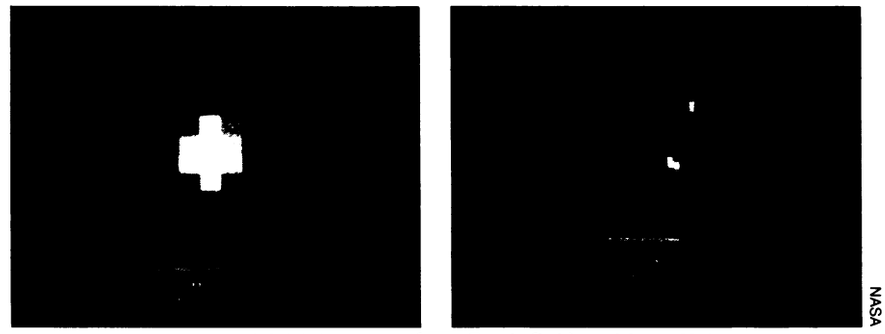
Hubble finally has the stars in its eyes



NASA

Part of the star cluster NGC 3532 as seen from Earth (left) and from Hubble.

"First light" – the Hubble Space Telescope's first look into space – elated scientists and engineers who had worked so long to ready and orbit the $2 billion craft. "Our image quality is significantly better than we were concerned that it might be," says James Westphal of the California Institute of Technology in Pasadena.

On May 20, ground controllers at NASA's Goddard Space Flight Center in Greenbelt, Md., commanded Hubble to take two photos of the same area, one exposed for 1 second and the other for half a minute. The subject of the telescope's first photographs was part of an open star cluster known as NGC 3532 in the southern-sky constellation Carina, or the Ship's Keel. Enhancement of the first photo later revealed that what had appeared as a single, diffuse bright spot was actually two stars (shown at right), although it remained unclear whether the two orbited each other as a binary system.

For comparison, the left image depicts the same region as it was photographed from the ground by Eric Persson of the Las Campanas Observatory in Chile, using the 100-inch DuPont reflector telescope. This image was made through a visible-light filter equivalent to the one on the space telescope, using the same kind of charge-coupled device to detect the star cluster's light. The angular resolution or sharpness of the picture is 1.1 arc-seconds. The space-based image has a resolution of about 0.2 arc-second.

Since Hubble's April 25 release from the space shuttle, engineers have labored to improve the instrument's focus by adjusting its mirrors. Westphal, chief scientist of the wide-field/planetary camera that captured Hubble's first light, says the adjustments should approximately double the sharpness of its pictures. Engineers also want to reduce several wobbles and aiming uncertainties that limit the telescope's aiming accuracy. Along with better focusing, improved stabilization should help sharpen photos that require the telescope to hold steady for extended periods.

Still awaiting their first light from the stars are the telescope's other scientific instruments (SN: 1/6/90, p.8). These include two spectrometers that measure light to see what it shows about the composition and temperature of its source; a camera designed to look specifically at faint objects by counting individual photons of light; and a high-speed photometer to measure brightness changes as brief as 20 millionths of a second in objects such as pulsars. Also part of the research equipment is the telescope's guidance system, which will measure subtle motions such as those of stars that may be wobbling because they have planets orbiting around them. The telescope should begin its actual scientific studies in about three to six months.

– J. Eberhart

Bright-light therapy expands its horizons

Over the last decade, researchers have found that daily doses of bright light markedly improve the mood of people with recurring depressions that emerge only in winter (SN: 5/21/88, p.331). But light therapy also offers rays of hope for those suffering from nonseasonal depression, as well as for chronic "night owls" whose inability to fall asleep until the wee hours of morning causes them serious daytime problems, according to two preliminary studies described at last week's annual meeting of the American Psychiatric Association in New York City.

"Light therapy is more versatile than anyone expected," concludes Norman E. Rosenthal of the National Institute of Mental Health (NIMH) in Bethesda, Md., who coauthored one of the new reports.

In a study directed by Daniel F. Kripke of the University of California, San Diego, bright light benefited 25 male veterans hospitalized for severe, nonseasonal depression. The men stayed in a room illuminated with 1,600 watts of bright white light between 8 p.m. and 11 p.m. every night for one week. Another 26 depressed men received similar treatment with dim red light. No one in the study was taking antidepressant medication.

Compared with the dim-light group, men exposed to bright light reported an 18 percent reduction in depression symptoms at the end of the week.

Although researchers have yet to test the long-term effects of light therapy, the one-week results offer encouragement, especially since it takes several weeks for antidepressant drugs to begin to ease depression. Combining bright lights with drug treatment may speed recovery from a bout of depression, Kripke asserts.

The San Diego scientists are not sure why light therapy worked with nonseasonal depression. But Rosenthal suggests that the circadian timing system that governs sleepiness, hormone levels and other daily cycles of the body and behavior may be out of sync in nonseasonal depression. If the biological clock in these patients has shifted forward several hours – a phenomenon observed in cases of winter depression – then bright-light exposure in the evening could push the clock back, he says.

On the other hand, people with a slow-running biological clock often cannot fall asleep before 2 a.m. and then labor to stay awake and alert throughout the morning. This condition, known as delayed sleep phase syndrome (DSPS), often leads to abuse of caffeine and other stimulants upon waking and tranquilizers and alcohol in the nightly struggle to doze off.

Bright lights appear the best tonic for DSPS, reports Jean R. Joseph-Vanderpool of NIMH. He, Rosenthal and their coworkers advanced the circadian rhythms of 20 people with DSPS by having them sit in front of a bright-light screen for two hours every morning and then wear dark goggles for two hours just before dusk. After two weeks, participants fell asleep an average of two hours earlier and were substantially more alert in the morning. When the same group was exposed to dim light in the morning and wore clear goggles in the late afternoon, they fell asleep an average of one hour earlier than before treatment and did not experience the heightened morning alertness reported after bright-light treatment.

The volunteers, most of whom were in their early 30s, had grappled unsuccessfully with DSPS for more than half their lives. When contacted six months after the study, nearly all had purchased a bright-light screen and found it effective when used every morning.

"This problem is often perceived as laziness in the morning and willfulness at night, particularly by the parents of teenagers with DSPS," Rosenthal remarks. The prevalence of DSPS is unknown, but the condition appears most often during adolescence and young adulthood, when the circadian pacemaker is considerably slower than it is later in life, he notes.

– B. Bower