

**Two types of inhibition of cerebellar Purkinje cells.** By R. GRANIT and C. G. PHILLIPS. *Nobel Institute for Neurophysiology, Karolinska Institutet, Stockholm, Sweden*

Increased polarization of the cell membrane is a well-known inhibitory process in spinal motoneurons (Brock, Coombs & Eccles, 1952), crayfish sensory neurones (Kuffler & Eyzaguirre, 1955) and Betz cells (Phillips, 1956). We have found that the discharge of cerebellar Purkinje cells in decerebrate cats may also be inhibited in this way. We have, further, seen a brief inhibitory process of a second type, which depolarizes the membrane to a degree which temporarily inactivates it (cf. Hodgkin & Huxley, 1952).

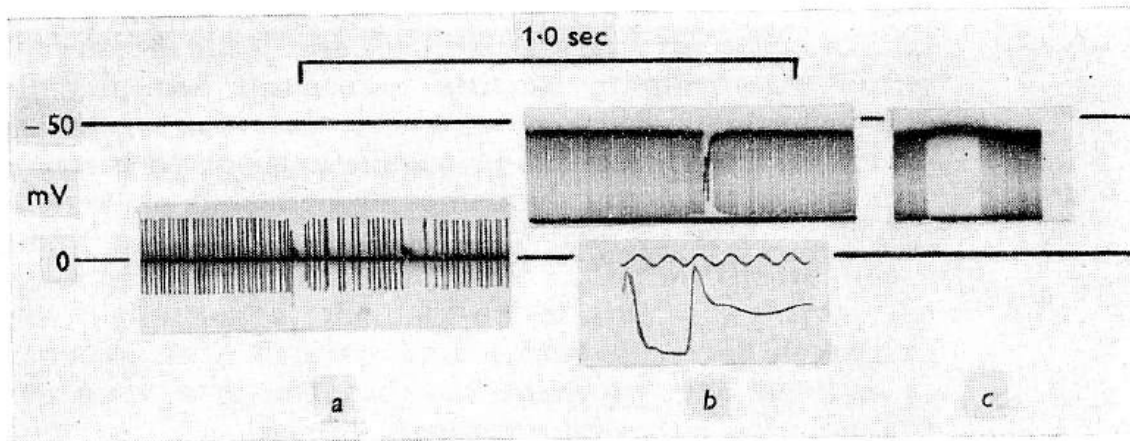


Fig. 1. Interruption of Purkinje cell discharges by transient 'inactivation'. (a) Extracellular record. (b) Intracellular records. Lower record shows the beginning of 'inactivation' on an expanded time scale (1000 c/s), and with positivity upward. (c) Intracellular record showing inhibition by hyperpolarization.

Unit spikes, recorded with KCl-filled microcapillaries, have been identified as Purkinje cell impulses by antidromic or monosynaptic (probably climbing fibre) activation from cerebellar nuclei or overlying *arbor vitae*. In extracellular records the spikes, at first negative-going and up to 5 mV amplitude, tend to grow into diphasic positive-negative spikes which may reach 50 mV peak-to-peak. A few intracellular records have been obtained, but 'resting' and action potentials have deteriorated rapidly, and the frequency of discharge has always implied injury.

The figure shows the interruption of impulse trains by brief 'inactivations', which in intracellular records appear as transient depolarizations prolonging the downstrokes of the spikes that initiate them. In extracellular records these responses may be positive- or negative-going. Stunted spikes appear as the membrane repolarizes, and grow to full size as repolarization becomes complete. An example of inhibition by hyperpolarization is also shown.

A similar membrane depolarization, with arrest of impulse discharge, is figured by Buser & Rougeul (1954) from an unidentified cell (assumed by them to be a Purkinje cell) in the pigeon.

## REFERENCES

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