

increased heart rate, an impaired driving ability and related skills (SN: 2/4/78, p. 71) and decreased vital capacity — the amount of air the lungs can expel following a deep breath. Results of investigations of the effects of marijuana on the incidence of lung cancer (marijuana smoke contains the carcinogen benzopyrene), the body's immune system and DNA synthesis remain inconclusive.

Interestingly, the HEW report mentions studies of chronic cannabis users in Jamaica, Greece and Costa Rica that failed to find evidence of lung damage or impaired intellectual functioning. "This may have been because traditional users in those countries do not inhale cannabis smoke as deeply and retain it in their lungs as do American users," HEW reports.

But Larry Schott, director of the National Organization for the Reform of Marijuana Laws, contends that marijuana smokers in the three countries studied inhale no differently than American users do. "I rechecked this with professors [Vera] Rubin and [Lambros] Comitas [who conducted the Jamaican study]," Schott says. "They have videotapes of people smoking and working in the fields and, in their words, 'They [Jamaican marijuana smokers] suck it in clear to their toes.'"

Furthermore, Schott says, "We're not seeing anything new [in the HEW report]. It is probably one of the most equivocal reports ever released by the agency."

The HEW report maintains: "While all of us would wish for greater certainty in this area, such certainty is not yet possible. The American marijuana experience has been of brief duration." □

## Formaldehyde peril

The National Academy of Sciences' recent pronouncement that formaldehyde is dangerous even at low levels is based on a survey of studies that took researchers to funeral homes (where the chemical is used in the embalming process), mobile homes (built with formaldehyde-containing particle board) and industrial settings.

The effects of formaldehyde exposure included skin, eye, nose and throat irritation. It produced thirst, headaches, dizziness, apathy and an inability to concentrate. Although an inhalation study of rats and mice has implicated the chemical as a potential carcinogen, similar results at the same concentration exposures have not yet been reported. Studies testing formaldehyde for mutagenicity also have yielded conflicting results.

Sources of public exposure to formaldehyde include cigarette smoke, photochemical smog, automotive exhaust, foam insulation, coated nylon fabrics (see p. 217), shampoo and cosmetics. The academy recommends maintaining formaldehyde at the "lowest practical concentrations to minimize adverse effects on public health." □

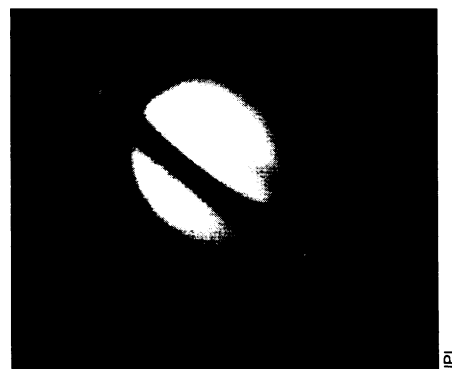
## Head-deep in planets

For all their worries about the future state of the U.S. space program (SN: 3/29/80, p. 196), many scientists have been virtually inundated by the rush of data from recent probes such as Viking, Pioneer 11, Pioneer Venus and Voyager. In many ways, the researchers are in the position of Lewis Carroll's Red Queen, who bemoaned having to run as quickly as possible merely to stay in one place. As a result, gatherings such as last month's Lunar and Planetary Science Conference in Houston sometimes become frantic affairs in which the participants fill notebooks as avidly as do students (or reporters) with findings from various planets, spacecraft and scientific disciplines, in hopes of keeping up with what's relevant to their own fields.

The Houston meeting, which began in 1969 as a session for moonrock investigators, is now a typical interplanetary potpourri. The moon is still a feature attraction, of course — most of the Apollo lunar samples have yet to be studied at all, and this year's conference included the preliminary report on an Apollo 12 core tube collected more than a decade ago. But sharing feature billing were Venus, Mars and Jupiter's spectacular Galilean satellites, along with a special session on meteorites from Antarctica, which in four brief collecting seasons has yielded some 4,700 examples amounting to about 40 percent of the total world meteorite "crop."

• Venus: Though the Pioneer Venus orbiter's radar mapper has not quite completed its coverage of the planet, researchers such as the U.S. Geological Survey's Harold Masursky now confidently state that Venus shows no signs of intraplate ridges, island arcs, subduction zones or other features that would suggest global-scale tectonics like the earth's. According to William M. Kaula of the University of California at Los Angeles, "It looks as though Venus has evolved much more continental crust [than the earth], leading to a thick layer of buoyant material which has squelched plate tectonics. The most evident cause-and effect chain," he says, "is that the absence of water led to higher surface temperatures, which led [through other steps] . . . to a greater proportion of basaltic differentiate floating rather than sinking, which led finally to shutting off plate tectonics, alas." Yet this does not necessarily mean that Venus is a completely inactive world. Shallow quakes detected on the moon, says Yoshio Nakamura of the University of Texas, appear quite similar to types of terrestrial earthquakes that do not depend on intraplate movements. Perhaps the lack of such movements on Venus need not write it off as a tectonically dead planet.

• Mars: One of the rusty world's most



*Saturn and moon Rhea from Voyager 1, 312 million km out on March 20. Composite was made from photos differently exposed for bright planet and dim rings, so rings appear as shadow where they cross disk.*

prominent features is the huge Tharsis rise, a bulge covering a sixth of the planet and bearing several huge volcanoes including Olympus Mons, three times the height of Mt. Everest and as wide as New Mexico. So massive that its formation has been blamed by some researchers for radically changing the tilt of Mars on its axis, Tharsis is often described as an "uplift," implying a feature forced upward by heat in the underlying mantle. Sean C. Solomon of the Massachusetts Institute of Technology, however, believes that it may not be an uplift at all, but a mere thickening of the crust, created where fracturing concentrated around a thin region in the lithosphere to let through successive layers of lava, each one piling atop the next like a stack of pancakes. Understanding the origin of Tharsis is not a trivial matter, since the monstrous bulge is one of the keys to Martian geologic history, as well as — if its birth indeed re-tilted the planet — the history of the planet's changing climate.

• Io: Jupiter's breathtaking, volcanically active satellite has been one of the focal points of the solar system ever since its eruptions were discovered a year ago by the Voyager 1 spacecraft's cameras. At the Houston meeting, Dennis L. Matson and colleagues from Jet Propulsion Laboratory reported an analysis of earth-based infrared measurements indicating that Io is a real cooker: Every square centimeter of its surface appears to be giving off an average of 48 ( $\pm 24$ ) microcalories of heat per second — about 30 times the average for earth and 90 times that of earth's moon. Five times earth's distance from the sun, Io is still a chilly place, with most of its surface at about 148°C below zero, but the average heat flow is brought up by numerous volcanic "hotspots." The University of Hawaii's William Sinton cites other earth-based data indicating that (according to Sinton's hypothetical model) as much as 200 square kilometers of Io's surface may be at a temperature of 327°C (621°F), with another 40,000 square kilometers at 27°C (81°F), on the balmy side of "room temperature." Close-up data from the two Voyager spacecraft are now being analyzed. And the data crush will continue: Voyager 1 has already photographed Saturn, and will get there in November. □