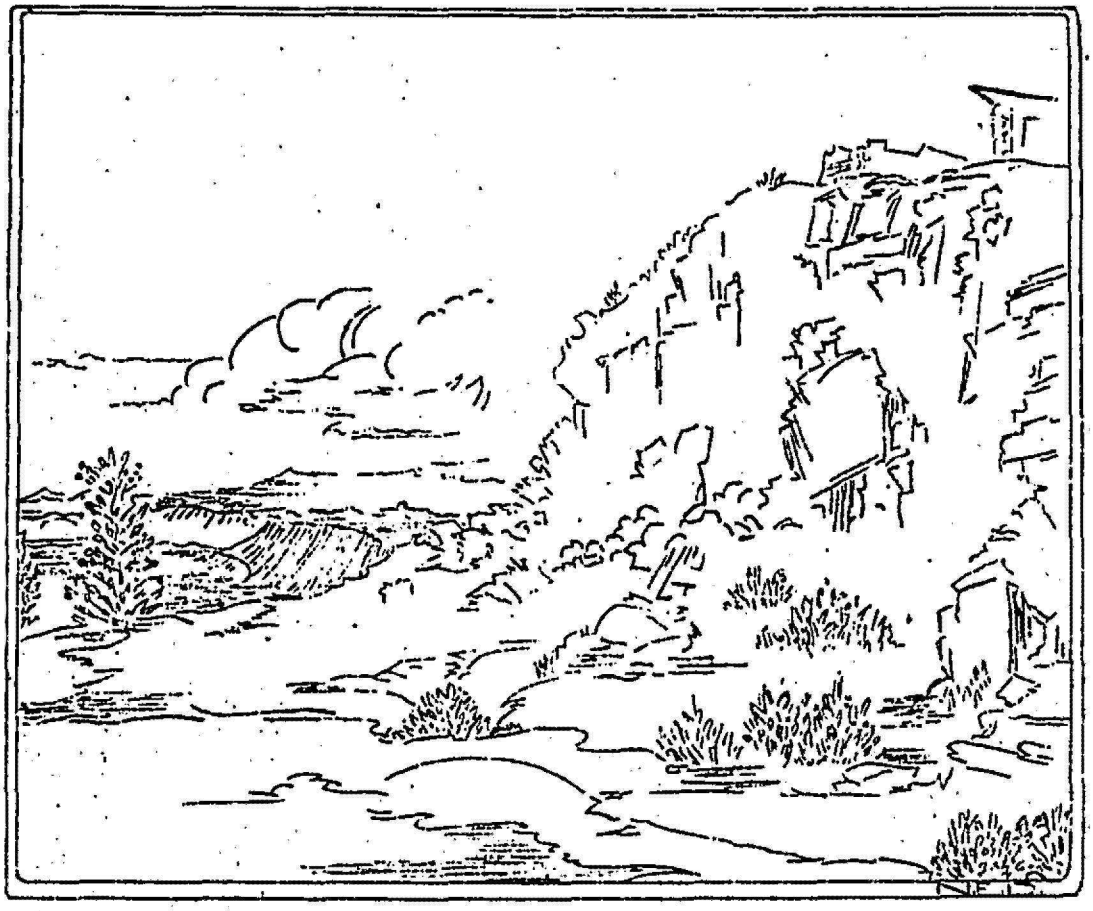
Nature Notes



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UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

HAWAII NATIONAL PARK
NATURE NOTES

Volume II January 1932 Number 1

Nature Notes from Hawaii National Park is a monthly pamphlet edited by the Park Naturalist and distributed to those interested in the natural history of the park. Free copies can be obtained through the office of the Park Superintendent, Hawaii National Park, Hawaii. Anyone desiring to use articles appearing in Nature Notes may do so. Please give credit to the pamphlet and author.

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

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THE CHAIN OF CRATERS

Preface

In preparing this article on the Chain of Craters the writer has made use of data published in "The Volcano Letter" of the Hawaiian Volcano Research Association whose scientific laboratory is located on the north rim of Kilauea crater in Hawaii National Park. The data referred to appears in numbers 173, 319, 324, and 329 of "The Volcano Letter". The writer hopes that this article will give the readers of Nature Notes not only an explanation of the formation of the Chain of Craters but also an introduction to the many interesting natural features of the area which will be described in future issues of this pamphlet.

Location of the Craters

Park visitors driving easterly from the summit crater of Kilauea have an opportunity to see along the Chain of Craters Road a series of volcanic pit craters. These pits - one of which is almost 1000 feet deep - are frequently thought of as existing only within the boundaries of the National Park but actually the line of craters or pits extends from the summit of Kilauea to the east point of the island of Hawaii. Green Lake near Kapoho in the Puna district occupies one of the most easterly of the craters in the chain. Figure 1 at the bottom of this page shows the location of the chain of craters within the park.

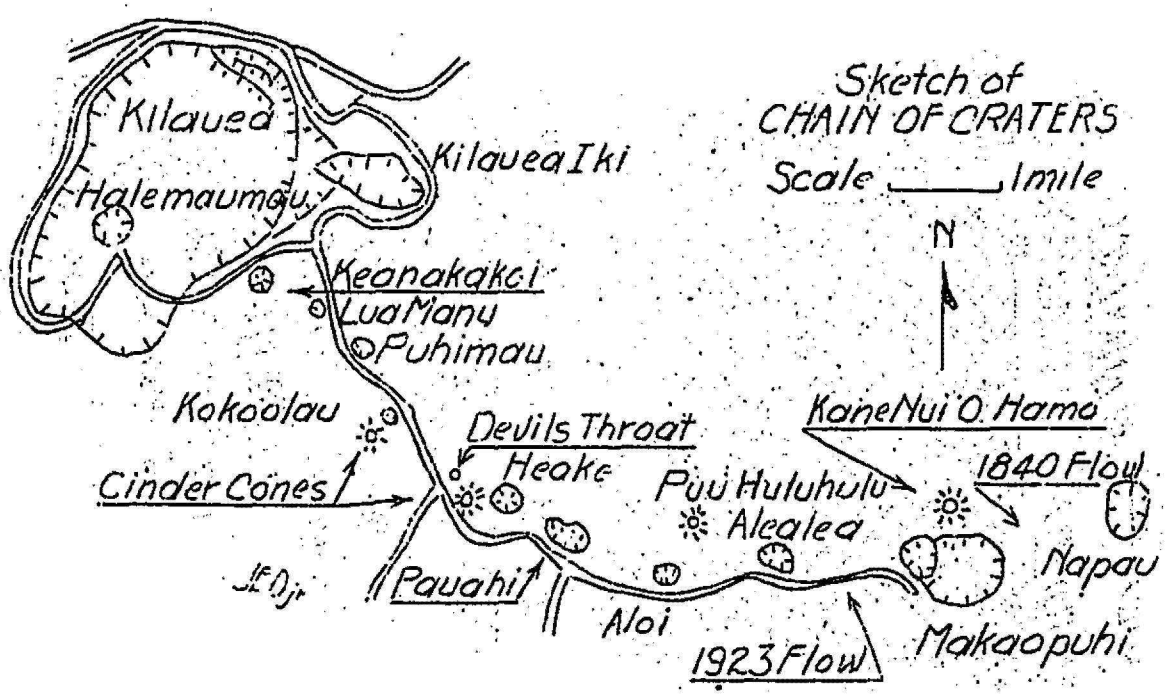
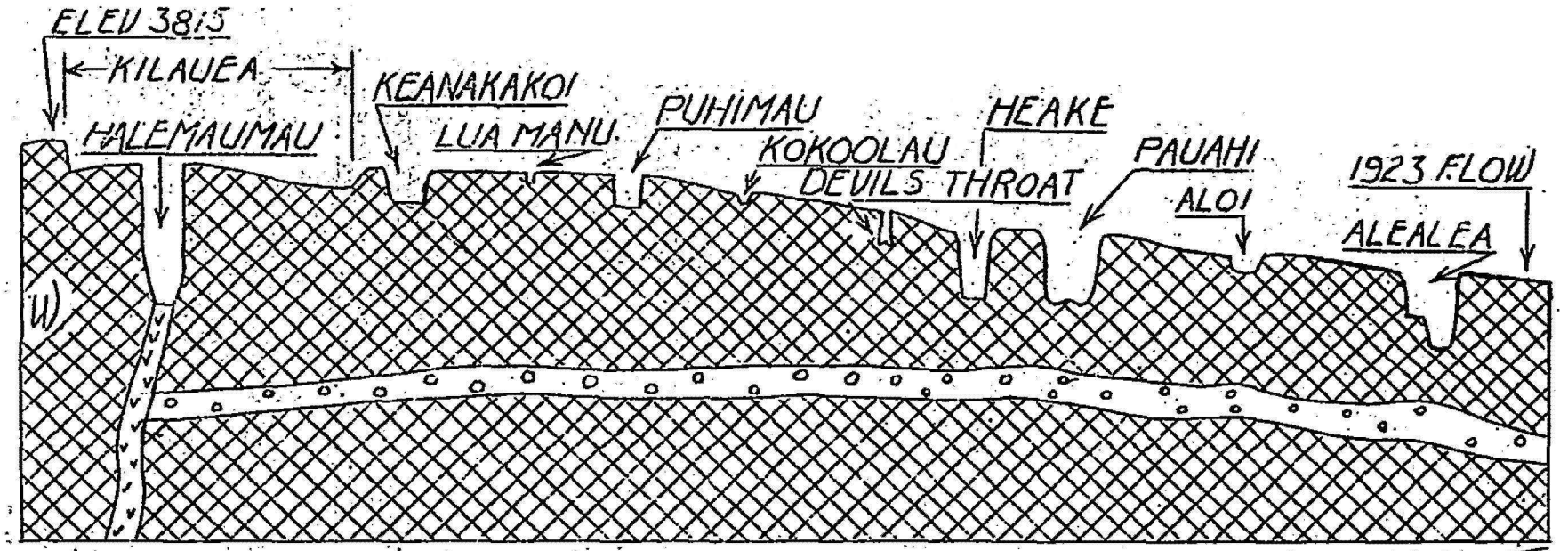


Fig. 1.



PROFILE AND BROKEN LINE CROSS SECTION
OF CHAIN OF CRATERS

SCALE

Horiz. 1 in. = 1 mile

Vert. 1 in. = 1000 ft.

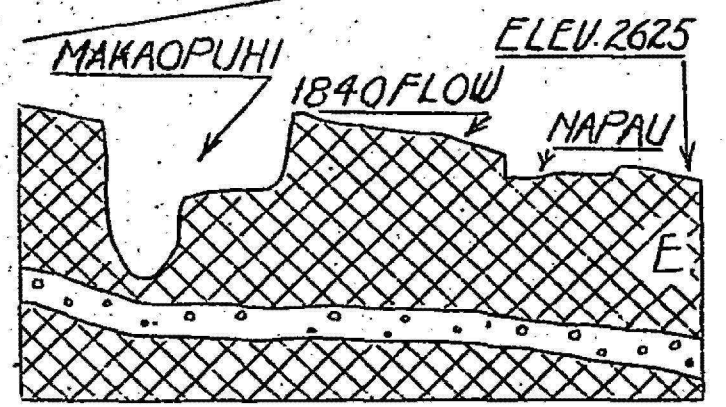
LEGEND

Lava Rock

Conduit of Kilauea

Probable Lava Tube

JEO jr



Geologic Features of the Region

These craters represent an important and interesting part of the volcanic activity of Kilauea. They occur along the Puna Rift zone. This rift zone is a crack or series of parallel cracks which essentially divide the volcanic mass of eastern Kilauea into two great blocks. This rift may be thought of as a fracture zone or zone of weakness in the earth's crust; Differential movements between the two blocks have frequently taken place along the rift. The rift zone has been the place of origin of numerous local earth tremors as well as the scene of ancient and recent volcanic activity. In the region of the Puna Rift volcanic activity has made not only pit craters but also cinder cones and surface flows of lava.

The craters are roughly circular, steep-sided depressions in the eastern slope of Kilauea. The largest pit, Makaopuhi, has a maximum diameter of almost a mile and is 950 feet deep. The cinder cones rise above the gradual slope of Kilauea as steep-sided, cone-shaped hills. Puu Huluhulu, the most prominent cone in the park area, rises over two hundred feet above the general elevation of the surrounding area. From the top of Puu Huluhulu one gets an excellent view of several of the nearby pit craters. The cinder cones have been built up by molten lava spattering out of vents in the rift. The scars of lava flows can be distinguished in many places as areas of little or no vegetation, the amount of vegetation depending on the age and thickness of the flow. Ancient flows from this great rift are covered in places by a dense jungle of tropical vegetation. Recent flows support no growth of plants except where the lava is thin in which case plants rooted on the old surface soil beneath the flow have broken through the thin new crusts of black lava.

All of these features of volcanic activity are a part of the activity of Kilauea. Each cone and crater should not be thought of as vents of separate conduits leading to an interior reservoir of molten material but rather as numerous vents of a great subterranean passageway leading from the conduit of Halemaumau, the fire pit of the summit crater of Kilauea, eastward to at least the east point of the island of Hawaii and perhaps even farther eastward beneath the floor of the ocean. Each depression in the line of pit craters shows evidence of having been formed by caving in; the trend of the pits and their caved-in characteristics are strong indications of a great subterranean passageway. The exact nature of the subsurface features of this rift zone will perhaps never be known. In places it is in all probability an actual tunnel of considerable size, in other places a crack and in still other places a fractured or brecciated zone. Regardless of the exact nature of the passageway the rift is a zone of weakness through which molten lava has been forced during periods of Kilauea's volcanic history. On the opposite page is a profile and cross section of the Puna Rift region from Kilauea's summit crater to the eastern boundary of the National Park. The probable subterranean tube is indicated

The fact that there is a close relationship between volcanic activity along this rift zone and the sinking of lava in Halemaumau is additional evidence of a subterranean passageway in the Puna Rift zone.

Volcanic Activity Along the Rift

In the past ten years there have been three outbreaks of lava along the Puna Rift. Each of the activities was preceded by a subsidence of lava in the fire pit Halemaumau.

During 1921-22 the lava column in Halemaumau rose and subsided three times. The last of the three subsidences - by far the largest- occurred during May 13 to 27, 1922. Following this subsidence Halemaumau was an oval-shaped pit having a maximum diameter of 2000 feet and a depth of 1000 feet. On May 28 molten lava poured into Makaopuhi Crater seven miles east of Halemaumau. The following day lava broke out in Napau Crater two miles east of Makaopuhi. Both of these activities lasted but a few hours. In view of what followed in 1923 one may conclude that the lava in the tube or rift between Makaopuhi and Napau hardened and sealed the zone until such a time when differential movement along the rift would break the seal.

By July 4, 1923 the molten lava column in Halemaumau had risen to a point 127 feet below the pit rim. In August this lava column subsided a distance of 437 feet or to a level 564 feet below the rim. On the 25th of that month a lava flow broke out along a crack just west of Makaopuhi Crater, the scene of the 1922 flow. The 1923 activity being just west of Makaopuhi indicates that the 1922 lava had sealed the rift causing the 1923 lava to rise to the surface between the sealed area and Halemaumau. Park visitors examine the 1923 flow while making the trip along the Chain of Craters Road. Some of the interesting features of the 1923 flow will be described in future issues of Nature Notes.

Following the 1923 flow lava began to rise in Halemaumau and on January 27, 1924 the surface of the molten lake, 2000 feet in diameter, was 121 feet below the rim of the pit. This activity represented a rise of over 800 feet and a volume of new molten lava of over 50 million cubic yards. Between February 15 and 21 this column of lava subsided approximately 280 feet. On April 21 differential movement took place at the extreme eastern end of the Puna Rift. Near the little village of Kapoho the displacement resulting from the movement was sufficiently large to be measured in terms of almost ten feet. On April 28 sudden subsidence in Halemaumau left a pit 1300 feet deep. The faulting or movement at the eastern end of the Puna Rift no doubt opened the rift zone permitting the molten lava to drain from Halemaumau. The great subsidence of lava in the pit was not followed by any outbreak of lava along the known extent of the rift. It is logical to conclude that the rift zone extends along the ocean floor east of Hawaii and that the lava draining from Halemaumau moved through the rift zone to a point beyond the shores of the island. The lava may have broken out on the floor of the ocean beneath a depth of water sufficiently great to conceal the evidence of such a flow of lava.

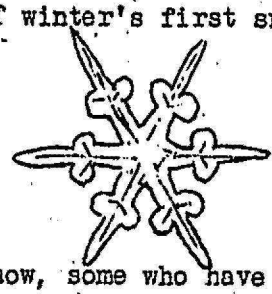
Summary

The great pits along the Puna Rift are depressions made by the caving in of the roof of a great lava tunnel. The debris from the roof of the tunnel has no doubt been remelted and carried along by the various flows moving through the rift zone from Halemaumau. Subsidences of lava in Halemaumau have been followed by outbreaks of lava along the rift. This indicates that there is a great subterranean passageway leading eastward from the summit crater of Kilauea. A temporary blocking of the passage has caused the molten material to rise in the bottoms of some of the pits. The solidification of this lava has resulted in the smooth, flat floors of several of the pits along the chain.

by the Park Naturalist

SNOW IN HAWAII

Many of the readers of Hawaii National Park's Nature Notes have many times experienced that stimulating, exhilarating feeling which is aroused by the first snow-fall of a winter season. In the gray-white darkness of an early winter evening perhaps you have heard the merriment of tinkling voices drifting over a blanket of snow, the merriment that is aroused and carried only by the soft crystal flakes of winter's first snow.



Maybe you live in a land where Jack Frost's artistic hand decorates your window panes with fantastic forms and crystal figures, in a land where it would seem strange not to have snow in winter. If you do it may surprise you to realize that as you read this there are some in Hawaii, also reading this, who have never experienced snow, some who have not even seen it on the distant mountains.

Though occupying a position within the tropic zone, Hawaii too experiences snow on the tops of its highest mountains. During the winter months the tops of Mauna Kea and Mauna Loa, both rising over 13,500 feet above the sea, are frequently capped with blankets of snow - snow-caps which add a touch of beauty to a sunny tropic island. Haleakala, the great volcanic mountain on the island of Maui, at times has its jagged rim decorated with a crown of snow.

One experiencing these tropical snows realizes that snow in Hawaii also gives one a feeling of exhilaration, perhaps a higher degree of exhilaration than the snows of cooler climates, particularly when one stands in the snow at the top of Mauna Loa and looks down the long gentle slope of the mountain to the green fields of sugar cane and tropical palm groves - to the flower-decorated harbor city of Hilo.

The first snow fall recorded on Mauna Loa this season began to fall in the late afternoon of December 1. Precipitation continued for four hours during which time three-quarters of an inch of snow accumulated and covered the bare lava slopes at the top of the mountain as well as the floor and high rugged walls of Mokuaweoweo, the summit crater of Mauna Loa.

During the very early hours of December 2 the light of a last quarter moon made weird phantom figures of the volcanic steam rising into the cold thin air - steam rising from the tops of snow-covered cinder cones inside Mokuaweoweo, a crater whose Hawaiian name conveys the meaning of an "island of lurid burning".

To one used to living in a temperature never less than 50 degrees fahrenheit, 22 degrees seems cold, very cold for Hawaii, very, very cold to one who has tried to sleep on the pumice-covered floor of a lava tube at an elevation of 13,000 feet; however, even 22 degrees does not cool ones enthusiastic appreciation of the view from snow-capped Mauna Loa to the somewhat higher snow-capped volcanic ruggedness of Mauna Kea;

even 22 degrees does not destroy ones desire to throw snow-balls at an imaginery lava snow-man. The lava snow-men that can be seen on Mauna Loa have been made by molten materials from the interior of the earth and decorated by the snow from the clouds which encircle the mountain. One has a particular desire to throw snow-balls when at the top of Mauna Loa because it gives one an opportunity to experience the reality of snow-balls in Hawaii.

by the
Park Naturalist
John E. Doerr, jr.

THE COVER

On the cover of this issue is a sketch of the Great Stone Face in Hawaii National Park. This face is at the top of Uwekahuna Bluff, on the west rim of the crater of Kilauea. Looking out over the crater this face has witnessed the liquid fires of Kilauea during many centuries, in fact the face itself is in part the result of the fires of the volcano.

Walking along the ledge directly beneith Uwekahuna Museum one can see the stone face silhouetted against the southern sky. Hawaiian legend describes this stone face as the image of Kamohoalii, brother of Pele, Goddess of Hawaiian Volcanoes. The legends also relate that Kamohoalii is buried at Uwekahuna and that the Goddess Pele has the responsibility of keeping her brother's body covered with volcanic materials. When the rain and wind removes the lava and ash covering Kamohoalii's bones, Pele comes out of her temple, Halemaumau, and deposits a new covering of lava over her brother.

To some of our readers the lettering on the cover may seem like a strange mixture of vowels and a few consonants, but really, they are words - Hawaiian words which mean that this issue of Nature Notes is Volume II, Number 1, January 1932.

Hoolaha means volume, elua means two.
Helu means number and ekahi one.
January translated into Hawaiian is ianuali.
The year, expressed in English with three words,
is beautifully described in Hawaiian in the five
words, Hookahi kaukeni eiwa haneli kanakolukumalua

The sketch and design of the cover is the work of Nancy E. Doerr, the Hawaiian wording is by Ranger E. Brumaghim.

by the Editor