

**REDESCRIPTIONS OF FOUR SPECIES OF THE FEATHER MITE GENUS
PTERODECTES ROBIN, 1877 (ACARI: PROCTOPHYLLODIDAE:
PTERODECTINAE) DESCRIBED BY HERBERT F. BERLA**

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ABSTRACT: Four species of the feather mite genus *Pterodectes* Robin, 1877, originally described by H.F. Berla, an early Brazilian acarologist, from various South American passerines are re-described: *Pterodectes bilineatus*; *P. nordestensis*; *P. turdinus* and *P. geothlypis*.

KEY WORDS: feather mite, Astigmata, Analgoidea, Proctophyllodidae, systematics, Brazil

INTRODUCTION

Herbert Franzoni Berla (1912–1985), the prominent Brazilian naturalist, was the pioneer in the study of feather mites of Brazilian birds. As a technician of the National Museum of Rio de Janeiro, he worked primarily with birds. Since 1940, after his expedition to the Espírito Santo State (Brazil), he started to accumulate feather mite samples from the skins in his ornithological collection (Pacheco and Parrini 1999). In 13 papers on feather mites, he described one new family, 13 new genera, and 42 new species. Unfortunately, at that time, Berla had neither high experience in acarology nor skillful colleagues to provide him any help. As a consequence, his morphological descriptions and some drawings were not sufficient for taxon diagnostics.

In the feather mite family Proctophyllodidae, Berla described new taxa in three subfamilies: in Proctophyllodinae he described a new genus and species, *Hemipterodectes squalocauda* Berla (1959b); in Ramphocaulinae he established a new genus, *Allodectes* Gaud and Berla (1963); in Pterodectinae he described six new *Pterodectes* species (Berla 1958, 1959a,b, 1960) and re-described *Pterodectes gracilis* Trouessart, 1885 (Berla 1959a).

The goal of the present paper is to redescribe four of H.F. Berla's species of *Pterodectes*: *P. bilineatus* Berla, 1958; *P. nordestensis* Berla, 1958; *P. turdinus* Berla, 1959, and *P. geothlypis* Berla, 1973. Two other species, known as members of this genus, *Pterodectes ocelatus* Berla, 1959 and *P. minor* (Berla 1960), are not re-described herein, because they do not belong to *Pterodectes*. In the revision of Pterodectinae, Park and Atyeo (1971) treated both as unassigned species of this subfamily. The latter species was originally described by

Berla in the genus *Proctophyllodes* Robin, 1868 and later it has been transferred to *Pterodectes* by Atyeo and Braasch (1966).

MATERIAL AND METHODS

Holotypes and paratypes of *Pterodectes* species re-described in this paper are kept in the Collection of the National Museum of Rio de Janeiro (MNRJ), Rio de Janeiro, Brazil, with Berla's original numbering. All drawings were made from type specimens.

We successfully remounted the slides of *P. geothlypis*, because the specimens were in bad conditions. The material was cleared and mounted on slides according to the procedure of Flechtmann (1975); the missing setae from a holotype were figured from paratypes.

The idiosomal and leg chaetotaxy follow Griffiths et al. (1990) and Atyeo and Gaud (1966), respectively. Measurements are given in micrometers (µm), including scale-bars of the drawings. Distances between setae were measured on one side of the body. Body dimensions were measured as follows: idiosomal length (including the lobar apices), that of the female excluding the terminal appendages, width at the level of setae *cp*; prodorsal shield length along midline and width at the posterior margin; length of the male hysteronotal shield including the lobar apices, female anterior hysteronotal shield along midline, excluding the lobar shield, width at the level of setae *cp*; width of the lobar shield at the level of setae *h2*; distance between the prodorsal and hysteronotal shields was measured along midline; distance between the centers of the male paranal suckers; length of the lobar cleft from the anterior end to the lobar apices for both sexes.

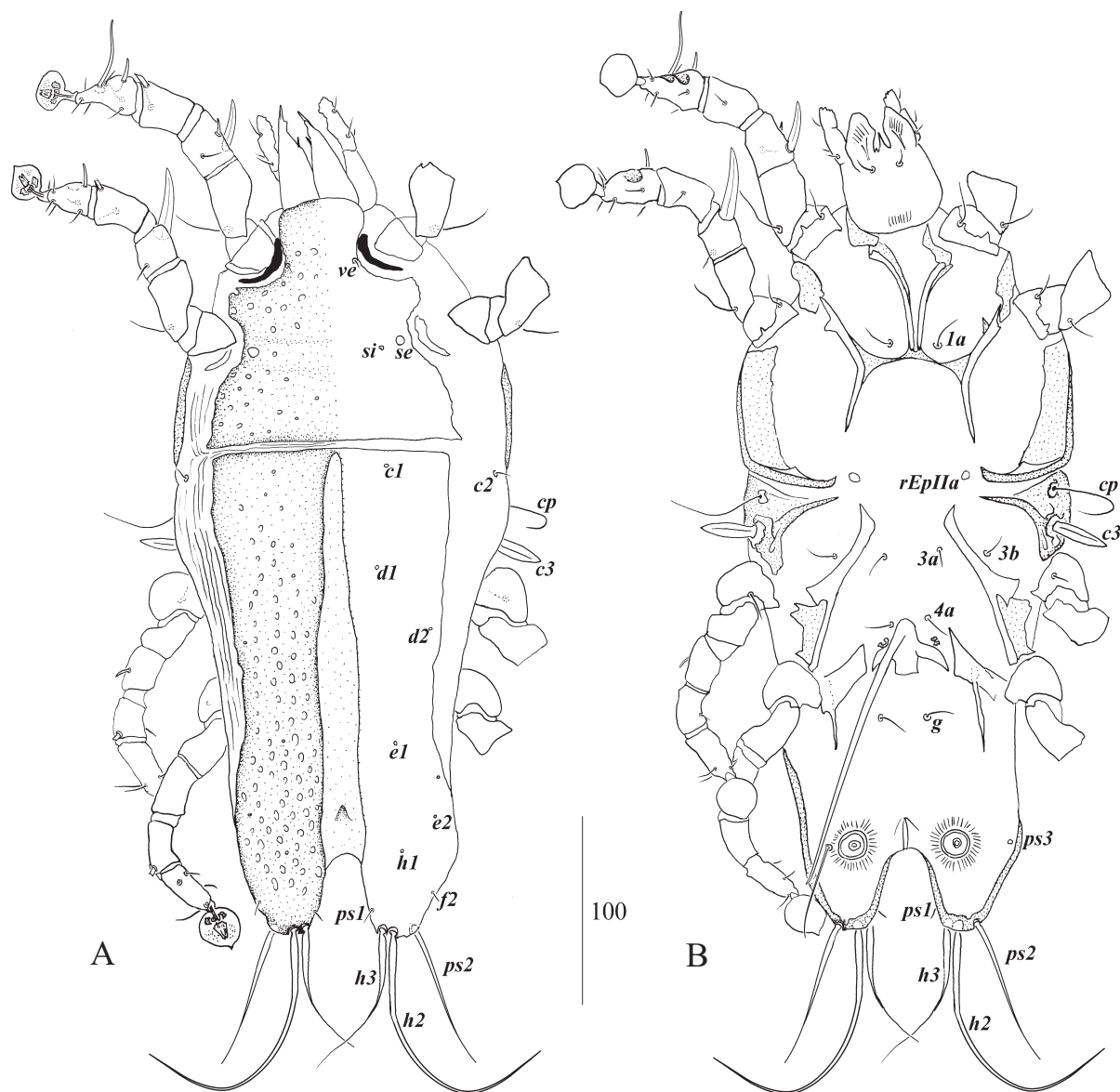


Fig. 1. *Pterodectes bilineatus* Berla, 1958. Male: dorsal (A) and ventral (B) views.

Character states for several structures that had been omitted in the original descriptions (the presence of the prodorsal setae *ve*, the insertion of setae *cp* on/off the humeral shield and the presence of pale sclerotized areas on the dorsal shields) are reported in the text. Epimeral sclerites IIa (rEpIIa), occurring only in males, are weakly developed and difficult to observe in old specimens.

Host names and classification follow Dickinson (2003) and Sibley and Monroe (1990).

FAMILY PROCTOPHYLLODIDAE
Trouessart et Mégnin, 1884

Subfamily Pterodectinae Park et Atyeo, 1971

Genus *Pterodectes* Robin, 1877

***Pterodectes bilineatus* Berla, 1958**

Figs. 1–3

Berla, 1958: 1–3, fig. 1–4; Park, Atyeo, 1971: 56.

Male holotype (Figs. 1A–B, 3A–C). Length of idiosoma 407, width 187. Dorsal shields without pale sclerotized areas. Prodorsal shield: 128 in length, 139 in width, surface with sparsely disposed circular lacunae. Setae *ve* present. Scapular setae *si* and *se* arranged in transverse line. External scapular setae missing, their bases separated by 82; bases of *si* separated by 57. Setae *c2* on striated tegument, setae *c3* lanceolate, 30 in length and 8 in width. Setae *cp* situated on humeral shields. Distance between prodorsal and hysteronotal shields 3. Hysteronotal shield: length 267, width 131; surface with numerous circular lacunae, occupying mainly posterior 3/4 of this shield. A long and wide median groove extending from anterior margin of hysteronotal shield to terminal cleft, not reaching prodorsal shield. Terminal cleft U-shaped, 44 in length; supranal concavity distinct. Setae *h3* separated by

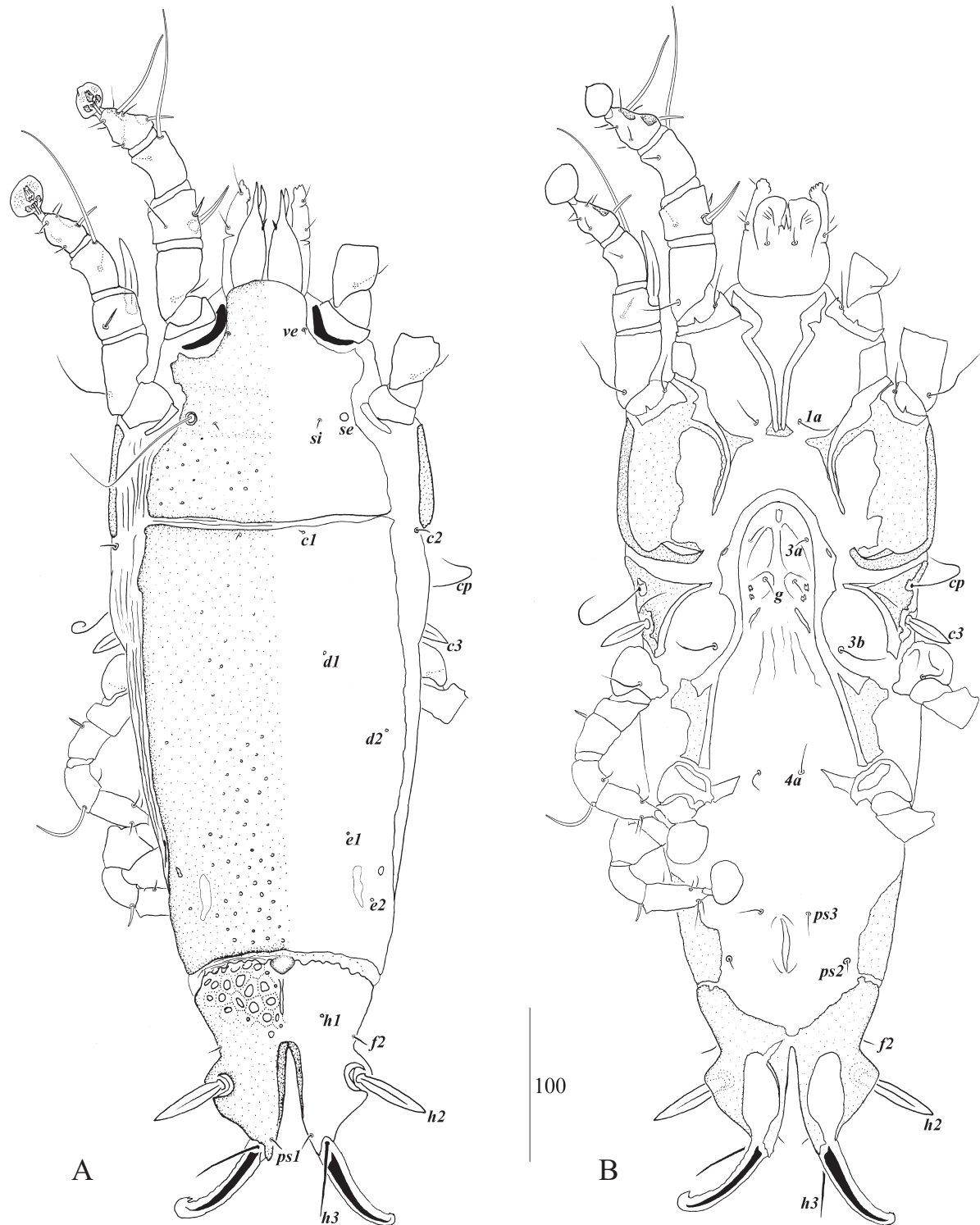


Fig. 2. *Pterodectes bilineatus* Berla, 1958. Female: dorsal (A) and ventral (B) views.

44. Length of setae: *ps1* 8, *h3* 87, *h2* 158, *ps2* 87, *f2* 8, *ps3* 46. Distance between dorsal setae: *si-c1* 63, *c1-c2* 49, *c1-d1* 60, *d1-d2* 44, *d1-e1* 90, *d2-e1* 60, *e1-e2* 46, *e1-h1* 60, *e2-h1* 24, *h1-f2* 30.

Epimerites I fused as narrow inverted π , posterior tips of epimerites connected with central part of epimerites II by thin transverse sclerotized bands. Rudimental epimeral sclerites (rEpIIa) present.

Coxal fields II and III open; lateral half of coxal field II heavily sclerotized. Epimerites IVa with long and narrow posterior projections. Aedeagus extending beyond anal discs, its tip approximately at midlevel of terminal cleft, 158 in length; genital arch 41 in width. Distance between ventral setae: *3a-4a* 38, *4a-g* 54, *g-ps3* 82, *ps3-ps3* 101. Paranal suckers edentate, 16 in diameter, separated by 57.

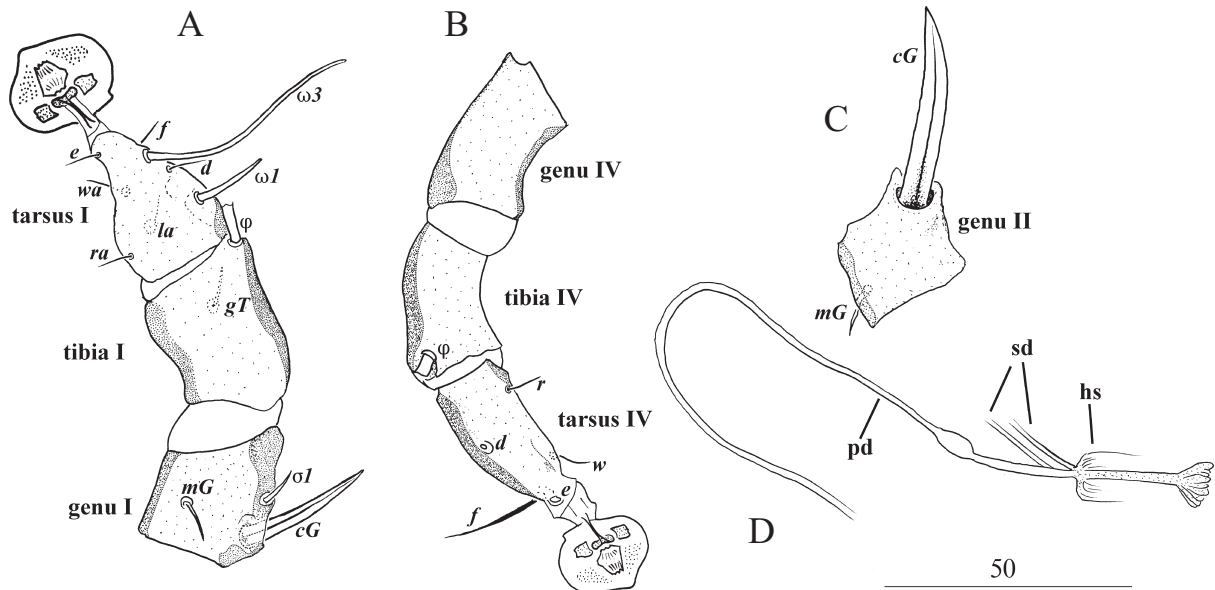


Fig. 3. *Pterodectes bilineatus* Berla, 1958. Dorsal view of male legs I (A) and IV (B). Dorsal view of male genu II (C). Female spermatheca (D): pd — primary duct; sd — secondary ducts; hs — head of spermatheca.

Opisthoventral shields narrow, restricted to lateral borders of lobes, seta *ps3* inserted on soft tegument, approximately at midlevel of anal discs.

Solenidion $\sigma 1$ of genu I in shape of thin spine (Fig. 3A); seta *cG* of genua I (27), II (41) thick dagger-like, on genu II this seta inserted apically (Fig. 3A, C). Tarsus IV 38 in length, modified setae *d* and *e* button-like (Fig. 3B). Solenidia ϕ of tibiae broken in all legs, only basal fragments visible (Figs. 1, 3A, B).

Female (Figs. 2A–B, 3D) ($n=6$). Length of idiosoma 561–627, width 209–242. Prodorsal shield: 158–171 in length, 155–177 in width; surface with few small circular lacunae, mainly posterior to scapular setae. Setae *ve* present. Scapular setae *si* and *se* arranged in transverse line. Setae *se* 68 in length, their bases separated by 90–114; pair *si* separated by 71–79. Setae *c2* on striated tegument; setae *c3* lanceolate, 35–38 in length and 8–10 in width. Setae *cp* set on humeral shield.

Distance between prodorsal and hysteronotal shields 0–3. Anterior hysteronotal shield: length 275–321, width 171–196. Surface of this shield with numerous pit-like lacunae mainly disposed in medio-posterior portion; two pale sclerotized areas in postero-lateral margins, near setae *e2*. Anterior hysteronotal and lobar shields separated by thin band of soft cuticle. Lobar region: length 136–141, width 112–125. Large circular lacunae on anterior portion of lobar shield; lobar cleft as an inverted and narrow V, 71–79. Supranal concavity distinct. Setae *h2* dagger-like, without terminal filament, 52–57 in length, 11 in width. Setae *h1* inserted on

anterior third of lobar shield. Setae *h1* and *f2* in trapezoidal arrangement. Distance between dorsal setae: *si-c1* 73–82, *c1-c2* 68–87, *c1-d1* 79–90, *d1-d2* 54–68, *d1-e1* 103–128, *d2-e1* 68–82, *e1-e2* 46–54, *e1-h1* 120–125, *e2-h1* 79–87, *h1-f2* 14–33, *f2-h2* 24–33.

Epimerites I fused as narrow inverted- π , with small posterolateral extensions, median part of epimerites II with small projections toward epimerites I. Coxal fields I, II and III open, lateral half of coxal field II heavy sclerotized. Distance between ventral setae: *1a-3a* 68–79, *3a-g* 27–38, *4a-ps3* 82–103, *g-4a* 122–136, *ps2-ps3* 38–46, *ps2-ps2* 75, *ps3-ps3* 32. Setae *ps2* and *ps3* piliform, their bases arranged in trapezium. Spermatheca and sperm ducts as in Fig. 3D. Legs I, II as in male; setae *cGI* 41–44, *cGII* 58–60. Pronounced rounded dorso-basal crests on genua IV (Figs. 2A–B). Legs IV extending by ambulacral disc at maximum to level of setae *h1*.

Material examined. Male holotype (MNRJ 44890, n° 1) from Yellow-green Grosbeak *Caryothraustes canadensis* (= *C. c. brasiliensis* Cabanis, 1851) (Cardinalidae), no data from host locality, Brazil, coll. H.F. Berla. Paratypes: 6 females MNRJ 44891 and 44892 (n° 2 and 3), same data.

Additional material. 1 female (MNRJ 44884, n° 4), from *C. canadensis* (= *C. c. frontalis* (Hellmayr, 1905), Brazil, 23.01.1958, coll. H.F. Berla.

Differential diagnosis. *Pterodectes bilineatus* resembles *P. storkani* Černý (1974) by the blade-like setae *cG* on genua I and II, the shape of epimerites I, the longitudinal median groove on the

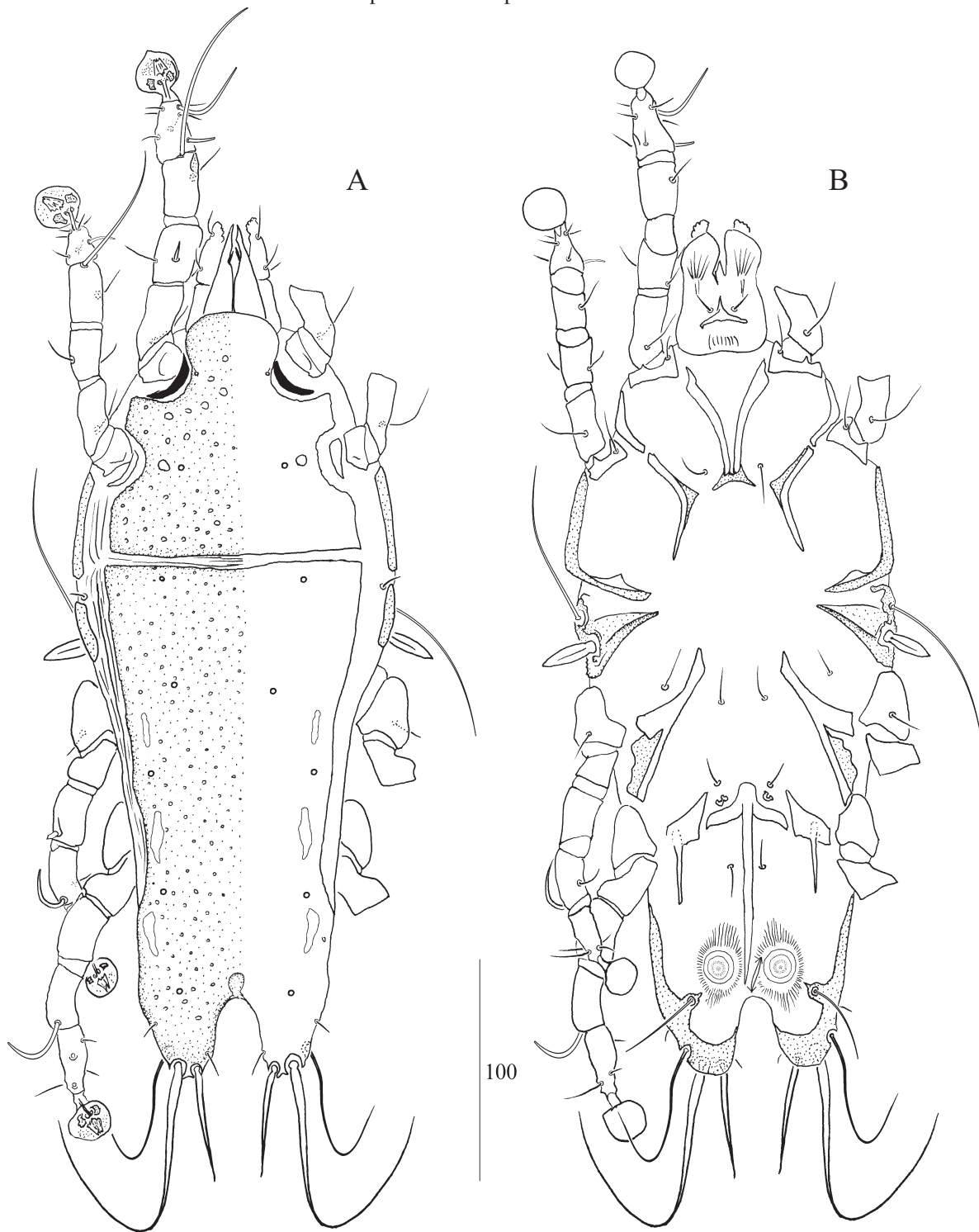


Fig. 4. *Pterodectes nordestensis* Berla, 1958. Male: dorsal (A) and ventral (B) views.

male hysteronotal shield, and the shape of the female terminal region. In the latter species setae *cG* of genua I are at least 1.5 times longer than the segment, whereas in *P. bilineatus* that setae are approximately as long as the segment. Furthermore, the median groove extends from the level of setae *c3* and not reaching the anterior margin of hysteronotal shield as in *P. bilineatus*. *Pterodectes fissuratus* Hernandez et Valim, 2005 also has a

median groove on hysteronotal shield, but it can be easily distinguished from both species by the U-shaped epimerites I which are not connected to epimerites II, the shorter length of aedeagus, reaching only the anterior margin of anal discs, and the female setae *ps2-ps3* (button-shaped) and *h2* (with terminal filament). In the latter species the median groove is also present in both sexes but reaches the posterior 1/3 of the prodorsal shield.

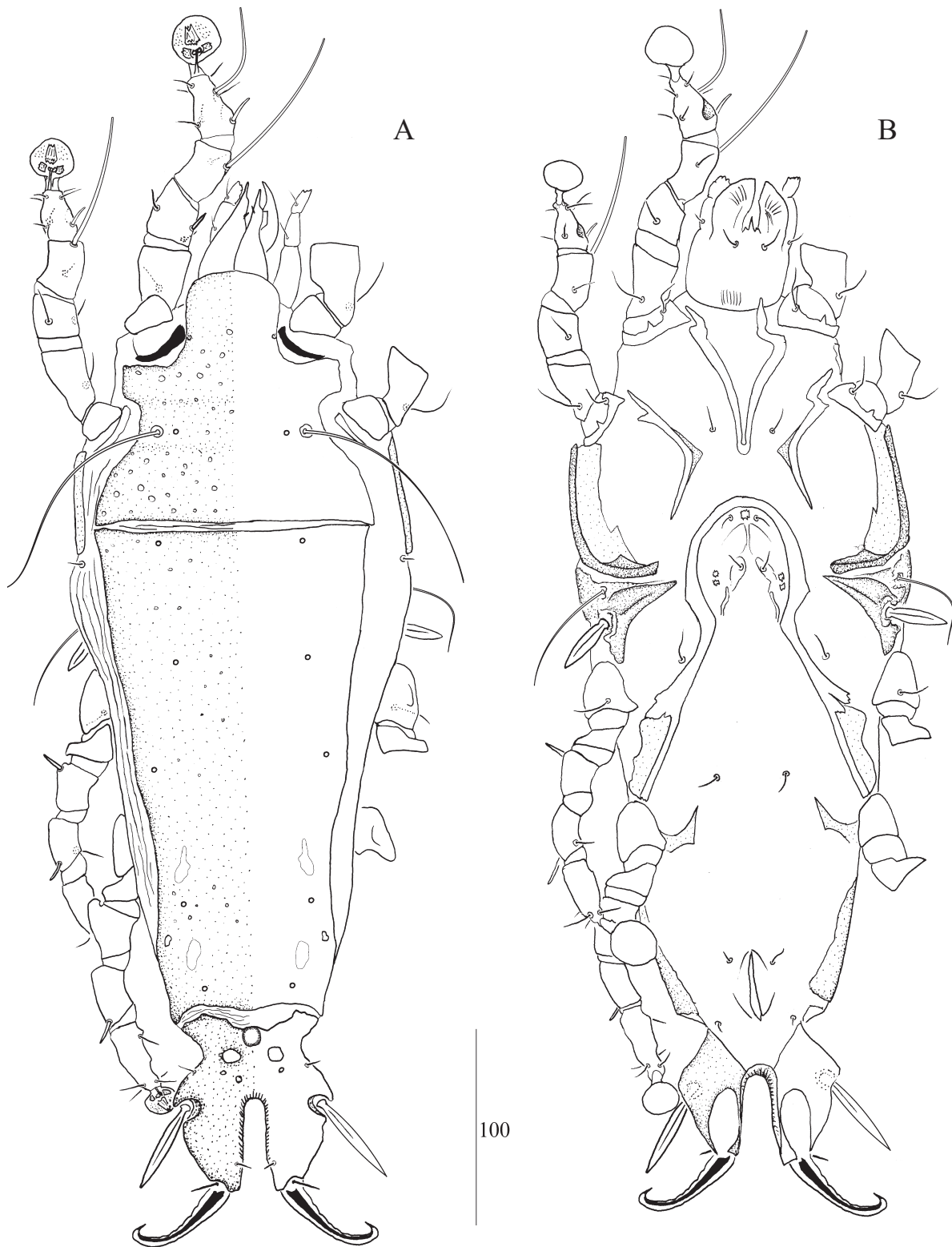


Fig. 5. *Pterodectes nordestensis* Berla, 1958. Female: dorsal (A) and ventral (B) views.

***Pterodectes nordestensis* Berla, 1958**

Figs. 4–6

Berla, 1958: 4–6, fig. 5–6; Park, Atyeo, 1971: 56.

Male holotype (Figs. 4A–B, 6A–B) (measurements of 2 paratypes are in parenthesis). Length of idiosoma 363 (341–347), width 154 (149–154).

Prodorsal shield: 117 (112–112) in length, 116 (110–125) in width, surface with small circular lacunae which distributed uniformly. Setae *ve* present, difficult to see. Scapular setae *si* and *se* arranged in transverse line. External scapular setae missing in all male specimens, their bases separated

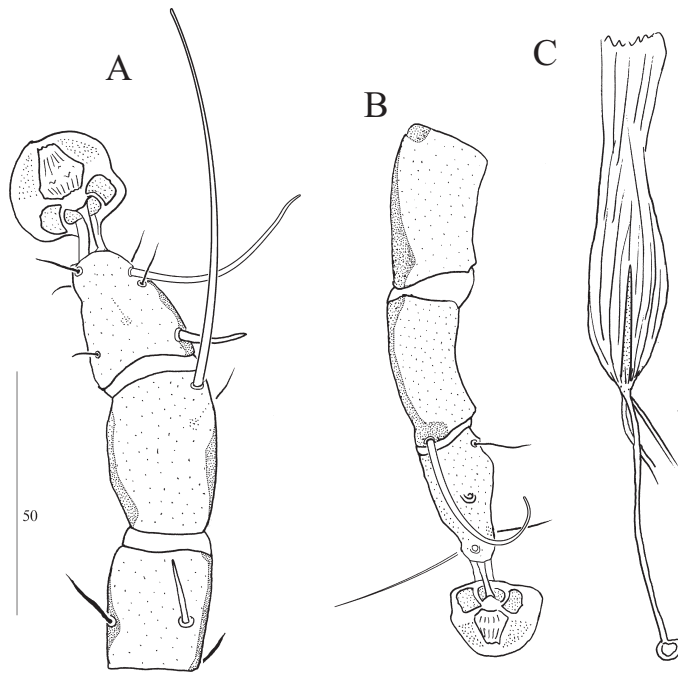


Fig. 6. *Pterodectes nordestensis* Berla, 1958. Dorsal view of male legs I (A) and IV (B). Female spermatheca (C).

by 65 (65); *si* separated by 49 (49–52). Setae *c2* on striated tegument, setae *c3* lanceolate, 27 in length and 8 in width (24–27 × 8). Setae *cp* set on humeral shield. Distance between prodorsal and hysteronotal shields 3 (1–3). Hysteronotal shield: length 234 (228–231), width 114 (106–117); surface with circular lacunae distribute uniformly, pale sclerotized areas on posterolateral margins of this shield, sometimes difficult to see. Terminal cleft U-shaped, 44 (38–46), and supranal concavity distinct. Setae *h3* separated by 35 (30–38). Length of setae: *ps1* 12 (11), *h3* 52 (54), *h2* 190 (177–204), *ps2* 95 (128), *f2* 11 (12), *ps3* 33 (27–33). Distance between dorsal setae: *si-c1* 54 (46–49), *c1-c2* 37 (33–38), *c1-d1* 54 (49–41), *d1-d2* 41 (44–46), *d1-e1* 93 (83–91), *d2-e1* 46 (53–54), *e1-e2* 30 (26–32), *e1-h1* 46 (49), *e2-h1* 52 (45), *h1-f2* 22 (16–22).

Epimerites I fused as narrow inverted- π with small posterolateral extensions. Epimerites II with small angular projections toward epimerites I. Sclerites rEpIIa absent. Coxal fields I, II, and III open. Aedeagus reaches level of posterior edge of anal discs, 92 in length (92–95); genital arch 38 in width (38). Epimerites IVa with narrow posterior projections. Distance between ventral setae: *3a-4a* 39 (35–38), *4a-g* 39 (41), *g-ps3* 37 (63), *ps3-ps3* 60 (54–63). Paranal suckers edentate, 14 (14–16) in diameter, separated by 30 (27–30). Opisthoventral shields occupying lateral margins of opisthosoma and distal half of opisthosomal lobes, with narrow inner projection situated posterior to anal discs and bearing seta *ps3*.

Solenidion $\sigma 1$ of genu I spine-shaped (Fig. 6A), seta *cG* of genua I, II filiform. Tarsus IV 33 (30–33) in length, modified setae *d* and *e* button-like (Fig. 6B).

Female (Figs. 5A–B, 6C) (measurements of 3 paratypes). Length of idiosoma 473–495, width 176–187. Prodorsal shield: 117–133 in length, 136–150 in width, surface with sparsely disposed little circular lacunae. Setae *ve* present, in some specimens poorly visible. Scapular setae *si* and *se* arranged in transverse line. Setae *se* 120–150 in length and separated by 82; pair *si* separated by 60. Setae *c2* situated on striated tegument; setae *c3* lanceolate, 30–33 in length and 8 in width. Setae *cp* situated on humeral shield.

Distance between prodorsal and hysteronotal shields 4–5. Anterior hysteronotal shield: length 245–253, width 136–147; surface with sparsely disposed small circular lacunae and two pairs of pale sclerotized

areas on posterolateral margins. Lobar cleft as a narrow inverted U, 49–52. Length of lobar region 79–95, width 84–87. Supranal concavity distinct, surrounded by two large latero-posterior circular lacunae. Setae *h2* dagger-like without terminal filament, 52 in length, 8 in width. Setae *h1* inserted on anterior third of lobar shield. Setae *h1* and *f2* arranged in a transverse line. Distance between dorsal setae: *si-c1* 56–57, *c1-c2* 52–54, *c1-d1* 60–65, *d1-d2* 52–60, *d1-e1* 109–133, *d2-e1* 65–75, *e1-e2* 40–46, *e1-h1* 81–88, *e2-h1* 40–42, *h1-f2* 12–16, *f2-h2* 19–22.

Epimerites I fused as narrow U, coxal fields I, II, and III open. Distance between ventral setae: *1a-3a* 54–60, *3a-g* 19, *4a-ps3* 92–94, *g-4a* 105–120, *ps2-ps3* 28, *ps2-ps2* 38, *ps3-ps3* 21. Setae *ps2* and *ps3* piliform, their bases arranged in trapezium. Spermatheca and sperm ducts as in Fig. 6C. Legs I, II as in male; distinct pronounced rounded dorso-basal crests on genua IV present (Fig. 5A). Legs IV extending by ambulacral disc to level of setae *h2*.

Material examined. Male holotype (MNRJ 44888, n° 5) from *Caryothraustes canadensis* (= *C. c. frontalis* (Hellmayr, 1905)) (Cardinalidae), no data from host locality, Brazil, 23.01.1958, coll. H.F. Berla. Paratypes: 2 males MNRJ 44887 and 44889 (n° 7 and 6) and 2 females, 44885, and 44886 (n° 10, and 8), the same data.

Differential diagnosis. *Pterodectes nordestensis* resembles *P. atyeoi* OConnor, Fofoupolos et Lipton, 2005 and *P. geothlypis* by the small lateral

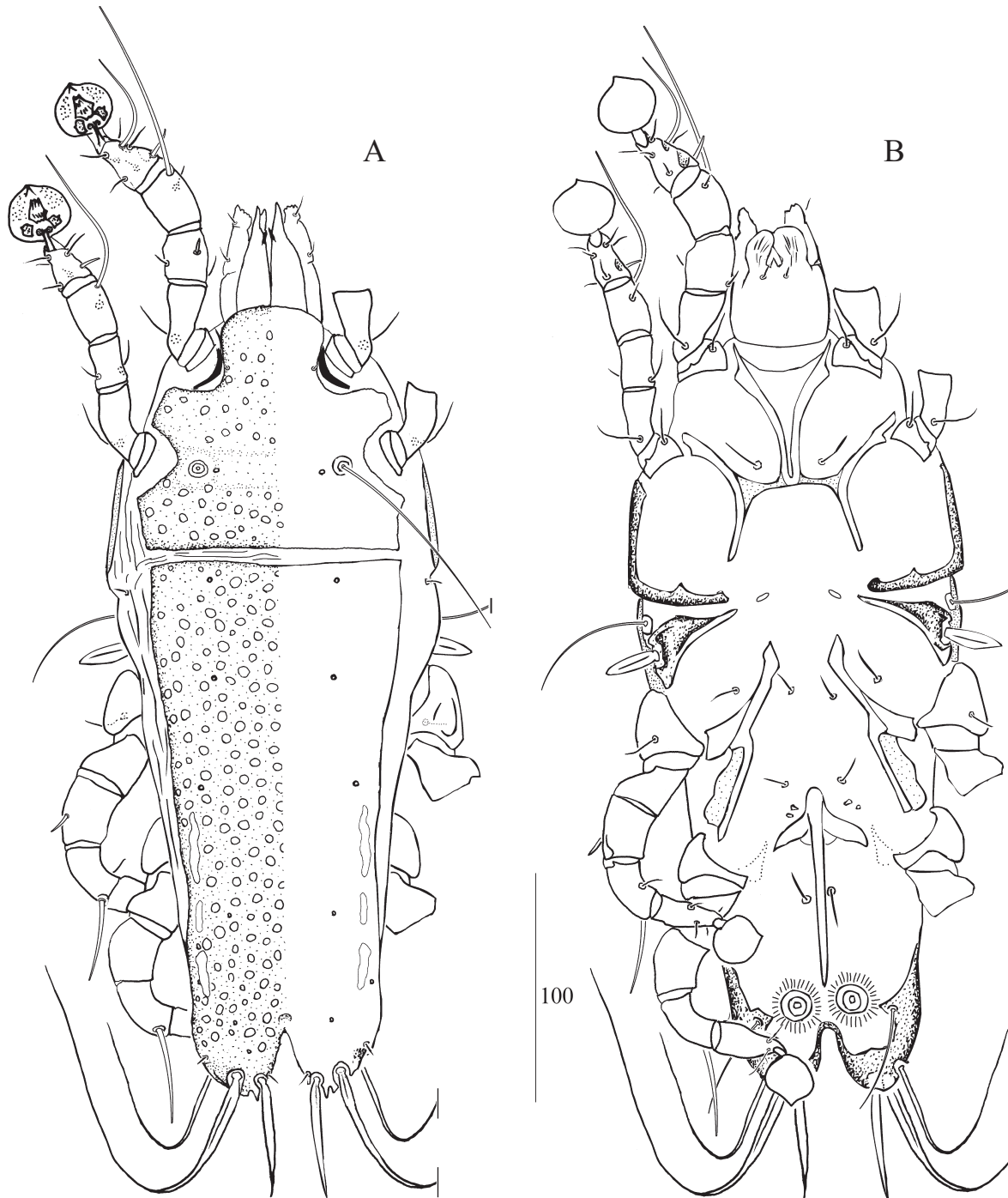


Fig. 7. *Pterodectes turdinus* Berla, 1959. Male: dorsal (A) and ventral (B) views.

projections of epimerites I which are extending towards epimerites II. Unlike the two species, *P. nordestensis* lacks the rudimentary epimeral sclerites IIa (rEpIIa) in the male and setae *cp* is situated on the humeral shield in both sexes. In contrast to *P. atyeoi*, the lobar cleft of female is an inverted U rather than an inverted V, and supraanal concavity is distinct. Furthermore, *P. nordestensis* has two pairs of pale sclerotized areas on posterolateral margins of hysteronotal shield (absent in *P. atyeoi* and *P. geothlypis*).

***Pterodectes turdinus* Berla, 1959**

Figs. 7–9

Berla, 1959a: 11–14, fig. 18–22; Park, Atyeo, 1971: 58.

Male holotype (Figs. 7A–B, 9A–B) (measurement of 6 paratypes are in parenthesis). Length of idiosoma 374 (352–374), width 165 (143–154). Prodorsal shield: 114 (112–114) in length, 122 (114–122) in width; surface with numerous distinct circular lacunae which distributed uniformly; pale sclerotized areas absent. Setae *ve* present, some-

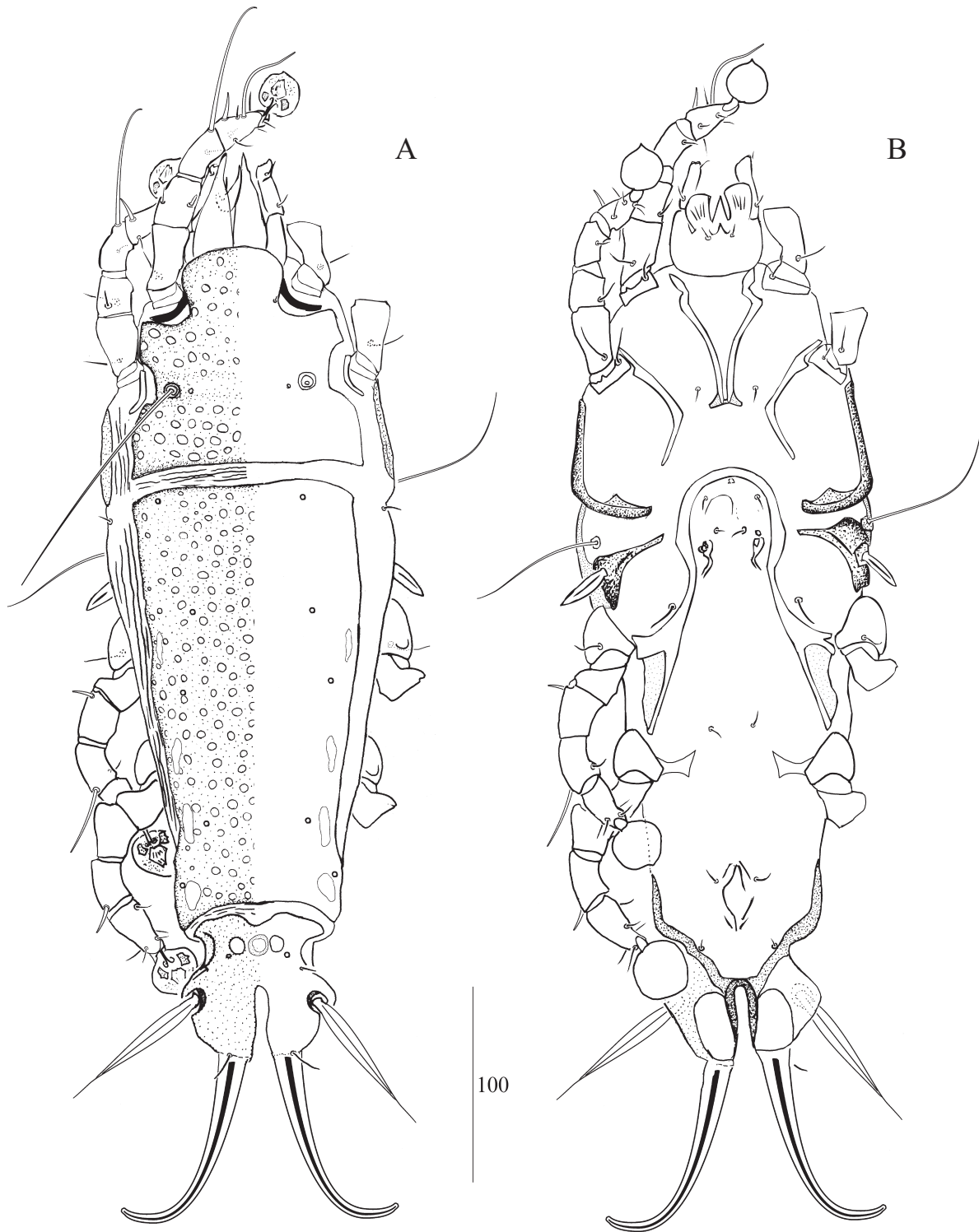


Fig. 8. *Pterodectes turdinus* Berla, 1959. Female: dorsal (A) and ventral (B) views.

times difficult to see. Scapular setae *si* and *se* arranged in transverse line. External scapular setae 136 in length, their bases separated by 68 (68–71); *si* separated by 49 (49–52). Setae *c2* on striated tegument, setae *c3* lanceolate, 24 in length and 8 in width (24–27 × 7–8). Setae *cp* situated outside humeral shield. Distance between prodorsal and

hysteronotal shields 11 (3–7). Hysteronotal shield: length 250 (245–256), width 117 (112–120); surface with same pattern of lacunae as on prodorsal shield; with 3 pairs of pale sclerotized areas on posterolateral margins of hysteronotal shield. Terminal cleft U-shaped, 24 (19–27), and with distinct supranal concavity. Setae *h3* separated by 33 (27–

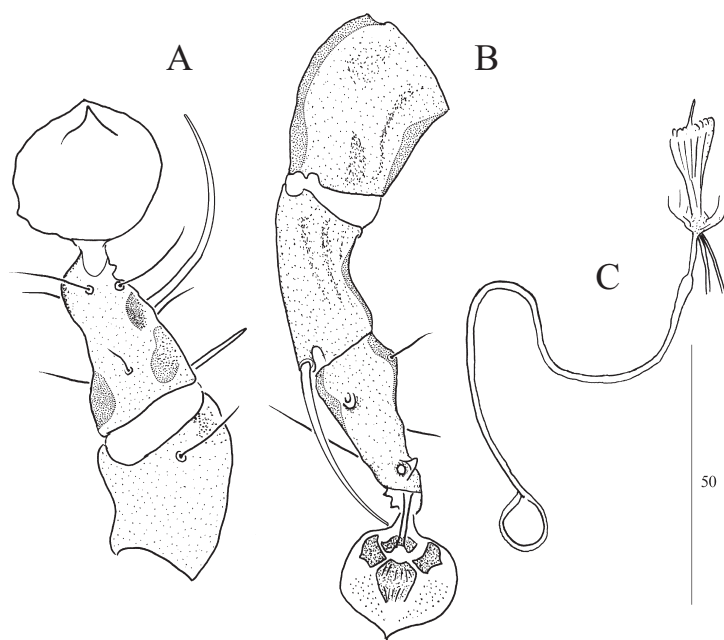


Fig. 9. *Pterodectes turdinus* Berla, 1959. Ventral view of male legs I (A) and IV (B). Female spermatheca (C).

33). Length of setae: *ps1* 8 (5–8), *h3* 54 (49–54), *h2* 185 (163–185), *ps2* 92 (92–122), *f2* 8 (5–8), *ps3* 27 (27–33). Distance between dorsal setae: *si-c1* 57 (49–54), *c1-c2* 46 (41–46), *c1-d1* 54 (41–57), *d1-d2* 38 (38–52), *d1-e1* 103 (103–112), *d2-e1* 68 (63–71), *e1-e2* 30 (24–33), *e1-h1* 46 (44–46), *e2-h1* 27 (22–33), *h1-f2* 24 (22–24).

Epimerites I fused as narrow inverted- π , posterior end connected with central part of epimerites II by thin transverse sclerotized bands. Sclerites rEpIIa present, difficult to see in some paratypes. Coxal fields II and III open. Aedeagus reaches level of anterior edge of anal discs, 98 in length (84–103); genital arch 44 in width (41–46). Distance between ventral setae: *3a-4a* 38 (37–46), *4a-g* 54 (49–57), *g-ps3* 60 (57–63), *ps3-ps3* 65 (61–65). Paranal suckers edentate, 14 (14–16) in diameter, separated by 24 (22–27). Opisthoventral shields occupying lateral margin of opisthosoma and distal half of lobes, with angular inner projection situated at level of posterior margin of anal discs and bearing seta *ps3*.

Solenidion σI of genu I spiniform, seta *cG* of genua I, II filiform (Fig. 9A). Tarsus IV 30 (30–33) in length, modified setae *d* and *e* button-shaped (Fig. 9B). Tibia IV with longitudinal dorsal crest.

Female (Figs. 8A–B, 9C) (n=3). Length of idiosoma 440–462, width 154–165. Prodorsal shield: 117–120 in length, 122–128 in width, pattern of lacunae as in male. Setae *ve* present, sometimes difficult to see. Scapular setae *si* and *se*

arranged in a transverse line. Setae *se* 131–133 in length, their bases separated by 73; pair *si* separated by 41–52. Setae *c2* on striated tegument; setae *c3* lanceolate, 30 in length and 8 in width. Setae *cp* situated outside humeral shield.

Distance between prodorsal and hysteronotal shields 8–9. Anterior hysteronotal shield: length 231–245, width 114–122; with numerous well pronounced circular lacunae distributed uniformly and with four pairs of pale-sclerotized areas in posterolateral portion, in some paratypes difficult to see. Lobar cleft as inverted U, 44–49. Length of lobar region 82–84, width 82–84, with distinct supranal concavity flanked by two large circular lacunae. Setae *h2* blade-like with terminal filament, 57 in

length, 8 in width. Setae *h1* inserted on anterior third of lobar shield. Bases of setae *h1* and *f2* arranged in trapezium. Distance between dorsal setae: *si-c1* 57–60, *c1-c2* 49–52, *c1-d1* 60, *d1-d2* 41–52, *d1-e1* 114–117, *d2-e1* 68–73, *e1-e2* 33–35, *e1-h1* 73–79, *e2-h1* 44–46, *h1-f2* 16, *f2-h2* 19.

Epimerites I fused as narrow inverted- π , posterior end with small lateral extensions. Coxal fields I, II, and III open. Distance between ventral setae: *1a-3a* 60–63, *3a-g* 14, *4a-ps3* 82–84, *g-4a* 103–109, *ps2-ps3* 38–41, *ps2-ps2* 38, *ps3-ps3* 21. Setae *ps2* and *ps3* filiform, their bases arranged in trapezium. Spermatheca and sperm ducts as in Fig. 9C. Legs I and II as in male, with well-developed rounded dorso-basal crests on genua IV (Figs. 8A–B). Legs IV extending by ambulacral disc to level of setae *h2*.

Material examined. Male holotype (MNRJ 44906, n° 47) from Rufous-bellied Thrush *Turdus rufiventris* Vieillot, 1818 (Turdidae), Fazenda Rubião, Mangaratiba, Rio de Janeiro, Brazil, 5.04.1958, coll. H.F. Berla. Paratypes: 6 males MNRJ 44895, n° 139, 44897, n° 136, 44898, n° 142, 44899, n° 141, and 44900, n° 138 and 3 females MNRJ 44896, n° 144 and 44901, n° 137, the same data.

Differential diagnosis. As in *P. bilineatus*, *P. gracilis* and *P. storkani*, the males of *P. turdinus* have epimerites I as an inverted- π , connected with epimerites II by a transverse bar. The latter species, however, unlike *P. bilineatus* and *P. storkani*, lacks a median groove on the hysteronotal shield, and setae *cG* of genua I and II are spindle-shaped rather than dagger-like. It can be distinguished from *P. gracilis* by the shorter length of aedeagus, only

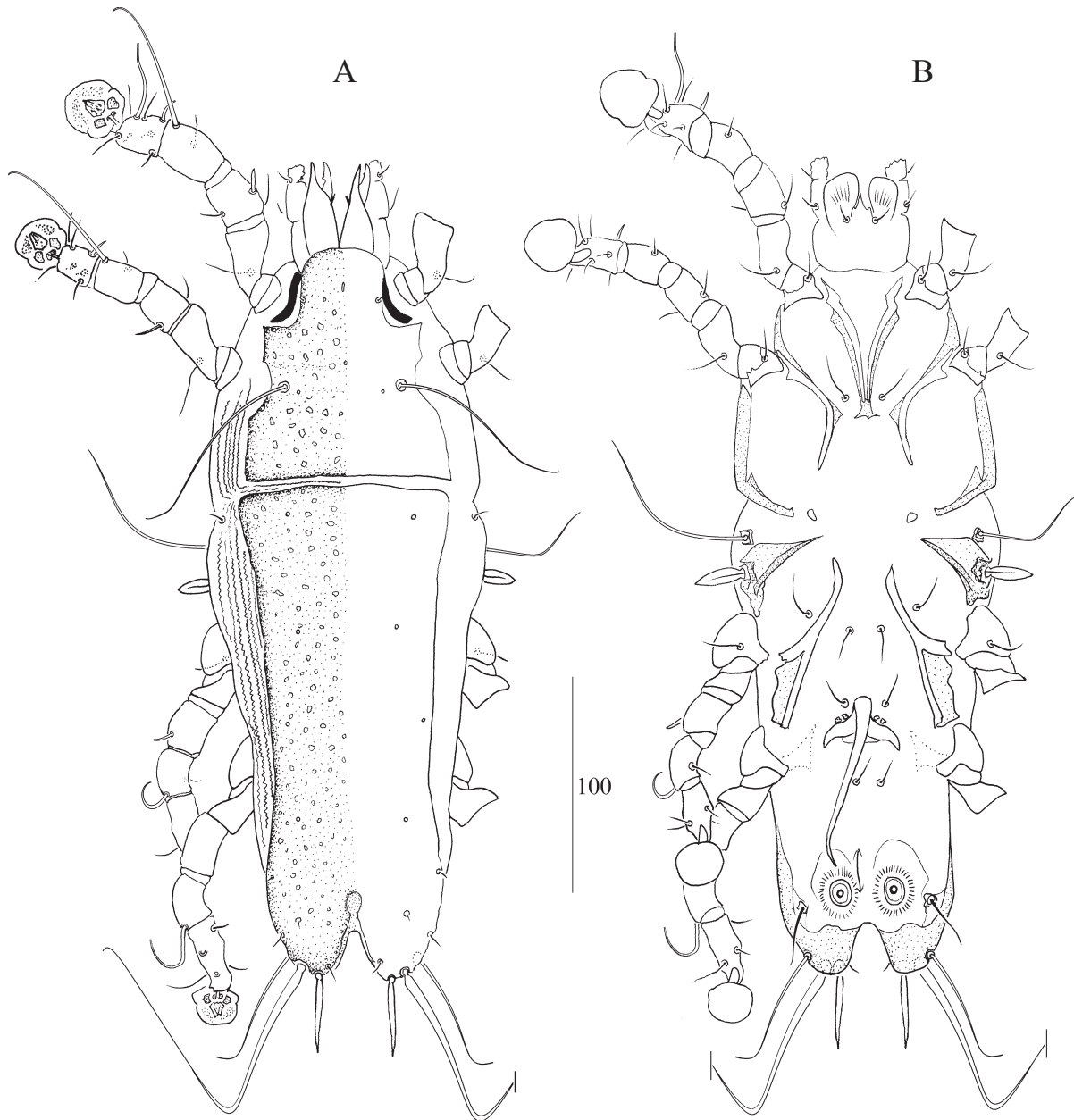


Fig. 10. *Pterodectes geothlypis* Berla, 1973. Male: dorsal (A) and ventral (B) views.

reaching the anterior level of paranal suckers (reaches the level of *ps2* in *P. gracilis*). Among these species, *P. turdinus* is the only one with female setae *h2* ending in a long terminal filament, rather than dagger-like as in most species of the genus *Pterodectes*. It can also be distinguished by the greater size of lacunae on the dorsal shields.

Note. The structures lateral to genital apparatus mentioned by Berla (1959a: 12) as “lacunas halteróides” and figured as ampoule-like structures most probably is a mounting artifact.

***Pterodectes geothlypis* Berla, 1973**

Figs. 10–12

Berla, 1973: 21–11, fig. 1–4; Park, Atyeo, 1971: 56.

Male holotype (Figs. 10A–B, 12A–B) (measurements of 1 paratype are in parenthesis). Length of idiosoma 363 (352), width 138 (132). Prodorsal shield: 114 (101) in length, 101 (95) in width, surface with small, uniformly distributed, circular lacunae. Paratype male with dorsal shields smooth, without lacunae. Setae *ve* present. Scapular setae *si* and *se* arranged in transverse line. External scapular setae missing in holotype (136), their bases separated by 57 (48); *si* separated by 41 (34). Setae *c2* on striated tegument, setae *c3* lanceolate, 24 in length and 7 in width (22 × 7). Setae *cp* situated outside humeral shield. Distance between prodorsal and hysteronotal shields 5 (8).

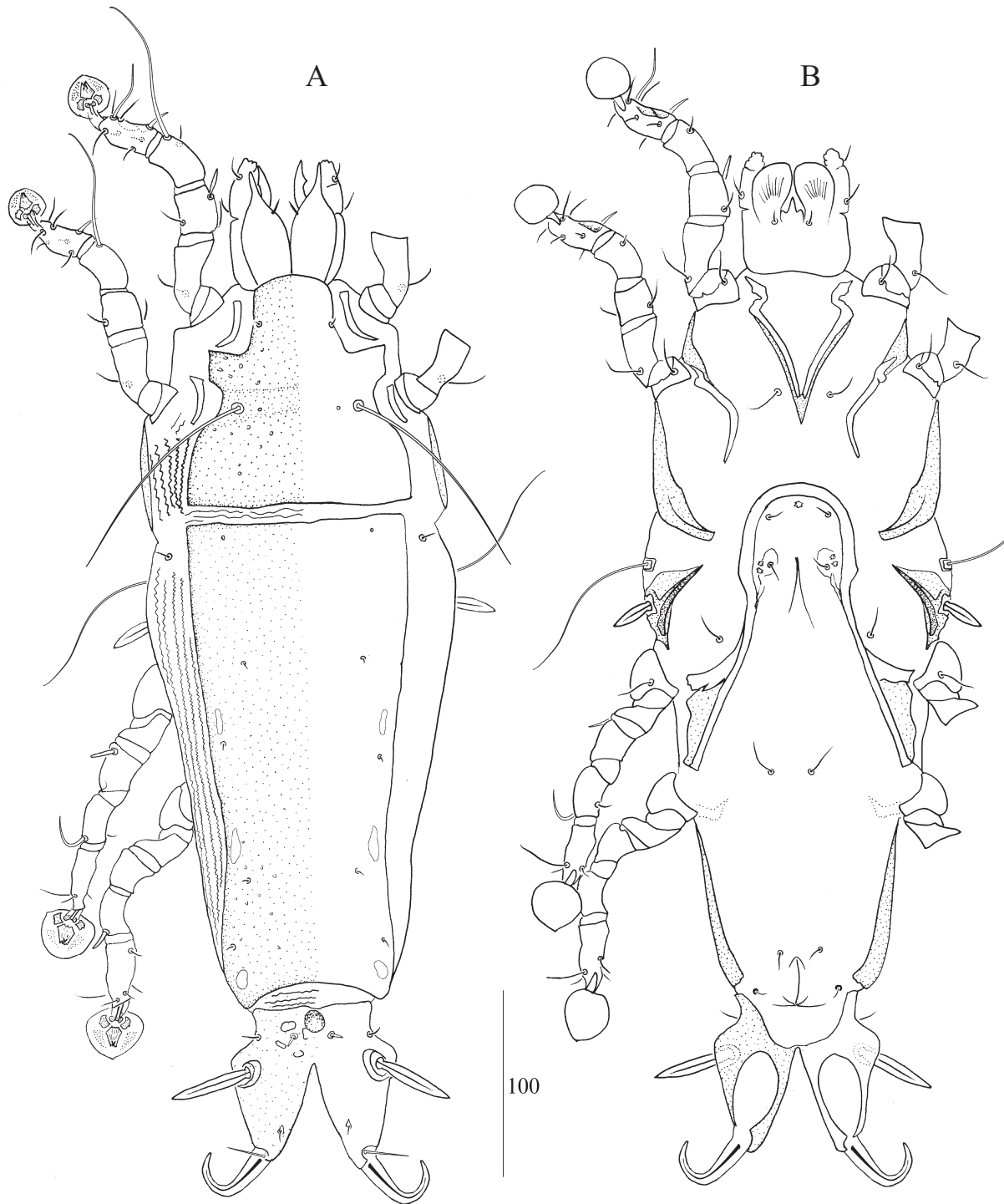


Fig. 11. *Pterodectes geothlypis* Berla, 1973. Female: dorsal (A) and ventral (B) views.

Hysteronotal shield: length 226 (231), width 103 (97); surface with small, uniformly distributed, circular lacunae. Terminal cleft U-shaped, 33 (27), with distinct supranal concavity. Setae *h3* separated by 35 (35). Length of setae: *ps1* 8 (8), *h3* missing (35), *h2* missing (109), *ps2* missing (63), *f2* 8 (8), *ps3* 35 (33). Distance between dorsal setae: *si-c1* 67 (58), *c1-c2* 33 (33), *c1-d1* 57 (60), *d1-d2* 41 (35), *d1-e1* 92 (84), *d2-e1* 52 (54), *e1-*

e2 27 (33), *e1-h1* 44 (46), *e2-h1* 22 (16), *h1-f2* 33 (27).

Epimerites I fused as a V, their posterior end with small posterolateral extensions; epimerites II with short angular projections toward epimerites I. Epimerites I and II with narrow sclerotized areas. Sclerite rEpIIa present. Coxal fields I, II, and III open. Aedeagus reaches level of anterior edge of anal discs, 90 in length (90); genital arch

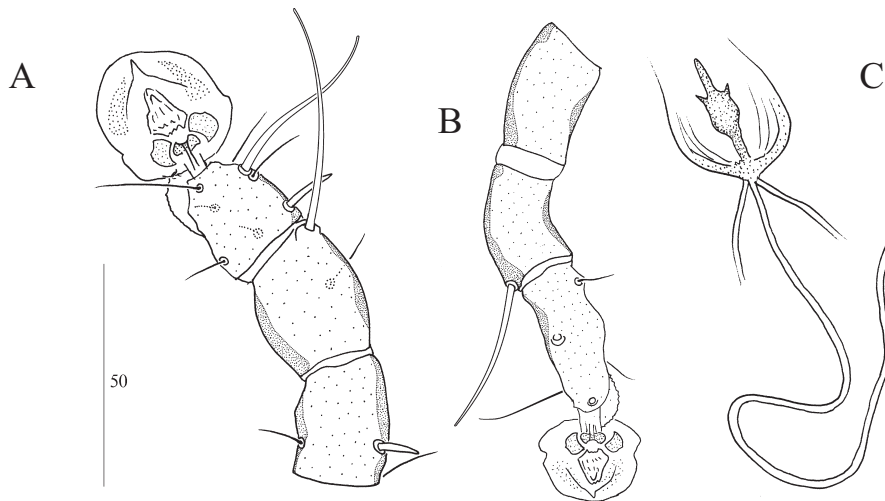


Fig. 12. *Pterodectes geothlypis* Berla, 1973. Dorsal view of male legs I (A) and IV (B). Female spermatheca (C).

38 in width (44). Distance between ventral setae: *3a-4a* 41 (38), *4a-g* 38 (39), *g-ps3* 63 (57), *ps3-ps3* 61(57). Paranal suckers edentate, 14 (16) in diameter, separated by 24 (24). Opisthoventral shields occupy lateral part of opisthosoma and lobes, with bluntly-angular inner projection situated at level of posterior margin of anal discs and bearing seta *ps3*.

Solenidion σI of genu I spiniform (Fig. 12A), seta *cG* of genua I, II filiform. Tarsus IV 35 (33) in length, modified setae *d* and *e* button-shaped (Fig. 12B).

Female (Figs. 11A–B, 12C) (n=4). Length of idiosoma 473–517, width 143–176. Prodorsal shield: 125–131 in length, 114–150 in width, surface with small, scarce circular lacunae. Setae *ve* present. Scapular setae *si* and *se* arranged in transverse line. Setae *se* 141–150 in length, their bases separated by 63–71; pair *si* separated by 44–46. Setae *c2* on striated tegument; setae *c3* lanceolate, 24–27 in length and 7–8 in width. Setae *cp* situated outside humeral shield.

Distance between prodorsal and hysteronotal shields 8–10. Anterior hysteronotal shield: length 250–277, width 117–131; surface evenly punctured, with few small circular lacunae mainly on posterior portion, near setae *e1* and *e2*, and three pairs of pale-sclerotized areas near lateral margins, the posterior pair more conspicuous. Lobar cleft as inverted V, 54–64. Length of lobar region 87–98, width 84–98. Supranal concavity distinct. Setae *h2* dagger-like, without terminal filament, 46–49 in length, 8–8 in width. Setae *h1* inserted on anterior third of lobar shield. Setae *h1* and *f2* arranged in transverse line. Distance between dorsal setae: *si-*

c1 73–73, *c1-c2* 33–35, *c1-d1* 65–71, *d1-d2* 49–49, *d1-e1* 117–136, *d2-e1* 65–82, *e1-e2* 33–35, *e1-h1* 82–87, *e2-h1* 60–60, *h1-f2* 22–27, *f2-h2* 19–22.

Epimerites I fused as short V, coxal fields I, II, and III open. Distance between ventral setae: *1a-3a* 63–73, *3a-g* 22–27, *4a-ps3* 90–109, *g-4a* 109–125, *ps2-ps3* 24–27, *ps2-ps2* 38–49, *ps3-ps3* 14–23. Setae *ps2* and *ps3* filiform, their bases arranged in trapezium. Spermatheca and sperm ducts as on Fig. 12C. Legs I and II as in the male; dorso-basal crests present on genua IV, although less developed than in previous species (Figs. 11A–B). Legs IV extending by ambulacral disc to level of setae *h2*.

Material examined. Male (holotype) (MNRJ 44907, n° 1066) from Masked Yellowthroat *Geothlypis aequinoctialis* (Gmelin, 1789) (= *G. a. velata* (Vieillot, 1807)) (Parulidae), Manguinhos, Rio de Janeiro, Brazil, 17.08.1970. Coll. H.F. Berla. Paratypes: 1 males (same slide of holotype, MNRJ 44907, n° 1066) and 4 females MNRJ 44908 (n° 1064) and 44909 (n° 1065), the same data. Slides were re-mounted by M.P. Valim (12.01.2006).

Differential diagnosis. As in *P. havliki* Černý, male epimerites I of *P. geothlypis* are terminally connected in an inverted- π , not connected with epimerites II, and setae *ps3* are inserted on a weak lateral portion of the opisthoventral shield. The males of the latter species have a relative shorter size (352–363 \times 132–138 versus 419 \times 146 in *P. havliki*). Females of both species share similarities in the shape of the lobar region (both with large dorsal lacunae on the anterior portion); in the posterolateral region of anterior hysteronotal shield (with paired pale sclerotized areas), and setae *h1*

and *f2* arranged in a transverse line in both these species. Unlike *P. havliky*, the female of *P. geothlypis* has a distinctive supranal concavity.

DISCUSSION

Although the species treated herein had been described by Berla quite superficially and incompletely, the classification of these species as members of the genus *Pterodectes* has been retained in the subfamilial revision made by Park and Atyeo (1971). In the 1950s, there was no well-defined nomenclature for chaetotaxy and other morphological structures of feather mites (Aty eo and Gaud 1966; Griffiths et al. 1990). As a result, many pterodectine species were described as members of the genus *Pterodectes* (e. g., Gaud and Mouchet 1957). Thus, describing a new species, Berla (1958, 1959, 1973) often compared it with quite distant species from other genera, such as *Montesauria* Oudemans, 1905 and *Proterothrix* Gaud, 1968. In other words, he considered mostly generic rather than specific differences. Currently the following characters are used for species diagnostics in *Pterodectes*: the shape of epimerites I and II, the pattern of lacunae and pale sclerotized areas on dorsal shields, the presence of the rudimental epimeral sclerites (rEpIIa) in males, leg chaetotaxy, insertion of setae *cp*, and the shape of the lobes and the opisthoventral shields. In Berla's descriptions, however, many of these important features were omitted; some were wrongly figured (e.g. epimerites I of female of *P. turdinus*, originally figured free rather than connected), some were misinterpreted (e.g. the "lacunas halteróides" of males of *P. turdinus*), and others were mixed up in ventral and dorsal aspects in the same figure (e.g. *P. bilineatus*) (Berla 1958: 3; 1959a: 12).

Park and Atyeo (1971) proposed two main species groups in the genus *Pterodectes*. In the first, the *rutilus* group, both sexes have setae *c2* inserted on the hysteronotal shield, and in females setae *h2* setae are almost filiform with a long terminal filament. In contrast, the *gracilis* group comprises all species in which setae *c2* are off the hysteronotal shield and setae *h2* are lanceolate or spindle-shaped, without a terminal filament in the female. At least one species that was described before the proposal of the subdivision has a mixture of these characteristics (*P. turdinus*, which clearly has a terminal filament in female seta *h2* and seta *c2* off the anterior hysteronotal shield). This species and two additional recently described species (Hernandes and Valim 2005, 2006) reveal that the separation of this genus into two groups (Park and Atyeo 1971) is not justified.

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REFERENCES

- Aty eo, W.T. and Gaud, J. 1966. The chaetotaxy of sarcoptiform feather mites (Acarina: Analgoidea). *Journal of the Kansas Entomological Society*, 39: 337–346.
- Aty eo, 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.
- Berla, H.F. 1958. Analgesidae Neotropicais. I — Duas Novas espécies de *Pterodectes* Robin, 1868 (Acarina — Proctophyllodinae) coletadas em Fringillidae, Aves, Passeriformes. *Boletim do Museu Nacional (Zoologia)*, 186: 1–6.
- Berla, H.F. 1959a. Analgesoidea Neotropicais. IV — Sobre algumas espécies novas ou pouco conhecidas de acarinos plumícolas. *Boletim do Museu Nacional (Zoologia)*, 209: 1–17.
- Berla, H.F. 1959b. Analgesoidea Neotropicais. V Sobre uma espécie nova de *Proctophyllodes* Robin 1868 e redescritção de *Pterolichus varians selenurus* Trouessart, 1898 (Acarina, Pterolichinae). *Revista Brasileira de Biologia*, 19 (2): 203–206.
- Berla, H.F. 1960. Analgesoidea Neotropicais. VII Novas espécies de acarinos plumícolas. *Anais da Academia Brasileira de Ciências*, 32 (1): 95–105.
- Berla, H.F. 1973. Analgesoidea Neotropicais. X— Uma nova espécie de *Pterodectes* Robin, 1877. *Revista Brasileira de Biologia*, 33 (1): 21–22.
- Černý, V. 1974. Parasitic mites of Surinam XXXI. New species of Proctophyllodidae (Sarcoptiformes, Analgoidea). *Folia Parasitologica*, 21: 349–361.
- 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, 1,039 pp.
- 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: (Part I) 1–187, (Part II) 1–436.
- Gaud, J. and Berla, H.F. 1963. Deux genres nouveaux Sarcoptiformes plumicoles (Analgesoidea). *Acarologia*, 5 (4): 644–648.

Redescriptions of four species of the feather mite

- 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.
- 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.
- Pacheco, J.F. and Parrini, R. 1999. A atividade naturalística de Herbert Franzoni Berla (1912–1985), ornitólogo e acarologista do Museu Nacional. *Atualidades Ornitológicas*, (87): 4–6.
- 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: 39–88.
- Sibley, C.G. and Monroe, B.L. 1990. *Distribution and taxonomy of the birds of the world*. Publisher: Yale University Press, New Haven, 1,111 pp.