

THE CAUSE OF THE ACCUMULATION OF MAGNETIC STORMS WHEN THE EARTH IS NEAR THE EQUINOXES. BY ANDREW ELMS.

(Read 7th February 1903.)

IN a paper read before this Institute about a year ago on sun-spots and the phenomena which seem to be connected with them, I expressed the idea that sun-spots, auroræ, and magnetic storms are caused by matter forming in space, and passing sunward in orbits more or less elliptical, which, when they cross the earth's orbit, produce auroræ and magnetic storms, pass on sunward, and by planetary perturbations and collisions fall in part on the sun and produce solar-disturbances. Supposing the theory then advanced to be correct, I wish to show how it is the fact that magnetic disturbances are *more numerous* at times when the earth is near the equinoxes than at other times.

The fact that disturbances are more numerous when the earth is at the equinoctial points, than at other parts of its orbit, shows it to be in some way connected with the earth's annual revolution.

Let us look for a moment at this motion. The sun is at the centre of the path in which the earth moves. We call the plane in which the earth moves the plane of the ecliptic. Whilst the earth is making its annual revolution, it is also rotating on its axis, and this axis is not at right angles to the plane of the ecliptic but about 24° from it.



If the poles were at right angles to the plane of the earth's path, each of the poles would be equally exposed to matter coming sunward from without in each month in the year (and as the planets move near this plane, and reach outward into space, *their action* on incoming cosmic matter will cause the larger part of it to move in this plane also; cosmic matter will be more abundant near the ecliptic than elsewhere): the earth in passing through it will have one pole more exposed to this matter during one half of its orbit, and the other pole most exposed during the other half. But at the equinoxes both poles will be equally exposed, and at any given point, except, perhaps, near the equator, the plus of cosmic matter which produces magnetic disturbances will fall on the outside hemisphere of the earth when it is *near the equinoxes*.

On this theory cosmic matter passing by the earth going sunward is the cause of *auroras* and *magnetic disturbances*: the plus of such matter caused by the action of Jupiter and Saturn, on incoming cosmic matter, is encountered by the earth when it passes us going sunward, and this is the cause of the long 11-year period. The moon's revolution, combined with the earth's motion, is the cause of the 25-day period, and the inclination of the earth's axis is the cause of the *plus of disturbances at the equinoxes*.