

## Iowa Section.

*State University of Iowa, October 20, 1932.*

6403

### Control of the Sex Characters in the English Sparrow, *Passer domesticus* (Linnaeus)\*

WARREN N. KECK. (Introduced by Emil Witschi.)

*From the Laboratory of the Department of Zoology, University of Iowa.*

I. The Male. A series of experiments was carried out to determine the nature of the control of the sex characters, particularly plumage, of the English Sparrow. Previous studies have established that the secondary sexual characters, including plumage, of various breeds of domestic fowl, ducks and pheasants are under the influence of the gonads.

In the first experiment 52 male birds (35 adult and 17 immature) were castrated. At the time of the operation feathers were plucked from areas showing sexual dimorphism. The regenerated feathers were always of the male type. The capon assumes the normal male plumage and in this respect is similar to domestic fowl.

The bill of the adult male during the breeding season is blue-black in color but during late August and early September the bill becomes a light horn color. This light color is retained during the winter but with the approach of the breeding season the bill again takes on the black color. When a male with a black bill is castrated the color changes to a light shade, characteristic of the winter condition when the gonads are inactive. The color change becomes noticeable at the base of the mandible 10-14 days after the operation. Three weeks later the bill has completely changed color.

In the second series daily intramuscular injections of female sex hormone (prepared from the urine of pregnant women) were given 12 capons. The dosage varied from  $\frac{1}{2}$  to 10 rat units per day for

---

\* The expenses of this investigation were supported in part by the Committee for Research in Problems of Sex of the National Research Council; grant administered by Dr. Emil Witschi.

a period of 30 days, a given capon receiving the same dose each day. Feathers were plucked at the time the injections were started. The regenerated feathers were of the normal male type. Experiments using Brown Leghorn and Sebright Bantam capons demonstrated that 1-2½ rat units of female sex hormone per 100 gm. of body weight given daily for a period of 30 days influenced regenerating feathers toward femaleness. Some of the sparrow capons received as much as 40 rat units per 100 gm. body weight of the same extract used on the Leghorns and Bantams but with no apparent effect on the plumage.

II. The Female. Forty-eight female sparrows were ovariectomized. Of this number 30 were adult and 18 immature. At the time of the operation feathers were plucked from sexual dimorphic areas. The regenerated feathers were invariably of the normal female type. In no case was there any indication of an influence toward male feathering that is so characteristic of poulards of fowl and ducks. Post-mortem examination revealed no macroscopic rudiments or regeneration on the site of the left ovary. Neither was there any compensatory hypertrophy of the right rudiment. In all cases the oviduct was small and immature in appearance. Histological examination of 6 poulards proved the operation to be complete.

Subcutaneous and intra-abdominal testis implants were made on 15 poulards. Post-mortem examination of 3 of these birds revealed active implants. Sexual dimorphic feather areas have been depummed twice and each time they have regenerated normal female feathers. Some of the individuals are still under observation but to date have failed to show any modifications toward male feathering.

Six immature female birds were daily injected with 2 rat units of female sex hormone for a period of 9 days. The oviducts were then dissected out and weighed. They showed hypertrophy as compared with the oviducts of controls in that they were more convoluted, swollen and with a richer vascular supply. The oviducts of the test individuals averaged 33⅓% heavier than those of controls.

From the above results it appears that the secondary sexual characters of the English Sparrow can be divided into 2 categories. (1) Those under the influence of secretions from the gonads: namely, the bill coloring of the male; and the oviduct of the female.<sup>1</sup> (2) Those under a genetical control and not influenced by gonad hormones, namely, male and female plumages.

---

<sup>1</sup> Juhn, Mary, and Gustavson, R. G., *J. Exp. Zool.*, 1930, **56**, 31.