

## II.—NOTES ON THE LATE ERUPTION OF VESUVIUS.

By G. POULETT SCROPE, F.R.S., F.G.S., etc., etc.

**T**HE Eruptions of Vesuvius naturally create a wider and deeper interest than those of any other volcano, owing to the mountain lying within sight and hearing of one of the most populous and frequented cities of Europe. And in these days of telegraphs and newspaper correspondence the mingled feelings of alarm and admiration which these phenomena excite at Naples are rapidly spread over the civilized world, tinged with all the exaggerations and embellishments that the imagination of writers, who, probably, witness an eruption for the first time, can bestow on them.

This has been in a marked degree the case with the recent eruption, which, beginning on the 26th of April, began to decline on the 28th, and terminated on the 2nd of May, and therefore in point of duration by no means equalled several outbursts of the same mountain that have occurred during the last century. That of 1793-4 lasted a year and a half. The eruption of 1822 continued with great violence through more than 20 days; that of 1834 twenty-four days; that of 1850 nearly a month. True, the violence of an eruption is not always to be measured by its duration, since moderate discharges of vapour and scorice, accompanying the emission of minor lava-streams, have sometimes gone on for months together in the intervals between the more powerful eruptive paroxysms. In the present instance indeed the vigour of the eruption seems to have been largely out of proportion to its limited duration, although by no means equalling in this respect some of those we have mentioned above, as is well known to those who are acquainted with the admirable volume of Professor Phillips.

The cone of Vesuvius had been continually increasing both in height and bulk since its truncation by the great eruption of 1822, and in place of the deep and wide crater then formed, and repeatedly filled up, and to some extent reformed, by subsequent eruptions of minor violence, an upper cone had risen, giving a pointed apex to the mountain. This subsidiary cone was in almost constant activity throughout the year 1871, steam and scorice being continuously ejected from its crater, while small streams of lava occasionally flowed out of it, and found their way down to the northern foot of the great cone, where they accumulated in or about the Atrio. This state of moderately tranquil activity lasted through the first months of this year, proving that up to that time the lava still occupied the highest part of the chimney of the volcano in a state of more or less fluid ebullition.

Suddenly, on the morning of the 26th April, a violent earth-shock was felt throughout the area of the mountain, and fearful detonations and incessant rumbling noises, accompanied by other shocks, were heard to proceed from the summit, which at the same time threw up a lofty fountain of steam and stones. A paroxysmal eruption had evidently commenced. The subterranean energy, residing in the lower depths of the volcanic focus, had increased to a point at which

the minor extravasations and ejections that had been so long going on from the summit, could not suffice for its relief. Violent ebullitions broke forth at some point in these lower recesses of the volcanic chimney, and with terrific eruption the evacuation of the contents of all its upper portion began. Shock succeeded shock, till those who looked at the mountain from a distance saw the colossal trunk of the pine-cloud reaching to a height of many thousand feet above the mountain top, in the usual double ascending column, one of white globular masses of vapour, the other of scorïæ black by day, but red-hot by night; while streams of incandescent lava gushed forth from several openings on the flank and at the base of the great cone.

Of many persons who, on the night of the 26th, ascended the mountain from Naples and its environs, for the purpose of witnessing so grand and unusual a spectacle, several who had incautiously entered the Atrio were caught by a sudden increase in the violence of the eruption and the outburst of a new stream of lava close to them, and perished miserably; the bodies of some never being recovered. This stream of lava flowed rapidly at first down the south-western slope of the mountain, below the Hermitage, and by its advance the entire village of San Sebastiano and a portion of that of Massa were destroyed. The population of Torre del Greco, Resina, and the other towns which line the sea-coast at the base of the mountain, naturally supposed themselves in danger of the same fate, and, deserting their homes, crowded the road to Naples. Their fears, however, proved groundless, since the lava stopped its course two miles short of Torre del Greco. The roaring and shocks of the detonations were especially loud and fearful, as heard and felt even at Naples—more so, it is said, than on any former occasion within living memory. They were particularly violent on the 26th, and again on the 29th, by which last day, however, the force of the eruption had in other respects considerably diminished. Even on the 27th the outflow of lava had apparently ceased. The other phenomena, namely, the ejection of scorïæ and ash from the main vent, continued some days longer, and increased, if not in violence, at least in their unpleasant character to the inhabitants of Naples. The wind, which had up to that time blown from the S.W., changed to S.E. on the 29th, and brought the cloud of ashes over Naples, obscuring the light of the sun, and giving to the atmosphere the appearance of a London smoky fog. This fine dust fell in the streets and on the house-tops to the depth of an inch or more, and heavy rains accompanying its fall, made the circumstance more disagreeable. With regard to these fragmentary ejecta, some incorrect notions are perhaps entertained, even by geological writers, who seem to suppose them to be originally thrown out from the volcano in the comminuted state in which they finally fall to the ground. The fact I believe to be that they are first thrown up by the explosions, proceeding from the surface of the lava within the crater, as coarse crusts (scorïæ) or even large liquid drops (bombs) of lava. These cooling and hardening in the air as they ascend, in part fall again

into the yawning gulf, to be again immediately ejected by subsequent explosions; till, after repeated ascents and descents, in each of which the hurtling shower undergoes intense trituration of its component fragments against each other, their angles are worn off, and they are reduced to small rounded gravel, then to sand, and finally to almost impalpable dust, which the winds take up, sort and transport to enormous distances. Blocks of pre-existing rock, volcanic or other, which obstructed the vent before the eruption, share, of course, in this process, which distributes the ejecta of the volcano more or less plentifully around in the ratio of their size and weight. Though drifted in some places by aqueous torrents, it is not, I believe, to attrition in water, but in the air, that volcanic gravel (*lapillo pozzolana*, etc.) owes its bouldered character. An eruption usually finishes by the ejection, through some days or hours, of the finest dust alone; the steam bubbles that explode from the lava-surface, as it sinks within the vent, having no longer power to throw out large fragments; in the end this stifling dust chokes the explosive force altogether, and quiet succeeds; the eruption has terminated for the time.

In all these respects the late eruption of *Vesuvius* appears to have followed the course of that of 1822, though clearly inferior to it in violence and duration. Its effect on the form of the mountain has, no doubt, been the same, that is to say, the truncation of the cone, and the reproduction of a great crater gulf in its centre. As yet no details have reached us to throw light on this question. We must wait the full report of Signor Palmieri on the subject from a scientific point of view. The same must be said on another point which does not come clear out of the accounts hitherto published, namely, whether any lava-streams were really emitted on this occasion from new openings in the southern flank of the mountain below the base of the old cone, as certainly happened in the eruptions of 1760, 1777, and again in that of 1861. Should such have been the fact, as some statements aver, new small cones of ejected scoriæ (*boccole*) will have been formed, as has always been the case, over each of the new mouths. But it not unfrequently happens that a lava-current breaking out from the summit, or some point on the side of the cone, penetrates hollow gutters within or beneath some older consolidated flow, and runs down out of sight until it forces an exit for itself at or near the base, and thus puts on the false appearance of a new eruptive mouth. The question has a rather important bearing on the security of *Torre del Greco*, as all previous deviations from the old established channel of eruption have been on the south side of the mountain on the line of one or more fissures radiating from the centre of the cone in that direction. So that if at any time *Vesuvius* should, following the example of *Etna*, Volcano in the *Lipari* group, and many other volcanos, shift its axis, it will in all probability be somewhere on the southern base of the mountain that the new crater will be formed. *Naples* may be considered quite safe, but *Torre del Greco* seems exposed not only to invasion from torrents of lava flowing down from the present eruptive vent behind, but also to the possible formation of a new one beneath it. The alarm, therefore, exhibited by its in-

habitants on the occurrence of this and previous paroxysms of their unquiet and disagreeable neighbour, is not very unreasonable.

Signor Palmieri, who watched throughout with creditable constancy the progress of the eruption, from his Observatory on the Crocelle, appears by so doing to have gained a character of almost superhuman heroism among the frightened population of Naples and its environs. The philosopher must have been much amused at the fervour of his extravagant admirers, who raised him almost to the level of their adored St. Januarius; knowing as he well did, of course, the very small amount of danger that he incurred while he remained at his post, under a substantial roof, above the possible reach of any lava-stream, in a building founded on a portion of old Somma, which has certainly never been seriously disturbed for the last 1800 years. He, better than any one, knows that the phenomena of the late eruption were by no means so exceptional as our newspaper correspondents would persuade us, but of the ordinary type of moderate Vesuvian paroxysms, such as the mountain has exhibited perhaps a dozen times within the last hundred years. That, indeed, is the judgment he is said to have passed upon it.

### III.—MAN IN THE CRAG.

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**P**ARAGRAPHS have appeared in several papers announcing more or less distinctly the discovery of fossils in the Crag which bear upon them marks of human work. Having had considerable opportunities of looking into this question, I venture to offer some reasons for believing that there is not the slightest evidence for attributing the phenomena in question to the agency of man.

The case may be thus briefly stated:—Some of the Crag deposits being composed of phosphate of lime are used for the manufacture of artificial manure, and therefore a very large number of fossils are turned over. Among them we find, in various states of preservation, sharks' teeth and vertebræ, sponges, and concretionary masses of various symmetrical forms. Some of the teeth have been found perforated in such a manner that they might be strung together for ornaments, or arranged along the edge of an instrument like a saw; just as we find similar teeth employed by savage races at the present time. Spherical, oval, and pear-shaped bodies also are found with a hole through the centre such as gives them the appearance of beads or net-sinkers. The whole question then resolves itself into this: Is it impossible or improbable that nature produced these forms?—for on that assumption only can they be considered as evidence of the existence of Man in the Crag Period.

What then is the evidence? Only a few of the teeth have been found bored right through, and not nearly all of these have the perforation in the middle of the basal portion of the tooth (see Fig. 1).<sup>1</sup>

<sup>1</sup> I have borrowed the specimens, figured on pp. 248 and 249, from my friend Mr. Etheridge, who entirely agrees with me in the views expressed in this paper.