Predation and food webs

Let the fishin' begin! Fig. 20.1

Lecture outline

- Food webs and methods
- Adaptations to predation
- The Trophic Cascade
- Abiotic controls on predation

Omnivory rules!

Fig. 20.2

Comparing food webs

Documenting feeding

- Gut content analysis
  - Amorphous detritus
  - What's there vs. what's not
- Fecal analysis
- Ingestion vs. assimilation
- Feeding and growth experiments
- Essential fatty acids
- Stable isotopes

Stable isotopes

- Several isotopes exist that can be used to document food webs
- The most common ratios used are $^{15}N/^{14}N$ and $^{13}C/^{12}C$, expressed in parts per thousand
- Nitrogen is heavier as you move up the food web (+3 to 5%)
- Organisms track the C ratio in their food
Example of isotopes in food webs

Old rice fields…

Anything missing?

Bayer 2011

Some adaptations to predation

Ruffe

Cyclomorphosis

(Boker 1939)

Kairomones?

Daphnia lumholtzi

(invasive)

Size rules in freshwater

Brooks & Dodson (1965)

3,337 G.S. citations as of 28 November 2016

Diel vertical migration of Daphnia

What about drift?

Fig. 20.5

Daphnia meets Chaoborus

Image: Spike Walker

Anything you can do, I can do better
**Chaoborus grows up**

- Darwin (1875) proposed that Venus flytraps select the largest prey possible by leaving small open spaces between spines shortly after closure, which allowed “small and useless fry to escape”; why?

- Foraging can be modified by food density (OFT)

**OFT and insectivorous wetland plants**

- Darwin (1875) proposed that Venus flytraps select the largest prey possible by leaving small open spaces between spines shortly after closure, which allowed “small and useless fry to escape”; why?

- Foraging can be modified by food density (OFT)

**The Trophic Cascade**

- Postulated since 1880 that predators can control herbivores and increase biomass of producers

- Top-down versus bottom-up control

- May use biomanipulation to control trophic state

**The Trophic Cascade (2)**

- Does the number of trophic levels matter?

**Biomanipulation in Netherland lakes**

- Shallow, eutrophic lakes; # of trophic levels in Yr 0?
Abiotic controls on predators

- Sure, predators are/can be important…
- But, can we also (sometimes) explain why certain predators are present, and…
- Do a decent job of explaining much of the overall community structure of our system of interest?

And also influence distributions

Still waters run deep…

Wellborn et al. (1996)