LETTERS

edited by Jennifer Sills

Protecting Lemurs: Madagascar's Forests

IN THEIR POLICY FORUM "AVERTING LEMUR EXTINCTIONS AMID Madagascar's political crisis" (21 February, p. 842), C. Schwitzer and colleagues make an impassioned plea for emergency action to save Madagascar's lemurs. The need for such action is unquestionable, but the authors repeat a tenacious misconception concerning human impact on the island by saying that "only 10 to 20% of Madagascar's original forest cover" remains (p. 842).

The evidence for the oft-repeated claim that people have eradicated 80 to 90% of Madagascar's forests [also cited in (*1*–*3*)] is dubious at best. It is not supported by the reference provided by Schwitzer *et al*. (*4*); for that study to be a source for the claim, its estimate of recent forest cover must be used in conjunction with an assumption of near-complete forest cover when humans first arrived. This assumption has long been in doubt, and a decade of palaeoecological investigation has revealed that a variety of nonforest vegetation covers predate humans (*5*). We should temper our claims about cumulative historical human impacts on the island accordingly.

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Protecting Lemurs: Ecotourism

IN THEIR POLICY FORUM "AVERTING LEMUR extinctions amid Madagascar's political crisis" (21 February, p. 842), C. Schwitzer *et al*. call for ecotourism, community reserves, and research stations as tools for lemur conservation. In fact, ecotourism already generates net conservation gains for at least 13 lemur species (*1*).

Ecotourism provides half the funds for research and captive breeding at Parc Ivoloina (*1*) for the critically endangered greater bamboo, blue-eyed black, and black-and-white ruffed lemur (species cited in the Policy Forum's supplementary table S1). Funds from ecotourism also pay local guides who protect the endangered Hubbard's sportive lemur near the mining town of Ilakaka, where unguarded woodland is cleared for firewood. In addition, these funds support entrance and guide fees at the community-owned Reniala Reserve on the dry southwest coast (*1*).

Tourism does cause some problems (*1*). Wildlife smugglers capture aye-ayes, release them briefly for tourists, and then recapture them. Ring-tailed lemurs at Isalo National Park are fed for the benefit of tourists. Caged captured fossas are put on show for tourists near Mantadia National Park. Lemurs on display at a rehabilitation center near Analamazaotra Nature Reserve may be captured for tourism. These concerns are not specific to Madagascar's primates. Similar exploitation concerns have been raised about orangutan rehabilitation centers in Borneo and chained captured jaguars on show to tourists in the Amazon.

On balance, however, ecotourism helps protect lemurs against logging (*2*–*4*), poaching, and bushmeat hunting (*5*, *6*). Many endangered and critically endangered species worldwide rely on ecotourism revenue for conservation (*7*). Ecotourism works when it switches local communities from cash or subsistence consumption to tourism earnings based on conservation (*1*, *8*, *9*).

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Response

MCCONNELL AND KULL QUESTION WHETHER the current forest habitat represents "only 10 to 20% of Madagascar's original forest cover." We agree that it would have been more pru-

dent to replace "original forest cover" with "surface." We also concur that there is palaeoecological evidence for nonforest vegetation, particularly in the highlands, predating human colonization. However, Madagascar's original forest cover is a controversial issue for which no final consensus has been reached.

For instance, there is clear evidence in the subfossil record that Madagascar's central plateau, today almost completely denuded, once harbored forest-dependent lemur communities (*1*). The currently disjunct distribution of extant species indicates that forests in the plateau must have been continuous enough to serve as conduits for migration for species such as ayes-ayes, brown lemurs, and others (*2*). Evidence from palaeo-pollen sequences indicates that the central plateau, as well as other Malagasy ecosystems, has been highly dynamic over the past millennia, with significant biotic and abiotic changes predating human settlements (*3*). Whatever the precise percentage of forest lost in this and other regions, however, deforestation is now—and has been in the recent past—extensive in Madagascar. Even conservative estimates are substantial, such as the ~40% forest loss from 1950 to 2000 that McConnell and Kull cautiously conclude in their recent review (*4*). Another estimate would be more than 52%, the forest loss from 1950 to 2010 as calculated from (*5*) and (*6*).

Accepting a lower estimate of forest loss need not affect our thinking about the current crisis. For example, we must not conflate the potentially mosaic nature of past landscapes with an interpretation that lemurs and other forest-dwelling species are adapted to such habitats. To the contrary: Although some extinct lemurs may have used open country, extant lemurs are forest-dependent. Moreover, there is little doubt that most of the 17 extinct lemurs were lost between 500 and 1500 CE, a period when human settlements expanded (*7*).

We fully agree with Buckley that case studies show that ecotourism can be very effective in lemur conservation, but also detrimental to some species or local populations if not properly managed. Indeed, we strongly believe that lemurs are Madagascar's most important global brand, that ecotourism represents the best long-sustainable economic option for the many communities living in close proximity to lemur habitats, and that it could become Madagascar's most important foreign exchange earner in the near future if the biodiversity upon which it is based is conserved. We all agree that we need to focus on finding solutions for the problems at hand. Our action plan (*8*) is largely devoted to spreading conservation to previously unhelped corners of Madagascar harboring threatened lemur communities and to identifying and promoting successful conservation initiatives.

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TECHNICAL COMMENT ABSTRACTS

Comment on "A Complete Skull from Dmanisi, Georgia, and the Evolutionary Biology of Early *Homo*"

Jeffrey H. Schwartz, Ian Tattersall, Zhang Chi

Lordkipanidze *et al*. (Research Article, 18 October 2013, p. 326) conclude, from gross morphological comparisons and geometric-morphometric analysis of general shape, that the five hominid crania from Dmanisi in Georgia represent a single regional variant of *Homo erectus*. However, dental, mandibular, and cranial morphologies all suggest taxic diversity and, in particular, validate the previously named *H. georgicus*.

Full text at http://dx.doi.org/10.1126/science.1250056

Response to Comment on "A Complete Skull from Dmanisi, Georgia, and the Evolutionary Biology of Early *Homo*"

Christoph P. E. Zollikofer, Marcia S. Ponce de León, Ann Margvelashvili, G. Philip Rightmire, David Lordkipanidze

Schwartz *et al*. hold that variation among the Dmanisi skulls reflects taxic diversity. The morphological observations to support their hypothesis, however, are partly incorrect and not calibrated against intraspecific variation in living taxa. After proper adjustment, Schwartz *et al*.'s data are fully compatible with the hypothesis of a single paleodeme of early *Homo* at Dmanisi.

Full text at http://dx.doi.org/10.1126/science.1250081

CORRECTIONS AND CLARIFICATIONS

Perspectives: "Enzyme kinetics, past and present" by X. S. Xie (20 December 2013, p. 1457). A production error resulted in a misspelled word in the first sentence of the paragraph in which Equation 4 appears; the sentence should read "In single-molecule turnover experiments, each enzyme experiences constant substrate and product [not produce] concentrations in the volume of interest (dashed circle)." In addition, bars should have appeared over the constants k_{cat} and K_M in Equation 3. The HTML and PDF versions online have been corrected.

Letters to the Editor

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