PHYSICS

Rockets Into Stratosphere Higher Than Balloons Can

Flights Leaving All Air Behind Planned By Scientist To Study Cosmic Rays and Heaviside Layer

Dr. R. H. Goddard, who has pioneered in rocket development for the past twenty years, is at Roswell, N. M., where he will resume experiments on high altitude rocket flights.

By DR. R. H. GODDARD, Professor of Physics, Clark University.

DEVELOPMENT of a rocket to reach high altitudes will be continued during the coming academic year at Roswell, New Mexico, under a grant from the Daniel and Florence Guggenheim Foundation. It is hoped that high flights with meteorological and other instruments will be obtained.

At the time the work was discontinued in 1932, short flights to study the performance of the rockets in the air and to develop the stabilizing devices had been made.

Continued in the Laboratory

No flights have been possible during the past two years, but work has been continued along a number of lines in the laboratory at Clark University, under grants from the Smithsonian Institution and the Daniel and Florence Guggenheim Foundation. Investigations have been carried on regarding materials, methods of fabrication, tests of stabilizing means, and similar matters, which will make possible a considerable saving of time in the forthcoming tests.

Flights can not be resumed immediately, as the entire experiment plant at Roswell was dismantled in 1932, and must first be reassembled and put in working order.

Will Go Higher Than Balloon

The importance of the work lies in the possibility of sending rockets equipped with recording instruments, or with instruments having short wave radio transmitters, to greater heights in the stratosphere than balloons can reach.

Such rockets will permit of more exact study of the ozone layer, which is believed to exist at an altitude of about 40 miles, and of the various so-called Appleton electrical layers of gas which exist above the ozone layer for many miles, and which make radio broadcasting possible. There are many other investigations, notably in the field of cosmic ray research, which it is very desirable to have carried on at heights that are practically above the atmosphere.

It is likely that most of the measurements will be made either at the highest point of the ascent, or while the rocket is descending in a parachute.

Science News Letter, September 15, 1934

There are now so many moose on Isle Royale in Lake Superior, that it is reported these animals are eating up the scenic beauties of the island, and may presently eat themselves out of food.

COUNTERFEITING ZEUS

When lightning strikes dry sand, it fuses the particles into a many-branched tube known as a fulgurite. These lightning-stones are objects of superstitious awe in some parts of the world. The one shown here, however, is man-made: it was produced by a high-voltage electrical discharge into sand at the Pittsfield laboratory of the General Electric Company.

PHYSICS

Next Radio Robot Balloon To Measure Cosmic Rays

By PROF. ARTHUR H. COMPTON, The University of Chicago.

THE SUCCESS of the trial flight of our radio transmitting balloon has prepared us for the next stage where the intensity of the cosmic rays will also be recorded.

Our balloon which ascended at Chicago was filled with 250 cubic feet of hydrogen. It carried a barometer, radio transmitter and batteries weighing about eight pounds. After 31 minutes the balloon had risen to 9.5 miles as indicated by the radio record of the barometer. The barometer was adjusted to silence the radio signals at this altitude but the balloon was observed with telescope as it continued to climb for another half hour.

Sixty-two minutes after leaving the earth it was seen to burst at an estimated altitude of about 18 miles. Here the balloon must have been expanded to about 24 feet in diameter. No report of finding it has been received. The transmitter radiated about a half watt at 20 meters wavelength which was received without difficulty, even though, through an accident, half of the antenna was broken loose as the balloon left the ground.

The test showed the adequacy of our barometer and of the radio method of noting its readings. On this test flight, the relatively expensive cosmic ray meter was not sent up.

Two important advances in science's drive to solve the mystery of the cosmic rays are disclosed as one of the research leaders, Prof. Arthur H. Compton of the University of Chicago, is aboard ship en route across the Atlantic

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 wih 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.

Science News Letter, September 15, 1934

VOLCANOLOGY

Spectacular New Eruption In Kilauea's Crater

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

HALEMAUMAU 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.

Science News Letter, September 15, 1934

VOLCANOLOGY

Kilauea Has Never Been Dangerous Volcano

KILAUEA, 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 fireworks of incandescent fountains and vast wall-cataracts of glowing liquid stone.

Science News Letter, September 15, 1934

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

PHYSICS

Cosmic Rays Studied 820 Feet Under Water

LATEST 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 suface. 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.