

# A SYSTEMATIC REVIEW OF FEATHER MITES OF THE *PTERODECTES* GENERIC COMPLEX (ACARI: PROCTOPHYLLODIDAE: PTERODECTINAE) WITH REDESCRIPTIONS OF SPECIES DESCRIBED BY VLADIMÍR ČERNÝ

M. P. Valim<sup>1\*</sup> and F. A. Hernandez<sup>2</sup>

<sup>1</sup>Laboratório de Ixodides, Pavilhão Mourisco, sala 214; Instituto Oswaldo Cruz, Fiocruz; Av. Brasil, 4365, Manguinhos, Rio de Janeiro, RJ, BRAZIL, 21045-900, e-mail: mpvalim@hotmail.com

<sup>2</sup>Depto. Zoologia e Botânica; Progr. Pós-Graduação em Biologia Animal — Universidade Estadual Paulista — UNESP; Rua Cristóvão Colombo, 2265, Jardim Nazareth, São José do Rio Preto, SP, BRAZIL, 15054-000, e-mail: abakashi@gmail.com

**ABSTRACT:** Five species of feather mites originally described in the genus *Pterodectes* by Vladimir Černý (1974) are redescribed: *Pterodectes havliki*, *P. maculatus*, *P. reticulatus*, *P. storkani*, *P. thraupicola* and *P. troglodytis*. The formerly unknown males of *P. thraupicola* and *P. reticulatus* and the female of *P. maculatus* are described for the first time. A synopsis of known species of the *Pterodectes* generic complex is presented, and species content of the genus *Pterodectes* is revised. Fifteen species previously included in this genus are transferred to the new genus *Amerodectes* gen. n.: *Amerodectes atyeoi* (O'Connor et al., 2005) comb. n., *A. bilineatus* (Berla, 1958) comb. n., *A. geothlypis* (Berla, 1973) comb. n., *A. gracilis* (Trouessart, 1885) comb. n., *A. maculatus* comb. n., *A. molothrus* (Mironov, 2008) comb. n., *A. nordestensis* (Berla, 1958) comb. n., *A. paroariae* (Mironov, 2008) comb. n., *A. pitangi* (Mironov, 2008) comb. n., *A. tangarae* (Mironov, 2008) comb. n., *A. turdinus* (Berla, 1959) comb. n., *A. sialiarum* (Stoll, 1893) comb. n., *A. storkani* (Černý, 1974) comb. n., *A. thraupicola* (Černý, 1974) comb. n., and *A. troglodytis* (Černý, 1974) comb. n. Five species are transferred to the genus *Tyrannidectes* Mironov, 2008: *Tyrannidectes amaurochalinus* (Hernandes et Valim, 2006) comb. n., *T. banksi* (Valim et Hernandez, 2008) comb. n., *T. crassus* (Trouessart, 1885) comb. n., *T. fissuratus* (Hernandes et Valim, 2005) comb. n., and *T. reticulatus* (Černý, 1974) comb. n.; and one species is moved to the genus *Metapterodectes* Mironov, 2008: *Metapterodectes muticus* (Banks, 1909) comb. n. The genus *Pterodectes* remains monotypic, with the type species *P. rutilus* Robin, 1877.

**KEY WORDS:** Astigmata, feather mites, Analgoidea, Proctophyllodidae, Pterodectinae, *Pterodectes* complex, systematics

## INTRODUCTION

Feather mites of the subfamily Pterodectinae (Proctophyllodidae) are adapted to living mostly on the large flight and tail feathers of their avian hosts and are mainly associated with passerines (Passeriformes) and hummingbirds (Apodiformes: Trochilidae). These mites have torpedo-shaped bodies and extensive dorsal shields, with most dorsal setae reduced in size, presumably an adaptive response to the strong air-flow during flight (Dabert and Mironov 1999). Mites of the genus *Pterodectes* Robin, 1877 (Pterodectinae) are usually found in narrow corridors between barbs on the ventral side of vanes of flight feathers (Fig. 1).

Until 1971, when Park and Atyeo defined the subfamily Pterodectinae, this genus was one of the largest feather mite genera, comprising a morphologically heterogeneous assemblage of species (Trouessart 1885, 1899; Gaud 1953; Gaud and Mouchet 1957). Park and Atyeo (1971) organized the pterodectines previously referred to *Pterodectes* into several genera, and the nine species retained in *Pterodectes* were arranged in the *rutilus* and *gracilis* species groups. After that, 15 more *Pterodectes* species were described (Berla 1973; Černý 1974; O'Connor et al. 2005; Hernandez and Valim 2005, 2006; Valim and Hernandez 2008; Mironov et al. 2008a), and more recently, the three closely related genera were established: *Tyrannidectes* Mironov, 2008, *Metapterodectes* Mironov, 2008, and *Cotingodectes* Valim et Hernandez, 2009.

In an attempt to bring into current concepts the species of *Pterodectes* with incomplete or unsatisfactory descriptions we redescribed in our previous papers (Valim and Hernandez 2006, 2008) four species of *Pterodectes* described by H.F. Berla in the end of 1950s, and six species described by the early naturalists, N. Banks, O. Stoll, E.L. Trouessart and C. Robin, in the end of 19<sup>th</sup> and the beginning of 20<sup>th</sup> centuries.

Among researchers who previously described species of *Pterodectes*, Vladimir Černý (1928–2002) was a prominent Czech acarologist, who worked on various parasitic mites, mostly those associated with birds. He described about 85 new taxa of mites and ticks (Daniel 2002), and most of them were feather mites (Astigmata: Analgoidea and Pterolichoidea). Černý (1974) described 11 species from Surinam, and six of them were referred to the genus *Pterodectes*. Despite the limited illustrations, his descriptions presented good diagnoses and an accurate acarological nomenclature for leg and idiosomal setae, which allows prompt recognition of his species.

The first goal of the present paper is to redescribe the six species of the genus *Pterodectes* de-

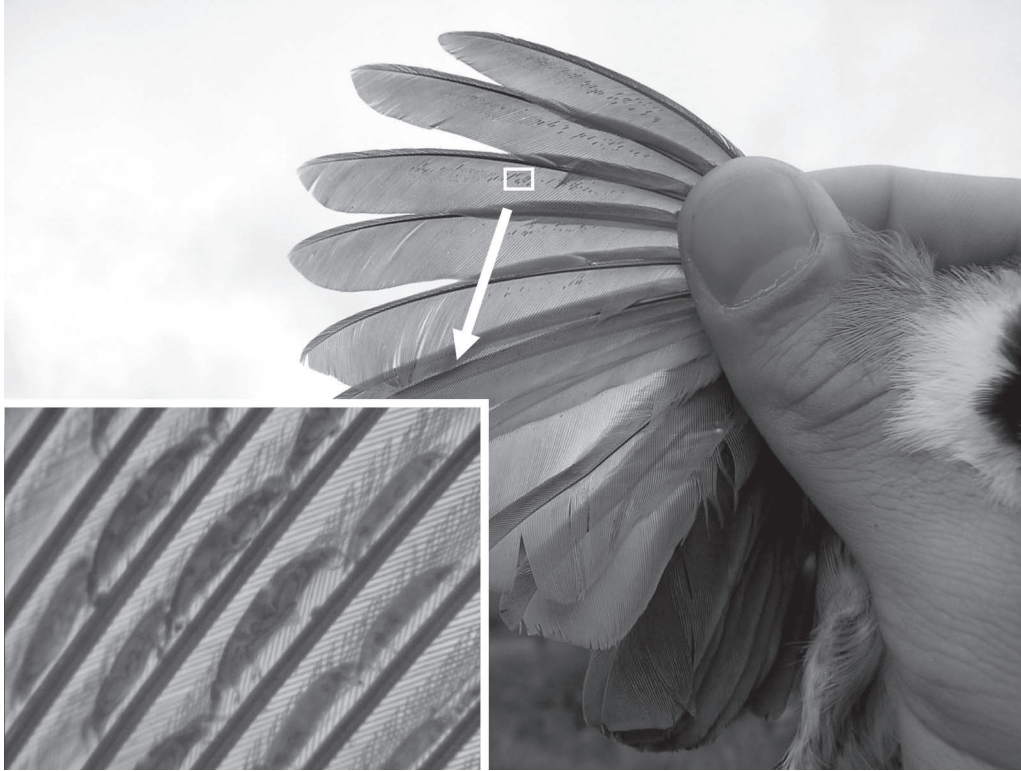


Fig. 1. Habitat of species included in *Pterodectes* generic complex, in the ventral side of large flight feathers, as exemplified by the wings of this Saffron-billed Sparrow *Arremon flavirostris* Swainson, 1838 (Emberizidae).

scribed by Černý (1974). Three of these species were originally described from only females (*P. thraupicola* and *P. reticulatus*) or males (*P. maculatus*), and the formerly unknown sexes of these species are herein described for the first time.

We also provide an overview of the genera and species of the *Pterodectes* generic complex (*sensu* Mironov 2009) from the New World with new data on hosts and geographical occurrence. An updated list of species referred to this complex with emendations to their taxonomic status is presented.

## MATERIAL AND METHODS

Specimens used to describe previously unknown sexes were collected from live birds (*e.g.* males of *P. reticulatus* and *P. thraupicola*) or museum skins (*e.g.* females of *P. maculatus*). Additional material used in the description of female *P. maculatus* was collected from bird skins deposited at the Museum of Zoology of São Paulo State University, Brazil following the method described by Gaud and Atyeo (1996).

The redescrptions of the taxa follow the format used in recent papers for pterodectine feather mites (Hernandes and Valim 2005, 2006; Valim and Hernandez 2006, 2008; Mironov 2006, 2008; Mironov et al. 2008a, b). The chaetotaxy of the

ideosoma and legs follow Griffiths et al. (1990) and Atyeo and Gaud (1966), respectively; the host taxonomy is updated according to Dickinson (2003). All measurements are in micrometers ( $\mu\text{m}$ ); distance between setae was measured as a direct distance between their bases; distances between setae belonging to different pairs were taken on one side of the body. Measurements follow the descriptive method presented by Valim and Hernandez (2006, 2008): (I) idiosomal length, measured from the anterior margin of prodorsal shield to the lobar apices in males, and excluding the terminal appendages in females; (II) idiosomal width, measured at the level of setae *cp*; (III) prodorsal shield dimensions, length measured along the midline and width at the posterior margin; (IV) hysteronotal shield length (in males), measured from the anterior margin to lobar apices, and anterior hysteronotal shield length (in females), measured from the anterior to posterior margin (lobar shields excluded); (V) hysteronotal shield width (in both sexes), measured at the level of setae *cp*; (VI) lobar shield dimensions (in females), length measured from the anterior margin to the apices of lobes excluding appendages and width measured at the level of setae *h2*; (VII) distance between prodorsal and hysteronotal shields, measured along the midline; (VIII) distance between male

anal suckers, measured between their centers; (IX) length of terminal cleft (in both sexes), measured from its anterior end to the level of lobar apices and; (X) dimensions of setae, length taken from bases to visible ends, and width of setae *c3* (in both sexes) and *h2* (in females) at their greatest dimensions; (XI) length of tarsi IV (in males), measured excluding the pretarsus.

The specimens studied herein are deposited in the following institutions: National Museum of Natural History “Naturalis”, Leiden, Netherlands (RMNH); University of Hamburg, Zoological Institute and Zoological Museum, Hamburg, Germany (ZMUH); Institute of Parasitology of Academy of Sciences, České Budejovice, Czech Republic (IPCB); United States National Museum of Natural History at Beltsville, Maryland, USA (USNM); Museum of Zoology, University of Michigan, Ann Arbor, Michigan, USA (UMMZ); Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA (MCZ); Acarological Collection of Instituto Oswaldo Cruz, Rio de Janeiro, Rio de Janeiro, Brazil (CAI-OC); Collection of Acari of Departament Zoologia e Botânica of Universidade Estadual Paulista, São José do Rio Preto, São Paulo, Brazil (DZSJRP); Museum of Zoology of the São Paulo University, São Paulo, São Paulo, Brazil (MZSP); and Collection of National Museum of Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brazil (MNRJ).

Despite the slides from IPCB were not provided with the mark “types”, they had the same collection data as those stated in the original publication (Černý 1974), including the host, localities, collector and date of collection; therefore, we treated them as holding type specimens.

Although many *Pterodectes* species of previous authors have been recently re-described as belonging to this genus *sensu* Park and Atyeo (1971), after re-examination of most of type specimens and new materials, a number of comments and corrections are made for them in the present publication. A diagnosis is presented for each species, although one should bear in mind a huge diversity of undescribed species to date. So it could appear in the future that some diagnoses have a limited value, *i.e.* they are applicable to samples from only a type host or, in contrary, they characterize several close species.

Asterisk (\*) denotes a type host and a type locality for each mite species, and crosses (†) mark new or previously unpublished hosts and localities.

## Family Proctophyllodidae

Trouessart et Mégnin, 1884

### Subfamily Pterodectinae Park et Atyeo, 1971

#### *Pterodectes* generic complex

The Pterodectinae comprises the tribes Rhamphocaulini and Pterodectini, which are distributed mostly on hummingbirds (Apodiformes) and passerines (Passeriformes), respectively. The former is subdivided into two generic groups (*Rhamphocaulus* and *Trochilodectes* groups), and the Pterodectini is subdivided into the *Proterothrix* and the *Pterodectes* generic groups. Finally, the genera within the *Pterodectes* group are subdivided in two complexes, the *Montesauria* and *Pterodectes* generic complexes. So, we intend to restrict our synopsis to those species, which are distributed through New World birds and taxonomically belong to the *Pterodectes* generic complex (Mironov 2009). For further information on other pterodectine generic groups see Park and Atyeo (1971), Mironov et al. (2008b), Mironov (2009) and Hernandes et al. (2010).

The *Pterodectes* generic complex currently comprises six genera which present the male genital papillae situated anterior to the genital arch: *Amerodectes* Valim et Hernandes gen. nov., *Berladectes* Valim et Hernandes, 2009, *Cotingodectes* Valim et Hernandes, 2008, *Metapterodectes* Mironov, 2008, *Pterodectes* Robin, 1877 and *Tyrannidectes* Mironov, 2008. Despite their superficial body resemblance, representatives of this complex bear important morphological characters that allow a prompt distinction of them as different genera (Table 1).

#### Genus *Pterodectes* Robin, 1877

Type species: *Proctophyllodes* (*Pterodectes*) *rutillus* Robin, 1877 by subsequent designation.

**Description. Both sexes.** Moderately elongated pterodectines. Maximal set of hysterosomal setae occurring in Proctophyllodidae present. Prodorsal shield covering most of prodorsum; scapular shields not developed dorsally; and humeral shields well developed and situated ventrally, not fused with epimerites III. Setae *c2* situated distinctly on antero-lateral margin of hysteronotal shield. Setae *c3* short, narrowly spine-like. Epimerites I fused into a Y, not connected with epimerites II. Setae *wa* on tarsi I and II anterior to setae *la* and *ra*. Solenidion *σ1* of genu I shorter than solenidion *ω3* of corresponding tarsus. Femora I and II lacking ventral crest, other segments



Table 1.

Morphological characters in different genera of the *Pterodectes* generic complex.

Characters	<i>Amerodectes</i>	<i>Berladectes</i>	<i>Metapterodectes</i>	<i>Pterodectes</i>	<i>Tyrannidectes</i>	<i>Cotingodectes</i>
	Both sexes					
Position of seta <i>c2</i> on hysteronotal shield	off	off	off	on	off	off
Setae <i>c3</i> width	$\geq 5\mu\text{m}$	$\geq 5\mu\text{m}$	$\geq 5\mu\text{m}$	$\leq 3\mu\text{m}$	$\geq 5\mu\text{m}$	$\geq 5\mu\text{m}$
<i>sRIII</i>	present	present	absent	present	absent	present
Solenidion $\sigma 3$	present	present	absent	present	present	present
Supranal concavity	distinct	distinct	distinct	indistinct	distinct	distinct
Males						
Epimerites I	inverted $\pi$ , V-shaped	inverted $\pi$	U-shaped	Y-shaped	U-shaped	inverted $\pi$
Setae <i>h3</i> length	long/median/short <sup>1</sup>	median	short	short	short	median
Setae <i>h3</i> shape	setiform/spiculiform	setiform	spiculiform	spiculiform	spiculiform	foliform
Ratio of genital arch length/aedeagus	$>1/3$	$>1/3$	$>1/3$	$\leq 1/3$	$>1/3$	$>1/3$
Opisthoventral shield	variable	entire lobes	lateral	lateral	variable	entire lobes
Females						
Epimerites I	V-shaped	U-shaped	U-shaped	Y-shaped	U-shaped	U-shaped
Lobar region	developed	developed	developed	atrophic	developed	developed
Seta <i>h2</i> shape	dagger-like	dagger-like	dagger-like	setiform	dagger-like	dagger-like
Terminal filament on seta <i>h2</i>	present/absent	absent	present	present	present	absent
Crest on genu IV	present	absent	present	absent	present	present

<sup>1</sup>long — subequal to the width of idiosoma or longer; median — longer than the width of opisthosomal lobes but lesser than the width of idiosoma; short — less than the width of opisthosomal lobes.

without processes and other modifications. Setae *sR* of trochanters III and solenidion  $\sigma 1$  of genu III present. Supranal concavity indistinct.

**Male.** Coxal fields II–IV open; epimerites I–IV with extensive sclerotized areas. Setae *h3* medium-sized, spiculiform, situated on lobar apices. Setae *h1* situated anterior to bases of opisthosomal lobes. Setae *ps1* setiform and minute, situated on margins of terminal cleft. Genital arch large and with well-developed branches, situated between trochanters IV; aedeagus ensiform, at most 3 times longer than genital arch. Genital papillae situated anterior to genital arch. Pregenital apodeme, paragenital apodemes, and genital shield absent. Opisthoventral shields present and restricted to lateral borders of opisthosomal lobes, with large roughly rectangular projections bearing setae *ps3*. Corolla of anal suckers dentate. Adanal shields absent. Setae *ps3* located antero-lateral to anal suckers. Setae *g* and *ps3* in trapezoid arrangement. Legs I–IV subequal in size. Solenidia  $\phi$  of tibiae IV slightly longer than on legs III. Tarsus IV without apical claw-like process, setae *d* and *e* button-like.

**Female.** Lobar region of opisthosoma clearly separated from remaining part of opisthosoma; opisthosomal lobes relatively short, with well developed terminal appendages. Hysteronotal shield split dorsally into anterior and lobar shields. Terminal cleft V-shaped. Setae *h2* long and entirely setiform. Epigynum horseshoe-shaped. Translobar apodemes present. Genu IV dorsally slightly inflated, without pronounced dorsal crest. Solenidion  $\phi$  of tibiae IV much shorter than corresponding tarsus and slightly shorter than that on tibiae III.

**Remarks.** Based on the present review, the genus *Pterodectes* is considered to be monotypic; its sole species is associated exclusively with passerines of the family Hirundinidae (swallows). These are intercontinental migratory birds, which explains the worldwide distribution of *P. rutilus*.

#### ***Pterodectes rutilus* (Robin, 1877)**

*Pterodectes rutilus* Robin 1868: 787 (*nomen nudum*).

*Proctophyllodes (Pterodectes) rutilus* Robin, in: Robin and Mégnin 1877: 644.

*Dermaleichus hirundinis* Canestrini 1878: 66.

*Pterodectes rhodesiensis* Till 1954: 90, figs. 5–6.

*Pterodectes rutilus*: Canestrini 1886: 305; Radford 1958: 149; Gaud and Till 1961: 255, figs. 158 A–B; Černý 1967: 17; Park and Atyeo 1971: 56, figs. 21–24; Černý and Lukoschus 1975: 196; Valim and Hernandez 2008: 132, figs. 1–2.

**Hosts.** *Delichon urbicum* (Linnaeus, 1758)\*, *Hirundo rustica* Linnaeus, 1758, *H. nigrita* Gray, 1845, *Atticora melanoleuca* (Wied, 1820), *Riparia riparia* (Linnaeus, 1758), *Riparia paludicola* (Vieillot, 1817), *Stelgydopteryx ruficollis* (Vieillot, 1817)† (Passeriformes, Hirundinidae), *Apus apus* (Linnaeus, 1758) (Apodiformes, Apodidae).

**Distribution.** Brazil (Roraima†), Cameroon (no other data); Cuba (no other data), Europe\* (no other data), Mozambique and Zimbabwe, Kazakhstan (Djambul Province), Surinam (Weg naar Zee).

**Material examined.** 5 males and 5 females from *Hirundo rustica*, Chokpak, Djambul Province, Kazakhstan, 06.09.1984, coll. S.V. Mironov, deposited at DZSJRP. 2 males and 4 females from *Hirundo rustica erythrogaster* (skin MZSP 56152, 10.04.1962, coll. O. Pinto and E. Dente); Upper Mucajaí River, Roraima, Brazil, 20.08.2008, coll. M.P. Valim, deposited at CAIOC and MZSP. 3 males and 3 females from *Stelgydopteryx ruficollis* (ISCM 2442), no data for locality, 10.06.1910, coll. H.E. Ewing, deposited at USNM.

**Remark.** The only record if this mite (Vitzthum 1929: 101) on a bird host other than Hirundinidae, *Apus apus*, is regarded herein as a questionable host association.

#### **Genus *Amerodectes* Valim et Hernandez gen. nov.**

Type species: *Proctophyllodes (Pterodectes) gracilis* Trouessart, 1885.

**Both sexes.** Moderately elongated pterodectines. Maximal set of hysterosomal setae found in Proctophyllodidae present. Prodorsal shield covering most of prodorsum; scapular shields not developed dorsally; humeral shields moderately developed and situated latero-dorsally, free or fused with epimerites III. Setae *c2* situated dorso-laterally on striated tegument. Setae *c3* well developed and dagger-like. Setae *wa* on tarsi I and II situated anterior to setae *la* and *ra*. Solenidion  $\sigma 1$  of genu I shorter than solenidion  $\omega 3$  of corresponding tarsus. Setae *sR* on trochanter III and solenidion  $\sigma$  on genu III present. Supranal concavity usually distinct.

**Male.** Epimerites I fused in different forms: as an U or V, with or without posterior projections or as a narrow inverted  $\pi$  with their posterior extensions connected to epimerites II. Coxal fields II–IV open; epimerites I–IV usually with narrow

sclerotized areas. Setae *h3* long, setiform, lanceolate or spiculiform, situated on lobar apices. Setae *h1* situated anterior to bases of opisthosomal lobes. Setae *ps1* setiform and minute. Genital arch with moderately developed branches, situated between trochanters IV; aedeagus ensiform, at least 5 times longer than genital arch. Genital papillae anterior to genital arch. Pregenital apodeme, paragenital apodemes, and genital shield absent. Opisthoventral shields occupy distal half or all surface of opisthosomal lobes, bearing setae *ps3*. Corolla of anal suckers edentate. Adanal shields usually absent (present only in *A. thraupicola*). Setae *ps3* located antero-lateral to anal suckers. Setae *g* and *ps3* in trapezoid arrangement. Legs I–IV subequal in size. Solenidia  $\phi$  of legs IV slightly longer than on legs III. Tarsus IV without apical claw-like process, setae *d* and *e* button-like.

**Female.** Lobar region of opisthosoma clearly separated from remaining part of opisthosoma; opisthosomal lobes well developed, with long terminal appendages. Hysteronotal shield split dorsally into anterior and lobal shields. Setae *h2* always dagger-like, with or without terminal filament. Epigynum horseshoe-shaped. Translobar apodemes present. Genu IV dorsally inflated, with longitudinal dorsal crest. Solenidia  $\phi$  of tibiae IV slightly shorter than on tibiae III.

**Diagnosis.** In general appearance and most diagnostic features the new genus *Amerodectes* gen. n. is similar to the genera *Pterodectes*, *Metapterodectes* and *Tyrannidectes*. It differs from *Pterodectes* by the position of dorsal setae *c2* off the hysteronotal shield and the shape of epimerites I never forming a sternum in both sexes, by the smooth corolla of anal suckers in males, and by the dagger-shaped setae *h2* in females. *Amerodectes* can be easily distinguished from both *Metapterodectes* and *Tyrannidectes* by the simultaneous presence of setae *sR* and solenidion  $\sigma 1$  on legs III. In *Pterodectes*, setae *c2* are set on the hysteronotal shield, epimerites I are fused into a Y, corolla of anal suckers is dentate, and macrosetae *h2* are simple whip-like (Park and Atyeo 1971; Valim and Hernandez 2008). In *Metapterodectes*, setae *sR* and solenidion  $\sigma 1$  on legs III are absent, and in *Tyrannidectes*, seta *sR* on trochanter III is absent and solenidion  $\sigma 1$  on genu III is present (Mironov et al. 2008a).

**Remarks.** The new genus *Amerodectes* (including most species previously referred to *Pterodectes*) currently includes 15 species, associated with Neotropical oscine and suboscine passerines of the families Cardinalidae, Emberizidae, Fur-

nariidae, Icteridae, Parulidae, Thraupidae, Troglodytidae, Turdidae, and Tyrannidae.

**Etymology.** Contraction of ‘America’ and *Pterodectes*, an allusion to the three Americas — North, Central and South, — where species of this genus occur.

***Amerodectes atyeoi* (OConnor, Foufopoulos et Lipton, 2005) comb. nov.**

*Pterodectes atyeoi* OConnor et al. 2005: 1307, figs. 13–17.

**Hosts.** *Geospiza fuliginosa* Gould, 1837\*, *G. difficilis* Sharpe, 1888, *G. fortis* Gould, 1837, *G. magnirostris* Gould, 1837, *G. scandens* (Gould, 1837) (Passeriformes, Emberizidae).

**Distribution.** Ecuador (Galapagos Islands\*).

**Type material examined.** Holotype male and female paratype from *Geospiza fuliginosa*; Estación Científica Charles Darwin, Isla Santa Cruz, Galápagos Province, Ecuador, 14.10.2002, at USNM. Paratype male from *G. fortis* from Albermale Island, Galapagos Islands, 27.11.1897, donated to DZSJRP; paratype female from *G. fortis*, from Chatham Island, Galapagos Islands, 25.06.1897, donated to DZSJRP.

**Diagnosis.** In males, epimerites I fused as an U, with short postero-lateral extensions; rudimentary sclerites rEpIIa present; opisthoventral shields covering entire ventral surface of the lobes; aedeagus reaching the anterior margin of anal suckers. In females, epimerites I fused into a V; supranal concavity weakly developed; small and scattered ovate lacunae around setae *hl*; primary spermaduct with slight enlargement in its terminal portion.

**Remarks.** The posterior ventral sclerotization of male opisthosomal lobes, pointed by OConnor et al. (2005) as a distinctive feature for this species, is herein considered as similar to the sclerotization regularly found in males of several species of this genus.

***Amerodectes bilineatus* (Berla, 1958) comb. nov.**

*Pterodectes bilineatus* Berla 1958: 1–3, figs. 1–4; Park and Atyeo 1971: 56; Valim and Hernandez 2006: 42, figs. 1–3.

**Hosts.** *Caryothraustes canadensis* (Linnaeus, 1766)\* (Passeriformes, Cardinalidae), *Thraupis sayaca* (Linnaeus, 1766)†, *T. episcopus* (Linnaeus, 1766)† (Passeriformes, Thraupidae).

**Distribution.** Brazil\* (without exact locality for type material, Rio de Janeiro†, and Pará†).

**Type material examined.** Male holotype (44890) from *C. canadensis*, no data from host lo-

cality, Brazil, coll. H.F. Berla, at MNRJ; 6 females paratypes (44891 and 44892), same data as holotype, at MNRJ.

**Additional material examined.** 1 female (44884) from *C. canadensis*, Brazil, 23.01.1958, coll. H.F. Berla, at MNRJ. 5 males and 6 females from *T. sayaca*, Vale de Dois Rios, Ilha Grande, Rio de Janeiro, Brazil, 29.09.2001, coll. A. Storni, at CAIOC and DZSJRP. 4 males and 4 females from *T. episcopus*, Belém, Pará, Brazil, 2000, no other data, at CAIOC.

**Diagnosis.** In both sexes: setae *cG* on genua I–II dagger-like. In males, epimerites I as an inverted  $\pi$ , their posterior ends connected with epimerites II by narrow transverse sclerotized bands; longitudinal median groove reaching the anterior margin of hysteronotal shield.

**Remarks.** This species was originally described from *Caryothraustes canadensis* (Cardinalidae) (Berla 1958; Valim and Hernandez 2006) and herein is reported on two species of tanager (Thraupidae) in synoxenism with *A. thraupicola* (see below). Further investigation is required to clarify whether birds of the family Cardinalidae are indeed the hosts for this species, or it was originally described from contaminated samples.

***Amerodectes geothlypis* (Berla, 1973) comb. nov.**

*Pterodectes geothlypis* Berla 1973: 21, figs. 1–4; Valim and Hernandez 2006: 51, figs. 10–12.

**Hosts.** *Geothlypis aequinoctialis* (Gmelin, 1789)\* (Passeriformes, Parulidae).

**Distribution.** Brazil (Rio de Janeiro\*).

**Type material examined.** Male holotype (44907) from *G. aequinoctialis*, Manguinhos, Rio de Janeiro, Brazil, 17.08.1970, coll. H.F. Berla, at MNRJ; 1 male and 4 female paratypes (44907–44909), same data as holotype, at MNRJ.

**Diagnosis.** See redescription of this species (Valim and Hernandez 2006) and diagnosis and comments for *A. havliki* below.

***Amerodectes gracilis* (Trouessart, 1885) comb. nov.**

*Proctophyllodes* (*Pterodectes*) *gracilis* Trouessart 1885: 79. *Pterodectes gracilis*: Canestrini and Kramer 1899: 125; Berla 1959: 9, figs. 15–17; Park and Atyeo 1971: 56; Valim and Hernandez 2008: 138, figs. 5–7.

**Hosts.** *Psarocolius decumanus* (Pallas, 1769)\*, *P. viridis* (Müller, 1776), *Cacicus haemorrhous* (Linnaeus, 1766)†, *C. cela* (Linnaeus, 1758)† (Passeriformes, Icteridae).



**Distribution.** Brazil\* (without exact locality for type material, Acre†, Amazonas†, Pará†, Rio de Janeiro, Roraima†, and São Paulo†).

**Additional material examined.** 3 males and 2 females (44926–44931) from *P. decumanus*, Fazenda Rubião, Mangaratiba, Rio de Janeiro, Brazil, 05.04.1958, coll. H.F. Berla, at MNRJ; 1 male and 1 female (44932) from *P. viridis*, from same data above, at MNRJ. 6 males and 6 females from *P. decumanus* (skin MZSP 43103, 26.10.1959, coll. M. Amaral and C.T. Carvalho), Município Jamundá, Paraná Bom Jardim, Amazonas, Brazil, 19.08.2008, coll. M.P. Valim. 3 males and 3 females from *P. viridis* (skin MZSP 79062, 19.04.2007, coll. L.F. Silveira), Pacaraima, Comunidade Nova Esperança (04°26'S, 61°08'W), Roraima, Brazil, 01.09.2008, coll. M.P. Valim. 3 males and 3 females from *P. viridis* (skin MZSP 77613, \_09.2006, coll. L.F. Silveira), Reserva Florestal da Agropalma, Tailândia, Pará, Brazil, 19.08.2008, coll. M.P. Valim. 6 males and 6 females from *Cacicus haemorrhous* (skin MZSP 29646, 18.11.1943, coll. E. Lima), Ubatuba, (Estação Experimental), São Paulo, Brazil, 19.08.2008, coll. M.P. Valim. 6 males and 6 females from *C. cela* (skin MZSP 77612, \_09.2006, coll. L.S. Silveira), Reserva Florestal da Agropalma, Tailândia, Pará, Brazil, 20.08.2008, coll. M.P. Valim, all material are deposited at CAIOC, DZSJRP and MZSP.

**Diagnosis.** In males, epimerites I as an inverted  $\pi$ , their posterior ends connected with epimerites II by narrow transverse sclerotized bands; aedeagus long, reaching body terminus; bending of aedeagus backward approximately at level of trochanters III; female with conspicuous narrowing ("waist") in anterior part of lobar region.

***Amerodectes havliki* (Černý, 1974) comb. nov.**

Figs. 2–3

*Pterodectes havliki* Černý 1974: 353, figs. 3C–D, 5B, 6B; Černý and Lukoschus 1975: 195.

**Hosts.** *Philydor pyrrhodes* (Cabanis, 1848)\* (Passeriformes, Furnariidae), *Tachyphonus cristatus* (Linnaeus, 1766), *T. rufus* (Boddaert, 1783)†, *Ramphocelus carbo* (Passeriformes, Thraupidae), *Atticora melanoleuca* (Passeriformes, Hirundinidae).

**Distribution.** Surinam (Tawajariweg and Weg naar Zee).

**Type material examined.** Holotype male (P 1592) and paratype (allotype) female (P 1591) from *Philydor pyrrhodes*; Tawajariweg, Surinam, 09.09.1971, coll. F. Lukoschus and N.J.J. Kok, at RMNH; 1 male paratype (A18/77), same data as

holotype; 1 female and 1 nymph paratypes (A56/81) from *Tachyphonus rufus*; Weg naar Zee, Surinam, 10.09.1971, coll. F. Lukoschus and N.J.J. Kok, at ZMUH; 1 male and 1 female paratypes, same data as holotype, at USNM.

**Additional material examined.** 1 male and 4 females from *Philydor pyrrhodes*; Tawajariweg, Surinam, 09.09.1971, coll. Lukoschus and Kok, at IPCB; 2 males and 4 females from *Tachyphonus cristatus*; Weg naar Zee, Surinam, 10.09.1971, coll. F. Lukoschus and N.J.J. Kok, at IPCB.

**Remarks.** It is important to stress that Černý (1974) cited only *Philydor pyrrhodes* as a host for this species. Later on, Černý and Lukoschus (1975) reported this mite from the two species of tanagers, *Tachyphonus cristatus* and *Ramphocelus carbo*, collected at localities and dates close to that of the type material. In addition, we examined slides from ZMUH and USNM collected from *T. rufus* and also labeled as paratypes. The record (Černý and Lukoschus 1975) of one female of this species on *Atticora melanoleuca* is probably the result of contamination.

**Diagnosis.** *Amerodectes havliki* is morphologically very similar to *A. geothlypis*. In males of these species, epimerites I are fused in a V, with short posterior extensions; sclerites rEpIIa are present; the opisthoventral shields are covering the entire ventral surface of the lobes; the aedeagus is reaching the anterior margin of the anal suckers. In females, epimerites I are fused in a V; the supranal concavity is well developed; at least three large lacunae are present around setae *hl*; the alveoli of setae *ps2* are visibly thicker than those of *ps3*; the primary spermatheca is without enlargement near the head of spermatheca.

In males of *A. havliki*, the level of setae *hl* is equidistant from the levels of *e2* and *f2*; the aedeagus is extending to the midlevel of anal suckers (Fig. 2A, B); in females, numerous pit-like lacunae are present on the anterior hysteronotal shield; the lobar shield with narrow median furrow; setae *hl* are piliform (Fig 3A). In males of *A. geothlypis*, setae *hl* are closer to the level of *f2* than to the level of *e2*; the aedeagus is extending to the anterior margin of anal suckers; in females, lacunae are absent on the anterior hysteronotal shield; the median furrow on lobar shield is absent; setae *hl* are slightly thickened.

As mentioned above, these species are remarkably similar and could only be separated by slight differences in their morphology, and more conservative taxonomists could reasonably consider

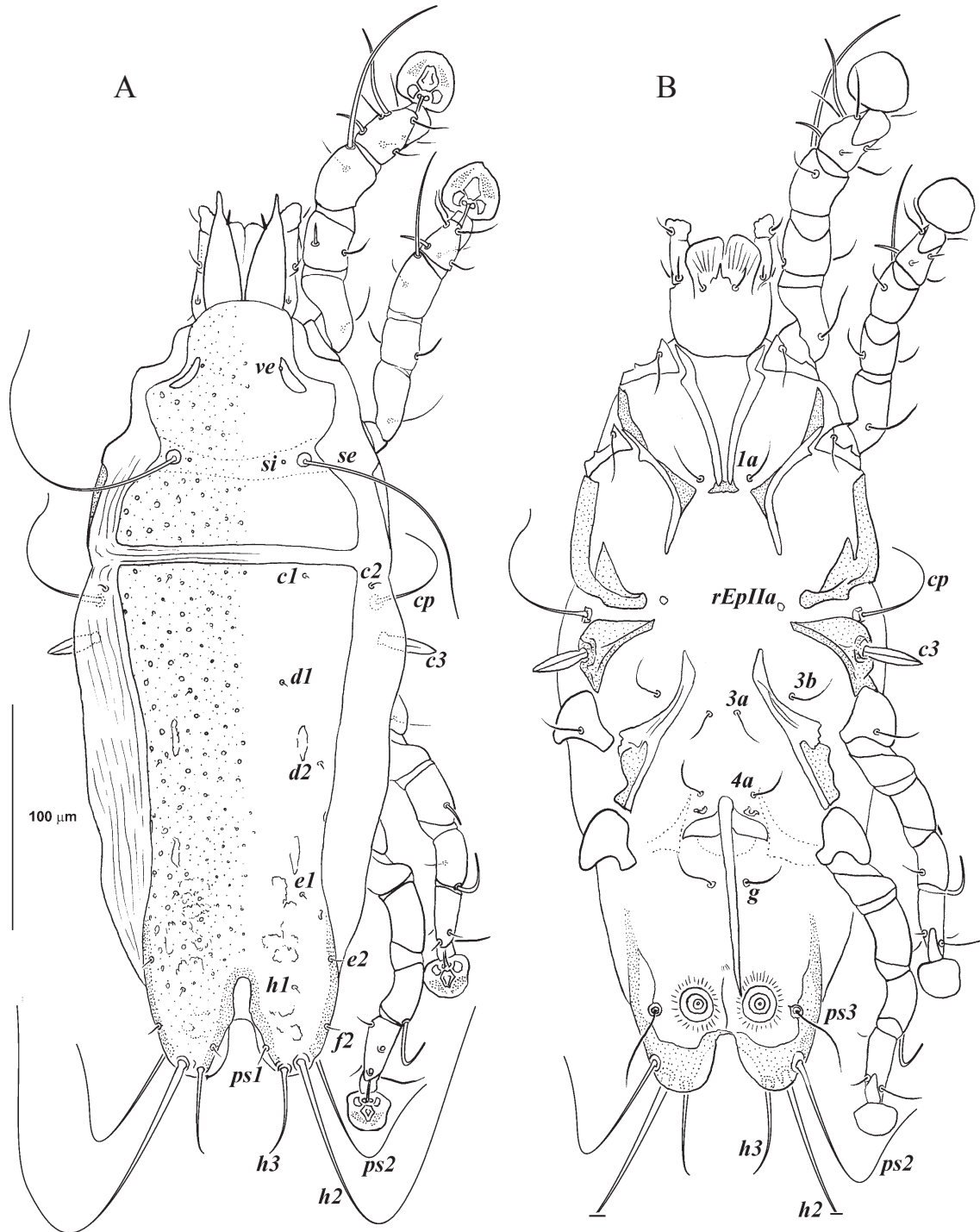


Fig. 2. *Amerodectes haviliki* (Černý, 1974), male holotype. A — dorsal view, B — ventral view.

them as synonyms. Despite minor variations in hysteronotal lacunae of these species (pit-like lacunae present in both sexes of *P. haviliki* and absent in females of *P. geothlypis*), it was found that in one paratype male of *P. geothlypis*, collected from the same bird specimen as the holotype, such dorsal lacunae were also absent (Valim and Hernandez 2006: 51). The features used by Valim and Hernandez (2006: 53) to separate both spe-

cies, mainly body measurements, were taken from the original description (Černý 1974: 354). Nevertheless, after examining and measuring the types of both species, it is possible to conclude these ranges of measurements overlap. However, we prudently regard them as separate species until more specimens are collected and examined, and more data are accumulated on host associations of these species.





Fig. 3. *Amerodectes haviliki* (Černý, 1974), female paratype. A — dorsal view, B — ventral view, C — spermatheca and spermatheca.

**Description. Male** (Figs. 2A–B) (holotype, measurements for 1 paratype from type host in parentheses). Length of idiosoma 372 (352), width 150 (143). Prodorsal shield 111 (109) in length, 113 (109) in width, surface with sparsely disposed lacunae of circular shape. Setae *ve* present. External scapular setae *se* 119 (109) in length, their bases separated by 61 (60); bases of *si* separated by 47

(44). Humeral shields absent. Setae *c2* and *cp* on striated tegument, setae *c1* on hysteronotal shield. Setae *c3* lanceolate, 29 (27) in length and 10 (8) in width. Distance between prodorsal and hysteronotal shields 18 (8). Hysteronotal shield 242 (228) in length, 117 (109) in width, surface with numerous circular lacunae uniformly distributed on this shield, and with two pairs of pale-sclerotized areas

well outlined. Terminal cleft U-shaped, 30 (27) in length, with distinct supranal concavity. Setae *h3* separated by 12 (38). Length of setae: *ps1* 7 (10), *h3* 46, *h2* 161 (174), *ps2* 82 (90), *f2* 9 (14), *ps3* 35 (33). Distance between dorsal setae: *si-c1* 62 (53), *c1-c2* 37, (30) *c1-d1* 61 (53), *d1-d2* 33 (35), *d1-e1* 91 (92), *d2-e1* 58 (60), *e1-e2* 30, *e1-h1* 41, *e2-h1* 13 (22), *h1-f2* 23 (24).

Epimerites I contiguous, their posterior tips fused by its internal surface fields, roughly V-shaped, with small postero-lateral extensions; epimerites II bent, with surface fields projecting toward posterior tips of epimerites I. Sclerites rEpIIa present. Epimerites IVa weakly expressed. Aedeagus extending to anterior margin of anal suckers, 97 (92) in length; genital arch 15 (11) in length and 45 (41) in width. Distance between ventral setae: *3a-4a* 37, *4a-g* 41, *g-ps3* 64 (63), *ps3-ps3* 69 (65). Anal suckers edentate, 17 (15) in diameter and separated by 24 (29). Opisthoventral shields occupying lateral margin of opisthosoma and entire lobes, bearing seta *ps3* on their inner margins approximately at midlevel of anal suckers.

Setae *cG* on genna I and II spine-like. Tarsus IV 33 (35) in length, modified setae *d* and *e* button-like (Fig. 2A).

**Female** (Figs. 3A–C) (2 paratypes: from type host and from *T. rufus*). Length of idiosoma 502–539, width 187–200. Prodorsal shield 136–137 in length, 133–135 in width, surface lacking lacunae. Setae *se* 86–128 in length, their bases separated by 71–75; pair *si* separated by 49–50. Humeral shields absent. Setae *c2* and *cp* on striated tegument, setae *c1* on anterior hysteronotal shield. Setae *c3* lanceolate, 27–32 in length and 8–10 in width. Distance between prodorsal and anterior hysteronotal shields 21–22. Anterior hysteronotal shield 260–269 in length and 128–130 in width. Surface with sparsely disposed lacunae of circular shape and a pair of well expressed pale sclerotized areas on postero-lateral angles of this shield. Anterior hysteronotal and lobar shields separated by thin band of soft cuticle. Lobar region 92 in length, 93–95 in width, with a median dorsal split running from supranal concavity until anterior margin of lobar cleft. Terminal cleft as an inverted and narrow V, 59–60 in length, reaching level of setae *h2*. Supranal concavity distinct. Setae *h2* dagger-like, without terminal filament, 49–55 in length and 10–11 in width. Setae *h3* 22–25 in length and their bases separated by 35–45. Setae *h1* inserted on anterior third of lobar shield, set posterior to supranal concavity opening and surrounded by some large

lacunae; their bases forming linear arrangement with setae *f2*. Setae *ps1* set closer to setae *h3* than to setae *h2*, at inner margin of lobar cleft (Fig. 12 B). Distance between dorsal setae: *si-c1* 82–84, *c1-c2* 35–54, *c1-d1* 38–58, *d1-d2* 57–60, *d1-e1* 131–134, *d2-e1* 75–76, *e1-e2* 33–37, *e1-h1* 85–92, *e2-h1* 50–65, *h1-f2* 19–23, *f2-h2* 16.

Epimerites I contiguous, their posterior tips fused by its internal surface fields, roughly V-shaped, without postero-lateral extensions; epimerites II bent, surrounded by narrow surface fields. Coxal fields I–III open. Distance between ventral setae: *1a-3a* 72–79, *3a-g* 21–23, *4a-ps3* 92–98, *g-4a* 121–128, *ps2-ps3* 25–34, *ps2-ps2* 42–44, *ps3-ps3* 23. Setae *ps2* setiform with large alveolus, setae *ps3* setiform, bases of setae *ps2*, *ps3* in nearly rectangular arrangement. Spermatheca and spermaducts as in Fig. 3C. Legs I and II as in the male; setae *cG* on genna I and II spine-like. Legs IV extending by ambulacral disc at maximum to level of setae *h2*.

***Amerodectes maculatus*  
(Černý, 1974) comb. nov.**

Figs. 4–5

*Pterodectes maculatus* Černý 1974: 355, figs. 4C–D; Černý and Lukoschus 1975: 196.

**Host.** *Chrysomus icterocephalus* (Linnaeus, 1766)\* (Passeriformes, Icteridae).

**Distribution.** Brazil (Pará†), Surinam (Welgedacht\*).

**Type material examined.** Holotype male (P 1590) from *Chrysomus* (= *Agelaius*) *icterocephalus*, Welgedacht, Surinam, 22.08.1971, coll. F. Lukoschus and N.J.J. Kok, at RMNH.

**Additional material examined.** 6 males and 6 females from *C. icterocephalus* (skin MZSP 70911, 31.10.1968, coll. A.M. Olalla), Tapará River, Sta Maria do Arapenam, Pará, Brazil, 19.08.2008, coll. M.P. Valim, deposited at CAIOC, DZSJRP and MZSP. 6 males and 6 females from *C. icterocephalus* (skin MZSP 70915, 12.11.1968, coll. A.M. Olalla), Tapará River, Santa Maria do Arapenam, Pará, Brazil, 19.08.2008, coll. M.P. Valim, deposited in CAIOC, DZSJRP and MZSP.

**Diagnosis.** In both sexes, dorsal shields almost entirely covered by large lacunae; in males, epimerites I fused as a V with short postero-lateral extensions; sclerites rEpIIa absent; aedeagus reaching the anterior margin of the anal suckers. In females, epimerites I fused in a V; supranal concavity well developed; at least three large lacunae around setae *h1*.

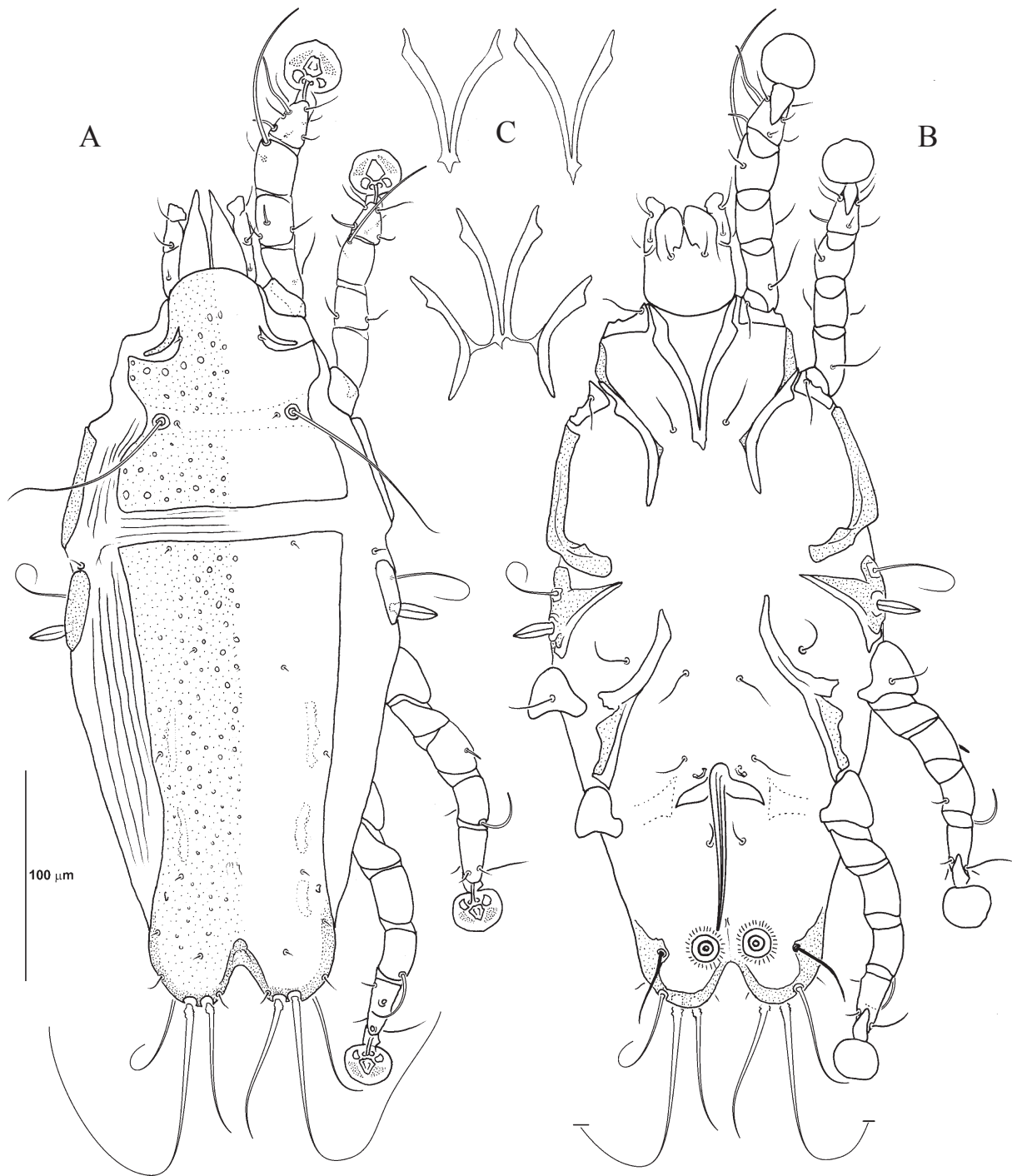


Fig. 4. *Amerodectes maculatus* (Černý, 1974), male holotype. A — dorsal view, B — ventral view, C — variations in epimerites I.

**Male** (Figs. 4A–C) (holotype, range for 5 additionally collected males in parentheses). Length of idiosoma 360 (333–350), width 165 (140–148). Prodorsal shield: 115 (105–117) in length, 114 (90–115) in width, surface with well-distributed circular lacunae. Setae *ve* present. Scapular setae *si* and *se* arranged in transverse line. External scapular setae *se* missed in holotype (89–102), their bases separated by 64 (50–66); bases of *si* separated by 48 (40–52). Humeral shields present,

fused to epimerites III. Setae *cp* surrounded by small sclerotized base, in some specimens these sclerotized areas connected to corresponding humeral shield. Setae *c2* on striated tegument, setae *c1* set on hysteronotal shield. Setae *c3* lanceolate, 24 (20–22) in length and 9 (7–8) in width. Distance between prodorsal and hysteronotal shields 19 (5–9). Hysteronotal shield: 230 (217–229) in length, 109 (85–110) in width; surface with numerous circular lacunae uniformly distributed on



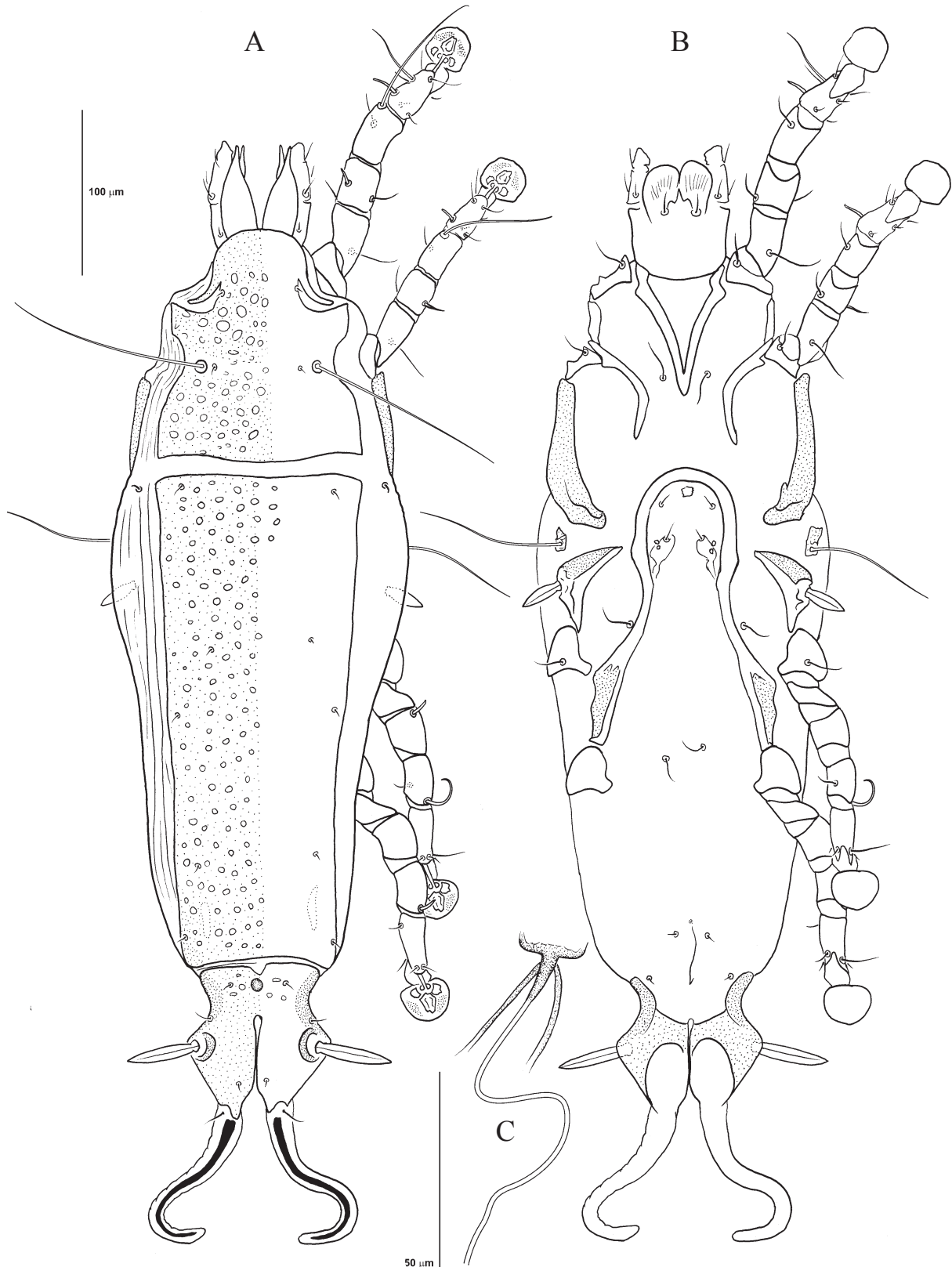


Fig. 5. *Amerodectes maculatus* (Černý, 1974), female. A — dorsal view, B — ventral view, C — spermatheca and spermatheca ducts.

this shield, and with some pale-sclerotized areas weakly expressed on lateral margins of this shield. Terminal cleft U-shaped, 10 (18–22) in length with distinct supranal concavity. Setae *h3* long and setiform, separated by 35 (32–36). Length of set-

ae: *ps1* 6 (5–7), *h3* 65 (52–79), *h2* 115 (137–175), *ps2* 50 (62–88), *f2* 7 (7–9), *ps3* 27 (28–36). Distance between dorsal setae: *si-c1* 61 (47–59), *c1-c2* 38 (30–39), *c1-d1* 51 (53–64), *d1-d2* 53 (35–44), *d1-e1* 64 (86–101), *d2-e1* 27 (51–58),

*e1-e2* 25 (22–31), *e1-h1* 77 (35–41), *e2-h1* 43 (19–25), *h1-f2* 18 (14–25).

Epimerites I fused into a V, without posterolateral extensions in holotype (with short posterolateral extensions in some additional males, Fig. 4C); epimerites II bent, with little surface projections pointed to epimerites I. Sclerites rEpIIa absent. Epimerites IVa weakly expressed. Aedeagus extending to anterior margin of anal suckers, 84 (79–103) in length; genital arch 13 (9–11) in length and 43 (38–42) in width. Distance between ventral setae: *3a-4a* 42 (35–43), *4a-g* 44 (34–37), *g-ps3* 58 (52–62), *ps3-ps3* 66 (55–63). Anal suckers 14 (12–15) in diameter and separated by 24 (23–30). Opisthoventral shields occupying lateral margin of opisthosoma and posterior edge of lobes, bearing setae *ps3* on their lateral margins.

Setae *cG* on genua I and II setiform, 10 (8–10) and 11 (10–13) in length, respectively. Tarsus IV 29 (26–33) in length, modified setae *d* and *e* button-like.

**Female** (Figs. 5A–C) (range of measurements for 5 additional specimens). Length of idiosoma 469–495, width 155–169. Prodorsal shield: 118–134 in length and 102–127 in width, surface as in male. Setae *ve* present. Scapular setae *si* and *se* arranged in transverse line. Setae *se* 89–104 in length, their bases separated by 62–95; pair *si* separated by 46–55. Humeral shields represented by small plates surrounding setae *cp* and separated from epimerites III. Setae *c2* on striated tegument, setae *c1* set on anterior hysteronotal shield. Setae *c3* lanceolate, 22–25 in length and 7–8 in width. Distance between prodorsal and anterior hysteronotal shields 7–14. Anterior hysteronotal shield: 253–269 in length and 97–122 in width; surface as described for male. Anterior hysteronotal and lobar shields separated by thin band of soft cuticle. Lobar region 74–92 in length and 76–84 in width. Terminal cleft V-shaped, 43–63 in length, reaching level of setae *f2*. Supranal concavity distinct. Setae *h2* dagger-like, without terminal filament, 41–45 in length and 8–10 in width. Setae *h3* 13–23 in length and their bases separated by 27–43. Setae *h1* surrounded by at least three conspicuous lacunae and inserted at middle level of supranal concavity opening; their bases forming trapezoidal arrangement with those of setae *f2*. Setae *ps1* set closer to *h3* than to *h2*, near to inner margin of lobar cleft (Fig. 5A). Distance between dorsal setae: *si-c1* 61–71, *c1-c2* 28–44, *c1-d1* 70–82, *d1-d2* 40–57, *d1-e1* 117–131, *d2-e1* 72–81, *e1-e2* 42–49, *e1-h1* 67–74, *e2-h1* 29–39, *h1-f2* 17–21, *f2-h2* 17–18.

Epimerites I fused as a V, without small posterolateral extensions. Distance between ventral setae: *1a-3a* 69–80, *3a-g* 14–23, *4a-ps3* 84–105, *g-4a* 111–119, *ps2-ps3* 21–30, *ps2-ps2* 41–46, *ps3-ps3* 16–21. Setae *ps2* and *ps3* setiform, set in trapezoidal arrangement. Spermatheca and spermaducts as in Fig. 5C. Setae *cG* on genua I and II setiform, 9–12 and 11–14 in length, respectively. Legs IV extending by ambulacral disc at maximum to level of setae *f2*.

***Amerodectes molothrus* (Mironov, 2008)  
comb. nov.**

*Pterodectes molothrus* Mironov (in Mironov et al. 2008a: 13, figs. 7–9).

**Hosts.** *Molothrus bonariensis* (Gmelin, 1789)\*, *M. rufoaxillaris* Cassin, 1866† (Passeriformes, Icteridae).

**Distribution.** Argentina (Buenos Aires†), Brazil (Mato Grosso do Sul\*).

**Type material examined.** 1 male paratype from *M. bonariensis*, Fazenda Monte Alegre, Pantanal, Mato Grosso do Sul, Brazil, 20.06.2006, colls. I. Literak and M. Čapek, donated to MZSP.

**Additional material examined.** 8 males and 8 females from *Molothrus rufoaxillaris*, Albufera Mar Chiquitita, BA, Argentina, 15.10.2006, coll. M.P. Valim, deposited at CAIOC and DZSJRP.

**Diagnosis.** In males, epimerites I fused as a V with short and acute posterior extensions; sclerites rEpIIa absent; aedeagus reaching the anterior margin of the anal suckers. In females, epimerites I fused as an U, with small triangular plate on its end; supranal concavity well developed; lacunae around setae *h1* absent.

***Amerodectes nordestensis* (Berla, 1958)  
comb. nov.**

*Pterodectes nordestensis* Berla 1958: 4–6, figs. 5–6; Park and Atyeo, 1971: 56; Valim and Hernandez, 2006: 46, figs. 4–6.

**Host.** *Caryothraustes canadensis* (Linnaeus, 1766)\* (Passeriformes, Cardinalidae).

**Distribution.** Brazil\* (no other data).

**Type material examined.** Male holotype (44888) from *C. canadensis*, no data from host locality, Brazil, 23.01.1958, coll. H.F. Berla, at MNRJ; 2 male and 2 female paratypes (44885–44887 and 44889), same data as holotype, at MNRJ.

**Diagnosis.** In both sexes, dorsal shields covered by small lacunae; in males, epimerites I U-shaped with small plate; sclerites rEpIIa absent; aedeagus reaching the posterior margin of anal

suckers. In females, epimerites I fused as a V; supranal concavity well developed; single large circular lacuna situated anterior to each seta *h1*.

***Amerodectes paroariae*  
(Mironov, 2008) comb. nov.**

*Pterodectes paroariae* Mironov (in Mironov et al. 2008a: 5, figs. 1–3).

**Host.** *Paroaria capitata* (Orbigney et Lafresnaye, 1837)\* (Passeriformes, Emberizidae).

**Distribution.** Brazil (Mato Grosso do Sul\*).

**Type material examined.** 1 male paratype from *P. capitata*, Fazenda Belcanto near Ivinhema River, Mato Grosso do Sul, Brazil, 12.08.2006, colls. I. Literak and M. Čapek, donated to MZSP.

**Diagnosis.** In both sexes, dorsal shields covered by large circular lacunae, epimerites I fused as a V, without posterior extensions. In males, sclerites rEpIIa absent; opisthoventral shields covering the entire ventral surface of the lobes; aedeagus reaching the anterior margin of anal suckers; setae *h3* lanceolate. In females, supranal concavity weakly developed; at least four middle-sized lacunae around each seta *h1*.

***Amerodectes pitangi*  
(Mironov, 2008) comb. nov.**

*Pterodectes pitangi* Mironov (in Mironov et al. 2008a: 17, figs. 10–12).

**Host.** *Pitangus sulphuratus* (Linnaeus, 1766)\* (Passeriformes, Tyrannidae).

**Distribution.** Brazil (Mato Grosso do Sul\* and Rio de Janeiro†).

**Type material examined.** 1 male and 1 female paratypes from *P. sulphuratus*, Nova Andradina, Mato Grosso do Sul, Brazil, 12.08.2006, colls. I. Literak and M. Čapek, donated to MZSP.

**Additional material examined.** 23 males, 2 females and 17 nymphs from *P. sulphuratus*, 08.2003, Rio de Janeiro, RJ, Brazil, coll. M.P. Valim, deposited at CAIOC and DZSJRP.

**Diagnosis.** In both sexes, prodorsal shield with narrow lateral incisions around or posterior to scapular setae *se* and *si*, epimerites I often free. In males, solenidion  $\phi$  on tibia IV at least 2.5 times longer than that on tibia IV.

***Amerodectes sialiarum*  
(Stoll, 1893) comb. nov.**

*Proctophyllodes sialiarum* Stoll 1893: 42, pl. 21, figs. 3–4.  
*Pterodectes sialiarum*: Atyeo and Braasch 1966: 317; Park and Atyeo 1971: 56; Reeves et al. 2007: 56; Valim and Hernandez 2008: 142, figs. 8–9.

**Host.** *Sialia sialis* (Linnaeus, 1758)\* (Passeriformes, Turdidae).

**Distribution.** Guatemala (Retalhuleu\*), USA (Georgia and North Carolina).

**Additional material examined.** 4 males and 3 females from *S. sialis*; Georgia, USA, 19.06.2004, coll. R. Carleton, deposited at DZSJRP.

**Diagnosis.** In males, epimerites I fused as a V with short postero-lateral extensions; sclerites rEpIIa absent; opisthoventral shields covering the middle-level of surface of opisthosomal lobes; aedeagus reaching the posterior margin of the anal suckers; setae *h3* long setiform. In females, epimerites I fused as a V; supranal concavity well developed; lacking lacunae around setae *h1*.

***Amerodectes storkani*  
(Černý, 1974) comb. nov.**

Figs. 6–8

*Pterodectes storkani* Černý 1974: 352, figs. 3A–B, 5A, 6A; Černý and Lukoschus, 1975: 196.

**Hosts.** *Ramphocelus carbo* (Pallas, 1764)\*, *R. bresilius* (Linnaeus, 1766)† (Passeriformes, Thraupidae).

**Distribution.** Brazil (Rio de Janeiro†), Surinam (Tawajariweg\*).

**Type material examined.** Holotype male (P 1612) and allotype female (P 1614) from *Ramphocelus carbo*; Tawajariweg, Surinam, 07.09.1971, coll. F. Lukoschus and N.J.J. Kok, at RMNH; 1 female paratype (A56/81), same host data, at ZMUH.

**Additional material examined.** 10 males and 6 females from *R. carbo*; Tawajariweg, Surinam, 07.09.1971, coll. F. Lukoschus and N.J.J. Kok, at IPCB; 11 males and 7 females from *R. bresilius*; Vale de Dois Rios, Ilha Grande, Rio de Janeiro, Brazil, 25.11.2001, coll. A. Storni, deposited at CAIOC and DZSJRP.

**Diagnosis.** *Amerodectes storkani* is very similar to *A. bilineatus* (Berla, 1958) (see above) by having setae *cG* on genua I and II modified in a strong dagger in both sexes, and the hysteronotal shield with a deep median groove in males. It can be distinguished from *A. bilineatus* by having the aforementioned leg setae relatively longer (males: *cGI* 65 vs 27 and *cGII* 60 vs 41; females: *cGI* 65 vs 44 and *cGII* 65 vs 60), and by the median longitudinal groove not reaching the anterior margin of male hysteronotal shield (in *A. bilineatus*, this groove extending to the anterior margin of this shield).

**Male** (Figs. 6A–B, 7A–B) (holotype). Length of idiosoma 382, width 163. Prodorsal shield: 129 in length, 129 in width, surface with numerous lacunae of circular shape disposed on its posterior



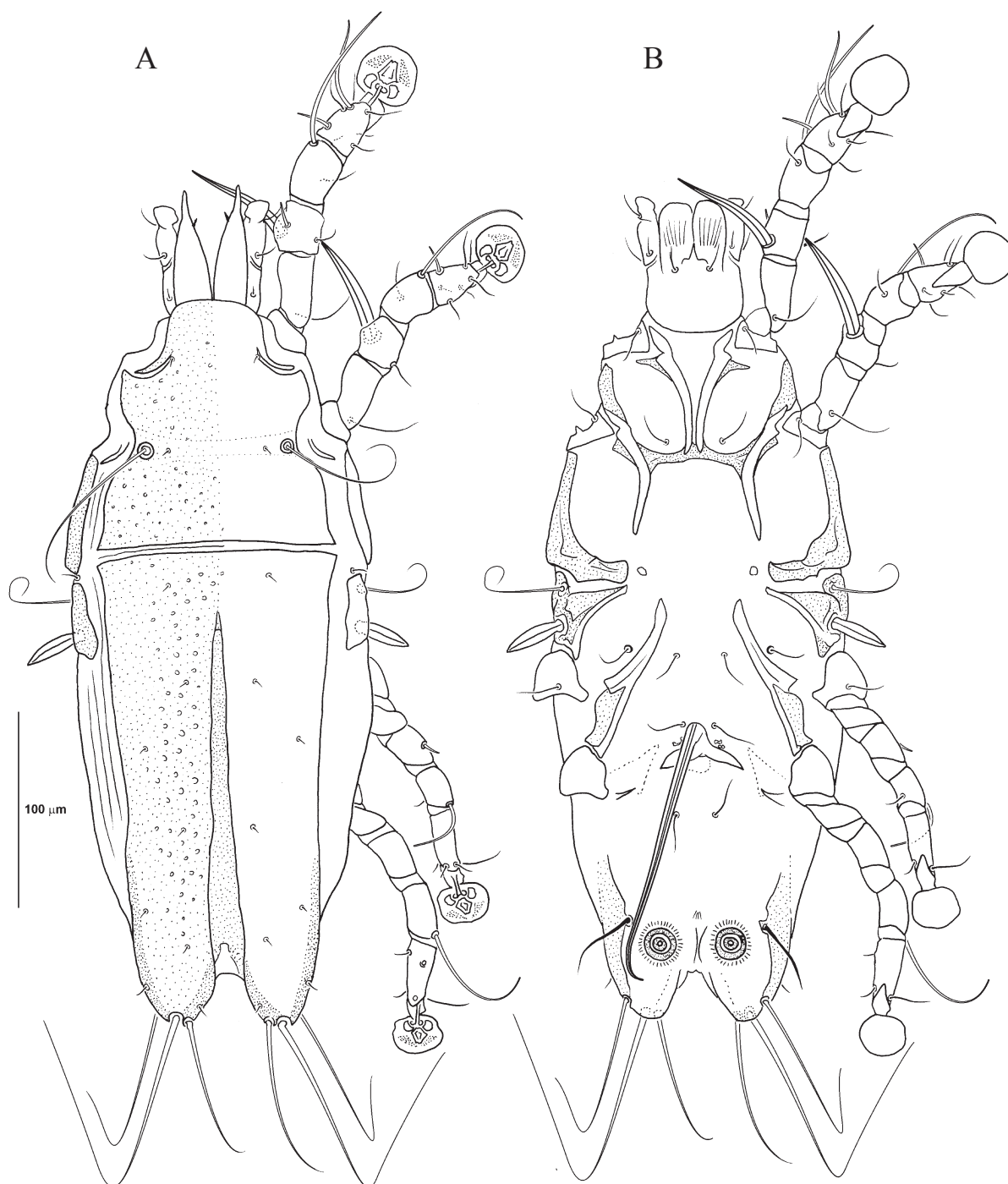


Fig. 6. *Amerodectes storkani* (Černý, 1974), male holotype. A — dorsal view, B — ventral view.

third. Setae *ve* present. Scapular setae *si* and *se* arranged in transverse line. External scapular setae *se* 91 in length, their bases separated by 75; bases of *si* separated by 52. Humeral shields present, fused to epimerites III; setae *cp* on humeral shields. Setae *c2* on striated tegument near humeral shields; setae *c1* on hysteronotal shield. Setae *c3* lanceolate, 32 in length and 12 in width. Distance between prodorsal and hysteronotal shields 6. Hysteronotal shield: 252 in length, 120 in width; surface with numerous small circular lacunae distributed through both sides of this shield. A long and wide median groove running from terminal cleft to the area between setae *c1* and *d1* on hysteronotal shield and not reaching anterior margin of this shield (Fig. 6A). Terminal cleft U-shaped, 25 in length with distinct supranal concavity. Setae *h3* long and setiform, separated by 42. Length of setae: *ps1* minute, *h3* 75, *h2* 181, *ps2* 87, *f2* 10, *ps3* 45. Distance between dorsal setae: *si-c1* 67, *c1-c2* 45, *c1-d1* 55, *d1-d2* 39, *d1-e1* 78, *d2-e1* 52, *e1-e2* 49, *e1-h1* 59, *e2-h1* 25, *h1-f2* 33.

tributed through both sides of this shield. A long and wide median groove running from terminal cleft to the area between setae *c1* and *d1* on hysteronotal shield and not reaching anterior margin of this shield (Fig. 6A). Terminal cleft U-shaped, 25 in length with distinct supranal concavity. Setae *h3* long and setiform, separated by 42. Length of setae: *ps1* minute, *h3* 75, *h2* 181, *ps2* 87, *f2* 10, *ps3* 45. Distance between dorsal setae: *si-c1* 67, *c1-c2* 45, *c1-d1* 55, *d1-d2* 39, *d1-e1* 78, *d2-e1* 52, *e1-e2* 49, *e1-h1* 59, *e2-h1* 25, *h1-f2* 33.

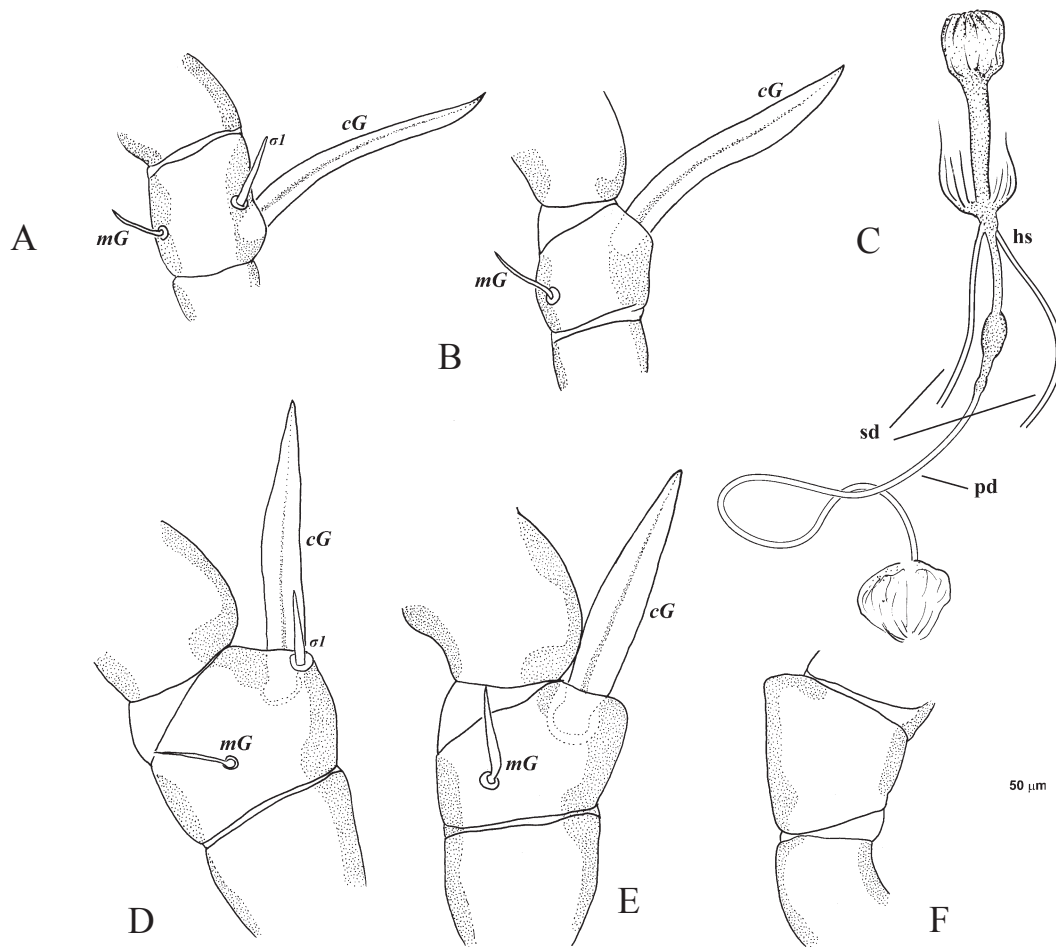


Fig. 7. *Amerodectes storkani* (Černý, 1974). Male holotype: A — genu I, B — genu II. Female “allotype”: C — spermatheca and spermatheca, D — genu I, E — genu II, F — genu IV. pd — primary duct; sd — secondary ducts; hs — head of the spermatheca.

Epimerites I fused as a narrow inverted  $\pi$ , postero-lateral extensions connected with central part of epimerites II by thin transverse bands. Sclerites rEpIIa present. Epimerites IVa weakly expressed. Aedeagus extending beyond anal discs, its tip approximately at midlevel of terminal cleft, 136 in length; genital arch 15 in length and 44 in width. Distance between ventral setae: 3a–4a 37, 4a–g 47, g–ps3 64, ps3–ps3 72. Anal suckers 19 in diameter and separated by 38. Opisthoventral shields occupying at least lateral third of opisthosomal lobes, with discrete inner projection, situated slightly anterior to level of anal suckers, bearing setae ps3.

Setae cG of genua I (65), II (60), thick dagger-like in shape, on genu II this setae inserted apically (Figs. 7A–B). Tarsus IV 38 in length, modified setae d and e button-like (Fig. 6A).

**Female** (Figs. 7C–F, 8A–B) (range of measurements for 2 paratypes). Length of idiosoma 495–515, width 176–204. Prodorsal shield: 141–148 in length and 136–147 in width; surface without lacunae; setae ve, scapular setae si and se

as described for male. Setae se 75–95 in length, their bases separated by 80–81; pair si separated by 51–54. Humeral shields present, fused with epimerites III. Setae cp set on humeral shields. Setae c1 on anterior hysteronotal shield, setae c2 on striated tegument. Setae c3 lanceolate, 31 in length and 8–9 in width. Distance between prodorsal and anterior hysteronotal shields 8–9. Anterior hysteronotal shield: 237–245 in length and 133–148 in width; surface as described for the male. Anterior hysteronotal and lobar shields separated by thin band of soft cuticle. Lobar region: 106–118 in length and 87–114 in width. Terminal cleft U-shaped, 52–62 in length, reaching level of setae h2. Supranal concavity distinct. Setae h2 dagger-like, without terminal filament, 43–46 in length and 10–11 in width. Setae h3 30 in length and their bases separated by 27–43. Setae h1 inserted on anterior third of lobar shield, posterior to supranal concavity opening and surrounded by several small lacunae; its bases of setae h1 and f2 in trapezoidal arrangement. Setae ps1 closer to h3 than to h2,

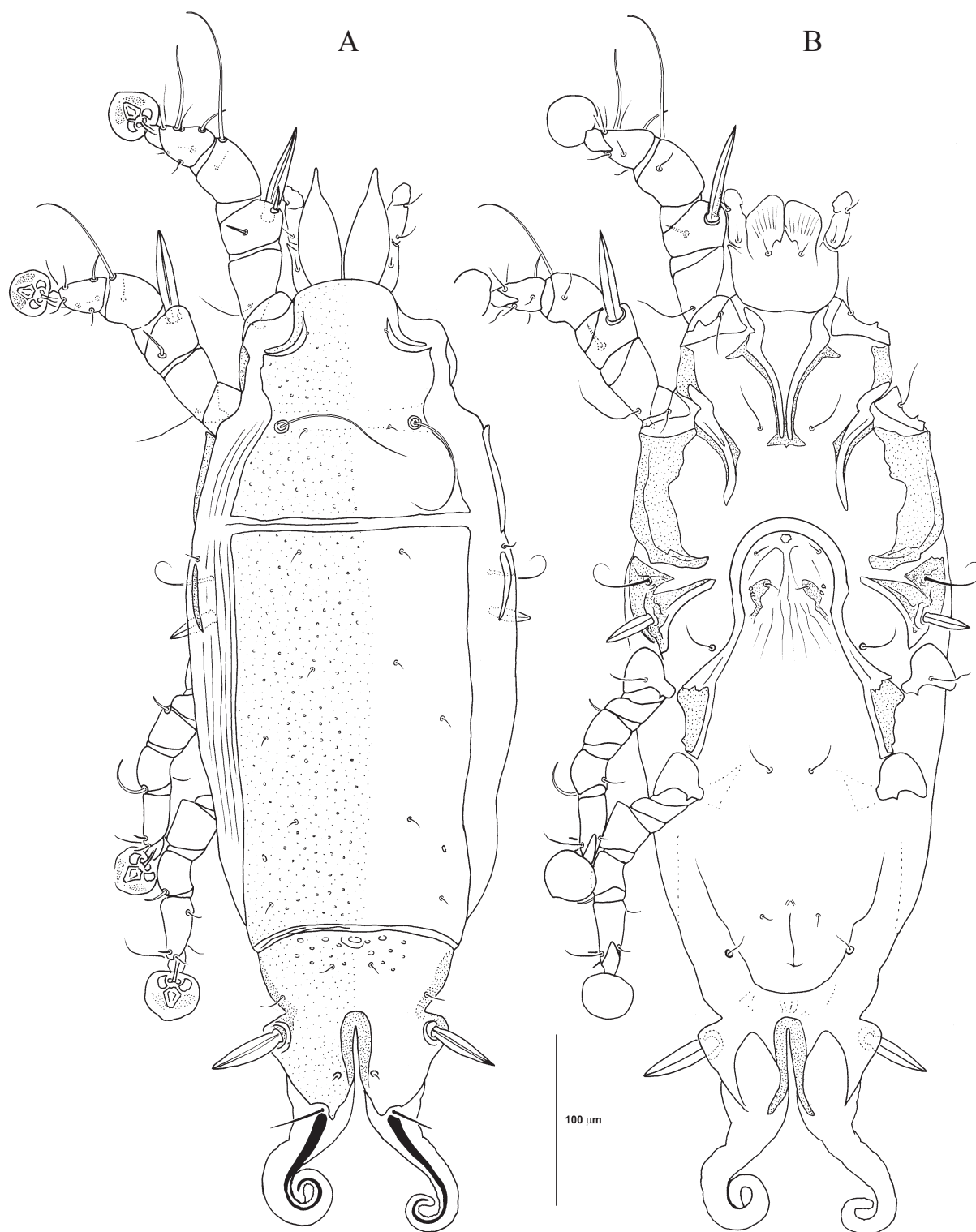


Fig. 8. *Amerodectes storkani* (Černý, 1974), female paratype. A — dorsal view, B — ventral view.

situated on lateral margins of terminal cleft (Fig. 8A). Distance between dorsal setae: *si-cl* 71–78, *cl-c2* 49–64, *cl-d1* 69–73, *d1-d2* 45–46, *d1-e1* 95–96, *d2-e1* 61–65, *e1-e2* 46–55, *e1-h1* 87–89, *e2-h1* 54–56, *h1-f2* 30–38, *f2-h2* 19–20.

Epimerites I contiguous, posterior tips fused by their surrounding surface fields into a V with

small postero-lateral extensions; epimerites II bent, surrounded by narrow surface fields. Distance between ventral setae: *1a-3a* 75–90, *3a-g* 16–21, *4a-ps3* 82–89, *g-4a* 114–117, *ps2-ps3* 28–30, *ps2-ps2* 65–75, *ps3-ps3* 27–34. Setae *ps2* and *ps3* setiform, their bases in trapezoidal arrangement. Spermatheca and spermaducts as in



Fig. 7C. Legs I and II as in male; setae *cG* of genua I (61–65), II (59–65) thick dagger-like. Pronounced rounded dorso-basal crests on genua IV (Figs. 7F, 8A). Legs IV extending by ambulacral disc at maximum to level of setae *f2*.

***Amerodectes tangarae*  
(Mironov, 2008) comb. nov.**

*Pterodectes tangarae* Mironov (in Mironov et al. 2008a: 9, figs. 4–6).

**Host.** *Tangara cayana* (Linnaeus, 1766)\* (Passeriformes, Thraupidae).

**Distribution.** Brazil (Brasília† and Mato Grosso do Sul\*).

**Type material examined.** 1 male and 1 female paratypes from *T. cayana*, Nova Andradina, Mato Grosso do Sul, Brazil, 17.07.2006, colls. I. Literak and M. Čapek, donated to MZSP.

**Additional material examined.** 10 males and 10 females from *T. cayana*, Água Limpa farm (15°57'S, 47°56'W), Brasília, DF, Brazil, 18.07.2002, coll. M.F. Kanegae, deposited at CAIOC and DZSJRP.

**Diagnosis.** In males, epimerites I fused into a U, with short postero-lateral extensions; sclerites rEpIIa absent; opisthoventral shields covering the entire ventral surface of the lobes; aedeagus reaching the anterior margin of anal suckers; setae *h3* narrowly lanceolate. In females, supranal concavity weakly developed; maximum of five small lacunae around setae *h1*.

***Amerodectes thraupicola*  
(Černý, 1974) comb. nov.**

Figs. 9–10

*Pterodectes thraupicola* Černý 1974: 356, figs. 5D, 6D; Černý and Lukoschus 1975: 196.

**Hosts.** *Thraupis episcopus* (Linnaeus, 1766)\*, *T. palmarum* (Wied, 1821)†, *T. cyanoptera* (Vieillot, 1817)†, *T. sayaca* (Linnaeus, 1766)† (Passeriformes, Thraupidae).

**Distribution.** Brazil (Pará† and Rio de Janeiro†), Surinam (Tawajariweg\*).

**Type material examined.** Holotype female (P 1589) from *Thraupis episcopus* (Passeriformes, Thraupidae), Tawajariweg, Surinam, 07.09.1971, coll. F. Lukoschus and N.J.J. Kok at RMNH; 1 female and 1 nympha paratypes (A56/81), same data as holotype, at ZMUH; 1 female paratype, same data as holotype, at USNM.

**Additional material examined.** 1 female and 6 nymphae from *T. episcopus*, Tawajariweg, Surinam, 07.09.1971, coll. F. Lukoschus and N.J.J.

Kok, at IPCB; 3 males and 3 females from *T. episcopus*, Belém, Pará, Brazil, 2000, no other data at CAIOC; 1 male and 2 females from *T. palmarum*, Vale de Dois Rios, Ilha Grande, Rio de Janeiro, Brazil, 14.08.2001, coll. A. Storni, deposited at CAIOC and DZSJRP; 3 males and 6 females from *T. cyanoptera*, Vale de Dois Rios, Ilha Grande, Rio de Janeiro, Brazil, 29.09.2001, coll. A. Storni, deposited at CAIOC and DZSJRP; 3 males and 4 females from *T. sayaca*, Vale de Dois Rios, Ilha Grande, Rio de Janeiro, Brazil, 29.09.2001, coll. A. Storni, deposited at CAIOC and DZSJRP.

**Diagnosis.** This species can be easily distinguished from all species included in the new genus *Amerodectes* by the presence of the distinct transverse row of lacunae on posterior margin of the prodorsal shield in both sexes; the adanal shields are present in males; the primary spermatheca of female is extremely long, somewhat resembling a long string of spaghetti (Fig. 10C).

**Remarks.** In some examined males, it was difficult to visualize some structures like prodorsal setae *ve* and trochanteral setae *sR* on legs III. The rudimentary epimeral sclerites rEpIIa and the adanal shield can also vary in the shape and intensity.

**Male** (Figs. 9A–B) (range of measurements for 10 individuals from 4 species of *Thraupis*). Length of idiosoma 330–363, width 165–176. Prodorsal shield 117–125 in length and 122–139 in width, surface with scattered lacunae but with well defined line of lacunae on posterior margin of this shield. Setae *ve* present. Scapular setae *si* and *se* situated at same transverse level. External scapular setae *se* 87–133 in length, their bases separated by 82–90; bases of *si* separated by 54–60. Setae *c1* set on hysteronotal shield, and *c3* lanceolate, 22–24 in length and 5–8 in width. Humeral shield present, fused with epimerites III. Setae *cp* set on humeral shields. Setae *c1* on hysteronotal shield; setae *c2* on striated tegument, surrounded small sclerotized area. Distance between prodorsal and hysteronotal shields 3–8. Hysteronotal shield 218–237 in length, 117–136 in width; surface with small circular lacunae, and with poorly defined pale sclerotized areas on lateral margins of this shield. Terminal cleft as a shallow U, 19–33 in length and 14–22 in width, with distinct supranal concavity. Setae *h3* long and setiform, separated by 29. Length of setae: *ps1* 8–14, *h3* 68–87, *h2* 131–171, *ps2* 87–101, *f2* 8–19, *ps3* 35–46. Distance between dorsal setae: *si-c1* 54–60, *c1-c2* 38–45, *c1-d1* 48–57, *d1-d2* 35–48, *d1-e1* 79–98, *d2-e1* 52–60, *e1-e2* 27–30, *e1-h1* 39–41, *e2-h1* 22–35, *h1-f2* 24–30.

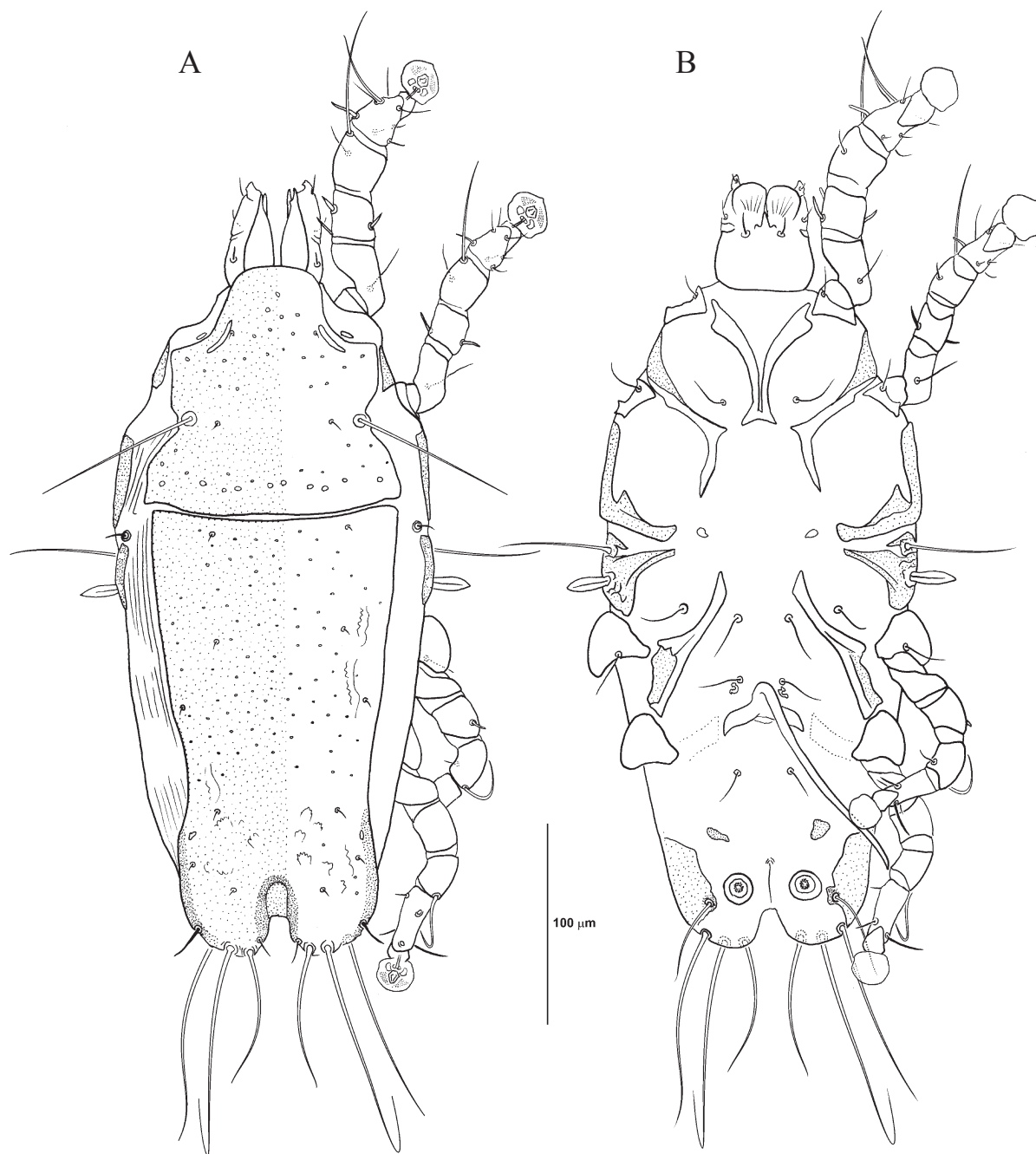


Fig. 9. *Amerodectes thraupicola* (Černý, 1974), male. A — dorsal view, B — ventral view.

Epimerites I as a narrow inverted  $\pi$  with postero-lateral extensions not connected to epimerites II. Sclerites rEpIIa present. Epimerites IVa weakly expressed. Aedeagus extending to posterior margin of anal suckers, 103–117 in length; genital arch 8–11 in length and 38–44 in width. Distance between ventral setae: *3a–4a* 27–35, *4a–g* 44–49, *g–ps3* 57–71, *ps3–ps3* 63–71. Adanal shields present, situated anterior to anal suckers. Anal suckers 14 in diameter and separated by 18 (distance between centers of discs 34). Opisthoventral shields occupying only lateral margin of opisthosoma,

bearing setae *ps3*. Setae *cG* on genua I and II spine-like. Tarsus IV 35–41 in length, modified setae *d* and *e* button-like.

**Female** (Figs. 10A–C) (holotype, measurements for 1 paratype in parentheses). Length of idiosoma 458 (440), width 177 (165). Prodorsal shield: 136 (125) in length and 143 (133) in width; surface, setae *ve*, scapular setae *si* and *se* as in male. Setae *se* 98 (114) in length, their bases separated by 91 (87); pair *si* separated by 58. Humeral shields present, fused with epimerites III; setae *cp* set on humeral shield. Setae *cI* set on anterior hys-

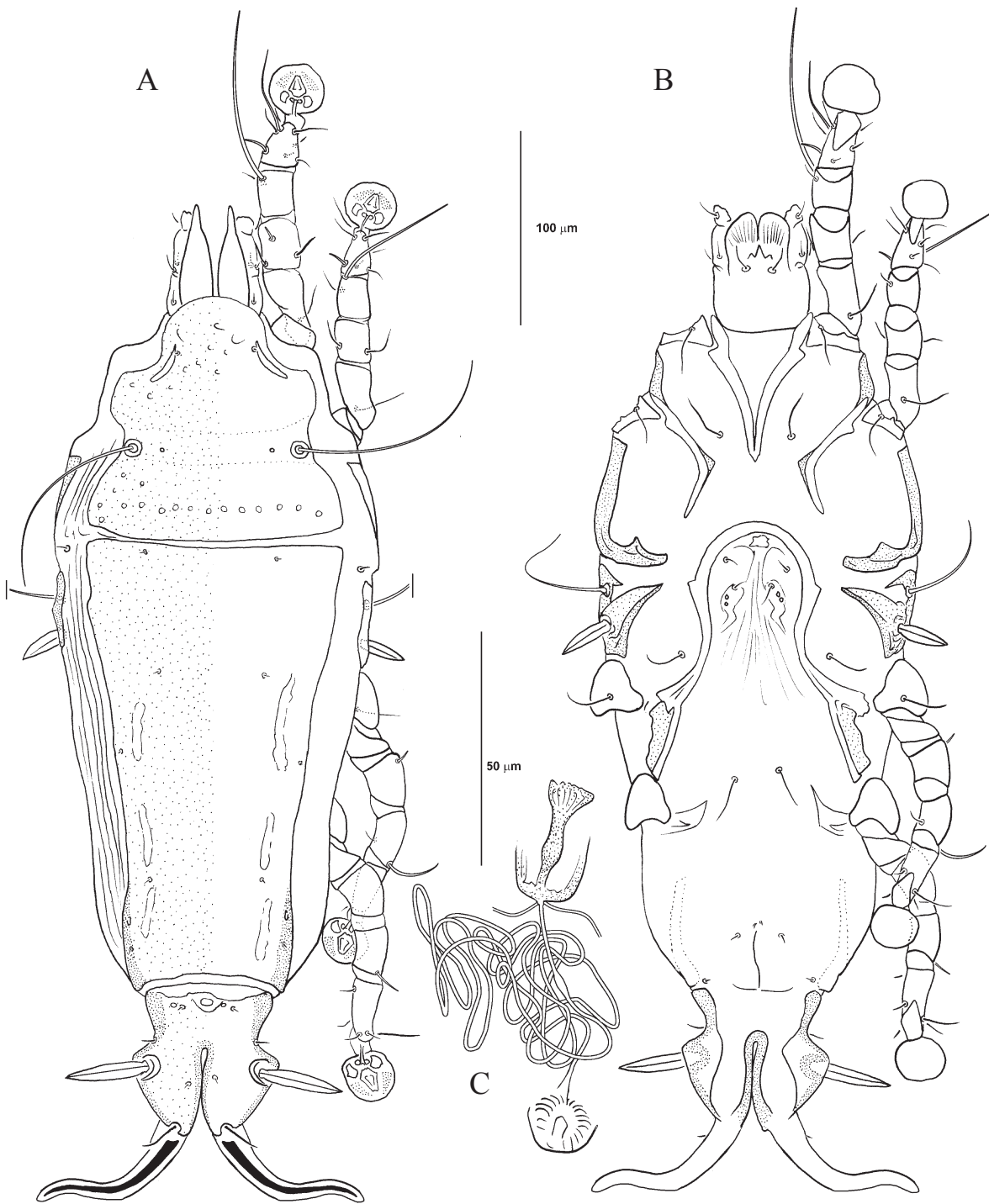


Fig. 10. *Amerodectes thraupicola* (Černý, 1974), female holotype. A — dorsal view, B — ventral view, C — spermatheca and spermaducts.

teronotal shield, setae *c2* on striated tegument. Setae *c3* lanceolate, 30 (27) in length and 9 (7) in width.

Distance between prodorsal and anterior hysteronotal shields 2 (5). Anterior hysteronotal shield 235 (226) in length and 142 (136) in width. Surface without lacunae but with three pairs of fusiform pale sclerotized areas on lateral margins of this

shield. Anterior hysteronotal and lobar shields separated by thin band of soft cuticle. Lobar region 84 (76) in length and 82 (76) in width. Lobar cleft as a narrow inverted U, inner margins of lobes slightly convex and touching each other at level of setae *h2* (Fig. 10A), 52 (44) in length, reaching level of setae *f2*. Supranal concavity distinct. Setae *h2* dagger-like, without terminal filament, 53 (46) in



length and 11 (10) in width. Setae *h3* 23 (24) in length and their bases separated by 23 (27). Setae *h1* inserted near anterior margin of lobar shield, slightly posterior to supranal concavity; bases of setae *h1* and *f2* in trapezoidal arrangement. Setae *ps1* inserted roughly at same transverse level as setae *h2*, at inner margin of lobar cleft (Fig. 10A). Distance between dorsal setae: *si-c1* 60 (54), *c1-c2* 42 (46), *c1-d1* 62 (63), *d1-d2* 51 (46), *d1-e1* 110 (109), *d2-e1* 68, *e1-e2* 37 (38), *e1-h1* 75 (68), *e2-h1* 43 (42), *h1-f2* 16 (22), *f2-h2* 13 (24).

Epimerites I fused as a V, without posterolateral extensions; epimerites II bent, with small projections pointed to epimerites I. Distance between ventral setae: *1a-3a* 64 (65), *3a-g* 19 (24), *4a-ps3* 90 (79), *g-4a* 96 (90), *ps2-ps3* 31 (27), *ps2-ps2* 62 (57), *ps3-ps3* 25 (24). Setae *ps2* and *ps3* setiform set in trapezoidal arrangement. Spermatheca and spermaducts as in Fig. 10C, primary spermaduct very long, often coiled within female body due to its long length. Setae *cG* on genua I and II spine-like. Legs IV extending by ambulacral disc at maximum to level of setae *h2*.

***Amerodectes troglodytis*  
(Černý, 1974) comb. nov.**

Figs. 11–12

*Pterodectes troglodytis* Černý 1974: 354, figs. 4A–B, 5C, 6C; Černý and Lukoschus 1975: 196.

**Host.** *Troglodytes aedon* Vieillot, 1809\* (Passeriformes, Troglodytidae).

**Distribution.** Surinam (Paramaribo\*).

**Type material examined.** Holotype male and paratype (allotype) female (both in slide, P 1593) from *Troglodytes aedon*; Paramaribo, Surinam, 18.07.1971, coll. F. Lukoschus and N.J.J. Kok, at RMNH.

**Additional material examined.** 1 male, 1 female and 1 tritonymph from *T. aedon*, Paramaribo, Surinam, 18.07.1971, coll. F. Lukoschus and N.J.J. Kok, at IPCB.

**Diagnosis.** *Amerodectes troglodytis* resembles *A. pitangi* (Mironov, 2008) (see above) by having the prodorsal shield with deep lateral incisions at the level of setae *se* in both sexes. It can be distinguished from that species by the following characters in males: epimerites I are fused in a V with postero-lateral extensions; solenidion  $\phi$  on tibia IV is at most 1.5 times longer than this segment; setae *h3* are about one fifth the length of *ps2*, and the aedeagus reaches the anterior margin of the anal suckers. In males of *A. pitangi*, setae the *h3* and *ps2* are subequal, and the aedeagus

reaches the midlevel between setae *g* and anterior margin of the anal opening. The females have epimerites I fused as a V without postero-lateral extensions, rather than into an U with short and acute postero-lateral extensions as in *A. pitangi*.

**Male** (Figs. 11A–B) (holotype, measurements for 1 additional specimen in parentheses). Length of idiosoma 350 (319), width 162 (143). Prodorsal shield: 111 (106) in length, 105 (98) in width, surface without lacunae, its lateral margins with incisions surrounding bases of setae *se*. Setae *ve* absent. Scapular setae *si* and *se* arranged in transverse line. External scapular setae *se* 120 (125) in length, their bases separated by 60 (54); bases of *si* separated by 44 (38). Humeral shields absent, setae *cp* and *c2* on soft tegument. Setae *c1* on hysteronotal shield. Setae *c3* lanceolate, 26 (23) in length and 8 (7) in width. Distance between prodorsal and hysteronotal shields 18 (14). Hysteronotal shield: 228 (204) in length, 98 (95) in width; surface without lacunae. Terminal cleft as a wide and shallow U, 17 (16) in length, 33 in width, with a distinct supranal concavity. Setae *h3* short and spine-like, separated by 49. Length of setae: *ps1* 5, *h3* 17 (15), *h2* 137 (196), *ps2* 58 (76), *f2* 5 (8), *ps3* 20 (22). Distance between dorsal setae: *si-c1* 67 (65), *c1-c2* 33 (37), *c1-d1* 54 (49), *d1-d2* 27 (34), *d1-e1* 82 (79), *d2-e1* 58 (49), *e1-e2* 24 (22), *e1-h1* 36, *e2-h1* 28, *h1-f2* 34.

Epimerites I fused as a narrow V, with small posterolateral extensions. Sclerites rEpIIa present, weakly expressed. Epimerites IVa absent. Aedeagus extending to anterior margin of anal suckers, 86 (79) in length; genital arch 7 in length and 43 (38) in width. Distance between ventral setae: *3a-4a* 37, *4a-g* 42 (37), *g-ps3* 49 (34), *ps3-ps3* 58 (54). Anal suckers edentate, 11 in diameter and separated by 30. Opisthoventral shields occupying postero-lateral margins of opisthosoma, bearing setae *ps3*. Setae *cG* on genua I and II very short and spine-like. Femur II with ventral crest, other segments of legs I, II without processes. Tarsus IV 26–30 in length.

**Female** (Figs. 12A–C) (paratype, measurements for 1 additional specimen in parentheses). Length of idiosoma 492 (495), width 171 (182). Prodorsal shield: 123 (128) in length and 133 (125) in width; surface, setae *ve*, scapular setae *si* and *se* as described for male, except for two small incisions on its postero-lateral margins. Setae *se* 133 (139) in length, their bases separated by 73; pair *si* separated by 50. Humeral shields absent, setae *cp* and *c2* on soft tegument. Setae *c1* set on

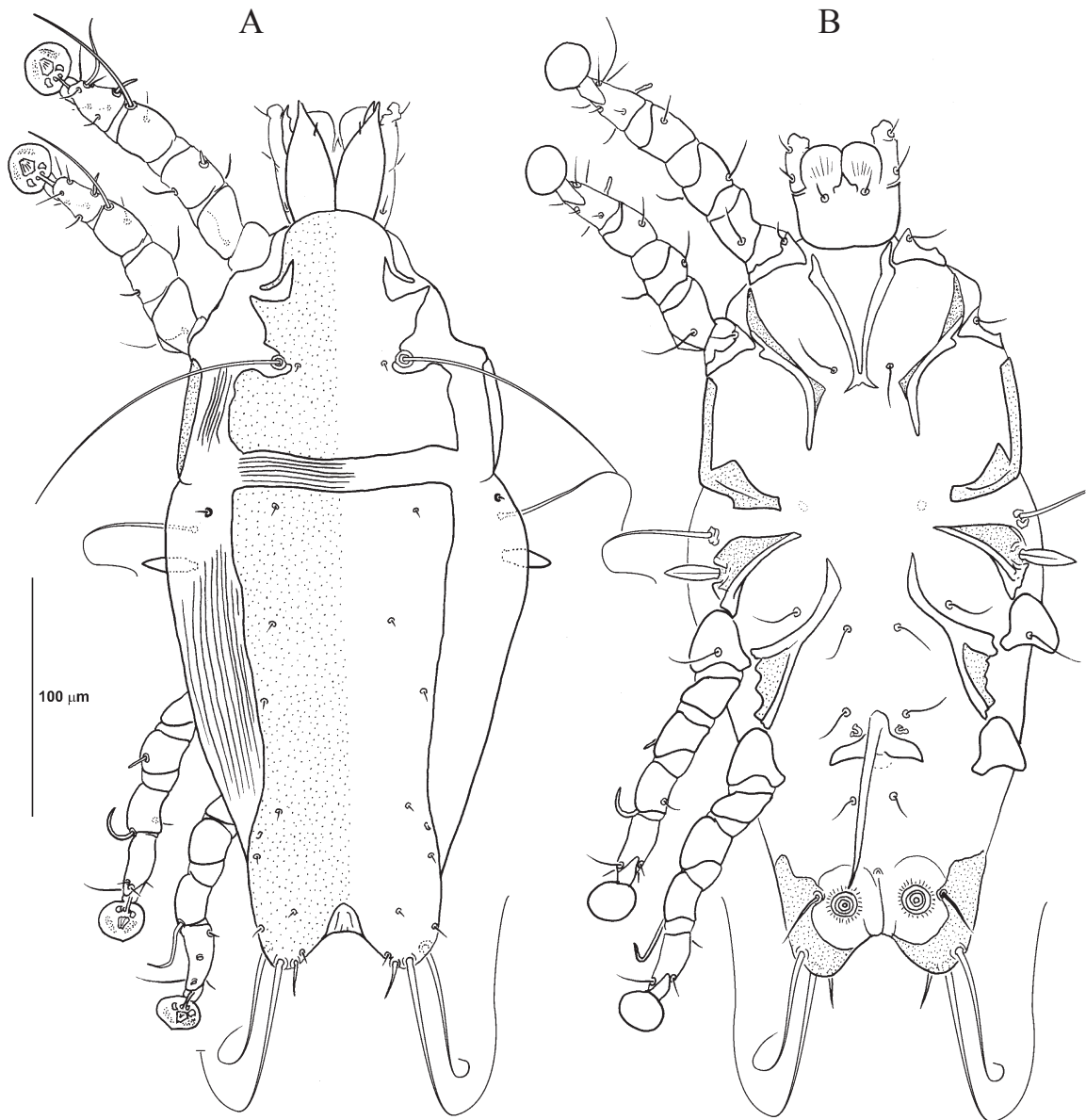


Fig. 11. *Amerodectes troglodytis* (Černý, 1974), male. A — dorsal view, B — ventral view.

anterior hysteronotal shield. Setae *c3* lanceolate, 30 (27) in length and 9 (8) in width.

Distance between prodorsal and anterior hysteronotal shields 15 (24). Anterior hysteronotal shield: 256 (245) in length and 130 (122) in width. Surface with small pit-like lacunae restricted to region between setae *e1* and *e2* and with pair of weakly expressed pale sclerotized areas on postero-lateral angles of this shield. Anterior hysteronotal and lobar shields separated by thin band of soft cuticle. Lobar region, 98 (95) in length, 95 (80) in width, completely separated by median dorsal split. Terminal cleft as a narrow inverted V, 68 (60) in length, 41 in width, reaching level of setae *h2*. Supranal concavity distinct. Setae *h2* dagger-like, without terminal filament, 50 (49) in length and 10 (8) in width. Setae *h3* 11 in length and their

bases separated by 63. Setae *h1* inserted on anterior margin of lobar shield, at same level as supranal concavity opening; its bases forming trapezoidal arrangement with setae *f2*. Setae *ps1* set at midlevel of setae *h2* and *h3*, at inner margin of lobar cleft (Fig. 12A). Distance between dorsal setae: *si-c1* 78 (79), *c1-c2* 44, *c1-d1* 78 (76), *d1-d2* 41 (44), *d1-e1* 118 (106), *d2-e1* 77 (68), *e1-e2* 33 (35), *e1-h1* 65 (68), *e2-h1* 39 (44), *h1-f2* 28 (35), *f2-h2* 17 (16).

Epimerites I fused as a V. Distance between ventral setae: *1a-3a* 75 (68), *3a-g* 18 (26), *4a-ps3* 87 (90), *g-4a* 114 (109), *ps2-ps3* 35 (33), *ps2-ps2* 52 (64), *ps3-ps3* 23 (30). Setae *ps2* and *ps3* setiform, set in trapezoidal arrangement. Spermatheca and spermaducts as in Fig. 12C. Legs I and II as in the male; setae *cG* on genua I and II short and

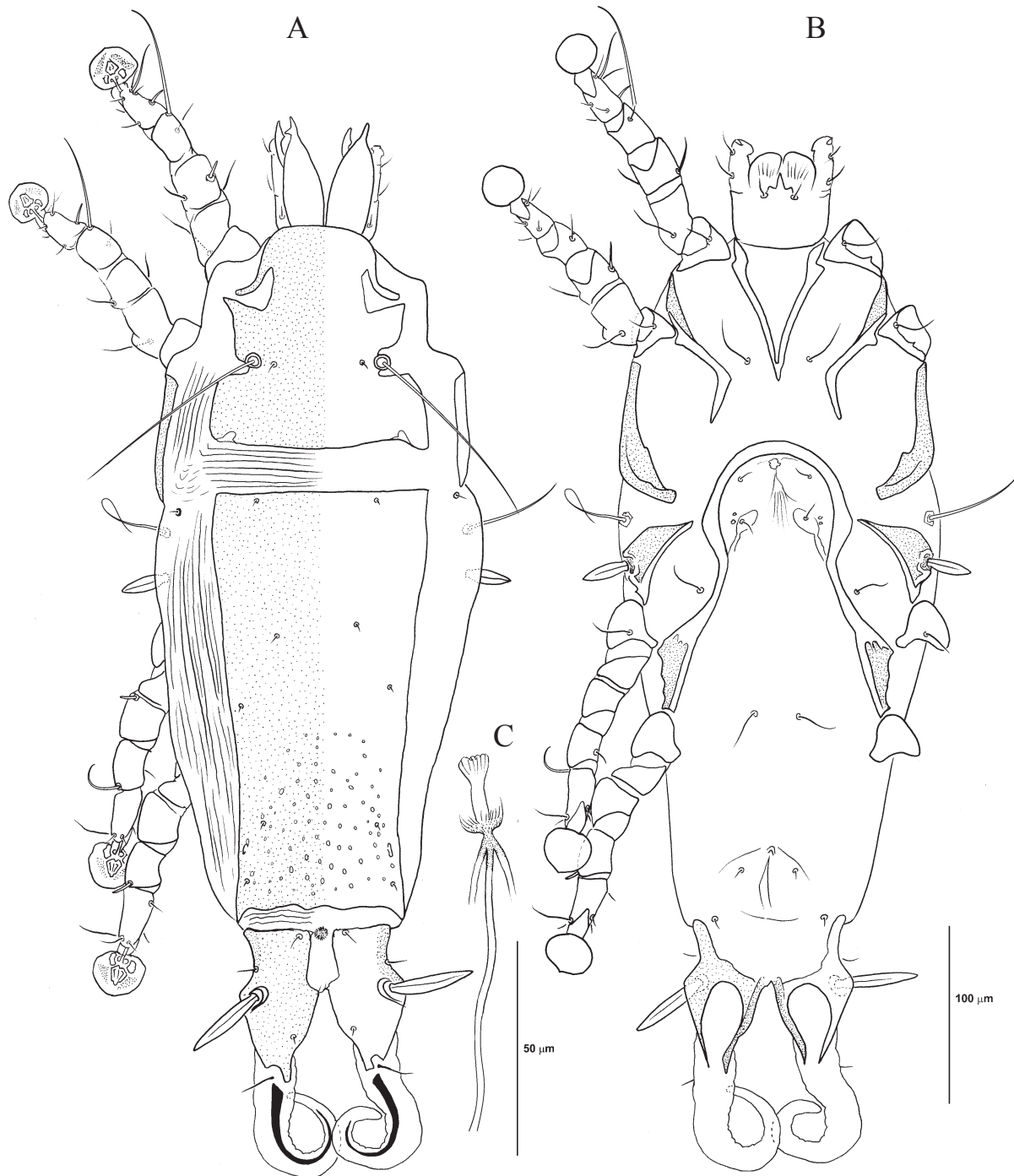


Fig. 12. *Amerodectes troglodytis* (Černý, 1974), female. A — dorsal view, B — ventral view, C — spermatheca and spermatheca ducts.

spine-like. Legs IV extending by ambulacral disc at maximum to the level of setae *f*<sub>2</sub>.

***Amerodectes turdinus* (Berla, 1959) comb. nov.**

*Pterodectes turdinus* Berla 1959a: 11–14, figs. 18–22; Park and Atyeo 1971: 58; Černý and Lukoschus 1975: 197; Storni et al. 2005: 421; Valim and Hernandez 2006: 48, figs. 7–9.

**Hosts.** *Turdus rufiventris* Vieillot, 1818\*, *T. albicollis* Vieillot, 1818, *T. nudigenis* Lafresnaye, 1848, *T. leucomelas* Vieillot, 1818 (Passeriformes,

Turdidae), *Thraupis episcopus* (Linnaeus, 1766) (Passeriformes, Thraupidae).

**Distribution.** Brazil (Rio de Janeiro\*), Surinam (Tawajariweg and Welgedacht).

**Type material examined.** Male holotype (44906) from *Turdus rufiventris*, Fazenda Rubião, Mangaratiba, Rio de Janeiro, Brazil, 05.06.1958, coll. H.F. Berla, at MNRJ; 6 male and 3 female paratypes (44895–44900), same data as holotype, at MNRJ.

**Diagnosis.** In both sexes, dorsal shields are entirely covered by large lacunae. In male, epimerites I are fused into an inverted  $\pi$  and connected by postero-lateral extensions to epimerites II, sclerites rEpIIa present. In female, setae *h2* with terminal filament.

**Remarks.** As noted by Černý and Lukoschus (1975), a single male of this species was found on *Thraupis episcopus* (Thraupidae), and it is obviously the result of contamination.

***Metapterodectes Mironov, 2008***

Type species: *Metapterodectes furnarius* Mironov, 2008, by original designation.

**Remarks.** The genus *Metapterodectes* currently comprises two species associated with Neotropical passerines of the families Emberizidae and Furnariidae. This genus differs from other genera of the *Pterodectes* complex by lacking solenidion  $\sigma I$  and seta *sR* on legs III.

***Metapterodectes furnarius* Mironov, 2008**

*Metapterodectes furnarius* Mironov (in Mironov et al. 2008a: 27, figs. 16–18).

**Host.** *Furnarius rufus* (Gmelin, 1788)\* (Passeriformes, Furnariidae).

**Distribution.** Brazil (Mato Grosso do Sul\* and Minas Gerais†).

**Type material examined.** 1 male and 1 female paratypes from *F. rufus*, Fazenda Monte Alegre, Pantanal, Brazil, 20.07.2006, colls. I. Litterak and M. Čapek, donated to MZSP.

**Additional material examined.** 10 males and 10 females from *F. rufus*, Belo Horizonte, Minas Gerais, Brazil, 26.05.2007, coll. A.J. Andrade, distributed at CAIOC and DZSJRP.

**Diagnosis.** In males, epimerites I fused as an U with short posterolateral extensions; sclerites rEpIIa absent; opisthoventral shields covering only the bases of *ps3*; aedeagus reaching the posterior margin of anal suckers; setae *h3* spiculiform. In females, epimerites I fused as a V with short posterior extensions; supranal concavity weakly developed; lacunae around setae *h1* absent.

***Metapterodectes muticus* (Banks, 1909) comb. nov.**

*Pterodectes muticus* Banks 1909: 141, pl. 10, fig. 4 (part); Park and Atyeo 1971: 56 (part); Valim and Hernandez 2008: 145, figs. 10–11.

**Host.** *Pooecetes gramineus* (Gmelin, 1789)\* (Passeriformes, Emberizidae).

**Distribution.** Canada\* (no other data), USA (Texas).

**Type material examined.** Several syntypes in poor condition (75521) from Vesper Sparrow (= *P. gramineus*), Canada, 19.04.1907, coll. Unknown, deposited at MCZ.

**Diagnosis.** In males, epimerites I fused as an U; sclerites rEpIIa absent; opisthoventral shields covering only the bases of *ps3*; aedeagus reaching the anterior margin of the anal suckers; setae *h3* short and spine-like. In females, epimerites I fused as a V with short posterolateral extensions; supranal concavity weakly developed; at least four small lacunae set anterior to setae *h1*.

**Remarks.** As pointed by Valim and Hernandez (2008), the absence of setae *sR* and solenidion  $\sigma I$  on legs III are characteristic in this species, therefore *Pterodectes muticus* is transferred to the genus *Metapterodectes*.

***Tyrannidectes Mironov, 2008***

Type species: *Tyrannidectes berlai* Mironov, 2008, by original designation.

**Remarks.** The genus *Tyrannidectes* currently comprises six species associated with Neotropical passerines of the families Corvidae, Turdidae and Tyrannidae. This genus is characterized by lacking setae *sR* on trochanters III.

***Tyrannidectes amaurochalinus* (Hernandes et Valim, 2006) comb. nov.**

*Pterodectes amaurochalinus* Hernandez and Valim 2006: 50, figs. 1–7.

**Host.** *Turdus amaurochalinus* Cabanis, 1850\* (Passeriformes, Turdidae).

**Distribution.** Brazil (Minas Gerais\*).

**Diagnosis.** In both sexes, dorsal shields with small circular lacunae, without median longitudinal groove; epimerites I fused as an U. In males, sclerites rEpIIa present. In females, setae *ps2* and *ps3* button-like; setae *h2* with terminal filament.

**Type material examined.** Male holotype, 6 male and 8 female paratypes from *T. amaurochalinus*, Belo Horizonte, Minas Gerais, Brazil; 13.10.2005, coll. M.P. Valim, at DZSJRP and CAIOC.

**Remarks.** The absence of setae *sR* on legs III is distinctive for the genus *Tyrannidectes* Mironov (in: Mironov et al. 2008a); and these setae were erroneously depicted by Hernandez and Valim (2006) in the original description of this species.

***Tyrannidectes banksi* (Valim et Hernandez, 2008) comb. nov.**

*Pterodectes banksi* Valim and Hernandez 2008: 148, figs. 12–13.



**Host.** *Sayornis phoebe* (Latham, 1790)\* (Passeriformes, Tyrannidae).

**Distribution.** USA (Texas\*).

**Type material examined.** Male holotype (NU 1178A) from *S. phoebe*, 20 mi. S. Dallas, Texas, USA, 01.10.1938, coll. unknown, at UMMZ; 2 female paratypes (1178C and 1178D), same data as holotype, at UMMZ.

**Diagnosis.** In both sexes, setae *c1* set off hysteronotal shield on striated tegument. In female, setae *ps2*–*ps3* setiform.

**Remarks.** As noted by Valim and Hernandez (2008), the absence of setae *sR* on legs III is distinctive for *Pterodectes banksi*; therefore this species is transferred herein to the genus *Tyrannidectes*.

***Tyrannidectes berlai* Mironov, 2008**

*Tyrannidectes berlai* Mironov (in Mironov et al. 2008a: 23, figs. 13–15).

**Hosts.** *Myiarchus tyrannulus* (Muller, 1776)\*, *M. ferox* (Gmelin, 1789) (Passeriformes, Tyrannidae).

**Distribution.** Brazil (Mato Grosso do Sul\*†).

**Type material examined.** 1 male and 1 female paratypes from *M. tyrannulus*, Fazenda Monte Alegre, Pantanal, Brazil, 20.07.2006, colls. I. Literak and M. Čapek, donated to MZSP.

**Additional material examined.** 10 males and 10 females from *M. tyrannulus*, Bataguassú, Mato Grosso do Sul, Brazil, 11.11.2007, coll. F.A. Hernandez, deposited at CAIOC and DZSJRP.

**Diagnosis.** In both sexes, epimerites I fused as an U with short postero-lateral extensions. In male, setae *h3* spiculiform. In female, setae *ps2* and *ps3* setiform; distinct pattern of reticulation forming oblique lines in lateral margins of anterior part of hysteronotal shield.

***Tyrannidectes crassus* (Trouessart, 1885) comb. nov.**

*Proctophyllodes* (*Pterodectes*) *crassus* Trouessart 1885: 79. *Pterodectes crassus*: Canestrini and Kramer 1899: 125; Park and Atyeo 1971: 56; Valim and Hernandez 2008: 132, figs. 3–4.

**Host.** *Cyanocorax chrysops* (Vieillot, 1818)\* (Passeriformes, Corvidae).

**Distribution.** Colombia\* (no other data), Paraguay (San Pedro).

**Additional material examined.** 5 males and 5 females from *C. chrysops*, Rio Paraguay, E. bank, 10km W Rosario, San Pedro, Paraguay, 13.09.1988, coll. S.M. Goodman, at UMMZ.

**Diagnosis.** In both sexes, epimerites I fused as an U; prodorsal setae *si* posterior to the level of

*se*; prodorsal shields with a pair of conspicuous incisions in posterior margin. In female, setae *ps2* and *ps3* button-like.

**Remarks.** *Pterodectes crassus* should be included in the genus *Tyrannidectes* based on the absence of trochanteral setae *sR*III (see Valim and Hernandez 2008).

***Tyrannidectes fissuratus* (Hernandes et Valim, 2005) comb. nov.**

*Pterodectes fissuratus* Hernandez and Valim 2005: 62, figs. 1–12.

**Hosts.** *Turdus leucomelas* Vieillot, 1818\*, *T. nudigenis* Lafresnaye, 1848† (Passeriformes, Turdidae), *Ramphocelus carbo* (Passeriformes, Thraupidae)†.

**Type material examined.** Male holotype, 2 male and 2 female paratypes, from *T. leucomelas*, Parque Estadual Vila Rica do Espírito Santo, Fénix, Paraná, Brazil, 30.03.2003, coll. A. Bispo, at DZSJRP.

**Distribution.** Brazil (Paraná\*), Surinam (Tawajariweg†).

**Additional material examined.** 1 male on *Ramphocelus carbo*, Tawajariweg, Surinam, 7.09.1971, coll. F. Lukoschus and N.J.J. Kok, at IPCB.

**Diagnosis.** In both sexes, epimerites I fused as an U; longitudinal median groove on entire hysteronotal shield and posterior half of prodorsal shield; dorsal shields with large and irregular lacunae. In female, setae *ps2* and *ps3* button-like; setae *h2* with terminal filament.

**Remarks.** *Pterodectes fissuratus* is transferred herein to the genus *Tyrannidectes* based on the absence of setae *sR* on trochanters III (Mironov et al. 2008a); these setae were mistakenly depicted in the original description of this species (Hernandes and Valim 2005). A single male specimen collected from *Ramphocelus carbo* and regarded as '*Pterodectes* sp.' by Černý and Lukoschus (1975: 197) is, in fact, a *T. fissuratus*. This latter host is likely resulted from the accidental contamination, and chances are that the actual host for this specimen is *Turdus nudigenis*, which was the only species of thrushes collected at the same date and locality as the aforementioned host.

***Tyrannidectes reticulatus* (Černý, 1974) comb. nov.**

Figs. 13–14

*Pterodectes reticulatus* Černý 1974: 357, figs. 5E, 6E; Černý and Lukoschus 1975: 196.

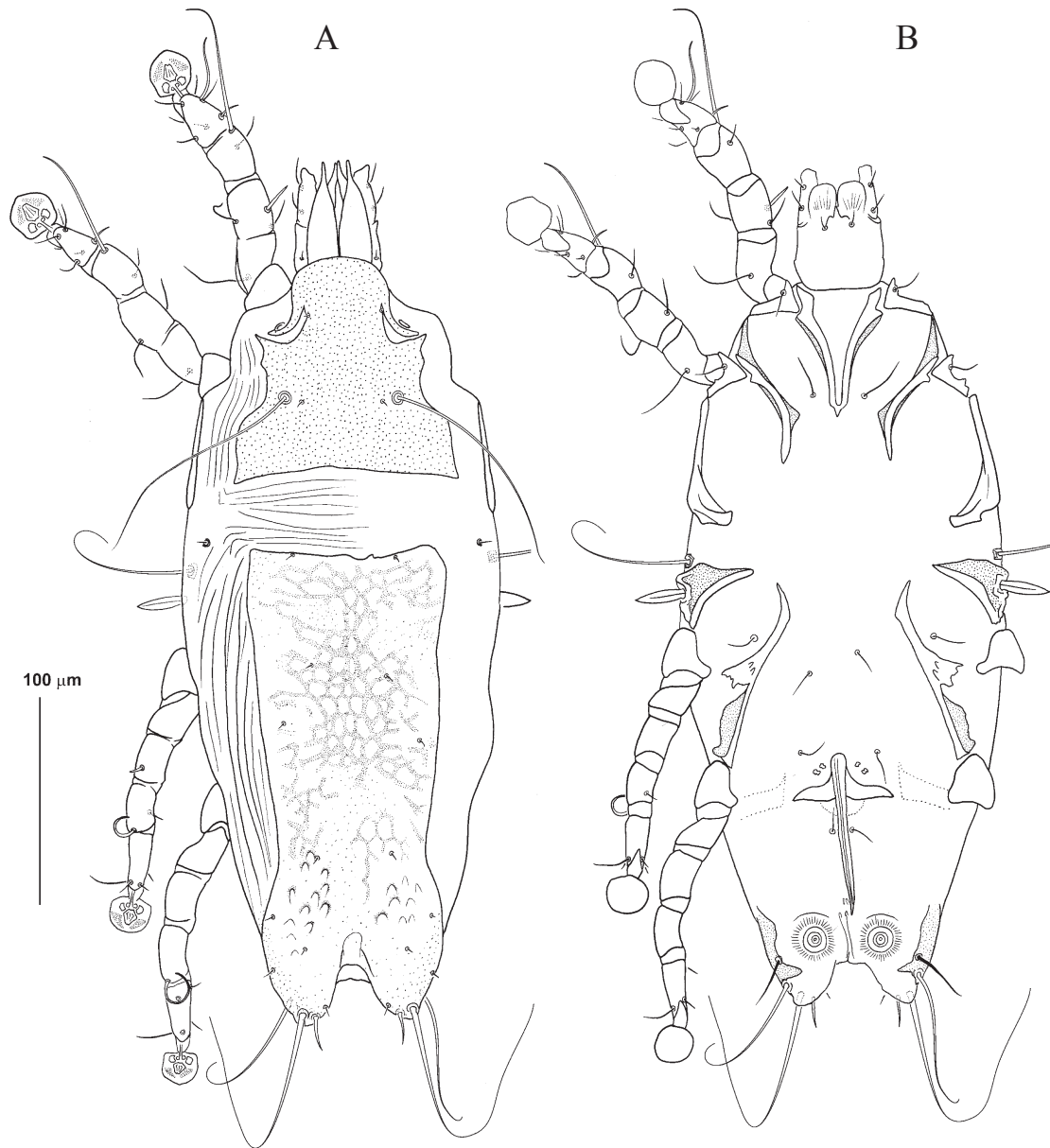


Fig. 13. *Tyrannidectes reticulatus* (Černý, 1974), male. A — dorsal view, B — ventral view.

**Hosts.** *Elaenia flavogaster* (Thunberg, 1822)\*, *E. chiriquensis* Lawrence, 1865† (Passeriformes, Tyrannidae).

**Distribution.** Brazil (Brasília†), Surinam (Weg naar Zee\*).

**Type material examined.** Holotype female (P 1620) from *Elaenia flavogaster*; Weg naar Zee, Surinam, 10.09.1971, coll. F. Lukoschus and N.J.J. Kok, at RMNH; 1 nymph paratype (A56/81), same data as holotype, at ZMUH.

**Additional material examined.** 2 males and 4 females from *E. flavogaster*, Água Limpa farm (15°57'S, 47°56'W), Brasília, Brazil, 07.08.2002; 22 males and 26 females from *E. chiriquensis* Lawrence, 1865, Água Limpa farm (15°57'S,

47°56'W), Brasília, Brazil, 13.02.2002, coll. M. Kanegae, deposited at CAIOC and DZSJRP.

**Diagnosis.** This species is very similar to *Tyrannidectes berlai* Mironov, 2008 by the presence of the following characters: in male, setae *h3* are short and spiculiform, the aedeagus reaches the level of anterior margin of anal suckers; in both sexes, dorsal shields are with distinct ornamentation (most clearly expressed in females). They are promptly distinguished by the shape of anterior margin of hysteronotal shield, which is straight in *T. reticulatus* and concave in *T. berlai*. The females can be separated by the pattern of hysteronotal ornamentation, which is reticulate in *T. reticulatus* and represented by transverse lines in *T. berlai*.

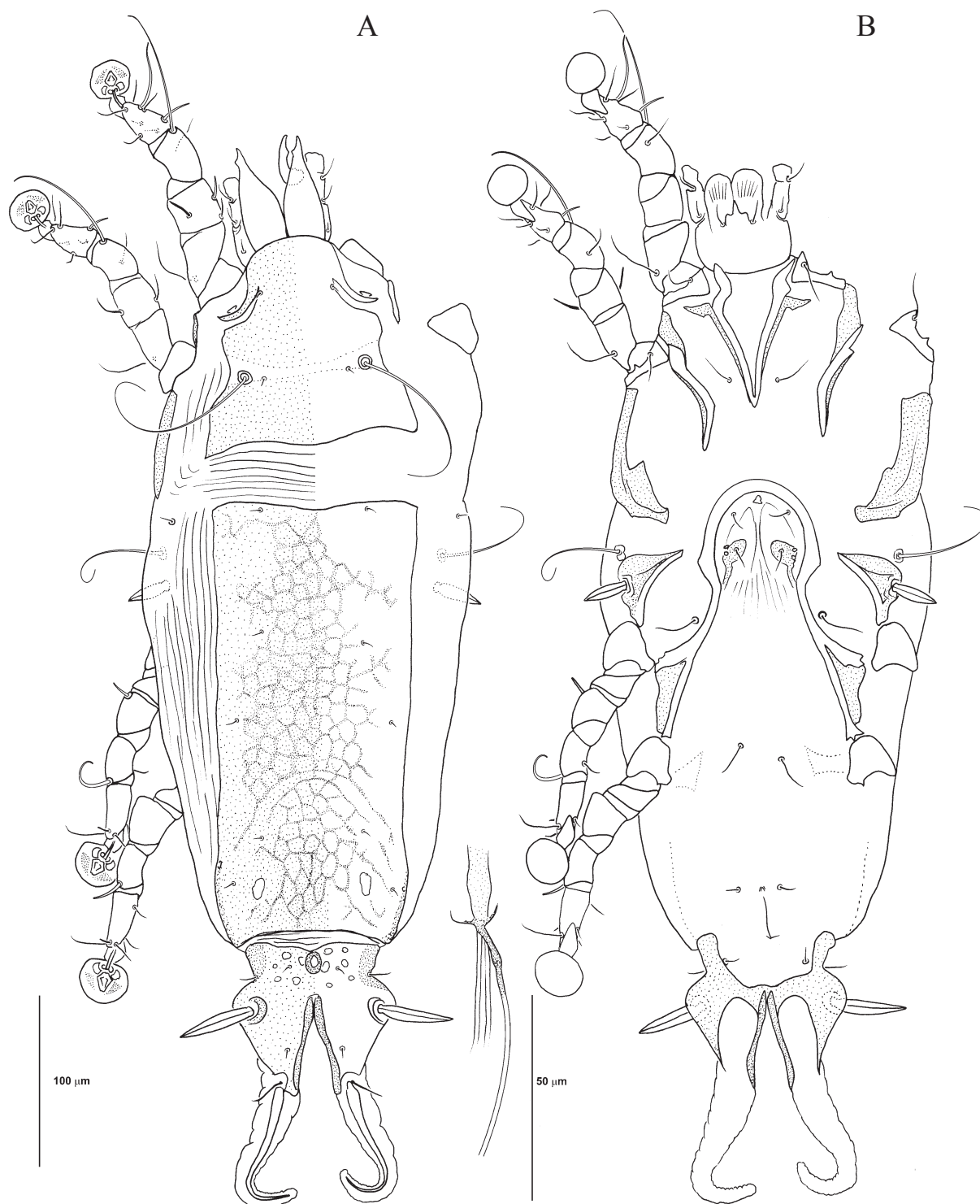


Fig. 14. *Tyrannidectes reticulatus* (Černý, 1974), female holotype. A — dorsal view, B — ventral view, C — spermatheca and spermaducts.

**Remarks.** The absence of setae *sR* on trochanters III is a distinctive character that places *Pterodectes reticulatus* in the genus *Tyrannidectes*.

**Male** (Figs. 13A–B) (measurements of 2 specimens from *E. flavogaster*). Length of idiosoma 341–396, width 165. Prodorsal shield 122–128 in length and 112–117 in width, surface without lacunae or pale sclerotized areas. Setae *ve* present.

Scapular setae *si* and *se* arranged in transverse line. External scapular setae *se* 150–158 in length, their bases separated by 64–65; bases of *si* separated by 42–46. Setae *c1* set on hysteronotal shield, and *c3* lanceolate, 24–30 in length and 6–8 in width. Humeral shields absent, setae *cp* set on soft tegument. Distance between prodorsal and hysteronotal shields 22–27. Hysteronotal shield: 245–250

in length, 109 in width; surface without lacunae but with small points forming reticulated pattern, in some specimens those reticulations faint. Terminal cleft as a wide U, 22–27 in length and 33–35 in width, with distinct supranal concavity. Setae *h3* short and spine-like, separated by 49. Length of setae: *ps1* 11, *h3* 19–24, *h2* 204–218, *ps2* 76–95, *f2* 8–11, *ps3* 27–33. Distance between dorsal setae: *si-c1* 82, *c1-c2* 41–44, *c1-d1* 63–65, *d1-d2* 38–44, *d1-e1* 95–101, *d2-e1* 63–71, *e1-e2* 38–41, *e1-h1* 46, *e2-h1* 19–22, *h1-f2* 16–19.

Epimerites I fused in a narrow U, with small postero-lateral projections. Sclerites rEpIIa absent. Epimerites IVa weakly expressed. Aedeagus extending to anterior margin of anal suckers, 82–84 in length; genital arch 8 in length and 38–49 in width. Distance between ventral setae: *3a-4a* 49–52, *4a-g* 44, *g-ps3* 68–71, *ps3-ps3* 65–68. Anal suckers 11 in diameter and separated by 30. Opisthoventral shields occupying lateral margins of opisthosoma, extending from setae *ps2* to anterior margin of anal suckers; acute projection inwards anal sucker between *ps3* and *ps2*.

Setae *cG* on genua I and II stick-like. Ventral crest present on femur I. Tarsus IV 38 in length, modified setae *d* and *e* button-like.

**Female** (Figs. 14A–C) (holotype). Length of idiosoma 520, width 201. Prodorsal shield 125 in length and 128 in width; surface, setae *ve*, scapular setae *si* and *se* as in male. Setae *se* 94 in length, their bases separated by 75; setae *si* separated by 50. Humeral shields absent, setae *cp* on soft tegument. Setae *c1* set on anterior hysteronotal shield; setae *c3* lanceolate, 29 in length and 9 in width.

Distance between prodorsal and anterior hysteronotal shields 40. Anterior hysteronotal shield 264 in length and 123 in width. Surface without lacunae but with small points forming reticulated pattern, with pair of pale sclerotized areas on latero-posterior angles of this shield. Anterior hysteronotal and lobar shields separated by thin band of soft cuticle. Lobar region 95 in length and 100 in width. Terminal cleft as a narrow V, 62 in length, reaching the level of setae *h2*. Supranal concavity distinct. Setae *h2* dagger-like, without terminal filament, 50 in length and 10 in width. Setae *h3* 48 in length and their bases separated by 46. Setae *h1* inserted on anterior third of lobar shield, set at middle level of supranal concavity opening; its bases forming linear arrangement with setae *f2*. Setae *ps1* set at midlevel of setae *h2* and *h3*, distant from inner margin of lobar cleft (Fig. 14A). Distance be-

tween dorsal setae: *si-c1* 85, *c1-c2* 56, *c1-d1* 82, *d1-d2* 51, *d1-e1* 114, *d2-e1* 69, *e1-e2* 41, *e1-h1* 84, *e2-h1* 46; *h1-f2* and *f2-h2* were not measured due the poor condition of the material.

Epimerites I fused as a V, without small postero-lateral extensions. Coxal fields I–II open. Distance between ventral setae: *1a-3a* 81, *3a-g* 23, *4a-ps3* 83, *g-4a* 127, *ps2-ps3* 47, *ps2-ps2* 45, *ps3-ps3* 25. Setae *ps2* and *ps3* setiform set in nearly rectangular arrangement. Spermatheca and spermaducts as in Fig. 14C. Setae *cG* on genua I and II spine-like. Legs IV extending by ambulacral disc at maximum to level of setae *f2*.

### **Cotingodectes Valim et Hernandez, 2008**

Type species: *Pterodectes interifolia* Trouessart, 1899, by original designation.

**Remarks.** The genus *Cotingodectes* currently comprises two species associated with Neotropical passerines of the family Cotingidae (Valim and Hernandez 2008, 2009). This genus is characterized by the following characters in male: the opisthosomal lobes are dissected into two lobules, the terminal cleft is large and with additional incisions on inner margins of lobes; all ventral surface of lobes is covered by sclerotization, setae *h3* are foliform; long paragenital apodemes are present, extend from the midlevel of coxal fields IV to the level of anal suckers and encircle the large genital field; the pre-genital sclerite is present between coxal fields IV.

### **Cotingodectes breviphallus Valim et Hernandez, 2009**

*Cotingodectes breviphallus* Valim and Hernandez 2009: 266, figs. 1–8.

**Host.** *Rupicola rupicola* (Linnaeus, 1766)\* (Passeriformes, Cotingidae).

**Distribution.** Brazil (Roraima\*).

**Type material examined.** Male holotype, 5 male and 3 female paratypes from *R. rupicola*, Serra do Tepequém, Vila do Cabo Sobral, Amajari, Roraima, Brazil, 20.08.2008, coll. M.P. Valim, at MZSP, DZSJRP and CAIOC.

**Diagnosis.** Aedeagus reaching the anterior margin of anal opening.

### **Cotingodectes interifolius (Trouessart, 1899)**

*Pterodectes interifolia* Trouessart 1899: 61; Park and Atyeo 1971: 56.

*Cotingodectes interifolius*: Valim and Hernandez 2008: 152, figs. 14–16.

**Host.** *Rupicola peruviana* (Latham, 1790)\* (Passeriformes, Cotingidae).



**Distribution.** Peru (Cuzco\*).

**Additional material examined.** 4 males (BMOC 01–0102–140) and 4 females (BMOC 01–0102–140) from *Rupicola peruviana*, Suecia, Paucartambo, Cuzco, Peru, 27.09.1999, coll. D.F. Stotz, at UMMZ.

**Diagnosis.** Aedeagus reaching level of bases of setae *h3*.

***Berladectes* Valim et Hernandes, 2009**

Type species: *Dolichodectes neotropicus* Hernandes et Valim, 2006, by original designation.

**Remarks.** The genus *Berladectes* is currently monotypic and associated with New World passerines of the family Tyrannidae (Valim and Hernandes 2009). This genus is characterized by having the male opisthosomal lobes long, rounded apically and entire; only lateral surface of lobes covered by ventral sclerotization; setae *h3* are setiform; long paragenital and pregenital apodemes encircle the large genital field; coxal field III are closed.

***Berladectes neotropicus*  
(Hernandes et Valim, 2006)**

*Dolichodectes neotropicus* Hernandes and Valim 2006: 55, figs. 8–17.

*Berladectes neotropicus*: Valim and Hernandes 2009: 270, fig. 10.

**Host.** *Elaenia chiriquensis*\* (Passeriformes, Tyrannidae).

**Distribution.** Brazil (Brasília\*).

**Type material examined.** Male holotype, 5 male and 13 female paratypes from *E. chiriquensis*, Fazenda Água Limpa, Brasília, D.F., Brazil; 07.08.2002, coll. M.F. Kanegae, at CAIOC and DZSJRP.

**DISCUSSION**

As noted by Park and Atyeo (1971), the genus *Pterodectes*, as defined then, still had many undescribed species. We only began to scratch the surface of this vastly underexplored diversity and up to this date, a still inexpressive number of known species withholds a clearer framework of the evolution and host-association of their species.

The distribution of members of the *Pterodectes* generic complex seems to be much more in agreement with the occurrence on passerines from the New World, than with the phylogenetic relationships of passerine birds living in this area (Table 2). These mites have colonized several hosts from families of the three major lineages of Passeriformes (*sensu* Barker et al. 2002, 2004) — Passerida, Corvida, and Tyrannida. The Passerida

host mites of the genera *Amerodectes*, *Metapterodectes* and *Pterodectes*; the Corvida exhibit so far an association with a sole species, *Tyrannidectes crassus*; finally, the Tyrannida harbour pterodectines of the genera *Amerodectes*, *Tyrannidectes*, *Metapterodectes*, *Berladectes* and *Cotingodectes*. Current data suggest that species of the genera *Amerodectes*, *Tyrannidectes* and *Metapterodectes*, being morphologically very close to each other, are distributed rather erratically among the three major groups of passerines. It could reasonably be hypothesized that this pattern of distribution was caused by many cases of horizontal transferring between these phylogenetically distant groups of birds (Mironov 2009). On the other hand, species of the genera *Berladectes* and *Cotingodectes*, which are morphologically quite distinct from other genera of the *Pterodectes* complex, were recorded only on South American tyrannids (Tyrannidae and Cotingidae, respectively). It is likely that these genera were formed and evolved in the frame of their respective host families.

Most of the Neotropical families and species of birds were not thoroughly investigated concerning their feather mite fauna (Valim et al. 2010, *in press*); therefore we expect many more new taxa to be discovered on these birds. Further findings and taxonomic efforts could certainly provide a deeper understanding of the recent associations of these ectosymbionts with their hosts.

A specific case in the *Pterodectes* complex deserves a further look: *Pterodectes rutilus*, regarded herein as a sole species of the genus *Pterodectes*, is associated exclusively with the bird family Hirundinidae, which contains species occurring both in the New and Old Worlds (e.g. *Hirundo rustica*) (Stotz et al. 1996). Owing to associations of *P. rutilus* with such species, this representative of the *Pterodectes* complex is distributed outside the Americas. Besides, it is necessary to keep in mind that this mite species could potentially constitute a complex of cryptic species (Gaud and Till 1961; Park and Atyeo 1971), since it was recorded to this date from swallows of phylogenetically distant hirundinid genera, such as *Atticora* Boie, *Delichon* Horsfield et Moore, *Hirundo* Linnaeus, and *Riparia* Forster (Sheldon et al. 2005). Among these, *Hirundo rustica* seems to be the most common host of *P. rutilus*, whilst its presence on hosts of other hirundinid genera is rather rare (S.V. Mironov, pers. com.). Given the geographical distribution of species of the *Pterodectes* generic complex is almost exclusively in

Table 2.

Host associations and distribution of species of the *Pterodectes* generic complex.

Mite genus and species	Host species	Host Suborder	Host family	Locality	References
<b><i>Amerodectes</i></b>					
<i>A. atyeoi</i>	<i>Geospiza difficilis</i> , <i>G. fortis</i> , <i>G. fuliginosa</i> , <i>G. magnirostris</i> , <i>G. scandens</i>	Passerida	Emberizidae	Galapagos Islands (Ecuador)	OConnor et al. (2005)
<i>A. bilineatus</i>	<i>Caryothraustes canadensis</i> , <i>Thraupis episcopus</i> , <i>T. sayaca</i>	Passerida	Cardinalidae, Thraupidae	Pará, Rio de Janeiro (Brazil)	Berla (1958); PS
<i>A. geothlypis</i>	<i>Geothlypis aequinoctialis</i>	Passerida	Parulidae	Rio de Janeiro (Brazil)	Berla (1973)
<i>A. haviliki</i>	<i>Philydor pyrrhodes</i> , <i>Tachyphonus cristatus</i> , <i>T. rufus</i> , <i>Ramphocelus carbo</i>	Tyrannida, Passerida	Furnariidae, Thraupidae	Tawajariweg, Weg naar Zee (Surinam)	Černý (1974); Černý and Lukoschus (1975); PS
<i>A. gracilis</i>	<i>Cacicus cela</i> , <i>C. haemorrhous</i> , <i>Psarocolius de- cumanus</i> , <i>P. viridis</i> ,	Passerida	Icteridae	Acre, Amazonas, Pará, Rio de Janeiro, Roraima, São Paulo (Brazil)	Trouessart (1885); Berla (1959); PS
<i>A. maculatus</i>	<i>Chrysomus icterocephalus</i>	Passerida	Icteridae	Pará (Brazil) and Welgedacht (Surinam)	Černý (1974); PS
<i>A. molothrus</i>	<i>Molothrus bonariensis</i> , <i>M. rufoaxillaris</i>	Passerida	Icteridae	Buenos Aires (Argentina), Mato Grosso do Sul (Brazil)	Mironov et al. (2008a); PS
<i>A. nordestensis</i>	<i>Caryothraustes canadensis</i>	Passerida	Cardinalidae	Brazil	Berla (1958)
<i>A. paroariae</i>	<i>Paroaria capitata</i>	Passerida	Emberizidae	Mato Grosso do Sul (Brazil)	Mironov et al. (2008a)
<i>A. pitangi</i>	<i>Pitangus sulphuratus</i>	Tyrannida	Tyrannidae	Mato Grosso do Sul, Rio de Janeiro (Brazil)	Mironov et al. (2008a); PS
<i>A. tangarae</i>	<i>Tangara cayana</i>	Passerida	Thraupidae	Brasília, Mato Grosso do Sul (Brazil)	Mironov et al. (2008a); PS
<i>A. turdinus</i>	<i>Turdus albicollis</i> , <i>T. leucomelas</i> , <i>T. nudigenis</i> , <i>T. rufiventris</i>	Passerida	Turdidae	Rio de Janeiro (Brazil), Tawajari- weg, Welgedacht (Surinam)	Berla (1959); Černý and Lukoschus (1975); Storni et al. (2005)
<i>A. sialiarum</i>	<i>Sialia sialis</i>	Passerida	Turdidae	Georgia, North Carolina (USA), Retalhuleu (Guate- mala)	Stoll (1893); Reeves et al. (2007); Valim and Hernandes (2008)
<i>A. storkani</i>	<i>Ramphocelus bresilius</i> , <i>R. carbo</i>	Passerida	Thraupidae	Rio de Janeiro (Brazil), Tawajari- weg (Surinam)	Černý (1974); PS
<i>A. thraupicola</i>	<i>Thraupis cyanoptera</i> , <i>T. episcopus</i> , <i>T. palmarm</i> , <i>T. sayaca</i>	Passerida	Thraupidae	Pará, Rio de Janeiro (Brazil), Tawajari- weg (Surinam)	Černý (1974); PS
<i>A. troglodytis</i>	<i>Troglodytes aedon</i>	Passerida	Troglodytidae	Paramaribo (Surinam)	Černý (1974)
<b><i>Berladectes</i></b>					
<i>B. neotropicus</i>	<i>Elaenia chiriquensis</i>	Tyrannida	Tyrannidae	Brasília (Brazil)	Hernandes and Valim (2006)

Table 2. Continued.

<b><i>Cotingodectes</i></b>					
<i>C. breviphallus</i>	<i>Rupicola rupicola</i>	Tyrannida	Cotingidae	Roraima (Brazil)	Valim and Hernandes (2009)
<i>C. interfolius</i>	<i>Rupicola peruviana</i>	Tyrannida	Cotingidae	Cuzco (Peru)	Trouessart (1899); Valim and Hernandes (2008)
<b><i>Metapterodectes</i></b>					
<i>M. furnarius</i>	<i>Furnarius rufus</i>	Tyrannida	Furnariidae	Mato Grosso do Sul, Minas Gerais (Brazil)	Mironov et al. (2008a); PS
<i>M. muticus</i>	<i>Poocetes gramineus</i>	Passerida	Emberizidae	Canada, Texas (USA)	Banks (1909); Valim and Hernandes (2008)
<b><i>Pterodectes</i></b>					
<i>P. rutilus</i>	<i>Atticora melanoleuca</i> , <i>Delichon urbicum</i> , <i>Hirundo rustica</i> , <i>H. nigrita</i> , <i>Riparia</i> <i>riparia</i> , <i>R. paludicola</i> , <i>Stelgidopteryx</i> <i>ruficollis</i>	Passerida	Hirundinidae	Cameroon, Mozam- bique, Zimbabwe, Cuba, Europe, Djambul (Kazakh- stan), Roraima (Brazil), Weg naar Zee (Surinam)	Robin and Mégnin (1877); Till (1954); Gaud and Till (1961); Černý (1967); Černý and Lukoschus (1975); Valim and Hernandes (2008); PS
<b><i>Tyrannidectes</i></b>					
<i>T. amaurochalinus</i>	<i>Turdus amaurochalinus</i>	Passerida	Turdidae	Minas Gerais (Brazil)	Hernandes and Valim (2006)
<i>T. banksi</i>	<i>Sayornis phoebe</i>	Tyrannida	Tyrannidae	Texas (USA)	Valim and Hernandes (2008)
<i>T. berlai</i>	<i>Myiarchus ferox</i> , <i>M. tyrannulus</i>	Tyrannida	Tyrannidae	Mato Grosso do Sul (Brazil)	Mironov et al. (2008a); PS
<i>T. crassus</i>	<i>Cyanocorax chrysops</i>	Corvida	Corvidae	Colombia, Paraguay (San Pedro)	Trouessart (1885); Valim and Hernandes (2008)
<i>T. fissuratus</i>	<i>Turdus leucomelas</i> , <i>T. nudigenis</i>	Passerida	Turdidae	Paraná (Brazil), Tawajariweg (Surinam)	Hernandes and Valim (2005); PS
<i>T. reticulatus</i>	<i>Elaenia chiriquensis</i> , <i>E. flavogaster</i>	Tyrannida	Tyrannidae	Brasília (Brazil), Weg naar Zee (Surinam)	Černý (1974); PS

PS — Present study

the Americas, in addition to the fact that no other pterodectines exhibit associations with the Hirundinidae, two tentative scenarios can be conjectured to explain the current distribution of *P. rutilus*. According to the first hypothesis, some ancestor of the genus *Hirundo* had acquired *P. rutilus* by the horizontal transfer from some passerines during their dispersion in the New World, and further this mite species had dispersed worldwide by hirundinids. Another suggestion, which needs further evidence, is that the genus *Pterodectes* originated earlier, still on some passerines in the Old World, and via “*Hirundo*-stock” birds has widely dis-

persed around the World (including Americas) and also has colonized swallows of other genera.

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## REFERENCES

- Atyeo, W.T. and 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. and Gaud, J. 1966. The chaetotaxy of sarcoptiform feather mites (Acarina: Analgoidea). *Journal of the Kansas Entomological Society*, 39: 337–346.
- Banks, N. 1909. New Canadian mites. *Proceedings of the Entomological Society of Washington*, 11: 133–143.
- Barker, F.K., Barrowclough, G.F., and Groth, J.G. 2002. A phylogenetic hypothesis for passerine birds: taxonomic and biogeographic implications of an analysis of nuclear DNA sequence data. *Proceedings of the Royal Society B*, 269: 295–308.
- Barker, F.K., Cibois, A., Schikler, P., Feinstein, J., and Cracraft, J. 2004. Phylogeny and diversification of the largest avian radiation. *Proceedings of the National Academy of Science*, 101 (30): 11040–11045.
- Berla, H.F. 1958. Analgesidae Neotropicais. I — Duas novas espécies de *Pterodectes* Robin, 1868 (Acarina — Proctophyllodinae) coletadas em Fringilidae, Aves, Passeriformes. *Boletim do Museu Nacional (Zoologia)*, 186: 1–6.
- Berla, H.F. 1959. Analgesoidea Neotropicais. IV — Sobre algumas espécies novas ou pouco conhecidas de acarinos plumícolas. *Boletim do Museu Nacional (Zoologia)*, 209: 1–17.
- Berla, H.F. 1973. Analgesoidea Neotropicais. X — Uma nova espécie de *Pterodectes* Robin, 1877. *Revista Brasileira de Biologia*, 33 (1): 21–22.
- Canestrini, G. 1886. Famiglia degli Analgesini. Prospetto dell'Acarofauna italiana. *Padova*, 2: 241–311.
- Canestrini, G. 1878. Nove specie del genere *Dermaleichus*. *Atti del Reale Istituto Veneto di Scienze, Lettere ed Arti (ser. 5)*, 5: 43–70.
- Canestrini, G. and Kramer, P. 1899. Demodicidae and Sarcoptidae. *Das Tierreich. Eine Zusammenstellung und Kennzeichnung der rezenten*, 7: 1–193.
- Černý, V. 1967. Catálogo de la fauna Cubana XX. Lista de los ácaros parásitos de aves reportadas em Cuba. *Trabajos de divulgación / Academia de Ciencias de Cuba, Museo Felipe Poey*, 45: 1–23.
- Černý, V. 1974. Parasitic mites of Surinam. XXXI. New species of Proctophyllodidae (Sarcoptiformes, Analgoidea). *Folia Parasitologica*, 21: 349–361.
- Černý, V. and Lukoschus, F.S. 1975. Parasitic mites of Surinam. XXXIII. Feather mites (Analgoidea). *Studies on the Fauna of Suriname and other Guyanas*, 15: 184–203.
- Dabert, J. and Mironov, S.V. 1999. Origin and evolution of feather mites (Astigmata). *Experimental and Applied Acarology*, 23: 437–454.
- Daniel, M. 2002. Vladimir Černý. *Acarina*, 10 (2): 189.
- Dickinson, E.C. (Ed.) 2003. *The Howard and Moore Complete Checklist of the Birds of the World. 3rd ed.* Publisher: Princeton University Press, New Jersey, 1039 pp.
- Gaud, J. 1953. Sarcoptidés plumicoles des oiseaux d'Afrique occidentale et centrale. *Annales de Parasitologie Humaine et Comparée*, 28 (3): 193–226.
- Gaud, J. and Atyeo, W.T. 1996. Feather mites of the world (Acarina, Astigmata): the supraspecific taxa. *Annales Musee Royal L'Afrique Centrale, Sciences Zoologiques*, 277: 1–187 (Part I), 1–436 (Part II).
- Gaud, J. and Mouchet, J. 1957. Acariens plumicoles (Analgesoidea) des oiseaux du Cameroun. I. Proctophyllodidae. *Annales de Parasitologie Humaine et Comparée* 32 (5–6): 491–546.
- Gaud, J. and Till, W.M. 1961. Suborder Sarcoptiformes. In: E. Zumpt (Ed.) *The arthropod parasites of vertebrates in Africa south of the Sahara (Ethiopian Region)*, Volume I (Chelicerata). Publications of the South African Institute of Medical Research, No L (Vol. IX). Johannesburg, South Africa, pp. 180–352.
- Griffiths, D.A., Atyeo, W.T., Norton, R.A. and Lynch, C.A. 1990. The idiosomal chaetotaxy of astigmatid mites. *Journal of Zoology*, 220 (1): 1–32.
- Hernandes, F.A. and Valim, M.P. 2005. A new species of *Pterodectes* Robin, 1877 (Proctophyllodidae: Pterodectinae) from the pale-breasted thrush, *Turdus leucomelas* (Passeriformes: Turdidae). *Zootaxa*, 1081: 61–68.



- Hernandes, F.A. and 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. and Mironov, S.V. 2010. On the identity of *Pterodectes ralliculae* Atyeo et Gaud, 1977 (Astigmata: Proctophyllodidae). *Journal of Natural History*, 44: 369–377.
- 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 the systematics of the genus. *Acarina*, 14 (1): 21–40.
- Mironov, S.V. 2008. Three new species of the feather mite subfamily Pterodectinae (Acari: Astigmata: Proctophyllodidae) from passerines (Aves: Passeriformes) in Central Africa. *Annales Zoologici*, 58 (2): 403–418.
- 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., Literak, I. and Čapek, 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., Diao, W., Zhang, Y., Zhang, C., and Yan, Zh. 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.
- OConnor, B.M., Foufopoulos, J., Lipton, D., and Lindström, K. 2005. Mites associated with the small ground finch, *Geospiza fuliginosa* (Passeriformes: Emberizidae), from the Galapagos Islands. *Journal of Parasitology*, 91 (6): 1304–1313.
- Park, C.K. and Atyeo, W.T. 1971. A generic revision of the Pterodectinae, a new subfamily of feather mites (Sarcoptiformes: Analgoidea). *Bulletin of the University of Nebraska State Museum*, 9 (3): 39–88.
- Radford, C.D. 1958. The host-parasite relationships of the feather mites (Acarina: Analgoidea). *Revista Brasileira de Entomologia*, 8: 107–170.
- Reeves, W.K., Durden, L.A., Ritzi, C.M., Beckham, K.R., Super, P.E., and OConnor, B.M. 2007. Ectoparasites and other ectosymbiotic arthropods of vertebrates in the Great Smoky Mountains National Park, USA. *Zootaxa*, 1392: 31–68.
- Robin, C. 1868. Memoire sur les Sarcoptides avicoles et sur les metamorphoses des Acariens. *Compte rendu hebdomadaire des seances de l'Academie des sciences, Paris*, 66 (16): 776–787.
- Robin, C. and Mégnin, P. 1877. Memoire sur les Sarcoptides plumicoles. *Journal of Anatomy and Physiology*, 13: 209–234, 341–429, 498–520, 629–656.
- Sheldon, F.H., Whittingham, L.A., Moyle, R.G., Slikas, B., and Winkler, D.W. 2005. Phylogeny of swallows (Aves: Hirundinidae) estimated from nuclear and mitochondrial DNA sequences. *Molecular Phylogenetics and Evolution*, 35: 254–270.
- Stoll, O. 1893. Arachnida Acaridea. *Biologia Centrali-Americana (zool.)*, 3: 1–55.
- Storni, A., Alves, M.A.S. and Valim, M.P. 2005. Ácaros de pena e carrapatos (Acari) associados a *Turdus albicollis* Vieillot (Aves, Muscicapidae) em uma área de Mata Atlântica da Ilha Grande, Rio de Janeiro, Brasil. *Revista Brasileira de Zoologia*, 22 (2): 419–423.
- Till, W.M. 1954. Five new feather mites of the genus *Pterodectes* (Acarina: Analgesidae). *Mocambique: documentario trimestral*, 19: 85–100.
- Trouessart, E.L. 1885. Note sur la classification des Analgésiens et diagnoses d'espèces et de genres nouveaux. *Bulletin de la Société d'Études scientifiques d'Angers*, 14: 46–89.
- Trouessart, E.L. 1899. Diagnoses préliminaires d'espèces nouvelles d'acarions plumicoles. Additions et corrections a la sous-famille des Analgésinés. *Bulletin de la Société d'Études scientifiques d'Angers*, 28: 1–62.
- Valim, M.P. and Hernandez, F.A. 2006. Redescriptions of four species of the feather mite genus *Pterodectes* Robin, 1877 (Acari: Proctophyllodidae: Pterodectinae) described by Herbert F. Berla. *Acarina*, 14 (1): 41–55.
- Valim, M.P. and Hernandez, F.A. 2008. Redescriptions of five species of the feather mite genus *Pterodectes* Robin, 1877 (Acari: Proctophyllodidae: Pterodectinae), with proposal of a new genus and a new species. *Acarina*, 16 (2): 131–157.
- Valim, M.P. and Hernandez, 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 (3): 265–272.
- Valim, M.P., Hernandez, F.A. and Proctor, H.C. Feather mites of Brazil (Acari: Astigmata: Analgoidea and Pterolichoidea). *International Journal of Acarology*, in press.
- Vitzthum, H. 1929. Ordnung: Milben, Acari. *Die Tierwelt Mitteleuropas*, 3: 1–112 + pls. 1–12.