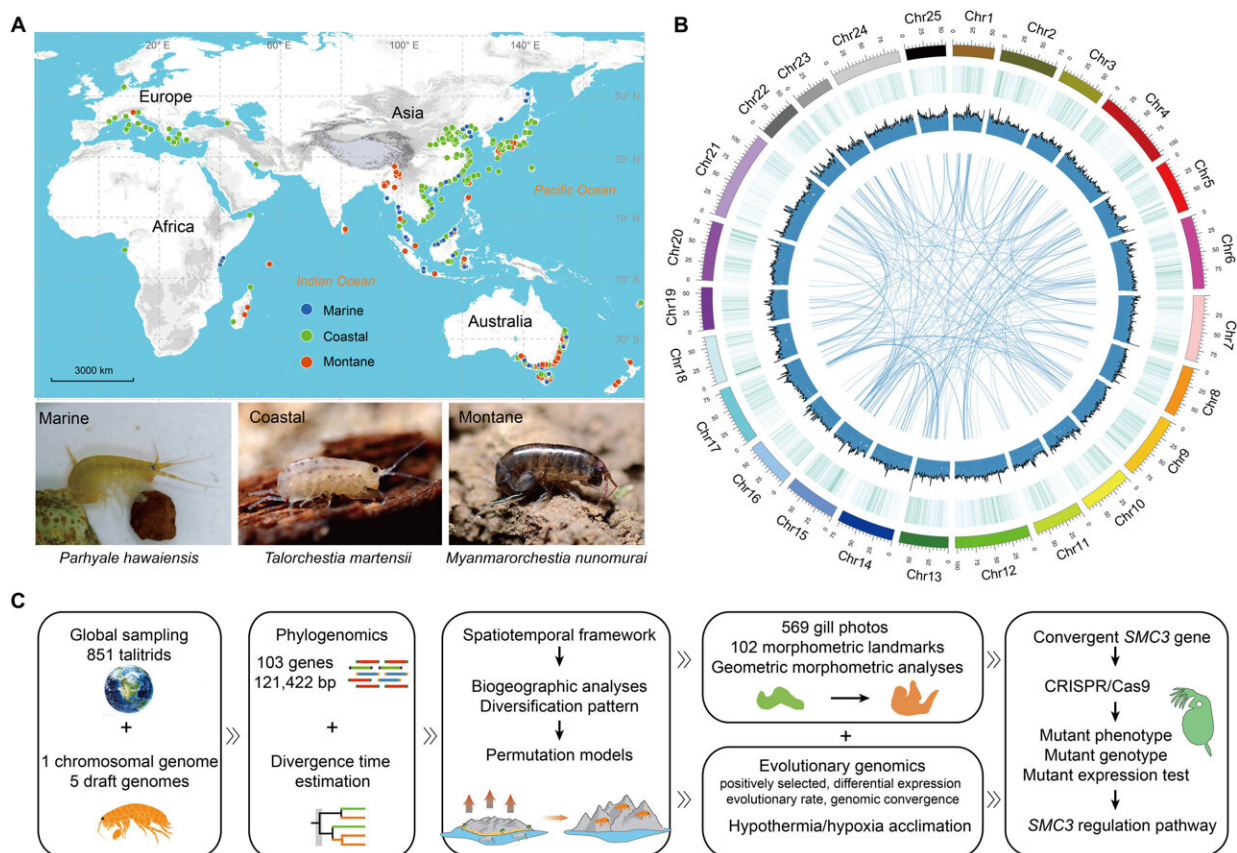


How talitrids advanced from sea to mountain: The legend of a terrestrial crustacean

June 28 2023, by Zhang Nannan



Global sampling and chromosome-level genome assembly. (A) Collection sites included in this study. Colored circles on the map and photos below correspond to talitrids inhabiting different habitats. Photograph by T. Jiang and Z. Yao. (B) Circos plot of *M. aosen* genomic features. From the outer circle to the inner circle, four types of information (25 chromosomes, gene density, GC content, and synteny blocks between different chromosomes) are shown. The statistic was

based on a 500-kb sliding window. (C) Workflow showing the dataset and main analyses used in this study. Credit: *Science Advances* (2023). DOI: 10.1126/sciadv.adg4011

Researchers led by Profs. Hou Zhongge and Li Shuqiang from the Institute of Zoology of the Chinese Academy of Sciences have revealed the morphological and genetic changes that occurred when animals evolved from a marine environment to a terrestrial lifestyle. The study was published in *Science Advances* on June 23.

In [evolutionary history](#), animals gained certain advantages when they left the sea and began to explore land. However, with these advantages came inevitable challenges.

In order to examine the marine-terrestrial transition and resulting biological adaptations, the researchers investigated talitrids, a group of small crustaceans that live in a variety of regions and habitats, including the ocean, along the coast, and in mountainous areas. They used cutting-edge genome-wide data to understand how talitrids evolved.

According to the researchers, talitrids originated in the sea and independently colonized mountain habitats at least four different times during the Oligocene and Miocene periods. The movement of tectonic plates and the formation of volcanic islands played a significant role in this transition, leading to the diversification of talitrid species in mountainous areas. These new habitats became centers of high biodiversity, with many endemic species unique to these regions.

During land colonization, talitrids developed specific genetic adaptations (convergent variations) related to their breathing organs (gills) and energy metabolism. These adaptations helped them survive in colder

environments and establish themselves in different habitats around the world.

The researchers also used a gene-editing technique called CRISPR-Cas9 to confirm that a specific gene called SMC3 was responsible for the observed changes in the shape of the talitrids' breathing organs, similar to changes in structures found in other crustaceans.

Overall, their study advances our understanding of the biological origins of marine organisms and provides valuable insights into how talitrids evolved and adapted to life on land, and how genes regulated their ability to survive in different environments.

More information: Hongguang Liu et al, Marine-montane transitions coupled with gill and genetic convergence in extant crustacean, *Science Advances* (2023). [DOI: 10.1126/sciadv.adg4011](https://doi.org/10.1126/sciadv.adg4011)

Provided by Chinese Academy of Sciences

Citation: How talitrids advanced from sea to mountain: The legend of a terrestrial crustacean (2023, June 28) retrieved 6 May 2024 from <https://phys.org/news/2023-06-talitrids-advanced-sea-mountain-legend.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.