

ABSTRACTS OF MEMOIRS

RECORDING WORK DONE AT THE PLYMOUTH LABORATORY

ALLEN, J. A., 1958. On the basic form and adaptations to habitat in the Lucinacea (Eulamellibranchia). *Phil. Trans. B*, Vol. 241, pp. 421-84.

The functional morphology of the Lucinacea is described. In particular, comparative accounts of the feeding, respiratory and cleansing currents are given. All species construct an anterior inhalant tube from particles of the substratum cemented together by the secretion of the glands in the tip of the modified vermiform foot. Particles entering by this tube are sorted by the ciliated epithelium covering the elongate anterior adductor muscle. An evolutionary sequence can be demonstrated showing that as the size and efficiency of the anterior adductor increases there is a related decrease in the size and efficiency of the gills and palps and the sorting mechanisms on them. Progressive reduction in sorting mechanisms of the stomach and in numbers of apertures to the digestive diverticula is demonstrated. This simplification emphasizes the essential mechanisms involved in the functioning of the eulamellibranch stomach.

J. A. A.

ATKINS, W. R. G., 1957. The direct estimation of ammonia in sea water, with notes on nitrate, copper, zinc, and sugars. *J. Cons. int. Explor. Mer*, Vol. 22, pp. 271-7.

A method for estimating ammonia not involving distillation appears to be provided by the use of chloramine T and a pyridine pyrazolone reagent devised by J. Kruse and M. G. Mellon in 1952. A purple colour is produced and can be extracted with carbon tetrachloride and matched or measured in a spectrophotometer at 450 m μ . Even with a 1 cm cell as little as 0.025 parts per million can be determined. Other constituents of sea water do not interfere. The advantages of the diphenyl benzidine reagent for nitrates are stressed, as are also those of carbon tetrachloride for extracting copper diethyl-dithiocarbamate. For zinc the dithiocarbamate is preferable to ferrocyanide but *p*-dimethyl-aminostyryl- β -naphthiazole methiodide is better. Sugars, as arabinose, may be estimated in sea water and unialgal cultures by the use of *n*-ethyl carbazole recommended by Collier, Ray and Magnitzky.

W. R. G. A.

ATKINS, W. R. G. & POOLE, H. H., 1958. Cube photometer measurements of the angular distribution of submarine daylight and the total submarine illumination. *J. Cons. int. Explor. Mer*, Vol. 23, pp. 327-36.

The average obliquity of submarine daylight in the English Channel was again found to be between 30° and 40°. It varied little, if at all, with depth below surface, or with surface or daylight conditions, hence the ratio of the total to the vertical illumination in water never differed much from 1.25. In air it is unlikely to be less than 1.5, and may run up to 5 or 6 with low sun.

Accordingly, the ratio (total illumination in water)/(total illumination in air) is equal to the corresponding ratio for the vertical illuminations multiplied by a factor which may vary from about 1.25/1.5 for high sunlight to about 1.25/6 for low sunlight, approximately a fourfold variation.

The upward light in clear water is about 2% of the downward, but may rise to

3.5 % or more nearer shore. As before green light penetrated best; for though in pure water extinction is a minimum for blue, the effects of scattering and more especially of the absorption of plankton chlorophyll and of yellow pigments cuts down the transmission relatively heavily in the blue.

W. R. G. A.

BIDDER, A. M., 1957. Evidence for an absorptive function in the 'Liver' of *Octopus vulgaris* Lam. *Pubbl. Staz. zool. Napoli*, Vol. 29, pp. 139-50.

A number of specimens of *Octopus vulgaris* were fed with crabs, previously injected with a dense suspension of carmine. The carmine was traced into the caecum, and thence, chiefly in solution, into the 'liver'. After entering the liver cells, the carmine becomes invisible, and can remain thus in the body for at least 3 days, being eliminated periodically with excretory granules contained in excretory vacuoles formed in the liver cells. The liver is shown to have three functions which each cell performs in turn: enzyme-secretion, absorption, excretion. Carmine also penetrates the liver of *Sepia officinalis*. The results are compared with those previously described for *Loligo vulgaris*, in which the liver has no absorptive function.

A. M. B.

BODEN, B. P. & KAMPA, E. M., 1958. Lumière, bioluminescence et migrations de la couche diffusante profonde en Méditerranée occidentale. *Vie et Milieu*, Tome IX, 10 pp.

The presence of a migratory sonic-scattering layer in the Golfe du Lion was established. This layer was found to be established with the $5 \times 10^{-3} \mu\text{watt/cm}^2$ isolume during its twilight migration toward the surface.

As the layer approached the surface, during its period of most rapid migration it appeared to overtake this isolume. Numerous bright flashes of bioluminescence were recorded at this time, and these may have obscured the true relationship between the depth of the scattering layer and the amount of transmitted light. The possibility that scattering-layer organisms possess discriminatory mechanisms which enable them to distinguish components of ambient light is discussed.

The layer did not rise above a depth of about 48 m. A sharp thermocline was present at this depth and it is suggested that this may have been a barrier to further migration.

B. P. B.

CALDWELL, P. C., 1958. Studies on the internal pH of large muscle and nerve fibres. *J. Physiol.*, Vol. 142, pp. 22-62.

An investigation of the internal pH of the muscle fibres of *Carcinus maenas* and *Maia squinado* and of the giant axons of *Loligo forbesi* is described. The internal pH was measured with micro-glass pH electrodes. Normally it is near 7. When the muscle fibres and the axons were immersed in saline or sea water saturated with CO_2 it fell to values in the region of 6, but in the other bathing solutions used it changed more slowly, usually by a smaller amount. During contractures of *Maia squinado* muscle fibres induced with 0.6M-KCl no changes in pH greater than the limits of sensitivity of the method of measurement (about 0.1 of a pH unit) could be detected. The changes in squid axons after depolarization with 0.6M-KCl were also less than the limits of sensitivity of the method.

The results indicate that the internal pH is regulated mainly by the external CO_2 tension and possibly also by some process which brings about the active extrusion of H ions. It does not appear to be regulated by the Donnan equilibrium.

P. C. C.

CAMBRIDGE, G. W., 1958. Responses of the anterior retractor muscle of the byssus of *Mytilus edulis*. *Nature, Lond.*, Vol. 182, p. 35.

A preliminary investigation of some agents which render the anterior retractor muscle of the byssus (ARMB) of *Mytilus edulis* insensitive to electrical stimulation and to acetylcholine (ACh) is reported.

Contrary to the findings of Schild using vertebrate smooth muscle, after treatment with 0.56 M-KCl the ARMB does not respond to either electrical stimulation or to ACh. The contraction produced by KCl is abolished by previous treatment with propylene glycol monophenyl ether. Both this and the KCl effect are reversible on washing with sea water. The toxin of *Gymnodinium veneficum* does not prevent the response of the muscle to d.c. stimulation.

G. W. C.

CARLISLE, D. B., 1958. A crustacean chromactivator. *Nature, Lond.*, Vol. 182, pp. 33-4.

Chromactivating substance A which is the stored form of one of the main colour change hormones of Crustacea is not present as such in extracts of the ganglionic X organ whose neurones appear to be the centre of production. If these extracts, however, are treated with any reagent which breaks hydrogen bonds substance A appears in large amounts. It is probably present in the form of an inactive precursor in the untreated extracts.

D. B. C.

COOPER, L. H. N., 1958. Consumption of nutrient salts in the English Channel as a means of measuring production. *Rapp. Proc. Verb. Cons. Int. Explor. Mer*, Vol. 144, pp. 35-7.

Evidence is produced that this powerful method of estimating minimum productivity of the English Channel has served its turn and other methods are needed for further advance. A cruise in January 1947, designed to test the uniformity of distribution of phosphate in the Western English Channel, revealed areas with phosphate contents varying by as much as 1.7:1. Moreover, the waters poorest in nutrients had been most productive of animals. The apparent winter maximum of phosphate in 1950 occurred a month late—in February. There is evidence for the view that this apparent maximum occurred in a narrow belt of coastal water created by a storm. The figure to represent the winter maximum for a wide area needs to be a lower one observed in January and March. A process of partition of nutrients consequent upon the prevailing winds is described.

L. H. N. C.

GREEN, J., 1958. *Dactylopusioides macrolabris* (Claus) (Copepoda; Harpacticoida) and its frond-mining nauplius. *Proc. zool. Soc. Lond.*, Vol. 131, pp. 49-54.

Nauplii and an associated adult female of *Dactylopusioides macrolabris* were found in mines between the two epidermal layers of the brown alga *Dictyota dichotoma* at Torquay, Devon. This is the first British record of this copepod, and the first record of a copepod mining the fronds of a member of the Phaeophyceae.

The second antenna of the nauplius is modified to form a biting appendage, while the mandibles are not capable of biting.

J. G.

HEDLEY, R. H., 1958. A contribution to the biology and cytology of *Haliphysema* (Foraminifera). *Proc. zool. Soc. Lond.*, Vol. 130, pp. 569-76.

The grey-white, arenaceous and monothalamous foraminifer *Haliphysema tumanowiczii* is very common near Penlee Point in the Plymouth area where it can be found firmly attached, by means of a basal disc, to the fronds of the red weed *Delesseria sanguinea*.

The test, usually 1-2 mm long and exceptionally 5 mm, is composed mainly of sponge spicules, detritus and quartz grains cemented together by a mucopoly-saccharide. Not many attached arenaceous foraminifera grow away from the substratum to the same extent as does *H. tumanowiczii* and this may be correlated with the presence of an organic sheath secreted by the animal on the inside of the test wall in the basal disc and first quarter of the pedicle. This is a flexible and fibrous component, composed of a mucoprotein, with the longitudinal axes of the fibres parallel to the major axis of the test. Because of the mechanical buffer action of the organic sheath the animal is able to withstand the relatively rough conditions of the littoral zone. At times an unattached spheroidal individual is released from the attached animal. These individuals were seen to move over the substratum, settle, form basal discs and eventually to grow, becoming typical attached individuals. In the opinion of the author the following forms are probably synonyms of *H. tumanowiczii* Bowerbank: *H. primordiale* Haeckel, *H. echinoides* Haeckel, *H. globigerina* Haeckel and *H. advena* Cushman.

R. H. H.

JONES, W. CLIFFORD, 1958. The effect of reversing the internal water-current on the spicule orientation in *Leucosolenia variabilis* and *L. complicata*. *Quart. J. micr. Sci.*, Vol. 99, pp. 263-78.

Oscular tubes of *Leucosolenia* were excised and tied on the ends of fine glass tubes through which a current of sea water was allowed to siphon. The tubes were mounted either at the basal or at the oscular end, with or without the original oscular rim. Spicules subsequently developing in the wall tended to be oriented towards the distal end in the distal part of the tube and towards the mounted end in the proximal part, a confused zone lying in between. The orientation was but little affected by the removal of the original oscular rim, and only coincided with the direction of the internal water-current over part of the tube. The orientation cannot, furthermore, depend on static structural features in the wall. A mechanical hypothesis explaining the orientation is briefly described.

W. C. J.

SOUTHWARD, A. J. & SOUTHWARD, E. C., 1958. Pogonophora from the Atlantic. *Nature, Lond.*, Vol. 181, p. 1607.

SOUTHWARD, A. J., 1958. Abundance of Pogonophora. *Nature, Lond.*, Vol. 182, p. 272.

Several species of *Siboglinum*, including some new species, have been dredged up from the continental slope between lat. 47° 56' N., long. 7° 56' W. and lat. 48° 32' N., long. 10° 11' W., at depths of 300 to 710 fm. Specimens of the same genus have also been found in bottom samples taken by Mr N. A. Holme in 80-90 fm. off Dingle Bay, Ireland. The Pogonophora now appear to be among the commonest animals from muddy bottoms, and not only in deep water. Previous recognition may have been hindered by the resemblance of the tubes to fibres used in dredge and trawl netting.

A. J. S.