as dog 2 that had been depancreatized 2 years prior to its eye examination revealed only peripheral striations in both lenses.

Old age as a factor in the production of the cataractous changes in the depancreatized dogs studied can be ruled out for lens opacities were discovered in animals 2 years old or younger (dogs 6 and 8). As will be pointed out below, cataracts were not found in young normal dogs.

A large number of normal dogs of various ages were examined with respect to lens pathology. Two normal dogs, litter mates of dogs that had been depancreatized, are included in the table. Dog 3, a normal dog, was placed on the diet recorded above on September 1, 1931, the day when its litter mate, dog 2, had been depancreatized. Thus both normal and depancreatized dogs have been kept under the same environmental and dietary conditions for the same length of time. Dogs 8, 9, and 10 are also litter mates, the first 2 being diabetic and dog 10, normal. The normal control of this group has also been maintained under the same dietary and environmental conditions as its 2 diabetic litter mates. The lenses in dogs 3 and 10 were found normal. Seventy normal dogs in various laboratories of the Medical School were also examined. Only 4 of these animals showed cataractous involvement. It is significant, moreover, that the latter were advanced in years, all showing signs of old age.

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Ovogenesis in the Ewe and Cow.

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The evidence presented by Allen[1] did much to establish the concept that ovogenesis extends into the postpubertal period in mammals. He found that the germinal epithelium contributed new ova in the adult mouse and, further, that the rate of ovogenesis varied according to the stage of the oestrous cycle. The greatest number of mitotic figures was found in the germinal epithelium during oestrus. Allen and coworkers[2] found in the sow that there was an elimination of most of the larger follicles in the ovaries coincident

[1] Allen, E., *Am. J. Anat.*, 1923, **31**, 439.

[2] Allen, E., Kountz, W. B., and Francis, B. F., *Am. J. Anat.*, 1925, **34**, 445.

with the maturation of a set of follicles. Engle,[3] working with the mouse, found a greater number of both small and large follicles in active stages of degeneration during oestrus and early metoestrum than at other stages, although the actual differences found were relatively small. In a study of ovogenesis and follicular atresia in the rat, guinea pig, dog, cat, and man Evans and Swezy[4] concluded that the maturation of one or more follicles involved the destruction of all remaining follicles and that after ovulation a new ovogenetic wave began.

Twenty-five pairs of ewe ovaries and a slightly smaller number of cow ovaries, removed at various phases of the oestrous cycle, have been carefully studied. From some of these complete series; from others only a few sections were made.

No evidence has been found which would indicate that the new ova arise from the germinal epithelium in the sexually mature ewe or cow. Rather, it appears that they arise in the neogenic layer beneath the ovarian tunic in a manner very similar to that described by Simpkins[5] for the human. As clear-cut evidence has been presented by Allen[1] in the mouse and by Evans and Swezy[4] in the rat, guinea pig, dog, and cat that ova do arise from the germinal epithelium in mature animals, it would appear that species or group differences exist in this respect.

Healthy and atretic follicles are found in the ovaries at all times in approximately the same proportions. If there are differences it will be necessary to make actual counts to determine them. Small differences in atresia such as Engle found in the mouse might easily have been overlooked. Marked differences in the number of atretic follicles in the ovaries of different individuals removed during the same stage of the cycle do exist. This has been found to be true for all species of mammals thus far studied. There is no indication that the maturation of one or more follicles involves the destruction of all remaining follicles. During oestrus and early metoestrum follicles of considerable size are found in an apparently healthy condition. Thus, in the species under consideration, it seems unnecessary to assume that the life span of an ovum is limited to an interval of time corresponding to the length of the cycle. In fact, the appearance of healthy follicles during oestrus, fully one-half their mature size, makes it appear entirely probable that the development of a definitive ovum takes place over a period corresponding to the

[3] Engle, E. T., *Am. J. Anat.*, 1927, **39**, 187.

[4] Evans, H. M., and Swezy, Olive, *Mem. Univ. of Cal.*, 1931, **9**, 119.

[5] Simpkins, C. S., *Am. J. Anat.*, 1932, **51**, 465.

length of 2 or more cycles as Hammond[6] has postulated. It is likely that overemphasis has been placed upon the rhythmicity of ovogenesis and follicular atresia in mammals in general. Although Allen clearly showed that there were distinct cyclical differences in the rate of mitoses in the germinal epithelium, the evidence favors the view that the production and destruction of follicles are continuous processes not entirely limited to single phases of the cycle. The presence of follicles in practically all intermediate stages of development is the rule. Further, very little evidence exists in favor of the view that ovogenesis and atresia are initiated by factors which initiate and regulate the oestrous cycle. Changes in hormonal concentrations affect them, no doubt, to a greater or lesser degree dependent upon the species. Ovogenesis and atresia occur, however, during the prepubertal period and continue after hypophysectomy.

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Vaccination of Monkeys Against Pneumococci with Special Reference to Oral Immunization.*

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Cecil and Steffen have found the Philippine macaque *(Macacus syrichtus)* more suitable than *Macacus rhesus* for the production of experimental pneumococcus pneumonia but the former were not available; consequently we were obliged to use the latter.

Four monkeys were given a subcutaneous injection of 1 cc. of vaccine per kilo of weight carrying 20 million Type I and an equal number of Type II and Type III pneumococci in broth suspension sterilized with 0.5% tricresol every 5 days for 6 doses.

Four additional animals were given 1 cc. of acid-killed mixed vaccine of the same numerical strength per kilo of weight by stomach tube every 5 days for 6 doses.

Two weeks after the last dose 2 monkeys of each series, with a normal control, were given intratracheal injections of 0.5 cc. of 1:20 dilutions of 8 hour broth culture of Type I pneumococcus. At

[6] Hammond, J., Physiology of Reproduction in the Cow. Cambridge Univ. Press, 1927, 44.

* Aided by a grant from the Samuel F. Fels Fund for Research.