NOTES FROM EARTH

Surf's Up On Venus

Before Pioneer, Venera or Magellan, science fiction writers speculated that Venus's clouds cloaked blue oceans and lush tropical jungles—what else could create so much steam? That picture changed, however, as spacecraft from Earth showed that Venus was dry as a bone. But writers may not have been completely wrong. They just missed the date by three billion years. Last October, the Pioneer Venus probe burned up in the planet's atmosphere after a 14-year mission. Among the last findings that Pioneer sent back to Earth was strong evidence that Venus once had oceans, perhaps as deep as 35 meters.

"Venus may have been a fairly wet planet," says Thomas Donahue of the University of Michigan at Ann Arbor. "Certainly it's possible that Earth and Venus would have developed similarly 4.5 billion years ago with temperate climates capable of supporting oceans."

Donahue, along with Richard E. Hartle and Joseph M. Grebowsky, both of NASA's Goddard Space Flight Center in Greenbelt, Maryland, found that Venus had high levels of deuterium, a heavy isotope of hydrogen. In fact, the level recorded was 150 times higher than that found on any other body in the Solar System, including Earth, Mars or Halley's Comet. "During the course of the mission, we found many pieces of a bigger puzzle," explains Donahue. "We had lots of evidence, but the deuterium finding was the single most important piece."

Above: Science fiction writers once believed that the clouds of Venus cloaked vast, blue oceans. Recent data suggests they may not have been completely wrong.

The simplest explanation for the super-abundance of deuterium is that as the cool, early Sun became more luminous, the temperature on Venus rose. Eventually, the early oceans vaporized and greenhouse gases—such as carbon dioxide and water vapor—accumulated. Water vapor in the atmosphere was zapped by ultraviolet radiation, which split the water into its hydrogen and oxygen constituents. The hydrogen, being very light, was lost to space. But deuterium, twice as heavy as hydrogen, has accumulated in Venus's atmosphere over the past three billion years.

The presence of an ocean on Venus brings up an interesting question: Could life have once existed on that distant world? "Life could have formed on Venus, just like on Earth, but it's clearly speculative," says Donahue. In any event, don't expect to find fossilized remains of ancient rainforests on Venus. If the evolution of life on Earth is any guide, then three billion years ago the only plant life found on Venus would have been blue-green algae.

—John R. Williams

The Eyes Have It

A diagnostic tool developed by NASA scientists to fly aboard the space shuttle might be just what the doctor ordered for thousands of Americans suffering from cataracts.

The researchers are developing and testing a fiber optic probe that uses laser light to detect protein molecules in the eye. The lens of the eye is composed of about 35 percent protein and 65 percent water by weight. Normally, a healthy lens is transparent, allowing light to pass through it to the retina at the back of the eye. However, if, due to aging, injuries or disease the protein molecules begin to group together, they form many small crystal aggregates—a cataract—and block the transmission of the light. "When a patient develops a cataract, the physician in most cases cannot tell," says Rafat Ansari, a scientist at the NASA Lewis Research Center in Cleveland, Ohio. "The protein molecules are so tiny [in their earliest stages], there is no technique that can detect them."

Ansari's new cataract probe shoots a low-power laser beam into the eye. A technique known as dynamic light scattering provides data that makes it possible to measure the size of protein particles in the fluid of the eye. Other researchers have applied dynamic light scattering to study cataracts in the past, but the techniques required bulky lasers and big power supplies to run them. The fiber optic probe, on the other hand, was designed to fly aboard