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}O:^{18}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 sampled 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 counterintuitive." 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 basilis — 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-