

SUMMARY AND CONCLUDING REMARKS

A critical analysis of the existing literature shows that most of the annelids have been studied, from the point of view of their morphology, taxonomy, anatomy, comparative anatomy and physiological mechanism of some life processes performed by different organs. In some cases nervous and hormonal control on physiological mechanisms have been studied. Though various tissues and organ - systems such as connective tissue, body wall, blood vascular system, nephridia, sense organs, digestive, nervous and reproductive systems etc. have been elaborately investigated to find out morphology, histology, histochemical and biochemical characterization of various metabolites and wherever possible some physiological roles have been attributed to the organ - systems, but comparatively there exists a remarkable paucity in the information on the histochemical localization of mucosubstances in the alimentary canal of the annelids.

At a comparative level morphology of the alimentary canal has been studied in detail and very little is known about its histology. At present some information is available on the histology of the alimentary canal on earthworm, P. posthuma (Bahl, 1926) and on leech, H. granulosa (Bhatia, 1946). Whatever work reported on mucosubstances in the annelids, has been focused around mucus secreting glands in body wall and practically no attention has been paid on the alimentary canal

mucosubstances and their role in physiology of digestion. Therefore, the present investigation has been under taken with a view to study histology of various organs in the alimentary canal, to study histochemical localization and distribution of mucosubstances in various organs of the alimentary canal in P. posthuma and H. granulosa and suggest some functional significance to the mucosubstances in the physiology of digestion.

The following is a brief summary of the observation and conclusions drawn in the present investigation.

A. P. posthuma :

1. Histologically, the wall of the alimentary canal consisted of four layers viz. outer peritoneum, longitudinal muscle layer, circular muscle layer and inner epithelial lining.
2. The histochemical results revealed the presence of only diastase resistant PAS reactive neutral mucosubstances but absence of glycogen in the peritoneal epithelium of entire gut wall. The chlogogen cells in the peritoneum of stomach and intestine contained glycogen in them.
3. The longitudinal and circular muscles in the gut contained

glycogen in them in different organs of the alimentary canal.

4. The histochemical results indicated presence of neutral mucosubstances in the inner epithelial lining of the gut wall. Within the inner epithelium were present tubular gland cells, mucous gland cells and glandular cells.
5. Histochemically, the mucous gland cells in the buccal cavity pharynx and oesophagus contained neutral mucosubstances, and sulfomucins.
6. The glandular cells in the stomach showed presence of the sulfomucins and neutral mucosubstances. The intestinal gland cells are of two, G_1 and G_2 types. The G_1 gland cells contained neutral mucosubstances, sialomucins and sulfomucins while G_2 gland cells indicated presence of neutral mucosubstances and sialomucins in them.
7. The pharyngeal gland cells that formed a rich glandular structure in the roof of pharynx, contained neutral mucosubstances, sialomucins and sulfomucins.
8. The cuticle lining, the inner epithelium of buccal cavity and gizzard showed negative histochemical staining reactions indicating absence of mucosubstances.

9. Lubricating, storage and protection of inner epithelium functions have been suggested to the secreted mucosubstances in the alimentary canal of the earthworm.

B. H. granulosa :

1. The wall of the alimentary canal in leech, histologically, consisted of three layers - a layer of connective tissue, muscles in the connective tissue and a inner layer of columnar epithelium.
2. The connective tissue formed a layer around the inner epithelium and exhibited presence of neutral mucosubstances and hyaluronic acid in all the histological regions of the alimentary canal.
3. The muscles in the gut wall indicated presence of only glycogen, in the histochemical staining reactivities employed.
4. The histochemical results indicated presence of neutral mucosubstances but absence of glycogen in columnar epithelium of various organs in the alimentary canal.
5. The epithelium in pre-oral chamber buccal cavity and crop

contained specialized glands such as tubular gland cells, mucous gland cells and goblet cells.

6. The tubular gland cells in pre-oral chamber and mucous gland cells in the buccal cavity can be distinguished histologically. Histochemically, both the gland cells showed similar staining reactivities indicating presence of neutral mucosubstances and sulfomucins.
7. The goblet cells in the crop showed presence of neutral mucosubstances, sialomucin and sulfomucins.
8. The pharynx was surrounded by salivary gland cells. The histochemical reactivities of salivary gland cells indicated presence of neutral mucosubstances, sulfomucins and sialomucins.
9. Role in anticoagulant secretion by salivary glands and haemolysis of blood in the crop by secretions of the goblet cells are the functions designated to mucosubstances secreted by the alimentary canal in the leech.

CONCLUDING REMARKS :

Thus, the aims and objectives with which the present investigation was undertaken have been successfully completed.

The main aims of the present investigation were to study the histology of various organs in the alimentary canal of earthworm and leech, histochemical characterization of mucosubstances, their distribution in various histological sites of these organs and to project the idea about the functional significance of mucosubstances based on circumstantial evidences. It is hoped that these aims and objectives have satisfactorily been achieved.

While concluding the present M. Phil. dissertation on the alimentary canal mucosubstances in earthworm and leech, the author would like to humbly state that the present work is by no means complete. He is fully aware of his shortcomings. For the purpose of studying the concentration or contents of mucosubstance/s in a given histological site in an organ, the author had to entirely depend on the visually estimated intensity of staining. Hence the terms such as "trace" "predominant", "small amount or level", etc. of mucosubstances need to be understood keeping the above short coming in mind. The mucosubstances identified in the present investigation should further be identified by employing the bioassay studies to find out exact quantities of mucosubstances in the given organ of the alimentary canal in mathematical terms. Some of the mucosubstances such as neutral mucosubstances, sulfomucins etc. should be further identified. The mucosubstances in the various

organs of the alimentary canal, whether differ according to the dietary habits of the animal should be investigated by selecting a large number of animals with diverse feeding habits. The functions of mucosubstances in the various organs of the alimentary canal of animals should be confirmed by experimental studies involving alteration of food, including pathological conditions etc. Thus the present investigation shows that there are several avenues open for further researches. Even with all these shortcomings, the author feels gratified that he has studied and reported some preliminary observations on the alimentary canal mucosubstances in earthworm, P. posthuma and Indian cattle leech, H. granulosa.