

ABSTRACTS OF MEMOIRS

RECORDING WORK DONE AT THE PLYMOUTH LABORATORY

CHANDLER, W. K. & MEVES, H. 1970. Sodium and potassium currents in squid axons perfused with fluoride solutions. *J. Physiol., Lond.*, Vol. 211, pp. 623-52.

Fibres perfused with a K-free solution containing 300 mM-NaF and sucrose to maintain isotonicity were studied using the voltage-clamp technique. Step depolarizations from a holding potential which varied from -70 to -100 mV showed an early current which decreased to a smaller maintained level. Both the early and maintained components are considered to be carried by sodium ions since they reversed direction at the estimated thermodynamic sodium equilibrium potential and were blocked by tetrodotoxin in the external solution. Following NaF perfusion, the delayed potassium currents with 300 mM-KF showed less than one-tenth the initial amplitude with little, if any, change in kinetics. In this condition, as well as with 300 mM-CsF perfusion, the ratio (steady-state sodium current: peak sodium current) was about half that observed with NaF. The maintained component of sodium conductance in axons perfused with NaF may underlie the plateau phase of long-lasting action potentials recorded under similar conditions.

H. M.

CHANDLER, W. K. & MEVES, H. 1970. Evidence for two types of sodium conductance in axons perfused with sodium fluoride solution. *J. Physiol., Lond.*, Vol. 211, pp. 653-78.

Voltage-clamp experiments were carried out on squid giant axons internally perfused with 300 mM-NaF + sucrose. K-free artificial sea water, -0.3 to 3.5 °C, was used externally. Changes in sodium conductance were fitted according to the Hodgkin-Huxley model in which $g_{Na} = \bar{g}_{Na} m^3 h$. Stepwise depolarizations from a holding potential which varied from -67 to -83 mV resulted in an exponential decline of h from its initial level to a final, non-zero level. A positive prepulse (duration, 19-105 msec; voltage, -6 to 94 mV) increased the rate constant for h roughly threefold with practically no change in the final level. These results as well as others concerned with the steady-state level of inactivation and recovery from inactivation could not be fitted using the original kinetic formulation for h . They could be fitted by a model in which h is given by the sum of two components, h_1 and h_2 .

H. M.

GIBSON, R. N., 1970. The tidal rhythm of activity of *Coryphoblennius galerita* (L.) (Teleostei, Blenniidae). *Anim. Behav.*, Vol. 18, pp. 539-43.

The swimming activity of the intertidal fish *Coryphoblennius galerita* (L.) recorded in natural daylight and darkness and in complete darkness, shows a periodicity which is phased with the tidal cycle. Of the two activity peaks which occur each day, the first is usually the greatest, caused by a weak circadian component of the rhythm with a peak in the late morning. Darkness has a small suppressive effect on activity. The activity rhythm is considered to be related to feeding.

R.N.G.

HOWARTH, J. V., 1970. The technique of thermal measurements in excitable tissues. *Q. Rev. Biophys.*, Vol. 3, pp. 429-58.

The problems of sensitive and rapid measurements of temperature in living tissues are described and followed by an account of the methods employed in their successful solution. The theory of the design of thermopiles is discussed and practical details given for the construction of these instruments. The principles underlying the choice of galvanometers are described. The limitations of the technique are defined and the common sources of error are identified. Details are given of practical expedients employed to minimize artifact and error. Some innovations and contemporary

developments in the conventional technique are described, followed by an evaluation of the possibilities of novel methods of tackling the problem.

J.V.H.

POTTS, G. W., 1969. Behaviour of the snapper, *Lutianus monostigma*, around Aldabra. *Underwater Ass. Rep.*, Vol. 4, pp. 96-9.

A school of *Lutianus monostigma* was investigated in the shallow reef environment of Aldabra. The school structure was examined in relation to the physical environment. The school consisted of up to two thousand individuals positioned at aggregation areas along the coast. Short migrations occurred. Strong currents caused the fish to aggregate closer together. The degree of dispersal varied throughout the day apparently in response to light intensity. The school showed differing intensities of fright response depending on the species of predator and its size. The observations are discussed and related to recent literature.

G.W.F.

RUSSELL, F. S., 1970. On a new species of medusa from an inland salt lake in South Australia. *J. Zool.*, Vol. 162, pp. 449-52.

A description is given of a new species of medusa collected from a small inland salt lake in South Australia. A new genus has been erected for the species, which is probably a limnomedusa.

F.S.R.

SOUTHWARD, A. J. & SOUTHWARD, E. C., 1970. Observations on the roles of dissolved organic compounds in the nutrition of benthic invertebrates. Experiments on three species of Pogonophora. *Sarsia*, No. 45, pp. 69-96.

Three species of *Siboglinum*, two from Norway and one from the Bay of Biscay, were removed from their tubes and exposed to sea-water solutions of ¹⁴C-labelled phenylalanine, mixed amino acids, glucose, palmitic acid, and sodium butyrate; the range of concentrations used, 10⁻⁸ M to 10⁻⁵ M, was similar to that reported from sea-water and marine sediments. All species accumulated glucose and amino acids, though at different rates. The rate declined with time but the quantity accumulated did not show a plateau effect. Kinetics of uptake suggest that active transport could be involved: K_m values are in the range 10⁻⁷ M to 10⁻⁵ M, at least two orders of magnitude lower than K_m values for uptake by vertebrate intestine or intestinal parasites. Fatty acids are accumulated to a lesser extent. Further experiments suggest that the tentacle is not necessary for uptake which takes place in all regions of the body. These species spend most of their time inside their tubes which do not impose a serious barrier to uptake of the substrates tested.

A.J.S.

SPOONER, M., 1970. Some ecological effects of marine oil pollution. In *Proceedings of a Joint Conference on Prevention and Control of Oil Spills*, sponsored by the American Petroleum Institute and Federal Water Pollution Control Administration, held in New York, 15-17 December 1969, pp. 313-16. New York: American Petroleum Institute (Publ. 4040) [1970].

Oil at sea affects chiefly species associated with the surface; damage at sea by oil and dispersants after 'Torrey Canyon' were not as bad as expected.

Slicks sometimes disappear naturally; how, apart from physical actions, may this be taking place? Bacteria can, under experimental conditions very favourable to their growth, assist in dispersal, sinking and decomposition of oil, and zooplankton can ingest oil droplets, but are these factors of significance at sea?

On shores after 'Torrey Canyon' far more damage was done by excess detergent than by oil. Repopulation is following the expected sequence, most affected shores being still abnormal. Observations on oil left untreated in Cornwall, at Eleuthera and on the Devon coast show slow removal by various natural means, including the browsing action of fauna.

Toxic detergents can affect the sublittoral zone, including species of economic importance. Areas liable to repeated pollution, such as estuaries and salt marshes, require special care. The use of newer dispersants of low toxicity is desirable here and on shores.

M.F.S.