Homo homeless: No early food sharing

Two of the major hominid fossil sites in East Africa both contain concentrated deposits of primitive tools and animal bones, and for decades these deposits have been taken as evidence that early humans set up permanent campsites for the purpose of butchering and food sharing. Based on this interpretation, anthropologists have argued that distinctly human forms of social and cultural organization began as early as 1.5 to 2 million years ago. Scientists are now challenging the simplicity of that view, suggesting that a human "home base" was not likely to have evolved prior to the controlled use of fire or domestication of animals.

Speaking at the recent meeting of the American Anthropological Association in Washington, D.C., Richard Potts of Yale University said that the evidence from Olduvai Gorge in Tanzania does not fit with what is known about the behavior of modern hunter-gatherers. Specifically, he reported, the 1.7-million-year-old Olduvai deposits indicate that the sites were occupied over long periods of time (from four to five years); they contain some bones that were not thoroughly processed; and they contain no evidence of fire or domesticated dogs. In contrast the San, a modern tribe of hunter-gatherers living on the Kalahari Desert in Botswana, tend to move from site to site and not to reoccupy older sites; they rarely leave a bone that hasn't been broken open for its marrow; and they rely on the use of fire for protection. "In short," Potts says, "none of these behaviors that form the social ecology of the San can be inferred for the early hominids at Olduvai."

The notion of a "home base" has become firmly entrenched in the theory of human evolution only because the idea of home or community is so central to modern human life, Potts says. In its place he suggests an alternative interpretation: early humans, he says, may have learned to cache their tools in various spots, so that when they killed an animal (or found a killed animal) they could chop off part of the carcass and transport it to a nearby site; once at a tool site, they would butcher the carcass and eat quickly, departing before hyenas invaded the site. The fossil bones contain great numbers of both butchering marks and carnivore teeth marks.

Glynn Isaac, an anthropologist at the University of California at Berkeley who has examined similar deposits at the Koobi Fora in northern Kenya, agreed that the simple association of artifacts and bones does not prove early evolution of human campsites nor the beginnings of cultural evolution. It is possible that early hominids were still competing among themselves for food and as a result tended to eat alone, perhaps in the trees; or it is possible, Isaac said, that they carried the bones to butchering sites as Potts suggested. But the quantity of bones and tools in these deposits—thousands of tools and tens of thousands of bones in sites 15 meters in diameter — suggest, according to Isaac, that the food was being carried to the sites and that quite a few people were taking part in the feasting. "What was going on in these sites we genuinely don't know," says Isaac, who has championed the idea of a home base as an important evolutionary adaptation. He adds, however, that although he still considers it possible that early humans were returning daily to established campsites, he would now delete the word *home*: "It makes it sound a bit too cozy." — *W. Herbert*

Europa: A moon of ephemeral oases?

Hellish Venus, airless Mercury, bone-dry Mars, radiation-drenched Io — hostile environments all. And yet, though it lacks apparent evidence of extraterrestrial life, might not the solar system at least contain some spots that could, by the standards of our own biology, be considered habitable? Far too little is known. But beneath the frozen crust of Jupiter's moon Europa, a group of scientists suggest, there may occasionally spring into being regions that, perhaps only for a few years at a time, are as warm, wet and well-lit as some regions that currently support life on earth.

"Warm" could mean colder than 0°C, and "well-lit" is probably too dark to see, but such conditions are home to the blue-green algae that live in vast mats beneath the ice-covered lakes of Antarctica's Dry Valleys. Steven Squyres, Ray Reynolds and David Colburn of NASA's Ames Research Center in California emphatically point out that they are not saying life does — or even necessarily could — exist on Europa. What they do propose, however, is the existence of transitory pockets with two of the same essential ingredients that the Dry Valley life forms need to get by: liquid water and an energy source, in the form of enough light for photosynthesis.

Nearly as large as earth's moon, Europa is a bizarre object, smoother than a billiard ball and entirely clad in an icy blanket. Its only conspicuous feature is a global network of fine lines (see map, SN: 5/3/80, p. 283), apparently representing cracks in the ice. Few if any craters mar the terrain, which is unlike that of any other known solid body in the solar system.

Inside, Europa is thought to be heated by a combination of radioactive elements at its core and the tidal stresses of a gravitational tug-of-war with Jupiter and two of its other major moons, Ganymede and Io. Reynolds and others believe that these two factors may together produce enough heat to melt the lower levels of the ice, so that the frozen crust is enclosing a liquid-water mantle — a hidden, satellite-wide ocean.

Additional lines of evidence suggest that when the crust cracks (also perhaps due to tidal stress), water from the ocean may spew forth into space and settle back onto the ice. Sunlight reflected from the surface at different angles, for example, behaves like the reflection from a relatively fresh layer of frost. Another clue comes from ultraviolet measurements by an earth-orbiting satellite that show Europa's trailing hemisphere to bear traces of sulfur, such as might have been transported out from Io, the next moon toward Jupiter. But if Io is the sulfur's source, says Reynolds, there ought to be more than is observed, suggesting that most of the sulfur is subsequently either removed (such as by bombardment from particles trapped in Jupiter's magnetosphere, which sputter it away) or covered up—by periodic ocean spray through the cracks in Europa's crust.

When such a crack opens, Squyres suggested last week to the American Geophysical Union meeting in San Francisco, it provides a way not only for water to get out, but for sunlight to get in. The light is weak at Europa's distance from the sun (about five times that of earth), but only a tiny amount is also required by the blue-green algae in the Antarctic Dry Valleys. Once a Europan crack exposes the liquid water to the cold of space, it begins freezing immediately, but it should take from three to five years, Squyres calculates, to refreeze the ice thickly enough to cut down the sunlight below the level that the terrestrial algae seem to be thriving on.

One could even extend the list of hospitable factors to include chemical sources, notes Reynolds, if the waters of Europa are in fact brines containing a variety of dissolved elements. There are no data of any kind to support this addition, but some scientists speculate that the "rocky" portion of objects like Europa may consist of primitive, carbonaceous-chondrite material. Planetary spacecraft have included flybys, orbiters, atmosphere probes and landing craft. Now, how about a submarine? —*J. Eberhart*

Cosmonauts set record

Soviet cosmonauts Anatoli Berezovoy and Valentin Lebedev set a 211-day record for a human stay in orbit before returning to earth Dec. 11 from their orbital sojourn aboard the Salyut 7 space station. The crew was launched May 13, and one day later boarded the Salyut, which had been lofted about a month before. The previous record of 185 days was set by two other cosmonauts aboard Salyut 6, which was visited by 16 separate crews before reentering the atmosphere and burning up on July 29. □