approximated the size of a normal female spur. This subsequent reduction in size of the spur was undoubtedly due to the natural wear on the spur.

It is evident from these experiments that the male hormone does not influence the female spur once the chick is hatched. Nor does it appear probable from the 2 experiments with the adult birds that the female spur continues to develop in the presence of a normal ovary once growth has begun. The fact that the spur continues to develop in the poulard even after the plumage has reverted to the female type and not in the normal female would indicate that the threshold level of the female hormone necessary to inhibit the development of the female spur is high. It may still be possible that the spur is subjected to conditioning only during an early critical period of development, at the time the primordial cells of the spur are determined. But the fact that the female spur is capable of developing at any stage in the life of the bird, would indicate that it remains in an embryonic condition and should therefore be subjected to the influence of the male hormone even after hatching. While these facts favor the theory that the difference in the behavior of the spurs is due to a genetic difference rather than to a conditioning of the male spur by the male hormone, the final answer as to the equipotentiality of the spurs in the two sexes cannot be made until critical data on the effects of the male hormone on the primordium of the female spur has been obtained. Work is now in progress on this phase of the problem.

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Implantation of Pineal Glands in the Leghorn Fowl.*

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Foà[1] reported a precocious development of the secondary sex structures in pinealectomized males of the domestic fowl. The growth of the body of the cockerels was retarded during the first

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[1] Foà, C., *Arch. Ital. de Biol.*, 1914, **61**, 79.

2 or 3 months following the operation, but after this period of retarded growth they attained the weight of normal adults. No noticeable effect was produced on the operated hens. Izawa[2] observed a precocious increase in body weight as well as in the size of the comb in both sexes. Christea[3] obtained contradictory results. He observed a marked retardation in the development of the secondary sex characters in male birds in which the pineal gland had been removed. The development of the body was not particularly delayed. Badertscher[4] did not observe any significant difference in the development of the secondary sex characters nor in body weight between pinealectomized birds and the controls.

In an effort to collect additional data on the function of epiphysis, implantation of the pineal gland was resorted to as a possible point of attack, a method that has proved successful in the study of some of the other endocrine glands. Because of the prevalent idea among a number of investigators that the pineal gland is concerned with the rate of maturity, pineal bodies from adults were implanted subcutaneously into infant chicks; and pineal glands from infant chicks and from embryos in the latter stages of incubation were implanted into half grown birds, birds in which the secondary sex characters showed marked sex dimorphism. In the first series of experiments 2 infant male chicks were used. The one received 14 implants from adult birds over a period of 28 days; the other, 25 over a period of 44 days. In the latter series of experiments, 2 females and 2 males were employed. The one female received 18 implants from the 43 to the 90 day after hatching; the other, 30 from the 40 to the 97 day. Of the males, one received 27 implants from the 40 to the 99 day after hatching; the other, 36 from the 55 to the 114 day. The transplantations in both series of experiments were made for the most part between related individuals, many of which were full brother and sister. Nevertheless, all the grafts were eventually absorbed, as far as could be determined, due undoubtedly in part to the development of a condition in the host that made it sensitive to the foreign protein. In general, the grafts in the infant chicks were evident for more than a week, whereas those in the older birds persisted only a few days.

The increase in body weight and in growth of the comb of the birds receiving implants differed in no significant way from those of their control brothers and sisters. It thus appears from the ex-

[2] Izawa, Y., *Am. J. Med. Sci.*, 1923, **166**, 185.

[3] Christea, G., (cited by Krabbe) *Rev. Sp. Med.*, 1912.

[4] Badertscher, J. A., *Anat. Rec.*, 1924, **28**, 177.

periments here reported and from those of Badertscher in pinealectomy that the pineal gland is not of vital importance during puberty. From the many experiments on the extirpation of the gland in the fowl and in mammals, we may safely conclude that if the pineal gland does have a function in adult life, this function can, in the absence of the gland, be performed by other tissues in the body.