

Cloudy finding unclouds starbirth

Look in any astronomy textbook and you'll find the standard description of starbirth: A cloud of dust and gas collapses to form one or more stars. But for years, astronomers lacked direct, compelling evidence of such a collapse.

Now Shudong Zhou of the University of Illinois at Urbana-Champaign and his colleagues, including Neal J. Evans II of the University of Texas at Austin, report they have caught a cloud in the act of making a star. They describe their work in the Feb. 10 *ASTROPHYSICAL JOURNAL*.

Why hadn't researchers seen an unequivocal pattern of cloud collapse earlier? The problem, notes Evans, is that starbirth clouds seem to collapse from the inside out, with the innermost regions shrinking first. The collapse triggers a strong wind that blows out debris from the cloud's outer layers. With both inflow and outflow of gas thought to occur simultaneously, it's difficult to zero in on just the inner, collapsing regions, especially by examining radio emissions from a favorite astrophysical molecule, carbon monoxide. This gas doesn't discriminate between cloud layers at different depths or densities.

In examining the cloud B335, located about 750 light-years from Earth in the constellation Aquila, Zhou relied on millimeter-wave emissions from formaldehyde and carbon monosulfide, which he calculated would be strongest from the dense regions where collapse was likely occurring.

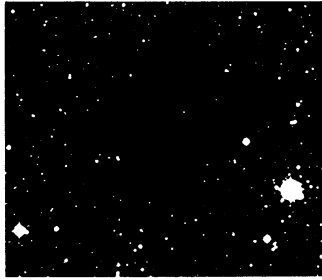
Using the IRAM telescope near Granada, Spain, Zhou's team indeed found the signature of infalling gas. Radiation from regions of the cloud nearer Earth appeared shifted toward the redder end of the spectrum, as if this material were moving away from our planet and into the center of the cloud. At the same time, emissions from the far side of the cloud were shifted toward the blue, as if material there were headed toward Earth and the cloud's center. Evans says that so far, the collapsed region contains half as much mass as the sun and will take about a million years to become a full-fledged star.

Another pulsar in the neighborhood

The pulsar Geminga now has a competitor for the title of nearest known pulsar to Earth. Astronomers have discovered another such object nearby, estimated to reside just 400 light-years from Earth. Known as PSR J0437-4715, this rapidly spinning, radio-wave emitting neutron star rotates once every 5.75 milliseconds.

Simon Johnston of the Australia Telescope National Facility in Epping and his colleagues discovered the nearby pulsar, which orbits a companion star, while surveying the southern sky with the Parkes 64-meter radiotelescope. The researchers roughly inferred the distance to the pulsar by measuring the dispersion of the star's radio-wave emissions as they traveled through the ionized interstellar medium, the team reports in the Feb. 18 *NATURE*. The measurement indicates that PSR J0437-4715 vies with only one other pulsar, the once-mysterious Geminga — now estimated to lie within 300 light-years of Earth — as the closest pulsar to the solar system (SN: 1/2/93, p.4).

Both the signal strength and the proximity of the newly identified pulsar should allow direct measurements of the star's distance. Researchers also hope to probe the fine-scale structure and polarization of radio pulses at a level that has never been possible with any other rapidly spinning pulsar.



Dark, central blob depicts the star-forming cloud B335.

Palomar Observatory Sky Survey

Finding a way to mind your pain

The dentist's sharp, gleaming tools torment your teeth and gums. Every so often you lean forward, rinse, and spit out a garish, rose-colored fluid. Pay no attention to such slings and arrows of dental hygiene, you think, and perhaps this oral agony will decay faster than your teeth.

Unfortunately, suppressing thoughts of pain — dental or otherwise — may actually prolong physical discomfort, according to a study in the February *JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY*. A seemingly paradoxical strategy offers the quickest escape from dental distress: Bravely monitor tooth and gum sensations and concentrate on their location, quality, and intensity.

This approach to pain management takes its inspiration from studies directed by psychologist Daniel M. Wegner of the University of Virginia in Charlottesville showing that people who suppress a particular thought cannot get it out of their minds once they let their guard down.

Delia Cioffi of Dartmouth College in Hanover, N.H., and James Holloway of the University of North Carolina at Chapel Hill presented 28 female and 35 male college students with the task of submerging one hand in a container of freezing water for as long as possible, up to four minutes. Recorded messages instructed volunteers to think in one of three ways during the task: Form a vivid, distracting mental picture of their rooms at home, monitor the details of their hand sensations, or suppress all awareness of their hand sensations.

None of the strategies increased pain tolerance, the two psychologists assert. Participants in each group kept their hands in the water for about two minutes and reported considerable discomfort at that point. But over the next two minutes, ratings of hand pain dropped most sharply among those who had monitored hand sensations and most slowly among those who had suppressed the painful sensations.

Moreover, when students then received a gentle vibration on their necks delivered by a massage device, those in the monitoring and distraction groups rated it as "pleasant," while those in the suppression group classed it as "neutral."

Monitoring builds a sense of mental control over a painful event by focusing attention on sensations rather than on "pain" and makes it easier to notice any ebbing of discomfort over time, the researchers theorize. Suppression inevitably fails and undermines feelings of mental control, they contend. Thus, pain feels worse and fuels negative expectations about further sensations, such as a pleasant vibration. Distraction fosters a weaker sense of mental control than monitoring, but it works better than suppression, Cioffi and Holloway hold.

Thoughts of sleep

As many as one in four people age 65 or older suffers serious problems in falling and staying asleep. A study directed by Charles M. Morin, a psychologist at Virginia Commonwealth University in Richmond, indicates that, rather than relying on various sleep medications, many older individuals can shed their insomnia through psychological training.

A total of 23 insomnia sufferers averaging 67 years old completed eight weekly sessions of cognitive-behavior therapy. Volunteers agreed to stay in bed only when sleepy, revised inaccurate beliefs and attitudes about sleep, and received information on how diet and exercise can affect sleep.

After therapy ended, and for up to one year later, 13 participants enjoyed a substantially better night's sleep with fewer awakenings, Morin and his colleagues report in the February *JOURNAL OF CONSULTING AND CLINICAL PSYCHOLOGY*. About half the sample had used sleep medication prior to the study, but none resumed regular use of these drugs in the year following cognitive-behavior therapy.