*Assigned readings, 8th Edition pp. 1198-1203
7th Edition pp. 1083-1093, 1159-1171

Organism Interactions and Competition

Outline of Lecture 5

- ***A. Competition***
  - ***1. Competitive exclusion***
  - ***2. Competition between two species***
- ***B. Limiting resources***
- ***C. Competition***
  - ***1. Exploitative competition***
  - ***2. Interference competition***
- ***D. Demonstrations of interspecific competition***
  - ***1.*** **Tribolium** *beetles*
  - ***2. Barnacles***

A. Competition: the use or attempted use of a limited environment resource by two or more populations (interspecific) or by members of the same population (intraspecific).
   1. Competitive exclusion: if two species are competing for the same limited resource, one species will be able to use that resource more efficiently than the other and the former species will be able to eliminate the latter species locally.

   2. Competition between two species is likely to be more intense, the more similar their ecological requirements; species occupying similar niches will tend to evolve in ways to minimize competition. Niche: sum total of all ecological needs and tolerances.

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B. Limiting resources
1. Energy
2. Nutrients
3. Water space
4. Nesting sites
5. Refugia

C. Competition (N_1 and N_2 populations)

$$\frac{dN_1}{dt} = N_1 r_1 \frac{K - N_1 - (\alpha \times N_2)}{K}$$

also,

$$\frac{dN_2}{dt} = N_2 r_2 \frac{K - N_2 - (\beta \times N_1)}{K}$$

Competition cont'd
when N_1 is the size of competing population 1, N_2, is competing population 2, α is the proportional effect on species 2 on the population size of species 1 relative to resource K, and β is the effect of species 1 on species 2. α and β tend (but not always) to be reciprocal. For example:

			Competition	
Cockroaches	α= 0.001	β=100		
Gorillas	1.0	1.0	Species 1	Species 2
Elephants	100.0	0.001	intraspecific	intraspecific
			Interspecific	

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Organism Interactions and Competition

1. **Exploitative competition:** two individuals are using the same limited resource in the same way but have different efficiencies in using that resource. There are no direct interactions.
2. **Interference competition:** competition results from direct behavioral interactions.

E. Demonstrations of interspecific competition
   1. *Tribolium* flour beetles (hot and damp, *T. castaneum* thrives; cool and dry, *T. confusum* thrives).

2. Barnacles: species A lives in shallow water, often exposed to air; species B lives in deeper water, rarely exposed to air.
   a. In deeper water, species B out competes species A; but if species B is removed, species A moves into deeper zone.
   b. In shallow water, remove species A but species B cannot tolerate shallow water conditions.
   c. Hence they are only competing in deeper waters.