

SCIENTIFIC PROCEEDINGS

ABSTRACTS OF COMMUNICATIONS.

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Studies on fatigue of voluntary muscles.

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A new method was worked out to stimulate the nerve of a voluntary muscle of a mammalian animal, this being kept in a physiological condition without impairing circulation, respiration, etc. As no operation was performed the same animal could be used for repeated experiments. Rhythm and strength of tetanic stimuli were controlled.

In the beginning there occurred a slight drop of contraction height, the "initial fatigue." Then a certain level was reached and maintained for several hours. Fatigue did not ensue if the rhythm of tetanic stimuli was every second second, even every second. The ratio of "excitation period" to "pause period" had a marked influence. In isometric contractions non-fatigue was still more definite than in isotonic contractions. Extirpation of the sympathetic nerve supply on one side had no influence.

In the frog, fatigue soon ensued when stimulation was made with tetanic stimuli, but break-shocks of an interval down to every fourth second applied with the new method produced no

fatigue. It appeared at first that stimulation every third second was the critical "interval" but later experience showed that this only holds good for winter frogs. With fresh spring and summer frogs fatigue was avoided in good experiments with stimuli every second second, sometimes even every second. Even when fatigue occurred, if a pause of about twenty minutes was given in a second series of the same stimuli, fatigue did not result. That the observed difference was due primarily to temperature was shown experimentally by placing the frog in a box in which temperature variations ranging between 15 and 35 degrees were obtained. The state of the summer and winter frog could be reproduced in one and the same animal.

Cutting the posterior roots caused fatigue to be delayed on the operated side. Microscopic examinations showed no alterations. Acetylcholin produced the same delay as cutting the posterior roots. An explanation is given, based on the similarity to paralytic secretion after cutting parasympathetic nerves.

Investigations on the action-current of muscles under the new experimental conditions are being carried out with the help of the highly sensitive American-Swiss-Einthoven-Fahr-Stoppani String Galvanometer.

The most recent investigations of the biochemical behavior of the muscles working under the new conditions have shown that formation of lactic acid is about ten times less than with the older methods of studying fatigue.