Two new genera and five new species of the feather mite subfamily Proctophyllodinae (Astigmata: Proctophyllodidae) from suboscine birds in Brazil

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Abstract
Two new genera and five new species of the family Proctophyllodidae are described from passerine birds from Brazil: Tyranniphylloides pitangi gen. n., sp. n. from Pitangus sulphuratus (Tyrannidae); Atrichophyllodes delalandi gen. n., sp. n. from Corythopis delalandi (Tyrannidae); A. mentalis gen. n., sp. n. from Dysithamnus mentalis (Thamnophilidae); Anisophyllodes candango sp. n. from Elaenia chiriquensis (Tyrannidae); and Platyacarus sittasomi sp. n. from Sittasomus griseicapillus (Dendrocolaptidae). The discovery of these taxa might give data for a better understanding of the evolution of the family Proctophyllodidae in general and the dispersion of these mites on passerines in South America in particular.

Keywords: Acari, Analgoidea, Astigmata, Brazil, feather mite, new genera, new species, Proctophyllodidae, systematics

Introduction
Proctophyllodidae, a family of feather mites mostly associated with passerines (Passeriformes) and hummingbirds (Apodiformes), is the most species-rich family within the superfamily Analgoidea and comprises three subfamilies: Proctophyllodinae, Pterodectinae, and Rhamphocaulinae (Gaud and Atyeo 1996). The Neotropical region has one of the richest bird faunas in the world, hosting many basal lineages of Passeriformes (Ericson et al. 2002). In this sense, one should expect to find numerous early derivative proctophyllodid mites in this part of the world. Exploring this fauna is thus very important for understanding the evolution and cospeciation processes of this family. However, the diversity of proctophyllodids living on passerine birds on the entire continent of South America, and more specifically in Brazil, is poorly known. Data on this family are scattered among a dozen systematic papers, and most of these deal with species of the subfamily
Pterodectinae (Park and Atyeo 1972, 1973, 1974a, 1974b, 1975; Hernandes and Valim 2005, 2006; Valim and Hernandes 2006). As for the Rhamphocaulinae, only one species has been reported from Brazil (Park and Atyeo 1972). Representatives of the subfamily Proctophyllodinae, occurring on passerines in Brazil, include the monotypic genus *Hemipterodectes* Berla, 1959 described from the cotingas, Cotingidae (Berla 1959), and six species of *Platyacarus* Kudon, 1982a, described from woodcreepers, Dendrocolaptidae (Kudon 1982a, 1982b, 1982c, 1982d). Finally, three species of the genus *Proctophyllodes* Robin, 1868, *P. icteri* Atyeo and Braasch, 1966, and *P. weigoldi* Vitzthum, 1922, have been found on Brazilian passerines of the families Icteridae and Turdididae, respectively (Atyeo and Braasch 1966).

This paper describes new feather mite taxa of the subfamily Proctophyllodinae found in Brazil on the passerine families Tyrannidae and Dendrocolaptidae. We describe two new genera, *Tyranniphyllodes* gen. n. with one new species and *Atrichophyllodes* gen. n. with two new species. We also describe two additional species, one from each of the genera *Anisophyllodes* Atyeo, 1967 and *Platyacarus*.

**Material and methods**

Most of the feather mite material used in this study was collected from live birds, captured in mist nets for a banding study. In one case, the mites were collected from a freshly dead specimen of *Pitangus sulphuratus* (Linnaeus, 1766) (Tyrannidae). The feathers with mites were kept in vials with 70% ethanol. The mites were mounted in Hoyer’s medium following the technique described by Atyeo and Braasch (1966).

In the descriptions and diagnoses, leg chaetotaxy follows Atyeo and Gaud (1966), and idiosomal chaetotaxy follows Griffiths et al. (1990). The general terms and classification of feather mites are taken from Gaud and Atyeo (1996) and host names and classification are according to Dickinson (2003). Measurements presented in the descriptions and in the scale bars on figures are given in micrometres (µm); distance between setae is measured as a direct distance between their bases; distances between setae belonging to different pairs were taken on one side of the body. Measurements for particular structures of the body include: (1) idiosomal length, measured from anterior margin of prodorsal shield to lobar apices excluding lamellae in males, and excluding the terminal appendages in females; (2) idiosomal width, measured at the level of setae *cp*; (3) prodorsal shield dimensions, length measured along midline and width at the posterior margin; (4) hysteronotal shield length (in males), measured from anterior margin to lobar apices excluding lamellae, and anterior hysteronotal shield length (in females), measured from anterior to posterior margin (lobar shields excluded); (5) hysteronotal shield width (in both sexes), measured at the level of setae *cp*; (6) lobar shield dimensions, length (in females) measured from the anterior margin to the apices of lobes excluding appendages and width measured at the level of setae *h2*; (7) distance between prodorsal and hysteronotal shields, measured along the midline; (8) distance between male anal suckers, measured between their centres; (9) length of terminal cleft (in both sexes), measured from its anterior end to the level of lobar apices; (10) dimensions of setae, length taken from bases to visible ends, and width of *c3* and female *h2* setae at their greatest dimensions; and (11) length of tarsi IV (in males), measured excluding the pretarsus (ambulacrum).

Abbreviations for the institutions where material is deposited: DZSJR, collection of Acari at the Depto. Zoologia e Botânica, Universidade Estadual Paulista, São José do Rio Preto, São Paulo, Brazil; CAIOC, Acarological Collection of Instituto Oswaldo Cruz,
Systematics

**Family PROCTOPHYLLODIDAE** Trouessart and Mégnin, 1884
**Subfamily PROCTOPHYLLODINAE** Trouessart and Mégnin, 1884
**Genus *Tyranniphyllodes* gen. n.**

Type species: *Tyranniphyllodes pitangi* gen. n., sp. n.

*Differential diagnosis*

The new genus, *Tyranniphyllodes*, is most closely similar to the genus *Platyacarus* in the following features: in males, opisthosomal lobes short and wide, terminal lamellae relatively small (shorter than distance $h_3:h_3$), legs III and IV are subequal in size and not hypertrophied, their segments not modified; in both sexes, the prodorsal shield with blunt-angular posterior margin. *Tyranniphyllodes* gen. n. can be readily separated from *Platyacarus* by the following combination of features: in both sexes, hysteronotal setae $d_2$, $e_2$ and trochanteral setae $sRII$ are absent; in males, sheath of aedeagus is bifurcated apically, and opisthogastral shield is H-shaped. In males of *Platyacarus*, the sheath of the aedeagus is ensiform like the aedeagus proper, opisthogastral shield is absent and area between genital apparatus and anal suckers bears two pairs of small sclerites. It is necessary to stress that the absence of setae $sRII$ is a unique feature of *Tyranniphyllodes* gen. n. differentiating it from all other genera of Proctophyllodinae; it is also interesting to note that the H-shaped opisthogastral shield in this genus resembles that in the genus *Joubertophyllodes* Atyeo and Gaud, 1971 and the *pinnatus* species group of the genus *Proctophyllodes*.

*Description*

**Both sexes.** Moderately elongated proctophyllodids. Prodorsal shield developed in median part of prodorsum, strongly narrowed in anterior end, with short and acute posterior angles, with blunt-angular posterior margin. Scapular setae $si$ and $se$ arranged in transverse line. Humeral shields rudimentary, represented only by small plate lateral to epimerites III and dorsally not developed. Setae $c_2$ situated ventrally on striated tegument. Epimerites I connected by posterior ends into narrow U. Epimerites IIa straight, not bent to median line. Vertical setae $ve$, lateral hysteronotal setae $d_2$ and $e_2$ absent. Solenidion $sI$ of genu I slightly longer than $a_3$ on tarsi I, situated in median part of the segment (Figure 3). Setae $wa$ anterior to setae $la$ and $ra$ on legs I and II (Figures 3, 4). Femora II with blunt-angular outer protrusion, other segments of legs I and II without processes and other modifications. Seta $sR$ absent on trochanters III (Figure 5).

**Male.** Prodorsal shield completely or partly split into anterior and posterior pieces by transverse band of soft tegument (Figures 1, 9); scapular setae $se$ and $si$ situated on posterior piece. Opisthosomal lobes scarcely expressed; posterior margin of opisthosoma between setae $h_3$ concave and with pair of relatively small tongue-shaped terminal lamellae; dorsal surface of lamellae ornamented. Supranal concavity well developed. Setae $h_3$ setiform, much shorter than macrosetae $h_2$. Setae $h_1$ posterior to level of setae $ps_2$. Coxal fields I–IV open, without extensive sclerotized areas. Genital organ at level of trochanters IV; genital
arch large, with widely divergent branches; sheath of aedeagus longer than arch, and bifurcated apically. Opisthogastral shield H-shaped, its transverse branch with median extension directed anteriorly and fused to base of genital sheath, setae g situated on its transverse branch (Figure 11). Genital acetabula at level of genital arch apex. Anal suckers
cylindrical, corolla dentate. Setae ps3 on soft tegument of anal field, situated anterior to anal suckers. Pregenital and paragenital plates absent. Opisthoventral shields not developed. Legs III and IV subequal, not hypertrophied. Tarsi IV with apical claw-like process, modified setae d and e button-like (Figure 6).

Figures 3–6. Tyranniphyllodes pitangi gen. n., sp. n., male legs I–IV, dorsal views.
Female. Prodorsal shield entire. Lobar region of opisthosoma clearly separated from hysterosoma, opisthosomal lobes well developed, straight, with long terminal appendages. Anterior hysteronotal and lobar shields separated by narrow band of striated tegument. Supranal concavity absent. Macrosetae $h_2$ long and setiform. Epignyium horseshoe-shaped, large. Translobar sclerites present. Legs III and IV subequal in size; genua III and IV with dorsal crest; solenidia $\phi$ of tibiae III and IV subequal in length.

Figures 7, 8. *Tyranniphyllodes pitangi* gen. n., sp. n., female: dorsal (7) and ventral (8) views. co, copulatory opening.
Etymology

Contraction of the host family, Tyrannidae, and Proctophyllodes, the type genus of the mite family Proctophyllodidae.

*Tyranniphyllodes pitangi* gen. n., sp. n.

(Figures 1–14)

Type material

Male holotype, six male and seven female paratypes from the Great Kiskadee, *Pitangus sulphuratus* (Linnaeus, 1766) (Passeriformes, Tyrannidae), Rio de Janeiro, RJ, Brazil, August 2003, coll. M. P. Valim. Holotype and paratypes—DZSJRP; female and male paratypes—CAIOC and ZISP.
**Description**

*Male holotype (Figures 1–6, 9–11) (range for six paratypes in parentheses).* Length of idiosoma 253 (242–264), width 127 (110–132). Prodorsal shield split in two pieces, anterior portion narrow and less sclerotized, 49 in length × 22 in width (48–52 × 24–27), posterior portion as a transverse band bearing setae $se$ and $si$ on its anterior margin, 14 (12–14) in length and 42 (35–46) in width. In two paratypes there is a narrow connection between these two pieces (Figure 9). Posterior margin of prodorsal shield convex, and anterior one concave. Scapular setae $se$ 92 in length (79–95) and separated by 30 (29–34); $si$ separated by 20 (19–23). Setae $c1$ on anterior angles of hysteronotal shield; setae $c2$ set ventrally on striated tegument; setae $c3$ needle-shaped, 18 in length and 3 in width (19–20 × 2–3); setae $cp$ set off humeral shield. Distance between prodorsal and hysteronotal shields 30 (24–34).

Hysteronotal shield: anterior margin concave, 160 (158–169) in length and 68 (67–73) in width; surface without lacunae or pale sclerotized areas (Figure 1). Opisthosomal lobes as short blunt-angular extensions, margin of opisthosaoma between setae $h3$ as a shallow concavity, bearing a pair of short terminal tongue-shaped lamellae, 30 in length (24–34). Supranal concavity well expressed, long. Setae $h3$ separated by 35 (34–38). Length of setae: $h3$ 109 (95–114), $h2$ 177 (171–185), $ps1$ 4 (4–5), $ps2$ 27 (22–27), $ps3$ 5 (5). Distance between dorsal setae: $si$–$c1$ 46 (41–49), $c1$–$c2$ 27 (22–33), $c1$–$d1$ 27 (27–30), $d1$–$e1$ 71 (67–76), $e1$–$h1$ 49 (46–54), $h1$–$f2$ 44 (41–46).

Epimerites I fused as a narrow U. Rudimentary sclerites rEpIIa absent. Trochanters III flanked by narrow sclerotized band connecting bases of epimerites III and IIIa. Epimerites IVa present. Sheath of aedeagus reaching the level of setae $g$ and bifurcated apically (Figure 11), 38 in length (41–44); genital arch 23 (23–27) in length and 38 in width (38–52). Distance between ventral setae: 3a–4a 19 (18–20), 4a–g 41 (41–44), g–$ps3$ 11 (8–12), $ps3$–$ps3$ 19 (19–22). Opisthogastral shield H-shaped, its transverse branch with long median extension directed anteriorly and fused with base of genital sheath; setae $g$ on transverse branch; setae $ps3$ set off of this shield, situated on anal field (Figures 2, 11). Anal suckers 10 (8–10) in diameter, distance between discs 11 (11–14), corolla with poorly expressed teeth.

Tarsus IV 34 (31–35) in length, modified seta $d$ approximately at mid-level of this segment (Figure 6).

*Female (Figures 7, 8, 12–14) (measurements of seven paratypes).* Length of idiosoma 374–407, width 154–165. Prodorsal shield entire and narrowed anteriorly: 82–92 in length and 68–82 in width, without lacunae or pale sclerotized areas. Posterior margin of prodorsal shield convex. Setae $se$ 101–120 in length and separated by 50–58; pair $si$ separated by 35–44. Setae $c1$ in anterior angles of anterior hysteronotal shield; setae $c2$ set ventrally on striated tegument; setae $c3$ spiculiform, 19–22 in length and 2–3 in width; setae $cp$ set off humeral shield. Distance between prodorsal and hysteronotal shields 19–30. Anterior hysteronotal shield: 190–218 in length and 84–95 in width, anterior margin slightly concave, surface without lacunae but with a pair of pale sclerotized areas near posterolateral margin of that shield (Figure 7). Lobar region: 71–82 in length and 73–82 in width. Terminal cleft as a narrow inverted U, 46–54 in length. Supranal concavity absent. Setae $h2$ 182–209 in length, 3–4 in width; and setae $h3$ 46–54 in length and separated by 33–41. Setae $h1$ inserted on striated tegument between the anterior hysteronotal shield and lobar region. Setae $h1$ and $f2$ in trapezoidal arrangement. Distance between dorsal setae: $si$–$c1$ 46–57, $c1$–$c2$ 30–38, $c1$–$d1$ 42–50, $d1$–$e1$ 94–101, $e1$–$e2$ 19–27, $e1$–$h1$ 61–71, $e2$–$h1$ 52–60, $h1$–$f2$ 24–30, $f2$–$h2$ 5–14.
Epimerites I as a narrow U with slightly divergent anterior ends. Trochanters III flanked by narrow sclerotized band connecting bases of epimerites III and IIIa. Epimerites IVa present. Epigynium horseshoe-shaped, 54–57 in length, 60–63 in width; epigynium tips reaching the level of setae g and 3b. Setae ps2 and ps3 short and setiform, setae ps2 at level of posterior end of anal opening. Distance between ventral setae: 1a–3a 44–52, 3a–g 33–35, 4a–ps3 75–82, g–4a 65–76, ps2–ps3 19–24, ps2–ps2 46–49, ps3–ps3 19–22. Copulatory opening ventral, on soft integument, near to posterior end of anal opening. Spermatheca and spermaducts as in Figure 12. Legs I and II as in male; genua III and IV with dorsal crest (Figures 13, 14); legs IV extending by ambulacral disc to the level of setae f2 (Figures 7, 8).

Etymology

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

**Genus Atrichophyllodes** gen. n.

Type species: *Atrichophyllodes delalandi* gen. n., sp. n.

**Differential diagnosis**

The new genus, *Atrichophyllodes*, is similar to *Nycteridocaulus* Atyeo (1966) in the following characters in males: terminal lamellae are wide and short, almost semicircular, genital arch is much wider than long, legs III and IV subequal in size and not hypertrophied; epimerites I free. *Atrichophyllodes* gen. n. is readily distinguished from the latter genus by the absence of idiosomal setae d2 and e2, and by the branches of genital apparatus forming a low arch (rather than a bat-shaped structure, as in *Nycteridocaulus*). This genus also resembles *Tyranniphyllodes* gen. n. (see above) in the absence of hysterosomal setae d2 and e2; however, it differs from *Tyranniphyllodes* gen. n. by having a sword-shaped aedeagus sheath, a trochanteral seta sRIII, a uniquely shaped prodorsal shield (in both sexes), and by males lacking an opisthogastral shield.

**Description**

**Both sexes.** Moderately elongated proctophyllodids. Prodorsal shield entire, covering nearly the entire prodorsum, with acute antero-lateral extensions, posterior angles rounded. Scapular setae si and se arranged in transverse line. Humeral shields well-developed dorsally, encompassing bases of setae c2 and cp. Epimerites I free, their posterior parts close to each other. Epimerites IIa L-shaped, bent to median line. Hysteronotal setae d2 and e2 absent. Solenidion σ1 of genu I slightly longer than ω3 on tarsi I, situated in median part of the segment (Figure 17). Setae wa anterior to setae la and ra on legs I and II (Figures 17, 18). Segments of legs I and II without processes or other modifications.

**Male.** Scapular setae se and si situated on prodorsal shield. Opisthosomal lobes short and wide; posterior margin of lobes with semi-circular terminal lamellae. Supranal concavity well expressed. Setae h3 setiform, much shorter than macrosetae h2. Setae h1 anterior to the level of setae ps2. Coxal fields I–IV open, without extensive sclerotized areas. Genital organ at level of trochanters IV; genital arch large and low, sheath of aedeagus approximately twice longer than arch. Adanal shields present, situated between anal
suckers and setae \( ps3 \), weakly connected to each other anterior to anal opening. Genital acetabula at level of genital arch apex, acetabular plates surrounding these acetabula present or absent. Anal suckers cylindrical, corolla dentate. Pregenital and paragenital plates absent. Opisthoventral shields not developed. Legs III and IV subequal, not hypertrophied. Tarsus IV without apical claw-like process, modified setae \( d \) and \( e \) button-like.

**Female.** Lobar region of opisthosoma clearly separated from hysterosoma, opisthosomal lobes well developed, with long terminal appendages. Anterior hysteronotal and lobar shields separated by narrow band of striated tegument. Supranal concavity absent. Macrosetae \( h2 \) setiform, long. Epigynium horseshoe-shaped, large. Translobar sclerites present. Legs III and IV subequal in size; segments without modifications; solenidia \( \phi \) of tibiae III and IV subequal in length.

**Etymology**

Contraction of \( a \) (without, G.), \( tricho \) (hair, G.), and \( Proctophyllodes \) to point out the absence of dorsal setae \( d2 \) and \( e2 \).

**Key to species of Atrichophyllodes gen. n.**

1. In males, rudimentary sclerites \( rEpIIa \) present, genital acetabula situated on ovate plates, setae \( 3a \) situated off epimerites \( IIIa \), setae \( ps3 \) off adanal shields, tarsus IV with paraxial extension bearing seta \( r \). In females, terminal cleft as a narrow inverted \( V \); anterior hysteronotal shield with two pairs of elongated pale sclerotized areas on anterior half ............ **A. delalandi** sp. n.
   - In males, rudimentary sclerites \( rEpIIa \) absent, genital acetabulae situated on soft tegument, setae \( 3a \) situated on inner ends of epimerites \( IIIa \), setae \( ps3 \) on anterior margin of adanal shields, tarsus IV without paraxial extension. In females, terminal cleft as an inverted \( U \) (19–27 in width), anterior hysteronotal shield with small scattered lacunae between levels of setae \( d2 \) and \( e2 \) and with pair of pale sclerotized areas situated on postero-lateral margins ............ **A. mentalis** sp. n.

**Atrichophyllodes delalandi** gen. n., sp. n.

(Figures 15–23)

**Type material**

Male holotype, seven male and eight female paratypes from the Southern Antpipit, *Corythopis delalandi* (Lesson, 1831) (Passeriformes, Tyrannidae), Guajuvira Farm, Fênix, Paraná State, Brazil (23°53’S, 51°57’W), 27 March 2003, coll. A. Bispo. Holotype and paratypes are deposited at DZSJRP, female and male paratypes are deposited at CAIOC and ZISP.

**Description**

**Male holotype** (Figures 15–20) (range for seven paratypes indicated in parentheses). Length of idiosoma 253 (242–253), width 121 (121–138). Prodorsal shield: 78 (76–82) in length and 87 (84–90) in width, without lacunae or pale sclerotized areas. Posterior margin of
prodorsal shield with two shallow concavities. Scapular setae se 103 in length (87–98) and separated by 54 (41–57); si separated by 38 (38–54). Setae c1 on hysteronotal shield; setae c2 and cp on humeral shield; setae c3 lanceolate, 16 in length and 3 in width (15–17 × 3). Distance between prodorsal and hysteronotal shields 16 (14–18). Hysteronotal shield: 150 (141–152) in length and 79 (82–84) in width; anterior margin almost straight, surface without lacunae and pale sclerotized areas. Opisthosomal lobes poorly developed, as a pair of convexities between setae h3; supranal concavity well expressed, long; terminal lamellae short semicircular with radial striation, 14 in length (11–15). Setae h3 separated by 54 (50–56). Length of setae: h3 68 (60–73), h2 139 (122–141), ps2 16 (16–22), ps3 11 (8). Distance between dorsal setae: si–c1 46 (45–48), c1–c2 33 (30–34), c1–d1 27 (26–30), d1–e1 60 (57–64); e1–h1 24 (24–29); e2–h1 18 (16–20), h1–f2 16 (15–18).

Figures 15, 16. *Atrichophyllodes delalandi* gen. n., sp. n., male: dorsal (15) and ventral (16) views. ad, adanal shield; ap, acetabular plate.
Epimerites I free, with slightly divergent posterior tips; epimerites II and III with narrow surface fields; rudimentary sclerites r EpIIa present. Bases of trochanters III almost completely flanked by sclerotized band extending from epimerites IIIa. Aedeagus extending to level of setae g, 27 in length (24–29); genital arch 38 in width (38–41) and 19 (16–22) in length. Genital acetabula situated on small ovate plates. Distance between ventral setae: 3a–4a 18 (18–19), 4a–g 38 (34–38), g–ps3 16 (16–19), ps3–ps3 8 (7–11). Adanal shields with truncate anterolateral extensions, inner angles close to each other anterior to anal opening. Setae ps3 off adanal shields (Figure 16). Anal suckers 11 (11) in diameter, and distance between discs 22 (18–22). Tarsus IV 27 (24–27) in length, with paraxial cone-like extension bearing setae r; modified seta d on distal half of the segment (Figure 20).

Female (Figures 21–23) (measurements of eight paratypes). Length of idiosoma 380–396, width 143–160. Prodorsal shield: form as in male, 91–101 in length and 106–112 in width. Setae se 117–131 in length and separated by 63–75; pair si separated by 50–57. Setae c1 on hysteronotal shield; setae c2 and cp on humeral shields; setae c3 lanceolate, 16–19 in length.
and 3–5 in width. Distance between prodorsal and hysteronotal shields 8–22. Anterior hysteronotal shield: 188–196 in length and 98–106 in width, anterior margin straight, posterior margin with short median extension, surface without lacunae, but with two pairs of elongated pale sclerotized areas on anterior half (Figure 22). Lobar region: 92–103 in length and 95–103 in width, lateral margins strongly convex; lobar shield split into three fragments: a pair of large sclerites covering opisthosomal lobes and a small oval sclerite situated between their anterior ends. Terminal cleft as a narrow inverted V, 65–73 in length. Supranal concavity absent. Setae \( h2 \) lanceolate in basal half and apical half filiform,
90–109 in length, 4–6 in width; setae $h_3$ 63–68 in length and separated by 31–44. Setae $h_1$ and $f_2$ in trapezoidal arrangement. Distance between dorsal setae: $s_i-c_1$ 50–60, $c_1-c_2$ 33–50, $c_1-d_1$ 42–49, $d_1-e_1$ 84–94, $e_1-h_1$ 46–53, $h_1-f_2$ 34–38, $f_2-h_2$ 16–24.

Epimerites I free, posterior ends slightly divergent. Trochanters III almost completely flanked by sclerotized band extending from bases of epimerites IIIa. Epimerites IVa with large posterior extension. Epigynium horseshoe-shaped, 41–49 in length, 53–58 in width, tips extending to level of setae $g$. Setae $p_s^2$ and $p_s^3$ setiform, setae $p_s^2$ at mid-level of anal opening. Distance between ventral setae: $3_a-4_a$ 22, $4_a-g$ 38, $g-p_s^3$ 20, $p_s^3-p_s^3$ 16. Adanal shields L-shaped, broad; their anterior ends acute, inner

Etymology

The specific epithet was directly taken from the specific name of the type host and is a noun in the genitive case.

*Atrichophyllodes mentalis* gen. n., sp. n.

(Figures 24–29)

Type material

Male holotype, four female paratypes from the Plain Antvireo, *Dysithamnus mentalis* (Temminck, 1823) (Passeriformes, Thamnophilidae), Guajuvira Farm, Fênix, Paraná State, Brazil (23°53'9"S, 51°57'9"W), 26 July 2006, coll. A. Bispo. Holotype and paratypes are deposited at DZSJRP.

Description

Male holotype (Figures 24–26). Length of idiosoma 275, width 154. Prodorsal shield: 84 in length and 103 in width, without lacunae or pale sclerotized areas; posterior margin of prodorsal shield straight. Scapular setae $s_e$ 109 in length and separated by 69; $s_i$ separated by 50. Setae $c_1$ set on hysteronotal shield; setae $c_2$ and $c_p$ on humeral shield; setae $c_3$ lanceolate, 16 in length and 4 in width. Distance between prodorsal and hysteronotal shields 29. Hysteronotal shield: 163 in length and 95 in width, anterior margin almost straight, surface without lacunae or pale sclerotized areas. Opisthosomal lobes short, as a pair of slightly convex extensions between setae $h_3$; supranal concavity well expressed, long. Terminal lamellae semicircular, 11 in length with radial striation. Setae $h_3$ separated by 57. Length of setae: $h_3$ 90, $h_2$ 158, $p_s^2$ 19, $p_s^3$ 8. Distance between dorsal setae: $s_i-c_1$ 57, $c_1-c_2$ 49, $c_1-d_1$ 37, $d_1-e_1$ 63; $e_1-h_1$ 31; $h_1-f_2$ 11.

Epimerites I free with slightly divergent posterior tips; epimerites II and III without surface fields; rudimentary sclerites rEpIIa absent. Trochanters III partly flanked by sclerotized band extending from bases of epimerites IIIa. Aedeagus extending to level of setae $g$, 23 in length; genital arch 30 in width and 14 in length. Acetabular plates absent, genital acetabula situated on soft tegument. Distance between ventral setae: $3_a-4_a$ 22, $4_a-g$ 38, $g-p_s^3$ 20, $p_s^3-p_s^3$ 16. Adanal shields L-shaped, broad; their anterior ends acute, inner
angles touching each other anterior to anal opening, setae ps3 on adanal shields (Figure 25). Anal suckers 15 in diameter, distance between discs 22.

Tarsus IV, 24 in length, without paraxial extension, modified seta d on middle portion of the segment (Figure 26).

**Female (Figures 27–29) (measurements of four paratypes).** Length of idiosoma 374–385, width 176–182. Prodorsal shield: posterior margin with two shallow concavities and other features as in male, 101–106 in length and 131–139 in width. Setae se 131–139 in length and separated by 90–97; setae si separated by 69–73. Setae c1 on anterior hysteronotal shield; setae c2 and cp set on humeral shields; setae c3 lanceolate, 22 in length and 5 in width. Distance between prodorsal and hysteronotal shields 19–24. Anterior hysteronotal shield: 182–188 in length and 120–125 in width; anterior margin slightly concave, posterior...
margin with short and blunt median extension, surface with small lacunae mainly in median area between setae $d1$ and $e1$, and one pair of ovate pale sclerotized areas present in postero-lateral angles (Figure 27). Lobar region: 82–95 in length and 114–120 in width, lateral margins convex. Terminal cleft as a narrow inverted U, 57–60 in length and 19–27 in width. Supranal concavity absent. Setae $h2$ narrowly lanceolate with terminal filament, 90–114 in length, 5 in width; and setae $h3$ 60–68 in length and separated by 46–57. Setae $h1$ inserted on striated tegument between the anterior hysterontal and lobar shields. Setae

Figures 27–29. *Atrichophyllodes mentalis* gen. n., sp. n., female. (27, 28) Dorsal and ventral views, respectively. (29) Spermatheca. co, copulatory opening; pd, primary duct; sd, secondary ducts.
h1 and f2 in low trapezoidal arrangement. Distance between dorsal setae: si–c1 63–68, c1–c2 60–65, c1–d1 48–57, d1–e1 75–83, e1–h1 54–63, h1–f2 41–42, f2–h2 16–19.

Epimerites I free, posterior ends parallel. Bases of trochanters III almost completely flanked by sclerotized band extending from epimerites IIIa. Epimerites IVa with large posterior extension. Epignynium semicircular, 44–48 in length, 68–73 in width; tips almost extending to level of setae g. Setae ps2 and ps3 setiform, setae ps2 at mid-level of anal opening. Distance between ventral setae: 1a–3a 54–58, 3a–g 22–27, 4a–ps3 76–82, g–4a 54–68, ps2–ps3 14–16, ps2–ps2 48–52, ps3–ps3 23–26. Copulatory opening terminal. Spermatheca and spermaducts as in Figure 29. Legs I and II as in the male; legs III and IV subequal, ambulacral disc of legs IV extending to the level of setae h2 (Figure 28).

Etymology

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

Genus Anisophyllodes Atyeo, 1967

The genus Anisophyllodes was originally based on a single species, Anisophyllodes pipromorphae Atyeo, 1967 collected from Mionectes (= Pipromorpha) oleagineus (Lichtenstein, 1823) (Tyrannidae) from Trinidad and Tobago (Atyeo 1967). Atyeo (1969) later transferred Alloptes intermedius described by Trouessart and Neumann (1888), on Elaenia martinica (Linnaeus, 1766), to Anisophyllodes. The latter species was also reported by Cerny and Lukoschus (1975) from E. flavogaster (Thunberg, 1822). The main diagnostic features separating this genus from other proctophyllodine genera are as follows: in both sexes, epimerites I free with diverging posterior tips; in males, opisthosoma attenuate to posterior end and with truncated opisthosomal lobes usually separated by slit-like terminal cleft; genital arch and aedeagus short, situated at the level of trochanters IV; setae g and ps3 arranged in a longitudinal rectangle; paired or unpaired pregenital plates are present; adanal shields present. Dimorphism of males was also noted for this genus: in heteromorph males, the opisthosomal lobes bear short and wide terminal lamellae and legs IV are thicker than legs III; in homeomorph males, the opisthosomal lobes lack terminal lamellae and legs III, IV are subequal in size. It is necessary to note that the original diagnosis (Atyeo 1967) stated that dorsal setae e1 are absent in Anisophyllodes; however, this character actually varies among species. In A. intermedius and in a new species described below these setae are present.

Anisophyllodes candango sp. n.
(Figures 30–40)

Type material

Male holotype, two male and six female paratypes from the Lesser Elaenia, Elaenia chiriquensis Lawrence, 1865 (Passeriformes, Tyrannidae), Fazenda Agua Limpa, Brasília, D.F., Brazil (15°57′S, 47°56′W); 9 August 2002, coll. M. F. Kanegae. Holotype and paratypes are deposited at CAIOC; a paratype female and male are deposited at DZSJRNP.
Differential diagnosis

Among two formerly known species, the new species is morphologically similar to *Anisophyllodes intermedius*. The males of *A. candango* differ from *A. intermedius* by relatively wider idiosoma, with the ratio of length to width about 1.9–2, and by the rounded lateral extensions bearing bases of setae *h2*; the females are distinguished by significantly wider terminal cleft, which is 1.2–1.3 times longer than wide. In the males of *A. intermedius*, the idiosoma is much narrower, 2.5–2.7 times longer than wide, and the lateral extensions of
the opisthosoma bearing setae \( h2 \) are acute apically; in the females, the terminal cleft is long and narrow, 3.5–4 times longer than wide.

**Description**

*Male holotype (presumed heteromorphic) (Figures 30–37) (range for two paratypes indicated in parentheses).* Length of idiosoma 325 (308–330), width 165 (154–165). Prodorsal shield: 90 (87–92) in length, 95 (92–99) in width, surface without lacunae or pale sclerotized areas, posterior margin with two shallow concavities. Scapular setae \( se \) 109 in length (122–128) and separated by 68 (69–73); \( si \) separated by 46 (48–52). Setae \( c1 \) on hysteronotal shield; setae \( c2 \) on striated tegument, setae \( cp \) on humeral shield; setae \( c3 \) lanceolate, 20 in length and 3 in width (18–22 × 3). Distance between prodorsal and hysteronotal shields 35 (35). Hysteronotal shield: 199 (199–218) in length, 90 (90–101) in width; anterior margin concave; surface with numerous oval lacunae in posterior half, between levels of setae \( d2 \) and \( h1 \) (Figures 30, 32). Opisthosoma strongly attenuate posteriorly; opisthosomal lobes almost rectangular, their posterior margin truncate with short and wide terminal lamellae,
about 8 (8) in length and 24 (23–25) in width. Terminal cleft slit-shaped, 44 (44–52) in length; supranal concavity distinct. Setae h3 situated on outer margins of lobes separated by 41 (37–39). Length of setae: h3 114 (114–122), h2 226 (209–218), f2 11 (11), ps1 8 (8), ps2 33 (29–33), ps3 8 (8). Distance between dorsal setae: si–c1 58 (56–58), c1–c2 46 (41–49), c1–d1 45 (44–48), d1–d2 26 (26–31), d1–e1 73 (71–76), d2–e1 52 (49–52), e1–e2 27 (22–27), e1–h1 49 (48–52), e2–h1 24 (24–27), h1–f2 22 (20–44).

Epimerites I well separated, posterior tips slightly divergent, epimerites I, II with narrow surface fields; epimerites IVa present, rudimentary sclerite rEpIIa absent. Aedeagus 24
(24–25) in length, reaching the level of setae g, genital arch 35 (35) in width and 16 (18–19) in length. Genital acetabula on small oval plates at level of genital arch apex. Pregenital plates represented by a pair of longitudinal sclerites situated between tips of epimerites IIIa and genital apparatus; setae 4a on posterior tips of these sclerites (Figures 31, 33). Setae 3a posterior to inner tips of epimerites III. Distance between ventral setae: 3a–4a 29 (27–33), 4a–g 31 (35), g–ps3 39 (37–41), ps3–ps3 19 (18–19). Adanal shields represented by a pair of oblique sclerites situated anterolateral to anal suckers; setae ps3 situated mesal to these sclerites (Figures 31, 33). Anal suckers edentate, 7 (8) in diameter, distance between discs 16 (14).

Figures 38–40. *Anisophyllodes candango* sp. n., female. (38, 39) Dorsal and ventral views, respectively. (40) Spermatheca. co, copulatory opening; pd, primary duct; sd, secondary ducts.
Tarsus IV 33 (33–34) in length, with apical claw-like process and with minute spine-like process near base of ventral seta r; button-like seta d closer to base of this segment (Figure 37).

Female (Figures 38–40) (measurements of six paratypes). Length of idiosoma 352–385, width 154–176. Prodorsal shield: form as in male, 92–95 in length and 92–112 in width. Setae se 139–147 in length and separated by 79–80; setae si separated by 53–58. Setae c1 on anterior hysteronotal shield; setae c2 on antero-medial tips of humeral shields; setae c3 lanceolate, 19–24 in length and 4–5 in width. Setae cp set on humeral shield. Distance between prodorsal and hysteronotal shields 35–38. Anterior hysteronotal shield: 180–185 in length and 101–114 in width; anterior margin slightly concave, anterior angles acute, posterior margin with short median extension, surface with numerous oval-shaped lacunae on posterior third (Figure 38). Lobar region: 49–57 in length and 76–82 in width. Terminal cleft as an inverted U, 31–35 in length and 22–24 in width. Supranal concavity indistinct; area between bases of lobes with several transverse striae. Setae h2 setiform, 125–144 in length, 5 in width; setae h3 60–64 in length and separated by 45–49. Setae h1 inserted on striated tegument between the anterior hysteronotal and lobar shields. Setae h1 and f2 in trapezoidal arrangement. Distance between dorsal setae: si–c1 58–63, c1–c2 48–52, e1–d1 48–61, d1–d2 31–44, d1–e1 78–91, d2–e1 50–58, e1–e2 41–49, e1–h1 51–58, e2–h1 23–24, h1–f2 23–27, f2–h2 12–14.

Epimerites I as in male; epimerites I, II and III with narrow surface fields. Setae ps2 and ps3 setiform, setae ps2 at level of posterior part of anal opening. Epignyium horseshoe-shaped, 44–46 in length, 63–68 in width, tips extending to level of setae g. Distance between ventral setae: 1a–3a 49–54, 3a–g 19–29, 4a–ps3 75–78, g–4a 65–79, ps2–ps3 19–22, ps2–ps2 39–44, ps3–ps3 15–18. Copulatory opening terminal. Spermatheca and spermaducts as in Figure 40. Legs I, II as in the male; legs IV extending by ambulacral disc to the level of setae h3 (Figures 38, 39).

Etymology

The specific epithet derives from candango (African origin), a common name meaning those who live, but were not actually born in Brasilia (the capital of Brazil), the type locality of this mite species; the name is a noun in apposition.

Genus Platyacarus Kudon, 1982a

Twelve known species of the genus Platyacarus were described in a series of four papers by Kudon (1982a, 1982b, 1982c, 1982d). Representatives of this genus occur only on birds of the family Dendrocolaptidae. They were recorded on these hosts across Central and South America (Kudon 1982e): Brazil (17 host species), Ecuador (three), Guyana (one), Colombia (one), Venezuela (three), Panama (two), French Guyana (one), Surinam (one), and Costa Rica (one). Mites of Platyacarus may be distinguished from other proctophyllodine genera by the following combination of characters: setae ve absent; epimerites I normally fused into a U; setae f2 absent; in males, opisthosomal lobes short, provided with terminal lamellae of triangle or tongue-shaped form; aedeagus is ensiform; genital arch is small, with strongly divergent branches; adanal shields represented by one or two pairs of small sclerites; setae g and ps3 arranged into longitudinal rectangle; legs III–IV subequal.
Platyacarus sittasomi sp. n.
(Figures 41–51)

Type material
Male holotype, and three female paratypes from the Olivaceous Woodcreeper, Sittasomus griseicapillus (Vieillot, 1818) (Passeriformes, Dendrocolaptidae), Fazenda Agua Limpa, Brasilia, D.F., Brazil (15°57’S, 47°56’W), 25 March 2002, coll. M. F. Kanegae. Holotype and paratypes are deposited at DZSJRP; a paratype female is deposited at CAIOC.

Differential diagnosis
Platyacarus sittasomi sp. n. may be referred to the oligolaccius species group (Kudon 1982a) by most features, except for the structure of the prodorsal shield in both sexes (Figures 41, 49) and primary spermaduct in females (Figure 51). It differs from the two species previously included in this group, P. oligolaccius Kudon, 1982a and P. dontocoronius Kudon, 1982a, by the following characters: in both sexes, the lateral margins of the prodorsal shield without incision around scapular setae se; in males, the aedeagus is short (25) extending by the distal third only, and anterior margin of hysteronotal shield straight; in females, the terminal cleft is narrow (60–63 × 22–27), approximately three times longer than wide, and the primary spermaduct is not expanded in the proximal part. In both sexes of two formerly known species, the prodorsal shield has deep lateral incisions around setae se; in the males, the aedeagus is much longer (50 in P. oligolaccius and 41 in P. dontocoronius), almost extending to the level of anal setae ps3, and anterior margin of hysteronotal shield is concave; in the females, the terminal cleft is approximately as long as wide (47 long in P. oligolaccius and 38 in P. dontocoronius), and the primary spermaduct is abruptly expanded near the head of spermatheca.

Description
Male holotype (Figures 41–48). Length of idiosoma 319, width 127. Prodorsal shield: 112 in length and 82 in width, surface without lacunae or pale sclerotized areas, posterior margin with blunt-angular extension, lateral margin without incision around scapular setae. Setae se 139 in length and separated by 45; si separated by 30. Setae c1 on hysteronotal shield; setae c2 on antero-medial angles of humeral shields; setae cp adjacent to humeral shield; setae c3 lanceolate, 20 in length and 5 in width. Distance between prodorsal and hysteronotal shields 20. Hysteronotal shield: 193 in length and 79 in width, anterior margin almost straight, surface with scattered small lacunae restricted to region from setae d1 to h1 (Figures 41, 47). Terminal cleft as a small inverted U, 11 in length; supranal concavity distinct, and terminal lamellae linguiform, 24 in length and 15 in width. Distance between prodorsal and hysteronotal shields 20. Hysteronotal shield: 193 in length and 79 in width, anterior margin almost straight, surface with scattered small lacunae restricted to region from setae d1 to h1 (Figures 41, 47). Terminal cleft as a small inverted U, 11 in length; supranal concavity distinct, and terminal lamellae linguiform, 24 in length and 15 in width. Setae h3 about half-length of setae h2, separated by 38. Distance of setae: h3 115, h2 144, ps1 5, ps2 27, ps3 8. Distance between dorsal setae: si–c1 67, c1–c2 35, c1–d1 41, d1–d2 31, d1–e1 73, d2–e1 52, e1–e2 41, e1–h1 46, e2–h1 13.

Epimerites I fused into a narrow U; rudimentary sclerite rEpIIa present; epimerites IVa barely discernible. Aedeagus dagger-shaped, 35 in length, extending by distal third beyond setae g; genital arch 19 in length, 30 in width. Genital acetabula adjacent at their bases. Distance between ventral setae: 3a–4a 39, 4a–g 39, g–ps3 33, ps3–ps3 14. Two pairs of adanal shields present, setae ps3 situated on inner pair (Figures 42, 48). Corolla of anal suckers dentate, 11 in diameter; distance between inner discs 14.
Seta cG of genua I and II setiform (Figures 43, 44). Tarsus IV 33 in length, without apical claw-like process; button-like seta d at mid-level of this segment (Figure 46).

Female (Figures 49–51) (measurements of three paratypes). Length of idiosoma 462–495, width 165–176. Prodorsal shield: 114–120 in length and 120–136 in width, surface without
lacunae or pale sclerotized areas, posterior margin with shallow concavities, lateral margins concave, but without incision around scapular setae $se$. Setae $se$ 133–139 in length, separated by 63–68; setae $si$ separated by 45–46. Setae $c1$ on anterior hysteronotal shield; setae $c2$ on humeral shields; setae $cp$ on humeral shield; setae $c3$ lanceolate, 22–24 in length and 5 in width. Distance between prodorsal and hysteronotal shields 22–38. Anterior

Figures 43–46. *Platyacarus sittasomi* sp. n., male legs I–IV, dorsal views.
hysteronotal shield: 228–245 in length and 98–103 in width; anterior margin almost straight; surface with numerous small lacunae posterior to setae d2, with a pair of pale sclerotized areas in posterior angles, postero-lateral border with oblique folds (Figure 49).

Lobar region: 76–87 in length and 68–90 in width. Terminal cleft as an inverted U, 60–63 in length, 22–27 in width. Supranal concavity absent. Setae h2 dagger-like with terminal filament, 98–103 in length, 4–5 in width; setae h3 relatively short, 24–30 in length and separated by 10–39. Setae h1 inserted on striated tegument between the anterior hysteronotal and lobar shields. Distance between dorsal setae: si–c1 63–82, c1–c2 41–44, c1–d1 49–54, d1–d2 38–41, d1–e1 114–117, d2–e1 76–79, e1–e2 65–68, e1–h1 72–79, e2–h1 31–34.

Epimerites I as in male, epimerites IVa barely discernible. Setae ps2 and ps3 setiform, setae ps2 approximately at mid-level of anal opening. Epigynium semicircular, 44–49 in length, 63–71 in width, tips almost extending to level of setae g. Distance between ventral setae: 1a–3a 63–68, 3a–g 24–29, 4a–ps3 114–120, g–4a 84–98, ps2–ps3 24–26, ps2–ps2 50–57, ps3–ps3 19–26. Copulatory opening terminal. Spermatheca and spermaducts as in Figure 51. Legs I, II as in the male; legs IV extending by ambulacral disc to the level of setae h1 (Figure 49).

**Etymology**

Specific epithet derives from the generic name of the type host and is a noun in the genitive case.
Remarks

Although Kudon (1982e) had studied bird skins from all genera of the Dendrocolaptidae, he did not find any species of Platyacarus inhabiting woodcreepers of the genus Sittasomus Swainson, 1827. The finding of a new species of Platyacarus inhabiting this host reinforces
Kudon’s hypothesis that the distribution of these mites on hosts shows that both “lower” and “higher” dendrocolaptid genera constitute the distinct family Dendrocolaptidae apart from the Furnariidae, which have never been recorded as hosts of Platyacarus. Phylogenetic relationships and monophyly of the Dendrocolaptidae are disputable; Feduccia (1973) suggested that these birds originated polyphyletically from the Furnariidae and even the lower dendrocolaptid genera (Dendrocincla Gray G. R., 1840, Dendronychura Cherrie, 1891, Glyphorynchus Wied-Neuwied, 1831, and Sittasomus) represent a polyphyletic grouping of three lineages. Thus, about half of the species (27/50) and the majority of genera (10/13) of Dendrocolaptidae sensu Dickinson (2003) are now known as the hosts of Platyacarus species, except for three monotypic genera, Drymornis Eyton, 1852, Glyphorynchus, and Nasica Lesson, 1830. Further sampling of these host genera is needed to determine whether they also host Platyacarus.

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