

show quite a remarkable benefit in the total catch of each district. Northumberland gives particularly striking results, while it is shown that the Scotch coast to the north has gained by migration about a quarter of a million female crabs each year owing to this closure. The paper should be read by every legislator for, if it does nothing else, it shows by inference how foolish and wasteful it is, scientifically speaking, to have fisheries in each of our three islands in the hands of different authorities, and coastal fisheries under a series of independent local committees. Each county might just as well manage the railways within its boundaries.

F. S. Russell deals with the diurnal changes in the distribution of the macroplankton. The place sampled was about half way between the Plymouth breakwater and the Eddystone, in 51 m. of water. The date was the full moon on July 15-16, 1924, fair weather. The author clearly hopes that he was beyond the region of local swirls and upward currents, but to convince us of this he should surely have taken serial temperature and  $pH$  readings. We should have liked also to know a little more about the weather and particularly the strength of the light. Five series of observations at different depths were taken with a large round stramin cloth net of 2 m. diameter at approximately equal intervals. Each haul was 10 minutes. A depth recorder was attached, and the depth path of the net at each haul was recorded. The organisms caught were counted, and lists are given of those definitely migrating to the surface at night, of those dispersing evenly through the body of water, of those making smaller but yet definite upward migrations, and lastly of those not affected. The young stages of fish are omitted, but are to be recorded in a separate paper. Of isolated facts, 14,000 *Tornaria*-larvæ caught in the surface haul at midnight is interesting, while the various crustacean larvæ are particularly well done, thanks perhaps to the stimulus of Dr. Lebour. The work is of real importance and clearly must be repeated; we would like it to be done much farther from land and at a season when larvæ are less abundant, so that the whole problem may, to start with, be simplified as much as possible.

C. F. Hickling has been working on the Atlantic slope and there he obtained luminescence in a species of deep-sea fish, *Malacocephalus lævis*, produced by an epithelial invaginated gland opening around the anal papilla and lying in front in the ventral wall of the abdomen; it is of considerable size and is pro-

vided with connective tissue struts and a muscle sheath. The secretion is highly luminous and appears to be always poured out by the dying fish. It goes into solution in water, but constant shaking (? oxidation) is required to maintain its luminosity. It is not due to bacterial action, but to a definite substance which has been termed luciferin. It is suggested that the material may be shot out as ink is by a cuttlefish, only here a cloud of light, while the fish darts off to escape from danger; it is also possible that the light may be used to attract food.

Four papers deal with Crustacea. Miss Jorgensen describes the early stages of Nephrops. Dr. Lebour has nearly completed the description of the stages of *Nyctiphanes*, while working in general on Euphausiada, a family of considerable importance as being fed on largely by herring. Her knowledge of and insight into crustacean development is clearly an asset of importance to the Laboratory. Dr. Stephenson adds a new species of anemone to the British fauna, this being only the second new form in more than sixty years, a remarkable tribute to the zeal and insight of Gosse, whose beautiful pictures are so well known. We hope E. Mary Stephenson will continue and extend her work on the same group wherein she emphasises the fact that the cinclides may be soft spots "which can rupture neatly and without harm to the animal when needed as safety-valves." We always like to know in such work the preservatives employed, and we think important results in the minute anatomy will be attained by employing the methods of Ramon y Cajal's laboratory.

Of other papers we may refer to C. M. Yonge's account of the  $pH$  in the gut of Mollusca, wherein he shows that the origin of the general acidity of the entire gut lies in the style which dissolves rapidly in alkaline media, its maintenance being the result of a balance between the rate of its secretion and its dissolution; the acidity may also be caused by the salivary and digestive glands. H. W. Harvey's paper on oxidation in sea-water is mainly concerned with the actual processes, the action of a catalyst being inhibited by dissolved organic substance; the paper suggests further researches that may well lead to economic results. Finally, a new technique for studying the dissociation of oxyhæmoglobin, described by Pantin and Hogben, will make a wide appeal as it is suitable for class work. The Journal concludes with abstracts of thirteen memoirs, published elsewhere but describing the work done at the Plymouth Laboratory. J. STANLEY GARDINER.

## Motor Fuels.

TO the layman the subject of motor fuel is sym-  
 bolical of the entire petroleum industry, and in view of the fact that this commodity is at least a tangible and universal expression of commercial activity, there is perhaps something to be said for the idea. Listeners to the Howard Lectures at the Royal Society of Arts, delivered by Prof. J. S. S. Brame and published recently in the Society's journal, would, however, have arrived at very different conclusions concerning not only the scope of the industry, but also the complex subject of motor fuels considered as a whole, and they would have at least been impressed with one fact, namely, the rapid strides recently made in research whereby supplementary fuels to petrol are gradually being made available for general consumption.

In his first lecture the author dealt with petroleum, cracked spirit, casing-head spirit and motor benzole, and his remarks on cracked spirit were of particular interest, as this is still a much-discussed

product, both from technical (*e.g.* refinement) and economic (utilisation) aspects. Efficiency of plant, loss of initial material, gas and carbon formation, and the commercial possibilities of treating residue-oil, are some of the many problems raised in this connexion, though it is clear that they are now well on the way to adequate solution. Cracked spirit is generally blended with ordinary petrol much as is the case with casing-head spirit, neither products being suitable for direct use with motor cars. Referring to benzole, the author remarked on the increasing importance of absorption processes for extracting this fuel from coal or coke-oven gas; such processes simulate those employed for recovering petrol from natural gas, *i.e.* casing-head spirit, though in the former case silica gel has apparently been successfully utilised as an absorbent.

In his second lecture, Prof. Brame discussed power alcohol, fire-risks with fuels, physical properties, boiling ranges, explosive ranges, and

calorific values of various direct and mixed types. Regarding alcohol, he rightly stressed not so much the value of this compound as a fuel, but the problem of its cheap, commercial production, without which its application is impracticable. The third lecture dealt with fuel-air mixtures, composition of fuels and efficiency, current research in the United States, and the interesting subject of "anti-knock" compounds, including the famous lead tetraethyl—the distinctive but poisonous ingredient of the temporarily prohibited ethyl gasoline in America. The intricate problems of mixed fuels such as petrol-benzole, petrol-tetralin, petrol-alcohol, and alcohol-ether, etc., were touched on, the whole syllabus thus forming a most comprehensive review of the subject up to the present time.

### University and Educational Intelligence.

CAMBRIDGE.—The election of Prof. J. Barcroft to the chair of physiology did not come as a surprise to those who are acquainted with the Cambridge Physiological School. He was elected a fellow of King's in 1899, in which year he won the Walsingham medal; he has held several important physiological posts and was appointed reader in 1919.

Dr. R. G. W. Norrish has been elected to a Junior Fellowship at Emmanuel College; he was recently admitted to the degree of Ph.D. for physico-chemical research.

Early in December the town was visited by numerous candidates for entrance scholarships and exhibitions. It is reported that the numbers offering physics and chemistry are considerably greater than usual, whilst those taking biological subjects have fallen off. This is an unfortunate state of affairs in view of the shortage of high-grade biological students.

EDINBURGH.—The University Court has made the following appointments in the Department of Public Health:—Colonel P. S. Lelean, until recently professor of hygiene in the Royal Army Medical College, to the Bruce and John Usher chair of public health; Dr. William Robertson, Medical Officer of Health of the City of Edinburgh, to be Director of Instruction in Sanitary Administration.

Dr. Archibald Milne, Depute Director of Studies in the Edinburgh Provincial Training College, has been appointed a lecturer in the University to conduct the course on school organisation and administration, and Mr. R. B. Kerr, a lecturer in education in the Training College, to be a lecturer in the University to conduct the course on modern educational systems and problems.

LIVERPOOL.—At a meeting of the University Council held on December 15, Associate Professor F. J. Teago was appointed to the Robert Rankin chair of electrical machinery. Dr. Teago served his apprenticeship in engineering with Messrs. Charles Parsons and Co., returning to the designs staff of this Company in 1909, after spending three years at Armstrong College, Newcastle-upon-Tyne, where he graduated with the degree of B.Sc. In 1912 he was appointed lecturer in electrical engineering at the University of Liverpool. During the War he occupied important positions in connexion with the design of electrical machinery, and as Assistant General Manager of the Ministry of Munitions Steel Works, Manchester. After the War he was appointed senior lecturer in electrical engineering at the University of Liverpool, and in 1924 the title of associate professor was conferred upon him. In 1924 he was admitted to the degree of D.Sc. (Durham). Dr. Teago has published a number of papers on electrical machinery, three of which have been awarded special premiums by the Institute of Electrical Engineers.

LONDON.—Prof. A. V. Hill has, on his appointment by the Royal Society to a Foulerton chair, resigned the Jodrell chair of physiology tenable at University College. He will carry out his research work at University College, and the Senate has resolved that he shall continue to hold the title of "Professor of Physiology in the University of London" in respect of the functions to be discharged by him at that College.

The following doctorates have been conferred:—*D.Sc. (Embryology)*, Mr. A. S. Rau (University College) for a thesis entitled "Contributions to our Knowledge of the Structure of the Placenta of *Mustelidæ*, *Ursidæ* and *Sciuridæ*"; *D.Sc. (Physics)*, Mr. W. B. Haines (University College and the Rothamsted Experimental Station) for a thesis entitled "Studies in the Physical Properties of Soils"; *D.Sc. (Metallurgy)*, Miss Constance F. Elam (Imperial College—Royal School of Mines) for a thesis entitled "(1) Tensile Tests of Crystals of an Aluminium-Zinc Alloy; (2) The Orientations of Crystals in Metal Test-pieces subjected to small Strains followed by Heat-treatment."

THE University College of the South-West of England, formerly known as University College, Exeter, directs attention in its report for 1924-25 to the harmonious development (justifying its change of name) of its scheme for co-operation with the Technical School, Plymouth. With effect from the beginning of the current session, the more technical part of the School of Pharmacy has been transferred to Plymouth, while the pure science part of the curriculum continues to be provided at Exeter as well as at Plymouth. The Department of Law also provides courses at Plymouth, and a project is on foot for establishing a School of Commerce there. The total number of full-time students has increased from 313 to 332, the increase of science degree students alone being from 67 to 87, and of pharmacy diploma students from 10 to 18. The number of degree students has more than doubled in the last four years.

STATISTICS of State Universities and State Colleges for the year 1923-24 are published in Bulletin, 1925, No. 12 of the United States Bureau of Education. Similar annual returns have been published by the Bureau for the past sixteen years, but in this bulletin appears for the first time a tabular statement of tuition and other fixed annual charges payable by students. The subject is one to which much attention has been directed of late. In the institutions, 106 in number, represented in the returns, the total student enrolment, excluding the summer school, was men 148,230, and women 77,567; and the student fees paid, excluding board and room rent, amounted to sixteen million dollars. There is very great diversity of practice in regard to the fixed charges which students are called upon to pay in these state universities and colleges, the amounts varying, in arts and sciences, for tuition and other fixed annual charges, excluding laboratory fees, from nine dollars in the University of Oklahoma to 314 dollars in Cornell University. The table includes figures for medicine, dentistry, law, and pharmacy as well as arts and sciences; in almost all instances the rates for other courses of study such as engineering and agriculture are the same as for arts and sciences. The highest professional school tuition charges are 500 dollars per annum for the Medical School of the University of California. Many institutions at which tuition is nominally free impose "incidental" and "registration" charges, generally small but sometimes considerable, e.g. Pennsylvania State College, 100 dollars.