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.

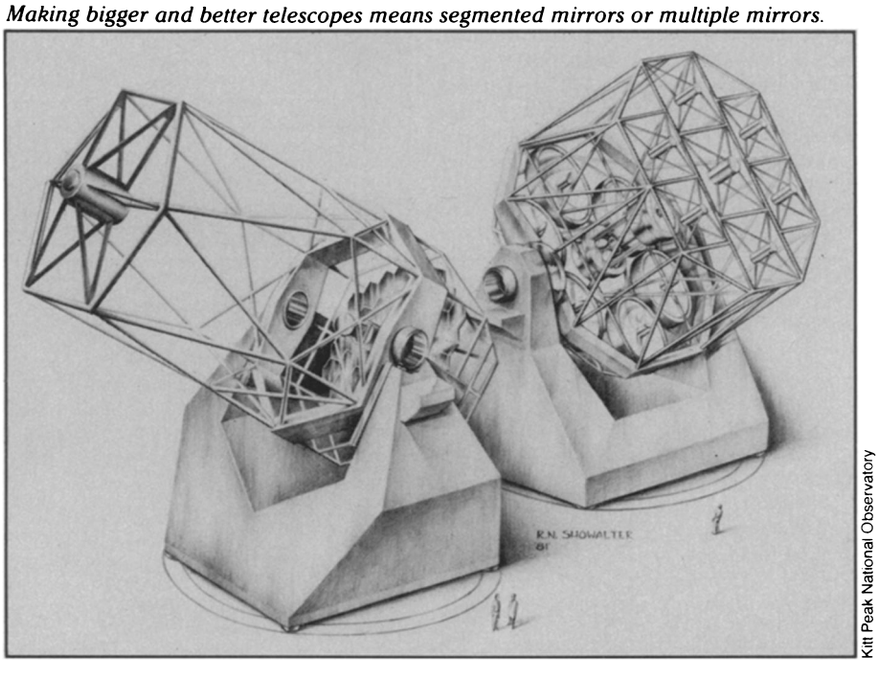
The difficulty is that grinding machinery and grinding techniques have always been designed to grind shapes that are symmetric about an axis. Monolithic mirrors, whether paraboloidal or spherical, are symmetric about an axis. The whole 15-meter segmented paraboloid would be similarly symmetric, but the 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