

Effect of Auditory Stimulation on Reproduction. IV. Experiments on Deaf Rats.* (29326)

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In previous experiments(1,2,3,4) it was shown that auditory stimuli do not, in contrast to heat and cold and other stressful stimuli, cause regressive changes in the structure or function of the genital organs, but on the contrary stimulate the gonadotropic activity of the anterior pituitary lobe. Auditory stimuli during a 4 day copulation period cause a decrease in the fertility rate, from 70 to 80% in controls, to about 7% of pregnancies and to 5.9% in relation to total number of offspring. Auditory stimuli during pregnancy disturb the course of pregnancy, acting in effect as a pregnancy block. After mating for 4 days the rats were exposed to auditory stimuli for 48 hours. The effect was most pronounced following stimulation during the 7th to 9th and the 8th to 10th day period, in which group pregnancy rates declined from 70 to 80% to 5-20%. The uteri appeared as if pregnancy had not occurred. Male and female rats exposed to auditory stimuli prior to mating show a decrease of fertility to 10-20%. The above results were not influenced by seasonal variations.

To determine whether the acoustic system in the audio-range is the pathway involved in auditory stimulation, or whether other factors are involved, experiments were carried out on rats deafened by several weeks treatment with kanamycin as described by Hawkins(5,6). A reversible loss of response to the Galton whistle occurs in rats treated at 200 mg/kg, and a level of 400 mg/kg seems to be necessary to produce irreversible deafness (Hawkins). Changes seen in the ears of experimental animals treated with kanamycin suggest that the primary effect is on the organ of Corti. Hawkins is not sure whether the hair cells are affected first, or whether the changes seen in them are second-

ary to changes in the supporting cells.

Auditory stimuli: The animals were kept close to an electric alarm bell (diameter 25 cm) which rang for periods of one minute at 10 minute intervals, day and night. The audio frequency spectrogram of the bell indicated that the acoustic energy is concentrated in a relatively small frequency band, between 3000 to 12,000 cps. The bell shows a pronounced peak of nearly 100 db at a frequency of 4000 cps and a second one of 95 db at 10,000 cps.

Experiments. In the strain of rats used in our studies kanamycin doses at 400 mg/kg daily proved to be highly toxic, resulting in a mortality up to 50%. Therefore we decreased the daily dose to 200 mg/kg, in which series a mortality of 10% occurred. Following 50 days treatment with 50 mg of kanamycin daily (total dose of 2 g) deafness was produced as evidenced by the following observations: The rats did not respond to the Gaston whistle. Exposed to auditory stimuli by the electric alarm bell, as described above, the kanamycin-treated animals failed to react, whereas normal rats showed unrest, increased motor activity and circular running movements. Six to eight months after treatment with kanamycin the animals still failed to react to auditory stimuli. Following the treatment, the rats were given 3 months rest, then the following problems were studied.

1) Does the toxic influence of the treatment with kanamycin (2 g in 50 days) damage the ovaries and especially the ova, thus interfering with the fertility of the rats?

Twenty-eight female rats deafened by kanamycin were housed together with males, each couple in a separate cage, for 4 days and killed on the 20th day of the experiment. Twenty rats (71.4%) were found to be pregnant, producing 150 offspring, an average of 7.5 young per rat. These results demonstrate that 50 days treatment with 2 g

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of kanamycin has no influence on the fertility rate of rats.

2) Do auditory stimuli influence fertility in deafened rats? Fifty-eight female rats treated with kanamycin were exposed to auditory stimuli during a 4 days copulation period and killed on the 20th day of the experiment. Forty-three rats were found to be pregnant (74.1%), producing 260 offspring, an average of 6 young per rat. The experiments show that auditory stimuli during the copulation period do not cause a decrease in fertility of deafened rats in contrast to normal animals.

3) Do auditory stimuli block pregnancy in deafened rats? Forty deaf female rats were housed together with males, each couple in a separate cage, for a 4 day copulation period. On the 7th to 9th day the pregnant females were exposed to auditory stimuli and killed on the 20th day after the start of experiment. Twenty-eight deaf females were found to be pregnant (70% fertility), producing 169 litter (5.7 litter per rat). These findings demonstrate that auditory stimuli during pregnancy do not disturb the course of preg-

nancy in deafened rats, whereas in normal rats, as mentioned above, blockage of pregnancy occurs.

Summary. Auditory stimuli in the audio-range are ineffective in inducing infertility and blockage of pregnancy in deaf rats by damage of the organ of Corti in the inner ear following administration of kanamycin.

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***In vitro* Lactogen Production by Anterior Pituitaries from Lactating Rats and Estrous Cyclic Rats.* (29327)**

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Reece and Turner(1) reported a 2-fold increase in anterior pituitary lactogen content in rats following parturition, and a similar increase has been noted for mice(2), guinea pigs(1,3,4) and rabbits(4,5). Meites *et al* (6) found that anterior pituitaries from lactating rats cultured *in vitro* produced, on a per gland basis, twice as much lactogen as did glands from virgin females 3-4 months old. The purpose of the present study was to determine lactogen production by pituitaries from lactating rats and estrous cyclic rats during first 3 days, the second 3 days,

and the third 3 days of *in vitro* culture.

Materials and methods. Anterior pituitaries (AP) were obtained from 3-month-old, hooded Norway rats lactating an average of either 4 or 14 days (10 per group) and cultured simultaneously with AP from estrous cyclic rats (10 per group). Estrous cyclic rats were sacrificed without reference to stage of estrous cycle and were the same age as the lactating rats, but 20 to 30 g lighter in body weight.

Culture techniques were similar to those reported by others(6). Anterior pituitaries were divided into 4 pieces, one gland per dish, and cultured at $35 \pm 1.0^\circ\text{C}$. Gas environment was humidified 95% O₂-5% CO₂ at a

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