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Observations on a Hen Possessing some Structural Doubling and Limited Cock Characters

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OBSERVATIONS ON A HEN POSSESSING SOME STRUCTURAL DOUBLING AND LIMITED COCK CHARACTERS[1]

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Cases of adult hens showing cock characters have been studied extensively, but doubling of structure is seldom found beyond the embryonic stages. This case of a White Leghorn hen is of interest not only in that she carried some cock characters while laying normal eggs, but also in that she possessed some marked anomalies that are indicative of irregular embryonic development. The Poultry Husbandry department, Iowa State College, gave this particular hen to the Genetics department in the spring of 1927. She had been sent to the college by an Iowa farmer some time previously. From Nov. 20, 1927, to March 5, 1928, she was kept in the Genetics animal laboratory with a flock of hens which were under regular laboratory observations. On March 5, 1928, the hen was photographed, dissections were made, and histological studies were begun.

Visible structural irregularities were expressed in a wry tail arising from two distinct caudal enlargements located one directly above the other. There were two vents. The larger functional one was to the left of the lower tail enlargement, the smaller one directly opposite on the right side.

The suggestion of male characters had expression in a large thickened comb measuring 13.5 by 10 cm. And internally there was also some development of the right gonad which superficially suggested a small testis. Normally the right gonad development is entirely absent in the laying hen.

The dissection showed that the respiratory and circulatory tracts were normal. The digestive tract was normal down to the cloaca. On either side the cloaca had connections with the vents. From each side of the cloaca a duct extended forward. The one on the right was about 5 cm. in length, extending approximately half the distance from the cloaca to the gonad. The left one was the functionally normal oviduct (see diagram). The left gonad, though

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functioning as a normal ovary, contained much necrotic tissue in the form of degenerate ovarian substance enclosed in heavy connective tissue capsules. These were suspended on fibrous pedicles. Some of the capsules beside containing a pigmented amorphous substance also contained a quantity of oil, suggesting that the oil-forming function of the follicle had not been entirely destroyed. Oocytes of microscopic size that were destined to atresia and

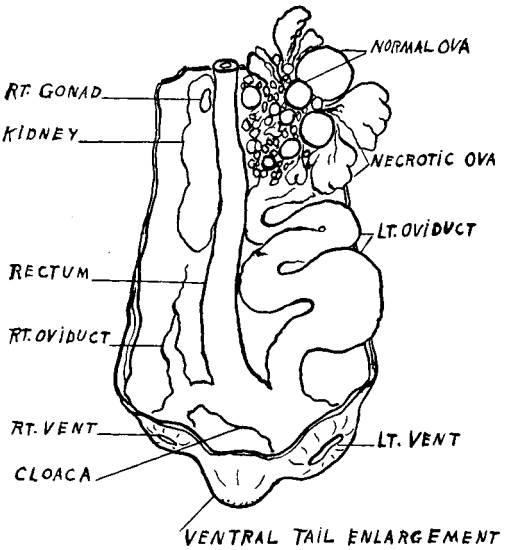

DIAGRAM OF DISSECTION

VENTRAL VIEW

SCHOTT '28
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necrosis could be found in the proliferating layers of the ovary. The mark of distinction here was the speck of pigment as if a capillary had ruptured into the follicle. All sizes from the microscopic to the large masses could be recognized by the dark color of the amorphous debris.

Histological studies of the right gonad showed it to be essentially an ovary. A number of cystic follicles were imbedded in a thick cortex. One large follicle in the center of the gonad was apparently in a state of disintegration. Its contents after fixation suggested a semiliquid protoplasmic mass. Neither right nor left ovary contained distinct male developments such as sex-cords or spermatic tubules which could be directly related to the stimulation

of the malelike development of the comb through male hormone secretion.

Further structural peculiarities expressed themselves in the bones of the pelvic and caudal regions. The left ilium projected forward about 1 cm. beyond the right. The pelvic bones showed an irregular dorsal line of fusion. The caudal vertebræ were all irregular in shape and arrangement. Apparently there was a pygostyle for each tail enlargement.

The formation of the two tail nodes and the two ani with their cloacal connections can undoubtedly be attributed to an interruption in the differentiation of the posterior part of the primary embryonic axis. Newman (1923) shows that the critical period for deaxiation is generally passed by the time that the egg is laid, but that a common effect of early laying on the embryo is to cause two-tailedness in birds. Here the interruption took place late enough so that the abnormality did not interfere with the life processes, although the divided or hindered axiation caused the formation of two anal plates, two tail bones, irregularities in the dorsal line, and possibly it also influenced the proliferation of the right ovary.

The appearance of male head furnishings in hens is most often associated with a loss of normal ovarian function with a subsequent development of male tissue in the gonads either spontaneously or following grafting (Crew, 1923, Lillie and Domm, 1927, Roxas, 1926). However, Parks and Brambell (1927) report four cases in which the ovaries were non-functional, and male head furnishings had appeared; but no male structures were detectable in the gonad regions. The female fowl carries a high male potentiality as has been shown by numerous experiments even though the female possesses one functional chromosome less than the male according to genetic evidence. Where the expression of male characters begins when female functions are depressed has not been established. Although in this observed case no male developments in the gonads could be demonstrated, the primordia for such developments may have been stimulated enough to produce more permanent expression in the comb at a non-laying period, when the inactive ovary was further depressed by the presence of the excessive necrotic tissue.

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