ABSTRACTS OF MEMOIRS

RECORDING WORK DONE IN THE PLYMOUTH LABORATORY

CALDWELL, P. C. & WALSTER, G. E., 1975. The turnover of phosphorus compounds in crab muscle fibres. *Journal of Physiology, London*, **248**, 1–13.

The exchange of ^{32}P injected into single crab muscle fibres as either orthophosphate or ATP has been studied. The results have been analysed in terms of a simple kinetic model. The exchange of ^{32}P between ATP and arginine phosphate is considerably faster than that between ATP and orthophosphate during rest and during contraction in caffeine. The rate constants obtained at rest after the injection of either orthophosphate or ATP labelled with ^{32}P were of the same order. They were also of the same order as those which have been obtained previously for squid axons. The exchange during caffeine contraction of ^{32}P injected as orthophosphate gave rate constants which were consistent with an increased rate of splitting of ATP and with the rate constants needed to account for the observed net formation of orthophosphate. The results obtained after the injection of ^{32}P-labelled ATP during caffeine contraction were less clear cut.

CORNER, E. D. S., 1975. The fate of fossil fuel hydrocarbons in marine animals. *Proceedings of the Royal Society of London* (**B**), **189**, 391–413.

Certain hydrocarbons present in crude oil have been detected in several marine animal species as well as algae and sediments. The importance of pollution as a source of these hydrocarbons is briefly considered as is evidence for their biosynthesis in marine organisms. The problem of whether these compounds, particularly the polycyclic aromatic hydrocarbons are transferred through the marine food web is considered in the light of recent evidence for their uptake and release by various marine animals; and the question of whether they are excreted unchanged or as metabolites is discussed in the context of the many studies that have been made of their fate in mammals.

HOWARTH, J. V., 1975. Heat production in non-myelinated nerves. *Philosophical Transactions of the Royal Society of London* (**B**), **270**, 425–32.

Experiments with the C fibres of the rabbit vagus nerve have established that heat is evolved during the depolarizing phase of the action potential and is absorbed during the repolarizing phase. Subsequent studies using the pike olfactory nerve indicate that the heat production begins at a high rate very early in the depolarizing phase and is completed in advance of the peak of the spike. This would be expected if the heat arises from the energy released by the discharge of the membrane capacitance which varies as the square of the membrane potential; but estimates of the stored energy fall short of the observed heat production by a factor of two or three times. The prominent cooling phase suggests that a substantial part of the heat may rise from an entropy change. Such an entropy change would be expected to result from the change in the electrical stress in the dielectric of the membrane capacitance, and may thus be a manifestation of reversible changes in the molecular architecture of the insulating matrix of the membrane.

LEVINSON, S. R. & MEVES, H., 1975. The binding of tritiated tetrodotoxin to squid giant axons. *Philosophical Transactions of the Royal Society of London* (**B**), **270**, 349–52.

The binding of tetrodotoxin to squid giant axons was determined as a function of toxin concentration, using a tritiated toxin preparation of known radiochemical purity and specific activity. From the amount of saturable binding observed, the number of toxin binding sites thought to be sodium channels was found to be $553 \pm 119/\mu m^2$ of axon surface.

MEVES, H., 1975. Calcium currents in squid giant axon. *Philosophical Transactions of the Royal Society of London* (**B**), **270**, 377–87.

Voltage-clamp experiments were carried out on intracellularly perfused squid giant axons in a Na-free solution of 100 mM $CaCl_2$ + sucrose. The internal solution was 25 mM CsF + sucrose or 100 mM RbF + 50 mM tetraethylammonium chloride + sucrose. Depolarizing voltage clamp steps produced small inward currents; at large depolarizations the inward current reversed into an outward current. Tetrodotoxin completely blocked the inward current and part of the outward current. No inward current was seen with 100 mM $MgCl_2$ + sucrose as external solution. It is concluded that the inward current is carried by Ca ions moving through the sodium channel. The reversal potential of the tetrodotoxin-sensitive current was +54 mV with 25 mM CsF + sucrose inside and +10 mV with 100 mM RbF + 50 mM tetraethylammonium chloride + sucrose inside. From the reversal potentials mesured with varying external and internal solutions the relative permeabilities of the sodium channel for Ca, Cs and Na were calculated by means of the constant field equations. The results of the voltage-clamp experiments are compared with measurements of the Ca entry in intact axons.

MEVES, H., 1975. Asymmetry currents in intracellularly perfused squid giant axons. *Philosophical Transactions of the Royal Society of London* (**B**), **270**, 493–500.

Asymmetry currents were recorded from intracellularly perfused squid axons subjected to exactly equal positive and negative voltage clamp pulses at a temperature close to 0 °C. The voltage and time dependence of the asymmetry currents was studied at a holding potential of −80 to −100 mV. The effect of varying the holding potential was investigated. The latter experiments showed that the voltage dependence of the asymmetrical charge movement is different from the voltage dependence of the *m* system.

WELLS, R. M. G. & DALES, R. P. (1974). Oxygenational porperties of haemerythrin in the blood of *Magelona papillicornis* Müller (Polychaeta: Magelonidae). *Comparative Biochemistry and Physiology*, **49**(**A**), 57–64.

The oxygen equilibrium characteristics of whole blood of *Magelona papillicornis* Müller have been determined and compared with the whole coelomic fluid of the sipunculid *Golfingia elongata* (Keferstein) using the same methods. *M. papillicornis* haemerythrin is shown to have a low affinity for oxygen (p_{50} = 13 mmHg (1·733 kN m^{-2}) at 15 °C) but a high oxygen-combining capacity (6·2 vol. % at 15 °C) indicating an adaptation to function at high ambient oxygen tensions. *G. elongata* fluid was shown to have a higher affinity (P_{50} = 4 mmHg (0·533 kN m^{-2}) at 15 °C) but a lower oxygen capacity (3·5 vol. % at 15 °C) indicating adaptation to low ambient P_{O_2}'s.
Hill's coefficient, N, = 1·0 in *M. papillicornis* indicating no interaction between combining centres. As recorded for several sipunculid other haemerythrins, that of *G. elongata* shows slight interaction (N = 1·2).