

ART. LXII.—*On the recent Eruption of Kilauea*; by W. T.  
BRIGHAM.\*

I PRESENT herewith my report on the changes that have taken place in the crater of Kilauea during the past month.

The last week of February, I found the crater in a state of intense but not extensive activity. During the seven months that had elapsed since my last visit, the depressed area of 1885 had been filled to a height of nearly 150 feet, and there were

\* Report to Prof. Wm. D. Alexander, Surveyor General, dated Honolulu, H. I., April 8th, 1891.

indications that the entire floor of the crater, which has long been domed, had been elevated to some undetermined extent. One indication of this was seen in the great crack which extends across the trail near the eastern edge of the crater. This crack had closed nine inches.

The peaks that have long been an interesting feature of the fire area, as well as a land mark for the whole crater, had risen with the tide, and now towered at least 200 feet above the pools of liquid lava at their feet. Seen from the Volcano House, one-third of their total height was above the outer western wall. Their structure was loose, and so much smoke or sulphurous fumes escaped from almost their entire surface that it was not safe to attempt the ascent. On all sides they were surrounded by cones, generally hot and ejecting lava spatters. These cones were, in at least two cases, high up on the side of the main peaks, and exactly resembled the "Hornitos" of Humboldt. Several of the cones could be approached closely enough to throw blocks of lava into the oven door. One large cone of a group of three had become extinct, and one-half had fallen in fragments, showing the smooth inner walls, and the exceedingly superficial nature of its action. The wind was southerly, and it was therefore easy to go to the south and west of the fire area. Southeast of this was an extensive lava flow, covering some six acres, and proceeding from the base of a cone. To the southward of this a previous flow had formed a high ridge of "*a-a*."

West of the peaks was the most active portion, while in July the active lake was on the southeast side. The northern pool was the largest, of an irregular shape, having a promontory extending a third of its diameter from the middle of the western side. Its diameter, north and south, may have been 250 feet, and the banks were of unequal height but averaged fifteen feet above the lava surface. The next pool was the smallest, but the most active, and was 500 feet south of the first. Its diameter was less than one hundred feet, but the banks were overhanging. The third pool was near the last and intermediate in size.

All these pools were seemingly on a level, and were in my opinion connected; the crust intervening being not more than fifteen inches thick, and quite hot, although all the neighborhood was covered with a thick coating of "Pele's Hair," a good non-conductor. The usual intermittent action was no longer there: the surface had no time to cool, and no crust was allowed to cover the surface. From all the pools spatters of considerable volume were thrown on to the surrounding banks, and the direction of these jets was very peculiar. The molten lava was thrown obliquely, and the bright matter de-

scribed figures not unlike an interrogation point; the plane of these figures was quaquaversal.

There was remarkably little sulphurous vapor, and the absence of steam would have puzzled those geologists who impute to its agency the volcanic action. Outside of the crater, however, steam was issuing in several places; among these, the top of the wall near the Kau trail; the eastern wall between the two lateral craters; and the depressed wall between the main crater and Kilauea-iki.

As we left the pools in the evening, it was noticed that a cone some fifty yards west of the southern lake was sputtering in a very excited manner, and at 2 o'clock the next morning we saw it from the house spouting lava to an estimated height of twenty-five feet, while detached spatters were thrown twice that height. At 8 o'clock, when we left the crater, the fire fountain was still bright in the full morning light. It seemed to flow as freely as an uncapped artesian well.

This was nearly the condition of the crater a week later, when on March 6th, 1891, at 9.30 P. M. a slight earthquake was felt at the Volcano House, and the cones settled slightly. The next morning the peaks were out of sight. At Punaluu stronger earthquakes were felt, and at the Half Way House, the ground was in a continual tremor for some time; 300 shocks were counted in one night, but no accurate record was kept.

On the 2d of April, at your request, I visited the crater again and found the following condition of things. From the house the absence of two landmarks,—the peaks and the column of smoke, was at once noticed, and as night fell the accustomed look toward Halemau mau met not the slightest glimmer of light; all was as cold and dead as the grand old dome of Mauna Loa ten thousand feet above it.

The next morning the yawning pit was clear cut as seen from the house, and only a pale bluish smoke arose from its lips. Beyond, to the southward, was a white smoke that rose and fell, but was not of considerable extent. On descending into the crater the crack was found unchanged. Many smaller cracks intersected the trail, especially towards the middle of the crater, but the condition of the stone monuments on the Rock called the "Half Way House" showed conclusively that there had been very little disturbance in the crater itself: not one of the stone piles had been upset. The lava flow noticed on the previous visit was still warm, and on the borders of the depression was red hot. The entire fire area was gone. Peaks, cones and pools had vanished, and in their place was a pit

crater of elliptical outline, 2500 by 3000 feet, the major axis being nearly east and west. The walls were perpendicular and quite impassable. The estimated depth was 500 feet. There were many concentric and radial cracks making it dangerous in many places to approach the edge. Almost all the smoke proceeded from the hot upper crust of the border, none came from the bottom; and while every portion of the pit was clearly seen, the heated air constantly rising from the border made photographing a partial failure. Portions of the cracked lips had sunk, leaving steps toward the pit. There was a complete absence of any black in the walls or bottom; all shades of brown, red and yellow, but generally light: not in the least dismal or fresh looking, except for size, it looked quite like Mokuaweoweo, and might have been as old. The walls were in remarkably even layers; no cavities, dikes or great irregularities were to be seen. It was a wall of masonry whose cement time had crumbled, and it would hardly have seemed out of place had some vine trailed its festoons down the courses. The bottom was a confused mass of lava blocks of the same color as the walls, and was deeper at the west side. The impression was that the top of the peaks was there.

Owing to the bad arrangements of the Inter-Island S. N. Co. we were hurried away at daybreak the second morning, and so had no opportunity to photograph from the western wall, nor to take the desired measurements. The location is however settled with sufficient accuracy as the whole area covered by the last break-down and the pool to the eastward as well.

No word could be heard of any surface flow "*makai*" (seaward) of the crater, but from the steamer as we left Punaluu Saturday afternoon, a dense smoke was seen midway between Kilauea and the sea, which might have been a forest fire, or an outbreak.

It is useless to speculate as to the return of the fires: the present condition of the pit precludes any approach to them were the bottom dotted with fire-pools. In 1886, the wall was sloping on one side at least, affording access to the bottom. Any earthquakes may however topple down enough of the present wall to make a descent possible and the fires may be visible in a week or not for months. In its present condition Kilauea is most interesting to geologists, as in the walls of its included pit is an epitome of the formation of the mountain itself, a clean-cut section of 500 feet.