electrical engineers and architects (see *Nature*, January 28, p. 125). The forecasting of such needs in these times of instability and rapid change is not easy.

To-day, however, the chief preoccupation of those concerned with technical education in Great Britain is no longer how many exponents of higher technology are required, but where they should be educated. Broadly speaking, there are three schools of thought about this: many would have the top of the technical colleges strengthened to deal in greater measure with teaching of degree standard and the research that properly accompanies such teaching; others would prefer to see the broader fields of technological education attached to universities; and yet another school is in favour of the development of a few institutes of technology of the type already existing in the United States and on the Continent of Europe. Sir Raymond would be content to see experiments on all three lines. He is in favour of the establishment of a Royal Institute of Technology which, through associateships and fellowships of unquestionably high standard, should so foster higher technological education in the better technical colleges that the qualifications they give should, though of different scope and emphasis, be on terms with the first degree of a university and should rank for consideration for admission to university postgraduate courses in the same way as do honours degrees. It should, however, be borne in mind that the United States, with a population of 150 millions, only manages to support three such institutes of international reputation.

It should be very carefully considered whether it would be wise to isolate the higher technology from higher studies in other fields. The tendency in the American institutes of technology has been to reorientate their curriculum and include an increasing proportion of the 'humanities'. In fact, they have moved steadily towards becoming universities with a technological bias, but without the advantage of having that informed intercourse with students who have other disciplines as their main objectives. Liberal education can be achieved to some extent by the proper treatment of almost any specialist subject; but specialists will immerse themselves in their subjects, and some counterbalancing influence is essential. Such an influence is more easily and better secured through contact, outside the lecture room and laboratory, with fellow students studying other fields of human knowledge and activity than through the inclusion of a proportion of 'arts' subjects in the science curriculum.

As to the civic universities generally, they cannot retreat out of the world of which they are a part. Sir Raymond thinks the only solution is to keep a firm hold of the idea that there is a general corpus of fundamental knowledge with which every university must be concerned. Beyond this there are fields of applied knowledge vital to the welfare of a modern community in which teaching and research at the university level must be done. Each university should do its share according to its genius and its environment. A university strong in physics, mathematics and chemistry, as Birmingham is, may rightly develop engineering. From a good engineering faculty in a city famous for its light industries, a chair of production engineering might naturally arise, as it did in Birmingham.

The University Grants Committee has requested the University of Birmingham to consider the establishment of courses, similar to those in production engineering, in mechanical engineering (thermodynamics), metallurgy and chemical engineering. This the University will be glad to do, but two problems have to be solved. In the first place, the courses would be intended for those who have already spent some years in industry, most of them of mature age, some of them in established positions and many with wives and families. Such men would be returning to the University at a considerable financial sacrifice, and maintenance grants of £300–£450 would be required. Some, no doubt, would be financed by the firms for which they work, and others may be supported by grants from the Department of Scientific and Industrial Research, but some additional help will be required in many cases. Whatever the source of assistance, it would be a great convenience if its distribution were in the hands of the University. For the Department of Production Engineering funds have been provided by the generosity of Sir Peter Bennett, and it is hoped that, after the new courses have proved their value, a larger proportion of the sum will be maintained by the firms which they are serving or which hope to benefit from this development of technological education. Such an endowment might well appeal to friends of the University in the industrial world.

The second problem is that of living accommodation, and this at the present time is one of great difficulty. In the long run the proposed building of halls of residence may be expected to provide the solution, but the effect of devaluation of the pound sterling on the national capital-development programme has probably postponed this achievement for five years or more.

PACIFIC SCIENCE BOARD

ANNUAL REPORT FOR 1948

THE second annual report of the Pacific Science Board* covers the operations of the Board in 1948, but includes a brief account of the establishment of the Board and of the Pacific Science Conference at Washington, D.C., in June 1946. The Co-ordinated Investigation of Micronesian Anthropology continued, and the intensive field investigations of twenty-seven out of the forty-two participants were completed during the year. Final reports from the eleven participants have been accepted by the Board and will be published, where possible, in the regular scientific bulletins of the sponsoring institution or will be micrographed.

At the meeting in Honolulu on April 16, 1948, of the Insect Control Committee for Micronesia, the results were assessed of field work carried out in Malaya and the Palaus on the rhinoceros beetle (*Oryctes rhinoceros*); in Malaya, Java and the Marianas on the coco-nut beetle (*Brontispa mariana*), and in British East Africa and Zanzibar on the giant African snail (*Achatina fulica*). The programme for the year included the preparation of a comprehensive report on the giant snail, and an abstract of the results of all these studies was presented at the Seventh Pacific Science Congress in New Zealand. Follow-up reports on the effectiveness of the wasp *Scolia ruficornis* in control of the rhinoceros beetle in the Palaus are so far inconclusive. A conference on conservation in Micronesia, arranged in Honolulu by the Board, was followed by a similar conference in Washington, D.C. The recommendations of these two conferences,

* Pacific Science Board. Second Annual Report, 1948. Pp. 73. Washington, D.C.: National Research Council, 1949.)

which are summarized in this report, were published in a report, "Conservation in Micronesia", compiled by H. J. Coolidge, and they were transmitted to the Navy Department and the administrative authorities of the Trust Territory of the Pacific Islands. Later, the Pacific Science Board was requested to nominate a candidate for the post of conservation officer, and to organise an advisory committee. This has been done in two panels, one in Washington, D.C., and one in Honolulu.

The meeting on June 19, 1948, of the United States Committee on the Oceanography of the Pacific was concerned with the presentation at the Seventh Pacific Science Congress of the American contribution in this field. Reference is also made to the progress of the Pacific Oceanic Biology project, but while the report lists the American men of science who attended the Seventh Pacific Science Congress, a full account of that Congress is promised in the 1949 report of the Board. Among the advisory activities of the Board in 1948, the report stresses the close association of the Board with the Fulbright programme of the international exchange of personnel of the Conference Board of Associated Research Councils.

A total of 43,300,000 dollars was announced for research in the Pacific area, including five million for Australia, seven million for Netherlands East Indies, twenty million for China and 2,300,000 dollars for New Zealand, and some of the twenty million dollars announced for the United Kingdom and the five millions for France may be available for their Pacific Colonies. The Board was also consulted on matters concerning the scientific personnel and programme of the Research Council of the South Pacific Commission, and the executive secretary of the Board, as one of the two United States Government delegates to the Fontainebleau Conference, assisted in the establishment of the new International Union for the Protection of Nature.

LADY TATA MEMORIAL TRUST

THE Lady Tata Memorial Trust, founded in 1932 by the late Sir Dorabji Jamsetji Tata, of Bombay, in memory of his wife, the late Lady Tata, has published a report of the work done by its international section during the past fifteen years*. In this report is set out a summary of the work on leukæmia and other blood diseases which has been financially helped by the Trust during this period on the recommendation of its distinguished European scientific advisory committee.

About one-fifth of the income of the Trust is devoted each year to scholarships and prizes, which are awarded to Indian workers for research by them on any problem related to human suffering; the other four-fifths provides grants or scholarships which are open to persons of any nationality in any country for work on diseases of the blood, with special reference to leukæmia. The report shows that some twenty-nine workers in eleven different countries have been helped by the Trust, either by short-term grants or scholarships or by expenses grants for long-term programmes of work on the leukæmias at recognized centres. These long-term programmes have been assisted at the Department of Pathology, Cornell University Medical College, New York, under Prof. E. L. Opie and Prof. Jacob Furth; at the Institut du Cancer, Paris, under Prof. G. Roussy; and at the University of Copenhagen, under the late Prof. Oluf Thomsen and latterly under Prof. J. Engelbreth-Holm.

These long-term studies are summarized in this report, and Prof. Furth gives a valuable brief summary of our present knowledge of the leukæmias. Leukæmia behaves, he writes, as a neoplastic disease, and the availability of leukæmic animals in large numbers has made it possible to prove that leukæmia is "cancer of the blood-forming cells". Leukæmic cells are, however, not inherited as such, even by the mice of the leukæmic strain *Ak*, most members of which will die of leukæmia at the age of 7–11 months. At a few sites in the body, of which the lymphoid tissue in and around the thymus gland is one, normal cells become leukæmic a few weeks before signs of leukæmia are noted. These sites are determined largely by heredity, and there is evidence that the change is analogous to a somatic mutation. There is no evidence that the leukæmic change can be prevented, and the trend towards an increase in the incidence of leukæmia is likely to remain.

It has been known for some time that a virus-like agent causes leukæmia in fowls, and this, together with leukæmia in the rat, has been studied by Prof. Roussy and his colleagues. Prof. Roussy concludes that the same virus may cause either transmissible leukæmia or sarcoma of fowls; that considerable active immunization against fowl leukæmia is possible; that fowl leukæmia can occasionally be induced by carcinogenic hydrocarbons; and that the transplantable chloroma found in the rat has close affinities to human chloroma.

At the University of Copenhagen, Prof. Engelbreth-Holm and his colleagues have studied leukæmia of fowls and mice. They agree that fowl leukæmia is a true malignant tumour and that different types of fowl leukæmia can be produced by the same virus. This virus can also induce sarcoma. Their attempts to treat the disease by X-rays, hormones and chemotherapy failed, but a strong immunity could be produced in chicks by virus adsorbed to aluminium hydroxide. In ducks a powerful immune serum was produced by injection of blood from leukæmic fowls. Leukæmia in mice was accelerated by treatment with carcinogenic agents (X-rays, hydrocarbons), and the implications of this are discussed. Prof. Engelbreth-Holm's book, "Spontaneous and Experimental Leukæmia in Animals" (Edinburgh and London: Oliver and Boyd, Ltd., 1942) was written at the request of the scientific advisory committee of the Trust; it was smuggled out of Denmark during the earliest period of the German occupation and was then published under the authority of the Trust.

Workers helped by the Trust have studied karyoclastic drugs, such as urethane and nitrogen mustards, and have played their part in the development of folic acid and in work with radioactive isotopes, which can be used for the induction and treatment of leukæmia. Demographic studies of the disease, too, have been aided by the Trust, which has also helped to establish the Oxford Lymph-Node Registry. One has only to look through the list of grants given in this report to realize how broad and wise is the outlook of the scientific advisory committee. The help given has not been confined to the study of leukæmia, but has also included grants for work on the megaloblastic anæmias, tropical nutritional anæmia, the argentaffin cells of the alimentary tract and the effects of pterins on blood-formation.

G. LAPAGE

* Report on the Working of the Lady Tata Memorial Trust (International Section) from 1933 to 1947. Pp. iii+53. (Bombay: Lady Tata Memorial Trust, 1949.)