

***Lanceacheyla filipina*, A NEW SPECIES OF CAVE-INHABITING
PREDATORY MITE FROM THE PHILIPPINES
(ACARI: CHEYLETIDAE: CHEYLETINAE)**

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ABSTRACT

A new species, *Lanceacheyla filipina* (Acariformes: Prostigmata: Cheyletidae) from bat guano inside a cave in Bulacan Province, Luzon Island, Philippines is described. This species differs from the generic type species, *L. whartoni* Xia, Klompen & Childers, 2011, by the lanceolate caudal seta *h2* which, like the humeral seta *c2*, is differentiated in shape from the squamiform setae of dorsal shields; presence of hornlike anterolateral projections on protegmen, reticulate (vs. granulate) pattern of tegmen and protegmen; presence of cupules *im* and *ip*; and transverse arrangement of anal setae *ps1-3* on a half-moon shaped anal plate (vs. longitudinal). Morphological characteristics were described and illustrated based on the female of this species.

Key words: Acari, cave fauna, Cheyletidae, *Lanceacheyla*, new species

INTRODUCTION

This paper reports the discovery of a new species of cave-inhabiting cheyletid mite, the second species known in the genus *Lanceacheyla* Xia et al. (2011) and the first species of this genus from a cave habitat. Five species in five genera of cheyletids were recorded earlier on bat guano by Fain and Bochkov (2001, 2002), namely, *Cheletonella vespertilionis* Womersley, 1941 from parts of the Palaearctic Region, USA and Malaysia; *Chelacaropsis apicola* Fain, 1972 from Rwanda and Burundi; *Grallacheles bakeri* De Leon, 1962 from Surinam; *Kenyacheylus troglodytes* Fain and Bochkov, 2001 from Kenya; and *Granulocheyletus corpuzrarosae* Fain and Bochkov, 2002, from Australia. The new Philippine species described here is the sixth species of known cave cheyletids.

The family Cheyletidae is one of the better known members of the Philippine acarine fauna and now composed of 62 species in 31 genera and subgenera. Most of these species were listed in Corpuz-Raros (2005) together with other mite species then known from the country, while several others described by Bochkov and OConnor (2003, 2004) were missed in the list. The recorded species belong to nine out of 15 tribes (Acaropsellini, Bakiini, Chelenotini, Cheletomorphini, Cheletogenini, Cheyletini, Cheyletiini, Cheletomorphini and Ornithocheyletini) recognized by Bochkov and Fain (2001), which are all predatory except for the Ornithocheyletini which are skin parasites of birds. The additional genus *Lanceacheyla* remains unassigned to a tribal or genus-group as noted below under "Remarks."

MATERIALS AND METHODS

A sample of guano was taken by staff of the Museum of Natural History, UPLB, from a cave within the Biak-na-Bato cave complex in Bulacan Province, Luzon Island, as part of a series of expeditions for cave fauna in the Philippines. The guano sample was taken within the dark zone of the cave, 50–75 meters away from the cave entrance. The cave entrance is surrounded by few plant species dominated mostly by ferns, figs, mosses and liverworts. The limestone forest frog *Platymantis biak* Siler et al., 2010, which is endemic to the area, can be found in the entrance and twilight zones of the cave.

Santol cave is located within the Sierra Madre Mountain ranges in a protected area under the jurisdiction of the Protected Areas and Wildlife Bureau of the Department of Environment and Natural Resources. The cave, though, is exposed to anthropogenic disturbances as it was open for tourism long before the collection of samples. Another trip to collect additional specimens could not proceed since DENR authorities prohibited entrance to the area after the accidental drowning of several students within the vicinity of the cave complex in August of 2014. Thus only two specimens collected earlier served as basis for this report.

Mites were extracted from the medium with a Tullgren funnel, sorted out from other arthropods, cleared in lactic acid, and mounted on slides with modified Hoyer's medium. Mounted specimens were studied taxonomically under a light microscope model Olympus CX-21, figures drafted with the aid of a drawing tube, and fine morphological details drawn by free-hand after careful study, before final inking on parchment paper, scanning and labelling of setae on a computer. Measurements were taken from the holotype (female) with an ocular micrometer and given in micrometers (μm).

Morphological terms are according to standard usage in the family but nomenclature of setae on idiosoma and legs follows those of Xia et al. (2011) for *Lanceacheyla whartoni* which was based on Grandjean's universal system and implemented for cheyletoids and other eleutherengone mites by Bochkov and associates in various papers on the group (e.g. Bochkov, et al., 2008; Bochkov, 2009; Bochkov & Otto, 2010). These are compared below under "Remarks," with Skvarla et al.'s (2014) interpretation of idiosomal chaetotaxy in *Paracaropsis travisi* (Baker, 1949).

DESCRIPTION OF SPECIES

***Lanceacheyla filipina* Corpuz-Raros & Naredo, n. sp.**

Figures 1-3

Diagnosis. This cave-inhabiting species is the second known for the genus *Lanceacheyla* Zia et al. (2007). Like the type species, *L. whartoni* Xia et al., which was collected from citrus trees in Florida, USA, its outstanding generic characteristics include the absence of eyes, seta v'' on tibia I and seta v on femur III; humeral seta c_2 long and lanceolate, and clearly differentiated from the other idiosomals; presence of two well-developed dorsal shields; modest hypertrichy or neutrichy of anterior shield; and the presence of solenidion ϕ on tibia II. Other characteristics shared with many

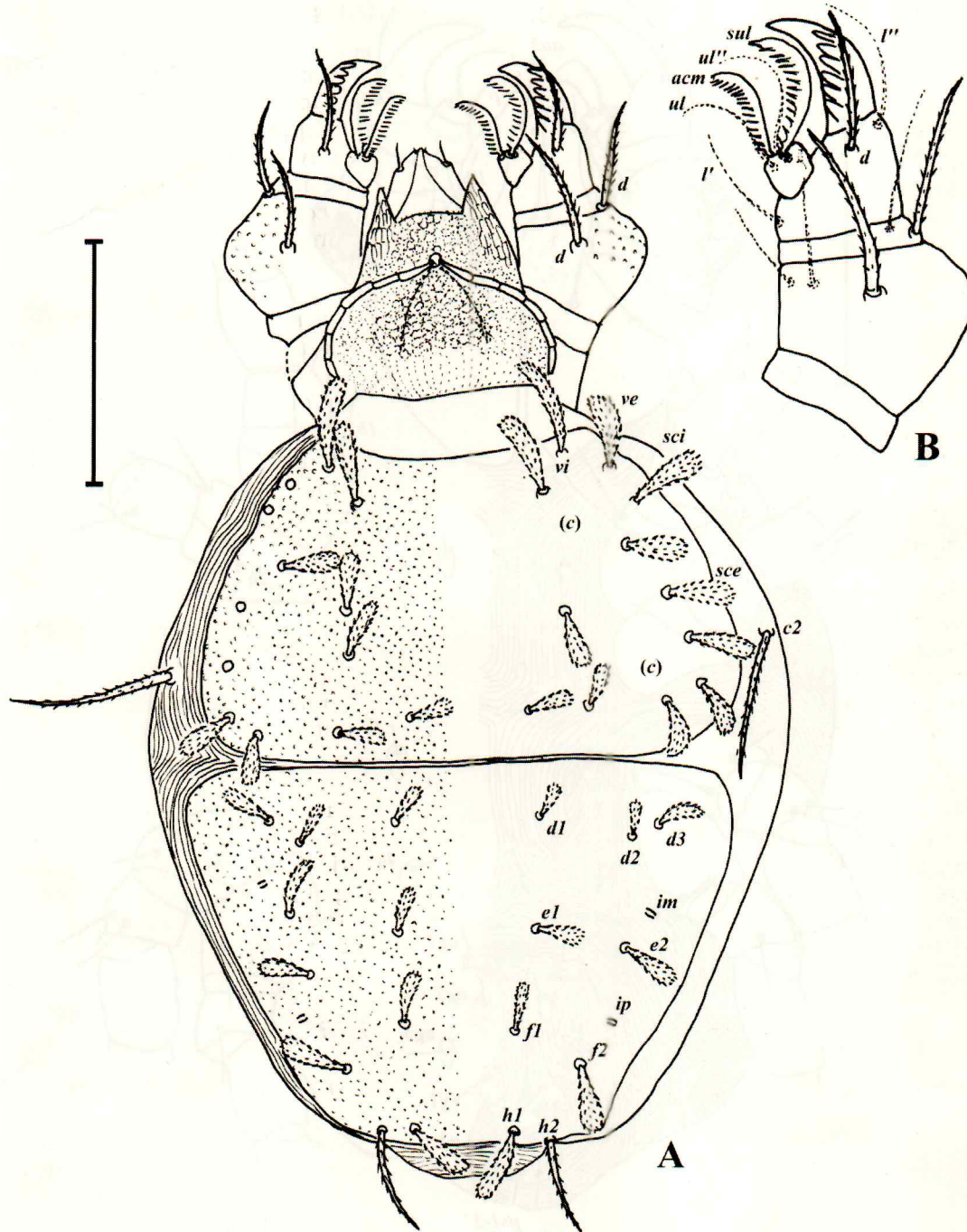


Figure 1. *Lanceacheyla filipina* Corpuz-Raros & Naredo, n. sp.: A. dorsum of body, B. Pedipalp. Scale bar: 100 micrometers

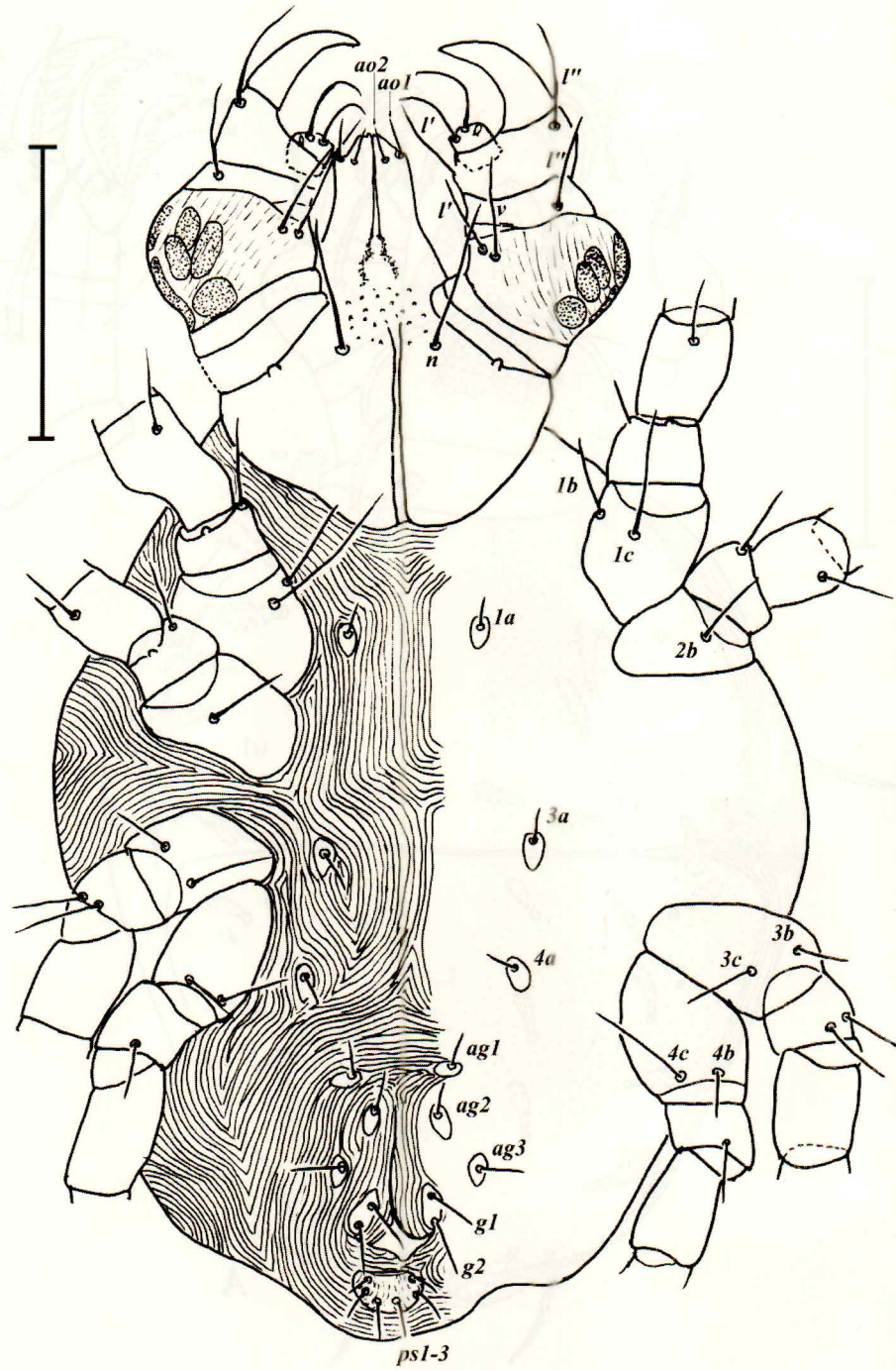


Figure 2. Venter of body of *Lanceacheyla filipina* Corpuz-Raros & Naredo, n. sp. Scale bar: 100 micrometers.

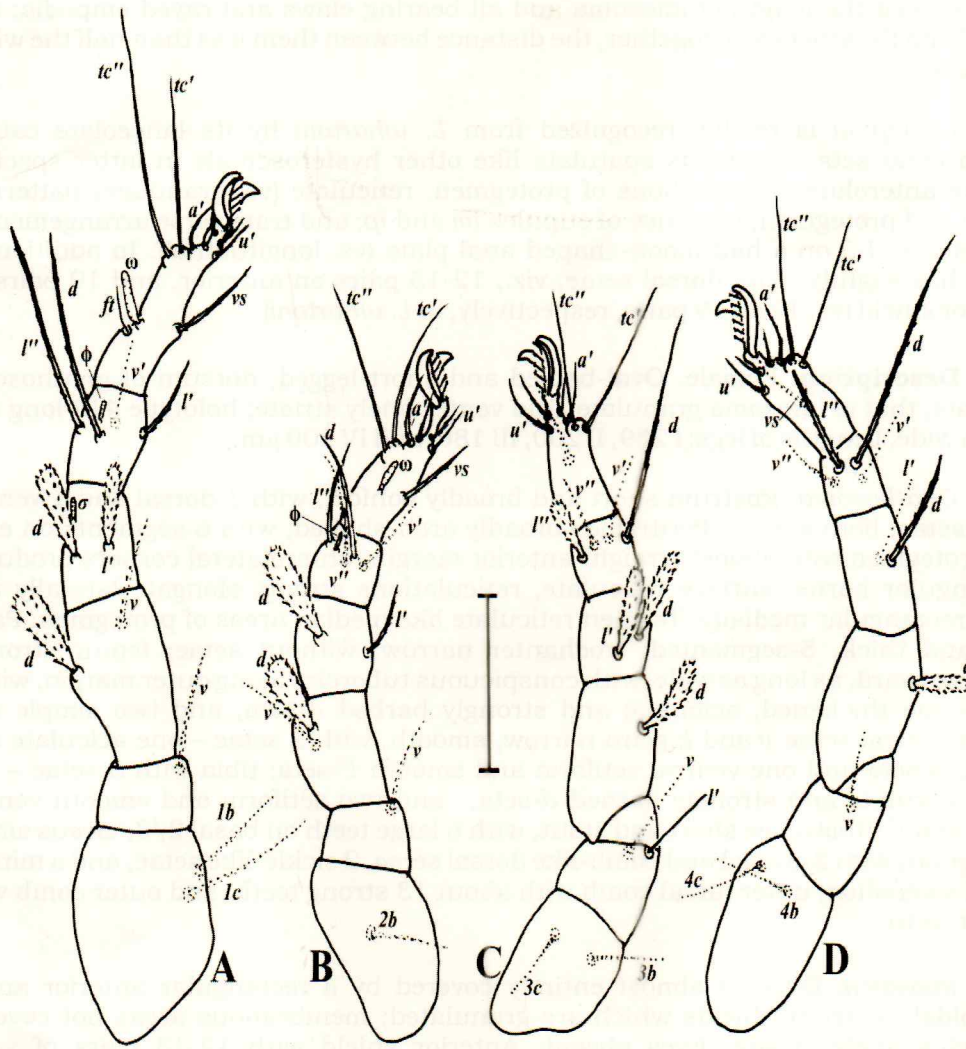


Figure 3. *Lanceacheyla filipina* Corpuz-Raros & Naredo, n. sp.: A. leg I, B. leg II, C. leg III, D. leg IV. Scale bar: 50 micrometers.

genera of the tribe Cheyletini (subfamily Cheyletinae) are the presence of two dorsal comb-like and two ventral sickle-like setae on the palp tarsus; relatively short legs that do not exceed the length of idiosoma and all bearing claws and rayed empodia; and coxae II and III rather close together, the distance between them less than half the width of idiosoma.

L. filipina is readily recognized from *L. whartoni* by its lanceolate caudal hysterosomal seta *h2* (versus spatulate like other hysterosomals in latter species), hornlike anterolateral projections of protegmen, reticulate (vs. granulate) pattern of tegmen and protegmen, presence of cupules *im* and *ip*; and transverse arrangement of anal setae *ps1-3* on a half-moon-shaped anal plate (vs. longitudinal). In addition, *L. filipina* has slightly more dorsal setae, viz., 12-13 pairs on anterior, and 10 pairs on posterior shield (vs. 12 and 9 pairs, respectively, in *L. whartoni*).

Description. Female. Oval-bodied and short-legged; dorsum of gnathosoma reticulate, that of idiosoma granulate, and venter finely striate; holotype 412 long and 258 μm wide. Lengths of legs: I 239, II 200, III 186, and IV 200 μm .

Gnathosoma. Rostrum short and broadly conical, with 1 dorsal and 1 ventral adoral setae, both simple. Peritremes broadly arch-shaped, with 6 segments on each arm. Protegmen with almost straight anterior margin, anterolateral corners produced as triangular horns; surface reticulate, reticulations strong, elongate laterally and faintly rectangular medially. Tegmen reticulate like median areas of protegmen. Palps short and thick, 5-segmented; trochanter narrow, without setae; femur strongly bulged outward, as long as wide, with conspicuous tubercles along outer margin, with 3 setae – one thickened, aciculate and strongly barbed *d*-seta, and two simple and smooth ventral setae *v* and *l*; genu narrow, smooth, with 2 setae – one aciculate and barbed, *d*-seta and one ventral setiform and smooth *l'*-seta; tibia with 3 setae – one dorsal aciculate and strongly barbed *d*-seta, and two setiform and smooth ventral setae *l'* and *l''*; tibial claw short and stout, with 6 large teeth on basal 2/3; tarsus small, rectangular, with 2 curved and comb-like dorsal setae, 2 sickle-like setae, and a minute ventral solenidion; outer tarsal comb with about 13 strong teeth, and outer comb with 16 finer teeth.

Idiosoma. Dorsum almost entirely covered by a rectangular anterior and a trapezoidal posterior shields which are granulated; membranous areas not covered by shields finely striate. Eyes absent. Anterior shield with 12-13 pairs of setae (*vi*, *ve*, *sci*, *sce*, and 8-9 neotrichial *c*-setae), all squamiform-serrate, anterior pairs longer than posterior ones, *vi* 40 μm , *ve*, *sci* and anteriormost *c*-seta 34 μm ; the rest 13-27 μm . Humeral seta *c2* lanceolate, long-barbed, 66 μ long. Posterior shield with two pairs of slit-like cupules (*im*, and *ip*) and 9-10 pairs of setae (*d1*, *d2*, *d3*, *e1*, *e2*, *e3*, *f1*, *f2*, *h1* and *h2*). Cupule *ih* and associated seta *h2* which are displaced ventrally when present, not observed. Setae of posterior shield squamiform-serrate except *h2* which is shaped like the humeral pair; *h2* 43 μ long, the rest 13-27 μm , with submedian pairs generally shorter than lateral ones.

Venter of *Idiosoma* finely striate except platelets bearing the setae; with 3 pairs of intercoxal (*1a*, *3a* and *4a*), 2 pairs of genital setae (*g1* and *g2*), 3 pairs of aggenital (*ag1-3*), and 3 pairs of anal (*ps1-3*); all short and simple and borne on small but distinct platelets. Anal plate transversely half-moon-shaped and sparsely striated.

Legs. Arranged 2-2 on venter, coxae II and III arising rather closely, distance between them much less than half the width of idiosoma. Legs relatively short and thick, the longest first pair 2/3 the length of idiosoma or slightly more than half the total body length; all 6-segmented and end in a pair of smooth claws and rayed empodium. Dorsal *d*-setae of femora and genua as well as *l*-seta of genu I squamiform-serrate; *d*- and *l*-setae of tibiae lanceolate and long-barbed; *d* and *l*" of tibia I, and *d*-setae of tibiae I, III and IV much longer and thinner than *d*-seta of tibia II; setae *tc* of tarsi flagellate and smooth; the rest of leg setae simple and of varying lengths. Chaetotaxy of segments of legs I-IV (solenidia enclosed in parentheses after tactile ones): coxae 2-1-2-2, trochantera 1-1-2-1, femora 2-2-1-1, genua 2(1)-2-2-2, tibiae 4(1)-4(1)-4-4, and tarsi 9(1)-7(1)-7-7. Solenidion ω on tarsi I, 13 and on II, 7 μ m long; σ on genu I and ϕ tibiae I and II minute and inconspicuous; guard seta *ft* on tarsus I thin, about as long as solenidion ω I.

Male. Unknown.

Types (both females). Holotype and 1 paratype, LUZON Island: Santol Cave, Biak-na-bato National Park, San Miguel, Bulacan Province, Philippines, collected by A.R. Larona /I.L. Lit, Jr., on 07 December, 2003, from bat guano inside cave. Both types are deposited in the Entomology Section, Museum of Natural History, University of the Philippines Los Baños.

Etymology. The specific name is dedicated to the Filipina, a female national of the Philippines.

Remarks. Skvarla et al. (2014) recently proposed a new interpretation of setal nomenclature of the idiosoma in the Cheyletidae based on the assumption that the line dividing the propodosomal and hysterosomal shields corresponds to the dorsosejugal suture (*ds*). In the system adopted herein, the *ds* is absent as in other Cheyletoidea and Raphignathoidea (Bochkov, et al., 2008). The C-segment is presumed to have fused with the true propodosomal shield and *ds* would be the imaginary intersegmental division between them. The transverse row of setae borne posteriorly on the anterior shield constitutes the *c*-series. The posterior shield is one segment less than the true hysterosomal shield and the first transverse row it carries is the *d*-series. To reflect their true homologies, the neutral terms anterior and posterior dorsal shields are, therefore, more accurate as used by Xia et al. for *L. whartoni*. The humeral seta *c2* (*hm* in Skvarla et al.'s system) is located on the lateral membrane way anterior to the posterior margin of the anterior shield and closer to the point of insertion of the external scapular seta *sce*, than it is to the setae of posterior shield. In elongate-bodied cheyletids where dorsal shields are poorly developed or entirely absent, the humeral seta is anterior to a lateral constriction that is often evident, and is transversely aligned with the dorsomedian pair formerly labelled as a *d*-seta (*d1* in Fain and Bochkov 2001 for *Bak*, *Chelacheles* and *Neochelacheles*; *d2* in Corpuz-Raros, 2000 in *Bak* species). More logically, the

constriction would correspond to the anterior-posterior subdivision of the dorsal shield, or the intersegmental division signified by cupule (lyrifissure) *ia* between the C- and D-segments. Consequently, the cupules arising within the posterior shield are named here as *im* between segments D and E, and *ip* between E and F. These are called *ia* and *im*, respectively, by Skvarla et al. (2014) in *Paracaropsis travisi*.

Affiliations of the genus *Lanceacheyla* were analyzed by Xia et al. (2011) but in the absence of extensive species-level taxa for comparison, they opted not to assign it to any of the 15 phylogenetic groups/tribes proposed by Fain and Bochkov (2001) within the family Cheyletidae. The former authors compared *Lanceacheyla* with other eyeless cheyletids of the *Cheyletus*-group and the unassigned genus *Cheletonella*. In contrast, species of *Cheletonella*, in particular, have few or no neotrichous setae on the anterior dorsal shield, solenidion ϕ is absent on tibia II, and a *v*-seta is present on femur III. They considered it "ill-advised" to place *Lanceacheyla* in a single group with *Cheletonella* since this "would force a substantial revision of the concept" of the latter genus, and especially that "ecologically the match is also poor, given the previous records (of *Cheletonella*) are from bat guano, bird nests, and soil." Discovery of *L. filipina* from bat guano inside a cave could contribute to future phylogenetic analysis of eye-less cheyletid genera which is beyond the scope of this paper.

ACKNOWLEDGEMENTS

We thank Mr. Ariel R. Larona and Dr. Ireneo L. Lit, Jr. for the collection of the mite species described herein, and to Dr. Lit, also, then Director of the UPLB Museum of Natural History, for support and being part of the team in the MNH cave exploration. We also thank Professor Phillip A. Alviola, Mr. James DV. Alvarez and students of cave ecology class for providing additional information about the cave.

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