The hundred wonders of the world

Clarke, Charles Cowden

London, 1820

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Shelf Mark: Rar 32554

Persistent Link: https://doi.org/10.3931/e-rara-72825

Baslatique and rocky wonders.

earthquakes,—overwhelming the plantations of rice, and sweeping away houses, with whatever came within its reach. It is calculated that twelve thousand individuals perished. The trees and herbage of every description, along the whole of the north and west sides of the peninsula, were completely destroyed, with the exception of a high point of land near the spot where the village of Tomboro stood.

The extreme misery to which the inhabitants of the western part of the island were reduced, was dreadful to behold. The roads were strewed with dead bodies; the villages were almost entirely deserted, and the houses fallen down. The peasants wandered in all directions in search of food; and the famine became so severe, that one of the daughters of the Rajah died of hunger.

To judge of the violence of the eruption, it will suffice to state, that the cloud of ashes which had been carried with so much celerity as to produce utter darkness, extended, in the direction of the Island of Celebes, two hundred and seventeen nautical miles from the seat of the volcano; and, in a direct line towards Java, upwards of three hundred geographical miles.

BASALTIC AND ROCKY WONDERS.

THE GIANT'S CAUSEWAY.

This vast collection of basaltic pillars is in the vicinity of Ballimony, in the county of Antrim, Ireland. The principal, or grand causeway, (there being several less considerable and scattered fragments of a similar nature,) consists of an irregular arrangement of many hundred thousands of columns, formed of a black rock, nearly as hard as marble. The greater part of them are of a pentagonal figure, but so closely and compactly situated on their sides, though perfectly distinct from top to bottom, that scarcely any thing can be introduced between them. These columns are of an unequal height and breadth: several of the most elevated, visible above the surface of the strand, and at the foot of the impending angular precipice, are of the height of about twenty feet, which they do not exceed, at least not any of the principal arrangement.

How deeply they are fixed in the strand, has never yet been ascertained.

This grand arrangement extends nearly two hundred yards, as it is visible at low water; but how far beyond is uncertain: from its declining appearance, however, at low water, it is probable that it does not reach beneath the water to a distance equal to that which is seen above. The breadth of the principal causeway, which runs out in one continued range of columns, is in general from twenty to thirty feet: in some parts it may, for a short distance, be nearly forty. From this account are excluded the broken and scattered pieces of the same kind of construction, which are detached from the sides of the grand causeway, as they do not appear to have ever been contiguous to the principal arrangement, although they have been frequently comprehended in the width, which has led to such wild and dissimilar representations of this causeway, in the different accounts that have been given. Its highest part is the narrowest, at the very spot of the impending cliff, whence the whole projects; and there, for about the same space in length, its width is not more than from twelve to fifteen feet. The columns of this narrow part incline from a perpendicular a little to the westward, and form a slope on their tops, by the unequal height of their sides; and in this way a gradual ascent is made at the foot of the cliff, from the head of one column to the next above, to the top of the great causeway, which, at the distance of about eighteen feet from the cliff, obtains a perpendicular position, and lowering from its general height, widens to between twenty and thirty feet, being for nearly three hundred feet always above the water. The tops of the columns being, throughout this length, nearly of an equal height, from a grand and singular parade, which may be walked on, somewhat inclining to the water's edge. But from the high-water mark, as it is perpetually washed by the beating surges, on every return of the tide, the platform lowers considerably, becoming more and more uneven, so as not to be walked on but with the greatest care. At the distance of a hundred and fifty yards from the cliffs, it turns a little to the east, for the space of twenty or thirty yards, and then sinks into the sea. The figure of these columns is, with few exceptions, pentagonal, or composed

of five sides; and the spectator must look very narrowly indeed to find any of a different construction, having three, four, or six sides. What is very extraordinary, and particularly curious, is, that there are not two columns in ten thousand to be found, which either have their sides equal among themselves, or display a like figure.

The composition of these columns, or pillars, is not less deserving the attention of the curious observer. They are not of one solid stone in an upright position, but composed of several short lengths, nicely joined, not with flat surfaces, but articulated into each other like a ball and socket, or like the joints in the vertebræ of some of the larger kind of fish, the one end at the joint having a cavity, into which the convex end of the opposite is exactly fitted. This is not visible unless on disjoining the two stones. The depth of the concavity or convexity is generally about three or four inches. It is still farther remarkable, that the convexity and correspondent concavity of the joint, are not conformable to the external angular figure of the column, but exactly round, and as large as the size or diameter of the column will admit; consequently, as the angles of these columns are in general very unequal, the circular edges of the joints are seldom coincident with more than two or three sides of the pentagonal, and are, from the edge of the circular part of the joint to the exterior sides and angles, quite plain. It ought likewise to be noticed as a singular curiosity, that the articulations of these joints are frequently inverted, in some of them the concavity being upwards, in others the reverse. This occasions that variety and mixture of concavities and convexities on the tops of the columns, which is observable throughout the platform of this causeway, without any discoverable design or regularity with respect to the number of either.

The length of these particular stones, from joint to joint, is various: they are in general from eighteen inches to two feet long; and, for the greater part, longer towards the bottom of the columns than nearer the top, the articulation of the joints being there somewhat deeper. The size, or diameter, likewise of the columns is as different as their length and figure: in general they are from fifteen to twenty inches in diameter. Throughout the whole of this combination there are not any traces of uniformity or de-

sign, except in the form of the joint, which is invariably by an articulation of the convex into the concave of the piece next above or below it; nor are there traces of a finishing in any part, whether in the height, length, or breadth. If there be particular instances in which the columns above water have a smooth top, others near them, of an equal height, are more or less convex or concave, which shows them to have been joined to pieces that have been washed away, or by other means taken off. It cannot be doubted but that those parts which are constantly above water have gradually become more and more even, at the same time that the remaining surfaces of the joints must necessarily have been worn smoother, by the constant action of the air, and by the friction in walking over them, than where the sea, at every tide, beats on the causeway, continually removing some of the upper stones, and exposing fresh joints. As all the exterior columns, which have two or three sides exposed to view, preserve their diameters from top to bottom, it may be inferred, that such is also the case with the interior columns, the tops of which alone are visible.

Notwithstanding the general dissimilitude of the columns, relatively to their figure and diameter, they are so arranged and combined at all the points, that a knife can scarcely be introduced between them, either at the sides or angles. It is most interesting to examine the close contexture and nice insertion of the infinite variety of forms exhibited on the surface of this grand parade. From the great dissimilarity of the figures of the columns, the spectator would be led to believe the causeway a work of human art, were it not, on the other hand, inconceivable that the genius or invention of man should construct and combine such an infinite number of columns, which should have a general apparent likeness, and still be so universally dissimilar in their figure, as that, on the minutest examination, not two in ten or twenty thousand should be found having their angles and sides equal among themselves, or those of one column to those of another. As there is an infinite variety in the configuration of the several parts, so are there not any traces of regularity or design in the outlines of this curious phenomenon: including the broken or detached pieces of a similar structure, they are extremely

scattered and confused. Whatever may have been their original state, they do not at present appear to have any connection with the grand or principal causeway, as to any supposable design or use in its first construction; and as little design can be inferred from the figure or position of the several constituent parts.

The cliffs, at a great distance from the causeway, exhibit in many parts similar columns. At the depth of ten or twelve feet from the summit of the cape of Bengore the rock begins to assume a columnar tendency, and forms a range of massy pillars of basalt, which stand perpendicular to the horizon, presenting in the sharp face of the promontory, the appearance of a magnificent gallery or colonade, upwards of sixty feet in height. This colonade is supported on a solid base of coarse, black, irregular rock, nearly sixty feet thick, abounding in blebs and air-holes; but, though comparatively irregular, it evidently affects a peculiar figure, tending in many places to run into regular forms, resembling the shooting of salts and many other substances during a hasty crystallization. Beneath this great bed of stone, stands a second range of pillars from forty to fifty feet high, more exactly defined, and emulating in the neatness of its columns, those of the Giant's Causeway. This lower range is upborne by a layer of red ochre stone, which serves as a relief to shew it to greater advantage. The two admirable natural galleries, with the interjacent mass of irregular rock, form a perpendicular height of one hundred and seventy feet, from the base of which the promontory, covered with rock and grass, slopes down to the sea a considerable space, so as to give an additional height of two hundred feet, making in all nearly four hundred feet of perpendicular elevation, and presenting a mass, which for beauty and variety of colouring, for elegance and novelty of arrangement, and for the extraordinary magnitude of its objects, cannot, perhaps, be rivalled by any thing at present known.

The promontory of Fairhead raises its lofty summit more than four hundred feet above the level of the sea, and forms the eastern termination of Ballycastle bay. It presents a vast compact mass of rude columnar stones, the forms of which are extremely gross, many being a hundred and fifty feet in length. At the base of these

gigantic columns lies a wild waste of natural ruins of an enormous size, which, in the course of successive ages, have been tumbled down from their foundations by storms, or some more powerful operations of nature. These massive bodies have occasionally withstood the shock of their fall, and often lie in groupes, and clumps of pillars, resembling artificial ruins, and forming a very novel and striking landscape.

Many of these pillars lie to the east, in the very bottom of the bay, at the distance of about one-third of a mile from the causeway. There the earth has evidently fallen away from them upon the strand, and exhibits a very curious arrangement of pentagonal columns, in a perpendicular position, apparently supporting a cliff of different strata of earth, clay, rock, &c. to the height of a hundred and fifty feet. Some of these columns are from thirty to forty feet high, from the top of the sloping bank beneath them; and being longer in the middle of the arrangement, shortening on either of the sides, have obtained the appellation of *organs*, from a rude likeness in this particular to the exterior or frontal tubes of that instrument. As there are few broken pieces on the strand, near this assemblage of columns, it is probable that the outside range, as it now appears, is in reality the original exterior line towards the sea; but how far these columns extend internally into the bowels of the incumbent cliff is unknown. The very substance, indeed, of that part of the cliff which projects to a point, between the two bays on the east and west of the causeway, seems composed of similar materials; for, besides the many pieces which are seen on the sides of the cliff, as it winds to the bottom of the bays, particularly on the eastern side, there is, at the very point of the cliff, and just above the narrow and highest part of the causeway, a long collection of them, the heads or summits of which just appearing without the sloping bank, make it evident that they lie in a sloping position, and about half-way between the perpendicular and the horizontal. The heads of these columns are likewise of mixed surfaces, convex and concave; and they evidently appear to have been removed from their original upright position, to the inclining or oblique one they have now assumed, by the sinking or falling of the cliff.

BASALTIC COLUMNS.

In the country surrounding Padua, in the State of Venice, there are several basaltic columns, similar to those of the Giant's Causeway, although less magnificent in appearance. About seven miles, in a southern direction, from that city, is a hill named Monte Rosso, or the Red Mount, which presents a natural range of prismatic columns, of different shapes and sizes, placed in a direction nearly perpendicular to the horizon, and parallel to each other, nearly resembling that part of the Giant's Causeway, called "The Organs."

At an inconsiderable distance is another basaltine hill, called *Il monte del Diavolo*, or the Devil's Hill, along the sides of which the prismatic columns are arranged in an oblique position. This causeway extends along the side of the vale beneath, nearly with the same arrangement of the columns as is displayed on the hill. Although the columns of both these hills are of the simple, or unjointed kind, still they differ very remarkably from each other in many respects, but principally in their forms, and in the texture and quality of their parts. Those of the Monte del Diavolo commonly approach a circular form, as nearly as their angles will allow; which is also observable in the columns of the Giant's Causeway, and of most other basaltic groups. On the contrary, those of Monte Rosso assume an oblong or oval figure. The columns of the former measure, one with the other, nearly a foot in diameter, varying but little in their size; while those of the latter present a great variety in their dimensions,, the diameter of some of them being nearly a foot, and that of others scarcely three inches: their common width may be estimated at six or eight inches. They differ, therefore, very considerably in size from those of the Giant's Causeway, some of which measure two feet in width. The length of the columns of the Monte del Diavolo cannot be ascertained, as they present their summits only to the view: their remaining parts are deeply buried in the hill, and in some places entirely covered. Those of Monte Rosso, as far as they are visible, measure from six to eight or ten feet in height—an incon-

siderable size when compared with the height of those of the Giant's Causeway. The columns of the Venetian groupes display, however, all the varieties of prismatic forms, which are observable in those of the latter, and other similar groups. They are usually of five, six, or seven sides; but the hexagonal form seems chiefly to prevail.

The texture and quality of these columns are not less different than their forms. Those of the Monte del Diavolo present a smooth surface, and, when broken, appear within of a dark iron-grey colour, manifesting also a very solid and uniform texture; in which characters they correspond with the columns of the Giant's Causeway, and those of most other basaltic groups. But the columns of Monte Rosso are in these respects very different, they having not only a very rough, and sometimes knotty, surface, but displaying likewise, when broken, a variegated colour and unequal texture of parts. They are commonly speckled, more or less distinctly, and resemble an inferior sort of granite, of which Monte Rosso is itself formed, and which serves as a base to the range of columns in question. It is, in general, not quite so hard as the Alpine and Oriental granites, and is sometimes even friable. This species of granite abounds in France, where large tracts of it are to be seen in the adjoining provinces of Auvergne, Vivarez, and Lionnois. But it is still more common in Italy, seeing that, besides Monte Rosso, the bulk of the Euganean hills, of which that is a part, principally consists of it; and these hills occupy a considerable tract in the plains of Lombardy. It is also common in the Roman and Tuscan States; and of this substance the mountain close to Viterbo, on the road to Rome, is entirely composed. The columns of Monte Rosso appear, therefore, of a different character from any hitherto described by mineralogists, who mention those only of an uniform colour and texture. But the great singularity here is, that such a range of prismatic columns should be found, bedded as it were, in a mass of granite, and composed nearly of the same substance. An instance of this kind, relative to any other causeway, is not recorded; and this circumstance seems to render that of Monte Rosso, in one respect at least, more curious and singular than the celebrated Giant's Causeway is known to be, from the regular articulation of

its columns. It is certain, that the basaltic group of Monte Rosso is not only highly curious in itself, but interesting on account of the great light it throws on the origin of granites in general.

It is likewise remarkable, that the columns, in the two groupes of Monte Rosso and Monte del Diavolo, preserve respectively the same position, nearly parallel to each other; which is not usually the case in basaltic groups. For, although the principal aggregate of which the Giant's Causeway is formed, stands in a direction perpendicular to the horizon, still other small detached groups of columns also appear on the eminence above, assuming by their position different degrees of obliquity. Among the numerous basaltic hills of Auvergne and Velay in France—phenomena which seem to abound in those provinces more than in any other part of Europe, and, perhaps, of the known globe—nothing is more common than to see the columns of the same group lying in all possible directions, as irregularly almost as the prisms in a mass of common crystal. Nor is this variety of position so observable in single columns as in whole masses or ranges of them, which often present themselves on the same hill, disposed in different strata or stages, as it were, one above the other, many of them assuming very different, and even opposite directions. The columns of the Monte del Diavolo are bedded in a kind of volcanic sand, by which, in many parts of the hill, they are entirely covered: it is probable, however, that they repose beneath on a base of basaltic rock of a similar nature. Nothing is more common, in the provinces of France, above mentioned, than to see insulated basaltic hills almost exclusively composed of different layers of columns, which present themselves in stages, one above the other, often without any other stratum between them, resembling in some measure, if the comparison can be allowed, a huge pile or stack of cleft wood. Although the columnar crystallization of Monte Rosso is the only one yet known or described, in a mass of granite, still other groups of columns have elsewhere been met with, which are equally of a heterogeneous substance or texture, however they may otherwise differ from those of Monte Rosso, as well as from the common basalts.