

*Assigned readings, 8th Edition pp. No assigned readings
7th Edition pp. 1106-1133

Microevolution and Ecology

Outline of Lecture 12

- A. *Irish deer*
- B. *Freshwater mussel Lampsilis*
- C. *Preadaptation*
- D. *Altruistic behavior*
- E. *How can altruistic behavior evolve?*
- F. *Sexual selection*
- G. *Does evolution fashion perfect organisms?*

A. **Irish deer:** Evolutionary changes should be adaptive but there is no guarantee that a useful structure will continue to be adaptive in changing circumstances.

B. Freshwater mussel *Lampsilis*

- retains eggs in a pouch called a marsupium; marsupium is fish-shaped
- larvae are called glochidia, and attach parasitically to the gills of a fish; before being released, larvae are inside the marsupium
- a related mussel, *Cyprogenea*, has a worm-like marsupium
- functional change in structural continuity; A STRUCTURE CAN CHANGE ITS FUNCTION WITHOUT CHANGING ITS FORM

*Assigned readings, 8th Edition pp. No assigned readings
7th Edition pp. 1106-1133

Microevolution and Ecology

C. Preadaptation

Two definitions:

1. The occurrence of genetic traits (by spontaneous mutation) prior to, ***or*** irrespective of, any adaptive value they may have.
OR
2. The appearance of any phenotypic trait (morphological or behavioral) prior to the origin of its present adaptive function.

3. Intermediate stages may have a different function than final stage
 - i. Selection for an external marsupium to increase O₂ exchange for *Lamsilis* glochidia.
 - ii. Selection for external marsupium to look like a fish, which then attracts fish and increase the change of glochidia attachment to fish gills.

- **Directional Selection:** natural selection that favors individuals at one end of the phenotypic range (*Professor Moritz has covered this topic in greater detail*).

*Assigned readings, 8th Edition pp. No assigned readings
7th Edition pp. 1106-1133

Microevolution

D. **Altruistic behavior:** self-sacrifice for the benefit of others; a behavior that increases the fitness of the recipient but that reduces the fitness of the altruistic individual.

1. Belding’s ground squirrel – How can a squirrel enhance its’ individual fitness by aiding other members of its population, which are in fact its closest competitors?
2. Bees

E. How can altruistic behavior evolve if it reduces the reproductive success of the self-sacrificing individual?

1. Natural selection will increase genes for “altruism” if individuals that benefit from the unselfish acts are themselves also carrying those genes for “altruism.”
2. Kin selection
3. Reciprocal altruism

F. Sexual selection: sexually dimorphic characteristics

1. Males with the most impressive of these will be most attractive to females; or
2. Secondary structures may be used in direct contact with other males.
3. Not all sexual dimorphism is obviously adaptive.

*Assigned readings, 8th Edition pp. No assigned readings
7th Edition pp. 1106-1133

Microevolution

G. Does evolution fashion perfect organisms?

NO.

1. Each species has a long history of descent with modification.
2. Adaptations that exist today are compromises.
3. Not all of what we've talked about is adaptive.
4. Natural selection favors the fit variation from what's available in the gene pool.

