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## Ptyctimous mites mainly from Samar island of the Philippines (Acari: Oribatida)

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ABSTRACT. Twenty four species of ptyctimous mites, mainly from Samar Island National Park are described on the background of the topography and vegetation at the collection sites. Descriptions of five new species are given: *Oribotritia dipterocarpensis*, *O. lepteces*, *Phthiracarus mindanaoensis*, *Notophthiracarus aethes*, and *N. samarensis*. All known 37 species of ptyctimous oribatids from the Philippines are listed together with conspecific species. A comment on the proportions of the zoogeographical elements present has been added.

Key word. acarology, taxonomy, zoogeography, new species, Ptyctimous mites, Samar Island, Philippines.

### INTRODUCTION

In 1998, NIEDBALA and CORPUZ-RAROS first reported on the ptyctimous oribatids of the Philippines, accounting for collections gathered for about two decades during previous general oribatid studies by the junior author (LACR). The report included 28 species in four superfamilies and seven families of primitive oribatids whose body form allows the prodorsum to be folded like a penknife against the hysterosoma (Ptyctima). These species originated mainly from Luzon Island but

some also came from the islands of Samar, Leyte, Negros and Panay in the Visayas; Palawan-group; eastern part of Mindanao Island, and Basilan. Collections in Samar were limited to the Sohoton cave area in Barangay Rawis, Basey, Western Samar and yielded only four ptyctimous species: *Austrotritia lebronneci* (JACOT) and *Oribotritia aokii* MAHUNKA of the family Oribotritiidae, and *Acrotritia curticephala* (JACOT) and *A. spiculifera* (MAHUNKA) of the family Euphthiracaridae.

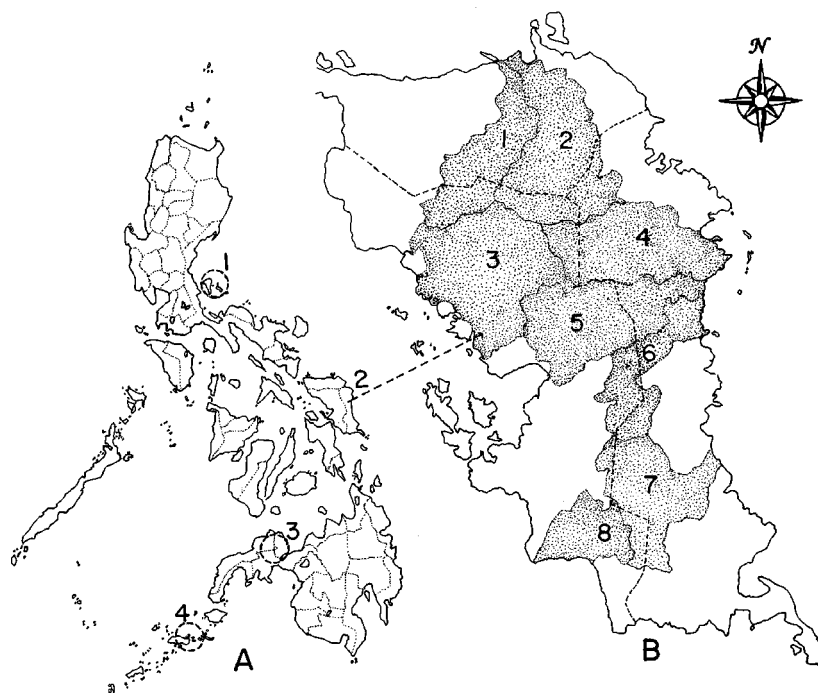
One of us (WSMG) has recently conducted an intensive field study to assess the floral diversity status in the seven of eight watersheds comprising the Samar Island Natural Park (SINP, Figure 1B) in Samar Island. This site, recently designated as a natural park, is a composite of the remaining forested areas on Samar Island which are now all situated in the island's interior. In each watershed, a total of 25 circular study plots, each measuring 1/8 ha or 1,250 m<sup>2</sup> were established along a 5 km transect line. This survey line was positioned in the direction of the closed canopy rainforests. A linear distance of 200 m separated one study plot from another. From these transects a total of 224 litter and soil samples were collected and analysis of their content is the basis of this report. The present account of Philippine ptyctimous mites includes also extracts from precursory samples taken earlier in Taft, Eastern Samar; two batches (August 2001 and October 2004) of samples from another floral diversity project in the Mt. Malindang Range, Misamis Occidental Province, Mindanao Island; more limited mangrove forest samples along the shoreline of Capual Island, Sulu-group south of Mindanao Island, and samples from the Sibulan Watershed in Polillo Island (located at 14°N, 122°E), off Luzon Island and within the political jurisdiction of Quezon Province. Details of data collection are given below and the specific sites are plotted in Figure 1.

During extended surveys in Samar, WSMG sent the fresh field samples in batches through courier air services. The mites and other arthropods contained therein were extracted in Tullgren funnels upon receipt of the field samples. Extraction, separation of arthropods from accompanying debris, separation of mites from other extracted arthropods and clearing of the mites in 1:1 lactophenol solution were made at the Acarology Laboratory at UPLB, College, Laguna, southern Luzon Island. Three fourths of about 250 Samar samples have thus been cleaned out and prepared, but most contained no ptyctimous species. The remaining samples, mainly from the Basey watershed, are likely to yield other species not included in this report and are subject to future studies. The material on hand includes a total of 24 species, of which 5 are new species and 4 are new species records from the Philippines. These bring the total to 37 species now known from the country.

Type specimens and other specimen documentation are deposited at the Adam Mickiewicz University, Poznań, Poland (DATE), and the Entomological Museum, Museum of Natural History (UPLB), College, Laguna, the Philippines.

## TOPOGRAPHY AND VEGETATION OF SAMAR COLLECTION SITES

Next to Luzon and Mindanao Islands, Samar is the third largest island in the Philippines, with total land area of 13,458 km<sup>2</sup> or 1.348 million hectares. It lies between 12° N latitude and 125° E longitude (Fig. 1). On the west, it is bordered by the islands of Leyte, Biliran and Masbate, and it is immediately south of Luzon Island from which it is separated by the San Juanico Strait. It is bordered on the south by Dinagat and Siargao islands, and it is situated directly on the easternmost shelf of the Philippine Pacific Plate facing the wide expanse of the Pacific Ocean. Samar is made up of three provinces, namely, Northern Samar, Eastern Samar and Western Samar, and is surrounded by 180 islets. Outside of the few urbanized areas, the island's landscape from the seashore to the interior is a composite of flat terrain to moderately rolling grasslands-brushlands, hilly patches of secondary forests pockmarked with sporadically scattered swidden fields and oldgrowth lowland mixed with dipterocarp forests. In some parts of the island, forest-over-limestone and riparian forest type are prominently present.



1. A. Map of the Philippines showing the collection sites: 1. Polillo Island-group, 2. Samar Island, 3. Mt. Malindang in Mindanao Island, and 4. Capual Island in northeastern corner of the largest island (Jolo) of the Sulu-group; B. Watersheds comprising the Samar Island National Park – 1. Pambujan, 2. Catubig, 3. Gandara, 4. Dolores, 5. Can-avid, 6. Taft, 7. Suribao, and 8. Basey

The SINP watersheds from where the samples originated are within the territorial jurisdiction of the three provinces on Samar Island – Gandara and Can-avid in Western Samar, Catubig and Pambujan in Northern and Western Samar, Taft and Suribao in Eastern Samar, and Dolores in Eastern Samar. Their general topography and vegetational types are described as follows:

**Gandara and Can-avid Watersheds** (Fig. 1. B-3 and B-5). Field studies were carried out in Gandara and Can-avid watersheds from October 6-25, 2002 and November 3-18, 2002, respectively. In the Gandara watershed, three subtransect lines were situated in the vicinity of Mt. Huraw (summit at 1,000 m, highest on Samar Island) within the municipality of San Jose de Buan, Western Samar Province, while in Can-avid watershed, two subtransect lines were laid out in the vicinity of Barangays Tapul and Anagasi, municipality of Paranas. Both watersheds have generally very rough topography with thin ridge tops, steep ridge slopes and narrow, congested valley bottoms. On the basis of their overall structure and composition, the majority of the study plots fall under the lowland dipterocarp forest type at elevations of 300 to 800 m above sea level. In the slopes of Mt. Huraw, there are two forest types, midmontane and mossy or cloud forest types, the latter on the mountains' summit. The 18 dominant dipterocarps in these two watersheds are species of *Anisoptera*, *Dipterocarpus*, *Hopea*, *Shorea* and *Vatica*, the last including two species that are endemic to Samar Island. Two conifers, *Agathis philippinensis* (Family Auracariaceae) and *Gnetum gnemon* (Family Gnetaceae), are also represented by a few mature trees as in other closed canopy forests of the island.

**Catubig and Pambujan Watersheds** (Fig. 1. B-1 and B-2). The Catubig and Pambujan Watersheds are two water catchments located in the extreme northern part of SINP. Like Gandara and Can-avid, both water basins are laced with creeks and small rivers which drain their water to their respective main waterways, the Catubig and Pambujan Rivers, that run north and finally culminate in the Philippine Sea. Intensive field studies in these watersheds were conducted from April 17-27, 2003 and May 2-8, 2003, respectively. In the Catubig Watershed, the presence of huge limestone rock-outcrops and small to medium-sized caves along the transect line, attest to the existence of a vegetation type termed forest-over-limestone. However, despite the presence of limestone-derived soils, the prevalent vegetation in the area is the lowland dipterocarp forest co-dominated by the species of *Shorea*, *Parashorea*, *Hopea* and *Vatica*. Numerous other large, non-dipterocarp species are associated with this forest type.

On the other hand, the Pambujan Watershed has vegetation belonging to the typical lowland dipterocarp forest type. The topography of this watershed is generally undulating, and elevation reaches up to 500 m along ridge tops and as low as 125 m along banks of the Pambujan River at the outskirts of Silvino Lubos town proper. In this watershed thirteen species of dipterocarps of the same genera as in the other watersheds are co-dominants.

**Taft and Suribao Watersheds** (Fig. 1. B-6 and B-7). The field study in the Taft Watershed was conducted from July 1-7, 2003 within two barangays of the

municipality of Taft, Binalo-an and San Rafael, within the headwaters of the Taft River flowing southwest to northeast toward the Pacific Ocean. Elevation varies from 250 to 400 m and general topography is characterized by a series of isolated small limestone hill ranges that are narrowly separated by flat to moderately sloping grounds with sharp-pointed limestone outcrops or shallow mudflats where water stays for short periods of time. Despite the fact that limestone is the main bedrock component of this watershed, cave formation is not common and instead there are small sinkholes or underground aquifers with small openings. Creeks or streams are prominently absent, hence flowing surface water is virtually nonexistent. In these barangays the greatest concentration of closed canopy mature forests and forest residual stands of the forest-over-limestone type are found. Plants represented in great number are the endemic species, *Neotrewia cumingii* and *Strombosia philippinensis*, that are of lesser value as timber source.

In Suribao Watershed a field survey was carried out within the boundary of Barangay Benowangan, Borongan, Eastern Samar Province, from July 10-17, 2003. The general topography of the site is characterized by riverbanks of moderate to steep slopes on its southern portion, and a mosaic of coconut plantations, upland rice or corn fields, agroforestry stands, and dense closed canopy rainforests on gently increasing elevation in the north. A number of creeks are present, all draining their water to the Suribao River. The entire vegetation landscape is a composite of forest-over-limestone, riparian forest and mixed dipterocarp forest on basalt-derived soil, with the first and last types appearing in discontinuous pattern from the riverbanks into the interior portions. Only the riparian forest, by the nature of its location, appears continuously throughout the entire length of the Suribao River system. Although a larger part of the study area belongs to a mixed dipterocarp forest type, two other forest types can be recognized on the basis of unique plant composition and attendant ecological conditions: the mossy or cloudy forest characterized by thick growths of mosses on trunks and branches of shrubs and small trees in the vicinity of Mt. Apoy, and an undescribed, mixed *Falcatifolium gruezoii* forest type (Gruezo, in prep.)

**Dolores Watershed** (Fig. 1. B-4). Field survey in the Dolores Watershed was conducted in October 17-25, 2003 in closed canopy dipterocarp forests in several sitios of Barangays Jicontol; Villa Hermosa; and Osmeña, all in the municipality of Dolores, Eastern Samar Province. Of the eight SINP watersheds, that of Dolores has the most mature and dense forest ecosystem, and no swidden fields of any size were observed in the area. The forest floor is rich in humus matter despite having relatively steep slopes of 30 to 70%. Elevation ranges from 625 to 125 m above sea level, and in general, the landscape is a composite of forest-over-limestone, riparian forest ecosystem, lowland dipterocarp-almaciga forest, grasslands, and agroforestry ecosystem, dominated particularly by coconuts and bananas. Fifteen species of dipterocarps grow luxuriantly on ridge tops, and along valley slopes. Other families with a high number of species in this watershed include Palmae, Myrtaceae, Pandanaceae, Rubiaceae, and Moraceae. During the field study, the area had very dense seedling (wildling) populations of *Shorea*

*negrosensis* and *Dipterocarpus grandiflorus*, among other dipterocarps. Apparently due to limited collections by residents of almaciga resin, Dolores is the only watershed where a large number of huge almaciga (*Agathis philippinensis*) are found growing together with equally numerous huge dipterocarp species. This watershed is harnessed as the main source of potable water for the many barangays within its borders as shown by dam constructions along the Jicontrol River and other waterways.

#### COLLECTION DATA

Abbreviations: Bgy = Barangay, the lowest political unit in the structure of the Philippine government; So = Sitio, a subunit of a barangay; T = Transect, P = Plot. Unless otherwise stated, all collections were made by W.SM. Gruezo

#### LACR Coll. No.

- 4926 MINDANAO IS.: Mt. Malindang Range, Bgy. Lake Dumagat, Don Victoriano, Misamis Occidental Province, leaf litter with soil, 16 VIII 2001;
- 4969 MINDANAO IS.: *ibid.*, moss;
- 5187 SAMAR IS.: Mt. Huraw, San Jose de Buan, Western Samar Province, leaf litter sample from lowland dipterocarp forest, 20 X 2002;
- 5194 SAMAR IS.: Anagasi, Paranas, Western Samar province, 600-700 m, litter sample T1P10 from lowland dipterocarp forest, 11 XI 2002;
- 5200 SAMAR IS.: *ibid.*, litter and soil sample no T1P1, 9 XI 2002;
- 5202 SAMAR IS.: *ibid.*, leaf litter sample no T2P5, 8 XI 2002;
- 5203 SAMAR IS.: *ibid.*, litter and soil, 8 XI 2002;
- 5208 SAMAR IS.: *ibid.*, leaf litter sample no T1P9, 11 XI 2002;
- 5211 SAMAR IS.: *ibid.*, leaf litter, XI 2002;
- 5212 SAMAR IS.: *ibid.*, leaf litter, XI 2002;
- 5384 POLILLO IS.: Sibulan watershed, Bgy. Pinaglubayan, Polillo Quezon Province, moss 27 IV2003, leg. I.L. Lit, Jr. & O.L. Eusebio;
- 5388 SAMAR IS.: Bgy. Victory, Silvino Lobos, Northern Samar Province, litter sample no T1P24, from secondary dipterocarp forest, 3 V 2003;
- 5390 SAMAR IS.: *ibid.*, litter sample no T1P22;
- 5392 SAMAR IS.: So. Salvacion, Bgy. San Nicolas, San Jose de Buan, Western Samar Province, *Ficus* fruits, 23 IV 2003;
- 5440 Samar IS.: Taft, Eastern Samar Province, litter from lowland dipterocarp forest, VII 2003;
- 5465 SAMAR IS.: *Ibid.*;
- 5468 SAMAR IS.: Suribao watershed 13, So. Kaparupusan, Bgy. Benowangan, Borongan, Eastern Samar Province, moss on tree trunk, 15 VII 2003;
- 5478 SAMAR IS.: Taft watershed 22, So. Parina, Binoloan, Eastern Samar Province, litter from secondary lowland forest, 6 VII 2003;

- 5480 SAMAR IS.: Suribao watershed 3, So. Kamparina, Benowangan, Eastern Samar Province, litter from secondary dipterocarp forest, 16 VII 2003;
- 5485 SAMAR IS.: Suribao watershed 3, Calaasan, Benowangan, Borongan, Eastern Samar Province, litter from secondary dipterocarp forest, 13VII 2003;
- 5487 SAMAR IS.: Suribao watershed 13, So. Kaparuspusan, Bgy. Benowangan, Borongan, Eastern Samar Province, litter from secondary dipterocarp forest, 15 VII 2003;
- 5492 SAMAR IS.: Suribao Watershed, near So. Kaparuspusan, Benowangan, Borongan, Eastern Samar Province, litter from secondary dipterocarp forest, 17 VII 2003;
- 5493 SAMAR IS.: Suribao Watershed 8, Daku-na-bukid, Benowangan, Borongan, Eastern Samar Province, moss on dead tree trunk, 14 VII 2003;
- 5498 SAMAR IS.: Benowangan, Borongan, Eastern Samar Province, litter from secondary dipterocarp forest, 14 VII 2003;
- 5537 POLILLO IS.: Burdeos, Quezon Province, decaying coconut trunk, 23 X 2003, leg. A.R. Larona;
- 5550 SAMAR IS.: So. Kalumutan, Bgy. Villa Hermosa, Dolores, Eastern Samar Province, litter and soil, sample no TiP2 from secondary dipterocarp forest, 23 X 2003;
- 5551 SAMAR IS.: So. Napatu-o, Bgy. Osmeña, Dolores, Eastern Samar Province, soil sample no T2P4 from secondary dipterocarp forest, 23 X 2003;
- 5556 SAMAR IS.: So. Hitindug, Bgy. Jicontol, Dolores, Eastern Samar province, 620 m, moss sample no T1P5 from secondary dipterocarp forest, 19 X 2003;
- 5566 SAMAR IS.: So. Maraot, Bgy. Osmeña, Dolores, Eastern Samar Province, 450 m, moss sample no T1P9 from secondary dipterocarp forest, 20 X 2003;
- 5569 SAMAR IS.: So. Maraot, Bgy. Osmeña, Dolores, Eastern Samar Province, sample no T1P16 from secondary dipterocarp forest, 20 X 2003;
- 5571 SAMAR IS.: So. Maraot, Bgy. Osmeña, Dolores, Eastern Samar Province, 400 m, litter and soil sample no T1P12 from secondary dipterocarp forest, 21 X 2003;
- 5573 SAMAR IS.: So. Napatu-o, Bgy. Osmeña, Dolores, Eastern Samar Province, 325 m, litter and soil sample no T1P13 from secondary dipterocarp forest, 21 X 2003;
- 5577 SAMAR IS.: So. Napatu-o, Bgy. Osmeña, Dolores, Eastern Samar Province, 225 m, moss sample no T1P15 from secondary dipterocarp forest, 21 X 2003;
- 5578 SAMAR IS.: So. Napatu-o, Bgy. Osmeña, Dolores, Eastern Samar Province, 225 m, litter sample no T1P16 from secondary dipterocarp forest, 22 X 2003;

- 5582 SAMAR IS.: So. Napatu-o, Bgy. Osmeña, Dolores, Eastern Samar province, 250 m, litter sample no T1P19 from secondary dipterocarp forest, 22 X 2003;
- 5585 SAMAR IS.: So. Napatu-o, Bgy. Osmeña, Dolores, Eastern Samar province, 150 m, litter sample no T1P21 from secondary disperocarp forest, 23 X 2003;
- 5589 SAMAR IS.: So. Napatu-o, Bgy. Osmeña, Dolores, Eastern Samar Province, 150 m, litter sample no T1P25 from secondary disperocarp forest, 23 X 2003;
- 5593 CAPUAL IS.: (Sulu Is. group): LUUK, Sulu Province, litter from mangrove forest, 13 X 2003, leg. C. Española;
- 5596 POLILLO IS.: (off Luzon Is.): near Mapanghe cave, Burdeos, Polillo, Quezon Province, bamboo litter, 16 X 2004, leg. O.L. Eusebio;
- 5615 MINDANAO IS.: Mt. Malindang Range, Bgy. Sibucal, Oroquieta City, Misamis Occidental Province, 1175 m, mixed litter and soil from almaciga forest, 24 X 2004;
- 5617 MINDANAO IS.: Mt. Malindang Range, Bgy. Sibucal, Oroquieta City, Misamis Occidental Province, 1205 m, mixed litter and soil from almaciga forest, 24 X 2004;
- 5618 MINDANAO IS.: Mt. Malindang Range, route to Bgy. Mialen, Oroquieta City Misamis Occidental Province, 720 m, soil with moss, 24 X 2004;
- 5621 MINDANAO IS.: Mt. Malindang Range, Bgy. Liboron, Lake Duminagat, Don Victoriano, Misamis Occidental Province, 1130 m, leaf litter, 24 X 2004;
- 5622 MINDANAO IS.: Mt. Malindang Range, trail to Bgy. Sibucal, Oroquieta City, Misamis Occidental Province, 1370 m, mixed litter and soil, 24 X 2004;
- 5623 MINDANAO IS.: Mt. Malindang Range, Bgy. Liboron, Lake Duminagat, Don Victoriano, Misamis Occidental Province, 1180 m, leaf litter, 24 X 2004.

## LIST OF SPECIES

**Family - Apoplophoridae**

1. *Apoplophora pantotrema* (BERLESE, 1913) – Polillo 5537(3); Samar 5187 (2), 5213 (5), 5388 (1), 5390 (11), 5468 (1), 5492 (2), 5498 (2), 5550 (1), 5556 (1), 5569 (6), 5573 (2), 5577 (2), 5578 (3), 5582 (4), 5585 (2), 5589 (3); Mindanao 4969 (1), 5615 (1).

**Family - Oribotritiidae**

2. *Oribotritia aokii* MAHUNKA 1987 – Samar 5493 (2).
3. *O. dipterocarpensis* **new species** – Samar 5485 (1).



4. *O. lepteces* **new species** – Samar 5577 (1).
5. *Sabacarus corneri* RAMSAY and SHEALS 1969 – Samar 5577 (1); Mindanao 5615 (2).
6. *Indotritia javensis* (SELLNICK, 1923) – Mindanao 5618 (9).
7. *Austrotritia robusta* NIEDBALA et CORPUZ-RAROS, 1998 – Samar 5203 (1), 5211 (1), 5480 (1), 5492 (3), 5498 (1).

#### Family - Euphthiracaridae

8. *Acrotritia comteae* (MAHUNKA, 1983) – Samar 5187 (1), 5194 (1), 5487 (1); Mindanao 5621 (5), 5623 (2).
9. *A. curticephala* (JACOT, 1938) – Samar 5202 (1), 5390 (1), 5465 (3), 5487 (1), 5569 (1), 5585 (1); Mindanao 5617 (4), 5622 (1), 5623 (1).
10. *A. refracta* NIEDBALA, 1998 – Samar 5388 (2), 5390 (3), 5468 (1), 5478 (3), 5582 (4); Mindanao 5615 (1).
11. *A. sinensis* JACOT, 1923 – Samar 5187 (2), 5194 (1), 5200 (1), 5550 (1), 5556 (2), 5571 (1).
12. *Microtritia tropica* MARKEL 1964 – Samar 5492 (1).

#### Family - Sabahtritiidae

13. *Sabahtritia sarawak* MAHUNKA, 1996, **new species on record** – Samar 5187 (1).

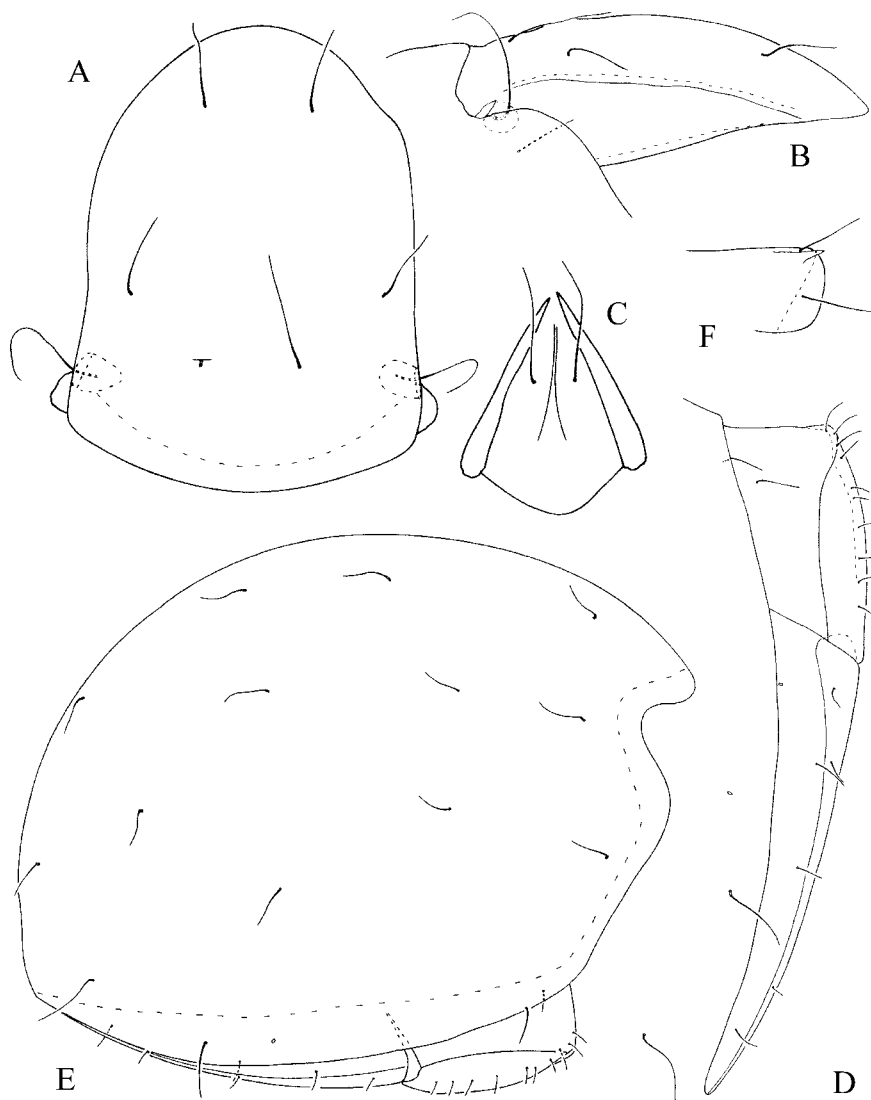
#### Family - Phthiracaridae

14. *Phthiracarus mindanaoensis* **new species** - Mindanao 4926 (1).
15. *P. pygmaeus* BALOGH, 1958, **new species on record** – Polillo 5384 (5); Samar 5187 (3), 5200 (3), 5390, 5480 (2), 5485 (1), 5551 (1), 5556 (3), 5566 (3), 5571 (1), 5578 (2), 5582 (3), 5585 (2).

#### Family – Steganacaridae

16. *Plonaphacarus dispar* NIEDBALA, 2000, **new species on record** – Samar 5202 (2), 5440 (12), 5578 (1); Mindanao 5617 (1), 5618 (5).
17. *P. kugohi* (AOKI, 1959) – Polillo 5596 (1); Samar 5194 (2), 5213 (3), 5390 (2), 5440 (1), 5465 (2), 5478 (8), 5480 (1), 5485 (2), 5550 (2); Mindanao 5622 (2).
18. *Hoplophthiracarus clavellatus* NIEDBALA et CORPUZ-RAROS, 1998 – Mindanao 5615 (1), 5623 (5).
19. *H. illinoisensis* (EWING, 1909), **new species on record** – Capual, Sulu Is. group 5593 (17).
20. *Notophthiracarus aethes* **new species** – Mindanao 4926 (3), 4969 (2).
21. *N. samarensis* **new species** – Samar 5468 (1), 5480 (2), 5487 (2), 5493 (1), 5551 (1), 5573 (2), 5577 (1), 5585 (1).

22. *N. stenotus* NIEDBAŁA et CORPUZ-RAROS, 1998 – Samar 5200 (2), 5202 (6), 5208 (3), 5498 (1), 5556 (1).  
 23. *Atropacarus (Hoplophorella) cucullatus* (EWING, 1909) – Samar 5194 (2), 5213 (1), 5440 (5), 5478 (12), 5485 (1), 5498 (1), 5573 (1), 5577 (2), 5582 (2), 5585 (1), 5589 (4); Mindanao 5622 (5).  
 24. *A. (H.) vitrinus* (BERLESE, 1913) – Samar 5390 (3).



2. A-F. *Oribotritia diptercarpensis* n. sp. (holotype): A – prodorsum, dorsal view, B – prodorsum, lateral view, C – mentum of infracapitulum, D – right genital, aggenital, anal and adanal plates, E – notogaster, F – distal part of femur I

## DESCRIPTIONS OF SPECIES

***Oribotritia dipterocarpensis* n. sp.**

(Figs 2. A-F)

## ETYMOLOGY

The name of the new species refers to the habitat of this species in dipterocarp forest.

## DESCRIPTION

Measurements of holotype: prodorsum: length 566, width 434, height 192, sensillus 152, setae: interlamellar 137, lamellar 91.1, rostral 93.6, exobothridial 70.8; notogaster: length 949, height 677, setae:  $c_1$  50.6,  $h_1$  45.5,  $ps_1$  43.0; genital and aggenital plates 202 x 106, anal and adanal plates 439 x 30.3.

Colour dark brown. Integument densely punctate.

Prodorsum with rigid, simple lateral carinae. Sensilli long, fine smooth, tapering. Setae fine, filiform,  $in > ro > le > ex$ .

Notogastral setae fine, short,  $c_1 < 1/2 \ c_1-d_1$ , only setae  $ps_2$  and  $ps_3$  stronger than other setae. Setae of row  $c$  remote from anterior margin, setae  $c_1$  and  $c_2$  more than setae  $c_3$ . Arrangement of lyrifissures and vestigial setae typical of genus.

Ventral region. Setae  $h$  of mentum considerably longer than distance between them. Ten pairs of genital and two pairs of aggenital setae present. Three pairs of anal and 3 pairs of adanal setae present.

## TYPE MATERIAL

Holotype (in DATE) SAMAR IS (5485): Suribao watershed 3, Calaasan, Benowangan, Borongan, Eastern Samar Province, 13 VII 2003, ex litter from secondary dipterocarp forest.

## COMPARISON

The new species is very similar to *Oribotritia corporaali* (OUDEMANS, 1926), *Oribotritia capitanea* NIEDBALA et CORPUS-RAROS, 1998. *O. corporaali* has 2 pairs of adanal setae and a different arrangement of anal and adanal setae and *O. capitanea* has feeble lateral carinae and vestigial notogastral setae except  $ps_2$  and  $ps_3$  setae.

***Oribotritia lepteces* n. sp.**

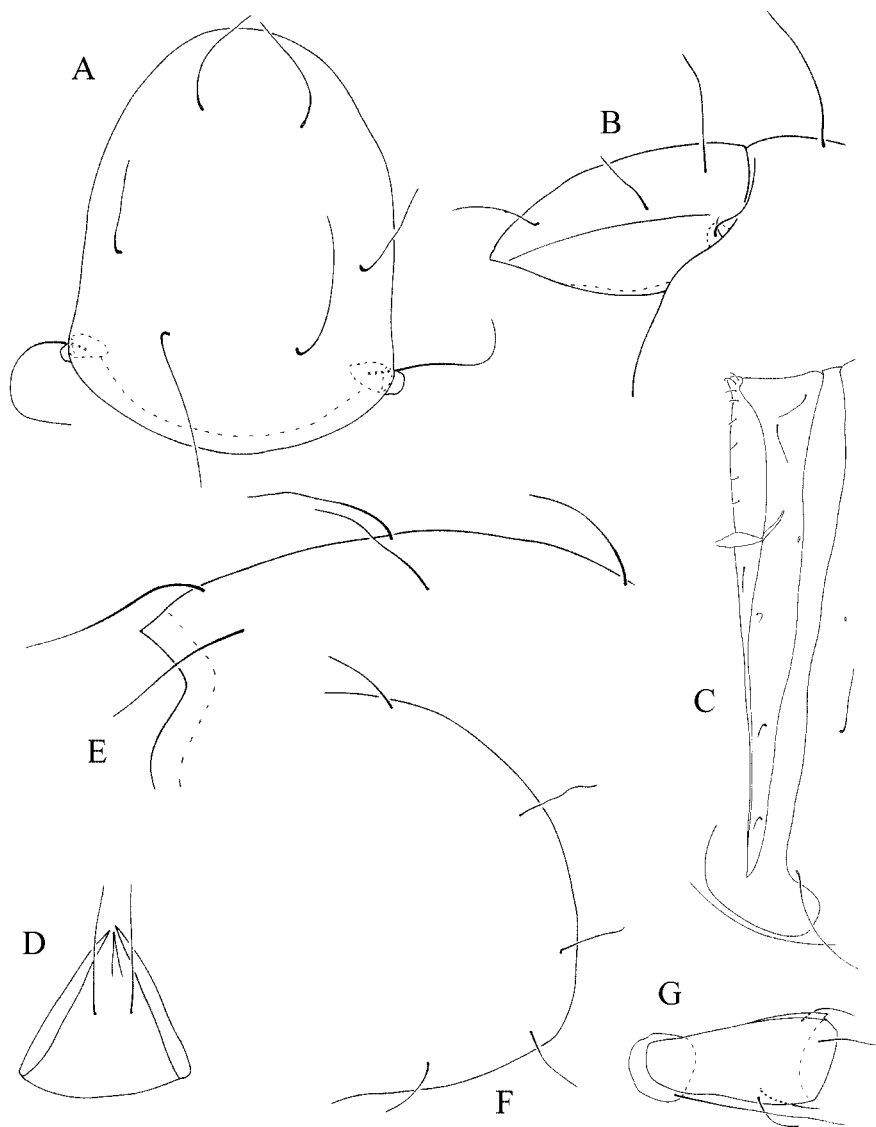
(Figs 3. A-G)

## ETYMOLOGY

The specific epithet is Latinized Greek for fine, pointed, delicate and refers to the shape of setae of the body.

## DESCRIPTION

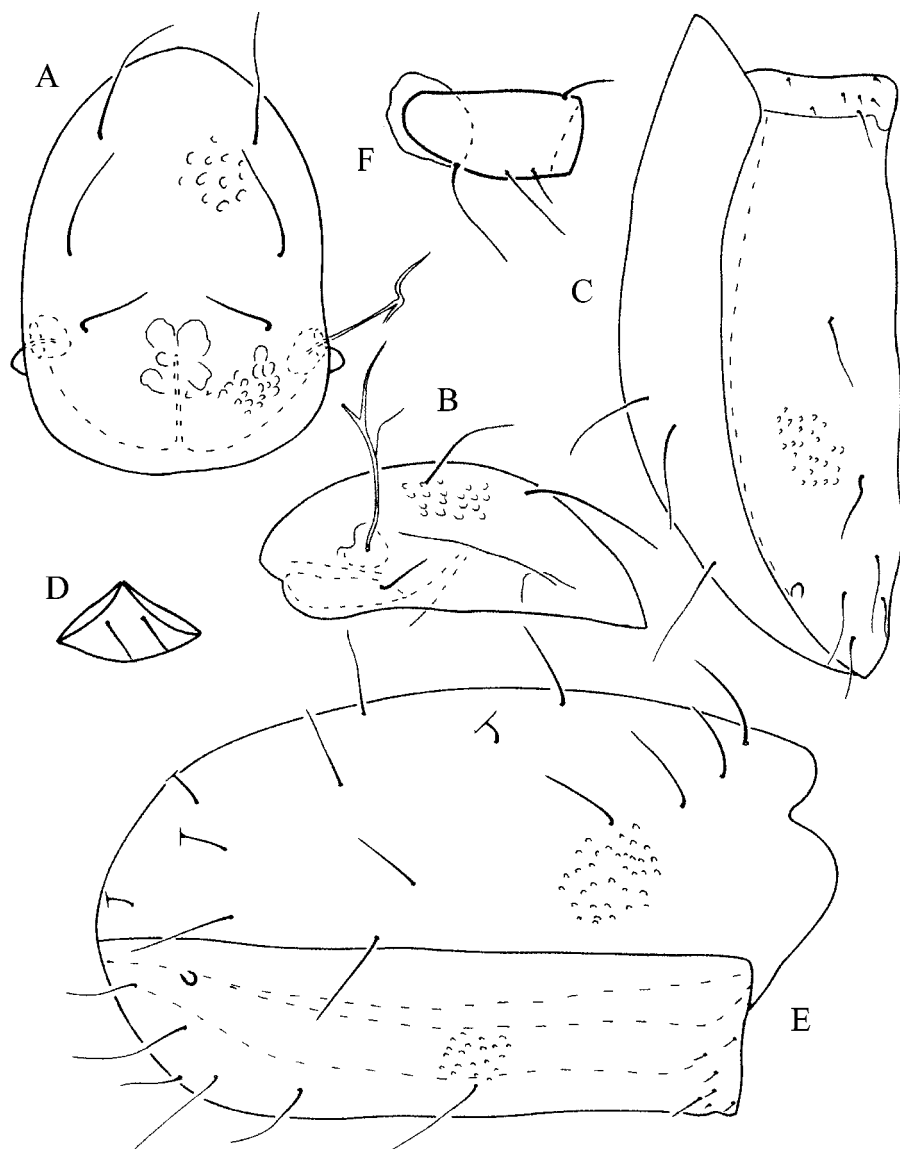
Measurements of holotype: prodorsum: length 505, width 384, height 202, sensillus 101, setae: interlamellar 197, lamellar 106, rostral 114; notogaster: length 848, width 384, height 768, setae:  $c_1$  228,  $h_1$  126,  $ps_1$  101; genital and aggenital plates 197 x 101, anal and adanal plates 409 x 65.6.



3. A-G. *Oribotritia lepteces* n. sp. (holotype): A – prodorsum, dorsal view, B – prodorsum, lateral view, C – left genital, aggenital, anal and adanal plates, D – mentum of infracapitulum, E – anterior and superior parts of notogaster, F – posterior part of notogaster, G – trochanter and femur of leg I

Colour dark brown. Integument densely punctate.

Prodorsum with simple distinct lateral carinae. Sensilli long, filiform. Setae rather long, fine, interlamellar longer than lamellar and rostral setae, exobothridial setae vestigial.



4. A-F. *Sabahtritia sarawak* MAHUNKA, 1996 (specimen from sample 5187): A – prodorsum, dorsal view, B – prodorsum, lateral view, C – right part of ventral side, D – mentum of infracapitulum, E – notogaster, F – trochanter and femur of leg I

Notogastral setae fine, filiform. Arrangement of lyrifissures and vestigial setae typical of genus.

Ventral region. Setae *h* of mentum considerably longer than distance between them. Eight pairs of genital and two pairs of aggenital setae present. One pair of anal and 3 pairs of adanal setae present. Lyrifissures *iad* located on the level of triangle *trv*.

Chaetome of legs (without tarsi): I: 1-4-5(2)-5(1), II: 1-3-4(1)-5(1), III: 3-2-3(1)-3(1), IV: 3-2-2(1)-3(1). Tarsi of legs heterotridactylous.

#### TYPE MATERIAL

Holotype (in DATE): SAMAR IS. (5577): So. Napatu-o, Bgy. Osmeña, Dolores, Eastern Samar Province, 21 X 2003, ex moss sample no. T1P15 from secondary dipterocarp forest, 225 m.

#### COMPARISON

The new species is similar to *Oribotritia heterotricha* NIEDBALA, 2000 from Borneo but all notogastral setae are similar in shape and the arrangement of adanal setae is different.

### ***Sabahtritia sarawak* MAHUNKA, 1996**

(Figs 4. A-E)

#### SUPPLEMENTARY DESCRIPTION

Measurements of the specimen from Samar Island: prodorsum: length 152, width 109, height 55.7, sensillus 55.7, setae: interlamellar 27.8, lamellar 45.5, rostral 55.7, exobothridial 25.3; notogaster: length 268, width 182, height 106, setae: *c*<sub>1</sub> 35.4, *c*<sub>3</sub> and *ps*<sub>2</sub> 30.4; genitoaggenital and anoadanal plate 230 x 70.8.

The specimen from the Philippines is bigger than from Sarawak, the type locality.

Chaetome of legs (without tarsi): I: 1-3-3(3), II: 1-2-2(1)-3(1), III: 2-2-2(1)-2(1), IV: 2-1-0-3(1). All tarsi monodactylous.

### ***Phthiracarus mindanaoensis* n. sp.**

(Figs 5. A-H)

#### ETYMOLOGY

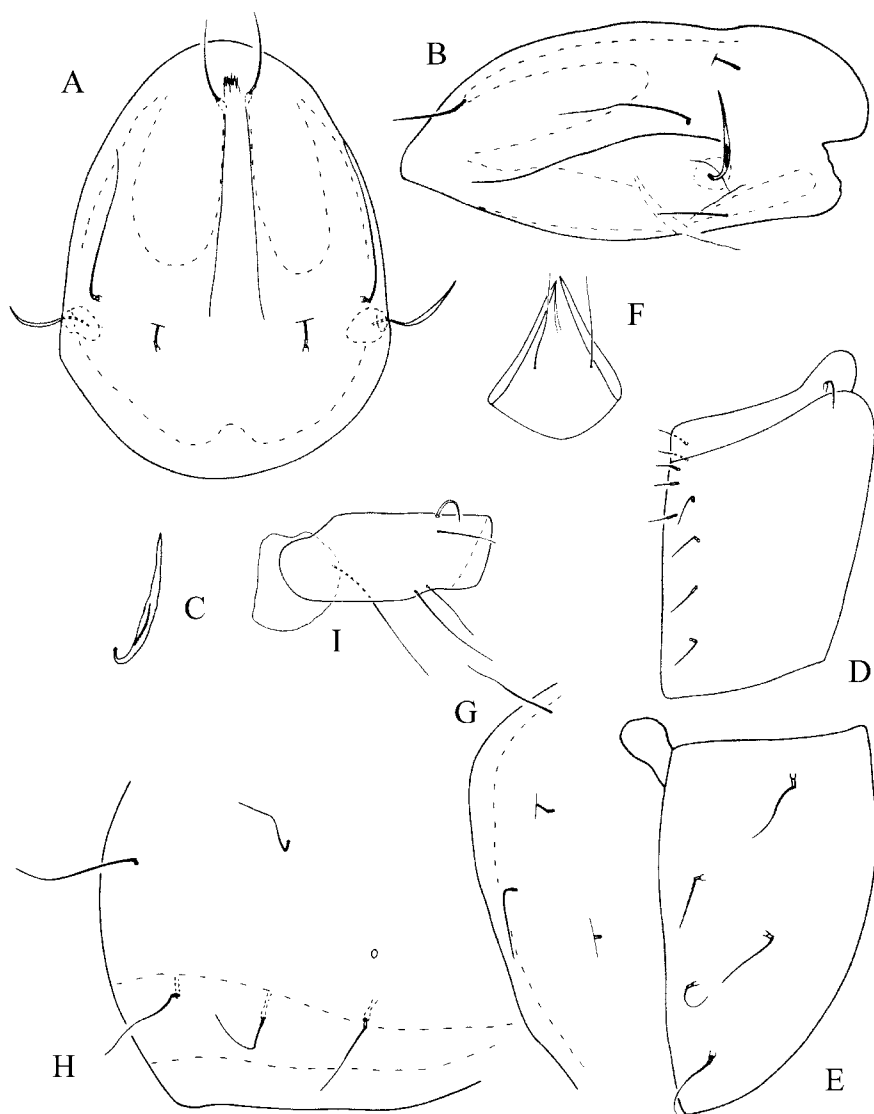
This species is named after Island Mindanao.

#### DESCRIPTION

Measurements of holotype: prodorsum: length 399, width 288, height 172, sensillus 78.4, setae: lamellar 121, rostral and exobothridial 70.8; notogaster: length 727, width 606, height 454, seta *h*<sub>1</sub> 121; genitoaggenital plate 162 x 131, anoadanal plate 212 x 95.9.

Colour dark brown. Microsculpture of integument punctate.

Prodorsum with distinct median carina and long lateral carinae. Sigillar fields long and narrow. Sensilli sickle shaped, narrow, pointed distally. Lamellar setae longer than rostral and exobothridial setae. Rostral setae placed close to each other.



5. A-I. *Phthiracarus mindanaoensis* n. sp. (holotype): A – prodorsum, dorsal view, B – prodorsum, lateral view, C – sensillus, D – left genitoaggenital plate, E – left anoadanal plate, F – mentum of infracapitulum, G – anterior part of notogaster, H – posterior part of notogaster, I – trochanter and femur of leg I

Notogaster is destroyed. Setae of medium length. Setae of row *c* slightly distant from anterior margin. Vestigial setae  $f_1$  located anteriorly of  $h_1$  setae. Four pairs of lyrifissures *ia*, *im*, *ip* and *im* present.

Ventral region. Setae *h* of mentum considerably longer than distance between them. Formula of genital setae 4+3: 2. Anoadanal plates with 5 pairs of well developed setae.

Chaetome of legs of "complete type", setae *d* of femora I remote from distal end of article.

#### TYPE MATERIAL

Holotype (in DATE): MINDANAO IS. (4926): Mt. Malindang Range, Bgy. Lake Dumagat, Don Victoriano, Misamis Occidental Province, ex leaf litter with soil, 16 VIII 2001.

#### COMPARISON

The new species is very similar to *Phthiracarus paraglobosus* NIEDBALA, 1982 from northern India. It is distinguishable by the presence of four pairs of lyrifissures, setae  $f_1$  situated anteriorly of  $h_1$  setae and very long mentum setae.

### ***Notophthiracarus aethes* n. sp.**

(Figs 6. A-G)

#### ETYMOLOGY

The specific epithet *aethes* is Latinized Greek for "unusual, curios" and alludes to the unusual construction of sigillar fields of prodorsum, unusual position of setae  $c_3$  and  $ps_4$  of notogaster and unusual arrangement of anal and adanal setae almost in one line.

#### DESCRIPTION

Measurements of holotype: prodorsum: length 389, width 242, height 141, sensillus 68.3, setae: interlamellar 37.9, lamellar 17.7, rostral 43.0; notogaster: length 778, width 495, height 596,  $c_1$  101,  $h_1$  109,  $ps_1$  104; genitoaggenital plate 207 x 126, anoadanal plate 202 x 106.

Colour dark brown. Surface of body covered with deep, distanced alveoles.

Prodorsum with sigillar fields joined broadly and forming deep sinus between rostral setae. Sensilli long, robust covered with small spines in distal half. Setae, except vestigial exobothridial, spiniform, short, thick, roughened.

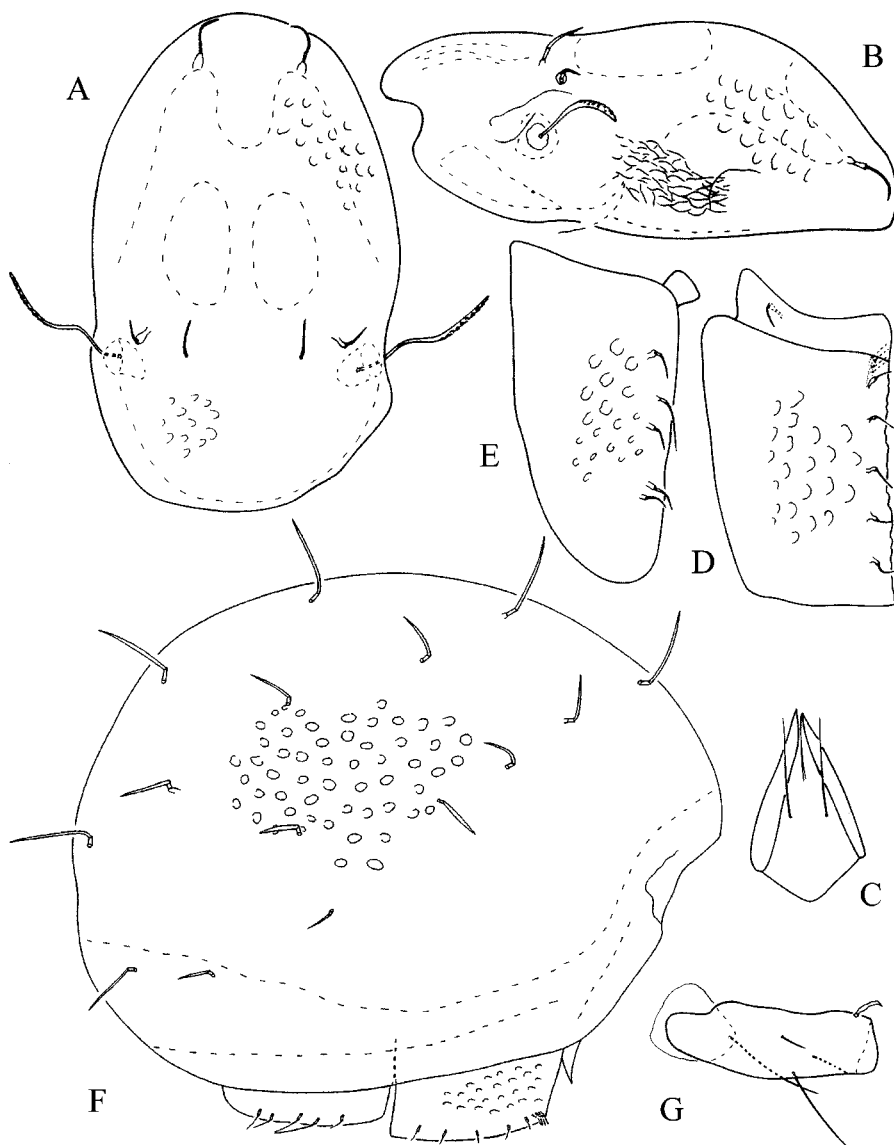
Notogaster with spiniform, short, thick and rough setae, pointed distally. Seta of row *c* remote from anterior border, especially setae  $c_3$ . Setae  $ps_4$  located in unusual position near  $h_3$  setae. Vestigial setae and lyrifissures not visible because of strong integument.

Ventral region. Setae *h* of mentum considerably longer than distance between them. Genitoaggenital plates with 9 pairs of genital setae with arrangement 5:4.



Anoadanal plates each with 5 pairs of short setae, adanal setae situated near proximal margin of plates.

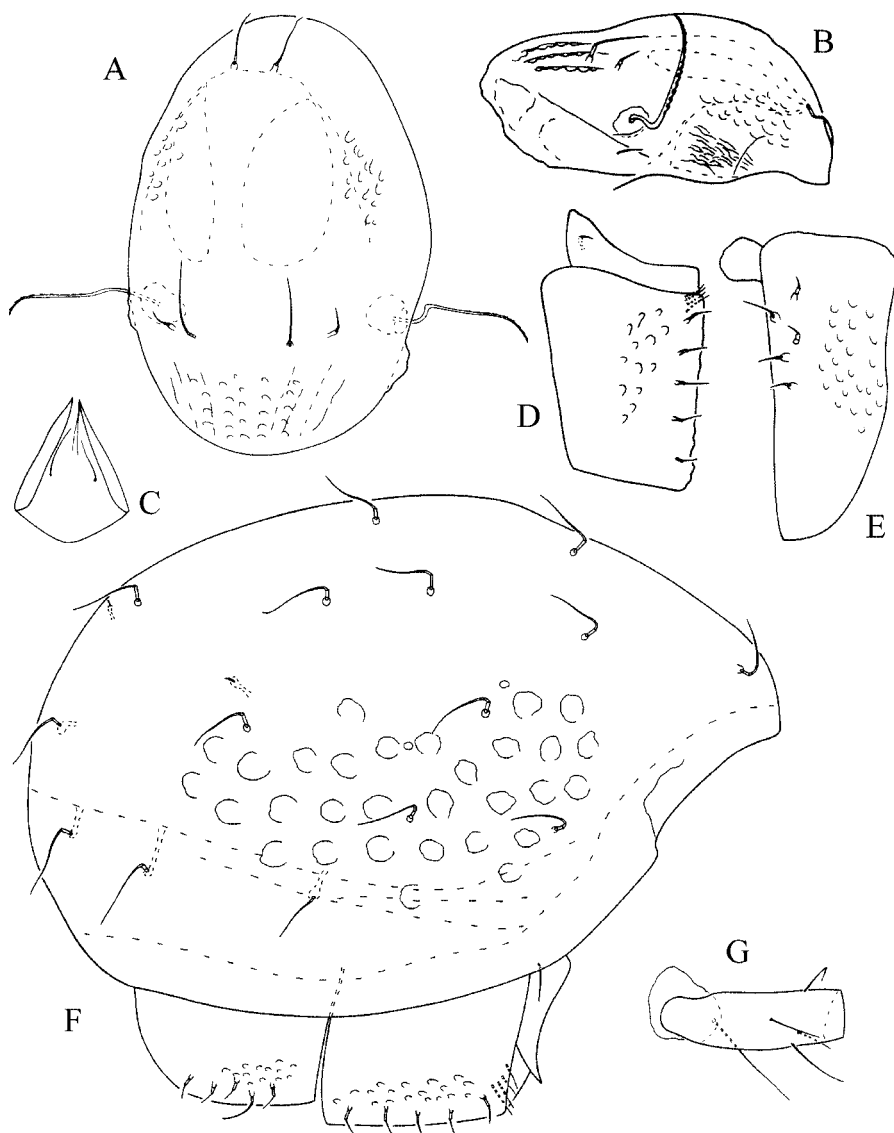
Legs. Formulae of setae and solenidia of "complete type". Setae *d* of femora I short, thick, spiniform and situated at distal end of article.



6. A-G. *Notophthiracarus aethes* n. sp. (holotype): A – prodorsum, dorsal view, B – prodorsum, lateral view, C – mentum of infracapitulum, D – right genitoaggenital plate, E – right anoadanal plate, F – notogaster, G – trochanter and femur of leg I

## TYPE MATERIAL

Holotype and one paratype (in DATE): MINDANAO IS (4969): Mt. Malindang Range, Bgy. Lake Dumagat, Don Victoriano, Misamis Occidental Province, in moss, 16 VIII 2001; 3 paratypes (in UPLB): ibid (4926), leaf litter with soil.



7. A-G. *Notophthiracarus samarensis* n. sp. (holotype): A – prodorsum, dorsal view, B – prodorsum, lateral view, C – mentum of infracapitulum, D – right genitoaggenital plate, E – right anoadanal plate, F – notogaster, G – trochanter and femur of leg I

## COMPARISON

The new species may be differentiated from its congeners by the unusual nature of the three above-mentioned features.

***Notophthiracarus samarensis* n. sp.**

(Figs 7. A-G)

## ETYMOLOGY

The specific name refers to the island Samar.

## DESCRIPTION

Measurements of holotype: prodorsum: length 268, width 121, height 187, sensillus 106, setae: interlamellar 43.0, lamellar 22.8, rostral 30.4, exobothridial 12.6; notogaster: length 480, width 293, height 313, setae:  $c_1$  43.0,  $h_1$  48.1,  $ps_1$  45.5; genitoaggenital plate 106 x 75.9, anoadanal plate 139 x 63.2.

Colour light brown to brown. Surface of body, especially of notogaster covered with large, distanced foveoles.

Prodorsum with robust median carina. Lateral carinae absent. Sigillar fields long, narrow, joined at distal end. Posterior furrows present. Sensilli long, narrow, sickle shaped, covered with small spines. Setae short, spiniform, except exobothridial setae rough,  $in > ro > le > ex$ .

Notogaster significantly narrow, with short, rather smooth, spiniform setae. Setae  $c_1$  and  $c_3$  near anterior border, setae  $c_2$  remote from border. Vestigial setae  $f_1$  situated posteriorly of  $h_1$  setae.

Ventral region. Setae  $h$  of mentum slightly longer than distance between them. Formula of genital setae: 5: 4. Setae of anoadanal plates minute, similar in length. Adanal setae situated closely to proximal border.

Chaetome of legs of "complete type". Setae  $d$  of femora I distinctly remote from distal end of article.

## TYPE MATERIAL

Holotype and one paratype (in DATE): SAMAR IS. (5480): Suribao watershed 3, So. Kamparina, Benowangan, Eastern Samar Province, 16 VII 2003, litter from secondary dipterocarp forest; 11 paratypes (in UPLB): Samar: 5468 (1), 5480 (2), 5487 (2), 5493 (1), 5551 (1), 5573 (2), 5577 (1), 5585 (1).

## COMPARISON

This species is very similar to another Philippine species – *Notophthiracarus stenotus* NIEDBALA et CORPUZ-RAROS, 1998. It is easily distinguishable by the shape of notogastral setae which is spiniform and not phylliform.

## PRESENT STATE OF KNOWLEDGE OF THE PTYCTIMOUS MITES FAUNA OF THE PHILIPPINES

List of the known species from the Philippines:

**Protoplophoroidea EWING, 1917**

**Protoplophoridae EWING, 1917**

genus – *Aedoplophora* GRANDJEAN, 1932

*A. glomerata* GRANDJEAN, 1932, pantropical

**Hypochthonioidea BERLESE, 1910**

**Mesoplophoridae EWING, 1917**

genus - *Mesoplophora* BERLESE, 1904

subgenus – *Parplophora* NIEDBAŁA, 1985

*M. (P.) flavida* NIEDBAŁA, 1985, oriental

subgenus - *Mesoplophora* BERLESE, 1904

*M. (M.) vesca* NIEDBAŁA et CORPUZ-RAROS, 1998, oriental

**Apoplophoridae NIEDBAŁA, 1984**

genus - *Apoplophora* AOKI, 1980

*A. pantotrema* (BERLESE, 1913), oriental

**Oribotritioidea GRANDJEAN, 1954**

**Oribotritiidae GRANDJEAN, 1954**

genus - *Oribotritia* JACOT, 1924

*O. aokii* MAHUNKA, 1987, oriental

*O. capitanea* NIEDBAŁA et CORPUZ-RAROS, 1998, endemic

*O. dipterocarpensis* n. sp., endemic

*O. leptece* n. sp., endemic

genus - *Sobacarus* RAMSAY et SHEALS, 1969

*S. corneri* RAMSAY et SHEALS, 1969, pantropical

genus - *Indotritia* JACOT, 1929

*I. javensis* (SELLNICK, 1923), oriental

*I. krakatauensis* (SELLNICK, 1923), pantropical

genus - *Austrotritia* SELLNICK, 1959

*A. lebronneci* (JACOT, 1935), pantropical

*A. robusta* NIEDBAŁA et CORPUZ-RAROS, 1998, pantropical

*A. saraburiensis* AOKI, 1965, pantropical

**Euphthiracaroida JACOT, 1930**

**Euphthiracaridae JACOT, 1930**

genus - *Acrotritia* JACOT, 1923 = *Rhysotritia* MÄRKEL et MEYER, 1959

*A. ardua* (C.L. KOCH, 1841), semicosmopolitan

- A. comteae* (MAHUNKA, 1983), pantropical  
     = *R. anchistea* NIEDBALA, 1998  
*A. curticephala* (JACOT, 1938), semicosmopolitan  
     = *R. lucida* NIEDBALA, 1998  
*A. refracta* (NIEDBALA, 1998), pantropical  
*A. sinensis* JACOT, 1923, oriental  
*A. spiculifera* (MAHUNKA, 1991), pantropical

genus - *Microtrititia* MÄRKEL, 1964

*M. tropica* MÄRKEL, 1964, pantropical

### **Sabahtritiidae MAHUNKA, 1987**

genus – *Sabahtritia* MAHUNKA, 1987

*S. sarawak* MAHUNKA, 1996, oriental

### **Phthiracaroida PERTY, 1841**

#### **Phthiracaridae PERTY, 1841**

genus - *Phthiracarus* PERTY, 1939

*P. mindanaoensis* n. sp., endemic

*P. obscurus* NIEDBALA, 1986, oriental

*P. pygmaeus* BALOGH, 1958, pantropical

### **Steganacaridae NIEDBALA, 1986**

genus - *Plonaphacarus* NIEDBALA, 1986

*P. dispar* NIEDBALA, 2000, oriental

*P. kugohi* (AOKI, 1959), pantropical

genus - *Hoplophthiracarus* JACOT, 1933

*H. clavellatus* NIEDBALA et CORPUZ-RAROS, 1998, native

*H. illinoisensis* (EWING, 1909), semicosmopolitan

genus - *Arphthacarus* NIEDBALA, 1994

*A. furcatus* NIEDBALA et CORPUZ-RAROS, 1998, endemic

genus - *Austrophthiracarus* BALOGH et MAHUNKA, 1978

*A. tuberculatus* NIEDBALA et CORPUZ-RAROS, 1998, oriental

genus - *Notophthiracarus* RAMSAY, 1966

*N. aethes* n. sp., endemic

*N. samarensis* n. sp., endemic

*N. stenotus* NIEDBALA et CORPUZ-RAROS, 1998, native

genus - *Atropacarus* EWING, 1917

subgenus - *Hoplophorella* BERLESE, 1923

*A.(H.) cucullatus* (EWING, 1909), semicosmopolitan

*A.(H.) hamatus* (EWING, 1909), semicosmopolitan

    = *A.(H.) glaucus* (HAMMER, 1972)

*A.(H.) vitrinus* (BERLESE, 1913), semicosmopolitan

    = *A.(H.) andrei* BALOGH, 1958

In total there are 37 known species representing 5 superfamilies, 8 families and 17 genera. Remarkable is almost the same number of species representing the two most numerous superfamilies Euphthiracaroida (18 species) and Phthiracaroida (15 species). In general in the Oriental Region the number of Phthiracaroida species found was greater (NIEDBAŁA 2000).

The proportions of species representing different zoogeographical elements are:

semicosmopolitan – 6 species (16.2 %), pantropical – 12 species (32.4 %), oriental – 10 species (27.0 %), native - 2 species (5.4 %), endemic – 7 species (18.9 %).

Thus, a considerable number of species (almost a half of the number found) represent widespread species, cosmopolitan and pantropical, nearly 1/3 of the species are oriental, and only 1/4 are related only to the Philippines (native and endemic). On the background of the other subregions of the Oriental Region, the Philippines are characterised by a lower number of oriental species (in particular by a lower number of endemites) and a higher number of widespread species of high mobility (in the sense of dispersal ability), especially among the Euphthiracaroida.

#### REFERENCES

- NIEDBAŁA, W., 2000. The ptyctimous mites fauna of the Oriental and Australian regions and their centres of origin (Acari: Oribatida). Genus, supplement, 1-489.
- NIEDBAŁA, W., CORPUZ-RAROS, L.A., 1998. Ptyctimous mites (Acari, Oribatida) from the Philippines. The Philippines Agriculturist, **81**(1-2): 1-58.