bonded by peroxide linkages. A tentative formula was proposed for the crystalline peroxide as

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CH.(CH2)3.CH.CH=CH.CH.CH:CH—
              |         |
              O―――――――――O
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Dr. O'Neill also described the results of direct studies of the autoxidation of drying oils in film form. Thus linseed oil takes up eight atoms of oxygen per molecule. Some of this oxygen is lost as volatile products, and only five atoms are retained after fourteen days. The volatiles include water, carbon dioxide, aldehydes and acid (particularly formic acid). Little change occurs in the film after a few days, and it seems necessary to postulate scission of the oxidation polymer in order to explain this high oxygen take-up.

C. E. H. BAWN

SCIENCE AND GOVERNMENT

IN his address, "Science and Government", to the American Chemical Society at its meeting in Los Angeles on March 16, Dr. L. A. DuBridge suggested that there are three points of contact between government and science. First, the nature, form and operation of the government determine the political, economic and intellectual climate of a nation, and whether the resulting climate is favourable to science or not may be accidental. If science is to flourish, however, that climate must provide for intellectual freedom, progressive change and the recognition and encouragement of intellectual pursuits. Secondly, science and its technological applications produce changes in the way men live, requiring corresponding changes in the operations, and possibly even in the forms of government. Advances in technology are a major source of advances in human welfare. Thirdly, science and government come together most directly and intimately when science affects matters such as national defence, agriculture, industry, transport, navigation, conservation of natural resources, flood control and the weather, which are prime functions of government.

Following this, Dr. DuBridge reviewed the gradual growth in the United States of government interest in science, from the establishment of the U.S. Coast Survey in 1807 and the creation of the Smithsonian Institution in 1846, until in 1952 Federal Government expenditure on research and development in science and technology was about 1,250 million dollars, or more than 40 per cent of the country's total expenditure on research and development. More significant, however, than this increase in Federal expenditure on research, in Dr. DuBridge's opinion, is the increase in non-Federal research expenditure, from 143 million dollars in 1930 to 1,740 millions in 1952. Pointing out that it is almost impossible to distinguish rigidly between expenditure on military and non-military purposes, or even between research and development, Dr. DuBridge classified government activities according to five different management techniques commonly used: government agencies under civilian management; government agencies under military management; government-owned institutions managed privately under contract; contracts for research or development services; and contracts or grants in support of research, usually to colleges or universities.

Dr. DuBridge does not believe that the United States Government is at present getting full value from its vast expenditure on research and development. He thinks that expenditure under the fifth category—research grants—is the most fruitful and valuable. In 1952 this, however, only amounted to about 71 million dollars; and he urged that this should be substantially increased. He is concerned also that 87 per cent of these funds come from the Atomic Energy Commission and the Department of Defence, whereas, in place of the 15 million dollars requested for basic research by the National Science Foundation, the Foundation has only received 3·25 millions in 1952 and 4·75 millions this year. As regards contracts for research services, Dr. DuBridge repeated the warning frequently given by others, that universities and colleges should be chary of accepting too heavy a load of such sponsored research lest their programmes of basic research be endangered.

The opinion was expressed by Dr. DuBridge that the most successful device for development of new ideas, equipment or techniques for the military services is that of government research centres under private management, such as the Los Alamos Scientific Laboratory operated for the Atomic Energy Commission by the University of California. He believes it desirable that any new research facilities—and as many existing ones as possible—should come under the private management contracts rather than military direction. Apart from proving grounds and acceptance or inspection centres, research centres for new military weapons would be more efficient under civilian direction. It is necessary, moreover, not only to give more attention to planning weapon development expenditure but also to consider problems of grand national strategy against the background of recent scientific and technical developments. For this reason, he suggested the appointment of an outstanding scientist or engineer as scientific adviser to the Defence Department, who might also serve as chairman of the Research and Development Board. The chairman of the Atomic Energy Commission should, in his opinion, be a member of the National Security Council, and that Council should be provided with a science advisory council with a full-time chairman.

U.S. NATIONAL SCIENCE FOUNDATION

RESEARCH GRANTS

DURING the year ended June 30, 1952*, the National Science Foundation made ninety-six grants totalling 1,073,975 dollars for the support of basic research in the biological, medical, mathematical, physical and engineering sciences at fifty-nine institutions in the United States. Research proposals totalling 13·3 million dollars were received, of which 38 per cent were declined, withdrawn or represented reductions in budgets of approved proposals, and 54 per cent are pending. New proposals submitted in 1953 will exceed the 1952 figure, but the limited Foundation funds for research have discouraged many competent investigators from submitting proposals. Those submitted to date have been marked to an unusual extent by originality in

* Second Annual Report of the National Science Foundation, Fiscal Year 1952. Pp. viii+77. (Washington, D.C.: Govt. Print. Office, 1953.) 30 cents.

concept, boldness in design and a desire on the part of scientists to explore important but relatively neglected fields. While there appear to be large untapped resources for research in the colleges, universities and other non-profit institutions in the United States, the Foundation has discovered many areas of great scientific interest needing additional support, and nearly 75 per cent of its financial grants went to institutions previously participating least in Federal research support. About 52 per cent of these financial grants was spent on direct assistance to graduate students and other research assistants. Of the sixty-eight grants, totalling 762,675 dollars, for biological and medical research, molecular biology claimed the most, particularly the physical chemistry of proteins and related substances found in living tissues. In this programme the work on photosynthesis is of special interest, and the Foundation, along with other agencies, is supporting photobiological research in various institutions. Much support has also been given to research on regulatory biology and to systematic biology.

In the physical sciences, 29 grants, totalling 311,300 dollars, were awarded, and the report stresses the Foundation's obligation to support integrated attacks upon borderline and inter-disciplinary problems. In the engineering sciences, the Foundation's programme places its emphasis on such fields as fluid mechanics, strength of materials, heat transfer, corrosion, and thermodynamics, which are common to several branches of engineering, and it is also encouraging research designed to fill gaps in the basic information at present available to the engineer. Special attention is being given to projects bearing on the extension of the use of strategic materials, their replacement with new, hitherto unknown, materials and the better understanding of the conversion of energy. In the terrestrial sciences, the Foundation's programme is expected to embrace eventually more or less equally studies of the atmosphere, the waters, the surface, and the interior of the earth and their interrelations, and especially microphysical processes basic to the discovery and understanding of geophysical and geochemical principles.

Of the 624 graduate fellowships in the sciences awarded in April 1952 for the academic year 1952–53, 55 were made to post-doctoral applicants. Of the remainder, 169 went to those entering their first year of graduate study, 170 to second-year graduates and the remaining 230 to advanced pre-doctoral students. Biological sciences claimed 158 fellowships, chemistry 140, physics 137, engineering 75, mathematics 62, the terrestrial sciences 36, agriculture 7, astronomy 6 and anthropology 3. While this fellowship programme immediately affects the shortage of scientific men, the Foundation recognizes that the eventual correction of that shortage requires a long-range attack on defects in the educational, social and economic structure of the United States. At present the annual output of trained men of science in the United States is ten per cent or more below demand, and the 3,600 new doctorates in the sciences each year—rather less than 10 per cent of the output of graduates—is too low to meet the expanded current needs of technology; and the situation is expected to become more critical. Meanwhile, the operation of the present National Scientific Register, for which the Foundation assumed financial responsibility after the passage of the National Science Foundation Act of 1950, was to be discontinued after December 31, 1952, when the Register should have completed the initial registration and analysis of data on scientists trained in chemistry, chemical engineering, physics, psychology, agricultural and biological sciences, geosciences, and veterinary medicine. The Foundation has established an office to assist the professional scientific societies in compiling information on scientific workers in various fields on a uniform basis.

Its survey of publications has led the Foundation to believe that no continuing Federal support of scientific periodicals is desirable at present, though in critical cases temporary emergency support may be appropriate. The development of improved methods for compiling scientific information and for its rapid handling, economical storage, and efficient distribution is being followed, and the Foundation is also giving attention to the international exchange of scientific literature, particularly the availability of foreign scientific literature in the United States. A complete survey is being made of the present pattern of distribution and processing of Russian scientific literature in the United States.

UGANDA FOREST DEPARTMENT

ANNUAL REPORT FOR 1951

THE annual report of the Forest Department, Uganda, for 1951* gives full evidence that the Government of Uganda is intent on putting into force its declared forest policy. This is noteworthy, since during the present century (a forest policy was first laid down in India during the past century) such a policy has been enunciated for several forestry departments of the British Commonwealth and remained a dead letter. The general forest policy in Uganda comprises the maintenance of an adequate forest estate for protective and productive purposes, the management of the estate to fulfil those objects, the teaching to the people of the value of forests, and the encouragement of the practice of sound forestry by local authorities and private enterprise. To carry out these objects the forest officer requires the full support of the civil administration in the district and of the headquarters Government presided over by the Governor. That the Uganda Forest Department has the full support of the civil administration is evidenced by its present position in professional matters and the great strides that have been made in recent years.

To a considerable extent this progress must have been aided by the statement on "Land Policy of the Protectorate Government in Uganda", issued by the Government in 1950. This reaffirms that rural lands are being held in trust for the use and benefit of the African population; it further goes on to state that, while the Protectorate Government retains the forest rights, the Governor may, at his discretion and regard being had to the circumstances of each case, make an *ex gratia* payment to the African local government concerned of a portion of the income derived from Crown forest rights.

That good professional administration is possible under the present régime is shown by the progress made in the enumeration of the growing stock in the forests, the preparation of working plans and the striking sylvicultural investigations being undertaken by the research staff, the plantation work being

* Uganda Protectorate. Annual Report of the Forest Department for the Year ended 31st December 1951. Pp. iv+38. (Entebbe: Government Printer, 1952.) 2s.