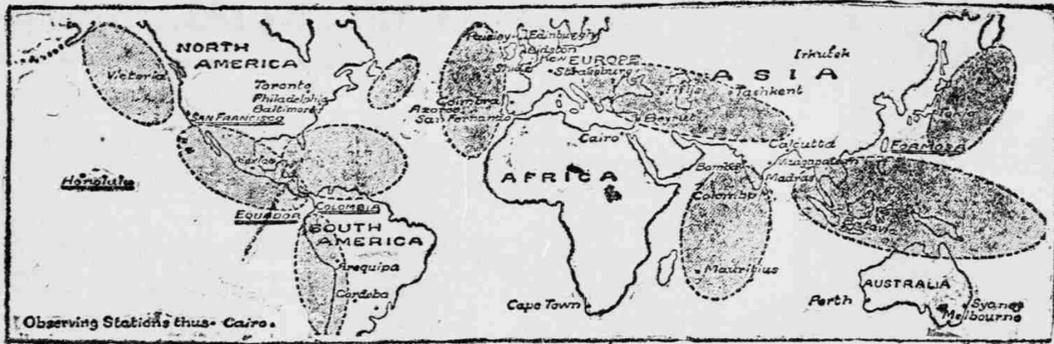


EARTHQUAKES AND THEIR CAUSES



HAWAII OUT OF IT. MAP OF THE WORLD, SHOWING THE CHIEF AREAS OF SEISMIC ACTIVITY AND THE EARTHQUAKE OBSERVING STATIONS.

The accompanying chart reproduces the chief features of a seismic map of the world which Professor Milne contributed to the "Geological Journal" some years ago. It will be seen that San Francisco is near an area of seismic activity, and that the many other parts of the globe which have lately been visited by earthquakes are situated in or close to such districts. The following is a list of these places:

- January 31st to February 6th.—Earthquakes on coast of Colombia and Ecuador, accompanied by tidal wave. Over 300 persons perished.
- February 22d.—Mont Pelee and La Soufriere reported active, and earthquakes recorded in many West Indian Islands.
- February 20th.—Slight shocks felt at Baku, near Tiflis.
- March 17th.—Great earthquake in Formosa. Over 3000 persons killed and injured, and 5500 houses destroyed.
- March 29th.—Repeated earthquakes in the Island of Ustica, off north coast of Sicily, obliging the inhabitants to abandon the island.
- April 3d-13th.—Eruption of Vesuvius, preceded by earthquake shocks.
- April 14th.—Another earthquake in Formosa, accompanied by considerable loss of life.
- April 18th.—San Francisco destroyed by earthquake.

Professor Milne is said to have ascribed the cause of the Californian earthquake to the formation of a fault or dislocation, terms used in geology to characterize certain displacements common among the strata which form the crust of the earth. The disaster might, however, have been caused by the movement of an old fault. In any case Professor Milne thinks it probable that further movements, though not of the violent character of that of April 18, are likely to take place. To those of our readers who are not familiar with the elements of geology, the accompanying diagram will help to explain the formation of a fault. Great strains of compression are going on in the world's surface, and under these strains the strata occasionally give way in their weakest parts. Sometimes the fissure is smooth and close; in other cases the rocks are jumbled and shattered. The diagram shows one of the simplest kinds of fault.

In the great fault between the Highlands and the Lowlands of Scotland which for forty years racked the little village of Comrie with earthquakes, one

of the dislocated surfaces has slipped 8000 feet below the other; while the similar dislocation between the Lowlands and South Uplands of Scotland has in many places a "downthrow," as it is called, of 15,000 feet.

Before settling at Shide ten years ago Professor Milne, who is undoubtedly the greatest living authority on seismology, spent eight years making experiments and observations in Japan, where, as he states in the introduction to his book, "Earthquakes and Other Earth Movements," he had the privilege of recording an earthquake every week. At his observatory at Shide, in the Isle of Wight, he does not enjoy the opportunity of making observations so frequently, but with the aid of a delicate apparatus invented by himself he is able to record all the important earthquakes that disturb the crust of our globe, no matter how distant the seat of disturbance may be. This instrument not only records an earthquake, but the movements of the pencil on the revolving drum indicate the intensity of the convulsions, and show how they succeed each other. The seismometer, as it is called, makes, in fact, three separate diagrams, or seismographs, of an earthquake. The first records the vibrations transmitted through the earth's interior, and this message travels at the rate of ten miles a second. The second is on a large scale, and records the vibrations which have traveled round the surface of our globe in the most direct route, and the third, which is not so strong as the latter, though stronger than the first, records the vibrations which have been transmitted round the earth in the other direction, by the longer route. In the last two cases the velocity of the movement is less than two miles a second.

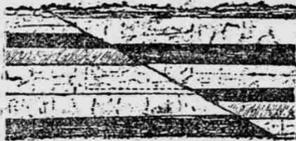


DIAGRAM OF A FAULT.

FOLLOWING OLD TRAILS

(Continued from Page 1)

flow, working painfully from white disk to white disk, the road growing rougher and more uncertain all the time. But this more recent flow, upon which the forest was not yet started, was by so much better than the old ones where the trees were breaking up the pahoehoe that we could at least observe the caves and cracks and crevices, and would have met our death, if we were doomed to meet it, with seeing eyes. If I am destined to fall into a bottomless pit, there is a certain dark satisfaction in seeing the place of death.

PRETTY HARD GOING.

I can conceive of nothing more difficult to travel upon than an old flow of pahoehoe, not yet transformed into soil, upon which a lehua forest has started. The trees and the rock seem to combine against the traveler—the one to drag him from his saddle, the other to trip his horse and hurl him to his death on the black and merciless rock. And the wear and tear of the horse's gait, and the strain upon the nerves of a man, and the racking of his muscles, combine to put the traveler a little closer to the contemplation of the possibilities to follow an ill-spent life than may be altogether pleasant. This did not trouble me, of course, but we had politicians in the party.

The flow of 1859, in many of its aspects, is unique. You probably know

AT AUCTION
BY **WILL E. FISHER**
AUCTIONEER
Telephone Main 424.

To Let.

Cottage on Hotel Street,
First one on makai side of Hotel near Alapai, contains 6 rooms; modern improvements, etc. Rent, \$25. Vacant July 15th.
First come, first served.

WILL E. FISHER,
AGENT.

TO LET.

Nicely-furnished Cottage, situate on Miller street, will be rented at a small rental to right party for 2 or 3 months.

WILL E. FISHER,
Agent.

all about that, if you know anything of lava flows. And, if you do not, you are not going to get the knowledge of them from me. All I know of them is that they are hard to ride over—and the flow of 1859, because that we rode along upon it instead of crossing it directly, seemed something harder to ride over than the rest.

It came to an end, after it had seemed to extend for miles and miles and miles—but not until I had noticed at places in it some peculiar brownish spots, which seemed to be made by a kind of smooth clay coating the black rock, these brown spots invariably hiding caverns in the lava.

A STRANGE COVERING.

This brownish stuff was soft, and about half an inch in thickness. I do not know what it was. Maybe a lava expert can tell. Nor do I understand why it should lie in spots in certain parts of the flow, and be altogether absent in other parts.

We reached the end of this hard road, at last, and came out upon the sand plain that forms the table-land between Mauna Loa and Hualalala—a table-land that is covered with forest growth but in which there is not one drop of water. Here the Secretary and Rawhide Ben and Thimbleberry Jim went galloping off, after crossing that lava flow, in chase of wild pigs—which they did not get. As to the rest of us, we rested. That was the most convenient thing to do, and the easiest. I have found in myself a great capacity for resting, and Jimmie has noted the same thing of himself.

The Secretary and the guide came back again, presently, without a pig, and after we had jogged for a very little distance across the sand plain, we struck into a wide trail, running straightaway toward Kona, built up of small rocks put together almost as firmly as masonry, and the Secretary shouted:

"The Judd road!"

ON THE JUDD ROAD.

And it was true. This was the road that Dr. Judd, the grandfather of

Judds and Carters and Wilders of this generation, and himself a great statesman in his time, would have built from Kona in a straight line across the Island of Hawaii. It was meant, of course, as a road for horsemen and pack animals. In the generation of Dr. Judd it was a great work, and the manner of its building showed that he meant it to be a monument to him for all time.

It had progressed, when the flow of 1859 came down and crossed it, to the point at which it stops now, from the coast a little above Kailua. At this point the red-hot lava boiled over it, and all the power and prestige of Dr. Judd, backed by the power of the kings, could not get the natives to work upon it again. The gods were angry, and no man must build a road across there. So Dr. Judd had to come to a halt. Some day, however, there will be a road through there—although it will hardly follow the line that Dr. Judd took. In these days of wheeled vehicles, men cannot make their roads as the crow flies, regardless of topography. Dr. Judd could—and, so far as his road went, did do that thing.

ROOM FOR A BATTLE.

We rode but for a mile or two along the Judd road, and then branched off to the southward and in a little time came to the House of Umi, in the middle of a great plain, where it is said that the old chief was wont to drill his armies. There was room enough there to do it, in all conscience. There would be room in that plain to fight the battle of Waterloo—and then leave a few acres for the retreat of the French.

One can understand, traveling over the Island of Hawaii as I have done, how it was that Vancouver estimated the population of these islands so high. That plain where Umi's house stands must have been thickly populated, at one time. There are remains of houses everywhere, although all the houses are gone now. The chiefs, indeed, would have gathered their people about them, probably by thousands. And if water was plenty, there is room for thousands on that plain.

Straightaway from the House of Umi we rode to the house where Dr. Trousseau once dwelt alone in the wilderness, and we saw his old-fashioned wool press here, still used by the Greenwells. Here we off-saddled, and gave to our tired horses the first good drink of water they had had in two days; and here likewise we lunched upon sardines and hard tack. After lunch, we rode on again, through a great forest of sandal wood, some of the trees of very fair size, descending gradually into a vast belt of gray koas standing in a country where the cattle were belly-deep in lush grasses; and so on down into a region of mist and fertility, which was Kona.

DEATH OF THE KOAS.

I have said that it is a pity that the koa trees are being cut on the Volcano House side! I still think that it is a pity! But men must be served, though the tree that you know most intimately and love the best is slain; and though the cutting is pity, it is not nearly so sad as the sight of the trees in this Kona forest that are dying, apparently from pure neglect. Only in one place, in all the stretch of forest that we traversed in a long afternoon, was there apparent any effort to save a single tree. That was where some natives were hewing out a canoe. Everywhere, the trees lay dead on the ground, or drooped over to die—like old, gray men who had passed their usefulness, and for whom the world had no more care.

Downward and still downward we rode, out of the forest and through the rolling uplands, once and again the Kona Plantation, and presently, after we had stopped at the house of Mr. Roy, and been regaled upon fresh peaches grown on the place, came through a gate upon the Kona road along the hills above Kailua, and were presently met and welcomed by Mr. White at the Roy place and made to feel at home in a spacious house upon whose lanai we might sit and watch the Manna Loa sail by, and dream the sweet dreams of peace and plenty which go to make up life in Kona, the fairest, sweetest spot in this fair, sweet island land.

TRY A GAS STOVE.

The mechanism of the gas stoves and ranges sold by the Honolulu Gas Co. is so simple that anyone can achieve success as a cook by using one. The fact that the stove heats quicker by using gas means economy in the use of fuel and less heat in the kitchen. The styles sold by this company are various, covering everything from a griddle to a hotel range. If you are at all interested in stoves a few minutes' conversation with an attaché of the company will be instructive and entertaining.

THE S. S. ALAMEDA

takes the next shipment of Tropic Fruit Co.'s selected pineapples to the Coast. 6 fruits to the crate. Office with Wells-Fargo, King street.

Seattle
Brewing & Maltng
SEATTLE BREWING & MALTNG COMPANY
RAINIER BEER
THERE'S NEW VIGOR AND STRENGTH IN EVERY DROP.

Beat the Beetles

You can do it as "easy as ease." It is time the country was cleared of the enemy to roses just as it is being cleared of the enemies of sugar. Private interests are looking after the sugar and private parties should see that Honolulu will be in a position to have a "War of the Roses" next year. Arsenate of Lead from Hobron Drug Co. will help amazingly.

A little Taroena food today will be right.

Hobron Drug Company.

It's Made of Pure Cream

We are selling the purest ice cream in the city at our soda counter. Pure, because it is made of cream, and is thoroughly worked out, so that it is absolutely flawless. The flavors are from pure fruit only.

CONFECTIONARY

The best bonbons at forty cents the pound box. Did you ever buy them as cheap anywhere in Honolulu? We do not tell you that these are better than other people sell, but they are as good and ten cents cheaper on the pound.

The Goods Prove the Statements Made by Us in Every Instance. Sweets department is open Sunday all day. Come in and try the ice cream.

PEOPLES' BARGAIN STORE

PROGRESS BLOCK.

IN FOREIGN LANDS

or in your native land when you are away from home, the SEMI-WEEKLY GAZETTE will be found a most welcome visitor; giving as it does a condensed summary of all the local news of the Islands and Honolulu.

Subscribe before you start on your travels and you won't need to "wonder what is happening at home" while you are away.

Price 50 cents per month or \$5.00 per year postpaid to any part of the United States. Foreign postage extra.

HAWAIIAN GAZETTE CO., LTD.
PUBLISHERS.

65 South King St.

Phone 68.

Honolulu, Hawaii.

TENDER BROILERS!

We have always a supply of the tenderest young broilers from the best poultry yards on the Coast. The fact that they have been kept in cold storage adds to the quality of the meat; it will melt in your mouth. Fat roasting Turkeys, corn-fed and tender, are to be had of us at all times. Fresh Bologna Sausage every day.

Metropolitan Meat Co., Ltd.