A Fowl Lecture: Chickens, Pigeons and other Birds

CL Davis
May 2009

Which group listed below have the highest basal metabolic rate of all vertebrates, which is 50-60% higher than other birds of the same body size?

a) Galliformes
b) Anseriformes
c) Columbiformes
d) Passeriformes


- Hormonal control of singing behavior resulted in how hormones modulate brain function and behavior
- Sexual dimorphism in brain anatomy
- Adult neurogenesis discovered first with songbirds and led researchers to other species, including humans

Pigeons/Doves

Plexus venosus intracutaneous collaris
- Large vascular plexus of vessels
- Back of neck
- Both sexes, larger in male
- Dilate to dissipate heat
- Be careful about injecting into this complex – can hemorrhage out

http://www.avianmedicine.net/ampa/44.pdf

Crop milk
Which sex produces it?

What hormone stimulates it?
• This is a normal chicken
• Commonly used Strains in Research:

• What does OS stand for?
• What is the background breed of the OS?

• What disease is studied using the OS strain?

• What are some lab animals used to study this or similar disease?

Muscular Dystrophy in Chickens

Lack of Efficacy of Injectable Ketamine with Xylazine or Diazepam for Anesthesia in Chickens

• Measured toe pinch response
• Compared:
  – Ketamine: Xylazine (20mg/kg and 2mg/kg IM)
  – Ketamine: Diazepam (20mg/kg and 2mg/kg IM)
  – Isoflurane
• Only isoflurane obliterated toe pinch but reported ketamine dose in chickens goes up to 50mg/kg

“Expression of exogenous protein in the egg white of transgenic chickens” Alex J. Harvey, et al Nature Biotechnology 2002

“Progress Toward the Culture and Transformation of Chicken Blastodermal Cells” Youliang Wang, et al Stem Cells 2006
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Japanese Quail

- To what order do they belong?
- What is the genus and species?
- What disease is studied using these birds?

View of Syrinx

- What 3 other avian species have been most widely used for atherosclerosis research?

Japanese Quail uses:

- Operant conditioning
- Study of microgravity on embryonic development
- Regenerate the mechanosensory hair cells in their auditory and vestibular sensory organs after damage

Japanese Quail: An Efficient Animal Model for the Production of Transgenic Avians
Guide Floor Space

<table>
<thead>
<tr>
<th>Species</th>
<th>Floor space (ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigeon</td>
<td>0.8</td>
</tr>
<tr>
<td>Quail</td>
<td>0.25</td>
</tr>
<tr>
<td>Chickens &lt; 0.25 kg</td>
<td>0.25</td>
</tr>
<tr>
<td>Chickens 0.25-0.5 kg</td>
<td>0.50</td>
</tr>
<tr>
<td>Chickens 0.5-1.5 kg</td>
<td>1.00</td>
</tr>
<tr>
<td>Chickens 1.5-3 kg</td>
<td>2.00</td>
</tr>
<tr>
<td>Chickens &gt; 3 kg</td>
<td>&gt;3.00</td>
</tr>
</tbody>
</table>

Name the structures seen in this picture of tissue taken from a chicken.

Line Drawing of a Bird

- Which ovary has developed?

Which species shown is RESISTANT to atherosclerosis?
Common name?
Scientific name?
What is the cause of Pigeon Breeder’s Disease in Humans?

What type of pigeon is this?

Unique to the pigeon model, atherosclerosis develops first in what highly predictable site in the aorta?

What virus induces atherosclerosis in pigeons?

Pigeon Herpes Virus

- PHV1, Columbid Herpes Virus 1
- Enveloped DNA virus
- Acute: rhinitis, conjunctivitis
- Chronic: pseudomembranous necrosis, encephalitis, sinusitis

What reportable viral disease is carried by pigeons that can cause diarrhea and visceral hemorrhage or neurological signs?

What is the virus family?

What is the genus?

Etiologic Diagnosis?

- Conjunctivitis
- Culture
- Pulmonary lesions

New Castle disease (NCD). Swelling of the lower eyelid and conjunctivitis

NCD. Acute form: Hemorrhage in the mucosa of the trachea (upper), large intestine, (middle), proventriculus (bottom) and gizzard.

http://www.fao.org/docrep/003/i0756e/i0756e08.htm
Most likely etiologic agent?

**Chlamydophila (Chlamydia)**
- **Pigeons**
  - C. psittaci-obligate intracellular parasite
  - Ruffled feathers, diarrhea, conjunctivitis
- **Turkeys**
  - Severe chronic caseous pericarditis and epicarditis

One of four

- Dry crusty lesions
- Caseous lesions

Two forms of one disease

Three of four slides

Four of four slides

What is the disease shown in the previous four slides?

What is the method of microscopy shown in this slide?
This chicken has matted feathers and thick scabby skin. Upon close examination, multiple small gray or black discolorations are seen on the feathers.

Microscopic examination reveals the parasite shown here. What is the genus and species of this mite?

Dermanyssus gallinae
red mite of chickens
feeds at night

Pigeon
What fungus is common in the upper GI tract, associated with pseudomembranous inflammation of the mouth termed “thrush”?

Zoonotic Fungal Agents
- Cryptococcus neoformans
- Histoplasma capsulatum
- Aspergillosis

Tracheal / Lung Lavage
- A sterile catheter is inserted through the glottis into the trachea to the point just cranial to the syrinx. Sterile saline is introduced (0.5 - 1.0ml per kg bodyweight) and immediately aspirated.
- The cytology of normal tracheal or air sac lavage has a low cellular content with few pulmonary macrophages or inflammatory cells.

http://www.ivis.org/advances/Kearns/kearns2/ivis.pdf
http://cheval.vet.gla.ac.uk/vetscape/vet-x/redrobe/index.htm
Crop Wash
- Restrain or anesthetize
- Pass soft plastic or rubber feeding tube into crop
- Palpate crop to confirm placement
- Infuse 10-20 ml/kg warm sterile solution-massage to increase cellular recovery and then aspirate

Blood collection
- Blood volume about 10% body weight and take 10% safely
- Sites:
  - Wing vein (basilic)
  - Cardiac
  - Foot web
  - Jugular
  - Medial Metatarsal
  - Skin puncture, toenail clip

Tetrameres americana
- Nematode
- Female—is blood red in color and lies embedded in the proventriculus
- Male is free in the lumen, four rows of cuticular spines

Egg found in fecal material from a Chicken
- The common name for the worm that deposits this egg is the Crop worm
- What is the Genus of this worm?

This was found on a pigeon
- What is it?
- What is the common name?
- What is the genus and species?

One of two slides
- Gross of a joint from a chicken
Two of two slides

- Histopathology from animal whose joint was shown in previous slide.
- What tissue is shown in this slide?
- What is the condition?

One of two slides

- Oral cavity of a pigeon

Two of two slides

- Esophagus of same animal from previous slide.
- Shows caseous nodules and ulceration.
- What is the etiologic diagnosis?

One of two slides

- Emaciated chicken

Two of two slides

- Peritoneal cavity of animal from previous slide
- Multifocal granulomatous peritonitis
- What is the cause of this condition?

Ulcerative Enteritis/Quail disease

Acute, highly contagious disease of chickens and quail
Caused by the bacterium Clostridium colinum
Ulcers of the intestines and caecae.
High mortality: 100% in quail and 10% in chickens.
Turkeys, game birds and pigeons may also be affected.
Fecal-oral transmission
Predisposing factors include Coccidiosis (especially E. necatrix, E. tenella, and E. brunetti) and overcrowding.
What is the avian genus and species depicted in this picture?

This species develop what specific lesion in association with naturally occurring atherosclerosis?

• What dietary additive induces dilated cardiomyopathy in turkeys?

• What is the common name for this condition?

• What protein is lacking?

• What is it a model for?

Turkey

• Name the Genus and species

• Name a virus commonly studied in this species.

Duck plague

– Duck viral enteritis
– Herpes virus
– Ducks, geese, swans
– 3-7 day incubation
– Death, diarrhea, bloody beak due to ulceration of oral cavity
– Ducks, geese, swan

Amyloidosis in Pekin Duck

Lesion was also seen in the bursa. Mature birds are more affected than young birds. Seen in females more than males.

**Chicken: What is the Disease?**

- What is the term for the condition shown here?
- What is the disease?

**Differential diagnosis between lymphoid leucosis and Marek's disease**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Lymphoid leucosis</th>
<th>Marek's diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of onset</td>
<td>16 weeks</td>
<td>4–6 weeks or older</td>
</tr>
<tr>
<td>Neuro signs</td>
<td>Absent</td>
<td>Frequently paralysis or paresis</td>
</tr>
<tr>
<td>Gross Lesions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peripheral nerve enlargement</td>
<td>Absent</td>
<td>Usually present</td>
</tr>
<tr>
<td>Bursa of Fabricius</td>
<td>Nodular tumours</td>
<td>Diffuse enlargement or atrophy</td>
</tr>
<tr>
<td>Cytology</td>
<td>Uniform</td>
<td>Lympho blasts</td>
</tr>
<tr>
<td></td>
<td>Pleomorphic lymphs</td>
<td></td>
</tr>
</tbody>
</table>

**Avian Influenza**

- Fowl plague
- H5N7

**Animal Models of Human Disease**

<table>
<thead>
<tr>
<th>species</th>
<th>animal disease</th>
<th>human disease</th>
<th>Model No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>Round heart disease</td>
<td>Alpha1 antitrypsin deficiency</td>
<td>112 49</td>
</tr>
<tr>
<td>Chicken</td>
<td>Thyroiditis-OS chicken</td>
<td>Hashimoto thyroiditis</td>
<td>85</td>
</tr>
<tr>
<td>Chicken</td>
<td>Muscular dystrophy</td>
<td>Muscular dystrophy</td>
<td>22 337</td>
</tr>
<tr>
<td>Pekin duck</td>
<td>Amyloidosis</td>
<td>Amyloidosis</td>
<td>174</td>
</tr>
<tr>
<td>Chicken</td>
<td>Atherosclerosis induced by Marek's disease</td>
<td>Atherosclerosis</td>
<td>338</td>
</tr>
<tr>
<td>Chicken</td>
<td>Scoliosis</td>
<td>Scoliosis in children</td>
<td>333</td>
</tr>
<tr>
<td>Chicken</td>
<td>Scleroderma</td>
<td>Scleroderma</td>
<td>323</td>
</tr>
<tr>
<td>Pekin duck</td>
<td>Torticollis</td>
<td>Torticollis</td>
<td>314</td>
</tr>
</tbody>
</table>
• http://partnersah.vet.cornell.edu/avian-atlas/

• http://www.fao.org/docrep/003/t0756e/T0756E08.htm