

## ABSTRACTS OF MEMOIRS

### RECORDING WORK DONE AT THE PLYMOUTH LABORATORY

#### ENZYMIC OXIDATION OF AMINES IN DECAPODS

By H. Blaschko and J. M. Himms

*J. exp. Biol.*, Vol. 31, 1954, pp. 1-7

The occurrence of the enzyme amine oxidase in the tissues of *Eusepia officinalis* has already been previously reported. In the present work, a survey was made of the enzymic activity in the organs of two decapod cephalopods, *E. officinalis* and *Loligo forbesii*. In all organs of the alimentary tract, including the salivary glands, the liver and the pancreas, high enzymic activity was found. The enzyme was also present in nervous tissue, in the gonads, the renal appendages, the hearts, the pericardial glands and in other tissues. It was not found in muscle and skin.

The enzyme oxidized tyramine and related compounds, e.g. *p*-hydroxyphenylethanolamine (synthetic 'octopamine'), tryptamine and 5-hydroxytryptamine ('enteramine' or 'serotonin') and many aliphatic amines.

The liver of *Loligo* also contains the enzyme D-amino acid oxidase; this enzyme is already known to occur in *Octopus vulgaris* and in *Eusepia officinalis*.

H.B.

STUDIES ON *LYSMATA SETICAUDATA* RISSO (CRUSTACEA DECAPODA). III. ON THE ACTIVITY OF THE MOULT-ACCELERATING PRINCIPLE WHEN ADMINISTERED BY THE ORAL ROUTE. IV. ON THE SITE OF ORIGIN OF THE MOULT-ACCELERATING PRINCIPLE—EXPERIMENTAL EVIDENCE. V. THE OVARIAN INHIBITING HORMONE AND THE HORMONAL INHIBITION OF SEX-REVERSAL. VI. NOTES ON THE STRUCTURE OF THE NEUROSECRETORY SYSTEM OF THE EYE-STALK

By D. B. Carlisle

*Publ. Staz. zool. Napoli*, Vol. 24, 1953, pp. 279-85, 285-92, 355-72 and 435-47

The moult-accelerating principle of the eye-stalk of *Lysmata* is active when administered orally as well as upon injection; a far greater dose is required when the material is taken orally. It is present in extracts of both parts of the X organ, but was not found in extracts of sinus gland, of the retina and lamina ganglionaris or of the medullae interna and externa. Outside the eye-stalk it was found in extracts of the cerebral and thoracic ganglia. The hormone is probably a product of neurosecretory cells.

Eye-stalk ablation leads to an increase in ovarian growth and to an increase in the rate of reversal of sex from male to female in this protandrous hermaphrodite. Extracts of whole eye-stalks, of sinus glands or of the ganglionic part of X organs, when injected into intact animals intramuscularly, inhibit ovarian growth and depress the rate of sex reversal. Extracts of other tissues within the eye-stalk do not have this effect. The principle responsible for these effects is not active orally. Probably a single hormone is responsible for both effects—inhibition of ovarian growth and inhibition of sex reversal. This principle is presumably formed in the cells of the ganglionic part of the X organ and thence passed via the fibres of the sinus gland tract to the sinus gland where it is stored until finally released into the blood-stream. It is not the same as the moult-inhibiting or as the moult-accelerating hormone. The topography and anatomy of the neurosecretory structures which produce, transport and store these various hormones are described, and the relationship of their structure to the secretion of hormones discussed. A method is described by which it has been possible to observe the passage of neurosecretory material along the axons of the X organ connective; the entire axoplasm appears to be flowing along the axon.

D.B.C.

ON THE RELATIONSHIP BETWEEN MAMMARY, SWEAT,  
AND SEBACEOUS GLANDS

By D. B. Carlisle

*Quart. J. micr. Sci.*, Vol. 95, 1954, pp. 79–83

As a result of an investigation into the development of the mammae of male rabbits responding to regular injections of oestrogen and progesterone, it is suggested that the phylogenetic origin of mammary tissue lies in proliferated sebaceous glands.

D.B.C.

SEISMIC PROSPECTING IN THE ENGLISH CHANNEL  
AND ITS GEOLOGICAL INTERPRETATION

By M. N. Hill and W. B. R. King

*Quart. J. geol. Soc. Lond.*, Vol. 109, 1953, pp. 1–20

Recent geological information obtained by core sampling in the English Channel off the South Devon coast is set forth. This information has been combined with the results obtained from a seismic survey along a line southwards from Plymouth.

The evidence from these two sources points to the existence of a trough filled with New Red Sandstone deposits which extends from within a few

miles of the English coastline to a point south of the middle of the Channel. The thickness of these deposits reaches approximately 3000 ft.

The line of reefs formed of metamorphic rocks extending from Bolt Tail to the west of the Eddystone projects through the New Red Sandstone formations, which appear to be swamping an irregular topography.

Southwards from the Eddystone the breccias and sandstones of the Permian and Trias are followed by Keuper Marl and a small thickness of Lower Jurassic formations. These in turn are covered unconformably by a few hundred feet of Chalk.

M.N.H.

### THE ATRIAL NERVOUS SYSTEM OF AMPHIOXUS (*BRANCHIOSTOMA*)

By W. Holmes

*Quart. J. micr. Sci.*, Vol. 94, 1953, pp. 523-35

An interconnected system of neurons lies throughout the lining of the atrial cavity of *Branchiostoma*. Since the neurons lie in or immediately below the atrial epithelium, and are not confined to the gut wall, it is suggested that the homology with the craniate autonomic (enteric) system, proposed by Boeke, gives an incomplete interpretation of the system.

The atrial nervous system is connected with the central nervous system through the dorsal spinal roots, and contains receptor and effector elements. It is particularly dense in the walls of Lankester's atrio-coelomic 'funnels' and round the inner surface of the atriopore. The distribution of smooth muscle in the gut wall is discussed. Since the contents of the atrial cavity are a constantly refreshed sample of the external environment, and since the outer surface of the animal is so sparsely innervated, it is suggested that the atrial nervous system may play an important part in determining behaviour.

W.H.

### CONTRACTION AND RELAXATION IN THE ADDUCTOR MUSCLES OF *PECTEN MAXIMUS*

By J. Lowy

*J. Physiol.*, Vol. 124, 1954, pp. 100-5

The phenomena of contraction and relaxation in the adductor muscles of *Pecten maximus* have been studied by simultaneously recording muscle potentials and movement. The results confirm and extend the findings obtained in similar experiments with the adductor muscles of *Mytilus edulis*. Thus it was shown that in *Pecten* slow phasic contractions are accompanied by smooth muscle action-potentials whose number and amplitude depends on the extent of contraction, and that the maintenance of tension is associated

with continuous electrical activity in the smooth muscle. The striated muscle works by large synchronous contractions. As in the case of the *Mytilus* adductor, a state of contraction in the smooth *Pecten* muscle can be terminated by nervous stimulation.

It is concluded that tonic contraction in lamellibranch smooth muscles is a tetanic phenomenon and that the slow speed of these muscles adequately accounts for their capacity to maintain a state of tension for long periods of time without appreciable fatigue. J.L.

### FACILITATION IN SEA ANEMONES. III. QUICK RESPONSES TO SINGLE STIMULI IN *METRIDIUM SENILE*

By D. M. Ross

*J. exp. Biol.*, Vol. 29, 1952, pp. 235-54

This paper describes further work on anemone extracts which in earlier experiments had the effect of enabling *Metridium* to respond to single stimuli. (In untreated animals a single stimulus elicits no response; it sets up facilitation and enables the animal to respond to subsequent stimuli.) The new information can be summarized as follows. (1) Extracts are most effective in causing responses to single stimuli from 15 to 30 sec after introduction, which is too soon for any material to reach the neuromuscular junctions where facilitation is set up. (2) There is no difference in the potency of extracts from stimulated and unstimulated animals, so the active substance in the extracts can have no relation to neuromuscular activity in the animals. (3) Other treatments have similar effects, big changes in pH, K ions, bile salts and saponin, but they have no obvious neuromuscular significance, suggesting that the effect is not due to any specific neuromuscular action.

The general conclusion is that these are not direct facilitating effects but arise from sensory excitation set up by the treatments. Yet there is a singular absence of spontaneous contractions and post-stimulus contractions, suggesting differences between this kind of excitation and the impulses set up by electrical stimulation. D.M.R.

### RESEARCHES ON PHORONIDEA OF THE GULLMAR FIORD AREA (WEST COAST OF SWEDEN)

By Lars Silén

*Ark. Zool.*, Ser. 2, Bd. 4, 1952, pp. 95-140

Four species of *Phoromis* were treated, viz. *P. pallida* (Schneider) (previously unknown in the adult form), *P. mülleri* Selys-Longchamps, *P. hippocrepeia* Str. Wright, and *P. ovalis* Str. Wright. Material of *P. hippocrepeia* collected

during a stay at the Plymouth Laboratory in 1949 was used for comparison. The anatomy and histology of the different organs, except the nervous system, were investigated. The four species proved to represent as many distinct types. However, it was considered premature to erect separate genera for them as the phoronid species known are sufficiently few to be easily handled, and too few to allow of more than a very dim idea of the phylogenetic lines within the group. L.S.

#### ON THE NERVOUS SYSTEM OF *PHORONIS*

By Lars Silén

*Ark. Zool.*, Ser. 2, Bd. 6, 1954, pp. 1-40.

Investigations were made on six species. *P. hippocrepi*, represented by material collected by the author at Plymouth in 1949, proved to be the form most suited for studying the histology in general of the nervous system. Fixation in Bouin's fluid and staining according to Bodian gave fairly selective results. Certain experiments were performed on living material. The nervous system is situated in the epidermis. Interior organs are innervated by fibres perforating the basal membrane. The chief constituent is a nerve net, typically developed in the metasoma, concentrated into a nervous ring (including the 'ganglion') at the border between pro- and metasoma. The components are described. There are two, one, or no decussating giant fibres ('lateral nerves') in different species. A paired lophophoral sense organ is described. The organization of the nervous system in *Phoronis* is easy to interpret from the functional, but difficult to interpret from the phylogenetic point of view. L.S.