

## Canine Assistants for Conservationists

Although some forensic uses of scent-following dogs may be questionable, as Brisbin, Austad, and Jacobson point out in their letter "Canine detectives: the nose knows--or does it?" (10 Nov., p. [1093](#)), the scent discrimination abilities of canines are still impressive. Controlled behavioral tests indicate that dogs can distinguish the odors from different species of animals, male and female dogs, and even different individuals within a species ([1](#)). These abilities are proving invaluable in conservation programs for endangered and difficult-to-distinguish species ([2](#)), particularly when combined with molecular techniques for the analysis of DNA extracted from the sloughed intestinal cells contained in feces ([3](#)).

We have obtained molecular genetic confirmation of the ability of trained scenting dogs to distinguish among the scats (feces) of sympatric canid species. We trained dogs ([4](#)) to detect scats of the endangered San Joaquin kit fox (*Vulpes macrotis mutica*) and ignore those of coyotes (*Canis latrans*). One German shepherd recovered 435 presumed kit fox scats along 140 kilometers of transects in the Carrizo Plain Natural Area, California, in 16 days. We were able to isolate DNA from 329 of the scats. Mitochondrial DNA tests developed in the National Zoological Park's Molecular Genetics Laboratory ([5](#)) revealed that all 329 scats were indeed from kit foxes. Thus, the dog was 100% accurate in identifying kit fox scats in the presence of coyote, skunk (*Mephitis mephitis*), and badger (*Taxidea taxus*) scats along the transects. Species identification based on mitochondrial DNA ([5](#)) costs about \$40 per sample. Hence, use of scent-detection dogs to distinguish scats from species of interest could provide a cost-effective alternative to laboratory methods in some conservation applications.

Fecal DNA analysis is potentially a powerful method for identifying species, population size, sex ratio, home range, paternity, and kinship ([6](#)). However, finding enough samples for this approach is difficult and time-consuming in many habitats, such as dense vegetation. Along transects through vegetation, our trained dog found about four times as many kit fox scats as an experienced person searching for scats visually. Thus, trained scent dogs can greatly increase the utility of DNA techniques in conservation and might be the only way to obtain information on the presence or absence of some endangered species around the world.

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## References and Notes

1. H. Shiroma and H. Ukuta, in *Problem Snake Management: The Habu and the Brown Treesnake*, G. H. Rodda *et al.*, Eds. (Cornell Univ. Press, Ithaca, NY, 1999), pp. 348-352; B. J. LeBoeuf, *Behavior* **29**, 268 (1967); V. I. Krutova *et al.*, *Sens. Syst.* **12**, 211 (1998).
2. Dogs have been used successfully to find feces of grizzly bears (*Ursus arctos horribilis*) (S. Wasser, personal communication), black bears (*Ursus americanus*) (S. Wasser, personal communication; P. Paquet, personal communication), wolves (*Canis lupus*), and coyotes (P. Paquet, personal communication).
3. M. H. Kohn and R. K. Wayne, *Trends Ecol. Evol.* **12**, 223 (1997).
4. Our training methods were similar to those used when training dogs to detect narcotics.
5. E. Paxinos *et al.*, *Mol. Ecol.* **6**, 483 (1997).
6. M. H. Kohn *et al.*, *Proc. R. Soc. Lond. Ser. B.* **266**, 1429 (1999); H. B. Ernest *et al.*, *Mol. Ecol.* **9**, 433 (2000).