

BIO 45 –Lect. III-1 -- Mating Systems - 8 Nov. 2002

The study of mating systems is in transition. This that leaves us with a mixture of traditional and emerging views. Use Alcock for the traditional story and my lectures and handouts as embellishments on that story. Get a sense of the variations among and within species in mating systems. After I introduce parental care, inclusive fitness theory and the evolution of group living, we will spend the rest of the semester looking at the group structure and social dynamics of a number of different vertebrates. That will let us integrate many of the ideas about sexual selection, mating systems, and social dynamics.

I. MATING SYSTEMS -- patterns of pair bonding (see Alcock Ch. 12 for details)

A. Old Classification -:

1. Monogamy – ($\sigma + \varphi$) single pair, usually with long term pair bond
2. Polygamy
 - a. polyandry ($\varphi + \sigma\sigma\sigma$)
 - b. polygyny ($\sigma + \varphi\varphi\varphi$) –
 - [female defense
 - resource defense
 - scramble
 - lek,
 - c. polygynandry ($\sigma\sigma\sigma + \varphi\varphi\varphi$)

B. Problems with the classification

1. Original classification had a strong emphasis on birds and mammals and thus a strong bias.
2. Focused attention on describing species specific patterns and not on what is actually going
 - many species are mixture of mating systems - e.g., Dunnocks are a little of everything
 - mating system does not describe all pairings (e.g., in polyandry some individuals are monogamous, some have no mates)
3. Extra-pair copulations (EPCs) in "monogamous" birds - a substantial proportion of young in nest of some species do not belong to male or female or both -- males AND female can benefit from EPCs -- bonding pattern may not fully reflect fertilization pattern.

C. **Our focus** - Emlen and Oring (1977) view of what influences mating system within and between species – see diagram on next page. Mating systems are an interplay of:

1. Ecology (resource distribution, predation)
2. Parental care
3. Phylogeny (constraints)
4. Sexual selection

II. GENERAL COMMENTS on MATING SYSTEM - PARENTAL CARE - ECOLOGY & SEXUAL SELECTION

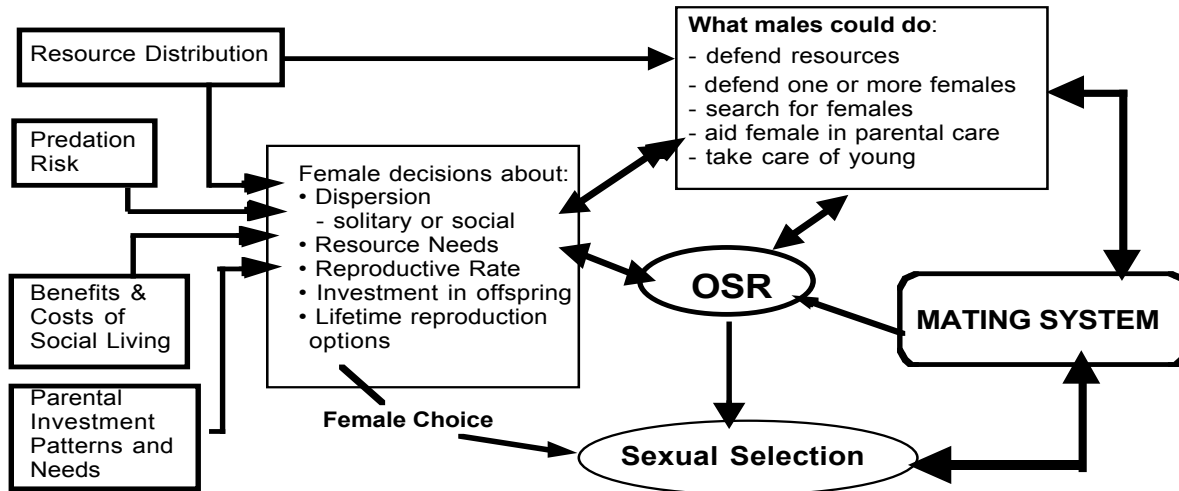
There is a complex interplay of habitat structure, resource availability, group dynamics and sexual selection. The directions of causality are often blurred. For example, does sexual selection lead to a particular mating system or does the environment dictate a mating system which, in turn, causes a certain OSR that leads to sexual selection? Remember that mating systems and the tactics of individuals interacting within and between sexes all act as selection on each other -- thus the complexity.

We will deal with the complexity by seeing it as an intricate cost/benefit "game". What an organism should do in a given set of ecological, phylogenetic and behavioral circumstances depends on the relative profitability (gain minus cost) of the alternatives it faces. For example, males should be choosy when they have the opportunity and ability to choose; but mostly when it pays to be choosy. What conditions would make male choice profitable?. It is easier than it seems. Imagine a world where all females have equal fecundity and another in which females vary greatly in fecundity. In which world

would you be more likely to find male choice -- all else being equal? **You have to brainstorm this material to learn it!**

Emlen and Oring (1977) tried to integrate the importance of ecology, sexual selection and operational sex ratio for the evolution of mating systems. We have since discovered a lot of underlying variation in mating systems (see Alcock's discussions of extra pair copulations and of dunnocks). There are a number of emerging ideas:

- It is probably OSR (Operational Sex Ratio) that most strongly influences sexual selection and several factors besides parental investment can change OSR.



- High parental investment by females also means considerable influence over reproduction and over offspring. Thus female reproductive decisions must involve a lot more than just which male to mate with. Males influence their offspring largely through their genes, females influence their offspring in genetic and non-genetic ways.
- Classifying mating systems based on pair bonds may be very inaccurate.
- Mating systems are not static, species-wide characteristics. Dunnocks may be a better model for many mating systems -- a dynamic interplay of environment and reproductive tactics of males and females.
- The costs and benefits underlying mating decisions and reproductive tactics by both sexes may largely be driven by environmental conditions like resource availability and distribution (see diagram). For example, where females must compete for resources for themselves and their offspring, males may compete to overlap female territories. Habitat structure, resource density and distribution will influence the degree of overlap.

III. Dunnocks

- Habitat structure, resources and female needs determine size of female home range.
- Habitat structure and female home range size determine how many mates she has.
- Males do better with polygyny, females with polyandry – compromise driven largely by ecology.

