

# Cold-water coral feeding rates

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## Introduction

- **Functional responses**, i.e. feeding rates as function of food concentration, determine growth and the links in food webs.
- The functional responses of cold-water coral may be modified by **environmental factors** such as water flow velocity, sediment concentration and food particle size.
- Therefore, we **combine data and theory** to ultimately arrive at a functional response dependent on such environmental factors.

## Methods

- We analyze data from **several experiments** all conducted in **identical flumes** (Fig. 1).
- In each experimental run, a known amount of food (*Artemia salina* larvae) is added to a known amount of coral (*Lophelia pertusa*, *Madrepora oculata* or zooxanthellae containing *Balanophyllia europaea*) and the **decline of food concentration over time** is recorded.
- Experimental runs differ in **water flow velocity**, **sediment concentration**, **food particle size**, **light regime**, **initial food concentration** and **duration** of experimental run.
- For each experimental run, we determine the clearance rate, i.e. the volume cleared of food per hour per polyp.

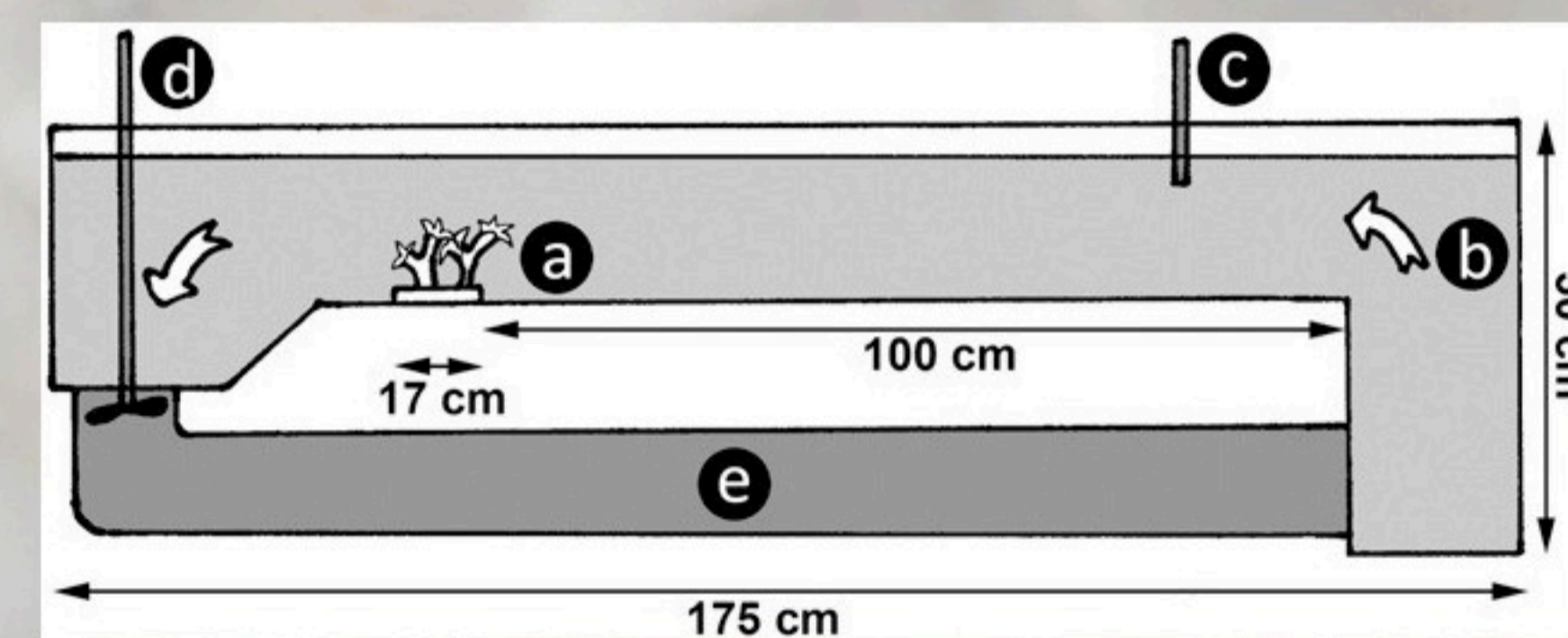


Fig. 1. Feeding experiment in flume. (a) coral. (b) flow direction. (c) food delivery and water sampling. (d) rotor. (e) return pipe.

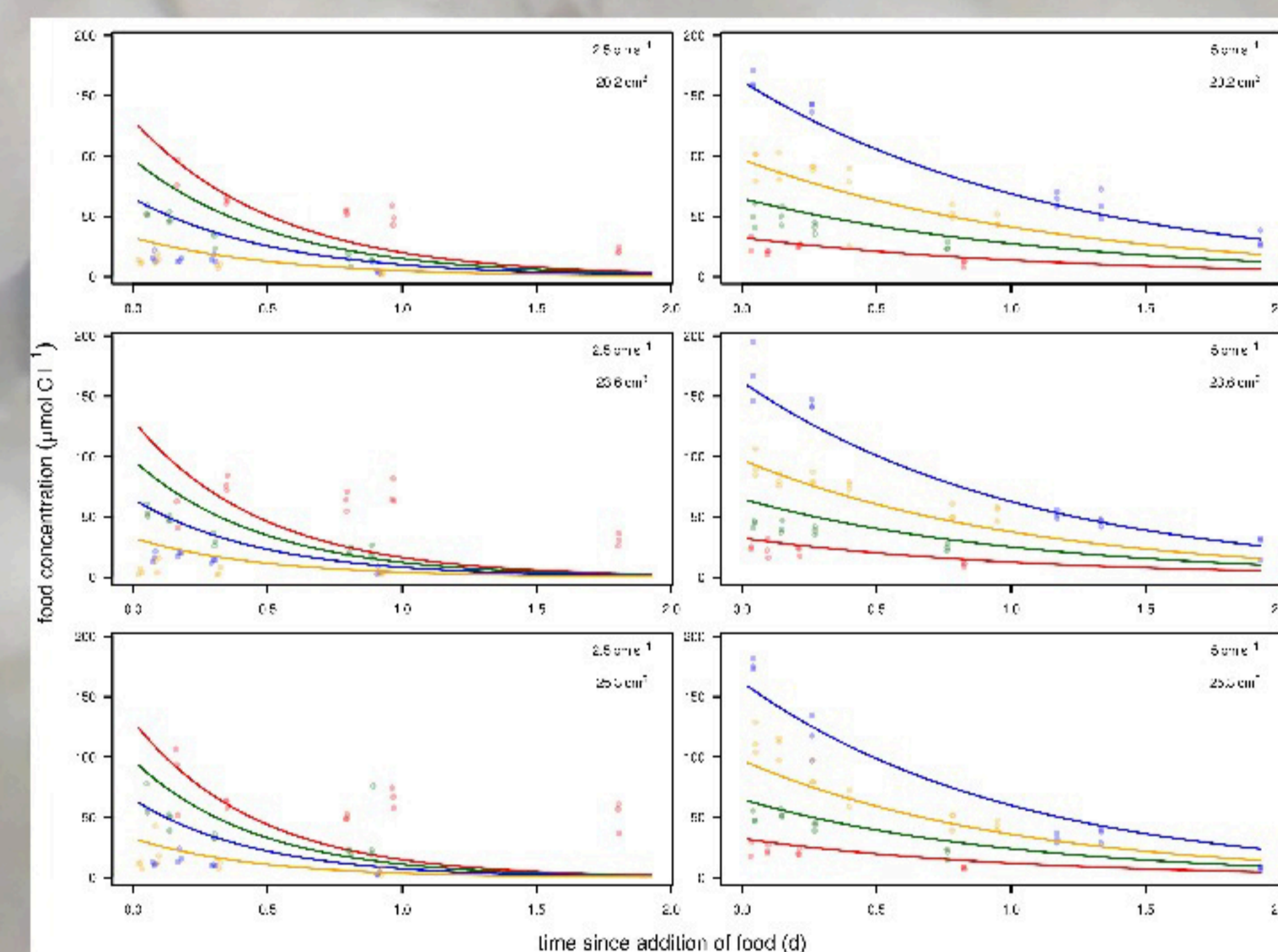


Fig. 1. Example of clearance rate fit to data. Here, there is one coral surface area-specific clearance rate for each flow velocity.

## Functional response: central assumption

- Coral and food meet at a rate proportional to each of their densities.
- The constant of proportionality is the **clearance rate**.

## Conclusion

- Estimating clearance rates **normalizes for the effect of food concentration** on feeding rates.
- Clearance rates appear to depend on **flow velocity** and **food particle size**.

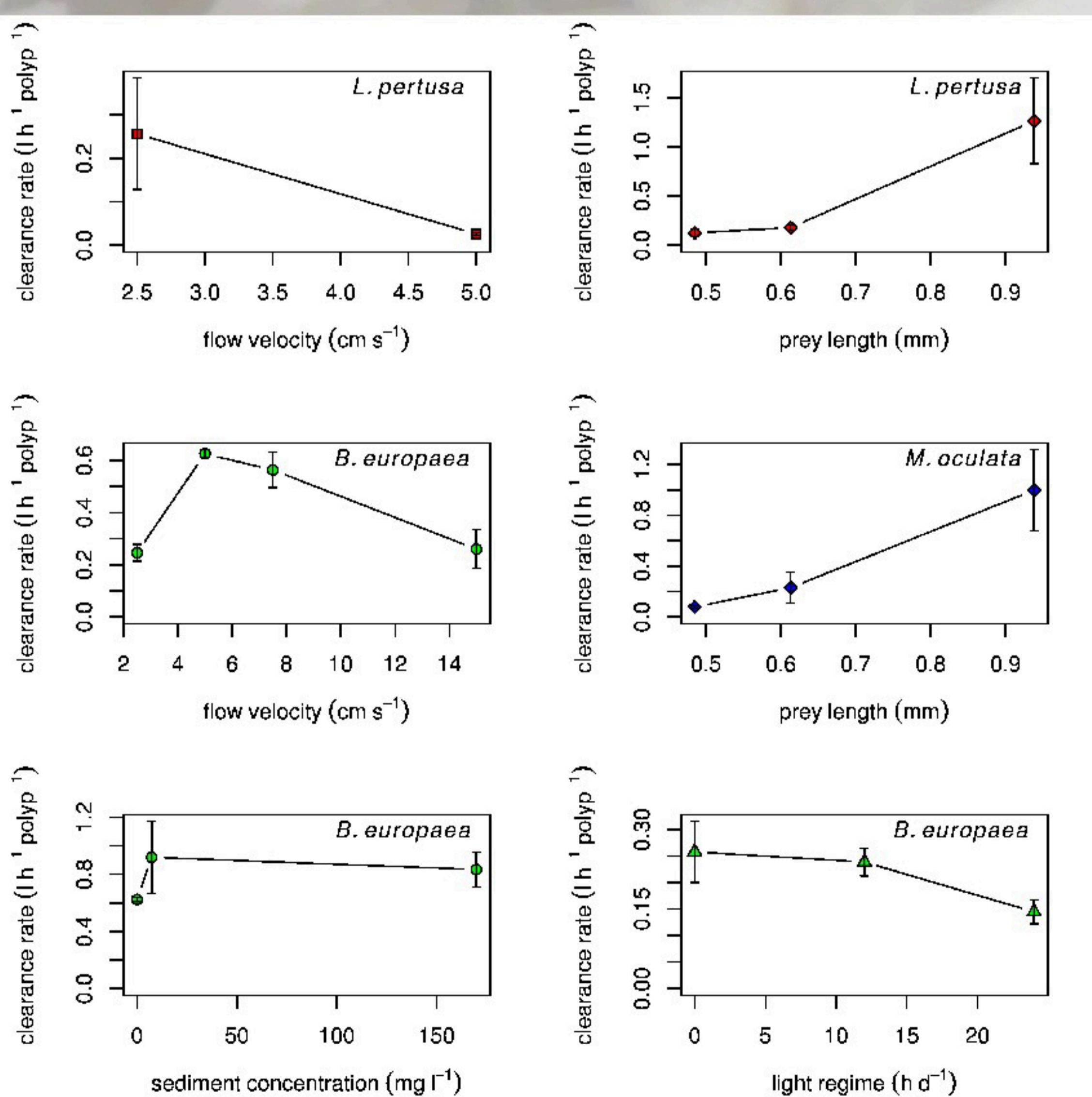


Fig. 1. Relations between environmental variables and clearance rates.