Range expansion of the pine processionary moth under climate change: Research directions on the responses to thermal heterogeneity

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POSTER

POSTER 11 – RANGE EXPANSION OF THE PINE PROCESSIONARY MOTH UNDER CLIMATE CHANGE: RESEARCH DIRECTIONS ON THE RESPONSES TO THERMAL HETEROGENEITY

Climate warming is assumed as the main factor driving rapid expansion of the pine processionary moth in Europe, by broadening habitat suitability during its winter development. Nonetheless, the way this insect deals with climate heterogeneity at the range edge has not been fully untangled. Yet, this is critical to understand its sustained expansion despite conditions close to developmental limits during uneven years or stochastic extreme events. Mitigating responses range from gregarious life in sheltering silk tents to prolonged diapause, which ensures recruitment of individuals even following years of extreme larval mortality (uneven winter near distribution margins). It may also include physiological plasticity and its evolution across the expansion succession due to positive selection on thermal tolerance. The ecological relevance of such responses directly depends on local conditions and their predictability, which vary along altitudinal and latitudinal gradients, or from oceanic to continental climates. The heterogeneity of climate through space and time therefore appears as a critical selective pressure on pine processionary moth's life histories. Its rapid expansion may consequently promote differentiation of populations throughout its range. This poster will detail research directions of a new project aiming at investigating the mechanisms of such responses and associated variability. It should ultimately allow testing the spatio-temporal structuration of the variation observed within and among populations. Untangling how pine processionary moth's life histories are impacted by climate heterogeneity and expansion history may prove being crucial for (1) understanding success or failure under challenging conditions, and (2) improving predictive models of phenology and expansion.