

Comparative anatomy of Stomach

(1)

The stomach is the sac like muscular enlargement of the digestive tract lying between the oesophagus and intestine. It is a part of the foregut and serves for temporary storage and maceration of solid food and also for preliminary stages of digestion.

A true stomach is absent in protochordates, Cyclostomes, Holocephali, Dipnoi and even certain Teleostei. In many teleosts stomach region is reduced. When epithelial lining contains gastric glands, it is known as true stomach. A true stomach is present in elasmobranchs, amphibians, reptiles, birds and mammals.

Elasmobranchs :

In elasmobranchs (shark and rays) the stomach is 'J'-shaped, differentiated into proximal cardiac part and distal pyloric part. At the junction of the two there is blind-sac.

The mucous membrane of cardiac stomach is thrown into numerous plate-like longitudinal folds that end in the blind sac. The inner lining of the pyloric stomach is more or less smooth in the proximal part.

Bony fishes and Amphibians :

In bony fishes and amphibians also, the stomach is curved 'U' shaped tube and is differentiated into cardiac and pyloric parts.

In amphibians, specially in frogs and toads, the cardiac region is more developed than narrow and ill developed pyloric region.

Reptiles :

In reptiles, the stomach is usually sac-like bent upon itself, preserving the basic amphibian pattern.

In some lizards and snakes, the stomach is very much elongated, tubular and spindle shaped; capable of great dilation.

Comparative anatomy of Stomach (2)

In Crocodile, stomach is much specialized, approaching the birds, where part of the stomach has been modified to form 'gizzard'.

Birds :

The stomach in birds is highly specialized to and has been divided into two distinct regions. The distinction is external as well as internal. The anterior part of the stomach possessing glandular lining, known as glandular stomach or proventriculus. Its secretion is mixed up with the food. The posterior part of the stomach has thick and highly muscular walls known as muscular gizzard. Its inner lining is hard and keratinized containing many tubular glands. Within the gizzard are found small gizzard stones that help in grinding.

In seed eating birds gizzard is well developed but in insectivorous and predator birds, gizzard is not so pronounced.

Mammals :

The mammalian stomach has undergone maximum modifications. It may be simple sac or divided into cardiac, fundic and pyloric regions, each region having its characteristic gastric glands.

→ The anterior part of stomach, receives the opening of oesophagus and is nearer heart, therefore called Cardiac part.

→ Main sac like portion is termed fundic part or Body. It is swollen with thick walls and secretes a digestive enzyme 'Pepsin'.

→ The caudal end called 'pyloric part' communicates with duodenum and secretes mucus. It terminates at a pyloric valve or sphincter called pylorus.

→ Gastric glands are of three types and have been named according to their location -

- (i) Cardiac , (ii) fundic and (iii) pyloric glands.

Secretion of stomach is known as gastric juice (it contains mucus, HCl, pepsin, trypsin etc.)

→ Cardiac and pyloric glands secrete mucus only. Fundic gland has 3 types of cells -

- (i) mucous neck cells producing mucus.
- (ii) Oxyntic cells or parietal cells secreting HCl.
- (iii) Zymogen cells or chief cells secrete Pepsin.

→ In Monotremes :

A true stomach is lacking in monotremes and is represented by a wide sac devoid of glands internally and is lined throughout by stratified epithelium.

→ In herbivorous mammals : the stomach is relatively large, ~~an~~ sacculated and usually divided into many chambers as seen in ruminants.

→ In Macropus sp. pyloric stomach has many sacculated folds.

→ In whales and hippopotamus, the stomach is divisible into many regions.

In Ruminants : (Ruminant stomach)

In ruminants (cow, deer etc.) stomach is differentiated into 4 well defined chambers or compartments, namely rumen, reticulum, omasum and abomasum. Among four, only the last chamber (abomasum) represents true glandular stomach containing gastric glands.

1. Rumen = The first is the rumen or paunch. It is the most spacious bag which stores food for temporary reception and fermentation.

2. Reticulum =

The second chamber is reticulum or honeycomb stomach. Its mucous lining has numerous pits. It is also a storing part and its wall are with a honey combed texture. (4)

3) Omasum or Psalterium =

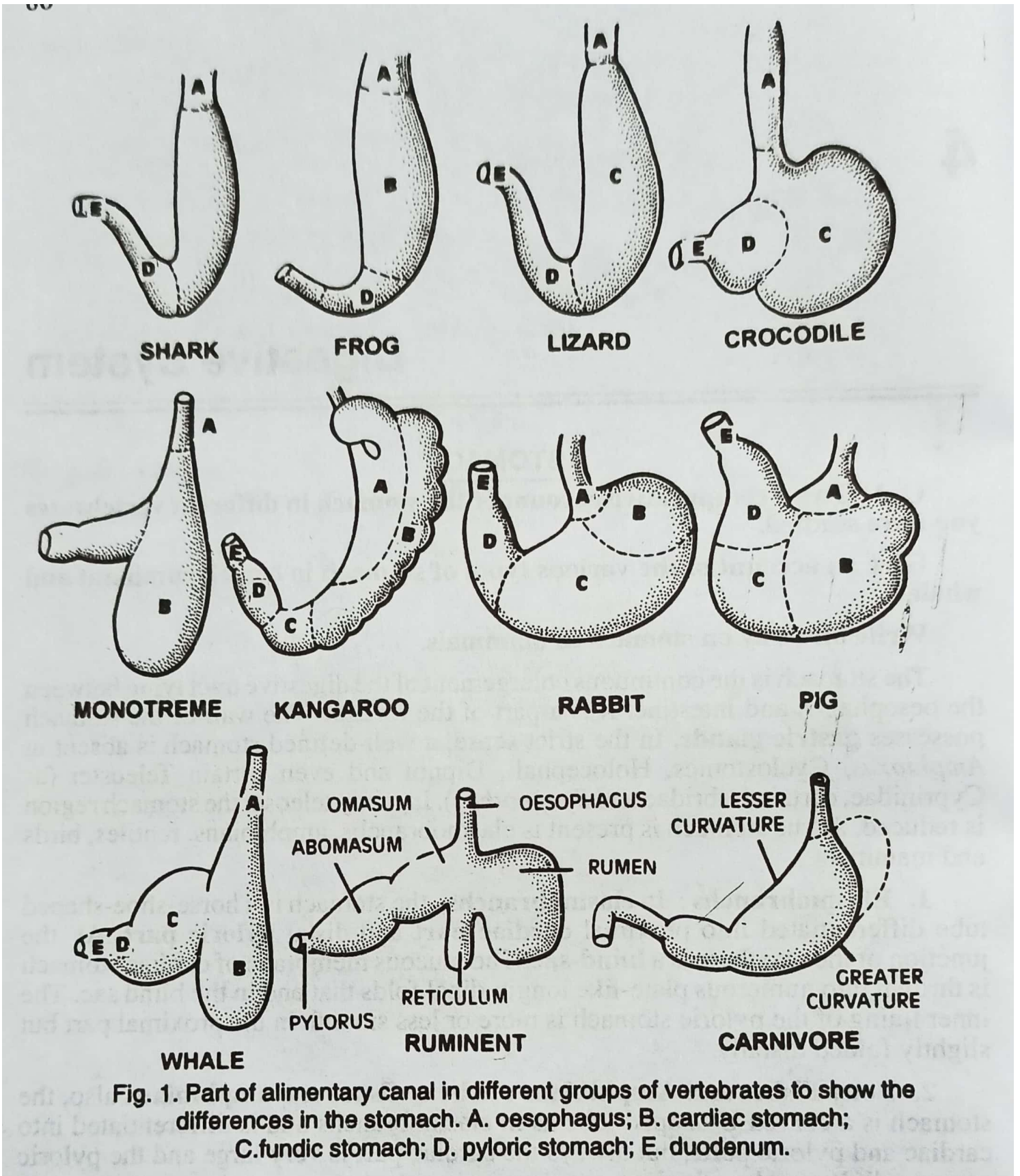
In third part of stomach, the muscular ridges occur as overlapping leaves and lined by stratified epithelium.

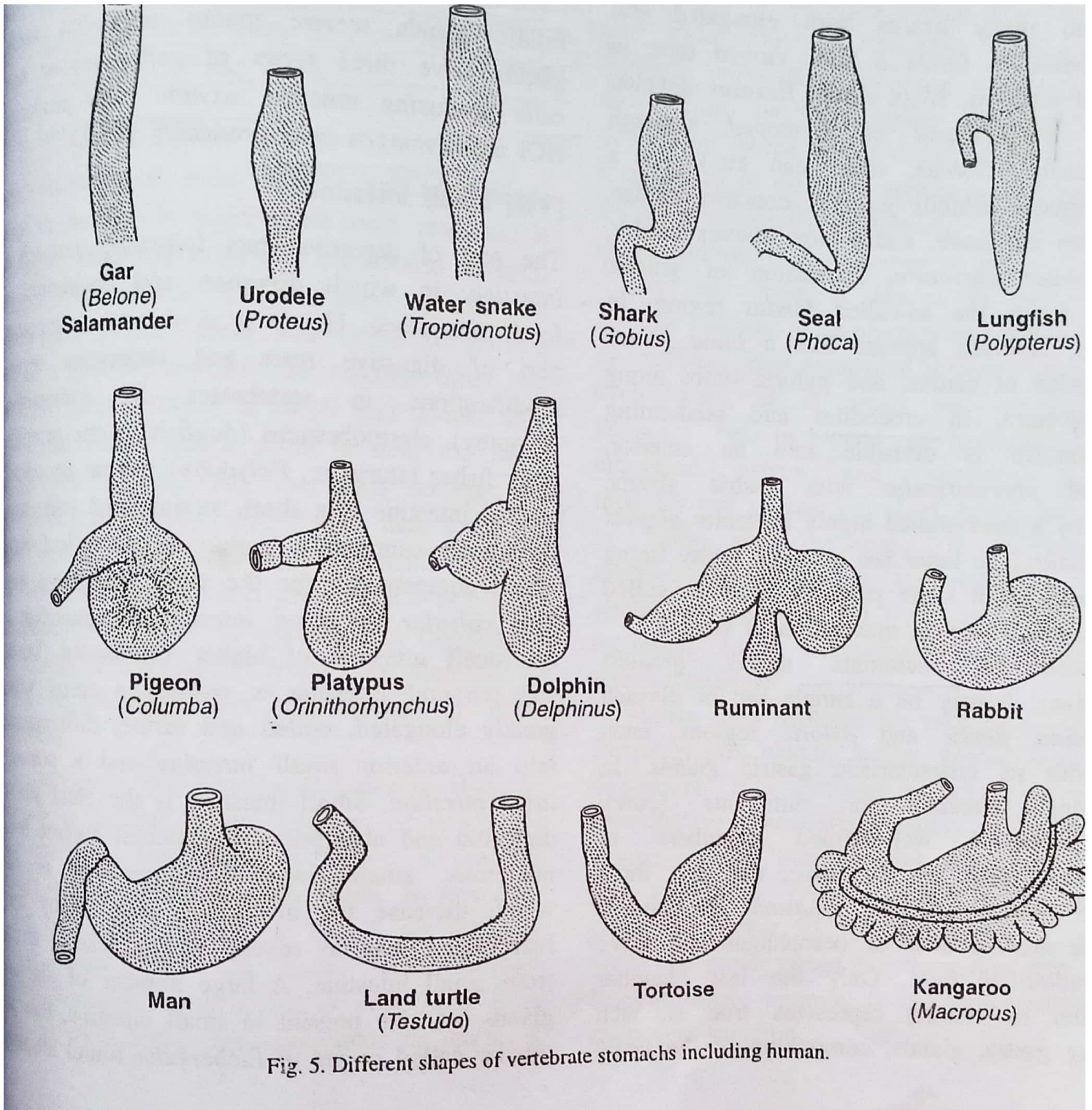
4. Abomasum or Rennet =

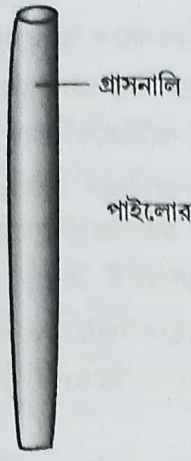
This chamber is the true glandular stomach. It possesses a smooth vascular and glandular mucous membrane with peptic glands.

In Camel's stomach =

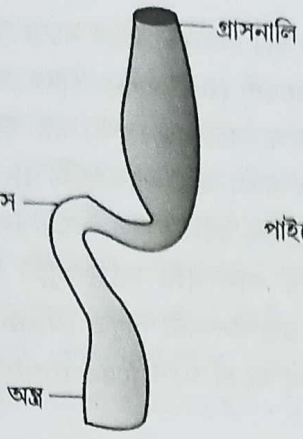
In camels, the stomach is three-chambered — namely rumen, reticulum and abomasum, while omasum is absent. The rumen and reticulum are provided with pouch-like water cells.



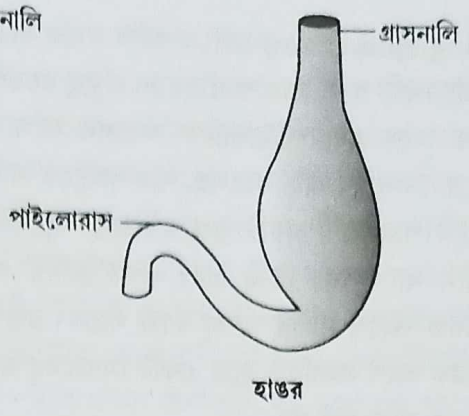




Belone sp.



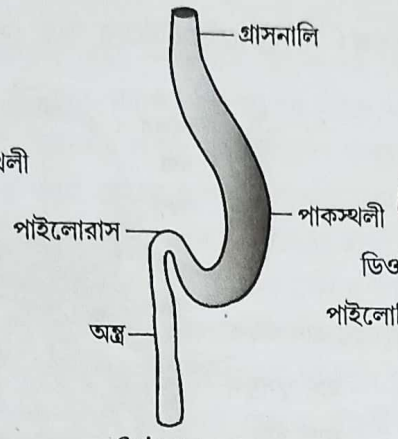
Gobius niger



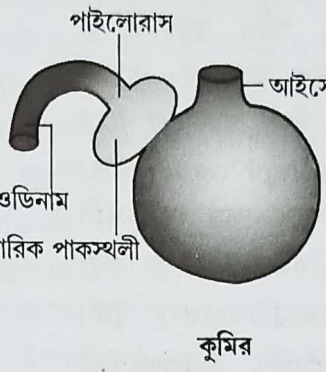
Proteus sp.



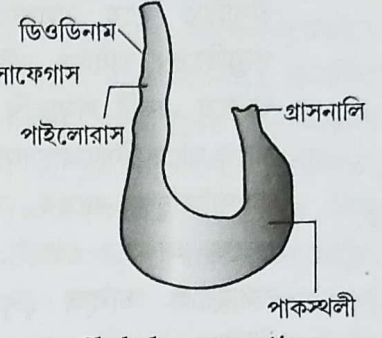
সাপ



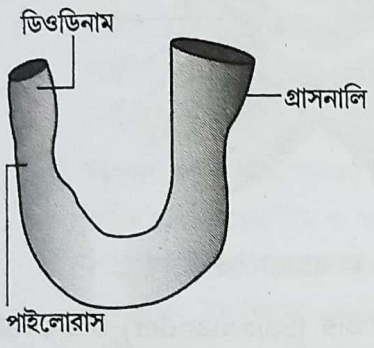
Scincus sp.



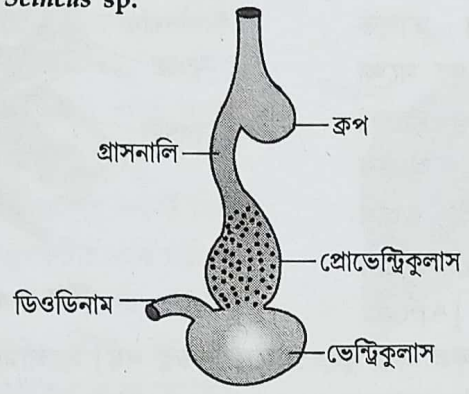
কুমির



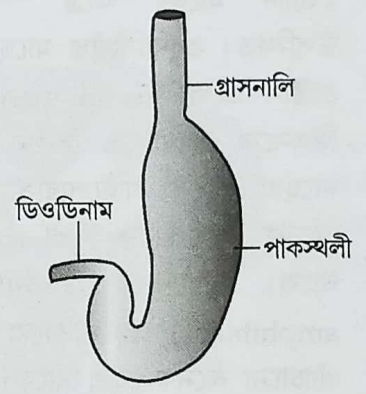
Chelydra serpentina



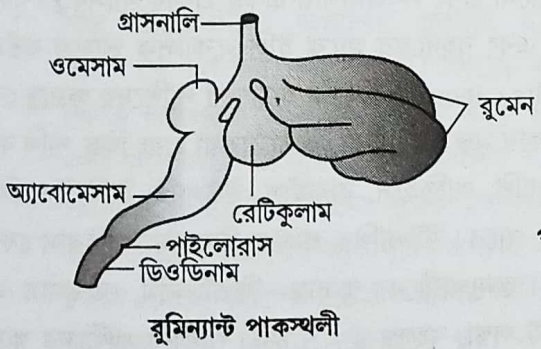
Pseudemys sp.



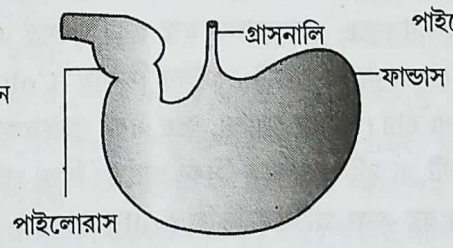
শস্যদানাভুক পাখি



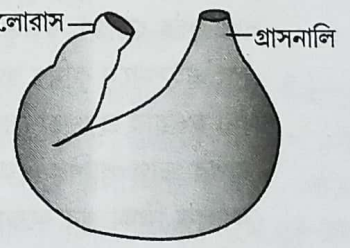
Phoca sp.



রুমিন্যান্ট পাকস্থলী



Lepus (খরগোশ)



Felis leo (সিংহ)

চিত্র 3.3 : বিভিন্ন আকৃতির মেবুদণ্ডীদের পাকস্থলী

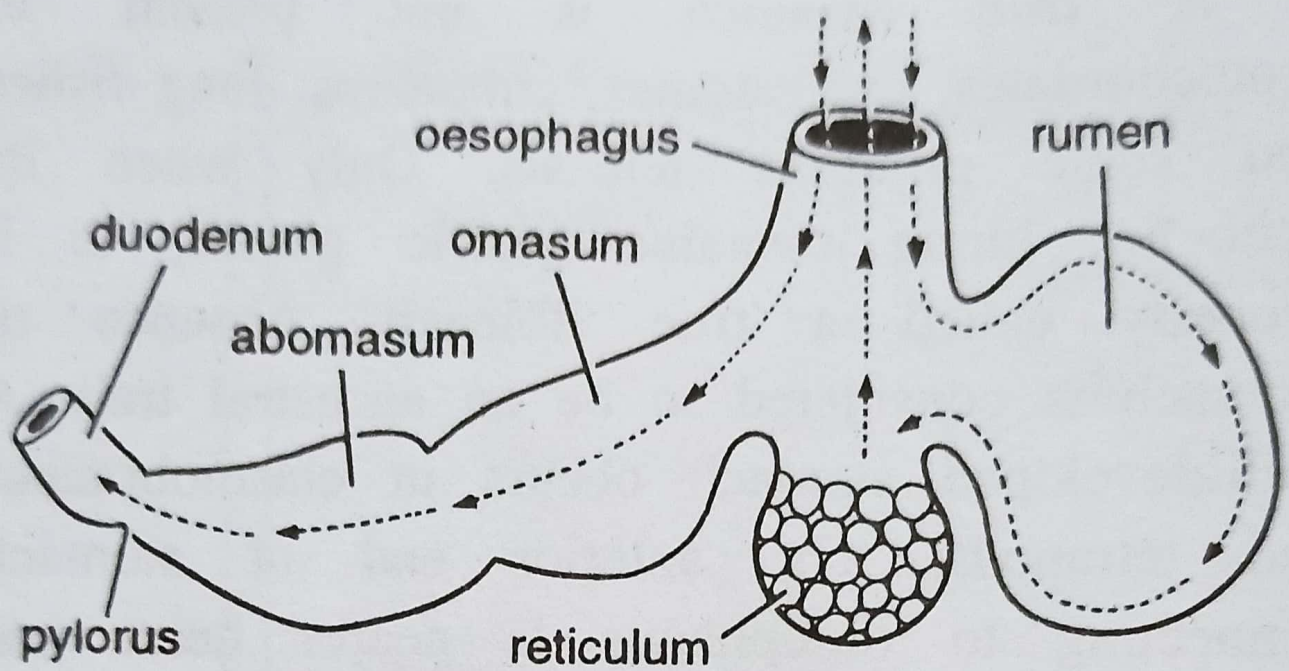


Fig. 6. Stomach of a ruminant or cud-chewing mammal. Arrows indicate course of food.

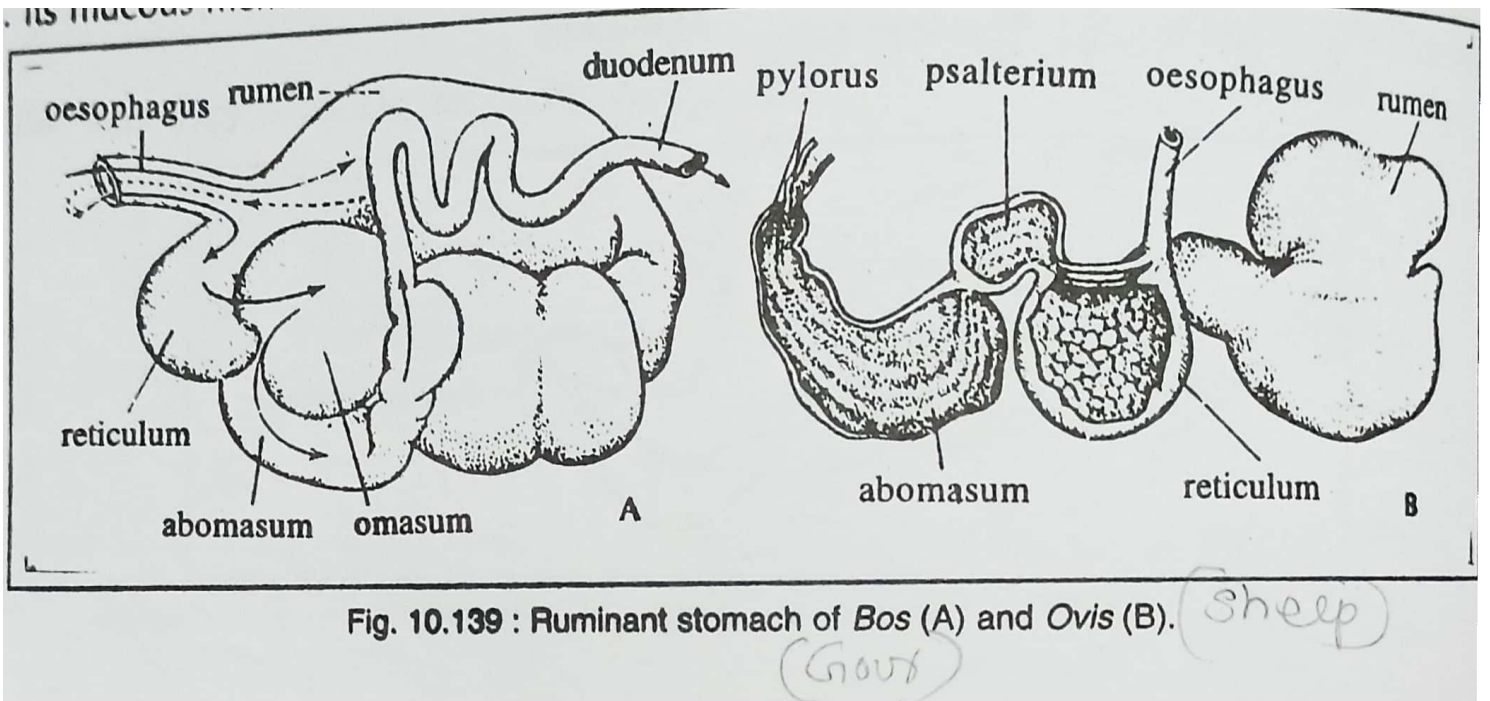
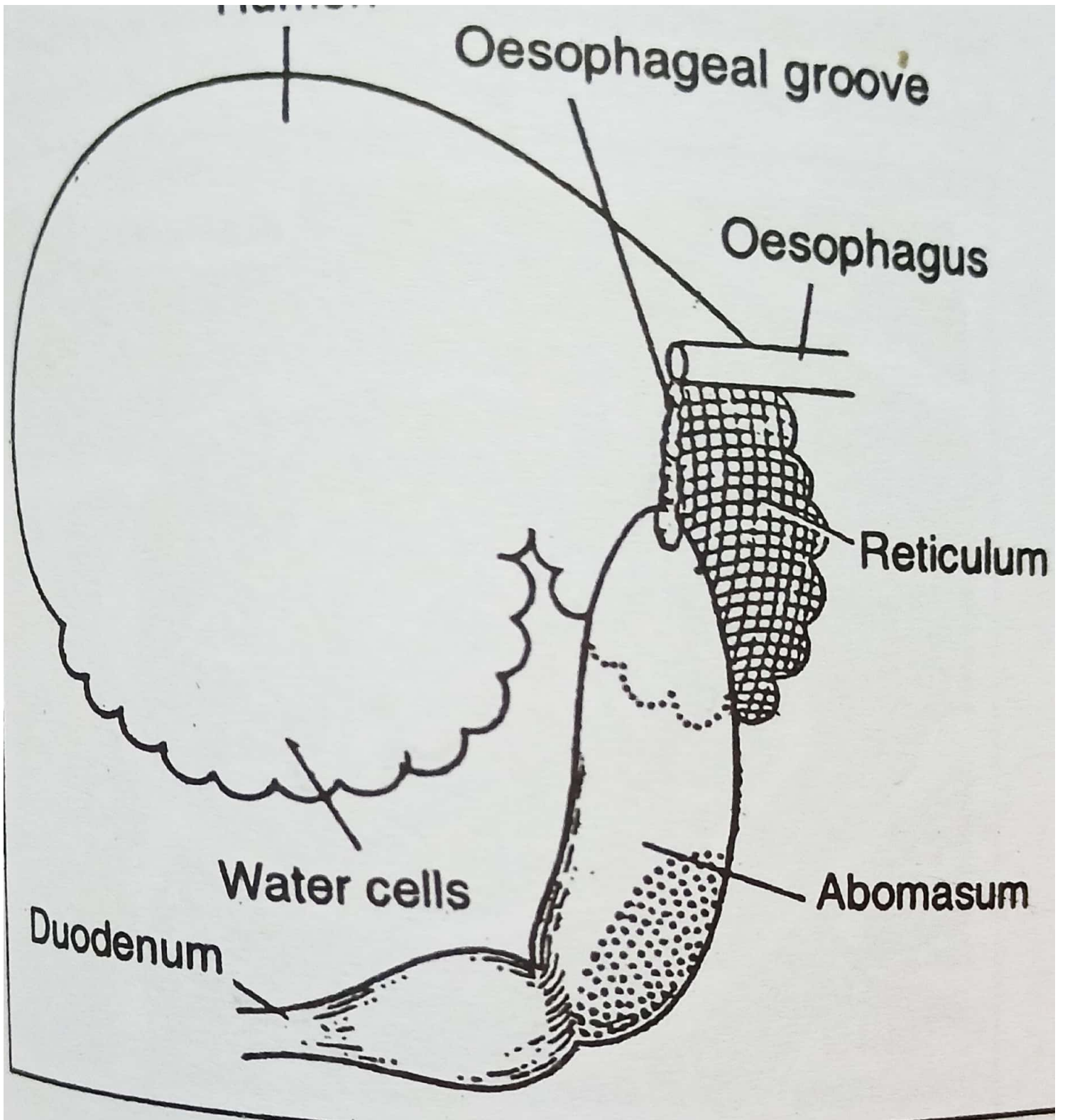
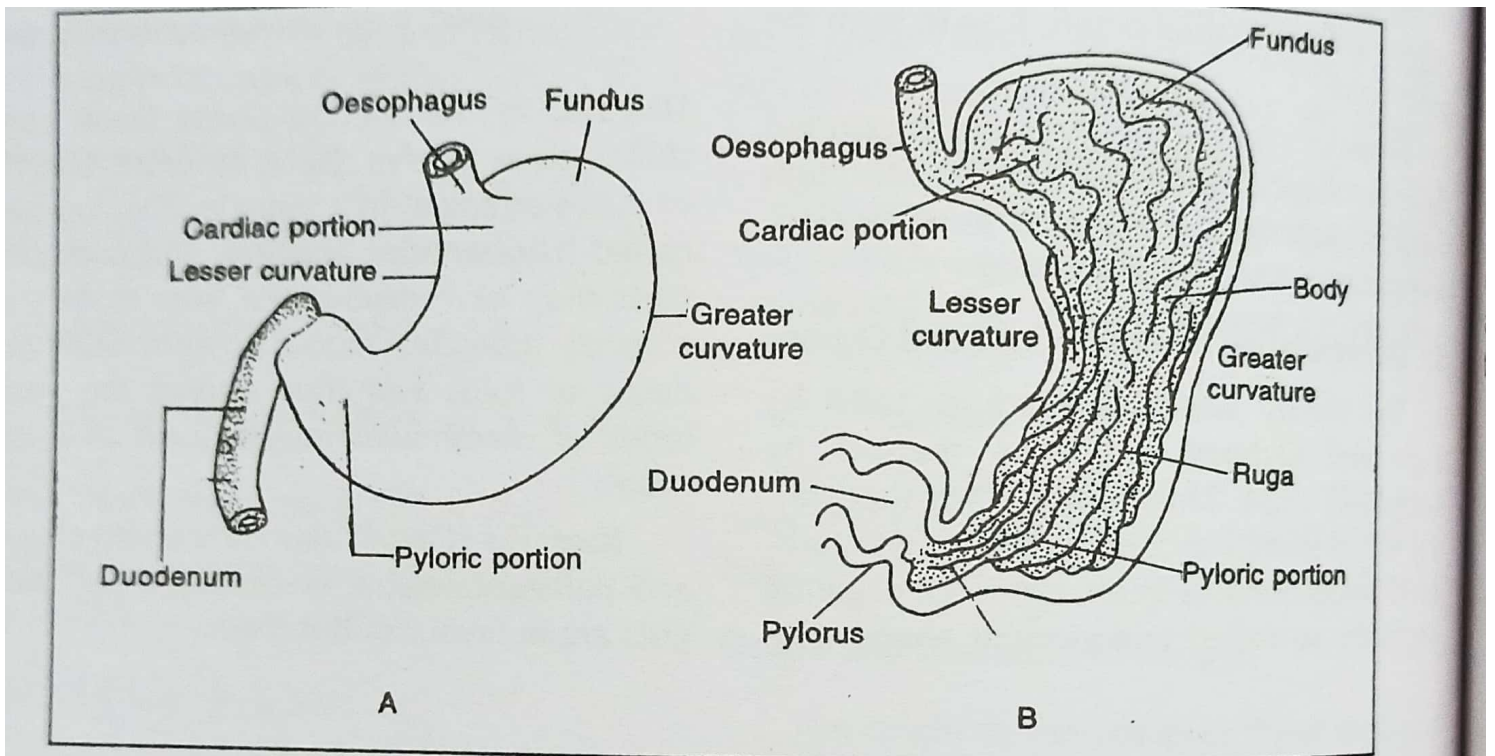


Fig. 10.139 : Ruminant stomach of *Bos* (A) and *Ovis* (B).





10.133 : Human stomach : A. Human stomach showing the external morphology, B. Internal views of human stomach.

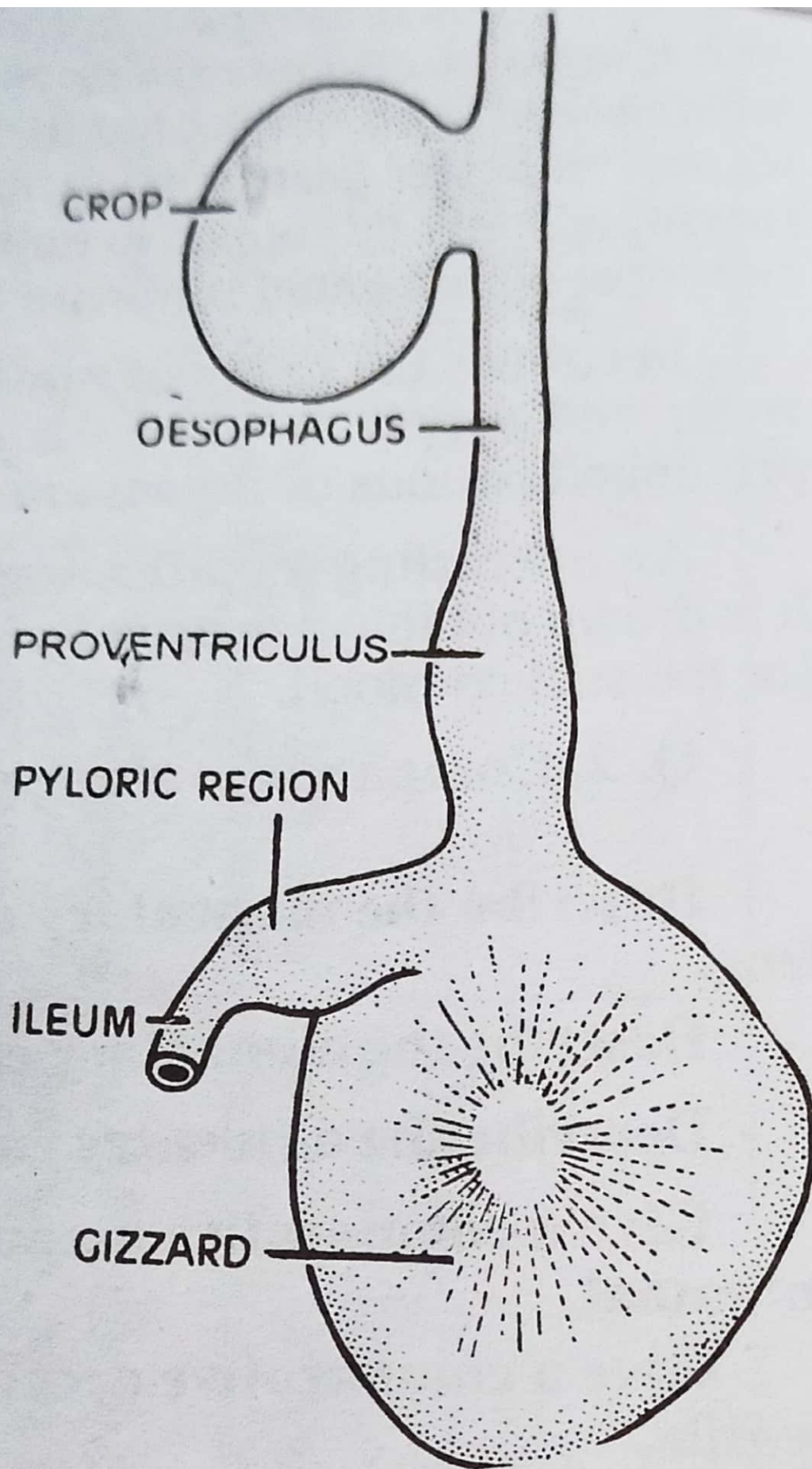


Fig. 2. Crop, oesophagus and stomach of a grain eating bird.