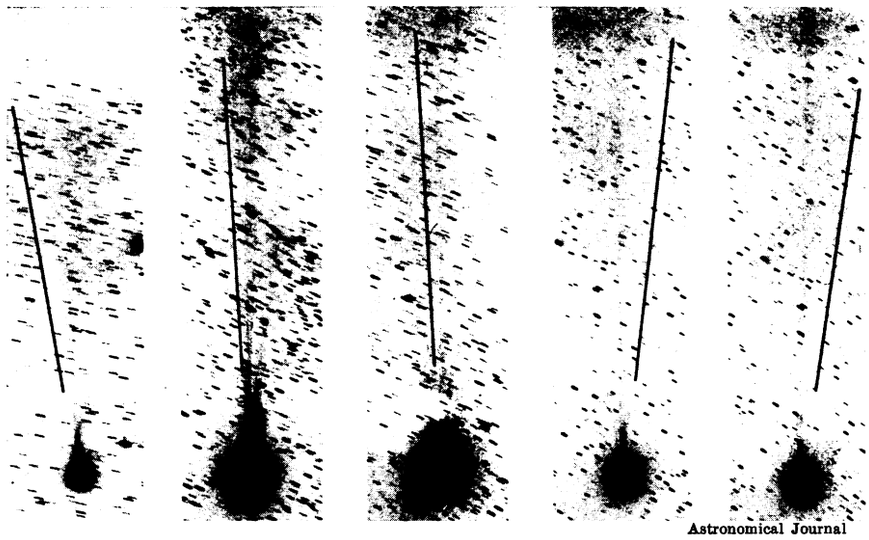

BURNHAM 1960 II—To see how this comet wags its tail, compare the constant position of the radius vector (dark line in upper part of pictures) with the position of the relatively sraight tail of the comet. Photographed on (a) April 23.0833; (b) April 26.0444; (c) April 30.0868; (d) May 1.0514; (e) May 1.0805.

ASTRONOMY

OH in Interstellar Space

The hydroxyl radical, hydrogen combined with oxygen, has been detected and measured in interstellar space for the first time by using radio astronomy and computer science.

➤ PART of the water molecule—called hydroxyl, or OH—has been discovered and measured in interstellar space for the first time.

The detection is considered one of the outstanding accomplishments of United States radio astronomers in the past ten years. The hydroxyl ion has not been seen optically in interstellar space, and spotting it required using a combination of radio astronomy and electronic computer techniques.

The observations were made by a team from two Massachusetts Institute of Technology facilities, the Research Laboratory of Electronics and Lincoln Laboratory, with support from the U.S. Air Force.

The discovery ends a year-long search for the hydroxyl radical, which contains one atom of oxygen and one atom of hydrogen, one less hydrogen atom than water. It marks the first time that elements in combined form have been detected and measured by radio means in interstellar space.

Participating in the detection were Prof. Alan H. Barrett, Dr. Marion L. Meeks, Dr. Sander Weinreb and John C. Henry. Their observations were made on ten different days between Oct. 15 and Oct. 29 using the 84-foot radio telescope at Millstone Hill Observatory, Westford, Mass., a computer and a special radiometer. They will report their work in Nature, Nov. 30, 1963.

The so-called correlation radiometer, developed by Dr. Weinreb, was a key instrument in the detective work. The frequencies at which the OH radical was discovered, 1667.35 and 1665.40 megacycles per second or 18 centimeters wavelength, are in close agreement with earlier predictions based on theoretical calculations and laboratory experiments.

Their measurements showed hydroxyl radicals are present in interstellar space in a ratio of about one hydroxyl to every ten million hydrogen atoms. Atomic hydrogen is the most abundant form of matter in interstellar space, and was first detected in 1951.

The team scanned the frequency spectrum of the radio emissions from Cassiopeia A and measured slight absorptions of energy. By repeating the experiments over several days, a slight shift in the absorption path was found, showing that the OH doing the absorption was not in the earth's atmosphere but in interstellar space.

Atomic hydrogen was the first substance to be detected and measured in interstellar space by radio astronomy techniques.

Finding the OH lines and determining their characteristics is expected to help astronomers chart the distribution and abundance of OH and hence, oxygen, as well as hydrogen throughout the galaxy.

• Science News Letter, 84:323 Nov. 23, 1963

ASTRONOMY

First Tail-Wagging Comet Discovered

➤ THE FIRST tail-wagging comet has been discovered.

Observations made at the Astrophysical Institute of the University of Liege, Belgium, showed that the tail of the comet Burnham 1960 II swung back and forth once every four days.

Sometimes the short tail—only 1.8 million miles long—would divide into several smaller tails and then merge again. Once it faded out altogether for three hours. Daniel Malaise, now with the Smithsonian Astrophysical Observatory and the Harvard College Observatory in Cambridge, Mass., reported in New York.

What caused the tail to wag is still undetermined. The solar "wind," or gas stream that comes from the sun, is believed to create the comet's tail by sweeping ionized gases off the head of the comet. A comet's tail may be either curved and hazy or straight and well-defined, but it always points away from the sun, depending on which way the solar wind blows.

Although the solar wind could cause a tail to swing back and forth, it seems unusual that it would do so regularly every four days, Mr. Malaise said.

One cause of the motion could be the rotation of the nucleus, a hard core of frozen gases, water, dust and particles that is sometimes called "dirty ice," Mr. Malaise reported in the Astronomical Journal, 68:561, 1963.

• Science News Letter, 84:323 Nov. 23, 1963

RADIO ASTRONOMY

Largest Radio-Radar Telescope Unveiled

➤ THE WORLD'S largest and most powerful radio-radar telescope, so huge that its reflecting dish alone covers 18½ acres, now stands completed on a picturesque mountain-top near Arecibo, Puerto Rico.

The $9 million telescope was built by Cornell University, Ithaca, N. Y., the Advanced Research Projects Agency of the Defense Department, the Air Force Cambridge Research Laboratories and the Army Corps of Engineers in a natural depression in a now isolated but growing area of Puerto Rico. Because it conforms to the valley's shape, the telescope itself is non-steerable.

The telescope has a reflecting dish 1,000 feet in diameter and is to be used for research in radio astronomy. For at least a half of its operational time the radio-radar telescope will be used in a study of the ionosphere.

The novel dish shape consists of a partial sphere. In such a configuration, unlike parabolic reflectors, collected energy is not focused at a point but falls along a line, thus achieving a central focus, in effect.

The concept for the Arecibo Ionospheric Observatory was originated by Prof. William E. Gordon of Cornell University, now director of the Observatory.

• Science News Letter, 84:323 Nov. 23, 1963