

tinental side the middle section is the wettest. Moreover, taking the divisions in pairs, there is a marked difference in the comparison. In the northern and central pairs the "continental" section is the drier, while in the remaining pair the difference is greater and also reversed in sign. Prof. Terada connects this anomaly with a possible "centre of action" controlled by the position of the Korean promontory, but it seems to be quite possible that he has overlooked the probable effect of the contour of the land itself. A glance at the map will show that his southernmost "ocean" division is practically outside the main island, which includes the northern and central divisions and the greater part of the continental southern division, so that we should naturally expect some sort of anomaly in that region, apart from the fact that the vertebral line of division, which is not far from a meridian in the north, tends to become more nearly a parallel in the south.

The author has adopted a good plan in using percentages instead of totals to prevent undue emphasis being placed on the wettest periods and places.

W. W. B.

Economic Entomology in the Philippines.¹

A CONSIDERABLE portion of the Bulletin before us is the outcome of work undertaken with the definitely economic object of procuring and transporting to the battlefield natural enemies of the beetle *Anomala orientalis*, which, by reason of the havoc wrought in the larval stage on the roots of the sugarcane, is a serious pest in the plantations, and was causing heavy losses in the Island of Oahu, Hawaii. It is gratifying to learn that the quest of the entomologists was entirely successful, and that through their labours the foe appears to have been vanquished, and thereby all mankind benefited in the saving of large quantities of one of our most valuable articles of food. The ally which the entomological staff summoned to the aid of the sugar-planters was the "wasp" *Scolia manilae*. It is perhaps prudent here to indicate that the term "wasp studies" must not be understood to apply solely to the true Diplopterous wasps, the Vespidae; it is used in this publication as a convenient term including many families of aculeate Hymenoptera other than the bees.

Scolia manilae is a small black and yellow wasp that occurs abundantly in the Philippines. The females possess the power of detecting the presence of certain subterranean beetle grubs, and, having located their victim, dig down to it and deposit on its ventral surface an egg from which there soon emerges a larva that devours the beetle grub. The plan of campaign was simple. At Los Baños quantities of females of *Scolia manilae* were captured and placed in suitable vessels in which had been placed beetle grubs of appropriate age, and a sprig of foliage moistened with water and honey for the personal benefit of the wasps. Most of the grubs duly received an egg; those so favoured were placed in clay cells which were packed in soil in a tightly closed can, and then shipped to Oahu. Here the *Scolia* of the next generation emerged and were liberated. They established themselves with such success and increased so rapidly that they are now more abundant near Honolulu than at their native place, Los Baños, while the pest

Anomala orientalis is vanishing so satisfactorily as to cause wonder how the wasp maintains itself.

The authors describe and figure twenty-six new species belonging to several different families of "wasps"; and the bionomics of these and others are narrated with great detail by Dr. Williams. His observations show that many species of these "wasps" are of economic importance in keeping in check the numbers of harmful insects, and suggest that an important line of research is here open to the field-naturalist. From the purely scientific point of view, perhaps the most interesting feature of the Bulletin is the frequency with which instincts and behaviour that are characteristic of the most highly developed social wasps manifest themselves sporadically and in an incipient fashion among these solitary species. So much is this the case that it becomes almost possible to construct a gradually ascending series from the simplest to the most highly specialised. Commencing with species that differ but little in habits from the Ichneumonidae, stinging and only temporarily paralyzing their victim in order the better to attach their egg, but constructing no nest or burrow of any description, we may pass on to those that dig burrows or build nests either unaided or in company with a few other individuals, and reach the climax in the elaborate domestic arrangements and architecture of our familiar social wasps and hornets. O. H. L.

Climate of the Netherlands.

THE Royal Netherlands Meteorological Institute has recently issued, as publication No. 102, "The Climate of the Netherlands with Respect to Air Temperature," by Dr. Ch. M. A. Hartman. Many years have elapsed since any previous discussion of air temperature in the Netherlands was undertaken. The stations yielding observations only for recent years have been compared with the stations available for longer periods, by which, together with the aid of stations affording hourly observations, special corrections have been found for each month and for each station required to secure the true temperature from observations at the hours of 8, 2, and 7. At Zwanenburg, situated midway between Amsterdam and Haarlem, there is a series of observations from 1743 to 1860, and at De Bilt observations are available from 1849 to 1917. The annual variation is given for twenty-four years from 1894 to 1917 inclusive at twelve stations; the range of temperature varies with latitude and with an increased distance from the sea. Diurnal variation is much affected by the influence of the sea, which suggests the difficulty of obtaining a true mean temperature from a combination of, say, three hours, 8, 2, and 7, and of maintaining the same hours in winter and in summer, but a change of hours is recognised as not practicable. The highest temperatures observed are 99° F. and 97° F. at Maestricht respectively on August 4, 1857, and July 28, 1911, and 97° F. at Oudenbosch on June 8, 1915. The lowest readings are -8° F. at Winterswijk on February 7, 1895, and at Katwijk-on-Rhine on February 14, 1895. Frequency of different temperatures is given for several stations and for all months, and the occurrences of diurnal variations of temperature for each degree Centigrade are tabulated, also the diurnal range for each of the twenty-four hours. One of the many tables shows the temperatures which occur each month, with the different directions of the wind.

¹ "Philippine Wasp Studies." Part i., Description of New Species. By S. A. Rohwer. Part ii., Descriptions of New Species and Life-history Studies. By F. X. Williams. Report of Work of the Experiment Station of the Hawaiian Sugar Planters' Association. Entomological Series. Bulletin No. 14. Pp. 186+106 figs. (Honolulu, December, 1919.)