

## HISTOMORPHOLOGY AND HISTOCHEMISTRY OF ADENOMERES OF LABIAL GLANDS IN BUFFALO (BUBALUS BUBALIS)

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### ABSTRACT

The study was conducted on ten healthy buffalo calves. The labial glands were distributed mainly at the commissure of lips and some isolated lobes in upper and lower lips. The gland was not encapsulated and parenchyma was comprised of secretory units and duct system. The adenomeres (secretory units) were mainly mucous with some serous and mixed type. Few serous demilunes capping the mucous alveoli were also present. The mucous cells contained mucopolysaccharides and some glycogen content. Acid and alkaline phosphatases were in traces.

**Key words:** Histomorphology, histochemistry, adenomeres, labial glands, buffalo

The major and minor salivary glands help in digestion of food through their saliva and provide fluid environment for microbial digestion of ingesta as fore-stomach in ruminants is devoid of secretory glands. It also facilitates mastication and deglutition in these animals. A very little work has been conducted on minor salivary glands, particularly the labial glands of buffalo. The present study explains the detailed histomorphological and histochemical composition of labial glands in buffalo.

### MATERIALS AND METHODS

The present investigation was conducted on ten healthy buffalo calves of 1-1½ years age, used for conducting practical classes of undergraduate and postgraduate students. The tissues of labial glands from different regions were collected and processed for standard paraffin and frozen sectioning techniques. The sections were stained with Harri's haematoxylin and eosin stain for histomorphological studies, Weigert's method for elastic fibres, Gomori's silver stain for reticular fibres, periodic acid Schiff's stain with and without saliva treatment for mucopolysaccharides, Best's carmine stain for glycogen, Alcian blue with metanil yellow

for acid mucopolysaccharides, Mayer's mucicarmine stain for mucin, Sudan-black-B method for fat (Luna, 1968), Crossman's trichrome stain for connective tissue and muscular fibers (Crossman, 1937), methenamine silver argentaffin stain for argentaffin cells (Humason, 1979), Nile blue sulphate for acidic and neutral lipids (Bancroft and Stevens, 1977), Azo-dye method for acid phosphatases (Barka, 1960) and Azo-dye coupling technique for alkaline phosphatases (Burstone, 1958). Micrometry was done with the help of linear calibrated ocular micrometer. The relative proportions of various components were recorded with the help of a net square ocular micrometer to calculate their percentage.

### RESULTS AND DISCUSSION

The localization of the labial gland in buffalo calves was found more at the commissure of the lips even though some isolated lobes of the gland scattered in other parts of upper and lower lips were also not uncommon as reported in sheep (Kay, 1960). Whereas, Sloss (1954) found poorly developed labial glands in pig being located at the commissural half of lower lip. The gland was not encapsulated and the glandular lobes were found distributed in tunica submucosa as well as in tunica muscularis layers as reported

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in domestic animals (Parida and Das, 1991a). The labial glands found to be lobulated compound tubulo-alveolar in buffalo were in agreement to the earlier reports in buffalo (Dhingra *et al.*, 1978) and zebu (Magalhaes and Silva, 1976) whereas, Banks (1993) classified the labial glands as branched tubulo-alveolar in large ruminants. The parenchyma of the labial glands in buffalo was comprised of secretory units (adenomeres) and duct system. The secretory units were mainly mucous (77.67%) with some serous (10.32%) and mixed (12.01%) types (Fig 1). Few serous demilunes capping the mucous alveoli were also occasionally present. Whereas the labial glands were serous in large ruminants, swine and horse, mucous in small ruminants, dogs and cats and mixed in human beings (Banks, 1993) and camel (Taib and Bashir, 1987). Parida and Das (1992) recorded more number of serous components in labial glands of goat as compared to cattle, buffalo and sheep. Serous demilunes capping the mucous end pieces found in the present study were also observed in the labial glands of one humped camel (Taib and Bashier, 1987) and horse (Magalhaes *et al.*, 1975).

The mucous alveoli were round to irregular in shape, bounded by a basement membrane composed of reticular fibers and

mucopolysaccharides. Myoepithelial (basket) cells were juxtaposed intimately to the basement membrane. Similar observations had been reported by Parida and Das (1991 b) in domestic ruminants and Dhingra, *et al.* (1978) in buffalo. These were the contractile cells which squeeze the alveoli for extrusion of the secretory products. The alveoli measured  $62.93 \pm 2.48 \mu$  and  $21.46 \pm 1.76 \mu$  in alveolar and luminal diameter, respectively. The pyramidal cells lining the mucous alveoli measured  $20.72 \pm 0.92 \mu$  and were filled with finely granular mucicarmine positive granules (Fig 2) and slightly basophilic cytoplasm giving vacuolated and foamy appearance (Fig 1). Each cell contained flat hyperchromatic nucleus in its basal region close to the basement membrane.

The serous alveoli were scattered and were mostly round in shape. These measured  $31.08 \pm 1.6 \mu$  in diameter and  $3.70 \pm 0.34 \mu$  in luminal diameter. The cells lining the alveoli were wedge or pear shaped measuring  $13.69 \pm 0.49 \mu$  in height. The cells were resting on a well defined reticular PAS-positive basement membrane binding the alveoli. The cells contained fine granular eosinophilic cytoplasm and serozymogen granules towards the apical surface. Centroacinar cells occupied the centre of the

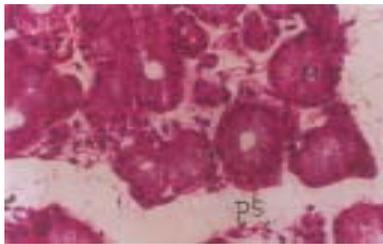


Fig 1. Labial gland showing mucous alveoli (M), serous alveoli (S) and serous demilunes (Ps). (H. & E. x 100).

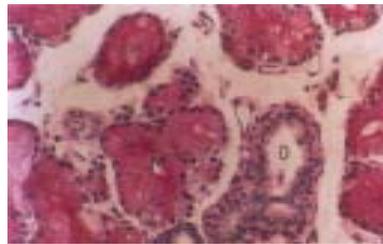


Fig 3. Labial gland showing strong PAS positive reaction in the mucous alveoli (M) which is absent in serous alveoli (S) and duct (D). (PAS method x 100)

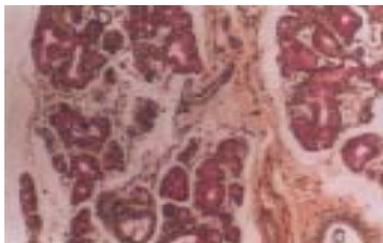


Fig 2. Labial gland showing mucicarmineophilic material in the mucous alveoli (M) which is absent in ducts (D). (Mayer's mucicarmine stain x 50)

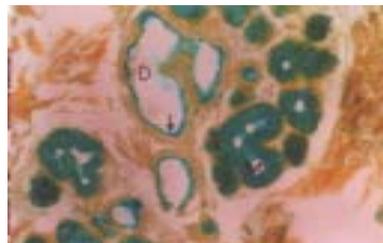


Fig 4. Labial gland showing Alcian blue positive material in the mucous alveoli (M) and along the luminal border (arrow) of the duct (D). (Alcian blue with metanil yellow x 50).

alveoli and resembled the serous cells in all respects. All these findings simulated to the information available in several books of veterinary histology (Banks, 1993). Mixed alveoli and serous demilunes capping the mucous alveoli as reported in the labial glands of one humped camel (Taib and Bashir, 1987), horse (Magalhaes *et al.*, 1975) and domestic ruminants (Parida and Das, 1991 b) were also found in buffalo calves. Kay (1960) observed fewer serous cells in the labial glands of sheep and cattle which occasionally grouped to form small demilunes.

Histochemically the mucous cells were filled with strongly PAS-positive, coarse granular material (Fig 3), the intensity of which was slightly reduced on treatment with saliva. The material also showed a weak reaction with Best's carmine, indicating presence of small amount of glycogen along with other mucopolysaccharides. Alcian blue and PAS-positive material had also been reported in the glandular cells of labial glands in domestic ruminants (Parida and Das, 1992) and sheep and cattle (Kay, 1960). The cytoplasm also contained metachromatically reactive and acidic mucopolysaccharides evidenced by strong reaction with mucicarmine (Fig 1) and Alcian blue (Fig 4) stains. The authors opined that strong PAS and Alcian blue positive reactions confirmed the presence of neutral mucopolysaccharides and acidic sulphated mucosubstances respectively. The presence of neutral and sulphated acidic mucopolysaccharides has also been reported in labial glands of horse (Magalhaes *et al.*, 1975) and domestic ruminants (Parida, 1992). The weak and mild activity for acid and alkaline phosphatase enzymes was seen in the labial glands of buffalo which corroborated the earlier report of Taib and Bashir (1987) in camel. Fat of any kind could not be demonstrated during the present study in labial glands of buffalo.

The serous cells of labial glands in buffalo were found negative to all histochemical techniques carried out for mucosubstances, fats and enzymes during the present study. Contrary to these Parida and Das (1992) reported a strong PAS and moderate Alcian blue positive reaction in serous components of labial glands in domestic ruminants whereas, Magalhaes *et al.* (1975) stated that both mucous and serous demilune

cells of labial glands in horse secreted sulphated acidic mucopolysaccharides and sialic acid. The authors in the present study were of the opinion that the serous cells of labial glands in buffalo may contain material other than glycogen, acidic and neutral mucopolysaccharides, metachromatically and orthochromatically reactive mucins, fats, acid or alkaline phosphatases.

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