

S U M M A R Y

A N D

CONCLUDING REMARKS

A critical analysis of the existing literature shows that comparatively less attention has been paid to the alimentary tract mucosubstances of the gastropod. Although, the mucosubstances have also been studied in the gastrointestinal tract, the mammals are the focal point for such studies and particularly the laboratory animals. In this regard the various organ of the alimentary tract of the invertebrates with reference to gastropods have not received the due attention as they rightly deserve,

This stimulated to undertake the present investigation on mucosubstances in the alimentary tract of *O. verraculatum* . Several recent histochemical techniques were employed in the present investigation.

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

I. Buccal mass

1) The buccal mass consisted of mucosa, connective tissue muscular layer and serosa. The epithelium contained columnar epithelial cells and goblet cells.

2) The mucosubstances in the various histological sites of the buccal mass resembled in their histochemical reactivities to the identical mucosubstances in other organ systems.

3) The histochemical results revealed the presence of sulfomucins in columnar epithelial cells, neutral mucosubstances in the connective tissue and glycogen in muscular layers and neutral mucosubstances and sulfomucins in the serosa.

4) Protection of the mucosa and lubricating function have been suggested to the secreted mucosubstances in the buccal mass.

II. Esophagus

1) The esophagus consisted of chitinous lining, mucosa, connective tissue, muscular layer and the serosa. The epithelium contained columnar epithelial cells and goblet cells.

2) The mucosubstances in the various histological sites of esophagus resembled in their histochemical reactivities to the identical mucosubstances in other organ-system.

3) The histochemical results revealed the presence of neutral mucosubstances, trace amount of glycogen and weak sulfomucins in chitinous lining and columnar epithelial cells; sulfomucins in the goblet cells; neutral mucosubstances in connective tissue, glycogen in muscular layer and neutral mucosubstances in the serosa.

4) Some of these mucosubstances are similar to the esophageal mucosubstances in other gastropods.

5) Protection of the mucosa and lubricating functions have been suggested to the secreted mucosubstances in the esophagus.

III. Stomach

1) The stomach consisted of mucosa, connective tissue, muscular layers and serosa. The epithelium contained columnar epithelial cells and goblet cells. Mucous glands are absent.

2) The mucosubstances in various histological sites of the stomach resembled in their histochemical reactivities to the identical mucosubstances in other organ systems.

3) The histochemical results indicated the presence of neutral mucosubstances in columnar epithelial cells; sulfomucins (predominant) and sialomucins (less amount) in goblet cells, neutral mucosubstances in the connective tissue, glycogen in the muscular layer and neutral mucosubstances in serosa.

4) Some of these results are in good agreement with the mucosubstances reported in the stomach of other gastropods.

5) Some of the functions such as lubricant and protection of mucosa have been suggested.

IV. Intestine

1) The intestine consisted of mucosa, connective tissue,

muscular layer and serosa. The surface epithelium contained columnar epithelial cells and goblet cells. Intestinal glands and crypts were found to be absent.

2) The mucosubstances in the various histological sites of the intestine resembled in their histochemical reactivities to the identical mucosubstances in other organ-systems.

3) The histochemical results indicated the presence of neutral mucosubstances and sulfomucins in the columnar epithelial cells; sulfomucins in the goblet cells; neutral mucosubstances in the connective tissue and serosa, and glycogen in the muscular layer.

4) Most of these mucosubstances are in good agreement with the mucosubstances reported in the intestine of the other gastropods.

5) Some of the functions of intestinal mucosubstances such as protection of the mucosa against proteolytic enzymes and harmful luminal contents.

Concluding remarks

Thus, the aims and objectives with which the present investigation was undertaken have been successfully fulfilled. The main aims of the present investigation were to study the histology of the various organs from buccal mass to intestine

histochemical characterization of mucosubstances, their distribution in various histological sites of these organs, comparison of the results obtained and existing literature and to project idea about the functional significance of mucosubstances in various organs based on circumstantial evidences. It is hoped that these aims and objectives have been satisfactorily achieved.

While concluding the present M. Phil. dissertation on the alimentary tract mucosubstances in one of the gastropods, the author would like to humbly state that the present work is by no means complete. He is fully aware of his short comings. For the purpose of studying the concentration or content of mucosubstances in a given histological site an organ, the author had to depend entirely on the visually estimated intensity of staining. Though the differences in the staining intensities to give indirectly some idea about the mucosubstances content, they do not form reliable criteria while reporting the amount of mucosubstances. Hence the terms such as "quantities". "predominance", "trace quantities", "less amount" of mucosubstances need to be understood keeping the above short comings in mind.

This, hence forms an excellent subject matter for further studies. Further studies should be carried in the following directions :

- i) The mucosubstances identified in the present investigation should further be studied by employing the bioassay studies to find out the exact quantities of mucosubstances in the given organ of the alimentary tract in mathematical terms.
- ii) The mucosubstances in the various organs investigated should further be isolated by chromatography and further be characterized.
- iii) The mucosubstances in the various organs should further be confirmed by employing autoradiographic studies.
- iv) Some of the mucosubstances such as neutral mucosubstances, sulfomucins etc. should be further identified.
- v) Whether any a typical mucosubstances present in the alimentary tract mucosubstances should be studied in gastropods.
- vi) The species diversity of alimentary tract mucosubstances should further be confirmed by studying large number of animals including some closely related species.
- vii) The mucosubstances in the various organs of the alimentary tract, whether differ according to the diatory habits of the animals should be investigated by selecting animals differing in their diet.
- viii) The functional significance of the mucosubstances in the various organs of the alimentary tract of animals should be confirmed by experimental studies involving alteration of the

food, including pathological conditions etc.

Thus, the present investigation shows that there are several avenues open for further researches.

Some studies are going on in these directions in this laboratory on alimentary tract of several vertebrates from fish to mammals as well as in some gastropods, the results of which will be published in the due course of time. In this laboratory there is no provision for autoradiography, even there is no ultracentrifuge for separation of different sediments and there is no electron microscope for ultra-structural studies. With all these shortcomings, the author feels gratified that at least he has provided some preliminary observations on alimentary tract mucosubstances in one of the gastropod by employing a battery of histochemical techniques. There is unlimited scope for further researches on mucosubstances and their physiological importance in the alimentary tract of invertebrates.