

ASTRONOMY

Second Largest Telescope

The world's second largest telescope, second only to the 200-inch at Mt. Palomar, is scheduled to begin operation this year. Observing programs of the two will be coordinated.

By ANN EWING

► THE WORLD'S second largest telescope, a 120-inch reflector, is scheduled to start searching the skies this year at the University of California's Lick Observatory on Mt. Hamilton.

Second only to the 200-inch giant at Mt. Palomar, it will reach 900,000,000 miles into space, comparing most favorably with the more than approximately two billion of its big brother.

Of the many programs planned for this new instrument, the most important may well be the studies of far-distant galaxies, great pinwheels of stars like the Milky Way in which the sun, the earth and other planets are located. Galaxies consist of billions of stars, shining by their own light as the sun does. They are so far away, however, they appear only as faint spots of light even on long-exposure photographs.

Unnumbered Millions of Galaxies

There are unnumbered millions of these other galaxies, mostly invisible to the naked eye, although their dim light can be caught and concentrated by telescopes. The larger the telescope, the fainter the objects it can photograph.

That is why the 200-inch and the 120-inch will be teamed to study the far reaches of space. Astronomers want to know about the universe. They would like to find out whether it is going through pulsating cycles on a time scale of billions of years, first expanding at tremendous speeds, then contracting to a tight knot of matter.

Examining the light of galaxies like the Milky Way hundreds of millions of light years away from it is now the only known key to the problem. With two great telescopes at work on the puzzle, finding an answer is expected to be speeded.

Young Brother of 200-Inch

The 120-inch is, in a very real way, the young brother of the 200-inch, which for several years has been gathering light from very faint galaxies. The mirror of the 120-inch was cast to test the one now in use on the Palomar telescope.

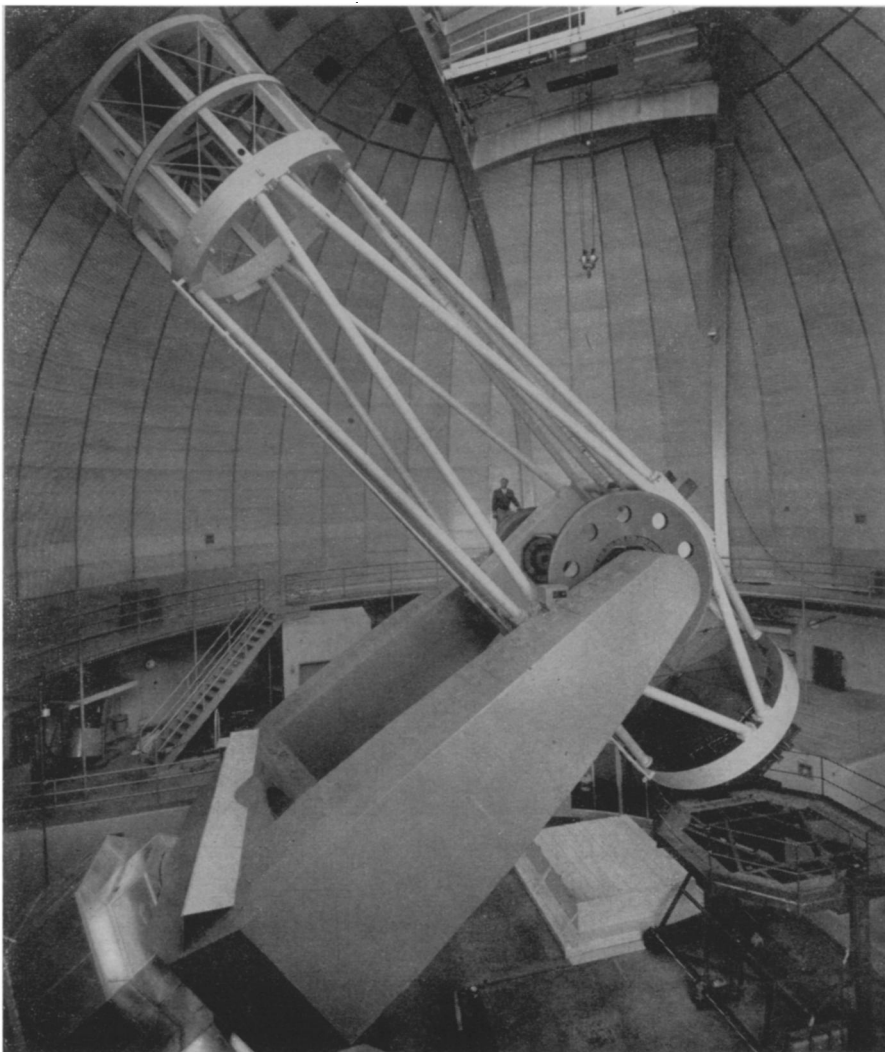
Lick astronomers did not know until 1949 that the 120-inch blank was available, and they had previously been searching for a disk of 100 inches diameter or larger. However, they were delighted to be able to purchase the 120-inch ribbed blank from the California Institute of Technology for the modest sum of \$50,000.

Having a very large telescope at Lick Observatory was the reason it was founded. When the observatory was built in the last part of the 19th century, it fulfilled the provision of its donor that it should "contain the most powerful telescope in the world." Although larger and more powerful telescopes have since been built at other observatories, acquiring the 120-inch has boosted Lick back close to the realization of the original bequest.

James Lick was a pioneer California business man. He died in 1876, but before his death he selected the mountain-top site for the observatory, where conditions for observing are still considered as favorable as any in this country.

His body now lies in the base of the pier on which the great equatorial telescope, the 36-inch refractor, is based. This instrument was for many years the largest in the world, and is still the second largest of its kind.

The 36-inch refracting telescope looks the way a telescope is expected to look—a long closed tube pointed skyward. The 120-inch, on the other hand, like the 200-inch, is an open framework supporting a



120-INCH TELESCOPE—This photograph shows the nearly complete 120-inch telescope at the University of California's Lick Observatory, scheduled to start searching the skies during 1957. When in operation, it will be the second largest in the world, capable of reaching 900,000,000 light years into space.

mirror of that diameter. It is an impressive instrument, 50 feet long and weighing almost 40 tons.

The mirror itself is not yet installed in its gay yellow housing. A slab of cement of about its weight takes its place to keep the instrument in balance while final adjustments are made to the supporting mechanisms.

Only a final bit of touch-up polishing is needed on the mirror and that is scheduled for completion by "late spring," the observatory's director, Dr. C. D. Shane, reports. This work has been suspended during the winter months to avoid any possible trouble because of temperature changes.

The engineer in charge of design and construction of the building and instrument was W. W. Baustian, who now holds a similar position for the national astronomical observatory, but is continuing as a consultant for the 120-inch.

Worth Hour-Long Trip

Lick Observatory is reached from Santa Clara Valley, south and east of San Francisco, by a winding narrow road that loops back on itself again and again. Although it is only 25 miles from San Jose, the trip to the 4,200-foot crest takes about an hour. It is well worth the time, however.

The scenery is magnificent, and the man-made shining domes housing the various instruments set this mountain top apart from all others in the world. For here is gathered the highest number of large telescopes anywhere in the world.

Included among the instruments, besides the 120-inch and the 36-inch already mentioned, are another 36-inch telescope, a reflector; a 20-inch astrographic telescope; a 22-inch reflector; a 12-inch equatorial telescope, and a six-inch meridian circle instrument.

Scattered among the round domes covering these telescopes are the houses where astronomers and the Lick staff live with their families. For this is a complete, although isolated, community here, compact enough so anyone who wants to can walk to work.

Visitors' Night Traditional

Early every morning except Sunday, orders are placed for food and other needed supplies. One man makes the long drive down to the valley and does the shopping for everyone, also bringing back the mail.

One tradition observed at Lick since the Mt. Hamilton crest could be reached only by horse and buggy is the Friday night visitors' night. On that evening, weather permitting, visitors are shown celestial objects with the 12-inch and 36-inch telescopes.

Besides looking through the telescopes, visitors can see in the halls of the main building photographs taken over the years of outstandingly beautiful sky scenes. These range from the earth's nearest neighbor in space, the moon, to the planets, to stars, to the nearest galaxy visible from the

Northern Hemisphere, the Andromeda Nebula, and other, more distant galaxies.

The wide variety of these photographs indicates the many contributions Lick astronomers have made to the present knowledge of the structure and evolution of the universe.

New and exciting results are forecast when the 120-inch goes into operation, for it is expected to be able to catch light from stars as faint as the 22nd magnitude.

Although this telescope will be the second largest in the world, even its ability to use the light falling on the 120-inch mirror can be increased manyfold, and it may soon become the equivalent of an instrument ten times its size.

Modern electronic devices, now under intensive development, will give this big increase. Known as image converters, they are far more efficient at using light photons than are photographic plates. When attached to a telescope, they will intensify an object's faint light before it hits the photographic emulsion.

These new image converters hold bright promise for all telescopes. One could make the 120-inch telescope capable of reaching as far into space as a 1,200-inch would, and others would give a corresponding increase to other telescopes.

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