hemorrhage, no mice have been lost during the operation, and the post-operative mortality has been somewhat lower than in rats.

Six mice, 3 months of age, were hypophysectomized on the second or fourth day of lactation. All recovered from the operation and attempted to rear their litters, but milk secretion failed and within 24 hours the stomachs of the young were empty.

Six mice, 3 months of age, were hypophysectomized during the second half of pregnancy. Abortion did not occur; as the date of impregnation was not known, it could not be ascertained whether parturition was delayed; however, it took place normally in every case, and the litters were normal in size and gross appearance. The young were born dead, or at least were dead when first observed a few hours after birth, whereas 22 out of 24 rats hypophysectomized during gestation bore living young.[2] The mice resembled the rats in that milk secretion occurred; this was shown by the escape of milk when the gland was incised, and confirmed by histological study.

These experiments in general confirm our previous work on the rat. We intend to describe the effects of hypophysectomy in the mouse in more detail elsewhere; it may be mentioned here that the corpora lutea regress rapidly after hypophysectomy, whereas in the rat they preserve their normal appearance for a considerable time.

7005 P

Susceptibility of Eels and Dogfish to Diphtheria Toxin; Toxicity of Eel Serum and Dogfish and Skate Plasma.

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The action of the bacterial toxins depends upon tissue susceptibility; but the mechanism by which they act and the conditions in the tissues determining their action are quite obscure, despite many years of experimental investigation with susceptible laboratory animals. In contrast, the susceptibility of the higher marine animals has been little studied.[1]

The Marine Biological Laboratory at Woods Hole provided

[1] Metchnikoff, Elie, Immunity in infective diseases, 1901. Translated by F. G. Binnie, 1907. London, Cambridge University Press.

facilities for a few experiments on eels, *Anguilla chryspa,* and dogfish, *Mustelus canis,* to determine their susceptibility to diphtheria toxin under different conditions. Inoculations were all intramuscular. An eel, weighing 106.5 gm., received 125 M.L.D. of diphtheria toxin. Nine days after inoculation, the eel became inactive but did not die until the twenty-fourth day. Two control eels, inoculated, respectively, with toxin broth and with heated diphtheria toxin, remained normal. Two other seawater eels were gradually habituated to fresh water. They weighed 40 and 50 gm. and were inoculated with 62 M.L.D. of the diphtheria toxin. Two days after inoculation, the eels were unusually active. This excessive activity subsided slowly and the animals became quiescent, breathing with difficulty. They both died on the thirteenth day, or in about half the time required by those in seawater.

A young seawater dogfish, weighing 1067 gm., was inoculated with 1375 M.L.D. of diphtheria toxin without effect. Four dogfish were gradually habituated to an environment of 50% fresh water. Two, weighing 681 and 818 gm. respectively, received series of doses ranging from 25 to 1250 M.L.D. of diphtheria toxin. The action of the toxin was manifest in about 7 days—the smaller animal died in 26 days, the larger in 20 days. The 2 control dogfish remained normal and increased in size.

At autopsy of both the inoculated eels and the dogfish, no tissue nor organs differed in any respect from those of the normal animal sacrificed for comparison.

The difficulties encountered throughout this work rendered it impracticable to include a larger number of eels and dogfish, and one can only record the results of this limited series of experiments, which consistently indicate susceptibility in the eel and, in comparison, an immunity in the seawater dogfish. The susceptibility of the eel and also that of the dogfish was apparently increased when their environment was changed wholly or in part to fresh water.

In view of these findings, it was obviously important to determine the action of seawater on diphtheria toxin. Accordingly, guinea pigs were inoculated with diphtheria toxin after it had been exposed to the action of seawater at room temperature. The results indicated that there is a somewhat greater loss in toxicity for guinea pigs in such diphtheria toxin than in that exposed to the action of a similar amount of 0.85% salt solution.

Immunization of eels and dogfish with diphtheria toxin was attempted in a few experiments. Neither the serum nor the plasma of any of these animals neutralized toxin when titrated on the guinea

pig. The reactions induced by the eel sera alone, however, obscured the intracutaneous titration.

The toxicity of eel serum and dogfish plasma was tested on rabbits and guinea pigs. The numerous reports in the literature concerning the toxicity of eel serum for the rabbit were first confirmed: intravenous injection of 0.3 cc. of the seawater-eel serum proved fatal in 27 hours. When the sera of eels which had been gradually adapted to fresh water were tested, 0.3 cc. or even 1.25 cc. failed to prove toxic. The injections of skate plasma, reported in the literature as toxic,[2] gave rise to practically no symptoms in the rabbit. Intracutaneous injection of the guinea pig was also studied. The plasma of the dogfish and the skate, as well as seawater, incited practically no reaction except a slight redness. The sera of the seawater eel and of those habituated to fresh water proved toxic in that they gave rise to marked local reaction with necrosis. The serum of the eel habituated to fresh water appeared to be less toxic in these experiments.

The period of incubation after injection suggests a complex mechanism determining the action of toxin in the tissues. The action of diphtheria toxin in the seawater eel, as compared with its action in the guinea pig, is delayed. In fresh water the susceptibility of the seawater eel is increased; and the dogfish, ordinarily immune, becomes susceptible when transferred to an environment of half fresh and half seawater.

7006 C

Normal Emptying Time of the Stomach of the Dog.

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(Introduced by A. J. Carlson.)
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In the course of experimental work on the effect of anoxemia on the emptying time of the stomach of the dog a good deal of control data was obtained. It was felt that these data might be of interest and use to other workers, especially as there appears to be a considerable difference of opinion as to the time it takes the stomach of a dog to empty.

Dogs varying in weight from 5 to 10 kilos were used in these

[2] Camus, Lucien, and Gley, E., *C. r. Soc. de biol.*, 1915, **78**, 203.