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Additions to the oribatid mite fauna of the Caribbean, with a description of a new species of *Epidamaeus* (Acari, Oribatida, Damaeidae)

Sergey G. ERMILOV and Harry SMIT

(Received 21 November 2016; accepted 01 March 2017; published online 04 July 2017; edited by Ekaterina SIDORCHUCK)

**ABSTRACT** — A list of identified oribatid mite taxa (Acari, Oribatida) from the Caribbean (mostly Lesser Antilles) partly based on a collection of the Naturalis Biodiversity Center (Leiden, The Netherlands), including 84 species from 64 genera and 35 families, is presented; of these, *Grandjeania bicaudata*, *Scheloribates* (*Scheloribates*) *milleri*, *Protoribates oblongus*, and *Orthogalumna saeva* are recorded in the Neotropical region for the first time. A new species of *Epidamaeus* from the Bahamas is described; *E. bahamensis* n. sp. differs from *E. flagelloides* Norton, 1979 by the morphology of notogastral setae, prodorsal tubercles *Dp* and parastigmatic tubercles *Sa*, and the absence of prodorsal tubercles *Bp*. Moreover, a new combination, *Dyobelba palaciosi* (Iglesias and Guzmán, 2012) n. comb., is proposed.

**KEYWORDS** — mites; fauna; list of taxa; record; new species; morphology; systematics; Neotropical region

**ZOOBANK** — 47CBA113-F86D-4E9C-B49F-70A6D9F9A9D7

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**INTRODUCTION**

The oribatid mite fauna (Acari, Oribatida) of small Islands of the Caribbean (for example, Lesser Antilles, Bahamas) is poorly known (e.g. Willmann 1936; Mahunka 1978, 1985a, b, 1998).

This work is the final report (see Ermilov 2016a, b) of our study of oribatids from the Caribbean (mostly Lesser Antilles) based on previously unstudied material from the collections of the Naturalis Biodiversity Center, Leiden, The Netherlands. The primary goal is to present a list and new findings of identified taxa.

A second goal is to describe and illustrate a new species of the genus *Epidamaeus* Bulanova-Zachvatkina, 1957 of the family Damaeidae—*E. bahamensis* n. sp. At present, this genus comprises about 80 species, which are distributed in the Holartic, Neotropical and Oriental regions. The main generic characteristics were summarized by Miko (2006).

In addition, the systematic placement of one damaeid mite, *Epidamaeus palaciosi* Iglesias and Guzmán, 2012 is discussed.

**MATERIALS AND METHODS**

Material — Oribatid mites (stored in ethanol) were received (one part of the large materials) from the Naturalis Biodiversity Center, Leiden, The Netherlands, The samples (soil/leaf litter) were collected by P. Wagenaar Hummelinck (1907–2003) during
his voyages in the Caribbean. Oribatids were sorted by M. Sellnick (1884–1971) from the following Islands (Fig. 1) and sites:

**Dutch Antilles, Bonaire (21 on Fig. 1)**

- 48A (this code – hereinafter – refers to the codes used by P. Wagenaar Hummelinck in 1981) Fontein, near spring, 12°15’N, 68°18’W, 30.III.1937 (the original label – hereinafter – is given, sometimes slightly modified)
- 180 Lac Bay, 12°6’7.01”N, 68°13’4.38”W, 29.III.1937
- 183 Cave of Watapana, Lima, 1.IV.1937
- 878 Isla di Chico near Boca Chinite, sandy key surrounded by Rhizophora and saltflats, some low shrubs with Sporobolus, 12°7’5.37”N, 68°13’45.58”W, 17.VIII.1967

**Virgin (2 on Fig. 1)**

- 615 Saint Croix, Fredensborg Hill, south slope,
marly limestone, semi-cultivated area with scanty plant growth, some debris, II–VI.1955

**Anguilla (3 on Fig. 1)**
- 482 Forest Point, Saltwell, 18°02’09”N, 63°02’45.2”W, 18.VI.1949
- 483 Long Bay, 18°11’27.6”N, 63°07’53”W, 18.VI.1949
- 486 Upper Prickley Pear Island, 18°15’50.20”N, 63°10’26.62”W, 17.VI.1949

**Barbuda (11 on Fig. 1)**
- 596 Martello Tower, 17°35’38.73”N, 61°49’49.40”W, 8.VII.1955
- 599 Highlands, sinkhole of Dark Cave, 17°37’25.86”N, 61°45’03.63”W, 6.VII.1955
- 831 Coco Point Beach, 17°32’59.10”N, 61°45’57.50”W, 23.VIII.1967

**Dutch Antilles, Sint Eustatius (9 on Fig. 1)**
- 297 Oranjestad, 17°29’N, 62°58’W, 18.III.1937
- 430 Glass Bottle, West of Quill, 17°28’1.61”N, 62°58’0.91”W, 12.VII.1949
- 432 Billy Gut, downtown, 17°28’57.94”N, 62°59’3.60”W, 11.VII.1949
- 433 Concordia Bay, 17°30’14.95”N, 62°58’41.51”W, 8.VII.1949

**Trinidad (20 on Fig. 1)**
- 295 Tetron Bay, northwest Trinidad, 7.V.1936
- 295A Four Roads, northwest Trinidad, 7.V.1936
- 572 N-range, Cerro del Aripo, 10°44’N, 61°15’W, 30.I.1955
- 574 North Coast Road near La Vache Bay, schists, shrubs and weeds near watertrack, leaf debris with ferns and mosses, 10°44’57.32”N, 61° 28’48.12”W, 29.I.1955
- 575A Saint Augustine, Imperial College of Tropical Agriculture, 10°38’33.12”N, 61°24’2.69”W, 31.I.1955
- 576A Gaspar Grande Island, limestone, chimney of 20 m deep cave with a few shrubs and trees around (shade), debris of Clusia on clayish soil, mould, 10°39’51.10”N, 61°39’53.79”W, 11.I.1955
- 577 Monos Island, South Sea Bay, sand, schist debris, abandoned cocos grove, some debris of Cocos, 10°40’N, 61°41’W, 10.I.1955
- 580 Chacachacare Island, Bande du Sud, 10°40’30.31”N 61°45’26.24”W, 1.I.1955
- 585 Little Tobago Island, at landing, volcanic rock, shrubs and scattered small trees, rock fissures with debris and debris, 11°18’2.02”N, 60°30’18.52”W, 18.I.1955
- 587 Saint Georges, Martin Bay, decomposed volcanic rock, some debris, behind the bark and near base of dead Ceiba, 12°0’N, 61°45’W, 26.I.1955
- 588 Corinth Estate, Saint David, volcanic rock, cocoa estate with banana and coconut trees, leaf debris of *Theobroma, Musa* and *Cocos*, 25.I.1955
- 589 Saint George, Grand Etang Road, at bridge, 12°3’1.95”N, 61°45’13.74”W, 24.I.1955

**Tobago (19 on Fig. 1)**
- 582 South of airport near West Point, limestone, scattered trees in semi-cultivated grassy area, rocks with plant debris, cattle dung, 11°8’52.58”N 60°50’26.44”W, 17.I.1955
- 584 Roseau near Botanical Garden, soft tuffoid rocky slope, growth of shrubs, trees and bamboo, some debris, 15°17’59.18”N, 60°22’58.32”W, 14.VIII.1967

**Dominica (15 on Fig. 1)**
- 845 Portsmouth, Prince Rupert Point Swamp, 15°34’11.45”N, 61°27’19.13”W, 15.VII.1967
- 417 Saint Christopher, Morne Hills, East of Basseterre, 17°18’N, 62°44’W, 29.VI.1949
- 419 La Guérite, Agricultural Experimental Station, 2.VIII.1949
- 420 Wingfield River, 30.VI.1949
- 421 Brimston Hill, top, 17°30’49.49”N, 62°50’9.32”W, 30.VII.1949

**Saint Kitts (10 on Fig. 1)**
- 417 Saint Christopher, Morne Hills, East of Basseterre, 17°18’N, 62°44’W, 29.VI.1949
- 419 La Guérite, Agricultural Experimental Station, 2.VIII.1949
- 420 Wingfield River, 30.VI.1949
- 421 Brimston Hill, top, 17°20’49.49”N, 62°50’9.32”W, 30.VII.1949

**Grenada (18 on Fig. 1)**
- 586 Point Salines, volcanic tuffs, scattered shrubs on grassy slopes near coast, rock debris with some debris and cow dung, 12°0’N, 61°47’W, 26.I.1955
- 587 Saint Georges, Martin Bay, decomposed volcanic rock, scattered shrubs and trees near shore, rock debris, behind the bark and near base of dead Ceiba, 12°4’N, 61°45’W, 22.I.1955
- 588 Corinth Estate, Saint David, volcanic rock, cocoa estate with banana and coconut trees, leaf debris of *Theobroma, Musa* and *Cocos*, 25.I.1955
- 589 Saint George, Grand Etang Road, at bridge, 12°3’1.95”N, 61°45’13.74”W, 24.I.1955

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Near Grand Etang, forest, volcanic tuffs, forest with ferns, Selaginella and mosses near lake, wood debris, ferns and mosses, 12°5'44.48"N, 61°41'46.74"W, 24.I.1955

Saint Vincent (17 on Fig. 1)
- 856 Calliaqua Bay at Johnson Point, scanty plant debris with leaves of Coccoloba uvifera (Uca), 13°7'24.21"N, 61°11'37.91"W, 10.VII.1967
- 857 Calliaqua Bay at Johnson Point, remains of building, plant debris on and in fissures of masonry, 13°7'48.66"N, 61°11'41.53"W, 10.VII.1967

Dutch Antilles, Curaçao (22 on Fig. 1)
- 79C Pool San Pedro, 12°15'19.64"N, 69°02'40.20"W, 5.III.1955
- 204 Oost Seinpost Fuik, 12°4'N, 68°47'W, 9.IX.1936
- 206 Santa Barbara, northwest slope of Tafelberg, 12°4'13.78"N, 68°50'9.29"W, 4.XI.1936
- 235 Western foot of Seroe Christoffel, 10.XI.1936
- 238 Boshi di Westpunt, 12°22'44.3"N, 69°09'41.4"W, 27.X.1936

Dutch Antilles, Aruba (23 on Fig. 1)
- 247 Boca Prins, dunes, 12°29'54.02"N, 69°54'27.18"W, 9.I.1937
- 251 Quadirikiri Cave southeast of Fontein, 12°58'54.51"N, 69°53'53.79"W, 9.II.1937
- 253 Boca Grandi, 12°26'N, 69°52'W, 5.I.1937
- 474A Devils Hole Cave, limestone cave without vegetation (shady to dusky), weathered soil with bat faeces (Tadarida brasiliensis), rock debris, 18°07'26"N, 63°11'89"W, 26.VII.1955
- 532 Puddle in Rambaud Valley North of Marigot, 18°4'N, 63°4'W, 20.V.1949
- 541 Devils Hole Cave Pool, 18°07'26"N, 63°11'89"W, 4.VIII.1949

Dutch Antilles, Saba (8 on Fig. 1)
- 298 Road to the Bottom at S-curve, 17°37"N, 63°14"W, 18.III.1937
- 437 Hellsgate, slope of the Mountain, 17°38'32.44"N, 63°14'43.37"W, 25.VII.1949
- 439B Near to mountain (top of Mt Scenery), 17°38'4.01"N, 63°14'16.69"W, 26.VII.1949
- 443 Thais Hill, 17°37'21.02"N, 63°14'46.39"W, 28.VII.1949
- 444 Great Hill, 17°37'34.34"N, 63°15'8.62"W, 19.VII.1949
- 714 Cove Bay, andesite, shore vegetation, sandy leaf debris of Coccoloba uvifera, 17°37'34.34"N, 63°13'17.74"W, 5.X.1963

French Antilles, Guadeloupe (14 on Fig. 1)
- 727 Source de la Baie Nord-Ouest, W of Moule, permanent pool in connection with swamp with Alocasia and Rhizophora at about 20 m distance, sandy mud, grasses and ferns, 16°20'32.11"N, 61°22'42.70"W, 29.I.1964.
- 733 La Désirade, North of Grande Anse, limestone, dense growth of high shrubs and small trees, rock debris and plant debris, for the greater part Coccoloba uvifera, 16°18'N, 61°4"W, 26.I.1964
- 751 Marie-Galante, Viex Fort River, Embouchure, mouth of rivulet dammed by sandy bar, sand and soft mud, algae, Ruppia and Rhizophora, 15°59'18.02"N, 61°18'1.68"W, 31.I.1964

Bahamas (1 on Fig. 1)
- 493 New Providence Island, Blue Hills at Hunt’s Cave, 22.VIII.1949

French Antilles, Saint-Barthélémý (7 on Fig. 1)
French Antilles, Tintamarre (4 on Fig. 1)
454 White Bay, 18°6'53.57"N, 62°59’15.68"W, 20.VI.1949
455 Bluff N of White Bay (Baie Blanche), 18°6'53.58"N, 62°59’15.68"W, 20.VI.1949

British Antilles, Montserrat (13 on Fig. 1)
837 Plymouth, Agricultural Experimental Gardens, 16°42'N, 62°13'W, 20.VII.1967

Methods — Specimens 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 in dorsal aspect. Lengths of body setae were measured in lateral aspect. All measurements are presented in micrometers. Formulas for leg setation are given in parentheses according to the sequence trochanter–femur–genu–tibia–tarsus (famulus included). Formulas for leg solenidia are given in square brackets according to the sequence genu–tibia–tarsus.

Morphological terminology used in this paper follows that of F. Grandjean: see Travé and Vachon (1975) for general references, Norton (1977) for leg setal nomenclature, and Norton and Behan–Pelletier (2009), for overview. Systematics of oribatid mites used mostly follows that of L.S. Subías (2004, updated 2016). Identification of taxa used follows that of original descriptions, redescriptions and personal collection of the first author. Drawings were made with a camera lucida using a Carl Zeiss transmission light microscope “Axioskop-2 Plus”.

LIST OF ORIBATID TAXA COLLECTED FROM THE CARIBBEAN

This list (except ptyctimous species; see Niedbala and Ermilov 2017) indicates the specific localities where oribatid mites were collected, and notes new records and general known distribution (See mostly Subías 2004, updated 2016). All specimens (except holotype) are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia. References for original descriptions of species are not presented in the “References” section.

Lohmanniidae

Malaconothridae
Malaconothrus sp. (in bad condition). Locality: 79C.


Trhypochthoniidae

Nothridae

Crotoniidae
Crotonia sp. (in bad condition). Locality: 433.

Nanhermanniidae
Masthermannia mammillaris (Berlese, 1904). Locality: 48A. Distribution: Tropical and Subtropical regions.
Nanhermannia sp. (in bad condition). Locality: 439B.
Hermannilliidae


Pheroliodidae


Neoliodidae


Damaeidae


Liacaridae


Xenillidae


Eremulidae


Basilobelbidae


Oppiidae


Dampfiellidae


Otocephiidae

Plenotocephus sp. (it is a new species, which is described in other paper). Locality: 576A.

Carabodidae


Hydrozetidae


Cymbaeremaeidae


Scutoverticidae


Phenopelopidae

Microzetidae


Ceratozetidae


Puncroribatidae


Drymobatidae


Mochlozetidae


Oribatulidae


Scheloribatidae


Oripodidae


Haplozetidae


Parakalummidae

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**Nasobatidae**


**Galumnellidae**

*Galumnopsis* sp. (in bad condition). Locality: 572.

**Galumnidae**


**Description**

*Epidamaeus bahamensis* n.sp. (Figures 2–4)


**Description** — Measurements — Medium size. Body length: 614 (holotype: female), 547 (two paratypes: two males); notogaster width 365 (holotype), 332 – 348 (two paratypes). Female larger than two males.

**Integument** (Figs 2A–B, 3A) — Body color light brownish. Surface of body with filamentous cerotegument. Setae of prodorsum, notogaster and legs usually without cerotegument.


**Notogaster** (Figs 2A–B, 3A) — Oval. Spinae adnatae (*sa*, 28–32) thorn-like, elongate, truncate or slightly bifurcate distally. Dorsal notogastral setae
FIGURE 2: *Epidamaeus bahamensis* n. sp.: A – dorsal view, right half mirrored (legs except trochanters I–III not illustrated); B – ventral view, right half mirrored (legs except trochanters I–IV not illustrated). Scale bar 100 µm.

(h₁, 61 – 65, other setae 110 – 114) inserted in 2 sub-parallel rows, setiform, with flagellate tips, slightly barbed. Posterior setae *p₁* longest on notogaster (160 – 164), flagellate, smooth; *p₂* and *p₃* (61) shortest and thinnest, setiform, slightly barbed. All lyrifissures (*ia, im, ip, ih, ips*) and opisthontal gland openings (*gla*) distinct.

Gnathosoma (Fig. 3A) — Typical for *Epidamaeus* (e.g. Bayartogtokh 2000; Ermilov & Kalúz 2013). Subcapitulum longer than wide (118 × 86–90). Subcapitular setae (*h, m, a, 41*) setiform, slightly barbed. Adoral setae (10) thin, smooth. Palps (94) with setation 0–2–1–3–8(+a). Postpalpal setae (*ep, 6*) spini-form. Chelicerae (123) with 2 setiform setae, *cha* (32) barbed, *chb* (20) ciliate unilaterally in medio-distal part. Trägårdh’s organ narrow, conical.


Anogenital region (Figs 2B, 3A) — Six pairs of genital (41), one pair of aggenital (*ag, 41*), two pairs of anal (*an₁, an₂, 41*) and three pairs of adanal (*ad₁–ad₃, 45 – 49*) setae setiform, indistinctly barbed.
Figure 3: Epidamaeus bahamensis n. sp.: A – lateral view (gnathosoma and legs not illustrated); B – tarsus of leg I, right, antiaxial view; C – genu and tibia of leg I, right, antiaxial view; D – trochanter and femur of leg I, right, antiaxial view. Scale bar 100 µm (A), scale bar 50 µm (B–D).

Figure 4: Epidamaeus bahamensis n. sp.: A – genu and tibia of leg II, right, antiaxial view; B – tarsus of leg IV, left, antiaxial view; C – tibia of leg IV, left, antiaxial view; D – genu of leg IV, left, antiaxial view; E – trochanter and femur of leg IV, left, antiaxial view; F – genu and tibia of leg III, left, slightly oblique antiaxial view. Scale bar 50 µm.
TABLE 1: Leg mean lengths (micrometers) of one paratype Epidamaeus bahamensis n. sp.

<table>
<thead>
<tr>
<th>Leg</th>
<th>Tr</th>
<th>Fe</th>
<th>Ge</th>
<th>Ti</th>
<th>Ta</th>
<th>All</th>
<th>Leg : body mean length</th>
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<tr>
<td>I</td>
<td>24</td>
<td>237</td>
<td>69</td>
<td>86</td>
<td>192</td>
<td>608</td>
<td>≈1.11</td>
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<tr>
<td>II</td>
<td>24</td>
<td>147</td>
<td>61</td>
<td>86</td>
<td>176</td>
<td>494</td>
<td>≈0.90</td>
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<tr>
<td>III</td>
<td>82</td>
<td>139</td>
<td>57</td>
<td>106</td>
<td>192</td>
<td>576</td>
<td>≈1.05</td>
</tr>
<tr>
<td>IV</td>
<td>118</td>
<td>205</td>
<td>73</td>
<td>106</td>
<td>287</td>
<td>888</td>
<td>≈1.62</td>
</tr>
</tbody>
</table>

Note: Tr – trochanter, Fe – femur, Ge – genu, Ti – Tibia, Ta – tarsus.

TABLE 2: Leg setation and solenidia of adult Epidamaeus bahamensis n. sp.

<table>
<thead>
<tr>
<th>Leg</th>
<th>Tr</th>
<th>Fe</th>
<th>Ge</th>
<th>Ti</th>
<th>Ta</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>v'</td>
<td>d, (l), bo&quot;, (v 1), v&quot;</td>
<td>l&quot;, (v), ( \phi_1, \phi_2 )</td>
<td>(ft), (tc), (it), (p), (u), (a), s, (pv), (pl), (v), r, ( \omega_1, \omega_2 )</td>
<td></td>
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<tr>
<td>II</td>
<td>v'</td>
<td>d, (l), bo&quot;, (v)</td>
<td>l&quot;, (v), ( \phi_1, \phi_2 )</td>
<td>(ft), (tc), (it), (p), (u), (a), s, (pv), (v)</td>
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<tr>
<td>III</td>
<td>l&quot;, v'</td>
<td>d, l&quot;, ev&quot;, v&quot;</td>
<td>l&quot;, (v), l&quot;, ( \phi_1, \phi_2 )</td>
<td>(ft), (tc), (it), (p), (u), (a), s, (pv), (v)</td>
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<tr>
<td>IV</td>
<td>v'</td>
<td>d, l&quot;, ev&quot;, v&quot;</td>
<td>l&quot;, (v), l&quot;, ( \phi_1, \phi_2 )</td>
<td>(ft), (tc), (it), (p), (u), (a), s, (pv), (v)</td>
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</table>

Note: Roman letters refer to normal setae, Greek letters to solenidia (except \( \varepsilon \) = famulus), \( d \) – seta and solenidion coupled. Single prime (') marks setae on the anterior and double prime (") setae on the posterior side of a given leg.

Adanal lyrifissures (iad) located in inverse apoanal position.

Legs (Figs 3B–D, 4A–F) — Leg II shorter than body length; legs I, III, IV longer than body length (Table 1). Formulae of leg setation and solenidia:

1. The list of identified oribatid mite taxa from the Caribbean based on part of large material from the collections of the Naturalis Biodiversity Center (Leiden, The Netherlands) included 84 species from 64 genera and 35 families. Of these (except seven not identified species), 17 species are known so far only from the Antilles, 39 species from the Neotropical region and other 21 species have more wide geographic distribution. The largest number of species belongs to the families Galumnidae (15 species), Haplozetidae (7), Scheloribatidae (7), Opiidae (6) and the genera Pergalumna (8), Scheloribates (5) and Galumna (4). Muliercula orixaensis, Teleioliodes zikani, Archegozetes longisetosus, Hemileius major and Scheloribates (Scheloribates) praecinus prevailed on number of studied sites (26, 18, 14, 14, 13, respectively). Four species, Grandjeania bicaud-
data, Scheloribates (Scheloribates) milleri, Protoribates oblongus and Orthogalumna saeva, are recorded in the Neotropical region for the first time.

2. The analysis of literature on Damaeidae species has revealed an incorrect systematic placement of one species. Epidamaeus palaciosi was described by Iglesias and Guzmán (2012) from Mexico. However, it (see Figs 4–10 in Iglesias and Guzmán 2012) has solenidia coupled with dorsal setae on leg tibiae II and III (vs. dorsal setae on leg tibiae II and III absent in Epidamaeus). All main morphological characters of E. palaciosi correspond to Dyobelba Norton, 1978 (see generic traits in Norton 1978 and Bayartogtokh et al. 2001), therefore we propose the following change: Dyobelba palaciosi (Iglesias and Guzmán, 2012) n. comb.

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REFERENCES


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