UNIT 3 STUDY OF CALOTES VERSICOLOR

Systematic Position

Phylum	:	Chordata
Subphylum	:	Vertebrata or Craniata
Section	:	Gnathostomata
Superclass	:	Tetrapoda
Class	:	Reptilia
Subclass	:	Diapsida
Order	:	Squamata
Suborder	:	Lacertilia or Squria
Family	:	Agamidae
Genus	:	*Calotes*
Species	:	*versicolor*

Habit and Habitat:

- *Calotes* versicolor is commonly called as garden lizard.
- The lizard lives in gardens and jungles, but it prefers plains.
- *Calotes versicolor* is an arboreal lizard and commonly found in hedges and shrubs.
- It is diurnal and often nodes the forepart of its body up and down.
- It runs and climbs very swiftly.
- It is insectivorous animal.
- It changes its body colour.
- Its head and neck tuns red and trunk becomes pale yellow when excites in courtship hence called blood sucker.
- The colour changes under the control of temperature, environment and pituitary hormone.
- During courtship, male performs courtship dance before the female.
- *Calotes* is oviparous.

Economic Importance:

Calotes is non-poisonous and helpful to farmers because it destroys insects. It is also dissected in the laboratories as a study material.

External Characters:

Calotes has an elongated body which is compressed laterally to a slight extent. The body is olive green or greyish above and white below. In breeding season, the male assumes a brilliant red or scarlet colour on the ventral side of the neck and shoulder region. It is about 35 to 40 cm long. The body is divisible into four regions, head, neck, trunk and tail.

1. Head:

- The head is nearly triangular and slightly depressed.
- The anterior blunt end of the head is called snout.
- It has wide, slit like mouth extending round the anterior border.
- A little above the mouth, on the snout pair of small apertures are present called external nares.
- On the sides of the head are a pair of small eyes with rounded pupil and well developed movable eyelids.
- Each eyelid is covered with upper and lower eyelids.
- Behind the eye on each side a circular semi-transparent depressed area is present called tympanum.
- The whole surface of head is covered by scales having different sizes and shapes.

2. Neck:

- The neck is short and not distinct region externally, but it is well formed internally in the axial skeleton.
- The neck helps for movement of head within limited range.
- The neck is connecting region of head and trunk.
- It lacks gular sacs, but in case of male one gular sac develops during the breeding season.

3. Trunk:

- The trunk is somewhat cylindrical in form and slightly compressed laterally but flat ventrally.
- The trunk is divisible into two regions, the anterior small, stout walled thorax and the posterior large, soft walled abdomen.
- At the junction of trunk and tail, is a transverse slit called cloacal aperture.
- On the middorsal line all the scales are spinose type and they form nuchal crest.
- The trunk bears two pairs of stout limbs, forelimbs and hindlimbs.

Forelimbs:

- The forelimbs are shorter and more slender than hindlimbs.
- They arise just behind the neck. Each forelimbs consists of three parts, the proximal upper arm or brachium, the middle foreman or antebrachium and the distal hand or manus.
- The hand further comprises a short wrist or carpus, broad palm or metacarpus and 5 slender fingers or digits of varying size but each ends into curved, pointed claw.
- Thus, the hand is pentadactyle and its third and fourth digits are longer than others.

Hindlimbs:

- The hindlimbs arise just in front of the tail and they are larger than the forelimbs.
- Each hindlimb is consists of three parts, the proximal thigh or femur, the middle shank or crus and the distal foot.
- The foot further comprises a shirt ankle or tarsus, a broad instep or metatarsus and five slender toes or digits of varying size.
- Each ending in a curved pointed horny claw.
- The hindlimbs are also pentadactyle and their fourth digits are larger than other.

4. Tail:

It is the posterior part of the body. It is cylindrical and tapers to a point posteriorly. It is more than twice the length of the trunk region and measures about 23 cm. The tail is also covered by scales.

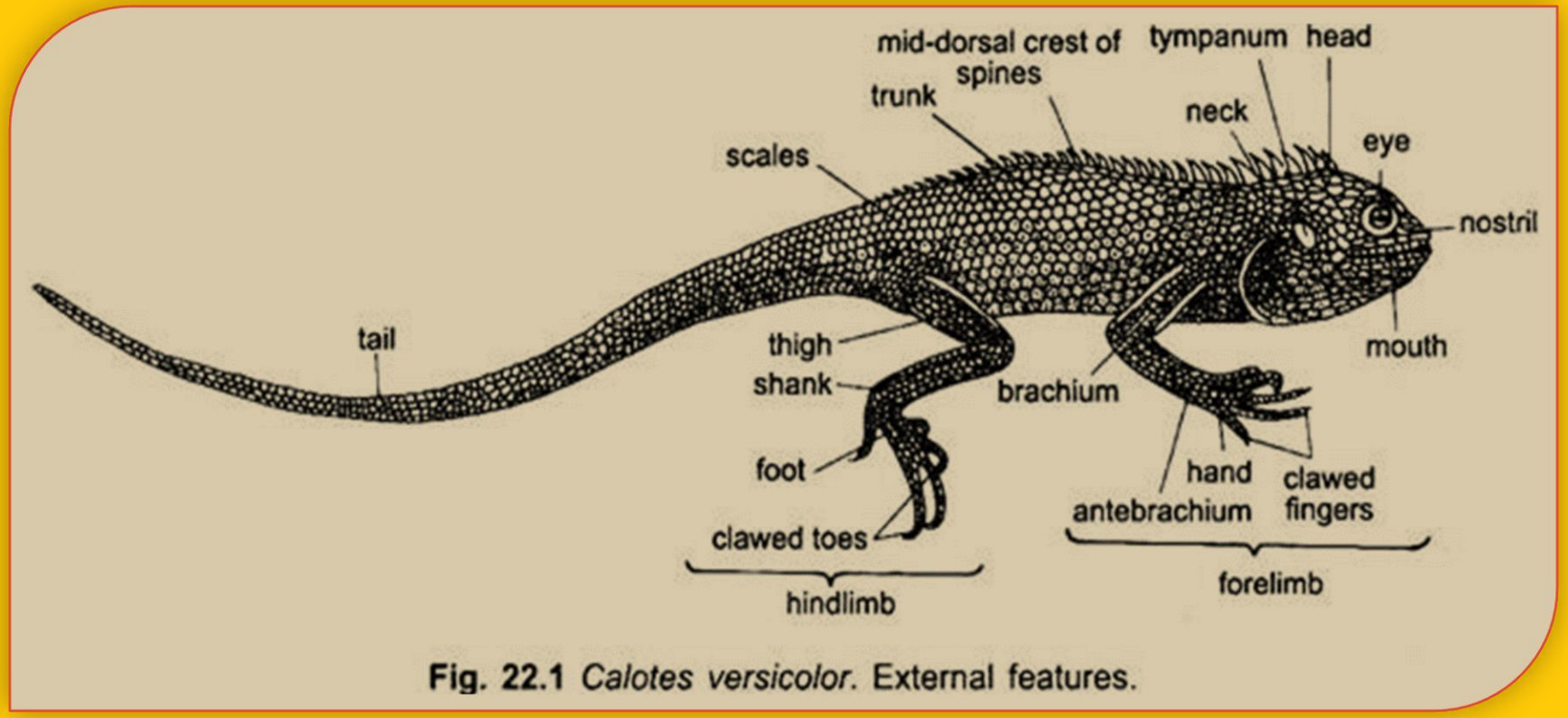


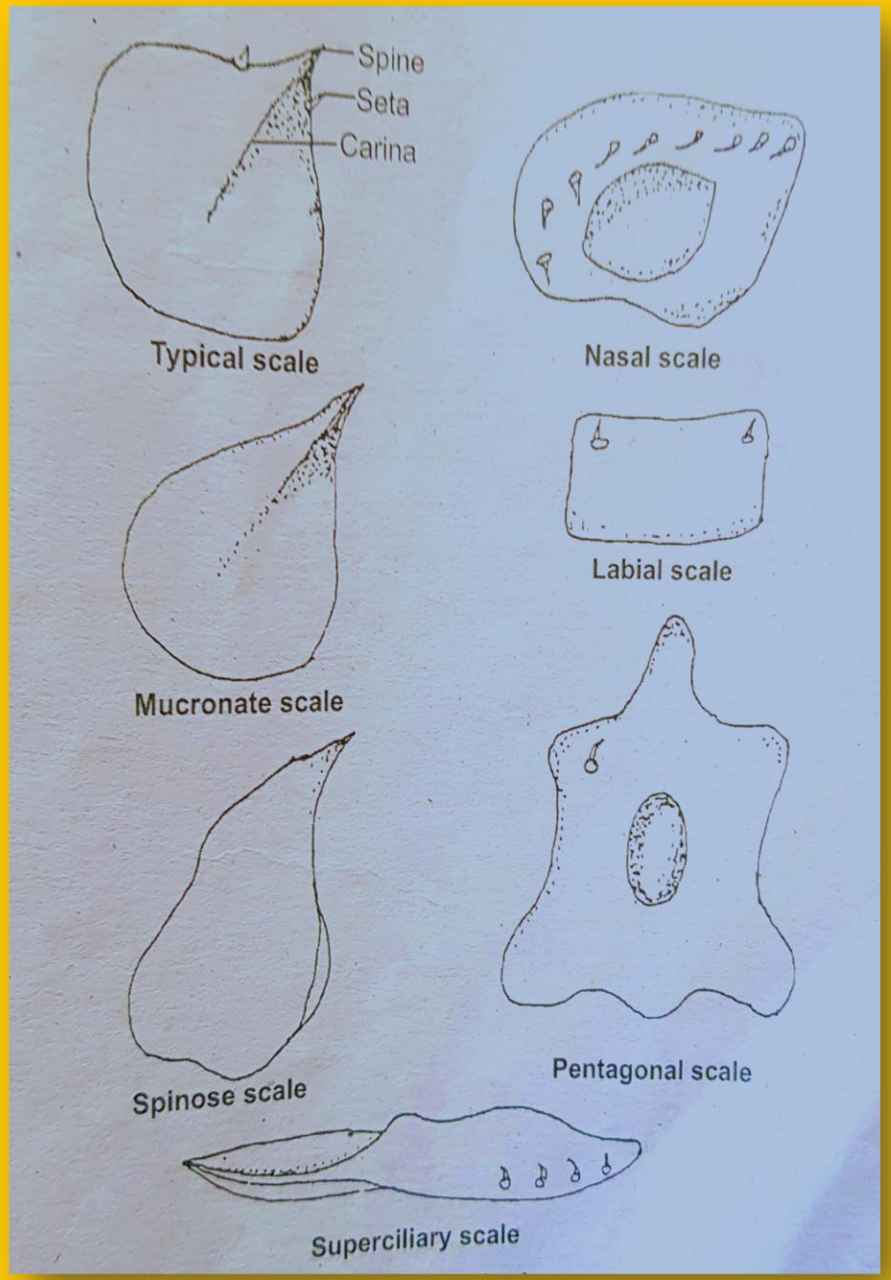
Fig. 22.1 *Calotes versicolor*. External features.

Exoskeleton:

Scales and claws are the exoskeleton in Calotes. Entire body is covered by horny, epidermal, overlapping keeled scales. There are different types of scales present on the body which show variation in shape and size.

1. Typical Scales:

- They are found on the trunk region.
- The scale has thin rhomboidal plate which is formed from cornified epidermis.
- These scales are fixed in the skin but free at posterolateral sides.
- The typical scale has on its free outer surface a median ridge called keel or carina which forms spine at the end.
- Its free posterolateral margins carry one or two setae or hair like processes on each side.
- These setae are tactile in function.



2. Denticulate Scale: In this scale, the carinate spine is small. They occur on trunk.
3. Mucronate Scale: If the carinate spine is large and stiff the scale is called mucronate scale. These scale are more on trunk.
4. Spinose Scale: If in the scale the major free portion is occupied by spine it is called spinose scale. These scales occur on nuchal crest located along the middorsal line of the trunk.
5. Pentagonal Scale: These scales occur on parietal region of the head and they have pentagonal shape.
6. Nasal Scale: The nasal scales are conical or oval and occur on nasal region. They carry submarginal row of setae.
7. Labial Scale: The labial scales are distinctly rectangular in shape. They occur on labial region.
8. Superciliary Scale: These scales are elongated and slightly twisted in form.

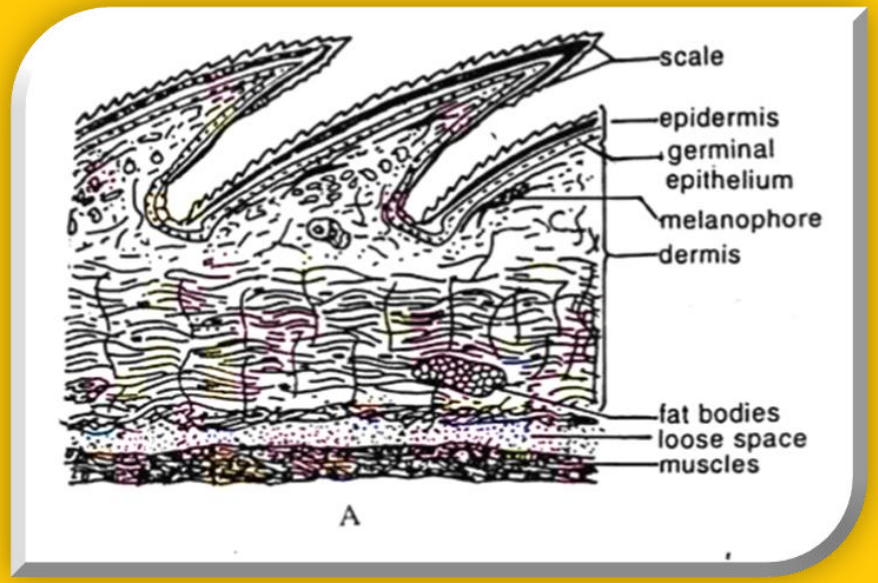
Claws:

The digital tips of the Calotes are provided with sharp claws. Each claw is made up of a dorsal and a ventral scale like horny plates. It make digit to pointed. Its dorsal plate is called unguis. It is convex and rounded at tip and lateral sides. The ventral plate is called subunguis and it is flattened. The unguis is well developed than subunguis.

Body Wall: The body wall consist of skin, muscles and peritoneum.

Skin: The skin of Calotes is highly modified for terrestrial mode of life.

- It is rough, dry and scaly. The skin glands are absent except few femoral glands.
- The skin is firmly attached to the underlying muscles.
- There is no lymph sinuses beneath it.
- Histologically skin is formed of two layers.
- The upper epidermis and lower dermis.
- The epidermis is ectodermal in origin while dermis is mesodermal in origin.
- The epidermis is thin and the deepest layer of the epidermis is called germinal epithelium.
- The dermis is formed of loose fibrous connective tissue which is traversed through by blood capillaries and nerve endings, which contains pigment cells or melanophores or chromatophores



Muscles: Below the skin layer there is a layer of muscle. This muscle is much thicker on the dorsal side. It is composed of striated muscle fibres and contains supporting framework of bones.

Peritoneum: The muscle layer is covered internally by peritoneum, a epithelium of thin close fitting cells.

Coelom:

- The body wall encloses a spacious coelom or body cavity in the trunk.
- It is divisible into two unequal parts, anterior small pericardial cavity in which heart is located and posterior very large pleuroperitoneal or perivisceral cavity in which all visceral organs except kidneys are situated.
- There is no communication between the two coelomic compartments because they are separated by thin so called oblique septum.
- Both the cavities contain a watery fluid called coelomic fluid.
- The pericardial cavity lies somewhat ventral to the anterior part of the perivisceral cavity.

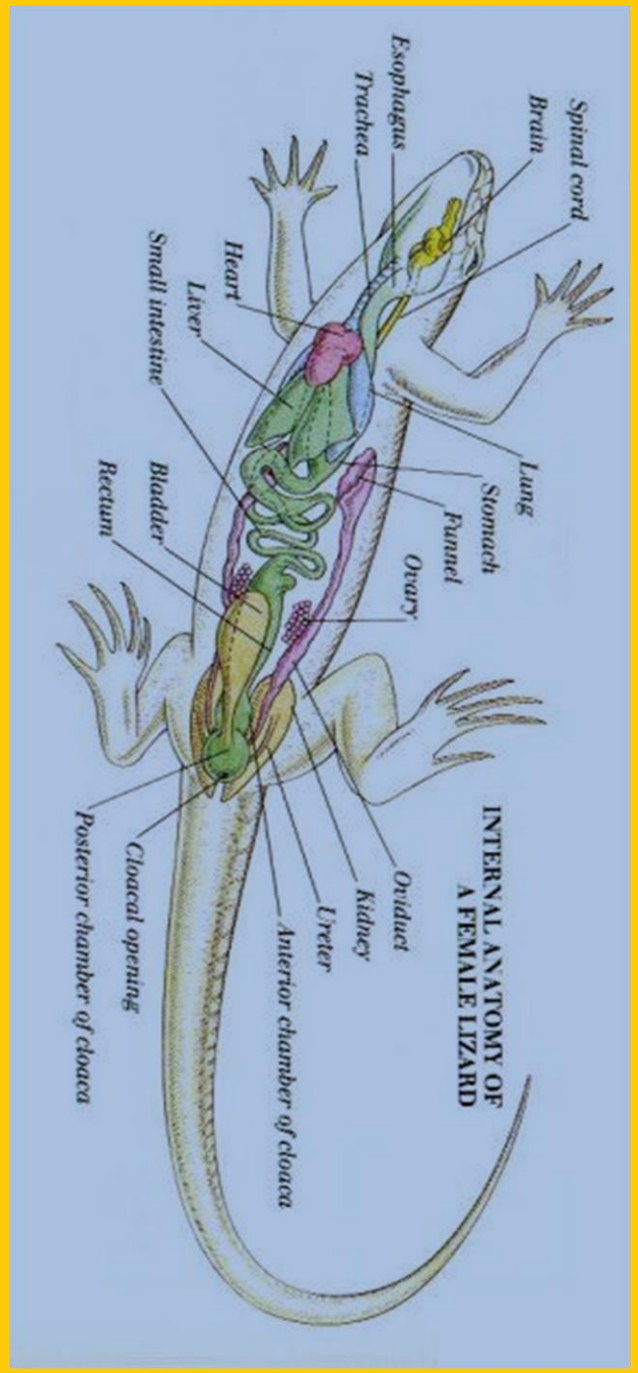
Digestive System:

A. Alimentary Canal

1. Mouth
2. Bucco-pharyngeal cavity
3. Oesophagus
4. Stomach
5. Small Intestine
6. Large Intestine
7. Cloaca
8. Cloacal Aperture

B. Digestive Glands

1. Gastric Glands
2. Liver
3. Pancreas
4. Intestinal Glands



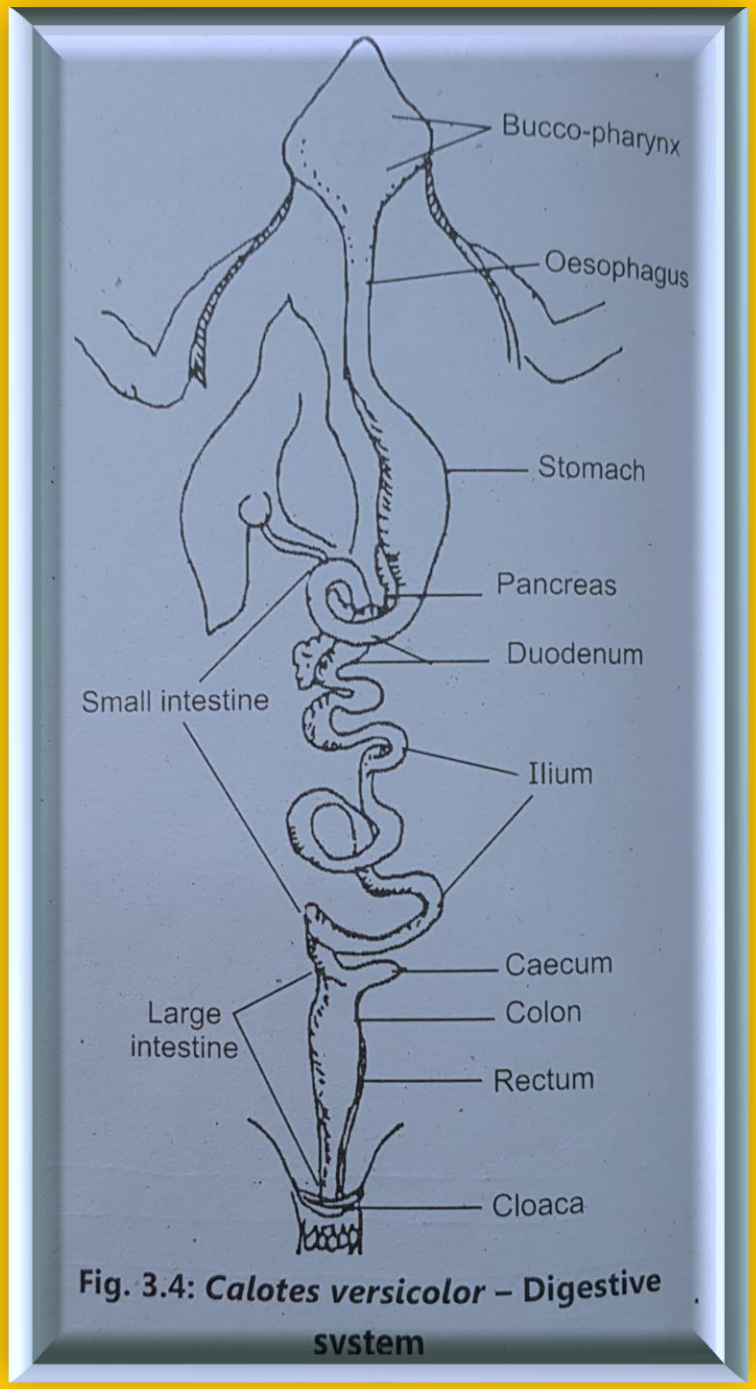


Fig. 3.4: *Calotes versicolor* – Digestive system

1. Mouth:

- The mouth is a wide, semioval, inverted V-shaped slit like and extending around the anterior border of the head. It has a wide gap.
- The mouth is bounded by a pair of toothed jaws and they are covered by a thin, non-muscular upper and lower lips bearing the labial scales.
- The free boundries of the lips possess numerous openings of labial glands.
- Their number is more on upper lips.
- The labial glands secrete mucous on the surface of lip.
- The jaws are provided with teeth. The teeth are sharp, small pointed and recurved backwards. The teeth are almost uniform called homodont teeth.
- Each teeth has broad base and pointed apex. This condition is called as acrodont teeth.
- The teeth form shows difference in male and female Calotes.
- They are simple and conical in female whereas in male they are conical but trident with stout process.
- The teeth are not useful for mastication of the food but they prevent escape of the prey from the mouth.
- The mouth leads into buccopharyngeal cavity.

2. Bucco-pharyngeal Cavity:

- It is a large and compressed dorsoventrally. This cavity is bounded by the base of the skull above and by the pharynx.
- Its anterior part is known as the buccal cavity and posterior part as the pharynx.
- The floor of the buccal cavity houses a median and muscular tongue and its roof is formed by the palate.
- The tongue is protrusible and the apex of tongue is slightly bifurcated.
- It bears taste buds.
- In the anterior region of the palate are seen two slit like openings called the internal nares which play important role in respiration.
- In pharynx, just behind the tongue there is vertical slit like opening called the gullet. In addition to this, there is a pair of openings of eustachian tubes on the roof of pharynx.

3. Oesophagus:

- It is a straight narrow tube which extends through the neck dorsal to the trachea and passes into stomach.
- It appears dark due to the presence of melanophores in its wall. Internally it shows number of longitudinal folds.

4. Stomach:

- It is a thick walled, swollen tubular sac situated on the left side of the cavity.
- It is wider than the oesophagus and divisible into three regions, an anterior, middle fundic and posterior pyloric region.
- The oesophagus opens into cardiac stomach and the pyloric stomach i.e. the posterior part of the stomach opens into duodenum.
- There is no demarcation between the two regions. A slight constriction at the end of pyloric stomach marks the position of a sphincter muscle called pyloric valve.
- The inner lining of the wall of the stomach is longitudinal folds called rugae.

5. Small Intestine:

- It is a long, thin walled, narrow tube beginning anteriorly from the pyloric end of the stomach. It is a coiled structure.
- It also divide into two parts, anterior duodenum and posterior ileum. The duodenum runs straight forwards parallel to the stomach, forming with it.
- It receives the bile and pancreatic ducts near its beginning. The long, looped posterior part is ileum. The ileum is the longest part of the alimentary canal and it is much coiled. It leads into the large intestine.

6. Large Intestine:

- It is relatively short straight tube divisible into anterior swollen portion called the colon and a posterior tubular portion called the rectum.
- At the junction of ileum and rectum a small blind finger like projection is called coelic caecum. Ileo-rectal valve is also present at the junction.
- Large intestine leads into cloaca by a spinctered aperture called anus.

7. Cloaca:

- It is a small, tubular, terminal chamber in which rectum and urinogenital system opens.
- Cloacal sac is differentiated internally into three parts.
- The anterior coprodaeum that receives the rectum anteriorly, the middle urodaeum which receives urinogenital ducts dorsally and gives off urinary bladder ventrally and the posterior proctodaeum that opens out by the cloacal aperture.

8. Cloacal Aperture:

- It is a transverse slit on the ventral side at the junction of the trunk and the tail.

B. Digestive Glands:

1. Gastric Glands:

- The gastric glands are microscopic, simple or branched, tubular glands which lie in the mucous membrane of the stomach.
- Depending on their location, they are called as cardiac, fundic and pyloric glands.
- These glands are arise from gastric pits.
- These glands secrete gastric juice into the stomach.

2. Liver:

- Liver is the large brownish, bilobed digestive gland present behind the heart between the lungs.
- It is joined to the stomach by mesenterial connection.
- Liver is divisible into right and left lobe. Right lobe extends dorsally upto the right gonad.
- A greenish, sac like gall bladder is embedded in the right lobe. The liver secretes bile juice.

3. Pancreas:

- Pancreas is an elongated ribbon like compact gland.
- It lies very close to the pyloric stomach and duodenum and situated between the loop formed by them.
- Many fine ducts originate from the pancreas and finally form pancreatic ducts.
- It open into the duodenum. The secretion of pancreas is called pancreatic juice.
- The juice is alkaline in nature and contains digestive enzymes.
- These enzymes are trypsin, amylopsin and lipase.
- Its exocrine part secrete pancreatic juice and endocrine part i.e. Islets of Langerhans secrete hormone insulin.

4. Intestinal Glands:

- These glands are present in the mucosa of the small intestine.
- They secrete intestinal juice in the lumen of the small intestine.

Mechanism of food-getting and digestion:

Food and Feeding:

The food of Calotes consists mainly of small living insects. Ingestion is done with the help of the tip of the tongue and the insect is taken inside alive. The sticky mucous secretion helps to catch the prey. In the stomach HCl and pepsin react on the food matter.

Digestion:

- HCl makes the medium acidic and kills bacteria while pepsin reacts with the protein part of the food and breaks it into peptone and proteoses.
- In the duodenum, bile neutralizes the acidic half-digested chyme and emulsifies the fat part of the food.
- Now pancreatic juice comes into play. Being alkaline in nature it makes the medium strongly alkaline.
- Digestive enzyme trypsin (present in pancreatic juice) react with protein and proteoses and convert them into soluble amino acids.
- Amylase reacts with carbohydrate and transforms into glucose. Lipase reacts on fat converting it to fatty acid and glycerol.
- The mixture of food containing simpler and soluble products and undigested food materials passes into the intestine.
- The lining of the intestine absorbs the soluble products while the undigested food particles are stored in the rectum from where these are voided to the exterior periodically.