

Notas

First record of *Clarazella patagona* (Orthoptera: Ommexechidae) in Chubut Province (Argentine Patagonia)

Primer registro de *Clarazella patagona* Pictet & Saussure (Orthoptera:
Ommexechidae) en la Provincia del Chubut (Patagonia argentina)

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Revista de la Sociedad Entomológica
Argentina vol. 83 núm. 4 65 70 2024

Sociedad Entomológica Argentina
Argentina

Recepción: 14 Agosto 2024

Aprobación: 12 Noviembre 2024

Abstract: Although the knowledge of Orthoptera in northern arid Argentine Patagonia has increased recently, many of its aspects have still not been addressed. The objective of this study was to report the presence of *Clarazella patagona* Pictet & Saussure (Orthoptera: Ommexechidae) in the Patagonian steppe for the first time, extending the southern limit of its geographical distribution to more than 350 km. These are the first records for the Central District of Patagonia in Chubut Province, where the most arid environments in the ecoregion are located. The knowledge about this family of Orthoptera in the area is limited, as records are very scarce. Thus, the distribution data provided here and their possible relationship with the increase in temperature at a regional scale contribute to enhancing our understanding of this taxon in arid Patagonia.

Keywords: Arid environments, Citizen science, Distribution ranges, Grasshoppers, Patagonia.

Resumen: Aunque el conocimiento de los ortópteros en el norte de la Patagonia árida argentina se ha incrementado recientemente, muchos de sus aspectos aún no han sido abordados. El objetivo de este estudio fue reportar por primera vez la presencia de *Clarazella patagona* Pictet & Saussure (Orthoptera: Ommexechidae) en la estepa patagónica, extendiendo el límite sur de su distribución geográfica a más de 350 km. Estos son los primeros registros para el Distrito Central de la Patagonia en la Provincia del Chubut, donde se encuentran los ambientes más áridos de la ecorregión. El conocimiento sobre esta familia de ortópteros en la zona es limitado, ya que los registros son muy escasos. Así, los datos de distribución aquí aportados y su posible relación con el aumento de la temperatura a escala regional contribuyen a mejorar el conocimiento de este taxón en la Patagonia árida.

Palabras clave: Ambientes áridos, Ciencia ciudadana, Patagonia, Rangos de distribución, Saltamontes.

In some places, such as Argentine Patagonia, orthopterans are among the most abundant groups of terrestrial arthropods, but data is relatively scarce (Cheli et al., 2010). Recently, based on the specimens of Orthoptera hosted in the Entomological Collection of the Instituto Patagónico para el Estudio de los Ecosistemas Continentales (IPEEC-CONICET), we updated the knowledge of the group in Patagonia, citing six species whose presence in the arid region of Chubut Province was unknown to date, and analysing their taxonomic and trophic structure (through abundance range curves) (Castelli et al., 2023). Although this material comes from more than 20 years of collections carried out by the Grupo de Entomología Patagónica (GENTPAT) in the central region of the Patagonian steppe, no specimens of the Ommexechidae family have been collected until now.

The Ommexechidae family comprises three subfamilies and 13 genera, which have an exclusively Neotropical distribution (Cigliano et al., 2024). In Argentine Patagonia, the Aucacridinae subfamily is represented by *Aucacris bullocki* Rehn and *Neuquenina fictor* (Rehn), in Mendoza, Neuquén and Río Negro provinces (Cigliano et al., 2024), while Ommexechinae is represented by four species: *Calcitrena maculosa* Eades, only found in Río Negro in the San Antonio Oeste locality (Ronderos, 1974; Cigliano et al., 2024); *Graea horrida* Philippi with only two records in Río Negro (General Conesa and Río Colorado); *Tetrixocephalus willemsei* Gurney & Liebermann, mainly distributed in Neuquén, since outside this province there is only one record in Chubut (Gualjaina) and another in Santa Cruz (Comandante Luis Piedra Buena) (Cigliano et al., 2024); and *Clarazella patagona* Pictet & Saussure, which has a much wider distribution spanning from Santa Cruz de la Sierra (Bolivia) to our Argentine province of Río Negro (Ronderos, 1973; Carbonell et al., 2024; Cigliano et al., 2024). In this sense, all records of *C. patagona* in Río Negro Province correspond to semi-arid environments belonging to the biogeographical province of Monte (Morrone, 2014) and its Monte Austral district (Oyarzabal et al., 2018). However, the information available on Ommexechidae in Argentina is scarce and fragmentary. It comes mainly from the works carried out by Ronderos (1973, 1974, 1979) over 40 years ago and from the contribution made a few years ago by Domenico (2012) regarding its phylogeny and relationship with Tristiridae. The main goal of this publication is, therefore to improve our knowledge of this family, by presenting the first records of *C. patagona* in the Chubut Province (Argentina) (Fig. 1), expanding its geographical range to 43° S latitude, and making comments about the relationship between this species and recent temperature increases in the region as a result of global climate change.

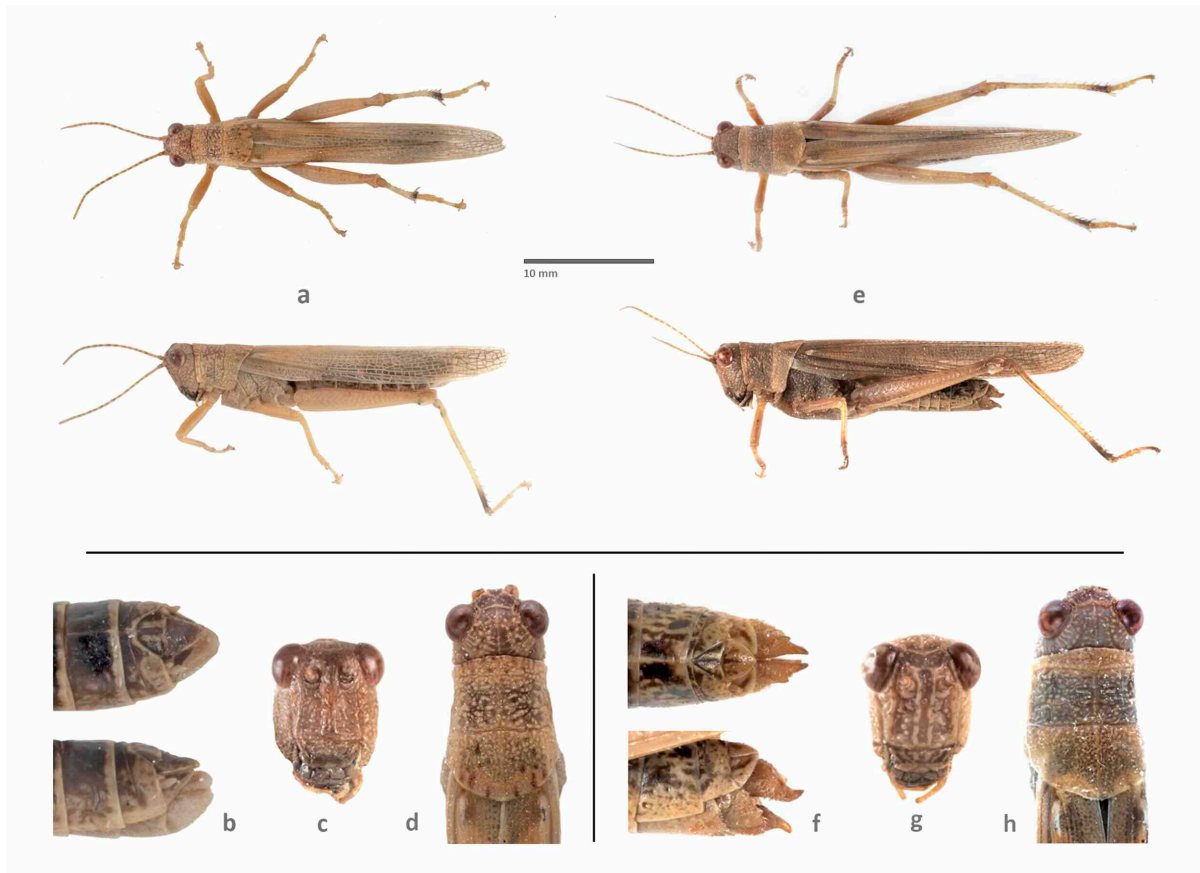


Fig. 1.

Clarazella patagona.

Male: a. Dorsal and lateral view. b. Terminalia, dorsal and lateral view. c. Head, frontal view. d. Head and pronotum, dorsal view. Female: e. Dorsal and lateral view. f. Terminalia, dorsal and lateral view. g. Head, frontal view. h. Head and pronotum, dorsal view. Scale= 10 mm.

The studied material came from El Mirasol (43° 20' S, 67° 43' W; Fig. 2) and was collected by the local Primary Health Care Center Personnel on March 25, 2024. The specimens were collected manually and preserved with 70 % alcohol. The staff of the Dirección de Salud Ambiental of Chubut Province submitted them to the IPEEC, and the GENTPAT staff proceeded to identify them using the taxonomic keys developed by Ronderos (1979) and Cigliano et al. (2014). Four males and one female of *C. patagona* were identified, and deposited in the IPEEC Entomological Collection (597 and 598 catalog numbers).

This new record of the genus *Clarazella*, and its species *C. patagona*, in Chubut Province represents the southernmost of the genus, extending the distribution of the species more than 350 km South (Fig. 2a). Moreover, this new record reports its presence in the biogeographical province of the Patagonian Steppe (Morrone, 2014) for the first time, specifically in its Central District (Oyarzabal et al.,

2018) (Fig. 2b). So far, *T. willemsei* has been the only found Ommexechidae species in this province (Cigliano et al., 2024).

Central District is a two-stratum shrub steppe, where vegetation cover is 30-50 % and the tallest plants average is 1 m tall. In the upper stratum, *Chuquiraga avellanadae* Lorentz dominates, and there are species of *Lycium* L., *Prosopis* L., and *Schinus* L.; and in the lower stratum, there are *Poa* L., *Pappostipa* (Speg.) Romasch., P.M.Peterson & Soreng, among others (Oyarzabal et al., 2018). Interestingly, the habitats are among the driest in the Patagonian region, with annual rainfall less than 200 mm (Instituto Nacional de Tecnología Agropecuaria, 2006). On the other hand, the *C. patagona* specimens were found in a riparian environment characterized by abundant ravines that collect rainwater and flow into the Arroyo Perdido, an endorheic basin of a small area. This habitat is very similar to that described by Ronderos (1973,1979) as preferred by this species: arid environments associated with areas where there are permanent or temporary water courses. In addition, Ronderos (1973) mentions the affinity of this species for plant species of the genera *Senecio* L., *Baccharis* L., and *Tessaria* Ruiz & Pav., all very common taxa in these environments.

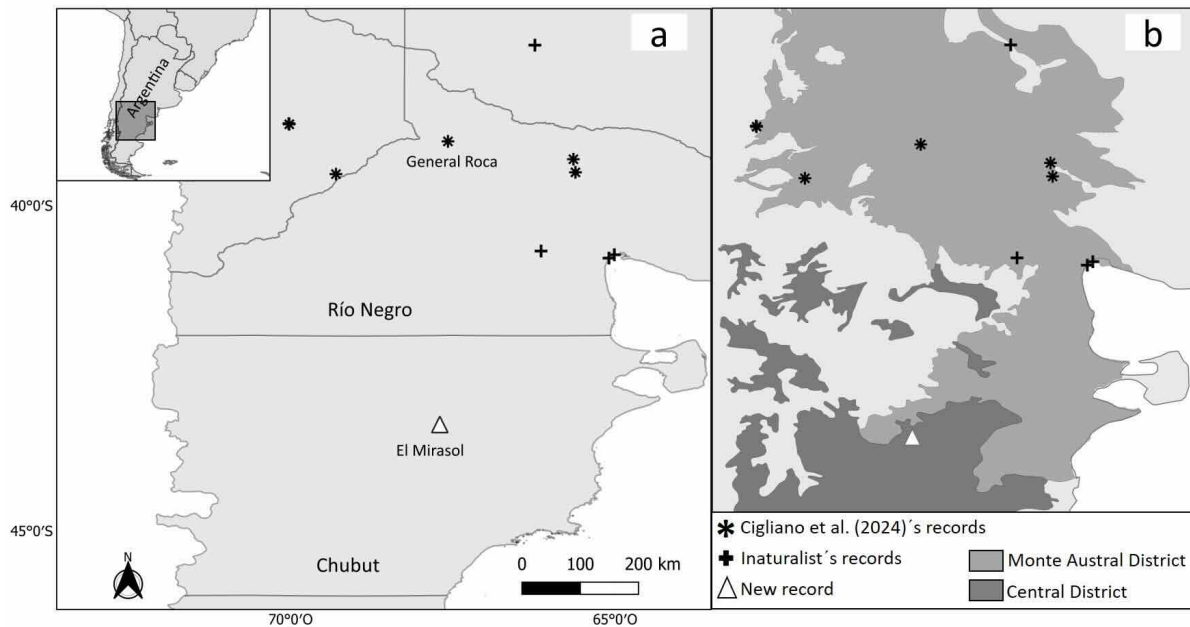


Fig. 2.

Distribution of *Clarazella patagona* in Patagonia

a. Records in the different political provinces (data according to Cigliano et al., 2024 and iNaturalist, 2024). b. Detail of the records in relation to the main vegetation units (according to Oyarzabal et al., 2018).

The occurrence of *C. patagona* in the Central District of the Patagonian steppe may be explained by several factors. Firstly, this species may have already been present in the region but was not

previously recorded due to insufficient sampling efforts. Although the Entomological Collection of the IPEEC contains nearly a hundred specimens of Orthoptera from this district of the Patagonian steppe, and this species has not been recorded to date, the prior presence of *C. patagona* in the region seems unlikely. Although this entomological material was collected using pitfall traps and manual techniques (methods that are not ideal for capturing Acridoidea), as noted by Castelli et al. (2023), the xerophytic conditions of the studied region, dominated by shrub steppes adapted to aridity with large spines, make the use of entomological nets virtually impossible in most habitats. Furthermore, pitfall traps have previously provided reliable estimates of entomological biodiversity in the region. In this context, using this technique, Castelli et al. (2023) observed community structures of Orthoptera similar to those found in other arid regions of South America, where using entomological nets, Acridoidea were also among the most abundant taxa. Consistent with this, the health personnel who collected the specimens of *C. patagona* studied here (and who have lived in the area for over twenty years) reported that they had never observed this species until now.

Alternatively, although this should be confirmed through long-term studies, this finding could be due to regional changes in environmental conditions (such as increasing mean temperatures in the region), which may impact the home ranges of several insect species. In this sense, it is known that other species of Orthoptera have managed to establish themselves in previously colder regions due to the global increase in temperatures (Poniatowski et al., 2020; Fartmann et al., 2021). Supporting this idea, the GENTPAT has recently found that there are specimens of the poisonous spider *Latrodectus mirabilis* (Holmberg) that have managed to survive the temperatures of the current Patagonian winter, arriving alive and in good condition to the next spring (Zaffaroni et al., 2024).

It is known that environmental temperature is extremely important for the development, reproduction, and dispersal in orthopterans (Willott & Hassall, 1998; Fielding, 2004), highlighting the deleterious effect that low temperatures have on the development in the egg stage (Fielding & Defoliart, 2010). To explore this idea, we compare the average and minimum temperatures of the first week of October 2022 and 2023 versus those of 2005 and 2006 (18 years ago) in El Mirasol (where we found *C. patagona* this year) and in General Roca (39° 01' S, 67° 34' W; Fig. 2) respectively. The choice of General Roca as point of comparison with the temperature at El Mirasol was based on three aspects: 1- *C. patagona* was first documented in the area over 60 years ago (Ronderos, 1973; Cigliano et al., 2024); 2- this locality was the southern limit of distribution of *C. patagona* for a long time (Ronderos, 1973); and 3- General Roca is at the same longitude as El Mirasol approximately (both are located between 67-68° W). Additionally, the temperatures from the first

week of October were considered for comparison because, at that time of year, there is an increase in terrestrial arthropod activity and biodiversity in the region due to improved environmental conditions following the winter in the Southern Hemisphere (Mariottini et al., 2011; Olivera, 2018). Temperatures were taken from the database <https://www.ready.noaa.gov/READYamet.php> (Rolph. et al., 2017) and were analyzed using Generalized Linear Models (GLM) (Crawley, 2013) using the `glmmTMB` function in R (R Core Team, 2024). As a result, we found that both the average (GLM: Df= 3; $X_2= 103.43$; $p < 0.001$; Fig. 3a) and the minimum (GLM: Df= 3; $X_2= 73.77$; $p < 0.001$; Fig. 3b) temperatures in El Mirasol 18 years ago were significantly lower than those present at General Roca. Meanwhile, the current average (Fig. 3a) and minimum (Fig. 3b) temperatures in El Mirasol are similar to those in General Roca between 2005 and 2006. In this way, El Mirasol temperatures 18 years ago (colder than today), could have prevented the appearance of *C. patagona* previously.

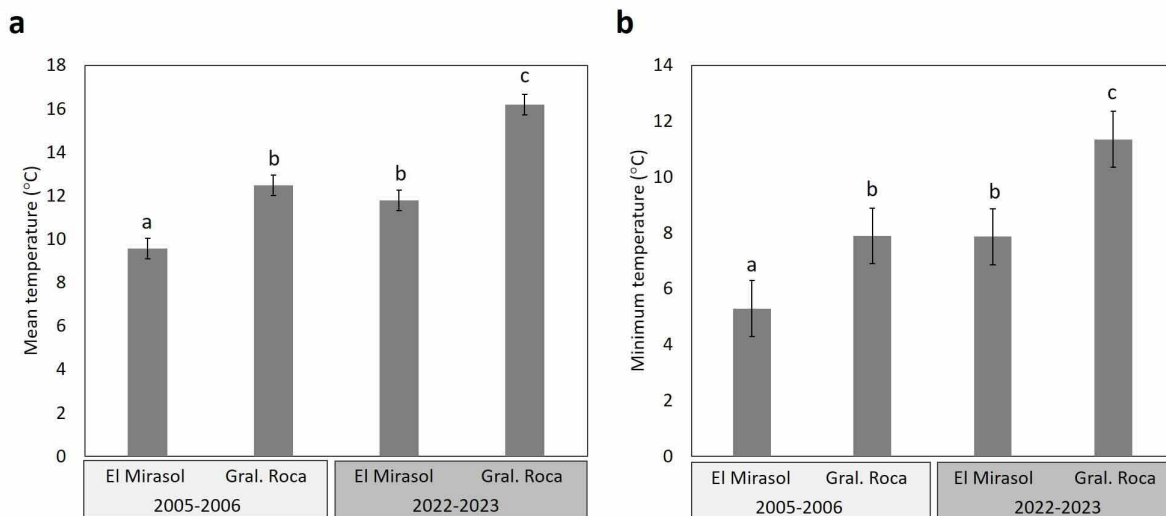


Fig. 3.

Mean temperature in the October first week in the past and currently, in the El Mirasol and General Roca sites

a. Mean Average daily temperature. b. Minimum Average daily temperature. Different letters indicate significant differences ($p < 0.001$).

Finally, we would like to emphasize the importance of citizen participation in the scientific findings presented here, as well as in other regional studies in Patagonia. Citizens in this region generally demonstrate a strong interest in nature, actively communicating their observations and engaging in various scientific research activities (Werenkraut et al., 2020; Arbetman et al., 2022; iNaturalist, 2024). Consequently, this participation has proven crucial for improving our understanding of insect biodiversity and for developing more effective public policies in Patagonia (Actis & Arza, 2023).

Acknowledgments

We thank the person in charge of the Primary Health Care Center in El Mirasol locality, Lic. Claudia Blanco, for collecting and preserving the entomological material studied, the Dirección de Salud Ambiental of the Chubut Province for sending us the specimens, IPEEC for providing us with the necessary logistics and infrastructure to be able to carry out our work, Lic. Darío Podestá for his photographic magic, and thanks to Natalia Quinonez for her language assistance. We also thank Secretaría de Fauna y Flora Silvestre and Secretaría de Ciencia y Tecnología of the Chubut Province for providing collecting permissions and assistance.

This study was financed by “Preservation, recovery and digitization of collections of scientific interest in Argentina 2023” (Williams Foundation and Bunge y Born Foundation), Consejo Federal de Ciencia y Tecnología - MINCyT “Proyecto Federal Interministerial de Investigación, Transferencia y Fortalecimiento para la Salud en Territorio (IF- 2023–106858667-APN-SSFCTEI#MCT), and Consejo Nacional de Investigaciones Científicas y Técnicas (PUE-IPEEC-CONICET N° 22920160100044).

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Revista de la Sociedad Entomológica Argentina
vol. 83, núm. 4, p. 65 - 70, 2024
Sociedad Entomológica Argentina, Argentina
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ISSN-E: 1851-7471

DOI: <https://doi.org/10.25085/rsea.830407>