Abstracts of Memoirs

RECORDING WORK DONE AT THE PLYMOUTH LABORATORY.

The Rapid Determination of Available Phosphate in Soil by the Coeruleo-molybdate Reaction of Denigès.

By W. R. G. Atkins.

J. Agric. Science, 1924, *Vol. XIV*, 192–197.

The method affords a rapid means of estimating phosphates in aqueous extracts, one soil to five water by weight, even when the extract is diluted twenty-fold. The majority of the soils studied gave to the extract phosphate corresponding to under two parts per million of phosphorus pentoxide. Dunged soil gave up to 20 p.p.m. or more. Extraction for 3–4 hours gives values as high as extraction for 4–7 days with soils of low phosphate content, but the phosphate of richer soils may undergo a reversion to an insoluble form during prolonged extraction.

W. R. G. A.

The Electrical Conductivity of Extracts from Soils of various types, and its use in Detecting Infertility.

By W. R. G. Atkins.

J. Agric. Science, 1924, *Vol. XIV*, 198–203.

The electrical conductivity of aqueous extracts of soils varies according to the time of extraction. With one of soil to five of water extraction of the more fertile soils for 3–4 hours gives less than half as great a conducivity as is given in 4–11 days. In peat a high conductivity is reached quickly. Certain infertile soils also reach their maximum quickly, but the actual conductivity is low, closely similar to that of the purest upland streams. A rapid increase in conductivity as extraction proceeds may be considered an indication of fertility. A low conductivity, which remains low on continued extraction, denotes a soil so insoluble as to be unfertile.

W. R. G. A.

Solubility of Phosphates in Relation to Hydrogen Ion Concentration.

By W. R. G. Atkins.

Nature, 1924, *Vol. CXIV*, 275.

The method of Denigès was used to study the solubility of a sample of tricalcic phosphate (B.P.) between pH 7·0 and pH 5·1, hydrochloric acid being used to increase the acidity. Over this range the solubility increased from 114 to 786 parts per million. From the form of the solubility curve it results that a small change in pH value around pH 5 gives rise to a large increase in solubility. The phosphates of strontium and barium give curves which are qualitatively similar. Other "insoluble" phosphates were also studied and work is in progress.

W. R. G. A.

Notes on the Filtration and other Errors in the Determination of the Hydrogen Ion Concentration of Soils.

By W. R. G. Atkins, Sc.D.

Sci. Proc. Roy. Dublin Soc. 1924, *Vol. XVII*, 341–347.

Increase or decrease in the proportion of soil to water within limits does not alter the pH value by as much as pH 0·1 for soils between pH 6 and 8. For lightly buffered acid soils one part of soil to two of water is recommended; for other soils one of soil to five of water. The pH value of soil some extracts is markedly modified by filtration, even when a first filtrate is rejected. Both untreated and acid-extracted filter papers may reduce the acidity. Clearing by a centrifuge is the best practice. Unextracted filter papers are at about pH 7–7·6; they give up traces of alkali to distilled water. Acid-extracted papers are near pH 4·8, but washing is not found to render them less acid. The indicator brom cresol green is to be preferred to methyl red for about the same pH range.

W. R. G. A.

The Preservation of Fishing-nets, Mosquito-nets and Tent Fabrics.

By W. R. G. Atkins.

Nature, 1925, *Vol. CXV*, 761.

The work of Taylor and Wells regarding the use of copper oleate in petrol or benzol has been confirmed as regards stramin nets. The preservative has also been found specially useful for silk plankton nets which rapidly deteriorate.

A mixed copper soap prepared specially by Mr. W. A. Davis, of Lever Bros., was found preferable to copper oleate, for a five per cent solution gave considerably better protection than a ten per cent oleate solution.

Trials with tent fabrics are in progress. There is every indication that copper soaps should preserve mosquito netting also.

W. R. G. A.

Report on Biological work and on the effect of Poisons on Teredo.

By George Barger.

Fourth (Interim) Report of the Committee of the Institution of Civil Engineers. H.M. Stationery Office, 1924, *pp.* 23–27.

Control test blocks of wood, exposed inside the pier at Lowestoft, were only slightly attacked by Teredo, probably because the blocks became covered with sludge; they were, therefore, removed to a more exposed situation on the outside of the pier. Organic compounds of arsenic, such as diphenylchlorarsine and other substances used in chemical warfare, protect against Teredo at high dilution, but much less against Limnoria. The resistance of greenheart wood to Teredo attack is not due to the mechanical properties of the timber, but to the presence of a poison (probably the alkaloid bebeerine), because Baltic fir, impregnated with an alcoholic extract of greenheart sawdust, is protected in comparison with untreated Baltic fir controls.

Mr. C. M. Yonge grew Teredo larvæ for four weeks at Plymouth. In the end they all crowded on to strips of wood immersed in the cultures; but no boring, or even metamorphosis preliminary to it, could be detected. Mr. Yonge also measured 300–400 Teredos taken from a raft and carried out toxicity experiments with Teredo larvæ.

G. B.

On a new Ciliate, Cryptochilum boreale nov. sp., from the Intestine of Echinus esculentus Linn., together with some notes on the Ciliates of Echinoids.

By C. C. Hentschel, B.Sc.

Parasitology, Vol. XVI, No. 3, *July,* 1924.

This paper describes a new ciliate, *Cryptochilum boreale,* found in the intestine of *Echinus esculentus* from Scottish waters, being first observed at Fetlar, Shetland Islands, and afterwards from Millport and Aberdeen. Specimens of Echinus from Plymouth were examined with a negative result. It would thus appear to be a northern form. This ciliate appears

to differ in a number of points from a species, *C. echini*, described in 1883 by Maupas from Strongylocentrotus from the Mediterranean ; but there does not seem to be sufficient justification for the creation of a new genus for the inclusion of the Scottish form.

Finally, in view of the inaccessibility of some of the literature on the ciliates from Echinoids, it has been thought worth while to add brief descriptions of those ciliates that have been recorded as parasites or commensals of this group, with references to all the papers known up to date.

C. C. H.

Studies on Internal Secretion III. The action of Adrenaline and Pituitary extract upon Invertebrate Muscle.

By Lancelot T. Hogben and A. D. Hobson.

Brit. Journ. Exp. Biol., Vol. I, 1924, *pp.* 487–500.

The effect of adrenaline and of pituitary extract upon the isolated heart of Maia, crop of Aplysia and Aphrodite, and on the perfused heart of Pecten was investigated. Adrenaline and the allied sympathomimetic amine *epinine* have a powerful excitatory action on the musculature of all these structures : the crop of Aplysia responds to less than one in a million of the latter. Pituitary extract was in all cases without action, though histamine exerted its characteristic action on the plain muscle of vertebrates. The specificity of the oxytocic action of pituitary extract, and the physiological activity of adrenaline and allied substances in animals without a sympathetic nervous system is indicated.

L. T. H. AND A. D. H.

On the Photo-electric Measurement of Submarine Illumination.

By H. H. Poole, Sc.D.

Sci. Proc. Roy. Dublin Soc., 1925, *Vol. XVIII*, 99–115.

A method is described of using photo-electric cells for submarine photometry which may be employed in a comparatively small vessel at sea in fine weather. The photo-electric current is passed through a known high resistance, the P.D. between the ends of the latter being balanced against a potentiometer. A telephone is fitted as a detector instead of a

galvanometer as used by Shelford and Gail in calm water. The telephone circuit is interrupted many times per second by a special interrupter. A two-stage valve amplifier is interposed between this circuit and the telephone. A vacuum photo-electric cell is used as a standard, and also for recording fluctuations in the surface light, while the light below the surface is measured by a cell of the Kunz type enclosed in a brass case. Corrections are applied for the effect of obliquity in the incident light and for loss of light at the front surface of the photometer window. Preliminary tests at Cawsand Bay, Plymouth Sound, showed that the mean absorption coefficients per metre for shallow water varied from 0·7 on a day when the water was obviously sandy to 0·25 in calm weather a few days later.

H. H. P.

On the Life-History of Harveyella pachyderma and H. mirabilis.

By H. H. Sturch.

Annals of Botany, Vol. XXXVIII, 1924, *pp.* 27–42.

The two plants are true algal parasites, without photosynthetic structures, growing respectively only on *Rhodomela subfusca* and *Gracilaria confervoides*, and in habit, external morphology and somatic details are very similar. The external soma is hemispherical in shape, made up of radiating filaments enclosed in a gelatinous outer coat, occupying about the same space as the mass of parasitic filaments inside the host.

In both the Zygote nucleus is transferred to an auxiliary cell, from which the ooblastema springs. In *H. mirabilis* the auxiliary mother cell is the subtending cell of the carpogonial branch, and the very long ooblastema is connected with the gametophyte only at this auxiliary cell, while in *H. pachyderma* the auxiliary mother cell is situated on a neighbouring branch, and the ooblastema is also connected by secondary fusions with every somatic cell in its neighbourhood. The plants should be placed in, at least, different genera, but this has been postponed until further species have been examined. During the year both plants pass twice through the full Floridean life cycle in moderately deep water, accompanied by the same cycle once, from October to April, in very shallow water, in greater numbers. Both plants entirely disappear from this shallow water from May to October on British coasts.

H. H. S.

Studies on the Physiology of Reproduction. I. The Flocculation of Sperm Suspensions in Relation to Surface Charge.

By Arthur Walton, B.Sc.

Brit. Journ. Exp. Biol., Vol. II, 1924, *pp.* 13–20.

The surface charge on spermatozoa of *Echinus esculentus*, and *E. miliaris* was determined approximately by observation of the rate of migration in an electric field. With varying pH a maximal negative charge was observed between pH 7 and pH 8. On the acid side an isoelectric point occurred about pH 3, beyond this the charge was positive. On the alkaline side of the maximum the charge was also reduced but the increase of alkalinity was accompanied by inaccuracy of determination. Correlated with this decrease of charge, flocculation occurred with both acid and alkalie, being greatest at the isoelectric point. Flocculation could be observed microscopically in about fifteen minutes, but the full macroscopic effects were not seen until 3–4 hours had elapsed. The stability of the suspension was greatest in a molar solution of cane sugar. It was reduced by the addition of sea-water (electrolytes), and still further reduced by sea-water in which ripe eggs had stood for twenty minutes. Flocculation with acid was accompanied by agglutination of the heads while with alkali the tails of the spermatozoa were involved, resulting in the formation of a network of threads. Acknowledgments for scientific hospitality are due to the Marine Biological Association, and to the British Association for the use of the Table.

A. W.

The Growth of the Egg in the Dab (Pleuronectes limanda).

By J. F. G. Wheeler.

Quart. Journ. Micr. Sci., Vol. LXVIII, Pt. IV, 1924, *pp.* 641–660.

The egg of the dab takes only one year to attain maturity.

At each spawning season a fresh crop of oocytes appears, and no division can be observed. It is probable that the eggs develop from some of the cells of the follicular layer of the previous crop.

With Da Fano's cobalt nitrate modification of Cajal's process the Golgi bodies can be demonstrated in different phases during the growth of the oocyte. A negative image of the same structure can be seen after fixing in fluids such as Bouin and staining in iron hæmatoxylin. This

apparently depends upon the absence of the Golgi bodies and the staining of the rest of the cytoplasm.

Osmic acid and osmic mixtures fix and blacken the whole cytoplasm. The negative image can be obtained by removal of the Golgi bodies with turpentine.

Yolk-formation is intimately connected with the Golgi bodies. This structure plays a leading part in the chemical changes resulting in yolk-formation, if, indeed, it is not itself converted into yolk. The mitochondria appear to play no particular part in the formation of yolk. The nucleus, nucleoli, and vitelline body also have no definite rôle in yolk-formation.

Growth-rings and plasmatic zoning in dab oocytes are artefacts.

J. F. G. W.

Experimental Work carried out at Plymouth Marine Biological Laboratory during July–August, 1922.

By C. M. Yonge, Ph.D.

Dept. Scient. Indust. Research, 4th (Interim) Report of Com. Inst. C.E., 1924, *pp.* 9–22.

The common species of Teredo at Plymouth was identified as *T. norvegica*. Attempts were made to rear Teredo from artificial fertilizations. The larvæ were kept alive for thirty-five days, during which time they increased in size from $48 \times 48\ \mu$ to $90 \times 72\ \mu$, but their natural food was not found and no sign of change into the adult form was observed. The females are on the average larger than the males. Experiments on the relative toxicity of a number of substances to the larvæ were carried out.

C. M. Y.