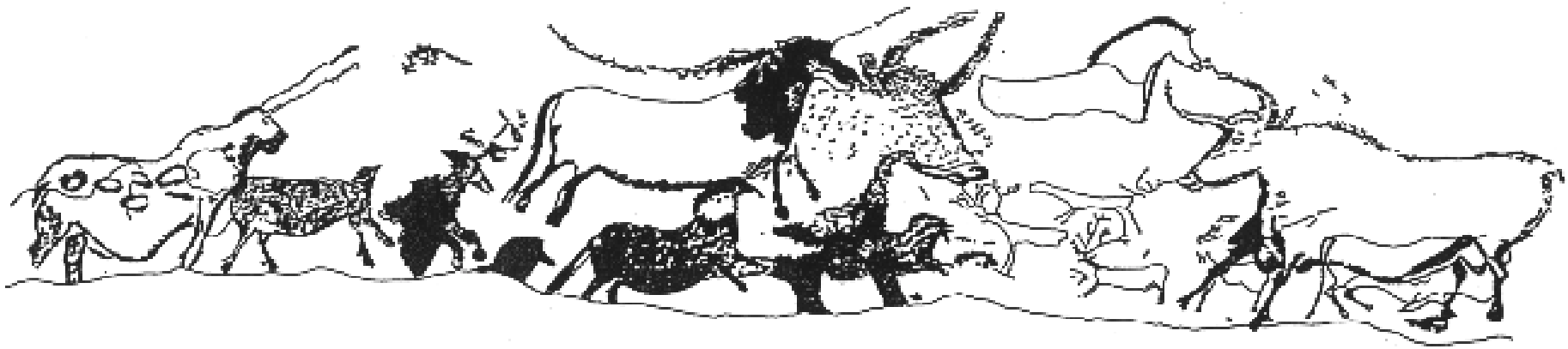
History of the study of animal behavior

100,000 years B.P. through ~1850

People have been making detailed descriptions
of the natural history of animals since the dawn of our species

100,000 years B.P. through ~1850



100,000 years B.P. through ~1850

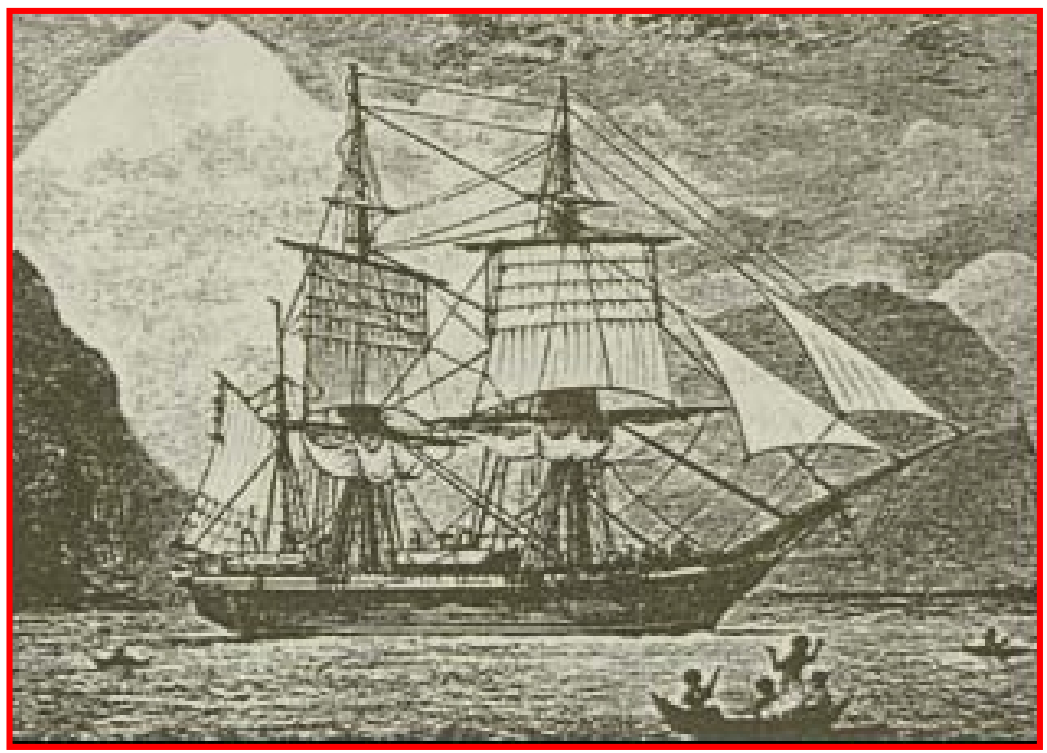
Consider yourself a prehistoric *Homo sapiens*

What characteristics and habits of other animals in your environment would you want to know?

1850 - 1900

Darwin's theory of natural selection gradually accepted by mainstream biologists

How did Darwin's theory of natural selection alter the study of animal behavior?



1850 - 1900

Comparative method developed in response to Darwin's ideas

George John Romanes formalized the use of the *comparative method*. He compared the behavior of taxonomically unrelated organisms to gain insight into the evolution of our own emotional states.

"Worms experience only surprise and fear.
Insects experience various social feelings and curiosity.
Fish exhibit play, jealousy, anger.
Reptiles display affection.
Birds exhibit pride.
Mammals experience hate, cruelty & shame."

What is the problem with this approach?

1850 - 1900

C. Lloyd Morgan developed the observational method in response to the extensive anthropomorphism of folks like Romanes

Morgan argued that one must use direct experimentation and observation, rather than poetic inference, to make generalizations and develop theories

Law of parsimony

In no case may we interpret an action as the outcome of the exercise of a higher physical faculty if it can be interpreted as the outcome of one which stands lower in the psychological scale

What does Morgan mean by this statement?

1900 - 1920

What is the story of Clever Hans,
and how is it relevant to Morgan's Law of Parsimony?

How did Oskar Pfungst determine what Clever Hans was actually doing?

1880 - 1920

What was the significance of Mendel's work on peas to the study of animal behavior?

1900 - 1975

Four major experimental approaches to the study of animal behavior were developed during the 20th century

Comparative psychology
Ethology
Behavioral Ecology
Sociobiology

Comparative psychology & physiology

explores mechanisms underlying behavior (i.e., the control mechanisms)--most popular in U.S.

Comparative psychology: discussed earlier

Physiological psychology (or behavioral neuroscience): studies how the nervous system generates behavior

Perceptual psychology: attempts to measure sensation objectively--lead to modern field of psychophysics

Animal psychology: focused on the development of systematic, replicable experiments; emphasizes mechanisms of learning in captive and domesticated animals (e.g., lab rat)

Behaviorism: argued that behavior consists of an animal's learned responses, reactions, or adjustments to specific stimuli

➔ animals were born as a *tabla rosa*, upon which experience etched behavior (John B. Watson, B.F. Skinner)

Ethology

systematic study of the function and evolution of behavior --originally developed in Europe

Novel view of behavior: individual behaviors, like anatomical traits, are are viewed in evolutionary terms that are subject to natural selection. ➔ most behaviors are under genetic control Why does this prediction necessarily follow?

Sensory Umvelt (J. von Uexkull): animals designed to perceive only limited portions of the total environment with their sense organs, and to respond in adaptive ways to these percepts; this led to notions of sign stimuli and fixed action patterns

Tended to study animals in natural environment

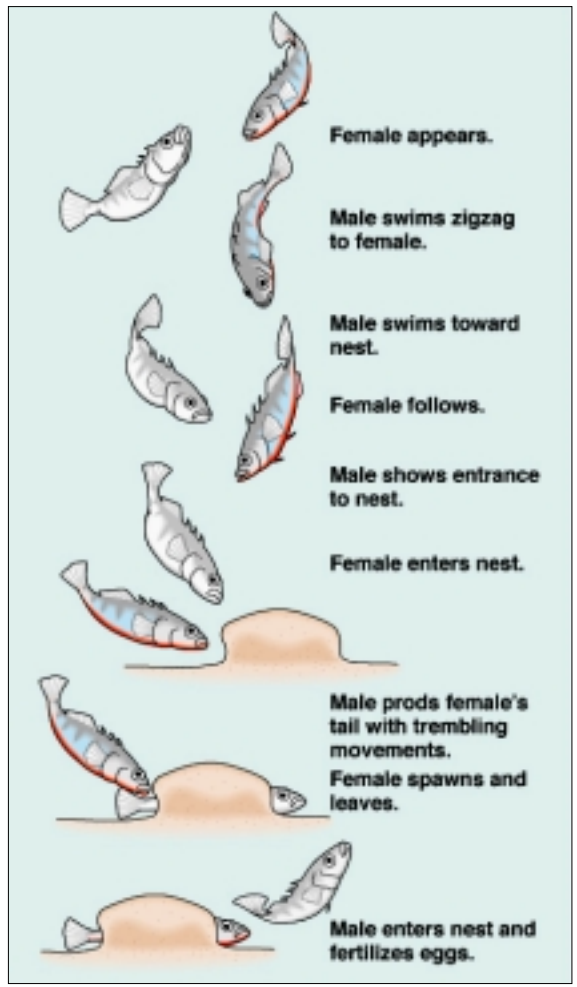
Concerned w/ 4 areas of inquiry: causation, development, evolution and function

Vitriolic debate occurred between ethologist and behaviorists during middle part of 20th century. What was nature of debate?

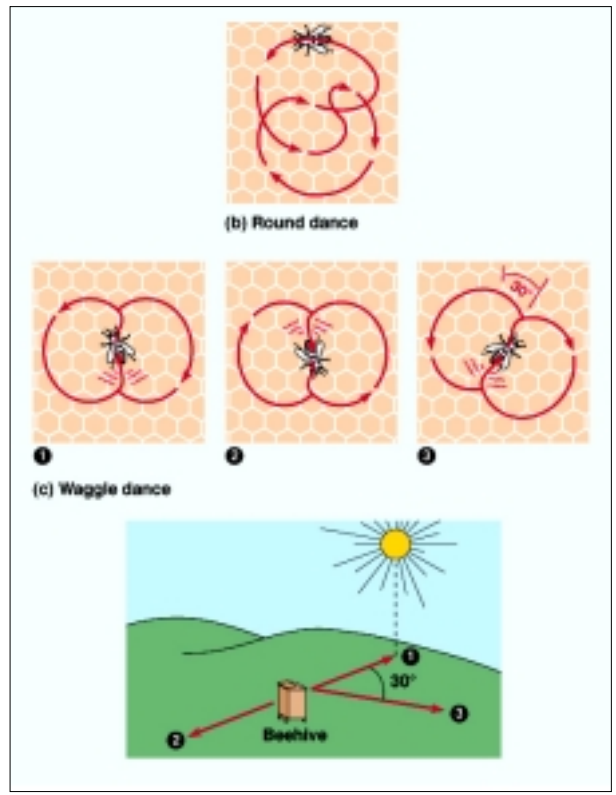
Founders of ethology

Konrad Lorenz

Niko Tinbergen



Karl von Frisch



Behavioral Ecology

studies how animals interact with environment, and how specific behaviors promote survival

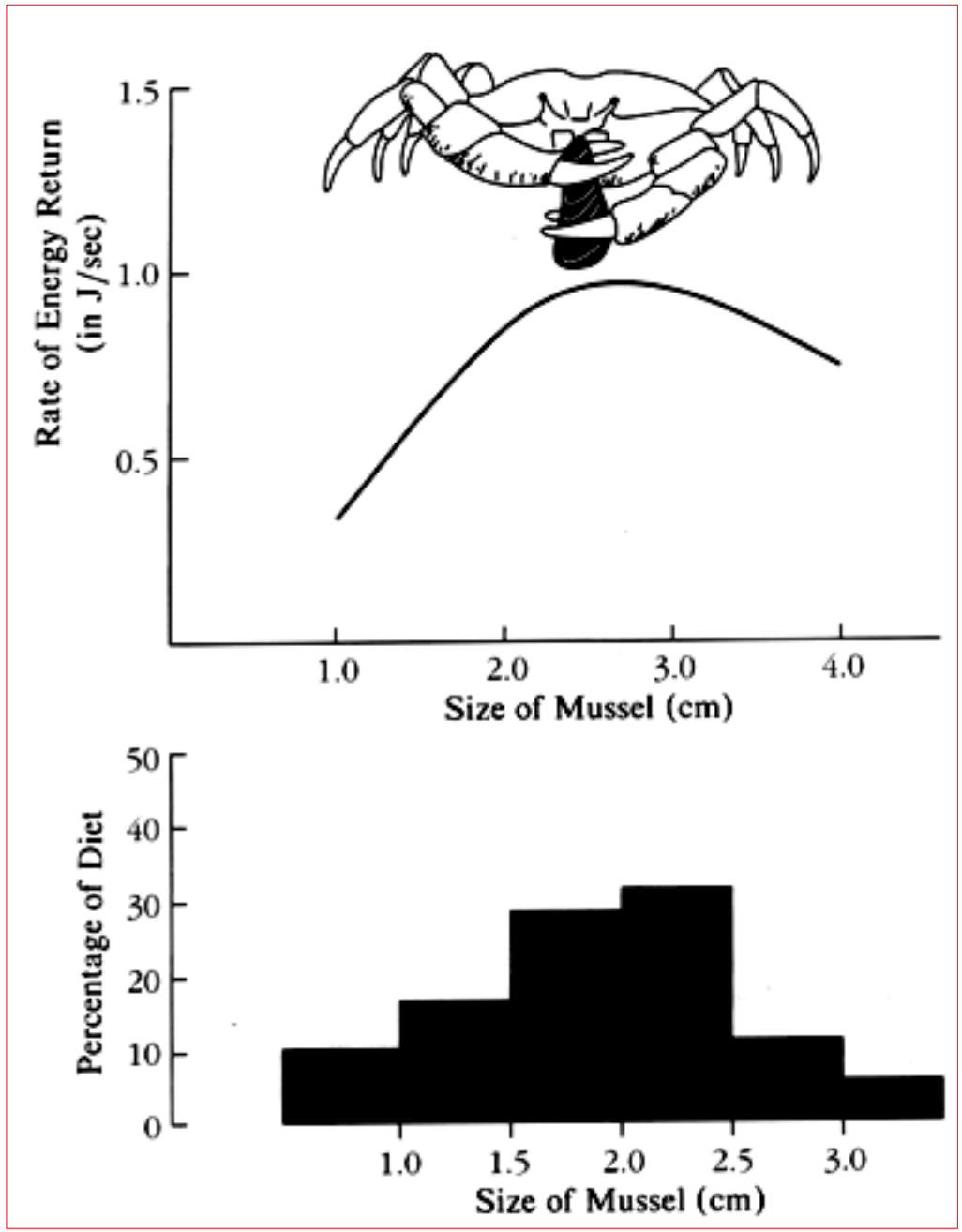
Asked questions from an ecological and evolutionary standpoint

Most practitioners trained in zoology and ecology, and tend to employ comparative approach

Develop hypotheses to be tested in the field

Much of the work tends to have strong basis in evolutionary theory
e.g., optimality models

Typical optimality approach utilized by behavioral ecologists



Energy return per muscle

Muscles eaten by crabs

Sociobiology

applies principles of evolutionary biology to the study of social behavior in animals

Developed almost single-handedly by E.O. Wilson in 1975

Makes detailed descriptions of social groups of animals in their natural environments, and then relates these observations to evolutionary theory

Prominent observations that serve as basis for many sociobiological studies: altruism, parent-offspring conflict, animals more likely to help relatives than nonrelatives (assumed most of these behaviors were under genetic control)

Wilson's work re-ignited the debate over social darwinism.
Why?