

## CAN ENVIRONMENTAL CHANGES AFFECT THE HOST PARASITE MEDIATED SPECIATION: - A REVIEW

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### ABSTRACT

*Parasitism can be a driver of species divergence and thereby significantly alter species formation processes. While we still need to better understand how parasite-mediated speciation functions, it is even less clear how this process is affected by environmental change. Both rapid and gradual changes of the environment can modify host immune responses, parasite virulence and the specificity of their interactions. They will thereby change host–parasite evolutionary trajectories and the potential for speciation in both hosts and parasites. Here, we summarise mechanisms of host–parasite interactions affecting speciation and subsequently consider their susceptibility to environmental changes. We mainly focus on the effects of temperature change and nutrient input to ecosystems as they are major environmental stressors. There is evidence for both disruptive and accelerating effects of those pressures on speciation that seem to be context-dependent. A prerequisite for parasite-driven host speciation is that parasites significantly alter the host's Darwinian fitness.*

*Keywords: Parasitism, environmental, ecosystems, parasites*

### 1. INTRODUCTION

Current biodiversity studies focus on species extinction rates and how they are amplified by human-mediated environmental change. Whether changing environments affect the processes that give rise to new species is, however, rarely considered. Host–parasite interactions represent one such evolutionary process. They are major parts of ecosystems and as such vary with ecological settings and environmental change. Ecological settings can entail, but are not restricted to, the presence and abundance of intermediate and final hosts for the different parasite species, but also further ecological interactions such as predation or competition. Global change affects individuals, e.g. by affecting the trade-offs for the host involving immunity and defence strategies or transmission pathways for the parasite the interaction between hosts and parasites; and the ecological settings when host or parasite community composition or population structure change. The consequences of all these alterations depend on the specific characteristics of the “disease triangle”: (i) the host corner includes the variation of its life history traits, its immunity innate and/or acquired) and its abundance; (ii) the parasite corner comprises its transmission rates, its ability to accomplish its life cycle and its virulence. Lastly, (iii) the environment corner represents the ecosystem in which the host and the parasite live – and the initial source of change.

Reciprocal feedbacks between ecological settings and evolutionary dynamics are the topic of eco-evolutionary research and such dynamics may well play an important role in shaping host and parasite evolution through time. However, as these mechanisms are not yet well understood it would be too speculative to describe how they may shape speciation at this point. We have therefore excluded eco-evolutionary dynamics from further discussion in this review.