ship in 1921. His highly productive career started with the publication, while he still held the studentship at Gonville and Caius, of papers on the structure and movement of cilia in *Mytilus* and on the early development of the echinoderm egg. Two other papers on veliger cilia followed after his move to a lectureship at Glasgow, and it is clear that this early work was influenced by Sir James Gray, who was two years his senior and held the Balfour Studentship at Cambridge during Carter's time as a Part II student. His work from Glasgow at the Millport Marine Station, where he was much encouraged by Richard Elmhirst, and at Naples, led to a further nine papers on sperm and fertilization in *Echinus* and *Asterias* and concluded the first recognizable phase in his work, largely concerned with invertebrate physiology. He returned to a lectureship in Cambridge and a fellowship at Corpus Christi College in 1930, holding the former to his retirement in 1960 and the latter until his death.

A new facet of Carter's wide ranging biological interests opened up with his expeditions in the 1920s and 1930s to Brazil, the Paraguayan Chaco and to British Guiana, and subsequently in the middle 1950s to Jinja and the papyrus swamps on Lake Victoria. Substantial papers with Beadle on the South American work, a biological review, and other papers of his own followed, covering all aspects of that fascinating environment, the tropical swamp, and dealing with adaptations largely of fish and oligochaetes to this taxing mode of life. It would seem clear that his great interest in evolution arose during this work. The material collected on these expeditions was worked upon by Gurney, Lowndes and Jepps, among others, and was of wide influence.

It was perhaps in his final and maturest phase, as a writer of substantial general texts, that Carter exerted his most profound influence on the development and teaching of zoology. His *General Zoology of the Invertebrates*, first published in 1940 and running to four editions by 1961, remains a model of readable analysis and instructive information, and his *Animal Evolution* (1951) and *A Hundred Years of Evolution* (1957) were of equal value to the student and the general reader respectively. He continued writing until the beginnings of his final illness and happily saw *Structure and Habit in Vertebrate Evolution* published in 1967. This late work is perhaps the best tribute to his versatile and enquiring mind, for it forms a synthesis of physiological, structural and behavioural knowledge in this field which shows most clearly his ability to develop a new and profitable approach to an old problem in the light of a lifetime's experience of enquiry.

Although this is meant primarily to be an account of his published contributions to knowledge, the moment cannot be allowed to pass without also recording the appreciation of generations of undergraduates and colleagues who were alike given his stimulating, critical but kindly advice and encouragement. He was much loved and will be much missed by many friends.

Correspondence

Should Slides be seen Blind?

SIR,—I fully endorse the views expressed by Roe *et al.*[1] on the subject of histological examination using a "blind" technique.

In this sort of examination the pathologist often has to decide whether the abnormality he finds could have been the result of a natural disease process rather than of a specific insult from administration of the test substance. Such a distinction may be difficult or even impossible without a knowledge of necropsy findings and of lesions in the other animals on the same regimen of treatment.

Assessment of minor degrees of change resulting from toxic damage is one of the principal objects of safety evaluation tests. Such minor changes often cannot be readily distinguished from variations in the normal appearance of tissues, or from a processing artefact, without information relating to level of treatment, state of health of the animals, and necropsy findings.

In the clinical field the pathologist relates his findings and opinion to the clinical history and biochemical results. Only by following the same procedure in experimental animal studies can a sound pathological opinion be given of any lesions.

Efforts to examine pathological material from toxicity tests "blind" have been made in the past and they have been met with unqualified disfavour by pathologists. Dr A. A. Nelson, one of the pioneers in the field of pathological examination of animal tissues from toxicity tests, when asked whether he would advise this sort of procedure[2] replied, ". . . my own feeling is that a person that couldn't give a reliable opinion if he had the data would give a worse one without it. . . . The truly blind and random reading, I think, will result in the pathologist having wider limits of normality than he otherwise would have, and eventually what is actually a mild but definite effect will be passed off as within those broad normal limits"[1].

Yours faithfully,

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[1] Roe, F. J. C., Carter, R. L., Cotchin, E., and Bonser, G. M., *Nature*, **225**, 1081 (1970).

[2] Nelson, A. A., in *The Pathology of Laboratory Animals: the Recording and Reporting of Pathological Data* (edit. by Ribelin, W. E., and McCoy, J. R.) (1965).

Another *Acanthaster* Disaster

SIR,—Possible biological consequences of establishing an open waterway between the eastern Pacific and the Caribbean have recently been pointed out by several scientists[1–5]. These consequences include interactions between closely related species as well as between unrelated species. Conceivably the results of either could, from man's viewpoint, be detrimental or beneficial. Generally biologists have warned of possible bad effects of uncontrolled biological exchange between the two oceans, although Topp[4] offers a guarded opinion that the characteristics of the fish faunas, at least, will not be drastically altered.

Introductions of foreign species leading to undesirable results are well known, and to ignore the probability of a plethora of serious problems resulting from free migrations through a sea-level canal is the height of folly, but unfortunately it is difficult to predict which organisms will cause trouble in new environments. Without intensive study, only obviously inimical species can be singled out.

Weathersbee[5] has valid fears about the possible introduction of the poisonous sea snake, *Pelamis platurus*, into the Caribbean through a sea-level canal, but *Acanthaster ellisi* (Gray), the eastern Pacific crown-of-thorns starfish, may present an even greater potential danger to the Caribbean. Wholesale destruction of coral reefs by the Indo-Pacific crown-of-thorns, *A. planci*, has received considerable attention recently[6–9] and the problem has become so acute that Chesher[6] has expressed fears for the future of Pacific reefs. *Acanthaster ellisi* is so similar to its Indo-Pacific relative that separation of the two species has been questioned (personal communication with J. Halpern, University of Miami). Presumably it eats coral, although nothing is known about its biology. It is thought to be rare[10], and population growth is possibly limited by a lack of suitable coral growth in the eastern Pacific.

The known distribution of *A. ellisi* includes the Gulf of California and nearby Socorro and Clarion Islands[11,12]. The adults do not appear to extend to the Isthmus, but their distribution is not well known.

If the crown-of-thorns were to invade the Caribbean it would find a lush habitat to exploit in the present extensive coral biotope. A population explosion on a scale comparable with that of its Indo-Pacific relative would be disastrous.

An invasion of the Caribbean by *A. ellisi* is entirely possible should a sea-level canal be constructed without a barrier to the free distribution of marine animals. The alternative to risking invasions into either ocean by potentially dangerous foreign species is patently clear; construction of a suitable biological barrier in any new trans-isthmus canal.

Yours faithfully,

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[5] Weathersbee, C., *Science News*, **94**, 578 (1968).
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[7] Barnes, J. H., *Austral. Nat. Hist.*, **15**, 256 (1966).
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[11] Madsen, F. J., *Vidensk. Medd. dansk naturh. Foren. Kbh.*, **117**, 179 (1955).
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Pulses, Units, Pitts and Hertz

SIR,—I refer to Stark's letter[1] proposing a new unit of frequency, pitts, for nerve pulses per second, which would simplify the use of neurophysiological papers and graphs. I wish to point out that the results of radioactivity measurements are likewise expressed in pulses (counts) per unit time, and that some confusion exists concerning units of frequency, because no distinction is made between periodic and aleatory phenomena.

Frequencies of periodic phenomena are expressed in Hertz units (with dimension s^{-1}), an accepted derived unit in the International System of Units (SI). The same dimension applies to averaged frequencies of aleatory phenomena like those mentioned in the preceding paragraph; the word "averaged" is intended to imply that the duration of the measurement is appreciably larger than the statistical frequency of the aleatory phenomenon. According to the latest ICRU report on radiation quantities and units[2], the unit for activity, the Curie (accepted by SI), is defined as $3{\cdot}7 \times 10^{10}$ nuclear transformations (that is disintegrations or isomeric transitions) per second. However, in accordance with the former definition of the Curie as a unit of quantity of a radioactive nuclide, the presently accepted definition of the Curie includes the words "... nuclear transformations occurring in a *quantity* of radioactive nuclide per second", although the italicized part is irrelevant since the dimension of the Curie unit is s^{-1}.

Until a treaty for the non-proliferation of scientific units (and journals) has been signed, I support Stark's proposal[1], with the proviso that frequencies of periodic phenomena should be expressed in Hertz, results of absolute measurements of radioactivity in Curie, and averaged frequencies of aleatory phenomena (including results of relative measurements of radioactivity) in a new unit (all these three units have s^{-1} as dimension). It would have been better to have only two frequency units, one for periodic and the other for aleatory phenomena, but this seems to be no longer possible.

Yours faithfully,

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Roumania.

[1] Stark, L., *Nature*, **225**, 394 (1970).
[2] *Radiation Quantities and Units*, Report No. 11 of the International Commission on Radiation Units and Measurements (Washington, DC, September 1, 1968).

University News

Dr Donald G. Rea, NASA, has been appointed to the newly created post of assistant laboratory director for science at the Jet Propulsion Laboratory, **California Institute of Technology.**

Professor C. R. O'Dell has been reappointed chairman of the Department of Astronomy and Astrophysics and director of the Yerkes Observatory, and **Professor Eugene N. Parker** has been appointed chairman of the Department of Physics, in the **University of Chicago.**

Dr Eli Chernin has been appointed professor of tropical public health in the Faculty of Public Health, **Harvard University.**

Professor Richard H. Greenwood, University of Queensland, has been appointed to the second chair of geography, at the **University College of Swansea.**

Appointments

Professor J. Cruickshank, University of Sussex, has been appointed to membership of the **University Grants Committee,** and **Professor C. E. H. Bawn,** University of Liverpool, **Professor R. C. Cross,** University of Aberdeen, and **Professor J. Diamond,** University of Manchester, have been reappointed.

CORRIGENDUM. At a meeting of the Parkinson's Disease Society on February 11 the impression arose that patients involved in trials of L-dopa would have to stop taking the drug when trials are completed. (*Nature*, **225**, 675; 1970.) Professor J. N. Walton, chairman of the MRC working party on L-dopa, has pointed out that this is not correct, and that patients who benefit from L-dopa have been guaranteed a continuing supply after completion of trials.

International Meetings

April 2–3, **Creativity in Engineering,** Birmingham (C. Hearn Buck, University of Aston in Birmingham, Gosta Green, Birmingham 4).

April 7–9, **Statistical Techniques for Library and Information Work,** London (Education Officer, Aslib, 3 Belgrave Square, London SW1).

April 7–10, **Special Library and Information Work,** London (Education Officer, Aslib, 3 Belgrave Square, London SW1).

April 7–10, **Bio-Medical Engineering,** Oxford (J. D. Gasking, Department of Pharmacology, The Medical College of St Bartholomew's Hospital, Charterhouse Square, London EC1).

April 9–10, **Metabolism and Biological Functions of Polyamines,** New York (New York Academy of Sciences, 2 East 63rd Street, New York, NY 10021, USA).

April 14–16, **Handling Current Records,** London (Education Officer, Aslib, 3 Belgrave Square, London SW1).