra and M. Capek; 1 males and 9 females (ZISP 6236–6245) from *Mionectes olivaceus* Lawrence (Tyrannidae), same location data, 20 August 2009, collectors I. Literak, O. Sychra and M. Capek; 6 males and 8 females (ZISP 6373–6386) from *M. olivaceus*, **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamaca Mts., 09°46′N, 83°47′W, 31 July 2009, collectors I. Literak, O. Sychra and M. Capek; 4 males and 9 females (ZISP 6496–6508) from *M. olivaceus*, same location data and collectors, 8 August 2009. All collected males are homeomorphs.

Description. HOMEOMORPH MALE (range for 7 specimens from *Mionectes oleagineus*). Idiosoma, length × width, 280–295 × 150–155, length of hysterosoma 175–190. Prodorsal shield: antero-lateral extensions rounded, lateral margins entire, posterior angles unevenly indented, posterior margin with a pair of shallow concavities, surface with numerous ovate and circular lacunae up to 5 in diameter, length along midline 102–108, width at posterior margin 115–120). Setae *ve* rudimentary. Scapular setae *se* separated by 75–80. Setae *c2* on antero-mesal angles of humeral shields. Setae *cp* on humeral shield. Setae *c3* lanceolate, 16–18 × 5–5.5. Distance between prodorsal and hysteronotal shields along midline 7–15. Hysteronotal shield: 180–185 in length, 115–125) in width; anterior margin slightly concave; anterior angles roughly rectangular, surface with numerous ovate and circular lacunae (Fig. 40A). Setae *c1* on anterior margin of hysteronotal shield. Opisthosoma slightly narrowed terminally,

opisthosomal lobes short triangular, with acute membranous apices. Terminal cleft short blunt-angular, with narrow membranous margin, extending to level of setae *h2*, length from anterior end to lobar apices 12–14. Supranal concavity distinct, represented by narrow longitudinal groove enlarged anteriorly, 15–20 long. Setae *h2* situated on oblique rounded lateral extensions of opisthosoma, setae *h3* on small angular extension near lobar apices, setae *h1* at level of anterior end of supranal concavity; setae *ps1* approximately at level of setae *h3*. Distance between dorsal setae: *c2:d2* 67–75, *d2:e2* 70–75, *e2:h3* 27–37, *h2:h2* 58–62, *h3:h3* 40–43, *ps2:ps2* 73–75, *h1:h3* 22 –25, *d1:d2* 22–24, *e1:e2* 27–33.

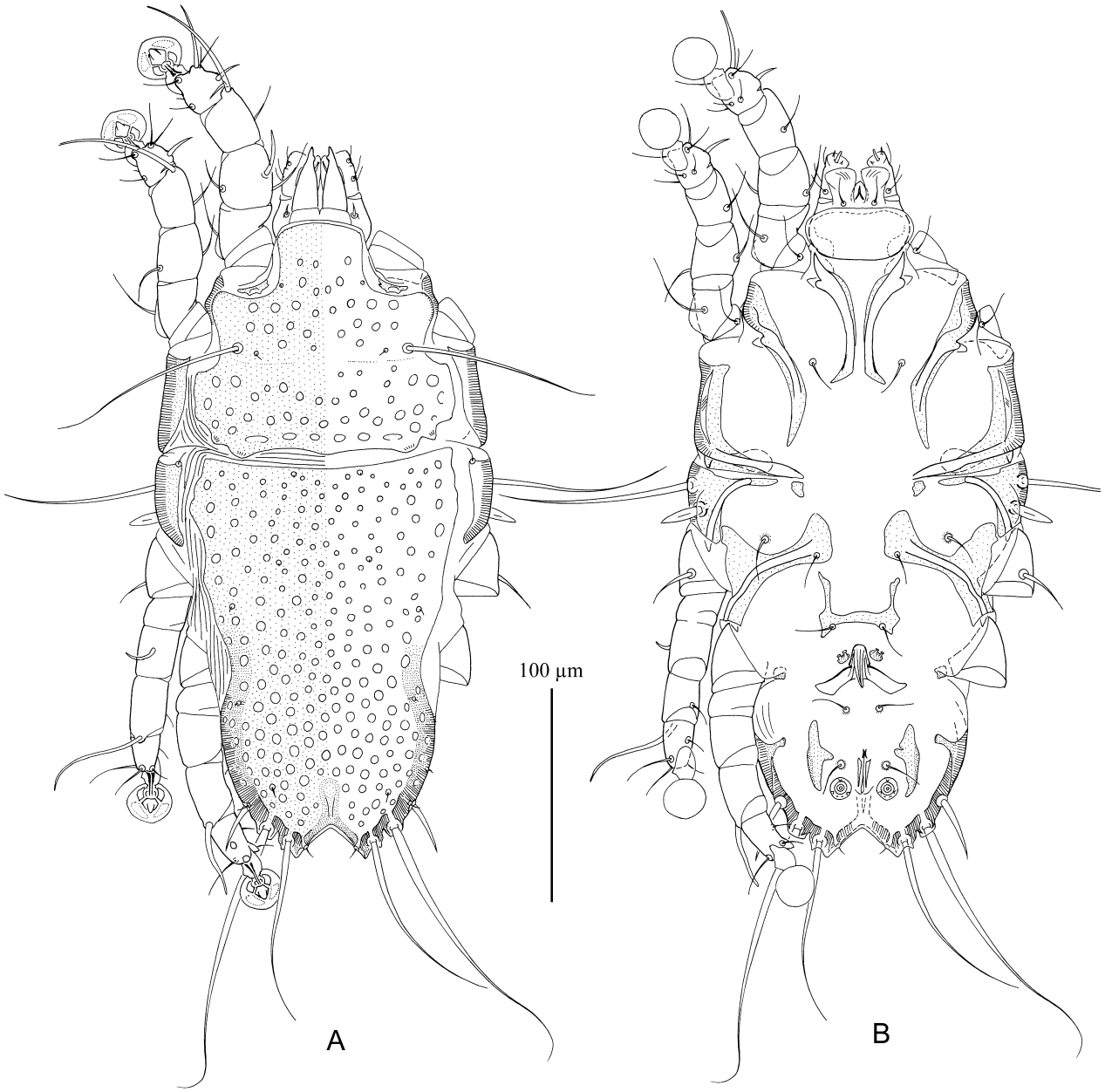

FIGURE 40. *Anisophyllodes pipromorphae* Atyeo, 1967, homeomorph male. A—dorsal view, B—ventral view.

Epimerites I free, close to each other, posterior tips divergent; epimerites I, II with narrow sclerotized fields; epimerites IVa rudimentary (Fig. 40B). Rudimentary sclerite rEpIIa present. Genital arch of moderate size, arch apex at midlevel of trochanters IV, 22–25 in length and 42–44 in width. Aedeagus dagger-like, 20–23 in length, reaching level of genital arch base (Fig. 42A, B). Genital papillae on small ovate plates at level of genital arch apex. Distance from genital arch apex to bases of setae *h3* 92–95. Pregenital apodemes represented by a pair of longitudinal sclerites situated between tips of epimerites IIIa and genital apparatus, their posterior ends connected

by transverse bridge; setae *4a* on posterior ends of these apodemes, setae *4b* on inner tips of epimerites IIIa. Distance between ventral setae: *3a:4b* 10–12, *4b:4a* 30–33, *4a:g* 35–38, *g:g* 12–15, *g:ps3* 22–25, *ps3:ps3* 20–23, *ps3:h3* 35–40. Adanal suckers 10–11 in diameter, corolla with unequal indentation: one large denticle on anterior margin, two large denticles and two small denticles on posterior margin. Adanal shields situated anterolateral to adanal suckers, represented by a pair of longitudinal sclerites with a short extension on their inner margins, setae *ps3* situated mesal to each of these sclerites.

Femora I, II with ventral crest. Solenidion *σ1* of genu I subequal in length to this segment and situated at its midlevel (Fig. 42C, D). Solenidion *σ* of genu III situated at midlevel of segment. Legs IV slightly thicker than legs III, with ambulacral disc extending beyond the level of lobar apices. Setae *d*, *f* of tarsi II, III subequal in length. Tarsus IV 22–24 long, with short claw-like apicoventral process; modified setae *d*, *e* button like, seta *d* slightly closer to apex of segment than to its base, solenidion *φ*IV extending to midlevel of ambulacral discs (Fig. 42E, F). Length of solenidia: *σ1*I 22–25, *σ*III 8–12, *φ*IV 32–35.

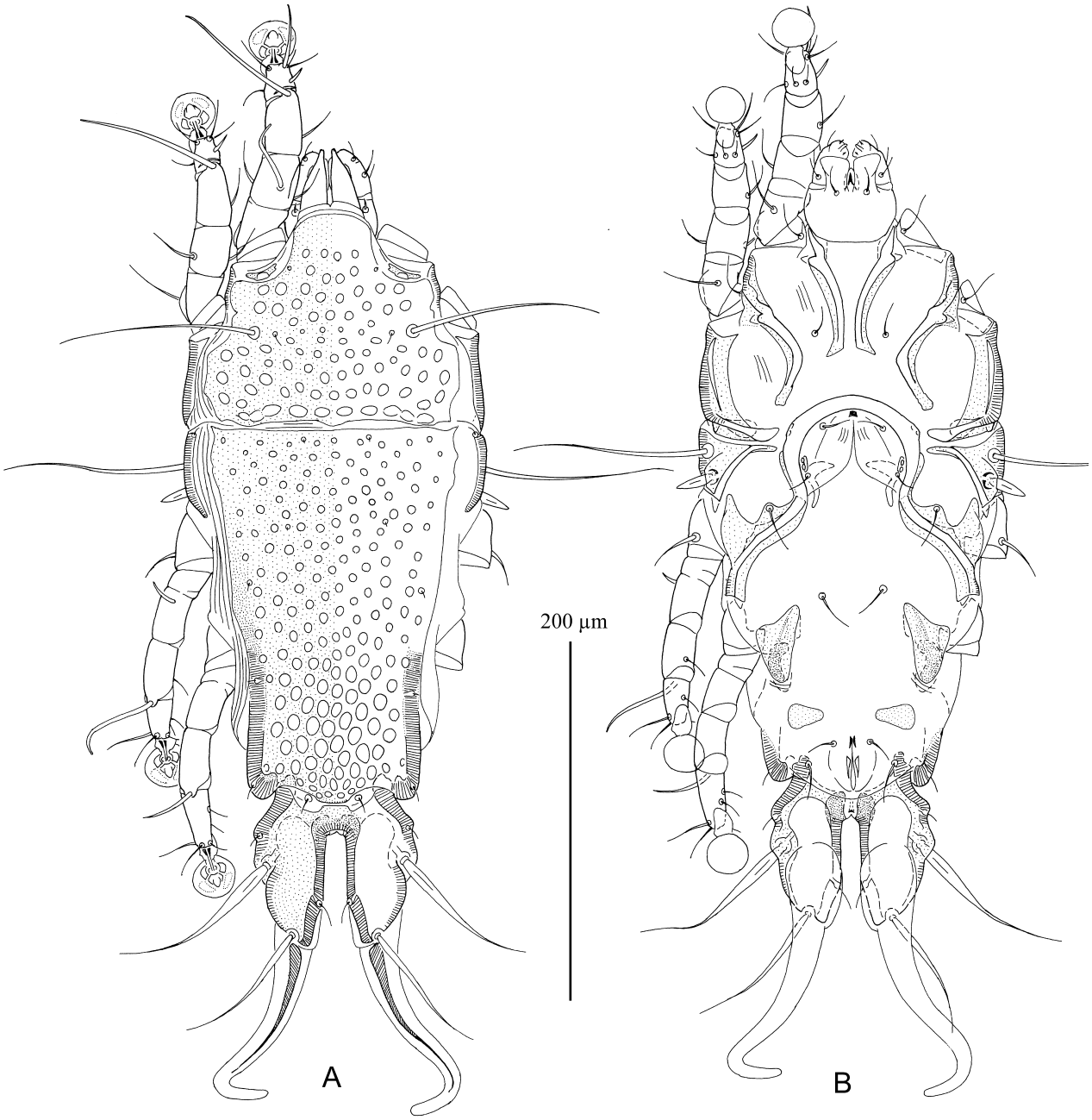

FIGURE 41. *Anisophyllodes pipromorphae* Atyeo, 1967, female. A—dorsal view, B—ventral view.

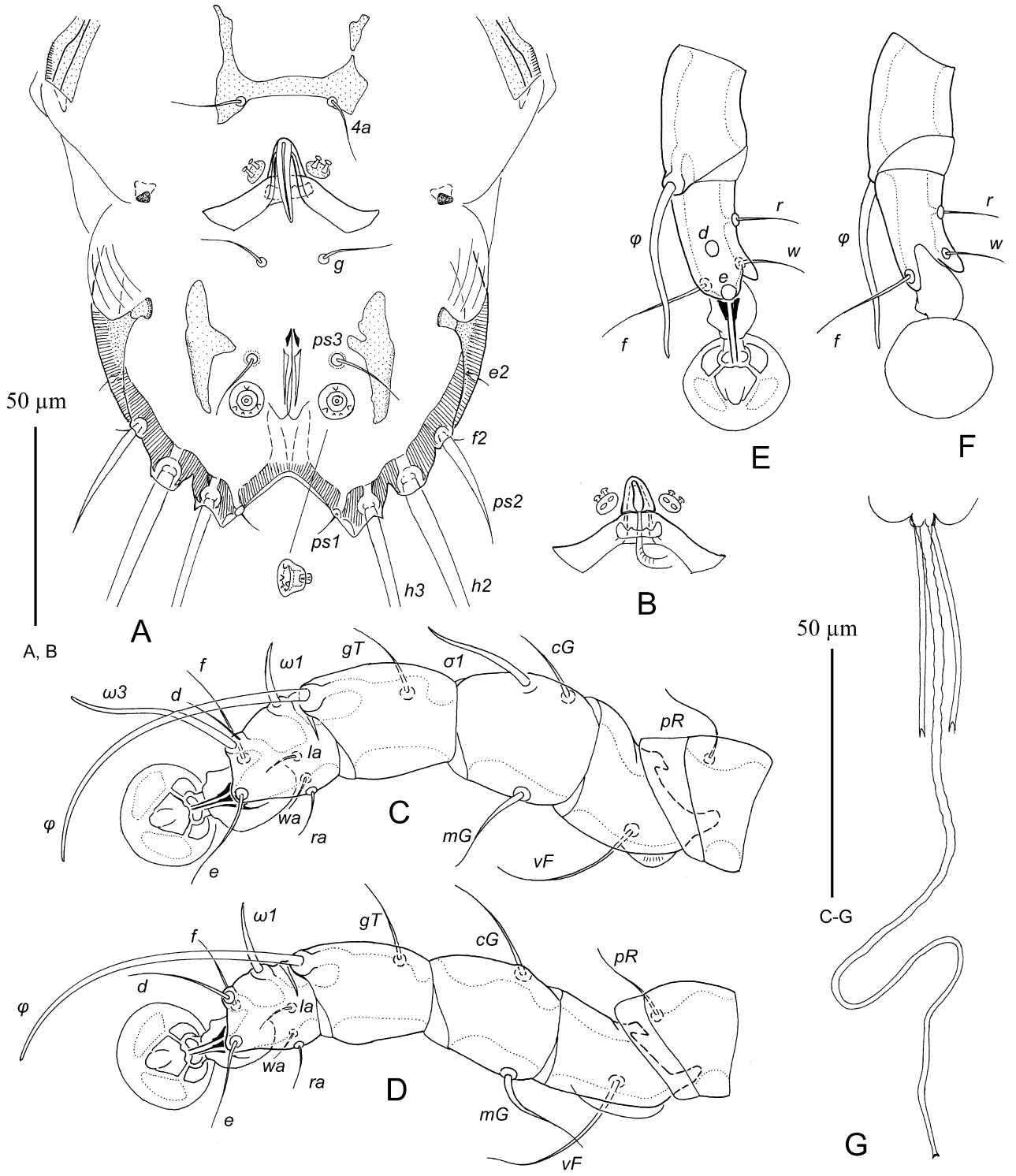

FIGURE 42. *Anisophyllodes pipromorphae* Atyeo, 1967, details of female and homeomorph male. A—opisthosoma of male, ventral view, B—genital apparatus of male, dorsal view, C, D—legs I and II of male, dorsal view, E—tibia and tarsus IV of male, dorsal view, F—tibia and tarsus IV of male, ventral view, G—spermatheca and spermaducts.

FEMALE (range for 10 specimens from *M. oleagineus*). Idiosoma, length × width, 390–410 × 155–170, length of hysterosoma 280–290. Prodorsal shield: shape and ornamentation as in male, 110–118 in length and 125–140 in width. Setae *ve* rudimentary. Setae *se* separated by 82–88. Setae *c2* on antero-mesal angles of humeral shields. Setae *cp* set on humeral shields. Setae *c3* lanceolate, 17–20 × 5–6.5. Prodorsal and hysteronotal shields almost touching. Hysteronotal shield completely split into anterior and lobar shields. Anterior hysteronotal shield: 200–

210 in length and 125–135 in width; anterior margin straight, anterior angles acute, posterior margin with shortened wide median extension and a pair of shallow concavities, entire surface with numerous circular and ovate lacunae up to 8 in diameter; size of lacunae increases to posterior part of this shield (Fig. 41A). Setae *c1* on anterior margin of hysteronotal shield. Lobar region: greatest length 82–90, greatest width 92–98. Terminal cleft as a narrow inverted U, slightly divergent posteriorly, 62–65 in length and 10–17 in width in anterior part. Anterior margin of lobar shield with short and truncate median extension and with a pair of incisions. Supranal concavity indistinct. Setae *h1* inserted on soft tegument between anterior hysteronotal and lobar shields. Setae *h2* strongly thickened basally, with filiform apical filament, 85–105 long, 6.5–7.5 wide, slightly shorter than terminal appendages; setae *h3* 70–80 long, about 2/3 of terminal appendages. Setae *h1* and *f2* in trapezoidal arrangement. Setae *ps1* approximately equidistant from levels of setae *h2* and *h3*. Distance between dorsal setae: *c2:d2* 77–87, *d2:e2* 105–115, *e2:h2* 37–45, *h2:h3* 37–40, *h1:h2* 35–37, *d1:d2* 27–37, *e1:e2* 52–60, *h1:h1* 22–27, *h2:h2* 77–80, *h2:ps1* 20–23.

Epimerites I, II as in male, with narrow sclerotized fields. Epimerites IVa large triangular. Epigynum horseshoe-shaped, thick, length 52–58, greatest width 70–80, posterior tips fused with inner ends of epimerites IIIa, traces of fusion distinct (Fig. 41B). Genital papillae of each side situated on small ovate plate extending to bases of setae *g*. Setae *ps2* at middle of anal opening. Translobar apodemes not fused to each other anterior to terminal cleft. Copulatory opening ventral, situated near anterior end of terminal cleft. Head of spermatheca short, poorly sclerotized; primary spermaduct without enlargements; secondary spermaducts 30–35 long (Fig. 42G). Distance between pseudanal setae: *ps2:ps2* 47–50, *ps3:ps3* 20–25, *ps2:ps3* 10–13.

Legs I, II as male. Legs IV with ambulacral disc extending to level of setae *h2*. Solenidion *σ1*I about 1.5 times longer than genu I and situated at midlevel of this segment. Solenidion *σ* of genu III in basal part of this segment. Setae *d* and *f* of tarsi II–IV subequal in length. Solenidion *φ* of tibia IV slightly shorter than corresponding tarsus. Length of solenidia: *σ1*I 27–32, *σ*III 12–17, *φ*III 45–47, *φ*IV 27–30.

Remark. *Anisophyllodes pipromorphae*, the type species of the genus *Anisophyllodes*, was originally described from heteromorph and homeomorph males from *Mionectes oleagineus* (Tyrannidae) from Trinidad (Atyeo 1967a), while its female remained unknown. This species displays several unique morphological characteristics within the family Proctophyllodidae. It is one of rarest cases with two discretely different forms of males. The only other case known in this family is represented by the monobasic genus *Ptyctophyllodes* Atyeo, 1967.

Additionally, females of *A. pipromorphae*, described herein, have the epigynum fused with the tips of epimerites IIIa (Fig. 41B). This morphological feature is the main and unconditional diagnostic characteristic of the subfamily Pterodectinae (Park & Atyeo 1971a; Gaud & Atyeo 1996). No doubt, this character state arose independently in *A. pipromorphae* and the subfamily Pterodectinae. In this unique proctophyllodine species, the junction between the epigynum and the inner tips of the epimerites remains clearly visible, while in pterodectines, these sclerites form an integrated keyhole-shaped structure without any traces of fusion.

Genus *Atrichophyllodes* Valim, Hernandes and Mironov, 2007

Type species: *Atrichophyllodes delalandi* Hernandes, Valim and Mironov, 2007, by original designation.

Diagnosis. BOTH SEXES. Moderately elongated proctophyllodines. Prodorsal shield covering nearly the entire prodorsum, with antero-lateral extensions, and rounded posterior angles. Vertical setae *vi* rudimentary, represented by alveoli. Scapular setae *si* and *se* situated on prodorsal shield and arranged in transverse line. Humeral shields well-developed dorsally, encompassing bases of setae *c2* and *cp*. Subhumeral setae *c3* lanceolate. Epimerites I free, bow-shaped, with posterior ends slightly divergent. Hysteronotal setae *d2* and *e2* absent. Solenidion *σ1* of genu I slightly longer than solenidion *ω3* of tarsus I. Tarsi I, II with 3 ventral setae, setae *wa* anterior to setae *la* and *ra* on these tarsi. Segments of legs I and II without processes or other modifications.

MALE. Hysteronotal shield covering almost all hysterosoma. Opisthosoma wide, opisthosomal lobes short and wide; posterior margin of lobes with semicircular terminal lamellae, striated or punctated dorsally. Supranal concavity well expressed. Setae *h3* shorter than macrosetae *h2*. Setae *h1* anterior to the level of setae *ps2*. Coxal fields I–IV open, without extensive sclerotized areas. Genital organ at level of trochanters IV; genital arch wide and low, aedeagus in sheath approximately twice as long as genital arch. Adanal shields present, variable in form,

situated between adanal suckers and setae *ps3*, connected each other anterior to anal opening or free. Genital papillae situated at level of genital arch apex, surrounded by ovate plates or these plates absent. Pregenital and paragenital apodemes absent. Adanal apodemes present or absent. Opisthoventral shields poorly developed. Adanal suckers cylindrical, corolla dentate. Legs III and IV subequal, not hypertrophied. Tarsus IV without apical claw-like process, with or without ventral extension, modified setae *d* and *e* button-like.

FEMALE. Lobar region of opisthosoma clearly separated from remaining part of hysterosoma, opisthosomal lobes well developed, with terminal appendages. Anterior hysteronotal and lobar shields separated by narrow band of striated tegument. Lobar shield entire or split longitudinally. Supranal concavity absent. Macrosetae *h2* thickened basally, with filiform apex. Epigynum large, semicircular or horseshoe-shaped. Translobar apodemes present, fused with each other anterior to terminal cleft or free. Copulatory opening terminal or subterminal. Legs III and IV subequal in size; segments without modifications; solenidia φ of tibiae III and IV subequal or solenidion φIV noticeably shorter.

Hosts. Thamnophilidae, Tyrannidae.

Remark. The genus *Atrichophyllodes* is close to *Nycteridocaulus*, in particular, by the form of the opisthosomal lobes, the terminal lamellae and the shape of the genital apparatus in males. It is readily differentiated from that genus by the lack of lateral idiosomal setae *d2* and *e2* in both sexes. The genus previously included three species (Hernandes *et al.* 2007; Hernandes 2014). One new species is described herein.

Key to species of *Atrichophyllodes*

(Males)

1. Terminal cleft deep, extending to level of setae *h2*, setae *ps3* situated on adanal shields, rudimentary sclerites rEpIIa absent, tarsus IV without ventral extension. . . . . 2.
- Terminal cleft short, not extending to level of setae *h2*, setae *ps3* situated off adanal shields, rudimentary sclerites rEpIIa present, tarsus IV with ventral extension. . . . . 3.
2. Aedeagus extending to level of setae *g*, genital papillae situated on soft tegument and joined at bases, proximal button-like seta *d* of tarsus IV nearly two times larger in diameter than apical button-like seta *e*. . . . . *A. mentalis* Hernandes *et al.,* 2007
- Aedeagus not extending to level of setae *g*, genital papillae situated on small ovate plates, apical button like seta *e* of tarsus IV nearly two times larger than proximal button-like seta *d* (Figs. 43B, 45E) . . . . . *A. latilobus* Mironov **sp. n.**
3. Genital arch shaped as a low bow, aedeagus 24–29 µm long, setae *3a* situated off epimerites IIIa, opisthoventral shields not developed, anterior ends of adanal shields wide and truncate, tarsus IV with long ventral extension bearing seta *r* . . . . . *A. delalandi* Hernandes *et al.*, 2007
- Genital arch shaped as recurved bow (bat-shaped), aedeagus 20–22 µm long, setae *3a* situated on narrow extensions going posterior from tips of epimerites IIIa, opisthoventral shields with long and narrow extensions directed antero-mesally, anterior ends of adanal shields long and attenuate, tarsus IV with rounded ventral extension bearing setae *r* and *w* . . . . . *A. leucopterus* Hernandes, 2014

(Females)

1. Lobar region with strong lateral extensions bearing bases of setae *h2*, greatest width of lobar region twice as wide as base of lobar region; bases of trochanters IV flanked by sclerotized band (Fig. 44A, B). . . . . *A. latilobus* Mironov **sp. n.**
– Lateral margins of lobar region moderately convex, greatest width of lobar region 1.2-1.5 times as wide as base of lobar region; bases of trochanters IV without sclerotized band 2
2. Terminal cleft as a narrow inverted V with inner margins of opisthosomal lobes almost touching, epigynum horseshoe-shaped . . . . . *A. delalandi* Hernandes *et al.* 2007
– Terminal cleft U-shaped (parallel-sided), approximately 2 times longer than wide; epigynum bow-shaped, with posterior ends not curved medially. 3
3. Terminal cleft approximately 3 times longer than wide, epigynum semicircular, proximal part of primary spermaduct approximately 2 times wider than distal part . . . . . *A. mentalis* Hernandes *et al.*, 2007
- Terminal cleft approximately 2 times longer than wide, outer margins of epigymun with blunt angles, proximal part of primary spermaduct near head of spermatheca with strong ampuliform enlargement, approximately 5 times wider than distal part . . . . . *A. leucopterus* Hernandes, 2014

***Atrichophyllodes latilobus* Mironov sp. n.**
(Figs. 43–45)

Type material. Male holotype (ZISP 6340), 3 male and 2 female paratypes from *Hylophylax naevioides* (Lafresnaye, 1847) (Thamnophilidae), **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10°46'N, 85°18'W, 20 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depositories. Holotype, 2 male and 1 female paratypes (ZISP 6341–6343)—ZISP, 1 male and 1 female paratype—IMUCR.

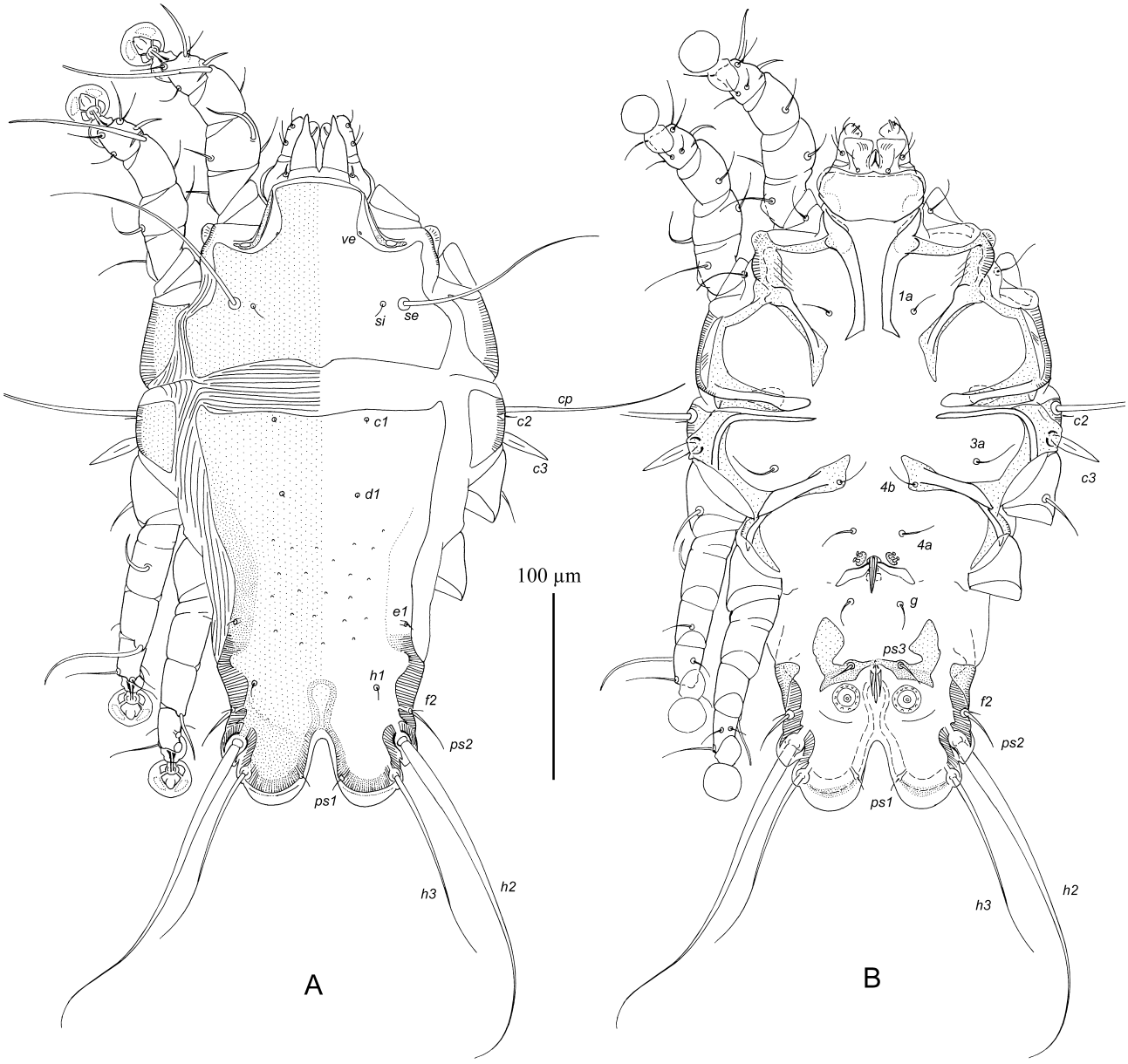

FIGURE 43. *Atrichophyllodes latilobus* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Description. MALE (holotype, range for 3 paratypes in parentheses). Idiosoma, length × width, 325 (315–325) × 195 (185–195), length of hysterosoma 210 (200–210). Prodorsal shield: anterolateral extensions acute, lateral margins entire, posterior margin with small median extension and two wide shallow concavities, 100 (90–100) in length, 135 (125–135) in width, surface without ornamentation (Fig. 43A). Setae *ve* rudimentary. Scapular setae *se* separated by 87 (80–88). Setae *c2* and *cp* on humeral shield. Setae *c3* lanceolate, 27 (25–28) × 6.5 (6–7). Distance between prodorsal and hysteronotal shields 25 (20–25). Hysteronotal shield: 200 (190–200) in length and

130 (120–135) in width; anterior margin almost straight, anterior angles acute, surface with small circular lacunae in central part. Opisthosomal lobes short and wide, slightly shorter than wide at base, posterior margins semicircular. Terminal lamellae with rounded free margin, greatest length 10 (10–13), surface without striation. Terminal cleft roughly triangular, with rounded anterior end, length of cleft from anterior end to bases of terminal lamellae 47 (45–50). Supranal concavity about 25 long, opened posteriorly into terminal cleft. Setae *h3* filiform situated in postero-lateral margins of opisthosomal lobes; setae *ps1* minute, situated on lateral margins of terminal cleft, approximately at level of setae *h3*; setae *h1* at level of anterior end of supranal concavity. Distance between dorsal setae: *c2:e2* 110 (105–115), *e2:h3* 82 (80–85), *h2:h2* 87 (83–90), *h3:h3* 77 (75–80), *ps2:ps2* 95 (90–98), *h1:h3* 47 (45–50).

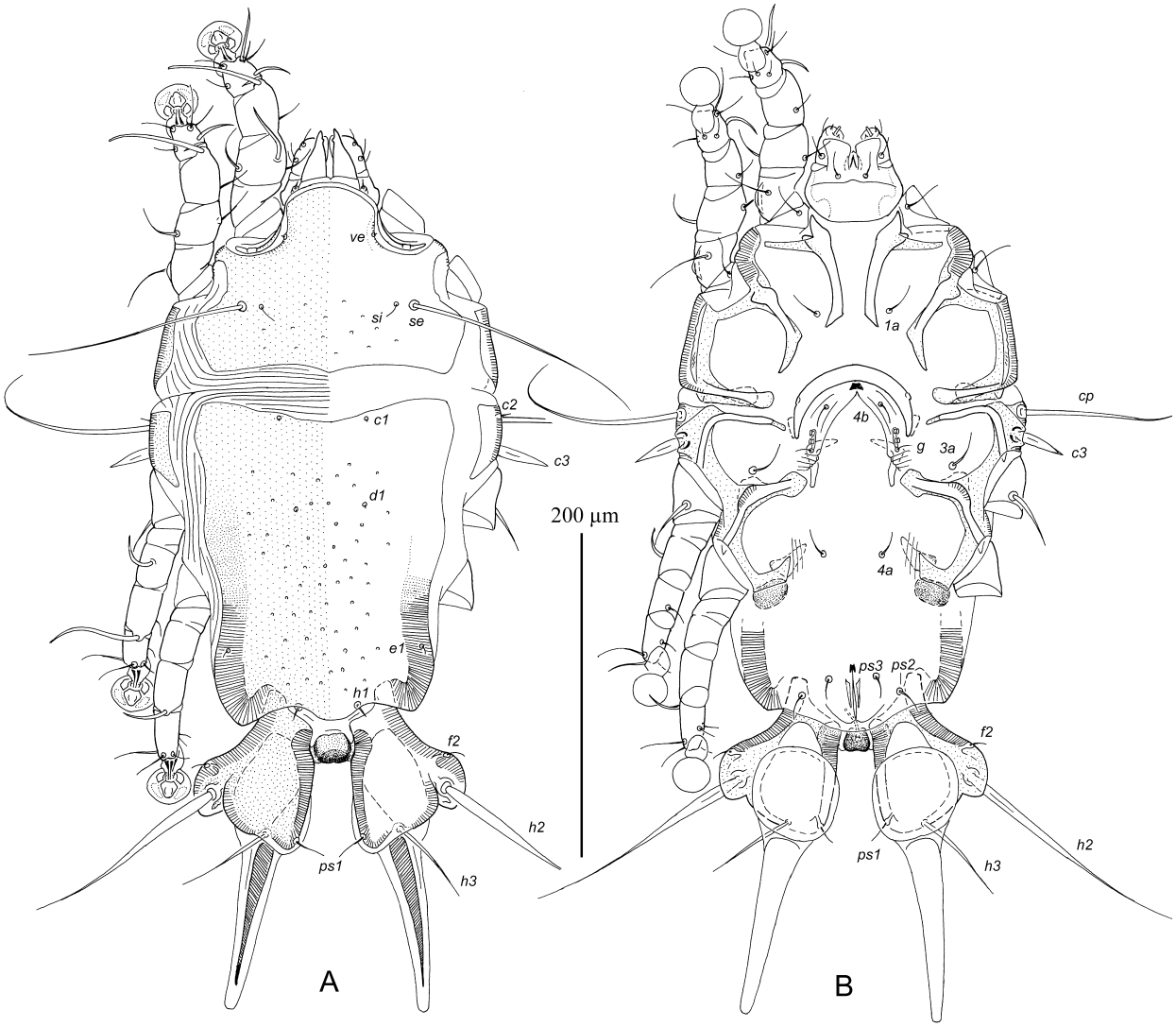

FIGURE 44. *Atrichophyllodes latilobus* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

Epimerites I free, well separated, with posterior tips slightly divergent. Epimerites Ia with small semi-rounded lateral extension (Fig. 43B). Epimerites I, II with narrow sclerotized fields. Bases of trochanters I–III flanked by narrow sclerotized bands connecting corresponding epimerites. Epimerites IVa absent. Rudimentary sclerite rEpIIa absent. Genital arch short, 13 (12–14) in length and 45 (40–45) in width; branches of arch with blunt-angular bent. Aedeagus stylet-like, 20 (20–22) in length, not reaching level of setae *g* (Fig. 45A). Genital papillae on small oval plates at level of genital arch apex. Distance from genital arch apex to bases of setae *h3* 115 (115–120). Pregenital apodemes absent. Setae *4b* on inner tips of epimerites IIIa, setae *4a* on soft tegument near them. Adanal suckers 15 (14–15) in diameter, corolla with 11–12 denticles. Adanal shields roughly L-shaped, connected each other by narrow transverse bridge anterior to anal opening, posterior parts more strongly sclerotized than anterior ones.

Setae *ps3* on transverse branches of adanal shields. Distance between ventral setae: *4b:3a* 10 (10–12), *4b:4a* 27 (24–28), *4a:g* 35 (32–35), *g:g* 25 (24–26), *g:ps3* 33 (30–34), *ps3:ps3* 25 (23–25), *ps3:h3* 60 (58–60).

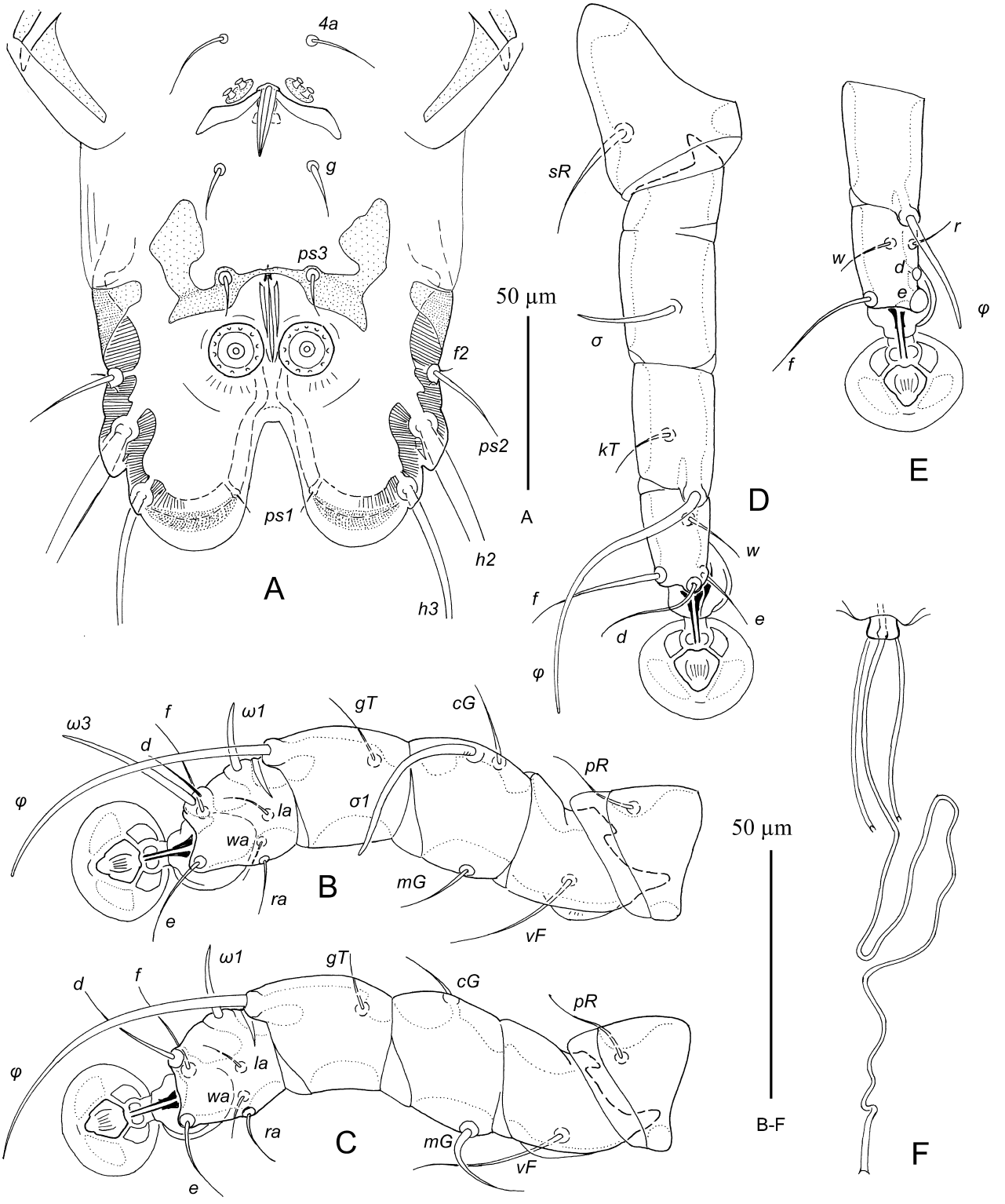

FIGURE 45. *Atrichophyllodes latilobus* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B–D—legs I–III of male, dorsal view, E—tibia and tarsus IV of male, dorsal view, F—spermatheca and spermaducts.

Femora I, II with narrow ventral crest. Solenidion *σ1*I about 1.3–1.4 times longer than genu I, situated at midlevel of this segment. Solenidion *σ* of genu III situated at midlevel of segment (Fig. 45B–D). Legs III and IV subequal in size; legs IV with ambulacral disc almost extending to level of lobar apices. Tarsus IV 23 (22–24) in

length, without apical process; modified setae *d* and *e* button-like, seta *e* approximately 2 times wider than seta *d* (Fig. 45E). Setae *d* and *f* of tarsus II subequal, seta *d* of tarsus III much shorter than corresponding seta *f*. Length of solenidia: *σ1*I 30 (28–30), *σ*III 20 (20–23), *φ*IV 25 (25–27).

FEMALE (range for 2 paratypes). Idiosoma, length × width, 410–415 × 210–215. Prodorsal shield: shaped as in male, anterolateral angles fused with bases of epimerites Ia, 115–120 in length and 160–165 in width. Setae *ve* rudimentary. Setae *se* separated by 105–110. Setae *c2* and *cp* on humeral shields; setae *c3* lanceolate, 26–28 × 6–6.5. Distance between prodorsal and hysteronotal shields 30. Anterior hysteronotal shield: 190–195 in length and 160–165 in width, anterior margin slightly concave, posterior margin with short median extension, median area with small poorly distinct lacunae (Fig. 44A). Lobar region: 97–100 in length and 165–170 in width, lateral margins with strong semiovate extensions bearing setae *h2*; lobar shield split into three fragments: a pair of large sclerites covering opisthosomal lobes and a small oval sclerite situated between their anterior ends. Terminal cleft almost rectangular, 55–60 in length and 27–29 in width. Supranal concavity absent. Setae *h2* thickened in basal part, 140–150 in length, 6–6.5 in width; setae *h3* 55–60 in length, about 1/2 of terminal appendages. Setae *h1* inserted on striated tegument between the anterior hysteronotal and lobar shields. Setae *h1* and *f2* in trapezoidal arrangement Setae *ps1* situated slightly posterior to level of setae *h3*. Distance between dorsal setae: *c2:e2* 140–145, *e2:h2* 87–90, *h2:h3* 28–30, *h1:h2* 56–58, *h2:ps1* 26–28, *h1:h1* 37–38, *h2:h2* 140–145.

Epimerites I, II as in male, with narrow sclerotized fields. Epimerites IVa large. Bases of trochanters I–IV flanked by narrow sclerotized bands connecting corresponding epimerites. Epigynum thick semicircular, with small lateral extensions, 45–48 in length, 78–80 in width, tips almost extending to level of genital papillae (Fig. 44B). Both genital papillae of each side and corresponding setae *g* on small longitudinal plate. Translobar apodemes wide, not fused to each other anterior to terminal cleft. Copulatory opening ventral, situated near anterior end of terminal cleft. Head of spermatheca short cylindrical, primary spermaduct without enlargements, secondary spermaducts 35–40 in length (Fig. 45F). Setae *ps2* at middle level of the anal opening. Distance between pseudanal setae, *ps2:ps2* 56–58, *ps3:ps3* 24–25, *ps2:ps3* 10–11.

Legs I, II as in male. Solenidion *σ* of genu III situated closer to base of this segment. Legs IV with ambulacral disc extending to level of setae *h2*. Solenidion *φ* of tibia IV slightly shorter than corresponding tarsus. Setae *d* of tarsus II slightly longer than corresponding seta *f*, setae *d* of tarsi III, IV shorter than corresponding setae *f.* Length of solenidia: *σ1*I 31–33, *σ*III 22–24, *φ*III 54–56, *φ*IV 22–24.

Differential diagnosis. The new species *Atrichophyllodes latilobus* sp. n. is most similar to *A. mentalis* Hernandes, Valim and Mironov, 2007, described from *Dysithamnus mentalis* (Temminck) (Thamnophilidae) from Brazil (Hernandes *et al.* 2007), by the absence of rudimentary sclerites rEpIIa in males, and in having strong lateral extensions of the opisthosomal lobes bearing setae *h2* in females. *Atrichophyllodes latilobus* sp. n differs from *A. mentalis* by the following features. In males, the aedeagus does not extend to the level of setae *g*, the genital papillae are situated on small ovate plates, the apical button-like seta *e* of tarsus IV is nearly two times larger than proximal button-like seta *d*; in females, the greatest width of lobar region is twice as wide as the base of the lobar region; the lobar shield is split into three pieces (two large lateral pieces covering lobes and a small median fragment), and setae *ps1* are situated at the level of setae *h3*. In males of *A. mentalis,* the aedeagus extends to the level of setae *g*, the genital papillae are situated on the soft tegument and joined at their bases, the proximal button like seta *d* of tarsus IV is nearly two times larger than apical button-like seta *e*; in females, the greatest width of the lobar region is 1.2-1.5 times that of the base, the lobar shield is entire, and setae *ps1* are distinctly anterior to the level of setae *h3.*

Etymology. The specific epithet refers to uncommonly wide opisthosomal lobes in females.

Genus *Diproctophyllodes* Atyeo and Gaud, 1968

Type species: *Proctophyllodes (Alloptes) dielytra* Trouessart, 1885, by original designation.

The genus *Diproctophyllodes* was established by Atyeo and Gaud (1968) and includes two species, *Diproctophyllodes dielytra* (Trouessart, 1885) and *D. oxyrunci* Atyeo and Gaud, 1968, associated with suboscine passerines of the families Pipridae and Tityridae, respectively (Table 1). This genus is close to *Nycteridocaulus*, but is readily differentiated from that genus by the males having hypertrophied legs III and extremely long opisthosomal lobes that make up nearly half the length of hysterosoma.

Diproctophyllodes dielytra (Trouessart, 1885)

Proctophyllodes (Alloptes) dielytra Trouessart, 1885: 66.
Alloptes dielytra, Canestrini and Kramer 1899: 111; Radford 1953: 213; 1958: 148.
Brephosceles dielytra, Berla 1959a: 1–3, figs. 1, 2.
Diproctophyllodes dielytra, Atyeo and Gaud 1968: 212, figs. 5–7.
Brephosceles exquisitus Berla, 1959a: 3–4, figs. 3, 4; synonymized by Atyeo and Gaud 1968.

Material examined. 3 males and 16 females (ZISP 6297–6315) from *Chiroxiphia linearis* (Bonaparte, 1838) (Pipridae), **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10º46'N, 85º18'N; 800 m; 20 August 2009, collectors I. Literak, O. Sychra and M. Capek; 3 males and 12 females (ZISP 6182–6196) from *Corapipo altera* Hellmayr, 1906 (Pipridae), **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10°46'N, 85°18'W, 23 August 2009, collectors I. Literak, O. Sychra and M. Capek; 10 females (ZISP 6531–6540) from *C. altera*, **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamanca Mts., 09º46'N, 83º47'W, 8 August 2009, collectors I. Literak, O. Sychra and M. Capek; 4 males and 10 females (ZISP 6541–6554), same host and collection data.

This species is associated with various manakins (Passeriformes: Pipridae). Originally, it was described from *Pipra aureola* (Linnaeus) (type host) in Cayenne (French Guiana) and *Ceratopipra erythrocephala* (Linnaeus) in "Guyanes" (French Guiana or neighboring territories) (Trouessart, 1885). Later on, it was recorded from several more species of manakins from South America (Berla 1959a; Atyeo & Gaud 1968; Enout *et al*. 2012; Silva *et al*. 2015) (Table 1). This is the first finding of this mite in Costa Rica and the first records on *Chiroxiphia linearis* (Bonaparte) and *Corapipo altera* Hellmayr.

Genus *Proctophyllodes* Robin, 1868

Type species: *Dermaleichus glandarinus* Koch, 1840, by subsequent designation.

Proctophyllodes is the most species-rich genus in the family Proctophyllodidae and also among all families of feather mites. Up to now it has included 170 species (Atyeo & Braasch 1966; Gaud & Atyeo 1996; Mironov 2012, 2017; Mironov & OConnor 2014; Wang *et al.* 2014). Mites of this genus are associated almost exclusively with oscine passerines and have been recorded from 35 families of this grouping (as classified by Gill & Donsker 2017); additionally, three species inhabit suboscine passerines of the families Furnariidae, Pittidae, and Tyrannidae, and a single species is known from each of the three non-passerine orders Apodiformes (Trochilidae), Charadriiformes and Piciformes (Atyeo & Braasch 1966).

The world revision of the genus *Proctophyllodes* was carried out by Atyeo and Braasch (1966) and this work is still the main taxonomic study of this genus and provides the only non-regional key for identification of its species. These authors proposed subdivision of the genus into 10 species groups although they did not suggest how they might be related to each other. Since then, two more species groups, *mecistocaulus* and *caulifer*, were established within *Proctophyllodes* (Gaud & Fain 1990; Mironov & Kopij 1996b). An overview of literature published after the revision by Atyeo and Braasch and an updated world checklist of *Proctophyllodes* species were provided by Mironov (2012). A preliminary phylogenetic study of *Proctophyllodes* and related proctophyllodids based on molecular data (Knowles & Klimov 2011) showed the derived position of this genus within the family, and revealed relationships between most previously recognized species groups. This study also showed that the genus *Proctophyllodes* is paraphyletic, because two highly evolved proctophyllodine genera, *Joubertophyllodes* Atyeo and Gaud, 1971 and *Monojoubertia* Radford, 1950, arise from its core.

The fauna of the genus *Proctophyllodes* on passerines of the New World currently includes about 70 identified species (Atyeo & Braasch 1966; Forrester & Spalding 2003; OConnor *et al.* 2005; Galloway *et al.* 2014; Mironov & OConnor 2014). In the present work we report 7 species for Costa Rica, including 5 new species.

***Proctophyllodes arremoni* Mironov sp. n.**
(Figs. 46–48)

Type material. Male holotype (ZISP 6424), 5 male and 6 female paratypes from *Arremon brunneinucha* (Lafresnaye, 1839) (Emberizidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamanca Mts., 09°46'N, 83°47′W, 3 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depositories. Holotype, 3 male and 4 female paratypes (ZISP 6425–6431)—ZISP; 1 male and 1 female paratype—UMMZ (BMOC-15-1028-004), 1 male and 1 female paratype—IMUCR.

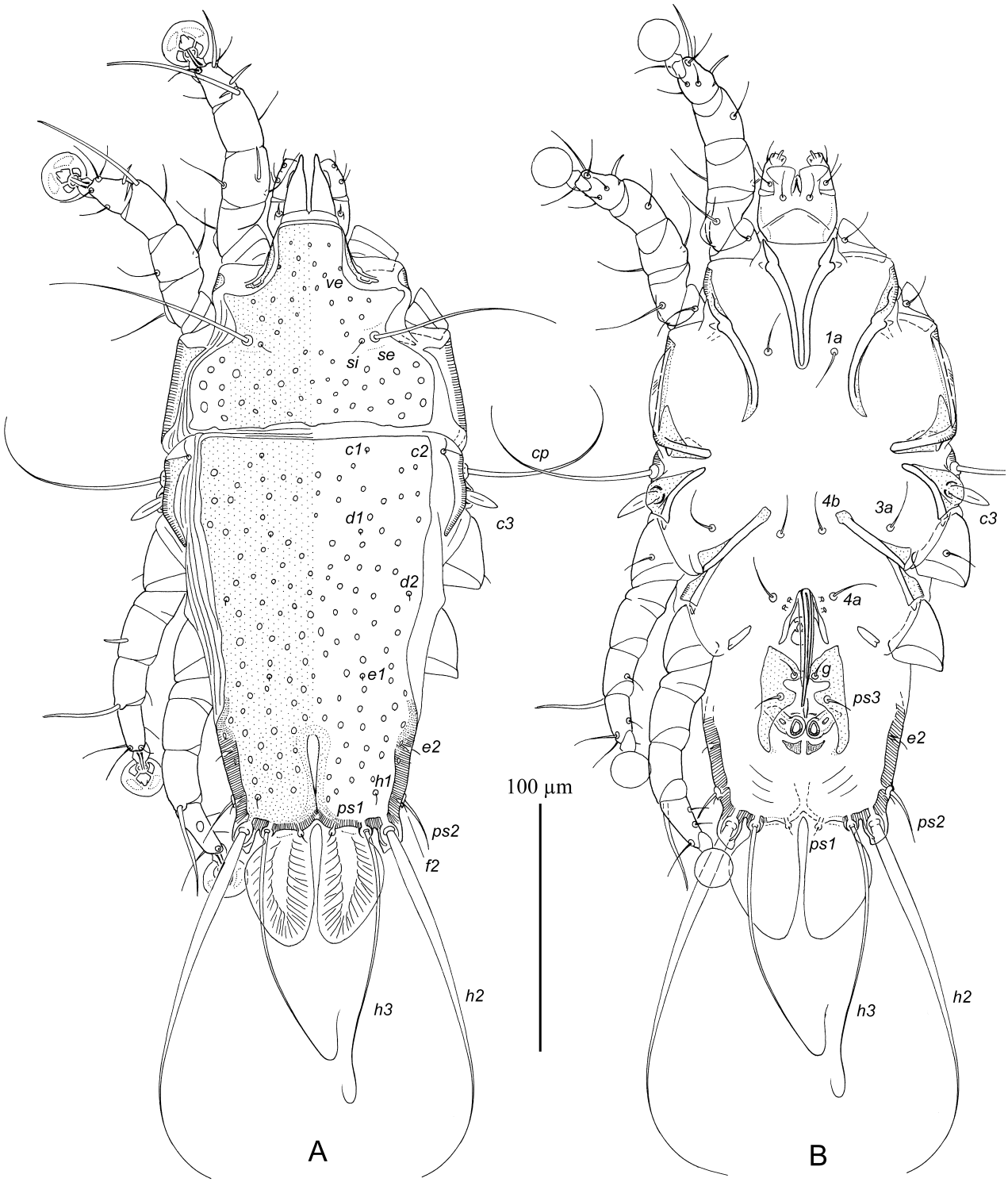

FIGURE 46. *Proctophyllodes arremoni* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

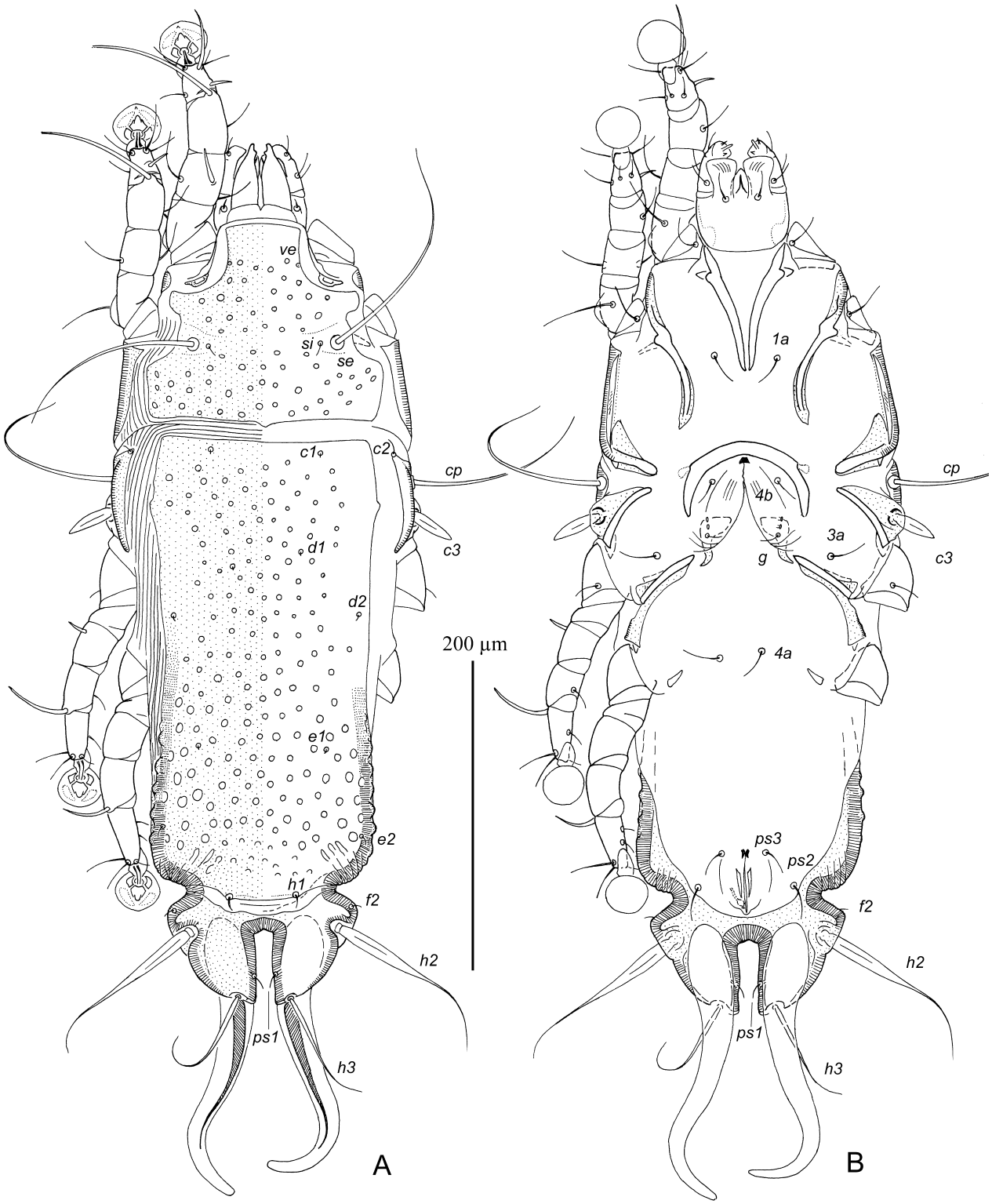

FIGURE 47. *Proctophyllodes arremoni* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

Description. MALE (holotype, range for 5 paratypes in parentheses). Idiosoma, length × width, 245 (235–245) × 125 (115–125), length of hysterosoma 150 (150–155). Prodorsal shield: antero-lateral extensions long and rounded terminally, lateral margins entire, posterior margin nearly straight with small median extension, posterior angles roughly rounded, length 80 (75–80), width 98 (90–98), surface with numerous circular lacunae, setae *ve* rudimentary (Fig. 46A). Scapular setae *se* separated by 52 (50–55). Scapular shields narrow. Humeral shields well developed, fused with epimerites III, encompassing bases of setae *cp*. Setae *c2* on antero-median angles of humeral

shields. Subhumeral setae *c3* lanceolate, 16 (15–16) × 4 (4–4.5). Hysteronotal shield: anterior margin straight or slightly concave, anterior angles almost right-angular, length 155 (145–155), width at anterior margin 90 (85–90), surface with numerous circular lacunae. Supranal concavity closed terminally, anterior end extending slightly beyond level of setae *e2*, length 37 (35–40). Posterior margin of opisthosoma between setae *h2* slightly sinuous. Terminal lamellae wide, cordiform, not overlapping, with pennate venation; length 45 (43–45), maximum width 29 (25–30). Distances between hysteronotal setae: *c2:d2* 58 (52–58), *d2:e2* 60 (55–60), *e2:h3* 33 (30–33), *d1:d2* 25 (18–25), *e1:e2* 30 (28–30), *h1:h3* 18 (17–18), *h2:h2* 58 (55–59), *h3:h3* 40 (36–40), *ps2: ps2* 65 (62–65).

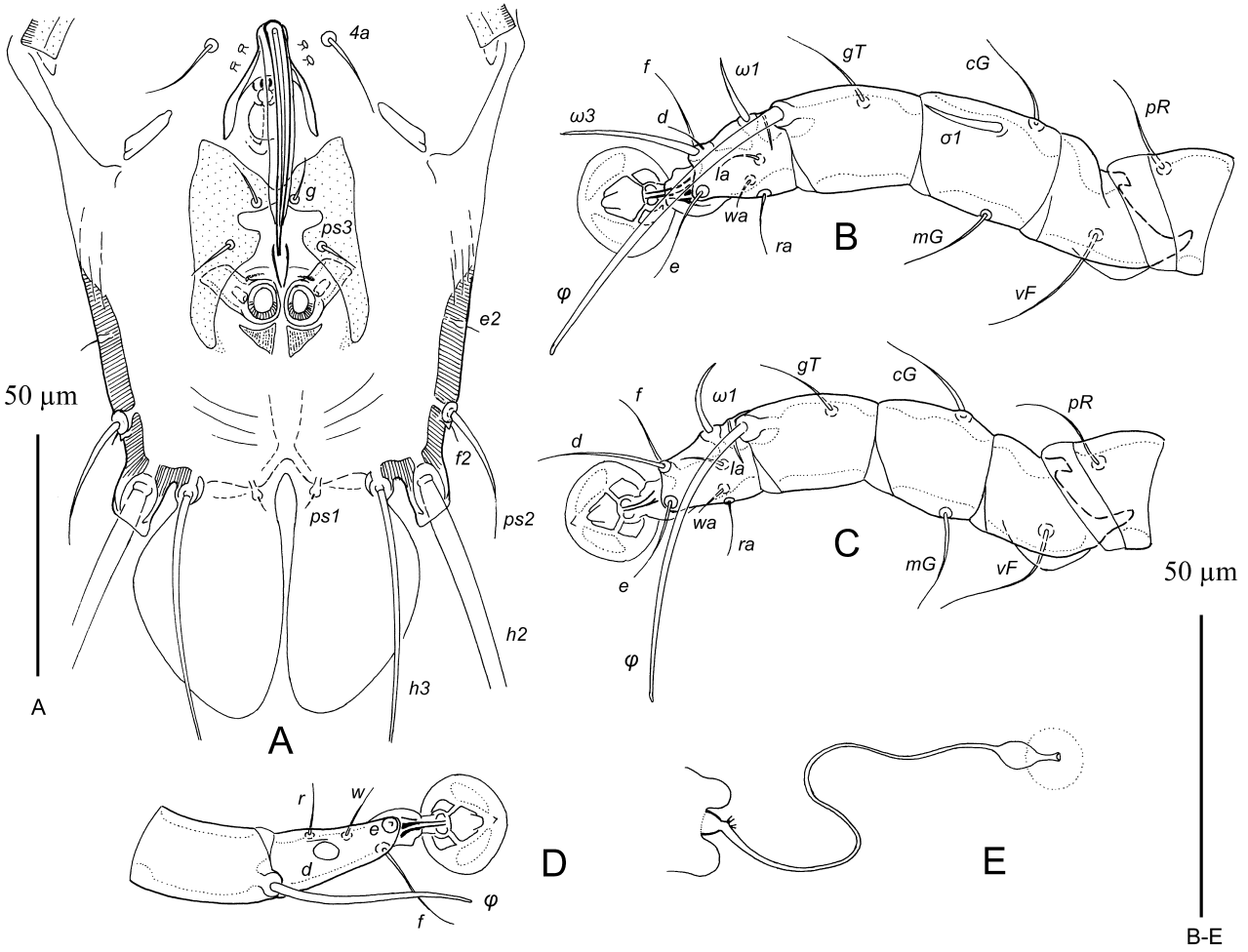

FIGURE 48. *Proctophyllodes arremoni* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B, C—legs I and II of male, dorsal view, D—tibia and tarsus IV of male, dorsal view, E—spermatheca and spermaducts.

Epimerites I fused into a narrow U, without lateral extensions. Setae *4b* situated posterior to inner tips of epimerites IIIa. Epimerites IVa developed, small, not extending to setae *4a*. Genital arch of moderate size, narrow, 23 (21–23) in length, 20 (18–20) in width, its base situated at midlevel of trochanters IV. Genital organ: aedeagus sword-shaped, turned rearward immediately from genital arch apex, extending slightly beyond level of setae *ps3*, 46 (44–46) in length; genital sheath relatively wide, tapering distally, not extending to tip of aedeagus (Fig. 46B, 48A). Setae *4a* at level of genital arch apex. Paragenital and pregenital apodemes absent. Genital papillae not connected. Opisthogastric shield roughly H-shaped, anterior margin shaped as blunt-angular concavity; anterior branches adjoining to genital arch and without lateral extensions, posterior margin of transverse bridge with shallow incision between bases of setae *g*; lateral margins almost straight and slightly divergent posteriorly, flanking anal field antero-laterally; inner margins of each piece of opisthogastric shield with incisions between bases of setae *g* and *ps3*; greatest length 42 (40–45), greatest width (posteriorly) 35 (35–38). Accessory sclerites rudimentary. Postanal sclerites small triangular. Setae *g* and *ps3* filiform, their bases arranged in moderate trapezium, setae *g* on anterior margin of transverse bridge, setae *ps3* on lateral parts of opisthogastric shield; distances between these setae: *g:g* 9 (8–9), *g:ps3* 10 (8–10), *ps3:ps3* 19 (18–20). Distance from genital arch apex to

setae *ps1* 93 (90–95). Adanal suckers cylindrical, with obliquely cut base, with apical part slightly inflated and slightly wider than diameter of corolla, 18 (17–17) in length, 8 (7–9) in greatest width (at apex); corolla with radial striae in posterior part, anterior part smooth.

Femora I, II with ventral crests. Solenidion *σ1*I shorter than genu I and situated at midlevel of this segment or slightly closer to its base (Fig. 48B, C). Solenidion *σ*III situated in distal part of genu III. Tarsus IV 23 (22–23) long, button-like seta *d* twice as wide as button-like seta *e* and situated closer to base of this segment, seta *e* with minute nipple (Fig. 48D). Length of solenidia: *σ1*I 13 (11–13), *σ*III 9 (8–9), *φ*IV 33 (30–33).

FEMALE (range for 6 paratypes). Idiosoma, length × width, 350–365 × 140–150, hysterosoma length 240–250. Prodorsal shield: antero-lateral extensions rounded, lateral margins entire, posterior margin straight with small median extensions, posterior angles roughly rounded, length 88–92, width 105–110, surface with numerous large circular lacunae, setae *ve* rudimentary (Fig. 47A). Scapular setae *se* separated by 65–70. Scapular shields narrow. Humeral shields fused with epimerites III, encompassing bases of setae *cp.* Setae *c2* on antero-median angles of humeral shields. Subhumeral setae *c3* narrowly lanceolate, 20–22 × 6–7. Lobar region of opisthosoma distinctly separated from remaining part of hysterosoma, hysteronotal shield split dorsally into anterior and lobar parts by narrow transverse furrow but remains connected ventro-laterally by sclerotized bands. Anterior hysteronotal shield roughly rectangular, anterior margin straight, lateral margins with rough tubercles in posterior third, posterior margin with wide and short median extension, surface with numerous circular lacunae, length 205–215, width at anterior margin 100–105. Lobar shield entire, 50–55 in length, 85–90 in width, anterior margin concave. Opisthosomal lobes relatively short, length similar to their width at base; terminal cleft narrow U-shaped, 30–40 in length, 8–12 in width. Setae *h1* situated on posterior margin of anterior hysteronotal shield. Setae *ps1* on lateral margins of terminal cleft, closer to lobar apices than to setae *h2*. Setae *h2* enlarged in basal part, similar to or slightly longer than terminal appendages, 70–80 long; setae *h3* 50–55 long, half the length of terminal appendages. Distance between dorsal setae: *c2:d2* 70–75, *d2:e2* 100–105, *e2:h2* 35–38, *h2:h3* 30–35, *d1:d2* 25–28, *e1:e2* 40–43, *h1:h2* 15–17, *h2:ps1* 20–21, *h1:h1* 22-30, *h2:h2* 68–70.

Epimerites I fused into a V or their posterior tips not connected (Fig. 47B). Epimerites IVa present, small. Epigynum semicircular, tips extending to level of anterior genital papillae, lateral extensions present, poorly sclerotized, length 32–35, greatest width 55–60. Genital papillae not connected at bases. Genital setae *g* anterior to level of setae *3a*. Translobar apodemes wide, connected each other anterior to terminal cleft. Setae *ps2* situated at midlevel of anal opening or slightly posterior; distance between setae: *ps2:ps2* 42–43, *ps2:ps3* 15–16, *ps3:ps3* 16–19. Flaps of anal opening not protruding into terminal cleft. Copulatory opening on small circular plate, covered with posterior ends of anal opening flaps. Head of spermatheca small cone-shaped, poorly sclerotized; proximal part of primary spermaduct monotonously enlarging to head of spermatheca, distal part of primary spermaduct near copulatory opening with small ovate enlargement about 4–5 in transverse diameter; secondary spermaducts extremely short, 2–3 long (Fig. 48E).

Legs I, II as in males. Solenidion *σ*III situated in basal half of segment. Legs IV with ambulacral disc extending to level of contraction separating lobar region. Length of solenidia: *σ1*I 13–15, *σ*III 7–8, *φ*III 30–33, *φ*IV 18–20.

Differential diagnosis. The new species, *Proctophyllodes arremoni* sp. n., belongs to the *weigoldi* group, characterized by the male genital organ extending to the level of setae *ps3* or slightly beyond it. The new species is most similar to *P. habiae* Atyeo and Braasch, 1966, described from *Habia rubica* (Vieillot) (Cardinalidae), in having, in males, the cordiform terminal lamellae, the genital sheath not extending to the tip of the aedeagus, and the opisthogastral shield with incisions between bases of setae *g* and *ps3*. *Proctophyllodes arremoni* differs from *P. habiae* by the following features: in males, the aedeagus extends distinctly beyond the level of setae *ps3*, the accessory sclerites are rudimentary; in females, setae *h3* are approximately half the length of the terminal appendages, and the lateral margins of the hysteronotal shield bear small tubercules. In males of *P. habiae*, the aedeagus does not extend beyond the level of setae *ps3*, the accessory sclerites are reniform and heavily sclerotized; in females, setae *h3* are approximately 3/4 the length of the terminal appendages, and the lateral margins of the hysteronotal shield are without tubercules.

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

Proctophyllodes euphoniae **Mironov sp. n.**
(Figs. 49–51)

Type material. Male holotype (ZISP 6287), 2 male and 9 female paratypes from *Euphonia hirundinacea* Bonaparte, 1838 (Fringillidae), **COSTA RICA**, Rincón de la Vieja National Park, 10°46'N, 83°47′W, 19 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depository. Holotype, 1 male, 8 female paratypes (ZISP 6286–6296)—ZISP; 1 male and 1 female paratype—IMUCR.

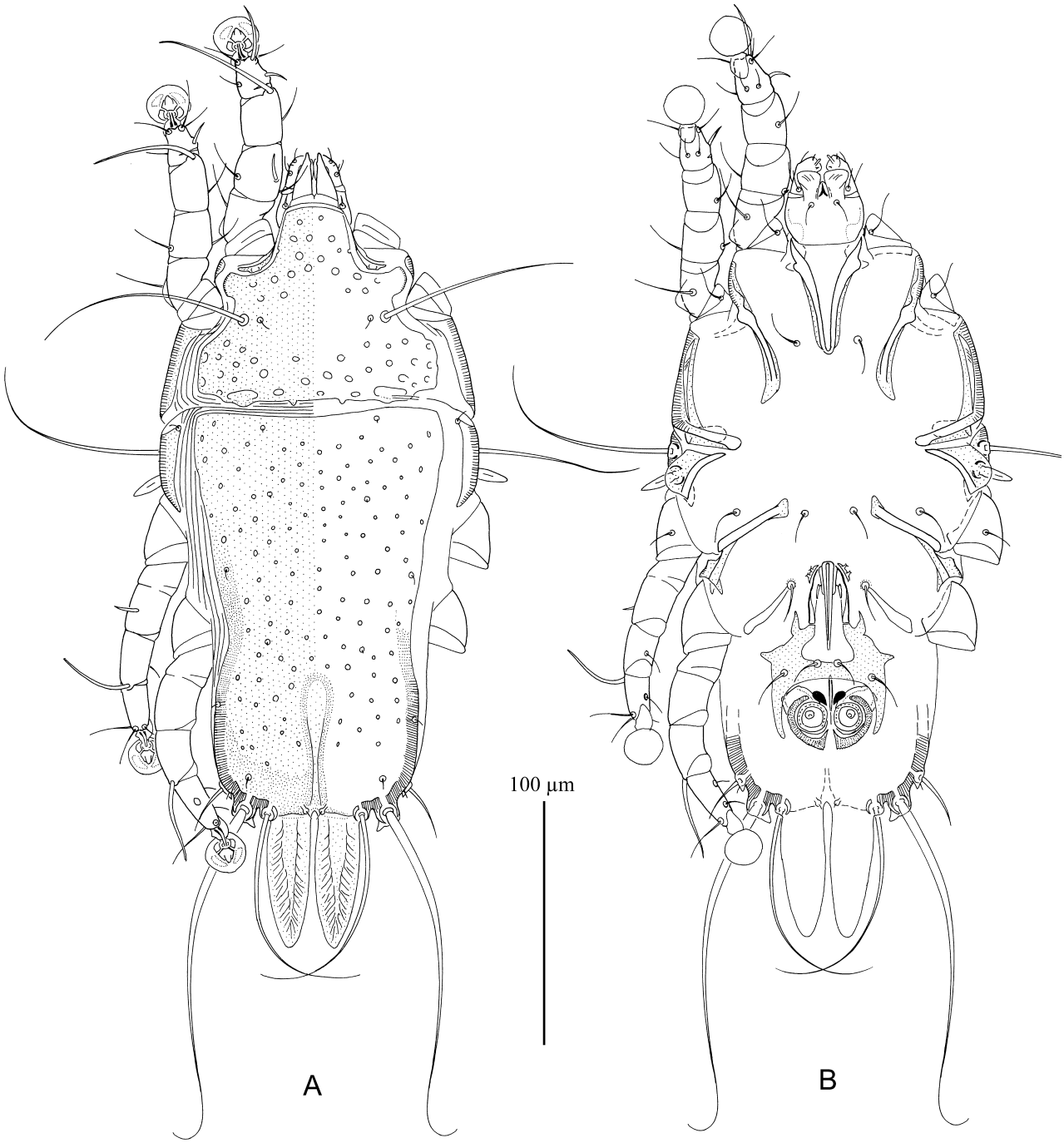

FIGURE 49. *Proctophyllodes euphoniae* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Description. MALE (holotype, range for 2 paratypes in parentheses). Idiosoma, length× width, 225 (220–230) × 125 (120–135), length of hysterosoma 140 (140–150). Prodorsal shield: represented by alveoli, antero-lateral extensions rounded, lateral margins entire, posterior margin straight with two small tooth-like extensions, posterior angles roughly rounded, length 80 (78–82), width 97 (95–100), surface except central area with numerous circular

and ovate lacunae, setae *ve* rudimentary (Fig. 49A). Scapular setae *se* separated by 60 (58–62). Scapular shields narrow. Humeral shields well developed, fused with epimerites III, encompassing bases of setae *cp*. Setae *c2* on antero-median angles of humeral shields. Subhumeral setae *c3* lanceolate, 15 (13–15) × 4 (4–5). Hysteronotal shield: anterior margin straight or slightly concave, anterior angles rounded, length 155 (150–155), width at anterior margin 100 (98–105), surface with numerous circular lacunae. Supranal concavity opened terminally, anterior end extending to midlevel between setae *e1* and *e2*, length 53 (50–55). Posterior margin of opisthosoma between setae *h2* almost straight. Terminal lamellae narrow, tongue-shaped, not overlapping, with pennate venation; length 55 (52–55), maximal width 18 (17–20). Distances between hysteronotal setae: *c2:d2* 60 (55–62), *d2:e2* 57 (55–60), *e2:h3* 38 (35–43), *d1:d2* 30 (30–36), *e1:e2* 25 (25–30), *h1:h3* 15 (15–16), *h2:h2* 60 (58–60), *h3:h3* 38 (38–43), *ps2:ps2* 75 (73–75).

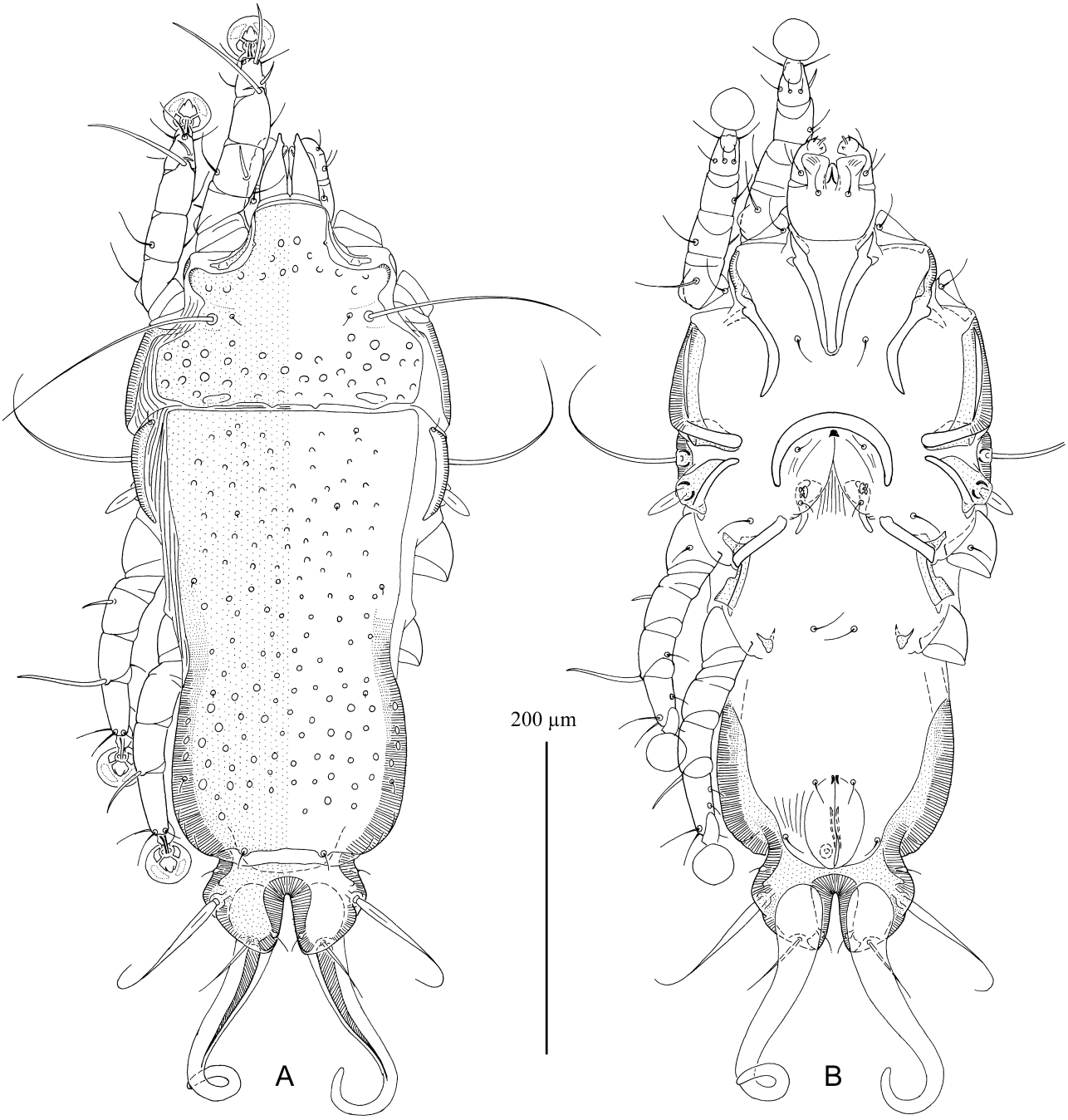

FIGURE 50. *Proctophyllodes euphoniae* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

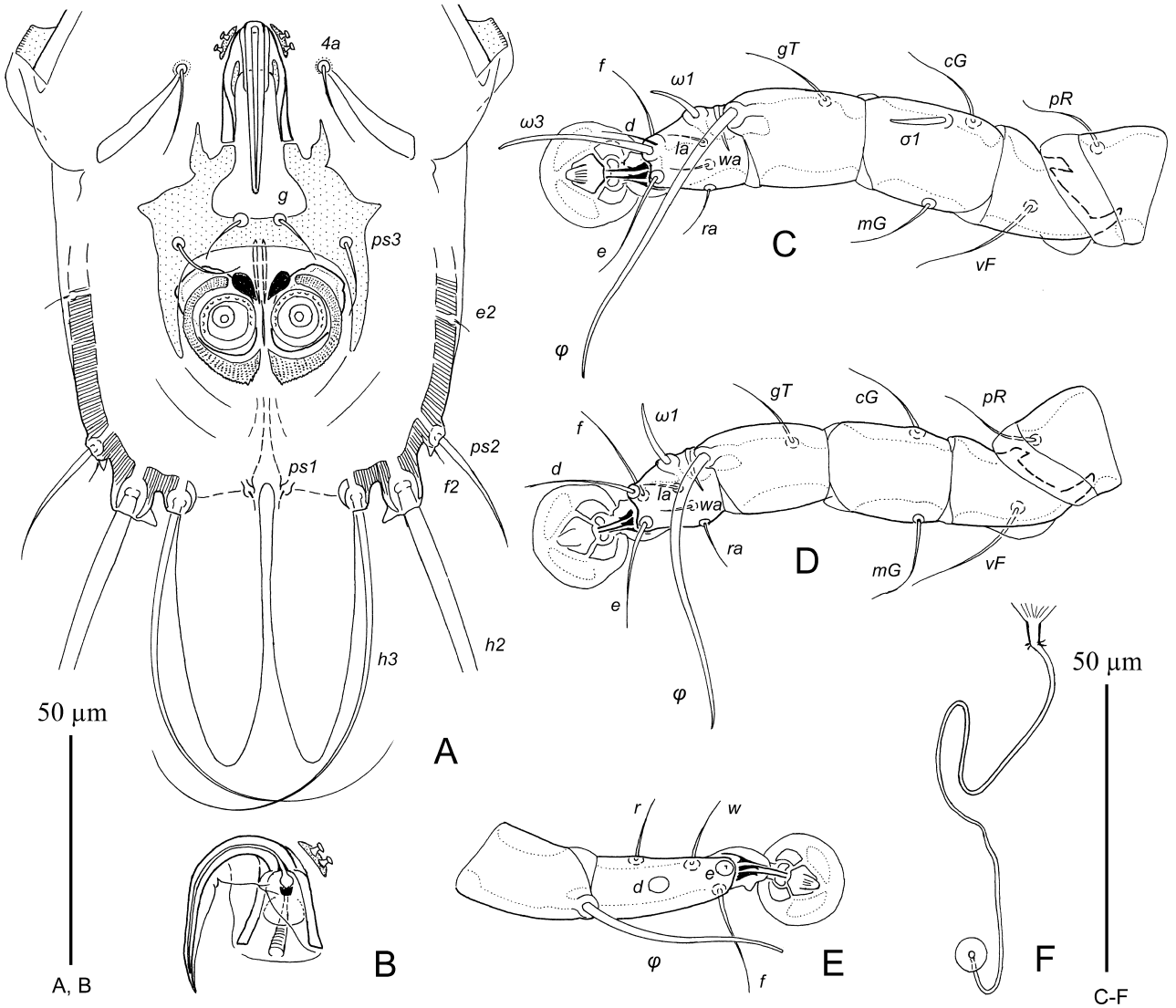

FIGURE 51. *Proctophyllodes euphoniae* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B—genital apparatus of male, ventrolateral view, C, D—legs I and II of male, dorsal view, E—tibia and tarsus IV of male, dorsal view, F—spermatheca and spermaducts.

Epimerites I fused into a narrow U, without lateral extensions. Setae *4b* situated posterior to inner tips of epimerites IIIa. Epimerites IVa well developed, extending to and encompassing bases of setae *4a*. Genital arch long and narrow, 25 (24–25) in length, 20 (18–20) in width, its base situated at midlevel of trochanters IV. Genital organ shaped as large hook (in exactly frontal position it looks sword-like, Fig. 51A, B), curved rearward immediately from genital arch apex, 35 (35–40) in length, 4.5 (4.5–5) in width at base, extending to midlevel between arch tips and level of setae *g*; genital sheath abruptly narrowed at midlength of aedeagus, tapering apically, extending to apex of aedeagus (Fig. 49B). Setae *4a* at level of anterior one third of genital arch apex. Pregenital apodemes absent. Genital papillae on small longitudinal sclerites (rudimentary paragenital apodemes), not touching at bases. Opisthogastric shield roughly H-shaped, transverse bridge wide without incisions; anterior branches adjoining genital arch and with acute lateral extensions, lateral margins slightly convex with triangular extensions (slightly anterior to level of transverse bridge); posterior branches long attenuate, slightly curved medially, flanking anal field antero-laterally. Accessory sclerites shaped as apple seeds. Postanal sclerites present, C-shaped, encompassing adanal suckers postero-laterally. Setae *g* and *ps3* filiform, their bases arranged in low trapezium, setae *g* on anterior margin of transverse bridge, setae *ps3* on lateral parts of opisthogastric shield; distances between setae: *g:g* 10 (9–10), *g:ps3* 5 (4–5), *ps3:ps3* 37 (35–38). Distance from genital arch apex to setae *ps1* 97 (95–100). Adanal suckers cylindrical, inflated in medial part and slightly wider than diameter of corolla, 20 (19–20) in length, 14 (12.5–14) in width at base; corolla with 11–13 small denticles on anterior part, posterior part smooth.

Femora I, II with narrow ventral crest. Solenidion *σ1*I shorter than genu I and situated at midlevel of this segment (Fig. 51C, D). Solenidion *σ*III situated at midlevel of genu III or slightly closer to its distal margin. Tarsus IV 25 (25–28) long, button-like seta *d* situated at midlevel of this segment, button-like seta *e* with minute nipple (Fig. 51E). Length of solenidia: *σ1*I 8 (8–12), *σ*III 6 (6–8), *φ*IV 35 (30–35).

FEMALE (range for 9 paratypes). Idiosoma, length × width, 320–330 × 000–206, length of hysterosoma 215–230. Prodorsal shield: shape and surface as in males, length 90–95, width 120–125. Scapular setae *se* separated by 70-75. Scapular shields narrow. Humeral shields fused with epimerites III, encompassing bases of setae *cp.* Setae *c2* in anterior angles of humeral shields. Subhumeral setae *c3* lanceolate, 17–20 × 5–6.5. Lobar region of opisthosoma distinctly separated from remaining part of hysterosoma; hysteronotal shield split dorsally into anterior and lobar parts by narrow transverse furrow and remains connected ventro-laterally by sclerotized bands. Anterior hysteronotal shield: 180–190 in length and 115–120 in width, anterior margin straight, with lateral margins shallowly concave, posterior margin straight, with a pair of small tooth-like extension bearing setae *h1*, surface with numerous circular lacunae (Fig. 50A). Lobar shield entire, 45–48 in length, 72–80 in width, anterior margin almost straight. Opisthosomal lobes short, at base wider than long; terminal cleft narrowly V-shaped, 27–30 in length. Setae *ps1* on lateral margins of terminal cleft, close to lobar apices. Setae *h2* thickened in basal part, shorter than terminal appendages, 70-80 long; setae *h3* 32–37 long, about 1/4 the length of terminal appendages. Distance between dorsal setae: *c2:d2* 70–75, *d2:e2* 85–90, *e2:h2* 55–58, *h2:h3* 17–23, *d1:d2* 30–35, *e1:e2* 37–40, *h1:h2* 24–26, *h2:ps1* 15–17, *h1:h1* 36–38, *h2:h2* 65–68.

Epimerites I shaped as in males, with very thin connecting commissure. Epimerites IVa present, small. Epigynum semicircular, tips extending to level of anterior genital papillae, lateral extensions absent, length 30–35, greatest width 55–62. Genital papillae on small ovate plates (Fig. 50B). Genital setae *g* anterior to level of setae *3a*. Translobar apodemes wide, connected each other anterior to terminal cleft. Setae *ps2* situated at level of posterior half of anal opening. Distance between pseudanal setae: *ps2:ps2* 40–43, *ps3:ps3* 15–17, *ps2:ps3* 27–30. Flaps of anal opening not protruding into terminal cleft. Copulatory opening situated on small circular plate, covered with posterior ends of anal flaps. Head of spermatheca narrow cone-shaped; primary spermaduct without enlargements; secondary spermaducts extremely short, 1.5–2 long (Fig. 51F).

Legs I, II as in males. Solenidion *σ*III situated in basal half of segment. Legs IV with ambulacral disc extending to level setae *f2*. Length of solenidia: *σ1*I 12–15, *σ*III 10–12, *φ*III 35–37, *φ*IV 20–25.

Differential diagnosis. The new species *Proctophyllodes euphoniae* sp. n. belongs to the *thraupis* species group in having, in males, the genital arch narrow and the opisthogastric shield with a narrow anterior incision and claw-shaped posterior branches. Among the three species previously included in this group, the new species is most similar to *P. thraupis* Atyeo and Braasch, 1966 from *Thraupis abbas* (Deppe, 1830) (Thraupidae) from Mexico (Atyeo & Braasch 1966), in having numerous lacunae on the dorsal shields in both sexes and the aedeagus extending beyond the base of the genital arch in males. *Proctophyllodes euphoniae* differs from *P. thraupis* by the following features: in males, the lateral margins of the opisthogastric shield have large triangular extensions at the level of the transverse bridge, epimerites IVa extend to and encompass the bases of setae *4a*, and the terminal lamellae are longer (52–55 μm); in females, macrosetae *h2* are shorter that the terminal appendages, and setae *h3* are about 1/3 the length of the terminal appendages. In males of *P. thraupis,* the lateral margins of the opisthogastric shield are convex and smooth, epimerites IVa do not extend to the bases of setae *4a*, and the terminal lamellae are shorter (*c*. 42 μm); in females, macrosetae *h2* are similar in length to the terminal appendages, and setae *h3* are 1/2–3/4 the length of the terminal appendages.

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

Proctophyllodes vesicularis Mironov sp. n.

(Figs. 52–54)

Type material. Male holotype (ZISP 6387), 7 male and 9 female paratypes from *Euphonia anneae* Cassin, 1865 (Fringillidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamanca Mts., 09°46'N, 83°47′W, 31 July 2009, collectors I. Literak, O. Sychra and M. Capek.

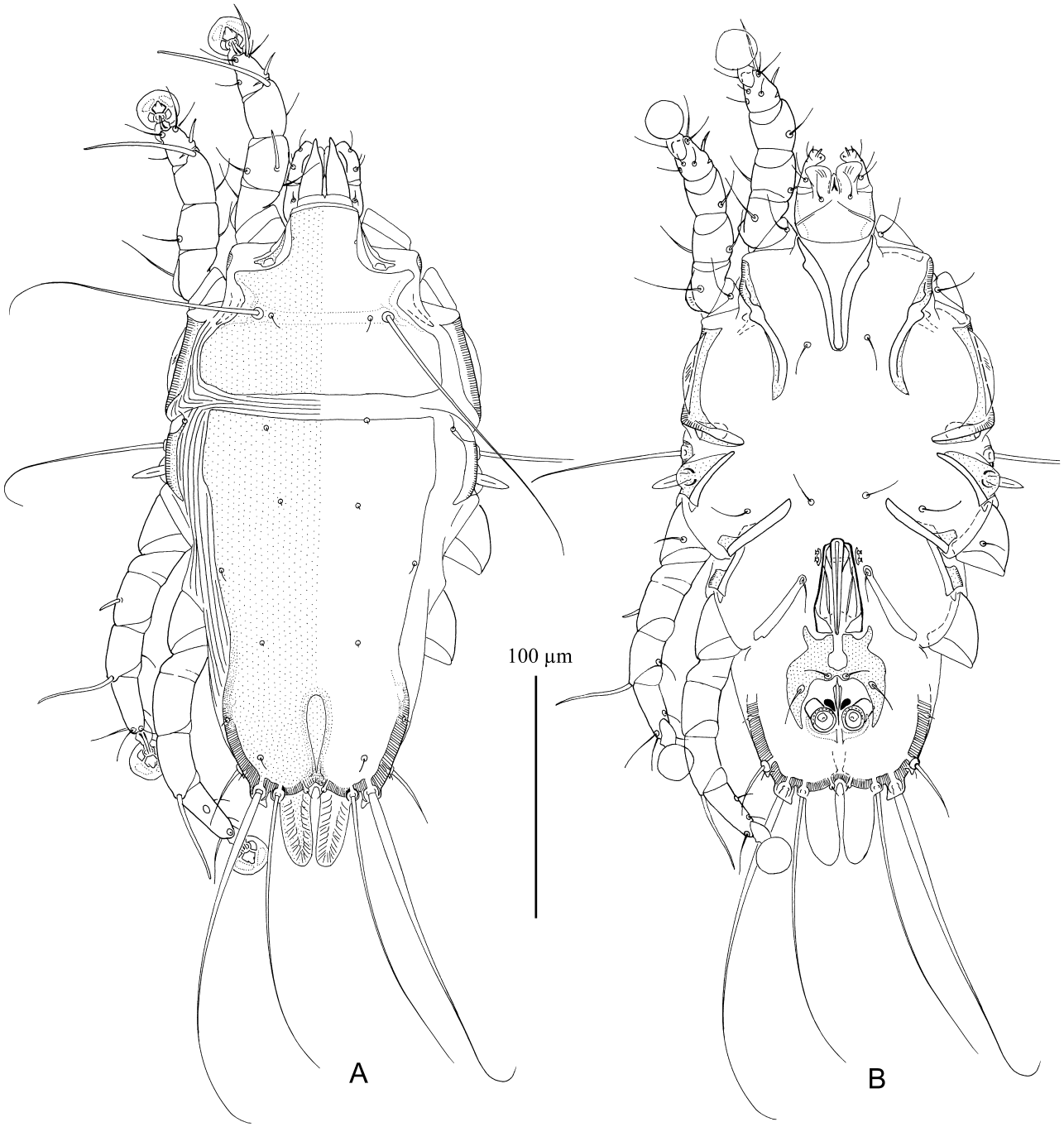

FIGURE 52. *Proctophyllodes vesicularis* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

Depositories. Holotype, 5 male and 7 female paratypes (ZISP 6387–6399)—ZISP; 1 male and 1 female paratype—UMMZ (BMOC-15-1028-002), 1 male and 1 female paratype—IMUCR.

Additional material. 7 males and 10 females (ZISP 6432–6448), same collection data as for the type material, except date, 5 August 2009.

Description. MALE (holotype, range for 7 paratypes in parentheses). Idiosoma, length × width, 240 (240–250) × 130 (120–130), length of hysterosoma 150 (145–160). Prodorsal shield: antero-lateral extensions rounded, lateral margins entire, posterior margin straight, posterior angles roughly rounded, length 80 (80–82), width 100 (90–100), surface without ornamentation, setae *ve* rudimentary (Fig.52A). Scapular setae *se* separated by 53 (52–54). Humeral shields well developed, fused with epimerites III, encompassing bases of setae *cp*. Setae *c2* on narrow anteromedial extensions of humeral shields. Subhumeral setae *c3* lanceolate, 17 (15–18) × 5 (4.5–5).

Hysteronotal shield: anterior margin straight anterior angles nearly right-angular, length 150 (145–150), width at anterior margin 93 (90–100), surface without ornamentation. Supranal concavity opened terminally, anterior end extending to midlevel between setae *e1* and *e2*, length 38 (35–40). Posterior margin of opisthosoma between setae *h2* slightly concave, shaped as blunt angle. Terminal lamellae narrow, tongue-shaped, not overlapping, with pennate venation; length 31 (26–32), maximal width 12 (12–13). Distances between hysteronotal setae: *c2:d2* 55 (50–55), *d2:e2* 64 (60–65), *e2:h3* 33 (32–35), *d1:d2* 22 (20–25), *e1:e2* 28 (26–28), *h1:h3* 13 (13–15), *h2:h2* 47 (45–50), *h3:h3* 31 (30–32), *ps2:ps2* 62 (60–62).

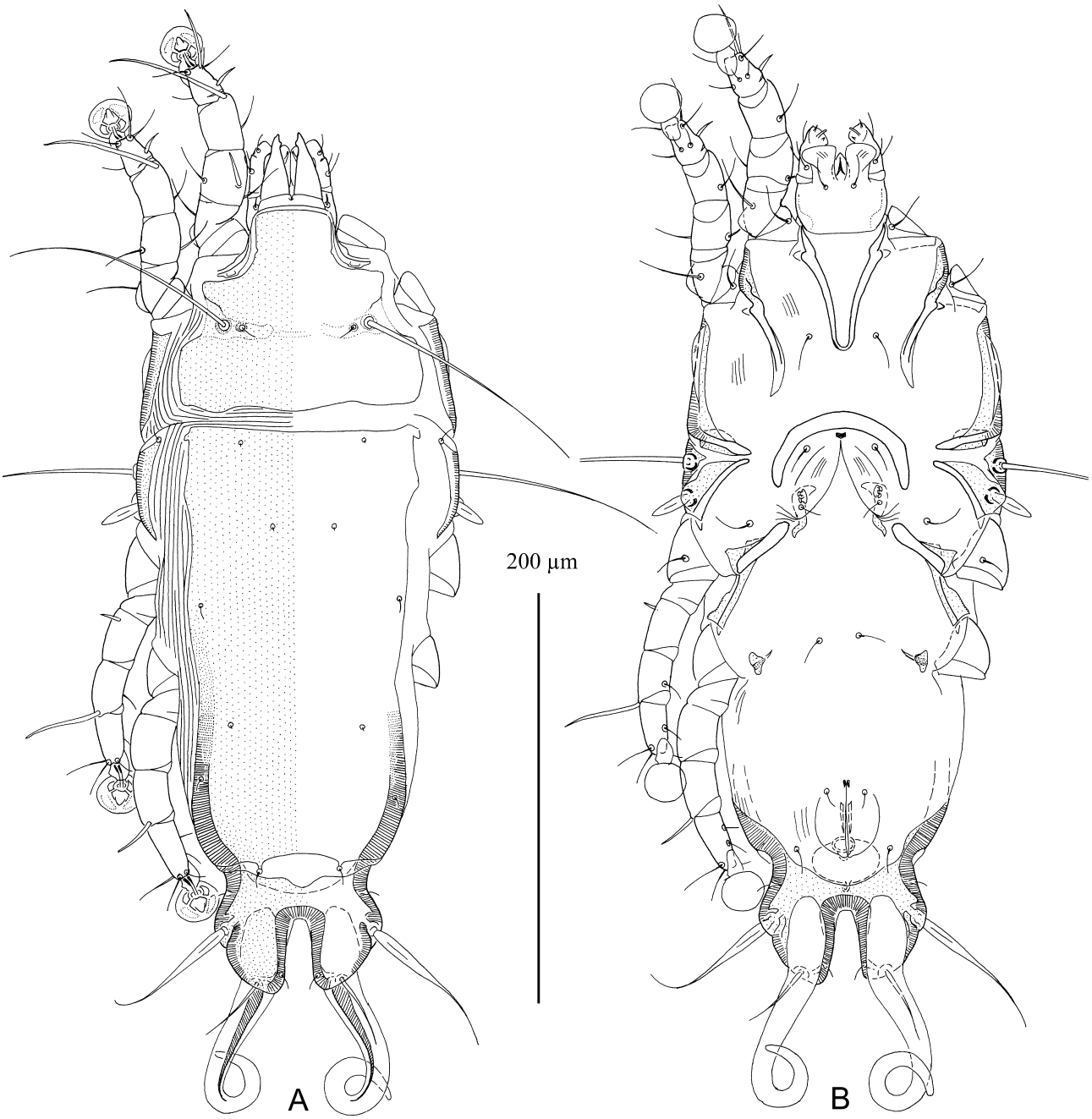

FIGURE 53. *Proctophyllodes vesicularis* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

Epimerites I fused into a narrow U, without lateral extensions. Setae *4b* situated at level of inner tips of epimerites IIIa. Epimerites IVa well developed, extending to and encompassing bases of setae *4a*. Genital arch long and narrow, 38 (36–38) in length, 22 (20–22) in width, its base situated at midlevel of trochanters IV. Genital organ shaped as large and thin hook curved immediately rearward from genital arch apex, 39 (38–40) in length, 7 (6.5–7.5) in width at base (in exactly frontal position it looks sword-shaped, Figs. 52B, 54A, B), extending to level of

genital arch base; genital sheath monotonously tapering apically, extending to apex of aedeagus. Setae *4a* at level of anterior one third of genital arch apex. Pregenital apodeme absent. Genital papillae of each side on small elongated plate (rudimentary paragenital apodemes), not touching at bases. Opisthogastric shield H-shaped, transverse bridge narrow, without incisions; anterior branches adjoining to genital arch with long and acute lateral extensions; lateral margins convex; posterior branches long attenuate, slightly curved medially, flanking anal field from anterior and lateral sides. Accessory sclerites reniform. Postanal sclerites present, bow-shaped, encompassing adanal suckers postero-laterally. Setae *g* and *ps3* filiform, their bases arranged in low trapezium, setae *g* on anterior margin of transverse bridge, setae *ps3* on lateral parts of opisthogastric shield; distances between these setae: *g:g* 7 (7–9), *g:ps3* 3 (3–4.5), *ps3:ps3* 29 (28–31). Distance from genital arch apex to setae *ps1* 106 (104–110). Adanal suckers cylindrical, 14 (13–15) in length, 10 (10–12) in width apically; corolla with 8–10 small denticles on anterior part, posterior part smooth.

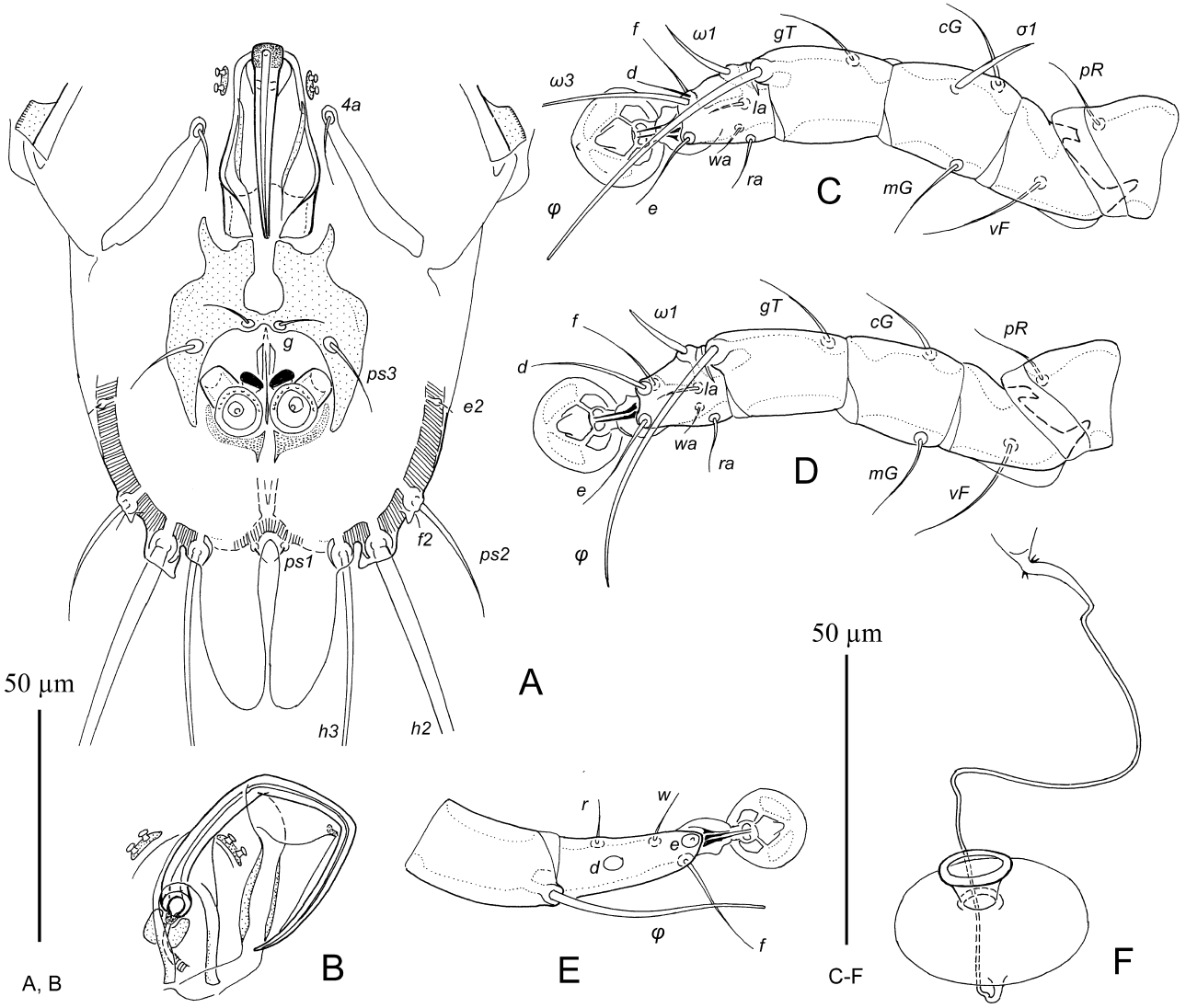

FIGURE 54. *Proctophyllodes vesicularis* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B—genital apparatus of male, ventrolateral view, C, D—legs I and II of male, dorsal view, E—tibia and tarsus IV of male, dorsal view, F—spermatheca and spermaducts.

Femora I, II with ventral crest. Solenidion *σ1*I slightly shorter than genu I, situated at midlevel of segment (Fig. 54C, D), solenidion *σ*III situated closer to distal margin of genu III. Tarsus IV 22 (22–25) long, button-like seta *d* situated in proximal half of this segment, button-like seta *e* with minute nipple (Fig. 54E). Solenidion *φ*IV extending to midlevel of ambulacral disc. Length of solenidia: *σ1*I 40 (38–42), *σ*III 21 (20–21) *φ*IV 000 (35–37).

FEMALE (range for 9 paratypes). Idiosoma, length × width, 380–390 × 150–160, length of hysterosoma 265–

275. Prodorsal shield: shape and surface as in males, length 100–105, width 120–125. Scapular setae *se* separated by 70-75. Scapular shields narrow. Humeral shields fused with epimerites III, encompassing bases of setae *cp.* Setae *c2* on anterior end of humeral shields. Subhumeral setae *c3* narrowly lanceolate, 20–22 × 5–6. Lobar region of opisthosoma distinctly separated from remaining part of hysterosoma, hysteronotal shield split dorsally into anterior and lobar parts by narrow transverse furrow and remains connected ventro-laterally by narrow sclerotized bands. Anterior hysteronotal shield: 210–215 in length, 110–115 in width, anterior margin straight, posterior margin slightly concave with a pair of small extensions bearing setae *h1*, surface without ornamentation (Fig. 53A). Lobar shield entire, 60–65 in length, 80–85 in width, anterior margin with shallow median concavity. Opisthosomal lobes relatively short, their length approximately equal to width at base. Terminal cleft narrow U-shaped, 32–34 in length, 16–18 in width at midlevel. Setae *h1* situated on posterior margin of anterior hysteronotal shield, on small extensions. Setae *ps1* on lateral margins of terminal cleft, close to level of lobar apices. Setae *h2* enlarged in basal part, approximately half the length of terminal appendages, 70–75 long; setae *h3* 38–40 long, about 1/4 of terminal appendages. Distance between dorsal setae: *c2:d2* 74–78, *d2:e2* 85–100, *e2:h2* 60–66, *h2:h3* 25–28, *d1:d2* 33–38, *e1:e2* 32–35, *h1:h2* 28–30, *h2:ps1* 23–25, *h1:h1* 38–44, *h2:h2* 70–72.

Epimerites I shaped as in males, with very thin connecting commissure. Epimerites IVa small. Epigynum semicircular, tips not extending to level of anterior genital papillae, lateral extensions absent, length 38–42, greatest width 64–68. Genital papillae situated on small ovate plates (Fig. 53B). Genital setae *g* anterior to level of setae *3a*. Translobar apodemes wide, connected each other anterior to terminal cleft. Setae *ps2* situated at level of posterior end of anal opening. Distance between pseudanal setae: *ps2:ps2* 44–50, *ps3:ps3* 18–21, *ps2:ps3* 31–33.Flaps of anal opening not protruding into terminal cleft. Copulatory opening large, with sclerotized margin, covered with posterior ends of anal opening flaps. Head of spermatheca simple cone-like; distal part of primary spermaduct near copulatory opening with large ovate enlargement 31–36 × 20–22; secondary spermaducts extremely short, 2–3 long (Fig. 54F).

Legs I, II as in males. Solenidion σIII situated in basal half of genu III. Legs IV with ambulacral disc extending to level of setae *f2*. Length of solenidia: *σ1*I 15–16, σIII 7–9, φIII 34–36, φIV 20–22.

Differential diagnosis. As with the previous species, *Proctophyllodes vesicularis* sp. n. belongs to the *thraupis* species group in having, in males, the genital arch narrow and the opisthogastric shield with a narrow anterior incision and with claw-shaped posterior branches. Among the three species previously known in this group, *P. vesicularis* is most similar to *P. thraupis* Atyeo and Braasch, 1966 and *P. megathraupis* Atyeo and Braasch, 1966 in having the opisthogastric shield with convex lateral margins and claw-shaped posterior branches in males. Males of *P. vesicularis* differ from *P. thraupis* and *P. megathraupis* by the following features: the terminal lamellae are shorter and narrower, 26–32 × 12–13 μm (*vs*. 42 × 22 μm in *P. thraupis* and 80 × 28 μm in *P. megathraupis*), the aedeagus extends to the level of the genital arch base (*vs*. distinctly extending beyond in *P. thraupis* and not extending in *P. megathraupis*), and epimerites IVa extend to setae *4a* (*vs*. not extending in both the species). Females of *P. vesicularis* differ from those of *P. thraupis* (females of *P. megathraupis* are unknown) by the following features: the dorsal shields lack any ornamentation (*vs*. with numerous circular lacunae), the length of macrosetae *h2* are half the length of the terminal appendages (*vs*. subequal in length), and the length of setae *h3* are about 1/4 of the terminal appendages (*vs*. half the length or more).

Etymology. The specific epithet is derived from *vesicle* (L., little bladder) to refer to the ovate enlargement of the primary spermaduct in females.

Proctophyllodes habiae Atyeo and Braasch, 1966

Proctophyllodes habiae Atyeo and Braasch 1966: 221, figs. 211–213.

Material examined. 5 males and 12 females (ZISP 6344–6355) from *Habia rubica* (Vieillot, 1817) (Cardinalidae), **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10°46'N, 83°47′W, 20 August 2009, collectors I. Literak, O. Sychra and M. Capek.

This species was previously recorded on *Habia rubica* (type host) in Belize and Mexico and from *H. gutturalis* (Sclater) in Mexico (Atyeo & Braasch 1966). This is the first record of *Proctophyllodes habiae* in Costa Rica.

Proctophyllodes thraupis Atyeo and Braasch, 1966

Proctophyllodes thraupis Atyeo and Braasch 1966: 134, figs. 117, 118.

Material examined. 6 males and 9 females (ZISP 6449–6463) from *Tangara icterocephala* (Bonaparte, 1851) (Thraupidae), **COSTA RICA**, Tapantí National Park, Sector Tapantí, Cordillera de Talamanca Mts., 09°46'N, 83°47′W, 7 August 2009, collectors I. Literak, O. Sychra and M. Capek; 3 males and 5 females (ZISP 6523–6530), same collection data, except date, 8 August 2009.

This species was previously recorded by Atyeo and Braasch (1966) from two species of tanagers (Thraupidae) in Mexico and Belize: *Chlorophanes spiza* (Linnaeus) from Belize and Mexico and *Thraupis abbas* (Deppe) (type host) from Mexico. These authors also reported this mite from *Chlorospingus flavopectus ophthalmicus* (Du Bus de Gisignies) (Emberizidae) from Mexico and from *Euphonia affinis* (Lesson), *E. hirundinacea* Bonaparte (mentioned as *T. lauta* Bangs and Penard), and *E. musica* (Gmelin, JF) (Fringillidae) from Belize and Mexico. Natural associations of *Proctophyllodes thraupis* with hosts other than thraupids look questionable. These findings could be the result of accidental contaminations, since Atyeo and Braasch collected most of their materials from dry museum skins. Besides, mite specimens found by these authors on euphonias could potentially represent another species, *P. euphoniae* or *P. vesicularis*, described above from *Euphonia* species.

Proctophyllodes strictophyllus Mironov sp. n.
(Figs. 55–57)

Type material. Male holotype (ZISP 6587), 2 male and 3 female paratypes from *Coereba flaveola* (Linnaeus, 1758) (Coerebidae), Costa Rica, Tapanti National Park, Sector Tapantí, Cordillera de Talamanca Mts., 09°46'N, 83°47′W, 9 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depositories. Holotype, 1 male and 2 female paratypes (ZISP 6588–6590)—ZISP; 1 male and 1 female paratype—IMUCR.

Description. MALE (holotype, range for 2 paratypes in parentheses). Idiosoma, length × width, 230 (225–235) × 140 (130–145), hysterosoma length 145 (140–150). Prodorsal shield: antero-lateral extensions short, blunt-angular, lateral margins entire, posterior margin almost straight, posterior angles roughly rounded, length 73 (72–75), greatest width 88 (85–90), surface without ornamentation, setae *ve* indistinct (Fig. 55A). Scapular setae *se* separated by 60 (60–65). Scapular shields narrow. Humeral shields not fused with epimerites III, encompassing bases of setae *cp*. Setae *c2* on antero-medial angles of humeral shields. Subhumeral setae *c3* spiculiform, 13 (13–15) long. Hysteronotal shield: length 153 (150–158), width at anterior margin 108 (105–110), anterior margin straight, anterior angles bluntly rounded, surface without ornamentation. Supranal concavity shaped as inverted teardrop, anterior end not extending to midlevel between setae *e1* and *e2*, length 40 (38–42). Posterior margin of opisthosoma between setae *h2* straight or slightly concave. Terminal lamellae narrowly foliform, slightly curved and attenuate to apex, not overlapping, with posterior ends slightly divergent, surface with pennate venation; length 66 (62–68), maximal width in basal part (50–64), greatest distance between bases 22 (21–24). Distances between hysteronotal setae: *c2:d2* 49 (48–53), *d2:e2* 60 (60–62), *e2:h3* 31 (29–31), *d1:d2* 26 (25–33), *e1:e2* 22 (20–24), *h1:h3* 11 (9–11), *h2:h2* 71 (70–72), *h3:h3* 53 (50–55), *ps2: ps2* 82 (80–85).

Epimerites I fused into a narrow U with narrow commissure, without lateral extensions. Setae *4b* situated posterior to inner tips of epimerites IIIa. Epimerites IVa narrow, not extending to setae *4a*. Genital arch narrow, 21 (20–22) long, 16 (16–18) wide, its base situated at midlevel of trochanters IV, tips of arch adjoining to opisthogastric shield. Genital organ sword-shaped, with reflexion rearward at level of articulation of trochanter/femur III; genital sheath: thin, tapering apically, equal in length to aedeagus and completely encompassing it, extending beyond level of setae *g*, and almost reaching anal opening, 47 (45–48) in length from reflexion (Figs. 55B, 57A). Setae *4a* situated at level of genital arch apex. Pregenital apodeme absent. Paragenital apodemes rudimentary, represented by narrow longitudinal sclerites bearing genital papillae. Opisthogastric shield represented by large entire plate, with small incision on anterior margin, with lateral margins convex, with deeply concave posterior margin, with poor sclerotization in central part between setae *ps3* and along midline in posterior part, with longitudinal striation at posterior margin, greatest length 35 (33–47), greatest width 44 (42–45).

Accessory sclerites absent. Small postanal sclerites present. Setae *g* and *ps3* filiform, slightly thickened basally, their bases arranged in low trapezium, and both situated on opisthogastric shield, distances between setae: *g:g* 7 (6–7), *g:ps3* 7 (7–10), *ps3:ps3* 31 (29–32). Distance from genital arch apex to setae *ps1* 91 (90–95). Adanal suckers cylindrical, 18 (17–18) in length, 10 (9–11) in width; corolla with 15–16 small denticles.

Femora I, II with ventral crest. Solenidion *σ1*I shorter than genu I and situated closer to base of this segment, solenidion *σ*III situated approximately at midlevel of segment (Fig. 57C, D). Tarsus IV 22 (21–11) long, button-like seta *d* situated at midlevel of segment, button-like seta *e* with small nipple (Fig. 57E). Length of solenidia: *σ1*I 12 (11–12), *σ*III 11 (9–11), *φ*IV 26 (26–29) long.

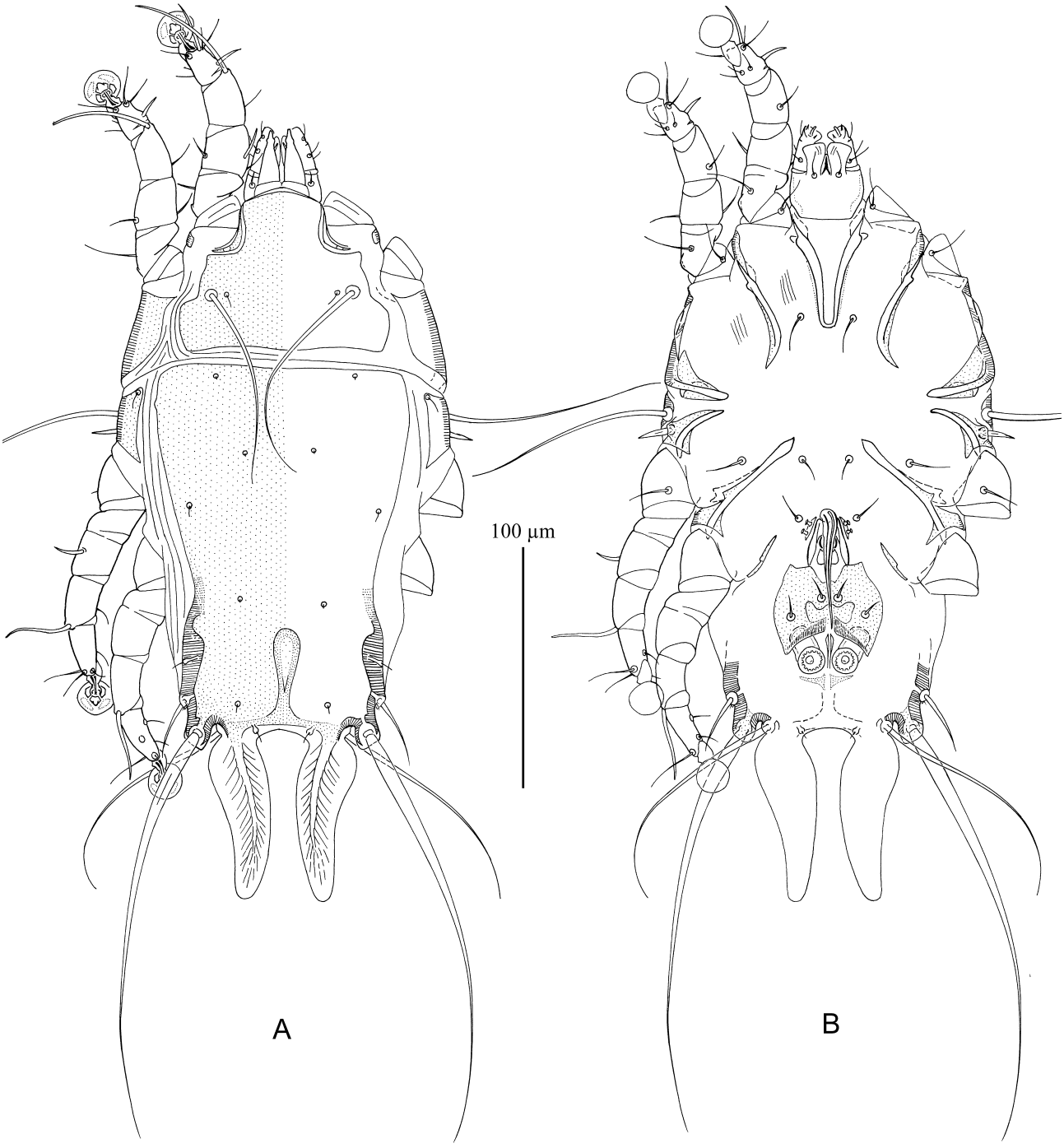

FIGURE 55. *Proctophyllodes strictophyllus* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

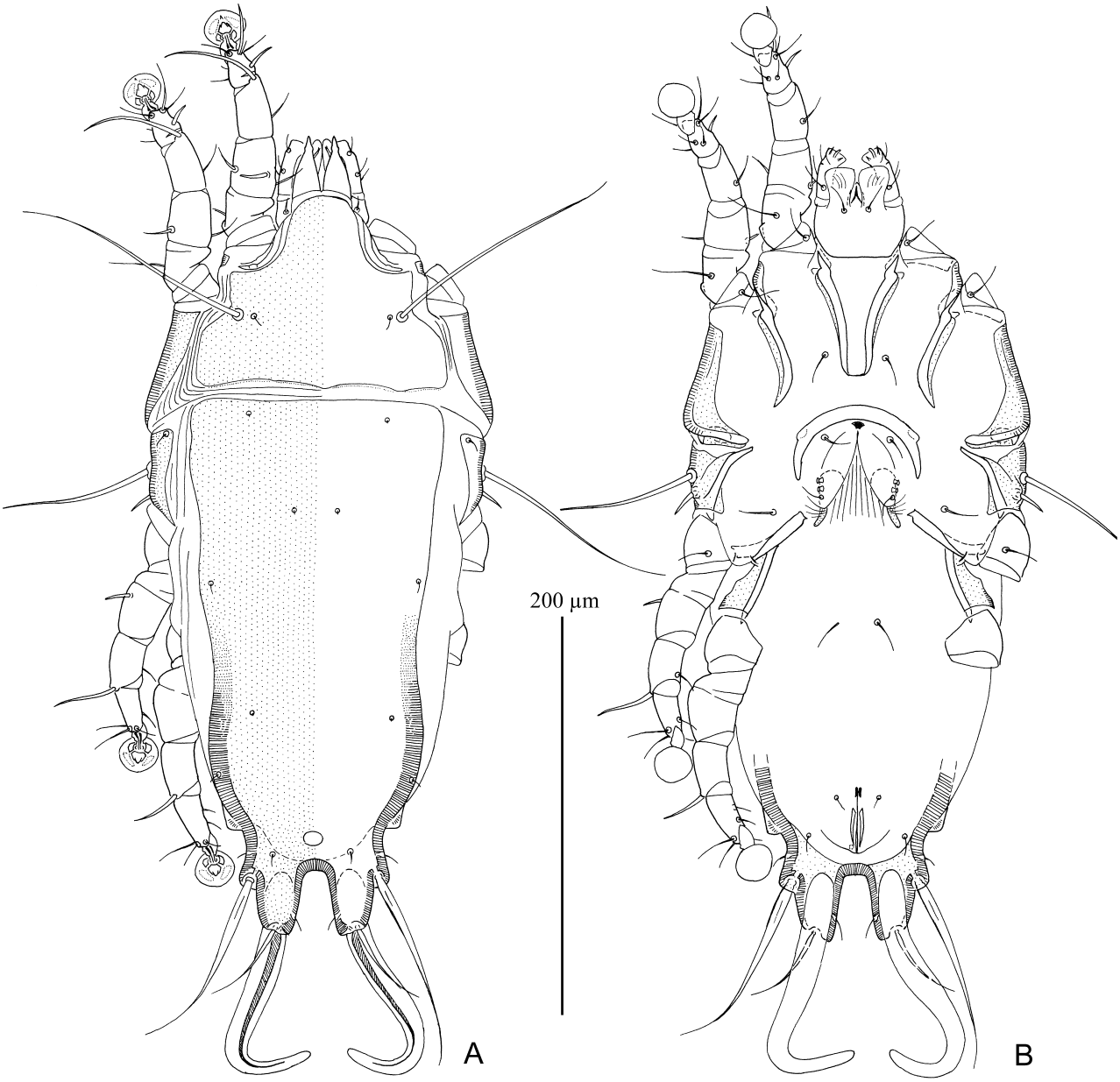

FIGURE 56. *Proctophyllodes strictophyllus* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

FEMALE (range for 3 paratypes). Idiosoma, length × width, 355–365 × 160–170, hysterosoma length 240–250. Prodorsal shield: shape and surface as in males, length 95–100, width 120–125. Distances between scapular setae *se* 84–86. Scapular shields narrow. Humeral shields fused with epimerites III, encompassing bases of setae *cp.* Setae *c2* on antero-medial angles of these shields. Subhumeral setae *c3* spiculiform, 13–15. Lobar region of opisthosoma distinctly delimited from remaining part of hysterosoma by a pair of angular extensions and concavities of the body margin immediately after them. Hysteronotal shield not split into anterior and lobar parts, with anterior margin straight, with anterior angles rounded, surface without ornamentation, total length including lobar area 260–270, width at anterior margin 125–135 (Fig. 56A). Supranal concavity present, circular in shape. Lobar area of hysteronotal shield 50–55 in length (from angular extensions to lobar apices), 72–75 wide. Opisthosomal lobes relatively short, slightly longer than wide at base; terminal cleft U-shaped, with lateral margins slightly divergent, 29–31 in length, 14–16 in width in anterior part. Setae *h1* posterior to supranal concavity. Setae *ps1* on lateral margins of terminal cleft, closer to lobar apices than to setae *h2*. Setae *h2* slightly enlarged in basal part, shorter than terminal appendages, 80–90 long; setae *h3* 45–50 long, about 1/2 of terminal appendages. Distance between dorsal setae: *c2:d2* 72–75, *d2:e2* 92–98, *e2:h2* 52–55, *h2:h3* 22–25, *d1:d2* 35–38, *e1:e2* 25–32, *h1:h2* 11–17, *h2:ps1* 13–15, *h1:h1* 34–40, *h2:h2* 60–62.

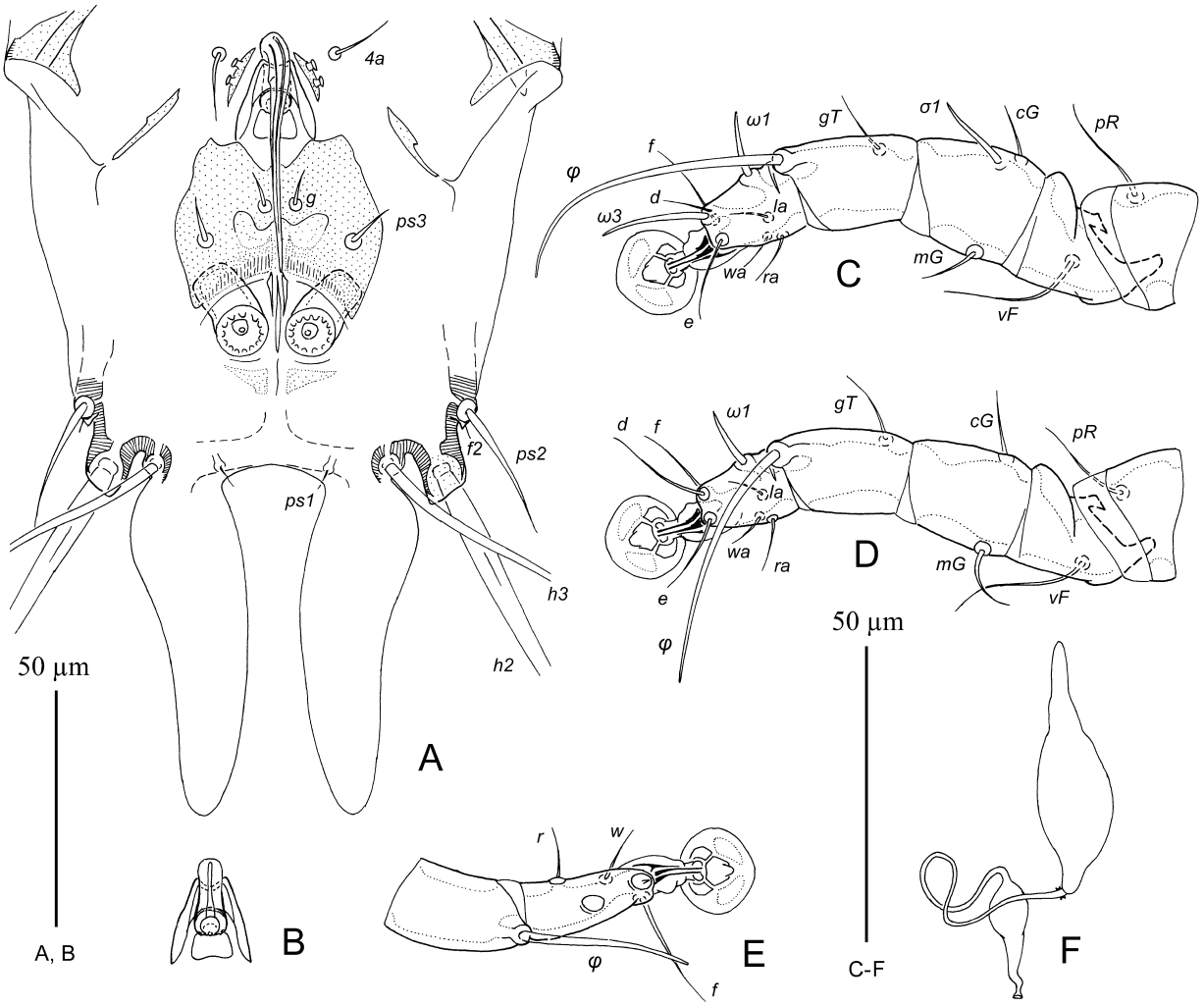

FIGURE 57. *Proctophyllodes strictophyllus* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B—genital apparatus of male, dorsal view, C, D—legs I and II of male, dorsal view, E—tibia and tarsus IV of male, dorsal view, F—spermatheca and spermaducts.

Epimerites I shaped as in males. Epimerites IVa present, small. Epigynum almost semicircular, tips almost extending to level of genital papillae, lateral extensions short, length 35–38, greatest width 60–64 (Fig. 56B). Genital setae *g* slightly anterior to level of setae *3a*. Translobar apodemes narrow, connected each other anterior to terminal cleft. Setae *ps2* situated at level of posterior end of anal opening. Distance *ps2:ps2* 48–50, *ps2: ps3* 15–20, *ps3:ps3* 19–21. Flaps of anal opening not protruding into terminal cleft. Copulatory opening situated at anterior margin of fused translobar apodemes and covered with posterior ends of anal flaps. Head of spermatheca small cone-shaped and poorly sclerotized, primary spermaduct with ampuliform enlargement near copulatory opening, secondary spermaducts extremely short, 1.5–2 long (Fig. 57F).

Legs I, II as in males. Solenidion *σ*III situated in basal half of corresponding segment. Legs IV with ambulacral disc almost extending to level of setae *h2*. Length of solenidia: *σ1*I 12–13, *σ*III 9–11, *φ*III 28–30, *φ*IV 20–22.

Differential diagnosis. The new species *Proctophyllodes strictophyllus* sp. n. formally belongs to the *weigoldi* species group and is very close to *P. coerebae* Atyeo and Braasch, 1966, described from the same host, *Coereba flaveola,* in Jamaica (Atyeo & Braasch 1966) in having an entire opisthogastric shield with convex lateral margins in males and an entire hysteronotal shield in females. *Proctophyllodes strictophyllus* differs from that species by the following features: in males, the terminal lamellae are noticeably longer (62–68 µm) and directed almost parallel to each other, the genital papillae are situated on rudimentary paragenital apodemes, the posterior margin of the opisthogastric shield has longitudinal striation; in females, the total length of the hysteronotal shield is longer (260–270 µm). In males of *P. coerebae*, the terminal lamellae are shorter (*c*. 50 µm), directed obliquely to the midline and with overlapping distal parts, the genital papillae are situated on soft tegument, and the posterior

margin of the opisthogastric shield is without striation; in females, the total length of the hysteronotal shield is *c*. 230 μm.

Etymology. The specific epithet, combination of *strictus* (L. straight) and *phyllo* (Gr. leaf), refers to the terminal lamellae in males being almost parallel with each other.

***Proctophyllodes parkesiae* Mironov sp. n.**
(Figs. 58–60)

Type material. Male holotype (ZISP 6251), 6 male and 8 female paratypes from *Parkesia motacilla* (Vieillot, 1809) (Parulidae), **COSTA RICA**, Rincón de la Vieja National Park, Cordillera de Guanacaste Mts., 10º46'N, 85º18'N, 16 August 2009, collectors I. Literak, O. Sychra and M. Capek.

Depositories. Holotype, 4 male, 8 female paratypes (ZISP 6252–6258)—ZISP; 1 male and 1 female paratype—UMMZ (BMOC-15-1028-011), 1 male and 1 female paratype—IMUCR.

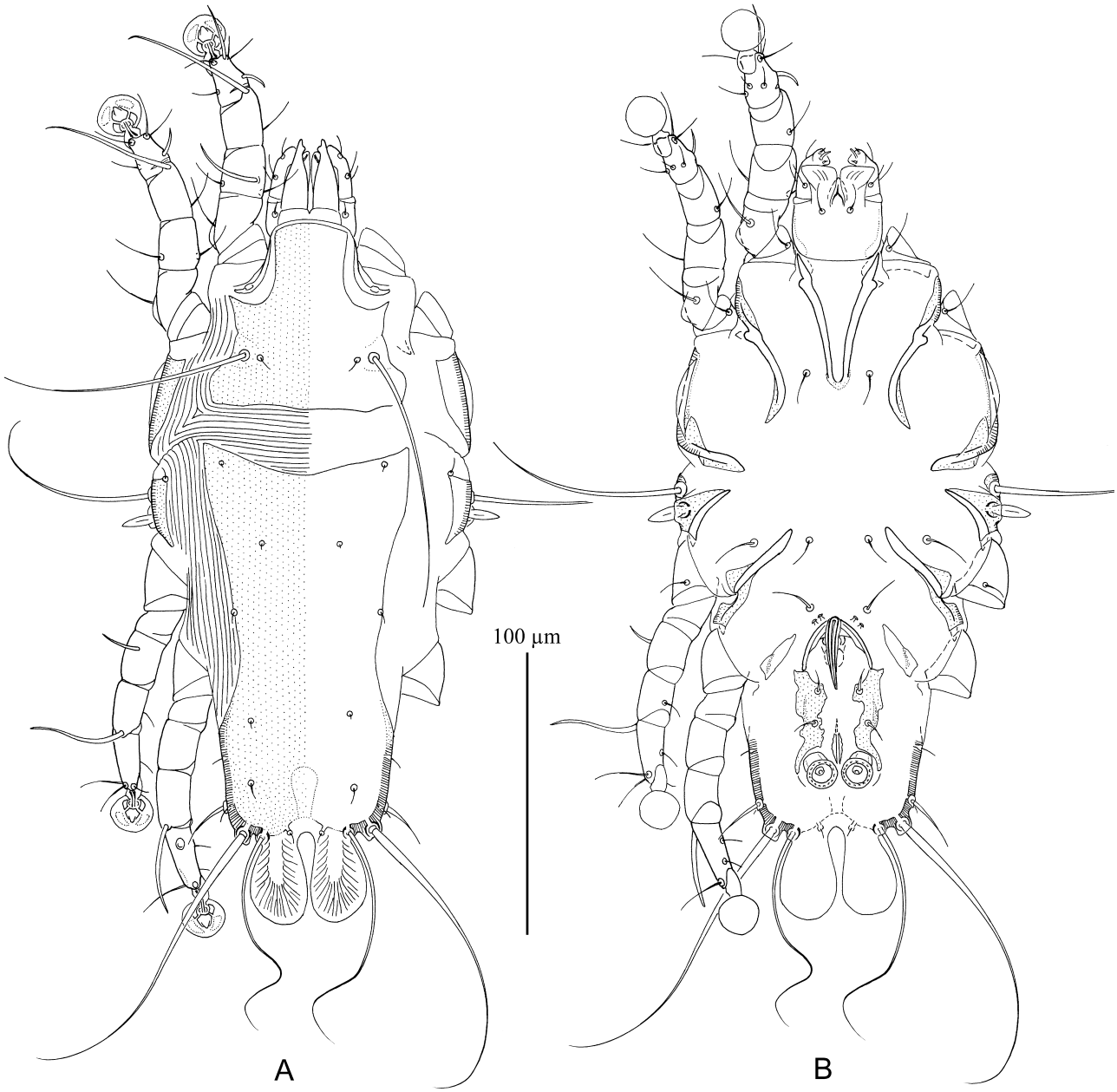

FIGURE 58. *Proctophyllodes parkesiae* Mironov **sp. n.**, male. A—dorsal view, B—ventral view.

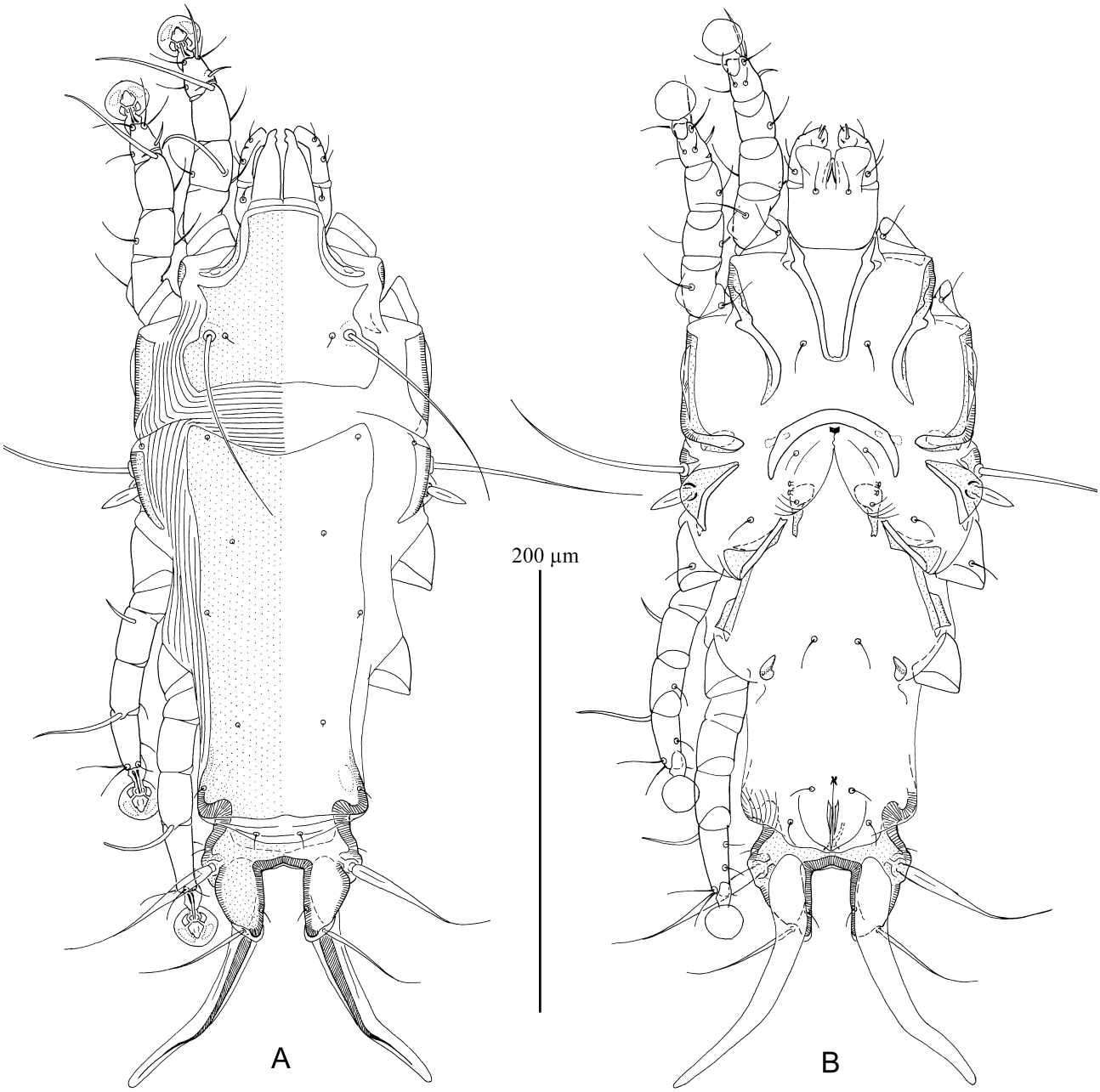

FIGURE 59. *Proctophyllodes parkesiae* Mironov **sp. n.**, female. A—dorsal view, B—ventral view.

Diagnosis. MALE (holotype, range for 6 paratypes in parentheses). Idiosoma, length × width, 200 (195–215) × 115 (115–125), length of hysterosoma 130 (130–135). Prodorsal shield: setae *vi* absent, antero-lateral extensions acute, lateral margins entire, posterior margin almost straight, posterior angles rounded, length 67 (62–68), width 67 (63–69), surface without ornamentation (Fig. 58A). Scapular setae *se* separated by 45 (43–46). Scapular shields narrow. Humeral shields well developed, not fused with epimerites III, encompassing bases of setae *cp*. Setae *c2* on antero-medial angle of humeral shields. Subhumeral setae *c3* lanceolate, 14 (12–15) × 2.5 (2.5–3). Hysteronotal shield: anterior margin concave, anterior angles acute, length 130 (130–135), width at anterior margin 72 (67–73), surface without ornamentation. Supranal concavity opened terminally, anterior end slightly extending beyond level of setae *h1*, length 27 (25–30). Posterior margin of opisthosoma between setae *h2* slightly concave. Terminal lamellae ovate, not overlapping, with pennate venation, length 32 (27–33), maximal width 20 (20–25), distance between bases 6 (6–7). Distances between hysteronotal setae: *c2:d2* 50 (50–54), *d2:e2* 52 (52–55), *e2:h3* 25 (25–30), *d1:d2* 22 (20–25), *e1:e2* 15 (15–20), *h1:h2* 15 (15–22), *h2:h2* 45 (45–50), *h3:h3* 30 (30–35), *ps2:ps2* 52 (52–60).

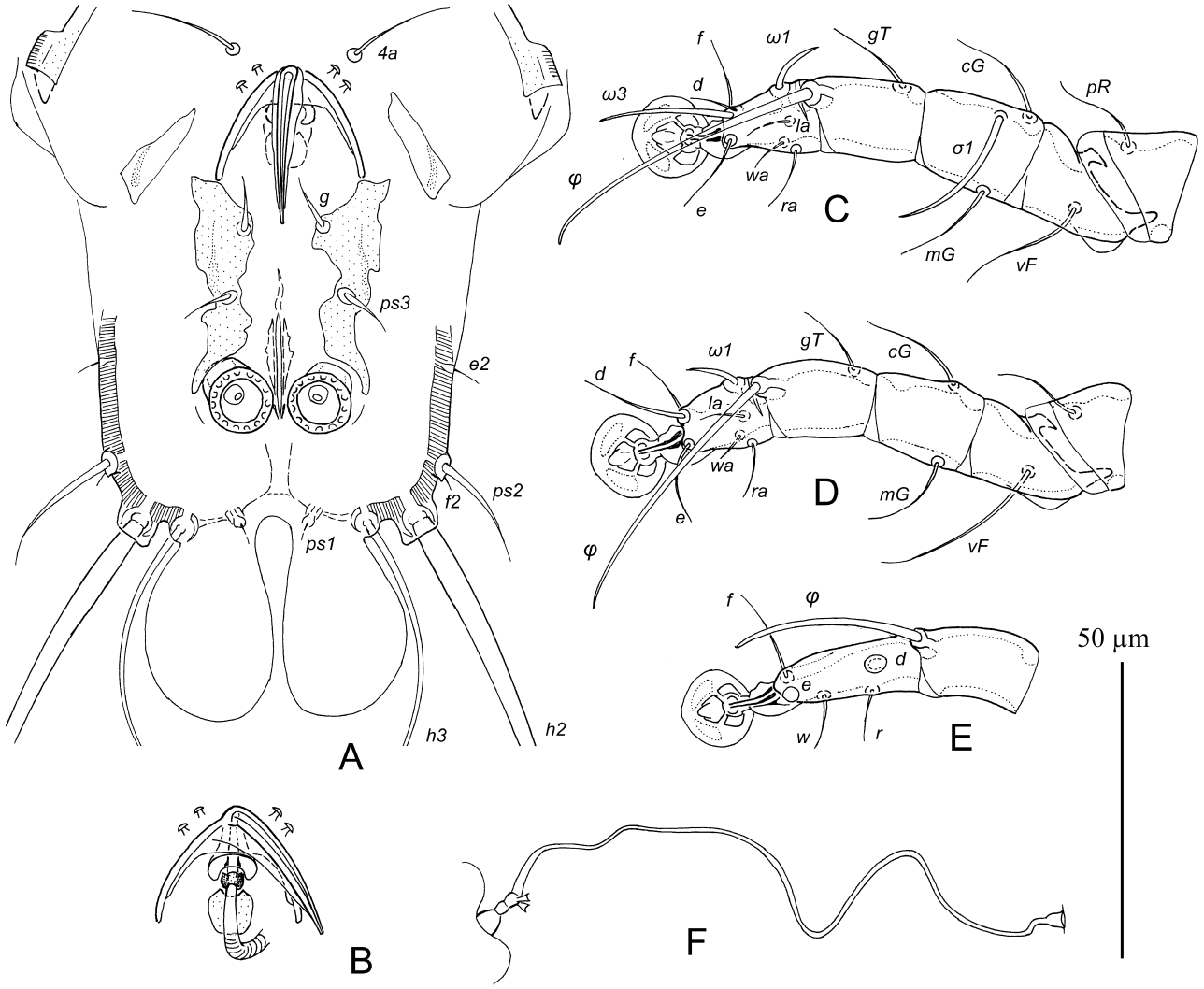

FIGURE 60. *Proctophyllodes parkesiae* Mironov **sp. n.**, details. A—opisthosoma of male, ventral view, B—genital apparatus of male, ventrolateral view, C, D—legs I and II of male, dorsal view, E—tibia and tarsus IV of male, dorsal view, F—spermatheca and spermaducts.

Epimerites I fused into a narrow U, without lateral extensions. Setae *4b* situated slightly posterior to inner tips of epimerites IIIa. Epimerites IVa well developed, not extending to level of setae *4a*. Genital arch of moderate size, 18 (17–19) long, 26 (25–28) wide, its base situated at midlevel of trochanters IV. Genital organ (aedeagus wrapped by genital sheath) stylet-shaped, slightly curved, directed backward immediately from genital arch apex, almost extending to level of setae *g*, 25 (25–27) in length; genital sheath thin, tapering apically, and almost extending to apex of aedeagus (Figs. 58B, 60A, B). Setae *4a* slightly anterior to level of genital arch apex. Paragenital and pregenital apodemes absent, genital papillae not connected. Opisthogastric shield represented by a pair of longitudinal plates with strongly uneven margins; anterior ends joined to genital arch with small lateral extensions; posterior ends narrowed and flanking anal field antero-laterally; length of sclerites 37 (30–38), distance between outer margins 32 (30–32). Accessory sclerites and postanal sclerites absent. Setae *g* and *ps3* slightly thickened basally, their bases arranged in a rectangle and both situated on opisthogastric shield; distances between these setae: *g:g* 15 (12–15), *g:ps3* 12 (12–14), *ps3:ps3* 18(18–20). Distance from genital arch apex to setae *ps1* 75 (75–78). Adanal suckers short cylindrical, 12 (12–14) long, 10 (10–11) wide (in apical part), corolla with 15–16 small and rounded denticles.

Femora I, II with narrow ventral crest. Solenidion *σ1*I longer than genu I and situated close to base of this segment. Solenidion *σ*III situated in basal half of genu III (Fig. 60C, D). Tarsus IV 22 (22–25) long; button-like seta *d* situated in basal third of this segment and about 1.5 times wider than button-like seta *e* (Fig. 60E). Length of solenidia: *σ1*I 27 (27–33), *σ*III 13 (12–16), *φ*IV 30 (30–37).

FEMALE (range for 8 paratypes). Idiosoma, length × width, 310–335 × 125–135, length of hysterosoma 205–220. Prodorsal shield: shape and surface as in males, posterior margin straight or slightly concave, length 77–87, width 87–100. Scapular setae *se* separated by 62–72. Scapular shields narrow. Humeral shields not fused with epimerites III, touching bases of setae *cp.* Setae *c2* on antero-medial angles of humeral shields or off these shields. Subhumeral setae *c3* narrowly lanceolate, 20–22 × 4.5–5. Lobar region of opisthosoma distinctly separated from remaining part of hysterosoma; hysteronotal shield split dorsally into anterior and lobar parts by narrow transverse furrow, but remains connected ventro-laterally by narrow sclerotized bands. Anterior hysteronotal shield roughly rectangular, with anterior margin concave, with posterior margin straight, surface without ornamentation, greatest length 155–170, width at anterior margin 82–88 (Fig. 59A). Lobar shield entire, 52–55 long, 72–77 wide, anterior margin concave. Opisthosomal lobes slightly longer than wide at base (1.2–1.3); terminal cleft almost rectangular, 28–33 in length, 15–17 in width. Setae *h1* on soft tegument between anterior hysteronotal and lobar shields. Setae *ps1* on lateral margins of terminal cleft, closer to level of setae *h3* than *h2*. Setae *h2* strongly thickened in basal part, subequal in length to terminal appendages, 70–80 long; setae *h3* 55–62 long, about 1/2 the length of terminal appendages. Distance between dorsal setae: *c2:d2* 75–80, *d2:e2* 77–90, *e2:h2* 35–40, *h2:h3* 27–30, *d1:d2* 35–37, *e1:e2* 30–42, *h1:h2* 16–18, *h2:ps1* 17–20, *h1:h1* 15–20, *h2:h2* 65–68.

Epimerites I shaped as in males. Epimerites IVa small. Epigynum almost semicircular, with tips not extending to level of genital papillae, with lateral extensions short and poorly sclerotized, length 32–35, greatest width 60–64 (Fig. 59B). Bases of genital papillae not connected. Genital setae *g* anterior to level of setae *3a*. Translobar apodemes connected each other anterior to terminal cleft. Setae *ps2* situated approximately at midlevel of anal opening; distance between setae: *ps2:ps2* 32–33, *ps2:ps3* 12–15, *ps3:ps3* 17–18. Flaps of anal opening not protruding into terminal cleft. Copulatory opening situated at anterior margin of fused translobar apodemes and covered with posterior ends of anal flaps. Head of spermatheca small cone-like, with two small bead-like enlargements, primary spermaduct without enlargements, secondary spermaducts short, 2–3 long (Fig. 60F).

Legs I, II as in males. Solenidion σIII situated in basal half of genu III. Legs IV with ambulacral disc extending to level of setae *h3*. Length of solenidia: σ*1*I 32–35, σIII 20–22, φIII 40–42, φIV 32–35.

Differential diagnosis. The new species, *Proctophyllodes parkesiae* sp. n., belongs to the *quadratus* species group in having setae *g* and *ps3* arranged in a rectangle in males. Within this group, *P. parkesiae* is most similar to *P. trisetosus* Atyeo and Braasch, 1966, described from *Sturnella magna* (Linnaeus) (Icteridae) in the USA (Atyeo & Braasch 1966) in having the pieces of the opisthogastric shield completely separated and the aedeagus extending to the level of setae *g* in males. The new species differs from *P. trisetosus* by the following features: in males of *P. parkesiae*, the terminal lamellae are shorter and wider (27–33 × 20–25 μm), the corolla of the anal discs with 15–16 denticles, the anterolateral extensions of the opisthogastric shields are short, poorly distinct; in females, macrosetae *h2* are subequal in length to the terminal appendages, setae *h3* are slightly longer than 1/2 the length of the terminal appendages, and the terminal cleft is rectangular and longer than wide. In males of *P. trisetosus*, the terminal lamellae are larger (*c.* 43 × 28 μm), the corolla of anal discs has 18 denticles, the anterolateral extensions of the opisthogastric shields are long; in females, macrosetae *h2* are nearly 1.5 times longer than the terminal appendages, setae *h3* are about 1/4 the length of the terminal appendages, and the terminal cleft is trapezoidal and wider than long.

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

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References

Alexio, A., Gregory, S.M.S. & Penhallurick, J. (2007) Fixation of the type species and revalidation of the genus *Dendroplex* Swainson, 1827 (Dendrocolaptidae). *Bulletin of the British Ornithologists' Club*, 127 (3), 242–246.

Atyeo, W.T. (1966a) A new genus and six new species of feather mites primarily from Tyranni (Acarina: Proctophyllodidae). *Journal of the Kansas Entomological Society*, 39, 481–492.

Atyeo, W.T. (1966b) Two new genera of feather mites (Acarina: Proctophyllodidae). *Journal of the Kansas Entomological Society*, 39, 473–480.

Atyeo, W.T. (1967a) Two new feather mite genera with polymorphic males (Analgoidea: Proctophyllodidae). *Journal of the Kansas Entomological Society*, 40, 465–471.

Atyeo, W.T. (1967b) Four new species of *Monojoubertia* from one species of bird (Analgoidea: Proctophyllodidae). *Journal of the Kansas Entomological Society*, 40, 458–465.

Atyeo, W.T. (1969) Redescription of *Anisophyllodes intermedius* (Trouessart and Neumann), 1888, new combination (Acarina: Proctophyllodidae). *Journal of the Georgia Entomological Society*, 4, 153–155.

Atyeo, W.T. (1971a) New genera of analgoid feather mites. *Journal of the Kansas Entomological Society*, 44, 75–80.

Atyeo, W.T. (1971b) Analgoid mites (Proctophyllodidae) from the Dicaeidae (Aves: Passeriformes). *Journal of the Australian Entomological Society*, 10, 37–42.
https://doi.org/10.1111/j.1440-6055.1971.tb00008.x

Atyeo, W.T. (1971c) *Exochojoubertia*, a new genus of proctophyllodid feather mites (Acarina: Analgoidea). *New Zealand Journal of Science*, 14, 219–223.

Atyeo, W.T. (1972) A new genus of feather mites (Analgoidea: Proctophyllodidae) from cocks-of-the-rock (Aves: Rupicolidae). *Boletim do Museu Nacional de Rio de Janeiro*, New Series, Zoologia, 285, 1–6.

Atyeo, W.T. & Braasch, N.L. (1966). The feather mite genus *Proctophyllodes* (Sarcoptiformes: Proctophyllodidae). *Bulletin of the University of Nebraska State Museum*, 5, 1–354.

Atyeo, W.T. & Gaud, J. (1968) Two feather mite genera (Analgoidea, Proctophyllodidae) from birds of the families Oxyruncidae and Pipridae (Passeriformes, Tyranni). *Bulletin of the University of Nebraska State Museum*, 8, 209–215.

Atyeo, W.T. & Gaud, J. (1970a) A new genus of feather mites from African Muscicapidae (Analgoidea: Proctophyllodidae). *Journal of the Kansas Entomological Society*, 43, 243–247.

Atyeo, W.T. & Gaud, J. (1970b) The feather mite genus *Monojourbertia* Radford, 1950 (Analgoidea: Proctophyllodidae). *Entomologische Mitteilungen aus dem Zoologischen Staatsinstitut und Zoologischen Museum, Hamburg*, 4, 145–155.

Atyeo, W.T. & Gaud, J. (1971a) A new genus of feather mites near *Proctophyllodes* Robin, 1877 (Analgoidea: Proctophyllodidae). *Journal of the Georgia Entomological Society*, 6, 43–50.

Atyeo, W.T. & Gaud, J. (1971b) *Mimicalges*, an analgid-like genus of Proctophyllodidae (Acarina: Analgoidea). *Folia Parasitologica*, 18, 51–53.

Atyeo, W.T. & Gaud, J. (1976) The probable association of a new genus of Proctophyllodidae with a New Guinean parrot (Acarina: Analgoidea). *Journal of the Kansas Entomological Society*, 49, 489–491.

Atyeo, W.T. & Gaud, J. (1977) Gruiformes, a new host group for pterodectine feather mites (Acarina: Analgoidea). *Journal of Parasitology*, 63, 141–144.

Barreto, M., Burbano, M.E., Proctor, H.C., Mironov, S.V. & Wauthy, G. (2012) Feather mites (Acariformes: Psoroptidia) from Colombia: Preliminary list with new records. *Zootaxa*, 3516, 1–68.

Berla, H.F. (1959a) Analgesoidea neotropicais. IV—Sôbre algumas espécies novas ou pouco conhecidas de acarinos plumícolas. *Boletim do Museu Nacional de Rio de Janeiro*, *New Series, Zoologia*, 209, 1–17.

Berla, H.F. (1959b) Analgesoidea neotropicais. V. Sôbre uma espécie nova de "*Proctophyllodes*" Robin, 1868 e redecriçao de "*Pterolichus varians selenurus*" Trouessart, 1898 (Acarina, Pterolichinae). *Revista Brasileira de Biologia*, 19, 203–206.

Berla, H.F. (1959c) Analgesoidea neotropicais. VI. Um novo gênero de acarinos plumícolas (Acarina, Proctophyllodinae), hóspede de Oxyruncidae (Aves, Passeriformes). *Studia Entomologica*, 2, 31–32.

Canestrini, G. & Kramer, P. (1899) Demodicidae und Sarcoptidae. *Das Tierreich*, 7, 1–193.
https://doi.org/10.5962/bhl.title.69280

De Alzuet, A.D.B. & Brandetti, E. (1986) Ácaros plumícolas, ectoparásitos de aves silvestres (Astigmata: Proctophyllodidae). *Neotropica*, 32, 81–87.

Enout, A.M.J., Lobato, D.N.C., Diniz, F.C. & Antonini, Y. (2012) Chewing lice (Insecta, Phthiraptera) and feather mites (Acari, Astigmata) associated with birds of the Cerrado in Central Brazil. *Parasitology Research*, 111, 1731–1742.
https://doi.org/10.1007/s00436-012-3016-5

Evans, G.O. (1992) *Principles of Acarology*. CAB International, Wallingford, 563 pp.

Forrester, D.J. & Spalding, M.G. (2003) *Parasites and diseases of wild birds in Florida*. University Press of Florida, Gainesville, 1132 pp.

Fuentes, D., Reyes, J., Sepúlveda, M.S., Kinsella, M., Mironov, S., Cicchino, A., Moreno, L., Landaeta-Aqueveque, C., Troncoso, I. & González-Acuña, D. (2015) Gastrointestinal and external parasites of the white-crested elaenia *Elaenia albiceps chilensis* (Aves, Tyrannidae) of Chile. *Revista Brasileira de Parasitologia Veterinária*, 24, 276–282.
https://doi.org/10.1590/S1984-29612015053

Fuentes-Castillo, D., Cicchino, A., Mironov, S., Moreno, L., Landaeta-Aqueveque, C., Barrientos, C. & González-Acuña, D. (2016) Ectoparasites of the black-chinned siskin *Spinus barbatus* (Passeriformes: Fringillidae) in Chile. *Revista Brasileira de Parasitologia Veterinária*, 25, 476–483.

https://doi.org/10.1590/s1984-29612016079
Galloway, T.D., Proctor, H.C. & Mironov, S.V. (2014) Chapter 5. Chewing lice (Insecta: Phthiraptera: Amblycera, Ischnocera) and feather mites (Acari: Astigmatina: Analgoidea, Pterolichoidea): ectosymbionts of grassland birds in Canada. *In*: Cárcamo, H.A. & Giberson, D.J. (Eds.), *Arthropods of Canadian grasslands*, 3 (biodiversity and systematics), Part 1 (Biological survey of Canada), pp. 139–188.
Gaud, J. & Atyeo, W.T. (1996) Feather mites of the World (Acarina, Astigmata): the supraspecific taxa. *Annales du Musée Royal de l'Afrique Centrale*, *Sciences Zoologiques*, 277 (Part 1 & 2), 1–193 (text) & 1–436 (illustrations).
Gaud, J. & Berla, H.F. (1963) Deux genres nouveaux de Sarcoptiformes plumicoles (Analgesoidea). *Acarologia*, 5, 644–648.
Gaud, J. & Fain, A. (1990) Deux espèces nouvelles d'Acariens plumicoles du genre *Proctophyllodes* (Analgoidea, Proctophylodidae) parasites de Passériformes africains de la famille Pycnonotidae. *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Entomologie*, 60, 133–138.
Gaud, J. & Till, W.M. (1961) Suborder Sarcoptiformes. *In*: Zumpt, F. (Ed.), *The arthropod parasites of vertebrates in Africa south of the Sahara (Ethiopian Region). Vol. I. Chelicerata.* Publications of the South African Institute of Medical Research, Johannesburg, No L (Vol. IX), pp. 180–352.
Gill, F. & Donsker, D. (Eds.) (2017) IOC World Bird List. Version 7.2.
http://dx.doi.org/10.14344/IOC.ML.7.2
Hernandes, F.A. (2013) A new genus and species of pterodectine feather mite (Acari: Proctophyllodidae) from Tod-Tyrants in Brazil (Passeriformes: Tyrannidae). *Acta Parasitologica*, 58, 309–316.
https://doi.org/10.2478/s11686-013-0153-7
Hernandes, F.A. (2014) Three new proctophyllodine feather mites (Acari: Proctophyllodidae) from passerines in Brazil (Aves: Passeriformes). *Journal of Natural History*, 48, 185–202.
https://doi.org/10.1080/00222933.2013.791949
Hernandes, F.A. & Valim, M.P. (2005) A new species of *Pterodectes* Robin, 1877 (Proctophyllodidae: Pterodectinae) from the pale-breasted thrush, *Turdus leucomelas* (Passeriformes: Turdidae). *Zootaxa*, 1081 (1), 61–68.
https://doi.org/10.11646/zootaxa.1081.1.4
Hernandes, F.A. & Valim, M.P. (2006) Two new species of the feather mite subfamily Pterodectinae (Acari: Astigmata: Proctophyllodidae) from Brazil. *Zootaxa*, 1235, 49–61.
Hernandes, F.A. & Valim, M.P. (2012) The genus *Nanopterodectes* Mironov, 2009 (Acari, Proctophyllodidae), with descriptions of three new species from antbirds (Passeriformes: Thamnophilidae) in Brazil. *Systematic Parasitology*, 83, 227–242.
https://doi.org/10.1007/s11230-012-9385-4
Hernandes, F.A. & Valim, M.P. (2014) On the identity of two species of Proctophyllodidae (Acari: Astigmata: Analgoidea) described by Herbert F. Berla in Brazil, with a description of *Lamellodectes* gen. nov. and a new species. *Zootaxa*, 3794 (1), 179–200.
https://doi.org/10.11646/zootaxa.3794.1.8
Hernandes, F.A., Pedroso, L.G.A. & Oniki-Willis, Y. (2016) Five new feather mites of the subfamily Pterodectinae (Acariformes: Astigmata: Proctophyllodidae) from passerines and hummingbirds (Aves) of Brazil. *Zootaxa*, 4161 (3), 301–328.
https://doi.org/10.11646/zootaxa.4161.3.1
Hernandes, F.A., Valim, M.P. & Mironov, S.V. (2007) Four new species and one new genus of the feather mite subfamily Proctophyllodinae (Astigmata: Proctophyllodidae) from Brazil. *Journal of Natural History*, 41, 2653–2681.
https://doi.org/10.1080/00222930701644718
Hernandes, F.A., Valim, M.P. & Mironov, S.V. (2010) On the identity of *Pterodectes ralliculae* Atyeo and Gaud, 1977 (Astigmata: Proctophyllodidae). *Journal of Natural History*, 44, 369–377.
https://doi.org/10.1080/00222930903383594
Kanegae, M.F., Valim, M.P., Fonseca, M.A., Marini, M.A. & Serra-Freire, N.M. (2008) Ácaros plumícolas (Acari: Astigmata) em aves do Cerrado do Distrito Federal, Brasil. *Biota Neotropica*, 8, 31–39.
https://doi.org/10.1590/S1676-06032008000100003
Knowles, L.L. & Klimov, P.B. (2011) Estimating phylogenetic relationships despite discordant gene trees across loci: the species tree of a diverse species group of feather mites (Acari: Proctophyllodidae). *Parasitology*, 138, 1750–1759.
https://doi.org/10.1017/S003118201100031X
Krantz, G. & Walter, D. (Eds.) (2009) *A Manual of Acarology (3rd edition).* Texas University Press, Lubbock, 807 pp.
Kudon, L.H. (1982a) *Platyacarus*, a new genus of feather mites (Acarina: Proctophyllodidae). *Journal of the Georgia Entomological Society*, 17, 337–346.
Kudon, L.H. (1982b) Descriptions of three new species in the genus *Platyacarus* Kudon (Acarina: Proctophyllodidae). *Journal of the Georgia Entomological Society*, 17, 525–530.
Kudon, L.H. (1982c) New feather mites from the genus *Platyacarus* (Acarina: Proctophyllodidae). *Journal of the Georgia Entomological Society*, 17, 531–536.
Kudon, L.H. (1982d) Four new species of feather mites from the genus *Platyacarus* (Acarina: Proctophyllodidae). *Journal of the Georgia Entomological Society*, 17, 537–544.
Kudon, L.H. (1982e) Host relationships of the feather mite genus *Platyacarus* Kudon (Acarina: Proctophyllodidae) with a key to the species. *Journal of the Georgia Entomological Society*, 17, 545–552.
Mégnin, P. & Trouessart, E.L. (1884) Note sur la morphologie et sur la classification des Sarcoptides plumicoles. *Bulletin de la*

Société d'Études Scientifiques d'Angers, 12, 131–139.
Mironov, S.V. (2006) Feather mites of the genus *Montesauria* Oudemans (Astigmata: Proctophyllodidae) associated with starlings (Passeriformes: Sturnidae) in the Indo-Malayan region, with notes on systematics of the genus. *Acarina*, 14, 21–40.
Mironov, S.V. (2008) New feather mites of the subfamily Pterodectinae (Astigmata: Proctophyllodidae) from passerines (Aves: Passeriformes) in Africa. *Annales Zoologici*, 58, 403–418.
https://doi.org/10.3161/000345408X326744
Mironov, S.V. (2009) Phylogeny of feather mites of the subfamily Pterodectinae (Astigmata: Proctophyllodidae) and their host associations with passerines (Aves: Passeriformes). *Proceedings of the Zoological Institute of the Russian Academy of Sciences*, 313, 97–118.
Mironov, S.V. (2012) New species of the feather mite genus *Proctophyllodes* Robin, 1877 (Acari: Analgoidea: Proctophyllodidae) from European passerines (Aves: Passeriformes), with an updated checklist of the genus. *Acarina*, 20, 130–158.
Mironov, S.V. (2017) Two new feather mites of the genus *Proctophyllodes* Robin (Acari: Proctophyllodidae) from European passerines (Aves: Passeriformes). *Systematic Parasitology*, 94, 215–226.
https://doi.org/10.1007/s11230-016-9691-3
Mironov, S.V. & Fain, A. (2003) New species of the feather mite subfamily Pterodectinae (Astigmata: Proctophyllodidae) from African passerines (Aves: Passeriformes). *Bulletin de la Société Royale Belge d'Entomologie*, 139, 75–91.
Mironov, S.V. & González-Acuña, D.A. (2009) Two new species of the feather mite subfamily Proctophyllodinae (Acari: Proctophyllodidae) from suboscine birds (Aves: Passeriformes) in Chile. *Acarina*, 17, 189–199.
Mironov, S.V. & González-Acuña, D.A. (2011) New feather mites of the subfamily Pterodectinae (Astigmata: Proctophyllodidae) from passerines (Aves: Passeriformes) from Chile and Cuba. *Zootaxa*, 3057, 1–48.
Mironov, S.V. & Kopij, G. (1996a) New feather mite species (Acarina: Analgoidea) from some starlings (Passeriformes: Sturnidae) of South Africa. *Journal of African Zoology*, 110, 257–269.
Mironov, S.V. & Kopij, G. (1996b) Three new species of the feather mite family Proctophyllodidae (Acarina: Analgoidea) from some South African passerine birds (Aves: Passeriformes). *Acarina*, 4, 27–33.
Mironov, S.V. & Kopij, G. (1997) New feather mite species of the subfamily Pterodectinae (Analgoidea: Proctophyllodidae) from some passerines (Aves: Passeriformes) of South Africa. *Journal of African Zoology*, 111, 449–463.
Mironov, S.V. & O'Connor, B.M. (2014) New species of the feather mite family Proctophyllodidae (Acariformes: Astigmata) from two species of mockingbirds (Passeriformes: Mimidae) in Eastern North America. *Journal of Medical Entomology*, 51, 529–546.
https://doi.org/10.1603/ME13109
Mironov, S.V. & Overstreet, R.M. (2015) A new species of the feather mite genus *Amerodectes* Valim et Hernandes (Acariformes: Proctophyllodidae) from *Xanthocephalus xanthocephalus* (Passeriformes: Icteridae) in Oregon. *Acarina*, 23, 74–80.
Mironov, S.V. & Proctor, H.C. (2009a) A new feather mite genus of the family Proctophyllodidae (Astigmata: Analgoidea) from lyrebirds (Passeriformes: Menuridae) in Australia. *Zootaxa*, 2326, 51–61.
Mironov, S.V. & Proctor, H.C. (2009b) Feather mites of the genus *Proterothrix* Gaud (Astigmata, Proctophyllodidae) from parrotbills (Passeriformes: Paradoxornithidae) in China. *Journal of Parasitology*, 95, 1093–1107.
https://doi.org/10.1645/GE-1961.1
Mironov, S.V. & Tolstenkov, O.O. (2013) Three new feather mites of the subfamily Pterodectinae (Acari: Proctophyllodidae) from passerines (Aves: Passeriformes) in Vietnam. *Proceedings of the Zoological Institute RAS*, 317, 11–29.
Mironov, S.V. & Wauthy, G. (2010) *Afroproterothrix* gen. n., a new feather mite genus of the feather mite subfamily Pterodectinae (Astigmata, Proctophyllodidae) from passerines (Aves: Passeriformes) in Africa. *International Journal of Acarology*, 35, 175–182.
https://doi.org/10.1080/01647950903524158
Mironov, S.V., Dabert, J. & Dabert, M. (2012a) A new feather mite species of the genus *Proctophyllodes* Robin, 1877 (Astigmata: Proctophyllodidae) from the Long-tailed Tit *Aegithalos caudatus* (Passeriformes: Aegithalidae) — morphological description with DNA barcode data. *Zootaxa*, 3253, 54–61.
Mironov, S.V., Literak, I. & Capek, M. (2008a) New feather mites of the subfamily Pterodectinae (Acari: Astigmata: Proctophyllodidae) from passerines (Aves: Passeriformes) in Mato Grosso do Sul, Brazil. *Zootaxa*, 1947, 1–38.
Mironov, S.V., Literák, I., Nguen, M.H. & Capek, M. (2012b) New feather mites of the subfamily Pterodectinae (Acari: Proctophyllodidae) from passerines and woodpeckers (Aves: Passeriformes, Piciformes) from Vietnam. *Zootaxa*, 3440, 1–49.
Mironov, S.V., Literak, I., Sychra, O. & Capek, M. (2011) A new feather mite species of the genus *Picalgoides* Černý, 1974 (Astigmata: Psoroptoididae) from a passerine host in Costa Rica. *Systematic Parasitology*, 79, 63–70.
https://doi.org/10.1007/s11230-011-9293-z
Mironov, S.V., Literak, I., Sychra, O. & Capek, M. (2014) Two new species of the feather mite family Gabuciniidae (Acariformes: Pterolichoidea) from wrens (Passeriformes: Troglodytidae). *Acta Parasitologica*, 59, 568–579.
https://doi.org/10.2478/s11686-014-0287-2
Mironov, S.V., Diao, W., Zhang, Y.A., Zhang, C. & Yan, Z.H. (2008b) A new feather mite species of the genus *Proterothrix* Gaud (Astigmata, Proctophyllodidae) from *Ficedula zanthopygia* (Hay) (Passeriformes: Muscicapidae) in China. *Acarina*, 16 (1), 31–38.

Norton, R. (1998) Morphological evidence for the evolutionary origin of Astigmata (Acari: Acariformes). *Experimental and Applied Acarology*, 22, 559–594.
https://doi.org/10.1023/A:1006135509248
OConnor, B.M., Foufopoulos, J., Lipton, D. & Lindström, K. (2005) Mites associated with the small ground finch, *Geospiza fuliginosa* (Passeriformes: Emberizidae), from the Galapagos Islands. *Journal of Parasitology*, 91, 1304–1313.
https://doi.org/10.1645/GE-581R.1
Park, C.K. & Atyeo, W.T. (1971a) A generic revision of the Pterodectinae, a new subfamily of feather mites (Sarcoptiformes: Analgoidea). *Bulletin of the University of Nebraska State Museum*, 9, 39–88.
Park, C.K. & Atyeo, W.T. (1971b) A new subfamily and genus of feather mites from hummingbirds (Acarina: Proctophyllodidae). *Florida Entomologist*, 54, 221–229.
https://doi.org/10.2307/3493717
Park, C.K. & Atyeo, W.T. (1972a) A new genus of allodectine feather mites from hummingbirds. *Journal of the Kansas Entomological Society*, 45, 327–334.
Park, C.K. & Atyeo, W.T. (1972b) The species of a new subfamily of feather mites, the Allodectinae (Acarina: Proctophyllodidae). *Redia*, 52, 653–678.
Park, C.K. & Atyeo, W.T. (1973a) The pterodectine feather mites of hummingbirds: The genera *Syntomodectes* Park and Atyeo and *Sclerodectes*, new genus. *Journal of the Georgia Entomological Society*, 8, 39–51.
Park, C.K. & Atyeo, W.T. (1973b) The pterodectine feather mites of hummingbirds: The genus *Toxerodectes* Park and Atyeo (the *hastifolia* group). *Journal of the Georgia Entomological Society*, 8, 221–233.
Park, C.K. & Atyeo, W.T. (1974a) The pterodectine feather mites of hummingbirds: The genus *Toxerodectes* Park and Atyeo (the *lecroyae* and *gladiger* groups). *Journal of the Georgia Entomological Society*, 9, 18–32.
Park, C.K. & Atyeo, W.T. (1974b) The pterodectine feather mites of hummingbirds: The genus *Trochilodectes* Park and Atyeo. *Journal of the Georgia Entomological Society*, 9, 156–173.
Park, C.K. & Atyeo, W.T. (1975) The pterodectine feather mites of hummingbirds: The genus *Xynonodectes* Park and Atyeo. *Journal of the Georgia Entomological Society*, 10, 128–144.
Radford, C.D. (1953) The mites (Acarina: Analgesidae) living on or in the feathers of birds. *Parasitology*, 42, 199–230.
https://doi.org/10.1017/S0031182000084468
Radford, C.D. (1958) The host-parasite relationships of the feather mites (Acarina: Analgesoidea). *Revista Brasileira de Entomologia*, 8, 107–170.
Roda, S.A. & Faris, A.M.I. (1999) Ácaros plumícolas em aves Passeriformes da Zona da Mata Norte de Pernambuco, Brasil. *Revista Brasileira de Zoologia*, 16, 879–886.
https://doi.org/10.1590/S0101-81751999000300025
Silva, H.M., Hernandes, F.A. & Pichorim, M. (2015) Feather mites (Acari, Astigmata) associated with birds in an Atlantic Forest fragment in Northeastern Brazil. *Brazilian Journal of Biology*, 75, 726–735.
https://doi.org/10.1590/1519-6984.23313
Štefka, J., Hoeck, P.E.A., Keller, L.F. & Smith, V.S. (2011) A hitchhikers guide to the Galápagos: cophylogeography of Galápagos mockingbirds and their parasites. *BMC Evolutionary Biology*, 11, 284.
https://doi.org/10.1186/1471-2148-11-284
Trouessart, E.L. (1885) Note sur le classification des Analgésiens et diagnoses d'espèces et de genres nouveaux. *Bulletin de la Société d´Etudes Scientifiques d´Angers*, 14, 46 –89.
Trouessart, E.L. (1899) Diagnoses préliminaires d'espèces nouvelles d'Acariens plumicoles. Additions et corrections à la sous-famille des Analgésinés. *Bulletin de la Société d´Etudes Scientifiques d'Angers*, 28, 1–62.
Trouessart, E.L. & Mégnin, P. (1884) Sur le polymorphisme sexuel et larvaire des Sarcoptides plumicoles. *Compte Rendus Hebdomadaires des Séances de l´Academie des Sciences, Paris, Série D Sciences Naturelles*, 97, 1319–1321.
Trouessart, E.L. & Neumann, G. (1888) Diagnoses d'espèces nouvelles de Sarcoptides plumicoles (Analgesinae). *Bulletin Scientifique de la France et de la Belgique*, 19, 325–380 + pls. XXI–XXVII.
Valim, M.P. & Hernandes, F.A. (2006) Redescription of four species of the feather mite genus *Pterodectes* Robin, 1877 (Acari: Proctophyllodidae: Pterodectinae) described by Herbert F. Berla. *Acarina*, 14, 41–55.
Valim, M.P. & Hernandes, F.A. (2008) Redescription of five species of the feather mite genus *Pterodectes* Robin, 1877 (Acari: Proctophyllodidae: Pterodectinae), with the proposal of a new genus and a new species. *Acarina*, 16, 131–158.
Valim, M.P. & Hernandes, F.A. (2009) A new species of the feather mite genus *Cotingodectes* and a new genus of Pterodectinae (Astigmata: Proctophyllodidae). *International Journal of Acarology*, 35, 265–272.
https://doi.org/10.1080/01647950903071143
Valim, M.P. & Hernandes, F.A. (2010) A systematic review of feather mites of the *Pterodectes* generic complex (Acari: Proctophyllodidae) with redescriptions of species described by Vladimír Černý. *Acarina*, 18, 3–35.
Valim, M.P., Hernandes, F.A. & Proctor, H.C. (2011) Feather mites of Brazil (Acari: Astigmata: Analgoidea and Pterolichoidea). *International Journal of Acarology*, 37, 293–324.
https://doi.org/10.1080/01647954.2010.519719
Villa, S.M., Le Bohec, C., Koop, J.A.H., Proctor, H.C. & Clayton, D.H. (2013) Diversity of feather mites (Acari: Astigmata) on Darwin's finches. *Journal of Parasitology*, 99, 756–762.
https://doi.org/10.1645/12-112.1
Wang, Z., Wang, J. & Su, X. (2014) Four new feather mite species of the genus *Proctophyllodes* Robin (Astigmata: Proctophyllodidae) from China. *Zoological Systematics*, 39, 248–258.