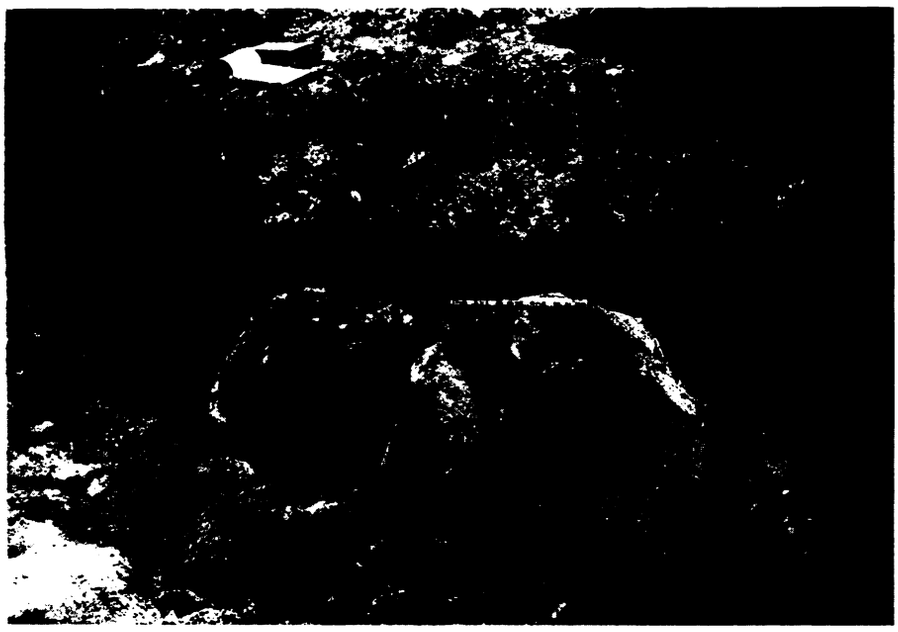

JAW BONES OF A MASTODON?

ASTRONOMY

Costly Grinding of Mirrors For Telescopes Now Avoided

New Process Calls for Depositing Just Enough Aluminum in Right Places to Produce Desired Shape

A NEW discovery promising to revolutionize the whole costly and lengthy procedure of finishing large and accurate mirrors for giant telescopes was announced by Dr. John Strong and Prof. Enrique Gaviola of California Institute of Technology before the meeting of the Pacific Division of the American Association for the Advancement of Science.

Amateur and professional astronomers of the future need not be paragons of patience as were their forebears. Instead of rubbing and grinding a spherical mirror for months or even years until the desired parabolic shape, the new Strong-Gaviola method is to deposit just enough aluminum on the mirror in just the right places to change the sphere to a parabola.

Errors Easily Corrected

The amount to be deposited can be calculated in advance instead of using the tedious cut-and-try methods of grinding of the old opticians.

If something goes wrong, instead of reworking the whole mirror, it is only necessary to remove the aluminum and repeat the process. The method is an outgrowth of Dr. Strong's technique for evaporating aluminum on large glass mirrors in a vacuum to attain better light-gathering power through all of the spectrum. Dr. Gaviola, who is visiting professor from Buenos Aires, has been assisting him in this work.

First a Success

The first attempt to turn a spherical mirror into a parabolic one by evaporation has just been completed with complete success. Drs. Strong and Gaviola used a mirror twelve inches in diameter for the test. There are great technical difficulties in handling very large mirrors, but the limit has not nearly been reached in the present case.

The evaporation technique may change the practice of the design of optical instruments, and astronomers have shown great interest in the method.

Other shapes of telescope mirror surfaces can be made beside parabolas. Hyperbolas, for example, can be constructed. At present mirrors of this shape present enormous constructional difficulties, especially when they are off center, and are avoided at all costs. Yet they have their uses in astronomical research.

To grind the great mirror of the 100-inch telescope at Mt. Wilson Observatory took three men five years, astronomers at the U. S. Naval Observatory report.

The 69-inch mirror of Perkins Observatory telescope at Ohio Wesleyan University required over two years of continuous grinding to bring it to its parabolic surface.

The new 200-inch telescope mirror of the California Institute of Technology will have to be ground from three to five years, according to various estimates, before it is accurately shaped.

Exchange Information

Now that large astronomical mirrors have been coated with aluminum and tried out, a group of astronomers and physicists got together at the meetings of the Pacific Division of the American Association for the Advancement of Science in Los Angeles and compared notes.

Dr. John Strong of the California Institute of Technology, who has aluminized all the big astronomical mirrors so far, told some of the tricks involved. The main thing is to get a good vacuum and a fantastically clean surface for the aluminum to stick to. Then just the right amount of aluminum has to be melted on the right size of tungsten wire and the wire heated until the aluminum has boiled off in all directions.

A Good Alloy

Prof. Hiram Edwards of the University of California at Los Angeles told how he happened to find a most favorable alloy of magnesium and aluminum to deposit by evaporation in a vacuum. He found the reflecting power of the alloy to be remarkably constant and equal, for visible light, to the unheard of value of 94 per cent. This is 4 per cent. higher than aluminum. Astronomers from various observatories pointed out newly found advantages for aluminum. No mirrors have deteriorated so far. They have proved easy to clean of dust and they permitted longer exposures because of the cleanness of the pictures photographed. One mirror on a sun telescope had to be treated with optical rouge every week while it had a silver surface, but during the last year and a half since it was aluminized it required no attention. The full investigation of all the benefits of aluminum will probably not be completed for years.

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