Execretion analysis aids primate social studies

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The arrival of molecular genetic analysis of both genes and hormones is providing scientists unexpected and unprecedented information about animals -- provided the researchers can find ways to get acceptable samples, said Duke University biology professor Susan Alberts.

When researchers first genetically analyzed the DNA of songbirds in 1987 for example, they found that avian species thought to be "quintessentially monogamous actually engage in what we politely call extra-pair copulation," Alberts said. "It revealed to us that there is much going on behind the scenes that we can't detect from direct observations."

But while collecting songbird DNA can be simply a matter of climbing a tree to get "a little bit of blood from the nestling," getting samples from primates is another matter, Alberts said. Larger animals such as baboons typically need to be trapped or darted in order to get blood samples. And trapping or darting large mammals represents a major undertaking.

"All that can perturb their physiology, diet and nutrition, which is a big part of being a wild animal," she said. Moreover, "relatively large numbers of samples are required to reveal kin relationships within a primate social group."

Progress was made in the early 1990s when scientists developed techniques to extract DNA from animal droppings, she said. A second advance provided methods to extract hormone breakdown products from

excreted feces and urine.

Alberts will provide examples of what this new sampling has taught researchers in a symposium on the origins of complex societies in primates and humans. That symposium takes place today during the American Association for the Advancement of Sciences' 2009 Annual Meeting, to be held in Chicago.

For instance, she said, by finding evidence for elevated levels of glucocorticoid stress hormone in the feces of female baboons that had lost a close female companion, researchers deduced that those animals were grieving. "Those showed physiological responses to what can only be termed a psychological event -- the loss of a friend," Alberts said. "This reveals a level of social involvement and complexity that had not been appreciated before."

Primates "live in matrilineal societies where females remain with their kin while males disburse," Alberts said. "If offspring have a high ranking mother a lot of things go well in their lives. If they have a low-ranking mother, things will not go so well."

Her research group's own DNA and hormone sampling at a baboon population in Kenya has revealed that "males actually provide paternal care too, something that we've never suspected," she said. "And females form friendships with paternal sisters as well as maternal sisters. They have these two different types of relatives that we didn't appreciate before and didn't understand."

Source: Duke University