



Research note

First record of the genus *Limnohalacarus* (Acari: Halacaridae) from Mexico

Primer registro del género Limnohalacarus (Acari: Halacaridae) de México

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Abstract

Limnohalacarus cultellatus Viets, 1940 was collected from an anchialine cave (Cenote Bang) in the Ox Bel Ha system located near Tulum, Quintana Roo, Mexico. This species has been recorded from the Antilles, Brazil, Hungary, India, Madagascar, El Salvador and USA. The record presented here is the first one of the species for Mexico and the first record for an halacarid mite from continental waters in the country. A key to the species of *Limnohalacarus* is given as well as information about the variation shown by the organisms named under *L. cultellatus*.

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Keywords: Acari; *Limnohalacarus*; Anchialine; Quintana Roo; First record

Resumen

Limnohalacarus cultellatus Viets, 1940 fue recolectado en una cueva anchialina (Cenote Bang) del sistema Ox Bel Ha localizado cerca de Tulum, Quintana Roo, México. La especie se conoce de las Antillas, Brasil, Hungría, India, Madagascar, El Salvador y EUA. El registro que se presenta es el primero de la especie para México y también el primer reporte de un halacárido en aguas continentales en el país. Se proporciona una clave para las especies conocidas del género y se aporta información sobre la variación que se observa en los organismos ubicados en *L. cultellatus*. Derechos Reservados © 2016 Universidad Nacional Autónoma de México, Instituto de Biología. Este es un artículo de acceso abierto distribuido bajo los términos de la Licencia Creative Commons CC BY-NC-ND 4.0.

Palabras clave: Acari; *Limnohalacarus*; Anquihalino; Quintana Roo; Primer registro

Halacaridae are prostigmatid mites with more than 1,100 described species around the world (Bartsch, 2009), and as a group they are mainly known as the marine mites. Eight species of halacarids have been reported from Mexico: *Agaua variabilis* MacQuitty, *Agauopsis filirostris* MacQuitty, *Copidognathus ilsebartschi* MacQuitty, *Halacarus newelli* MacQuitty, *Simognathus crameriae* Rivas, *Actacarus giganteus* Krantz, *Copidognathus yucatanensis* Chatterjee & De Troch, and *C. unicusatus* Bartsch; the former 5 are distributed along the Pacific

(MacQuitty, 1983, 1984; Rivas, 2006) and the latter 3 in the Caribbean Sea (Chatterjee & De Troch, 2001; Krantz, 1971).

This family is mainly marine, occurring at depths ranging from the littoral zone to about 7,000 m (Bartsch, 1988); however, some 60 species can be found in continental and coastal fresh and brackish waters (Bartsch, 1996, 2008). In particular, the subfamily Limnohalacarinae is composed of 5 genera: *Hamohalacarus* Walter, *Himejacarus* Imamura, *Parasoldanelonyx* Viets, *Soldanelonyx* Walter and *Limnohalacarus* Walter; all of them with species that inhabit continental waters.

Particularly, the 13 species of *Limnohalacarus* have a worldwide distribution, living in fresh to slightly brackish waters (Bartsch, 2013; Pepato & Costa, 2015): *Limnohalacarus africanus* Walter, *L. australis* Bartsch, *L. capernaumi* Petrova,

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Table 1
Records and variation of the total body size and some of the plates of *Limnohalacarus cultellatus*.

Distribution	Habitat	Length/width ratio							References
		Idiosoma	Gnathosoma	AD	OC	PD	AE	GP	
Margarita, Curacao, Aruba and Bonaire Islands	Piped water, rivers and water in fissures	1.41	1.35	1.00	1.12	1.87	0.80	1.20	Viets (1940)
Andhara Pradesh, India	Brackish water, bay near confluence of a river	1.37	1.42	1.13	1.10	1.92	0.58	1.12	Chatterjee and Chang (2005)
Georgia and Wisconsin, USA	River	1.19	1.65	1.16	1.00	1.78	0.62	0.80	Bartsch (2011)
Northern Madagascar	River, riffle	1.19	NA	1.10	1.10	1.70	NA	NA	Bartsch (2013)
Rio Grande do Sul, Brazil	Lake with salinity gradient (brackish to freshwater)	1.47	1.28	1.01	1.06	1.53	0.60	0.71	Pepato and Costa (2015)
Yucatán Peninsula, Mexico	Anchialine cave	1.34	1.36	1.13	1.53	1.83	0.57	1.17	Present study

AD, anterior dorsal plate; AE, anterior epimeral plate; GP, genital plate; NA, not available; OC, ocular plate; PD, posterior dorsal plate.

L. cultellatus Viets, *L. dentatus* Bartsch, *L. fontinalis* Walter & Bader, *L. inopinatus* Fain & Lambrechts, *L. lanae* Green, *L. major* Bader, *L. mamillatus* Fain & Lambrechts, *L. novus* Bartsch, *L. portmanni* Bader and *L. wackeri* (Walter).

Only 2 species of Limnohalacarinae have been reported from the Neotropics. The first one, *L. cultellatus*, originally described from the Antilles, has also published records from the northern USA and El Salvador (Bartsch, 2011), the Caribbean region (Bartsch, 1984; Viets, 1940) and Brazil (Bartsch, 2011; Pepato & Costa, 2015). The second species, *L. mamillatus*, was described from an aquarium in Belgium and has been recorded in Brazil (Pepato & Costa, 2015).

Regarding anchialine systems, only a few records of aquatic mites exist from caves in Bermuda (Bartsch & Iliffe, 1985). No previous records of halacarids exist for the Yucatán Peninsula in Mexico, where large anchialine systems with hundreds of kilometers of flooded passages have developed. The typical taxa occurring in the anchialine systems of Yucatán are crustaceans: remipedes, amphipods, isopods, ostracods, thermosbaenaceans, and caridean shrimps (Álvarez, Iliffe, Benitez, Brankovits, & Villalobos, 2015).

We herein present a new record of *Limnohalacarus cultellatus* from Cenote Bang which is part of the Ox Bel Ha system, Tulum, Quintana Roo, Mexico. The samples of *L. cultellatus*, obtained in 2013 are the first for Mexico and also the first from an anchialine habitat. The morphological variations observed relative to the original description are presented (Table 1), and an identification key for females of all the species of *Limnohalacarus* is included.

The Ox Bel Ha system develops just to the south of the town of Tulum, Quintana Roo, Mexico (Fig. 1). Cenote Bang is located in the innermost section of the system about 12 km from the shore. Around Cenote Bang the submerged galleries develop at an average depth of 18 m and the halocline is present at a depth ranging from 18 to 21 m.

Samples were obtained with a plankton net (300 µm) from 0 to 8 m in the cenote. The contents were preserved in 70% ethanol. At the laboratory, mites were sorted under a stereoscopic

microscope, cleared in lactic acid and mounted in Hoyer's medium. The illustrations and measurements in micrometers (µm), were made using a Nikon Optiphot-2 phase contrast microscope. Microphotographs were obtained with an AxioCam MRC5 camera using a Carl Zeiss AxioZoom V16 microscope.

The specimen was collected under the scientific collector's license issued to F. Álvarez (FAUT 0104) by the Mexican environmental authority (Semarnat). The organism was deposited in the National Acarological Collection (CNAC) of the Institute of Biology, UNAM, México City, with the catalog number CNAC009211.

The abbreviations used in the diagnosis and redescription are: AD (anterior dorsal plate), AE (anterior epimeral plate), AP (anal plate), ds (dorsal setae, from anterior to posterior: ds-1 to ds-5), P-2 to P-4 (second to fourth palpal segment), GA (genitoanal plate), ε (famulus), gac (genital acetabula), glp (dorsal or lateral gland pores, from anterior to posterior: glp-1 to glp-5), GP (genital plate), GO (genital opening), OC (ocular plate), pas (parambulacral seta), PD (posterior dorsal plate), PE (posterior epimeral plate), pgs (perigenital setae), sgs (subgenital setae), ω (solenidium), legs (numbered I to IV). Segments, from distal to proximal region are: tarsus, tibia, genu, telofemur, basifemur, and trochanter. The chaetotaxy formulas exclude the solenidia, famuli and parambulacral setae from the trochanter to the tarsus. The number of bipectinate spines is given in parentheses. Lengths of leg segments are measured along their dorsal margin. Measurements are expressed in micrometers (µm).

Complementary description

Classification follows Krantz & Walter, 2009: 98–100.

Subclass Acari Leach, 1817

Superorder Acariformes Zakhvatkin, 1952

Order Trombidiformes Reuter, 1909

Superfamily Halacaroidea Cunliffe, 1955

Family Halacaridae Murray, 1877

Subfamily Limnohalacarinae Viets, 1927

Genus *Limnohalacarus* Walter, 1917

Limnohalacarus cultellatus Viets, 1940

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