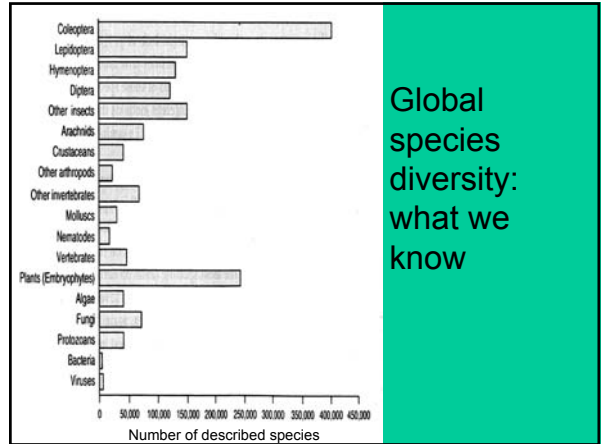
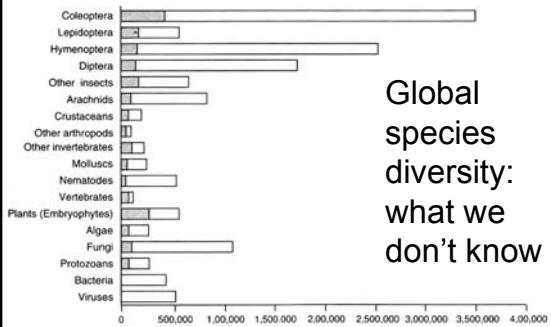


# Biodiversity



Global species diversity: what we know

Many groups of organisms are poorly sampled



Global species diversity: what we don't know

Number of species: shaded=described  
unshaded=estimate of yet to be named

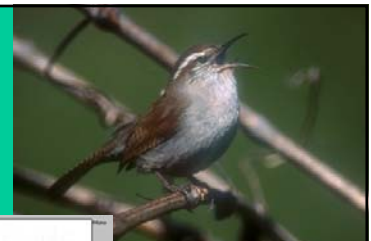
**A definition of behavior:** All observable or measurable muscular and secretory responses an animal makes to changes in its internal or external environment.

Problem- doesn't fully account for analysis of cognitive/neural processing.

## Skinner box

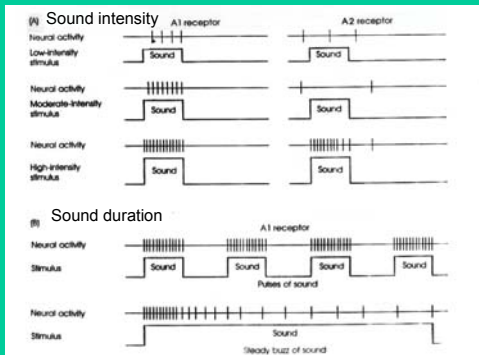


## Bewick's wren singing



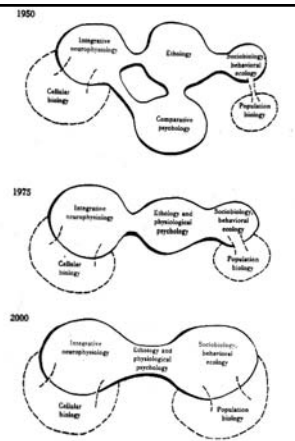
Sonogram

## Activity of moth ear neuron when exposed to bat calls



How does animal behavior fit into psychology?

Relationships among scientific disciplines related to animal behavior (E.O. Wilson 1975)



Why should scientists, including psychologists, study animal behavior?

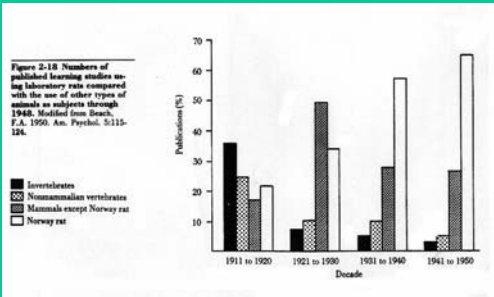
**1. We depend on other species**  
Biophilia concept (E.O. Wilson)

**2. We are animals**

**3. Biological conservation**

## The History of Animal Behavior as a Science

	Comparative Psychology (USA)	Ethology (Continental Europe)
Main approach	Experimentation	Observation
Setting of research	Laboratory	Field, natural conditions
Focus of theory	Learning	Instinct
Main level of questioning	Development	Evolution
Motivation	Animals as models of humans	Animals for own sake
Subjects	Mammals (Norway rat)	Birds, Fish, Insects



Niko Tinbergen's four levels of questions about causation.

1. Control (mechanisms)
2. Ontogeny (development)
3. Function (adaptive value)
4. Phylogeny (evolutionary history)

Niko Tinbergen's four levels of questions about causation.

1. Control (mechanisms): Physical basis of behavioral output. Includes genetics and physiology (emphasis on nervous systems)
2. Ontogeny (development)
3. Function (adaptive value)
4. Phylogeny (evolutionary history)

Niko Tinbergen's four levels of questions about causation.

1. Control (mechanisms)
2. Ontogeny (development): How individuals' behavior changes over time
3. Function (adaptive value)
4. Phylogeny (evolutionary history)

Niko Tinbergen's four levels of questions about causation.

1. Control (mechanisms)
2. Ontogeny (development)
3. Function (adaptive value): What role does a behavior play in enhancing animals' survival or reproduction?
4. Phylogeny (evolutionary history)

Niko Tinbergen's four levels of questions about causation.

1. Control (mechanisms)
2. Ontogeny (development)
3. Function (adaptive value)

**4. Phylogeny (evolutionary history):  
How have patterns of behavior changed, or been maintained, as new species evolved?**

Levels of complexity of behavioral patterns

1. Action pattern
2. Sequences of action patterns
3. Spatial distribution of action patterns
4. Interactions with other animals  
can be either **ecological** (with other species) or **social** (with the same species).

Behavioral variation:

1. Species differences:  
cats vs. dogs
2. Individual differences  
your (sweet) cat vs. that pesky neighbor's tom cat
3. Changes over time  
your cat as a kitten vs. as an adult

**Observations vs. Experiments**