

## Solar system's Canterbury pilgrims

*Iste mirant stella* (here they wonder at the star), reads one of the captions in the Bayeux Tapestry, that textile comic strip that celebrates William the Bastard's conquest of England. The appearance of a comet, probably Halley's, in the invasion year 1066 is thus noted. In a nearby panel is the figure of Archbishop Stigand of Canterbury.

The conjunction of comet and archbishop is not necessarily happenstance. In those days the clergy were the ones who recorded and attempted to explain unusual celestial happenings. A little over 100 years later another Canterbury cleric, a monk named Gervase, recorded that on a June night in 1178, "... the upper horn of the new moon seemed to split in two and a flame shot from it." On the basis of this report, Kenneth Brecher of Boston University and NASA's Goddard Spaceflight Center in Greenbelt, Md., proposes that a swarm of cometary debris, which he calls a new component of the solar system, be named the Canterbury Swarm. He spoke at the recent meeting in Baltimore of the American Astronomical Society.

This Canterbury Swarm seems to have made history on other occasions. Brecher credits it with the Siberian catastrophe known as the Tunguska event of 1908 and an unusual incidence of hits on the moon in 1975. The Canterbury Swarm seems to consist of objects up to about a kilometer in diameter amounting in total to a mass of 100 billion metric tons spread over a region about 15 million km long. The swarm shares virtually the same orbit with comet Encke. It has a period of 3.349 years, and when it comes near or crosses the earth's orbit, it tends to do so in June. The Tunguska event occurred June 30, 1908; the swarm of hits on the moon came between June 22 and 25, 1975.

Brecher hypothesizes that the Canterbury Swarm, comet Encke, two asteroids, a 1976 discovery now called 2212 Hephaistos and a more recent one, 1982 TA, and the meteor swarm known as the northern Taurids came from the breakup of a single progenitor. The breakup needs to have happened before 1178 and may possibly have happened a few thousand years ago. The swarm would be stable in its orbit for a few thousand years.

What Gervase and others who were there saw would have been a hit on the moon just at the point of the crescent. In 1976 J. Hartung found a young crater, now known as Giordano Bruno, in about the right location. The hit would have caused a libration or rocking of the moon — and indeed there is some evidence that traces of that libration still continue. The rocking would have given the appearance of the horn of the crescent breaking in two momentarily. The "flame" would have been debris thrown up by the hit. The event would have been the equivalent of a

10,000 megaton explosion.

The Tunguska event was an atmospheric explosion that knocked down trees for miles around a remote location on the Upper Tunguska River in Siberia. A meteorite or, *a fortiori*, an asteroid hit would have left an impact crater. There is none. Yet the argument against a comet has always been that, comets being mostly ice, one would never have gotten far enough down into the atmosphere to do the damage.

Brecher argues that since, by his hypothesis, one progenitor object yielded the undoubted comet Encke, two undoubted asteroids, a meteor swarm and

## Anomalous anomalon story: Back again

Anomalons are fragments of atomic nuclei that seem to have an anomalously strong propensity to interact with other nuclei. Their history is only a few years old, but it is quite a checkered one: Now you see them; now you don't; lately you do again. Evidence for them was first found by Barbara Judek, a physicist with the Canadian National Research Council in Ottawa. She had a hard job persuading other physicists, but eventually others found evidence, and anomalons became the subject of an international workshop last year (SN: 7/9/83, p. 20).

But at the beginning of this year, experiments failed to find them (SN: 2/25/84, p. 118), and anomalon debunkers said that proponents were revising their opinions. Now comes an experiment by Piyare L. Jain, M.M. Aggarwal and K.L. Gomber of the State University of New York at Buffalo that finds them again, and Jain says, "I stand positive that anomalons exist."

Anomalons seem to represent a previously unknown, highly interactive state of nuclear matter. This is of great scientific interest to nuclear physicists, and given the technological uses of nuclear matter, the importance of a highly reactive form of it does not need to be belabored.

Anomalons occur after atomic nuclei moving with high energies strike solid targets. The incoming nucleus strikes a nucleus in the target and breaks into fragments. It is among the fragments that anomalons are found, three to five percent of the time according to those who have found them. Anomalons betray their character by traveling much shorter distances than nonanomalous fragments before they interact with some other nucleus in the target material.

The experiment of Jain, Aggarwal and Gomber drove high-energy krypton ions (with 1.52 billion electron-volts energy per neutron or proton) against targets of nuclear emulsion. Nuclear emulsion is the same as photographic emulsion but comes in blocks rather than films. Particles make

the Canterbury Swarm, it must have been composed of some mixture of cometary ice and the rocky material of asteroids and meteors. Consequently the bodies in the Canterbury Swarm may be mixtures, and one of just the right composition to get far enough to do the Tunguska damage but not far enough to leave a crater is conceivable. He also points out that that night was "white" in northern Europe. The sky was bright as it would have been if a comet tail were passing close by. The geometry fits that of the Tunguska hit.

The Canterbury Swarm should pass within 30 million kilometers of the earth in June 1985. Brecher suggests optical and infrared searches for it. He also suggests looking for it in the data from the Infrared Astronomy Satellite. —D.E. Thomsen

three-dimensional tracks in it. "After three negative results, it was a difficult and hard struggle to look at it again," Jain says, but the look found anomalons, he and co-workers report in the June 18 PHYSICAL REVIEW LETTERS.

Jain contends that the detectors in the negative experiments were too thick to see the actual anomalon interactions and could not identify them by their products if the change in electric charge of the primary projectile was small. He presents tables of events in which the anomalon flight path was only a few micrometers and the charge change small. He says his discussions with the negative experimenters have moved them to find ways to slim down their detectors. —D.E. Thomsen

## Jails are last stop for mentally ill

In the past month a congressionally appointed bipartisan commission, a behavioral scientist and several mental health clinicians have all concluded that the nation's 3,493 local jails have become holding cells for large numbers of mentally ill citizens.

The Advisory Commission on Intergovernmental Relations reports that "in recent years, local jails have been used to house persons charged with no crime or simply petty violations." Anywhere from 20 percent to 60 percent of all inmates in jails are "mentally ill or disordered," according to the report.

Mentally ill inmates are often subject to physical, sexual and mental abuse, says the commission, and their condition is likely to deteriorate.

An estimated 600,000 mentally ill and retarded persons are now in jails in the United States, says Judith Johnson, director of the Washington, D.C.-based National Coalition for Jail Reform. For many, the mental hospital has been replaced by

the local jail, she adds.

Her contention is hard to document, but a study of police practices in an unidentified Northern city indicates that, for similar offenses, mentally disordered citizens have a significantly greater chance of being arrested than non-mentally disordered people.

Linda A. Teplin, a psychologist at Northwestern University Medical School in Chicago, and co-workers observed 1,382 police-citizen encounters over a 14-month period beginning in 1980. After excluding traffic offenses and other minor incidents, the researchers analyzed arrest rates for 506 police suspects.

The investigators identified 30 suspects with severe mental disorders. Almost 47 percent of this group was arrested, compared with 28 percent of the suspects who showed no signs of mental disorder.

Since most of the mentally disordered citizens committed misdemeanors, "the jail rather than the prison may have become a 'revolving door' for the chronically mentally ill person," says Teplin in the July *AMERICAN PSYCHOLOGIST*.

The findings are preliminary, she notes.

For now, Teplin recommends training police officers to handle the mentally ill; sending persons with minor charges pending to a mental health facility if necessary; establishing programs for people with multiple problems, such as alcoholism and depression; and developing community-based alternatives to hospitalization such as day-care units.

Teplin's suggestions are warranted, says psychologist John Monahan of the University of Virginia in Charlottesville, but it is not clear that the identified mentally disordered people had been released from mental hospitals or would have been sent to these facilities several years ago when commitment laws were less strict.

But in California, people who formerly would have gone to state hospitals are now more likely to be arrested for minor crimes, according to a report in the June *AMERICAN JOURNAL OF PSYCHIATRY*. "There is an urgent need to provide psychiatric services for mentally ill inmates in local jails," write psychiatrist H. Richard Lamb of the University of Southern California in Los Angeles and colleagues.

—B. Bower

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## Long-distance racers give from the gut

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The fatigue a long-distance runner feels after pounding out 6 to 26 miles on the pavement isn't always a simple case of tired muscles. "Sports anemia," a drop in the percentage of iron-rich red cells in the blood that can occur during long bouts of intense exertion, has been recognized for several years, but its source has never been pinned down. Now, two studies of healthy racers published in the June *ANNALS OF INTERNAL MEDICINE* indicate that between 20 and 30 percent of the runners studied lost small but "significant" amounts of blood through their stomach and intestines during a race. The tiny amount lost in a single race is probably harmless, the researchers say, but could interact with other factors to help account for the iron deficiency anemia found in 10 to 15 percent of frequent competitors.

Laurence F. McMahon and colleagues at Yale University studied 32 racers in the 1983 Boston Marathon, while David A. Ahlquist and his research team at the Mayo Clinic in Rochester, Minn., looked at 10-kilometer racers as well as those who ran in marathons.

The conclusions from both studies were similar: Stool samples before the race and in several-hour intervals afterwards showed that up to a third of the runners were losing the equivalent of at least 3 milliliters (ml) of blood per day. (Non-racers typically excrete less than 2 ml per day, Ahlquist says.) One runner in Ahlquist's study lost 11 ml, another lost 18 ml, while a third, after two consecutive days of long-distance running, lost 43 ml of blood.

Exactly why blood seeps through the gastrointestinal tract is still unclear, the scien-

tists say, though they suspect that the repeated jarring of internal organs during a race, or the shunting of blood from gut to muscles that takes place during heavy exercise, might lead to a temporary breakdown in the lining of the intestine. Neither specific length of race nor blood thinning medications such as aspirin seemed to determine the amount of bleeding, and none of the racers had ulcers. In most runners, the excess bleeding stopped within a few days of the race.

Lest recreational joggers hang up their tennis in fear that their life's blood is oozing away, McMahon cautions that the findings seem tied to the extreme exertion of long-distance racing and competitive training. "Our findings say nothing about Joe and Jane Jogger," McMahon told *SCIENCE NEWS*. "Running is a great way to keep in shape, and nothing from our results suggests that it's bad for you."

Iron deficiency anemia can be successfully treated with iron supplements. Nonetheless, both McMahon and Ahlquist are anxious to identify factors that influence the bleeding in order to better understand how heavy exercise shapes normal physiology. "If we're going to check for blood in stools to screen for [the possibility of] colon cancer, for example, we need to ask how many of our patients run," Ahlquist says. At the same time, McMahon cautions that the estimated 10 to 30 million long-distance runners in the United States should not automatically discount blood in their stool as a harmless by-product of exercise, but rather should check with their doctors to rule out more malignant sources.

—D. Franklin

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## Liquid droplets on high

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Many meteorologists believe that thin wispy cirrus clouds play an important role in determining both the amount of solar radiation that reaches the earth and the amount reflected by the planet back to space. Their models, though, are built upon the widespread assumption that because of low temperatures at altitudes of 20,000 to 40,000 feet, where such clouds are common, the clouds are composed of ice crystals. But recent measurements show that the lowest layers of cirrus clouds sometimes are composed of liquid water. The finding is leading researchers to revise their radiation models.

In a report to the National Science Foundation, Kenneth Sassen of the University of Utah in Salt Lake City described his measurements of liquid water in cirrus clouds at temperatures of  $-35^{\circ}\text{C}$  to  $-36^{\circ}\text{C}$ . At such temperatures cloud droplets are believed to freeze rapidly, yet liquid cloud droplets have been observed at this temperature, Sassen says. He attributes the phenomenon at such high altitudes to the dearth of particles that provide droplets with a nucleus around which to freeze. "The air up there may be so clean that there are not many of the particles we take for granted," he says.

Sassen, working with Kuo-Nan Liou, also of the University of Utah, collected his data from cirrus clouds 8.2 kilometers over Boulder, Colo. Measurements were gathered from lidar readings, in which laser beams are bounced off the clouds and returned to a ground-based sensor. Measurements by a high-flying aircraft confirmed the lidar observations that the base and up to 91.5 meters into the cloud were composed of liquid cloud droplets.

It is not yet clear how prevalent the phenomenon is. Still, liquid water differs from ice in ways that affect calculations of the radiation balance. In this light the researchers are adjusting their theoretical models to study the transfer of solar and terrestrial radiation through the liquid cloud layer.

—C. Simon

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## Shuttle launch aborted

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Engineers at Kennedy Space Center in Florida this week were back at work trying to ready the third and newest U.S. space shuttle, Discovery, for its maiden flight, following an on-board malfunction that stopped the ignition of the craft's three main rocket engines—one was already firing—only four seconds before the intended June 26 liftoff. The oft-postponed launching had been most recently attempted the day before, but that try was canceled with minutes to go because of an apparent hardware failure in one of Discovery's five main on-board computers. At SN's deadline, it was uncertain whether the latest delay would last days or weeks. □