Animal Behavior Notes
Mrs. Laux AP Biology

I. Most behavior is adaptive.
- **A. Definitions**
  - **1. Behavior**
    - **a. what an animal does and how it does it**
    - **b. an animal's reaction to stimuli**
  - **2. Innate→inborn, present at birth**
    - **a. instincts**
    - **b. ex: cats cleaning**
  - **3. learned behavior→behavior that has been modified in response to an environmental stimulus**
  - **4. behavioral ecology (what we study)**
    - **a. the study of behavior that seeks to explain how specific behaviors increase reproductive success**
    - **b. based on assumption that behavior increases fitness**
    - **c. bird songs, rhesus monkeys and crabs**
- **B. All behavior has some genetic basis**
  - **1. capacity for learned behavior is inherited**
  - **2. behavior is modified by the environment in which the animal lives**
  - **3. therefore, both nature and nurture determine an animal's behavior**
    - **a. ex: baby sounds→human and bird→are coded in genes, but animals must learn and practice sounds to sound like adults**
    - **b. ex: courtship mating dance in fruit flies is controlled by 12+genes**
    - **c. ex: lovebirds→ carrying bark for nest building→behavior differs with change in appearance**
      - **i. either in beak or tucked beneath wing (early on)**
      - **ii. Dilger→hybrids**
        - **a. confused-tried both ways**
        - **b. after 3 years, carried in beaks**
      - **iii. shows method of transport is inherited with flexibility**
- **C. Behavior develops**
  - **1. mostly concerns nervous and endocrine systems**
  - **2. all systems, however, are involved**
    - **a. no secondary sex characteristics until level of hormones in blood is at a certain level**
    - **b. babies cannot walk (learned behavior) until muscles are mature enough**
    - **c. bird songs→male white-crowned sparrows**
      - **i. regional variation in song**
      - **ii. 10-50 day long 'critical period' in which young male learns song in dialect**
      - **iii. in lab, when young sparrows are isolated, they will sing a very poorly developed but recognizable song**
    - **d. 6 month old baby coos**

II. Kinds of Animal Behavior
- **A. Instinct→innate behavior**
  - **1. mammals→female parent caring for offspring**

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2. cuckoos
a. females lay eggs in nests of other species
b. within hatching, helpless cuckoo pushes host's eggs and/or chicks out of nest

B. Fixed-Action Patterns (FAP)
1. stereotyped, innate behavior with unvarying pattern (to natural stimuli)
2. will typically be carried out to completion whether or not the original intent can still be carried out
a. elicited by a sign stimulus or releaser, a simple signal that triggers a specific behavioral response
3. example→European graylag goose
a. after mother lays an egg, she will carry out a series of motions to push egg back to nest
b. she will do this with any object that resembles an egg
c. if egg is removed after FAP has begin she will continue with motions anyway
4. ex: Nino Tinbergen→male 3-spined stickleback fish
a. male fish will attack other males when they see red belly of fish
b. males will attack any object with a read belly and won't attack stickleback look alikes with no red belly
c. red belly triggers FAP
5. other examples
a. parent/young feeding behavior in birds
i. stimulus→parent landing on nest
ii. FAP→behavior of newly hatched chicks→raised heads, open mouths, loud cheeps
b. human infant
i. stimuli→tactile stimulus in hand, FAP→grasp
ii. stimulus→face, figure of 2 dark spots in circle, FAP→smile

Learned Behavior (change in behavior due to experience)

C. Habituation
1. learned behavior which allows animal to disregard meaningless stimuli; ignore repeated, irrelevant stimulus
2. ex: gray squirrels respond to alarm calls of other squirrels, but will stop responding if not followed by attack (cry-wolf effect)
3. ex: safari at Great Adventure
4. ex: you-car alarm
5. you-Indian Point alarm

D. Imprinting
1. form of learned behavior closely associated with instinct
2. organism will acquire a specific behavior if an appropriate stimulus is experienced during a critical period→limited time interval of life of animal, usually within a few hours after birth (or hatching)

3. once acquired, the behavior is irreversible
***4. ex: Konrad Lorenz→graylag geese**
a. first 2 days, goslings will accept any moving object as mother
b. Lorenz, himself, was moving object=mother
c. when exposed to true mother, goslings rejected her
d. goslings preferred humans, even tried to mate with them
5. ex: salmon return to stream that they hatched in to spawn
a. after birth, they had gone to ocean to breed
b. imprinting stimulus→unique chemical composition (odor) associated with hatching stream
6. ex: song of white-crowned sparrows
a. study of imprinting
b. birds exposed to songs at 10-50 days old (critical period) developed normal songs

E. Classical Conditioning
1. associative learning→animals associate one stimulus with another
2. a process in which an animal learns to respond to a stimulus which doesn't normally elicit that response
***3. ex: Ivan Pavlov→dog**
a. food→salivates
b. rang bell with food→salivates
c. rang bell alone→salivates
c. unconditioned stimulus→food; unconditioned response→salivates
d. conditioned stimulus→bell; conditioned response→salivates
4. other exs: rustling under brush→predator; smells, sounds, etc.

F. Operant Conditioning (Trial-&-Error Learning)
1. process by which animal learns to associate one behavior with reward or punishment and tends to repeat or avoid that behavior
2. ex: B.F. Skinner
a. rats in box with levers
b. test animals learned to pull levers that yielded food and avoid those that caused electrical shock
3. ex: how we train animals-dogs and invisible fencing
4. ex: English tits→learned to open milk bottles left on doorsteps and drank cream→one or more birds found reward after opening bottle

G. Observational Learning
1. ability of animals to learn by observing the actions of others
2. allows behaviors to be established and passed on to succeeding generations
3. ex: English tits→drinking spread quickly throughout England, showing that one must have learned from another
4. ex: song development in birds→many species→the young learn song by observing elder
5. ex: Japanese monkeys remove sand from potatoes by brushing with hand

a. in captivity, one monkey discovered that she could more easily brush sand away in water-seen in wild, too
b. all monkeys in troop learned this

H. Insight→reasoning

1. ability of animals to perform appropriate behaviors on first attempt in situations where they have no prior experience
2. more developed in primates than any other animal (except humans)
3. ex: chimp will stack boxes to reach a banana that is too high, after "sizing" up the situation

III. Animal Movements

A. Kinesis

1. a randomly directed change in activity rate in response to an environmental stimulus
2. ex: snowbugs→slow in moist areas, speed up in dry areas; tends to keep them in moist areas
3. ex: pick up rock, all bugs scurry in response to change in light, temperature, touch, etc.

B. Taxis

1. directed movement in response to a stimulus
2. organism moves towards or away from a stimulus
3. phototaxis→towards light
a. insects→phototactic
b. sharks→move toward food when food odors reach them by diffusion or bulk flow (ocean currents)
c. female mosquitoes find mammals by moving towards heat

C. Migration

1. seasonal movements of animals over long distances
2. migrants generally make an annual round trip between 2 regions
3. ex: birds, whales, butterflies, fish

IV. Communication in Animals

→used for species recognition, mating, social behavior

A. Chemical

1. pheromones→hormones that are accepted by other individuals; chemical signals secreted by animals that convey information between members of a species; very specific, immediate, but transitory
a. releaser pheromone→triggers behavior in another organism
b. primer pheromone→cause physiological changes in other organisms
2. ex: female moths releaser pheromone to attract males
3. ex: ants→releaser pheromone to mark pathway to food
4. ex: Queen bees, termites, ants→primer hormone that prevents development of reproductive ability

B. Visual

1. aggression
a. ex: Tinbergen→stickleback fish

b. wolves→bear teeth
c. cats→hiss
2. courtship
a. male bird plumage

C. Auditory
1. sounds used to communicate over long distances, water, night
2. ex: whales' songs→100s of miles by other whales
3. ex: female elephants→sounds to males (infrasound→below range that humans hear) miles away
4. ex: crickets→ward off male rivals
5. ex: birds→attract females, species recognition
D. Tactile
1. social bonding, infant care, groom, mating
2. ex: bees-Karl von Frisch
a. dances→information about location of food
b. round dance
i. bees move in complete circle
ii. other bees taste, smell nectar on dancing bee
c. waggle dance
i. shows that food is farther away
ii. figure 8 pattern
→shape tells where food is
→other bees touch scout during dance to see

V. Foraging Behavior
-optimize feeding
-minimize risk of being injured, eaten
1. herds, flocks, schools (aggregations)
a. concealments
b. defense
2. packs
3. search images-look for specific

VI. Biological Rhythms Affect Behavior
1. circadian rhythms-approximately one day
a. animals have biological clocks (?) that are set, adjusted, and reset to environmental cues
2. diurnal
a. most active during the day
b. ex: honeybees, pigeons
3. nocturnal
a. most active during the night
b. ex: bats, moths, Ollie cat
4. crepuscular
a. active at dawn or dusk or both

b. ex: mosquitoes, fiddler crabs

5. lunar cycles

a. ex: grunion-small fish, off the Pacific coast of North America

b. swarm 3 or 4 nights from April to June when tide is highest

c. squirm onto beach, release eggs

d. 15 days later, next high tide, young fishes hatch and are ready to enter the sea

VII. Sexual Selection

A. Polygyny

1. favors males; mating with many females

2. male provides little besides supplying sperm

B. Polyandry

1. favors females; mating with several males

2. females receive gifts from many males and elicit help from many to care for their young

3. helps to protect against inbreeding

4. infanticide is lower if male knows he has mated with a female

C. Monogamy

1. mating with one partner during a breeding season

2. pair bonds form

a. stable relationship between 2 animals of opposite sex

b. ensures cooperative behavior

c. birds: 90% stay true in a breeding season