Acarologia

A quarterly journal of acarology, since 1959
Publishing on all aspects of the Acari

All information:

<http://www1.montpellier.inra.fr/CBGP/acarologia/>
acarologia-contact@supagro.fr

**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 2023 (Volume 63): 450 €

<http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php>

Previous volumes (2010-2021): 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)

Supporting agricultural research
for sustainable development

**Acarologia is under free license and distributed under the terms of the
Creative Commons-BY**

Additional contributions to the knowledge of predatory mites of the subfamily Coleoscirinae (Acari: Prostigmata: Cunaxidae) from the Philippines

Leonila A. CORPUZ-RAROS¹, Jeremy C. B. NAREDO^{2✉} and Rufino C. GARCIA³

(Received 08 February 2017; accepted 01 June 2017; published online 29 September 2017; edited by Farid FARAJI)

¹Institute of Weed Science, Entomology and Plant Pathology, College of Agriculture and Food, and Museum of Natural History, University of the Philippines Los Baños, College, Laguna, Philippines. lacraros@gmail.com

²Entomological Museum, Museum of Natural History, University of the Philippines Los Baños, College, Laguna, Philippines. (✉) jbnaredo1@up.edu.ph

³Ecology Laboratory, Crop Protection Cluster, College of Agriculture and Museum of Natural History, University of the Philippines Los Baños, College, Laguna, Philippines. prostigman7@hotmail.com

ABSTRACT — Four new species of predatory mites belonging to the subfamily Coleoscirinae (family Cunaxidae) are described from the Philippines, namely, *Neobonzia ermilovi* **n. sp.**, *Neoscirula klompeni* **n. sp.**, *N. lagunaensis* **n. sp.** and *N. lambatina* **n. sp.** Keys based on females are provided for four species of *Neobonzia*, and 11 species of *Neoscirula* that are currently known from the Philippines. New locality and habitat data are given for four previously known species of the genera *Coleoscirus* and *Neoscirula*.

KEYWORDS — Acari; biodiversity; Coleoscirinae; Cunaxidae; *Neobonzia*; *Neoscirula*; Prostigmata; new species; Philippines; predatory mites

ZOOBANK — [40F21D7F-7F7F-49DC-975E-C424B7A777D7](https://zoobank.org/40F21D7F-7F7F-49DC-975E-C424B7A777D7)

INTRODUCTION

The family Cunaxidae is one of the better-known groups of predatory mites in the Philippines. It includes 74 species described or recorded by Corpuz-Raros, et al. (1995, 1996, 2007, 2008, 2011), of which 26 belong to the subfamily Coleoscirinae. During a visit by Dr. Hans Klompen in January to early February 2016, samples of soil and litter mites collected primarily for uropodines yielded a number of new mites, including some unfamiliar cunaxids. These new collections were made in readily accessible sites where we had a collection per-

mission. Surprisingly, relatively well-explored areas like Mt. Makiling and University of the Philippines Land Grant in the Laguna-Quezon border, new mite species are still showing up, indicating the rich diversity of mites in these relatively protected forested areas.

As of Den Heyer's (2011a) database for the family Cunaxidae, the Philippines ranked third (with 57 species) to South Africa (68 species) and USA (58 species). The Philippine records in named database, however, included only those reported by Corpuz-Raros *et al.* in 1995-1996, and failed to account

for 17 other species recorded later by the same authors. Discovery of four new species described in this paper brings the total known Philippine cunaxid fauna to 78, probably now surpassing other countries worldwide. The objective of this paper is to describe one new species of *Neobonzia* and three of *Neoscirula*, both members of the subfamily Coleoscirinae. Secondary objectives are to update keys to Philippine species of both genera, and to record new localities and habitats for some previously known species of Coleoscirinae.

MATERIALS AND METHODS

Samples of litter, soil, and similar media were bagged in the field and subjected mainly to Berlese extraction in the laboratory. Most of the samples were decomposing material on the ground but litter lodged or hanging on branches of plants were also collected. Samples from ant nests hanging on trees were also taken, as well as soil samples from underground nests that were opened after trailing ant columns to their nest. Some litter samples were set up under no-light funnels in the field immediately after collection. Extracts with soil residues were floated using hydrocarbon flotation method with kerosene as the hydrocarbon agent. Extracts were preserved in absolute ethyl alcohol, and the mites separated from the rest of the arthropods contained in the samples. All mites were cleared in lactic acid, and those of interest were mounted on slides with Hoyer's as medium.

Mounted specimens were studied under a compound microscope model Zeiss Primostar. Illustrations were initially made with the aid of a drawing tube mounted on a Wild compound microscope but finer morphological details were drawn free-hand after careful analysis of taxonomic characters. Measurements were made with an ocular micrometer and expressed in micrometers (μm) following a given part. Measurements of whole body parts like the entire body, gnathosoma, palps, chelicerae and legs, as well as dorsal idiosomal setae, were taken from most of the type specimens for a given species, and are expressed herein according to the following sequence: Holotype [range (mean, number of spec-

imens measured)]. Measurements of other setae on gnathosoma and venter are those of the holotype.

Terms used for various structures follow those of Den Heyer (1981) except that the term hypognathum is replaced by the more widely used subcapitulum, and the term dt or dorsoterminal solenidion on the leg tarsi is renamed as dtsl as in Den Heyer *et al.* (2011). Nomenclature for dorsal body setae follows that of Kethley (1990), as adopted for the Bdelloidea by Den Heyer and Castro (2008a).

The chaetotaxy or number and types of setae on leg segments are given consecutively from legs I-II-III-IV for each segment. Schematic diagrams (Figures 1a-z) showing setal types are provided, along with other key character states in Philippine species of *Neobonzia* and *Neoscirula*.

SYSTEMATICS

Genus *Neobonzia* Smiley

Neobonzia Smiley, 1992: 331 [Type species – *N. moseri* Smiley, 1992].

Coleobonzia Den Heyer and Castro, 2008a: 45 [Type species – *Pseudobonzia argillae* Den Heyer, 1977].

Diagnosis — This genus was redefined by Den Heyer (2011b) and this redefinition was adopted by Skvarla *et al.* (2014) and in the present paper. It includes species with 5-segmented palps that extend beyond the subcapitulum by at most the distal half of last segment. The dorsal basifemoral and telofemoral setae of palps are thin and simple but are both spine-like in *N. gruezoi* (Corpuz-Raros & Garcia, 1996) and the new species described herein. The palp tibiotarsus is long, basally stout and distally thin (S-shaped) as opposed to short and cone-like in *Neoscirula*; may or may not have a tubercle, and the penultimate sts (simple tactile seta) on outer margin is rather long. There are 4 pairs of hypostomal setae, two pairs of adoral setae, and a cheliceral seta is usually present.

Neobonzia species are soft-bodied, with weakly sclerotized dorsal propodosomal shield and entirely membranous hysterosoma in females, while dorsal plates are more sclerotized and hysterosomal plates may be present in addition to the propodosomal in

FIGURE 1: Schematic diagrams of key character states and some descriptive terms used for Philippine species of *Neobonzia* and *Neoscirula* – a, ventral view of hysterosoma with separate coxal plates I+II; b, coxal plates I+II fused as a sternal plate; c-d, shape of palpal claw – simple (Fig. c), bifid (Fig. d); e-l, ornamentations of cuticle – separate subcuticular cells (Fig. e), band of coalesced cells on propodosomal shield (Fig. f), large rectangular cells coalesced as reticulations on posterior margin of subcapitulum (Fig. g), coalesced cells forming a network pattern or reticulations (Fig. h), round papillae (Fig. i) and spine-like papillae (Fig. j) on sclerotized areas, round papillae (Fig. k) and spine-like papillae on striations of membranous parts of body; m-r, solid tactile setae of various types – simple tactile seta **sts** (Fig. m), strongly pointed spine-like seta **spls** (Fig. n), finely pointed **spls** (Fig. o), claw-like seta (Fig. p) and rod-like tubercle (Fig. q) on inner margin of palp tibiotarsus, and minute tactile seta or microseta **mst** (Fig. r); s-w, hollow sensory setae or solenidia – attenuate solenidion **asl** (Fig. s), blunt solenidion **bsl** of even thickness or cylindrical in shape (Fig. t), basally inflated **bsl** (Fig. u), bulbous or bulb-like **bsl** (Fig. v), and apically knobbed **bsl** (w); x-z, various types of trichobothria (T) or sensilla borne on cup-shaped pseudostigmata – smooth on tibia of leg IV (Fig. x), clavate and plumose (Fig. y), pointed and plumose (Fig. z) on dorsal propodosomal shield.

males. Extensive reticulated pattern is absent on the propodosomal shield but there may be lateral bands of subcuticular cells as in *N. gruezoi* and *N. ermilovi* **n. sp.** The hysterosoma bears setae *c1-h1* and usually also *c2* and *f2*. Coxal plates I+II are not fused medially as a sternal plate, coxal plates are usually not reticulated but some species may have a few subcuticular cells. The legs are usually shorter than idiosoma, never constricted apically as to end in lobes, and solenidia on tarsi are usually cylindrical, but basally or distally swollen in two Philippine species, *N. gruezoi* (as illustrated by Fuan-garworn and Lekprayoon, 2004 based on specimens from Thailand) and *N. ermilovi* **n. sp.**

***Neobonzia ermilovi* n. sp.**
(Figures 2–6)

Zoobank: [65B808A2-F6AB-4573-8749-C85C99765C69](https://zoobank.org/65B808A2-F6AB-4573-8749-C85C99765C69)

Diagnosis — This species is distinctive in having bidentate cheliceral claw, minute cheliceral seta, short and thick spine-like seta each on dorsum of palp basifemur and telofemur, polygonal subcuticular cells on propodosomal shield, coxal plates I+II and III+IV, and female leg basifemoral chaetotaxy of 5-6-4-2 sts.

Description — **Female.** Body oval, light brown with slightly darker legs and gnathosoma; rather large, body length, 824 [731 – 824 (769), *n* = 6], body width, 346 [332 – 399 (361), *n* = 6]. Sclerotized parts covered with papillae composed of a mixture of larger, round, light or luminous and finer, darker ones on subcapitulum, chelicerae and palp segments. Membranous areas finely striate-papillate.

Gnathosoma (Figure 2a) — Short and stout, 258 [238 – 265 (253), *n* = 7], about 1/3 of total body length. Subcapitulum basally thick, gradually tapered as a cone towards hypostome; polygonal reticulations present medially between posterior margin and seta *hg4*; lengths of hypostomal setae – *hg1* 31, *hg2* 27, *hg3* 54 and *hg4* 17; 2 pairs of minute adoral setae present. Palps relatively short and stout, 197 [190 – 238 (213), *n* = 7], extending beyond hypostome at the level of the cone-like tubercle on inner margin; tibiotarsus longest of palp segments, curved, tapered, and ending in a small claw.

Chaetotaxy of palp segments – trochanter, 0; basifemur, 1 dorsal spls (15); telofemur, 1 dorsal spls (14); genu, 4 sts, of which the dorsodistal is longest (34 – 37); tibiotarsus, 1 dorsoapical tsl (41), one cone-like tubercle (7) arising on inner margin about 1/3-way from the claw, and 4 sts, including one long (51) penultimate arising on mid outer margin, one short (7) near the tubercle, one ventrobasal on inner margin, and one ventral at about the level of penultimate sts. Chelicerae (Figure 2b) slightly longer than palps, 238 [214 – 255 (234), *n* = 7]; trochanter broad, second segment broad basally and gradually tapered on distal half; inner dorsal half thickened and ornamented like subcapitulum; minute cheliceral seta present; claw relatively thick, armed with two small but distinct teeth on mid inner margin.

Idiosoma (Figures 3a-b) — Length, 602 [469 – 619 (560), *n* = 5]. Propodosomal shield rectangular, slightly wider than long and with a distinct notch lateral to the posterior trichobothrium or seta *sce*; with a pair of lateral bands of short and thick subcuticular cells, each composed of about 6 cells and extending anterad from *sce* but not reaching the level of *ve*. Trichobothria plumose, *vi* 228 [228 – 78 (248), *n* = 4], *sce* 194 [194 – 238 (212), *n* = 3]; sts *ve* 41 [34 – 41 (37), *n* = 7], arising on about 1/3 the distance between the trichobothria, *sci* 24 [24 – 31 (25), *n* = 7] close and slightly mesoposterior to *sce*. Hysterosoma membranous, covered with fine striae that are each laden with closely set round papillae; complemented with 8 pairs of setae (lengths based on 7 specimens) – *c1* 17 [10 – 17 (13)], *c2* 14 [10 – 17 (14)], *d1* 10 [all 10], *e1* 14 [10 – 14 (13)], *f1* 24 [17 – 27 (23)], *f2* 17 [14 – 20(15)], *h1* 37 [31 – 37 (34)] and *h2* 17 [14 – 17 (15)]. Anal plates dorsal, coarsely striate-papillate, with 2 pairs of anal setae *ps1* and *ps2*. Two pairs of relatively conspicuous, oval cupules – *im*, lateral to and about midway between setae *e1* and *f2*; and *ih*, near seta *h2*.

Venter of idiosoma broadly membranous, finely striate-papillate, except for the relatively small coxal plates I+II and III+IV. Coxal plates I+II widely separated, II and IV with a few, faint polygonal cells. Eight pairs of setae composed of 1 propodogastral, 5 hystergastral (sometimes with an additional un-

FIGURE 2: *Neobonzia ermilovi* n. sp. : a – ventral view of female gnathosoma; b – female chelicera; c – ventral view of male gnathosoma. Scale bar 100 μ m.

paired seta) and 2 paragenital, borne on ventral membrane between coxae II and genital plates. One pair of paraanal setae between genital and anal plates. Genital plates relatively small, finely papillate, with 2 oval genital papillae on each plate, the anterior larger than posterior one; 4 pairs of genital setae present, g3 slightly longer (24) than the other pairs (14 – 17).

Legs (Figures 4a-d) — Relatively short and stout, the longest about $\frac{3}{4}$ of idiosomal length. Lengths of legs: I, 398 [340 – 398 (370), n = 4]; II, 408 [313 – 408 (357), n = 3]; III, 374 [374 – 408 (385), n = 6]; IV, 422 [374 – 442 (415), n = 5]. Chaetotaxy of leg segments: coxae, 3-3-3-3 sts; trochanters, 1-1-2-1 sts; basifemora, 5-6-4-2 sts; telofemora, 5-5-4-3 sts; genua, 4 sts, 4 asl, 1 mst – 5 sts, 3asl – 5 sts, 1 asl – 5

FIGURE 3: *Neobonzia ermilovi* n. sp., female idiosoma: a – dorsal view; b – ventral view. Scale bar 100 μ m.

sts, 2 asl; tibiae, 5 sts, 1 bsl – 5 sts, 1 bsl – 5 sts, 1 bsl – 4, 1 smooth T, 88 long; tarsi, 20 sts, 3 short bsl, 1 asl, 2 dtsl – 20 sts, 1 long bsl, 2dtsl – 17, 2 dtsl – 17 sts, 2 dtsl.

Male — Relatively smaller, more slender and more tapered posteriorly than female; body length, 527 [505 – 572 (535), n = 3]; body width, 238 [238 – 272 (249), n = 3], length of idiosoma, 347 [n = 2].

Gnathosoma (Figure 2c) as in female, including ornamentations, and about 1/3 of total body length. Palps 156 [156 – 163 (160), n = 3]; chaetotaxy as in female, basifemoral and telofemoral spls (both 10);

tsl of tibiotarsus (37). Chelicerae 173 [170 – 84 (176), n = 3] long, as in female, also with two minute teeth on mid inner margin of claw.

Idiosoma (Figures 5a-b) more sclerotized than in female, with two densely papillate dorsal shields, propodosomal also notched lateral to trichobothrium *sce*, separated from hysterosomal by a narrow, striated membrane. Lengths of trichobothria – *vi* (156, n = 1), and *sce* (136, n = 1), sts *ve* 31 [24 – 34 (29), n = 3] about twice as long as *sci* 17 [17 – 20 (19), n = 3]. Hysterosomal shield with 6 pairs of sts (lengths based on 3 specimens) – *c1* 10 [8 – 10 (9)], *c2*

FIGURE 4: *Neobonzia ermilovi* n. sp., legs of female: a – leg I; b – leg II; c – leg III; d – leg IV. Scale bar 100 μ m.

FIGURE 5: *Neobonzia ermilovi* n. sp., male idiosoma: a – ventral view; b – ventral view. Scale bar 100 μ m.

FIGURE 6: *Neobonzia ermilovi* n. sp., legs of male: a – leg I; b – leg II; c – leg III; d – leg IV. Scale bar 100 μ m.

9 [9 – 12 (10)], *d1* all 10, *e1* all 10, *f1* 17 [17 – 20 (18)] and *f2* 14 [10 – 14 (12)]. Two pairs of setae on posterior membrane of idiosoma, *h1* 24 [20 – 24 (22)] and *h2* all 14. Cupules as in female. Venter of idiosoma with coxal plates I+II and III+IV bearing larger and stronger subcuticular cells than in female. Membrane between coxal plates I+II and genital plates bearing 4 pairs of ventral setae (hysterogastral) and 1 pair paragenital. One pair of paraanal setae also present. Genital plates smaller than in female, with 2 pairs of oval genital papillae and 4 pairs of genital setae, *g3* (14) slightly longer than the others (7 – 10).

Legs (Figures 6c-d) relatively short and stout, the longest about $\frac{3}{4}$ of idiosomal length. Lengths of legs: I, 262 [262 – 272 (269), *n* = 3]; II, 255 [252 – 255 (254), *n* = 3]; III, 275 (*n* = 1); IV, 292 (282 – 292 (287), *n* = 2]. Chaetotaxy of leg segments – coxae, 3-3-3-3 sts; trochanters 1-1-2-1 sts; basifemora, 4-6-4-0 sts, telofemora, 5-5-4-2 or 3 sts; genua, 5sts, 1 cylindrical bsl exceeding length of segment, 2 asl, 1 mst in duplex with distal asl – 5 sts, 1 basally inflated bsl exceeding length of segment, 2 asl, 1mst in duplex with distal asl – 5 sts, 1 bsl, 1 asl – 5 sts, 2asl; tibiae, 5 sts, 1 short bsl – 5 sts, 1 short bsl – 5 sts, 1short bsl – 4 sts, 1 smooth T, 54 long; tarsi, 14 sts, 1 long basally inflated bsl almost reaching dtsl, 1 short bsl, 2 dtsl – 15 sts, 2 long basally inflated bsl almost reaching tsl, 2 dtsl – 13 sts, 2 dtsl – 12 sts, 2 dtsl.

Material — Holotype female, 1 male and 3 paratype females, Philippines, Luzon Island, Siniloan, Laguna-Real, Quezon border, University of the Philippines Land Grant, from dried fern litter hanging on roadside, 22 Jan. 2016 (R.C. Garcia, J.C.B. Naredo and H. Klompen); 1 female paratype same data as for holotype but from soil below rotten tree; 2 female and 1 male paratypes, also same data as for holotype but from soil in nest of army ant; and 2 male paratypes, same data as holotype but collected from an unknown habitat, 23 Jan. 2016. Type deposition – Holotype female, 6 paratype females and 2 paratype males are deposited in the Museum of Natural History, University of the Philippines Los Baños, College, Laguna, Philippines; and 2 paratype females and 1 paratype male in The Ohio State University Acarology (OSAL) Collection, Columbus, Ohio, USA.

Etymology — This species is dedicated to Dr. Sergey G. Ermilov, Tyumen State University, Russia, in recognition of his outstanding contributions to Philippine oribatology.

Remarks — The new species resembles *N. gruezo* (Corpuz-Raros & Garcia, 1996) from the Philippines and *N. yini* (Smiley, 1992) from Guam, in having subcuticular cells on propodosomal and coxal plates, as well as spine-like palp basi- and telofemoral setae, but neither named species have dentate cheliceral claw and have leg basifemoral chaetotaxy of 5-5-4-2 and 4-5-5-2 sts in females, respectively.

Distribution — As of Skvarla *et al.*'s (2014) review, 23 species of *Neobonzia* have been described worldwide. The genus is of cosmopolitan distribution, but the Oriental Region leads with 12 species (5 Pakistan, 3 Philippines, others 4), followed by the Ethiopian Region (5 South Africa), while only 1–3 species represent the other regions. Females of four species of *Neobonzia* that are currently known from the Philippines may be separated through the following key:

Key to known Philippine species of *Neobonzia*

1. Trichobothria on propodosomal shield, *vi* and *sce* clavate (Figure 1y) *N. clavata* Corpuz-Raros, 2008
— Trichobothria on propodosomal shield, *vi* and *sce*, not clavate 2
2. Basifemur I with 3 sts; palp basifemur and telofemur with simple dorsal sts; propodosomal and coxal plates without subcuticular cells
..... *N. longispina* (Corpuz-Raros & Garcia, 1996)
— Basifemur I with 5 sts; palp basifemur and telofemur each with a spine-like spls (Figure 1n); propodosomal and coxal plates with subcuticular cells (Figure 1e) 3
3. Basifemora II with 6 sts; cheliceral claw with 2 teeth on mid inner margin *N. ermilovi* **n. sp.**
— Basifemora II with 5 sts; cheliceral claw without teeth *N. gruezo* (Corpuz-Raros & Garcia, 1996)

Genus *Neoscirula* Den Heyer

Neoscirula Den Heyer, 1977: 73 [Type species: *N. theroni* Den Heyer, 1977].

Diagnosis — Mites of the genus *Neoscirula* are relatively small, averaging 300 µm, lightly sclerotized and light brown with darker legs. The palps are short, stout, with thick and conical tibiotarsus, and end in a small claw which is usually undivided apically but sometimes has a subterminal tooth, giving it a bifid appearance. The subcapitulum bears 4 pairs of setae, the anteriormost (*hg 1*) longest and bent basally or “semi-geniculate”, not truly geniculate as emphasized by Den Heyer and de Castro (2008b) against Smiley’s (1992) first criterion for dividing the family Cunaxidae into subfamilies, and as basis for transferring *Neoscirula* to the subfamily Bonzinae where a truly geniculate *hg1* is present. Adoral setae may be present or absent. Cheliceral setae may be present or absent.

Females have a weakly sclerotized dorsal propodosomal shield while the hysterosoma is entirely membranous, without dorsal shield. In the male, a hysterosomal shield is present in addition to the propodosomal. The propodosomal shield bears 2 pairs of trichobothria, *vi* and *sce*, and 2 pairs of sts, *ve* and *sci*. The hysterosoma bears 7 pairs of setae, *c1-h1*, *c2* and *h2*, as well as *f2* in some cases. Coxal plates I+II may be separate or fused medially as a sternal shield; coxal plates III+IV are contiguous and confined to the coxal bases. Dorsal and ventral shields are covered with fine or relatively coarser papillae and subcuticular cells may be additionally present. The legs are shorter than body, each ends in a pair of claws and rayed empodium, and the tarsus is not constricted apically as lobes. Solenidia of tarsi cylindrical, but one or two of them may be bulbous or basally swollen as in new Philippine species described in this paper.

Neoscirula klompeni n. sp.
(Figures 7–11)

Zoobank: 982F30A5-8952-4721-B75E-E6ABAB30B7A6

Diagnosis — Coxae I+ II fused as a sternal shield; presence of conspicuous subcuticular cells on propodosomal and sternal shields; reticulate pattern on subcapitulum posterior to setae *hg4*; undivided palpal claw; presence of 7 pairs of ventral setae between coxae II and genital shields; palp basifemoral seta thin and simple (sts), that of telofemur spinelike (spl); and 4-5-3-1 setae on leg basifemora, 5-5-4-3 on telofemora.

Description — **Female** — Body oval, broadest at the level of setae *sce*, gradually tapered posteriorly, light brown with slightly darker gnathosoma and legs; sclerotized areas, viz., subcapitulum, palp segments, chelicerae, propodosomal shield, coxal plates and leg segments, densely covered with round papillae; membranous areas finely striate-papillate. Body length, 381 [372 – 492 (437), n = 23]; body width, 221 [199 – 253 (231), n = 22].

Gnathosoma (Figures 7a-b) — Relatively short and thick, 116 [106 – 133 (118), n = 25]; short and gradually produced as a cone. Hypostome almost evenly thin with acute tip, adoral setae minute (only 1 pair observed). Subcapitulum with 7–8 pairs of large polygonal reticulations medioposteriorly between posterior margin and setae *hg4*; *hg1* longest (34) of the hypostomal setae and slightly bent at base, *hg2* 14 arising close to *hg1*, *hg3* 17, and *hg4* 14. Palps relatively short and stout, 85 [78 – 88 (81), n = 17], extending only slightly beyond hypostome, and terminating in a large claw; tibiotarsus conical. Chaetotaxy of palp segments – trochanter, 0; basifemur, 1 dorsal, slightly thickened sts (10); telofemur, 1 dorsal, finely pointed spls (10); genu 4 sts, dorsodistal (14), longer than all others; tibiotarsus, 1 tsl (17), 1 short (3) and thin rod-like tubercle, and 4 sts including one thin near the rod, one penultimate sts (17), and two shorter ventrobasal ones. Chelicerae (Figure 7c) slightly longer than palps, 105 [105 – 119 (112), n = 17]; trochanter broad, second segment basally as broad as trochanter, gradually tapered up to distal 1/3 which is almost evenly thick up to base of claw; claw long and slender; cheliceral seta absent.

FIGURE 7: *Neoscirula klompeni* n. sp.: a – ventral view of female gnathosoma; b – male palp; c – female chelicera. Scale bar 50 μ m.

Idiosoma (Figures 8a-b) — Length, 265 [266 – 332 (319), n = 23]. Dorsum with an elongate, trapezoidal propodosomal shield that is slightly wider than long, anterior corners produced as striate oval lobes, a band of about 6 squarish subcuticular cells on each side between setae *ve* and *sce*, and 2 oval cells mesad of *sce*. Trichobothria subequal in length, *vi* 109 [109 – 122 (113), n = 10], *sce* 102 [102 – 119 (112), n = 10];

sts *ve* and *sci* both 14 – 17 (16), n = 10 for each]; *ve* arising at about midway between *vi* and *sce*, *sci* close and mesal to trichobothrium *sce*. Hysterosoma membranous, roughly striate-papillate; with 7 pairs of sts (lengths based on 10 specimens each) – *c1*, *c2*, *d1*, *e1* (all about 10), *f1* all 14, *h1* 17 [17 – 20 (18)], and *h2* 14 [14 – 17 (16)]. Cupule *im* conspicuous, roundish, located about midway and laterad to *e1* and *f1*; *ih* also conspicuous, close to seta *h2*. Anal

FIGURE 8: *Neoscirula klompeni* n. sp., female idiosoma: a – dorsal view; b – ventral view. Scale bar 100 μ m.

plates striate, with setae, *ps1* and *ps2*.

Ventrally, coxal plates I+II fused medially as a sternal plate with narrowly produced posterior margin, ornamented with numerous oval to rounded subcuticular cells. Seven pairs of setae between coxae II and genital plates (1 propodogastral and 6 hystergastral). Genital plates large, finely papillate, each with 2 oval genital papillae of uneven size, and 4 genital setae; *g4* longest (14), *g1-3* (9 – 10). Paraanal setae absent. Legs (Figures 9a-d) – Relatively short and stout, the longest more than $\frac{3}{4}$ of idiosomal length. Lengths of legs – I, 204 [200 – 239 (220), *n* = 24]; II, 186 [186 – 213 (210), *n* = 23]; III, 204 [193 – 226 (212), *n* = 20]; IV, 231 [213 – 253 (236), *n* = 23]. Chaetotaxy of leg segments: coxae, 3-3-3-3 sts; trochanters, 1-1-2-1 sts; basifemora, 4-5-3-1 sts;

telifemora, 5-5-4-3 sts; genua, 5 sts, 4 asl, 1 mst in duplex with the distal asl – 5 sts, 3 asl – 5 sts, 1 asl – 5 sts, 2 asl; tibiae, 5 sts, 1 long bsl extending to distal margin of segment, 1 asl – 5 sts, 1 bsl – 5 sts, 1 bsl – 4 sts, 1 smooth T, 31 long; tarsi, 19 sts, 1 long bsl, 1 short and bulbous bsl, 2 asl, 1 dtsl – 19 sts, 1 long bsl, 1 dtsl – 16 sts, 1 dtsl – 16 sts, 1 dtsl.

Male — Body more slender than female, and narrowly tapered posteriorly, darker brown due to more extensive sclerotization; body length, 415 [412 – 426 (419, *n* = 2)], idiosomal length, 279 [279 – 293 (286), *n* = 2], body width, 202 [199 – 213 (208), *n* = 3].

Morphologically similar to female, differing as follows: Palps (Figure 7b) more slender, 95 [93 – 106

FIGURE 9: *Neoscirula klompeni* n. sp., legs of female: a – leg I; b – leg II; c – leg III; d – leg IV. Scale bar 50 μ m.

FIGURE 10: *Neoscirula klompeni* n. sp., male idiosoma: a – dorsal view; b – ventral view. Scale bar 100 µm.

(97), $n = 4$]; chelicerae 122 [120 – 126 (122), $n = 4$], also without seta. Idiosoma (Figures 10a-b), with two large dorsal shields – a trapezoidal propodosomal which is broader than long, and anterior corners lobate as in female, and a triangular hysterosomal shield with broadly rounded posterior margin. Propodosomal shield with a band of 6–7 oval, subcuticular cells between setae *ve* and *sce*, and about 4 cells mesad of *sce* on each side; propodosomal trichobothria *vi* (136, $n = 1$) and *sce* 119 [109 – 119 (114), $n = 2$] and sts *ve* 17 [14 – 17 (14), $n = 2$] and *sci* (14, $n = 2$). Hysterosomal shield with 5 pairs of setae (lengths based on one paratype only) – *c1*, *c2*, *d1*, and *e1* (all 10 long), and *f1* 14; *h1* 15, and *h2* 10 borne on membrane flanking anal plates. Venter of idiosoma extensively sclerotized and ornamented

with more numerous subcuticular cells; holoven-tral shield covering almost entire area, except for a soft non-striated membrane between it and genital plates, and bears 3 pairs of setae in addition to the coxal setae.

Legs (Figures 11a-d) — Rather short and stout, the longest 0.8 of idiosomal length. Lengths of legs: I, 213 [all 213, $n = 3$]; II, 194 [186 – 199 (195), $n = 4$]; III, 204 [all 200, $n = 4$]; IV, 224 [all 224, $n = 4$]. Chaetotaxy of leg segments: coxae, 3-3-3-3 sts; trochanteras 1-1-2-1 sts; basifemora, 4-5-3-1 sts; telofemora, 5-5-4-3 sts; genua, 4 sts, 4 asl, 1 mst in duplex with distal asl – 5 sts, 3 asl – 5 sts, 1 asl – 5 sts, 2 asl; tibiae, 5 sts, 1 long and basally inflated bsl, 2 asl – 5 sts, 1 long and cylindrical bsl – 5 sts, 1 short bsl – 4 sts, 1 smooth T, 24 long; tarsi, 22 sts, 1 long bsl reaching

FIGURE 11: *Neoscirula klompeni* n. sp., legs of male: a – leg I; b – leg II; c – leg III; d – leg IV. Scale bar 50 μ m.

dtsl, 1 short and bulbous bsl, 2 asl, 1dtsl – 21 sts, 1 very long basally inflated bsl almost reaching tip of tarsus, 1 dtsl – 17 sts, 1 dtsl – 15 sts, 1 dtsl.

Material — Holotype female, 33 female paratypes and 4 paratype males, Philippines, Luzon Island, Laguna Province, University of the Philippines Los Baños, Forestry campus, area around the UPLB Museum of Natural History building, from rotten banana trunk in secondary forest with trash, 18 Jan. 2016 (R.C. Garcia, J.C.B. Naredo and H. Klompen).

Type deposition — Holotype female, 28 paratype females and 3 paratype males are deposited in the Museum of Natural History, University of the Philippines Los Baños, College, Laguna, Philippines; and 5 paratype females and 1 paratype male in the Ohio State University Acarological Collection, Columbus, Ohio, USA.

Etymology — This species is named in honor of Dr. Hans Klompen, Ohio State University, in recognition of his extensive studies on Philippine vertebrate parasitic mites, especially Sarcoptoidea and other Astigmata.

Remarks — This species appears most similar to *N. aspirasi* Corpuz-Raros, 1996 in having coxal plates I+II fused medially as a sternal shield, subcuticular cells on propodosomal shield, simple dorsal seta on palpal basifemur, and leg basifemoral chaetotaxy of 4-5-3-1. However, in the new species, the sternal shield (coxal plates I+II) is ornamented with prominent subcuticular cells and the posterior portion of subcapitulum has rectangular reticulations (vs. without such cells and reticulations), and 7 pairs of ventral setae arise between coxae II and genital plates (vs. 6 pairs).

***Neoscirula lagunaensis* n. sp.**
(Figures 12–14)

Zoobank: [D7473D71-747B-4734-BDA5-1C4F5EC059C2](https://zoobank.org/D7473D71-747B-4734-BDA5-1C4F5EC059C2)

Diagnosis — This species is unique among *Neoscirula* species in having a combination of the following characteristics: bifid palpal claw, stout claw-like seta subterminally on inner margin of palp tibiotarsus; reticulate posterior portion of subcapitulum; transversely rectangular dorsal propodosomal shield bearing conspicuous subcuticular cells;

dorsal hysterosomal setae borne on platelets; coxal plates I+II separate, not forming a sternal shield and ornamented with subcuticular cells; and 4-5-3-1 leg basifemoral chaetotaxy.

Description — **Female** — Body oval, widest at the level of setae *sce*, only slightly tapered posteriorly; body length, 391 [381 – 479 (424), $n = 12$], width, 221 [211 – 255 (233), $n = 12$]. Subcapitulum, palp segments, chelicerae, propodosomal shield, coxal plates, and leg segments finely papillate; membranous areas roughly striate-papillate.

Gnathosoma (Figure 12a) — Short and stout, about as long as wide, length 95 [95 – 122 (117), $n = 14$], a little over $\frac{1}{4}$ of total body length. Hypostome rather long, gradually tapered towards an acute tip; adoral setae absent. Subcapitulum with large rectangular reticulations along posterior margin, and smaller cells medially between setae *hg2* and *hg4*; *hg1* slightly bent at base, longest (37) of the hypostomal setae, *hg2* (17) arising close to *hg1*, *hg3* (20), and *hg4* (14). Palps short and stout, 65 [65 – 88 (82), $n = 10$], extending only slightly beyond hypostome; tibiotarsus stoutly conical and end in a short, basally thick and distally bifid claw. Chaetotaxy of palp segments – trochanter, 0; basifemur, 1 dorsal thin sts (10); telofemur, 1 strong, dorsal spls (10); genu 4 thin sts, the dorsoterminal seta longest (17); tibiotarsus, 1 long tsl (14), one basally thick and claw-like (7) subterminally on inner margin of segment, and 4 sts including the penultimate sts (20), one short at base of claw, and two ventrobasal. Chelicerae (Figure 12b) 95 [95 – 116 (109), $n = 10$] long; trochanter broad; second segment with basal $\frac{2}{3}$ thick, bulging, and gradually narrowed distally; distal $\frac{1}{3}$ almost evenly thick, about $\frac{1}{3}$ the width of chelical base; chelical seta absent.

Idiosoma (Figures 13a-b) — Length, 296 [265 – 357 (307), $n = 12$]. Dorsum covered by a transversely rectangular propodosomal shield, $1\frac{1}{2}$ times wider than long, anterior corners drawn as striated rounded lobes; with a short band of 5–6 stout, oval subcuticular cells laterally between setae *ve* and *sce*; about 9 cells also present, mesolateral to trichobothrium *sce*. Trichobothria *vi* and *sce* subequal (mean = 116 and 111, respectively, with $n = 10$ for each); sts *ve* about as long as *sci* (mean = 17 and 15, respectively,

FIGURE 12: *Neoscirula lagunaensis* n. sp., female: a – ventral view of gnathosoma; b – chelicera. Scale bar 50 μ m.

n = 10 for each). Hysterosoma roughly striate, laden with very fine papillae; complemented with 7 pairs of setae (lengths of setae with n = 10 each) borne on finely papillate platelets – *c1* 7, *c2* 7, *d1* 7 and *e1* subequal (7 – 10), *f1* 12 [10 – 17 (13.4)], *h1* 17 [17 – 20 (19)], and *h2* 9 [9 – 17 (15)]. Cupule *im* and *ih* conspicuous, roundish and arising in their normal position as in other cunaxids. Anal plates dorsal, striate-papillate, with 2 pairs of anal setae, *ps1* and *ps2*.

Ventrally, coxal plates I+II widely separated, not fused medially as a sternal plate, sparsely ornamented mesally with oval subcuticular cells of various sizes; coxae III+IV rather small, without subcuticular cells. Membrane between coxae II and genital plates with 5-7 pairs of setae that may arise asymmetrically in the same individual. Genital plates large, oval, with 2 oval genital papillae, and 4 pairs of subequal (5 – 7) genital setae. Paraanal setae ab-

FIGURE 13: *Neoscirula lagunaensis* n. sp., female idiosoma: a – dorsal view; b – ventral view. Scale bar 100 μ m.

sent.

Legs (Figures 14a-d) — Short and stout, the longest about 2/3 of idiosomal length; segments papillate, with some oval subcuticular cells on femora I and II. Lengths of legs – I, 180 [180 – 221 (210), n = 12]; II, 163 [163 – 211 (193), n = 10]; III, 177 [177 – 218 (205), n = 5]; IV 197 [197 – 247 (230), n = 11]. Chaetotaxy of leg segments: coxae, 3-3-3-3 sts; trochanters, 1-1-2-1 sts; basifemora, 4-5-3-1 sts; telofemora, 5-5-4-3 sts; genua, 5 sts, 4 asl, 1 mst in duplex with distal asl – 5 sts, 3 asl – 5 sts, 1 asl – 5 sts, 2 asl; tibiae, 5 sts, 1 bsl, 1 asl – 5 sts, 1 bsl – 5 sts, 1 bsl – 4 sts, 1 smooth T, 34 long; tarsi, 20 sts, 1 short, cylindrical bsl, 1 short and bulbous bsl, 2 asl, 1 dtsl – 20 sts, 1 long, cylindrical bsl, 1 dtsl – 16 sts, 1 dtsl – 15 sts, 1 dtsl.

Male — Unknown.

Material — Holotype female and 12 paratype females, Philippines, Luzon Island, Laguna Province, Los Baños municipality, upper Forestry campus, UPLB, area around the Museum of Natural History building, from rotten banana trunk in secondary forest with trash, 18 Jan. 2016 (R.C. Garcia, J.C.B. Naredo and H. Klompen).

Other paratypes from Los Baños municipality – 1 female, same data as for holotype but collected from ant nest in stump in the same site; 1 female, lower UPLB campus, Museum of Natural History Hortorium, from litter between leaves on top of palm, 27 Jan. 2016 (R.C. Garcia, J.C.B. Naredo and H. Klompen); 1 female, Barangay Anos, Garcia's farm, from decomposing mango trunk, 29 Jan. 2016 (R.C.

FIGURE 14: *Neoscirula lagunaensis* n. sp., legs of female: a – leg I; b – leg II; c – leg III; d – leg IV. Scale bar 50 μ m.

Garcia); and 12 females, Barangay Anos, Garcia's farm, from decomposing grasses, 29 Jan. 2016 (R.C. Garcia). One additional female from border between Siniloan municipality, Laguna Province and Real municipality, Quezon Province, University of the Philippines Land Grant, from unknown habitat, 21 Jan. 2016 (R.C. Garcia, J.C.B. Naredo and H. Klompen).

Type deposition — Holotype female, 26 paratype females are deposited in the Museum of Natural History, University of the Philippines Los Baños, College, Laguna, Philippines; and 2 paratype females in The Ohio State University Acarology (OSAL) Collection, Columbus, Ohio, USA.

Etymology — This specific name is derived from Laguna, the province from where the types originated.

Remarks — The female of this species keys to *N. oliveirae* Den Heyer and Castro, 2008b (from Brazil) in Skvarla *et al.*'s (2014) key to species of *Neoscirula* on account of the following character states shared with latter named species – coxal plates separate and do not form a sternal shield, absence of a hook-like process on palp genu, bifid palp tibiotarsal claw, and absence of cheliceral seta. However, it is clearly distinct from *N. oliveirae* in many respects – dorsal hysterosomal setae borne on finely papillate platelets, presence of subcuticular cells on coxal plates I+II (vs. absent), polygonal reticulations and subcuticular cells posteriorly on subcapitulum (vs. absent), presence of a hook-like seta on inner margin of palp tibiotarsus, and the number of setae on leg basifemora (4-5-3-1 vs. 4-6-3-1) and telofemora (5-5-4-3 vs. 5-5-4-3). The female is also similar to *N. baloghi* Mejia-Recamier and Palacios-Vargas, 2007 (from Mexico) where the dorsal hysterosomal setae are also borne on papillate platelets but differs by having bifid palp tibiotarsal claw (vs. undivided), widely separated coxal plates I+II (vs. fused as sternal shield), subcuticular cells on propodosomal shield and coxal plates I+II (vs. absent), and leg basifemoral chaetotaxy of 4-5-3-1 (vs. 4-4-3-1).

***Neoscirula lambatina* n. sp.
(Figures 15–17)**

Zoobank: [2711C84B-434C-4999-B478-37EB5AC52F09](https://doi.org/10.2711/1C84B-434C-4999-B478-37EB5AC52F09)

Diagnosis — This species is unique in having reticulate median areas of propodosomal shield and chelicerae; bifid palpal claw; and presence of paraanal setae.

Description — Female — Relatively small species, oval, broadest at the level of setae *sce*, gradually tapered posteriorly, light brown with slightly darker gnathosoma and legs; body length, 381 [381 – 391 (386), *n* = 2]; width, 187 [187 – 228 (207), *n* = 2]. Surfaces of subcapitulum and palp segments covered with larger, light (luminous) and smaller roundish papillae; coxal plates and genital plates with smaller papillae; membranous areas finely striate and densely laden with small, pointed papillae, striae becoming rougher posterior to seta *h1*.

Gnathosoma (Figure 15a) — Short and thick, about as long as wide; 92 [92 – 95 (93), *n* = 2] long. Hypostome broadly conical, one pair of minute adoral setae evident. Subcapitulum with large rectangular cells along posterior margin; *hg1* rather strongly bent basally, longest (20) of the hypostomals; *hg2* (10) arising close to *hg1*, *hg3* 17, *hg4* shortest (7). Palps short and thick, projected only slightly beyond hypostome, 68 [66 – 68 (67), *n* = 2]; tibiotarsus thickly conical, and end in a thick, bifid claw. Chaetotaxy of palp segments – trochanter, 0; basifemur, 1 basally thick sts (10); telofemur, 1 thinly pointed spls (12); genu, 4 sts the dorsodistal seta (17) longer than all others; tibiotarsus, 1 *tsl* (14), 1 short (3) and rod-like tubercle subterminally on inner margin of segment, and 4 sts including the longest (17) penultimate sts on outer margin, one short near base of claw, and two other sts arising ventrally on segment. Chelicerae (Figure 15b) 95 long (*n* = 2), longer than palp; trochanter and second segment reticulate and densely armed with small pointed papillae; basal 4/5 of second segment strongly bulged on inner margin, gradually tapered; distal 1/5 abruptly narrowed to less than 0.2 of basal width; 1 minute seta near base of claw.

Idiosoma (Figures 16a-b) — Length, 289 [289 – 296 (292), *n* = 2]. Dorsum with a relatively small,

FIGURE 15: *Neoscirula lambatina* n. sp., female: a – ventral view of gnathosoma; b – chelicera. Scale bar 50 μ m.

rectangular propodosomal shield, 1.4 times wider than long, posterior corners excavated at the level of posterior trichobothrium *sce*; surface of shield strongly reticulate-papillate medially, reticulations fading out laterally. Trichobothria plumose, *vi* slightly longer (139) than *sce* (129); sts *ve* (14) twice as long as *sci* (7); *ve* arising about 1/3-way between *vi* and *sce*, and *sci* close and mesal to *sce*. Hysterosoma finely striate-papillate, striae fine anteriorly, becoming rougher behind seta *fl*; striae laden with fine papillae; complemented with 7 pairs of setae (lengths based only on holotype) – *c1* 10, *c2* 9, *d1* 9,

e1 10, *f1* 14, *h1* 20, and *h2* 14 long. Cupules *im* and *ih* small, roundish, arising in their normal position among cunaxids. Anal plates striate-papillate, with 2 pairs of setae, *ps1* and *ps2*.

Ventrally, coxal plates I+II contiguous, not fused medially as a sternal plate, finely papillate, with some 6 rounded subcuticular cells; III+IV also contiguous, with a few subcuticular cells. Six pairs of short sts on finely striate-papillate membrane between coxae II and genital plates. Genital plates rather small, with 2 subequal oval genital papillae and 4 pairs of subequally short (14) genital se-

FIGURE 16: *Neoscirula lambatina* n. sp., female idiosoma: a – dorsal view; b – ventral view. Scale bar 100 μ m.

tae. Paraanal setae present between genital and anal plates.

Legs (Figures 17a-d) — Relatively short and stout, longest pair about 2/3 of idiosomal length. Lengths of legs ($n = 2$ for all legs): I, 173 [173 – 177 (175)]; II, 150 [150 – 163 (156)]; III, 167 [167 – 190 (168)]; IV, 194 [194 – 197 (195)]. Chaetotaxy of leg segments – coxae, 3-3-3-3 sts; trochanters, 1-1-2-1 sts; basifemora, 4-5-3-1 sts; telofemora, 5-5-4-3 sts; genua, 5 sts, 4 asl, 1 mst – 5 sts, 3 asl, 1 mst – 5 sts, 1 asl – 5 sts, 1 asl; tibiae, 5 sts, 1 bsl – 5 sts, 1 bsl – 5 sts, 1 bsl – 4 sts, 1 smooth T; tarsi, 20 sts, 2 clavate bsl, 2

asl, 1 dtsl – 18 sts, 1 long basally inflated bsl, 1 dtsl – 15 sts, 1 dtsl – 17 sts, 1 dtsl.

Male — Unknown.

Material — Holotype female and I female paratype, Philippines, Luzon Island, border between Siniloan municipality, Laguna Province and Real municipality, Quezon Province, University of the Philippines Land Grant, from unknown habitat, 23 Jan. 2016, (R.C. Garcia, J.C.B. Naredo and H. Klompen).

Type deposition — Both holotype and paratype

FIGURE 17: *Neoscirula lambatina* n. sp., legs of female: a – leg I; b – leg II; c – leg III; d – leg IV. Scale bar 50 μ m.

females are deposited in the Museum of Natural History, University of the Philippines Los Baños, College, Laguna, Philippines.

Etymology — The specific name is coined from the Pilipino term, *lambat*, for net, referring to the reticulate pattern of dorsal shield and chelicerae.

Remarks — The female of *N. lambatina* most closely resembles the South African species, *N. sevidi* Den Heyer, 1980, in having distinct reticulations on propodosomal shield, spine-like setae on palp basifemur and telofemur, bifid palp tibiotarsal claw, and minute cheliceral seta. It differs from the named species by having a leg basifemoral chaetotaxy of 4-5-3-1 (vs. 3-4 or 5-3-1), presence of subcuticular cells on both coxal plates I+II and III+IV (vs. absent in both plates), and distinctly reticulate cheliceral trochanter and segment II (vs. randomly arranged papillae on trochanter, and forming irregular rows on segment II).

Distribution — Twenty-seven *Neoscirula* species have been described from all zoogeographical regions of the world, but the most records (12) come from the Oriental Region, 9 of which are from the Philippines alone (Skvarla *et al.*, 2014). The addition of three new species in the present paper brings the known Philippine fauna to 12, the most diverse in the world, thus far.

An updated key to Philippine species based on Corpuz-Raros (2007), is given below while keys to world species then known are found in Mejia-Recamier and Palacios-Vargas (2007) and Skvarla *et al.* (2014).

Key to Philippine Species of *Neoscirula*

1. Coxal plates I+II of each side fused medially as a sternal shield 2
— Coxal plates I+II separate, not fused as a sternal shield 5
2. Leg basifemur I with 5 setae; palp basifemoral seta spine-like; leg telofemur II with 6 setae
..... *N. makilingica* Corpuz-Raros, 1996
— Leg basifemur I with 4 setae; palp basifemoral seta thin, not spine-like; leg telofemur II with 4 or 5

setae 3

3. Dorsal propodosomal shield without subcuticular cells; with a claw-like seta subapically on inner margin of palp tibiotarsus; leg telofemur II with 4 setae *N. ogawai* (Shiba, 1986)

— Dorsal propodosomal shield with subcuticular cells; without claw-like seta on palp tibiotarsus; leg telofemur II with 5 setae 4

4. Sternal shield with subcuticular cells; 7 pairs of setae on ventral membrane between coxae II and genital plates *N. klompeni* n. sp.

— Sternal shield without subcuticular cells; 6 pairs of setae on ventral membrane between coxae II and genital plates *N. aspirasi* Corpuz-Raros, 1996

5. Palp tibiotarsal claw bifid 6

— Palp tibiotarsal claw not divided or without a tooth that renders it a bifid appearance 9

6. Leg basifemur I with 4 setae; palp telofemoral seta thickened and spine-like 7

— Leg basifemur I with 5 setae; palp telofemoral seta simple, not spine-like
..... *N. laboensis* Corpuz-Raros, 2007

7. Hypostome with a shield-like process; propodosomal shield and coxal plates I+II without subcuticular cells *N. luxtoni* Smiley, 1992

— Hypostome without a shield-like process; propodosomal shield and coxal plates I+II with subcuticular cells 8

8. Dorsal propodosomal shield and chelicerae reticulate; palp tibiotarsus without a claw-like seta; paraanal setae present *N. lambatina* n. sp.

— Dorsal propodosomal shield and chelicerae not reticulate, but with a band of subcuticular cells laterally on the shield; palp tibiotarsus with a claw-like seta on inner margin at base of claw; paraanal setae

absent.....*N. lagunaensis* **n. sp.**

9. Dorsal propodosomal shield and coxal plates I+II with subcuticular cells 10

— Dorsal propodosomal shield and coxal plates I+II without subcuticular cells 11

10. Hypostome long, thinly conical; 6 pairs of setae on ventral membrane between coxae II and genital plates *N. abraensis* Corpuz-Raros, 1996

— Hypostome short and thickly conical; 7 pairs of setae on ventral membrane between coxae II and genital plates.....
.....*N. taclobanensis* Corpuz-Raros, 2007

11. Dorsal propodosomal shield trapezoidal, longer than wide; 6 pairs of setae on ventral membrane between coxae II and genital plates; paraanal setae absent *N. putinglupa* Corpuz-Raros, 1996

— Dorsal propodosomal shield transversely rectangular, wider than long; 7 pairs of setae on ventral membrane between coxae II and genital plates; paraanal setae present.....
.....*N. imperata* Corpuz-Raros, 1996

NEW COLLECTION RECORDS OF COLEOSCIRINAE

1. *Coleoscirus breslauensis* Den Heyer, 1980

Material — From Philippines, Luzon Island, Laguna Province, Los Baños municipality, lower UPLB campus, Hortorium of the Museum of Natural History, 27 Jan. 2016 (R.C. Garcia, J.C.B. Naredo): 2 females from litter of palm; 4 females and 1 male from bamboo litter; and 8 females and 1 male, from dry stuff at base of huge tree. Also from Los Baños municipality, Barangay Anos, Garcia's farm, 29 Jan. 2016 (R.C. Garcia): 1 female from decomposing mango trunk; and 8 females from mixed litter at base of mango tree.

2. *Coleoscirus simplex* (Ewing, 1917)

Specimens examined — 1 female, Philippines, Luzon Island, Laguna Province, Los Baños municipality, Barangay Anos, Garcia's farm, from litter at base of palm tree, 29 Jan. 2016 (R.C. Garcia).

3. *Coleoscirus tuberculatus* Den Heyer, 1979

Specimens examined — 1 female, Philippines, Luzon Island, Laguna Province, Los Baños municipality, lower UPLB campus, Hortorium of the Museum of Natural History, from litter and debris on top of broken palm tree, 27 Jan. 2016 (R.C. Garcia, J.C.B. Naredo). Also from Los Baños municipality, Barangay Anos, Garcia's farm, 29 Jan. 2016 (R.C. Garcia): 1 male from decomposing mango trunk; 2 females from mixed banana leaves and grasses; and 7 females and 3 males, from decomposing grasses.

4. *Neoscirula ogawai* (Shiba, 1976)

Material — Two females, Philippines, Luzon Island, Isabela Province, Gamu municipality, Barangay Pintor, Raros farm, from rotting log of royal palm (*Roystonea regia*), 31 Jan. 2016 (R.C. Garcia and J.C.B. Naredo).

ACKNOWLEDGEMENTS

We thank Dr. Hans Klompen for funding travels to the U.P. Land Grant in Laguna-Quezon border, and several places in Northern Luzon, and facilitating attendance of one of us (Jeremy Naredo) in the 2016 Summer Program in Acarology at OSU. We also thank the U.P. Land Grant Management Office for the permit and assistance in conducting collection activities at the Laguna-Quezon Land Grant. We greatly appreciate critical comments and suggestions of two unknown reviewers towards improvement of the manuscript.

REFERENCES

- Corpuz-Raros L.-A. 1995 — Philippine predatory mites of the family Cunaxidae (Acari). 2. Genera *Armascirus* Den Heyer and *Dactyloscirus* Berlese — Philipp. Agric., 78(2): 159-173.
- Corpuz-Raros L.-A. 1996a — Philippine predatory mites of the family Cunaxidae (Acari). 3. Genus *Coleoscirus* Berlese — Asia Life Sci., 5(1): 1-25.
- Corpuz-Raros L.-A. 1996b — Philippine predatory mites of the family Cunaxidae (Acari). 5. Genera *Neoscirula*

- Den Heyer, *Parabonzia* Smiley and *Orangescirula* Bu & Li — Philipp. Agric., 79(1 & 2): 15-37.
- Corpuz-Raros L.-A. 1996c — Philippine predatory mites of the family Cunaxidae (Acari). 6. *Neocunaxoides* Smiley with a new record from Central Kalimantan, Borneo, Indonesia — Asia Life Sci., 5(2): 125-140.
- Corpuz-Raros L.-A. 1996d — Philippine predatory mites of the family Cunaxidae (Acari). 7. Genus *Pulaeus* Den Heyer with records of two species from Central Kalimantan, Borneo, and Java, Indonesia — Philipp. Entomol., 10(2): 119-138.
- Corpuz-Raros L.-A. 2007 — Additional species of Bonziinae and Cunaxoidinae and description of the male of *Coleoscurus horidula* (Tseng) (Coleoscurinae) from the Philippines (Cunaxidae, Acari) — Asia Life Sci., 16(2): 153-173.
- Corpuz-Raros L.-A. 2008 — Additional species of Cunaxinae and first report of the subfamily Neobonziinae (Cunaxidae, Acari) from the Philippines — Asia Life Sci., 17(1): 71-89.
- Corpuz-Raros L.-A., Garcia R.-C. 1995 — Philippine predatory mites of the family Cunaxidae (Acari). 1. Genus *Cunaxa* von Heyden — Philipp. Entomol., 9(6): 605-624.
- Corpuz-Raros L.-A., Garcia R.-C. 1996 — Philippine predatory mites of the family Cunaxidae (Acari). 4. Genera *Pseudobonzia* Smiley and *Scutascirus* Den Heyer — Philipp. Entomol., 10(1): 15-28.
- Corpuz-Raros L.-A., Gruezo W.-Sm. 2011 — New species and records of Oribatida and other soil-inhabiting mites (Acari) mainly from Luzon and Mindanao Islands, Philippines — Asia Life Sci., 20(1): 37-61.
- Den Heyer J. 1977 — A new genus *Neoscirula* (Cunaxidae: Prostigmata: Acari) from the Ethiopian Region — J. Entomol. Soc. South Africa, 40(1): 73-86.
- Den Heyer J. 1978 — Coleoscurinae, a new cunaxid subfamily and two new South African species of *Coleoscurus* Berlese, 1916 (Prostigmata: Acari) — Acarologia, 20(4): 522-541.
- Den Heyer J. 1980 — Six new species of the subfamily Coleoscurinae (Cunaxidae: Actinedida: Acarida) — Phytolactica, 12: 105-128.
- Den Heyer J. 1981 — Systematics of the family Cunaxidae Thor, 1902 (Actinedida: Acarida) — Publ. Univ. North, Series A, 24: 1-19.
- Den Heyer J. 2011a — Some statistics on the taxonomy of the family Cunaxidae (Acari: Prostigmata) — Zoosymposia, 6: 34-38.
- Den Heyer J. 2011b — The genus *Coleobonzia* declared synonymous with *Neobonzia* Smiley, 1992 (Bdelloidea: Cunaxidae: Coleoscurinae) — Zootaxa, 2817: 59-62.
- Den Heyer J., de Castro T.M.M.G. 2008a — A new cunaxid genus with descriptions of two new species from Brazil (Acari: Prostigmata: Bdelloidea: Cunaxidae) — Zootaxa, 1731: 42-50.
- Den Heyer J., de Castro T.M.M.G. 2008b — Subfamilial affiliation of *Neoscirula* (Acari: Prostigmata: Cunaxidae) and descriptions of three new species of this genus from Brazil — Zootaxa, 1731: 51-62.
- Den Heyer J., Ueckermann E.-A., Khanjani M. 2011 — Iranian Cunaxidae (Acari: Prostigmata: Bdelloidea). Part I. Subfamily Coleoscurinae — Int. J. Acarol., 37(2): 143-160. doi:10.1080/01647954.2010.495953
- Ewing H.-E. 1917 — New Acarina. Part II. Descriptions of the new species and varieties from Iowa, Missouri, Illinois, Indiana and Ohio — Bul. Am. Mus. Nat. Hist., 37(2): 149-172.
- Fuangarworn M., Lekprayoon C. 2004 — A new species and records of *Pseudobonzia* Smiley (Acari: Prostigmata: Cunaxidae) from Thailand — Nat. Hist. J. Chulalongkorn Univ., 4(2): 45-51.
- Kethley J.-B. 1990 — Acarina: Prostigmata (Actinedida). pp. 667-756. In: Dindal D.L. (Ed.). Soil Biology Guide. New York: John Wiley & Sons.
- Mejia-Recamier B.-A., Palacios-Vargas J.-G. 2007 — Three new species of *Neoscirula* (Prostigmata: Cunaxidae) from a tropical dry forest in Jalisco, Mexico — Zootaxa, 1545: 17-31.
- Shiba M. 1976 — Taxonomic investigation on free-living Prostigmata from the Malay Peninsula — Nat. Life Southeast Asia, 7: 83-229.
- Skvarla M., Fisher J.-R., Dowling A.P.G. 2014 — A review of Cunaxidae (Acariformes: Trombidiformes): histories and diagnoses of subfamilies and genera, keys to world species, and some new locality records — ZooKeys, 418: 1-103.
- Smiley R.-L. 1992 — The Predatory Mite Family Cunaxidae of the World with a New Classification — Michigan: Indira Publishing House. 356 pp.

COPYRIGHT

Corpuz-Raros L.A. et al. 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.