

LITERARY.

Dr. Haywood's Lecture.

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Mr. President, Ladies and Gentlemen:

If I should be so fortunate, in the remarks which I shall make this evening, as to persuade even a single individual among you to turn his attention to the study and investigation of natural history, or the operations of nature as displayed in her works, which surround us at every step we take upon the earth, I shall feel myself well repaid for the small amount of time and labor required in the preparation of this address.

I am, myself, well persuaded that the study of nature is calculated both to make us better and happier—to draw away the mind from the difficulties which are incident to life—from our own passions and the bickerings and strife of those whom we live—in short, from the artificial to the natural.

The most splendid conceptions of the human mind, when carried out by the most consummate art in the construction of any kind of fabric whatever, fall so incomparably short of the amazing perfection of all the works of the Great, from the greatest of which men have any knowledge, to the Moran, the ultimate point of animal existence, that those who closely compare them are astonished at the imperfections of all the works of men—and equally astonished at the perfect arrangement and beauty of the works of nature, and are irresistibly led to contemplate more or less, the great source and power from whence springs this perfection.

All nature, both animate and inanimate, is worthy of your study and investigation—for there is not a stone or pebble upon which you tread in your daily walks, which has not an interesting history, a history which the mineralogist and geologist are able to read. Not a plant or flower but has a secret history known only to the botanist—each beast, bird, fish, and insect, has also its history, which is read only by the zoologist, ornithologist, &c. Much of this knowledge is within the reach of all you who are young, and have sufficient energy and industry to occupy that portion of your time in study, which is usually wasted in idleness, or thrown away in pursuits wholly unprofitable.

I do not wish, by any means, to be understood as saying that your whole studies should be directed to the investigation of nature's operations, but that much of your time may thus profitably employed, and that any amount of knowledge thus obtained, is calculated in a great degree to refine our feelings and cultivate a charity of thought scarcely attainable by others.

I have never seen a lady with even a single pot of flowers, without having a better opinion of her; and I always associate with the love of flowers purity of thought, deep rooted affections and upright conduct.

Our associations are apt to give tone to our character and actions—and as there is perfection and beauty in all nature's works, that mind which is the most constantly active in their investigation, can scarcely be devoid of those great principles which adorn human nature.

I shall confine myself in the remainder of the remarks which I propose to make this evening, to the subject of VOLCANOES AND VOLCANIC ACTIVITY—THEIR CAUSES AND EFFECTS.

It will at once be obvious, that a subject of such vast magnitude and intricacy as this, would require a much greater period of time, for a thorough and minute examination, than has been allotted to me upon this occasion. Volcanoes would be required to describe all the causes, effects, and changes which have been produced in and upon the Earth by igneous agency during the long period which has elapsed since its creation; I shall therefore attempt to do nothing more, than give a mere outline of the causes of these phenomena, and a history of some of their effects upon the physical condition of the Globe. That we may the more clearly understand the subject, it will be necessary to make some inquiry into the past and present conditions of the Earth. It is now almost universally admitted by learned and scientific men, who have made the subject of geology the principal study of their lives, that at some former period, the whole of our globe was a liquid mass in a state of fusion, through which steam and gases were thrown off, when formed by the contact of water with the subterranean heat—and through which lava was forced in consequence of the subsidence of the crust which has sometimes disgorged. In 1660, the amount of lava was 20 times greater than the whole mass of the mountain; and in 1669, when 77,000 persons were destroyed, the lava covered 84 square miles. But the greatest eruption of modern times was from Skaptar Jokul in Iceland, in 1783. Two streams of lava flowed in opposite directions; one of them 50 miles long and 12 broad; and the other 40 miles long and 7 broad; both having an average thickness of 100 feet—which was sometimes increased to 500 or 600 feet. Twenty villages and 9000 inhabitants were destroyed.

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The amount of melted matter, ejected from Vesuvius in the eruption of 1777, was estimated at nearly 12,000,000 cubic yards; and in 1794, at a little over 22,000,000. It is evident, that volcanic cones vary in height from 600 feet, which is the height of Stromboli, to 17,730 feet, the height of Cotopaxi.

When nothing but aqueous and molluscid vapors have been emitted from a volcanic elevation for centuries, such elevation is termed a Solfatara—when they exist beneath the sea, they are called Submarine; when upon the land, Suberial.

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Volcanoes are frequently formed by volcanic eruptions. History abounds with instances of this kind. Such were Delos, Rhodes, and the Cyclades, situated in the Grecian Archipelago, and described by Pliny the naturalist, and other ancient writers. In modern times, small islands have risen—such as Sabina in 1811, which was 300 feet high, and 10 miles in circumference; and in 1812, a part of Caracas. About the same time numerous earthquakes agitated the valley of the Mississippi. They extended, if I remember rightly, over the whole valley—but were much more terrible from the mouth of the Ohio to the St. Francis; where numerous tracts were sunk and others raised, lakes and islands were formed, and the bed of the Mississippi was exceedingly altered. In many of the lake bottoms at that time, the forests are said to be standing as when they were first depressed, deep below the surface of the water; and when the water is clear and the air tranquil, great numbers of fish may be distinctly seen swimming about in the cane brakes and forests.

In 1819 the bed of the Indus, at its mouth, was sunk 18 feet, and the village and port of Soodree submerged. At the same time a tract of the delta of the Indus, 50 miles long and 16 miles in extent—800 to 1200 miles from the ocean.

The number of active volcanoes upon the globe is estimated at 303, by Girardin, and of the number of eruptions about 20 a year, or 2000 in a century.

Of these 303 active volcanoes, 109 are situated upon Continents, and 194 upon Islands—almost 2 to 1 upon the latter—hence it may be very rationally inferred that water acts a very important part in volcanic phenomena—indeed it is generally admitted that the immediate cause of an eruption is the expansive force of steam and water.

There are but few volcanoes which are constantly active; in most cases their operation is paroxysmal, and is succeeded by longer or shorter intervals of repose, varying from a few months to 17 centuries.

Hence some of the volcanoes, considered as extinct, may yet break forth, and show themselves to belong to the active class; for example, Chimborazo in Quito, Tacna in Peru, &c.

A volcanic eruption is commonly preceded by earthquakes in the vicinity; stillness of the air, and a sense of oppression, noises in the mountain, and the drying up of fountains. The eruption commences with a sudden explosion, followed by vast clouds of smoke and vapor, with flashes of lightning and showers of ashes and stones, and finally by red hot lava; which flows over the rim of the crater and spreads over the surrounding country.

Mr. Clark, as quoted by Mr. Lyell, in describing an eruption of Vesuvius, which occurred in 1773, says, "the point where the lava issued from an arched chasm in the side of the mountain, the vivid torrent rushed with the velocity of a flood. It was in perfect fusion, unattended with any scoria on its surface, or any gross materials not in a state of complete solu-

tion. It flowed with the transparency of honey, in regular channels, cut finer than art can imitate, and glowing with all the splendor of the Sun. Stones of 5 to 20 pounds in weight, thrown upon it, made no impression, but were carried off floating upon its surface." This lava, it will be seen, was in a state of perfect fusion, and therefore an exception to the general rule.

A few volcanoes have been constantly active ever since their discovery. They always contain boiling lava; and vapor and gases are constantly escaping. Stromboli is an example of this kind—and for the last 2000 years it has been unceasingly active. There are others of the kind, of which we may mention Popocatepetl, in Mexico, which is nearly 18,000 feet high. Ever since the conquest of Mexico, it has been pouring forth smoke.

But the most remarkable volcano upon the globe is said to be Kilauea, on the island of Hawaii, one of the Sandwich group. It is situated upon a plain 8 or 10,000 feet above the level of the ocean, at the foot of Mount Mauna. In approaching the crater it is necessary to descend two steep terraces, each from 100 to 200 feet high, and extending entirely around the volcano. The outer one is 20, and the inner one 15 miles in circumference. Arrived at the margin of the present crater, the observer has a view of the lake-shaped gulf, 1500 feet deep, at whose bottom, which is from 5 to 7 miles in circumference, the top being 8 or 10, is a vast lake of lava, in some parts molten, others covered with a crust; while in numerous places, some have noticed as many as 50) are small cones, with smoke and lava issuing out of them from time to time. Sometimes, and especially at night, such masses of lava are forced up, that a lake of liquid fire, not less than 2 miles in circumference, is seen dashed up its angry billows, and forming one of the most magnificent and thrilling objects ever witnessed by man.

A powerful eruption of this volcano took place in May and June 1840. For several years the great gulf had been gradually filling up, until it was not more than 900 feet deep. At length the lava found a subterranean passage, and flowed 8 miles under ground, when it reached the surface, and then advanced 32 miles farther, and for three weeks continued to pour into the sea a stream of red hot lava, with the most brilliant hissing and detonations.

From the facts which I have given in relation to volcanic eruptions, I think it will be perfectly obvious to you all, that the power which produces them must be deeply seated beneath the earth's crust, and independent of the mountain, for they often throw out more matter at a single eruption, than the whole mountain, if melted down, could supply.

Among the most prominent effects of igneous agency, we may mention earthquakes; of which it will be necessary to say something before closing this paper.

As the thickness of the crust increased, the presumption is that it acquired strength sufficient to sustain its own weight, until the liquid mass below, shrinking from the loss of caloric, was left between it and the crust, the latter of which, from its own weight, and the superincumbent waters, which must still have increased as the surface cooled, finally gave way and was precipitated upon the liquid fire, accompanied by the water, which of necessity was instantaneously converted into steam, and forced, with irresistible power along the surface of the fiery globe, in great waves, upheaving the solid earth, and causing it to shake and tremble as the aspen leaf, until some place less resisting than the rest was found, through which the pent up fire and steam rushed forth, the perfect "embodiment" of a VOLCANO.

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