suggested in Flam's article. I have not given access to either the actual raw CDF data or to any subset of raw or "processed data" which could provide the basis of any conclusive physics analysis.

I respect the CDF policy of not releasing data until they are validated and until such release is authorized by the CDF internal "blessing" procedures. I have no dispute with the CDF policy; we are all aware of situations where sporadic events or partial indications have led to mistaken claims and retractions.

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Detecting Explosives

Because airline luggage inspection is an important application of science and technology, we would like to clarify some points discussed in A. Fainberg's excellent and comprehensive article "Explosives detection for aviation security" (20 March, p. 1531).

The "associated production" technique is singled out by Fainberg as one of the four newer nuclear methods for detecting explosives. We have been evaluating this method for the Department of Energy (DOE), primarily for national security applications such as arms control verification of nuclear (or chemical) weapons, which include a conventional high-explosive component. To our knowledge, no DOE funds are now directed toward airport security.

The strongest advantage for associated production (which is usually referred to as the "associated-particle" method for neutron-inelastic scattering) is its ability to penetrate, identify, and image explosives, that is, to provide a *separate* tomographic image of each elemental constituent within sealed containers. All chemical elements having larger atomic numbers than 4 (beryllium) are measurable. In particular, data have been collected by Nuclear Diagnostics Systems (NDS) showing detection of more than a half dozen high explosives (such as C4, PBX, and TNT) on the basis of carbon, oxygen, and nitrogen ratios. Because of this wide-ranging capability for nondestructive examination, applications of this technology have been pursued not only for arms control and luggage inspection but also for drugs and other contraband.

Fainberg mentions the need for "an appropriate, reliable accelerator." In fact, NDS has developed a state-of-the-art, compact-sealed, continuous deuterium-tritium accelerator that incorporates a tritium target and an alpha-detecting scintillator. An electrode focuses the ion beam so that neutrons are produced from a small "spot" (with a diameter of 1 millimeter) needed for imaging. This design differs significantly from well-logging neutron generators.

Ten of the accelerators have been built and improved since 1985 and used by NDS. Their average operating life was about 2000 hours at an output of 10^6 neutrons per second; seven are still operable at less than 10^6 neutrons per second. A full system was recently delivered to Argonne National Laboratory and was operating the next day A rate of more than 10^7 neutrons pe second was achieved during qualification tests. Because the associated-particle method strongly discriminates against background, operating radiation levels are lower than for other high-energy radiation generator techniques.

The signal and background for a specific application depend on the neutron output, the efficiency and solid angle of the gamma-ray detectors, pulse pile-up, accidental coincidences, and other factors. The optimum neutron output is about 10^6 neutrons

per second for the systems developed by NDS for physical security. For these reasons, a further increase in neutron output will not reduce the required measurement time. Because luggage inspection requires relatively low amounts of irradiation, an increase in intensity and lifetime is not needed for the NDS sealed-tube neutron generator.

As Fainberg points out, the most effective system would integrate different types of sensors and detectors. An option that he does not mention is to directly use complementary and synergistic information to maximize detection probability while minimizing false-alarm rates and inspection times. For example, rather than sequential AND/OR logic, the actual integration of the data from an x-ray unit linked to an associated-particle system would provide improvement. In a piece of luggage, a suspicious geometric object imaged by x-rays could be probed for high explosives by the associated-particle method. This would substantially increase the detection confidence of the combined x-ray–associated-particle system while reducing the overall false-alarm rate.

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NSF's New Home

Kudos to National Science Foundation (NSF) director Walter Massey for indicating his unwillingness to dip into the NSF research and development (R&D) budget to fund the NSF's new building in the event that it receives no overall budget increase in fiscal year 1993 (ScienceScope, 24 July, p. 471). Many who have visited the existing quarters agree that a new home is well deserved. But Massey, in the tradition of his predecessors since Vannevar Bush, has signaled with his stance that NSF remains committed to optimizing substantive opportunities for basic R&D funding. Like scientists at many campus laboratories supported by NSF, Massey and his staff continue to forego many of the amenities enjoyed by colleagues in other careers so that available funds can be applied to the substance of scientific work.

The upgrading of both the aesthetic and functional quality of the space in which science is administered and conducted cannot be long ignored, however, particularly if science is to succeed in attracting its share of top new talent. For now, Massey seems to recognize that NSF might need to continue its vigorous promotion of science from existing offices, along with many working scientists who strive to continue to produce pathbreaking research in some of the more cramped corners of our nation's campuses.

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Epistemology and Anthropology

If paleoanthropology is really so "underaxiomatized" and "conceptually or paradigmatically" impoverished (G. A. Clark, Letters, 31 July, p. 597), we'd better get it straightened out epistemological-wise. I'm on Clark's side, I think—we'd better rush a few axioms, paradigms, and even lowly concepts in there, refute a few Popperian hypotheses for good measure, and knock those protocols into shape.

But it isn't just Clark's epistemology that constitutes a "deplorable situation." Perhaps I could be allowed to say where I'm "coming from" with an empirical observation (no "explicit . . . inferential basis" here). If Clark doesn't start paying the English language the respect it deserves, it will be more than the "epistemological infrastructure" of his discipline that goes down the tubes into the great paleoanthropological midden. "I can't stand it any-