

mese Oberland; but the difference in the geological structure of the two ranges will, I conceive, be sufficient to explain, why hot springs are more rare in the latter than in the southern range. Most of the highest mountains in the Bernese Alps are covered with secondary strata; and the valleys are chiefly excavated in these strata, or in enormous beds of sandstone and conglomerate, that form a thick intervening mass between the surface and the primary rocks, sufficient to obstruct the rise of thermal waters; for it has before been stated, that all the thermal waters in the Pennine Alps, issue from the primary rocks, or near their junction with the lowest calcareous strata.

ON THE TEMPERATURE OF MINES AND WELLS.

It was stated in Chap. XXIV. that the temperature of the water in Artesian wells (or those wells formed by boring) had been found in France to increase about 1° centigrade for 25 metres in depth. But this increase of temperature is sometimes variable in different situations. France has been the seat of active volcanoes at no remote geological epoch; and, in the volcanic districts, there are numerous hot springs remaining: it is, therefore, not improbable that, in the southern and central departments, the increase of temperature with the increase of depth in Artesian wells, may be derived from the remains of volcanic heat. In England, many borings for water have been executed; but I am not aware of any experiments having been made on the water to ascertain the temperature. At Boston, in Lincolnshire, water was bored for to the extraordinary depth of 600 feet: the boring, during the whole depth, was in clay; and the experiment was unsuccessful, no good water being obtained. It is to be regretted that the temperature of the water at that depth had not been ascertained.

Many experiments have been made on the temperature both of the air, the water, and the rocks in mines, at different depths; and the general results of each have indicated a considerable increase of heat with the increase of depth. In Dolcoath copper mine, Mr. Fox found the temperature of the water (at about 480 yards from the surface) to be more than 30° of Fahrenheit above the mean temperature of the country. A thermometer, plunged into the earthy matter, at the bottom of another mine in the same county, 400 yards deep, and which had been inundated for two days, was raised 38° above the mean temperature. I apprehend that in these instances, and in many others that have been stated, one source of error has not been sufficiently attended to, viz. the increase of heat by chemical changes that are taking place in the mineral substances in mines, from access to water or the atmosphere. I was informed by working miners in Cornwall, that they could generally tell when they were approaching to a copper lode, by the increased warmth of the water; but this was not the case when they came to a lode of tin ore. The cause of this warmth seems very intelligible: the copper ore of Cornwall is chiefly a mixture of iron pyrites and copper pyrites; and it is well known that iron pyrites is more or less decomposed by the access of air and water,