By stimulation of the deltoideus, biceps and brachioradialis on the contralateral side of a Hemiparkinson it could be demonstrated that the tremor of the ipsilateral side is triggered or can be evoked during a silent period (Fig. 3).

From these experiments we assume that tension reflexes by adequate stimulation of Golgi tendon organs and mediated by highly facilitated interneurones are the origin of the phenomena of Parkinsonian tremor.

The persistence of tremor activity after de-afferentation of a muscle or a whole limb is not proof of a central automatism, because the tremor can be triggered from other muscle groups of the same or the contralateral limb.

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Measuring Small Rapid Changes in Nerve Threshold during Exposure to Snake Venom

The purpose of this communication is to direct attention to a method that permits very small alterations in the average threshold of nerve fibres in a mixed nerve bundle to be followed over a rapid time course. The method depends on the steepness of the slope of the central region of the response amplitude/stimulus strength curve. From Fig. 1 it can be seen that in the case of a sub-maximal compound action potential, with an amplitude of 30–70 per cent maximal, an alteration in stimulus strength (or mean threshold) of only 1 per cent will result in an alteration of up to 10 per cent in response amplitude, due to the large proportion of nerve fibres the thresholds of which fall within this 1 per cent range.

The method has been used successfully to follow the rise in threshold which occurs when frog nerves are exposed to certain snake venoms. Fig. 2 shows the result of a typical experiment. A submaximal compound action potential was evoked with a 1·09-V stimulus pulse

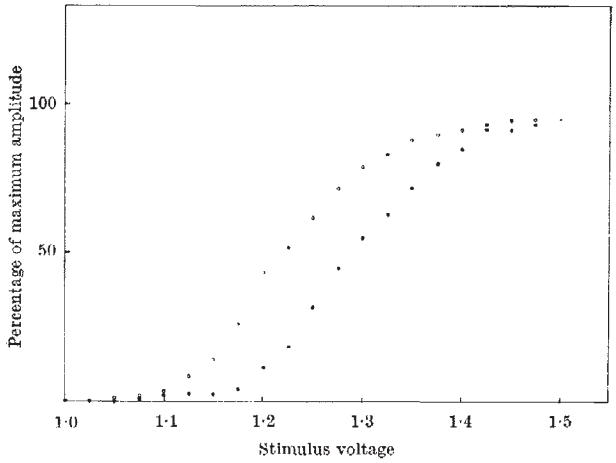

Fig. 1. Two curves of the peak amplitude of compound action potential of a frog nerve, expressed as a percentage of the maximum amplitude, plotted against stimulus voltage. One set of points (○) obtained with the nerve bathed in Ringer's solution, the other (●) 12 min after adding rattlesnake venom 10 μg/ml. to the Ringer's solution

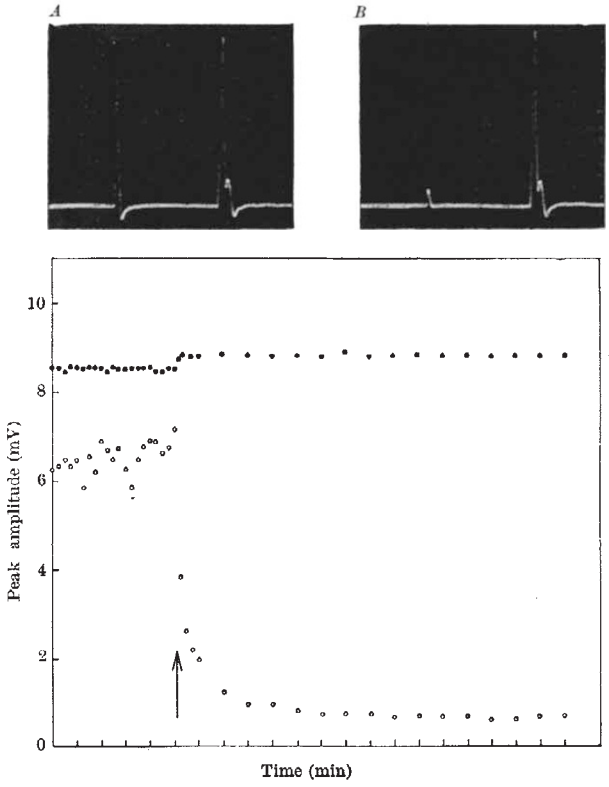

Fig. 2. Oscillograms of sub-maximal and maximal action potentials from a frog nerve taken before (*A*) and 7 min after (*B*) adding rattlesnake venom 100 μg/ml. to the surrounding Ringer's solution. The peak amplitudes of the sub-maximal (○) and maximal (●) responses are plotted against time in graph below, the arrow marking the addition of venom

and 18 msec later a supra-maximal stimulus was given to evoke the full compound action potential with α- and β-components for comparison (Fig. 2*A*). *Crotalus terrificus* venom was then added in a concentration of 100 μg/ml. to the oxygenated saline solution which surrounded the middle 2·5 cm of the isolated nerve trunk. This quickly raised the mean threshold of the nerve fibres, as shown by the diminution of the sub-maximal response, although the α- and β-components of the maximal response were not significantly affected (Fig. 2*B*). The responses were photographed every 15–60 sec and the time course of the changing threshold is shown in the graph of Fig. 2. Twenty minutes after adding the venom the sub-maximal response could be restored to its original amplitude by increasing the stimulus strength to 1·22 V, a 12 per cent increase in threshold.

Although based on well-known properties of nerve fibres this technique does not seem to have been used often, as there have been few investigations on changes in nerve threshold. The method deserves to be better known because of its sensitivity and the speed with which changes in threshold can be followed, the speed being limited only by the rapidity with which successive action potentials can be recorded. The great sensitivity of the amplitude of a sub-maximal response to small changes in threshold also indicates the danger of using sub-maximal afferent volleys in investigations on reflex excitability, where small changes in peripheral threshold could lead to much greater changes in the afferent input to a reflex arc.

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