

## SOME ACTIVE AND EXTINCT VOLCANOES.

BY CHARLES F. HOLDER.

The terrible holocaust which has devastated the islands of St. Vincent and Martinique takes rank in its appalling significance with the most frightful disasters of history. There was time to escape from Herculaneum and Pompeii, but never so far as known has an entire community been wiped out of existence on the instant in the manner illustrated at the southern islands of Great Britain and France. Anyone who has studied the sun spots and noted the vast outward rushes of fiery gas or material from the surface of the sun, projected thousands of miles into space, can imagine that at St. Pierre something of the kind, on an infinitesimal scale, had happened. The fact that the volcano of Pelée had been "dead" for fifty years shows that there is an element of uncertainty about these splendid monuments to the hidden powers of the earth and suggests that those who insist upon living on the slopes of other "dead" or sleeping volcanoes, as Vesuvius, are acting with open eyes and taking the chance of death.

The United States, or that portion included in the continent proper, is comparatively free from such menaces to human life, yet there are many localities which show that the volcano has been in the past an active factor in the country. In New Mexico the traveler passes a number of old volcano cones, and miles of the country are covered with lava which ran in a fiery flood over the valleys, devastating the land. This is pointed out as the flow of an extinct volcano, and there is no legend or history to tell when it occurred. As a matter of convenience, an extinct volcano is one which has not displayed any activity for one hundred years, but this is no guarantee that it is not liable to reawaken. The people who died at Herculaneum had been taught to believe that Vesuvius was an extinct volcano.

Volumes have been written about volcanoes and their causes, but in point of fact, very little is known about them beyond what we see. In the eighteenth century Humboldt tells us "225 volcanoes erupted," and this is known to be far below the actual number, and doubtless the "extinct" volcano is merely dormant. Etna, which towers 11,000 feet into the air and has a circumference of about 100 miles, has been active periodically for thousands of years—300,000 at least. For the past two thousand years it has had eruptions about four times a century, or every twenty-five years. Etna is a typical periodic volcano; while Stromboli is an example of continued mild eruptions. The photographs of the moon exhibit a remarkable state of ancient volcanic eruption, the face of the moon having the appearance of a pepper box, and doubtless from a great height the earth or certain sections would have a similar appearance, as volcanoes, ancient and modern, are more common than generally supposed. The Pacific Ocean, especially in the equatorial region, is dotted with them. The following groups are conspicuous volcanic centers: the Society group, Marquesas, Navigator, Feejees, Friendly Islands, New Hebrides and Ladrões. Many of these are active, as Tauna and Ambrym in the New Hebrides, Tafoa and Amargura in the Friendly Islands, Tinakora in the Santa Cruz Islands. Mona Loa, 13,760 feet high, is one of the splendid active volcanoes of the world, as well as Mt. Hualalai, 10,000 feet, while Mount Kea also, on the Hawaiian Islands, is now supposed to be extinct. At least ten of the islands, including Martinique, representing the West India group, are volcanic and bear volcanoes. In the Mediterranean country we have Vesuvius, the volcanoes of Sicily and others in Spain, France, Germany, etc., formerly more or less active. Near Greece there are five volcanic islands. Mt. Ararat, 16,950 feet, is an ancient volcano, and along the Red Sea are many volcanic cones. Passing on to Java we find fifty volcanoes, twenty-five of which are active, and the same is true more or less, of Sumatra and Borneo. About the latter over one hundred make life strenuous among the small islands. Madagascar, Mauritius, the Isle of Bourbon, and Comoro Islands, all have volcanoes, and as we approach the South Pole the smoke of Erebus and Terror suggests volcanic activity. Africa is not particularly famous in this respect, but the Bight of Benin and the various islands are volcanic. St. Helena, the Canaries, the Cape Verde, Madeira, Iceland and the Azores are virtual volcanoes more or less ancient.

With the Philippines we have acquired fifteen or twenty volcanoes. Patagonia has its volcanoes; Chili can boast of thirty-two, Aconcagua being 23,000 feet in height, and there are a dozen in Peru and Bolivia. Quito is surrounded by nearly twenty volcanoes, none of which are under 12,000 feet, Cotopaxi (19,660 feet) being the center of interest. Coming up the coast the volcano seeker will find nearly forty in Central America, and in Mexico a number, large and small.

The volcanoes of America, or of the United States, are of especial interest and they are found in the Western country, as a rule west of the Rocky Mountains. One of the most beautiful of these is Mt. Shasta, 14,440 feet high, which rears its massive twin

cones in Northern California. Mt. Helena in Oregon, 12,600 feet in height, is a majestic volcanic peak, and Mt. Hood, 11,225 feet, has a world-wide fame for its beauties, little thought being given to its activity in the early geological history of the continent. Other famous peaks are Mt. Jefferson, Mt. Adams, Mt. Rainier, Mt. Baker and Mt. Lassen.

In the Aleutian chain there are twenty-one islands with volcanoes. Kamtchatka has fifteen or twenty, the Kurile Islands thirteen, and the Japan group twenty-four. In a word, the world is fairly dotted with volcanoes more or less notable for their activity in ancient or modern times. The catastrophe of Mt. Pelee calls to mind other famous eruptions. The extinct volcano of Maui, 10,217 feet high, not many centuries ago emitted a river of lava two miles wide. In 1779 Vesuvius tossed cinders 10,000 feet into the air. During the time of Christ Vesuvius was extinct; even its crater was covered with verdure and its slopes to the summit with vines and trees; then Pompeii was destroyed and one thousand years passed in silence until 1036, when an eruption occurred. In 1631 towns about the base were destroyed, and it is known that the outbreaks have increased in volume and violence in time; yet people still live on the slopes, inviting the fate which is almost certain to come in some later generation.

In 1815 Tomboro on the island of Sumbawa erupted, causing a panic in the Javanese group. Herschel estimated that the ashes if collected would have made a solid mass three times the size of Mont Blanc. For days utter darkness hung over the island and explosions were heard in Ceylon, nearly one thousand miles distant. In 1783 Mt. Reykjanes threw out a mass of lava equivalent to twenty-one cubic miles. Perhaps the most remarkable flow was that of Kilauea, one of our own possessions, which in 1840 ejected a river of lava forty miles long; if collected it was estimated that it would have covered a square mile eight hundred feet in depth. The roar of the volcano of Cosequina, Nicaragua, in 1835, was heard at Jamaica, eight hundred miles northeast. That of St. Vincent in 1812 was heard on the llanos of Caracas. The volcano of Soufrière at St. Vincent, now devastating the island, and supposed for years to be extinct, has many times wrecked portions of the island, the eruptions of 1718 and 1812 being particularly terrible. The latter has been remembered as "Black Sunday." The inhabitants of Barbadoes thought that the fleets of France and Germany were engaged, so loud was the continued roar, yet Barbadoes is eighty miles distant. This island was buried deep in gloom from the dust of St. Vincent and covered several inches deep, yet the St. Vincent islanders forgot the warning, and on the termination of the present outbreaks on this island and Martinique the places not covered with lava will again be occupied, St. Pierre will be restored and life, or what there is left, will move on until the next cataclysm.

## VALUABLE MINERALS.

BY GEORGE E. WALSH.

The output of the mineral products of the United States in 1900 showed a large increase over that of any previous year, and with a grand total of \$1,070,108,899, according to the Geological Survey Report, we are one of the most important countries in the world both as to mineral resources and to the variety obtained. The increase in precious metals and stones was most noticeable because of the discovery of new fields for operation. While never recognized as a country rich in diamonds and other precious stones, the United States has yielded some precious stones of considerable value, and with the extension of our mining industry for ores there is gradually brought to light more of these products.

The output of so-called precious stones in 1900 was valued at \$233,170, but this does not include garnets used for abrasive purposes, nor many others employed in the arts and industries. The total value of gems of quartz origin is considerable in this country, and the mining of these has almost become an industry by itself. Rock crystal is now employed to a much larger extent than ever before for imitating diamonds and other precious stones, and also for producing desirable effects in decoration and refraction of lights. Rock crystal is really the purest form of quartz, and it is found in this country so transparent and colorless that it becomes one of the most useful of our semi-precious minerals.

One of the finest rock crystals in the world was found in 1876, and was cut into a magnificent crystal ball for the late Gov. Ames, of Massachusetts; it is now in possession of the Boston Fine Arts Museum. The ball measures  $7\frac{1}{4}$  inches, but the original crystal from which it was cut was some 18 inches high and 12 inches thick. But this crystal was not found in this country, although a 5-inch crystal ball found in Ashe County, North Carolina, and another near the summit of Mount Antero, Colorado, were nearly as handsome as the one in the Boston Museum. The former is cut in a ball 5 inches in diameter, and the latter 6 inches.

There are a number of well-defined regions in this country where rock crystals are found, and mining for them is carried on with more or less regularity most of the time. But the most remarkable ones have been found by chance rather than by any definite clew to their whereabouts. One of the well-defined regions where quartz crystals have been found in the past dozen years is at Hot Springs, Colorado, on the banks of the Ouachita. A remarkable feature about these stones is that they are so worn by the tide and current that they are round like pebbles. In most cases they are very clear crystals, and they are of fair value. Some have been cut and sold for good prices. They are not different, however, from the quartz crystals found on the Atlantic coast at various points, although of a rather purer and higher grade. Transparent quartz pebbles are frequently sold in cities under the name of imitation diamonds. They can be cut and polished to a rich brilliancy, so that they attract nearly as much attention as the genuine stones, but they soon lose their luster and cannot be retouched again without recutting.

The various colored quartz crystals produce many fine specimens of stones which are used in the jewelry trade. Thus the amethyst is a transparent purple variety of quartz. Some varieties are so plentiful that they have lost much of their ancient value. The finest deep purple gems naturally command nearly as much attention as ever, and when cut properly they sell for good prices. Small but very fine amethysts are now found in parts of Pennsylvania, Maine and North Carolina. These stones are eagerly sought after, and occasionally a large one is found which is valued nearly as much as those imported from the Orient.

Agates and chalcedonies have also in recent years been mined in considerable quantities and variety in this country, and their value is proportioned somewhat to the quality of their grain. The best agates are found in hard nodules where the rocks have disintegrated through one cause or another, and consequently they are strewn in places along the coasts and beds of streams. Agate pebbles, which present rather a fine appearance and readily lend themselves to cutting for jewelry effects, are found in considerable quantities on the California beaches, especially at Pescadero. These pebbles are often neglected by visitors because of their rough external appearance, but when cut and polished they have fine coloring and grain. They are now used in a dozen different ways for ornamenting trinkets, match boxes, beads, studs and handles of knives and forks. In recent years the best agates and chalcedonies have advanced in price, and efforts have been made to imitate them. Deep-red carnelians and sards are produced in this way by skillfully burning the pale or dull chalcedonies. Black agate is made in the same way, and is very popular for mourning jewelry. In Wyoming large masses of moss agates have been found, and when cut properly they are very pretty. These are used for table tops and other ornaments.

The treatment of chalcedony by chemical and other processes has greatly widened the uses of this mineral. By treating it in different ways it is possible to make the coloring suit almost any passing fashion. The so-called "golden opal" is made by boiling chalcedony in honey and then in a solution of chromate of lead, and finally placing it in hydrochloric acid kept at a moderate heat for a few weeks. Other colors and stripes are obtained by boiling the mineral in such solutions as blood and water, sugar and water, and molasses and water, and after it has absorbed these boiling it in sulphuric acid.

In fact, modern chemistry has produced such changes in the colorings of many of our stones and minerals that it is possible to imitate many of them and improve upon nearly all. Any colored onyx can be obtained by simple chemical processes, and the common dull colors of this stone can be converted into brilliant hues, thus greatly increasing the value. Not only can the whole stone be made to change its color, but sections and lines of it can be made to assume a red, black, yellow or white color while the rest is pure white or black. Agates are easily converted into an onyx-like substance and character, which lapidaries use for cameos and intaglios. Altogether, our chemical treatment of some of the abundant stones and minerals has not only widened and developed the resources of the country, but it has made it possible for the poor to possess good imitations of jewels which at one time were considered almost priceless.

Captain Lawrence, who was recently in command of the Signal Corps of the First Brigade at San Francisco, Cal., has invented a safety shield and signal for the protection of the markers stationed behind the targets at rifle contests. The markers are stationed in a bullet-proof house at the side of the target where there can be no possibility of injury, but if they should leave this shelter for any purpose whatever, a signal is automatically shown over the face of the target. The signal is operated electrically by the movement of the door of the shelter.