

us with a never-failing source of chemical action, from which volcanic heat might be derived.

*Recapitulation.*—Before entering, in the next chapter, still farther into the inquiry, how far the phenomena of volcanos and earthquakes accord with the hypothesis of a continued generation of heat by chemical action, it may be desirable to recapitulate, in a few words, the conclusions already obtained.

1st. The primary causes of the volcano and the earthquake are, to a great extent, the same, and must be connected with the passage of heat from the interior to the surface.

2dly. This heat has been referred, by many, to a supposed state of igneous fusion of the central parts of the planet when it was first created, of which a part still remains in the interior, but is always diminishing in intensity.

3dly. The spheroidal figure of the earth, adduced in support of this theory, does not of necessity imply an universal and simultaneous fluidity, in the beginning; for supposing the original figure of our planet had been strictly spherical—which, however, is a gratuitous assumption, resting on no established analogy—still the statical figure must have been assumed, if sufficient time be allowed, by the gradual operation of the centrifugal force, acting on the materials brought successively within its action by aqueous and igneous causes.

4thly. It appears, from experiment, that the heat in mines increases progressively with their depth; and if the ratio of increase be continued uniformly from the surface to the interior, the whole globe, with the exception of a small external shell, must be fluid, and the central parts must have a temperature many times higher than that of melted iron.

5thly. But the theory adopted by M. Cordier and others, which maintains the actual existence of such a state of things, seems wholly inconsistent with the laws which regulate the circulation of heat through fluid bodies. For, if the central heat were as intense as is represented, there must be a circulation of currents, tending to equalize the temperature of the resulting fluids, and the solid crust itself would be melted.

6thly. Instead of an original central heat, we may, perhaps, refer the heat of the interior to chemical changes constantly going on in the earth's crust; for the general effect of chemical combination is the evolution of heat and electricity, which in their turn become sources of new chemical changes.

7thly. The existence of currents of electricity in the shell of the earth has been deduced from the phenomena of terrestrial magnetism; from the connection between the diurnal variations of the magnet and the apparent motion of the sun; from observations on the electro-magnetic properties of metalliferous veins; and, lastly, from atmospheric electricity, which is continually passing between the air and the earth.

8thly. Subterranean electric currents may exert a slow decomposing power like that of the voltaic pile, and thus become a constant source of chemical action, and, consequently, of volcanic heat.