

§ 9. As connected with the great problem of the change in relative level between the continents and the ocean, we have to

between the land and waters, was the elevation of the former by mechanical force.

3. The only agent with which we are acquainted, whose operation bears any analogy to the effects above specified, is the volcanic energy which still occasionally forms new islands and elevates new mountains.

4. Although these effects are indeed now partial and limited, yet there is certain proof that volcanic agency has formerly been much more active; the extinct volcanoes of the Rhine, Hungary, and Auvergne, as well as those which occupy so large a portion of Italy, where one only now remains in activity, concur in proving that we now experience only the expiring efforts, as it were, of those gigantic powers which have once ravaged the face of nature.

5. If to this certain proof of the greater prevalence of volcanic convulsions in earlier, but still comparatively recent, periods of the history of our planet, we add the presumption that the trap rocks (so singularly intruded among the regular strata, and producing where they traverse those strata so precisely the effects of heat acting under compression, and so different in all their phenomena from formations decidedly aqueous) were of volcanic origin, we shall find that scarcely a country exists which has not been a prey to the ravages of this powerful principle. If with many of the best geological observers (Dr. Mac Culloch, Von Buch, Necker, &c.) we incline to extend the same conclusions to granitic rocks, a mass of volcanic power, clearly adequate to all the required effects, is provided.

6. The question will undoubtedly present itself, what is the source of volcanic action; and sufficient proof exists that this source is deeply seated beneath the lowest rocks with which our examination of the Earth's surface makes us acquainted; for in Auvergne the lavas have evidently been erupted from beneath the primitive rocks.

7. The very important recent discoveries with regard to the increased temperature noticed in descending deep mines, &c. by Messrs. Fourrier and Fox, will, if confirmed by further examination, prove that some great source of heat exists beneath the Earth's crust. Mr. Fox's observations have been disputed by Mr. Moyle, who considers him to have been led into error, by the higher temperature of the portions of the mine where it had been raised by the animal heat of the workmen employed; but it is obvious that this can never account for the regular gradation of increased temperature said to have been noticed in every successive level examined: the subject, however, cannot fully be cleared without reiterated and continued observations. While this paragraph was passing through the press, Mr. Fox has returned what appears to be a satisfactory answer to the objections of Mr. Moyle, in the *Ann. Phil.* for May 1822.

8. A degree of presumption may be thought to arise from these considerations, that the crust of the Earth rests on an heated nucleus, the true source of volcanic energy. If this nucleus be in a fluid or viscous state, its undulations would readily account for the convulsions which have affected that crust both in originally dislocating and elevating portions of its strata, and in the actual phenomena of earthquakes, (of many of which phenomena no other hypothesis appears to offer a sufficient explanation), while at the same time it would assign an adequate reason for the figure of the globe as a spheroid of rotation.

9. On this supposition, we should at once perceive a reason why the effects of the volcanic force may have been much more violent in earlier periods, while that mass of deposits which now covers the supposed vol-