

DIGESTIVE SYSTEM: A GENERAL ACCOUNT

The esophagus delivers the bolus of food to the stomach, an expanded region of the alimentary canal. Stomachs are absent in protochordates, except for some urochordates in which a stomach is present to receive mucus that is laden with collected food particles from the branchial basket.

Q.What is the purpose of having stomach in a digestive system?

- i) Animals that take in large quantities of food on an irregular basis, such as many carnivores, have stomachs that serve as storage compartments until the processes of mechanical and chemical digestion catch up.
- ii) Such food storage may have been an initial function of the stomach when early vertebrates evolved from suspension feeding to feeding on larger chunks of food.
- iii) **Hydrochloric acid** produced by the stomach may have functioned to retard food putrefaction by bacteria, thus preserving it until digestion was underway.
- iv) In most vertebrates, the stomach performs an expanded role.
- v) Some absorption of water, salts, and vitamins occurs in the stomach, but predominantly it serves to churn and mix food mechanically and add digestive chemicals collectively called gastric juice. Gastric juice includes some enzymes and mucus but is primarily composed of hydrochloric acid released from the mucosal wall of the stomach.
- vi) The stomach's expanded size sets it apart from the narrow esophagus that enters it and the small intestine into which it empties.
- vii) When not distended with food, the stomach wall relaxes into folds known as rugae (a series of ridges produced by folding of the wall of an organ.), which also help delineate its boundaries (Figure 34).
- viii) On the basis of mucosal histology, two regions of the stomach can be distinguished. **The stomach's glandular epithelium** is characterized by the presence of gastric glands. These are **branched, tubular glands**, several of which empty into the bases of surface indentations, or gastric pits.

Q.Mention general features of stomach. /Q.Which part of stomach is more important and why?

i) There are three divisions of the stomach—**cardia, fundus, and pylorus**—based on the relative position and type of gastric gland.

(a) **The cardia** is a very narrow region found only in mammals, and it marks the transition between the esophagus and the stomach. Its gastric glands, termed cardiac glands, are composed predominantly of mucus-secreting cells.

(b) **The fundus** is usually the largest region of the stomach and contains its most important gastric glands, the fundic glands. Mucous cells are present in fundic glands, but these glands are distinguished by their abundance of parietal cells, the source of hydrochloric acid, and chief cells, the presumed source of several proteolytic enzymes.

(c) Before emptying into the intestine, the stomach usually narrows into a **pylorus, whose mucosal walls hold distinct gastric glands called pyloric glands**. The pyloric glands are predominantly *composed of mucous cells whose secretions help to neutralize the acidic chyme as it moves next into the intestine.*

Thus, most of the chemical and mechanical processes of gastric digestion occur in the **fundus**. The cardia (when present) and pylorus add mucus. Smooth muscle bands in their walls act as sphincters to prevent the retrograde transfer of food (Figure 1).

Q.What do you mean by nonglandular part of a stomach?

i) In addition to a region of glandular epithelium, the stomach of some vertebrates also has a second region characterized by **nonglandular epithelium, devoid of gastric glands.**

ii) As in some herbivores, the **nonglandular region** may develop from the base of the esophagus.

iii) In other species, such as rodents, loss of *gastric glands in the mucosa leaves a nonglandular epithelial stomach* in which smooth muscle contractions knead [work (moistened flour or clay) into dough or paste with the hands.] and mix digesta. This nonglandular epithelium in rodents also can be keratinized, perhaps as a result of mechanical abrasion from rough foods such as seeds, grasses, and insect chitinous exoskeletons. Chemical insult from digestive enzymes added in the mouth may also cause a keratinized nonglandular epithelium.