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Dating the Sterkfontein Fossils

R. J. Clarke, *et al.*

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Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 6 months or issues of general interest. They can be submitted by e-mail (science_letters@aaas.org), the Web (www.letter2science.org), or regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.

Science Editor Bias on Climate Change?

***SCIENCE'S* EDITOR-IN-CHIEF DONALD KENNEDY** uses his Editorials inappropriately to advocate politically derived goals—undermining the proper role of *Science* and endangering credibility with the public. In "An unfortunate U-turn on carbon" (Editorial, 30 March 2001, p. 2515), he accused President George Bush of reversing his position on the Kyoto Protocol. There was no such reversal: Bush had made it quite clear during his 2000 campaign that he opposed the Protocol—echoing the U.S. Senate, which had unanimously rejected such restrictions on energy use in 1997.

> "Maybe we do need to know more science before we charge blindly ahead with ruinous mitigation schemes based on opinions."
>
> —SINGER

Next came "The policy drought on climate change" (Editorial, 17 Jan., p. 309), in which Kennedy attacked the White House research plan for the Climate Change Science Program (CCSP). Kennedy faults the strategic plan for concentrating on, yes, science. He wants studies on regulation of energy—putting the cart before the horse!

Then we get "The climate divide" (Editorial, 21 March, p. 1813), where Kennedy bemoans the CCSP's lack of recommendations for emission controls to avert what he considers a climate catastrophe that would trigger an abrupt cooling of the temperate Northern Hemisphere. But climate models predict a steady warming as greenhouse gases rise. And abrupt climate changes have been occurring throughout the history of Earth (*1*–*3*).

Kennedy also endorses a wildly implausible British plan to reduce their CO_2 emissions by 60% by 2050—with mostly wind power and without the use of nuclear reactors. But just a week later, we read that stabilization of global climate (or at least its alleged human component) would require installing carbon-free primary power at the rate of 1000 MW each day over the next 50 years (*4*). That's like adding an amount of nuclear capacity every year equal to what is now in existence globally.

The Editorials basically call for drastic action to limit carbon dioxide emissions, like sequestering CO_2 from power plants or the rationing of energy by legislated cap-and-trade schemes—all costly but also ineffective (*5*). Kennedy even suggests that Bush's refusal to join Kyoto has provoked European resentment with respect to the Iraq problem.

Kennedy keeps insisting that "[t]he scientific evidence on global warming is now beyond doubt" (17 Jan.). Presumably, he sees no need for further climate-science research—contrary to evidence published in his own journal (*6*, *7*) to which he responded dismissively. There isn't even solid evidence for current warming: A National Research Council report (*8*) confirms that the atmosphere has not warmed appreciably for the past 20-odd years. And there are no "fingerprints" that would assign any observed surface warming trends to human-produced greenhouse gases.

Just a week before Kennedy's 21 March Editorial, researchers suggested a completely different picture on what drove rapid climate change at the end of the most recent ice age (*9*). And on 28 March, another group had to admit that it was not known what produces abrupt climate change (*10*). Maybe we do need to know more science before we charge blindly ahead with ruinous mitigation schemes based on opinions.

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Response

SOME CLIMATE SCIENTISTS CRITICIZED ME FOR publishing Fred Singer's earlier letter [(*5*) in his letter], in which he attempted to rebut—as he does here—the consensus of the Intergovernmental Panel on Climate Change and of most scientists. I'm doing it again, even though his case is old wine in a new bottle, because I think it important for *Science*'s readers to hear and to evaluate a position that is still taken by many industry and political leaders. I invite those readers to examine Singer's selection from the scientific literature. His references (*8*) and (*9*) add to our knowledge about the history of abrupt climate change, but say nothing against the consensus for contemporary global warming and, if anything, support growing concerns that its continuation might produce dramatic, nonlinear responses. He ignores the recent Report by B. D. Santer *et al.* (*1*), which shows that the alleged discrepancy between surface and satellite measurements of global temperature—of which he made much in his earlier letter—is largely attributable to inconsistencies in the satellite data.

Much of his argument with me is about three Editorials, and he has misread each one of them. In the first, the word "Kyoto" does not appear; the U-turn I described was Bush's reversal on his campaign commitment (later called a "mistake" by a White House spokesperson) to include carbon dioxide among the four regulated atmospheric pollutants. The second never faulted the science in the administration's plan, but pointed out that its focus on long-range alternative energy research unfortunately bypassed the need for shorter-range remediation strategies. The third did not label abrupt cooling as the likely

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>
> —KENNEDY

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alternative to continued "steady warming"; it pointed out that the former has received increasing support from new studies.

DONALD KENNEDY

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Dating the Sterkfontein Fossils

IN AN ARTICLE ("GREAT AGE SUGGESTED FOR South African hominids," News of the Week, 25 April, p. 562) published in conjunction with our announcement of new absolute dates and early hominid specimens from Sterkfontein ("Lower Pliocene hominid remains from Sterkfontein," T. C. Partridge *et al.*, Research Article, 25 April, p. 607), Ann Gibbons writes, "co-author Clarke says that Little Foot does not resemble *A. anamensis* in crucial aspects. And he says that the new Jacovec fossils, which [co-author] Granger dated to 4 million years ago, may represent two types of australopithecines—suggesting a diversity of 4-million-year-old hominids."

These statements by Gibbons are incorrect. Clarke told Gibbons that it was not possible at this stage to compare the australopithecines at Jacovec Cavern with *Australopithecus anamensis* because the most diagnostic part of *A. anamensis*, the mandible, was not represented in the Jacovec fossil sample. Furthermore, the Little Foot skeleton, including the mandible, is still embedded in breccia and thus cannot yet be compared directly to *A. anamensis* or any other *Australopithecus* species.



These fossils were dated by Partridge *et al.* as 4 million years old.

CREDIT: R. J. CLARKE

In the text of our paper, we observed that there are two forms of femur represented in the Member 4 breccia of Sterkfontein and that one of these, the long-necked form, is present in Jacovec. We state, "This suggests that two different forms of *Australopithecus* might be represented by the Sterkfontein femurs." We did not say, and do not even consider, that two forms are currently represented in the Jacovec sample.

We take this opportunity to correct other misconceptions about the dating. The stratigraphy at Sterkfontein is not particularly complex and is well documented in numerous surface and underground exposures, as well as by five stratigraphic boreholes [see (*2*, *5*) in our Research Article]. The validity of our results is, however, constrained by local relationships and not by overall stratigraphy. The hominid-bearing deposits that we dated were the first to accumulate after the cave opened to the surface via two vertical shafts. The sampling sites are in deep chambers whose dolomite roofs remain intact and exceed 20 m in thickness. These deposits overlie a basal sequence (Member 1) made up of roof-collapse blocks and insoluble components of the dolomite bedrock (mainly manganese and iron oxides) that accumulated as a fine residue during phreatic solution (i.e., below the water table); no extracavernous elements have been found within Member 1. Careful examination of the surface of the Sterkfontein hill, which consists largely of outcropping dolomite bedrock, as well as the shaft conduits themselves, has failed to reveal any infill deposits that could have contaminated soil entering the cave from the hill slopes

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outside. The shafts themselves are dolomite-walled and vertical and are not a source of quartz particles. It must also be pointed out that contamination from infills at depths shallower than 20 m would result in a reduction in apparent age, as such deposits would, regardless of their true age, have accumulated recent ^{26}Al and ^{10}Be.

The sequence within the Silberberg Grotto that contains the skeleton is well layered and includes four thick and laterally persistent layers of hard calcite flowstone that occur within a vertical interval of 3 m; after each of the intervening soil layers fell from above, it was sealed off by the next flowstone, precluding vertical mixing. The skeleton is sandwiched between the second and third flowstones, both of which were intact when our excavations began.

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Response

THE ARTICLE SHOULD HAVE SAID THAT THERE were two types of australopithecines at Sterkfontein rather than in the Jacovec caverns, and I regret the error.

On the question of hominid diversity in Africa, I asked co-author Ron Clarke if the skeleton called Little Foot (Stw 573) was a member of *Australopithecus anamensis*, which lived in East Africa at the same time, and he replied in a telephone interview: "No, we cannot say it is like *anamensis*." He added that he did not have the "right parts" to settle the taxonomic question, but then continued, "This was another indication that there were many species of australopithecines ranging all over Africa, just as there were multiple species of Miocene apes. There were multiple species of ape-men."

I gave all the authors an opportunity to check facts in the final draft of the article. Granger made minor corrections on the dating, Partridge did not respond to e-mail or a telephone message for 4 days, which was after deadline, and Clarke was unavailable.

ANN GIBBONS

Politically Correct or a Bad Decision?

IN HIS ARTICLE "REVISITING A 1930S scandal, AACR to rename a prize" (News Focus, 25 April, p. 573), Douglas Starr describes some reprehensible actions by Cornelius P. Rhoads, a highly regarded cancer scientist and the originator of chemotherapy, who died in 1959. In recognition of his many contributions to its field, the American Association for Cancer Research has named a prize in his memory. Highly coveted, this prize has been awarded anually to outstanding young cancer researchers.

Although I do not condone the lamentable statements made by Rhoads in an unmailed letter while on a scientific mission in Puerto Rico, I find the "politically correct" decision to remove his name from the prize at this late date no less inappropriate. It so happens that Richard Wagner, one of our greatest operatic composers, was an incipient Nazi, a blatant antisemite, and an unrepentant malefactor. Does his behavior justify a condemnation of his music? Or should we remove his name from our operatic programs? Would

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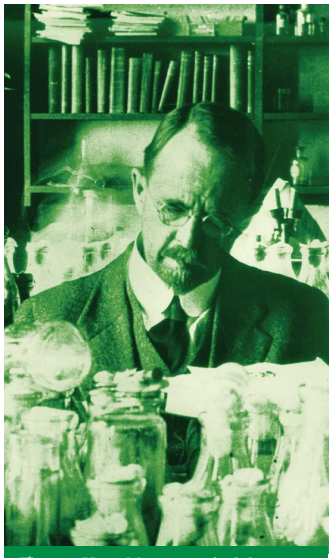
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not such a belated retribution display an equally deplorable intolerance on our part?

LEONID V. AZAROFF

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Early U.S. Interest in Hypersonic Flight

IN DAVID MALAKOFF'S ARTICLE "MACH 12 BY 2012?" (News Focus, 9 May, p. 888), he dates U.S. government interest in hypersonic flight to Army research in 1949 using a World War II Nazi V-2 rocket. In fact, in NASA's predecessor, the National Advisory Committee for Aeronautics (NACA), that terror weapon inspired hypersonic research just as the war was ending. NACA engineer John V. Becker, later a leader of hypersonic X-15 research, wrote that the "eventual need for a wind tunnel capable of speeds in the range of 5 to 10 times the speed of sound was envisioned in 1945," and that ensuing efforts led by 1947 to an operational hypersonic tunnel at what is now called NASA Langley Research Center [(*1*), pp. 619–620; (*2*), pp. 344–347].

STEVEN T. CORNELIUSSEN

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TECHNICAL COMMENT ABSTRACTS

COMMENT ON "Obesity and the Environment: Where Do We Go from Here?"

Nancy F. Butte, Kenneth J. Ellis

In light of observed changes in weight and body composition, halting the epidemic of childhood obesity cannot be achieved with "small changes" in diet and/or physical activity, as suggested by Hill *et al.* (Viewpoints, 7 February 2003, p. 853). Closing the energy gap will require significant and concerted societal effort to change the way our children are eating and increase their physical activity.

Full text at www.sciencemag.org/cgi/content/full/301/5633/598b

RESPONSE TO COMMENT ON "Obesity and the Environment: Where Do We Go from Here?"

James O. Hill, Holly R. Wyatt, George W. Reed, John C. Peters

Reducing positive energy balance by 100 kcal/day could prevent weight gain in most adults. A similar strategy of targeting small behavior changes may prevent excessive weight gain in children and adolescents. Even if changes of 200-300 kcal/day are required in high-risk individuals, the strategy of starting with small changes should be considered.

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