sure, valley, or deep depression. No doubt many, if not most, modern as well as ancient vents, especially those of large size, have done so. It is a curious fact, however, that in innumerable instances minor vents have appeared where there was no visible line of dislocation in the rocks at the surface to aid them. This has been well shown by a study of the ancient volcanic rocks of the Old Red Sandstone, Carboniferous, and Permian formations of Scotland.[32] It has likewise been most impressively demonstrated by the way in which the minor basalt cones and craters of Utah have broken out near the edges or even from the face of cliffs, rather than at the bottom. Captain Dutton remarks that among the high plateaus of Utah, where there are hundreds of basaltic craters, the least common place for them is at the base of a cliff, and that, though they occur near faults, it is almost always on the lifted, rarely upon the depressed side.[33] On a small scale, a similar avoidance of the valley bottom is shown on the Rhine and Moselle, where eruptions have taken place close to the edge of the plateau through which these rivers wind. Why outbreaks should have occurred in this way is a question not easily answered. It suggests that the existing depressions and heights of the earth's surface may sometimes be insignificant features, compared with the depth of the sources of volcanoes and the force employed in volcanic eruption. On the other hand, it is remarkable that in Scotland the Palæozoic eruptions took place on the low ground and valleys, and continued to show themselves there during a long succession of volcanic periods. Especially noteworthy is the way in which the Permian vents were

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[32] Trans. Roy. Soc. Edin. xxix. p. 437.

[33] "High Plateaus of Utah," Geol. and Geog. Survey of Territories, 1880, p. 62.