Proceedings of the International Union of Physiological Sciences
Vol. II
XXII International Congress
Leiden 1962
Abstracts of free communications
films and demonstrations

A PROBABILITY PHENOMENON IN PERIPHERAL AXON.

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A nerve fiber, stimulated with identical electrical pulses of about threshold intensity at a frequency below that initiating cumulative effects produces an action potential in a fraction of the trials. It exhibits a spontaneous and unpredictable fluctuation in excitability. This phenomenon is an inherent property of nervous tissue and is probably of functional importance (Pecher, 1939). Fluctuation in excitability was investigated on axons from different animals (Rana, Astacus, Sepia) and for various conditions (temperature): Fluctuation in excitability is always present. The relationship between probability of response and stimulus intensity always closely approximates a Gaussian distribution function. The changes are found in its parameters: threshold (mean) and spread (standard deviation). Both are functions of stimulus duration, but the quotient spread/threshold, RS, is independent. The RS is the measure of the width of the threshold range, relative to the stimulus--threshold, and of the "intrinsic spread" (e.g. the effective noise component) *of* the axon, relative to the "intrinsic threshold" (e.g. the threshold potential). The intrinsic spread is increased by strychnine. From the relation between relative spread and axon diameter and from the experiments on temperature it is concluded that thermal agitation may play an important role in the cause of the phenomenon.

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Verveen, A. A. 1962. A probability phenomenon in peripheral axon.
Proc. XXII Int. Congr. Phys. Sc., vol. II, abstract 788,
Amsterdam-New York: Excerpta Medica Foundation.