The papers belonging to the second section, "Design and Planning", ranged over a very wide field, from the broad implications of the Town and Country Planning Acts to the more intimate social problems of rehousing the family. Hitherto, the social scientists have been able to do little to influence such plans, but the fruits of their research have had considerable potential value and ought not to be neglected. To the observer of the discussions relating to these papers the day's work was stimulating; but sometimes there crept in a doubt about whether some of the more basic questions were being missed. There were so many different views on how the needs and aspirations of a planned community could be measured; it was therefore disturbing to feel that the experts had not reached any solid basis of agreement.

The third section of the conference—on "Needs and Standards in the Social Services"—began by considering social security in the epoch following the Beveridge Report. Recent years have brought about developments which were not foreseen when the scheme was planned. Ever-increasing demands are being made on the central exchequer to supplement the allowances paid under national insurance. These allowances fall substantially below the minimum subsistence requirements as assessed by the scale of need of the National Assistance Board. In 1952, 24 per cent of the households drawing retirement pensions were receiving supplementary assistance compared with 18 per cent four years previously, and the same trend is apparent in the other branches of national insurance. Clearly it would be impossible to raise the level of contributions to make the scheme actuarially sound. Would it therefore be better to drop the figment of a contributory insurance and finance the entire scheme out of general taxation? Or should one follow some other British Commonwealth countries and raise the money through a progressive social-security tax? In such a case should there be progressive rates of benefits, thus taking account of the fact that different people have different needs? Would it be advisable to develop some branches of social security as self-supporting insurance schemes—for example, those providing for short-term crises such as sickness or unemployment—while financing the remainder out of general taxation? These were some of the questions raised in the discussion. There was a general feeling that the abandonment of the principle of a contributory insurance for the purpose of economy and simplification in administration would, in the popular mind, entail the abandonment of the right to benefit. This right is held dear by working people, particularly in regard to unemployment. The imposition of a test of need would be considered as harking back to the days of the means test and the Poor Law. There is some recent evidence to show that there is still reluctance to claim assistance on the part of unemployed workers. Old people, too, it has been said, like to feel that they have something which they have earned, contributed or 'put by' for themselves and generally deplore the idea of charity.

It seems desirable that the purpose of the various social-security schemes be thought out and defined more clearly with the view of bringing about modifications designed to meet the needs for which they were intended.

The group turned to subsistence standards and to methods of measurement in social science. A method of measuring poverty that takes into account the

actual purchasing behaviour of people was discussed and shows promise of an improvement over its precursors. Then followed a discussion on the advantages and limitations of social survey techniques. It was agreed that such investigations could provide accurate factual data on the problem of needs and standards in the field of social insurance, but there was a lively debate on their value to the administrator in policy-making and in assessing priorities in the field of social welfare. Here the question of values which had obtruded itself many times in the conference came to the fore. Social scientists cannot claim the right to pronounce on how value judgments are to be made, but—and perhaps this was a keynote of the meeting—they can provide factual data by which such judgments can be considered and made more rationally.

INSECTICIDES AND COLONIAL AGRICULTURAL DEVELOPMENT

SOME eighty representatives of Colonial agricultural administration, of applied entomology, and of insecticide research and development were invited to Bristol by the Colston Research Society during March 23–27 to take part in a symposium dealing with insecticides in relation to Colonial agricultural development. The conference, which had the support of the Colonial Office and the Agricultural Research Council, was directed by Prof. T. Wallace, head of the Bristol University Agricultural and Horticultural Research Station at Long Ashton.

In the opening session, Dr. W. G. Hall (Commonwealth Institute of Entomology) stated that entomologists have been appointed in only fourteen of the thirty-eight British Colonies. The Colonial Empire, totalling 2½ million square miles, with a population of 70 millions and an annual export of crops valued at £182 million, employs, in all, 29 entomologists. Dr. Hall referred to the coming expiry of the Colonial Welfare and Development Act in 1956 and expressed the hope that ample funds will be made available to continue the pest-control work initiated by that Act.

Mr. C. B. Symes, of the Colonial Office, outlined the insecticide research programmes in the British Colonies, emphasizing the uses of the chlorinated hydrocarbons on pests of food plants. He pressed for an increase in fundamental work on specific Colonial problems.

Mr. S. Callaway, of the Chemical Defence Experimental Establishment, Porton, gave a detailed account of an air-spraying operation against locusts in Tanganyika, in which a spray of 20 per cent dinitrocresol in oil destroyed 4½ million locusts (96 per cent of the original population).

In the discussion on these papers, several speakers questioned the practicability of introducing insecticide treatments on peasant-grown crops. Sir Harold Tempany pointed out that the yields from peasant holdings are exceptionally low and will have to be increased because population is outpacing food production. Mr. W. T. Cowan noted that co-operative societies of native cotton growers are starting in Uganda.

In the afternoon session of March 24, Mr. E. O. Pearson (Empire Cotton-Growing Corporation) said that the control of jassid on irrigated cotton in the Sudan is the only instance in Africa of large-scale insecticide applications to this crop. He considers

that the employment of insecticides on peasant cotton awaits a more orderly system of farming and an increase in basic yields by improved cultivation and manuring.

Mr. R. S. McKinlay (East African Agriculture and Forestry Research Association) described a method of assaying *Lygus* damage to cotton by using weekly spraying of individual rows with DDT and toxaphene to provide pest-free plants for comparison of yields with those of surrounding *Lygus*-infested rows. He suggested that the inevitable delay in extending insecticide treatments to peasant crops might give time for the perfection of effective techniques.

In the discussion, Mr. Pearson recorded that the United States yields, being ten times those of Africa, carry a much higher cost of spraying. Mr. Leyland Cole deprecated the use of over-crude methods for applying the potent modern insecticides. A question on developments in the Congo elicited the reply that a much greater degree of direct control of agriculture is established there than in British colonies. Mr. McKinlay believes that the peasant cultivator can be taught to use insecticides but that it will be a slow process.

On the second day, Mr. G. Swaine (Department of Agriculture, Tanganyika) recorded experiments showing that treatment of cotton with five applications of 10 per cent DDT plus 3 per cent BHC greatly increases yield by controlling American bollworm. On coffee, the Pentatomid bug *Antestia lineaticollis* is now widely controlled in East Africa by DDT emulsion. Contact insecticides have given striking results when applied as seed dressings or mixed with soil; for example, BHC against termites or sugarcane white grubs, aldrin and BHC against the wheat pest, *Heteronychus consimilis*, and toxaphene against cutworms.

Mr. M. J. Way (Rothamsted Experimental Station) described certain ecological balances between pests and predators that might be adversely affected by insecticides. In Zanzibar the *Theraptus* bug attacking coconut palms is often kept in check by a predatory ant. This ant, however, encourages the mealy bug suspected of being the vector of a virus attacking clove trees. A similar relationship between ants and mealy bugs exists on cacao in West Africa.

Mr. J. Bowden (Agricultural Department, Gold Coast) described the damage done by insects to the African's principal food crops—maize, sorghum and millet.

During the discussion it was stated that seed dressing with BHC uses only one-tenth of the quantity of material employed in broadcast applications, but still gives a residual effect. The phytotoxicity of BHC to tobacco seedlings was noted.

In the afternoon, a paper by Mr. R. G. Fennah (Imperial College of Tropical Agriculture) was read by Mr. D. B. Murray. Mr. Fennah considers that, in the West Indies, losses due to the inefficiency of agricultural methods far outweigh those caused by insects. The successes so far gained by insecticides in that area are the suppression of the sugar-cane froghopper in Trinidad and the simplification of parasol ant control.

Prof. J. W. Munro (Imperial College, London) warned the conference that transfers of native labour from subsistence agriculture to industry will bring famine nearer, unless satisfactory storage and transport of foodstuffs can be provided. Much existing knowledge of stored-products pest control is not being used. Prof. Munro emphasized the importance of

training selected Africans and West Indians as technicians in the practice of storage pest destruction.

In the discussion, Dr. Jepson said he hopes that the development of agriculture as a subject of study in African universities will be encouraged by the provision of sufficiently attractive posts for Africans trained in agricultural science. He described the methyl bromide fumigation of the groundnut 'pyramids' at Kano as an outstanding example of co-operative effort. Mr. Swaine explained the method of pit storage in Tanganyika, which depends on the production by hermetically sealed grain of sufficient carbon dioxide to act as a fumigant. Dr. R. C. Fisher directed attention to infestations of timber, and outlined the activities of the West African timber-borer research team appointed by the Colonial Office to study infestation in logs before export.

The first paper of the morning session of the last day of the Conference was a general review by Sir Thomas Dalling (Food and Agriculture Organization, Rome) of the insect-transmitted diseases of livestock in Colonial territories. This was followed by a film and paper by Dr. J. Carmichael (formerly of the Uganda Veterinary Department) describing tsetse control in Zululand by application of DDT aerosols from Anson aircraft. Seven such applications in the period September 1950 to January 1951 reduced tsetse populations by 97–99.9 per cent.

Mr. H. E. Harbour (Cooper Technical Bureau) referred first to the earlier treatment of ticks on livestock by sodium arsenite dips, and the development of arsenic-tolerant tick populations. At present, BHC, DDT and toxaphene are making great contributions to tick control. In two areas in Tanganyika tanks have been installed and compulsory dipping instituted. As substitutes for dipping tanks, spray 'tunnels' are proving effective.

The discussion was opened by Dr. J. C. Matthyssse (Cornell University), who has been working on ticks in Rhodesia under the auspices of the Mutual Security Agency. He described systems of pen spraying of cattle, using itinerant spray teams. Dr. J. T. Martin suggested that the cost of derris treatment against warble flies might be lowered by the use of synergists. Mr. Symes described the contribution of the workers at Porton in the design of pumps and nozzles for tsetse-eradicating sprays.

In the final session, Dr. H. G. H. Kearns (Long Ashton Research Station) stressed the fact that the successful solution of a spraying problem must take into account the biology of the pest, the spray material, the culture of the crop, the machinery and the user. Present designs, particularly of small manual sprayers, are capable of much improvement, but low-priced standardized designs necessitate large orders. 'Air-flow' mist sprayers can be used for drift spraying only in exceptional cases, as in locust control. Appreciation by the engineer of the biologist's problems is fundamental to the development of satisfactory equipment.

Dr. E. Holmes (Plant Protection, Ltd.) summarized the magnitude and cost of the search for, and development of, new insecticides. He emphasized the necessity for the overseas user to give the manufacturer ample time to ship materials to ensure their delivery at a given date. He referred to the benefits that are accruing from the closer co-operation between official research workers and those from industry.

In the discussion, Mr. Higgins mentioned that the training of entomologists at the Imperial College, London, includes instruction in the use of spray

machinery. Mr. Hoare stressed the importance of obtaining exact data on spray deposition and offered the use of an electronic deposit analyser. Mr. Joyce described low-volume spraying in the Sudan, using 25 per cent DDT concentrate at just over $\frac{1}{2}$ gallon per acre. Mr. Symes considers that until formulations of insecticides and designs of machinery are based on much more fundamental research there will be much guesswork in pest-control procedures.

Throughout the conference the outstanding value of co-operation between home and overseas workers was apparent, and it was made clear that one of the immediate problems in Colonial agriculture is the reconciling of peasant cultivation with the need to increase food production by modern methods of pest control.

R. W. MARSH

NATIONAL RESEARCH DEVELOPMENT CORPORATION

REPORT FOR THE YEAR 1951-52

SIR HENRY TIZARD'S cautious reference to the National Research Development Corporation in his Messel Memorial Lecture last July would of itself induce careful scrutiny of the third report of the Corporation, covering the year ended June 30, 1952, which has now been published*. Although in content and arrangement this report differs somewhat from the two previous reports, which were concerned largely with describing the administrative arrangements, internal and external, and the policy it was proposed to pursue, and describes in more detail the kind of work now being done, it still appears that the Corporation has been in operation for too short a period for a sound judgment as to whether the fear is justified that the existence of such a government body will of itself discourage the spirit of adventure on the part of industry. The brief factual account of its work contained in this report gives no indication of any such trend, if indeed such a trend is likely to be reflected in the work of the Corporation itself.

Some 1,736 patents and patent applications have been vested in the Corporation during its first three years, and, of the 1,027 of which the Corporation was first apprised during 1951-52, 491 were from government departments and research councils, sixteen from British Commonwealth official organizations, one from a nationalized industry, eight from industrial research associations, fifty-three from universities, three from charitable organizations and 455 from private firms and individuals. Many of these last-named, of which 432 were British, were not of public importance. Of patent rights in inventions assigned to the Corporation during the year, 414 were from government departments and research councils, three from industrial research associations and twenty-two from universities, out of a total of 445; and of 401 United Kingdom patent applications and 559 United Kingdom granted patents that were held by the Corporation at June 30, 1952, 235 of which were the subject of 776 overseas patents and patent applications, 844 came from government departments and research councils, seven from industrial research associations and eighty-seven from universities. Most of the 199 licence agreements entered into at June

30, 1952, were not yet revenue-carrying, and net receipts from the various assets were £25,676.

During the year details of 361 inventions were the subject of 8,871 circulations to industrial firms and led to 245 inquiries. Of these, and of a further hundred inquiries brought forward from the previous year, 166 eventually proved abortive and 101 were still under consideration at June 30: the balance resulted in licence negotiations, of which thirty-one had been completed and forty-seven were still proceeding at that date. A second group of inventions includes some two hundred government and research council inventions, represented by patents and patent applications assigned to the Corporation, about eighty from universities, and a few from research associations and private inventors. All these cases are somewhat complex, requiring more-or-less constant individual attention. Sometimes the subject-matter is still too immature or tentative or the field of possible application as yet too remote or obscure to call for any action at this stage, but, from this whole group of inventions, nine licence agreements were concluded and thirty-two were still the subject of licensing and development discussions.

From the third group of inventions, of a long-term character, for which no individual enterprise can be found that is prepared to spend money on development, and in which the Corporation has undertaken the financial responsibility for development, some fifteen development projects have been sponsored during the Corporation's first three years, and further details of some of these are given in the report. Electronic digital computers have been the subject of ninety-nine inventions assigned to the Corporation, fifty-nine being from universities, thirty from government departments and corporations and ten from industrial firms. Patents have been applied for in respect of seventy-four of these inventions in ten foreign countries, and the Corporation has given a contract for the supply of four machines similar to that installed according to the design of Prof. F. C. Williams at the University of Manchester, where grants for development have also been made by the Corporation. The Corporation is, too, entering into a further contract for the supply of a prototype of a machine of much-reduced size based upon the development of special techniques which are expected to decrease cost and increase reliability.

The Corporation is assisting with grants of money for staff and materials experimental work at the Imperial College of Science and Technology, London, on a project for hydrocarbon synthesis; and development work at the National Physical Laboratory, Teddington, arising out of Sir Thomas Merton's work on diffraction gratings, and particularly in relation to spectroscopes, is being assisted by the provision of staff. Two industrial firms in the instrument industry have already taken out licences under the patent rights assigned to the Corporation in respect of these inventions. The Corporation has also agreed to sponsor a project, emanating from Sir Harry Ricardo, for a light steam-engine, which is operated off boiler plant designed to be fired with low-grade fuel and which is based on the application to such engines of the considerable engineering processes made during recent decades in the field of light internal-combustion engines. The project is regarded as likely to contribute materially to Commonwealth interests by meeting the need for small prime movers in under-developed regions of the world. A pilot plant in East Africa, where sisal juice is available in quantity for

* National Research Development Corporation. Report and Statement of Accounts for the Year 1st July, 1951, to 30th June, 1952. Pp. 18. (London: H.M.S.O., 1953.) 9d. net.