

STRUCTURE AND POSTNATAL DEVELOPMENT OF MAGNUM IN JAPANESE QUAIL (*Coturnix coturnix japonica*)

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Magnum is the longest region of the avian oviduct and is concerned with the secretion of albumen. There are many reports regarding the structure of the magnum in the domestic fowl. In the case of quail, recorded observations are very few (Fertuck *et al.*, 1970 and Pageaux *et al.*, 1986). In the present study, the histology of the magnum of the Japanese quail was studied at various stages of postnatal development.

Materials and methods

Magnum was collected from freshly sacrificed 72 quail chicks (six in each group). The material was collected at three days interval upto 15 days, five days interval upto 30 days and ten days interval upto 60 days of age. The live body weight and the weight and length of the oviduct were recorded. For the last two

age groups (50 and 60 days of age) the length of the magnum was measured. The tissue was fixed in formol saline and processed for paraffin embedding. The sections cut at 5 mm were stained by Haematoxylin and Eosin (H&E), Periodic acid Schiff's (PAS), van-Gieson's, Verhoeff's haematoxylin and Gomori's reticulum methods.

Results and discussion

In the day-old quail chicks, the oviduct was a narrow white translucent tube towards the left side of coelom and the various segments of the oviduct were not differentiated. Portion corresponding to the future magnum consisted of innermost epithelium and subepithelial connective tissue (Fig. 1).



Fig. 1 C. S. of the cranial region of the oviduct (day-old). (H & E x 400)

Different tunics of the wall of the oviduct were not developed. The lumen was characterized by low primary mucosal folds lined by simple columnar epithelium. Subepithelial connective tissue layer was made up of densely packed cells supported by a fine collagen and reticular framework. Externally there was a thin collagenous covering. Reports on the magnum of the day-old quails are not available for comparison.

The oviduct was supported by peritoneal folds - the dorsal and ventral ligaments consisting of collagen fibres and fibroblasts. Ventral ligament possessed smooth muscle fibres also. At 15 days of age the height and number of the primary folds were found to be increased and were more regular in their arrangement. Structural changes in the oviduct were more evident between 30 and 40 days of age. An increase in the height of the mucosal folds and

the number of luminal epithelial cells indicated the beginning of a rapid growth phase. This observation supports the findings of Pageaux *et al.* (1986). Lamina propria was made up of collagen fibres, fine reticular fibres and glandular tissue.

Differentiation of the magnum was completed at 50 days of age. The region of the oviduct succeeding the infundibular neck increased in size to form the magnum which became the longest and the most coiled segment of the oviduct. The contribution of the magnum to the total length was 48.3 per cent. In the terminal region, the diameter gradually reduced to that of the isthmus.

In the adult bird, mucosal ridges of the magnum were considerably taller and wider than the infundibulum, the greater part of this development being due to the intense development of the tubular glands (Fig. 2).

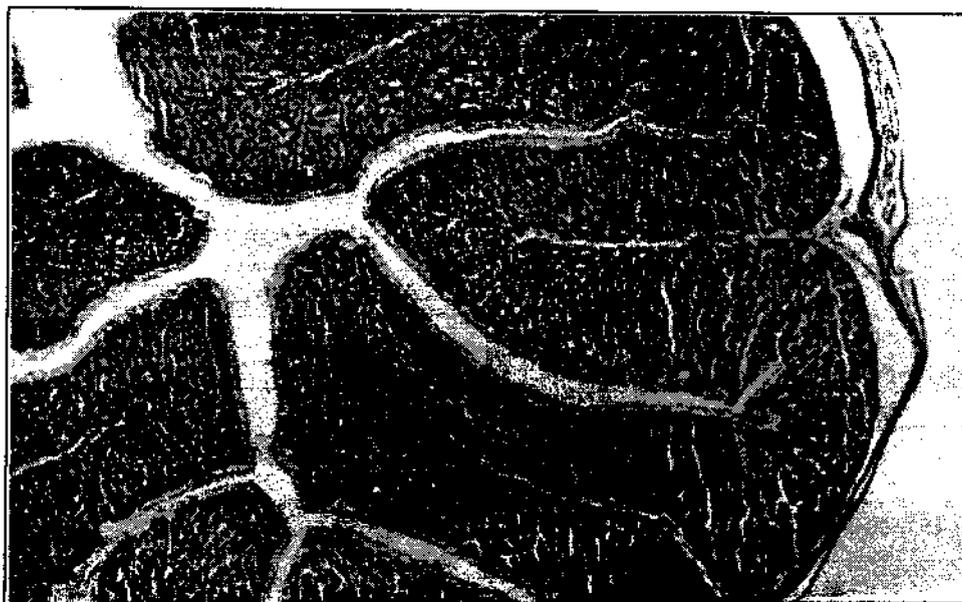


Fig. 2 C. S. of the magnum showing well developed mucosal folds and tubular glands (60 days). Gomori's rapid one step trichrome method x 60

A similar observation was made by Das and Biswal (1968) in duck and Wyburn *et al.* (1970) in fowl. In the present study, 14 to 19 primary mucosal folds with a few secondary folds were noticed in the magnum. In the fowl, McLelland (1990) distinguished on an average 22 well developed primary folds with no secondary folds.

The epithelium lining the magnum was of a ciliated columnar type with goblet cells (Fig.3). Aitken (1971) also made a similar observation. The columnar cells possessed

spherical basal nuclei and basophilic cytoplasm. Goblet cells presented broad apical regions containing numerous PAS positive granules.

The tubular glands of the magnum were lined by pyramidal cells with basal spherical nucleus and an eosinophilic cytoplasm as observed in the fowl by Davidson *et al.* (1968). Aitken (1971) reported that these cells secreted the bulk of egg-white protein. Core of the mucosal fold was formed of dense collagen fibres and fine reticular and elastic fibres (Fig.3).



Fig. 3 C. S. of the magnum showing epithelium and core of mucosal fold with collagen fibres (60 days). Gomori's rapid one step trichrome method x 160

Musculature was very thin and circularly arranged with blood vessels in between the bundles. Externally there was a thin collagenous serosa.

Presence of scattered lymphocytes in the wall of magnum of the quail oviduct agrees with the findings of Kimijima (1989) in fowl. However, Das and Biswal (1968) did not find lymphocytes in the magnum of duck. In the magnum region of quail oviduct, ovum spends 2 - 2½ hours were the bulk of egg albumen is

secreted (Woodard and Mather, 1964). The mucosal folds of the magnum were higher and thicker than those in other parts, increasing the surface area of the mucosa.

Summary

Postnatal development of the magnum in the coturnix quail was carried out using 72 quail chicks from day-old to 60 days of age. Different segments of the oviduct were not clear in day-old subjects. The portion of oviduct corresponding to the future magnum consisted

of low primary mucosal folds lined by simple columnar epithelium and subepithelial connective tissue. Rapid growth of the organ took place between 30 and 40 days of age. At 50 days of age, the wall of the magnum was markedly thicker due to the intense development of the tubular glands in the lamina propria. The epithelium consisted of ciliated columnar cells and goblet cells. Tubular glands showed pyramidal secretory cells with eosinophilic cytoplasm and basal spherical nucleus. Musculature was very thin and consisted of circularly arranged fibres. Magnum was the longest and the most coiled segment of the quail oviduct.

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