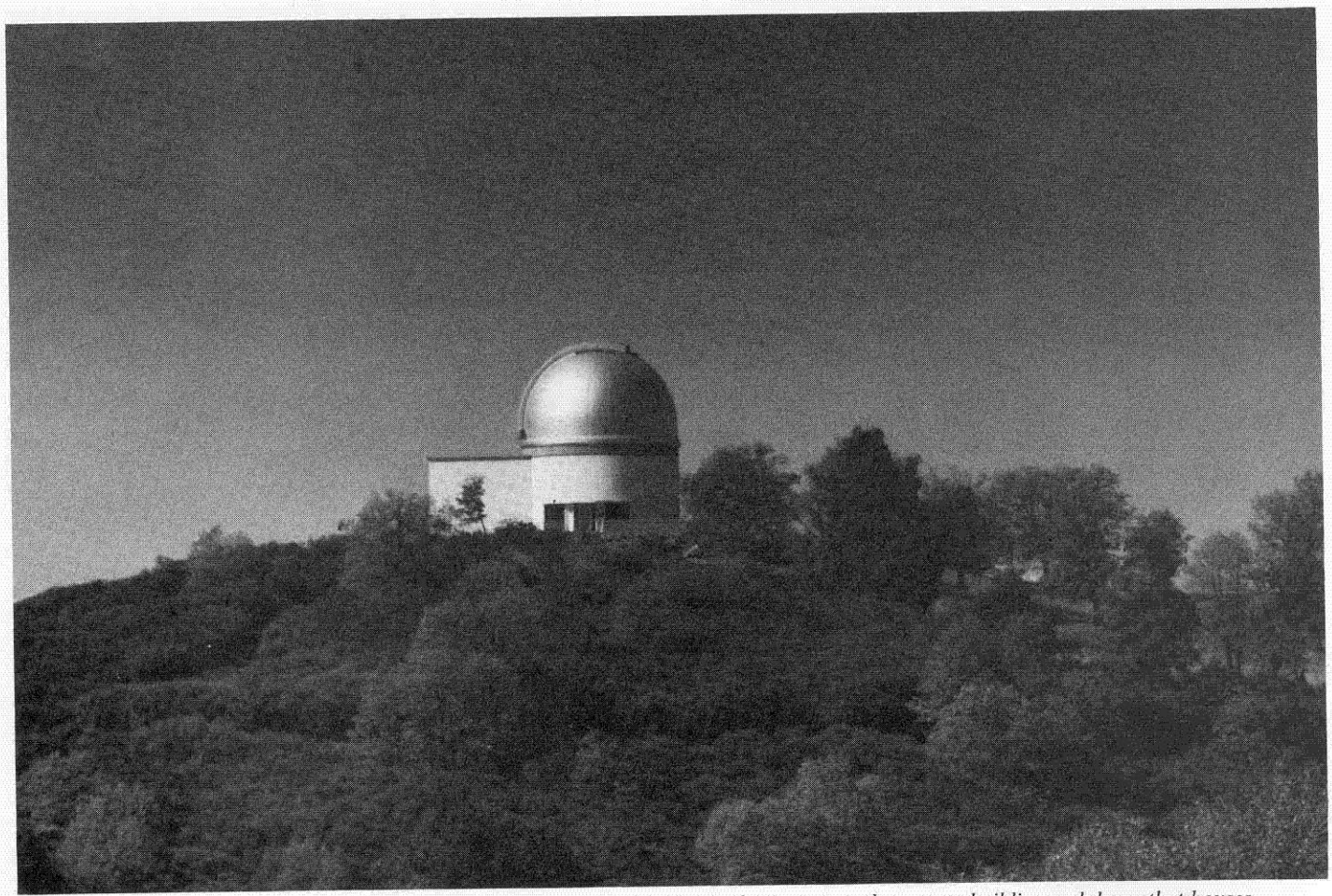
A New Telescope at Palomar

A new 60-inch telescope representing unique advances in electronic and optical design was dedicated at Palomar Observatory on October 23. The first major addition to the observatory in some 22 years, the new telescope joins the 200-inch Hale and 48-inch Schmidt telescopes at Palomar Mountain. The three Palomar telescopes, together with the 100-inch and 60-inch telescopes at Mt. Wilson, comprise the Hale Observatories, now operated jointly by Caltech and the Carnegie Institution of Washington.

The new instrument fills a critical need at the Hale Observatories for a telescope of moderate size in a



The Mayer Observatory, a three-story building and dome that houses the new 60-inch telescope, is located on Palomar Mountain a little less than half a mile from the 200-inch facility.

location remote from city lights. Aside from the 200-inch, the only other telescopes at Palomar capable of photometric observations have been of 20 inches diameter or less. The light-gathering power of these instruments falls far short of that required for a major portion of the observations conducted. The 48-inch Schmidt at Palomar is restricted to photographic observations and is not equipped for spectral measurements. Telescopes of moderate size—100 inches and 60 inches—are available at Mt. Wilson, but the lights from the Los Angeles Basin seriously hamper those observations that require a dark sky. As a result, the 200-inch was often being used in experiments where its great light-gathering capability wasn't really needed. Finally, observing time on the four existing Hale Observatories telescopes was in such demand that requests for their use exceeded available time by 50 percent or more.

One of the first major telescopes to operate with a computer, the new 60-inch combines the maneuverability of a short tube together with the higher magnifications normally associated only with a long focal length. It can detect objects as faint as 22½ magnitude (as compared with a limit of 23rd magnitude for the 200-inch Hale).

The source of the higher performance capacity is an unusual optical system of six mirrors and a corrector lens. The system permits effective focal lengths of 525 inches and 1,800 inches at the two operating focuses of the telescope—the Cassegrain and the coudé—even though the actual length of the tube is only 150 inches.

Much of the photometric and photographic work will be done at the Cassegrain focus, while spectrometry will be done at the coudé. By means of a simple mechanical procedure, the observer can change mirrors and select the desired focal length.

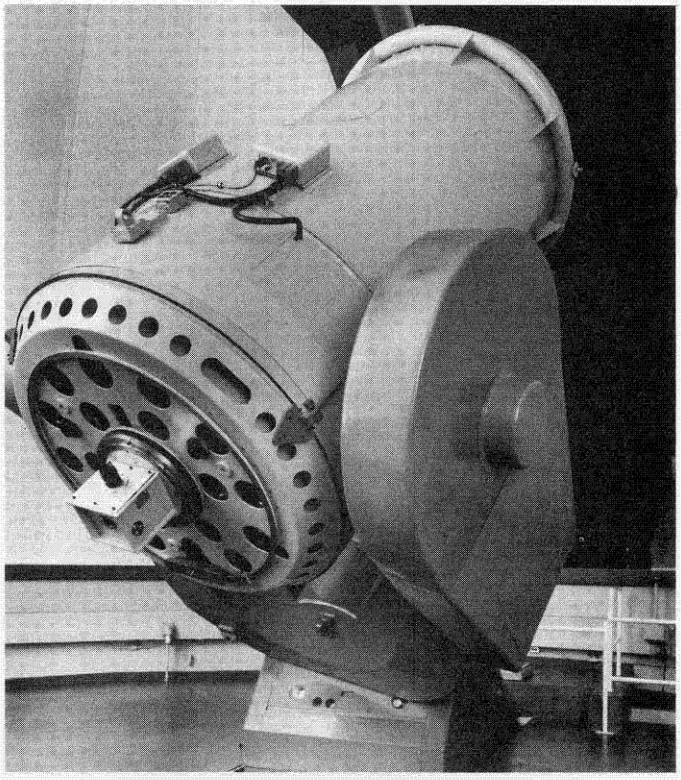
Weighing 19½ tons, the new telescope occupies a three-story circular observatory building adjacent to the 200-inch telescope facility. The new building also contains an observing space; an extended coudé room (where light can be spectroscopically analyzed); a combination office, library, and photographic plate assessment room; dark rooms for developing plates; and a galley, elevator, and service facilities. The dome is insulated to minimize temperature changes, and work rooms below the observation floor are air-conditioned.

Planning for the new instrument began in 1962. Over-all design and construction were supervised by Bruce Rule, chief engineer of the Hale Observatories. Construction, which took place largely in the central shops at Caltech, began four years ago when the Corning Glass Works of Bradford, Pennsylvania, cast a mirror blank of fused silica 61 inches in diameter. The 2,000-pound mirror disk is 10½ inches thick on the outside by 9 inches on the inside. A hole 18 inches in diameter through the center allows the magnified image of stars and galaxies to reach the Cassegrain focus.

Optician Floyd Day of the Hale Observatories optical shop took two months to grind several pounds off the sides to achieve the desired mirror configuration and disk shape. After that, two years were spent in polishing to achieve the desired precision of the front surface.

Ira Bowen, former director of the Mt. Wilson and Palomar Observatories, designed the six-mirror optical system in the Ritchey-Chretien form—a type of design that eliminates the distortion of images near the outer edge of the field.

Total cost of the new telescope, facilities, and support equipment was about $1 million. A grant of $590,000 from the National Science Foundation covered costs of materials and construction of the telescope itself, and the Oscar G. Mayer family of Madison, Wisconsin, contributed $373,000 for the observatory building. A grant of $125,000 from NASA supported preliminary design studies and paid for the mirror blank.



Looking for all the world like a stubby cannon aimed at the stars, the new 60-inch telescope stands ready for use. The observer uses a chair that is placed to permit him to make direct observations by looking into the black, circular eyepiece which extends from the box mounted at the base of the tube.