

QUAKES DUE TO ROCK MOVEMENT

Vast Subterranean Settling on Pacific Coast.

MANY TREMORS FELT AT 'FRISCO

More Than 250 Earth Shocks in City and its Neighborhood in the Past Fifty Years.

New York, April 20.—Dr. C. P. Berkey, assistant to Professor Kemp, of the department of geology, Columbia University, does not think there can be any possible connection between the eruption at Vesuvius and the earthquake at San Francisco. The old theory of submerged lakes, he said, which would be the sole means of such a communication, is now a dead theory. Atmospheric conditions, it is true, have sometimes an effect upon neighboring active volcanoes, but the distance between Italy and California is too great for any such connection. Dr. Berkey is more inclined to believe that the disaster at San Francisco was caused by the folding processes of rock in mountain-making.

"These changes are constantly going on, particularly in a country of the Mesozoic era," said Dr. Berkey. "But they are usually so slight compared to the size of the earth as not to be felt. Sometimes the sudden slipping of great masses of rock causes such a disturbance as to have immediate effect in the neighborhood, and shake down strong buildings. San Francisco is directly in line between the new and active, volcanic fields of Mexico and the extinct volcanoes of Washington and Oregon to the north. Geologically, the position of California is such that these disturbances would come as a natural course."

To a later inquiry Professor Berkey said: "There is no possible connection between the San Francisco disturbance and the recent eruption of Vesuvius. Earthquakes are not necessarily of volcanic origin. The earth's crust, in cooling, contracts, and often contracts unevenly, so that it causes the strata to slide. Such a sliding of the earth's crust might have caused the San Francisco earthquake."

"Some people hold to the idea that volcanic eruptions are caused by a percolation of water from the sea, into the heated parts of volcanoes, and that the steam thus starts the eruption. According to the theory now generally accepted by scientists, volcanic explosions are caused by steam, but not from water percolating from the sea, but from contact of the molten matter with underground masses of water. Thus volcanoes are safety valves for the earth."

Prof. William Hallcock, of the department of physics at Columbia, agreed with Prof. Berkey as to the causes of the San Francisco earthquake. "The Charleston earthquake, Columbia University has been trying to secure seismographic instruments and a place for them," he said. "A small building was assigned the university for the purpose in the Botanical Garden in Bronx Park, but nothing has yet been done toward securing the instruments. We hope in time to have such instruments to record seismic disturbances."

Previous Earthquakes There.

Whatever may be the cause, California, Nevada, Oregon, and Mexico have been annually visited by these disturbances ever since 1892. The report of the United States Geological Survey record a succession of shocks, and sometimes considerable damage through the years 1892, 1894, 1896, 1897, 1898 and 1900. The first disturbances reported occurred at points along the Pacific coast ranging from British Columbia to Central America. On Jan. 27, 1892, Carson, Nevada, felt a shock about 8:30 o'clock in the morning. The Capitol building was particularly well shaken, and a jar at 1 o'clock shook down plaster and opened a crack in the side of the postoffice. Through January, February and March, slight shocks were felt through California, Nevada and British Columbia. In the latter part of the year the vibrations were enough to stop clocks and break chimneys. On Dec. 17, at Santa Barbara, California, a tidal wave, the largest in the history of the place, washed over the boulevard at 8 o'clock in the morning, carrying back huge blocks of the beautiful driveway, which had been put down in concrete and heavy masonry. One section of the drive carried away was nearly 50 feet square and 8 feet deep.

In 1897, 25 distinct shocks were recorded, as again in the year pre-

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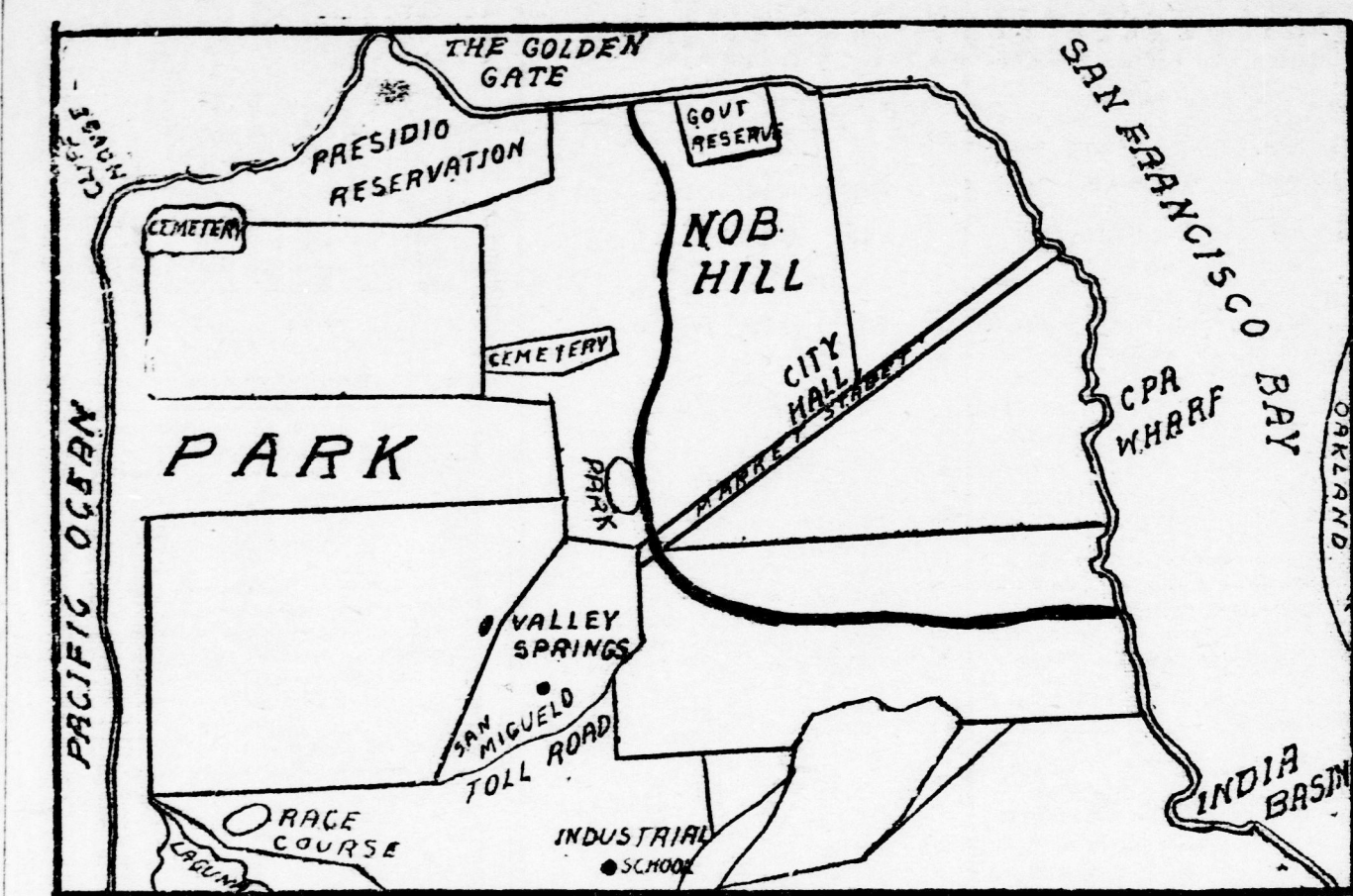
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Plan of Stricken San Francisco—Ten Square Miles Devastated



That Portion of the City Between the Heavily Shaded Line and the Bay Has Been Reduced to Ruins. The Presidio and the Park are Being Utilized as Hugo Refugee Camps.

VESUVIUS AND PELEE COMPARED

One a Smelter, the Other a Crushing Engine.

THE FALL OF ST. PIERRE

Early Records of the Italian Volcano Are Unscientific and Imaginative.

New York, April 20.—The eruptions recorded recently in Naples brings to mind the great excitement of 1902, when all the journals of the world were full of the extraordinary disaster in the West Indies occasioned by Mont Pelée. On that occasion, it will be remembered, there was a simultaneous outbreak of two volcanoes.

On May 7, 1902, La Soufrière in St. Vincent sent a mighty column of steam and ash miles upward and laid waste the plantations on its flanks. The next morning, May 8, "la montagne Pelée," at the northern end of Martinique, a hundred miles away from St. Vincent, gave vent to a culminating explosion after several days of forewarning, and a peculiar black cloud rushed down the slope of the mountain on St. Pierre, a thriving French city of 25,000 inhabitants. It was instantly destroyed, and only two persons were ever removed from the city alive, although several people on the ships in the roadstead escaped.

After the destruction of St. Pierre, both volcanoes continued active for months. A second eruption of Soufrière took place on May 18, and of Pelée on May 29. Until the end of August, Soufrière remained tranquil, but Mont Pelée suffered recurrent explosions of increasing violence. The series of volcanic happenings culminated on Aug. 30, when Mont Pelée sent out a terrific blast in a new direction, wiping out a hill town with its 2,000 inhabitants and greatly extending the area of its devastation. On September 3 Soufrière followed the lead of its neighbor and again erupted violently, but the inhabitants of the vicinity had long since fled, and no damage was done beyond what had been already accomplished—complete destruction of everything human within reach of the octopus arms of the volcanic monster.

After September the eruptions were of minor importance, but a remarkable phenomenon on Pelée attracted world-wide attention. On the new heap of fallen debris piled above the vent a tooth-like projection appeared, which rose like a tower to a height of a thousand feet, and fluctuated in height during the various phases of activity of the cone. The fluctuations appeared to be due to the caving in of the tower especially on one side, and its slow extrusion upward. All observers agreed that the spine or tower was a mass of half molten rock substance forced slowly up from a fissure in the new cone, and solidified by chilling in its progress. Men of science disagreed, however, as to its origin, some believing it to be a "lava" from the deep regions, others that it was a loosened old core of solid rock, and still others, among whom was the writer, that it was merely fused material among the hot pasty blocks which had fallen back on the cone from many explosive eruptions. No sign of a flowing incandescent lava has been reported from this series of eruptions on Pelée.

The Record of Vesuvius. In marked contrast to this story is the record of Vesuvius since the year 1036, A. D. Flowing streams of lava have been characteristic of its eruptions, while the explosive phenomena have been also much in evidence, but the material exploded consists less of broken fragments of old rocks, and more of the glassy sherds which would result from the tearing asunder of viscid lava. Pelée is a great crushing engine, comminuting rocks and hurling far and wide the dust and broken stones. Vesuvius is a smelting furnace with eternal fires beneath, which comminutes the present day are certainly characterized by wholly explosive eruptions, while others, like those of Hawaii, are known chiefly as the scene

of quiet overflows of very fluid basalt. These two types are distributed over the globe in proportions not at present known. Most of the American volcanoes are "cinder-cones," that is, of the explosive kind, and the same is true of the East Indies and the Japanese group, probably, Iceland, the Mediterranean comes the Hawaiian Islands, and some of the New Zealand volcanoes are characterized by lavas. The classification of volcanoes at present is in a very uncertain condition, because of the wide diversity of opinion among geologists concerning their origin and mechanism. The only possible satisfactory classification is a genetic one, and while their genesis is unknown we cannot well classify. They have been grouped in accordance with the nature of their vents, their products and their phenomena, but as all of these overlap, the grouping is in no way satisfactory.

Extinct Previous to A. D. 63.

Vesuvius prior to 1936 was an explosive vent. The early records are unscientific and imaginative, but enough is known to show that prior to the year A. D. 63, the volcano was extinct, that it was a high, open cone with infacing precipices where the gladiator Spartacus could hold at bay the Praetor Claudius Glabrus and his cohorts. Villas, temples and cities were clustered at the foot of the mountain, among them Herculaneum, Pompeii, and Stabiae. Earthquakes began in 62 and continued for sixteen years. On the night of August 24, A. D. 79, the shocks became terrific, and the next day at 1 o'clock a dense cloud of steam, laden with dust, shot up to an enormous height from Vesuvius.

The younger Pliny told something of the story in his letters to Tacitus, and Prof. Hillebrand has recently drawn a parallel between this account and the history of Pelée to show that the two events contained much that was singular. The cloud spread out and was full of lightnings; showers of stones and sand fell; a black on-rushing fog descended the slopes of the mountain like a deadly snake, and the people fled before it. Torrents of mud overwhelmed Herculaneum; sand and stones buried Pompeii and Stabiae—the latter place being not far from the present site of the city of St. Pierre. The presence of the ruins of Pompeii beneath the surface of its grave was first suspected in 1738 when the sinking of a well revealed the statues of Hercules and Isopatra at the site of the well-known theatre. There is no reason to suppose that any very large number of persons remained in Pompeii when it was overwhelmed, for the people were in flight during the eruption, and the people fled before it. Torrents of mud overwhelmed Herculaneum; sand and stones buried Pompeii and Stabiae—the latter place being not far from the present site of the city of St. Pierre.

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In January this eruption began with detonations and the discharge of incandescent projectiles. Abundant lava flowed out from the base of the cone into the valley which is walled in by the old half-crater on the north side of the cone. Small craters formed and reformed; in November of 1872 copious lava flows poured down the slopes of the volcano towards the bay. In March, 1873, at the time of full moon, a great rift formed in the cone on its northwest side, and lava rushed out. On the 23rd of April (another full moon), the craters all increased in activity, splendid lava streams flowed forth, and one of these, on the 25th of April, overwhelmed a party of visitors from Naples. They were enveloped in the cloud of fumes and buried in a hailstorm of heated projectiles. The lava stream on this date moved directly toward the villages of St. Sebastiano and Massa. Tremendous explosions took place from the summit craters, sending bombs four to five thousand feet into the air. Torre del Greco on the shore was upraised six and one-half feet and its houses were shaken down.

On the 28th of April, the explosive phase reached its climax, following the lava phase. Accompanied by thunder and lightning, ash-clouds darkened the air, and the countryside was terror-stricken. Gradually, however, the violence decreased, and by the first of May the eruption was over. There are some singular resemblances with respect to the seasons of their occurrence. Krakatoa in 1883 and Pelée in 1902 began in the spring and culminated late in August. Pompeii was destroyed late in August. The eruptions of Vesuvius of this year (1906), and of

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Probably the British law will be changed so as to allow trades unions to bank money up to any amount in the postoffice savings bank, as is now permitted to friendly societies. In the case of ordinary depositors, interest is not allowed on more than \$1,000. The Pope has ordered a firm of Florence jewelers to manufacture a crown set with imitation stones for the image of the virgin in the basilica of the Vatican, in place of the crown of using gems valued at \$7,500, which is to be deposited in the vaults of the Vatican.

Arthur Speck, of Gloucester, England, received such a shock on hearing of his father's death that he lost the power of speech. Recently he went to a football game. In his excitement he tried to cheer and succeeded in doing so. He can speak as fluently as ever now.

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Professor Koch is said to have decided to apply the Nobel prize recently awarded to him to the publication of a complete edition of his scientific writings.

