miscellaneous, and testing services. The wide scope of the work of the establishment is illustrated by the fact that within the eight main sections there are nearly a hundred sub-sections dealing with such widely different topics as pulsed infusion of coal, ignition of gases by sparks of various origins, fighting roadway fires with foam-plugs, atomic hydrogen welding of wrought iron, catalytic oxidation of exhaust gases of Diesel locomotives, deposition and dispersion of respirable dust, automatic assessment of miners' pneumoconiosis from chest radiographs, safety helmets and factors affecting the movement and control of rats in drift mines.

It is not easy to select from the necessarily highly condensed accounts of investigations included in the report examples which illustrate adequately the scope and quality of the work of the Establishment; accordingly, the largest sections, those devoted to the explosion hazard and to engineering and metallurgical research, are selected for mention. The report points out that, during the decade 1946–55, there was a marked decrease in the number of casualties from explosions in mines in Great Britain, due not to any great reduction in the number of gas ignitions but to reduced severity of the explosions as measured by the number of casualties. This improvement may well be due to improved mine ventilation and gas control, with consequent reduction in the size of accumulations of gas available for inflammation. It is felt by the Establishment that current research on the causes of ignition of gas in mines should be supplemented by research on the movement of firedamp in mines and on the dispersal of accumulations of gas. Coal-dust explosions in mines are generally initiated by explosions of methane, so that attention continues to be directed towards the ignition of methane, particularly by frictional sparking such as may occur when certain light alloys strike rusty steel, or from steel chock releases, or from auger mining, or from rocks during drilling.

So far as coal-dust explosions are concerned, the report includes work on binding of coal dust by dilute solutions of adhesive and by aerosols, and work in the Establishment's explosion gallery at Buxton on the propagation and prevention of propagation of a coal-dust explosion. The work in the gallery includes an investigation on the dispersion of dust by, and in, the blast from an explosion. An interesting part of that section on explosions deals with the application of gas chromatography followed by a hot-wire detector (or for some purposes an infra-red analyser) for analysis of mine atmospheres, natural gases from boreholes in coal and ironstone mines, fire products and Diesel exhausts.

The section on engineering and metallurgical research shows that light-weight roof-bars were studied during 1956 especially in respect of their stability in temporary support systems at roadheads. Attention was given to the development of convenient and rapid non-destructive methods for checking the soundness of welds in chain links, of particular importance, for example, in cage suspensions. Several failures in ropes and components of couplings and draw gear were examined, and as a result theoretical and experimental work was begun to find improvements in design or in choice of material; photo-elastic methods are being used increasingly in this work. Mining gear may be subjected to corrosion arising from, for example, moist salt spread in mines to bind dust, from acid pit-water, or from the reaction products between salt and acid pit-water. The effects of potentially corrosive materials on mining gear, including wire ropes, were examined during the year and the influence of certain inhibitors was investigated.

As mentioned above, it is not easy to deal adequately in this short notice with the wide variety of work summarized in the report. The report will be read, as the earlier reports of the Establishment have been, with real interest by those connected with the mining industry. It can be recommended, also, to those who are not connected with the mining industry, not only because of the wide range of problems receiving attention but also because several of the problems are similar to those found in other industries.

S. G. WARD

BIOLOGISTS IN THE TROPICS

ON July 5 a meeting was arranged by the Institute of Biology to discuss the professional problems of biologists serving overseas. A report of the meeting has been published in the Institute's *Journal* (4, No. 4; 1957). The meeting was opened by Dr. Kenneth Mellanby, lately principal of the University College, Ibadan, Nigeria, who said that many of the economic problems of tropical territories could only be solved by biologists, for whom there are an immense number of fascinating and important problems waiting to be tackled. So far, there has been very little serious biological research in any part of the tropics. Hard-pressed government officials in a number of territories have done much fine work, but shortages of staff and the constant preoccupation with *ad hoc* measures have meant that the fundamental work on which practical measures should be based has not been tackled. At times, the need for such fundamental work has not even been realized; in Nigeria the belief was that there was no need for any work on cocoa and its pests because this was all covered by the work of the Cocoa Research Station in Ghana. There are many more entomologists in Britain studying the wheat bulb fly than there are in West Africa concerned with the pests of cocoa, the mainstay of the economy of Ghana and Western Nigeria.

Dr. E. E. Weatherly, who some years ago worked as a botanist in the Department of Agriculture, Uganda, indicated that there could be no better experience for a biologist of Ph.D. level than that of spending a few years of research in a tropical country. The major professional difficulty in working in tropical parts is that of isolation. First, there is isolation from libraries. To a scientist the library comes second only to the laboratory, but a library is more difficult and expensive to equip and maintain than a laboratory. This difficulty is inherent in spreading out research over isolated and remote stations, for even reasonably useful libraries simply cannot be maintained at such centres.

Next to the absence of books comes the absence of professional colleagues. Except for the very few,

discussion of work with others in the same or related fields is a vital stimulus to progress. Few specialists in the tropics can expect such contacts.

Professional isolation has a secondary effect: it can lead only too easily to professional oblivion. The young man overseas, having no opportunity for the self-advertisement provided by conferences and meetings, remains unknown to those of his seniors who might help promote his professional interests.

The greatest problem of all who serve overseas, according to Dr. Weatherly, is education of children. It looms even larger than the purely professional problems, but it inevitably leads to a vital question which is professional in nature. This is the question of length of service. In view of professional and family difficulties, the ideal arrangements would seem to be five, ten or even fifteen years of service, with the opportunity of a return to the United Kingdom when professional or family circumstances demand.

The not-so-young biologist who wishes to resign is confronted with the problem of obtaining a post in the United Kingdom; for this the specialist is better placed than his administrative colleagues. A general agricultural officer is unfit for a return to Britain in proportion to the length of his service. His intimate knowledge of the agriculture, people and climate of an area in Africa is not likely to impress a committee of the Ministry of Agriculture in Britain, or a commercial firm wanting a farm manager.

The difficulties of the biologist research officers wishing to return to the United Kingdom are considerable. For a man who obtains a Colonial Office scholarship immediately after his first degree, the possibility of obtaining a higher degree is precluded. In any event, the type of work carried out in a government department might not be suitable for submission as a thesis. Moreover, his work, although very valuable to his employers and perhaps very valuable as experience to himself, may have led to little publication except in local reports or journals. Then there is the disadvantage of physical remoteness. The head of a department receiving applications for a post is likely to view one from overseas less favourably than others. Nor can the attitude which many senior biologists have to work overseas be precluded. In most branches of biology, tropical experience is not at a premium—it is often regarded as an improper and largely irrelevant version of experience gained in the United Kingdom.

This misconception is rendered possible by the fact that so many senior biologists themselves have never visited, or worked in, the tropics and are in no position to assess the value of tropical experience. Many biologists who have spent some years of successful research in the tropics might reasonably look forward to a biological post in one of the universities in the United Kingdom, but the pattern of university recruitment to-day makes their chances very slender. University teaching has become a profession which may be entered at the bottom, occasionally at the top, but very seldom in the middle.

Finally, there is the problem with which a university tutor is faced in advising students whether to take up tropical work. Is a young man to-day well advised to enter a field of work which seems to be contracting? Self-government in overseas territories and the increasing education of Africans and other peoples up to university-level must inevitably mean fewer posts for Europeans. This would seem to point to scientific careers in the tropics being in many cases rather short, at all events much shorter than thirty years.

Guarantees of security for young men who wish to venture overseas are essential. As biologists they are taking great professional risks and their interests should be safeguarded. Such safeguards are expressed by the Colonial Office in "Reorganization of the Colonial Service, 1954"* as follows: "They will be given adequate notice of any intention to terminate their employment in consequence of constitutional changes, and Her Majesty's Government in the United Kingdom will endeavour to find them alternative employment should they so desire". The word 'endeavour' should be replaced by 'undertake'.

Other contributions to this important meeting were made by D. Rhind, Secretary for Colonial Agricultural Research, who talked about biological research in Colonial territories; Prof. A. H. Bunting, who considered the problems of biologists in the transition of Colonial countries to independence; Prof. G. F. Asprey, who examined the problems of biologists in university colleges overseas, and Prof. R. D. Purchon, of the University of Malaya, who was particularly concerned with the problems of his own university.

* Colonial No. 306. (London: H.M. Stationery Office.)

TRADE WASTES

As a result of public demand for the abatement of pollution of rivers, the River Boards Act, 1948, and the Rivers (Prevention of Pollution) Act, 1951, all those concerned with the disposal of polluting liquids, and particularly industrialists and local authorities, have found it necessary in recent years to give serious consideration to the development of efficient methods of treating such liquids to reduce their polluting character. During the past three years, several symposia on industrial effluents have been held in Britain, and a report has been issued* on the proceedings of a successful and well-attended symposium held by the Midland Branch of the Institute of Sewage Purification at the University of Birmingham on April 9, 1957. The chairman was Dr. A. Key, senior chemical inspector, Ministry of Housing and Local Government, and the proceedings were opened by Alderman A. Paddon Smith, chairman of the Birmingham Tame and Rea District Drainage Board. The papers presented dealt with the problems concerned with acceptance of trade effluents into public sewers, the obligations imposed on local authorities and traders by the rivers pollution prevention Acts, and methods of treatment of particular waste waters.

Mr. M. A. Kershaw, in a paper on the first of these subjects, makes the point that one of the effects of

* Symposium on Trade Wastes held at the University of Birmingham. Pp. 167. (London: Joint Secretaries, Institute of Sewage Purification, 1957.) 10s.