

## Abstracts of Memoirs.

RECORDING WORK DONE AT THE PLYMOUTH LABORATORY.

### Structure of Pearls.

By C. Amirthalingam.

*Nature*, No. 3091, Vol. 123, 1929, p. 129.

PEARLS from the tissues of a Pinna showed that the conchyolin layers may be arranged radially as found in Pinna shells or concentrically round the nucleus as in *Ostrea edulis* pearls; in two cases, however, an alveolar layer was found round the nucleus with concentric layers on the outside. The nuclei of twenty-nine pearls out of thirty-two, were found to be conchyolin; this observation supports the view that the origin of pearls is due to abnormal secretion of the epidermis.

C. A.

### The Integration of Light by Photo-electrolysis.

By W. R. G. Atkins and H. H. Poole.

*Sci. Proc. R. Dub. Soc.*, 1929, Vol. 19, pp. 159-164.

It is possible to use a vacuum photo-electric cell for the integration of light. A Burt sodium cell gave 1.15 microamperes per 1000 metre-candles. On a bright November afternoon the production of alkali by the photo-electric current was observed in a dilute bicarbonate solution within 10 seconds, using brom thymol blue as indicator. The current may also be used for the deposition of copper. An average winter day should give about 0.13 mg. with the photometer horizontal; in summer nearly 1 mg. might be expected.

W. R. G. A.

### The Photo-electric Measurement of the Illumination in Buildings.

By W. R. G. Atkins and H. H. Poole.

*Sci. Proc. R. Dub. Soc.*, 1929, Vol. 19, pp. 173-187.

By the use of vacuum sodium photo-electric cells of the Burt type, together with suitable portable galvanometers, simultaneous measurements were made of the illumination in the open and in buildings; the ratio expressed as a percentage, the daylight factor, is a useful index

of the illumination inside. This applies to diffuse skylight. A correction must be applied when the sun is shining, the illumination in the shade being multiplied by a factor  $\beta$ , which denotes the ratio of the reading of the photometer in the open site, to that obtained when the direct sunlight has been screened off. In an old church the daylight factor varied from 0.02 to 0.86 per cent for vertical illumination with the blue sensitive sodium cell. In a dwelling-house the factor immediately inside large windows was 7 per cent. The value in a well-lighted room is under 1 per cent. From this it follows that it is uneconomical to fit glass transparent to ultra-violet light in windows other than those that receive direct sunlight.

W. R. G. A.

**Photo-electric Measurements of Illumination in Relation to Plant Distribution. Part II. Measurements with Portable Galvanometers.**

By W. R. G. Atkins and H. H. Poole.

*Sci. Proc. R. Dub. Soc.*, 1929, Vol. 19, pp. 295-309.

By the use of Burt cells, robust Onwood micro-ammeters and suitable shunts simultaneous measurements were made of the vertical illumination in the open and in shaded sites. The photometer windows, as before, were sheets of double surface-flashed opalised glass. Large obliquity factors are thus avoided. The results obtained for measurements of the daylight factor agreed well with those determined by the rate of decomposition of uranyl oxalate solutions in quartz tubes. The daylight factor is not a constant, but varies somewhat according to the distribution of the illumination in the absence of sunlight. The factor is sufficiently constant to be a useful index of the light received at any spot. Data are presented showing the behaviour of certain plants growing in varying degrees of shade. In the deepest shade measured, daylight factor 1.3 per cent, only straggling branches of *Hedera helix* were found.

W. R. G. A.

**The Uranyl Oxalate Method of Daylight Photometry and its Photo-electric Standardization.**

By W. R. G. Atkins and H. H. Poole.

*Sci. Proc. R. Dub. Soc.*, 1929, Vol. 19, pp. 321-339.

The rate of decomposition of uranyl oxalate was compared with the reading of a potassium vacuum photo-electric cell which had been standardised by means of an open carbon arc. After making due allowance for the difference in the absorbing surfaces it was found that the

rate of decomposition of the standard solution, in quartz tubes, was 0.225 c.c. per hour per thousand metre-candles. Tubes of Monax glass required 1.14 times as long an exposure to produce the same result. This should not prevent their use for ecological work.

Measurements of the mean horizontal illumination were made at sea over two complete days by means of tubes suspended in the rigging, the average for the period from sunrise to sunset being 25,800 metre-candles on August 17 and 23,600 m.c. on September 18th, 1928.

The usual practice of exposing photo-sensitive liquids in vertical tubes measures the mean horizontal illumination. Exposure in a spherical flask measures the total illumination. This is desirable for some purposes.

W. R. G. A.

### The Photo-chemical and Photo-electric Measurement of the Radiation from a Mercury Vapour Lamp.

By W. R. G. Atkins and H. H. Poole.

*Sci. Proc. R. Dub. Soc.*, 1929, Vol. 19, pp. 355-361.

The uranyl oxalate method was used to study the rate of deterioration of a quartz mercury lamp. The decrease in radiation appears to be non-selective, or nearly so, for the visible portion and near ultra-violet as compared with the middle and far ultra-violet stopped by 4.0 mm. of Pyrex glass. The Pyrex transmitted 40 per cent, clear Corex A (8.2 mm.) 70 per cent and red-purple Corex A (10.2 mm.) 19 per cent.

Radiation from a mercury arc produces erythema of the skin of the upper arm when it suffices to decompose roughly 0.056 mg. of crystalline oxalic acid per sq. cm. in 3 minutes, under standard conditions.

Changes in a mercury arc may be followed with a glass vacuum sodium photo-electric cell of the Burt type. The 4 mm. Pyrex sheet transmitted enough radiation to produce a current 75 per cent of that with unscreened cell; the red-purple Corex A transmitted 33 per cent with a new lamp and 30 per cent with a lamp which had been in use for 360 hours. Double surface-flashed opal glass, 1.8 mm. thick, cut down the current to 46-47 per cent. Owing to the fact that the cell is not equally sensitive to radiation of different wave-lengths these figures are not percentages of the energy transmitted.

When first switched on the radiation from a mercury arc on a 200-volt town supply (A.C.) falls to about one-half of its initial value within a little over a minute. It then increases rapidly, reaching a maximum approximately fifteen times the minimum value within 5 or 6 minutes from the start.

W. R. G. A.

### Methods for the Photo-electric and Photo-chemical Measurement of Daylight.

By W. R. G. Atkins and H. H. Poole.

*Report of the Conference of Empire Meteorologists, Agricultural Section, London, 1929, pp. 67-89. Reprinted in Biological Reviews, 1930, 5, 91.*

The photo-electric current may be measured by suitable (portable) galvanometers, or continuously by means of a recording galvanometer. The potentiometer null method (H. H. Poole) can be used at sea, as can also the neon lamp method (J. H. J. Poole) which integrates the current over a short period and thus gives a measure which is independent of the large variations from moment to moment, caused by waves. Integration over longer periods may be carried out at sea or on shore by photo-electric production of alkali or deposition of copper.

The colour sensitivity, standardisation and constancy of photo-electric cells are discussed, also the optical conditions to be considered in such measurements.

The authors' previous photo-electric work is summarised, especially with regard to seasonal changes in illumination.

W. R. G. A.

### The Action of Adrenaline and of Certain Drugs upon the Isolated Crustacean Heart.

By W. A. Bain.

*Quart. Journ. Exp. Phys., Vol. XIX, 1929, pp. 297-308.*

The effect of Adrenaline, Ephedrine, Ergotoxine, Pilocarpine, and Atropine upon the isolated perfused heart of the crabs *Maia squinado*, *Cancer pagurus*, and *Carcinus maenas*, is described and eleven tracings given. The perfusion method adopted is described, the perfusion medium being sea-water adjusted to a suitable pH by means of hydrochloric acid—all fluids used in any one experiment having the same pH.

Adrenaline, in all active concentrations, is accelerator and, in the case of Cancer, augmentor in addition. Ephedrine, on the other hand, has no action on the crab heart. Ergotoxine is depressant, but it neither antagonises nor reverses the adrenaline effect. Pilocarpine (1/10,000) produces an action similar both qualitatively and quantitatively to that obtained with adrenaline (1/40,000), but the effect is immediately abolished by atropine sulphate (1/250,000) whereas the adrenaline effect cannot be so abolished even with the concentration of atropine as high as 1/40,000.

The almost identical nature of the response obtained with adrenaline and pilocarpine respectively suggests that a similar mechanism is responsible for each. The failure of atropine to abolish the action of adrenaline shows that this can hardly be so; further, the similar failure of ergotoxine demonstrates that the conditions obtaining in the crustacean heart with respect to adrenaline may not be strictly comparable with those obtaining in the vertebrates.

W. A. B.

**Influence of Age on the Temperature Coefficient of the Respiration Rate in Leaves of *Scolopendrium scolopendrium* Karst.**

By J. Bělehrádek and M. Bělehrádková.

*New Phytologist*, Vol. XXVIII, 1929, pp. 313-318.

Oxygen intake in leaves of *Scolopendrium scolopendrium* Karst. under varied temperature was measured and it was found that the temperature coefficient first increases and then decreases with the age of the leaves. Variations of temperature coefficient with age, found in these experiments, are analogous to those previously described in animals. They are explained by the hypothesis that colloidal changes occur in the protoplasm with age, and that these are accompanied by variations of the viscosity, and thus of the rate of diffusion, in the reacting protoplasmic phases.

J. B.

**On the Feeding Mechanism of the Copepods, *Calanus finmarchicus* and *Diaptomus gracilis*.**

By H. Graham Cannon.

*Brit. Journ. Exper. Biol.*, Vol. VI, No. 2, 1928, pp. 131-144.

*Calanus finmarchicus* and *Diaptomus gracilis* both feed automatically when swimming slowly and steadily through the water. A feeding current is produced which is filtered by the stationary maxillæ. Food so obtained is passed on to the mandibles by the maxillary endites and setæ on the bases of the maxillipeds. The feeding current is a vortex passing through the mouth parts which results automatically from the swimming activities of the antennæ, mandibular palps and maxillules. The feeding vortex is caused to pass through the maxillæ by the combined activities of the maxillipeds and the maxillary endites. The former suck water into the filter chamber between the maxillæ while the latter suck it out through the maxillary setæ. The views of Storch and Pfisterer on the feeding mechanism of *Diaptomus gracilis* are criticised. There is no

powerful antero-posterior swimming current as described by these authors. The swimming current is in the form of a vortex encircling the body and most marked at the sides in the angle between the body and the antennules.

H. G. C.

**The Histology of the Alimentary Tract of the Plaice**  
(*Pleuronectes platessa*).

By Ben Dawes.

*Q.J.M.S.*, Vol. 73, Part II, Oct. 1929, pp. 243-274.

The alimentary tract of the plaice consists of the following regions : pharynx, oesophagus, stomach, duodenum intestine and rectum. In the pharyngeal and oesophageal regions the mucosa of the tract is intensely folded and the epithelium is liberally beset with goblet cells. Taste-buds occur in the pharynx, which is devoid of glands as is also the oesophagus. The oesophagus is sharply defined from the stomach. Gastric glands occur in all parts of the gastric mucosa, being shallower at the cardiac end of the organ. Each gland consists of 3 types of cells, columnar cells lining the crypt, cubical, mucus-producing cells forming the neck of the gland tubule, and granular cells forming the base of the tubule. Parietal or oxyntic cells do not occur, nor do goblet cells, in any part of the gastric epithelium. The intestinal mucosa is folded so as to simulate crypts and villi, but these structures do not occur. There is no differentiation of the epithelium except into goblet cells. Leucocytes probably do not play any important part in food absorption. The pyloric caeca exhibit the same histological structure as the intestine and probably perform similar functions. A well-developed valve occurs at the junction of the intestine and the rectum.

B. D.

**The Early Prophases of the First Oocyte Division as seen in Life**  
in *Obelia geniculata*.

By G. H. Faulkner, B.Sc.

*Q.J.M.S.*, Vol. 73, 1929, pp. 225-242.

The nucleolus of the resting oocyte contains the whole of the chromatin of the nucleus. During the early growth phases the nucleolus elongates and then divides by a series of transverse fissions into fragments, each of which is a condensed pair of chromosomes. The two members of each pair subsequently separate and finally break down into a group of globules and are thus dispersed. The two members of the largest bivalent chromosomal element are unequal and probably represent an XY pair. The whole account is based on observations made on the living oocyte.

G. H. F.

### Lipin Secretion in Elasmobranch Interrenal.

By A. H. H. Fraser, M.B., Ch.B., B.Sc.

*Q.J.M.S.*, Vol. 83, 1929, pp. 121-134.

The paper describes the results of an intensive histological study of the interrenal of about thirty rays (*Raja clavata*). It was found that while the majority of glands correspond to the usual description of an ochre-yellow body, with the lipins confined to its constituent cells, a minority (about one in ten) show a brown coloration of varying intensity. When sectioned, these brown glands show evidence of active lipin secretion, in some cases the greatest concentration of lipin being in the interlobular capillaries.

Further, it is shown that in addition to the ordinary lobule commonly figured, the interrenal may show hypertrophied lobules, disintegrating lobules, and acini.

These various and histological pictures are interpreted as phases in a definite cycle of glandular activity, viz. :—

1. Resting lobule.
2. Distension of lobule.
3. Disintegration of lobule.
4. Formation of acinus.
5. Collapse of acinus.
6. Reformation of resting lobule.

From the acini a massive secretion of lipin takes place into the interlobular capillaries. The physiological importance of this phenomenon is emphasised.

The occurrence of melanin pigment in a minority of the glands is described, and evidence submitted of a relationship between the formation of melanin and the secretion of lipin.

A. H. H. F.

### Methods of Estimating Phosphates and Nitrates in Sea-Water.

By H. W. Harvey.

*Cons. Perm. Internat. Rapp. et Proc. Verb. LIII*, 1929, pp. 68-74.

Existing methods of estimating phosphates and nitrates in sea-water are reviewed and possible sources of error discussed. A colourimeter is described for more exact estimation of the very faint blue produced in the Atkins-Denigès method with sea-water containing less than 15 milligrams  $P_2O_5$  per cubic metre, also a colourimeter for the rapid estimation of phosphate in sea-water samples on board ship. The former was demonstrated at the Conference held in October, 1928, at Oslo, where a more

robust instrument embodying the same principles was designed and later made by Messrs. Hellige to the order of Professor Johan Hjort. (See also "Report on the results of special investigations conducted at the University of Oslo in October, 1928," by Buch, Gaarder, Grau, Harvey, Schreiber, and Wattenberg, *ibid.*, pp. 95-115.)

H. W. H.

### Hydrodynamics of the Waters South-East of Ireland.

By H. W. Harvey.

*Journ. du Conseil, Vol. IV, 1929, pp. 80-92.*

A simple method is described of calculating the velocity and direction of ocean currents from the distribution of density in the sea. The theoretical grounds on which this method, and a similar calculation by Werenskiold, rest are given. A comparison of the results obtained by this simple and rapid method, with results obtained by applying Bjerknes' Theorem, shows that the differences are not likely to exceed 5 per cent, which is of little consequence.

The currents, set up by differences in density, in the upper 60 metres of the sea lying to the south-east of Ireland, form a current system which is similar to the movement of the whole body of water as deduced by Matthews from the distribution of salinity.

The application of Bjerknes' Circulation Theory to this area, subject only to extremely slow currents, yields results which conform with conclusions based on entirely different evidence.

H. W. H.

### The Maintenance of Life and Irritability in Isolated Animal Tissues.

By A. V. Hill, F.R.S.

*Nature, Vol. 123, 1929, pp. 723-730.*

This paper represents the Ludwig Mond Lecture delivered at the University of Manchester on March 6th, 1929. It refers to the conditions under which survival of isolated animal tissues can be secured, particularly in reference to their study in the laboratory. The influence of oxygen in maintaining the normal state is discussed. Reference is made to the experiments of Levin and of Furusawa on the "depolarisation" of crustacean nerve, and on the utilisation of oxygen by this nerve in maintaining its state or readiness to respond to a stimulus.

A. V. H.



### The Heat Production and Recovery of Crustacean Nerve.

By A. V. Hill, F.R.S.

*Proc. Roy. Soc. B., Vol. 105, 1929, pp. 153-176.*

Levin, in 1927, published an account of certain new observations upon the electric change in stimulated crustacean nerve, and these observations were confirmed and extended by Furusawa in a paper published in 1929. It appears from these investigations that these non-medullated nerves are in a sense "depolarised" by activity and that in the presence of oxygen a recovery process occurs in which the state of polarisation is restored. The electric signs of activity in such nerve are much larger than in ordinary medullated nerve, and it seemed likely that an examination of the heat production during recovery might throw considerable light upon the process of restoration after activity.

The total heat per second of maximal stimulation is many times greater than in frog's nerve, and there is a clear division into two phases, initial and recovery. The initial process, completed during stimulation, yields only about two and a quarter per cent of the total heat. The recovery process, lasting for about 25 minutes at 16° C., supplies the remainder. The ratio of recovery to initial heat is about five times as great as in the case of frog's nerve. The result shows the importance of oxidative recovery, and confirms Furusawa's hypothesis that in the presence of oxygen a crab's nerve, "depolarised" by activity, is recharged by an active combustion process.

The limb nerves of *Maia* form an admirable preparation for such research.

A. V. H.

### The Precipitation of Calcium and Magnesium from Sea-Water by Sodium Hydroxide.

By Eleanor M. Kapp.

*Biological Bulletin, Vol. LV, No. 6, 1928, pp. 453-458.*

Sea-water, after the addition of varying amounts of NaOH, was analysed for the amount of Ca and Mg left in solution. It was found that the amount of these ions precipitated depended on (1) the amount of NaOH added; (2) the concentration of carbonate in the sea-water; and (3) the extent to which equilibrium had been attained in the mixture.

E. M. K.

Lankester's "Gregarine" from the Eggs of *Thalassema neptuni*.

By D. L. Mackinnon and H. N. Roy.

*Nature*, Dec. 7, 1929.

Among twelve female specimens of *Thalassema neptuni* Gärtner examined at Plymouth, eight showed the developing eggs (in the nephridial sacs) heavily infected by a sporozoan. This is apparently the parasite described by Lankester (1881) as a "gregarine." Our preliminary investigation shows, however, that it is a coccidian. The adult trophozoite is a worm-like organism, which may reach the length of 400 $\mu$ . We have noted all the main stages in development of the gametes and sporoblasts, and are continuing our investigation in the hope of demonstrating the schizogonic portion of the life-cycle and of determining the systematic position more exactly.

D. L. M. AND H. N. R.

Regeneration and Fragmentation in the Syllidian Polychætes  
(Studies on the Syllidæ. II).

By Yô K. Okada.

*Arch. f. Entwickl.-mech.* Bd. CXV, 1929, pp. 542-600.

Syllids regenerate easily the posterior segments, if the extremely anterior part is not cut, but anterior regeneration is variable according to the species employed. The regeneration capacity in *Syllis gracilis* and *Procerastea Halleziana* is limitless, and there is a complete recovery of the missing part, including a new formation of the entire system of the pharyngeal apparatus. In *Autolytus pictus* the anterior (before the 13th set. segment), the middle (from the 14th to 42nd set. segment) and the posterior part of the body behave quite differently in respect to their faculties of regeneration.

Fragmentation can be artificially caused by changing the salinity of the sea-water in which the experimental worms are kept (by adding fresh water according to E. J. Allen, 1921), or by subjecting the worms to a solution of KCl. In the first case a change of the osmotic pressure in the intestinal cavity would seem to be the main cause of the process of breaking, while in the latter case the fragmentation would seem to be provoked by an unusually strong constriction of the longitudinal muscles of the segments. The position of breaking is, however, predetermined by the special arrangement of megasepta, the presence of which can be seen by external observation through the transparent integument, as a particularly deep constriction in the alimentary tract.

Yô K. O.

## On the Physiology of Amœboid Movement. V. Anærobic Movement.

By C. F. A. Pantin, M.A.

*Proc. Roy. Soc. B., Vol. 105, 1930, p. 538.*

The effect of lack of oxygen on a marine "Limax" amœba has been studied. Several methods have been used to remove oxygen.

In the absence of oxygen, gradually diminishing amœboid movement continues for 6 to 12 hours. The amœba then abruptly passes into an inactive condition. Anærobic activity is accompanied by morphological changes and an apparent rise in protoplasmic viscosity. There is a definite relation between the velocity of movement and the duration of anærobiosis.

Movement continues not only when oxygen is completely absent, but when the external medium has considerable reducing power.

Evidence is given that the energy of amœboid movement is supplied by an anærobic process, which allows movement to continue in the absence of oxygen.

It is suggested that the progressive diminution of anærobic movement is related either to the exhaustion of a precursor of the anærobic process or, more probably, to the accumulation of products of this process.

Oxygen is required for recovery after anærobiosis; this recovery occurs even after 48 hours, but anærobic inhibition of movement is ultimately irreversible. It is concluded that the anærobic processes of amœboid movement are normally accompanied by an oxidative recovery process.

Recovery is progressively delayed as the period of anærobiosis is increased beyond about 6 hours. Delayed recovery occurs in two stages; the amœba is at first inactive, and then suddenly resumes activity, as in immediate recovery. The delay is caused by increase in duration of the inactive phase. Delay in recovery increases long after all activity in the anærobic amœba has ceased, and is therefore not altogether dependent on activity. The delay may be related to the accumulation of an "oxygen debt."

The analogy with muscular and other forms of contractile activity is discussed.

C. F. A. P.

**On the Physiology of Amœboid Movement. VI. The Action of Oxygen.**

**By C. F. A. Pantin, M.A.**

*Proc. Roy. Soc. B., Vol. 105, 1930, p. 555.*

The effect of different partial pressures of oxygen on the movement of a marine amœba has been investigated.

With a limited oxygen supply, movement diminishes and ceases. But its duration is greatly prolonged when a trace of oxygen is present as compared with the duration under complete anærobiosis. The duration of movement increases with the oxygen pressure. After complete anærobiosis oxygen is required for recovery; prolonged activity in the presence of a trace of oxygen may therefore be due to this recovery process operating to a limited extent.

After a given duration of oxygen deficiency, the greater the deficiency has been the greater is the time required for the amœba to recover in aerated sea-water. The efficiency of the recovery process during oxygen deficiency therefore diminishes with the oxygen pressure.

As an oxygen pressure of 30–40 mm. Hg is approached the activity of the amœbæ increases. Above this critical pressure movement is maintained as long as in controls in aerated sea-water. Reduction of activity below this critical pressure does not seem to be related to difficulty of diffusion of oxygen into the amœba but to the diminished efficiency of the recovery process itself in the presence of insufficient oxygen.

The relation of the critical pressure to the oxygen pressure of the environment is discussed.

C. F. A. P.

**On the Physiology of Amoeboid Movement. VII. The Action of Anæsthetics.**

**By C. F. A. Pantin, M.A.**

*Proc. Roy. Soc. B., Vol. 105, 1930, p. 565.*

The effect of certain anæsthetics on a marine amœba has been studied. The morphological changes and other effects of cyanide (below  $10^{-4}$ M.) resemble those of oxygen deficiency. Activity progressively falls to zero; "Limax" movement is maintained till inhibition occurs. Inhibition is reversible even after 40 hours in  $10^{-4}$ M. cyanide.

The effects of cyanide on the amœbæ are characteristic of its action on a respiratory mechanism. The minimal effective concentration lies between

$10^{-5}$  and  $10^{-6}$ M. Increasing the concentration to  $10^{-1}$ M. only slowly increases the effect. The effect of a given cyanide concentration can be matched with that of a given oxygen deficiency in the medium.

The effects of cyanide recorded differ from the cytolytic effects recorded by Hyman in fresh-water amœba. It is suggested that such cytolysis is not due to cyanide, but to the great alkalinity and unbalanced potassium-ion concentration of KCN solutions.

The effects of sulphides on the marine amœba closely resembles that of cyanides.

Alcohols and chloretone cause inco-ordination of amœboid movement. At a certain liminal concentration movement becomes irregular, and it is inhibited by about 10 times this concentration. The effects do not resemble oxygen deficiency. The effectiveness follows the series methyl < ethyl < butyl and chloretone < amyl.

In the absence of oxygen, cyanides do not effect the behaviour of the amœbæ. This agrees with the supposition that cyanides act upon the respiratory mechanism in the amœba. Alcohols are even more effective in the absence of oxygen than in its presence.

Those anæsthetics (cyanides and sulphides) which induce effects resembling oxygen deficiency in the amœba are those which inhibit the cytochrome respiratory mechanism. It is suggested that the adverse effects produced by the anærobic processes causing amœboid movement are normally removed by an oxidative recovery process, which involves some respiratory mechanism similar to cytochrome.

C. F. A. P.

**The Gregarines of Cucumaria; *Lithocystis minchinii* Woodc.  
and *Lithocystis cucumariæ* n.sp.**

**By H. Pixell-Goodrich, M.A., D.Sc.**

*Q.J.M.S.*, Vol. 73, 1929, pp. 275-287.

*Cucumaria saxicola* Brady and Robertson is shown to contain two neogamous gregarines whose life-histories have hitherto been confused with one another. One of these, *Lithocystis cucumariæ* n.sp., is exceptional in passing through all its stages in the respiratory trees of its host where the cysts form conspicuous opaque white spheres, up to .5 mm. in diameter, easily seen on opening the body cavity. There is little doubt that spores enter and leave the host with currents of water through the cloacal aperture. This parasite has spores with long flattened tails similar to the type species, *L. schneideri* Giard, from Spatangoids.

About 18.5 per cent *C. saxicola* from Wembury Bay, Mewstone and Stoke Point were found to be infected.

The other gregarine, *L. minchinii* Woodc., is enclosed throughout most of its life in a cup-like outgrowth of the host's coelomic epithelium and connective tissues. Its spores have peculiar episporal processes including a short tail.

From the same regions mentioned above, 40 per cent of the *C. saxicola* were infected with this species.

H. P. G.

**The Comparative Morphology of the Elysioid and Æolidioid Types of the Molluscan Nervous System, and its Bearing on the Relationships of the Ascoglossan Nudibranchs.**

By Lilian Russell, M.Sc.

*Proc. Zool. Soc., London. Part 2, 1929, pp. 197-233.*

Since Souleyet posed the problem of the phylogensis of the Elysioid type in 1852, the taxonomists have solved it in one of two ways. Those impressed by the Æolidioid external morphology of *Hermæa* and *Stiliger* have included them in the Nudibranchs, while the close resemblance of the alimentary canal, and especially of the pharyngeal mechanism, in Elysioids and Lophocercoids, has led others to group these two types together as Ascoglossa. The above paper reopens the controversy, using as a criterion that system which has served most consistently as an index of relationship in the Gastropoda. The nervous systems of *Elysia* and certain Æolidioid types are compared in detail, the territorial distribution of all nerves being determined, and employed in ascertaining the homology of their ganglia of origin. A special attempt is made to render the representation and analysis of the visceral system as complete as possible. By this means the three ganglia of the visceral loop of *Elysia* are established as true homologues of the three primitive visceral ganglia of the Gastropod. This verification of homology makes it impossible to follow Pelseneer in deriving the Elysioids from Æolidioids with a naked visceral loop. It is further shown that the characteristic gastro-œsophageal ganglia have no homologues in *Elysia*. The Elysioid nervous system thus resembles the Lophocercoid in general plan, in the structure of the visceral system, and in the possession of retractile superficial eyes, auriculate tentacles with an organ of Hancock, genital nerves derived from the abdominal ganglion, and pedally innervated lateral appendages: the author accordingly proposes to sever the unnatural union of the Elysioids with the Nudibranchs, and to place them with their natural relatives, the Lophocercoids.

L. R.

### The British Sea Anemones.

By T. A. Stephenson, D.Sc.

*Vol. I, Ray Society publications, No. 113, London, 1928, pp. xiv+148.*

This volume contains a general account of the morphology, colouration, development, bionomics and classification of the Actiniaria, with special reference to British forms. The account deals most fully with morphology, and is designed, apart from this, to give an introduction, in outline, to the study of Actinians, of such a nature as to render intelligible a more detailed account of them. It is followed by a classified list of the British species, of which 39 are recognised; and by a classified and a general list of literature. The second volume will contain full descriptions of the species, and further notes on their natural history. The illustrations in Vol. I represent in colour about half the species, the series to be completed in Vol. II; beyond this they illustrate morphology, histology, etc., and include a dedication page and some tailpieces after the manner of Forbes' *British Echinoderms*.

T. A. S.

### A Contribution to Actinian Morphology: the Genera Phellia and Sagartia.

By T. A. Stephenson, D.Sc.

*Trans. Roy. Soc. Edinburgh, Vol. LVI, p. 121.*

The most serious gap in our knowledge of the anatomy of the British Actiniaria has been the almost complete absence of structural data referring to the genus *Phellia*. This paper describes the anatomy of the British forms which have been assigned to the genus; shows that the genus is heterogeneous; establishes *P. gausapata* Gosse as the type; creates a new genus *Cataphellia* for *P. brodrickii* Gosse; and shows that *P. murocincta* Gosse is a form of *Sagartia troglodytes*, whilst *P. picta* Gosse is undoubtedly the young of *S. lacerata*. The status of the genus is discussed, after which the paper goes on to consider other matters. An account of the complex patterns developed on the peristome and tentacles of many anemones is given, and the value of the structure of such patterns as an index to relationships is pointed out. Lastly, the status of those variable species, *Sagartia elegans* and *S. troglodytes*, is discussed.

T. A. S.

**Observations on the Function of Peroxidase Systems and the Chemistry of the Adrenal Cortex. Description of a New Carbohydrate Derivative.**

By A. Szent-Györgyi.

*Biochem. Journ.*, Vol. XXII, 1928, pp. 1387-1409.

Peroxidase plants contain a highly active reducing agent, which can be oxidised and reduced by biological systems, playing this way the rôle of a catalyst between different mechanisms of oxidation. The substance was crystallised, and identified as a hitherto unknown carbohydrate derivative, isomer to glucuronic acid. With regard to the chemical structure "hexuronic acid" is proposed for the name of the substance.

It is shown, that the adrenal cortex of mammals contains a strong reducing agent, specific for this organ. The substance has been isolated and found to be identical with "hexuronic acid" isolated from plants.

It is shown, that the interrenal bodies of elasmobranch fishes (*Scyllium canicula*) contain a strong reducing agent, which is specific for this organ, and shows the same reactions as the hexuronic acid of the mammalian adrenal cortex.

Chemical and physical properties of the hexuronic acid are described (M.P. 175-189,  $[\alpha]_D^{21} = +24^\circ$ ).

The substance is studied in its relation to different biological oxidation systems. It is shown, that the substance gets oxidised in all systems, in which a phenol is oxidised to a quinone. The substance is not oxidised by the indophenoloxidase of animal tissues or by hæmatine compounds (cytochrom). The hexuronic acid is strongly reduced by the Hopkins glutathion system.

A. S.-G.

**A Habit of the Common Periwinkle (*Littorina littorea* Linn.).**

By D. P. Wilson.

*Nature*, Vol. CXXIV, 1929, p. 443.

On shores where there is little or no growth of the larger Fucoid algæ the periwinkles clinging to the boulders may be exposed to the sun for long periods. The risk of desiccation is lessened by the periwinkle's habit of sticking itself to the rock by secreting a film of mucus between the lip of its shell and the rock surface. This film soon dries, becoming brittle, and the mollusc then retracts and closes the opening of its shell with its operculum. On a steeply sloping surface it is nearly always orientated with the lip of the shell uppermost, the position in which there is least tendency for it to topple over.

D. P. W.