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The Differential Action of Pressure on Fibers of Different Sizes in a Mixed Nerve.

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The effect of pressure on a mixed nerve was studied to determine whether it would shed any light upon the nature of the complex constitution of nerve trunks. Nerve action potentials recorded at a distance from a stimulating electrode have been shown to have a form dependent on the structure of the nerve as revealed histologically. The velocity of conduction in the fibers varies as the diameter; therefore in the action potential wave, recorded as above, the first of the action wave is made up by potentials in large fibers, and the end by potentials in small fibers.

A priori mechanical considerations lead one to suppose that an applied external pressure would block the large fibers before the small ones. This was indeed found to be the case. The nerve was blocked by a method similar to that of Meek and Leaper[1] who first applied fluid pressure through a cuff. A brass T-tube was made 12 mm. long with a bore of 2.5 mm. Through this was threaded a rubber tube with a fairly thin wall, whose outside diameter fitted the bore of the tube. The ends of the rubber tube were everted over the ends of the brass tube and tied, then covered with a brass cap to prevent longitudinal extension of the cuff. The nerve was threaded through a perforation in the cap. Pressure was then conveniently applied from an oxygen cylinder, being accurately controlled by a reducing valve. It was applied between the stimulus and the leads to the recording instrument, a Braun tube oscillograph; therefore, what is obtained is a record of normal waves, the form of the wave being altered either through block in some of the fibers, or a delay in traversing the compressing chamber.

When pressure is rapidly applied, the front of the action potential wave as it appears on the fluorescent screen, seems to melt away. When pressure is applied more slowly a long series of gradations is demonstrable. The α wave gets smaller, then disappears. But before this is completed the β wave shows a delay in passing the cuff, then the fibers in it too begin to be blocked, and later the same cycle is repeated with respect to the γ wave.

The significance of these experiments is revealed by comparing

them with some old subjective observations on block. To quote one case; Goldschneider[2] found that the order in which skin sensations disappear, when the innervation is blocked by pressure, is cold, contact, heat and pain. Therefore a comparison of the changes in the action potential wave with such a series of observations gives an indication of the relative sizes of the fibers carrying the different modalities; and it, together with similar comparisons using data obtained by other methods of blocking nerves, should aid, when compared with the corresponding losses of function, in the analysis of a nerve trunk for the functions of its various fibers.

[1] Meek, W. J., and Leaper, W. E., *Am. J. Physiol.*, 1911, xxvii, 308.
[2] Goldschneider, *Pfluger's Arch.*, 1886, xil, 115.

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Skin Reactions to Scarlatinal Streptococcus Filtrate in New-Born Infants and Their Mothers.

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Observations on over 150 infants during the first 2 weeks of life, and their mothers, were made by noting (1) the reaction of the skin to 2, 20 and 50 standard skin test doses of scarlatinal toxin, (2) the occurrence of antitoxin in the blood of a number of these infants and their mothers, and (3) later skin tests on a number of the same infants between the ages of 6 weeks and 2 months.

It was found that the skin of infants in the first 2 weeks of life does not react to small amounts (2 S. T. D.) of toxin, only one instance of a positive reaction having been observed. With larger amounts (20 and 50 S. T. D.) only a small proportion (about one-eighth) show positive reactions, and the mothers of these babies in practically every instance have positive reactions to two skin test doses. It was quite exceptional for an infant to give a positive reaction to 20 or 50 S. T. D. if the mother was negative to 2 S. T. D. The presence of antitoxin in infant's serum had no relation to the infant's skin test, but is associated with the presence of antitoxin in the mother's blood. No antitoxin was demonstrated in infants of mothers who reacted to 2 S. T. D., but it was rather constantly present in infants whose mothers gave negative reactions to 2 S. T. D., even though skin tests with larger amounts were positive.