

Comet Controversy Caught On Film

Several new pieces of evidence — including direct pictures — are bolstering one of the more controversial theories in space sciences: that swarms of tiny comets are hurtling through the solar system and bombarding earth at the incredible rate of 10 million comets per year.

Proposed two years ago by physicist Louis Frank of the University of Iowa in Iowa City, the theory radically challenged accepted ideas and immediately drew fire from much of the space sciences community (SN: 3/29/86, p.199). "If you accept these [tiny comets], your concept of the solar system has to be entirely different from what's in the literature today," says Frank. "It's 10,000 times more material coming into earth than what they thought previously."

Now Frank has pictures to support his claim.

Using a telescope with a moving field of view — a difficult technique that required a year of preliminary calculations to plan — physicist Clayne Yeates has found and photographed what seems to be a population of fast-moving objects near earth that range between 8 and 16 feet in size. These previously undetected bodies match Frank's predictions concerning the speed, direction and number of proposed comets flying by earth, says Yeates, a scientist at the Jet Propulsion Laboratory in Pasadena, Calif. He presented his findings last week at the spring meeting of the American Geophysical Union in Baltimore.

Normally, astronomers keep the view of their telescopes fixed with respect to the stars. But because the proposed comets are small, dark and moving close to earth, astronomers say they cannot be captured on the image of a fixed-view telescope. Yeates, therefore, moved the view at a rate he calculated would keep the comets in focus for a sufficient period — an action akin to skeet-shooting.

Having completed his analysis only within the last month, Yeates has yet to submit his findings to a refereed scientific journal, and his talk at the conference was scheduled at the last minute. Thus, the staunchest critics of the comet theory have not had an opportunity to thoroughly appraise the new information.

Those who have seen the telescope pictures think Yeates may have found something, although they remain far from convinced the photos prove Frank's theory. "I think that people, because of Yeates' results, will have to take [the comet theory] more seriously," says Alexander Dessler, editor of the JOURNAL OF GEOPHYSICAL RESEARCH and a space scientist at Rice University in Houston. But he adds, "I'm not sure Yeates is seeing what

Frank thinks is out there."

At the meeting, Frank also reported a second piece of evidence supporting the small-comet theory. In examining images of the earth taken by an ultraviolet-sensitive camera on the Swedish Viking satellite, Frank found dark spots in the earth's dayglow — an aura of radiation emitted by atoms in the atmosphere. These spots are similar to ones that appeared on images from the U.S. Dynamics Explorer I satellite, which provided the original evidence that led Frank to propose the theory.

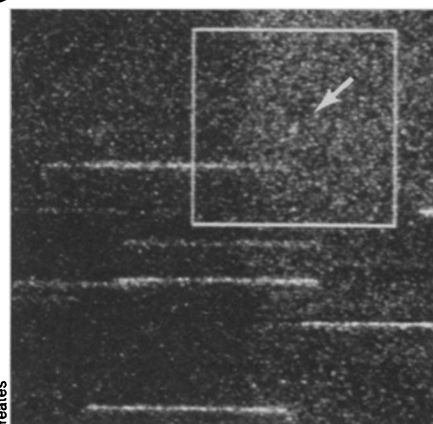
According to Frank's proposal, the comets are loosely packed balls of ice, each weighing about 100 tons. When they reach within about 1,000 kilometers of earth, tidal and other forces rip the comets apart, creating a large cloud of water vapor. Because these ultraviolet-absorbing clouds block out part of the dayglow, they appear as dark spots on the satellite images, Frank says.

Most experts agree that if such a class of comets does exist, it will force a sweeping revision within the canon of the space and planetary sciences. Perhaps most dramatically, this theory would refute the accepted idea that the earth accrued its water supply early in its history from the small planetesimals that formed the planet. Frank proposes that the growth of the oceans is actually a slow process continuing even today with the current bombardment of the comets at an average of roughly one every 3 seconds.

Such an idea has proved unpalatable to many scientists who have calculated that the comets would have contributed several oceans' worth of water by now. In addition, some question what has happened to the comet-borne water on Mars. Others ask about the craters the comets would cause on the moon, which has no atmosphere to vaporize the bodies before they impact. According to some calculations, Dessler says, the comets should be punching football-field-size holes in the lunar landscape, but there are too few craters to account for this activity.

Far from clinching the issue, the recent findings are only "the opening arguments in the second round of debate," Dessler says. When Yeates and Frank report their respective findings in peer-reviewed journals, scientists will be able to scrutinize the new work. Some have speculated that the comets — if they exist — are not as numerous as suggested by Frank and Yeates.

According to Torrence Johnson of the Jet Propulsion Laboratory, "the cautious scientist would say that [Yeates' work] looks possibly very significant, but it needs to stand the test of some other



The white dot in the center of the box (arrow) may depict one of the 10 million small comets that purportedly enter earth's atmosphere each year. To capture the dark, fast-moving comets, the telescope's view was swept across the sky at the calculated comet speed. The long streaks are background stars.

people in the astronomical community looking at the techniques used, and the data." — R. Monastersky

Wrinkles and Retin-A

Tretinoin (brand name Retin-A) — the prescription anti-acne ointment that appears to reverse signs of skin aging — reduces wrinkles, softens skin and lightens pigment spots for at least 16 months in patients who continue using the cream, researchers report.

"What we find in general is that the longer we go, the more improvement we get," says John Voorhees, chairman of the department of dermatology at the University of Michigan Medical Center in Ann Arbor. Voorhees coauthored the original, widely reported, four-month study in the Jan. 22 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, in which Retin-A use was associated with "significant improvement" in sun-damaged or "photoaged" skin (SN: 1/30/88, p.71). He and other researchers presented new data last week in Philadelphia at a conference on skin aging at Jefferson Medical College.

So far, Voorhees says, the most serious side effect is transient skin irritation, which usually subsides "after a couple of weeks." Long-term toxicity, however, has yet to be determined. Also unknown: how the cream works, what the minimum effective dose is, how long the benefits may last after treatment stops and whether the drug helps prevent skin cancer. □