Astronomy

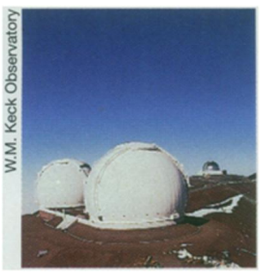
Double vision on Mauna Kea

The domes of eight telescopes dot the barren landscape atop Mauna Kea, an extinct Hawaiian volcano. Reigning supreme among them for the last 4 years has been the 10-meter W.M. Keck Telescope. Now, the world's largest optical telescope has a partner.

On May 8, astronomers and administrators gathered on Mauna Kea to celebrate the construction of Keck II. Like the original, Keck II uses a mirror composed of 36 hexagonal glass tiles to form a parabolic reflecting surface equivalent to that of a single 10-meter mirror. The tiles are much thinner, lighter, and cheaper to manufacture than a solid mirror.

The new telescope features three spectrographs, each with special capabilities. Its near-infrared spectrograph lets scientists analyze the light from faint celestial sources at wavelengths just slightly longer than those visible to the naked eye. Using another spectrograph, called DEIMOS, researchers plan to analyze the light from 100 objects simultaneously. The Eschelle spectrograph and imager spans an unusually broad range of infrared wavelengths.

Using an adaptive optics system to compensate for the turbulence of Earth's atmosphere, Keck II can also remove the twinkle from starlight. By adjusting individual tiles of the segmented mirror 100 times a second, the telescope is expected to produce images with a resolution as sharp as 0.04 arc second in the near infrared. That's like distinguishing between two barely touching pennies viewed from a distance of 600 kilometers.



Spaced 85 meters apart, Keck I and Keck II can make simultaneous observations of the same heavenly body. In that way, the paired instruments would act as a single, 85-meter telescope, a powerful tool for ferreting out planets hidden in the glare of their parent stars.

The Keck II (left) and I (right) telescopes atop Mauna Kea.

Old equipment finds big asteroid nearby

They should have come up empty-handed.

Instead of using expensive, solid-state light detectors, the two students had to rely on photographic film. And instead of looking in the plane of the solar system, where most asteroids are thought to reside, they pointed their small telescope 35° out of the plane.

Nonetheless, with a 16-inch telescope atop Mount Bigelow north of Tucson, Timothy Spahr and Carl Hegenrother have discovered what appears to be the largest known asteroid to have come within 450,000 kilometers of Earth. Only five recorded asteroids have come closer.

"This asteroid wouldn't destroy civilization if it hit Earth, but it sure would mess things up," says Spahr, now a graduate student at the University of Florida in Gainesville. He identified the asteroid, dubbed 1996 JA1, on May 15 from film taken 2 days earlier. Hegenrother and the students' supervisor, Steve Larson, both of the University of Arizona in Tucson, confirmed the finding with a telescope on Arizona's Kitt Peak. They describe the discovery in a May 18 circular of the International Astronomical Union.

Scientists estimate that 1996 JA1 has a diameter of 300 to 500 meters. In contrast, each of the five asteroids known to have passed closer to Earth was 5 to 100 meters across.

"We were told when we started this project that we would never find anything interesting," says Hegenrother. "But this object would not have been found had we been looking along the [plane of the solar system] with everyone else."

Biomedicine

Another meaty link to cancer

Before you fire up the grill this summer, consider the latest bad news about red meat.

Recent reports have tied British beef to the human version of mad cow disease (SN: 4/13/96, p. 228). Now, U.S. researchers suggest that a diet heavy on steak and hamburger may increase the risk of non-Hodgkin's lymphoma, a cancer of the immune system. In this disease, malignant cells proliferate in the lymphoid tissue, usually the lymph nodes and the spleen.

James R. Cerhan, an epidemiologist at the University of Iowa College of Medicine in Iowa City, and his colleagues studied more than 35,000 women age 55 to 69 who had no history of cancer when the study started in 1986. The women began by filling out a questionnaire on diet.

During the 7-year study, 104 of the women developed non-Hodgkin's lymphoma. From a statistical analysis, the researchers discovered that women who ate more animal protein had a higher risk of developing the disease. Women who said they ate 36 or more 4- to 6-ounce servings of red meat per month had a 73 percent greater risk of this cancer than women who ate fewer than 22 servings. Hamburger, they found, could be blamed for most of the increased risk.

Carcinogens called heterocyclic amines form as red meat cooks (SN: 4/23/94, p. 264). These compounds or an unknown contaminant spread by grinding beef may boost the risk of non-Hodgkin's lymphoma, the team reports in the May 1 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

Does the link between red meat and this cancer hold for men? "We don't have any strong reason to think the biology of the cancer is different in men versus women," Cerhan says.

The incidence of non-Hodgkin's lymphoma has risen rapidly since the 1970s. Further study of the red meat and cancer connection may solve this deadly puzzle, Cerhan says.

Study finds no decline in sperm counts

A recent French study showed a 20-year decline in Parisian men's sperm counts. That report, and others with similar results, raised the fear that an environmental toxin is delivering a crippling blow to male fertility (SN: 2/25/95, p. 127).

Now, two U.S. studies come to the opposite conclusion. They suggest no drop in sperm counts worldwide—and even a slight increase in the United States. "We were surprised," says Harry Fisch of Columbia-Presbyterian Medical Center, coauthor of the reports published in the May FERTILITY AND STERILITY.

In one study, Fisch and his colleagues reviewed data from three sperm banks, one in New York City, one in Los Angeles, and one in Roseville, Minn. They analyzed information from men who had banked sperm from 1970 to 1994 before undergoing vasectomy, a sterilization procedure. The scientists found a slight, but significant, increase in sperm concentrations during the 25-year period. They report no change in semen volume or the sperms' ability to swim.

The researchers also found a significant geographic variation in sperm counts. For unknown reasons, men who had banked sperm in New York had the highest sperm counts. These men averaged 131.5 million sperm per milliliter of semen, while men in Roseville logged in at 100.8, and men in Los Angeles had 72.7.

In the second study, Fisch and his colleague Erik T. Goluboff, also at Columbia-Presbyterian, reanalyzed data from a 1992 metanalysis that combined a number of independent studies to reveal a worldwide decline in sperm quality. The earlier studies in this metanalysis were often conducted in New York City, whereas the later ones included more developing countries, where sperm counts tend to be low. After correcting for such geographic variations, Fisch and Goluboff found no sign of an overall global decline.