

velocity. S^3 offers a design service for objective lenses.

Second, electrical interference on the recorded signal increases the error in the velocity inferred. It is difficult to be precise as electrical interference is highly variable from one location to another, but for most locations the S^3 -204 is probably adequately screened. If, however, as was our experience, the interferometer had to be operated outside a conventional screened room near equipment generating severe electrical interference ($>1 \text{ kV m}^{-1}$) then the screening of the photomultiplier assembly is not adequate and local elec-

trical double screening is necessary to reduce the interference to an acceptable level of less than 10% of the recorded signal.

Third, the interferometer does not measure the direction of the target movement, and it is in many cases not obvious from the record itself where acceleration reversals have taken place. Nonetheless, the S^3 -204 can be adapted to use an optical technique of phase shifting the laser light recorded in one photomultiplier by $\lambda/4$ to obtain records in both photomultipliers that unambiguously identify acceleration reversals (Bouricous and Clifford, *Rev. Sci. Inst.*,

41, 1800; 1970). Fig. 2 shows interferometer records obtained with this technique together with the inferred velocity. In only one record are the acceleration reversals unambiguous. The technique is available from S^3 .

The S^3 -204 interferometer measures reliably surface velocities from shock physics experiments, and, once a prospective purchaser has decided which of the many available options are useful to him, the instrument will provide a useful addition to any laboratory working in shock physics.

P. H. WHITE
R. H. GOBBETT

CORRESPONDENCE

Creation or Evolution

SIR,—The discussion by advocates of creation vs evolution (*Nature*, 240, 365; 1972) was triggered by the "school textbook controversy" in California. Solan, at least by implication, identifies the dispute with the State of California, but a bill requiring Michigan's public schools to teach the biblical account of creation along with evolutionary theory was unanimously approved by the House Education Committee in Michigan on December 5.

The textbook controversy has both religious and scientific components. The religious arguments used by the California State Board of Education and its creationist supporters were opposed by eminent clergymen, representing several of the leading faiths, in the hearings at Sacramento on November 9. Other objections raised by the "creationists" were directed against the scientific content of evolution. These objections are uninformed, illogical, trivial, and, if they find their way into the textbooks, they will degrade the teaching of science to the children of California.

Dr John Ford, the vice-president of the Board, favours "as the best current explanation for variation among plants and other living things the Special Theory of Evolution as defined by G. A. Kerkut and others". He also states that science "classically ignores" the areas of "value systems, morals, art and poetry". Evidently, he does not know, or ignores, the contributions made to human welfare by great scientists who were also great humanitarians.

An engineer named Vernon Grose has been the Board's leading adviser on evolution. The Board elevated him to the State Textbook Commission. He is also a member of the Governor's Commission on Law Enforcement. Mr Grose's statements have made it evident that he does not have even a

rudimentary knowledge of biology. He says that Pasteur's demonstration that bacteria do not arise spontaneously disproves theories of the origin of life. Mr Grose strongly opposes the concept of adaptation as an evolutionary force. He asserts that "the regular absence of transitional forms may best be explained by a creation theory", and he dislikes the concept that plants and animals have a common ancestral origin. However, he has not so far proposed a revision of the primary sequence of cytochrome *c*.

The controversy continues, and the Board, on December 14, evidently favoured introducing the teaching of creation into science textbooks. There will be more news in January, following action by a new committee of the Board that includes Dr Ford and two scientists (Richard Bube and Robert Fischer) who are active in the religiously-oriented American Scientific Affiliation.

Yours faithfully,
THOMAS H. JUKES

University of California,
Berkeley, California 94720

SIR,—It is welcome that you are initiating a review of any time-honoured scientific tenet of faith—for this is what evolution has become to many of us—rather like a theological doctrine, to be defended with some passion. It is a good thing for people to question broad philosophical assumptions and keep open minds. On the issue of evolution as a primary directive force in the cosmos, I propose to do just that whilst feeling free to use the evolutionary hypothesis in relevant cases in my research and thinking.

I feel undogmatic and somewhat sceptical in the debate. Special creation cannot be proved, and a thoroughgoing evolutionary origin on the basis of environmental adaptation explains

much, but leaves plenty of unanswerable queries.

My atheist undergraduate diet of Haldane, Huxley, Bernal, Wells and so on failed to satisfy me that evolution is the sole creative force behind the cosmos and the biosphere and modern *Homo sapiens*. On more recent review, I find it too much for my credulity, for reasons similar to those cited by Vanderkooi and Van Kley (*Nature*, 240, 365; 1972). On the other hand, I find God real and His activity demonstrable over the years.

One demonstrates biogenetic evolution in the laboratory and field at species and generic level, but I doubt the validity of extrapolating these data and turning them into a first cause. Wouldn't we beat our students about the head for far less a sin?

So one opts for some creative power—I call Him God—as a first cause, which I maintain is common sense and fair science. Why did it happen—that is a non-scientific issue. How it happened is a valid question, but too difficult, except as the answer comes clear here and there from observation and experiments.

Yours faithfully,
DAVID ALLBROOK

Department of Anatomy,
The University of Western Australia

SIR,—I thank you for publishing my letter on the subject of creation or evolution.

The whole fable of evolution is nothing more than a confidence trick on the part of the Devil, who is as perfectly well able to blind the eyes of men of science as he is those of lesser mortals. A theory which results in a grovellingly debased view of human origins—the absolute opposite of the truth that man was created in God's own image—and which helps to spawn such

grotesquely distorted pieces of literature as Marx's *Das Kapital* and Hitler's *Mein Kampf*, can only have originated from such a source.

Yours faithfully,

ALAN RADCLIFFE-SMITH

13 Argyle Avenue,
Hounslow,
Middlesex

β -Carotene

SIR,—The following comments may be of some interest with respect to the letter of Drs Johnson and Fusaro.

While it is true that Kesten (not Keston) was the first to describe the use of β -carotene cream as a photoprotective agent, Mathews-Roth and associates were the first to show unambiguously in a number of patients and animals the effectiveness of internally administered β -carotene¹. It should be recognized that there is a marked difference between topically and internally administered β -carotene. As Kesten showed in a single patient, topically applied β -carotene provides some protection against photosensitivity. This protection is due to the absorption of part of the incident visible light by the carotene, and hence topically applied black treacle would probably have a similar effect. When β -carotene is taken internally, its protective effect is enhanced and it seems likely that the carotene is acting not merely as a light shield but as an *in vivo* quencher of singlet oxygen. Although Kesten did administer β -carotene orally to one photosensitive patient, she did not report any definite conclusions regarding the effectiveness of the treatment.

Yours faithfully,

ANTONY F. McDONAGH

School of Medicine,
Department of Medicine,
University of California,
San Francisco

¹ Mathews-Roth, M. M., Pathak, M. A., Fitzpatrick, T. B., Harber, L. C., and Kass, E. H., *Trans. Assoc. Amer. Phys.*, **83**, 176 (1970).

Congress Caveat

SIR,—We would like to reply to the letter (*Nature*, **240**, 428; 1972) about the prices of some of the excursions arranged for participants in the ninth International Congress of Biochemistry. When preparing for the Congress, the organizing committee asked a well-known Swedish travel agency, RESO, to arrange a number of visits and excursions in connexion with the Congress. The tours were to be arranged at RESO's financial risk and on the condition that they could not be cancelled on the basis of a low number of participants. The negotiations with RESO resulted in plans

for those visits and excursions that are described in circular 2 of the Congress. The arrangement of these tours constitutes no source of income for the Congress but should be considered only as a service to the Congress members. The tours specially arranged for participants of the Congress provide good opportunities for informal discussions and exchange of ideas, in combination with a comfortable way of doing some sightseeing. There is no doubt that the sightseeing by itself can, in many cases, be done at a cheaper price and there are, of course ample possibilities for every visitor to arrange his own sightseeing. However, when it comes to regular sightseeing tours comparable with the Congress tours in routes, transport facilities, meals and refreshments, guide services and so on, the prices are comparable to or higher than those offered by RESO for the Congress tours.

In response to our specific question regarding the price (75 Sw. kr) of the Congress excursion through the Stockholm archipelago, we have received the following information from RESO:

The participants will sail from Stockholm to Sandhamn and back to Stavsån by a rented ship. In order to save time, the trip from Stavsån back to Stockholm will be made by rented buses. The regular voyages from Stockholm to Sandhamn and back (entirely by ship, return price 24 Sw. kr) are subsidized by the City of Stockholm, not so the Congress tour. The latter, moreover, includes a first class lunch at Sandhamn, music and coffee on board, and the services of guides. RESO will be glad to answer further questions regarding this and other Congress tours.

It is our sincere hope that all participants of the Congress will find their stay in Stockholm pleasant and profitable, and we shall do our utmost to this end.

Yours faithfully,

LARS ERNSTER

9th International Congress of
Biochemistry,
c/o Svenska Kemistsamfundet,
Wenner-Gren Center, 6 tr.,
S-113 46 Stockholm

Pulsar Disclaimer

SIR,—The statement made by the authors at the end of "Periodicities in Seismic Response caused by Pulsar CP1133" by Dror Sadeh and Meir Meidav (*Nature*, **240**, 136; 1972), reading "We thank Professor C. L. Pekeris and the Applied Mathematics Department at the Weizmann Institute . . ." should not be construed as implying that I, or the Department of Applied Mathematics of the Weizmann Institute, are in any way responsible for the

views expressed by the authors in this paper.

Yours faithfully,

C. L. PEKERIS

Department of Applied Mathematics,
The Weizmann Institute of Science,
Rehovot

Cancer Chemotherapy

SIR,—I wish to present a strategy for cancer chemotherapy which, to my knowledge, has not been explicitly stated in print before.

Consider two classes of substances: class A substances kill only dividing cells, class B substances reversibly inhibit the division of normal cells but do not inhibit the division of malignant cells. The strategy is to first apply a class B substance; when it has taken effect, a class A substance is applied. Both are removed before unacceptable damage is done.

The key advantageous feature of this strategy lies in the protective effect of the class B substances. This will allow larger doses of more potent class A substances to be used more frequently and for longer periods.

Class A substances are well known among current chemotherapeutic agents. Do class B substances exist?

Yours faithfully,

DAVID ZIPSER

Cold Spring Harbor Laboratory,
Cold Spring Harbor, New York 11724

Announcements

Miscellaneous

THE Soviet State Prizes for science for 1972 were awarded as follows:

1. To Academician Boris Ivanovich Stepanov, Director of the Institute of Physics of the Byelorussian Academy of Sciences, Anatolii Nikolaevich Rubinov and Vasilii Andreevich Mostovnikov for work carried out in the Institute on the optical generation of complex organic compounds in solutions and the development of a new type of laser in connexion with this work.

2. To Dr Anatolii Filippovich Tulinov, Yurii Vladimirovich Melikov, Vatslavas Stanislavovich Kulikauskas, Grigori Arkad'evich Iferov and Grigori Pavlovich Pokhil of Moscow State University, Arij Aleksandrovich Puzanov of the Ural Polytechnic Institute, Bela Gabdulgaliyeva Akhmetova of the Kazakh State University, and Sarkis Arshavirovich Karamyan of the Joint Institute of Nuclear Research for their discovery and investigation of the shadow effect in nuclear reactions on monocrystals.