OBSERVATIONS ON THE CLOACAL GLAND OF THE EURASIAN QUAIL, *COTURNIX COTURNIX*

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While handling the Eurasian quail, *Coturnix coturnix*, in a game stocking program, the junior author noted that the breeding males issued a frothy fluid from their cloacae. Upon examination we noted that this secretion originated in a gland located above the dorsal lip of the cloaca. There is a hypertrophy of this glandular tissue which is associated with enlarged testes (15 x 25 mm in size) and with great behavioral sexual activity of the male. There seems to be little doubt that this secretion is associated with the mechanics of internal fertilization. There exudes a copious, clear secretion from many small pores over the surface of the gland. The secretion becomes full of air bubbles and fills the cloaca with a meringuelike froth. It is also evacuated on defecation and clings to the droppings; the latter occurrence causes caged birds to accumulate large balls of dung on their toes. The froth is transferred to the cloaca of the female during copulation.

Tissues were removed from freshly-killed birds and placed in San Falice's, Carnoy's, and corrosive acetic fixatives. Sections were cut 12 to 14 μ thick and were placed on slides (cleaned with acid) without the use of albumin. The stains used were periodic acid Schiff, Harris' haematoxylin, azure B (buffered at 4.0) and periodic acid-celestin blue (Pearse, 1950). Acetone, ethyl alcohol and xylene dried with silica gel were used for dehydration.

In this bird, the dorsal lip of the cloaca extends ventrad (about five mm) outside the ventral lip which is internal to the other lip. The dorsal lip is thin and only slightly muscular with a thin layer of circular and longitudinal muscles.

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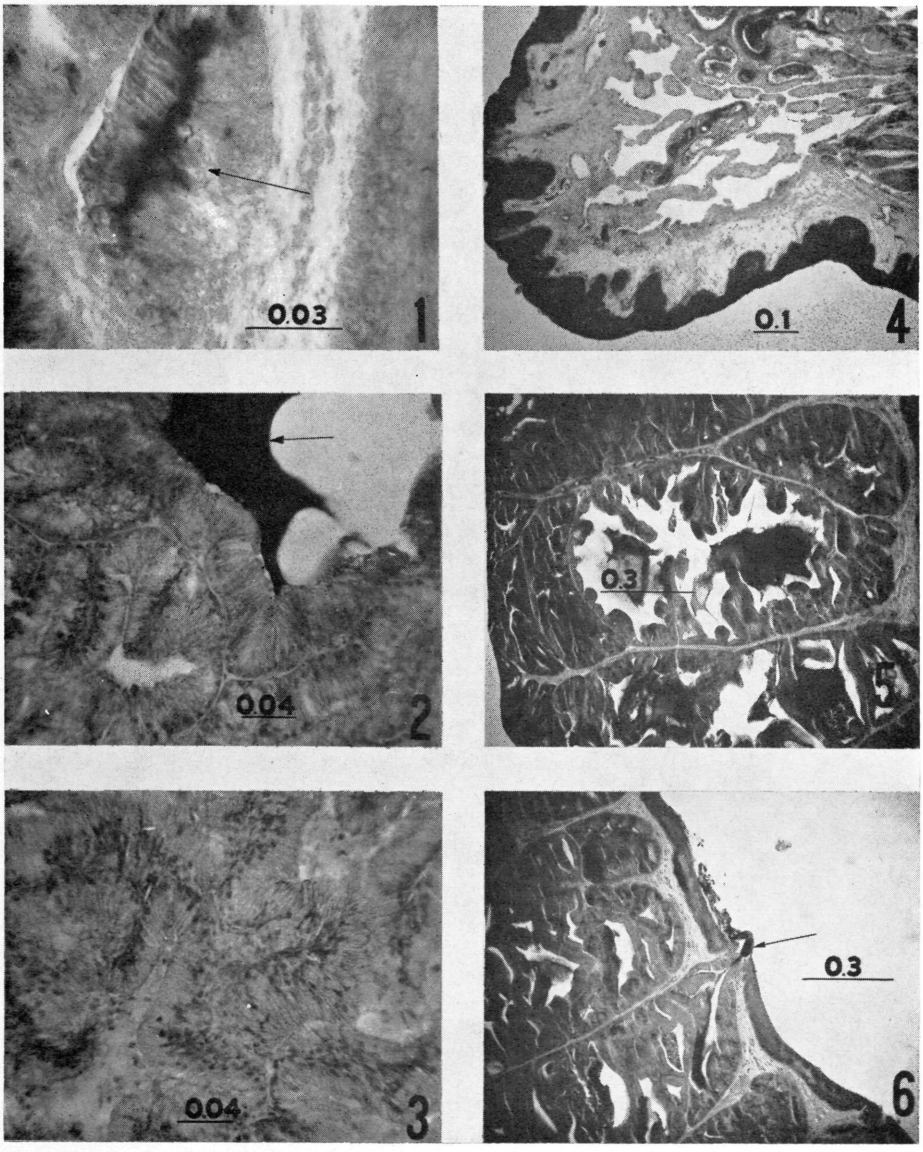

EXPLANATION OF FIGURES IN PLATE

All tissues shown in this plate, except figure 1, were stained periodic acid Schiff-celestin blue. All measurements are in millimeters.

1. A section stained with periodic acid Schiff showing the positive reaction of the secretion adjacent to the epithelium.
2. A collection of the secretion in the lumen of the gland.
3. A section showing the granular nature of the secretory cytoplasm.
4. A section through the penis.
5. A sagittal section showing the arrangement of the sections.
6. A sagittal section showing a pore and its secretion.

The lining of the lip is heavy, stratified epithelium and this extends to the juncture with the proctodeum. The ventral lip is heavy, short and extends up inside the long arc formed by the dorsal lip. The low columnar epithelium characteristic of the proctodeum (Calhoun, 1933) is present at the base of the ventral lip. Near the border of this lip, there is a large circular muscle.

The gland studied here is embedded in the dorsal lip of the cloaca and extends from the heavy musculature at the base of the bursa of Fabricus almost to the tip of the dorsal lip. The size of the gland is about ten mm long (measured around a curve) and two mm thick. In the breeding male (sexual maturity about seven weeks) the crissum is greatly distended, accommodating the enlarged gland, and it is colored a dark red externally. The swelling is useful in determining the sex of live birds in questionable plumage. This swelling is not to be confused with that of passerine birds (Wolfson, 1954) which contains convoluted sperm ducts. The vas deferens and ureter open independantly of the cloacal gland in the quail.

The gland is divided by connective tissue septa forming units which are longer than broad (fig. 5). Each of these segments opens to the outside by means of a small pore (fig. 6). Frequently these pores are reenforced by stratified epithelium thickenings and other times the pore appears only as a hole through the epithelium (which could be confused with a simple break in the tissue). The individual unit of the gland is tubular in shape (fig. 1). These are arranged so that the effect is an alveolar gland. The ducts are not readily apparent and they are lined with a low columnar epithelium. The typical glandular epithelium is a high columnar type with a nucleus in the basal third of the cell. The cytoplasm contains a network with small granules.

We have good evidence to believe that this secretion is mucoid in nature. It stains readily with the periodic acid Schiff reagent and clearly violet with toluidine blue (the latter is a specific test for mucin). The cytoplasmic granules are positive for these two stains also (fig. 1 and 2). Both the secretion and the granules are resistant to digestion by malt diastase and ribonuclease. The secretion removed from the bird, smeared on a slide, and air dried, gives the same reactions as the secretion found in the ducts in the sectioned material.

In the male bird there is a penislike structure on the ventral wall of the cloaca (fig. 4). The structure is quite small, but it can be located readily by the pigment present in it. The penis appears to be erectile; sinuses lined with epithelium are present in it. We did not observe the penis in the turgid state and since we do not know the size of it in the distended state, we can only speculate concerning its relationship to the gland. If the penis is inserted during copulation, then it is possible that the secretion of the gland may serve as lubrication. Although the presence of a penis is well-known in water fowl, it has not been reported in gallinaceous birds.

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