Acarologia is proudly non-profit, with no page charges and free open access

Please help us maintain this system by encouraging your institutes to subscribe to the print version of the journal and by sending us your high quality research on the Acari.

Subscriptions: Year 2021 (Volume 61): 450 €
http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php
Previous volumes (2010-2020): 250 € / year (4 issues)
Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France
ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d’avenir » programme (Labex Agro: ANR-10-LABX-0001-01)

Acarologia is under free license and distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.
TWO NEW SPECIES OF ORIPODOIDEA (ACARI: ORIBATIDA) FROM VIETNAM

Sergey G. ERMILOV1* and Alexander E. ANICHKIN2

(Received 12 January 2011; accepted 07 February 2011; published online 30 June 2011)

1 Laboratory of Entomology, Center of Independent Examinations-NN, Gagarin 97, 603107 Nizhniy Novgorod, Russia. ermilovacari@yandex.ru (corresponding author)
2 Institute of Ecological and Evolutionary Problems, Russian Academy of Sciences, Lenin 33, 119071 Moscow, Russia; Joint Russian-Vietnamese Research and Technological Center, Southern Branch, Dstr. 10, Str. 3/2, 3, Ho Chi Minh City, Vietnam. repetty@yandex.ru

ABSTRACT — Two new species of oribatid mites of the superfamily Oripodoidea, Peloribates spiniformis n. sp. and Zygoribatula prima n. sp., are described from dark loamy soil of Lagerstroemia forest of Cat Tien National Park (southern Vietnam). Peloribates spiniformis n. sp. can be included in the Peloribates species group having very short notogastral setae, however it clearly differs from other species by having interlamellar setae that are medio-distally dilated (setiform or spiniform in the other species). Zygoribatula prima n. sp. is the first species of Zygoribatula recorded from Vietnam; it can be included in the species group having a striate notogaster, but differs from other species by the specific localization of the striae. Peloribates rangiroaensis Hammer, 1972 is recorded for the first time in Vietnam. An identification key to all Vietnamese species of Peloribates is presented.

KEYWORDS — oribatid mites; new species; record; Peloribates; Zygoribatula; Vietnam

INTRODUCTION

In the course of faunistic studies of the oribatid fauna of Cat Tien National Park (southern Vietnam) we found representatives of two new species of the superfamily Oripodoidea, one belonging to the genus Peloribates Berlese, 1908 and the other to Zygoribatula Berlese, 1916.

Peloribates is a large genus of the family Haplozetidae that was proposed by Berlese (1908) with Oribata peloptoides Berlese, 1888 as type species. Currently, it comprises more than 80 species that collectively have a cosmopolitan (except Antarctica) distribution. The known Vietnamese fauna of Peloribates has included four species: P. pseudoporosus Balogh and Mahunka, 1967, P. kaszabi Mahunka, 1988, P. gressitti Mahunka, 1967, and P. stellatus Balogh and Mahunka, 1967 (Balogh and Mahunka 1967; Golosova 1983; Mahunka 1988; Krivolutskiy et al. 1997; Vu 2007). Peloribates pseudoporosus and P. stellatus are currently recorded only from Vietnam. Peloribates kaszabi was known only from Vietnam, until it was recently found in India (Bayartogtokh and Chatterjee 2010). Peloribates gressitti is currently recorded from Vietnam and the Philippines.

In addition to the new species, we also have found the first representatives of Peloribates rangiroaensis Hammer, 1972 known from Vietnam. This species is distributed in the eastern Palearctic region, southeastern China and Polynesia (Subías, 2004, online version 2010). Specimens are collected in the same place where new species are collected.
Zygoribatula is a large genus of the family Oribatulidae that was proposed by Berlese (1916) with Oribatula connexa Berlese, 1904 as type species. Currently, it comprises more than 90 species that collectively have a cosmopolitan distribution. For the Vietnamese fauna Zygoribatula has been recorded once, represented by an unidentified species (Golosova 1983). Thus, the new species is the first identified member of Zygoribatula recorded for Vietnam.

MATERIALS AND METHODS

Collection localities and habitats of the new species are characterized in the "Material examined" sections. Specimens were studied in lactic acid, mounted in temporary cavity slides for the duration of the study and then stored in 70% alcohol in tubes.

All body measurements are presented in micrometers. Body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate, to avoid discrepancies caused by different degrees of notogastral distension. Notogastral width refers to the maximum width in dorsal aspect. Length of body setae was measured in lateral aspect. Some paratypes of each species were dissected for detailed studies (gnathosoma, ovipositor, legs).

Formulae for leg setation are given in parentheses according to sequence of trochanter-femur-genu-tibia-tarsus (famulus included). Formulae for leg solenidia are given in square brackets according to sequence of genu-tibia-tarsus.

DESCRIPTION OF NEW SPECIES

Peloribates spiniformis n. sp.
(Figures 1 – 3)


Diagnosis

This species is characterized by the following combination of traits: body size 332 – 348 x 182; body surface foveolate; interlamellar setae medio-distally dilated, barbed; sensilli with long stalk and oblong head, rounded distally, with small barbs; 14 pairs of short, spiniform, straight, smooth notogastral setae; claws of legs finely serrated on dorsal edges.

Description

Measurements — Body length 340 (holotype), 332 – 348 (mean 337, three paratypes); body width 182 (holotype), 182 (three paratypes).

Integument — Body color light brown to brown. Surface of body, leg femora and trochanters III, IV foveolate. Foveolae oval or round (up to 10 in length or diameter) (Figure 4).

Prodorsum — (Figure 1A; Figure 2A–F). Rostrum broadly rounded anteriorly. Lamellae longer than half of prodorsum, distally with weakly developed lateral tooth. Rostral (ro, 41 – 45) and lamellar (le, 53 – 61) setae setiform, barbed. Interlamellar setae (in, 20) medio-distally dilated, barbed. Exobothridial setae (ex, 8) setiform, slightly thickened, barbed. Sensilli (ss, 52 – 60) with long stalk (28 – 32) and oblong head (24 – 28), rounded distally, with small barbs.

Notogaster — (Figure 1A). Dorsosejugal suture weakly developed, hardly visible. Pteromorphae short, movable. Fourteen pairs of short (4 – 6), spiniform, straight, smooth notogastral setae. Four pairs of minute sacculi, visible with difficulty. Opisthontotal gland opening (gla) and lyrifissures developed in typical arrangement for genus.

Lateral part of body — (Figure 2A). Tutorium (tu) long. Sublamellar line weakly developed. Sublamellar areae porosae (Al, 8 – 10) rounded or oval. Pedotecta I and II small. Discidia (di) triangular.

Anogenital region — (Figure 1B; Figure 2G, H). Two pairs anal (an1, an2, 4), three pairs adanal (ad1 – ad3, 4 – 6), one pair aggenital (ag, 4 – 6) and five pairs of genital setae (g1 – g5 4) slightly thickened, smooth. Lyrifissures iad in typical position for genus.

Epimeral region — (Figure 1B). Apodemes 2, sejugal, 3 and circumpedal carina well-developed. All epimeral setae setiform, weakly barbed; setae 3c longest (24), 3a shortest (6).
Gnathosoma — (Figure 3A–C). Subcapitulum longer than wide: 69 – 73 x 57 – 61. Hypostomal setae setiform, barbed, different little in length (12 – 16). Lateral lips with two pairs of adoral setae (6 – 8), setiform, barbed. Palps (length 53 – 61) with setation 0-2-1-3-9(+1ω). All setae (except some on tarsi) barbed. Chelicerae (length 73 – 82) chelate-dentate; cheliceral setae setiform, barbed, cha (20 – 24) longer than chb (12 – 16).

Legs — (Figure 3D–F). Morphology similar to other species of Peloribates (Beck 1964; Bayartogtokh 2000; Bayartogtokh and Smelyansky 2008). Tarsi with three claws, weakly serrated on dorsal sides; median claw thicker than lateral claws. Formulae of leg setation and solenidia: I (1-5-3-4-19) [1-2-2], II (1-5-3-4-15) [1-1-2], III (2-3-1-3-15) [1-1-0], IV (1-2-2-3-12) [0-1-0]; homology of setae and solenidia indicated in Table 1. All setae barbed or with short cilia. Famulus short, straight, blunt-ended. Solenidia ω₁ on tarsi I, ω₂ and σ on tarsi II, σ on genua II and III rod-shaped; other solenidia setiform.

Material examined — Holotype (female), paratypes (three specimens: two females and one male) were obtained from southern Vietnam, 11°25’ N, 107°25’ E, Cat Tien National Park, 149 m above sea level, in dark loamy soil of Lagerstroemia forest, February-March 2009, collected by A.E. Anichkin.

Type deposition — The holotype is deposited in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia;
two paratypes are deposited in the collection of the Center for Biodiversity Resources Education and Development (CEBRED), Hanoi National University of Education, Hanoi, Vietnam; one paratype is in the personal collection of the first author (Center of Independent Examinations–NN, Nizhniy Novgorod, Russia).

Etymology — The specific name "spiniformis" refers to the spine-like notogastral setae.

Distribution. — At present, this species is only known from Cat Tien National Park of southern Vietnam.

FIGURE 3: *Peloribates spiniformis* n. sp. A – subcapitulum; B – palp; C – chelicera; D – leg I, left, antiaxial view; E – femur and genu of leg II, right, antiaxial view; F – leg IV, right, antiaxial view. Scale bars 20 µm.
from the Neotropical region, *P. pseudoporosus* Balogh and Mahunka, 1967 from Vietnam, *P. tunisiensis* Mahunka, 1980 from the Mediterranean region. However, it clearly differs from all species in this group by having interlamellar setae that are medio-distally dilated (setiform or spiniform in the other species).

### Key to Vietnamese species of genus Peloribates

An identification key to all known Vietnamese species of *Peloribates* is presented below.

1. Notogastral setae very short (not longer than diameter of bothridia) .................................................2
   — Notogastral setae medium or long (considerably longer than diameter of bothridia) .................................3

2. Interlamellar setae setiform, head of sensilli with setiform tip . . . . *pseudoporosus* Balogh and Mahunka — Interlamellar setae medio-distally dilated, head of sensilli rounded distally . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . ..
part. Rostral (45 – 53), lamellar (65 – 82) and inter-
lamellar (65 – 82) setae setiform, barbed. Exoboth-
roidal setae (24) setiform, thin, barbed. Sensilli (40 –
50) with shorter stalk (16 – 20) and longer head (24
– 30), rounded distally, barbed.

Notogaster — (Figure 4A; Figure 5F–M). Dor-
sosejugal suture complete, convex. Humeral projec-
tions slightly developed. Fourteen pairs of setiform,
barbed notogastral setae. Setae $c_2$, $da$ and $la$ longest
(36 – 41), setae $dm$ and $lm$ little shorter (28 – 36), set-
ae $dp$, $lp$, $h_1$, $h_2$ and $h_3$ short (16 – 20), setae $p_1$, $p_2$ and
$p_3$ shortest (12 – 16). Four pairs of areae porosae de-
veloped dorsally: $Aa$ oblong (14 – 20 x 6 – 8); $A1$

Anogenital region — (Figure 4B; Figure 5N, O).
Two pairs anal (4 – 8), three pairs adanal (8 – 12), one
pair aggenital (ag, 4 – 6) and four pairs of genital se-
tae (4 – 8) setiform, slightly barbed. Lyrifissures $iad$
in preanal position.
Ermilov S. G. and Anichkin A. E.

FIGURE 5: Zygoribatula prima n. sp. A – lateral view of prodorsum, legs, gnathosoma and epimeral setae removed; B – rostrum; C – rostral setae; D – lamellar seta; E – sensillus; F – notogastral seta c1; G – notogastral seta c2; H – notogastral seta lm; I – notogastral seta h3; J – area porosa Aa; K – area porosa A1 (oblong form); L – area porosa A1 (round form); M – area porosa A2; N – genital plate, left; O – anal plate, left. Scale bar (A) 100 µm, scale bar (J+K+L+M) 10 µm, scale bars (B, C+D, E+F+G+H+I, N+O) 20 µm.
**Figure 6:** *Zygoribatula prima* n. sp. A – subcapitulum; B – palp; C – chelicera; D – leg I, right, antiaxial view; E – leg IV, left, antiaxial view. Scale bars 20 µm.

**Epimeral region** (Figure 4B). Apodemes 2, sejugal, 3 and circumpedal carina well-developed. All epimeral setae setiform, slightly barbed. Setae 1c longest (20 – 24), other setae shorter (8 – 16).

**Gnathosoma** — (Figure 6A–C). Subcapitulum longer than wide: 86 x 71. Hypostomal setae setiform, barbed, h (24 – 32) slightly longer than a and m (20 – 28). Lateral lips with two pairs of adoral setae (8 – 12), setiform, barbed. Palps (length 53) with setation 0-2-1-3-9(+1ω). All setae (except some on tarsi) barbed. Chelicerae (length 94) chelate-dentate; cheliceral setae setiform, barbed, cha (32) longer than chb (20).

**Legs** — (Figure 6D, E). Morphology similar to that in other species of *Zygoribatula* (Grobler 1993; Bayartogtokh and Smelyansky 2008). Tarsi with
three simple claws, median claw obviously thicker than lateral claws. Formulae of leg setation and solenidia: I (1-5(4)-3-4-19) [1-2-2], II (1-5-2-4-15) [1-3], III (2-3-1-3-15) [1-1-0], IV (1-2-2-3-12) [0-1-0]; homology of setae and solenidia indicated in Table 2. Setae l” on femora I absent from some specimens. All setae barbed or with short cilia. Famulus short, straight, blunt-ended. Solenidia \( \omega_1 \) on tarsi I, \( \omega_2 \) on tarsi II, \( \sigma \) on genua III rod-shaped; other solenidia setiform.

Material examined — Holotype (female), paratypes (four specimens: two females and two males) were obtained from southern Vietnam, 11°25' N, 107°25' E, Cat Tien National Park, 149 m above sea level, in dark loamy soil of Lagerstroemia forest, February-March 2009, collected by A.E. Anichkin.

Type deposition — The holotype is deposited in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; two paratypes are in the collection of the Center for Biodiversity Resources Education and Development (CEBRED), Hanoi National University of Education, Hanoi, Vietnam; two paratypes are in the personal collection of the first author (Center of Independent Examinations–NN, Nizhniy Novgorod, Russia).

Etymology — The specific name "prima" refers to the first identified species of Zygoribatula recorded for Vietnam.

Distribution — At present, this species is known only from Cat Tien National Park of southern Vietnam.


ACKNOWLEDGEMENTS

We gratefully acknowledge to Prof. Dr. Roy A. Norton (State University of New York, College of Environmental Science and Forestry, Syracuse, USA), Kerstin Franke (Senckenberg Museum für Naturkunde Götting, Germany), Prof. Dr. Heinrich Schatz (Institute of Ecology, Leopold-Franzens University of Innsbruck, Innsbruck, Austria), Dr. Umukusam Shtanchaeva (Caspian Institute of Biological Resources, Makhachkala, Russia), Dr. Ekaterina A. Sidorchuk (Paleontological Institute, Moscow, Russia), Dr. Matthew Colloff (CSIRO Entomology, Canberra, Australia) for help with collecting literature. We thank three anonymous re-

Table 2: Leg setation and solenidia of Zygoribatula prima n. sp.

<table>
<thead>
<tr>
<th>Leg</th>
<th>Trochanter</th>
<th>Femur</th>
<th>Genus</th>
<th>Tibia</th>
<th>Tarsus</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>( v' )</td>
<td>( d, l, b v', v'' )</td>
<td>( l, v', \sigma )</td>
<td>( l, (v), \phi_1, \phi_2 )</td>
<td>( ft, (tc), (lt), (pl), (a), (s), (pv), v', (pl), e, \omega_1, \omega_2 )</td>
</tr>
<tr>
<td>II</td>
<td>( v' )</td>
<td>( d, l', l_2', b v', v'' )</td>
<td>( l', v', \sigma )</td>
<td>( l, (v), \phi )</td>
<td>( ft, (tc), (lt), (pl), (a), (s), (pv), \omega_1, \omega_2 )</td>
</tr>
<tr>
<td>III</td>
<td>( l', v' )</td>
<td>( d, l', v' )</td>
<td>( l', \sigma )</td>
<td>( l', (v), \phi )</td>
<td>( ft, (tc), (lt), (pl), (a), (s), (pv) )</td>
</tr>
<tr>
<td>IV</td>
<td>( v' )</td>
<td>( d, v' )</td>
<td>( d, l', )</td>
<td>( l', (v), \phi )</td>
<td>( ft', (tc), (lt), (pl), (a), (s), (pv) )</td>
</tr>
</tbody>
</table>

See Table 1 for explanation.
viewers for their valuable comments. We thank the staff of Cat Tien National Park for supporting during the fieldwork.

REFERENCES


Ermilov S. G. and Anichkin A. E.

Weigmann G. 2006 — Hornmilben (Oribatida) — Die Tierwelt Deutschlands. 76. Goecke and Evers, Keltern, 520 ss.

COPYRIGHT

Ermilov and Anichkin. Acarologia is under free license. This open-access article is distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.