

Moonrock Yes, Marsrocks Maybe

The idea of meteorites coming from the moon had been around for more than three centuries, when lunar rocks brought back by the Apollo astronauts seemed to squelch it by failing to resemble any meteorites that had ever been seen. Last year, however, a meteorite picked up from the Antarctic ice sheet reopened the case when it promptly reminded researchers of material from the lunar highlands (SN: 11/27/82, p. 341). Samples of the new find were hastily distributed to more than 20 groups of scientists from the United States and abroad. It was hoped that the annual Lunar and Planetary Science Conference, held last week at NASA's Johnson Space Center in Houston, would be able to offer a consensus on the Big Question: Would the little rock, known as ALHA 81005, turn out to be from the moon? If so, it would be the first meteorite ever recovered from a known source, and the first proof that meteorites could be ejected to earth from a planet-sized body, rather than just from the likes of asteroids.

"Consensus" is putting it mildly. There had been hints for weeks that some early results were looking positive (SN: 1/22/83, p. 54), but the Houston gathering revealed near-unanimity. In fact, said Donald Bogard of JSC after talking with many of the researchers. "I haven't heard any negative opinions at all."

Toshiko K. Mayeda and Robert N. Clayton of the University of Chicago found, for example, that the oxygen isotope ratios ($^{17}\text{O}:^{18}\text{O}$) in their sample resembled only the earth, the moon and the presumed "parent body" of a family of meteorites known as aubrites, among "all the known sources of solar system rocks." And chemical data, they noted, "eliminate the earth and the aubrite parent as candidates." The confluence of numerous studies, from iron:manganese ratios to rare-gas abundances and detailed mineralogic examinations, prompted some of the investigators to completely forego the caveats that usually accompany all but the most open-and-shut scientific presentations. "ALHA 81005 is a lunar regolith breccia [a near surface chunk of reglued fragments]," flatly reported Gero Kurat and Franz Brandstätter of Austria's Museum of Natural History. "It is undoubtedly of lunar origin," concluded J. C. Laul of Battelle Northwest in Richland, Wash. "It is clearly a lunar highland soil breccia," said Ursula B. Marvin of the Harvard-Smithsonian Center for Astrophysics. Most of the other participants were only slightly more conservative ("All compositional data," according to Gregory W. Kallemeyn of the University of California at Los Angeles, "are consistent with a lunar origin.")

With such agreement on the key point,

might it also be possible to determine the actual spot on the moon from which the object came? Though it seems to be almost surely from the lunar highlands, it also includes bits of basalt typical of the vast volcanic plains called maria, suggesting to some researchers that such a plain must have been near the spot from which ALHA 81005 was tossed into space by an impact. It is very low in titanium, and a sample of such "VLT" basalt — unlike almost everything in the Apollo collection — was returned to earth by the unmanned Soviet Luna 24 probe from Mare Crisium. The matter is not so simple, however, since spectroscopy through earth-based telescopes has also identified VLT basalts in other locales.

But more intriguing is the meteorite's near-total lack of a type of rock known as KREEP (a sort of acronym representing its composition of potassium, rare-earth elements and phosphorus). Small satellites placed in lunar orbit by Apollo 15 and 16 took gamma-ray measurements indicating most of the KREEP to be on the moon's earthward face, and several of the scientists at the Houston conference suggested that ALHA 81005 may thus be from the lunar far side, which has never been sam-

pled by spacecraft.

One research team — Rolf Ostertag and Graham Ryder from the Institute for Mineralogy in Münster — even proposed a specific farside crater as the meteorite's source. Called Giordano Bruno, it lies in highland terrain, but with mare material about 150 kilometers away. The size of the crater's bright rays suggest it to be a young one, and the two researchers maintain that unless ALHA 81005 has been on earth far longer than any other dated meteorite from Antarctica's Allen Hills, Giordano Bruno is "far more likely than any other lunar crater" to be its source.

That a meteorite could be driven from the moon to the earth (meaning that it exceeded the moon's 2.4-kilometer-per-second escape velocity) also adds some support to the suggestion by several scientists that certain other meteorites have come from Mars (though escape velocity there is about twice as great). One such chunk, a Shergottite from Antarctica's Elephant Moraine, is reported by Donald Bogard to show rare-gas isotopes in ratios similar to the Martian atmosphere. At the Houston meeting, Robert O. Pepin and colleagues from the University of Minnesota added nitrogen isotopes to the same rock's list (though with the modeled assumption that the measured nitrogen came from both crustal and atmospheric components). The question: Can a Marsrock be confirmed without known examples?

—J. Eberhart

Treating senility with opiate blockers

A preliminary study by a team of New York University scientists suggests that the symptoms of Alzheimer's disease, a degenerative nervous disorder affecting primarily the elderly, might be treatable — in some cases with dramatic results — with a drug called naloxone. Researchers in the field are reacting to the new findings with very cautious enthusiasm: while the results of this novel drug treatment are intriguing, they say, other treatments have shown preliminary promise in the past, only to fail in replication.

The NYU neuroscientists, directed by Barry Reisberg and joined by Eugene Roberts of California's City of Hope Research Institute, gave a weekly dose of naloxone for six weeks to seven subjects who were suffering from a "moderate to severe" form of Alzheimer's disease. Alzheimer's causes severe intellectual dilapidation — what is commonly called "senility" or "senile dementia" — in an estimated 1 million to 3 million people in the United States. The researchers assessed the behavior and intellectual performance of the patients before and soon after treatment, and they found (and report in the March 24 *NEW ENGLAND JOURNAL OF MEDICINE*) what Reisberg calls "a notable clinical turnaround." Patients who typically were having difficulty dressing appropriately

and could not recall the President's name, the season or their own address showed significant improvement in social functioning, short- and long-term memory, and ability to concentrate, Reisberg told SCIENCE NEWS. In three cases the improvement was so dramatic that it was recognizable at home to family members, suggesting that the effects were lasting at least for a matter of days.

Naloxone is an opiate "antagonist" — it blocks the effects of the brain's naturally circulating pain killers — and just why it would improve mental performance is unclear. According to Joseph T. Coyle of Johns Hopkins University, Alzheimer's disease does not involve abnormalities in pain perception, and Reisberg's results seem at first to be "surprising and counter-intuitive." However, Coyle adds, opioid peptides have also been found in areas of the brain that have nothing to do with pain perception, including, in the basal forebrain, the cholinergic nucleus basalis — the main source of chemical stimulation for the cerebral cortex. Degeneration of the pathways from the basal forebrain to the cortex (the seat of higher intellectual activity) is widely accepted as a major cause of Alzheimer's symptoms. One hypothesis, Coyle told SCIENCE NEWS, is that naloxone may alter the activity of the sur-

viving cholinergic neurons.

Reisberg agrees that Coyle's hypothesis is one, but only one, of several hypotheses that might explain his findings. Naloxone probably modulates the effects of numerous neurotransmitters, he says, and in addition opiates may act directly—by exciting the hippocampus (the seat of memory) and causing amnesia or by slowing the electrical activity of the cortex.

The same journal issue contains two reports of memory improvement in Alzheimer's patients following treatment with physostigmine, a drug that acts directly on the cholinergic neurotransmitter system. But unlike such drugs, Reisberg reports, naloxone appears to have no serious side-effects. —*W. Herbert*

Marijuana and the reproductive cycle

Moderate marijuana use may cause a temporary disruption of the menstrual cycle, but this cycle returns to normal in three to four months in rhesus monkeys, whose reproductive system is similar to that of humans. This was one of the conclusions of a seven-year study on the effects of marijuana's psychoactive components on the primate reproductive system.

In the study, Carol Grace Smith and her colleagues gave five monkeys doses of tetrahydrocannabinol (THC), the principal psychoactive component of marijuana. The doses were equivalent to five or six joints a day three times a week, which the researchers called "moderate usage." After the injections, the monkeys failed to ovulate for a period ranging from 103 to 135 days. They then developed a tolerance to the THC and began menstruating normally at usual hormonal levels.

Smith and her colleagues of the Uniformed Services University of the Health Sciences in Bethesda, Md., and Ricardo Asch of the University of Texas in Austin report in the March 25 *SCIENCE* that this tolerance is not metabolic (clearing the body more quickly of THC), since the THC concentrations in the blood remained roughly constant throughout the injection period. Instead, Smith said, "There are nervous pathways into the hypothalamus [a gland that regulates the reproductive cycle] that are being suppressed."

Less rigorous studies in women show a similar menstrual cycle disruption, says Smith, followed by a return to a normal cycle in chronic marijuana users who have developed a tolerance. However, other studies indicate that THC may be directly toxic to the developing egg cell. Smith warns that women who are attempting to conceive or who are pregnant should not use marijuana. There is also evidence that heavy marijuana use might cause serious, possibly irreversible, menstrual disruptions in adolescents, an effect the team has now begun to study. —*A. Chen*

Immunity syndrome: New test, new ideas

A surprising correlation between a hormone and acquired immune deficiency syndrome (AIDS) provides the basis of a new test that may soon limit the spread of the often fatal condition and also indicates new possibilities for its treatment. A separate discovery of abnormal interferon in some AIDS patients offers yet another view of the disease.

Scientists have identified abnormally high levels of an immune system hormone, called thymosin alpha₁ (α_1), both among patients with AIDS and in relatively healthy persons considered at high risk for AIDS because of social characteristics and clinically measured depression of immune system functions. The test employed to identify the hormone in blood is now being adapted for routine clinical use and tested by Roche Biomedical Laboratories, Inc. The drug company plans to have a form of the test available in a few weeks for clinical research use, says James Geyer of the Burlington, N.C., laboratory.

Most common among homosexual males, the disorder appears to be spread by an infectious agent through intimate contact and blood transfusions (SN: 9/25/82, p. 202; 1/1/83, p. 8). Because there may be no symptoms of AIDS for as long as a year after the disease is contracted, apparently healthy sexual partners and blood donors can transmit the disease. So far there is no effective treatment.

The new test, which uses antibodies to label thymosin α_1 with radioactivity, was originally employed in studies of the hormone's levels in aging and in a variety of diseases. Collaborating with Evan M. Hersh at M.D. Anderson Hospital in Houston, Allan L. Goldstein of George Washington University examined blood samples from almost 150 homosexual male patients considered at high risk for AIDS because of deficits in immune system function. The scientists expected to find lowered levels of thymosin α_1 , because many of these patients have decreased numbers of helper T cells, white blood cells that require thymosin α_1 in order to mature. But instead the thymosin α_1 levels were often elevated to almost four times normal. Such high levels are only seen in a few adult leukemias, certain brain tumors and some cases of multiple sclerosis. Thymosin α_1 is not elevated in blood of healthy homosexuals, Goldstein reports.

Scientists at Roche plan to run more than 1,000 blood samples supplied, along with patient histories, by several clinical centers. "We hope to have some definite results in less than a month," Geyer says. "We may be off and running." He expects the test to be widely used in screening donated blood, as well as in early and simplified diagnosis of the syndrome.

The finding of high levels of thymosin α_1 has implications as to the course of AIDS and to potential treatments. Goldstein

suggests that the white blood cells that normally respond to thymosin α_1 may be defective and do not send a feedback signal to make the thymus gland stop producing the hormone. In parallel with certain forms of diabetes, an effective therapy may be to give the patient more hormone. Another possible therapy, suggested by overproduction of the hormone, is to surgically remove much of the thymus. This type of treatment is effective in myasthenia gravis, an autoimmune disease.

Research at New York University Medical School has described components of AIDS that resemble autoimmune diseases. "While AIDS involves a shut-down of cellular immunity, some B cell functions [such as antibody production] certainly are increased," says Jan T. Vilcek. He has discovered an abnormal form of alpha-interferon, a natural disease-fighting substance, in 17 out of 27 homosexual AIDS patients with Kaposi's sarcoma, a cancer that frequently develops in the course of AIDS. He has also found it, but less frequently, among patients with swollen lymph glands, a symptom that may be an early indication of AIDS, and even less frequently among healthy homosexuals. The abnormal interferon was not found in any healthy heterosexuals, but it is found in patients with an autoimmune disease called lupus. —*J.A. Miller*

New EPA chief nominated

William D. Ruckelshaus, the Environmental Protection Agency's first administrator, has been nominated by President Reagan to succeed Anne McGill Burford as EPA's top official. This proposed return engagement for Ruckelshaus at EPA has won the support of environmentalists and industrialists alike. Reagan describes the 50-year-old lawyer, a senior vice president of Weyerhaeuser Co., as "the right man for the right job at the right time."

Burford, who resigned March 9 under fire, heads a list of current or former Reagan appointees at EPA now under congressional investigation. Many question whether those under investigation were only doing Reagan's bidding; and it is into this limelight that Ruckelshaus has stepped. Claiming he's been offered a "free hand" to deal with the agency and its responsibilities, Ruckelshaus will begin by, in his words, attempting to restore "stability" to the troubled agency.

Though Senate confirmation of Ruckelshaus is not expected to encounter much opposition, environmental groups note they will be looking for signs of whether the agency's founding administrator has in any way compromised his integrity or commitment to environmental protection over the past decade by his representing firms regulated by EPA. □