

teen species of "locust" on the earth, but the memoir lists 112 of the family Acridiidae (called Locustidae). Allowing for this, the memoir provides an excellent summary of habits, life-histories, remedies, and international co-operation.

It is curious that human ingenuity has not succeeded in controlling locusts, or even in understanding why an insect, normally widespread in small numbers, becomes enormously abundant, packs into swarms, and migrates over really enormous distances. One reason is that no single observer in his lifetime can get a long enough experience to be able to estimate the value of the different factors that govern these outbreaks; they are probably so diverse that a very minute knowledge of local conditions is required, and in any one locality there may not be sufficient outbreaks during a single working lifetime. So we still know very little of the conditions producing outbreaks, or the means of anticipating them and preparing for them. The methods in use are most diverse and as a rule extremely simple. In India troops have been turned out to fire volleys of blank cartridge to divert a swarm; while in Morocco cultures of *Coccobacillus acridiorum* have been used with success. These two represent the extremes of simplicity and of scientific achievement; but a perusal of this memoir shows that the locust problem still remains, and looks like doing so. As the author says, "Il existe toujours une question des sauterelles," and in the main the pest must be fought in every country with simple, homely methods devised to suit the local circumstances: the arsenic-treacle method succeeds in South Africa, but not in India; the method of "mopping up" hoppers in Bombay with a bamboo frame and bag is useless elsewhere; and there is no one method that stands out definitely as likely to be valuable.

To the economic entomologist, who is probably a member of an agricultural department, locusts present a serious problem, calling for whatever ingenuity he possesses. In 1903 there broke out in Bombay a plague of locusts of unknown habits, which actually flew about for eight months before laying eggs, and then suddenly the entomologist was called on for a means of dealing with hoppers about to hatch from eggs laid over 150,000 square miles of country. Such occasions are crises in the life of the entomologist, and we commend Prof. Trinchieri's summary as a welcome source of inspiration when faced with an outbreak.

In his last section the author discusses shortly the value of international co-operation, a matter that has been prominent since the Phytopathological Conference was held in Rome. Sixteen countries have answered in the affirmative the institute's query as to their willingness to co-operate against locusts. The value of such co-operation lies in the intelligence mutually given as to the occurrence of locusts, and this would be most valuable. It is useless discussing

this at present. Locusts do not respect international boundaries or join the Entente; but it is a part of the valuable work done by the institute that we should have these memoirs and be prepared for international co-operation when other circumstances render it possible. H. M.-L.

BIRD MIGRATION IN CENTRAL SWITZERLAND IN RELATION TO METEOROLOGICAL CONDITIONS.¹

THE relation of bird migration to meteorological conditions has been considered, of late years, an important part of the study of the movements of birds, and various theories have been advanced to explain their interrelations. In the memoir before us Dr. Bretscher deals very fully with the arrival in spring and departure in autumn of the summer visitors to Central Switzerland. In relation to these he treats of bird migration and atmospheric pressure, wind, atmospheric precipitation, temperature, etc., and under each heading he has tables of statistics in support of the statements in the text. By tables 1 and 15 he shows that the position of barometric depressions within the area has, as we should expect, no influence on the arrival of the summer migrants and their departure in autumn. In tables 3 and 4 he discusses the influence of direction and strength of the wind, and concludes that, in Central Switzerland, migration proceeds irrespective of the direction of the wind, and that, unless the force be so great as to be a hindrance, the influence of this, too, may be regarded as a negligible quantity. The fourth section deals with atmospheric precipitation in relation to bird migration; as the author tells us in Switzerland even keen ornithologists stay at home in wet weather, we are not surprised to find that they have few direct records of migration in rain, snow, or fog, and he himself says, further observations on this subject are wanted.

What strikes one as being the most interesting of any of the sections are those on spring and autumn migration in relation to temperature. Dr. Bretscher gives many interesting tables showing the number of observations on the movements of each species under each degree of temperature Centigrade. These indicate the maximum and minimum between which migration takes place, the gradual increase to the most favourable migration temperature, and the decrease after this is reached. Here we see that birds migrate between certain temperatures, which vary according to the species; thus, the blackbird and song-thrush perform their migrations at a lower temperature than the insect-eating warblers. Another aspect is presented on table 9, namely, the duration of the migration period in relation to the average temperature, and the author here comes to the conclusion that the two are not correlated; thus the warmest average temperature does not necessarily coincide with the shortest

¹ "Der Vogelzug im schweizerischen Mittelland in seinem Zusammenhang mit den Witterungsverhältnissen." Von Dr. K. Bretscher. *Nouveaux mémoires de la Société Helvétique des Sciences naturelles*, vol. li., mém. 2.

migration period, nor does a cold spell mean a lengthening of the time over which the migration extends. Table 10 shows the difference of temperature of the migration day and that directly preceding it, and purports to prove that it is the temperature of the moment, not that which went before, which incites birds to migrate. It seems, however, as if the author had somewhat confused the issue; it cannot be the temperature at the point of arrival which incites the bird to begin its migration in spring. After this we have the various migration dates compared for Switzerland, Hungary, Bavaria, and Württemberg, though as the last has only three entries we think it might have been omitted.

In conclusion, the author indicates his conviction, which is probably shared by most ornithologists, that the real incentive to migration is not to be found in outward circumstances, but must be sought in physiological conditions. The outward conditions, including food, do undoubtedly have some effect upon it, but do not produce the necessary impulse. Though there is perhaps nothing startlingly new in this pamphlet, yet it is a welcome addition to the literature relating to migration; it shows much careful work, and the fact that Dr. Bretscher refrains from drawing more than very tentative conclusions adds to, rather than detracts from, its value. He realises that it is not possible to come to any definite solution of the problem he is studying without observations—and, we would add, meteorological data—made over a much wider field.

W. E. C.

CONTRIBUTIONS TO EMBRYOLOGY.¹

NO money given by Mr. Carnegie for the furtherance of scientific research is likely to yield better interest than that invested in the Department of Embryology in the Carnegie Institution of Washington, D.C. The nucleus of the department was formed by the collection of human embryos assembled by Prof. Mall when he held the chair of anatomy in Johns Hopkins University, Baltimore. It took Prof. Mall ten years to collect his first hundred specimens; five years to collect the second hundred; three years for the third; and two years for the fourth hundred. Since his collection was taken over by the Carnegie Institution four hundred specimens have been gathered each year. The collection of material is now the most extensive and the equipment the best of any embryological department in the world. Specimens are being gathered from all parts for the study of "racial embryology"—an untouched field of research. New technical procedures are being introduced to enable workers to reconstruct the different parts of the embryo with much greater accuracy than had been previously possible.

The two volumes here noticed contain an account of recent researches carried out by workers attached to the department of which Prof. Mall is the director. The director himself contributes

¹ "Contributions to Embryology." Vols. iv. and vi. (Carnegie Institution of Washington, 1916-17.)

two papers—one on the origin of the "magma reticule," which is present in normal embryos, but is particularly abundant, as Giacomini had noted, in pathological human embryos. His second paper is a description of the condition of cyclops as seen in early stages of human development. Mr. R. S. Cunningham describes the development of lymphatics in the lung—a paper which is interesting not only from a theoretical, but also from a practical point of view. Dr. Florence Sabin gives an account of a prolonged series of investigations concerning the origin of blood-vessels, and reaches some unexpected conclusions regarding the earliest blood channels which appear in the head and brain. Certain channels which at first serve as veins appear afterwards to be converted into arteries.

All the papers represent a high grade of workmanship, and no pains or expense have been spared to obtain accuracy and finish of illustration.

A. K.

NOTES.

THE succession of M. Painlevé to the Premiership of the French Government ought, even in this country, to excite the interest and friendly sympathy of the scientific world. The new Premier is a member of the Paris Academy of Sciences, and a mathematician of world-wide reputation; besides contributing to the literature of his subject, he has held, until quite lately, two of the most important mathematical chairs in France. To construct a similar case in our own country, we should have to suppose our Prime Minister to be a man like the late H. J. S. Smith, or Sir William Ramsay; could anything more improbable be thought of? Yet the evidence is steadily growing that men of the so-called professorial type may show themselves eminently capable of directing public affairs; President Wilson is a conspicuous example, and as time goes on the number of such cases is certain to increase. We feel that, on behalf of English men of science, we may congratulate, not only M. Painlevé, but even France herself, on this appointment; and we confidently hope that the sequel will justify it, and help to make average citizens understand the value, in all national affairs, of a strictly scientific habit of mind.

UNDER the heading of "New German Chemical Discoveries," the *Times* of September 14 quotes from the *Neue Zürcher Zeitung* a review of German activities in technical matters in the field of war economics. It is stated that by the use of liquid sulphur dioxide viscous golden-yellow mineral oils are being extracted from coal; the yield, however, is small, 5 kilos. per metric ton. This is equivalent to about 1¼ gallons per imperial ton, and is a striking commentary on the shortage of such oils in Germany. The refining of petroleum oils by this solvent had already been placed upon a commercial footing under the Edeleanu patents, but the outbreak of the war interrupted the development of the process, which depends on the preferential solvent action of the liquefied gas on certain classes of hydrocarbons and sulphur compounds, enabling the removal of those which give rise to a smoky flame, together with the objectionable sulphur compounds. In a series of Howard lectures (Roy. Soc. Arts, 1916) Prof. Brame suggested the use of this solvent as being the most promising for the extraction of certain constituents of coal in future investigations; it is therefore of some interest to find that commercial application of liquid sulphur dioxide is now yielding these hydro-