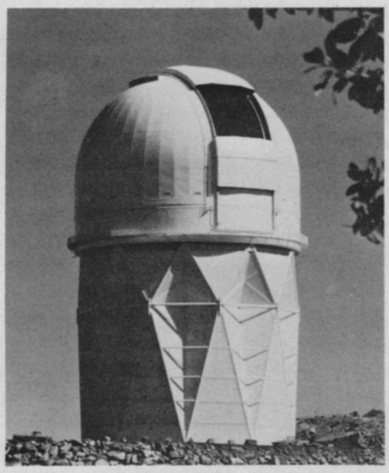
First light through Kitt Peak's 158-incher

One of the most active fields in astronomy is the study of objects at the farthest reaches of the visible universe. These distant galaxies and quasars fascinate astronomers because of their possible contributions to both astrophysics and cosmology.

Such objects can be studied only with the largest telescopes in existence. But astronomers wishing to observe the most distant parts of the universe have encountered severe competition for time on the biggest telescopes. There are just too few large telescopes to go around.

Some of this slack will be taken up by the new 158-inch Mayall telescope nearing completion at Kitt Peak National Observatory in southern Arizona. This week the Mayall telescope underwent the ceremony known as "letting in the first light." The event is comparable to the launching of a ship: The basic parts are in place and proven sound, but additions and adjustments remain to be made before the telescope is fully operational.

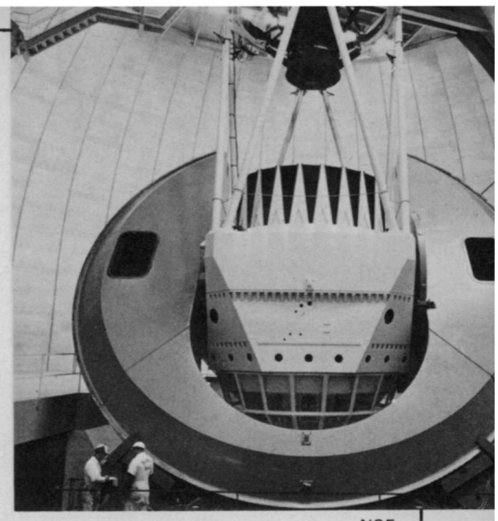


Dome is high as 19-story building.

The telescope, named in honor of Nicholas U. Mayall, retired director of the observatory, will be the second largest reflecting telescope in the world when it is dedicated in June. The only larger one at present is the 200-inch instrument at Mt. Palomar in California. The Russians are building a telescope with a 236-inch aperture at Zelinchuk in the Caucasus Mountains, and a telescope described as nearly a twin to the Mayall is being built at the Cerro Tololo Inter-American Observatory in Chile.

The Mayall will have a wider field of view than any existing telescope, six times wider than that of the largest telescope. This will give about 40 times as much sky coverage. Photographic plates as large as 14 inches square will record an area of the sky about twice as large as the moon. The wide field of view should make searches for faint and distant objects somewhat easier.

The new telescope will have three main focal positions, prime focus, Cassegrain and Coudé. The prime focus lies within the telescope tube at the point where light rays reflected by the concave primary mirror converge. An astronomer in an observing cage inside the tube can record the image. For the Cassegrain focus, a secondary mirror reflects the converging beams back down the tube through a 50-inch hole in the primary to a focus slightly behind the primary. This is expected to be the most popular system. In the Coudé focus mirrors send the converging beam laterally outside the tube to a focus in the telescope building where equipment can be set up to analyze the light.



NSF

New telescope mounted in its dome.

The telescope is housed in a circular building 105 feet in diameter and 185 feet high (equal to a 19-story building). The dome, which rotates, weighs 500 tons. Major contracts for construction were let in 1967, and construction started in 1968. The National Science Foundation provided the $10 million cost.

lieves, could have been avoided if the weather modifiers and their sponsors had invited extensive local involvement during the early planning stages of the projects. Positive relationships could have been built up, questions answered and fears allayed. "The science is sufficiently vague," he says, "that many things can be explained away."

W. J. D. Kennedy of the National Center for Atmospheric Research in Boulder agrees that good public relations are necessary. He says, "Weather modification scientists and sponsoring government agencies have failed to recognize how fragile this important resource really is." Tension between the scientist and the public, he says, "should be a matter of concern for the pragmatic scientist who wants to press on with his work." If a serious rift occurs, it is possible that Federal lawmakers will step in with restrictive legislation that would melt any public relations snow job.

Last week, for instance, Rep. Frank E. Evans (D–Colo.) introduced a weather modification bill (H.R. 4770) that some scientists feel would make it extremely difficult for commercial and experimental weather modifiers to operate. The bill, in its present form, requires that weather modifiers obtain a Federal permit and a state license (to ensure local participation) before any work be attempted. After a rigorous review of the operator's qualifications and the aims of the project, a bond (up to $1 million) would have to be posted on each project to protect persons or property injured by the project. The bill would also require extensive reporting before, during and after the project.

Haas feels that such restrictive legislation can be avoided if the weather modifiers tread lightly. But Kennedy warns that "weather modification scientists may be in for some difficult years unless they adopt a more enlightened and more effective policy of interaction with the public." □

Radar off Saturn's rings: Chunks of solid debris

Radar astronomy is the one non-passive form of the science. In other cases astronomers must observe the emanations given off by celestial bodies and draw what conclusions they can from them. With radar, astronomers can send a signal to a celestial body and receive the reflection. This often gives information, especially about surface conditions, that passive watching does not.

So far radar is useful only with bodies in the solar system to which a signal can be sent and reflected in strength. Radar has been especially prominent in studies of Venus and Mercury, but it has been gradually moving farther out to distant parts of the system. Its latest achievement, reported by the Jet Propulsion Laboratory in Pasadena, is the reflection of a signal off the rings of Saturn.