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An application of the BBC microcomputer to teaching cell physiology

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A computer model for teaching cell physiology, written in FORTRAN for the RML 380Z microcomputer, was demonstrated previously to the Society (Gardner-Medwin, 1983). The program has been revised and rewritten in the BBC BASIC, for use with the BBC model 'B' microcomputer – a cheaper and more widely used machine.

Computation of ion gradients, membrane potential and volume of a hypothetical cell are made by solving ionic flux equations as described for the previous version of the program. In the present version students carry out 'experiments' on the cell by selecting paged menus showing: the current cell environment; the relative permeability to Na, K and Cl; the relative activity of the Na/K pump; and the ratio of Na to K ions pumped per cycle. Alterations in external ion concentrations, osmolarity, membrane permeability and pump activity are keyed into the appropriate menu. Unacceptable alterations (for example, those which violate the principle of electroneutrality) are referred back to the user. One-key entries cause display of either the immediate, transient effect on cell properties (membrane potential under conditions of zero net ionic current); the state of the cell after movement of water to osmotic equilibrium but before any bulk ionic movements; or the steady state with zero net transmembrane fluxes of ions or water.

As before, the model allows students to study the interactions of cell parameters that are not easily measured with elementary techniques. The main advantage of the present version is that it is easier for students to use than the earlier one. The computer instructions employ programming structures that are peculiar to BBC BASIC; translation to other versions of BASIC for use with other machines should be possible without too much difficulty however.

REFERENCE

GARDNER-MEDWIN, A. R. (1983). *J. Physiol.* **341**, 5–6P.