Anthropology

Bruce Bower reports from Oakland, Calif., at the annual meeting of the American Association of Physical Anthropologists

South African fossil surprises

An underground cavern in South Africa known as Sterkfontein yielded an important trove of hominid fossils in a series of excavations more than 35 years ago. Finds included the approximately 2.5-million-year-old bones of *Australopithecus africanus,* a creature whose place in human evolution remains unclear, and the remains of an early *Homo* species from around 1.5 million years ago.

Sterkfontein excavations conducted over the past 8 years have unearthed nearly 600 hominid fossils that may shake up current theories about our evolutionary family tree, asserts Lee R. Berger of the University of the Witwatersrand in Johannesburg, South Africa.

The most striking discovery is a partial skeleton of an *A. africanus* individual whose apelike body was capable of only limited two-legged walking, Berger contends. The find includes bones from the shoulder, arm, spine, and pelvis.

Anatomical analysis indicates that this hominid used powerful arms to climb in trees much of the time, Berger contends. Although the shoulder fossils are fairly thin and light, they contain grooves where large muscles were once attached. Upper and lower arm bones appear more apelike than humanlike, he adds.

The pelvis is unusually small, according to Berger. It has a generally apelike shape combined with several features of a two-legged gait already noted in *A. afarensis,* an East African hominid that lived from 4 million to 3 million years ago. The famous partial skeleton of Lucy belongs to *A. afarensis.*

New *A. africanus* fossils at Sterkfontein date to between 2.9 million and 2.6 million years ago and come from hominids who walked less steadily on two legs than Lucy's species, Berger concludes. This suggests that hominids in eastern and southern Africa evolved separately after splitting off from a common ancestor, with perhaps the southern branch spawning the *Homo* line, the South African scientist proposes.

The hand that cradles the rock

Separate research teams, one working in western Africa and the other in New Guinea, have reported in the past 5 years that right- or left-handedness does not occur in groups of wild chimpanzees, with one exception. When using a stone to crack open nuts, about half the animals hammer exclusively with their right hands, the rest with their left.

Chimpanzees living in Tanzania's Gombe National Park use their hands similarly, hold Linda F. Marchant and William C. McGrew, both of Miami University in Oxford, Ohio. In a variety of daily behaviors, such as grooming others and plucking fruit from trees, no hand preferences emerged in a group of 38 Gombe chimps observed last year for 3 months, Marchant and McGrew contend. However, the animals split about evenly into those who wielded flexible pieces of vegetation only with the right or with the left hand to fish termites out of earthen mounds.

Chimps' neurological makeup may not promote preferential hand use, McGrew theorizes. But individuals may randomly choose to develop one hand as the performer of fine motor skills, such as termite fishing and nut cracking, he argues.

Observations of Gombe chimps' hand use challenge the theory that primates have evolved to favor the right hand for precise manipulation and practiced acts and the left for reaching out and pulling in various objects (SN: 1/7/89, p.10). Several experiments with captive monkeys and apes have supported that theory. But those studies consist of small numbers of animals given tasks unlike any they face in their natural environments, McGrew asserts. Scientific evidence to date for any type of strong right- or left-handedness in nonhuman primates is "very dicey," he maintains.

Biology

Making scents of mother-infant bonding

Each person has a smell of his or her own. Such characteristic odors are detectable even before birth, according to a study published in the March 28 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. Trained rats can distinguish between samples of a woman's urine taken before and after she gives birth, Gary K. Beauchamp of the Monell Chemical Senses Center in Philadelphia found.

But Beauchamp and his colleagues were unsure how the rats made this distinction. So the researchers tested the rats with samples of the mother's urine during pregnancy and postpartum urine mixed with urine from her child. In fact, the rats could not distinguish between these samples 73 percent of the time.

Yet the rats could simply have been picking up on a general odor characteristic of any fetus, says Beauchamp. So the researchers also tested the rats using a mixture of urine from a woman and an infant that was not her own. The rats responded to this mixture about 44 percent of the time.

This indicates that the odor type and pertinent genotype of the fetus is present in the mother's urine, says Beauchamp, although a more general fetal smell may also be detectable.

A genetic basis for individual odor types was first discovered in mice, Beauchamp says. Such odors — often transmitted through urine — are important in coordinating the animals' reproductive, social, and maternal behavior. The smells seem to come mainly from normal metabolites that happen to be odorous and whose outputs are subject to genetic variation.

"The nose, even the human nose, is a remarkable instrument," says Beauchamp. He suggests that humans detect odors in sweat, saliva, or milk rather than urine.

How much information humans gather from such odors remains unclear, says Richard H. Porter of Vanderbilt University in Nashville. "This is the first evidence [in humans] that odors produced by the fetus, secreted in the mother's urine, alter the odor of the mother herself. . . . This is theoretically interesting simply because it provides a new channel of information about the fetus itself."

Porter's research shows that human mothers can identify their infants by smell just a few hours after giving birth. Beauchamp's work may offer an explanation: "Perhaps," he says, "such identification has already been learned before birth, by means of odor types exchanged during gestation, representing possibly an important early factor in parent-infant bonding."

Molecules of memory

Sometimes, remembering what you've learned is more difficult than learning it in the first place. But Jerry C. P. Yin has solved that problem — for his fruit flies, at least.

Yin and his colleagues at Cold Spring Harbor (N.Y.) Laboratory have created a strain of fruit fly that overproduces a protein, called CREB, known to affect long-term memory formation. It usually takes about 10 repeated trials, with rest intervals between them, to get a fruit fly to learn something well enough to remember it 7 days later, Yin says. But the genetically manipulated flies remembered after just one trial, he reports in the April 7 CELL.

Last October, Yin and his colleagues showed that flies that overproduced a different form, or isomer, of CREB failed long-term recollection tests. They suggest that in normal flies, changes in the ratio of the two isomers during intervals between trials help establish long-term memories.

"The really stunning thing here is that manipulating just one molecule can perturb such complicated behavior," Yin says. "There are a million ways you can muck something up. . . [but] if you can improve a process, you're probably looking at something that's crucial."