



Cold, dry and extreme

Terrestrial Antarctica is one of the most extreme environments found on Earth. It is a cold and dry continent that is effectively isolated from the rest of the world by global weather patterns and the Southern Ocean. Even within Antarctica, patches of habitable soils are highly isolated ranging from small patches to relatively large extents. Yet, Antarctic soils are anything but uninhabited. It is now known that Antarctica is home to substantial microbial diversity and supports a broad range of common soil fauna, including nematodes, tardigrades, rotifers, mites and collembolans. More than 520 terrestrial invertebrates, of which about 170 are endemic, inhabit Antarctic terrestrial ecosystems. Many of the native organisms are well adapted physiologically to survive and perform critical ecosystem functions, such as biogeochemical cycling under harsh conditions.

While Antarctic soil systems are in many ways unique, there is much to learn from the diversity and functioning of this extreme environment. They provide, for example, a resource for scientific research into the role of species in ecosystem function, biogeographical patterns, climate change impacts and evolution of life on Earth and, potentially, on other planets. However, solid knowledge of the organisms and communities of terrestrial Antarctica is still lacking, and there is a great need to acquire information on the current diversity and distribution of species within Antarctica and the response and vulnerability of these species to global changes, particularly climate change and human impacts. Here a brief overview is given of the biodiversity of Antarctic terrestrial soil systems and the adaptations that soil fauna has gone through to proliferate in this harsh environment.

Soil biodiversity

Antarctica can broadly be divided into three climatic zones: sub-Antarctic, maritime and continental Antarctica. This page focuses on the maritime and continental regions as these represent the most extreme conditions. Colonisation of terrestrial habitats in Antarctica is limited by the Southern Ocean and predominant weather patterns; colonisation events are rare. Therefore, many of the terrestrial inhabitants of Antarctica are endemic species that have survived several glaciation events.

Furthermore, the climate, a considerable constraint to the Antarctic fauna and flora, is generally colder than at comparable latitudes in the Northern Hemisphere. Most of continental Antarctica is covered by ice (~ 0.3 % of the land mass is free of snow and ice) and hosts one of the most extreme soil environments with mean annual air temperatures below 0 °C and very limited precipitation compared to the sub-Antarctic islands or maritime Antarctica.

Consequently, the landscape of continental Antarctica is dominated by polar desert ecosystems that support only a few species of mosses, lichen and algae, although more developed vegetation is found in favourable areas along the coastline. By contrast, sites with well-developed vegetation are more common in maritime Antarctica where two native vascular plants also occur - hairgrass and pearlwort. Below ground communities are generally simple and highly heterogeneous, with greater biomass and diversity observed in warmer and wetter microhabitats that have vegetated soils and soils impacted by birds and marine mammals supporting the most complex soil food webs.

To be continued...

Soil Lovers say: The Wonders Of Nature's Adaptability Are Unceasingly Amazing

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