

ERRATUM. In the article "Changing Duration of Glacial Cycles from Lower to Upper Pleistocene" by J. Chappell (*Nature*, 219, 36; 1968) "35 per cent" should read "0.35 per cent" in the twenty-second line of the third paragraph on page 39, and three lines higher the wording should be: "with winds blowing to the north"; not "from the north" as it says.

ERRATUM. In the article "Transplantation and Cytotoxicity Changes induced by Acid Mucopolysaccharides" by Muriel Lippman (*Nature*, 219, 33; 1968) the beginning of the second paragraph should read: "Both the histochemical observation that applied AMPS can coat cell surfaces^{3,4} and the increased electrophoretic mobility produced in a variety of ascites tumour cells after exposure to the sodium salt of heparin¹ suggest that surface coating can explain the experimental observations". In the first sentence of the sixth paragraph "100 test substance" should be "100% of test substance". The first sentence of the tenth paragraph should read: "Collectively the increased tumour volume and the shortened survival time of animals with YAC ascites tumours shows that preincubation of the cells with AMPS facilitated the growth of these tumours in syngeneic animals". The author's present address is the Department of Pediatrics, not Zoology, at the University of Chicago.

CORRESPONDENCE

De-acceleration

SIR,—Any sectional interest, scientific or otherwise, can always make out a case for a particular project which in their eyes is unassailable in logic, virtue and derived benefit.

Advice, by definition, is an expression of opinion and, solicited or unsolicited, is surely not binding on the recipient.

One wonders whether your editorial and the views of the eminent professors (expressed in *Nature*, July 6, 1968, page 15) would have induced the same inflamed passions had the Government been unanimously advised not to participate in the 300 GeV accelerator project and yet had decided to support it?

Yours faithfully,

ANTHONY M. FREKE

"Mildura",
7 Porchester Road,
Newbury, Berks.

On the Codification of Science

SIR,—Whatever the truth with respect to the relative and absolute growth in the number and size of scientific journals¹, there is a continuing concern over the scientific "knowledge explosion" and its containment. Some of the proposed remedies in terms of preprints², information storage and retrieval³ and the proliferation of new journals⁴ may mistake the nature of the disease and help to kill⁵ rather than cure the patient. There is undoubtedly widespread agreement on the morbidity of the present system⁶⁻⁸.

One great addition to the volume of the scientific literature comes from the repetition required not only to place a problem in historical perspective but also to re-establish the nomenclature and develop the argument from basic premises. How often the author in presenting a paper at a learned society meeting uses his few precious minutes in once again setting up the problem and leaves little or no time for his unique contribution, the solution! This is even more noticeable at interdisciplinary conferences⁹, where there is no established symbolism common to the different disciplines and each speaker has to relate

his spacing, scattering parameters, etc., to those of the preceding speakers. A modest proposal to reduce the repetition of spoken and written work is that we "codify", set forth systematically, the accepted state of science at a particular time.

It is possible to give illustrations of the usefulness and overall success of codification in limited fields. For example, the work of the International Bureau of Weights and Measures and the various national bureaux has been basic to the systematic development of modern science. The findings of the bureaux, applied with the natural conservatism of governments, have added the weight of the legal code to the force of scientific laws. At another level, temporary organizations concerned with the codification of science were the committees on the teaching of geometrical optics which in Britain and the United States reduced to order the sign conventions for spherical mirrors and lenses. A more recent example of the successful provision of guide lines for teaching is the work of the Coulomb Law Committee of the American Association of Physics Teachers¹⁰.

Mathematical and physical tables, handbooks and *handbücher* are all approaches to codification but *handbuch* articles have not, in general, become the authoritative references one might expect. An interesting exception at a high theoretical level is Pauli's relativity article written at the age of 21 and published in English¹¹ nearly fifty years later. In review articles, Bacher, Bethe and Livingston¹² provided a classic of nuclear physics which, because of its authority and timing, served a whole generation of scholars. Finally, Born and Wolf's *Principles of Optics*¹³ can be cited as a treatise which seems to have been generally accepted as the codification of its particular field. Thus it is quite common for authors and speakers to start off scientific papers with a reference to a specific equation in this book. In its logical organization, meticulous attention to detail, comprehensive assessment of the literature and frequent revision, it exemplifies the codification which might usefully be extended to all fields of science.

In summary, the proposal is that science be reviewed and codified by recognized authorities (not necessarily committees). The selection of proper authors might serve as a legitimate concern and new breakthrough for the national and international scientific organization. Codification should not introduce an orthodoxy or rigidity in science because the acceptance of a particular work would depend on its inherent quality and the precise formulation of the present state of knowledge would facilitate argument against as well as for the status quo. The foregoing examples are taken from physical science but they could be extended to show that such a codification would serve science generally.

WILLIAM J. NOBLE

Department of Physics,
Mount Allison University,
Sackville, New Brunswick.

¹ *Is the Literature Really Exploding?*, *Nature*, 218, 41 (1958).

² *A Debate on Preprint Exchange*, *Phys. Today*, 19, 6, 60 (June 1966).

³ *Toward National Information Networks*, *Phys. Today*, 19, 1, 38 (Jan. 1966).

⁴ Powles, J. G., *Birth Control for Journals*, *Nature*, 218, 50 (1968).

⁵ Pasternak, S., *Is Journal Publication Obsolescent?*, *Phys. Today*, 19, 5, 38 (May 1966).

⁶ Maddox, J., *Is the Literature Worth Keeping?*, *Bull. Atom. Sci.*, 19, 9, 14 (Nov. 1963).

⁷ Goudsmit, S. A., *Is the Literature Worth Retrieving?*, *Phys. Today*, 19, 9, 52 (Sept. 1966).

⁸ Branscomb, L. M., *Is the Literature Worth Reviewing?*, *Sci. Res.*, 3, 11, 49 (May 27, 1968).

⁹ An example is the second interdisciplinary conference on electromagnetic scattering held at the University of Massachusetts at Amherst, June 1965, with proceedings published as Rowell, R. L., and Stein, R. S., *ICES II, Electromagnetic Scattering* (Gordon and Breach, 1967).

¹⁰ *The Teaching of Electricity and Magnetism at the College Level*, *Amer. J. of Phys.*, 18, 1, 69 (1950).

¹¹ Pauli, W., *Theory of Relativity* (Pergamon Press, 1959).

¹² Bethe, H. A., and Bacher, R. F., *Rev. Mod. Phys.*, 8, 82 (1936); Bethe, H. A., *ibid.*, 9, 69 (1937); Livingston, M. S., and Bethe, H. A., *ibid.*, 9, 245 (1937).

¹³ Born, M., and Wolf, E., *Principles of Optics* (Pergamon Press, 1959).