

parable tissue of the host gonad was composed of the usual cords and tubules.

The distribution of the tubules of the graft within the host gonad varies. In some the tubules of the graft are rather definitely confined in certain parts of the gonad, while in others they may be quite uniformly scattered, while another condition was that in which the tubules were arranged in small scattered aggregations. In places the engrafted tubules were rather conspicuously partitioned from those of the host. The extent to which the host gonad had been penetrated by the implanted tissues is variable. In 1 case practically the entire gonad had been invaded while in the rest the invasion has not been so extensive, though in none does less than one-third of the series reveal some tubules of the graft. The abundance of these in any particular cross section varies from a single tubule to those in which practically the entire tissue is composed of seminiferous tubules.

That the poularde has the potentialities of developing a complete male genital system from gonad to cloaca cannot be questioned, for occasionally such a system may be demonstrated. However, in the present series a preliminary study has failed to demonstrate a connection between the tubules of the implanted gonad and the efferent system of the host gonad. Evidence for spermatic infection of the tubules of the host gonad is difficult to determine.

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### Artificial Insemination with Motile Sperm from Ovariectomized Fowl.\*

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Our recent studies<sup>1</sup> have demonstrated the occurrence of spermatogenesis in the ovariectomized Leghorn fowl and explained the conditions under which it arises. In these cases ovariectomy was performed at a relatively early age before the primordial germ cells in the right rudimentary gonad were known to disappear. In a

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<sup>1</sup> Domm, L. V., *Proc. Soc. Exp. Biol. and Med.*, 1929, **26**, 338; *W. Roux' Archiv. f. Entw. mechan.*, 1929, Bd. 119, p. 171; *Anat. Rec.*, 1929, **42**, 15.

small percentage of the birds operated under these conditions spermatogenesis was later found to occur.

These early cases of spermatogenesis were found on histological examination of the serially sectioned gonad. This study revealed that only exceedingly rarely did most of the gonad undergo spermatogenesis, but that almost invariably only a small part of the tubules of the gonad revealed this condition, while the rest of the gonad was composed of scattered sterile tubules varying in number. In a few cases spermatogenesis was apparently not yet complete in that no differentiated spermatozoa were found. A continuous passageway between the spermatic tubules and the associated vas deferens could not be positively demonstrated, though such connections with some of the tubules may occasionally be found in sterile right gonads. In all cases belonging to the series, the anterior part of the vas deferens from its area of attachment to the gonad to 5-6 mm. posteriorly was sectioned. This part of the duct was always fixed intact with the gonad, care being taken not to destroy the union between them. In no case has sperm been found in this part of the duct.

The question whether the spermatozoa observed in such cases of sex-inversion are actually motile and capable of fertilization is exceedingly interesting and one that obviously could not be answered from a study of the histologically prepared material. Furthermore, since the poularde is not known to tread except in very rare cases, having found but one case in our entire work, special methods were necessary to determine this point. Hence the surviving poulardes of the series were subjected to special post-mortem examination. Deep transverse incisions were made at close intervals throughout the entire gonad and several smears from each examined microscopically. Smears of the contents of the vas deferens near the gonad were also examined.

Twenty-eight poulardes were examined. In each of these the contents of the vas deferens were devoid of spermatozoa. Smears from each of the gonads excepting one were likewise devoid of spermatozoa. This case, Bird No. 1084, yielded motile spermatozoa approximately 6 mm. from the posterior end; the entire gonad measuring 1.8 cm. in length and 1.1 cm. greatest width. These were not numerous but their vibrations were unmistakable and some could be clearly seen in the cellular debris of the smear. The poularde had been ovariectomized when 8 days old and was killed 3 years and 17 days later. It had become typically masculine after the manner of ovariectomized fowl. It, however, had not yet re-

vealed any indication of plumage reversion, having retained the luxuriant male plumage throughout.

The part of the gonad containing spermatozoa was carefully removed from the rest and placed in a sterile dish with about 6 cc. of Locke's solution and thoroughly mashed. Equal parts of the sperm suspension were then introduced by means of an ordinary medicine dropper into the cloaca and distal end of the oviduct of 3 virgin brown Leghorn laying hens. All eggs laid were collected for 18 days and incubated. No fertility was found. A similar technique, previously developed, in which spermatozoa were obtained from the vasa deferentia of sexually active cocks yielded fertile eggs.

It is highly probable that the sperm suspension was not sufficiently dense to bring about fertility under the conditions involved. It is also probable that the spermatozoa of the fowl may undergo an ageing or ripening process in some part of the reproductive system other than the seminiferous tubules which is essential for fertilization. If this were true then spermatozoa taken directly from the seminiferous tubules would be decidedly inferior to those, for instance, found crowded in the vasa deferentia of a sexually active cock. According to Young<sup>2</sup> such a condition actually prevails in mammals, though it has not been demonstrated in the bird.

## 5289

## A Quantitative Study of Ovulation in the Rabbit.\*

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Evidence presented by Smith and Engle<sup>1</sup> points to the fact that there is a correlation between the amount of gonadal stimulating hormone of the anterior lobe of the hypophysis and the stages of the oestrous cycle. These investigators found that only a slight response was secured from glands taken from donors during the oestrous period, while a marked reaction was secured when glands were taken from animals which were in dioestrous.

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<sup>2</sup> Young, Wm. C., *Anat. Rec.*, 1929, **44**, 252.

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<sup>1</sup> Smith, P. E., and Engle, E. T., *Anat. Rec.*, 1929, **42**, 38.