ABSTRACTS OF MEMOIRS

RECORDING WORK DONE IN THE PLYMOUTH LABORATORY

CORNER, E. D. S., 1972. Laboratory studies related to zooplankton production in the sea. *Symposia of the Zoological Society of London*, **29**, 185–201.

The question of how much particulate food has to be captured by zooplankton in order to provide a known amount of animal tissue is an important aspect of the general problem of zooplankton production in the sea and one that has given rise to numerous studies in the laboratory. The nature of these laboratory investigations is illustrated in the present account by examples drawn mainly from recent work with the Calanoid copepods. Particular emphasis is given to topics such as: possible food sources and the assimilation of food by the animals; factors affecting metabolic rates (measured in terms of oxygen uptake and the levels of nitrogen and phosphorus excreted); efficiencies with which different dietary materials are used by copepods for growth and egg-production; and total rations needed daily by the animals for growth and maintenance. Note is made of the relevance of the various laboratory findings to certain field studies and some attention given to possible ways in which zooplankton production in the sea could be affected by pollutants.

E.D.S.C.

STANFIELD, P. R., 1972. Electrical properties of white and red muscle fibres of the elasmobranch fish *Scyliorhinus canicula*. *Journal of Physiology*, **222**, 161–86.

1. Standard electrophysiological techniques (including a method which controls the membrane potential at a point on a muscle fibre) were used to investigate the electrical properties of white and red muscle fibres of the elasmobranch fish *Scyliorhinus canicula*.

2. The resting potential of the white fibres in the standard Ringer solution was $-85{\cdot}2 \pm 0{\cdot}4$ mV. That of the red fibres was $-71{\cdot}1 \pm 1{\cdot}2$ mV. The membrane resistance of white fibres was 1588 ± 97 Ω cm^2 and that of red fibres was 5410 ± 1070 Ω cm^2.

3. White fibres always responded to direct stimulation with an action potential. It proved impossible, with two impaling micro-electrodes, to record action potentials from the red fibres, although on one occasion an abortive spike was seen.

4. The resting membrane of the red fibres seemed less permeable to chloride than was the membrane of the white fibres. However, the resting potassium permeability showed the potential dependence called inward or anomalous rectification in both white and red fibres.

5. White fibres responded to square depolarizing pulses with conductance changes to sodium and, subsequently, to potassium.

6. All red fibres examined with the point voltage clamp showed a delayed increase in potassium conductance on depolarizing.

7. Out of twenty-seven red fibres examined, six showed no sign of having any sodium conductance mechanism. Eight showed large sodium currents on depolarizing, and the remaining thirteen had small sodium currents. It seemed likely that the group of eight fibres might be able to propagate action potentials.

BAKER, P. F., HODGKIN, A. L. & RIDGWAY, E. B., 1971. Depolarization and calcium entry in squid giant axons. *Journal of Physiology*, **218**, 709–55.

Light emission from the Ca-sensitive protein aequorin was used to monitor the internal concentration of ionized Ca in squid giant axons. The resting ionized Ca concentration was about 0·3 μM. This was increased reversibly by raising the external Ca, by replacing external Na by choline or lithium or by poisoning with cyanide or dinitrophenol. These observations are consistent with earlier evidence that much of the Ca in squid axons is bound, probably within mitochondria, and

the ionized Ca is maintained in part by intracellular binding and in part by a Na-dependent transport system located in the axolemma.

Stimulation also caused the light intensity to increase reversibly to a new steady level. This increased light emission during stimulation required external Ca ions, which suggests that it was dependent on the entry of Ca rather than the release of Ca from an internal store. Voltage-clamp experiments showed that the Ca entry associated with a depolarizing pulse could be divided into an early component which was abolished by tetrodotoxin and a late component which was unaffected by this inhibitor. The time relations of the early component were consistent with its being a leak of Ca through the Na channel; but the properties of the late component were not consistent with its being a leak of Ca through either the Na or K channels. The implication is that there is a separate Ca channel which opens late in the action potential and the properties of this channel are strikingly similar to those of the Ca-entry mechanism that is presumed to initiate the release of transmitter substances from presynaptic terminals. P.F.B.

BONE, Q., 1972. Some notes on histological methods for peripheral nerves. *Medical Laboratory Technology*, **29**, 319–24.

Comments are made on the technique of staining peripheral nerves with silver and with methylene blue, and various procedures are described which have been found useful upon non-mammalian tissue. Q.B.

BONE, Q., 1972. The dogfish neuromuscular junction: dual innervation of vertebrate striated muscle fibres? *Journal of Cell Science*, **10**, 657–65.

In the myotomal muscles of the dogfish, *Scyliorhinus canicula*, there are two major types of fibre. The red fibres at the periphery of the myotome receive a distributed *en grappe* pattern of innervation. There are subjunctional folds at these endings, and the nerve terminals contain vesicles around 50 nm in diameter. In contrast to this, the white twitch fibres of the myotome are innervated focally, by two nerve fibres passing to the same motor end-plate. These two fibres contain vesicles of different types. One type of nerve terminal contains vesicles around 50 nm in diameter; these terminals resemble those upon the red fibres. The other contains vesicles up to 100 nm in diameter, frequently possessing a dense core. It is suggested that the white twitch fibres of dogfish are innervated by two separate axons, possibly containing different transmitter substances.

GIBBS, P. E. & BRYAN, G. W., 1972. A study of strontium, magnesium, and calcium in the environment and exoskeleton of decapod crustaceans, with special reference to *Uca burgersi* on Barbuda, West Indies. *Journal of experimental marine Biology and Ecology*, **9**, 97–110.

Analyses of samples from Barbuda, Leeward Islands, show that the strontium/calcium atom ratio of the exoskeleton of the fiddle crab *Uca burgersi* Holthuis is proportional to that of the environment, whilst the atom ratio magnesium/calcium of the exoskeleton is fairly constant regardless of the environmental ratio.

Laboratory experiments on *Carcinus maenas* (L.) demonstrate that the strontium/calcium atom ratio of the exoskeleton is, to a large extent, determined by the ratio in the environment at the time of the deposition of the new exoskeleton.

The available information concerning strontium/calcium and magnesium/calcium atom ratios is reviewed and discussed. It is concluded that most brachyuran crabs have similar distribution coefficients and that major variations in the strontium/calcium atom ratio can be related to differences in the environmental ratio.

HOLME, N. A., 1971. Disposal of china clay waste in the English Channel. *Mémoires du Bureau de Recherches géologiques et Minières* (*B.R.G.M.*), **79**, 269–70.

A scheme for disposal of fine micaceous waste from the china clay industry by pipeline to a position on the sea bed at 18 m depth near Dodman Point is outlined. Studies have been made on the hydrography of the area and experimental dumping of radioactive tracer carried out, and tank experiment made in order to find out how residues would be dispersed from the outfall.