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BENDING TIME

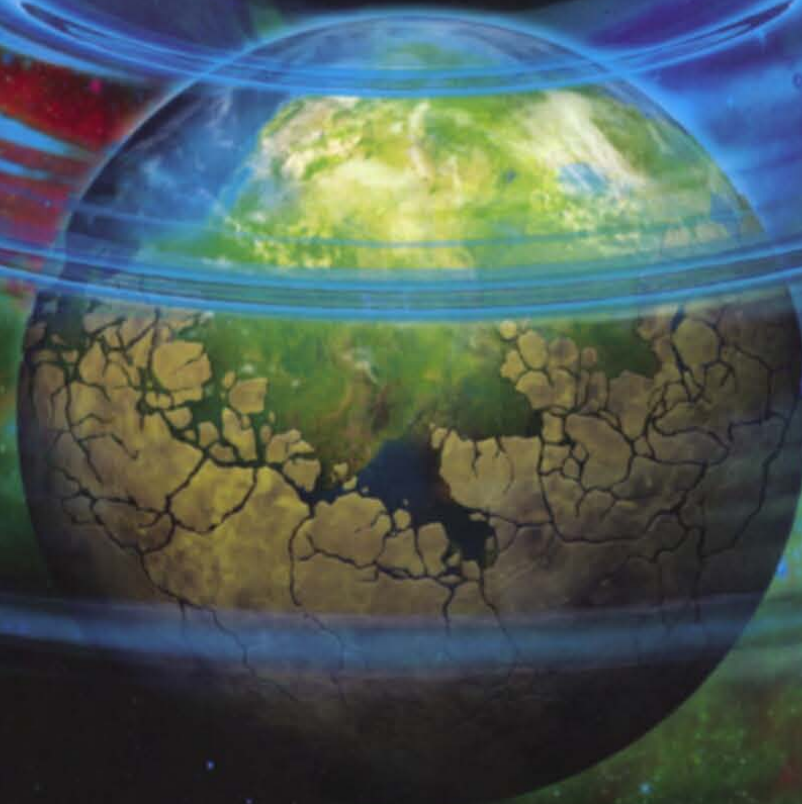
**JARED
DIAMOND ON
THE PERFECT
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KEPLER'S
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**PLUS: PHIL PLAIT,
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INSECT CIVILIZATION**




**MEMO
TO THE
NEXT
PRESIDENT:
50 WAYS
TO SUPPORT
SCIENCE**

NOVEMBER 2008



DISCOVERMAGAZINE.COM

\$6.99 U.S.



Invest in fundamental discovery science—especially in the areas of energy, “big physics,” the mind, and evolution.

J. CRAIG VENTER

Genomic scientist

Make alternative energy the number one priority of the administration with a mixture of new funding for basic research and incentives for introduction of new renewable-energy solutions. End the ban on federal funding for human stem cell research.

Overhaul the existing federal system for funding scientific research, making it not only a system that is tolerant of risk but one that rewards true innovation and multidisciplinary approaches to solving our nation's needs.

STEVEN WEINBERG Nobel laureate in physics

In tax and budget proposals, aim to shift our economy to less spending in the private sector and more spending on the public good: pure and applied scientific research as well as health, education, and infrastructure. In particular, the United States should build the next large accelerator for elementary particle physics, thus resuming our participation in the exploration of science at its outer frontier.

Ask Congress for a tax on gasoline and diesel fuel that would increase their price at the pump by 20 to 30 percent, and guarantee that their price would never fall below that level, indexed for inflation. Nothing would do more to spur research and development on alternate fuels and energy efficiency and to reduce the flow of dollars to oil producers. The blow to individuals should be softened by building a modern passenger rail network and by giving a tax credit to those who live at some distance from their jobs—but a credit based on mileage, not on the actual amount spent for fuel.

Radically cut back the manned spaceflight program, and in particular cancel the Moon-Mars project, which is not an effective program for scientific discovery. Restore and expand programs to use robots and unmanned satellites to explore our solar system and the structure and evolution of the universe.

CRAIG R. BARRETT Chairman, Intel Corporation

Get serious about fixing our K-12 education crisis. Today the average American high school graduate is weak in the basics of math and science, compared with international peers. We need more well-trained math and science teachers, we need higher expectations for performance, and we need to put competition into the system to counter the vested interests of the educational establishment.

Basic R&D is the backbone of future economic growth. Dramatically increase National Science Foundation funding—double it within a few years. I would not try to pick between winners and losers regarding technology investment but would continue to support peer-based, refereed research proposals—leave the current system alone, just increase the funding level and let our bright researchers in the engineering and biotech areas explore new frontiers. There is nothing wrong with our universities; they are still the best in the world. We just need to fund them at a competitive level.

Structure an immigration policy to attract and retain the brightest researchers in the world. This means structuring investment and R&D tax credits to promote investments in innovation. It means a

corporate tax policy that promotes investment in the United States and does not drive investment to other, lower-tax environments; and it means simplifying our intellectual property rules, streamlining our export rules, and continuing our free-trade philosophy to promote growth of local industries.

JAY KEASLING Synthetic biologist

Significantly increase funding for energy. If we spent on energy research at a level comparable to what we spend on health-care research (relative to the size of the industries), we would be spending much more than we currently spend.

Invest heavily in basic research. Basic research fuels discoveries, which eventually fuel the economy.

Consider immigration policy for scientists and engineers. As a nation we train far too few and make it very difficult for foreign-trained scientists and engineers to work in this country. Further, our immigration policy makes it difficult for foreign students to attend U.S. universities. This is one of our strongest “industries.”

WALTER WILLETT Epidemiologist

Restore funding for research. This has been declining in recent years in terms of real dollars at a time when the rest of the world is ramping up its investment. Science is one of the few areas where the United States has had world leadership, and we risk losing this. Commit more research funding to the translation of existing knowledge into practice. We know what should be done to prevent most of the major diseases that burden our population, but we often don't know how to do this most effectively or efficiently. For example, we are aware that our children need to be more physically active and eat more fruits and vegetables, but we don't know the most effective ways to translate this knowledge into behavior.

Support more research on alternative, sustainable energy sources, transportation, and food production. In the long run, this is crucial to the quality of life of Americans.

JACK HORNER Paleontologist

Read *The Origin of Species* and understand evolution. Fund the National Science Foundation as though America's future depended on it. Realize that without a strong scientific community, the United States will become an intellectual third-world country.

DAVID HIRSH Executive vice president for research, Columbia University

First, there needs to be a redirection of funding to invest in fundamental discovery science—the applications will follow—especially in the areas of energy, “big physics,” the mind/brain, and evolution.

Second, investment in people is essential. We need to offer better salaries and support for researchers, particularly in the early stages of their careers. We also need to ease immigration restrictions to allow foreigners to resume coming to America for science training.

Third, help cure the endemic science illiteracy in the United

Add a couple of zeros to the budget for “pure” research. The most profound discoveries are often unanticipated.

States by bolstering science education across the entire system—K through 12 and beyond—and into the popular culture.

C. EVERETT KOOP Former U.S. surgeon general

Appoint the next surgeon general with an eye to scientific and medical prowess, rather than make it a political appointment. There are more than 50 assistant surgeons general, and these could be divided into task forces to serve the president in any way he wishes. These officers represent a dozen specialty fields in science and medicine.

Give the surgeon general's office and the Association of State and Territorial Health Officers a joint grant, making it possible to set up lecture programs to hear both sides of any argument such as the use of stem cells in the broadest sense.

DANIEL HILLIS Supercomputer designer

Look at any list of the most important “American” scientific accomplishments and you will see that they are in large part the accomplishments of immigrants. Our strength in science and technology is, and always has been, based on our willingness to welcome and support scientists from other nations.

STEVEN E. NISSEN Cardiologist

Restore funding at the National Institutes of Health. For many years the NIH budget has remained essentially flat. This means that, in inflation-adjusted dollars, actual expenditures have decreased.

Avoid government intrusions on the academic independence of scientists. NASA's leading climate scientist, James E. Hansen, was repeatedly prevented from speaking out about global warming. Censorship for political purposes is antithetical to good science.

Consider major new initiatives to promote breakthrough advances in science and engineering, analogous to the current \$10 million X Prize that will be awarded to the first team that demonstrates a practical automobile that can achieve 100 miles per gallon.

ANN DRUYAN Author

Appoint a scientist of impeccable independence, interdisciplinary expertise, and vision who knows how to connect with the public as the president's “science adviser.” Elevate the position to Cabinet status, and ensure regular access to the president and to the public. Add a couple of zeros to budgets for “pure” research. Even a glancing familiarity with the history of science will affirm that the most profound and fruitful discoveries are often an unanticipated result of scientific investigation.

Revolutionize the teaching of science by decompartmentalizing it. Do away with the 40 minutes of boring torture several days a week. Humans learn best through stories. Tell the dramatic tales of courage and integrity that compose much of the history of science. These stories memorably convey the fundamental scientific insights that are at the heart of our civilization.

PETER SINGER Ethicist

Free up scientific research on stem cells by revoking Bush's restriction of research to stem cell lines that were created before his

speech in August 2001. It was never defensible to give more protection to embryos consisting of a few cells than we give to sentient beings like dogs and chimpanzees. In any case, thanks to advances in science, the potential for creating a new human life now exists in almost every cell in our body.

Step up research on issues related to climate change, including ways of reducing the nation's greenhouse gas emissions, developing solar energy, and assisting poorer nations to mitigate the impact of climate change. And follow the lead of the Gates Foundation and direct more of the nation's medical research budget into areas where it will do the most to help those who need help most.

WALTER BENDER Media technologist

Promote more risk taking within the government funding agencies: Industry has all but given up on research of any kind except marketing research, and for the most part, universities are slipping into a mode of incrementalism, because it's the safest way to secure funding.

Specifically, I'd increase the discretionary programs a thousand-fold. As with any enterprise, the government (management) should set clear goals, but the means to achieve those goals should be left to the “intelligence in the leaves.”

DAVID BRIN Futurist and science fiction author

Restore the independent scientific panels that used to advise Congress on scientific and technological matters.

Going much further, let each member of Congress select one scientifically or technologically qualified person to serve both as an adviser and as his or her representative on a scientific “shadow Congress” to thrash out complex matters of fact, so that Congress itself can concentrate on policy solutions.

While pushing for better science education and more research funding, don't forget the rising trend of the 21st century: amateur science. More and more fields of professional research have found use for part-timers, who are sometimes knowledgeable, skilled, and surprisingly well equipped. Some investment should be given to endeavors like the Society for Amateur Scientists.

Develop trust-building tools—methods for assessing risk and reducing unpleasant consequences—so that we again become a people willing to take on big and daring projects.

BUZZ ALDRIN Astronaut

Commit to an expansion of federal funding for all U.S. federal scientific research (at least a 50 percent increase). Make the Office of Science Technology Policy a Cabinet rank, overseen by the science adviser. Commit to a long-term and stable federally funded program of exploration of space, including manned exploration and settlement of the solar system and robotic exploration of the universe. ■

