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A relation between experimental hyperthyroidism and barring in poultry.

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When the thyroid secretion of the domestic fowl is augmented by the addition of desiccated thyroid in the diet, or by the injection of thyroxin, changes in the moulting process and in the form, structure and color of new feathers occur, some of which have been described elsewhere.[1] Among these effects, one of the most notable is a modification of the form of certain feathers in the male that have a broad lacy border of naked barbs. The width of this border loses its normal uniformity, becoming narrower at some points than at others, owing to the unusual extension of barbules at these points on to the barbs. The contour of the central barbuled area thus presents a more or less regular series of scallops.

This structural change was first observed in Rhode Island Red males but its significance overlooked because of its relative irregularity. In Brown Leghorn males, however, the regularity of the marking in the hackles suggested a correlation with the pigment bars of barred breeds such as, for instance, the Barred Plymouth Rock. This surmise proved to be correct. When Barred Plymouth Rock males were fed thyroid, their new hackles displayed the same characteristic scalloping, and in this case the scallops corresponded closely with the pigment bars. When male Campines were given injections of thyroxin,[2] hackles, that followed white feathers that were plucked, contrasted sharply with the latter, both in color and structure. Not only was there a quantity of dark pigment, but it was laid down in a pattern in which bars could be readily recognized. And the scallopings characteristic of the feathers of thyroid-fed birds were associated with the pigment bars, as in Barred Plymouth Rocks.

[1] Torrey, Harry B., and Horning, Benjamin, PROC. SOC. EXP. BIOL. AND MED., 1922, xix, 275; *Biol. Bull.*, 1925, xlix, 275; *ibid.*, 365.

[2] Experiments by Mr. Floyd Ruch, a student in my laboratory.

It appears, then, that a fundamental tendency toward rhythmic feather marking was manifested by these birds in two ways: in color pattern and in structure. Under normal conditions, the color type was exhibited by typically barred breeds such as Barred Rocks and Campines (body only). Under the condition of hyperthyroidism experimentally produced, the structural type was demonstrated in feathers with barred color pattern, in pigmented feathers without barred color pattern, and in non-pigmented feathers. The rhythm characteristic of these two types is not referable directly to diurnal metabolic rhythms that appear to determine the fundamental barring which Whitman had described in pigeons.[3]

Whatever the underlying mechanism, its activity has been associated experimentally with the activity of the thyroid.

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Further evidence concerning the significance of nuclear inclusions as indicators of a transmissable agent.

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In 1920 Jackson[1] reported the occurrence of what she described as a protozoan infection of the ducts of the salivary glands of guinea pigs. "Round oval, encysted organisms" were found lying in the duct cells of 54 per cent of the guinea pigs examined by this author. Jackson concluded that these structures represented the vegetative cycle of an intracellular protozoan, probably belonging to the group of coccidia.

In 1921 Goodpasture and Talbot[2] confirmed Jackson's findings. These authors found a striking resemblance between the structures described by Jackson and certain protozoan-like cells found by them in the lung, liver and kidney of a two months old baby. The occurrence of cells of this type in infants had been previously

[3] Riddle, O., *Biol. Bull.*, 1908, xiv, 328.

[1] Jackson, L., *J. Infect. Dis.*, 1920, xxvi, 347.

[2] Goodpasture, E. H., and Talbot, F. B., *Am. J. Dis. Child.*, 1921, xxi, 415.