

THE TRANSMISSION OF ACUTE POLIOMYELITIS TO MONKEYS \*

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Poliomyelitis or infantile paralysis prevailed in epidemic form along the Atlantic seaboard in the summer of 1907. About that time it appeared in Austria and Germany. In the summer of 1909 the disease reappeared as a focalized epidemic in Greater New York and had, by that time, spread widely throughout the United States and Europe.

The cause and mode of dissemination of the disease are unknown; and hence there exists no intelligent means of prevention. While the severity and fatality of the disease fluctuate widely, its effects are always so disastrous as to make it of the highest medical and social importance.

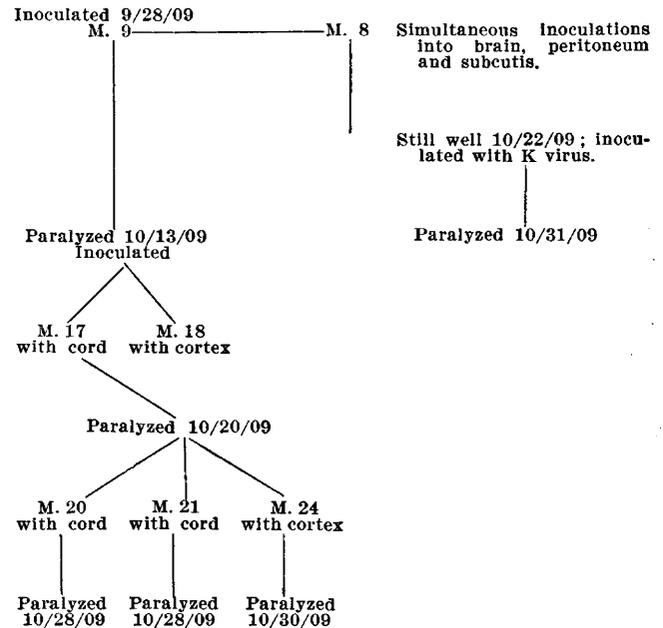
In spite of many thorough studies of the spontaneous disease in man, our knowledge of causation and prevention has not been advanced; it may be hoped that it will be advanced by the opportunity for fundamental study opened up by the successful transmission of the disease to lower animals.

In May, 1909, Landsteiner and Popper<sup>1</sup> published a report of two successful inoculations of monkeys with the spinal cord obtained from two fatal cases of poliomyelitis. The injections were made into the peritoneal cavity. One monkey became paralyzed in the lower extremities and died on the sixth day after inoculation; the other was killed on the nineteenth day. In both, lesions of the spinal cord similar to those in man existed. The disease could not be transferred to other monkeys. Our efforts to transmit the disease to lower animals were first made in 1907, at which time cerebrospinal fluid obtained by lumbar puncture was introduced into the spinal canal and peritoneal cavity in monkeys and other animals. We were limited to this fluid, as we did not secure material from a fatal case. The results were negative. Since September of this year we have secured suitable material from two cases of poliomyelitis in human beings. For the material from one we are indebted to Dr. Ridner, of Lake Hopatcong, N. J., and for the other to Dr. Le Grand Kerr, of Brooklyn.

Dr. Ridner's patient died on the fifth or sixth day after the appearance of the paralysis, which affected the lower extremities. The lumbar cord was obtained in a sterile condition, twenty-six hours after death, and a portion was inoculated into monkeys about twelve hours later.<sup>2</sup> The entire spinal cord was obtained from Dr. Kerr's case twelve hours after death, and inoculation into monkeys was made four hours later. In Dr. Kerr's case, in which death occurred on the fourth day, the lesions were diffuse throughout the cord. Paralysis had been very extensive. The gross and microscopic lesions were characteristic in both cases.

In order to favor the transmission of the disease to monkeys, the brain was chosen as the site of inoculation, which was made under ether anesthesia through a small trephine opening. After the operation, the animals were at once lively and normal. The injected material consisted at first of emulsions in salt solution of the spinal cord from the children and later of emulsions of the spinal cord of monkeys developing the paralysis. An effort was made to enrich the inoculating material by

incubating it in celloidin sacs placed in the peritoneal cavity of monkeys and rabbits. At the present time we wish merely to record the series of successful experiments which we have conducted with the spinal cord obtained from the case of Dr. Ridner and designated M. A. The accompanying chart will show at a glance what has been accomplished up to date with the M. A.



Transmission of M. A. virus through monkeys. The virus is being transmitted further. The abbreviation M. signifies monkey.

virus. We may mention here that the microscopic study of the spinal cord from the affected monkeys has shown, without exception, lesions similar to those of poliomyelitis in man. In some cases the lesions in the cords of monkeys could be detected by the naked eye.

The chart shows unmistakably that by employing the intracranial method of inoculation it is possible to carry the virus of epidemic poliomyelitis successfully through a series of monkeys. It is highly probable that the transmission may be carried on indefinitely. Should this expectation prove well founded, the outlook for securing a fuller understanding of the nature of this disease will be immeasurably improved.

It should incidentally be mentioned that not only is the spinal cord active, but the cortex of the brain also (Monkey 24). A delayed or unsuccessful inoculation may be converted into a successful infection by reinoculation with an active virus (Monkey 8).

It has long been supposed that epidemic poliomyelitis is an infectious disease. Its mode of spread certainly points to that view. A single successful inoculation with human virus could not establish the view, because the result might be due to a transferred toxic body. But now that successive transfer of the active agent of the disease has been accomplished, any doubt of its infectious origin can hardly be longer maintained.

The experiments with the virus of poliomyelitis are being continued, as is the search for additional evidences of its micro-organismal nature.<sup>3</sup> The complete protocols of the experiments here summarized and still other experiments will be published in a forthcoming issue of the *Journal of Experimental Medicine*.

3. A thorough search for bacteria by cultural and other methods was made in 1907, and again this year, but none that could be viewed as the causative agent has been discovered.

\* From the Laboratories of the Rockefeller Institute for Medical Research.

1. Landsteiner and Popper: *Ztschr. f. Immunitätsforsch.*, Orig., 1909, ii, 377.  
2. No reference will be made in this preliminary report to other varieties of animals employed.