

ASTRONOMY

What Makes Up a Comet?

Comets are born with hearts of "ices" of gases, a new theory holds. As this solid nucleus approaches the sun, the heat turns it into a huge gaseous cloud.

► A COMET is formed from a heart of "ices" of common gases, starting in the outer reaches of the solar system, an astronomer proposed.

Dr. Fred L. Whipple of Harvard College Observatory suggested that this solid nucleus, or heart, is turned into the huge cloud of gas, which makes up the head of the comet, by heat as it approaches the sun. Dr. Whipple's answer to a baffling riddle of the solar system—What is a comet?—was given to the American Astronomical Society meeting in Ottawa, Canada.

The "icy" solid heart from which the comet head is formed would not be large. Its diameter would be four miles, at most, and more likely about a half mile. In addition to water in its solid form, ice, Dr. Whipple believes that the solid forms of the gases ammonia, methane, carbon monoxide or carbon dioxide and carbon nitride are in the comet nucleus.

In addition to the "ices," the heart probably contains some bits of solid matter similar to meteors, or shooting stars. And there is a layer or shell of this matter outside the nucleus, through which the evaporation of the "ices" takes place.

The famed tail of the comet is known to be caused by the pressure of the sun's radiation which sweeps back gases and dust of the comet's head.

To have an "icy" heart, the comet nucleus must begin its lengthy travels far out in the solar system, practically out in interstellar space but still within the gravitational pull of the sun. Some comets are known which probably take millions of years to complete one journey around the sun. Others which have much shorter periods, such as those in planet Jupiter's comet family, may have been captured by the planet's gravitational pull, Dr. Whipple explained.

As the comet moves through the solar system, it gives off some of the gases, and this accounts for changes in its path, or orbit. Also lost are some of the bits of meteoric matter which cause the showers of shooting stars when these solid pieces of a comet strike the earth's atmosphere.

Under Dr. Whipple's theory, the ovalness, or eccentricity, of a comet's orbit would increase or decrease, depending on whether the comet's rotation was in the same or opposite direction as its path around the sun. If it is the same, the emission of gases would be backward, and the orbit's eccentricity would increase.

Thus, a well-known comet, Encke, has

been observed to be decreasing its eccentricity, so it is believed to be rotating in an opposite direction from its path.

Dr. Whipple calculates that this comet has to lose only one five-hundredth of its

AERONAUTICS

Non-Protruding Antennas

► SOME of the steps taken by the U. S. Air Force to eliminate drag on speedy planes caused by protruding radio antennas were revealed at the Wright-Patterson Air Force Base in Dayton, O. Over 600 horsepower is saved for propulsion purposes in some of the larger planes which may have as many as 15 receiving and sending antennas.

The new antennas, of which there are several types, are hidden in the skin of the plane or buried beneath the skin. In addition to being positioned where they cause no drag as protruding antennas do, they are safe from icing, precipitation static, the sealing out of moisture, and danger of breaking off at high speeds.

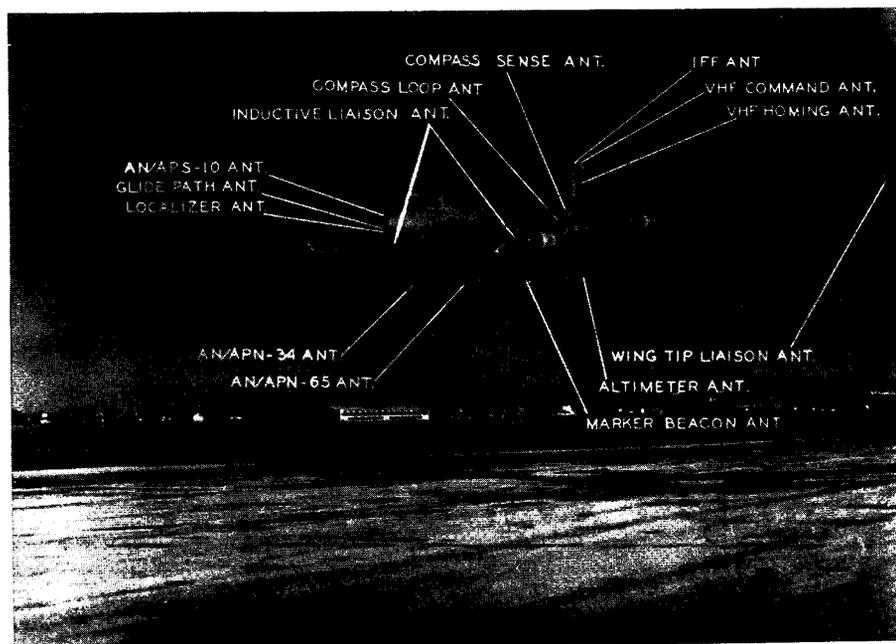
Flush-mounted antenna is a general term

that applies to the new types. One is a pickaxe shaped antenna which rides inside the aircraft tail, protected by a plastic radome. A slot type is a slit in a thin metal sheet set in the airplane surface and covered with a dielectric material.

One of the latest developments in the field of zero-drag is the use of all or part of the airplane fuselage itself as an antenna. This technique has been necessitated by the use of low radio frequencies which require antennas sometimes as large as the aircraft they serve.

The solution of this problem came by isolating a small portion of the plane, for example a wing tip, and then feeding voltage across the plastic-covered isolating section, thereby exciting the entire wing.

Science News Letter, July 2, 1949



15 BURIED ANTENNAS—Several hundred horsepower are saved by this new mounting of antennas under the aircraft skin. The former exterior mounting of antennas caused a drag on speedy planes.