Early hints at a moonish meteorite

Excitement is growing among scientists about the recently raised possibility that a tiny piece of rock, discovered a year ago in Antarctica, may have come from the moon. It is a meteorite, with a composition unlike that of most if not all other known meteorites, and it promptly reminded some of the first researchers to examine it of lunar highland samples brought back by the Apollo 16 astronauts.

It is not simply a matter of having one more moonrock (although any differences between it and the Apollo collection will surely be of interest). The excitement stems from the chance that comparison with Apollo data will reveal the newly found fragment as the first meteorite—out of thousands now cataloged — ever to be firmly linked to the "parent body" from which it came (SN: 11/27/82, p. 341). In addition, a proven connection would be a valuable demonstration that meteorites can be driven all the way to earth from a source as massive as a planet. This would be of great interest to scientists who are now debating whether certain other classes of meteorites may have come from Mars, a question whose answer depends in part on establishing whether chunks of rock can even be kicked free of Martian gravity.

Last month, samples of the possible new moonrock were distributed to about 20 scientists or teams of them who had expressed interest in analyzing it in detail. The first order of business, according to the U.S. Antarctic Meteorite Advisory Group, would be to see if the rock (known as ALHA 81005) could indeed be shown to have a lunar origin. Interest was high, and the group expressed the hope that the selected researchers would be able to report at least preliminary results in time for the annual Lunar and Planetary Science Conference at the National Aeronautics and Space Administration's Johnson Space Center in Houston in March. (The meeting, known informally as the "rockfest," was begun in the Apollo 11 year of 1969 as a forum devoted to moonrock studies, though it has since expanded into comparative planetology.)

The recipients of the samples are withholding any announcements of their findings prior to the meeting, both because the measurements are in some cases incomplete and to forestall false hopes that might be dashed by later analyses. Even with Apollo data for comparison, actual *proof* that ALHA 81005 came from the moon would be a difficult if not impossible task (though an extremely strong case could be made). Despite that caveat, a number of sources already report that several early studies are showing just what one would expect if the researchers were conducting their tests on a true lunar fragment. "Everything is looking pretty consistent," says one source. "There's a lot of excitement going on."

Ratios between stable isotopes of oxygen, for example, have been found to look one way in the case of terrestrial and lunar rocks, and another for most meteoritic material. Actual numbers may have to await the March meeting, but "it appears," says another source, in a comment echoed by several others, "that the oxygen isotopes are consistent with a lunar origin." Another key ratio, that between iron and manganese, is said to show a similarly provocative result.

In a more general way, the meteorite's overall composition points in the same direction. It is a breccia, or reglued chunk of broken particles, made of anorthosite, a rock well known from the highlands of the moon but virtually unknown in most meteorites. One source cites the presence of light-pinkish, magnesium-aluminum-rich spinels, which, he says, "I've never seen in earth rocks or meteorites, only in moon rocks."

Again, many of these results are preliminary (and also can be more clearly judged when the detailed measurements are available), and some of the planned analyses have yet to be begun. Still, says a source, "if it isn't lunar, it is an *extraordinary* meteorite."

Some of the later tests will include dating, to determine, for instance, whether the meteorite's time in space (indicated by cosmic-ray measurements) could be typical of a trip from the moon to the earth. The processes that could launch such a flight are poorly understood, however, so a long cosmic-ray "exposure age" would not necessarily prove the negative. Other studies involve comparison of the meteorite data with remote-sensing maps of the moon, in hopes of being able to pick out the sorts of lunar regions from which the rock could have come.

The March meeting in Houston may not provide an unambiguous yes or no to the question of the meteorite's lunar origin. "What I would expect," says one source, "is an incredibly strong 'maybe.'"

— J. Eberhart

Centers for Disease Control: On the Beach

Ellen K. Silbergeld of the Washington-based public interest group Environmental Defense Fund called it a "face-to-face conflict." Another observer, an official of the Federal Emergency Management Agency, called it "latent hostility." Both were referring to the strained relationship that had developed between officials of the Environmental Protection Agency and the Centers for Disease Control during the early stages of their work at Times Beach, Mo. In December, floodwaters struck that small town; and preliminary analyses of soil samples (coincidentally collected just before the flood) indicated that the town is tainted with potentially hazardous levels of one of the most dangerous substances known: 2,3,7,8-TCDD, a dioxin (see p. 60). In animal studies, TCDD has been linked to a variety of disorders, including cancer and birth defects.

EPA is at TCDD-tainted Times Beach to continue sampling soil. CDC is there to deal with health matters. The strain between the two agencies became apparent when CDC officials recommended on Dec. 23 that Times Beach residents evacuate the area. This struck a dissonant chord within EPA, Silbergeld contends, because it implied there is an "emergency" situation. And to date, she explains, EPA has decided that immediate, emergency Times Beach soil clean-up efforts are not necessary — a decision that has met with much criticism from environmentalists and former Times Beach residents.

While one EPA official acknowledged the recommendation had ruffled agency feathers, that official maintains that it was because CDC had not informed the agency of it prior to release. CDC authorities declined to comment on this particular situation, but one official told SCIENCE NEWS: "I'm kind of hacked at EPA for not making it more well known what they have or haven't done [in terms of soil sampling], because I don't know what my line of thinking [regarding health matters] should be if I don't know exactly what they've found."

Despite the strained relations, CDC still managed to secure one-half million dollars from EPA's Superfund pool to administer a health questionnaire to residents of Times Beach and three other confirmed dioxin-contaminated sites in Missouri.

The purpose of this survey, whose administration is under the direction of Gary Stein and Paul Stehr of CDC and Missouri Division of Health authorities, is to identify "high risk" individuals — those persons most probably exposed to the highest levels of dioxin in their communities. The survey includes questions concerning medical history, outside activity (gardening, for example) and diet, because the dioxin could have entered the food chain.

The "high risk" individuals eventually will undergo physical examinations, during which medical personnel will check for signs of chloracne, a known effect of dioxin exposure, and administer a battery of tests. Then, if any "abnormalities" are detected, says Stein — "say, if we find 10 folks at Times Beach with some weird elevated enzyme levels we can't explain" — CDC officials ultimately may match individuals from dioxin-exposed communities with controls from non-exposed communities in order to determine whether a significant link between exposure to dioxin and that health effect can be established.

— L. Garmon