Lekking and the Lek Paradox

Mating Systems

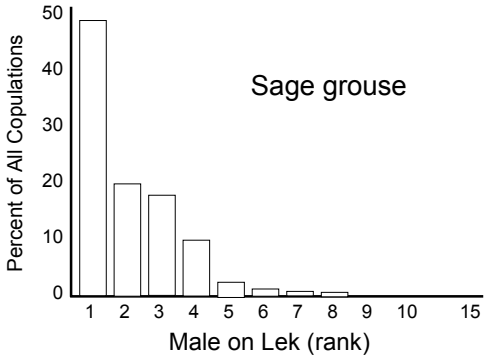
5. Lekking: One sex (usually males) provides only genes to their mate. No direct benefits are passed to the mate.

6. Cooperative: Some individuals forgo reproduction (generally for a breeding season) and instead provide care for another mated pairs' offspring. These "helpers" are usually relatives (e.g., sons or daughters) of the parents then help.

Leks and the Lek Paradox

1. In some cases, males aggregate into groups and each male defends a tiny mating territory containing no resources.
2. Males put a great deal of effort into defending their territory.
3. Males advertise themselves to females with elaborate visual, acoustic or olfactory displays.
4. Females often visit several males before copulating and appear to be very selective in their choice.
5. Mating success is strongly skewed, with most matings being performed by just a few males (the "hot shots").

Leks and Mating Skew



Leks and the Lek Paradox

1. Leks occur when males are unable to defend economically either females themselves or the resources they require.
2. This may arise when resources are widely distributed, or when population density is high making it costly to defend resources of females.
3. Leks are an example of a non-resource-based mating system.

Why do males aggregate on leks?

Four hypotheses:

1. Males aggregate on 'hotspots': males settle where female encounter rate is particularly high (hotspots).
2. Males aggregate to reduce predation: displaying males may suffer a high risk of predation; aggregating together might dilute predation.

Why do males aggregate on leks?

Four hypotheses:

3. Males aggregate to increase female attraction: males aggregated together might appear more attractive to females.

4. Male aggregate because females prefer aggregates: aggregated males may reduce female mating effort and are therefore preferred and visited more by receptive females.

The Lek Paradox

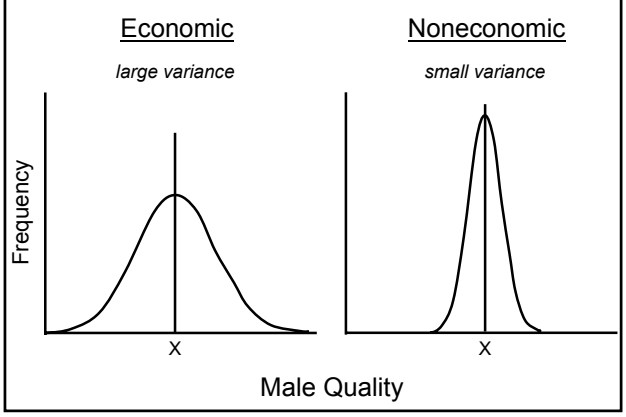
1. Females receive no direct benefits from males; they receive only genes.
2. Leks are characterized by high reproductive skew – one male gets most of the matings.
3. After just a few generations of mating, genetic variation at important fitness loci should be limited; yet females remain very selective.
4. What benefit do females get from being choosy?
5. What might maintain fitness genetic variability?

The Lek Paradox

Economic mating systems: males offer resources to females or their young. These resources should directly influence female or offspring survivorship.

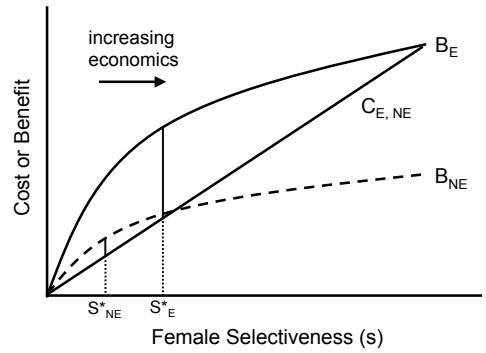
Noneconomic mating systems: males offer no resources to females or their young. Males do not appear to influence the survival of either females or their young (by non-genetic means).

The Lek Paradox



The Lek Paradox

According to the lek paradox, females in noneconomic mating systems should be less choosy. But they are more selective?



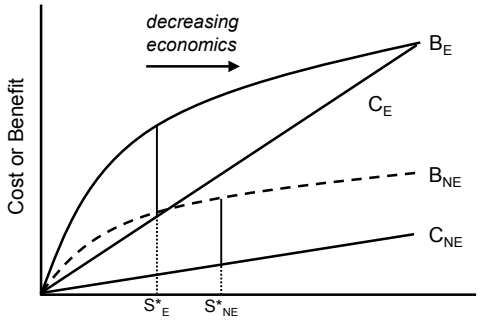
The Lek Paradox

Decreased cost to choice in noneconomic mating systems:

The Lek Paradox

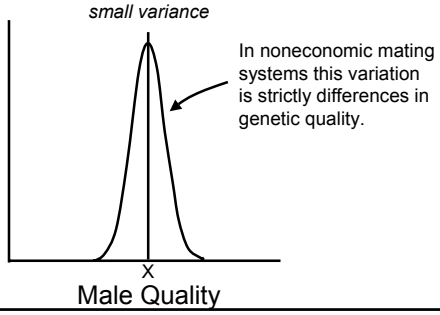
(Reynolds & Gross 1990)

Females will be more selective noneconomic mating systems provided the costs to exercising their choice is considerably lower.



The Lek Paradox

Still required benefit to choice – something must maintain genetic variation in quality or trait(s) under selection.



The Lek Paradox

Problem: With strong skew in male reproductive success, a few generations of selection (female choice) should deplete most genetic variation in quality – i.e., the genes underlying the trait that females choose.

The Lek Paradox

Solution 1: Trait under selection may be multigenic, including many modifier genes. Thus the trait will show large additive genetic variation and mutation at any of these modifier genes will introduce genetic variation in the trait (Pomiankowski & Møller 1990).

Solution 2: Trait under selection may be condition dependent. Expression of the trait becomes "linked" to an individual's condition, which is multigenic. Mutation at any gene locus involved in condition introduces genetic variation in quality and hence the trait state (Rowe & Houle 1996).

The Lek Paradox

1. For both solutions, deleterious mutations are ultimately responsible for introducing the genetic variation in "quality".
2. The first solution introduces variation in the genes that underlie the trait itself.
3. The second solution introduces variation in condition, which directly influences expression of the trait.