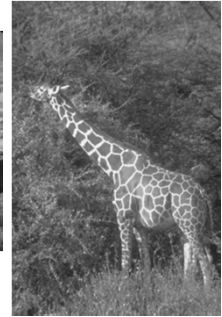


# Feeding adaptations of wildlife

## Foods eaten shape anatomy, physiology & behavior



### Herbivore

### Carnivore

#### Food Source



#### Food Capture



- Plants
- Stationary
- Abundant

- Lo energy & time
- Hi success
- 10,000 bites/day
- Hi intake

- Animals
- Mobile
- Rare

- Hi energy & time
- Lo success
- Few prey/day
- Lo intake

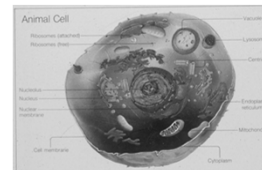
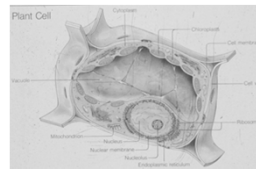
### Herbivore

### Carnivore

#### Food Quality

- Lo & variable in protein and energy
- High fiber in cell wall

- Hi & uniform in protein and energy
- No fiber or cell wall



### Herbivore

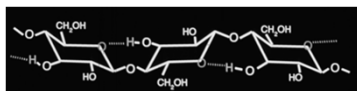
### Carnivore

#### Digesting food



- Much chewing
- Complex digestive tract
- Energy & protein from microbial fermentation

- Little chewing
- Simple digestive tract
- Energy & protein from catabolism

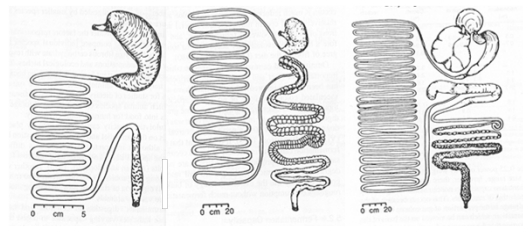


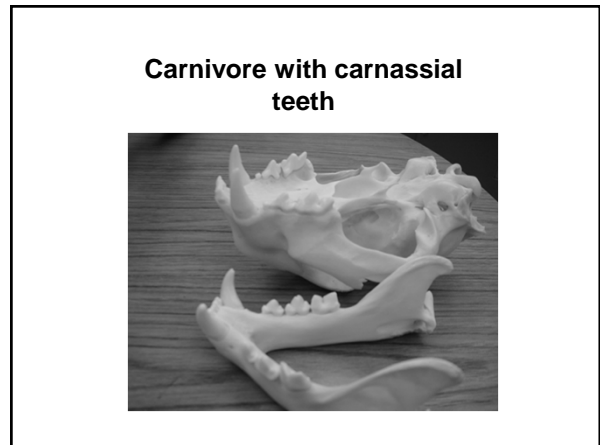
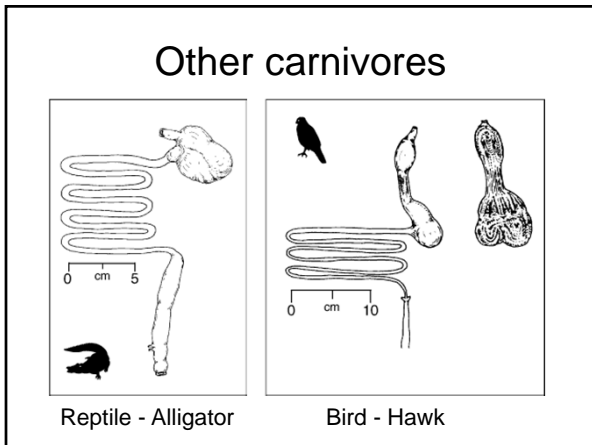
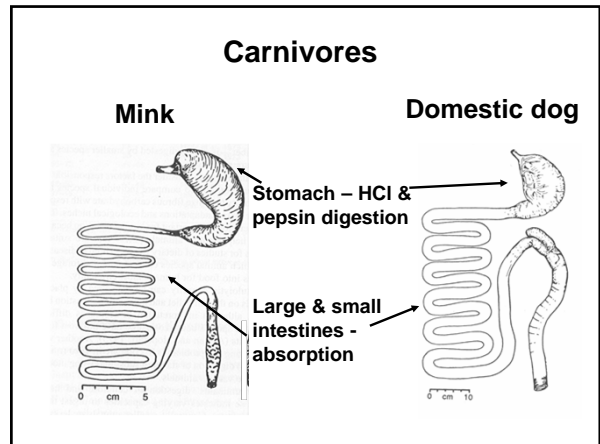
## Mammalian Digestive Systems

### Carnivore

### Omnivore

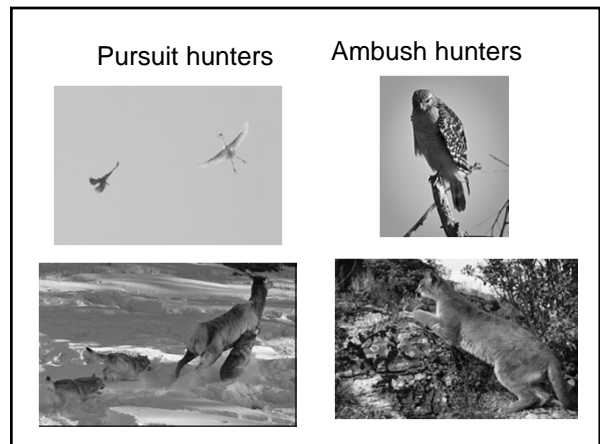
### Herbivore



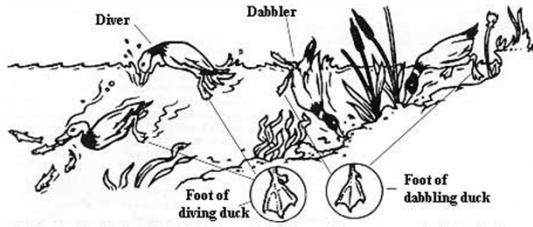


### Hunting styles of carnivores & omnivores

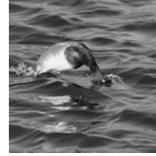
<p><b>Chasing or pursuit hunters</b></p> <ul style="list-style-type: none"> <li>• Chase prey</li> <li>• Often work in cooperatively in groups</li> <li>• Most efficient when move faster than preferred prey, or prey are sick or weak</li> </ul>	<p><b>Ambush or "sit and wait" or still hunters</b></p> <ul style="list-style-type: none"> <li>• Hide &amp; wait for prey to come within striking distance</li> <li>• Often camouflaged &amp; solitary</li> <li>• Most efficient when can't move faster than preferred prey)</li> </ul>
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## Diving vs. Dabbling duck



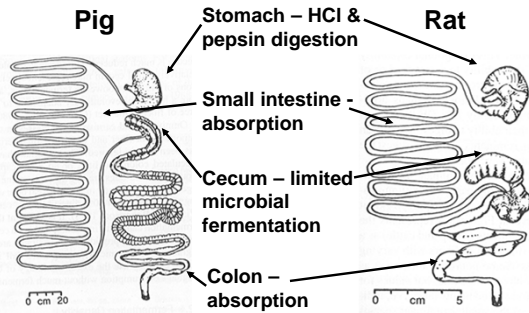
## Diving



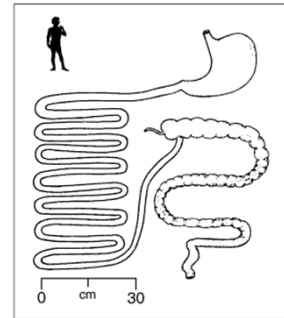
## Dabbling



## Omnivores



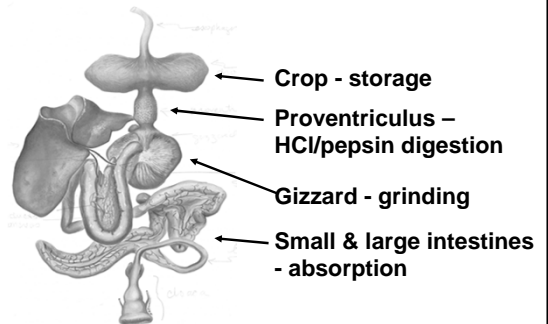
## Human as omnivore

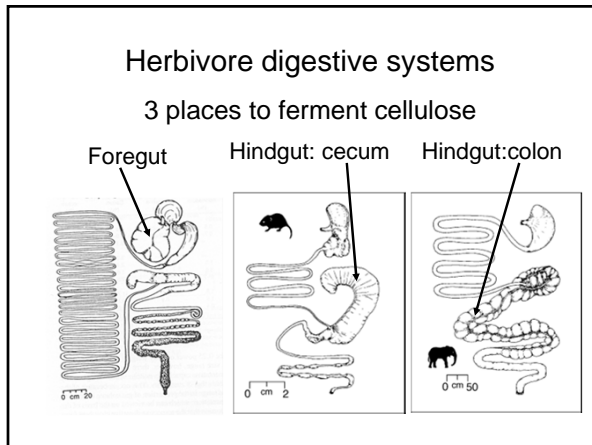
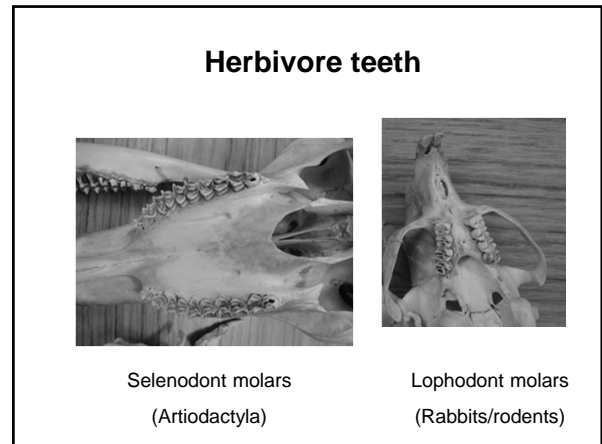
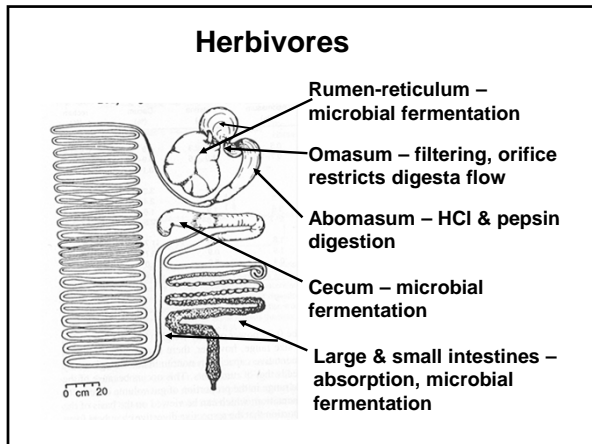


## Omnivore with Bunodont teeth



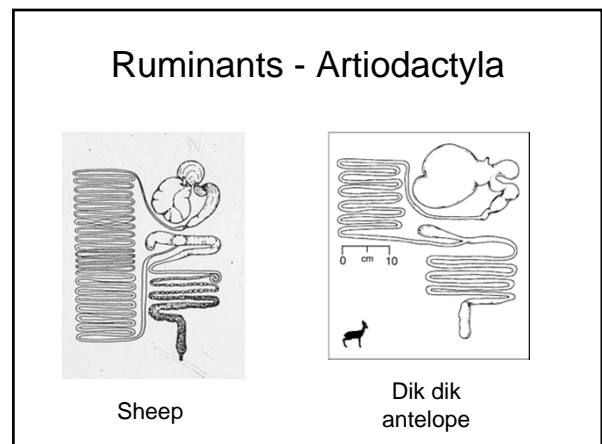
## Omnivorous Bird



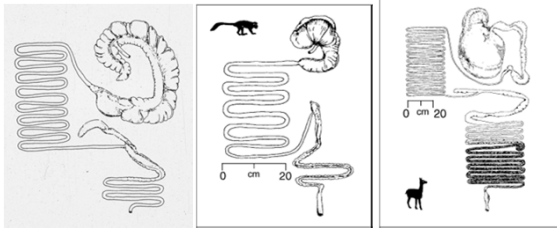


Foregut	Cecum	Colon
<ul style="list-style-type: none"> <li>• Fermented before digested, often ruminated</li> <li>• Slow passage, low intake</li> <li>• Uses microbial protein &amp; energy</li> <li>• Efficient digestion of cellulose</li> <li>• Inefficient digestion of cell solubles</li> <li>• Medium to large herbivores</li> <li>• Moderate quality food</li> </ul>	<ul style="list-style-type: none"> <li>• Digested before fermented</li> <li>• Faster passage, moderate intake</li> <li>• If cecotrophic, uses microbial protein &amp; energy</li> <li>• Less efficient digestion of cellulose</li> <li>• Efficient digestion of cell solubles</li> <li>• Small herbivores</li> <li>• Highest quality food</li> </ul>	<ul style="list-style-type: none"> <li>• Digested before fermented</li> <li>• Fast passage, high intake</li> <li>• Doesn't use microbial protein &amp; energy</li> <li>• Less efficient digestion of cellulose</li> <li>• Efficient digestion of cell solubles</li> <li>• Large to very large herbivores</li> <li>• Low quality food</li> </ul>

- ### List of foregut fermenting mammals
- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Ruminants or ruminant-like               <ul style="list-style-type: none"> <li>– Pronghorn</li> <li>– Cows/sheep/goats/antelope</li> <li>– Camels/llamas</li> <li>– Deer</li> <li>– Giraffes</li> <li>– Hippo</li> <li>– Mouse deer</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Non-ruminant foregut fermenters               <ul style="list-style-type: none"> <li>– Kangaroos &amp; wallabies</li> <li>– Colobus monkeys</li> <li>– Sloths</li> </ul> </li> </ul> |
|--|---|



### Other foregut fermenters



Kangaroo

Colobus monkey

Llama

### Hoatzin – the flying cow

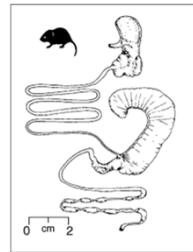


Crop is modified for foregut fermentation

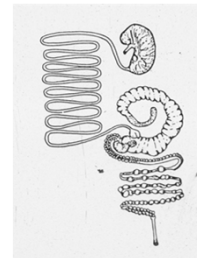
### List of hindgut fermenting mammals

- Colon-fermenters
  - Elephants
  - Horses
  - Rhinos
  - Tapirs
  - Dugongs
  - Manatees
- Cecal-fermenters
  - Possums/gliders
  - Koalas
  - Lemurs
  - Howler & other folivorous monkeys
  - Rabbits/hares/pikas
  - Mountain beavers
  - Beavers
  - Voles
  - Porcupines
  - Gophers
  - & many more herbivorous rodents

### Small cecal fermenters

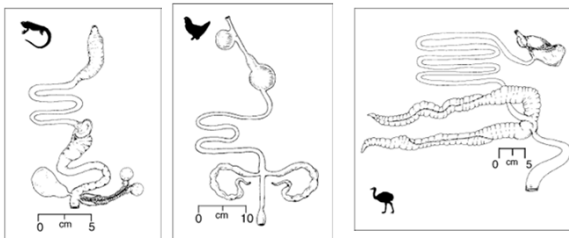


Vole



Rabbit

### Other cecal fermenters

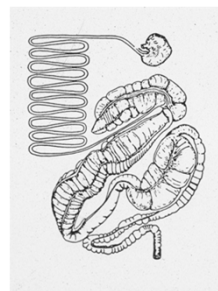


Iguana

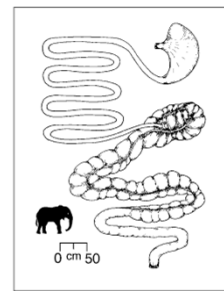
Ruffed grouse

Rhea

### Large colon fermenters

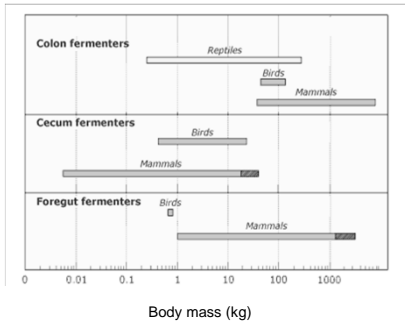


Horse



Elephant

## Size distribution of herbivore types



## Differences between grasses and browses

- **Browses**
  - Thin cell wall
  - More lignin in cell wall
  - Phenolics, terpenes, & other toxins
- **Grasses**
  - Thick cell wall
  - More cellulose in cell wall
  - Silica



## Browser-grazer continuum

Browser	Intermediate feeder	Grazer
>70% dicots	Mix of dicots & monocots	>70% monocots
>Usually small	Usually medium-sized	>Usually large



- **Browsers**
  - Narrower muzzle & incisors to select high-quality leaves
  - Small, simple foregut w/larger reticular-omasal orifice which increases digestion of cell solubles at the expense of cell wall
  - Larger parotid salivary glands that produce tannin-binding proteins
- **Grazers**
  - Wide muzzle & incisors to maximize intake rate on grass swards
  - Large, subdivided foregut w/small reticular-omasal orifice giving time for more efficient digestion of cellulose
  - Small parotid salivary glands, that do not produce tannin-binding proteins

