optics systems at the Keck Observatory in Hawaii and the twin Gemini Observatory telescopes in Hawaii and Chile have a shot at resolving the pinprick infrared glows of newly coalesced gas giants in the outer parts of planetary systems around the Beta Pic stars, says astronomer Thomas Greene of NASA's Ames Research Center in Mountain View, California.

Still, Greene maintains, the group's provenance needs more study. Uncertainties in the stars' positions and velocities make it hard to trace their motions back in time to determine whether they shared a birthplace. "If the original cloud was big enough, it could have formed several small clusters with age differences of 5 or 10 million years," he says. It does seem clear that Beta Pic's cluster was a low-mass, loosely bound assemblage that scattered once the stars formed, unlike the tighter Pleiades cluster, Greene says. NASA's Full-sky Astrometric Mapping Explorer, tentatively scheduled for launch in 2004, should track the stars with enough precision to settle the issue, he adds.

In the meantime, Zuckerman and Song believe that further scouring of nearby stars will turn up more relatives. Already, their list contains two stars more massive than the group's namesake. Beta Pic, it appears, is no longer the pick of its own litter.

–ROBERT IRION

ARCHAEOLOGY

Questions Arise Over Second Japanese Site

TOKYO—A team of archaeologists has cast strong doubts on claims that a cave in western Japan contains evidence concerning the extent of early human habitation of the archipelago. The accuracy of the cave findings is also the subject of a suit filed this month by the family of the site's lead scientist, who killed himself after a Japanese news magazine reported that the findings might be bogus. It's the second time in a year that the veracity of an archaeological dig has made headlines in Japan (*Science*, 10 November 2000, p. 1083).

Archaeologist Mitsuo Kagawa led excavations in 1961 and 1962 of the Hijiridaki Cave in Oita Prefecture, on Kyushu Island in western Japan. The digs produced human and animal bones and stone artifacts, some of which Kagawa and his colleagues concluded date back 10,000 years or more. Although the dating has always been controversial, Hijiridaki made its way into Japanese textbooks because it was the only site in Japan where stone tools and human bones have been found together. The cave site was revisited in December 1999 by a research team studying the origins of the Japanese people. After examining both previously and newly collected artifacts, the team issued a lengthy report in June that will be summarized this month in the Japanese journal *Paleolithic Archaeology*.

The report concludes that the bones and charcoal found in the cave are no more than 600 to 700 years old, based on radiocarbon dating. The report does agree that some of the artifacts recovered both in the early 1960s and in the recent excavation are from the late Paleolithic period. But it points to several anomalies. Artifacts ranging from 2000 to 20,000 years old were found mixed together, and in a stratum above the one yielding material that is 600 to 700 years old. The artifacts are made of obsidian, almost certainly from a distant part of Kyushu Island and unlike the chert and rhyolite artifacts found in the area around the Hijiridaki Cave. "The results of the 1999 excavation," the paper concludes, "indicate that the recovered artifacts were not part of the original cave, but were rather the result of a secondary intrusion."

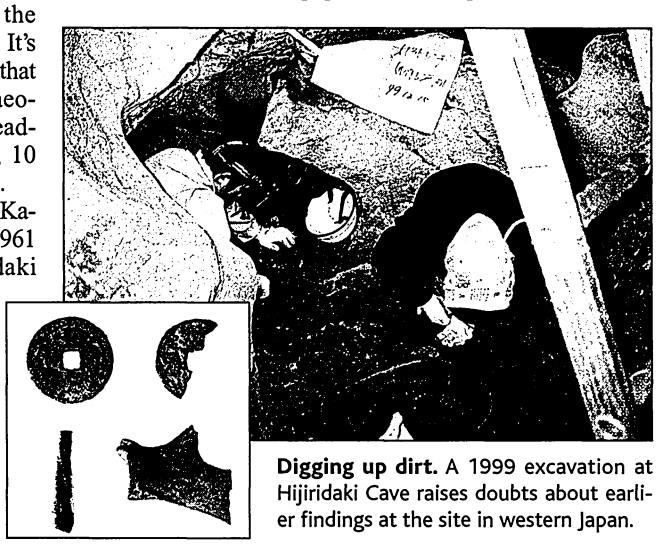
Hideji Harunari, an archaeologist at the National Museum of Japanese History in Sakura City, near Tokyo, and one of the organizers of the recent investigation, believes that "the best explanation for these conditions is that [the 1960s findings] are fake." But Masanobu Tachibana, the team leader and an archaeologist at Beppu University, says he cannot rule out more benign explanations. It is clear, he says, that medieval people used the cave and could have brought in the collection of stone implements for their own purposes: "There are explanations other than Harunari's."

The paper does not speculate further on how the artifacts may have ended up in the cave. And even Harunari says he does not believe that Kagawa was at fault, noting that Kagawa has long held that the Hijiridaki findings needed to be reexamined.

Speaking at an archaeological conference in August 2000, Harunari called the placement of the artifacts "very unnatural." But his comments went unreported until newspaper reporters caught amateur archaeologist Shinichi Fujimura planting artifacts at a second, unrelated archaeological dig in northern Japan last November. *Shukan Bunshun*, a weekly news magazine, ran four articles between January and March of this year suggesting that Hijiridaki might be another example of archaeological fraud. Although the magazine did not identify a culprit, it said that Kagawa was the leader of the 1960s excavations. Kagawa hanged himself on 9 March, leaving a note saying that he was acting "to protest articles alleging our discoveries were faked."

On 1 November his family filed a suit in Oita District Court against *Shukan Bunshun*'s publisher, editor, and the reporter who wrote the stories. The family is seeking $460,000 in compensation and a published apology, claiming that the articles defamed Kagawa and inflicted mental trauma. A written statement from the magazine expresses surprise. "We did not mention an individual's name or print anything defamatory [about Kagawa]," says Seigo Kimata, *Shukan Bunshun*'s editor in chief.

–DENNIS NORMILE



Digging up dirt. A 1999 excavation at Hijiridaki Cave raises doubts about earlier findings at the site in western Japan.

CREDITS: H. HARUNARI

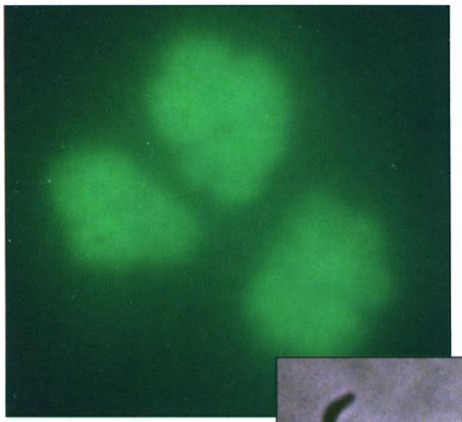
MICROBIAL GENOMES

Sequences Reveal Borrowed Genes

New data emerging from microbial genome sequences are so perplexing that "we can no longer comfortably say what is a species anymore," says Daniel Drell, who manages the Department of Energy's (DOE's) microbial genomes program. Two bugs in particular, described at a recent meeting,* seem to have nabbed enough genes from other organisms that they no longer resemble their supposedly closest relatives—raising fascinating questions about how and why they obtained these new traits.

The genome data may have practical applications as well, notes Drell: Because both microbes also play key roles in geochemical cycles, they may suggest opportunities for cleaner energy sources, more effective pol-

* The Ninth International Conference on Microbial Genomes, 28 October to 1 November, Gatlinburg, Tennessee. *R. palustris*: www.jgi.doe.gov/JGI_microbial/html/rhodopseudomonas/rhodops_content.html; *M. mazei*: www.g2l.bio.uni-goettingen.de/methano.html



Genetic pack rats. *M. mazei* (*left*) and *R. palustris* both borrowed lots of genes from other organisms.

lution control, and better recycling of both natural and human-made products—which is why DOE funds microbial genetics in the first place.

One newly deciphered microbe is *Methanosarcina mazei*, a methane-generating archaea. Unlike most of its brethren that live in thermal vents and other hot environments, *M. mazei* thrives in freshwater sediments worldwide. Versatile in other ways as well, it can harvest the carbon it needs from acetate and so-called methylamines—and not just carbon dioxide. That makes *M. mazei* a "really major player" in the production of methane, a greenhouse gas, says Gerhard Gottschalk, a microbiologist at the University of Göttingen in Germany.

When Gottschalk and his colleagues started sequencing *M. mazei*'s genome 3 years ago, they expected it to be a tidy 3 million bases or less, as are the genomes of two other methanogens sequenced to date. Instead, Gottschalk reported at the meeting, *M. mazei*'s single circular chromosome proved to be 4.1 million bases long, about the size of the bacterium *Escherichia coli*. Its chromosome contains several sets of the same genes, apparently providing unanticipated redundancy for particular functions.

But it's the source of many of its genes that has researchers excited. "The amazing thing is that there were so many eubacterial genes," comments James Lake, an evolutionary biologist at the University of California, Los Angeles. Often microbial genomes reveal instances of horizontal gene transfer from one organism to another. "But it's never happened quite like this," says Lake. Of the 3300 predicted genes, about 1100 look like they used to belong to bacteria, Gottschalk reported. No one understands why this happened, but these numbers drive home "how little we understand about species' definitions," adds Judy Wall, a biochemist at the University of Missouri, Columbia.

The other microbe, *Rhodopseudomonas palustris*, a so-called purple nonsulfur bacterium, also comes with a panoply of unexpected genes. "The biggest surprise," says Lake, "is that it carries circadian rhythm genes." These genes were not thought to be part of the repertoire of bacteria or archaea, with the exception of an unusual group called the cyanobacteria, says Caroline Harwood, the microbiologist at the University of Iowa, Iowa City, who has been analyzing this microbe's gene content for the past year. Their presence suggests that these organisms are more sophisticated than microbiologists had suspected.

Another surprise is that this bacterium's genome more closely resembles the genomes of rhizobium bacteria that fix nitrogen for plants than those of other purple nonsulfur bacteria, Harwood reported. In particular, it has an unusual cluster of photosynthetic genes that are very similar to those in a rhizobium that infects soybean stems. Either this microbe borrowed a lot of genes from the rhizobium, or else the two are closely related. Finally, its genome revealed a plethora of genes that enable this microbe to break down complex organic matter—something other purple nonsulfur bacteria don't do—as well as fix nitrogen and produce hydrogen gas. "It's just an amazing collection of pathways," says Drell. But one would expect nothing less of a genetic pack rat. **–ELIZABETH PENNISI**

CREDITS: (TOP TO BOTTOM) SEBASTIAN BÄUMER; CAROLINE S. HARWOOD/UNIVERSITY OF IOWA

SELF-ASSEMBLING MATERIALS

Coated Nanofibers Copy What's Bred in the Bone

If imitation is flattery, Sam Stupp has just paid nature a high compliment. On page 1684, Stupp, a materials scientist at Northwestern University in Evanston, Illinois, and his postdocs Jeffrey Hartgerink and Elia Beniash report creating a self-assembling material, made from organic molecules with a mineral coat, that closely mimics bone. The feat opens the door to making a synthetic replacement for bone. And because the chemistry of the self-assembling molecules is simple to change, it also gives researchers a general strategy for forming a wide array of organic-inorganic fibers.

"It's a major step forward" for the field of self-assembled materials, says Ulrich Wiesner, a chemist at Cornell University in Ithaca, New York. The new work, Wiesner says, distills the essential lessons that have been learned about how bone forms and incorporates them into a synthetic molecule that is simple to produce. "It connects the

ScienceScope

U.K. Cloning Controversy A legal ruling on a law governing embryo research might allow Italian fertility doctor Severino Antinori to attempt human reproductive cloning in Britain. On 15 November, Britain's High Court ruled that the Human Fertilisation and Embryology Act, passed in 1990 and amended last year, covers only embryos created by the union of sperm and egg and not those created by nuclear transfer procedures—i.e., cloning. A day later, Antinori told BBC television he planned to exploit the loophole by setting up a baby-cloning program in Britain, an idea the government opposes.

Some scientists, however, would like to create genetically matched pluripotent stem cells from cloned embryos, and last year Parliament voted to allow such limited cloning. Last week's ruling—in response to a lawsuit by British abortion opponents—apparently nullifies that vote and calls into question the government's ability to allow just certain types of cloning. After their victory, antiabortion groups called for quick legislation outlawing all forms of human cloning, but the government said it will appeal the decision.

The ruling does not end the government's ability to regulate stem cell research. Studies on cells derived from embryos not created by cloning are still overseen by the government.

Sound Bites It's pretty hard to argue with a commitment to research excellence. Or more interdisciplinary collaborations, or helping underserved populations. So the Canadian Institutes of Health Research (CIHR) won't need to spend much time defending its new suggestions for strengthening the country's health research.

But CIHR president Alan Bernstein warns scientists that these fuzzy generalities may take on a harder edge when used for judging funding proposals. "If someone puts forward a large initiative that doesn't fall into these [categories], they'll have to articulate a clear reason why it should be considered," Bernstein says.

In particular, Bernstein suggests that biomedical scientists figure out how to take advantage of hot areas such as bioinformatics and combinatorial chemistry. "This is, to some extent, my own view of where the action is going to be," he says. Whatever idea they pitch, he adds, researchers should spell out how it will "build Canada's international leadership through national excellence in health research."

Contributors: Mark Russell, Eliot Marshall, Gretchen Vogel and Aude Sonneville, Wayne Kondro