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Certain Light Microscopic Studies on Proventriculus of Parent Stock of Vanaraja Chicken

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Abstract

The present study was conducted on twelve adult Vanaraja birds of either sex whose weight varied from 1.5 – 2 Kg. All the birds were purchased from Central poultry farm Bihar Animal Sciences University, Patna. Before culling the birds were anaesthetised by giving inhalant anaesthesia and the organs were collected and preserved in 10% neutral buffered formalin for histological and histochemical studies. The wall of proventriculus of parent stock of Vanaraja consisted of four tunics which consisted of tunica mucosa, tunica submucosa, tunica muscular and tunica serosa. The tunica mucosa was thrown into extensively folded structures similar to papillae which consist of the opening of the excretory ducts of the glands of glandular stomach. The tunica mucosa consisted of lamina epithelialis, lamina propria and lamina muscularis mucosae. The lamina epithelialis was made up of mucus secreting cells which were lined with simple columnar epithelium. The lamina propria was made up of connective tissue containing collagen fibers, lymphoid tissues and blood capillaries. The lymphoid cells were present near the papillae of tunica mucosa. The tunica submucosa was present below the laminae muscularis mucosae and consisted of two types of proventricular glands, deep and superficial proventricular glands. The superficial glands were located near the mucosal folds. These proventricular glands were having the structure of a compound tubular gland. The wall of the tubular adenomeres were lined with simple cuboidal epithelium and the adenomeres were arranged in a circular pattern around the central collecting sinus. The tunica muscularis composed of smooth muscle fibers which consisted of an inner thick circular layer and an outer thin longitudinal layer. Collagen, reticular and elastic fibers were also observed in between the longitudinal layer.

Key words : *proventriculus, histology, vanaraja, chicken.*

Introduction

A major contribution to India's economy is contributed by livestock and poultry sector (1). Out of total income earned by Agriculture sector 17% is contributed by the poultry sector. Poultry are mainly reared for their egg and meat which have high quality nutrients and micronutrients which are essential for a balanced diet. Vanaraja chicken breed is a dual purpose multicolored breed mainly reared for its egg and meat production. The breed was developed for its high juvenile body weight, better feed conversion ratio, better immunity and an ideal body weight of about 1.5-2 Kg at the time of sexual maturity. Backyard poultry farming of Vanaraja is gaining great economic importance in agribusiness. They can be reared in rural village conditions with minimum input and low cost of production than those produced under intensive rearing condition with high input cost. Proventriculus play a significant role as the performance of an animal or bird is dependent on their digestive system and the feed which subsequently affect the F.C.R which is required for growth, maintenance, and egg production. Although (2, 3, 4) studied certain histological and histochemical structures on proventriculus of Japanese Quail, Uttara fowl and Moorhen respectively very few literature is available on the proventriculus of Vanaraja. Hence the present study was undertaken to reveal the microscopic structure of proventriculus of Vanaraja chicken.

Materials and Methods

The present study was conducted on twelve adult Vanaraja birds of either sex whose weight varied from 1.5–2 Kg. All the birds were purchased from Central poultry farm Bihar Animal Sciences University, Patna. Before culling the birds were anaesthetised by giving inhalant anaesthesia and the organ was collected and preserved in 10% neutral buffered formalin for histological and histochemical studies. After fixation a tissue of 5 mm thickness was cut with the help of BP blade and processed for various histological and histochemical processes such as washing, dehydration, clearing, paraffin impregnation, embedding and sectioning. Paraffin sections were cut at 5-7micron thickness with the help of semiautomatic rotary microtome and sections were stained with different staining procedures for various microscopic observations as per (5).

Results and Discussion

The wall of proventriculus of parent stock of Vanaraja consisted of four tunics, tunica mucosa, tunica submucosa, tunica muscular and tunica serosa (Fig.-1).

The tunica mucosa was thrown into extensively folded structures similar to papillae which consist of the opening of the excretory ducts of the glands of glandular stomach. Similar observations were reported in Pigeon

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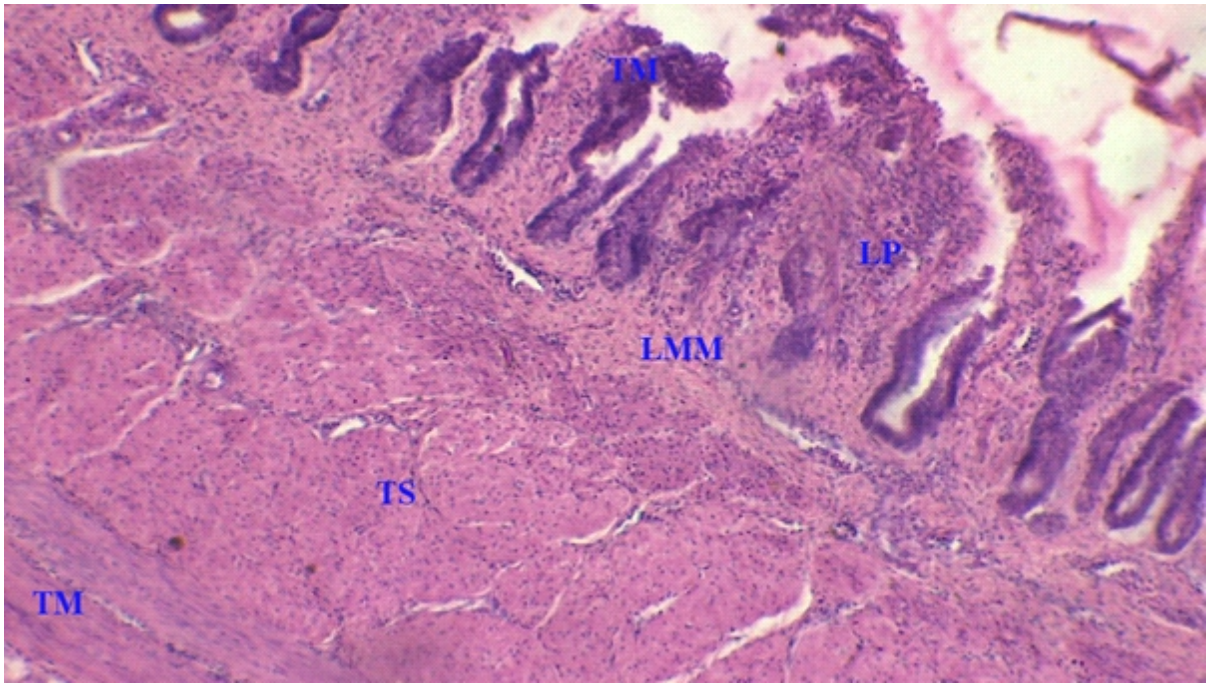

Fig.-1 : Photomicrograph of transverse section of proventriculus of parent stock of Vanaraja showing Tunica mucosa (TM), Lamina propria (LP), Laminae muscularis mucosae (LMM), Tunica submucosae (TS) and Tunica muscularis (TM) H&E Stain, X100.

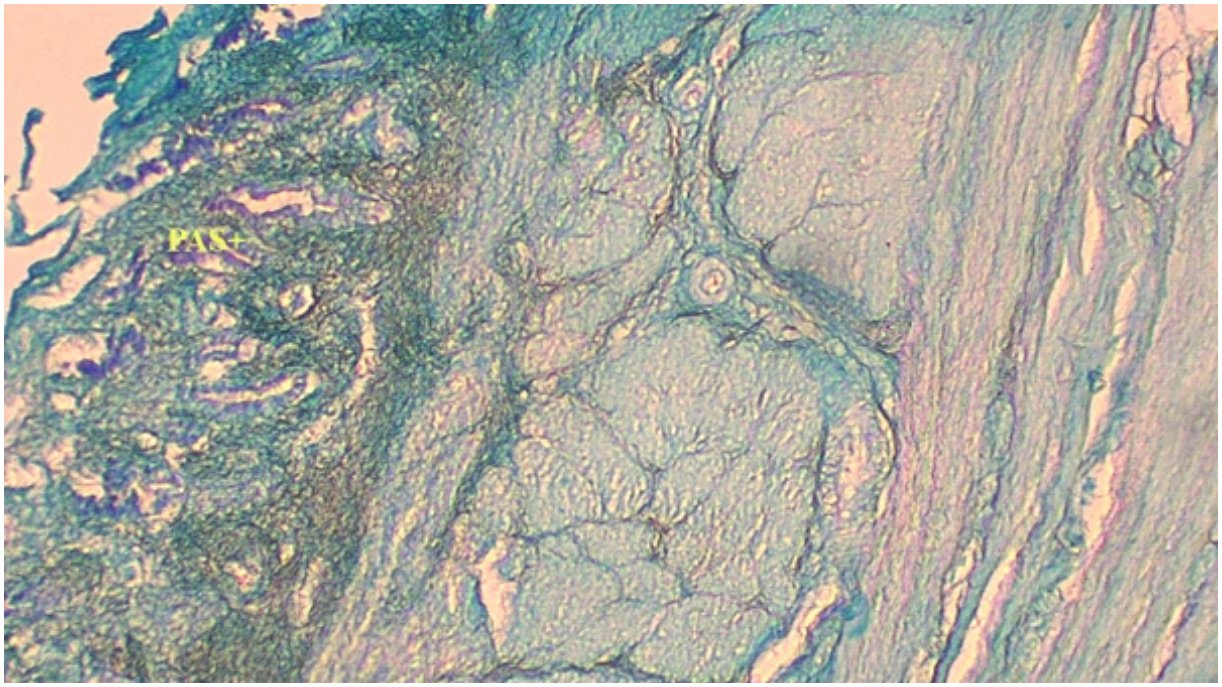

Fig.-2 : Photomicrograph of transverse section of proventriculus of parent stock of Vanaraja showing PAS positivity in mucous secreting cells of tunica mucosa, PAS stain, X100.

and Coot bird by (6, 7) respectively. The tunica mucosa consisted of lamina epithelialis, lamina propria and lamina muscular mucosae. The lamina epithelialis was made up of mucus secreting cells which were lined with simple columnar epithelium (fig.-3).

Similar observations were reported in Japanese quail by (8) and in cattle egret fowl by (9). The lamina propria was made up of connective tissue containing collagen fibers, lymphoid tissues and blood capillaries. The lymphoid cells were present near the papillae of tunica mucosa. indicating the importance of proventriculus in enhancing the immune system where the food passes through the digestive tract (fig.-3&4).

These findings were in accordance with the

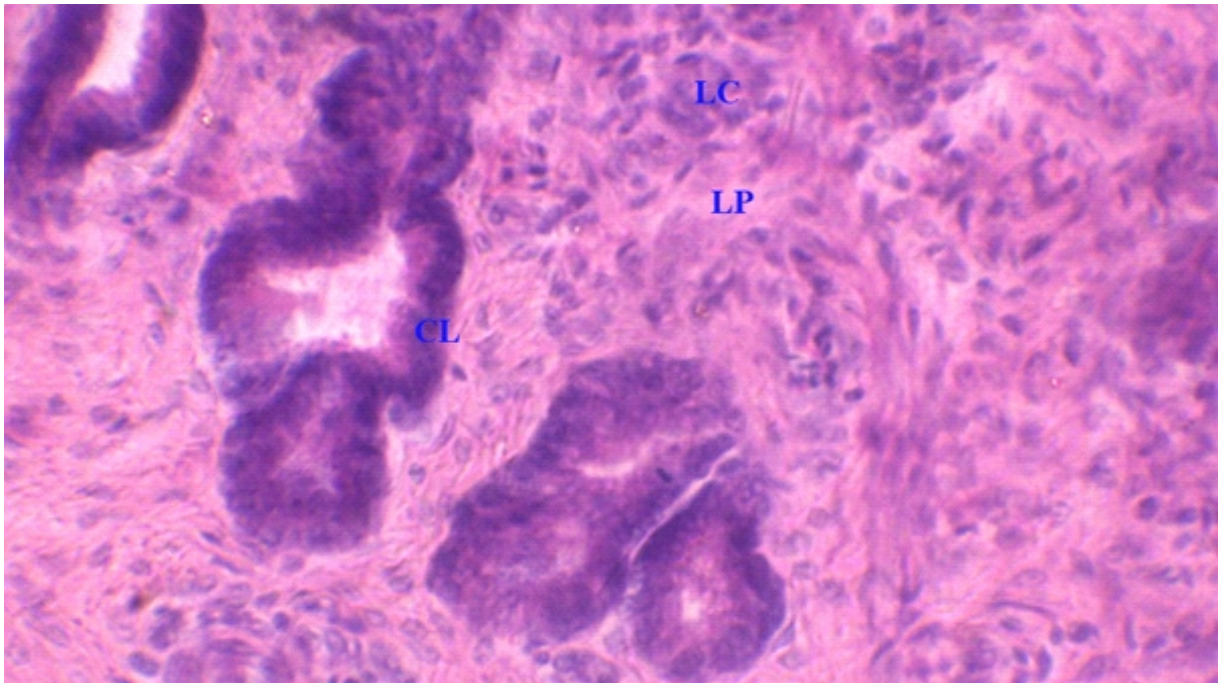

Fig.-3 : Photomicrograph of transverse section of proventriculus of parent stock of Vanaraja showing lymphoid cells (LC) in the region of laminae proprea (LP) and columnar lining (CL) of the mucous, secreting cells of laminae mucosae, H&E stain, X400.

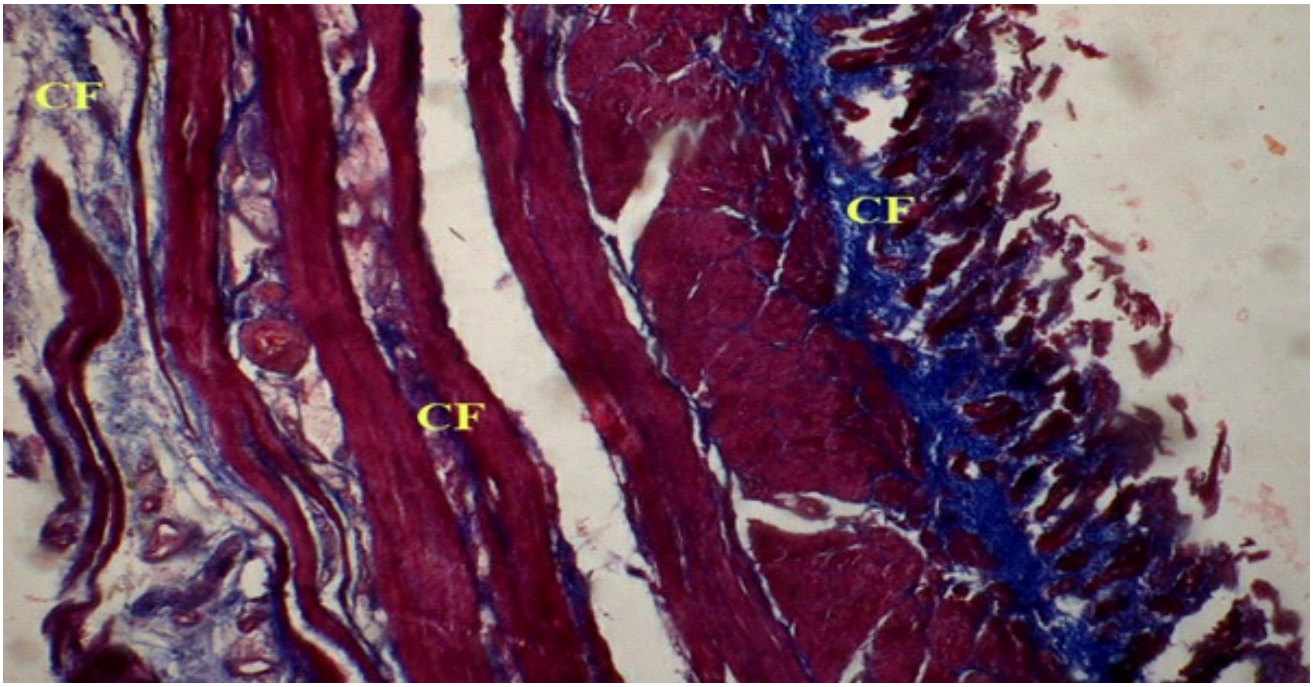

Fig.-4 : Photomicrograph of transverse section of proventriculus of parent stock of Vanaraja showing collagen fibers (CF) in the region of laminae propria, tunica muscularis and tunica serosa. Masson Trichome stain, X100.

observations of (9) in Cattle egret, (10) in broilers, (11, 12, 13) in fowl. The lamina muscularis mucosae was made up of smooth muscle fibers which were oriented longitudinally into two layers an internal and an external layer around the proventricular glands. Similar observations were recorded in Grey backed shrike by (14). The tunica submucosa was present below the laminae muscularis mucosae. It consisted of two types of proventricular glands, deep and superficial proventricular. glands. The superficial glands were located near the mucosal folds (fig.-5&6).

These proventricular glands were having the structure of a compound tubular gland. The wall of the tubular adenomeres were lined with simple cuboidal

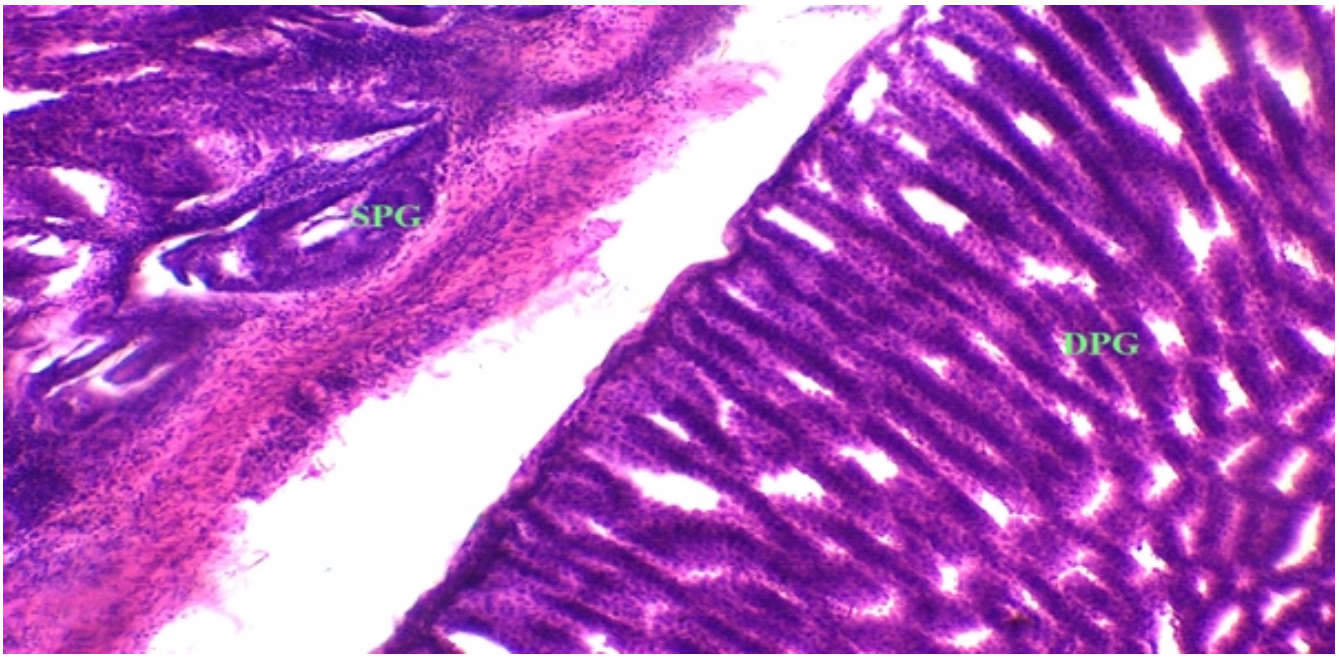

Fig.-5 : Photomicrograph of transverse section of proventriculus of parent stock of Vanaraja showing Superficial proventricular glands (SPG) in the region of Laminae propria and deep proventricular glands (DPG) in the region of Tunica submucosae, H&E Stain, X100

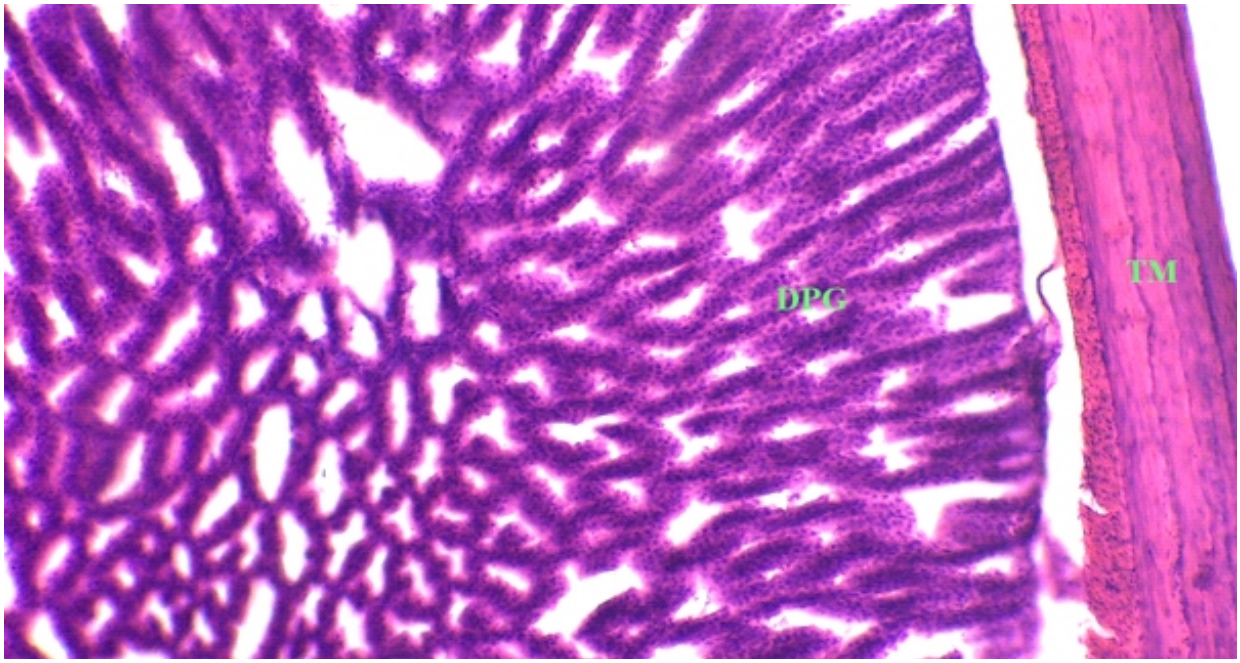

Fig.-6 : Photomicrograph of transverse section of proventriculus of parent stock of Vanaraja showing deep proventricular glands (DPG) in the region of Tunica submucosae and above Tunica muscularis (TM) H&E stain, X100.

epithelium and the adenomeres were arranged in a circular pattern around the central collecting sinus. The present finding was in accordance with the observation of (15) who reported that the wall of each lobule consisted of numerous straight alveoli radiating out from the central cavity. The duct system comprised of primary, secondary and tertiary duct which were lined with simple columnar epithelium (Fig.-7&8).

The location of proventricular glands is a controversial matter between authors, some authors have reported that the proventricular glands were located in the lamina propria and lamina muscularis mucosa whereas according to some authors the proventricular glands are located in the tunica submucosa. The location of proventricular glands in parent stock of Vanaraja was in accordance with the observations of (10, 16, 17, 18). They

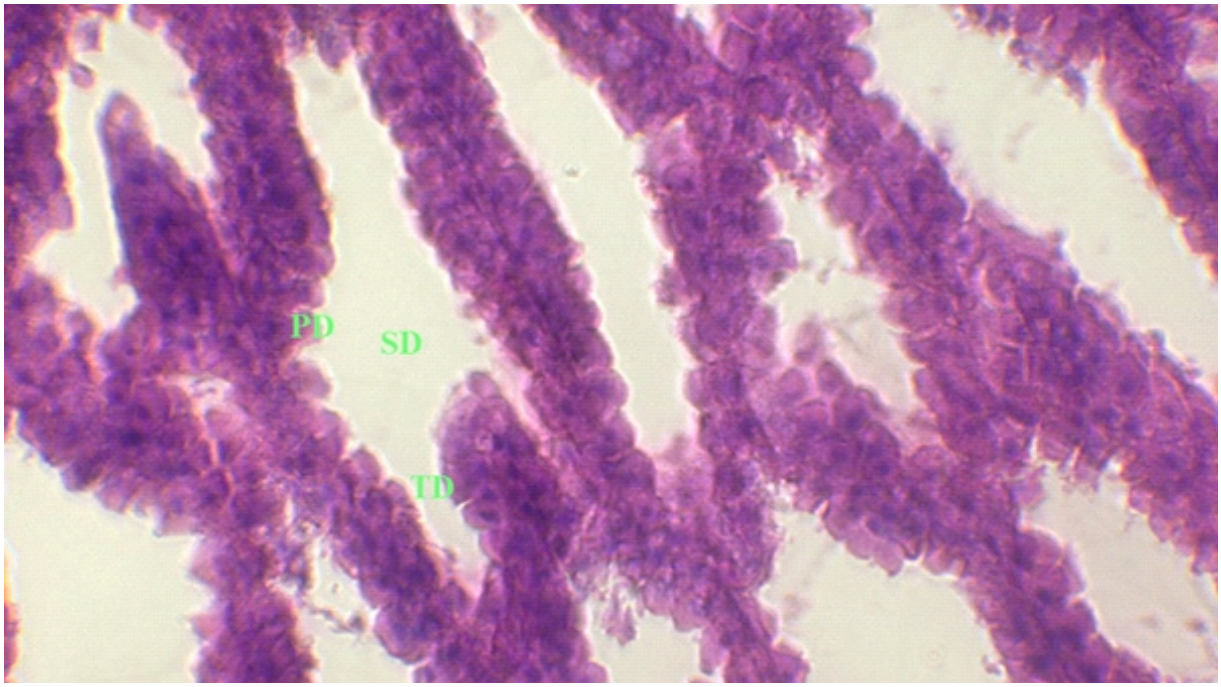

Fig.-7 : Photomicrograph of transverse section of proventriculus of parent stock of Vanaraja showing compound tubular glands having primary duct (PD), secondary duct (SD) and tertiary duct (TD) H&E stain, X40.

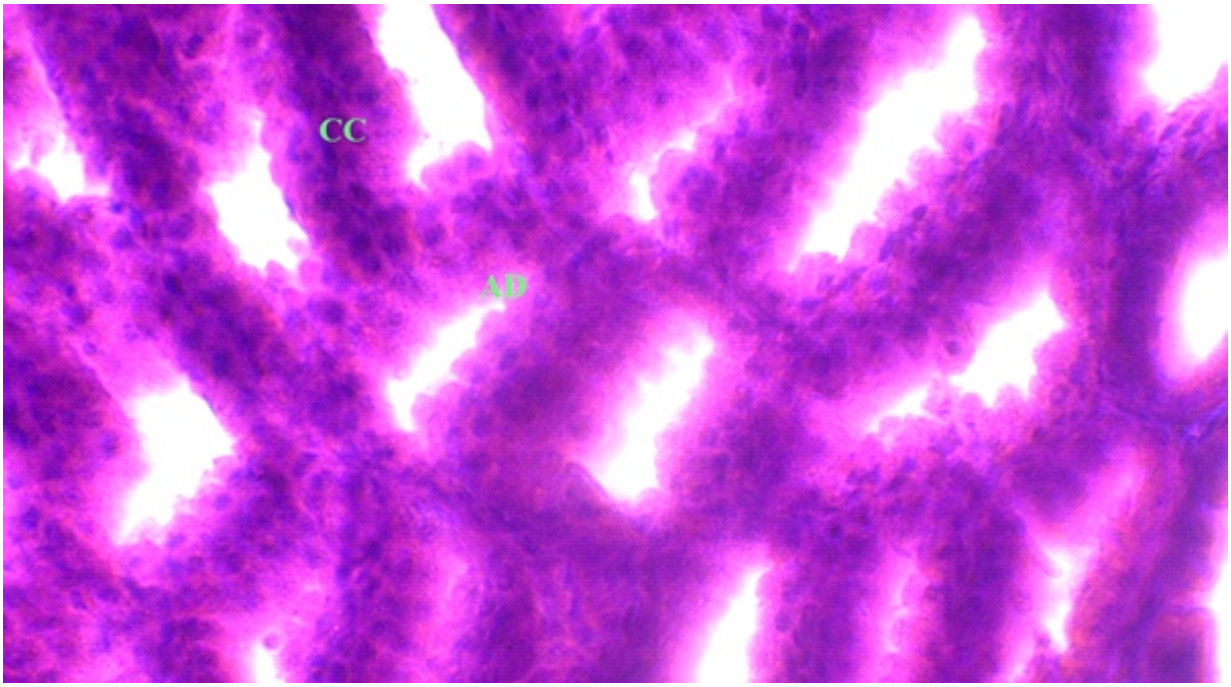

Fig.-8 : Photomicrograph of transverse section of proventriculus of parent stock of Vanaraja showing adenomeres (AD) lined with cuboidal cells (CC) H&E stain, X400.

stated that these glands were submucosal in location arranged into round, oval to polygonal shaped lobules. The space between these lobules were filled with blood vessels, collagen fibers, reticular fibers and elastic fibers. However, the present location of proventricular gland in submucosal region was in contradictory to the findings of (19) who stated that these glands penetrated into the muscularis mucosae in fowl. It was also contradictory with the observations of (20) who stated that these glands were present in the lamina propria and. (21) who could not identify the existence of submucous layer in proventriculus of yellow-billed grosbeaks. The tunica muscularis composed of smooth muscle fibers which consisted of an inner thick circular layer and an outer thin

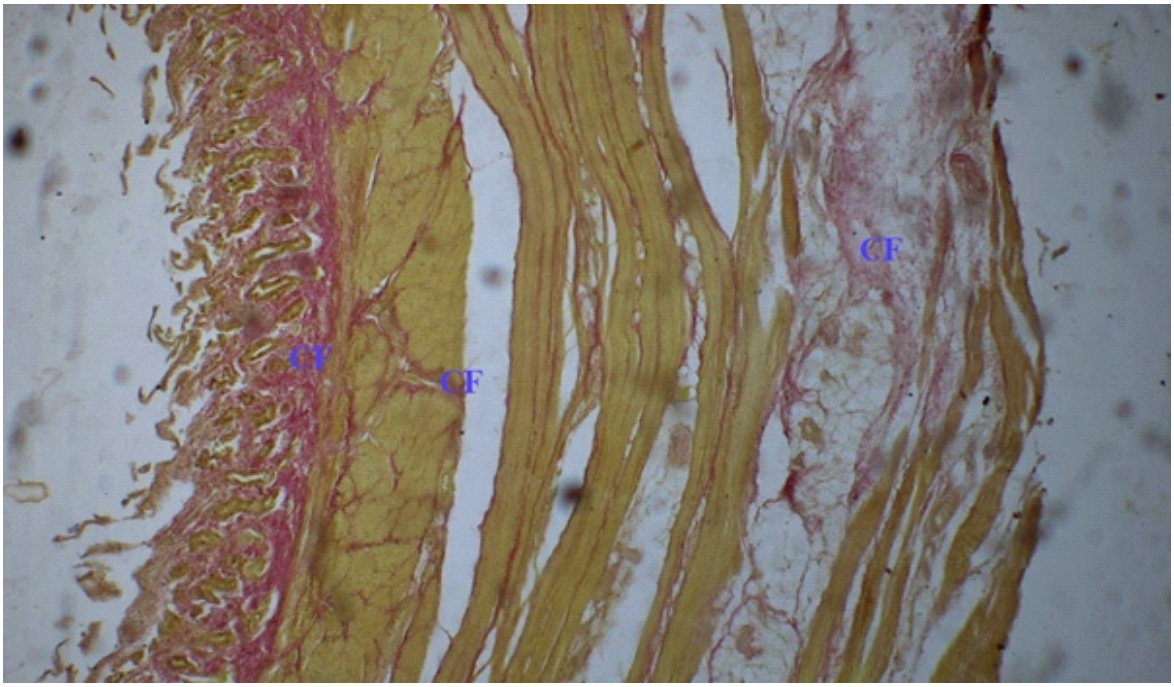

Fig.-9 : Photomicrograph of transverse section of proventriculus of parent stock of Vanaraja showing collagen fibers in the region of laminae propria, tunica submucosae, tunica muscularis and tunica serosa. Van Geison stain, X100

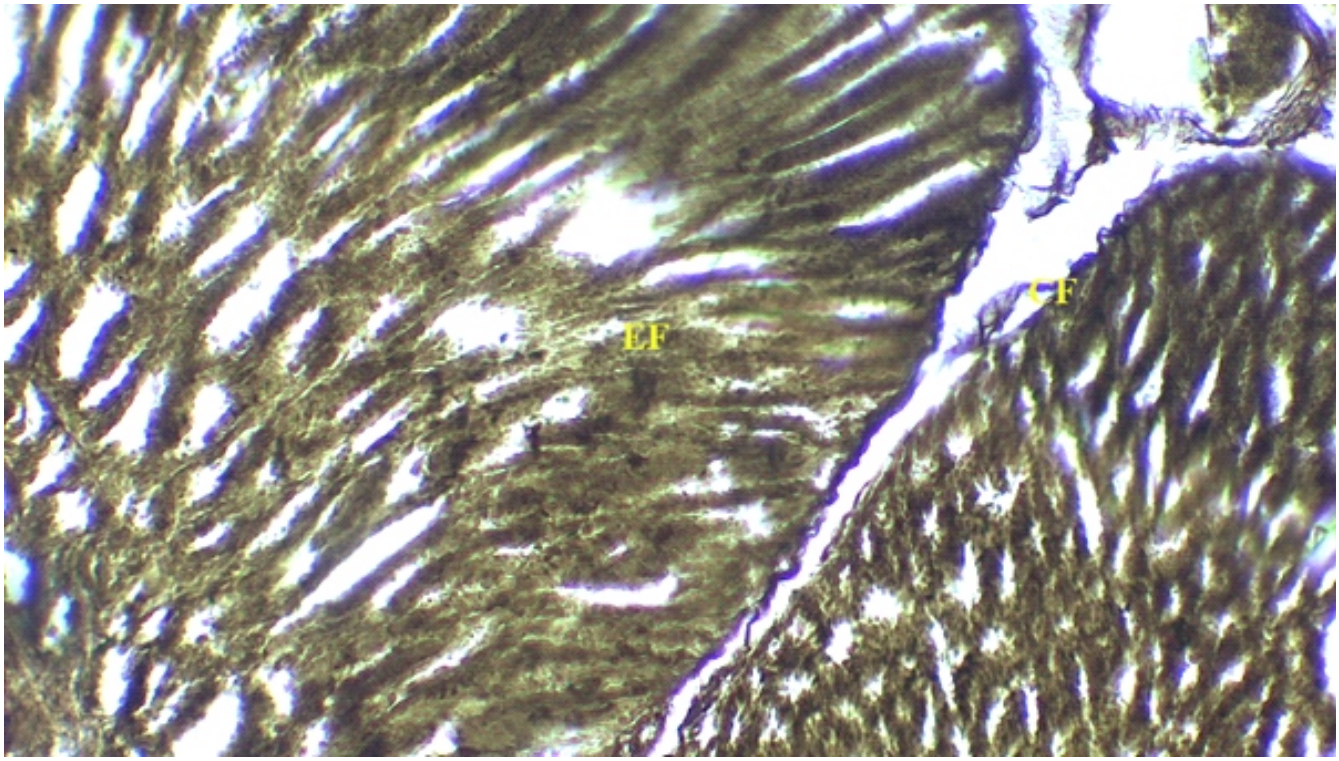

Fig.-10 : Photomicrograph of transverse section of proventriculus of parent stock of Vanaraja showing collagen fibers (CF) and elastic fibers (EF) distributed in the region of proventricular glands. Verhoefs elastic stain, X100.

longitudinal layer. Collagen, reticular and elastic fibers were also observed in between the longitudinal layer which were similar to the observations recorded in Kadaknath fowl by Das (2010). The tunica serosa was a thin layer of connective tissue. Presence of connective tissue fibers, collagen, reticular and few elastic fibers were observed in serosa (fig. 9&10) and the findings were similar to the observations reported in Black tailed crake (14), in Coot bird by (7), in fowl by (13, 22).

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