

The telephones recommended are equipped with powerful magneto-generators and high-resistance bells, enabling a number to be bridged across one pair of wires if desired. They are fitted with 'neophone' hand-microtelephones to improve speech transmission. Portable telephones are provided for by 'looping in' one pair of wires at each point and fixing a 2-pin weatherproof socket. A lamp calling-

system in addition to the bell can be fitted when the telephone is to be used in a very noisy position.

A.R.P. signals can be either visual or audible or a combination of both. The signal system usually consists of a starting switch which puts into action loud-ringing bells, hooters, etc., where large staffs are to be controlled, and buzzers or single lamps for offices and small staffs.

AN EXPERIMENT IN BIOLOGICAL CONTROL

THE control of injurious forms of insect life by the application of biological methods has, in a number of instances, proved remarkably successful. Other methods of control in such cases had been of little avail or were impracticable. Success achieved by the utilization of the natural enemies of injurious insects has usually proved to be relatively inexpensive and of a more or less permanent character. As a rule the most favourable conditions are those afforded by tropical or subtropical islands where the dissemination of the beneficial introduced insects meets with few handicaps or barriers. Recently an experiment in the biological control of coconut pests in Seychelles has been recounted (*Bull. Entomol. Res.*, 31; 1940).

The author of the paper in question, Mr. D. Vesey-Fitzgerald, mentions that the affected crop is of special importance, since its product, copra, is the main export of Seychelles. The pests concerned are scale insects (Coccidæ), and of these, four species were specially injurious. It is noteworthy that the species in question, namely, *Ischnaspis longirostris*, *Pinnaspis bucci*, *Chrysomphalus ficus* and *Eucalymnatus tessellatus*, are unknown as major pests of coconut in other countries, while the brown scales, that are usual pests of this crop, are not found in Seychelles. Other Coccidæ were also found to be infesting coconut in this area, while a large variety of different species were noted as attacking the general vegetation.

This fauna needed investigation, as it concerned the main problem, and as a result it became evident that general rather than specialized enemies of Coccidæ required searching for. Species that would, in fact, attack all the different scale insects without special preference were obviously needed, since the elimination of a particular kind might result in an increase of some other species. The life-history and special requirements of each of the four species, already named, are described and their incidence on the coconut is discussed.

In order to combat these Coccidæ, four species of Coccinellid beetles were introduced from East Africa. The species were *Chilocorus distigma*, *C. wahlbergi*, *Exochomus ventralis* and *E. flavipes*. Since the journey from Mombasa to Seychelles takes only three days by steamer, these predators could be landed there within a week of leaving the centres where they were bred in East Africa.

The breeding technique and the establishment of each of these species is dealt with. Records covering three years are given in order to show the effects of the introduced predators on the population of scale insects. The figure quoted shows that the introduced enemies are reducing the scale insects below the density at which they cause economic loss. Also it seems that the reduction of one species of pest has not been followed by a correlated increase of another species.

ELECTRICITY IN AGRICULTURE

REFERENCE has already been made in NATURE (Jan. 11, p. 62) to the report on the utilization of electricity in agriculture and horticulture prepared by C. A. Cameron Brown and issued by the Electrical Research Association. The Institution of Electrical Engineers is now publishing written contributions to the discussion of this report. The first contribution appears in the Institution's *Journal* of November.

Mr. H. W. Grimmitt, of the staff of the Electricity Commissioners, begins his written introduction to the discussion by pointing out that the extent of the bibliography is some indication of the wideness of the field of research and investigation which was carried out. Great Britain has not been in the forefront of research into agricultural applications of electricity, but the small amount of work that has been done has indicated the need for a central co-ordinating body, with vital interest in the whole matter, to make use of the excellent agricultural research resources which already exist, and which, with proper help, could carry out research along the parallel and related paths of electricity and agriculture. The E.R.A. has taken steps to provide co-ordination and

drive, and there is evidence of enthusiastic co-operation from the agricultural research institutions and also from the Ministry of Agriculture and the Agricultural Research Council. As a preliminary to active research, the E.R.A. has had prepared a complete survey of the whole field of research on the subject, both to provide information on past work and to make constructive suggestions for future work.

The general lines of the work are to investigate by research and experiment the extent to which each application of electricity can be developed to the point of maximum economic advantage to both farmer and supplier, and generally to study each application with the view of indicating the best technique to be adopted.

To the dairy farmer—the producer of milk and its by-products—more than to any other kind of farmer, electricity has much to offer. The appreciable load and annual revenue obtainable from a well-electrified dairy farm are sufficient justification for some trouble being taken to show grounds why electrification should not be the rule instead of the exception. War conditions, scarcity of labour, higher

wages, etc., have, as in many other branches of farming, lent greater weight to any considerations of labour saving or the obtaining of first-class results with comparatively unskilled or newly trained labour. The mechanical milking machine is an outstanding example of such a case. Americans are definitely in favour of milking machines, largely because of the labour-saving aspect. Official figures show an average increase of 112.7 per cent in the output of milk per hour of labour and, in all, a labour-saving of 52.1 per cent.

Cooling the milk after milking is another vital step in the process which does not always receive the attention it deserves. Here again, electricity is the best source of power, with attractive characteristics to the supply authority, the connected load being from $\frac{1}{2}$ to 1 horse-power, and the return some 500 to 1,000 kwh per consumer per annum for a 30-cow herd.

Water supply is second only to field work in essential importance on the farm; on the dairy and stock farm it might almost be awarded the premier place. The tendency is still to make a simple substitution of an electric motor for the previous source of power, in ignorance of the increased opportunity afforded by electrical operation and of the great advances made in recent years. The most notable has been the perfecting of the small automatic air-pressure controlled set; the full utilization of this method of water supply gives all the advantages of main water supply but at a substantially reduced cost.

A vital requirement on a dairy farm is the provision of hot water and steam for the essential washing and sterilizing of dairy appliances and utensils. There is no technical difficulty in doing this electrically, and to the electrical industry it is a very attractive load. On an average farm the washing and sterilizing requirements alone could account for a consumption of 500-1,000 electric units a year.

On the poultry farm, too, electricity can play a substantial part.

For several purposes, the use of power for grinding mills and general farm-yard loads is used extravagantly on many farms at present. For example, a grinding mill taking anything from 5 h.p. to 15 h.p. may be used for only a few hours weekly. By suitably using a much smaller mill of a simpler and more foolproof type and leaving it to run all day and all night if required, the power requirements may be reduced to about one fifth of what they were before for the same amount of total work. In threshing, the traditional method of using a large thresher requiring about 15 h.p. could be modified to enable corresponding work to be done over a longer period with a reduction of about 50 per cent in the power unit. To the farmer the attraction would be that the present bugbear of providing eight to ten men would be removed, as by using small threshers and mechanical adjuncts, the threshing of 75 acres could be handled by three men. These would be employed on the job for perhaps a month on the aggregate, but this could be spread over the winter months, allowing of the men being diverted for urgent work.

There is scope for research to determine how, on one hand, the cost of giving rural supplies can be reduced, and how, on the other hand, the rural load can be developed with economic justification to the farmer himself, so as to attract supply on a scale which, under present conditions of use, is only too often far from economic to the supplier. Both ends of the problem are being tackled by the Electrical Research Association.

FORTHCOMING EVENTS

[Meeting marked with an asterisk is open to the public.]

Monday, January 20

ROYAL SOCIETY OF ARTS (at John Adam Street, Adelphi, London, W.C.2), at 1.45 p.m.—Sir David Chadwick: "Some Problems of World Economic Development" (Cantor Lectures, 1).

ROYAL GEOGRAPHICAL SOCIETY (at Kensington Gore, London, S.W.7), at 3 p.m.—Commandant J. Hackin: "Routes anciennes en Afghanistan".

Tuesday, January 21

ROYAL INSTITUTION (at 21 Albemarle Street, London, W.1), at 2.30 p.m.—Dr. Gilbert Murray: "Hellenism".*

WARBURG INSTITUTE (at the Imperial Institute Buildings, London, S.W.7), at 2.30 p.m.—Dr. O. Kurz: "Stellar Divinities in the East and the West".

INSTITUTION OF CIVIL ENGINEERS (at Great George Street, London, S.W.1), at 1.30 p.m.—Mr. Herbert Cecil Whitehead: "The Design of Sewage-Purification Works".

Wednesday, January 22

ROYAL SOCIETY OF ARTS (at John Adam Street, Adelphi, London, W.C.2), at 1.45 p.m.—Sir Alan Cobham: "Flight Refuelling".

GEOLOGICAL SOCIETY OF LONDON (at Burlington House, Piccadilly, London, W.1), at 3 p.m.—Mr. Frederick Chapman: "On the Sequence and Age of the Rocks in Borings in the Atoll of Funafuti". Dr. A. G. Jhingran: "The Cheviot Granite".

Saturday, January 25

INSTITUTE OF PHYSICS (London and Home Counties' Branch) (at the Research Laboratories of the General Electric Co. Ltd., Wembley), at 2 p.m.—Conference on Industrial Radiography (Chairman: Dr. V. E. Pullin). Mr. H. P. Rooksby and Miss K. L. Jackman: "Applications of Radiography to the Electrical Industry"; Mr. W. L. Harper: "X-ray Examination of Light Alloy Castings"; Dr. L. Mullins: "Recent Developments in the Photographic Aspects of Radiography".

APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates mentioned:

LECTURER IN COOKERY AND DIETETICS to the Liverpool Education Committee—The Director of Education, 14 Sir Thomas Street, Liverpool 1 (January 22).

TEACHER OF SPEECH TRAINING in the Aberdeen Education Committee's Schools—The Director of Education, Education Offices, Municipal Buildings, Castle Street, Aberdeen (January 25).

SPEECH THERAPIST in the Leicester Education Committee's Schools—The Director of Education, Education Department, Newarke Street, Leicester (January 25).

DOMESTIC SCIENCE TEACHERS to the Bradford Education Committee—The Director of Education, Town Hall, Bradford (January 25).

LECTURER IN MATHEMATICS at the North Staffordshire Technical College—The Clerk to the Governors, Town Hall, Hanley, Stoke-on-Trent (February 1).

PSYCHIATRIC SOCIAL WORKER in the Department of Psychological Medicine—The Superintendent, Guy's Hospital, London Bridge, London, S.E.1.

REPORTS AND OTHER PUBLICATIONS

(not included in the Monthly Books Supplement)

Great Britain and Ireland

Transactions of the Royal Society of Edinburgh. Vol. 60, Part 1, No. 8: The Soils and Vegetation of the Bin and Clashindarroch Forests. By Dr. A. Muir and Dr. G. K. Fraser, with Notes on Afforestation by Dr. H. M. Steven. Pp. 233-342+4 plates. (Edinburgh: Robert Grant and Son, Ltd.; London: Williams and Norgate, Ltd.) 17s. [1912]