Mercury's atmosphere: An inside source?

Spectral measurements in 1985 revealed that the planet Mercury, whose closeness to the sun makes it difficult to study from Earth, has a thin atmosphere containing sodium and potassium. The researchers who made the discovery suggested that the rarefied atmosphere might result either from tiny meteorites vaporizing as they hit the planet or from atoms knocked loose from the surface by the stream of charged particles called the solar wind. Last week, however, an astronomer described evidence that the planet's atmosphere may come from gases diffusing up through its crust.

The most prominent feature on Mercury is a huge basin named Caloris, about 1,300 kilometers across, that apparently formed from the impact of a large meteorite. After four years of studying the planet with the 1.5-meter telescope at Catalina Observatory on Mount Bigelow in Arizona, Ann L. Sprague of the University of Arizona in Tucson last week told a meeting of the American Astronomical Society's Division for Planetary Sciences in Providence, R.I., that about ten times as much potassium showed up in Mercury's spectrum when Caloris was in view as when the big basin was out of sight. Also, she told SCIENCE NEWS, Mercury's atmosphere shows signs of a similar Caloris-related sodium enrichment.

Sprague's group, including colleagues Donald M. Hunten and Richard W.H. Kozlowski, does not envision Caloris as a volcano, spewing forth eruptions of potassium and sodium. Instead, Sprague says, the atoms probably just "diffuse out of the well-fractured crust."

The original discoverers of Mercury's atmosphere, Andrew E. Potter Jr. of NASA's Johnson Space Center in Houston, Tex., and Thomas H. Morgan, now with NASA in Washington, D.C., have described it as essentially evenly distributed, with some irregularities caused by photons of sunlight pushing the atmosphere's atoms around. At last week's meeting, Morgan presented images showing enhanced sodium emissions in localized areas, which he attributed to interaction of the sodium with Mercury's magnetic field.

The idea of the material diffusing upward through Mercury's crust, on the other hand, says Sprague, can explain not only why more sodium and potassium exist above Caloris than elsewhere on the planet, but also why Mercury has a higher sodium-to-potassium ratio than does Earth's moon, where both elements also have been detected.

The moon has about five times more sodium than potassium, while Mercury shows about 15 times as much. Mercury's magnetic field alone cannot explain the ratio difference, Sprague says. But if Mercury and the moon have similar compositions and similarly cracked surface rocks, differing temperatures of the rocks beneath the surfaces of the two bodies, due to such factors as the moon's greater distance from the sun, could account for the different sodium-to-potassium ratios, she says.

Potter told SCIENCE NEWS this week that reexamining their initial potassium data in fact shows that Caloris was in view, a detail not noted at the time, and that there is even slightly more potassium in the planet's northern hemisphere, where Caloris lies, though he says that the difference is within the uncertainty of the measurements. — *J. Eberhart*

Rad risks in young breasts

An apparent lack of breast cancers in women who as infants survived the bombing of Hiroshima and Nagasaki long suggested that young breast tissue was somehow protected from ionizing radiation's carcinogenic effects. But a recent increase in breast cancers among these women has hinted the problem only reveals itself slowly. Now a study of 1,201 U.S. women who as infants received x-ray treatments to shrink enlarged thymus glands confirms this grim view, revealing a 3.5-fold increased risk of breast cancer among these women compared with their nonirradiated sisters after an average of 36 years. The new figures indicate that the younger the breast tissue, the greater its susceptibility to x-rays' ill effects.

While physicians no longer treat enlarged thymuses with radiation, the findings call for "judicious" exposure of young breast tissue to any diagnostic or therapeutic radiation, says study coauthor Nancy G. Hildreth of the University of Rochester (N.Y.) School of Medicine and Dentistry.

A study led by Anthony B. Miller of the National Cancer Institute of Canada in Toronto also finds a decreased sensitivity of older breast tissue to the effects of ionizing radiation. Miller concludes that if mammography provides even a small increase in the detection of early breast cancers, this benefit would outweigh any radiation risk associated with the low-dose procedure. Both studies appear in the Nov. 9 NEW ENGLAND JOURNAL OF MEDICINE. □

Blackbirds that flock together breed better

In the red-winged blackbird mating game, the female calls the shots. And when shopping for a mate, she seems to care more about real estate than looks, basing her choice on the territory the male bird controls. Now researchers say she also bases her choice on whether she knows his neighbors.

Gordon H. Orians and Les D. Beletsky of the University of Washington in Seattle found that male red-winged blackbirds with familiar neighbors attract significantly larger harems each year and thus have more offspring. They say their "familiar neighbor" hypothesis represents a new twist on what zoologists call the "dear enemy" relationship. Territorial birds and other creatures that battle each other over space also band together to defend nests from predators.

In the October PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (Vol.86, No.20), Orians and Beletsky say they deduced their "familiar neighbor" hypothesis from a decade of watching red-winged blackbirds, *Agelaius phoeniceus,* in Washington's Columbia National Wildlife Refuge. Beletsky says they found the strongest evidence of the "familiar neighbor" effect in pocket marshes, where males with familiar neighbors averaged 10.3 fledglings per year compared with 6.4 for birds that nested near strangers. In strip marshes, where fewer blackbirds nest, knowing the neighbors didn't significantly influence fledgling numbers.

Orians and Beletsky say other factors exert a stronger influence on breeding success than familiarity with neighbors. But they think the phenomenon may directly help males by reducing the time they spend defending their territory. Females may prefer nesting near familiar males because of the females' mating habits, which Orians says show "less than the highest Christian morals." Females "sneak copulations with other males," and those males may be more likely to help feed her young or defend her nest.

Orians

Male red-winged blackbirds in a territorial boundary dispute.

Ken Yasukawa, a behavioral ecologist at Beloit (Wis.) College, calls the finding "pretty exciting." While Yasukawa says he suspects the phenomenon holds true for other red-winged blackbird populations, he notes that species in different areas often behave differently. For example, while males in the Washington refuge rarely feed their nestlings, three-quarters of their Wisconsin counterparts do, Yasukawa says. — *D.E. Loupe*