Germ-free animals are free from antibacterial agglutinins readily demonstrable in conventional animals, although in some instances antibodies are later developed due to antigen in the autoclaved diet. Undoubtedly germ-free animals will provide a useful tool for immunologists in such questions as the source of 'natural antibodies' or whether serum γ-globulin exists apart from that produced in response to an antigenic stimulus. Indeed, germ-free animals raised on diets free from antigenic materials would be a boon to immunologists. In one paper, germ-free animals were indispensable in experiments to refute the hypothesis that irreversible hæmorrhagic shock was due to absorption of bacterial endotoxins from the bowel.

Interesting experiments are described to show that the increased growth-rate of conventional chicks, reared on diets containing penicillin, did not occur in germ-free chicks, but did occur after particular bacterial species had been experimentally established in their intestines. Another paper gives an account of experiments which show that infection with *Entamoeba histolytica* produces no lesions in germ-free guinea pigs, whereas it produces extensive ulceration of the intestinal mucosa in conventional guinea pigs. The potential value of germ-free animals in investigation of dental caries is, of course, obvious. In addition, the process of ageing in germ-free animals offers possibilities, but very little has been achieved so far in this respect on account of competition for available germ-free animal accommodation. However, perhaps the most exciting possibilities of germ-free animals at present relate to investigation of latent viruses, cancer and the relationship between them. No work upon latent viruses with germ-free animals is reported but a beginning has been made with cancer.

Filtrates from methylcholanthracene-induced tumours in conventional chicks are not infective, but when such tumours are induced in germ-free chicks inoculation of cell-free suspensions, produced by filtration through coarse filters, produces tumours and inoculation of suspensions produced by filtration through fine filters produces a fatal wasting disease. Purification procedures and electron microscopy tend to associate the tumour-producing activity with microsomal or virus-like particles of 50–150 mμ diameter and the wasting disease with smaller particles (20 mμ). In uncompleted experiments with germ-free C_3H mice, no mammary tumours in the females or hepatomas in the males have appeared in 100 mice of which the oldest are more than 700 days, whereas in comparable conventional C_3H mice 90 per cent die of these tumours within about 300 days.

It seems that germ-free experimental animals are likely to prove indispensable tools to answer certain basic questions of capital importance in several fields of biological research ; yet after these questions have been answered the value of germ-free animals may perhaps decline. This poses a difficult problem for those called upon to decide whether to support the production of germ-free animals, an expensive and long-term undertaking. A. W. GLEDHILL

WATER POLLUTION RESEARCH, 1958*

APPLIED scientific research must ensure that projects and results are directly relevant and immediately available, so it is satisfactory to see from the annual report of the work of the Water Pollution Research Laboratory that contacts with the industries and authorities concerned are increasing and producing useful conclusions. Apart from the report itself, information is exchanged through numerous publications in journals, the invaluable *Water Pollution Abstracts*, a new series entitled "Notes on Water Pollution", and several committees recently established where the Laboratory makes close contact with the River Boards, the Institute of Sewage Purification and the Federation of British Industries. Financial support by the latter body has enabled two new investigations of considerable importance to industry to be started, and there are many examples in the report of valuable short-term studies undertaken in collaboration with specific industries, often on a repayment basis. In particular, suggestions made by the Laboratory have enabled several firms to reduce the danger of pollution by simple changes in manufacturing processes instead of expensive purification plant, and anaerobic digestion has been shown to be suitable for the treatment of slaughterhouse wastes but not for whisky wastes.

In the field of automatic apparatus it is anticipated that the merits of the dissolved oxygen recorder developed and applied by the Laboratory will be recognized by commercial production. The use of continuous recorders for oxygen and temperature has made it clear that isolated samples often do not give sufficient information for the accurate assessment of the condition of a river.

The studies made in the Laboratory of the foaming of detergents, and their behaviour in sewage treatment plant, are of particular interest. As the detergents normally used are resistant to biological treatment in percolating filters or activated sludge plant, the effluents may cause objectionable frothing in rivers. Recently, a new active material has been developed by the industry and tests have shown that a much greater proportion is destroyed during sewage treatment. If this is confirmed in large-scale trials, and if it could then replace existing detergents, the state of many rivers and drinking-water supplies should be improved directly. There might also be a general improvement in the quality of many effluents, as the efficiency of treatment can be affected by the amount of detergent present.

It is to be hoped that successes in empirical investigations will not distract attention from more prolonged and fundamental studies which are likely to be more economical in the long run. For example, the detailed results of the analysis of domestic sewage are proving to be very interesting and it will be extremely useful to know exactly the nature of the substances which treatment must aim to destroy. Biologists will be encouraged to see the success of modern analytical methods for the detailed separation and identification of the components of such a complex material.

* Department of Scientific and Industrial Research. Water Pollution Research 1958 : The Report of the Water Pollution Research Board with the Report of the Director of the Water Pollution Research Laboratory. Pp. v+113+4 plates. (London : H.M. Stationery Office, 1959.) 7*s*. net.

Investigations of the toxicity of various substances and the effects of temperature on fish continue. In these studies, and also in work on biological treatments of sewage, cyanides and phenols, it is interesting to see the growing significance of acclimatization of the organism or the community. Most of the toxicity studies have been based on mortalities during relatively short periods of exposure, and it would now seem necessary to study the effects of much longer exposures on the growth, longevity and reproduction of fish.

The survey of the Thames estuary, which has been an important part of earlier reports, is now nearing completion. Some examples of the difficulties that arise in predicting the behaviour of this intricate system are to be found in this report. Recent improvements in the treatment of some of the sewage discharged to the estuary have apparently not produced the expected improvement in estuarine conditions for much of the year. It seems probable that dredging may have to be added to the numerous factors which must be considered, as it appears that a concurrent reduction in the removal of organic matter in this way could have masked the effects of the improvements.

It may be helpful to direct attention to two errors which might lead the reader to erroneous conclusions. In Fig. 4, p. 13, the continuous lines refer to a depth of 3 ft. and the broken lines to 15 ft., not vice versa as in the key given. In a section describing the work of the reviewer while at the Laboratory (p. 85), the last paragraph should start, "The gross rates of oxygen production are nearly twice (not ten times) published values for various aquatic plants in optimum light but in stagnant vessels. Static values for the plants used, obtained by extrapolating the flow curves, are much lower than the experimental stagnant results".

D. F. WESTLAKE

UNIVERSITY OF OXFORD SECOND TANGANYIKA EXPEDITION

WITH the encouragement of the Government of Tanganyika, a second party from the University of Oxford visited the Mahali Mountains on the eastern shore of Lake Tanganyika during July to October to continue the work started by last year's expedition (see *Nature*, **183**, 726 ; March 14, 1959).

The Mahalis form a small, well-defined, yet little known region, not typical of most of Tanganyika, where flora and fauna of East and West Africa meet. Whereas last year's expedition concentrated on the southern half of the peninsula, this year the base camp was farther north, at Kasoge, a short distance from Mount Kungwe (*c.* 8,250 ft.), the highest peak in the range.

A collection of plants at all altitudes above lake-level was made by R. M. Harley and J. G. B. Newbould, of the Botany School, Oxford. The specimens have been sent to the Royal Botanic Gardens at Kew for identification and will be used in the preparation of the Flora of Tropical East Africa. The collection includes a number of live orchids which are now in the orchid houses at Kew.

The two zoologists made a general collection of birds, snakes and small mammals and also specialized in Arachnida and freshwater biology. J. A. Cooke, of the Zoology Department, Oxford, made an exhaustive study of the spiders in the area and collected nearly 4,000 specimens. D. H. Eccles, of the Bureau of Animal Population, Oxford, collected several hundred fish from the streams draining into Lake Tanganyika, using both poison and electric shock methods. For two weeks the party was joined by G. H. Yeoman, of the Tanganyika Veterinary Department, who was investigating parasites on small mammals.

W. J. Wadsworth and R. C. Herrera, of the Department of Geology, Oxford, made a geological investigation of the layered igneous intrusion at Kapalagulu, about 20 miles north-east of Mount Kungwe. T. E. Stevens, of the same Department, completed a survey of the Mount Kungwe region itself. Collections of rock specimens from these two areas will be examined in the Department of Geology, Oxford, and at the Geological Survey, Dodoma, Tanganyika.

R. Davis, of the Institute of Experimental Psychology, Oxford, conducted experiments on reaction times and visual perception among local inhabitants and tested 350 children in missions and native authority schools as part of a comparative study of African and European children. A household survey of villages in the northern half of the peninsula was also undertaken.

The members of the expedition participated in the social activities of the region and various features of local life were recorded, both photographically and on magnetic tape.

R. DAVIS

GEOMAGNETIC ACTIVITY AT HALLEY BAY ON DISTURBED DAYS

By J. MACDOWALL
Meteorological Office, London

THIS examination of the diurnal variation of geomagnetic activity at Halley Bay, lat. 75° 31′ S., long. 26° 37′ W., was based on Q-indices which occurred during the five most disturbed days in each month. A year was formed from the twenty months observations and then divided into four seasons.

Greatest activity occurred for the seven hours after local midnight in each season, but a significant seasonal change occurred in the form of the daily variation.

Fig. 1 shows that the mean activity of the year was of a similar form to the diurnal variation at the equinox. However, Fig. 2 illustrates the marked seasonal change in the form of the diurnal curve. Near local midnight, activity started earliest in winter and latest in summer, but activity after mid-