New species and records of ptyctimous mites from the Oriental region

(Acari, Oribatida)

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The present study is based on ptyctimous oribatid mite materials (Acari, Oribatida) collected from China, Taiwan, Indonesia, Myanmar and Vietnam. A list of identified taxa, including 26 species from five families, is presented; of these, new records are: five species (Atropacarus (Hoplophorella) hamatus, Notophthiracarus lienhardi, Phthiracarus lentulus, P. paucus, P. persimplex) in the Chinese fauna, two species (Australotritia lebronneci and Atropacarus (Hoplophorella) hamatus) in Java and Bali, six species (Australotritia lebronneci, A. robusta, Mesotritia maerkeli, Notophthiracarus robertsi, Oribotritia leptoeus, Phthiracarus pondoklowii) in Myanmar, one species (Notophthiracarus lienhardi) in Vietnam. P. persimplex is new in the Oriental Region. Two new species are described: Phthiracarus paramindanaensis Niedbała spec. nov. (Phthiracaridae) (from Taiwan) differs from Phthiracarus mindanaensis Niedbała, Corpuz-Raros & Gruezo, 2006 by the arrangement of genital and adanal setae and surface of prodorsum; Plonaphacarus myanmarus Niedbała spec. nov. (Steganacaridae) (from Myanmar) differs from Plonaphacarus foveolatus Liu, Wu & Chen, 2011 by the shape of adanal setae ad2, morphology of prodorsum and formula of genital setae. The supplementary description of Notophthiracarus robertsi (Sheals, 1965) (Steganacaridae) is given based on material from Myanmar.

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Introduction

This work is based on a random set of previously unstudied material of ptyctimous oribatid mites (Acari, Oribatida) collected from different samples of five countries of the Oriental region (southern China, Taiwan, Indonesia, Myanmar, Vietnam). The primary goal of this paper is to present a list and new findings of the identified taxa. At present, the ptyctimous mite fauna of listed countries are moderately known (with ca 110 species from China, and separately with 8 species from Taiwan, ca 80 species from Indonesia, and more than 40 species from Vietnam) or absolutely unknown (Myanmar) (Niedbała & Liu 2018).

In the course of taxonomic identification, we found two new species, one (from Taiwan) belonging to the genus Phthiracarus Perty, 1841 (Phthiracaridae), and the other (from Myanmar) to Plonaphacarus Niedbala, 1986 (Steganacaridae). The secondary goal of this paper is to describe and illustrate these species. The generic characters of Phthiracarus and Plonaphacarus, and identification keys and analysis on geographical distribution to the Oriental species were presented by Niedbala (2000).
Additionally, the supplementary description of *Notophthiracarus robertsi* (Sheals, 1965) (Steganacaridae) is given based on material from Myanmar.

### Material and methods

#### Material examined.

List of collecting sites:

**China**

C1 – Jiangsu Province, Nanjing city, Zhongshanling, litter, 30.V.1991 (collected by F. S. Huang);

C2 – Jiangxi Province, Lu Mt., Sanbaooshu, litter, 2.IX.1983 (collected by W. B. Yao);

C3 – Fujian Province, Wuyi Mt., Wuyigong, litter, 23.IV.1989 (collected by H. F. Wang);

C4 – Yunnan Province, Mengjun, Longshammane, litter, 02.IV.1994 (collected by X. M. Zhang & L. L. Yang);

C5 – Hainan Island, Jianfengling, litter, 1994 (collected by C. H. Liao);


C7 – Guangxi Province, Shangxi, Nanping, Changlong, 910 m a.s.l., fungi under broadleaf, 10.VI.2000 (collected by J. Chen);

C8 – Hainan Island, Jianfengling, litter, XII.1993 (collected by C. H. Liao);

C9 – Guizhou Province, Guiyang city, Huaxi, Guizhou University, litter under shrub, 13.VIII.2006 (collected by J. Chen);

C10 – Fujian Province, Jiangzhou city, Longqi Mt., shrub and defoliation, 08.IX.1990 (collected by H. F. Wang);

C11 – Chongqing city, Wulong county, Huolu, 660 m a.s.l., litter, 06.VII.1989 (collected by X. C. Zhang);

C12 – Yunnan Province, Pingbian county, litter, 21. XII.1992 (collector not known);

C13 – Guangzhou Province, Guangzhou city, litter, 02.XI.1978 (W. B. Yao);

C14 – Anhui Province, Jiuhuashan Mt., from litter, VI.1988 (collector not known);

C15 – Guangdong Province, Zhaqing city, Dinghushan National Nature Reserve, 23°09'35.51"N, 112°33'15.05"E, litter of *Gnetum parvifolium*, 20.X.1997 (H. F. Wang);

C16 – Chongqing City, Youyang county, 850 m a.s.l., litter, 07.1987 (Y. Q. Cui).

**Taiwan**


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1 Specimens from China were submerged in permanent slides and determined together with Dr. Dong Liu during his stay on 05–23.XI.2009 on DATE.

**Indonesia**

I1 – Java, Cibodas volcano, 1800 m a.s.l., detritus from woody fern, 29.VIII.1979 (collected by J. Błoszyk);

I2 – Java, Cibodas volcano, 2700 m a.s.l., sifted litter from forestry leafy leaves and moss, 23.VIII.1979 (collected by J. Błoszyk);

I3 – Bali, Tulamben, 8°16'46.51"S, 115°35'44.48"E, dry litter under trees of Parkia type, 07.VI.2016 (collected by K. Falericzky-Koziróg);

I4 – as I3, but 8°16'50.48"S, 115°35'47.86"E.

**Myanmar (Burma)**

M1 – Southern Chin State, road to South of Nat Ma Taung National Park, 21°10'07.5"N, 93°54'53.5"E, 2543 m a.s.l., pristine primary forest with rich understory, leaf litter, 16.V.2014 (collected by P. Jäger);

M2 – Southern Chin State, Nat Ma Taung National Park, road Kampetlet-Mindat, 21°12'33.8"N, 94°01'26.8"E, 2150 m a.s.l., disturbed primary forest, 11.V.2014 (collected by P. Jäger).

**Vietnam**


### 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 of the notogaster in dorsal view. Lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometres.

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

The following abbreviations are used on the figures: ro, le, in, ss, ex – rostral, lamellar, interlamellar, bothridial and exobothridial setae, respectively; c, d, f, h, ps – notogastral setae; an, ad – anal and adanal setae, respectively; ia, im, ip, ips – notogastral lyrifissures; h – subcapitular seta, d – dorsal seta of femur I.

Morphological terminology used in this paper follows that of F. Grandjean: see Travé & Vachon (1975) for references and Norton & Behan-Pelletier (2009) for overview.

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

Mesoplophoridae

Apoplophora pantotrema (Berlese, 1913). Locality: I1 (5 specimens including two deutonymphs). Distribution: Australian and Oriental regions.

Oribotritiidae


Phthiracaridae


Acrotritia sinensis Jacot, 1923. Localities: C6 (1 specimen), C7 (1 specimen). Distribution: Tropical and Subtropical regions.

Phthiracaridae


Phthiracarus paramindanaoensis Niedbala spec. nov. Locality: T (1 specimen).


Steganacaridae


Plonaphacarus myanmarus Niedbala spec. nov. Locality: M1 (1 specimen).


Systematics

Phthiracarus paramindanaoensis Niedbala spec. nov.
Fig. 1A–F

Description

Measurements. Prodorsum: length 278, width 207, height 109; setae of prodorsum: ss 53, in 104, le 94, ro 38, ex 43; notogaster: length 480, width 399, height 269; setae of notogaster: c₁ 71, c₁/c₁-d₁ = 0.6, c₁ 40, h₁ and ps₁ 56; genitoaggenital plate 126 × 78, anoadanal plate 152 × 63.

All specimens are deposited in DATE.

Prodorsum with sigillar fields narrow and long, median longer than laterals. Surface is covered with fine median and posterior furrows usually unnoticed in genus Phthiracarus. Lateral carinae long. Sensilli smooth, short, fusiform, pointed distally. Setae fine, attenuate, interlamellar and lamellar (in > le) setae longer than rostral and exobothridial setae (ex > ro).

Notogaster with 15 pairs of fairly short (c₁ < c₁–d₁) setae, c₁ and c₂ remote from anterior border, c₃ near border. Vestigial setae f₁ positioned anterior of h₁. Four pairs of lyrifissures (ia, im, ip and ips) present.

Ventral region. Setae h of mentum slightly longer than distance between them. Genito-aggenital plates with nine pairs of setae with formula: 9 (4 + 3): 2. Ano-adanal plates each with five well-developed setae, anal setae longer than adanal setae, ad₁ and ad₂ located near paraxial border, ad₂ lateral and anterior of an₂.

Legs. Formulae of setae and solenidia of "complete type". Setae d on femora I long, curved and remote from distal end of article.


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

Etymology. The prefix para is Latin meaning “near” and refers to the similarity of the new species to Phthiracarus mindanaoensis Niedbała, Corpuz-Raros & Gruezo, 2006 from the Philippines.

Remarks. The new species is similar to Phthiracarus mindanaoensis Niedbała, Corpuz-Raros & Gruezo, 2006 (Niedbała et al. 2006) from the Philippines by the shape of sensilli, length of prodorsal and notogastral setae, number and arrangement of lyrifissures.

Fig. 1A–F. Phthiracarus paramindanaoensis Niedbala spec. nov. (holotype): A. Prodorsum, dorsal view. B. Prodorsum with anterior part of notogaster, lateral view. C. Opisthosoma, lateral view. D. Mentum of subcapitulum. E. Ventral plates, right genitoaggenital and anoadanal plates. F. Trochanter and femur of leg I. Scale bars: 100 µm (A–C, E), 50 µm (D, F).

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and vestigial setae, length of setae $h$ of subcapitular mentum, arrangement of setae at femora of legs, but differs by the arrangement of genital setae (genital setae $g_4$ and $g_6$ located lateral and between setae $g_6$ and $g_7$, versus only setae $g_5$ lateral and between setae $g_6$ and $g_7$), adanal setae $ad_2$ and $ad_3$ situated more in paraxial border of ano-adanal plates, and $ad_2$ lateral and anterior of setae $an_2$ (versus setae $ad_2$ and $ad_3$ located more antiaxial and setae $ad_2$ lateral and between setae $an_2$ and $an_3$). Moreover, also the prodorsum of new species is covered with fine median and posterior furrows (versus furrows absent).

**Plonaphacarus myanmarus** Niedbala spec. nov.

**Fig. 2A–H**

Measurements. Prodorsum: length 318, width 212, height 126; setae of prodorsum: $ss_{45}$, $in_{137}$, $le_{5}$, $ro_{58}$, $ex_{10}$; notogaster: length 616, width 404, height 384; setae of notogaster: $c_1_{124}$, $c_1/c_1-d_1=0.9$, $h_1_{116}$, $ps_{109}$; genitoaggenital plate $162 \times 137$, ano-adanal plate $230 \times 174$.

Integument. Colour dark brown. Cuticle of body well sculptured, prodorsum and notogaster covered with weak foveoles, surface of genitoaggenital and ano-adanal plates with distinct foveoles.

Prodorsum with posterior furrows. Sigillar fields narrow, long, median and laterals similar in length. Sensilli short, club-like, rough with rounded head.
Interlamellar setae long, stout, rigid, erect, covered with small scales along the length and with distinct, longer spines in distal end. Lamellar setae short, spiniform, rough. Rostral setae short, thick, covered with small spines. Exobothridial setae minute. Comparative lengths of setae: \(\text{in} > \text{ro} > \text{ss} > \text{le} > \text{cx}\).

Notogaster with setae of medium size \((c_1 > c_1 - d_1)\) as interlamellar setae, stout, rigid, covered with small scales along the length and with distinct, longer spines in distal end. Setae \(c_1\) and \(c_2\) remote from anterior border, setae \(c_3\) located near the border. Vestigial setae \(f_1\) placed posterior to \(h_1\). Two pairs of lyrifissures \((ia\) and \(im)\) present.

Ventral region. Setae \(h\) of mentum longer than the distance between them. Genitoaggenital plates with nine pairs of genital setae with arrangement: \((4+2): 3\). Anoadanal plates each with five pairs of rough setae, setae \(ad_2\) distinctly longer than other, equally narrowed along the length, curved distally; anal setae longer than setae \(ad_1\) and \(ad_3\).

Legs. Formula of setae and solenidia of “complete type”. Setae \(d\) of femora I curved and slightly remote from distal end of segment.

**Material examined.** Holotype: Myanmar (Burma), Southern Chin State, road to South of Nat Ma Taung National Park, 21°10'07.5" N, 93°54'53.5" E, 2543 m a.s.l., pristine primary forest with rich understory, leaf litter, 16.V.2014 (collected by P. Jäger).

**Type deposition.** The specific name *myanmarus* refers to the Myanmar country, where the new species is collected.

**Etymology.** The specific name *myanmarus* refers to the Myanmar country, where the new species is collected.

**Remarks.** The new species is similar to *Plonaphacarus foveolatus* Liu, Wu & Chen, 2011 (see Liu et al. 2011) from the Oriental part of China by the similar shape of prodorsal and notogastral setae, but differs by the shape of long and curved adanal setae \(ad_2\) (versus shorter and not curved), long lateral fields of prodorsum (versus lateral fields distinctly shorter than median fields) and formula of genital setae: \(4+2: 3\) (versus \(4+3: 2\)). Another species from Somalia, *Plonaphacarus persimilis* Niedbala, 1994 (see Niedbala 1994), is very similar in having \(ad_2\) setae equally narrowed, but differs by the presence of lateral carinae of prodorsum (versus lateral carinae absent), vestigial exobothridial setae (versus exobothridial setae minute), location of notogastral setae \(f_1\) anterior of \(h_1\) (versus posterior position), presence of four pairs of lyrifissures (versus two pairs) and formula of genital setae \(4+3: 2\) (versus \(4+2: 3\)).
In this population a specimen with a powerful median hood of prodorsum (Fig. 3A) was found much more powerful than in holotype (Sheals 1965) and specimens from Nepal (Niedbala 1982). In this specimen interlamellar (in) setae of prodorsum are longer than in the previously known specimens. Other specimens in the population from Myanmar do not have any median crista (Fig. 3C) and interlamellar setae are even longer. The size and other morphological characters are comparable to those described in the specimens from Nepal (Sheals 1965, Niedbala 1982).

Conclusion

The list of identified ptyctimous mites collected from the Oriental region includes 26 species from five families. 11 species recorded from continental China, 4 from Chinese Hainan Island, 1 from Taiwan, 5 from Indonesia, 7 from Myanmar, and 2 from Vietnam. Two species (*Plonaphacarus paramindanaensis* Niedbala spec. nov. from Taiwan and *Plonaphacarus myanmarus* Niedbala spec. nov. from Myanmar) are new to science; five species (*Atropacarus* (*Hoplophorella*) *hamatus*, *Notophthiracarus lienhardi*, *Phthiracarus lentulus*, *P. paucus*, *P. persimplex*) are recorded in China for the first time; two species (*Atropacarus* (*Hoplophorella*) *hamatus*, *Austrotritia lebronneci*) are recorded in Java and Bali, respectively, for the first time; six species (*Austrotritia lebronneci, A. robusta, Mesotritia maerkeli, Notophthiracarus robertsi, Oribotritia lepites, Phthiracarus pondoklowii*) are recorded in Myanmar for the first time; one species (*Notophthiracarus robertsi*) is recorded in Vietnam for the first time; and one species (*Phthiracarus persimplex*) is recorded in the Oriental region for the first time.

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References


