

FIRST MIDTERM EXAM
(6 pages, 100 points)

General instructions: Answer each question as directed. Please make answers clear and concise. Full sentences are not required, but make sure that your answers are complete enough to be understandable. Point values for questions are indicated.

In a study of mate choice in voles, the number of parasites present in 0.5 ml of blood was measured for 20 males. Urine samples were then collected from each male. Mate choice trials were run by placing urine samples from two different males at opposite ends of a rectangular arena and then introducing a female vole to the arena and recording the amount of time that she spent sniffing each urine sample. The data obtained revealed no relationship between the amount of time that females spent sniffing samples from males with different levels of parasitism. Based on these data, the investigators concluded that, in voles, parasites are not used by females to choose mates.

1. (10 pts) Having been trained to be skeptical in IB 146, you do not agree with the investigators' conclusion. Briefly outline an alternative explanation for these findings that does not negate the hypothesis that parasite load is an important aspect of female choice in this species.

Name _____

2. (15 pts) As part of your critique of this study, you note that it uses a correlational approach to explore the relationship between parasite load and female mating preferences. Briefly outline an experimental approach to this question that could be used to address this question. Why is your experimental study a better test of the relationship between parasite load and female choice than the original study described above?

3. (10 pts) In a study of crested auklets (shown below), a behavioral ecologist found positive correlations between the size of the crest on a male, the number of females mated with, and the number of chicks sired by a male. Based on these data, the researcher concluded that “the tuft of feathers on the male’s head is an adaptation that evolved to attract females.” Do you agree or disagree with this conclusion? Explain your answer.

Name _____

4. (10 pts) In the lecture on game theory, you learned that constructing a payoff matrix is the critical step in developing any game theory model. What is a payoff matrix? What important information does a payoff matrix provide that helps us to understand why individuals exhibit particular behavioral responses during social interactions with conspecifics?

5. (10 pts) As part of a study of mate choice in guppies, you are interested in documenting the number of female glide displays (indicative of sexual receptivity) that are elicited by males with different amounts of orange pigmentation. Assuming that this study takes place in the classic 3-compartment aquarium set up that we discussed in class, which technique for collecting observational data is most appropriate for examining the relationship between male coloration and female display rate? Explain your answer.

Name _____

6. (15 pts) As a professor of behavioral ecology, you are approached by a student who is studying sexual selection in Harris sparrows. Specifically, this student hypothesizes that dark coloration on the head and chest is indicative of male quality, or “good genes.” This student has successfully demonstrated that females prefer darker males, that darker males survive longer, and that darker males sire more offspring. Based on these data, the student would like to finish their thesis and publish their study. You respond by telling the student that they aren’t done yet – the student needs to conduct one more study that examines the survival of chicks sired by dark versus light male sparrows. Why is this last study necessary to test the good genes hypothesis? If dark color in male Harris sparrows is an example of the good genes model of sexual selection, what should the relationship between male darkness and chick survival look like?

Name _____

7. (10 pts) If the student finds that the relationship predicted above for male darkness and chick survival is correct, can this student definitively conclude that plumage coloration in male Harris sparrows is the result of a good genes model of sexual selection? Why or why not?

8. (10 pts) As you read the student's thesis more closely, you notice that the student measured male reproductive success by counting the number of chicks that survived to fledging (independence from parents). Was this the best measure of male fitness to use for this research problem? Why or why not? If you answer yes, briefly explain why this is the best measure. If you answer no, briefly indicate why this measure may be problematic.

Name _____

9. (10 pts) The use of molecular genetic techniques to accurately determine the parentage and reproductive success is often said to have revolutionized the study of animal mating systems. List two discoveries about animal mating systems that have resulted from our ability to obtain accurate data on parentage and reproductive success. Briefly explain each discovery and how it has affected our understanding of patterns of reproductive competition in animals.

#1.

#2.