
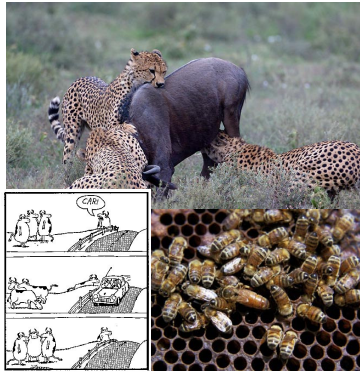


## Living in Groups



22 Feb 07  
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## Benefits of Group Living



- Group acquisition of food
- Access to mates
  - Shelter
- Protection from predation
- Division of labor
  - Social thermoregulation
- Group defense

## Costs of Group Living

- Increased parasites and disease
- Mate competition/infidelity
- Resource competition
- Fighting
- Increased conspicuousness
- Cannibalism
- Suppressed reproduction



## Costs/ Benefits of group living: Differential Reproductive Success

Cuvier's Gazelle

- Hierarchy associated with age, body weight, and horn size
- Status reinforced by aggression



Dama Gazelle

- Hierarchy not associated with age or physical characteristics
- Status reinforced by aggression
- Submissive individuals contest dominance



Alados C.L., Escos J.M. (1992) Ethology Ecology & Evolution

## The Experiment

THE DETERMINANTS OF SOCIAL-STATUS AND THE EFFECT OF FEMALE RANK ON REPRODUCTIVE SUCCESS IN DAMA AND CUVIER'S GAZELLES

- Looked at 18 adult Dama females and 23 adult Cuvier's females (in captivity)
- Observed social status and measures of reproductive success (age at first birth, fecundity and annual survival of offspring)
- Found that low social status resulted in later first birth, reduced fecundity and lower annual survival of offspring in Cuvier's gazelles only

Alados C.L., Escos J.M. (1992) Ethology Ecology & Evolution

## Questions

- Why the difference between gazelle species?
- What determines status in the Dama gazelles?
- Could stress from maintaining dominance in Damas lead to lowered reproductive success? Is there an advantage to status in this species? If not, why does the behavior exist?
- Are complex courtship/mating behaviors more prevalent in groups? Possibly developed to avoid random mating?

## Costs/ Benefits of group living: Group defense

- *Elasmucha grisea*
- Female lays single clutch on a birch leaf
- Female defends eggs and nymphs against invertebrate predators
- Sometimes 2 parents are observed on the same leaf (not due to lack of space)



Mappes J, Kaitala A, Alatalo R.V. (1995) Behavioral Ecology and Sociobiology

## The Experiment

- Field observations
- Lab experiment

### Results

- Field: females on same leaf have larger clutch sizes, no 3 indiv leaves, many singles still observed
- Lab: joint and single behaviors did not differ, joint females lost less eggs to predators than singles



Mappes J, Kaitala A, Alatalo R.V. (1995) Behavioral Ecology and Sociobiology

## Questions

- Why are there no “3 individual” leaves?
- Why don't all females form one group? Or all form pairs?
- Is this a common scenario for the evolution of group living?

## Costs/Benefits of Group living: Conspicuousness vs Dilution

- Study looked at Wolf predation on Elk in Banff National Park (winters '97-99)
- Focused on wolves predation response to elk group size



Hebblewhite M, Pletscher D (2002) Canadian Journal of Zoology



- Results showed that wolves encountered large groups more than expected
- Wolves killed more elk from large groups than expected based on numbers of encounters

Hebblewhite M, Pletscher D (2002) Canadian Journal of Zoology

## Individual Elk Predation Risk

- Relative risk (based on risk of encounter and risk of death during encounter) peaks in intermediate sized groups
- Most Elk (58%) live in groups  $\geq 30$ , and more Elk live in small (2-5) groups than in intermediate sized (6-30) groups

Hebblewhite M, Pletscher D (2002) Canadian Journal of Zoology

### Questions

- Is group living equally beneficial to all? Do some fare better?
- Is observed group size random? A result of optimality, resource availability...?
- Are optimally sized groups stable?
- How significant is indirect fitness on evolution?
- Did haplo-diplody evolve more than once? How soon after sociality did it arise?
- Do groups always organize to maximize relatedness amongst individuals?

### More ?s

- Does group living allow for the existence of a wider range of phenotypic variance amongst individuals due to different roles? How does this affect selection/ evolution?
- Could different roles within a group lead to the generation of separate species?

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- Will groups revert from group behaviors if such behaviors become maladaptive?
- Are the pelages of group living animals evolved to increase confusion effect?