carried out on a proportion only to save time and expense. Mechanical tests must, from their nature, be made on insulators one at a time, while temperature cycle tests cannot be made in less than six hours, and are very awkward to carry out with more than a few units at a time.

Skilled craftsmanship plays a greater part in porcelain manufacture, both in the moulding and the firing, than it does in the production of rolled or drawn metal. This is reflected in the incidence of tests. A simple set of tests would usually satisfy a purchaser of several tons of rolled steel, but of the insulators 0·5 per cent is the minimum standard quantity tested. If in these a failure is recorded, a second batch of 1 per cent is tested. A failure on the second group of tests is followed by tests on 1·5 per cent, and if there are defects among these, the whole quantity is rejected. The increasing size of the batch tested is a clear indication of increasing suspicion about the quality of the bulk. In more readily controlled materials it is not usual to increase the percentages tested, even if failure does occur in the initial batch.

Electrical work presents also another class of type-tests such as in those made to determine the impulse voltage characteristics of an insulator or bushing. The impulse ratio depends almost completely upon the physical dimensions and the relative dispositions of dielectrics and conductors in such apparatus. Without changing these features, there is practically nothing that can be done in course of manufacture which would sensibly alter the impulse breakdown values. Thus a type-test on any one of a batch of dimensionally similar units is adequate to prove the characteristics of all. It is, in fact, a purely design test.

The tests carried out by the Home Office Mines Departments at Buxton, to prove electrical apparatus safe for use in explosive atmospheres, are also in this group. Inspection which shows identity of detail conveys full confidence that duplicates of the tested apparatus are equally flameproof.

Recently, the industry has become increasingly aware of a new group of type-tests, namely, those made on circuit breakers, which are covered by certificates issued by the Association of Short-Circuit Testing Authorities or the National Physical Laboratory. These two bodies are now working in conjunction to carry out and certify the short-circuit type-tests made in conformity with the requirements of Brit. Spec. 116 (1937). This standard specification calls for other tests also, but these are of a well-understood nature and may be made with apparatus found in any properly equipped factory.

The over-voltage tests on insulation and those made to check the operation of tripping and closing coils, are carried out on every breaker as a matter of routine. Hydraulic tests to prove tank strength and adequacy of joints need not necessarily be made on every breaker. This also applies to the mechanical endurance test, which consists of opening and closing the breaker 500 times on no-load. A test of this kind is necessary on any complicated mechanism, to ensure that some trifle, which might cause ultimate failure by excessive wear or distortion in service, has not been overlooked in design.

The practical circumstances in which a breaker may have to perform vary widely, and the accompanying electrical and physical phenomena are very complex. It is impossible, therefore, to separate the short-circuit tests into a series, each of which is simple and clearly defined, as can be done, for example, with an insulator. The only possible method of carrying out these tests is to use a testing generator which has short-circuit characteristics like those of the largest power stations. The operation, control, and recording work with such call for technical skill of an uncommon and very high order. The type-tests that have been devised are of an all-embracing character, and represent the worst that could happen in service; they are far more severe than is likely to occur in the majority of cases. It is essential to do this, because the primary duty of the breaker is to protect all other connected apparatus.

It will be generally agreed that the proper fields for type-testing are: (*a*) whenever the process of testing must destroy the article; (*b*) whenever the test is to determine a characteristic which is dependent upon dimensions and physical positions of parts; and (*c*) whenever individual testing would increase the cost of the finished article to an uneconomic level.

DUGGAN-CRONIN BANTU GALLERY, KIMBERLEY

WHEN in 1929 the British Association visited South Africa, the anthropologists in particular were much impressed by the scientific value, as well as by the importance as a record, of the collection of photographs of characteristic types of the native races of South Africa, which had been formed and was still being augmented by Mr. A. M. Duggan-Cronin. This impression was fully confirmed by further examination of the material placed on exhibition by Mr. Duggan-Cronin at the centenary meeting of the Association held in London in 1931.

Mr. Duggan-Cronin's interest in native types was first aroused when, as an employee of the De Beers Company in Kimberley, he was brought into contact with the wide variety of tribesmen who sought employment in the mines. After mastering the technique, he began his photographic series of racial types in 1904; but it was not until 1919 that he was able to undertake work in the field, when at the instance of the Board of the McGregor Institute, Kimberley, he visited the Langenbergen, Griqualand West, to photograph the Bushmen living there. Since that time, each year Mr. Duggan-Cronin, with the financial assistance of the Union Research Grant Board or from the Carnegie funds, has carried on his work, visiting one or other of the South African peoples, until a record has been made of every important Bantu tribe in the Union and of a number elsewhere, as well as of the Yellow races, Bushmen and Korannas. These records, to the number of 2,600, have been mounted in albums and the negatives stored in a strong room of De Beers. The material has also been published in part in eight volumes with the Cambridge University Press, while seven further volumes await publication.

From 1925 onward Mr. Duggan-Cronin, in view

of the fact that no Bantu gallery existed in South Africa, threw his collection open to the public, maintaining the gallery at his own expense. After twelve years, however, it was offered as a gift to the town of Kimberley, subject to the provision of suitable housing. The gift was accepted and the collection was officially declared open in 1938 as the Duggan-Cronin Bantu Gallery by Sir Ernest Oppenheimer, chairman of De Beers Company, in premises, formerly the guest house, generously provided by that company, together with £150 per annum towards the cost of upkeep.

The unique character of many of these photographs as records from the cultural, as well as the racial point of view, was the subject of commendatory reference at an exhibition which was held at a recent joint meeting of the Rhodesia Scientific Association with the newly formed Rhodesia Photographic Society at Salisbury (*Transactions*, **37** ; 1939), when attention was directed to, among others, the complete series illustrating the smelting of iron ore among the Mashona, and the initiation ceremony of the Bomvana Kwetas. In the Bantu Gallery at Kimberley the photographs are supplemented and further illustrated by objects of the tribal culture collected by Mr. Duggan-Cronin.

THE EARTH'S INTERIOR

K. E. BULLEN has examined the recent developments in knowledge of the earth's interior (*Acta Astronomica*, **4**, April 1939). The most recent estimate of Gutenberg and Richter shows a radius of the core of 2,920 km., and work on near earthquakes suggests the existence of various crustal layers extending to a depth of the order of 30 km. from the surface of the earth. According to Bullen, if the variation of density between the earth's crustal layers and the central core were continuous, the moment of inertia of the central core would have to be $0{\cdot}57\,Ma^2$, where M is mass of core and a is radius of core. This, being in excess of the value $0{\cdot}40\,Ma^2$ which would hold for a homogeneous sphere, would appear to indicate a virtually impossible distribution of matter inside the central core. Thus some assumption made in obtaining these estimates appeared to need amendment. The amendment suggested by Bullen is that there is a change of material at a depth of the order of several hundred kilometres.

On account of the 20° discontinuity in the travel time graph of P waves from earthquakes which appears to be fairly well established, Jeffreys has suggested either an abrupt change at a depth of 474 km. (uncertainty 20 km.) or an appreciable variation from 300 to 700 km. below the earth's surface. Incidentally, 700 km. gives the depth of focus of the deepest focus earthquake yet recorded. Price and Lahiri have recently suggested a change of material at a depth of approximately 700 km. in the earth on the evidence of variation of electrical conductivity. Following work by Olczak, Jeffreys, Bernal, Benfield and himself, Bullen suggests the following distribution of matter within the earth :

	Depth	Density range
Normal olivine layer	30–474 km.	3·32–3·69 gm. cm.$^{-3}$
Cubic olivine layer	474–2920 km.	4·24–5·57 ,,
Central core	2920–6371 km.	9·77–12·29 ,,

Concerning further density changes within the earth, Gutenberg and Richter have recently directed attention to the possibility of variation within the core itself.

SEVENTY YEARS AGO

NATURE, vol. 1, April 14, 1870

Left-handedness

"J. S." in a letter to the Editor concludes : "Left-handedness is very mysterious ; it seems quite against physiological deductions and the whole tendency of arts and fashion. Prof. Buchanan, of Glasgow, who wrote an able memoir on right-handedness in 1862, thinks that left-handedness may be due to transposition of the viscera, and tells me that his friend Dr. Aitken found such a case. But surely transposition of the viscera must be far rarer than obstinate left-handedness. In cases of left-handed persons which I have examined, the links of the left side were proportionally larger, just as those of the right side are in normal cases. I have also found that left-handedness is hereditary".

Heat Units

THOMAS MUIR, writing from College Hall, St. Andrews, refers, in a letter to the Editor under this title, to the cumbersome terminology used to describe "units of heat", and makes the following comments.

"Define, first, as follows :—A *therm* is the quantity of heat necessary to raise the temperature of 1 gramme of water from 0° C to 1° C. Secondly 1 kilotherm = 10 hectotherms = 1000 therms = . . . , thus having kilotherm, hectotherm, &c., suggestively corresponding to kilogramme, hectogramme, &c., in name as well as in nature.

"Therms and kilotherms, which would probably alone be required in practice, would thus take the place of 'thermal units, centrigrade', 'gramme-water-units', 'kilogramme units of heat', and others more or less lengthy and inexact at present to be found in writing, on Heat and Energy."

Postage on Printed Matter

THE Budget contains an announcement "of the greatest importance to men of science. The postage on printed matter not exceeding 2 oz., and on newspapers not exceeding 6 oz., is to be reduced to one halfpenny. We have waited a long time for this change : not too long, however, to welcome it warmly now it has come, for the tax on all authors of the postage of the scientific papers, copies of which they wish to distribute, has been very great."

AT the anniversary meeting of the Chemical Society held on March 30, the president, Dr. A. W. Williamson, announced in his address that Messrs. Johnstone and Matthey had offered the Society a donation of palladium to be used for the preparation of the first ten Faraday Medals.

THE honour of knighthood has been conferred on Mr. Ronalds for his early researches in telegraphy.

UNIVERSITY EVENTS

ABERDEEN.—On April 4, the honorary degree of LL.D. was conferred on Sir William Jameson, professor of public health, University of London, and Prof. F. A. Lindemann, professor of experimental philosophy, University of Oxford.