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MISCELLANEOUS PAPERS

ON

SCIENTIFIC SUBJECTS.

BY

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TO

GENERAL SIR HOWARD DOUGLAS, BART.,

G.C.B., G.C.M.G., K.S.C., D.C.L., F.R.S., ETC.,

THE FOLLOWING PAGES ARE,

WITH SENTIMENTS OF

HIGH RESPECT AND ESTEEM,

DEDICATED BY

HIS TRESBLY OBLIGED, AND FAITHFUL SERVANT,

THE AUTHOR.

London, April 11th, 1861.

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ON THE CAUSE OF TERRESTRIAL ELECTRICITY, OR MAGNETISM.

As the late President of the Royal Society, Lord Wrottesley, in his penultimate annual address, contained in page 31 of the "Proceedings of the Royal Society," vol. ix., 1859, remarks, that "it is clear that the sun exercises some influence on the earth's magnetism, dependent on the existing state of its own luminous atmosphere;" and again, "that the mild influence of the moon affects the magnetic needle; the declination, the inclination, and the magnetic force all undergo a small variation, dependent on the lunar hour angle;" and also, in his lordship's final annual address, (page 505 *ejusdem*,) "that all the so-called imponderable agents, heat, light, electricity, and magnetism, are intimately connected by mysterious links," I wish to offer a few remarks, which had some time previously occurred to me, upon that most interesting subject, Electricity—a subject which yet occupies, and has continued to occupy, the absorbing attention and persevering inquiries of the first philosophers of Europe.

It being an established and universally well-known fact that Electricity is an agent that is, and can be, easily produced by the effect of friction, such, for instance, as

that which is caused by the rapid and continuous attrition, one against the other, of certain substances, even though they may be the one a conductor, the other a non-conductor of that fluid, it has occurred to me that Electricity, an (as yet) "imponderable agent," is caused or produced on the earth's surface simply by the *friction* created by the sun's minute rays (of light) impinging upon, and thence passing through obliquely (or directly), and with immense velocity, the denser particles (of elastic fluid) constituting the earth's atmosphere; if, indeed, they would not produce a similar, but partial, effect, by striking obliquely, without the intervention of any medium whatever, upon the bare surface of the earth itself.

Now, if this supposition be well-founded, a great portion of the electrical phenomena, as now noticed, may probably, if not certainly, be accounted for—such as the varied and various *maxima* and *minima* of magnetic (electric) inequalities that are observed, whether diurnal or decennial; the sun's *spots*, in the latter case, of course causing, during the periods of their continuance, a considerable, or appreciable difference of amount in the quantities of electricity produced or experienced, as more or less interfering with the otherwise constant transmission of the rays (of his light) in the direction of, or towards this sphere. The effects of the *aurora borealis*, likewise, may be accounted for; and with respect to the variations effected, as it is remarked, by the moon, it is

only necessary to say, that that luminary dispenses her rays in a lesser degree, and with lesser effect, they being reflected by her from the sun itself; and, consequently, with a lesser electric effect.

Now, in support of this theory, which I have presumed to erect, it scarcely seems requisite for me to remark, that the rays of "light" emanating from the sun, however "imponderable" they may as yet have proved, must necessarily have an immense attritional effect (if I may use the term) upon the denser particles composing the earth's atmosphere; because they strike upon the latter with a force directly proportional to their inconceivable, though measurable velocity, sufficient, indeed, when collected, to fuse the hardest metals, and even the diamond itself. Nor does it seem scarcely requisite to notice, that the earth's atmosphere has, or possesses, a proportional power to, in part, resist them (the sun's rays)—as that effect is incontrovertibly evidenced by the fact of the existence of twilight, whereby they only reach us by inflection, which inflection is caused solely by the great resistance of the particles constituting the earth's atmosphere.

It may be observed, also, that whether there were an atmosphere or not circumscribing this planet, an effect similar to, but probably of lesser degree than that now observed, would be occasioned by the oblique incidence of the sun's rays upon the *side* surfaces of the bare earth itself; and, therefore, the moon (should she, as has been