The effect of habitat variation on organisms of different body size

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# Introduction

Previous observational studies [@Farjalla2012] have shown that larger bodied organisms show a greater degree of habitat filtering: there is greater environmental structure as body size increases from bacteria (weak), zooplankton (intermediate) and insects (strong). This is especially interesting as these different environments are caused by variation in habitat preference among several bromeliad species -- some species are found under shrub cover, while others are meters away in full sun.

Sun and shade habitats have different species compositions. This may be caused by organism' s local environmental tolerances; sensitivity to heat may vary among the three groups of organisms studied. However, species compositions may also be affected by the effects of temperature fluctuations on metabolism. Warmer animals may show increased feeding rate, which may increase top-down regulation and alter both density and richness of lower trophic levels.

In this experiment we will test these observations by homogenizing these communities, removing variation among communities as much as possible. We hypothesize that as habitat filtering acts, via mortality and -- for non- metamorphosing organisms -- reduced fecundity, we will observe a 'relaxation' of the community towards the orginal species composition. We hypothesize that this relaxation will be greatest for insects, less for zooplankton and nearly zero for bacteria.

## Methods

We performed two complementary experiments to test how different groups within these communities respond to environmental variation. In each experiment, we removed the communities from bromeliads, sampled them, and then returned a homogenized community to all plants. Plants were replaced in a similar local habitat to their original, and enclosed in a mesh cage to prevent colonization. After a 12 day period, we sampled communities again and tested for a 'relaxation' in composition towards their original composition. In our first experiment (among-species) we tested how sensitivy to different bromeliad species. Our second experiment (within-species) examined the effects of habitat independently of species, by comparing communities within the same bromeliad species in open- and closed-canopy habitats.

We performed these experiments at the Parque Nacional de Jurubatiba, in Rio de Janeiro state, Brazil ( S ). For our between--species experiment we used *Aechmea nudicaulis*, *Neoregelia cruenta*, and *Vriesea neoglutinosa*; our between --habitat experiment used *Neoregelia cruenta* only, sampled from exposed and shaded habitats. *N. cruenta* is both common and highly plastic, occuring in a broader range of habitats than any other bromeliad in this study site.

Macroinvertebrate communities were sampled by washing the plants throughly and seiving the water through a (dimenions) sieve. They were identified to the lowest taxonomic level possible in the field (genus or family). Homogenized communities were the arithemetic mean of the densities of each group in original communities (though often quite a bit lower because of natural mortality).

To homogenize zooplankton, protist and bacteria communities, we collected and equal volume of inoculum from each plant, mixed and returned equal volumes to all bromeliads. In our first experiment we used 100ml of inoculum from each plant, because *A. nudicaulis* is very small and this was the maximum volume we could obtain while simultaneously selecting average-sized plants.

## Results

## Literature Cited