sample of blood were then injected intraperitoneally into three white mice. This was followed by the injection of the materials studied into the femoral vein of a dog. At varying intervals after the intravenous injection, blood was again drawn from the three vessels and injected intraperitoneally into a new series of white mice. These mice were subsequently killed two hours later by decapitation and their blood sugar determined by the Hagedorn-Jensen method. The secretion of epinephrin and insulin was interpreted by the effect upon the blood sugar changes in the mice. The substances injected intravenously were dextrose, levulose, galactose, tyrosine, alanine and morphine. Similar experiments were performed on dogs fed milk and glucose.

The influence of levulose and galactose on epinephrin and insulin secretion proved to be similar to that of dextrose, both sugars calling forth insulin secretion and depressing the secretion of epinephrin. A similar result was obtained by feeding milk and dextrose.

For the first few minutes after tyrosine injection there was no change in the blood sugars of the mice. Thirty to 45 minutes later, the blood sugars rose and one hour and 45 minutes later there was a definite depression. Alanine had no effect. The most effective stimulant of epinephrine secretion appeared to occur after the injection of the morphine.

5645

Failure to Immunize the Monkey Against Poliomyelitis by Prolonged Nasopharyngeal Spraying with Live Virus.*

C. W. JUNGEBLUT AND E. L. HAZEN.

From the Department of Bacteriology, College of Physicians and Surgeons, Columbia University.

In an attempt to explain the protection which a large number of children and the majority of adults enjoy against poliomyelitis it has been generally held that this immunity is acquired by repeated contact with subinfectious amounts of the active virus. It has also been suggested that this process of latent immunization is accomplished by small doses of virus entering the body through the

* Under a grant from the International Committee for the study of infantile paralysis, whose work is being financed by Jeremiah Milbank.

upper respiratory tract. We have undertaken to verify experimentally the soundness of this hypothesis.

Four rhesus monkeys were subjected to extensive spraying of the nose and throat with a 10% emulsion of live poliomyelitis virus during a period of about 2½ months. The treatments were given twice a week, so that each monkey received 20 sprays in all. The amount of virus consumed for each spray was approximately 1 cc. per monkey. At the end of the immunization period one of the 4 treated monkeys had died from extensive visceral tuberculosis; the autopsy showed a perfectly normal cord and histological examination revealed no lesions of poliomyelitis. From each one of the 3 remaining animals a sample of blood was obtained after a rest period of about one month following the last spray. These monkeys at the same time were inoculated intracerebrally with 1 cc. of a 10% virus emulsion to test for immunity, one normal control accompanying this test. All 3 treated monkeys developed typical poliomyelitis together with the control. Inasmuch as it has been suggested that the intracerebral inoculation is too severe a test to determine slight degrees of immunity, we have examined the sera of these 3 monkeys in the customary manner for the presence of virucidal substances. Equal quantities of serum and of 1% virus emulsion, 0.5 cc. in each case, were mixed, incubated for 2 hours at 37°C, left in the icebox overnight and the mixture, 1 cc., was then injected intracerebrally into a monkey; one control animal received a similarly prepared mixture of virus and salt solution. Although a very small amount of virus was deliberately chosen for this test, all monkeys in this experiment came down with typical poliomyelitis.

The experiment leaves no doubt that prolonged spraying of the nose and throat of the monkey with fairly large doses of active virus fails to induce any demonstrable immunity, as indicated by the lack of individual protection against brain infection and by the absence of virucidal substances in the blood serum. However, in view of the many differences in host susceptibility and mode of infection between the human disease and the experimental infection in the monkey, it is questionable to what extent these results are directly applicable to the problem of human epidemiology.