

## BIO 45 2002 Lecture #3 – The Role of the Environment

### An evolutionary approach to behavior links proximate and ultimate causality:

A simple argument:

1. Most (all?) behaviors are stimulated or caused to occur by the external or internal environmental state of an animal. They occur at appropriate times and in appropriate contexts.
2. The underlying structure (neurophysiological and morphological) that produces behavior and processes information from the environment arises from an interaction between genes and the developmental environment.
3. Most behaviors are adaptations. They and their underlying machinery were designed by selection. Selection is provided by the abiotic and biotic environment in which animals live. Those traits that do best in one generation tend to prevail in future generations.
4. Thus the environment enters in at three levels
  - gene = [developmental environment] »»» structure
  - structure = [environmental stimuli] »»» behavior
  - behavior = [selective environment] »»» reproduction of genes

### A conceptualization of how it all fits together:

Environments differ within and among levels of causation, but they are functionally linked through the process of evolution and the life cycles of animals. The proximate and ultimate causes are part of an ongoing process - linked historically and functionally - not alternatives!! Here is one way to view the integration:

