



## CATALOGUE OF AQUATIC MITES FROM THE MINHO RIVER (NW IBERIAN PENINSULA)

Harold Cantallo<sup>1\*</sup>, Nuno Gomes<sup>1,2</sup>, Carlos Antunes<sup>1,2</sup>, Tiago Ribeiro<sup>1</sup>, Maria Inês Gomes<sup>1</sup>, Dimitri de Araújo Costa<sup>1,2</sup>

### Abstract

Acari are a subclass of chelicerate arthropods that includes mites and ticks. The present study focuses on the taxonomic diversity of aquatic mites in the Portuguese territory of the Minho Region. Our aim was to compile all available information and thus generate a list of species linking them to the site where they were recorded. Aquatic species were all those that live exclusively in the marine environment, deep sea, intertidal, freshwater, brackish water or in transitional environments with the terrestrial environment if their lifestyle is associated with the aquatic environment. Since the first records of Portuguese endemic mites by Lunblad in the 1950s several authors have contributed to accurately catalogue, record, and redescribe this vast group in Portugal and Minho consecutively. In our review in this work, we used the Global Biodiversity Information Facility (GBIF) to obtain previous occurrences supplemented by an extensive literature review and the book collection Süßwasserfauna von Mitteleuropa, among others. Additionally, we resorted to active sampling and by-catch sampling in the Portuguese section of the Rio Minho catchment area. The collected organisms represent 12 new records for the Minho River and among them 10 are new records for Portugal, which were deposited in the Natural History Museum of the Iberian Peninsula - NatMIP ("Museu de História Natural da Península Ibérica"), Vila Nova de Cerveira, Portugal.

**Keywords:** Acari. Taxonomy. Portuguese Exclusive Economic Zone. North Atlantic Ocean.

<sup>1</sup>Interdisciplinary Centre of Marine and Environmental Research (CIIMAR), University of Porto, Portugal.

<sup>2</sup>Aquamuseu do Rio Minho, Vila Nova de Cerveira, 4920-290, Portugal.

\*Corresponding author: [haroldcantallo.hcc@gmail.com](mailto:haroldcantallo.hcc@gmail.com)

Submitted on: 3 Dec. 2021  
Accepted on: 19 Dec. 2021  
Published on: 31 Dec. 2021



## 1 Introduction

Aquatic mites in Portuguese territory had been studied since long time with the first observations of endemic species made by O. Lundblad in the 50's decade in the Madeiran and Azores archipelago (LUNDBLAD, 1956) and previously with the observations made by THOR, (1898) and KOENIKE, (1895).

Despite the efforts made by more recent authors like VALDECASAS, (1988) and BARTSCH, (1978b, 1978a, 1988, 1996) it remains poorly characterized and disbalanced relatively to the effort in characterize brackish and marine mites.

Mites in general are a taxonomic group with associated difficulties to identify due the disperse available literature and their reduced dimensions.

## 2 Material and Methods

Sampled aquatic mites from International Minho River, Portugal (Fig. 1), were collected from dissected guts of European flounder *Platichthys flesus* (Linnaeus, 1758) from beam trawls in October 2019 from (41°56'18.852"N, 8°45'2.52"W to 41°56'12.768"N, 8°45'9.108"W), and June 2020 from (41°59'29.76"N, 8°40'38.76"W to 41°59'27"N, 8°40'50.76"W).

Also, by using Van Veen grab sampler on September 2020 at Morradeira das Varandas Island (41°54'36.7"N, 8°49'4.49"W), Lovelhe (41°57'2.39"N, 8°44'51.5"W), São Pedro da Torre (41°59'42.05"N, 8°40'27.94"W), and Valença municipality (42°2'57.01"N, 8°37'54.74"W).

Lastly, by using hand-net at the tributary Rio Mouro from Ponte do Curto (42°4'29.27"N, 8°23'39.12"W), Ponte de Mouro (42°04'30.0"N, 8°23'38.5"W), and Rio Gadanha (42°2'14.7"N, 8°30'6.9"W).

Sampled specimens complemented an exhaustive literature review using the available literature and the book collection Süßwasserfauna von Mitteleuropa: Acari Volumes 1 to 3 as baseline. This book collection also served as main tool for taxonomic identification with relevant ecological notes.

Collected organisms were deposited in the Natural History Museum of the Iberian Peninsula - NatMIP ("Museu de História Natural da Península Ibérica"), Vila Nova de Cerveira, Portugal.

## 3 Results

A total of 12 species were reported for the Minho River, with 10 of those species being identified as new records

while 2 had been previously reported over the remaining territory (Fig. 2).

These records include the following 12 species restricted to freshwater environment:

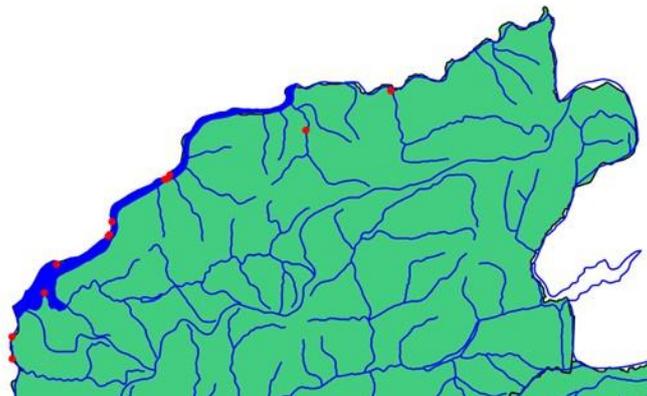


Figure 1. Schematic sampling sites in the Minho River (NW Iberian Peninsula) and some sites where aquatic mites were accurately recorded in previous works in the Minho region.

### *Hydrozetes confervae* (Schrank, 1781)

**Ecological notes:** On lakes, ponds and slow moving waters, as well as associated with duckweed (*Lemna* spp.) (BARTSCH et al., 2006). At this study, this species may represent the first record found in a main river stretch (International Minho River).

### *Hydrozetes lemnae* (Coggi, 1899)

**Ecological notes:** Freshwater, feeding on submerged plant fragments (PÉREZ-ÍÑIGO, 1997). Associated with macrophytes.

### *Hygrobatas (Hygrobatas) setosus* (Besseling, 1942)

**Ecological notes:** On freshwater tributaries pools; with parasitic larvae of insect-dipterans (GERECKE et al., 2016). In present study, this species was found in association with macrophytes ("Rio Gadanha"). One specimen was found on rock environment close to the spring ("Rio Mouro"). One individual was collected in the main sector from Minho River, on sediment type 'moderately sorted coarse sand', in which logarithmic main grain size value was 0.345.

### *Lebertia (Eolebertia) elsteri* Schwoerbel, 1957

**Ecological notes:** Interstitial on springs and streams (SABATINO et al., 2010). In this study, one individual was collected in the main sector from Minho River, on moderately sorted medium sand.

### *Lebertia (Lebertia) oblonga* Koenike, 1911

**Ecological notes:** On sandy bottom of streams and lakes (SABATINO et al., 2010).



Figure 2. Plate showing the generic appearance of the 12 species sampled on the Minho International River, including a) *Lebertia (Eolebertia) elsteri*, b) *Lebertia (Pilolebertia) pilosa*, c) *Sperchon (Sperchon) thienemanni*, d) *Torrenticola (Megapalpis) fagei*, e) *Hydrozetes lemnae*, f) *Hydrozetes confervae*, g) *Lebertia (Lebertia) lusitanica*, h) *Sperchonopsis verrucosa*, i) *Lebertia (Mixolebertia) halberti*, j) *Lebertia (Lebertia) oblonga*, k) *Hygrobates (Hygrobates) setosus*, l) *Torrenticola (Torrenticola) anomala*.

***Lebertia (Lebertia) lusitanica* Lundblad, 1956**

**Ecological notes:** Found on cascade staircase (LUNDBLAD, 1956). Possibly rithrobiont-like (on river and tributaries habitats) species (SABATINO et al., 2010). In this study, two individuals were collected in the main sector from Minho River, on moderately sorted coarse sand.

***Lebertia (Mixolebertia) halberti* Koenike, 1902**

**Ecological notes:** On standing waters (SABATINO et al., 2010). In this study, one individual was collected in the main sector from Minho River, on moderately sorted coarse sand.

***Lebertia (Pilolebertia) pilosa* Maglio, 1924**

**Ecological notes:** On lakes and rivers (SABATINO et al., 2010). In this study, one individual was collected in the main sector from Minho River, on moderately sorted coarse sand.

***Sperchon (Sperchon) thienemanni* Koenike, 1907**

**Ecological notes:** Freshwater, common in rheohelocrenes springs, with crenophilous-type habit; larvae parasites of chironomids (SABATINO et al., 2010).

***Sperchonopsis verrucosa* (Protz, 1896)**

**Ecological notes:** On muddy sediment in streams, feeds on chironomid larvae (SABATINO et al., 2010). Associated with macrophytes.

***Torrenticola (Megapalpis) fagei* (Angelier, 1949)**

**Ecological notes:** On low order streams in montane areas (SABATINO et al., 2010), with second larval form - deutonymph (ANGELIER, 1949). In this study, one individual was collected in the main sector from Minho River, on moderately sorted coarse sand.

***Torrenticola (Torrenticola) anomala* (Koch, 1837)**

**Ecological notes:** On middle order streams, with the ability to withstand a wide range of temperatures - eurythermal species; deutonymph stage larval present (SABATINO et al., 2010).

## 4 Discussion

Hydrarachids are known to inhabit watercourses and lentic environments such as lakes or ponds. Trombidiformes are a heterogeneous group, as they also include several marine species, members of the family

Halacaridae. Additionally, we have the presence of Sarcoptiformes such as the oribatids described by Weigmann in previous works (WEIGMANN, 2008, 2009a, 2009b, 2010, 2011, 2012, 2013), also occurring in the Minho region.

These results suggest a high prevalence of freshwater and transition species in the Portuguese territory, which may indicate a trend, as they are more accessible than marine species.

## 5 Conclusions

The present work reports the presence of aquatic mites in the Minho International River. This region is especially rich in aquatic mite species, providing 12 new records in just a few samples. However, we believe that there is much work ahead to characterise the aquatic mite fauna of this region. New starting points could be the association of aquatic mites with the invasive macrophyte *Egeria densa* Planchon, 1849 and a better characterisation of the fauna associated with the intertidal zone.

## REFERENCES

- ANGELIER, E. Hydracariens phréatiques des Pyrénées-Orientales. *Mémoires du Muséum national d'Histoire naturelle - Nouvelle Série (1935-1950)*, v. 29, n. 2, p. 31p., 1949.
- BARTSCH, I. Halacaridae (Acari) Aus Der Tiefsee Des Atlantischen Ozeans. *Cahiers de Biologie Marine*, v. 19, n. 1, p. 47-62, 1978a.
- BARTSCH, I. Halacaridae (Acari) Aus Der Tiefsee Des Atlantischen Ozeans. *Cahiers de Biologie Marine*, v. 19, n. 1, p. 47-62, 1978b.
- BARTSCH, I. Halacaridae (Acari) in the Northern Atlantic Ocean. Description of *Halacarus balgimus* n. sp. and *Aguides cryosi* n. gen. and n. sp. *Cahiers de Biologie Marine*, v. 29, n. 3, p. 353-359, 1988.
- BARTSCH, I. Halacarid mites (Acari) from the Mid-Atlantic Ridge. New records. *Cahiers de Biologie Marine*, v. 37, n. 2, p. 159-167, 1996.
- BARTSCH, I. et al. *Süßwasserfauna von Mitteleuropa, Vol. 7/2-1 Chelicerata: Araneae/Acari I*. Berlin, Heidelberg: Springer Berlin Heidelberg, 2006.
- GERECKE, R. et al. *Chelicerata: Acari III. Süßwasserfauna von Mitteleuropa*. Band 7/2-3 ed. Heidelberg, Dordrecht, London, New York: Springer Spektrum, 2016.
- KOENIKE, F. Neue *Sperchon*-Arten aus der Schweiz. *Revue Suisse de Zoologie*, v. 3, n. 3, p. 415-427, 1895.
- LUNDBLAD, O. Zur Kenntnis süd- und mitteleuropäischer Hydrachnellten. *Arkiv för Zoologi*, v. 10, n. 1, p. 1-306 + Tafel LXXXIV, 1956.
- PÉREZ-ÍÑIGO, C. *Fauna Iberica. Vol. 9. Acari: Oribatei, Gymnonota I*. Madrid: Museo Nacional de Ciencias Naturales, Consejo Superior de Investigaciones Científicas, 1997.
- SABATINO, A. DI et al. *Süßwasserfauna von Mitteleuropa, Bd. 7/2-2 Chelicerata*. Berlin, Heidelberg: Springer Berlin Heidelberg, 2010.
- THOR, S. *Ljania*, en ny hydrachnide-slegt fra omegnen af Kristiania, Norge. Forelobig meddelelse. *Archiv for matematik og naturvidenskab*, v. 20, n. 13, p. 1-4, 1898.
- VALDECASAS, A. G. *Lista sinonímica y bibliográfica las Hidracnelas (Acari, Hydrachnellae) de la Península Ibérica, Islas Baleares e Islas Canarias*. Madrid: Asociación Española de Limnología, 1988.
- WEIGMANN, G. Oribatid mites (Acari: Oribatida) from the coastal region of Portugal. I. *Peloptulus sacculiferus* n. sp., an aberrant species of Phenopelopidae compared with similar European species of the genus. *Soil Organisms*, v. 80, n. 1, p. 145-151, 2008.
- WEIGMANN, G. Oribatid mites (Acari: Oribatida) from the coastal region of Portugal. II. The genera *Zachvatkinibates* and *Punctoribates* (Mycobatidae). *Soil Organisms*, v. 81, n. 1, p. 85-105, 2009a.
- WEIGMANN, G. Oribatid mites (Acari: Oribatida) from the coastal region of Portugal. III. New species of Scutoverticidae and Scheloribatidae. *Soil Organisms*, v. 81, n. 1, p. 107-127, 2009b.
- WEIGMANN, G. Oribatid mites (Acari: Oribatida) from the coastal region of Portugal. IV. The genera *Coronoquadropia*, *Schelorbates*, *Haplozetes* and *Pilobates*. *Soil Organisms*, v. 82, n. 3, p. 383-406, 2010.
- WEIGMANN, G. Oribatid mites (Acari: Oribatida) from the coastal region of Portugal. V. *Xenillus*, *Oribatella*, *Galumna*, *Eupelops* and *Lucoppia*. *Soil Organisms*, v. 83, n. 2, p. 287-306, 2011.
- WEIGMANN, G. Oribatid mites (Acari: Oribatida) from the coastal region of Portugal. VI. *Chamobates*, *Protozetomimus*, *Protorbates*, *Oribatula*. *Soil Organisms*, v. 83, n. 3, p. 529-550, 2012.
- WEIGMANN, G. Ecology and biogeography of oribatid mites (Acari: Oribatida) from the coastal region of Portugal. *Soil Organisms*, v. 85, n. 3, p. 147-160, 2013.