

Land and freshwater molluscs of the Açores Islands



A VANISHING TREASURE – know to protect

The 6th biodiversity crisis has been widely announced and shown to be occurring mostly with the rapid disappearance of vertebrate species. Comparatively little is known about what is happening to the minute forms of life. Hence the effects of global warming or other forms of global pollution, being undetected at the human scale, could be severely underestimated, thus compromising attempts to a timely recovery, for nature's schedule does not fit into human lifetime.

Small animals and plants, mainly the endemics which are often narrowly adapted to a niche and, thus, restricted in their response capacity to sudden perturbation, are the front-line warning system to harmful changes in the ecosystems. Like canaries in the coal mine, side casualties of our inability to perceive danger, their behavior should be closely followed and the causes duly investigated, for lives may depend, however indirectly, on how well they thrive.

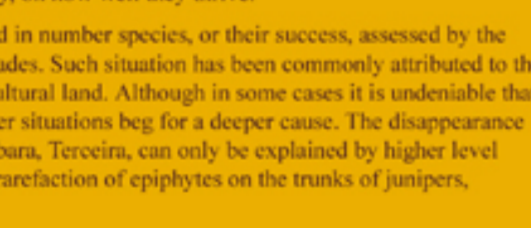
The diversity of the terrestrial malacofauna of the Açores, measured in number species, or their success, assessed by the health of their populations, has been dwindling over the last four decades. Such situation has been commonly attributed to the disappearance of suitable habitats, transformed into productive agricultural land. Although in some cases it is undeniable that local human activity is the direct influence on such deterioration, other situations beg for a deeper cause. The disappearance of microspecies from endemic forests, such as Caldeira de Santa Bárbara, Terceira, can only be explained by higher level global change thermally or chemically affecting the ecosystems; the rarefaction of epiphytes on the trunks of junipers, observed since the 1970s, appears to support such hypothesis.

Santa Maria, the gem of the Açorean malacology, has been severely hit by this problem. Its age (~8 million years) rather than its size (97 km²) makes it unique in the archipelago. It has as many island endemics (17) as all the remaining islands together. The collections made in the 1990s gathered many new taxa, some already described, including the Lazarus-species *Moreletina obrata*, reported previously as fossil but now found alive. At least 5 new species, and possibly 3 genera, await description. The tragedy, however, is that at least three of the described island endemics as well as some of the yet undescribed species are presumed to be extinct, for intensive investigation on that small island in the last 20 years has failed to yield any animals or even dead shells. The rarity of specimens found in the last surveys indicates that many more endemic species are severely threatened. To size of the island, the fragmentation of the habitat, the reduction of endemic, forested areas and the absence of buffer zones around the protected areas all contribute to the deterioration of the conditions suitable for the well-being of the precious malacofauna of this unique island.

The population of Santa Maria should be the first to cherish such treasure, and influence those in power (or service?) to implement effective measures to mitigate this irreversible loss. They should be proud of their unique natural heritage and use it as a banner to promote the island in a sustainable, nature-friendly way.



Leptaxis tessellata (SMA), presumed extinct



Oxychilus micromphalus (SMA), described in 2017, presumed extinct

Backhuys, W., 1975. *Zoogeography and Taxonomy of the land and freshwater Molluscs of the Açores*, Backhuys & Meesters, Amsterdam.

Martins, A.M.F., 2011. When the Galápagos "finches" are Azorean snails. *Açores*, supplement 7: 209-228.

Morelet, A., 1860. *Notice sur l'Histoire Naturelle des Açores suivie d'une description des Mollusques terrestres de cet Archipel*. J.-B. Baillière et Fils, Paris.

Oxychilus agostinhoi (SMA), critically endangered



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Undescribed genus and species (SMA), presumed extinct

SOCIEDADE AFONSO CHAVES - ASSOCIAÇÃO DE ESTUDOS AÇOREANOS - is a scientific and cultural association dedicated to promote studies of any sort about the Açorean Islands, and the publication of works about the Açores.
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FIELD GUIDE TO THE LAND AND FRESHWATER MOLLUSCS OF THE AÇORES ISLANDS

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The first Açorean endemic terrestrial mollusc – *Balunus* [= *Napaeus*] *pruninus* – was described in 1848 by Augustus A. Gould, on material collected ten years earlier during a U.S. Capt. Charles Wilkes' Expedition unplanned stop at São Miguel Island. The first comprehensive study of the Açorean terrestrial molluscs, however, was the result of a 6-months expedition, in 1857, by two French naturalists, Arthur Morelet and Henri Drouët. In 1860, Morelet compiled his researches in a book, where he listed 66 species, of which 32 were endemic; he included the pulmonate, halophilic ellobiids in his list, but no freshwater molluscs were then found. Over a century later, Wim Backhuys (1975) published a detailed review of the land and freshwater mollusks of the Açores, listing 97 species of which 35 were considered endemic.

Since Backhuys' work, extensive collecting and intensive research on malacology was carried out at the Department of Biology of the University of the Açores. The result was the establishment of a "reference collection", duly registered at the GBIF (Global Biodiversity Information Facility) under the acronym DBUAç-MT (Departamento de Biologia da Universidade dos Açores – Molluscos Terrestres), but presently needing proper institutional attention, for most lots remain to be catalogued. On the basis of the material therein contained, Martins (2011) updated the former listings of land molluscs and, for the purpose of presenting a more realistic account of the richness of the Açorean malacofauna and supported by extensive, unpublished preliminary anatomical research, included a series of putative, to-be-described taxa.

The 2011 list is here updated, illustrating the 122 described species known to live in the archipelago, 53 of which being endemic. Some of the putative species of the 2011 listing have since been described but, at present, the material deposited at the DBUAç-MT collection harbors about 40 new species still awaiting proper description. Such wealth of unpublished material reveals the scientific importance of the DBUAç-MT collection and calls attention to the urgent need of its proper curatorial tending.

The Açores, an oceanic archipelago composed of wide-spread groups of islands, is a natural laboratory where the evolutionary processes are in action. Hence, in order to understand the reasons for the similarities and the origin of the differences of its biota, the description of new taxa always entails revision of the targeted group throughout the archipelago; in the process, new taxa are frequently found.

The diversity within taxa is expressed in nature through a multitude of forms. For example, preliminary research on the iconic endemic slug *Plutonina atlantica* has shown consistent inter-island molecular homogeneity in spite of its morphology appearing strikingly different even in intra-island populations. Martins (2011) recorded other cases of mismatch between morphology and molecular variability; the *Napaeus pruninus*-complex apparently breaks the conservative rules of species boundaries, for not even the spermatophore shape – a decisive character in species identification – agrees with the distribution of populations throughout São Miguel and Santa Maria. On the other hand, a series of cryptic sister species are found in *Oxychilus* – the most diverse genus in the Açores; joint information on morphology, anatomy, molecules and geographic distribution is needed to unravel the evolutionary dynamics and, therefore, the relationships within the group. Where external morphology fails, sometimes it is necessary to break off the shell and look inside. The minute *Carychium* species, about 2 mm in length, are better told apart through the winding of the parietal lamella around the columella, flaring out in *C. ibazoricum* and folding over in *C. tridentatum*. On the other side of the diversity spectrum is the halophilic ellobiid *Myostella*; its shell morphology is so varied and overlapping that, at one time, all the 40 nominate species were reduced to a single one: *M. myostella*. However, inspection of the morphology of the penial papilla has shown the needed consistency that the shell could not provide.

Therefore, the present "Guide", instead of being the ultimate, static picture of a finished listing, is only the starting point for a deeper understanding of the rich diversity of the terrestrial and freshwater malacofauna of the Açores.

Color code for the geographic distribution of the species
endemic ■ macaronesian ■ palaeartic ■ boreartic ■ nearctic ■ Scale = 1 mm

