New comet might be quite a sight in 1997

Fickle by nature, comets may look tantalizingly bright far from Earth yet fizzle by the time they venture closer. So when it comes to predicting whether one of these icy objects will delight or disappoint, astronomer Brian G. Marsden usually remains cautious.

But new information has now inspired Marsden to compare a recently discovered comet to the great comet of 1811 and Tolstoy's poetic description of it in *War and Peace*:

". . .the radiant star which, after travelling in its orbit with inconceivable velocity through infinite space, seemed suddenly—like an arrow piercing the earth—to remain fast in one chosen spot in the black firmament, vigorously tossing up its tail, shining and playing with its white light and the countless other scintillating stars."

Even if the newly found comet, dubbed Hale-Bopp, doesn't quite live up to Tolstoy's account as it passes near the sun in April 1997, it still might qualify as the first "really good" comet visible to the naked eye in 2 decades, says Marsden of the Smithsonian Astrophysical Observatory in Cambridge, Mass.

Marsden wasn't making literary allusions 3 weeks ago, when Alan Hale of Cloudcroft, N.M., and Thomas J. Bopp of Glendale, Ariz., independently discovered what ranks as the most distant comet ever found by amateur astronomers. Now residing in the constellation Sagittarius, Comet Hale-Bopp lies about seven times as far from the sun as Earth does. Yet even at that distance—beyond the orbit of Jupiter—the comet reflects sunlight well enough to be seen with 10-inch telescopes.

This could mean that the object is big and intrinsically bright. But at first Marsden, like other scientists, didn't let himself get too excited about the discovery, reported in a July 23 International Astronomical Union (IAU) circular. After all, Hale-Bopp's brightness could have a less intriguing explanation.

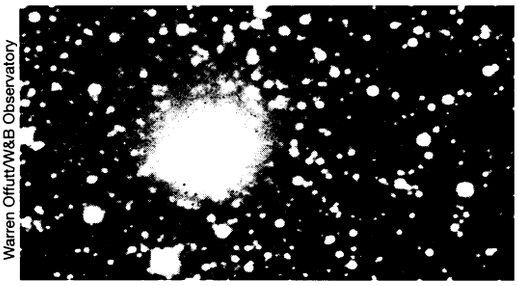
The observers may have imaged the comet just after an outburst, when a pocket of frozen, volatile material just beneath its surface vaporized, he notes. Expelled as a jet of gas, the material would drag dust out along with it, temporarily increasing the reflectivity of the comet and boosting its brightness.

"The question has been, Is this really a big comet, or is it just a comet that has had a big outburst?" says Marsden.

Astronomers have been fooled before by a comet's distant appearance. The highly publicized Comet Kohoutek, unusually bright when discovered, proved a dud when it neared the sun in 1973.

Comets are more likely to exhibit such behavior on their first visit to the inner solar system, explains Marsden. That's because they start their journey with a full supply of highly volatile compounds. These compounds vaporize at very low temperatures, giving the comets a promising glow far from the sun. But some first-timers don't have large reserves of a more crucial material, water-ice, which turns to steam only as a comet nears the sun. If they don't vent steam, comets can't fling out the dusty tails that give them their brilliance.

But recent evidence suggests that Hale-Bopp's current brightness isn't a fluke. Robert H. McNaught of the Anglo-Australian Observatory in Coonabarabran, Australia, reported in an Aug. 2 IAU circular that he has found an image of what appears to be the comet in a single photographic plate taken April 27, 1993. Marsden says that the image, if real, shows that Hale-Bopp already looked relatively bright 2 years ago. This argues against an outburst as the cause of its present appearance. And by comparing the comet's 1993 position with recent observations, Marsden deduces that



Warren Offutt/W&B Observatory

Comet Hale-Bopp imaged with a 0.6-meter telescope on July 24.

Hale-Bopp visits the inner solar system about every 3,000 years.

With new data pouring in, Marsden says the location in the 1993 image looks more and more accurate.

"There's still a chance that the comet underwent an outburst," Marsden says. "But I think we can be optimistic that the comet does have a 3,000-year period and that it's been around many times before."

"Taking the situation at face value," Marsden writes in an Aug. 4 IAU circular, "one can note that the comet is in many respects similar to the great comet of 1811 . . . and *may* perform as spectacularly."

— R. Cowen

Gene ups obesity, accelerates diabetes

The Pima Indians of Arizona suffer from some of the highest rates of obesity and diabetes in the world: Roughly half of all Pimas will develop diabetes by age 40. But the reason for their susceptibility remains a mystery.

Now, the discovery of a genetic defect in a cellular protein thought to help the body burn fat may offer the first clues to the Pimas' health problems.

Researchers from the Johns Hopkins University School of Medicine in Baltimore found that a mutated form of a protein that ordinarily converts fat into body heat appears to promote obesity and accelerate adult-onset diabetes.

"If we could identify people with this gene, we could intervene with diet and exercise," says study leader Alan R. Shuldiner. "And eventually we may be able to circumvent the [protein]."

The protein in question is the beta-3-adrenergic receptor. Rodent studies have shown that this receptor receives signals from the sympathetic nervous system that help to set the animals' metabolic rate. The signals encourage so-called brown fat to generate heat. Researchers believe the same process occurs in humans, but confirmation of this hypothesis remains difficult because people carry, in their trunks and abdomens, only small amounts of brown fat.

Because brown fat appears to play a role in metabolism, Shuldiner's group examined the Pimas for mutations in the DNA that encodes this protein. As the researchers report in the Aug. 10 NEW ENGLAND JOURNAL OF MEDICINE, roughly half of all Pimas carried the mutated form of the receptor. "And these people suffered diabetes at a significantly earlier age," Shuldiner points out.

Pimas carrying this mutation developed diabetes 5 years earlier than their counterparts with normal receptors. The mutation also appeared to increase obesity, especially in the abdomen and chest. This "apple" pattern of fat deposition substantially increases the risk of diabetes and heart disease.

Among other groups in the United States, the researchers found that 25 percent of African Americans and Mexican Americans, as well as 12 percent of Caucasians, carry the mutation.

Collaborations with Finnish and French researchers published in the same issue of the journal support these findings. Finns with the mutation experienced apple-pattern obesity and earlier onset of diabetes, while morbidly obese French with the mutation gained weight faster and became heavier than similarly obese French without the mutation.

Susan Yanovski of the National Institute of Diabetes and Digestive and Kidney Diseases in Bethesda, Md., finds the work "an interesting piece of the puzzle." But she notes that obesity and diabetes result from many genes and that the mutation's effects were modest.

Shuldiner agrees that the findings will not be a magic bullet and points out that diet and exercise remain important. He notes that Pima Indians in Mexico, who still eat a traditional diet, suffer no excess obesity or diabetes.

— L. Seachrist