

CHAPTER XLII.

METHODS OF CALCULATING THE ALTITUDES ABOVE SEA-LEVEL.

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I.

The only means of finding the altitudes above sea-level in the interior of the Asian continent, where it has hitherto been impossible to determine the altitude of any point by levelling from the sea, is by barometrical measurement. The precision of this method is not, of course, comparable with that of levelling. But as the barometrical observations made by Dr. Hedin are very accurate, having been made by good holosteric barometers and a Richard barograph and controlled by daily hypsometrical observations taken by the excellent boiling thermometers of Fuess in Berlin, the method will in this case certainly furnish the best possible results. A more detailed description will be given in the meteorological part of this work, and I shall here only give a sketch of the main points.

Owing to the kind assistance of the late Director H. Wild and of the present Director M. Rykatchew of the Central Physical Observatory of St. Petersburg and that of the former and present Secretaries of the Meteorological Office of London, Dr. R. H. Scott and Dr. W. N. Shaw, I have received series of meteorological observations from several stations in Russian Asia and in India. The altitude of those stations above sea-level is known partly by means of levelling from the sea, partly by means of daily barometrical observations taken during several years. In most cases the error of those altitudes probably does not exceed one or two meters, and in no case 10 meters.

Now by means of a barometric formula and tables calculated from it, as explained in the meteorological part (vol. V), the average barometrical pressure at altitudes of 800, 1000, 1400 and 3000 meters in the vertical line of those stations was calculated for every month, that Dr. Hedin was travelling in Central Asia. Then isobaric maps were constructed by means of those average pressures and the isobars were extended over the unknown intervening space in the manner that seemed to be most probable. From these isobaric maps the barometric pressure at one of the the altitudes indicated was taken for every point at which Dr. Hedin made observations during the month for which the map was constructed; and by comparing this pressure with that observed by Dr. Hedin, the altitude of his station was calculated. In