

## Four-year study finds no ocean on Titan

By bouncing radar off the surface of Titan, Saturn's largest moon, scientists have confirmed earlier findings that Titan does not possess a global ocean of hydrocarbons. But the researchers say they still have not ruled out ponds or lakes on the surface.

Ever since the Voyager spacecraft discovered that Titan contains a thick atmosphere that includes methane and other carbon-rich compounds, researchers have speculated that a hydrocarbon ocean might blanket Titan. Such a sea seemed a likely source of the thick atmosphere, according to Jonathan I. Lunine of the University of Arizona in Tucson.

Because the hazy atmosphere of Titan prevents visible light from reaching its surface, astronomers aimed a radar beam at the distant moon and detected the reflected signal received by the Very Large Array (VLA) radiotelescope near Socorro, N.M. The intensity of the reflected signal indicated that Titan does not have a large-scale ocean, because an all-liquid surface would reflect radio waves poorly (SN: 7/1/89, p.5).

Since their initial study, Duane O. Muhleman and Bryan Butler of the California Institute of Technology in Pasadena, Martin A. Slade of the Jet Propulsion Laboratory in Pasadena, and Arie W. Grossman of the University of Maryland in College Park have repeated their measurements over three additional summers, when the Saturn system comes closest to Earth. The researchers reported their studies last month in Munich, Germany, at a meeting of the American Astronomical Society.

Besides verifying their initial results, which suggest that Titan has an icy surface similar to Jupiter's moon Callisto, the scientists detected a puzzling daily variation in the intensity of the radar echoes they received. They suggest the variation may indicate that Titan's surface contains some hydrocarbon tars, and possibly ethane lakes, mixed with large ice patches. Thus, as different areas of the rotating moon face Earth, they would reflect radar waves with greater or less strength.

Grossman and Muhleman also used the VLA to detect thermal radio emissions from Titan. The observed emissions are similar to those expected from frozen water, not a hydrocarbon ocean.

Lunine contends that the team's findings are consistent with a "dirty" sea contaminated by particles of radar-reflecting material or a hydrocarbon sea submerged beneath an icy surface.

## Unwelcome encounter with Swift-Tuttle?

Astronomers last month hailed Comet Swift-Tuttle's return to Earth's vicinity after an absence of 130 years. The visit set a record, making Swift-Tuttle the longest-period comet whose calculated orbit has been confirmed by observations (SN: 10/10/92, p.230). But Swift-Tuttle's next visit to the inner solar system may prompt a less enthusiastic greeting.

Brian G. Marsden of the Smithsonian Astrophysical Observatory in Cambridge, Mass., calculates that there's a small chance — no greater than one in 10,000 — that the 10-kilometer-wide comet will crash into Earth in the year 2126. He predicts that the comet will reach perihelion — its closest approach to the sun — on July 11, 2126. If so, not to worry: By the time Swift-Tuttle crosses Earth's orbit some 19 days later, our planet will be about 15 million miles away. Marsden notes, however, that the unpredictable nature of such nongravitational effects as cometary outbursts of gas may mar his prediction. And if Swift-Tuttle reaches perihelion 15 days later, on July 26, then Earth could be in for big trouble.

Astronomers can improve this prediction by monitoring Swift-Tuttle for the next five years, Marsden says, when nongravitational effects dominate. As for the myriad schemes to avoid a future doomsday, such as bombing the comet, he says these are best left to future generations. Besides, he notes, in the 2060s two asteroids — Hathor and the apt-sounding Nereus — may pass even closer to Earth than Swift-Tuttle.

## Cultural hyper-reactions

Researchers planning a survey of attention-deficit hyperactivity disorder in China, Indonesia, Japan, and the United States have found that applying this diagnosis across cultures may prove tricky. Mental health clinicians perceive children's hyperactive and disruptive behaviors in markedly different ways from one country to another, even when using a uniform rating system, report psychiatrist Eberhard M. Mann of the University of Hawaii in Honolulu and his colleagues.

The researchers videotaped four 8-year-old boys, two from Honolulu and two from Tokyo. At each site, one boy was recruited from children receiving treatment for problem behaviors at a mental health clinic and another was chosen at random from an elementary school. Videotapes first showed each boy drawing a picture by himself and then building a block tower with several other boys.

Groups of eight to 12 psychiatrists, psychologists, and social workers in the four countries rated the extent to which each child displayed 18 hyperactive or disruptive behaviors. These include constant fidgeting or squirming, difficulty maintaining attention and finishing projects, a volatile temper, and becoming frustrated easily.

Chinese and Indonesian clinicians gave all four boys significantly higher scores on these behaviors than did their U.S. and Japanese counterparts, Mann's team reports in the November *AMERICAN JOURNAL OF PSYCHIATRY*. Cultural standards for appropriate childhood behavior, such as expectations of emotional control and conformity in China and a greater emphasis on individual expression and creativity in the United States, shaped the clinicians' ratings, according to the researchers.

Roughly similar prevalence rates of hyperactivity have been reported for China and the United States, but the new data suggest that boys considered hyperactive in one country might not receive that diagnosis in the other, Mann's group argues.

Further studies should consider cross-cultural behavior ratings made by parents and teachers, the researchers note. This approach may reveal widely agreed upon types of hyperactive and disruptive behavior among children, they say.

## Deflating peer pressure

Investigators have often portrayed teenagers as especially vulnerable to peer pressure to engage in all sorts of dangerous or illegal behaviors. But recent long-term studies indicate that friends generally exert only a small influence on the attitudes and actions of adolescents, contends psychologist Thomas J. Berndt of Purdue University in West Lafayette, Ind.

Those studies also indicate that adolescents influence their friends in return, Berndt points out. Mutual persuasion and compromise gradually make friends more similar to each other in some respects, a pattern that characterizes friendships at all ages, Berndt asserts in the October *CURRENT DIRECTIONS IN PSYCHOLOGICAL SCIENCE*.

However, two independent studies have uncovered only a weak influence of friends on such important factors as adolescents' educational aspirations and alcohol use, he says.

Teenagers respond more often to positive feedback from friends than to coercive pressure, Berndt argues. Exceptions exist, such as urban gangs that violently enforce their own codes of behavior. "But most adolescents simply choose new friends if they constantly disagree with the decisions of their old friends," the Purdue psychologist holds.

Much evidence for the strong influence of peer pressure on adolescents' behavior has relied on the similarity between a teenager's self-reported behavior and his or her descriptions of friends' behavior. But research now indicates that teenagers frequently overestimate the degree to which their own beliefs and actions match those of their friends, Berndt maintains.