The results of some Recent Magnetic Work

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Mr. Swinburne thought that for such small perpendicular forces the permeability should be nearly infinite. He also said there seemed a sort of angular hysteresis in iron; for if a loose-running armature was turned slowly round by hand, it would come back two or three degrees when left free.

The President remarked that, as far as he could see, M. Osmond's theory does not account for the great influence which a small percentage of tungsten has on the magnetic property of steel, and all theories which failed in this particular must necessarily be imperfect.

LIII. Prof. RÜCKER described the results of *some Recent Magnetic Work* undertaken by himself and Prof. Thorpe in connexion with their Magnetic Survey of the United Kingdom*.

IN a paper read before the Royal Society last year they have shown that the United Kingdom can be divided into seven or eight distinct districts, in each of which a source of disturbance seems to exist. The probable cause of these disturbances the authors believe to be the presence of "magnetic rocks." If this be true, an intimate connexion should exist between the magnetic elements of a district and its geological structure. If a magnetic mass be supposed to exist below the surface, then one would expect the vertical force to be greatest above that mass, whilst the horizontal disturbances would tend towards the mass, and would differ in direction on its opposite sides.

With a view to testing more fully than heretofore the magnetic constitution of the districts above referred to, the work (the results of which Prof. Rücker now described) was undertaken.

Two test districts were selected in which numerous observations were taken; one of these is situated on the west coast of Scotland, and the other embraces parts of Lincolnshire and Yorkshire. The first of these districts was chosen for two reasons:—First, because it is very disturbed, and, owing to the vast masses of basalt, would be a specially difficult one; and secondly, because it is near the borders of their survey, and

* Read April 18, 1890.

is thus particularly open to suspicion that the calculated values of the elements may be inaccurate.

By the aid of magnetic maps, Prof. Rücker showed that a centre of disturbance exists to the west of Iona and south of Barra. Both the vertical force and the horizontal disturbances indicate the same position, and hence favour the hypothesis.

In the Lincolnshire and Yorkshire district, extending from the Wash to Appleby, there is a region in which the horizontal disturbances along the East side tend towards the West, whilst along the West side they are, on the whole, directed easterly. This points to a ridge of magnetic material along the middle of the region, and from numerous observations the approximate position of the ridge-line has been determined over a length of 150 miles. In Lincolnshire the ridge follows closely the line of Wolds, whilst at the Kettlewell end it is directed towards the Cumberland Lake-district. Places of maximum vertical force occur near Market Weighton and Harrogate.

The observers were directed to Market Weighton by Prof. Judd as being situated where the Liassic strata thins out. Harrogate stands on the summit of an anticlinal. The fact that such places of maximum vertical force exist where, according to hypothesis, they would be expected, tends to confirm the supposition, and thus to demonstrate that a very close connexion exists between the magnetic elements and the geological structure of a country. This is further confirmed by the observation that in Lincolnshire the line of disturbance follows closely the line of the Wolds, and that from Market Weighton it passes across the plain of York to the Millstone Grit and Limestone, which are the oldest rocks in the neighbourhood.

Mr. Whipple said he had listened with very great pleasure to the interesting details and results given by Prof. Rücker. Never, to his knowledge, had a magnetic survey been conducted with such minuteness and accuracy. The older surveys related chiefly to declination, whilst the determinations of intensity were made in a very primitive way. He looked forward with interest for other important results, which he felt sure would follow from the admirable survey of Professors Rücker and Thorpe.