Principle of allocation

Soma
- assimilation
- growth
- maintenance
- excretion
- reproduction

Life history - how allocation changes over the lifetime of an organism.

young     lifetime     old
Principle of allocation leads to trade-offs

Example: Size vs. number of offspring

Size-number trade-offs

Darters that produce larger eggs lay fewer.

Plants that produce larger seeds produce fewer.
A dazzling variety of life-histories

Fishes with higher mortality rates allocate a greater proportion of their energy to reproduction.
Grime’s Triangle

What characteristics would be associated with each strategy?

Winemiller and Rose’s classification space

What are the trade-offs involved?
Competition

G.F. Gause

“Competitive exclusion principle”

No two species sharing identical niches can coexist indefinitely…
**Tribolium flour beetles**

**Park’s flour beetles**

Growing separately

Warm and humid

Growing together

Cool and dry

When grown separately at 34°C and 70% relative humidity, populations of *T. confusum* and *T. castaneum* both did well.

When grown together at 34°C and 70% relative humidity, *T. confusum* populations died off after 430 days, while *T. castaneum* persisted.

When grown separately at 24°C and 30% relative humidity, *T. confusum* populations did well, while *T. castaneum* populations died off in about 500 days.

When grown together at 24°C and 30% relative humidity, *T. castaneum* populations died off in less than 400 days, while *T. confusum* persisted.
Temperature

24  29  34

Relative humidity

30  70

T. castaneum

indeterminate

T. confusum

Theory of competition

Alfred Lotka

Vito Volterra
ZNGIs in the Lotka-Volterra models

Warbler Feeding Niches limit competition

Robert MacArthur