ASTRONOMY

Palomar's Big Glass Eye

A tiny bit of glass, which needs to be ground off, is hampering further work with the giant eye, which has already photographed stars of a billion years ago.

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Written at Mt. Palomar.

➤ THE big glass eye of Palomar is to have another try at seeing bright groups of stars way off in space. But first it must have a bit of glass, only a tiny fraction of an inch, ground off around its edge.

Already the best telescope in the world, the 200-inch Hale telescope has photographed groups of stars so distant that their light started on its way toward the earth more than a billion years ago. It has even now reached twice as far into space as Mount Wilson's 100-inch, the most keen-eyed telescope previously in operation.

Another set of tests is to be run on the gigantic mirror which was installed in the telescope in November, 1947. Then it will be removed from the supporting mechanism, and the extra glass that keeps it from giving maximum efficiency will be polished away right there on Palomar Mountain.

"My guess is that the mirror will be removed some time in May," I was told by Dr. Ira S. Bowen, director of Mount Wilson and Palomar Observatories. Officials of the California Institute of Technology and of the Mount Wilson Observatory are jointly responsible for its operation.

Only about twenty millionths of an inch —one wavelength—will be polished away on the average. This will be removed from the outer 18 inches of the telescope. But the amount to be removed is not exactly the same all the way around the mirror's edge. In some places practically none need be ground away, in others nearly twice this amount must be taken off.

Under ordinary seeing conditions, this additional polishing will make little difference in the quality of the finished picture. But on clear nights, when the telescope can peer far into space, this final grinding will enable it to trap light that originated even farther away from our tiny planet.

"It is our hope under good seeing conditions to increase the amount of light striking the photographic plate by as much as 20% to 25%," Dr. Bowen estimates. "Already capable of doing far more than any other telescope, we want to push it to the very limit before putting it into operation."

Six months or even more must be spent in polishing this gigantic mirror before the telescope can reach out as far into space as experts feel it should.

More than a year will have elapsed from the time the Hale telescope was dedicated (June 3, 1948) until it is performing to the satisfaction of its astronomer guardians. Some two years will have gone by since the mirror was moved up Mount Palomar and installed in the telescope.

Even before the mirror was moved from the Optical Shop at the California Institute of Technology, where it was painstakingly polished for about a decade, experts feared that more work on it might be necessary. But it was considered better to grind away too little than too much. At Cal Tech the mirror could be tested in only one position—standing on edge—and those responsible wanted to be sure before doing any more grinding.

A large number of test pictures have been taken to date, but no systematic research has been done. Many of these experimental pictures, however, taken with an eye to discovering just how well the telescope can perform at present and to estimating how much polishing is needed where, surpass all others in excellence.

Dr. Edwin P. Hubble of Mount Wilson and Palomar Observatories, a leading investigator of distant groups of stars, is already fast at work on these trial photographs. The plates have soaked up light from distant objects never before recorded here on earth. They tell of far-away nebulae whose light has not previously been captured by man.

These trial pictures and other photographs of the heavens to be taken with the 200-inch telescope when it begins to work at maximum efficiency will put at the disposal of astronomers eight times the volume of space now available. Some day, on the basis of this ever-growing file of pictures, Dr. Hubble and his associates hope to report to the world whether or not the universe of which our earth is but a minute part is actually expanding.

The 48-inch Schmidt telescope, little brother to the "big eye" and also located on Mount Palomar, is already busy laying the groundwork for the 200-inch Hale telescope.

Each clear night it scans the sky, looking for bright distant objects worthy of the mammoth telescope's time. For the next three or four years it will be used exclusively to survey all of the sky visible from southern California.

In use since last October or November, this mighty camera is the largest of the wide-eyed telescopes. Itself capable of reaching three hundred millions of light years out into space (a light year is the vast distance over which light, traveling 186,000 miles a second, passes in a year), it sees much more at a glance than the 200-inch telescope. The latter, which has already reached a billion light years out into space, pinpoints its vision on a tiny field only a quarter of a square degree in area.

Although the 200-inch mirror, to be reground and put to work some time next winter, is the primary and most important mirror, the telescope will have six others. Three of these are convex and three flat. Being a reflecting telescope, it has no lenses, only mirrors.

Already five of these mirrors have been completed and several are in place. The other is practically finished and will be ready when the big mirror swings into action. Even the spectrographs for fanning out the light of distant stars so it can be studied in detail are well under way.

When working at its best, the telescope is expected to be capable of trapping light that a billion years ago started on its way from a nebula of average brightness. But extremely bright nebulae may be even farther than that from our planet and still record their presence on the photographic film, explains Dr. Bowen.

In general astronomers can never be sure when they have reached beyond the dreamed-of billion light years and captured light from these most distant nebulae. The yardstick for measuring these gigantic distances is not very accurate, and the distances reached by the telescope can only be esimated on the basis of present information.

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BIOCHEMISTRY

Progress on Rat Killer Antidote Reported

➤ LEADS toward possible antidotes to poisoning by sodium fluoroacetate, the potent rat killer also known as 1080, were reported by two groups of investigators to the meeting of the Federation of American Societies for Experimental Biology in Detroit.

Giving more acetate, in the form of monoacetin, was the method tried by Drs. Maynard B. Chenoweth, Edward B. Scott and S. Louise Seki of the University of Michigan. When this was given a half hour before a certainly fatal dose of the poison, it prevented any symptoms of poisoning in 27 of 36 rabbits. Given during the latent or acute stages of poisoning, it was without much effect.

The antidotal action of acetate could be stepped up by giving it with ethyl alcohol, Drs. W. W. Tourtellotte and J. M. Coon found in experiments with mice at the University of Chicago Toxicology Laboratory.

They used sodium acetate, which the Michigan investigators had found to be of little or no use in protecting rabbits. But when this was dissolved in alcohol and injected into the mice's bellies, it saved from 90% to 100% of the animals poisoned with 10 times the dose of 1080 that would kill 50% of the animals. This was when the poisoned mice were treated immediately.

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