

EXPLANATION OF THE CATALOGUES.

In the first catalogue (p. 1—243) the shocks are placed in chronological order from 1 to 8,331. When disturbances have apparently been simultaneous in two distant localities, they are included under a single number.

In the second and third columns the date and time for each disturbance is given. When the latter is noted to seconds, the record refers to the commencement of motion at an observatory, like that in Tokyo, which

is provided with automatic chronographs. Until the end of 1887, these records, which are practically correct, refer to Tokyo mean time, or 9 hr. 19 min. 1 sec. before Greenwich mean time. Subsequently to this date the times given are those of Long. 135° E. or 9 hours before Greenwich mean time. The other time records are only approximately correct, and can not be used in any investigation relating to the velocity with which earthquake motion is propagated.

The fourth column gives in square *ri* (1 square *ri* = 5.96 square miles) the *land area* which was shaken. For small shocks which were only felt at one or two stations, the determination of this quantity has largely depended upon the judgment of the observer. The figures given are those obtained from the maps by means of a planimeter and entered in the records of the Meteorological Department. In the second catalogue, based upon a second inspection of the maps, it will be noticed that many material alterations have been made in these quantities. In many instances the *land areas* of the first catalogue are *total areas*, but in others they only represent an insignificant portion of a disturbed tract, the centre of which was beneath the bed of the ocean. The limits of the areas given are those places round an origin up to which the movement was perceptible to people or sufficiently strong to have been recorded by ordinary seismographs. With instruments like delicately adjusted horizontal pendulums, there is no doubt that movements might have been detected far beyond these arbitrary limits. For example, shock number 4145 has assigned to it a land area of 15,750 sq. *ri*, when we have good reasons for believing that with

suitable instruments it might have been noted at any point upon the surface of our globe.

The number in the fifth column approximately indicates, as shown upon the key map, the epicentre of a disturbance, or a number on the coast line nearest to a submarine origin. In the second catalogue, the positions of a submarine origin, by means of a distance in tens of miles and the direction in which it is to be measured from a central number, is defined more closely. On the key map the numbers referring to squares, each 10 miles by 10 miles, commence at the top and run from left to right down to the bottom of the same.

A line drawn on the key map through the numbers in the sixth column, gives the boundary of the land surface which was shaken. The area of this should be equal to the quantity in the second column. By completing, when it may be necessary, this outline seawards, a *total area* is obtained, which is indicated by its major and minor axes in the second catalogue.¹

In the small map, which is a photographic reproduction of a map the same size as the key map, the small dots indicate the position of all the epicentral numbers, and the large numerals ranging from 1 to 15, districts in which earthquakes are frequent. Districts 6 and 7 are bounded by straight lines because there was not sufficient space in which to place all the dots. For example, in district 7, all the dots indicate earthquakes which originated about the centre of this district. Until October 28th, 1891, the disturbances in this district were not more numerous than they are in district 8.

1.—The unit is 10 geographical miles.

When an earthquake has been felt at the extremities of the Empire, and at the same time not along a great length of coast line, as in districts 1 and 10, it is often difficult to determine the direction or distance from the coast line of its origin. In these cases the assumption made has been that the shocks just reaching the coast have originated from about the same locality as the larger shocks which have spread some distance along the shore line, these stronger disturbances being severe at places just reached by their feebler successors. The signs + and — along the coast line indicate that near these places there are evidences of secular elevation or depression. This information was obtained by the help of Prof. D. Kikuchi, who kindly assisted in the distribution of a circular to various towns and villages round the coast of the Empire enquiring whether from maps, traditions, or observations, there were reasons to believe that changes had taken place in the relative position of the land and water. The large black dots on the map indicate the positions of more or less active volcanic cones, in the neighbourhood of which there are huge bosses of volcanic rocks and many ancient craters. The dotted lines show the boundaries of provinces, which are usually the ridges of high mountains dividing one seismic region from another.

If analyses of this catalogue show that it is of any value, it is clear that several advantageous changes may be made in a system for its continuation. As it stands, it is only a tentative effort to provide investigators with a new kind of data, which may lead to investigations not hitherto possible. None of the facts excepting a few of the time observations, claim

any great degree of accuracy. The object of the list drawn up for me by Dr. E. von Rebeur-Paschwitz, is explained in the next section.

The long list of corrections, additions, and suggestions at the end of the volume, inasmuch as they have so far as possible been inserted in the second catalogue, almost entirely refer to the first catalogue p. 1—243. Although they show that actual errors occur in work of this description, they also show that from given data different persons may arrive at different results.