Anthropology

Bruce Bower reports from Las Vegas at the annual meeting of the American Association of Physical Anthropologists

Frozen in time

Last September, two mountain climbers scaling a glacier in the Austrian Alps made history — as well as prehistory — by chancing upon a body in the surrounding ice. They alerted scientists to their discovery, and within a week worldwide news reports described the freeze-dried, mummified body as that of a man who lived around 4,000 years ago, during Europe's Bronze Age.

But recent carbon dating of hay used for insulation in the man's boots indicates an age of about 5,300 years, placing him in the late Stone Age, reports Torstein Sjovold of the University of Stockholm, Sweden. Sjovold participates in the international scientific study of the prehistoric body and its associated paraphernalia, which began Feb. 6 at the University of Innsbruck, Austria.

The body retains a few patches of hair, and investigators are now analyzing the chemical makeup of about 1,000 individual hairs, Sjovold says. The man's front teeth show considerable wear, and one sports a blue tint of undetermined origin. Computer tomography scans indicate that he did not have third molars, or wisdom teeth. Several groups of dark marks on the man's legs and ankles appear to be tattoos, Sjovold says.

Research also focuses on artifacts found with the frozen body, including a copper axe (described in initial news reports as bronze), clothes fragments, a bow and quiver that still contained arrows, and a knapsack.

Scientists plan to examine the corpse for evidence of any prehistoric bacteria or parasites that might pose dangers to modern humans.

"The body will probably never be put on public display, although a replica might be exhibited," Sjovold says. "Many of us may be distantly related to this Stone Age man."

Early hominid's diet expands

Australopithecus robustus, a hominid (member of the human evolutionary family) living in southern Africa about 1.8 million years ago, consumed a greater variety of foods than previously assumed, reports Andrew Sillen of the University of Cape Town, South Africa. Although some researchers claim these creatures mainly ate plants, nuts and seeds, analyses of two key minerals in *A. robustus* fossils suggest that their menu also included meat, Sillen contends.

A. robustus belongs to a line of hominid species — placed within the genus *Paranthropus* by some investigators — that died out about 1 million years ago. Fossils indicate that members of these species had relatively small brains and large jaws specialized for chewing. Several years ago, a study of *A. robustus* teeth found in a South African cave yielded microscopic evidence of nut and seed eating (SN: 7/2/88, p.14).

However, a low ratio of strontium to calcium in *A. robustus* fossils from the same cave reflects a diet that must have included animals as well as plants, Sillen asserts. He used a recently developed chemical technique to separate and measure the two substances in 50-milligram samples taken from nine *A. robustus* skulls and jaws. Recent studies find low ratios of strontium to calcium among carnivores and substantially higher ratios among herbivores, Sillen says.

The South African researcher brands as "oversimplified" the widely accepted notion that *A. robustus* and its kin munched plants and seeds while direct human ancestors (belonging to the genus *Homo*) living in Africa at the same time ate an assortment of plant and animal foods. Research has begun on the mineral content of early *Homo* fossils also found in the South African cave. One sample from a *Homo* find shows a surprisingly high ratio of strontium to calcium. "It's a much higher ratio than we anticipated," Sillen remarks. "But it's only one specimen, and we're not sure what it means at this point."

Chemistry

Janet Raloff reports from San Francisco at the American Chemical Society spring meeting

Another reason to drink green tea

"Every time you eat a sweet," Isao Kubo's grandmother used to say, "drink green tea." Though Kubo failed to heed her advice, he now acknowledges that he should have. An organic chemist, Kubo reported data last week demonstrating that flavor compounds in the Japanese brew can kill *Streptococcus mutans* — bacteria that help initiate dental caries.

The tea's cavity-fighting potential, confirmed roughly 10 years ago, first appeared to trace to water-soluble compounds, largely tannins, that can halt *S. mutans'* production of glucans. These sticky materials bind acid-generating bacteria to teeth. However, a cup of tea did not appear to contain enough glucan inhibitors to account for its anticariogenic activity. So Kubo turned to the tea's hexanes — oily, floral-scented, water-insoluble compounds that give the drink its distinctive flavor.

At least nine of the 10 most abundant flavor compounds in green tea also inhibit glucan production, Kubo's team at the University of California, Berkeley, now reports. Moreover, when certain of these hexanes accompany one another, as they do in the tea, they can kill the microbes — and at far lower levels than required to shut down glucan production. For instance, even at 1,600 parts per million (ppm), caryophyllene alone exhibits no activity against the microbe. But when it accompanies 200 ppm of indole (half of that hexane's bacteria-inhibiting dose), a mere 6.25 ppm of caryophyllene kills *S. mutans*.

Nor are the hexanes' antimicrobial abilities restricted to *S. mutans*. Kubo found them active against all the strains he tested: two molds, three yeasts and eight bacteria, including some responsible for gastrointestinal disease and acne.

What if you don't like green tea? Its active hexanes also occur naturally in coriander, sage and thyme and as approved additives in ice creams, candy, chewing gum and baked goods. In the future, Kubo envisions green tea toothpastes and dental rinses.

Arsenic in water: Bigger cancer threat

Drinking arsenic-contaminated water constitutes a "far more serious" toxic threat than previously believed, according to Joseph P. Brown, a toxicologist with California's Environmental Protection Agency in Berkeley. Indeed, a new risk assessment by his agency indicates that lifetime consumption of drinking water with levels of arsenic at the current federal limit — 50 parts per billion (ppb) — presents a one-in-100 risk of cancer. As environmental threats go, he says, "It ranks right up there with radon and secondhand tobacco smoke."

Present throughout Earth's crust, arsenic contaminates groundwater around the world. The U.S. EPA considers its current standard — not originally based on cancer risk — to correspond to a skin-cancer risk of about 2.5 in 1,000.

Since that limit was issued in 1976, however, researchers in Taipei have correlated cancer mortality in much of Taiwan with arsenic measured in the 83,656 wells serving those individuals. Typically consuming water bearing 150 to 800 parts per billion (ppb) of the contaminant, this population "is almost a laboratory for studying the epidemiology of arsenic," Brown maintains. And the high levels of other cancers associated with arsenic in that study — malignancies of the lung, liver, kidney, bladder, prostate and other internal sites — now indicate that the current 50-ppb U.S. standard "is out of line," Brown contends.

On the basis of an analysis of the data from Taiwan and elsewhere by researchers at the University of California, Berkeley, Brown's office has recommended that California's Department of Health Services lower its 50-ppb drinking-water standard and establish an even lower regulatory goal of 2 parts per trillion arsenic. Brown says the lower level corresponds to an overall cancer risk of roughly one in 1 million.