Anthropology

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

European cave carnage

In 1908, a German investigator exploring a cave in Bavaria known as Ofnet uncovered two small pits in which 38 human skulls lay bunched together, resembling, as he later wrote, "eggs in a nest." A new examination of the Ofnet remains indicates someone intentionally and violently cracked many of the cranial "eggs" before placing them in the cave, reports David W. Frayer of the University of Kansas in Lawrence.

"This is a unique site in European prehistory and provides convincing evidence for inter-human violence more than 7,000 years ago," Frayer asserts. Radiocarbon dating provides an age estimate of approximately 7,200 years for the Ofnet skulls.

The two pits yielded a total of five adult males, 10 adolescent and adult females, and 23 children and adolescents of undetermined sex. Several spinal bones from the neck also turned up. Of the 32 reasonably intact skulls, 18 possess at least one fairly large, oblong hole apparently caused by the impact of a blunt object, Frayer contends. These "bludgeon injuries" appear on individuals of all ages and occur on both the left and right sides of the head, he says. Males possess more holes per skull than females or the unsexed youngsters.

Moreover, incisions on the neck bones created by a sharp object suggest decapitation took place, Frayer maintains.

Although the reasons for the grisly demise of the Ofnet individuals remain unclear, violence may have assumed considerable social importance in human groups living in Europe from about 10,000 to 5,000 years ago, Frayer argues. In support of his theory, he cites recent documentation of significant amounts of warfare (SN: 2/9/91, p.88) and homicide (SN: 2/6/88, p.90) among modern nonindustrial groups.

Fossil skull goes ape

The discoverers of a 9- to 10-million-year-old fossil skull in Greece recently stirred controversy with their contention that the specimen, assigned to the species *Ouranopithecus macedoniensis,* may represent the earliest known hominid (SN: 6/23/90, p.390). Most investigators accept the 3- to 3.5-million-year-old remains of *Australopithecus afarensis,* which include the partial skeleton of "Lucy," as the first hominids, or members of the evolutionary family that includes modern humans.

Initial criticism of the Greek find stressed its anatomical links to orangutans, not hominids. But a new study finds a strong cranial connection between *Ouranopithecus* and both chimpanzees and gorillas.

"*Ouranopithecus* was not a hominid, but it's an entirely plausible ancestor for African apes and humans," contends study director Robert B. Eckhardt of Penn State University in University Park.

Eckhardt and his colleagues found that the *Ouranopithecus* fossil shares many dental and cranial features with skulls from 280 common chimpanzees housed in a Frankfurt, Germany collection. These characteristics include canine teeth that project out slightly, a gap between the upper canine and its adjoining incisor, and a jutting upper jaw. The overall pattern resembles gorillas as well as chimpanzees, Eckhardt maintains.

On two of its cheek teeth, *Ouranopithecus* lacks a rubbed-down surface typically observed among apes — but not among hominids — and caused by overlap with large canines. However, the absence of this canine rubbing does not provide enough evidence for establishing hominid status, since some *A. afarensis* specimens display ape-like tooth patches produced by canine contact, Eckhardt asserts.

"We need to establish the population frequency of a single fossil's cranial and dental features, since most of these traits are present in some individuals but not in others within the same species," he argues.

Chemistry

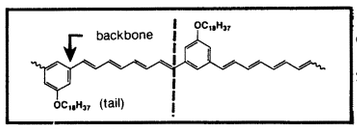
Unmixing oil and water with microwaves

Using household items, two engineers have harnessed microwave energy to separate water from viscous oil solutions. The process, they now conclude, may prove useful for waste reduction in oil refineries, natural-gas pipeline operations and oil and gas production.

At an American Institute of Chemical Engineers meeting last week in Houston, Cheng-Shen Fang of the University of Southwestern Louisiana in Lafayette and Peter M.C. Lai of the Taiwan Center for Pollution Control Technology in Hsinchu reported they had achieved a 90 percent separation of water from oil. With a kitchen blender, they mixed motor oil with distilled water and sodium hydroxide until the liquid thickened. After heating the oil-and-water shake in a microwave oven for several minutes, they measured the temperature throughout the sample and evaluated the results.

Previously, they microwaved a water-in-oil blend in a 10-foot-high, 10-foot-diameter tank for several hours. "The field tests proved the technology works," says Fang. "But to do the design [of treatment facilities] we need data," which they obtained from this kitchen microwave. He thinks the method will prove cost-effective.

Progress in designing magnetic polymers



Dougherty/Caltech

Dotted line separates two PMPOT-18 units

As modern alchemists, organic chemists keep trying to make plastics more like metals — either to conduct electricity or to serve as magnets. Although several thought they had discovered magnetic organic materials, rarely have these leads panned out (SN: 4/18/87 p.252). However, in the March 27 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, three chemists at Caltech in Pasadena report developing a polymer with promising magnetic potential. Called PMPOT-18, it contains a hexagonal benzene-ring "tail" and a polyene backbone (see diagram).

To be magnetic, a material needs its unpaired electrons to align and spin in the same direction. This alignment, called ferromagnetic coupling, rarely occurs naturally because electrons tend to spin in opposite directions, canceling out any potential ferromagnetism. But PMPOT-18's structure apparently encourages the necessary coupling. To generate unpaired electrons, Dennis A. Dougherty and two students removed an electron from several electron pairs in the backbone.

This provided magnetic properties in one dimension. "The problem is you need it to be three-dimensional to have a ferromagnet," says Dougherty. The molecules in the polymer also must line up to ensure coupling of electrons between, as well as within, the molecules. The researchers hope to use PMPOT-18's tail to help order the polymer molecules.

Squeeze on hydrogen reveals complexity

Hydrogen just isn't the simple element it's supposed to be. When incredibly pressed, it does not undergo the abrupt changes in conductivity — as it moves towards its metallic state — that some scientists had predicted.

In the April 11 NATURE, physical chemist Russell J. Hemley and two colleagues at the Carnegie Institution of Washington (D.C.) report that instead of undergoing a dielectric catastrophe — a phenomenon in which a material that didn't conduct electricity suddenly does — hydrogen gains conductance slowly. To assess electron structure in this experiment, the researchers developed a new way to monitor the index of refraction — how much light bends — in hydrogen compressed to 1.7 million atmospheres.