

The Recent Eruption of Etna.

By Prof. GAETANO PONTE, of the Etna Vulcanological Institute.

DURING the last ten years Etna has exhibited various phenomena of considerable interest, especially at the lateral crater which appeared in May 1911 on the north-eastern slope of the central cone at the 3100 metre contour. This was the forerunner of a more violent eruption in September of 1911, when the new north-east crater became more active than the central one.

In 1917 a luminous column rose like a fountain a thousand metres above the north-east crater, and about 50,000 cubic metres of very fluid lava were poured out in about half an hour, without either rumblings or shakings of the ground. This afforded most striking proof of the resistance of the structure

days, and observations became impossible. At 2.30 A.M. of June 17 the inhabitants of the northern slope of the volcano were rudely awakened by deep rumblings and shakings of the ground, while near the craters of 1809, at the 1500 metre altitude, there rose imposing outpourings of lava; meanwhile other craters opened and other streams ran lower down the mountain, until at 4 A.M., at the 2000 m. contour on the western slope of Monte Ponte di Ferro, and at the south-western foot of Monte Nero, there were established definitely the craters of the main flow. The flow of Monte Nero, which was feeble and of short duration, ran over the bed of the 1879 lava for about 3 kilometres, but the mouth from which it flowed closed on June 21, whereas the flow from Monte Ponte di Ferro, which was of much greater extent, invaded the pine-forest of Petarrone, and, rapidly running down the eastern side of the lava-flow of 1911, reached in a few hours the Piano dei Filici, where, spreading its front, it headed towards Cerro and destroyed the vineyards and the nut-plantations of the Piano di Pallamelata (see Fig. 1).

In ten hours the lava had travelled about 7 kilometres, falling in that distance 1200 metres, but as soon as it reached the plain, as has happened in other eruptions of Etna, it slackened the speed of its advance, spread fan-wise, and swelled like the carapace of a tortoise. Thus it happened that the front of the lava, which on the evening of June 17 was about 1 kilometre from the Circum-Etna Railway, reduced its speed, and did not

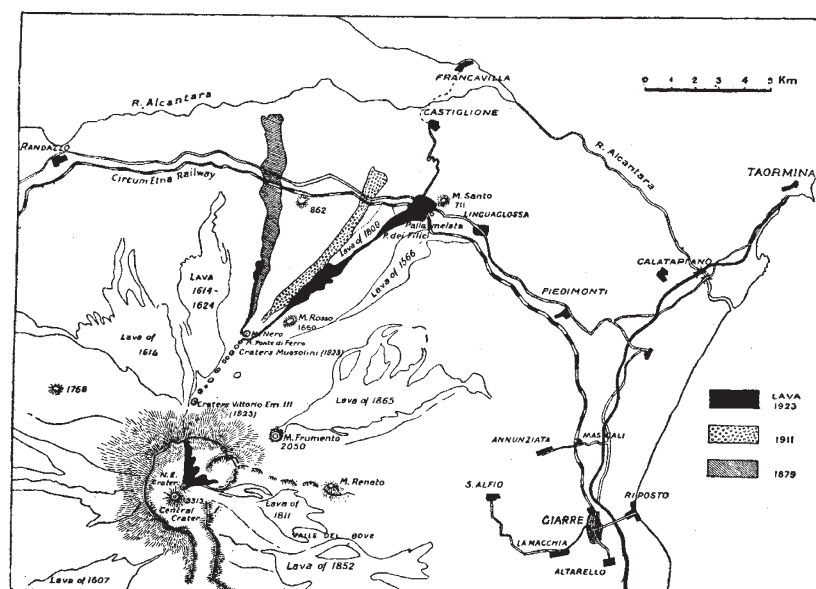


FIG. 1.—Sketch-map of north-eastern part of Etna, showing track of lava.

of the volcano to the enormous forces propelling the lava, which was raised not by the force of volcanic gases, but by powerful static pressure.

In June 1922 the activity of the north-east crater was resumed, and there were feeble explosions. In the spring of 1923 its activity increased still more, and at the foot of the explosion-cone which had been formed, some streams of lava appeared and spread out in short many-branched flows over the snow-fields. It was very interesting to observe the phenomenon of the hot lava spreading over the snow without melting it, but rather transforming it into ice under the weight.

The activity of the north-east crater continued until the outbreak of the eccentric eruption, which was preceded by the great explosions in the central crater, where, on June 6 last, the throat of the volcano, obstructed since 1918, reopened and ejected gigantic pine-tree clouds of reddish ash to a great height above the crater.

Following this the sky remained obscured for many

invade the station of Castiglione until the night of June 19.

On June 20, when the King of Italy arrived in the region devastated by the lava-flow, the front was already 1 kilometre in width, and was still advancing at a speed of from 10 to 15 metres per hour. On the following day, when the Premier, Signor Mussolini, arrived, the flow had reached the foot of Monte Santo and continued to spread out slowly like a fan, enveloping the last few houses of the Catena suburb and threatening the town of Linguaglossa. Fortunately, however, from that day the impetus of the lava began slowly to diminish, and by June 26 its rate of advance was reduced by a half. The front of the lava-flow, not being sufficiently fed from its source, stopped definitely on June 29, but on the Piano di Pallamelata, on the eastern side of the flow, a fresh branch was formed, which at first threatened to give a new direction to the devastating torrent. In the meantime, higher up on the lava-flow there were further additions and lateral outbreaks. At some points the crust of lava

formed blisters, some of which, becoming solidified and remaining hollow, finally crashed in, owing to the lateral fissures. The emission of lava continued slowly until July 18, when the fiery torrent appeared to have solidified in the crater-mouth. The area covered by the lava is about three square kilometres, as estimated from the photographs taken by me from the hydro-plane M. 28, kindly placed at my disposal by Signor Mussolini.

From the phenomena observed during the eruption, it can be seen that its progress was in direct relation to the mass of the lava emitted, and the various incidents were the consequences of special local conditions. If the structure of Etna were homogeneous, that is to say without hollows or fissures, the molten

of the eruption of Etna. The hypothesis of radial fractures which split the volcano at its base is not in harmony with the observed phenomena, and is contrary to the principles of the statics of liquids.

In this eruption it has been observed that the explosions were due to the detonation of explosive mixtures of volcanic gases—hydrogen, carbonic oxide, and methane—which are given off by the lava, and, when collected in subterranean cavities, form explosive mixtures with the oxygen of the air. The explosions were strongest in those parts of the fissures where deep chambers had formed in which the gases could collect, while towards the uncovered portions of the lava-canal there were milder explosions, with only small jets of lava. Later, when along this canal

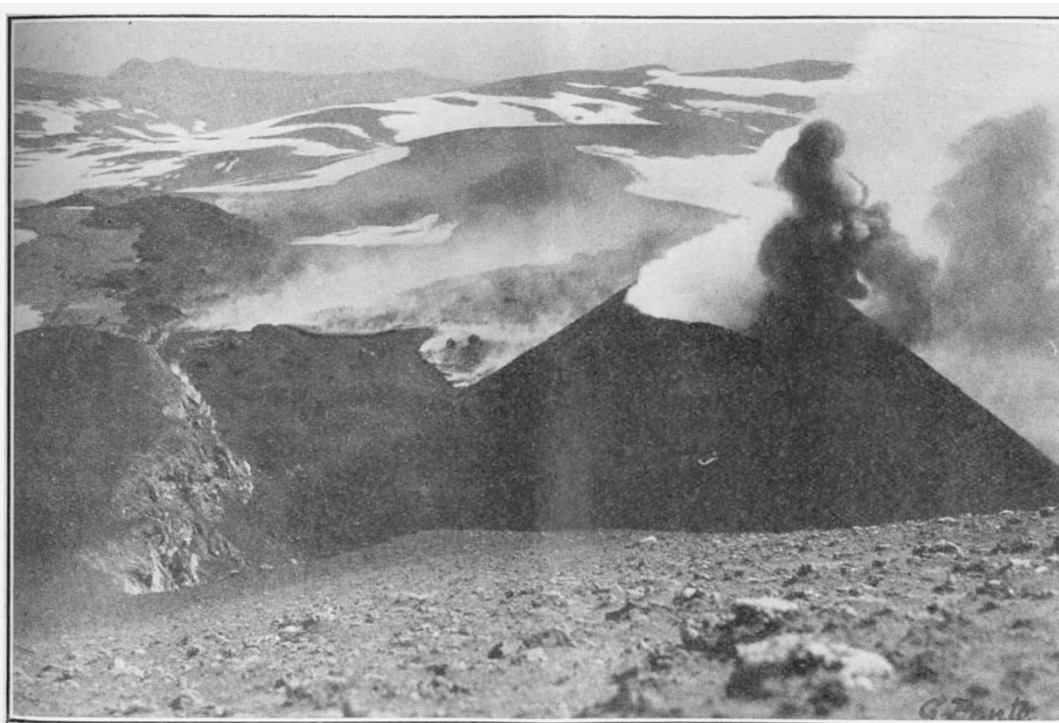


FIG. 2.—The north-east crater at the beginning of the eruption of May 1923.

[Photo: G. Ponte.]

lava would not have departed from its principal eruptive conduit, and the eruption would have developed in the central crater. The passages which abound in the lava-flows on the slope of the volcano represent, however, so many subterranean routes which the molten lava could follow through a breach in the principal conduit, which might be formed by the simple collapse of weak parts of its walls or by breaking through where the rock was corroded by acid vapours. We do not know the changes that may have taken place along the epi-subterranean canal during the present eruption, but if its main vent near the principal eruptive conduit is still open, we can assume that with any renewed rise of the magma the lava will follow the same route. If, on the other hand, the breaches in the main pipe have been closed, the magma will reappear at the central crater until other subterranean routes are opened.

It is not possible to give a more explicit explanation

small cones were formed with corresponding explosion-chambers, the noises became intense. At the mouths of some of these small explosion-cones, there were often seen hissing darts of flame like those of powerful oxyhydrogen jets. These flames, due to the burning of the volcanic gases, have been observed at other volcanoes.

Various experiments were made during this important eruption. Of particular interest were the successful attempts to reduce, or even to stop for a short time, the explosions at some of the craters near their mouths by introducing carbon dioxide gas, which prevented the combustible gases from meeting with the oxygen of the air. In another experiment, nitrogen was blown through the liquid lava in order to carry away the gases given off, and to enable them to be collected without contamination by the air. This was carried out by means of a special apparatus, already described in the *Rendiconti della Reale Accademia dei Lincei*, vol. xxxi.,

1922, pp. 387-389. From the repeated trials made, it was definitely proved that the gases so collected are free from water. Thus the theory of the anhydrous nature of the magmatic gases, advanced by Albert Brun, receives fresh experimental confirmation.

on the cyclonic movements caused by convection currents in the hot air over the lava-flow.

In honour of the King and the Premier, the Accademia Gioenia di Catania has given the name Vittorio Emanuele III. to the new craters in the upper part of

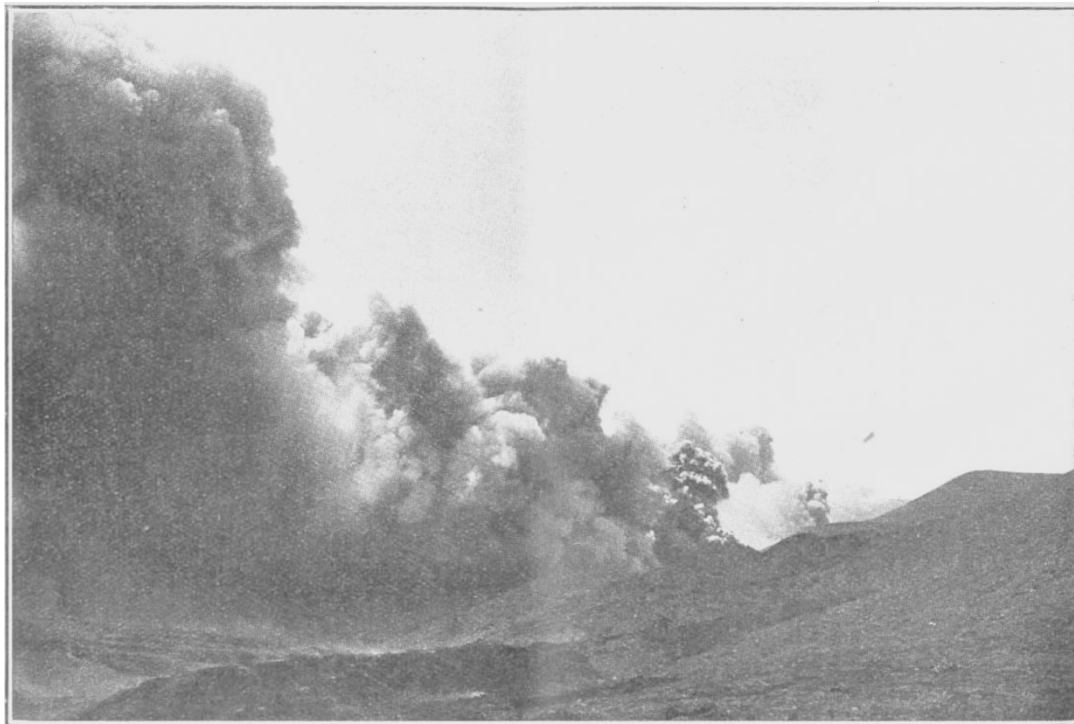


FIG. 3.—Explosion-craters, Vittorio Emanuele III.

[Photo: G. Ponte.]

Many observations were made of the temperature of the lava, and it was found that this varied in different parts of the flow owing to superficial cooling in contact with the air. At a temperature of from 670° to 690° the lava was still pliable, and could be easily bent and compressed. Some interesting observations were made

the eruptive region, and has named those near the vent from which the lava issued Crateri Mussolini.

Many foreign vulcanologists came to see the eruption, and among them I had the pleasure of seeing Dr. G. Kemmerling, chief of the Vulcanological Service of the Dutch Indies.

Population and Unemployment.¹

By Sir WILLIAM H. BEVERIDGE, K.C.B.

THE impression that the civilised world is already threatened with over-population is very common to-day. Many, perhaps most, educated people are troubled by fear that the limits of population, probably in Europe and certainly in Great Britain, have been reached, and that a reduction in the rate of increase is an urgent necessity. Most, if they were asked to give reasons for their fear, would refer to one or both of two reasons: they would point to the enormous volume of unemployment in Britain; they would say that economic science, at least at Cambridge, had already pronounced its verdict. I propose to begin by raising some doubts as to the validity of each of these arguments.

The volume of unemployment in Britain is undoubtedly serious, and almost certainly unparalleled

in past history. Those who see, as we now do, more than a million wage-earners whom our industry for years together is unable to absorb in productive employment may be excused if they draw the inference that there are too many wage-earners in the country. The inference, though natural, is unjustified. Unemployment in Britain can in any case prove nothing about the world as a whole. History shows that it does not prove over-population even in Britain.

During the last half of the nineteenth century, the industry of the United Kingdom was finding room for a rapidly increasing number of wage-earners with an admittedly rising standard of production and comfort. Through the whole of that period there was unemployment in the country. The percentage of trade unionists out of work never fell to zero; in no year since 1874 was it less than two; at more than one crisis it reached a height comparable if not equal to that which we have

¹ From the presidential address delivered to Section F (Economic Science and Statistics) of the British Association at Liverpool on September 17.