

EXPERIMENTAL INVESTIGATIONS.

In commencing this work we realized that little could be done until we had produced experimental poliomyelitis. Consequently we obtained a small supply of monkeys from the municipal authorities at Wellington and Auckland. As previous experience seemed to show that the intracerebral method of inoculation gave the best results we decided to use this method exclusively. Through the kindness of Dr. Wilson, who gave us every possible assistance, suitable accommodation was got for the monkeys at the Hospital. We were also given part of the Out-patient Department, and such theatre equipment, gowns, &c., as was necessary to carry out the operative work under aseptic conditions.

The first case used for experimental purposes was Case VI in the series above. On the 22nd January a 20-per-cent. emulsion was made from glycerized cord. Dr. Wilson anaesthetized monkey A with ether, and, after shaving and sterilizing the scalp, dressing-sheets were put in position, and a skin and muscle flap was turned down in the parietal region. A $\frac{1}{2}$ in. trephine opening was made, leaving the dura uninjured. With a 24-gauge needle 0.2 c.c. of emulsion was injected deeply into the brain-substance. The skin and muscle flap was sutured back in position. After placing a collodion dressing over the wound the monkey was returned to its cage. It rapidly recovered from the operation, and seventy days after showed no signs of paralysis.

Monkey B was inoculated in exactly the same way on 31/1/25, except that a $\frac{1}{4}$ in. trephine opening was used. 0.4 c.c. of a fresh emulsion (20 per cent.) of cord (Wanganui case) which had been kept on ice for twenty-four hours was injected through a trephine opening in the parietal region. On 11/2/25 it was noticed that the animal was shivering. On the morning of the next day the animal was obvious ill and feverish, eyes were running, refusing food, unsteady gait, and loss of interest in surroundings. In the afternoon the condition was worse, the lower jaw was inclined to the right, and there was some weakness in the hind legs. On 13/2/25 the animal lay on its back unable to move, and its respirations were slow. Temperature normal. Examination showed pupils equal and reacting to light. No strabismus. Corneae slightly glazed. No facial paralysis. There was evidently difficulty in swallowing. Forceful flexion of the head gives the animal pain. Both arms are paralysed, the right was flaccid, and the left slightly spastic. Deep reflexes lost. There was paralysis of the intercostals. Abdominal reflexes present. There was now some paresis of the legs, but knee-jerks were brisk. 14/2/25: Respirations 29. Right leg was flaccid, with absent reflexes. Paralysis of arms is now of flaccid type on both sides. Abdominal reflexes were now absent. 16/2/25: Spinal puncture fluid not under pressure. 5 c.c. withdrawn. Globulin greatly increased, thirteen cells per cmm. Animal was now *in extremis*, and was killed with chloroform.

Post-mortem: The brain showed oedema and marked congestion, the vessels in the floor of the fourth ventricle were congested, but there were no hæmorrhages. The cord was tense with oedema, and the meningeal vessels were injected. On section of the cord there were marked lesions in the grey matter of the cervical region, less in the dorsal and indefinite in the lumbar region. The operation-wound was soundly healed, and there was no evidence of hæmorrhage or infection at the site of inoculation. The mesenteric glands were not palpable.

Microscopical examination of the cord showed precisely the same lesions as were noted in the human cases. The perivascular collections of small round cells were to be seen most marked in the cervical region. There were no lesions in the meninges of the brain at the site of inoculation or at any other part.

Monkey C was inoculated intracerebrally on 2/2/25 with 0.2 c.c. of a 20-per-cent. emulsion of the cord of Case VII. At the termination of the operation the animal collapsed and could not be brought round.

Monkey D was inoculated in the same way and with the same quantity of virus from Case VI. Six days later the animal appeared to be seedy with a tendency to drag the left leg, but this passed off and monkey recovered completely.

Monkey E was inoculated with emulsion of cord from a case which was at the time believed to be poliomyelitis, but which on subsequent examination proved to be a case of liver necrosis. On 16/2/25, one week after the above inoculation, the animal was reinoculated through the same trephine-hole with an emulsion of cord from monkey B, which had had the disease. 24/2/25: The animal was going off its food, and two days later it was seen crouching in the corner of its cage, shivering, with its head pressed against the wall. There now appeared some difficulty in mastication and swallowing. 27/2/25: Feverishness had now gone, but the animal was much worse. Mastication was impossible, and animal had to be fed with a pipette. The back legs seem very weak. 28/2/25: There was now, in addition, definite stiffness of the neck, paralysis of the left deltoid, paresis of both arms, intercostals working feebly, both legs flaccid paralysis, and deep reflexes lost. 2/3/25: There was some slight recovery in the left foot. 3/3/25: Respirations were much more difficult, the intercostals have only slight movement, right arm alone unaffected. 6/3/25: Paralysis remained unchanged. Spinal puncture showed fluid not under pressure, with a slight increase in globulin and 900 cells per cmm. Animal killed with chloroform.

Post-mortem showed that the site of inoculation was soundly healed. There was marked congestion of the cortex. The meninges of the cord were congested, and the cord itself was tense with oedema. There were no macroscopic lesions in the medulla, cervical, or dorsal regions. Lumbar enlargement showed swelling and darkening of the anterior cornu. The mesenteric glands were enlarged and soft. There were some recent adhesions in the left pleura. There were no naked-eye changes in any other organs.

Microscopic examination showed the same appearances as seen in other cases, except that there appeared to be some organization and the formation of young fibrous tissue in the anterior horn. No further inoculations were made with this material. It will thus be seen that of five monkeys inoculated there were two definite cases of the disease, proved clinically and pathologically. Further,