

both vasectomy and irradiation were practically the same as those found in animals receiving only irradiation. Furthermore, in another series of animals in which the influence of vasectomy was studied, the degeneration in the germinal epithelium was neither as uniform nor as complete as that resulting from the roentgen rays alone.

The data on hand seem to indicate that the roentgen rays have a selective action on the germinal epithelium of the testis.

Summary. Testes of adult rabbits subjected to a series of exposures to X-rays aggregating 2,268 r (4.4 E.S.D.) over a period of 15 days showed complete atrophy of the germinal epithelium. The secretory function of the testes, as judged by the maintenance of the normal size of the penis and scrotal sacs, and by the normal psycho-sexual behavior of the animals, was not affected as long as 6 months following irradiation.

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Immunity and Experimental Relapsing Fever in the Chinese Hamster (*Cricetulus griseus*).

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While the problem of immunity in relapsing fever of man and of laboratory animals has been extensively investigated, no definite conclusion has been reached owing to the contradictory findings. However, it is generally agreed that immunity following an attack of relapsing fever is of short duration but occasionally a long-lasting immunity may occur which has usually been attributed to the persistence of residual infection, notably in the brain.¹⁻⁴ In connection with our studies on the course and chemotherapy of experimental relapsing-fever infection by a California strain in Chinese hamsters,⁵ opportunity arose for a careful examination of certain phases of immunity in this infection with special attention to its relation to

¹ Hindle, E., *A System of Bacteriology*, London, His Majesty's Stationery Office, 1931, **8**, 146.

² Hindle, E., *Trop. Dis. Bull.*, 1935, **32**, 309.

³ Coleman, G. E., *J. Infect. Dis.*, 1934, **54**, 1.

⁴ Beck, M. D., *J. Infect. Dis.*, 1937, **60**, 64.

⁵ In press.

residual brain-infection and to the influence of treatment in the development of immunity.

Twenty hamsters, both treated and untreated, which survived 20 to 43 days after spirochetes had disappeared from the peripheral blood, were used. These animals, 4 of which were treated with neoarsphenamine,* 6 with trisodarsen,† and 4 untreated, were reinoculated with blood from one infected hamster, the amount inoculated being double that used in the original inoculation. The remaining 6 animals served as controls and were not reinfected. Following inoculation, blood smears were made daily on all animals during the period of observation.

Results. Among the neoarsphenamine-treated group, 2 showed complete and the other 2 partial resistance. In the latter cases spirochetes were found for only 1 or 2 days after a prolonged incubationary period of 5 to 8 days. Of the 6 treated with trisodarsen, 5 were completely protected, while the other showed partial immunity. Of the untreated animals, one showed partial immunity while the rest were completely resistant. No relapses were seen in any of these animals. As expected, the control animals, which were not reinfected, did not show spirochetes in the peripheral blood during the course of observation. It may be noted that of the 4 hamsters which showed spirochetemia during the second infection, 3 belonged to the group infected with mouse- rather than hamster-blood at the first inoculation. This finding seems to indicate that the immunity conferred by the first infection is apparently stronger against reinfection with homologous blood than with heterologous blood.

For detecting residual infection in the brain of both partially and completely immune animals and those not reinfected, about half of those that survived 17 days after the second inoculation were sacrificed for examination. Sections of the brain were stained with Steiner's method.⁶ All the animals so examined showed large number of spirochetes in the brain. Spirochetes could be found in the brain of infected hamsters, treated or untreated, as late as 60 days after the spirochetes had disappeared from the peripheral blood. At the same time, it was found that all the animals remained

* Purchased locally; prepared by the Abbott Laboratories, North Chicago, Illinois, U. S. A.; Lot No. 905L004.

† Supplied through the courtesy of the Abbott Laboratories, North Chicago, Illinois, U. S. A.; Lot No. 811L073.

⁶ Quoted by Spielmeyer, von W., *Technik der Mikroskopischen Untersuchung des Nervensystem*, p. 160, Julius Springer, Berlin, 1930.

at least partially immune for as long as 43 days after the apparent cure of the first infection. This correlation suggests that residual infection plays an important part in the production of immunity to spirochetal infection in Chinese hamsters.

Comment. (1) Chinese hamsters apparently recovered from infection with a California strain of relapsing-fever spirochetes were resistant to subsequent infection. Treatment did not seem to influence this immunity to any appreciable degree. (2) A suggested correlation between residual infection in the brain and immunity appears in the present experiment.

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Effect of Diethylstilbestrol Dipropionate on Mammary Development and Lactation.

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The prolonged effect of the dipropionate ester of diethylstilbestrol has been shown to maintain rats in estrus 50 days after a single 10 γ injection.¹ The influence of this estrogen upon mammary development and lactation was studied on heifers and rats. Two Jersey heifers, one a castrate at 12 months of age and the other a sterile 3-year-old, were used. Twelve castrate and 14 intact lactating rats were employed to further check the results obtained in the heifers.

The castrate heifer was injected over a period of 9 months with a total of 1560 mg of diethylstilbestrol dipropionate* and 530 mg testosterone propionate† at the end of which time milking was begun. During the first half of the injection period only the estro-

¹ Dodds, E. C., Goldberg, L., Lawson, W., and Robinson, R., *Nature*, 1938, **142**, 211.

* Stilbestryl dipropionate contributed by The Lakeside Laboratories, Inc., Milwaukee, Wisconsin.

† Oreton contributed by Schering Corporation, Bloomfield, New Jersey, and Perandren contributed by Ciba Pharmaceutical Products, Inc., Summit, New Jersey.