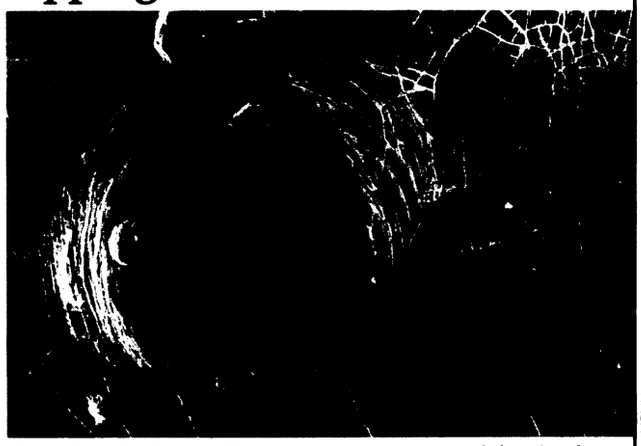
ogy's Lincoln Laboratory in Lexington made the first corrections for atmospheric turbulence with the aid of a laser beam in August 1988, working with a 60-centimeter telescope in Hawaii. The team initially used a laser at the White Sands Missile Range near Las Cruces, N.M., to assess the relatively low-altitude concentrations of nitrogen and oxygen. In 1984, they extended their distortion measurements to the sodium layer, about 90 kilometers above Earth.

Primmerman notes that for best results, astronomers should use both laser light and a true reference star, since lasers cannot compensate for another atmosphere-induced phenomenon called wandering – the apparent movement of an image. He adds that several artificial stars – i.e., laser beams – may be needed to eliminate distortion in flexible-mirror telescopes larger than 10 meters.

Results presented at last week's meeting by Laird A. Thompson of the University of Illinois in Urbana suggest that a laser-based adaptive optics system might give a fairly large telescope – such as the 4-meter telescope on Kitt Peak in Arizona – the viewing quality previously restricted to instruments orbiting above the atmosphere. He calculates that a 4-meter telescope with the laser system could distinguish celestial features about 0.04 arc-seconds apart – roughly twice the resolution expected from the Hubble Space Telescope once its optical flaws are corrected. *– R. Cowen*

Magellan mapping unveils volcanic Venus

NASA released new pictures last week from Magellan's first mapping cycle of Venus, revealing a surface shaped by volcanic activity and scarred with impact craters. Over a span of 243 days ending May 15, the orbiting craft's radar pierced thick clouds to capture detailed images of 84 percent of Venus' surface.



NASA

Scientists think upwelling molten matter created the circular structure, called the Aine corona, that dominates this picture. Two "pancake" domes – one to the north and the other on the western side of the 120-mile-diameter corona – may have arisen from eruptions of extremely thick lava.

"Magellan has removed the veil from the planet Venus. We have now been able to see entirely through Venus' perpetual cloud cover," says Wesley T. Huntress Jr. of the Jet Propulsion Laboratory (JPL) in Pasadena, Calif., who heads NASA's solar system exploration group.

Magellan found no evidence for Earth-like plate tectonics (SN: 5/4/91, p.280), but it did detect a host of unusual volcanic features, including huge lava flows and a formation shaped like a giant tick. Despite the overwhelming evidence of past volcanism, Venus' current status remains unclear. "It's highly probable that volcanism is going on right now, but it's sort of like a mystery novel: Is Venus dead or alive? We need to find the smoking volcano," says geologist James Head of Brown University in Providence, R.I.

Long considered Earth's planetary twin, Venus now appears instead to resemble the Earth of eons ago. "We're starting to realize that Venus may indeed be giving us a look into our past," says Magellan chief scientist R. Stephen Saunders of JPL.

If things go well, Magellan's radar will map all of Venus by the end of its third cycle in September 1992. NASA will then attempt to construct a global gravity map of the planet based on subtle shifts in the craft's altitude. As Magellan travels, its orbit dips and rises slightly in response to variations in gravity, which reflect the different densities of matter within the planet. Thus, the craft can provide not only a look at Venus' surface but also a glimpse into the planet's interior. *– J. Travis*

Gene for inherited retardation found

Physicians currently diagnose fragile X syndrome – the most common inherited cause of mental retardation – by placing a patient's cells under a microscope and scanning for a nearly broken X chromosome whose tip hangs by a flimsy thread. Candidates for the test include not only the mentally retarded but also some healthy individuals who may be "silent carriers," capable of passing the disorder to their children or grandchildren. Unfortunately, the chromosome test spots only 70 to 80 percent of these carriers.

Now, U.S. and Dutch scientists have identified the specific gene involved in fragile X syndrome. Testing for mutations in this gene, they say, should improve physicians' ability to predict whether prospective parents risk having a baby with the disorder.

The researchers – from Emory University School of Medicine in Atlanta, Baylor College of Medicine in Houston, Erasmus University in Rotterdam and Sylvius Laboratory in Leiden – dubbed the gene *FMR*-1, for fragile X mental retardation-1. Although they have not yet discovered the gene's normal function, they note that certain stretches of *FMR*-1 are duplicated many times over in silent carriers and in patients with fragile X syndrome. The duplications disrupt the gene's message, just as repeating words randomly throughout a sentence would make it unreadable. The investigators presume that this disruption can somehow lead to mental retardation.

"This is an advance," says David H. Ledbetter, a Baylor geneticist not involved in the study. The test for the repeated gene "presents a better diagnostic strategy" than chromosome analysis, he says.

To identify individuals carrying the duplications, the researchers chopped up samples of their genetic material and sorted the bits according to length. People with the fragile X gene had extra-long fragments, a telltale sign of duplications.

"We think that repeat region expands by an amplification mechanism that we don't understand yet," says Stephen T. Warren of Emory, who directed the work. He suggests that the amplification makes the X chromosome more fragile.

Warren and his collaborators note in the May 31 CELL that the gene directs the production of a protein bearing multiple positive electrical charges. Because DNA is negatively charged, the protein encoded by this gene could bind to DNA, perhaps regulating other genes.

An understanding of the protein's action may one day point the way to a strategy for reversing fragile X syndrome, Warren says. This form of retardation affects 1 in 1,000 males and 1 in 2,500 females worldwide. Down's syndrome – the leading cause of mental retardation – affects 1 in 600 babies, but subsequent generations cannot inherit it.

Warren's team is now developing a faster screening test, using antibodies to the protein, for routine use in medical laboratories. Only academic medical centers and specialized genetic testing labs are equipped to undertake the complex procedure the researchers used in their study, he says. *– C. Ezzell*