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Rhagidiidae mites of the Western Italian Alps

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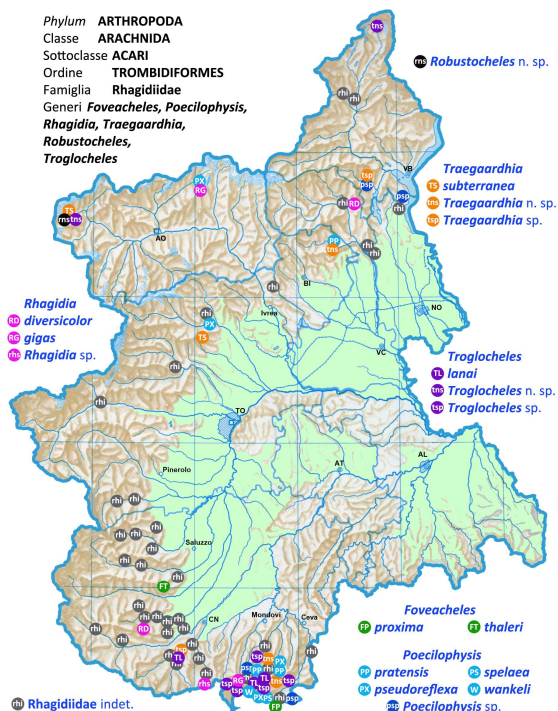
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Quaternary glaciations in northern Italy
(from <http://www.pantalica.org/gliaciazioni>)

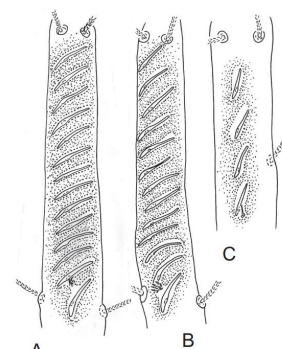
In the pre-alpine areas of the Mediterranean basin, fragmented underground environments have differentiated, which have probably remained unchanged since the Miocene. These environments enabled long periods of colonization and geographical isolation organisms, allowing the Rhagidiidae mites an evolutionary process of millions of years.



Map of the Rhagidiidae recently detected in Western Alps (from Lana et al., 2021)

In the Western Italian Alps, strongly affected by the Quaternary glaciations, underground arthropod research neglected Rhagidiidae (Acari, Trombidiformes) for a long time, which do not appear in the faunal lists until recent times. This study was carried out since 1990s, investigating underground cavities of Piedmont and Aosta Valley regions to deepen knowledge on the Alps underground fauna and create the basis for future and more in-depth research.

Their evident morphological adaptations to the underground environment depended on the rigid climate conditions, the environmental parameters variations, the glaciations and the time of stay in these peculiar environments. The lengthening of the appendages and bristles, and the progressive sensory organs development, called "solenidia", on the tarsi and tibiae of the first two pairs of paws, provide an indication of the underground environment adaptation degree.



Solenidia in the *Troglocheles lanai* leg: A) first pair of legs; B) second pair; C) third pair (from Zacharda et al., 2011)

In 1995, a species belonging to this systematic group was found at a depth of about 250 meters in Abisso Bacardi cave (PI873, Frabosa Soprona, Piedmont); subsequently, different cave adapted mites were found in 1998 in Bossea cave (PI108, Frabosa Soprona, Piedmont) and in 2003 in Barón Litron cave (PI1214, Valdieri, Piedmont).

In 2009, the mites were analyzed by the specialist Miloslav Zacharda of Prague, establishing all the collected specimens were a species new to science, described in 2011 as *Troglocheles lanai*.



Troglocheles n. sp. (ph. E. Lana)



Traegaardhia n. sp. (ph. E. Lana)



Robustacheles n. sp. (ph. E. Lana)

Hundreds of Rhagidiidae specimens were found in over 90 underground stations and cavities since 2014, including other species new to science belonging to the genus *Troglocheles*, *Traegaardhia* and *Robustacheles*.

At the moment, dozens of other samples were collected in the Alps, waiting to be analyzed. The increasingly marked shortage of specialists has led to the slowdown of much field of research. However, underground environments still offer several research possibilities and many species are still unknown to science, needing in-depth studies and descriptions.

We sincerely hope to stimulate researchers to deal in the near future with this very interesting group of arachnids, really significant for the biogeography of the underground environment of the Alpine chains.

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Troglocheles lanai Zacharda, 2011 (ph. E. Lana)