Compare the design & function of the GI tract in vertebrate evolution.

Key Vocabulary
• Ingestion
• Mechanical Digestion
• Chemical Digestion
• Secretion
• Absorption
• Peristalsis
• Defecation


How do mesenteries & the coelomic cavity form?

What germ layer forms the smooth muscle of the gut?

See Kardong Fig. 5.11, 5.14

How did the tongue change in tetrapods?

Fish: no intrinsic muscle
Tetrapods: intrinsic (lingual) muscles (hypobranchial)
Lingual feeding. Keratinization in some amniotes.

Iwasaki, 2002

Blue-spotted Flathead Fish
Frog
Skink
Tiger

Explain the pattern of Hox genes influence over the digestive system differentiation.

Zorn & Wells, 2009
Humans have salivary amylase. Is amylase in saliva of all tetrapods?

Compare these digestive systems

Which taxa have a spiral valve intestine? What is the function of a Large Intestine?

How will metabolic rate affect the design requirements of the digestive system?

What are advantages & disadvantages of ectothermy & endothermy?

What makes the GI tract of birds so unique?

What are the functions of the crop & each part of a bird’s stomach?
What are the digestion challenges of small herbivores?

Cecal Digestion & Coprophagy

Eckert, 2001


Carabano, Piquer, Menoyo, & Badiola, 2010

What are the challenges of herbivorous digestion?

Foregut        Midgut    Hindgut

Plant Fiber: cellulose, pectin, lignin & Toxins: Alkaloids & Tannins

Lopez-Perez 2013; Cornell Univ., Dept. of Animal Science, 2014

Microbial Fermentation

Fiber → SCFA (VFA)

Efficiency of fiber digestion: 20-65%


Which large mammals use colonic fermentation?
**What are the advantages of a ruminant stomach with “pregastric” fermentation?**

- **Midgut (small intestine)**
- **Domestic Sheep**
- **Order Artiodactyla (Suborder Suiformes)**
- **Coomc**
- **Colon**
- **Large intestine**

<table>
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<tr>
<th>SCFA &amp; H₂O reabsorbed</th>
<th>Microbes</th>
<th>HCl &amp; pepsin, pH 2.5</th>
<th>Packing</th>
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<td>20 cm</td>
<td>6.2-6.8</td>
<td>2.5</td>
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**Selected References**