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E. P. Leavitt, Superintendent      John E. Doerr, jr, Park Naturalist

TABLE OF CONTENTS

The Footprints in Kau

by the Park Naturalist

Page 52

"Mark Twains" Strange Dream

by Mark Twain, from the  
Volcano House Records

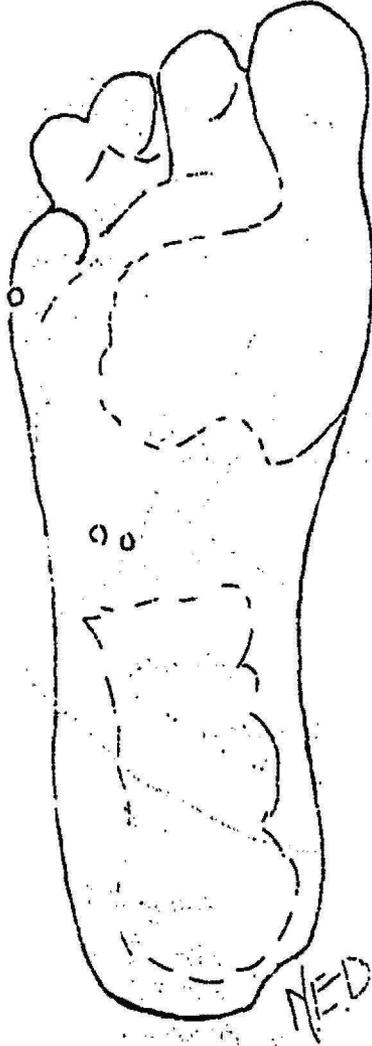
Page 56

Volcanic Excitement

by the Park Naturalist

Page 58

## THE FOOTPRINTS IN KAU



When Captain James Cook discovered the Hawaiian Islands in 1778, Kalaniopuu was king of the island of Hawaii. Kalaniopuu reigned as king of the island until his death in 1782. Before his death he provided that his son, Kiwalao, should succeed him as king of the island. Kalaniopuu gave to his nephew, Kamehameha, the powers of high chief over the districts of Kona, Kohala, and Hamakua. These districts include the western and northern parts of the island as indicated on the map on page 53.

Soon after Kiwalao assumed the duties of king of Hawaii, his half-brother, Keoua, showed dissatisfaction with the divisions of power and land made by the late king. With the help of the new king, Keoua led forces against Kamehameha. In a battle fought at Mokuohai, Kiwalao was killed. Keoua fled to Kau, the district on the south side of the island, and there declared himself king of the island of Hawaii.

Skirmishes between Keoua and Kamehameha continued until 1790. During that year Kamehameha invaded the island of Maui. With the help of cannon furnished by white men, he gained several victories over the Maui warriors.

During Kamehameha's campaign on Maui, Keoua and his forces overran north Hawaii. Hearing of Keoua's activities, Kamehameha returned to Hawaii and succeeded in driving Keoua from Hamakua to Hilo. While in Hilo, Keoua divided his lands among his chiefs and prepared

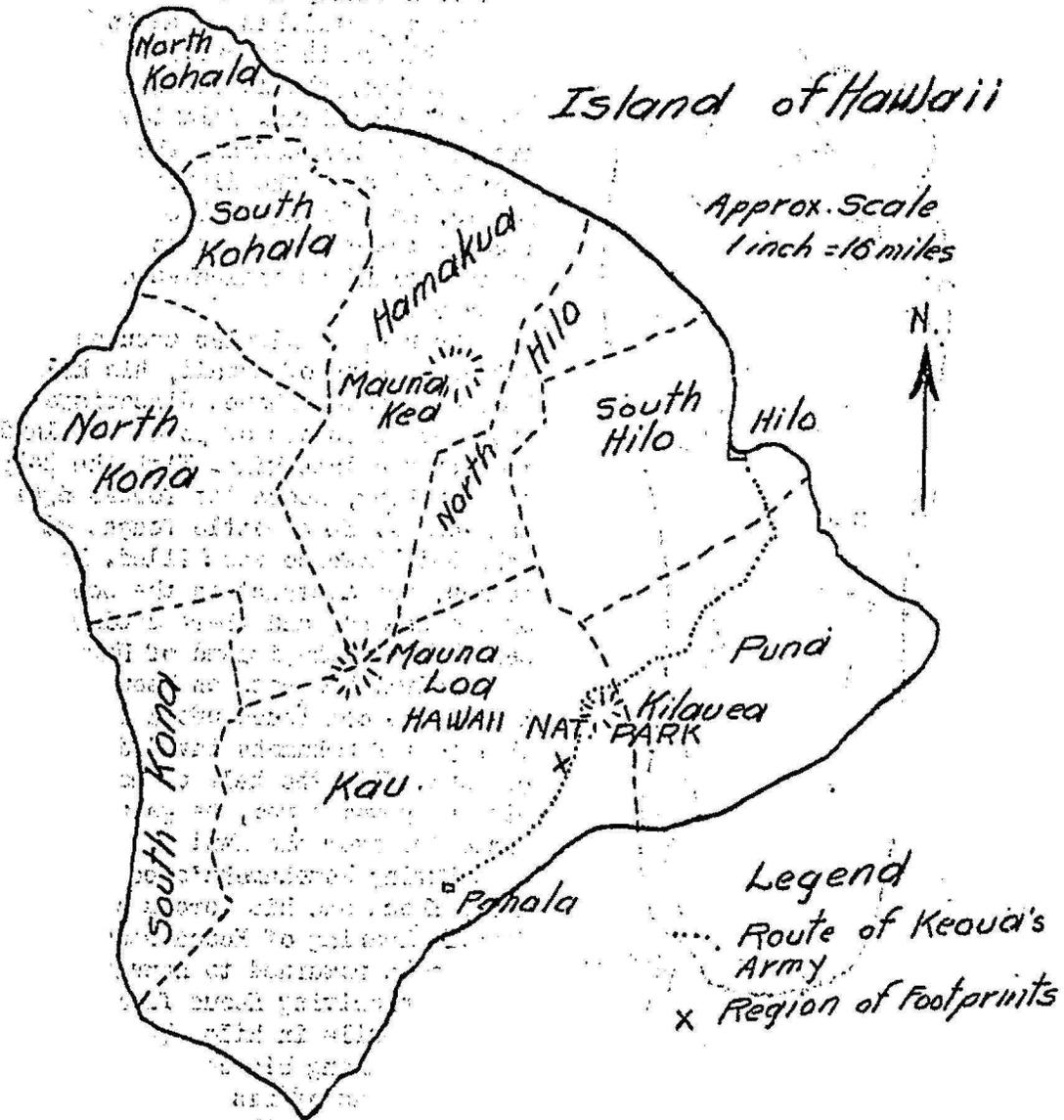
to move southward to Kau with three divisions of his army. The three divisions set out for Kau over what was known as the overland route, a route leading passed the volcanic crater of Kilauea. To-day the around-the-island road from Hilo, through the National Park, to Pahala follows essentially the route taken by Keoua's army.

The overland route proved to be a disastrous one for Keoua and his followers. While in the region of the crater of Kilauea, the volcano suddenly erupted with a violent explosion. Great quantities of rock and ash were thrown into the air; falling to earth these volcanic products killed everyone (about eighty people) in one division of Keoua's army.

The accounts of this disaster vary somewhat. In the "Journal of William Ellis"\* the disaster is described as taking place at night

\*Ellis, William, Journal of, A Narrative of a Tour Through Hawaii in 1823, Honolulu 1917.

while the army was camped near the volcano. Other accounts indicate that the first division of the army had safely passed the volcano and that the explosion occurred while the second division was passing through the vicinity of the crater.\*



The footprints preserved in the volcanic ash of the 1790 explosion are evidence of the fact that the army of Keoua was on the march when the explosion took place. The footprints, preserved in the ash for one hundred and forty-one years, silently tell many things outstanding among which is that they were made by highly excited people wandering around - lost in the darkness of the falling volcanic ash cloud. Some of the footprints tell a story of a mother looking for a lost child; of children running to keep up with their parents, of people stumbling and falling in the ash. These footprints are evidence that entire families accompanied the warriors on the march for one can distinctly see the footprints of men women and children. The imprints of shoeless

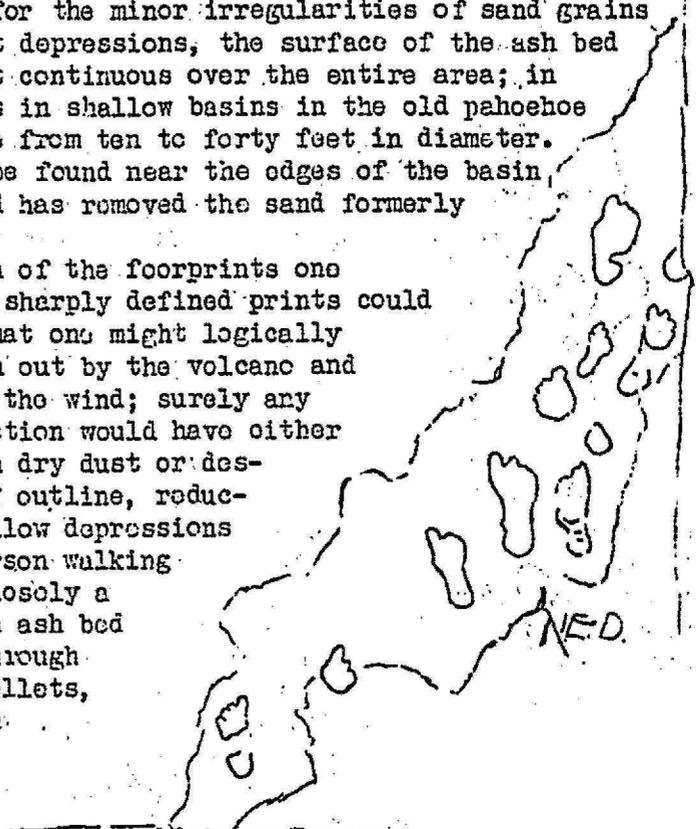
\*Taylor, Albert P., Under Hawaiian Skies, A Narrative History of Hawaii. Honolulu, 1926.

feet tell of many torturous journeys over hard lava surfaces; one can distinguish the deformities of the feet of people who did not know the use of shoes.

Keoua's greatest loss during the disaster was probably not in terms of the number of people killed but rather in terms of the destroying of his people's faith in his cause. Armies and nations at war have a faith in a supreme power and trust that their supreme power is on their side. Keoua and his followers certainly had faith in Pele, their Hawaiian Goddess whose temple is the fire-pit of the volcano. To have their Goddess suddenly appear as the smoke, fire, thunder and ashes of the eruption and destroy part of their people must have been a strong indication to many that Pele did not approve of their cause; at least it was evidence to Kamehameha that Pele, the Goddess of Volcanoes, was on his side.

The footprints made by the second division of Keoua's army may be seen to-day along the National Park's trail which leads from the Kau road (nine miles south of the park headquarters) to the Mauna Iki lava flow of 1920. The footprints are preserved in a bed of buff-colored, silty, clay-like volcanic ash. The bed has an average thickness of  $1\frac{1}{2}$  inches. This particular bed of ash represents the finer materials thrown out during the early stages of the 1790 explosive eruption of Kilauea. Beneath it are from one to three feet of coarse sand or rocky ash resting on a very slightly weathered pahoehoe (smooth) lava surface. When dry the clay-like bed of ash is brittle, breaking like polygons of sun-dried clay; moisture reduces the brittleness of the bed to a condition of crumbling under the pressure of one's fingers. Except for the minor irregularities of sand grains and the shallow footprint depressions, the surface of the ash bed is smooth. The bed is not continuous over the entire area; in most cases the bed occurs in shallow basins in the old pahoehoe surface. These basins are from ten to forty feet in diameter. The best footprints can be found near the edges of the basin structures where the wind has removed the sand formerly covering the ash bed.

On first examination of the footprints one wonders why and how such sharply defined prints could have been preserved in what one might logically think was dry dust thrown out by the volcano and carried several miles by the wind; surely any post-depositional wind action would have either obliterated footprints in dry dust or destroyed their sharpness of outline, reducing them to the mere shallow depressions such as are made by a person walking in dry sand. Examining closely a cross-section of the thin ash bed one finds disseminated through it small, well rounded pellets,  $1/16$  to  $3/8$  of an inch in diameter, composed of the same material as the matrix of the bed.



itself. When wet the pellets crumble easily in the fingers.

These pellets are called "Pele's Tears"; like the footprints, they tell one something of what was happening during certain stages of the eruption. They tell one of the rain that fell during the explosion. The finer particles of ash drifting in the air collected in the raindrops hence one might picture a precipitation not of drops of rain but rather drops or pellets of ash or mud.

The moisture of the rain gave to the clay-like ash bed a consistency comparable to that of mud wet enough to take an impression of one's foot, yet dry enough to retain the sharp outline of the impression.

The footprints are in what is called the Kau Desert, on the lee side of the island of Hawaii, six miles southwest of the crater of Kilauea. Realizing that the Kau Desert is a region of strong winds, little rain and scant vegetation, one might be skeptical about the footprints being made as long ago as 1790, particularly when one considers the probable wind abrasion that has gone on in the area; however, when one realizes that the foot-printed ash bed was buried beneath beds of ash deposited during the later stages of the explosion, one's skepticism is soon forgotten. The ash beds deposited over the footprints have protected them from wind and water abrasion. The footprints that can be seen to-day are those that have had their protecting cover removed by wind action during the past few years.

The sketches of the footprints in this article were made from actual footprints which can be found in the Kau Desert area of the park. The sketch at the beginning of the article (page 52) was drawn  $\frac{1}{2}$  natural size; the actual impression measures  $10\frac{1}{2}$  inches from heel to toe and 4 inches across the ball of the footprint. The sketch on page 54 shows a group of footprints made by various people all of whom were traveling in essentially the same direction or southwest away from the crater of the volcano. The impression showing the ball and toes of a right foot suggests a man running; the

impression of the left and next footfall of the man has been obliterated or is covered by course sand.

On the outcrop sketched on the opposite page one can distinguish the footprints of probably five individuals four of whom were moving north-easterly toward the crater, the fifth was moving in the opposite direction away from the volcano. The figures at the side of the sketched impressions indicate the footprints evidently made by the same person.

Number one's (both left and right) feet measure 11 inches from heel to toe and  $4\frac{1}{2}$  inches across the ball of the impression. Number two's feet (probably the footprints of a woman) measure  $7\frac{1}{2}$  by 3 inches. Number three's imprint, (of which there is only one) measures 9 by  $3\frac{1}{2}$  inches; number four's impression measures 10 by 4 inches; and number five's footprint, also only one impression, measures 10 by  $4\frac{1}{2}$  inches.

Seeing these footprints and realizing the fear that native Hawaiians had of Kilauea, the home of the Goddess of Volcanoes, one can easily picture the warriors and their families frantically trying to free themselves from the falling blanket of death, a cloud-blanket which they knew was the anger of the unforgiving Goddess Pele.

by the Park Naturalist  
John E. Doerr, jr.

"MARK TWAINS" STRANGE DREAM  
Concluded

"As I walked along, I even half expected to see my solemn guide step out from the nook in the lofty wall, and beckon me to come on. At last when I reached the place where I had first seen him in my dream, I recognized every surrounding object, and there, winding down among the blocks and fragments of lava, I saw the very trail I had traversed in my vision! I resolved to traverse it again, come what might. I wondered if in my unreal journey I had 'blazed' my way, so that it would stand the test of stern reality, and thus wondering, a chill went to my heart when I came to the first stony projection I had broken off in my dream, and the fresh new fracture, and the dismembered fragment lying on the ground! My curiosity rose up and banished all fear, and I hurried along as fast as the rugged nature of the trail would allow me. I looked for my other 'blazes' and found them, found the cleft in the wall; recognized all its turnings, walked in the light that ascended from the glowing furnaces visible far below; sweated in the close hot atmosphere, and breathed the sulphurous smoke. I at last stood hundreds of feet beneath the floor of Kilauea, in the ruined chamber, and in the presence of the mysterious boulder!

"'This is no dream' I said, 'this is a revelation from the realm of the supernatural; and it becomes not me to longer reason, conjecture, suspect, but blindly to obey the impulses given me by the unseen power that guides me.' I moved with slow and reverent step toward the stone and bore against it. It gave perceptibly to the pressure. I brought my full weight to bear and surged against it. It yielded again but I was so engulfed by the toilsome journey that I could not overthrow it. I rested a little and then raised an edge of the boulder by a strong steady pressure, and placed a small stone under it to keep it from sinking back into its place. I rested again and then repeated the process. Before long I had added a third prop, and had got the edge of the boulder considerably elevated. The labor and the close atmosphere together was so exhausting, however, that I was obliged to lay down, then, and recuperate my strength by a short season of rest. And so, hour after hour I labored, growing more and more weary, but still upheld the fascination which I felt was infused into me by the invisible powers whose will I was working.

"At last I concentrated my strength in a final effort and the stone rolled from its foundation.

"I can never forget the overpowering sense of awe that sank down on my spirit at that moment. After a solemn pause to prepare myself, with form and uncovered head, I slowly turned my gaze till it rested on the spot where the great king had laid.

"THERE WASN'T ANY BONES THERE!

"I just said to myself, 'Well if that ain't the blamedest, infernalist swindle that ever I've come across'.

"You can't bet anything on dreams.

The End.

The original of "Mark Twains Strange Dream" may be found in the volume of the "Volcano House Visitors Records", dated 1865 to 1873. The original article in the record book of visitors is written in ink and was signed by Mark Twain. Unfortunately some collector of autographs has removed the portion of the page containing the signature of the famous writer.

In view of the torn edges of the pages on which the original of the story appears, it has been necessary to supply in a few places the missing words, just as you have had to guess at parts of words in reading the story in Nature Notes.

The editor of Nature Notes wishes to thank Mr. J. N. Gandy, Manager of the Volcano House, for the use of the visitor's records containing the interesting story of "Mark Twains Strange Dream".

by the Park Naturalist  
John E. Doerr, jr.

## VOLCANIC EXCITEMENT

About the time this issue of Nature Notes should have come off the mimeograph press housed at Uwekahuna Bluff, a high bluff overlooking the crater of Kilauea, "The Volcano", (meaning Kilauea) suddenly became active. If you have witnessed Kilauea as an active volcano you will fully appreciate why the work on Nature Notes was suddenly postponed. The desire to see the eruption from all points of observation and during all hours of the day and night was too great. The December issue was pushed aside in the excitement of the volcanic activity. It was not the excitement of getting away from Kilauea but rather the excitement of getting as close to the active fire pit of the crater as possible, the excitement of conducting visitors across the crater floor at night and assisting people in gaining a full appreciation of the volcano and surrounding region.

Letters from friends who have as yet not seen Kilauea express sympathy for the people living in the region of the volcano. The sympathy should be envy for to-day volcanic activity in Hawaii is a time of great rejoicing. Eruptions bring special steamers and airplanes from Honolulu to Hilo. Hundreds of cars bring thousands of people to the very rim of the fire pit and among them there is no one who has the slightest fear of danger or destruction as they stand on the rim and look down to the spraying fountains sending great, fiery red, molten lava streamers arching through the air - streamers which rise two hundred, three hundred feet and then fall back with a splash into the molten lava lake at the bottom of the fire pit.

Only twice in Kilauea's history have eruptions made approach to the fire pit dangerous; once in 1790 and again in 1924. Explosive eruptions such as occurred in 1790 and 1924 are not at all common for the type of volcano existing in Hawaii. Even the 1924 explosive eruption attracted thousands of people to the outer rim of the crater. It is true that periods of volcanic activity are generally preceded by earth tremors but they are neither dangerous nor destructive; and too, during stages of an eruption sulphur fumes do issue from the fire pit of Kilauea but even they can be avoided by those approaching the pit. The dependable northeast trade winds carry the fumes over the desert section of the park, a treeless, uninhabited region.

Answering questions - there were hundreds of them - added to the joyous excitement of the eruption. Visitors at an active volcano can ask more questions than a college professor quizzing his class on the facts absorbed during a year course in geology. Like some of the professor's questions, it was not always easy to determine just what information was wanted. There were questions which amused, questions which human knowledge can not answer, questions which could be answered by a "Yes sir" or a "No ma'am", and questions requiring lengthy explanations of geology.

To a National Park Service man a question represents a park visitor's desire for information. Park Service men welcome questions. To answer questions is to render service to park visitors. By asking questions visitors not only obtain information but also help the park staff in giving better service. The holiday activity of Kilauea proved to Hawaii National Park's staff that there is nothing more exciting than rendering service during a period of volcanic activity.

by the Park Naturalist