for the rest of his life. These early experiments were concerned with the specific dynamic action of ingestion of amino-acids; the strongest effects were with glycine and, remembering the important hormone thyroxin (an iodine-substituted amino-acid) he decided to try mono-iodoacetic acid. The results he obtained changed the whole picture of energy provision for muscle contraction.

His most striking early observation was of the onset of rigor some minutes after injection of monoiodoacetic acid, a rigor brought on by muscle activity. Lundsgaard found that the muscle in rigor did not produce lactic acid, and that the breakdown of phosphocreatine accompanied muscle contraction and could supply the necessary energy. He suggested that when normal muscle contracts the hydrolysis of phosphocreatine directly yields the necessary energy, with lactic acid formation continually supplying the energy for resynthesis of phosphocreatine. This was quite a revolutionary proposal, for at this time the formation of lactic acid was generally accepted to be all-important for contraction while phosphocreatine was merely destabilized (without energy release).

In 1930, Lundsgaard went to work in Meyerhof's laboratory in Heidelberg. He was greeted at first with some scepticism which rapidly melted away. In Heidelberg he was able to demonstrate a much more definite connexion between phosphocreatine breakdown and the production of tension in muscle poisoned with iodoacetic acid. He also found evidence of the involvement of phosphocreatine breakdown in the provision of energy during the contraction of normal muscle. He felt that energy from phosphocreatine hydrolysis only was involved in contraction. But he did make the prophetic proviso that the energy from the breakdown of normal muscle phosphocreatine could be at the disposal of a third unknown process. His estimations of ATP showed that breakdown of this substance might be considerable, especially just at the onset of rigor; but there was no evidence then to suggest that this might be the third energy-yielding reaction. In 1934 Lundsgaard published his observation that, immediately after cessation of contraction in muscle poisoned with iodoacetic acid, there was delayed phosphocreatine hydrolysis; this reinforced the idea that phosphocreatine hydrolysis is a recovery process.

At this time Lundsgaard also produced clear evidence to support Verzar's suggestion that the absorption of glucose involves phosphorylation, and showed that in kidney tubules the process is specifically inhibited by the drug phlorizin. Also at about this time he decided that the site of the facilitating effect of insulin on glucose transfer is the cell membrane. This work was published only in a Swedish medical journal, and was re-discovered in the 1940s.

In 1942 he continued his early work on specific dynamic action, using isolated perfused livers, and found that oxygen consumption decreased to about a half within an hour. This decline could be prevented by including the hind limbs in the circuit; but otherwise, although he added many known muscle constituents to the perfusing blood, results were always negative, and it was only with apologies that he published this work in the *Meyerhof Festschrift* of 1950. Yet these observations were the starting point for the elucidation of the carnitine story in the oxidation of fatty acids, the problem which attracted Irving Fritz to Lundsgaard's laboratory in 1954.

Lundsgaard became professor at the University of Copenhagen in 1934 and held the chair until 1967, teaching all aspects of physiology. In spite of his dislike of public life he held many important positions in the Danish scientific world. His reputation was international; he received honorary degrees at the Universities of Montreal and Paris and was president of the eighteenth international Congress of Physiological Sciences in 1950.

C. R. Bury

THE death occurred on December 24, 1968, of Charles Rugeley Bury in his seventy-ninth year. Bury was a physical chemist who made notable contributions to his subject. A scholar of Trinity College, Oxford, he graduated with first class honours and for a year did research with (now Sir) Harold Hartley. Having joined the chemistry department of the University College of Wales, Aberystwyth, in 1912, he enlisted in 1914 and saw active service on the western front and over a wide area of the Middle East, eventually as a captain with an independent command.

At Aberystwyth (till 1943) he was responsible for teaching and research in physical chemistry. His first major contribution was a paper (*J. Amer. Chem. Soc.*, **43**, 1602; 1921) in which he corrected and extended the Langmuir model of the electron shells in the chemical atoms. Langmuir had the electron numbers in the shells: 2.8.8.18.18.32. and so on. Bury, in a brief, exceptionally clear presentation of the chemical evidence, deduced that the noble gases (after helium) invariably had outermost shells of eight electrons and he delineated in the since accepted fashion the character of the transition elements and of the rare earth sequences. He also predicted significant aspects of the chemistry of the then unknown transuranic elements. From spectroscopic evidence, Bohr (*Nature*, **107**, 106; 1921) simultaneously concluded that the noble gases had outermost shells of eight electrons.

A smaller but still important contribution was Bury's clear characterization of the molecular and thermodynamic conditions leading to micelle-formation in aqueous solution: his studies in 1927 and later of aqueous butyric acid as a model system eliminated several uncertainties and corrected aspects of McBain's findings with the soaps. A brief paper on auxochromes and resonance (*J. Amer. Chem. Soc.*, **57**, 2115; 1935) was a third major contribution. In it Bury presented the relation between colour and chemical constitution in terms of molecular electronic structures and emphasized the role of electronic resonance hybrids in many groups of typical dyestuff compounds. This paper formed the starting point of many important systematic studies in organic colouring matters by, for example, G. N. Lewis (Berkeley), Schwarzenbach (Zurich) and L. G. S. Brooker (Eastman-Kodak, Rochester). In 1943 Bury joined the research department of the Billingham division of ICI, where he was head of the phase-rule section until his retirement in 1952.

Bury was basically a shy person with a first-class intellect and keen critical faculty, little inclined to indulge in theory not closely related to quantitative observations. His directness of manner and independence of mind doubtless contributed to the absence of public recognition of his merits.

Correspondence

Growth of the Sexes

SIR, — Your mathematical probability correspondent makes a remark (*Nature*, **221**, 1103; 1969) which I feel is worth a short comment. He says: "It remains an essentially unsolved problem to work out the theory of a population model which neither blows up nor dies out". If your correspondent means "never blows up" and "never dies out" then I suggest the problem is a sterile one, not worth trying to solve. There is no evidence (nor, of course, can there ever be such evidence) that any population could exist for ever without blowing up or dying out. There is a lot of evidence, on the other hand, that shows populations of all sizes doing both. Certainly, there is

evidence for the existence of species for many thousands of years, but this is still not "for ever" and there is a profound difference between infinite and finite in this context. The requirement of an endless, more or less steady state in population numbers imposes a rigidity on a model which strains biological credulity. As soon as the model builder specifies a doomsday, the problem immediately becomes quite different and solvable in many ways. Random factors, climatic changes, feedback mechanisms, long-shot catastrophes can be mixed together in varying proportions and the model will then demonstrate (if the maker is ingenious enough) blowings-up and dyings-out at any desired number of generations from the start.

Yours faithfully,

ROGER LAUGHLIN

The University of Adelaide,
Waite Agricultural Research Institute,
Department of Entomology,
South Australia.

SI Units

SIR,—Why do so many people lecture physicists for resisting SI units? I do not mind in the least being asked to change my units of mass and length and I hold no brief at all for "slugs". My difficulties date back to the very sad day when an official distinction between gauss and oersted was introduced. The idea of a magnetic field is difficult enough to expound to students at the best of times, whether one makes use of the abstraction of a magnetic pole or not. What on earth are they supposed to make of the official statement that there are two sorts of magnetic field of different physical dimensions (which are, in reality, different types of average of the same thing, and often agree numerically to within a few parts in a million)?

If we really must have this confusion, where is the corresponding classification elsewhere? I cannot find it in spite of a careful reading of the letter in your issue of May 3 (*Nature*, 222, 500; 1969).

Put in another way, it seems to me that the official handout is that ϵ_0 and μ_0 are indispensable, whereas 4π and c can somehow be swept under the carpet. We teach electromagnetics up to honours level without any mention of ϵ_0 and μ_0 , but 4π and c , if banished from one formula, promptly appear elsewhere in the scheme, so we seem to be exactly out of step. In a vacuum, two vector fields are enough, so what is gained by pretending that there are really four there? What about William of Occam?

Yours faithfully,

H. N. V. TEMPERLEY

Department of Applied Mathematics,
University College of Swansea.

University News

Dr E. B. Newman will become professor of psychology at Harvard University on July 1.

Professor B. G. Gowenlock has been appointed dean of the faculty of science at Heriot-Watt University. Professor A. Bolton has been appointed dean of the faculty of engineering.

Dr N. M. Bleehen has been appointed to the chair of radiotherapy tenable at the Middlesex Hospital Medical School, University of London.

The title of professor of morbid anatomy has been conferred on **Dr A. E. Claireaux** in respect of his post at the Institute of Child Health, University of London.

The title of professor of haematology has been conferred on **Dr R. M. Hardisty** in respect of his post at the Institute of Child Health, University of London.

Announcements

A new subsection of the **Productivity of Marine Communities Section (PM)**, **International Biological Program (IBP)**, was recently organized, whose activities will be known as "Theme B Modification of the Marine Environment by Man's Activities". The programme is designed to include studies of actual as well as potential modification of the environment, including the effects of pollution, the construction of harbour works, dams and other artificial structures. The organizers hope to attract engineers to the programme who are interested in the total marine environment as it is being affected by technology, as well as marine ecologists. To improve communication in this field, the coverage of the monthly *NE Coast (Great Britain) Pollution Bulletin* has been increased and its name changed to the *Marine Pollution Bulletin*. It will in future include progress reports and proposals from investigators working throughout the world as well as material from the NE coast of Great Britain. Further information can be obtained from Dr Jack B. Pearce, Sandy Hook Marine Laboratory, Highlands, New Jersey 07732, USA, or Professor R. B. Clark, Department of Zoology, University of Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU, UK.

The **Chalmers Medal** of the Royal Society of Tropical Medicine and Hygiene has been awarded to **Dr B. O. L. Duke**, Helminthiasis Research Unit of the MRC, Kumba, West Cameroons, in recognition of his research on loiasis.

The **Alexander Agassiz Medal** of the National Academy of Sciences has been awarded to **Mr F. C. Fuglister**, Woods Hole Oceanographic Institution, in recognition of his observations of the Gulf Stream and its vortices.

The **Henry Arctowski Medal** of the National Academy of Sciences has been awarded to **Dr E. N. Parker**, University of Chicago, in recognition of his contributions to the theoretical understanding of the interaction between the magnetic fields of the Sun and Earth and the ion plasmas that surround these bodies, and to **Dr J. P. Wild**, Commonwealth Scientific and Industrial Research Organization in Sydney, for his contributions to solar radio astronomy. The **US Steel Foundation Award in Molecular Biology** has been awarded to **Dr W. B. Wood**, California Institute of Technology, for his successful reconstruction of the T4 virus *in vitro* and studies of its assembly mechanism. The **James Craig Watson Medal** has been awarded to **Dr J. K. Moser**, New York University, Courant Institute of Mathematical Sciences, for his mathematical contributions to dynamical astronomy.

ERRATUM. In the report entitled "Will ELDO last" (*Nature*, 221, 1183; 1969), it was stated that Professor H. Bondi chaired the first meeting of the committee of high officials. In fact, Professor Bondi merely took the chair while the committee elected as its chairman Professor G. Puppi.

CORRIGENDUM. In the article by L. S. B. Leakey entitled "Lower Dentition of *Kenyanthropus africanus*" (*Nature*, 217, 827; 1968) it was stated in the second paragraph of the section "The Teeth" that "There is an attrition facet down the lingual aspect (of the canine), instead of along the buccal face". Dr Leakey has now written to say that after further detailed study he believes that it is not an attrition facet, but that it is due to some other form of damage to the enamel, not related to the canine occlusion.