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A HISTOCHEMICAL STUDY OF BOVINE SALIVARY GLAND
SECRETORY PRODUCTS AND AN INVESTIGATION OF
INTRAEPITHELIAL GRANULAR DUCT CELLS
OF THE PAROTID GLAND

A thesis presented in partial fulfillment
of the requirements for the degree
of Master of Philosophy in
Physiology and Anatomy at
Massey University.

Chandan Jayaraj Gurusinghe

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*"The co-existence of the most wonderful success
with the most profound ignorance is one of
the characteristic features of present day biology."*

A. SZENT-GYÖRGYI.

ABSTRACT

Paraffin wax embedded histological tissue samples of bovine salivary glands were examined by staining, histochemical and immunohistochemical methods. The characteristically tubular secretory endpieces were composed of either proteoserous cells or mucous cells and demilunes.

Parotid glands and the histologically identical ventral buccal glands were composed entirely of proteoserous cells which occasionally contained diastase resistant PAS positive neutral glycoproteins, additionally confirmed by acetylation and saponification. Immunohistochemical studies established that most proteoserous cells also contained either protein band 4 or band 10. An examination of sheep and cattle parotid glands revealed that basal striations were absent from intralobular ducts of cattle but were abundant in those of sheep. Some duct cells contained diastase labile and diastase resistant PAS positive material and apical blebs. A granulated intraepithelial cell type, which was ultrastructurally examined and found to be similar to a globule leucocyte, was specific to intralobular duct walls of the parotid glands; their precise function was not established. The main excretory duct of the parotid gland contained several goblet cells.

The mandibular gland mucous cells contained acidic and neutral mucosubstances. The presence of acidic groups was confirmed by methylation, saponification and neuraminidase digestion. The conspicuous demilunes contained acidic and neutral mucosubstances and acidophil granules which contained protein band 8. Intralobular ducts with tall columnar cells were basally striated. Goblet cells were not identified in the main excretory duct.

The sublingual gland mucous cells contained neutral and acidic mucosubstances; the latter were not neuraminidase labile. Unlike the mandibular glands, the sublingual mucous

cells stained for sulphate groups, attributed to sulphated or sialo-sulphated glycoproteins, since hyaluronidase digestion did not eliminate basophilia at low pH. The demilune cells were mostly proteoserous and contained protein band 9. The "striated" intralobular ducts were identical to those of the mandibular gland.

Intermediate buccal, dorsal buccal, palatine, posterior tongue and pharyngeal glands mucous cell histochemical composition was similar to those of the sublingual glands. The demilune contents of the minor glands were mainly proteoserous; however those of the pharyngeal and posterior tongue occasionally contained acidic and neutral mucosubstances.

Two unusual features of the minor glands were the presence of goblet cells in intralobular ducts of the pharyngeal glands and the appearance of an atypical secretory mechanism in dorsal buccal, intermediate buccal and palatine glands, the secretions of which frequently contained cellular debris mixed with mucus.

Humoral immunity in bovine salivary glands was mediated by sublingual, mandibular and pharyngeal glands, three glands which contained abundant subepithelial plasma cells. The parotid and ventral buccal glands noticeably lacked plasma cells but contained intraepithelial granular duct cells. It was proposed that these cells may provide cell-mediated immunoprotection against bloat since increased numbers of these cells have been reported in animals with low bloat scores.

Salivary protein band 4 from parotid saliva has been correlated with bloat susceptibility in cattle, but was equally distributed in parotid tissues of both low and high bloat susceptible animals, suggesting that band 4 is synthesised but not secreted by low bloat strains.

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