finally, aptitudes and abilities of the people of South Africa and their adjustment to changing conditions.

The present housing of the exhibition in the Pretoria Show grounds is a temporary arrangement, and eventually it is intended to provide permanent accommodation which will be more conveniently situated. A film auditorium is included in the exhibition hall, and on Wednesday evenings a programme of lectures and films is arranged to amplify the exhibits in the hall and other items of general scientific interest.

The establishment of the Permanent Exhibition of Modern Science has been made possible through the voluntary efforts of members of the organizing committee and the support and co-operation of numerous sponsors. It is a long-term project, and success will depend on continued support and sponsorship of industrial, commercial and public undertakings; on the active participation in its activities by scientists working in these organizations; on the interest and participation of school teachers and scholars; and on the Association for the Advancement of Knowledge and Culture.

OBITUARIES

Prof. Camille Guérin

PROF. CAMILLE GUÉRIN died on June 9 in Paris in the hospital of the Pasteur Institute after a long illness.

Probably not all who are aware of, or are responsible for organizing, vaccination with BCG, finally but only very recently accepted in Britain as safe and effective and having an important ancillary part to play in the control of tuberculosis in man, recognize that the initials perpetuate so eloquently the close and fruitful collaboration of two of the most illustrious of Pasteur's disciples which, more than forty years ago, resulted in the development of this antituberculosis vaccine—Bacille Calmette-Guérin.

Guérin was born in Poitiers in La Vienne on December 22, 1872. He pursued his veterinary studies in the Ecole d'Alfort near Paris. It was fortunate that Nocard, one of the professors at this school, realizing his interest in research in the bacteriological field, initiated Guérin's technical training and encouraged his vocation. Nocard was an able master, for he was associated with Pasteur in the early studies on rabies in the rue d'Ulm and later, in addition to continuing his teaching at Alfort, he brought his clinical science and experience in experiments on animals to a collaboration with his friend Roux at the Pasteur Institute in studies on tuberculin, mallein and on the development and improvement of bacteriological techniques, just as Guérin did later to his collaboration with Calmette. It was Nocard who brought Calmette and Guérin together.

In 1896, the year following Pasteur's death, Calmette was appointed director of the newly founded Pasteur Institute in Lille on his return from a mission to Saigon, starting in 1891, to establish a centre for smallpox vaccination and for the diagnosis of and vaccination against rabies with the Pasteur vaccine. This latter became one of the three Pasteur Institutes in the great French colony of Indo-China.

In 1897 Guérin was appointed assistant to Calmette in Lille. Their collaboration lasted for thirty-six years and was only terminated by Calmette's death in 1933.

As Guérin once waggishly commented, he could not be accused of having tackled too many problems without devoting sufficient time to any one of them. Only two were the subjects of his researches, vaccinia and tuberculosis. Experiments on Jenner's vaccine were indeed the first subject of his researches, and the regeneration of the virus by passage on the shaved skins of rabbits led to an original method of titrating the virus which was later adopted in 1927 by the League of Nations for the standardization of the vaccine for smallpox.

However, it was to the experimental study of the bacillary infection and the immunity against tuberculosis that in collaboration with Calmette he consecrated the major part of his long scientific career, extending over forty-six years. They had come to the conclusion that only a living vaccine would be likely to prove efficacious, and their long, patient efforts from 1908 over a period of thirteen years, during which a bovine strain of tuberculosis was passaged 230 times in a medium to which they had added bile which they had found in early work had an attenuating effect on the bacilli, finally led to a culture which proved to be non-infective for guinea pigs and cattle while retaining immunizing properties for these species. Investigations were made on the stability of this attenuated culture in respect of lack of tendency to reversion of pathogenicity when subcultured in media without bile or evidence of similar reversion in vaccinated animals. At this stage consideration was given to the possibility that the vaccine would be safe and effective for the immunization of man. The first vaccinations of children were carried out by Weill-Hallé in 1921 with successful results. BCG vaccination became increasingly popular so that in 1928 the number of vaccinated children in France increased to more than 100,000. During this period the activities of the Lille Institute had been interrupted by the 1914–18 War. In 1919 Calmette went to the Pasteur Institute in Paris, where Guérin soon joined him to continue the work. Their culture is the parent of all the cultures used for BCG vaccination, and the number of persons vaccinated with BCG throughout the world is now estimated to be about 200 million. There is no evidence of reversion to virulence in the body of vaccinated persons. Moreover, following trials organized by the Medical Research Council (Rep. 1956, 1958 and 1959), which indicated safety, substantial protection for at least 6½ years and satisfactory conversion-rates to tuberculin sensitivity following vaccination with liquid or freeze-dried BCG, it has at long last come to be recommended in Britain for the vaccination of infants born to tubercular parents, children of 13–14, doctors, nurses and medical students coming in contact with tubercular patients and those who have been in contact with cases of open tuberculosis, provided that all these categories show negative results in tuberculin tests before vaccination. The important part that BCG can play in economically

developed countries, as it is pointed out, must be considered as ancillary to all the instruments available for the control of tuberculosis. These have been listed in a recent review by an eminent professor and expert in tuberculosis, J. W. Crofton, as BCG and the general improvement in the standard of living to raise community resistance, miniature radiography, chemotherapy, appropriate isolation, improved ventilation and the reduction of overcrowding in home, work, play and transport.

Reference is also made to control of bovine tuberculosis; with regard to this it is appropriate to mention the recent announcement by the Ministry of Agriculture that October 1, 1960, marked the end of a concentrated effort to reduce the incidence of bovine tuberculosis in Britain to a degree that it is no longer a national problem in that it has been virtually eradicated by attestation of the herds of the whole country. It is stressed that the present position with regard to human tuberculosis does not justify complacency. However, it is considered that a stage has been reached when it is possible to see how the main weapons against tuberculosis can be applied, and that provided there is enthusiasm and public backing to the end, there is a prospect of foreseeing the elimination of tuberculosis in the not too distant future. The problem in the undeveloped countries is more difficult. It is commented that BCG has an important part to play in economically developed countries, and it might be even more useful in the others provided that the efficacy and appropriate use of the vaccine is kept under constant review in the laboratory and in the field.

In this connexion it is interesting that what is considered as one of the most convincing studies of the protective power of BCG vaccination was first reported by Aronson in 1948. North American Indian children and young adults who did not react to tuberculin were divided into groups of 1,550 vaccinated with BCG and 1,457 unvaccinated. There was segregation of the first group for two months after vaccination. Tuberculin testing and radiographic examination was carried out each year for seven years and at the end of this period 4–5 times more unvaccinated had developed tuberculosis than the vaccinated and the mortality-rate from tuberculosis was seven times higher in the unvaccinated. It is interesting to note, in view of the early demonstration by Calmette and Guérin of the immunizing value of BCG in cattle, that it is now considered that control of tuberculosis should, whenever possible, be by an eradication scheme based on attestation of herds by tuberculin testing. Since BCG vaccinates are sensitized to tuberculin, diagnostic procedures are difficult and thus BCG can play no part in such a scheme. Nevertheless, although the BCG vaccine has become established as safe and effective, it had a very stormy history and one of the roughest passages of any vaccine before final acceptance. Undoubtedly, one of the major setbacks was the unfortunate incident in 1930 in Lubeck in Germany when 78 out of 251 infants believed to have been vaccinated with BCG, but who as was later established by official inquiry had been inoculated in error with fully virulent human culture of the tuberculosis bacillus, died. Until the result of the official inquiry had confirmed that BCG was not responsible, Calmette and Guérin suffered adverse criticism and vituperation from all quarters, including that from those who had warned that reversion to virulence was possible and here was the proof. Although BCG was exonerated, the incident had unfortunate repercussions, and it was a very long time before confidence in the safety and efficiency of the vaccine was established. Calmette especially was greatly shaken by the incident. He did not have the resilence of Pasteur in dealing with his detractors. The worry, strain and the vilification by the critics together were too much for him. He died in 1933, a disappointed man broken in spirit and health.

Guérin continued the fight against tuberculosis as chief of the BCG service in the Pasteur Institute for another ten years, consolidating the victory, opposing the doubts and critics with his lucid, well-considered judgments. Even after his retirement, he gave encouragement and advice to those who took over from him. Guérin was a member and president or vice-president of many learned societies and, in addition to receiving many foreign decorations, his contribution to the control of tuberculosis was recognized with gratitude in 1952 by the award of the Grande Médaille de Vermeil de la Ville de Paris, in 1955 by a prize of one million francs by the Academy of Sciences and appointment as Grand Officier de la Légion d'Honneur in 1958.

Those who knew Guérin recognized his charming modesty and great affability, and what gave him the greatest satisfaction was presiding at the First International Congress of BCG in 1948 and the opportunity of surviving long enough to witness the ultimate success of BCG, the universal recognition of the safety and efficacy of the vaccine which he and Calmette had struggled to develop nearly half a century ago.

IAN A. GALLOWAY

Prof. R. M. Gordon, O.B.E.

RUPERT MONTGOMERY GORDON, professor emeritus of parasitology and entomology in the School of Tropical Medicine, University of Liverpool, died on July 26, 1961, aged sixty-seven. During his youth he lived in Phoenix Park, Dublin, and there he developed early an interest in biology. He graduated in medicine in Trinity College, Dublin, in 1916, and, joining the Royal Army Medical Corps, he spent the war years in the Middle East. He was demobilized in 1919 and joined the staff of the Liverpool School of Tropical Medicine. He was soon sent to work for some two years in the School's laboratory at Manaos in Brazil, and on his return he became house physician and clinical pathologist to the Tropical Ward in Liverpool. In 1924 he was transferred to the Sir Alfred Lewis Jones Research Laboratory in Sierra Leone, where he became director in 1929 and professor of tropical diseases of Africa. In 1937 he returned to Liverpool to the chair of entomology, and in 1941 he became the first occupant of the Dutton and Walter Myers chair of entomology and parasitology.

He was president of the Royal Society of Tropical Medicine and Hygiene during 1955–57, and he was awarded the Chalmers Memorial Gold Medal in 1937. On his retirement he received the Mary Kingsley Medal of the Liverpool School of Tropical Medicine. He was an active member of many scientific committees and an editor of the *Annals of Tropical Medicine and Parasitology* for 28 years. In collaboration with Dr. M. M. J. Lavoipierre he completed a text-book on medical entomology shortly before his death.

Prof. Gordon was author of more than one hundred scientific papers which covered a wide range of subjects. In addition to many minor studies he made