

Prey and predator interactions

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An ecological study on three anuran species

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Introduction – climate change

Climate change influence many aspects of a species' biology

- Habitat loss
- Altered geographical distributions
- Changing in life cycles' timing
- Density reduction
- **Altered interactions**

Introduction – why anurans?

Climate change is one of the greatest threats to amphibians

Global warming effect on anurans:

- Range shift
- Effect on reproduction
- Effect on development
- Effect on behaviour
- Other indirect effect (food availability, community changes, emerging diseases)

Does climate change affect prey-predator interactions in anurans? How?

Ch.1 – Acclimation effect on prey-predator interaction

Prey species:



Rana dalmatina

Family: Ranidae

Deposition: starting from february



Pelophylax sp.

Family: Ranidae

Deposition: from march to june



Hyla intermedia

Family: Hylidae

Deposition: from the end of february to august



Ch.1 – Acclimation effect on prey-predator interaction

Predator species:



Dytiscus marginalis

Order: Coleoptera



Anax imperator

Order: Odonata

Ch.1 – Acclimation effect on prey-predator interaction

Survival to predation experiment

Three-way factorial design (2x2x3)

Two predators:

- *A. imperator*
- *D. marginalis*

Acclimation effect

Two acclimation levels:

- 20 °C
- 30 °C

Climate change effect

Three experimental temperatures:

- 20 °C
- 25°C
- 30 °C

Ch.1 – Acclimation effect on prey-predator interaction

10 tadpoles vs 2 predator larvae

2 hours

3 iterations

n tadpoles with iterations per species	n predators with iterations per species
360	72*
*36 <i>Dytiscus marginalis</i> , 36 <i>Anax imperator</i>	

Survival success, efficiency of predators and handling time will be measured

Ch.1 – Acclimation effect on prey-predator interaction

What are the effects of raising temperatures on prey-predator interactions?

Can acclimation alter these effects?

Ch.2 – Climate change and habitat complexity

Preys: *R. dalmatina*, *Hyla intermedia*,
Pelophylax sp. (tadpoles)

Predator: *Anax imperator* (larvae)



Habitat complexity can decrease predation success by offering refuge areas to preys or by limiting predator movements and sight

But what happens when near critical thermal maximum?

Ch.2 – Climate change and habitat complexity

What is “critical thermal maximum”?

Ctmax is defined as the upper body temperature at which animals lose the ability to function

Can climate change affect the ability of preys to exploit potential refugees?

Ch.2 – Climate change and habitat complexity

Two-way factorial design (2x3)

Categories of habitat complexity:

- Partial coverage
- High coverage

10 tadpoles vs 2 predator larvae

2 hours experiment

3 iterations for each combination

Survival success

Experimental temperatures:

- 20 °C
- 25 °C
- 30 °C

Total n tadpoles	Total n predators
180	36

Ch.3 – Interaction with an allochthonous predator

Climate change can alter mechanisms of introduction of alien species

Preys: *R. dalmatina*, *Hyla intermedia*, *Pelophylax* sp.
(tadpoles)

Predator: *Procambarus clarkii*



Ch.3 – Interaction with an allochthonous predator

Tadpoles have an innate response to cue of predators they are familiar with, while they seem to ignore the threat poses by predators they do not encounter frequently

Tadpoles' response involve reduced movements and changed morphology

Different tadpoles' response depending on predator's diet

Ch.3 – Interaction with an allochthonous predator

Predator cue experiment:

Three predator categories:

- Fasted *P. clarkii*
- *P. clarkii* fed with boiled carrots
- *P. clarkii* fed with prey species

10 iterations for each predator treatment

Would an allochthonous predator trigger any response?

Ch.3 – Interaction with an allochthonous predator

Single tadpole chosen randomly

15 minutes to acclimatize

Predator added in a plastic cage to allow predator's cue to freely flow in the tank

30 minutes of experiment

total n tadpoles per species	total n predators
30	3

Total distance covered, path tracked and morphometric traits

**THANK YOU FOR THE
ATTENTION!**



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