Learning Objective
• In vs. out-group (PC)
• Social structure (PC)

6.1 Social Structure: stability/instability
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What is the difference? Territories vs. dominance

Territories
- Intense combat between SEVERAL groups— injury likely
  - H1: defense of space—group home range
  - H2: group access to resources

Dominance
- Minor conflict among individuals in ONE group— injury not likely
  - defense of personal distance within a group
  - individual access to resources (FP: "waiting in line")

Common misperception that territoriality and dominance are the same thing; important to distinguish between the two concepts (different physiological basis)

NOTE: for solitary species, group size may be 1 individual (e.g. ocelot, bobcat, cougar)

H1: Stable group— trumpeter swan family fights other families

Source: Trials of Life “Friends & Rivals”

Common misperception that territoriality and dominance are the same thing; important to distinguish between the two concepts (different physiological basis)

NOTE: for solitary species, group size = 1 individual (e.g. ocelot, cougar)
The stable relations for swans are within the family group. The relations between family groups are unstable and less predictable.

Closed group at the time of this video. The relationships were established as each new chicken was added to the group and was pecked by the others.

Source: Trials of Life “Friends & Rivals”
Slide 7

H1: Stable group => “peck order”
- Alpha: 1 hen pecks all others
- Beta: “second in command”
  - pecked by alpha
  - pecks all others
- Omega: “bottom of hierarchy”
  - pecked by all others
  - does not peck back
- Stability depends on order of entry into group; younger new ones are pecked

Fits linear hierarchy model

Slide 8

H2: Instable relations - “open” group of baboons

Adapted to fluctuating environment; a lot of turnover in the groups. Males leave natal group and join other group, then work their way “up the hierarchy” (FP)

Source: Trials of Life “Friends & Rivals”

Slide 9

H2: De-escalation stabilizes relations

Minor conflict changes as old males “retire”, young enter group, learn what to expect

Source: Trials of Life “Friends & Rivals”
Slide 10

**H2: Baboons - age affects instability**

- Females
  - youngest daughter supported by mother
  - older daughters drop in rank
- Males
  - leave mother’s group, enter a new group
  - form alliance with females, appease males
  - rise in rank as older males weaken or die

Branched model of social structure

Slide 11

**H3: Fixed strategy - leaf cutter ants**

The behavior of leaf cutter ants is highly heritable. Each caste has a role, in harvesting leaves and caring for a fungus garden inside the network of burrows.

Source: Trials of Life “Friends & Rivals”

Slide 12

**H3: Stable castes - fixed social roles**

Each caste behaves differently due to nutrition during development

Source: Trials of Life “Friends & Rivals”
H3: Ant castes—“hard wired roles” do not change during lifetime

- Diploid (fertilized) - females
  - Largest - reproductive queen
  - Large - soldiers
  - Small - workers (brood care, foragers)
  - Dependent on nutrition at a critical stage of development

- Haploid (unfertilized) - males
  - Produced near the end of queen’s life
  - Male (3-4 with one queen), then die

SUMMARY: Social structure (stability)

- Distinguish between
  - In-group: intense combat (e.g. defense of territory)
  - Out-group: mild conflict (e.g. hierarchy)

- 3 hypotheses of social structure
  - H1: Stable groups = predictable conflict in “closed” groups
  - H2: Unstable groups = friends & rivals change in “open” groups
  - H3: Social insects = castes fixed by nutrition

Learning Objective

- In vs. out-group (PC)
- Social structure (PC)

Action Items - Social structure: stability/instability

- Prepare answers for:
  - Q6.1: How do hierarchical relations in stable groups...
  - Q6.2: What are 3 hypotheses about structure...

- Some recommended searches on Web of Science:
  - Waddington Sarah J “leaf-cutting ants”
  - "dominance hierarchy" sort for [since 2000]
  - "social structure primates" sort for [since 2000]
  - "dominance mongooses"
  - "animal social networks"

- Dialogue
  - Volunteer to chat on Q6.1, Q6.2
  - Post examples/sources to Blog2 Unit 6
6.2 Social Function: access to resources

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Slide 2

FUNCTION: Hierarchy is an adaptation to a changing environment

- **H1**: In hard times (e.g., wolves, dwarf mongoose)
  - Parents that controlled access to food were more likely to reproduce
  - Offspring that dispersed gained access to resources or died
- **H2**: In severe environments (e.g., mole rats, termites, honeybees)
  - Those that dispersed lost access to resources (genotype “edited out”)
  - Those “bidders” that stayed home, survived but were malnourished
- **H3**: When parents died in a social group (e.g., all of above species)
  - Some bidders had a chance to reproduce, although many did not
  - Genotype for “bidding” persisted in the gene pool even though many bidders never reproduced (genotype was not “edited out”)
  - In good times, the “switcher genotype” that retained the physiological ability to reproduce would have increased in the population

Slide 3

**H1 & H2**: Naked mole rats - harsh environmental stressors

Fits the severe environment model
Those that bided their time survived better than those that dispersed and died in the severe desert conditions outside.

Best fits the hypothesis of adaptation to a harsh environment.

Sources: Rodney Honeycutt, J. Jarvis

Learning goals
• Hierarchy hypotheses (UF)
• Hierarchy example (UF)
Action Items - Social function: access to resources

- Prepare answers for:
  - Q 6.3. What are 3 hypotheses about function...
  - Q 6.4. Function of social structure for one species...

- Some recommended searches on Web of Science:
  - Honeycutt, R "mole rat"
  - Jarvis, J* "naked mole-rat"

- Recommended searches on scholar.google.com
  - "naked mole rat"

- Dialogue
  - Volunteer to chat on Q6.3, Q6.4
  - Post examples/sources to Blog2 Unit 6
Learning goals
• Repro suppression (PC)
• Manage species (PC)

How would you apply your understanding of social conflict to managing a social species of your choice?

Important to distinguish between the major stress in unstable groups (which may lead to reproductive failure & intense combat) and the minor conflict in stable groups, which is not stressful (depends on group composition)

SOURCE: Sapolsky, Robert M.

Source: “Friends & Rivals” Trials of Life

See references in wolf workbook
Females immigrate in from natal group, not likely to breed until they are older. May help care for breeding female’s young. Conflict when they do breed.

Key author: Rood, Alan; Rasa, Ann
Source: “Friends & Rivals” Trials of Life

The solitary cats have less of a repertoire of communication signals with a function of appeasement (de-escalation). They avoid each other in time, if not in space.

Learning goals
• Repro suppression (PC)
• Manage species (PC)
Action Items - Stress, health & reproduction

- Prepare answers for:
  - 6.5. Cause of social hierarchy in a species...
  - 6.6. Managing a species... apply understanding of social conflict...

- Some recommended searches on Web of Science:
  - Wingfield JC (birds, reproduction)
  - Sapolsky RM (baboons, primates)
  - Abbott, DH (primates, subordinate, stressed)

- Recommended searches on google.scholar.com
  - Creel, Alan; Flasa, Ann (dwarf mongoose)
  - Rood, Alan; Flasa, Ann (dwarf mongoose)

- Dialogue
  - Volunteer to chat on Q6.5, Q6.6
  - Post examples/sources to Blog2 Unit 6