Carcinopodacarus polymorphus gen. n. et sp. n. from Guira guira (Cuculiformes: Cuculidae) in Brazil: a first example of male polymorphism in the family Dermationidae (Acariformes: Analgoidea)

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Abstract: Carcinopodacarus polymorphus gen. n. et sp. n. (Acariformes: Dermationidae: Dermationinae) is described from the guira cuckoo Guira guira (Gmelin) (Cuculiformes: Cuculidae) in Brazil. The new genus differs from the closest genus, Psittophagoidea Fain, 1964, by the following features: in both sexes, the anterior spines of trochanters I and II are absent (vs present in Psittophagoidea), setae d2 are distinctly developed (vs only alveoli), and genual setae mGI are absent (vs present); in males, the hysteronotal shield is split transversally at the level of trochanters III (vs hysteronotal shield entire); in females, the platelets situated posterior to the propodonotal shield are absent (vs present), the metapodosomal sclerites are present (vs absent), and the adanal shields are fused anteriorly to each other (vs separated from each other). In this species, andropolymorphism is detected for the first time for the family. It involves various characters but the most impressive feature is the structure of legs III. In hetero- and mesomorphic males, these legs are strongly hypertrophied and have a distinct ventral spur on femora III; in homeomorphic males, legs III are not modified and subequal to legs IV.

Keywords: Acari, andropolymorphism, cuculiform birds, parasites, Psoroptidia, systematics

MATERIALS AND METHODS

Mites were collected from guira cuckoos Guira guira found dead alongside roads in the campus of the Universidade Estadual de Campinas (UNICAMP), Campinas, São Paulo, Brazil. Totally, six host individuals were examined and mites were found on three (50%). The individual birds were washed with water containing dish washing detergent and then the liquid was filtered. Mites were collected from the filter paper under a stereomicroscope, cleared in 30% lactic acid for 2–4 h and mounted in Hoyer’s medium. Drawings were made with a Leica DM3000 microscope equipped with differential interference contrast optics (DIC) and a camera lucida. Photomicrographs were made with a scanning electron microscope (Quanta 250). Mites were preserved in 96% ethanol.

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ethanol, next put to hexamethyldisilazane for 10 min, and then dried and sputtered with platinum.

In the descriptions below, the idiosomal setation follows Griffiths et al. (1990) with modifications of Norton (1998) concerning coxal setae. The leg chaetotaxy follows Grandjean (1939). All measurements are in micrometres (μm) and were taken as follow: body length = the total length from the palpal extremities to the posterior margin of the body; body width = the width at level of setae cp; idiosomal length = length from the anterior margin of the propodonotal shield to the posterior margin of the body; length of the propodonotal shield = length measured along the median line of the shield; width of the propodonotal shield = width at level of the posterior margin of this shield; length of the anterior part of the hysteronotal shield = length, measured along the median line of the shield; width of the anterior part of the hysteronotal shield = width at level of setae cp; length of the posterior part of the hysteronotal shield = length of the lateral border of this shield; width of the posterior part(s) of the hysteronotal shield = width at level of the anterior margin of this shield; width of the opisthosomal lobes = width of each lobe at the level of setae ps2; length of the terminal membrane = length from the base of seta h3 to the posterior end of this membrane; length of the posterior legs = length from the most basal point of the trochanter to the apex of the tarsus, excluding pretarsus; length of tarsus III, IV = length from the most basal point of the tarsi to its apex, excluding pretarsus.

Host systematics follows Clements et al. (2012). Specimen depositories are cited using the following abbreviations: DZUne-sp-RC – Department of Zoology of the Universidade Estadual Paulista, Rio Claro, São Paulo, Brazil; UMMZ – Museum of Zoology, University of Michigan, Ann Arbor, USA; ZISP – Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia.

RESULTS

Family Dermationidae Fain, 1965
Subfamily Dermationinae Fain, 1965
Carcinopodacarus gen. n.

ZooBank number for genus: urn:lsid:zoobank.org:act:BD492196-6708-4E25-90B6-8F505F1CF78B


Male. Humeral shields without dorsal valves. Hysteronotal shield transversally split at level of trochanters III into anterior hysteronotal and lobar parts. Apodemes IVb absent. Bases of tarsal setae dIV and eIV widely separated from each other. Opisthosomal lobes well-developed, terminal cleft well developed, variable among different forms of males. Cupules ih situated posterior to analad suckers. Male polymorphism present.


Mesomorphic male. Similar to heteromorph but lobar part of hysteronotal shield with deep posterior median incision, legs III much wider but slightly longer than legs IV, and ventral spur of femur III with 2 spines in middle part.


Female. Scapular shield with short triangular inwardly directed dorsal process. Metapodosomal sclerites present. Hysteronotal shield rectangular with slightly attenuated corners. Adanal shields fused to each other anteriorly. Tarsi III and IV with weakly developed basoventral spine each; projections on femora III and IV absent.

Type and only species: Carcinopodacarus polymorphus sp. n.

Etymology: The epithet is a combination of the Greek καρκίνος (karkinós, carcinos = crab), ποδός (podos = feet), and akari (mite).

Differential diagnosis. The new genus is most similar to Psittophagoides. In both sexes of these genera, each scapular shield bears a large, ventral, hook-like process directed inward, setae e2 are absent, solenidion o1I, setae sIII, rIII, and rIV are present. The new genus differs from Psittophagoides by the following features: in both sexes of species of the genus Carcinopodacarus, the anterior spines of trochanters I and II are absent, setae d2 are distinctly well-developed and genual setae mGI are absent; in males, the hysteronotal shield is split transversally at the level of trochanters III; in females, paired platelets situated posterior to the propodonotal shield are absent, the metapodosomal sclerites are present, the adanal shields are fused to
each other anteriorly. In both sexes of the genus *Psittophagoide*is*, an anterior spine is present on trochanters I and II, setae *d2* are represented by alveoli or absent and genual setae *mGI* are present; in males, the hysteronotal shield is not separated transversally; in females, a pair of platelets situated posterior to the propodonotal shield is present, the metapodosomal sclerites are absent and the adanal shields are well separated from each other.

*Carcinopodacarus polymorphus* sp. n.  
Figs. 1–10

ZooBank number for species  
urn:lsid:zoobank.org:act:DEA48663-AF46-4506-BC57-A3CBA9D4E0BC

Fig. 3. *Carcinopodacarus polymorphus* gen. n. et sp. n. from *Guira guira*, mesomorphic male. A – dorsal view; B – ventral view.

Fig. 4. *Carcinopodacarus polymorphus* gen. n. et sp. n. from *Guira guira*, homeomorphic male. A – ventral view; B – dorsal view.


**Fig. 5.** Carcinopodacarus polymorphus gen. n. et sp. n. from Guira guira, posterior legs in dorsal view, mesomorphic male (A, D). A – leg II; D – leg IV. Homeomorphic male (B, C). B – leg III; C – leg IV.

**Fig. 6.** Carcinopodacarus polymorphus gen. n. et sp. n. from Guira guira, details of male. Opisthosoma in ventral view (A–C). A – heteromorphic male; B – mesomorphic male; C – homeomorphic male; D – aedeagus of heteromorphic male.
Fig. 7. *Carcinopodacarus polymorphus* gen. n. et sp. n. from *Guira guira*, female. A – ventral view; B – dorsal view; C – spermatheca.

Fig. 8. *Carcinopodacarus polymorphus* gen. n. et sp. n. from *Guira guira*, scanning electron micrographs, dorsal view. A – heteromorphic male; B – female.
wide, respectively. Setae sRIII 24–43 long. Tarsi III and IV 34–40 and 26–33 long, respectively. Lengths of solenidia:
\( \sigma I \) 38–48, \( \sigma II \) 27–39, \( \varphi I \) 31–41, \( \varphi II \) 49–58, \( \varphi III \) 15–25, \( \varphi IV \) 15–21, \( \omega I \) 11–16, \( \omega III \) 31–39, \( \omega III \) 19–29.


**Tritonymph** (2 paratypes, Fig. 10). Body 275–280 long and 203–205 wide. Idiosoma 240–250 long. Propodonotal shield 73–81 long and 69–70 wide, posterior margin convex. Distance between propodonotal and hysteronotal shields in midline 46–51. Setae se 42–51 long, setae si 7–10 long about 8 posterior to level of setae se. Distances se–se about 89–89, si–si 78–79. Humeral shields absent. Hysteronotal shield small, narrowed posteriorly, dissected longitudinally, 44–45 long and 43–45 wide at midlevel. Posterior margin of opisthosoma widely rounded. Coxl fields III opened. Genital papillae situated near inner tips of apodemes IIIa. Lengths of setae: cp 120–130, c3 35–48, d2 5–10, h2 190–200, h3 64–69, ps1 10–10, ps2 10–13, ps3 12–19, la 12–17, 3a 14–16, 4a 9–11, 4b 9–12, and g 16–18. Legs III and IV 88–94 and 85–93 long, 16–17 and 14–15 wide, respectively. Tarsis III and IV 25–27 and 22–27 long, respectively. Length of solenidia: \( \sigma I \) 25–27, \( \sigma II \) 33–37, \( \varphi I \) 24–27, \( \varphi II \) 7–10, \( \varphi III \) 10–11, \( \varphi IV \) 5–6, \( \omega I \) 11–12, \( \omega II \) 12–18, \( \omega III \) 20–25.

**Type host**: Guira cuckoo *Guira guira* (Gmelin) (Cuculiformes: Cuculidae).

**Type locality**: Universidade Estadual de Campinas (UNICAMP; 22°54’S; 47°03’W), Campinas, São Paulo, Brazil.

**Type material**: Heteromorphic male holotype (No. 1111), 5 heteromorphic male, 8 mesomorphic male, 6 homeomorphic male, 16 female and 2 tritonymph paratypes, 10 September 2010, Campinas, Brazil, coll. D. Vilas Boas-Filho, deposited.
Fig. 10. Carcinopodacarus polymorphus gen. n. et sp. n. from Guira guira, tritonymph. A – ventral view; B – dorsal view; C – tarsus IV in dorsal view.

E t y m o l o g y : The specific epithet reflects the presence of different morphs found in males; it is an adjective in the nominative singular.

R e m a r k s. In the superfamily Analgoidea, mostly represented by feather mites, male polymorphism is very common and involves hypertrophy of the various parts of the male body, i.e. legs I, chelicerae, legs III, etc. (Proctor et al. 2009). In dermationids, however, the andropolymorphism had never been recorded before this investigation. The true polymorphism supposes the presence of genetic differences among recognised morphs (Mayr 1969). Notwithstanding, most cases of male ‘polymorphism’ in Acariformes so far investigated in this aspect have shown no genetic basis whatsoever (Regev 1974, Timms et al. 1981, Radwan 1995) and strictly speaking they cannot be named by this term. Nevertheless, this term is widely used by most acarologists for aims of utilitarian systematics.

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