ficial action of Ringer on a nerve that has failed to recover from cold block. Finally nerves soaked in isotonic NaCl for 40 minutes before the start of asphyxia, though still fully recovering in oxygen, no longer show any recovery in Ringer. Nerves soaked in NaCl followed by Ringer behave as if they had been in Ringer throughout.

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A Note on the Propagation of the Virus in Experimental Poliomyelitis.*

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While there is good evidence to show that the virus travels along the axis cylinder of the nerve fibers of the spinal cord, particularly from recent work of Fairbrother and Hurst,[1] dissemination by the cerebrospinal fluid has been invoked in explanation by other authors. (Flexner and associates.[2, 3]) A crucial experiment to settle the question would be found in an attempt to recover virus from the cervical cord and from the lumbar cord of a monkey, inoculated intracerebrally, after complete transsection of the spinal cord above the lumbar region. Incidentally, further information might be adduced by histological examination of the 2 separate cord sections for the presence or absence of specific lesions.

Accordingly, we have carried out a complete transsection of the spinal cord in 2 monkeys, severing the structure at the level of the first lumbar vertebra. In the first animal (Monkey 144), 2 silk ligatures were tied tightly around the unopened dural sac, crushing the cord. The whole structure was then cut between the ligatures, the stumps retracting about 1 cm. apart. In the second animal (Monkey 165), the dural sac was opened, but not severed, and the cord was totally divided, leaving a gap of about 3 mm. The operative procedure in the first animal was adopted in order to test the possibility of dissemination by routes other than either the nervous substance or the cerebrospinal fluid, such as the general circulation or the lymphatics. In the second animal our main interest lay in dis-

* Under a grant from the Milbank International Fund for the study of infantile paralysis.

1 Fairbrother, R. W., and Hurst, E. W., *J. Exp. Path. a. Bact.*, 1930, xxxii, 17.

2 Flexner, S., and Amoss, H. L., *J. Exp. Med.*, 1914, xx, 249.

3 Amoss, H. L., in Rivers, Th.: Filterable Viruses, Baltimore, 1928.

tinguishing between transmission by the cerebrospinal fluid and through the cord itself.

The 2 transsected monkeys, which immediately after the operation showed a complete paraplegia of the lower extremities, including paralysis of the bladder and rectum, were infected intracerebrally the following day, together with 2 normal controls. (1 cc. of the supernatant fluid of a centrifuged 20% virus cord emulsion.) The first animal died on the eighth day after the inoculation with somewhat indefinite symptoms, though strongly suggestive of poliomyelitis. The upper and the lower cord were removed with care to prevent mutual contamination with virus. Post mortem autolysis, in this case, unfortunately made a conclusive tissue diagnosis impossible. Transfers of the 2 cord sections, respectively, to 2 new monkeys were both negative. The second transsected monkey, which incidentally had suffered much less from traumatic shock than the first, developed on the seventh day all the typical symptoms of poliomyelitis, including tremor and progressive paralysis of the muscles of the arms and the back. It was killed on the ninth day at the height of the infection, with fully developed symptoms, and the upper and lower cord were removed with the same technical precautions. The transfer of the cervical cord to another monkey resulted in typical poliomyelitis in that animal, while the transfer of the lumbar cord was negative. Histological examination showed typical lesions (nerve cell degeneration, neuronophagia, extensive perivascular infiltration and edema) in the cervical and thoracic cord. The lumbar cord appeared normal.

Since, in the normal animal, the lumbar cord represents the place of predilection for the localization of the virus, the absence of virus and of lesions in that structure after transection together with the presence of both in the cervical cord of Monkey 165, are of singular importance. As indicated before, there was full communication of spinal fluid in that animal between the severed cord fragments. While we do not wish to over-emphasize the significance of an isolated observation, the nature of the experiment would make the conclusion almost inevitable that the virus, ordinarily, travels along the nerve tracts. We believe that our results furnish additional evidence for the correctness of the viewpoint of Fairbrother and Hurst on the mode of propagation of the virus in the central nervous system. This theory is further corroborated by the rare occurrence of the virus in the cerebrospinal fluid and by the fact that, in almost all cases, the contralateral limb is the first to show paralysis after intracerebral infection of one hemisphere, an observation which we can fully confirm from our own experience. Our experiments, of

course, have no bearing on the question as to how the virus is disseminated in the body under natural conditions of invasion from the periphery, before it has come in direct contact with the central nervous system.

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Feathers as Indicators of Concentration of Female Hormone in the Blood.*

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(Introduced by F. R. Lillie.)

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In the first observations made in this laboratory on the induction of ♀ feathering in capons and cocks subsequent to injections of chemically prepared ♀ hormone during the period of feather regeneration, regional variations in the degree of plumage responses became evident. It was noted that feathers having a more rapid growth rate required definitely higher concentrations of hormone for the female reaction than feathers having a slower growth rate.[1] The growth rates of feathers in various parts of the body have now been accurately measured, and constant regional differences have been established. The birds used for these experiments were brown leghorn fowls, and in this breed the capon is similar in plumage to the cock. In both cock and capon, the growth rate of the feathers is greater in the breast than in the saddle or back, and even greater in the posterior than in the anterior region of the breast. The ratio between the most rapidly and the most slowly growing feathers when measured in growth in length per day is approximately 2:1. In the hen differences in growth rate in various parts of the body are slight, and the general rate for all is intermediate between the maximum and minimum rates of the cock. The threshold concentrations of hormone required for the ♀ reaction are closely correlated with this observed difference in growth rate.

Feathers formed on a capon receiving regular effective daily injections of female hormone are completely female in character; if, however, the injections are restricted to short periods of time, then

* The expenses of this investigation were supported in part by the Committee for Research in Problems of Sex of the National Research Council; grant administered by F. R. Lillie.

[1] Juhn and Gustavson, *J. Exp. Zool.*, 1930, lvi, 31.