

ABSTRACTS OF MEMOIRS

RECORDING WORK DONE AT THE PLYMOUTH LABORATORY

BLASCHKO, H. & HOPE, D. B., 1957. Observations on the distribution of amine oxidase in invertebrates. *Arch. Biochem. Biophys.*, Vol. 69, pp. 10-15.

The tissues of a number of marine invertebrates have been examined for the presence of the enzyme amine oxidase. No enzymic activity was found in three species of tunicates examined. Tryptamine and β -phenylethylamine were oxidized by extracts of gut of a polychaete, *Chaetopterus variopedatus*. Enzymic activity was found to be present in many, but not all, of the species of molluscs examined; of particular interest is the finding that the digestive gland and the anterior retractor muscle of the byssus in *Mytilus edulis* contain the enzyme; the latter muscle is known to be highly sensitive to 5-hydroxytryptamine. Among the echinoderms, all asteroids and echinoids had amine oxidase activity but no activity was detected in holothuroids. The presence of the enzyme in echinoderms suggests that biogenic amines, hitherto not detected, occur in these animals.

H.B.

DARTNALL, H. J. A., 1957. The spectral variation of the photosensitivities of some visual pigments. *Symposium on visual problems of colour, held at Nat. Phys. Lab. Teddington, Middx., from 23rd to 25th September 1957*, Paper No. 3.

The photosensitive retinal pigments of the tench (*Tinca tinca*), the carp (*Cyprinus carpio*), the gurnard (*Trigla cuculus*) and the conger eel (*Conger conger*) were extracted by means of 2% digitonin solutions.

It was found that the bleaching kinetics of these four pigments could be described by the same equation as that previously developed for the well-known rhodopsin or visual purple of the frog. The photosensitivities of the pigments were measured as ratios relative to the frog pigment over the wavelength range 440-580 m μ .

The absolute values of the photosensitivities of the four pigments were obtained by multiplying the ratios by the known values for the absolute photosensitivities of the frog pigment.

H.J.A.D.

HANSON, JEAN & LOWY, J., 1957. Structure of smooth muscles. *Nature, Lond.*, Vol. 180, pp. 906-9.

The detailed structure of smooth muscles from various invertebrate (particularly molluscan) and vertebrate animals was investigated by electron microscopy and phase-contrast light microscopy. It was found that there are several very different types of fibres: there is no 'typical' smooth muscle. The dimensions and structure of the protein filaments are highly variable. They may be randomly arranged in the fibre or closely and regularly packed into distinct myofibrils. In the muscles of squid (*Loligo*) the myofibrils are helically arranged and are composed of two kinds of filaments which are cross-linked to each other and closely resemble those in the anisotropic bands of cross-striated myofibrils; but the smooth fibrils have this construction along the whole of their length. The mechanism of contraction is probably the same in these particular smooth muscles as in cross-striated muscles. Other muscles have neither cross-striations nor a double array of filaments. In vertebrate smooth muscles the filaments

are all very thin and look alike. In the white (slow) part of lamellibranch adductors the 'filaments' are very large and appear to be composed of ribbon-shaped subfilaments with the elaborate 'paramyosin' structure.

J.L.

HOBSON, G. E. & REES, K. R., 1957. The annelid phosphokinases. *Biochem. J.*, Vol. 65, pp. 305-6.

Following the isolation of taurocyamine and glycoyamine from a number of annelid worms, it was suggested that these guanidine bases, when phosphorylated on the terminal amino group functioned as 'phosphagens'. We have confirmed that fresh body-wall muscles from a number of polychaete worms very often contain a mixture of glycoyamine phosphate with either taurocyamine or creatine phosphate. Furthermore, we have shown the presence in the same tissues of the appropriate phosphokinase enzyme systems, capable of building up the phosphates from the guanidine and adenosine triphosphate.

The existence of these active transphosphorylation systems is held as evidence for the products serving a new but typical 'phosphagens' *in vivo*, for certain of the annelids. Their distribution, however, appears to be completely arbitrary.

K.R.R.

JONES, W. C., 1957. The contractility and healing behaviour of pieces of *Leucosolenia complicata*. *Quart. J. micr. Sci.*, Vol. 98, pp. 203-17.

Isolated pieces of the body wall, when left in sea water or in $MgCl_2$: sea water, undergo a process of reorganization whereby the tubular form of the colony is regained. The piece first curls with the choanoderm on the inner surface, and a membrane then spreads from the four edges, closing off a new spongocoel. The membrane consists of the two surface epithelia with a thin layer of mesogloea in between. Its spread is accompanied by a shrinkage of the area of the original piece.

When the internal epithelium has been brushed away, the pieces shrink rapidly and curl longitudinally towards the dermal side.

The experiments indicate that both epithelia are contractile. There is evidence that the porocytes are responsible for the contractility of the internal epithelium and are interconnected beneath the bases of the choanocytes.

W.C.J.

NICOL, J. A. C., 1957. Observations on photophores and luminescence in the teleost *Porichthys*. *Quart. J. micr. Sci.*, Vol. 98, pp. 179-88.

Histology and physiology of the photophores of an inshore teleost, *Porichthys myriaster*, are described. Photophores lie in the dermis: each consists of a lens, photogenic and reflecting layers, and is supplied by a nerve. Luminescence in the living fish was evoked by electrical stimulation of the spinal cord, and by injection of adrenaline. Latency, following stimulation of the cord, was 7-10 sec; after intracardiac injection of adrenaline, 2 min. Electrical stimulation of the cord produced luminescence after arrest of the circulation. It is suggested that the photophores of *Porichthys* are under control of the sympathetic nervous system.

J.A.C.N.

ROSS, D. M., 1957. Quick and slow contractions in the isolated sphincter of the sea anemone, *Calliactis parasitica*. *J. exp. Biol.*, Vol. 34, pp. 11-28.

This paper deals with the physiology of isolated marginal rings of the sea anemone, *Calliactis parasitica*, a preparation containing the marginal sphincter muscle which is responsible for the powerful closing movement of this animal. Besides this quick

contraction, so well known from the work of Pantin as a unique example of a facilitated response, the preparation shows slow contractions in response to stimuli at lower frequencies. On account of the relative absence of spontaneous movements in this preparation it was possible to obtain a good deal of information about relationships between the size and latent period of the slow contractions obtained and the number and frequency of stimuli applied. There is a threshold number of stimuli at each frequency which causes only a tiny response and there is an optimal frequency at which the biggest responses are obtained with fewest stimuli. In considering the possible causes of 'fast' and 'slow' activities in the margin of *Calliactis*, the general evidence is in favour of an explanation which imagines muscle fibres of the same type which can contract in two different ways according to the number and frequency of impulses reaching them, and possibly according to the route by which the impulses travel.

D.M.R.

STOTT, F. C., 1957. Observations on the food canal and associated structures in the holothurian *Holothuria forskali* delle Chiaje. *Proc. zool. Soc. Lond.*, Vol. 129, pp. 129-36.

A simpler nomenclature is suggested for the parts of the holothurian gut. The rete mirabile of *Holothuria forskali* showed three regions, namely, a relatively unpigmented region attached to the dorsal edge of the stomach which connected by a single strand to a yellowish brown region alongside the intestine which had a brownish black edge to it filled with melanin granules. Feeding with saccharated iron carbonate showed that some amoebocytic ingestion took place in the stomach and intestine and clumps of amoebocytes containing iron appeared in the haemal canals, lumen of the rete mirabile and in the walls of the respiratory trees, where it was probably egested. Injection of trypan blue into the body cavity resulted in its phagocytosis by the agranulocytes and their clumping together with the granulocytes on the respiratory trees, gonads and intestine. Migration into the lumen of the latter was observed. Melanin granules were identified within granulocytes in the lumen and walls of the rete mirabile as well as in the cells of the rete wall.

F.C.S.