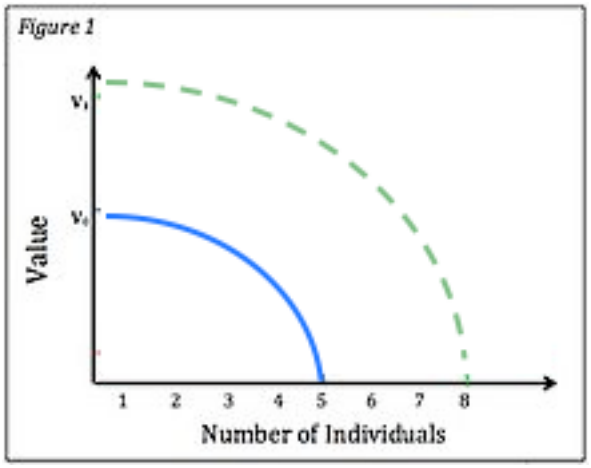
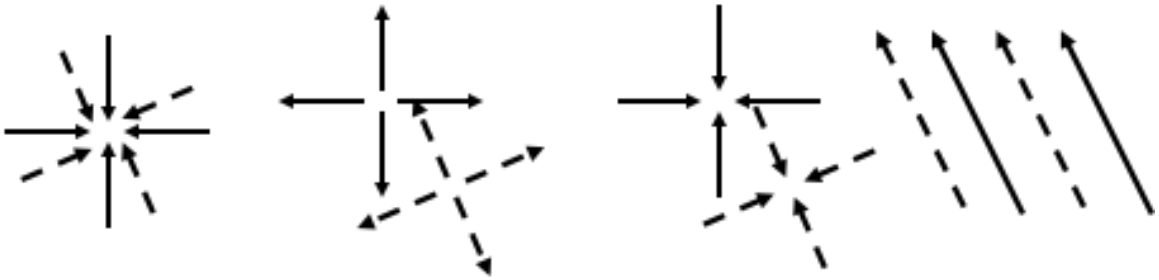
LECTURE OUTLINE:

1. Animals are rarely distributed at random in the environment. Though it is rarely met, "Ideal Free Distribution" provides a "model" to explain distribution of individuals based on resources.
2. Remote sensing allows us to track animals with minimal observer interface, less disruption, individual identification, continuous and reliable data, large amounts of data, can access animals in difficult locations.
3. On the down side, with remote tracking there is alack of detail, little information on social interaction and behavior other than movement is difficult to capture. It gives large amounts of data and is expensive.
4. Animal movement is
5. classified as: Dispersal, Homing, Hunting, Navigation, Migration
6. Many strategies are available to animals to achieve movement
    a. Hitching
    b. Taxis
    c. Path integration (Consider flight)
    d. Piloting
    e. Navigation
    f. Charting
7. Strategies are not mutually exclusive, many animals use multiple strategies at different times in their lives or under different environmental conditions (see turtle example for next lecture).
8. The best experimental design predicts the "error" that an animal will make given the manipulation of specific stimuli.
9. Migration is the regular, repeated (usually seasonal) endogenously controlled movement (usually related to breeding ground) of animals (as a population).
    a. Biogeographers use this word to mean range expansion.
    b. Population geneticists use this word in relation to gene flow.
10. The "heroic" migrations most often rely on true navigation which requires a compass.
11. Many non-migratory birds still show zugunruhe and this appears to be an internal rhythm.
12. The internal rhythm(s) are entrained by seasonal cues (photoperiod).(Even at the Equator, there are seasonal cues (analemma).)
13. There are two main models for photoperiodic time measurement:
    a. internal coincidence detection
    b. threshold model of detection
14. Melatonin and the circadian clock likely play roles in transducing photoperiod.
15. The earth's magnetic field also provides information for a magnetoreception compass.
16. Magnetite hypothesis magnetoreception
17. Chemical hypothesis for magnetoreception.
18. Both timing and direction of migration can be heritable….
    a. Or condition dependent
    b. Or learned
19. A circadian clock is part of a time compensated compass.
20. Turtles as an example of using multiple strategies……

HELPFUL FIGURES & NOTES:
(All PowerPoint files will be available on the courses server after lecture. The subset of figures and notes here are meant to assist your note taking or studying.)





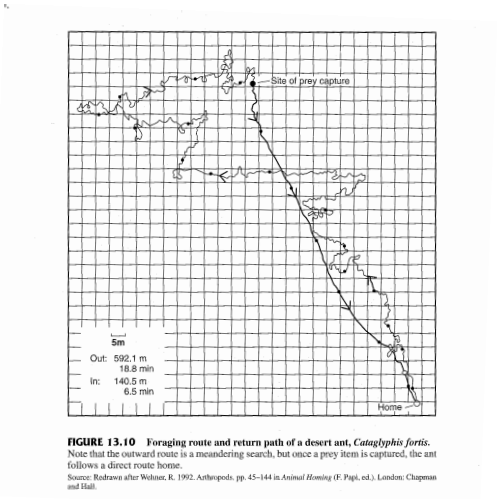
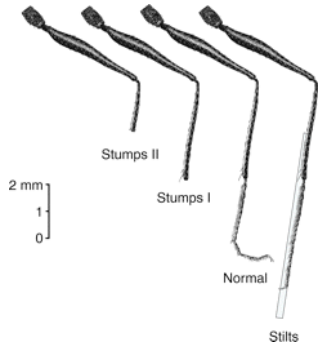
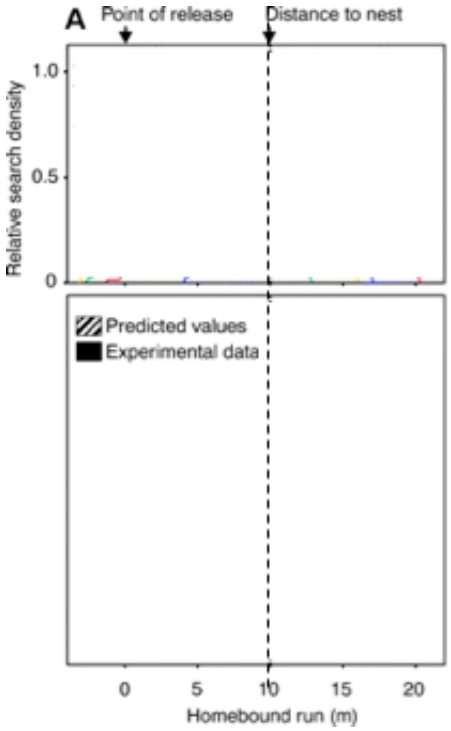


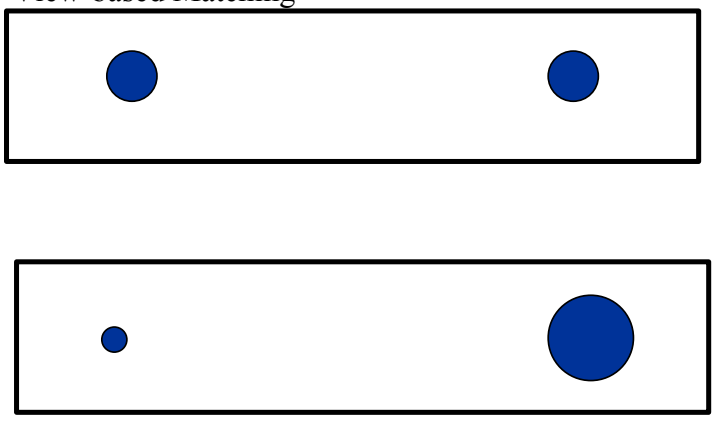
FIGURE 13.10 Foraging route and return path of a desert ant, *Cataglyphis fortis*. Note that the outward route is a meandering search, but once a prey item is captured, the ant follows a direct route home.
Source: Redrawn after Wehner, R. 1992. Arthropods. pp. 45–144 in *Animal Homing* (P. Papi, ed.). London: Chapman and Hall.



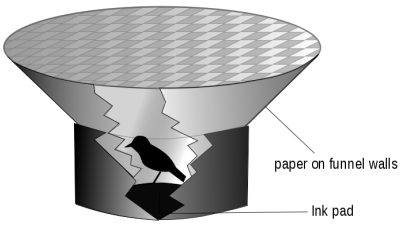


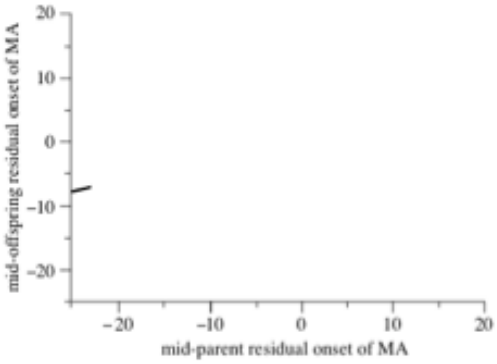
Path Integration

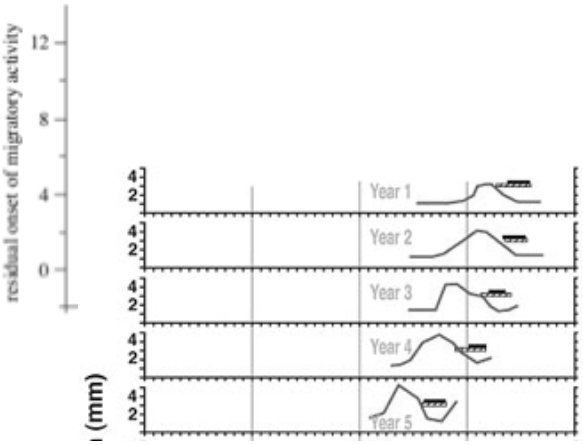
View-based Matching



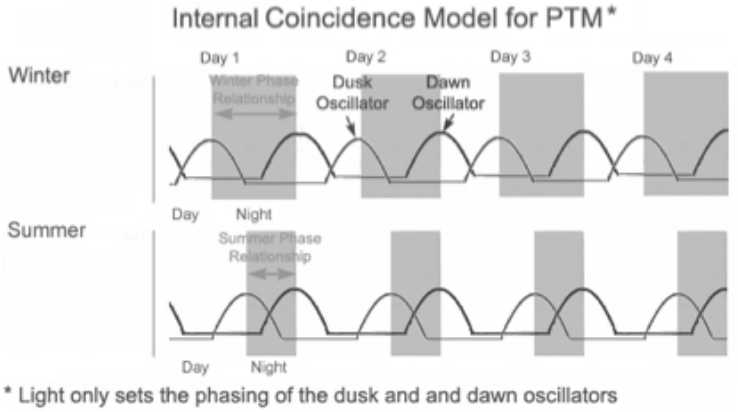
Zugunruhe



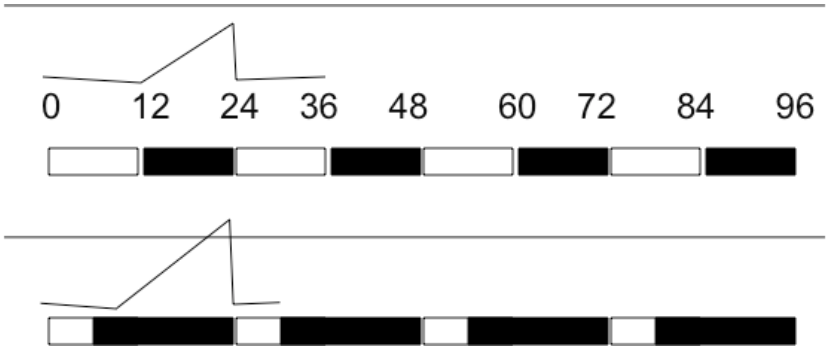




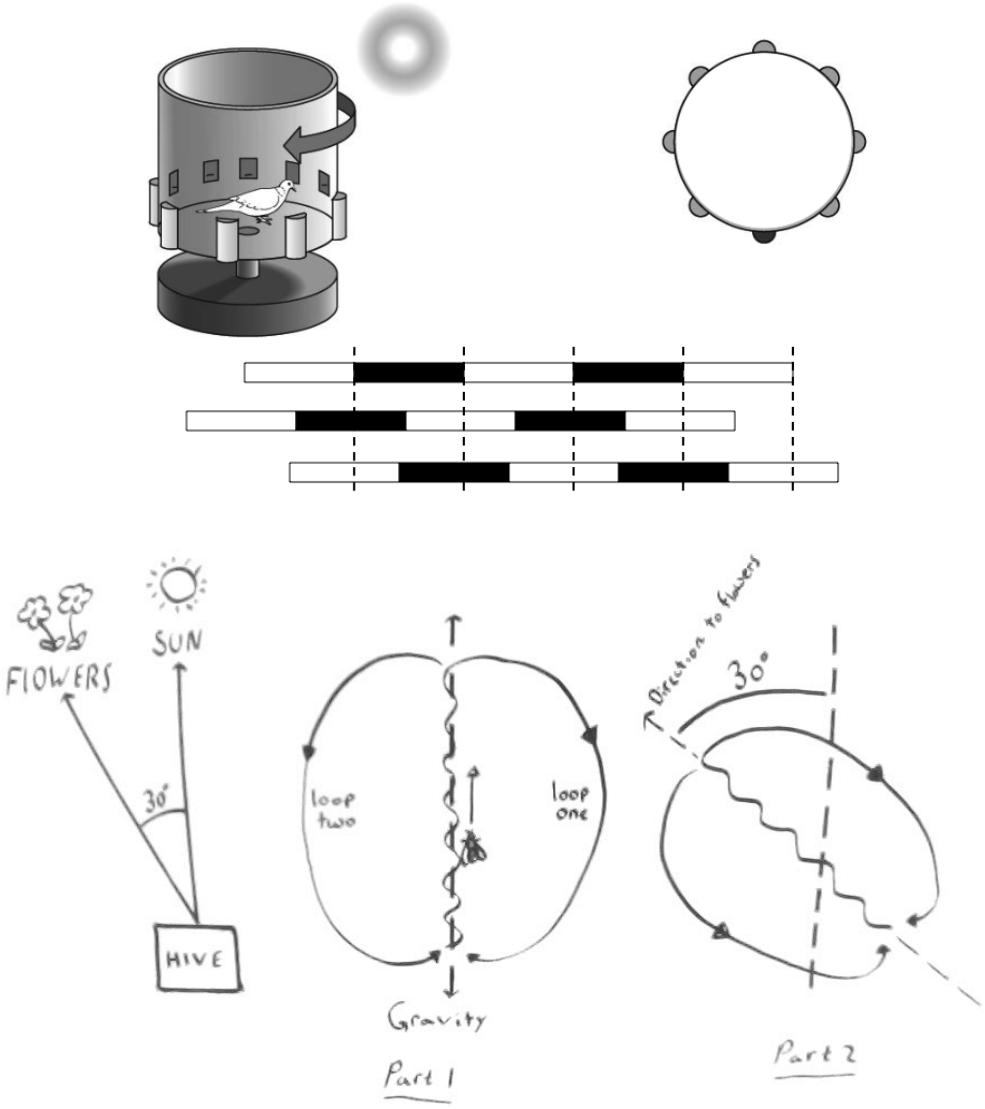
Internal Coincidence Detection

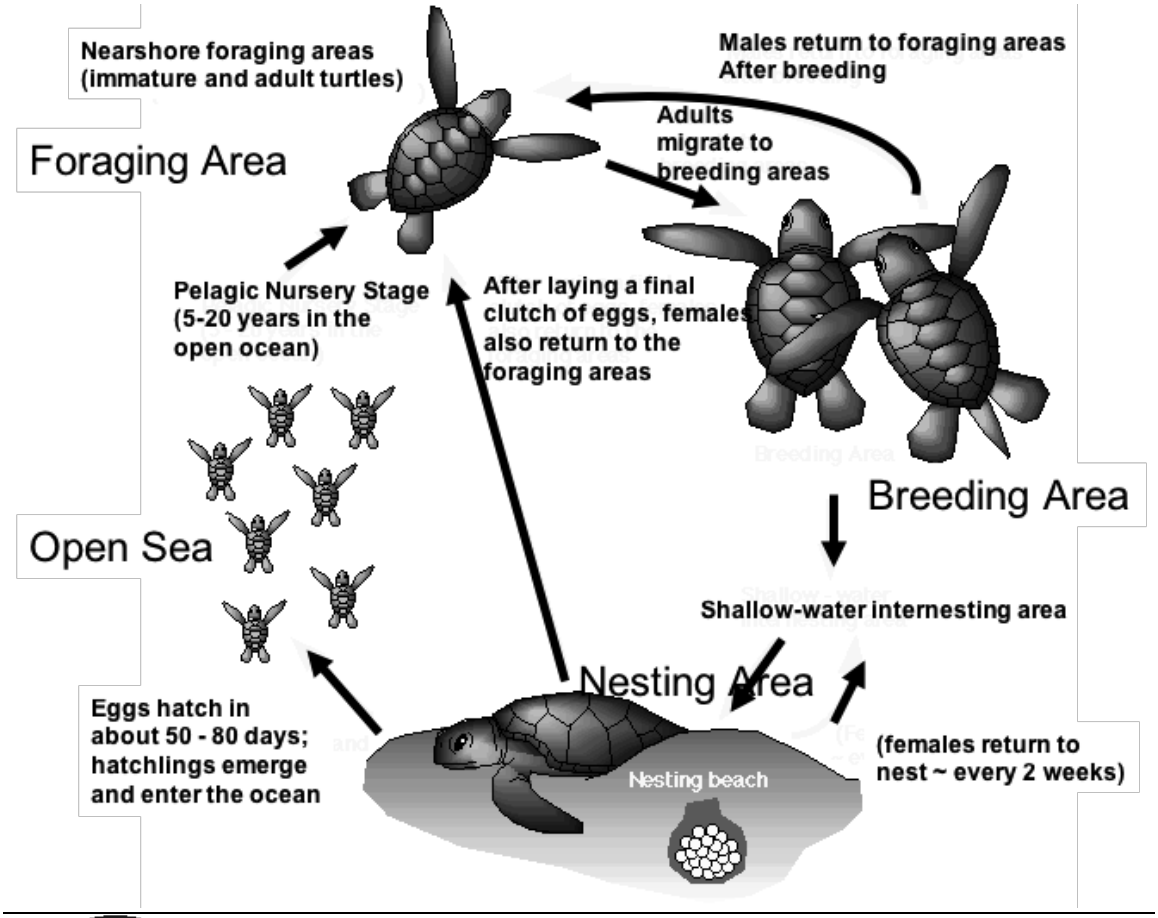


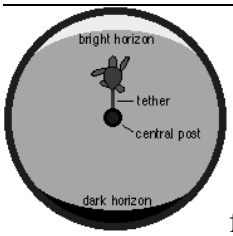
Threshold model



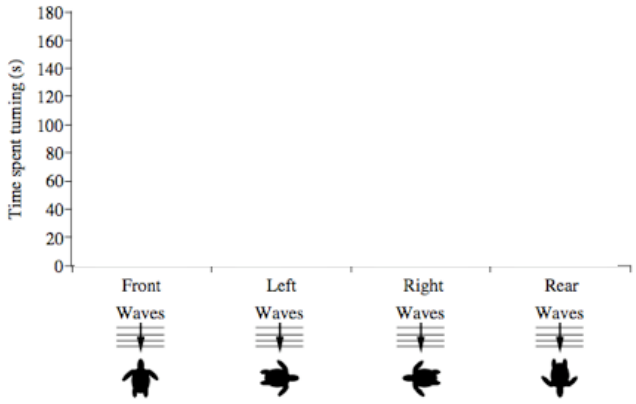
Time compensated sun compass



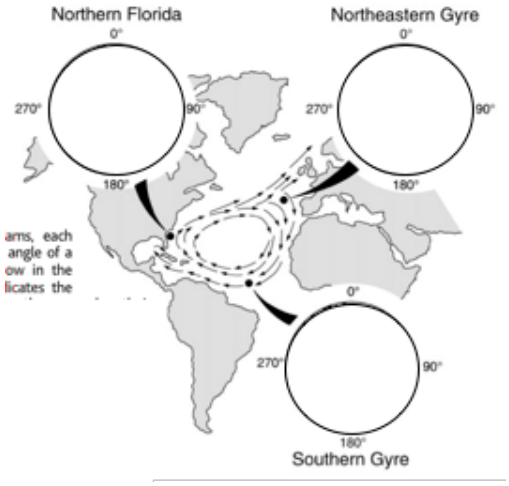




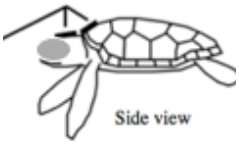
_____finding the water

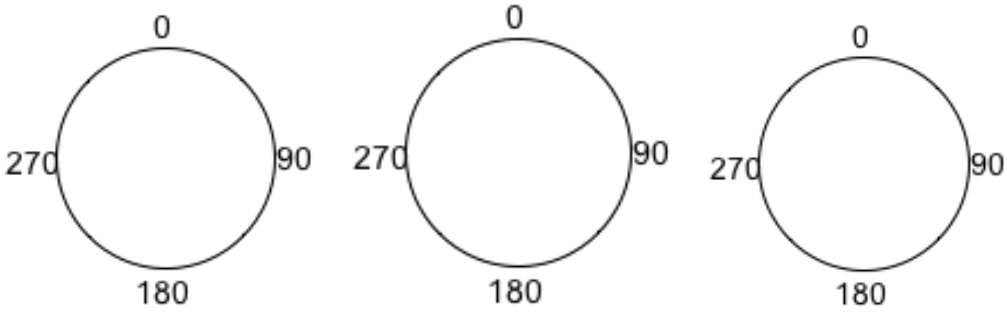


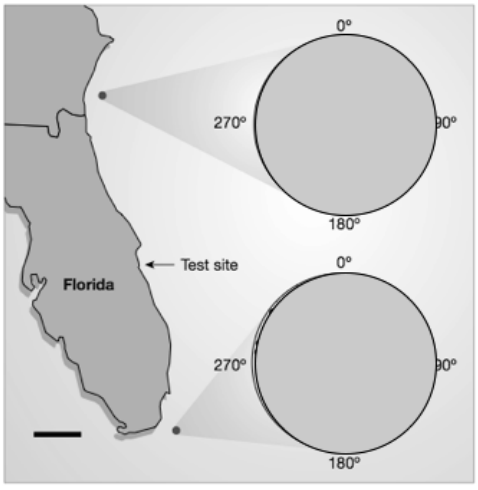
Finding the open sea



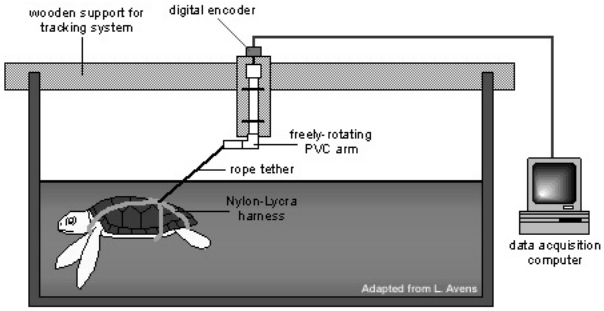
Staying in the gyre





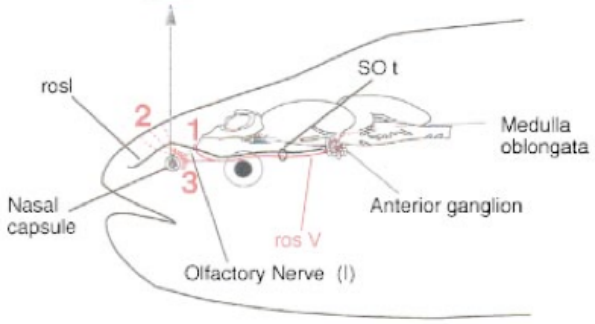


finding the natal beach

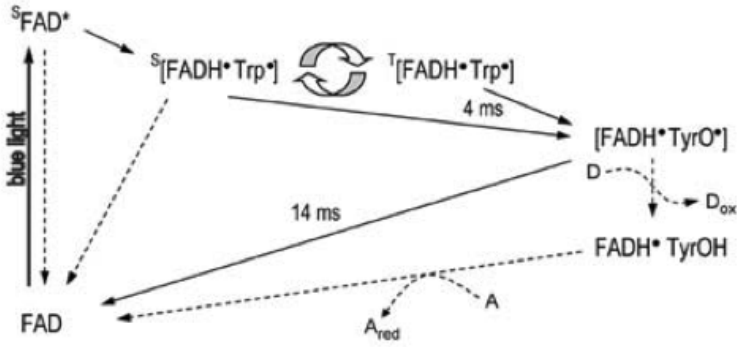


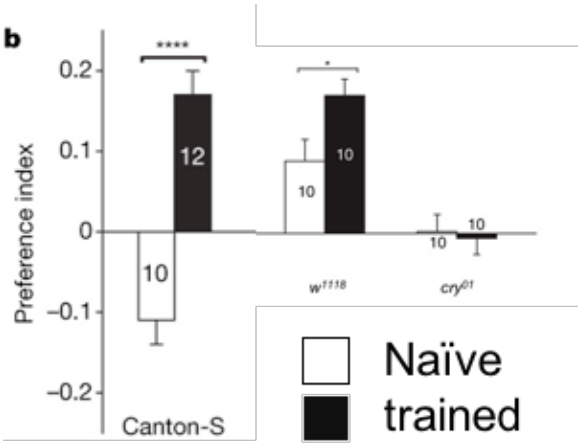
Magnetoreception

Magnetite Hypothesis



Chemical Hypothesis





Drosophila Experiment

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.)

Ideal Free Distribution
Dispersal
Homing
Hunting
Migration
Navigation Hitching
Taxis
Path integration
Piloting
Navigation
Charting
View-based matching
Optic Flow
Entrain
Endogenous
Migration
Circadian
Circaanual
Zugunruhe
Heritable
Analemma
Time Compensated Sun Compass
Magnetoreception
Magnetite Hypothesis
Chemical Hypothesis

PRACTICE EXAM QUESTIONS:

1. Consider the many ways that animals might violate the assumptions necessary to use Mark/Recpature methods to estimate the population size.
2. Design an experiment to test whether an animal is using taxis or hitching to reach a destination.
3. Design an experiment to test whether an animal is using piloting or path integration to reach a destination.
4. Ask 4 questions about navigation.
5. Design an experiment to determine whether the magnetite hypothesis or the chemical hypothesis best explain an organism's magnetoreception abilities.
6. Compare and contrast the internal coincidence detection model, and the threshold model to explain mechanisms of the circannual rhythm.

READING FOR TODAY:

R&W Chapter 5
B chapter 7
Pinter-Wollman & Mabry 2010 .pdf
Lohman & Lohman 2010 .pdf
Nordman et al 2017 .pdf
Libhoff 2017 .pdf (How do you determine that this is pseudo science?)

READING FOR THURSDAY Sexual Development and Sexual Selection

R&W Chapter 6 & 7
Crews 1994 .pdf (review from intro)
Bachtrog 2014 .pdf
Anderson & Simmons 2006 .pdf
Eens & Pinxten 2000 .pdf
Clutton Brock 2007.pdf