

**Concepts & Applications Assignment - EVOLUTIONARY BIOLOGY FALL 2015  
(20 points total)(due December 7<sup>th</sup> 2015)**

The goal of this assignment is briefly review an area in Evolutionary Biology to identify practical applications or the front edge of the field. There are two possible tracks to this assignment. Pick one. The first, **Track I** is to search the primary literature to find papers relevant to a topic we are covering in this last half of the class and briefly review it. The second, **Track II** is to review a practical application of evolutionary biology to real-world issues.

**TRACK I:** Chose **ONE** of the topics below. Write a review of a concept in this area and what the latest views and research are on it. You can start with a recent review paper in the area, but be sure to highlight empirical papers by conducting a literature search to identify original research papers in the area. Recent papers are always interesting, but there are many good older ones as well so there is no restriction on the time frame for these publications. Chose papers that illustrate concepts we discussed in class.

**Areas:**

- Speciation
- Sexual Selection
- Evolution of Sex
- Evolution of Senescence
- Origin of Novel Traits
- Macroevolutionary Patterns and Processes
- Causes and Consequences of Extinction
- Kin Selection and the Evolution of Eusociality
- Molecular Evolution
- Human Evolution

**Cover the following points and questions:**

- What is the focal area of research you are reviewing?
- What are the major conceptual frameworks in this area? What unresolved issues and specific Hypothesis(es) are current researchers trying to test? In other words, "What is the leading edge of this area?"
- How does current research in this area relate to the concepts we discussed in class?
- How will study in this area advance our understanding of evolutionary processes or patterns?

**TRACK II:** Identify an area where evolutionary thinking is relevant to human or environmental health and well-being. There are many possibilities ranging from understanding the dynamics of infectious pathogens to multi-drug resistance in bacteria. Cancer Biology and research on human genetic disorders have benefited from an evolutionary perspective. Evolutionary principles are useful in trying to understand the consequences of environmental change, which may have a large impact on the health and function of natural communities and the species in them. There are also many applications in agriculture, harvesting and pharmaceutical development. The list is long and not limited to the areas mentioned above!

Conduct a literature search to identify original papers that illustrate the practical application of the concepts we discussed in class. The papers you chose should be data papers not reviews, and they should be published within the last 10 years. There is a nice synthesis of the basic evolutionary processes we have covered in a review paper by Andrew Hendry and colleagues (cited below). This paper, "Evolutionary Principles and their Practical Application" is a good

jumping of point for finding papers that demonstrate the relevance of the concepts in evolutionary biology to real world challenges.

**Cover the following points and questions:**

- Summarize the area of practical concern where understanding evolutionary processes and principles is/can have a large impact.
- Explain the relevance of the papers you chose to this area.
- How do these studies help us resolve a pressing issue in human or environmental health?
- What future research do you think should be done to further advance our understanding in this area?

**Guidelines for both Tracks:**

**Length:** 3-4 pages

**Title:** In the title to your paper indicate which Track you are using (i.e., *Track II: Something Extremely Important in the Application of Evolutionary Principles to Real-world Issues*)

**References:** Include at least **3** citations to original research papers and a Literature Cited Section at the end with references in the format below.

**Submission:** Submit your paper electronically via email.

**Deadline:** Due by the end of the day **Monday DEC 7<sup>th</sup>**

Include appropriate in text citations to the paper(s) (e.g., Hendry et al. 2011) and a reference at the end in this format:

Hendry, A. P., M. T. Kinnison, M. Heino, T. Day, T. B. Smith, G. Fitt, C. T. Bergstrom, J. Okeshott, P. S. Jorgensen, M. P. Zalucki, G. Gilchrist, S. Southerton, A. Sih, S. Strauss, R. F. Denison, S. P. Carroll. 2011. Evolutionary principles and their practical application. *Evolutionary Applications* 4:159-183.