However, the credibility of researchers in Tanzania has been severely affected by the demise of the wild dogs, due to scientists apparently not reporting the sudden demise of vaccinated packs in 1991.

If wildlife research is to play a role in conservation, then significant results from long-term research should be accurately reported, and all forms of intervention including vaccination must be carefully examined.

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2. P. Kat *et al.*, *ibid.* **262**, 229 (1995).
3. R. Burrows *et al.*, *ibid.*, p. 235.
4. J. Ginsberg *et al.*, *Conserv. Biol.* **9**, 665 (1995).

Response: The paper by M. S. de Villiers *et al.*, "Handling-induced stress and mortalities in African wild dogs (*Lycaon pictus*)" does contain new data about the effects of handling on the species (*1*, p. 220).

In the current study, 79 immobilizations of 40 captive wild dogs over the last two years did not result in any mortalities. Captive wild dogs which were vaccinated by darting (n = 2) or vaccinated by hand (n = 21) against rabies were all alive a year later.

Regarding the effects of the deaths of the Serengeti wild dogs on other wildlife research: Scott Creel studied the dwarf mongooses in the Serengeti from 1987 until 15 June 1991, just before the first reports about the wild dogs came in. In 1992 and 1993 two other researchers attempted to renew Creel's project, but were turned down by Tanzanian park authorities in part because of the handling issue, says Creel. Similarly, researchers with Craig Packer's Serengeti Lion Project last collected blood samples from the Ngorongoro Crater lions from 11 to 22 March 1991, a few months before the demise of the wild dogs. Since then, all requests to resume this sampling have been denied.

The majority of researchers interviewed for this article concluded that given the paucity of the data, it is impossible to determine what caused the deaths of the Serengeti wild dogs. They also urge a closer look at the issue of handling wild animals and, as reported, are doing just that.

Virginia Morell

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Resistance to Mutagenesis

In the Perspective "Resistance to radiation" (24 Nov., p. 1318), Michael J. Daly and Kenneth W. Minton speculate about the resistance to ionizing radiation of the bacterium *Deinococcus radiodurans*. They mention that this high resistance could be an evolutionary response to routine dehydration.

The very wide range within the plant kingdom and between plants and animals in sensitivity to ionizing radiation was the subject of the life work of Arnold Sparrow (1914–1976) at Brookhaven National Laboratory. Sparrow elaborated the details of the sensitivity and showed how and why organisms with many small chromosomes were more resistant than those with few large chromosomes. In his latter years, Sparrow addressed microorganisms in particular with great effectiveness (*1*).

I addressed the question of radiation resistance as it is related to evolutionary history and ecological role, and came to a similar conclusion to that expressed by Daly and Minton, but I discussed a broader array of potentially mutagenic factors, such as extremes of temperature and moisture (*2*). The topic raised by Daly and Minton is fascinating and has broad implications that have been only superficially examined.

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1. A list of papers by A. Sparrow is available from the Department of Biology, Brookhaven National Laboratory, Upton, NY 11973, USA.
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Evidence of Early Cannibalism

The oldest human remains and tools that have been discovered in southern Europe (from 780,000 years ago) were described in two recent reports: "Lower Pleistocene hominids and artifacts from Atapuerca-TD6 (Spain)," by E. Carbonell *et al.* and "Paleomagnetic age for hominid fossils at Atapuerca archaeological site, Spain," by J. M. Parés and A. Pérez-Gonzàlez (11 Aug., pp. 826 and 830, respectively). Additional studies of the lower Pleistocene human fossils, recently found in level 6 (TD6) of the Gran Dolina cave site at Sierra de Atapuerca provide evidence of anthropophagy. Striations on the small temporal bone fragment ATD6-16 (4 by 3.5 by 4.5 centimeters) were noticed during excavation, and subsequent analyses after careful cleaning have revealed similar marks on two podial phalanges. Scanning electron microscope analysis of replicas obtained from these human bones show clear features characteristic of cut-marks (Fig. 1). Comparison with marks on faunal remains indicate similar features, probably created by an identical type of stone tool raw material.

The temporal bone exhibits about 12 parallel striations on the mastoid crest where the sternocleidomastoid muscle was attached. Identical placement of cut marks on human skulls has been reported in Neolithic assemblages with extensive evidence of cannibalism (*1*). The proximal pedal phalanx (ATD6-30) has five striations on the dorsal surface of the proximal shaft, while the medial pedal phalanx (ATD6-33) shows two striations that affect the attachment area of the *flexor digitorum brevis* muscle. Location and distribution of cut marks are suggestive of dismembering (detachment of the head) and defleshing activities. Faunal remains exhibit similar patterns of butchering techniques, which suggests that human and animal carcasses were similarly processed, with no special or ceremonial treatment to humans, indicating, therefore, cannibalism (*3*). Cranial and postcranial human skeletons were not sorted out, and human elements were found disseminated and mixed with herbivore bone fragments. Bone remains were found along with many (100) stone tools defined as Pre-Acheulean technology. There was probably intensive activity at the site, given the unusual use of podial elements and the high abundance of small fragments and bone flakes.

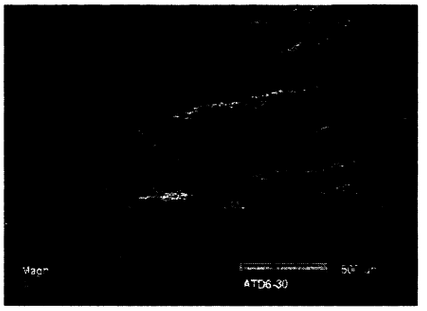

Fig. 1. Microphotograph of a set of cut marks from bone TD6-30 (human pedal phalanx I) at the dorsal face, showing internal V-section, microstriations, and herzinian cones. Scale bar, 500 micrometers.

Herbivore and human age and size were similar, with a high number of infant and juvenile individuals and a predominance of less than 50 kilograms of body weight. These features suggest that hominids transported bone remains to the cave. In-