ON THE ETIOLOGY OF EPIDEMIC POLIOMYELITIS[1]

By the combined use of methods employed by Rosenow in a bacteriologic study of various diseases including diseases of the nervous system and the methods of Flexner and Noguchi in their study of poliomyelitis, we have isolated from all of 52 cases of poliomyelitis a peculiar streptococcus. This organism has been obtained from the throats, tonsils, abscesses in tonsils and from the central nervous system. It has been obtained from the ventricular fluid after death, but not from the spinal fluid during life. In only one instance has it been isolated from the blood during life.

In seventeen fatal cases the tonsils showed from one to fifteen abscesses. These were situated near the capsule and contained a peculiar gelatinous opalescent material from which this peculiar streptococcus was isolated in large numbers.

The microorganism is remarkably polymorphous, appearing to grow large or small according to the medium on which it is grown. Details as to its growth on various media may be found in the *Journal* of the American Medical Association for October 21, 1916. In general, it may be said that under aerobic cultivation and in dextrose-containing media, the organism tends to grow large, while in ascites fluid in tall tubes containing tissue, the small forms predominate. The latter appear to be identical with the microorganism described and cultivated by Flexner and Noguchi.

Cultures of Berkfeld N filtrates of emulsions of brain and cord of rabbits which died of paralysis after intravenous injections of suspensions of broth cultures showing only the large forms have repeatedly grown out in suitable media. The microorganism has been grown also from the filtrates of cultures showing the small form but not from filtrates of cultures showing only the large form. It has been isolated from the brain and cord of paralyzed monkeys following intracerebral injection of fresh human virus and glycerinated human and monkey virus.

The large form of the organism, injected intravenously or intracerebrally, has produced paralysis consistently in animals (rabbits, guinea-pigs, dogs, cats) which are known to be quite insusceptible to inoculations by the methods which infect monkeys—injection of emulsions of brain and cord from patients with poliomyelitis. After producing paralysis consecutively in three rabbits one strain caused characteristic paralysis and lesions of poliomyelitis in monkeys.

The cords of paralyzed animals have shown lesions very similar to those of experimental poliomyelitis in monkeys: hemorrhages and round-cell infiltration in the gray matter, as well as degeneration of the ganglion cells and neurophagocytosis.

Lesions, other than those in the central nervous system, were relatively few, but when present were most commonly found in lymph glands, the spleen, lymphoid structures in the intestinal tract, particularly in the colon and in the splanchnic region. Pure cultures of the organism have been obtained from the central nervous system in numerous animals when blood and other tissues were sterile.

It appears that the small filterable organism of Flexner and Noguchi which has been generally accepted as the cause of poliomyelitis is probably the form which this streptococcus takes in the central nervous system and in suitable culture media under anaerobic conditions, while the larger, more virulent and more typically streptococcic form which other investigators have considered contaminations is the same organism grown larger on suitable media. The larger forms may play an important part in the epidemiology of poliomyelitis.

E. C. Rosenow,
The Mayo Foundation, Rochester, Minn.,
E. B. Towne,
Peter Bent Brigham Hospital, Boston, Mass.,
G. W. Wheeler
New York Hospital, New York

[1] From the laboratories of the Mayo Foundation and the New York Hospital. Presented before the Minnesota State Medical Association, Minneapolis, October 13, 1916.