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Review of the Chewing Louse Genus *Tinamotaecola* (Phthiraptera: Philopteridae), with the Description of Three New Species

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ABSTRACT: A systematic study of the chewing louse genus *Tinamotaecola* (Phthiraptera: Philopteridae) was undertaken, enabling us to recognize four species in the genus. The single previously recognized species, *T. andinae* Carriker, is redescribed for specimens from the Puna Tinamou, *Tinamotis pentlandii* (Tinamiformes: Tinamidae) from Bolivia, Chile, and Peru. One new species is described from the Elegant Crested Tinamou, *Eudromia elegans* (Tinamiformes: Tinamidae), from Argentina and two new species from the Red-legged Seriema, *Cariama cristata* (Gruiformes: Cariamidae), from Paraguay and Brazil. The family Heptapsogasteridae is placed as a junior synonym of the family Philopteridae.

Introduction

We recently obtained a collection of *Tinamotaecola* Carriker from the Red-legged Seriema, *Cariama cristata* (Linnaeus), from eastern Paraguay. This served as the stimulus for us to study the single known species in the genus, *Tinamotaecola andinae* Carriker, in an attempt to identify these specimens. An analysis of these new specimens, in addition to other specimens available from the National Museum of Natural History (Washington, DC) and The Natural History Museum (London), made it apparent that three new species should be recognized, thereby resulting in four species of *Tinamotaecola,* all of which are restricted to South American seriemas and tinamous. We herein provide a redescription and illustrations of the genus *Tinamotaecola* and of *T. andinae,* describe and illustrate three new species of *Tinamotaecola,* and place the family Heptapsogasteridae as a junior synonym of the family Philopteridae.

In the following descriptions, all measurements are in millimeters. Abbreviations for dimensions are TW (temple width), HL (head length at midline), PW (prothorax width), MW (metathorax width), AWV (width of abdomen at segment V), TL (total length at midline), GL (length of male genitalia to tip of parameres), GW (width of male genitalia at point of paramere attachment), and BAL (length of basal apodeme). The value in parentheses following a statement of range is the mean. Abdominal tergal setal counts on segments III–VIII include those between the postspiracular setae (Fig. 7: PSS).

Systematics

Genus *Tinamotaecola*

Tinamotaecola Carriker, 1944: 86. Type species: *Tinamotaecola andinae* Carriker.

This genus was erected by Carriker (1944) to include the single species, *T. andinae,* described for lice from the Puna Tinamou, *Tinamotis pentlandii* Vigors. To date, this has remained as the only known species in the genus. Including the 3 new species described be-

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low, the members of *Tinamotaecola* share the following characteristics: Head narrower than long, rounded in front, with conspicuous uninterrupted frontal carina; antennae similar in both sexes; chaetotaxy much as in Fig. 7, each side having 2 very long marginal temple setae and 1 very long ocular seta. Pronotum with single long lateroposterior seta. Metanotum and abdominal terga lacking anterior setae except for medioanterior pair on tergum II (first apparent tergum). Median elongate dark line extending from mid-metanotum through segment II. Abdominal terga divided at midline on II–VIII; with very long postspiracular seta on each side of III–VIII; tergum IX undivided at midline; without obvious sternal sclerites. Male and female similar except for terminalia and dimensional differences. Male sternum VIII with 2 setae; genitalia (Figs. 3–6) with sharply tapered parameres, broad conspicuous basal apodeme, and complex of mesomeral structures. Female subgenital plate (Figs. 1, 2) rounded, with short fine setae marginally and short spiniform setae submarginally.

andinae species group

The two species comprising this group, both with tinamou type hosts, are distinguished from those of the *zyskowskii* species group by the following features: (1) male with only 10 marginal metanotal setae; (2) head of both sexes with narrow frontal carina (Figs. 9, 10); (3) smaller dimensions (e.g., male TW, 0.38–0.53 (0.463); male GL, 0.35–0.46 (0.407); female TW, 0.38–0.55 (0.485); and female MW, 0.32–0.51 (0.428)); and (4) fewer abdominal setae (e.g., male tergum V, 5–11 (8.1); male sternum IV, 4–9 (6.1); female tergum IV, 7–12 (9.4); female sternum IV 2–11 (6.8); and female subgenital plate marginal and submarginal setae, 25–41 (34.0)).

Tinamotaecola andinae Carriker
(Figs. 2, 5, 9)

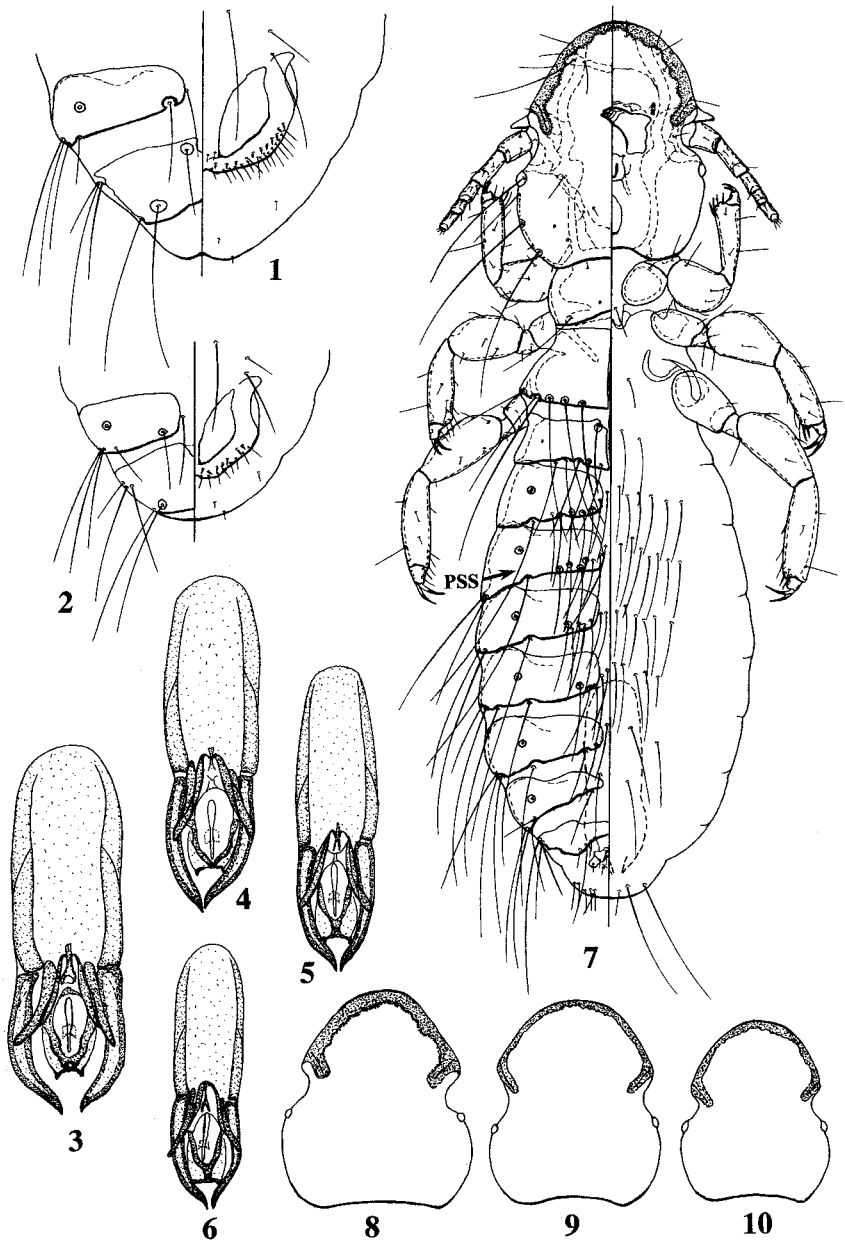
Tinamotaecola andinae Carriker, 1944:87. Type host: *Tinamotis pentlandii* Vigors.

MALE: Much as in Fig. 7. Head as in Fig. 9. Tergal setae on II, 5–9 (7.3); III, 8–13 (11.0); IV, 10–12 (11.2); V, 9–11 (10.3); VI, 7–8 (7.5); VII, 4–5 (4.2); VIII, 2–4 (3.2). Sternal setae on II, 4–5 (4.4); III, 8–10 (8.6); IV, 8–9 (8.7); V–VI, 6–9 (7.5); VII, 3–4 (3.8). Genitalia as in Fig. 5. Dimensions: TW, 0.47–0.53 (0.495); HL, 0.54–0.61 (0.577); PW, 0.30–0.33 (0.316); MW, 0.40–0.48 (0.446); AWV, 0.49–0.78 (0.628); TL, 1.92–2.21 (2.104); GL, 0.42–0.46 (0.442); GW, 0.10–0.13 (0.113); BAL, 0.25–0.29 (0.269).

FEMALE: Metanotal margin with 10 setae. Tergal setae on II, 6–9 (6.9); III–V, 8–12 (10.3); VI, 7–11 (8.4); VII, 6–9 (7.4); VIII, 2–5 (3.6). Sternal setae on II, 3–4 (3.6); III, 6–12 (8.3); IV–V, 9–11 (9.9); VI, 7–11 (8.5); VII, 5–8 (6.2). Terminalia as in Fig. 2; subgenital plate with 26–41 (35.6) marginal and submarginal setae. Dimensions: TW, 0.50–0.55 (0.526); HL, 0.56–0.65 (0.608); PW, 0.31–0.34 (0.323); MW, 0.38–0.51 (0.466); AWV, 0.50–0.89 (0.676); TL, 2.18–2.37 (2.273).

MATERIAL EXAMINED: Ex *T. pentlandii,* holotype male, allotype female, 1 male, 1 female paratypes of *Tinamotaecola andinae,* Bolivia; 3 males, 6 females, Chile; 1 male, Peru. Ex *Chunga burmeisteri* (Hartlaub), 1 male, 3 females, Brazil; 1 male, Paraguay.

REMARKS: Features for separating *Tinamotaecola andinae* from the other member of this group will be given after the following description. We are suspicious that the specimens from *C. burmeisteri* may not represent true host records for *T. andinae.* It is unusual to find the same louse species on both Gruiformes and Tinamiformes hosts. However, pending study of additional specimens, we tentatively regard *C. burmeisteri* as a valid host for this louse.



Figs. 1–10. 1, 2. Dorsoventral female terminalia (70×): 1, *Tinamotaecola zyskowskii* n. sp.; 2, *T. andinae*. 3–6. Male genitalia (110×): 3, *T. zyskowskii* n. sp.; 4, *T. wardi* n. sp.; 5, *T. andinae*; 6, *T. elegans* n. sp. 7, Dorsoventral male *T. zyskowskii* n. sp. (PSS = postspiracular seta) (55×). 8–10. Male head (55×): 8, *T. wardi* n. sp.; 9, *T. andinae*; 10, *T. elegans* n. sp.

Tinamotaecola elegans Hellenthal, Price, and Timm, new species (Figs. 6, 10)

TYPE HOST: *Eudromia elegans* G. St-Hilaire.

MALE: Much as for *Tinamotaecola andinae* except as follows. Head as in Fig. 10. Tergal setae on II, 4–6 (4.9); III–IV, 6–9 (7.5); V, 5–7 (6.4); VI, 4–6 (4.6); VII, 2–4 (3.6). Ster-

nal setae on II, 2; III, 2–5 (3.3); IV–V, 3–6 (4.5); VI, 4–6 (5.2). Genitalia as in Fig. 6. Dimensions: TW, 0.38–0.46 (0.426); HL, 0.46–0.55 (0.500); PW, 0.26–0.30 (0.281); MW, 0.35–0.41 (0.386); AWV, 0.47–0.60 (0.523); TL, 1.68–2.00 (1.901); GL, 0.35–0.42 (0.381); GW, 0.08–0.10 (0.092); BAL, 0.21–0.24 (0.222).

FEMALE: Close to *T. andinae* except as follows. Sternal setae on II, 1–2 (1.7); III–IV, 2–7 (4.3); V–VI, 4–8 (5.8). Dimensions: TW, 0.38–0.50 (0.444); HL, 0.47–0.56 (0.526); PW, 0.27–0.33 (0.295); MW, 0.32–0.43 (0.394); AWV, 0.34–0.71 (0.485); TL, 1.77–2.25 (2.015).

TYPE MATERIAL: Holotype male (in National Museum of Natural History), ex *Eudromia elegans elegans* G. St-Hilaire, Argentina, Mendoza, Tunuyan, 30 May 1923, H. B. Conover 645; 6 female paratypes, same data as holotype; 1 female paratype, same except 26 May 1923, H. B. Conover 624. 2 male paratypes, ex *E. e. albida* (Wetmore), Argentina, San Juan, Angaco Sud, 11 Aug 1916, L. E. Miller & H. S. Boyle. 2 male, 1 female paratypes, ex E. *e. intermedia* (Dabbene & Lillo), Argentina, Tucuman, Colalao del Valle, 8 Aug 1916, L. M. Dinelli 5856; 1 male paratype, same except 9 Aug 1916, L. M. Dinelli 5857.

OTHER MATERIAL: Ex *Eudromia formosa* (Lillo), 2 males, 2 females, Argentina; 1 female, Paraguay.

REMARKS: This species is separable from *T. andinae* by both sexes of *T. elegans* with smaller dimensions and fewer sternal setae, and by the male also with fewer tergal setae. *Tinamotaecola andinae* and *T. elegans* are the only species of this genus known from the tinamous. They are restricted to the host genera *Tinamotis* and *Eudromia,* the last two genera of Tinamiformes listed in Mayr and Cottrell (1979), Sibley and Monroe (1990), and Howard and Moore (1991).

zyskowskii species group

The two species of the group, both found on *Cariama cristata,* are distinguished from the members of the *andinae* species group by the following characteristics: (1) male metanotal margin with 11–13 (12.0) setae; (2) head of both sexes with wide frontal carina (Figs. 7, 8); (3) larger dimensions (e.g., male TW, 0.52–0.57 (0.548); male GL, 0.47–0.53 (0.500); female TW, 0.56–0.62 (0.588); and female MW, 0.50–0.63 (0.572)); and more abdominal setae (e.g., male tergum V, 10–16 (12.6); male sternum IV, 7–16 (12.4); female tergum IV, 12–16 (13.6); female sternum IV, 11–15 (13.0); and female subgenital plate marginal and submarginal setae, 46–65 (54.6)).

Tinamotaecola zyskowskii Hellenthal, Price, and Timm, new species (Figs. 1, 3, 7)

TYPE HOST: *Cariama cristata* (Linnaeus).

MALE: As in Fig. 7. Tergal setae on II, 8–12 (10.0); III–V, 12–17 (13.7); VI, 8–12 (10.1); VII, 4–8 (5.8); VIII, 2–4 (3.7). Sternal setae on II, 2–4 (2.8); III, 10–14 (12.4); IV, 13–16 (14.3); V, 10–15 (12.2); VI, 8–13 (9.8); VII, 4–6 (4.5). Genitalia as in Fig. 3. Dimensions: TW, 0.55–0.57 (0.559); HL, 0.63–0.65 (0.643); PW, 0.36–0.38 (0.371); MW, 0.54–0.56 (0.551); AWV, 0.75–0.87 (0.824); TL, 2.37–2.50 (2.437); GL, 0.50–0.53 (0.516); GW, 0.13–0.15 (0.136); BAL, 0.31–0.33 (0.322).

FEMALE: Metanotal margin with 10–12 (11.0) setae. Tergal setae on II, 7–12 (9.2); III–V, 12–15 (13.6); VI, 10–13 (11.4); VII, 7–10 (8.8); VIII, 4–6 (4.9). Sternal setae on II, 2–5 (3.1); III, 9–14 (12.0); IV–V, 11–15 (12.7); VI, 9–12 (10.3); VII, 4–8 (6.0). Terminalia as in Fig. 1; subgenital plate with 46–65 (55.7) marginal and submarginal setae. Dimensions: TW, 0.58–0.62 (0.603); HL, 0.66–0.70 (0.679); PW, 0.38–0.41 (0.396); MW, 0.57–0.63 (0.596); AWV, 0.87–0.97 (0.928); TL, 2.63–2.86 (2.725).

TYPE MATERIAL: Holotype male (in National Museum of Natural History), ex *Cariama cristata* (female, KU 90092), Paraguay, Dpto. Presidente Hayes, Población 25 de Mayo, ca. 60 km S Filadelfia [22°54.5′S, 59°48.8′W], 16 September 1999, K. Zyskowski 519; 12 male, 12 female paratypes, same data as holotype.

ETYMOLOGY: This new species is named in honor of Kristof Zyskowski, Peabody Museum of Natural History, Yale University, who collected the host and saved its lice for us to study. His research efforts, genuine enthusiasm for learning about the natural world, and willingness to share that information have contributed greatly to our understanding of the South American biota.

REMARKS: The differentiating features for this species will be discussed following the next species description. The host individual from which the extensive type series of *T. zyskowskii* was obtained was an adult, as judged by plumage, skull ossification, and large size (weight 2100 g). Its habitat was arid tropical scrub bordering a pasture. The Red-legged or Crested Seriema, *Cariama cristata,* is found in grasslands and open scrub of Argentina, Bolivia, Brazil, Paraguay, and Uruguay. The genus is monotypic.

Tinamotaecola wardi Hellenthal, Price, and Timm, new species
(Figs. 4, 8)

TYPE HOST: *Cariama cristata* (Linnaeus).

MALE: Much as for *T. zyskowskii* except as follows. Head as in Fig. 8. Tergal setae on II, 6–8 (7.1); III, 9–12 (11.0). Sternal setae on III–V, 6–12 (9.2); VI, 7–8 (7.6). Genitalia as in Fig. 4. Dimensions: TW, 0.52–0.55 (0.531); HL, 0.58–0.61 (0.597); PW, 0.31–0.35 (0.339); MW, 0.48–0.51 (0.497); AWV, 0.65–0.78 (0.700); TL, 2.02–2.21 (2.121); GL, 0.47–0.48 (0.473); BAL, 0.29–0.30 (0.293).

FEMALE: Close to *T. zyskowskii* except as follows. Dimensions: TW, 0.56–0.59 (0.570); HL, 0.62–0.66 (0.641); PW, 0.33–0.37 (0.354); MW, 0.50–0.56 (0.541); AWV, 0.66–0.82 (0.786); TL, 2.18–2.40 (2.343).

TYPE MATERIAL: Holotype male (in The Natural History Museum), ex *Cariama cristata,* Brazil, Estado de Sao Paulo, Franco da Rocha, L. R. Guimaraes; 6 male, 8 female paratypes, same data as holotype.

ETYMOLOGY: This species is named for Ronald A. Ward, Rockville, Maryland, in recognition of his studies on the taxonomy of chewing lice, especially for his excellent work making sense of the complexity of the species of tinamou lice.

REMARKS: This species is separated from *T. zyskowskii* by *T. wardi* consistently having much smaller dimensions and a tendency for the male to have fewer abdominal tergal and sternal setae. Even though both species of this complex share the same type host species, the consistent differences between them and the wide divergence of their geographical localities easily justify their separation.

Discussion

The single individual of *Cariama cristata* from Paraguay, in addition to providing the excellent series used for the description of *T. zyskowskii,* yielded 24 specimens of *Colpocephalum cristatae* Price and 97 specimens of *Heptapsogaster frielingi* Eichler, both of which are chewing lice previously recorded from this host taxon. *Chunga burmeisteri,* the only other avian species in the gruiform family Cariamidae, also has *C. cristatae, H. inexpectatus* Eichler, and, in this paper, *T. andinae,* described from it. These records for *Heptapsogaster* and *Tinamotaecola* represent the only instances of these genera on hosts outside of the Tinamiformes. We cannot speculate on the reasons for the Cariamidae to

carry lice whose genera otherwise are restricted to the Tinamiformes, but this well-documented association may prove of interest.

The family Heptapsogasteridae was described by Carriker (1936) in his monograph on the chewing lice of the Tinamiformes. He based this family primarily on what he considered to be its unique 7-segmented abdomen and the presence of spiracles on the first visible abdominal segment. Keler (1938) showed this to be a misinterpretation of the abdominal segmentation. Ward (1957), from an analysis of the pterothorax and abdominal segmentation, concluded that the Heptapsogasteridae was not distinct from the Philopteridae. Review of louse species assigned to the genera *Cuclotocephalus, Discocorpus, Heptapsogaster, Kelloggia, Lamprocorpus, Megaginus, Megapeostus, Nothocotus, Ornicholax, Physconella, Pterocotes, Rhopaloceras, Strongylocotes,* and *Trichodopeostus* suggests that these genera do not form an assemblage that warrants recognition as a family, but rather represent a group of louse genera with affinities to the Philopteridae that have been united by their common occurrence on hosts of the Tinamiformes. We support the views of earlier workers in regarding the family Heptapsogasteridae as a junior synonym of Philopteridae.

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