# SCIENCE NEWS OF THE WEEK

## Stalking the Causes of the Hyatt Tragedy

Debris that lies under lock and key in a Kansas City warehouse holds the clues to determining what caused the July 17 collapse in that city of two Hyatt Regency Hotel interior walkways — a disaster that left 111 persons dead and 188 others injured. The walkway debris, a massive jumble of concrete and steel, now is the focal point of a legal battle and scientific effort to recreate the mysterious prelude to the tragedy.

Shortly after the disaster, the Missouri Circuit Court of Jackson County granted custody of the walkway debris to Crown Center Redevelopment Corp., owner of the hotel. The two collapsed skywalks, along with a third one that had remained intact, were removed and transported to a nearby warehouse. Now, National Bureau of Standards (NBS) researchers are seeking permission to take some of that debris to their laboratories in Gaithersburg, Md., where — at the request of Kansas City Mayor Richard L. Berkeley — they will determine the most probable cause of the hotel tragedy.

The NBS researchers must battle bureaucracy for the debris because lawyers already have filed more than $2.5 billion in lawsuits alleging negligence by the hotel owner and the Hyatt Hotel Corp., which manages the hotel. And, as one NBS researcher explains, there is concern that the NBS investigation "will destroy the evidence."

On the other hand, although the investigation necessarily would involve a limited number of destructive analyses, the information generated in those analyses could be used in court, says Edward O. Pfrang of NBS. "While we're not in the business of finding fault," he explains, "in determining the scientific basis for the collapse, you at the same time can support or reject someone else's legal argument as to who is at fault." Moreover, says Pfrang in a Sept. 18 letter to Crown Center Corp. President James C. McClune, "In preparing this request [for debris samples], the need to minimize the alterations or disturbances of the walkway debris has been a primary concern . . . we have limited our request to items which, if removed, will still allow other interested parties to conduct their own comprehensive test programs." Says Pfrang, NBS researchers have designed a phased-effort test program in which the immediate tasks planned "specifically avoid the removal of unique elements of the walkway debris."

*The aftermath of a disaster.*

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Certain of the phases in this multi-staged test program already are under way. Some NBS researchers are collecting documents concerning the construction of the Hyatt Regency Hotel; others are building walkway "mock-ups." In addition, NBS researchers recently were allowed to weigh selected spans of the Hyatt walkways. The real heart of the investigation, however, awaits the outcome of the NBS request to take sample debris from Kansas City.

NBS researchers have requested, for example, segments of the steel rods that were used to suspend the 30-ton walkways from the lobby ceiling, samples of the welded box beams through which those steel rods were placed and cores of the concrete decks. Reports that surfaced after the hotel disaster indicate that the design for the assembly of these components as originally approved by the city called for the fourth- (upper) and second- (lower) floor decks to be supported independently of one another by steel rods hanging from the atrium ceiling. These plans were scrapped, however, in favor of a design in which the second-floor walkway hung from the fourth-floor one.

A structural engineer hired by the Kansas City Star newspaper shortly after the Hyatt disaster hypothesized that this change in plans could have caused, or at least contributed to, the collapse of the upper and lower walkways by doubling the stress on the fourth-floor walkway box beams. NBS researchers plan to test this hypothesis by first establishing the precise weight of the concrete decks. They then will determine the exact grade and yield strength (the amount of stress needed to deform a material) of the hanger-rod steel. Next, they will determine the resistance of the box beams to hanger load.

In addition, NBS researchers plan to check the welded seams on the box beams. "One of our interests is to determine the contribution, if any, of weld failure to the gross failure," says Bud Kasen of the NBS Fracture and Deformation Division. Kasen and colleagues will search box beams for flaws such as slag impurities (left from the coating of the welding electrode) and shallow welds — ones that do not penetrate to the same depth as the metal being joined.

Other projects planned include taking an electron microscope's view of the fractured surfaces — which first involves the grueling one-inch-per-hour process of reproducing the three-dimensional surface on specially prepared Scotch tape — and determining whether the walkways' dynamic live load (the weight of the persons in motion) prior to collapse exceeded their resistance capability.

"There are too many possibilities," Kasen says. "It's going to take some careful examination of the debris to get some idea of the sequence of events that occurred when the structure failed." Meanwhile, he and Pfrang await word from Missouri. "We hope that an early approval [of the NBS request to take walkway wreckage] will be granted by the court," Pfrang says, "so that the Bureau's investigation of the Hyatt Regency walkway collapse can be concluded expeditiously." □

## Synthetic hormone: Male contraceptive

A powerful variant of an inhibitor of testosterone production shows promise of becoming the first safe, practical, and reversible form of male contraception, according to a Vanderbilt University endocrinologist.

In the past, the search for a male contraceptive focused on agents that inhibit spermatogenesis, sperm motility, sperm maturation, or enzyme activity. This new research, reported by David Rabin in the Sept. 17 NEW ENGLAND JOURNAL OF MEDICINE, is the first successful example of reversible hormone inhibition in human males. But one serious side effect — impotency — blocks the path between current research and practical application.

In its endogenous state, the luteinizing hormone-releasing hormone (LHRH) is the master switch over the hormones essential to reproduction. A subtle modification in the amino acid sequence of LHRH produces a compound that, although structurally similar to the original peptide, is both stronger and more persistent. This LHRH mimic, called LHRH-A, reacts with the pituitary and prevents production of testosterone (SN: 5/24/80, p. 331).

All eight men who received LHRH-A showed a dramatic decline in both serum testosterone levels and sperm density. Mean levels of testosterone fell approximately 95 percent, from 4.71 ng per milliliter to 0.24 ng per milliliter. Sperm density fell by 70 percent or more in each subject, including five men in whom therapy was discontinued after seven weeks.

Unfortunately, as fertility dropped, so did sex drive. The LHRH analog does not act selectively, but blocks production of both the luteinizing hormone (LH), which produces testosterone, and the follicle-stimulating hormone (FSH), which influences sperm production. Five of the eight volunteers experienced impotence within seven weeks of treatments and four reported "hot flashes" comparable to those experienced by postmenopausal women. The side effects disappeared within two weeks after the treatment was stopped.

Rabin remains unperturbed by the side effects, calling them "a positive and predictable consequence of testosterone inhibition .... We found what we anticipated," he told SCIENCE NEWS. "Now we must refine it."

Future research will seek ways of preserving sex drive while reducing fertility. In its present form, LHRH-A targets a cell responsible for the production of both LH and FSH. Selective inhibition of this cell's gonadal function, suppressing FSH but leaving LH production alone, is one strategy. Supplementation using an outside supply of testosterone may also help maintain sex drive. However, because supplementation would require the administration of two agents, rather than just one, this strategy is less favored by researchers. Intermittent administration of LHRH-A may disrupt the 45-day production cycle of sperm but not the short-cycled formation of sex hormones.

The injection of LHRH-A is another obstacle to popular acceptance of the compound. Like insulin and other small peptide chains, LHRH-A is destroyed by the bowel if administered orally. Nasal sprays are the most likely prospect on the pharmaceutical horizon.

Unlike steroids, peptides do not have a general impact on other body systems. However, researchers are reluctant to predict whether LHRH-A will be significantly safer than oral contraceptives. Twenty years of experience elapsed before the pill's steroidal complications became apparent, they say. Other side effects — thinning of facial hair, for instance—could develop with extended use of the compound. However, future long-term experimentation would involve not the substance used in recent research, but one with less troublesome characteristics, Rabin says. "This is not the last word, but rather the first, on the subject." □

# New telescopes: Not the same old grind

It seems clear by now that any new telescope larger than the biggest now existing will be built according to one or another radically new design. Two major committees investigating such topics, one at the University of California and the other at Kitt Peak National Observatory—and a lot of astronomers not on committees—suggest that, at the current maximum diameters of five or six meters, single, monolithic glass mirrors have reached the practical limits of their size.

The next generation's telescopes, these committees say, will be either of the multiple mirror variety, in which an array of mirrors gathers light and throws it all on a single focal point, or of the segmented mirror sort, in which a single large mirror is built up like a jigsaw puzzle out of several dozen hexagonal segments.

An actual multiple mirror telescope has been built and is working quite well on top of Mt. Hopkins, not many miles from Kitt Peak (SN: 8/6/80, p. 106). For the segmented mirror to stay competitive, proof must be found that it can be built; someone must show how to grind the mirror segments into their proper shapes so that they fit correctly. Such a method has been developed, and Kitt Peak announces that its optical shops are setting up to grind two blanks that could be full-size segments for a 15-meter segmented mirror.

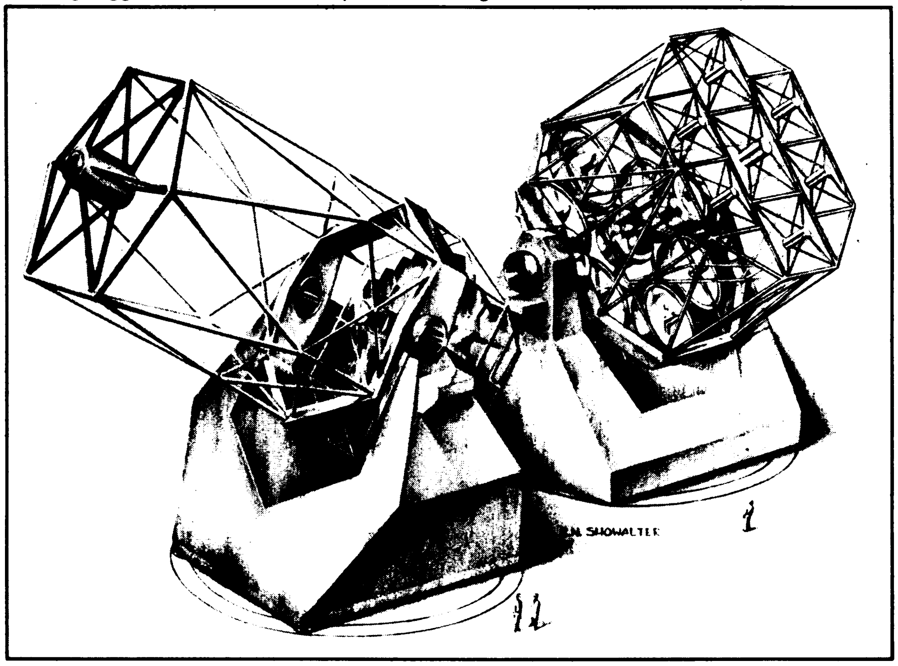
The difficulty is that grinding machinery and grinding techniques have always been designed to grind shapes that are symmetric about an axis. Monolithic mirrors, whether paraboloidal or spherical, are symmetric about an axis. The whole 15-meter segmented paraboloid would be similarly symmetric, but the individual segments would not be. Grinders designed to work on spherically symmetric shapes could not handle them. The work seemed to require new machine designs and new computer programs. These seemed likely to prove so complex as to be impractical.

The method that appears to work actually turns out quite simple in principle. The segments are bent in such a way that they have a spherical shape while they are being ground, but revert to the appropriate nonspherical shape when they are released. The method is difficult in practice because glass is brittle. Working with glass that is under constant stress is therefore a delicate operation, and it gets more delicate as the glass gets bigger.

According to Larry Barr, an engineer involved in the project, the idea goes back to Bernhard Voldemar Schmidt, who designed the famous Schmidt camera for wide-angle sky photography. Schmidt needed an aspherical correction plate and made it by this kind of bending and grinding. But that was a small piece. A California group has used the technique on a 13-inch mirror. Now the Kitt Peak shops are ready to start on two 2-meter blanks. If all goes well, Barr estimates that each grinding set-up can do about 4 segments a year. A 15-meter mirror requires 90 segments, so, if three set-ups are grinding, it would take seven to eight years to prepare the whole mirror.

For now a consortium has been formed by Kitt Peak and the Universities of Arizona, California and Texas to work jointly on the technical problems involved. What happens if and when solutions are reached is unclear. Each of these parties except the University of Arizona has plans for a large telescope of its own. □

*Making bigger and better telescopes means segmented mirrors or multiple mirrors.*




Kitt Peak National Observatory