

in the period minus the total increase in this value due to the food, calculated from the average of the figures previously obtained. The total net energy of the ration is the *average* net energy for maintenance as found in the different experimental periods in which the particular food under consideration was used, plus the energy gained by the animal, which is determined by subtracting the total heat production from the metabolisable energy of the food.

By this method it is found that the results obtained in the different experimental periods usually agree fairly well, and it is easy to see and discard any abnormal set of figures. The authors are inclined to consider differences in maintenance requirements in different periods as due to experimental errors rather than to differences in the rations or in the plane of nutrition of the animal. On the other hand, from experiments on fasting animals it appears that energy is more efficiently utilised in sub-maintenance periods, so that consistent figures for net energy values of rations are more likely to be obtained when the plane of nutrition in the different periods does not vary too

greatly, and thus that the results should be considered as applying accurately in other cases only when the animals are kept at a somewhat similar level of nutrition. A further point to which attention may be directed is the applicability of results obtained with a particular breed to animals of another breed or in a different country where the rations are almost certain to be different. F. J. Warth, L. Singh, and S. M. Husain (*Memoirs Dep. Agric. India*, 1926, vol. 8, p. 153) have established certain differences between their animals and those used in America in considering the requirements for milk production with Indian foodstuffs. These differences affect primarily the digestibility of the rations, due in part to their actual nature, but at the same time individual animals have their own characteristics.

In conclusion, it may be stated with confidence that there appears to be sufficient accurate knowledge of the efficiency of different rations for maintenance and production to enable the practical farmer to select from those available to him the most economical in meeting his requirements.

Marine Biology at Plymouth.

THE latest number of the *Journal of the Marine Biological Association* (N.S., vol. 14, No. 2, August 1926, 10s. net) is full of good things. Dr. Orton resumes the interrupted publication of his studies on the rate of growth of marine organisms with a paper on the cockle. The investigations were carried out mainly in an experimental box laid down in the estuary of the river Yealm, in which the growing cockles were exposed to practically natural conditions, and the results have been checked by observations on near-by cockle beds. Apart from the definite determination of growth-rate—a matter of some economic importance, though it may be expected that the growth-rate will vary in different localities—the main interest of the paper lies in the study of the growth rings on the shell. It appears that, in the main, the deeply marked rings do indicate the winter checks in growth, and may be used—with caution—to determine the age of the cockle. Dr. Orton has, however, made the interesting observation that the mere removal of the cockles from the box for an hour or so for the purpose of examination suffices to cause the appearance of a "disturbance ring" on the shell. Specially well-defined rings are induced by the technique adopted of marking the shells for identification purposes with a file. Such disturbance rings can also be induced in the mussel. Further, in mild winters the winter-ring may become extended and spread out into several rings, so that accurate determination of the age by means of winter-rings is a matter of some difficulty, especially in the larger individuals. The paper would have been improved by the addition of a summary.

A second paper by Dr. Orton deals with the comparative effect of dilute but lethal solutions of T.N.T. on native and Portuguese oysters (*Ostrea edulis* and *Gryphea angulata*), and was carried out at the request of the Fisheries Department to clear up a point left undetermined in the course of Dr. Orton's elaborate study of the abnormal mortality among native oysters in 1920-21. It is said that the mortality did not affect the Portuguese oysters. Dr. Orton shows, however, that both species are about equally susceptible to T.N.T.

The next paper—a valuable study, by Dr. C. M. Yonge, of feeding and digestion in the oyster—also arises out of Dr. Orton's oyster-mortality investigations, and its genesis illustrates in a striking way how important it is that 'fundamental' or purely scientific

studies should accompany, or better still precede, any investigations directed towards a practical or economic end. It became apparent from Dr. Orton's own work on the mortality of oysters that not nearly enough was known about the normal physiology of the oyster for any one to say what conditions were normal and what were indicative of disease or pathological disturbance. Dr. Orton wisely pointed the moral by recommending a special research into the anatomy and physiology of the oyster, and of this Dr. Yonge's paper gives us the first fruits.

The paper seems to us wholly admirable. Dr. Yonge is of the modern school in combining anatomy with physiology, in studying form and function together. Considerable space is given to a clear and well-illustrated account of the anatomy and histology of the digestive apparatus both in the adult and in the larval oyster, and to a description of the amazingly complex system of ciliary currents by which the oyster collects and sifts out the tiny planktonic organisms on which it feeds, rejecting all such as are too large for it to deal with, and leading the rest over the palps into the mouth, down into the stomach and the digestive diverticula (commonly known as the 'liver'). Other sections treat of assimilation, the digestive enzymes, the function of the crystalline style, and the storing of reserve products. Dr. Yonge finds that digestion is mainly intracellular—soluble matter and fine particles being ingested by the cells of the digestive diverticula, larger particles by the phagocytes present in all parts. This is demonstrated by ingenious feeding experiments with iron saccharate, with blood corpuscles of the dog-fish, with olive oil, and with the diatom *Nitzschia*. He rejects the theory of the Danish workers that the oyster is primarily a detritus feeder, and emphasises the importance of the smaller diatoms, peridinians, algal spores, and other microscopic vegetable matter.

It comes out clearly from Dr. Yonge's work, especially that on the enzymes present, that the oyster, like other lamellibranchs, is specially adapted for the digestion, assimilation and storage of carbohydrates. The rationale of fattening the oyster for market is, then, to supply it with plenty of microscopic vegetable food, as already indicated by Savage in a recent paper, and as realised empirically in some fattening ponds, particularly in France. It has been known for some time that the oyster stores its surplus nourishment mainly in the form of glycogen, which is no doubt

chiefly derived from the carbohydrates richly present in the diatoms and peridinians of its food. Dr. Yonge's elaborate paper represents a distinct advance in our knowledge of lamellibranch physiology, and cannot fail to be of great service both theoretically and practically.

The three papers so far considered take up about half the present number of the *Journal*, and the remaining papers can be only lightly touched upon. Mr. F. S. Russell continues his interesting studies on the vertical distribution of the macro-plankton, with papers on the diurnal changes in distribution of pelagic young fish and on the importance of light as a factor in determining the vertical distribution of plankton forms. From Dr. Atkins comes a third contribution to our knowledge of the phosphate content of sea-water in relation to the growth of algal plankton. Samples obtained from the English Channel, North Sea, the open Atlantic and Pacific confirm the author's views on the importance of phosphate as a limiting condition for production in the sea. Mr. C. F. Hickling gives some further details regarding the remarkable kind of luminescence discovered by him in the fish *Malacocephalus laevis*. Among two or three faunistic papers one may perhaps specially note one by Dr. Lebour giving a general survey of larval euphausiids, with a scheme for their identification. Such work is of very great service to plankton investigators, and it is to be hoped that Dr. Lebour will continue the good work and deal with other groups in the same way.

In conclusion, mention must be made of the ingenious 'vacuum grab' invented by Mr. O. D. Hunt, with the assistance of Dr. Bidder, and here described in detail. By means of this instrument samples of the bottom can be taken which retain the finest particles together with the micro-fauna and micro-flora therein contained.

E. S. R.

University and Educational Intelligence.

BIRMINGHAM.—At the meeting of the Council of the University held on November 3 the following appointments were made: Dr. T. L. Hardy, assistant physician to the General Hospital, to be assistant to the chair of medicine; Dr. C. C. W. Maguire, physician for out-patients at Queen's Hospital, to be honorary demonstrator in the Department of Anatomy.

It was decided that the Court be asked to confer the title of emeritus professor upon Prof. O. J. Kauffmann, joint professor of medicine in the University from 1913 to 1926.

CAMBRIDGE.—Mr. T. W. Wormell, St. John's College, has been appointed observer in meteorological physics at the Solar Physics Observatory. Mr. J. T. MacCurdy, University lecturer in psycho-pathology, and Mr. H. C. B. Mynors, have been elected to fellowships at Corpus Christi College. The Adam Smith Prize has been awarded to G. T. Jones, Emmanuel College. The Engineering Department has been presented with portraits of Sir Alfred Ewing, the late Prof. Bertram Hopkinson and Prof. Inglis. The Henry Sidgwick Memorial lecture will be given at Newnham College on Nov. 13 at 5 P.M., by Sir William Bragg, who will take as his subject "The New Crystallography."

LONDON.—The following doctorates have been conferred: *D.Sc. (Economics)* on Mr. S. G. Panandikar (London School of Economics) for a thesis entitled "The Wealth and Welfare of the Bengal Delta"; *D.Sc. (Chemistry)* on Mr. G. W. Ellis for a thesis entitled

"A Contribution to the Chemistry of Drying Oils, Parts i-iii. (containing a Study of the Autoxidation of Linseed Oil and a Theory on the Nature of the Autoxidation of Unsaturated Compounds)"; *D.Sc. (Veterinary Science)* on Mr. J. T. Edwards for a thesis entitled "The Chemotherapy of Surra (*Trypanosoma evansi* infections) of Horses and Cattle in India."

ST. ANDREWS.—On November 3 Dr. Fridtjof Nansen was installed as Rector of the University, after having been admitted to the honorary degree of Doctor of Laws. He delivered an inspiring address on the spirit of adventure, in the course of which he referred to his own experiences as an explorer and as a supporter of the League of Nations. The honorary degree of LL.D. was then conferred upon His Excellency Mons. P. B. Vogt, Norwegian Minister; Prof. Vilhelm F. K. Bjercknes, of the University of Oslo; Prof. Bjorn Helland-Hansen, of Bergen; Capt. Otto Neumann Sverdrup (Captain of the *Fram*); Prof. J. Norman Collie; Brig.-General the Hon. Charles Granville Bruce; Sir T. W. Edgeworth David; and (*in absentia*) the Right Hon. Viscount Cecil of Chelwood.

It is stated in the *Chemiker Zeitung* that Dr. G. von Hevesy, professor of physical chemistry at the University of Freiburg in Baden, has been invited to succeed Prof. Bodenstein in the chair of physical chemistry at the Technische Hochschule at Hannover.

THE British Institute of Adult Education issued in September the first number of a half-yearly review entitled the *Journal of Adult Education*, published by Messrs. Constable and Co., Ltd., at 2s. 6d. The editors, Prof. J. Dover Wilson and Prof. A. E. Heath, are assisted by an advisory panel of thirty-one, whose names, well known in educational circles, appear on the cover. This first number is remarkable for the prominence given to the questions of what are and what should be the purposes of adult education. The questions are raised both explicitly in the more important articles, and indirectly by incompatibility of the ideals of some of the writers. They are dealt with most comprehensively by Prof. Robert Peers, the director of the important department of extra-mural education of University College, Nottingham, who classifies the various views concerning the aims of adult education under the three heads—development of the individual person, social service, and social change. A certain ambiguity is observable in the arguments owing to confusion between the aims of the students, the aims of the teachers, and the aims of those who organise and administer and finance the work. Education that aims primarily—not at the student's emancipation from the shackles of ignorance, but at the emancipation of 'workers' from the restraints incidental to a social system under which 'the means of life' are subjects of private ownership, the education on a Marxian basis, as given in the 'Labour' colleges, is described in one of the articles as 'independent' working-class education. This article, beginning with this curious use of the word 'independent' and ending with an appeal to class hatred by describing resistance to the subsidising of the mining industry as "the whole power of capitalism turned to defeating one particular section [of 'the workers'] by the use of the starvation weapon against women and children," shows that a wide circulation of the *Journal* is anticipated.

A PROJECT for founding a British Institute in Paris was launched at a meeting at the Mansion House,