

ABSTRACTS OF MEMOIRS

RECORDING WORK DONE AT THE PLYMOUTH LABORATORY

BLAUSTEIN, M. P. & HODGKIN, A. L., 1969. The effect of cyanide on the efflux of calcium from squid axons. *J. Physiol., Lond.*, Vol. 200, pp. 497-527.

This paper deals with the effect of cyanide and external ions on the efflux of calcium from axons. Cyanide had little immediate effect on calcium efflux, but after $1\frac{1}{2}$ h the efflux rose from 5 to 15 times its normal value. The effect was rapidly reversed when cyanide was removed. The extra efflux in cyanide seemed to be largely an exchange for external calcium and sodium since it was abolished by replacing Ca with Mg and Na with Li. Removal of Ca reduced the Ca efflux in cyanide to $\frac{1}{3}$ and subsequent removal of Na reduced it to between $\frac{1}{10}$ and $\frac{1}{20}$.

A possible explanation of the cyanide effect is that calcium ions are released from a store and can then exchange with Ca and Na in the external medium. Evidence for an increase in free calcium was that pretreatment with cyanide greatly increased the rate at which ^{45}Ca could be dialysed from axoplasm.

The experiments provide evidence for coupling between Na influx and Ca efflux and suggest that downhill movement of Na may give some of the energy for extruding Ca.

In the appendix theoretical equations for diffusion and chemical reaction are used to calculate the time course of Ca efflux following an axial injection. M.P.B.

COOPER, L. H. N., 1969. Extraction of oceanographical time-series from the four-dimensional 'liquidum' (or continuum). *Prog. Oceanogr.*, Vol. 5, pp. 127-48.

Though the Plymouth Laboratory has some of the finest observations in the world as a basis for biological time series, these require a physical and chemical sub-structure which even after 60 years work we cannot yet provide.

Time-series require inter-comparison of a number of parameters, each studied in four dimensions. Observations by the Plymouth Laboratory for temperature and salinity started in 1903, for phosphate in 1923 and for silicate in 1924 with a gap of 20 years between 1931 and 1951. The variations in quality of the results is described, together with the difficulties of interpretation to which these variations give rise. Single stations cannot be used as a basis for time-series; grids of stations are essential and reveal wide variations within short distances. The difficulty of 'extracting the tide' from oceanographical observations is mentioned. In the English Channel it is still premature to devote resources to constructing time-series. Studies on partition processes, on physical and biological events around headlands and in re-entrant bays, and on productivity and the food chain will demand priority for some time to come.

L.H.N.C.

CORNER, E. D. S., DENTON, E. J. & FORSTER, G. R., 1969. On the buoyancy of some deep-sea sharks. *Proc. R. Soc. Lond. B*, Vol. 171, pp. 415-29.

Fish of five species of deep-sea squaloids and one deep-sea holocephalan were found to float in surface sea water. However, by taking into account the differences of salinity, temperature and pressure between the surface water and that in which the animals lived, it was shown that they must have been very close to neutral buoyancy

at the bottom of the sea. Every fish had an enormous oily liver and the lift which this gave almost exactly compensated for the weight in sea water of the rest of the animal. The livers contained large amounts of squalene which, with its low specific gravity (0.86), is particularly suited to give lift, being 80% more effective per unit weight than cod-liver oil. It is calculated that because they use squalene the fish not only obtain the lift needed for neutral buoyancy more economically in terms of weight of oil required: they also use less metabolic energy in providing the oil-store responsible for buoyancy. It seems that these fish must carefully regulate the oil content of their livers so as always to balance exactly the weight of sea water of their other tissues: but the mechanism by which they do this is unknown.

E.J.D.

DAVIES, A. G., 1968. On the adhesion of colloidal hydrous ferric oxide to glass. *J. colloid interface Sci.*, Vol. 28, pp. 48-52.

The effect of stirring upon the adhesion to glass of colloidal particles of hydrous ferric oxide in aqueous suspension has been investigated. Contact between the particles and the glass, necessary for adhesion to occur, was prevented by the hydration layer on the glass surface for the particles having insufficient energy to penetrate this barrier. The energy provided by stirring enabled increasing numbers of the particles to make contact with the glass and thus promoted adhesion. At high stirring rates, however, the viscous drag on the particles overcame the adhesive forces and reduced the extent of adhesion. There was, as a result, a rate of stirring at which adhesion was maximal. A theoretical equation, in accord with the results, has been proposed. The effect of a cationic surfactant upon the adhesion of aged hydrous ferric oxide to glass has been shown to support the idea of a hydration barrier.

A.G.D.

GIBBS, P. E. & WICKSTEAD, J. H., 1969. On a collection of Acrania (Phylum Chordata) from the Solomon Islands. *J. Zool.*, Vol. 158, pp. 133-41.

A collection of acranians from Marovo Lagoon in the New Georgia Group of the Solomon Islands is described. Five species are recorded—*Asymmetron lucayanum*, *A. cultellus*, *Branchiostoma malayanum*, *B. indicum* and *B. lanceolatum* or *B. haeckeli*: each is discussed briefly in relation to its taxonomic and biogeographic interest. P.E.G.

MAKAREWICZ, W., 1969. AMP-aminohydrolase in muscle of elasmobranch fish. Purification procedure and properties of the purified enzyme. *Comp. Biochem. Physiol.*, Vol. 29, pp. 1-26.

The procedure resulting in about 480-fold purification of AMP-aminohydrolase from white skeletal muscle of the elasmobranch fish *Raia clavata* is described. The procedure involves extraction with phosphate buffer, heat treatment (NH₄)₂SO₄ fractionation, adsorption on calcium phosphate gel and chromatography on DEAE-cellulose. The separation of AMP-aminohydrolase from actomyosin in fish muscle extracts was studied. The properties of the AMP-aminohydrolase purified from white skeletal muscle of the elasmobranch fish *Raia clavata* were investigated. The purified enzyme does not possess adenosine triphosphatase activity and is specific for 5'-AMP. The optimum pH was found to be 6.6 and the Michaelis-Menten constant in 0.1 M K-succinate buffer at 30 °C was $1.52 \pm 0.66 \times 10^{-3}$ M. The allosteric activation of the enzyme by ATP and K⁺ was studied. The enzyme is also activated by 2'-AMP. The competitive inhibition of the enzyme by 3'-AMP was observed; K_i for 3'-AMP was found to be 3×10^{-3} M. The enzyme was inhibited by fluoride, inorganic phosphate and *p*-chloromercuribenzenesulphonic acid. The properties of fish muscle AMP-aminohydrolase are compared with those already known for mammalian enzyme.

W.M.

SOUTHWARD, E. C. & BRATTEGARD, T., 1968. Pogonophora of the northwest Atlantic: North Carolina region. *Bull. mar. Sci.*, Vol. 18, pp. 836-75.

The taxonomy and distribution are described of Pogonophora from a region off the east coast of the U.S.A. between 32° 10' N and 36° 35' N. Sixty-six samples have been examined, taken in depths ranging from 43 to 5350 m. Fifteen species of Pogonophora are present in the samples. Of these species, two are already known from Florida and three from New England; nine species are new, and two others, which may be new, are represented by fragments only. The new species described include six species of *Siboglinum*, one of *Diplobranchia*, and two of *Polybranchia*.

E.C.S.

TAYLOR, D. L., 1969. The nutritional relationship of *Anemonia sulcata* (Pennant) and its dinoflagellate symbiont. *J. Cell Sci.*, Vol. 4, pp. 751-62.

High resolution autoradiography in the optical and electron microscopes has been used to define the nature of the nutritional relationship between *Anemonia sulcata* and its algal symbiont. Grain counts from these autoradiographs have been examined quantitatively, and the results compared with those obtained from an *in vitro* analysis of the excreted products of the symbionts. These investigations clearly indicate that a system of carbon translocation between the alga and the host does exist *in situ*, and that over 60% of the carbon fixed in photosynthesis is transferred to the host under the conditions of these experiments.

D.L.T.