

and disturbed. Afterwards the upper series was thrown down in horizontal strata upon it. If these superior beds, as *d, d*, fig. 83, are also inclined, it is plain that the lower strata, *a, a*, have been twice displaced; first, before the deposition of the newer beds, *d, d*, and a second time when these same strata were thrown out of the horizontal position.

Playfair has remarked* that this kind of junction, which we now call unconformable, had been described before the time of Hutton, but that he was the first geologist who appreciated its importance, as illustrating the high antiquity and great revolutions of the globe. He had observed that where such contacts occur, the lowest beds of the newer series very generally consist of a breccia or conglomerate consisting of angular and rounded fragments, derived from the breaking up of the more ancient rocks. On one occasion the Scotch geologist took his two distinguished pupils, Playfair and Sir James Hall, to the cliffs on the east coast of Scotland, near the village of Eyemouth, not far from St. Abb's Head, where the schists of the Lammermuir range are undermined and dissected by the sea. Here the curved and vertical strata, now known to be of Silurian age, and which often exhibit a ripple-marked surface, are well exposed at the headland called the Siccar Point, penetrating with their edges into the incumbent beds of slightly inclined sandstone, in which large pieces of the schist, some round and others angular, are united by an arenaceous cement. "What clearer evidence," exclaims Playfair, "could we have had of the different formation of these rocks, and of the long interval which separated their formation, had we actually seen them emerging from the bosom of the deep? We felt ourselves necessarily carried back to the time when the schistus on which we stood was yet at the bottom of the sea, and when the sandstone before us was only beginning to be deposited in the shape of sand or mud, from the waters of a superincumbent ocean. An epoch still more remote presented itself, when even the most ancient of these rocks, instead of standing upright in vertical beds, lay in horizontal planes at the bottom of the sea, and was not yet disturbed by that immeasurable force which has burst asunder the solid pavement of the globe. Revolutions still more remote appeared in the distance of this extraordinary perspective. The mind seemed to grow giddy by looking so far into the abyss of time; and while we listened with earnestness and admiration to the philosopher who was now unfolding to us the order and series of these wonderful events, we became sensible how much farther reason may sometimes go than imagination can venture to follow."†

In the frontispiece of this volume the reader will see a view of this classical spot, reduced from a large picture, faithfully drawn and colored from nature by the youngest son of the late Sir James Hall. It was impossible, however, to do justice to the original sketch, in an engraving, as the contrast of the red sandstone and the light fawn-colored vertical schists

* Biographical account of Dr. Hutton.

† Playfair, *ibid.*; see his Works, Edin. 1822, vol. iv. p. 81.