

**LITERATURE REVIEW — POSSIBLE TOPICS TO CHOOSE AMONG (or you may come up with your own topic):**

- 1) Sperm competition and cryptic female choice. How do females choose males with post-copulatory sexual selection. What strategies do males use to win during sperm competition. What adaptations do females have to make it difficult for males to copulate with her, or to inseminate her. Do different taxa show different patterns of sperm competition and male-female conflict?
- 2) Cooperative breeding; cases where young forgo breeding in order to help raise offspring of relatives and non-relatives. What ecological conditions favor cooperative breeding? Do the helped gain reproductive benefits? How do the helpers benefit, do these benefits vary by system, and are there cases where there is no clear benefit to helping. Does cooperative breeding vary by taxa in interesting ways?
- 3) Eusocial systems; cases where there is an extraordinary division of labor (like honeybees or naked-mole rats) where only one (or few) individual in a group breeds--often only the queen. How have these systems evolved (historic level of analysis). Why does it make adaptive sense that animals will self-sacrifice for the benefit of a queen. Is there conflict in these systems between members of different casts, and how are these conflicts mediated or resolved? Slime molds are instructive! (note that this topic is best for someone with good quantitative skills)
- 4) Darwinian medicine; how does understanding evolutionary processes and adaptation provide insight into the body's response to injury, disease, and parasitism. Should evolutionary thinking lead to different medical treatments than we currently practice? For example, why is morning sickness (i.e., NVP) beneficial for the fetus, why is pain effective at promoting healing, why do we senesce and can medicine 'beat' our aging process?
- 5) Review cases of lek polygyny, especially focusing on differences between mammals and birds. What are differences in female defense polygyny (FDP) and resource defense polygyny (RDP), and why is FDP so rare in birds? Discuss differences in how leks form, reviewing female defense, hotshot males, and hotspot males.
- 6) Why do birds engage in extrapair copulations? Males clearly benefit by increased reproductive success, but why do females do this? What are the benefits to females: getting genes of higher quality mates, of mates that are similar/dissimilar to the female in genetic makeup? And what are the costs associated with engaging in EPCs. Does engaging in an EPC ever lead to a repercussions from the mate?
- 7) Review cases of heterospecific brood parasitism to explain how such a system evolved (historic level of analysis), and why some species have evolved to be generalist (e.g., cowbirds) and why others are specialist (e.g., cuckoo). Are host parents generally duped? Are there cases where parents have evolved mechanisms to detect parasitism? Why do some species fail to recognize parasites? Are hosts better at detecting parasitic eggs or chicks, and why should we expect a difference?

8) Winner-looser effects; where winning a fight at time  $N$  increases, and losing at time  $N$  decreases, the probability of winning future contests at time  $N+1$ ,  $N+2$  etc. Describe how past competitive success affects future investment in aggression. Review two hypotheses for how the winner-loser effect changes the outcome of future fights (self-assessment, signaling), and how the history of an individual's competitive success induces changes in hormonal state.

9) Review cases of cooperative courtship (e.g., manakins, turkeys). Why do subordinate males participate in these displays if they are unlikely to gain any matings? From a dominant male's perspective, is it always beneficial to let subordinates join in and participate in a cooperative courtship?

10) Review differences between the sexes in human mating behavior. Why are males more likely to seek short-term relationships? Why are males more likely than females to experience jealous feelings? What attributes in a mate do males and females look for, and why are there such differences in these preferences? Do these preferences vary with age, status, health?

11) Review cases where reciprocal altruism has been shown in non-human animals, and explain what ecological circumstances favor the evolution of this behavior. Most examples of reciprocal altruism are in humans-- review studies on this phenomenon. Why is it that this form of social interaction is so often found in humans, but appears to be rare in other species?

12) Review cases of cooperative efforts surrounding feeding, including hunting and food sharing (e.g., chimps, harris' hawks, vampire bats). What ecological factors favor the evolution of this behavior. Does cooperative hunting and food sharing really increase access to food? Are there other social benefits associated with this behavior?

13) Review the evolution of odd forms of mating systems, including cases of polyandry and polygynandry, including some focus on humans, and explain how ecological or social factors have given rise to these mating systems. How have these mating systems given rise to 'reversals' in other behaviors, or in the evolution of ornamental signals. Could also contrast monogamy to other mating system.

14) Review seed caching and food storage in birds. How do birds plan for future need, and how do they mentally map the location of stored food. What ecological circumstances select for this behavior-- is there a sexual difference? What other animals store food, can inferences be made about consciousness in animals based on their ability to plan for the future.

15) Review cases of parent-offspring conflict of interest, both pre-birth (e.g., preeclampsia), and post-birth (e.g., resource allocation to other offspring). Discuss cases of infanticide, what ecological conditions favor this behavior, and why do parents gain greater reproductive success by killing, or stacking the cards against, certain offspring.

16) Review cases of sibling rivalry in non-humans. Discuss how animals can divert parental resources away from siblings, and what ecological conditions favor this behavior. Some attention should be given to human interactions (e.g., first-born favoritism and first-born success).

17) Deceit & deception and punishment in non-humans and humans. Review cases of signals of deceit in non-humans. What benefits are associated with deceit, and how are these signals evolutionarily stable? Is the incidence of deceit affected by punishment? Is deceit more common in certain signaling contexts (e.g., mate choice, contest competition, when interests are aligned)? For studies of deceit & deception in humans focus on studies with an evolutionary perspective.

18) Offspring begging. Review how begging depends on need, perceived relatedness to siblings, # siblings, # reproductive events remaining for parents. What responses have parents evolved to ensure that these signals truly reflect need, and what ecological costs are there to begging unnecessarily.

19) Review cases where females have been shown to evolve ornaments used in sexual display. Discuss if females gain the same sexually selected benefits from advertising quality that males gain? Do males pay attention to female signals, or do females pay attention to these signals?

20) Review cases of using ornaments/armaments to signal status (dominance, fighting ability). Review ways to signal status, with weapons themselves, or indices of size, with special focus on the use of arbitrary badges of status (e.g., coloration), and what information is conveyed by these types of signals. How is honesty enforced in arbitrary signals of status?

21) Review how males use song to advertise dominance (and not mate-quality). Are certain types of songs or song features more likely to be used in male-male interactions? Discuss the various ways that males communicate aggressive intent.

22) Review the rare cases when female birds and mammals sing solo songs, and also discuss female participation in duetting. Discuss the adaptive benefits associated with females vocalizations, and what ecological factors favor this behavior.

23) Review cases of pursuit-deterrent signals, when potential prey communicates to a predator its ability to escape. What different information is conveyed with these signals? Why are predators selected to pay attention? Are these signals more commonly found in some taxa, and why?

24) Alarm signals. Review cases of alarm signaling among conspecifics. Are there other benefits associated with these signals besides kin selection, and is there ever cheating? What types of signals are typically used to sound alarm, and are there exceptions?

25) Risk-taking as a COMMUNICATION SIGNAL of quality used in mate-choice. Review non-human cases of advertisement by taking risks (e.g., singing in the face of danger) and human cases (e.g., young-male syndrome: smoking, sky-diving), and discuss why receivers are selected to pay attention to these signals.

26) Evolutionary stable strategies (ESS). Review the math in game theoretical models of how an opponent's (or competitor's) behavior affects frequency-dependent strategies or tactics. Discuss cases where mating strategies vary depending on frequency of what others are doing, and how individuals in competitive interactions can best 'guess' at what move to make next. (note that this topic is best for someone with good quantitative skills)

27) Animal personalities; are there consistent behavioral phenotypes that are consistently expressed in certain individuals, but not in others? Are these 'behavioral syndromes' a result of phenotypic plasticity, or do they have high heritability and thus pass from generation to generation? If it is the latter, why has selection acted to favor certain syndromes, are there constraints and pleiotropic effects linking behaviors together, and why don't all individuals in the population share the same suite of syndromes?

28) Review cases of eavesdropping in cases of dominance interactions, mate-choice, and other forms of communication. Discuss how eavesdroppers (non-intended receivers) can use signal information that was directed to another receiver to make decisions on future interactions.

29) Review how birds signal different aspects of quality or condition with coloration. Discuss how three main categories of plumage coloration (melanin, carotenoid, structural colors) have different production/maintenance costs, how these colors signal different information, and how honest signaling with different types of color can be favored in different signaling systems.

30) Review cases of individual recognition signals. Discuss how elaborate traits can signal identity (i.e., zebra stripes, Quelea), and how such signals can be used to discriminate kin from non-kin, or mate from non-mate. Discuss the chemical signals are generally used in mammals and insects, and the visual & vocal signals that are used in other taxa. Discuss ecological factors that favor these types of signals, and discuss the unique design features of these signals.

31) Sex allocation (Trivers-Willard hypothesis). Why do parents sometimes favor sons over daughters. How can males be evolutionary more valuable in polygynous species? In cases that the primary (at birth) sex ratio is skewed towards male, what are the mechanisms underlying this sexual favoritism, and are males or females influencing this 'decision'? How does female condition, or male attractiveness, affect sex allocation?

32) Testosterone and honest signaling. Review what is known about testosterone's negative effects on the immune system, as well as other physiological and behavior effects that can negatively impact fitness. How does testosterone affect signal expression? Does the 'handicap' of maintaining high levels of testosterone make those testosterone-dependent signals honest? Do we see testosterone dependent signals more often used as dominance signals? Do certain types of color signals (black vs red) have a greater likelihood of evolving a link to testosterone, and why?

33) Kin-structured neighborhoods. What happens when kin settle near one another? Often occurs among cooperative breeders.