DR. LÜDELING'S RESEARCHES ON THE DIURNAL VARIATION AND ON MAGNETIC DISTURBANCES IN POLAR REGIONS.

By L. A. Bauer.

By request of the Editor, Dr. Lüdeling has contributed the foregoing summary of the results of his recent investigations. It had been the intention to have the article translated into English, as the author had already published his paper in German. This could not, however, be done in time for the present issue, and accordingly the following brief abstract is given for the benefit of those who have difficulty in reading German.

The author investigates graphically the phenomena of the diurnal variation of the earth's magnetism for the eleven stations enumerated on page 246, with the aid of von Bezold's vector-diagrams. A vector-diagram is the curve which the north end of a horizontally suspended needle, freed from the mean action of the earth, would describe in the course of a day in consequence of the diurnal variation, if at every instant the half length of the needle represented the magnitude of the horizontal deflecting force. Such diagrams were employed originally by Airy and Lloyd. They, however, took as components of change those along the magnetic meridian and perpendicular thereto, while von Bezold takes his components along the astronomical directions. Von Bezold first showed the full significance of such diagrams. Thus, for example, if the diurnal variation could be referred to an invariable system of magnetic forces revolving around the earth once in twenty-four hours, then the vector-diagram for all places along a parallel of latitude would be the same for the same local mean time at each.[1]

Dr. Lüdeling's paper is a continuation of von Bezold's investigation. He constructs the vector-diagrams for the eleven stations for the months of June and July, 1883, with and without the inclusion of days of disturbances. The computed components for both cases are given in the annexed table. On page 250 are exhibited the curves for two stations; first, as resulting from including all days; and secondly, from excluding the disturbed days. It will be seen that the magnetic disturbances have a decided effect upon the curve, and that by excluding them the direction becomes in the main clockwise; corresponding thus to von Bezold's diagrams for middle latitudes as based upon Schuster's computations. The same curious fact was noticed at other stations in northern latitudes.

It seems quite probable, from the author's researches. that the assumption made by Schuster, in his well-known paper on the diurnal variation, that the part of the diurnal variation freed from disturbance can be referred to an invariable, revolving magnetic system, is not far from the truth.

In a similar manner the disturbing forces are investigated. It will be seen from the diagrams on page 255 that, in general, the direction of the disturbance vector-diagram is anti-clockwise. The diurnal variation in the disturbance components is well exhibited in the figures given in Table II. It is furthermore found that the form of the curves is dependent upon the absolute magnetic declination—their size, however, upon the absolute horizontal force—and that the disturbing forces stand approximately in an inverse ratio to the value of H.

The author promises to contribute soon another article on this matter.

[1] For a fuller exposition of von Bezold's paper. the English reader may be referred to Gray's *Treatise on Magnetism and Electricity*, London, 1898, pp. 77–80.