

## **Bernard Ginsborg's Scientific work**

**Donald Jenkinson, August 2018**

Bernard Ginsborg made important and remarkably wide-ranging contributions to physiology and pharmacology. His earliest papers were from the Department of Physics in Reading where, with RW Ditchburn, he developed the first practicable methods for the spatial stabilisation of the retinal image in man (often Bernard) and for the study of the involuntary spontaneous movements of the eye. After a second undergraduate degree in physiology, and now working with Paul Fatt at University College London, he showed that calcium ions can contribute to the rising phase of the action potential. This was the first description of the voltage-dependent calcium current. He also collaborated with Liam Burke in a definitive study of multiply-innervated skeletal muscle. At that time there was no convenient nerve-muscle organ bath preparation for this muscle subtype and on moving to Edinburgh, and working with Joan Warriner, he rectified this by introducing the widely used chick biventer cervicis preparation. He also characterised synaptic transmission in frog sympathetic ganglion cells, with JG Blackman and C Ray. In keeping with his increasing pharmacological interests, and in collaboration with GDS Hirst and later EM Silinsky, the opposite effects of adenosine and ATP on transmitter release were described. He also undertook a comprehensive study of the membrane and second messenger events underlying glandular secretion in invertebrates, work done mainly with CR House and JG Blackman.

Being in the same department as RB Barlow and RP Stephenson led to an interest in receptor kinetics and with Stephenson he analysed the paradoxical increase in the response to an agonist that can occur when a fast-acting antagonist is applied in the presence of second antagonist which is slower to dissociate. The three differential equations that describe this were elegantly solved using a Laplace transform - mathematical expertise underpinned all his research.

In parallel with his experimental work, Bernard Ginsberg published a set of influential reviews: on involuntary eye movements (with DM Maurice), on ion movements in synaptic transmission, on the modulation of transmitter release by adenosine and ATP (with EM Silinsky and JH Hirsh), on neuromuscular transmission (with DH Jenkinson) and on stimulus-response coupling in gland cells (with CR House)

The breadth of his scientific interests reflected an always enquiring mind. He was also conscientious, almost to a fault, serving as Head of Department in Edinburgh and as an outstanding editor of the *Journal of Physiology*. Invariably helpful to students, colleagues and collaborators, he will be remembered with respect, gratitude and affection.

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