

Facultative paedomorphosis, a mechanism promoting niche differentiation in newts: Evidence from stable isotope analysis

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Facultative paedomorphosis is a heterochrony that allows a part of the individuals in a population to retain larval traits at the adult stage. In species with complex life cycles such as amphibians, this process can lead to radical differences in the morphology of adults without the need of extensive genetic modifications. In newts, paedomorphs retain external gills at the adult stage, allowing for a fully aquatic life, while metamorphs undergo complete metamorphosis, adapted for a terrestrial life-stage. These morphological differences affect feeding mechanisms and microhabitat use during the aquatic life stage of newts. Such process raises important questions concerning its adaptive and evolutionary implications. One hypothesis is that facultative paedomorphosis may be maintained in some populations as a trophic polymorphism, with the consequence to lessen intraspecific competition in environments devoid of competitors. We explored this hypothesis in facultatively paedomorphic populations of two species occurring in contrasting environments: *Ichthyosaura alpestris*, inhabiting deep alpine lakes and *Lissotriton helveticus*, inhabiting small permanent ponds. We determined the trophic niche and regime of the alternative morphs using SIBER and SIAR mixing model on carbon and nitrogen stable isotopes. Our results show that paedomorphs and metamorphs occupied different trophic niches in both species and environments. Interestingly, we observed different patterns of niche differentiation between morphs and sexes that could be linked to differences in food resources and microhabitat use. Our results support the role of facultative paedomorphosis as a trophic polymorphism promoting niche differentiation in newts.

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