

## Meteorites: Quick change in a freezer

Scientists favor Antarctica as a hunting ground for meteorites, not because an unusual number fall there, but in part because meteorites are more easily seen against the barren, frozen terrain. These extraterrestrial chunks are prime examples of their kind, with valuable details preserved against the erosion of more temperate climates for thousands or millions of years in the arid chill at the bottom of the world.

Even there, meteorites can rust or change in other ways, but it has been unclear just how rapidly such weathering takes place in Earth's deep-freezer — how long the "space rocks" actually remain pristine. Now a group of scientists reports what James L. Gooding of NASA's Johnson Space Center in Houston calls "the first age-date for a weathering product" on an Antarctic meteorite. The rock itself, a 220-kilogram chunk recovered in an area called Lewis Cliff, fell to Earth at least 32,000 years ago. But the researchers have determined that it also bears a tiny patch of a powdery, white mineral that formed on it in the 1950s.

The substance, a hydrous magnesium carbonate called nesquehonite, appears from isotopic measurements to have resulted from a reaction between the meteorite's original minerals and terrestrial water and carbon dioxide. The dating was possible because the carbon in the carbon dioxide provided an isotope "tracer" caused by nuclear tests in the Earth's atmosphere.

"Most workers," says A.J. Timothy Jull of the University of Arizona in Tucson, writing with Gooding and other colleagues in the Oct. 21 *SCIENCE*, "have presumed that weathering proceeds slowly in the cold, dry Antarctic environment." The results, however, suggest that, "at least for salt formation [such as nesquehonite], weathering may be sufficiently rapid that most observable effects can develop in tens of years rather than over thousands of years."

The fact that the nesquehonite formed so rapidly "suggests, but does not prove" that most weathering effects on Antarctic meteorites occur after they have been "exhumed" from beneath the ice, according to the researchers. Some scientists have expressed the hope that it may someday become possible to trace the movements of the Antarctic ice by comparing the time between a meteorite's descent through the ice on Earth and its reexposure to air, though much more work remains to be done. Another concern is that chemical changes in Antarctic meteorites on Earth could mislead scientists trying to identify the materials available in the early solar system when the rocks formed. — J. Eberhart

## NAS fossil report: Lacking backbone?

Protection of fossil resources on U.S. public lands is eroding, according to the Society of Vertebrate Paleontology. A poll of the group's 900-plus U.S. and Canadian members and a vote at its annual meeting last week in Drumheller, Alberta, express the concern that a National Academy of Sciences (NAS) report could threaten the safety of untapped fossil sites and allow the commercialization of rare fossils.

Although they support many parts of the academy report, members take issue with several important elements, says society President Michael Woodburne of the University of California, Riverside. The 1987 document represents the work of a 13-person panel, which included vertebrate and invertebrate paleontologists, a paleobotanist, lawyers and businessmen.

Vertebrate paleontologists are particularly upset by panel recommendation #5, stating that "commercial collecting of fossils from public lands should be regulated to minimize the risk of losing fossils and data of importance to paleontology" — a statement the society says tacitly condones commercial fossil collection and sale. Woodburne says the society wants the federal government to expressly prohibit commercial collecting on public lands. Such collect-

ing drives up fossil prices and encourages entrepreneurs to sell specimens to the highest bidder, sometimes someone seeking home decorations, Woodburne says.

"When things are commercialized, unique specimens that should rightfully end up in a museum, perhaps do not end up in a museum. They can end up in a personal collection or in another country," says Bruce J. MacFadden, past president of the society. The NAS recommendations do not recognize the rarity of vertebrate fossils as compared with invertebrate fossils, which tend to be much more numerous, he adds. For some species of dinosaur or long-extinct fish, only one specimen is known.

John Pojeta Jr., an academy panel member and an invertebrate paleontologist with the U.S. Geological Survey in Reston, Va., says the report attempts to accommodate the needs of many groups and that commercial collectors often provide fossils for schools and museums.

He points out that the panel suggested that any important specimen found by commercial collectors should be placed in a public institution. "Recommendation #5 is a strong endorsement of the policy 'science comes first,'" Pojeta says. — R. Monastersky

## Antarctic research requires costly cleanup

Antarctica inspires images of pristine emptiness, but McMurdo Station — the primary U.S. research base there — has produced air and water pollution that environmental groups say far surpass levels acceptable in the United States. On Oct. 14 in Washington, D.C., officials of the National Science Foundation (NSF), which oversees U.S. scientific efforts in Antarctica, outlined a potential multi-million-dollar plan to minimize U.S. pollution in the Antarctic.

At a monthly meeting of the agency's governing body, Carol A. Roberts of NSF's polar programs division described a cleanup and prevention program for NSF's field camps and three year-round stations in Antarctica. NSF Director Erich Bloch said the effort may cost more than \$30 million during the next three or four years. NSF provides about \$125 million annually for Antarctic research.

"We do have a serious problem," Roberts told *SCIENCE NEWS*. "We have to clean up our act, especially at McMurdo," which houses more than 1,000 people in Southern Hemisphere summer. By 1991, NSF intends to complete the first steps of its plan: Disperse McMurdo's sewage more effectively by submerging the exposed pipe that empties the settlement's

waste water into McMurdo Sound, and improve water quality by building a treatment system that Roberts says will prove as effective as those now used in 37 U.S. coastal cities.

But many environmental observers view NSF's efforts as inadequate. Mary A. Voytek of the Environmental Defense Fund in Washington, D.C., says, "NSF is trying, but we would like to see them speed up the process. Several of the things they talked about doing [at the recent meeting] were things they talked about in 1980." NSF has yet to address other issues, such as the impact of uncontrolled vehicle emissions, she says.

Separate August reports from the Environmental Defense Fund and the international group Greenpeace accuse NSF of violating treaty obligations at McMurdo by dumping garbage in a landfill and burning plastics. Both groups also say the agency should follow up a 1983 NSF study suggesting concentrations of toxic chemicals and heavy metals in McMurdo Sound exceed those in many of the most polluted U.S. bays and estuaries. But Roberts says, "We consider the water-sample data from that study to be very imprecise." NSF plans to conduct a new study in December, she says. — C. Knox