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# Rhagidiidae mites of the Western Italian Alps

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## Abstract

In the pre-alpine areas of the Mediterranean basin fragmented underground environments have differentiated, probably almost unchanged since the Miocene (over 5 million years ago). These environments enabled long periods of colonization and geographical isolation for organisms, allowing the Rhagidiidae mites an evolutionary process of millions of years. 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.

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

In 1995, a species belonging to this systematic group was finally found at a depth of about 250 meters in Abisso Bacardi cave (PI873, Frabosa Soprana); subsequently, different cave-adapted mites were found in Bossea cave in 1998 (PI108, Frabosa Soprana) and in Barôn Litron cave in 2003 (PI1214, Valdieri). In 2009, collected mites were analyzed by the specialist Miloslav Zacharda of Prague, establishing all the collected specimens belonged to a new species for science, described it in 2011 as *Troglocheles lanai*. Hundreds of Rhagidiidae specimens were found in over 90 underground stations and cavities since 2014, including other new species for science of the genus *Troglocheles*, *Traegardhia* and *Robustoches*.

At the moment, dozens of other samples have been 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. With this summary 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.

**Keywords:** mites, Rhagidiidae, caves, subterranean biology, conservation

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