

Positive correlation between density and parthenogenetic reproduction in oribatid mites (Acari) supports the structured resource theory of sexual reproduction

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ABSTRACT

Question: A number of theories have been proposed to explain the dominance of sexual reproduction in Metazoa. Using oribatid mites (Acari, Oribatida) as model organisms, we test the validity of the structured resource theory of sexual reproduction (SRTS), which suggests that limited resources result in the dominance of sexual processes, whereas ample resources favour parthenogenesis. Oribatid mites are mainly soil-living animals that reproduce either sexually or by thelytoky.

Key assumptions: Resource supply is reflected by animal density. Populations are controlled predominately by bottom-up rather than top-down forces, such as predation, which is likely true for oribatid mites.

Data studied: The relationship between oribatid mite density and the frequency of parthenogenetic reproduction was investigated at two spatial scales: (1) regionally, using data on oribatid mites from two different forests in Germany, and (2) globally, by compiling data on 38 oribatid mite communities from different habitats.

Conclusions: Predictions of the SRTS were supported at both scales, indicating that ample resources (as indicated by high population densities) in fact favour parthenogenetic reproduction.

Keywords: evolution of sex, Oribatida, parthenogenesis, structured resource theory of sexual reproduction.

INTRODUCTION

The perceived disadvantages of sexual compared with parthenogenetic reproduction are manifold and include, for example, the break-up of favourable gene combinations and the need to both find mating partners and produce male offspring (Maynard Smith, 1978). Despite

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