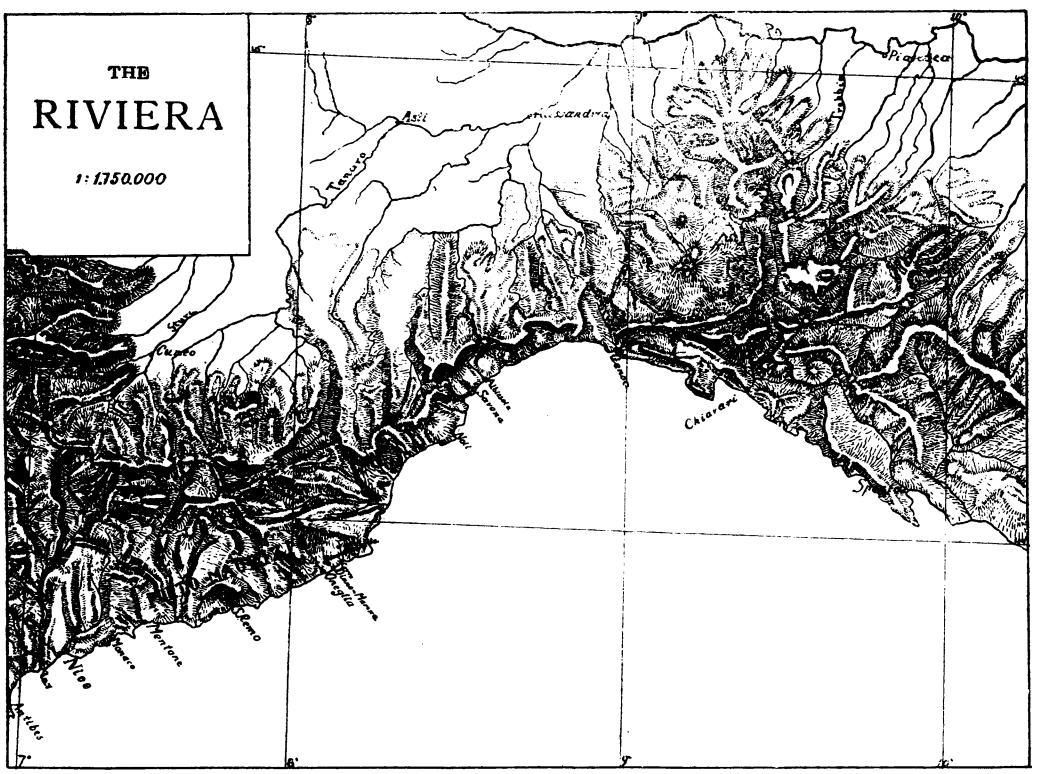
tions, this gave an estimated height of seven miles. Probably steam from the boiling sea was contributing to this cumulus. About six square miles of glowing surface were then radiating heat, all near the sea, the point of emission being only seven miles back, and 3,500 feet up. I judged, however, that the chief source of the vapor was the one above named, — inflowing atmospheric currents. That cumulus was naturally blazing with incessant lightning, visible even after sunrise at that immense distance. Some brownish smoke could be distinguished around the lowest part of the snow-white pile of cumulus. Previous to the actual outflow of 1868 an enormous emission of smoke had taken place, which densely shrouded Lahaina and the whole group for many days, objects one mile distant being invisible to us when at the thickest, and a very distinct odor of sulphur being present.

The present eruption was first announced to us at Honolulu by the pervading smoke, continuing from the 20th to the 30th of January. The smoke is evidently first discharged into the upper current, and transported far to the east-north-east before settling down into the trade wind, which brings it back upon us.

S. E. BISHOP.

THE RIVIERA EARTHQUAKE.

THE accompanying sketch-map shows the scene of the late destructive earthquake. The centre of the disturbance was in the Italian province of Porto Maurizio and the adjoining French Departement des Alpes Maritimes. Two severe shocks in quick succession occurred on Feb. 23 at 6 A.M. They did a great deal of damage all along the coast, and were felt far inland. The heaviest loss of life and property was sustained in the district of Oneglia, 570 persons being killed and 156 injured. The villages of Diano-Marina, Diano-Castello, and Bajardo were almost destroyed. In the province of Genoa thirty-four persons were killed and thirty-seven injured, and in the Departement des Alpes Maritimes eleven persons were killed. The following reports show the extent of the disturbance: at Toulon two violent shocks were felt at 6 A.M., the first shock of fifteen seconds duration, the second of twelve seconds. The movements were from west to east. At Cannes three shocks were felt at the same hour. At Cuneo and Turin they did considerable damage. Earthquake shocks were observed in south-eastern France, Switzerland, Piedmont, Lucca, and Corsica. On Mount Vesuvius the instruments did not indicate any dis-



turbance, while those of Etna and at Catania were much agitated. The steamer Guadeloupe felt two shocks in latitude 43° 45′ N. and longitude 5° 39′ E. at 6 A.M., and a third one at 8 A.M. At Cannes and Antibes the sea fell three feet at the moment of the chief shock, and then rose six feet. The seismoscope at Washington was disturbed at 7.33 A.M. On Feb. 24, slight shocks occurred at Mentone and at Digne (Departement des Basses Alpes), and on the following day at 1.53 A.M. a shock was reported from Nice, and at 2 and 4 A.M. from Cannes.

This earthquake occurred on the large fault on the south-western side of the Apennines. A glance at the map shows the difference between the declivities of the Apennines. North of Genoa the Molasse hills gradually rise from the plains of Piedmont, forming a continuous curve, which may be observed from here to the Bay of Taranto. Inside of this continuous belt we find limestone, forming the Abruzzo, Gran Sasso, and the Basilicata. This line is interrupted in Tuscany. Still farther inside, on the west coast, and partly submerged in the Tyrrhenian sea, we find the separated *débris* of the ancient crystalline rocks. Here is the great fault between the sunken tract now occupied by the Ligurian and Tyrrhenian seas and the mountains. It is marked by the long lines of volcanoes and countries of frequent seismical disturbances. The east side of the Apennines is regularly folded: the west side is torn, and a seat of volcanic and seismic action. The folded side is convex and continuous: the opposite one is broken by faults and sunken tracts. Inside of the Apennines there are a great number of sunken tracts arranged on a long line, the curved limits of which cut far into the range of mountains: the Gulf of Genoa, Salerno, Naples, and the bay around the Lipari Islands are the centres of regions of this kind. The movements of the strata along these faults give rise to the numerous violent earthquakes of western Italy.

LONDON LETTER.

THE unsavory subject of the disposal of London sewage continues to attract much attention, and to create considerable interest. On three successive evenings the large theatre of the Institute of civil engineers has been crowded to excess to hear the discussion on papers by Messrs. Dibdin and Crimp on sewage-sludge and its disposal. The most telling speech was that of Dr. Meymolt Tidy, who, in a most incisive manner, delivered a heavy indictment against the Metropolitan board of works, on the ground, that, when forced by public opinion to do something to remedy the nuisance in the Thames, they summoned to their aid the very chemists who had previously given evidence before a royal commission to the effect that there was no sewage nuisance in the river! He ridiculed unsparingly the treatment by lime and ferrous oxide, and by sodium manganate, which had been adopted by the board, and also Mr. Dibdin's view that the ferrous oxide acted as a carrier of oxygen between the air and the sewage in which it was suspended. The idea that sewage could be 'made to pay' had done more than any thing else to restrict advances in the mode of dealing with it: such processes were like those for extracting silver out of sea-water. On another occasion the advocates of irrigation and sewage farms had their say at the Society of arts, where Dr. Alfred Carpenter gave his experiences of the Croydon sewage-farm, near London, which were very favorable. Such an opinion has especial value, as the author is well known as a distinguished sanitarian and medical officer of health. The local conditions for successful sewage-irrigation are not easily obtainable. There are, however, many places near American cities, within the knowledge of the present writer, where sewage-irrigation might be applied with the greatest advantage.

Another subject much before the scientific public at present is the employment of gas for lighting and heating. Mr. Colnaghi has lighted a small picture-gallery most efficiently by the gaslight system of Dr. von Welsbach of Vienna. The figures given are an average consumption in each burner of two feet per hour, at a pressure of nine-tenths of an inch, and an average illuminating-power of seventeen candles, or eight and a half candles per cubic foot of gas consumed. Within an ordinary atmospheric or Bunsen flame, is placed a mantle or hood of cotton net or webbing which has been previously steeped in a solution of oxides of zirconium and lanthanium. Mr. William Sugg, the well-known gas-engineer, lately gave a most successful gas-cooking demonstration, in which the non-luminous flame is abandoned in favor of the radiant heat from a luminous flame in a well-ventilated chamber. The gas-supply is regulated by a governor, and the results can be predicted to a nicety. The loss in roasting a joint is reduced from twenty-five per cent to eight or twelve. Neither the food nor the vessels containing it are touched by the flame: hence unpleasant flavors are avoided, and the whole apparatus, which is adaptable to many different culinary operations, has the merit of great simplicity. A very striking lecture, well illustrated, was recently given to the Manchester technical school, on 'Some curious flames,' by another gas-engineer, Mr. Thomas Fletcher. He strongly insisted, that, in the ab-