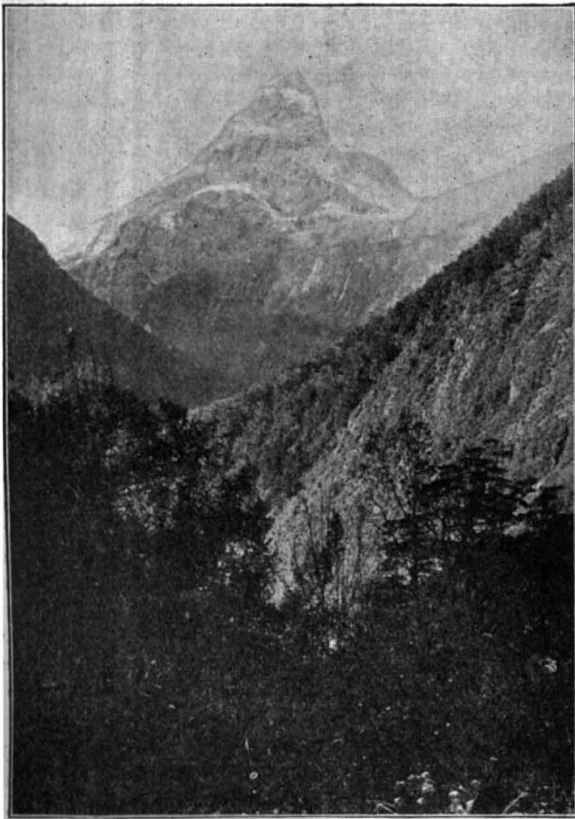


western part of the South Island, when, owing to the roughness of the way and a wrong route, four days' provisions had to serve for seven, and the party might not have survived except for some chance birds that were killed by stones.

The last chapters describe Dr. Bell's journeys in the Southern Alps, and give a brief summary of the geography and climate of New Zealand. Most of the author's results have been stated in his geological papers, and as the present work is essentially popular he has excluded technical matter; but he writes of different areas with the intimate knowledge gained in the course of his surveys. The book gives an interesting account of the author's journeys, and is a useful record of the present conditions of some of the less-



Mount Balloon, near the track to Milford Sound. From "The Wilds of Maoriland."

known parts of New Zealand; it conveys a good impression of the magnificence and variety of New Zealand scenery, but indicates that the conditions of travel there are exceptionally rough and the accommodation often poor.

RECENT PROGRESS OF THE METRIC SYSTEM.¹

WE have received a copy of a report on the progress of the metric system which was presented by Dr. Guillaume at the meeting of the fifth general conference on weights and measures held in Paris in October last. A previous report

¹ "Les récents Progrès du Système métrique." By Ch. Ed. Guillaume. Pp. 118. (Paris: Gauthier-Villars, 1913.) Price 5 francs.

by Dr. Guillaume on the same subject was reviewed in these columns in 1908 (April 30). In the first part of the present work the author deals with the question of standards of measure and weight. As regards the use of vitreous quartz or silica for the construction of standards of length he points out that recent investigations tend to show that this material is unsuitable for the purpose, owing to inconstancy of length. A historical account is then given of the attempts made at the international bureau to find an appropriate material for the construction of standards of length for use in the laboratory, where the question of cost prohibits the employment of iridio-platinum. These efforts led to the important series of investigations with respect to the metrological properties of the alloys of nickel and steel, and to the discovery by Dr. Guillaume of the alloy of minimum expansion, now well known as "invar." The feeble expansion of invar would render this alloy an ideal material for standards of precision were it not for its tendency to instability. In spite of this drawback, however, its use for secondary standards deserves careful consideration in cases where an accuracy of one part in a million is sufficient.

Researches have also been made with the view of finding suitable alloys to replace iridio-platinum for the construction of secondary standards of weight. Various non-magnetic alloys of nickel were investigated. Of these constantan was found to be unsuitable, owing to its lack of durability, but "baros," formed by the addition of small quantities of chromium and manganese to commercial nickel, has proved to be more satisfactory. Tungsten, in virtue of its hardness, high density and durability, promises to be a very suitable material, especially as it seems likely that this metal will soon be obtainable at a relatively low price. Dr. Guillaume also discusses the results of recent researches with reference to the employment of wave-lengths of light in metrology, and points out that the gases krypton and neon both afford special advantages as regards interference measurements.

A section is devoted to legislation with respect to the metric system in various countries since the fourth general conference. During the past six years the system has been made obligatory in several countries, notably Denmark, Siam, the Belgian Congo, and certain of the republics of Central America. Dr. Guillaume considers that the difficulties standing in the way of the adoption of the system in Great Britain and the United States have been greatly exaggerated by its opponents. He urges that in the engineering trade, for example, the proposed innovation would not, as is often alleged, necessarily put out of use all machines the dimensions of which could not be expressed in convenient figures in terms of metric units; the first reform would be simply to give the metric equivalents of the quantities hitherto expressed in Imperial units; later on, when the machines were being replaced by new ones in the usual course, any slight modifications required might be introduced.