The appreciation of detail in the image on the screen depends on surface structure (grain, visibility, contrast and resolution). Structures of dimensions smaller than 50 A. can easily be observed on the screen, which goes to show that the basic requirements are satisfactorily fulfilled.

The size of the zinc–cadmium sulphide crystals can be made not to exceed 1–2 $\mu$; this is very much a matter of skill in the preparation of the screen.

Contrast, visibility and resolution depend at the present stage of electron microscopy much more on the preparation of the specimen than on the screen. By this is meant that the zinc–cadmium sulphide screen will show with good contrast any detail which is rendered visible on the photographic plate. Density measurements to assess visual contrast compared with a negative of the same field showed close agreement, though the difficulties of measuring contrast on the screen are considerable, owing to the rapid loss of contrast and the general deterioration of the specimen if it is kept for any length of time in the concentrated beam of electrons. This effect is well known, particularly as far as the 'building up' of crystals is concerned, resulting in an increase of the diameter of fine needles by several 100 per cent. This can easily be seen and photographed by exposure of, for example, zinc oxide crystals (not suspended on a collodion or other supporting film). In the case of biological specimens, a support in the form of a collodion or other film is commonly used.

It appeared from the measurements of contrast that the deterioration of the collodion film follows the same course as the thickening of the zinc oxide needles, which is in keeping with the conception of the collodion film as a closely packed crystal lattice.

One of the most important characteristics of the new screen, besides its visual resolution, is that it shows all the detail registered on the photographic plate. This means that there need no longer be guesswork and delay while the plate is being developed. The greatly facilitated observation allows speedy observation of detail without prolonged search and consequently the introduction of artefacts, owing to the effect of the electron bombardment on the specimen. This effect, however, is dependent not only on the time of bombardment, but also, perhaps more so, on the intensity, in other words, beam current and concentration or focusing by the condenser. It was found that the new screen made it possible to work with the condenser permanently defocused, which is of the greatest importance when the specimen includes structures of the order of 50 A. and the thinnest possible collodion films. For such cases it was found to be of great advantage to produce dark adaptation of at least 15 minutes previous to the actual observations and photography.

The increased visibility, of course, facilitates focusing greatly and made it possible to take photographs of structures which are quite invisible on willemite screens.

To illustrate the efficiency of the zinc–cadmium sulphide screen, four photographs are reproduced which were taken of fields that showed, on the willemite screen, none of the details recorded on the photographic plate. The electron microscope used here is the Metropolitan-Vickers *E.M.*2.

The willemite screen did not show the thickened ends of the phage tails (Fig. 1), nor the 'ingestion' or 'invasion' recorded on Fig. 2. Neither was it possible to see in Fig. 3 the extremely fine tails within the cluster of phage bodies, nor in Fig. 4 the low-brightness granules and to gain an impression of the intracellular phage bodies, as known from observations on living specimens[2].

Further work as well as technical bacteriological details will be published elsewhere.

Fig. 1 Fig. 2

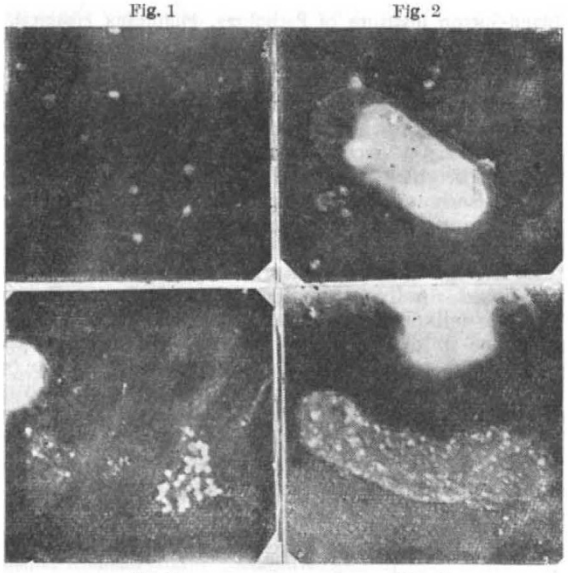

Fig. 3 Fig. 4

Fig. 1. Bacteriophage of *B. coli*; the phage bodies have tails with thickened ends

Fig. 2. A colon bacillus being 'invaded' by a phage body; its tail has been shed and it has been surrounded by the bacterial membrane. Two other phage bodies are attached to the outside of the membrane

Fig. 3. A cluster of phage bodies in an arrangement suggestive of multiplication

Fig. 4. A lysed colon bacillus in which can be seen granules of a low brightness, presumably bacillary protoplasm and a few ill-defined phage bodies. × 12,000

[1] Meyer, H., and Tomes, G. A. R., *Electronics Forum*, 5, 27 (1947).
[2] Merling, K. B. E., *Brit. J. Exp. Path.*, 19, 338 (1938).

## RECENT EARTHQUAKES

DURING the third quarter of 1948, twenty-eight strong earthquakes were registered in New Zealand at Auckland, Arapuni, Christchurch, New Plymouth, Kaimata, Tuai and Wellington. In addition, 61 local shocks and tremors have been recorded. The strongest of these latter was felt with Modified Mercalli Scale 6 in the southern part of South Island and especially at Monowai on July 14. The earthquakes of July 12 and 23 in the same region and that on September 6 at Opotiki were all felt with Scale 5.

During the last quarter of 1948 there were fifteen strong earthquakes in various parts of the world, in addition to many other minor ones. Of the fifteen strong ones the epicentres of which have been determined from instrumental observations, two were near enough to centres of population to do extensive damage, and a third did some damage. The one doing most extensive damage was that on October 5 with epicentre in north-eastern Iran (see *Nature*, October 23, p. 647). The second most damaging occurred on December 4 from a focus having an epicentre near latitude 21½° N., longitude 106½ W., off the west coast of Mexico. Extensive property-damage was done on Madre Madre Maria, the prison

island 30 miles off Mazatlan. When the two-story wireless building collapsed, the chief wireless operator and his assistant were killed. The third, which did some damage, also occurred on December 4 from a focus having an epicentre near latitude 33·9° N., longitude 116·4° W., in southern California. The strongest effects were stated locally to have been in the desert between the towns of Indio and Twenty-Nine Palms, and the shock would undoubtedly have done more damage had it occurred nearer to a centre of population.

The other strong earthquakes during the quarter had dates and epicentres as follow: October 1, near Guerrero, coast of Mexico; October 15, north of Falkland Islands; October 18, between Crete and Rhodes; October 21, off west coast of Nicaragua; October 21, near Solomon Islands; October 28, near coast of Honshu, Japan; November 1, Kamchatka; November 3, Loyalty Islands; November 19, near coast of western Costa Rica; November 21, Queen Charlotte Islands; November 26, New Guinea; December 5, south-east of New Zealand.

Of the minor shocks, an earth tremor of unknown origin was felt in Cheshire about 7.45 a.m. on October 4, one at Lyons (France) on October 20, one at Oporto (Portugal) on November 18, several in the latter half of November in the canton of Zurich (Switzerland), and others elsewhere.

None of this seismic activity can be said to have occurred in unexpected places since earthquakes have happened in the above regions previously. Seismogram readings have been received from the central stations of the Jesuit Seismological Association, United States; Strasbourg, France; United States Coast and Geodetic Survey; and individual stations at Aberdeen, Beograd, Cleveland (Ohio), De Bilt, Durham, Kew, Stuttgart, Toledo, Uccle and Zurich.

## NEW BELGIAN INSTITUTE FOR SCIENTIFIC RESEARCH IN CENTRAL AFRICA

THE Institut pour la Recherche Scientifique en Afrique Centrale (I.R.S.A.C.), which was created on July 1, 1947, at Leopoldville, is a public corporation, that is to say, it is sponsored by the Government but ruled by a board of twenty-five administrators. At the beginning of 1948, the Institute was endowed with 200 million Belgian francs (£1,129,000), to be used for the erection of buildings, and another 200 million francs to be kept in Government bonds. This initial endowment will be supplemented with annual subsidies, the minimum at present being 25 million francs (£141,240).

The purpose of the Institute is the fundamental study of human, zoological and botanical environment in the tropics. Several research centres will be erected in the Congo during the next two years. The main one will probably be on the high plateau between Lake Kivu and Lake Tanganyika, south of Costermansville, where a team is now in the field, searching for a suitable site for a high-altitude astronomical observatory. This main station will house a laboratory of vulcanology, seismology and ionospheric measurements, and a department of experimental biology. Early this year a research centre devoted to hydrobiological studies will be opened at Uvira, on the northern shore of Lake Tanganyika. Another centre, for researches on physical and social anthropology, will be started, before the end of the year, at Astrida in the Ruanda, east of the Congo. A fourth station will be erected in the Province of Equator, in the low central forest, and dedicated to studies on climatology, hydrobiology, anthropology, nutrition, botany, etc.

The Belgian Congo offers unusually favourable conditions for the study of tropical environment with its wide variety of altitudes and an exceptionally good road system. The Institute will provide fellowships and subsidies to the scientific workers established in the Congo. Its aim is to co-ordinate and inspire the various scientific institutions and services there. It will have its own scientific and technical staff and will act as an information agency for men of science visiting the Congo and provide them with material help and various exploration and research facilities. Work tables will be kept at the disposal of Belgian and foreign institutions in the different centres, and a library, by far the largest one yet available in Central Africa, will be assembled at the headquarters.

The board of administrators, under the presidency of Prof. E. De Bruyne, of the University of Ghent, who was formerly Minister of Colonies in the Belgian Government, is composed of representatives of all branches of science. All of them are Belgian, except for three: Dr. E. B. Worthington, scientific adviser to the High Commissioner for East Africa in Nairobi; Dr. Harlow Shapley, director of the Harvard College Observatory; and M. A. Chevalier, professor of Colonial agriculture in the Musée Nationale d'Histoire Naturelle, Paris.

The director of the Institute, Dr. Louis van den Berghe, professor at the Institute of Tropical Medicine, Antwerp, is already established in the Belgian Congo. The present address is I.R.S.A.C., B.P. 217, Costermansville, Belgian Congo. M. J.-P. Harroy, former secretary of the Institut des Parcs Nationaux du Congo Belge, is the secretary-general of the administrative services in Brussels at 42 rue Montoyer. No scientific journal will be maintained by the Institute; but a scientific report on general subjects, including abstracts of the papers published elsewhere by the members and guests, will appear annually. A first report, for 1948, will be published by the middle of 1949.

## FORTHCOMING EVENTS

*(Meeting marked with an asterisk * is open to the public)*

### Monday, April 4

SOCIETY OF CHEMICAL INDUSTRY, LONDON SECTION (joint meeting with the LONDON AND S.E. COUNTIES SECTION of the ROYAL INSTITUTE OF CHEMISTRY, at the London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C.1), at 6.30 p.m.—Dr. A. Forster: "Recent Developments in Explosives".

INSTITUTION OF ELECTRICAL ENGINEERS, LONDON STUDENTS' SECTION (at Savoy Place, Victoria Embankment, London, W.C.2), at 7 p.m.—Mr. T. Graeme N. Haldane: "Future Methods of Power Generation, and other Problems" (Presidential Address).

### Tuesday, April 5

ROYAL ANTHROPOLOGICAL INSTITUTE (at 21 Bedford Square, London, W.C.1), at 5 p.m.—Dr. Fernando Henriques: "West Indian Family Organisation".

INSTITUTION OF ELECTRICAL ENGINEERS, RUGBY SUB-CENTRE (at the Electricity Showrooms, Rugby), at 6.30 p.m.—Mr. C. A. Cameron Brown and Mr. E. W. Golding: "The Application of Electricity to Agriculture".

MANCHESTER GEOGRAPHICAL SOCIETY (in the Geographical Hall, St. Mary's Parsonage, Manchester), at 6.30 p.m.—Mr. C. A. J. Barrington: "Growing Trees".