Quote of the day:
Whenever he hears it he is young and Nature is in her spring; wherever he hears it it is a new world, and a free country, and the gates of heaven are not shut against him.

*Henry David Thoreau*

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**Lecture Outline**

- Communication
- Vocal
- Mechanisms of sound production
- Physiological control
- Song development & plasticity

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**Sound Production**

- Feathers
- Feet
- Air sacs

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**Songs vs. Calls**

- Complexity…
- Function…
- Who vocalizes…

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**Calls**

- Simple, mono-syllabic
- Produced by all birds
- Functions:
  1. Begging
  2. Social contact
  3. Courtship
  4. Predator alarm
  5. Aggression

**Songs**

- Complex
- Produced primarily by males
- Functions:
  1. Territory defense
  2. Mate attraction - especially rich vocal repertoires

**Female Song**

- Song occurs in some females, especially tropical species
- Functions:
  1. Territory defense
  2. Pair bonding/contact
  3. Mate guarding
  4. Synchronization of breeding

**Sound Production**

- Syrinx
- Internal & external tympaniform membranes
- Paired bronchial openings
**Syrinx Sound**

- Recall “flow-through” respiratory system
- Produced by:
  1. Contraction of muscles forcing air through the bronchi & syrinx
  2. Vibrating air molecules passing by labia & membranes

**Variations in the Syrinx**

- Quiet breathing
- Phonation by a crow lacking a pessulus
- Phonation via syringeal constriction

**Interspecific Variation**

- Primitive syrinx … owls, pigeons, swans
- Sub-oscines … flycatchers
- Oscines … songbirds

**Physiological Control of Song**

- Under influence of gonadal hormones
- Evidence:
  1. Castration = no song
  2. Castration + testosterone = song
  3. Testosterone + females = song
**Neural Control of Song**

- Song is perceived & controlled by HVc
- Concentration of neurons
- Seasonal variation in size
- Males = song
- Females = discrimination

**Song Development**

- How does a sparrow learn its song?
- Dialects exist...why?
- Similarities to human speech development?

**White-crowned Sparrow**

- Critical period
- 10-50 days after hatch
- Genetic template for learning species-specific song
- Evidence:
  1. Isolation – young bird doesn’t incorporate all elements of normal song

**White-crowned Sparrow Nest**

- Quiet period … then
- Motor learning phase
- 150 days after hatch
- Muted subsong practiced
- Evidence:
  1. Deafening – young bird can’t practice what its heard

**Juvenile White-crowned Sparrow**
• Early spring of 2nd yr
• Full song produced

Model of Song Development in White-crowned Sparrow

• Genetic template +
• Learning +
• Practice =
• Adult song

White-crowned Sparrow