ASTRONOMY

Comet Breaks in Three

The nucleus of Comet Ikeya-Seki split into three pieces, perhaps a result of huge tidal forces set up because of its close approach to the sun.

➤ THE STAR-LIKE NUCLEUS of the sun-grazing comet, Ikeya-Seki, split into three pieces, all of which are speeding together back into deep space.

The comet, discovered Sept. 18 and named after its two Japanese observers, may have broken because of huge tidal forces set up in the nucleus by passing so close to the sun—within about 300,000 miles.

The three-piece break was observed Nov. 4 and 5 by Howard Pohn with a 30-inch reflector telescope at the U.S. Geological Survey Observatory southeast of Flagstaff, Ariz. It has been confirmed by scientists at the Mt. Palomar Observatory in California and at the Boyden Station in South Africa.

The first piece is the largest and brightest of the three, and the second piece is about one-third to one-half as bright, said Mr. Pohn. The third piece is difficult to determine but may be about one-twentieth as bright.

Ikeya-Seki is similar to other comets that have closely grazed the sun, Mr. Pohn said. During the past 100 or 150 years, about seven of these sun-grazers have been spotted, some of which broke into pieces as they whirled back into space.

A comet in 1882 broke into approximately seven pieces, all strung out along the tail spine of the comet. The brightest piece was third in line.

Comets are believed to be composed of loosely combined aggregates of dust and frozen gas, moving through space under the influence of the sun's gravitational force. They consist of three parts: a nucleus that looks like a star and consists of particles of solid matter, a head or coma which is an atmosphere of gas and dust that enshrouds the nucleus, and a tail that consists of ionized gases and often extends 12 million to 18 million miles away from the head, pushed away from the sun by the force of solar winds.

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Carl Zeiss

UNDISTORTED SOLAR IMAGE—The domeless solar telescope at the Capri Observatory of the Fraunhofer Institut of Germany needs no dome because of its double tube and double-mount design which protects it against wind and weather. Built by Carl Zeiss, Oberkochen, West Germany, the instrument is used during daytime hours and the currents of warm air inside a dome would have distorted the solar image.

GEOLOGY

Light Watches Volcanoes

➤ VOLCANOES may be closely watched and measured by a new tool for geologists —a beam of light or radio waves that measures the diameter of a volcano's crater as it expands or contracts.

This is definitely a breakthrough in tools of the geologists' trade and may become standard practice in volcano watching, according to Dr. Robert W. Decker, Dartmouth College, Hanover, N.H.

The electronic beam is cheaper and simpler to operate than tiltmeters, strainmeters or other equipment used to observe active volcanoes, Dr. Decker noted in a paper presented before the 78th annual meeting of the Geological Society of America, in Kansas City, Mo. It also may become a valuable tool for measuring active faults and earth movements building up to earthquakes.

As molten rock moves up a volcano's vent from the earth's interior, the entire volcano expands like an inflating balloon, tilting the sides of its caldera or crater outward. When the magma pours out from the crater or flows back into the earth, the volcano contracts. By close observation, geologists can anticipate when a volcano is ready to erupt.

Part of the electronic beam equipment, set on a tripod on one edge of a volcano's caldera, transmits radio or light beams across the crater. A reflector at the other edge transmits the beams back. If there is the slightest contraction or expansion of the crater's diameter, the pulses of outgoing electronic beams become out of phase with the incoming pulses, and the distance the diameter changed can be calculated.

In using the beam to measure Kilauea volcano, Hawaii, during the March 1965 eruption, Dr. Decker found that the summit caldera expanded about five inches between October 1964 and March 1965, and contracted about 11 inches after the eruption. These measurements showed excellent agreement with changes in vertical elevation and degree of tilt measured by conventional equipment. The research was carried out in cooperation with W. T. Kinoshita and D. P. Hill of the U.S. Geological Survey at the Hawaiian Volcano Observatory.

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OCEANOGRAPHY

Two-Man Sub Completes Year-Long Program

➤ THE TWO-MAN, deep-diving submarine Alvin has successfully completed a year-long program of diving to ocean floors as deep as 6,000 feet near the Bahamas Islands.

The maneuverable submarine, operated by the Woods Hole Oceanographic Institution, opens up new methods of studying the ocean by allowing scientists to descend for first-hand exploration rather than having to rely on coring or dredging equipment or underwater cameras.

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ASTROPHYSICS

Comet Could Hit Earth One in 10 Million Years

➤ A COMET could collide with the earth at the rate of one every 10 million years.

Based on information from 326 well-observed comets, calculations show that comets can pass around the sun 2,170 times every 1,000 years, reported Drs. R. H. Nafziger and F. Dachille of Pennsylvania State University, University Park, Pa.

Seven of these comets would intersect the earth's orbit with a one-in-10,000 probability of an earth-comet collision, the scientists reported at the Geological Society of America meeting in Kansas City, Mo.

An "average" comet has a mass of a trillion tons, most of which is in the comet's nucleus or head. All comets which approach the vicinity of the earth are traveling at close to 24 miles per second.

The collision of an average comet with earth would be comparable to colliding with a rock five to 500 miles in diameter. An average comet collision would have little effect on the length of earth's day and axis of rotation, but collision with a larger comet could change the length of a day by about two hours and relocate the earth's axis by five degrees.

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