Anthropology

Mild and woolly monkeys

The woolly spider monkey, or muriqui, is the largest primate in the Western Hemisphere and ranks among the most endangered primates in the world. Muriquis were once the omnipresent occupants of a forest that stretched along the southeastern coast of Brazil. Much of the forest has been cut for farm and pasture land in the last century, and only 300 to 400 muriquis are known to survive.

In 1982, anthropologist Karen B. Strier of Harvard University began monitoring a group of muriquis in one of the remaining pockets of Brazilian forest. Her research, intended to aid conservation efforts and a planned captive breeding program in Brazil, has uncovered social behavior and organization rarely observed in primate species.

In a study group of 26 individuals continuously observed over 14 months, Strier found an "extraordinary degree" of cooperation and friendship among males. Only the spider monkey and the chimpanzee exhibit comparable levels of "male bonding," she reports in the most recent ANTHROQUEST. Even more striking, she says, are the low levels of aggression between male muriquis. "Unlike most other primates, indeed, most other vertebrates, male muriquis show no overt competition over access to mates," explains Strier.

An important reason for this cooperative behavior appears to lie in family ties, she says. Male muriquis did not leave the study group, suggesting that they mated with the same limited sample of females and, over the generations, had become genetically related to one another. Young females, on the other hand, may tend to leave the group into which they are born; during Strier's observations, two juvenile females immigrated into the study group. Nevertheless, adult males and females travel together in the same group with few signs of conflict, and no adverse effects of inbreeding are currently evident. Cohesive groups, she notes, are better able to compete with other bands of muriqui for the relatively rare fruit species that they prefer to eat.

The study group's pattern of male bonding and female dispersal, a reversal of what is usually observed in primate species, will need to be confirmed in other surviving muriqui groups, says Strier. But knowledge of their strong social relationships will aid efforts to establish captive groups that can reproduce successfully.

Rising above a prehistoric handicap

Bones recovered from a grave in southern Italy more than 20 years ago have provided scientists with evidence of the earliest known case of dwarfism in the human record. The partial skeleton is that of an adolescent male who lived about 11,150 years ago, according to a report in the Nov. 5 NATURE.

The skull and limb bones of the youth closely match the features found in an inherited bone disease known as acromesomelic dysplasia, say anthropologist David W. Frayer of the University of Kansas in Lawrence and his colleagues. At the time of his death the young man was about 3 1/2 feet tall and probably would not have reached 4 feet as an adult. Persons with this type of bone disease are usually of normal intelligence and have no serious medical problems.

The youth was buried in a cave with several individuals of normal stature. He appears to have been a member of a nomadic group of hunter-gatherers, say the researchers, although the bone disease severely limited his ability to contribute to subsistence activities. His handicap was, however, tolerated by the group. Not only did the youth survive to about 17 years of age, note the scientists, but he was buried in a cave reserved for individuals of high status. The site was an important social and ritual center, they add, with a long prehistoric occupation.

Chemistry

Partners for a noble element

The noble gases — helium, neon, argon and xenon — stand apart from other elements. As their title implies, these atoms resist forming chemical bonds. Carrying a full complement of electrons, they are generally content to lead solitary lives. Since 1962, however, chemists have found elemental companions so irresistible that stable, neutral molecules incorporating each of neon, argon and xenon have been synthesized. The one holdout is helium. Now a team of theorists in California and West Germany have calculated that the combination of helium with beryllium and oxygen (HeBeO) is likely to be stable. "Helium can form strong chemical bonds in ions and may even be bound in the ground state of a neutral molecule," the researchers conclude in the Sept. 30 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY.

The computations, the most extensive ever performed for helium, consisted of determining from quantum mechanical principles the likelihood that helium would bond with a number of other elements. Gernot Frenking of the Molecular Research Institute in Palo Alto, Calif., and his colleagues started by looking at positively charged ions (cations) containing helium and elements such as carbon. They found, for instance, that a doubly charged species consisting of two helium and two carbon atoms is surprisingly stable.

The cation calculations provided clues indicating that stable, neutral molecules containing helium could exist. Step by step, the researchers were led to HeBeO. "All this computation would not have been possible without access to a supercomputer," says Frenking. Even on a supercomputer, the calculations for a single candidate often took several hours.

According to Frenking's calculations, HeBeO is barely stable. The energy required to disrupt its bonds is much smaller than the energy required to split, say, a carbon atom from a hydrogen atom. Nevertheless, the compound would probably hold together under the right conditions.

"You never know what strange, new characteristics this compound may have," says Frenking, "but my guess is that you won't find many practical applications for it." No one is ever likely to bottle significant amounts of HeBeO and be able to carry it around. "This compound is important just for knowledge on chemical bonding," he says, and it opens up the "new and really fascinating" field of helium chemistry.

It may be possible to synthesize HeBeO, says Frenking, by heating beryllium oxide, a polymeric solid, until it dissociates into pairs of beryllium and oxygen atoms, then trapping the pairs in liquid helium. A group of researchers at the IBM Research Center in San Jose, Calif., is already trying a somewhat different approach: shining laser light on a beryllium oxide surface in a helium atmosphere. No one has yet reported success in synthesizing the compound. The situation for helium cations looks more promising. Calculations show that several of these ions are likely to be much more stable than neutral helium-containing molecules. One research group has already detected a singly charged carbon-helium pair.

Because helium, after hydrogen, is the second most abundant element in outer space and because evidence for the presence of helium ions has been found, Frenking says that helium may play a role in the chemistry that takes place on dust particles in interstellar space. The synthesis and study of helium cations in laboratories may soon provide the data needed to monitor interstellar chemistry more effectively.

Frenking and his colleagues are also excited about a more recent set of calculations that concerns bonding between helium and various ions such as lithium. The researchers have found bonding trends and indications of chemical structures that may turn out to be useful for constructing new kinds of lasers.