pact Halo Object) and OGLE (Optical Gravitational Lensing Experiment), which are scanning the skies for the gradual "Paczyński curves" in order to estimate how much unseen matter might be swarming through the galaxy in the form of such objects. While such lensing events are rare toward the galaxy's thinly populated outskirts, they are plentiful toward the bulge.

In a 1991 paper, Mao and Paczyński expanded on the idea. They pointed out that adding a planet around such a star would be akin to spattering water on the magnifying glass, embellishing the more gradual curve with rapid spikes in brightness. Sahu and Sackett realized that well-spaced telescopes of moderate size—a meter or less—could sample lensing events detected by MACHO and OGLE on much finer time scales, searching for planetary anomalies. So they formed PLANET, which now includes telescopes operated by SAAO, Perth Observatory and the University of Tasmania in Australia, and the European Southern Observatory and Cerro Tololo Inter-American Observatory in Chile.

Each night, PLANET keeps an eye on a handful of events reported by MACHO, immediately stepping up the sampling rate if any of them shows anomalous variations. "When anomalies are detected ... e-mail and phone services run very hot," says John Greenhill of the University of Tasmania.

The glimmer that galvanized PLANET and GMAN began with a sharp spike around 19 June, followed by a slow rise like a Paczyński curve, and—by some accounts—a strange, double-humped peak around 24 July before a final downturn. Follow-up observations and analysis that could eliminate an ordinary binary-star system as the cause should be completed in a few months, says Sackett.

The candidate planet circling around this putative dim star is a massive one, like the other extrasolar planets detected so far. But the search method could be sensitive enough to detect planets as small as Earth, unlike techniques that rely on finding a "wobble" in the parent star as a giant planet whirls around it (*Science*, 30 May, p. 1336). On the downside, it gives just a brief glimpse of the planet, and because of the very gradual convergence of light bent by gravity, any planets it reveals are so far out in the galactic blackness that they can't be studied by any other method. Says Jean Schneider of the Observatoire de Paris-Meudon in France, "I would be frustrated by the impossibility of investigating the planet any further."

For now, PLANET observers like SAAO's Menzies are simply enjoying the chase. "It is interesting to speculate," he says, "that one may be the only person on Earth to be aware, while watching the light curve unfold, of the existence of this other possible world."

–James Glanz

ARCHAEOLOGY

New Respect for Metal's Role In Ancient Arctic Cultures

When English naval officer Sir William Parry was searching for the elusive Northwest Passage in the Canadian High Arctic in 1821, he got a vivid glimpse of the Inuit passion for iron tools. Wherever Parry's party went, they encountered aboriginal groups eager to barter their most cherished possessions for iron nails and hoops; on one occasion, he wrote in his journal, he even witnessed an Inuit woman offer a 4-year-old child in exchange for a metal knife. His experience was shared by others who ventured into Arctic regions in the early 19th century. When British explorer Robert M'Clure's ship *Investigator* became jammed in the ice off northern Banks Island in 1853, for example, aboriginal families flocked from hundreds of kilometers away to salvage metal for making tools.

A. MCCARTNEY/UNIVERSITY OF ARKANSAS

Metal traders. Remains of Thule Eskimo winter house, consisting of whale bones and boulders, on Bathurst Island, central Canadian Arctic.

This ardor for iron, it turns out, was not a new phenomenon sparked by the metal's novelty. Archaeologists have long known that prehistoric Arctic cultures possessed tools crafted of iron scavenged from meteorites and fashioned from native copper. But only recently have they come to realize how widely dispersed and relatively abundant metal objects were in the ancient Arctic. By employing metal detectors in their excavations, searching for rust stains on wooden and bone handles, and studying slots that might have held metal blades, four independent research teams have recently recovered and identified troves of metal artifacts and other clues to its use at five sites in the Canadian Arctic and Greenland.

The discoveries are giving new insight into the complexity of ancient Arctic society. Metal objects were common at sites hundreds of kilometers from the few known northern sources of copper and iron, implying the existence of elaborate trade networks. And at some sites, the possession of metal objects seems to reflect patterns of social ranking. The desire for metal implements, says Peter Whitridge, an archaeologist at the University of Northern British Columbia in Prince George, both "united distant communities and divided them internally."

Researchers have been slow to recognize this brisk commerce in metal and the material's importance in prehistoric Arctic cultures largely because metal objects were so precious that they were rarely left behind for archaeologists to find. The Thule Inuit, who inhabited the Canadian Arctic and Greenland from A.D. 1000 to historic times, and their predecessors, the Dorset people, recycled broken pieces over and over again. While many tool handles bear rust stains, for example, few are found today with metal blades in place, suggesting that their owners thriftily removed the precious iron when an implement cracked or broke. "Metal is a material that you can keep reusing until it is dust practically," notes veteran Arctic researcher Allen McCartney, a professor of anthropology at the University of Arkansas, Fayetteville. "So it's been hard to find, because if it was big enough for someone to have seen it, they walked off with it." This realization led McCartney, in an influential paper published 6 years ago, to urge his colleagues to intensify the search for metal with electronic metal detection and other recovery techniques.

Several groups of researchers took this advice to heart. In the 1994 field season, for example, a team led by James Helmer and Genevieve LeMoine of the University of Calgary in Alberta recorded and confirmed 288 pieces of copper and iron with the help of a metal detector in two Dorset villages on Little Cornwallis Island in the Canadian High Arctic. Of 98 pieces ultimately collected—blades, points, needles, fasteners, and debris unearthed in dwellings dating from A.D. 450 to 1250—53 were made of copper and 45 of iron.

There's no obvious source of metal anywhere near Little Cornwallis Island, and ancient Arctic peoples did not smelt metal ores, as they lacked both trees for fuel and a tradition of pyrotechnology. But in a paper published in the 1980s, Vagn Buchwald, a chemical engineer at the Technical University of Denmark, gathered data on three major sources of metallic iron that prehistoric Arctic cultures could have hammered into tools: telluric iron that occurs as pea-sized inclusions in iron basalt at Disko Bay in western Greenland, wrought iron from the two Norse colonies founded in Greenland during the late 10th century A.D., and iron from fragments of the massive Cape York meteorite in northwestern Greenland. Other research teams have identified several other possible sources of Arctic metal, including important drift-copper deposits in the Coronation Gulf–Coppermine River region of Canada, and Asiatic metal traded across the Bering Strait.

Recent analyses tie the newly excavated artifacts to several distant sources. Trace element analysis on 10 of the iron pieces recovered by Helmer's team, for example, showed nickel levels between 6.8% and 7.9%—the same levels found in iron from the Cape York meteorite shower in Greenland, more than 600 kilometers away. Trace element analysis on the copper pieces proved disappointing, however. "The copper contains almost no trace elements," says Helmer, "so we can't say for a certainty where it comes from." But Little Cornwallis Island lies more than 800 kilometers from the nearest known copper source. Although little research has yet been done on trade routes in Dorset times, Helmer is intrigued by the findings. "I think the most interesting thing to come from this is the fact that the world view of these people was a lot broader than we often give them credit [for]," he says.

The metal could have been easily transported by sled and water craft in Thule times, from society to society across the Arctic. Moreover, the relative abundance of metal, says McCartney, dramatically illustrates how closely linked these far-flung societies were. "I think we've got to see the Thule now as major wheelers and dealers in metal," says McCartney. "I envision a latticework of trade networking that goes on from village to village, group to group, annual fair to annual fair. This stuff is just constantly on the move."

The distribution of metal within some individual Arctic settlements also sheds light on ancient social organization. For years, explains Northern British Columbia's Whitridge, researchers relied heavily on ethnographic records of the historic Canadian Inuit for their ideas about Thule social organization and economy. Because the historic Canadian Inuit lived in a small-scale egalitarian band society, many researchers assumed the earlier Thule did, too.

Whitridge, who has been studying Qariaraqyuk, a large Thule whaling village on Somerset Island in the Canadian Arctic that was inhabited from A.D. 1100 to 1450, now has evidence that this assumption is wrong. He carefully collected all visible traces of metal—including splashes of turquoise color in the excavation units that chemical analysis later proved to be copper—during digs from 1992 to 1994. But the sample sizes were too small to reveal statistically meaningful differences in the abundance of metal in the excavated houses. So Whitridge turned to another indicator of metal use: the widths of blade slots in 194 excavated slotted tools such as knife handles. McCartney had previously pointed out that the ground slate blades favored by the Thule are generally 2 millimeters or greater in thickness, while their metal blades are approximately 1 mm in thickness.

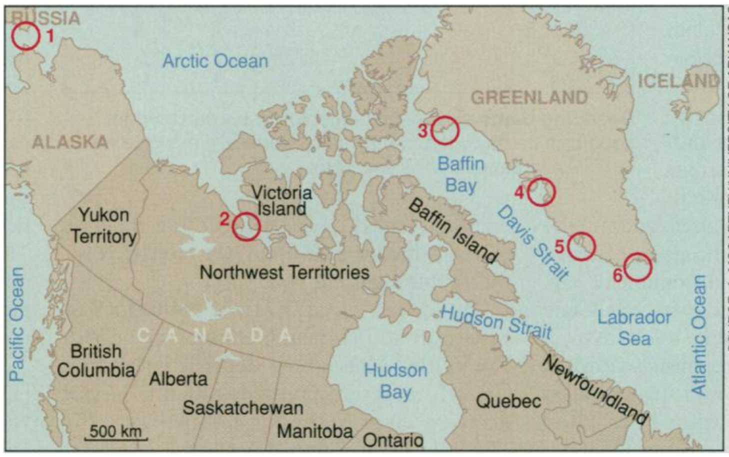
A. MCCARTNEY/UNIVERSITY OF ARKANSAS

Iron tools. Artifacts, mostly of meteoritic iron, from Somerset Island, central Canadian Arctic.

In research yet to be published, Whitridge found that blade slots at the site fell into two groups, with peaks centered at 1.9 mm and 1.1 mm. Taking 1.5 mm as the dividing point between metal and stone blades, he found that 34% of the slotted tools at the site had once boasted metal blades. Intrigued, he then looked to see if some houses had more of these desirable tools than others. The results revealed some unexpected disparities. In one large dwelling, replete with whaling gear and other exotic goods such as amber, 46.2% of the slotted tools had had metal blades; in a smaller house where most of the gear was for terrestrial hunting, the figure was just 9.6% of the slotted tools.

Such findings, says Whitridge, suggest that hunters playing key roles in whaling had far greater access to trade metal than did others in the community. "These were people who were appropriating more of the fruits of the whaling harvest [such as whale oil]. And they were converting that into other kinds of wealth to maintain their position in the community," he says. Indeed, McCartney likens these Thule leaders to the umialiks or whaling captains of the historic North Alaska Eskimos.

For McCartney, who almost singlehandedly sparked this new archaeological interest in Arctic metal, the findings are gratifying. But many questions remain, he notes. One is how the far-flung trade in meteoritic iron got started. Current research suggests that prehistoric Arctic dwellers began hammering the metal into tools about 1200 years ago. McCartney initially wondered whether this expansive trade began soon after the Cape York meteorite shower —estimated at a total of some 200 tons—crashed to Earth.



SOURCE: A. MCCARTNEY/UNIVERSITY OF ARKANSAS

Trade routes. Metal sources for ancient Arctic cultures: 1. Asian trade metal; 2. Coronation Gulf–Coppermine River native copper; 3. Cape York meteoritic iron; 4. Disko Bay telluric iron; 5. and 6. Norse settlement trade iron.

Meteorite experts, however, believe the impact date was much earlier. Vagn Buchwald, an authority on the Cape York meteorite shower, says that both the degree of corrosion on the fragments and the absence of a crater suggest that the shower fell more than 2000 years ago, when the region was covered by ice. Indeed, he favors an impact date as early as 10,000 years ago. To McCartney, this raises a tantalizing puzzle: If Arctic hunters first colonized Greenland some 4000 years ago, why did it take them so long to capitalize on such a desirable supply of metal? "That's not a meteorite problem, but it is an archaeological problem," he adds. Certainly, it's a question for a new generation of Arctic archaeologists.

–Heather Pringle

Heather Pringle is a science writer in Vancouver, British Columbia.