of Nebraska. Three of them issued a joint statement deploring the use of fetal cells in research and calling on UNMC to desist. Creighton University, a Jesuit school in Omaha, threatened to break off a collaboration with UNMC, and at least one Creighton faculty member quit the UNMC lab where he was doing research. Creighton's interim vice president for health sciences, M. Roy Wilson, insists that the faculty member left on his own, not under duress, as some have claimed. "We believe firmly in academic freedom," Wilson says, but he adds that, "we do not condone fetal cell research."

Other state politicians took up the issue, as did members of Nebraska's federal delegation—including U.S. Representative Lee Terry (R) and Senator Chuck Hagel (R). Both issued statements deploring the use of fetal tissue from abortion clinics. The state attorney general, Don Stenberg, who is planning to run for the Senate this year, also opposes the use of fetal tissue.

The scientist whose work lies at the center of this political storm, Howard Gendelman, says he's simply trying to advance what he believes is some of the "hottest" research being done on viral infection and dementia. For more than a decade, Gendelman has investigated how HIV interferes with normal brain function. His center at UNMC, which he says now includes more than 30 scientists, has focused on microglial cells, the role of inflammation in Alzheimer's disease, and patterns of damage and regeneration in brain tissue. This research depends on a supply of cultured brain cells, Gendelman says, and only cells derived from fetal tissue propagate adequately in culture. Gendelman is grateful that the university has given him solid support, and he says that officials have "put their jobs on the line" for his research.

The university has tried to accommodate the activists by promising to create a new bioethics review panel and to find "alternate sources" of human cells. William Berndt, UNMC's vice chancellor for academic affairs, says the university has contacted all area hospitals in an attempt to collect tissue from miscarriages, stillbirths, and ectopic pregnancies. It is also trying to set up a program of rapid autopsy to recover brain cells from adults. But Berndt has acknowledged that getting viable new sources may be difficult.

Gendelman, meanwhile, is recovering from a grueling month. He received a 1-week extension for an $8 million grant application that he was compiling just as the political furor exploded in Omaha and submitted it to the National Institutes of Health on 6 January. The grant, if funded, would support his center for 5 years. But Gendelman knows that the battle over the "soul of the university" is far from over: "We're right in the middle of it now. I don't know how it will play out."

–ELIOT MARSHALL

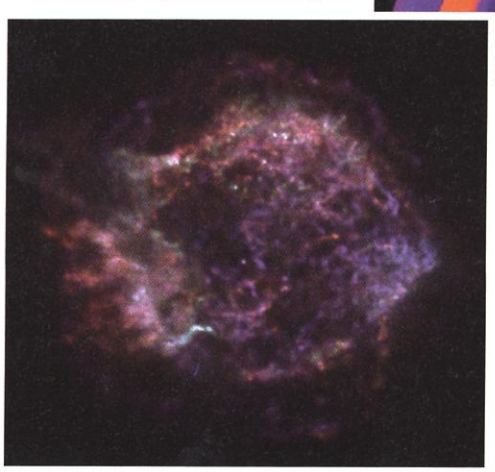
ASTROPHYSICS

Supernova Pumps Iron In Inside-Out Blast

Just in time for today's opening of the big-screen thriller *Supernova*, astronomers have assembled a portrait of a real-life star in our galaxy that blew up 300 years ago. It reveals a supernova more twisted than Hollywood writers could have imagined, with parts of the star's deepest core hurled into space the farthest and fastest.

The images, taken last August by NASA's newly launched Chandra X-ray Observatory and published in the 10 January issue of *Astrophysical Journal Letters*, promise to help unravel the violent processes by which giant stars spew oxygen, silicon, iron, and other vital elements into space during their dramatic death throes. In particular, Chandra's observations mark the first time that astronomers have clearly identified freshly formed iron within the hot maelstrom of gas created by a supernova. The exploding star forged ironlike elements only near its core, but this dense matter somehow blasted out through a thick shroud of helium and other lighter elements perhaps 20 times more massive than our sun.

Theorists had already suspected, based on computer models and distinctive radiation seen from Supernova 1987A in the nearby Large Magellanic Cloud galaxy, that turbulence at the center of a supernova would propel bullets of iron-rich material through a star's outer layers. Even so, Chandra's confirmation of that scenario has excited supernova veterans. "These data go a long way toward illustrating that the star really did blow up inside-out to a surprising degree," says astronomer Robert Fesen of Dartmouth College in Hanover, New Hampshire. Adds astrophysicist Adam Burrows of the University of Arizona in Tucson: "The mere fact that they are seeing iron is a great milestone."



Cosmic alchemy. This image *(above)* from the Chandra X-ray Observatory of supernova remnant Cassiopeia A shows rich blobs of iron (red regions, lower left) far from their origins at the core of the star. Computer simulations *(above right)* suggest that turbulence at the core of a supernova can rifle plumes of such heavy elements into space.

Chandra's quarry was a supernova remnant called Cassiopeia A (Cas A), about 11,000 light-years away. Although the timing of the star's death is uncertain, astronomers believe that light from the explosion reached Earth in 1680—making Cas A the youngest known supernova remnant in our Milky Way. Debris within the remnant, now more than 10 light-years across, still flies outward at thousands of kilometers per second and spawns fierce shock waves as it plows into other matter in space. The shocks zoom back into the remnant and push its gas temperatures to tens of millions of degrees, making the entire cloud emit torrents of x-rays.

Iron within Cas A eluded detection until

CREDITS (LEFT TO RIGHT): NASA/CXC/SAO; K. KIFONIDIS *ET AL.*, MAX PLANCK INSTITUTE FOR ASTROPHYSICS

now because the iron-rich knots are small, and previous x-ray satellites lacked the resolution to see them. Nor could optical telescopes spot the iron, because it barely shines at visible wavelengths. However, Chandra combines a powerful x-ray sensitivity with eyesight about as sharp as that of the best optical telescopes on the ground.

A team led by astronomer John Hughes of Rutgers University in Piscataway, New Jersey, used Chandra's clear vision to find that the most iron-rich blobs were at the fast-moving fringes of the expanding cloud. Such blobs, astronomers believe, could only arise deep within the core of the blast from the flash fusion of silicon atoms into unstable atoms of nickel, a process that lasts a fraction of a second and requires temperatures of at least 5 billion degrees. The nickel decays first into cobalt and then iron, driving the supernova's light display as intense radioactivity makes the explosion glow white-hot.

Hughes and his co-workers also saw plenty of silicon-rich blobs in Cas A, believed to arise from the explosive burning of oxygen atoms into silicon further out from the core at temperatures of perhaps 3 billion degrees. However, the images from Chandra reveal that the silicon-rich material is closer to the middle of the Cas A remnant than the iron-rich nuggets. "The deeper iron-rich ejecta is the last stuff that got out of the star, yet it's now the farthest from the center of the explosion," Hughes says. That argues strongly against a neat, spherically symmetric "onion-skin" explosion, in which the star's outermost layers would expand most quickly into space.

Researchers had seen hints of this asymmetry in Supernova 1987A, notes astrophysicist Stan Woosley of the University of California, Santa Cruz. Computer simulations by Burrows and others also suggest that massive instabilities in the first few seconds of a supernova blast should create "crooked fingers" of heavy elements that poke through the overlying star. However, the distribution of elements within Cas A may be more topsy-turvy than predicted by simulations. Further analysis of Cas A and other supernova remnants may help theorists re-create the exotic physics of the initial moments of the detonations. Two other powerful x-ray observatories will contribute to this effort: the European Space Agency's X-ray Multi-Mirror satellite, launched in December, and Japan's Astro-E, scheduled for launch early this year.

Chandra's observations also deepen an enduring mystery about Cas A: Why didn't 17th century observers see it more clearly? English astronomer John Flamsteed may have spied it in 1680 as a very faint "star," a description at odds with the potent radioactive energy that the explosion should have unleashed when its nickel-rich ejecta decayed into iron. "It must have been a brilliant supernova," says Woosley, who posits that "a whole lot of dust" near the star and between Earth and Cas A made it nearly invisible. Moviegoers can rest easy, however: Hollywood scriptwriters would never permit any such effect to dim the supernova now terrorizing our screen heroes in space.

–ROBERT IRION

CREDIT: NA'AMA GOREN-INBAR/HEBREW UNIVERSITY

ARCHAEOLOGY

Dredging at Israeli Site Prompts Mudslinging

A prehistoric site critical for understanding early human evolution appears to have suffered permanent damage after a local Israeli drainage authority allegedly bulldozed a big chunk of it last month. Prehistorians claim that the earthmoving, undertaken to prevent flooding of nearby farms during rainstorms, has destroyed their ability to make sense of the complex layers at Gesher Benot Ya'aqov, on the banks of the river Jordan in northern Israel. "This wanton destruction is a travesty that has caused irreparable damage to a site of worldwide significance," says archaeologist Steven Rosen of Ben-Gurion University in Beersheva, Israel. But according to the drainage official who oversaw the project, scientists are exaggerating the harm done to the site.

Happier times. A Hebrew University–led dig at Gesher Benot Ya'aqov.

While the current state of Gesher is contested, the site's importance is not. Gesher Benot Ya'aqov was first discovered in the 1930s and has been excavated several times since. Along with the nearby prehistoric site of Ubeidiya, also in the Jordan valley, Gesher is a key location for understanding how and when *Homo erectus*—an ancestor of modern humans—moved out of Africa, probably through the so-called Levantine corridor that includes Israel. "Israel and the Jordan valley are one of the great crossroads of human prehistory," says Clive Gamble, an archaeologist at the University of Southampton in the Unit-

ScienceScope

Inside Candidate A new name tops the list of potential future directors of the National Institutes of Health. Two high-level officials at different NIH institutes in Bethesda, Maryland, say that Gerald Fischbach, director of the National Institute of Neurological Disorders and Stroke (NINDS), is in the running to succeed Harold Varmus. Fischbach chaired the neurobiology departments at Harvard Medical School and Massachusetts General Hospital in Boston before taking charge of NINDS in July 1998. Through an assistant, Fischbach declined to discuss the rumor.

Wish Granted National Science Foundation director Rita Colwell has an extra bounce in her step, the result of winning White House approval for a double-digit budget increase. *Science* has learned that President Clinton's 2001 request, to be unveiled on 7 February, will include a boost of roughly 15% for the $4 billion agency. Congressional approval would mean the biggest spending increase for NSF in a decade and more than double the 6.6% raise the agency got this year.

NSF's budget is expected to highlight four areas. Three are ongoing efforts, in training, information technology, and biocomplexity, while the fourth—nanotechnology—is part of a new Administration initiative. The White House also has given the green light to EarthScope, which would create a mobile seismic network and probe California's San Andreas fault (*Science*, 26 November 1999, p. 1655), and to NEON, a string of high-tech field stations for ecologists (*Science*, 10 December 1999, p. 2068).

Small Spark Managers of the overbudget National Ignition Facility (NIF) at last have something to smile about. An independent panel appointed to get the laser fusion project "back on track" (*Science*, 10 September 1999, p. 1647) released a report this week that gives a qualified thumbs-up to the facility. The panel did find that the $1.2 billion project has "significant" managerial shortcomings, including inadequate oversight and emergency funds. However, says chair John McTague, "the panel has not uncovered any mechanical or technical obstacles that would prevent completion of NIF."

Some observers are less sanguine. The panel has underestimated the engineering challenge of getting a pellet of hydrogen to fuse and release energy, argues the Natural Resources Defense Council's Chris Paine, who contends that the report "is making an open endorsement for a system of potentially infinite cost."