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Induction of Singing in Female Canaries by Injections of Male Hormone.*

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It is generally recognized that singing in canaries is limited to the male and as such this may be considered as a secondary sexual characteristic. In order to determine if this behavior is conditioned by secretions of the testis, male hormone was injected into female birds.

The canaries used were raised by a local breeder, Mr. J. Frederichs, who has developed a hardy strain of birds by acclimating them to life out of doors throughout the year. They were brought into the laboratory in January, a few weeks before the normal breeding season. Females can be distinguished from males during the breeding season by observing differences in the cloacal eminence. The male cloacal eminence is long, pointed and projects ventrally while that of the female is broad and is directed posteriorly. At no time did the females sing previous to injections; they gave only the characteristic "chirp" of the female and were busy carrying bits of straw and paper, to build nests.

Testosterone propionate (Oreton)† in 0.2 cc doses equal to 5 mg of hormone, was injected into the breast muscles every 3 or 4 days until singing occurred. Five birds were used in this study.

In 4 out of 5 birds, the typical male song was sung by the injected females. One of them began singing after 2 injections, the others after 4 injections. The singing was continued for periods of 5 to 13 days after the last injection, depending on how much hormone was given. The remaining bird, though it sang no sustained song, behaved like the normal males or the stimulated females in her attempts to sing. She strutted on her perch, swelled out her throat and moved it as if singing but the sounds emitted were interrupted and resembled only portions of the male song in variation and duration. This behavior subsided on the withdrawal of the hormone. On the basis of behavior, this result may be considered positive because the usual female "chirping" was abnormal in the beginning.

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† The male hormone, Oreton, was furnished through the kindness of Dr. W. R. Bond of the Schering Corporation.

Apparently there was no permanent deleterious effect on the reproductive system following the injections because 3 of the 5 birds were mated and have built nests and laid eggs.

In summary, it is seen that female canaries can be made to sing the typical male song by injections of male hormone. The most striking difference between the singing in normal males and stimulated females was in the greater sound volume produced by the males. Whether or not the tone quality was as good as that of the males must be left for experts to decide but certainly the range of tones, variations, trills and duration of song were similar to those of the males of this strain of birds. The temperamental nature of the time and frequency of singing, so characteristic of the males, also occurred in females. The best results were obtained when the females were isolated.

Several canary owners have informed me that female canaries normally will sing under certain conditions. This was not observed in the females used in these experiments nor has it been observed by Mr. Frederichs. The stimulation of the female birds to sing by male hormone injections under the above conditions of the experiments indicates that singing is a secondary sexual characteristic of male canaries.

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A Method for Concentrating Serum in Cellophane Bags and Simultaneously Removing Salts and Other Constituents.

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A report was made about a year ago describing a simple, inexpensive method for concentrating serum under sterile conditions in sterile, cellophane sausage casings.[1] Subsequently, Dr. P. A. Kober[2] informed me that he had described this process in 1917 and 1918 under the name "Pervaporation".

The casing filled with serum is suspended by the tied end from a hook either at room temperature or in a large mechanical refrigerator

1 Thalhimer, William, PROC. SOC. EXP. BIOL. AND MED., 1938, **37**, 639.

2 Kober, P. A., *J. Am. Chem. Soc.*, 1917, **39**, 941; 1918, **40**, 1226; PROC. SOC. EXP. BIOL. AND MED., 1917, **15**, 1233.