cultured cells is relevant to the disease."

Although the new results suggest that overproduction of β-amyloid causes Alzheimer's disease in the Swedish family, they don't settle the question of β-amyloid's role once and for all. For one thing, Younkin's group actually found lower β-amyloid production when they tested another mutant APP gene that has been associated with familial Alzheimer's. That doesn't necessarily mean that the mutation doesn't cause Alzheimer's, Younkin says. He notes that β-amyloid varies in length from 39 to 43 amino acids and his assay can't discriminate among the variants. It's possible, he speculates, that this other mutation causes more of the longer β-amyloid variants to be produced even while the total amount goes down, and that the longer variants are more prone to form amyloid deposits than the shorter ones. That has yet to be demonstrated, however. Meanwhile, says Rudolph Tanzi of Harvard Medical School, whose work focuses on the neurogenetics of Alzheimer's, the discordant findings with the two mutants raise a question about whether the production of β-amyloid is part of the mechanism of Alzheimer's pathology. It may well be that it is, he says, "but the jury is still out."

Everybody in the field agrees that one way to bring that jury to a verdict would be to insert the APP gene with the Swedish mutation into mice to see if the animals develop Alzheimer's pathology. But previous difficulties with using APP gene transfer to develop mouse models for Alzheimer's suggest this may not be such an easy thing to do (*Science*, 6 March 1992, p. 1200). Many groups are trying to accomplish the feat, however. Another possibility, suggests Younkin, is to measure β-amyloid concentrations in spinal fluid from affected and unaffected members of the Swedish Alzheimer's family. Finding higher concentrations in family members with the disease would support the idea that increased β-amyloid production is important.

Although Selkoe concedes the importance of animal models, he doesn't think people should overlook the virtues of using cultured cells to study β-amyloid production. They could, for example, help resolve an issue that has just cropped up in his group's work, which has produced circumstantial evidence suggesting that the lysosomes may not be the site of β-amyloid formation after all. The cell culture system should also be useful for identifying the enzymes that release β-amyloid, which are potential drug targets, as well as screening for drugs to prevent β-amyloid formation. "Before we [Selkoe and Younkin] showed that cells continuously produce the β peptide, we had no way to study the dynamic aspects of β-amyloid formation" Selkoe says. "Now we can do that." And studying that process could help resolve the vexatious, chicken-or-egg status of β-amyloid.

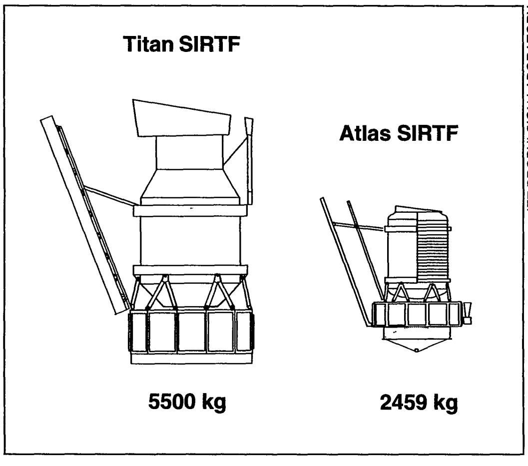
–Jean Marx

Astronomers Meet in Phoenix, Recount a Stellar Year

Despite a tightening of the National Aeronautics and Space Administration's budget and the trouble with the Hubble Space Telescope, astronomers were starry-eyed over their latest findings, presented at the major annual meeting of the American Astronomical Society, (AAS) January 3 to 7. New images and measurements of stars, galaxies, cosmic microwaves, and mysterious gamma rays, along with an exciting nova explosion, made it a bright year for those working with existing orbiting satellites and ground-based telescopes, though uncertain funding clouds the future.

A Leaner, Meaner Infrared Satellite

Last year things looked bleak for the Space Infrared Telescope Facility (SIRTF), says project scientist Michael Werner of the Jet Propulsion Laboratory. The proposed $1.3 billion satellite was a high piority for the astronomy community, promising to reveal hidden details of distant stars and galaxies. But Congress deemed it a lowly "technology activity" and denied funding to start building the spacecraft. NASA was left with $8 million to develop the infrared detection technology and only $150,000 for engineering.



JET PROPULSION LABORATORY

Smaller, faster, cheaper. The new, version of the infrared observer, SIRTF, may cut costs by as much as half—and weight by an even larger fraction.

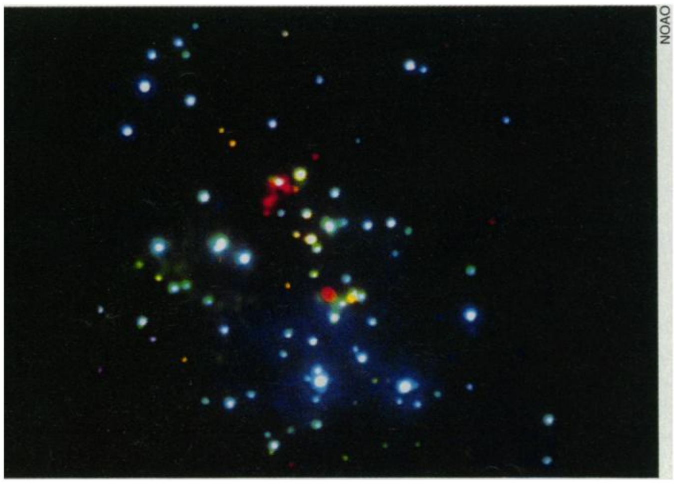
Now astronomers are back with a leaner proposal they hope will be more to Congress's liking. SIRTF planners combined the engineering money with money already approved by Congress in the previous year and went back to the drawing board. "We had to come up with a smaller, lower mass, less expensive mission," says Werner. At the AAS meeting they displayed their new conception: a smaller spacecraft designed to orbit the sun instead of the earth. The new proposal has the head of NASA taking notice. But the biggest hurdle—Congress—is still to come.

The key to the new, downsized mission was putting the satellite into solar orbit, explains project scientist Peter Eisenhardt of the Jet Propulsion Laboratory. Ironically, getting a satellite into solar orbit is easier than getting it to orbit the earth. To get into earth orbit, you have to fire your jets twice: once to get into orbit and once to make the path circular rather than elliptical (which is what it would tend to be with a single push). A solar orbit, on the other hand, needs only one push, which makes it possible to replace the cumbersome Titan rocket with the smaller Atlas.

Like many other missions, the old SIRTF was initially constrained into a low-earth orbit by the capabilities of the planned launch vehicle, says NASA director Daniel Goldin. Its planners later considered the possibility of a high-earth orbit, but that alternative presented problems of its own, Goldin adds. "There was a sub-conscious lock," he says. "The real breakthrough came when they said, 'Let's think freely.'" Out of that free thought came the idea of a solar orbit.

The SIRTF designers made a number of other changes to scale back bulk and cost, cutting the total equipment, launch, and operations cost in half. In the process they've tried to keep enough scientific capability to fulfill their promise of a new infrared scan of distant stars and planets. From its orbit, SIRTF will see past all but one-millionth of the background radiation that blocks our infrared view from Earth, allowing the satellite to carry out detailed studies of possible preplanetary disks surrounding stars and get a close look at the most distant galaxies.

Goldin, in a speech at the meeting, called the new plan "elegant." But he warns that while the SIRTF designers have sold astronomers and NASA, Congress may not be so easily swayed. Still, Goldin says, his agency plans to put the new concept before Congress in the not-too-distant future, and "if these people proceed with the wonderful things they are doing, there's a very good chance it will get started within this decade."


NOAO

Littering the sky. Observers use an infrared telescope to see into this gas cloud, revealing newborn stars in small clutches. Later they wander away.

A Star's Life: Born in a Group, Dies Alone

Why is the night sky so star-spangled? That question has puzzled astronomers for some time. Earlier observations showed stars are born in clusters of hundreds in the thick gas clouds that drift through the universe. What has them scratching their heads is that gravity should hold such big clusters together, yet observations show that at least 90% of all stars drift through space in solitary splendor. Now University of Massachusetts astronomer Karen Strom and her colleagues say they've found a solution to this apparent paradox—and their answer may increase the likelihood of finding planets like our own elsewhere in the universe.

Strom's group looked for their answer deep in the thickest, darkest clouds of molecular hydrogen in the neighborhood of the Orion Nebula. Looking through the gas-penetrating infrared telescope at Kitt Peak National Observatory near Tucson, Strom found hundreds of newly minted stars, virtually all huddled in small families with 10 to 50 members. Those groups are too small for their gravitational pull to bind the stars together permanently, and so the infants wander off to establish lives of their own.

Strom says others studying star birth had concentrated their observations on the northern part of the vast Orion Nebula, a difficult area to study because it's full of bright stars that make it hard to see what else is there. The darker clouds to the south were untouched, she says, so she, with her husband Stephen, also of the University of Massachusetts, and her colleague Michael Merrill of Kitt Peak, started exploring that virgin territory, beginning with a 100-light-year-wide cloud known as Lynds 1641.

That cloud is just the kind of dark cocoon where star birth takes place, says Strom, but even so, she didn't expect to find what she saw: 3000 stars, 300 clumped in aggregates of 10 to 50. These aggregates held all the youngest stars, and therefore Strom concludes they are litters of newborns. "No one had ever seen a place where stars form this way," says an excited Merrill.

If Strom and her colleagues are correct, and formation in clumps is the starry norm, then so is the presence of disks of dust grains; the team saw these possible planet precursors wrapped around nearly all the baby stars. Others, including a group using the Hubble Space Telescope, had seen stellar disks before (in that case, disks of gas that might have been precursors of giant planets like Jupiter and Saturn). But the earlier sightings were isolated cases, says University of California, Berkeley, theorist Frank Shu. "Here they are seeing it in a representative situation," he says.

Fully formed planets surrounding other stars have so far eluded astronomers, except for one oddball case where they circle a dead star known as a pulsar. But precursor disks add to a body of tantalizing evidence that planetary systems like ours do exist in the cosmos. If Strom is correct, and the dusty disks are, as she says, "part of the normal process of star formation," it's likely that some of these have gone the next step and condensed into planets. And looking for them should keep astronomers searching the starry skies for some time to come.

News Flash–Stellar Couple in Explosive Breakup!

Just before dawn on 20 February 1992, an amateur astronomer spotted an explosion in the sky. Over the next few days, four major astronomy satellites and scores of different ground-based instruments zoomed in on this event like paparazzi closing in on a messy Hollywood divorce. And, in fact, the object of their attentions was a blowup touched off when a pair of stars got too closely entangled with each another. Neither of those stars was of the Rodeo Drive variety, however. One was a white dwarf, the other was a red giant—and their explosion, Nova Cygni 1992, has now been scanned more carefully than anything in the sky aside from another well-known stellar cataclysm, supernova 1987a.

Nearly a year later, at the January AAS meeting, astronomers compared notes in an effort to piece together a detailed picture of the Nova Cygni explosion. Unlike a supernova, which represents the death throes of a single, massive star, this kind of nova is always a double conflagration involving the white dwarf, a compact, burned-out star, and its orbital companion, the red giant, a bloated, dying star. Sooner or later, the consorts get too close and the white dwarf begins to suck material from its companion. Eventually, the added mass and higher temperature pass a critical point, turning the dwarf into a huge nuclear bomb. In the detonation, the dwarf's carbon, oxygen, and nitrogen are transformed into heavier elements that shoot out into surrounding space.

Nova Cygni 1992 went off extraordinarily close to the earth, making it the brightest nova observed since 1975. Ten days after the blast, Nick Elias and his colleagues at the U.S. Naval Observatory and Naval Research Laboratory used the Mark III interferometer on Mount Wilson in California to measure the diameter of the exploding material in Nova Cygni. The Mark III consists of two op-tical telescopes linked into a single instrument to reconstruct an image with resolution that is superior to that of either telescope alone.

Meanwhile, other cosmic lensmen were stalking the explosion of the paired stars. NASA-Goddard astronomer Steve Shore and his colleagues used the Hubble Space Telescope to get a three-dimensional picture. "We're essentially taking a CAT scan of the nova," he says. They were also able to measure the speed with which the blast moves outward—1300 kilometers/second. Expanding at that speed, in 6 months the nova has grown from the size of Earth to dimensions that would fill Saturn's orbit around the sun.

Though astronomers could measure how bright the nova appeared, they couldn't calculate its full power without knowing its distance from Earth. It took a combination of measurements made from the space telescope and the ground interferometer to get a distance, which made it possible to deduce the intrinsic brightness. Now both ground- and space-based observers are watching to see what remains behind of the exploding white dwarf. "We don't know how much of it blows away in the explosion," says Shore.

Although they've gotten some great shots already, the earthbound paparazzi aren't through trailing their prey—or competing with other image makers. Elias says his ground-based instrument will soon be able to produce images rivaling those of the Hubble telescope for less than one-tenth of the cost. On the other hand, the space telescope may get a boost in resolution after the repair mission, planned for later this year. So far, however, the competing groups have complemented each other beautifully, says Shore. "Between what we see and what they see, we can create a true three-dimensional picture of this object," he says. And that's the kind of information nationally inquiring astronomers want to know.

–Faye Flam