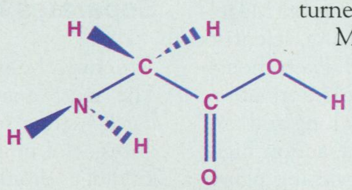
ASTRONOMY

Hints of First Amino Acid Outside Solar System

Last year, when the University of Illinois's Lewis Snyder and his band of interstellar molecule hunters presented some early research results at an astronomy meeting in Los Angeles, Snyder was taken aback to find himself on the front page of a local newspaper the next day. Two weeks ago, his graduate students Yi-Jehng Kuan and Yanti Miao presented an update on the group's efforts at the American Association of Astronomy meeting in Minneapolis, and the media blitz surprised Snyder again. The Associated Press wired a story across the country, Connie Chung noted the research on the CBS evening news, and a TV show about UFOs called his lab, says Snyder.

Snyder, a cautious scientist, would rather forgo the attention until his conclusions are rock solid. But that may be asking too much when the result is as provocative as this one: strong hints of the presence of glycine, an amino acid, in a star-forming region about 300 light-years from the center of the galaxy.

The evidence, Snyder stresses, is just a couple of suggestive peaks on a spectrum. But if it holds up, it would mark the first time the presence of any of the 20 amino acids that make up the proteins crucial to life on Earth has been confirmed outside our solar system. (Amino acids have been found in meteorites and moon rocks.) "People have been looking for a long time," says University of Chicago astronomer Patrick Palmer. He notes the discovery will inevitably reignite long-running controversies about how common life might be in the galaxy and whether the seeds of life were created in the dead of space or—as the conventional view holds—in the violent chemistry of the early Earth.



Found in space? Glycine structure.

In the hunt for glycine, a 10-atom structure that is the smallest of the 20 amino acids, Snyder's team joined with Frank Lovas of the National Institute of Standards and Technology to look at Sagittarius B2, a massive cloud of star-forming gas and dust that is home to 93 out of the 100 or so molecules detected in space. "It's the richest area in the whole galaxy," says Snyder. While those riches made the cloud a good hunting ground for amino acids, they also complicated the search. Astronomers detect far-off molecules from their "spectral fingerprints," characteristic light or radio waves emitted by the molecules. In Sagittarius B2, however, the large number of overlapping fingerprints makes it hard to obtain a conclusive identification.

The Illinois team's strategy was to look at the cloud on a finer scale than ever before, hoping to single out a region in which glycine's fingerprint would stand out. They turned to the Berkeley-Illinois-Maryland Array (BIMA), a group of six radio telescopes in Northern California that merge their signals to achieve a higher resolution than a single telescope could. Since glycine's emission lines are relatively weak, the Illinois researchers first searched for ethyl cyanide and other molecules that, like glycine, are large by the standards of interstellar space. Regions with conditions favoring these molecules, they assumed, might also harbor glycine.

That strategy enabled the group to home in on a promising area of the cloud some 50 arc seconds north of its core. "We only see big molecules in the north," explains Miao. But even when the astronomers took a close look at the radio signals from that site, two parts of the spectrum that should have revealed glycine emission lines were too crowded for the group to draw any conclusions, says Miao. Elsewhere in the spectrum, however, they saw clear emission peaks right where glycine would produce them. "We're in the 90% confidence range. Nobody has gotten this far before," says Snyder, adding that his group will look for one more set of glycine emission lines before publishing.

Colleagues are already convinced, however. "The odds are he's right," says Palmer, who has discovered a number of interstellar molecules himself. And if there's glycine in Sagittarius B2, it may be relatively common in other star-forming clouds. The amino acid might form when simpler molecules react on the surface of dust grains, says Miao. Although any amino acids that happened to form in a cloud's radiation-drenched core would quickly be torn apart, says Snyder, "there are always heavily obscured regions [like the northern part of Sagittarius B2] where the chemistry survives."

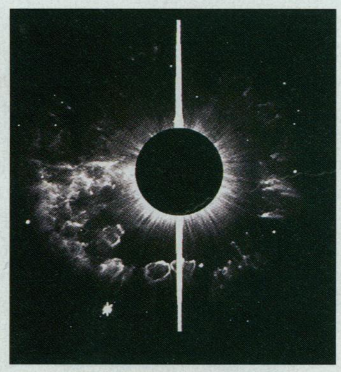
The possibility that at least one of life's building blocks is scattered through the galaxy moves some researchers to speculate about humanity's position in the universe. "The implication is that we might not be unique," says Kuan. Indeed, after the molecule hunters firm up the evidence for glycine in Sagittarius B2, they hope to broaden the hunt to other star-forming clouds. Meanwhile, Snyder told *Science*, they are also building a case for another addition to galactic chemistry: nitrous oxide, better known as laughing gas. That should warrant at least a giggle from the news media, if not another smile from Connie Chung.

–John Travis

ASTRONOMY

Star Writes Its Own History

At the American Astronomical Society meeting in Minneapolis 2 weeks ago, Hubble Space Telescope astronomers unveiled a stunning close-up of a massive star in the process of shedding its skin. The star, one of a class known as luminous blue variables, is the supergiant AG Carinae, 50 times more massive than the sun and 1,500,000 times brighter—"one of the most massive and luminous objects in our galaxy," says Antonella Nota of the Space Telescope Science Institute (STScI).



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Supergiants like AG Carinae become luminous blue variables when, late in life, they grow unstable and puff out vast clouds of gas and dust. The shapes, composition, and dynamics of these nebulae record the star's tens of thousands of years of variability and mass loss, and the new Hubble picture offers the best chance yet to read such a record. The star itself is blacked out (the bright line is a feature of the image processing), but it lights up dust in the surrounding nebulae. An earlier Hubble photo, made before last December's repair mission, had revealed some features, such as a "jet" on one side of the star, but now "we can clearly resolve this jet," says Nota. She adds, "We've [also] discovered plenty of new features," among them curious cometlike tails of dust opposite the jet. The next challenge will be to decipher those clues to the star's biography.

–J.T