

ROCK THE COSMOS

BY ELEANOR PERRY-SMITH

The truck bounced along the rocky surface of the desert as Geoffrey Notkin peered out at the arid landscape. There were no plants, reptiles, insects nor birds of any kind. The only sign of life was the man sitting next to him, Steve Arnold, as they traveled deep into the Chilean Atacama Desert. For the most part, the terrain had been flat, putting their minds at ease as they drove, but then their momentum crawled to a complete stop as the truck sank into a ravine full of fine, powdery sand. As Notkin realized they were stuck days from civilization, his thoughts trailed from the reason they were on this expedition in the first place: to hunt for meteorites. >>

Geoffrey Notkin stands on the north rim of Arizona's Meteor Crater—the best preserved impact structure in the world. The event which created it is believed to have occurred approximately 50,000 years ago.



Most meteorites hail from the area between Jupiter and Mars known as the asteroid belt and tend to be the byproduct of collisions between these giant aimless space rocks. On occasion an asteroid will slam into Mars or the moon and yield rare Martian and lunar meteorites. Blue to green to red—their friction against the sky leaves behind a streak of light and molds them into metallic sculptures that can be as big as a house or as small as a peanut. These rocks are evidence of the stellar carnage that takes place in the heavens while we go to the grocery store or watch a movie. When these chunks are careening through the sky, they are called meteors. Once they hit the ground, only then are they considered meteorites.

There are three groups into which meteorites are classified: the irons, the stones and the stony irons. “Only seven or eight percent of all meteorites are made entirely of iron; it is always a mixture of iron and nickel,” Ann Black says. Black is an internationally known meteorite dealer who leaves the actual hunting to people like Notkin, while making it her business to authenticate the specimens they find and then sell them to collectors.

Every specimen, in order to be classified for resale, falls into one of the three main groups and one of thousands of subgroups. Most found meteorites are classified as stones, while the rarest types, the stony irons, make up less than 1 percent of all meteorites. Black says one of the stony irons happens to turn into crystals of olivine, also known as the August birthstone peridot, after it

has been cleaned up and polished. When a stony iron smacks the earth and is found to have equal amounts of metal and peridot, that meteorite is then called a pallasite, which is one of the most uncommon subtypes. These can be sold for well over \$50,000, depending on the size.

Notkin was out inspecting the Atacama for pallasites and other meteorites, which can be spotted by their black exterior or discovered by using a metal detector, until his truck got stuck in deep sand. Too far into the desert to hike for help and lacking a radio with long-range capabilities, he and Arnold had only their wits at their disposal.

Leaving the truck behind, they set out in search of something to help the tires gain traction in the sand. But, of course, the chances were slim in the barren desert. After a few anxious miles, they happened upon slabs of limestone. Dragging them back to the truck, the meteorite hunters worked them under the tires and eventually pried the truck free. They were ready to roll, tired from the struggle, yet relieved. They drove 20 feet ahead and fell into another sand pit. “It took us the better part of the day to get it back up to high ground,” Notkin says in his jovial English accent. “That was scary. We were in a really dodgy position there.” That incident was in 1997, and Notkin and Arnold were relative novices at the time. Nevertheless, they left the Atacama with a few pallasites.

In addition to the aesthetic beauty and market value of space rocks, meteorites offer scientific insight. By analyzing their chemical makeup, scientists gain clues as to the early formation of the solar system, since



meteorites come from places we don't yet have the ability to travel to, and are often twice as old as Earth. "The pallasites are believed to have formed at the core mantle boundary of an asteroid large enough to have a molten core," Notkin says. This means meteorites serve as geological indicators that hint at the way our own planet may have formed, and from there we can speculate about the conditions in which life may have evolved. In particular, scientists have compared dissimilar atoms of the same elements, called isotopes, in meteorites with those in Earth rocks and discovered differences in the silicone isotopes. The silicone isotope with the mass 28 was found in greater abundance on Mars and the asteroid Vesta than on Earth and the moon. From this, researchers concluded that our

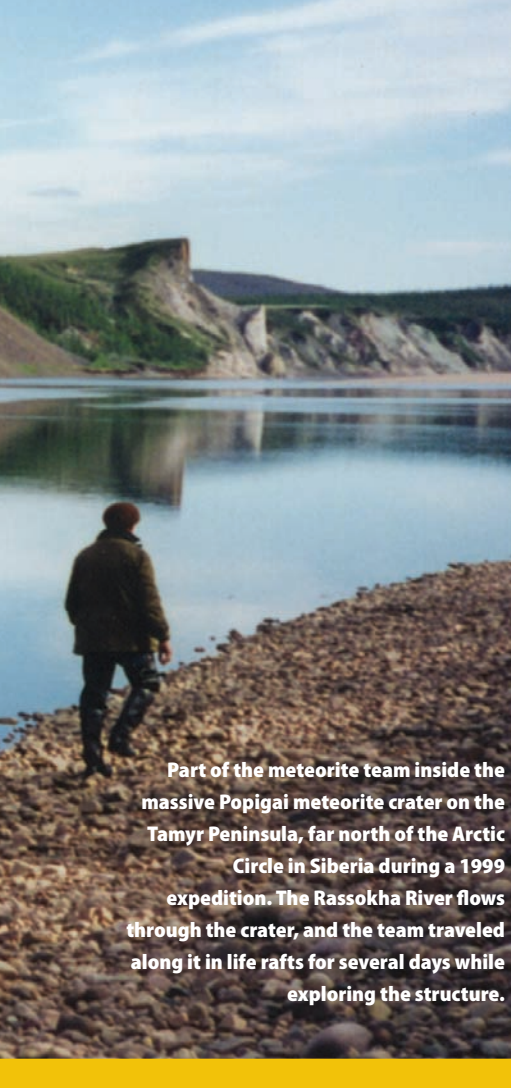
planet, along with the moon, formed under different circumstances than our most similar cousin, Mars. Furthermore, meteorites sometimes contain minerals that are geologically significant for study, even though they are made up of the same elements as Earth rocks.

For example, meteorite dealer Edwin Thompson was trying to preserve a meteorite and inadvertently secured a four-and-a-half billion-year-old water-soluble mineral inside of it, called Halite. The Halite's azure blue crystal is an indication that water—fundamental in sustaining life—may have existed elsewhere in the solar system.

The shapes of meteorites have also aided scientists in the design of spacecraft. Oriented meteorites are rocks that have traveled through the atmosphere with very little tumbling

or twisting, so they maintain an even orientation, and develop a snub-nosed bullet shape. Thus the Mercury, Gemini and Apollo spacecrafts had a snub-shaped heat shield on them for returning to the Earth. Meteorites helped the designers figure out what was the most efficient shape to travel through the atmosphere.

HARVEY NININGER WOULD be proud. Not just because science has taken a profound interest in meteorites, or that the industry circulates thousands of dollars each year, but simply because people are now as fascinated by them as he was. Nininger wasn't the first person to hunt for meteorites, but he was the first to collect them with a passion in the 1920s and 30s—a time when



Part of the meteorite team inside the massive Popigai meteorite crater on the Tamyr Peninsula, far north of the Arctic Circle in Siberia during a 1999 expedition. The Rassokha River flows through the crater, and the team traveled along it in life rafts for several days while exploring the structure.

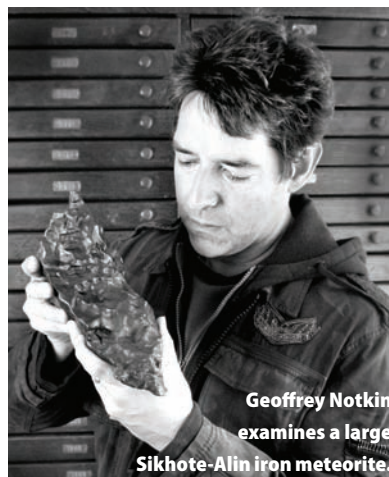
scientists considered them too rare to be worth looking for.

In fact, meteorites fall all the time. Many of them burn up before reaching Earth, but the prevailing theory is that they fall randomly and somewhat evenly over the planet's surface. Theoretically, you could find one in your backyard, but in reality, since nearly all meteorites contain a great deal of iron, they will start to decompose after hitting the ground in a moist or humid climate. Notkin grew up in London, not a prime place for hunting with its wet climate.

Notkin says the current working statistic is that one meteorite lands on every square mile of Earth's surface approximately every 10,000 years. It could be the size of your little finger, or huge like the one that hit the Northern tip of Siberia 35.7 million years ago, leaving the Popigai

Crater, a dent 100 kilometers in diameter. The crater enticed Notkin to go on another global expedition, this time with a team of American and Russian scientists to analyze the remnants of the blast.

"We took seven planes, various boats, Jeeps, buses and one helicopter to get into the crater," Notkin says. The last was an ex-Russian military helicopter, with only a rickety wooden bench for a seat, that dropped them down into the Popigai and left them there. It was the longest one-way trip he had ever taken, traveling far across the Arctic Circle and into the wilderness. The team was looking for impactites, rocks that had contact with the meteorite. These would provide clues to the chemical composition of the planet centuries ago, because the impactites have undergone minimal change since the time they were hit by the meteorite. There was a lot of equipment to carry and the mosquitoes were overwhelming, which led Notkin to wear a net around his face. But the team ran into a big problem. The lifeboats they brought to float them down the river that runs through the middle of the crater couldn't hold all the weight they were lugging, especially



Geoffrey Notkin examines a large Sikhote-Alin iron meteorite.

"Meteorites fall all the time. Many of them burn up before reaching Earth, but you could find one in your backyard."

the 70-pound batteries for their outdated radio used to call for the helicopter to pick them up. It was then that Notkin's Russian team members pulled out a chainsaw. "They cut down pine trees and built a raft," says Notkin. "It was all very Tom Sawyer-like." They then spent nine days collecting impactites, and when they were finished, they wound the bulky radio's hand crank and called for a helicopter ride home.

Yet home is a place where professional meteorite hunters don't stay for long. When there's a reported meteorite fall, they're on the first plane out of town. However, the next time Notkin hits the road it will be with a different kind of team: a camera crew. This month Notkin and Arnold hosted a Science Channel pilot titled "Meteorite Men." If the show gets picked up, the hunters will be traveling to the edges of the Earth once again, sporting Indiana Jones-esque fatigues, scouring rough terrain side by side, but of course, in two separate Jeeps. 