

The BIOCHEMISTRY of GASTRIC ACID SECRETION

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CHAPTER I

THE GASTRIC MUCOSA AND THE SITE OF THE ACID SECRETING CELLS

GENERAL DESCRIPTION

THE STOMACH wall (Fig. 1) in man and higher animals is made up of a mucous layer or mucosa containing the secreting glands, a submucous and a muscular coat, outside which is a serous coat derived from the peritoneum.

The muscular coat, made of plain muscle fibre, consists typically of outer longitudinal, middle circular and internal oblique layers.

The submucosa consists of loose connective tissue containing blood vessels and lymphatics, and contains a ganglionated nerve plexus similar to the plexus of Meissner in the intestine.

The mucous or glandular coat is bounded externally by the muscularis mucosae which consists of an outer longitudinal and inner circular layer of plain muscular fibres, the inner layer sending strands of muscle towards the surface, between the glands. When the stomach is empty the muscular coats contract and the inextensible mucous membrane is thrown into numerous prominent folds. Its surface is mamillated or marked out into a number of small, slightly elevated polygonal areas. These little areas from 1 to 6 mm. in diameter have numerous small pits, *foveolae gastricae*, about 0.2 mm. wide, the surface separating them forming a series of elevated ridges, *plicae villosae*, resembling villi on section.

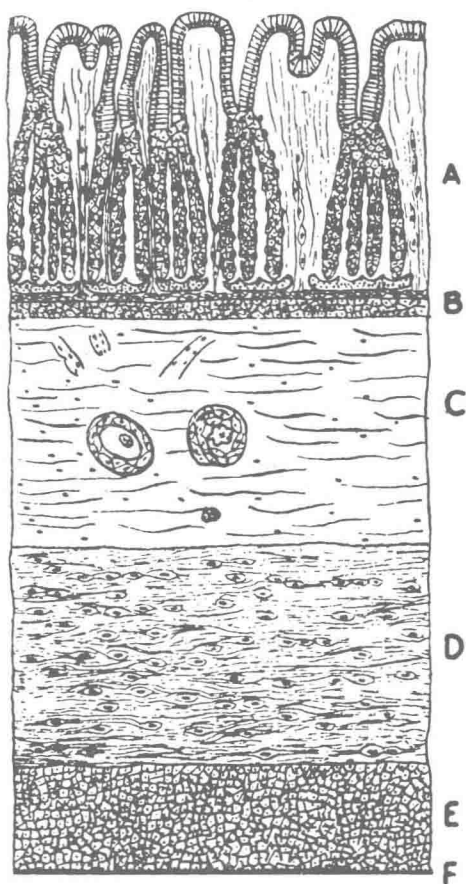


Fig. 1. Diagrammatic section through wall of stomach. (A) Mucous layer with glands opening into gland ducts. (B) Muscularis mucosae. (C) Submucosa. (D) Circular muscle layer. (E) Longitudinal muscle layer. (F) Serous coat.

The gastric glands. The gastric glands differ somewhat in different parts of the mucosa. Such parts have been distinguished as a small area near the oesophagus termed the cardiac region and near the duodenal entrance,

the pyloric region, the main part being termed the fundus or corpus. Often the stomach is considered simply as divided into two regions, a cardiac (including the fundus) and a pyloric region, and various other names have been used.

In general a gastric gland is composed of secreting tubules, one or more in number, which open at the surface into the foveola (crypt or pit). An average number of 4.3 tubules open into each crypt of the gastric mucosa of an adult man (Scott, 1925), and the average number of tubules in the human subject is nearly fourteen million (about half a million in the new born, Scott, 1925).

In man the thickness of the mucous layer varies between 0.5 to 1.5 mm. (Babkin, 1950) but in the pig it may reach to 3.5 mm. (Holter and Linderstrøm-Lang, 1934). The width of the body of the gland is generally less than 100 μ and the inner diameter of the collecting tubule less than 10 μ (Hollander, 1943).

The following types of cells may be distinguished.

(a) **Surface columnar epithelium.** This lines the crypts and forms the innermost layer of the gastric mucosa. The cells secrete mucus, from mucigen granules (Schaffer, 1927). The mucus forms a layer covering the surface of the stomach and mucus threads may be observed joining the mucous layer (Bucher, 1932) with the surface epithelium.

(b) **Central cells.** The epithelium of the secreting tubules is composed of two kinds of cells termed from their position, *central* and *parietal*. The central include the peptic or chief cells of the fundic glands, and also a type of cell which is found in the neck of the gland and stains with a Mallory stain like mucin-containing cells. These are often referred to as the mucoid cells of the neck.

(c) **Parietal cells.** These cells, which secrete the

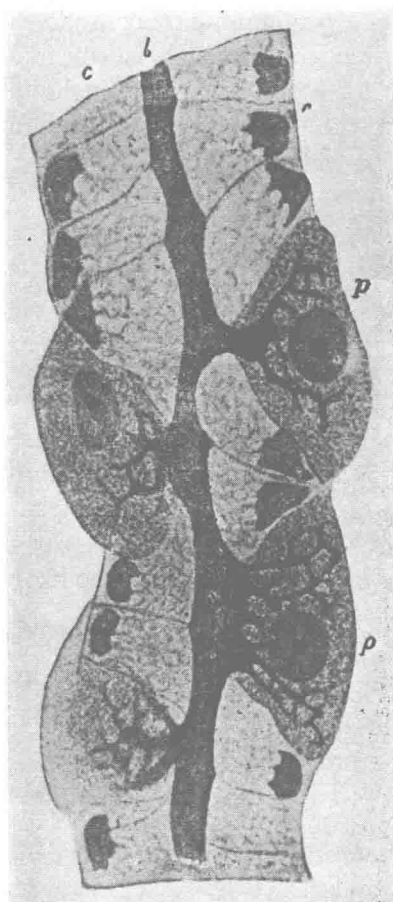


Fig. 2. Part of tubule of fundus gland showing lumen and the secreting canaliculi of the parietal cells; also the chief or pepsin-secreting cells (after Zimmermann).

HCl of the gastric juice, are concentrated chiefly in the neck of the glandular tubule, the body of the tubule being composed mainly of peptic cells.