

Comment

A seat at the table

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I should start with a disclaimer: I was a strong supporter of Barack Obama during the recent US presidential campaign, and I remain a strong supporter of the President-elect today. That may open me to charges of bias as far as this particular column is concerned, because I'm going to be lauding one of his recent decisions. But another disclaimer I probably should include is that I am a life scientist, and that admission may reveal additional prejudice, because what I am going to say will be self-serving in that it is meant to promote the life sciences. However, I think my argument will stand up to objective scrutiny. See if you agree.

I learned in mid-December that President-elect Obama would choose, for the dual position of presidential science advisor and head of the Office of Science and Technology Policy (OSTP), John Holdren, a Harvard physicist and outspoken critic of the Bush Administration's science policies. Holdren's primary appointment is not in the physics department - he is the Teresa and John Heinz Professor of Environmental Policy at the Kennedy School of Government at Harvard University, and also Professor of Environmental Science and Public Policy in the Department of Earth and Planetary Sciences. He earned a bachelor's degree in physics from MIT in 1965, and worked as a consultant on re-entry vehicles in the 1960s at Lockheed Martin before receiving a PhD in plasma physics at Stanford University in 1970. Since then, his work has focused largely on science policy rather than on fundamental physics, with emphasis on global environmental change, energy technologies and policies, nuclear proliferation, and science and technology policy in general. He is a prominent and vigorous advocate for strong response to the global climate crisis. Holdren is also director of the Woods Hole Research Center in Woods Hole, Massachusetts.

In many respects, this looked like a fine choice. Holdren has a very distinguished record. Before moving to Harvard in 1996, he was Professor of Energy and Resources at Berkeley for over 20 years. He was President of the American

Association for the Advancement of Science in 2006. He is the author of over 300 articles and papers, mostly on policy issues, and has co-authored or co-edited 20 books and book-length reports. He is a member of the National Academy of Sciences, the National Academy of Engineering, and was a member of President Bill Clinton's science advisory team from 1994 to 2001. When the Pugwash Conferences on Science and World Affairs won the Nobel Peace Prize in 1995, he delivered the acceptance speech in Stockholm. He's spent much of his career trying to save the planet. Sort of a scientist's Al Gore, if you will. It's likely that he has more combined expertise on climate science and clean energy technology than anyone, with the possible exception of Obama's nominee for Secretary of Energy, Nobel Laureate Steve Chu. But when I heard of his likely appointment, I was disappointed.

I wasn't disappointed because I have anything against Holdren - he's certainly highly qualified and I love his positions on issues like climate change. He'll probably do a terrific job. I was disappointed because he's a physicist. No disrespect to Holdren, but I am wary of physicists as presidential science advisors. Nearly all have been so. It's partly a legacy from the days when they knew how to make nuclear weapons, and partly, I think, because when most non-scientists think about scientists, they tend to think of physicists (call it the Einstein Effect). Most of the physicists I know, and certainly all recent presidential science advisors, have little knowledge of or feel for the life sciences, believe physics to be superior to all other sciences (with the possible exception of higher mathematics), and tend to think in terms of big science programs as opposed to individual investigator-initiated research. Certainly physics is important in issues such as energy policy and response to climate change, and I suspected that the Holdren appointment was meant to emphasize the significance the Obama Administration attaches to those issues, but we already have someone, of cabinet rank with direct access to the President, with exactly the same qualifications and mission as Holdren: a strong physics background and a track record of vigorous advocacy

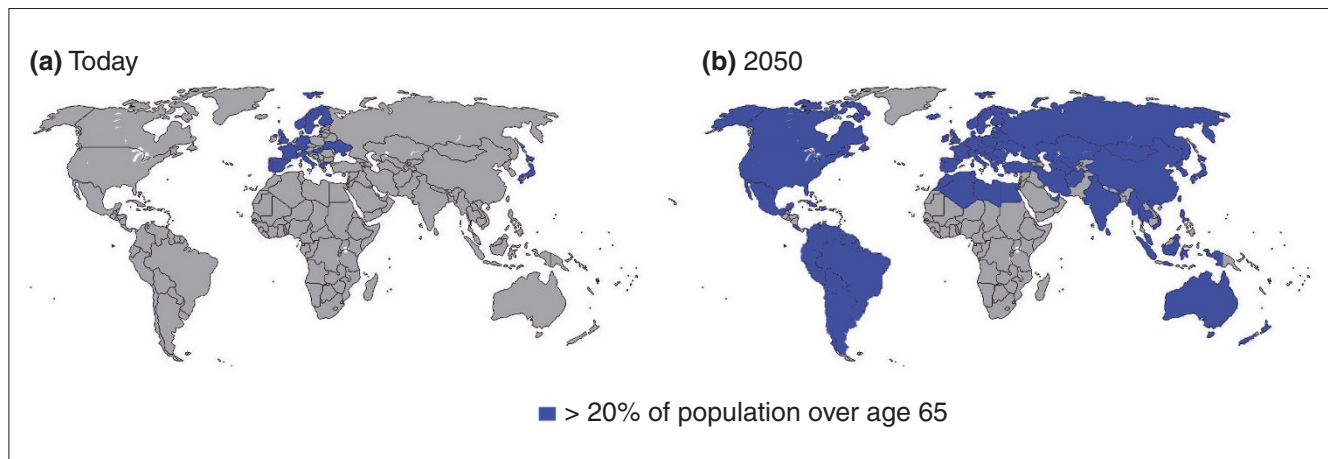


Figure 1
The rapidly aging world. (a) The world today, showing in blue areas where greater than 20% of the population is over the age of 65. (b) The world in 2050, showing the huge increase in areas where the population will be over 65 years old.

for alternative energy. I refer to the aforementioned Steve Chu, the nominee for Energy Secretary. I didn't understand why we needed to duplicate that expertise and focus, when the Presidential Science Advisor seemed to me the best opportunity to bring someone knowledgeable about the life sciences into the President's inner circle. And if we ever needed people in government to listen to the voices of the life scientists, we need them now.

I believe it's essential that there be people in Washington who can explain to President Obama, for example, the science that must be done to combat a coming global crisis that is comparable in its effects to the climate crisis: the rapidly aging population. Figure 1 shows what I mean. On these maps I have colored in blue every country in which more than 20% of the population is over 65 years of age. The map on the left is the world we live in. The map on the right, where virtually every country is blue, is the world our children will live in. In most of the developed world, by 2050 at least a quarter of the people will be older than 65, and in some countries that figure will exceed 40%. In the US alone, there are more than 10 million people over the age of 80 today; by 2050 there will be more than 30 million, and half of them will have some degree of dementia. Another 3 million, at least, will have Parkinson's disease. Millions more will suffer from stroke. The incidence of all three of these disorders rises exponentially after age 65. The total cost of age-related neurological diseases in the US is currently more than \$300 billion a year. In 40 years the annual cost will exceed a trillion dollars. Yet the federal expenditure on AIDS research in 2008 is more than four times the federal expenditure on Alzheimer's disease research, despite the fact that there are ten times more new Alzheimer's cases per year than there are AIDS cases. (This is not meant to imply that we're spending too much on AIDS research; my point is that

we're not spending nearly enough on research into age-related neurological diseases.) Heart disease and cancer rates, too, are likely to increase in coming years, because the vast majority of new cases of both occur in people over age 65.

Aging of the population is a time-bomb that is ticking in most of the world - an impending medical crisis of magnitude similar to global warming. Health care reform, as important as it is, will not solve this problem. Alternative energy, as important as it is, will not solve it. The only thing that will is biomedical research, both basic and applied.

I'm emphasizing the coming biomedical crisis because it is the nature of people, and politicians, to focus on crises, but there are many other reasons why the life sciences deserve a seat at the table of power. The post-genomic revolution in our understanding of biology has the power to transform all of our lives. One of the answers to the climate crisis, and to the problem of energy independence, is biofuels. Another answer, which could wean us away from petroleum-based plastics, is biomaterials. Basic biomedical research is essential to arm our pharmaceutical and biotechnology companies for the fight against weapons of biological warfare, as well as the increasing threat from emerging infectious diseases. The life sciences have central roles to play in addressing the collapse of the environment, the disappearance of species, and our efforts to combat developmental disorders, to name but a few areas of importance. But when I started to write this column, I was afraid that there would be no advocate for biomedical research at that table where policy makers sit down to decide the nation's priorities.

Then something (well, actually, someone) told me to wait until after the President-elect's next radio address. I just finished listening to it, and I urge you to read the transcript

(you can find it, and a video, at http://change.gov/newsroom/entry/the_search_for_knowledge_truth_and_a_greater_understanding_of_the_world_aro/); it's so unlike anything we've heard from recent US Presidents as to be almost revolutionary. Here are just two excerpts:

"Whether it's the science to slow global warming; the technology to protect our troops and confront bioterror and weapons of mass destruction; the research to find life-saving cures; or the innovations to remake our industries and create twenty-first century jobs - today, more than ever before, science holds the key to our survival as a planet and our security and prosperity as a nation. It is time we once again put science at the top of our agenda and worked to restore America's place as the world leader in science and technology."

"...promoting science isn't just about providing resources - it's about protecting free and open inquiry. It's about ensuring that facts and evidence are never twisted or obscured by politics or ideology. It's about listening to what our scientists have to say, even when it's inconvenient - especially when it's inconvenient. Because the highest purpose of science is the search for knowledge, truth and a greater understanding of the world around us. That will be my goal as President of the United States..."

President-elect Obama then went on to name the key members of his science and technology team. One, as I already expected, was John Holdren as Assistant to the President for Science and Technology and Director of the White House Office of Science and Technology Policy. He would also, as is customary, chair the President's Council of Advisors on Science and Technology - or PCAST, a board that advises the President on all matters pertaining to science and technology. (Under George Bush, PCAST had consisted almost entirely of CEOs of big corporations. It had almost no scientific expertise at all.) But then came the surprise: PCAST would have two additional co-chairs, and both of them would be distinguished life scientists.

One is Harold Varmus, 1989 Nobel Laureate in Medicine or Physiology for his work on cancer genes and former Director of the National Institutes of Health during the Clinton Administration - and during the completion of the Human Genome Project. Arguably the most effective NIH Director in decades, Varmus is currently President of the Memorial Sloan-Kettering Cancer Center in New York City. The other is Eric Lander, Professor of Biology at MIT, member of the Whitehead Institute, the Founding Director of the Broad Institute at MIT and Harvard, and one of the driving forces behind the mapping and sequencing of the human genome.

Varmus probably needs no introduction from me, but some of my readers may be a little less familiar with Lander. He is one of those rare individuals who might just be as smart as

he's supposed to be. A mathematical prodigy, he did his doctoral work at Oxford University as a Rhodes Scholar. He then taught economics at Harvard Business School before, looking for new worlds to conquer, he did a postdoc in genetics with David Botstein at MIT, joining the Biology faculty there afterwards. He is - get ready for it - a genome biologist, the first to have the ear of a President. Now you might think, or even fear, that a genome biologist, especially one who has built a mighty institute for large-scale genomics, would not be an ideal friend for individual investigator-initiated research, but let me set your mind at ease. The 'big' science that Eric Lander has pioneered has always been in the service of hypothesis-driven 'small' science, and his track record as Director of the Broad Institute has been one of encouraging young investigators, providing tools and information to the broader biological community, and promoting basic as well as applied research.

Two better appointments could scarcely be imagined. Both men are vigorous advocates for basic biomedical science, both men know how the industry-academic partnership is supposed to work, both men understand the way the age of genomics is transforming the life sciences, and both men are not so far removed from running research laboratories of their own that they will not appreciate the problems of the average scientist.

So for the next few years, at least, when policy makers in the Obama Administration sit around that table to plan the future of the country, the life sciences will have a seat alongside the physical sciences. And a President who promises to listen to the voice of science will be hearing the full scope of that voice at last.