

New activity near Supernova 1987A

Seven years ago this week, astronomers witnessed the birth of the first supernova visible to the naked eye in nearly 400 years. Supernova 1987A began fading from view in mid-1987 and has stayed dim ever since. But just in time to mark the seventh anniversary of this event, astronomers have found that a ring of gas surrounding the remains of this exploded star has brightened. E. Joseph Wampler of the European Southern Observatory in Garching, Germany, says the brightening may be a prelude to the fireworks expected some 4 years from now, when the densest part of the supernova's blast wave slams into the gas ring.

Wampler and Li-Fan Wang of the Beijing Astronomical Observatory viewed the ring in visible light last December using the New Technology Telescope in La Serena, Chile. Some parts of the ring were emitting more visible light than at any time during the past 2 years, they report in a Jan. 27 circular of the International Astronomical Union.

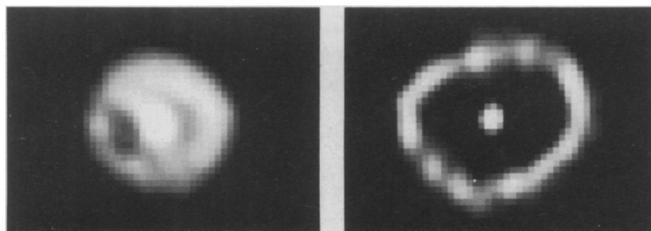
The ring predates the supernova. Fierce winds from the supernova's parent star provided the raw material for the gas ring and sculpted it. But the ring only became visible after radiation from the supernova's blast wave heated it. The recent brightening indicates that the outermost layers of the fireball have begun to catch up and collide with the ring. Ultraviolet light produced by the encounter would ionize gas in the ring and cause it to glow in visible light, Wampler says.

The brightening may herald a violent interaction between the ring and the interior of the supernova's fireball, which moves more slowly and has a higher density than the exterior portions. This encounter, which might begin in 1997, will illuminate the ring dramatically and eventually distort it. By observing such changes, researchers hope to learn more about the shape and velocity of the fireball.

On the track of a young nova

Nova Cygni 1992, a celebrity among the stellar eruptions known as novae, has been photographed by countless astronomical paparazzi and spacecraft since its debut 2 years ago (SN: 1/16/93, p.43). New images taken by the Hubble Space Telescope continue to track the evolution of this young outburst.

A nova occurs in a binary star system. The compact member of



Nova Cygni 1992 seen before Hubble repair (left) and after.

Photos: Robert Jadrzewski/
NASA, European Space Agency

this duo, a white dwarf, steals mass from its bloated companion. As the mass accumulates, it sparks a thermonuclear explosion on the surface of the dwarf, hurling a shell of hot gas into space.

A Hubble image taken last May provided the first glimpse of the nova's shell of expelled material as well as a mysterious bar-like structure. A new image, taken with a repaired Hubble last month and presented at a NASA press briefing, shows that the shell has elongated and expanded from a diameter of 46 billion to 60 billion kilometers. The bar has all but vanished.

Francesco Paresce of the Space Telescope Science Institute in Baltimore suggests that the bar revealed dense gas in the orbital plane of the double-star system that created the nova. As the explosion punched through the gas, the material grew more tenuous and faded. The shell's oblong shape may indicate that it's easier for expelled gas to expand above and below the orbital plane, where fewer obstacles lie.

More illuminating statistics on mercury

In assembling its new mercury-emissions inventory (SN: 2/19/94, p.119), the Environmental Protection Agency found that some small, diffuse sources can really add up.

Lighting manufacturers use an estimated 32 tons of mercury each year to produce fluorescent, mercury-vapor, metal-halide, and high-pressure sodium lamps. EPA estimates that up to 22 percent of those used indoors and another third of those used outdoors ultimately break. Together, they release about 8.8 tons of mercury annually. That's more mercury than escapes into the air from either of two major industrial processes: the combined production of chlorine and caustic soda (7.3 tons) or the manufacture of Portland cement (6.5 tons).

Though phasing out their reliance on mercury as an antimicrobial agent, U.S. paint manufacturers still used about 7 tons of the metal in 1991. Because up to 66 percent of the mercury in paint can volatilize, the new inventory estimates that painting may release up to 4.4 tons of this metal into the air each year. By contrast, though U.S. labs annually use some 35 tons of mercury as a chemical reagent and catalyst, EPA estimates that only 0.4 ton of this escapes into the air.

And then there are teeth. Dentistry, which uses about 30 tons of mercury annually — principally for fillings — probably accounts for about 0.6 ton of the highly toxic metal released into the atmosphere each year, EPA says. Another 0.4 ton may come from fillings in the teeth of people who are cremated. As a result, the new inventory indicates, these diffuse dental releases together could emit almost one-quarter as much mercury each year as the nation's oil-fired power plants.

Sperm changes linked to drinking water

Researchers in England have observed a very recent decline in sperm motility and an increase in rates of abnormally shaped sperm among British men. Though far from conclusive, the researchers say, the findings from their small, 12-year study do hint that the sperm changes might trace to water pollution.

Jean Ginsburg and her coworkers at London's Royal Free Hospital School of Medicine examined sperm from the same 260 men during each of two 6-year periods: 1978 through 1983 and 1984 through 1989. All of the men were partners of women who had received hormone therapy for infertility.

Nearly 21 percent of the men produced sperm with abnormal motility during the first sampling period. That proportion increased to fully one-third of the men during the second sampling, Ginsburg and her colleagues report in the Jan. 22 LANCET. The researchers also observed that the number of men producing mostly abnormal sperm was 12 times as high in the second sampling period as in the first.

Suspecting a possible environmental link to these trends, Ginsburg's team compared 79 men who lived within the Thames River water supply area to 183 who were permanent United Kingdom residents served by other drinking-water systems. Both groups exhibited a similar increase between the two sampling periods in the production of abnormally shaped sperm. By contrast, only men whose drinking water came from the Thames suffered a drop in sperm density and motility over the two periods.

Studies have indicated that falling sperm counts and other reproductive problems in men and animals may trace — at least in part — to pollutants that resemble the female sex hormone estrogen (SN: 1/22/94, p.56). At a meeting on such agents last month in Washington, D.C., John Sumpter of Brunel University in Uxbridge, England, reported unpublished data on estrogenic breakdown products of detergents commonly found in the Thames and other waterways. Among immature fish, even relatively low doses of these nonyl and octyl phenols stunted the growth of their sperm-producing testicles.