same gases as volcanos. Steam of high temperature has continued for more than twenty centuries to issue from the "stufas," as the Italians call them; thermal springs abound not only in regions of earthquakes, but are found in almost all countries, however distant from active vents; and, lastly, the temperature in the mines of various parts of the world is found to increase in proportion as we descend.

It is probably to this unceasing discharge of subterranean heat that we owe the general tranquillity of the globe; and the occasional convulsions which occur may arise from the temporary stoppage of the channels by which heat is transmitted to the surface; for the passage of caloric from below upwards may be compared to the descent of water from the continents to the sea; and as a partial interruption of the drainage of a country causes a flood, so any obstruction to the discharge of volcanic heat may give rise to an earthquake or eruption.

The diagram (fig. 72.) in the next page, may convey some idea of the proportion which our continents and the ocean bear to the radius of the earth.* If all the land were about as high as the Himalaya mountains, and the ocean every where as deep as the Pacific, the whole of both might be contained within a space expressed by the thickness of the line *a b*; and masses of nearly equal volume might be placed in the space marked by the line *c d*, in the interior. Seas of lava, therefore, of the size of the Mediterranean, or even of the Atlantic, would be as nothing if distributed through such an outer shell of the globe as is represented by the shaded portion of the figure *a b c d*. If throughout that space we imagine electro-chemical causes to be continually in operation, even of very feeble power, they might give rise to heat which, if accumulated at certain points, might melt or render red-hot entire mountains, or sustain the temperature of stufas and hot springs for ages.

Theory of an unoxidated metallic nucleus. — When Sir H. Davy first discovered the metallic bases of the earths and alkalies, he threw out the idea that those metals might abound in an unoxidized state in the subterranean regions to which water must occasionally penetrate. Whenever this happened, gaseous matter would be set free, the metals would combine with the oxygen of the water, and sufficient heat might be evolved to melt the surrounding rocks. This hypothesis was at first very favourably received both by the chemist and the geologist; for silica, alumina, lime, soda, and oxide of iron, — substances of which lavas are principally composed, — would all result from the contact of the inflammable metals alluded to with water. But whence this abundant store of unsaturated metals in the interior? It was assumed that, in the beginning of things, the nucleus of the earth was mainly composed of inflammable metals, and that oxidation went on with intense energy at first; till, at length,

* Reduced, by permission, from a figure in plate 40. of Sir H. de la Beche's Geological Sections and Views.