

COMMENTARY

Physics and Society Travels with Dave

David Hafemeister

California Polytechnic State University

San Luis Obispo, CA

I recently retired and will be 70 this year! It is time to take stock and be decisive. After 30 years of “doing” physics and society, it is time for me to “outreach” to the physics community. I believe that science is the driving force of history as it changes our lives. Physics plays a major role in military, energy and environmental policy. For this reason, presidential science advisors continue to be physicists, not yet biologists. Since the technological imperative pushes new inventions into the market place, we must educate ourselves on the implications to avoid the worst aspects of the new technologies. The progression of public policy does not follow a linear, logical pathway. John Milton understood this when discussing the adoption of Ptolemy’s planetary system in *Paradise Lost*:

The mighty frame, how build, unbuild, contrive
To save appearances, how grid the sphere
With centric and eccentric scribbled o’er
Cycle and epicycle, orb in orb

During John Steinbeck’s last days on planet Earth, he decided to travel with his dog Charlie. His trip and subsequent book, *Travels with Charlie*, explored the human dimension along America’s byways. I decided to take the traveling page from Steinbeck’s book. I raced to the public library and checked out Steinbeck’s biography video. This was followed with a visit to the Steinbeck museum in Salinas and the purchase of *Travels with Charlie* and other of his books. As a youth before age twenty-one, I had hitch-hiked enough miles in Europe and North America to circle the globe. Am I now too old for the open road? Well, maybe not hitching, as I do not have that clean 20-year-old look. Perhaps, I should consider a softer mode of travel, such as a recreational vehicle? I discussed with the fair Gina a plan to journey to America’s physics departments to give physics and society talks. Gina responded that she would be delighted to accompany me to Washington, DC, but her Fall-2003 schedule was too busy for more than a one week. What to do? I then hit upon a brilliant idea. My neighborhood chum of thirty years, Roger Longden, looked ready for adventure. Roger said yes, he would join me and rent to me his RV *Ma-blue* to make *the van plan* possible.

For two months (September and October 2003) Roger and I traveled to universities between Washington, DC and Utah. In all, 44 talks were given, 21 colloquia and 23 seminars (See Table 1).

Table 1. Physics of Societal Issues Talks. George Washington U, National Academy of Science, Johns Hopkins, U. Delaware, Princeton, Princeton Plasma Physics Laboratory, Rutgers, CUNY Graduate Center, US Military Academy, SUNY-Stony Brook, U. Connecticut, Tufts, U. Massachusetts, Amherst, Williams, Cornell, Penn State, Carnegie Mellon, U. Pittsburgh, Ohio State, U. Michigan, Michigan State, U. Illinois, Argonne, U. Chicago, Northwestern, U. Wisconsin-Milwaukee, Milwaukee Physics Club, U. Wisconsin-Madison, U. Minnesota, Macalester, Carleton, Iowa State, U. Nebraska, U. Colorado, Colorado State, U. Wyoming, Utah State, U. California at Santa Barbara and Santa Cruz, 2004-March APS.

The attendance varied between 7 and 130, with an average of 45. I spent \$5000 and received \$2500. This result cost me \$1 for each listener hour, which is more than the \$5-10 per student listening-hour we are paid. But I was very happy with the result, meeting many students and renewing old acquaintances. Half the talks were on arms control and the other half were on energy and environment (see Table 2).

Table 2. Colloquium and Seminar Topics. See <http://www.calpoly.edu/~dhafemei> for abstracts and book information.

- 1. Comprehensive Nuclear Test Ban Treaty:** A review of the 2002 National Academy technical study on CTBT verification, stockpile stewardship, and military significance of cheating.
- 2. Strategic Arms Control after START:** How nuclear warheads can be monitored in a region of fewer warheads.
- 3. Verification of Arms Treaties:** Effective verification measures for monitoring strategic nuclear weapons and nuclear testing. The quantification of the "effective" verification standard.
- 4. Nuclear Proliferation in the Post Soviet World:** The actions being taken to reduce the pathways to plutonium and highly-enriched uranium.
- 5. Boost Phase Missile Defense:** A review of the 2003 American Physical Society study.
- 6. Current Energy Situation:** An update of the 1996 APS-POPA study. Six case examples.
- 7. Buildings and Energy:** A scaling model of a cubic building with solar inputs.
- 8. Electromagnetic Fields and Public Health:** A review of the 1996 APS-POPA study.
- 9. Climate Change:** Pedagogical modeling of global climate change.

The talks emphasized technical matters, using equations where appropriate. (This is the theme of my forthcoming book, *Physics of Societal Issues: Calculations on National Security, Environment and Energy.*) (see Table 3)

Table 3. D Hafemeister, *Physics of Societal Issues: Calculations on National Security, Environment and Energy*, Springer-Verlag and American Institute of Physics Press, New York, 2004.

1. Nuclear Weapons and Effects
2. The Offense: Missiles and War Games
3. The Defense: ABM/SDI/BMD/NMD
4. Verification of Arms Control Treaties
5. Nuclear Proliferation
6. Air and Water Pollution
7. Nuclear Pollution
8. Climate Change
9. Electromagnetic Fields and Epidemiology
10. The Energy Situation
11. Energy in Building
12. Solar Buildings
13. Renewable Energy
14. Enhanced End-Use Efficiency
15. Transportation
16. Energy Economics

I was pleased to learn from the students that there is a great deal of interest in science/society topics. We all agree that physics education must be specialized to be competitive, but some physics students clearly thirst to know more about societal issues.

Hernando de Soto may not have found the “elixir of life” when tramping through Florida in 1539, but I found it in US physics departments in 2003. At the end of this trip I could barely walk or stand, but after spinal back surgery at L4-5, “all is well that ends well” (W. Shakespeare). With renewed vigor I will live in Vincent House and walk spryly through London, continuing on these talks during April and May of 2004.