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Raghu Naik K
Department of Veterinary
Anatomy, College of Veterinary
Science, Rajendranagar,
Hyderabad, India.

Santhi lakshmi M
Department of Veterinary
Anatomy, College of Veterinary
Science, Rajendranagar,
Hyderabad, India.

Pramod Kumar D
Department of Veterinary
Anatomy, College of Veterinary
Science, Rajendranagar,
Hyderabad, India.

K.B.P Raghavender
Department of Veterinary
Anatomy, College of Veterinary
Science, Rajendranagar,
Hyderabad, India.

Corresponding Author:
Raghu Naik K
Department of Veterinary
Anatomy, College of Veterinary
Science, Rajendranagar,
Hyderabad, India.

Ultrastructural studies on the infundibulum of Oviduct in emu (*Dromaius novaehollandiae*)

Raghu Naik K, Santhi lakshmi M, Pramod Kumar D and K.B.P Raghavender

Abstract

The Ultrastructure of infundibulum was studied in eight adult apparently healthy emu birds. The mucosal surface contained spirally oriented unbranched longitudinal ridges in the funnel part of infundibulum with shallow furrows. The epithelial cells contained cylindrical cilia of uniform length and microvilli, in which clumps of cilia were observed. Four types of cells were observed in the lining epithelium, Viz., ciliated, non-ciliated, basal and mucous secretory cells (Goblet cells). The goblet cell was distended with secretion and contained elongated mitochondria throughout the cytoplasm. The roots of cilia were found to be concentrated with prominent mitochondria. The columnar ciliated cells showed little evidence of secretory activity by membrane bound electron dense secretory granules.

Keywords: Infundibulum, Emu, Oviduct, Ultrastructure

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). The ultra structural studies on the infundibulum have been carried out in Ostrich (Sharaf *et al.* 2012). So the present study was initiated to examine the ultrastructure of the infundibulum in emu (*Dromaius novaehollandiae*).

Materials and Methods

The present work on "Micro anatomical and Histochemical studies on the Oviduct of 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 different regions of the oviduct like infundibulum. For SEM, fixed samples collected from different regions of oviduct were dehydrated in series of graded alcohol and were dried with CPD unit. 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). The samples were scanned under Scanning Electron Microscope (model: JOEL-JSM 5600, Japan).

For TEM, 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) [9] and were later observed under Transmission Electron Microscope (Model:Hitachi,H-7500, Japan).

Results and Discussion

Scanning electron microscopy

The mucosal surface contained spirally oriented unbranched longitudinal ridges in the funnel part of infundibulum. The tubal part of infundibulum contained small secondary folds on the

larger primary ridges. Parto *et al.* (2011) [11] also reported that the infundibulum of the turkey showed spirally oriented longitudinal ridges and contained small secondary folds on them. The surface of infundibulum was lined by ciliated columnar epithelium with deep furrows in between. Similar finding was reported in ostrich by Saber *et al.* (2009) [12]. In the present study, the epithelial cells contained cylindrical cilia of uniform length and microvilli.

Transmission electron microscopy

In the present study, the tubular glands were opened onto the surface epithelium between the mucosal folds. However Wyburn *et al.* (1970) [13] reported that the tubular glands in sub-epithelial layer were lined with cells containing large granular endoplasmic reticular (GER) space filled with homogeneous material of low electron density. Similar observations were reported in fowl. In the present study, four types of cells were observed in the lining epithelium of the infundibulum, Viz., ciliated, non ciliated, basal and mucous secretory cells (Goblet cells). However, Wyburn *et al.* (1970) [13] reported that the surface ridges of infundibulum in fowl was lined with columnar epithelium and contained only ciliated cells, with little secretory activity and granular cells with electron dense granules.

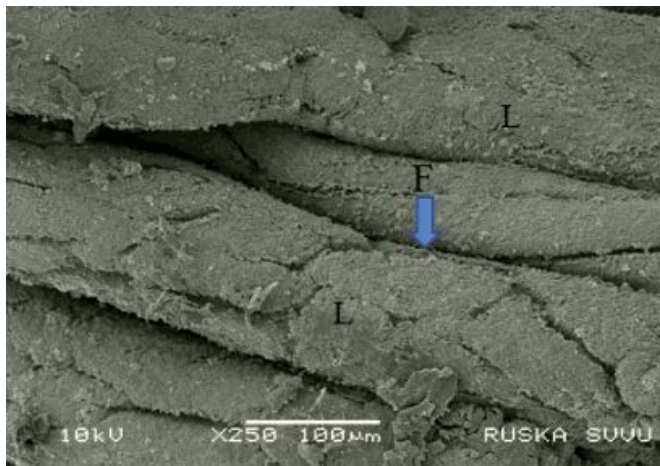


Fig 1: Scanning Electron micrograph (SEM) of infundibula funnel surface showing spirally oriented longitudinal ridges (L) with furrows (F) in between, X250



Fig 2: Scanning Electron micrograph (SEM) of the infundibulum showing cylindrical cilia (C) of uniform length and microvilli (s-secretory cell), X10.000

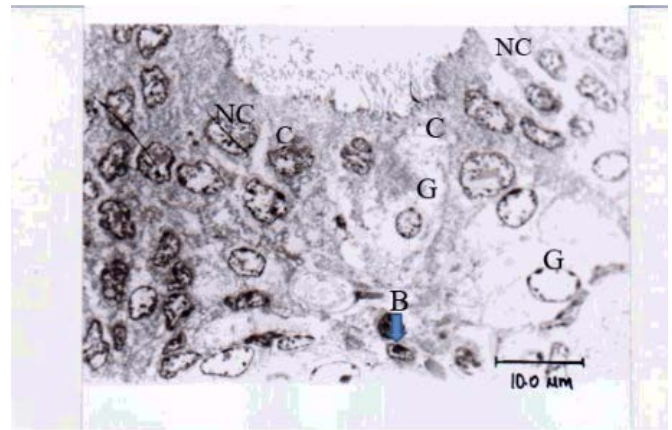


Fig 3: Transmission Electron micrograph (TEM) of infundibulum showing lining epithelium containing ciliated (C), non ciliated (NC), basal (B) and mucous secretory cells (Goblet cells) (G), X1930

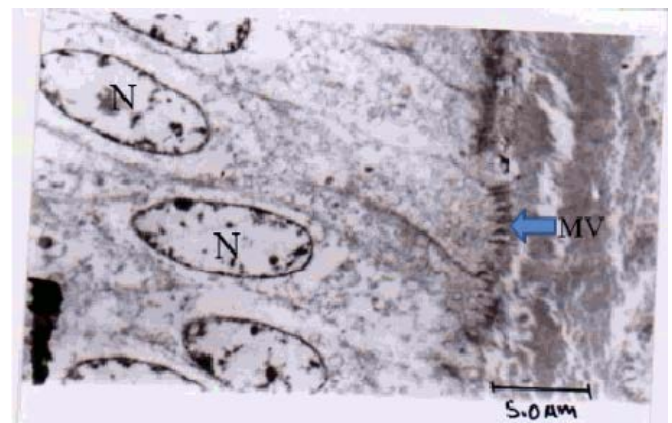


Fig 4: Transmission Electron micrograph (TEM) of the lining epithelium of infundibulum showing ciliated cells with achromatic oval nuclei (N) in central or apical portions and long, complex and microvilli (MV) on apical surface and prominent mitochondria (M) around the roots of the cilia, X3860

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