

# BIO 45 2002 - LECTURE #2 - WAYS TO THINK ABOUT BEHAVIOR

## I. What is behavior?

1. What animals do and how and why they do it

## II. "Watching some behavior"

1. Monarch butterflies
  - I'll describe and you come up with some questions

## III. What Kinds of Questions Can We Ask About Behavior? - Tinbergen's "4 Questions"

1. MECHANISM -- HOW DOES IT WORK? -- PROXIMATE CAUSES
  - How do the sensory, information processing and nerve-muscle systems work?
  - What can the animal learn and how does it learn?
  - What part of the **environment** stimulates or releases the behavior?
2. Ontogeny -- How Does it Develop in the Individual? -- Proximate causes
  - What are the roles of **environment** and genes in programming the behavior?
  - What determines the timing of behaviors?
  - What causes behaviors to differ with age or gender or time?
3. FUNCTION -- WHY IS IT DONE? -- ULTIMATE CAUSES
  - What are advantages for animal or its offspring? Why is it adaptive?
  - What is the "design" or "purpose" of the behavior and
  - What role does the **environment** play in determining the fitness of the behavior?
4. PHYLOGENY -- HOW DID THE BEHAVIOR ARISE IN THE SPECIES? -- ULTIMATE CAUSES
  - What do close and distant relatives do?
  - What is the evolutionary history of the behavior?
  - What were the past **environments** that shaped the behavior?

## IV. An example from damselflies

- Why do males stay with females after mating?

## V. Why distinguish among the possible causes of behavior?

1. A complete analysis requires all perspectives
2. It avoids needless debates about causes
  - e.g., proximate versus ultimate explanations
3. One perspective can give insights into another
4. Behavior is "caused" by the interaction of animals and their "environment"
  - The environment "stimulates" the behavior
  - The environment interacts with the genes to produce the underlying mechanisms
  - The environment is the selection that determines the success of behaviors
  - Past environment – organism-interactions produced the basic structures involved
  - It is the type of interaction between behavior and "environment" that is key!