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Natural Occurrence of Imperforate Vagina in the Adult Female Albino Rat.*

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Occurrence of imperforate vagina with complete absence of the caudal portion has been reported in the adult female albino rat and mouse as a result of prenatal administration of androgens to the mother during pregnancy.[1] The present report deals with a somewhat similar condition discovered in connection with other experiments involving female rats whose mothers had received no treatment during pregnancy.

Imperforate vagina was noted in 9 untreated adult female rats, born of untreated parents between April 15, 1936, and June 16, 1937. Three of the rats were sixth generation descendants of a brother-sister inbred stock; the other 6 cases were from random matings. In each case gross inspection showed no vaginal aperture, and, internally, the lower half of the vagina was missing The upper half of the vagina formed a sac-like structure, closed distally 1 to 6 mm from the perineum, which appeared externally as a continuous, hairless plate between the orifice of the urethra and the anus. The existent portions of the vagina and the uterus were considerably distended with retained fluid in 7 of the animals.

The frequency with which the abnormality was observed in the normal stock colony during a 14-month period was about one in every 150 female rats. The animals were sacrificed for investigation of their internal genital tract at ages ranging from 64 to 442 days.

The most extreme example, case 7, autopsied at 386 days of age, had female reproductive organs which, with their contained fluid, weighed 139 g, almost half of the animal's total body weight of 299 g. The length and width of the vagina were respectively 28x38 mm, the left uterine horn 85x36 mm, and the right uterine horn 56x40 mm. A littermate sister of this rat, case 9, showed

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1 *a.* Greene, R. R., and Ivy, A. C., *Science,* 1937, **86**, 200; *b.* Greene, R. R., Burrill, M. W., and Ivy, A. C., *Science,* 1937, **87**, 396; *c.* Greene, R. R., Burrill, M. W., and Ivy, A. C., PROC. SOC. EXP. BIOL. AND MED., 1938, **38**, 1 and 4; *d,* Hamilton, J. B., and Gardner, W. U., PROC. SOC. EXP. BIOL. AND MED., 1937, **37**, 570; *e.* Raynaud, A., *Bull. Biol. de la France et la Belgique,* 1938, **72**, 297.

the same abnormality, although its internal genital organs with fluid weighed 17.3 g compared with a body weight of 189 g. This is the only observed instance of imperforate vagina occurring twice within the same litter.

Seventeen subcutaneous injections of theelin, irregularly administered to case 1 over a period of 34 days before it was sacrificed at the age of 406 days, produced no apparent change in the abnormal vagina.

That the presence of imperforate and bloated vagina does not eliminate the estrous cycle is indicated by case 2 which, by means of an automatically recording revolving cage, was found to run the characteristic 4-day activity cycle for a period of 6 weeks.

Recently,[2] the occurrence of 2 additional cases has come to our attention. These cases occurred in a small colony of hooded rats, of a strain wholly unrelated to ours. A similar anomaly has been described for 3 strains of mice.[3]

These data have been presented as a word of caution in the interpretation of alleged embryonic modifications of the reproductive tract of the female rat foetus as a result of hormone administration to the pregnant mother. The fact that imperforate vaginas were observed in 9 untreated adult female rats, a ratio of about one to every 150 female rats examined, indicates that structural modifications of the reproductive system very similar to those produced experimentally may occur occasionally in a normal rat colony. This possibility would need to be recognized in any evaluation of the effects of hormones on the offspring of treated pregnant rats.

On the other hand, because agreement of experimental results leaves little doubt of the effects of androgens on the secondary sex complex of female rats *in utero,* some hint of explanation of the normal occurrence of a similar condition may be had in the experimental modifications.

Summary. Nine adult female albino rats in a normal stock colony were found with imperforate vagina and absence of its lower half. These data are presented because of the similarity between this condition as observed in untreated rats and that reported by others in female rats whose mothers received injections of androgenic hormones during gestation.

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2 Beck, N., 1939, personal communication.

3 Marx, L., *Anat. Rec.,* 1936, **66**, 449.