

The habits of camelid species that differ in social patterns suggest that dungpiles play a communication role

BY JULIE ANN MILLER



Female vicunas, as well as the males, use the dungpiles.

Even the stately llama, for all its apparent serenity, must urinate and defecate, just like anybody else. This less decorous side of animal and human life, which was long ignored by anthropologists, can provide valuable clues to larger social schemes. William Franklin of Iowa State University has found, for instance, that differences in elimination behaviors between the two species of South American wild camelids, relatives of the llama, reflect their differing social interactions.

In many type of animals urine and feces have a significance beyond waste elimination. As intermediaries between an animal and its environment, they are practical media for communication. Deer, dogs and rabbits mark their territories with signposts of urine or feces. The smell of urine can also serve as a trail. Urine odors indicate sexual readiness in dogs and spider monkeys. The odor of a male mouse's urine can bring out male mouse aggression, speed the sexual development of immature females, counteract suppression of an adult female's estrous cycle or block a pregnancy created by another male. Among foxes, urine is the ink for an elaborate bookkeeping system informing late-comers to a site whether or not food is still available (SN: 11/19/77, p. 349).

Franklin suggests that wild camelids also use excrement as a communication scent, most probably to identify family territories. Observing camelids on the mountains is more difficult than watching mice in the laboratory, but Franklin's data indicate that camelids' dungpile behavior has communication value.

The vicuna, the smaller and more graceful wild camelid, inhabits the highlands of the Andes. The animals live in a tight family group composed of a male, several females and their offspring less than one year old. The male defends two territories for his group, a feeding area of about 20 hectares (50 acres) and, on higher ground, a small sleeping area.

Unlike most hooved animals, vicuna urinate and defecate at dungpiles. Males, females and juveniles of the family group all contribute to the piles. About 85 piles are scattered throughout the feeding terri-

tory, but only 15 to 20 are located at the sleeping site. The size of the sleeping territory dungpiles, however, is quite impressive. Franklin found some to be as large as 50 kilograms (135 pounds).

Use of the dungpile has a ritual element, Franklin said at the recent Symposium on Chemical Signals in Vertebrates and Aquatic Animals held in Syracuse. The vicuna first sniffs the pile, then kneads it with its forepaws, turns, positions itself and finally eliminates. Franklin has tallied the frequency of each behavioral subunit — an animal almost always sniffs, kneads only 20 to 30 percent of the time and turns around in 50 to 60 percent of the visits to the dungpile. The kneading may be a vicuna's means of anointing its foot pads with the smell of the home pile, Franklin suggests. Defecation and urination are most frequently observed just before the animals leave their feeding territory or their sleeping territory and while they traverse the neutral zone between the territories and the drinking spring.

A striking example of ritual is the "defecation-urination display" that males sometimes perform at the dungpile. A male will interrupt a territorial defense to perform a defecation-urination display. Stopping at the dungpile may allow the male to confirm that he is within his territory and to reinforce his ownership. The pause also gives the invader a chance to escape. Franklin suggests that the interruption allows the confrontation to be solved without unnecessary injury.

The display is performed most often by a dominant vicuna and is more often directed at an animal that shares a territorial boundary than at a more distant, but familiar, neighbor. The display seldom includes kneading, but involves more frequent turning behavior than does a routine visit to the dungpile. Franklin reports that in 40 percent of the displays the vicuna goes through the preliminaries but does not actually urinate or defecate.

The vicuna dungpiles have attracted two quite distinct hypotheses. The first is that the piles are a sanitation measure. Localizing excrement could limit parasite contamination of potential food. The sec-

ond hypothesis is that the piles are a sign for maintaining territory. Recently Franklin has observed a second camelid species. Their dungpile habits may help distinguish between the hypotheses.

Wild guanacos are larger than vicunas and inhabit a wider range of South American terrain. Guanacos have more flexible social units than those of vicunas: A male and several females share a feeding territory in the summers, but females may spend the winters in all-female groups.

Guanacos, as well as vicunas, pile their dung, but the behavior has quite different characteristics. For example, the dungpiles of a guanaco are much smaller than those of the vicuna. Only the adult males use the piles, and they do so for only about half the times they urinate or defecate. A male on a dungpile introduces his action with sniffing, turning and tail wagging. Females and males show less ceremonial behavior when they eliminate away from a pile.

The observations of guanacos are evidence against the hypothesis that camelid dungpiles are a sanitary necessity, accord-

Vicuna yearling smells dungpile before using it. Sniffing, kneading, and turning behaviors often precede elimination.



WHY A DUNG PILE?

photos: Franklin



Dungpiles in the vicuna sleeping territories can weigh as much as 50 kilograms.

ing to Franklin. Female and immature guanacos urinate and defecate in the feeding areas without obvious health consequences. In addition, Franklin has observed that vicunas are not fastidious; they prefer feeding near their dungpiles.

Territory marking is the more likely explanation of dungpiles, Franklin believes. Like vicunas, the guanaco males defecate and urinate most frequently when they are about to leave or have just returned to the territory. "Guanaco females don't use the dungpiles because they have less permanence with the territorial group," Franklin proposes. In addition, the females are not as dependent as males on being oriented to a territory.

On the mountain slopes where there are few natural features to distinguish bound-

aries, the piles may provide identifying markers. Franklin has mapped territorial boundaries of the animals and finds that they vary little over the months.

Several observations seem to argue against the piles being boundary markers. Their almost uniform distribution within a territory should be less effective than a concentration of piles at the edges. (Border piles, however, would increase the time the camelids spend ambling between feeding areas and the dungpiles.) In addition, as the vicunas traverse the neutral zone on their way to the spring, the animals contribute to seemingly public dungpiles. Finally, if the inhabitants are away from their territory, the dungpiles do not keep out trespassing neighbors.

In higher mammals, however, scent sig-

nals are just signals, not commands. A dog approaching a territorial border marked with an odorous sign is cautioned that it is about to trespass, but is not made incapable of crossing the line. If the animal sees, hears and smells no inhabitants, it may choose to cross the territory, dungpiles notwithstanding. Franklin suggests dungpiles may play a more important role in keeping the insiders in, than in keeping outsiders out.

The vicuna and guanaco studies, along with those of deer and foxes and even of free-living rodents, illustrate the increasing tendency of behavioral scientists to track animals and their scented signals beyond the laboratory or zoo, to their natural territories in the mountains and forests. □

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THE DEVELOPMENT OF MEMORY IN CHILDREN—Robert Kail—WH Freeman, 1979, 168 p., charts and graphs, \$12, paper, \$6. Written to provide an overview of our knowledge of memory development for those who have had no more than an introductory course in psychology.

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