

of Barger and Dale^{3,9} for epinephrine and for β -3,4-dihydroxy-phenyl-ethanolamine; of Pyman⁷ for 3,4-dihydroxy-phenyl-ethylmethylaniline; and of Alles⁸ for β -3,4-dihydroxy-phenyl-isopropylaniline and β -3,4-dihydroxy-phenyl-ethylamine, we agree with Dakin that the catechol nucleus is in great part responsible for the typical sympathomimicity of epinephrine. The 3,4-position of the phenyl-hydroxyls; a 2 carbon side chain; a beta carbon hydroxylated; an alpha carbon hydrogen substituted by some indifferent molecule, preferably an amine; and where all of these are present, the levorotatory isomer, are contributory factors in the formation of a typically sympathomimetic drug.

8089 C

A Poliomyelitis Antiserum.*

JOHN A. TOOMEY.

From the Department of Pediatrics, Western Reserve University, and the Division of Contagious Diseases, City Hospital, Cleveland, Ohio.

A normal sheep was bled, and no neutralizing antibodies for poliomyelitis virus were found in the blood serum in 1:1 dilutions. The animal was then injected as follows: September 8, 12, 17, and 24, 1934, 10 cc. of a suspension of equal parts of 2% poliomyelitis virus and P.C.B. filtrate intradermally;¹ October 1st and 8th, 30 cc. of a suspension of equal parts of a 2% virus combined with P.C.B. filtrate subcutaneously; October 13th, 40 cc. of a suspension made up of equal parts of a 5% virus combined with P.C.B. filtrate subcutaneously; October 23rd, November 8th and 20th, and December 8th, 50 cc. of a suspension made up of equal parts of 5% virus combined with P.C.B. filtrate subcutaneously and intramuscularly. On September 13th, there was some local induration about the injection, and on September 15th, there was a small localized abscess.

⁴ Schaumann, *Arch. Exp. Path. u. Pharm.*, 1931, **160**, 127.

⁵ Hartung, Munch, Miller and Crossly, *J. Am. Chem. Soc.*, 1931, **53**, 4149.

⁶ Tiffeneau, *Ch. Richet Festschrift*, 1912, 399.

⁷ Pyman, F., *J. Chem. Soc.*, 1910, **97**, 266.

⁸ Alles, G., *J. Pharm. and Exp. Therap.*, 1933, **47**, 339.

⁹ Barger, *Some Applications of Organic Chemistry to Biology and Medicine*, 1930, 80.

* Expenses defrayed in part by a grant from the Marion R. Spellman Fund, The Cleveland Foundation.

¹ Toomey, John A., *Proc. Soc. Exp. Biol. and Med.*, 1935, **32**, 869.

Although there was still evidence of local induration about the last injection, the animal was bled on November 20th and the serum tested. It was found that this serum, obtained only 12 days after an injection of the virus and filtrate combination, acted as an accelerator, since the disease was produced in the test animal in 3 days, and in the control in 7 days. That the serum was tested too soon after the injection was obvious from later results. The animal was not bled again until January 18, 1935, at a time when no external evidence of reaction was found in the skin or in the area over the muscles where the injections had been made.

The sheep serum was inactivated at 56°C. for 1 hour. In these experiments, the injections were all made intracerebrally under complete ether anesthesia.

Set I. Monkey No. 406, injected with 0.5 cc. of solution made up of 0.25 cc. of 2% virus plus 0.25 cc. of whole sheep serum: no effect. †Monkey No. 407, injected with 0.5 cc. of solution made up of 0.25 cc. of 2% virus plus 0.25 cc. of saline: tremor and furred, 5th day; quadriplegia, 7th day.

Set II. Monkey No. 408, 0.5 cc. of solution made up of 0.25 cc. of 2% virus plus 0.25 cc. of $\frac{1}{2}$ sheep serum in saline: no effect. †Monkey No. 404, same as No. 407: furring 4th day; quadriplegia 7th day. Monkey No. 409, 0.5 cc. of solution made up of 0.25 cc. of 2% virus plus 0.25 cc. of $\frac{1}{4}$ sheep serum in saline: no effect. †Monkey No. 401, same as No. 407: furred, not active 5th day; quadriplegia, 7th day. Monkey No. 410, 0.5 cc. of solution made up of 0.25 cc. of 2% virus plus 0.25 cc. of $\frac{1}{8}$ sheep serum in saline: no effect.

Set III. Monkey No. 412, 0.25 cc. of solution made up of 0.125 cc. of 2% virus plus 0.125 cc. of $\frac{1}{16}$ sheep serum in saline: no effect. †Monkey No. 411, 0.25 cc. of solution made up of 0.125 cc. of 2% virus plus 0.125 cc. of saline: inactive, furred, clumsy 7th day; paralysis 10th day. Monkey No. 413, 0.25 cc. of solution made up of 0.125 cc. of 2% virus plus 0.125 cc. of $\frac{1}{32}$ sheep serum in saline: no effect. †Monkey No. 402, same as No. 411: paresis 6th day; quadriplegia 7th day. Monkey No. 414, 0.25 cc. of solution made up of 0.125 cc. of 2% virus plus 0.125 cc. of $\frac{1}{64}$ sheep serum: no effect save some slight furring on the 6th day. †Monkey No. 289, same as No. 411: sick, furred, anorexia 9th day; paralyzed 10th day.

Set IV. †Monkey No. 415, 0.3 cc. of solution made up of 0.15 cc. of 2% virus plus 0.15 cc. of saline: furred and tremor 6th day;

† Control.

quadriplegia 7th day. Monkey No. 416, 0.3 cc. of solution made up of 0.15 cc. of 2% virus plus 0.15 cc. of 1/128 sheep serum: furred 16th day; tremor and paralysis 17th day. This animal, although protected, died. Before injection, however, it was thin and scrawny and had been losing weight. Autopsy showed a marked gastroenteritis with a matting together of the lower portion of the ileum and numerous tuberculous enlargements of the mesenteric and intestinal glands. Several tubercles were found in the lung. Monkey No. 422, was injected later with the same dose of material that Monkey No. 416 had received and did not contract poliomyelitis. Monkey No. 421, 0.3 cc. of solution made up of 0.15 cc. of 2% virus plus 0.15 cc. of 1/256 sheep serum: no effect.

Set V. †Monkey No. 423, 0.3 cc. of solution made up of 0.15 cc. of 2% virus plus 0.15 cc. of saline: furred 3rd day; quadriplegia 6th day. Monkey No. 424, 0.3 cc. of solution made up of 0.15 cc. of 2% virus plus 0.15 cc. of 1/512 sheep serum in saline: furred 3rd day; no paresis or paralysis. Monkey No. 425, 0.3 cc. of solution made up of 0.15 cc. of 2% virus plus 0.15 cc. of 1/1024 sheep serum in saline: furred 2nd day; no paresis or paralysis.

Set VI. †Monkey No. 450, 0.3 cc. of solution made up of 0.15 cc. of 2% virus plus 0.15 cc. of saline: furred 4th day; quadriplegia 7th day. Monkey No. 448, 0.3 cc. of solution made up of 0.15 cc. of 2% virus plus 0.15 cc. of 1/1536 sheep serum in saline: furred 8th day; paralysis of the muscles of the left leg 9th day; paralysis of some of the muscles of the right leg 10th day; paralysis of some of the muscles of the left arm 11th day; recovered with residual muscle paralyses of both legs. Monkey No. 447, 0.3 cc. of solution made up of 0.15 cc. of 2% virus plus 0.15 cc. of 1/2048 sheep serum in saline: furred 5th day; quadriplegia 7th day.

Animals No. 422 and No. 448 were observed for over one month, while all the other surviving animals were observed for over 3 months.

Thus in 3 months a potent unconcentrated antipoliomyelitic sheep serum was produced by injecting a sheep with crude virus (7 gm.) combined with P.C.B. filtrate. This serum neutralized the virus completely in a dilution of 1:1024.