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HISTOLOGICAL OBSERVATIONS ON THE ALIMENTARY TRACT OF THE LIZARD, *HEMIDACTYLUS FLAVIVIRIDIS*

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ABSTRACT

The present investigation reveals the structure of tissues of the alimentary tract of *Hemidactylus flaviviridis*, and its differences from that of other lizards recorded and interpreted. The alimentary tract consists of five major functional zones viz. oesophagus, stomach, duodenum intestine and rectum. The oesophagus is devoid of oesophageal glands but consists of mucous cells, goblet cells and columnar epithelial cells. Mucous cells are mucoid, goblet cells are secretary and columnar epithelial cells are absorptive in function. Stomach contains gastric glands of peptic, oxyntic and mucoid type. Duodenum lined with absorptive cells is devoid of duodenal glands. Goblet cells in intestine is an adaptation for water absorption. Lymphoid tissue in intestine and rectum is meant for defence and nutrition.

INTRODUCTION

Important contribution on histology of alimentary tract of lizards have been made by Reese (1913), Stayley (1925), Eltouby and Bisahai (1958), Bisahai (1960 & 61), and Amar and Ismail (1975 & 79). However, nothing is known about the histology of alimentary tract of house lizard, *Hemidactylus flaviviridis* and thus the present investigation has been under-taken.

MATERIAL AND METHODS

For histological studies, oesophagus, stomach, duodenum, intestine and rectum were removed form the freshly dissected specimens of *Hemidactylus flaviviridis* (collected from Vidisha, M. P.) and were washed in saline water. These tissues were fixed in alcoholic Bouin's picroformal solution for 20 hours. The meterial was dehydrated, cleared and embadded in wax and sections of five micron thickness were cut. The sections were stained with Delafield's Haematoxylin and counter stained with Eosin. Toludine blue and Mayer's mucicarmine were used for mucus staining.

OBSERVATIONS

Oesophagus : Its wide lumen lined by ciliated mucosa, bears numerous short

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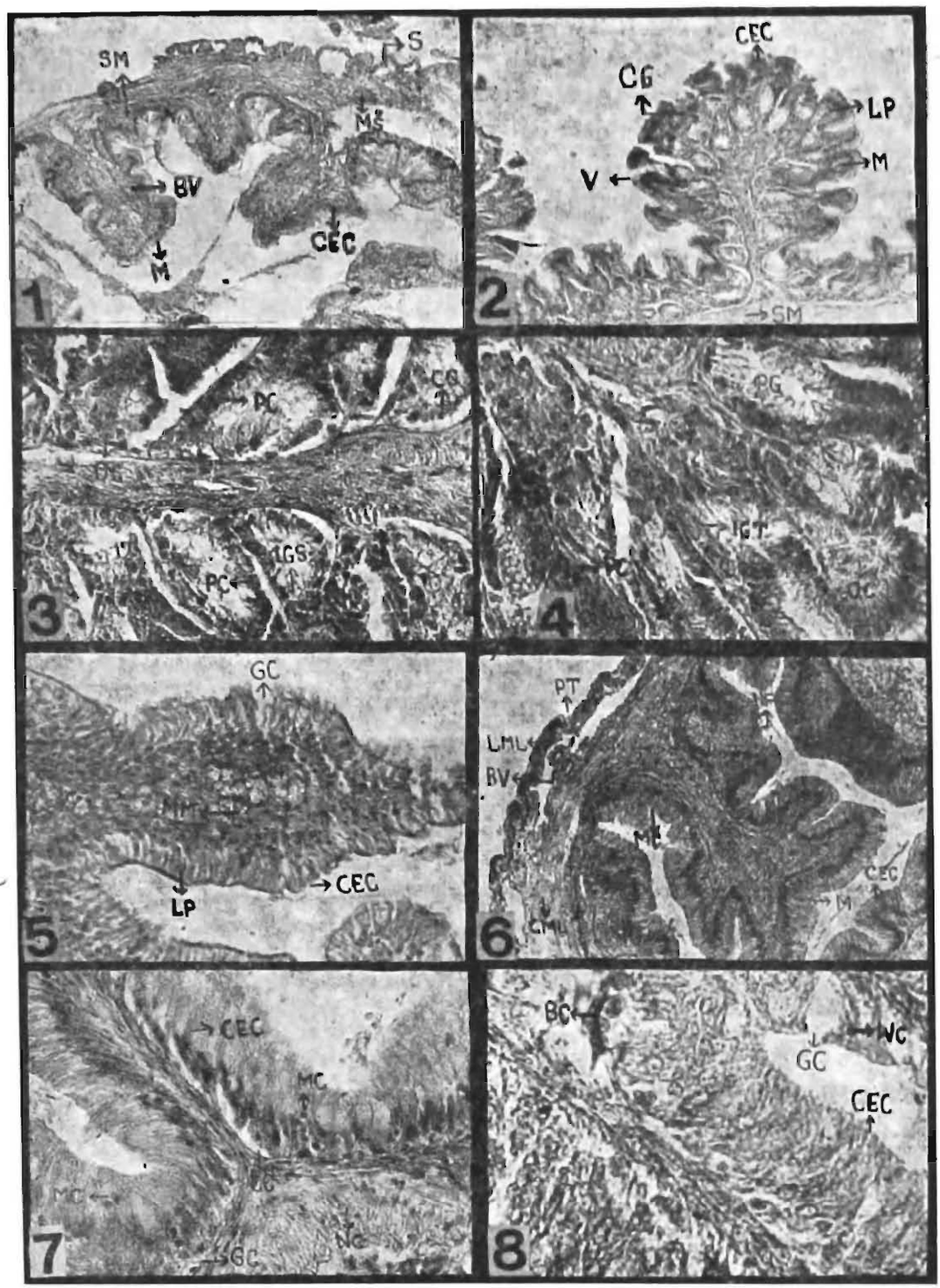
folds which are richly branched. It consists of mucosa, submucosa, muscularis and serosa layers. Mucosa is a mucous membrane made up of double layered columnar epithelium and lamina propria with numerous goblet cells indispersed with lymphocytes and blood capillaries. The goblet cells are cylindrical with homogenous cytoplasm and irregular basal nuclei, while the columnar epithelial cells possess granular cytoplasm and oval nuclei. The submucosa is well developed and consists of connective tissue formed of collagenous fibres and fibroblasts. It is richly supplied with blood vessels, lymphocytes and nerve fibres. The muscularis consists of a smooth muscle coat containing an outer poorly developed longitudinal and an inner thicker circular layer. Longitudinal muscle layer is made up of loose areolar muscle fibres. The oesophagus is enveloped by a thin single layer of adventitia consisting of fibro-elastic tissue.

Stomach : It is divisible into an anterior cardiac and posterior pyloric region. Like oesophagus, both the parts of stomach are consisting of mucosa, submucosa, muscularis and serosa layers. Mucosa of cardiac stomach consist of epithelium, lamina propria and muscularis mucosae layers. The mucous membrane is thrown into a number of longitudinal folds. Tubular gastric glands of mucosa open into the lumen of stomach by gastric pits. Gastric glands consists of peptic eells and oxyntic cells. Peptic cells are dome shaped with projecting apical ends and possess granular cytoplam with centrally placed spheroidal nuclei while the oxyntic cells are oval and irregular with light cytoplasm.

Histologically, pyloric stomach resembles cardiac stomach except that the columnar epithelial cells are elongated, compactly arranged and gastric gtands are replaced by pyloric glands lined with columnar mucus secreting cells. A distinct muscularis mucosae occurs throughout the cardiac and pyloric regions of the stomach. The submucosa of cardiac and pyloric parts is highly vascular and contain nerve fibres, near the plexuses of blood vessels. An outer poorly developed layer of longitudinal muscle fibres and an inner thick layer of circularly disposed muscle fibres is also observed. The inner layer is about three times thicker than the outer layer.

Duodenum : It consists of mucosa, submucosa, muscularis and serosa. The mucosa is thrown into number of high narrow folds where the connective tissue of the submucosa extends as a thin layer of lamina propria. The lining epithelium is formed of tall columnar absorptive cells with granular cytoplasm and oval nuclei. These cells possess a scarcely distinct striated border and contain goblet cells in between. The goblet cells increase in number towards the intestinal region. Lamina propria contain lymph spaces, blood vessels and lymphocytes ; the latter are crowded at the base of the columnar epithelial cells.

Intestine : It is a thick walled tubular structure made up of mucosa, submucosa, muscularis and serosa layers. Mucosa, consists of columnar epithelium, lamina propria and muscularis mucosae. Lamina propria is well developed due to thick banding of connective tissue and it is composed of stratum granulosum, stractum compectum and blood vessels. The stratum compectum is a strengthening substance



Figs. 1-8 : 1. T. S. of oesophagus showing mucosa, submucosa, muscularis and serosa along with mucous cells, columnar epithelial cells and lymph spaces. 2. T. S. of stomach showing the structure of its villus and glandular tissues. 3. Showing the peptic cells, oxyntic cells, interglandular spaces, and cardiac glands. 4. Showing the presence of pyloric glands, peptic cells, oxyntic cells, columnar epithelial cells and lymphocytes. 5. T. S. of duodenum showing goblet cells, columnar epithelial cells along with lamina propria and muscularis mucosae. 6. T. S. of intestine showing mucosa, submucosa, muscularies and serosa along with abundant columnar epithelial cells, mucous cells, blood vessels and nerve fibres. 7. Showing mucous cells, columnar epithelial cells, goblet cells, nerve cells and lymphatic capillaries. 8. Showing the presence of columnar epithelial cells, goblet cells, mucous cells and scattered wandering cells in rectum.

composed of collagen fibres. Mucosa is characterized by the presence of columnar epithelial cells, goblet cells and absorptive mucous cells. Columnar epithelial cells having central nuclei are raised into a number of fingure shaped villi. Mucous cells are spindle shaped with swollen base and narrow neck found at the top of mucosal folds open into the lumen. Narrow strands of smooth muscle fibres extends from the muscularis mucosae into villi which impart them flexibility. Submucosa consists of dense collagenous fibres enclosing blood capillaries, blood vessels, lymph spaces and abundant lymphoid tissue. Muscularis is differentiated into an outer thin longitudinal and an inner thick circular muscle layer. Serosa forms a thin outer most covering made up of flattened cells.

Rectum : Like intestine, its mucosal folds are short and broad. Epithelium has typical columnar absorptive cells, few goblet cells and scattered wandering cells. Lamina propria supports the columnar epithelium and connects it with the muscularis mucosae. Lamina propria carries blood and lymphatic capillaries and consists of unstriated muscles fibres which increase the absorptive surface of villi. Submucosa, muscularis and serosa are similar to that of intestine.

Discussion

Structure of mucosa of the oesophagus of *Hemidactylus flaviviridis* resemble with the findings of Eltouby (1936), Bisahai (1961) and Eltouby and Bisahai (1958) in lizards viz. *Scincus officinalis, Varanus griseus and Uromastix aegyptia.* The present observation in *Hemidactylus flaviviridis* also agrees with the findings of Bisahai (1961) in *Varanus griseus* and Amar and Ismail (1975) in *Mubaya quinquetaeniata* who have reported the absence of oesophgeal glands, while Eltouby and Bisahai (1958) in *Uromastix aegyptia* and Bisahai (1960) in *Chamaeleon vulgarus* and *Chamaeleon chamaeleon* reported the presence of oesophageal glands.

Like the findings in *Hemidactylus flaviviridis*, Eltouby (1936), Eltouby and Bisahai (1958), Amar and Ismail (1975) observed circular and longitudinal muscle layers in muscularis region of oesophagus of the lizards viz. *Scincus scincus*, *Uromastix aegyptia* and *Mubaya quinquetaeniata* but Bisahai (1960 & 61) reported the absence of longitudinal muscle layer in oesophagus of *Chamaeleon vulgarus* and *Varanus griseus.*

Presence of peptic cells and oxyntic cells in the gastric glands of cardiac stomach and pyloric glands in the pyloric stomach of *Hemidactylus flaviviridis* confirms the findings of Stayley (1925), Eltouby and Bisaihai (1958) and Amar and Ismail (1975) in *Alligator mississippiensis, Uromastix aegyptia, Mubaya quinquetaeniata* and *Agama stellio.* Bisahai (1961) observed the fundic grands in the stomach of *Varanus griseus* which are gradually replaced by mucus secreting glands in the posterior region of stomach.

Eltouby (1936) observed the absence of longitudinal muscle fibre in muscularis layer of stomach of *Scincus officinalis.* Eltouby and Bisahai (1958) reported duodenal glands in *Uromastix aegyptia*, but Amar and Ismail (1975) found absence of duodenal glands in *Chamaeleon vulgarus, Varanus griseus* and *Mubaya quinquetianiata* like *Hemidactylus flaviviridis.* Presence of goblet cells in the intestine of *Hemidactylus flaviviridis* confirms the findings of Bisahai (1961) which absorb

water in arid and semi-arid condition. Lymphoid tissue in rectum indicates a defence reaction and helps in nutrition. Presence of wandering cells and goblet cells in epithelial mucosa of rectum of *Hemidactylus flaviviridis* is also in conformity with the findings of Amar and Ismail (1975 & 79) in *Mubaya quinquetaeniata* and *Agama stellio* lizards.

ABBREVIATIONS USED

M=Mucosa, V=Villi, S=Serosa, SM=Submucosa, MS=Muscularis, LP=Lemina propria. MM=Muscularis Mucosae, GC=Goblet cells, PC=Peptic cells, Oc=Oxyntic cells, CG=Cardiac gland, PG=Pyloric gland, MC=Mucous cells, PT=Peri toneum, CEC=Columnar epithelial cells, CML=Circular muscle layer, LML=Longitudinal muscle layer, IGS=Inter glandular space, IGT=Inter glandular tissue, NF=Nerve Fibre, LT=Lymphoid Tissue, BV=Blood vessel, BC=Blood capillaries.

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