

May 16, 1889.

Professor G. G. STOKES, D.C.L., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read :—

- I. "On a possible Geological Origin of Terrestrial Magnetism."  
By EDWARD HULL, M.A., LL.D., F.R.S., Director of the  
Geological Survey of Ireland. Received April 30, 1889.

(Abstract.)

The author commenced by pointing out that the origin and cause of terrestrial magnetism were still subjects of controversy amongst physicists, and this paper was intended to show that the earth itself contains within its crust a source to which these phenomena may be traced, as hinted at by Gilbert, Biot, and others; though owing to the want of evidence regarding the physical structure of our globe in the time of these observers, they were unable to identify the supposed earth's internal magnet.

The author then proceeded to show cause for believing that there exists beneath the crust an outer and inner envelope or "magma," the former less dense and highly silicated, the latter basic and rich in magnetic iron-ore. This view was in accordance with those of Durocher, Prestwich, Fisher, and many other geologists. The composition of this inner magma, and the condition in which the magnetic iron-ore exists were then discussed, and it was shown that it probably exists under the form of numerous small crystals with a polar arrangement. Each little crystal being itself a magnet, and having crystallised out from the magma while this latter was in a viscous condition, the crystalline grains would necessarily assume a polar arrangement which would be one of equilibrium. Basalt might be taken as the typical rock of this magma.

The thickness and depth of the magnetic magma beneath the surface of the globe were then discussed, and while admitting that it was impossible to come to any close determination on these points owing to our ignorance of the relative effects of increasing temperature and pressure, it was assumed tentatively that the outer surface of the effective magnetic magma might be at an average depth of about 100 miles, and the thickness about 25 or 30 miles. The proportion of mag-

netic iron-ore in basaltic rocks was then considered, and it was shown that an average of 10 to 15 per cent. would express these proportions; and assuming similar proportions to exist in the earth's magnetic magma, we should then have an effective terrestrial magnet of from  $2\frac{1}{2}$  to 3 miles in thickness. The actual magnetic magma or shell might be very much thicker than that here assumed.

Instances of polarity in basaltic masses at various localities were adduced in order to illustrate the possibility of polarity in the internal mass. The subject of the polarity of the globe was then discussed, and it was pointed out how the position of the so-called "magnetic poles" leads to the inference that they are in some way dependent upon the position of the terrestrial poles.

The author regarded the so-called "double poles" as merely *foci* due to protuberances of the magnetic magma into the exterior non-magnetic magma, and considered that there was really only a single magnetic pole in each hemisphere, embracing the whole region round the terrestrial pole and the *stronger and weaker magnetic foci*, and roughly included within the latitude of  $70^\circ$  within the northern hemisphere.

It was pointed out that the poles of a bar-magnet embrace a comparatively large area of its surface, and hence a natural terrestrial magnet of the size here indicated may be inferred to embrace a proportionably large tract for its poles.

In reference to the question why the magnetic poles are situated near those of the earth itself, this phenomenon seemed to be connected with the original consolidation of the crust of the globe, and the formation of its internal magmas.

It was pointed out that, owing to the differences of temperature which must have existed in the polar regions, as compared with those of the equatorial, the process of solidification has been more rapid in the polar regions than elsewhere, and it was inferred that in the case of the magnetic magma the process of crystallisation and the polar arrangement of the particles of magnetic iron-ore would proceed from the poles towards the equator in a radial direction. The manner in which the phenomena of magnetic intensity, and of the dip of the needle at different latitudes could be explained on the hypothesis of an earth's internal magnet, such as here described, was then pointed out, and the analogy of such a magnet with a magnetic bar passing through the centre of the earth was illustrated.

The author then proceeded to account on geo-dynamical principles for the secular variation of the magnetic needle, and also to show how the objections that might be raised to the views here advanced, on the grounds of the high temperature which must be assumed to exist at the depth beneath the surface of the magnetic magma, could be met by considerations of pressure, and on this subject read a letter which he had received from Sir William Thomson, F.R.S.

In conclusion, the author stated it was impossible in a short abstract to go into the details of the subjects here discussed, and for further information the reader must be referred to the paper itself.

II. "Physiological Action of the Active Principle of the Seeds of *Abrus precatorius* (Jequirity)." By SIDNEY MARTIN, M.D. London, British Medical Association Research Scholar, Assistant Physician to the Victoria Park Chest Hospital, and R. NORRIS WOLFENDEN, M.D. (Cantab.). (From the Physiological Laboratory, University College.) Communicated by E. A. SCHÄFER, F.R.S. Received April 11, 1889.

The object of the present investigation was to study the physiological action of the active principle of the jequirity seed. A watery infusion of the seeds, as is well known, produces severe inflammation of the conjunctiva when a few drops are placed in the eye; and when injected under the skin, or as in the "sui" poisoning of cattle in India, it is fatal to animals.

Both the local irritant and the poisonous properties of the seed were formerly ascribed to a specific organism, called the jequirity bacillus, the nature of which was investigated by Sattler, Cornil, and Berlioz. Klein, however, showed that the action could not be due to a bacillus, since the poison was permanently destroyed by momentary boiling of the infusion. Warden and Waddell have effectually disposed of the bacillus theory of the action of jequirity, and in a pamphlet entitled the 'Non-Bacillar Nature of Abrus Poison' (Calcutta, 1884), they demonstrated that the poisonous activity of the seeds was dependent on a proteid body which was called by them *Abrin*. *Abrin* was considered to be closely allied to egg-albumin and the vegetable albumins. The reactions given by Warden and Waddell are, however, by no means conclusive that *abrin* belongs to the class of "albumins" as understood by physiological chemists. The fact that it is precipitated from solution by acetic acid shows that it is not an albumin: this is a reaction common to globulin and certain other proteids, such as alkali-albumin. The reactions, moreover, given by these observers as given by *abrin* are not distinctive of it, but are common to all proteids.

To clear up these discrepancies the proteids of the seed were investigated by one of us (M.), and in a paper published in the 'Proceedings of the Royal Society' (vol. 42, p. 331) two proteids were described, a globulin and an albumose. The globulin was found to be vegetable paraglobulin, being soluble in 15 per cent. sodium chloride solution, and coagulating in 10 per cent. magnesium sulphate