

the only British party to observe the eclipse. On the same island an American expedition also took observations. The weather was good, and both expeditions were successful. The New Zealand results comprised direct photographs of the corona, and photographs of the flash and corona spectra. The expedition is to be congratulated on the success obtained in the interests of eclipse astronomy.

In seismology, the standard equipment has consisted of two Milne-Shaw and one Milne horizontal component seismographs. As a result of the increased activity in the number of earthquakes recorded in New Zealand, considerable extra work has been involved in the working-up of seismological records. With the object of providing for more efficient instrumental recording of local earthquakes, additional equipment has been obtained, and is now in course of erection. This equipment includes a Galitzin vertical-component instrument, three Wood-Anderson horizontal components, an Imamura strong-motion horizontal and vertical components instrument, and an Ishimoto clinograph. At Suva, Fiji, there is a twin-boom Milne seismograph, the records of which are sent to the Dominion Observatory. Dr. T. A. Jaggar has presented one of his earthquake-recorders to the Observatory.

Seismographs now are in operation in the following towns: Wellington, Arapuni, Hastings, Napier, Wairoa, Gisborne, Stratford, New Plymouth, Takaka, and Christchurch.

A detailed account of the geological and seismic aspects of the recent earthquakes is in course of preparation.

PETROLOGICAL LABORATORY.

As in previous years, the rock-tests that have been made under standard conditions have shown that many of the rock-materials that occur most widely in New Zealand give good results, and are perfectly suitable for road construction. In particular, the hard feldspathic sandstone—greywacke—which is most widely distributed in New Zealand, has given very uniform and satisfactory tests on samples from all parts of the country. New Zealand granites give about average tests when compared with standards elsewhere, but they are not generally available for use. The basalts generally are good, but the andesites are often poor. In comparing the tests of New Zealand rocks with those from the United States it often is found that the abrasion tests in New Zealand are relatively low. It is thought that fragments of a more angular form have been used in the local tests. This matter shortly will be investigated.

Further samples have been collected in the Waikato for investigation in regard to the utilization of some of the huge formations of vitric tuff as building-material. It is satisfactory to note that the good qualities of this stone for building purposes are now recognized. One type of it is now being used in the construction of the Campanile tower at Wellington. It is confidently hoped that this will lead to a wide use of this type of stone throughout New Zealand.

The great number of samples dredged off Otago Heads were first dried and then graded. They were then treated with acid to remove the shell fragments and were again graded. The latter result must be considered the more important since the shells and shell fragments generally have been formed in place, and their presence is not related to the drift.

MINERAL CONTENT OF PASTURES.

The general object of the work is to investigate the mineral content of pastures with a view to determining the grassland areas in which deficiencies exist, and the most economical methods of alleviating the effects of these deficiencies.

The importance of the mineral composition of pastures is now recognized the world over, and the thriftiness of stock is largely dependent upon the presence of suitable minerals in adequate amounts in the grass and clover upon which they are grazing. There are, in all countries, districts where stock do poorly, and New Zealand is no exception to this rule. Fortunately, such areas where mineral deficiencies occur in the Dominion are restricted, and, while the trouble is serious to farmers located thereon, the fact that adjoining districts are perfectly stock-healthy often enables the whole to be successfully farmed. In the aggregate, mineral deficiencies do not constitute so serious a restricting feature of the Dominion's pastoral production as, possibly, might be assumed from the attention that has been given to them by investigators. Nevertheless, as they occur on land with great potentialities for production, the solution of the trouble well merits careful research.

The programme of investigations during the year has been continued at Ngaroma, Mamaku, and Mairoa, all of which places are located in the region affected by volcanic-ash showers. In the Poverty Bay, Wairarapa, Taranaki, and certain other districts the pastures have been examined with a view to ascertaining their seasonal variation in mineral composition. Evidence has accumulated testifying to the curative effect of the ingestion of iron compounds in all cases of bush sickness. Iron carbonate, found in quantity at Huntly, and hydrated iron oxide, supplies of which are available from Whangarei, fed to stock as licks or incorporated in ensilage, have proved effective in combating bush sickness of both cattle and sheep.

Dopiness disease of sheep in the Mairoa district has been overcome by the top-dressing of pastures with lime at 5 cwt. per acre and superphosphate at 2 cwt. per acre. The trials with this manurial application, which were originated some three seasons ago, have given continued good results, and thus enabled sheep to be retained on this class of country throughout the year, giving increased yields of both wool and mutton, with high lambing percentages. The control of bush sickness and dopiness by means that are economical and readily applicable by farmers should greatly help in the utilization of large areas of land of which the value has been at a very low level on account of the incidence of these two diseases.