

ASTRONOMY

Observatory in the Sky

Peering into the night skies, astronomers find their view obscured by the ever-present veil of the earth's atmosphere. Swirling air currents blur the images of stars and planets. Scattered light and auroras in the atmosphere blot out faint stars. The thick blanket of air soaks up ultraviolet light and other radiation given off by distant stars, thus depriving scientists of valuable clues about the nature of the universe around them. Last week U.S. astronomers dramatically thrust their telescopes through the atmospheric veil and began to see the sky in a new light.

On Target. The fresh view of the universe was made possible by the successful launching of the Orbiting Astronomical Observatory, which began probing the heavens with eleven telescopes while circling the earth in a 480-mile-high orbit—well above the confining atmosphere. Unfolding its solar panels, the OAO obediently performed operations that assured ground controllers that it was in good working order. Then the 4,400-lb. spacecraft turned to its first assignment. Rolling slowly in space, it sought out two reference stars and unerringly swung its telescopes toward a bright Southern Hemisphere star named Miaplacidus.

Locked onto its target by a combination of control jets and spinning inertia wheels, OAO for several hours examined the ultraviolet emissions, telemetering its findings back to earth.

By the time that it turned to its next target, a super giant star named Iota Carina, the orbiting observatory had already transmitted a record amount of ultraviolet data. In the previous 15 years, scientists had accumulated only three hours of ultraviolet stargazing during the flights of 40 telescope-equipped sounding rockets, which briefly poke their noses above the atmosphere before falling back to earth.

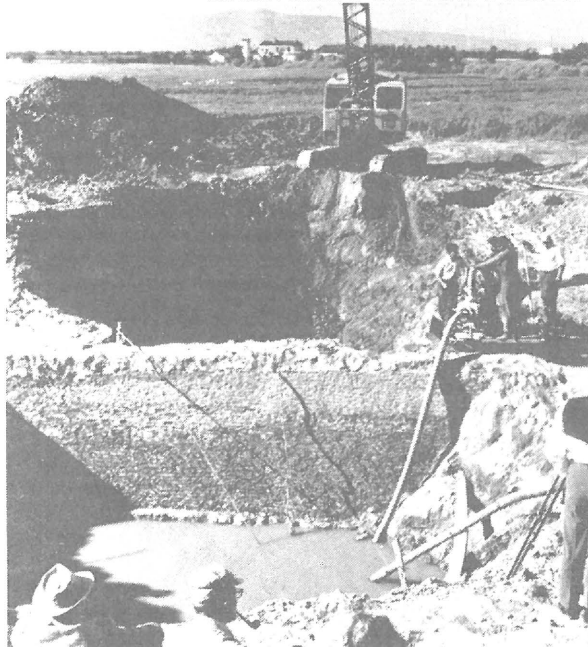
In the next six months, OAO is scheduled to study more than 50,000 stars, most of them of the hot, young variety that emit 95% of their energy in heretofore unobservable ultraviolet light. From the ultraviolet TV pictures and data that the satellite transmits, scientists hope to learn more about the chemical composition of the stars, their temperatures, their rate of burning and their total energy emission. These characteristics in turn should help them understand how stars are born out of cosmic dust and gas, how heavy elements are formed in stars and how the universe itself evolved.

OAO's stellar performance should ensure continuation of the \$321 million

OAO program, which in the next three years is scheduled to launch three more observatories. Since April 1966, when a \$69 million OAO went dead in orbit before it could return any useful information, NASA scientists have been aware that another failure might well spur Congress into cutting off the program's remaining funds.

NASA will apparently get its money's worth from the current \$75 million observatory, which was planned to operate for at least six months. The craft is performing so perfectly, says OAO Project Scientist James Kupperian Jr., that "it now appears that all we have to worry about is the observatory's simply wearing out. It could last for two, three, four or even five years."

UNIVERSITY MUSEUM OF THE UNIVERSITY OF PENNSYLVANIA



SYBARIS EXCAVATION
Ancient gift from the space age.

ARCHAEOLOGY

A Pleasurable Find

Of all the cities of the ancient world, none was more opulent than Sybaris, which was settled by Greek colonists on the instep of the Italian boot near the Ionian coast. Wealthy Sybarites had wine piped from vineyards to their homes, dressed in fine woolens, decorated themselves with gold ornaments, enjoyed vapor rubs in their bathtubs and spent as long as a year preparing for parties. They walked on roads canopied to protect them from the sun, abhorred manual labor and so enjoyed sleeping late that they banned noisy blacksmiths, carpenters and even roosters from the city.

This endless quest for pleasure may well have led to the downfall of Sybaris. To amuse themselves, according to legend, the superb Sybarite cavalymen trained their horses to dance to pipe music. Armed with pipes, an invading

army from nearby Crotonia assailed the Sybarite cavalry with music, then plunged through the dancing horses to victory. The Sybarites were dispersed, and their proud city mysteriously disappeared. They left for posterity the chamber pot, which they may well have invented, and the word sybaritic, which has come to mean luxurious or voluptuous. Last week, 2,500 years later, Sybaris again became a center of attention. U.S. and Italian archaeologists announced that after an eight-year search, they had finally located the site of the long-lost city.

Despite plentiful references to Sybaris in ancient literature, finding it was no easy task. The ruins of the city lie under as much as 18 ft. of earth and are below sea level in an area about six miles in circumference. Because water gushes up through the sandy subsoil to flood excavations, digging has been limited only to a few test cuts. But the scientists, led by Archaeologist Froelich Rainey, director of the University of Pennsylvania museum, were aided in their discovery by an exotic space-age tool that "sees" beneath the earth: a cesium magnetometer.

The magnetometer, an offspring of instruments carried on space probes to measure magnetic fields, is carried like a divining rod over a suspected archaeological site. It can detect anomalies, or disturbances in the earth's magnetic field, that are caused by objects buried as much as 20 ft. beneath the soil. Using the instrument, the archaeologists found and mapped the outlines of foundation walls, building columns, tile and pottery.

To confirm the magnetometer finds, the team used a high-speed drill, which penetrated to the ruins and brought to the surface tile and pottery samples that were later found to date from the time of Sybaris. By 1966, the port of Sybaris had been located and mapped. And by this fall, Rainey says, his team "beyond any reasonable doubt" had located the central city.

Test drillings also show that Sybaris was located on dunes above a flat plain, a finding that apparently demolishes the legend that the victorious Crotonians diverted a river to flood and destroy the ancient city. What is more likely, says Rainey, is that the city sank to a lower level after an earthquake, allowing the sea to rush in. "After all," he says, "that is an area in which earthquakes are common."

Because of the constant water seepage, a full excavation of Sybaris seems highly unlikely; it would require millions of dollars and a major technological effort. But Rainey is confident that thousands of valuable Sybarite artifacts can be recovered by drilling and hopes that the Italian government will prevent industrialization of the historical area.