



**Project acronym:** AR3ST

**Project title:** Landscapes, shapes and genes: Charting the adaptive response of three-spine sticklebacks to Holocene coastal evolution

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**Discipline:** Earth Sciences & Environment: Ecosystems & Biodiversity

**Station(s):** Arctic Station (Greenland/Denmark)

With this project, we aim to investigate the adaptive response of threespine stickleback (*Gasterosteus aculeatus*) to environmental change along a millennial age gradient in the landscape context of coastal evolution along the southern shoreline of Disko Island (Qeqertarsuaq), Greenland. The slow isostatic uplift of the area determines a gradual isolation of salinity-adapted populations of stickleback in near-coastal lakes. With the consecutive freshening of these isolation basins, the populations are forced to adapt and multiple studies have demonstrated that extremely rapid phenotypic changes occur and persist in stickleback populations. However, over these limited time scales the changes may be the result of epigenetic rather than genetic adaptations. We therefore aim to identify all axes of change (phenotypic, genetic, epigenetic) in stickleback and look into the loss of phenotypic plasticity over time-scales of thousands of years. We will therefore determine the precise timing for the isolation of populations from the marine environment and the past evolution of the lake basins, based on indication from hydroacoustic surveying, sedimentary archives and landscape geochronology. Having a long-term understanding of coastal evolution, environmental variability, and the relative roles and timescales of adaptive mechanisms is crucial in predicting future species dynamics in the Arctic. The threespine stickleback is one of only four freshwater fish in Greenland and thus plays a major role in structuring ecosystems and food webs.