A distant Halley stages a bright outburst

They intended only a routine observation of a heavenly body nearly faded from view — an object that since 1988 has appeared as a faint speck of light moving away from the sun. But when scientists at the European Southern Observatory in La Silla, Chile, tracked Comet Halley last month, the image they found prompted them to do an astronomical doubletake.

Only after repeating their initial sighting of an unusually brilliant blob moving at exactly the right sky coordinates did the researchers conclude that Halley had undergone a major outburst. Some 2.14 billion kilometers from the sun, the quiescent comet had burst back to life, sporting a new shroud of dust about 200,000 kilometers in diameter and reflecting sunlight 300 times more brightly than predicted.

ESO astronomers Olivier Hainaut and Alain Smette say their discovery, made Feb. 12 and announced last week, establishes a new record: Astronomers have never before observed a cometary outburst this far from the sun.

While scientists debate how frequently such disturbances may occur — researchers have tracked only a handful of comets once they exit the solar spotlight — several astronomers call the new finding unexpected and believe it may boost efforts to uncover the detailed chemical composition of these icy, dust-covered enigmas.

"Of course we're excited; we couldn't believe this was happening," says Hainaut, who along with his ESO colleagues studied the comet for five days. Karen Meech of the University of Hawaii confirmed the ESO results on Feb. 15.

Comet expert Zdenek Sekanina of the Jet Propulsion Laboratory in Pasadena, Calif., notes that although he and other researchers have developed scenarios to explain the outburst, the right explanation "is anybody's guess."

The puzzle stems from the way a comet typically interacts with sunlight. Near the sun, ice on and beneath the comet's debris-pocked crust steadily vaporizes, creating and replenishing the cloud of gas and dust grains that shrouds the comet's solid body. Dust in the cloud, also called the coma, reflects sunlight extremely well, making the comet highly visible from Earth. As the comet heads ever closer to the sun, its brightness may vary considerably as sunlight triggers the explosive release of fast-moving jets of gas from the comet's interior. These jets expel large amounts of dust and gas, creating a larger coma that further boosts the comet's reflectivity.

But as a comet moves away from the sun's warming rays, its temperature plummets and most of its core material can no longer vaporize. Once gas and dust in the coma disperse into space, relatively little new material emerges from the comet to replace it, leaving behind a bare nucleus.

So what made Halley brighten so far from the sun—about midway between the orbits of Saturn and Uranus? Hainaut and other astronomers, including Michael F. A'Hearn of the University of Maryland at College Park, speculate that heat slowly absorbed by the comet when it passed close to the sun vaporized an internal pocket of frozen material. This eventually created sufficient pressure for the gas to burst through a tiny vent in the crust. A'Hearn suggests carbon dioxide (dry ice) as the likely candidate for the vaporized material, since water and dust would remain frozen on the comet's ultracold surface. Even a small amount of expelled gas, he adds, could drag enough dust from the crust to cause the sudden brightening.

Says A'Hearn, who has detected similar outbursts in the comet Chiron, but at slightly smaller distances, "I no longer find [this phenomenon] surprising." But Sekanina maintains that the distance at which Halley's outburst occurred, as well as its suddenness, still makes this event noteworthy. Hainaut told SCIENCE NEWS he plans to resume observations next week, when a full moon no longer obscures Halley's image. — *R. Cowen*

New evidence supports a cofactor in AIDS

A controversial theory that primitive microbes called mycoplasmas play a contributory role in the development of AIDS got new support this week from one of its leading proponents.

Cultured cells infected with both *Mycoplasma fermentans* and human immunodeficiency virus (HIV) — the virus causing AIDS — die more readily than cells infected with HIV alone, according to a team of federal researchers headed by Shyh-Ching Lo of the Armed Forces Institute of Pathology in Washington, D.C. The finding, reported in the March 1 SCIENCE, supports a growing group of investigators championing the idea that mycoplasmas serve as cofactors in some cases of AIDS. Cofactors are independent organisms or molecules that act synergistically to foster or cause disease.

"When we coinfected cells with mycoplasma and HIV, the cell killing was much more dramatic," says Lo. "The implication is that mycoplasmas are important to the pathology of AIDS."

This research goes one step further than studies published last December by HIV-codiscoverer Luc Montagnier of the Pasteur Institute in Paris. They showed that antibodies against a particular piece of a mycoplasma's outer membrane could block HIV infection in the test tube.

Montagnier's studies were the first *in vitro* evidence that mycoplasma infections—found one year earlier by Lo in the blood and tissues of AIDS patients — could accelerate HIV disease. Both studies caused a controversy among retrovirologists, most of whom regard HIV as the sole agent responsible for AIDS (SN: 6/30/90, p.404).

The smallest and simplest organisms that can live without a host, mycoplasmas are strange microbes, now classified as bacteria. Most are innocuous, though some can cause pneumonia, premature labor or kidney disease.

To show that mycoplasma infection could worsen HIV disease, Lo and his colleagues infected separate cultures of human white blood cells — called CD4 lymphocytes — with HIV alone, with *M. fermentans* alone, or with a combination of the two. Cells infected with HIV alone at first died off to 20 percent of their original density, and then recovered to 80 percent after two weeks. But cells infected with both HIV and the mycoplasma nearly died off completely and they only recovered to 20 percent of their original volume within two weeks.

Thomas Folks, from the Retrovirus Diseases Branch of the Centers for Disease Control in Atlanta—a former skeptic of the theory that mycoplasmas can accelerate AIDS — finds Lo's new data persuasive. "I think Lo may be right . . . you have to believe that HIV is probably not acting alone," he says. But Folks adds he won't be convinced completely of the link until epidemiological studies show that most AIDS patients also have mycoplasma infections.

How might mycoplasmas aid and abet HIV infection? "At the present time we don't know the exact mechanism," Lo says. Cells infected with both mycoplasmas and HIV did not clump together to form giant, unhealthy cells called syncytia, as did those infected with HIV alone. They also did not test positive for reverse transcriptase, the enzyme HIV uses to reproduce itself. The assay is probably wrong, however, because mycoplasmas are thought to make a substance which could interfere with it.

Lo speculates that mycoplasmas may have an indirect effect on enhancing HIV infection. This might involve prompting cells to make such cytokines as interleukin-2 or interleukin-6 — immune system stimulators known to activate HIV.

"I think that could be a real possibility," says Joseph Tully, a mycoplasmologist at the National Institute of Allergy and Infectious Diseases in Bethesda, Md. "It's my gut feeling that there are cytokines involved in some way," he says. "It's certainly going to be investigated."

— *C. Ezzell*