ARCHAEOLOGY

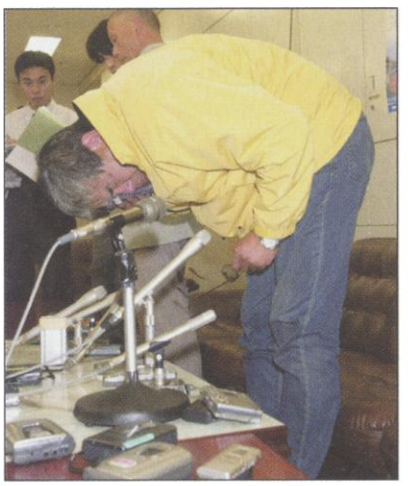
Japanese Fraud Highlights Media-Driven Research Ethic

Shinichi Fujimura's ability to plant stone tools to bolster the case for earlier human settlement in Japan raises troubling questions for the field

TOKYO—It was early in the morning of 22 October when amateur archaeologist Shinichi Fujimura snuck onto the Kamitakamori excavation, dug several holes with a shovel, dropped in some stone tools believed to be 30,000 or so years old, and then covered them with earth. Five days later, he invited a crowd of journalists to this site 350 kilometers northeast of Tokyo to hear him describe an incredible find: Caches of stone tools seemingly arranged in a symbolic way in a stratum dated to nearly 600,000 years ago, signifying a much earlier dispersion and evolution of *Homo erectus* in northeast Asia than other evidence suggests.

Unfortunately for Fujimura, a team of reporters from the *Mainichi Shimbun*, a leading national daily, had captured his escapade on video. The newspaper had been tracking him for 6 months in the wake of rumors about the veracity of earlier discoveries, and on 5 November the damning photographs appeared on its front page. Hours later, Fujimura held a press conference at which he confessed to planting artifacts at Kamitakamori and a second site in Hokkaido, the country's northernmost island.

Fujimura's confession dealt a body blow to claims of a much older human settlement in Japan and casts doubt on dozens, if not hundreds, of related findings. But it also cuts close to the bone of the country's scientific enterprise. It exposes a sloppy side of Japanese archaeology in which press conferences take precedence over publication, few scientists bother to study artifacts once they are plucked from the ground, and there is little public debate over the scientific merits of any claim. The result, says Toshiki Takeoka, an archaeologist at Kyoritsu Women's University in Tokyo, is that Japanese archaeology "isn't really about scholarship, it's about making spectacular discoveries."



Brought low. Shinichi Fujimura apologizes at a 5 November press conference after his hoax was caught on tape.

Fujimura's headline-grabbing discoveries played neatly into a scientific mystery. It begins with the generally accepted view that early humans lived in northern China about 600,000 years ago. During that era, Japan was periodically connected to the continent by land bridges that emerged as sea levels dropped. There's evidence that land mammals crossed these bridges and spread through the Japanese archipelago, but no conclusive sign of early humans doing the same. Instead, firm evidence of humans in Japan goes back only 30,000 to 35,000 years.

Armed with only a high school education, Fujimura turned a passion for archaeology into a series of remarkable discoveries of stone artifacts that steadily pushed back those dates. He was said to have "god's hand" because of his knack for finding materials that had eluded others. In 1992, he and two trained archaeologists set up the Tohoku Paleolithic Institute in Tagajo, near Sendai, 300 kilometers northeast of Tokyo, to hunt for Paleolithic sites.

Fujimura said at his November press conference that he was under great pressure to come up with discoveries. Scientists say this competition has had a corroding effect on archaeology in Japan. Press conferences are typically held at sites to trumpet the latest findings. The findings are quickly circulated among both the public and the profession with little critical review or scholarly debate, says Charles Keally, an American archaeologist who has lived and worked in Japan for 30 years.

In the aftermath of the *Mainichi* expose, dozens of scientists have written newspaper editorials or spoken on TV talk shows about their persistent doubts about Fujimura's work. But Keally and others say it is an indictment of the field that these doubters didn't surface until the newspaper had done the detective work for them. "Few critics of the Kamitakamori finds have taken the time to actually go and examine the artifacts," adds Keally, who says he must shoulder some of the blame.

Takeoka is one scientist who did take this task seriously, and his experience is sobering. After concluding that one batch of artifacts belonged to the Jomon era, roughly 4000 to 14,000 years ago, Takeoka submitted a paper to the Japanese journal *Paleolithic Archaeology*. But he says the editors cut out the most critical sections. Kazuto Matsufuji, an assistant professor of archaeology at Doshisha University in Kyoto who reviewed Takeoka's paper, says that Takeoka was asked to change sections alluding to rumors of planted artifacts because "the editorial committee decided we could not, as a scientific journal, publish rumors in a research paper." Takeoka says that even a toned-down version raised the hackles of colleagues.

Keiichi Omoto, an anthropologist and director of the International Research Center for Japanese Studies in Kyoto, says that one reason the Kamitakamori findings were accepted so uncritically was that they fit the expectations of leading scientists, in particular Chosuke Serizawa, a professor emeritus of Tohoku University. The findings would have bolstered Serizawa's controversial claim that stone tools he unearthed in the 1960s and

Not so old. Workers digging at the Kamitakamori site *(above)* earlier this year. Artifacts *(right)* planted by Fujimura as they were unearthed.

CREDITS: (PRESS CONFERENCE) KYODO NEWS INTERNATIONAL; (SITE PHOTOS) MASASHI SUZUKI, TOHOKU PALEOLITHIC INSTITUTE

'70s date back 300,000 years. Omoto says that Serizawa's stature and his role as mentor to Hiroshi Kajiwara, an archaeologist at Tohoku Fukushi University and deputy director of the Tohoku institute, tended to deflect criticism of the Tohoku group's findings.

Serizawa says that he made no attempt to shield the group from criticism. In fact, he says he also had questions about the dating of the artifacts, which he recently published in *Chuo Koron*, a leading intellectual magazine. But he didn't express his reservations earlier, either to the group or in public, because "they said there was no mistaking the old strata that yielded the artifacts."

Fujimura emerged from seclusion on 18 December to reiterate his claim that he had planted findings at only the Kamitakamori and Hokkaido sites. But Kajiwara agrees that a large cloud now hangs over all of Fujimura's work, which involves 33 excavations directly and extends to 160 other efforts. Nevertheless, Kajiwara says, "I still have confidence that we are working with Paleolithic sites." Peter Bleed, a professor of anthropology at the University of Nebraska, Lincoln, who just completed a 6-month stint as a guest professor at Tohoku University Museum, agrees. "It would be a real tragedy if researchers elsewhere concluded that none of the early Paleolithic evidence coming out of Japan could be trusted," he says.

There is also no consensus on how to correct the deeper problems that may have contributed to the fraud. Serizawa blames it on Fujimura's popularity with the media and a lack of analysis. "From the 1950s through the 1970s, we never had these problems, and I have confidence in the work done in those years," he says. "The problems started in the 1980s, and they can be resolved by investigating the artifacts Fujimura was involved with," he adds. Kajiwara predicts that "there will be a change in how these press conferences are arranged."

But many think the problem runs deeper. Ken Amakasu, professor emeritus of Niigata University and chairman of the Japanese Archaeological Association, says, "It is clear that more time should be spent on analysis before making claims." Greater collaboration with foreign scientists would raise standards of scholarship and introduce the notion of free-wheeling scientific debate, Omoto believes, although Keally warns that their impact would be lessened by language and cultural barriers.

Takeoka isn't sure what will happen, but he's hopeful that his colleagues will learn from Fujimura's misconduct. "I do think researchers are reflecting on various aspects of this incident," he says. "If this leads to even a little improvement in the current state of affairs, I'll be really happy."

–DENNIS NORMILE

CREDIT: VISUALS UNLIMITED

PHARMACOLOGY

How the Body's 'Garbage Disposal' May Inactivate Drugs

A protein sentry that triggers the liver's defense against chemical toxins can explain drug interactions—and an old legend

Some 2000 years ago, King Mithridates of Pontus, a region on the Black Sea that is now part of Turkey, performed an astonishing trick. According to a legend immortalized in an A. E. Housman poem, the ambitious and warring monarch feared his enemies would poison him. To guard against this, he dosed himself with small amounts of poisons to build up his immunity. The technique worked: Mithridates survived the assassination attempt he predicted, and his name came to mean an antidote for poison.

Molecular endocrinologist Ronald Evans now thinks he has a molecular explanation for Mithridates's invulnerability. Recent work by Evans at the Salk Institute for Biological Studies in La Jolla, California, and by other teams around the world is revealing the machinery of the body's defense against poisons and other foreign chemicals. The work, reported over the last year, helps explain not only an ancient riddle but also why taking certain drugs or herbs, like the popular St. John's wort, can render others ineffective.

Interference. St. John's wort (*Hypericum perforatum*) triggers the body's defense against chemical toxins—and renders many other drugs impotent.

Scientists have known for years that the body has a chemical surveillance system in the liver. Sensing the presence of potentially dangerous chemicals, the liver cells crank up the production of an enzyme called CYP3A, which breaks down a host of compounds, including many toxins. "CYP3A is like the liver's garbage disposal," says Steven Kliewer, an endocrinologist at GlaxoSmithKline in Research Triangle Park, North Carolina.

Many scientists suspect that this "garbage disposal" evolved to fend off the countless toxins to which animals are exposed in the environment, including the poisons plants produce to avoid being eaten. But exactly how it works has long been a mystery. A key question is what receptors in the liver cell initially sense the toxin and alert the chemical police to seek and destroy it. Most scientists expected to find a suite of receptors, all tailored to recognize specific threats. But over the past few months, converging research by several teams suggests that just one protein—perhaps aided by a handful of assistants—can recognize the thousands or even tens of thousands of potentially harmful compounds present in the environment and prompt the liver to mount an all-out attack on them.

One set of clues came from an unexpected line of research: Patients taking St. John's wort, a popular herbal remedy for depression. In late 1999 and early 2000, several papers reported that in some half-dozen patients taking St. John's wort, the blood concentrations of other drugs they were taking—including the asthma drug theophylline and the anticlotting drug warfarin—were dramatically reduced. Several women taking birth control pills reported breakthrough bleeding, suggesting that the pill's hormone levels had dropped. In another well-publicized example, two heart transplant recipients in Germany experienced life-threatening transplant rejections a few weeks after starting to take St. John's wort. Their physicians found that levels of the immunosuppressant cyclosporin had plummeted to half the normal dose (see sidebar).

Many scientists suspected that St. John's wort was activating the CYP3A pathway, which would accelerate the breakdown of the other drugs. Intrigued, Kliewer and his Glaxo colleagues decided to test whether St. John's wort was working through the PXR receptor, a protein they had discovered in mice several years earlier and had been