# Astronomy

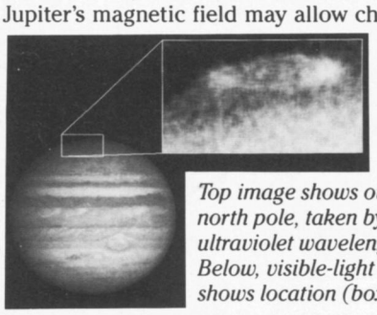
## Hubble images Jupiter's aurora

Last February, while the Ulysses spacecraft probed the magnetic field surrounding Jupiter (SN: 2/22/92, p.118), the Hubble Space Telescope recorded the first ultraviolet image of an aurora above Jupiter. The image represents the sharpest picture of this Jovian phenomenon ever taken at any wavelength.

Auroras occur when charged particles strike the magnetic field surrounding a planet and then spiral inward toward the planet's magnetic north and south poles. Above Earth, charged particles from the solar wind trigger auroras. In the case of Jupiter, astronomers believe that its volcanically active moon, Io, provides the charged particles. Io spews out sulfur and oxygen atoms that become ionized and fall under the influence of Jupiter's intense magnetic field.

The oval aurora imaged by Hubble corresponds roughly to the region where Jupiter's magnetic field lines would pass through Io's orbit and enter the Jovian atmosphere. Thus, the picture offers supporting evidence that Io indeed supplies the ions that create Jupiter's aurora, says John Caldwell of York University in North York, Ontario.

Researchers can't fully explain why the western edge of the aurora appears brighter, he adds. But the effect may stem partly from the time of day — late afternoon on the planet — when Hubble's faint-object camera took the picture, Caldwell notes. At that time, the orientation of the solar wind pushing on Jupiter's magnetic field may allow charged particles to penetrate one section of the Jovian atmosphere more easily, causing part of the aurora to glow more brightly.



Caldwell/NASA/European Space Agency

*Top image shows oval aurora above Jupiter's north pole, taken by Hubble on Feb. 8 at an ultraviolet wavelength of 1,600 angstroms. Below, visible-light image of Jupiter's full disk shows location (box) of northern aurora.*

## Space tomatoes: The fruits of research

For nearly six years, packages containing 12.5 million tomato seeds circled our planet. The project was one of 57 experiments housed aboard the Long Duration Exposure Facility, which a shuttle crew finally brought back to Earth in January 1990.

Amid some media hoopla that they might bear poisonous or severely mutant fruit, the space-exposed seeds were distributed in March 1990 to some 64,000 teachers and 3.3 million students in the United States and abroad. NASA has now summarized 8,000 reports sent to the agency about the seeds.

The findings indicate that the space-exposed seeds germinated slightly faster — in 8 days compared with 8.3 — than Earth-bound control seeds. Plants grown from the space seeds grew faster for the first three to four weeks, exhibited premature chlorophyll development and had greater levels of chlorophyll than controls. The space plants also had a surprisingly low rate of mutations that altered physical appearance, such as speckled fruit or variations in leaf color.

When teacher Ken Selee of Brown Elementary in Turlock, Calif., became the first to produce a ripe tomato from the seeds, his classes celebrated by organizing the first Bacon, Lettuce and Space Tomato Sandwich Party. Selee also published a newsletter that kept schools informed about the experiments.

And then there was the report of a budding scientist from Ontario: "Dear NASA: Hi. My name is Matt. I am in grade 2. I really enjoy growing my plants. Here are my results. My Earth seed did not grow. My space seed grew but it fell off my desk. It died."

# Behavior

*Bruce Bower reports from Washington, D.C., at the annual meeting of the American Psychiatric Association*

## Prior abuse stokes combat reactions

Physical or sexual abuse during childhood may leave psychological wounds that promote the development of post-traumatic stress disorder (PTSD) among soldiers exposed to combat, according to a study of Vietnam veterans.

Abused individuals may learn to wall off emotionally charged experiences and memories through a process called dissociation, says J. Douglas Bremner of the Veterans Administration Medical Center in West Haven, Conn. After combat, these people may avoid talking about traumatic events and may instead experience persistent PTSD, Bremner asserts. PTSD symptoms include nightmares about a prior trauma, numbing of emotions, sudden, angry outbursts, and panic in response to situations that symbolize or recall the trauma.

Bremner's group compared 38 Vietnam combat veterans seeking help for PTSD with 28 Vietnam combat veterans seeking medical treatment but not suffering from PTSD. On a self-report questionnaire, 29 percent of the PTSD group described childhood physical or sexual abuse; 7 percent of the other group noted such incidents. This difference remained when researchers controlled statistically for the greater combat exposure of men with PTSD. Interviews uncovered no tendency among PTSD sufferers to remember or report child abuse more easily than the other veterans.

However, the data do not imply that child abuse causes combat-related PTSD, Bremner notes. Some people with a history of child abuse may harbor a "sensitivity" to developing PTSD in response to trauma, but most veterans suffering from this psychiatric disorder reported no child abuse, he says.

The new findings indicate that child abuse can foster the link between dissociation and PTSD (SN: 3/26/88, p.197), says Joe G. Fagan of Walter Reed Army Medical Center in Washington, D.C., who served as chief psychiatrist for Operation Desert Storm. Researchers need to examine whether soldiers under the influence of alcohol or illicit drugs display a heightened tendency to dissociate following intense combat, he adds.

## Schizophrenia's defining trends

Many psychiatrists regard the introduction of antipsychotic medication in the 1950s as a boon for the long-term adjustment of people with schizophrenia, a devastating disturbance of thought and emotion. But an analysis of research conducted over the past century indicates that psychiatric definitions of schizophrenia, rather than new treatments, primarily account for observed improvements or declines in the condition of schizophrenics over time.

James D. Hegarty of McLean Hospital in Belmont, Mass., and his colleagues identified 359 studies from the United States, Europe, Russia and China in which scientists used specific criteria to diagnose schizophrenia in 15 or more individuals and then tracked the patients' progress for at least one year.

At least 15 percent of the schizophrenics studied from 1900 to 1930 showed significant improvement, Hegarty's team contends. That figure rises to 30 percent between 1930 and 1970 and then declines to about 15 percent again in research covering the past 20 years, they say. Studies in the first and last time periods generally used narrow definitions of schizophrenia, often requiring continuous signs of disturbance for at least six months. Projects in the middle period relied on broader definitions with no minimum time limits on symptoms.

"In studies from 1930 to 1970, more patients got better because they had milder problems to begin with," Hegarty maintains.

The poorer outcome for schizophrenics studied after 1970 may also reflect the discharge of many patients from state mental hospitals and the lack of community mental health care for people with severe psychiatric disorders, he adds.