Today’s Agenda

- 10 pt Quiz
- Feedback on Presentations
- Feedback on Fern Life cycle lab report
- Organism of the day
- Behavioral Ecology

Presentation Feedback

- For Power Point
  - Remember to label images
  - Make sure text is large enough to be read
  - Make sure backgrounds don't obscure text
  - Organization of slides

- For Presenters
  - Speak loudly and clearly enough to be heard in the back of the room
  - If you use notes, try to maintain at least some eye contact
  - Avoid reading the slides
  - Practice

Fern Life Cycle Lab Report

- Remember important parts of “Alternation of Generations”
  - How do the gametes form?
  - How does this differ from our life cycle?
  - What are the constraints for reproduction?
  - What is required for fertilization?
  - What adaptations does the fern life cycle have for terrestrial existence?
Organism of the day

- Cuckoo Catfish (Synodontis multipunctatus)
- Lake Tanganyika
- Brood Parasite upon mouth brooding cichlids
- http://www.wimp.com/killercatfish/

Scenario: Suppose a group of aliens abducted the organisms below. The Aliens made you the commander and said they might let you go any day, but if you are not let go, one of the organisms must be destroyed each day. Your assignment is to put a 1 by the organism to be killed first, a 2 by the organism to be killed second and so on. In the spaces provided indicate the order that you would choose for the organisms to die. (Assume that the organisms will not be used for your food and will not help or harm you.)

1. Fish
2. Dog
3. Brown algae
4. Crab
5. Other person
6. Paramecium
7. Grass
8. E. coli
9. Turtle
Scenario 2: Suppose you are in your home and a large, strong, scary-looking man, with a knife came in. The man grabbed an item (any of the items listed below) and started to run out. Rank the following in order of how much you would risk your life to save the item (a 1 for what you would risk your life the most for, a 2 for second most, etc.).

1. Your own baby.
2. Your computer with your only version of a 50 page term paper that is due the next day worth 75% or your grade in a 5 credit class in your major and a teacher who would not believe your computer was stolen.
3. Your niece.
4. Your life savings (thousands of dollars).
5. Your dog.
6. A random child you have never seen before.
7. TV
8. Your computer with your high scores saved on a video game.

Behavioral Ecology

- Behavioral Ecology utilizes an evolutionary approach.
- Animal Behavior: complex set of responses to various stimuli.
- Questions:
  - Can broad evolutionary hypotheses explain behavior?
  - Does evolution through natural selection apply to behavior?
    - Are behaviors genetically determined &/or passed down to offspring? or
    - Are behaviors determined by the environment?

Behavioral Ecology

- Animal behavior should be guided by evolution through natural selection
- Evolution through natural selection requires:
  - Variation
  - Heritability
  - Selection
Behavior and Fitness

- Behaviors that maximize fitness should be favored.
  - **Fitness**: ability to both survive & reproduce.
  - Fitness has both **costs & benefits**.
    - Do positive results of behavior outweigh negative results?

Inclusive Fitness

- **Ultimate Goal**
  - How does this related to behavior?
    - Animals should use cost benefit analyses to determine behavior
  - Cost/Benefit Analysis:
    - Do behavior where costs are low and benefits are high
    - Cease behavior when costs are high and benefits are low

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- Fish  |
- Dog  |
- Brown algae
- Crab  |
- Other person
- Paramecium
- Grass  |
- E. coli  |
- Turtle
In what rank order would you let things die (last to first)?

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___ TV
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What would you risk your life most to save?
Space Use

- **Home Range**: area where animal can be found 95% of the time.
- **Core Area**: heaviest use area within home range, contains nest, feeding area, or water source.
- **Territory**: area in which an individual defends against intrusion from conspecifics. Territories do NOT overlap.

Dominance Hierarchies:

- **Dominant animals control behavior of subordinate animals**
- **Dominance Hierarchies**: common result when socially living organisms engage in competition.
- **Dominant Animals**: animals that control the behavior of conspecifics (called subordinates).
  - Predictions can be made about outcome of future competitive interactions.

*Melanochromis johanni* African Cichlid

- **Male**: Usually Dark Blue
- **Female**: Typically Golden Yellow

- **Habitat**: Lake Malawi → Fresh Water Lake in Africa
- **Reproductive Method**: Mouth Brooder → Females takes Eggs & Sperm in Mouth
  - Female Chooses Males
  - Egg Spot = Sneaky Copulation
Behavior Monitoring

**Ethogram:**
- catalogue of discrete, conspecific behavior patterns
- form behavioral repertoire of a species

Many ways to measure behavior:
- **Latency:** time from specific event to onset of behavioral occurrence
- **Frequency:** # of occurrences of behavior pattern per unit time
- **Duration:** time span over which behavioral occurrence lasts
- **Intensity:** degree to which behavior pattern is performed

Behavior Monitoring

**Ethogram of Agonistic Cichlid Behavior**
(Table 11.1 on Page 180)

**Aggressive Behaviors:**
- Pursuit
- Lateral Threat Displays
- Bumping, Biting &/or Nipping
- Fins Up
- Brighter Color Change

**Submitive Behaviors:**
- Retreat
- Hiding
- Fins Down
- Duller Color Change

**Neutral Behaviors:**
- Indifference
- Ambivalence

Procedures

- Explain how evolution through natural selection relates to fish behavior
- Predict results of your experiment
- Experimental Variables:
  - Sex
  - Size
  - Intruder vs. Resident
Today’s Lab

- Work in Groups of 4 or 5
- Read Procedure
  - Starts on Page 179
- Examine Experimental Setups on each Lab Bench
- Determine which Variable(s) to Test
  - What Variables need to be Standardized?
- Develop Prediction & Experimental Protocol:
  - Use Experimental Question: Can a broad evolutionary hypothesis explain dominance behavior in Johanni?
    - See “Key Principles” on Page 159
  - Verify Prediction & Protocol with Me before starting experiment

Handling Fish

- Get a Fish
  - Use Large Net to Slowly & Gently Catch Fish
    - Do NOT Trap Fish with Nets Edge
- 1 Catcher & 1 Measurer
  - Catcher Supports Fish under Net with 1 Hand
  - Measurer Quickly Measures Fish within 4-5 mm
  - Cator Gently Places Fish in Experimental Tank
- Observe Behavior of Both Fish in 2 Minutes Trials
  - Run 4 or 5 Trials
  - Turn Off Lights & Use Lamps
  - Prevent Fish Injury!
    - IF Fish Start to Act Aggressively, Immediately Remove Introduced Fish
    - Contrary to Nature, Fish do NOT have the Ability to Leave

Finishing Up

- Put Intruder Fish Back into Original Aquarium
  - Do NOT confuse Resident Fish and Intruder Fish
- Compile Data into Front Computer
  - Data will be compiled with 2011 data
  - Emailed data will Include:
    - Graphs
    - Statistics (with P-Values)
- Before You Leave:
  - Make Sure Fish are in Their Original Aquaria
  - Clean Your Lab Bench
  - Turn Off Lamps