

MISCELLANEOUS.

The article on the climate of New Zealand for the "Handbook of the Climatology of the World," which is being issued in sections by Drs. W. Köppen and R. Geiger, was completed and is now advertised. It is included in a separate volume with the climate of Australia, by Professor T. Griffith Taylor. The joint editors of the Handbook expressed themselves as pleased with the work. The figures for the article were drawn by Mr. G. Harris, of the Geological Survey, and I am indebted to Dr. Henderson for the loan of Mr. Harris's services and to Mr. Harris for his excellent drawings.

The Institute of Pacific Relations has in view the publication of a volume on "Land Utilization in New Zealand." In connection with this we have been asked to write an article on climate and its relation to agriculture. With this aim in view, the study of various aspects of the climate has been intensified and a number of articles have been published in the *New Zealand Journal of Science and Technology*. These include,—

"Mean Temperatures in New Zealand," by Dr. E. Kidson.

"Annual Variation of Pressure in New Zealand," by Dr. E. Kidson.

"Dry Years in New Zealand," by Dr. E. Kidson.

"The Diurnal Variation of Temperature at Wellington," by Dr. E. Kidson and A. G. C. Crust.

"The Occurrence of Frost, Hail, and Snow in New Zealand," by Dr. E. Kidson.

In the first of these, the first part, after discussing the data available, gives for each month and the year maps indicating by means of isothermal lines the variation in temperature over the Dominion. This is the first occasion on which anything of the kind has been attempted in any detail. The next section discusses the annual variation of temperature and its relation to topography and other factors. The final section deals with the rate at which the temperature falls as one proceeds from north to south. This is an important question, because it determines to a large extent the character of our winds, and consequently of our storms. The rate of change is not simple, but to the south of New Zealand, at any rate, the variation of temperature with latitude is least in winter and greatest in summer, which is somewhat surprising.

The study of the annual variation of pressure showed that there are two maxima and two minima. The principal maximum is in April, all parts of the Dominion having, on the average, their highest pressure in this month. At Auckland the second maximum is in September and is quite pronounced, but as one goes southwards it becomes earlier and decreases in importance. At Dunedin it is represented by a slight rise of pressure from July to August, but the September pressure is lower than that of July. The rate at which the pressure normally falls with increasing latitude was also discussed in the paper. This rate is greatest in spring and least in winter. This corresponds with the fact that westerly winds are strongest in spring and lightest in winter. Actually, the wind velocity and pressure gradient go very closely together, and the latter gives the best measure of the air-flow from the west at a moderate height that is at present available.

The diurnal variation of temperature at Wellington was investigated primarily in order to discover how close an approximation to the mean temperature of the day was given, on the average, by the mean of the maximum and minimum. It was important to discover this, because for most places the only means of determining the mean temperature is from the mean of the maximum and minimum. But, in addition, information regarding the diurnal variation is of practical value in connection with the heating of buildings, &c. Indeed, it was an interesting coincidence that just after the hourly temperatures at Wellington were tabulated we were asked by a large business concern, engaged in the provision of heating-appliances, for the number of hours during each month of the year in which the temperature fell below a certain value. Similar data will be tabulated for other places where continuous records of temperature are being made.

The paper on frost, hail, and snow is intended to indicate how frequently, on the average, a person in any part of the Dominion may expect these phenomena to occur in the different seasons of the year. The information is of value to those engaged in or connected with the organization of agricultural pursuits. Many orchards, for instance, have been established without due regard to the incidence of frost, and have proved failures in consequence.

The paper on dry years showed by means of charts by how much the rainfall in the driest years for which we have records fell below the appropriate average in different districts.

The object of this series of studies is to put on a definite basis our knowledge of the various aspects of the climate of New Zealand, so that works of all kinds in which climate and weather are important factors may be scientifically planned. At the same time, the information is essential to the meteorologist and of general interest to the public. It is the intention to continue the series.

One of the most difficult of the present problems of soil research is to find a means of accurately recording soil moisture. Since vegetation has to live by means of the mineral salts extracted from the soil in solution in water, the importance of soil moisture is obvious. The source of the moisture is normally the natural rainfall, but what happens to the rain after its fall varies greatly with the class of soil, its mechanical condition, and various topographical features. While on a visit to the Fruit Research Station at East Malling, Kent, England, I was shown apparatus devised by Mr. W. Stephen Rogers, for measuring soil moisture by means of the capillary pull exerted by the soil on a supply of moisture with which it was brought in contact but which it was unable to abstract. Since then Mr. Rogers, who had removed to Canada, has given complete details of his equipment and results. The method seems quite promising, and I have asked Mr. R. G. Simmers to commence a series of experiments with a view to its development here.

Monthly rainfall maps have been drawn for the six odd months of the year, and the completion of the remainder would be a simple matter. Sufficient funds for their publication are, however, unfortunately not available.

Mr. D. C. Meldrum has continued the tabulation of hourly amounts of sunshine and rainfall.

Miss M. E. Ewart has completed a tabulation of hourly wind velocities and directions for a year at the aerodromes at Hobsonville, near Auckland; Rongotai, near Wellington; and the Wigram Aerodrome, near Christchurch. The discussion of these data is nearly complete, and when available will give much information regarding the character of the winds in these localities and enable a comparison to be made with conditions elsewhere.

In conclusion, I have pleasure in acknowledging the cordial co-operation of my staff.