

PTYCTIMOUS MITES (ACARI, ORIBATIDA)
FROM CÔTE D'IVOIRE
WITH DESCRIPTION OF THREE NEW SPECIES

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The present study is based on ptyctimous oribatid mite material collected in Côte d'Ivoire in 2007. A list of identified taxa, including 9 species from 7 genera and 4 families, is provided; of these, three species are new for science, and other species are recorded in this country for the first time. *Plonaphacarus longisetosus* Niedbała **sp. n.** differs from congeners by the presence of long, similar in shape interlamellar and lamellar setae. *Hoplophthiracarus brevispinus* Niedbała **sp. n.** differs from *Hoplophthiracarus spinus* Niedbała et Starý, 2014 by longer and narrower sigillar fields equal in length, the absence of posterior furrows of prodorsum, the similar length and shape of interlamellar and lamellar setae, and by spini-form, rough and shorter notogastral setae. *Atropacarus* (*Hoplophorella*) *paratuberculosissimus* Niedbała **sp. n.** differs from congeners by the presence of tubercles on notogaster and very long sensilli and interlamellar setae.

Key words: oribatid mites, fauna, systematics, morphology, Afrotropical region.

INTRODUCTION

The oribatid mite (Acari, Oribatida) fauna of Côte d'Ivoire is briefly investigated. At present, 67 species from 50 genera and 31 families are known (ERMILOV 2018, ERMILOV & N'DRI 2018), but ptyctimous oribatid mites have not been registered.

Our present work is based on material collected in Côte d'Ivoire in 2007. The primary goal of this paper is to present a list of the identified ptyctimous taxa. In the course of a taxonomic survey, we found three new species of the family Steganacaridae, belonging to the genera *Plonaphacarus* Niedbała, 1986, *Hoplophthiracarus* Jacot, 1933 and *Atropacarus* Ewing, 1917. The secondary goal of this paper is to describe and illustrate these new species. The generic characters and identification keys of *Plonaphacarus*, *Hoplophthiracarus* and *Atropacarus* were presented by NIEDBAŁA (e.g., 2000, 2001, 2004). The data on geographical distribution of these genera are summarized by NIEDBAŁA and LIU (2018).

MATERIAL AND METHODS

Material. Côte d'Ivoire, Oumé region, precisely in the village of Goulikao, 6°31'N, 5°30'W, 200 m a.s.l., primary forest, ferrallitic soil, June 2007 (rainy season), collected by Julien K. N'Dri. Soil mites were extracted by using the Berlese–Tullgren funnels; extraction lasted 10 days.

Methods. Specimens (adult; sex not identified) were mounted in lactic acid on temporary cavity slides for measurement and illustration. Body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. Notogastral width refers to the maximum width of the notogaster in dorsal view. Lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometers.

The identification and the illustrations of mite specimens were performed under a phase contrast microscope “Olympus BX50”, equipped with a drawing attachment.

The following morphological abbreviations are used: *ro*, *le*, *in*, *ex* – rostral, lamellar, interlamellar and exobothridial setae, respectively; *ss* – sensillus; *c*, *d*, *f*, *h*, *ps* – notogastral setae; *g*, *ag*, *an*, *ad* – genital, aggenital, anal and adanal setae, respectively; *ia*, *im* – notogastral lyrifissures; *h* – subcapitular seta, *d*, *v* – leg setae.

Morphological terminology used in this paper follows that of F. Grandjean: see TRAVÉ and VACHON (1975) for references, and NORTON and BEHAN-PELLETIER (2009) for an overview.

The following abbreviation for collection is used: DATE – Department of Animal Taxonomy and Ecology, Adam Mickiewicz University in Poznań, Poland.

SYSTEMATICS

List of identified taxa from Côte d'Ivoire

Mesoplophoridae Ewing, 1917

Mesoplophora (Mesoplophora) africana Balogh, 1958: 11 specimens

Oribotritiidae Grandjean, 1954

Indotritia paraconsimilis Niedbała, 2012: 5 specimens

Euphthiracaridae Jacot, 1930

Acrotritia ardua (C.L. Koch, 1841): 2 specimens

Steganacaridae Niedbała, 1986

Atropacarus (Hoplophorella) andrei (Balogh, 1958): 3 specimens

Atropacarus (Hoplophorella) paratuberculosissimus Niedbała **sp. n.**: 1 specimen

Hoplophthiracarus brevispinus Niedbała **sp. n.**: 1 specimen

Plonaphacarus longisetosus Niedbała **sp. n.**: 1 specimen

Plonaphacarus kugohi (Aoki, 1959): 1 specimen

Protophthiracarus dignus (Niedbała, 1983): 6 specimens

Thus, we have registered 9 species from 7 genera and 4 families of ptyctimous mites; of these, three species are new for science, and other species are recorded in Côte d'Ivoire for the first time.

Descriptions

Plonaphacarus longisetosus Niedbala sp. n.

(Fig. 1A-I)

Measurements. Prodorsum: length 368, width 252, height 151; prodorsal setae: *ss* 116, *in* 233, *le* 172, *ro* 129, *ex* 33; notogaster: length 757, width 525, height 535; notogastral setae: *c*₁ 187, *c*₁/*c*₁-*d*₁ = 1.2, *h*₁ 190, *ps*₁ 185; genitoaggenital plate 182 × 116; anoadanal plate 258 × 131.

Integument. Colour light brown. Surface of body finely dotted.

Prodorsum. Prodorsum with distinct lateral carinae. Posterior furrows absent. Sigillar fields narrow and long, median field in anterior part conically elongated. Sensilli long, rigid, swollen in distal half, covered with small spines. Interlamellar and lamellar setae similar in shape and length, erect, rigid, long covered with small spines in distal half, similar to notogastral setae. Rostral setae long, rigid, rough, evenly thick. Exobothridial setae short, smooth, spiniform. Relative length of setae: *in* > *le* > *ro* > *ss* > *ex*.

Notogaster. Notogaster with 15 pairs of moderately long (*c*₁ > *c*₁-*d*₁) setae, stout covered with small spines in distal half. Setae *c*₁ and *c*₃ located near anterior border, setae *c*₂ remote from border. Vestigial setae invisible. Two pairs of lyrifissures *ia* and *im* present.

Ventral region. Setae *h* of subcapitular mentum shorter than distance between them. Formula of genital setae: 4+2: 3. Anoadanal plates with five pairs of poorly ciliate setae; setae *ad*₂ longest, curved distally, equally thick as rostral setae; anal setae shorter than *ad*₁, but longer than *ad*₃.

Legs. Formulas of setae and solenidia of "complete type". Setae *d* of femora located almost at anterior end of article, setae *v*' very small.

Type material. Holotype: Côte d'Ivoire, Oumé region, village Goulikao (6°31'N, 5°30'W, 200 m a.s.l.), primary forest, ferrallitic soil, June 2007 (rainy season), collected by Julien K. N'Dri.

Type deposition. The holotype (70% ethanol with drop of glycerol) is deposited in DATE.

Etymology. The specific name *longisetosus* refers to the length of interlamellar and lamellar setae.

Remarks. The new species is easily distinguished from its congeners by the presence of long, similar in shape interlamellar and lamellar setae. No other species of afrotropical *Plonaphacarus* has such setae. Similar prodorsal and notogastral setae has *Protophthiracarus diatropos* Niedbala et Starý, 2014 from Cameroon (see NIEDBAŁA & STARÝ 2014), but in addition to being of a different genus has very long prodorsal lateral carinae, posterior furrows and vestigial exobothridial setae. Another slightly similar interlamellar and lamellar setae has afrotropical species of another genus *Steganacarus (Rhacaplacarus) pervigens* (Niedbala, 1988) from the Democratic Republic of the Congo (see NIEDBAŁA 1988), but has different length of sigillar fields, shape of sensilli and rostral setae and four pairs of lyrifissures.

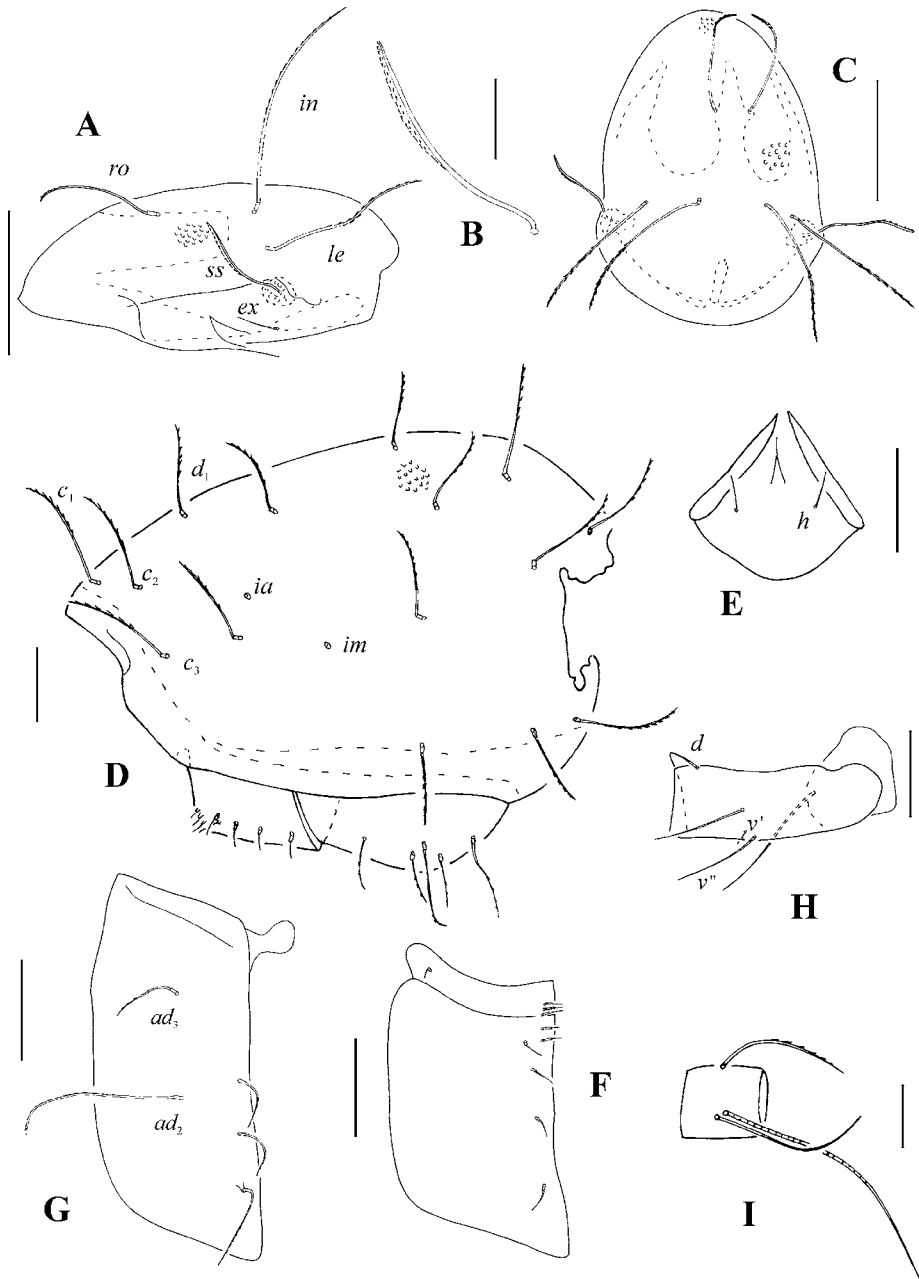


Fig. 1. *Plonaphacarus longisetosus* Niedbala **sp. n.** (holotype): A = prodorsum, lateral view, B = sensillus, C = prodorsum, dorsal view, D = opisthosoma, lateral view, E = mentum of subcapitulum, F = right genitoaggenital plate, G = right anoadanal plate, H = trochanter and femur of leg I, I = tibia of leg IV. Scale bars: 100 μ m (A, C, D), 50 μ m (F, G, H), 25 μ m (B, E, I).

Hoplophthiracarus brevispinus Niedbała sp. n.
(Fig. 2A-H)

Measurements. Prodorsum: length 399, width 273, height 136; prodorsal setae: *ss* 66, *in* 38, *le* 40, *ro* 48; notogaster: length 778, width 535, height 616; notogastral setae: c_1 68, $c_1/c_1-d_1 = 0.45$, h_1 63, ps_1 71; genitoaggenital plate 217×131 ; anoanal plate 328×126 .

Integument. Colour dark brown. Surface of body covered with weakly expressed concavities.

Prodorsum. Prodorsum with weak median crista. Lateral carinae distinct. Posterior furrows absent. Sigillar fields distinct, narrow, long, similar in length. Sensilli short, club shaped, with irregular edges. Interlamellar, lamellar and rostral setae short, spiniform, rough. Exobothridial setae vestigial. Relative length of setae: $ss > ro > le > in$.

Notogaster. Notogaster with 15 pairs of short, spiniform, rough setae ($c_1 < c_1-d_1$). Setae c_1 and c_2 remote from anterior margin more than setae c_3 . Vestigial setae f_1 invisible. Two pairs of lyrifissures *ia* and *im* present.

Ventral region. Setae *h* of subcapitular mentum shorter than distance between them. Genitoaggenital plates with 9 pairs of setae with formula: $6(4+2): 3$. Anoanal plates each with 5 setae, 2 anal and 3 adanal, spiniform, rough except setae ad_2 . Setae ad_2 evenly thick, longest and thickest, ad_3 smallest.

Legs. Formulas of setae and solenidia of "complete type". Setae *d* on femora I slightly remote from distal end of article, setae *v'* very small, situated ventral from *v''*.

Type material. Holotype: Côte d'Ivoire, Oumé region, village Goulikao ($6^{\circ}31'N$, $5^{\circ}30'W$, 200 m a.s.l.), primary forest, ferrallitic soil, June 2007 (rainy season), collected by Julien K. N'Dri.

Type deposition. The holotype (70% ethanol with drop of glycerol) is deposited in DATE.

Etymology. The specific epithet *brevispinus* comes from Latin for "short" and "spine" and alludes to small, spiniform setae of body.

Remarks. New species looks similar to several other species of *Hoplophthiracarus* recently described from Cameroon (NIEDBAŁA & STARY 2014). Among them the most similar is *H. spinus* Niedbała et Stary, 2014 by the relatively short setae of body and some similarity of sensilli. The new species is distinguishable from it by longer and narrower sigillary fields equal in length (in *H. spinus* lateral fields are shorter than median), the absence of posterior furrows of prodorsum (versus presence of fields), the similar length and shape of interlamellar and lamellar setae (versus interlamellar setae longer, covered with small spines, lamellar setae shorter, spiniform), and by spiniform, rough and shorter notogastral setae (versus setae longer, ciliate at one side).

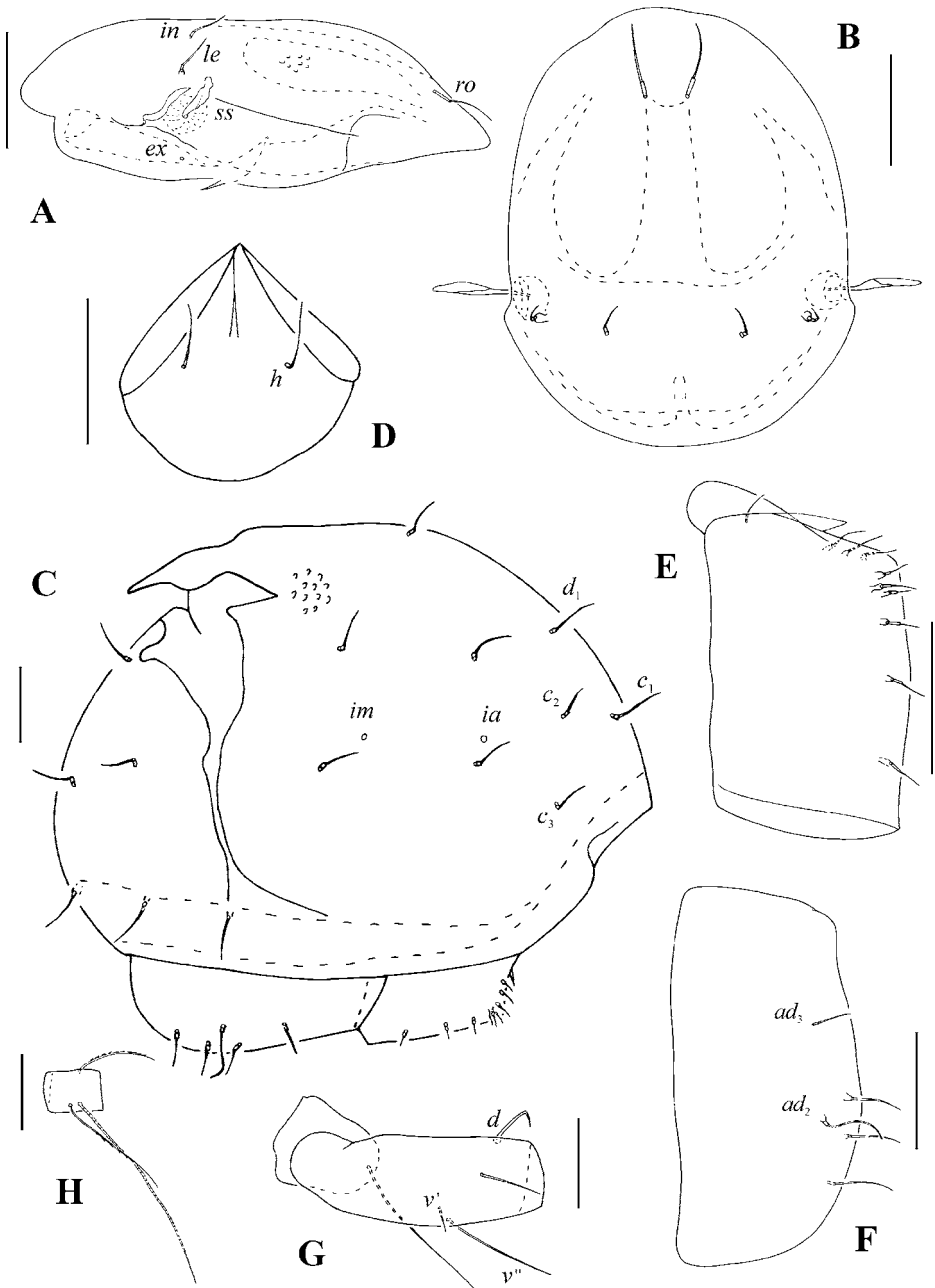


Fig. 2. *Hoplophthiracarus brevispinus* Niedbała **sp. n.** (holotype): A = prodorsum, lateral view, B = prodorsum, dorsal view, C = opisthosoma, lateral view, D = mentum of subcapitulum, E = right genitoaggenital plate, F = right anoadanal plate, G = trochanter and femur of leg I, H = tibia of leg IV. Scale bars: 100 μ m (A–C, E, F), 50 μ m (D, H, G)

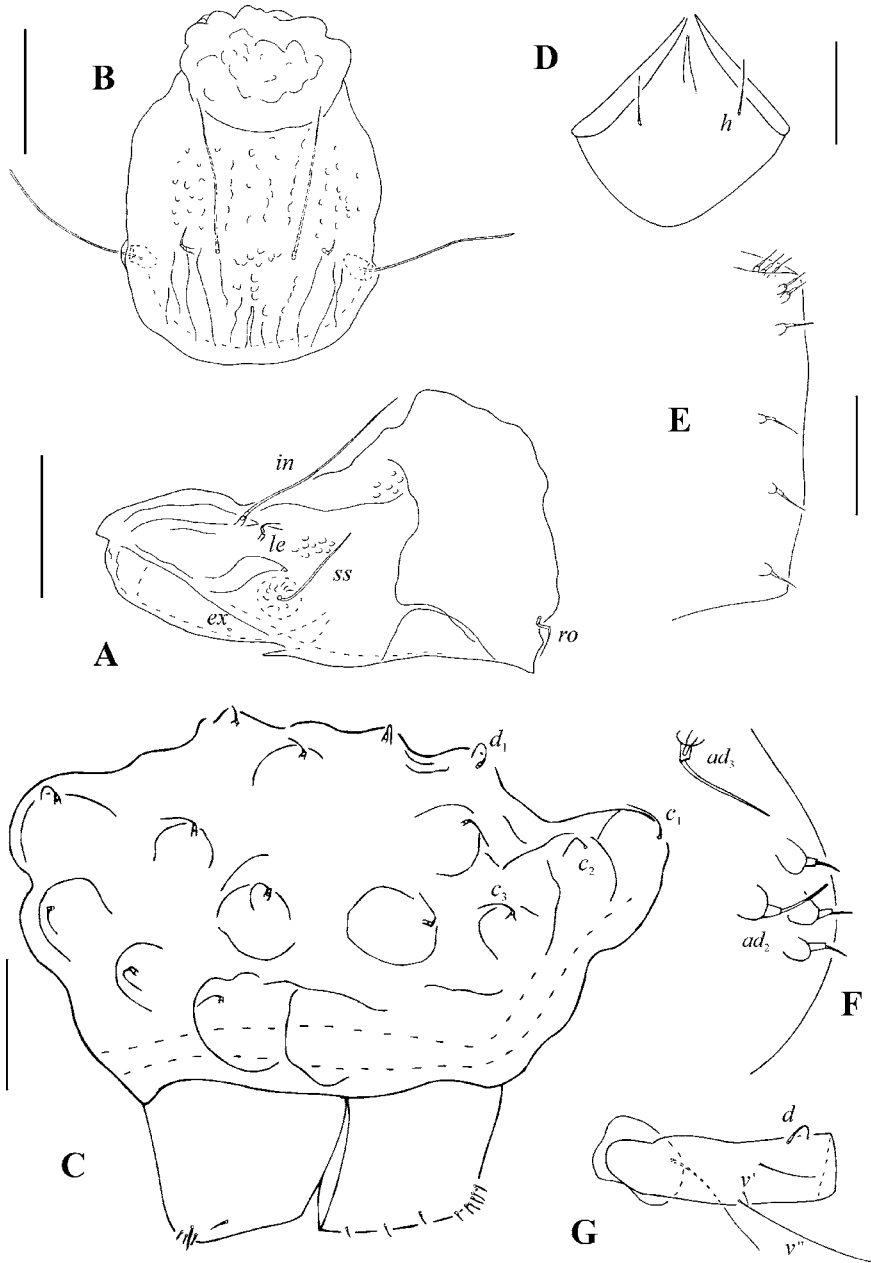


Fig. 3. *Atropacarus (Hoplophorella) paratuberculosissimus* Niedbała **sp. n.** (holotype): A = prodorsum, lateral view, B = prodorsum, dorsal view, C = opisthosoma, lateral view, D = mentum of subcapitulum, E = right fragment of genitoaggenital plate, F = right fragment of anoadanal plate, G = trochanter and femur of leg I. Scale bars: 100 μ m (A, C, D), 50 μ m (E), 25 μ m (D, F, G)

***Atropacarus (Hoplophorella) paratuberculosissimus* Niedbała sp. n.**
(Fig. 3A-G)

Measurements. Prodorsum: length 318, width 202, height 192; prodorsal setae: *ss* 131, *in* 144, *le* 23, *ro* 28; notogaster: length 515, width 431, height 374; notogastral setae: c_1 46, $c_1/c_1-d_1 = 0.23$, d_1 40, h_1 25, ps_1 20; genitoaggenital plate 151×136 ; anoadanal plate 192×141 .

Integument. Colour light brown. Body strongly sculptured, covered with strong ribs, foveoles and rugae; notogaster with tubercles.

Prodorsum. Prodorsum with powerful anteromedian crista. Lateral carinae absent. Posterior furrows well developed. Sigillar fields invisible because of strong sclerotization. Sensilli long, like stick, without head, obtuse distally, rough. Interlamellar setae similar to sensilli also stick-shaped, but pointed distally, rigid and rough. Lamellar setae spiniform, bent, rough. Rostral setae also spiniform but slender, directed downwards, rough. Exobothridial setae vestigial. Relative length of setae: $in > ss > ro > le$.

Notogaster. Notogaster with anterior hood. Setae very short ($c_1 < c_1-d_1$), thin, fine and curved, inserted on tubercles. Setae c_1-c_3 remote from anterior margin. Vestigial setae and lyrifissures invisible because strong sculpture.

Ventral region. Setae *h* of subcapitular mentum shorter than distance between them. Genitoaggenital plates with formula of genital setae: 6 : 3. Anoadanal plates with setae ad_2 slightly conical and ad_3 spiniform longer than other setae.

Legs. Formulas of setae and solenidia of "complete type". Setae *d* of femora I remote from distal end of article, setae *v'* very short, situated ventral from *v''*.

Type material. Holotype: Côte d'Ivoire, Oumé region, village Goulikao ($6^{\circ}31'N$, $5^{\circ}30'W$, 200 m a.s.l.), primary forest, ferrallitic soil, June 2007 (rainy season), collected by Julien K. N'Dri.

Type deposition. The holotype (70% ethanol with drop of glycerol) is deposited in DATE.

Etymology. The prefix *para* is Latin meaning "near" and refers to the similarity of new species to *Atropacarus (Hoplophorella) tuberculosissimus* (Mahunka, 1978).

Remarks. The new species is easily distinguishable from congeners by the presence of tubercles on notogaster and very long sensilli and interlamellar setae. It is similar to widely distributed afro-tropical species *Atropacarus (Hoplophorella) tuberculosissimus* (Mahunka, 1978) by the presence of tubercles on notogaster, but differs by the presence of interlamellar setae very long (versus minute), very strong anterior crista of prodorsum (versus not so strong), smaller anterior hood of notogaster (versus distinctly larger hood), longer ad_2 and ad_3 setae of anoadanal plates (versus these setae minute).

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