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Morphometry of genera *Apodera* and *Trinema* from the Kerguelen archipelago suggests environmentally driven phenotypic plasticity

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Apodera vas is an emblematic species with a broad distribution from the southern hemisphere up to Tropic of Cancer region. Although infrequent, this species has been intensively studied. Documented morphological and morphometrical variability suggest the existence of species complex, but the relationships between this variability and environmental constraints is unknown. In contrast, species of the genus *Trinema* are present in most analyzed samples globally, with several species described based on morphological characteristics.

The Kerguelen archipelago is located in the subantarctic part of the southern Indian Ocean. With 7200km², the essentially magmatic territory presents a wide range of soil types, hydrological conditions, and vegetation, all showing strong gradients. We analyzed 166 samples from four sampling campaigns (1972, 2018, 2019 & 2021), in which 180 *Apodera vas* individuals and 921 *Trinema* individuals (*T. enchelys*, *T. lineare*, *T. complanatum*) were measured. It appears that the genus *Trinema* is present throughout the archipelago, while *Apodera* is present mostly in the west where land surface temperature variations are the strongest but rare or absent in the east with more stable conditions. We observed a strong morphological variability; the largest individuals being found in non-degraded and hydromorphic mosses and the smallest individuals in saxicolous mosses and environments degraded by erosion. These contrasts may either indicate the presence of two or more species within the genus *Apodera* or alternatively phenotypic plasticity. Changes in environmental conditions may cause the migration or disappearance of sensitive species such as *Apodera vas*.