fact that the zero of altitude does not correspond with the axis of collimation of the telescope. This displacement of the zero line has been necessitated by the desire to make the instrument available for the measurement of differences of altitude amounting to 30°, and to get the resulting displacement for such elevation it was necessary to use more than the semidiameter of the field. The author discusses the amount of error likely to arise from this cause and puts the result in a tabular form. Very full descriptions of the method of adjustment are given and some very practical remarks are made on the method of using the apparatus.

To judge by the examples that the author has given, the instrument should prove very useful in the hands of an expert. These examples show that in the measurement of a distance of 250 m. an error of about 0·6 m. may be apparent, while the average error in elevation over the same distance, and in which the variation of level amounts to about ± 7°, will amount to a few centimetres.

OUR BOOK SHELF.

Results of Meteorological Observations made at the Radcliffe Observatory, Oxford, in the eight years 1892–99. Edited by Arthur A. Rambaut, M.A. (Dubl. and Oxon.), Sc.D., F.R.S., Radcliffe Observer. Vol. xlviii. Pp. xxiv + 245. (Oxford: J. Parker, 1901.)

THE publication of a collection of meteorological observations made in 1892 may at first sight appear somewhat belated, and as giving promise of but little interest. But observations such as the greater part of those contained in this volume serve two purposes. There is first of all the immediate application of knowledge concerning the atmospheric variations whose usefulness is shown in weather prediction and similar purposes. Some may think that this is the main, if not the only, outcome of meteorological inquiry. But, apart from all ephemeral interests, the maintenance of a continuous record of the behaviour of the atmosphere is of great importance. The study of climatic oscillations throughout long periods is a study that is likely to be attended with great advantage and instruction. The long, costly and laborious series of observations, that are so carefully prosecuted at so many stations, can only be justified by their use in investigations which aim at the primary causes of atmospheric disturbance. The records of the Radcliffe Observatory hold a deservedly high place in such series, both for accuracy and for length of time during which they have been uninterruptedly pursued, and for the purposes of scientific meteorology the value of the present volume is undiminished by the length of time that separates us from the earlier observations. It will take its place among many worthy companions and hand on the history of the variation of climate to those who have the skill to read it.

A feature of great additional interest is given to the present volume by an inquiry into underground temperatures at various depths by means of platinum-resistance thermometers. This inquiry was originated under the direction of the late Mr. E. J. Stone, and has been vigorously prosecuted by the present director. The thermometers are placed at depths varying from six inches to ten feet; a greater depth, which was originally contemplated, being found impracticable owing to the presence of water in the soil. The present inquiry is limited, but precise. It concerns itself with the variation of temperature in dry gravel; and the thermal conductivity of a water-logged stratum, or of one greatly differing in constitution from that here investigated, does not come into consideration. The main conclusion to which the Radcliffe Observer is led in this investigation into the physics of the earth's crust is, that the annual variation of temperature is reduced to 0°·1 F. at a depth of 45·3 English feet, and to 0°·01 F. at 66 English feet. The semi-annual wave has the same limits at 21·4 and 36 feet, respectively. The temperature curves for the separate months of the year on which this result is based are shown graphically in a plate possessing many features of interest.

But of equal, if not of greater, importance is the inquiry into the accuracy of the thermometers themselves and their suitability for such investigations. One gathers that although very considerable difficulty was experienced at the outset, and not unnaturally with a novel kind of apparatus, these thermometers have stood the test with great satisfaction and proved themselves more trustworthy and more convenient than the long-stemmed spirit thermometers ordinarily employed in similar researches, and against which some obvious objections can be urged The main difficulty in the use of the platinum-resistance thermometer seems to arise from a damp atmosphere affecting the connecting wires and impairing the insulation, but with sufficient precaution the recording apparatus is most sensitive and permanent.

The Telephone System of the British Post Office. By T. E. Herbert. Pp. xi + 218. (London: Whittaker and Co., 1901.) Price 3*s.* 6*d.*

MR. T. E. HERBERT describes the book before us as a practical handbook, and, from certain expressions used in the second chapter, he seems to be one of those practicians who have not overmuch sympathy with theoretical workers. It is not perhaps to be wondered at, therefore, if the preliminary chapters of his book, dealing with the fundamental principles of sound, electricity, magnetism, and telephony are handled in a very unsatisfactory manner. We are afraid that a reader, if he has not already acquired a thorough knowledge of the subject, will be liable to form erroneous impressions. Thus, to give one example, Mr. Herbert states that in an induction coil "the E.M.F.'s generated in the secondary coil are directly proportional to the current variations in the primary." Again, the description of the action of the Bell transmitter is, we are inclined to think, incorrect, as the same mistake is made here of not properly allowing for the time taken over a vibration of the diaphragm.

The greater part of the book is devoted to a detailed consideration of the apparatus and connections used by the Post Office. This would have been greatly improved if more care had been taken with the diagrams. It is a great pity that in a book of this kind, where clearness in the illustrations is so important, the lettering should be in some cases so small as to be unreadable. It is to be regretted, too, that such words as "nextly" and "inoxidible" are allowed places in the text. In spite of the defects, some of which we have tried to point out above, we have no doubt the book may prove useful to telephone engineers who are anxious to be helped over some of their practical difficulties, and are not particular about a clear understanding of the groundwork of their science.

Maps: their Uses and Construction. A Short Popular Treatise on the Advantages and Defects of Maps on Various Projections, followed by an Outline of the Principles involved in their Construction. By G. James Morrison, Memb. Inst.C.E., F.R.G.S. Pp. viii + 110. (London: Edward Stanford, 1901.) Price 5*s.* net.

A BOOK in English on map projections has long been needed, and the present work is a very welcome attempt to meet this need. It may be commended to all who have to deal with geographical questions, and to teachers of mathemathics and practical geometry who wish to find fresh exercises for their pupils.

The volume consists of an introduction, a popular account of eight common projections, followed by another