the needs of all three phases of the proposed policy. The syllabuses seem well designed to meet some of the criticisms which have been made of the outlook of science graduates themselves, and the Statement and its accompanying detailed sections demonstrate that the two Associations are tackling the revision of syllabuses imaginatively as well as energetically. They are to be commended not simply to the attention of science teachers themselves but at least as much to scientists and the professional associations, as well as to the universities, for the recommendations can scarcely achieve their full effort without full co-operation by the universities and professional bodies. Moreover, considering the steps already taken by the National Science Foundation in the United States, and in view of the serious shortage of science teachers both the Minister of Education and the Minister for Science should be considering the wider implications, and the steps that will be required at a higher level if the recommendations are to be adopted not merely in grammar schools but also elsewhere.

ATOMIC RADIATIONS AND LIVING ORGANISMS

SINCE 1955 various committees appointed by the U.S. National Academy of Sciences—National Research Council have been conducting a continuing appraisal of the effects of atomic radiations on living organisms. Various reports have come from sub-committees of the Committee on Pathologic Effects, and differ considerably in their approach and content[1].

The most generally valuable of the recent reports is that on *Inhaled Radioactive Particles* (ref. 1*a*). It contains, or provides references to, basic factual information on the nature of these particles, and the physiological and pathological mechanisms involved in their deposition in and translocation from the respiratory tract. The formidable complexity of the problems involved is clear.

Different processes are responsible for the retention of particles of different sizes and densities, and in practical situations the amount of radioactivity in a given particle is independent of the nature of the radioactivity and of the size of the particle. The rate of loss of radioactivity from particles deposited in the respiratory tract is not simply related to 'solubility' in body fluids. The problems of assessing radiation 'dose' to the tissue around a radioactive particle go to the root of what is meant by tissue dose, a concept which still awaits a fruitful synthesis of physical chemistry, cell biology and pathology, at least in relation to carcinogenesis. Although miners of radio-active ores have suffered a gross excess of cancer of the lung for several centuries, the relative importance of the different factors which may be concerned, including those non-radiative, is quite obscure.

Another report (ref. 1*b*) entitled *Long-Term Effects of Ionizing Radiations from External Sources*, is more discursive and covers the same ground as many fairly recent reviews: life-shortening, tumour production, cataract, fertility and ageing. Seven of the eleven sub-committee members come from the same university, five from the same department, and it is not unfair to say that this common background permeates the theoretical framework or point of view. The implication that ovarian damage in the adult human female is not irreversible (p. 27) would not be generally acceptable. The definition of threshold dose as a description of the possible response of a single animal (p. 2) seems likely to add further confusion to the existing conceptual muddle.

A short report (ref. 1*c*) on the *Effects of Ionizing Radiation on the Human Haematopoietic System* has also been issued, but much that is new is an expression of opinion, for example, on the proper clinical treatment for an individual exposed to a dose in the acutely lethal range. Routine blood counts at periodic intervals in occupationally exposed persons are "wasteful and unproductive in detecting low-dose radiation effects". When decisions are to be made involving exposure of populations, *society* must weigh the benefits against the potential health hazard (my italics).

R. H. MOLE

[1] National Academy of Sciences—National Research Council. (*a*) Publication No. 848: *Effects of Inhaled Radioactive Particles: Report of the Subcommittee on Inhalation Hazards, Committee on Pathologic Effects of Atomic Radiation*. Pp. vi+78. (*b*) Publication No. 849: Report of the Subcommittee on *Long-Term Effects of Ionizing Radiations from External Sources*, of the Committee of Pathologic Effects of Atomic Radiation. Pp. v+82. (*c*) Publication No. 875: *Effects of Ionizing Radiation on the Human Hemapoietic System:* Report of the Subcommittee on Hematologic Effects, Committee on Pathological Effects of Atomic Radiation. Pp. v+14. (Washington, D.C.: Nationa Academy of Sciences—National Research Council, 1961.)

SLOW DECOMPOSITION OF EXPLOSIVE CRYSTALS AND THEIR DAMAGE BY FISSION FRAGMENTS

By DR. F. P. BOWDEN, C.B.E., F.R.S., and H. M. MONTAGU-POLLOCK
Physics and Chemistry of Solids, Cavendish Laboratory, Cambridge

Thermal Decomposition

WITH many explosive solids the decomposition may begin slowly before it passes over into rapid explosion or detonation. The onset of explosions is usually governed by thermal considerations: if the rate of heat liberated by the slow chemical decomposition of the crystal is greater than that of heat lost by conduction, the reaction will accelerate to explosion[1]. The mechanism of slow decomposition is therefore of considerable importance in determining the explosive process. We have in this Laboratory been using electron microscopy and electron diffraction to study the early stages of the slow decomposition[2-5].