Testing a new hypothesis regarding the advantage of an important developmental process in evolution: Progenesis.

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Paedomorphosis, an extreme form of developmental plasticity involving the retention of larval traits at the adult stage, is considered a major evolutionary process in many groups because it can quickly generate phenotypic variation without requiring important genetic modifications. Two main processes underlie paedomorphosis: neoteny, which consists in a slowdown of somatic development, and progenesis, which consists in an acceleration of sexual maturation associated to body size reduction. Because it is essentially a truncation of ontogeny, progenesis has often been deemed an evolutionary dead-end by macroevolutionists, with advantages mainly attributed to a precocious reproduction or small body size required in specific environmental contexts (e.g. parasitism or interstitial life of meiofauna). Yet body size is also recognized as a key factor determining the trophic niche of species. Here, we formalized a new hypothesis regarding the immediate ecological advantage of progenesis which is that via body size reduction, progenesis might intrinsically promote trophic niche differentiation and therefore allow to decrease intraspecific competition for resources. We tested this hypothesis in multiple populations of facultatively progenetic newts where both phenotypes (progenetic and metamorphic) coexist using stable isotope niche modelling and mixing models in relation to morphological and environmental parameters. We show that not only did progenetic individuals occupy a different trophic niche in all populations, but the smaller they were compared to metamorphs due to progenesis, the more different they were in terms of trophic ecology. We argue that beyond generally recognized fitness advantages of progenetic development such as an earlier reproduction, this process may also generally bring immediate trophic advantage via body size reduction.

Eco-Evolutionary interactions/dynamics

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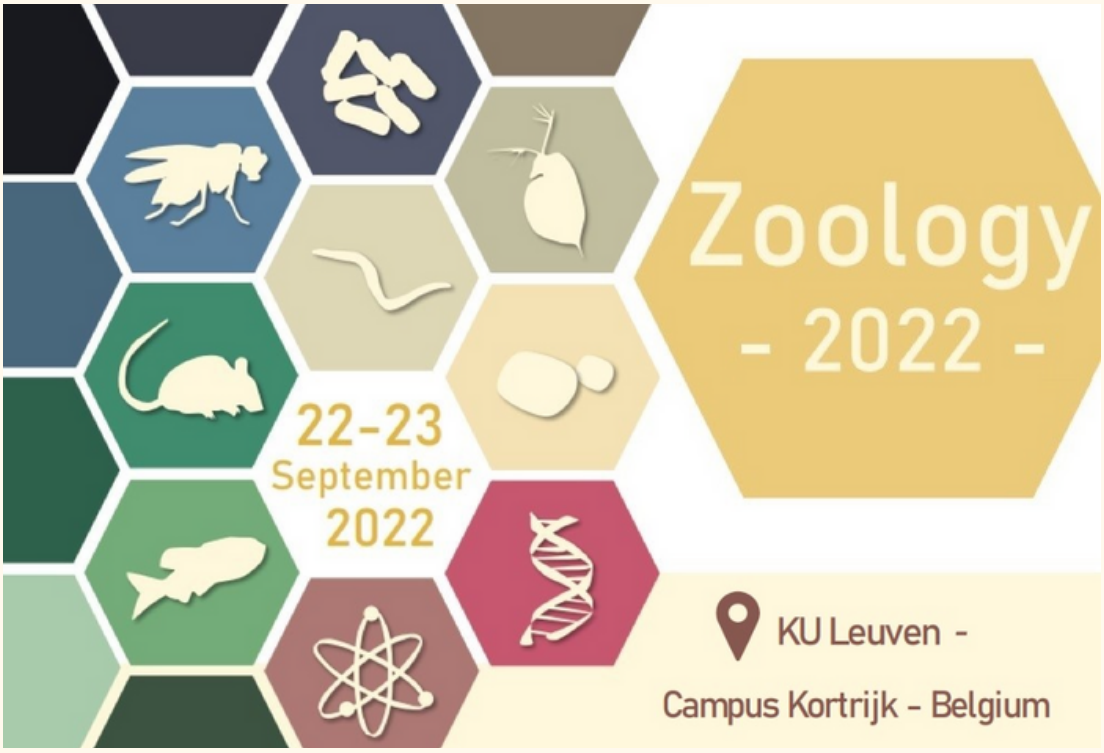

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