feeble force constantly acting on the whole surface of the earth. This subject, however, must evidently remain obscure, until we become acquainted with the causes which give a determinate direction to the supposed electric currents. Already the experiments of Faraday on the rotation of magnets have led him to speculate on the manner in which the earth, when once it had become magnetic, might produce electric currents within itself, in consequence of its diurnal rotation.*

Before leaving the consideration of thermo-electricity, I may remark, that it may be generated by great inequalities of temperature, arising from a partial distribution of volcanic heat. Wherever, for example, masses of rock occur of great horizontal extent, and of considerable depth, which are at one point in a state of fusion (as beneath some active volcano); at another, red hot; and at a third, comparatively cold—strong thermo-electric action may be excited.

Some, perhaps, may object, that this is reasoning in a circle; first, to introduce electricity as one of the primary causes of volcanic heat, and then to derive the same heat from thermo-electric currents. But there must, in truth, be much reciprocal action between the agents now under consideration; and it is very difficult to decide which should be regarded as the prime mover, or to see where the train of changes, once begun, would terminate.

In the ordinary operations of nature, it is in the atmosphere alone that we observe the action of electricity; and it is probable that a moment never passes without a flash of lightning striking some part of the earth. The electric fluid shatters rocks, and instantaneously melts substances which are commonly regarded as infusible. The air is supposed to derive a great part of this electricity directly from the earth†; and M. Necker seems to have succeeded in establishing that there is a connection between the direction of the curves of equal magnetic intensity and the *strike* of the principal mountain chains.‡ Some, also, attribute the electricity of the air to the evaporation of sea-water by the sun: for it can be shown, by experiment, that the conversion of salt water into vapour is accompanied by the excitement of electricity; and the process alluded to takes place on so vast a scale,—the measure of the quantity of evaporation being the constant flow of all the rivers of the earth exclusive of the rain which falls directly into the ocean,—that a feeble action of this kind may become very powerful by accumulation.

During volcanic eruptions, vivid lightnings are almost invariably seen in the clouds of vapour which ascend from the crater; and, as there are always one or more eruptions going on in some part of the globe, we are here presented with another perpetual source of derangement. How far subterranean electric currents may possess the decomposing power of the voltaic pile is a question for those alone who are farthest advanced in the career of discovery in a rapidly progressive science; but such a power would at once supply

* Phil. Trans., 1832, p. 176.; also pp. 172, 173, &c.

† Faraday, Phil. Trans., 1832, p. 177.

‡ Biblioth. Univers., tom. xliii. p. 166.