HOW VOLCANOES MAKE COLD SUMMERS

The Startling New Discovery of Science That the Millions of Tons of Dust Thrown Up by Our Alaskan Volcano Katmai Spread All Around the World and Reduced the Sun's Heat 10 Per Cent in 1912

THAT cold years are due to volcanic dust is the curious discovery made by Professor C. G. Abbot, Director of the Astrophysical Laboratory of the Smithsonian Institution, of Washington.

His conclusions are published in a pamphlet called "Volcanoes and Climate," just issued by this institution.

From this it appears that the remarkably cool Summer which we experienced last year must be attributed to volcanic dust.

The professor made this discovery while observing the sun at Bassour, Algeria, for the purpose of comparing temperatures with those taken at Mount Wilson, California. He was working on the hypothesis that the amount of heat given off from the sun's surface varies in different years. While this hypothesis has not been disproved, it has been considerably modified by his recent observations.

He was puzzled to observe a very persistent reddish haze in the sky above Bassour. Observation showed that it could not be a vapor cloud. Reports from Mount Wilson informed him that a similar haze was visible there. Investigation proved that this could only be due to the tremendous eruption of Mount Katmai, near Alaska, which occurred on June 6, 1912.

A long series of intricate calculations indicated that the volcanic dust in the atmosphere reduced the amount of heat received from the sun by about 10 per cent. It would produce a fall of several degrees Fahrenheit—perhaps five or six—from the mean average temperature of the year.

"From our Bassour (Algeria) experiments," writes Professor Abbot, in his report, "including the measurements by two methods of the radiation of the sky, it appears that the quantity of heat available to warm the earth was diminished by nearly, or quite, 10 per cent by the haze. There is, however, some indication that this was in part counterbalanced by a decrease in the earth's radiation to space, caused by the haze."

One method of measuring the heat was by the spectro-bolometer, invented by the late Professor Langley. This instrument shows by spectroscopy the amount of heat abstracted from a pure ray of sunlight by the atmosphere and all the substances in it.

Professor Abbot calculated that the amount of heat ordinarily lost in Summer by radiation to space was 0.05 calories per square centimetre per minute, while during the prevalence of the volcanic dust it was 0.28 calories, showing a loss of 0.20 calories to the earth through this cause.

Volcanic dust now appears to be the chief factor in causing cold years. Hitherto the variation in sun spots has been regarded as the determining factor. The sun spots go through an eleven-year cycle of increase and decrease. It has been noticed that there is a fall from the average temperature at the point of maximum sun spots. The year 1912, however, was not a year of maximum sun spots, and this strengthens the evidence that the fall of temperature was due to volcanic dust. The fall was much greater than has usually been found to occur in years of maximum sun spots.

The loss of heat is, of course, due to the interposition of a layer of minute floating solid particles which prevent a certain proportion of the sun's rays from reaching the earth.

The effect of the volcanic dust is very much intensified if it prevails shortly before the beginning of Winter or just after that season. In that case it would cause an abnormal accumulation of ice and snow and an unnatural prolongation of Winter. Fortunately, this coincidence did not occur in 1912. Volcanic dust clouds may prevail for many months, and it seems quite possible that if they should come at the end of a long and severe Winter they might create a practically all-the-year Winter.

That would be a calamity of worldwide magnitude. It would mean the failure of the crops over the whole of the United States and all the temperate regions of the earth.

It seems clear from Professor Abbot's observations that there is no form of terrestrial disturbance which is so farreaching in its effects as volcanic dust. Within a week or less of a great volcanic eruption in America the dust is observed in Europe. The dust often travels at a speed of forty miles an hour, or 960 miles a day. That means that in fifteen days it will have gone half way around the world.

From the moment of the eruption the effect on o ur climate begins to be felt and in less than a month that of the whole world shows the influence of the disturbance.

We should remember that even at ordinary times a large proportion of the sun's heat and light is lost to us. We should perish instantly if we were exposed to the unfiltered heat of the sun. It is the reflection of the sun's light from particles of dust and water vapor that gives us the beautiful and welcome phenomenon we call the sky. In so-called cloudless countries the sunlight is very difficult to endure, and even there the atmosphere is by no means free from particles of dust and water vapor.

When, however, the atmosphere is filled with an almost continuous pall of red dust, the dilution of the sunlight is carried much farther than is agreeable or healthy. Such occurrences suggest the possibility that they may some day take a much more alarming form than they have yet done. The material thrown up by the volcanoes varies very much in composition. Is it not possible that through certain chemical combinations, and the composition of the earth where the eruption occurs, the material ejected may take the form of a heavy poisonous gas?

How the Great Alaskan Volcano Katmai Threw Up Millions of Tons of Ashes Which Drifting Around the Earth in the Highest Stratum of Our Atmosphere Formed a Barrier to the Sun's Rays, Threw Ten Per Cent of Its Heat Back Into Space and So Caused the Cold Summer of 1912.

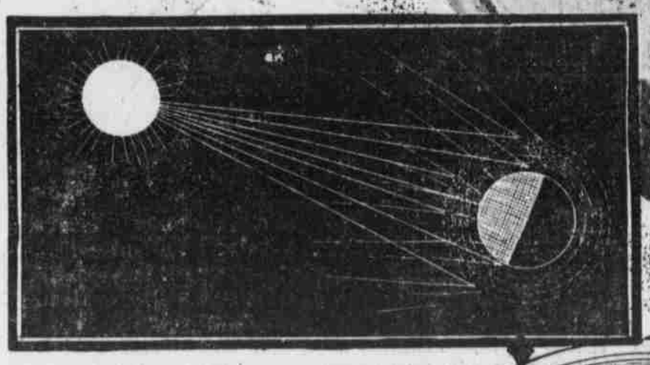

Diagram Illustrating How the Tiny Particles of Dust Thrown Up by Volcanoes Obstruct the Sun's Rays and Turn One in Ten Back Into Space, Depriving Earth of That Much Light and Heat.

Now the ability of one volcano to throw a shower of solid particles over more than half the earth's surface has been amply demonstrated. If this material should be changed into a poisonous gas it would extinguish the life of most, or perhaps all, of the human inhabitants of the globe. It is evident that science is increasingly disposed to accept the probability of such a catastrophe occurring from one cause or another.

Bodies Covered with Volcanic Ash After the Disastrous Eruption of Mont Pelee, in Martinique.

The 1912 Eruption of the Volcano Colima in Mexico. The Enormous Club-Shaped Cloud Shown Rises 17 Miles High in Air. It Is Composed Mainly of Particles of Dust, So Small That They Drift for Months in the Higher Air, Being Held Up by the Denser Air Below.

After observing the presence of dust from Mount Katmai in tremendously separated parts of the world, Professor Abbot made a study of the temperature in connection with all periods of great volcanic activity during the past century. He found that in every year of great volcanic activity there had been a less than normal temperature. He also found that in all these years there were reports of "hazes," "dry fogs" and curious atmospheric disturbances in places far apart. The relation of these to one volcanic centre was not generally understood and their effect on climate was entirely overlooked.

There were periods of diminished heat from 1883 to 1887, from 1888 to 1892, and from 1902 to 1904. These were all periods of great volcanic activity. The last named period, for instance, was begun by the terrible eruption of Mount Pelee, on the Island of Martinique, which was followed by that of La Soufriere on the Island of St. Vincent.

Professor Abbot has collected an impressive mass of facts showing the stupendous quantities of material thrown up by volcanoes. We are impressed by the historical fact that Pompeii and Herculanium were buried under a shower of lava, mud and ashes from Vesuvius, but that is only an imperfect indication of the power and activity of a volcano, for those towns are but a mile or two from the crater.

One of the greatest eruptions on record is said to have been that of Mount Asamayama, in Japan, in 1783. The matter it threw up formed an island in a river which is shown at the present day. The dust darkened the air for months and was observed in many parts of the world, although its source was not recognized. That was an exceptionally cold year.

That year was marked by an eruption of nearly equal violence to that in Japan. This second eruption occurred at the volcano of Shaptar Jokull, in Iceland. Half a mountain was blown away by this eruption.

The dust thrown up by these eruptions was noticed all over Europe and in parts of Africa. It was described in many places as "a dry fog," and the idea that it was a fog coincided with the coldness of the weather. Benjamin Franklin, our earliest American scientist, who was in Paris at the time, commented on the presence of this peculiar haze and the annoyance it caused him. He attributed an attack of bronchitis to it.

The year 1883 was remarkable for great volcanic disturbances, and at that time the extraordinarily wide distribution of the dust was noticed. Around Babujan, in Southeastern Asia, the sun was hidden for three weeks. There was no thickness of the atmosphere at the surface of the earth, the obstruction being high up in the air.

When the darkness cleared somewhat the sun appeared green, although at other times volcanic dust has been found to be purple. A tremendous eruption occurred at Krakatoa, in the South Pacific, in the same year and was attended by similar phenomena. The dust reached Europe within ten days and caused considerable obscuration of the sun.

The eruption of Krakatoa is regarded as one of the most terrible in history because 40,000 persons lost their lives in it. The eruption blew away nearly half the island and crevices a thousand feet deep were left where once there had been mountains.

The report was heard 3,000 miles away and the darkness caused by the dust extended over 720,000 square miles.

Many remarkable eruptions escape notice because they are not attended with great loss of life or damage to property. An eruption in Guatemala in 1902 spread ashes over an area of 125,000 square miles. The dust cloud above the crater was eighteen miles high, a very significant indication of the force of the eruption.

Although the eruption of Mount Katmai has attracted comparatively little attention, because it occurred far away from thickly peopled regions, it was, nevertheless, of a most tremendous character. There is every reason to believe that the eruption of Mount Pelee, which caused such universal distress, was but a trifling natural disturbance compared to that of Mount Katmai. This latter eruption deposited a foot of ashes a hundred miles away. When it is remembered that this deposit was spread for at least that distance in every direction the enormous quantity may be gauged.

The column of dust above the crater was estimated to be thirty miles high. The United States revenue cutter Manning witnessed the eruption from a distance of 100 miles from the volcano. The sky became completely dark for twenty-four hours and the deck was piled up with volcanic dust to such a depth that the men had great difficulty in freeing the ship from the burden.

The dust was observed by Professor Abbot in Africa, 6,000 miles away, eleven days after the eruption, and at Mount Weather, Virginia, 3,700 miles away, within four days. It was not seen at Mount Wilson, California, 2,500 miles from Katmai, until fifteen days after the eruption, because the prevailing air currents do not blow in that direction. The dust moves with the upper air currents.

How "Squaw Men" Add to England's Woman Troubles

THE Fabian Society of England—of which George Bernard Shaw is the distinguished head—is taking a census of the growing army of "Squaw Men" in that country—husbands who loaf while their wives labor to support them. The suspicion is that the rapid increase of this type of male creature is largely responsible for the growing violence of militant suffragettism.

Mrs. C. M. Wilson, of the Fabians, who is investigating the matter, has this to say:

"The object of the Fabian women's group is to study as thoroughly as possible the economic position of women in this country.

"So little is known at present about the number of wage-earning women who support others that we are making special inquiries into the subject.

"I have as yet no definite figures, but I should say that there are many thousands of women in this country who support husbands or other relatives.

"These women are to be found among all classes and in all professions and trades. Some of these wives are skilled workers, and take up their position as bread-winners quite cheerfully.

"It is very difficult to ascertain details of the better class homes where husbands, for some reason or other, are supported by their wives.

"Among poorer people, however—particularly in the districts around the East London docks—I know there are hundreds of cases where the wife is the wage-earner of the home.

"The numbers of women who work to support not only husbands but fathers, mothers, sisters, brothers and other relatives, must be amazing!

"I have heard of poor little domestics who have given away nearly all their money every month to keep some home going, while there are numerous instances of elder sisters who have bravely gone out to business in order to bring up a troop of small brothers and sisters.

"Women workers with idle or invalid husbands have practically the same financial responsibilities as a man, and are looked upon by the State as the official wage-earners."

According to the statistics issued, and assuming the economic conditions to be unchanged, New York, it is claimed, will contain 1,500,000 women workers and 300,000 husbands and fathers of families of the idle, never-work class by the year 1931.