THE STUDY OF EARTHQUAKES IN SWITZERLAND

ALTHOUGH much has already been done for the investigation of earthquakes, it must be admitted that yet more remains to be done, and that we are very far from what might be considered as a scientifically organised system of observations of earthquakes. Therefore all lovers of science will be much pleased to see that the sixty-first meeting of Swiss Naturalists, which was held in 1878 at Bern, appointed a special commission for the study of this important subject. The Commission, which consisted of Prof. Forster, of Bern, as president, Prof. Albert Heim, of Zurich, as secretary, Professors Amsler, of Schaffhausen, Forel, of Morges, Hagenbach, of Basel, Soret, of Geneva, and M. Billwiller, Director of the Statistical Board of Zurich, chose the telluric Observatory at Bern as its central board, and, after having put itself into communication with foreign observers, it began with the elaboration of a scheme for the organisation of a wide system of observations on earthquakes in Switzerland.

The scheme elaborated by the Commission is to provide two or three chief stations (Bern, Basel, and, if possible, Geneva) with first-class seismometers, and then to organise a wide net of second-class stations provided with simpler instruments. As to the latter three different apparatus were proposed, and will be submitted to experiment. Prof. Amsler's seismometer is a pendulum, provided at its extremity with a pencil which draws a line on a blackened paper when it is set in motion by a shock of earthquake; the time of the shock is determined by connecting the pendulum with a clock which is stopped by means of an electrical current as soon as the pendulum is set into motion. The apparatus of Prof. Forster is the common mercury seismometer, but the usual cup with mercury is replaced by two Y-like glass tubes, the upper branches of which are directed to the four chief points of the horizon. Finally, the seismometer of Prof. Hagenbach is the simplest one; it consists of three hollow metallic cylinders with heavy tops, which are placed vertically like skittles; on a simple plank, when the plank is brought into motion by a shock, the cylinders fall down, and show the direction of the shock (rolling being prevented by a layer of sand which is strewn on the plank), and as they are of different sizes, it is only the smaller one which falls when the shock is feeble, and all three when the shock is a strong one. We do not know what results might be attained by means of the cylinders, but we fear that the pendulum and the mercury seismometers will prove far more difficult to manage, and that they will give less satisfactory results than might be expected. In every case these seismometers will be submitted to a thorough trial before being introduced into practice, and Prof. Forster has already constructed a special apparatus for trying them. A thick plank, 150 lbs. weight, is suspended in a room on three strings, and, the seismometer being placed on it, shocks of various intensity are communicated to the plank by means of a heavy lead-pendulum; moreover, we daresay that an earthquake will not be long in coming to tell what is the practical value of the new instruments.

Besides, the Commission has taken steps to interest the public in this class of observations, and Prof. Heim has just published a pamphlet on the nature and causes of earthquakes, and on the means of observing them without instruments. This pamphlet, which will be translated into French by Prof. Forel, will be sent to all members of the Swiss Society of Naturalists and of the Alpine Club, as well as to the meteorological and telegraphic stations and to the editors of all Swiss newspapers. Further, special leaves, containing each a series of questions on the chief features of an earthquake, are printed, and they will be sent in great quantities throughout Switzerland. The whole country is divided into seven regions, each member of the Commission being intrusted with one of them; and as soon as the newspapers announce an earthquake, the member of the Commission in whose region it has occurred immediately sends the printed leaflets with questions to all persons who might give any information about it. All information is represented on a map and inscribed in a special book, another book being used for collecting all information about former earthquakes.

Such are the important steps taken up to the present by the Commission, and we hope that soon a widely-spread organisation will afford us detailed and accurate information on all earthquakes in Switzerland.

THE HISTORY OF VESUVIUS DURING THE YEAR 1879

PROF. JOHN PHILLIPS, in his admirable monograph on Vesuvius, has given a history of the mountain from the earliest times to the end of the year 1868. Palmieri, in his detailed description of the eruption of 1871-72, continued the history to the end of the latter year; and in NATURE, vol. xix. p. 343, the present writer has described the comparatively uneventful life of the volcano from 1873 to the end of 1878. The past year, although unmarked by any special and paroxysmal disturbance, has furnished facts not unworthy of record.

It will be remembered by readers of the former article on the subject, that at the conclusion of the great eruption of 1872, a vast abyssmal crater, 250 metres deep, and nearly as many in diameter, was left in the great cone of Vesuvius. After three years of comparative rest, during which carbonic acid, sulphurous acid, and ultimately hydrochloric acid, were evolved from fumeroles in the bottom and sides of the crater, a deep chasm opened on December 18, 1875, from which dense volumes of smoke issued. At night the smoke could be seen to be illuminated by the reflection of the light emitted by the molten lava within. A small eruptive cone was soon formed over a portion of this chasm, which increased in energy, and emitted small quantities of lava. On the night of November 1, 1878, the lava which had spread itself over the floor of the crater of 1872, rose to the lowest portion of the edge of the crater, and commenced to flow down the great cone in a north-westerly direction, towards the Atrio del Cavallo. The secondary cone rose to a height of about 20 metres, and exhibited a fair amount of dynamic activity when I visited it on December 29, 1878 (*v.* p. 344, *loc. cit.*).

During 1879 small lava streams appeared from time to time on the sides of the great cone, sometimes flowing a little distance downwards in a north-westerly direction, and occasionally towards the north-east. Prof. Palmieri, in a MS. account of "Il Vesuvio nel 1879," with which he has been so good as to furnish me, asserts that the energy is markedly greater at the time of the new and full moon. On December 17 the energy increased considerably, and a small stream of lava flowed down into the Atrio del Cavallo. When I saw the mountain during the last days of the year it emitted great volumes of smoke, but there was no lava flowing, and but slight illumination of the smoke at night. Towards the 11th of this month, however (new moon), the energy increased, and on the 13th I ascended the mountain, and witnessed a considerable augmentation of activity.

We reached the observatory at 11 a.m., when we found that a tramontana, which was blowing strongly at the foot of the mountain, was here so violent that it was questionable whether it would be advisable to attempt the ascent. Moreover, the temperature of the wind was − 3° C. (26·4° F.), and it blew with intermittent gusts of great violence. However, the guide determined to make the attempt, but he asserted that it would be impossible to ascend the cone by the usual path which proceeds nearly due west from the observatory, as the wind was