



ISSN: 2456-2912
VET 2020; 5(3): 14-16
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www.veterinarypaper.com
Received: 02-03-2020
Accepted: 04-04-2020

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Ultrastructural studies on the magnum of oviduct in emu (*Dromaius novaehollandiae*)

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Abstract

The Ultrastructure of Magnum was studied in eight adult apparently healthy emu birds. Mucosa contained different folds, of which the primary folds were more prominent. Several tubular invaginations on the primary folds and the openings of the proprial glands appeared on the surface epithelium. The magnum contained ciliated and non ciliated columnar cells, goblet cell of which non ciliated columnar cells and goblet cells were predominant. Two columnar cell types were observed in the surface epithelium i.e. light secretary cells and dark non secretary cells. Prominent elongated mitochondria were concentrated in the sub apical region. Three basic cells were observed in the basal part of tubular glands viz., type A cells packed with strongly electron dense granules, type B cells filled with amorphous material of low electron density.

Keywords: Carcass characteristics, weaner pigs, meat quality, palm kernel cake

Introduction

The emu is the second largest bird and belonged to order Ratite. These birds are reared commercially in many parts of the world for their meat, oil, skin and feathers, which are of high economic value (Sibley and Ahlquist, 1990; Patodkar *et al.*, 2009; Sreedevi *et al.*, 2012; Supriya Shukla *et al.*, 2013) [10, 6, 7, 8]. The ultrastructural studies on the magnum have been carried out in Ostrich (Sharaf *et al.* 2012) [11]. So the present study was initiated to examine the ultrastructure of the magnum in emu (*Dromaius novaehollandiae*).

Materials and Methods

The present work on “ultrastructural studies on the Magnum of Oviduct in Emu bird (*Dromaius novaehollandiae*)” was conducted at the Department of Veterinary Anatomy, College of Veterinary Science, Rajendranagar, Hyderabad. Fresh tissue samples were collected immediately from magnum of oviduct. The dried samples were mounted over the stubs with double-sided conductivity tape and were coated by a thin layer of gold metal over the samples using an automated sputter coater for about 3min (Bozzola *et al.*, 1999) [1]. The processed samples were scanned under Scanning Electron Microscope (model: JOEL-JSM 5600, JAPAN).

For transmission electron microscopy, the tissues from different regions of the oviduct were dehydrated in series of graded alcohol from 50% to 100% for 40 minutes each, infiltrated in 1:1 alcohol and resin, pure resin and later embedded in pure Spurr resin. Both semi thin and ultra thin sections were cut with a glass knife on a Leica Ultra cut UCT-GA-D/E-1/00 ultramicrotome. Semi thin sections of 200-300 nm were stained with Toluidine blue whereas, ultra thin sections (50-70 nm) were mounted on copper grids. Then the sections were stained with saturated aqueous Uranyl acetate for 30 minutes and counter stained with 4% Lead citrate for 20minutes (Bozzola *et al.*, 1999) [1] and observed under transmission electron microscope (Model: Hitachi, H-7500, JAPAN).

Results and Discussion

Scanning electron microscopy

The magnal mucosa contained different folds, of which the primary folds were more prominent and showed deep clefts in between. Deep furrows or clefts between the ridges were

Reported to be observed in adult chicken (Jung *et al.*, 2011) [3] and turkey (Parto *et al.*, 2011) [5]. Secondary folds were noticed on the primary folds of magnum. However, the primary folds accompanied by secondary and tertiary folds were reported to be noticed in the proximal part of the magnum, while in the distal part the folds were reported simple without secondary ones in turkey (Parto *et al.*, 2011) [5]. The openings of the proprial glands appeared on the surface epithelium and at the bases of the deep clefts, which agreed with the observations in ostrich by Saber *et al.* (2009) [9]. The surface epithelium of magnum was pseudostratified ciliated columnar epithelium. Similar finding was reported in fowl by Hodges (1974) [2].

Transmission electron microscopy

The surface epithelium of the magnum contained ciliated and non ciliated columnar cells, goblet cells. Similar observations were reported in the magnum of adult chicken by Jung *et al.* (2011) [3]. However, the epithelium was reported to contain ciliated and non ciliated cells predominated with ciliated cells by Saber *et al.* (2009) [9] in ostrich. In contrary to this, in the present study, the lining epithelium of magnum contained more number of non ciliated columnar cells and goblet cells. However, the similar epithelium with more number of goblet cells was also reported in the mucosa of magnum in hen by Mehta and Guha (2012) [4] and Sharaf *et al.* (2012) [11] in ostrich. The columnar epithelial cells contained granules of low electron density, which agreed with the reports of Wyburn *et al.* (1970) [12] in fowl. Three basic cells were observed in the basal part of tubular glands viz., type A cells packed with strongly electron dense granules, type B cells filled with amorphous material of low electron density and numerous RER profiles and type C cells with few strongly electron dense granules and prominent organelles, RER Spaces and golgi complex. The above features correlated with the reports of Wyburn *et al.* (1970) [12] in the magnum of fowl.

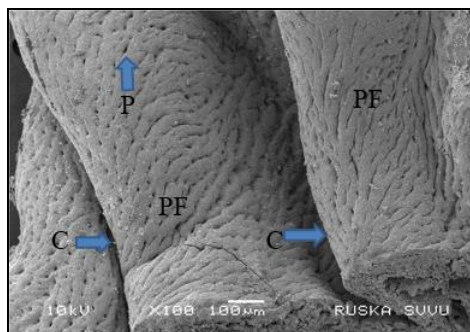


Fig 1: Scanning Electron micrograph (SEM) of the magnum showing prominent primary folds (PF) with pits (P) on surface and deep clefts (C) between them. X100

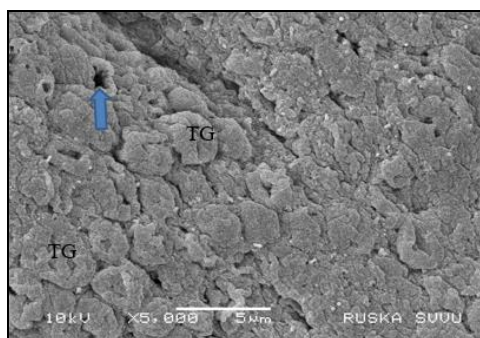


Fig 2: Scanning Electron micrograph (SEM) of the magnum showing proprial glands (TG) opening (arrows) on to the mucosal surface (M). X5000

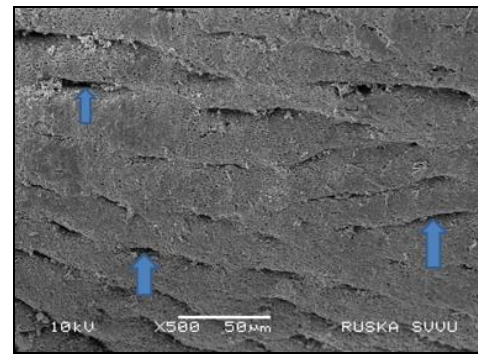


Fig 3: Scanning Electron micrograph (SEM) of the magnum showing numerous pits (arrows) on the surface of primary folds. X500

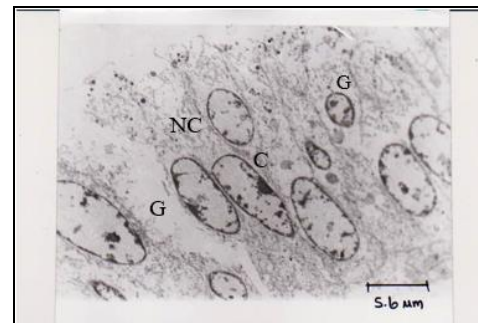


Fig 4: Transmission Electron micrograph (TEM) of the lining epithelium of the magnum showing ciliated (C), non ciliated columnar cells (NC) and goblet cells (G). X3474

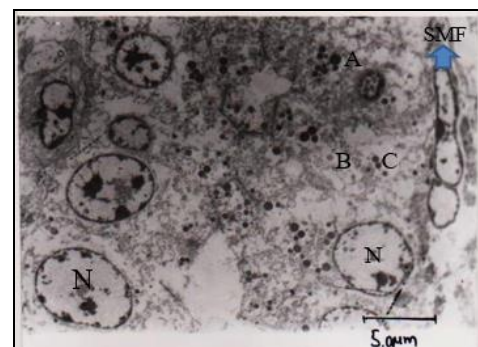


Fig 5: Transmission Electron micrograph (TEM) of glandular epithelium of magnum showing Type A (A), Type B (B) and Type C (C) cells containing electron dense secretory granules (G) at their apical surfaces. X3860. SMF-smooth muscle fibres. N- nucleus.

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