
The implications of climate change for native insects and insect invasion potential at the subantarctic islands

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Abstract

Subantarctic islands are characterised by impoverished terrestrial ecosystems with highly reduced or absent functional redundancy. Subantarctic biodiversity is currently threatened by the significant increase in the number of introduced species. The permanent establishment and spread of alien insects is facilitated by the ongoing climate changes, as observed for the blowfly *Calliphora vicina* at the Kerguelen Islands. The amount of heat required by this alien fly to successfully complete its development (Physiological time, expressed in degree-days) was determined. The data demonstrated that the permanent establishment of the blowfly at the Kerguelen Islands occurred just after climate warming, so that the amount of heating days matches with the physiological time required by this invasive fly species. Further, we compared the sensitivity to future climate change in native and nonnative insect species from both Crozet and Kerguelen archipelagos. Overall, nonnative Diptera and Coleoptera were not affected by elevations of thermal amplitudes. Conversely, native dipterans quickly suffered as soon as the applied thermal regimes fall out of usual thermal windows they encounter in the field. Altogether, our results confirm that future climate change should enhance the invasion power of nonnative insects at the subantarctic islands. Interestingly, differential responses were obtained among native insects, with flies, one of the dominant insect group at the subantarctic islands, being highly threatened by climate changes. The possible effects on the structure of insect communities will be discussed.

Keywords: Polar Ecology, Climate change, Insect, Survival, Thermal fluctuations

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