mately 50 rats seems to indicate that graying of black hair in rats may result from a deficiency of a factor or factors present in the vitamin B complex and may also result from a deficiency of iron, copper, and manganese.

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Effects of Testosterone Propionate on Female Roller Canaries under Complete Song Isolation.

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It is commonly assumed that secondary sexual characteristics are conditioned by the secretions of the respective gonads of each sex. Singing in canaries is normally limited to the male of the species and so may be considered as a male secondary sexual characteristic.

Baldwin and Goldin[1] indicated that when testosterone propionate was administered to the female viviparous teleost, *Xiphophorus helleri* Heckel, the male secondary sexual characteristics were induced in all cases. Noble and Wurm[2] treated adult females and immatures of both sexes of the black-crowned night heron, and produced male sexual behavior. They concluded that the differences between the sexual behavior of adults of this form seem to be regulated only by proportionate differences in the amounts of male hormone normally found in these birds. Allee and Collias[3] reported crowing in hens treated with testosterone propionate, and cessation of this crowing soon after the treatment was stopped, indicating the dependence of this behavior on the male hormone.

Leonard[4] treated female roller canaries with testosterone propionate and reported that they produced song that differed from normal male song only in the greater sound volume produced by the males. He also stated that his best results were obtained when the females were "isolated" by putting them in individual cages but keeping them in

[1] Baldwin, F. M., and Goldin, H. S., PROC. SOC. EXP. BIOL. AND MED., 1939, **42**, 813.

[2] Noble, G. K., and Wurm, M., *Anat. Rec.*, 1938, **72**, Sup. 1, 60.

[3] Allee, W. C., and Collias, N., *Anat. Rec.*, 1938, **72**, Sup. 1, 60.

[4] Leonard, S. L., PROC. SOC. EXP. BIOL. AND MED., 1939, **41**, 229.

the same room.* Shoemaker[5] likewise induced song in treated female canaries, and observed that the failure of these birds to tread receptive females may reflect the lack in testosterone propionate of the capacity to imitate the complete chain of events caused by the normal testicular hormone, and not to a lack in the nervous system, as two untreated females were observed to copulate like males.

From a behavior standpoint, Lashley[6] indicated that in the rat, hormone action seems to activate some central nervous mechanism to maintain excitability or activity. Moore[7] made observations on castrated and transplanted rats that showed the transforming power of the gonads of one sex over the psychic nature of the opposite sex. He concluded that this psychic behavior, absolutely distinct in itself, lends great weight to the idea of transformed sexual nature.

Experimental. The canaries used were raised out of doors by a local breeder, and were all past one year of age. Each bird was put in its own soundproofed, ventilated cage[8] to preclude any effects of song environment in addition to the administration of the testosterone propionate. These birds were isolated for observation over a preliminary period of 2 weeks before administration to assure the absence of any song. A crystal microphone was placed in each cage and provision made for recording any sound of the birds on aluminum discs. An operator listened to the sounds at a control board in another room. As soon as any sounds were heard, samples were recorded. Lights were on in the cages at regular daily intervals corresponding in length to the normal waking hours of the birds.

Six birds were used in this problem, 4 for treatment with testosterone propionate, and 2 to act as oil-treated controls. Injections were made daily at the same hour, each bird receiving 2.5 mg of testosterone propionate† per injection. Thirteen subcutaneous injections in alternate breast regions constituted the extent of the experimentation. The controls were given similar treatment with sesame oil.

Results. While the microphones, amplifiers and recording disc were in readiness for recordings of the voices and calls of the treated birds from the start of the injections, the first song calls in any of the treated birds were forthcoming on the twelfth day. The

* From personal communications with the author, S. L. Leonard.

5 Shoemaker, H. H., PROC. SOC. EXP. BIOL. AND MED., 1939, **41**, 299.

6 Lashley, K. S., *Psycholog. Rev.*, 1938, **45**, 445.

7 Moore, C. R., *J. Exp. Zool.*, 1919, **28**, 137.

8 Metfessel, M., *J. Psychology*, 1940, **10**, 177.

† The male hormone, Oreton, was furnished through the kindness of Dr. Max Gilbert of the Schering Corporation.

second bird sang on the thirteenth day, the third bird on the sixteenth day, and the fourth bird on the twentieth day. From these data, it appears that the average length of time in administration of the hormone approximates fifteen days to produce song. Three of the treated birds gradually developed male-like tours¶ that were somewhat of the same pattern and quality, with limited variations. The fourth bird showed a song of a varied pattern that followed the same sequences when the songs were repeated. The songs developed exhibit a small repertoire with poor male quality so far, but with voice that was definitely male in character. Cessation of treatment resulted in a return to the ordinary female calls.

Conclusion. The administration of testosterone propionate to normal adult female roller canaries under conditions of complete song isolation brings forth male-like song in approximately 15 days after first administration, and thus substantiates previous theories.[3-7]

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Isolation of a Murine Neurotropic Virus by Passage of Monkey Poliomyelitis Virus to Cotton Rats and White Mice.*

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Armstrong[1,2,3] reported apparent transmission of poliomyelitis (Lansing strain) from the monkey to the Eastern cotton rat and to white mice. This report deals with attempts to adapt other strains of poliomyelitis virus to these rodents.

Cotton rats *(Sigmodon hispidus littoralis)* were infected intracerebrally with 5 recognized strains of monkey poliomyelitis virus (RMV, Aycock, Philadelphia, ST Los Angeles, SK New Haven). None of the animals injected with the first 4 strains showed any abnormal symptoms. However, of 2 cotton rats injected with the SK‡

¶ A tour is somewhat analogous to a syllable of language; there are thirteen recognized tours in roller canary song.

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† Fellow in Dermatology.

1 Armstrong, C., *Public Health Reports*, 1939, **54**, 1719.

2 Lillie, R. D., and Armstrong, C., *Public Health Reports*, 1940, **55**, 115.

3 Armstrong, C., *Public Health Reports*, 1939, **54**, 2302.

‡ Received in its 11th monkey passage through the courtesy of Dr. John R. Paul.