ing its own set of characteristics. There is so much variation in *T. cruzi* today that different lineages must have been isolated from each other for 40 million to 50 million years. That means, says Ayala, that "these lineages are as different from one another as we are from whales."

Not surprisingly, these barely related creatures could differ dramatically in their ability to cause disease and resist drugs—something the two scientists have been testing on animal models in their laboratory. Indeed, *T. cruzi* isn't the only parasite skipping out on sex and causing havoc as a result. Tibayrenc and Ayala last week reported at the AAAS meeting that they have found a wide range of protozoan parasites that can reproduce clonally—including parasites that cause sleeping sickness, Leishmaniasis, amoebic dysentery, Giardia, and, probably, toxoplasmosis. Although these organisms may reproduce clonally most of the time, many also have sex on occasion—prompting Tibayrenc to say they have a "nearly clonal" population structure.

These findings should shake up the medical treatment of these diseases: Vaccines and drugs against parasitic protozoa may be ailing because they do not adequately take into account their genetic diversity. "Generally people studying and testing new drugs use one strain of a species, which is not representative of the actual genetic variability," says Tibayrenc, who adds that it is not uncommon for a patient to be infested with more than one strain of a parasite at once.

Or, how about 100 strains? *T. cruzi* has turned out to be a doctor's worst nightmare, partly because researchers have now identified more than 100 genetically distinct strains of the parasite, which is a major health problem in Latin America, where it has struck 90 million people. The parasite is spread by the ubiquitous blood-sucking bugs of the subfamily *Triatominae*, also known as the kissing bug.

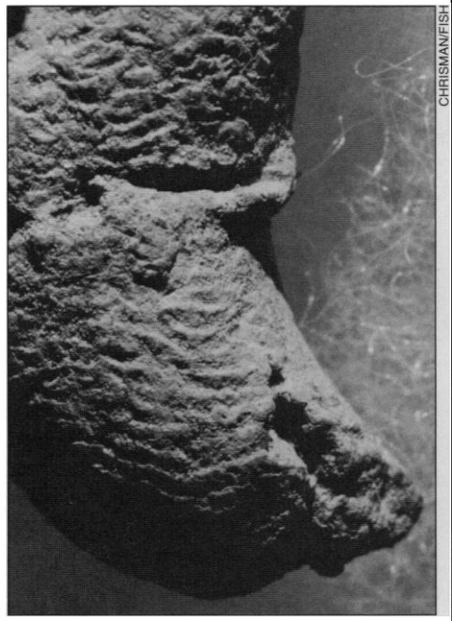
While the prospects are grim for designing one vaccine that prevents infestation from so many different strains of the parasite, there is some hope for the victims of the disease. There appear to be four major strains that predominate, giving vaccinologists a reasonable target at which to aim their research. And it should help researchers to know the true nature of the beast they are fighting, even though it could be far more difficult to control than they first believed. Says Ayala: "It's as though lions and tigers are killing people but we're setting traps for mice." ■ ANN GIBBONS

A High Five From the First New World Settlers?

Bones, stones, and a palm print from a New Mexico cave could shake up New World archeologists

THE FASTEST WAY TO GET MANY ARCHEOLOGISTS' blood pressure to skyrocket is to suggest that Clovis, New Mexico, might not be the first prehistoric site in the New World. For the last 50 years, the received wisdom has been that the 11,500-year-old artifacts found at Clovis were made soon after the first Americans found their way across the Bering landbridge. Those who have dared question the consensus have met with harsh criticism, and they haven't changed many minds (see *Science*, 17 August 1990, p. 783). But in recent months archeologist Richard MacNeish has been telling his colleagues that the scientific ground beneath the Clovis partisans is about to crumble.

For the past 2 years MacNeish, a respected figure in New World archeology who is based at the Andover Foundation for Archeological Research, has been excavating in Orogrande Cave, a dusty limestone cave in southern New Mexico. In a presentation at the AAAS meeting, he described the results as "ten counts [of evidence] that will eliminate the Clovis-firsters." Bones, charcoal, chipped stones, and what he believes is an ancient human palm print prove, he says, that ancient hunters dragged their kill into the cave, butchered it with crude stone tools, and grilled it over clay-lined hearths on the cave floor, starting more than 30,000 years ago.



Old hand? *Palm print at Orogrande.*

MacNeish's doubters—and there are many—do endorse one of his claims: that he has unearthed a remarkable 30,000- to 40,000-year record of the area's fauna. "It's a fascinating paleontological site," says Harvard University archeologist John Shea. "Mammal experts should be climbing all over each other to get at this." Bones of camels, extinct horses, and other prairie species litter the lowest strata in the excavation, giving way to woodland animals like tapirs and weasels at intermediate levels and dryland species—including antelope and llama—at shallower levels. The bones lie in a clear stratigraphic sequence, interleaved with charcoal layers that have been carbon dated.

All that makes for a paleontological treasure, but MacNeish thinks it's an archeological one as well. The charcoal, he says, comes from ancient hearths, and at least some of the bones were discarded by human hunters. That evidence is easy to attack as the work of wildfires and carnivorous animals, though. As MacNeish himself conceded, "The $64,000 question is: Do we have artifacts?"

His answer is an emphatic yes. The simple, chipped pebbles and rock flakes his team has unearthed look nothing like the beautifully worked points found at Clovis-era sites. But MacNeish says he and his co-workers have done tests showing that the patterns of chipping couldn't have been produced by animals trampling the cave floor or debris falling from the ceiling. And only human beings could have brought the stones into the cave in the first place, he says, since nearly half of them represent rock types found nowhere in the cave.

But other archeologists aren't convinced. "I have doubts about almost everything he showed me from the lower [pre-Clovis] levels of the cave," says Shea, who has examined some of MacNeish's finds. The chipping is

simply too irregular, he says. Dena Dincauze of the University of Massachusetts at Amherst, who has visited the site, agrees. "The stone pieces do not show the kinds of scars that are typical" of human artifacts, she says.

Such doubts might be harder to sustain if MacNeish's most dramatic piece of evidence holds up: what looks like a human palm print on a fragment of fire-baked clay, 27,900 years old according to a carbon date from nearby charcoal. Like a prosecutor flourishing clinching evidence to a jury, MacNeish told his AAAS audience that Ontario Provincial Police fingerprint experts have examined the clay impression and declared that it is "consistent" with a human palm print. The palm print, says MacNeish, proves he has caught pre-Clovis humans red-handed.

But the doubters don't think the print proves anything—it may not be human, they say, and if it is human it may not be ancient. Paul Martin, a paleoecologist at the University of Arizona, says it's time to use the scientific method to resolve the Orogrande issue: Let another archeologist take a close look at the site. "If more digging is done, it should be done by an independent operator.... Scotty [MacNeish] is acting as a jury as well as a prosecutor."

MacNeish has a different idea. The day after his talk, he said, he was planning to be back at Orogrande, digging even deeper. The Clovis-firsters haven't heard the last from him, he vowed as he left. "We're going to get a lot more evidence before we're through." ■ TIM APPENZELLER

Plants of the Apes

Harvard University anthropologist Richard Wrangham was in the Gombe National Forest in Tanzania at dawn one day watching chimpanzees, when he saw a strange sight. Instead of heading for nearby fruit trees for their first meal of the day, some of the chimps walked for up to 20 minutes to breakfast on a plant called *Aspilia mossambicensis*, a member of the sunflower family. Could *Aspilia* be a nutritious, chimp delicacy—something they craved every so often? Not by the looks of this group: The chimps wrinkled their noses as they swallowed the leaves whole. To confirm his observation, though, Wrangham tried a leaf himself: "It's extremely nasty to eat," he says.

If the chimps were going to so much trouble first to collect and then to ingest these leaves whole, then the leaves must be special, reasoned Wrangham. So he sent samples of leaves collected from the plants and from chimp dung to biochemist Eloy Rodriguez of the University of California at Irvine for analysis. Rodriguez found that the undigested *Aspilia* leaves were high in a red oil called thiarubrine-A, which kills fungi and parasites, including tiny worm-like nematodes. "Chimps are loaded with all kinds of nematodes," says Rodriguez. "This would be a very effective agent against them." That prompted them to ask, were the chimps using the forest as a medicine cabinet, ingesting plants as needed to cure their ills? And with that question, an intriguing subdiscipline was born: "zoopharmocognosy."

KENNETH GLANDER

Sex selection. *Howler monkeys may influence their offspring's sex with diet.*

Last week, at the AAAS annual meeting, a half-dozen researchers came together in what was the first-ever symposium on zoopharmocognosy. There were several reported cases of chimpanzees ingesting plants capable of settling their stomachs, as well as ridding themselves of parasites. One primatologist, Karen Strier of the University of Wisconsin at Madison, even postulated that some species of monkey regulate their fertility through judicious dietary practices. And primates aren't the only animals practicing medicine without a license: Researchers are finding signs that bears, cats, and dogs treat themselves with plants.

At the symposium, Kyoto University primatologist Michael Huffmann recounted his experience with a lethargic female chimp in Tanzania's Mahale Mountains National Park. Within 24 hours of sucking the juice from the pith of the *Vernonia amygdalina* bush, her health improved significantly. But does that prove she knew that the bitter juice may contain an antibiotic? Tanzania's human natives appear to know it: They use it as a drug to treat parasites and disease. Both Huffmann and Wrangham speculated that chimps may even anticipate when they need a dose of preventive medicine: They presented data showing that chimps use medicinal plants more during the rainy season, when they are more susceptible to pneumonia and other ailments. Preliminary data also indicate that chimps infested with more parasites ingest the medically useful plants more often than their less-infested brethren.

But the data that are most startling were those gathered by Strier. She reports that muriqui monkeys in Brazil may be reducing their fertility after giving birth by ingesting leaves that contain isoflavonoids, a compound structurally similar to estrogen. On the other hand, when they are ready to have offspring, she has noticed that they appear to eat more of a legume called the "monkey ear" that produces a steroid that could enhance fertility. And this may be only the beginning: Duke University primatologist Kenneth Glander has a theory that howler monkeys in Costa Rica may even influence the sex of their offspring by eating plants that can alter the electric potentials in howler vaginas, creating an environment that would assist negatively charged, male-producing sperm. Glander admits his work needs confirmation in the lab.

Whether he succeeds or not, this new breed of researchers may have shown that Hippocrates was a relative newcomer in the medical world. Says Wrangham: "The fact that chimps are self-medicating from the time we have split from them means that the history of the use of medicine goes back at least 5 to 6 million years." ■ ANN GIBBONS