

Atomic Energy Authority, Harwell, was a description of the method of observing π -mesonic X-rays. The work discussed was carried out on the Liverpool synchrocyclotron during 1952-56 and the main item of measuring equipment was a Hutchinson-Scarrott type kicksorter. It is most interesting, therefore, to find that the thirty-sixth Duddell Medal addresses, which follow Dr. West's article, were delivered by G. G. Scarrott on the application of computer techniques to nuclear physics instruments and by G. W. Hutchinson on 'memories' for nuclear physics.

In 1959 it was the turn of the Physical Society to arrange for the delivery of the Parsons Memorial Lecture, and Dr. C. R. Burch was invited to be the lecturer on October 22, 1959, at the Science Museum, London. He chose to speak about aspheric imaging systems and described the work in this field carried out by the University of Bristol's Optical Group during the past twenty years. Under Dr. Burch's inspiring influence, his devoted band of research workers, all of whom he proudly mentions by name and with affection, have made, many with their own hands, optical instruments of new and advanced design. Advanced testing methods, aspheric reflecting microscope design and manufacture, meniscus-

Schmidt camera design and manufacture, conecylinder and screw interferometers, and several applications particularly in the biological field of these instruments are all touched on in Dr. Burch's lecture.

The subject of the twentieth Thomas Young Oration, given by Prof. R. W. Ditchburn on November 12, 1959, was also of an optical nature. He dealt with problems of visual discrimination, and described various methods of recording eye-movements and the analysis of involuntary movements. Eye-movements, both voluntary and involuntary, are of importance in contrast discrimination, and from the study of the discrimination of hue, it appears that in some conditions, normal subjects give reports usually associated with defective colour vision. The question as to how far the results obtained on the living eye are related to theories of retinal action is discussed with reference to electro-physiological measurements of impulses in optic nerve fibre of animals.

The lectures and addresses were intended for a very wide audience, and are extremely well and clearly written. They deal with specialist subjects, but their contents do not require specialist knowledge to understand them. The Year Book is a worthy addition to all science libraries.

THE COLONIAL DEVELOPMENT CORPORATION

THE annual report and statement of accounts of the Colonial Development Corporation for the year ended December 31, 1959*, the first to appear over Sir Nutcombe Hume's signature as chairman, follows the general style of Lord Reith's recent reports. Eighty-eight continuing projects are reported, as against seventy-seven the previous year, including fifteen new projects totalling £13,184,000, of which four have been removed from the list, and £4,046,000 further investment in existing projects was approved. Of the continuing projects, representing £90 million, of which £60 million has been spent, 45.2 per cent were concerned with utilities, 43.1 per cent with primary production and processing, and 11.7 per cent with commerce and industry, the corresponding figures for 1958 being 46.9, 40.8 and 12.3 per cent, respectively. No capital has yet been raised from outside sources, nor has any attempt been made to do so. Although the Corporation is now well established and its revenue is increasing, its present capital structure is unsuited to raising outside capital except with the Government's guarantee, but if the recommendations of the Sinclair Committee are adopted it should be much easier to devise a form of capital which would find purchasers among private investors without such a guarantee. The Corporation, however, is nearing the end of the resources it can draw from the Government, and further capital may soon be needed if it is to go forward.

The report emphasizes the importance of the correct adjustment of the relation between the highly industrialized countries and the under-developed countries of the world; and in these territories, for which the United Kingdom Government is responsible, the Corporation is in a unique position to assist

in finding a solution to this problem. Even when money and technical aid are available, the capacity to put them to the best use is often lacking, and the Corporation has now built up an organization staffed by experienced people and designed for this very purpose. Their fitness for the task is shown both by the success now being achieved by the Corporation and by the fact that commercial interests, which have been hesitant to participate in risk ventures in territories the political and economic future of which was uncertain, have been reassured when the Corporation has been ready to be associated with their investment.

To assist in securing the maximum use of the Corporation's experienced organization in Great Britain and abroad, the chairman is leading a mission of the general manager and all six regional controllers to Washington to discuss the possibilities of the Corporation working for the International Bank, the International Finance Corporation and the Development Loan Fund. To-day the Corporation is well equipped to make contact with and examine new projects anywhere in the present or former dependent territories, to negotiate or assist in negotiating the terms of investment, to arrange for the management of the project and to watch over its progress. Almost all its capital of £130 million is now committed, and the value of products by direct projects and associated companies in 1959 amounted to about £18 million, much of which contributed to the export trade of the countries concerned. The stimulation of other development caused by the Corporation's example and initiative is more difficult to assess, but the report cites as examples new housing enterprises and ideas due to the Malaya Borneo Building Society and housing schemes in Africa and the Caribbean, and new standards for large-scale agricultural enterprises in Borneo set by Borneo

* Colonial Development Corporation. Annual Report and Statement of Accounts for year to 31.12.59. Pp. v+77. (London: H.M. Stationery Office, 1960.) 5s. net.

Abace, Ltd., in introducing two new crops (cocoa and oil palms). The report also stresses the way in which opportunities are taken for partnership with private industry and association with local interests, and apart from stressing the importance of public

relations and encouraging both at home and overseas a correct understanding of the Corporation's purpose and work, the report contains two interesting sections discussing various aspects of management and training schemes which merit separate consideration.

ECHO-SOUNDING EXPERIMENTS IN THE BARENTS SEA

NEARLY all large fishing vessels carry echo-sounders for locating fish. A 'ping' of sound is sent down into the water, and any fish between the ship and the sea bed give echoes which can be detected. In the case of vessels trawling for cod, it is fish within a few fathoms of the sea bed which are of interest, and because of the short separation in time between the echoes from these and the much stronger echo from the sea bed, certain difficulties arise. These have to a large extent been overcome by displaying the echoes on a cathode-ray oscilloscope, arranged to present echoes from near the sea bed on an expanded scale.

A recent booklet contains five papers concerned with the use of such equipment*. They cover the identification and measurement of the echoes, the relationship of the number and size of echoes to the catch of fish, the measurement of the strength of echoes from individual fish, practical and theoretical work on the properties of the equipment, and its use for surveying the distribution of fish on the fishing grounds. Taken together, they form a comprehensive survey of the characteristics and use of the equipment considered primarily from a practical point of view.

One is particularly struck by the high correlation between the count of echo signals, that is, the sum of the strengths of each echo during a trawling run, corrected for depth, and the number of fish caught. The correlation coefficients are in the region of 0.9, in spite of the necessarily rather crude methods of echo measurement.

* Ministry of Agriculture, Fisheries and Food. Fishery Investigations, Series II, 22, No. 9: Echo Sounding Experiments in the Barents Sea. By I. D. Richardson, D. H. Cushing, F. R. Harden Jones, R. J. H. Reverton, and R. W. Blacker. Pp. vi + 57. (London: H.M. Stationery Office, 1959.) 20s. net.

In the past, much of the information required for systematic design of echo-sounders for fish detection has not been available. Design has been based largely on the properties of previous models known to give reasonably satisfactory results, followed by sea trials and alterations as required. The third paper describes an attempt to obtain some of the necessary basic data. The echo strength given by (dead) cod of different lengths has been measured and compared with the echo given by a standard target, so that the target strength of the cod is known in absolute units. The water-borne noise has been measured as a function of ship-speed and water-depth (though unfortunately only in terms of received voltage without the sensitivity of the receiver being known). The information about the target strength of cod is of universal application, and that about the water-borne noise allows the prediction of the performance of this particular sounder over a wide range of conditions.

The checking of the performance of equipment under working conditions is highly desirable, and helps to give one confidence in both the equipment and one's methods. The first part of the fourth paper describes checks of the beam pattern and of the variation of echo-strength with depth. Such checks have been made on many other acoustic devices, and since in the present case they also agree with theoretical expectations within experimental accuracy, the fifteen pages devoted to this work seem excessive.

In conclusion, these papers describe a great deal of careful work, mostly 'in the field', and form a very valuable contribution to the subject.

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ORIGIN OF TEKTITES

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LAST January, Dr. G. Baker¹ criticized in considerable detail my suggestion² that comet heads colliding with the Earth heated the surface to the melting point and spread small fragments of glassy objects to great distances and that these objects are tektites. I believe these objects have compositions which are not greatly different from some of the more acid terrestrial rocks, but that no source of sufficiently high temperatures to melt these materials is known to be present on the Earth's surface or somewhat below the surface. My communication was written to suggest a possible source of high temperatures. I really thought everyone who had worked on this problem would be pleased to consider a mechanism by which terrestrial material could be melted and

scattered to great distances even though it did not necessarily answer all questions. This was certainly not true. I have thought over Dr. Baker's very thoughtful criticisms and would like to make a brief reply.

Dr. Baker is quite right about tektites not being spaced some 50 million years apart in age, but Prof. Z. Kopal very soon pointed out to me that cometary collisions with the Earth were probably ten or more times as frequent as I had assumed. I have not troubled to correct this incorrect estimate, for it was very uncertain in any event. We probably have only the most approximate ideas in regard to the numbers of non-luminous comet heads moving in the solar system; and comet heads must certainly collide