

initial screening tests of brain function.

Each participant first watched television in a dimly lit, quiet room for a few minutes. A researcher measured the viewer's pupils, then administered a drop of sterile water into one eye and a drop of tropicamide into the other. The researcher did not know which drop was which. For the next hour, a special infrared video camera monitored changes in the pupils.

The eyes of Alzheimer's patients and people suspected of having the disease reacted similarly to the eyes of the three volunteers with some loss of mental function, Scinto, Potter, and their colleagues report. This reaction differed most from that of healthy individuals one-half hour into the test, the group reports in the Nov. 11 *SCIENCE*.

Pupils dilate about 5 percent in normal individuals and in those with other types of dementia but 23 percent in those with or possibly suffering from Alzheimer's. This test pointed to Alzheimer's in 18 of the 19 people having or believed to have

this disease, the researchers note.

Furthermore, pupils seem to become sensitive to tropicamide very early in the course of the disease. A man with slightly abnormal brain function who had tested positive for Alzheimer's now shows signs of being in the early stages of the disease, Potter says.

"[The test] is very provocative if it holds true," comments Zaven S. Khachaturian of the National Institute on Aging in Bethesda, Md. He adds, however, that the test must be studied in many more people to determine whether it holds up in different types of people with different types of Alzheimer's.

Even Potter cautions against physicians trying this test out yet. "[It] requires rather specialized equipment," he warns. "You can't just use an eyedropper and ruler."

In the second study, reported in the Nov. 3 *NATURE*, Potter's group demonstrated that the cholesterol-carrying molecule apolipoprotein E (apo E) pro-

motes the formation of deposits, called amyloid plaques, in the brain. These plaques serve as a hallmark of Alzheimer's disease.

Apo E-IV, the version of the molecule associated with increased risk of Alzheimer's, stimulates plaque formation the most, while apo E-III works less well, and apo E-II can even slow plaque formation, the team reports. These findings agree with those of earlier epidemiological studies (SN: 1/1/94, p.8).

The researchers had already established that the protein ACT helps stimulate the creation of filaments, which clump into amyloid plaques. These new experiments, done by mixing high concentrations of the substances involved in a test tube, demonstrate that ACT links with one part of the amyloid fragment and apo E with another part. Other studies indicate that ACT and apo E are more abundant in the parts of the brain most affected by Alzheimer's, Potter notes.

— E. Pennisi

Hubble: Evidence of oceans on Titan?

Of all the solar system bodies other than Earth, planetary scientists believe just one may harbor oceans or lakes. Researchers have long debated whether Saturn's moon Titan, cloaked in a methane-rich atmosphere, contains hydrocarbon oceans or lakes.

In penetrating much of Titan's haze, the Hubble Space Telescope has taken a new step in clearing up the mystery. Peering through a "window" that allows near-infrared light to escape through the smog and methane engulfing Titan, Hubble has imaged intriguing bright and dark patches that seem to lie on the moon's surface. One explanation for the dark patches: They represent oceans of hydrocarbons; the brightest patch could be a continent-size chunk of frozen water and ammonia ice.

Peter H. Smith of the University of Arizona in Tucson and his colleagues presented the findings last week in Bethesda, Md., at the annual meeting of the American Astronomical Society's Division for Planetary Sciences.

He cautions that the dark patches could have more mundane explanations. Hydrocarbon tars coating parts of the moon's surface, for example, could also lower Titan's reflectivity and account for the dark features.

Because the near-infrared wavelengths at which Hubble observed don't penetrate all of Titan's haze, Smith and his colleagues had to subtract the murky atmosphere to produce the final images. Some astronomers express concern that the pictures may show a mix of surface and lower-atmosphere features rather than just the surface.

But Smith notes that the light and

dark regions imaged by Hubble match several ground-based observations. Unlike Hubble, telescopes on Earth must contend with Earth's wavering atmosphere and for now can't resolve individual features on Titan. But near-infrared observations from Earth taken over several years reveal that the regions of Titan that reflect the most and least sunlight are the same ones in which Hubble finds the brightest and darkest patches, respectively.

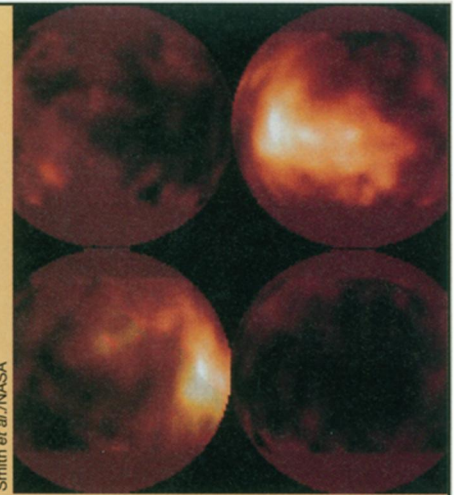
"The real proof of the pudding that these are surface features is that our bright spot and our dark spot line up precisely with the ground-based measurements," Smith says.

Jonathan I. Lunine of the University of Arizona, a proponent of the ocean hypothesis, says the Hubble images suggest that the composition and topography of the moon's surface vary considerably. Both hydrocarbon tars and a small ocean might reside within the same dark patch, he notes.

Researchers proposed Titan's hydrocarbon ocean in order to solve a dilemma. They realized that to sustain the amount of methane found in Titan's atmosphere, the moon must have a reservoir of the hydrocarbon. Without it, sunlight would have long ago destroyed the atmospheric methane.

Given Titan's temperature and surface pressure, scientists suggested that the reservoir took the form of methane and ethane oceans and lakes. Radar studies later ruled out an ocean covering the entire moon but allowed for individual lakes or seas.

Several developments may help identify what lies on Titan, even before a



Hubble images of Titan. The false-color pictures are projected global views of the moon, each separated by 90° of longitude. Assuming that Titan rotates at the same rate that it orbits Saturn, upper left image shows the hemisphere facing Saturn; upper right is the hemisphere that leads in the moon's orbit; lower left is the hemisphere facing away from Saturn; and lower right is the trailing hemisphere. Poles were not imaged.

space probe parachutes onto the moon in 2004. New techniques to compensate for Earth's blurry atmosphere should enable ground-based infrared telescopes to image individual features on Titan. Similarly, an upgrade of the Arecibo Observatory's radio telescope in Puerto Rico, to be completed in 1996, should provide higher-resolution radar images. In space, NASA plans to install a new infrared camera on Hubble in 1997. This should enable the telescope to get an even clearer view of Titan's surface.

— R. Cowen