Predators need to encounter prey in order to acquire them

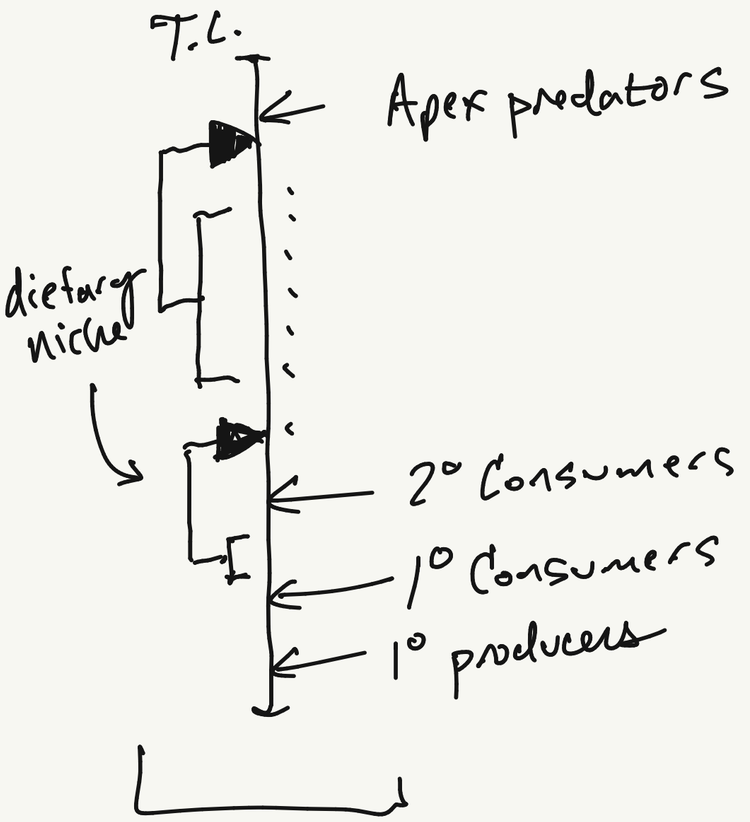
What impacts encounter rates?

- Active hunting : prey density, predator velocity, prey velocity
- Sit-And-Wait : prey density, prey velocity

- Generalists - many species of prey are consumed
  - long term advantage
  - Access to more prey
  - less efficient for any given prey
- Specialists - few species of prey are consumed
  - short term advantage
  - Prey resources less available
  - More efficient for specialized prey

General Rules for trophic interactions in ecosystems

General Rules for trophic interactions in ecosystems



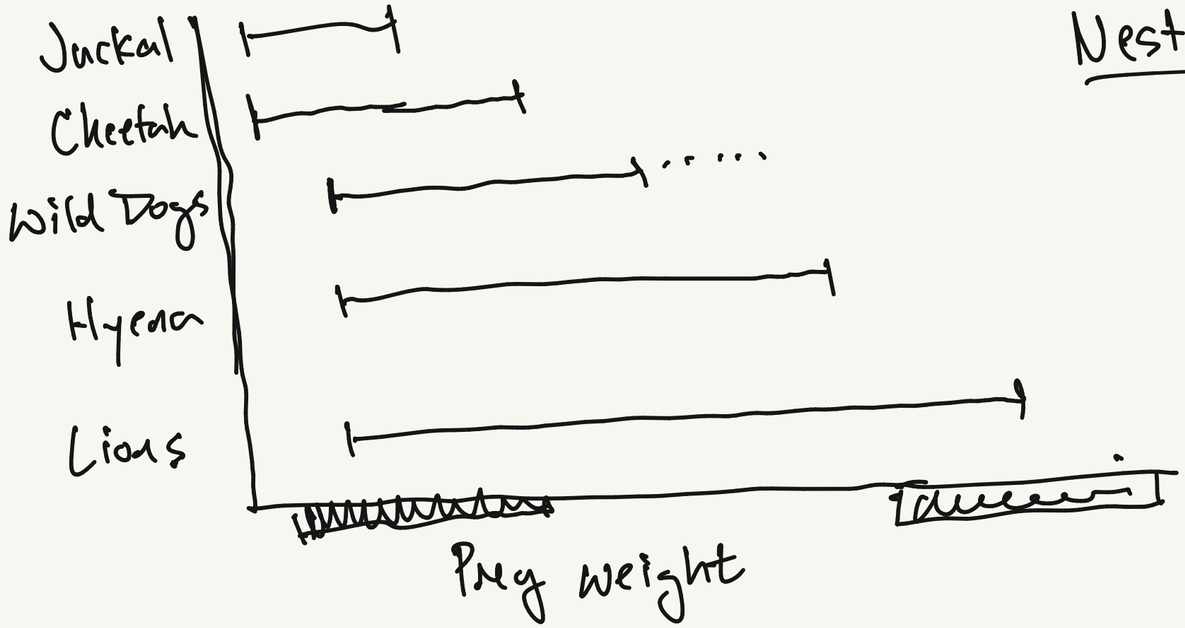
Marine Systems : Gape limited

Common pattern of generalization / specialization as a function of trophic level

- Higher trophic level organisms tend to be generalists
- Lower trophic level organisms tend to be specialists

Body Size Structures predator-prey interactions

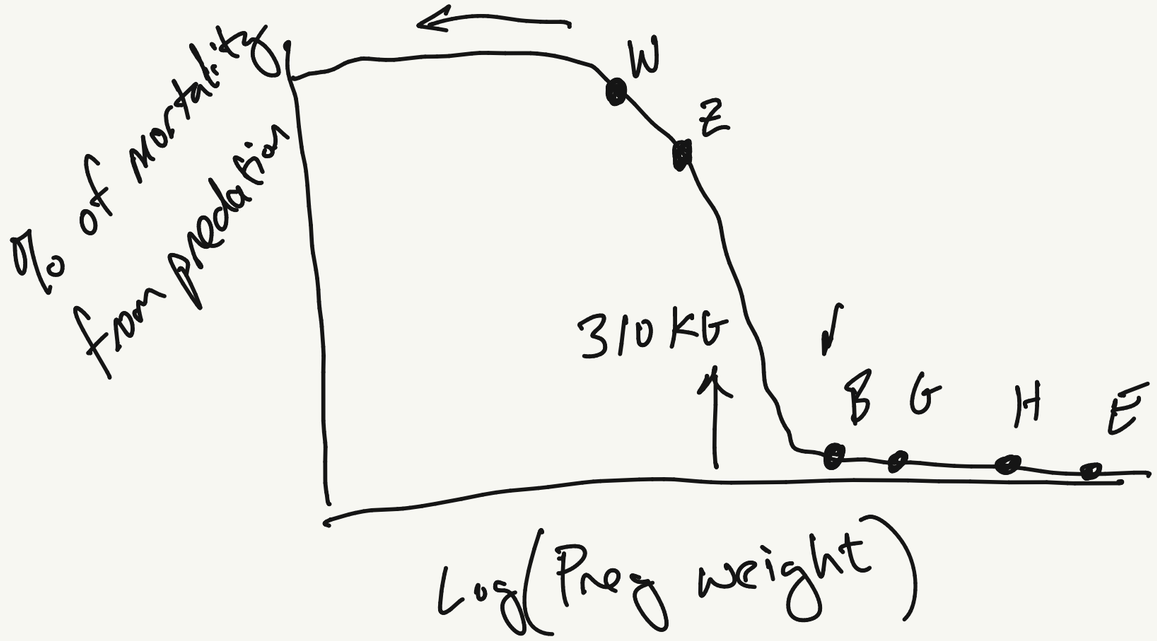
East African Mammalian Carnivores

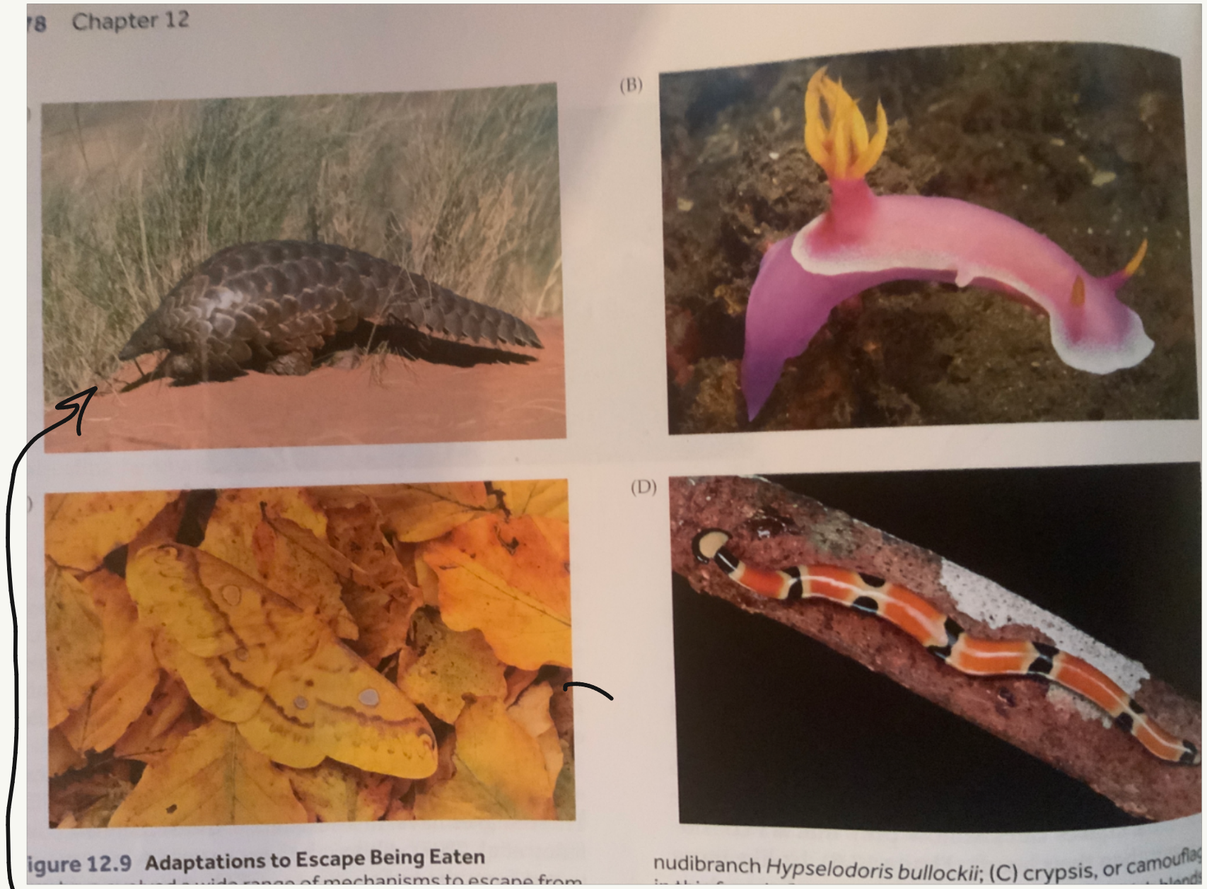


Nested structure

Predator perspective: lots of competition for smaller prey
- less competition for larger prey

Herbivore perspective: If you're small, you're getting hammered by every predator





igure 12.9 Adaptations to Escape Being Eaten

nudibranch *Hypselodoris bullockii*; (C) crypsis, or camouflag

Predators drive natural selection in their prey

- Physical defenses
- Toxins (+ aposematic coloration)
- Mimicry
  - Crypsis (Camoflouge)
  - Resemble less palatable organisms
    - False advertising

Plants reduce herbory

Structural defenses

- spines, thorns, hairs

Cacti / Acacias

Induced defense - production of defensive structures is increased in response to herbivory

Secondary compounds: toxic chemicals to reduce herbivory

N.A. tobacco
- toxins that dispel herbivores
- toxins that attract predators and parasites

- Up to 90% reduction in herbivory when the chemicals are induced

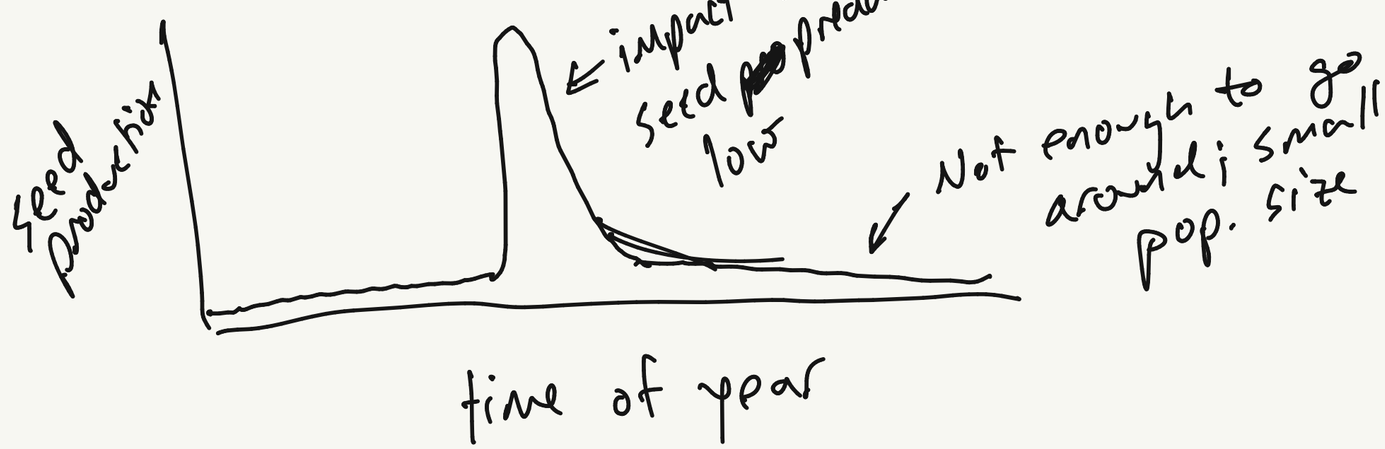
- Why not produce toxins all of the time?

Expensive

- Compensation: when the ~~no~~ removal of plant tissues stimulates growth

e.g.) Beech trees: ↑ leaf production following herbivory
↑ photosynthetic rate

- Manipulate pred-prey dynamics
  - Masting: low seed production for a long time interval
    - followed by an explosion of ~~seed~~ seed production during a short time interval (masting)
    - Keeps seed-predators at low population sizes
    - Overwhelms them during the masting event



How predators evolve in response to prey

- Physical features: speed, size — hunting
- Toxins (spiders, wasps, snakes)
- Mimicry ~ crypsis (hide/ambush)
- Detoxification - the ability to detoxify poisonous prey

garter snakes vs. rough-skinned newt
- enough tetrodotoxin to kill 25000 mice

- Persistance Hunting