ABSTRACTS OF MEMOIRS

RECORDING WORK DONE AT THE PLYMOUTH LABORATORY

ALLAN, T. D., 1961. A magnetic survey in the Western English Channel. *Quart. J. geol. Soc. Lond.*, Vol. 117, pp. 157–70.

Since 1956, when a nuclear spin magnetometer was first developed for towing behind a ship, measurements of the earth's total field in the western English Channel have been made on six expeditions of R.R.S. *Discovery II* and R.V. *Sarsia*. There are now enough profiles to allow a magnetic contour map of the area to be drawn.

The most striking feature of the map is an anomaly with its peak value approximately 15 miles south of the Eddystone and with a total area of 30 × 12 square miles. The discovery of this anomaly has necessitated a reappraisal of the underlying geology which had been previously postulated from coring and seismic results.

Sharp magnetic anomalies to the east of the Lizard show good correlation with the basic intrusive rocks on land but the limited extent of the anomalies to the east appears to disprove the idea of a continuous Lizard–Dodman–Start thrust. The boundary of New Red Sandstone outcrops on the sea floor, postulated from previous coring results, shows a remarkable coincidence with the extent of the sharp anomalies off the Lizard and off the Start peninsula. T.D.A.

BAKER, P. F., HODGKIN, A. L. & SHAW, T. I., 1961. Replacement of the protoplasm of a giant nerve fibre with artificial solutions. *Nature, Lond.*, Vol. 190, pp. 885–7.

A technique is described for removing the protoplasm from the giant nerve fibres of squid and replacing it with artificial solutions. If certain simple requirements are met, the fibres will continue to conduct nerve impulses. The requirements are that the solutions contain a potassium salt (chloride, isethionate, methyl sulphate or sulphate are all effective) and that they be both roughly isotonic with sea water and buffered to pH 7–8. Fibres so treated will conduct many impulses (e.g. a third of a million) and maintain their excitability over several hours. Quite large volumes of solution (a hundred times the volume of the fibre) can be passed through the sheath without destroying its capacity to conduct impulses, though hydrostatic pressures of more than a few centimetres of water can render the fibres inexcitable, and from this there may be a slow recovery when the pressure is removed.

The action potential in the perfused fibre is similar in size and shape to the normal form; the resting potential is of similar magnitude to that of an intact fibre. The principal predictions of the ionic hypothesis as it relates to internal ionic composition have been confirmed experimentally: the resting potential is reduced when the internal potassium is replaced by sodium and the action potential diminishes as the internal sodium concentration is increased. T.I.S.

ENDEAN, R., 1961. The test of the ascidian, *Phallusia mammillata*. *Quart. J. micr. Sci.*, Vol. 102, pp. 107–17.

The test of *Phallusia mammillata* (Cuvier) consists of gelatinous material permeated by blood vessels and containing an apparent variety of cells. Over 90% of the test is

composed of water. Cellulose is present in the gelatinous material and associated with the cellulose is a mucopolysaccharide which is readily removed by mild acid hydrolysis. The mucopolysaccharide is produced in the vacuolated cytoplasm of epidermal cells covering the blood-vessels of the test.

Vanadocytes which have migrated into the test matrix through the walls of the test blood vessels appear to produce the cellulose of the test. In the test, the vanadocytes lose their acid and intraglobular osmiophil material and produce processes which extend into the surrounding test matrix. Minute globules and submicroscopic vesicles are present in the cytoplasm surrounding the large polysaccharide-containing globules of such vanadocytes, and also in the processes arising from such cells. The small globules and vesicles seem to arise from the large globules and to be involved in the production of micro-fibrils. The micro-fibrils, which vary from 20 to 40 mμ in diameter and are arranged in the form of an open network, may constitute a cellulose framework within the test.

Near each disintegrating vanadocyte there is an area devoid of test matrix. The remnants of each vanadocyte often come to lie in such an area. Fluid-filled capsules—the so-called 'bladder cells' of the test are thereby formed.

Phagocytes occur throughout the test and melanin-containing pigment cells are aggregated around its periphery. R.E.

OLDFIELD, E., 1961. The functional morphology of *Kellia suborbicularis* (Montagu), *Montacuta ferruginosa* (Montagu) and *M. substriata* (Montagu), (Mollusca, Lamellibranchiata). *Proc. malac. Soc. Lond.*, Vol. 34, pp. 255–95.

The anatomy of *Kellia suborbicularis*, *Montacuta ferruginosa* and *M. substriata* is described. All are eulamellibranchs of small size, *Kellia* being free-living, whereas both species of *Montacuta* are commensal with echinoderms. Both genera show the antero-posteriorly directed water current through the pallial cavity, and possess a flat-soled, creeping foot. Certain anatomical simplifications such as small labial palps, a simplified stomach (in that the dorsal pouch and caecum are reduced and the posterior sorting area is absent), a short intestine and, in *Montacuta substriata*, poorly differentiated ducts of the digestive diverticula and few gill filaments, may well be correlated with minuteness of size.

The progressive reduction of the outer demibranch, and the presence of guarding cilia associated with the food groove on the inner demibranch are specialized features. The well-developed byssus apparatus of *M. substriata* is an ecological adaptation. The complete separation of the style sac from the intestine is an advanced feature shared by both genera, and all are specialized in that they are hermaphrodite. Spermatogenesis in the two species of *Montacuta* is unusual in that the spermatids complete their development within the cytoplasm of nutritive cells, and it appears that they are shed from the individual while still contained within these cells.

A comparison of the anatomy of *Kellia suborbicularis*, *Lasaea rubra*, *Montacuta ferruginosa*, *M. substriata* and *Turtonia minuta* emphasizes that whereas the three former genera are closely related, the latter genus does not seem to belong to the order Leptonacea, and that its systematic position is uncertain. E.O.

PARKE, M. & ADAMS, I., 1961. The *Pyramimonas*-like motile stage of *Halosphaera viridis* Schmitz. *Bull. Res. Counc. Israel*, Vol. 10D, pp. 94–100.

The *Pyramimonas* stage of *Halosphaera viridis*, interesting phylogenetically, is described. It possesses trichocysts or muciferous organelles, two or four pyrenoids

covered by starch sheaths, and a large internal reservoir connected to the exterior by a narrow canal. This canal–reservoir system may be comparable with the gullet found in the cellulose-walled genus *Platymonas* and is reminiscent of the reservoir in the Euglenophyceae and the gullet in the Cryptophyceae. M.P.

SHAW, T. I., 1959. The mechanism of iodide accumulation by the brown sea weed *Laminaria digitata*. The uptake of ^{131}I. *Proc. roy. Soc.* B, Vol. 150, pp. 356–71.

Iodide added to sea-water bathing *Laminaria digitata* is rapidly converted into molecular iodine, as evidenced by the blue colour given to starch. A number of reagents, such as thiocyanate, thiosulphate, metabisulphite, tyrosine, catechol and pyruvate will prevent the reaction which is also inhibited by the exclusion of oxygen. Besides converting iodide to molecular iodine, *Laminaria* also absorbs iodine from the sea water, as shown by the net increase in iodine content of plants kept in sea water rich in iodide and by the uptake of radio-active iodide which has been added to sea water. To determine the molecular species of iodine absorbed by the alga, the effect of the reagents which inhibited the formation of molecular iodine has been studied upon the uptake of radio-active iodide. These reagents, and the exclusion of oxygen, blocked the uptake of radio-active iodide, thus providing evidence that molecular iodine was the form absorbed by the plant. This view was supported by the observation that molecular iodine, though not iodide, was absorbed in strictly anoxic conditions.

The relationship between the rate of iodine absorption and the iodine concentration in the sea-water bathing the plant could be most readily accounted for by supposing that hypiodous acid, rather than molecular iodine, was the form that the plant absorbed; the rapid interconversion of these forms prevents more direct proof of this point.

Chemical analyses showed that the iodine, once it has been absorbed by the plant, is retained principally in the form of iodide. T.I.S.

SHAW, T. I., 1960. The mechanism of iodide accumulation by the brown sea weed *Laminaria digitata*. II. Respiration and iodide uptake. *Proc. roy. Soc.* B, Vol. 152, pp. 109–17.

During the summer months when *Laminaria digitata* is capable of rapidly absorbing iodide, the oxygen consumption of the plant is enhanced up to fivefold by the addition of iodide to the sea-water bathing the alga. This enhanced respiration persists only as long as the iodide absorption proceeds and must be restricted to the outermost layer of tissue. There is an approximate relationship between the overall quantities of oxygen consumed and of the iodide absorbed; in general three (though occasionally as many as six) molecules of oxygen are used for each iodide ion taken up. The respiratory quotient is close to unity, indicating that a carbohydrate-like material is being metabolized. This material must be a major constituent of the tissues, since up to 2% of the dry weight may be oxidized during the enhanced respiration. When it is born in mind that generally three oxygen molecules are consumed for each iodide ion absorbed and, moreover, a carbohydrate-like material is the substrate oxidized, it seems that a triose unit must be metabolized for each iodide ion that the plant absorbs. T.I.S.