

Abstracts of Memoirs

RECORDING WORK DONE AT THE PLYMOUTH LABORATORY.

Lecture Experiments on the Hydrogen Ion Concentration Changes in the Rusting of Iron.

By **W. R. G. Atkins.**

Nature, 1928, **121**, p. 615.

THE rusting of iron is ordinarily regarded as a slow process, but by adding brom thymol blue to distilled water brought to pH 6.8 by the addition of a trace of bicarbonate, the action of the iron in removing acid from the solution can be observed within two minutes. The ferrous salt thus produced is oxidised at once to ferric, with regeneration of acid. It is possible to follow each step by the use of appropriate indicators. The attack on the iron proceeds, though more slowly, in alkaline solutions in equilibrium with carbon dioxide at a very low pressure.

W. R. G. A.

The Biological Significance of the Unsaponifiable Matter of Oils.

III. Fish-Liver Oils.

By **H. J. Channon.**

Biochem. J., 1928, **22**, pp. 51-59.

1. A study has been made of the yields of unsaponifiable matter from the livers of a number of fish.
2. The liver oils of the Selachii differ from those of the Teleostei in that, in many cases, very large amounts of unsaponifiable matter occur in the former.
3. A relationship seems to exist between the percentage of unsaponifiable matter in the liver oils of the Selachii and their sterol content. The higher the percentage of unsaponifiable matter in a given oil the lower is the percentage of sterol in that fraction.
4. Squalene was not detected in the liver oils of any of the fish studied, save in those from three members of the Squalidæ family.
5. The question as to whether squalene is synthesised or is derived by the fish from its food is briefly discussed.

H. J. C.

Further Observations on Phosphagen.

By Philip Eggleton and Grace Palmer Eggleton.

J. Physiol., 1928, 65, pp. 15-24.

Muscles which are capable of rapid energy output are, when resting, richer in phosphagen than muscles of slow-moving type. The muscles of such invertebrates as have been examined contain no phosphagen, or free creatine. *Amphioxus* in this respect resembles the vertebrates. The disappearance of phosphagen in a muscle resting under anaerobic conditions is not directly correlated with the lactic acid production, for the former is practically complete when the latter has only reached a quarter of the value finally attained. The disappearance of phosphagen, whether as the result of fatigue, rigor, or incubation of the minced muscle in bicarbonate buffer in the presence or absence of fluoride, results in the liberation of free creatine. In the presence of fluoride the phosphagen phosphorus becomes acid-stable, presumably being used to form hexose-esters. The reappearance of phosphagen which occurs when a fatigued muscle is allowed to recover in oxygen is very rapid in comparison with the oxidative removal of lactic acid which also occurs. The phosphagen destroyed in a muscle when resting in the absence of oxygen, or when minced and incubated in a bicarbonate buffer solution, is completely accounted for by the orthophosphoric acid produced: phosphagen destroyed during activity appears only in part as free orthophosphate, the remainder (0.40%) appearing as "lactacidogen" phosphorus—i.e. acid-stable organic phosphates rapidly hydrolysed by the muscle enzymes when the chopped muscle is incubated in a bicarbonate buffer.

Über den Auslösungsreiz des Umdrehreflexes bei Seesternen und Schlangensternen.

On the stimulus causing the righting reflex of the starfishes and ophiurians.

By Gottfried Fraenkel.

Zs. f. vergleich. Physiol., 1928, 7, pp. 365-378.

The first phase of the righting movements of the starfishes consists of a dorsal bending of the arms. The latent time of this dorsal bending is exactly the same, if the dorsal sheet and the intestine of the animals are removed, also, if the animals are freely suspended in the water, in any orientation to gravity. Therefore we cannot believe the receptors for the righting reflex to be in sensitive cells of the dorsal sheet (as stated by Mangold, 1921), neither has the intestine the function of a statical organ (as Wolf [1927] has presumed). The dorsal bending of the arms

takes place in all the cases in which the tube feet are not sticking on the bottom. Consequently the stimulus causing the righting movements is due to the not-touching of the tube feet on the bottom. The receptors of the stimulus are the tube feet. There is no more righting reflex, if all the tube feet are cut off.

G. F.

Brown Coloration in Interrenal Cell Tissue.

By Allan Fraser.

Nature, 1928, **122**, p. 206.

In a histological investigation of the interrenal tissue of the ray (*R. clavata*), it has been found that while the majority of the glands examined correspond to the usual description of an ochre-yellow body, a minority show a brown coloration apparently due to melanin pigment. In the yellow glands the lipin has been found to be confined to the cells of the lobules which compose the organ, but in the brown glands a considerable proportion of the lipin lies in the interlobular blood-spaces. The photomicrograph taken from a gland prepared by Marchis' method shows this quite clearly. The black masses of osmicated lipin obviously lie between the lobules. The appearances suggest very strongly that the brown glands when fixed were actively secreting lipin into the blood. The relation between lipin secretion and melanin formation is probably significant.

A. F.

The Effect of Electrolytes on the Muscle of the Fore-gut of *Dytiscus marginalis* with Special Reference to the Action of Potassium.

By A. D. Hobson.

Brit. J. Expt. Biol., 1928, **5**, pp. 385-393.

A medium of the composition NaCl 0.161M. : KCl 0.003M. : CaCl₂ 0.002M. : pH 7.2 will maintain rhythmic contractions of the striated muscle of the crop of *Dytiscus* for long periods. In the presence of normal concentrations of sodium the responses to changes of the K or Ca concentration are similar to those described by Hogben and by Wells for other invertebrate muscle preparations. If the concentrations of K and Ca are increased while the K/Ca ratio is kept constant there is decrease in the completeness of relaxation while the rhythm becomes more regular. Complete elimination of sodium from the medium is possible, and the muscle maintains its activity for a long time in presence of potassium and calcium only. Under these conditions the muscle reacts normally to changes in the K/Ca ratio. The optimum K/Ca ratio is about 0.4 which is to be compared with the optimum Na/Ca ratio of 50.

A. D. H.

**The Action of Isotonic Salt Solutions on the Unfertilised Eggs of
Thalassema neptuni.**

By A. D. Hobson.

Brit. J. Expt. Biol., 1928, **6**, pp. 65-78.

At the pH of sea-water isotonic calcium chloride causes artificial parthenogenesis of the eggs of *Thalassema*. Under the same conditions the chlorides of sodium, lithium, and potassium have no activating power. KCl, in fact, inhibits maturation and quickly renders eggs incapable of being fertilised. Mixtures of CaCl₂ with the chloride of an alkali-metal in certain proportions cause parthenogenesis, and, in the case of potassium at least, may be more effective than pure calcium chloride. When the activating power of a series of K+Ca mixtures is tested it is found that there are two optima, one where the calcium concentration is high and one where it is low. If the calcium concentration is low, sodium and lithium seem to be much less effective in causing activation than potassium. The time factor is of great importance. For all activating solutions two optimal times of exposure were found, at 6-9 mins. and at 30 mins. It is concluded that, in *Thalassema*, cleavage is directly continuous with maturation, and that the difference between a stimulus causing the former and one causing the latter is merely quantitative.

A. D. H.

Observations on the Metabolism of Nervous Tissue.

By E. G. Holmes and B. E. Holmes.

Minerva Medica, 1928, **8**, No. 23 bis, pp. 1-8, re-paged reprint.

Previous work on the metabolism of the mammalian central nervous system is discussed. It is shown that the brain produces lactic acid from added glucose in vitro, and that under the same experimental conditions lactic acid is oxidised. The brain contains but a very small store of carbohydrate, and it is shown that during life it is dependent for lactic acid precursor on sugar supplied by the blood stream, so that the lactic acid value after death depends on the blood sugar level at the time of killing.

Observations on the peripheral nerve show that in contrast to brain this tissue has a carbohydrate reserve which, in anaerobic conditions, is connected to lactic acid. Oxidative removal of lactic acid has not been demonstrated.

Unlike both kinds of medullated mammalian nervous tissue, the non-medullated nerve ganglia of *Mia* contain large amounts both of glycogen and of free sugar. In vitro, this is slowly converted to lactic acid under anaerobic conditions.

E. G. H.

Entwicklungsgeschichtliche Florideenstudien.

Lunds Universitets Årsskrift, N.F. Avd. 2, Bd. 24, Nr. 4, pp. 127, 64 fig.

By Harold Kylin.

The following species have been described, with illustrations: *Aghardiella tenera*, *Asparagopsis hamifera*, *Atractophora hypnoides*, *Bonne-maisonia californica*, *Calliblepharis jubata*, *Callophyllis obtusifolia*, *Callymenia reniformis*, *Catenella opuntia*, *Chantransia rhipidandra*, *Chondria dasyphylla*, *Cruoria pellita*, *Cumagloia Andersonii*, *Dudresnaya coccinea*, *Endocladia muricata*, *Epilithon membranaceum*, *Gelidium cartilagineum*, *Gigartina leptorhynchos*, *Halarachnion ligulatum*, *Helminthora divaricata*, *Iridaea cordata*, *Laurencia pinnatifida*, *Naccaria Wiggii*, *Peyssonnelia Dubyi*, *Phyllophora membranifolia*, *Ptilothamnion pluma*, *Rhodoglossum affine*, *Ricardia saccata*, *Stenogramme interrupta*.

W. R. G. A.

The Larval Stages of the Plymouth Brachyura

By M. V. Lebour.

Proc. Zool. Soc., London, 1928, Pt. 2, pp. 473-560, Pl. 16, Fig. 5.

This is a survey of all the larval crabs which have been studied in the neighbourhood of Plymouth; 37 species are known, 33 are described fully or partially, and the relationships of the larvæ discussed. Whenever possible the crab has been hatched from the egg and a coloured drawing made of the first zoea; 30 zoeæ were thus drawn, 23 of which came from the pre-zoea hatched from the egg. Larvæ of the rarer crabs were obtained from the plankton, also stages of various species when not reared through the complete life-history. Three species have been reared from egg to crab, many others through several stages. Larvæ from the plankton were kept until they became crabs. In this way it has been found possible to distinguish the larvæ of nearly all the Plymouth crabs. Accounts have been given of each species, with reference to the previous work of other authors and keys formed for use of plankton workers. It was found that there were distinct differences between the larvæ of the Oxyrhyncha and the Brachyrhyncha, and in most cases between the genera in both groups. It should now be possible to place any British larval crab in its proper genus if not species. A note on further work on the larval stages of foreign crabs is added. The paper is illustrated by 16 plates, 3 of which are coloured.

M. V. L.

The Food of *Sardina pilchardus* (Walbaum).

By M. V. Lebour.

Bull. Soc. d. Sci. Nat. du Maroc, 1927, 7, pp. 220-223.

This is a very brief account of the food of the sardine from Casablanca, Morocco, from slides of the stomach contents, sent by Monsieur R. Ph. Dollfus. The most frequent food was *Peridinium depressum*, and secondly, the silicoflagellate *Dictyocha fibula*. These were mixed with a variety of diatoms, dinoflagellates and other protista, besides copepods and numerous larval metazoa.

M. V. L.

***Brachiella obesa*, a Parasitic Copepod of *Trigla Cuculus*, with a Description of the Male.**

By W. H. Leigh-Sharpe.

Parasitology, 1928, 20, pp. 25-31.

Brachiella obesa is not uncommon on *Trigla cuculus* at Plymouth in the neighbourhood of the Eddystone. Early in June one fish in ten harboured the parasite (5 : 50), and two of the females bore males. The appendages of the female are described; attention is called to the postero-lateral lobes of the trunk from which issue the egg-sacs, the pateriform bulla, and the striking resemblance of the maxillipedes to those of *Ommatokoita*. The male with its appendages is described for the first time, and while not resembling in form the more typical males, e.g. *B. thynni*, it bears a close resemblance to the American species *B. gulosa* Wilson. Some remarks on the relationship of *Brachiella* to other genera are added.

W. H. L.-S.

Note on the Tail-organs of *Acetes*.

By Yô K. Okada.

Ann. Mag. Nat. Hist., 1928, ser. 10, 1, pp. 308-310.

There are two enigmatic organs in the uropod of *Acetes japonicus*, one in the basal segment and the other in its endopodite. They are visible in the fresh condition as red spots.

The structure is the same in all four; a mass of large plump cells having round nuclei forming the centre of the organ, which is limited by a thin layer of circular fibres and externally is clothed by a thick investment of radial fibres. The colour of the spots is due to the presence of red pigment granules in the outer investment.

The function is unknown, but may be photogenic. Both outer and inner investments are pierced here and there by a number of what are probably blood-capillaries, and the centre of the organ seems to receive an abundant supply of blood.

Y. K. O.

Feeding Organs and Feeding Habits of *Autolytus Edwarsi* St. Joseph.

By Yô K. Okada.

Q.J. Microscop. Sci., 1928, **72**, pp. 219-245.

At Plymouth *Autolytus Edwarsi* is always associated with *Obelia*. The meaning of this association is easily understood as the former lives upon the latter. The Syllid deprives the hydroid of the hydranths and eats them.

The worm cuts off the tentacles from the hydranth with the toothed crown of the chitinous tube, and sucks them up through the protruded pharynx by establishing in the front of the alimentary tract, by the activity of the proventriculus, a continuous water-column, which is drawn back into the intestine.

The pumping action of the proventriculus is particularly strong and distinctly visible at the outset of feeding. After a short time it dies away and the action is followed by peristalsis in the intestine.

The entire organisation in the front part of the alimentary tract, which is the feeding apparatus of the animal, suggests the system of a suction pump, the pharynx representing the pipe, the proventriculus the pump itself with a valve at each entrance, and the ventriculus the regulator of the water-column.

Y. K. O.

The Biology of Shell-fish in Relation to Public Health.

By J. H. Orton.

J. Roy. Sanitary Inst., 1928, **49**, (5), pp. 263-274.

In this communication is reproduced an address given to Section E, Hygiene of Food, at the Congress of the Royal Sanitary Institute at Plymouth, July, 1928.

The general structure of bivalves was illustrated by a wooden model, shown in the drawing in Fig. 1, and habits, habitats, modes of feeding, breathing and reproducing along with the incidence of disease and death were reviewed in relation to the production of pure and polluted animals.

Pollution and purification were discussed briefly, and it was shown that

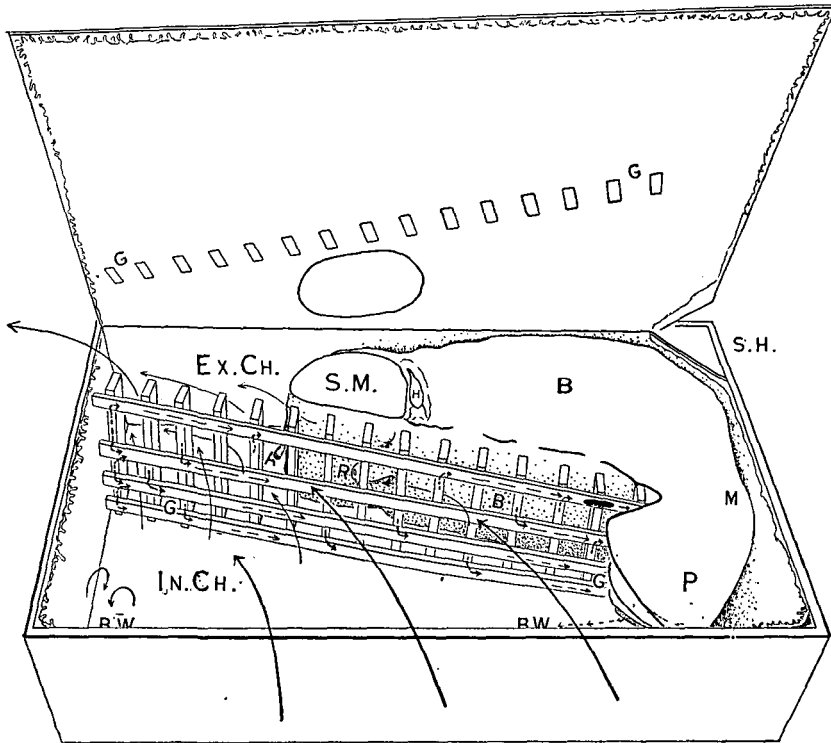


FIG. 1.—A box model of the generalised construction of a bivalve shell-fish to show essentially the division of the shell-space into two main compartments by the gill (G.G.), which is in principle a grid-like sieve. The cut edges of the vertical gill-bars and the shell-closing muscle are shown both in the lower and upper valves, which are represented by the box and its lid. One main compartment contains the body (B), the shell-closing muscle (S.M.), and the exhalant chamber (Ex.Ch.), while the other, lower compartment is composed entirely of the inhalant chamber (In.Ch.) and also contains the lip-folds or palps (P.).

G.G. The grid-like gill consists essentially of numerous vertical gill-bars and four horizontal main food channels, and hangs like a curtain between the inhalant and exhalant chambers. Sets of cilia on the gill both maintain the current of water through the gill-spaces and the shell-chambers, and sieve off the food-particles brought into the shell in this current of water. Food-particles are collected on the front faces of the vertical gill-bars and transported thence (as shown by the small broken-line arrows) into the main horizontal food channels. In these latter channels food masses or particles are carried along towards the mouth (as indicated by the larger broken-line arrows). One food-mass is shown approaching the palps in the uppermost food channel.

A. Anus and rectum in the exhalant chamber.

R. Combined renal and reproductive aperture (of the right side), which also opens into the exhalant chamber.

B.W. Back-waters in the inhalant chamber in which rejected food or other unwanted material is collected and from which such material is periodically expelled.

a consideration of the biology of bivalves leads to a recognition of the following cardinal facts :—

a. Any solid impurities which may occur in the water must necessarily be taken from the water and at least arrested on the body of the animal.

b. Bivalves are in the best condition as a food product in the fattening and pre-spawning periods of their life-history ; and in the worst condition in the spawning and post-spawning periods.

Therefore from the point of view of Public Health the following conclusions may be drawn :—

1. The indiscriminate consumption (especially in the uncooked state) during summer of those bivalves, whose spawning or post-spawning periods occur in summer, is in most cases inadvisable, if such shell-fish originate from estuarine beds.

2. There is a need for a clearly defined and recognised standard of purity in bivalves, or alternatively, the beds or other situation from which the bivalves are taken for consumption.

3. Existing beds of bivalves should be reclassified under recognised standards of purity.

J. H. O.

Contributions to the Cytology of Tetrasporic Plants of *Rhodymenia palmata* (L.) Grev., and some other Florideæ.

By M. A. Westbrook.

Ann. Bot., 1928, 42, pp. 149–172, Pls. II and 8 figs.

Somatic division is illustrated and described in detail for tetrasporic plants of *Laurencia pinnatifida* (Gmel.) Lamour., *Chondria dasyphylla* (Woodw.) C. Ag., and *Rhodymenia palmata* (L.) Grev., and compared with that in others of the Florideæ. Common features are the small nuclei, the large number of small chromosomes, and the absence of a spireme stage.

Stages in the prophase of the first division of the tetrasporangium are described for *Laurencia pinnatifida*, *L. hybrida* (D.C.) Lenorm., *Chondria dasyphylla*, *Stenogramme interrupta* (Ag.) Mont., and *Rhodymenia palmata*. For all but *Stenogramme* spireme stages are figured and evidence adduced for the occurrence of meiosis. In the tetrasporangia of *R. palmata* a peculiar stage is described and compared with the "growth period" of some animal oocytes, where the nucleus, after developing a spireme, returns to an apparently resting stage. A process of regeneration of the tetrasporangium is reported for *R. palmata*.

Attention is drawn to the anomalous life-history of the latter. Up to

the present only male and tetrasporic plants have been found, but the cytological results here recorded are taken to indicate that there is a nuclear fusion in the life-cycle. The possible occurrence of as yet unidentified female plants is suggested.

M. A. W.

**Note on a Method of Obtaining Long Working Distances with
Low-power Objectives.**

By Douglas P. Wilson.

J. Roy. Microscop. Soc., 1927, **47**, pp. 335-337.

A 2-in. or $1\frac{1}{2}$ -in. objective screwed on to the nosepiece of the microscope in the usual way is used in conjunction with a $\frac{2}{3}$ -in. objective which is screwed on to the lower end of the draw-tube. An eyepiece is in the usual place. By sliding the draw-tube in and out and so varying the distance between the two objectives it is possible to focus and considerably magnify small objects at a fair distance from the microscope. The same combination can also be used as a telescope.

D. P. W.