CURRENT SCIENCE

Vol. VI] June 1938 [No. 12

The Fourth International Locust Conference, Cairo, 1936.

THE "Proceedings of the Fourth International Locust Conference, Cairo, 23rd April 1936", which has been recently published, is a handsome volume on which the Egyptian Government might well be congratulated, though one might wish that it had been issued more expeditiously. The "Proceedings" serve to remind us that the beginning of a new locust visitation, which, from past experience, might be expected in Northern India at intervals of 4 to 8 years, may not be far off, and that, as in the case of States expecting war, the best course is a policy of armed preparedness, with trained staff and control material ready to come into action at a moment's notice.

In the past, Governments took interest in the Locust Problem only while locusts were present in their millions devastating the crops, and spent vast sums of money on their control, but when they disappeared in course of time, no further interest was taken, till such time as another visitation made its appearance. The reason for this apparent neglect is not far to seek. In the case of such pests or diseases, as are confined to a particular country or tract and are of annual recurrence, it should not be difficult for that country to arrange for their study and control, but where one is concerned with a plague of the nature of locusts, capable of migrating long distances across a number of countries, and appearing, moreover, after long intervals of absence, it is research work on a basis of Inter-State or International co-operation that is called for.

Various conferences had been held in the past, with the object of achieving a common orientation of policy and mutual co-operation in combating locust visitations. The earliest, possibly, was the one held at Pretoria in 1906, composed of representatives of Basutoland, the Cape Colony, Natal, the Orange River Colony and the Transvaal, and another met at Montevideo in 1913, when delegates from the Argentine, Bolivia, Brazil, Paraguay and Uruguay conferred about the investigation of the breeding grounds of the South American locust. In October 1920, an International Conference

in connection with the organisation of locust control was held at Rome under the auspices of the International Institute of Agriculture, in which 20 States of the Old and the New Worlds participated. It resulted in the Rome Convention of 31st October 1920, whereby adjoining States bound themselves to make co-operative efforts and to give mutual help in regard to locust control.

In ancient days, and in fact till very recently, the appearance of locusts had been popularly regarded as a visitation of Divine Wrath—one which had to be endured passively, as there was no remedy for it. There were then, if at all, but vague ideas as to where locusts came from or as to why they disappeared. It was only in 1921, when Uvarov put forward his "Theory of the Phases of Locusts" that a rational explanation of the phenomena connected with locust visitations became available. He showed that when locusts were apparently no more to be seen, they had not, by any means, really disappeared. What actually happened was that they had ceased to exist in a crowded state as swarms, but were, nevertheless, present in their breeding grounds as *solitary* individuals, scattered all over the area, living just like any ordinary grasshopper. According to Uvarov, these *solitary phase* individuals can increase rapidly in numbers, under the influence of favourable environmental conditions, and subsequently form concentrations in restricted areas, where they would breed in crowded state and undergo a transformation into the *gregaria phase*, leading to the formation of incipient swarms. Observations made, under natural conditions during the past decade, by various workers, in parts of the Red Sea Coast, Mekran and West Africa, have borne out the general soundness of the hypothesis, and investigations carried out in various parts of the world under the stimulus of the phase theory have, in most cases, borne fruitful results.

Subsequent to the appearance of the severe infestations of the Desert Locust, and the African Migratory Locust and the Red Locust in various parts of Africa during the period 1927–29, and of the Desert Locust in various parts of Western Asia during 1926–29, important schemes of locust research were organised in the countries affected, of which the most prominent is the British scheme under the control of the Imperial Institute of Entomology of London, whose work is spread over Anglo-Egyptian Sudan, Arabia, and parts of Central and South Africa, and the French organization of Anti-locust Research, stationed at Alger, which carries out investigations all over the French Possessions in North Africa and French Sudan. In the Indian area, a scheme of locust research, working under the auspices of the Imperial Council of Agricultural Research, New Delhi, has been in progress since December 1930, of which the work on the Bionomics of the Locust has been carried out in the laboratories of the Punjab Government Entomologist, Lyallpur, and the field observations on *solitary phase* locusts in various breeding grounds in Sind, Baluchistan and Rajputana, by staff working under the control of the Locust Research Entomologist, stationed at Karachi. Similar research on locusts is known to be in progress in various other countries also, such as for instance, Italy, Egypt, the United States, Canada, the Argentine and the Soviet Union.

It was felt, however, that there was bound to be an unnecessary reduplication of work, as well as a great deal of overlapping, when locust research was being undertaken in different places without a knowledge of what was being done elsewhere, and in view of the need of formulating a concerted scheme of research after pooling all the information available, the first International Locust Conference was convened at Rome by the International Institute of Agriculture under the patronage of the Italian Government in September 1931. In July 1932, the second Conference met at Paris at the invitation of the French Government, the third one at London in September 1934, under the patronage of the British Government, and the fourth at Cairo under that of the Egyptian Government in April 1936. We understand that the Fifth International Locust Conference will shortly meet at Brussels at the invitation of the Belgian Government at the end of August, during the current year.

There is little doubt that international meetings of this character are of great service in focussing together a knowledge of the work that is being carried out at various different centres. Usually, much of the work in progress at a particular centre, would tend to remain unpublished, awaiting a definite confirmation of results, so that for a considerable time workers would

remain in entire ignorance of the results obtained elsewhere. Much of the time and energy of workers could, therefore, be conserved, if facilities of contact between workers in the different parts of the world could be periodically provided. Of greater value than even the regular discussion of subjects at the plenary sessions of the Conference, are the opportunities provided of informal contact between workers and of mutual exchange of experiences on various details, which would not emerge in the course of formal meetings.

A cursory glance at the resolutions passed at the Conference and the recommendations made in regard to the international plans of future work on various locusts would give one an idea of the vast ground covered. The following formed the subjects of some of the resolutions: statistics of damage by locusts and grasshoppers, study of the phases, study of migrations in correlation with meteorological conditions, studies of the breeding grounds, factors controlling locust activity, the ecological control of outbreak centres, methods of forecasting locust outbreaks, locust control methods including employment of aeroplanes, and study of natural enemies. The resolutions recorded are highly valuable, as they embody the latest information available on the particular subject. Most of the papers submitted to the Conference have been appended to the "Proceedings" and are of exceeding value as records of experiences in different countries under varying climatic conditions.

Among the documents included in the "Proceedings," are four papers submitted by the Indian delegation, which call for a few comments. Two of the papers were contributed by Khan Bahadur Afzal Husain, who attended the Conference as the delegate representing India. Besides other interesting results, two of the conclusions recorded in his papers are of outstanding merit, *viz.*, the effect of (1) *carbon dioxide*, and (2) *continued physical exertions on the part of the hoppers* on the development of black pigments on the body. In this connection, it may be stated that the possession of black pigment by the hoppers is one of the main points of difference between the *solitaria* (usually green) and the *gregaria* (always black) hoppers, and it is well known that green hoppers, if kept crowded in a cage, will assume the black colouration. Mr. Husain's experiments have shown that *even when bred singly*, a hopper would develop black pigment if reared in an atmosphere of a certain proportion of carbon dioxide, and secondly, also if the hopper is kept continuously active by the use of certain artificial contrivances. The other two papers by Y. Ramachandra Rao were the outcome of continuous observations recorded by the survey staff stationed at various places in the Sind-Rajputana desert areas and in the Lasbela-Mekran coastal areas during a series of years. One of the papers deals with the evidence obtained in regard to the existence of powers of long distance migrations among the *solitary phase* population of the Desert Locust, whereby the *solitaria* individuals are shown to be able to breed in two different rain-belts, just like the swarms of the *gregaria* phase. The evidence as to the ability of the solitaries to migrate rather upsets the usually accepted conception of solitary phase populations, which are generally supposed to be sedentary and static, the migratory power being developed only when the swarms are produced. On the other hand, the ability, on the part of the solitary phase, of taking advantage of favourable conditions of breeding in two different rain-belts in the same year, greatly increases its powers of multiplication and consequently, the danger of its swarming. The second paper describes the outbreak centres that were discovered in the interior valleys of Mekran in 1935. These had been formed as a result of concentrated egg-laying in the valleys by solitary locusts that had migrated there from the coastal areas, and are of great importance to India, as forming the foci from which locust infestations might develop under favourable conditions.

One of the important results of the various schemes of locust research has been the tracing of many of the infestations of recent times to their actual outbreak centres. In the case of the Desert Locust, it was found that infestation had originated in three different centres: (1) in the Mekran area of British and Iranian Baluchistan, (2) in the Red Sea Coasts of Sudan and Arabia and (3) in some centre in the western areas of Sahara. As regards the African Migratory Locust, the infestation was proved to have begun first in the region of the Niger Bend in French Sudan, and to have gradually increased in extent and intensity till an

enormous extent of area of over 10 million square miles of territory on the African Continent was covered. The determination that this extensive infestation of the Migratory Locust had originated in a single outbreak centre, *viz.*, the San-Macina District of French Sudan has been appropriately described as "an outstanding achievement of the international anti-locust investigations".

Adverting to the practical aspect of the results of locust research, it may be stated that it is an exceedingly difficult task attempting to control locusts, when they have taken the shape of swarms. The swarms appear in such large numbers and have such immense powers of migration, that it would be well nigh impossible to control them. On the other hand, it should be an easier task to tackle an infestation in its initial stages, in the outbreak areas. If all potential outbreak centres could be delimited, and the area watched by a fully competent organisation, the incipient swarms could be dealt with as they arise. If this could be arranged, it should be possible to nip the evil in the bud, and save the enormous expenses entailed in the attempt to deal with infestations after they have developed.

In the words of Uvarov, "the alternative to thorough studies of locusts leading to rational schemes of control, is to continue paying annual tribute to the oldest enemy of agriculture—the Locust. This may have been unavoidable in the past, but there is now no excuse for carrying on the old policy of letting locusts develop unchecked and then spending millions in attempting to control them."

Forest Research in India, 1936-37.*

TWO official publications summarising the work done during 1936–37 at the Forest Research Institute, Dehra Dun and in the various British Indian Provinces (including Burma) have recently been issued. The first opens with a general review followed by five chapters, each dealing in turn with the work of the Sylvicultural, Botanical, Entomological, Utilisation and Chemical sections of the Institute. The second has much the same general plan, the sectional accounts, however, being summarised with reference to the provinces. This arrangement, while admitting of reference under subject-heads, precludes a coherent account being given of the work done on Forest Research in any one province. The compiler of the Reports has realised this drawback and sought to overcome it by brief provincial summaries in the opening "General" chapter in the second publication.

It is not possible even to merely mention, in a brief note the important problems, work on which is referred to in these two interseting reports. It would be very much like summerising a catalogue. The range of problems covered is exceptionally wide and, to the student who is particularly interested in any of these, an appendix to each of these reports provides a useful bibliography of the publications.

Special mention must be made of two features, during the year under review, which are of significant importance to Forest Research in India. The first of these is the inauguration of the Timber Development Section at the Dehra Dun Institute. Secondly, this was the first year in which the Indian Paper Mills subscribed towards part of the cost of the Paper Pulp Section of the Institute. This donation is, perhaps, the first outward indication that at long last Indian industry is beginning to realise the importance of Indian forests as feeders of Indian industry. Such recognition, long overdue and in an increasing measure in future, is essential for the porsperity of Indian industry no less than of Indian forests.

The reports are printed on paper made at the Dehra Dun experimental paper plant and this fact finds mention (as suggested in an earlier review in *Curr. Sci.*, Vol. IV, 789) at the beginning of each volume. A few well-chosen photographs in the body of the reports, while adding to their value, would go far in counteracting the "Blue Book" atmosphere of these publications.

EMMENNAR.

* *Forest Research in India*, 1936-37. Part I. Forest Research Institute. (Manager of Publications, Delhi), 1937. Pp. 92. Price Rs. 1–10–0 or 2*sh.* 9*d.*

Forest Research in India, 1936–37. Part II. Provincial Reports. (Manager of Publications, Delhi), 1938. Pp. 205. Price Rs. 4–6–0 or 7*sh.* 3*d.*