Letters

Cell Line Origins

Attribution of HeLa origins to transformed cell lines with marker chromosomes and the type A isozyme of glucose 6-phosphate dehydrogenase is not unlike Berenson's work on the authorship of old Italian paintings: educated guesses that may not stand the test of time.

Chen (*1*) pointed out the possibilities of hybrid cell lines stemming from HeLa contamination, and it is safe to say that no one will be able to prove such points in the absence of detailed examination of chromosomes at each passage level. It is possible to say, however, that use of authenticated material, conforming to published descriptions and continuously checked would provide a much better scientific and philosophical basis for experimental work.

The significance of the comment by Nelson-Rees *et al.* (8 Aug., p. 719) is not that the line described is HeLa but rather that it is not what it was thought to be—that of a normal human epithelial cell. The radiation biologists will now have to reinterpret what the results mean.

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References

1. T. R. Chen, *Mamm. Chromosome Newsl.* **19**, 119 (1978).

Energy Demand Forecasts

As Bernard I. Spinrad points out (Letters, 8 Aug., p. 636), three numbers in my diagonal matrix showing future energy demand estimates were misidentified in Eliot Marshall's otherwise excellent article (News and Comment, 20 June, p. 1353) as "the spread of the National Academy of Sciences Committee on Nuclear and Alternative Energy Systems (CONAES)." I have never so identified them. The April 1978 overhead transparency of the matrix I have shown in talks and its several updated published versions (*1*) all show the correct source: not the main CONAES report published in 1980, but the CONAES Demand and Conservation Panel's analysis, as summarized in *Science* (14 Apr. 1978, p. 142). I have consistently cited the panel's unsubscripted Scenarios I (63 quads in 2010—not 67 quads as printed in Marshall's article), II (77 quads), and III (96 quads) as part, not the whole, of the panel's product.

The reprinted version of the matrix could also have included the Department of Energy's September 1978 Solar Energy Domestic Policy Review forecasts for 2000: "Conventional wisdom" of 95 quads at a year-2000 oil price of $32 per barrel (in 1977 dollars)—precisely the number greeted with howls of derision when I published it 2 years earlier (*2*)—and 123 quads as an average of the $18 per barrel and $25 per barrel cases, which requires supernatural intervention and thus belongs in the "Superstition" column. Both fit the diagonal pattern nicely, unlike the Solar Energy Research Institute's forthcoming estimates of around 60 quads or less.

The low estimate of the CONAES Consumption, Location, and Occupational Patterns Resource Group was 53 quads, not 58 as Spinrad states. What was 58 quads was the Demand and Conservation Panel's Scenario I estimate for 2010, without its 5 quads of active solar heat.

Spinrad's discussion of the Exxon forecast implies both that high unemployment was an exogenous assumption driving low energy growth and that faster energy growth would significantly reduce unemployment. He also suggests that faster economic growth achieved by increased labor productivity is compatible with fuller employment and that combining faster economic growth with low (that is, subsidized) energy prices would benefit Americans, especially the poor. These four hypotheses are without analytical or recent historical foundation, and the last ducks the key question of *who* gets the benefits. What will arguably be beneficial to the nation is an economically efficient energy policy whereby marginal investments supply exactly the amount and form of energy needed to supply each end-use service at least cost (*1*).

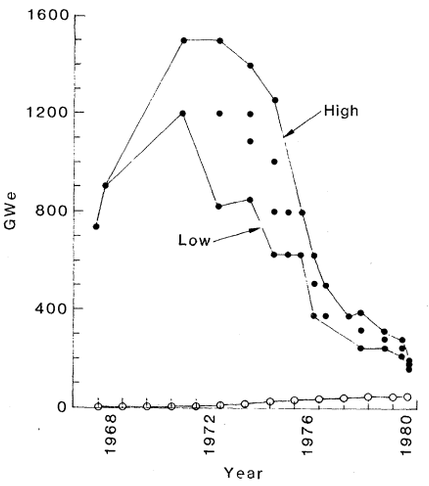

Fig. 1. Operable U.S. nuclear power capacity in various years (open circles) and range of official forecasts, issued in those years, of U.S. installed nuclear capacity in the year 2000 (closed circles) (*3*).

The Petroleum Industry Research Foundation's report, finally, seems to consider only "hard" supply technologies when forecasting (as Marshall puts it) that the "fastest growing major [U.S.] energy sector . . . will be nuclear power." Hardly. Forecast and operable nuclear capacity are both shrinking (Fig. 1); installed capacity is growing far more slowly than most renewable sources (presumably not considered "major"), probably including firewood, which now delivers about twice as much energy as nuclear power; and if, as recent statistics suggest, U.S. primary energy use grew 0.06 percent in 1979 while real gross national product grew 2.3 percent, then 97 percent of that economic growth was fueled by the largest and fastest growing "source" by far—efficiency improvements.

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References and Notes

1. For example, A. B. Lovins, in *Energy/Climate Interactions*, W. Bach *et al.*, Eds. (Reidel, Dordrecht, 1980). This paper implies that a rigorous least-cost strategy would enable a far more affluent United States to approach asymptotic primary demand at around 10 to 15 quads.
2. ———, *For. Aff.* **55**, 65 (October 1976).
3. Forecasts issued from 1967 through 1977 are by the Atomic Energy Commission, the Energy Research and Development Administration, and the Department of Energy (DOE), as compiled and plotted by C. F. Zimmermann and R. O. Pohl, *Energy* **2**, 465 (1977). Forecasts issued for 1978 through 1980 are by DOE's Energy Information Administration and combine reactor-by-reactor assessments through 1995 with post-1995 growth in installed capacity representing the maximum physically achievable with 1980 domestic manufacturing capabilities if demand, siting, and finance are unconstrained. Since earlier forecasts supposedly consider how many plants are likely to be installed, not just how many could be, the 1978–80 data exaggerate nuclear potential relative to earlier forecasts. Data on operable capacity are from the Energy Information Administration. Operable capacity declined from a high of 49.4 gigawatts-electric at the end of 1978 to 49.1 at the end of 1979 and 49.0 in mid-1980.