

Astronomy

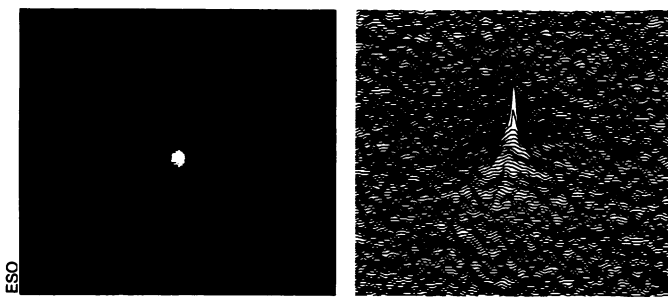
Ivars Peterson reports from Baltimore at the 20th General Assembly of the International Astronomical Union

A distant look at Comet Halley

Out of sight to the naked eye but not out of astronomers' minds or the reach of Earth-based scientific instruments and telescopes, Comet Halley remains under intense scrutiny. Last April and May, astronomers from the European Southern Observatory (ESO), using the Danish telescope at La Silla, Chile, captured images of the comet, then about 1,250 million kilometers from Earth or roughly where the orbit of Saturn lies. The comet was so faint that the scientists needed to combine more than 60 images obtained over 19 nights, an exposure totaling nearly 12 hours, to see details of the comet's structure.

The resulting picture is the most detailed ever obtained of a comet so far from the sun. The comet's avocado-shaped nucleus appears as a small, bright point, which varies in brightness, reflecting rotation of the nucleus. This core appears to one side of a relatively bright, asymmetric region called the inner coma, about 120,000 kilometers across. The somewhat darker outer coma is at least 300,000 kilometers across. The shape and density of the inner coma indicate the comet's nucleus is still releasing dust, which is pushed away from the comet by the solar wind.

"The comet is still active, even at this distance," says ESO's Richard M. West, of Garching, West Germany. ESO astronomers expect to make further observations in early 1989 and in 1990, when Comet Halley will be 1,900 million kilometers away. "Not only may such observations provide a firmer basis for the determination of the rotation [period] of the nucleus, they also carry cometary research further into the outer reaches of the solar system than ever before attempted," he says.



These computer-processed images of Comet Halley show the comet's small, bright nucleus, asymmetric inner coma and larger, elongated outer coma. The three-dimensional representation (right) illustrates the relative brightness of the nucleus as compared with the coma.

Pieces of a fluffy comet

Measurements during spacecraft encounters with Comet Halley (SN: 5/24/86, p.327) revealed that dust shed by the comet contained elements such as hydrogen, carbon, oxygen, silicon and magnesium. Those observations indicate the dust particles probably consist largely of water ice, silicates and various hydrocarbons. J. Mayo Greenberg of the University of Leiden in the Netherlands suggests these materials are layered within tiny, capsule-like grains. Each grain has a silicate core, surrounded by an inner mantle of hydrocarbon material and an outer mantle of ice flecked with minute, dark particles. Hundreds of these grains stick together to form a single dust particle, producing a fluffy aggregate, about 80 percent empty space, with an average diameter of 5 microns.

"Such a model would explain practically all that we observed in the dust of [Comet] Halley," says Vassily I. Moroz of the Space Research Institute of the USSR in Moscow. Whether the dust from Comet Halley is typical of interstellar dust is unknown. Researchers have proposed a number of alternative models for interstellar dust (SN: 6/18/88, p.396).

Biomedicine

AIDS: Even *in vivo*, evolution persists

The AIDS virus, HIV-1, is notorious for its ability to mutate rapidly, making it a difficult, "moving target" for scientists trying to develop an effective AIDS vaccine. New research reported in the Aug. 4 NATURE provides a genetic explanation for some of the clinical complexity of AIDS infection, and supports previous findings that rapid and significant HIV-1 mutation may be rampant within individuals even after initial infection (SN: 4/9/88, p.232).

Researchers at the University of Alabama at Birmingham and the University of Miami (Fla.) School of Medicine cloned and analyzed the genetic makeup of AIDS viruses isolated from two infected patients over a 16-month period. In 3 samples, they found 17, 9 and 13 distinguishable varieties of the virus. The limited degree of difference among the varieties suggests the viral variants evolved after the patients were first infected.

"The results indicate that HIV-1 variation . . . is rapid, that a remarkably large number of related but distinguishable genotypic variants evolve in parallel and coexist during chronic infection, and that 'isolates' of HIV-1 . . . consist of complex mixtures of genotypically distinguishable viruses," the researchers say.

Related work by the Alabama researchers in collaboration with scientists at the National Cancer Institute in Bethesda, Md., and the Walter Reed Army Institute of Research in Washington, D.C., indicates different HIV-1 clones may prefer to infect different types of white blood cells. This may account for the heretofore unexplained variation in HIV infectivity of T-cells and monocyte-macrophages.

Herb offers headache re-leaf

An herb used as a folk medicine in Europe to prevent migraines did indeed cut the number and severity of such attacks in a small study. The herb, called feverfew, reduced the nausea that often accompanies migraines, but did not shorten the headaches' duration when they occurred.

Writing in the July 23 LANCET, three researchers from University Hospital in Nottingham, England, report a 24 percent reduction in the number of headaches among those taking daily capsules of ground feverfew leaves. The study involved 60 adults who had suffered at least one migraine a month for the past two years. Half received the herb and half placebo for the first four months of the double-blind, eight-month study. Then researchers reversed the two groups. None of the patients suffered serious side effects.

While no one knows for certain what causes migraines, one theory contends blood platelets cause the headaches when they release abnormal amounts of serotonin, a compound that constricts blood vessels. Feverfew inhibits serotonin release *in vitro*, the researchers say.

Highballs and the heart

In the latest and largest study of its kind, researchers in Boston found that compared with nondrinkers, middle-aged women who consume moderate amounts of alcohol have approximately half the risk of heart disease after adjustment for other coronary risk factors. Alcohol consumption was also associated with a decreased risk of ischemic stroke — a potential complication of arterial disease in which blood and oxygen supply to part of the brain is blocked.

Similar associations have been noted in men, although the data on strokes have been conflicting. The associations in women, which the researchers say are "likely to be causal," were observed with as much as 25 grams of alcohol per day, or about 15 drinks per week. Researchers at Harvard Medical School and Harvard School of Public Health report the findings in the Aug. 4 NEW ENGLAND JOURNAL OF MEDICINE.