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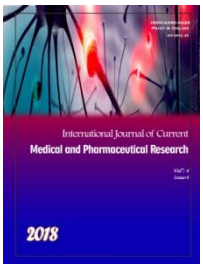


# HISTOLOGICAL OBSERVATIONS OF STOMACH IN DIFFERENT MAMMALS

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**ABSTRACT**

**Introduction:** Despite striking advances have been made in the technology of microscope to elucidate the ultra structure of various body tissues, yet the exact histology picture of stomach remained an enigma for different research workers engaged in the field, all over the world to resolve the issues. Although the wall of the stomach consists of four usual layers, Serous, muscular, submucous and mucous together with various types of glands, vessels and nerves; but it is oversimplification of the complex subject.

**Material and Methods:** The aim of the present work is to study the histological variations in the stomach of some mammals, include in this series of study. The stomach of different species have been chosen for the study, which are commonly available i.e. human, albino rat, guinea pig, rabbit, goat etc. The tissues were kept for histological examination in 10% formal saline solution. Paraffin- blocks were prepared. These block specimen were cut a thickness of about 5 microns and now usual Haematoxylin and Eosin staining were performed on albuminised slides.

**Observations:** A true glandular stomach is present only in carnivores; all other domestic mammals possess non glandular organs of various kinds.

**Summary And Conclusion:** A critical study of the histology aspects of stomach in some mammals was done. It was also tried to study the evolutionary changes in stomach with respect to the development of animals in the phylogenetic scale. In addition to the above, a brief study its microscopic features were also studied.



## INTRODUCTION

Despite striking advances have been made in the technology of microscope to elucidate the ultra structure of various body tissues, yet the exact histology picture of stomach remained an enigma for different research workers engaged in the field, all over the world to resolve the issues. Although the wall of the stomach consist of four usual layers, Serous, muscular, submucous and mucous together with various types of glands, vessels and nerves ; but it is oversimplification of the complex subject. Literature to date fails to explain the exact histological pattern of the gastric mucosa which in its own turn makes it difficult to explain the various pathophysiological disorders of stomach often encountered in our clinical practices are poorly understood and any attempt to cure such disorders often proves empirical. The stomach, a component of the gastrointestinal tract , performs the function of storage and churning of food in to a semi liquid called chime. Histological view of the stomach presents an adaptation favouring the diets of a particular animal (Ofusori *et al*, 2007)(1). The histoarchitectural organization including the distribution of connective tissue fibres provides a useful interpretation of the adaptational mechanisms adopted by the gut of different animals in copying with their diets [2](Hildebrand and Goslow, 2001). Connective tissues also known as supporting tissue provides structural and metabolic support for other tissues and organs throughout the body[3] (Heath *et al*, 1999). They are mesoderm in origin and mediate the exchange of nutrients, metabolites and waste product between tissues and circulatory system. The fibrous components of supporting tissues are of two types: collagen and elastin. The presence, arrangement and distribution of the connective tissue fibers in the stomach have been known to be related to specific diet (Ofusori and Caxton-Martin, 2005)(4). The cellular component of the stomach consisted of a mixed population of cells of three main types: mucus-secreting cells, acid secreting cells (parietal cells) and pepsin-secreting cells (zymogenic cells) (Heath *et al*)(3). The secretory activities of these cells is controlled by the autonomic nervous system and the hormone gastrin secreted by endocrine cells mainly located in the pyloric region. The present observation will provide the morphological base line for further experimental work on the fine structural alterations associated with changes in the physiological state of the mammalian stomach.

## MATERIAL AND METHODS

The aim of the present work is to study the histological variations in the stomach of some mammals, include in this series of study. The stomach of different species has been

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chosen for the study, which are commonly available i.e. Human, Albino rat, Guinea pig, Rabbit, Goat etc.

***Procurement of Specimen:*** Human stomachs were obtained from the patients undergoing operations for either gastric ulcer or malignancy of the stomach from Upgraded Department of Surgery, Darbhanga Medical College & Hospital, Laheriasarai. The specimens were taken out from the healthier portions of the stomach. The animal stomachs were procured from slaughter house where animals were sacrificed from the department of Pharmacology, D.M.C. and Bihar Veterinary College, Patna.

Stomach of guinea pig and albino rat has been taken from animal house in the Department of Anatomy, Darbhanga Medical Collage, Laheriasarai.

## METHODS

The tissues were kept for histological examination in 10% formal saline solution. Sections of all paraffin block were cut at thickness of 5 microns in a ribbon. Serial sections of the whole blocks were not maintained but the slides prepared were the representative of the whole block. For qualitative, histological observation of the mucosa, Harri's haematoxylin with Eosin as counter stain were used for staining on albuminised slides. Mucous layer is stained and histological findings were noted in all the mammals and compared.

***Obsevations***

***The general and Histological Organisation of Stomach***

A true glandular stomach is present only in carnivores; all other domestic mammals possess non glandular organs of various kinds.

Topographic distribution of the several regions

1. Non glandular (Esophageal) Region- This portion is absent in the rabbit, albino rat and guinea pig. In the goat it extends from the esophagus to the margo plicatus. In ruminants all forestomach are lined by a nonglandular mucosa.
2. Cardiac Region- In the goat and ruminants, a very small area of cardiac glands is present adjacent to the mucosa of the esophagus of the nonglandular region.
3. Fundic Region – In the rabbit, albino rat and guinea pig this region extends over half of the stomach in the horse, it occupies one-third of the stomach. In ruminants, fundic glands are present in two-third of the abomasums.
4. Pyloric Region – In all domestic mammals the pyloric region occupies the remainder of the stomach. In the rabbit albino rat and guinea pig, it amounts to approximately half. In the goat, about one-third of the stomach is occupied by the pyloric region. In ruminants about one-third of the abomasums is pyloric region.

Structure of the various compartments

**Rumen** – The characteristics structures of the rumen are the ruminal papillae which are wide flat epithelium-propria protrusions of the mucosa. They are especially long (up to 15 mm) in the blind sacs, and absent on the pillars and sometimes also on the dorsal wall, where slight folds are present. The function of the papillae is to increase the absorbing surface and probably also to heat (heating rod action) the ruminal contents.

***Mucosa***

1. ***Lining epithelium:*** This lamina is a very thin layer of stratified squamous keratinized epithelium.
2. ***Lamina Propria****:* An irregular dense connective tissue forms the core of the ruminal papillae. Sometimes lymphoreticular tissue is present. A layer of condensed connective tissue is present at the limit between propria and submucosa.
3. ***Muscularis mucosa:*** This is absent, but occasionally single smooth muscle cells are present.

***Submucosa:*** consists of loose connective tissue.

***Muscularis Externa:*** Two or three layers make up this layer. They are especially thick at the pillars.

***Serosa:*** The lamina subseross is rich in adipose tissue, especially in the ruminal grooves. The lamina epithelialis serosa is a simple squamous or low cuboidal epithelium.

Vascularity, nerve supply large blood vessels are locked in the submucosa. A dense capillary of the rumen is parasympathetic (vagus) and sympathetic.

***Reticulum*** - This fore stomach is separated from the rumen by the ruminoreticular fold. The mucosa is thrown into reticular folds which can be subdivided into primary, secondary and tertiary folds.

***Mucosa***

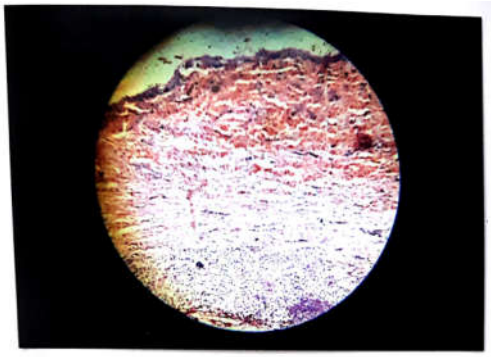
1. **Lining epithelium:** A stratified squamous keratinized epithelium is present; a higher degree of Keratinization is observed on wet-like lateral papillae of the folds.
2. ***Lamina Propria:*** The propria is a dense irregular connective tissue with elastic networks.
3. ***Muscularis mucosa:*** In the apical portion of the primary and secondary folds, longitudinal bundles of smooth muscularis mucosae of the ventricular groove.

a. ***Submucosa****:* The submucosa is not clearly separable from the propria and consists of loose connective tissue.
b. ***Muscularis Externa****:* The inner layer of the muscularis externa consist of fine bundles which are continuous with the longitudinal layer. The outer layer is continuous with the transverse muscle bundles of the ventricular groove.
c. ***Serosa****:* Its structure is identical to that of the tunica serosa of the rumen.
d. ***Vascularity, nerve supply:*** The vascularity and nerve supply are similar to those of the rumen.

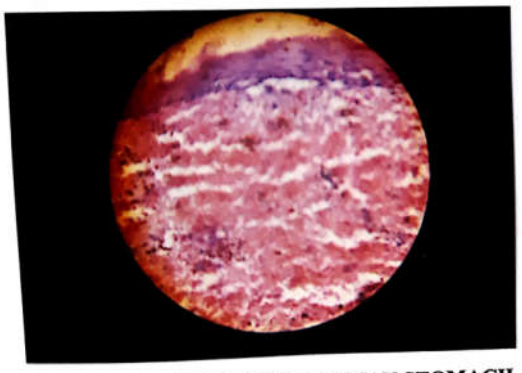
***Ventricular Groove*** –The ventricular groove can be subdivided into three positions; the reticular, omasal and abomasal portions.

***Mucosa***

1. ***Lining epithelium:*** The ventricular groove is lined by stratified squamous keratinized epithelium . Claw-like papillae exist at the entrance into the omasum.
2. ***Lamina propria:*** An irregular dense connective tissue
3. ***Muscularis mucosa:*** This layer consists of a few scattered muscle bundles especially in the floor of the groove. It is continuous with the lamina muscularis mucosae of the omasum and reticulum.



PHOTOGRAPH SHOWING : HUMAN STOMACH
(LOW POWER MICROSCOPE)



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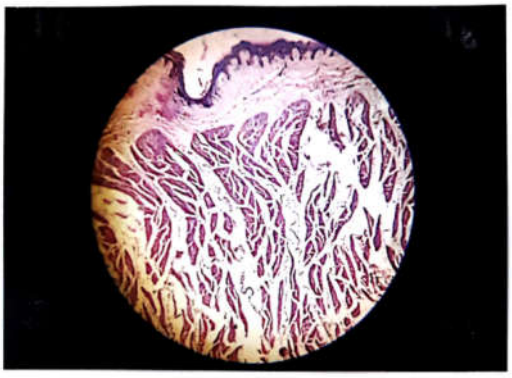

PHOTOGRAPH SHOWING : GOAT STOMACH
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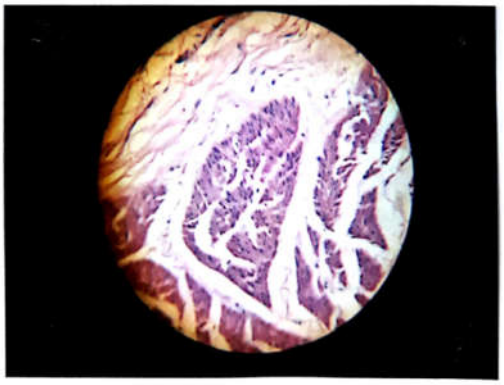

PHOTOGRAPH SHOWING : GOAT STOMACH
(HIGH POWER MICROSCOPE)

PHOTOGRAPH SHOWING : GUINEA PIG STOMACH
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PHOTOGRAPH SHOWING : GUINEA PIG STOMACH
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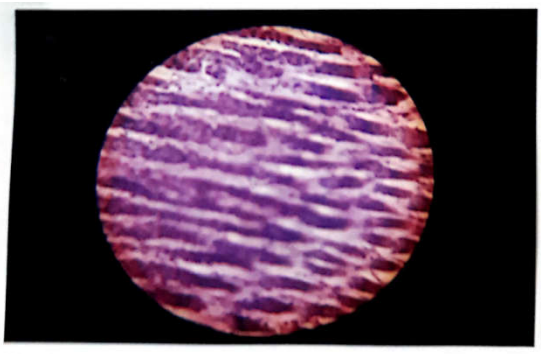

PHOTOGRAPH SHOWING : RAT STOMACH
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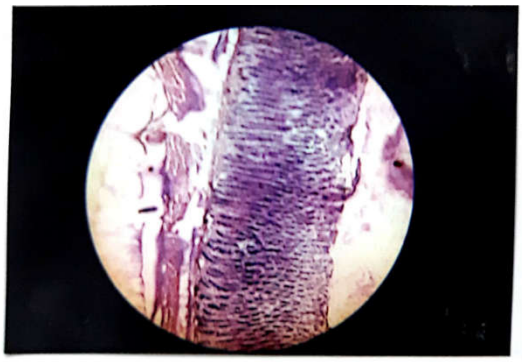

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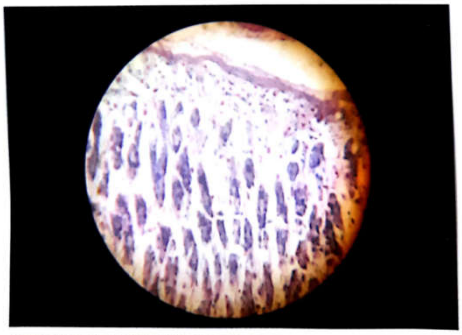
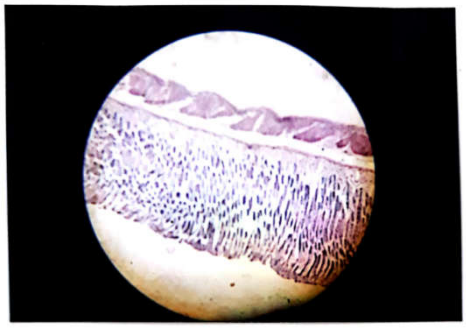


PHOTOGRAPH SHOWING : RABBIT STOMACH (HIGH POWER MICROSCOPE)



PHOTOGRAPH SHOWING : RABBIT STOMACH (LOW POWER MICROSCOPE)

***Submucosa:*** The layer consist of loose connective tissue. In goat, occasionally simple branched tubula-acinar mucous or mixed glands are present.

***Muscularis Externa:*** The longitudinal layer is located in the lips of the ventricular groove and is continuous with the inner layer of the tunica muscularis of the reticulum, omasum and abomasums.

***Serosa:*** This structure is identical to that of the tunica serosa of the rumen.

***Vascularity, nerve supply:*** Conditions similar to those in the rumen are found in the ventricular groove.

***Function:*** The ventricular groove conveys liquid into the abomasums, bypassing the fore stomach; in suckling animals, it closes upon receiving milk and forms a tube. Copper sulfate (in sheep) and sodium bicarbonate cause the groove to close in adult animals.

***Omasum***

The omasal mucosa is thrown into leaf-like primary (I), secondary (II), tertiary (III) and quaternary (IV) folds.

***Mucosa***

1. ***Lining epithelium:*** The epithelium is stratified squamous and keratinized. Numerous keratinized papillae are found on the sides of the leaves.
2. ***Lamina propria:*** It consists of dense irregular connective tissue. In the papillae, the fibroblasts are arranged in concentric layers with large intercellular spaces.
3. ***Muscularis mucosa:*** The lamina muscularis mucosae are uninterrupted and extend into the folds where it forms two peripherally located layers. These layers fuse in the free edge of each fold with the centrally located layer of the tunica muscularis.

***Submucosa****:* This is composed of loose connective tissue.

***Muscularis Externa****:* This consists of two muscle layers; the inner layer extends between the two layers of the lamina muscularis mucosa into the folds (except the smallest [IV] ones) and fuses in the free edge with the lamina muscularis mucosae.

***Serosa****:* Its structure is identical to that of the tunica serosa of the rumen

***Vascularity, nerve supply:*** The descriptions above apply in essence to the omasum.

Function of the Fore stomachs - This rumen is a large reservoir of food. Cellulose (polysaccharide) is broken down primarily in the rumen, forming butyric, acetic and propionic acids which are the major source of metabolic energy in ruminants.

***Omaso-Abomasal Fold***

***Mucosa***

1. ***Lining epithelium:*** This lamina is a stratified squamous and, toward the abomasal side, simple columnar epithelium.
2. ***Lamina propria:*** There are many lymphocytes, eosinophils, plasma cells and mast cells. Frequently, lymph nodules are found (especially in the pig).

The propria contains the gastric glands, which are simple branched tubular coiled specific and nonspecific glands.

***Specific gastric glands or fundic glands:*** These glands are called specific glands because of the nature of their secretary product, which is specific for the stomach, as opposed to the nonspecific secretary product of the cardiac and pyloric glands. The fundic glands are generally composed of three regions: The neck region, containing predominantly mucous neck cells, a few chief cells, and some parietal cells. The body, containing mainly chief cells and parietal cells. The fundus, with chief cells, a few parietal cells and argentaffin cells.

***Mucous neck cells:*** These cells are located only in the neck. The mucous neck cells have an appearance typical of mucous cells, Often, transitional forms between mucous neck cells and surface epithelial cells of the gastric pits are found.

***Chief cells:*** The chief cells are typical serous zymogen cells (resembling pancreatic cells).

They are cuboidal, with a basophilic cytoplasm. Short microvilli on the surface, well-developed cisternae of the endoplasmic reticulum in the basal portion and around the nucleus, abundant ribosomes, well-developed Golgi apparatus, zymogen granules toward the surface.

***Cardiac glands***

The simple branched tubular coiled glands contain mucous secreting cells and argentaffin cells. In the dog, some parietal cells are present in addition. In the pig, the basal portion (fundus) of the glands contains chief cells.

***Function:*** production of protective mucus and gastrin (which regulates in part, the activity off the parietal cells).

***Pyloric glands:*** These glands are shorter, more branched and coiled, and open into deeper gastric pits than in the other

regions off the stomach. The cells morphologically resemble mucous neck cells or cells of the submucosal intestinal glands with basophilic, light-staining cytoplasm and, frequently, flat nuclei in the cell basis. Occasionally, parietal cells occur.

***Function:*** production of protective mucus and gastrin (in higher amounts than the cardiac glands).

***Subglandularis:*** This layer is interposed between the glands and the muscularis mucosae. It occurs regularly in carnivores. In young animals, it is one layer, in older animals, it is composed of the two layers. The innermost layer is called the stratum granulosum and contains of two layers. The outer layer is the stratum compactum, a tendon-like sheet of collaagenic fibers (dense regular connective tissue. In carnivores, the stratum compactum supposedly provides protection against perforating bone splinters.

***Muscularis mucosa:*** Between one and four layers of smooth musculature, perpendicular to each other, make up this lamina. 2. a light zone with thin mucosae only a few parietal cells. The pyloric zone does not possess any peculiarities.

***Gastric Structure (Human):*** The wall of human stomach consists of four usual layers : serous, muscular, submucous and mucous together with vessels and nerves. The serosa covers the entire surface of the organ excepting along the greater and lesser curvatures and a small area on the postero-inferior surface of the stomach, close to the cardiac orifice.

The muscularis externa is situated immediately beneath the serous covering. It consists of three layers of visceral muscular fibers: longitudinal, circular and oblique. The longitudinal fibers are the most superficial and are arranged in two sets. The first set consist of fibers continuous with the longitudinal fibers of the oesophagus and they radiate from the cardiac orifice, best developed near the curvatures and end proximal to the pyloric portion. The second set commences on the body of the stomach and passes to the right, its fibers becoming more thickly arranged as they approach the pylorus. Some of the superficial fibers of this set pass on to the duodenum, but the deeper fibers turn inwards and interlace with the fibers of the pyloric sphincter.

The circular fibers from a uniform layer over the whole of the stomach internal to the longitudinal fibers. At the pylorus they are most abundant, and are three aggregated into a ring which forms the pyloric sphincter. The circular fibers of the gastric wall are continuous with those of the oesophagus, but they are sharply marked off from the circular fibers of the duodenum by connective tissue septum.

The oblique fibers, internal to the circular layer, are limited chiefly to the body of the body of the stomach and are most developed near the cardiac orifice. They sweep downwards from the cardiac notch and run more or less parallel with the lesser curvature. On the right they present a free and sell-defined margin, on the left they blend with the circular fibers.

The sub mucosa consists of loose, aereolar tissue, connecting their mucous and muscular layers. The mucous membrane is thick and its surface is smooth, soft and velvety.

***Structure of Gastric Mucosa***

When examined with a lens, the luminal surface of the mucous membrane because it is covered with small depressions or alveoli of a polygonal or slit-like from, about 0.2 mm in diameter. These are the gastric pits and at the bottom of each are the orifices of the gastric glands. The surface of mucous membrane and that off the gastric pits is covered with a single layer of columnar cells, the surface mucous cells, which liberate mucous from their apices on to the surface of the stomach.. The type of epithelium commences very abruptly at the cardiac orifice, where there is a sudden transition from the stratified epithelium of the oesophagus. The gastric glands comprise: (1) Cardic gland; (2) main glands of the body and fundus and (3) pyloric glands.

The Cardiac Glands are few in number and are confined mainly to a small area near the cardiac orifice; some are simple tubular glands whilst others are compound racemose in type. Mucous-screting cells predominate whilst oxyntic and zymogenic cells are infrequent.

1. The chief (peptic or zymogenic) cells are present particularly at the basal parts of the glands . These are cuboidal, and strongly basophilic because of their contained RNA.
2. The oxyntic (parietal) cells, large rounded and eosinophilic, are most numerous on the side walls and near the duct of the gland.
3. Mucous neck cells are present and cattered between the other types of cell and are particularly numerous around the neck of the glands.
4. Argentaffin cells occur in all types of gastric gland but more commonly in those of the body and fundus than in the deeper parts of the gland, lying between the zymogenic cells and the basal lamina – only occasionally do they reach the gland lumen. But these cells couldn't be demonstrated here as only H & E stain was used.
5. Undifferentiated columnar cells are also present in smaller number and these appear to be the origin of new cells to replace the existing one as they are lost.

The Pyloric Glands each consist of two or three short convoluted tubes opening into a conical pit which occupies about two-thirds of the depth of the mucous membrane. The epithelial cells are predominantly mucous in type, oxyntic cells being sparse.

Between the glands the mucous membrane consists of a connective tissue framework and lymphoid tissue, also called gastric lymphatic follicle.

## DISCUSSION

The stomach is a unique organ which tells the story of its adaptation to different food habits and its position in the phylogenetic scale of animals. It can be broadly divided under two main portions: non-glandular and glandular stomach. The present project was therefore undertaken to study the histological aspects of glandular stomach in particular in addition to the non-glandular portion of stomach.

The glandular stomach is a musculo-glandular organ which is the caudal continuation of the alimentary canal. It contains the usual four layers as serosa, muscularis, submucosa and mucosa together with various types of glands, vessels and nerves.

Regional differences in the Mucosa of the stomach permit the histological identification of four distinct gastric regions: oesophageal, cardiac, fundic and pyloric gland region.

1. ***Oesophageal Region:*** It is non-glandular portion of the stomach which is lined by stratified Squamous

epithelium. Keratinization may be present but it depends upon species and diet . The oesophageal region is limited in carnivores, man and swine .

2. ***Cardiac Glands:*** This are branched tubular coiled glands which consist of a neck and body region. The neck and upper portion of the body are lined by cuboidal cells. The cuboidal lining cells are mucous-secreting. Some parietal cells may be present in canine cardiac region whereas some porcine cardiac region may be present in porcine cardiac glands.

[5]Horst Dectar Dellmann (1971) also agreed with the above observation made in cardiac region of stomach in different mammals. He added that they are non-specificgastric glands, branched tubular, coiled, containing mucous secreting and argentaffin cells. In the dog, some parietal cells were found in addition. [6]William J. Bank (1974), in his series of study in different mammals also came with the similar results. He said that the cardiac gland region is not developed equally in all species. The beginning of the cardiacgland region is marked by a transition from stratified Squamous epithelium to columnar epithelium. The point of transition be called the margo plicatus in the hourse. According to him the cardiac glands are the distinctive histologic components of this region. [6]W.J.Bank (1974) in his further observations in the stomach, added argentaffin cells (entercochromaffin cells). These cells are small, pyramidal cells with a clear cytoplasm that are located between the lining cells of the glands and the associated basement membrane. According to Bank, the argentaffin cells do not secrete materials into lumen of the organ, rather their products are secreted into the lamina propria and are distributed by the blood vessels. So they are better called enteroendocrine cells are they are gastrointestinal endocrine cells that secrete hormones. [7]Walter Rubin (1972) described an unusual morphological and cytochemical relationship observed between human gastric endocrine cells and other types of gastric epithelial cells. In my observations, I couldn't confirm the findings of other research workers regarding argentaffin cells due to lack of high power magnification and special staining techniques which are essential for their demonstration. (i)Fundic Gland Region : The fundic gland region is similar to the morphology described for the cardiac region. The unique histologic feature of the fundic region relate to the configuration of the fundic glands, the types of cells contained within the glands and the thickness of the lamina propria. The glands of the fundic region, fundic glands or gastric which are longer than but less frequently branched than the cardiac region counterparts. The amount of connective tissue within the lamina propria is reduced greatly because the glands are packed tightly. A fundic gland is divisible into four regions base, neck and isthmus. The body or main tubular portion of the gland continues from the neck and terminates as a slightly dilated and a bent adenomere, the base. Three cell types are distinguishable readily in routine preparation of fundic glands, chief cells (Zymogenic cells), parietal cells (oxyntic cells) and mucous neck cells. [6]William J.Bank (1974) also have had the similar observations regarding cell types and its distribution in fundic region of stomach in different mammals studied. [5]Horst, D.Dellmann (1971) found that the fundic region in the rabbit, albino rat and guinea pig extends over half of the stomach. In the goat, it occupies one third of the stomach. In ruminants, fundic glands are present in two-third of the abomasums. He called fundic glands as specific gastric glands of the nature of secretory product which is specific for the stomach, as opposed to the nonspecific secretory products of cardiac and pyloric region. The fundic glands, he too described of three regions : the neck region, containing predominantly mucous neck cells, a few chief cells and some parietal cells, the body containing mainly chief cells and oxyntic cells, the fundus with chief cells,a few parietal cells and argentaffin cells. [8]M.K.Roy (1974) studied the guinea pig fundic mucosa and came with following observations : (a) The fundic mucosa of the porcine stomach was lined by simple columnar epithelium. The epithelium in the gastric pits was alcianophilic. Mammals the guinea pig fundic glands comprised neck mucous cells, chief cells and pariental cells. Similar results were obtained in my observations and tally with the results of [9]Dr.Roy excepting that argentaffin cells which were demonstrated in his study couldnot be demonstrated in my study due to lack of specific staining techniques.

***Special Cytology of the Gastric Mucosa***

***Neck mucous cells****:* The columnar shaped neck mucous cells appeared in more numbers in the neck and the base of the glands. [10] Greenwood (1952) reported that the bases of the guinea pig fundic glands, in the anterior mid region were solely composed of the chief cells. The present study revealed that the neck mucous cells were predominantly present in the bases of the glands towards the pyloric region. [11]Ito(1963) in his observations in albino rat stomach reported that a single layer of columnar surface mucous cells lines the gastric lumen and extends into the gastric pits. He reported that the mucous neck cell is distinguished from the other epithelial cells by its location in the gastric gland and by its characteristic specific granules. The mucous neck cells occur singly or in small clusters among the most deeply located parietal cells in the neck region and occasionally between chief cells.

***Chief Cells:*** The chief cells were the predominant cells of the fundic glands. The cells appeared in more numbers in the body and base portions of the fundic glands. However, they were occasionally seen in the neck region. In the body area the chief cells were almost surrounded by the vertical row of pariental cells [12] (Sloss, 1954). William [6]J.Bank (1974) described that thew chief cells are the vpredominant cells of the fundic glands. They are pyramidally shaped cells with a basally positioned round nucleus. A distinct polarity is evident in these cells. And these cells are source of gastric enzymes e.g. pepsinogen, prorenin and gastric lipase.

***Parietal Cells:*** The large and nearly triangular pariental cells contained eosinophilic granules and spherical nucleus. They are large cells scattered throughout the gland from neck to base. In the base of the glands, the cells had flattered appearance. However, they were absent in the glandular bases close to the pyloric glandular zone, where the bases only contained the neck mucous cells. [6] William J.Bank (1974) in his studies in different mammals supports the view as described above. [12]Sloss (1954) observed that when the pariental cells appeared in the fundus of the glands they remained outside the chief or mucous cells lining the tube.

***Pyloric Gland Region:*** The extent of the pyloric gland region is species variable, although the histologic organization of the pyloric region is similar to the cardiac region. The gastric pits are deeper than in other regions of the stomach, but the pyloric glands are similar to the cardiac glands. The pyloric glands are short, simple or branched tubular glands. The predominant cell is the mucous secreting cell similar to those that occur in the

cardiac glands. The remaining mural slements are typical; however, a well-developed inner circular lamina of the tunica muscularies is a striking feature of this area. It forms the pyloric sphincter at the gastroduodenal junction. Besides the above mentioned main cell types, other cell types have also been described in literature called enterochromaffin cells (Ec) and the G cell [13](Solcia, Vassallo and Capella, 1969).[7] Walter Rubin (1972) found that there is an unusual intimate relationship between endocrine cells and other types of epithelial cells in the human stomach.

These cell types couldn't be demonstrated in my research work due to lack of specific staining techniques used for their identification.

## SUMMARY AND CONCLUSION

A critical study of the histology aspects of stomach in some mammals was done. It was also tried to study the evolutionary changes in stomach with respect to the development of animals in the phylogenetic scale.

In addition to the above, a brief study its microscopic features were also studied.

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