

ART. XIX.—*On the Mechanism of Stromboli*; by ROBERT
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[Abstract of a paper received by the Royal Society of London, May 17, 1874, and
read June 25, 1874.]

STROMBOLI stands unique (omitting the as yet imperfectly known Masaya in Central America), amongst the volcanoes of our globe as characterized by the rhythmical recurrence of its outbursts, which have continued with but little alteration for more than 2000 years. The phenomena of Stromboli have been more or less accurately described by several authors, from Spallanzani and Hoffman to Scrope and Daubenay. The last but one of these has proposed an explanation of the phenomena presented by the recurrent outbursts at short intervals of time, which within rather narrow limits are constant, and in the traditional convictions are supposed to have some connection with the state of the weather or of the barometer. This author points out that these explanations fail wholly to account for the long continued rhythmical action of this volcano, and for any presumable connection with the weather.

The writer, in company with Colonel Henry Yule, B.E. (well-known for his embassy in Siam, as editor of Marco Polo's Travels, and for other important labors), examined Stromboli and other islands of the Lipari group in 1864, and describes more systematically and minutely than has been done by previous writers, to his knowledge, the circumstances and phenomena of rhythmical eruption presented by the volcano. He then briefly refers to the history of observation as respects the geysers of Iceland; to some of the circumstances, as to those experimentally ascertained by Henderson, and to the

able explanation of their rhythmical action given by Bunsen and Des Cloizeaux. He then points out that Stromboli presents the rhythmic recurrence of outburst of a geyser combined with the eruptive action of a volcano of small energy, and suggests, aided by a diagram, the very simple mechanism by which this combination is produced at Stromboli; and, comparing the action of such mechanism with the actual phenomena presented by the volcano, shows that they tally with each other minutely. The crater of Stromboli consists of a deep cavity, at bottom of which is a tundish-shaped funnel, formed chiefly of the loose material which after each outburst falls back into the crater. More or less liquid lava finds its way by a lateral duct into the bottom of this funnel of loose material, which it partially solders together in the period between successive outbursts. Below this mass of loose material, and penetrating to a depth considerably below the sea level, which is about 400 feet below the bottom of the crater, is the tube which in all ordinary volcanoes carries up together the mixed steam and liquid lava that are erupted through it and the crater. In this instance the tube is supplied with water percolated from the sea, which is heated by the high temperature of the ducts through which it passes by the heated walls of the tube, and by jets of superheated steam driven into its lower extremity by ducts, which, like those that conduct the lava to the bottom of the crater above, are derived from the great volcanic channels much more centrally situated in the island, and belong to the great craters by which the island itself was formed. The tube with its water and steam ducts thus performs the rhythmical functions of alternate outbursts and quiescence that belong to the geyser, and the ascending column of water in the tube, when the boiling point, due to statical depth, superincumbent tension, and obstructions at the bottom of the crater, has been reached for all parts of its height, is driven forth, throwing the loose material mingled with liquid lava out of the crater before it in a cloud of stones, dust, shreds of semi-liquid lava, and steam, and perhaps pulverized water. The main mass of the solid ejecta fall back into the crater, to be again expelled by the next outburst.

Several facts and details are adduced tending to corroborate this as being the true mechanism of this singular volcanic vent, and several inaccuracies of description of preceding writers, more especially the statement that the bottom of the crater is about 2000 feet above the level of the sea, are corrected—the author's levels being derived from approximate barometric measurements. The author then refers to the old traditions still current as to connections in the way of cause and effect between the phenomena of the volcano and those of weather, etc. He points out that the explanation previously given of

the supposed mechanism of Stromboli fail as completely to account for any such connection as they do to explain the rhythmical action of the volcano itself. The only distinct relations that can be gathered from the inhabitants of the Lipari group, between the appearances presented by Stromboli with different states of weather, wind or atmospheric pressure, are shown to be not those of direct cause and effect, but to be referable to acknowledged meteorological principles.