

WHY SEX?
SEXUAL REPRODUCTION
& SELECTION

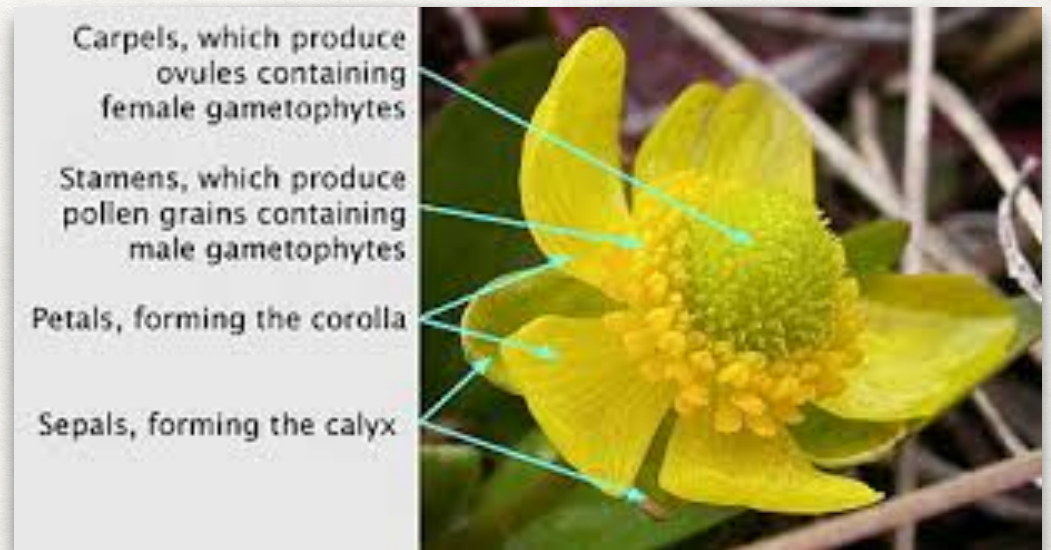
WHAT TYPES OF REPRODUCTIVE STRATEGIES HAVE EVOLVED?



TYPES OF SEXUAL REPRODUCTIVE SYSTEMS



TYPES OF SEXUAL REPRODUCTIVE SYSTEMS



Carpels, which produce
ovules containing
female gametophytes

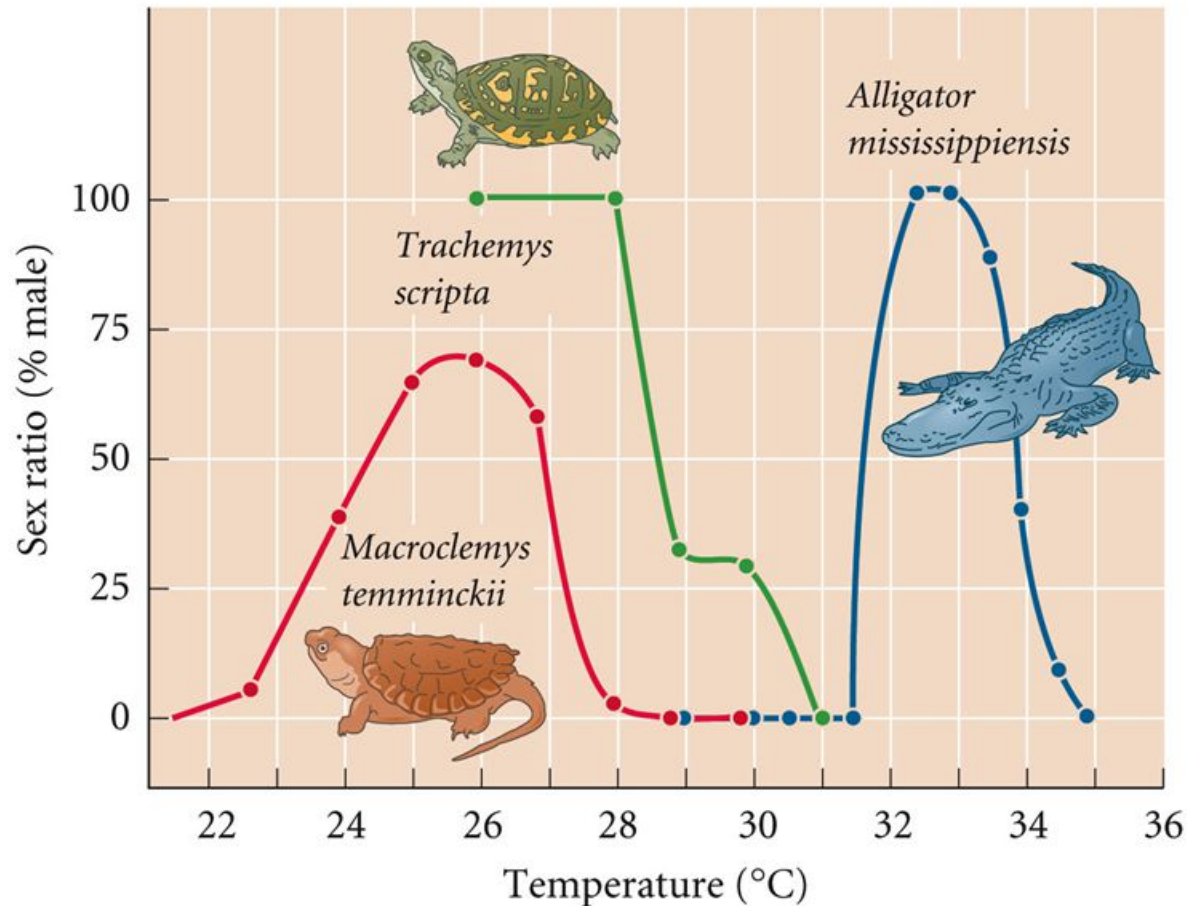
Stamens, which produce
pollen grains containing
male gametophytes

Petals, forming the corolla

Sepals, forming the calyx

TYPES OF SEXUAL REPRODUCTIVE SYSTEMS

Figure 14.22 Temperature-dependent sex determination in three species of reptiles



THINK-PAIR-SHARE

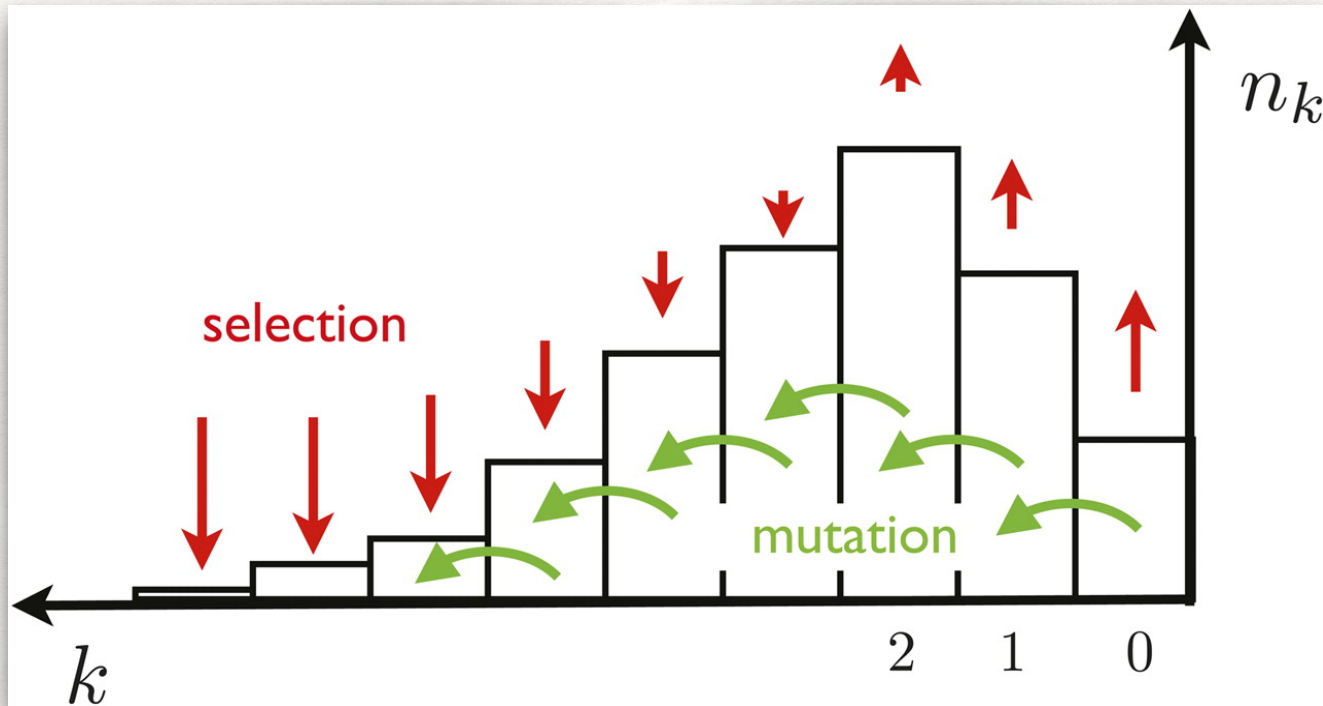
- We know there are a variety of sex determination mechanisms, including genetic sex determination, hermaphroditism, and temperature-sensitive sex determination, as well as species that are not obligately sexual (i.e., can reproduce asexually or sexually).
 - Why might each of these reproductive systems have evolved?
 - What might these different systems tell us about the advantages or disadvantages of sexual reproduction?

WHY MIGHT SEX HAVE EVOLVED?

Some hypotheses to explain the evolution of sex:

- Making new genetic combinations
- Resistance to parasites
- Clearing deleterious mutations through recombination
- Decreased genetic correlation to parents (both an advantage and disadvantage)

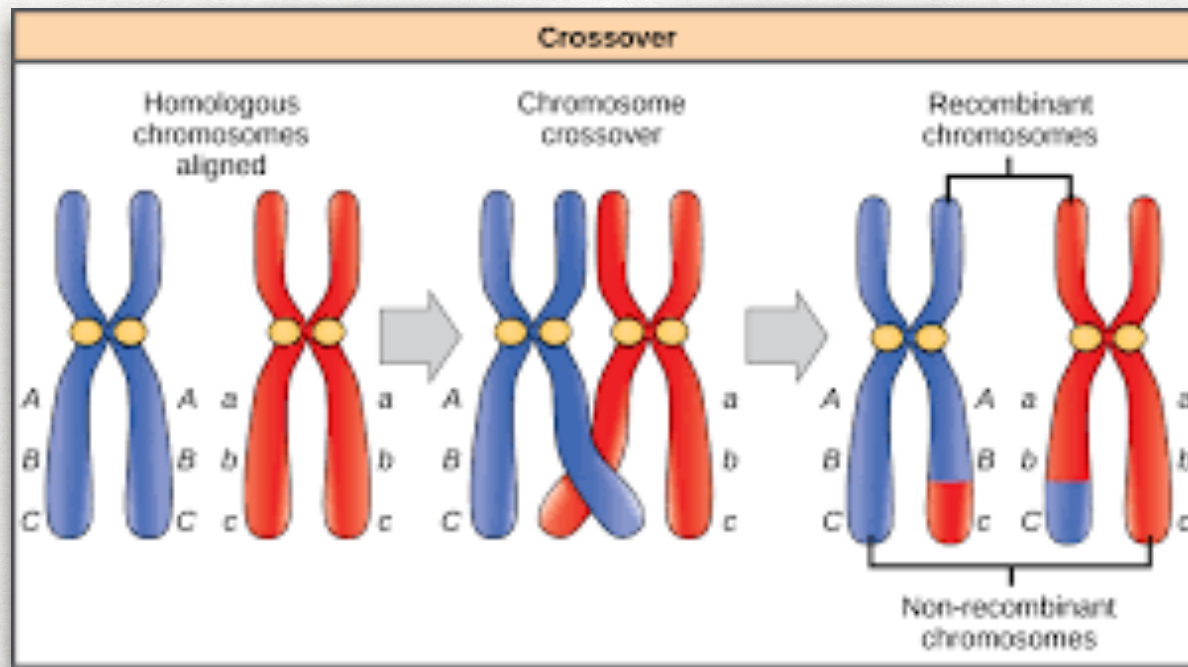
WHY SEX? GENETIC MELTDOWN



n_k is the number of individuals with k deleterious mutations

k is the number of deleterious mutations

WHY SEX? GENETIC NOVELTY



THINK-SHARE-PAIR

- Suppose that two mutations arise simultaneously during DNA replication in an asexual species. One mutation is beneficial, and one is deleterious. Suppose the beneficial mutation is strongly beneficial, but the deleterious mutation is only weakly damaging.
 - What are the possible evolutionary outcomes (i.e., whether they become fixed or lost) for these mutations in this asexual species?
 - Suppose that the same thing happens in a sexual species. What are the possible outcomes for the two mutations now?

WHY SEX? THE RED QUEEN & PATHOGENS



- Asexual (clonal) reproduction results in near identical copies
- Sexual reproduction results in the generation of lots of genetic novelty on short time-scales
- Could be beneficial to have rare combinations of genotypes if this helps protect against pathogens

SEXUAL SELECTION

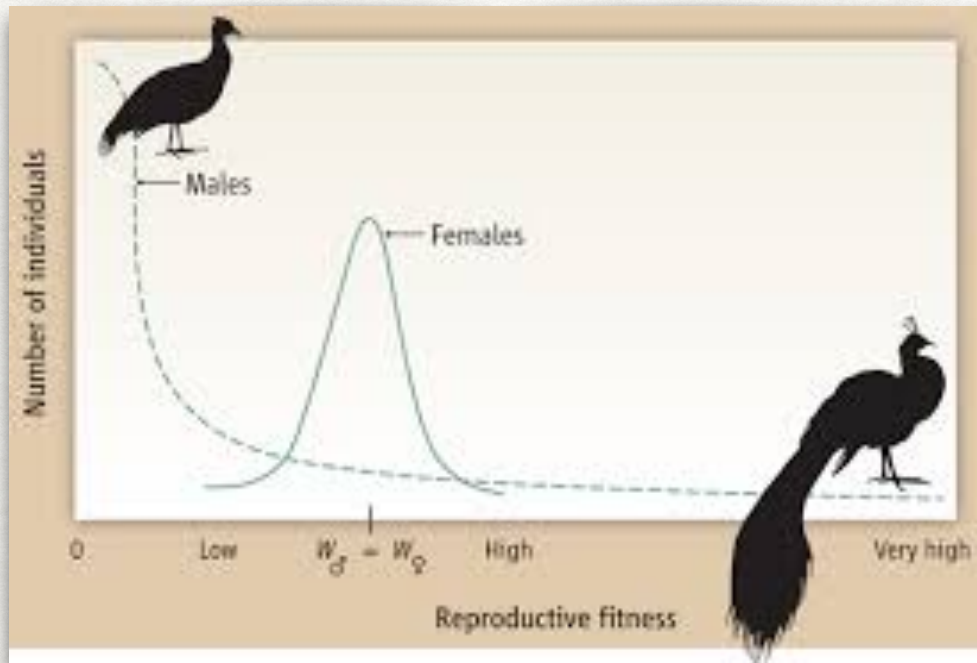


MALE COMPETITION



- Males compete intensely, resulting in the evolution of extreme adaptations to for reproductive success
- In elephant seals, males have evolved to be much larger than females

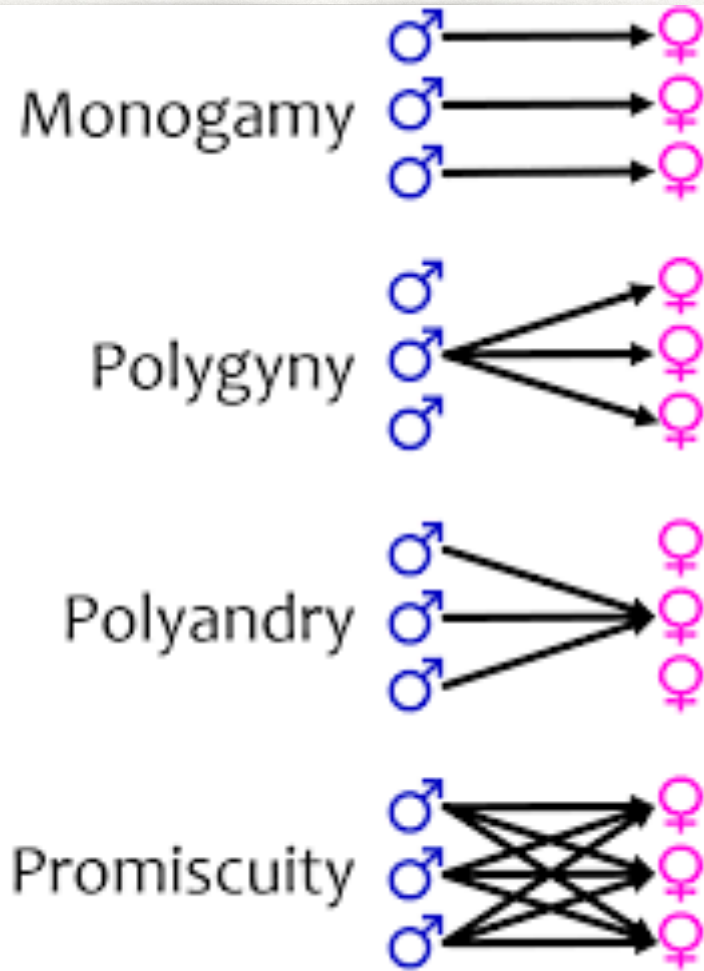
FEMALE CHOICE



- When females control mating through choosing mates, males may evolve ornaments that are suggestive of their fitness
- Male reproductive success may be concentrated in a few high fitness males
- Male ornaments do not necessarily have to convey high fitness. Why?

Why do we expect selection to act differently on males and females?

MATING SYSTEMS

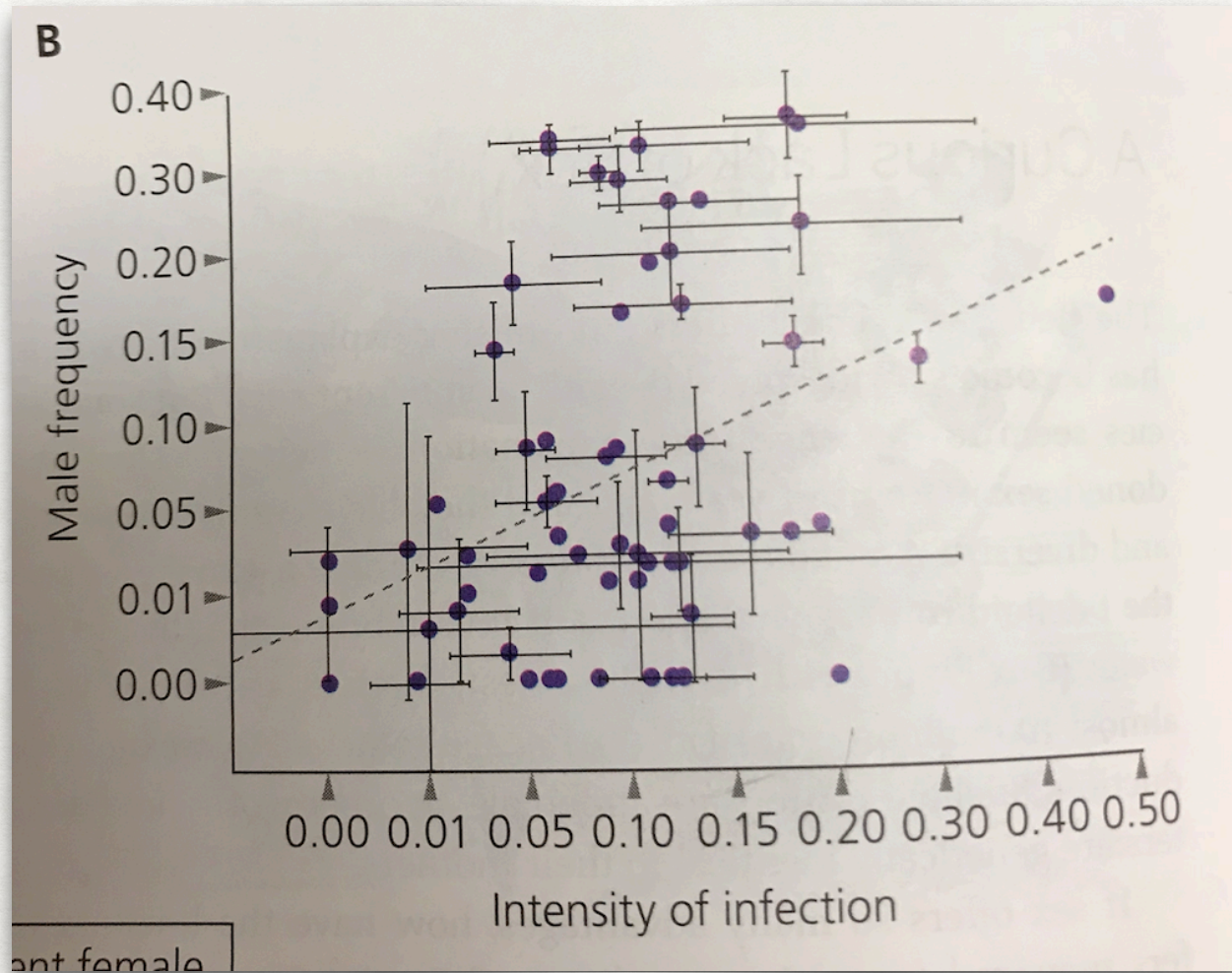


- Monogamy: songbirds
- Polygyny: elephant seals
- Polyandry: humpbacks
- Promiscuity: bonobos

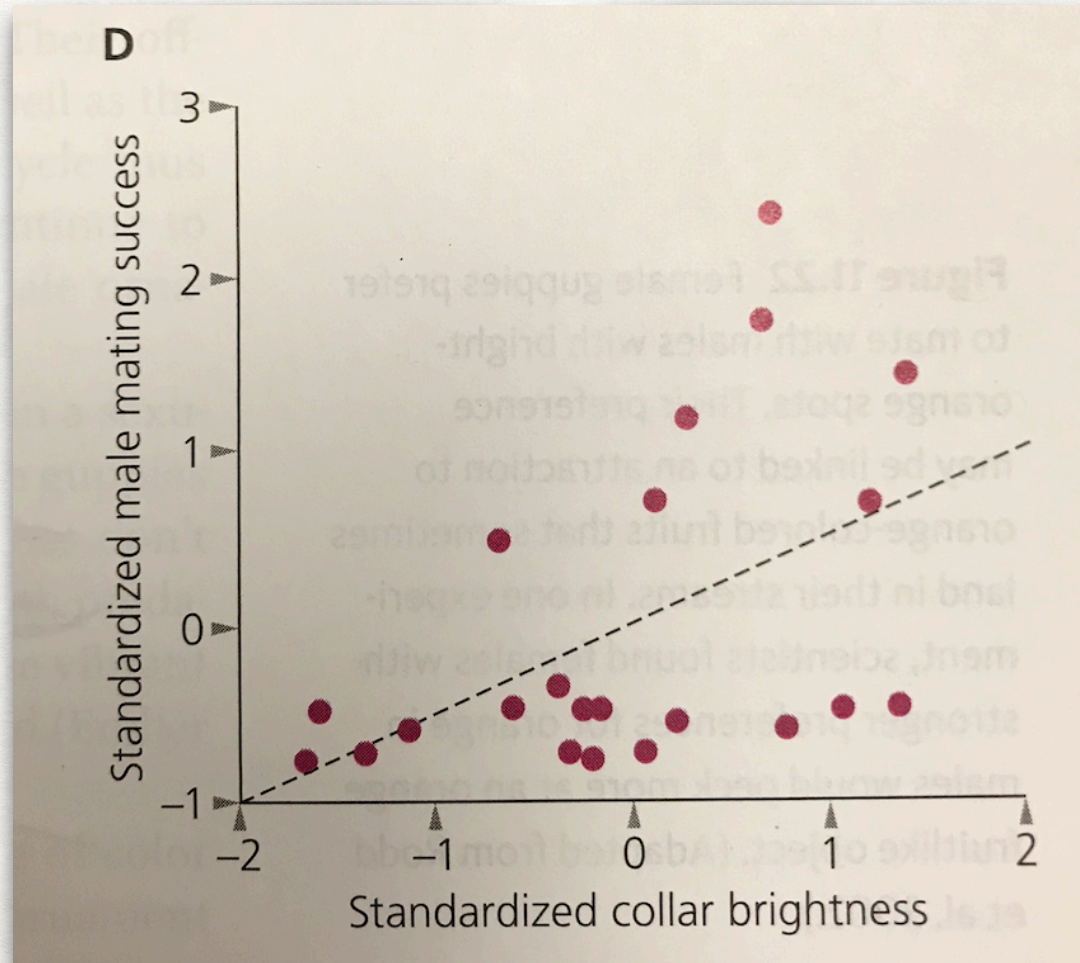
SEXUAL CONFLICT



EXPERIMENTAL TESTS - RED QUEEN



EXPERIMENTAL TESTS - MALE COMPETITION



EXPERIMENTAL TESTS - SEXUAL CONFLICT

