

for a seven months' visit to Oxford University and other European science centers.

On its next flight, the radio-speaking robot stratosphere balloon perfected in Dr. Compton's laboratory will carry a cosmic ray meter.

Seven permanent cosmic ray observation stations are to be established at

strategic mountain sites throughout the world, equipped with heavily sheathed self-recording instruments of great sensitivity. Some of these will be operated for the next eleven years in an attempt to discover whether there is a relationship between cosmic rays and the sunspot cycle.

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## VOLCANOLOGY

## Spectacular New Eruption In Kilauea's Crater

By DR. T. A. JAGGAR, Chief, Volcanological Section, U. S. Geological Survey.

**H**ALEMAUMAU Pit of Kilauea Volcano started a major lava eruption on Thursday, Sept. 6. At 2:44 a. m. fountains were spurting up the north and northwest edges of the old bottom.

This activity was extended into a remarkable cascade of fiery lava which fell from a crack in the wall 400 feet above the bottom of the west side of the pit. The ribbons of cascading lava occupied a length of 900 feet and fell directly into the lake below. Within twenty minutes after the beginning the old floor was covered with a lake 90 acres in extent.

At 6 a. m. the cascade went out of action but the fountains continued all day. At noon the lake was 65 feet deep and was developing benches around the edges. After 3 p. m. the eruption appeared to diminish rapidly.

The general character of the present eruptive action is like that of other recent eruptions, which have usually continued from one to three weeks. The estimated volume of lava poured out since the outbreak began is 9,500,000 cubic yards.

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## VOLCANOLOGY

## Kilauea Has Never Been Dangerous Volcano

**K**ILAUEA, watched in its spectacular new eruption by Dr. T. A. Jaggar of the U. S. Geological Survey, is not expected to do any harm to human life—unless some over-bold spectator ventures too near its boiling pool of liquid rock in Halemaumau Pit. Karl Sapper, noted German authority on volcanoes,

has listed all lives claimed by erupting volcanoes during known history, and finds that the last time a Kilauea eruption slew any human victims (aside from those who have gone into the crater looking for trouble) was in 1789. At that time about eighty natives were overcome, apparently by a cloud of red-hot particles.

Kilauea's relative harmlessness is due to the fact that it is predominantly a "lava" volcano, without the violently explosive steam outbursts such as that of Vesuvius that wiped out Pompeii, and of Peleé that decimated the population of Martinique in our own time. Its lava tides rise relatively quietly, and when they do erupt from cracks in the side of the mountain simply flow over the countryside until the source is exhausted. For this reason, the volcano has never developed a towering cone-shaped peak, the commonly accepted concept of a volcano. It is of the type known among geologists as a "shield volcano"—a very wide, gradually rising circle, with the great gaping crater near the center. Its altitude is not great: only 4,100 feet, quite dwarfed by the 12,625 feet of its gigantic neighbor volcano, Mauna Loa.

Most of Kilauea's activity takes place within its gigantic crater, in a depression near one end of the floor, known as Halemaumau Pit. Here the lava seethes and bubbles practically ceaselessly, its level sometimes falling until the pit is almost empty, again rising, as in the past few days, in majestic fire-works of incandescent fountains and vast wall-cataracts of glowing liquid stone.

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A zoologist reports finding 131 kinds of birds at various times in "barren" Death Valley.

## PHYSICS

## Cosmic Rays Studied 820 Feet Under Water

**L**ATEST evidence that cosmic rays are, in part, composed of electrical particles comes from under-water depths of 820 feet. Sending down cosmic ray measuring instruments in the Red Sea comparable with the descents of Dr. William Beebe in the Barton bathysphere, the Dutch physicist Prof. J. Clay recently reported studies supporting the view that the mysterious cosmic rays are at least partly of a particle nature.

Dr. W. F. G. Swann, director of Bartol Research Foundation, has just reported to the *Physical Review* that Dr. Clay's work confirms his expressed belief that swift cosmic ray particles having energies of 10,000,000,000 volts fail to produce any ionization effect in the matter which they penetrate.

If this situation exists, Dr. Swann indicates, studies of cosmic ray ionization in instruments sunk deep in water should decrease gradually with depths. Dr. Clay's measurements show that such is the case down to 200 meters, or 656 feet.

At this stage far below the surface of the water, Dr. Swann predicted, the energy of the ten billion volt non-ionizing cosmic rays should be so decreased that they will enter a region in which they become capable of ionizing the gas inside the cosmic ray instruments.

Thus the ionization curve for great depths should increase at a certain point and in a short additional distance fall to zero. The curve of depth plotted against cosmic ray ionization looks like a giant fishhook; first falling rapidly, then rising a little and finally stopping entirely.

Dr. Clay found by experiment that the cosmic ray ionization showed the predicted hump, or maximum. At 656 feet, the curve rose; it reached the predicted maximum at 820 feet below the surface. Sixty-five feet farther down the ionization fell to zero.

This new evidence, taken with studies of the latitude and directional effects of cosmic ray intensities, improves the argument that cosmic rays contain high-speed, great-energy electrical particles.

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Ninety per cent of the persons who die of heart diseases are over forty years of age.