Equipment Setting the Pace

by Ann Ewing

Photographs of the moon with magnificent detail gave many astronomers another chance to point publicly to evidence supporting their views concerning the origin of lunar surface features. Most of them were just as convinced their pet theories were correct after studying the pictures as they had been before moon probes brought earth's natural satellite as close photographically as a neighboring mountain range.


Ewing

Since astronomers take a long-range view of both time and the heavens, however, the distribution of image intensifier systems to 13 astronomical observatories during the year is much more likely to go down in astronomical history as the achievement of 1966 than are lunar photographs, no matter how spectacular.

Progress in science often comes only when new apparatus becomes available with which much refined measurements can be made. Image intensifier tubes that make the telescope to which they are attached an "electronic camera" instead of a photographic one are just such a development. Although they have been in the works for some dozen or 30 years, depending upon how their origin is dated, previous work with them has been experimental, not routine at many observatories as now.

Whether or not electronic cameras will help scientists solve one of the puzzle of the decade—the energy source that stokes the "crazy" quasars, and their distance from the solar system—will be known only when even more observatories start using image tube intensifiers.

During the year:

Quasars continued to be the most puzzling objects yet discovered in the heavens and many, often conflicting, theories were proposed to explain them. It was suggested they are not the most distant objects in the universe, but are relatively close. Quasars are more numerous than had previously been thought, one astronomer reported. One quasar was found to be only 653 million million miles in diameter, relatively small for a source that radiates as much energy as an entire galaxy, and another was found to have brightened optically by 3.2 magnitudes in less than a year.

Deuterium was detected beyond earth for the first time, the third direct detection of this isotope (of hydrogen) in nature.

The first point source of gamma rays in the heavens was discovered from photographs taken 120,000 feet above the earth's surface. It is named Cygnus GR-1 and coincides with a region known as Cygnus XR-1.

The most intense source of X-rays yet found among sky objects, Scorpius XR-1, could be the remnant of an ancient nova. Measurements made from rockets showed the X-rays actually originate in two equally intense sources, one radiating at a temperature of 50 million degrees C., the other at one million or two million degrees.

Radio waves broadcast by helium in the Milky Way galaxy were detected at three wavelengths, a discovery that opens up literally hundreds of channels for studying the matter between stars and confirms a prediction made several years ago by a Russian astronomer.

A new theory was proposed to bring the predicted amount of helium in the universe in agreement with the observed abundance, previously in disagreement by a factor of two. The theory also explains how aging stars spew much of their matter into interstellar space.

"X-rays" of the moon should be made to determine whether its outer crust could be used to transmit radio waves, thus providing a system by which astronauts could communicate with each other when out of sight. If the moon can transmit radio waves, it could be used as a large lens that would focus radiation from sources far out in space toward a lunar satellite.

Neutral hydrogen clouds cover a large portion of the sky and are not restricted to certain areas, radio astronomers discovered by tuning in on the radiation the clouds emit.

The first photographs of a total solar eclipse from above the earth's obscuring atmosphere were made by Astronauts James Lovell and Edwin (Buzz) Aldrin when their spacecraft was in the eclipse path over the Pacific Ocean on Nov. 12.

A comet's temperature was taken for the first time. Infrared measurements showed that Comet Ikeya-Seki heated up from 700 degrees F. when it was 45 million miles from the sun to 1,200 degrees when some 20 million miles from the sun.

By pushing measurements to their limits, a fourth star—known only as BD plus five degrees 1668—was tentatively identified as having an unseen companion, either a large planet or a small star.

The accidental discovery that a beam of charged particles can be used to polish telescope mirrors was reported, a technique making it possible to achieve more accurate mirror surfaces than obtained by other methods.

The first, single catalogue of stars that an astronomer can use to find the positions of some 250,000 objects became available from the government. An electronic computer was used to combine and publish in one uniform catalogue the information on stellar locations previously available only by consulting 50 different sources.

Observations of black body radiation at three degrees Kelvin, believed left over from the primeval fireball in which the universe originated, at various wavelengths were reported.

Distances to RR Lyrae stars, one key to determining the structure of the Milky Way galaxy, are now known more precisely, thanks to a new method of programming a computer to simulate the behavior of these variable stars.

The changes in strength of radio waves as the Mariner probe passed behind Mars showed scientists that regions on the Martian surface vary as much as three miles in height.

Triton, the larger of Neptune's two moons, was calculated to be on a collision path that will send it crashing into the planet or break it into pieces to form a ring in some 10 million to a billion years.

Computer calculations helped scientists rediscover the long-lost Comet Tempel-Tuttle, the object responsible for the brilliant Leonid meteor showers.

New telescopes announced include a 60-inch that will join the 200-inch atop Mt. Palomar in California, a 98-inch that will be operated by the Royal Greenwich Observatory at Herstmonceux Castle, England, and a powerful radio telescope that will cover an area greater than 150,000 square meters, to be constructed near Chuguyev, USSR.