

Notas

The tracheal mite *Locustacarus buchneri* (Stammer) (Acari: Podapolipidae) in Argentina: new records and potential risks to autochthonous bumble bees

El ácaro traqueal *Locustacarus buchneri* (Stammer) (Acari: Podapolipidae) en
Argentina: nuevos registros y riesgos potenciales para abejorros autóctonos

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Abstract: *Locustacarus buchneri* (Stammer) is a tracheal mite that parasitizes various *Bombus* Latreille species worldwide, causing weakening effects that tend to intensify under crowded conditions. This contribution reports new records of the mite in Argentina, including the first detection in the non-native host *Bombus terrestris* L. and its presence in new localities in the provinces of Río Negro and La Pampa. From 2014 to 2019, 1,703 adult bumble bees of four species were examined by dissection. Nine individuals were parasitized: six *B. terrestris* and three *Bombus bellicosus* Smith. Prevalence was low across all cases, comparable to previous reports,

but contrasted sharply with the much higher rates documented in Chile. We discuss the likely introduction of the mite into Argentina via *B. terrestris* from Chile and the potential risks of parasite spillover to native species. These records update the known distribution of *L. buchneri* in the Neotropical and Andean regions and emphasize the need for haplotype-based studies of the isolated individuals to gain a better understanding of the parasite–host dynamics in *Bombus* spp.

Keywords: Acari, Allochthonous species, *Bombus terrestris*, Neotropical fauna, Parasite.

Resumen: *Locustacarus buchneri* (Stammer) es un ácaro traqueal que parasita diversas especies de *Bombus* Latreille a nivel mundial, causando efectos debilitantes que tienden a intensificarse en condiciones de hacinamiento (ej. cría masiva). En esta contribución se reportan nuevos registros de este ácaro en Argentina, incluyendo la primera detección en el hospedador no nativo *Bombus terrestris* L. y su presencia en nuevas localidades de las provincias de Río Negro y La Pampa. Entre 2014 y 2019, se examinaron por disección 1.703 abejorros adultos correspondientes a cuatro especies. Se detectaron nueve individuos parasitados: seis *B. terrestris* y tres *Bombus bellicosus* Smith. La prevalencia fue baja en todos los casos, comparable a estudios previos, pero contrastó marcadamente con las tasas mucho más altas documentadas en Chile. Se discute la probable introducción del ácaro en Argentina a través de *B. terrestris* proveniente de Chile, así como los riesgos potenciales de derrame (*spillover*) parasitario hacia especies nativas. Estos registros actualizan la distribución conocida de *L. buchneri* en las regiones Neotropical y Andina, y resaltan la necesidad de estudios haplotípicos de los diferentes individuos aislados para comprender mejor la dinámica parásito-hospedador en especies de *Bombus*.

Palabras clave: Acari, *Bombus terrestris*, Especie alóctona, Fauna neotropical, Parásito.

The mite *Locustacarus buchneri* (Stammer) (Acari: Prostigmata: Podapolipidae) is an internal parasite associated with at least 20 bumble bee species of the genus *Bombus* Latreille (Hymenoptera: Apidae) worldwide. All life stages of this mite (egg, male, larviform and gravid female) lodge in the principal tracheal lobes of adult bumble bees (Husband & Sinha, 1970). Although *L. buchneri* may cause debilitating effects in heavily parasitized bumble bees, it is generally not considered a major driver of natural populations, but rather a stress factor that may act synergistically with other parasites or stressors. It can, however, pose a significant threat to confined populations such as those in greenhouses or mass-rearing facilities, where prevalence tends to become higher than in wild populations (Husband & Sinha, 1970; Macfarlane et al., 1995; Goka et al., 2000).

Globally, *L. buchneri* has been recorded from *Bombus* species in at least 12 countries, mainly in the Northern Hemisphere (Wolmuth-Gordon, 2024) (Fig. 1a). In South America, this mite was first reported in Argentina in association with *Bombus bellicosus* Smith and *Bombus pauloensis* Friese (Plischuk et al., 2013), and shortly after in *Bombus terrestris* L., *Bombus ruderatus* (F.) and *Bombus dahlbomii* Guérin-Ménéville from southern Chile (Arismendi et al., 2016).

In this contribution we report recent findings of *L. buchneri* from new localities in Argentina, including its detection in the invasive species *B. terrestris*, and discuss the potential threat posed to native pollinators by its occurrence in an allochthonous host. Given the ongoing expansion of this bumble bee in South America (Geslin & Morales, 2015; Fontúrbel et al., 2021), examining its parasite associations is crucial to assess potential impacts on native pollinator communities.

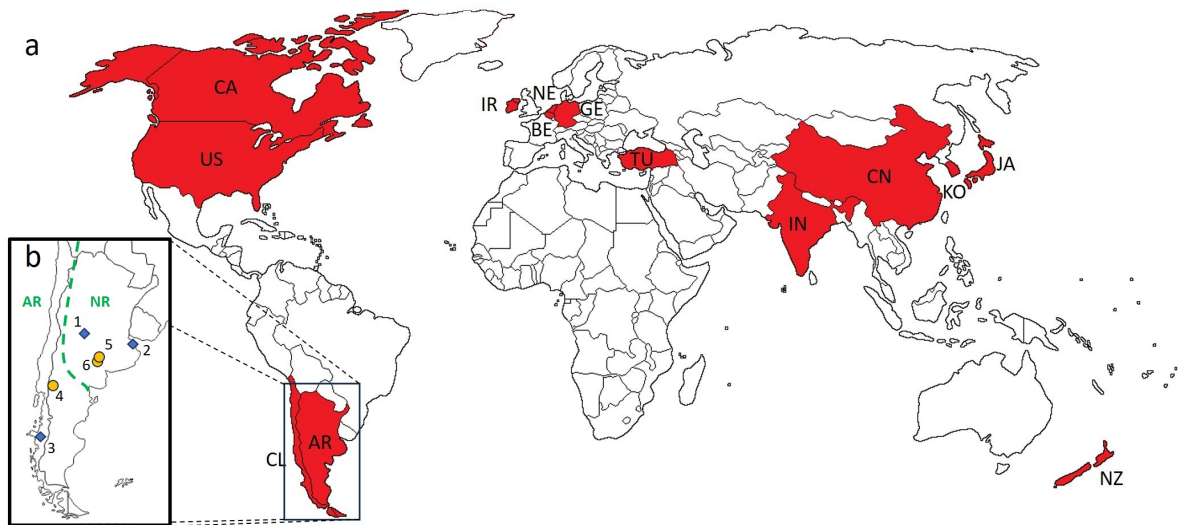


Figure 1.

Distribution of *Locustacarus buchneri*.

a. Countries in which it has been registered. b. Records of *L. buchneri* in South America. References= AR: Argentina, BE: Belgium, CA: Canada, CL: Chile, CN: China, GE: Germany, IN: India, IR: Ireland, JA: Japan, KO: Korea, NE: Netherlands, NZ: New Zealand, TU: Türkiye, US: United States of America. Previous records: 1: La Carolina (San Luis), 2: Colonia Urquiza (Buenos Aires) (Plischuk et al., 2013), 3: “Southern Chile” (Arismendi et al., 2016), indicated with diamonds, new records: 4: San Carlos de Bariloche (Río Negro), 5: Macachín, 6: Guatraché (La Pampa), indicated with circles. The dashed green line represents the approximate boundary between the Andean Region (AR) and the Neotropical Region (NR).

A total of 1,703 adult bumble bees belonging to four *Bombus* species (*Bombus brasiliensis* Lepeletier, *B. pauloensis*, *B. bellicosus*, and *B. terrestris*) were collected between September 2014 and May 2019. They were captured while foraging using entomological nets in various localities across the provinces of Buenos Aires, Chubut, La Pampa, Misiones, Río Negro, San Luis, and Santa Fe. Individuals were stored in plastic vials and transported alive to the laboratory, where they were identified (Abrahamovich et al., 2007) and then preserved at -30°C until processing. Parasitological examinations were conducted by dissecting and inspecting the tracheal lobes under a stereoscopic microscope ($\times 10 - \times 40$). Detection, isolation, identification, measurement, and photographic documentation of mites were performed using both simple and compound microscopes ($\times 400 - \times 1000$), following morphological descriptions by Husband & Sinha (1970) and Plischuk et al. (2013) (Fig. 2).

From the total parasitized bumble bees, six individuals were identified as *B. terrestris* (four workers and two males) collected in San Carlos de Bariloche, Río Negro ($41^{\circ}07'33''$ S; $71^{\circ}23'55''$ W). Two specimens corresponded to *B. bellicosus* (one worker and one queen) collected in Macachín, La Pampa ($37^{\circ}11'14''$ S; $63^{\circ}38'04''$ W), and one additional *B. bellicosus* worker was collected in Guatraché, La Pampa ($37^{\circ}34'30''$ S; $63^{\circ}36'47''$ W) (Fig. 1b).

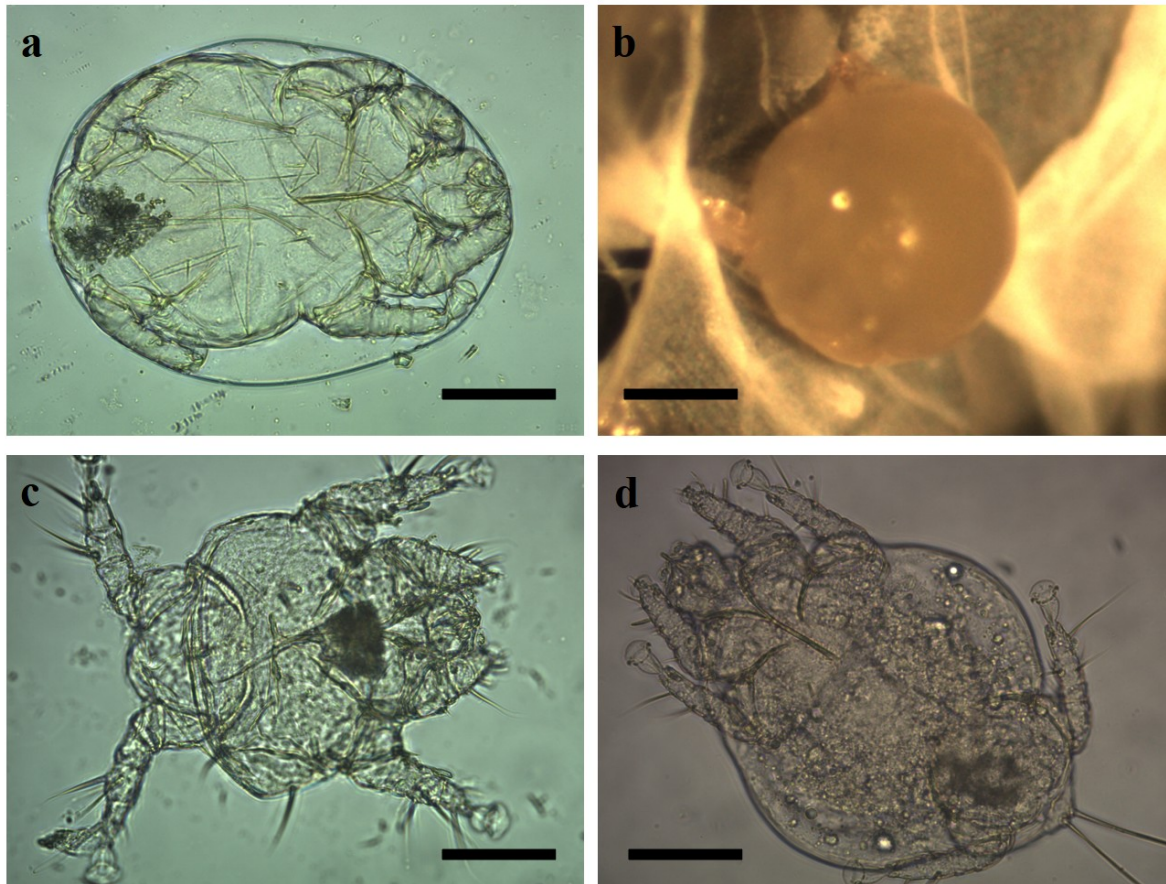


Figure 2.

Locustacarus buchneri

a. Larvated egg. b. Gravid female. c. Male. d. Larviform female. Scale bars= a, c: 30 μm , b: 200 μm , d: 35 μm

In a previous study in Argentina, *L. buchneri* was isolated only from native *B. bellicosus* and *B. pauloensis*, both at low prevalence (< 2 % *B. bellicosus* [2/105]; < 1 % *B. pauloensis* [1/1,713]) out of a total of 2,608 individuals belonging to eight species (Plischuk et al., 2013). The values obtained here are relatively similar, showing an average seasonal prevalence of 0.7 % in San Carlos de Bariloche and slightly higher in La Pampa (Table I). However, this is the first record of parasitized *B. terrestris* in the country, and the known distribution of the parasite is now extended to Río Negro and La Pampa provinces.

	2014/15	2015/16	2016/17	2017/18	2018/19
<i>B. terrestris</i>	0.62 % 1 (W) / 162	0.60 % 1 (W) / 166	0.56 % 2 (M) / 360	0.99 % 2 (W) / 201	-
<i>B. bellicosus</i>	-	-	-	-	4.76 % 3 (1Q, 2W) / 63

Table I.

Seasonal prevalence of *Locustacarus buchneri* in *Bombus terrestris* and *Bombus bellicosus* from Argentina.

Notes= For each season (September to May), the upper value indicates prevalence (%), and the lower value shows the number of parasitized individuals by caste/sex (Q = queen, W = worker, M = male) over the total number of individuals collected.

In southern Chile, Arismendi et al. (2016) reported prevalence rates of 41 % (n= 232), 31 % (n= 94), and 23 % (n= 52) in *B. terrestris*, *B. ruderatus*, and *B. dahlbomii*, respectively, based on molecular analyses. The relatively high prevalence in Chile may reflect the use of more sensitive detection methods, or alternatively, a greater physiological compatibility of *L. buchneri* with these species, particularly the first two, both allochthonous and commercially introduced into Chile at the end of the last century (see Ruz, 2002).

The detection in Argentina likely represents a recent introduction of the parasite via *B. terrestris* from Chile, given that the current distribution of this bumble bee in South America, covering much of the Andean region as defined by Morrone (2001), appears to not overlap yet with that of *B. bellicosus* or *B. pauloensis* which are acknowledged to be restricted to the southern Neotropical region (Abrahamovich et al., 2007). This makes *in situ* acquisition unlikely. Molecular studies in Chile revealed *L. buchneri* haplotypes nearly identical to European ones, suggesting co-introductions associated with importation activities (Arismendi et al., 2016). The higher prevalence values reported in Chile compared to Argentina may thus be linked to a longer establishment period of the parasite-host complex in that country. Local genetic characterization comparing *L. buchneri* haplotypes from *B. terrestris* and the native species (*B. bellicosus*, *B. pauloensis*) (Plischuk et al., 2013) could provide critical insights into the dynamics and historical trajectory of this complex in Argentina.

Elsewhere, *B. terrestris* exhibits strong dispersal and adaptation capabilities, leading to its classification as an invasive species in several regions (Kingston et al., 2002; Dafni et al., 2010; Goka, 2010). During its expansion, associated parasite spillover may threaten native *Bombus* species that share its distribution (Goka et al., 2006; Dafni et al., 2010; Aizen et al., 2019). This interaction could have even greater negative consequences if some of these species lack the necessary defense mechanisms to cope with *L. buchneri* parasitism, thereby increasing their vulnerability (Ebert & Fields, 2020).

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Notes

DATA STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

COMPETING INTERESTS

The authors have declared that no competing interests exist.

AUTHORS CONTRIBUTIONS

Conceptualization: [MCS, MEP, CEL, SP]; Field work: [all authors];
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