

Bermuda is a small remote subtropical archipelago in the Western Atlantic Ocean, which was elevated above sea level approximately 900,000 years ago. A recent study discovered an unexpected high number of small mites living in the intertidal zone and revealed interesting biological aspects of these animals. These mites dwell in the area between low and high tide which means they are completely flooded during high tide. Special body surface structures allow these animals to retain a layer of air to their bodies during submersion and hence they are able to breathe underwater. A genetic investigation demonstrated that the found species are geologically older than the islands of Bermuda and therefore they could not have evolved there. So where is the real origin of these species? The closest coast is the North American East Coast (North Carolina) with a distance of 960 kilometres but there are no records of these mites from this area. In the more distant regions of Central America and the Caribbean Islands occurrences of close relatives have been reported and consequently Bermudian mites may derive from this area. However, another question is how these small flightless animals were able to travel such enormous distances across the open ocean. There are three possible dispersal mechanisms: (1) dispersal by wind, (2) transport in the plumage of a bird and (3) drifting along ocean currents. Presently, there is no clear evidence for any of these possibilities but it is supposed that drifting along ocean currents is the most likely mode of transport. The proposed project intends to answer these questions. The geological and the oceanographic history of the Caribbean are well documented and we know the approximate geological age of each island and we know the direction and speed of the Caribbean ocean currents. This knowledge represents an excellent framework to investigate when, how and in which direction these mites have colonised certain Caribbean islands and regions.

A comprehensive anatomical and genetic investigation of species from selected areas will reveal the geographic origin of Bermudian intertidal mites and a comparison of detected dispersal patterns with ocean currents and migration routes of shore birds will reveal how these mites are able to travel long distances over the open sea.

Tobias Pfingstl will be the project leader; he investigated the Bermudian intertidal mites in detail and is an expert for these animals. This project will be performed in cooperation with the Association of Marine Laboratories of the Caribbean and with experienced international researchers working on marine associated organisms, bird migration and dispersal mechanisms.