

lines. Never before, I believe, had any government fitted out a naval expedition for an object whose attainment promised such advantages to practical navigation, while, at the same time, it deserved to be regarded as peculiarly scientific and physico-mathematical.

As no phenomenon can be thoroughly investigated by a careful observer, without being considered in its relation to other phenomena, Halley, on his return from his voyage, hazarded the conjecture that the northern light was of a magnetic origin. I have remarked, in the general picture of nature, that Faraday's brilliant discovery (the evolution of light by magnetic force) has raised this hypothesis, enounced as early as in the year 1714, to empirical certainty.

But if the laws of terrestrial magnetism are to be thoroughly investigated—that is to say, if they are to be sought in the great cycle of the periodic movement in space of the three varieties of magnetic curves, it is by no means sufficient that the diurnal regular or disturbed course of the needle should be observed at the magnetic stations which, since 1828, have begun to cover a considerable portion of the earth's surface, both in northern and southern latitudes;* but four times in every century an expedition of three ships should be sent out, to examine, as nearly as possible at the same time, the state of the magnetism of the Earth, so far as it can be investigated in those parts which are covered by the ocean. The magnetic equator, or the curve at which the inclination is null, must not merely be inferred from the geographical position of its nodes (the intersections with the geographical equator), but the course of the ship should be made continually to vary according to the observations of inclination, so as never to leave the track of the magnetic equator for the time being. Land expeditions should be combined with these voyages, in order, where masses of land can not be entirely traversed, to determine at what points of the coast-line the magnetic curves (especially those having no variation) enter. Special attention might also, perhaps, be deservedly directed to the movement and gradual changes in the oval configuration and almost concentric curves of variation of the two isolated closed systems in Eastern Asia, and in the South Pacific in the meridian of the Marquesas Group.† Since the memorable Antarctic expedition of Sir James Clark Ross (1839–1843), fitted out with admirable instruments, has thrown so much light over the polar regions of the southern hemisphere, and has determ-

* *Cosmos*, vol. i., p. 190–192.

† *Cosmos*, vol. i., p. 182.