LECTURE GOALS:
☐ Consider different ways of classifying questions in Animal Behavior.
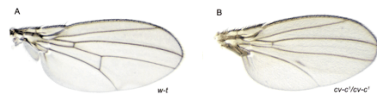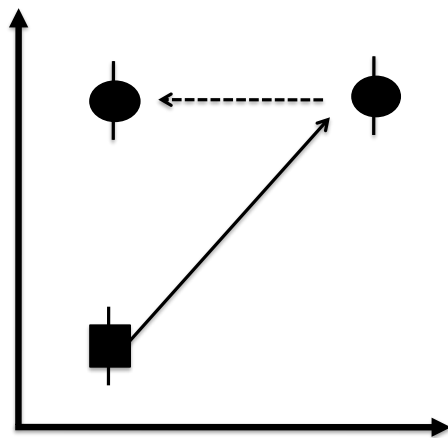

LECTURE OUTLINE:
1. Ethology cleaves to the "**4 questions**" delineated by Niko Tinbergen including:
    a. Causation ~ mechanism
    b. Ontogeny ~ development
    c. Adaptive Value ~ function
    d. Phylogeny ~ evolution
2. These **4 questions** can be described in dichotomous distinctions:
    a. proximate vs. ultimate
    b. contemporary (snapshot) vs. chronicle (story)
3. Tinbergen's 4 Questions resemble Aristotle's theoretical framework for a general analytical scheme known as "the 4 causes".
4. Dewsburry presents an alternate classification scheme that avoid the problems of the proximate/ultimate distinction.
    a. **Genesis**: What is the influence of past events as a dynamic interpretation of history on 3 timescales.
        i. Evolution: relates past natural selection & drift etc.
        ii. Culture: covers cross generational, non-genetic transmission.
        iii. Development: begins with conception and includes genetic factors as well as environmental factors. - dynamic.
    b. **Control**: Short term regulation of behavior.
        i. external (outside the skin: including biotic and abiotic environment)
        ii. internal (physiology & endocrinology) factors.
    c. **Consequences**: The full range of effects that are contingent on behavior
        i. consequences for the organism: behaviors change the organism itself
        ii. consequences for the environment : The extended phenotype, both abiotic and social
        iii. consequences for differential reproduction : inclusive fitness
5. Example of behaviors that are difficult to put into Tinberbgen's 4 Questions.
    a. Genetic Assimilation – the role of plasticity past and present.
    b. Epigenetic inheritance – Michael Meaney's work with maternal care in rats.
        i. This is a maternal influence at a critical period
        ii. The mechanism involves methylation of the Cortisol (Glucocorticoid) Receptor during a critical period that alters the function of the HPA.
    c. Genomic basis for complex behaviors.
        i. Eusociality.

Tinbergen's 4 Questions about Animal behavior

Genesis

_____

_____

_____

Control

_____

_____

Consequences

_____

_____

_____
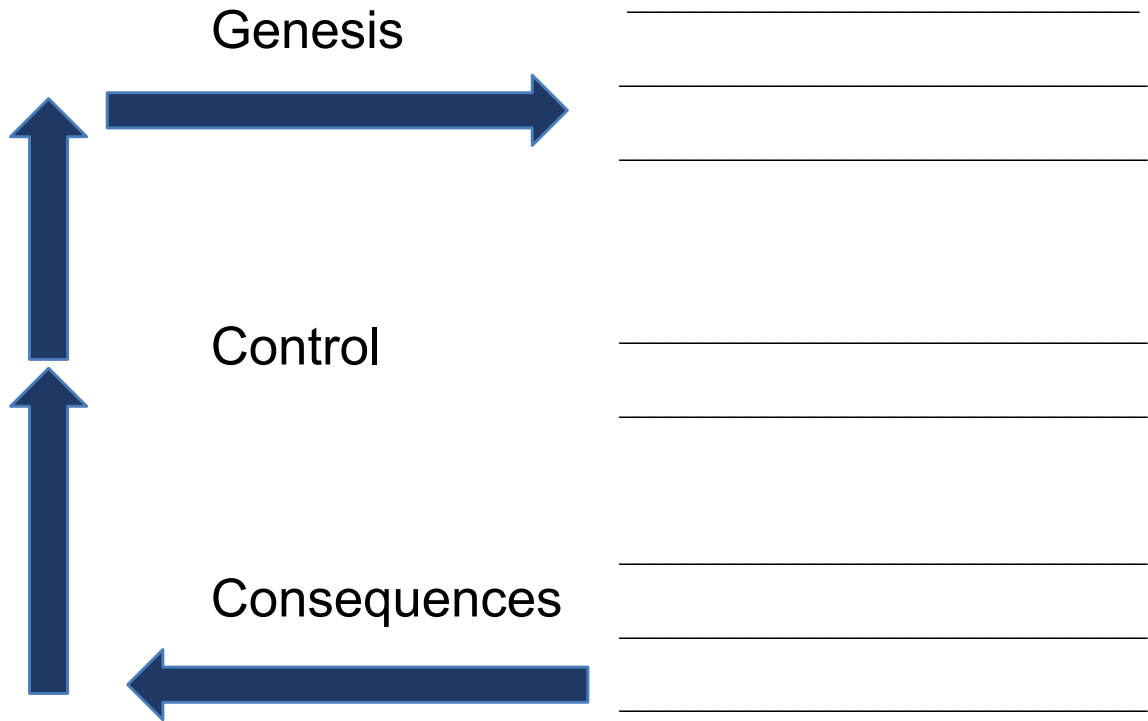
Genetic Assimilation

VOCABULARY:
(Practice writing interesting, informative sentences that include, and capture the meaning of, 4-5 words from this list. To simply memorize a definition, is not sufficient.)

Animal Behavior	Genetic Assimilation
Tinbergen's 4 questions	Plasticity
Proximate	Epigenetic
Ultimate	HPA
	Dewsburry's scheme

PRACTICE EXAM QUESTIONS:
1. Devise your own scheme for holistic classification of questions that can/should be asked about any behavior in order to fully understand that behavior.

READING FOR TODAY:
Readings will include information that goes beyond, but supports, the lecture material. (Additional suggestions (gray) are provided for students wishing to pursue the topic farther.)

Dewsburry D.A. (1992) On the problems studied in ethology comparative psychology and animal behavior. Ethology 89-107. (read only 98-102)
R&W Chapter 1 (for more see Tinbergen, N. (1963) On aims and methods of ethology. *Zeitschrift für Tierpsychologie*, 20, 410-433. Reprinted in *Animal Biology*, Vol. 55, No. 4, pp. 297-321 (2005))

READING FOR NEXT LECTURE: B Chapter 3
Byers chapter 3
R&W Chapter 3
Roth & Dicke (2013) Evolution of Nervous Systems and Brains
Review intro bio text book or other resource and complete the problem set worksheet. (OK to collaborate but each student must turn in a copy)